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, ±3.3, ±5,±7.2, ±9, ±12, ±15, ±18, ±24 Vdc. High performance features include 1000Vdc~6000Vdc input/output isolation, high efficiency operation and output voltage accuracy of ±3% maximum. Standard features include an input range of ±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	±3%
Line regulation	±1.2% / Per 1% Vin Change
Load regulation	(From 20% to 100% Load) ±10% (Output 3.3V Model) ±20%
Ripple & noise (20 MHz bandwidth)(1)	75mV pk-pk
Temperature coefficient	±0.02%/°C
Capacitor load(2)	See table

INPUT SPECIFICATIONS

Voltage Range	±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)	
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)	
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.

PART NUMBER STRUCTURE

S1 - 12 05 SS H6

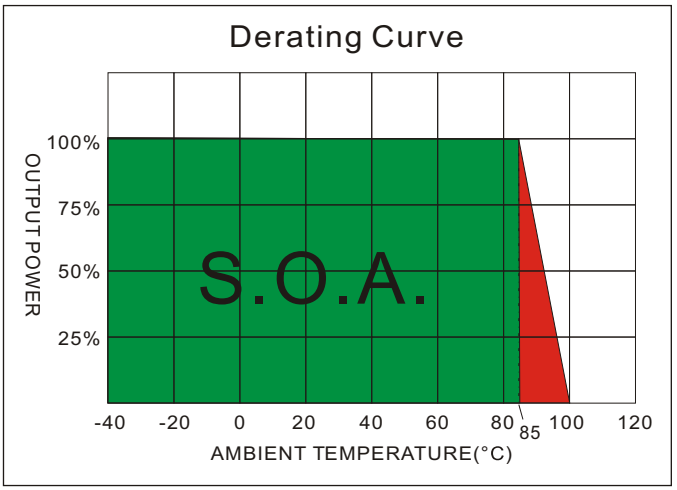
Series Name

Input Voltage
3R3 - 3.3V
05 - 5V
12 - 12V
15 - 15V
24 - 24V
48 - 48V

Output Voltage
3R3 - 3.3V
05 - 5V
7R2 - 7.2V
09 - 9V
12 - 12V
15 - 15V
18 - 18V
24 - 24V

Case & Output Type
S - SIP Case, DualOutput
D - DIP Case, DualOutput
SS - SIP Case, SingleOutput
DS - DIP Case, SingleOutput

High Isolation
Optional, if no suffix "H" mean 1 KVDC Isolation
H - 3KVdc Isolation
H4 - 4KVdc Isolation
H5 - 5.2KVdc Isolation
H6 - 6KVdc Isolation



MODEL SELECTION GUIDE

MODEL NUMBER	INPUT Voltage Range (Vdc)	INPUT Current No-Load (mA)	INPUT Current Full Load (mA)	OUTPUT Voltage (Vdc)	OUTPUT Current Full load (mA)	EFFICIENCY @FL(%)	Capacitor Load(uF)
S1-3R33R3SS	3.3	28	399	3.3	303	76	220
S1-3R305SS	3.3	22	389	5	200	78	220
S1-3R37R2SS	3.3	25	389	7.2	139	78	220
S1-3R309SS	3.3	35	379	9	111	80	220
S1-3R312SS	3.3	30	394	12	83	77	220
S1-3R315SS	3.3	30	389	15	67	78	220
S1-3R318SS	3.3	30	415	18	56	73	220
S1-3R324SS	3.3	30	415	24	42	73	220
S1-053R3SS	5	15	256	3.3	303	78	220
S1-0505SS	5	17	247	5	200	81	220
S1-057R2SS	5	16	247	7.2	139	81	220
S1-0509SS	5	15	244	9	111	82	220
S1-0512SS	5	17	253	12	83	79	220
S1-0515SS	5	17	233	15	67	86	220
S1-0518SS	5	16	241	18	56	83	220
S1-0524SS	5	20	244	24	42	82	220
S1-123R3SS	12	12	111	3.3	303	75	220
S1-1205SS	12	14	105	5	200	79	220
S1-127R2SS	12	14	111	7.2	139	75	220
S1-1209SS	12	9	104	9	111	80	220
S1-1212SS	12	13	105	12	83	79	220
S1-1215SS	12	10	102	15	67	82	220
S1-1218SS	12	11	103	18	56	81	220
S1-1224SS	12	20	110	24	42	76	220
S1-153R3SS	15	10	83	3.3	303	80	220
S1-1505SS	15	7	82	5	200	81	220
S1-157R2SS	15	10	85	7.2	139	78	220
S1-1509SS	15	10	85	9	111	78	220
S1-1512SS	15	8	83	12	83	80	220
S1-1515SS	15	12	84	15	67	79	220
S1-1518SS	15	10	83	18	56	80	220
S1-1524SS	15	5	80	24	42	83	220

