

The new **25A SemiQ™ Family** of DC-DC converters provide a high-efficiency single output in a size that is only 60% of industry-standard quarter-bricks, while preserving the same pinout and functionality.

The **25A SQM48 Series** converters of the **SemiQ™ Family** provide thermal performance in high temperature environments that exceeds most competitors' 25 A quarter-bricks. This is accomplished through the use of patent pending circuit, packaging and processing techniques to achieve ultra-high efficiency, excellent thermal management and a very low body profile.

Low body profile and the preclusion of heatsinks minimize airflow shadowing, thus enhancing cooling for downstream devices. The use of 100% automation for assembly, coupled with advanced electric and thermal design, results in a product with extremely high reliability.

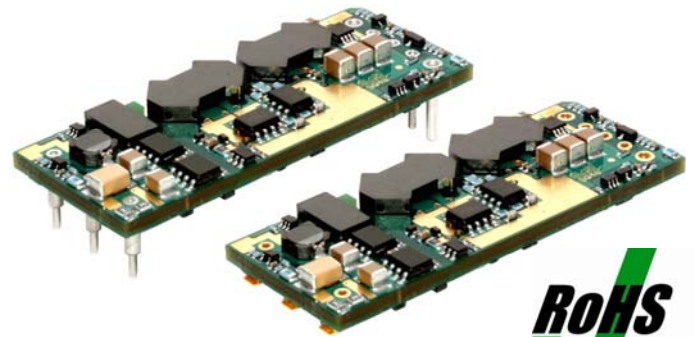
Operating from a 36-75 V input, the **25A SQM48 Series** converters provide any standard output voltage from 2.5 V down to 1.2 V. Outputs can be trimmed from -20% to +10% of the nominal output voltage ( $\pm 10\%$  for output voltage 1.2 V), thus providing outstanding design flexibility.

With a standard pinout and trim equations, the **SQM48 Series** converters are perfect drop-in replacements for existing 25 A quarter-brick designs. Inclusion of this converter in new designs can result in significant board space and cost savings. The device is also available in a surface mount package.

In both cases the designer can expect reliability improvement over other available converters because of the **SQM48 Series'** optimized thermal efficiency.

## Applications

- Telecommunications
- Data communications
- Wireless
- Servers



**SQM48T and SQM48S Converters**

## Features

- RoHS lead-free solder and lead-solder-exempted products are available
- Delivers up to 25 A (62.5 W)
- Industry-standard quarter-brick pinout
- Extremely small footprint: 0.896" x 2.30" (2.06 in<sup>2</sup>), 40% smaller than conventional quarter-bricks
- Higher current capability at elevated temperatures than most competitors' 25 A quarter-bricks
- On-board input differential LC-filter for the lowest input ripple current in industry
- Outputs available in 2.5, 2.0, 1.8, 1.5, and 1.2 V
- High efficiency – no heatsink required
- Start-up into pre-biased output
- No minimum load required
- Available in through-hole and SM packages
- Low profile: 0.28" (7.1 mm)
- Light weight: 0.66 oz (18.5 g)
- Meets Basic Insulation requirements of EN60950
- Withstands 100 V input transient for 100 ms
- Fixed-frequency operation
- Fully protected
- Remote output sense
- Output voltage trim range: +10%/-20% with Industry-standard trim equations (except 1.2 V output)
- High reliability: MTBF of 3.4 million hours, calculated per Telcordia TR-332, Method I Case 1
- Positive or negative logic ON/OFF option
- UL 60950 recognized in US and Canada and DEMKO certified per IEC/EN 60950 (pending)
- Meets conducted emissions requirements of FCC Class B and EN 55022 Class B with external filter
- All materials meet UL94, V-0 flammability rating

## Electrical Specifications (common to all versions)

Conditions:  $T_A=25^{\circ}\text{C}$ , Airflow=300 LFM (1.5 m/s),  $V_{in}=48\text{ Vdc}$ , All output voltages, unless otherwise specified.

