Size (with Case):
2.37 x 1.54 x 0.60 inches

Size (Open Frame):
2.28 x 1.45 x 0.43 inches

FEATURES

- Quarter-Brick Package
- 100% Burned-in
- Up to 125 Watts Output Power
- Water Washable
- Single Outputs
- No Minimum Load Required
- Superior Thermal Performance
- Fast Transient Response
- Fixed Switching Frequency
- 24VDC and 48VDC Nominal Inputs
- Ultra High Efficiency 92% at 5VDC (20A)
- Remote ON/OFF (Active High or Active Low)
- Industry Standard Output Trim Adjust
- Short Circuit, Over Current, Over Voltage, and Over Temperature Protection
- Low Cost Open Convection, Single Board Construction
- Open Frame, Case, and Heatsink Options

DESCRIPTION

The MPQ series of single output DC/DC converters provides up to 125 watts in a quarter-brick package. The MPQ series is well suited for telecom and datacom applications where high efficiencies are required. Some features include active high or active low remote on/off, fixed switching frequency, low output ripple, and ±10% output trim. These converters also have over voltage, short circuit, over current, and over temperature protection. These high density, low voltage input, quarter-brick converters offer great performance and high reliability at a very competitive price.

MODEL SELECTION TABLE

Model Number (1)	Nominal Input Voltage	Input Voltage Range	Output Voltage	Output Current	Ripple & Noise	Output Power	Efficiency
MPQ24S3.3-50C	24 VDC	9 – 36 VDC	3.3 VDC	15.2 A	100mVp-p	50W	85%
MPQ24S3.3-66C		10 – 36 VDC	3.3 VDC	20A	150mVp-p	66W	87%
MPQ24S3.3-85C		18 – 36 VDC	3.3 VDC	25A	150mVp-p	83W	88%
MPQ24S5-50C		10 – 36 VDC	5 VDC	10A	82mVp-p	50W	87%
MPQ24S5-100C		10 – 24 VDC	5 VDC	20A	175mVp-p	100W	87%
MPQ24S5-125C		18 – 36 VDC	5 VDC	25A	175mVp-p	125W	87%
MPQ24S15-50C		10 – 36 VDC	15 VDC	4A	65mVp-p	60W	88%
MPQ24S24-50C		10 – 36 VDC	24 VDC	2.5A	150mVp-p	60W	88%
MPQ24S48-50C		10 – 36 VDC	48 VDC	1A	104mVp-p	48W	87%
MPQ48S3.3-66	48 VDC	36 – 75 VDC	3.3 VDC	20A	150mVp-p	66W	90%
MPQ48S3.3-85		36 – 75 VDC	3.3 VDC	25A	150mVpp	83W	88%
MPQ48S5-100		36 – 75 VDC	5 VDC	20A	175mVp-p	100W	92%
MPQ48S5-125		36 – 75 VDC	5 VDC	25A	175mVp-p	125W	90%
MPQ48S12-120		36 – 75 VDC	12 VDC	10A	100mVp-p	120W	90%
MPQ48S24-100		36 – 75 VDC	24 VDC	4.16A	100mVp-p	100W	91%

NOTES

1. All 24 VDC input models must have a case. 48 VDC input models can either be open frame (no suffix) or have a case ("C" suffix). Both 24Vin and 48Vin models are heatsink compatible.

2. A heatsink can be applied for an extended temperature range. For heatsink, add the suffix "HS" to the model number.

3. Remote ON/OFF is primary referenced. Active High is standard; for Active Low add the suffix "R" to the model number.

4 Al DC/DC converters should be externally fused on the input side. Please consult factory for more information.

**Due to advances in technology, specifications subject to change without notice.*

SPECIFICATIONS: MPQ SERIES

All specifications are based on 25°C, Nominal Input Voltage, and Maximum Output Current unless otherwise noted.
We reserve the right to change specifications based on technological advances.

