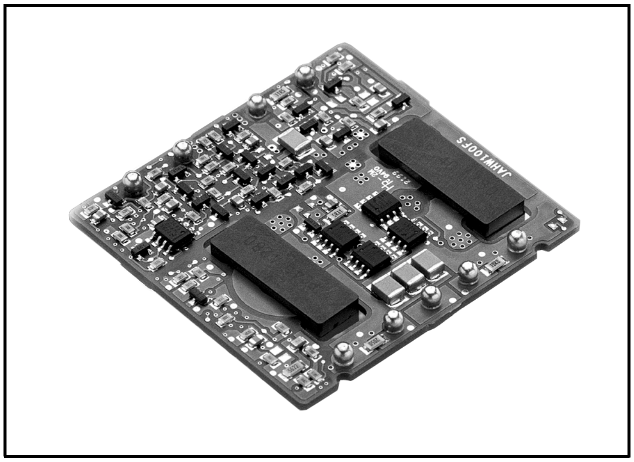
Data Sheet
November 2000

tyco / Electronics

JAHW050F-S and JAHW075F-S Power Modules; dc-dc Converters: 36 Vdc to 75 Vdc Input, 3.3 Vdc Output; 50 W to 75 W



The JAHW-S Series Power Modules offer a surface-mount package, high efficiency, and high reliability.

Applications

- Distributed power architectures
- Computer equipment
- Communications equipment

Options

- Choice of remote on/off logic configuration
- Basic Insulation (-SB version only)

Features

- Surface-mount, open-frame package with industry-standard pin pattern
- Low profile: 10.16 mm (0.40 in.)
- Small size: 54.36 mm x 57.40 mm x 10.16 mm (2.14 in. x 2.26 in. x 0.40 in.)
- High power density
- Very high efficiency: 89% typical
- Low output noise
- Constant frequency
- 2:1 input voltage range
- Overcurrent protection
- Remote sense
- Adjustable output voltage
- Output overvoltage protection
- Remote on/off
- Overtemperature protection
- *ISO** 9001 Certified manufacturing facilities
- Meets the voltage isolation requirements for ETSI 300-321-2 and complies with and is Licensed for Basic Insulation rating per EN60950 (-SB version only)
- *UL*†1950 Recognized, *CSA*‡ C22.2 No. 950-95 Certified, and *VDE* § 0805 (EN60950, IEC950) Licensed
- CE mark meets 73/23/EEC and 93/68/EEC directives**

Description

The JAHW050F-S and JAHW075F-S Power Modules are surface-mount dc-dc converters that operate over an input voltage range of 36 Vdc to 75 Vdc and provide a precisely regulated dc output. The outputs are fully isolated from the inputs, allowing versatile polarity configurations and grounding connections. The modules have maximum power ratings from 50 W to 75 W at a typical full-load efficiency of 89%.

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.

* *ISO* is a registered trademark of the International Organization for Standardization.
† *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-use equipment. All the required procedures for CE marking of end-use equipment should be followed. (The CE mark is placed on selected products.)

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 device reliability.

Parameter	Symbol	Min	Max	Unit
Input Voltage:				
Continuous	V_I	—	80	Vdc
Transient (100 ms)	$V_{I, trans}$	—	100	V
Operating Ambient Temperature (See Thermal Considerations section.)	T_A	–40	100	°C
Storage Temperature	T_{stg}	–55	125	°C
I/O Isolation Voltage (for 1 minute)	—	—	1500	Vdc

Electrical Specifications

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

Table 1. Input Specifications

Parameter	Symbol	Min	Typ	Max	Unit
Operating Input Voltage	V_I	36	48	75	Vdc
Maximum Input Current:					
V_I = 0 V to 75 V; $I_O = I_{O, max}$; see Figures 1—2:					
JAHW050F-S	$I_{I, max}$	—	—	1.2	A
JAHW075F-S	$I_{I, max}$	—	—	1.8	A
V_I = 36 V to 75 V; $I_O = I_{O, max}$:					
JAHW050F-S	$I_{I, max}$	—	—	1.0	A
JAHW075F-S	$I_{I, max}$	—	—	1.5	A
Inrush Transient	i^2t	—	—	1.0	A^2s
Input Reflected-ripple Current, Peak-to-peak (5 Hz to 20 MHz, 12 µH source impedance; see Figure 12.)	I_I	—	5	—	mAp-p
Input Ripple Rejection (120 Hz)	—	—	60	—	dB

Fusing Considerations

An input line fuse (normal-blow) of an appropriate rating is provided for safety and system protection. A further input lines fuse may always be used for additional safety and system protection.

Electrical Specifications (continued)

Table 2. Output Specifications

Parameter	Device	Symbol	Min	Typ	Max	Unit
Output Voltage Set Point (V_I = 48 V; $I_O = I_{O,\,max}$; T_A = 25 °C)	All	$V_{O,\,set}$	3.25	3.3	3.35	Vdc
Output Voltage (Over all operating input voltage, resistive load, and temperature conditions until end of life. See Figure 14.)	All	V_O	3.20	—	3.40	Vdc
Output Regulation:						
Line (V_I = 36 V to 75 V)	All	—	—	0.01	0.1	%V_O
Load ($I_O = I_{O,\,min}$ to $I_{O,\,max}$)	All	—	—	0.05	0.2	%V_O
Temperature (T_A = –40 °C to +100 °C)	All	—	—	15	50	mV
Output Ripple and Noise Voltage (See Figure 13.):						
RMS	All	—	—	—	50	mVrms
Peak-to-peak (5 Hz to 20 MHz)	All	—	—	—	100	mVp-p
External Load Capacitance	All	—	0	—	*	µF
Output Current (At $I_O < I_{O,\,min}$, the modules may exceed output ripple specifications.)	JAHW050F-S	I_O	0.5	—	10	A
	JAHW075F-S	I_O	0.5	—	15	A
Output Current-limit Inception (V_O = 90% of $V_{O,\,nom}$)	JAHW050F-S	$I_{O,\,cli}$	—	12	16.0†	A
	JAHW075F-S	$I_{O,\,cli}$	—	18	21.9†	A
Output Short-circuit Current (V_O = 250 mV)	All	—	0	—	35‡	A
Efficiency (V_I = 48 V; $I_O = I_{O,\,max}$; T_A = 70 °C)	JAHW050F-S	η	—	88.0	—	%
	JAHW075F-S	η	—	88.6	—	%
Switching Frequency	All	—	—	350	—	kHz
Dynamic Response ($\Delta I_O/\Delta t$ = 1 A/10 µs, V_I = 48 V, T_C = 25 °C; tested with a 10 µF tantalum and a 1.0 µF ceramic capacitor across the load.):						
Load Change from I_O = 50% to 75% of $I_{O,\,max}$:						
Peak Deviation	All	—	—	6	—	%$V_{O,\,set}$
Settling Time (V_O < 10% of peak deviation)	All	—	—	200	—	µs
Load Change from I_O = 50% to 25% of $I_{O,\,max}$:						
Peak Deviation	All	—	—	5	—	%$V_{O,\,set}$
Settling Time (V_O < 10% of peak deviation)	All	—	—	200	—	µs

* Consult your sales representative or the factory.
† These are manufacturing test limits. In some situations, results may differ.
‡ This module does not have a tail-out feature but a hiccup mode with automatic restart, in the event of a current limit. The value given here is an instantaneous peak value and not an RMS or continuous rating.

