SynQor

Technical Specification

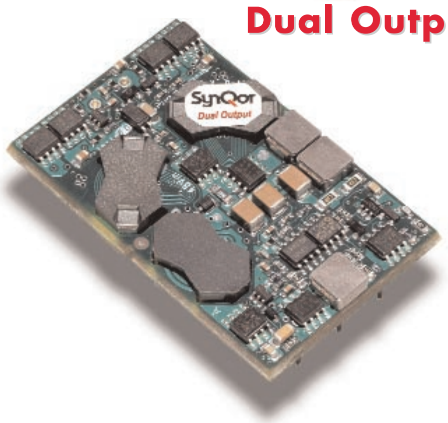
Quarter Brick Dual **48V$_{in}$ 5.0/3.3V$_{out}$ 60W**

Dual Output, High Efficiency, Isolated DC/DC Converter

The DQ65033QMA06 DualQor™ series is a dual output converter that uses the industry standard quarter brick package size. The very high efficiency is a result of SynQor's patented topology that uses synchronous rectification and an innovative construction design to minimize heat dissipation and allow extremely high power densities. The power dissipated by the converter is so low that a heatsink is not required, which saves cost, weight, height, and application effort. All of the power and control components are mounted to the multi-layer PCB substrate with high-yield surface mount technology, resulting in a more reliable product.

DualQor

Dual Output



DQ65033QMA06 Module

Operational Features

- Ultra-high efficiency, >90% at full rated load current
- Delivers up to 60 Watts of output power with minimal derating - no heatsink required
- Wide input voltage range: 35V – 75V, with 100V 100ms input voltage transient protection
- Fixed frequency switching provides predictable EMI performance
- No minimum load requirement means no preload resistors required

Mechanical Features

- Industry standard pin-out configuration
- Industry standard size: 1.45" x 2.3"
- Low profile of only 0.43", permits better airflow and smaller card pitch
- Total weight: 1.5 oz (43 g), lower mass reduces vibration and shock problems

Control Features

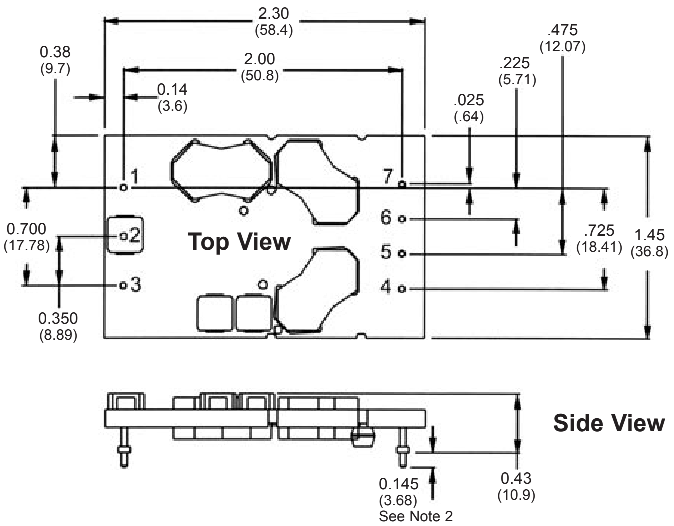
- On/Off control referenced to input side (positive and negative logic options are available)
- Output voltage trim: +10%/-10%, permits custom voltages and voltage margining

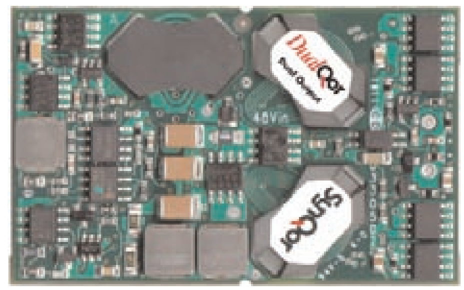
Protection Features

- Input under-voltage lockout disables converter at low input voltage conditions
- Output current limit and short circuit protection protects converter from excessive load current or short circuits
- Output over-voltage protection protects load from damaging voltages
- Thermal shutdown protects converter from abnormal environmental conditions