SPECIFICATION		TEST CONDITIONS	Min	Typ	Max	Unit
INPUT SPECIFICATIONS						
Input Voltage Range				See Table		
UVLO Turn On at		10-36 VDC Input Voltage Models	9.8	10.0	10.3	VDC
		36-75 VDC Input Voltage Models		35.0		
UVLO Turn Off at		10-36 VDC Input Voltage Models	9.4	9.7	9.9	VDC
		36-75 VDC Input Voltage Models		34.0		
Input Surge Voltage		100ms			50	VDC
External Filter Requirements				none		
OUTPUT SPECIFICATIONS						
Output Voltage				See Table		
Output Voltage Set Point		±Sense shorted to ±Vout	-1		+1	%
Trim			-10		+10	%
Line Regulation		±Sense shorted to ±Vout	-0.2		+0.2	%
Load Regulation		±Sense shorted to ±Vout	-0.2		+0.2	%
Output Power				See Table		
Output Current				See Table		
Minimum Load			0			%
Ripple & Noise				See Table		
Remote Sense Compensation		Measured at the converter output pins			+10	%
Temperature Coefficient			-0.02		+0.02	%/°C
MONOTONIC START-UP ACROSS ALL LOAD RANGES. CAPABLE OF STARTING INTO PRE-BIASED LOADS						
PROTECTION						
Short Circuit Protection		Continuous pulse-to-pulse (low power dissipation, auto-recovery)				
Over Voltage Protection				130		% Vo
Current Limit Inception				130		% Vo
Thermal Shutdown		PCB Temperature	+110		+125	°C
REMOTE ON/OFF						
Active High (Standard)	Remote ON	Min High to Enable	1.5			VDC
	Remote OFF	Max Low to Disable			0.3	
Active Low (“R” Suffix)	Remote ON	Max Low to Disable			0.8	VDC
	Remote OFF	Min High to Enable	2.1			
Remote ON/OFF Pin Floating	Active High	Over operating voltage range	1.6		5.2	VDC
	Active Low		2.3		6.2	
$I_{ON/OFF}$ Sink to Pull Low	Active High	$V_{ON/OFF}$ =0V, Vin=75V			0.15	mA
	Active Low				0.6	
$I_{ON/OFF}$ Source to Drive High		Active High or Active Low		0		mA
GENERAL SPECIFICATIONS						
Efficiency						
Switching frequency	24Vin Models			200		kHz
	48Vin Models			330		
Isolation Voltage	Input - Output	For 1 minute	1000			VDC
	Input – Chassis	For 1 minute	1000			
	Output - Chassis		1000			
Isolation Resistance		At 25°C	20			GΩ
Isolation Capacitance					0.01	µF
ENVIRONMENTAL SPECIFICATIONS						
Operating Temperature		Semiconductor junction temperature limit	-40	+25	+125	°C
Storage Temperature			-55		+125	°C
Cooling				Free air convection		
MTBF		Calculated using Bellcore TR-332 Method 1 case 3		1,250,300 hours min.		
PHYSICAL SPECIFICATIONS						
Weight				2.15oz (61g)		
Dimensions (L x W x H)		Open Frame (for 48Vin models only)		2.28 x 1.45 x 0.43 in (57.9 x 36.8 x 10.8 mm)		
		With Case (Add the suffix “C” to the model number)		2.37 x 1.54 x 0.60 in (60.2 x 39.1 x 15.1 mm)		
		With Heatsink (Add the suffix “HS” to the model number)		2.37 x 1.54 x 0.85 in (60.2 x 39.1 x 21.5 mm)		

