SQE48T10120

Eighth-Brick DC-DC Converter

The new high performance 10A SQE48T10120 DC-DC converter provides a high efficiency single output, in a 1/8th brick package that is only 62% the size of the industry-standard quarter-brick. Specifically designed for operation in systems that have limited airflow and increased ambient temperatures, the SQE48T10120 converter utilize the same pinout and functionality of the industry-standard quarter-bricks.

The SQE48T10120 converter thermal 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.

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 36-75V input, the SQE48T10120 converter provides a 12V output voltage that can be trimmed from –20% to +10% of the nominal output voltage, thus providing outstanding design flexibility.

With standard pinout and trim equations, the SQE48T10120 converter is a perfect drop-in replacement for existing 10A quarter-brick designs. Inclusion of this converter in a new design can result in significant board space and cost savings. The designer can expect reliability improvement over other available converters because of the SQE48T10120's optimized thermal efficiency.

RoHS Compliant

Key Features & Benefits

- 36-75 VDC Input; 12 VDC @ 10 A Output
- Industry-standard quarter-brick pinout
- Delivers 120W at 93% efficiency
- Withstands 100 V input transient for 100 ms
- Fixed-frequency operation
- On-board input differential LC-filter
- Start-up into pre-biased load
- No minimum load required
- Output voltage trim range: +10%/–20% with industry-standard trim equations
- Fully protected
- Remote output sense
- Positive or negative logic ON/OFF option
- Approved to the latest edition of the following standards: UL/CSA60950-1, IEC60950-1 and EN60950-1.
- Designed to meet Class B conducted emissions per FCC and EN55022 when used with external filter
- All materials meet UL94, V-0 flammability rating
- RoHS lead-free solder and lead-solder-exempted products are available

1. ELECTRICAL SPECIFICATIONS

Conditions: T_A = 25 °C, Airflow = 300 LFM (1.5 m/s), Vin = 48 VDC, Cin = 33 µF, unless otherwise specified.

PARAMETER	CONDITIONS / DESCRIPTION	MIN	TYP	MAX	UNITS
Absolute Maximum Ratings					
Input Voltage	Continuous Transient, 100ms	-0.3		80 100	VDC VDC
Operating Ambient Temperature		-40		85	°C
Storage Temperature		-55		125	°C
Isolation Characteristics					
I/O Isolation	Standard Product: Option **0** (refer to Ordering Information)	2250			VDC
Isolation Capacitance			190		pF
Isolation Resistance		10			MΩ
I/O Isolation	Option **K** (refer to Ordering Information)	1500			VDC
Isolation Capacitance			1200	1500	pF
Isolation Resistance		10			MΩ
Feature Characteristics					
Switching Frequency			500		kHz
Output Voltage Trim Range[1]	Industry-standard trim equations	-20		+10	%
Remote Sense Compensation[1]	Percent of V_{OUT}(NOM)			+10	%
Output Overvoltage Protection	Non-latching	117	122	135	%
Overtemperature Shutdown (PCB)	Non-latching			140	°C
Auto-Restart Period	Applies to all protection features		200		ms
Turn-On Time from Vin	Time from UVLO to Vo = 90% V_{OUT}(NOM) Resistive load		5		ms
Turn-On Time from ON/OFF Control	Time from ON to Vo = 90% V_{OUT}(NOM) Resistive load		5		ms
Turn-On Time from Vin	Time from UVLO to Vo = 90% V_{OUT}(NOM) Resistive load and 5,000 µF load		13		ms
Turn-On Time from ON/OFF Control	Time from ON to Vo = 90% V_{OUT}(NOM) Resistive load and 5,000 µF load		13		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
Input Characteristics					
Operating Input Voltage Range		36	48	75	VDC
Input Undervoltage Lockout	Turn-on Threshold	33	34	35	VDC
	Turn-off Threshold	31	32	33	VDC
Lockout Hysteresis Voltage		1.5			VDC
Maximum Input Current	Po = 120 W @ 36 VDC In			3.6	ADC

[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 V_{OUT}(nom), in order to ensure specified operation of overvoltage protection circuitry.

