Data Sheet
October 20, 2008

LINEAGE POWER

JQW Series Power Modules; dc-dc Converters
36 to 75 Vdc Input; Single Output up to 25A

RoHS Compliant

Applications

- Distributed power architectures
- Wireless equipment
- Optical network equipment

Options

- Negative Remote On/Off Enable

Features

- Compliant to RoHS EU Directive 2002/95/EC (-Z versions)
- Compliant to ROHS EU Directive 2002/95/EC with lead solder exemption (non-Z versions)
- Small size: 61.0 mm x 57.9 mm x 11.2 mm (2.40 in. x 2.28 in. x 0.44 in.)
- Delivers up to 25A @ 3.3V output
- High efficiency: 92% (3.3V)
- Excellent thermal performance
- Low Input Noise
- Fixed frequency
- Open frame, Industry-standard pin out
- Remote On/Off Enable: Primary referenced
- Remote Sense: compensates for distribution losses
- Low Output Noise
- Output over current protection (constant current)
- Output over voltage protection
- Over temperature protection
- Output voltage adjustment
- Operating temperature range (-40°C to +85°C)
- Meets the voltage isolation requirements for ETSI 300-132-2.
- *UL** 60950-1 Recognized, *CSA*† C22.2 No. 60950-1-03 Certified, and *VDE*‡ 0805 (IEC60950, 3rd Edition) Licensed
- CE mark meets 2006/95/EC directive§
- ISO** 9001 and ISO 14001 certified manufacturing facilities

Description

The JQW013A0A, JQW020A0A and JQW025A0F Power Modules are dc-dc converters that operate over a wide input voltage range of 36 Vdc to 75 Vdc and provide a single precisely regulated dc output. The outputs are fully isolated from the inputs, allowing versatile polarity configurations and grounding connections. The modules have a current rating of 13A at 5V or 20A at 5V and 25A at 3.3V with a typical full-load efficiency of 92% (3.3V version).The open frame modules offer excellent thermal performance. The standard feature set includes remote sensing, output trim, and remote on/off for convenient flexibility in distributed power applications. These modules are able to replace the ubiquitous JW-series.

* *UL* is a registered trademark of Underwriters Laboratories, Inc.
† *CSA* is a registered trademark of Canadian Standards Association.
‡ *VDE* is a trademark of Verband Deutscher Elektrotechniker e.V.
§ This product is intended for integration into end-user equipment. All the required procedures of end-user equipment should be followed.
** ISO is a registered trademark of the International Organization of Standards

Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only, functional operation of the device is not implied at these or any other conditions in excess of those given in the operations sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect the device reliability.

Parameter	Symbol	Min	Max	Unit
Input Voltage				
Continuous	V_{IN}	-0.3	80	Vdc
Transient (100ms)	$V_{IN,\ trans}$	-0.3	100	Vdc
Operating Ambient Temperature (See Thermal Considerations section)	T_A	-40	85	°C
Storage Temperature	T_{stg}	-55	125	°C
I/O Isolation Voltage	—	—	1500	Vdc

Electrical Specifications

Unless otherwise indicated, specifications apply over all operating input voltage, resistive load, and temperature conditions.

Parameter	Symbol	Min	Typ	Max	Unit
Operating Input Voltage	V_{IN}	36	48	75	Vdc
Input Over Voltage, turn-off threshold	$V_{OV/OFF}$	—	79	—	Vdc
Input Over Voltage, turn-on threshold	$V_{OV/ON}$	—	77	—	Vdc
Maximum Input Current (V_{IN}=0V to 75V, I_O=$I_{O,\ max}$)	$I_{IN,max}$	—	—	4.0	Adc
Quiescent Input Current, On/Off disabled (V_{IN}= $V_{IN,\ NOM}$)	$I_{IN,\ Q}$	—	—	5	mA
Idle Input Current (V_{IN}= $V_{IN,\ NOM}$, I_O= 0A)	$I_{IN,\ idle}$	—	—	30	mA
Inrush Transient	I^2t	—	—	1.0	A^2s
Input Reflected Ripple Current, peak-to-peak (5Hz to 20MHz, 12μH source impedance; V_{IN}=0V to 75V, I_O= I_{Omax} ; see Figure 9)	I_I	—	—	50	mAp-p
Input Ripple Rejection (120Hz)		50	—	—	dB
EMC, EN55022	See EMC Consideration Section				

Fusing Considerations

CAUTION: This power module is not internally fused. An input line fuse must always be used.

This power module can be used in a wide variety of applications, ranging from simple standalone operation to an integrated part of sophisticated power architectures. To preserve maximum flexibility, internal fusing is not included, however, to achieve maximum safety and system protection, always use an input line fuse. The safety agencies require a fast-acting fuse with a maximum rating of 8A (see Safety Considerations section). Based on the information provided in this data sheet on inrush energy and maximum dc input current, the same type of fuse with a lower rating can be used. Refer to the fuse manufacturer's data sheet for further information.