MECHANICAL DRAWINGS

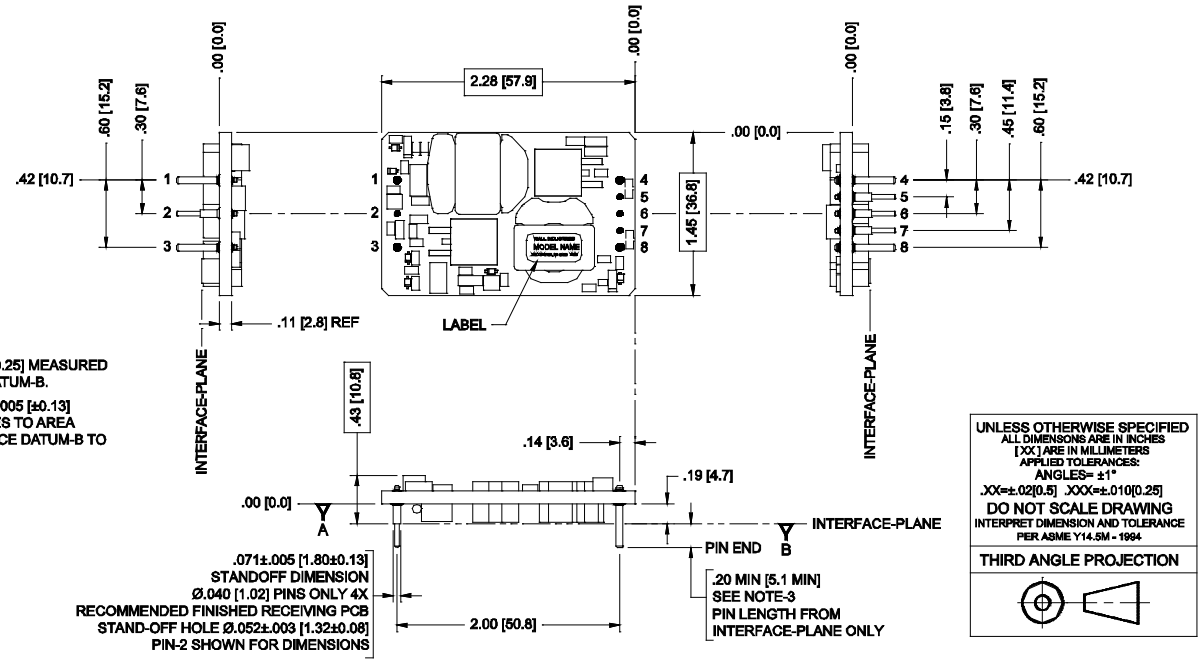
Open Frame (Only Available for 48Vin Models)

Unit: inches [mm]

PIN DESIGNATION		PIN Ø
1	+Vin	Ø.062 [1.57]
2	ON/OFF	Ø.040 [1.02]
3	-Vin	Ø.062 [1.57]
4	+Vout	Ø.062 [1.57]
5	+SENSE	Ø.040 [1.02]
6	TRIM	Ø.040 [1.02]
7	-SENSE	Ø.040 [1.02]
8	-Vout	Ø.062 [1.57]

NOTES:

1. PIN TO PIN TOLERANCE: ±.010 [±0.25] MEASURED AT STANDOFF FEATURE ONLY, DATUM-B.
2. PIN DIAMETER TOLERANCE OF ±.005 [±0.13] MEASUREMENT READING APPLIES TO AREA FROM INTERFACE-PLANE SURFACE DATUM-B TO END OF PIN ONLY.
3. UNLESS OTHERWISE SPECIFIED.



UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS ARE IN INCHES
[XX.] ARE IN MILLIMETERS
APPLIED TOLERANCES:
ANGLES= ±1°
.XX=±.02[0.5] .XXX=±.010[0.25]
DO NOT SCALE DRAWING
INTERPRET DIMENSION AND TOLERANCE
PER ASME Y14.5M - 1994
THIRD ANGLE PROJECTION

