

VQ-6W Series



6W 4:1 Regulated Single & Dual output

Features

- Wide 4:1 Input Range
- 1500VDC Isolation, Up to 3500VDC
- Continuous Short Circuit Protection
- Efficiency up to 86%
- Operating Temperature Range -40 ~ 95°C max.



PART NUMBER STRUCTURE

VQ - **24** **05** **S** **6** **H**
(1) (2) (3) (4) (5) (6)

(1) Series

(2) Input Voltage Range

24 - 9-36 V
48 - 18-72 V

(4) Output Type

S - Single Output
D - Dual Output

(3) Output Voltage

3R3 - 3.3 V
05 - 5.0 V
7R2 - 7.2 V
09 - 9.0 V
12 - 12 V
15 - 15 V
18 - 18 V
24 - 24 V

(5) Watt

(6) Isolation Voltage

Blank - 1500 VDC
H - 3500 VDC

ALL SPECIFICATIONS ARE TYPICAL AT 25°C, NOMINAL INPUT AND FULL LOAD UNLESS OTHERWISE NOTED

Model Number	Input Voltage Range (VDC)	Input Current		Output Voltage (VDC)	Output Current		Efficiency @FL (% , typ.)	Capacitive Load @FL (μF, max.)
		No-Load (mA, max.)	Full Load (mA, typ.)		Min. load (mA)	Full load (mA)		
VQ-243R3S6	9-36	15	250	3.3	0	1400	77	1000
VQ-2405S6	9-36	15	309	5	0	1200	81	1000
VQ-247R2S6	9-36	12	298	7.2	0	833	84	680
VQ-2409S6	9-36	15	295	9	0	666.6	85	680
VQ-2412S6	9-36	15	298	12	0	500	84	330
VQ-2415S6	9-36	18	295	15	0	400	85	220
VQ-2418S6	9-36	15	298	18	0	333	84	68
VQ-2424S6	9-36	18	295	24	0	250	85	68
VQ-243R3D6	9-36	20	325	±3.3	0	±909	77	±100
VQ-2405D6	9-36	15	305	±5	0	±600	82	±470
VQ-247R2D6	9-36	15	298	±7.2	0	±416	84	±470
VQ-2409D6	9-36	18	309	±9	0	±333	81	±100
VQ-2412D6	9-36	15	295	±12	0	±250	85	±220
VQ-2415D6	9-36	22	298	±15	0	±200	84	±47
VQ-2418D6	9-36	22	295	±18	0	±166	85	±22
VQ-2424D6	9-36	30	302	±24	0	±125	83	±22
VQ-483R3S6	18-72	10	125	3.3	0	1400	77	1000
VQ-4805S6	18-72	10	153	5	0	1200	82	1000
VQ-487R2S6	18-72	10	151	7.2	0	833	83	680
VQ-4809S6	18-72	10	151	9	0	666.6	83	220
VQ-4812S6	18-72	10	148	12	0	500	85	470
VQ-4815S6	18-72	10	146	15	0	400	86	330
VQ-4818S6	18-72	12	148	18	0	333	85	47
VQ-4824S6	18-72	10	146	24	0	250	86	220
VQ-483R3D6	18-72	10	159	±3.3	0	±909	79	±470
VQ-4805D6	18-72	10	151	±5	0	±600	83	±330
VQ-487R2D6	18-72	10	148	±7.2	0	±416	85	±470
VQ-4809D6	18-72	10	148	±9	0	±333	85	±100
VQ-4812D6	18-72	10	146	±12	0	±250	86	±68
VQ-4815D6	18-72	10	146	±15	0	±200	86	±22
VQ-4818D6	18-72	20	146	±18	0	±166	86	±22
VQ-4824D6	18-72	12	153	±24	0	±125	82	±22

