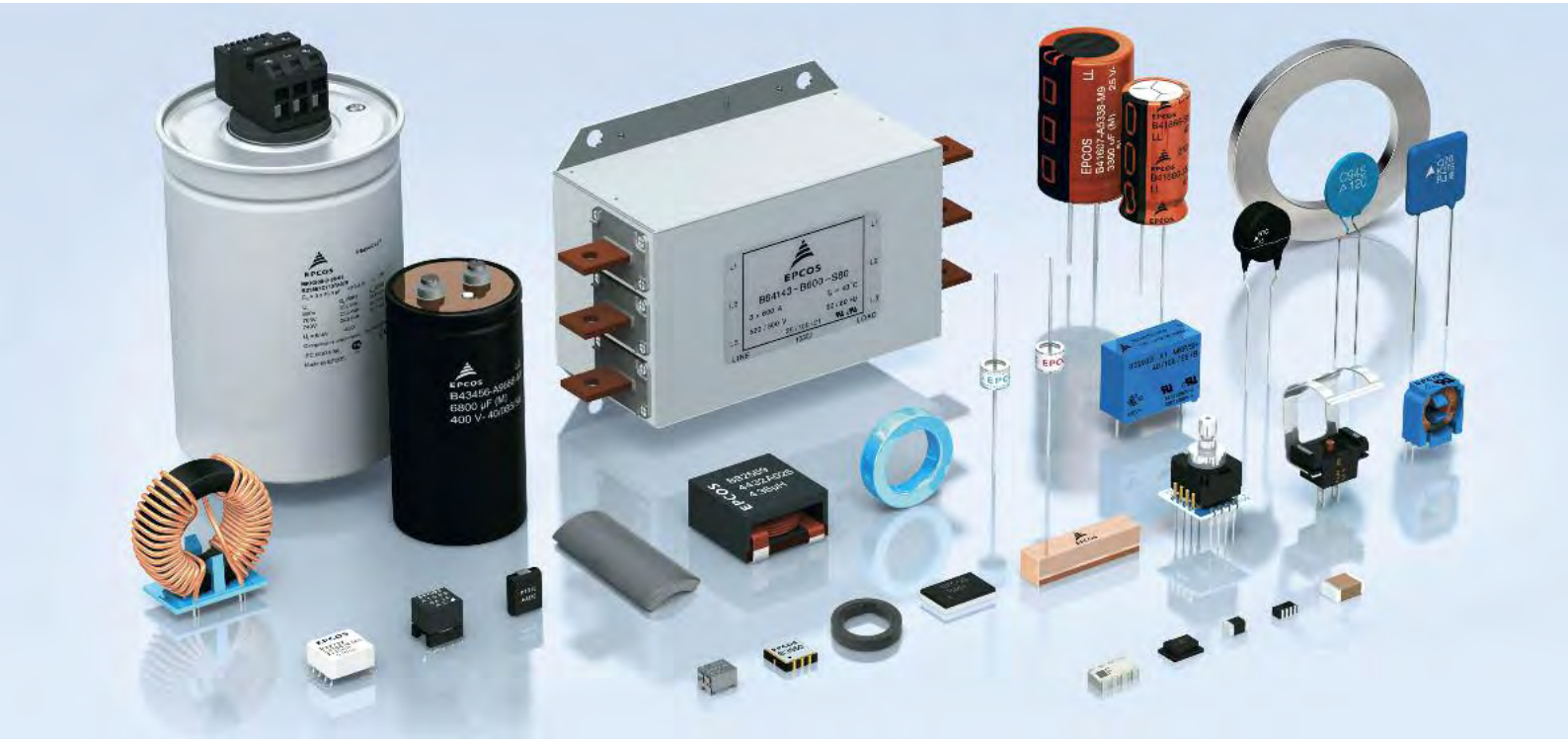
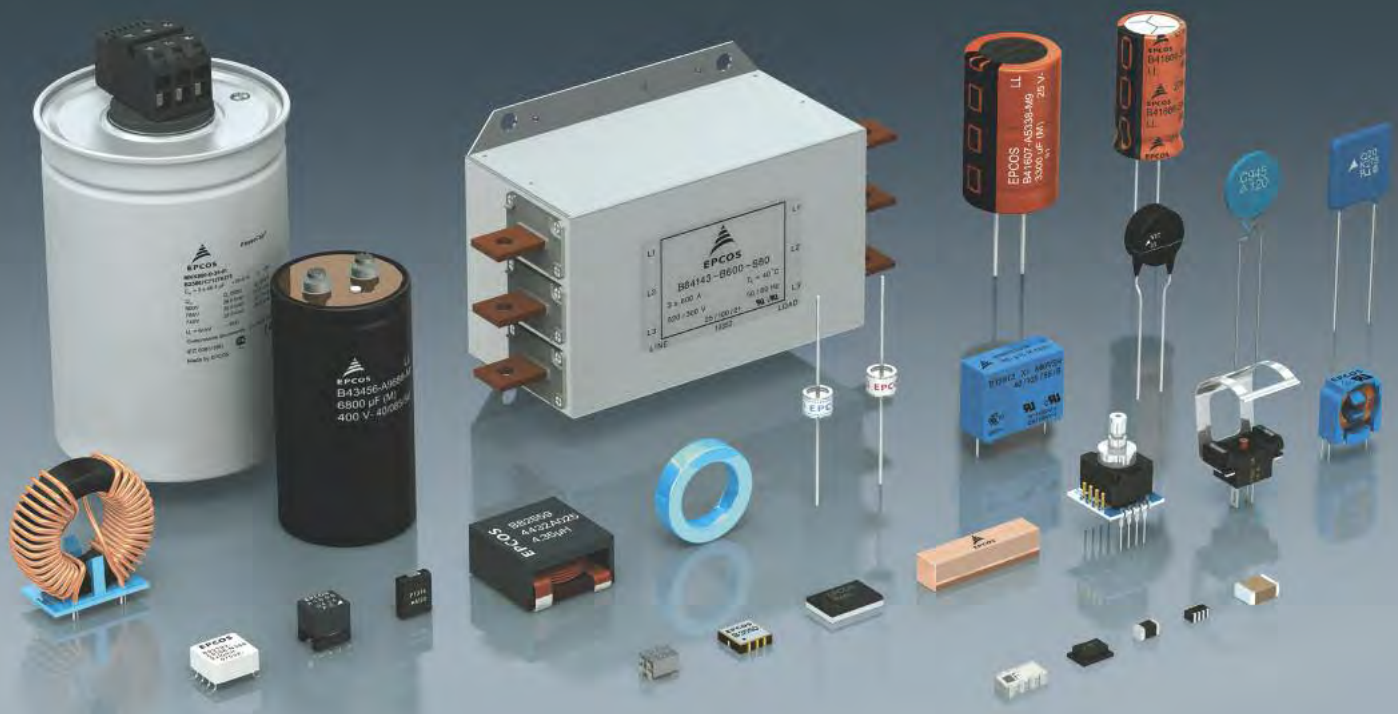
TDK and EPCOS Product Survey 2013

Electronic Components, Modules and Systems



www.global.tdk.com · www.epcos.com

Superior Solutions
for a Smart World.



- Ceramic capacitors
- Aluminum electrolytic capacitors
- Film capacitors
- Power quality solutions
- Ferrites and inductive components
- RF filters and modules
- ESD/EMI modules
- Piezo components
- Protection devices
- Sensors

Contents

Magnetics 4

- Transformers 4
- Power Inductors 8
- Signal Use Inductors 13
- Multilayer Inductors 15
- Signal EMC Filters 16
- Power EMC Filters and Chokes 21
- Ferrites 23
- Noise Suppressing Sheets 26

SAW Components 27

- MEMS Devices for Mobile Communications and Information Technology 27
- SAW Filters, Duplexers for Base Stations, Femto Cells and Trunked Radio 27
- SAW Filters for Automotive and Industrial 28
- SAW Filters for Multimedia 28
- SAW Filters, Duplexers and Modules for Cellular Communications 29
- Modules for Information Technology 30
- Ceramic and Thin-Film RF Components 31
- LTCC Substrates for LED 35

Piezo and Protection Devices 36

- Piezo Actuators for Automotive 36
- Piezo Receivers, Buzzers 36
- Surge Arresters 37
- PTC Thermistors 39
- Varistors 42
- Inrush Current Limiters 44
- Multilayer Varistors, Ceramic Transient Voltage Suppressors (CTVS) 44
- NTC Thermistors 45
- Nebulizer Units 46

Sensors 47

- NTC Sensors 47
- Pressure Sensors 50
- Humidity Sensors 51
- Applied Sensors 51

Ceramic Capacitors 54

- Multilayer Ceramic Capacitors 54
- Leaded Ceramic Capacitors 57
- Ultra-High Voltage Capacitors 57

Film Capacitors 58

- Medium Power Film Capacitors 58
- DC Link, DC Filtering Film Capacitors 61
- UPS Film Capacitors 61
- AC Film Capacitors 62
- PFC Capacitors and Key Components 63
- Power Capacitors 65

Aluminum Electrolytic Capacitors 67

Magnets 69

- Ferrite Magnets 69
- Rare Earth Magnets 70
- Bonded Magnets 74

Transparent Conductive Film 75

- ITO Transparent Conductive Film 75
- Hard Coat Film 75

EMC Measurement Solutions – Anechoic Chambers & Systems 76

Factory Automation Systems 78

- FOUP Load Port 78
- Flip-Chip Bonding System 78

DC/DC Converters for Automotive 80

Wireless Power Transmission Coil Unit 80

- Important Notes 81

Magnetics

Transformers

Transformers

				
Series	EP6 shielded – SMD	EHR – SMD	EPX5 – SMD	EP7 – SMD
Technical data	Output voltage (typ.): 80 … 140 V Size (l x w x h): 9 x 7.6 x 7.4 mm	Power: 20 … 50 W	Size (l x w x h): 7.6 x 7.6 x 9.9 mm	Size (l x w x h): 10 x 8.0 x 10.9 mm
Features	– High turn ratio – Low leakage inductance – High frequencies – Insensitive to external fields	– High saturation currents – Low leakage inductance – High frequencies	– Low leakage inductance – Smallest board space consumption – Low THD – Excellent longitudinal balance	– Low leakage inductance – Compact design – Low THD – Supplementary/ reinforced insulation levels – Excellent longitudinal balance
Applications	Park Distance Control units (PDC)	Xenon lights LED headlights Piezo fuel injection systems	xDSL interfaces	

Transformers

				
Series	EP13 – SMD	DL3.6 – SMD	ER11 – SMD	EV25
Technical data	Size (l x w x h): 13.5 x 17.5 x 12.4 mm	Frequency: 4 … 2500 MHz Size (l x w x h): 5.7 x 7.1 x 3.4 mm	Power: up to 1 W Operating temperature: up to +155 °C Size (l x w x h): 12 x 13 x 6 mm	Power: up to 40 W Size (l x w x h): 26.8 x 26.8 x 21 mm
Features	– Compact design – Very low THD – Supplementary/ reinforced insulation levels	– Very wide frequency range – 100% electrically tested – Miniaturized design	– Low stray inductance – High power density – High operating frequencies	– Pin-to-Hole (PTH) – High creepage distance – High dielectric strength – High power density
Applications	xDSL interfaces	Directional couplers Baluns Splitters	Power supplies DC/DC converters	Power supplies Ballasts

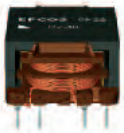
TDK EPCOS

Please read *Important notes* on page 81.

Magnetics

Transformers

Transformers

				
Series	EFD15 ... EFD25	EF12.6 ... EF25	EF26	Current-sense transformers – SMD B82801
Technical data	Power: up to 35 W Size (l x w x h): 16.7 x 15.8 x 8.5 ... 26.5 x 26 x14 mm	Power: up to 20 W Size (l x w x h): 15.5 x 14.5 x 12.5 ... 28.5 x 28.9 x 21 mm	Power: up to 80 W Size (l x w x h): 47.5 x 27.5 x 15 mm	Sensed current 7… 40 A Turns ratio: 1:20 … 1:200
Features	– Pin-to-Hole (PTH) or SMD – Low profile	– Pin-to-Hole (PTH) – High creepage distance – High dielectric strength – Types with 8 mm creepage and clearance distance available	– Pin-to-Hole (PTH) – High creepage distance – High dielectric strength – Types with 6 mm creepage and clearance distance available – Low profile	– Standard designs in SMD – Three different sizes available – Very low DC resistance, losses and high reliability – Ruggedness and simple implementation – Customized designs
Applications	Power supplies Ballasts			Compact DC/DC converters for midrange power

Transformers

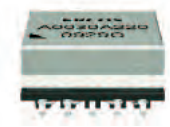
				
Series	Current-sense transformers – SMD PCEM, CTEM series – EP7	Gate-drive transformers – SMD GTEM series – R6.3, R10	Power chokes – ER47, ER51, ERU62	Power transformers PTEM series ER52, ER62
Technical data	I_{sense}: up to 20 A_{RMS}	V x t: up to 150 µVs bipolar	L_R: 1 … 3 µH I_R: up to 210 A	Power: 1800 … 3000 W $U_{in, typ}$: 240 … 420 V $U_{out, typ}$: 14 … 18 V
Features	– Basic isolation – High inductance values > 7 mH	– Basic isolation – Small coupling capacity < 10 pF	– Basic isolation – Low DC resistance	– Basic isolation – Innovative cooling concept
Applications	Electric car applications (xEV)	Electric car applications (xEV)	Electric car applications (xEV)	Electric car applications (xEV)

TDK EPCOS

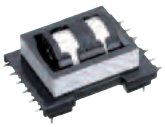
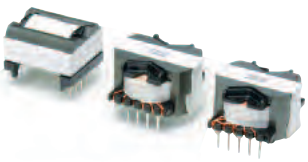
Magnetics

Transformers

Transformers

			
Series	Gate-drive transformers – SMD B82804	Flyback transformers – SMD B82802	Flyback transformers ECO series
Technical data	Isolation voltage: 1500 V DC Height: max. 5.4 mm Footprint: max. 8.1 x 6.7 mm	Power: 12 … 55 W Input voltage: 36 … 60 V DC Frequency: 100 kHz Output voltage: 5, 12 or 3.3, 5, 12 V Isolation voltage: 1500 V AC Suitable for ambient temperature: up to +85 °C Operating temperature: up to +125 °C	Vertical type Power: 12 ... 68 W Frequency: 50 kHz Horizontal type Power: 5 … 59 W Frequency: 50 kHz
Features	– Standard designs in SMD – Low leakage inductance – Low inter-winding capacitance – High SRF value – High isolation between primary and secondary	– Low profile SMT packages – Industry standard footprints – Customized designs	– Pin terminal type (for multiple outputs) – Downsized – Compliant with worldwide safety standards – Supports automatic winding – Reduced characteristic variations – Halogen-free
Applications	General purpose isolated AC/DC, DC/DC converters	DC/DC converters (isolated buck) Power over Ethernet (PoE)	Switching power supplies

Transformers

			
Series	Resonant transformers SRX series	Flyback transformers SRW series	Choke coils PFC series
Technical data	Drop-in type Power: 125 ... 180 W Frequency: 100, 120 kHz Through-hole type Power: 180 ... 300 W Frequency: 60, 80, 100 kHz	For multiple outputs (vertical type) Power: 15 ... 120 W Frequency: 40 kHz For multiple outputs (horizontal type) Power: 60 ... 100 W Frequency: 40 kHz For single output (horizontal type) Power: 45 ... 60 W Frequency: 40, 60 kHz	QM type (Drop-in type) Power: 125 ... 180 W Frequency: 65 kHz QM type (Through-hole type) Power: 75 ... 300 W Frequency: 50, 65 kHz ER type (Through-hole type) Power: 75 ... 250 W Frequency: 50 kHz
Features	– Pin terminal type (Resonant type, Drop-in/Through-hole) – Low height (8 ... 31.5 mm) – High power in compact dimensions – Supports automatic winding	– Pin terminal type for single output/ for multiple outputs – New ferrite material with low loss and high-saturation magnetic flux density – Ideal for small, multiple output switching power supplies – Perfect balance between core volume and coil share	– Pin terminal type – Low height (8 ... 27 mm) – High current in compact dimensions
Applications	Switching power supplies		Audio/video equipment Digital consumer electronics

TDK EPCOS

Please read *Important notes* on page 81.

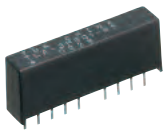
Magnetics

Transformers

Transformers

			
Series	Step-Up transformers – SMD ATB series	Pulse transformers for LAN – SMD ALT series	Pulse transformers for LAN, Pin terminal TLA series
Technical data	Size: 3225 Inductance: 7.0 µH DC resistance: Primary 0.4 Ω max./ Secondary 60 Ω max. Rated current: 0.6 … 0.7 A_{RMS} Withstanding voltage: 500 V_{RMS} Operating temperature: –40 … +85 °C	Size: 4532 Inductance (at 100 kHz/DC bias = 8 mA) 201 : 170 … 200 µH min. Insertion loss (0.1 … 100 MHz): 1.5 … 2.5 db max. Interwinding stray capacitance (100 kHz): 35 pF max. Operating temperature: –40 … +85 °C	Operating, storage temperature: –40 ... +85 °C Withstanding voltage E_{RMS}: 2000 V or 1500 V (60 s) Inductance typ. (100 kHz): 100 … 350 µH
Features	– Small size enables a reduction of mounting surfaces – Stable charging characteristics – High reliability	– Compatible with 10BASE-T, 100BASE-TX, and 1000BASE-T – High-quality product with automatic winding	– 12, 16, 24, 40-pin SMD package available – Excellent common-mode noise suppression
Applications	Xenon flashes Haptics	LAN interface portion of various devices like network devices, communication devices, and digital home appliances	LAN (10BASE-2/5/T, 10BASE-T, 10/100BASE-TX, 10/100BASE-TX & ATM, 10/100/1000 BASE-T)

Transformers

			
Series	Pulse transformers for LAN, Connector TLA series	Pulse transformers for LAN, LC Modules TLA series	Pulse transformers for Automotive LAN, MOST TLA8T102, TLA8T104 series
Technical data	Operating, storage temperature: –40 ... +85 °C Inductance min.: 200 µH DC bias (100 kHz): 8 mA Insertion loss max. (0.1 … 100 MHz): 1.5 dB	Operating temperature: 0 ... +70 °C Storage temperature: –40 ... +85 °C Withstanding voltage E_{RMS}: 1500 V (60 s) Insertion loss max. (5 … 10 MHz): 1 dB Attenuation min. (30 … 100 MHz): 25 dB Impedance typ. (5 … 10 MHz): 100 Ω C.M.R.R. min. (1 … 100 MHz): 25 db	16 Pin (1.27 mm PITCH) SMD package TLA8T102: Operating, storage temperature: –40 ... +95 °C Withstanding voltage E_{RMS}: 1500 V (60 s) TLA8T104: Operating, storage temperature: –40 ... +85 °C Withstanding voltage E_{RMS}: 100 V (60 s)
Features	– Pulse transformer, common-mode choke, resistor and high withstanding voltage capacitor are integrated into RJ45 modular jack – Excellent common-mode noise suppression	– Pulse transformer, common-mode choke and low pass filter are integrated into 16-pin SMD package – 16-pin SMD package (2.54 mm = 100 mil pin pitch)	– Excellent common-mode noise suppression – High reliability TLA8T102: – Greater than 100 µH (100 kHz) TLA8T104: – Greater than 350 µH (100 kHz) at DC current bias 8 mA
Applications	LAN (10/100BASE-TX)	LAN (10BASE-T)	TLA-8T102: MOST TLA-8T104: LAN (10/100BASE-TX)

TDK EPCOS

Magnetics

Power Inductors

Power Inductors

	 	 
Series	Power inductors – SMD A and G versions B82471 … B82479	Power inductors – SMD A and G versions B82462, B82464
Technical data	Rated inductance: 1 … 1000 µH Rated current: 0.18 … 9.8 A Temperature: up to +125 °C Size: 6.1 x 5.5 … 18.5 x 15.24 mm Height: 3.5 ... 7.25 mm	Rated inductance: 0.82 … 1000 µH Rated current: 0.11 … 7.6 A Temperature: up to +150 °C Size: 6 x 6 and 10 x 10 mm Height: 3.0 ... 4.8 mm
Features	– Shielded and unshielded construction – High rated current – Low DC resistance – Suitable for lead-free reflow soldering	– Shielded and unshielded construction – High rated current – Low DC resistance – Qualified to AEC-Q200 – Suitable for lead-free reflow soldering as referenced in JEDEC J-STD 020D
Applications	Filtering of supply voltages Coupling, decoupling DC/DC converters Consumer and industrial electronics	Filtering of supply voltages Coupling, decoupling DC/DC converters Automotive and industrial electronics

Power Inductors

	 	
Series	Power inductors – SMD P, R and M versions B82464 … B82477	Power inductors – SMD Helically wound B82559
Technical data	Rated inductance: 0.82 … 1000 µH Rated current: 0.2 … 11 A Temperature: up to +150 °C Size: 7.3 x 7.3 ... 12.5 x 12.5 mm Height: 4.5 ... 8.5 mm	Rated inductance: 0.5 … 35 µH Saturation current: 9.3 … 71 A Size: 13.2 x 11, 22.5 x 22 and 25.3 x 23.5 mm Height: 4.95 ... 14.2 mm
Features	– Shielded and unshielded construction – High mechanical stability – High rated current – Low DC resistance – Qualified to AEC-Q200 – Suitable for lead-free reflow soldering as referenced in JEDEC J-STD 020D	– Flat wire winding – Self-leaded construction under body termination – Very high rated current – Extremely low DC resistance – Suitable for pick-and-place process – Suitable for lead-free reflow soldering as referenced in JEDEC J-STD 020D
Applications	Filtering of supply voltages Coupling, decoupling DC/DC converters Automotive electronics LED lighting	Energy storage chokes for DC/DC converters VRM modules POL converters

TDK EPCOS

Magnetics

Power Inductors

TDK EPCOS

Power Inductors

			
Series	Dual inductors – SMD B82477D …	General use flat wire type – SMD RLF series	Automotive flat wire type – SMD RLF-D, RLF-T series
Technical data	Rated inductance: 2.0 …100 µH (inductance per winding) Rated current: 1.35 … 5.75 A Temperature: up to +150 °C Size: 12.5 x 12.5 mm Height: 6.5 ... 8.5 mm	Size: 7030 ... 12560 Inductance: 1 ... 10 µH Rated current: 2.8 ... 14.4 A	Size: 7045 … 12560 Inductance: 1 ... 220 µH Rated current: 550 mA ... 14.4 A Temperature: up to +150 °C
Features	– Two windings – 1:1 transformer – Shielded construction – Special winding technology for low stray inductance – High mechanical stability – Qualified to AEC-Q200 – Suitable for lead-free reflow soldering as referenced in JEDEC J-STD 020D	– Structural efficiency – Completely lead-free	– Low profile, low DC resistance, and high current handling capacities – Qualified to AEC-Q200
Applications	Common-mode chokes SEPIC matching circuits DC/DC converters Automotive electronics LED lighting	Consumer electronics PCs	Automotive electronics

Power Inductors

			
Series	General use – SMD SLF series	Automotive general use – SMD SLF-H series	General use – SMD CLF series
Technical data	Size: 6025 ... 12575 Inductance: 1.2 ... 1500 µH Rated current: 130 mA ... 8.2 A Temperature: –20 … +85 °C	Size: 7045 and 12575 Inductance: 2 ... 1500 µH Rated current: 22 mA ... 8.2 A Temperature: up to +125 °C	Size: 7045 and 10040 Inductance: 1.5 ... 22 µH Rated current: 1.9 ... 10.6 A
Features	– Low profile, low DC resistance, and high current handling capacities – Suitable for high-density mounting configurations – Flat bottom surface ensures secure, reliable mounting	– High magnetic shield construction actualizes high resolution for EMC protection – Qualified to AEC-Q200	– General use for portable DC/DC converter line – High magnetic shield construction actualizes high resolution for EMC protection
Applications	Mobile communications Consumer electronics PCs	Automotive electronics	Consumer electronics

TDK EPCOS

Magnetics

Power Inductors

Power Inductors

			
Series	Automotive general use – SMD CLF-H, CLF-D series	General use – SMD VLCF series	General use flat wire type – SMD VLM series
Technical data	Size: 6045, 12555 Inductance: 1.5 ... 470 µH Rated current: 370 mA ... 8.9 A Temperature: up to +150 °C	Size: 4018 ... 5028 Inductance: 1.2 ... 470 µH Rated current: 140 ... 2710 mA	Size: 10555 ... 13580 Inductance: 0.33 ... 4.3 µH Rated current: 7 ... 18.5 A Temperature: –40 … +125 °C
Features	– High rated DC current – High reliability with welding connection – Ferrite shielded component	– General use for portable DC/DC converter line – High magnetic shield construction	– Low loss and large current capability design – High magnetic shield construction – Magnetic coupling type core with low magnetic flux leakage and a three-terminal structure
Applications	Automotive (generic automotive DC/DC converter line)	DC/DC converters for communication Consumer electronics PCs	Mobile communications Consumer electronics PCs HDDs

Power Inductors

			
Series	Automotive flat wire type – SMD VLM-D1 series	General use – SMD LTF series	Automotive small size – SMD LTF-D, LTF-H series
Technical data	Size: 13580 Inductance: 1.5 ... 10 µH Rated current: 4.2 ... 26 A Temperature: up to +125 °C	Size: 5022 Inductance: 1.2 ...22 µH Rated current: 0.9 ...4.2 A Temperature: –40 … +105 °C	Size: 3022 ... 5022 Inductance: 1.2 ...100 µH Rated current: 0.32 ... 3.87 A Temperature: up to +150 °C
Features	– Low loss and large current capability – High magnetic shield construction actualizes high resolution for EMC protection	– Large DC current products – Magnetic shielding type with ferrite core	– Advanced small packaging size – Generic automotive DC/DC converter line – Low profile as a 2.0/2.2 mm height – High rated DC current – High reliability with welding connection – Ferrite shielded component
Applications	Automotive (ECM, HID, brake control, navigation system and ECU)	Mobile communications Consumer electronics PCs HDDs	Automotive (generic automotive DC/DC converter line)

TDK EPCOS

Please read *Important notes* on page 81.