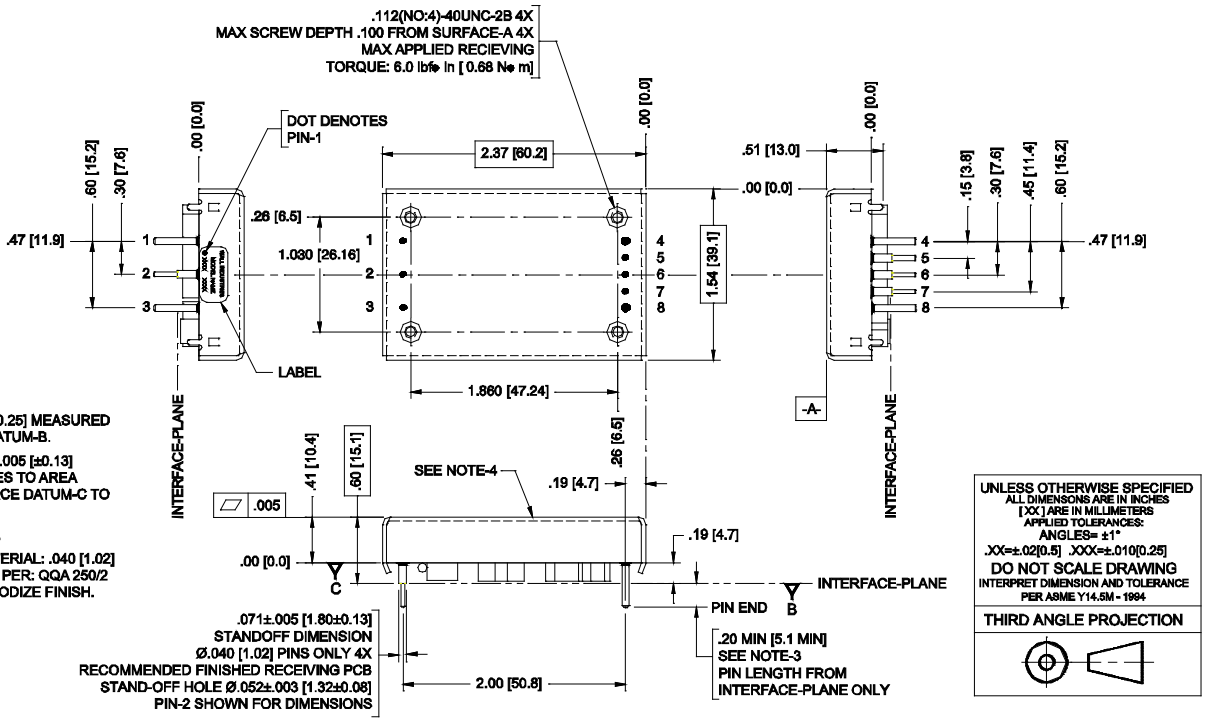
Cased Option ("C" Suffix)

Unit: inches [mm]

PIN DESIGNATION		PIN Ø
1	+Vin	Ø.062 [1.57]
2	ON/OFF	Ø.040 [1.02]
3	-Vin	Ø.062 [1.57]
4	+Vout	Ø.062 [1.57]
5	+SENSE	Ø.040 [1.02]
6	TRIM	Ø.040 [1.02]
7	-SENSE	Ø.040 [1.02]
8	-Vout	Ø.062 [1.57]

NOTES:

1. PIN TO PIN TOLERANCE: ±.010 [±0.25] MEASURED AT STANDOFF FEATURE ONLY, DATUM-B.
2. PIN DIAMETER TOLERANCE OF ±.005 [±0.13] MEASUREMENT READING APPLIES TO AREA FROM INTERFACE-PLANE SURFACE DATUM-C TO END OF PIN ONLY.
3. UNLESS OTHERWISE SPECIFIED.
4. THERMAL TRANSFER PLATE MATERIAL: .040 [1.02] THICK, ALUMINUM ALLOY 3003-0, PER: QQA 250/2 WITH BLACK SOFT SULFURIC ANODIZE FINISH.



