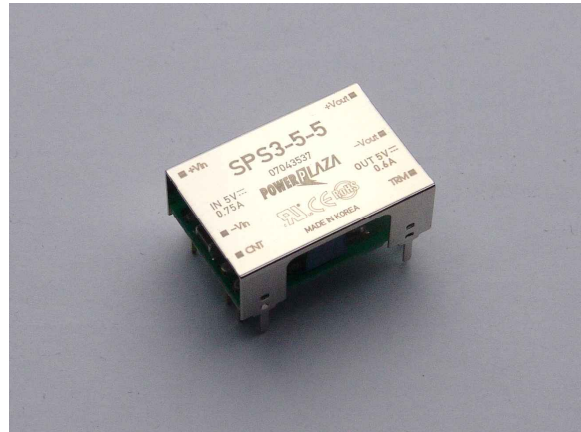


**SPS3 Series – Isolated DC/DC Converters**  
4.5 – 9Vdc Input, Maximum Power: 3WData Sheet  
Oct 09, 2007**SPS3-5 Series –small size isolated DC/DC converters****Features**

- High Efficiency
- Wide operating temperature range  
( -40°C to +85°C )
- Wide 2:1 input range
- Dimensions 23.40 x 8.50 x 16.0 (mm)
- Built-in over current protection circuit
- Input – Output Isolated
- Remote on/off control
- Long Life Design
- Trimmable output voltage(single output)
- Open case type  
( employ only ceramic capacitor)
- Safety agency approval  
UL (UL 60950-1,CSA C22.2 NO.60950-1):  
E227474  
CE (EN 60950) through TÜV
- **RoHS directive**

**Applications**

- Telecommunication
- Datacom
- Instrumentation/ Equipments
- Distributed Power Systems

**Description**

SPS Series is an isolated DC/DC converter offering designers low cost and space-efficient solution, Remote on/off, precisely regulated, over current protection.

The -40°C to 85°C operating temperature range makes the SPS series ideal for mixed analog/digital Subsystems, data communication equipments, distributed power systems. They are an excellent choice for both new design-information network system and upgrading older systems

**SPS3 Series – Isolated DC/DC Converters**  
4.5 – 9Vdc Input, Maximum Power: 3WData Sheet  
Oct 09, 2007**Absolute Maximum Ratings**

Parameter	Min	Typ	Max	Unit	Notes
Input Voltage Continuous	4.5	-	9	Vdc	
Operating Ambient Temperature	-40	-	85	°C	
Storage Temperature	-40	-	105	°C	
I/O Isolation Voltage	-	-	500	VAC	

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device

**Electrical Specifications****Input Characteristics**

Parameter	Symbol	Min	Typ	Max	Unit
Operating voltage Range		4.5	5	9	Vdc
Maximum Input current (At nominal input voltage and Maximum Output Power)	$I_{in}$		0.758		A
No load input current					
SPS3-5-3R3					mA
SPS3-5-5			32		mA
SPS3-5-12			36		mA
SPS3-5-15					mA
SPD3-5-1212			47		mA
SPD3-5-1515					mA
Disabled input current SPS3-5-5 (Remote on/off control)					A

**SPS3 Series – Isolated DC/DC Converters**  
 4.5 – 9Vdc Input, Maximum Power: 3W

 Data Sheet  
 Oct 09, 2007

**Output Characteristics**

 T<sub>A</sub> = +25°C, V<sub>in</sub> = 4.5 ~ 9V unless otherwise specified

Parameter	Symbol	Min	Typ	Max	Unit
Output Voltage tolerance	V <sub>o</sub>	-	-	±2	%
Output Current	I <sub>o</sub>				
SPS3-5-3R3				0.6	A
SPS3-5-5				0.6	A
SPS3-5-12				0.25	A
SPS3-5-15				0.2	A
SPD3-5-1212				130	mA
SPD3-5-1515				100	mA
Output Regulation;					
- Line Regulation		-	-	±0.5	%
(From minimum input voltage to maximum input voltage, constant load)					
- Load Regulation		-	-	±1	%
(From no load to maximum load)					
Output Current Limit (Automatic recovery)		>105			%
Output Ripple and noise (V <sub>in</sub> = 5V, and I <sub>o</sub> = Max output current Bandwidth 20MHz, 1uF Ceramic cap)	mVp-p	-	-	1% of Output Voltage	mV
Efficiency					
SPS3-5-3R3			73		%
SPS3-5-5			78		%
SPS3-5-12			80		%
SPS3-5-15			80		%
SPD3-5-1212			81		%
SPD3-5-1515			81		%
(100% of max I <sub>o</sub> , V <sub>in</sub> = 5V)					

**SPS3 Series – Isolated DC/DC Converters**  
**4.5 – 9Vdc Input, Maximum Power: 3W**

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Dynamic Load Response (1uF Ceramic 50% to 100 %, 100% to 50%, Tr = 100uS)			±	3% of Output Voltage	mV
Start – Up Time		-	-	10	ms
Turn – on overshoot		-	-	5	%
Maximum output capacitance					μF

### Isolation Specifications

Parameter	Symbol	Min	Typ	Max	Unit
I/O Isolation Voltage (AC500V, 1 Min) - Input-Output: - Input-Case: - Output-case:			-	500	VAC
			-	500	VAC
			-	500	VAC
Isolation Resistance - Output-Case (at DC500V at 25°C And 70%RH for 1 min)	Riso	>100	-	-	MΩ
Isolation Capacitance	Ciso				pF

