

QME48T40033, QME48T40025, QME48T40018 QME48T40015, QME48T40012, QME48T40010

The **QME48T40** DC-DC Series of converters provide outstanding thermal performance in high temperature environments. This performance is accomplished through the use of patented/patent-pending circuits, packaging, and processing techniques to achieve ultra-high efficiency, excellent thermal management, and a low-body profile.

The low-body profile and the preclusion of heat sinks minimize impedance to system airflow, thus enhancing cooling for both upstream and downstream devices. The use of 100% automation for assembly, coupled with advanced electronic circuits and thermal design, results in a product with extremely high reliability.

Operating from a 36-75 V input, the **QME48T40** converters provide any standard output voltage from 3.3 V down to 1.0 V that can be trimmed from – 20% to +10% of the nominal output voltage (\pm 10% for output voltages 1.2 V and 1.0 V), thus providing outstanding design flexibility.

Key Features & Benefits

- RoHS lead-free solder and lead-solder-exempted products are available
- Delivers up to 40 A
- Outputs available: 3.3, 2.5, 1.8, 1.5, 1.2 and 1.0 V
- Industry-standard quarter-brick pinout
- On-board input differential LC-filter
- Startup into pre-biased load
- No minimum load required
- Dimensions: 1.45" x 2.30" x 0.425" (36.83 x 58.42 x 10.80 mm)
- Weight: 1.2 oz [34.2 g]
- Meets Basic Insulation requirements of EN60950
- Withstands 100 V input transient for 100 ms
- Fixed-frequency operation
- Fully protected
- Remote output sense
- Non-Latching / Latching OTP option
- Positive or negative logic ON/OFF option
- Output voltage trim range: +10%/-20% with industry-standard trim equations (±10% for 1.2 V and 1.0 V)
- High reliability: MTBF = 13.9 million hours, calculated per Telcordia TR-332, Method I Case 1
- Approved to the following Safety Standards: UL/CSA60950-1, EN60950-1, and IEC60950-1
- Designed to meet Class B conducted emissions per FCC and EN55022
 when used with external filter
- All materials meet UL94, V-0 flammability rating







1. ELECTRICAL SPECIFICATIONS

Conditions: T_A = 25°C, Airflow = 300 LFM (1.5 m/s), Vin = 48 VDC, All output voltages, unless otherwise specified.

PARAMETER	CONDITIONS / DESCRIPTION	MIN	ΤΥΡ	MAX	UNITS
Absolute Maximum Ratings					
Input Voltage	Continuous	0		80	VDC
Operating Ambient Temperature		-40		85	°C
Storage Temperature		-55		125	°C
Input Characteristics					
Operating Input Voltage Range		36	48	75	VDC
Input Under Voltage Lockout					
Turn-on Threshold		33	34	35	VDC
Turn-off Threshold		31	32	33	VDC
Input Voltage Transient	100 ms			100	VDC
Isolation Characteristics					
I/O Isolation		2000			VDC
Isolation Capacitance			2		nF
Isolation Resistance		10			MΩ
Feature Characteristics					
Switching Frequency			460		kHz
Output Voltage Trim Range ¹	Non-latching (3.3 - 1.5 V)	-20		+10	%
	Non-latching (1.2 V and 1.0 V)	-10		+10	%
Remote Sense Compensation ¹	Percent of VOUT(nom)			+10	%
Output Overvoltage Protection	Non-latching	117	128	140	%
Auto-Restart Period	Applies to all protection features		200		ms
Turn-On Time			4		ms
ON/OFF Control (Positive Logic)					
Converter Off (logic low)		-20		0.8	VDC
Converter On (logic high)		2.4		20	VDC
ON/OFF Control (Negative Logic)					
Converter Off (logic high)		2.4		20	VDC
Converter On (logic low)		-20		0.8	VDC

¹⁾ Vout can be increased up to 10% via the sense leads or 10% via the trim function. However, the total output voltage trim from all sources should not exceed 10% of VOUT(nom), in order to ensure specified operation of overvoltage protection circuitry



2. OPERATIONS

2.1 INPUT AND OUTPUT IMPEDANCE

These power converters have been designed to be stable with no external capacitors when used in low inductance input and output circuits.

In many applications, the inductance associated with the distribution from the power source to the input of the converter can affect the stability of the converter. The addition of a 33 μ F electrolytic capacitor with an ESR < 1 Ω across the input helps to ensure stability of the converter. In many applications, the user has to use decoupling capacitance at the load. The power converter will exhibit stable operation with external load capacitance up to 40,000 μ F on 3.3 V – 1.0 V outputs. Additionally, see the EMC section of this data sheet for discussion of other external components which may be required for control of conducted emissions.

2.2 ON/OFF (Pin 2)

The ON/OFF pin is used to turn the power converter on or off remotely via a system signal. There are two remote control options available, positive and negative logic, with both referenced to Vin(-). A typical connection is shown in Fig. 1.

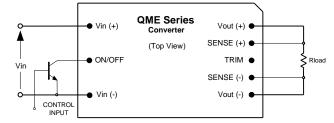


Figure 1. Circuit configuration for ON/OFF function.

The positive logic version turns on when the ON/OFF pin is at a logic high and turns off when at a logic low. The converter is on when the ON/OFF pin is left open. See the Electrical Specifications for logic high/low definitions.

The negative logic version turns on when the pin is at a logic low and turns off when the pin is at a logic high. The ON/OFF pin can be hardwired directly to Vin(-) to enable automatic power up of the converter without the need of an external control signal.

The ON/OFF pin is internally pulled up to 5 V through a resistor. A properly debounced mechanical switch, open-collector transistor, or FET can be used to drive the input of the ON/OFF pin. The device must be capable of sinking up to 0.2 mA at a low level voltage of \leq 0.8 V. An external voltage source (±20 V maximum) may be connected directly to the ON/OFF input, in which case it must be capable of sourcing or sinking up to 1 mA depending on the signal polarity. See the Startup Information section for system timing waveforms associated with use of the ON/OFF pin.

2.3 REMOTE SENSE (PINS 5 AND 7)

The remote sense feature of the converter compensates for voltage drops occurring between the output pins of the converter and the load. The SENSE(-) (Pin 5) and SENSE(+) (Pin 7) pins should be connected at the load or at the point where regulation is required (see Fig. 2).

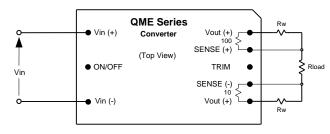


Figure 2. Remote sense circuit configuration



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CAUTION

If remote sensing is not utilized, the SENSE(-) pin must be connected to the Vout(-) pin (Pin 4), and the SENSE(+) pin must be connected to the Vout(+) pin (Pin 8) to ensure the converter will regulate at the specified output voltage. If these connections are not made, the converter will deliver an output voltage that is slightly higher than the specified data sheet value.

Because the sense leads carry minimal current, large traces on the end-user board are not required. However, sense traces should be run side by side and located close to a ground plane to minimize system noise and ensure optimum performance.

The converter's output overvoltage protection (OVP) senses the voltage across Vout(+) and Vout(-), and not across the sense lines, so the resistance (and resulting voltage drop) between the output pins of the converter and the load should be minimized to prevent unwanted triggering of the OVP.

When utilizing the remote sense feature, care must be taken not to exceed the maximum allowable output power capability of the converter, which is equal to the product of the nominal output voltage and the allowable output current for the given conditions.

When using remote sense, the output voltage at the converter can be increased by as much as 10% above the nominal rating in order to maintain the required voltage across the load. Therefore, the designer must, if necessary, decrease the maximum current (originally obtained from the derating curves) by the same percentage to ensure the converter's actual output power remains at or below the maximum allowable output power.

2.4 OUTPUT VOLTAGE ADJUST /TRIM (PIN 6)

The output voltage can be adjusted up 10% or down 20% for Vout \ge 1.5 V, and \pm 10% for Vout = 1.2 V and 1.0 V relative to the rated output voltage by the addition of an externally connected resistor.

The TRIM pin should be left open if trimming is not being used. To minimize noise pickup, a 0.1 µF capacitor is connected internally between the TRIM and SENSE(-) pins.

To increase the output voltage, refer to Fig. 3. A trim resistor, R_{T-INCR} , should be connected between the TRIM (Pin 6) and SENSE(+) (Pin 7), with a value of:

$$R_{\text{T-INCR}} = \frac{5.11(100 + \Delta)\text{V}_{\text{O-NOM}} - 626}{1.225\Delta} - 10.22 \text{ [k}\Omega\text{] (3.3-1.5V)}$$
$$R_{\text{T-INCR}} = \frac{84.6}{\Delta} - 7.2 \text{ [k}\Omega\text{] (1.2V)}$$
$$R_{\text{T-INCR}} = \frac{120}{\Delta} - 9 \text{ [k}\Omega\text{] (1.0V)}$$

where,

 $\mathbf{R}_{\text{T-INCR}}$ = Required value of trim-up resistor k Ω] $\mathbf{V}_{\text{O-NOM}}$ = Nominal value of output voltage [V]

$$\Delta = \frac{(V_{\text{O-REQ}} - V_{\text{O-NOM}})}{V_{\text{O-NOM}}} \times 100 \,[\%]$$

Vo-REQ = Desired (trimmed) output voltage [V].

When trimming up, care must be taken not to exceed the converter's maximum allowable output power. See previous section for a complete discussion of this requirement.



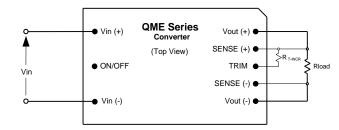


Figure 3. Configuration for increasing output voltage.

To decrease the output voltage (Fig. 4), a trim resistor, RT-DECR, should be connected between the TRIM (Pin 6) and SENSE(-) (Pin 5), with a value of:

$$R_{\text{T-DECR}} = \frac{511}{|\Delta|} - 10.22 \text{ [kg] (3.3 - 1.5V)}$$
$$R_{\text{T-DECR}} = \frac{700}{|\Delta|} - 15 \text{ [kg] (1.2V)}$$
$$R_{\text{T-DECR}} = \frac{700}{|\Delta|} - 17 \text{ [kg] (1.0V)}$$

where.

 \mathbf{R}_{T-DECR} Required value of trim-down resistor [k Ω]

and $\mathbf{\Delta}$ is as defined above.

Note:

The above equations for calculation of trim resistor values match those typically used in conventional industry-standard quarter-bricks (except for 1.2 V and 1.0 V outputs).

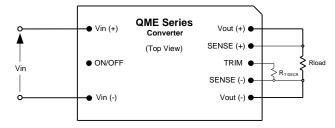


Figure 4. Configuration for decreasing output voltage.

Trimming/sensing beyond 110% of the rated output voltage is not an acceptable design practice, as this condition could cause unwanted triggering of the output overvoltage protection (OVP) circuit. The designer should ensure that the difference between the voltages across the converter's output pins and its sense pins does not exceed 10% of VOUT(nom), or:

$$[V_{\text{OUT}}(+) - V_{\text{OUT}}(-)] - [V_{\text{SENSE}}(+) - V_{\text{SENSE}}(-)] \le V_{\text{O}} \cdot \text{Nom x10\% } \text{[M]}$$

This equation is applicable for any condition of output sensing and/or output trim.



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3. PROTECTION FEATURES

3.1 INPUT UNDERVOLTAGE LOCKOUT

Input under voltage lockout is standard with this converter. The converter will shut down when the input voltage drops below a pre-determined voltage.

The input voltage must be typically 34 V for the converter to turn on. Once the converter has been turned on, it will shut off when the input voltage drops typically below 32 V. This feature is beneficial in preventing deep discharging of batteries used in telecom applications.

3.2 OUTPUT OVERCURRENT PROTECTION (OCP)

The converter is protected against overcurrent or short circuit conditions. Upon sensing an overcurrent condition, the converter will switch to constant current operation and thereby begin to reduce output voltage. When the output voltage drops below 60% of the nominal value of output voltage, the converter will shut down.

Once the converter has shut down, it will attempt to restart nominally every 200 ms with a typical 3-5% duty cycle. The attempted restart will continue indefinitely until the overload or short circuit conditions are removed or the output voltage rises above 40-50% of its nominal value.

Once the output current is brought back into its specified range, the converter automatically exits the hiccup mode and continues normal operation.

3.3 OUTPUT OVERVOLTAGE PROTECTION (OVP)

The converter will shut down if the output voltage across Vout(+) (Pin 8) and Vout(-) (Pin 4) exceeds the threshold of the OVP circuitry. The OVP circuitry contains its own reference, independent of the output voltage regulation loop. Once the converter has shut down, it will attempt to restart every 200 ms until the OVP condition is removed.

3.4 OVERTEMPERATURE PROTECTION (OTP)

The converter will shut down under an over temperature condition to protect itself from overheating caused by operation outside the thermal derating curves, or operation in abnormal conditions such as system fan failure. After the converter has cooled to a safe operating temperature, it will automatically restart.

3.5 SAFETY REQUIREMENTS

The converters meet North American and International safety regulatory requirements per UL60950 and EN60950 (pending). Basic Insulation is provided between input and output.

To comply with safety agencies' requirements, an input line fuse must be used external to the converter. The Table below provides the recommended fuse rating for use with this family of products.

OUTPUT VOLTAGE	FUSE RATING
3.3 V	7.5 A
2.5 -1.8 V	5 A
1.5 - 1.0 V	3 A

Modules are UL approved for maximum fuse rating of 15 Amps. To protect a group of modules with a single fuse, the rating can be increased from the recommended values above.

3.6 ELECTROMAGNETIC COMPATIBILITY (EMC)

EMC requirements must be met at the end-product system level, as no specific standards dedicated to EMC characteristics of board mounted component dc-dc converters exist. However, Bel Power Solutions tests its converters to several system level standards, primary of which is the more stringent EN55022, Information technology equipment - Radio disturbance characteristics-Limits and methods of measurement.

An effective internal LC differential filter significantly reduces input reflected ripple current, and improves EMC. With the addition of a simple external filter, all versions of the QME-Series of converters pass the requirements of Class B conducted emissions per EN55022 and FCC requirements. Please contact Bel Power Solutions Applications Engineering for details of this testing.



3.7 **STARTUP INFORMATION (USING NEGATIVE ON/OFF)**

Scenario #1: Initial Startup From Bulk Supply ON/OFF function enabled, converter started via application of VIN. See Figure 5.

- Time Comments ON/OFF pin is ON; system front-end power is t_0
- toggled on, VIN to converter begins to rise. VIN crosses Under-Voltage Lockout protection circuit t₁ threshold; converter enabled.
- Converter begins to respond to turn-on command t2 (converter turn-on delay).
- Converter VOUT reaches 100% of nominal value t3

For this example, the total converter startup time (t₃- t₁) is typically 4 ms.

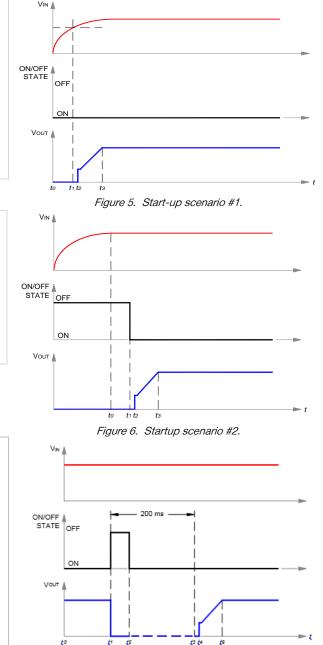
Scenario #2: Initial Startup Using ON/OFF Pin With VIN previously powered, converter started via ON/OFF pin. See Figure 6.

Time Comments

t∩

- VINPUT at nominal value.
- Arbitrary time when ON/OFF pin is enabled (converter t1 enabled).
- End of converter turn-on delay. t2
- Converter VOUT reaches 100% of nominal value. tз

For this example, the total converter startup time (t_3-t_1) is typically 4 ms.



Scenario #3: Turn-off and Restart Using ON/OFF Pin With $V_{\ensuremath{\mathsf{IN}}}$ previously powered, converter is disabled and then enabled via ON/OFF pin. See Figure 7. Time

Comments

- V_{IN} and V_{OUT} are at nominal values; ON/OFF pin ON. t₀ t1 ON/OFF pin arbitrarily disabled; converter output falls to zero; turn-on inhibit delay period (200 ms typical) is initiated, and ON/OFF pin action is internally inhibited. ON/OFF pin is externally re-enabled. t2
 - If (t₂- t₁) ≤ 200 ms, external action of ON/OFF pin is locked out by startup inhibit timer. If (t₂- t₁) > 200 ms, ON/OFF pin action is internally enabled.
- Turn-on inhibit delay period ends. If ON/OFF pin is t₃ ON, converter begins turn-on; if off, converter awaits ON/OFF pin ON signal; see Figure 6.
- t4 End of converter turn-on delay.
- Converter VOUT reaches 100% of nominal value. t5

For the condition, $(t_2 - t_1) \le 200 \text{ ms}$, the total converter startup time (t_5 - t_2) is typically 204 ms. For (t_2 - t_1) > 200 ms, startup will be typically 4 ms after release of ON/OFF pin.



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Figure 7. Startup scenario #3.

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4. CHARACTERIZATION

4.1 GENERAL INFORMATION

The converter has been characterized for many operational aspects, to include thermal derating (maximum load current as a function of ambient temperature and airflow) for vertical and horizontal mountings, efficiency, startup and shutdown parameters, output ripple and noise, transient response to load step-change, overload, and short circuit. The following pages contain specific plots or waveforms associated with the converter. Additional comments for specific data are provided below.

4.2 TEST CONDITIONS

All data presented were taken with the converter soldered to a test board, specifically a 0.060" thick printed wiring board (PWB) with four layers. The top and bottom layers were not metalized. The two inner layers, comprised of two-ounce copper, were used to provide traces for connectivity to the converter.

The lack of metalization on the outer layers as well as the limited thermal connection ensured that heat transfer from the converter to the PWB was minimized. This provides a worst-case but consistent scenario for thermal derating purposes. All measurements requiring airflow were made in the vertical and horizontal wind tunnel using Infrared (IR) thermography and thermocouples for thermometry.

Ensuring components on the converter do not exceed their ratings is important to maintaining high reliability. If one anticipates operating the converter at or close to the maximum loads specified in the derating curves, it is prudent to check actual operating temperatures in the application. Thermographic imaging is preferable; if this capability is not available, then thermocouples may be used. The use of AWG #40 gauge thermocouples is recommended to ensure measurement accuracy. Careful routing of the thermocouple leads will further minimize measurement error. Refer to Fig. 8 for the optimum measuring thermocouple locations.

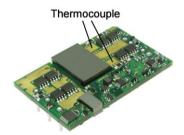


Figure 8. Location of the thermocouple for thermal testing.

4.3 THERMAL DERATING

Load current vs. ambient temperature and airflow rates are given in Fig. x.9 and Fig. x.10 for vertical and horizontal converter mountings. Ambient temperature was varied between 25 °C and 85 °C, with airflow rates from 30 to 500 LFM (0.15 to 2.5 m/s).

For each set of conditions, the maximum load current was defined as the lowest of:

- (i) The output current at which any FET junction temperature does not exceed a maximum specified temperature of 120 °C as indicated by the thermographic image, or
- (ii) The nominal rating of the converter (40 A).

During normal operation, derating curves with maximum FET temperature less or equal to 120 °C should not be exceeded. Temperature on the PCB at thermocouple locations shown in Fig. 8 should not exceed 120 °C in order to operate inside the derating curves.

