

# S1-1W Series

1W Unregulated Single & Dual output



## Features

- 7 Pin SIL / 14 Pin DIL Package
- 1000 VDC Isolation
- Up to 6000 VDC Isolation
- Low Ripple and Noise
- Efficiency up to 86%
- -40 ~ 85°C Operation Temperature Range
- Non-Conductive Black Plastic Case
- EMI Complies With EN55022 Class B



The S1 series is a family of cost effective 1W single & dual output DC-DC converters. These converters achieve low cost and ultra-miniature SIP 7 pin or DIP 14 pin size. Devices are encapsulated using flame retardant resin. The models operate from input voltage of 3.3, 5, 12, 15, 24, 48 Vdc with output voltage of 3.3, 5, 7.2, 9, 12, 15, 18, 24,  $\pm 3.3$ ,  $\pm 5$ ,  $\pm 7.2$ ,  $\pm 9$ ,  $\pm 12$ ,  $\pm 15$ ,  $\pm 18$ ,  $\pm 24$  Vdc. High performance features include 1000Vdc~6000Vdc input/output isolation, high efficiency operation and output voltage accuracy of  $\pm 3\%$  maximum. Standard features include an input range of  $\pm 10\%$  tolerance and low output noise and ripple.

All specifications typical at Ta=25°C, nominal input voltage and full load unless otherwise specified

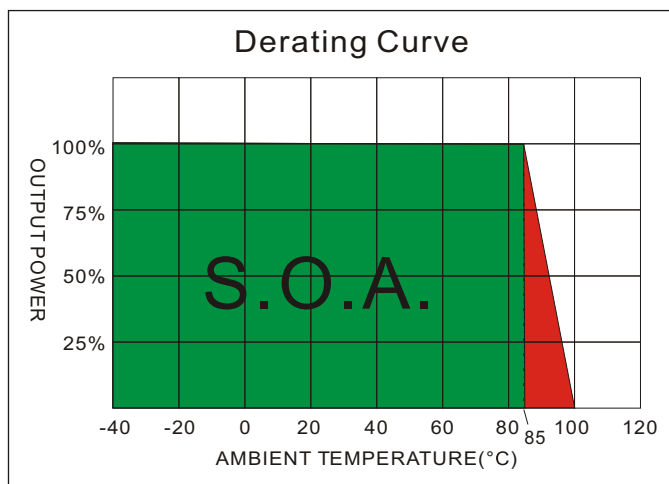
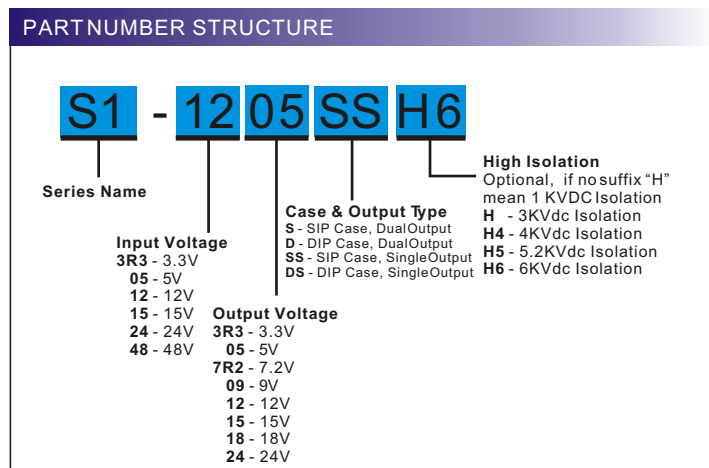
OUTPUT SPECIFICATIONS	
Voltage accuracy	$\pm 3\%$
Line regulation	$\pm 1.2\%$ / Per 1% Vin Change
Load regulation	(From 20% to 100% Load) $\pm 10\%$ (Output 3.3V Model) $\pm 20\%$
Ripple & noise(20 MHz bandwidth)(1)	75mV pk-pk
Temperature coefficient	$\pm 0.02\%/^{\circ}\text{C}$
Capacitor load(2)	See table
INPUT SPECIFICATIONS	
Voltage Range	$\pm 10\%$
Max. Input Current	See table
No-Load Input Current	See table
Input Filter	Capacitors
Input Reflected Ripple Current(3)	20mA pk-pk
ENVIRONMENT SPECIFICATIONS	
Operating Temperature	-40°C~85°C(See Derating Curve)
Maximum Case Temperature	100°C
Storage Temperature	-40°C~125°C
Cooling	Nature Convection
GENERAL SPECIFICATIONS	
Efficiency	See table
I/O Isolation Voltage(3 sec)	See table
Input/Output	1000~6000Vdc
I/O Isolation Capacitance	60 pF Typ.
I/O Isolation Resistance	1000M Ohm
Switching Frequency	Variable 80kHz
Humidity	95% rel H
Reliability Calculated MTBF(MIL-HDBK-217 F)	>1.121 Mhrs
Safety Standard : (designed to meet)	IEC 60950-1

