

VQ-5W Series



5W 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** **5** **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-243R3S5	9-36	15	233	3.3	0	1300	77	1000
VQ-2405S5	9-36	15	255	5	0	1000	82	1000
VQ-247R2S5	9-36	15	249	7.2	0	694	84	470
VQ-2409S5	9-36	15	246	9	0	555	85	470
VQ-2412S5	9-36	15	249	12	0	416	84	220
VQ-2415S5	9-36	15	246	15	0	333	85	68
VQ-2418S5	9-36	20	252	18	0	277	83	220
VQ-2424S5	9-36	16	249	24	0	208	84	68
VQ-243R3D5	9-36	18	264	±3.3	0	±757	79	±100
VQ-2405D5	9-36	15	252	±5	0	±500	83	±470
VQ-247R2D5	9-36	15	252	±7.2	0	±347	83	±220
VQ-2409D5	9-36	30	252	±9	0	±277	83	±100
VQ-2412D5	9-36	15	246	±12	0	±208	85	±68
VQ-2415D5	9-36	18	252	±15	0	±166	83	±22
VQ-2418D5	9-36	26	252	±18	0	±138	83	±22
VQ-2424D5	9-36	26	258	±24	0	±104	81	±22
VQ-483R3S5	18-72	8	118	3.3	0	1300	76	2200
VQ-4805S5	18-72	10	128	5	0	1000	82	1000
VQ-487R2S5	18-72	15	125	7.2	0	694	84	1000
VQ-4809S5	18-72	15	126	9	0	555	83	330
VQ-4812S5	18-72	10	123	12	0	416	85	470
VQ-4815S5	18-72	15	123	15	0	333	85	330
VQ-4818S5	18-72	15	125	18	0	277	84	47
VQ-4824S5	18-72	9	122	24	0	208	86	47
VQ-483R3D5	18-72	10	132	±3.3	0	±757	79	±680
VQ-4805D5	18-72	12	128	±5	0	±500	82	±330
VQ-487R2D5	18-72	15	128	±7.2	0	±347	82	±100
VQ-4809D5	18-72	15	125	±9	0	±277	84	±220
VQ-4812D5	18-72	12	122	±12	0	±208	86	±220
VQ-4815D5	18-72	15	123	±15	0	±166	85	±47
VQ-4818D5	18-72	15	128	±18	0	±138	82	±22
VQ-4824D5	18-72	15	129	±24	0	±104	81	±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-243R3S5H	9-36	8	233	3.3	0	1300	77	1000
VQ-2405S5H	9-36	12	255	5	0	1000	82	1000
VQ-247R2S5H	9-36	15	249	7.2	0	694	84	680
VQ-2409S5H	9-36	16	246	9	0	555	85	680
VQ-2412S5H	9-36	15	249	12	0	416	84	220
VQ-2415S5H	9-36	15	246	15	0	333	85	220
VQ-2418S5H	9-36	20	246	18	0	277	85	68
VQ-2424S5H	9-36	18	249	24	0	208	84	220
VQ-243R3D5H	9-36	12	264	±3.3	0	±757	79	±680
VQ-2405D5H	9-36	15	255	±5	0	±500	82	±330
VQ-247R2D5H	9-36	15	249	±7.2	0	±347	84	±330
VQ-2409D5H	9-36	18	258	±9	0	±277	81	±68
VQ-2412D5H	9-36	15	249	±12	0	±208	84	±100
VQ-2415D5H	9-36	20	249	±15	0	±166	84	±47
VQ-2418D5H	9-36	18	252	±18	0	±138	83	±47
VQ-2424D5H	9-36	30	261	±24	0	±104	80	±100
VQ-483R3S5H	18-72	8	117	3.3	0	1300	77	1000
VQ-4805S5H	18-72	10	129	5	0	1000	81	1000
VQ-487R2S5H	18-72	10	128	7.2	0	694	82	470
VQ-4809S5H	18-72	20	128	9	0	555	82	470
VQ-4812S5H	18-72	12	122	12	0	416	86	470
VQ-4815S5H	18-72	8	122	15	0	333	86	22
VQ-4818S5H	18-72	15	131	18	0	277	80	68
VQ-4824S5H	18-72	15	126	24	0	208	83	68
VQ-483R3D5H	18-72	10	131	±3.3	0	±757	80	±800
VQ-4805D5H	18-72	10	129	±5	0	±500	81	±470
VQ-487R2D5H	18-72	15	131	±7.2	0	±347	80	±100
VQ-4809D5H	18-72	15	129	±9	0	±277	81	±68
VQ-4812D5H	18-72	10	125	±12	0	±208	84	±220
VQ-4815D5H	18-72	15	125	±15	0	±166	84	±22
VQ-4818D5H	18-72	15	125	±18	0	±138	84	±22
VQ-4824D5H	18-72	15	128	±24	0	±104	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			A
	48V Input	0.5			
Note :					
1. Measured with a simulated source inductance of 12μH and a source capacitor Cin (47μF, 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			