Input Standby Current	Vin = 48 V, converter disabled		5		mA
Input No Load Current (No load on the output)	Vin = 48 V, converter enabled		55		mA
Input Reflected-Ripple Current, i_C	Vin = 48 V, 25 MHz bandwidth, Po = 120 W			42 10	mA_{PK-PK} mA_{RMS}
Input Reflected-Ripple Current, i_S				510 180	mA_{PK-PK} mA_{RMS}
Input Voltage Ripple Rejection	120 Hz		65		dB
Output Characteristics					
Output Voltage Setpoint	Vin = 48 V, No load, Room temperature	11.88		12.12	VDC
Output Regulation					
Over Line	Full load, Room temperature		±10	±24	mV
Over Load	Vin = 48 V, Room temperature		±10	±24	mV
Output Voltage Range	Over line, load and temperature	11.76		12.24	VDC
Output Ripple and Noise – 25 MHz bandwidth	Full load + 10 µF tantalum + 1 µF ceramic		40	200	mV_{PK-PK}
Admissible External Load Capacitance Full load (resistive)	CEXT ESR	0 TBD		5000 TBD	µF mOhm
Output Current Range		0		10	ADC
Current Limit Inception	Non-latching	11	12	15	ADC
Peak Short-Circuit Current	Non-latching, Short = 10 mΩ			15	A
RMS Short-Circuit Current	Non-latching			2.5	A
Dynamic Response					
Load Change 50%-75%-50% of Iout Max, di/dt = 0.1 A/µs	Co = 10µF tantalum + 1µF ceramic		100		mV
Settling Time to 1% of Vout			50		µs
Efficiency					
100% Load			93		%
50% Load			92.7		%
Environmental					
Operating / Storage Humidity	Non-condensing			95	%
Mechanical					
Weight			22.5		g
Vibration	GR-63-CORE, Sect. 5.4.2	1			g
Shocks	Half Sinewave, 3-axis	50			g
Reliability					
MTBF	Telcordia SR-332, Method I Case 1 50% electrical stress, 40°C components		TBD		MHrs
EMI and Regulatory Compliance					
Conducted Emissions	CISPR 22 B with specified EMI filter network				

SQE48T10120

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.
However, in some applications, the inductance associated with the distribution from the power source to the input of the converter can affect the stability of the converter. A 33 µF electrolytic capacitor with an ESR < 1 Ω across the input is recommended 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 5000 µF.

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 Figure A.

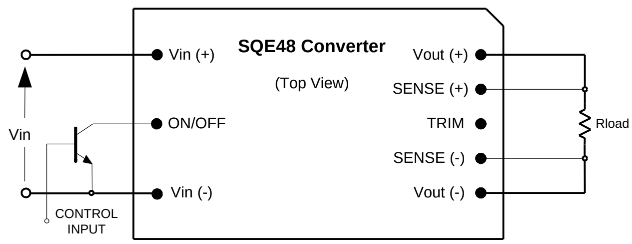

Figure A. Circuit configuration for ON/OFF function.

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 hard wired 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 5V through a resistor. A properly de-bounced 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 ≤ 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 Figure B).

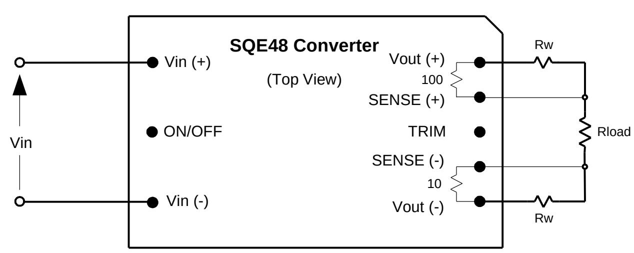

Figure B. Remote sense circuit configuration.

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 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%, relative to the rated output voltage by the addition of an externally connected resistor. Trim up to 10% at full load is guaranteed at Vin ≥ 40V
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 Figure C. A trim resistor, $R_{T\text{-}INCR}$, should be connected between the TRIM (Pin 6) and SENSE(+) (Pin 7), with a value of:

$$R_{T-INCR} = \frac{5.11(100+\Delta)V_{O-NOM} - 626}{1.225\Delta} - 10.22 \quad [k\Omega],$$

where,

$R_{T-INCR} =$ Required value of trim-up resistor kΩ]

$V_{O-NOM} =$ Nominal value of output voltage [V]

$$\Delta = \left| \frac{(V_{O-REQ} - V_{O-NOM})}{V_{O-NOM}} \right| X\ 100 \quad [\%]$$

$V_{O-REQ} =$ Desired (trimmed) output voltage [V].
When trimming up, care must be taken not to exceed the converter's maximum allowable output power. See the previous section for a complete discussion of this requirement.

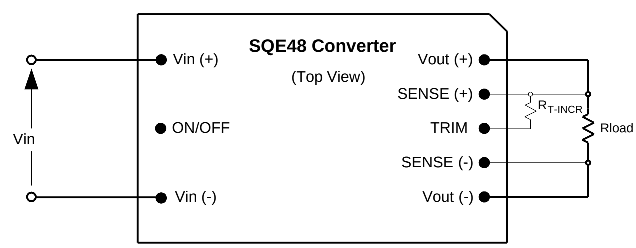

Figure C. Configuration for increasing output voltage.

