



## 9S8W4\_1.6RP series

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

## DC-DC Converter

9 Watt

- ⊕ Highest power density in a SIP8 package
- ⊕ Operation temperature range: -40°C ~+ 85°C
- ⊕ 4:1 wide input voltage range
- ⊕ Isolation 1600VDC
- ⊕ High efficiency up to 88%
- ⊕ Short circuit protection (SCP)
- ⊕ Remote On/Off control
- ⊕ RoHS Compliance
- ⊕ Smallest footprint 9W converter

Introducing our latest 9S8W4\_1.6RP series, featuring the highest power density in a SIP8 package. This state-of-the-art device operates efficiently within a temperature range of -40°C to +85°C, ensuring reliability in a wide variety of environments. With a 4:1 wide input voltage range and robust isolation at 1600VDC, this converter is designed to meet the demands of modern applications. Enjoy high efficiency of up to 88%, ensuring optimal performance with minimal energy loss. Our product is equipped with short circuit protection (SCP) for enhanced safety and includes a convenient remote On/Off control feature. It boasts the smallest footprint, making it a compact yet powerful 9W converter, perfect for your needs.



### Common specifications

Short circuit protection:	Continuous, automatic recovery
Operation temperature range:	-40°C~+85°C (see the derating curve)
Storage temperature range:	-55°C ~+125°C
Storage humidity range:	< 95% RH
Max. case temperature:	100°C max.
Lead temperature range:	260°C max, 1.5mm from case for 10 sec
Thermal Impedance:	• 3.3V Output 29.3 °C/W • Other Output 16.6 °C/W
Operating Frequency:	200kHz min
Safety standard:	IEC / EN / UL 62368-1; DK-80978-UL, E252573
Case material:	Copper
Potting material:	Epoxy (UL94V-0 rated)
Pin material:	Tinned copper
MTBF (MIL-HDBK 217F):	+25°C: >900 Khours
Cooling:	Natural Convection, 30 - 65 LFM
Dimensions:	21.84mm x 9.65mm x 11.78mm
Weight:	7.3g typ

### Input specifications

Item	Test condition	Min	Typ	Max	Units
Input Voltage	• 24V Input	9	24	36	VDC
	• 48V Input	18	48	75	VDC
Under Voltage Protection	• 24V Input Module ON		8.9		VDC
	Module OFF		7.0		VDC
	• 48V Input Module ON		16.0		VDC
	Module OFF		14.0		VDC
Start up time	Nominal Vin and constant resistive load		50		ms
Input surge voltage (100ms)	• 24V Input			50	VDC
	• 48V Input			100	VDC
Input Reflected Ripple Current <sup>1</sup>				30	mApk-pk
Input filter	Capacitor				
Remote ON OFF Control	• Module ON		open or high impedance		
	• Module OFF		2-4mA input current ( via 1kΩ )		
	• OFF idle current		2.5 mA		
	• 24V Input		2.2 A		
	• 48V Input		1.0 A		

1. Measured with a simulated source inductance of 12μH and a source capacitor Cin (47μF, ESR<1.0Ω at 100kHz)

### Example:

**9S8W4\_2405S1.6RP**  
9 = 9Watt; S8 = SIP8; W4 = Wide input (4:1); 24 = 9-36Vin; 5Vout; S = Single Output; 1.6 = 1600VDC; R = Regulated Output; P = Short Circuit Protection

### Output specifications

Item	Test condition	Min	Typ	Max	Units
Output accuracy	Nom. Vin and full load	-1.0		+1	%
Line regulation	Vin = min to max, full load	-0.2		+0.2	%
Load regulation (From 0% to 100% Load)	• Single Output	-0.5		+0.5	%
	• 3.3 V Output	-1.0		+1.0	%
	• Dual Output	-1.0		+1.0	%
Cross regulation	Asymmetrical	-5		+5	%
	Load 25% / 100% for Dual Output				
Ripple & noise <sup>1</sup>	20MHz Bandwidth			75	mVp-p
Temperature coefficient		-0.02		±0.02	%/°C
Maximum capacitive load	Minimum Vin and constant resistive load			See table	
Over voltage protection				130	%
Overload protection				180	%
Switching frequency	• 24V Input		400		kHz
	• 48V Input		500		kHz
Transient recovery time (Nominal Vin and 25% load step change) (75%-50%-25% of Io)	• For All models		250		μs
Transient response deviation (Nominal Vin and 25% load step change) (75% - 50% - 25% of Io)	• For all models		250		μs
	• 3.3V & 5V Output				
	• Other Output	-5		+5	%
		-3		+3	%

<sup>1</sup> Measure d with a 1.0 μF MLCC and 10μF electrolytic capacitor.