Electrical Specifications (continued)

Parameter	Device	Symbol	Min	Typ	Max	Unit
Output Voltage Set-point (V_{IN}=$V_{IN, nom}$ I_O=$I_{O, max}$ T_A=25°C)	All	$V_{O, set}$	-1.5	—	+1.5	% $V_{O, nom}$
Output Voltage (Over all operating input voltage, resistive load, and temperature conditions until end of life)	All		-3.0	—	+3.0	% $V_{O, nom}$
Output Regulation						
Line (V_{IN}=$V_{IN, min}$ to $V_{IN, max}$)	All		—	0.05	0.1	% $V_{O, nom}$
Load (I_O=$I_{O, min}$ to $I_{O, max}$)	All		—	0.05	0.2	% $V_{O, nom}$
Temperature (T_{ref}=$T_{A, min}$ to $T_{A, max}$)	All		—	0.25	1.0	% $V_{O, nom}$
Output Ripple and Noise (V_{IN}=$V_{IN, nom}$, T_A=25°C. Measured with 10μF tantalum and 1μF ceramic)						
RMS (5Hz to 20MHz bandwidth)	All		—	—	25	mV_{rms}
Peak-to-Peak (5Hz to 20MHz bandwidth)	All		—	—	75	mV_{pk-pk}
Admissible External Output Capacitance						
Capacitance	A	$C_{O, max}$	0	—	10,000	μF
	F		0	—	20,000	μF
Output Current	A – 13A	I_O	0	—	13.0	Adc
	A – 20A	I_O	0	—	20.0	Adc
	F	I_O	0	—	25.0	Adc
Output Current Limit Inception (Constant current mode)	All	$I_{O, cli}$	105	—	130	% $I_{O, max}$
Output Short-Circuit Current						
Maximum S/C Transient	All	I^2t	—	—	1.0	A^2s
Average S/C Current ($V_O \leq$ 0.3V)	All		—	—	150	% $I_{O, max}$
Efficiency	A – 13A	η	—	91.0	—	%
V_{IN}=$V_{IN, nom}$, I_O=0.5I_O to $I_{O,max}$, V_O=$V_{O,nom}$	A – 20A	η	—	91.0	—	%
T_A=25°C, airflow=1.0ms^{-1}	F	η	—	92.0	—	%
Switching Frequency, Fixed	All	f_{sw}	—	200	—	kHz
Dynamic Load Response ($\Delta Io/\Delta t$=0.1A/μs, V_{IN}=$V_{IN, nom,}$ T_A=25°C) Load Change from Io= 50% to 75% or 50% to 25% of Io,max:						
Peak Deviation	All	V_{pk}	—	2	—	% $V_{O, nom}$
Settling Time ($\Delta Vo \leq$ 10% peak deviation)	All	t_s	—	300	—	μs
Output Voltage Adjustment range						
Remote Sense Range	All		—	—	10	% $V_{O, nom}$
Set-point Adjustment Range (Trim)	All		80	—	110	% $V_{O, nom}$

Electrical Specifications (continued)

Isolation Specifications

Parameter	Symbol	Min	Typ	Max	Unit
Isolation Capacitance	C_{iso}	—	1 - 3	—	nF
Isolation Resistance	R_{iso}	10	—	—	MΩ

General Specifications

Parameter	Min	Typ	Max	Unit
Calculated MTBF (in accordance with Telcordia TR-NWT-000332: I_O=80% of $I_{O, max}$, T_A=40°C, Natural Convection airflow=0.3ms^{-1})	—	1,571,000	—	Hours
Weight	—	55 (1.9)	—	g (oz.)

Feature Specifications

Unless otherwise indicated, specifications apply over all operating input voltage, resistive load, and temperature conditions. See Feature Descriptions for additional information.

Parameter	Device	Symbol	Min	Typ	Max	Unit
Remote On/Off Enable Signal Interface						
(V_{IN}=$V_{IN, min}$ to $V_{IN, max}$; open collector or equivalent,						
Signal referenced to $V_{IN(-)}$ terminal)						
Logic Low = module Off, Logic High = module On						
Logic Low, Remote On/Off Current	All	$I_{on/off}$	—	0.5	1.0	mA
Logic Low , Remote On/Off Voltage	All	$V_{on/off}$	-0.7	—	1.2	V
Logic High Voltage – (Typ = Open Collector)	All	$V_{on/off}$	3.5	—	5.0	V
Logic High maximum allowable leakage current	All	$I_{on/off}$	—	—	50	μA
Turn-On Delay and Rise Times						
(I_O=80% of $I_{O, max}$, T_A=25°C)						
Case 1: On/Off input is set ON and then input power is applied (T_{delay} = from instant at which V_{IN}=$V_{IN, min}$ until V_O = 10% of $V_{O, set}$).	All	T_{delay} Case1	—	15	50	ms
Case 2: Input power is applied for at least 1 sec and then On/Off input is set from OFF to ON	All	T_{delay} Case2	—	5	50	ms
T_{rise} = time for V_O to rise from 10% of $V_{O, set}$ to 90% of $V_{O, set}$.	All	T_{rise}	5	10	20	ms
Output Voltage Overshoot – Start-Up and Recovery from a S/C ($V_O \leq 0.3$V)	All		—	—	3	% $V_{O, nom}$
Output Over Voltage Protection (Auto Restart)	A	$V_{O, limit}$	5.7	—	7.0	V
Minimum C_O of 1000μF must be fitted	F	$V_{O, limit}$	3.8	—	4.6	V
Over Temperature Protection (See Features Description)	All	T_{ref}	—	120	—	°C
Input Under voltage Lockout						
Turn-on Threshold	All	$V_{uv/on}$	—	34.5	36.0	V
Turn-off Threshold	All	$V_{uv/off}$	30.0	32.0	—	V
Hysterisis	All	V_{hyst}	—	2.5	—	V

Characteristic Curves

The following figures provide typical projected characteristics for the JQW025A0F.