### General Specifications

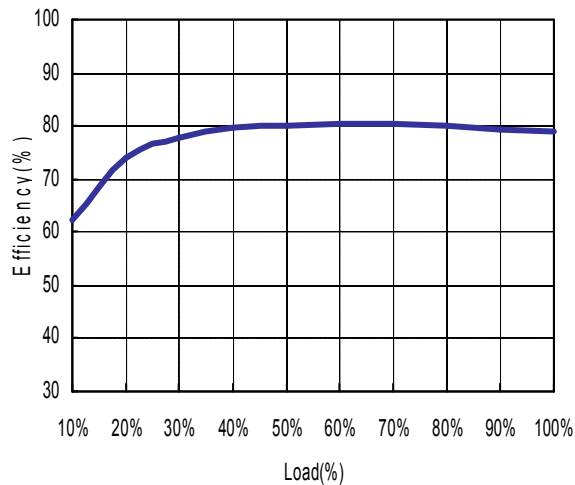
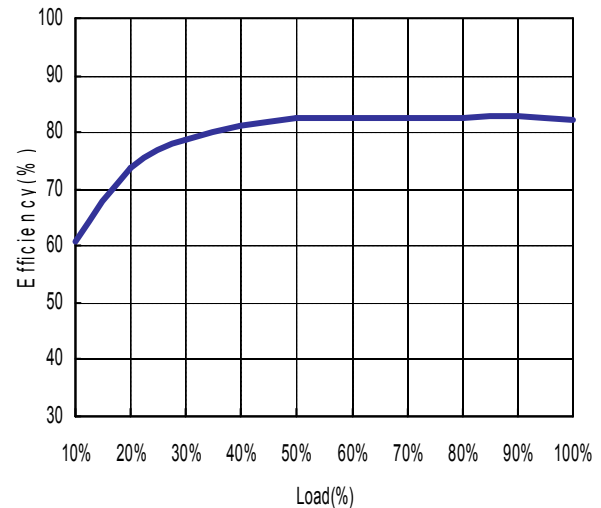
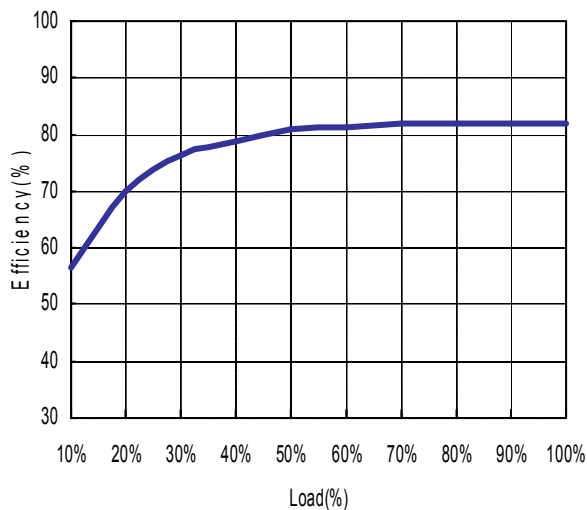
Parameter	Symbol	Min	Typ	Max	Unit
Switching Frequency			-		KHz
Remote ON/OFF control - Positive Logic On = short to - Vin Off = open					Vdc

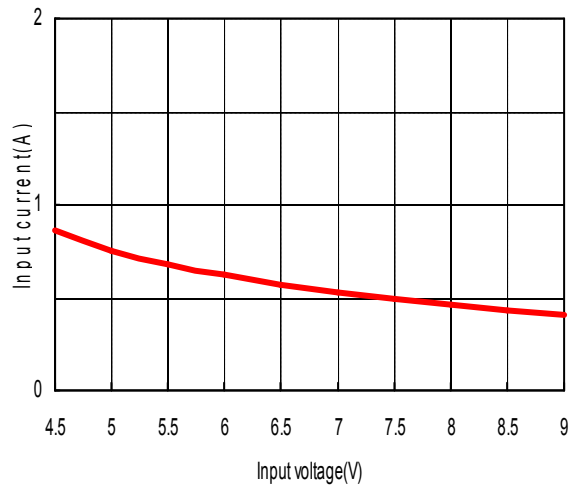
**SPS3 Series – Isolated DC/DC Converters**  
4.5 – 9Vdc Input, Maximum Power: 3WData Sheet  
Oct 09, 2007

Output voltage trim range			±10		%
MTBF(MIL-HDBK-217F)		7x10 <sup>5</sup>			hrs
Dimensions (W.H.L)		23.40 x 8.50 x 16.0			mm
Weight		-	4.0	-	Grams

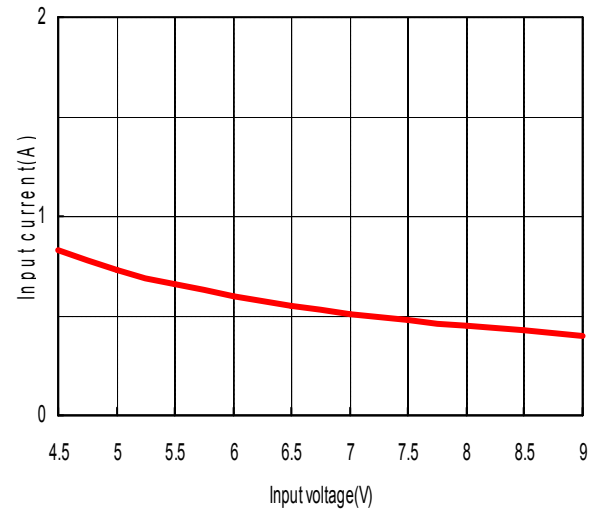
**Environmental**

Parameter	Symbol	Min	Typ	Max	Unit
Operating Temperature		-40		85	°C
Operating Humidity (RH non-condensing)		5		95	%
Storage Temperature		-40		105	°C