EMC SPECIFICATIONS		
Radiated Emissions	EN55022	CLASS B
Conducted Emissions (4)	EN55022	CLASS B
ESD	IEC 61000-4-2	Perf. Criteria A
RS	IEC 61000-4-3	Perf. Criteria A
EFT (5)	IEC 61000-4-4	Perf. Criteria A
Surge (5)	IEC 61000-4-5	Perf. Criteria A
CS	IEC 61000-4-6	Perf. Criteria A
PFMF	IEC 61000-4-8	Perf. Criteria A

PHYSICAL SPECIFICATIONS	
Case Material	Non-conductive Black Plastic(UL94V-0 rated)
Pin Material	0.5mm Alloy42 Solder-coated
Potting Material	Epoxy (UL94V-0 rated)
Weight	(SIP/2.3g) (DIP/2.6g)
Dimensions	SIP Case 0.76"x0.24"x0.39" DIP Case 0.80"x0.40"x0.27"

ABSOLUTE MAXIMUM RATINGS(6)	
These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.	
Input Surge Voltage(100ms)	See table
3.3 Models	6 Vdc ,max.
5 Models	7 Vdc ,max.
12 Models	15 Vdc ,max.
15 Models	18 Vdc ,max.
24 Models	28 Vdc ,max.
48 Models	54 Vdc ,max.
Soldering Temperature (1.5mm from case 10sec. max.)	260°C ,max.

## S1 - 1W Unregulated Single & Dual output



## MODEL SELECTION GUIDE

MODEL NUMBER	INPUT Voltage Range (Vdc)	INPUT Current		OUTPUT Voltage (Vdc)	OUTPUT Current Full load (mA)	EFFICIENCY @FL(%)	Capacitor Load(µF)
		No-Load (mA)	Full Load (mA)				
S1-3R33R 3SS	3.3	28	399	3.3	303	76	220
S1-3R3 05SS	3.3	22	389	5	200	78	220
S1-3R37R 2SS	3.3	25	389	7.2	139	78	220
S1-3R30 9SS	3.3	35	379	9	111	80	220
S1-3R31 2SS	3.3	30	394	12	83	77	220
S1-3R31 5SS	3.3	30	389	15	67	78	220
S1-3R31 8SS	3.3	30	415	18	56	73	220
S1-3R32 4SS	3.3	30	415	24	42	73	220
S1-053R 3SS	5	15	256	3.3	303	78	220
S1-0505 S	5	17	247	5	200	81	220
S1-057R 2SS	5	16	247	7.2	139	81	220
S1-0509 SS	5	15	244	9	111	82	220
S1-0512 SS	5	17	253	12	83	79	220
S1-0515 SS	5	17	233	15	67	86	220
S1-0518 SS	5	16	241	18	56	83	220
S1-0524 SS	5	20	244	24	42	82	220
S1-123R 3SS	12	12	111	3.3	303	75	220
S1-1205 SS	12	14	105	5	200	79	220
S1-127R 2SS	12	14	111	7.2	139	75	220
S1-1209 SS	12	9	104	9	111	80	220
S1-1212 SS	12	13	105	12	83	79	220
S1-1215 SS	12	10	102	15	67	82	220
S1-1218 SS	12	11	103	18	56	81	220
S1-1224 SS	12	20	110	24	42	76	220
S1-153R 3SS	15	10	83	3.3	303	80	220
S1-1505 SS	15	7	82	5	200	81	220
S1-157R 2SS	15	10	85	7.2	139	78	220
S1-1509 SS	15	10	85	9	111	78	220
S1-1512 SS	15	8	83	12	83	80	220
S1-1515 SS	15	12	84	15	67	79	220
S1-1518 SS	15	10	83	18	56	80	220
S1-1524 SS	15	5	80	24	42	83	220