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ALL DIMENSIONS ARE IN INCHES
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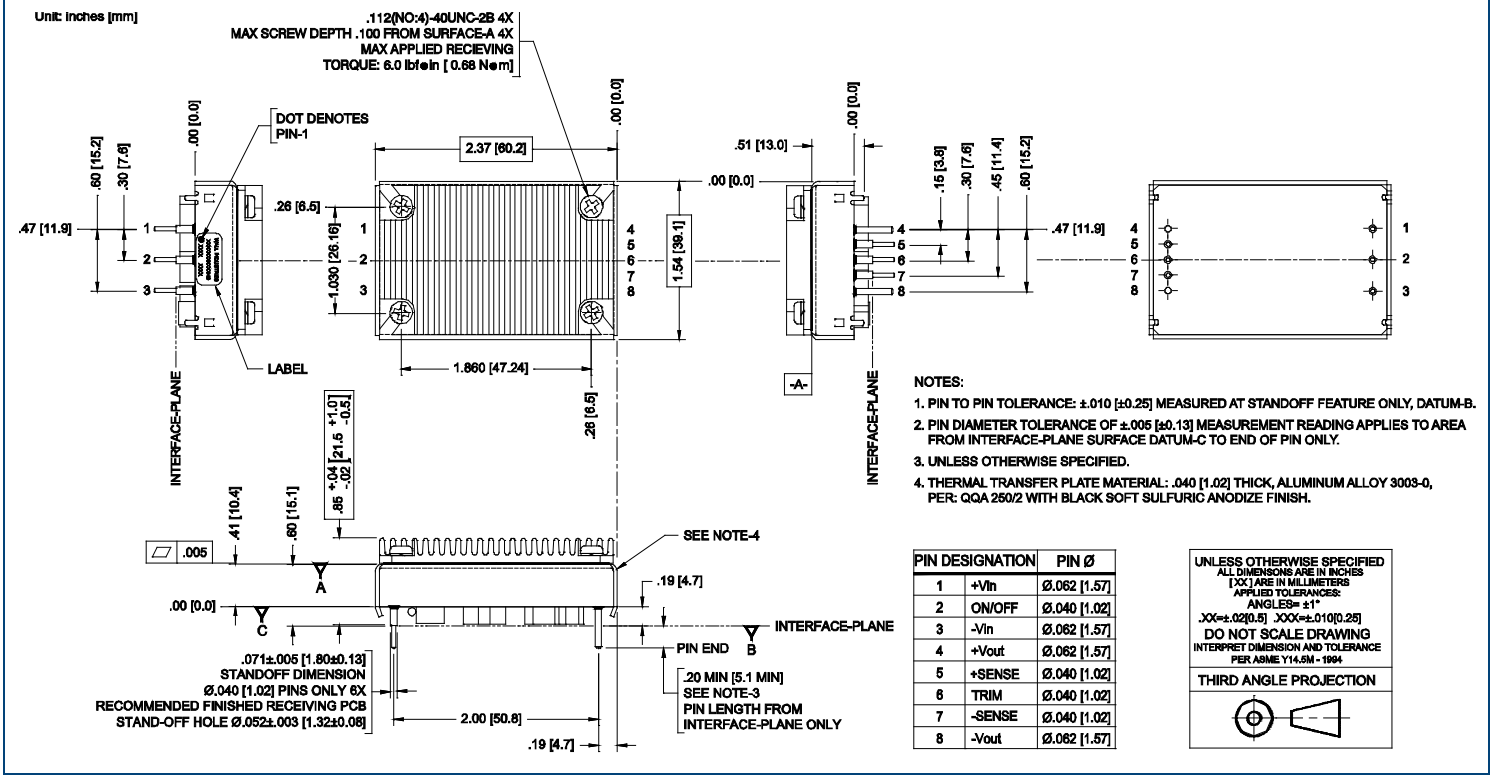
APPLIED TOLERANCES:
ANGLES= ±1°
.XX=±.02[0.5] .XXX=±.010[0.25]
DO NOT SCALE DRAWING
INTERPRET DIMENSION AND TOLERANCE
PER ASME Y14.5M - 1994
THIRD ANGLE PROJECTION

MECHANICAL DRAWINGS

Heatsink Option (“HS” Suffix)



FUNCTION DESCRIPTION

Pin	Pin Name	Function	Comments
1	+Vin	Positive Input	
2	Enable	Remote ON/OFF	If not used leave open for standard (Active High)units; short to –Vin on Active Low units (suffix “R”)
3	-Vin	Negative Input	
4	+Vout	Positive Output	
5	+Sense	Positive Remote Sense	If not used short to +Vo
6	Trim	Output Voltage Trim	If not used leave open
7	-Sense	Negative Remote Sense	If not used short to -Vo
8	-Vout	Negative Output	

DESIGN CONSIDERATIONS

Under Voltage Lock Out (UVLO)

The converter output is disabled until the input voltage exceeds the UVLO turn-on limit. The converter will remain ON until the input voltage falls below the UVLO turn-off limit.