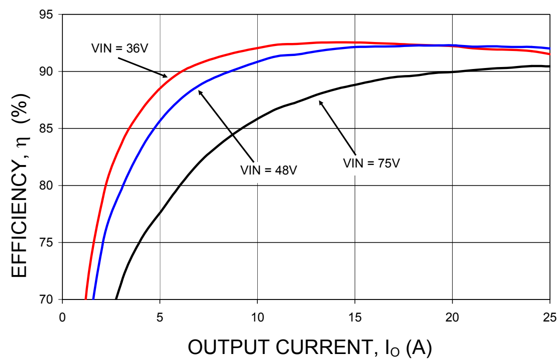


Figure 1. Converter Efficiency versus Output Current

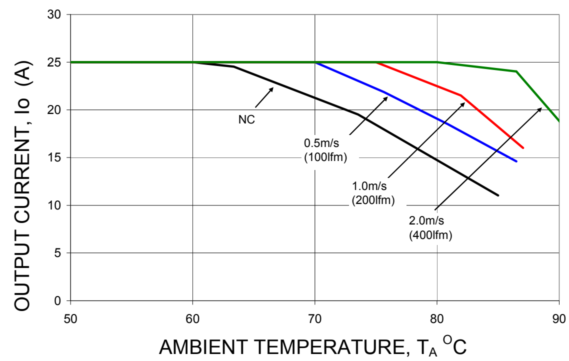


Figure 2. Derating Output Current versus Local Ambient Temperature and Airflow

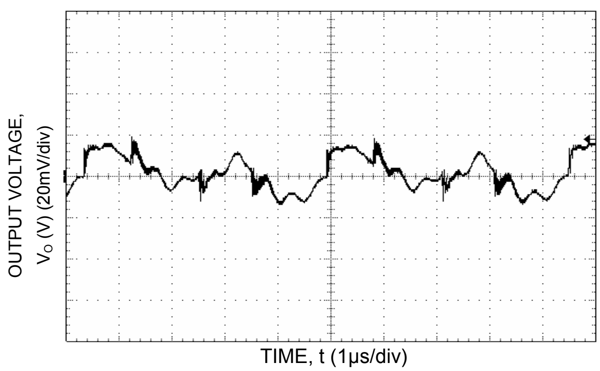


Figure 3. Typical Output Ripple and Noise.

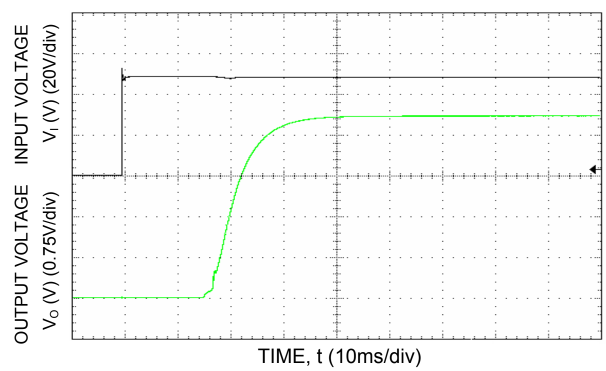


Figure 4. Typical Start-Up with application of Vin.

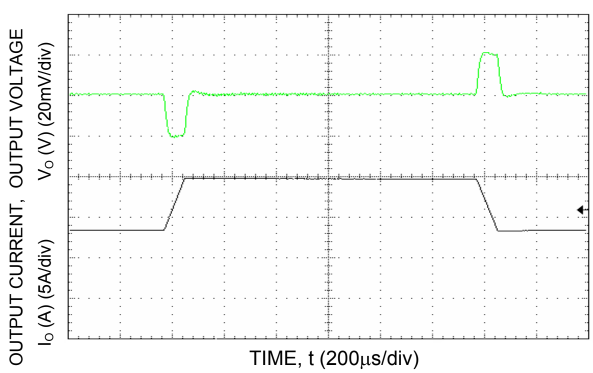


Figure 5. Transient Response to Dynamic Load Change from 50% to 75% to 50% of full load.

Characteristic Curves (continued)

The following figures provide typical projected characteristics for the JQW013A0A.

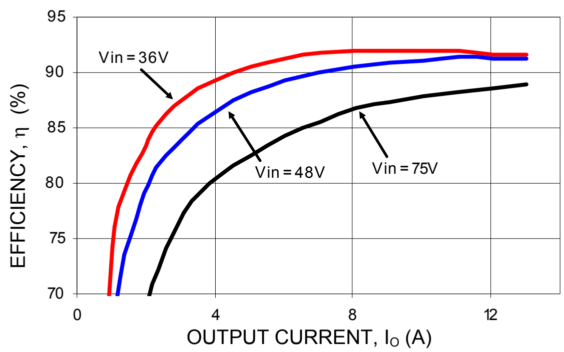


Figure 6. Converter Efficiency versus Output Current

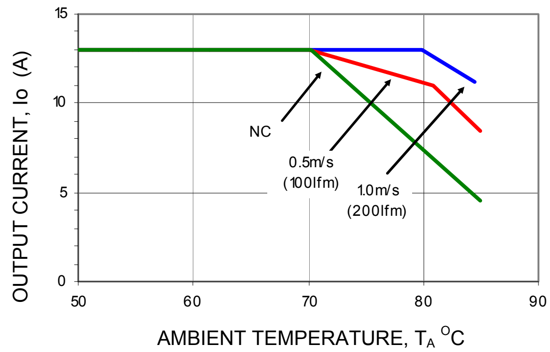


Figure 7. Derating Output Current versus Local Ambient Temperature and Airflow

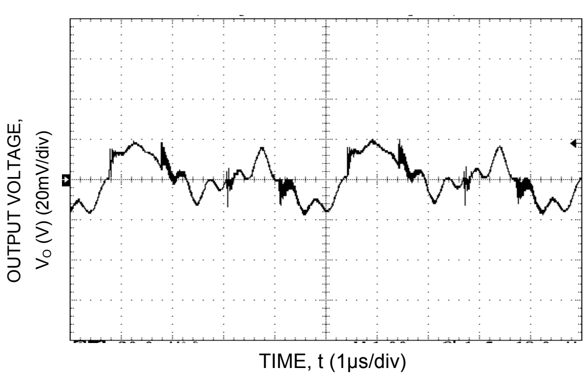


Figure 8. Typical Output Ripple and Noise.