Suffix "H" means 3 KVdcisolation      Suffix "H4" means 4 KVdcisolation  
 Suffix "H5" means 5.2 KVdcisolation      Suffix "H6" means 6 KVdcisolation

*S1 - 1W Unregulated Single & Dual output*

MODEL NUMBER	INPUT Voltage Range (Vdc)	INPUT Current		OUTPUT Voltage (Vdc)	OUTPUT Current Full load (mA)	EFFICIENCY @FL(%)	Capacitor Load(µF)
		No-Load (mA)	Full Load (mA)				
S1-243R 3SS	24	8	56	3.3	303	74	220
S1-2405 SS	24	6	54	5	200	77	220
S1-247R 2SS	24	6	57	7.2	139	73	220
S1-2409 SS	24	6	55	9	111	76	220
S1-2412 SS	24	6	53	12	83	78	220
S1-2415 SS	24	5	52	15	67	80	220
S1-2418 SS	24	5	51	18	56	82	220
S1-2424 SS	24	8	52	24	42	80	220
S1-483R 3SS	48	5	29	3.3	303	73	220
S1-4805 SS	48	5	29	5	200	73	220
S1-487R 2SS	48	5	28	7.2	139	75	220
S1-4809 SS	48	5	27	9	111	76	220
S1-4812 SS	48	5	27	12	83	76	220
S1-4815 SS	48	5	27	15	67	77	220
S1-4818 SS	48	5	28	18	56	75	220
S1-4824 SS	48	6	27	24	42	76	220
S1-3R33R3S	3.3	30	459	±3.3	±152	66	220
S1-3R30 5S	3.3	30	433	±5.0	±100	70	±100
S1-3R37R2S	3.3	30	421	±7.2	±69	72	±100
S1-3R309 S	3.3	26	404	±9.0	±56	75	±100
S1-3R312 S	3.3	30	384	±12	±42	77	±100
S1-3R315 S	3.3	25	389	±15	±33	78	±100
S1-3R318 S	3.3	25	404	±18	±28	75	±100
S1-3R324 S	3.3	25	404	±24	±21	75	±100
S1-053R3 S	5	20	299	±3.3	±152	67	±100
S1-050 5S	5	20	270	±5.0	±100	74	±100
S1-057R2 S	5	15	253	±7.2	±69	79	±100
S1-0509 S	5	15	247	±9.0	±56	81	±100
S1-0512 S	5	20	250	±12	±42	80	±100
S1-0515 S	5	20	244	±15	±33	82	±100
S1-0518 S	5	22	247	±18	±28	81	±100
S1-0524 S	5	22	247	±24	±21	81	±100
S1-123R3 S	12	13	123	±3.3	±152	68	±100
S1-1205 S	12	10	113	±5.0	±100	74	±100
S1-127R2 S	12	10	110	±7.2	±69	76	±100
S1-1209 S	12	13	107	±9.0	±56	78	±100
S1-1212 S	12	10	102	±12	±42	82	±100
S1-1215 S	12	10	102	±15	±33	82	±100
S1-1218 S	12	10	102	±18	±28	82	±100
S1-1224 S	12	20	111	±24	±21	75	±100
S1-153R3 S	15	20	89	±3.3	±152	75	±100
S1-1505 S	15	20	89	±5.0	±100	75	±100
S1-157R2 S	15	18	89	±7.2	±69	75	±100
S1-1509 S	15	18	87	±9.0	±56	77	±100
S1-1512 S	15	20	87	±12	±42	77	±100
S1-1515 S	15	20	87	±15	±33	77	±100
S1-1518 S	15	15	89	±18	±28	75	±100
S1-1524 S	15	15	89	±24	±21	75	±100