4.4 EFFICIENCY

Fig. x.11 shows the efficiency vs. load current plot for ambient temperature of 25 °C, airflow rate of 300 LFM (1.5 m/s) with horizontal mounting and input voltages of 36 V, 48 V and 72 V. Also, a plot of efficiency vs. load current, as a function of ambient temperature with Vin = 48 V, airflow rate of 200 LFM (1 m/s) with horizontal mounting is shown in Fig. x.12.

4.5 POWER DISSIPATION



4.6 START-UP

Output voltage waveforms, during the turn-on transient using the ON/OFF pin for full rated load currents (resistive load) are shown without and with external load capacitance in Figs. x.15-16, respectively.

4.7 **RIPPLE AND NOISE**

Fig. x.19 show the output voltage ripple waveform, measured at full rated load current with a 10 μ F tantalum and 1 μ F ceramic capacitor across the output. Note that all output voltage waveforms are measured across a 1 μ F ceramic capacitor. The input reflected ripple current waveforms are obtained using the test setup shown in Fig x.20. The corresponding waveforms are shown in Figs. x.21-22.



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5. ELECTRICAL SPECIFICATIONS MODELS

5.1 QME48T40033 (3.3 Volts Out)

Conditions: TA = 25 °C, Airflow = 300 LFM (1.5 m/s), Vin = 48 VDC, Vout = 3.3 VDC unless otherwise specified.

PARAMETER	CONDITIONS / DESCRIPTION	MIN	TYP	MAX	UNITS
Input Characteristics					
Operating Input Voltage Range		36	48	75	VDC
Input Under Voltage Lockout					
Turn-on Threshold		33	34	35	VDC
Turn-off Threshold		31	32	33	VDC
Input Voltage Transient	100 ms			100	VDC
Maximum Input Current	40 ADC Out @ 36 VDC In			4.1	ADC
Input Stand-by Current	Vin = 48V, converter disabled		3		mA
Input No Load Current (0 load on the output)	Vin = 48V, converter enabled		50		mA
Input Reflected-Ripple Current, is	Vin = 48V, 25 MHz bandwidth		10		mAPK-PK
Input Voltage Ripple Rejection	120 Hz		60		dB
Output Characteristics					
External Load Capacitance	Plus full load (resistive)			40,000	μF
Output Current Range		0		40	ADC
Current Limit Inception	Non-latching	42	47	52	ADC
Peak Short-Circuit Current	Non-latching, Short = 10 m Ω		50	60	А
RMS Short-Circuit Current	Non-latching		9		Arms
Output Voltage Set Point (no load)		3.267	3.300	3.333	VDC
Output Regulation Over Line			±2	±5	mV
Output Regulation Over Load			±2	±5	mV
Output Voltage Range	Over line, load and temperature ¹	-1.5		+1.5	%Vout
Output Ripple and Noise – 25 MHz bandwidth	VOUT = 3.3 VDC Full load + 10 μF tantalum + 1 μF ceramic		55	110	mVPK-PK
	VOUT = 1.0 VDC Full load + 10 μF tantalum + 1 μF ceramic		35	70	mVPK-PK
Dynamic Response					
Load Change 50%-75%-50% of lout Max, $di/dt = 0.1 \; A/\mu s$	Co = 1 µF ceramic (Fig. 3.3V.17)		50 ²		mV
di/dt = 5 A/µs	Co = 470 μF POS + 1 μF ceramic		130 ²		mV
Settling Time to 1% of Vout			15 ²		μs
Efficiency					
100% Load			91.0		%
50% Load			92.0		%

¹⁾ Operating ambient temperature range of -40 °C to 85 °C for converter.

²⁾ See waveforms for dynamic response and settling time for different output voltages.



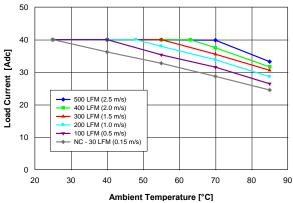


Figure 3.3V.9. Available load current vs. ambient air temperature and airflow rates for QME48T40033 converter with G height pins mounted vertically with air flowing from pin 1 to pin 3, MOSFET temperature ≤ 120 °C, Vin = 48 V.

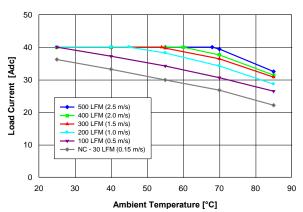


Figure 3.3V.10. Available load current vs. ambient air temperature and airflow rates for QME48T40033 converter with G height pins mounted horizontally with air flowing from pin 1 to pin 3, MOSFET temperature ≤ 120 °C, Vin = 48 V.

Note: NC - Natural convection

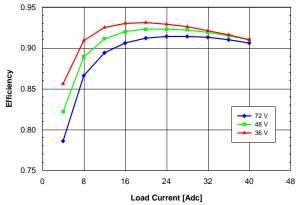


Figure 3.3V.11. Efficiency vs. load current and input voltage for QME48T40033 converter mounted horizontally with air flowing from pin 1 to pin 3 at a rate of 300 LFM (1.5 m/s) and $Ta = 25 \ ^{\circ}C.$

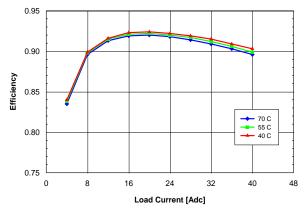


Figure 3.3V.12. Efficiency vs. load current and ambient temperature for QME48T40033 converter mounted horizontally with Vin = 48 V and air flowing from pin 1 to pin 3 at a rate of 200 LFM (1.0 m/s).



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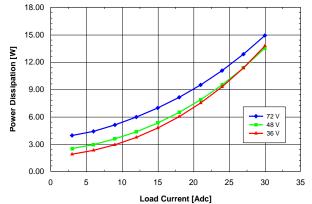


Figure 3.3V. 13. Power dissipation vs. load current and input voltage for QME48T40033 converter mounted horizontally with air flowing from pin 1 to pin 3 at a rate of 300 LFM (1.5 m/s) and Ta = $25 \ ^{\circ}$ C.

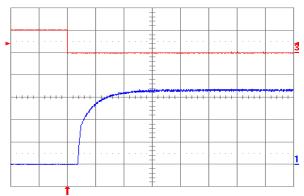


Figure 3.3V.15. Turn-on transient at full rated load current (resistive) with no output capacitor at Vin = 48 V, triggered via ON/OFF pin. Top trace: ON/OFF signal (5 V/div.). Bottom trace: output voltage (1 V/div.). Time scale: 2 ms/div.

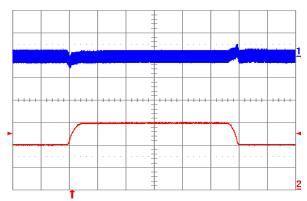


Figure 3.3V.17. Output voltage response to load current stepchange (20 A – 30 A – 20 A) at Vin = 48 V. Top trace: output voltage (100 mV/div.). Bottom trace: load current (10 A/div.). Current slew rate: 0.1 A/μs. Co = 1 μF ceramic. Time scale: 0.2 ms/div.



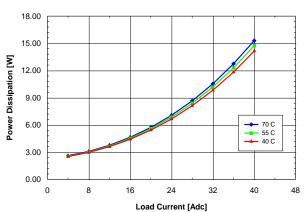


Figure 3.3V.14. Power dissipation vs. load current and ambient temperature for QME48T40033 converter mounted horizontally with Vin = 48 V and air flowing from pin 1 to pin 3 at a rate of 200 LFM (1.0 m/s).

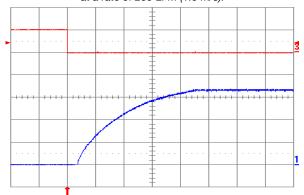


Figure 3.3V.16. Turn-on transient at full rated load current (resistive) plus 10,000 µF at Vin = 48 V, triggered via ON/OFF pin. Top trace: ON/OFF signal (5 V/div.). Bottom trace: output voltage (1 V/div.). Time scale: 2 ms/div.

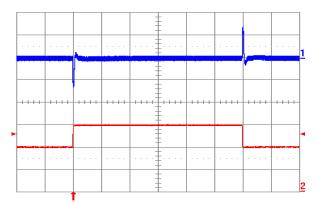


Figure 3.3V.18. Output voltage response to load current stepchange (20 A – 30 A – 20 A) at Vin = 48 V. Top trace: output voltage (100 mV/div.). Bottom trace: load current (10 A/div.). Current slew rate: 5 A/μs. Co = 470 μF POS + 1 μF ceramic. Time scale: 0.2 ms/div.

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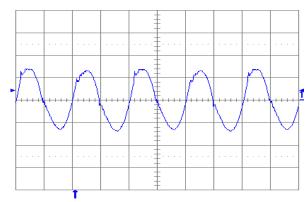


Figure 3.3V.19. Output voltage ripple (20 mV/div.) at full rated load current into a resistive load with $Co = 10 \ \mu\text{F}$ tantalum + 1 μF ceramic and Vin = 48 V. Time scale: 1 μ s/div.

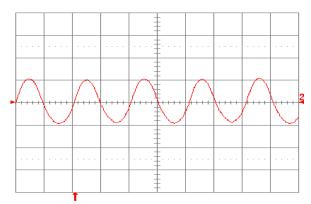


Figure 3.3V.21. Input reflected ripple current, ic (100 mA/div.), measured at input terminals at full rated load current and Vin = 48 V. Refer to Fig. 3.3V.20 for test setup. Time scale: 1 µs/div.

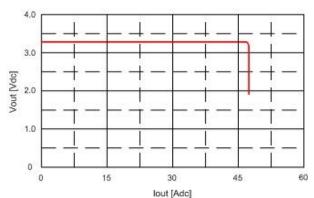


Figure 3.3V.23. Output voltage vs. load current showing current limit point and converter shutdown point. Input voltage has almost no effect on current limit characteristic.

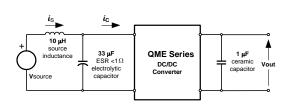


Figure 3.3V.20. Test setup for measuring input reflected ripple currents, ic and is.

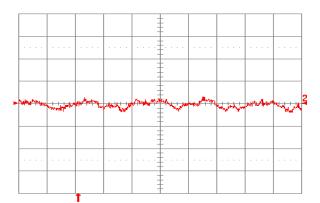


Figure 3.3V.22. Input reflected ripple current, is (10 mA/div.), measured through 10 μH at the source at full rated load current and Vin = 48 V. Refer to Fig. 3.3V.20 for test setup. Time scale: 1 μs/div.

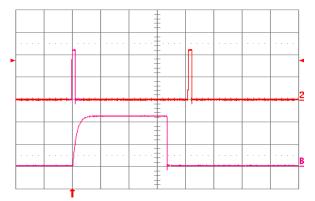


Figure 3.3V.24. Load current (top trace, 20 A/div., 50 ms/div.) into a 10 mΩ short circuit during restart, at Vin = 48 V. Bottom trace (20 A/div., 2 ms/div.) is an expansion of the on-time portion of the top trace.



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5.2 QME48T40025 (2.5 Volts Out)

Conditions: TA = 25 °C, Airflow = 300 LFM (1.5 m/s), Vin = 48 VDC, Vout = 2.5 VDC unless otherwise specified.

PARAMETER		CONDITIONS / DESCRIPTION	MIN	TYP	MAX	UNITS
Input Characteristics	_		_	_		
Operating Input Voltage Range			36	48	75	VDC
Input Under Voltage Lockout						
Turn-on Threshold			33	34	35	VDC
Turn-off Threshold			31	32	33	VDC
Input Voltage Transient		100 ms			100	VDC
Maximum Input Current		40 ADC Out @ 36 VDC In			3.2	ADC
Input Stand-by Current		Vin = 48V, converter disabled		3		mA
Input No Load Current (0 load on the ou	utput)	Vin = 48V, converter enabled		47		mA
Input Reflected-Ripple Current, is		Vin = 48V, 25 MHz bandwidth		9		mAPK-PK
Input Voltage Ripple Rejection		120 Hz		60		dB
Output Characteristics						
External Load Capacitance		Plus full load (resistive)			40,000	μF
Output Current Range			0		40	ADC
Current Limit Inception		Non-latching	42	47	52	ADC
Peak Short-Circuit Current		Non-latching, Short = 10 m Ω		50	60	А
RMS Short-Circuit Current		Non-latching		9		Arms
Output Voltage Set Point (no load)			2.475	2.500	2.525	VDC
Output Regulation Over Line				±2	±5	mV
Output Regulation Over Load				±2	±5	mV
Output Voltage Range		Over line, load and temperature ¹	-1.5		+1.5	%Vout
Output Ripple and Noise – 25 MHz ban	dwidth	VOUT = 3.3 VDC Full load + 10 μF tantalum + 1 μF ceramic		55	110	mVPK-PK
		VOUT = 1.0 VDC Full load + 10 μF tantalum + 1 μF ceramic		35	70	mVPK-PK
Dynamic Response						
Load Change 50%-75%-50% of lout M di/dt = 0.1 A/		Co = 1 µF ceramic (Fig. 2.5V.17)		50 ²		mV
di/dt = 5 A/µs	5	Co = 470 μ F POS + 1 μ F ceramic		130 ²		mV
Settling Time to 1% of Vout				15 ²		μs
Efficiency						
100% Load				89.0		%
50% Load				91.0		%

¹⁾ Operating ambient temperature range of -40 °C to 85 °C for converter.

²⁾ See waveforms for dynamic response and settling time for different output voltages.



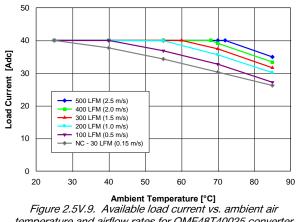


Figure 2.5V.9. Available load current Vs. ambient air temperature and airflow rates for QME48T40025 converter with G height pins mounted vertically with air flowing from pin 1 to pin 3, MOSFET temperature ≤ 120 °C, Vin = 48 V.



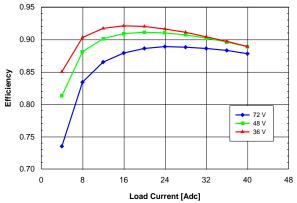


Figure 2.5V.11. Efficiency vs. load current and input voltage for QME48T40025 converter mounted horizontally with air flowing from pin 1 to pin 3 at a rate of 300 LFM (1.5 m/s) and $Ta = 25 \ ^{\circ}C.$

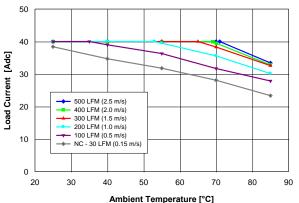


Figure 2.5V.10. Available load current vs. ambient air temperature and airflow rates for QME48T40025 converter with G height pins mounted horizontally with air flowing from pin 1 to pin 3, MOSFET temperature ≤ 120 °C, Vin = 48 V.

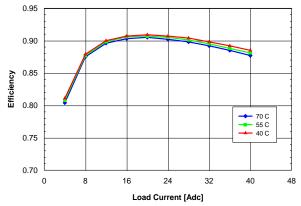


Figure 2.5V.12. Efficiency vs. load current and ambient temperature for QME48T40025 converter mounted horizontally with Vin = 48 V and air flowing from pin 1 to pin 3 at a rate of 200 LFM (1.0 m/s).



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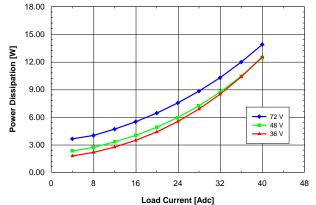


Figure 2.5V. 13. Power dissipation vs. load current and input voltage for QME48T40025 converter mounted horizontally with air flowing from pin 1 to pin 3 at a rate of 300 LFM (1.5 m/s) and Ta = $25 \ ^{\circ}$ C.

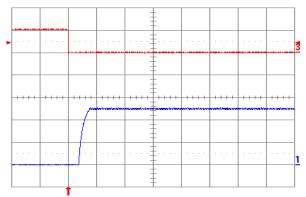


Figure 2.5V.15. Turn-on transient at full rated load current (resistive) with no output capacitor at Vin = 48 V, triggered via ON/OFF pin. Top trace: ON/OFF signal (5 V/div.). Bottom trace: output voltage (1 V/div.). Time scale: 2 ms/div.

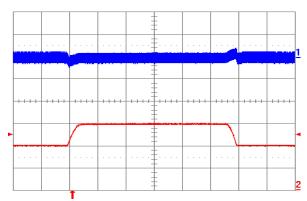


Figure 2.5V.17. Output voltage response to load current stepchange (20 A – 30 A – 20 A) at Vin = 48 V. Top trace: output voltage (100 mV/div.). Bottom trace: load current (10 A/div.). Current slew rate: 0.1 A/μs. Co = 1 μF ceramic. Time scale: 0.2 ms/div.



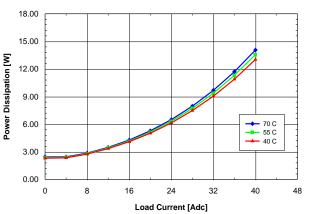


Figure 2.5V.14. Power dissipation vs. load current and ambient temperature for QME48T40025 converter mounted horizontally with Vin = 48 V and air flowing from pin 1 to pin 3 at a rate of 200 LFM (1.0 m/s).

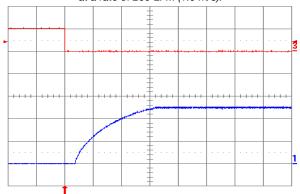


Figure 2.5V.16. Turn-on transient at full rated load current (resistive) plus 10,000 µF at Vin = 48 V, triggered via ON/OFF pin. Top trace: ON/OFF signal (5 V/div.). Bottom trace: output voltage (1 V/div.). Time scale: 2 ms/div.

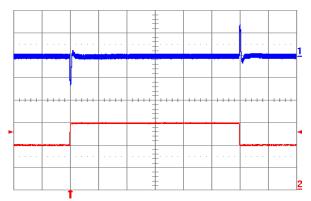


Figure 2.5V.18. Output voltage response to load current stepchange (20 A – 30 A – 20 A) at Vin = 48 V. Top trace: output voltage (100 mV/div.). Bottom trace: load current (10 A/div.). Current slew rate: 5A/μs. Co = 470 μF POS + 1 μF ceramic. Time scale: 0.2 ms/div.

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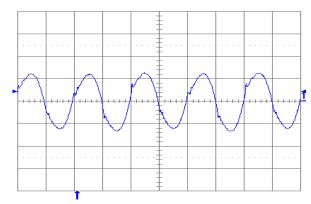


Figure 2.5V.19. Output voltage ripple (20 mV/div.) at full rated load current into a resistive load with $Co = 10 \ \mu\text{F}$ tantalum + 1 μF ceramic and Vin = 48 V. Time scale: 1 $\mu\text{s/div}$.

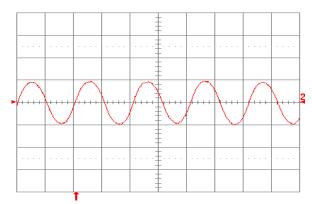


Figure 2.5V.21. Input reflected ripple current, *i*c (100 mA/div.), measured at input terminals at full rated load current and Vin = 48 V. Refer to Fig. 2.5V.20 for test setup. Time scale: 1 µs/div.

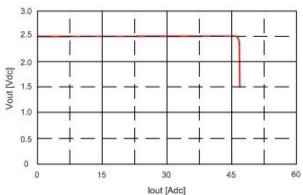


Figure 2.5V.23. Output voltage vs. load current showing current limit point and converter shutdown point. Input voltage has almost no effect on current limit characteristic.

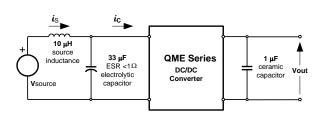


Figure 2.5V.20. Test setup for measuring input reflected ripple currents, *i*c and *i*s.