Magnetics

Power Inductors

Power Inductors

			
Series	General use – SMD SPM series	Automotive – metal composite core technology – SMD SPM-H series	High current – SMD VLB series
Technical data	Size: 3012 ... 6530 Inductance: 1... 10 µH Rated current: 2.8 ... 14.4 A Temperature: –40 … +125 °C	Size: 6530 ... 6550 Inductance: 0.25 ... 4.7 µH Rated current: 5.6 ... 23 A Temperature: up to +125 °C	Size: 7050 ... 12065 Inductance: 90 ... 360 nH Rated current: 14 ... 68 A Temperature: –40 … +125 °C
Features	– High power handling capability: Small copper loss Using large saturation induction of Fe-based metals – High Curie temperature of about 550 °C means low inductance temperature variance	– High rated DC and excellent saturation current – High reliability with welding connection – Molded technology	– High output processing capacity: Minimal copper loss – High saturation current and low DC resistance – High operating frequency up to 2 MHz
Applications	Mobile communications, consumer electronics, servers, VRM	Automotive (DC/DC converter, EMC filter applications)	Servers, notebooks, PCs, VRMs, VRDs

Power Inductors

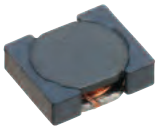
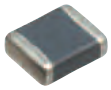
			
Series	Thin-Film – metal composite core technology – SMD TFM-T series	Semi-shielded – SMD VLP series	Small size, low profile, semi-shielded – SMD VLS series
Technical data	Size 2016 ... 2520 Inductance: 0.47 ... 2.2 µH Rated current: 1.9 ... 4.5 A	Size: 5040 … 8040 Inductance: 1 ... 680 µH Rated current: 0.3 ... 9.4 A	Size: 2010 ... 4012 Inductance: 0.47 ... 47 µH Rated current: 0.31 ... 2.75 A
Features	– Low height of 1.0 mm – Superior DC-bias characteristics – Consists of original fine copper pattern with micro-processing technology – Coil pattern is coated with metal magnetic material	– General use for portable DC/DC converter line	– General use for portable DC/DC converter line – High magnetic shield construction actualizes high resolution for EMC protection
Applications	Generic use for DC/DC converter of mobile communication devices	Consumer electronics Notebooks Mobile communications	Mobile communications Consumer electronics LCD displays HDDs

TDK EPCOS

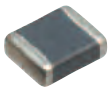
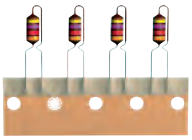
Magnetics

Power Inductors

Power Inductors

			
Series	Small size, low profile – SMD VLF series	Small size, low profile – SMD VLF-MT series	Multilayer technology – SMD MLP series
Technical data	Size: 3014 ... 5014 Inductance: 1 ... 100 µH Rated current: 0.26 ... 2.77 A	Size: 2520 ... 5040 Inductance: 0.47 ... 22 µH Rated current: 0.26 ... 3.72 A	Size: 1608 ... 2520 Inductance: 0.47 ... 10 µH Rated current: 0.6 ... 1.6 A
Features	– General use for portable DC/DC converter line – High magnetic shield construction actualizes high resolution for EMI protection	– DC/DC converter with topclass voltage conversion efficiency – Low profile – Generic use for portable DC/DC converter – High magnetic shield construction	– Most suitable for power lines with low output – Optimized ferrite materials enables the reduction of losses – DC superposition characteristics have been substantially improved
Applications	Mobile communications Consumer LCD displays Compact power supply modules	Mobile communications LCD displays HDDs DVC DSC	Mobile communications Power supply modules

Power Inductors

			
Series	Multilayer technology – SMD MLP-V series	Leaded RF chokes Axial and radial versions B781 …, B821 ...	Leaded VHF chokes Axial version B821 ..., B82500
Technical data	Size: 1608 Inductance: 0.47 ... 2.2 µH Rated current: 0.6 A	Rated inductance: 0.1 … 100 000 µH Rated current: 0.085 … 2.5 A	Rated inductance: 1 … 3900 µH Rated current: 0.1 … 10 A
Features	– Small size; height of 0.95 mm – Optimized ferrite materials enables the reduction of losses – DC superposition characteristics have been substantially improved	– High rated current – Low DC resistance – Suitable for wave soldering	– High resonant frequency – Suitable for wave soldering
Applications	Mobile communications DSC PCs HDDs	LF and HF decoupling of signal and control units Lighting technology Industrial, automotive, entertainment electronics Household appliances	RF blocking and filtering Interference suppression in small appliances Decoupling in telecommunication and entertainment electronics

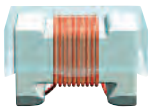
TDK EPCOS

Please read *Important notes* on page 81.

Magnetics

Signal Use Inductors

Signal Use Inductors

			
Series	SIMID 0603-C – SMD B82496C …	SIMID 0805-F – SMD B82498F ...	SIMID 1210-H – SMD B82422H ...
Technical data	Size (EIA): 0603 Inductance: 1 ... 220 nH Rated current: 110 ... 1800 mA Temperature: up to +150 °C	Size (EIA): 0805 Inductance: 2.7 ... 6800 nH Rated current: 80 ... 1000 mA	Size (EIA): 1210 Inductance: 1.0 ... 680 µH Rated current: 61 ... 1270 mA Temperature: up to +150 °C
Features	– High resonance frequency – Narrow inductance tolerances – High mechanic stability – Qualified to AEC-Q200	– Ceramic and ferrite core versions – High resonance frequency – Narrow inductance tolerance – Ceramic core version qualified to AEC-Q200	– Very high current handling capability – Qualified to AEC-Q200
Applications	Multimedia appliances Wireless communication systems Car access systems Tire Pressure Monitoring System (TPMS) GPS Digital cameras	Multimedia appliances Antenna amplifiers Wireless communication systems Car access systems GPS	Filtering of supply voltages, coupling, decoupling DC/DC converters, power supplies Automotive electronics Telecommunications Consumer and information technology Industrial electronics

Signal Use Inductors

			
Series	SIMID 1210-100 – SMD B82422A …	SIMID 1812-T/C – SMD B82432T …, B82432C …	SIMID 2220-T – SMD B82442T…
Technical data	Size (EIA): 1210 Inductance: 0.0082 ... 100 µH Rated current: 65 ... 800 mA Temperature: up to +145 °C	Size (EIA): 1812 Inductance: 1 ... 1000 µH Rated current: 55 ... 1300 mA Temperature: up to +150 °C	Size (EIA): 2220 Inductance: 1 ... 10 000 µH Rated current: 46 ... 3510 mA Temperature: up to +150 °C
Features	– High resonance frequency – High Q factor – Qualified to AEC-Q200	– High current handling capability – High Q factor – Qualified to AEC-Q200	– Very high current handling capability – High inductance values – Qualified to AEC-Q200
Applications	Filtering of supply voltages, coupling, decoupling Antenna systems Automotive electronics Telecommunications Consumer and information technology Industrial electronics	Filtering of supply voltages, coupling, decoupling DC/DC converters Antenna systems Automotive electronics Telecommunications Industrial electronics	Filtering of supply voltages, coupling, decoupling DC/DC converters/power supplies Automotive electronics Telecommunications Consumer electronics Industrial electronics

◣TDK ◣EPCOS

Magnetics

Signal Use Inductors

Signal Use Inductors

		
Series	X-Y Transponder coils – SMD B82450A …, B82450H …	Z Transponder coils – SMD B82451N …
Technical data	Size 8 mm: B82450A … E … Size 11 mm: B82450A … A … High Q 11 mm: B82450H … A … Inductance: 1 ... 7 mH Sensitivity: 10 ... 51 mV/µT	Size: 7.7 x 7.5 x 2.65 mm Inductance: 2.36 ... 7 mH Sensitivity: 16 mV/µT
Features	– Rugged construction for high mechanical stability when exposed to shock, drop and bending tests – High Q version available – Low profile version available – Qualified to AEC-Q200	– Rugged construction for high mechanical stability when exposed to shock, drop and bending tests – Qualified to AEC-Q200
Applications	Car access systems Immobilisers Passive Entry Passive Start (PEPS) Tire Pressure Monitoring System (TPMS) Heart rate monitoring devices Goods tracking systems	Passive Entry Passive Start (PEPS)

Signal Use Inductors

			
Series	3D Transponder coils – SMD B82453N …	X-Y Transponder coils TPL series	X-Y Transponder coils TPL802727 series
Technical data	Size: 11.5 x 12.5 x 3.65 mm Inductance: 3 x 6.75 mH Sensitivity: > 50 mV/µT	Size: 11.4 x 3.4 mm, 11.8 x 3.4 mm Inductance: 2.61 ... 7.20 mH Inductance tolerance: ±5% DC resistance: 26 … 50 Ω	Size: 7.85 x 2.7 mm Inductance: 4.5 … 18.52 mH (125 kHz) Inductance tolerance: ±3% DC resistance: 26 … 50 Ω
Features	– 3 coils in one component – High sensitivity – Qualified to AEC-Q200	– High reliability due to complete resin mold – Terminals are highly reliable due to their spring structure – Superior bending and anti-drop proof properties – Maintains stable electrical signal due to sectional winding	– Terminal fitting structure – “Thin wire bank” winding structure – Laser welding wire connection – Higher heat resistance wire – AEC Q200 compliant
Applications	Passive Entry Passive Start (PEPS)	Receiving LF antenna coils for in-car devices Tire Pressure Monitoring System (TPMS) Keyless entry systems Immobilisers	Receiving LF antenna coils for in-car devices Tire Pressure Monitoring System (TPMS) Keyless entry systems Immobilisers

TDK EPCOS

Please read *Important notes* on page 81.

Magnetics

Signal Use Inductors, Multilayer Inductors

Signal Use Inductors

			
Series	For standard circuits – SMD NL(V) series	For standard circuits – SMD NLFV/NLFC series	For decoupling circuits – SMD NLC(V) series
Technical data	Size: 2520 ... 5650 Inductance: 0.01 ... 10 000 µH Rated current: 25 ... 530 mA	Size: 2520 ... 4532 Inductance: 1 ... 1000 µH Rated current: 20 ... 800 mA	Size: 2520 ... 5650 Inductance: 0.1...1000 µH Rated current: 70 ... 2850 mA
Features	– Good heat durability that withstands lead-free compatible reflow soldering conditions – Lead-free material is used for the plating on the terminal – Metal terminals provide excellent connection reliability – Highly heat-resistant thermoplastic resin is used to form the exterior package		
Applications	Consumer electronics Automotive (car audio and ECU systems) HDDs and ODDs	Consumer electronics Communications Automotive (car audio and ECU systems) HDDs and ODDs	

Multilayer Inductors

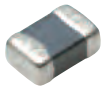
			
Series	High frequency for standard circuits – SMD MLG, MLG-S series	High frequency – High Q – SMD MLG-Q series	High frequency – High Q – SMD MLG-P series
Technical data	Size: 0603 ... 1608 Inductance: 0.3 ... 1000 nH Rated current: 50 ... 1000 mA	Size: 0402 Inductance: 0.2 ... 33 nH Rated current: 120 ... 350 mA Temperature: –55 … +125 °C	Size: 0603 Inductance: 0.6 ... 120 nH Rated current: 80 ... 1000 mA Temperature: –55 … +125 °C
Features	– Advanced monolithic structure is formed using multilayering and sintering process with ceramic and conductive materials for high frequency	– Optimal product for fine-pitch circuits	– Q is higher than in a conventional product; particulary at more than 800 MHz
Applications	High frequency applications such as mobile communication, high-frequency modules (PA, VCO, FEM), Bluetooth, WLAN, UWB and tuners		

TDK EPCOS

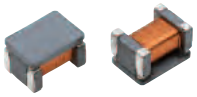
Magnetics

Multilayer Inductors, Signal EMC Filters

Multilayer Inductors

			
Series	High frequency – SMD MLK series	High frequency – Super High Q – SMD MHQ series	Signal line – Narrow tolerance – SMD MLF-J series
Technical data	Size: 0603 ... 1005 Inductance: 1 ... 330 nH Rated current: 70 ... 500 mA	Size: 1005 Inductance: 1 ... 15 nH Rated current: 400 ... 1200 mA	Size: 1608, 2012 Inductance: 0.1 ... 12 µH Rated current: 10 ... 300 mA
Features	– Giga-spiral laminated structure – High self-resonant frequency – Limited decrease of Q in the GHz band	– Achieves high Q characteristics equivalent to an air-core wire wound inductor – Inductance is provided in small increments, taking advantage of the multilayer technique	– Inductance tolerance ±5% (J-tolerance) – Temperature stress (drift variance percentage) for soldering ±3%
Applications	High frequency applications such as mobile communications, high-frequency modules (PA, VCO, FEM), Bluetooth, WLAN, UWB and tuners		Signal processing in mobile communications, car audio, tuners, DVC

Multilayer Inductors / Signal EMC Filters

			
Series	Signal line for standard circuits – SMD MLF, MLFL series	For decoupling circuits – SMD MLZ, MLZ-H series	Common-mode filters for CAN bus, FlexRay – SMD ACT45B, ACT45R series
Technical data	Size: 1005 ... 2012 Inductance: 0.047 ... 100 µH Rated current: 2 ... 300 mA	Size: 1005 ... 2012 Inductance: 0.1 ... 100 µH Rated current: 30 ... 1000 mA	Size (EIA): 1812 (4.5 x 3.2 mm) Rated inductance: 11 … 100 µH Impedance: 300 … 5800 Ω (10 MHz) Rated current: 0.15 ... 0.25 A Temperature: –40 … +150 °C
Features	– Magnetically shielded configuration suitable for high-density mounting	– Industry's best DC superimposition characteristics – Lowest DC resistance – Excellent effect mainly on the decoupling of power circuits – Also suitable for audio lines, due to its low DC resistance	– ACT45B for CAN-Bus – ACT45R for FlexRay – Non-dissolution of the abutment mounts in circuit board mounting – Qualified to AEC-Q200 – Suitable for lead-free soldering profiles acc. to JEDEC J-STD 020D
Applications	Signal processing modules for mobile communications and tuners	Modules for mobile communications and consumer electronics	Automotive electronics: CAN/FlexRay bus

TDK EPCOS

Please read *Important notes* on page 81.

Magnetics

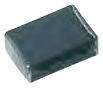
Signal EMC Filters

TDK EPCOS

Signal EMC Filters

			 
Series	Data line chokes – SMD SIMDAD 1812 B82789C0…, B82789S0…	Data line chokes – SMD B82793C0…, B82793S0…	Double/quad chokes B82792, B82794, B82791, B82720
Technical data	Size (EIA): 1812 Rated inductance: 11 … 100 µH Rated current: up to 300 mA Temperature: up to +150 °C	Size: 9 x 6 x 4.8 mm Rated inductance: 5 µH … 47 mH Rated current: up to 1.2 A Temperature: up to +125 °C	Rated inductance: 0.1 … 0.7 A Rated current: 0.47… 68 mH Rated voltage: 42 V
Features	– For reflow soldering and gluing – Qualified to AEC-Q200 – Suitable for lead-free soldering profiles acc. to JEDEC J-STD 020D	– High inductance range – Qualified to AEC-Q200 – Suitable for lead-free soldering profiles based on JEDEC J-STD 020D	– SMD and PTH available – Very low stray inductance – Very good symmetry features
Applications	Automotive electronics: CAN/FlexRay bus	Automotive electronics: CAN/FlexRay bus Industrial electronics xDSL applications	Telecom and automatization applications

Signal EMC Filters

			
Series	Chip beads for signal line – SMD MMZ series	Chip beads for signal line – High frequency, large impedance – SMD MMZ1005-E series	Chip beads for signal line – SMD HFxxACB series
Technical data	Size: 0402 ... 2012 Impedance: 10 ... 2500 Ω (100 MHz) Rated current: 100 ... 1500 mA Temperature: –55 … +125 °C	Size: 1005 Impedance: 47... 2200 Ω (100 MHz) Rated current: 150 … 300 mA	Size: 2012 ... 4532 Impedance: 7 ... 125 Ω (100 MHz) Rated current: 300 ... 600 mA
Features	– High reliability – Closed magnetic circuit structure – Low DC resistance structure of electrode	– Broad-band impedance values for higher frequency ranges – High reliability – Closed magnetic circuit structure – Low DC resistance structure of electrode	– Can be applied to a wide range of circuits – Use HF70, 50 and 30 materials
Applications	Elimination of signal line noises for mobile communications, consumer electronics, automotive electronics	Elimination of signal line noises for mobile communications, consumer electronics	Elimination of signal line noise for mobile communications, consumer electronics, automotive electronics

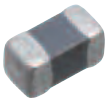
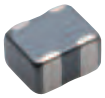
TDK EPCOS

Magnetics

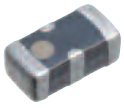
Signal EMC Filters

TDK EPCOS

Signal EMC Filters

			
Series	Chip beads for power line – SMD HFxxACC series	Chip beads for power line – SMD MPZ series	Common beads for audio/USB1.1. signal line – SMD MCZ1210-D series
Technical data	Size: 2012 ... 4532 Impedance: 7 ... 125 Ω (100 MHz) Rated current: 1.5 A	Size: 0603 ... 2012 Impedance: 10 ... 1000 Ω (100 MHz) Rated current: 0.5 ... 6 A	Size: 1210 Impedance: 90 ... 1000 Ω (100 MHz) Rated current: 50 mA ... 0.5 A
Features	– Effective EMC suppression over a broad bandwidth can be achieved simply be inserting this product into the DC power line on the circuit board	– Best-in-class energy-saving in the low DC resistance range – No crosstalk with closed magnetic circuit structural design	– Compact size, low R_{DC} (0.75 Ω max.) – Capable of removing both common and differential mode noise – Closed magnetic circuit structure allows high-density installation, while preventing crosstalk between circuits
Applications	Power line applications Automotive electronics	Elimination of power line noise for mobile communications, consumer electronics, automotive electronics	Elimination of power line noise for mobile communications and consumer electronics

Signal EMC Filters

			
Series	3-terminal filters for signal line – SMD MEM-S/P, MEM-D series	3-terminal filters for signal line – SMD ACF series	3-terminal filters for power line – SMD ACH series
Technical data	Size: 1608 ... 2012 Insertion loss: 20 dB (70 ... 2000 MHz) 30 dB (70 ... 2500 MHz) Rated current: 100 ... 250 mA	Size: 3225 ... 4532 Insertion loss: 25 dB (11 ... 700 MHz) Rated current: 300 mA Temperature: –25 … +85 °C	Size: 3216 ... 4518 Insertion loss: 25 dB (6 ... 700 MHz) Rated current: 1.5 ... 2 A Temperature: –40 … +125 °C
Features	– Multilayer chip EMC filter utilizing a T-type circuit – High reliability – Closed magnetic circuit architecture enables high-density installation and prevents crosstalk – Highly effective noise suppression	– T-type filter circuit is magnetically shielded with ferrite: Superior attenuation characteristics – Offers even greater attenuation characteristics when used in a stable circuit on the ground – Ideal for high-density circuit design space	– Offers even greater attenuation characteristics when used in a stable circuit on the ground – Ideal for high-density circuit design
Applications	MEM-S/P series: general signal line (consumer, office applications) MEM-D series: high-speed signal line (consumer, office applications)	Consumer electronics Office automation equipment Factory automation equipment Automotive electronics	Consumer electronics Office automation equipment Factory automation equipment Automotive electronics

TDK EPCOS

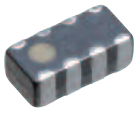
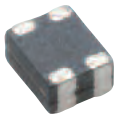
Please read *Important notes* on page 81.

Magnetics

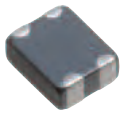
Signal EMC Filters

TDK EPCOS

Signal EMC Filters

			
Series	3-terminal filter arrays for multi-line – SMD MEA series	Common-mode filters for signal line – SMD TCM-S, TCM-G series	Common-mode filters for signal line – SMD ACM, ACM-D/H series
Technical data	Size: 1210 ... 2010 Cut-off frequency: 50 … 500 MHz Capacitance: 4 … 36 pF Rated current: 100 mA	Size: 0403 ... 1608 Impedance: 12 … 200 Ω (100 MHz) Rated current: 0.1 Idc A	Size: 2012 ... 2520 Impedance: 90 ... 1000 Ω (100 MHz) Rated current: 150 ... 400 mA
Features	– Array type: LC filter for 2 or 4 lines – Effective as a sensitivity suppression technique – Post-filter processing, base oval waveform signal – Suited for high-speed signal lines	– Thin-film common-mode filter with a large bandwidth – Suppresses radiation noise due to common-mode noise, without affecting the transmission of high-speed differential signals by realizing a higher cut-off frequency	– Miniaturized wire-wound chip-type filter – Extremely effective noise suppression – Minimal effect upon high speed signals, due to low differential mode impedance
Applications	Mobile communications Consumer electronics General signal line (Cellular Band, DVB-H Band): MEA-L, MEA-LC, MEA-PE High-Speed signal line, RGB and signal lines (Cellular Band, DVB-H Band): MEA-D, MEA-PH, MEA-LD, MEA-LE	TCM-G series: High-speed differential signal line (USB 2.0, LVDS) TCM-S series: Ultra high-speed differential signal line (HDMI, DVI, Display port, USB 3.0)	ACM series: High-speed differential signal line (USB 2.0, LVDS) ACM-D/H series: Ultra high-speed differential signal line (HDMI, DVI, Display port, USB 3.0)

Signal EMC Filters

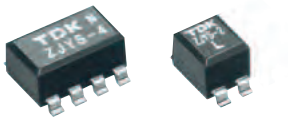
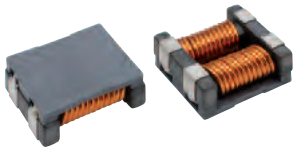
			
Series	Common-mode filters for automotive signal line – SMD ACM series	Common-mode filters for signal line – SMD TCE series	Common-mode filters for signal line – SMD MCZ-AH, MCZ-CH series
Technical data	Size: 2012 Impedance: 90 ... 360 Ω (100 MHz) Rated current: 220 ... 400 mA Temperature: –40 … +105 °C	Size: 0806 ... 1608 Impedance: 12 … 90 Ω (100 MHz) Rated current: 0.10 A	Size: 1210 … 2010 Impedance: 24 ... 300 Ω (100 MHz) Rated current: 100 ... 200 mA
Features	– High reliability – Impedance variation: 4 types of impedance values are prepared to correspond to the various applications – Suppresses the common mode EMI without waveform distortion	– Component can be used for suppressing common-mode noise and ESD – Wide bandwidth (cut-off frequency 3 GHz min.) for differential mode	– Minimum effect for high-speed differential signals due to wide bandwidth for differential mode – Suppresses radiated emissions MCZ-CH series: – Differential mode signal transmission band has been extended to 3.5 GHz – Differential mode characteristic impedance is 100 Ω
Applications	Radiation noise suppression for car multimedia interface (MOST, USB 2.0, IDB-1394)	Ultra high-speed differential signal line (HDMI, DVI, Display port, USB 3.0)	MCZ-AH series: High-speed differential signal line (USB 2.0, LVDS) MCZ-CH series: Ultra high-speed differential signal line (HDMI, DVI, Display port, USB 3.0)

TDK EPCOS

Magnetics

Signal EMC Filters

Signal EMC Filters

			
Series	Common-mode filters for general signal line – SMD ZJYS51 series	Common-mode filters for automotive signal line – SMD ZJYS81 series	Common-mode filters for power line – SMD ACM series
Technical data	Size: 5.5 x 5.8 mm, 10.5 x 5.8 mm Impedance: 100 ... 300 Ω (6 … 300 MHz) Rated current: 0.5 ... 2 A Temperature: –25 … +85 °C	Size: 9.5 x 6.0 mm Impedance: 1000 ... 2000 Ω (10 MHz) Rated current: 0.5 Temperature: –25 … +125 °C	Size: 4520 ... 1513 Impedance: 180 ... 1400 Ω (100 MHz) Rated current: 1.0 ... 10 A
Features	– Best filter for countering the common-mode noise resulting from data signal processing – Due to a maximum current tolerance of 2 A, can also be used to counter power line noise	– Best filter for countering the common-mode noise resulting from data signal processing – Due to a maximum current tolerance of 2 A, can also be used to counter power line noise	– Noise is strongly suppressed – Best-in-class highest current handling up to 10 A – Lightweight choke coil
Applications	Consumer electronics Communications Office equipment PCs	Automotive electronics CAN bus systems	Used for power line noise suppression for electronic devices Suitable for portable devices

Signal EMC Filters

			
Series	Common-mode filters for automotive power line – SMD ACM-V series	Common-mode filters for power line – SMD ACP3225 series	Clamp filters (Ferrite Cores with case) ZCAT, ZCAT-A, ZCAT-B, ZCAT-D/DT series
Technical data	Size: 7060 … 1211 Impedance: 700 Ω (100 MHz) Rated current: 4 ... 8 A Temperature: –40 … +125 °C	Size: 3225 Impedance: 1000 Ω (100 MHz) Rated current: 1.2 A	Impedance range: 20 ... 80 Ω (10 ... 100 MHz) 50 ... 150 Ω (100 ... 500 MHz) 30 ... 35 Ω (50 ... 500 MHz) Temperature : –40 … +85 °C
Features	– High impedance characteristic has achieved superior common mode noise suppression – Products have serialized a large current product up to 8 A corresponding to various DC power lines – Due to the low profile design, it is suitable for surface mounting	– Capable of achieving reduction in power consumption and improvement of noise suppression effect, due to its low DC resistance and high common-mode impedance – Low profile and compact shape makes it suited for surface mounting	– Unique plastic case ensures simple, convenient installation and features a self-holding mechanism – Ferrite core provides excellent absorption of high-frequency EMC and is highly effective as countermeasure against common-mode EMC
Applications	Automotive: Common-mode noise countermeasures for DC power lines of electronic control equipment Multimedia equipment in automotive applications	Power line noise suppression of electronic devices Noise suppression of adapter lines or battery lines of PCs	Communications Consumer electronics PCs

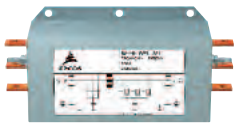
TDK EPCOS

Please read *Important notes* on page 81.