Suffix "H" means 3 KVdcisolation  
 Suffix "H5" means 5.2 KVdcisolation

Suffix "H4" means 4 KVdcisolation  
 Suffix "H6" means 6 KVdcisolation

*S1 - 1W Unregulated Single & Dual output*

MODEL NUMBER	INPUT Voltage Range (Vdc)	INPUT Current		OUTPUT Voltage (Vdc)	OUTPUT Current Full load (mA)	EFFICIENCY @FL(%)	Capacitor Load(µF)
		No-Load (mA)	Full Load (mA)				
S1-243R3 S	24	7	62	±3.3	±152	67	±100
S1-2405 S	24	6	56	±5.0	±100	74	±100
S1-247R2 S	24	7	53	±7.2	±69	78	±100
S1-2409 S	24	7	53	±9.0	±56	78	±100
S1-2412 S	24	6	52	±12	±42	80	±100
S1-2415 S	24	8	52	±15	±33	80	±100
S1-2418 S	24	6	51	±18	±28	81	±100
S1-2424 S	24	8	51	±24	±21	82	±100
S1-483R3 S	48	6	34	±3.3	±152	62	±100
S1-4805 S	48	5	31	±5.0	±100	68	±100
S1-487R2 S	48	5	29	±7.2	±69	72	±100
S1-4809 S	48	5	29	±9.0	±56	73	±100
S1-4812 S	48	6	28	±12	±42	74	±100
S1-4815 S	48	5	27	±15	±33	77	±100
S1-4818 S	48	5	28	±18	±28	75	±100
S1-4824 S	48	6	28	±24	±21	74	±100
S1-3R33R3DS	3.3	35	427	3.3	303	71	220
S1-3R30 5DS	3.3	35	404	5	200	75	220
S1-3R37R2DS	3.3	35	404	7.2	139	75	220
S1-3R309DS	3.3	30	394	9	111	77	220
S1-3R312DS	3.3	30	399	12	83	76	220
S1-3R315DS	3.3	30	399	15	67	76	220
S1-3R318DS	3.3	35	415	18	56	73	220
S1-3R324DS	3.3	35	415	24	42	73	220
S1-053R3DS	5	20	260	3.3	303	77	220
S1-050 5DS	5	20	244	5	200	82	220
S1-057R2DS	5	20	244	7.2	139	82	220
S1-0509 DS	5	20	250	9	111	80	220
S1-0512 DS	5	16	247	12	83	81	220
S1-0515 DS	5	20	250	15	67	80	220
S1-0518 DS	5	25	250	18	56	80	220
S1-0524 DS	5	22	244	24	42	82	220
S1-123R3DS	12	20	111	3.3	303	75	220
S1-1205 DS	12	14	104	5	200	80	220
S1-127R2DS	12	15	110	7.2	139	76	220
S1-1209 DS	12	10	104	9	111	80	220
S1-1212 DS	12	13	108	12	83	77	220
S1-1215 DS	12	15	110	15	67	76	220
S1-1218 DS	12	20	114	18	56	73	220
S1-1224 DS	12	25	114	24	42	73	220
S1-153R3DS	15	10	89	3.3	303	75	220
S1-1505 DS	15	7	82	5	200	81	220
S1-157R2DS	15	10	89	7.2	139	75	220
S1-1509 DS	15	10	89	9	111	75	220
S1-1512 DS	15	10	83	12	83	80	220
S1-1515 DS	15	10	84	15	67	79	220
S1-1518 DS	15	10	83	18	56	80	220
S1-1524 DS	15	10	83	24	42	80	220