Safety Features

- 2000V, 10 MΩ input-to-output isolation provides input/output ground separation
- UL 1950 recognized (US & Canada), basic insulation rating
- TUV certified to EN60950
- Meets 72/23/EEC and 93/68/EEC directives which facilitates CE Marking in user's end product
- Board and plastic components meet 94V-0 flammability requirements





Shown Actual Size

1) All pins are 0.040" (1.02mm) dia. with 0.080" (2.03mm) dia. standoff shoulders.
2) Other pin extension lengths available.
4) Undimensioned components are for visual reference only.
5) Weight: 1.5 oz. (43g) typical
6) All dimensions in inches (mm)
   Tolerances: x.xx +/-0.02 in. (x.x +/-0.5mm)
   x.xxx +/-0.010 in. (x.xx +/-0.25mm)
7) Workmanship: Meets or exceeds IPC-A-610B Class II

Pin No.	Name	Function
1	Vin(+)	Positive input voltage (35V - 75V)
2	ON/OFF	TTL input to turn converter on and off, referenced to Vin(-), with internal pull up.
3	Vin(-)	Negative input voltage
4	3.3Vout(+)	3.3V positive output voltage
5	OP RTN	Output Return
6	TRIM	Output voltage trim
7	5.0Vout(+)	5.0V positive output voltage

ABSOLUTE MAXIMUM RATINGS

Input Voltage:
Non-Operating: 100V continuous
Operating: 80V continuous
100V 100ms transient
Input/Output Isolation Voltage: 2000V
Storage Temperature: -55°C to +125°C
Operating Temperature: -40°C to +115°C
Voltage at ON/OFF input pin: +18V / -2V

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. Exposure to absolute maximum ratings for extended periods can adversely affect device reliability.

OPTIONS

- Logic sense - Negative (N); converter is on when the ON/OFF signal is low. Positive (P); converter is on when the ON/OFF signal is high. Logic input is TTL compatible with an internal pull up. Use N or P as 13th letter in part number to indicate logic.
- Pin Length - a variety of pin lengths are available for all modules (see last page). The14th letter in the part number indicates pin length.
- Feature Set - Dual Output Quarter-bricks are available with Standard (S) feature options only. Use S as 15th letter in part number to indicate feature set.

SAFETY

- UL 1950 - All modules are UL 1950 recognized (US & Canada) with basic insulation rating.
- EN60950 - All modules are TUV certified to EN60950 requirements.
- 72/23/EEC - All modules meet 72/23/EEC directives.
- 93/68/EEC - All modules meet 93/68/EEC directives.
- 94V-0 - All modules meet 94V-0 flammability requirements for board and plastic components.
- NEBS - All modules meet NEBS compatibility.
- An external input fuse must always be used to meet these safety requirements.

DQ65033QMA06 ELECTRICAL CHARACTERISTICS

T_A=25°C, airflow rate=300 LFM, V_{in}=48Vdc unless otherwise noted; full operating temperature range is -40°C to +115°C ambient temperature with appropriate power derating. Specifications subject to change without notice.