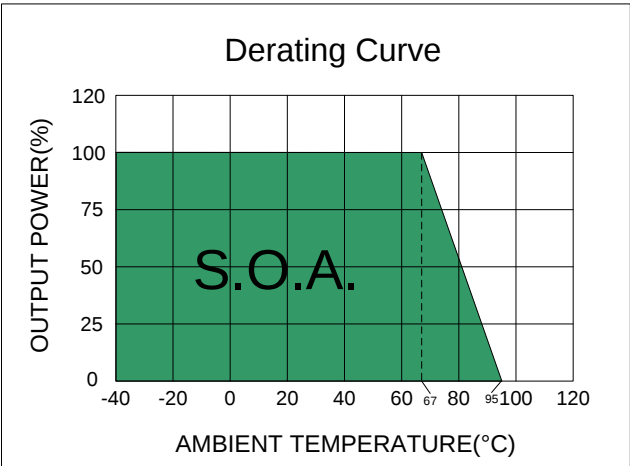
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ENVIRONMENT SPECIFICATIONS					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating Ambient Temperature	See the Derating Curve	-40		95	°C
Maximum Case Temperature				100	°C
Thermal Impedance		23			°C/W
Storage Humidity				95	% rel. H
Storage Temperature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

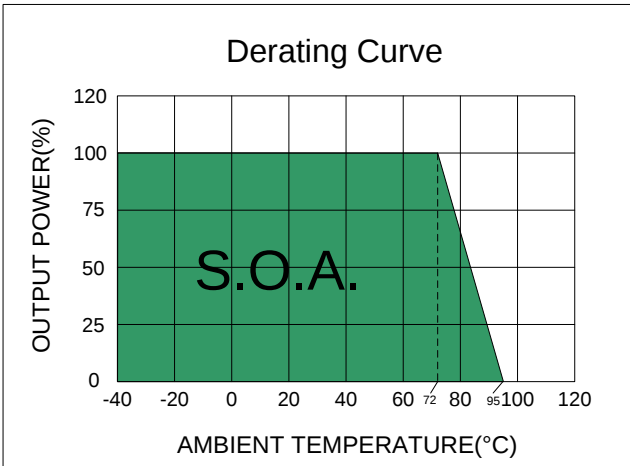
EMC SPECIFICATIONS			
Parameter	Standard	Condition	Criterion
Conducted Emissions	EN55032	with external components	A
Radiated Emissions	EN55032		A
ESD	IEC 61000-4-2	Air: ±8kV / Contact: ±6kV	A
RS	IEC 61000-4-3	10V/m	A
EFT	IEC 61000-4-4	±2kV	A
Surge	IEC 61000-4-5	±1kV with external components	A
CS	IEC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

