



9S8W4_1.6RP series

9W - Dual/Single Output - Wide Input - Isolated & Regulated DC-DC Converter

DC-DC Converter 9 Watt

- ⊕ Highest power density in SIP8 package
- ⊕ Operation temperature range: -40°C ~+ 85°C
- ⊕ 4:1 wide input voltage range
- ⊕ Isolation 1600VDC
- ⊕ High Efficiency up to 89%
- ⊕ Short circuit protection (SCP)
- ⊕ Remote On/Off control
- ⊕ Internal SMD construction
- ⊕ RoHS Compliance
- ⊕ Smallest footprint 9W converter

The 9S8W4_1.6RP series is a family of high performed 9W single & dual output DC-DC converters. These converters are built in copper package in a 8-pin SIP miniature compact case with high performance. Featured wide range devices operate over 4:1 input voltage range, providing stable output voltage. Devices are encapsulated using flame retardant resin. Featuring new PWM construction, no minimum load required and precise 1% output voltage accuracy.



UL-62368-1 (E347551)

Common specifications	
Short circuit protection:	Continuous, automatic recovery
Case temperature:	100°C max.
Cooling:	Free air convection
Operation temperature range:	-40°C~+85°C
Storage temperature range:	-55°C ~+125°C
Storage humidity range:	< 95%
Lead temperature range:	260°C max, 1.5mm from case for 10 sec
Switching frequency:	• 24V: 400kHz typ. • 48V: 500kHz typ.
Operating Frequency:	200kHz min
Safety standard:	IEC60950-1
Case material:	Copper
Potting material:	Epoxy [UL94-V0]
Pin material:	C5191R-H Solder-coated
MTBF (MIL-HDBK 217F):	+25°C: >900 Khours
Weight:	7.3g

Output specifications						
Item	Test condition	Min	Typ	Max	Units	
Output accuracy	Nominal Vin and full load			±1	%	
Line regulation	Vin=min to max, full load		±0.2		%	
Load regulation*	5% to 100% full load		±0.5		%	
Cross regulation	Dual output, full load, 25%-100% load, output voltage variable rate within 5%			±5	%	
Temperature drift				±0.02	%/°C	
Ripple & Noise*	20MHz Bandwidth		75		mVp-p	
Transient recovery time	Normal Vin, 100%-25% load, 25% load step change		250		µs	
Transient response deviation	Normal Vin, 100%-25% load, 25% load step change				• 3.3/5V ±5 % • Others ±3 %	

* Measured with a 1µF ceramic capacitor and a 10µF electrolytic capacitor.

Input specifications						
Item	Test condition	Min	Typ	Max	Units	
Start up time	Nominal Vin and constant resistive load		50		ms	
Surge voltage	100ms max. • 24V • 48V			50 100	VDC VDC	
Input filter	Capacitor					
Remote Power OFF (leave open if not used) (15 VDC max.)	Device ON Device OFF Device OFF (Stand by input current)		open or high impedance 2-4mA input current (via 1KΩ)		0.5mA max.	

* Measured with a 1µF ceramic capacitor and a 10µF electrolytic capacitor.

EMC specifications				
EMI	Conducted Emission	EN55032	CLASS A	
EMI	Radiated Emission	EN55032	CLASS A	
EMS	Electrostatic Discharge	IEC/EN61000-4-2 Contact ±2KV	perf. Criteria B	
EMS	Radiation Immunity	IEC/EN61000-4-3	perf. Criteria A	
EMS	EFT	IEC/EN61000-4-4	perf. Criteria A	
EMS	Surge*	IEC/EN61000-4-5	perf. Criteria A	
EMS	CS*	IEC/EN61000-4-6	perf. Criteria A	
EMS	PFMF	IEC/EN61000-4-8	perf. Criteria A	

* requires an external filter capacitor

Example:
9S8W4_1205S1.6RP
 9 = 9Watt; S8= SIP8; W4 = wide input (4:1); 9-36Vin; 5Vout;
 S = Single Output; 1.6 = 1600VDC; R = Regulated Output;
 P = Short Circuit Protection

Isolation specifications						
Item	Test condition	Min	Typ	Max	Units	
Isolation voltage	Tested for 1 second	1600			VDC	
Isolation resistance	500VDC, input to output	1			GΩ	
Isolation capacitance	Input/Output, 100KHz			50	pF	

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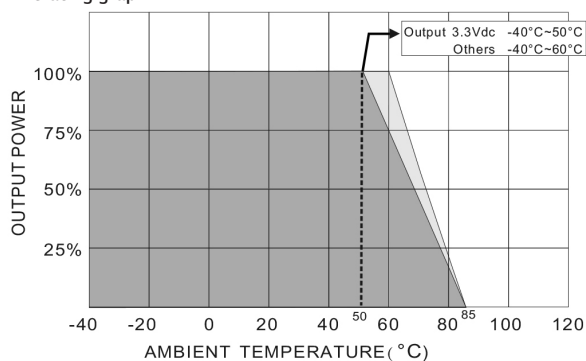
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Part Number	Input Voltage [VDC] Nominal	Input Voltage [VDC] Range	Input Current [mA, typ. @full load]	Output Voltage [VDC]	Output Current [mA, max.]	Efficiency [%, typ.]	Capacitive Load* [μF, max.]
9S8W4_2403S1.6RP	24	9-36	335	3.3	2000	82	2600
9S8W4_2405S1.6RP	24	9-36	392	5	1600	85	1300
9S8W4_2409S1.6RP	24	9-36	436	9	1000	86	800
9S8W4_2412S1.6RP	24	9-36	426	12	750	88	560
9S8W4_2415S1.6RP	24	9-36	421	15	600	89	560
9S8W4_2424S1.6RP	24	9-36	421	24	375	89	200
9S8W4_4803S1.6RP	48	18-75	168	3.3	2000	82	2600
9S8W4_4805S1.6RP	48	18-75	196	5	1600	85	1300
9S8W4_4809S1.6RP	48	18-75	218	9	1000	86	800
9S8W4_4812S1.6RP	48	18-75	211	12	750	89	560
9S8W4_4815S1.6RP	48	18-75	213	15	600	88	560
9S8W4_4824S1.6RP	48	18-75	213	24	375	88	200
9S8W4_2405D1.6RP	24	9-36	392	±5	±800	85	±800
9S8W4_2412D1.6RP	24	9-36	426	±12	±375	88	±390
9S8W4_2415D1.6RP	24	9-36	426	±15	±300	88	±200
9S8W4_4805D1.6RP	48	18-75	196	±5	±800	85	±800
9S8W4_4812D1.6RP	48	18-75	216	±12	±375	87	±390
9S8W4_4815D1.6RP	48	18-75	216	±15	±300	87	±200