PARAMETER	NOTES and CONDITIONS	PQ65033QMA06			
		Min.	Typ.	Max.	Units
INPUT CHARACTERISTICS					
Operating Input Voltage Range		35	48	75	V
Input Under-Voltage Lockout					
Turn-On Voltage Threshold		32	33	34	V
Turn-Off Voltage Threshold		28.5	29.5	30.5	V
Lockout Hysteresis Voltage		2.5	3.5	4.5	V
Maximum Input Current	100% Load, 35Vin			2.6	A
No-Load Input Current			50		mA
Off Converter Input Current			2		mA
Inrush Current Transient Rating			.01		A^2s
Input Reflected-Ripple Current	P-P thru 10µH inductor			20	mA
OUTPUT CHARACTERISTICS					
Output Voltage Set Point (3.3V)	48Vin, 50% load on each voltage		3.28		V
Output Voltage Set Point (5.0V)	48Vin, 50% load on each voltage		4.94		V
Total Output Voltage Regulation (3.3V)	cross regulation, line, load, temperature	3.2		3.4	V
Total Output Voltage Regulation (5.0V)	cross regulation, line, load, temperature	4.8		5.2	V
Output Voltage Ripple and Noise (3.3V & 5.0V)	20MHz bandwidth				
Peak-to-Peak	Full Load, 1µF ceramic, 15µF tantalum		50	100	mV
RMS	Full Load, 1µF ceramic, 15µF tantalum		10	20	mV
Operating Output Current Range (3.3V)		0		18	A
Operating Output Current Range (5.0V)		0		12	A
Output DC Current-Limit Inception (3.3V)	Output Voltage 10% Low		22		A
Output DC Current-Limit Inception (5.0V)	Output Voltage 10% Low		14.5		A
Short-Circuit Protection - redundant shutdown (3.3V)			40		A
Short-Circuit Protection - redundant shutdown (5.0V)			28		A
Maximum Output Capacitance (3.3V) (50/50 split)	60W load; 5% overshoot of Vout at startup			13,600	µF
Maximum Output Capacitance (5.0V) (50/50 split)	60W load; 5% overshoot of Vout at startup			6,800	µF
DYNAMIC CHARACTERISTICS					
Input Voltage Ripple Rejection	120 Hz		80		dB
Output Voltage Current Transient	470µF load cap, 5A/µs				
Positive Step Change in Output Current	50% Io to 75% Io		250		mV
Negative Step Change in Output Current	75% Io to 50% Io		250		mV
Settling Time to 1%	Figs 9 & 10		400		µs
Turn-On Transient					
Turn-On Time	from Remote On/Off Activation		4	8	ms
Start-Up Inhibit Period	-40°C to +125°C		200		ms
EFFICIENCY					
100% Load (60W)	48Vin, 50% load on each voltage		90		%
50% Load (30W)	48Vin, 25% load on each voltage		92		%
TEMPERATURE LIMITS FOR POWER DERATING CURVES					
Semiconductor Junction Temperature	Package rated to 150°C			125	°C
Board Temperature	Board rated to 165°C			125	°C
Transformer Temperature				125	°C
ISOLATION CHARACTERISTICS					
Isolation Voltage		2000			V
Isolation Resistance		10			MΩ
Isolation Capacitance			470		pF
FEATURE CHARACTERISTICS					
Switching Frequency			215		kHz
ON/OFF Control (Option P)					
Off-State Voltage		-2		0.8	V
On-State Voltage		2.4		18	V
ON/OFF Control (Option N)					
Off-State Voltage		2.4		18	V
On-State Voltage		-2		0.8	V
ON/OFF Control (Either Option)					
Pull-Up Voltage				9.2	V
Pull-Up Resistance	Pull up to Vin/6		40		kΩ
Output Voltage Trim Range	Trim up pins 6-5, Trim down pins 6-4	-10		10	%
Output Over-Voltage Set Point (3.3V)	Over full temp range		4		V
Output Over-Voltage Set Point (5.0V)	Over full temp range		6		V
Over-Temperature Shutdown	Average PCB Temperature	117	122	127	°C

Patents: SynQor is protected under various patents, including but not limited to U.S. Patent # 5,999,417.

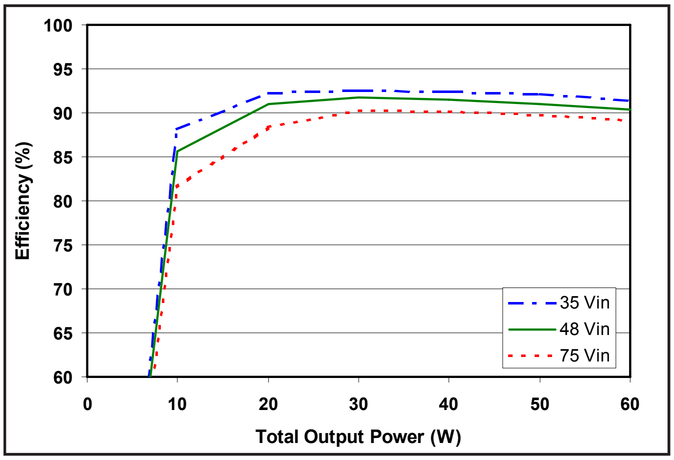


Figure 1: *Efficiency vs. output power, from 0 load to full load with 50% load on 3.3V output and 50% load on 5.0V output at minimum, nominal, and maximum input voltage at 25°C.*