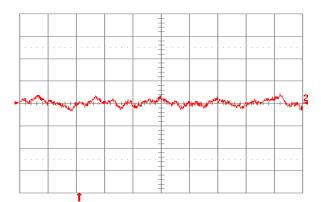


Figure 2.5V.22. Input reflected ripple current, is (10 mA/div.), measured through 10 µH at the source at full rated load current and Vin = 48 V. Refer to Fig. 2.5V.20 for test setup. Time scale: 1 µs/div.

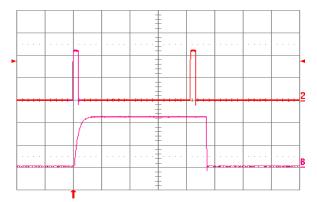


Figure 2.5V.24. Load current (top trace, 20 A/div., 50 ms/div.) into a 10 mΩ short circuit during restart, at Vin = 48 V. Bottom trace (20 A/div., 2 ms/div.) is an expansion of the on-time portion of the top trace.



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5.3 **QME48T40018 (1.8 Volts Out)**

Conditions: TA = 25 °C, Airflow = 300 LFM (1.5 m/s), Vin = 48 VDC, Vout = 1.8 VDC unless otherwise specified.

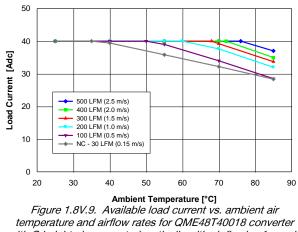
Operating Input Voltage Range 36 48 75 VDC Input Under Voltage Lockout 33 34 35 VDC Turn-on Threshold 31 32 33 VDC Input Voltage Transient 100 ms 100 VDC Maximum Input Current 40 ADC Out Ø 36 VDC In 2.4 ADC Input Stand-by Current VIn = 48V, converter disabled 3 mA Input No Load Current (0 load on the output) Vin = 48V, 25 MHz bandwidth 9 mAFK-PF Input Voltage Range Vin = 48V, 25 MHz bandwidth 9 mAFK-PF Input Voltage Range Vin = 48V, 25 MHz bandwidth 9 mAFK-PF Uptut Obtaracteristics 60 48 0 40.000 μF Output Voltage Range Pus full load (resistive) 40.000 μF 2 47 52 ADC Output Current Range 0 40 ADC							
Operating Input Voltage Range 36 48 75 VDC Input Under Voltage Lockout 33 34 35 VDC Turn-on Threshold 31 32 33 VDC Input Voltage Transient 100 ms 100 VDC Maximum Input Current 40 ADC Out Ø 36 VDC In 2.4 ADC Input Stand-by Current VIn = 48V, converter disabled 3 mA Input No Load Current (0 load on the output) Vin = 48V, 25 MHz bandwidth 9 mAFK-PF Input Voltage Range Vin = 48V, 25 MHz bandwidth 9 mAFK-PF Input Voltage Range Vin = 48V, 25 MHz bandwidth 9 mAFK-PF Uptut Obtaracteristics 60 48 0 40.000 μF Output Voltage Range Pus full load (resistive) 40.000 μF 2 47 52 ADC Output Current Range 0 40 ADC	PARAMETER		CONDITIONS / DESCRIPTION	MIN	TYP	MAX	UNITS
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Turn-on Threshold 33 34 35 VDC Turn-off Threshold 31 32 33 VDC Input Voltage Transient 100 ms 100 VDC Maximum Input Current 40 ADC Out @ 36 VDC In 2.4 ADC Input Stand-by Current Vin = 48V, converter disabled 3 mA Input No Load Current (io load on the output) Vin = 48V, converter enabled 45 mA Input Voltage Ripple Rejection 120 Hz 60 dB Output Characteristics External Load Capacitance Plus full load (resistive) 40,000 μ F Output Current Range 0 40 ADC Output Current Range 0 40 ADC Output Voltage Set Point (no load) Non-latching 42 47 52 ADC Output Voltage Set Point (no load) Non-latching 9 Arms MVC MVC Output Voltage Range Over line, load and temperature ¹ -1.5 *1.5 %Vout Output Regulation Over Load VOUT = 3.3 VDC 55 110 mVPK-PF Output Regulation Over Load	Operating Input Voltage Range			36	48	75	VDC
Turn-off Threshold 31 32 33 VDC Input Voltage Transient 100 ms 100 VDC Maximum Input Current 40 ADC Out @ 36 VDC In 2.4 ADC Input Stand-by Current Vin = 48V, converter disabled 3 mA Input Reflected-Ripple Current, is Vin = 48V, converter enabled 45 mA Input Voltage Ripple Rejection 120 Hz 60 dB Output Characteristics 60 dB dB External Load Capacitance Plus full load (resistive) 40,000 µF Output Characteristics 0 40 ADC Current Limit Inception Non-latching 42 47 52 ADC Peak Short-Circuit Current Non-latching 9 Arms Add Output Voltage Set Point (no load) VOUT = 3.3 VDC mV 1.818 VDC Output Ripple and Noise – 25 MHz bandwidth 10 mVFK-PH VOUT = 1.0 VDC 55 110 mVFK-PH VOUT = 1.0 VDC Full load + 10 µF tantalum + 1 µF ceramic 55 110 mVFK-PH VOUT = 1.0 VDC	Input Under Voltage Lockout						
Input Voltage Transient100 ms100VCCMaximum Input Current40 ADC Out @ 36 VDC In2.4ADCInput Stand-by CurrentVin = 48V, converter disabled3mAInput No Load Current (0 load on the output)Vin = 48V, converter enabled45mAInput Voltage Ripple Rejection120 Hz60dBOutput Voltage Ripple Rejection120 Hz60dBOutput Voltage Ripple Rejection120 Hz60dBOutput Current Range040ADCCurrent Limit InceptionNon-latching424752Peak Short-Circuit CurrentNon-latching, Short = 10 mQ5060ARMS Short-Circuit CurrentNon-latching, Short = 10 mQ1.818VOctOutput Voltage RangeOver line, load and temperature ¹ -1.5+1.5%VoutOutput Voltage RangeOver line, load and temperature ¹ -1.5+1.5%VoutVoutput Ripple and Noise - 25 MHz bandwidthCo = 1 µF ceramic (Fig. 1.8V.17)50 ² mVOutput Gidge Sol%-75%-50% of lout Max, di/dt = 0.1 A/µsCo = 1 µF ceramic (Fig. 1.8V.17)50 ² mVSetting Time to 1% of VoutCo = 470 µF POS + 1 µF ceramic130 ² mVSetting Time to 1% of Vout561 9 ² µsEfficiency15 ² µs57ys100% Load86.5%%	Turn-on Threshold			33	34	35	VDC
Name Maximum Input Current40 ADC Out @ 36 VDC In2.4ADC Maximum Input CurrentInput Stand-by CurrentVin = 48V, converter disabled3mAInput No Load Current (0 load on the output)Vin = 48V, converter enabled45mAInput Reflected-Ripple Current, isVin = 48V, 25 MHz bandwidth9mAPK-PFInput Voltage Ripple Rejection120 Hz60dBOutput Characteristics40,000 μ FExternal Load CapacitancePlus full load (resistive)40,000 μ GOutput Current Range040ADCCurrent Limit InceptionNon-latching424752Pask Short-Circuit CurrentNon-latching, Short = 10 mQ5060ARMS Short-Circuit CurrentNon-latching9ArmsOutput Voltage RangeOver line, load and temperature ¹ -1.5+1.5%VoutOutput Regulation Over LoadEt 2 ± 5 mVOutput Ripple and Noise – 25 MHz bandwidthFull load + 10 µF tantalum + 1 µF ceramic55110mVPK-PFDutput Ripple and Noise – 25 MHz bandwidthCo = 1 µF ceramic (Fig. 1.8V.17)50 ² mVOutput di/dt = 5 A/µsCo = 1 µF ceramic (Fig. 1.8V.17)50 ² mVSetting Time to 1% of VoutCo = 470 µF POS + 1 µF ceramic130 ² mVSetting Time to 1% of VoutCo = 470 µF POS + 1 µF ceramic15 ² μ SEfficiency10%66.5%	Turn-off Threshold			31	32	33	VDC
Input Stand-by CurrentVin = 48V, converter disabled3mAInput No Load Current (0 load on the output)Vin = 48V, converter enabled45mAInput Reflected-Ripple Current, isVin = 48V, 25 MHz bandwidth9mAPK-PHInput Voltage Ripple Rejection120 Hz60dBOutput Characteristics6040ADCCurrent Iange040ADCCurrent Limit InceptionNon-latching424752Peak Short-Circuit CurrentNon-latching, Short = 10 mQ5060ARMS Short-Circuit CurrentNon-latching, Short = 10 mQ5060ARMS Short-Circuit CurrentNon-latching9ArmsOutput Voltage Set Point (no load)1.7821.8001.818VDCOutput Voltage RangeOver Line±2±5mVOutput Voltage RangeOver Line, load and temperature ¹ -1.5+1.5%VoutOutput Voltage RangeOver Line, load and temperature ¹ -1.5+1.5%VoutOutput Voltage RangeOver Line, load and temperature ¹ -1.5+1.5%VoutOutput Ripple and Noise - 25 MHz bandwidthFull load + 10 µF tantalum + 1 µF ceramic3570mVPK-PHVOUT = 1.0 VDC Full load + 10 µF tantalum + 1 µF ceramic13670mVdi/dt = 5 A/µsCo = 1 µF ceramic (Fig. 1.8V.17)50 ² mVdi/dt = 5 A/µsCo = 1 µF ceramic (Fig. 1.8V.17)50 ² mVSetting Time to 1% of Vout15 ² µs </td <td>Input Voltage Transient</td> <td></td> <td>100 ms</td> <td></td> <td></td> <td>100</td> <td>VDC</td>	Input Voltage Transient		100 ms			100	VDC
Input No Load Current (0 load on the output)Vin = 48V, converter enabled45mAInput Reflected-Ripple Current, isVin = 48V, 25 MHz bandwidth9mAPK-PtInput Voltage Ripple Rejection120 Hz60dBOutput Characteristics40,000 μ FExternal Load CapacitancePlus full load (resistive)40,000 μ FOutput Current Range040ADCCurrent Limit InceptionNon-latching424752ADCPeak Short-Circuit CurrentNon-latching, Short = 10 mQ5060ARMS Short-Circuit CurrentNon-latching9ArmsOutput Voltage Set Point (no load)1.7821.8001.818VDCOutput Voltage RangeOver Line±2±5mVOutput Voltage RangeOver line, load and temperature1-1.5+1.5%VoutVOUT = 3.3 VDCVOUT = 3.3 VDC100mVPK-PtVOUT = 1.0 VDC Full load + 10 µF tantalum + 1 µF ceramic3570mVPK-PtVOUT = 1.0 VDC Full load + 10 µF tantalum + 1 µF ceramic3570mVPK-PtVOUT = 1.0 VDC full load + 10 µF tantalum + 1 µF ceramic1302mVdi/dt = 5 A/µsCo = 470 µF POS + 1 µF ceramic1302mVSetting Time to 1% of Vout152 μ S μ SEfficiency152 μ S μ S μ SItories152 μ S μ S μ SDynamic Response152 μ S μ S μ SEfficiency	Maximum Input Current		40 ADC Out @ 36 VDC In			2.4	ADC
Non-Input Reflected-Ripple Current, isVin = 48V, 25 MHz bandwidth9mAPK-PrInput Voltage Ripple Rejection120 Hz60dBOutput Voltage Ripple Rejection120 Hz60 μ FOutput CharacteristicsExternal Load CapacitancePlus full load (resistive)40,000 μ FOutput Current Range040ADCCurrent Limit InceptionNon-latching424752ADCPeak Short-Circuit CurrentNon-latching, Short = 10 mQ5060ARMS Short-Circuit CurrentNon-latching9ArmsOutput Voltage Set Point (no load)1.7821.8001.818VDCOutput Regulation Over Line±2±5mVOutput Voltage RangeOver line, load and temperature¹-1.5+1.5%VoutOutput Voltage RangeOver line, load and temperature¹-1.5+1.5%VoutOutput Ripple and Noise – 25 MHz bandwidthFull load + 10 µF tantalum + 1 µF ceramic55110mVPK-PFVOUT = 1.0 VDC Full load + 10 µF tantalum + 1 µF ceramic3570mVPK-PFDynamic ResponseLoad Change 50%-75%-50% of lout Max, di/dt = 5 A/µsCo = 1 µF ceramic (Fig. 1.8V.17)502mVSettling Time to 1% of Vout152 μ s μ sEfficiency152 μ sEfficiency15165%	Input Stand-by Current		Vin = 48V, converter disabled		3		mA
Appendix the constraint of the transmission of the constraint of the transmission of the constraint of the transmission of the constraint o	Input No Load Current (0 load on the out	tput)	Vin = 48V, converter enabled		45		mA
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External Load CapacitancePlus full load (resistive) $40,000$ μ FOutput Current Range040ADCCurrent Limit InceptionNon-latching424752ADCPeak Short-Circuit CurrentNon-latching, Short = 10 mQ5060ARMS Short-Circuit CurrentNon-latching9ArmsOutput Voltage Set Point (no load)1.7821.8001.818VDCOutput Regulation Over Line ± 2 ± 5 mVOutput Regulation Over Load ± 2 ± 5 mVOutput Voltage RangeOver line, load and temperature ¹ -1.5 ± 1.5 %VoutOutput Ripple and Noise - 25 MHz bandwidthVOUT = 3.3 VDC Full load + 10 µF tantalum + 1 µF ceramic55110mVPK-PFVOUT = 0.1 A/µsCo = 1 µF ceramic (Fig. 1.8V.17)502mVmVdi/dt = 0.1 A/µsCo = 1 µF ceramic (Fig. 1.8V.17)502mVSettling Time to 1% of VoutCo = 1 µF ceramic (Fig. 1.8V.17)502mVSettling Time to 1% of Vout162 μs μs Efficiency100% Load86.5%	Input Voltage Ripple Rejection		120 Hz		60		dB
Under the formation of	Output Characteristics						
Current Limit InceptionNon-latching424752ADCPeak Short-Circuit CurrentNon-latching, Short = 10 mQ5060ARMS Short-Circuit CurrentNon-latching9ArmsOutput Voltage Set Point (no load)1.7821.8001.818VDCOutput Regulation Over Line ± 2 ± 5 mVOutput Regulation Over Load ± 2 ± 5 mVOutput Regulation Over Load ± 2 ± 5 mVOutput Regulation Over Load $\psi VOUT = 3.3 \text{ VDC}$ ± 1.5 $\% Vout$ Output Ripple and Noise - 25 MHz bandwidthFull load + 10 µF tantalum + 1 µF ceramic 55 110mVPK-PF $VOUT = 1.0 \text{ VDC}$ Full load + 10 µF tantalum + 1 µF ceramic 35 70mVPK-PF $Dynamic Response$ $Co = 1 \mu F$ ceramic (Fig. 1.8V.17) 50^2 mVdi/dt = $5 A/\mu s$ $Co = 470 \mu F OS + 1 \mu F$ ceramic 130^2 mVSettling Time to 1% of Vout 15^2 μs μs Efficiency100% Load86.5%	External Load Capacitance		Plus full load (resistive)			40,000	μF
Peak Short-Circuit CurrentNon-latching, Short = 10 mΩ5060ARMS Short-Circuit CurrentNon-latching9ArmsOutput Voltage Set Point (no load)1.7821.8001.818VDCOutput Regulation Over Line ± 2 ± 5 mVOutput Regulation Over Load $\psi UUT = 3.3 \ VDC$ ± 1.5 ± 1.5 Output Voltage RangeOver line, load and temperature ¹ -1.5 ± 1.5 Output Ripple and Noise - 25 MHz bandwidthFull load + 10 µF tantalum + 1 µF ceramic 55 110 mVPK-PHVOUT = 1.0 VDC Full load + 10 µF tantalum + 1 µF ceramic 35 70 mVPK-PHDynamic Response $20 \pm 470 \mu$ F pOS + 1 µF ceramic 130^2 mVLoad Change 50%-75%-50% of lout Max, di/dt = $5 A/\mu$ sCo = 1 µF ceramic (Fig. 1.8V.17) 50^2 mVSettling Time to 1% of Vout 15^2 μ s μ sEfficiency100% Load86.5%	Output Current Range			0		40	ADC
RMS Short-Circuit CurrentNon-latching9ArmsOutput Voltage Set Point (no load)1.7821.8001.818VDCOutput Regulation Over Line ± 2 ± 5 mVOutput Regulation Over Load $\psi U T = 3.3$ VDC ± 2 ± 5 mVOutput Voltage RangeOver line, load and temperature ¹ -1.5 ± 1.5 %VoutOutput Ripple and Noise -25 MHz bandwidthFull load $+10 \mu$ F tantalum $+1 \mu$ F ceramic 55 110 mVPK-PFVOUT = 1.0 VDC Full load $+10 \mu$ F tantalum $+1 \mu$ F ceramic 35 70 mVPK-PFDynamic ResponseLoad Change 50% - 75% - 50% of lout Max, di/dt = $0.1 \mu/\mu$ sCo = 1μ F ceramic (Fig. $1.8V.17$) 50^2 mVMVdi/dt = $5 \mu/\mu$ sCo = 1μ F ceramic (Fig. $1.8V.17$) 50^2 mVSettling Time to 1% of Vout 15^2 μ sEfficiency100% Load 86.5 %	Current Limit Inception		Non-latching	42	47	52	ADC
Output Voltage Set Point (no load)1.7821.8001.818VDCOutput Regulation Over Line ± 2 ± 5 mVOutput Regulation Over Load ± 2 ± 5 mVOutput Voltage RangeOver line, load and temperature ¹ -1.5 $+1.5$ %VoutOutput Voltage RangeOver line, load and temperature ¹ -1.5 $+1.5$ %VoutOutput Ripple and Noise - 25 MHz bandwidthFull load + 10 µF tantalum + 1 µF ceramic 55 110mVPK-PFVOUT = 1.0 VDC Full load + 10 µF tantalum + 1 µF ceramic 35 70 mVPK-PFDynamic Response $VOUT = 1.0 VDC$ Full load + 10 µF tantalum + 1 µF ceramic 35 70 mVPK-PFLoad Change 50%-75%-50% of lout Max, di/dt = 0.1 A/µsCo = 1 µF ceramic (Fig. 1.8V.17) 50^2 mVdi/dt = 5 A/µsCo = 470 µF POS + 1 µF ceramic 130^2 mVSettling Time to 1% of Vout 15^2 µsEfficiency100% Load 86.5 %	Peak Short-Circuit Current		Non-latching, Short = 10 m Ω		50	60	А
Output Regulation Over Line ± 2 ± 2 ± 5 mVOutput Regulation Over Load ± 2 ± 5 mVOutput Voltage RangeOver line, load and temperature ¹ -1.5 ± 1.5 %VoutOutput Voltage RangeOver line, load and temperature ¹ -1.5 ± 1.5 %VoutOutput Ripple and Noise - 25 MHz bandwidthFull load + 10 µF tantalum + 1 µF ceramic 55 110 mVPK-PFVOUT = 1.0 VDC Full load + 10 µF tantalum + 1 µF ceramic 35 70 mVPK-PFDynamic ResponseLoad Change 50%-75%-50% of lout Max, di/dt = 0.1 A/µs $Co = 1 µF$ ceramic (Fig. 1.8V.17) 50^2 mVdi/dt = 5 A/µsCo = 470 µF POS + 1 µF ceramic 130^2 mVSettling Time to 1% of Vout 15^2 $µs$ Efficiency100% Load 86.5 %	RMS Short-Circuit Current		Non-latching		9		Arms
Output Regulation Over Load ± 2 ± 5 mVOutput Voltage RangeOver line, load and temperature ¹ -1.5 ± 1.5 %VoutOutput Voltage RangeOver line, load and temperature ¹ -1.5 ± 1.5 %VoutOutput Ripple and Noise - 25 MHz bandwidthFull load + 10 µF tantalum + 1 µF ceramic 55 110 mVPK-PFVOUT = 1.0 VDC Full load + 10 µF tantalum + 1 µF ceramic 35 70 mVPK-PFDynamic Response 25 100 mVPK-PF 100 mVPK-PFLoad Change 50%-75%-50% of lout Max, di/dt = 0.1 A/µsCo = 1 µF ceramic (Fig. 1.8V.17) 50^2 mVdi/dt = 5 A/µsCo = 470 µF POS + 1 µF ceramic 130^2 mVSettling Time to 1% of Vout 15^2 µsEfficiency100% Load 86.5 %	Output Voltage Set Point (no load)			1.782	1.800	1.818	VDC
Output Voltage RangeOver line, load and temperature1-1.5 $+1.5$ %VoutOutput Ripple and Noise - 25 MHz bandwidthVOUT = 3.3 VDC Full load + 10 µF tantalum + 1 µF ceramic55110mVPK-PH MVPK-PHVOUT = 1.0 VDC Full load + 10 µF tantalum + 1 µF ceramic3570mVPK-PHDynamic Response $Co = 1 \mu F$ ceramic (Fig. 1.8V.17) 50^2 mVdi/dt = 5 A/µsCo = 470 µF POS + 1 µF ceramic 130^2 mVSettling Time to 1% of Vout 15^2 µsEfficiency100% Load86.5%	Output Regulation Over Line				±2	±5	mV
VOUT = 3.3 VDC Output Ripple and Noise – 25 MHz bandwidthFull load + 10μ F tantalum + 1μ F ceramic 55 110 mVPK-PH VOUT = 1.0 VDC Full load + 10μ F tantalum + 1μ F ceramic 35 70 mVPK-PH Dynamic Response 10μ F tantalum + 1μ F ceramic 35 70 mVPK-PH Load Change 50% - 75% - 50% of lout Max, di/dt = $0.1 \text{ A/}\mu$ sCo = 1μ F ceramic (Fig. $1.8V.17$) 50^2 mV Load Change 50% - 75% - 50% of lout Max, di/dt = $0.1 \text{ A/}\mu$ sCo = 1μ F ceramic (Fig. $1.8V.17$) 50^2 mV Settling Time to 1% of Vout 15^2 mV 15^2 mV Efficiency 100% Load 86.5%	Output Regulation Over Load				±2	±5	mV
Output Ripple and Noise – 25 MHz bandwidthFull load + 10 µF tantalum + 1 µF ceramic55110mVPK-PHVOUT = 1.0 VDC Full load + 10 µF tantalum + 1 µF ceramic3570mVPK-PHDynamic ResponseULoad Change 50%-75%-50% of lout Max, di/dt = 0.1 A/µsCo = 1 µF ceramic (Fig. 1.8V.17)50²mVdi/dt = 5 A/µsCo = 470 µF POS + 1 µF ceramic130²mVSettling Time to 1% of Vout15²µsEfficiency100% Load86.5%	Output Voltage Range		Over line, load and temperature ¹	-1.5		+1.5	%Vout
Full load + 10 µF tantalum + 1 µF ceramic3570mVPK-PHDynamic ResponseLoad Change 50%-75%-50% of lout Max, di/dt = 0.1 A/µsCo = 1 µF ceramic (Fig. 1.8V.17) 50^2 mVdi/dt = 0.1 A/µsCo = 1 µF ceramic (Fig. 1.8V.17) 50^2 mVdi/dt = 5 A/µsCo = 470 µF POS + 1 µF ceramic 130^2 mVSettling Time to 1% of Vout 15^2 µsEfficiency100% Load86.5%	Output Ripple and Noise – 25 MHz band	dwidth			55	110	mVPK-PK
Load Change 50%-75%-50% of lout Max, Co = 1 μ F ceramic (Fig. 1.8V.17) 50 ² mV di/dt = 0.1 A/ μ s Co = 1 μ F ceramic (Fig. 1.8V.17) 50 ² mV di/dt = 5 A/ μ s Co = 470 μ F POS + 1 μ F ceramic 130 ² mV Settling Time to 1% of Vout 15 ² μ s <i>Efficiency</i> 100% Load 86.5 %					35	70	mVPK-PK
di/dt = 0.1 A/μs Co = 1 μF ceramic (Fig. 1.8V.17) 50² mV di/dt = 5 A/μs Co = 470 μF POS + 1 μF ceramic 130² mV Settling Time to 1% of Vout 15² μs Efficiency 100% Load 86.5 %	Dynamic Response						
Settling Time to 1% of Vout 15 ² μs Efficiency 100% Load 86.5 %	0		Co = 1 μF ceramic (Fig. 1.8V.17)		50 ²		mV
Efficiency 86.5 %	di/dt = 5 A/µs		Co = 470 μF POS + 1 μF ceramic		130 ²		mV
100% Load 86.5 %	Settling Time to 1% of Vout				15 ²		μs
	Efficiency						
50% Load 88.5 %	100% Load				86.5		%
	50% Load				88.5		%