To decrease the output voltage (Figure D), a trim resistor, $R_{T\text{-}DECR}$, should be connected between the TRIM (Pin 6) and SENSE(-) (Pin 5), with a value of:

$$R_{T-DECR} = \frac{511}{|\Delta|} - 10.22 \quad [k\Omega]$$

where,

R_{T-DECR} = Required value of trim-down resistor [kΩ] and Δ is defined above.

Note:
The above equations for calculation of trim resistor values match those typically used in conventional industry-standard quarter-bricks.

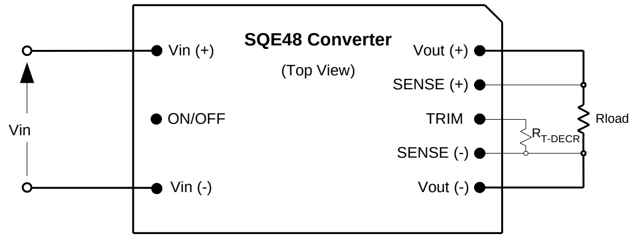

Figure D. Configuration for decreasing output voltage.

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:

$$[V_{OUT}(+) - V_{OUT}(-)] - [V_{SENSE}(+) - V_{SENSE}(-)] \le V_{O-NOM} \times 10\% \quad [V]$$

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

3. PROTECTION FEATURES

3.1 INPUT UNDERVOLTAGE LOCKOUT

Input undervoltage 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 34V for the converter to turn on. Once the converter has been turned on, it will shut off when the input voltage drops typically below 32V. 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.
If the converter is equipped with the special OCP version designated by the suffix K in the part number, the converter will shut down in approximately 15ms after entering the constant current mode of operation. The standard version (suffix 0) will continue operating in the constant current mode until the output voltage drops below 50% at which point the converter will shut down as shown in Figure 13.
Once the converter has shut down, it will enter the hiccup mode and attempt to restart approximately every 200 ms with a typical 3-5% duty cycle as shown in Figure 14. 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 overtemperature condition to protect itself from overheating caused by operation outside the thermal derating curves, or operation in abnormal conditions such as system fan failure. Converter with the non-latching option will automatically restart after it has cooled to a safe operating temperature**.**

3.5 SAFETY REQUIREMENTS

The converters are safety approved to UL/CSA60950-1, EN60950-1, and IEC60950-1. Basic Insulation is provided between input and output.
The converters have no internal fuse. If required, the external fuse needs to be provided to protect the converter from catastrophic failure. Refer to the “Input Fuse Selection for DC/DC converters” application note on belpowersolutions.com for proper selection of the input fuse. Both input traces and the chassis ground trace (if applicable) must be capable of conducting a current of 1.5 times the value of the fuse without opening. The fuse must not be placed in the grounded input line.
Abnormal and component failure tests were conducted with the input protected by a 5A fuse. If a fuse rated greater than 5A is used, additional testing may be required. To protect a group of converters with a single fuse, the rating can be increased from the recommended value 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, the SQE48T10120 converter passes 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 V_{IN}. See Figure E.

Time	Comments
t_0	ON/OFF pin is ON; system front-end power is toggled on, V_{IN} to converter begins to rise.
t_1	V_{IN} crosses undervoltage Lockout protection circuit threshold; converter enabled.
t_2	Converter begins to respond to turn-on command (converter turn-on delay).
t_3	Converter V_{OUT} reaches 100% of nominal value.

For this example, the total converter startup time (t_3- t_1) is typically 5 ms.

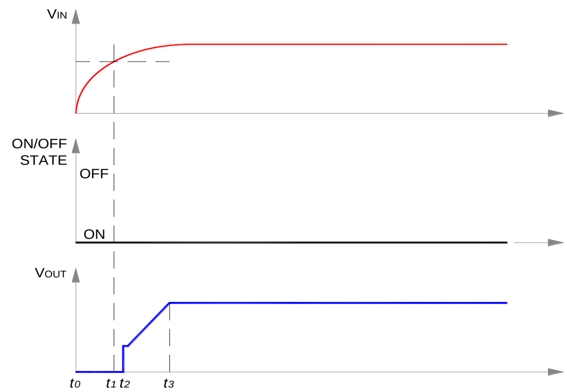

Figure E. Startup scenario #1.

Scenario #2: Initial Startup Using ON/OFF Pin
With V_{IN} previously powered, converter started via ON/OFF pin. See Figure F.