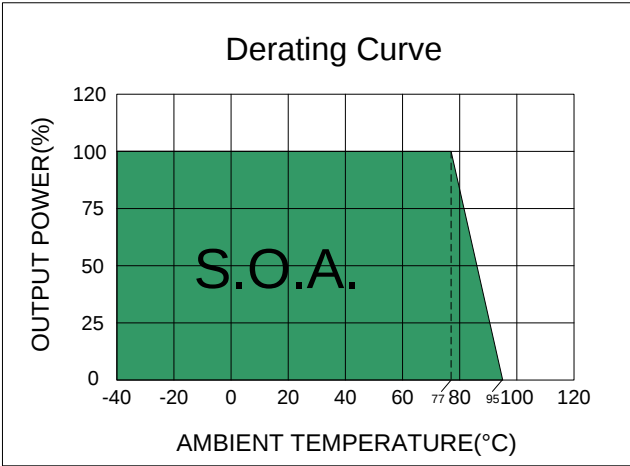
ELECTRICAL CHARACTERISTIC CURVES



Efficiency 76% ~ 80% Models



Efficiency 81% ~ 83% Models



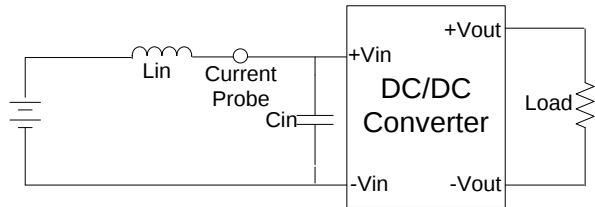
Efficiency 84% ~ 86% Models

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TEST CONFIGURATIONS

Input Reflected Ripple Current Test Step

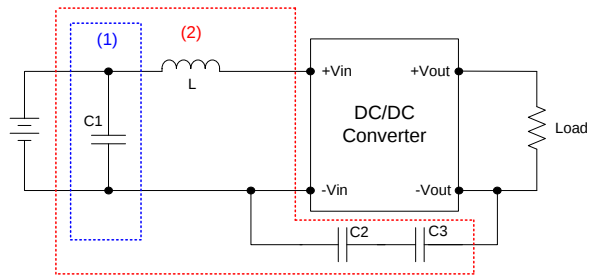
Input reflected ripple current is measured with a source inductor L_{in} ($12\mu H$) and a source capacitor C_{in} ($47\mu F$, $ESR < 1.0\Omega$ at $100kHz$) at nominal input and full load.



DESIGN & FEATURE CONFIGURATIONS

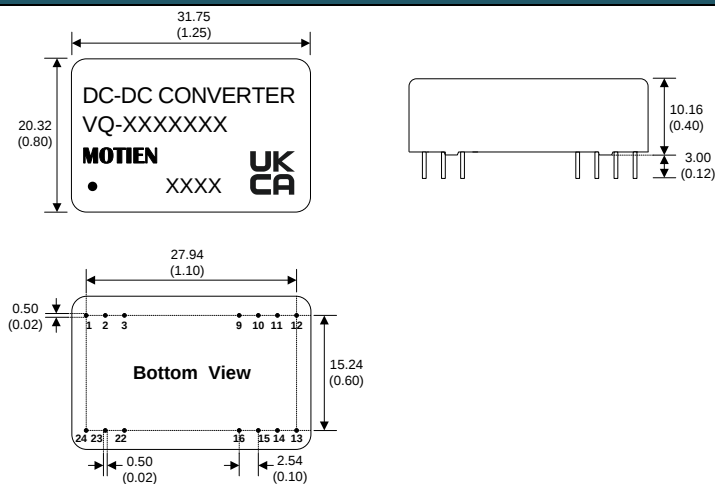
EMC Filter

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-24XXX5	NIPPON Chemi-con KY series 220μF, 100V	12μH	MLCC 1000pF, 2kV	
VQ-48XXX5				
VQ-24XXX5(H)			MLCC 2200pF, 2kV	MLCC 2200pF, 2kV
VQ-48XXX5(H)				

MECHANICAL SPECIFICATIONS

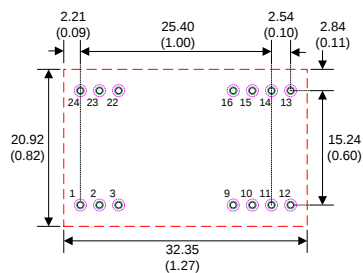


- Notes : All dimensions are typical in millimeters (inches).
1. Pin diameter: 0.5 ± 0.05 (0.02 ± 0.002)
 2. Pin pitch and length tolerance: ±0.35 (±0.014)
 3. Case Tolerance: ±0.5 (±0.02)
 4. Stand-off tolerance: ±0.1 (±0.004)

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



- Notes : 1. All dimensions are typical in millimeters (inches).
- Through hole (black) 1 ~ 24: $\varnothing0.80$ (0.031)
- Top view pad (green) 1 ~ 24: $\varnothing1.00$ (0.039)
- Bottom view pad (pink) 1 ~ 24: $\varnothing1.60$ (0.063)