¹⁾ Operating ambient temperature range of -40 °C to 85 °C for converter.

²⁾ See waveforms for dynamic response and settling time for different output voltages.



Note: NC - Natural convection



with G height pins mounted vertically with air flowing from pin 1 to pin 3, MOSFET temperature ≤ 120 °C, Vin = 48 V.

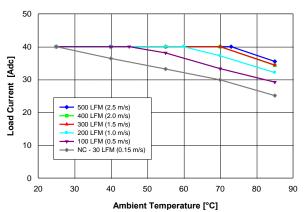


Figure 1.8V.10. Available load current vs. ambient air temperature and airflow rates for QME48T40018 converter with G height pins mounted horizontally with air flowing from pin 1 to pin 3, MOSFET temperature \leq 120 °C, Vin = 48 V.

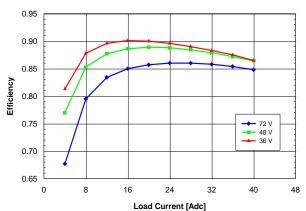


Figure 1.8V.11. Efficiency vs. load current and input voltage for QME48T40018 converter mounted horizontally with air flowing from pin 1 to pin 3 at a rate of 300 LFM (1.5 m/s) and $Ta = 25 \ ^{\circ}C.$

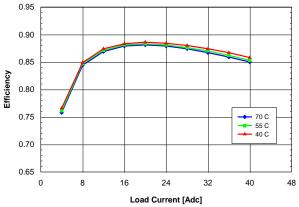


Figure 1.8V.12. Efficiency vs. load current and ambient temperature for QME48T40018 converter mounted horizontally with Vin = 48 V and air flowing from pin 1 to pin 3 at a rate of 200 LFM (1.0 m/s).



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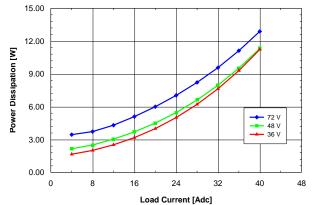


Figure 1.8V. 13. Power dissipation vs. load current and input voltage for QME48T40018 converter mounted horizontally with air flowing from pin 1 to pin 3 at a rate of 300 LFM (1.5 m/s) and Ta = 25 °C.

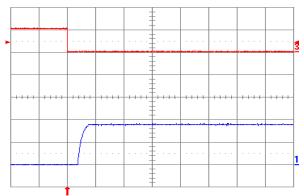


Figure 1.8V.15. Turn-on transient at full rated load current (resistive) with no output capacitor at Vin = 48 V, triggered via ON/OFF pin. Top trace: ON/OFF signal (5 V/div.). Bottom trace: output voltage (1 V/div.). Time scale: 2 ms/div.

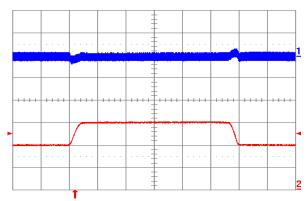


Figure 1.8V.17. Output voltage response to load current stepchange (20 A – 30 A – 20 A) at Vin = 48 V. Top trace: output voltage (100 mV/div.). Bottom trace: load current (10 A/div.). Current slew rate: 0.1 A/μs. Co = 1 μF ceramic. Time scale: 0.2 ms/div.



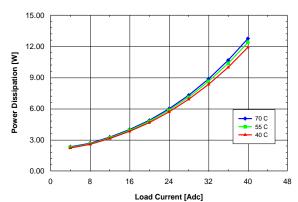


Figure 1.8V.14. Power dissipation vs. load current and ambient temperature for QME48T40018 converter mounted horizontally with Vin = 48 V and air flowing from pin 1 to pin 3 at a rate of 200 LFM (1.0 m/s).

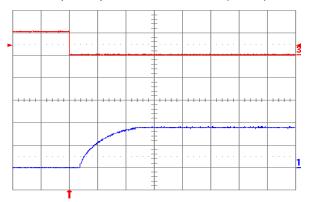


Figure 1.8V.16. Turn-on transient at full rated load current (resistive) plus 10,000 μF at Vin = 48 V, triggered via ON/OFF pin. Top trace: ON/OFF signal (5 V/div.). Bottom trace: output voltage (1 V/div.). Time scale: 2 ms/div.

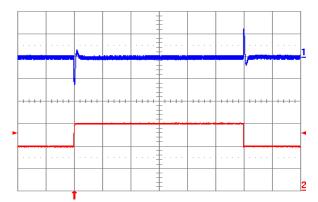


Figure 1.8V.18. Output voltage response to load current stepchange (20 A – 30 A – 20 A) at Vin = 48 V. Top trace: output voltage (100 mV/div.). Bottom trace: load current (10 A/div.). Current slew rate: 5 A/μs. Co = 470 μF POS + 1 μF ceramic. Time scale: 0.2 ms/div.

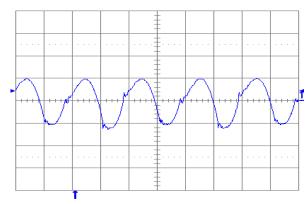


Figure 1.8V.19. Output voltage ripple (20mV/div.) at full rated load current into a resistive load with Co = 10 μF tantalum + 1 μF ceramic and Vin = 48 V. Time scale: 1 μs/div.

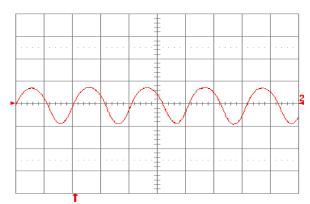


Figure 1.8V.21. Input reflected ripple current, *i*c (100 mA/div.), measured at input terminals at full rated load current and Vin = 48 V. Refer to Fig. 1.8V.20 for test setup. Time scale: 1 µs/div.

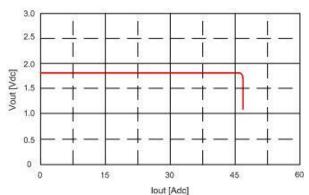


Figure 1.8V.23. Output voltage vs. load current showing current limit point and converter shutdown point. Input voltage has almost no effect on current limit characteristic.

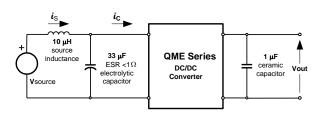


Figure 1.8V.20. Test setup for measuring input reflected ripple currents, ic and is.

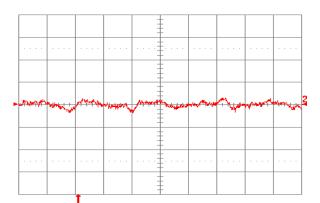


Figure 1.8V.22. Input reflected ripple current, is (10 mA/div.), measured through 10 µH at the source at full rated load current and Vin = 48 V. Refer to Fig. 1.8V.20 for test setup. Time scale: 1 µs/div.

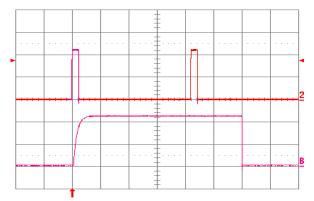


Figure 1.8V.24. Load current (top trace, 20 A/div., 50 ms/div.) into a 10 mΩ short circuit during restart, at Vin = 48 V. Bottom trace (20 A/div., 2 ms/div.) is an expansion of the on-time portion of the top trace.



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5.4 QME48T40015 (1.5 Volts Out)

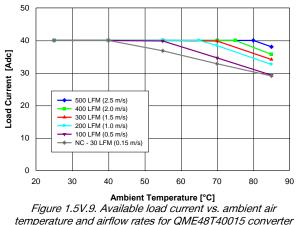
Conditions: TA = 25 °C, Airflow = 300 LFM (1.5 m/s), Vin = 48 VDC, Vout = 1.5 VDC unless otherwise specified.

