

SSR01-SERIES

DC-DC CONVERTER

3~5.5VDC AND 4.6~36VDC WIDE INPUT RANGE
UP TO 15Watts



FEATURES

- SMALL SIZE AND LOW PROFILE : 0.60 X 0.37 X 0.29 INCH
- ADJUSTABLE OUTPUT VLOTAGE
- LOW OUTPUT RIPPLE AND NOISE
- NEGATIVE OUTPUT APPLICATION
- UL60950-1, EN60950-1, & IEC60950-1 SAFETY APPROVALS
- CE MARKED
- COMPLIANT TO RoHS II & REACH

APPLICATIONS

- WIRELESS NETWORK
- TELECOM/DATACOM
- INDUSTRY CONTROL SYSTEM
- DISTRIBUTED POWER ARCHITECTURES
- SEMICONDUCTOR EQUIPMENT
- MICROPROCESSOR POWER APPLICATIONS

NON ISOLATION	REMOTE CONTROL	OCP	SCP	OTP	LOW STANDBY POWER
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TECHNICAL SPECIFICATION All specifications are typical at nominal input, full load and 25°C otherwise noted

POSITIVE OUTPUT APPLICATION

Model Number	Nominal Input	Input Range	Frequency	Nominal Output	Output Voltage Trim Range (1)	Output Current		Input Current @ No Load	Efficiency (2)	
	VDC	VDC		VDC	VDC	@Min. Load	@Full Load	mA	Min. Vin	Max. Vin
			kHz			A	A		%	%
SSR01-05S2P5	5	3.0 ~ 5.5	410	2.5	1.2 ~ 3.63	0	1	6	95.5	95.0
SSR01-12S3P3	12	4.6 ~ 36	300	3.3	1.5 ~ 5.5			1.5	87.5	80.0
SSR01-12S05	12	6.5 ~ 36	580	5	2.5 ~ 8.0			3	91.5	83.5
SSR01-12S09	12	10.5 ~ 36	580	9	4.5 ~ 12.6			4	94.5	89.0
SSR01-24S12	24	13.5 ~ 36	580	12	4.5 ~ 13.5			4	95.0	91.0
SSR01-24S15	24	16.5 ~ 36	580	15	4.5 ~ 15.5			4	95.5	92.5

NEGATIVE OUTPUT APPLICATION

Model Number	Nominal Input	Input Range	Frequency	Nominal Output	Output Voltage Trim Range (1)	Output Current		Input Current @ No Load	Efficiency (2)	
	VDC	VDC		VDC	VDC	@Min. Load	@Full Load	mA	Min. Vin	Max. Vin
			kHz			mA	mA		%	%
SSR01-12S3P3	12	4.6 ~ 32	300	-3.3	-1.5 ~ -5.5	0	-600	3	74.0	77.5
SSR01-12S05	12	4.6 ~ 31	580	-5	-2.5 ~ -8.0		-400	3	80.0	78.5
SSR01-12S09	12	7 ~ 27	580	-9	-4.5 ~ -12.6		-300	7	85.0	82.0
SSR01-24S12	12	7 ~ 24	580	-12	-4.5 ~ -13.5		-300	7	84.5	86.0
SSR01-24S15	12	7 ~ 21	580	-15	-4.5 ~ -15.5		-200	10	85.5	84.0

PART NUMBER STRUCTURE

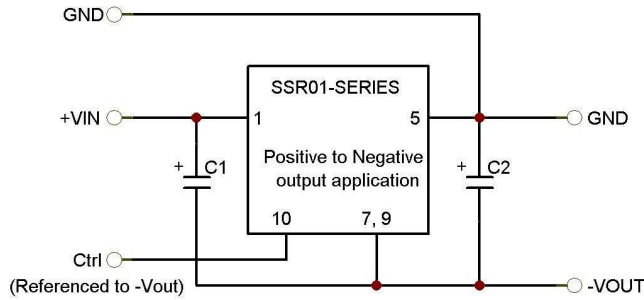
POSITIVE OUTPUT

SSR01 -	12	S	05
Series Name	Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)
	05: 3.0 ~ 5.5 12: 4.6 ~ 36 6.5 ~ 36 10.5 ~ 36 24: 13.5 ~ 36 16.5 ~ 36	S: Single	2P5: 2.5 3P3: 3.3 05: 5 09: 9 12: 12 15: 15

NEGATIVE OUTPUT

SSR01 - 12 S 05

Series Name	Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)
	12: 4.6 ~ 32 4.6 ~ 31 7 ~ 27	S: Single	3P3: -3.3 05: -5 09: -9 12: -12 15: -15
	24: 7 ~ 24 7 ~ 21		



C1 and C2 are required and should be fitted close to the converter pins. Maximum capacitive load including C2 is 470uF.