Suffix "H" means 3 KVdc isolation
Suffix "H4" means 4 KVdc isolation
Suffix "H5" means 5.2 KVdc isolation
Suffix "H6" means 6 KVdc isolation

S1 - 1W Unregulated Single & Dual output

MODEL NUMBER	INPUT Voltage Range (Vdc)	INPUT Current No-Load (mA)	INPUT Current Full Load (mA)	OUTPUT Voltage (Vdc)	OUTPUT Current Full load (mA)	EFFICIENCY @FL(%)	Capacitor Load(uF)
S1-243R3SS	24	8	56	3.3	303	74	220
S1-2405SS	24	6	54	5	200	77	220
S1-247R2SS	24	6	57	7.2	139	73	220
S1-2409SS	24	6	55	9	111	76	220
S1-2412SS	24	6	53	12	83	78	220
S1-2415SS	24	5	52	15	67	80	220
S1-2418SS	24	5	51	18	56	82	220
S1-2424SS	24	8	52	24	42	80	220
S1-483R3SS	48	5	29	3.3	303	73	220
S1-4805SS	48	5	29	5	200	73	220
S1-487R2SS	48	5	28	7.2	139	75	220
S1-4809SS	48	5	27	9	111	76	220
S1-4812SS	48	5	27	12	83	76	220
S1-4815SS	48	5	27	15	67	77	220
S1-4818SS	48	5	28	18	56	75	220
S1-4824SS	48	6	27	24	42	76	220
S1-3R33R3S	3.3	30	459	±3.3	±152	66	220
S1-3R305S	3.3	30	433	±5.0	±100	70	±100
S1-3R37R2S	3.3	30	421	±7.2	±69	72	±100
S1-3R309S	3.3	26	404	±9.0	±56	75	±100
S1-3R312S	3.3	30	384	±12	±42	77	±100
S1-3R315S	3.3	25	389	±15	±33	78	±100
S1-3R318S	3.3	25	404	±18	±28	75	±100
S1-3R324S	3.3	25	404	±24	±21	75	±100
S1-053R3S	5	20	299	±3.3	±152	67	±100
S1-0505S	5	20	270	±5.0	±100	74	±100
S1-057R2S	5	15	253	±7.2	±69	79	±100
S1-0509S	5	15	247	±9.0	±56	81	±100
S1-0512S	5	20	250	±12	±42	80	±100
S1-0515S	5	20	244	±15	±33	82	±100
S1-0518S	5	22	247	±18	±28	81	±100
S1-0524S	5	22	247	±24	±21	81	±100
S1-123R3S	12	13	123	±3.3	±152	68	±100
S1-1205S	12	10	113	±5.0	±100	74	±100
S1-127R2S	12	10	110	±7.2	±69	76	±100
S1-1209S	12	13	107	±9.0	±56	78	±100
S1-1212S	12	10	102	±12	±42	82	±100
S1-1215S	12	10	102	±15	±33	82	±100
S1-1218S	12	10	102	±18	±28	82	±100
S1-1224S	12	20	111	±24	±21	75	±100
S1-153R3S	15	20	89	±3.3	±152	75	±100
S1-1505S	15	20	89	±5.0	±100	75	±100
S1-157R2S	15	18	89	±7.2	±69	75	±100
S1-1509S	15	18	87	±9.0	±56	77	±100
S1-1512S	15	20	87	±12	±42	77	±100
S1-1515S	15	20	87	±15	±33	77	±100
S1-1518S	15	15	89	±18	±28	75	±100
S1-1524S	15	15	89	±24	±21	75	±100