Turn-on Threshold 33 34 35 VDC Turn-off Threshold 31 32 33 VDC Input Voltage Transient 100 ms 100 S2 30 VDC Maximum Input Current 40 ADC Out @ 36 VDC In 2.0 ADC Input Voltage Transient 100 VDC Maximum Input Current 40 ADC Out @ 36 VDC In 2.0 ADC Input Voltage Transient YDC Input Voltage Transient Vin = 48V, converter disabled 3 MA MA Input Voltage Ripple Rejection 120 Hz 60 MA MA Input Voltage Ripple Rejection 120 Hz 60 MA MA Output Current Enge Vin = 48V, 25 MHz bandwidth 9 mAPK-PH Output Current Lin Inception Non-latching 9 40 ADC Current Lini Inception Non-latching 42 47 52 ADC Peak Short-Circuit Current Non-latching 9 Arms 00 1.51 VDC Current Lini Inception Non-latching 1.485 1.500 1.51 VDC 1.							
Operating Input Voltage Range 36 48 75 VDC Input Under Voltage Lockout 33 34 35 VDC Turn-on Threshold 31 32 33 VDC Input Voltage Transient 100 ms 100 VDC Maximum Input Current 40 ADC Out @ 36 VDC In 2.0 ADC Input Stand-by Current Vin = 48V, converter disabled 3 mA Input No Load Current (0 load on the output) Vin = 48V, 25 MHz bandwidth 9 mARK-PF Input Voltage Ripple Rejection 120 Hz 60 dB 0 Output Characteristics Plus full load (resistive) 40.000 µF Output Current Range 0 40 ADC Output Current Range 0 40 ADC Output Current Range 0 40.000 µF MS Short-Circuit Current Non-latching 42 47 52 ADC Output Voltage Set Point (no load) Non-latching 1.600 1.515 VDC Output Voltage Set Point (no load)	PARAMETER		CONDITIONS / DESCRIPTION	MIN	ΤΥΡ	MAX	UNITS
Turn-on Threshold 33 34 35 VDC Turn-off Threshold 31 32 33 VDC Input Voltage Transient 100 ms 100 S2 30 VDC Maximum Input Current 40 ADC Out @ 36 VDC In 2.0 ADC Input Voltage Transient 100 VDC Maximum Input Current 40 ADC Out @ 36 VDC In 2.0 ADC Input Voltage Transient YDC Input Voltage Transient Vin = 48V, converter disabled 3 MA MA Input Voltage Ripple Rejection 120 Hz 60 MA MA Input Voltage Ripple Rejection 120 Hz 60 MA MA Output Current Enge Vin = 48V, 25 MHz bandwidth 9 mAPK-PH Output Current Lin Inception Non-latching 9 40 ADC Current Lini Inception Non-latching 42 47 52 ADC Peak Short-Circuit Current Non-latching 9 Arms 00 1.51 VDC Current Lini Inception Non-latching 1.485 1.500 1.51 VDC 1.	Input Characteristics	-		_	_	_	
Turn-on Threshold 33 34 35 VDC Turn-off Threshold 31 32 33 VDC Input Voltage Transient 100 ms 100 VDC Maximum Input Current 40 ADC Out @ 36 VDC In 2.0 ADC Input Stand-by Current Vin = 48V, converter disabled 3 mA Input No Load Current (io load on the output) Vin = 48V, converter enabled 44 mA Input Voltage Ripple Rejection 120 Hz 60 dB Output Voltage Ripple Rejection 120 Hz 60 dB Output Current Range 0 40.000 µF Output Current Range 0 400.000 µF Output Current Range 0 400.000 µF Output Current Range 0 40 ADC Peak Short-Circuit Current Non-latching 42 47 52 ADC Output Voltage Set Point (no load) Non-latching 9 Arms MV MV Output Regulation Over Load +12 ±5 mV MV MV MV E Output Regulation	Operating Input Voltage Range			36	48	75	VDC
Turn-off Threshold 31 32 33 VDC Input Voltage Transient 100 ms 100 VDC Maximum Input Current 40 ADC Out @ 36 VDC In 2.0 ADC Input Stand-by Current Vin = 48V, converter disabled 3 mA Input No Load Current (I0 load on the output) Vin = 48V, converter enabled 44 mA Input Voltage Ripple Rejection 120 Hz 60 dB <i>Output Oltaracteristics Uput Characteristics d d</i> External Load Capacitance Plus Iul load (resistive) 40,000 μ F Output Characteristics <i>d d</i> ADC Current Limit Inception Non-latching 42 47 52 ADC Peak Short-Circuit Current Non-latching, Short = 10 mΩ 50 60 A RMS Short-Circuit Current Non-latching 9 Arms MVC Output Voltage Rape Over line, load and temperature ¹ -1.5 +1.5 %Vout Output Rejulation Over Load VOUT = 3.3 VDC Full load + 10 µF tantalum + 1 µF ceramic 55 110 mVPK-PF	Input Under Voltage Lockout						
Input Voltage Transient100 ms100VCCMaximum Input Current40 ADC Out @ 36 VDC In2.0ADCInput Stand-by CurrentVin = 48V, converter disabled3mAInput No Load Current (b load on the output)Vin = 48V, converter enabled44mAInput Voltage Ripple Rejection120 Hz60dB <i>Output Characteristics</i> 20MACK-PFExternal Load CapacitancePlus full load (resistive)40,000 μ FOutput Current Range040ADCCurrent Limit InceptionNon-latching424752Peak Short-Circuit CurrentNon-latching, Short = 10 mQ5060ARMS Short-Circuit CurrentNon-latching, Short = 10 mQ1.515VDCOutput Voltage RangeOver line, load and temperature ¹ -1.5+1.5%VoutOutput Voltage RangeOver line, load and temperature ¹ -1.5+1.5%VoutVoutput Rejulation Over LoadFull load + 10 µF tantalum + 1 µF ceramic55110mVPK-PFVoutput Rejulation Over LoadCo = 1 µF ceramic (Fig. 1.5V.17)50 ² mVOutput Gidt = 5 A/µsCo = 1 µF ceramic (Fig. 1.5V.17)50 ² mVSettling Time to 1% of VoutCo = 470 µF POS + 1 µF ceramic132 ² µs <i>Efficiency</i> 15 ² µs <i>Fificiency</i> 15 ² µs100% LoadKot = 5 A/µsCo = 470 µF POS + 1 µF ceramic132 ² mV	Turn-on Threshold			33	34	35	VDC
Name40 ADC Out @ 36 VDC In2.0ADCInput Stand-by CurrentVin = 48V, converter disabled3mAInput No Load Current (0 load on the output)Vin = 48V, converter enabled44mAInput Reflected-Ripple Current, isVin = 48V, 25 MHz bandwidth9mAPK-PFInput Voltage Ripple Rejection120 Hz60dBOutput Characteristics40,000 μ FExternal Load CapacitancePlus full load (resistive)40,000 μ GOutput Current Range040ADCCurrent Limit InceptionNon-latching424752ADCPask Short-Circuit CurrentNon-latching, Short = 10 mQ5060ARMS Short-Circuit CurrentNon-latching9ArmsOutput Voltage RangeOver line, load and temperature ¹ -1.51.515VDCOutput Voltage RangeOver line, load and temperature ¹ -1.5+1.5%/outOutput Ripple and Noise - 25 MHz bandwidthFull load + 10 µF tantalum + 1 µF ceramic3570mVPK-PFDutput divid re 50% -75% of lout Max, di/dt = 0.1 AµsCo = 1 µF ceramic (Fig. 1.5V.17)50 ² mVOutput divid re 5 A/µsCo = 1 µF ceramic (Fig. 1.5V.17)50 ² mVSetting Time to 1% of VoutCo = 470 µF POS + 1 µF ceramic130 ² mVSetting Time to 1% of VoutCo = 470 µF POS + 1 µF ceramic15 ² μ SEfficiency100% Load84.5%%	Turn-off Threshold			31	32	33	VDC
Input Shand-by CurrentVin = 48V, converter disabled3mAInput No Load Current (0 load on the output)Vin = 48V, converter enabled44mAInput Reflected-Ripple Current, isVin = 48V, 25 MHz bandwidth9mAPK-PHInput Voltage Ripple Rejection120 Hz60dBOutput CharacteristicsExternal Load CapacitancePlus full load (resistive)40,000 μ FOutput Current Range040ADCCurrent Limit InceptionNon-latching424752ADCPeak Short-Circuit CurrentNon-latching, Short = 10 mQ5060ARMS Short-Circuit CurrentNon-latching9ArmsOutput Voltage Set Point (no load)1.4851.5001.515VDCOutput Voltage RangeOver Line±2±5mVOutput Voltage RangeOver line, load and temperature1-1.5+1.5%VoutOutput Voltage RangeOver line, load and temperature1-1.5110mVPK-PHVOUT = 3.3 VDC VOUT = 1.0 VDC Full load + 10 µF tantalum + 1 µF ceramic3570mVPK-PHVOUT = 1.0 VDC Full load + 10 µF tantalum + 1 µF ceramic3570mVPK-PHVOUT = 5.4/µsCo = 1 µF ceramic (Fig. 1.5V.17)50 ² mVdi/dt = 5 A/µsCo = 470 µF POS + 1 µF ceramic130 ² mVdi/dt = 5 A/µsCo = 470 µF POS + 1 µF ceramic132 ² μ SEfficiency15%130 ² mV100% Load84.5% <td>Input Voltage Transient</td> <td></td> <td>100 ms</td> <td></td> <td></td> <td>100</td> <td>VDC</td>	Input Voltage Transient		100 ms			100	VDC
Input No Load Current (0 load on the output)Vin = 48V, converter enabled44mAInput Reflected-Ripple Current, isVin = 48V, 25 MHz bandwidth9mAPK-PtInput Voltage Ripple Rejection120 Hz60dBOutput Characteristics40,000 μ FCurrent Iamit InceptionNon-latching424752Peak Short-Circuit CurrentNon-latching, Short = 10 mQ5060ARMS Short-Circuit CurrentNon-latching, Short = 10 mQ5060ARMS Short-Circuit CurrentNon-latching9ArmsOutput Voltage Set Point (no load)1.4851.5001.515VDCOutput Voltage RangeOver line, load and temperature1-1.5+1.5%VoutVoutput Voltage RangeOver line, load and temperature1-1.5+1.5%VoutVOUT = 3.3 VDCVOUT = 3.3 VDCVOUT = 1.0 VDCTo WPK-PtVoutput Ripple and Noise - 25 MHz bandwidthFull load + 10 µF tantalum + 1 µF ceramic55110mVPK-PtVOUT = 1.0 VDCFull load + 10 µF tantalum + 1 µF ceramic3570mVPK-PtVoutf di/dt = 0.1 A/µsCo = 1 µF ceramic (Fig. 1.5V.17)502mVmVSetting Time to 1% of Vout15² μ s $Efficiency10%MV100% Load84.5%%\pi\pi\pi$	Maximum Input Current		40 ADC Out @ 36 VDC In			2.0	ADC
Input Reflected-Ripple Current, isVin = 48V, 25 MHz bandwidth9mAPK-PrInput Voltage Ripple Rejection120 Hz60dB <i>Output Characteristics</i> 40,000 μ FCutrent Limit InceptionNon-latching424752ADCCurrent Limit InceptionNon-latching, Short = 10 mQ5060APeak Short-Circuit CurrentNon-latching, Short = 10 mQ5060ARMS Short-Circuit CurrentNon-latching9ArmsOutput Voltage Set Point (no load)1.4851.5001.515VDCOutput Voltage RangeOver line, load and temperature!-1.5+1.5%VoutOutput Voltage RangeOver line, load and temperature!-1.5+1.5%VoutVOUT = 3.3 VDC Full load + 10 µF tantalum + 1 µF ceramic55110mVPK-PFVOUT = 1.0 VDC Full load + 10 µF tantalum + 1 µF ceramic55110mVPK-PFDynamic ResponseCo = 1 µF ceramic (Fig. 1.5V.17)50 ² mVCad Change 50%-75%-50% of lout Max, di/dt = 5 A/µsCo = 1 µF ceramic (Fig. 1.5V.17)50 ² mVSettling Time to 1% of Vout15 ² µs15 ² µsEfficiency100% Load84.5%	Input Stand-by Current		Vin = 48V, converter disabled		3		mA
Input Voltage Ripple Rejection120 Hz60dBOutput Characteristics40,000 μ FCutput Current Range040ADCCurrent Limit InceptionNon-latching424752ADCPeak Short-Circuit CurrentNon-latching, Short = 10 mQ5060ARMS Short-Circuit CurrentNon-latching1.4851.5001.515VDCOutput Voltage Set Point (no load)	Input No Load Current (0 load on the ou	utput)	Vin = 48V, converter enabled		44		mA
Output CharacteristicsExternal Load CapacitancePlus full load (resistive)40,000 μ FOutput Current Range040ADCCurrent Limit InceptionNon-latching424752ADCPeak Short-Circuit CurrentNon-latching, Short = 10 mQ5060ARMS Short-Circuit CurrentNon-latching9ArmsOutput Voltage Set Point (no load)1.4851.5001.515VDCOutput Voltage Set Point (no load)±2±5mVOutput Regulation Over Line±2±5mVOutput Voltage RangeOver line, load and temperature ¹ -1.5+1.5%VoutOutput Voltage RangeOver line, load and temperature ¹ -1.5100mVPK-PFOutput Ripple and Noise - 25 MHz bandwidthFull load + 10 µF tantalum + 1 µF ceramic55110mVPK-PFVOUT = 1.0 VDC Full load + 10 µF tantalum + 1 µF ceramic3570mVPK-PFOutput did t = 0.1 A/µsCo = 1 µF ceramic (Fig. 1.5V.17)50 ² mVdi/dt = 0.1 A/µsCo = 1 µF ceramic (Fig. 1.5V.17)50 ² mVdi/dt = 5 A/µsCo = 470 µF POS + 1 µF ceramic130 ² mVSettling Time to 1% of Vout15 ² μs Efficiency100% Load84.5%	Input Reflected-Ripple Current, is		Vin = 48V, 25 MHz bandwidth		9		mAPK-PK
External Load CapacitancePlus full load (resistive) $40,000$ μ FOutput Current Range040ADCCurrent Limit InceptionNon-latching424752ADCPeak Short-Circuit CurrentNon-latching, Short = 10 mQ5060ARMS Short-Circuit CurrentNon-latching9ArmsOutput Voltage Set Point (no load)1.4851.5001.515VDCOutput Voltage Set Point (no load) ± 2 ± 2 ± 5 mVOutput Regulation Over Line ± 2 ± 5 mVOutput Regulation Over Load ψ Over line, load and temperature ¹ -1.5 ± 1.5 %VoutOutput Voltage RangeOver line, load and temperature ¹ -1.5 ± 1.5 %VoutOutput Ripple and Noise -25 MHz bandwidthFull load $+10 \mu$ F tantalum $+1 \mu$ F ceramic 55 110 mVPK-PF <i>Dynamic Response</i> VOUT = 1.0ν DC Full load $+10 \mu$ F tantalum $+1 \mu$ F ceramic 35 70 mVPK-PF <i>Dynamic Response</i> $50 = 1 \mu$ F ceramic (Fig. 1.5V.17) 50^2 mV 50^2 mVSettling Time to 1% of Vout $50 = 470 \mu$ F POS $+1 \mu$ F ceramic 130^2 mV 16^2 μ sEfficiency 16^2 μ s100% Load 84.5 $\%$ $\%$	Input Voltage Ripple Rejection		120 Hz		60		dB
Output Current Range040ADCCurrent Limit InceptionNon-latching424752ADCPeak Short-Circuit CurrentNon-latching, Short = 10 mQ5060ARMS Short-Circuit CurrentNon-latching9ArmsOutput Voltage Set Point (no load)1.4851.5001.515VDCOutput Regulation Over Line ± 2 ± 5 mVOutput Regulation Over Load ± 2 ± 5 mVOutput Voltage RangeOver line, load and temperature ¹ -1.5 $+1.5$ %VoutOutput Ripple and Noise - 25 MHz bandwidthFull load + 10 µF tantalum + 1 µF ceramic55110mVPK-PFVOUT = 1.0 VDC Full load + 10 µF tantalum + 1 µF ceramic3570mVPK-PFDynamic ResponseVOUT = 1.0 VDC Full load + 10 µF tantalum + 1 µF ceramic3570mVPK-PFDynamic ResponseCo = 1 µF ceramic (Fig. 1.5V.17)50 ² mVSettling Time to 1% of VoutCo = 470 µF POS + 1 µF ceramic13 ² µSIf <i>Lifeliancy</i> 100% Load84.5%	Output Characteristics						
Current Limit InceptionNon-latching424752ADCPeak Short-Circuit CurrentNon-latching, Short = 10 mQ5060ARMS Short-Circuit CurrentNon-latching9ArmsOutput Voltage Set Point (no load)1.4851.5001.515VDCOutput Regulation Over Line ± 2 ± 5 mVOutput Regulation Over Load ± 2 ± 5 mVOutput Voltage RangeOver line, load and temperature ¹ -1.5 ± 1.5 %VoutOutput Ripple and Noise - 25 MHz bandwidthFull load + 10 µF tantalum + 1 µF ceramic55110mVPK-PF <i>V</i> OUT = 1.0 VDC Full load + 10 µF tantalum + 1 µF ceramic3570mVPK-PF <i>Dynamic Response</i> $50^{\circ} = 1$ µF ceramic (Fig. 1.5V.17) $50^{\circ} = mV$ mVdi/dt = 5 A/µsCo = 1 µF ceramic (Fig. 1.5V.17) $50^{\circ} = mV$ mVSettling Time to 1% of Vout $15^{\circ} = 470$ µF POS + 1 µF ceramic $15^{\circ} = \mu$ μ 100% Load84.5%	External Load Capacitance		Plus full load (resistive)			40,000	μF
Peak Short-Circuit CurrentNon-latching, Short = 10 mΩ5060ARMS Short-Circuit CurrentNon-latching9ArmsOutput Voltage Set Point (no load)1.4851.5001.515VDCOutput Regulation Over Line ± 2 ± 5 mVOutput Regulation Over Load ± 2 ± 5 mVOutput Voltage RangeOver line, load and temperature ¹ -1.5+1.5%VoutOutput Voltage RangeOver line, load and temperature ¹ -1.5+1.5%VoutOutput Ripple and Noise - 25 MHz bandwidthFull load + 10 µF tantalum + 1 µF ceramic55110mVPK-PHVOUT = 1.0 VDC Full load + 10 µF tantalum + 1 µF ceramic3570mVPK-PHDynamic Response 50° 60° mVLoad Change 50%-75%-50% of lout Max, di/dt = 5 A/µsCo = 1 µF ceramic (Fig. 1.5V.17) 50° mVSettling Time to 1% of VoutCo = 470 µF POS + 1 µF ceramic 130° mVEfficiency100% Load84.5%	Output Current Range			0		40	ADC
RMS Short-Circuit CurrentNon-latching9ArmsOutput Voltage Set Point (no load)1.4851.5001.515VDCOutput Regulation Over Line ± 2 ± 5 mVOutput Regulation Over Load $\psi U T = 3.3$ VDC ± 2 ± 5 mVOutput Voltage RangeOver line, load and temperature ¹ -1.5 ± 1.5 %VoutOutput Ripple and Noise -25 MHz bandwidthFull load $+10 \mu$ F tantalum $+1 \mu$ F ceramic 55 110 mVPK-PFOutput Ripple and Noise -25 MHz bandwidthFull load $+10 \mu$ F tantalum $+1 \mu$ F ceramic 35 70 mVPK-PFDynamic Response $U = 1.0 \text{VDC}$ Full load $+10 \mu$ F tantalum $+1 \mu$ F ceramic 50° mV Load Change 50% - 75% - 50% of lout Max, di/dt $= 0.1 \text{A}/\mu\text{s}$ Co $= 1 \mu$ F ceramic (Fig. $1.5V.17$) 50° mV Setting Time to 1% of Vout $50 = 470 \mu$ F POS $+ 1 \mu$ F ceramic 130° mV Setting Time to 1% of Vout 15° μ s $Efficiency$ 15° $\%$ 100% Load 84.5 $\%$ $\%$ $\%$	Current Limit Inception		Non-latching	42	47	52	ADC
Output Voltage Set Point (no load)1.4851.5001.515VDCOutput Regulation Over Line ± 2 ± 5 mVOutput Regulation Over Load ± 2 ± 5 mVOutput Voltage RangeOver line, load and temperature ¹ -1.5 $+1.5$ %VoutOutput Voltage RangeOver line, load and temperature ¹ -1.5 $+1.5$ %VoutOutput Ripple and Noise - 25 MHz bandwidthFull load + 10 µF tantalum + 1 µF ceramic 55 110mVPK-PFVOUT = 1.0 VDC Full load + 10 µF tantalum + 1 µF ceramic 35 70 mVPK-PFDynamic Response $VOUT = 1.0 VDC$ Full load + 10 µF tantalum + 1 µF ceramic 35 70 mVPK-PFDynamic Response $VOUT = 1.0 VDC$ Full load + 10 µF tantalum + 1 µF ceramic 35 70 mVPK-PFDynamic Response $VOUT = 1.0 VDC$ Full load + 10 µF teramic (Fig. 1.5V.17) 50^2 mVdi/dt = $5 A/\mu s$ Co = 1μ F ceramic (Fig. 1.5V.17) 50^2 mVdi/dt = $5 A/\mu s$ Co = 470μ F POS + 1μ F ceramic 130^2 mVSettling Time to 1% of Vout 15^2 μs μs Efficiency100% Load 84.5 %	Peak Short-Circuit Current		Non-latching, Short = 10 m Ω		50	60	А
Output Regulation Over Line ± 2 ± 5 mVOutput Regulation Over Load ± 2 ± 5 mVOutput Regulation Over LoadOver line, load and temperature ¹ -1.5 ± 1.5 $\# V$ Output Voltage RangeOver line, load and temperature ¹ -1.5 ± 1.5 $\# V$ $\# V$ Output Ripple and Noise -25 MHz bandwidthFull load $\pm 10 \ \mu$ F tantalum $\pm 1 \ \mu$ F ceramic 55 110 mVPK-PHVOUT = $1.0 \ VDC$ Full load $\pm 10 \ \mu$ F tantalum $\pm 1 \ \mu$ F ceramic 35 70 mVPK-PHDynamic Response $VOUT = 1.0 \ VDC$ Full load $\pm 10 \ \mu$ F ceramic (Fig. $1.5V.17$) 50^2 mVdi/dt = $5.4/\mu$ sCo = $1 \ \mu$ F ceramic (Fig. $1.5V.17$) 50^2 mVdi/dt = $5.4/\mu$ sCo = $470 \ \mu$ F POS $\pm 1 \ \mu$ F ceramic 130^2 mVSettling Time to 1% of Vout 15^2 μ sEfficiency100% Load 84.5 $\%$	RMS Short-Circuit Current		Non-latching		9		Arms
Output Regulation Over Load ± 2 ± 5 mVOutput Voltage RangeOver line, load and temperature ¹ -1.5 ± 1.5 %VoutOutput Voltage RangeOver line, load and temperature ¹ -1.5 ± 1.5 %VoutOutput Ripple and Noise -25 MHz bandwidthFull load $\pm 10 \ \mu$ F tantalum $\pm 1 \ \mu$ F ceramic 55 110 mVPK-PHVOUT = 1.0 VDC Full load $\pm 10 \ \mu$ F tantalum $\pm 1 \ \mu$ F ceramic 35 70 mVPK-PHDynamic Response U Load Change 50%-75%-50% of lout Max, di/dt = 0.1 A/ μ sCo = 1 \ \muF ceramic (Fig. 1.5V.17) 50^2 mV mV di/dt = 5 A/ μ sCo = 470 \ \muF POS $\pm 1 \ \mu$ F ceramic 130^2 mV mV Settling Time to 1% of Vout 15^2 μ s E E E 100% Load 84.5 % $\%$ $\%$ $\%$	Output Voltage Set Point (no load)			1.485	1.500	1.515	VDC
Output Voltage RangeOver line, load and temperature1-1.5+1.5%VoutOutput Ripple and Noise - 25 MHz bandwidthVOUT = 3.3 VDC Full load + 10 µF tantalum + 1 µF ceramic55110mVPK-PH MVPK-PHVOUT = 1.0 VDC Full load + 10 µF tantalum + 1 µF ceramic3570mVPK-PHDynamic ResponseVOUT = 0.1 A/µsCo = 1 µF ceramic (Fig. 1.5V.17)502mVdi/dt = 5 A/µsCo = 470 µF POS + 1 µF ceramic1302mVSettling Time to 1% of Vout152µsEfficiency100% Load84.5%	Output Regulation Over Line				±2	±5	mV
VOUT = 3.3 VDC Output Ripple and Noise - 25 MHz bandwidthFull load + 10μ F tantalum + 1μ F ceramic $55 110 m$ VPK-PHVOUT = 1.0 VDC Full load + 10μ F tantalum + 1μ F ceramic $35 70 m$ VPK-PHDynamic ResponseULoad Change 50% - 75% - 50% of lout Max, di/dt = $0.1 \text{ A/}\mu$ sCo = 1μ F ceramic (Fig. $1.5V.17$) $50^2 mV$ di/dt = $5 \text{ A/}\mu$ sCo = 1μ F ceramic (Fig. $1.5V.17$) $50^2 mV$ Settling Time to 1% of Vout $15^2 \mu$ sEfficiency100% Load 84.5%	Output Regulation Over Load				±2	±5	mV
Output Ripple and Noise – 25 MHz bandwidthFull load + 10 µF tantalum + 1 µF ceramic55110mVPK-PHVOUT = 1.0 VDC Full load + 10 µF tantalum + 1 µF ceramic3570mVPK-PHDynamic ResponseULoad Change 50%-75%-50% of lout Max, di/dt = 0.1 A/µsCo = 1 µF ceramic (Fig. 1.5V.17)50²mVdi/dt = 5 A/µsCo = 1 µF ceramic (Fig. 1.5V.17)50²mVSettling Time to 1% of Vout15²µsEfficiency100% Load84.5%	Output Voltage Range		Over line, load and temperature ¹	-1.5		+1.5	%Vout
Full load + 10 µF tantalum + 1 µF ceramic3570mVPK-PHDynamic ResponseLoad Change 50%-75%-50% of lout Max, di/dt = 0.1 A/µsCo = 1 µF ceramic (Fig. 1.5V.17) 50^2 mVdi/dt = 5 A/µsCo = 470 µF POS + 1 µF ceramic 130^2 mVSettling Time to 1% of Vout 15^2 µsEfficiency100% Load84.5%	Output Ripple and Noise – 25 MHz ban	dwidth			55	110	mVPK-PK
Load Change 50%-75%-50% of lout Max, Co = 1 μ F ceramic (Fig. 1.5V.17) 50 ² mV di/dt = 0.1 A/ μ s Co = 1 μ F ceramic (Fig. 1.5V.17) 50 ² mV di/dt = 5 A/ μ s Co = 470 μ F POS + 1 μ F ceramic 130 ² mV Settling Time to 1% of Vout 15 ² μ s <i>Efficiency</i> 100% Load 84.5 %					35	70	mVPK-PK
di/dt = 0.1 A/μs Co = 1 μF ceramic (Fig. 1.5V.17) 50² mV di/dt = 5 A/μs Co = 470 μF POS + 1 μF ceramic 130² mV Settling Time to 1% of Vout 15² μs Efficiency 100% Load 84.5 %	Dynamic Response						
Settling Time to 1% of Vout 15 ² μs Efficiency 100% Load 84.5 %	0		Co = 1 µF ceramic (Fig. 1.5V.17)		50 ²		mV
Efficiency 84.5 %	di/dt = 5 A/µs	S	Co = 470 μ F POS + 1 μ F ceramic		130 ²		mV
100% Load 84.5 %	Settling Time to 1% of Vout				15 ²		μs
	Efficiency						
50% Load 87.0 %	100% Load				84.5		%
	50% Load				87.0		%

¹⁾ Operating ambient temperature range of -40 °C to 85 °C for converter.