Suffix "H" means 3 KVdcisolation  
 Suffix "H5" means 5.2 KVdcisolation

Suffix "H4" means 4 KVdcisolation  
 Suffix "H6" means 6 KVdcisolation

*S1 - 1W Unregulated Single & Dual output*

MODEL NUMBER	INPUT Voltage Range (Vdc)	INPUT Current		OUTPUT Voltage (Vdc)	OUTPUT Current Full load (mA)	EFFICIENCY @FL(%)	Capacitor Load(µF)
		No-Load (mA)	Full Load (mA)				
S1-243R3DS	24	7	55	3.3	303	76	220
S1-2405DS	24	7	52	5	200	80	220
S1-247R2DS	24	8	57	7.2	139	73	220
S1-2409DS	24	7	56	9	111	75	220
S1-2412DS	24	6	53	12	83	78	220
S1-2415DS	24	6	52	15	67	80	220
S1-2418DS	24	5	52	18	56	80	220
S1-2424DS	24	5	51	24	42	81	220
S1483R3DS	48	10	30	3.3	303	70	220
S1-4805DS	48	6	29	5	200	73	220
S1487R2DS	48	6	28	7.2	139	74	220
S1-4809DS	48	6	28	9	111	75	220
S1-4812DS	48	5	27	12	83	76	220
S1-4815DS	48	4	26	15	67	79	220
S1-4818DS	48	5	28	18	56	75	220
S1-4824DS	48	6	29	24	42	72	220
S1-3R33R3D	3.3	35	481	±3.3	±152	63	±100
S1-3R305D	3.3	25	452	±5.0	±100	67	±100
S1-3R37R2D	3.3	30	433	±7.2	±69	70	±100
S1-3R309D	3.3	30	415	±9.0	±56	73	±100
S1-3R312D	3.3	30	415	±12	±42	73	±100
S1-3R315D	3.3	30	399	±15	±33	76	±100
S1-3R318D	3.3	30	404	±18	±28	75	±100
S1-3R324D	3.3	30	404	±24	±21	75	±100
S1-053R3D	5	20	308	±3.3	±152	65	±100
S1-0505D	5	20	256	±5.0	±100	70	±100
S1-057R2D	5	20	274	±7.2	±69	73	±100
S1-0509D	5	16	253	±9.0	±56	79	±100
S1-0512D	5	20	250	±12	±42	80	±100
S1-0515D	5	20	247	±15	±33	81	±100
S1-0518D	5	18	244	±18	±28	82	±100
S1-0524D	5	20	244	±24	±21	82	±100
S1-123R3D	12	15	128	±3.3	±152	65	±100
S1-1205D	12	7	113	±5.0	±100	74	±100
S1-127R2D	12	13	111	±7.2	±69	75	±100
S1-1209D	12	15	104	±9.0	±56	80	±100
S1-1212D	12	14	103	±12	±42	81	±100
S1-1215D	12	11	102	±15	±33	82	±100
S1-1218D	12	15	111	±18	±28	75	±100
S1-1224D	12	20	110	±24	±21	76	±100
S1-153R3D	15	20	89	±3.3	±152	75	±100
S1-1505D	15	20	89	±5.0	±100	75	±100
S1-157R2D	15	18	89	±7.2	±69	75	±100
S1-1509D	15	18	87	±9.0	±56	77	±100
S1-1512D	15	20	87	±12	±42	77	±100
S1-1515D	15	20	87	±15	±33	77	±100
S1-1518D	15	15	89	±18	±28	75	±100
S1-1524D	15	15	89	±24	±21	75	±100