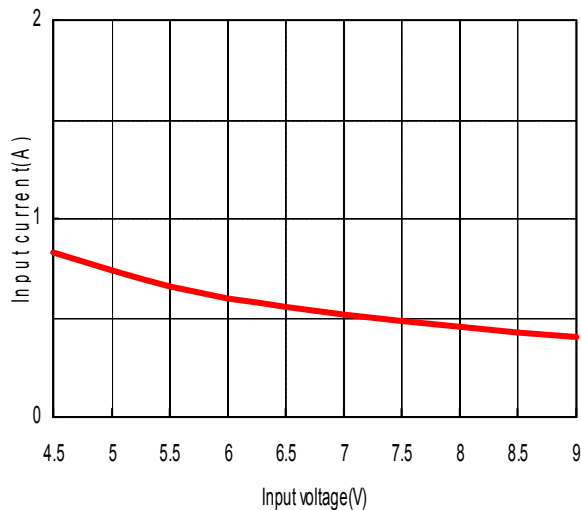
**SPS3 Series – Isolated DC/DC Converters**  
4.5 – 9Vdc Input, Maximum Power: 3WData Sheet  
Oct 09, 2007**Characteristic Curves****Efficiency Curves****- SPS3-5-5 -** $V_{in}=5V, V_o=5V@0.6A$ , At 25°C**- SPS3-5-12-** $V_{in}=5V, V_o=12V@0.25A$ , At 25°C**- SPD3-5-1212 -** $V_{in}=5V, V_o=+12V,-12V@0.13A$ , At 25°C

**SPS3 Series – Isolated DC/DC Converters**  
4.5 – 9Vdc Input, Maximum Power: 3WData Sheet  
Oct 09, 2007**Input Voltage vs Input Current****- SPS3-5-5 -**

