



## QS4E\_3U Series

0.25W - Single Output DC-DC Converter - Fixed Input - Isolated & Unregulated

### DC-DC Converter

0.25 Watt

- ⊕ 4 Pin SIL
- ⊕ 3KVDC Isolation
- ⊕ Operation temperature range: -40°C ~ +85°C
- ⊕ Low ripple and noise
- ⊕ Efficiency up to 77%
- ⊕ EMI complies with EN55032 Class B
- ⊕ Industry Standard Pinout

The QS4E\_3U series is a family of cost effective 0.25W single output DC-DC converters. These converters achieve low-cost and ultra-miniature SIP4 pin size. Devices are encapsulated using flame retardant resin.

They are specially designed for applications where an isolated voltage is required in a distributed power supply system. Such as: digit circuit condition; normal low-frequency artificial circuit condition; relay drive circuit and data switching circuit condition, etc.



Common specifications	
Cooling:	Free air convection
Operation temperature range:	-40°C~+85°C
Storage temperature range:	-40°C ~+125°C
Casing temperature:	100°C MAX
Soldering temperature:	260°C MAX, 1.5mm from case for 10 sec.
Storage humidity range:	< 95%
Case material:	Plastic [UL94-V0]
Pin material:	>1,121,000 hours
Safety standard:	IEC 60950-1
MTBF (MIL-HDFK-217F@25°C):	0.5mm Alloy42 solder-coated
Weight:	1.5g / 1.9g (48V)

Output specifications					
Item	Test condition	Min	Typ	Max	Units
Output voltage accuracy	See tolerance envelope graph				
Line regulation	For Vin change of ±1%			±1.2	%
Load regulation	20% to 100% load • 3.3V output • others		20 10		% %
Ripple & Noise*	20MHz Bandwidth		100		mVpk-pk
Temperature drift	100% full load		±0.02		%/°C
Switching frequency	variable		80		KHz

\* Ripple and noise are measured by "parallel cable" method, please see DC-DC Converter Application Notes for specific operation.

Input specifications					
Item	Test condition	Min	Typ	Max	Units
Voltage range			10		%
Reflected ripple current*			20		mApk-pk
Surge voltage	• 3.3VDC input • 5VDC input • 12VDC input • 15VDC input • 24VDC input • 48VDC input (SIP)			5 7 15 18 28 54	VDC VDC VDC VDC VDC VDC
Input filter	Filter capacitor				

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

EMC specifications		
CE*	EN55032	CLASS B
RE	EN55032	CLASS B
ESD	IEC/EN61000-4-2	perf. Criteria A
RS	IEC/EN61000-4-3	perf. Criteria A
EFT**	IEC/EN61000-4-4	perf. Criteria A
Surge**	IEC/EN61000-4-5	perf. Criteria A
CS	IEC/EN61000-4-6	perf. Criteria A
PFMF	IEC/EN61000-4-8	perf. Criteria A

\* Input filter components are required to help meet conducted emission class B, which application refer to the EMI filter section.

\*\* An external filter is required if the module has to meet IEC61000-4-4 and IEC61000-4-5.

Isolation specifications					
Item	Test condition	Min	Typ	Max	Units
Isolation voltage	Tested for 1 minute and 1mA max	3000			VDC
Isolation resistance	Test at 500VDC	1000			MΩ
Isolation capacitance	Input-output, 100KHz/0.1V		60		pF

#### Example SIP4 Case:

QS4E\_0505S3U  
 Q= 0,25 Watt; S4= SIP4; E= Pinning; 05= 5 Vin; 05= 5Vout;  
 S= Single Output; 3= 3kVDC Isolation; U= Unregulated Output

#### Note:

1. Operation under minimum load will not damage the converter; However, they may not meet all specification listed, and that will reduce the life of product.
2. All specifications measured at Ta=25°C, humidity<75%, nominal input voltage and rated output load unless otherwise specified.
3. Only typical models listed, other models may be different, please contact our technical person for more details.
4. In this datasheet, all the test methods of indications are based on corporate standards.