Suffix "H" means 3 KVdc isolation  
 Suffix "H5" means 5.2 KVdc isolation

Suffix "H4" means 4 KVdc isolation  
 Suffix "H6" means 6 KVdc isolation

## S1 - 1W Unregulated Single & Dual output

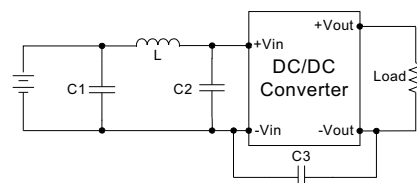
MODEL NUMBER	INPUT Voltage Range (Vdc)	INPUT Current		OUTPUT Voltage (Vdc)	OUTPUT Current Full load (mA)	EFFICIENCY @FL(%)	Capacitor Load(µF)
		No-Load (mA)	Full Load (mA)				
S1-243R3D	24	10	65	±3.3	±152	64	±100
S1-2405D	24	5	56	±5.0	±100	75	±100
S1-247R2D	24	7	56	±7.2	±69	75	±100
S1-2409D	24	5	52	±9.0	±56	80	±100
S1-2412D	24	6	53	±12	±42	79	±100
S1-2415D	24	8	51	±15	±33	81	±100
S1-2418D	24	10	53	±18	±28	78	±100
S1-2424D	24	9	53	±24	±21	78	±100
S1-483R3D	48	8	32	±3.3	±152	65	±100
S1-4805D	48	6	32	±5.0	±100	65	±100
S1-487R2D	48	5	31	±7.2	±69	68	±100
S1-4809D	48	5	30	±9.0	±56	70	±100
S1-4812D	48	6	29	±12	±42	71	±100
S1-4815D	48	6	29	±15	±33	72	±100
S1-4818D	48	8	30	±18	±28	70	±100
S1-4824D	48	8	29	±24	±21	72	±100

Suffix "H" means 3 KVdcisolation      Suffix "H4" means 4 KVdcisolation  
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### TEST CONFIGURATIONS

#### EMI Filter

Input filter components (C1, L, C2, C3) are used to help meet conducted emissions requirement for the module. These components should be mounted as close as possible to the module; and all leads should be minimized to decrease radiated noise.

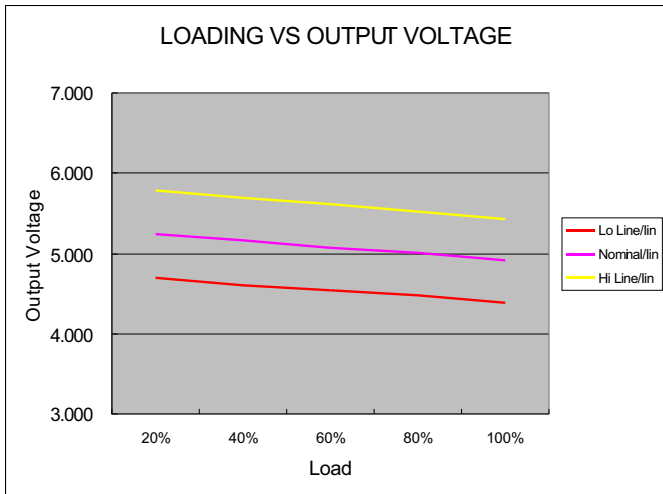


	C1	L	C2	C3
S1-3R3XXXXX	1210, 2.2µF/100V	18µH		
S1-05XXXXXX	1210, 2.2µF/100V	18µH		
S1-12XXXXXX	1210, 2.2µF/100V	18µH		
S1-15XXXXXX	1210, 2.2µF/100V	18µH		
S1-24XXXXXX	1210, 2.2µF/100V	18µH	1210, 2.2µF/100V	1206, 470pF/2KV
S1-48XXXXXX	Electrolytic capacitor, 10µF/100V	18µH	1210, 2.2µF/100V	1206, 470pF/2KV