Magnetics

Signal EMC Filters, Power EMC Filters and Chokes

Signal EMC Filters		Power EMC Filters and Chokes	
			
Series	Clamp filters (Ferrite Cores with case) for ECU in automotive ZCAT-V-BK series	Feedthrough capacitors Feedthrough filters B85121, B85321	2-line filters for single-phase or DC applications B8411…, B84142
Technical data	Impedance range: 120 ... 140 Ω (100 MHz) Temperature : –40 … +125 °C	Rated voltage: 75 … 600 V AC/ V DC Rated current: 16 … 500 A Feedthrough capacitors Rated capacitance: 0.00125 … 4.7 µF Feedthrough filters Rated capacitance: 0.0025 … 2 x 4.7 µF	Rated voltage: 250 … 520 V AC Rated voltage: 250 … 2000 V DC Rated current: 0.5 … 1600 A
Features	– Can easily be attached without cutting the cable – Plastic case has a self-sustaining mechanism that prevents slipping on the cable after being clamped – Excellent high-frequency noise absorption effect – Works against common-mode noise, allowing for noise suppression without affecting signal quality	– MKP technology (dry, self-healing) – Solderless production technology – Terminals as axial leads, screw connectors, soldering tags or tab connectors	– IEC inlet filters – Modular SIFI filter system – One or multi-stage filters – High-voltage versions
Applications	ECUs in automotive	Communications Shielded rooms Power supplies Medical appliances	Communications Industrial, solar inverters Medical appliances Traction applications

Power EMC Filters and Chokes			
			
Series	Filters for three-phase systems B84143, B84144	Converter chokes B86301, B86304	Output filters B84143U …, B84143V …
Technical data	Rated voltage: 440 … 760 V AC Rated current: 6 … 2500 A	Rated voltage: 520 … 760 V AC Rated current: 4 … 1500 A	Rated voltage: 440 … 760 V AC Rated current: 4 … 1500 A Clock frequency: 2.5 … 16 kHz
Features	– Filters without/with neutral line – One or multi-stage – Compact filters	– Line reactors – dv/dt chokes – DC chokes	– dv/dt filters – Sine-wave output filters – Sine-wave output filters, low cost – Sine-wave EMC output filters (SineFormer)
Applications	Industrial applications Solar and wind power Medical appliances Converters and power supplies	Industrial applications Converters Solar and wind power LCL filters	Industrial applications Variable speed drives

TDK EPCOS

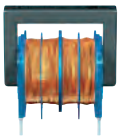
Magnetics

Power EMC Filters and Chokes

Power EMC Filters and Chokes

			
Series	Filters for shielded rooms B84299, B84312	EMC services	Ring core chokes (current compensated) B82720 … B82725, B82791
Technical data	Rated voltage: 100 … 690 V AC Rated voltage: 100 … 1000 V DC Rated current: 0.1 … 1600 A Insertion loss: >100 dB from 14 kHz … 40 GHz	EMC laboratory offers comprehensive consulting, pre-compliance investigations and conformity testing	Rated current: 0.25 … 16 A Rated inductance: 0.2 … 100 mH Rated voltage: 250 V
Features	– Power line filters – Filters for data, telephone or control lines	– Accredited laboratory – In-house or on-site testing – Measurement of conducted and radiated emissions	– High resonance frequency owing to special winding technique – Approx. 1% stray inductance for symmetrical interference suppression – Potted versions possible – B82720 also available in SMD – Plastic case with terminals
Applications	EMC laboratories Shielded rooms	Industrial applications Converters Solar and wind power	Power supplies

Power EMC Filters and Chokes

			
Series	Ring core chokes (current compensated) B82725S … B82726S…, B82727S…	D core chokes (current compensated) B82731 … B82734	U core chokes (current compensated) B82730
Technical data	Rated current: 6 … 54 A Rated inductance: 0.19 … 7.8 mH Rated voltage: 250 … 300 V AC 300 … 1000 V DC (DC link)	Rated inductance: 3.3 … 100 mH Rated current: 0.35 … 4.6 A Rated voltage: 250 V	Rated inductance: 0.33 … 15 mH Rated current: 0.4 … 2.6 A Rated voltage: 300 V
Features	– High resonance frequency – Approx. 1% stray inductance for symmetrical interference suppression – On baseplate, winding wire serves as solder terminal	– High resonance frequency due to 2-section winding – Approx. 1% stray inductance for symmetrical interference suppression – Low leakage due to closed core shape – High pulse strength – Low whirring noise – Low-height horizontal versions	– High resonance frequency – Approx. 1.3% stray inductance for symmetrical interference suppression – Low whirring noise – Low saturation effects – Low-height horizontal versions feasible on request – Compact design
Applications	Power supplies of high power applications, such as solar inverters, drives, household appliances	Power supplies Ballasts	Compact power supplies Ballasts Household appliances

◣TDK ◣EPCOS

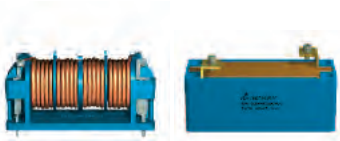
Please read *Important notes* on page 81.

Magnetics

Power EMC Filters and Chokes, Ferrites

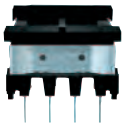
TDK EPCOS

Power EMC Filters and Chokes

			
Series	Frame core chokes (FC) (current compensated) B82732F ..., B82733F...	Ring core chokes, triple/quad (current compensated) B8274 ... B8276	I core chokes B82502 ... B82523
Technical data	Rated inductance: 10 ... 100 mH Rated current: 0.45 ... 2.3 A Rated voltage: 250 V	Rated inductance: 0.12 ... 6 mH Rated current: 6 ... 200 A Rated voltage: 440 ... 690 V	Rated inductance: 0.015 ... 82 mH Rated current: 0.2 ... 95 A Rated voltage: 400 ... 500 V
Features	– Closed magnetic circuit with frame construction – 4-section winding – High stray inductance, excellent differential mode suppression – High pulse-handling capability – Low height allows usage in lamp ballasts – Optional: magnetic bypass to increase stray inductance – Vertical version on request	– High power handling – Available in plastic or aluminum case (fully potted) or on baseplate	– Low power dissipation – Broadband interference suppression – Core: laminated iron-silicon – Single and double chokes available – Compact design
Applications	Power supplies Ballasts	Power supplies of high power applications, such as solar inverters, drives	Power supplies of high power applications

Power EMC Filters and Chokes

Ferrites

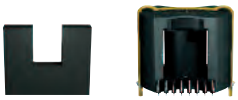
			
Series	Ring core (iron powder) chokes B826 ...	E, EFD, ETD cores	ELP, ER, EQ cores
Technical data	Rated inductance: 0.033 ... 20 mH Rated current: 0.3 ... 6 A Rated voltage: 250 V	Core shape: E5 ... E80 ETD29 ... ETD59 EFD15 ... EFD30 Material: N87, N97	Core shape: ELP14 ... ELP64 ER9.5 ... ER32 EQ13 ... EQ30 Material: N49, N87, N92, N95, N97
Features	– Iron powder core – Single and double chokes – High thermal stability – High differential attenuation at low frequencies	– Wide range of core shapes, sizes and accessories – Cost optimized	– Flat mounting height – Planar solution – Board integrated
Applications	PFC and reduction of harmonics in power supplies	Power supplies AC/DC converters DC/DC converters	Power supplies AC/DC converters DC/DC converters

TDK EPCOS

Magnetics

Ferrites

Ferrites

			
Series	PQ cores	U, PM cores	RM cores
Technical data	Core shape: PQ16 … PQ50 Material: N49, N87, N92, N95, N97	Core shape: U93 ... U141 PM50 ... PM114 Material: N27, N87, N97	Core shape: RM4 ... RM14 Material: N49, N87, N97, K1, M33, N48
Features	– Compact design – Ferrite cores for power transformers and chokes – Bobbins available	– Max. transmissible power – Max. magnetic cross section – Large volume cores – Accessories for PM cores available	– Without center hole – Compact design – Accessories available
Applications	Power supplies AC/DC converters DC/DC converters		Power supplies AC/DC converters DC/DC converters

Ferrites

			
Series	EP, EPX cores - SMD	P cores	Ring cores
Technical data	Core shape: EP5 … EP20 EPX7 … EXP10 Material: T38, T57, T66	Core shape: P3.3 … P70 Material: K1, M33, N48, N22, N30, T38	Core shape: R2.5 ... R202 Material: K10, T57, N30, N87, T35, T37, T38
Features	– Low hysteresis loss coefficient – Low THD	– Without center hole – Optimized shielding – Accessories available	– Parylene-coated – Epoxy-coated
Applications	xDSL applications	Signal transformers Proximity switches	Power supplies AC/DC converters DC/DC converters

◣TDK ◣EPCOS

Please read *Important notes* on page 81.

Magnetics

Ferrites

TDK EPCOS

Ferrites

			
Series	Ferrite cores for EMI suppression	Ferrite cores for EMI suppression	Ferrite cores for switching power supplies
Technical data	Core shape: T Initial permeability (typ.): 5000 µi Material: HF90 MnZn ferrites	Core shape: BB, R6H, RH, RU, T, SH, SU Initial permeability (typ.): 45 … 50 000 µi Material: HF30, HF40, HF56, HF57, HF70, HF90 NiZn ferrites	Core shape: EE, EER, EI, EP, EPC, LP, PQ, RM, T Initial permeability (typ.): 2200 … 3300 µi Material: PC40, PC44, PC90, PC95 MnZn ferrites
Features	– Good noise absorption characteristics in the frequency band from 100 kHz to 1.6 MHz – Effective noise suppression for devices with inverters – Various shapes and sizes	– Suitable for one-hole ferrite beads – Various materials, shapes and packaging styles available	– Suitable for various transformers of general-purpose DC/DC converters
Applications	Noise suppression for video, acoustic, office automation and communication equipment, automotive electronics		Main transformers Drive transformers Choke coils

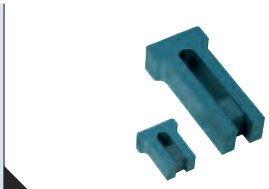
Ferrites

			
Series	Ferrite cores for telecommunication	Large size ferrite cores for high power	Ferrite cores for coils DR/FT/THP/P/TH series
Technical data	Core shape: P, RM, EP, EPC, ER, EE, EEM, T Initial permeability (typ.): 7500 … 15 000 µi Material: H5C2, H5C3, H5C4, HS10, HS72 MnZn ferrites	Core shape: DT, EC, EE, EI, EIC, PM, PQ, SP, T, UI, UU Initial permeability (typ.): 1800 … 2300 µi Material: PE22, PC40, PE90 MnZn ferrites	Initial permeability (typ.): 1 … 1500 µi Material: L7H, L2H, L20H, L9H, L18H, L17H MnZn ferrites
Features	– Toroidal cores are suitable for pulse transformers and sensors – Epoxy and paraxylylene insulation coating is available	– Large size ferrite cores developed for reactors and transformers used in high power units	– Mountable with lead-free soldering (+260 °C max.) – Excellent common-mode noise suppression – High-quality and wide-band ferrite cores for LAN
Applications	Filters Sensors Transformers	Transfomers (high frequency inductive heater, UPS, EV, automated warehouse) Reactor choke (general purpose inverters, trains)	LAN (10BASE-2/5/T, 100BASE-T, 1000BASE-T, ATM25)

TDK EPCOS

Magnetics

Ferrites, Noise Suppressing Sheets

Ferrites		Noise Suppressing Sheets	
			
Series	Ferrite for ultrasonic applied equipment V2X Series	Magnetic sheets for noise suppression Flexield – IRJ	Magnetic sheets for noise suppression Flexield – IFL
Technical data	– Temperature dependence of resonant frequency TK(1/°C): 17× 10^{-5} – Motional impedance Zm00: 180 Ω – Quality factor Q: 350 Qm – Electro-acoustic efficiency η0: 90% – Electro-mechanical coupling factor: 18%	Flame resistant, high μ type Standard sheet dimensions: 300 x 200 mm Standard sheet thickness: 0.1 ... 0.3 mm Recommended frequency range: 5 MHz ... 10 GHz Initial permeability at 1 MHz typ: 100 … 170 μi	Thin type, high μ/high Standard sheet dimensions: 300 x 200 mm Standard sheet thickness: 0.025 ... 0.1 mm Recommended frequency range: 5 MHz ... 3 GHz Initial permeability: 120 … 180 μi
Features	– π type ferrite magnetostrictive vibrators – Due to high specific resistance, eddy current loss is very small – High electro-mechanical energy conversion efficiency (85 to 90%). – Excellent anticorrosive characteristics	– Highly flexible and shock-resistant – Noise suppression across a wide frequency range – Excellent flexibility in fabrication	
Applications	Ultrasonic cleaning, sonar, ultrasonic devices	Noise reduction for flexible cables used in mobile devices Reduction of noise emitted from a wide variety of electronic devices (including noise from CPU) Reduction of specific absorbed radiation (SAR) from cellular phones Reduction of internal EMI (resonance, crosstalk) inside a shielded casing	

Noise Suppressing Sheets			
			
Series	Magnetic sheets for RFID Flexield – IRLG	Magnetic sheets for RFID Flexield – IRJ	Magnetic sheets for RFID Flexield – IRL
Technical data	High performance type Standard sheet dimensions: 300 x 200 mm Standard sheet thickness: 0.25 ... 0.5 mm Initial permeability: 50 (13.56 MHz) μi	Flame resistant, high performance type Standard sheet dimensions: 300 x 200 mm Standard sheet thickness: 0.1, 0.25 mm Initial permeability: 40, 1.0 (13.56 MHz) μi	Thin type Standard sheet dimensions: 300 x 200 mm Thick type Standard sheet dimensions: 200 x 200 mm Standard sheet thickness: 0.05, 0.1 mm Initial permeability: 25 (13.56 MHz) μi
Features	– Highly flexible and shock-resistant – Highly effective – Extensive line-up of sizes and dimensions – Excellent permeability – Excellent magnetic convergence		
Applications	For improving reception performance of RFID readers/writers in 13.56 MHz band Integrating IC cards with metal Integrating IC tags with metal Improved antenna reception sensitivity		

TDK EPCOS

Please read *Important notes* on page 81.

SAW Components

MEMS Devices for Mobile Communications and Information Technology,
SAW Filters, Duplexers for Base Stations, Femto Cells and Trunked Radio

MEMS Devices for Mobile Communications and Information Technology

		
Series	MEMS microphones – SMD	MEMS pressure sensors – SMD
Technical data	Up to 65 dB SNR < 5% THD up to 128 dB SPL	300 … 1100 hPa 16 bit SPI clock up to 20 MHz I2C clock up to 3.4 MHz
Features	– Analog or digital – Very small size – Excellent EMI shielding – Very high PSR – Omnidirectional – Top or bottom hole	– Factory calibrated – I2C and SPI interface – Very high PSR – Very small size – High accuracy – Low noise
Applications	Handsets/accessories Notebooks MP3 players Cameras	HDDs Navigation devices Altimeters

SAW Filters, Duplexers for Base Stations, Femto Cells and Trunked Radio

			
Series	IF filters ceramic – SMD	RF filters ceramic – SMD	RF filters CSSP
Technical data	Center frequency: 70 … 700 MHz Usable bandwidth: 0.2 … 75 MHz SMD package size (EIA): 5050, 7050	Center frequency: 250 MHz ... 2.7 GHz Usable bandwidth: 5 … 190 MHz Output impedance: 50 Ω or acc. customer request SMD package size (EIA): 3030, 3838, 5050	Center frequency: 700 MHz ... 2.7 GHz Usable bandwidth: 10 … 75 MHz CSSP package size (EIA): 1411, 1814, 2520, 3025
Features	– Very good nearby selectivity – Bandwidths up to full LTE band – Customized design	– Low insertion loss: e.g. 1.3 dB (typ.) – High ultimate rejection	– Low insertion loss: e.g. 1.9 dB (typ.) – High ultimate rejection – Matched duplexer with standard and mirror pinning – 2in1 filter and diplexer – Single filters for UL/DL/Snif
Applications	Base stations (macro, micro, pico cells)	Base stations (macro, micro, pico cells) Tetra, PMR	Femto cells (residential femto cells, enterprise femto cells, indoor pico cells)

TDK EPCOS

SAW Components

SAW Filters for Automotive and Industrial,
SAW Filters for Multimedia

SAW Filters for Automotive and Industrial

				
Series	SAW resonators – SMD	Wideband filters – SMD	Narrowband filters – SMD	SAW filters and duplexers for automotive telematics – SMD
Technical data	Center frequency: 300 MHz ... 1.2 GHz Center frequency tolerance: 25 … 300 kHz SMD package size (EIA): 2520, 3030, 3550, 5050	Center frequency: 72.54 MHz ... 2.5 GHz Usable bandwidth: 0.6 … 97 MHz Output impedance: 50 Ω SMD package size (EIA): 3030, 3838, 5050, 5070	Center frequency: 312 ... 903 MHz Usable bandwidth: 0.1 … 1.6 MHz SMD package size (EIA): 2520, 3030, 3838	Center frequency: 836 ... 2140 MHz Usable bandwidth: 25 … 93 MHz SMD package size (EIA): 1411, 2016, 2520, 3030, 3025
Features	– 1-port resonators – 2-port resonators – 2in1 resonators – High Q-factor, low motion resistance – Automotive reliability AEC-Q200 Grade 1	– Low insertion loss: down to 1.3 dB – High ultimate rejection – Automotive reliability AEC-Q200 Grade 1	– Low temperature drift – Very good near attenuation – Multichannel filters – Automotive reliability AEC-Q200 Grade 1 – Diplexers/Triplexers for multiband systems	– Filters and duplexers for all common mobile communication frequencies 2G/3G/4G and GNS systems – Automotive reliability AEC-Q200 Grade 3
Applications	Automotive RKE, TPMS Wireless transmitters in home comfort and industrial applications	RKE multichannel receivers, home comfort and industrial applications, smart metering, SDARS, DMB	Automotive RKE TPMS Car alarm systems	Automotive telematics Navigation devices Toll systems

SAW Filters for Multimedia

		
Series	CSSP3 – SMD	Ceramic – SMD
Technical data	Low loss RF band-stop filter for ISDB-T, 1seg, DVBH, CMMB and SBTVD Low insertion loss Low amplitude ripple and group delay ripple Unbalanced to unbalanced operation	Low loss RF filter Low insertion attenuation Low amplitude ripple No matching network required Unbalanced to balanced operation
Features	– Package size 1.4 x 1.1 mm – Maximum height of 0.45 mm	– Package size 3.0 x 3.0 x 1.1 mm – Maximum height of 1.225 mm
Applications	Mobile TV	Satelite TV with channel stacking switch Set Top Box Cable modem Mobile TV

TDK EPCOS

Please read *Important notes* on page 81.

SAW Components

SAW Filters, Duplexers and Modules for Cellular Communications

SAW Filters, Duplexers and Modules for Cellular Communications

		
Series	Mobile communications – SMD	Front-end modules (FEM) – SMD D5040
Technical data	Isolation: up to 60 dB Height: 0.42 … 1.00 mm Duplexer size: down to 1.8 x 1.4 mm Filter size: down to 1.1 x 0.9 mm For modules: 1.7 x 1.4 mm Low profile 0.28 mm height	Typ. insertion loss: 0.9 … 3.3 dB (dep. band) Typ. VSWR: 1.5:1 Harmonic attenuation: > 30 dB Max. input power: 35 dBm SMD package size: 3.5 x 3.2 x 1.2 mm
Features	– Matched WCDMA/LTE duplexer – Diplexed GSM 2in1 and 4in1 filters – Single filters for all mobile communication standards – Special low profile products for modules	– Supports 4 GSM bands (850/900/1800/1900) and 5 WCDMA/LTE bands – Integrates GSM 900/1800/1900 filters,Tx low pass filter, switch and decoder – Integrated 8 kV ESD protection
Applications	Mobile phones, tablets and data cards supporting GSM and WCDMA/LTE	

SAW Filters, Duplexers and Modules for Cellular Communications

		
Series	Diversity front-end modules – SMD (DivFEM) M318	Front-end modules with 4 integrated duplexers – SMD (FEMiD) M309
Technical data	Typ. insertion loss: 0.7 … 3.7 dB (dep. band) Typ. VSWR: 1.5:1 Typ. Tx suppression: > 45 dB Max. input power: 13 dBm SMD package size: 3.5 x 3.2 x 1.0 mm	Typ. insertion loss: 0.4 … 4.5 dB (dep. band) Typ. VSWR: 1.5:1 Typ. Isolation: > 55/50 dB (Tx/Rx) Harmonic attenuation: > 30 dB Max. input power: 30 dBm SMD package size: 6.0 x 4.0 x 1.0 mm
Features	– Supports 5 WCDMA/LTE bands (I, II, IV, V, VIII) and 4 other LTE bands from additional aux. ports – Integrates WCDMA/LTE Rx SAW filters for bands (I, II, IV, V, VIII), switch and decoder – Integrated 4 kV ESD protection	– Supports 4 GSM bands (800/900/ 1800/1900), 4 WCDMA/LTE bands (I, II, V, VIII) and 4 other bands from additional aux. ports – Integrates all GSM filters, Tx low pass filter, switch and decoder – Integrates WCDMA DPX band (I, II, V, VIII) – Integrated 4 kV ESD protection
Applications	Mobile phones, tablets and data cards supporting GSM and WCDMA/LTE	

◣TDK ◣EPCOS

SAW Components

SAW Filters, Duplexers and Modules for Cellular Communications,
Modules for Information Technology

SAW Filters, Duplexers and Modules for Cellular Communications

			
Series	Front-end modules with 5 integrated duplexers – SMD (FEMiD) D5058	Single feed antenna tuners D7005 – SMD	Complementary wireless – SMD
Technical data	Typ. insertion loss: 1.2 … 3.8 dB (dep. band) Typ. VSWR: 1.5:1 Typ. isolation: 55/50 dB (Tx/Rx) Typ. harmonic attenuation: >30 dB Max. input power: 35 dBm SMD package size: 8.0 x 4.95 x 1.0 mm	Average current consumption: < 1 mA Package size: 5 x 5 x 1 mm Pin max. = +36 dBm; supported frequency range: 700 … 2700 MHz Typical performance data: VSWR in / VSWR tuned / loss 6:1 / < 2.5 : 1 / ~ 2.0 dB 1:1 / < 1.5 : 1 / ~ 0.8 dB	Very low IL, e.g. 0.45 dB (typ.) Up to 100 bar molding 8 kV ESD protected
Features	– Supports 4 GSM bands (850/900/1800/1900), 4 WCDMA bands (I, II, IV, V) and 4 LTE bands (II, IV, V, XVII) – Integrates duplexers for bands (I, II, IV, V, XVII) – Integrates all GSM filters, Tx low pass filter, switch and decoder – Integrated 4 kV ESD protection	Closed loop tuner, improves both TRP and TIS. Built-in control loop detects and corrects user interaction effects. – Low implementation effort, stand alone implementation – On-board microcontroller, with preprogrammed algorithms – Supporting all protocols, GSM(EDGE), (W)CDMA, LTE – Enabling small form-factor antennas	– Navigation (GPS and Glonass), WLAN and Bluetooth – Very high isolation – GPS/WLAN multiplexer – Wafer level package
Applications	Mobile phones, tablets and data cards supporting GSM and WCDMA/LTE	Mobile phones, tablets and data cards using single feed antenna structures	Mobile phones, tablets, information technology, navigation devices

Modules for Information Technology

			
Series	R053 – SMD	R054 – SMD	R057 – SMD
Technical data	SiP Tri-Core solution GPS/BT/FM Module based on Texas Instruments NL5500 Package size: 6.7 x 7.5 x 1.2 mm (typ.)	SiP Quad-Core solution WLAN/GPS/BT/FM Module based on Texas Instruments WL1283 Package size: 11.9 x 9.5 x 1.2 mm (typ.)	Center frequency: 836 ... 1960 MHz Usable bandwidth: 25 … 93 MHz Package size (EIA): 1411, 2520, 3030, 3025
Features	– Bluetooth 4.0 – BT EDR (2 and 3 Mbps) – GPS – FM (Tx/Rx) – Fully shielded and tested SiP	– WLAN 802.11a – WLAN 802.11 b/g/n – Bluetooth 4.0 – BT EDR (2 and 3 Mbps) – GPS – FM (Tx/Rx) – Fully shielded and tested SiP	– WLAN 802.11 b/g/n – Bluetooth 4.0 – BT EDR (2 and 3 Mbps) – GPS – FM (Tx/Rx) – Fully shielded and tested SiP
Applications	Mobile phones Handheld Internet devices		

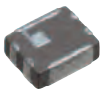
◣TDK ◣EPCOS

Please read *Important notes* on page 81.