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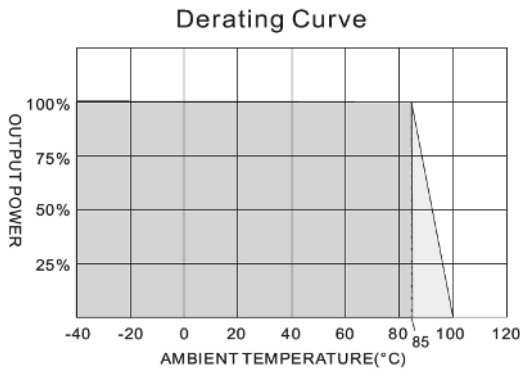
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Part Number	Input Voltage [V]	Input current [mA, max]	Output Voltage [VDC]	Output current [mA, max]	Efficiency [%, typ]	Capacitive load [μF max]
QS4E_0303S3U	3.3	120	3.3	75.7	63	100
QS4E_0305S3U	3.3	115	5	50	66	100
QS4E_0307S3U	3.3	118	7.2	34.7	64	100
QS4E_0309S3U	3.3	118	9	27.7	64	100
QS4E_0312S3U	3.3	113	12	20.8	67	100
QS4E_0315S3U	3.3	118	15	16.6	64	100
QS4E_0318S3U	3.3	115	18	13.8	66	100
QS4E_0324S3U	3.3	115	24	10.4	66	100
QS4E_0503S3U	5	78	3.3	75.7	64	100
QS4E_0505S3U	5	70	5	50	71	100
QS4E_0507S3U	5	74	7.2	34.7	68	100
QS4E_0509S3U	5	68	9	27.7	73	100
QS4E_0512S3U	5	66	12	20.8	76	100
QS4E_0515S3U	5	70	15	16.6	71	100
QS4E_0518S3U	5	69	18	13.8	72	100
QS4E_0524S3U	5	65	24	10.4	77	100
QS4E_1203S3U	12	32	3.3	75.7	65	100
QS4E_1205S3U	12	31	5	50	67	100
QS4E_1207S3U	12	31	7.2	34.7	67	100
QS4E_1209S3U	12	33	9	27.7	64	100
QS4E_1212S3U	12	33	12	20.8	63	100
QS4E_1215S3U	12	31	15	16.6	67	100
QS4E_1218S3U	12	32	18	13.8	65	100
QS4E_1224S3U	12	38	24	10.4	55	100
QS4E_1503S3U	15	26	3.3	75.7	63	100
QS4E_1505S3U	15	27	5	50	62	100
QS4E_1507S3U	15	28	7.2	34.7	60	100
QS4E_1509S3U	15	28	9	27.7	60	100
QS4E_1512S3U	15	27	12	20.8	62	100
QS4E_1515S3U	15	27	15	16.6	61	100
QS4E_1518S3U	15	29	18	13.8	57	100
QS4E_1524S3U	15	29	24	10.4	57	100
QS4E_2403S3U	24	17	3.3	75.7	60	100
QS4E_2405S3U	24	17.95	5	50	58	100
QS4E_2407S3U	24	18	7.2	34.7	57	100
QS4E_2409S3U	24	17	9	27.7	62	100
QS4E_2412S3U	24	19	12	20.8	56	100
QS4E_2415S3U	24	19	15	16.6	55	100
QS4E_2418S3U	24	18	18	13.8	57	100
QS4E_2424S3U	24	18	24	10.4	59	100
QS4E_4803S3U	48	9	3.3	75.7	55	100
QS4E_4805S3U	48	10	5	50	53	100
QS4E_4807S3U	48	10	7.2	34.7	54	100
QS4E_4809S3U	48	10	9	27.7	54	100
QS4E_4812S3U	48	9	12	20.8	55	100
QS4E_4815S3U	48	10	15	16.6	54	100
QS4E_4818S3U	48	11	18	13.8	49	100
QS4E_4824S3U	48	11	24	10.4	49	100

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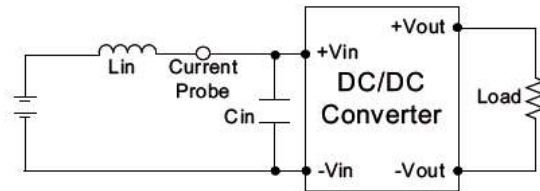
## Typical characteristics



## Test configurations

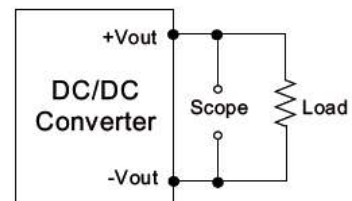
### Input reflected ripple current test step

Input reflected ripple current is measured through a source inductor  $L_{in}$  (12 $\mu$ H) and a source capacitor  $C_{in}$  (47 $\mu$ F, ESR<1.0 $\Omega$  at 100KHz) at nominal input and full load.