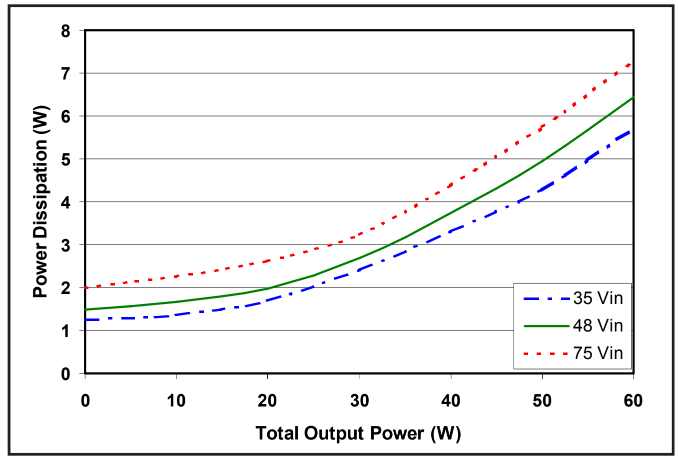


Figure 2: *Power dissipation vs. output power, from 0 load to full load with 50% load on 3.3V output and 50% load on 5.0V output at minimum, nominal, and maximum input voltage at 25°C.*

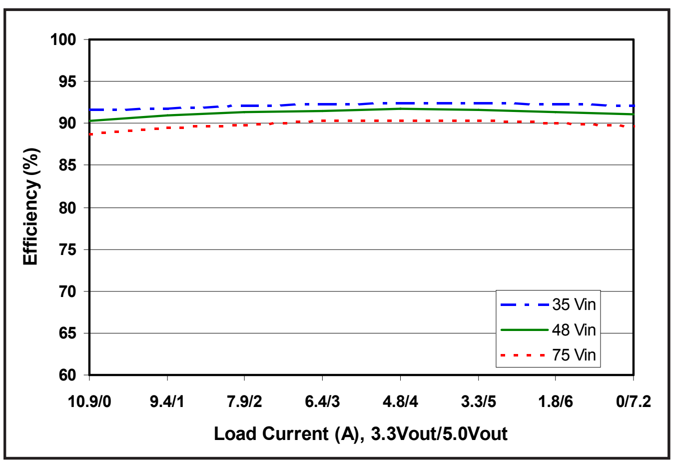


Figure 3: *Efficiency vs. load current, with total output power fixed at 60% load (36W) and load currents split as shown between 3.3V and 5.0V outputs at minimum, nominal, and maximum input voltage at 25°C.*

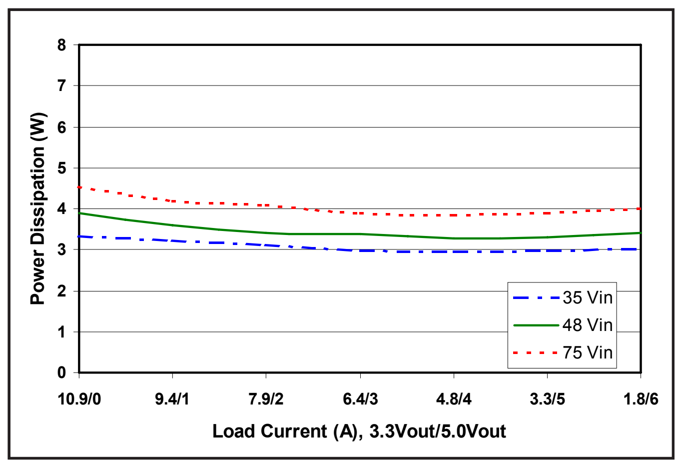


Figure 4: *Power dissipation vs. load current, with total output power fixed at 60% load (36W) and load currents split as shown between 3.3V and 5.0V outputs at minimum, nominal, and max input voltage at 25°C.*