Time	Comments
t_0	V_{INPUT} at nominal value.
t_1	Arbitrary time when ON/OFF pin is enabled (converter enabled).
t_2	End of converter turn-on delay.
t_3	Converter V_{OUT} reaches 100% of nominal value.

For this example, the total converter startup time (t_3- t_1) is typically 5 ms.

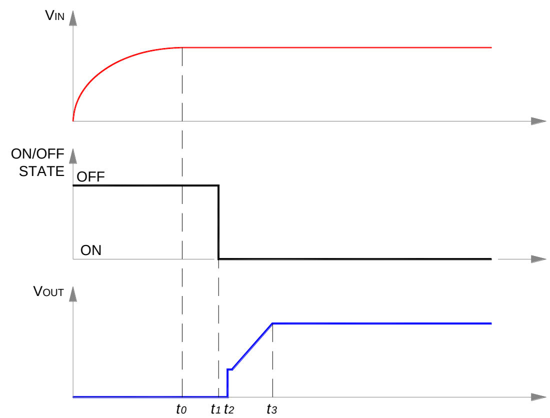

Figure F. Startup scenario #2.

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

Time	Comments
t_0	V_{IN} and V_{OUT} are at nominal values; ON/OFF pin ON.
t_1	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.
t_2	ON/OFF pin is externally re-enabled. **If (t_2- t_1) ≤ 200 ms**, external action of ON/OFF pin is locked out by startup inhibit timer. **If (t_2- t_1) > 200 ms**, ON/OFF pin action is internally enabled.
t_3	Turn-on inhibit delay period ends. If ON/OFF pin is ON, converter begins turn-on; if off, converter awaits ON/OFF pin ON signal; see Figure F.
t_4	End of converter turn-on delay.
t_5	Converter V_{OUT} reaches 100% of nominal value.

For the condition, **(t_2- t_1) ≤ 200 ms**, the total converter startup time (t_5- t_1) is typically 205ms. For **(t_2- t_1) > 200 ms**, startup will be typically 205ms after release of ON/OFF pin.

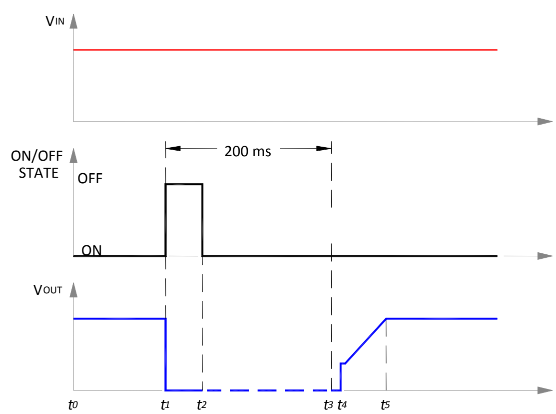

Figure G. Startup scenario #3.

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), efficiency, startup and shutdown parameters, output ripple and noise, transient response to load step-change, overcurrent, 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 Figure H for the optimum measuring thermocouple location.

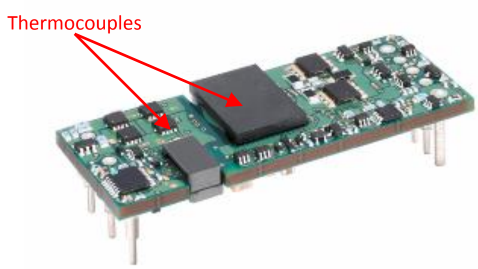

Fig. H: Location of the thermocouple for thermal testing.

4.3 THERMAL DERATING

Load current vs. ambient temperature and airflow rates are given in Figure 1. Ambient temperature was varied between 25°C and 85°C, with airflow rates from 30 to 500LFM (0.15 to 2.5m/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 temperature of 125°C as indicated by the thermographic image
(ii) The output current at which the temperature at the thermocouple locations shown in Figure H does not exceed 125°C
(iii) The nominal rating of the converter (10A).

4.4 EFFICIENCY

Figure 2 shows the efficiency vs. load current plot for ambient temperature of 25ºC, airflow rate of 300LFM (1.5m/s) with horizontal mounting and input voltages of 36V, 48V, and 75V. Also, a plot of efficiency vs. load current, as a function of ambient temperature with Vin=48V, airflow rate of 200LFM (1m/s) with vertical mounting is shown in Figure 3.

4.5 POWER DISSIPATION

Figure 4 shows the power dissipation vs. load current plot for Ta=25ºC, airflow rate of 300LFM (1.5m/s) with horizontal mounting and input voltages of 36V, 48V, and 75V. Also, a plot of power dissipation vs. load current, as a function of ambient temperature with Vin=48V, airflow rate of 200LFM (1m/s) with vertical mounting is shown in Figure 5.