Table 3. Isolation Specifications

Parameter	Min	Typ	Max	Unit
Isolation Capacitance	—	2500	—	pF
Isolation Resistance	10	—	—	MΩ

General Specifications

Parameter	Min	Typ	Max	Unit
Calculated MTBF (I_O = 80% of $I_{O,\,max}$; T_A = 20 °C)		6,000,000		hours
Weight	—	—	38 (1.34)	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	Symbol	Min	Typ	Max	Unit
Remote On/Off Signal Interface (V_I = 0 V to 75 V; open collector or equivalent compatible; signal referenced to V_I(–) terminal; see Figure 15 and Feature Descriptions.):					
JAHWxxxF1 Preferred Logic:					
Logic Low—Module On					
Logic High—Module Off					
JAHWxxxF Optional Logic:					
Logic Low—Module Off					
Logic High—Module On					
Logic Low:					
At $I_{on/off}$ = 1.0 mA	$V_{on/off}$	0	—	1.2	V
At $V_{on/off}$ = 0.0 V	$I_{on/off}$	—	—	1.0	mA
Logic High:					
At $I_{on/off}$ = 0.0 µA	$V_{on/off}$	—	—	15	V
Leakage Current	$I_{on/off}$	—	—	50	µA
Turn-on Time (See Figure 11.) (I_O = 80% of $I_{O,\,max}$; V_O within ±1% of steady state)	—	—	20	35	ms
Output Voltage Adjustment (See Feature Descriptions.):					
Output Voltage Remote-sense Range	—	—	—	0.5	V
Output Voltage Set-point Adjustment Range (trim)	—	60	—	110	%$V_{O,\,nom}$
Output Overvoltage Protection	$V_{O,\,sd}$	4.0*	—	5.0*	V
Overtemperature Protection (See Feature Descriptions.)	T_C	—	110	—	°C

* These are manufacturing test limits. In some situations, results may differ.

Solder Ball and Cleanliness Requirements

The open frame (no case or potting) power module will meet the solder ball requirements per J-STD-001B. These requirements state that solder balls must neither be loose nor violate the power module minimum electrical spacing.

The cleanliness designator of the open frame power module is C00 (per J specification).

Solder, Cleaning, and Drying Considerations

Post solder cleaning is usually the final circuit-board assembly process prior to electrical testing. The result of inadequate circuit-board 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 the *Board-Mounted Power Modules Soldering and Cleaning* Application Note (AP97-021EPS).

Characteristic Curves

The following figures provide typical characteristics for the power modules. The figures are identical for both on/off configurations.

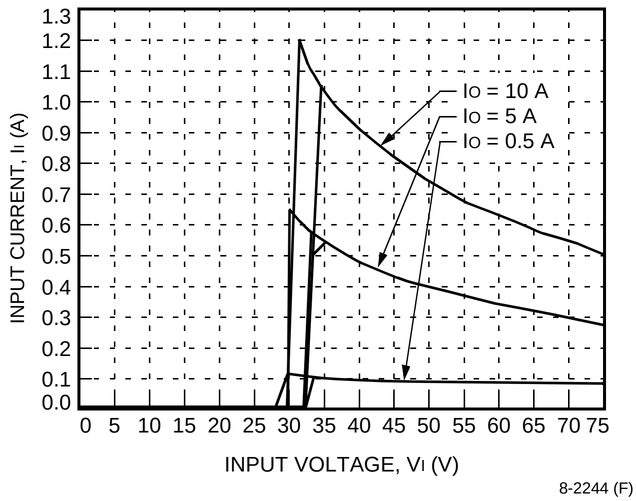


Figure 1. Typical JAHW050F-S Input Characteristics at Room Temperature

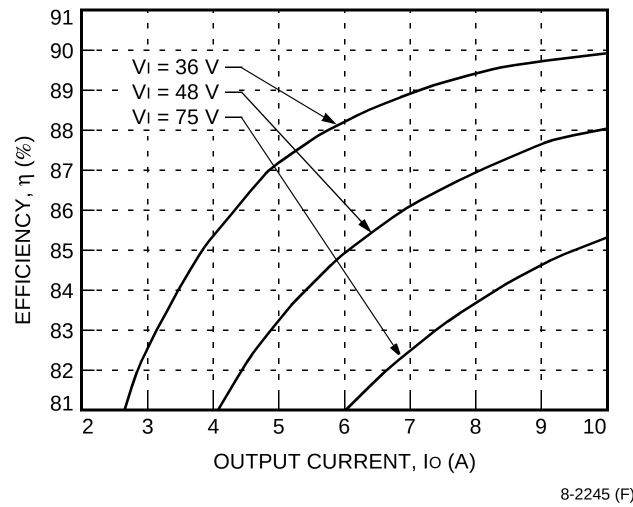


Figure 3. Typical JAHW050F-S Converter Efficiency vs. Output Current at Room Temperature

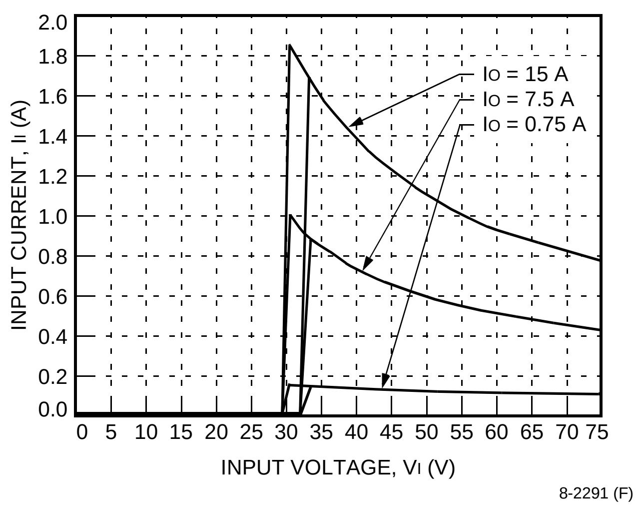


Figure 2. Typical JAHW075F-S Input Characteristics at Room Temperature

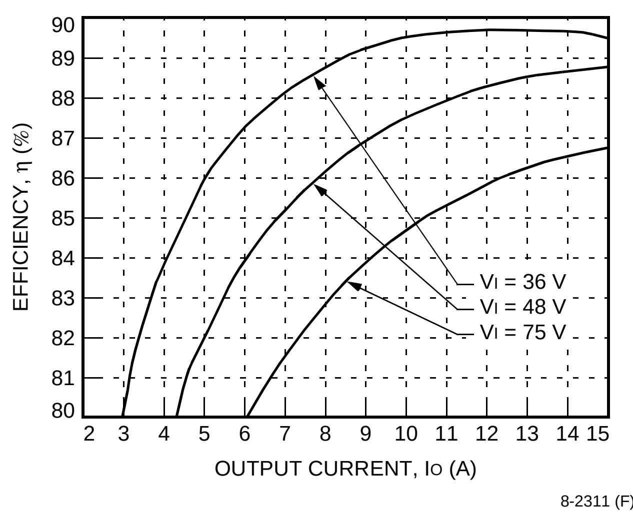
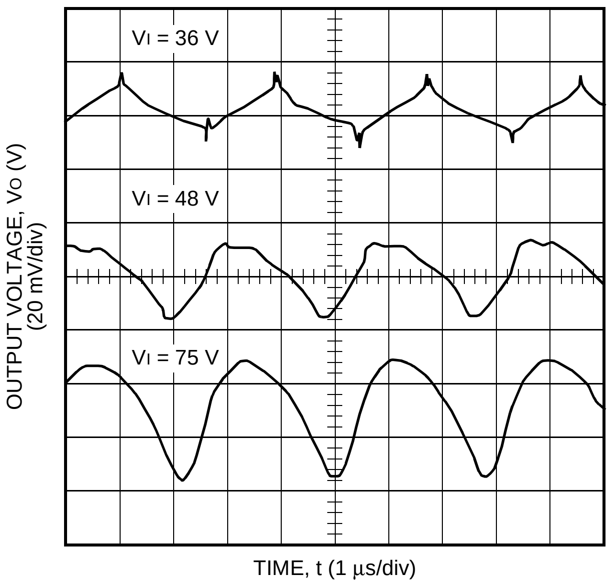