Over Current Protection

The converter is protected from short circuit and over current conditions. Upon sensing an over current, the output will begin to drop (or 'foldback') limiting the output power. Further increasing the output current will cause the converter to shut off and then restart (or 'hiccup') until the over current condition is removed. Shorting the output will cause the converter to immediately enter the 'hiccup' mode.

Over Temperature Protection

The converter is protected from over temperature conditions. Upon exceeding this temperature, the converter will shut down. The converter will automatically recover once the over temperature condition is removed.

Input Filter

No additional input capacitor is needed for the power supply to operate. However, due to the low voltage, high input current nature of the power supply; it is highly recommended that a minimum 100µF/50 V electrolytic type input bulk capacitor be added to reduce input ripple voltage and current. Refer to Photos 1 and 2 for an example. For an even further reduction of input ripple, an inductor may be placed between the source and the previously mentioned capacitor. Additionally, a 1-10µF ceramic capacitor may be added in front of the inductor to form pi-filter. No inductor should be placed between the capacitor and the input to the converter.

Output Filter

No additional output capacitor is needed for the power supply to operate. However, to reduce the ripple and noise on the output, additional capacitance may be added. Usually, a ceramic capacitor between 1 and 100µF works best for reducing ripple and spike noise. Also, capacitance in the form of a low-ESR, surge robust tantalum capacitor (ie: Kemet T495 Series) may also be placed across the output in order reduce ripple, and improve the transient peak-to-peak voltage deviation. Due to the low-ESR nature of the output of the power supply, adding typical aluminum electrolytic capacitors to the output will not help much in reducing ripple or transient deviations, unless the load is some distance from the power supply output. Then, these capacitors should be placed at the load.

Remote Sense

To improve regulation at the load, route the connections from the -Sense and the +Sense pins to the –Vout and +Vout connections at the load. This will force the converter to regulate the voltage at the load and not at the pins of the converter. If it is not desired to use the Remotes Sense feature, the –Sense and +Sense pins should be shorted to the -Vout and +Vout pins respectively. However, no damage to the converter will occur if the Sense pins are left open.

Fusing

It is required that the input to the converter be supplied with a maximum 10 A, 250 V rated fuse UL Listed or R/C fuse.

Safety

The MPQ series is designed to meet EN60950 Safety of Information Technology Equipment. The isolation provided by the MPQ series is a basic insulation in accordance with EN60950. SELV output reliability is maintained only if the input to the converter is a SELV source. To maintain SELV reliability, if either +Vin or –Vin is connected to chassis, either +Vout or –Vout must also be connected to chassis. Otherwise, both the input and the output must not be connected to chassis.

PCB Layout Considerations

Due to the basic isolation provided by the converter, caution must be observed in routing traces more than 2mm inward of any input or output pins on the top layer of the PCB board underneath the converter. Also, due to noise coupling and isolation requirements, no power or ground planes or any signal traces should be routed on the top layer of the PCB underneath the converter. Due to common noise coupling, input or output power and ground planes should not be poured across the input to output on any layers underneath the converter. Instead, it is best to provide separate input and output power and ground traces on the bottom or an inner layer with a minimum of 1mm separation between traces on the same layer.

Lastly, as the case/heatsink is floating metal, caution must also be observed to provide appropriate spacing (minimum 1.4mm for Pollution degree 2 Material Group IIIa + IIIb) around the case/heatsink or risk reducing the input to output spacing and violating basic insulation requirements.

Remote ON/OFF

These converters have the ability to be remotely turned ON or OFF. The series may be ordered Active-High or Active-Low (place the suffix "R" at the end of the part number). Active-High means that a logic high at the ENABLE pin will turn ON the supply (Figure 1). With Active-High, if the ENABLE pin is left floating, the supply will be enabled. Active-Low means that a logic low at the ENABLE pin will turn ON the supply (Figure 2). With Active-Low, if the ENABLE pin is left floating, the supply will be disabled. If remote On/Off is not used on an Active-Low supply, short the Enable pin to –Vin.