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Model Number	Input Voltage Range (VDC)	Input Current		Output Voltage (VDC)	Output Current		Efficiency @FL (% , typ.)	Capacitive Load @FL (μF, max.)
		No-Load (mA, max.)	Full Load (mA, typ.)		Min. load (mA)	Full load (mA)		
VQ-243R3S6H	9-36	12	250	3.3	0	1400	77	1000
VQ-2405S6H	9-36	15	305	5	0	1200	82	1000
VQ-247R2S6H	9-36	15	298	7.2	0	833	84	330
VQ-2409S6H	9-36	12	291	9	0	666.6	86	220
VQ-2412S6H	9-36	15	295	12	0	500	85	1000
VQ-2415S6H	9-36	18	295	15	0	400	85	470
VQ-2418S6H	9-36	20	291	18	0	333	86	47
VQ-2424S6H	9-36	18	298	24	0	250	84	47
VQ-243R3D6H	9-36	12	321	±3.3	0	±909	78	±470
VQ-2405D6H	9-36	10	305	±5	0	±600	82	±680
VQ-247R2D6H	9-36	15	298	±7.2	0	±416	84	±470
VQ-2409D6H	9-36	15	302	±9	0	±333	83	±470
VQ-2412D6H	9-36	20	295	±12	0	±250	85	±330
VQ-2415D6H	9-36	22	298	±15	0	±200	84	±100
VQ-2418D6H	9-36	18	291	±18	0	±166	86	±10
VQ-2424D6H	9-36	25	305	±24	0	±125	82	±22
VQ-483R3S6H	18-72	10	127	3.3	0	1400	76	2200
VQ-4805S6H	18-72	8	153	5	0	1200	82	1000
VQ-487R2S6H	18-72	15	149	7.2	0	833	84	1000
VQ-4809S6H	18-72	15	151	9	0	666.6	83	680
VQ-4812S6H	18-72	10	146	12	0	500	86	1000
VQ-4815S6H	18-72	10	146	15	0	400	86	100
VQ-4818S6H	18-72	10	148	18	0	333	85	10
VQ-4824S6H	18-72	12	148	24	0	250	85	22
VQ-483R3D6H	18-72	10	155	±3.3	0	±909	81	±330
VQ-4805D6H	18-72	10	153	±5	0	±600	82	±470
VQ-487R2D6H	18-72	15	149	±7.2	0	±416	84	±220
VQ-4809D6H	18-72	10	148	±9	0	±333	85	±330
VQ-4812D6H	18-72	10	148	±12	0	±250	85	±220
VQ-4815D6H	18-72	15	148	±15	0	±200	85	±47
VQ-4818D6H	18-72	15	148	±18	0	±166	85	±22
VQ-4824D6H	18-72	15	153	±24	0	±125	82	±22

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INPUT SPECIFICATIONS					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Input Voltage Range	24V Input	9	24	36	VDC
	48V Input	18	48	72	
Input Filter		Pi Type			
Input Reflected Ripple Current (1)			35		mApk-pk
Start up Time	Nominal Vin and constant resistive load		500		ms
Recommended input fuse (slow blow)	24V Input	1.25			A
	48V Input	0.63			
Note :					
1. Measured with a simulated source inductance of 12uH and a source capacitor Cin (47uF, ESR<1.0Ω at 100kHz).					

OUTPUT SPECIFICATIONS						
Parameter	Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy	3.3V Output		-2.0		+2.0	%
	Other Output		-1.0		+1.0	
Line Regulation			-0.5		+0.5	%
Load Regulation	From 0% to 100% Load	3.3V Output	-1.5		+1.5	%
		Other Output	-0.5		+0.5	
Cross Regulation	Asymmetrical Load 25% / 100% for Dual Output		-5		+5	%
Ripple & Noise (1)	20MHz bandwidth	24V Output			150	mVpk-pk
		Other Output			60	
Short Circuit Protection			Indefinite (Automatic Recovery)			
Temperature Coefficient			-0.02		+0.02	%/°C
Maximum Capacitive Load	Nominal Vin and constant resistive load		See Table			
Note :						
1. Measured with a 1.0μF MLCC.						

ABSOLUTE MAXIMUM RATINGS					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Input Surge Voltage (100 ms)	24V Input			40	VDC
	48V Input			80	
Soldering Temperature	1.5mm from case 10sec max.			260	$^{\circ}$ C
Note : These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.					

GENERAL SPECIFICATIONS					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage	Input-output, and rated for 60sec	Standard Type	1500		VDC
		Suffix "H"	3500		
	Case-I/O, and rated for 60sec	1000			
Isolation Resistance	Input-output	1000			M Ω
Isolation Capacitance	Input-output		500		pF
Switching Frequency			266		kHz
MTBF	MIL-HDBK-217 F @ 25 $^{\circ}$ C	1121			k hours
Safety Standard	IEC / EN / UL 62368-1	Designed to meet			
Environmental compliance		RoHS			