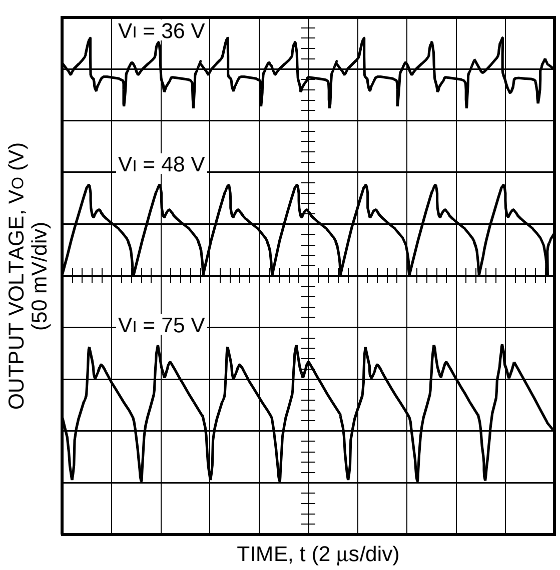
Figure 4. Typical JAHW075F-S Converter Efficiency vs. Output Current at Room Temperature

Characteristic Curves (continued)



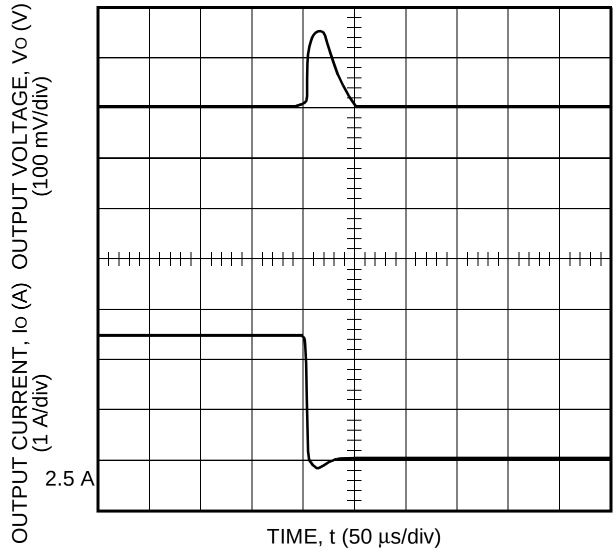
Note: See Figure 13 for test conditions.

Figure 5. Typical JAHW050F-S Output Ripple Voltage at Room Temperature, $I_O = I_{O,\,max}$



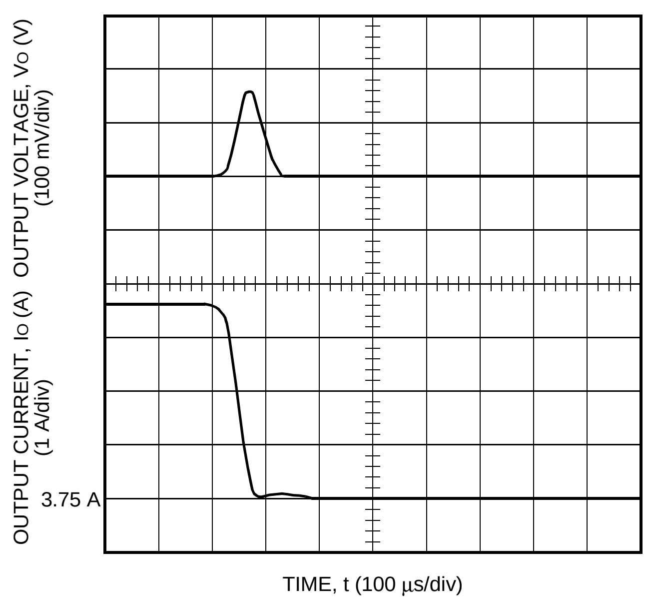
Note: See Figure 13 for test conditions.

Figure 6. Typical JAHW075F-S Output Ripple Voltage at Room Temperature, $I_O = I_{O,\,max}$



Note: Tested with a 10 µF tantalum and a 1.0 µF ceramic capacitor across the load.

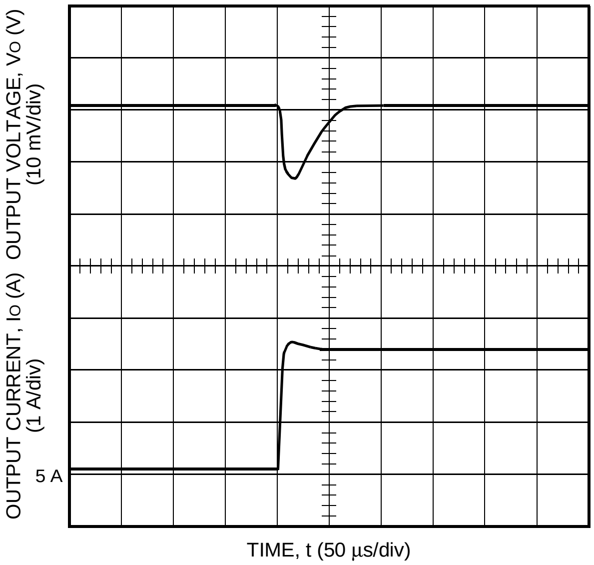
Figure 7. Typical JAHW050F-S Transient Response to Step Decrease in Load from 50% to 25% of $I_{O,\,max}$ at Room Temperature and 48 Vdc Input (Waveform Averaged to Eliminate Ripple Component.)



Note: Tested with a 10 µF tantalum and a 1.0 µF ceramic capacitor across the load.

Figure 8. Typical JAHW075F-S Transient Response to Step Decrease in Load from 50% to 25% of $I_{O,\,max}$ at Room Temperature and 48 Vdc Input (Waveform Averaged to Eliminate Ripple Component.)

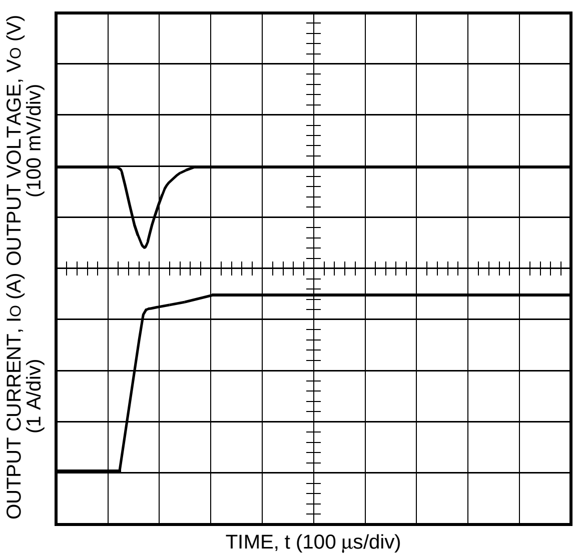
Characteristic Curves (continued)



8-2379 (F)

Note: Tested with a 10 µF tantalum and a 1.0 µF ceramic capacitor across the load.

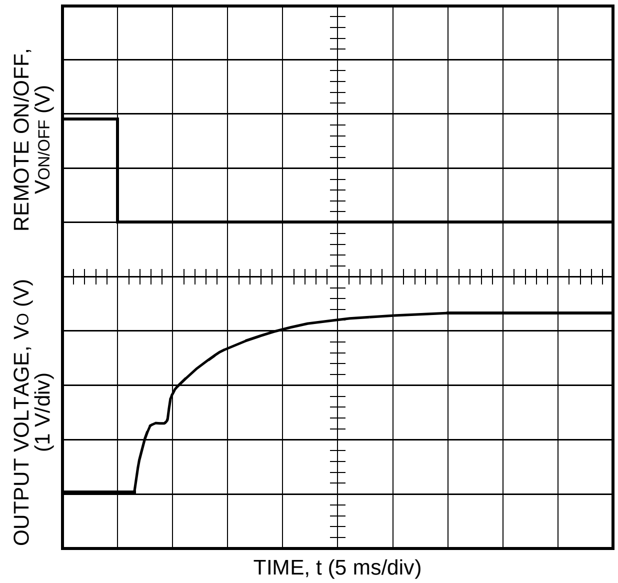
Figure 9. Typical JAHW050F-S Transient Response to Step Increase in Load from 50% to 75% of $I_{O,\,max}$ at Room Temperature and 48 Vdc Input. (Waveform Averaged to Eliminate Ripple Component.)