²⁾ See waveforms for dynamic response and settling time for different output voltages.





temperature and airflow rates for QME48T40015 converter with G height pins mounted vertically with air flowing from pin 1 to pin 3, MOSFET temperature ≤ 120 °C, Vin = 48 V.

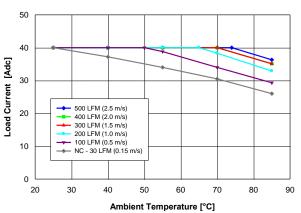


Figure 1.5V.10. Available load current vs. ambient air temperature and airflow rates for QME48T40015 converter with G height pins mounted horizontally with air flowing from pin 1 to pin 3, MOSFET temperature \leq 120 °C, Vin = 48 V.



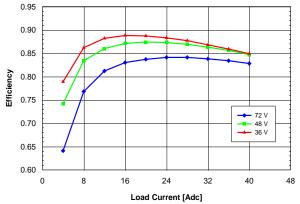


Figure 1.5V.11. Efficiency vs. load current and input voltage for QME48T40015 converter mounted horizontally with air flowing from pin 1 to pin 3 at a rate of 300 LFM (1.5 m/s) and Ta = 25 °C.

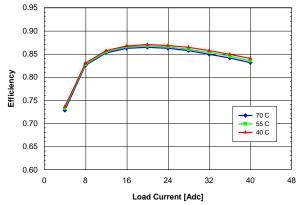


Figure 1.5V.12. Efficiency vs. load current and ambient temperature for QME48T40015 converter mounted horizontally with Vin = 48 V and air flowing from pin 1 to pin 3 at a rate of 200 LFM (1.0 m/s).



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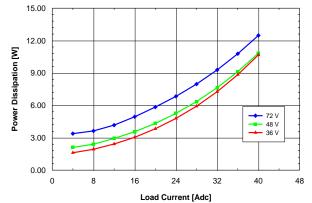


Figure 1.5V.13. Power dissipation vs. load current and input voltage for QME48T40015 converter mounted horizontally with air flowing from pin 1 to pin 3 at a rate of 300 LFM (1.5 m/s) and Ta = $25 \ ^{\circ}$ C.

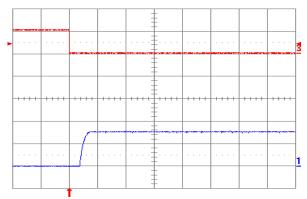


Figure 1.5V.15. Turn-on transient at full rated load current (resistive) with no output capacitor at Vin = 48 V, triggered via ON/OFF pin. Top trace: ON/OFF signal (5 V/div.). Bottom trace: output voltage (1 V/div.). Time scale: 2 ms/div.

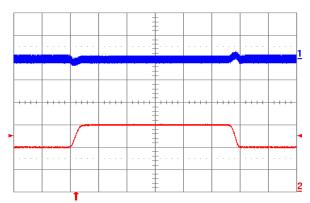


Figure 1.5V.17. Output voltage response to load current stepchange (20 A – 30 A – 20 A) at Vin = 48 V. Top trace: output voltage (100 mV/div.). Bottom trace: load current (10 A/div.). Current slew rate: 0.1 A/μs. Co = 1 μF ceramic. Time scale: 0.2 ms/div.



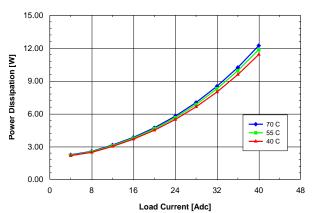


Figure 1.5V.14. Power dissipation vs. load current and ambient temperature for QME48T40015 converter mounted horizontally with Vin = 48 V and air flowing from pin 1 to pin 3 at a rate of 200 LFM (1.0 m/s).

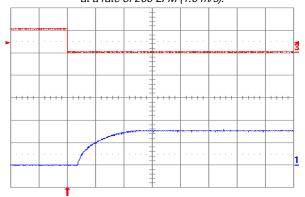


Figure 1.5V.16. Turn-on transient at full rated load current (resistive) plus 10,000 μF at Vin = 48 V, triggered via ON/OFF pin. Top trace: ON/OFF signal (5 V/div.). Bottom trace: output voltage (1 V/div.). Time scale: 2 ms/div.

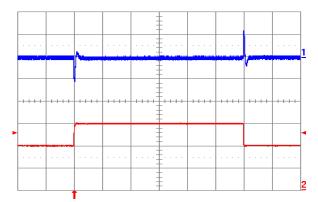


Figure 1.5V.18. Output voltage response to load current stepchange (20 A – 30 A – 20 A) at Vin = 48 V. Top trace: output voltage (100 mV/div.). Bottom trace: load current (10 A/div.). Current slew rate: 5A/μs. Co = 470 μF POS + 1 μF ceramic. Time scale: 0.2 ms/div.

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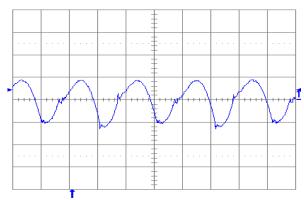


Figure 1.5V.19. Output voltage ripple (20 mV/div.) at full rated load current into a resistive load with $Co = 10 \ \mu F$ tantalum + 1 μF ceramic and Vin = 48 V. Time scale: 1 μs /div.

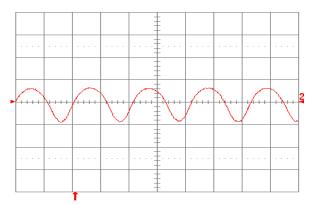


Figure 1.5V.21. Input reflected ripple current, *i*c (100 mA/div.), measured at input terminals at full rated load current and Vin = 48 V. Refer to Fig. 1.5V.20 for test setup. Time scale: 1 µs/div.

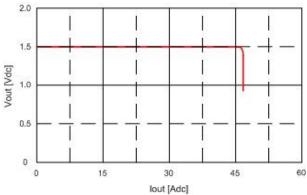


Figure 1.5V.23. Output voltage vs. load current showing current limit point and converter shutdown point. Input voltage has almost no effect on current limit characteristic.

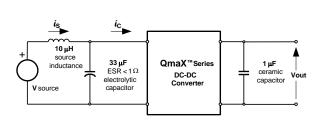


Figure 1.5V.20. Test setup for measuring input reflected ripple currents, *i*c and *i*s.

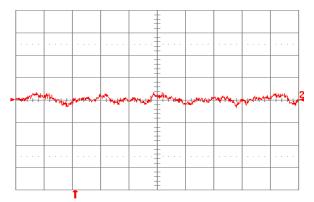


Figure 1.5V.22. Input reflected ripple current, is (10 mA/div.), measured through 10 µH at the source at full rated load current and Vin = 48 V. Refer to Fig. 1.5V.20 for test setup. Time scale: 1 µs/div..

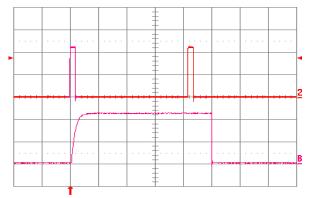


Figure 1.5V.24. Load current (top trace, 20 A/div., 50 ms/div.) into a 10 mΩ short circuit during restart, at Vin = 48 V. Bottom trace (20 A/div., 2 ms/div.) is an expansion of the on-time portion of the top trace.



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5.5 QME48T40012 (1.2 Volts Out)

Conditions: TA = 25 °C, Airflow = 300 LFM (1.5 m/s), Vin = 48 VDC, Vout = 1.2 VDC unless otherwise specified.

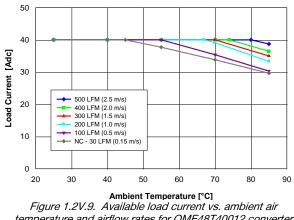
PARAMETER	CONDITIONS / DESCRIPTION	MIN	ТҮР	MAX	UNITS
Input Characteristics					
Operating Input Voltage Range		36	48	75	VDC
Input Under Voltage Lockout					
Turn-on Threshold		33	34	35	VDC
Turn-off Threshold		31	32	33	VDC
Input Voltage Transient	100 ms			100	VDC
Maximum Input Current	40 ADC Out @ 36 VDC In			1.6	ADC
Input Stand-by Current	Vin = 48V, converter disabled		3		mA
Input No Load Current (0 load on the output)	Vin = 48V, converter enabled		43		mA
Input Reflected-Ripple Current, is	Vin = 48V, 25 MHz bandwidth		8		mAPK-PK
Input Voltage Ripple Rejection	120 Hz		60		dB
Output Characteristics					
External Load Capacitance	Plus full load (resistive)			40,000	μF
Output Current Range		0		40	ADC
Current Limit Inception	Non-latching	42	47	52	ADC
Peak Short-Circuit Current	Non-latching, Short = 10 m Ω		50	60	А
RMS Short-Circuit Current	Non-latching		9		Arms
Output Voltage Set Point (no load)		1.182	1.200	1.218	VDC
Output Regulation Over Line			±2	±5	mV
Output Regulation Over Load			±2	±5	mV
Output Voltage Range	Over line, load and temperature ¹	-1.5		+1.5	%Vout
Output Ripple and Noise - 25 MHz bandwid	VOUT = 3.3 VDC Full load + 10 μ F tantalum + 1 μ F ceramic		55	110	mVPK-PK
	VOUT = 1.0 VDC Full load + 10 μF tantalum + 1 μF ceramic		35	70	mVPK-PK
Dynamic Response					
Load Change 50%-75%-50% of lout Max, $\label{eq:dispersive} di/dt = 0.1 \ \text{A}/\mu\text{s}$	Co = 1 µF ceramic (Fig. 1.2V.17)		50 ²		mV
di/dt = 5 A/µs	Co = 470 µF POS + 1 µF ceramic		130 ²		mV
Settling Time to 1% of Vout			15 ²		μs
Efficiency					
100% Load			82.0		%
50% Load			85.0		%

¹⁾ Operating ambient temperature range of -40 °C to 85 °C for converter.

²⁾ See waveforms for dynamic response and settling time for different output voltages.



Note: NC - Natural convection



temperature and airflow rates for QME48T40012 converter with G height pins mounted vertically with air flowing from pin 1 to pin 3, MOSFET temperature ≤ 120 °C, Vin = 48 V.

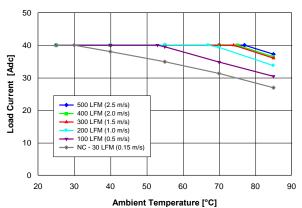


Figure 1.2V.10. Available load current vs. ambient air temperature and airflow rates for QME48T40012 converter with G height pins mounted horizontally with air flowing from pin 1 to pin 3, MOSFET temperature \leq 120 °C, Vin = 48 V.

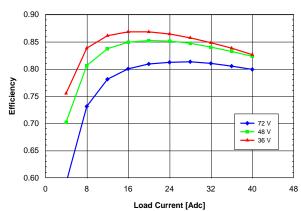


Figure 1.2V.11. Efficiency vs. load current and input voltage for QME48T40012 converter mounted horizontally with air flowing from pin 1 to pin 3 at a rate of 300 LFM (1.5 m/s) and $Ta = 25 \ ^{\circ}C.$

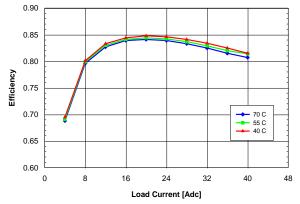


Figure 1.2V.12. Efficiency vs. load current and ambient temperature for QME48T40012 converter mounted horizontally with Vin = 48 V and air flowing from pin 1 to pin 3 at a rate of 200 LFM (1.0 m/s).



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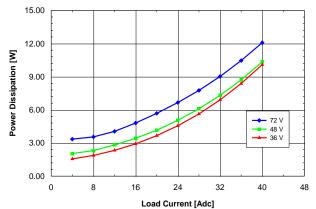


Figure 1.2V. 13. Power dissipation vs. load current and input voltage for QME48T40012 converter mounted horizontally with air flowing from pin 1 to pin 3 at a rate of 300 LFM (1.5 m/s) and Ta = $25 \ ^{\circ}$ C.

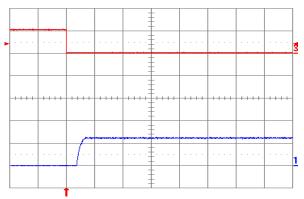


Figure 1.2V.15. Turn-on transient at full rated load current (resistive) with no output capacitor at Vin = 48 V, triggered via ON/OFF pin. Top trace: ON/OFF signal (5 V/div.). Bottom trace: output voltage (1 V/div.). Time scale: 2 ms/div.

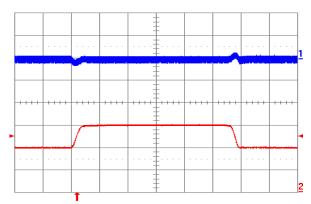


Figure 1.2V.17. Output voltage response to load current stepchange (20 A – 30 A – 20 A) at Vin = 48 V. Top trace: output voltage (100 mV/div.). Bottom trace: load current (10 A/div.). Current slew rate: 0.1 A/μs. Co = 1 μF ceramic. Time scale: 0.2 ms/div.



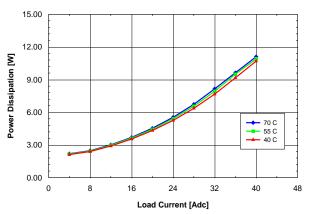
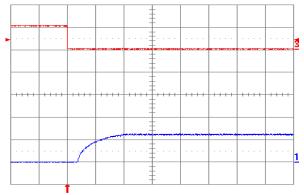
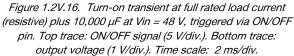


Figure 1.2V.14. Power dissipation vs. load current and ambient temperature for QME48T40012 converter mounted horizontally with Vin = 48 V and air flowing from pin 1 to pin 3 at a rate of 200 LFM (1.0 m/s).





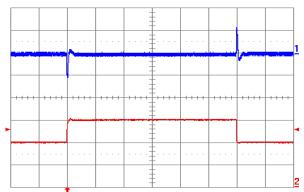


Figure 1.2V.18. Output voltage response to load current stepchange (20 A – 30 A – 20 A) at Vin = 48 V. Top trace: output voltage (100 mV/div.). Bottom trace: load current (10 A/div.). Current slew rate: 5 A/μs. Co = 470 μF POS + 1 μF ceramic. Time scale: 0.2 ms/div.

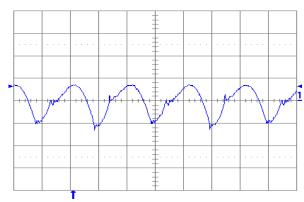


Figure 1.2V.19. Output voltage ripple (20 mV/div.) at full rated load current into a resistive load with $Co = 10 \ \mu F$ tantalum + 1 μF ceramic and Vin = 48 V. Time scale: 1 $\mu s/div.$

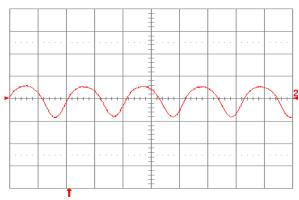


Figure 1.2V.21. Input reflected ripple current, ic (100 mA/div.), measured at input terminals at full rated load current and Vin = 48 V. Refer to Fig. 1.2V.20 for test setup. Time scale: 1 µs/div.

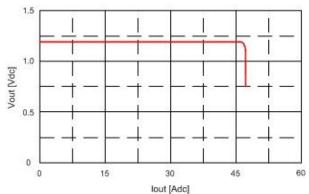


Figure 1.2V.23. Output voltage vs. load current showing current limit point and converter shutdown point. Input voltage has almost no effect on current limit characteristic.

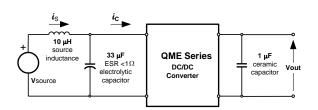


Figure 1.2V.20. Test setup for measuring input reflected ripple currents, *ic* and *is*.

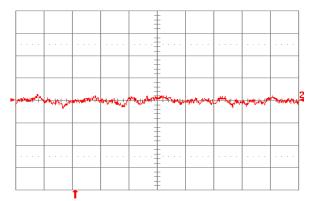


Figure 1.2V.22. Input reflected ripple current, is (10 mA/div.), measured through 10 µH at the source at full rated load current and Vin = 48 V. Refer to Fig. 1.2V.20 for test setup. Time scale: 1 µs/div.

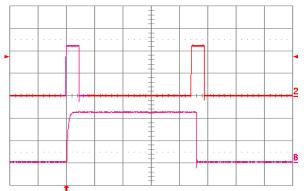


Figure 1.2V.24. Load current (top trace, 20 A/div., 50 ms/div.) into a 10 mΩ short circuit during restart, at Vin = 48 V. Bottom trace (20 A/div., 5 ms/div.) is an expansion of the on-time portion of the top trace.



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5.6 **QME**48T40010 (1.0 Volts Out)

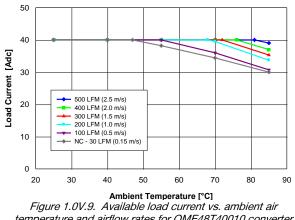
Conditions: TA = 25 °C, Airflow = 300 LFM (1.5 m/s), Vin = 48 VDC, Vout = 1.0 VDC unless otherwise specified.