* Test by minimal Vin and constant resistive load.

Typical characteristics

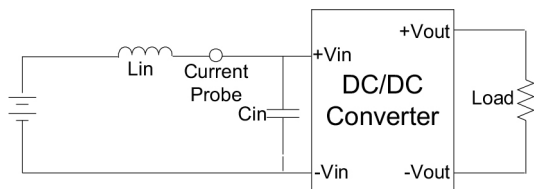
Derating graph



Test configurations

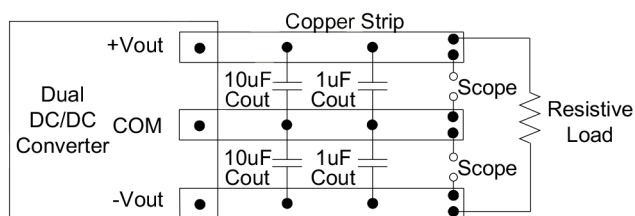
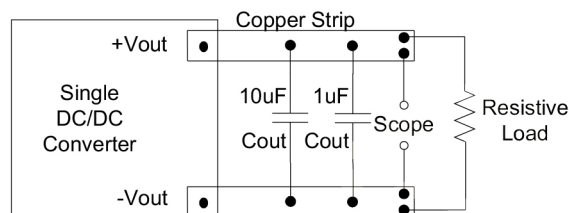
Input Reflected Ripple Current Test Step

Input reflected ripple current is measured through a source inductor Lin (12μH) and a source capacitor Cin (47μF, ESR<1.0Ω at 100KHz) at nominal input and full load.



Output ripple & noise measurement test

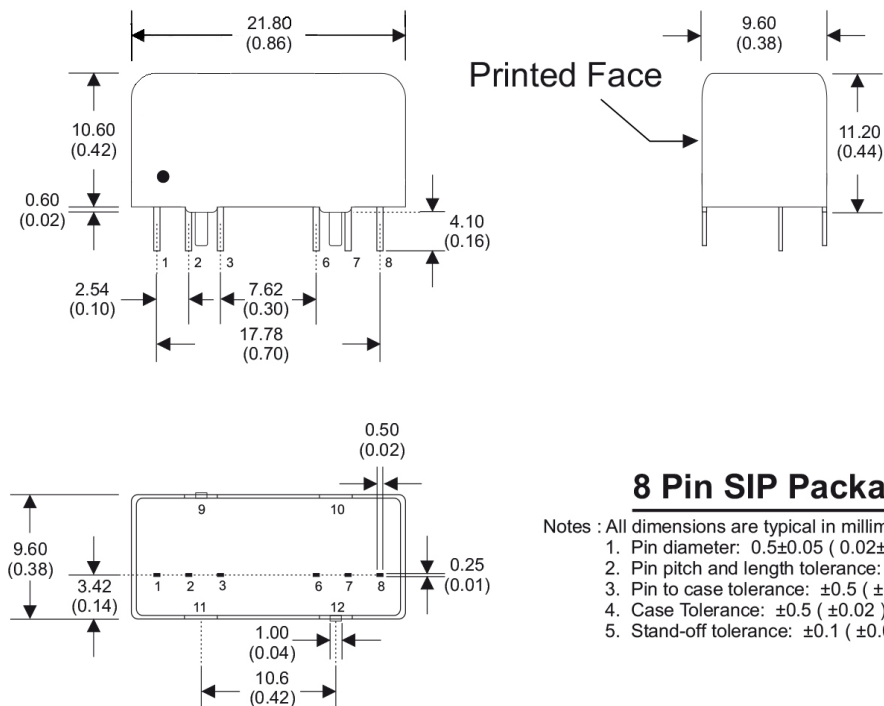
To reduce ripple and noise, it is recommended to use a 1.0μF ceramic disk capacitor and a 10μF electrolytic capacitor to at the output.



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Mechanical dimensions/footprint



Pin connections		
Pin	Single	Dual
1	-V input	-V input
2	+V input	+V input
3	Remote On/Off	Remote On/Off
6	+V output	+V output
7	-V output	Common
8	N.C.	-V output
9	Case	Case
10	Stand Off	Stand Off
11	Stand Off	Stand Off
12	Case	Case

8 Pin SIP 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. Pin to case tolerance: ± 0.5 (± 0.02)
 4. Case Tolerance: ± 0.5 (± 0.02)
 5. Stand-off tolerance: ± 0.1 (± 0.004)

Note:

1. All specifications measured at $T_a = 25^\circ\text{C}$, humidity <75%, nominal input voltage and rated output load unless otherwise specified.
2. In this datasheet, all the test methods of indications are based on corporate standards.