8-2295 (F)

Note: Tested with a 10 µF tantalum and a 1.0 µF ceramic capacitor across the load.

Figure 10. Typical JAHW075F-S Transient Response to Step Increase in Load from 50% to 75% of $I_{O,\,max}$ at Room Temperature and 48 Vdc Input. (Waveform Averaged to Eliminate Ripple Component.)

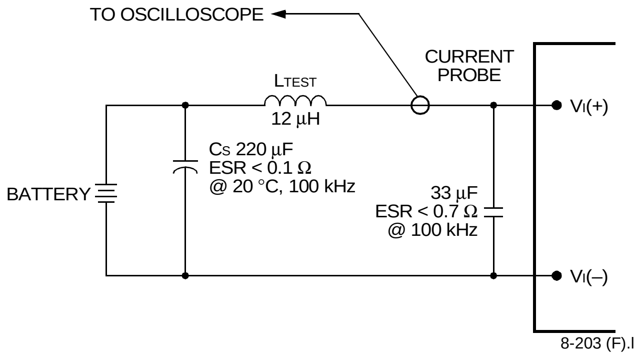


8-2296 (F)

Note: Tested with a 10 µF tantalum and a 1.0 µF ceramic capacitor across the load.

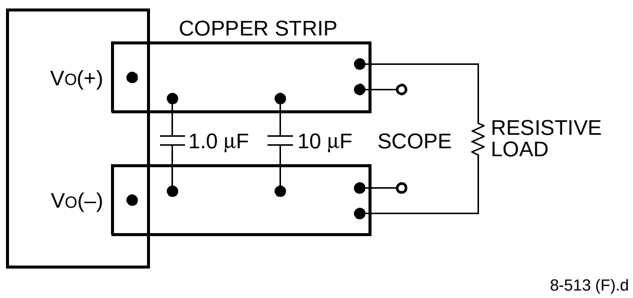
Figure 11. Typical Start-Up from Remote On/Off; $I_O = I_{O,\,max}$

Test Configurations



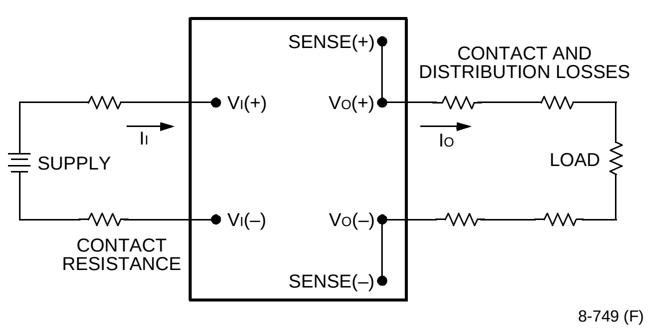
Note: Measure input reflected-ripple current with a simulated source inductance (L_{TEST}) of 12 µH. Capacitor C_S offsets possible battery impedance. Measure current as shown above.

Figure 12. Input Reflected-Ripple Test Setup



Note: Use a 1.0 µF ceramic capacitor and a 10 µF aluminum or tantalum capacitor. Scope measurement should be made using a BNC socket. Position the load between 51 mm and 76 mm (2 in. and 3 in.) from the module.

Figure 13. Peak-to-Peak Output Noise Measurement Test Setup



Note: All measurements are taken at the module terminals. When socketing, place Kelvin connections at module terminals to avoid measurement errors due to socket contact resistance.

$$\eta = \left(\frac{[V_O(+) - V_O(-)]I_O}{[V_I(+) - V_I(-)]I_I}\right) \times 100 \quad \%$$

Figure 14. Output Voltage and Efficiency Measurement Test Setup

Design Considerations

Input Source Impedance

The power module should be connected to a low ac-impedance input source. Highly inductive source impedances can affect the stability of the power module. For the test configuration in Figure 12, a 33 µF electrolytic capacitor (ESR < 0.7 Ω at 100 kHz) mounted close to the power module helps ensure stability of the unit. For other highly inductive source impedances, 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* 1950, *CSA* C22.2 No. 950-95, and *VDE* 0805 (EN60950, IEC950).

If the input source is non-SELV (ELV or a hazardous voltage greater than 60 Vdc and less than or equal to 75 Vdc), for the module's output to be considered meeting the requirements of 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_I pin and one V_O 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, as required by the safety agencies, on the combination of supply source and the subject module 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.

Safety Considerations (continued)

For input voltages exceeding –60 Vdc but ≤ –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 (-SB version only).

The input to these units is to be provided with a maximum 6 A normal-blow fuse in the ungrounded lead of the JAHW050F-S and JAHW075F-S.

Feature Descriptions

Overcurrent Protection

To provide protection in an output overload condition, the unit is equipped with an internal shutdown and auto-restart mechanism. At the instance of current-limit inception, the module enters a hiccup mode of operation whereby it shuts down and automatically attempts to restart. As long as the fault persists, the module remains in this mode.

The protection mechanism is such that the unit can continue in this condition until the fault is cleared.

Remote On/Off

Two remote on/off options are available. Positive logic remote on/off turns the module on during a logic-high voltage on the ON/OFF pin, and off during a logic low. Negative logic remote on/off turns the module off during a logic high and on during a logic low. Negative logic, device code suffix "1," is the factory-preferred configuration.

To turn the power module on and off, the user must supply a switch to control the voltage between the on/off terminal and the V_I(–) terminal ($V_{on/off}$). The switch can be an open collector or equivalent (see Figure 15). A logic low is $V_{on/off}$ = 0 V to 1.2 V. The maximum $I_{on/off}$ during a logic low is 1 mA. The switch should maintain a logic-low voltage while sinking 1 mA.

During a logic high, the maximum $V_{on/off}$ generated by the power module is 15 V. The maximum allowable leakage current of the switch at $V_{on/off}$ = 15 V is 50 µA.

If not using the remote on/off feature, do one of the following to turn the unit on:

- For negative logic, short ON/OFF pin to V_I(–).
- For positive logic, leave ON/OFF pin open.

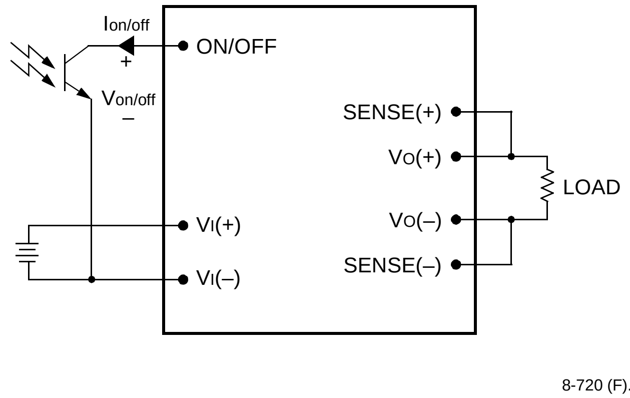


Figure 15. Remote On/Off Implementation

Output Voltage Set-Point Adjustment (Trim)

Output voltage trim allows the user to increase or decrease the output voltage set point of a module. This is accomplished by connecting an external resistor between the TRIM pin and either the SENSE(+) or SENSE(–) pins. The trim resistor should be positioned close to the module.

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

With an external resistor between the TRIM and SENSE(–) pins ($R_{adj\text{-}down}$), the output voltage set point ($V_{O,\ adj}$) decreases (see Figure 16). The following equation determines the required external-resistor value to obtain a percentage output voltage change of Δ%.

$$R_{adj\text{-}down} = \left(\frac{1000}{\Delta\%} - 11\right)k\Omega$$

With an external resistor connected between the TRIM and SENSE(+) pins ($R_{adj\text{-}up}$), the output voltage set point ($V_{O,\ adj}$) increases (see Figure 17).