Turn-on Threshold 33 34 35 VDC Turn-off Threshold 31 32 33 VDC Input Voltage Transient 100 ms 100 VDC Maximum Input Current 40 ADC Out @ 36 VDC In 1.4 ADC Input Stand-by Current Vin = 48V, converter disabled 3 mA Input No Load Current (io load on the output) Vin = 48V, converter enabled 43 mA Input Voltage Ripple Rejection 120 Hz 60 dB 0/tput Characteristics External Load Capacitance Plus full load (resistive) 40,000 µF Output Current Range 0 40 ADC Output Voltage Set Point (no load) Non-latching 42 47 52 ADC Pask Short-Circuit Current Non-latching 9 Arms Output Voltage Range VOC A Output Voltage Set Point (no load) Non-latching 9 Arms MV Output Voltage Range VOUT = 3.3 VDC VDC ±1.5 %Vout Output Regulation Over Load VOUT = 1.0 VDC 55 110 mVPK-Pt VOUT =							
Operating Input Voltage Range 36 48 75 VDC Input Under Voltage Lockout 33 34 35 VDC Turn-on Threshold 31 32 33 VDC Input Voltage Transient 100 ms 100 VDC Maximum Input Current 40 ADC Out Ø 36 VDC In 1.4 ADC Input Stand-by Current Vin = 48V, converter disabled 3 mA Input No Load Current (Ø load on the output) Vin = 48V, 25 MHz bandwidth 8 mAPK-PI Input Voltage Range 00 Iz 60 dB Output Obtaze Eristics MA Unput Voltage Range 0 HO ADC ADC ADC MA Unput Voltage Range Vin = 48V, 25 MHz bandwidth 8 mAPK-PI MA Input Voltage Range Vin = 48V, 25 MHz bandwidth 8 MAPK-PI Output Voltage Range Vin = 48V, 25 MHz bandwidth 8 MAPK-PI Output Voltage Range Puis full load (resistive) 40.000 µF Output Current Range 0 <td< td=""><td></td><td></td><td>CONDITIONS / DESCRIPTION</td><td>MIN</td><td>ТҮР</td><td>MAX</td><td>UNITS</td></td<>			CONDITIONS / DESCRIPTION	MIN	ТҮР	MAX	UNITS
Turn-on Threshold 33 34 35 VDC Turn-off Threshold 31 32 33 VDC Input Voltage Transient 100 ms 100 VDC Maximum Input Current 40 ADC Out @ 36 VDC In 1.4 ADC Input Voltage Transient 40 ADC Out @ 36 VDC In 1.4 ADC Input Na Lad Current (load on the output) Vin = 48V, converter disabled 3 mA Input Voltage Ripple Rejection 120 Hz 60 dB Output Characteristics win = 48V, 25 MHz bandwidth 8 mAPK-PH Output Characteristics vin = 48V, 25 MHz bandwidth 8 mAPK-PH Output Characteristics vin = 48V, 25 MHz bandwidth 8 MAPK-PH Output Characteristics vin = 48V, 25 MHz bandwidth 8 MAPK-PH Output Characteristics vin = 48V, 25 MHz bandwidth 8 MAPK-PH Output Characteristics vin = 48V, 25 MHz bandwidth 8 MAPK-PH Output Characteristic vin = 48V, 25 MHz bandwidth Maine 40 ADC Output String Short-Circuit Current Non-latching vin M ADC		-		_	_	_	
Turn-on Threshold 33 34 35 VDC Turn-off Threshold 31 32 33 VDC Input Voltage Transient 100 ms 100 VDC Maximum Input Current 40 ADC Out @ 36 VDC In 1.4 ADC Input Stand-by Current Vin = 48V, converter disabled 3 mA Input No Load Current (io load on the output) Vin = 48V, converter enabled 43 mA Input Voltage Ripple Rejection 120 Hz 60 dB 0/tput Characteristics External Load Capacitance Plus full load (resistive) 40,000 µF Output Current Range 0 40 ADC Output Voltage Set Point (no load) Non-latching 42 47 52 ADC Pask Short-Circuit Current Non-latching 9 Arms Output Voltage Range VOC A Output Voltage Set Point (no load) Non-latching 9 Arms MV Output Voltage Range VOUT = 3.3 VDC VDC ±1.5 %Vout Output Regulation Over Load VOUT = 1.0 VDC 55 110 mVPK-Pt VOUT =	Operating Input Voltage Range			36	48	75	VDC
Turn-off Threshold 31 32 33 VDC Input Voltage Transient 100 ms 100 VDC Maximum Input Current 40 ADC Out @ 36 VDC In 1.4 ADC Input Stand-by Current Vin = 48V, converter disabled 3 mA Input Reflected-Ripple Current, is Vin = 48V, converter enabled 43 mA Input Voltage Ripple Rejection 120 Hz 60 dB Output Characteristics 60 dB dB External Load Capacitance Plus full load (resistive) 40,000 µF Output Characteristics 0 40 ADC Current Limit Inception Non-latching 42 47 52 ADC Peak Short-Circuit Current Non-latching, Short = 10 mQ 50 60 A RMS Short-Circuit Current Non-latching 9 Arms Moutput Voltage Stel Point (no load) VDC Output Voltage Stel Point (no load) Over line, load and temperature ¹ -1.5 +1.5 %Vout Output Ripple and Noise – 25 MHz bandwidth Full load + 10 µF tantalum + 1 µF ceramic 55 110 mVPK-PI <td>Input Under Voltage Lockout</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	Input Under Voltage Lockout						
Input Voltage Transient100 ms100VOCMaximum Input Current40 ADC Out @ 36 VDC In1.4ADCInput Stand-by CurrentVin = 48V, converter disabled3mAInput No Load Current (0 load on the output)Vin = 48V, converter enabled43mAInput Voltage Ripple Rejection120 Hz60dBOutput Voltage Ripple Rejection120 Hz60dBOutput Voltage Ripple Rejection120 Hz60dBOutput Current Range040ADCCurrent Limit InceptionNon-latching424752Peak Short-Circuit CurrentNon-latching, Short = 10 mQ5060ARMS Short-Circuit CurrentNon-latching, Short = 10 mQ9ArmsOutput Voltage RangeOver line, load and temperature ¹ -1.5+1.5%VoutOutput Voltage RangeOver line, load and temperature ¹ -1.5+1.5%VoutVoutput Voltage RangeOver line, load and temperature ¹ -1.5+1.5%VoutVoutput Rejulation Over LineUV T = 3.3 VDCFull load + 10 µF tantalum + 1 µF ceramic55110mVPK-PIVoutput Rejulation Over LineCo = 1 µF ceramic (Fig. 1.0V.17)50 ² mVdi/dt = 5.4/µSCo = 1 µF ceramic (Fig. 1.0V.17)50 ² mVSettling Time to 1% of VoutCo = 470 µF POS + 1 µF ceramic130 ² mVEfficiencyEfficiency15 ³ µSDonamic Response100 ⁴ Los A/µSCo = 10 µF ceramic (Fig. 1.0V.17)50 ² <	Turn-on Threshold			33	34	35	VDC
Name1.4ADCMaximum Input CurrentVin = 48V, converter disabled3mAInput Stand-by Current (0 load on the output)Vin = 48V, converter enabled43mAInput Reflected-Ripple Current, isVin = 48V, 25 MHz bandwidth8mAPK-PtInput Voltage Ripple Rejection120 Hz60dBOutput Characteristics40,000 μ FExternal Load CapacitancePlus full load (resistive)40,000 μ GOutput Current Range040ADCCurrent Limit InceptionNon-latching424752ADCPack Short-Circuit CurrentNon-latching, Short = 10 mQ5060ARMS Short-Circuit CurrentNon-latching9ArmsArmsOutput Voltage RangeOver line, load and temperature1-1.5+1.5%VoutOutput Regulation Over LoadVOUT = 3.3 VDC110mVPK-PtOutput Ripple and Noise - 25 MHz bandwidthCo = 1 µF ceramic (Fig. 1.0V.17)50°mVOutput di/dt = 5 A/µsCo = 1 µF ceramic (Fig. 1.0V.17)50°mVSetting Time to 1% of VoutCo = 470 µF POS + 1 µF ceramic130°mVSetting Time to 1% of VoutCo = 470 µF POS + 1 µF ceramic130°mVSetting Time to 1% of VoutCo = 470 µF POS + 1 µF ceramic130°mVSetting Time to 1% of VoutCo = 470 µF POS + 1 µF ceramic130°mVSetting Time to 1% of Vout15²µsEfficiency100%Setting Time to 1% of Vout	Turn-off Threshold			31	32	33	VDC
Input Stand-by CurrentVin = 48V, converter disabled3mAInput No Load Current (0 load on the output)Vin = 48V, converter enabled43mAInput Reflected-Ripple Current, isVin = 48V, 25 MHz bandwidth8mAPK-PIInput Voltage Ripple Rejection120 Hz60dBOutput Characteristics6040ADCCurrent Iange040ADCCurrent Limit InceptionNon-latching424752Peak Short-Circuit CurrentNon-latching, Short = 10 mQ5060ARMS Short-Circuit CurrentNon-latching, Short = 10 mQ5060ARMS Short-Circuit CurrentNon-latching9ArmsOutput Voltage Set Point (no load)0.9851.0001.015VDCOutput Voltage RangeOver Line±2±5mVOutput Voltage RangeOver Line, load and temperature1-1.5+1.5%VoutOutput Voltage RangeOver Line, load and temperature1-1.5+1.5%VoutOutput Voltage RangeOver Line, load and temperature1-1.5100mVPK-PiVOUT = 1.0 VDC Full load + 10 µF tantalum + 1 µF ceramic3570mVPK-PiVOUT = 1.0 VDC Full load + 10 µF tantalum + 1 µF ceramic132mVdi/dt = 5 A/µsCo = 1 µF ceramic (Fig. 1.0V.17)502mVdi/dt = 5 A/µsCo = 470 µF POS + 1 µF ceramic1302mVSetting Time to 1% of Vout15²µsEfficiency100% Load80	Input Voltage Transient		100 ms			100	VDC
Input No Load Current (0 load on the output)Vin = 48V, converter enabled43mAInput Reflected-Ripple Current, isVin = 48V, 25 MHz bandwidth8mAPK-PIInput Voltage Ripple Rejection120 Hz60dBOutput Characteristics40,000 μ FExternal Load CapacitancePlus full load (resistive)40,000 μ FOutput Current Range040ADCCurrent Limit InceptionNon-latching424752ADCPeak Short-Circuit CurrentNon-latching, Short = 10 mQ5060ARMS Short-Circuit CurrentNon-latching9ArmsOutput Voltage Set Point (no load)0.9851.0001.015VDCOutput Voltage RangeOver Line±2±5mVOutput Voltage RangeOver line, load and temperature!-1.5+1.5%VoutVOUT = 3.3 VDCVOUT = 3.3 VDCVOUT = 1.0 VDCTill load + 10 µF tantalum + 1 µF ceramic55110mVPK-PiVOUT = 1.0 VDCFull load + 10 µF tantalum + 1 µF ceramic3570mVPK-PiVOUT = 1.0 VDCFull load + 10 µF tantalum + 1 µF ceramic3570mVPK-PiVout di/dt = 5 A/µsCo = 470 µF POS + 1 µF ceramic130 ² mVSetting Time to 1% of Vout15 ² µsEfficiency10%100% Load80.0%%%	Maximum Input Current		40 ADC Out @ 36 VDC In			1.4	ADC
Non-Input Reflected-Ripple Current, isVin = 48V, 25 MHz bandwidth8mAPK-PIInput Voltage Ripple Rejection120 Hz60dB <i>Output Characteristics</i> 40,000 μ FCutrent Limit InceptionNon-latching424752ADCCurrent Limit InceptionNon-latching, Short = 10 mQ5060APeak Short-Circuit CurrentNon-latching, Short = 10 mQ5060ARMS Short-Circuit CurrentNon-latching9ArmsOutput Voltage Set Point (no load)0.9851.0001.015VDCOutput Regulation Over Line±2±5mVOutput Voltage RangeOver line, load and temperature¹-1.5+1.5%VoutOutput Voltage So%-75%-50% of lout Max, di/dt = 5 A/µsCo = 1 µF ceramic (Fig. 1.0V.17)50²mVSettling Time to 1% of VoutCo = 1 µF ceramic (Fig. 1.0V.17)50²mVSettling Time to 1% of Vout15²µsEfficiency100% Load80.0%	Input Stand-by Current		Vin = 48V, converter disabled		3		mA
Appendix National Problem 2011Normation10 Hz60dBOutput Characteristics6040,000 μ FOutput Current Range040ADCCurrent Limit InceptionNon-latching424752ADCPeak Short-Circuit CurrentNon-latching, Short = 10 mQ5060ARMS Short-Circuit CurrentNon-latching9ArmsOutput Voltage Set Point (no load)0.9851.0001.015VDCOutput Regulation Over Line±2±5mVOutput Voltage RangeOver line, load and temperature!-1.5+1.5%VoutOutput Regulation Over LoadVOUT = 3.3 VDC55110mVPK-PIVOUT = 1.0 VDC Full load + 10 µF tantalum + 1 µF ceramic55110mVPK-PIDynamic ResponseCo = 1 µF ceramic (Fig. 1.0V.17)50 ² mVCod Change 50%-75%-50% of lout Max, di/dt = 0.1 A/µsCo = 1 µF ceramic (Fig. 1.0V.17)50 ² mVSettling Time to 1% of VoutCo = 1 µF ceramic (Fig. 1.0V.17)50 ² mVEfficiency15 ² µs245100% Load10% four Max,15 ² µs	Input No Load Current (0 load on the ou	utput)	Vin = 48V, converter enabled		43		mA
Output Current Range040ADCCurrent Limit InceptionNon-latching424752ADCPeak Short-Circuit CurrentNon-latching, Short = 10 mQ5060ARMS Short-Circuit CurrentNon-latching9ArmsOutput Voltage Set Point (no load)0.9851.0001.015VDCOutput Voltage Set Point (no load) ± 2 ± 5 mVOutput Regulation Over Line ± 2 ± 5 mVOutput Voltage RangeOver line, load and temperature ¹ -1.5 ± 1.5 %VoutOutput Voltage RangeOver line, load and temperature ¹ -1.5 ± 1.5 %VoutOutput Ripple and Noise - 25 MHz bandwidthFull load + 10 µF tantalum + 1 µF ceramic55110mVPK-PFVOUT = 1.0 VDC Full load + 10 µF tantalum + 1 µF ceramic3570mVPK-PFDynamic ResponseUotque Tantalum + 1 µF ceramic132'mVdi/dt = 0.1 A/µsCo = 1 µF ceramic (Fig. 1.0V.17)50'mVdi/dt = 5 A/µsCo = 470 µF POS + 1 µF ceramic130'mVSettling Time to 1% of Vout15' $µs$ $µs$ Efficiency100% Load80.0%	Input Reflected-Ripple Current, is		Vin = 48V, 25 MHz bandwidth		8		mAPK-PK
External Load CapacitancePlus full load (resistive)40,000 μ FCurpert Limit InceptionNon-latching424752ADCPeak Short-Circuit CurrentNon-latching, Short = 10 mQ5060ARMS Short-Circuit CurrentNon-latching9ArmsOutput Voltage Set Point (no load)0.9851.0001.015VDCOutput Voltage Set Point (no load) ± 2 ± 5 mVOutput Regulation Over Line ± 2 ± 5 mVOutput Regulation Over Load ± 2 ± 5 mVOutput Voltage RangeOver line, load and temperature ¹ -1.5 ± 1.5 %VoutOutput Ripple and Noise - 25 MHz bandwidthFull load + 10 µF tantalum + 1 µF ceramic55110mVPK-PFVOUT = 1.0 VDC Full load + 10 µF tantalum + 1 µF ceramic3570mVPK-PF <i>Dynamic Response</i> VOUT = 0.1 A/µsCo = 1 µF ceramic (Fig. 1.0V.17)50 ² mVSettling Time to 1% of VoutCo = 1 µF ceramic (Fig. 1.0V.17)50 ² mVSettling Time to 1% of Vout $5c = 10$ µF POS + 1 µF ceramic15 ² μ s <i>Efficiency</i> 10%10%80.0%	Input Voltage Ripple Rejection		120 Hz		60		dB
Output Current Range040ADCCurrent Limit InceptionNon-latching424752ADCPeak Short-Circuit CurrentNon-latching, Short = 10 mQ5060ARMS Short-Circuit CurrentNon-latching9ArmsOutput Voltage Set Point (no load)0.9851.0001.015VDCOutput Regulation Over Line ± 2 ± 5 mVOutput Voltage RangeOver line, load and temperature ¹ -1.5 ± 1.5 %VoutOutput Ripple and Noise - 25 MHz bandwidthFull load + 10 µF tantalum + 1 µF ceramic55110mVPK-PFVOUT = 1.0 VDC Full load + 10 µF tantalum + 1 µF ceramic3570mVPK-PFDynamic ResponseVOUT = 1.0 VDC Full load + 10 µF tantalum + 1 µF ceramic3570mVPK-PFDynamic ResponseCo = 1 µF ceramic (Fig. 1.0V.17)50 ² mVMVSettling Time to 1% of VoutCo = 470 µF POS + 1 µF ceramic130 ² mVEfficiency100% Load80.0%	Output Characteristics						
Current Limit InceptionNon-latching424752ADCPeak Short-Circuit CurrentNon-latching, Short = 10 mQ5060ARMS Short-Circuit CurrentNon-latching9ArmsOutput Voltage Set Point (no load)0.9851.0001.015VDCOutput Regulation Over Line ± 2 ± 5 mVOutput Regulation Over Load ± 2 ± 5 mVOutput Voltage RangeOver line, load and temperature ¹ -1.5 ± 1.5 %VoutOutput Ripple and Noise - 25 MHz bandwidthFull load + 10 µF tantalum + 1 µF ceramic55110mVPK-PFDynamic ResponseVOUT = 1.0 VDC Full load + 10 µF tantalum + 1 µF ceramic3570mVPK-PFDynamic ResponseVout = 0 = 1 µF ceramic (Fig. 1.0V.17)50 ² mVdi/dt = 0.1 A/µsCo = 1 µF ceramic (Fig. 1.0V.17)50 ² mVdi/dt = 5 A/µsCo = 470 µF POS + 1 µF ceramic130 ² mVSettling Time to 1% of Vout15 ² µs15 ² µsEfficiency100% Load80.0%	External Load Capacitance		Plus full load (resistive)			40,000	μF
Peak Short-Circuit CurrentNon-latching, Short = 10 mQ5060ARMS Short-Circuit CurrentNon-latching9ArmsOutput Voltage Set Point (no load)0.9851.0001.015VDCOutput Regulation Over Line ± 2 ± 5 mVOutput Regulation Over Load $\psi UUT = 3.3 VDC$ ± 1.5 ± 1.5 Output Ripple and Noise - 25 MHz bandwidthFull load + 10 µF tantalum + 1 µF ceramic 55 110mVPK-PHVOUT = 1.0 VDC Full load + 10 µF tantalum + 1 µF ceramic 35 70mVPK-PHDynamic Response $UOUT = 1.0 VDC$ Full load + 10 µF tantalum + 1 µF ceramic 50^2 mVLoad Change 50%-75%-50% of lout Max, di/dt = 0.1 A/µsCo = 1 µF ceramic (Fig. 1.0V.17) 50^2 mVSettling Time to 1% of Vout 15^2 μs μs Efficiency100% Load 80.0 %	Output Current Range			0		40	ADC
RMS Short-Circuit CurrentNon-latching9ArmsOutput Voltage Set Point (no load)0.9851.0001.015VDCOutput Regulation Over Line ± 2 ± 5 mVOutput Regulation Over Load $\psi U T = 3.3$ VDC ± 2 ± 5 mVOutput Voltage RangeOver line, load and temperature ¹ -1.5 ± 1.5 %VoutOutput Ripple and Noise -25 MHz bandwidthFull load $+10 \mu$ F tantalum $+1 \mu$ F ceramic 55 110 mVPK-PHVOUT = 1.0 VDC Full load $+10 \mu$ F tantalum $+1 \mu$ F ceramic 35 70 mVPK-PHDynamic ResponseLoad Change 50% - 75% - 50% of lout Max, di/dt = $0.1 \mu/\mu$ sCo = 1μ F ceramic (Fig. $1.0V.17$) 50^2 mVMVdi/dt = $5 \mu/\mu$ sCo = 1μ F ceramic (Fig. $1.0V.17$) 50^2 mVSettling Time to 1% of Vout 15^2 μ sEfficiency100% Load 80.0 $\%$	Current Limit Inception		Non-latching	42	47	52	ADC
Output Voltage Set Point (no load)0.9851.0001.015VDCOutput Regulation Over Line ± 2 ± 5 mVOutput Regulation Over Load ± 2 ± 5 mVOutput Voltage RangeOver line, load and temperature ¹ -1.5 ± 1.5 %VoutOutput Voltage RangeOver line, load and temperature ¹ -1.5 ± 1.5 %VoutOutput Ripple and Noise - 25 MHz bandwidthFull load + 10 µF tantalum + 1 µF ceramic 55 110mVPK-PłVOUT = 1.0 VDC Full load + 10 µF tantalum + 1 µF ceramic 35 70mVPK-PłDynamic Response $VOUT = 1.0$ VDC Full load + 10 µF terramic (Fig. 1.0V.17) 50^2 mVdi/dt = 0.1 A/µsCo = 1 µF ceramic (Fig. 1.0V.17) 50^2 mVdi/dt = 5 A/µsCo = 470 µF POS + 1 µF ceramic 130^2 mVSettling Time to 1% of Vout 15^2 µsEfficiency100% Load 80.0 %	Peak Short-Circuit Current		Non-latching, Short = 10 m Ω		50	60	А
Output Regulation Over Line ± 2 ± 5 mVOutput Regulation Over Load ± 2 ± 5 mVOutput Regulation Over LoadOver line, load and temperature ¹ -1.5 ± 1.5 %VoutOutput Voltage RangeOver line, load and temperature ¹ -1.5 ± 1.5 %VoutOutput Ripple and Noise - 25 MHz bandwidthFull load + 10 µF tantalum + 1 µF ceramic 55 110 mVPK-PHVOUT = 1.0 VDC Full load + 10 µF tantalum + 1 µF ceramic 35 70 mVPK-PHDynamic ResponseVOUT = 50° mV 30° mVLoad Change 50%-75%-50% of lout Max, di/dt = $5 A/\mu$ s $Co = 1 \mu$ F ceramic (Fig. $1.0V.17$) 50° mVdi/dt = $5 A/\mu$ s $Co = 470 \mu$ F POS + 1μ F ceramic 130° mVSettling Time to 1% of Vout 15° μ s μ sEfficiency100% Load 80.0 %	RMS Short-Circuit Current		Non-latching		9		Arms
Output Regulation Over Load ± 2 ± 5 mVOutput Voltage RangeOver line, load and temperature ¹ -1.5 ± 1.5 %VoutOutput Voltage RangeOver line, load and temperature ¹ -1.5 ± 1.5 %VoutOutput Ripple and Noise - 25 MHz bandwidthFull load + 10 µF tantalum + 1 µF ceramic 55 110 mVPK-PFVOUT = 1.0 VDC Full load + 10 µF tantalum + 1 µF ceramic 35 70 mVPK-PFDynamic Response 25 100 mVPK-PF Load Change 50%-75%-50% of lout Max, di/dt = 0.1 A/µs $Co = 1 \mu \text{F ceramic (Fig. 1.0V.17)}$ 50^2 mV di/dt = 5 A/µsCo = 470 µF POS + 1 µF ceramic 130^2 mV Settling Time to 1% of Vout 15^2 μs Efficiency100% Load 80.0 $\%$	Output Voltage Set Point (no load)			0.985	1.000	1.015	VDC
Output Voltage RangeOver line, load and temperature1-1.5+1.5%VoutOutput Ripple and Noise - 25 MHz bandwidthVOUT = 3.3 VDC Full load + 10 µF tantalum + 1 µF ceramic55110mVPK-PH MVPK-PHVOUT = 1.0 VDC Full load + 10 µF tantalum + 1 µF ceramic3570mVPK-PHDynamic ResponseVOUT = 0.1 A/µsCo = 1 µF ceramic (Fig. 1.0V.17)502mVdi/dt = 5 A/µsCo = 470 µF POS + 1 µF ceramic1302mVSettling Time to 1% of Vout152µsEfficiency100% Load80.0%	Output Regulation Over Line				±2	±5	mV
VOUT = 3.3 VDC Output Ripple and Noise – 25 MHz bandwidthFull load + 10μ F tantalum + 1μ F ceramic 55 110 mVPK-PH VOUT = 1.0 VDC Full load + 10μ F tantalum + 1μ F ceramic 35 70 mVPK-PH Dynamic Response 10μ F tantalum + 1μ F ceramic 35 70 mVPK-PH Load Change 50% - 75% - 50% of lout Max, di/dt = $0.1 \text{ A/}\mu$ sCo = 1μ F ceramic (Fig. $1.0V.17$) 50^2 mV Load Change 50% - 75% - 50% of lout Max, di/dt = $0.1 \text{ A/}\mu$ sCo = 1μ F ceramic (Fig. $1.0V.17$) 50^2 mV Settling Time to 1% of Vout $15^2 \mu$ s μ sEfficiency 100% Load 80.0%	Output Regulation Over Load				±2	±5	mV
Output Ripple and Noise – 25 MHz bandwidthFull load + 10 µF tantalum + 1 µF ceramic55110mVPK-PHVOUT = 1.0 VDC Full load + 10 µF tantalum + 1 µF ceramic3570mVPK-PHDynamic ResponseULoad Change 50%-75%-50% of lout Max, di/dt = 0.1 A/µsCo = 1 µF ceramic (Fig. 1.0V.17)50²mVdi/dt = 5 A/µsCo = 470 µF POS + 1 µF ceramic130²mVSettling Time to 1% of Vout15²µsEfficiency100% Load80.0%	Output Voltage Range		Over line, load and temperature ¹	-1.5		+1.5	%Vout
Full load + 10 µF tantalum + 1 µF ceramic3570mVPK-PHDynamic ResponseLoad Change 50%-75%-50% of lout Max, di/dt = 0.1 A/µsCo = 1 µF ceramic (Fig. 1.0V.17) 50^2 mVdi/dt = 5 A/µsCo = 470 µF POS + 1 µF ceramic 130^2 mVSettling Time to 1% of Vout 15^2 µsEfficiency100% Load80.0%	Output Ripple and Noise – 25 MHz ban	dwidth			55	110	mVPK-PK
Load Change 50%-75%-50% of lout Max, Co = 1 μ F ceramic (Fig. 1.0V.17) 50 ² mV di/dt = 0.1 A/ μ s Co = 1 μ F ceramic (Fig. 1.0V.17) 50 ² mV di/dt = 5 A/ μ s Co = 470 μ F POS + 1 μ F ceramic 130 ² mV Settling Time to 1% of Vout 15 ² μ s <i>Efficiency</i> 100% Load 80.0 %					35	70	mVPK-PK
di/dt = 0.1 A/μs Co = 1 μF ceramic (Fig. 1.0V.17) 50 ² mV di/dt = 5 A/μs Co = 470 μF POS + 1 μF ceramic 130 ² mV Settling Time to 1% of Vout 15 ² μs Efficiency 100% Load 80.0 %	Dynamic Response						
Settling Time to 1% of Vout 15 ² μs Efficiency 100% Load 80.0 %	0		Co = 1 µF ceramic (Fig. 1.0V.17)		50 ²		mV
Efficiency 80.0 %	di/dt = 5 A/µs	S	Co = 470 μF POS + 1 μF ceramic		130 ²		mV
100% Load 80.0 %	Settling Time to 1% of Vout				15 ²		μs
	Efficiency						
50% Load 83.0 %	100% Load				80.0		%
	50% Load				83.0		%