PARAMETER	NOTES	MIN	TYP	MAX	UNITS
<b>ABSOLUTE MAXIMUM RATINGS</b>					
Input Voltage	Continuous	0		80	Vdc
Operating Ambient Temperature		-40		85	$^{\circ}\text{C}$
Storage Temperature		-55		125	$^{\circ}\text{C}$
<b>INPUT CHARACTERISTICS</b>					
Operating Input Voltage Range		36	48	75	Vdc
Input Under Voltage Lockout	Non-latching				
Turn-on Threshold		33	34	35	Vdc
Turn-off Threshold		31	32	33	Vdc
Input Voltage Transient	100 ms			100	Vdc
<b>ISOLATION CHARACTERISTICS</b>					
I/O Isolation		2000			Vdc
Isolation Capacitance			160		pF
Isolation Resistance		10			M $\Omega$
<b>FEATURE CHARACTERISTICS</b>					
Switching Frequency			435		kHz
Output Voltage Trim Range <sup>1</sup>	Industry-std. equations (2.5 - 1.5 V)	-20		+10	%
	Use trim equation on Page 4 (1.2 V)	-10		+10	%
Remote Sense Compensation <sup>1</sup>	Percent of $V_{OUT(NOM)}$			+10	%
Output Over-Voltage Protection	Non-latching	117	122	127	%
Over-Temperature Shutdown (PCB)	Non-latching		125		$^{\circ}\text{C}$
Auto-Restart Period	Applies to all protection features		100		ms
Turn-On Time			3		ms
ON/OFF Control (Positive Logic)					
Converter Off		-20		0.8	Vdc
Converter On		2.4		20	Vdc
ON/OFF Control (Negative Logic)					
Converter Off		2.4		20	Vdc

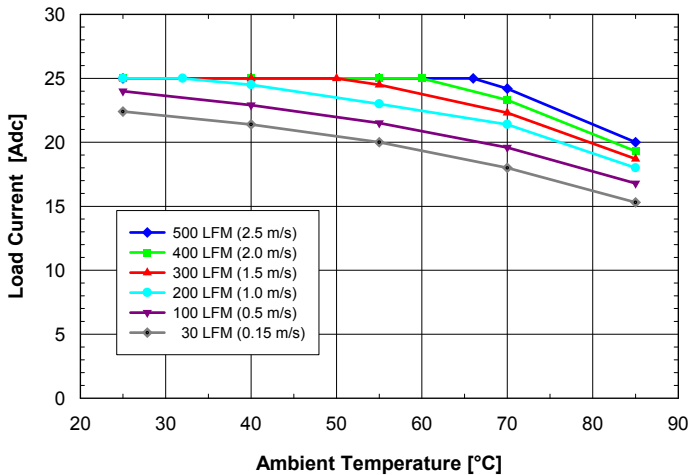
**Additional Notes:**

- V<sub>out</sub> can be increased up to 10% via the sense leads or up to 10% via the trim function, however total output voltage trim from all sources should not exceed 10% of V<sub>OUT(NOM)</sub>, in order to insure specified operation of over-voltage protection circuitry.

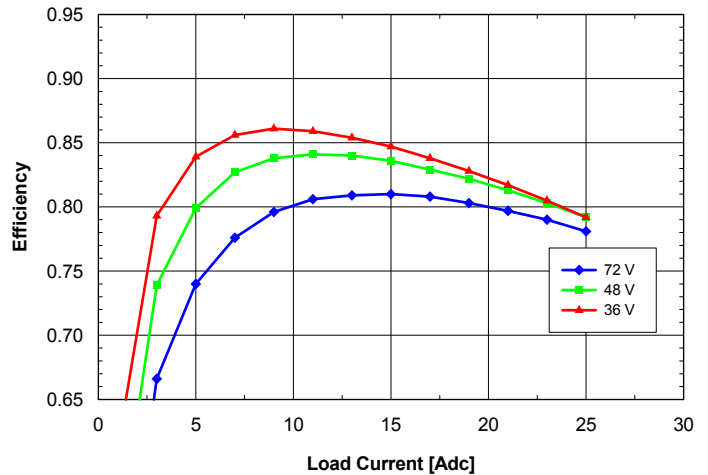
**Electrical Specifications: SQM48T/S25012 (1.2 Volts Out)**

Conditions:  $T_A=25^\circ\text{C}$ , Airflow=300 LFM (1.5 m/s),  $V_{in}=48\text{ Vdc}$ ,  $V_{out}=1.2\text{ Vdc}$  unless otherwise specified.