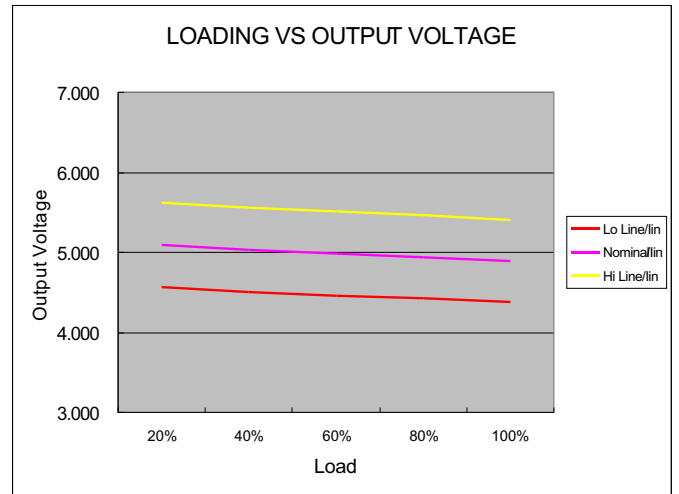
### NOTE

1. Ripple/Noise measured with 20MHz bandwidth.
2. Tested by minimal Vin and constant resistive load.
3. Measured Input reflected ripple current with a simulated source inductance of 12µH.
4. Input filter components are required to help meet conducted emission class B, which application refer to the EMI Filter of design & feature configuration.
5. An external filter capacitor is required if the module has to meet IEC61000-4-4 and IEC61000-4-5.  
The filter capacitor Schmid-M suggest: Nippon- chemi - con KY series, 470µF/100V.
6. Exceeding the absolute ratings of the unit could cause damage. It is not allowed for continuous operating.
7. Operation under no-load conditions will not damage these devices, however they may not meet all listed specifications.

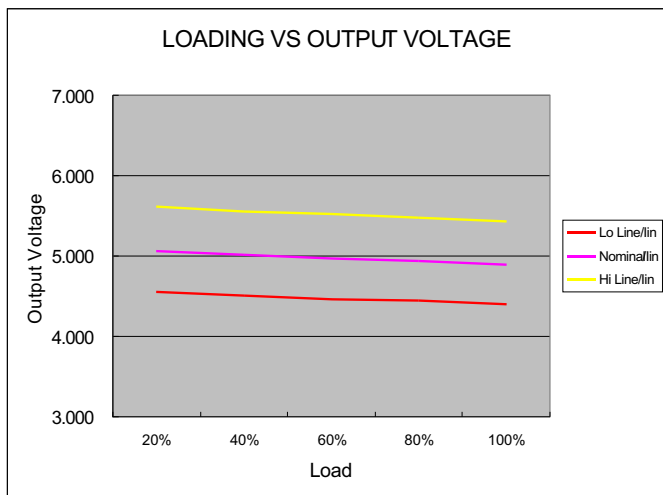
S1 - 1W Unregulated Single & Dual output