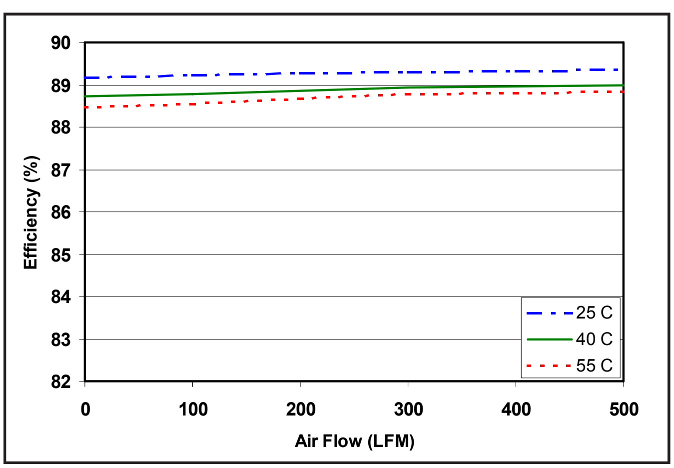


Figure 5: *Efficiency at 80% load and 50/50 voltage split (7.3A load on 3.3V and 4.8A load on 5.0V) versus airflow rate for ambient air temperatures of 25°C, 40°C.and 55°C.(nominal input voltage).*

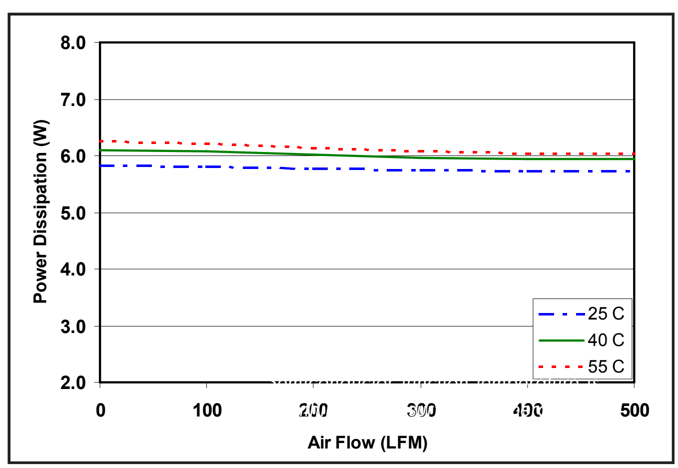


Figure 6: *Power dissipation at 80% load and 50/50 voltage split (7.3A load on 3.3V and 4.8A load on 5.0V) versus airflow rate for ambient air temperatures of 25°C, 40°C.and 55°C.(nominal input voltage).*

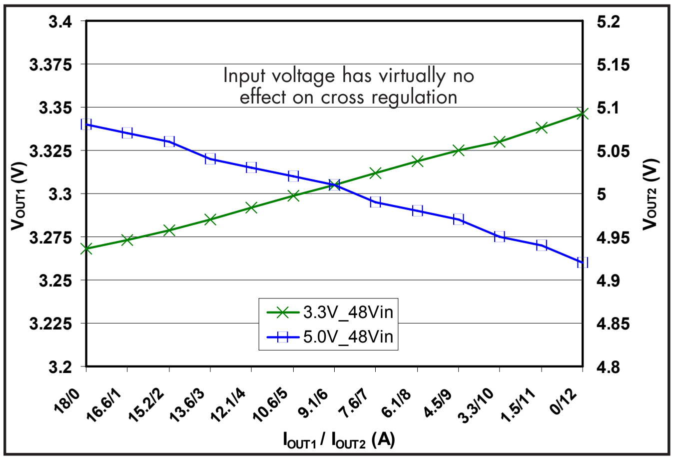


Figure 7: *Load regulation vs. load current with power fixed at full load (60W) and load currents split as shown between 3.3V and 5.0V outputs, at nominal input voltage.*