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

$$R_{adj\text{-}up} = \left(\frac{(V_{O,\ nom})\left(1 + \frac{\Delta\%}{100}\right) - 1.225}{1.225\Delta\%}1000 - 11\right)k\Omega$$

Feature Descriptions (continued)

Output Voltage Set-Point Adjustment (Trim) (continued)

The voltage between the VO(+) and VO(–) terminals must not exceed the minimum output overvoltage shutdown value indicated in the Feature Specifications table. This limit includes any increase in voltage due to remote-sense compensation and output voltage set-point adjustment (trim) (see Figure 18).

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 both. The maximum increase is the larger of either the remote sense or the trim. Consult the factory if you need to increase the output voltage more than the above limitation.

The amount of power delivered by the module is defined as the voltage at the output terminals multiplied by the output current. When using remote sense and trim, the output voltage of the module can be increased, which at the same output current would increase the power output of the module. Care should be taken to ensure that the maximum output power of the module remains at or below the maximum rated power.

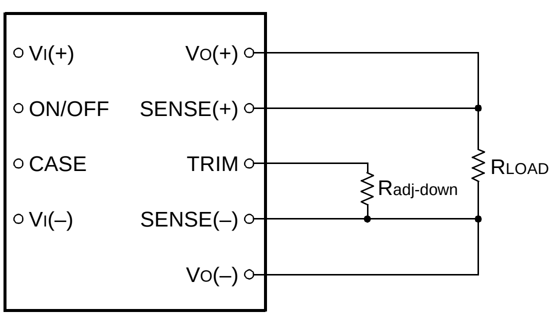


Figure 16. Circuit Configuration to Decrease Output Voltage

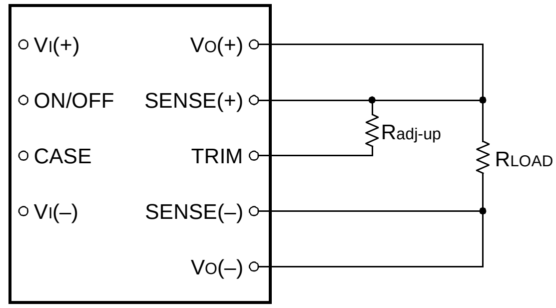


Figure 17. Circuit Configuration to Increase Output Voltage

Remote Sense

Remote sense minimizes the effects of distribution losses by regulating the voltage at the remote-sense connections. The voltage 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.:

$$[V_O(+) - V_O(-)] - [SENSE(+) - SENSE(-)] \leq 0.5\ V$$

The voltage between the VO(+) and VO(–) terminals must not exceed the minimum output overvoltage shutdown value indicated in the Feature Specifications table. This limit includes any increase in voltage due to remote-sense compensation and output voltage set-point adjustment (trim) (see Figure 18).

If not using the remote-sense feature to regulate the output at the point of load, then connect SENSE(+) to VO(+) and SENSE(–) to VO(–) 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 both. The maximum increase is the larger of either the remote sense or the trim. Consult the factory if you need to increase the output voltage more than the above limitation.

The amount of power delivered by the module is defined as the voltage at the output terminals multiplied by the output current. When using remote sense and trim, the output voltage of the module can be increased, which at the same output current would increase the power output of the module. Care should be taken to ensure that the maximum output power of the module remains at or below the maximum rated power.

Feature Descriptions (continued)

Remote Sense (continued)

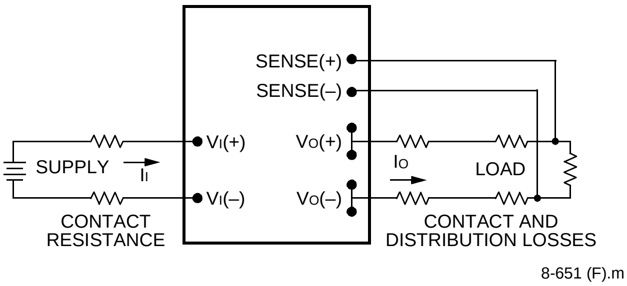


Figure 18. Effective Circuit Configuration for Single-Module Remote-Sense Operation

Output Overvoltage Protection

To provide protection in an output overvoltage condition, the unit is equipped with circuitry that moonitors the voltage on the output terminals. If the voltage on the output terminals exceed the overvoltage protection threshold, the module enters a hiccup mode of operation whereby it shuts down and automatically attempts to restart. As long as the fault persists, the module remains in this mode.

The protection mechanism is such that the unit can continue in this condition until the fault is cleared.

Overtemperature Protection

To provide protection in a overtemperature condition, the unit is equipped with an overtemperature circuit. In the event of such a fault, the module enters into a hiccup mode of operation whereby it shuts down and automatically attempts to restart. As long as the fault persists, the module remains in this mde.

The protection mechanism is such that the unit can continue in this condition until the fault is cleared.

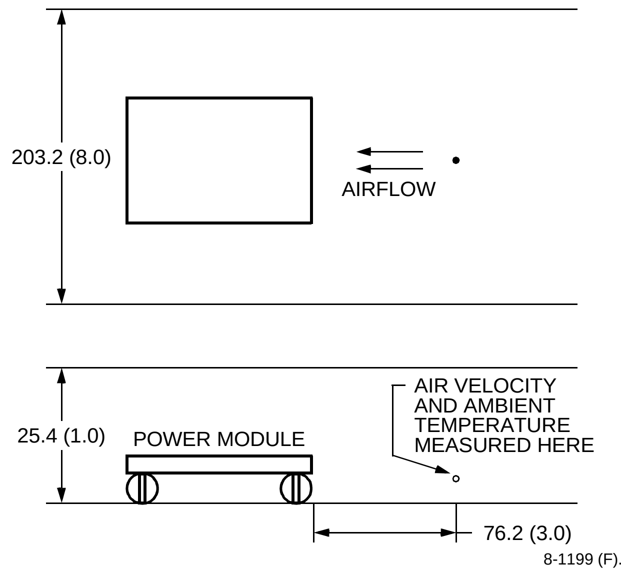
Thermal Considerations

Introduction

The power modules operate in a variety of thermal environments; however, sufficient cooling should be provided to help ensure reliable operation of the unit. Heat is removed by convection, and radiation to the surrounding environment.

The thermal data presented is based on measurements taken in a wind tunnel. Note that the orientation of the module with respect to airflow affects thermal performance.

Two orientations are shown in Figures 20 and 21.



Note: Dimensions are in millimeters and (inches).

Figure 19. Thermal Test Setup

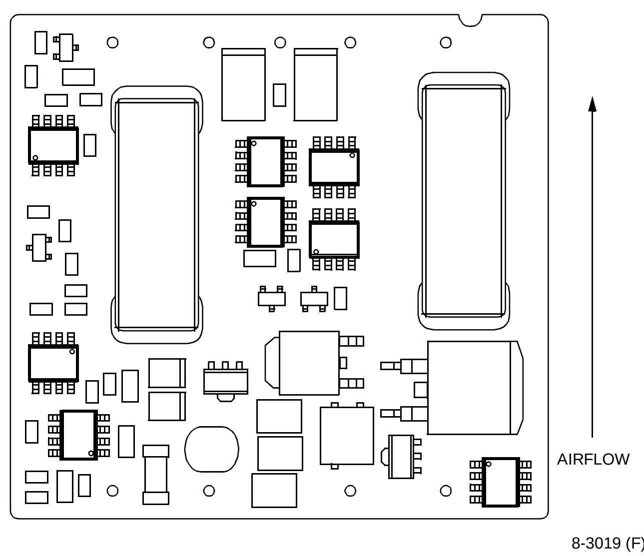


Figure 20. Best Orientation (Top View)

Thermal Considerations (continued)

Introduction (continued)

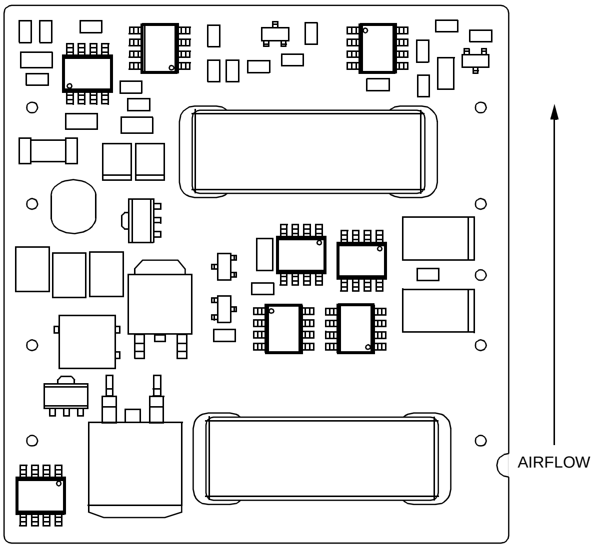


Figure 21. Worst Orientation (Top View)

Proper cooling can be verified by measuring the temperature. Peak temperature (T_C) occurs at the position indicated in Figure 22.