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4.6 STARTUP

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 Figure 6 and Figure 7, respectively.

4.7 RIPPLE AND NOISE

Figure 9 shows the output voltage ripple waveform, measured at full rated load current with a 10μF tantalum and a 1μF ceramic capacitor across the output. Note that all output voltage waveforms are measured across the 1μF ceramic capacitor. The input reflected-ripple current waveforms are obtained using the test setup shown in Figure 10. The corresponding waveforms are shown in Figure 11 and Figure 12.

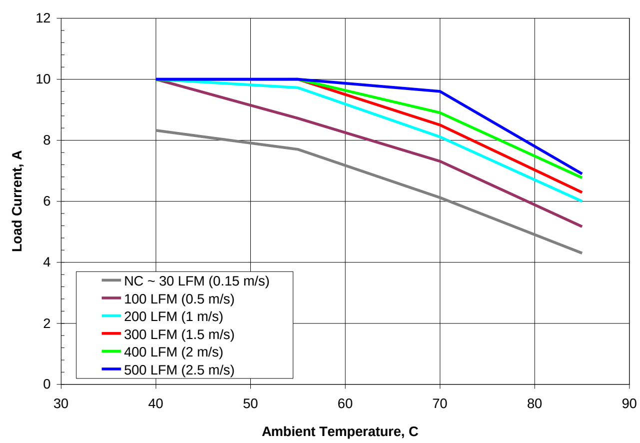


Figure 1. Available load current vs. ambient air temperature and airflow rates for SQE48T10120 converter mounted vertically with air flowing from pin 3 to pin 1, MOSFET temperature ≤ 120 °C, Vin = 48 V.

Note: NC – Natural convection

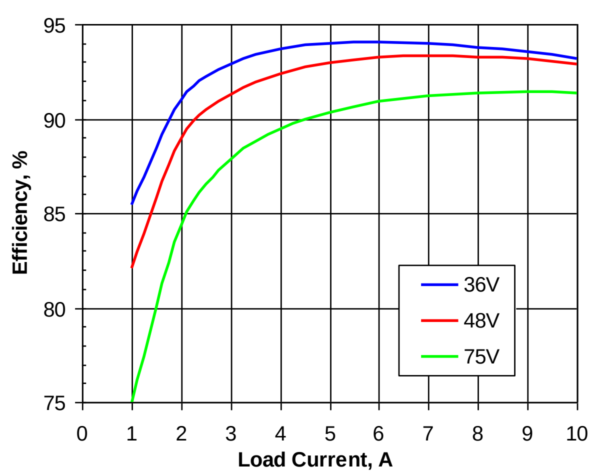


Figure 2. Efficiency vs. load current and input voltage for SQE48T10120 converter mounted horizontally with air flowing from pin 1 to pin 8 at 300 LFM (1.5 m/s) and Ta=25°C.

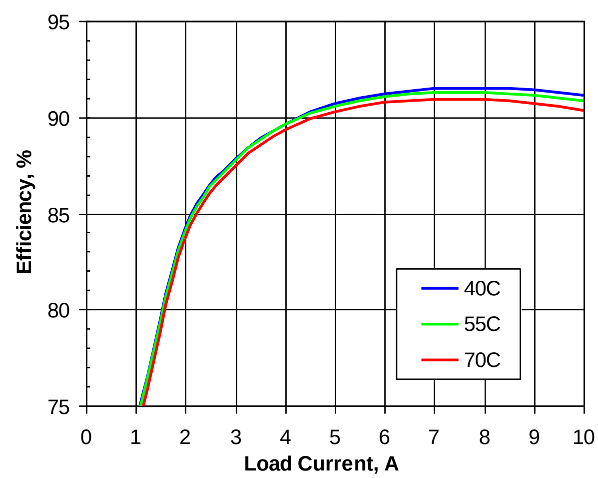


Figure 3. Efficiency vs. load current and ambient temperature for SQE48T10120 converter mounted horizontally with Vin=48V and air flowing from pin 1 to pin 8 at 200LFM (1.0m/s).