Vin=5V, Vo=5V@0.6A, At 25°C

**- SPS3-5-12 -**

Vin=5V, Vo=12V@0.25A, At 25°C

**- SPD3-5-1212 -**

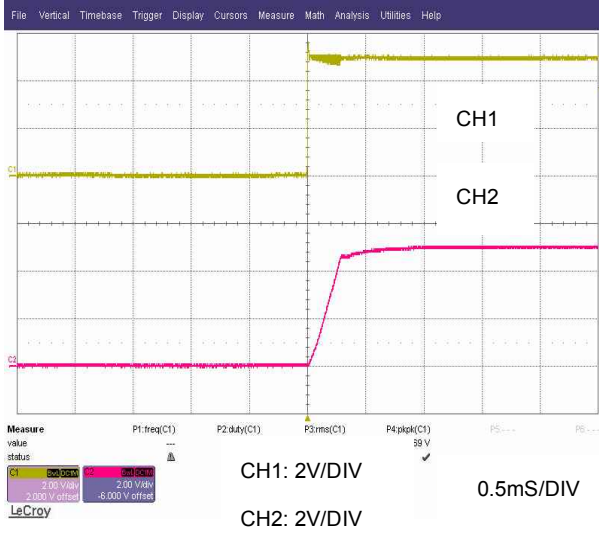
Vin=5V, Vo=+12V,-12V@0.13A, At 25°C

**SPS3 Series – Isolated DC/DC Converters**  
**4.5 – 9Vdc Input, Maximum Power: 3W**

Data Sheet  
 Oct 09, 2007

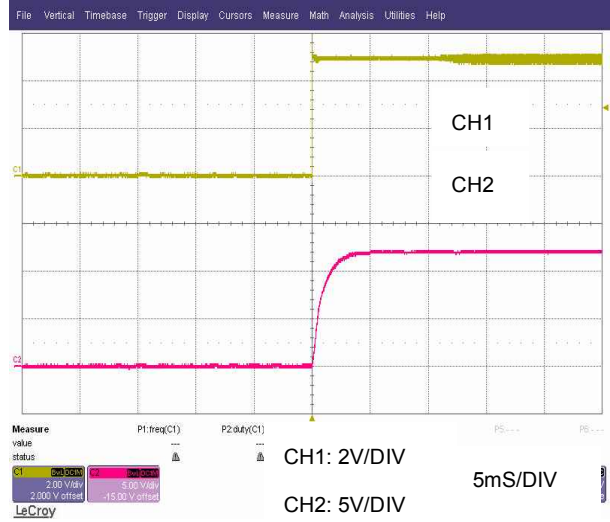
**Start-up from Vin**

**- SPS3-5-5 -**



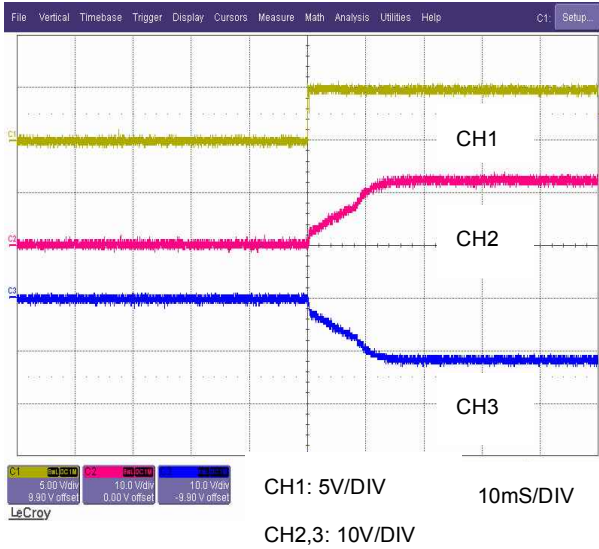
Vin=5V, Vo=5V@0.6A, At 25°C

**- SPS3-5-12 -**



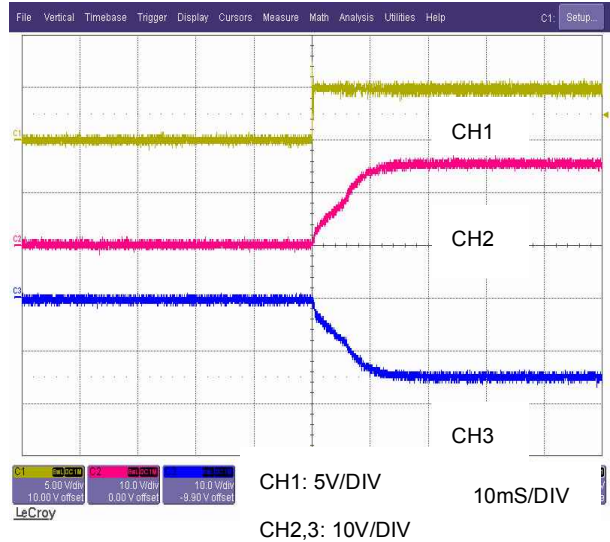
Vin=5V, Vo=12V@0.25A, At 25°C

**- SPD3-5-1212 -**



Vin = 5V, Vo=+12V,-12V@0.13A, At 25°C

**- SPD3-5-1515 -**



Vin = 5V, Vo=+15V,-15V@0.10A, At 25°C

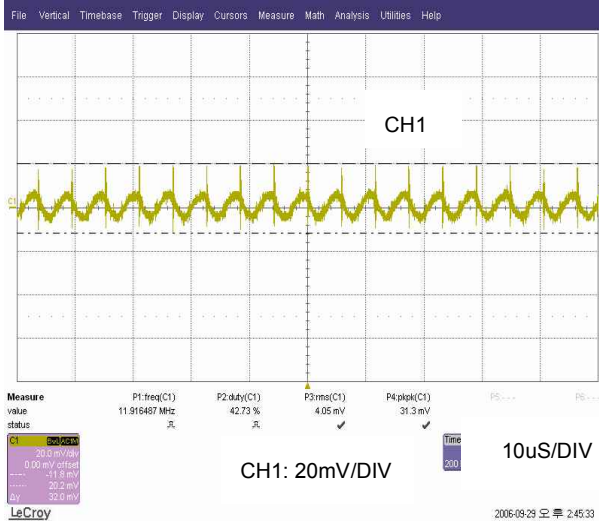


**SPS3 Series – Isolated DC/DC Converters**  
**4.5 – 9Vdc Input, Maximum Power: 3W**

Data Sheet  
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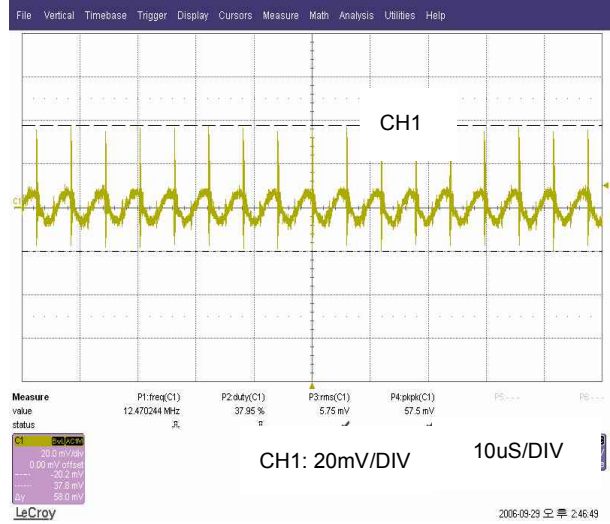
**Output Ripple/Noise**