### Isolation specifications

Item	Test condition	Min	Typ	Max	Units
Isolation voltage	• I/O and for 60sec	1600			VDC
	• Case I/O and for 60sec	1000			VDC
Isolation resistance	500VDC, input to output	1000			MΩ
Isolation capacitance	Input/Output			50	pF

### EMC specifications

Emissions	CE	EN55032	with external components	CLASS A
Emissions	RE	EN55032	with external components	CLASS A
Immunity	ESD	IEC 61000-4-2	Contact: ±6kV	CLASS B
Immunity	RS	IEC 61000-4-3	20V/m	CLASS A
Immunity	EFT	IEC 61000-4-4	±2 kV with external components	CLASS A
Immunity	Surge	IEC 61000-4-5	±2 kV with external components	CLASS A
Immunity	CS	IEC 61000-4-6	10Vrms	CLASS A
Immunity	PFFM	IEC 61000-4-8	100 A/m	CLASS A

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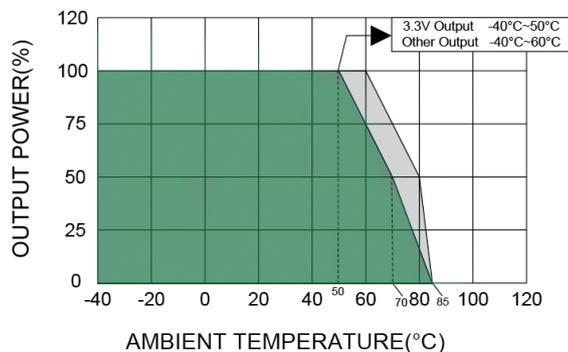
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### Product Selection Guide

Part Number	Input Voltage [VDC]		Input Current		Output Voltage [VDC]	Output Current [mA, full load]	Efficiency [%, typ.]	Capacitive Load* [μF, max.]
	Nominal	Range	[mA, max.]	@no load				
9S8W4_2403S1.6RP	24	9-36	15	344	3.3	2000	80	2600
9S8W4_2405S1.6RP	24	9-36	15	402	5	1600	83	1300
9S8W4_2409S1.6RP	24	9-36	15	431	9	1000	87	800
9S8W4_2412S1.6RP	24	9-36	15	426	12	750	88	560
9S8W4_2415S1.6RP	24	9-36	15	431	15	600	87	560
9S8W4_2424S1.6RP	24	9-36	15	426	24	375	88	200
9S8W4_2405D1.6RP	24	9-36	15	402	±5	2000	83	±800
9S8W4_2412D1.6RP	24	9-36	15	431	±12	1600	87	±390
9S8W4_2415D1.6RP	24	9-36	15	431	±15	1000	87	±200
9S8W4_4803S1.6RP	48	18-75	10	174	3.3	750	79	2600
9S8W4_4805S1.6RP	48	18-75	10	201	5	600	83	1300
9S8W4_4809S1.6RP	48	18-75	10	221	9	375	85	800
9S8W4_4812S1.6RP	48	18-75	10	216	12	±800	87	560
9S8W4_4815S1.6RP	48	18-75	10	216	15	±375	87	560
9S8W4_4824S1.6RP	48	18-75	10	216	24	±300	87	200
9S8W4_4805D1.6RP	48	18-75	10	203	±5	±800	82	±800
9S8W4_4812D1.6RP	48	18-75	10	221	±12	±375	85	±390
9S8W4_4815D1.6RP	48	18-75	10	218	±15	±300	86	±200

### Typical characteristics

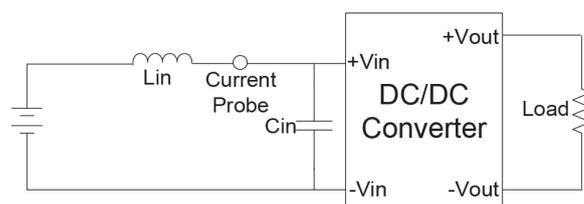
Derating graph



### Test configurations

#### Input Reflected Ripple Current Test Step

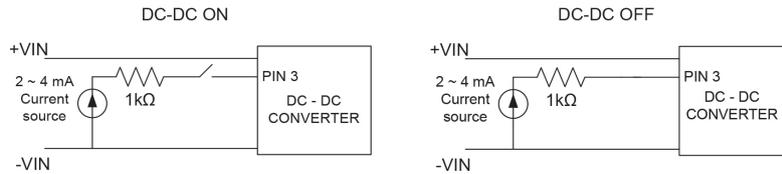
Input reflected ripple current is measured with a source inductor  $L_{in}$  (12μH) and a source capacitor  $C_{in}$  (47μF, ESR<1.0Ω at 100kHz) at nominal input and full load.



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### Remote Module ON / OFF

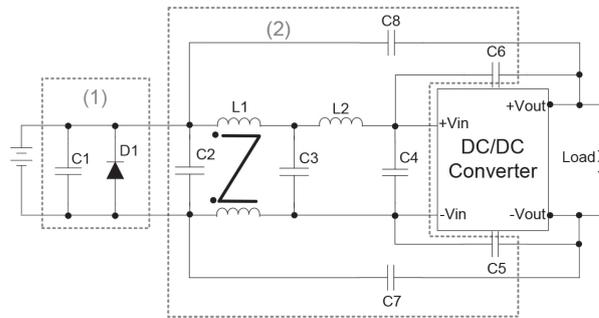


Remote function description				
	Remote	Ctrl pin applied current via 1kΩ	Output Voltage	Converter Input current
Converter on	Off	Open or High Impedance	See module	See module
Converter off	On	Input current ( 2 ~ 4 mA )	No Output Voltage	2.5mA,Typ.