PARAMETER	NOTES	MIN	TYP	MAX	UNITS
<b>INPUT CHARACTERISTICS</b>					
Maximum Input Current	25 Adc, 1.2 Vdc Out @ 36 Vdc In			1	Adc
Input Stand-by Current	$V_{in} = 48\text{ V}$ , converter disabled		3		mAdc
Input No Load Current (0 load on the output)	$V_{in} = 48\text{ V}$ , converter enabled		24		mAdc
Input Reflected-Ripple Current	25MHz bandwidth		6		$\text{mA}_{\text{PK-PK}}$
Input Voltage Ripple Rejection	120Hz		TBD		dB
<b>OUTPUT CHARACTERISTICS</b>					
Output Voltage Set Point (no load)	-40°C to 85°C	1.188	1.200	1.212	Vdc
Output Regulation					
Over Line			±1	±3	mV
Over Load			±1	±3	mV
Output Voltage Range	Over line, load and temperature	1.182		1.218	Vdc
Output Ripple and Noise - 25MHz bandwidth	Full load + 10 $\mu\text{F}$ tantalum + 1 $\mu\text{F}$ ceramic		30	50	$\text{mV}_{\text{PK-PK}}$
External Load Capacitance	Plus full load (resistive)			20,000	$\mu\text{F}$
Output Current Range		0		25	Adc
Current Limit Inception	Non-latching	26.5	30	32	Adc
Peak Short-Circuit Current	Non-latching. Short=10m $\Omega$ .		35	46	A
RMS Short-Circuit Current	Non-latching			6.7	Arms
<b>DYNAMIC RESPONSE</b>					
Load Change 20% of $I_{out\text{ Max}}$ , $di/dt = 0.1\text{ A}/\mu\text{S}$	$C_o = 1\text{ }\mu\text{F}$ ceramic		80		mV
$di/dt = 5\text{ A}/\mu\text{S}$	$C_o = 450\text{ }\mu\text{F}$ tant. + 1 $\mu\text{F}$ ceramic		140		mV
Setting Time to 1%			100		$\mu\text{s}$
<b>EFFICIENCY</b>					
100% Load			79		%
50% Load			84		%

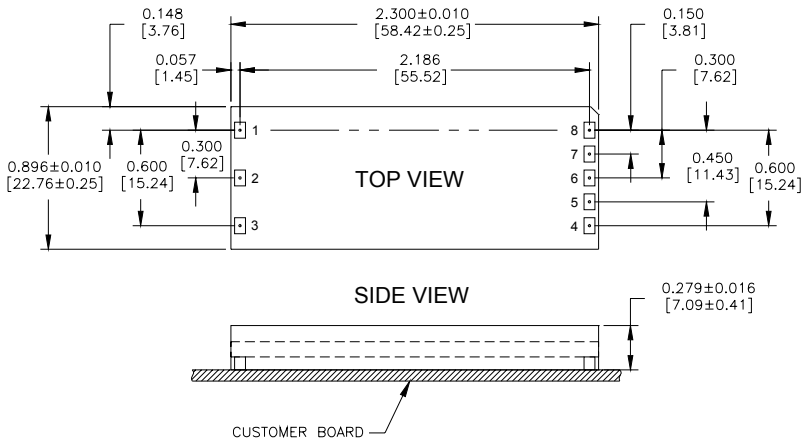


**Fig. 1.2V.1:** Available load current vs. ambient air temperature and airflow rates for **SQM48T25012** converter with D height pins mounted vertically with air flowing from pin 3 to pin 1, MOSFET temperature  $\leq 120^\circ\text{C}$ ,  $V_{in} = 48\text{ V}$ .



**Fig. 1.2V.2:** Efficiency vs. load current and input voltage for **SQM48T/S25012** converter mounted vertically with air flowing from pin 3 to pin 1 at a rate of 300 LFM (1.5 m/s) and  $T_a = 25^\circ\text{C}$ .