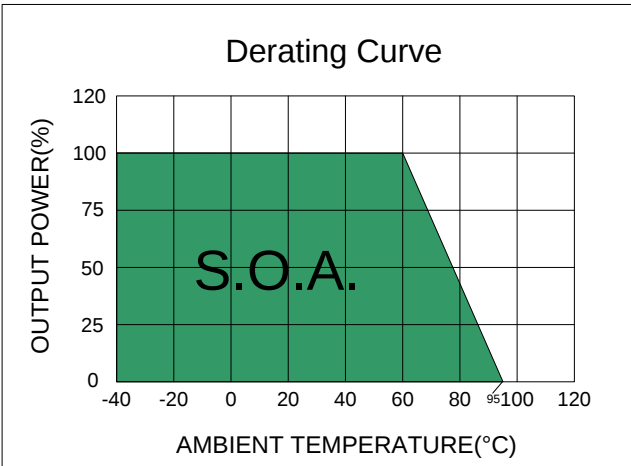
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ENVIRONMENT SPECIFICATIONS					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating Ambient Temperature	See the Derating Curve	-40		95	°C
Maximum Case Temperature				100	°C
Thermal Impedance		23			°C/W
Storage Humidity				95	% rel. H
Storage Temperature		-55		125	°C
Cooling	Natural Convection	30-65 LFM			

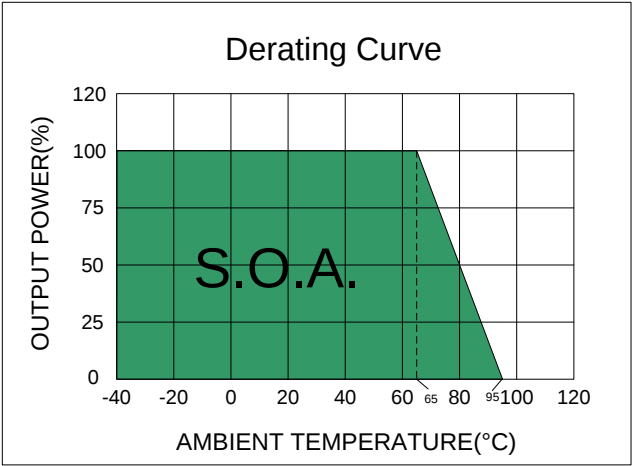
EMC SPECIFICATIONS			
Parameter	Standard	Condition	Criterion
Conducted Emissions	EN55032	with external components	A
Radiated Emissions	EN55032		A
ESD	IEC 61000-4-2	Air: ±8kV / Contact: ±6kV	A
RS	IEC 61000-4-3	10V/m	A
EFT	IEC 61000-4-4	±2kV	A
Surge	IEC 61000-4-5	±1kV with external components	A
CS	IEC 61000-4-6	10Vrms	A
PFMF	IEC 61000-4-8	1A/m	A

PHYSICAL SPECIFICATIONS	
Parameter	Value
Case Material	Aluminum
Pin Material	Ø0.5mm Brass Solder-coated
Potting Material	Epoxy (UL94V-0 rated)
Weight	13.0 g, typ.
Dimensions	1.25" x 0.8" x 0.4"