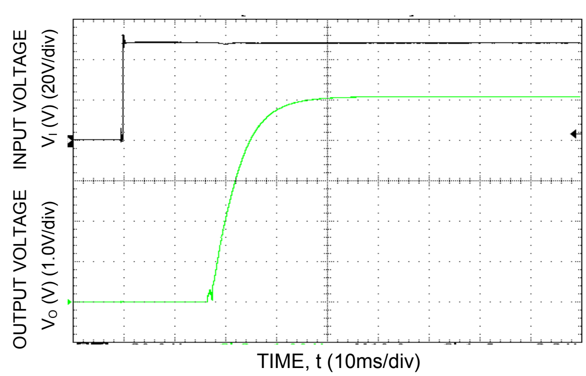


Figure 9. Typical Start-Up with application of Vin.

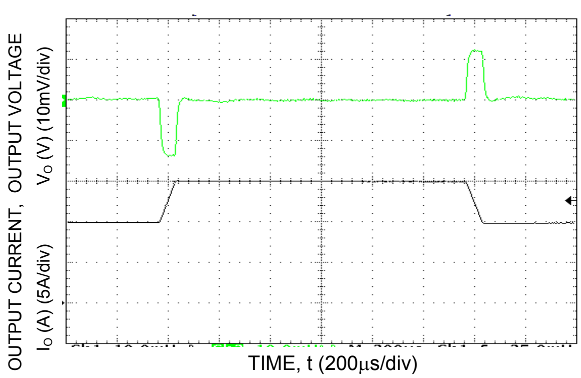


Figure 10. Transient Response to Dynamic Load Change from 50% to 75% to 50% of full load.

Characteristic Curves (continued)

The following figures provide typical projected characteristics for the JQW020A0A.

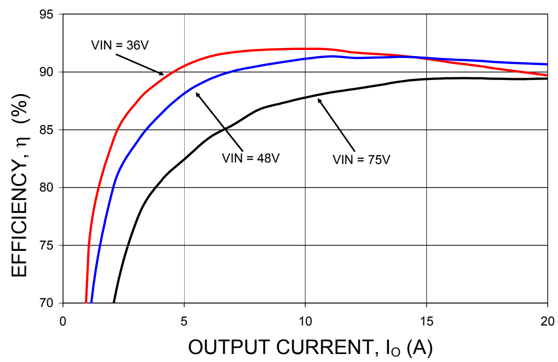


Figure 11. Converter Efficiency versus Output Current

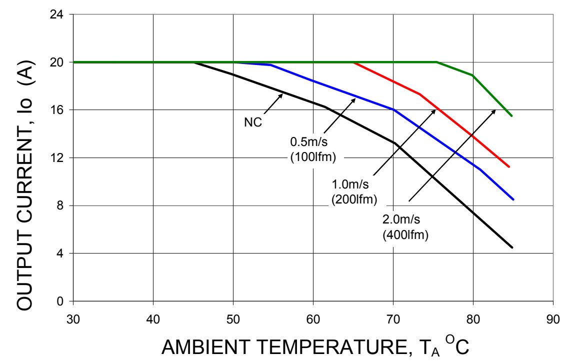


Figure 12. Derating Output Current versus Local Ambient Temperature and Airflow

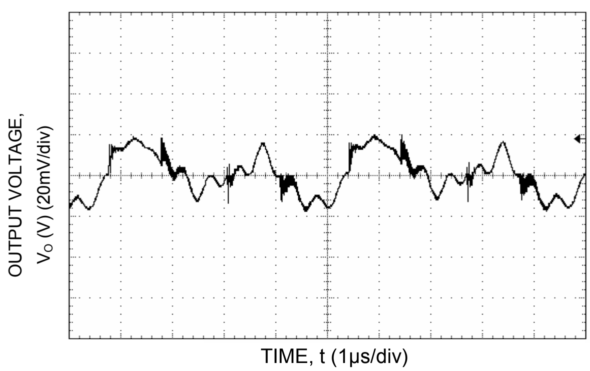


Figure 13. Typical Output Ripple and Noise.

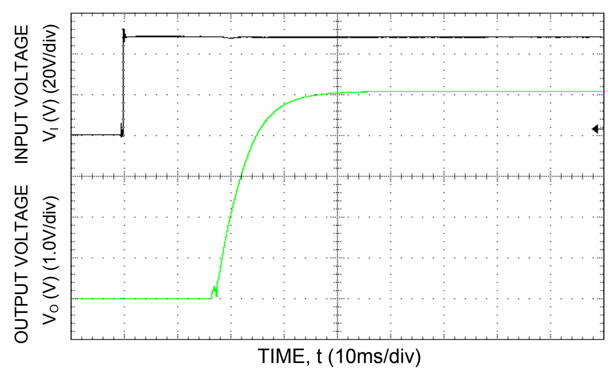


Figure 14. Typical Start-Up with application of Vin.