**- SPS3-5-5 -**



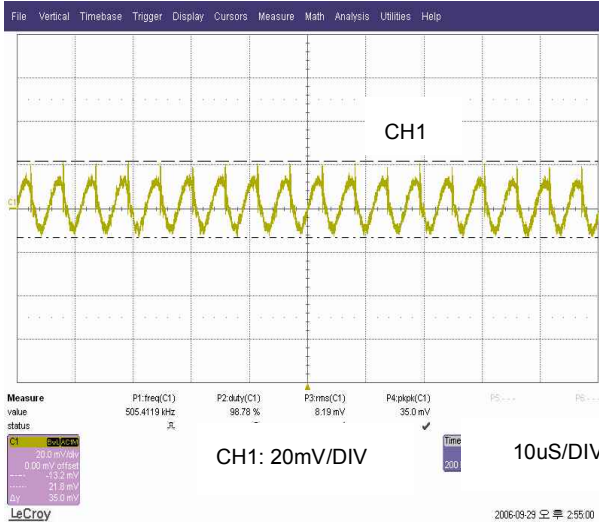
Vin=5V, Vo=5V@0.6A ,At 25°C

**- SPS3-5-12 -**



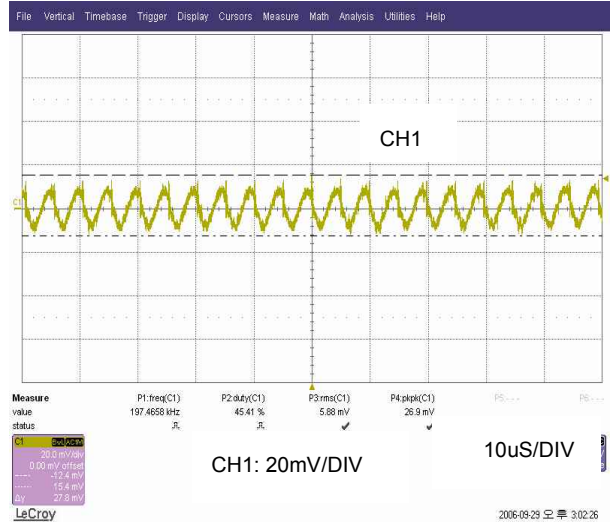
Vin=5V, Vo=12V@0.25A, At 25°C

**- SPD3-5-1212 -**



Vin = 5V, Vo=+12V,-12V@0.13A,At 25°C

**- SPD3-5-1515 -**



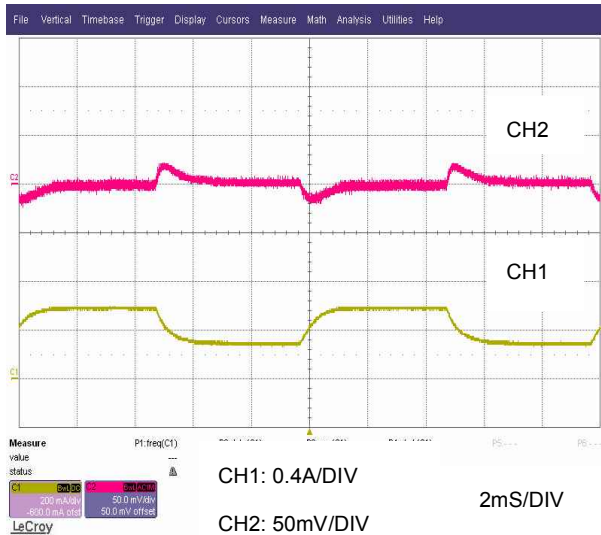
Vin = 5V, Vo=+15V,-15V@0.10A,At 25°C

**SPS3 Series – Isolated DC/DC Converters**  
**4.5 – 9Vdc Input, Maximum Power: 3W**

Data Sheet  
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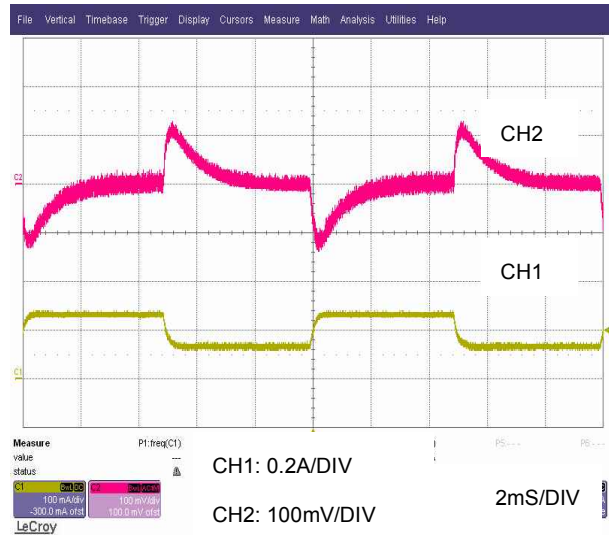
**Output Load Transient Response**

**- SPS3-5-5 -**



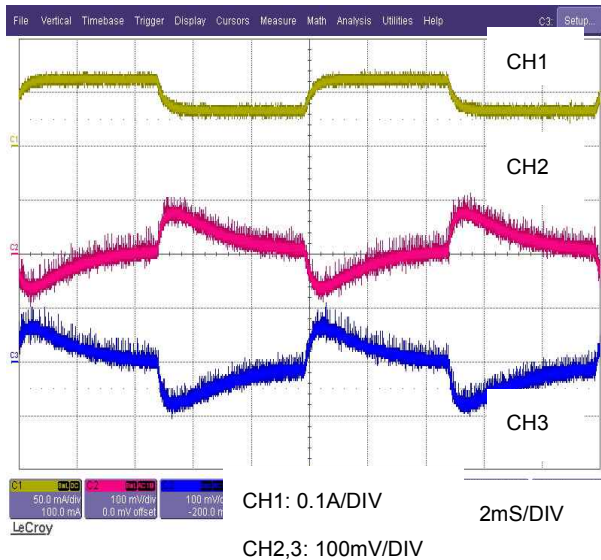
Vin=5V, Vo=5V@0.6A ,At 25°C

**- SPS3-5-12 -**



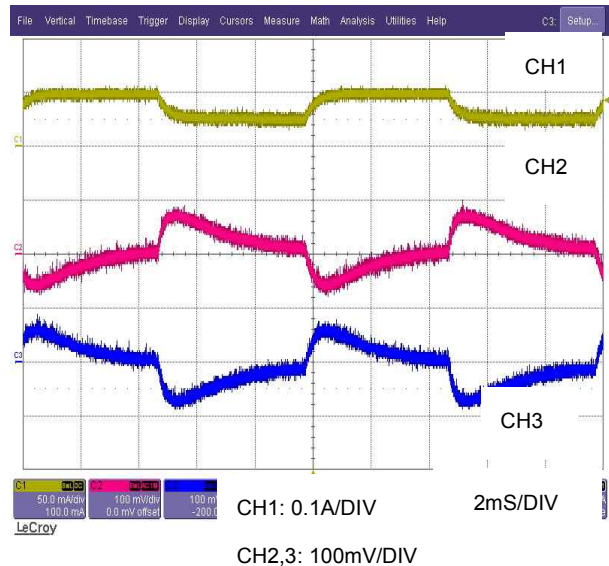
Vin=5V, Vo=12V@0.25A,At 25°C

**- SPD3-5-1212 -**



Vin = 5V, Vo=+12V,-12V@0.13A,At 25°C

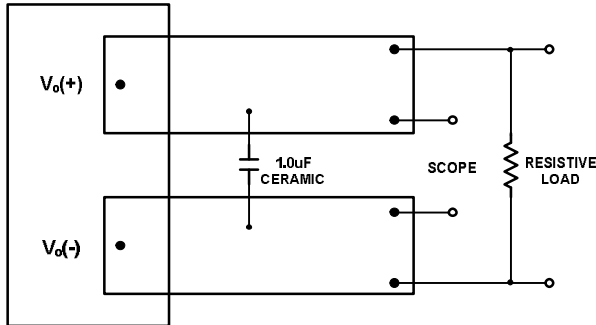
**- SPD3-5-1515 -**



Vin=5V, Vo=+15V,-15V@0.10A,At 25°C

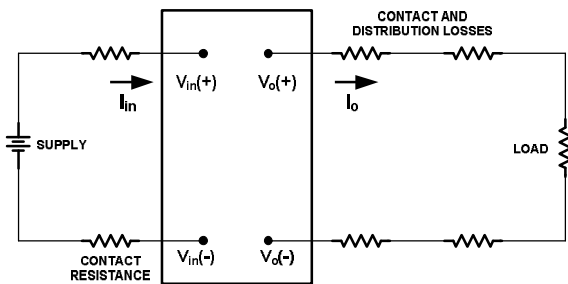
## TEST Configurations

### Output ripple and noise Test



\* Conductor from Vout-pins to capacitors = 50mm (1.97in)