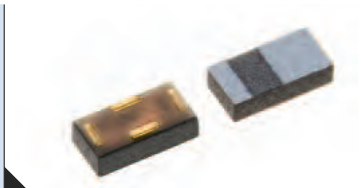
SAW Components

Ceramic and Thin-Film RF Components

Ceramic and Thin-Film RF Components

			
Series	Multilayer band pass filters – SMD DEA series	Multilayer band pass filters – SMD (balance output type) DEA series	Multilayer band pass filters – SMD (balance output type) DEA series
Technical data	Size (l x w x t): 1.6 x 0.8 x 0.6 … 2.5 x 2.0 x 1.5 mm (max.)	Size (l x w x t): 1.6 x 0.8 x 0.5 … 2.5 x 2.0 x 1.0 mm (max.)	Size (l x w x t): 2.0 x 1.25 x 0.8 … 2.0 x 1.5 x 1.4 mm (max.)
Features	– Compact lightweight and thin type – Low loss in the passband – High attenuation in the attenuated band	– Compact lightweight and thin type – Low loss in the passband – High attenuation in the attenuated band – IC impedance compatible design available	– Compact lightweight – High performance
Applications	2.4 GHz WLAN/Bluetooth 5.0 GHz WLAN 5.0 GHz Digital cordless WiMAX up to 3.6 GHz	2.4 GHz WLAN/Bluetooth	2.5 GHz WiMAX 5.0 GHz WLAN ZigBee

Ceramic and Thin-Film RF Components

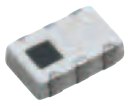
			
Series	Thin-film band pass filters – SMD TFSB series	Multilayer low pass filters – SMD DEA series	Thin-film low pass filter – SMD TFSL series
Technical data	Size (l x w x t): 1.0 x 0.5 x 0.3 mm	Size (l x w x t): 1.0 x 0.5 x 0.4 … 2.0 x 1.25 x 1.0 mm (max.)	Size (l x w x t): 0.65 x 0.50 x 0.25 mm
Features	– Small size – Low profile	– Compact lightweight and thin type – Low loss in the passband – High attenuation in the attenuated band	– High performance – High repeatability – Ultra-minature and low-profile
Applications	2.4/5.0 GHz WLAN/Bluetooth	DVB-H/ISDB-T GSM900 GSM850/GSM900 Tx DCS DCS/PCS GSM/DCS/PCS Tx & Rx PCS Tx & Rx 2.4 GHz WLAN/Bluetooth 5.0 GHz WLAN	2.4 GHz WLAN/Bluetooth Cellular

◣TDK ◣EPCOS

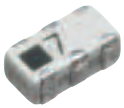
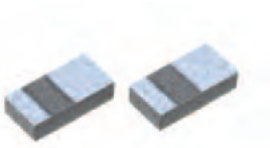
SAW Components

Ceramic and Thin-Film RF Components

Ceramic and Thin-Film RF Components

			
Series	Multilayer high pass filters – SMD DEA series	Multilayer phase shifters (delay lines) – SMD DEA series	Dielectric band pass filters – SMD CF series
Technical data	Size (l x w x t): 1.0 x 0.5 x 0.4 … 2.0 x 1.25 x 1.0 mm (max.)	Size (l x w x t): 1.0 x 0.5 x 0.52 mm (max.)	Size (l x w x t): 2.0 x 2.5 x 1.2 … 9.9 x 5.0 x 3.0 mm (max.)
Features	– Compact lightweight and thin type – Low loss in the passband – High attenuation in the attenuated band	– Compact lightweight and thin type – Low loss – Phase can be shifted according to the frequency band of each system	– T-type resonator – Low loss and high attenuation – High reliability – High power capability – High ESD stability
Applications	WiMAX 2.4 GHz WLAN/Bluetooth	DCS/PCS GSM800	GPS, Glonass, DAB XM and Sirius Radio WCDMA2100 WCDMA2GHz WLAN/WiMAX/BT filters from 2.4 up to 5 GHz Low, mid and high power filter for base station technology

Ceramic and Thin-Film RF Components

			
Series	Multilayer diplexers – SMD DPX series	Thin-film diplexer – SMD TFSD series	Triplexer – SMD TPX series
Technical data	Size (l x w x t): 1.6 x 0.8 x 0.6 ... 2.0 x 1.25 x 1.0 mm (max.)	Size (l x w x t): 1.0 x 0.5 x 0.3 mm	Size (l x w x t): 2.0 x 1.25 x 0.9 … 2.5 x 2.0 x 1.2 mm
Features	– Compact lightweight and thin type – Low loss in the passband – High attenuation in the attenuated band	– Ultra-small form-factor – Low-loss type – High-attenuation types	– Flexible band combinations – Low loss – High isolation
Applications	GSM850/900/DCS/PCS Tx & Rx GSM850/900/PCS Tx & Rx/GPS GSM850/PCS Tx & Rx WCDMA800/WCDMA2000 WCDMA800/WCDMA1900 GPS & 2.4 GHz/Bluetooth 2.4 GHz WLAN/Bluetooth 2.4/5.0 GHz WLAN WiMAX UWB	2.4 GHz WLAN/Bluetooth 5 GHz WLAN	GPS/2.4 GHz WLAN/Bluetooth 5 GHz WLAN/Cellular

TDK EPCOS

Please read *Important notes* on page 81.

SAW Components

Ceramic and Thin-Film RF Components

Ceramic and Thin-Film RF Components

		
Series	Multilayer balun transformers – SMD HHM series	Thin-film balun transformers – SMD TTB series
Technical data	Size (l x w x t): 1.0 x 0.5 x 0.4 … 2.0 x 1.25 x 0.95 mm (max.)	Size (l x w x t): 0.85 x 0.65 x 0.4 … 1.6 x 0.8 x 0.4 mm
Features	– Compact lightweight and thin type – Low loss	– Optimal, thin-film chip balun transformer for 50 to 200 Ω with low loss at DVB-H/T and ISDB-T frequency bands (174 to 860 MHz)
Applications	GSM850 Tx & Rx GSM900 Tx & Rx DCS Tx & Rx PCS Rx WCDMA Tx & Rx DCS/PCS Tx & Rx 2.4 GHz WLAN/Bluetooth 5.0 GHz WLAN WiMAX UWB GSM LOCAL DVB-H/ISDB-T	DVB-H/T ISDB-T

Ceramic and Thin-Film RF Components

		
Series	Wound chip baluns – SMD ATB series	Thin-film balun transfomer – SMD TFSZ series
Technical data	Size (l x w x t): 3.2 x 2.5 x 2.3 mm	Size (l x w x t): 0.65 x 0.50 x 0.25 mm
Features	– Chip balun transformer developed for 50, 75 impedance system – Impedance ration 1:1	– Low loss – Wide frequency line-up – Ultra-minature and low-profile
Applications	Tuner for TV, mobile devices (e.g. DVB-T/H, ISDB-T) Power divider for STB and tuners	2.4 GHz WLAN/Bluetooth 5 GHz WLAN WiMAX

TDK EPCOS

SAW Components

Ceramic and Thin-Film RF Components

Ceramic and Thin-Film RF Components

		
Series	Multilayer directional couplers – SMD HHM series	Multilayer directional couplers (Dual-Band) – SMD HHM series
Technical data	Size (l x w x t): 1.0 x 0.5 x 0.4 ... 2.0 x 1.25 x 0.95 mm	Size (l x w x t): 1.0 x 0.5 x 0.4 ... 2.0 x 1.25 x 0.95 mm
Features	– Compact lightweight and thin type – Low loss – High isolation	– Compact lightweight and thin type – Low loss – High isolation
Applications	GSM900 Tx; DCS TX; PCS; PCS Tx; GSM/DCS Tx GSM/DCS/PCS Tx GSM850/DCS/PCS Tx GSM850/GSM900 Tx GSM850/GSM Tx; WCDMA Tx; DCS/PCS Tx; PDC1500 Tx; GSM850/PCS Tx 2.4 GHz WLAN 2.4 GHz WLAN Divider	GSM/DCS Tx; GSM/DCS/PCS Tx; GSM850/DCS/PCS Tx

Ceramic and Thin-Film RF Components

		
Series	Thin-film directional couplers – SMD TFSC series	Thin-film capacitors (Z-match) – SMD TFSQ series
Technical data	Size (l x w x t): 0.65 x 0.50 x 0.25 … 1.0 x 0.5 x 0.3 mm	Size (l x w x t): 0.4 x 0.2 x 0.2 mm
Features	– Wide-band – Cellular attenuators included – Ultra-minature and low-profile	– Small size – High Q – Tight tolerance
Applications	Cellular 2.4 GHz WLAN WiMAX	Impedance matching at high frequency

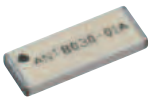
TDK EPCOS

Please read *Important notes* on page 81.

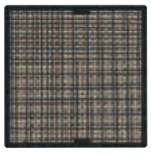
SAW Components

Ceramic and Thin-Film RF Components, LTCC Substrates for LED

Ceramic and Thin-Film RF Components

		
Series	Ceramic chip antennas – SMD ANT series	Multilayer chip antennas – SMD ANT series
Technical data	Size (l x w x t): 2.0 x 1.25 x 0.5 … 12.0 x 2.5 x 4.5 mm	Size (l x w x t): 8.0 x 3.0 x 1.0 mm
Features	– Suitable for installation on modular substrates – Easy frequency adjustment is available by using external elements (chip capacitors and chip inductors)	– Suitable for installation on modular substrates – Monopole type allows high acquisition
Applications	GPS	2.4 GHz WLAN/Bluetooth

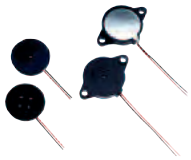
Ceramic and Thin-Film RF Components / LTCC Substrates for LED

		
Series	Ceramic patch antennas – SMD CABPB series	LTCC substrates
Technical data	Size (l x w x t): 7.0 x 7.0 x 1.5 ... 12.0 x 12.0 x 4.0 mm	Integrated ESD protection IEC 61000-4-2: level 4 with 8 kV contact Panel format 8 x 8"
Features	– Suitable for installation on modular substrates – Two bisecting polarized waves are used to avoid dead zones due to nonconformity of the polarized waves	– Thermal conductivity: > 40 W/mK with thermal vias – Mounting techniques: compatible with most standards – flip mount – wire bond – glue – solder – Surface finishing: Ag, Au, Cu variants available
Applications	2.4 GHz WLAN/Bluetooth	Bare die LEDs LED components and LED modules

◣TDK ◣EPCOS

Piezo and Protection Devices

Piezo Actuators for Automotive, Piezo Receivers, Buzzers

Piezo Actuators for Automotive				Piezo Receivers
				
Series	Cu actuators 30 mm (prototype)	Injection actuators 30 mm	Injection actuators 45 mm	Piezoelectric receiver RU
Technical data	Displacement: 40 µm Driving voltage: 160 V Max. temperature: up to +170 °C Useful life: > 3E9 cycles	Displacement: 40 µm Driving voltage: 160 V Useful life: > 1E9 cycles	Displacement: 60 µm Driving voltage: 160 V Useful life: > 1E9 cycles	Sound pressure: 108 dB ±3 Capacitance: 60 nF ±30% Maximum input voltage E_{RMS}: 5 V (Ep-p:14 V) Operating temperature: –20 ... +70 °C Operating humidity RH: 10 ... 80% Terminal construction: Lead wire 10 … 75 MHz CSSP package size (EIA): 1411, 1814, 2520, 3025
Features	– Proprietary piezo technology with copper inner electrodes – Stress release technology	– AgPd technology	– AgPd technology	– Compact, thin sounding body using unimorph piezoelectric vibration plate – No leakage flux
Applications	Diesel injection systems	Diesel injection systems	Gasoline injection systems	Mobile communications

Buzzers		
		
Series	Piezoelectric buzzers PS	Piezoelectric buzzers PB
Technical data	Sound pressure: 60 ... 90 dB(A)/10 cm min. (2 ... 4 kHz)	Sound pressure: 65 … 75 ±5 dB(A)/100 cm (2 ±0.5 ... 3.3 ±0.8 kHz)
Features	Pin terminal/lead, without oscillator circuit – High-performance buzzers that employ unimorph piezoelectric elements – Designed for easy incorporation into various circuits – Extremely low power consumption in comparison to electromagnetic units – Same part can serve as both a musical tone oscillator and a buzzer	Pin terminal/lead, with oscillator circuit – High-performance buzzers with a unimorph piezoelectric ceramic element – Extremely low power consumption in comparison to electromagnetic units – Constructed without switching contacts to ensure long life time and to prevent electrical noise
Applications	Washing machines, computer terminals, devices with speech synthesis output	Fire alarms, smoke detectors, home security systems, call buzzers, car alarm systems, clocks, cash registers

TDK EPCOS

Please read *Important notes* on page 81.

Piezo and Protection Devices

Buzzers, Surge Arresters

Buzzers

			
Series	Electromagnetic buzzers SD	Electromagnetic buzzers SDC	Electromagnetic buzzers – SMD SDR
Technical data	Sound pressure: 80 … 85 dB(A)/10 cm min. (2048 … 4096 Hz)	Sound pressure: 85 dB(A)/10 cm min. (1900 ... 2400 Hz) Operating voltage: 4 … 8 V 8 … 16 V	Sound pressure: 97 dB(A)/10 cm 88 dB(A)/10 cm min. (2 670 Hz)
Features	– Pin type terminal construction enables direct mounting onto printed circuit boards	– Built-in oscillator circuits: output can be produced by merely connecting to a DC power supply – Circuitry utilizes chip-type components for significantly reduced size and high reliability	– Without oscillator circuit – High output level of sound pressure due to high quality parts (yoke and magnets) – Good frequency response and high quality sound
Applications	Clocks, travel watches Keyboards Toys Alarms of automotive equipment	PCs Office automation equipment Medical appliances Household appliances	Mobile phones Pagers

Surge Arresters

			
Series	S20, S30, S50, S80 – SMD	LN8 – Arrester stack	EHV62
Technical data	DC spark-over voltage: 90 ... 500 V Size and footprint (l x w x h): S20: 3.2 x 1.6 x 1.6 mm S30: 4.5 x 3.2 x 2.7 mm S50: 5.7 x 5 x 5 mm S80: 6 x 8.4 x 8.4 mm Nom. discharge current 8/20 µs: 0.5, 2, 5, 20 kA	Max. DC operating voltage: 60 V Nom. discharge current 8/20 µs: 20 kA Nom. discharge current 10/350 µs: 4 kA Size and footprint (l x w x h): 16.3 x 8.4 x 9.5 mm	DC spark-over voltage: 2500 … 4500 V Max. discharge current 8/20 µs: 5 kA Size: Ø 6 x 7 mm
Features	– 2-electrode square design – SMD mounting – Low capacitance – High insulation resistance	– 2-electrode stacked surge arrester – SMD mounting – Excellent follow current limiting characteristic	– High voltage surge arrester – High insulation resisitance – Very small size
Applications	Overvoltage protection in telecommunication appliances, xDSL modems, cable modems, electronic circuits	Protection of DC power supply circuits in telecommunication systems	AC power supply units Photovoltaic systems Automotive (electric and hybrid vehicles)

TDK EPCOS

Piezo and Protection Devices

Surge Arresters

Surge Arresters

			
Series	M5	A8	T8
Technical data	DC spark-over voltage: 75 ... 600 V DC Nom. discharge current: 5 kA Size: Ø 5 x 5 mm	DC spark-over voltage: 75 ... 600 V DC Nom. discharge current: 20 kA Size: Ø 8 x 6 mm	DC spark-over voltage: 90 ... 600 V DC Nom. discharge current: 10 kA Size: Ø 8 x 10 mm
Features	– 2-electrode SMD and leaded version – Low capacitance – High insulation resistance	– 2-electrode SMD and leaded version – Very high discharge current – High insulation resistance	– 3-electrode arresters – High discharge current – High insulation resistance
Applications	Overvoltage protection in telecommunication appliances, xDSL- and cable modems, wireless networks, electronic circuits and industrial applications	Overvoltage protection in telecommunication appliances, fixed line network, wireless networks, electronic circuits and industrial applications	Overvoltage protection in telecommunication appliances, fixed line network, wireless networks and electronic circuits

Surge Arresters

			
Series	T8 with failsafe	T9 – SMD	T9 – SMD with failsafe
Technical data	DC spark-over voltage: 90 ... 420 V DC Nom. discharge current: 10 kA Size: Ø 8 x 10 mm	DC spark-over voltage: 90 ... 420 V DC Nom. discharge current: 5 kA Size: Ø 5 x 7 mm	DC spark-over voltage: 90 ... 350 V DC Nom. discharge current: 5 kA Size: Ø 5 x 7 mm
Features	– 3-electrode arresters with failsafe – High discharge current – High insulation resistance	– 3-electrode arresters in SMD – High insulation resistance	– 3-electrode arresters in SMD with failsafe – High insulation resistance
Applications	Overvoltage protection in telecommunication appliances, fixed line networks, wireless networks and electronic circuits		

TDK EPCOS

Please read *Important notes* on page 81.

Piezo and Protection Devices

Surge Arresters, PTC Thermistors

Surge Arresters

			
Series	H38	L1	V1
Technical data	DC spark-over voltage: > 600 V DC Protection level at 1.2/50 µs, 6 kV: < 1500 V Impulse current (10/350 µs): 100 kA Size: Ø 30 x 30 mm	DC spark-over voltage: > 600 V DC Protection level at 1.2/50 µs, 6 kV: < 1500 V Impulse current (10/350 µs): 100 kA Size: Ø 30 x 12 mm	DC spark-over voltage: > 600 V DC, > 1100 V DC Protection level at 1.2/50 µs, 6 kV: < 1500 V, < 2500 V Max. discharge current: 60 kA Impulse current (10/350 µs): 12 kA Size: Ø 12 x 17 mm
Features	– High impulse current (10/350 µs) – Temporary overvoltage withstand capability – IEC 61643-1		– High insulation resistance – Temporary overvoltage withstand capability – IEC 61643-1
Applications	AC line protection 230/400 V AC, class I, N-PE		AC line protection 230/400 V AC, class I & II, N-PE Power supplies Photovoltaic systems

Surge Arresters

PTC Thermistors

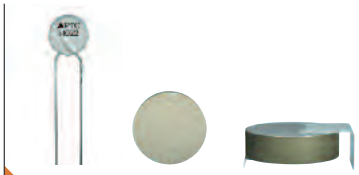
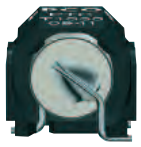
			
Series	EF	Overcurrent protection	Overcurrent protection Lead-free series
Technical data	DC breakdown voltage: 270, 470, 600, 800, 1500, 2500 V Max. discharge current: 10 kA Size: Ø 8 x 6 mm	Max. voltage: 20 … 1 000 V Rated resistance: 0.3 … 7500 Ω Rated current: 8 ... 2100 mA	Max. voltage: 265 V Rated resistance: 10 … 120 Ω Rated current: 50 ... 220 mA
Features	– High insulation resistance – Temporary overvoltage withstand capability – IEC 61643-1	– High thermal stability – No resistance drift for 100 switching cycles	– High thermal stability – No lead contained in ceramic or solder joint – No resistance drift for 100 switching cycles
Applications	AC line protection 230/400 V AC Device protection Power supplies Photovoltaic systems	Overcurrent protection in automotive electronics, power supplies, entertainment and household electronics	

◣TDK ◣EPCOS

Piezo and Protection Devices

PTC Thermistors

PTC Thermistors

			
Series	Overcurrent protection – SMD	Overcurrent protection Telecom	Telecom pair protectors – SMD
Technical data	Max. voltage: 30 … 400 V Rated current: 40 … 310 mA Size (EIA): 0603 … 4032	Max. voltage: 245 V Rated resistance: 4.75 … 50 Ω Matching: 0.5 … 2 Ω	Max. voltage: 245 V Rated resistance: 9 … 75 Ω
Features	– High thermal stability – No resistance drift for 100 switching cycles	– Compliant with ITU standards – No resistance drift after soldering or switching	– Compliant with ITU standards – Matched pair in one housing
Applications	Overcurrent protection in automotive electronics, power supplies, entertainment and household electronics	Overcurrent protection in central office linecards, base stations and customer premises equipment	

PTC Thermistors

				
Series	Telecom pair protectors for GR1089 central office	Switching applications Leaded disk	Switching applications Plastic case	Motor start
Technical data	Max. fault voltage: 600 V Rated resistance: 70 Ω	Max. voltage: 310 … 550 V Rated resistance: 70 …1500 Ω	Max. voltage: 160 … 265 V Rated resistance: 80 … 3200 Ω	Rated voltage: 120 … 230 V AC Max. current.: 6 … 12 A
Features	– Compliant with GR1089 central office – Matched pair in one housing	– Useful life up to 30 000 switching cycles	– Useful life up to 100 000 switching cycles	– Useful life 100 000 switching cycles
Applications	Overcurrent protection in central office linecards	Delayed switching for pre-heating of electrodes in fluorescent lamps, e.g. CFL General purpose delayed switching in entertainment and household electronics	General purpose delayed switching in entertainment, household and industrial electronics	Delayed switch-off of the starter auxiliary winding in single-phase induction motors (e.g. in refrigerators and air conditioners)

◣TDK ◣EPCOS

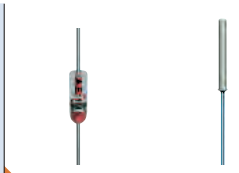
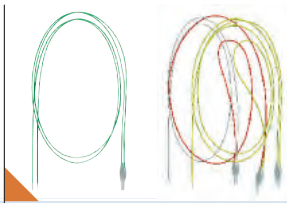
Please read *Important notes* on page 81.