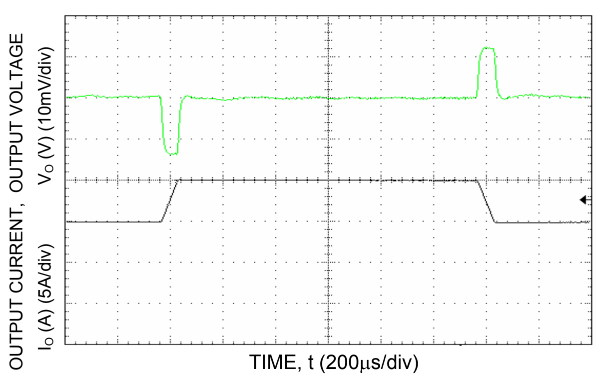
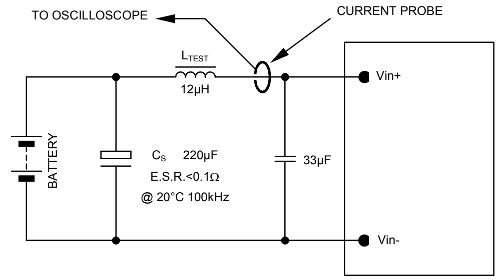


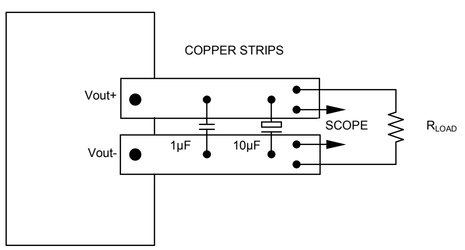
Figure 15. Transient Response to Dynamic Load Change from 50% to 75% to 50% of full load.

Test Configurations



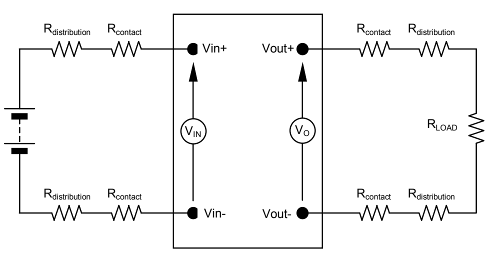
NOTE: Measure input reflected ripple current with a simulated source inductance (L_{TEST}) of 12μH. Capacitor C_S offsets possible battery impedance. Measure current as shown above.

Figure 16. Input Reflected Ripple Current Test Set Up



NOTE: Use a 1μF ceramic capacitor and a 10μF aluminium or tantalum capacitor. The scope measurement should be made using a BNC socket. Position the load 50mm to 75mm (2" to 3") from the module.

Figure 17. Output Ripple and Noise Test Set Up



NOTE: All voltage measurements to be taken at the module terminals, as shown above. If sockets are used then Kelvin connections are required at the module terminals to avoid measurement errors due to socket contact resistance.

Figure 18. Output Voltage and Efficiency Test Set Up

$$Efficiency\ (\eta) = \left[\frac{V_O \times I_O}{V_{IN} \times I_{IN}}\right] \times 100\ (\%)$$

Design Considerations

Input Source Impedance

The power module should be connected to a low ac-impedance source. Highly inductive source impedance can affect the stability of the power module. For the test configuration in Figure 16 a 33μF electrolytic capacitor (ESR<0.7Ω at 100kHz), mounted close to the power module helps ensure the stability of the unit. Refer to EMC considerations or consult the factory for further application guidelines.

Safety Considerations

For safety-agency approval of the system in which the power module is used, the power module must be installed in compliance with the spacing and separation requirements of the end-use safety agency standard, i.e., UL 60950-1, CSA C22.2 No. 60950-1-03, and VDE 0805 (IEC60950, 3rd Edition).

If the input source is non-SELV (ELV or a hazardous voltage greater than 60 Vdc and less than or equal to 75Vdc), for the module's output to be considered as meeting the requirements for safety extra-low voltage (SELV), all of the following must be true:

- The input source is to be provided with reinforced insulation from any other hazardous voltages, including the ac mains.
- One V_{IN} pin and one V_{OUT} pin are to be grounded, or both the input and output pins are to be kept floating.
- The input pins of the module are not operator accessible.
- Another SELV reliability test is conducted on the whole system (combination of supply source and subject module), as required by the safety agencies, to verify that under a single fault, hazardous voltages do not appear at the module's output.

Note: Do not ground either of the input pins of the module without grounding one of the output pins. This may allow a non-SELV voltage to appear between the output pins and ground.

The power module has extra-low voltage (ELV) outputs when all inputs are ELV.

For input voltages exceeding –60 Vdc but less than or equal to –75 Vdc, these converters have been evaluated to the applicable requirements of BASIC INSULATION between secondary DC MAINS DISTRIBUTION input (classified as TNV-2 in Europe) and unearthed SELV outputs (-B option only).

The input to these units is to be provided with a maximum 8A fast-acting fuse in the ungrounded lead.

Feature Descriptions

Remote On/Off Enable

The module is fitted with a Remote On/Off Enable control feature. This feature allows users to turn the output voltage on and off by means of external circuits. This control feature is primary referenced.

The Remote On/Off Enable features **positive logic** as standard.

To turn the power module on and off, the user must supply a switch (open collector or equivalent) to control the voltage ($V_{on/off}$) between the ON/OFF terminal and the V_{IN}(-) terminal.

A logic low (less than 1.2V) applied to the module Remote On/Off Enable pin will disable the output voltage. The typical $I_{on/off}$ during a logic low is 0.5mA. For reliable operation the switch should maintain a logic low level whilst sinking a minimum of 1.0mA.