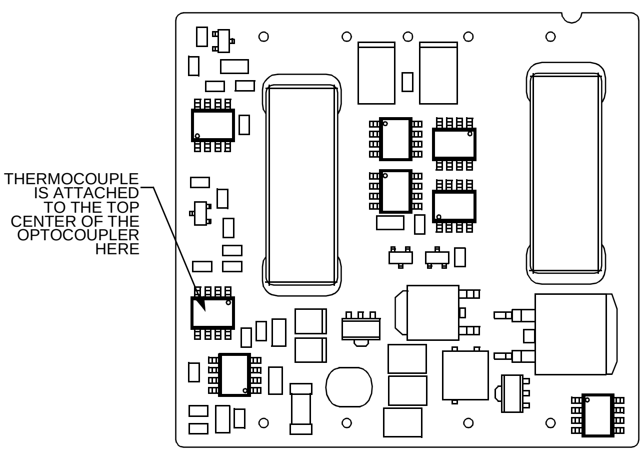


Figure 22. Temperature Measurement Location (Bottom View)

The temperature at this location should not exceed 100 °C. The output power of the module should not exceed the rated power for the module as listed in the Ordering Information table.

Although the maximum temperature of the power modules is 100 °C, you can limit this temperature to a lower value for extremely high reliability.

Heat Transfer

Increasing airflow over the module enhances the heat transfer via convection. Figures 23 and 25 show the maximum power that can be dissipated by the JAHW050F-S module without exceeding the maximum temperature versus local ambient temperature (T_A) for natural convection through 3 m/s (600 ft./min.) for the best and worst orientation, respectively. Figures 24 and 26 show the maximum power that can be dissipated by the JAHW075F-S without exceeding the maximum temperature versus local ambient temperature (T_A) for natural convection through 3 m/s (600 ft./min.) for best and worst orientation, respectively.

Note that the natural convection condition was measured at 0.05 m/s to 0.1 m/s (10 ft./min. to 20 ft./min.); however, systems in which these power modules may be used typically generate natural convection airflow rates of 0.3 m/s (60 ft./min.) due to other heat dissipating components in the system. The use of Figures 23 and 25 is shown in the following example.

Example

What is the minimum airflow necessary for a JAHW050F-S operating at V_I = 75 V, an output current of 10 A, and a maximum ambient temperature of 55 °C?

Solution

Given: V_I = 75 V
I_O = 10 A
T_A = 55 °C

Determine P_D (Use Figure 27.):

P_D = 6 W

Determine airflow (v) (Use Figures 23 and 25.):

v = nat. conv. (Best orientation)

v = 0.5 m/s (100 ft./min.) (Worst orientation)

Thermal Considerations (continued)

Heat Transfer (continued)

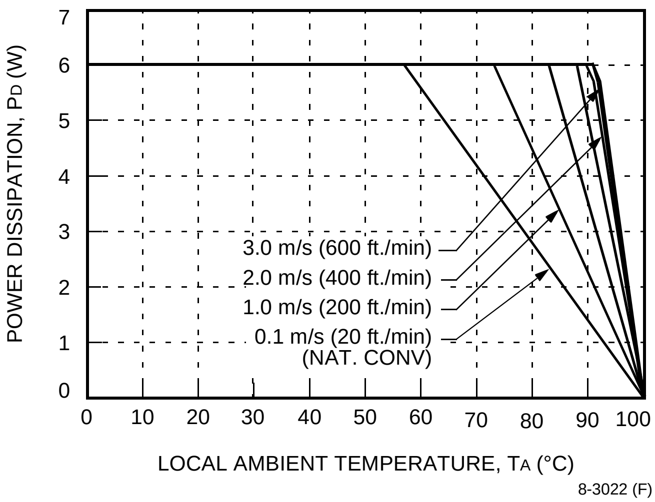


Figure 23. JAHW050F-S Forced Convection Power Derating; Best Orientation

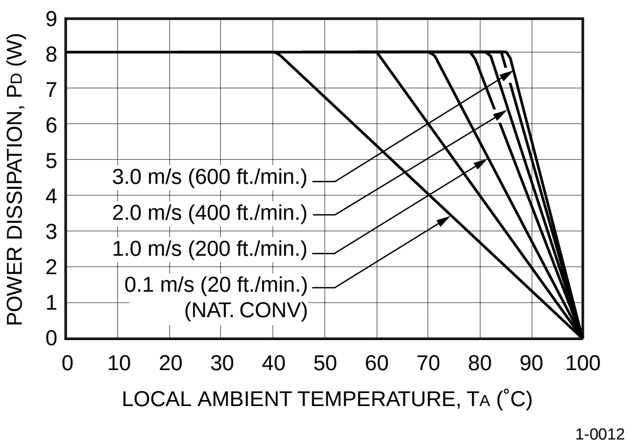


Figure 24. JAHW075F-S Forced Convection Power Derating; Best Orientation

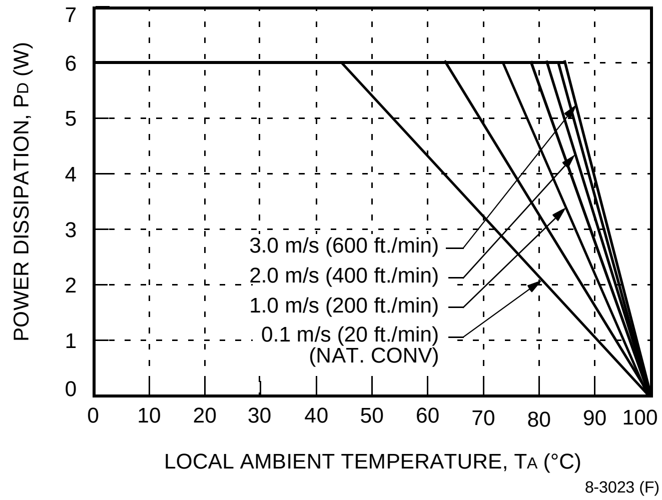


Figure 25. JAHW050F-S Forced Convection Power Derating; Worst Orientation

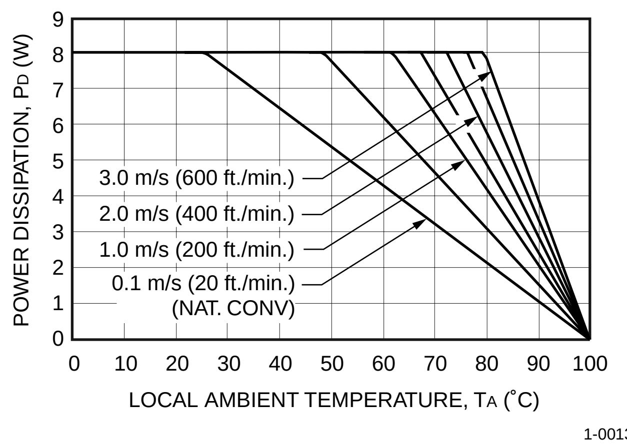


Figure 26. JAHW075F-S Forced Convection Power Derating; Worst Orientation

Thermal Considerations (continued)

Heat Transfer (continued)