Piezo and Protection Devices

PTC Thermistors

TDK EPCOS

PTC Thermistors

				
Series	Point level sensors	Motor protection Single or triple sensors	Limit temperature sensors	Limit temperature sensors – SMD
Technical data	Max. voltage: 18 … 24 V N = 5000 switching cycles	Max. voltage: 30 V Rated resistance: < 100 … 300 Ω	Max. voltage: 30 V Rated resistance: 100 … 250 Ω Thermal threshold time: 3 … 20 s	Max. voltage: 32 V Rated resistance: 110 … 10 000 Ω Temperature tolerance: ±3 … ±5 °C Size (EIA): 0402 … 0805
Features	– Liquid level detection for oil and water – Hermetically sealed glass case or stainless steel case	– Characteristics for sensing temperatures compliant with DIN 44081/44082 – Customer specific lead lengths on request	– Available as leaded disks or assembly probe	– Selected types available for wave soldering
Applications	Level sensors for indoor and outdoor tanks Industrial applications	Industrial motors and machines protection	Power supplies Lighting equipment	Automotive electronics Entertainment and household electronics Battery packs LED lighting

PTC Thermistors

				
Series	Thermal management in LED driver circuits – SMD	Heating elements	High voltage heating elements	FormFit PTC
Technical data	Max. voltage: 3 V Rated resistance: 110 … 470 Ω Resistance tolerance: ±15% Size (EIA): 0603	Max. voltage: 30 … 500 V Rated resistance: 1 … 1000 Ω	Customized solutions upon request Max. voltage: up to 1 kV	Customized heating elements and systems
Features	– Well-defined R/T curve	– Available as metalized round or rectangular disk	– Available as metalized rectangular disk	– Any kind of 3D structure possible – High accuracy of geometrical parameters – Efficient heating performance
Applications	Protection in LED lighting driver circuits	Automotive air heating systems Electrothermal actuators Cabinet heating	Automotive air or water heating systems Hybrid and electric vehicles	Heating of fluids, gases and solids

TDK EPCOS

Piezo and Protection Devices

Varistors

Varistors

			
Series	Ring Varistors VAR-18	S5, S7, S10, S14, S20	S25
Technical data	VAR-18-P (Plane surface electrode type) VAR-18-S (Side surface electrode type) Voltage: 2.0 ... 38.0 E10 mA (V)	S05: I_{max} 8/20 µs: up to 800 A S07: I_{max} 8/20 µs: up to 1750 A S10: I_{max} 8/20 µs: up to 3.5 kA S14: I_{max} 8/20 µs: up to 6 kA S20: I_{max} 8/20 µs: up to 12 kA Operating voltage V_{RMS}: 11 … 1100 V	I_{max} 8/20 µs: up to 20 kA Operating voltage V_{RMS}: 130 … 750 V
Features	– Positive temperature characteristics of the varistor voltage (E10 value): prevents the varistor voltage from decreasing at high temperatures and large currents flowing through the varistor	– Leaded varistors 5 to 20 mm – High surge current ratings – High energy ratings (2 ms) up to 595 J – For high energy absorption – UL 1449 ed.3	– Leaded varistors 25 mm – High surge current ratings up to 20 kA – High energy ratings (2 ms) up to 1025 J – For high energy absorption – UL 1449 ed.3
Applications	Micro-motors (this lineup includes side-surface electrode varistors that can be used with ultra-compact micro motors)	Industrial applications Power supplies Photovoltaic systems Household electronics Telecommunications	Industrial applications Power supplies Inverters Photovoltaic systems

Varistors

				
Series	Q14, Q20	ETFV/T-series	CU varistors – SMD	SFS14
Technical data	Q14: I_{max} 8/20 µs: 8 kA Q20: I_{max} 8/20 µs: 15 kA Operating voltage V_{RMS}: 130 ... 680 V	T14: I_{max} 8/20 µs: 6 kA T20: I_{max} 8/20 µs: 10 kA ETFV25: I_{max} 8/20 µs: 20 kA Operating voltage V_{RMS}: T14: 130 ... 420 V T20: 130 … 1000 V ETFV25: 115 … 420 V	Size (EIA): 3225, 4032, 4948 Operation voltage V_{RMS}: 14 … 300 V Max. surge current (8/20 µs): 3500 A Max. energy absorption: 82 J (2 ms); Max. power dissipation: 400 mW	I_{max} 8/20 µs: up to 5 kA Operating voltage V_{RMS}: 175 … 385 V
Features	– Leaded varistors 14 and 20 mm – Max. load capacity vs. height – High surge current ratings up to 15 kA – For high energy absorption – UL 1449 ed.3	– ThermoFuse (varistor and fuse in one housing) – Size Ø 14, 20 and 25 mm disks – Space saving – Monitoring option with 3rd lead – UL 1449 ed.3	– Electrically equivalent to leaded types S05, S07, S10 – Lead-free soldering – UL and CSA approved *)	– Plastic housing protected varistor – No flame or rupture – Heat resistance and flame-retardant to UL 94 V-0 – UL 1449 ed.3
Applications	Industrial applications Power supplies Inverters Photovoltaic systems	Industrial applications Power supplies Inverters Power meters	Surge current protection in SMD package for automotive, industrial and telecom applications	Consumer electronics Power supplies

TDK EPCOS

*) UL and CSA pending for CU4948

Please read *Important notes* on page 81.

Piezo and Protection Devices

Varistors

Varistors

			
Series	LS40, LS41, LS42	LS40-E7	LS50
Technical data	LS40: I_{max} 8/20 µs: 40 kA LS41: I_{max} 8/20 µs: 50 kA LS42: I_{max} 8/20 µs: 65 kA Operating voltage V_{RMS}: 130 … 750 V	I_{imp} 10/350 µs: 6.5 kA I_{max} 8/20 µs: 40 kA Operating voltage V_{RMS}: 130 … 460 V	I_{max} 8/20 µs: up to 75 kA Operating voltage V_{RMS}: 130 … 550 V
Features	– Strap terminals – High surge current ratings – High energy ratings (2 ms) up to 1200 J – UL 1449 ed.3	– Strap terminals – High surge current ratings at 10/350 µs – Designed to requirements of IEC 61643-1 – UL 1449 ed.3	– Strap terminals – High surge current ratings – High energy ratings (2 ms) up to 1820 J – UL 1449 ed.3
Applications	Power supplies Photovoltaic systems Wind power Surge protection devices		

Varistors

			
Series	B32, B40, B60, B80	S-AUTO	Energy varistors E32, E41
Technical data	B32: I_{max} 8/20 µs: 25 kA B40: I_{max} 8/20 µs: 40 kA B60: I_{max} 8/20 µs: 70 kA B80: I_{max} 8/20 µs: 100 kA Operating voltage V_{RMS}: 75 … 1100 V	S07: I_{max} 8/20 µs: up to 250 A S10: I_{max} 8/20 µs: up to 500 A S14: I_{max} 8/20 µs: up to 1 kA S20: I_{max} 8/20 µs: up to 2 kA Operating voltage: 16 … 48 V DC Operating temperature: +125 °C	E32: I_n 8/20 µs: 5 kA E41: I_n 8/20 µs: 10 kA Cont. operating voltage: 2.45 ... 4.9 kV
Features	– Disk shaped varistor element potted in plastic housing – Screw terminals – Housing and potting flame retardant to UL94 V-0 – UL 1449 ed.3	– Leaded varistors 7 to 20 mm – High energy absorption – Coating flame retardant to UL 94 V-0	– Size Ø 34 and Ø 42 mm – Glass collar passivation
Applications	Power supplies Photovoltaic systems Wind power Inverters	Automotive electronics Jump-start Load dumps	Gapless arresters Distribution class

◣TDK ◣EPCOS

Piezo and Protection Devices

Inrush Current Limiters, Multilayer Varistors,
Ceramic Transient Voltage Suppressors (CTVS)

Inrush Current Limiters

			
Series	S153, S235, S236, S237, S238, P11, P13, S364, S464	Plastic case	Leaded disks
Technical data	Operating voltage V_{RMS}: 265 V Rated resistance at +25 °C: 1 … 120 Ω I_{max}: up to 20 A Load capacitance: up to 2500 pF	Max. voltage: 260 … 560 V AC Rated resistance: 22 … 100 Ω	Max. voltage: 260 … 560 V Rated resistance: 25 … 500 Ω
Features	– Limiting of inrush current – Wide resistance range – Lead spacing 5 and 7.5 mm – UL approval	– PTC thermistor – Operating cycles at V_{max} (charging of capacitor): 100 000	– PTC thermistor – Operating cycles at V_{max} (charging of capacitor): 50 000
Applications	Power supplies Soft-start motors	Power supplies Household electronics Pumps Drives	

Multilayer Varistors, CTVS

			
Series	MLV and CeraDiodes – SMD	Multilayer chip varistors AVRL	Multilayer chip varistors AVR-M
Technical data	Size (EIA): 0201 … 2220 Max. operating voltage: 5.5 … 80 V DC Typical capacitance: 0.6 … 24 000 pF Max. surge current (8/20 µs): 1 200 A Max. energy absorption (2 ms): 12 000 mJ	Size: 1005 ... 1608 Varistor voltage: 27 … 90 typ. V 1 mA (DC 1 mA) Maximum continuous voltage: 10 … 16 max. V DC	Size: 0402 ... 2012/14A2 Array type (1.4 x 1.0 mm) Varistor voltage: 6.8 … 39 V, 1 mA (DC 1 mA) Max. continuous voltage: 3.5 … 28 max. V DC Maximum energy: 0.002 … 0.3 J max. (10/1000 s) Max. peak current: 0.2 … 100 A max. (8/20 s)
Features	– Bidirectional protection – No derating up to +125 °C – Lead-free soldering – Specific telecom series to IEC 61000-4-5 – Specific wireless clamping voltage series – ESD capability to IEC 61000-4-2 level 4	– No polarity, due to symmetrical current-voltage characteristics – Excellent electrostatic absorption capability – Adopted inner electrode lamination structure	– No polarity, due to symmetrical current-voltage characteristics – Excellent electrostatic absorption capability – Adopted inner electrode lamination structure
Applications	ESD protection for consumer electronics, industrial, telecom and wireless applications	Electrostatic absorption Pulse noise absorption	

◣TDK ◣EPCOS

Please read *Important notes* on page 81.

Piezo and Protection Devices

Multilayer Varistors, Ceramic Transient Voltage Suppressors (CTVS),
NTC Thermistors

Multilayer Varistors, CTVS

		
Series	MLV and CeraDiodes – SMD (2, 4 and 5 fold)	MLV automotive – SMD E series
Technical data	Size (EIA): 0405 … 0612 Max. operating voltage: 5.6 … 22 V DC Typical capacitance: 3 … 56 pF Max. surge current (8/20 µs): 1200 A Max. energy absorption: 12 000 mJ (2 ms)	Size (EIA): 0402 … 2220 Max. operating voltage: 16 … 34 V DC Typical capacitance: 10 … 15 000 pF Load dump and jump start specified Operating temperature: up to +150 °C
Features	– Bidirectional protection – No derating up to +125 °C – Lead-free soldering – Specific ESD/EMI filter series – ESD capability to IEC 61000-4-2 level 4	– Bidirectional protection – No derating up to +150 °C – 100% lead-free – Qualified based on AEC-Q200, rev. C – ESD capability to IEC 61000-4-2 level 4
Applications	ESD protection for automotive, consumer, industrial, and wireless applications Combined ESD protection and EMI filtering for audio lines in consumer and wireless applications	ESD and high-transient overvoltage protection in automotive applications

Multilayer Varistors, CTVS

NTC Thermistors

		
Series	SHCV	Standard – SMD
Technical data	Size (EIA): 1206/1812/2220 Max. operating voltage: 16 … 45 V DC Max. surge current (8/20 ms): 100 … 1200 A Max. load dump energy (10 pulses): 1.5 … 12 J Max. jump start voltage (5 min): 24.5 … 26 V Nominal capacitance (1 kHz, 0.5 V): 220 ... 4700 nF Insulation resistance: ≥ 10 MΩ Operating temperature: up to +125 °C	Size (EIA): 0402 … 0805 / 1206 on request B values: 3455 K … 4575 K R values: 1 … 680 kΩ R tolerance: up to +/-1%
Features	– Lead-free soldering – Qualified based on AEC-Q200, rev. C	– Ni barrier termination – Lead-free soldering
Applications	Combined protection against transient and RFI suppression in a single component for DC motors	Temperature measurement and compensation in consumer electronics, information technology, industrial and wireless applications

◣TDK ◣EPCOS

Piezo and Protection Devices

NTC Thermistors, Nebulizer Units

NTC Thermistors

		
Series	NTCG – SMD	Automotive – SMD
Technical data	Size: 0603 ... 2012 B constant: 3250 ... 4750 K (+25/+85 °C) Nominal resistance value: 30 Ω … 1.0 MΩ (+25 °C) Operating temperature: –40 … +125°C	Size (EIA): 0402/0603/0805 B values: 3455 K, 4000 K, 4480 K R values: 4.7 … 100 kΩ R tolerance: up to ±1%
Features	– Good solderability – Layered internal electrode structure – Wide range of resistances and B constants – Good stability of resistance value after soldering	– Qualification based on AEC-Q200, Rev. C – Temperature measurement up to +150 °C – Ni barrier termination – Lead-free soldering
Applications	Temperature measurement and compensation	Temperature measurement and compensation in automotive electronics

Nebulizer Units

	
Series	Ultrasonic nebulizer units NB
Technical data	Rated voltage: 48 V AC/12 V DC Power consumption: 13.2 max./30 W Mist output ratio: (150 + 100, –50) x 10^{-3} ... 450 x 10^{-3} min. l/h
Features	NB-59S-09S – Compact size – Compliance with radio law noise regulations – Reduction of harmonic component noise – Parallel connection to one transformer is supported – Provides DC 48 V output NB-80E-01 – Compact, with highly reliable circuitry – Separate transducer and drive circuit sections provide superior layout versatility
Applications	Household appliances Medical appliances

TDK EPCOS

Please read *Important notes* on page 81.

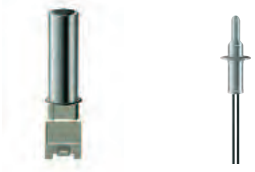
Sensors

NTC Sensors

NTC Sensors

			
Series	NTC thermistors with lead spacing	Mini sensors with bendable wires	Glass-encapsulated sensors
Technical data	Operating temperature: –55/+155 °C Resistance value: 15 Ω ... 470 kΩ Accuracy (%): $\Delta R_R/R_R = 1$, $\Delta R_B/R_B = 1$ Head size: 2.5 ... 6.0 mm Diameter of lead wires: 0.4 ... 0.6 mm Lead spacing: 2.5 or 5.0 mm Delivery mode: tape & reel; bulk Coating: lacquer, epoxy	Operating temperature: –55/+155 °C Resistance value: 2 ... 100 kΩ Accuracy (%): $\Delta R_R/R_R = 1$, $\Delta R_B/R_B = 1$ Head size: 2.41 ... 2.8 mm Diameter of lead wires: 0.25 mm Delivery mode: bulk Coating: epoxy	Operating temperature: –55/+300 °C Resistance value: 2 ... 100 kΩ Accuracy (%): $\Delta R_R/R_R = 1$, $\Delta R_B/R_B = 1$ Head size: 0.9 ... 3.0 mm Diameter of lead wires: 0.15 ... 0.3 mm Delivery mode: bulk Coating: glass Insulation voltage: 500 V/1 s
Features	– Available with insulated leads – High measuring accuracy – Lead-spacing – Rugged design – Cost effective	– Available with insulated leads – Special version with improved resistance to humidity available – High measuring accuracy – Tight B value tolerance available – Available with long bendable leads – UL approval (S861, S867)	– Available with insulation of head and leads – High measuring accuracy – Very short response time
Applications	Temperature measurement and compensation	Temperature measurement	

NTC Sensors

			
Series	Glass-encapsulated sensors for media contact	Cable-bound temperature sensors	Water temperature sensors
Technical data	Operating temperature: –55/+260 °C Resistance value: 10 ... 30 kΩ Accuracy (%): $\Delta R_R/R_R = 1$, $\Delta R_B/R_B = 1$ Head size: 3.0 mm Diameter of lead wires: 0.3 mm Delivery mode: bulk Coating: glass Insulation voltage: 500 V/1 s	Operating temperature: –40/+80 °C Resistance value: 5 … 12 kΩ Accuracy (%): $\Delta R_R/R_R = 2$, $\Delta R_B/R_B = 1.5$ Head size: 5.4, 7, 8, 9 mm Cable length: up to 2800 mm	Operating temperature: –10/+200 °C Resistance value: 4.8 ... 48 kΩ Accuracy (%): $\Delta R_R/R_R = 2$, $\Delta R_B/R_B = 1$
Features	– With insulation of head and leads for specified media resistance – Tests with several medias specified (e.g. oil, fuel) – High measuring accuracy	– Highly resistant to water/moisture – Construction based on DIN EN 60 730-1/VDE protection class 2 (M2020) – UL approved (M2020: file E69802)	– Suitable for use in corrosive environments – Highly resistant to water/moisture – UL approved (K276) – VDE approval (K276: DIN EN 60 539-1:2002)
Applications	Temperature measurement		

TDK EPCOS

Sensors

NTC Sensors

NTC Sensors

			 
Series	Screw-on temperature sensors	Pipe mounted temperature sensors	Evaporator sensors
Technical data	Operating temperature: –55/+300 °C Resistance: 5 … 100 kΩ Accuracy (%): $\Delta R_R/R_R$ = 2, $\Delta R_B/R_B$ = 1	Operating temperature: +5/+100 °C Resistance: 10 kΩ Accuracy (%): $\Delta R_R/R_R$ = 3, $\Delta R_B/R_B$ = 1 For pipe diameter: 13.5 … 22 mm Insulation voltage: 500 V AC	Operating temperature: –40/+90 °C Resistance: 2 … 10 kΩ Accuracy (%): $\Delta R_R/R_R$ = 1, $\Delta R_B/R_B$ = 1
Features	– Good thermal coupling through metal tag – Thermistor encapsulated in metal tag case – M703: UL approval (E69802)	– Fast and easy mounting – Short response time – Good thermal coupling to pipes	Special version with glass-encapsulated NTC: – Very short response time < 3 s in water and < 4 s in air 5 m/s – Highly humidity-resistant (designed for 10 000 h water immersion at +80 °C)
Applications	Surface temperature measurement	Temperature measurement of fluids in pipes	Temperature measurement at evaporator

NTC Sensors

	 		
Series	Air duct sensors	Ambient temperature sensors	Solar sensors
Technical data	Operating temperature: –40/+90 °C Resistance value: 2 … 30 kΩ Accuracy (%): $\Delta R_R/R_R$ = 1, $\Delta R_B/R_B$ = 1	Operating temperature: –40/+85 °C Resistance value: 2 … 30 kΩ Accuracy (%): $\Delta R_R/R_R$ = 1, $\Delta R_B/R_B$ = 1	Operating temperature: –40/+100 °C Tolerance: ±15%
Features	Plastic version with clip mounting – Fast response time – Reduction of weight – Simplified recycling – Clips for mounting (no sealing)	– Humidity resistant over-molded design – High resistance to water splashes IPx9k – Cable-based design – Designed for 2000 h water immersion at +80 °C	– Mono and dual-zone sensors – High resolution and sensitivity – Measurement of solar radiation on the passenger compartment for the HVAC system – Angular characteristics – Analog signal
Applications	Measurement of average air temperature	Outside temperature measurement	Measurement of solar radiation and direction

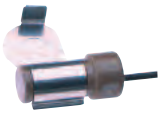
TDK EPCOS

Please read *Important notes* on page 81.

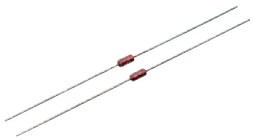
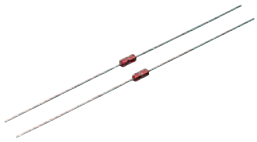
Sensors

NTC Sensors

NTC Sensors

			
Series	NTC sensors NTCGP series	NTC sensors NTCDP series	NTC sensors – ABS Plastic case NTCDP series
Technical data	Nominal resistance value: 15 Ω ... 50 kΩ (25 °C) B constant: 3950 K (25/50 °C) Operating temperature: –20 ... +80 °C Thermal time constant: 6 s max. (in still water) Heat dissipation constant: 2.8 mW/°C (in still air)	Nominal resistance: R_{25} = 10 kΩ ±5% B constant: $B_{25/85}$ = 4000 K ±2% Operating temperature: –40 ... +150 °C Thermal time constant: 15 s max. (in still water) Heat dissipation constant: 3.3 mW/°C (in still air)	Nominal resistance: R3 = 5.6 kΩ ±0.2 kΩ (3 °C) B constant: $B_{3/50}$ = 3850 K ±100 K Operating temperature: –40 ... +85 °C Thermal time constant: 30 s max. (in still water) Heat dissipation constant: 2.5 mW/°C (in still air)
Features	– Resin DIP type with built-in multilayer element – Good heat responsiveness due to its small size	– Excellent reliability, high responsiveness, high heat resistance – 3 types are available Epoxy (Ø 5.5 mm): Priority given to heat responsiveness Epoxy (Ø 6.0 mm): Compatible with copper case type of Ø 6.0 mm Epoxy screw fix: superior surface temperature detection	– Plastic case that is compliant to Food Hygiene Act – Highly waterproof – Inexpensive
Applications	Temperature measurement	Temperature measurement Surface temperature detection	Home appliances Consumer electronics

NTC Sensors

			
Series	NTC sensors NTCDP series	NTC sensors NTCDS series	NTC sensors NTCGF series
Technical data	Nominal resistance: R_{20} = 2.5 kΩ ±3% (20 °C) B constant: $B_{20/80}$ = 3520 K ±2% Operating temperature: –40 ... +165 °C Thermal time constant: 60 s max. (in still oil) Heat dissipation constant: 5 mW/°C (in still air)	Size: 3.0 × Ø 1.8 mm … 4.0 × Ø 2.0 mm Operating temperature: –40 ... +250 °C (Lead wire Ni plating), –40 ... +125 °C (Lead wire Sn plating) Heat dissipation constant: 1 … 2 mW/°C (in still air) Thermal time constant: 10 … 20 s max. (in still air) Insulation resistance (between lead and glass): 50 MΩ min. (DC, 500 V)	Size: 6.0 × Ø 2.0 mm Resin DIP type Operating temperature: –30 ... +100 °C Heat dissipation constant: 4 mW/°C (in still air) Thermal time constant: 30 s max. (in still air) Insulation resistance (between lead and thermistor): 5 MΩ min. (DC, 500 V)
Features	High heat resistance Excellent oil resistance	Features a glass-sealed construction identical to DHDs (Double Heatsink Diodes) They are highly reliable and resistant to high relative humidity Tight tolerances are maintained in resistance vs. temperature characteristics	
Applications	Automotive electronics Temperature measurement of oil	Automotive electronics, home appliances, consumer electronics	

TDK EPCOS

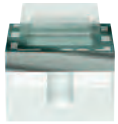
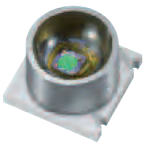
Sensors

NTC Sensors, Pressure Sensors

NTC Sensors

		
Series	E Motor temperature sensor	Battery temperature sensor
Technical data	Operating temperature: –40 … +200 °C Resistance value: 10 kΩ/25 °C	Operating temperature: –40 … +100 °C Resistance value: 10 kΩ/25 °C
Features	– Measurement directly in the winding of the motor – Mechanically protected by plastic housing – High insulation voltage up to 2000 V – Available with different connectors, RT-curves and cable lengths	– Screw-on sensor for battery – Mechanically protected by plastic housing – Easy mounting and good thermal coupling – Available with different connectors, RT-curves and cable lengths
Applications	Temperature measurement in stator of electric motor	Temperature measurement of batteries in electric cars

Pressure Sensors

			
Series	Sensor dies C32	MiniCell	ASB/ASA/ASR – SMD
Technical data	Pressure: 400 mbar … 40 bar Operating temp.: –40 … +135 °C Non-linearity: typ. 0.2% FS Output span: typ. 120 mV Size: 1.65 x 1.65 mm	Pressure: 0.5 … 16 bar Operating temp.: –40 … +140 °C Non-linearity: typ. 0.5% FS Ratiometric output signal	Pressure: 1.2 … 2.5 bar Operating temp.: –40 … +125 °C Non-linearity: typ. 0.1% FS Supply voltage: 2.7… 5.5 V Size: 4.3 x 4.3 x 2.4 mm for absolute and 4.3 x 7.9 x 3.0 mm for gauge measurement
Features	– Very small and variable pressure sensor die – Available for absolute, gauge and rear side absolute measurements	– Differential pressure – Pressure transmitter with high media resistance for both pressure ports with stainless steel diaphragms	– Analog V1 or VR voltage output – Minimized pressure transmitter
Applications	Automotive, medical, industrial and consumer applications	Industrial, medical and automotive applications	

TDK EPCOS

Please read *Important notes* on page 81.