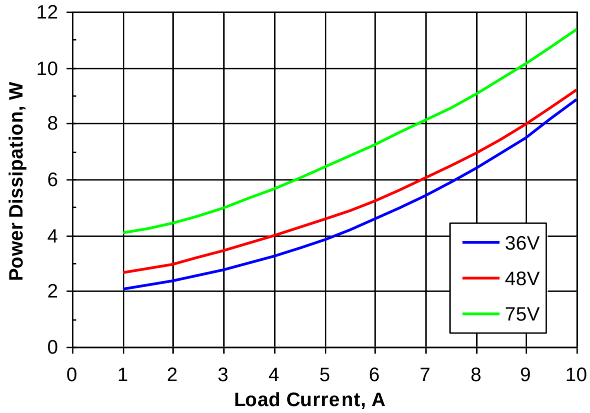


Figure 4. Power dissipation vs. load current and input voltage for SQE48T10120 converter mounted horizontally with air flowing from pin 1 to pin 8 at a rate of 300 LFM (1.5 m/s) and Ta = 25 °C.

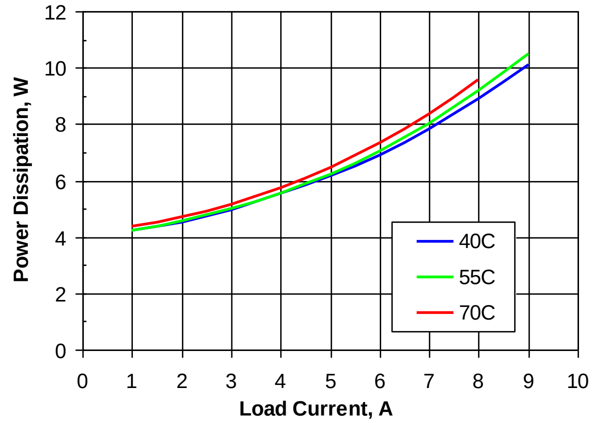


Figure 5. Power dissipation vs. load current and ambient temperature for SQE48T10120 converter mounted horizontally with Vin=48V and air flowing from pin 1 to pin 8 at 200LFM (1.0m/s).

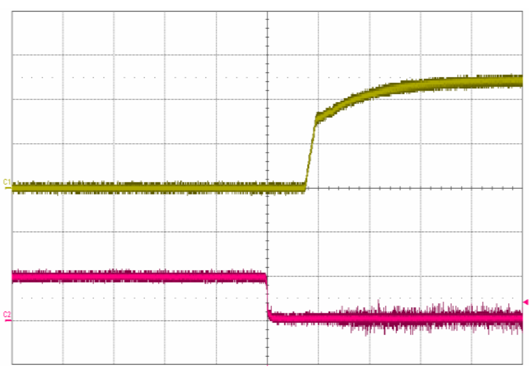


Figure 6. Turn-on transient at full rated load current (resistive) with no output capacitor at Vin=48V, triggered via ON/OFF pin. Bottom trace: ON/OFF signal (5V/div.). Top trace: Output voltage (5V/div.). Time scale: 1ms/div.

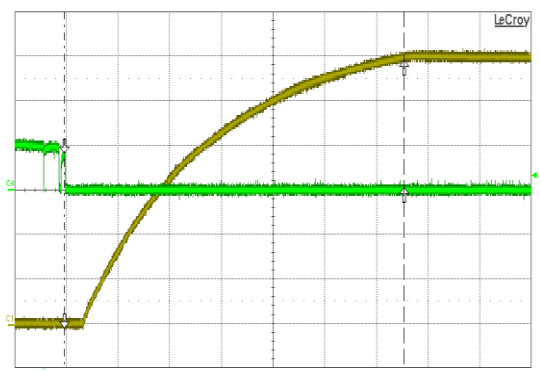


Figure 7. Turn-on transient at full rated load current (resistive) plus 5,000µF at Vin=48V, triggered via ON/OFF pin. Top trace: ON/OFF signal (5V/div.). Bottom trace: Output voltage (2V/div.). Time scale: 2ms/div.

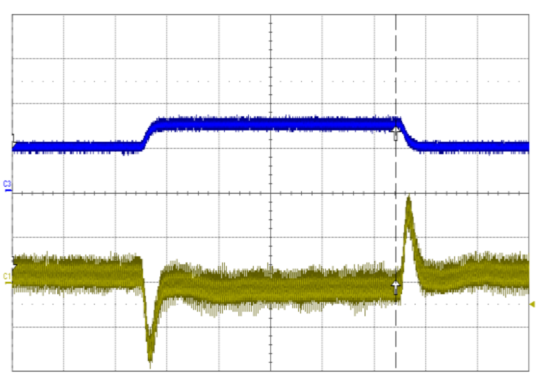


Figure 8. Output voltage response to load current step-change (5A – 7.5A – 5A) at Vin = 48 V. Bottom trace: output voltage (50mV/div.). Top trace: load current (5A/div.). Current slew rate: 0.1 A/µs. Co = 1 µF ceramic. Time scale: 0.1ms/div.