¹⁾ Operating ambient temperature range of -40 °C to 85 °C for converter.

²⁾ See waveforms for dynamic response and settling time for different output voltages.





temperature and airflow rates for QME48T40010 converter with G height pins mounted vertically with air flowing from pin 1 to pin 3, MOSFET temperature \leq 120 °C, Vin = 48 V.

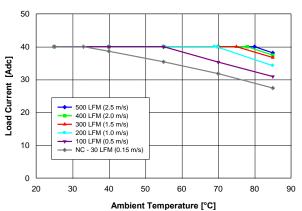


Figure 1.0V.10. Available load current vs. ambient air temperature and airflow rates for QME48T40010 converter with G height pins mounted horizontally with air flowing from pin 1 to pin 3, MOSFET temperature \leq 120 °C, Vin = 48 V.



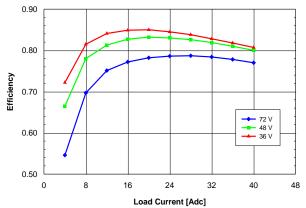


Figure 1.0V.11. Efficiency vs. load current and input voltage for QME48T40010 converter mounted horizontally with air flowing from pin 1 to pin 3 at a rate of 300 LFM (1.5 m/s) and Ta = 25 °C.

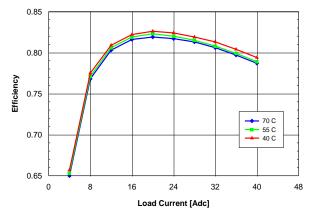


Figure 1.0V.12. Efficiency vs. load current and ambient temperature for QME48T40010 converter mounted horizontally with Vin = 48 V and air flowing from pin 1 to pin 3 at a rate of 200 LFM (1.0 m/s).



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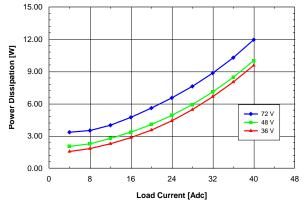


Figure 1.0V.13. Power dissipation vs. load current and input voltage for QME48T40010 converter mounted horizontally with air flowing from pin 1 to pin 3 at a rate of 300 LFM (1.5 m/s) and Ta = $25 \ ^{\circ}$ C.

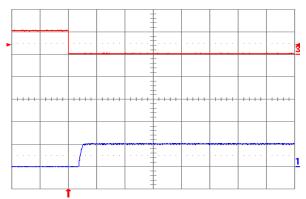


Figure 1.0V.15. Turn-on transient at full rated load current (resistive) with no output capacitor at Vin = 48 V, triggered via ON/OFF pin. Top trace: ON/OFF signal (5 V/div.). Bottom trace: output voltage (1 V/div.). Time scale: 2 ms/div

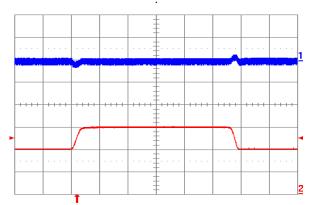


Figure 1.0V.17. Output voltage response to load current stepchange (20 A – 30 A – 20 A) at Vin = 48 V. Top trace: output voltage (100 mV/div.). Bottom trace: load current (10 A/div.). Current slew rate: 0.1 A/μs. Co = 1 μF ceramic. Time scale: 0.2 ms/div.



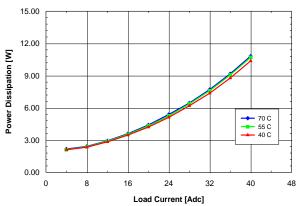


Figure 1.0V.14. Power dissipation vs. load current and ambient temperature for QME48T40010 converter mounted horizontally with Vin = 48 V and air flowing from pin 1 to pin 3 at a rate of 200 LFM (1.0 m/s).

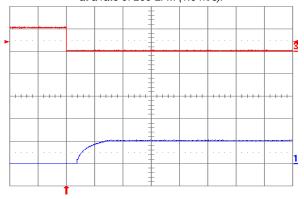


Figure 1.0V.16. Turn-on transient at full rated load current (resistive) plus 10,000 µF at Vin = 48 V, triggered via ON/OFF pin. Top trace: ON/OFF signal (5 V/div.). Bottom trace: output voltage (1 V/div.). Time scale: 2 ms/div.

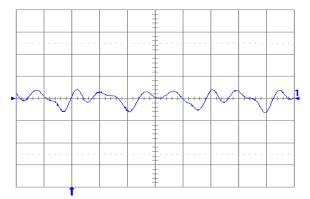


Figure 1.0V.18. Output voltage response to load current stepchange (20 A – 30 A – 20 A) at Vin = 48 V. Top trace: output voltage (100 mV/div.). Bottom trace: load current (10 A/div.). Current slew rate: 5 A/μs. Co = 470 μF POS + 1 μF ceramic. Time scale: 0.2 ms/div.

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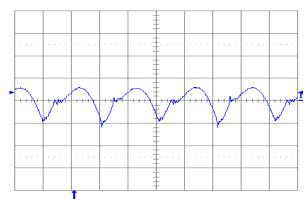


Figure 1.0V.19. Output voltage ripple (20 mV/div.) at full rated load current into a resistive load with $Co = 10 \ \mu F$ tantalum + 1 μF ceramic and Vin = 48 V. Time scale: 1 $\mu s/div.$

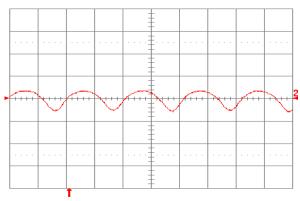


Figure 1.0V.21. Input reflected ripple current, *i*c (100 mA/div.), measured at input terminals at full rated load current and Vin = 48 V. Refer to Fig. 1.0V.20 for test setup. Time scale: 1 µs/div.

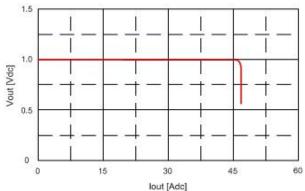


Figure 1.0V.23. Output voltage vs. load current showing current limit point and converter shutdown point. Input voltage has almost no effect on current limit characteristic.

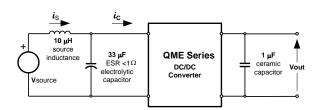


Figure 1.0V.20. Test setup for measuring input reflected ripple currents, *ic* and *is*.

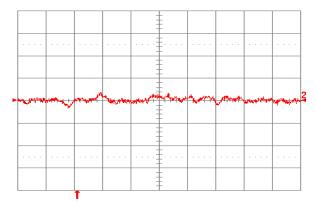


Figure 1.0V.22. Input reflected ripple current, is (10 mA/div.), measured through 10 µH at the source at full rated load current and Vin = 48 V. Refer to Fig. 1.0V.20 for test setup. Time scale: 1 µs/div.

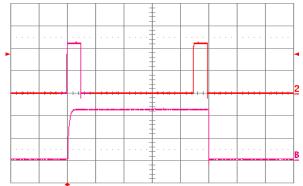


Figure 1.0V.24. Load current (top trace, 20 A/div., 50 ms/div.) into a 10 mΩ short circuit during restart, at Vin = 48 V. Bottom trace (20 A/div., 5 ms/div.) is an expansion of the on-time portion of the top trace.



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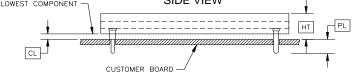
PAD/PIN	CONNECTIONS
Pad/Pin #	Function
1	Vin (+)
2	ON/OFF
3	Vin (-)
4	Vout (-)
5	SENSE (-)
6	TRIM
7	SENSE (+)
8	Vout (+)

• All dimensions are in inches [mm]

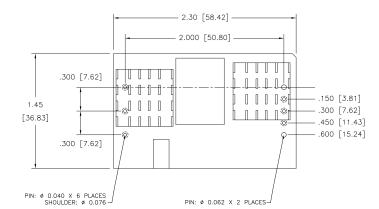
- Pins 1-3 and 5-7 are Ø 0.040" [1.02] with Ø 0.078" [1.98] shoulder
- Pins 4 and 8 are Ø 0.062" [1.57]
- without shoulder
- Pin Material & Finish: Brass Alloy 360 with Matte Tin over Nickel
- Converter Weight: 1.02 oz [34.2 g]

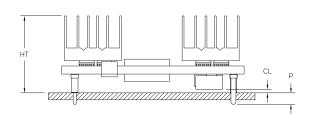
	0.145 [3.68]	
0.430 [10.92 1.450±0.020 [36.83±0.51] 0.300 [7.62]	- 	8 @ 7 © 6 @ 5 © 4 © 1 5.24] 3 0.600 [15.24] 5 © 4 © 1 5.24]
	TOP VIEW	
LOWEST COMPONENT	SIDE VIEW	1

MECHANICAL PARAMETERS



Height Option	HT (Maximum Height)	CL (Minimum Clearance)	Pin Option	PL (Pin Length) ±0.005 [±0.13]	
G	0.425 [10.80]	0.035 [0.89]	А	0.188 [4.78]	
			В	0.145 [3.68]	







Heatsink Option	HT (Maximum Height)	CL (Minimum Clearance)
S1	0.99 [25.1]	0.039 [1.00]

Pin Option	PL (Pin Length) ±0.005 [±0.13]
В	0.145 [3.68]

Tolerance Unless Otherwise Noted

Linear: X.X = +/- .020 [0.5] X.XX = +/- 0.010 [0.25] X.XXX = +/- 0.005 [0.13]

Angular $X^\circ = +/- 2^\circ$ $.X^\circ = +/- .25^\circ$

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6.

ORDERING INFORMATION 7.

Product ¹ Series	Input Voltage	Mounting Scheme	Rated Load Current	Output Voltage		ON/OFF Logic	Maximum Height [HT]	Pin Length [PL]	Special Features	RoHS	Heatsin k ²
QME	48	т	40	033	-	Ν	G	В	0		
Quarter- Brick Format	36-75 V	Through Hole	40 ADC	$\begin{array}{c} 010 \Rightarrow 1.0 \text{ V} \\ 012 \Rightarrow 1.2 \text{ V} \\ 015 \Rightarrow 1.5 \text{ V} \\ 018 \Rightarrow 1.8 \text{ V} \\ 025 \Rightarrow 2.5 \text{ V} \\ 033 \Rightarrow 3.3 \text{ V} \end{array}$		$N \Rightarrow$ Negative $P \Rightarrow$ Positive	$G {\Rightarrow} 0.425"$	A ⇒ 0.188" B ⇒ 0.145"	$0 \Rightarrow STD$ Non- Latching $L \Rightarrow$ Latching Options $F \Rightarrow$ Switching frequency 440kHz	$\begin{array}{l} \text{No Suffix} \Rightarrow \\ \text{RoHS} \\ \text{lead-solder-} \\ \text{exemption} \\ \text{compliant} \\ \\ \text{G} \Rightarrow \text{RoHS} \\ \text{compliant} \\ \text{for all six} \\ \text{substances} \end{array}$	No Suffix ⇒ No heatsink -S1 ⇒ Heatsink as shown

1) The example above describes P/N QME48T40033-NGB0: 36-75 V input, through-hole, 40 A @ 3.3 V output, negative ON/OFF logic, a 0.145" solder tail and maximum height of 0.425", standard (non-latching) protection, and Eutectic Tin/Lead solder. Consult factory for the complete list of available options.

2) The heatsink option "S1" is only available with the model QME48T40033-NGBOG-S1

For more information on these products consult: tech.support@psbel.com

NUCLEAR AND MEDICAL APPLICATIONS - Products are not designed or intended for use as critical components in life support systems, equipment used in hazardous environments, or nuclear control systems.

TECHNICAL REVISIONS - The appearance of products, including safety agency certifications pictured on labels, may change depending on the date manufactured. Specifications are subject to change without notice.



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 QME48T40018-NGB0G

 PGB0G
 QME48T40033-NGB0G
 QME48T40015-NGB0G
 QME48T40018-NGB0G
 QME48T40018-NGB0G