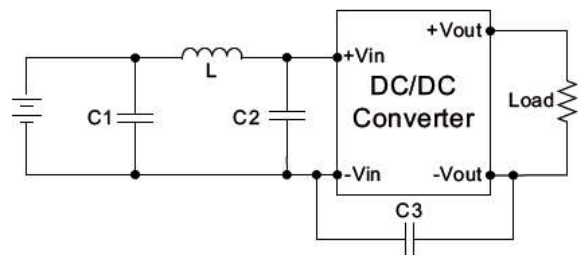
### Output ripple & noise measurement test

The scope measurement bandwidth is 20MHz.



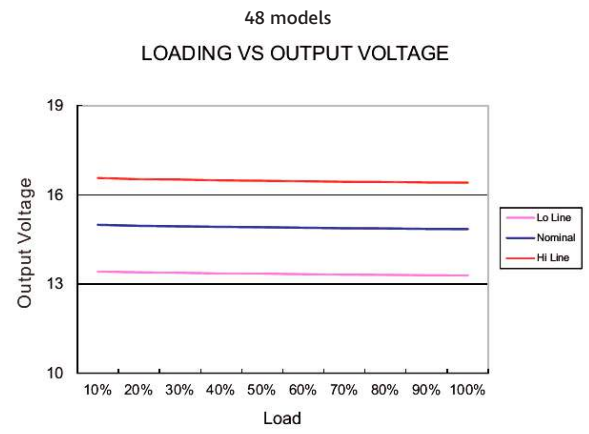
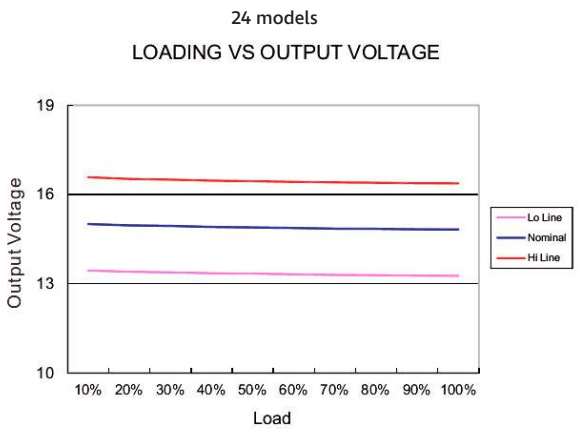
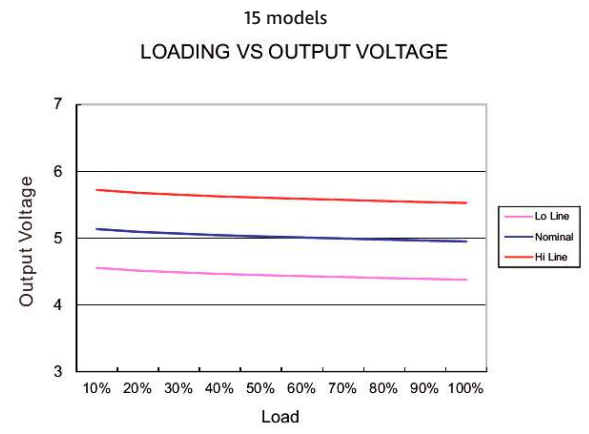
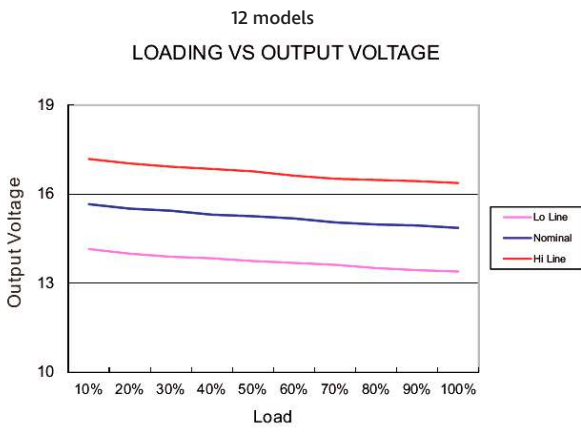
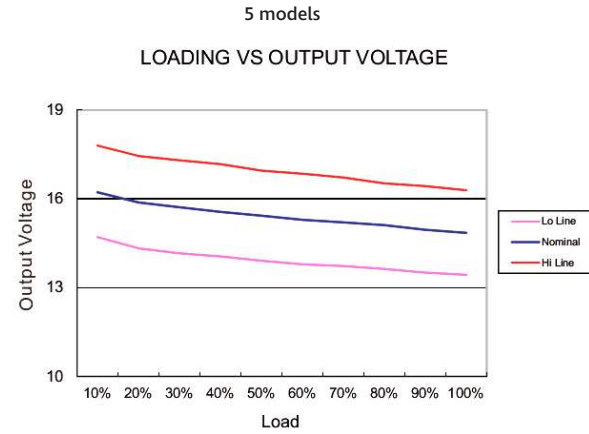
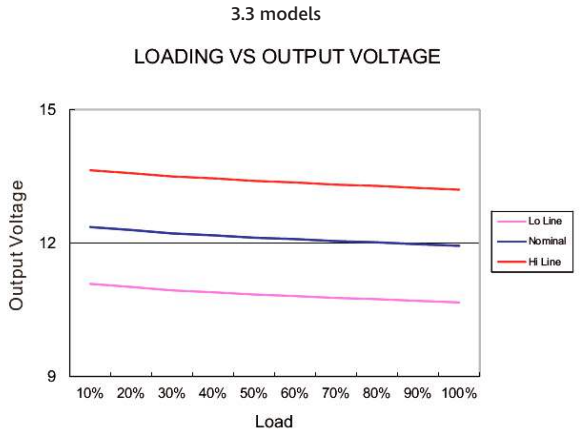
### EMI filter