### Output Voltage and Efficiency Test



\*All measurements are taken at the module terminals when Socketing, place Kelvin connections at module terminals to Avoid measurement errors due to socket contact resistance

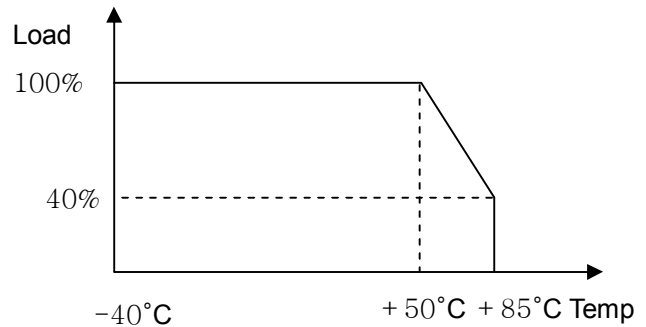
#### Efficiency

$$\eta = \left( \frac{[V_o(+)-V_o(-)] \times I_o}{[V_{in}(+)-V_{in}(-)] \times I_{in}} \right) \times 100\%$$

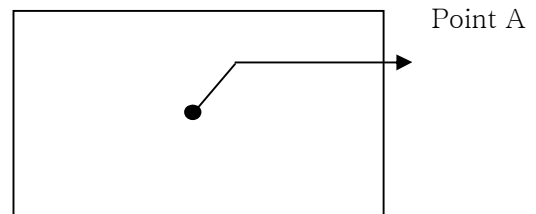
### Thermal Considerations

SPS series has wide operating temperature range from -40°C to +85°C.

However, it should be required a enough air flow for more reliable operation. Output derating curve provide designers with a quantity of a current under the desired ambient temperature and velocity of a airflow



If the device is installed in a system, the device's temperature of point A should be checked if does not exceed specified temperature as below. Please make sure that the ambient temperature does not exceed 85°C.



Output	1.5W	3W	6W	10W
Temp	90°C	90°C	95°C	100°C

**SPS3 Series – Isolated DC/DC Converters**  
4.5 – 9Vdc Input, Maximum Power: 3W

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**Feature Description**

**Input Fuse**

In order to comply with safety requirements, SPS series has a fuse built in.

	5V	12V	24V	48V
SPS1R5	2A	1A	0.75A	0.75A
SPS3	3A	2.5A	1A	1A
SPS6	5A	2.5A	2A	1.5A
SPS10	6A	4A	2.5A	2A

**Remote ON/OFF Control (CNT)**

By using CNT pin you can control the output without turning the input power on or off.

If you need not this function short CNT

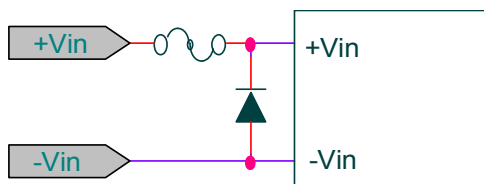
Pin to -Vin (Except 1.5W)

CNT Level for -Vin	OUTPUT
Open	OFF
Short	ON

**Input Reverse-polarity voltage protection**

Input reverse voltage protection has not built in this product.

So, you can set up a circuit externally as described below if necessary



**Input Output Filter**

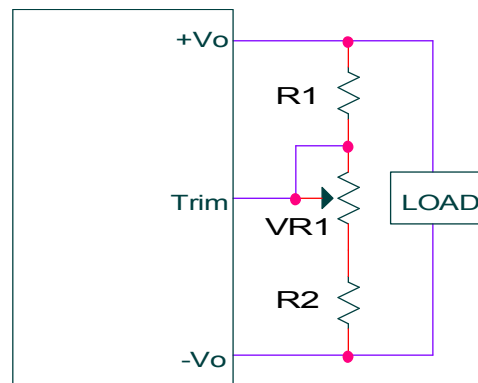
SPS series have an internal input filter. To minimize the ripple and noise of the input voltage, additional external capacitor is required (10uF ~ 680uF)

To reduce a output ripple and noise, external capacitor is required at the output of the device

**Output voltage variation (Trim)**

Output Voltage adjusted by using trim pin within  $\pm 10\%$  of output voltage.

Use of trim function can cause the output power to increase, so you should not use beyond the SPS's specified output power rating



Output voltage	VR	R1	R2
3.3V	500Ω	1kΩ	560Ω
5V	1kΩ	1kΩ	680Ω
12V	1kΩ	3.9kΩ	680Ω
15V	1kΩ	5.6k	750Ω

**SPS3 Series – Isolated DC/DC Converters**  
**4.5 – 9Vdc Input, Maximum Power: 3W**

Data Sheet  
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**Over current Protection(OCP)**

SPS series built in over current protection circuit Which operates when the output current is over 105% of rating and automatically recovers when over current condition is removed

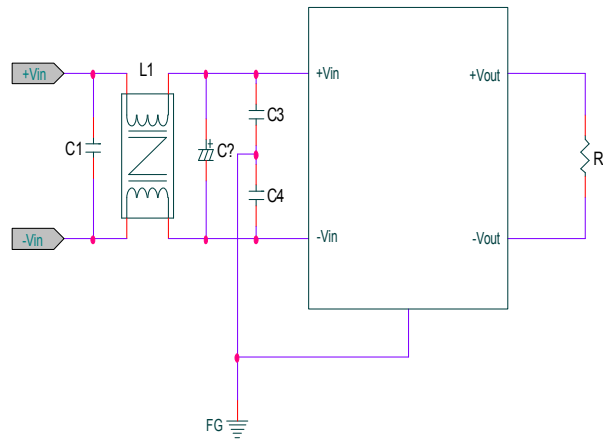
If load is connected to a inductive or constant current load such as lamp of motor, output may not start up.