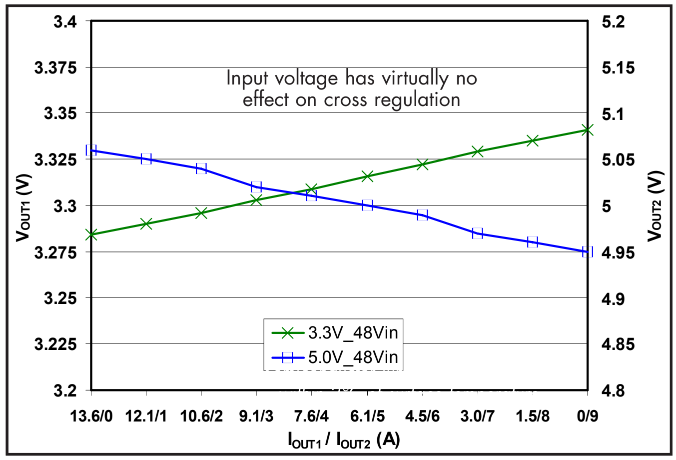


Figure 8: *Load regulation vs. load current with power fixed at 75% load (45W) and load currents split as shown between 3.3V and 5.0V outputs, at nominal input voltage.*

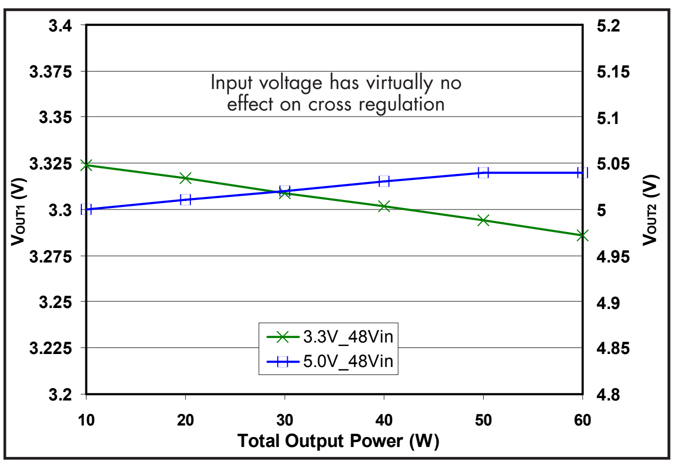


Figure 9: *Load regulation vs. output power from 10W load to full load with 75% load on 3.3V output and 25% load on 5.0V output at nominal input voltage.*

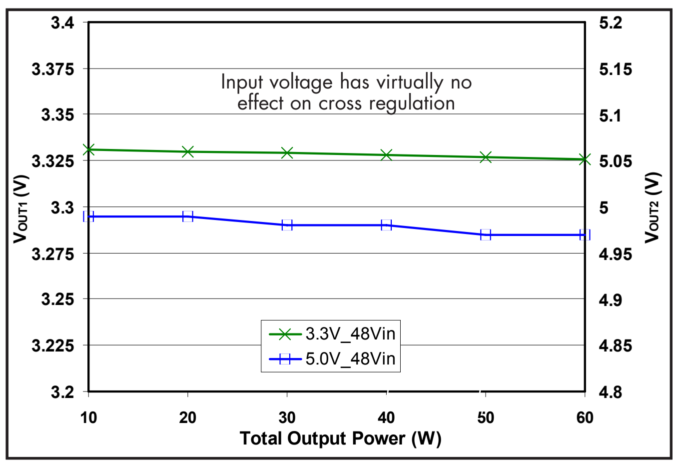


Figure 10: *. Load regulation vs. output power from 10W load to full load with 25% load on 3.3V output and 75% load on 5.0V output at nominal input voltage.*

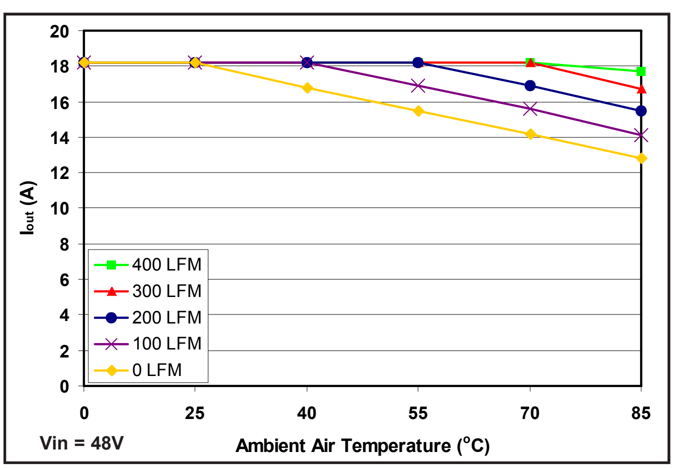


Figure 11: *Maximum output power-derating curves vs. ambient air temperature for airflow rates of 0 to 400 LFM, air flowing from pin 1 to pin 3. Full load (18A) on 3.3V output and no load on 5.0V output.*