A logic high voltage on the Remote On/Off Enable pin will enable the output. During a logic high, the typical $V_{on/off}$ generated by the module is 4.2V, and the maximum allowable leakage current in the external device at $V_{on/off}$ = 4.2V is 50μA. The module has an in-built pull-up, avoiding the need to supply an external pull-up.

If not using the Remote Of/Off Enable function, leave the pin open (no connection).

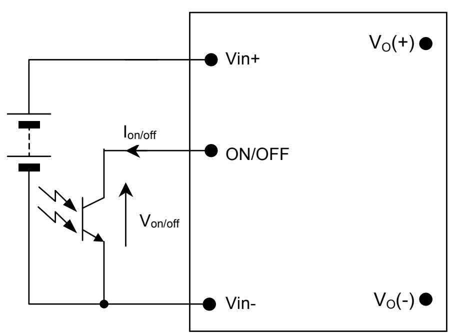


Figure 19. Remote On/Off Implementation

Output Over Current Protection

To provide protection in a fault (output overload) condition, the unit is equipped with internal current-limiting circuitry that can endure current limiting continuously. At the point of current-limit inception, the unit shifts from voltage control to current control (constant current mode). The unit operates normally once the output current is brought back into its specified range. If the output voltage is subjected to a severe fault, such as a short circuit (V_O ≤ 0.3V), the over current protection circuitry may cause the module to hiccup off once. The module will then attempt to auto restart and will enter constant current mode if the S/C persists. If the S/C is then removed the module will resume normal operation.

Over Temperature Protection

These modules feature an over temperature protection circuit to safeguard against thermal damage. The circuit shuts down the module if the over temperature threshold is exceeded. It will then wait for the module to cool sufficiently before automatically attempting to restart.

The module will typically enter thermal shutdown when the temperature measured at the thermal reference point T_{ref} (see Figure 23) reaches 120°C.

Output Over Voltage Protection

The output over voltage protection consists of control circuitry, independent of the primary regulation loop, which monitors the voltage at the output terminals. This redundant circuit has a higher voltage set point than the primary loop (see $V_{O,\ limit}$ values in the Feature Specifications table). In the unlikely event of a fault, the over voltage loop ensures that the output voltage does not exceed the specified values.

As standard the module will attempt to auto recover.

Input Under Voltage Lockout

At input voltages below the input under voltage lockout limit, the module operation is disabled. The module will only begin to operate once the input voltage is raised above the under voltage lockout turn-on threshold, $V_{UV/ON}$. Avoid applying reverse polarity input voltage as this may damage the unit.

Once operating, the module will continue to operate until the input voltage is taken below the under voltage turn-off threshold, $V_{UV/OFF}$.

Input Over Voltage Lockout

At input voltages above the input over voltage lockout limit, the module operation is disabled. The module will shut down if the input voltage is raised above the turn-off threshold, $V_{OV/OFF}$. The module will auto restart once the input supply drops back below the high voltage turn-on threshold, $V_{OV/ON}$.

Feature Descriptions (continued)

Remote Sense

Remote sensing minimises the effects of distribution losses by regulating the voltage at the remote-sense connections, i.e. at the point of load (Figure 20).

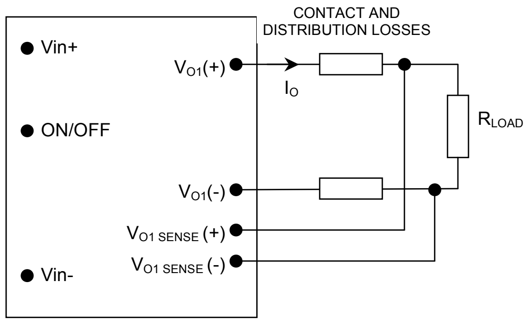


Figure 20. Circuit Configuration for Remote Sense Operation

The voltage difference between the remote-sense pins and the output terminals must not exceed the output voltage sense range given in the Feature Specifications table, i.e.

$[V_O(+) – V_O(-)] – [SENSE(+) – SENSE(-)] \leq 10\% V_{O,nom}$

The voltage between the $V_O(+)$ and $V_O(-)$ terminals must not exceed the minimum value of the output over voltage protection. This limit includes any increase in voltage due to remote-sense compensation and output voltage set-point adjustment (trim).

If not using the remote sense feature to regulate the voltage at the point of load, then connect SENSE(+) to $V_O(+)$ and SENSE(-) to $V_O(-)$ at the module.

Although the output voltage can be increased by both the remote sense and by the trim, the maximum increase for the output voltage is not the sum of the two maximum specifications. The maximum increase is limited to the larger of either the remote sense or the trim value.

Output Voltage Set-Point Adjustment (TRIM)

The trimming feature allows the user to adjust the output voltage set point of the module.

If not using the trim feature, leave the TRIM pin open.

With an external resistor between the TRIM and SENSE(-) pins (Radj-down), the output voltage set point (V_O, adj) decreases (see Figure 21).

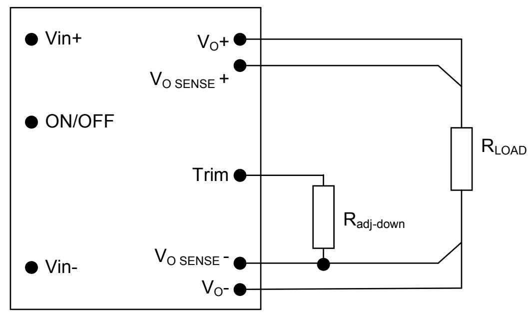


Figure 21. Circuit Configuration to Decrease Output Voltage

The following equation determines the required external-resistor value to obtain percentage decease in output voltage change of Δ%.

$$R_{adj\text{-}down} = \left(\frac{100}{\Delta\%} - 2\right) \ k\Omega$$

Example: to trim down 10%

Radj-down = 8kΩ

With an external resistor connected between the TRIM and SENSE(+) pins (Radj-up), the output voltage set point (V_O, adj) increases (see Figure 22).