**Physical Information**

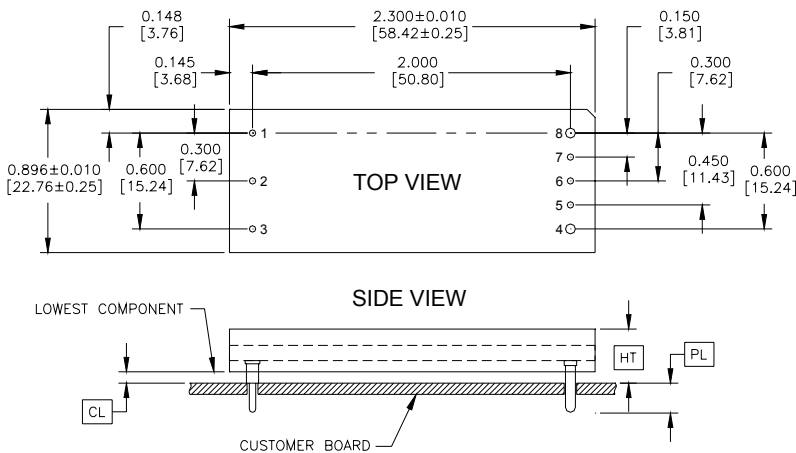


**SQM48S Pinout (Surface Mount)**

SQM48S Platform Notes

- All dimensions are in inches [mm]
- Connector Material: Copper
- Connector Finish: Gold over Nickel
- Converter Weight: 0.66 oz [18.5 g]
- Recommended Surface-Mount Pads:  
Min. 0.080" X 0.112" [2.03 x 2.84]  
Max. 0.092" X 0.124" [2.34 x 3.15]

Height Option	HT (Max. Height)	CL (Min. Clearance)
	+0.000 [+0.00] -0.038 [- 0.97]	+0.016 [+0.41] -0.000 [- 0.00]
A	0.325 [8.26]	0.030 [0.77]
B	0.358 [9.09]	0.063 [1.60]
C	0.522 [13.26]	0.227 [5.77]
D	0.422 [10.72]	0.127 [3.23]
E	0.304 [7.72]	0.009 [0.23]



**SQM48T Pinout (Through-hole)**

**Pad/Pin Connections**

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

Pin Option	PL Pin Length
	±0.005 [±0.13]
A	0.188 [4.77]
B	0.145 [3.68]
C	0.110 [2.79]

SQM48T Platform Notes


- 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: Brass
- Pin Finish: Tin/Lead over Nickel
- Converter Weight: 0.66 oz [18.5 g]

**Converter Part Numbering/Ordering Information**

Product Series	Input Voltage	Mounting Scheme	Rated Load Current	Output Voltage	ON/OFF Logic	Maximum Height [HT]	Pin Length [PL]	Special Features	Environmental
<b>SQM</b>	<b>48</b>	<b>S</b>	<b>25</b>	<b>018</b>	-	<b>N</b>	<b>B</b>	<b>A</b>	<b>0</b>
1/8 <sup>th</sup> Brick Format	36-75 V	S ⇒ Surface Mount	25 A (1.2 – 2.5 V)	012 ⇒ 1.2 V 015 ⇒ 1.5 V 018 ⇒ 1.8 V <b>020 ⇒ 2.0 V</b> 025 ⇒ 2.5 V	N ⇒ Negative  P ⇒ Positive	<u>SMT</u> S ⇒ 0.295"	<u>SMT</u> 0 ⇒ 0.00"	0 ⇒ STD	No Suffix Character ⇒ RoHS lead-solder-exempt compliant  G ⇒ RoHS compliant for all six substances

Product Series	Input Voltage	Mounting Scheme	Rated Load Current	Output Voltage	ON/OFF Logic	Maximum Height [HT]	Pin Length [PL]	Special Features	Environmental
<b>SQM</b>	<b>48</b>	<b>T</b>	<b>25</b>	<b>018</b>	-	<b>N</b>	<b>B</b>	<b>A</b>	<b>0</b>
1/8 <sup>th</sup> Brick Format	36-75 V	T ⇒ Through-hole	25 A (1.2 – 2.5 V)	012 ⇒ 1.2 V 015 ⇒ 1.5 V 018 ⇒ 1.8 V 020 ⇒ 2.0 V 025 ⇒ 2.5 V	N ⇒ Negative  P ⇒ Positive	<u>Through hole</u> A ⇒ 0.325" B ⇒ 0.358" C ⇒ 0.522" D ⇒ 0.422" E ⇒ 0.304"	<u>Through hole</u> A ⇒ 0.188" B ⇒ 0.145" C ⇒ 0.110"	0 ⇒ STD	No Suffix Character ⇒ RoHS lead-solder-exempt compliant  G ⇒ RoHS compliant for all six substances

The example above describes P/N SQM48T25018-NBA0: 36-75 V input, through-hole mounting, 25 A @ 1.8 V output, negative ON/OFF logic, a maximum height of 0.358", a through the board pin length of 0.188", and RoHS lead-solder-exempt compliancy. Please consult factory regarding availability of a specific version.

 Model numbers highlighted in yellow or shaded are not recommended for new designs.