Sensors

Pressure Sensors, Humidity Sensors, Applied Sensors

TDK EPCOS

Pressure Sensors		Humidity Sensors	
			
Series	Transmitters AK	Humidity sensors units CHS series	Humidity sensors CHS-ESS series
Technical data	Pressure: 25 mbar … 25 bar Operating temp.: –30 … +85 °C Non-linearity: typ. 0.5% FS	Standard operating voltage: 5 V Operating current: 0.6 mA Response time: 1 min Recommended operating temperature: +5 ... +45 °C	Rated voltage: 5 V max. Rated power: 0.5 mW Response time: 1 min Operating temperature: 0 ... +60 °C
Features	– Tube or thread connection – Packaged pressure sensor die for low pressure ranges – For gauge measurement	– Unit type – Humidity sensing characteristics exhibit virtually no hysteresis – Low current consumption – Output DC: 1 V at 100% RH; relative humidity can be read directly with a voltmeter – All-in-one construction integrates sensor with support circuitry – The module operates off a 5 V power supply	– Element type – Small and responsive – Minimal variation for excellent detection accuracy – Highly resistant to water and gases
Applications	Industrial, medical and automotive applications	Industrial and measuring equipment Consumer and office equipment	Air conditioners, humidifiers, dehumidifiers, dryers, refrigerators, PPC, LBP

Applied Sensors		
		
Series	Toner density/quantity sensors TS-A, TS-K, TS-L series	Powder level sensors TSP
Technical data	Rated voltage: 24 V Power supply current: 20 mA max. Rated control voltage: 7 V Control current: 10 mA max. Analog output voltage: 2 ... 3.3 V Digital output voltage: 0.5 ... 4.5 V	Operating voltage: 5 V Input current: 20 mA max. Sensor level: 5 mm Output voltage: High 4.5 V min. Low 0.5 V max.
Features	– One-sided substrate type: TS-A, TS-K series – Double-sided substrate type: TS-L series – Sensor adjustment point can be installed at any location – Operating point can be reset easily – Microprocessor in the printer or copier can vary the control lead voltage for automatic adjustment	– 2-terminal type separate excitation oscillation formula – Piezoelectric ceramic sensor element – Die cast finish – Highly resistant to external vibrations – Stable detection characteristics – Can detect both magnetic and non-magnetic powders
Applications	Toner density, quantity in printers	Toner detectors for copiers, laser printers Detectors for coffee and other powders in automatic beverage vending machines, detectors for powders

TDK EPCOS

Sensors

Applied Sensors

Applied Sensors

		
Series	Powder level sensors LTS series	Gear-tooth sensors GTS series
Technical data	Operating voltage: 5 V ±0.5 Input current: 20 mA max. Sensor level: 5 mm ±3 Output voltage: High 4.5 V min. Low 0.5 V max.	Operating temperature: –30 ... +150 °C Operating voltage: 5 ... 12 V Output voltage: VHIGH-VCC –0.5 V/VLOW 0.4 V Response frequency: 6 Hz ... 20 kHz
Features	– 3-terminal type separate excitation oscillation formula – Piezoelectric ceramic sensor element – Diecast finish – Highly resistant to external vibrations – Stable detection characteristics – Can detect both magnetic and non-magnetic powders	– Low cost sensor – Measures the rotation speed of gear and rotation angle of cam crank – Highly precise digital output due to integration of components into an IC package – Designed to tolerate extreme temperatures (–30 ... +150 °C) – Probe distance can be varied over a wide range – Built-in surge voltage suppression circuit
Applications	Toner detectors for copiers, laser printers Detectors for coffee and other powders in automatic beverage vending machines, detectors for powders	Automotive: angle, speed sensing

Applied Sensors

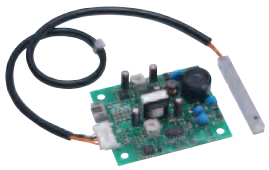
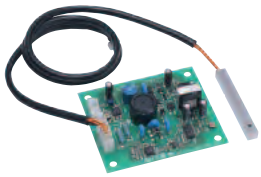
		
Series	Current sensors – Closed-loop hall sensors SAA0032	Current sensors – Closed-loop hall sensors SAA0041
Technical data	Measurement range: ±200 A Supply voltage: +5 V Offset: ±0.005 V / 2 V Gain error: ±1.0% Total error: ±2.2 A Response time: 10 ms Operating temperature: –30 … +80 °C Dimensions: 94 x 55 x 25, Ø 16 mm	Measurement range: ±32 A Supply voltage: +5 V Offset: ±0.02 V / 2 V Gain error: ±1.0% Total error: ±1.0 A Response time: < 7 µs Operating temperature: –40 … +105 °C Dimensions: 25 x 30 x 15 mm
Features	– EV high voltage battery management – High accuracy – Excellent temperature properties	– EV on-board battery charger management – Fast and high accuracy – On-board with soldering
Applications	Automotive: E-Mobility	Automotive: E-Mobility

TDK EPCOS

Sensors

Applied Sensors

Applied Sensors

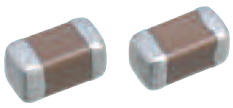
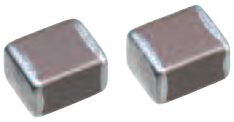
		
Series	Surface potential sensors EFS-22D series	Surface potential sensors EFS-31D series
Technical data	Measured voltage range Ve: –1000 ... 0 V Power supply voltage: 24 V ±10% Output voltage (measured voltage) V0: 2.5 (–500), 4.5 (–900) V Output variation ΔV0: ±0.05 Response time: 20 ms max. Operating temperature: 0 ... +50 °C	Measured voltage range Ve: 0 ... +1000 V Power supply voltage: 24 V ±10% Output voltage (measured voltage) V0: 0 (0), 2.5 (+500), 4.5 (+900) V Output variation ΔV0: ±0.05 Response time: 20 ms max. Operating temperature: 0 … +50 °C
Features	– Stable output performance is maintained for long periods – Quick responsiveness of high speed 11 ms (typical) realized – The range of detector output (0 to 4.5 V) fluctuations is limited to less than ±0.05 V	– Stable output performance is maintained for long periods – Quick responsiveness of high speed 11 ms (typical) realized – The range of detector output (0 to 4.5 V) fluctuations is limited to less than ±0.05 V
Applications	Surface electrical potential measurements in various equipment, including drum or paper in a copier, laser printer	Surface electrical potential measurements in various equipment, including drum or paper in a copier, laser printer

◣TDK ◣EPCOS

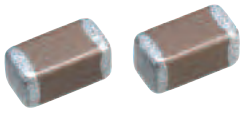
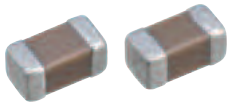
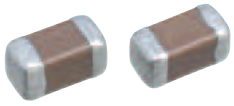
Ceramic Capacitors

Multilayer Ceramic Capacitors

Multilayer Ceramic Capacitors

			
Series	General application – SMD C, CGA series	Mid voltage – SMD C, CGA series	High voltage – SMD C series
Technical data	Size: 0402 ... 5750 Temp. characteristic: CH, C0G, JB, SL, X7S, X7R, X5R, X6S Rated voltage: 4 ... 50 V Capacitance: 0.2 pF ... 100 µF	Size: 1005 ... 5750 Temp. characteristic: C0G, X7R, X7S, X6S, X7T Rated voltage: 100 ... 630 V Capacitance: 100 pF ... 15 µF	Size: 3216 ... 5750 Temp. characteristic: C0G, X7S, X7R Rated voltage: 1 ... 3 kV Capacitance: 10 pF ... 47 µF
Features	– Wide range of case size and superior dimension precision – Available in EIA class 1 and 2 dielectrics up to 50 V	– Unique design allows for higher voltage in smaller case size – Available in 100, 250, 450 and 630 V	– Advance design provides improved withstanding voltage – Available rating up to 3000 V
Applications	Automotive electronics Communications Consumer electronics Industrial applications Green Energy	Automotive electronics Communications Consumer electronics Industrial applications Green Energy	Industrial applications Green Energy

Multilayer Ceramic Capacitors

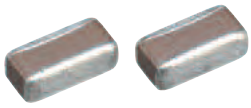
			
Series	High temperature – SMD C, CGA series	Serial design – SMD CEU series	Soft termination – SMD C series, CGA series
Technical data	Size: 1005 ... 3225 Temp. characteristic: X8R Rated voltage: 25 ... 100 V Capacitance: 150 pF ... 10 µF	Size: 1608 and 2012 Temp. characteristic: X7R Rated voltage: 50, 100 V Capacitance: 1 ... 100 nF	Size: 2012 … 7563 Temp. characteristic: X7R, X7S, X7T Rated voltage: 16 ... 630 V Capacitance: 10 nF ... 100 µF
Features	– Stable temperature characteristics up to 150 °C – Highly precise temperature performance (±7.5%) up to +125 °C	– 2 series-connected capacitors in one component – Improved bending resistance and temperature cycle performance – Ultra high reliability design for automotive battery line applications	– Improved bending resistance and temperature cycle performance – Termination technology available for most case sizes including arrays
Applications	Automotive electronics Industrial applications Green Energy	Automotive electronics Communications Consumer electronics Industrial applications Green Energy	Automotive electronics Communications Consumer electronics Industrial applications Green Energy

TDK EPCOS

Ceramic Capacitors

Multilayer Ceramic Capacitors

Multilayer Ceramic Capacitors

		
Series	Megacap type – SMD CKG series	Flip type – SMD C series
Technical data	Size: 3225 … 5750 Temp. characteristic: X5R, X7R, X7S, X7T Rated voltage: 16 ... 630 V Capacitance: 47 nF ... 100 µF	Size: 0510 ... 1632 Temp. characteristic: X6S, X7R, X5R, X7S Rated voltage: 4 ... 50 V Capacitance: 10 nF ... 10 µF
Features	– Advance design for twice the capacitance on single footprint – Improved vibration and thermal/mechanical stress performance – Lower ESR and ESL than ALU and TA capacitors	– Flipped geometry permits lower inductance than standard capacitor – Special design allows for adequate high frequency current to IC
Applications	Automotive electronics Communications Consumer electronics Industrial applications Green Energy	Communications Consumer electronics

Multilayer Ceramic Capacitors

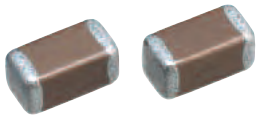
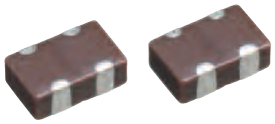
		
Series	2-in-1 array; 4-in-1 array – SMD CKC series	High Q – SMD C series
Technical data	Size: 1410 … 3216 Temp. characteristic: C0G, X7R, X5R Rated voltage: 6.3 … 50 V Capacitance: 10 pF … 2.2 µF	Size: 0603 … 1608 Temp. characteristic: C0G Rated voltage: 25 … 100 V Capacitance: 0.2 … 1000 pF
Features	– Allows for reduction of PCB space and mounting time – Unique electrode design reduces crosstalk – Also available in soft termination for higher reliability performance	– Design with higher Q factor than standard capacitors – Excellent attenuation and high self-resonance frequency (SRF)
Applications	Communications Consumer electronics	Communications Consumer electronics

◣TDK ◣EPCOS

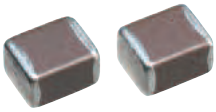
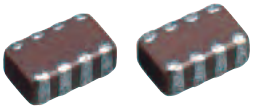
Ceramic Capacitors

Multilayer Ceramic Capacitors

Multilayer Ceramic Capacitors

			
Series	Open mode – SMD CGA series	Feed through – SMD CKD series	2-in-1 array & soft termination – SMD CKG series
Technical data	Size: 2012 … 4532 Temp. characteristic: X8R, X7R Rated voltage: 16 … 630 V Capacitance: 1000 pF … 22 µF	Size: 0402 … 1206 Temp. range: up to +125 °C Rated voltage: 6.3 … 50 V Capacitance: up to 22 µF	Size: 1410, 2012 Temp. characteristic: C0G, X7R, X5R Rated voltage: 6.3 … 50 V Capacitance: 10 pF … 2.2 µF
Features	– Unique design allows increased resistance to mechanical bending – Improved performance in vibration and electrical stresses	– Optimized for noise bypass with signal and power source circuits – Can be used for meeting EMC requirements – Ideal for use at higher frequencies due to low parasitic inductance	– Improved ruggedness against mechanical stress (e.g. bending, dropping) – Allows reduction of PCB space and mounting time
Applications	Automotive electronics	Communications Consumer electronics Green Energy	Automotive electronics Communications Consumer electronics

Multilayer Ceramic Capacitors

		
Series	Conductive epoxy – SMD CGA series	Ultra low inductance – SMD CLL series
Technical data	Size: 1005 … 3225 Temp. characteristic: C0G, X7R, X8R Rated voltage: 25 … 100 V Capacitance: 10 pF … 10 µF	Size: 1608 … 2012 Temp. characteristic: X7R, X7S Rated voltage: 4 … 10 V Capacitance: 100 nF … 4.7 µF
Features	– AgPdCu termination for conductive glue mounting – Improved mechanical/thermal strength when used with conductive glue	– Unique internal structure allows cancelation of magnetic fields to reduce equivalent series inductance – Eight-sided terminal electrode design in one capacitor
Applications	Automotive electronics	Communications Consumer electronics

TDK EPCOS

Please read *Important notes* on page 81.

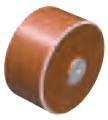
Ceramic Capacitors

Leaded Ceramic Capacitors, Ultra-High Voltage Capacitors

Leaded Ceramic Capacitors

		
Series	Dipped radial FK series	Mid-high voltage CK45 series
Technical data	Temp. characteristic: C0G, X7R, X5R, C0G, X7R (mid voltage) Rated voltage: 6.3 ... 50 V (general use), 100 ... 630 V (mid voltage) Capacitance: 1 pF ... 100 µF	Temp. characteristic: B, E Rated voltage: 1 ... 3 kV Capacitance: 100 pF ... 10 nF
Features	– Dipped radial leaded ceramic capacitors are multilayer ceramic capacitors attached with solder coated wire leads and dipped with UL94V-0 approved resin – Provides large electrostatic capacitance – Leads are formed with a “kink” to achieve consistent insertion heights and to facilitate the release of gases during soldering for dramatically improved solderability – Taping specifications for automatic insertions can be met	– High reliability – Low dissipation factor, and decreased self-heating temperature in high frequency and high voltage applications
Applications	General use	

Leaded Ceramic Capacitors / Ultra-High Voltage Capacitors

		
Series	Mid-high voltage CD/ CS series	Ultra-high voltage UHV series
Technical data	CD series Temp. characteristic: B, E Rated voltage: 250 V Capacitance: 100 pF ... 4.7 nF CS series Temp. characteristic: B, E, F Rated voltage: 250 V Capacitance: 100 pF ... 10 nF	Temp. characteristic: Z5T Rated voltage: 20 ... 50 kV Capacitance: 100 ... 4000 pF
Features	– Compliant with safety standards – Flame-resistant, reinforced outer insulation prevents fires, electrical shock, and other potential hazards	– Low dissipation and excellent voltage/capacitance characteristics – Epoxy-encapsulated to meet requirements of high voltage applications
Applications	AC lines	High voltage power supplies Laser equipment

TDK EPCOS

Film Capacitors

Medium Power Film Capacitors

Medium Power Film Capacitors

			
Series	MKT boxed B32520 … B32529	MKT uncoated (SilverCap) B3256 …, B3257...	MKT coated (stacked/wound) B32591 … B32594
Technical data	Rated capacitance: 1.0 nF … 220 µF Rated voltage: 63 ... 630 V DC 40 … 200 V AC	Rated capacitance: 1.0 nF … 33 µF Rated voltage: 63 ... 420 V DC 40 … 200 V AC	Rated capacitance: 10 nF … 10 µF Rated voltage: 100 ... 630 V DC 63 … 220 V AC
Features	Dielectric polyester (PET) offers: – Higher density of capacitance/mm³ and +125 °C operating temperature vs polypropylene (PP) dielectric – Lower dissipation factor, higher current capability (RMS and peak), longer useful life and parameter stability vs aluminum electrolytic dielectric		
	– Plastic case and epoxy resin sealing (UL94V-0) – Mechanical and environmental strength	– Shape flexibility – Special dimensions on request – B3257... for ignition	– Reduced and enlarged lead spacing available – Crimped and straight wire terminals
Applications	Blocking, coupling, decoupling, DC link, smoothing, ignition in industrial, lighting, automotive, information technology, entertainment electronics and household appliances		

Medium Power Film Capacitors

			
Series	MKP axial B32669	MKP boxed B32652 ..., B32656 ...	MKP dipped B32612 … B32614
Technical data	Rated capacitance: 1 … 10 µF Rated voltage: 250 … 400 V AC	Rated capacitance: 0.47 nF … 8.2 µF Rated voltage: 160 ... 2000 V DC 90 … 1000 V AC	Rated capacitance: 1.0 nF … 2.2 µF Rated voltage: 250 ... 2000 V DC 160 … 700 V AC
Features	Dielectric: Polypropylene (PP) offers: – Higher dielectric strength vs. polyester (PET) dielectric – Lower dissipation factor, higher current capability (RMS and peak) and parameter stability vs. polyester dielectric – Epoxy resin sealing and plastic box case are UL94V-0 flame retardant materials		
	– Low profile	Mechanical stability High RMS and peak current capability	Crimped and straight wire terminals High RMS and peak current capability
Applications	AC filtering in industrial, lighting, automotive, information technology, entertainment electronics and household appliances	General purpose, snubbering, resonance, ignition, AC and DC filtering in industrial, lighting, automotive, entertainment electronics and household appliances	

TDK EPCOS

Film Capacitors

Medium Power Film Capacitors

Medium Power Film Capacitors

		
Series	MKP boxed (PFC) B32671P…, B32673P… B32671Z…, B32673Z…	MKP boxed (high V AC-temp.) B32671L…, B32672L…
Technical data	Rated capacitance: 68 nF … 2.2 µF Rated voltage: 450 ... 630 V DC 160 … 200 V AC	Rated capacitance: 1 nF … 1 µF Rated voltage: 250 ... 2000 V DC 160 … 900 V AC
Features	Dielectric: Polypropylene (PP) offers: – Higher dielectric strength vs. polyester (PET) dielectric – Lower dissipation factor, higher current capability (RMS and peak) and parameter stability vs. polyester dielectric – Epoxy resin sealing and plastic box case are UL94V-0 flame retardant materials	
	– Small size – For (passive) power factor correction in power supplies, LED ballasts	– Small size – For high frequency AC loads and pulses
Applications	Decoupling, coupling, switching in industrial, lighting, automotive, entertainment electronics and household appliances	Snubbering, resonance in industrial, lighting, automotive, entertainment electronics and household appliances

Medium Power Film Capacitors

			
Series	MKP DC link HD B32774 … B32778	MKP DC link HP B32674 … B32678	MKP snubber B32656S…
Technical data	Rated capacitance: 1.5 … 200 µF Rated voltage: 450 ... 1300 V DC	Rated capacitance: 470 nF … 60 µF Rated voltage: 300 ... 875 V DC	Rated capacitance: 47 nF … 3.3 µF Rated voltage: 850 ... 2000 V DC 450 … 800 V AC
Features	Dielectric: Polypropylene (PP) offers: – Higher dielectric strength vs. polyester (PET) dielectric – Lower dissipation factor, higher current capability (RMS and peak) and parameter stability vs. polyester dielectric – Epoxy resin sealing and plastic box case are UL94V-0 flame retardant materials		
	– Small size – High density of capacitance per volume	– High power: density of I_{RMS} current per capacitance	– Very low ESL, ESR – Thermal, mechanical stability
Applications	DC link, DC filtering, decoupling in industrial, lighting, automotive, entertainment electronics and household appliances		Snubbering IGBT module in industrial, lighting, automotive, entertainment electronics and household appliances

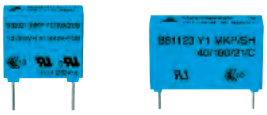
TDK EPCOS

Film Capacitors

Medium Power Film Capacitors

Medium Power Film Capacitors

			
Series	MKP AC filtering B32794 … B32798	MFP dipped B32632 … B32634	MFP boxed B32686A…
Technical data	Rated capacitance: 0.82 … 75 µF Rated voltage: 250 … 400 V AC, 630 … 1050 V DC	Rated capacitance: 0.47 nF … 0.33 µF Rated voltage: 630 … 3000 V DC, 300 … 750 V AC	Rated capacitance: 22 nF … 0.47 µF Rated voltage: 1000 ... 2000 V DC, 400 … 500 V AC
Features	Dielectric: Polypropylene (PP) offers: – Higher dielectric strength vs. polyester (PET) dielectric – Lower dissipation factor, higher current capability (RMS and peak) and para - meter stability vs. polyester dielectric – Epoxy resin sealing and plastic box case are UL94V-0 flame retardant materials – Optimized AC voltage performance – High ripple current/ frequency capability	– Polypropylene (PP) film dielectric metallized on one side and metal foil electrodes – It allows maximum pulse handling capability together with maximum ripple current and frequency – Crimped and straight wire terminals	– Plastic case (UL94V-0) – Mechanical stability
Applications	LC, LCL ouput filters in industrial, lighting, automotive, entertainment electronics and household appliances	Snubbering, resonance in industrial, lighting and medical electronics with very high pulse, frequency and current demand	

			
Series	MFP snubber B32686S…	X2/X1 EMI suppression B32921 … B32928, B32911 … B32916	Y2/Y1 EMI suppression B32021 … B32026, B81123
Technical data	Rated capacitance: 22 nF … 0.68 µF Rated voltage: 1000 ... 2000 V DC 400 … 500 V AC	X2: Rated capacitance: 10 nF … 45 µF Rated voltage: 305 V AC X1: Rated capacitance: 10 nF … 6.8 µF Rated voltage: 330 V AC	Y2: Rated capacitance: 1 nF … 1 µF Rated voltage: 300 V AC Y1: Rated capacitance: 1 … 10 nF Rated voltage: 250 V AC
Features	– Polypropylene (PP) film dielectric metalized on one side and metal foil electrodes – Provides maximum pulse handling capability together with the maximum ripple current and frequency – Very low ESL, ESR – Thermal, mechanical stability	Standard EMI suppression capacitor for EMC filtering	
Applications	Snubbering IGBT module in industrial, lighting and medical electronics with very high pulse, frequency and current demand	Across-the-line applications in industrial, lighting, medical, entertainment electronics and household appliances	

TDK EPCOS

Please read *Important notes* on page 81.

Film Capacitors

Medium Power Film Capacitors, DC Link, DC Filtering Film Capacitors, UPS Film Capacitors

TDK EPCOS

Medium Power Film Capacitors		DC Link, DC Filtering Film Capacitors	
			
Series	MKT AC HD B32932 … B32936	Inverter B32350I	MKP DC link HD B32774 … B32778
Technical data	Rated capacitance: 47 nF … 2.2 µF Rated voltage: 305 V AC	Rated capacitance: 50 … 260 µF Rated voltage: 350 … 1100 V DC	Rated capacitance: 1.5 … 110 µF Rated voltage: 450 ... 1300 V DC
Features	+85 °C/85% RH/1000 h/240 V AC X2 safety class per UL/ IEC (C ≤ 2.2 µF) High stability on capacitance	– Plastic can – Terminals: 2 terminals, 5 pin or customer specific – Optimized for PCB mounting – Segmented film safety function optional	Dielectric: Polypropylene (PP) offers: – Higher dielectric strength vs. polyester (PET) dielectric – Lower dissipation factor, higher current capability (RMS and peak) and parameter stability vs. polyester dielectric – Epoxy resin sealing and plastic box case are UL94V-0 flame retardant materials – Small size – High density of capacitance per volume
Applications	Capacitive power supplies AC voltage dividers Serial connection with mains	Air conditioner systems, for ripple smoothening after AC/DC converters, as DC link in inverters	DC link, DC filtering, decoupling in industrial, lighting, automotive, entertainment electronics and household appliances

DC Link Film Capacitors		UPS Film Capacitors	
			
Series	MKP DC link HP B32674 … B32678	Box type B32354S	MKP AC filtering B32794 … B32798
Technical data	Rated capacitance: 470 nF … 60 µF Rated voltage: 300 ... 875 V DC	Rated capacitance: 20 … 22 µF*) Rated voltage: 350 V AC*)	Rated capacitance: 0.82 … 75 µF Rated voltage: 250 … 400 V AC
Features	– High power: density of I_{RMS} current per capacitance	– Plastic can – Terminals: 4 pin – Optimized for PCB mounting – Segmented film safety function optional	Dielectric: Polypropylene (PP) offers: – Higher dielectric strength vs. polyester (PET) dielectric – Lower dissipation factor, higher current capability (RMS and peak) and parameter stability vs. polyester dielectric – Epoxy resin sealing and plastic box case are UL94V-0 flame retardant materials – Optimized AC voltage performance – High ripple current/frequency capability
Applications	DC link, DC filtering, decoupling in industrial, lighting, automotive, entertainment electronics and household appliances	Designed for AC input, DC link and AC output filters e.g. UPS	LC, LCL ouput filters in industrial, lighting, automotive, entertainment electronics and household appliances

TDK EPCOS

*) others on request

Please read *Important notes* on page 81.