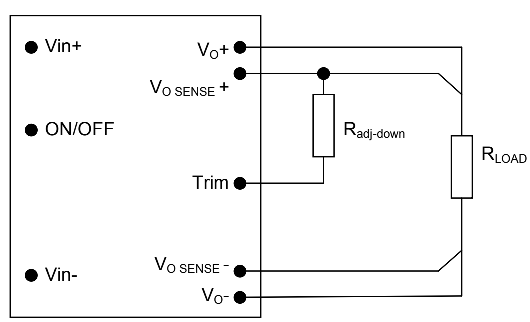


Figure 22. Circuit Configuration to Increase Output Voltage

Feature Descriptions (continued)

The following equation determines the required external-resistor value to obtain a percentage increase in the nominal output voltage (V_O) of $\Delta\%$.

$$R_{adj\text{-}up} = \left(\frac{V_O(100+\Delta\%)}{1.225\Delta\%} - \frac{(100+2\Delta\%)}{\Delta\%} \right) k\Omega$$

Example: to trim nominal 3.3V module up 10%

Radj-up = 17.63kΩ

The voltage between the $V_O(+)$ and $V_O(-)$ terminals must not exceed the minimum value of the output over voltage protection. This limit includes any increase in voltage due to remote-sense compensation and output voltage set-point adjustment (trim). See Figure 20.

External Output Capacitance

In typical applications, the user may add external capacitors to meet the specific demands of his load. Typically, such capacitors present very low impedance, as they often comprise the parallel combination of electrolytic, ceramic and polymer types. These power modules are specified to remain stable, with adequate gain and phase margins, when driving significant values of very low ESR capacitors as specified in 'Electrical Specifications'.

Thermal Considerations

DC-DC power converter modules may operate in a variety of thermal environments. Sufficient cooling should always be provided to help ensure reliable operation.

Considerations include ambient temperature, airflow, module power dissipation, and the need for increased reliability. A reduction in the operating temperature of the module will result in an increase in reliability.

The thermal reference point, T_{ref} used in the specifications is shown in Figure 23. For reliable operation this temperature should not exceed 110°C.

Please refer to the Application Note "Thermal Characterization Process For Open-Frame Board-Mounted Power Modules" for a detailed discussion of thermal aspects including maximum device temperatures.

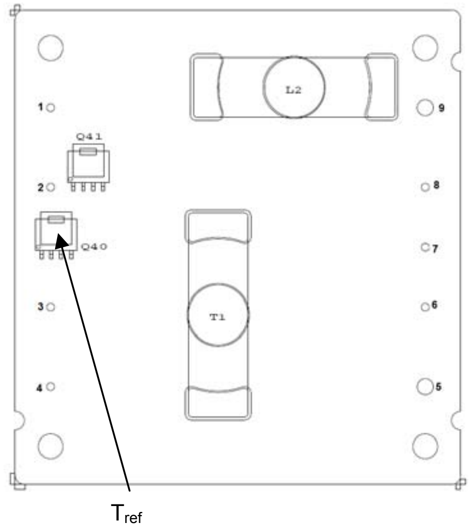


Figure 23. T_{ref} Temperature Measurement Location.

Heat Transfer via Convection

Increased airflow over the module enhances the heat transfer via convection. Derating figures showing the maximum output current that can be delivered versus local ambient temperature (T_A) for natural convection and up to 2ms^{-1} (400 ft./min) forced convection are shown in the Characteristics Curves section.

EMC Considerations

The JQW series of DC/DC converters contain internal input and output differential filters and employ other techniques to minimize noise and the need for external filtering. However, to meet regulatory conducted emissions standards such as EN55022, Class A it is expected that some external filter components will need to be fitted.

Layout Considerations

Avoid placing copper areas on the outer layer of the application PCB directly underneath the power module. Also avoid placing via interconnects underneath the power module. For further information on designing for EMC compliance, as well as layout guidelines, refer to the FLTR100V10 data sheet (FDS01-043EPS).

Feature Descriptions (continued)

Through-Hole Lead-Free Soldering Information

The RoHS-compliant through-hole products use the SAC (Sn/Ag/Cu) Pb-free solder and RoHS-compliant components. They are designed to be processed through single or dual wave soldering machines. The pins have an RoHS-compliant finish that is compatible with both Pb and Pb-free wave soldering processes. A maximum preheat rate of 3°C/s is suggested. The wave preheat process should be such that the temperature of the power module board is kept below 210°C. For Pb solder, the recommended pot temperature is 260°C, while the Pb-free solder pot is 270°C max. Not all RoHS-compliant through-hole products can be processed with paste-through-hole Pb or Pb-free reflow process. If additional information is needed, please consult with your Lineage Power representative for more details.

Post Solder Cleaning and Drying Considerations

Post solder cleaning is usually the final circuit-board assembly process prior to electrical board testing. The result of inadequate cleaning and drying can affect both the reliability of a power module and the testability of the finished circuit-board assembly. For guidance on appropriate soldering, cleaning and drying procedures, refer to Lineage Power *Board Mounted Power Modules: Soldering and Cleaning* Application Note (AP01-056EPS).