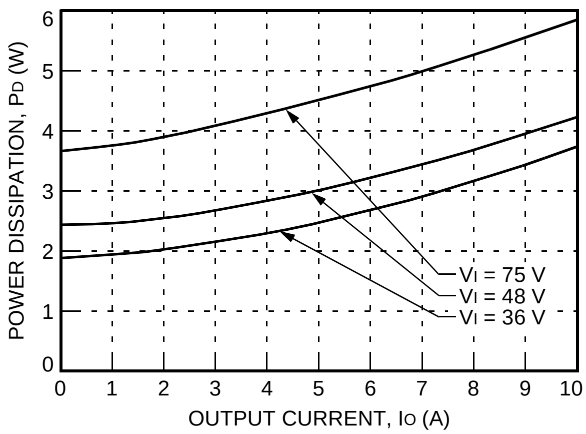


Figure 27. JAHW050F-S Power Dissipation vs. Output Current at 25 °C

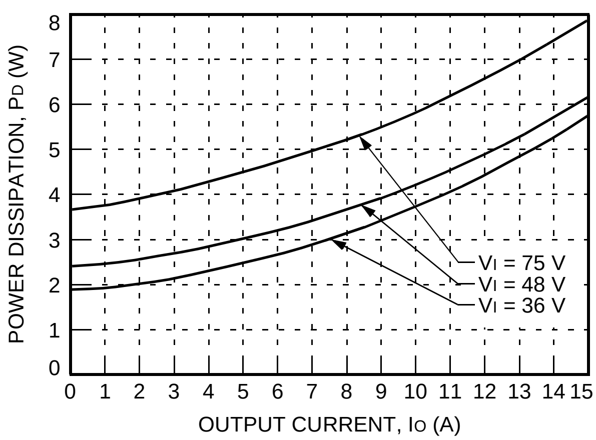


Figure 28. JAHW075F-S Power Dissipation vs. Output Current at 25 °C

Surface-Mount Power Module Solder Reflow Recommendation

The JAHW-Series surface-mount power modules are constructed with SMT (surface-mount technology) components and assembly guidelines. Such large mass/low thermal resistance devices heat up slower than typical SMT components. It is recommended that the customer review data sheets in order to customize the solder reflow profile for application board assembly.

It is recommended that a reflow profile be characterized for the module on the application board assembly. The solder paste type, component, and board thermal sensitivity must be considered in order to form the desired fused solder fillet. The power module balls are plated with tin/lead (Sn/Pb) solder to prevent corrosion and ensure good solderability. Typically, the eutectic solder melts at 183 °C, wets the land, and subsequently wicks the device connection. Sufficient time must be allocated to fuse the plating on the connection and ensure a reliable solder joint.

There are several types of SMT reflow technologies currently used in the industry. These surface-mount power modules can be adequately soldered using natural convection, IR (radiant infrared), convection/IR, or forced convection technologies. The surface-mount power module solder reflow profile is established by accurately measuring the module balls temperature.

The maximum oven temperature and conveyor speed should prevent the customer board and surface-mount module temperature from exceeding the maximum thermal profile limits as shown in Figure 30. The thermocouple should be attached to the smallest pad, not connected to a heavy path for current conduction. The customer board temperature during a typical reflow profile is shown in Figure 31. Failure to observe these maximum module temperatures and duration may result in permanent damage to the power module. The maximum temperature of the power module tantalum capacitors should not exceed 220 °C. The minimum temperature of the power module balls should be 210 °C.

Surface-Mount Power Module Solder Reflow Recommendation (continued)

Ball grid packaging provides robust surface-mount connections

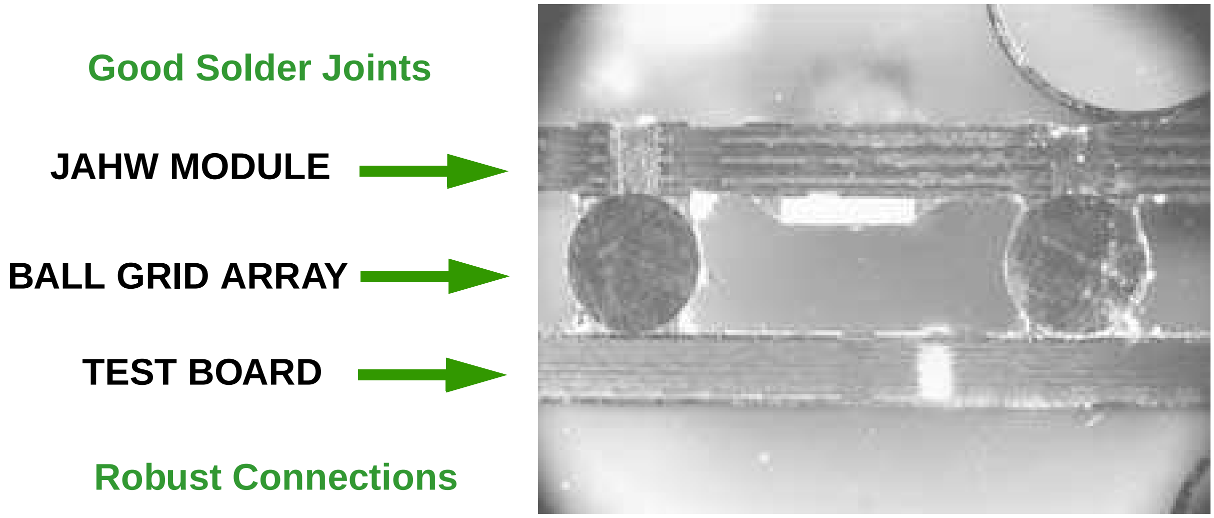
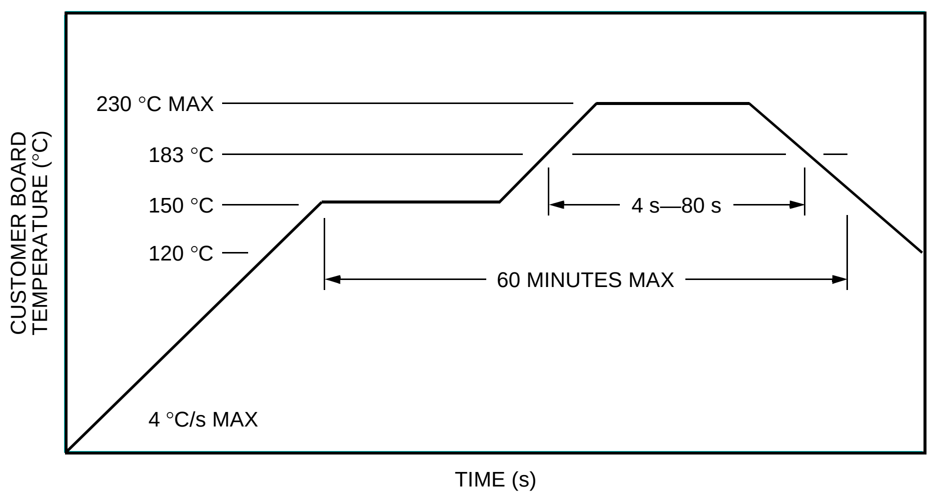


Figure 29. Cross Section of Solder Connection



8-2275 (F).a

Figure 30. Maximum Thermal Profile Limits

Surface-Mount Power Module Solder Reflow Recommendation (continued)

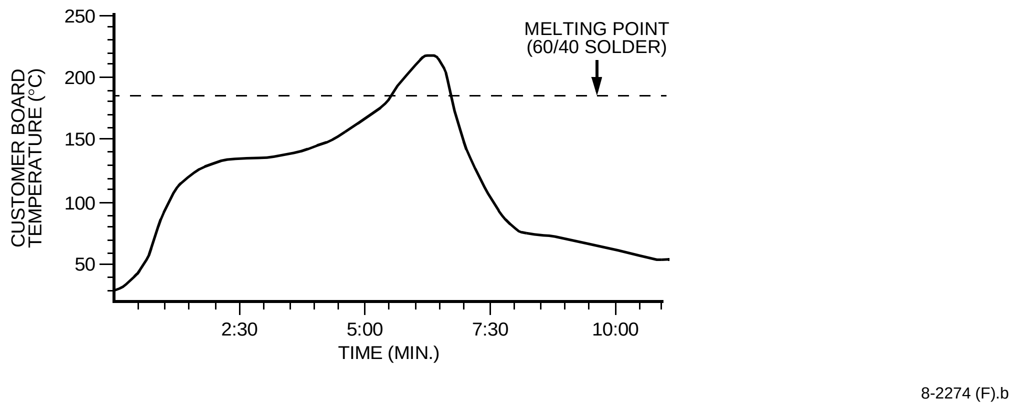


Figure 31. Typical Reflow Soldering Profile

Placement Recommendation

Use of vacuum-disk grippers is not recommended for placing the JAHW-S modules on application PCBs. Vacuum-activated mechanical grippers or, alternatively, hand placement is recommended.