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
QS4E_03xx_3U	1210, 2.2 $\mu$ F/100V	18 $\mu$ H		
QS4E_05xx_3U	1210, 2.2 $\mu$ F/100V	18 $\mu$ H		
QS4E_12xx_3U	1210, 2.2 $\mu$ F/100V	18 $\mu$ H		
QS4E_15xx_3U	1210, 2.2 $\mu$ F/100V	18 $\mu$ H		
QS4E_24xx_3U	1210, 2.2 $\mu$ F/100V	18 $\mu$ H	1210, 2.2 $\mu$ F/100V	1206, 470pF/2KV
QS4E_48xx_3U	Electrolytic capacitor, 10 $\mu$ F/100V	18 $\mu$ H	1210, 2.2 $\mu$ F/100V	1206, 470pF/2KV

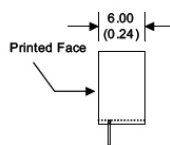
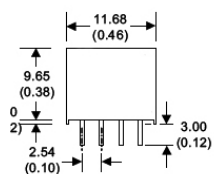
**Loading vs. output voltage**



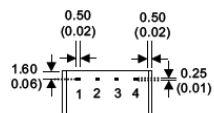
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### Mechanical dimensions



\* The thickness of 48V input voltage model is 7.50(0.29)



#### 4 Pin SIL Package

Notes : All dimensions are typical in millimeters ( inches ).

1. Pin diameter:  $0.5 \pm 0.05$  (  $0.02 \pm 0.002$  )
2. Pin pitch and length tolerance:  $\pm 0.35$  (  $\pm 0.014$  )
3. Case Tolerance:  $\pm 0.5$  (  $\pm 0.02$  )

PIN CONNECTIONS	
PIN NUMBER	SINGLE
1	-V Input
2	+V Input
3	-V Output
4	+V Output

(The Pin Connection of high isolation one is the same with normal one.)