Suffix "H" means 3 KVdc isolation Suffix "H4" means 4 KVdc isolation
Suffix "H5" means 5.2 KVdc isolation Suffix "H6" means 6 KVdc isolation

S1 - 1W Unregulated Single & Dual output

MODEL NUMBER	INPUT Voltage Range (Vdc)	INPUT Current No-Load (mA)	INPUT Current Full Load (mA)	OUTPUT Voltage (Vdc)	OUTPUT Current Full load (mA)	EFFICIENCY @FL(%)	Capacitor Load(uF)
S1-243R3S	24	7	62	±3.3	±152	67	±100
S1-2405S	24	6	56	±5.0	±100	74	±100
S1-247R2S	24	7	53	±7.2	±69	78	±100
S1-2409S	24	7	53	±9.0	±56	78	±100
S1-2412S	24	6	52	±12	±42	80	±100
S1-2415S	24	8	52	±15	±33	80	±100
S1-2418S	24	6	51	±18	±28	81	±100
S1-2424S	24	8	51	±24	±21	82	±100
S1-483R3S	48	6	34	±3.3	±152	62	±100
S1-4805S	48	5	31	±5.0	±100	68	±100
S1-487R2S	48	5	29	±7.2	±69	72	±100
S1-4809S	48	5	29	±9.0	±56	73	±100
S1-4812S	48	6	28	±12	±42	74	±100
S1-4815S	48	5	27	±15	±33	77	±100
S1-4818S	48	5	28	±18	±28	75	±100
S1-4824S	48	6	28	±24	±21	74	±100
S1-3R33R3DS	3.3	35	427	3.3	303	71	220
S1-3R305DS	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
S1-0505DS	5	20	244	5	200	82	220
S1-057R2DS	5	20	244	7.2	139	82	220
S1-0509DS	5	20	250	9	111	80	220
S1-0512DS	5	16	247	12	83	81	220
S1-0515DS	5	20	250	15	67	80	220
S1-0518DS	5	25	250	18	56	80	220
S1-0524DS	5	22	244	24	42	82	220
S1-123R3DS	12	20	111	3.3	303	75	220
S1-1205DS	12	14	104	5	200	80	220
S1-127R2DS	12	15	110	7.2	139	76	220
S1-1209DS	12	10	104	9	111	80	220
S1-1212DS	12	13	108	12	83	77	220
S1-1215DS	12	15	110	15	67	76	220
S1-1218DS	12	20	114	18	56	73	220
S1-1224DS	12	25	114	24	42	73	220
S1-153R3DS	15	10	89	3.3	303	75	220
S1-1505DS	15	7	82	5	200	81	220
S1-157R2DS	15	10	89	7.2	139	75	220
S1-1509DS	15	10	89	9	111	75	220
S1-1512DS	15	10	83	12	83	80	220
S1-1515DS	15	10	84	15	67	79	220
S1-1518DS	15	10	83	18	56	80	220
S1-1524DS	15	10	83	24	42	80	220

Suffix "H" means 3 KVdc isolation Suffix "H4" means 4 KVdc isolation
Suffix "H5" means 5.2 KVdc isolation Suffix "H6" means 6 KVdc isolation

S1 - 1W Unregulated Single & Dual output

MODEL NUMBER	INPUT Voltage Range (Vdc)	INPUT Current No-Load (mA)	INPUT Current Full Load (mA)	OUTPUT Voltage (Vdc)	OUTPUT Current Full load (mA)	EFFICIENCY @FL(%)	Capacitor Load(uF)
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
S1-483R3DS	48	10	30	3.3	303	70	220
S1-4805DS	48	6	29	5	200	73	220
S1-487R2DS	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 "H4" means 4 KVdc isolation
Suffix "H5" means 5.2 KVdc isolation Suffix "H6" means 6 KVdc isolation