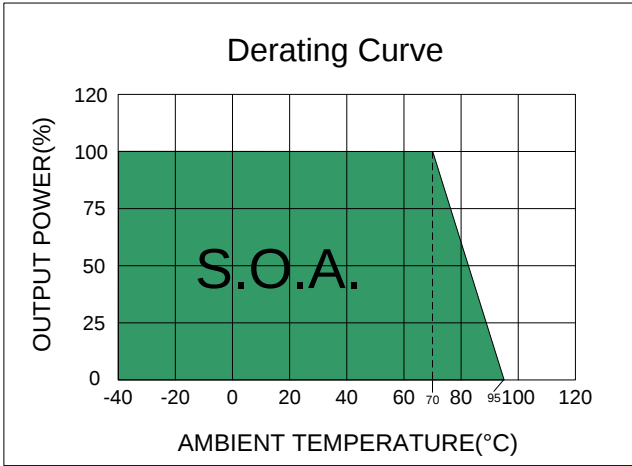
ELECTRICAL CHARACTERISTIC CURVES



Efficiency 76% ~ 80% Models



Efficiency 81% ~ 83% Models



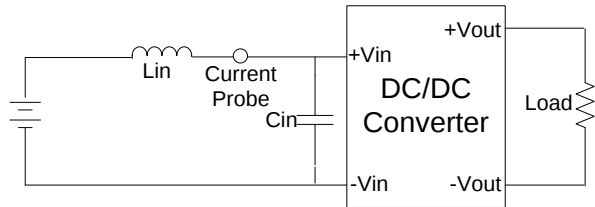
Efficiency 84% ~ 86% Models

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TEST CONFIGURATIONS

Input Reflected Ripple Current Test Step

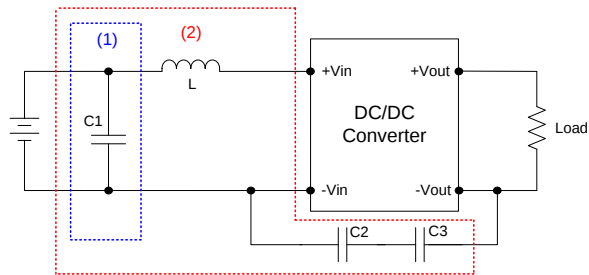
Input reflected ripple current is measured with a source inductor L_{in} ($12\mu H$) and a source capacitor C_{in} ($47\mu F$, $ESR < 1.0\Omega$ at $100kHz$) at nominal input and full load.



DESIGN & FEATURE CONFIGURATIONS

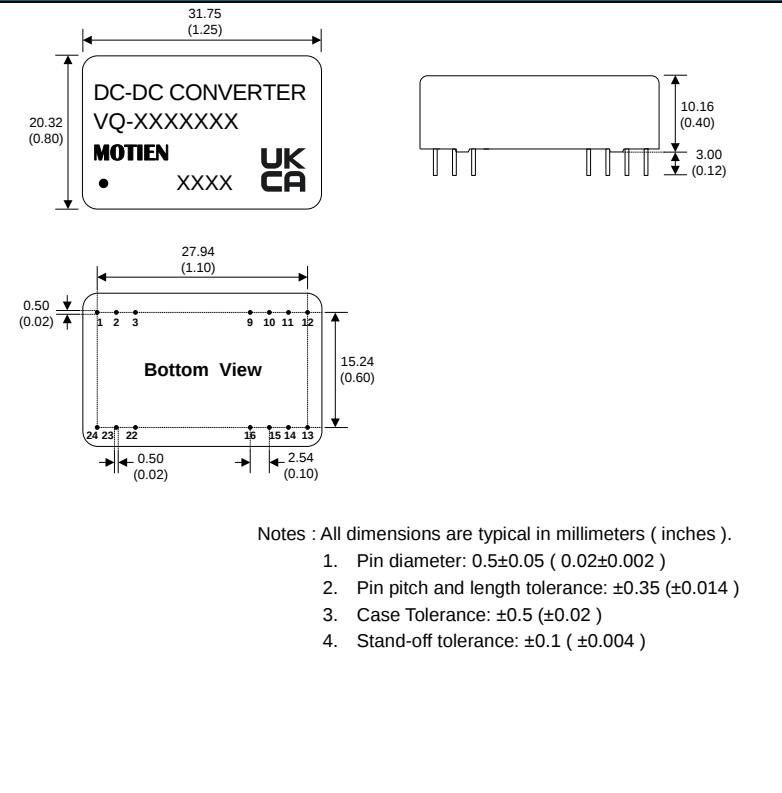
EMC Filter

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



	C1	L	C2	C3
VQ-24XXX6	NIPPON Chemi-con KY series 220μF, 100V	12μH	MLCC 1000pF, 2kV	
VQ-48XXX6				
VQ-24XXX6(H)			MLCC 2200pF, 2kV	MLCC 2200pF, 2kV
VQ-48XXX6(H)				

MECHANICAL SPECIFICATIONS



PIN CONNECTIONS				
PIN NUMBER	SINGLE	DUAL	SINGLE-H	DUAL-H
1	+Vin	+Vin	N.P.	N.P.
2	N.C.	-Vout	-Vin	-Vin
3	N.C.	COM	-Vin	-Vin
9	N.P.	N.P.	N.P.	COM
10	-Vout	COM	N.P.	N.P.
11	+Vout	+Vout	N.C.	-Vout
12	-Vin	-Vin	N.P.	N.P.
13	-Vin	-Vin	N.P.	N.P.
14	+Vout	+Vout	+Vout	+Vout
15	-Vout	COM	N.P.	N.P.
16	N.P.	N.P.	-Vout	COM
22	N.C.	COM	+Vin	+Vin
23	N.C.	-Vout	+Vin	+Vin
24	+Vin	+Vin	N.P.	N.P.

*N.P. : No PIN
*N.C. : No Connection

RECOMMENDED FOOTPRINT DETAILS