**Over Voltage Protection(OVP)**

SPS series has not built in overvoltage protection circuit. So, you need to set up a circuit externally which can protect the over voltage if necessary.

**EMI Characteristic (conducted Emission)**

In order to reduce conducted noise install an external input filter as shown in below.



Model Number	L1	C1	C2	C3,C4
SPS3-5-5	1mH	22uF (MLCC)	220uF	472
SPS3-12-5	1mH	10uF (MLCC)	220uF	472
SPS3-24-5	2mH	22uF	100uF	472
SPS3-48-5	2mH	22uF	47uF	472

Complies with CISPR 22 CLASS B

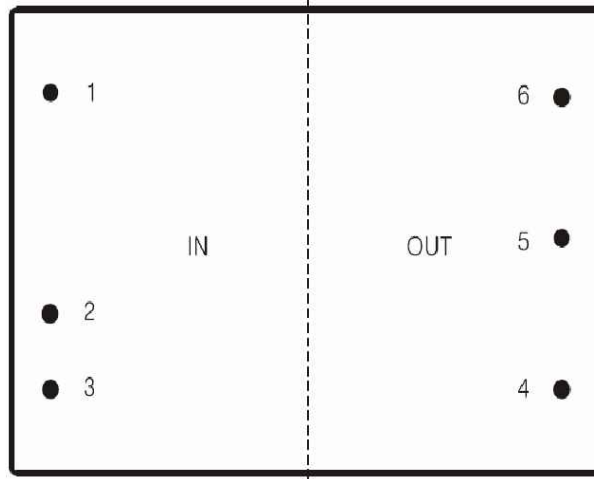
**Soldering Information**

The product is intended for through hole mounting in a PCB, When wave soldering is used, the temperature on the pins is specified to maximum 260°C for maximum 10 seconds when hand soldering, care should be taken to avoid direct contact between the hot soldering iron tip and the pins for more than a few seconds in order to prevent overheatin

**SPS3 Series – Isolated DC/DC Converters**  
4.5 – 9Vdc Input, Maximum Power: 3W

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**Pin assignments**



**Single output**

PIN NO	NAME	FUNCTION
1	+Vin	Positive terminal for 5V
2	-Vin	Negative terminal for 5V
3	CNT	Logic signal reference to Vin to Turn the converter ON/OFF
4	Trim	Output voltage variation
5	-Vout	Negative terminal for Vout
6	+Vout	Positive terminal for Vout

**Dual output**

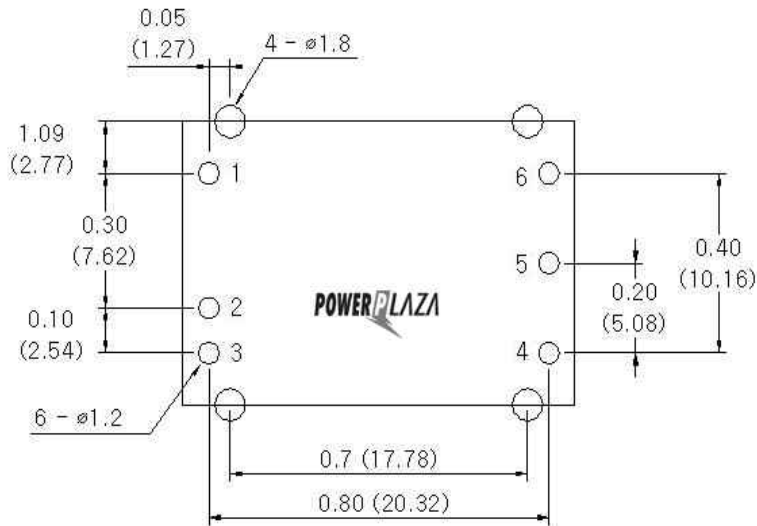
PIN NO	NAME	FUNCTION
1	+Vin	Positive terminal for 5V
2	-Vin	Negative terminal for 5V
3	CNT	Logic signal reference to Vin to Turn the converter ON/OFF
4	-Vout	Negative terminal for Vout
5	Com	
6	+Vout	Positive terminal for Vout