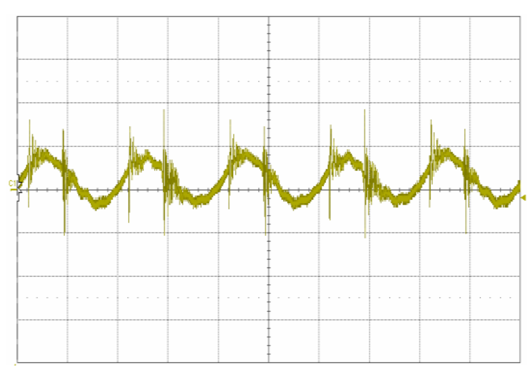


Figure 9. Output voltage ripple (20 mV/div.) at full rated load current into a resistive load with Co = 10µF tantalum + 1µF ceramic and Vin =48V. Time scale: 1µs/div.

SQE48T10120

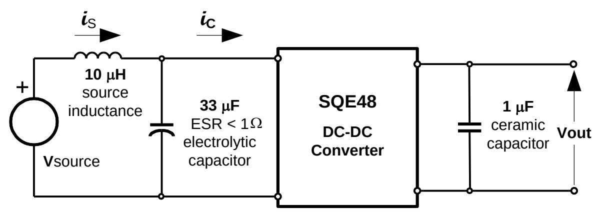


Figure 10. Test setup for measuring input reflected ripple currents, ic and is.

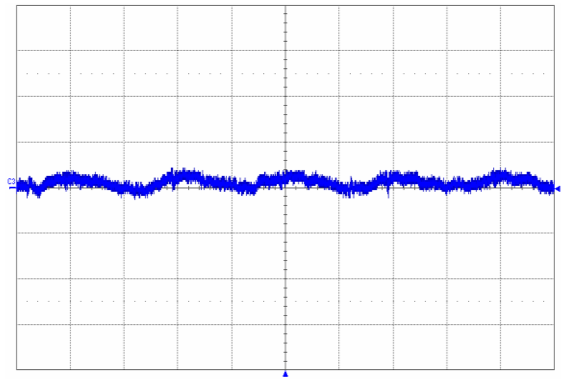


Figure 11. Input reflected-ripple current, is (20 mA/div.), measured through 10 µH at the source at full rated load current and Vin = 48 V. Refer to Figure 10 for test setup. Time scale: 1 µs/div.

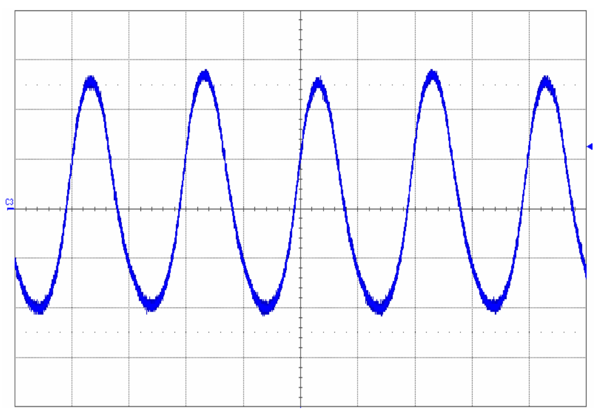


Figure 12. Input reflected ripple-current, ic (100 mA/div.), measured at input terminals at full rated load current and Vin = 48 V. Refer to Figure 10 for test setup. Time scale: 1 µs/div.

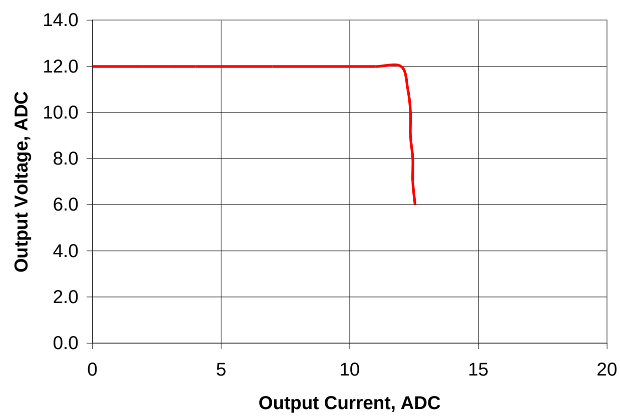


Figure 13. Output voltage vs. load current showing current limit point and converter shutdown point. Input voltage has almost no effect on current limit characteristic.