EMC Considerations

For assistance with designing for EMC compliance, please refer to the FLTR100V10 data sheet (DS99-294EPS).

Layout Considerations

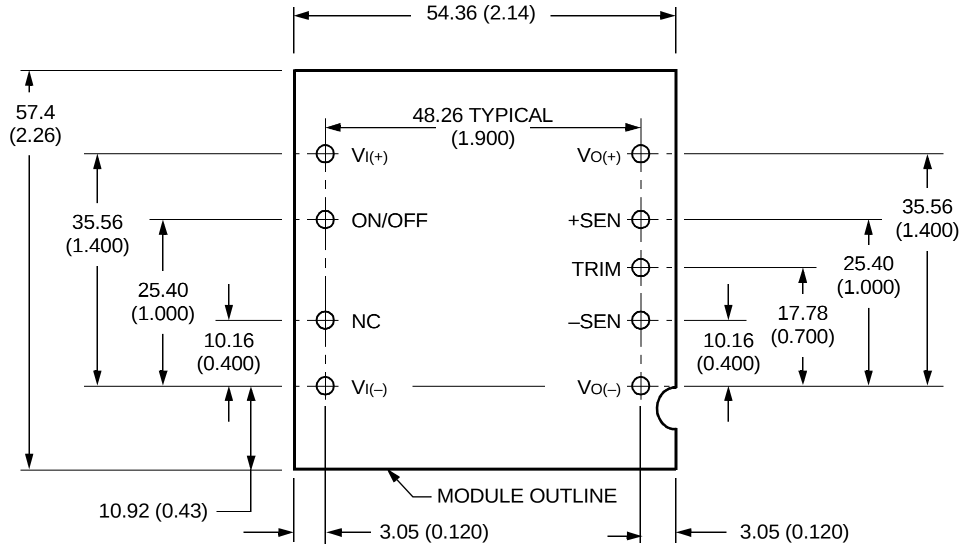
Copper paths must not be routed beneath the power module mounting inserts. For additional layout guidelines, refer to the FLTR100V10 data sheet (DS99-294EPS).

Outline Diagram

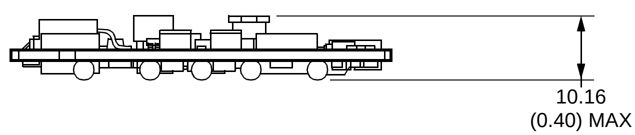
Dimensions are in millimeters and (inches).

Tolerances: x.x mm ± 0.5 mm (x.xx in. ± 0.02 in.)
x.xx mm ± 0.25 mm (x.xxx in. ± 0.010 in.)

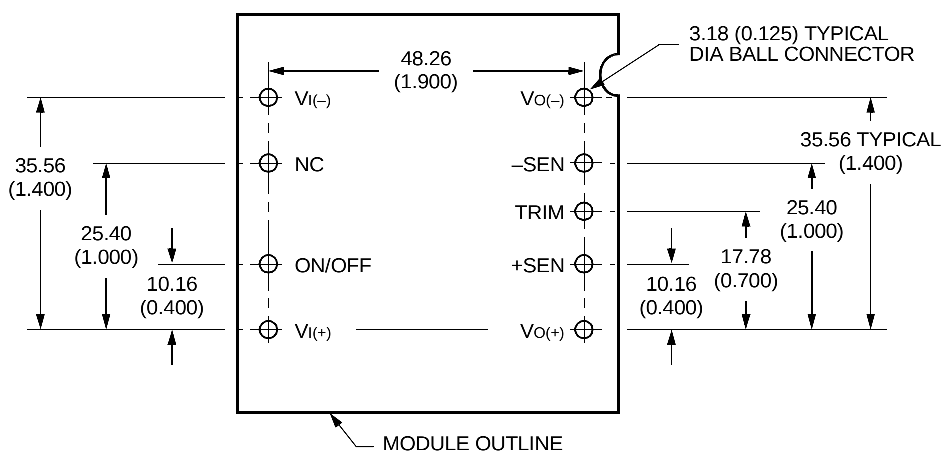
Top View



Side View



Bottom View

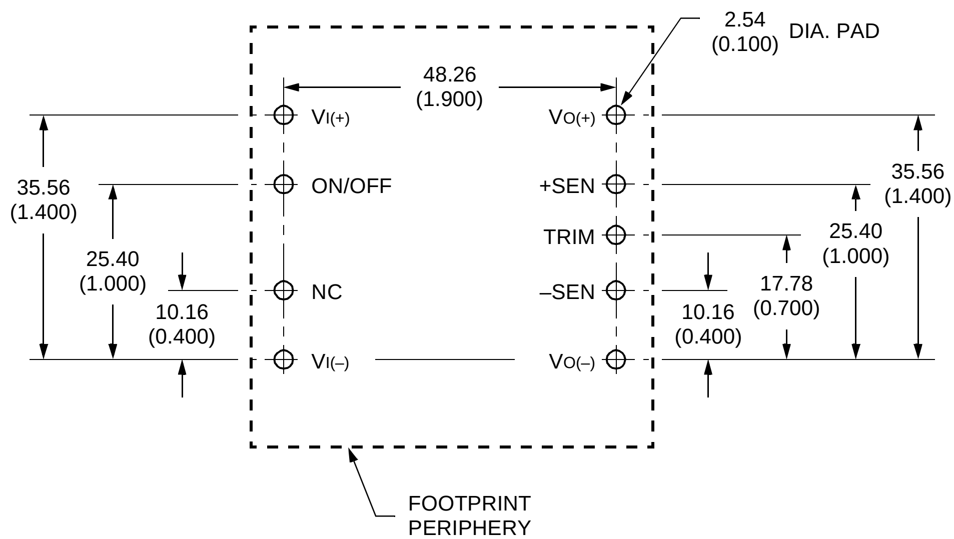


8-3024 (F).c

Recommended Hole Pattern

Component-side footprint.

Dimensions are in millimeters and (inches).



8-2989 (F)

Ordering Information

Please contact your Tyco Electronics' Account Manager or Field Application Engineer for pricing and availability.

Table 4. Device Codes

Input Voltage	Output Voltage	Output Power	Output Current	Remote On/Off Logic	Device Code	Comcode
48 Vdc	3.3 Vdc	33 W	10 A	Negative	JAHW050F1-S	108625344
48 Vdc	3.3 Vdc	49.5 W	15 A	Negative	JAHW075F1-S	108855735
48 Vdc	3.3 Vdc	33 W	10 A	Positive	JAHW050F-S	TBD
48 Vdc	3.3 Vdc	49.5 W	15 A	Positive	JAHW075F-S	TBD

Optional features can be ordered using the device code suffixes shown below.

Table 5. Device Options

Option	Device Code Suffix
Approved for Basic Insulation	-SB

Notes

Tyco Electronics Power Systems, Inc.
3000 Skyline Drive, Mesquite, TX 75149, USA
+1-800-526-7819 FAX: +1-888-315-5182
(Outside U.S.A.: **+1-972-284-2626**, FAX: +1-972-284-2900)
http://power.tycoelectronics.com

November 2000
DS00-244EPS (Replaces DS00-040EPS)