**SPS3 Series – Isolated DC/DC Converters**  
 4.5 – 9Vdc Input, Maximum Power: 3W

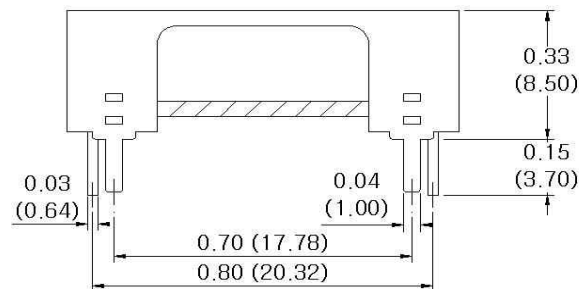
Data Sheet  
 Oct 09, 2007

**Mechanical Specification**

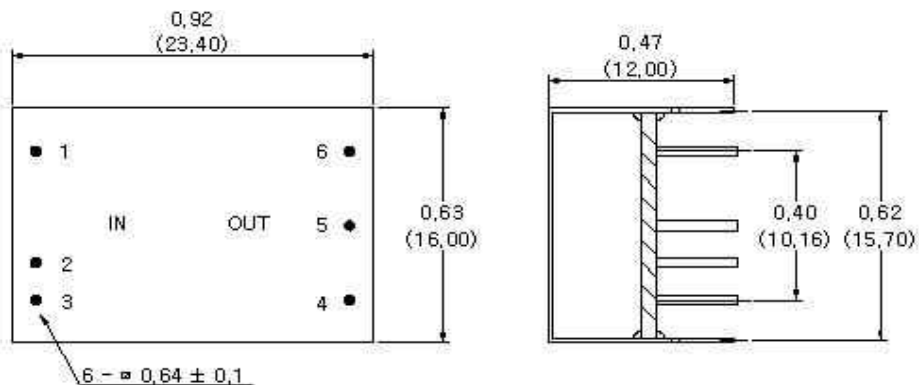
TOP VIEW



SIDE VIEW



OTHER VIEW



All dimensions are inches and (mm)

**SPS3 Series – Isolated DC/DC Converters**  
 4.5 – 9Vdc Input, Maximum Power: 3W

 Data Sheet  
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**Ordering Information**

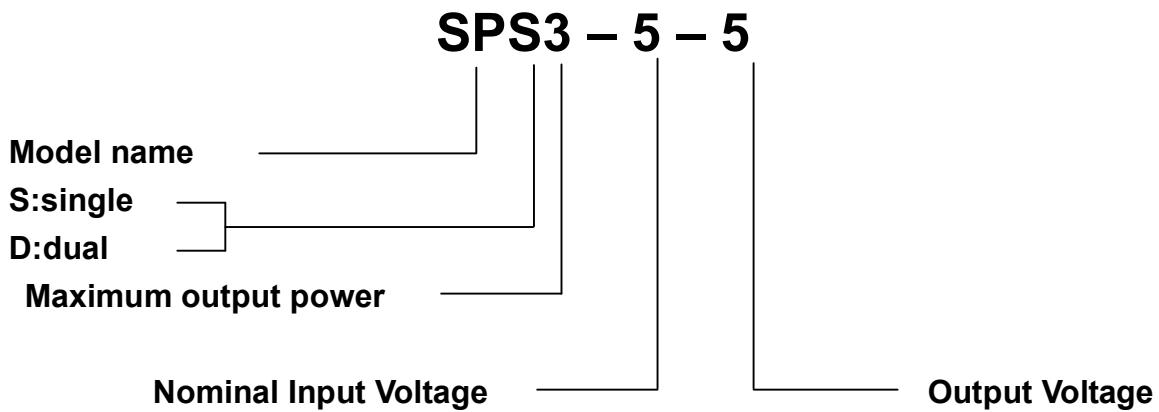
Input	Output1, Output2	Maximum Power	Ripple & Noise Typ.	Efficiency Typ.	Model Number
4.5 - 9V	3.3V@0.6A	1.98W	50mVp-p	73%	SPS3-5-3R3
	5V@0.6A	3W	50mVp-p	78%	SPS3-5-5
	12V@0.25A	3W	120mVp-p	80%	SPS3-5-12
	15V@0.2A	3W	150mVp-p	80%	SPS3-5-15
	+12V@130mA, -12V@130mA	3.12W	120mVp-p	81%	SPD3-5-1212
	+15V@100mA, -15V@100mA	3W	150mVp-p	81%	SPD3-5-1515
9 – 18V	3.3V@0.6A	1.98W	50mVp-p	74%	SPS3-12-3R3
	5V@0.6A	3W	50mVp-p	81%	SPS3-12-5
	12V@0.25A	3W	120mVp-p	83%	SPS3-12-12
	15V@0.2A	3W	150mVp-p	83%	SPS3-12-15
	+12V@130mA, -12V@130mA	3.12W	120mVp-p	83%	SPD3-12-1212
	+15V@100mA, -15V@100mA	3W	150mVp-p	83%	SPD3-12-1515
18 – 36V	3.3V@0.6A	1.98W	50mVp-p	73%	SPS3-24-3R3
	5V@0.6A	3W	50mVp-p	79%	SPS3-24-5
	12V@0.25A	3W	120mVp-p	82%	SPS3-24-12
	15V@0.2A	3W	150mVp-p	82%	SPS3-24-15
	+12V@130mA, -12V@130mA	3.12W	120mVp-p	83%	SPD3-24-1212
	+15V@100mA, -15V@100mA	3W	150mVp-p	83%	SPD3-24-1515
36 – 76V	3.3V@0.6A	1.98W	50mVp-p	73%	SPS3-48-3R3
	5V@0.6A	3W	50mVp-p	81%	SPS3-48-5
	12V@0.25A	3W	120mVp-p	83%	SPS3-48-12
	15V@0.2A	3W	150mVp-p	83%	SPS3-48-15
	+12V@130mA, -12V@130mA	3.12W	120mVp-p	83%	SPD3-48-1212



**SPS3 Series – Isolated DC/DC Converters**  
 4.5 – 9Vdc Input, Maximum Power: 3W

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	+15V@100mA, -15V@100mA	3W	150mVp-p	83%	SPD3-48-1515
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**Part number structure**


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**HEAD OFFICE & FACTORY**

#1402, 14F/L 6th Daeryung TechnoTown 493-6,  
 Gasan-Dong, Kumchon-Gu, Seoul, 153-774,  
 Korea

TEL: +82 2 855 4955 | FAX: +82 2 855 4954

**GENERAL SALES INQUIRIES**

Please feel free to

contact : [sales@powerplaza.co.kr](mailto:sales@powerplaza.co.kr)

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