C1	10uF / 50V	1210 X5R MLCC
C2	10uF / 25V	1206 X5R MLCC

INPUT SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating input voltage range for positive output (3)	$V_{in} > V_{out(set)} + 0.5V$	3.0		5.5	VDC
	$V_{in} > V_{out(set)} + 1.5V$	4.6		36	
Operating input voltage range for negative output (3)	See table				VDC
	$V_{in} + V_{out} \leq 36V$	4.6		32	
Input reflected ripple current			100		mAp-p
Maximum input current	$V_{in} = V_{in(min)}$; $I_o = I_o(max)$			1	A
Input filter				Capacitor type	

OUTPUT SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Voltage accuracy		-2.0		+2.0	%
Line regulation		-0.2		+0.2	%
Load regulation	0% to 100% of Full Load	-0.6		+0.6	%
	10% to 90% of Full Load	-0.3		+0.3	
Ripple and noise	Measured by 20MHz bandwidth $V_{out} = 1.2 \sim 8VDC$ $V_{out} = 8.1 \sim 15.5VDC$		50		mVp-p
			75		
Temperature coefficient		-0.015		+0.015	%/°C
Dynamic load response	50% load step change	Peak deviation		150	mV
		Recovery time		250	µs
Over load protection	Positive output	SSR01-05S2P5		400	%
		Others		200	
Short circuit protection		Continuous, automatics recovery			
Capacitor Load (4)				470	µF
Output voltage overshoot-startup				1.0	%

FEATURE SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Start up time	Nominal input and Constant resistive load	Power up		5	ms
		Remote ON/OFF		5	
Remote ON/OFF	Positive output : Referred to GND pin Negative output : Referred to -Vout pin	Positive logic DC-DC ON		Open or 2 ~ 5VDC	
		DC-DC OFF		Short or 0 ~ 0.8VDC	
		Input current of Ctrl pin		-0.1	0.1
		Remote off input current		1.2	mA

GENERAL SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Safety meets					UL60950-1 EN60950-1 IEC60950-1
Case material					Non-conductive black plastic
Base materia					Non-conductive black plastic
Potting material					Epoxy (UL94 V-0)
Weight					1.7g(0.060oz)
MTBF	MIL-HDBK-217F, Full load				1.457 x 10 ⁷ hrs

ENVIRONMENTAL SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating temperature range	With derating	-40		+105	°C
Maximum case temperature				105	°C
Over temperature protection	Internal IC junction		170		°C
Storage temperature range		-55		+125	°C
Lead-free reflow solder process					IPC J-STD-020D
Moisture sensitivity level(MSL)					IPC J-STD-033B Level 1
Thermal shock					MIL-STD-810F
Vibration					MIL-STD-810F
Relative humidity	Non-condensing				5% to 95% RH

Note:

- Output trimming:

Model Number	Vout,nom	Trim up	Trim down	Model Number	Vout,nom	Trim up	Trim down
		R _u (kΩ)	R _d (kΩ)			R _u (kΩ)	R _d (kΩ)
SSR01-05S2P5	±2.5V	$= \frac{40.75}{V_o - 2.5}$	$= \frac{50.75 \cdot V_o - 40.75}{2.5 - V_o}$	SSR01-12S09	±9.0V	$= \frac{80}{V_o - 9.0}$	$= \frac{100 \cdot V_o - 80}{9.0 - V_o}$
SSR01-12S3P3	±3.3V	$= \frac{26.4}{V_o - 3.3}$	$= \frac{33 \cdot V_o - 26.4}{3.3 - V_o}$	SSR01-24S12	±12.0V	$= \frac{240}{V_o - 12.0}$	$= \frac{300 \cdot V_o - 240}{12.0 - V_o}$

- Typical value at min. or max. input voltage and full load.
- The input voltage can be increased to 42VDC by external capacitors.
 - For Positive output: Input capacitor is necessary when input voltage 36VDC increased to 42VDC. The input capacitor suggestion is 22uF.
 - For Negative output application:

The input and output capacitors are necessary for negative output application when the 36VDC be increased to 42VDC, and the suggestion of capacitors: The C1 is 22uF and the C2 is 10uF. (Please refer to the figure of positive to negative output application)

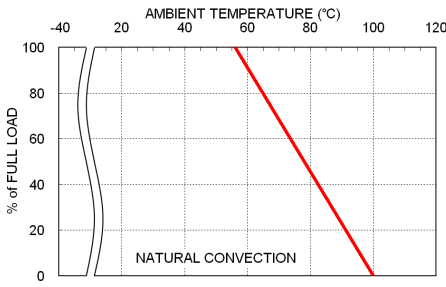
Consider to the maximum duty of internal controller. In the trim down application, these are some condition that input range can't increase to 42VDC.