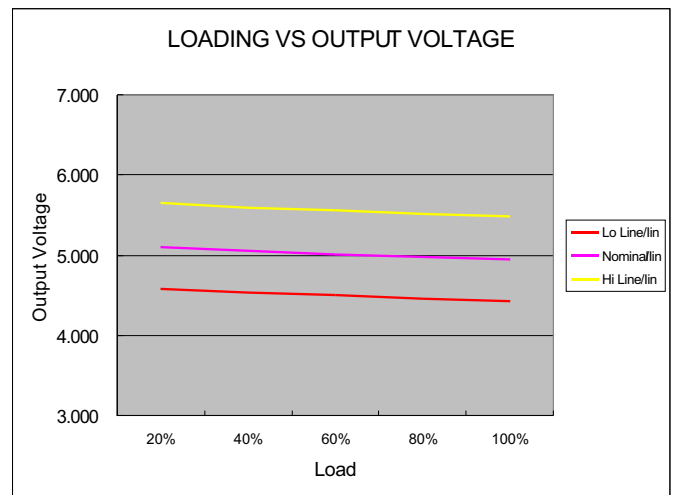
5 Models



12 Models



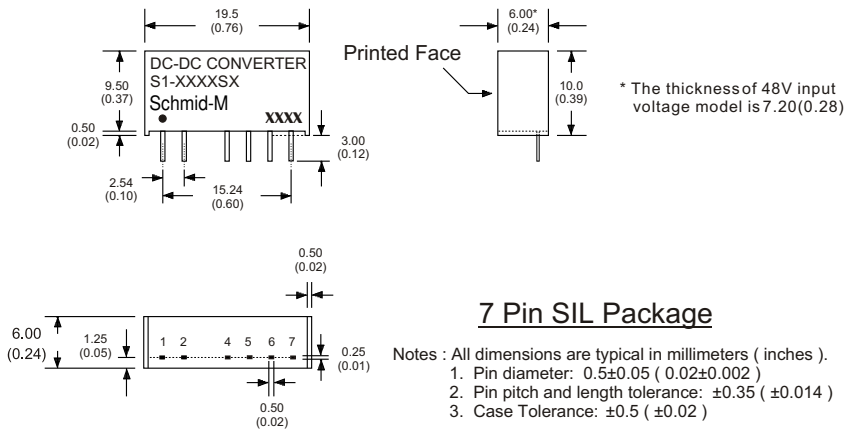
24 Models



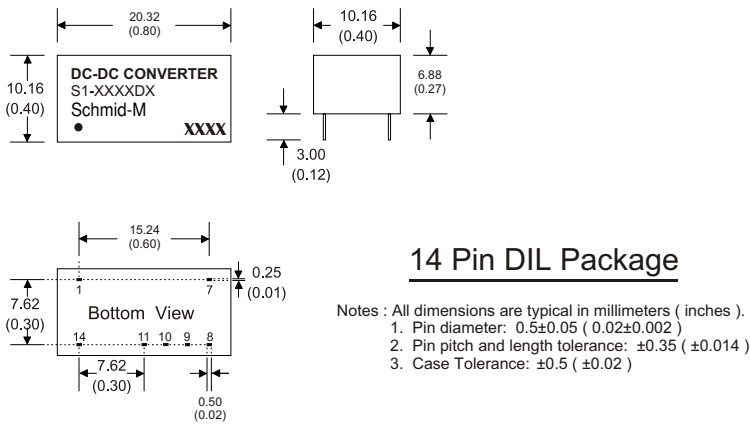
48 Models

# S1 - 1W Unregulated Single & Dual output

## MECHANICAL SPECIFICATIONS



PIN CONNECTIONS				
PIN NUMBER	SINGLE	DUAL	SINGLE-H	DUAL-H
1	+V Input	+V Input	+V Input	+V Input
2	-V Input	-V Input	-V Input	-V Input
4	-V Output	-V Output	N.P.	N.P.
5	N.P.	Common	-V Output	-V Output
6	+V Output	+V Output	N.P.	Common
7	N.P.	N.P.	+V Output	+V Output



PIN CONNECTIONS				
PIN NUMBER	SINGLE	DUAL	SINGLE-H	DUAL-H
1	-V Input	-V Input	-V Input	-V Input
7	N.C.	N.C.	N.C.	N.C.
8	N.P.	Common	+V Output	+V Output
9	+V Output	+V Output	N.P.	Common
10	N.P.	N.P.	-V Output	-V Output
11	-V Output	-V Output	N.P.	N.P.
14	+V Input	+V Input	+V Input	+V Input