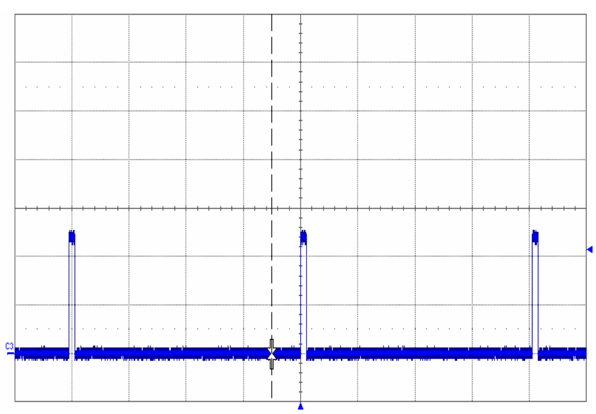


Figure 14. Load current (5A/div., 50 ms/div.) into a 10 mΩ short circuit during restart, at Vin = 48V.

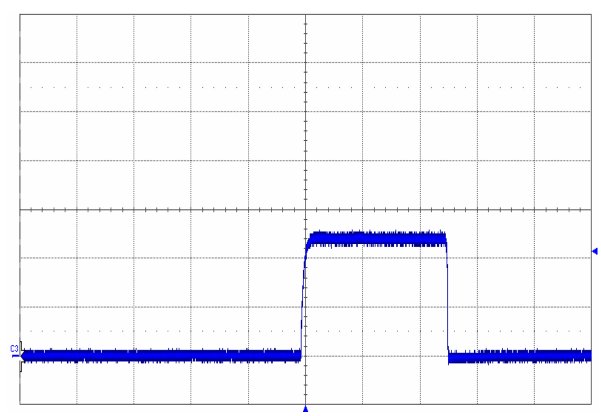
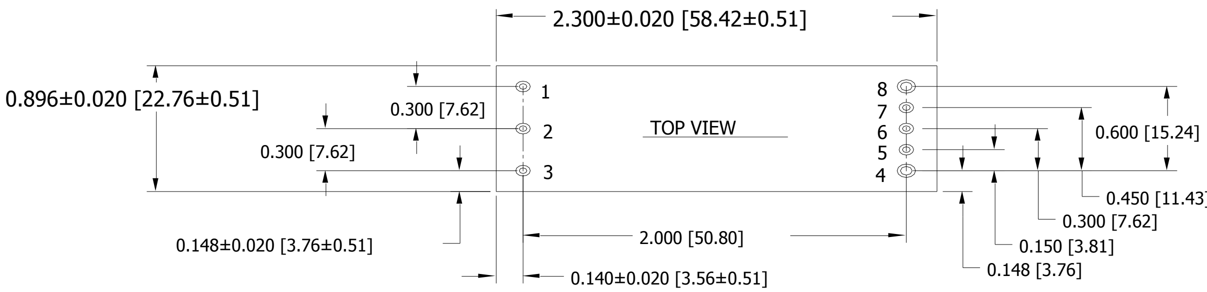


Figure 15. Load current (5A/div., 2ms/div.) into a 10 mΩ short circuit during restart, at Vin = 48V. (Figure 14 expanded)

5. MECHANICAL PARAMETERS



SQE48T Pinout (Through-Hole)

SQE48T 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 a shoulder
- Pin Material: Brass Alloy 360
- Pin Finish: Tin over Nickel

Height Option	HT (Max. Height)	CL (Min. Clearance)
	+0.000 [+0.00] -0.038 [- 0.97]	+0.016 [+0.41] -0.000 [- 0.00]
D	0.374 [9.5]	0.028 [0.7]

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

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

6. ORDERING INFORMATION

Product Series[1]	Input Voltage	Mounting Scheme	Rated Load Current	Output Voltage		ON/OFF Logic	Maximum Height [HT]	Pin Length [PL]	Special Features	RoHS
SQE	**48**	**T**	**10**	**120**	**-**	**N**	**D**	**A**	**K**	**G**
1/8th Brick Format	36-75 V	T⇒ Through-hole	10 ⇒ 10 A	120 ⇒ 12 V		N ⇒ Negative P ⇒ Positive	D ⇒ 0.374"	Through hole A ⇒ 0.188" B ⇒ 0.145"	0 ⇒ 2250VDC isolation, no CM cap K ⇒ 1500VDC isolation, CM cap, and special OCP	No Suffix ⇒ RoHS lead-solder-exemption compliant G ⇒ RoHS compliant for all six substances

The example above describes P/N SQE48T10120-NDA0G: 36-75V input, through-hole, 10 A @ 12 V output, negative ON/OFF logic, maximum height of 0.374", 0.188" pins, 2250VDC isolation, no common mode capacitor, and RoHS compliant for all 6 substances. Consult factory for availability of other options.

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.