Figure 1: Active High

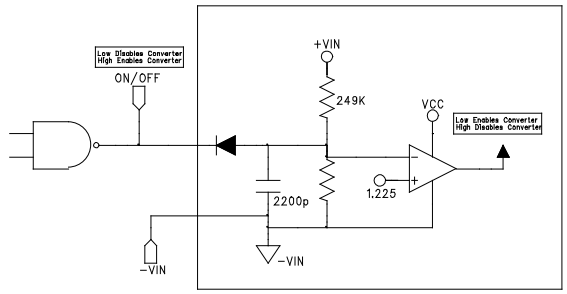
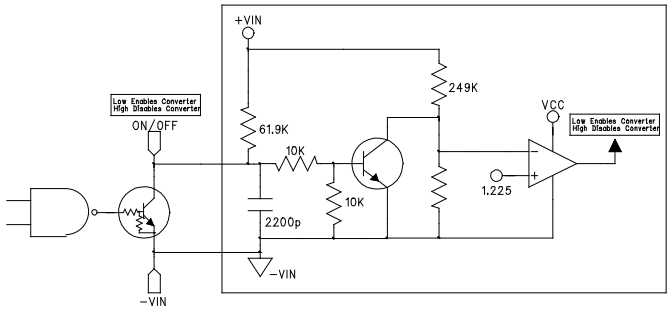


Figure 2: Active Low



Output Voltage Trim

The output is adjustable from ±10% of the output voltage. To adjust the output voltage low, place a resistor between the TRIM and -SENSE pins (Figure 3). To adjust the output voltage high, place a resistor between the +SENSE and TRIM pins (Figure 4). The value of the TRIM resistor with respect to the desired output voltage can be found in Table 1 or derived from the following equations:

$$R_{Trim-Low} = \frac{511}{\Delta\%} - 5.11 \quad (\text{in k}\Omega) \qquad R_{Trim-High} = \frac{5.11 \cdot V_{onom} \cdot (\Delta\% + 100)}{2.5 \cdot \Delta\%} - \frac{511}{\Delta\%} - 5.11 \quad (\text{in k}\Omega)$$

$$\text{where } \Delta\% = \text{Percent Trim} = \left| \frac{V_o^{+/-} - V_{onom}}{V_o^{+/-}} \right| \cdot 100$$

Figure 3: Trim Low

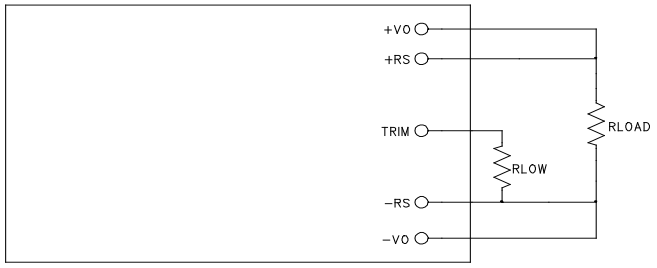


Figure 4: Trim High

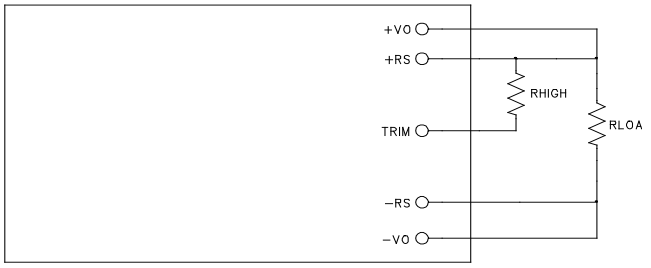
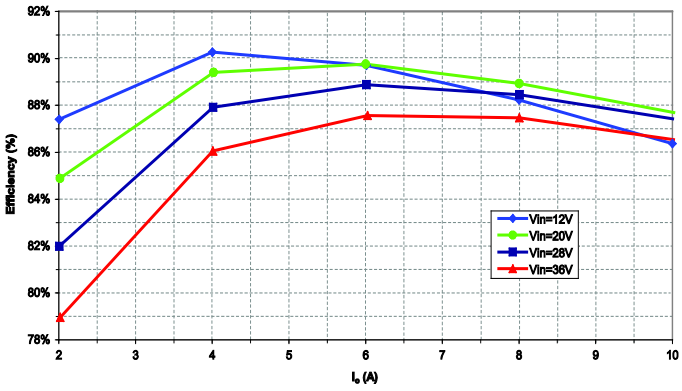