Model Number	Output voltage(Trim down)	Input range
SSR01-12S09	-4.5 ~ -6VDC	V _{in} + V _{out} ≤ 36VDC
SSR01-24S12	-4.5 ~ -6VDC	V _{in} + V _{out} ≤ 36VDC
SSR01-24S15	-4.5 ~ -6VDC	V _{in} + V _{out} ≤ 36VDC

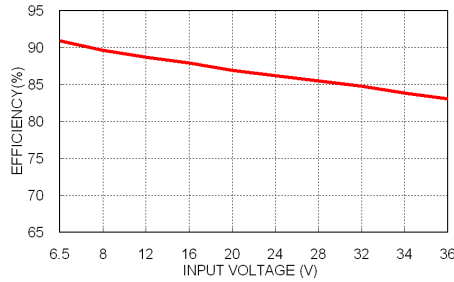
- Test by minimum input and constant resistive load.

CAUTION: This power module is not internally fused. An input line fuse must always be used.

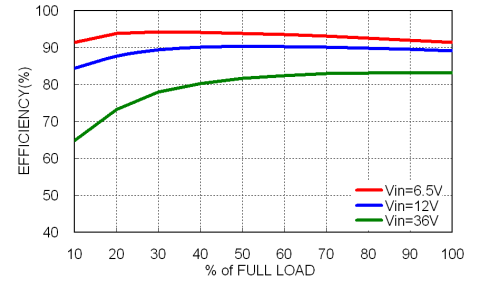
CHARACTERISTIC CURVE
POSITIVE OUTPUT



SSR01-12S05 Derating Curve

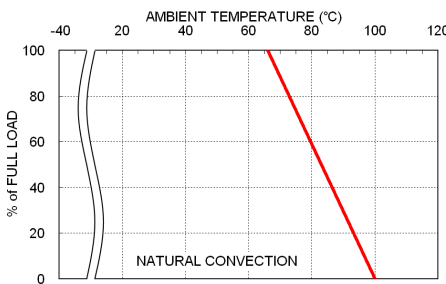


SSR01-12S05 Efficiency vs. Input Voltage

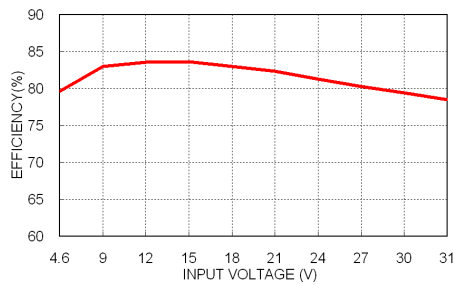


SSR01-12S05 Efficiency vs. Output Load

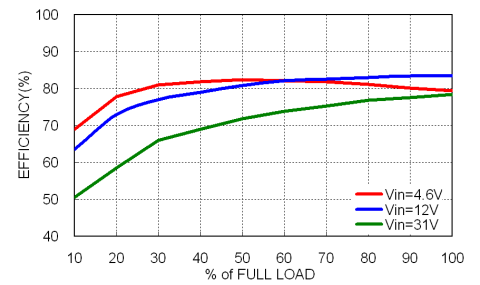
NEGATIVE OUTPUT



SSR01-12S05 Derating Curve

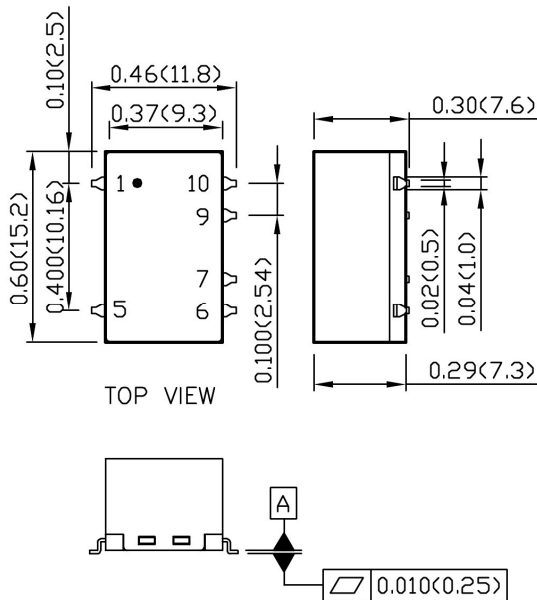


SSR01-12S05 Efficiency VS Input Voltage



SSR01-12S05 Efficiency VS Output Load

MECHANICAL DRAWING FOR STANDARDS

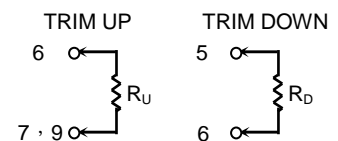


PIN CONNECTION

PIN	SINGLE
1	+Vin
5	+Vout
6	Trim
7	GND
9	GND
10	Ctrl

EXTERNAL OUTPUT TRIMMING

Output can be externally trimmed by using the method shown below.



1. All dimensions in inch (mm)
2. Tolerance :x.xx±0.02 (x.x±0.5)
x.xxx±0.01 (x.xx±0.25)
3. Pin pitch tolerance ±0.01 (0.25)
4. Pin dimension tolerance ±0.004(0.1)