S1 - 1W Unregulated Single & Dual output

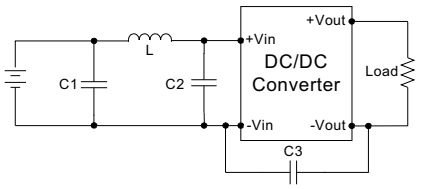
MODEL NUMBER	INPUT Voltage Range (Vdc)	INPUT Current No-Load (mA)	INPUT Current Full Load (mA)	OUTPUT Voltage (Vdc)	OUTPUT Current Full load (mA)	EFFICIENCY @FL(%)	Capacitor Load(uF)
S1-243R3D	24	10	65	±3.3	±152	64	±100
S1-2405D	24	5	56	±5.0	±100	75	±100
S1-247R2D	24	7	56	±7.2	±69	75	±100
S1-2409D	24	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 KVdc isolation Suffix "H4" means 4 KVdc isolation
Suffix "H5" means 5.2 KVdc isolation Suffix "H6" means 6 KVdc isolation

TEST CONFIGURATIONS

EMI Filter

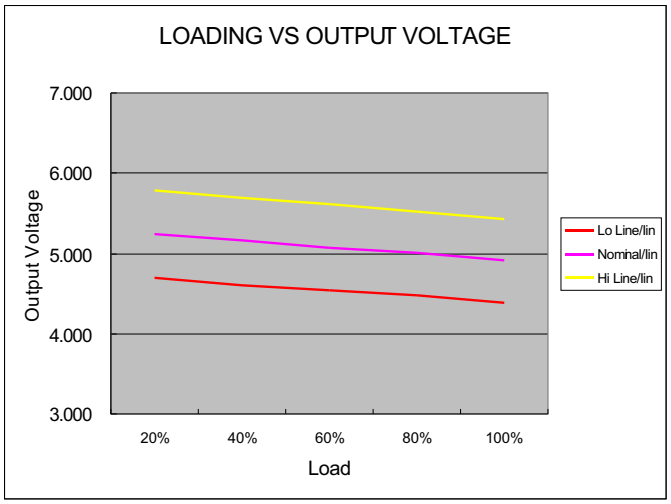
Input filter components (C1, L , C2 , C3) are used to help meet conducted emissions requirement for the module. These components should be mounted as close as possible to the module; and all leads should be minimized to decrease radiated noise.



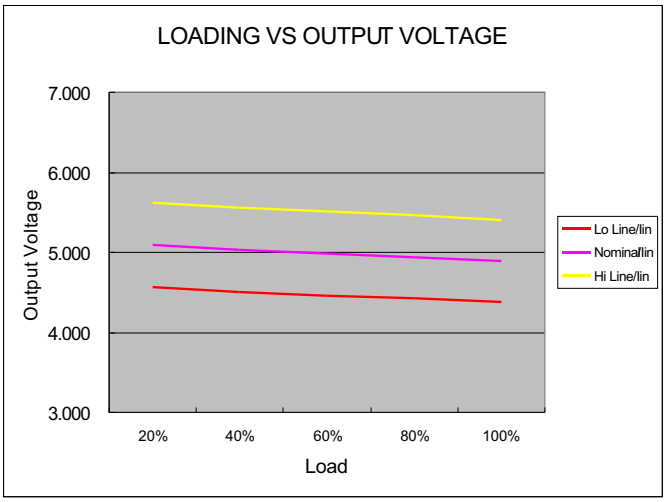
	C1	L	C2	C3
S1-3R3XXXXX	1210, 2.2uF/100V	18uH		
S1-05XXXXX	1210, 2.2uF/100V	18uH		
S1-12XXXXX	1210, 2.2uF/100V	18uH		
S1-15XXXXX	1210, 2.2uF/100V	18uH		
S1-24XXXXX	1210, 2.2uF/100V	18uH	1210, 2.2uF/100V	1206, 470pF/2KV
S1-48XXXXX	Electrolytic capacitor, 10uF/100V	18uH	1210, 2.2uF/100V	1206, 470pF/2KV