Table 1: Trim Resistor Values (in kΩ)				
Percent Trim	TRIM Low		TRIM High	
	Vout	RLow	Vout	RHigh
1%	4.950	500.78	5.050	511.00
2%	4.900	245.28	5.100	255.50
3%	4.850	160.11	5.150	170.33
4%	4.800	117.53	5.200	127.75
5%	4.750	91.98	5.250	102.20
6%	4.700	74.95	5.300	85.17
7%	4.650	62.78	5.350	73.00
8%	4.600	53.66	5.400	63.88
9%	4.550	46.56	5.450	56.78
10%	4.500	40.88	5.500	51.10

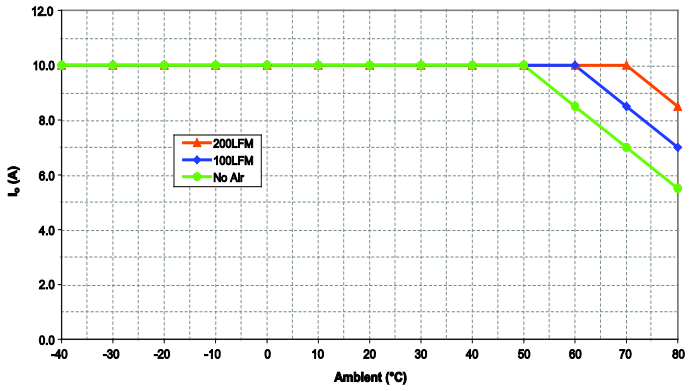
Note: While decreasing the output voltage, the maximum output current remains the same, and while increasing the output voltage, the output current is reduced to maintain the total output power.

CHARACTERISTIC CURVES

Graph 1: MPQ24S5-50C Efficiency vs. Output Current



Graph 2: MPQ24S5-50c Max Ambient vs. Io



Note: When trimming output high, I_o vs. Ambient is derated by power. i.e.: from Graph 2, find the maximum current at the desired ambient and airflow, and multiply this current by the nominal voltage to get the maximum power. Divide this power by the desired trimmed high voltage to get the maximum current at that ambient. When trimming low, the maximum current stays the same as shown in Graph 2.

PART NUMBER SETUP

MPQ	24	S	3.3	-	50	C	R	HS
Series Name	Input Voltage	Single Output	Output Voltage		Output Power	Case Options (1)	Remote ON/OFF	Heatsink
	24: 9-36 VDC 10-24 VDC 10-36 VDC 18-36 VDC **48:** 36-75 VDC	**S:** single	**3.3:** 3.3 VDC **5:** 5 VDC **12:** 12 VDC **15:** 15 VDC **24:** 24 VDC **48:** 48 VDC		**50:** 50 Watts **66:** 66 Watts **85:** 85 Watts **100:** 100 Watts **120:** 120 Watts **125:** 125 Watts	**None:** Open frame (1) **C:** Case	**None:** Active High Enable **R:** Active Low Enable	**None:** No Heatsink **HS:** Heatsink

COMPANY INFORMATION

Wall Industries, Inc. has created custom and modified units for over 50 years. Our in-house research and development engineers will provide a solution that exceeds your performance requirements on-time and on budget. Our ISO9001: 2015 certification is just one example of our commitment to producing a high quality, well-documented product for our customers.

Our past projects demonstrate our commitment to you, our customer. Wall Industries, Inc. has a reputation for working closely with its customers to ensure each solution meets or exceeds form, fit and function requirements. We will continue to provide ongoing support for your project above and beyond the design and production phases. Give us a call today to discuss your future projects.

Contact **Wall Industries** for further information:

Phone: ☎(603)778-2300
Toll Free: ☎(888)597-9255
Fax: ☎(603)778-9797
E-mail: sales@wallindustries.com
Web: www.wallindustries.com
Address: 37 Industrial Drive
Exeter, NH 03833