### EMC Filter

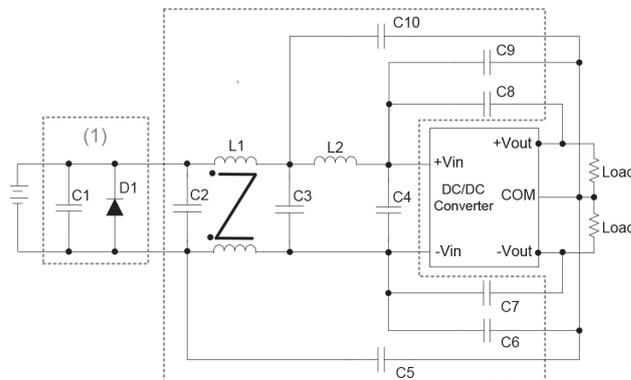
The part (1) circuit is used to meet surge & EFT test, and the part (2) circuit is used to meet EMI test.

#### Single Output models



	C1	D1	C2, C3, C4	C5, C6, C7, C8	L1	L2
9S8W4_24xxS1.6RP	NIPPON Chemi-con KY series	SMDJ70A	MLCC 10μF, 35V	MLCC 220pF, 3kV	20μH	20μH
9S8W4_48xxS1.6RP	330μF, 100V	SMDJ120A	MLCC 4.7μF, 100V	MLCC 1000pF, 3kV	132.8μH	10μH

#### Dual Output models

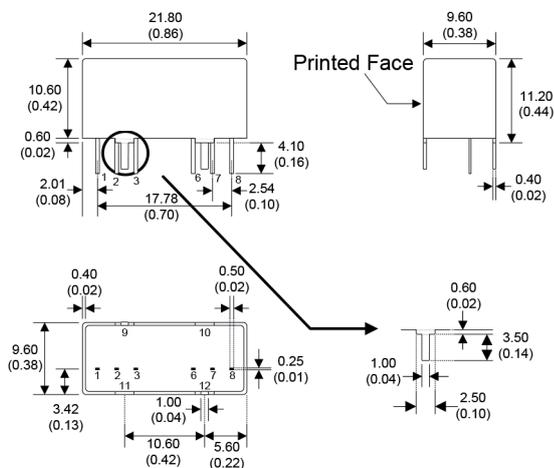


	C1	D1	C2, C3, C4	C5	C6, C10	C7, C8	C9	L1	L2
9S8W4_24xxD1.6RP	NIPPON Chemi-con KY series	SMDJ70A	MLCC 10μF, 35V	MLCC 220pF, 3kV	MLCC 220pF, 3kV	MLCC 220pF, 3kV	MLCC 1000pF, 3kV	20μH	20μH
9S8W4_48xxD1.6RP	330μF, 100V	SMDJ120A	MLCC 4.7μF, 100V	MLCC 220pF, 3kV	MLCC 220pF, 3kV	MLCC 1000pF, 3kV	MLCC 1000pF, 3kV	132.8μH	10μH

## 9S8W4\_1.6RP series

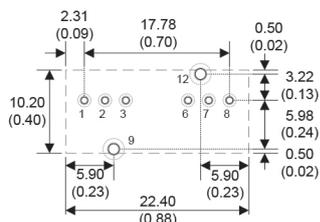
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### Mechanical dimensions/footprint



Pin connections		
Pin	Single	Dual
1	-V input	-V input
2	+V input	+V input
3	CTRL	CTRL
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

1. Pin dimension tolerance:  $\pm 0.05$  (  $\pm 0.002$  )
2. Pin pitch and length tolerance:  $\pm 0.35$  (  $\pm 0.014$  )
3. Pin to case tolerance:  $\pm 0.5$  (  $\pm 0.02$  )
4. Case Tolerance:  $\pm 0.5$  (  $\pm 0.02$  )
5. Stand-off tolerance:  $\pm 0.1$  (  $\pm 0.004$  )



Notes:

1. All dimensions are typical in millimeters ( inches ).  
Through hole ( black ) 1 ~ 8:  $\varnothing 0.80$  ( 0.031 )  
Top view pad ( green ) 1 ~ 8:  $\varnothing 1.00$  ( 0.039 )  
Bottom view pad ( pink ) 1 ~ 8:  $\varnothing 1.60$  ( 0.063 )
2. All dimensions are typical in millimeters ( inches ).  
Through hole ( black ) 9 & 12:  $\varnothing 1.3$  ( 0.051 )  
Top view pad ( green ) 9 & 12:  $\varnothing 1.5$  ( 0.059 )  
Bottom view pad ( pink ) 9 & 12:  $\varnothing 2.6$  ( 0.102 )

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.