NOTE

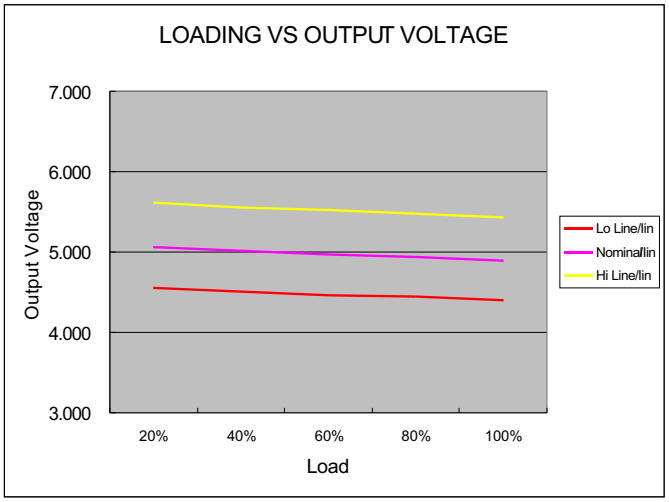
1. Ripple/Noise measured with 20MHz bandwidth.
2. Tested by minimal Vin and constant resistive load.
3. Measured Input reflected ripple current with a simulated source inductance of 12uH.
4. Input filter components are be required to help meet conducted emission class B, which application refer to the 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, 470uF/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.



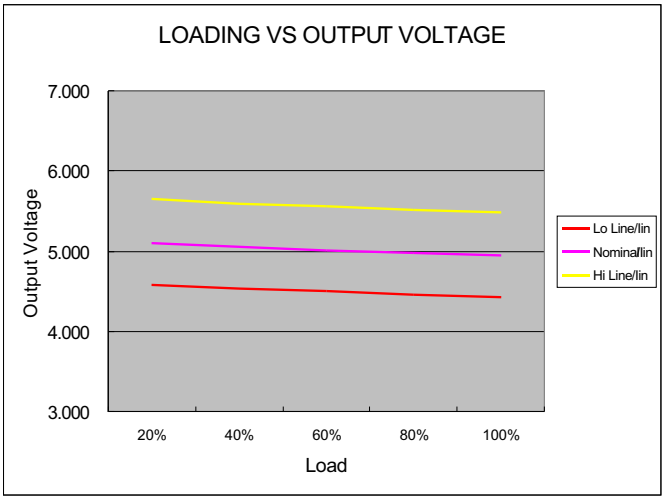
5 Models



12 Models

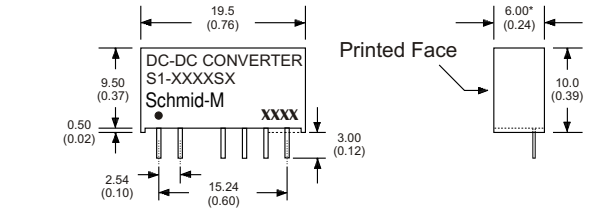


24 Models

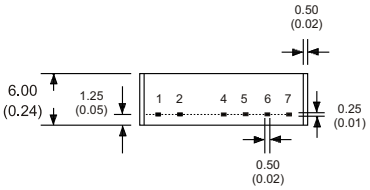


48 Models

MECHANICAL SPECIFICATIONS



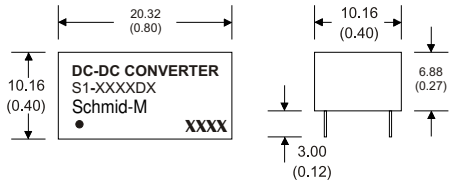
* The thickness of 48V input voltage model is 7.20(0.28)

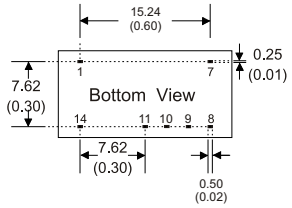


7 Pin SIL Package

Notes : All dimensions are typical in millimeters (inches).
1. Pin diameter: 0.5±0.05 (0.02±0.002)
2. Pin pitch and length tolerance: ±0.35 (±0.014)
3. Case Tolerance: ±0.5 (±0.02)

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





14 Pin DIL Package

Notes : All dimensions are typical in millimeters (inches).
1. Pin diameter: 0.5±0.05 (0.02±0.002)
2. Pin pitch and length tolerance: ±0.35 (±0.014)
3. Case Tolerance: ±0.5 (±0.02)

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