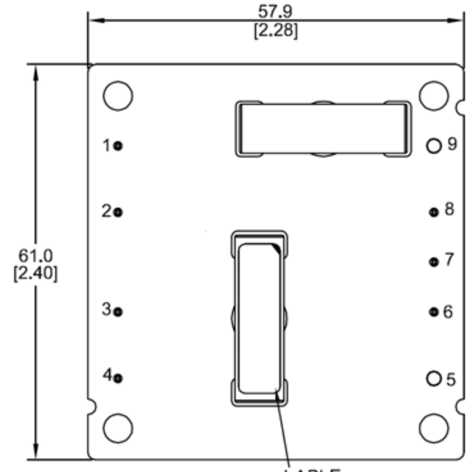
Mechanical Outline

Dimensions are in millimeters and [inches].

Tolerances: x.x mm ± 0.5 mm [x.xx in. ± 0.02 in.] (Unless otherwise indicated)

x.xx mm ± 0.25 mm [x.xxx in ± 0.010 in.]

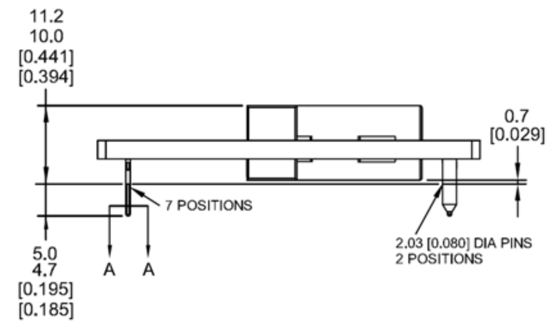
Top View

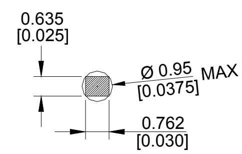


PIN TABLE

Pin	Function
1	Vin+
2	ON/OFF
3	CASE
4	Vin-
5	Vo-
6	S-
7	TRIM
8	S+
9	Vo+

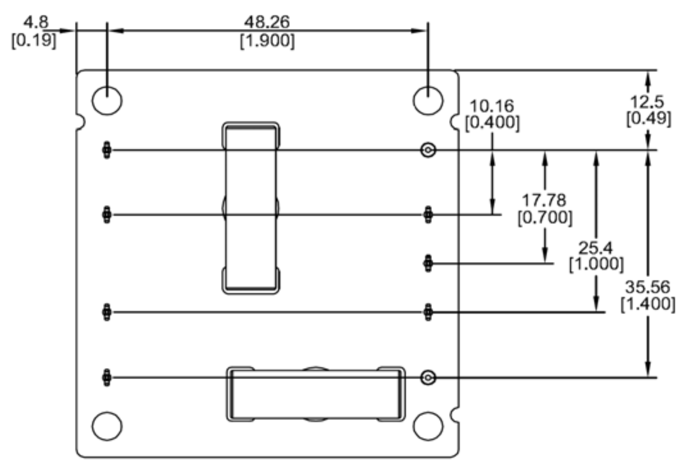
Side View





SECTION A-A

Bottom View

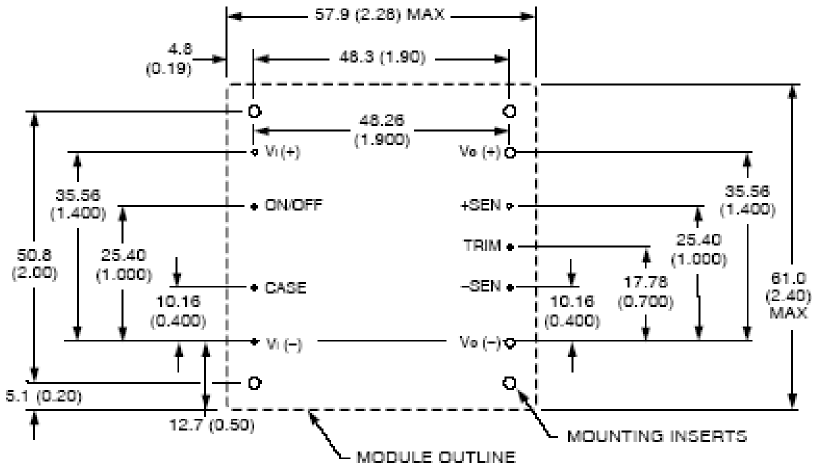


Recommended Hole Pattern

Dimensions are in millimeters and [inches].

Tolerances: x.x mm ± 0.5 mm [x.xx in. ± 0.02 in.] (Unless otherwise indicated)

x.xx mm ± 0.25 mm [x.xxx in ± 0.010 in.]



Ordering Information

Please contact your Lineage Power Sales Representative for pricing, availability and optional features.

Table 1. Device Codes

Input Voltage	Output Voltage	Output Current	On/Off Logic	Connector Type	Product Code	Comcode
48V (36-75Vdc)	5.0V	13A	Positive	Through-Hole	JQW013A0AZ	CC109136207
48V (36-75Vdc)	5.0V	20A	Positive	Through-Hole	JQW020A0AZ	CC109113627
48V (36-75Vdc)	3.3V	25A	Positive	Through-Hole	JQW025A0FZ	CC109113635
48V (36-75Vdc)	5.0V	20A	Negative	Through-Hole	JQW020A0A1Z	CC109131637

Table 2. Device Options

Option	Suffix
RoHS Compliant (6 of 6)	Z
Negative remote on/off logic	1

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