Film Capacitors

AC Film Capacitors

AC Film Capacitors

				
Series	MotorCap P0 plastic B3232 …	MotorCap P2 compact B3235 …	Super MotorCap P2 Alu B3233 …	Dual MotorCap B32335
Technical data	Rated voltage: 250, 420, 470 V AC Rated capacitance: 1 … 60 µF Plastic can	Rated voltage: 400, 450 V AC Rated capacitance: 2 … 20 µF Plastic can	Rated voltage: 420, 450 V AC Rated capacitance: 1 … 60 µF Aluminum can	Rated voltage: 250 … 450 V AC Rated capacitance: 10+1 … 60+10 µF Aluminum can
Features	– Useful life: Up to 10 000 h/class B – Terminals: Fast-on (single/double) Insulated wire Twin core cable – Safety class: P0 – Approvals: UL, VDE, IS	– Useful life: Up to 30 000 h/class A – Terminals: Fast-on (single/double) Insulated wire Twin core cable – Safety class: P2 – Approvals: UL, VDE, CQC	– Useful life: Up to 30 000 h/class A – Terminals: Fast-on (single/double) Twin core cable – Safety class: P2 – Approvals: UL, VDE, CQC	– Useful life: Up to 10 000 h/class B – Terminals: Fast-on (single/double/ quadruple) – Safety class: P2 – Approvals: UL, TÜV
Applications	General sine wave applications, mainly as motor run capacitor	Mainly as motor run capacitor, e.g. for refrigeration units, pumps	Mainly as motor run capacitor, e.g. for household appliances, heat pumps	Mainly as motor run capacitor, e.g. for air conditioning

AC Film Capacitors

				
Series	MotorCap DM B3231 …, B3235 …	MotorCap P0 plastic B3332 …, B3335 …	MotorCap P2 Alu B3333 …	Box type B3335 …
Technical data	Rated voltage: 250, 450 V AC Rated capacitance: 250 V AC: 10 … 15 µF 450 V AC: 1.2 …. 6 µF Plastic can	Rated voltage: 250 … 500 V AC Rated capacitance: 1 … 50 µF Plastic can	Rated voltage: 200, 500 V AC Rated capacitance: 1 … 80 µF Aluminum can	Rated voltage: 200, 450 V AC Rated capacitance: 1 … 20 µF Plastic box
Features	– Useful life: Up to 10 000 h/class B – Terminals: Fast-on (single/double) Insulated wire – Safety class: P0 and P2 – Approvals: UL, VDE (in progress)	– Useful life: 400 V AC: Up to 30 000 h/class A 450 V AC: Up to 10 000 h/class B – Terminals: Fast-on Insulated wire Twin core cable – Safety class: P0 and P2 – Approvals: UL, VDE	– Useful life: Up to 30 000 h/class A – Terminals: Fast-on (single/double) Twin core cable – Safety class: P2 – Approvals: UL, VDE, CQC	– Useful life: Up to 10 000 h/class B – Terminals: Fast-on (single/double) – Safety class: P0 and P2 – Approvals: UL, TÜV, VDE
Applications	General sine-wave applications, mainly as motor run capacitor		Mainly as motor run capacitor, e.g. for household appliances, heat pumps	Mainly as motor run capacitor, e.g. for ventilation units

◣TDK ◣EPCOS

Please read *Important notes* on page 81.

Film Capacitors

PFC Capacitors and Key Components

PFC Capacitors and Key Components

			
Series	PhaseCap Premium B25667	PhaseCap Compact B25673	PhaseCap HD B25669
Technical data	Power: 5.0 … 33 kvar Rated voltage: 230 ... 800 V AC Inrush current: up to 300 • I_R	Power: 5.0 … 33 kvar Rated voltage: 230 ... 1000 V AC Inrush current: up to 400 • I_R	Power: 40 … 60 kvar Rated voltage: 400 ... 525 V AC Inrush current: up to 300 • I_R
Features	– Useful life: Up to 180 000 h at temp. class –40/C Up to 130 000 h at temp. class –40/D	– Useful life: Up to 200 000 h at temp. class –40/C Up to 150 000 h at temp. class –40/D	– Useful life: Up to 180 000 h at temp. class –40/C Up to 130 000 h at temp. class –40/D
Applications	Automatic PFC equipment Individual fixed PFC Fixed PFC Tuned and detuned capacitor banks 690 V and 800 V series for usage in harsh applications such as wind turbine and industrial applications with heavy harmonic loads	Automatic PFC equipment Individual fixed PFC Fixed PFC Tuned and detuned capacitor banks All kinds of PFC applications	Automatic PFC equipment Individual fixed PFC Fixed PFC Detuned capacitor banks

PFC Capacitors and Key Components

				
Series	PhiCap B32340 … A …, B32343, B32344	HomeCap B32340 … J …	MKV Cap B25836	PoleCap B25671
Technical data	Power: 0.5 … 30 kvar Rated voltage: 230 ... 525 V AC Inrush current: up to 200 • I_R	Power: 0.02 … 1.99 kvar Rated application voltage: 127 … 400 V AC Inrush current: up to 100 • I_R	Power: 4.2 … 30 kvar Rated voltage: 400 ... 800 V AC Inrush current: up to 500 • I_R	Power: 0.5 … 30 kvar Rated voltage: 400 ... 525 V AC Inrush current: up to 200 • I_R
Features	– Useful life: Up to 135 000 h at temp. class –40/C Up to 100 000 h at temp. class –40/D	– Useful life: Up to 100 000 h at temp. class –40/D	– Useful life: Up to 300 000 h at temp. class –40/D	– Useful life: Up to 100 000 h at temp. class –40/C
Applications	Automatic capacitor banks Fixed PFC Detuned PFC systems	Residential PFC	Applications with high thermal loading AC applications in industrial electronics Tuned harmonic filter Industrial applications with heavy harmonic loads	Outdoor low voltage applications For installation in surroundings with high dust or moisture concentration

◣TDK ◣EPCOS

Film Capacitors

PFC Capacitors and Key Components

PFC Capacitors and Key Components

		
Series	PF controllers B44066R …	Measuring devices B44066M …
Technical data	Supply voltage: BR604: 230 V AC BR6000 (from V5.0 onwards) BR7000/BR7000-I: 110 … 230 V AC Measuring voltage: BR604 = supply voltage 230 V AC BR6000: 30 … 525 V AC (L-N) or (L-L) BR7000: 3 x 30 … 440 V AC (L-N); 3 x 50 … 760 V AC (L-L) BR7000-I: 30 … 400 V DC (L-N); 50 … 690 V AC (L-L)	Supply voltage: MMI6000: 230 V AC MMI7000: 110 … 230 V AC Measuring voltage: MMI6000: 230 V AC MMI7000: 30 … 440 V AC (L-N) 50 … 690 V AC (L-L)
Features	– Output stages: BR604: 4 relay outputs BR6000: depending on the type 6 to 12 relay and/or transistor outputs BR7000: 15 switching outputs BR7000-I: 12 or 13 switching outputs	– Compact dimensions – Panel mounting instrument – LCD display – Menu languages: MMI6000: DE/E MMI7000: DE/E/ES/RU/TR
Applications	Controlling of actual power factor Connecting/disconnecting capacitor steps	Accessory for PF controller BR60000 MMI6000: 1-phase measuring and display of grid parameters MMI7000: 3-phase measuring and display of grid parameters

PFC Capacitors and Key Components

			
Series	Grid analysis tool B44066M7777E230	Contactors B44066S … J …/N …	TSM modules B44066T …
Technical data	Operating voltage: 110 … 230 V AC Measuring current: 30, 300, 3000 A Measuring voltage: 3 x 30 … 440 V AC 3 x 50 … 760 V AC	Voltage: 400 … 690 V Output range: 12.5 … 100 kvar	Voltage: 3 x 400 V and 3 x 690 V; TSM-LC-I: 230 … 525 V (110 V on request) Output range: TSM-LC: 400 V, 10, 25, 50, 100, 200 kvar TSM-LC-I: 10 ... 22 kvar, depending on the voltage TSM-HV: 690 V, 50 and 200 kvar
Features	– Comfortable measuring tool – 1 GB memory card included – PC software for evaluation of measured values included	– Series J110/J230 for usage in PFC systems without reactors – Series N110/N230 for usage in PFC systems with reactors – cUL approval – CCC approval up to 75 kvar	– Fast electronically controlled thyristor switch – Easy installation – Very short switching times
Applications	Three-phase measuring, display and storage of electric parameters in LV grids	Damping of inrush current in low voltage PFC systems For PFC systems with/without reactors	Main supply networks with high load fluctuations for dynamic PFC systems, e.g. presses, welding machines, elevators, cranes, wind turbines

TDK EPCOS

Please read *Important notes* on page 81.

Film Capacitors

PFC Capacitors and Key Components, Power Capacitors

TDK EPCOS

PFC Capacitors and Key Components

Power Capacitors

			
Series	Reactors B44066D …	MKK DC/DCI B25650 (gas), B25750 (oil)	PCC LP B25655J …, B25655M …
Technical data	Voltage: 400 and 440 V Output range: 10 … 100 kvar Detuning factor: 5.67, 7, 14% Frequency: 50 or 60 Hz	Rated capacitance: 100 µF … 20 mF Nominal voltage: 800 … 6500 V Operating temp.: –55 … +80 °C Gas impregnation (DC) Oil impregnation (DCI)	Rated capacitance: 50 … 3000 µF Rated voltage: 200 … 1000 V DC Operating temp.: –40 … +110 °C
Features	– High harmonic loading capability – Very low losses – Low noise emission – Temperature protection by microswitch (NC)	– High peak current handling capability – Low losses – Long useful life – Very high reliability – Rectangular case – Flat windings – Overpressure switch possible, self-healing	– Low self-inductivity – High volume fill factor – Very good self-healing – Compact size – Flexible dimensions – Customer specific designs
Applications	Avoiding of resonance conditions Tuned and detuned harmonic filters Reduction of power losses	DC link Resonant filters Power modules for HVDC	DC link for LV converters, specially HEV applications

Power Capacitors

			
Series	MKP DC B2562 ...	MKP AC B323 …	MKP AC HP B2536 …
Technical data	Rated capacitance: 30 … 1500 µF Rated voltage: 880 … 1980 V DC Operating temp.: –55 … +60 °C	Rated capacitance: 3 … 600 µF Alternating voltage: 250 ... 680 V AC Operating temp.: –40 … +70 °C	Rated capacitance: 10 … 150 µF Rated voltage: 550 … 1000 V AC
Features	– High peak current handling capability – Self-healing – Aluminum can – Customized configurations – UL-certification	– High peak current handling capability – Overpressure disconnector – Self-healing – Customized configurations – UL-certification	– High peak current capability – Customized configurations – Overpressure disconnector – Self-healing – Oil impregnation – UL-certification
Applications	DC link capacitor for voltage converters in wind power applications	Filtering for e.g. uninterruptible power supplies, wind power applications	Industrial and general, AC filter applications, wind power applications

TDK EPCOS

Film Capacitors

Power Capacitors

Power Capacitors

		
Series	MKV B25834	MKK HP B25610
Technical data	Rated capacitance: 0.1 … 220 µF Rated voltage: 500 … 2100 V AC Operating temp.: –25 … +85 °C	Rated capacitance: from 3 x 50 µF on wards Rated voltage: up to 1000 V AC Operating temp.: –55 … +80 °C
Features	– High peak current capability – High dielectric strength – Overpressure disconnector – Self-healing – Non RoHS compatible	– Low ESR – Self-healing – Reduces high THD – Delta or star connected – Rectangular case – Customer specific design – Aluminum or stainless steel case – Compact size
Applications	Snubbering, filtering	High performance output filtering, especially in wind power applications

Power Capacitors

			
Series	MKK DCR B25640	MKP DC LSI B2563 …	MKV B25856
Technical data	Rated capacitance: up to 15 000 µF Rated voltage: up to 1500 V DC Operating temp.: –25 … +80 °C	Rated capacitance: 50 … 280 µF Rated voltage: 600 … 1200 V DC Operating temp.: –55 … +70 °C	Rated capacitance: 0.1 … 15 µF Rated voltage: 1700 … 4000 V DC Operating temp.: –25 … +85 °C
Features	– Low ESL – Self-healing – Open capacitors – Rectangular case – Customer specific design – Compact size – Resin filled	– Different terminal types – IEC1071 approved – High peak current capability – Customized configurations – Self-healing – Low self inductance – Plastic can	– Extremely low inductance – High peak current capability – Axial version – Self-healing – Non RoHS compatible
Applications	DC link, industrial and wind power applications	Compact DC link applications	GTO snubbering and clamping

TDK EPCOS

Please read *Important notes* on page 81.

Aluminum Electrolytic Capacitors

Aluminum Electrolytic Capacitors

			
Series	Screw terminals	4-/5-pin snap-in terminals Solder-pin terminals	Snap-in terminals
Technical data	Rated voltage: 16 … 600 V Rated capacitance: 560 … 680 000 µF Dimensions: 35.7 x 55.7 … 76.9 x 220.7 mm	Rated voltage: 350 … 500 V Rated capacitance: 390 … 3000 µF Dimensions: 35 x 45 … 50 x 100 mm	Rated voltage: 10 … 600 V Rated capacitance: 47 … 68 000 µF Dimensions: 22 x 25 … 35 x 55 mm
Features	– High ripple current capability – Long useful life (>20 years) – Self-extinguishing electrolyte upon request – Special designs for base cooling – Compact designs	– High ripple current capability – Long useful life (>20 years) – Optional PET insulation cap on terminal side – Compact designs	– High ripple current capability – Long useful life (>20 years) – Optional PET insulation cap on terminal side – Compact designs
Applications	Frequency converters DC link for wind energy and solar inverters Uninterruptible power supplies Professional power supplies	Frequency converters DC link for solar inverters Uninterruptible power supplies Professional power supplies	Frequency converters DC link for solar inverters Uninterruptible power supplies Professional power supplies On-board charger (e-Mobiity)

Aluminum Electrolytic Capacitors

			 
Series	Large size	Axial-lead	Soldering star
Technical data	Rated voltage: 25 … 63 V Rated capacitance: 900 … 27 000 µF Dimensions: 22 x 40 … 35 x 50 mm	Rated voltage: 25 … 250 V Rated capacitance: 22 … 10 000 µF Dimensions: 12 x 30 … 21 x 49 mm	Rated voltage: 25 … 250 V Rated capacitance: 22 … 10 000 µF Dimensions: 12 x 30 … 21 x 49 mm
Features	– High vibration stability up to 40 *g* – High ripple current capability – Low ESR at high temperatures – Long useful life up to 10 000 h at +125 °C	– High vibration stability up to 40 *g* – High ripple current capability – Low ESR at high temperatures – Long useful life up to 10 000 h at +125 °C – High temperature range up to +150 °C	– High vibration stability up to 40 *g* – Low inductance thanks to vertical mounting design – High ripple current capability – Long useful life up to 10 000 h at +125 °C – High temperature range up to +150 °C – Low ESR at high temperatures
Applications	High energy efficiency in automotive applications e.g. power steering, motor management	High energy efficiency in automotive applications e.g. motor management, power steering, fan control, trans - mission control, wiper system	High energy efficiency in automotive applications e.g. motor management, power steering, fan control, trans - mission control

◣TDK ◣EPCOS

Aluminum Electrolytic Capacitors

Aluminum Electrolytic Capacitors

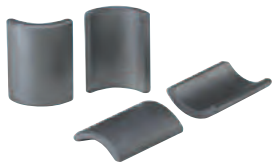
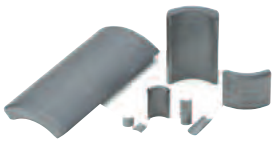
		
Series	Single-ended	Pulse applications
Technical data	Rated voltage: 10 … 450 V Rated capacitance: 2.2 … 10 000 µF Dimensions: 8 x 11.5 … 18 x 40 mm	Rated voltage: 300 … 500 V Rated capacitance: 200 … 6600 µF Dimensions: 25 x 45 … 50 x 100 mm
Features	– High temperature range up to +150 °C – Low impedance at high frequency – Different terminal configurations – Compact designs	– High charge/discharge proof – Low dissipation factor – Compact designs
Applications	Automotive e.g. motor management, power steering, fan control	Professional flashlights Mobile X-ray generators Welding machines Hair removal devices

◣TDK ◣EPCOS

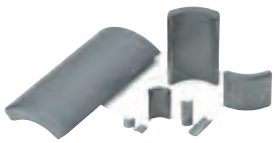
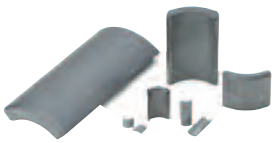
Magnets

Ferrite Magnets

Ferrite Magnets

		
Series	FB series – FB12B, FB12H material	FB series – FB9B, FB9H, FB9N material
Technical data	Residual flux density: 460 ±10 … 470 ±10 mT Coercive force: 340 ±12 … 345 ±15 kA/m Intrinsic coercive force: 380 ±12 … 430 ±15 kA/m Maximum energy product (BH) max: 41.4 ±1.6 … 43.1 ±1.6 kJ/m³	Residual flux density: 430 ±10 … 460 ±10 mT Coercive force: 278.5 ±12 … 342.2 ±12 kA/m Intrinsic coercive force: 286.5 ±12 … 397.1 ±12 kA/m Maximum energy product (BH) max: 35.0 ±1.6 … 40.4 ±1.6 kJ/m³
Features	– Wet-molded anisotropic ferrite magnet – Further improved coercive force HCJ temperature coefficient	– Wet-molded anisotropic ferrite magnets – Energy product with a substantially improved coercive force HCJ temperature coefficient
Applications	Automotive electronics Home appliances: electrical motors, actuators, appliance motors	Automotive electronics Home appliances: electrical motors, actuators, appliance motors

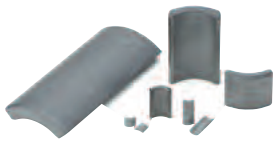
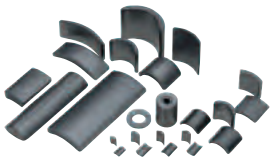
Ferrite Magnets

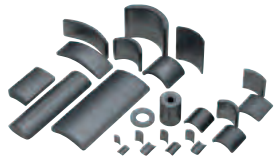
		
Series	FB series – FB6B, FB6E, FB6H, FB6N material	FB series – FB5B, FB5D, FB5DH, FB5H material
Technical data	Residual flux density: 380 ±10 … 440 ±10 mT Coercive force: 258.6 ±12 … 302.4 ±12 kA/m Intrinsic coercive force: 262.6 ±12 … 393.9 ±12 kA/m Maximum energy product (BH) max: 27.5 ±1.6 … 36.7 ±1.6 kJ/m³	Residual flux density: 400 ±10 … 420 ±10 mT Coercive force: 254.6 ±12 … 298.4 ±12 kA/m Intrinsic coercive force: 262.6 ±16 … 322.3 ±12 kA/m Maximum energy product (BH) max: 30.3 ±1.6 … 33.4 ±1.6 kJ/m³
Features	– Good balance of B_r and H_c values at high levels – Particularly suited for high powered motors with large demagnetizing fields	– Deliver high B_r and a relatively high level of H_c. – Excellent cost performance – Suitable for a diverse range of small, high-performance motors
Applications	Automotive electronics Home appliances: electrical motors, actuators, appliance motors	Automotive electronics Home appliances: electrical motors, actuators, appliance motors

TDK EPCOS

Magnets

Ferrite Magnets, Rare Earth Magnets – Nd-Fe-B Magnets

Ferrite Magnets		Rare Earth Magnets – Nd-Fe-B Magnets
		
Series	FB series – FB3G, FB3N material	NEOREC series – NEOREC53B material
Technical data	Residual flux density: 375 ±15 … 395 ±15 mT Coercive force: 234.8 ±12 … 254.6 ±16 kA/m Intrinsic coercive force: 238.7 ±16 … 270.6 ±16 kA/m Maximum energy product (BH)max: 25.9 ±2.4 … 28.7 ±2.4 kJ/m³	Residual flux density: 1450 ±20 mT Coercive force: 1120 ±48 kA/m Intrinsic coercive force: ≧1114 kA/m Maximum energy product (BH) max: 406 ±16 kJ/m³
Features	– Dry molded magnets deliver high B_r and high H_c values – Suitable for a diverse range of applications that require small and complex shapes	– Magnetic characteristics reach 49MGOe in maximum energy product (BH) max, achieving 50 to 80% higher performance than rare-earth cobalt magnet – Specific gravity is 7.4 g/cm³ more than 10% lower than that of rare-earth cobalt magnet – Higher mechanical strength such as bending and tensile strength than rare-earth cobalt magnets, making handling easier than before
Applications	Home appliances: consumer, power tools and motors	Green Energy (Wind power) Home appliances Automotive electronics

Rare Earth Magnets – Nd-Fe-B Magnets		
		
Series	NEOREC series – NEOREC50B, NEOREC50H material	NEOREC series – NEOREC47B, NEOREC47H material
Technical data	Residual flux density: 1420 ±20 mT Coercive force: 1074 ±48 … 1097 ±48 kA/m Intrinsic coercive force: ≧1114 … ≧1353 kA/m Maximum energy product (BH) max: 390 ±16 kJ/m³	Residual flux density: 1390 ±20 … 1390 ±30 mT Coercive force: 1035 ±56 … 1067 ±48 kA/m Intrinsic coercive force: ≧1114 … ≧1273 kA/m Maximum energy product (BH) max: 366 ±16 … 374 ±16 kJ/m³
Features	– Magnetic characteristics reach 49MGOe in maximum energy product (BH) max, achieving 50 to 80% higher performance than rare-earth cobalt magnet – Specific gravity is 7.4 g/cm³ more than 10% lower than that of rare-earth cobalt magnet – Higher mechanical strength such as bending and tensile strength than rare-earth cobalt magnets, making handling easier than before	– Magnetic characteristics reach 49MGOe in maximum energy product (BH) max, achieving 50 to 80% higher performance than rare-earth cobalt magnet – Specific gravity is 7.4 g/cm³ more than 10% lower than that of rare-earth cobalt magnet – Higher mechanical strength such as bending and tensile strength than rare-earth cobalt magnets, making handling easier than before
Applications	Green Energy (Wind power) Home appliances Automotive electronics	Green Energy (Wind power) Home appliances Automotive electronics

TDK EPCOS

Please read *Important notes* on page 81.

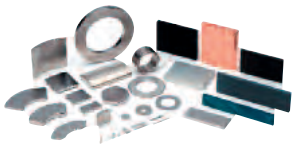
Magnets

Rare Earth Magnets – Nd-Fe-B Magnets

Rare Earth Magnets – Nd-Fe-B Magnets

		
Series	NEOREC series – NEOREC46HF, NEOREC46HG material	NEOREC series – NEOREC45SH material
Technical data	Residual flux density: 1350 ±20 … 1380 ±30 mT Coercive force: 1043 ±48 … 1066 ±56 kA/m Intrinsic coercive force: ≧1273 … ≧1432 kA/m Maximum energy product (BH) max: 352 ±16 … 368 ±16 kJ/m³	Residual flux density: 1360 ±30 mT Coercive force: 1051 ±56 kA/m Intrinsic coercive force: ≧1671 kA/m Maximum energy product (BH) max: 357 ±16 kJ/m³
Features	– Magnetic characteristics reach 49MGOe in maximum energy product (BH) max, achieving 50 to 80% higher performance than rare-earth cobalt magnet – Specific gravity is 7.4 g/cm³ more than 10% lower than that of rare-earth cobalt magnet – Higher mechanical strength such as bending and tensile strength than rare-earth cobalt magnets, making handling easier than before	– Magnetic characteristics reach 49MGOe in maximum energy product(BH) max, achieving 50 to 80% higher performance than rare-earth cobalt magnet – Specific gravity is 7.4 g/cm³ more than 10% lower than that of rare-earth cobalt magnet – Higher mechanical strength such as bending and tensile strength than rare-earth cobalt magnets, making handling easier than before
Applications	Green Energy (Wind power) Home appliances Automotive electronics	Green Energy (Wind power) Home appliances Automotive electronics

Rare Earth Magnets – Nd-Fe-B Magnets

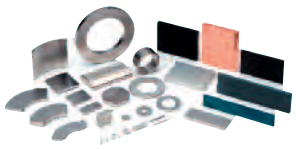
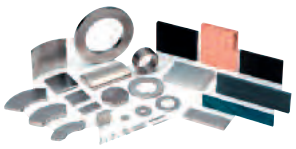
		
Series	NEOREC series – NEOREC44H material	NEOREC series – NEOREC43SX material
Technical data	Residual flux density: 1360 ±30 mT Coercive force: 1003 ±56 kA/m Intrinsic coercive force: ≧1353 kA/m Maximum energy product (BH) max: 350 ±16 kJ/m³	Residual flux density: 1310 ±30 mT Coercive force: 1012 ±56 kA/m Intrinsic coercive force: ≧1830 kA/m Maximum energy product (BH) max: 331 ±16 kJ/m³
Features	– Magnetic characteristics reach 49MGOe in maximum energy product (BH) max, achieving 50 to 80% higher performance than rare-earth cobalt magnet – Specific gravity is 7.4 g/cm³ more than 10% lower than that of rare-earth cobalt magnet – Higher mechanical strength such as bending and tensile strength than rare-earth cobalt magnets, making handling easier than before	– Magnetic characteristics reach 49MGOe in maximum energy product (BH) max, achieving 50 to 80% higher performance than rare-earth cobalt magnet – Specific gravity is 7.4 g/cm³ more than 10% lower than that of rare-earth cobalt magnet – Higher mechanical strength such as bending and tensile strength than rare-earth cobalt magnets, making handling easier than before
Applications	Green Energy (Wind power) Home appliances Automotive electronics	Green Energy (Wind power) Home appliances Automotive electronics

TDK EPCOS

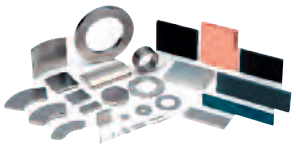
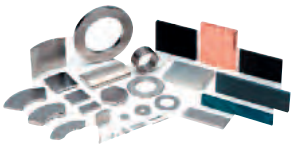
Magnets

Rare Earth Magnets – Nd-Fe-B Magnets

Rare Earth Magnets – Nd-Fe-B Magnets

		
Series	NEOREC series – NEOREC42B,NEOREC42SH material	NEOREC series – NEOREC41H material
Technical data	Residual flux density: 1300 ±30 … 1330 ±30 mT Coercive force: 979 ±56 ... 987 ±56 kA/m Intrinsic coercive force: ≧1114 … ≧1671 kA/m Maximum energy product (BH) max: 326 ±16 … 334 ±16 kJ/m³	Residual flux density: 1300 ±30 mT Coercive force: 971 ±56 kA/m Intrinsic coercive force: ≧1353 kA/m Maximum energy product (BH) max: 326 ±16 kJ/m³
Features	– Magnetic characteristics reach 49MGOe in maximum energy product (BH) max, achieving 50 to 80% higher performance than rare-earth cobalt magnet – Specific gravity is 7.4 g/cm³ more than 10% lower than that of rare-earth cobalt magnet – Higher mechanical strength such as bending and tensile strength than rare-earth cobalt magnets, making handling easier than before	– Magnetic characteristics reach 49MGOe in maximum energy product (BH) max, achieving 50 to 80% higher performance than rare-earth cobalt magnet – Specific gravity is 7.4 g/cm³ more than 10% lower than that of rare-earth cobalt magnet – Higher mechanical strength such as bending and tensile strength than rare-earth cobalt magnets, making handling easier than before
Applications	Green Energy (Wind power) Home appliances Automotive electronics	Green Energy (Wind power) Home appliances Automotive electronics

Rare Earth Magnets – Nd-Fe-B Magnets

		
Series	NEOREC series – NEOREC40H, NEOREC40TH NEOREC40UH material	NEOREC series – NEOREC38UH material
Technical data	Residual flux density: 1285 ±30 … 1330 ±30 mT Coercive force: 971 ±56 … 995 ±56 kA/m Intrinsic coercive force: ≧1353 … ≧2109 kA/m Maximum energy product (BH) max: 310 ±16 … 319 ±16 kJ/m³	Residual flux density: 1260 ±30 mT Coercive force: 963 ±56 kA/m Intrinsic coercive force: ≧1990 kA/m Maximum energy product (BH) max: 294 ±16 kJ/m³
Features	– Magnetic characteristics reach 49MGOe in maximum energy product (BH) max, achieving 50 to 80% higher performance than rare-earth cobalt magnet – Specific gravity is 7.4 g/cm³ more than 10% lower than that of rare-earth cobalt magnet – Higher mechanical strength such as bending and tensile strength than rare-earth cobalt magnets, making handling easier than before	– Magnetic characteristics reach 49MGOe in maximum energy product (BH) max, achieving 50 to 80% higher performance than rare-earth cobalt magnet – Specific gravity is 7.4 g/cm³ more than 10% lower than that of rare-earth cobalt magnet – Higher mechanical strength such as bending and tensile strength than rare-earth cobalt magnets, making handling easier than before
Applications	Green Energy (Wind power) Home appliances Automotive electronics	Green Energy (Wind power) Home appliances Automotive electronics

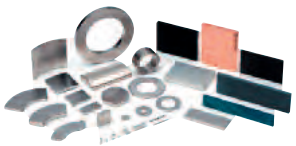
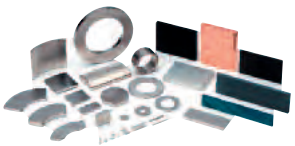
TDK EPCOS

Please read *Important notes* on page 81.

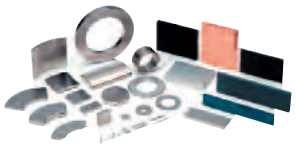
Magnets

Rare Earth Magnets – Nd-Fe-B Magnets

Rare Earth Magnets - Nd-Fe-B Magnets

		
Series	NEOREC series – NEOREC37H material	NEOREC series – NEOREC35NX, NEOREC35UX material
Technical data	Residual flux density: 1240 ±30 mT Coercive force: 923 ±56 kA/m Intrinsic coercive force: ≧1353 kA/m Maximum energy product (BH) max: 294 ±16 kJ/m³	Residual flux density: 1200 ±30 mT Coercive force: 920 ±56 ... 923 ±56 kA/m Intrinsic coercive force: ≧2626 … ≧2388 kA/m Maximum energy product (BH) max: 271 ±16 … 278 ±16 kJ/m³
Features	– Magnetic characteristics reach 49MGOe in maximum energy product (BH) max, achieving 50 to 80% higher performance than rare-earth cobalt magnet – Specific gravity is 7.4 g /cm³ more than 10% lower than that of rare-earth cobalt magnet – Higher mechanical strength such as bending and tensile strength than rare-earth cobalt magnets, making handling easier than before	– Magnetic characteristics reach 49MGOe in maximum energy product (BH) max, achieving 50 to 80% higher performance than rare-earth cobalt magnet – Specific gravity is 7.4 g/cm³ more than 10% lower than that of rare-earth cobalt magnet – Higher mechanical strength such as bending and tensile strength than rare-earth cobalt magnets, making handling easier than before
Applications	Green Energy (Wind power) Home appliances Automotive electronics	Green Energy (Wind power) Home appliances Automotive electronics

Rare Earth Magnets – Nd-Fe-B Magnets

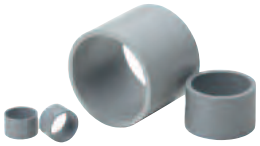
	
Series	NEOREC series – NEOREC30EV material
Technical data	Residual flux density: 1140 ±30 mT Coercive force: 867 ±56 kA/m Intrinsic coercive force: ≧756 kA/m Maximum energy product (BH) max: 231 ±16 kJ/m³
Features	– Magnetic characteristics at the mass production level reach 49MGOe in maximum energy product (BH) max, achieving 50 to 80% higher performance than rare-earth cobalt magnet – The specific gravity is 7.4 g/cm³ more than 10% lower than that of rare-earth cobalt magnet. Ideal for meeting miniaturization and weight reduction needs – Higher mechanical strength such as bending and tensile strength than rare-earth cobalt magnets, making handling easier than before – Since the main raw materials are neodymium and iron, both abundant resources, stable supply is assured
Applications	Green Energy (Wind power) Home appliances Automotive electronics

TDK EPCOS

Magnets

Bonded Magnets (Nd-Fe-B, Compress Molded)

Bonded Magnets (Nd-Fe-B, Compress Molded)

		
Series	CM series – CM8BL, CM8BLH material	CM series – CM11SH, CM11UH material
Technical data	Residual flux density Br: 620 ±30 … 650 ±30 mT Coercive force HcB: 398 ±40 … 414 ±40 kA/m Intrinsic coercive force HCJ: 717 ±80 kA/m Maximum energy product (BH) max: 63.7 ±8.0 … 69.3 ±8.0 kJ/m³	Residual flux density Br: 740 ±30 … 750 ±30 mT Coercive force HcB: 438 ±40 … 478 ±40 kA/m Intrinsic coercive force HCJ: 597±80 … 717 ±80 kA/m Maximum energy product (BH) max: 87.6 ±8.0 kJ/m³
Features	– Contribution to cost reduction – Largely compatible with CM8B (standard materials)	– CM11SH: suitable for realizing good characteristics in thin configurations – CM11UH: suitable for multi-polar applications in spindle and small stepping motors
Applications	Consumer electronics PCs Power tools	Consumer electronics PCs Power tools

TDK EPCOS

Please read *Important notes* on page 81.

Transparent Conductive Film

ITO Transparent Conductive Film, Hard Coat Film

ITO Transparent Conductive Film

		
Series	FLECLEAR series – Sputtered ITO films	FLECLEAR series – Wet-coated ITO films
Technical data	Base material: PET 125 µm Initial surface resistance: 150 Ω/sq Total light transmittance: 92% Haze: 0.5%	Base material: PET 125 µm Initial surface resistance: 600 Ω/sq Total light transmittance: 88% Haze: 1 % Bend resistance: 5%
Features	– Exhibits excellent flexibility, while realizing high bend resistance and slidability – Capable of coating various types of base materials – Available in film rolls and film sheets	– Exhibits excellent flexibility, while realizing high bend resistance and slidability – Capable of coating various types of base materials – Available in the form of film rolls to enable coating on the customer side
Applications	For electrode films and plastic plates for transparent touch panels For electronic paper/electronic books/electromagnetic wave shields	For electrode films and plastic plates for transparent touch panels For electronic paper/electronic books/electromagnetic wave shields

Hard Coat Film

	
Series	Hard Coat Film
Technical data	Base material thickness: 75, 100, 125 µm Total light transmittance: 92% Haze: 0.2% Contact angle Pure water: 110° Sliding angle Droplet 10 µl: 9° Anti-fingerprint property evaluation using artificial fingerprint ⊿H After application of artificial fingerprint: 1.3% After wiping: 0.4% Steel wool scratch resistance: Withstands 10 000 or more double-rubs
Features	– Industry-leading scratch resistance – High slipping property – Excellent fingerprint wiping property
Applications	Surface protection or shatter proofing of the cover-glass of smartphones, tablet computers and notebooks

TDK EPCOS

EMC Measurement Solutions – Anechoic Chambers & Systems

Electromagnetic Wave Anechoic Chambers for EMC Countermeasures/Evaluation

Electromagnetic Wave Anechoic Chambers for EMC Countermeasures/Evaluation

		
Series	CAC-S Compact Anechoic Chamber	3 m SAC Semi-Anechoic Chamber
Technical data	Specification examples Dimensions between shield surfaces (l x w x h): 7.5 x 3 x 3 m Internal dimensions between absorbers (l x w x h): 6.6 x 2.1 x 2.55 m Electromagnetic wave absorbers: IB-017 100 x 100 x 5.2 mm (l x w x t), IP-045C 600 x 600 x 450 mm (l x w x h) Turntable: Ø 1.0 m (0.5 t) / Ø 1.5 m (4 t)	Specification examples Dimensions between shield surfaces (l x w x h): 9.0 x 6 x 5.6 m Internal dimensions between absorbers (l x w x h): 8.1 x 5.1 x 5.15 m Electromagnetic wave absorbers: IB-017 100 x 100 x 5.2 mm (l x w x t), IP-045C 600 x 600 x 450 mm (l x w x h) Turntable: Ø 1 m (1 t) / Ø 2 m (4 t)
Features	Frequency range: 26 MHz to 18 GHz Measurement distance: 3 m Quiet zone (Ø x h): 1.5 x 2.0 m Maximum deviation NSA: ±4 dB Maximum S-VSWR: ≦6 dB	Frequency range: 26 MHz to 18 GHz Measurement distance: 3 m Quiet zone (Ø x h): 2.0 x 2.0 m Maximum deviation NSA: ±3.5 dB Maximum S-VSWR: ≦6 dB
Applications	Pre compliant radiated emissions measurement at EN 50147-2, ANSI 63.4, CISPR 22 Fully compliant radiated immunity measurement according to IEC-61000-4-3	Fully compliant radiated emissions CISPR 16-1-4, EN 50147-2, ANSI 63.4, CISPR 22 Fully compliant radiated immunity measurement according to IEC-61000-4-3

Electromagnetic Wave Anechoic Chambers for EMC Countermeasures/Evaluation

		
Series	5 m SAC Semi-Anechoic Chamber	10 m SAC Semi-Anechoic Chamber
Technical data	Specification examples Dimensions between shield surfaces (l x w x h): 11.0 x 7 x 6.0 m Internal dimensions between absorbers (l x w x h): 9.7 x 5.7 x 5.35 m Electromagnetic wave absorbers: IB-017 100 x 100 x 5.2 mm (l x w x t) IP-065BLB 600 × 600 x 650 mm (l x w x h) Turntable: Ø 1 m (1 t) / Ø 2 m (4 t)	Specification examples Dimensions between shield surfaces (l x w x h): 21.0 x 13 x 8.6 m Internal dimensions between absorbers (l x w x h): 19.2 x 11.2 x 7.7 m Electromagnetic wave absorbers: IB-017 100 x 100 x 5.2 mm (l x w x t) IP-090BLB 600 x 600 x 900 mm (l x w x h) Turntable: Ø 3 m (2 t) / Ø 5 m (6 t)
Features	Frequency range: 26 MHz to 18 GHz Measurement distance: 3 m and 5 m Quiet zone (Ø x h): 2.0 x 2.0 m Maximum deviation NSA: ±3.5 dB Maximum S-VSWR: ≦6 dB	Frequency range: 26 MHz to 18 GHz Measurement distance: 3 m, 5 m and 10 m Quiet zone (Ø x h): 2.0 … 5 x 2.0 m Maximum deviation NSA: ±3.0 … 3.5 dB Maximum S-VSWR: ≦6 dB
Applications	Fully compliant radiated emissions measurement CISPR 16-1-4, EN 50147-2, ANSI 63.4, CISPR 22, CISPR 25 Fully compliant radiated immunity measurement according to IEC-61000-4-3	Fully compliant radiated emissions measurement CISPR 16-1-4, EN 50147-2, ANSI 63.4, CISPR 22, CISPR 25 Fully compliant radiated immunity measurement according to IEC-61000-4-3

TDK EPCOS

Please read *Important notes* on page 81.

EMC Measurement Solutions – Anechoic Chambers & Systems

Electromagnetic Wave Anechoic Chambers for EMC Countermeasures/Evaluation
Electromagnetic Wave Test Systems for EMC Countermeasures/Evaluation

Electromagnetic Wave Anechoic Chambers for EMC Countermeasures/Evaluation

		
Series	CISPR-25 Automotive component testing chamber	10 m SAC Anechoic chambers for whole vehicle evaluation and testing
Technical data	Specification examples Dimensions between shield surfaces (l x w x h): 8.5 x 5.5 x 5.5 m Internal dimensions between absorbers (l x w x h): 7.6 x 4.6 x 5.05 m Electromagnetic wave absorbers: IB-017 100 x 100 x 5.2 mm (l x w x t) IP-045C 600 x 600 x 450 mm (l x w x h) CISPR 25 Test Bench	Specification examples Dimensions between shield surfaces (l x w x h): 23.0 x 14 x 9.0 m Internal dimensions between absorbers (l x w x h): 18.2 x 11.4 x 7.7 m Electromagnetic wave absorbers: IB-017 100 x 100 x 5.2 mm (l x w x t) IP-130 600 x 600 x 1300 mm (l x w x h) Turntable: Ø 5 m (1 t) / Ø 10 m (60 t) with Chassis Dynamometer
Features	Frequency range: 26 MHz to 18 GHz Measurement distance: 1 m Maximum deviation NSA: ±3.5 dB Maximum S-VSWR: ≦6 dB	Frequency range: 26 MHz to 18 GHz Measurement distance: 3 m, 5 m and 10 m Quiet zone (Ø x h): 2.0 … 5 x 2.0 m Maximum deviation NSA: ±3.0 … 3.5 dB Maximum S-VSWR: ≦6 dB
Applications	Radiated emissions measurement EN 55025/CISPR 25 Fully compliant radiated immunity measurement according to DIN/ISO11452-2	Radiated emission measurement full compliance with ANSI C63.4 and CISPR 16-1-4 in 3 m and 10 m distance Radiated immunity full compliance with EN 61000-4-3 The chamber covers the whole frequency range for automotive testing

Electromagnetic Wave Test Systems for EMC Countermeasures/Evaluation

	
Series	EMI and EMS Test Systems
Technical data	Providing innovative solutions for EMI and EMS test systems covering a wide range of specifications Our technical expertise includes: – Radiated and conducted emissions, radiated and conducted immunity – System integration and control – EUT monitoring – SAR test systems – Control room, shielded room, and chamber design – Pre-compliant testing (commercial, military/aerospace)
Features	Proven solutions: Our test system developments are based on proven commercial, telecom, automotive, and military system solutions already in place in Europe, North America, and Asia. As a result of our extensive experience and large installed base, our system designs are dynamic – we continually integrate the latest technologies into our solutions
Applications	Radiated emission measurement full compliance with ANSI C63.4 and CISPR 16-1-4 in 3 m and 10 m measuring distance Radiated immunity full compliance with EN 61000-4-3 The chamber covers the whole frequency range for automotive testing, following the latest editions of International, US and European standards, e.g. CISPR 12 and 25, ISO 11452, and automotive Directive 2004/104/EG as well as manufacturers' in-house standards

TDK EPCOS

Factory Automation Systems

FOUP Load Port, Flip-Chip Bonding System

FOUP Load Port		Flip-Chip Bonding System
		
Series	TAS300/TAS450	AFM-15 1504 type Ultrasonic process
Technical data	TAS300: – Detection function: FOUP Presence / FOUP Placement / Safety / FOUP docking / Wafer protrusion / FOUP Door / Info Pads – Stroke: Y-axis (FOUP forward and back motion 70 mm (SEMI Standard) – Repetition accuracy: Y-axis (FOUP forward and back motion ±0.1 mm – FOUP open/close operation: 10 s – Compatible with every 300 mm FOUP (compliant to SEMI E47.1, E62) – Loadport is compliant to following standards: E15, E57, E62, E63, E84, S2,S8, S14	– Bonding process: Ultrasonic GGI – Chip (w x d x t): max. 2.5 x 2.5 x 1.0 mm, min. 0.3 x 0.3 x 0.1 mm – Substrate (w x d x t): max. 170 x 105 x 3.0 mm, min. 50 x 50 x 0.3 mm – Mounting tact time: 0.75 s/chip (including 0.2 s process time) – Accuracy: ±7 µm/3 σ – Max. load: 25 N (option: 50 N, 100 N) – Chip supply: 5.6, 8, 12 inch wafer etc. wafer ring auto loading – Size (w x d x h): 980 x 1020 x 1860 mm – Weight: About 1500 kg
Features	– The highest degree of cleanness ever achieved in the industry – Improved maintenance – High reliability and high durability	– Excellent mounting tact time 0.75 s/chip (including 0.2 s process time) – Excellent mounting accuracy (±7 µm/3 σ) – Smallest footprint (0.99 m^2) – Low energy bonding
Applications	Semiconductor production lines	LED, CMOS Sensor, TCXO, SAW, Opto, HF devices

Flip-Chip Bonding System		
		
Series	AFM-15 1503 type Ultrasonic process	
Technical data	– Bonding process: Ultrasonic GGI – Chip (w x d x t): max. 3.0 x 3.0 x 1.0 mm, min. 0.3 x 0.3 x 0.1 mm, Option (w x d): max. 7.0 x 7.0 mm – Substrate (w x d x t): max. 180 x 120 x 3.0 mm, min. 50 x 50 x 0.3 mm – Mounting tact time: 0.8 s/chip (including 0.2 s process time) – Accuracy: ±7 µm/3 σ – Max. load: 25 N (option: 50, 100 N) – Chip supply: 5, 6, 8, 12 inch wafer etc. wafer magazine auto loading – Size (w x d x h): 1200 x 1450 x 1650 mm – Weight: About 1800 kg	
Features	– Excellent mounting tact time 0.75 s/chip (including 0.2 s process time) – Excellent mounting accuracy (±7 µm/3 σ) – Smallest footprint (0.99 m^2) – Low energy bonding	
Applications	LED, CMOS Sensor, TCXO, SAW, Opto, HF devices	

TDK EPCOS

Please read *Important notes* on page 81.

Factory Automation Systems

Flip-Chip Bonding System

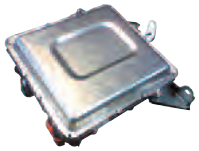
Flip-Chip Bonding System

		
Series	AFM-25 Heat compression	MDM-20/MDM-50 Dispenser
Technical data	– Bonding process: Heat compression (NCP, ACP, NCF, ACF), C4 – Chip (w x d x t): max. 30 x 30 x 1.0 mm, min. 3 x 3 x 0.1 mm – Substrate (w x d x t): max. 200 x 120 x 1.6 mm, min. 50 x 50 x 0.4 mm – Mounting tact time: 2.5 s/chip (excluding process time) – Accuracy: ±2 µm/ 3 σ – Max. load: 372.4 N – Chip supply: 2 inch tray etc. – Size (w x d x h): 750 x 910 x 1760 mm – Weight: About 1100 kg	– Bonding process: Glue dispensing – Substrate (w x d x t): max. 200 x 150 x 2.0 mm, min. 30 x 30 x 0.3 mm – Accuracy: ±3 µm – Size (w x d x h): 740 x 1140 x 1650 mm – Weight: About 600 kg
Features	– Mounting tact time 2.5 s/ chip – Excellent mounting accuracy (±2 µm/3 σ) – Smallest footprint (0.68 m^2) – Modular system for various bond process	– Continuous stable amount of dispense – Excellent dispense nozzle positioning accuracy (±3 µm) – Smallest footprint (0.84 m^2) – Dispense monitoring system for traceability control
Applications	Module-Opto	LED, CMOS Sensor, TCXO, SAW, Opto, high frequency devices, Module-Opto

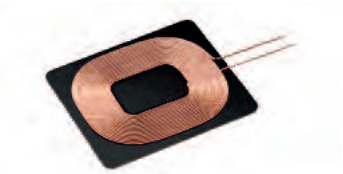
◣TDK ◣EPCOS

DC/DC Converters for Automotive
Wireless Power Transmission Coil Unit

DC/DC Converters for Automotive

		
Series	Air-cooled type	Water-cooled type
Technical data	Input voltage: 260 … 420 V DC Output voltage: 12.5 … 14.5 V DC/165 A Size (l x w x h): 375 x 165 x 64.5 mm Efficiency: >90% Weight: 5.5 kg	Input voltage: 175 … 350 V DC Output voltage: 14.5 V DC/145 A Size (l x w x h): 204 x 200 x 52 mm Efficiency: >88% Weight: 1.8 kg
Features	– Compact and lightweight – High conversion efficiency	– Compact and lightweight – High conversion efficiency
Applications	Automotive: E-Mobility Hybrid vehicles (HVs)/plug-in hybrid vehicles (PHVs)	Automotive: E-Mobility Hybrid vehicles (HVs)/plug-in hybrid vehicles (PHVs)

Wireless Power Transmission Coil Unit

	
Series	WPC Qi receiver coil
Technical data	– Receiving coil unit (Rx coil) can be custom-designed with a thickness of 0.8 mm or less – Test production of a product with 0.57 mm thickness has started – Output current: 0.5 ... 0.6 A
Features	– Ultra low profile – High performance
Applications	Smartphones and mobile devices

TDK EPCOS

Please read *Important notes* on page 81.

Important Notes

The following applies to all products named in this publication:

1. Some parts of this publication contain **statements about the suitability of our products for certain areas of application**. These statements are based on our knowledge of typical requirements that are often placed on our products in the areas of application concerned. We nevertheless expressly point out **that such statements cannot be regarded as binding statements about the suitability of our products for a particular customer application**. As a rule, TDK or EPCOS is either unfamiliar with individual customer applications or less familiar with them than the customers themselves. For these reasons, it is always ultimately incumbent on the customer to check and decide whether a TDK or EPCOS product with the properties described in the product specification is suitable for use in a particular customer application.
2. We also point out that **in individual cases, a malfunction of electronic components or failure before the end of their usual service life cannot be completely ruled out in the current state of the art, even if they are operated as specified**. In customer applications requiring a very high level of operational safety and especially in customer applications in which the malfunction or failure of an electronic component could endanger human life or health (e.g. in accident prevention or life-saving systems), it must therefore be ensured by means of suitable design of the customer application or other action taken by the customer (e.g. installation of protective circuitry or redundancy) that no injury or damage is sustained by third parties in the event of malfunction or failure of an electronic component.
3. **The warnings, cautions and product-specific notes must be observed**.
4. In order to satisfy certain technical requirements, **some of the products described in this publication may contain substances subject to restrictions in certain jurisdictions (e.g. because they are classed as hazardous)**. Useful information on this will be found in our Material Data Sheets on the Internet (www.epcos.com/material). Should you have any more detailed questions, please contact our sales offices.
5. We constantly strive to improve our products. Consequently, **the products described in this publication may change from time to time**. The same is true of the corresponding product specifications. Please check therefore to what extent product descriptions and specifications contained in this publication are still applicable before or when you place an order.

   We also **reserve the right to discontinue production and delivery of products**. Consequently, we cannot guarantee that all products named in this publication will always be available.

   The aforementioned does not apply in the case of individual agreements deviating from the foregoing for customer-specific products.
6. Unless otherwise agreed in individual contracts, **all orders are subject to the current version of the "General Terms of Delivery for Products and Services in the Electrical Industry" published by the German Electrical and Electronics Industry Association (ZVEI)**.
7. The trade names EPCOS, BAOKE, Alu-X, CeraDiode, CeraLink, CSMP, CSSP, CTVS, DeltaCap, DigiSiMic, DSSP, FilterCap, FormFit, MiniBlue, MiniCell, MKD, MKK, MLSC, MotorCap, PCC, PhaseCap, PhaseCube, PhaseMod, PhiCap, SIFERRIT, SIFI, SIKOREL, SilverCap, SIMDAD, SiMic, SIMID, SineFormer, SIOV, SIP5D, SIP5K, ThermoFuse, WindCap are **trademarks registered or pending** in Europe and in other countries. Further information will be found on the Internet at www.epcos.com/trademarks.

The world of electronic components,
modules and systems within a mouse click

www.epcos.com
www.global.tdk.com

Edition 2012 · Ordering No. EPC:65055-7600 · Printed in Germany · PP 121110.