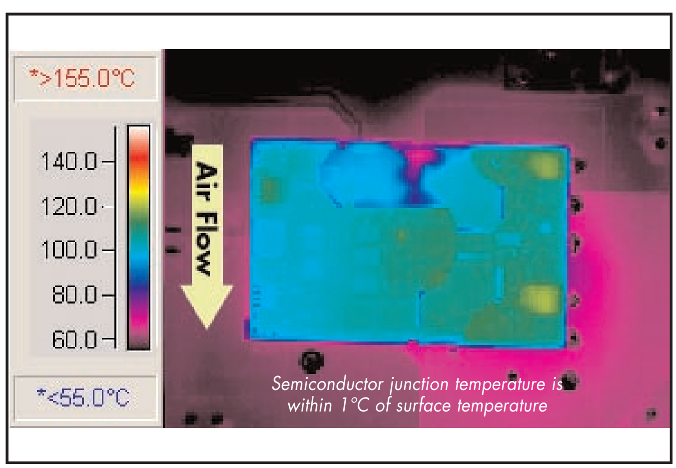


Figure 12: *Thermal plot of converter at 18 amp load on 3.3V ouput and no load on 5.0V output with 55°C air flowing at 200 LFM. Air flow across the converter is from pin 1 to pin 3 (nominal input voltage)*

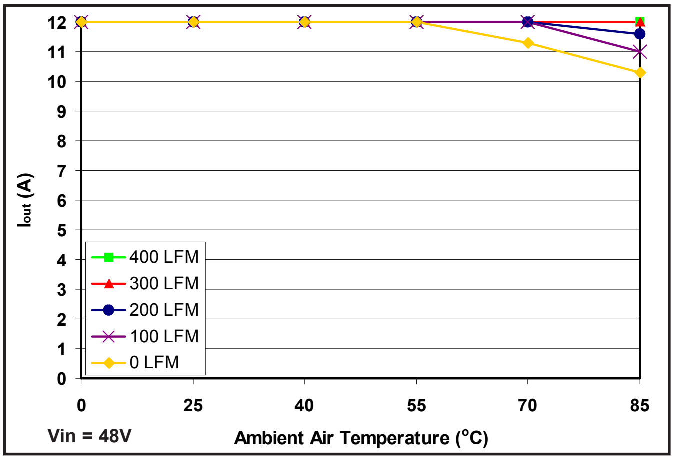


Figure 13: *Maximum output power-derating curves vs. ambient air temperature for airflow rates of 0 to 400 LFM, air flowing from pin 1 to pin 3. Full load (12A) on 5.0V output and no load on 3.3V output.*

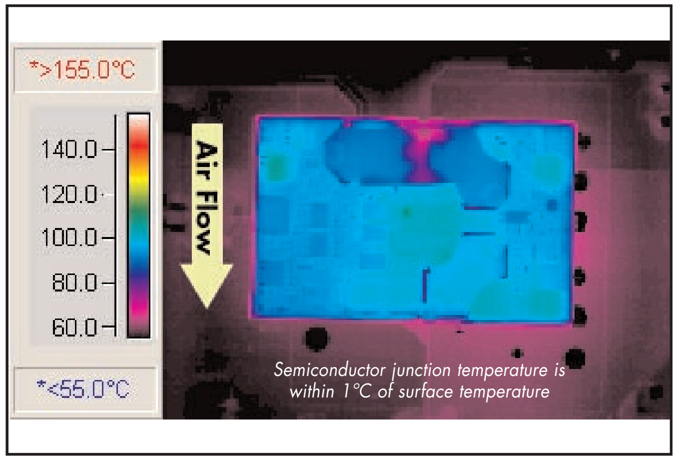


Figure 14: *Thermal plot of converter at 12 amp load on 5.0V ouput and no load on 3.3V output with 55°C air flowing at 200 LFM. Air flow across the converter is from pin 1 to pin 3 (nominal input voltage)*

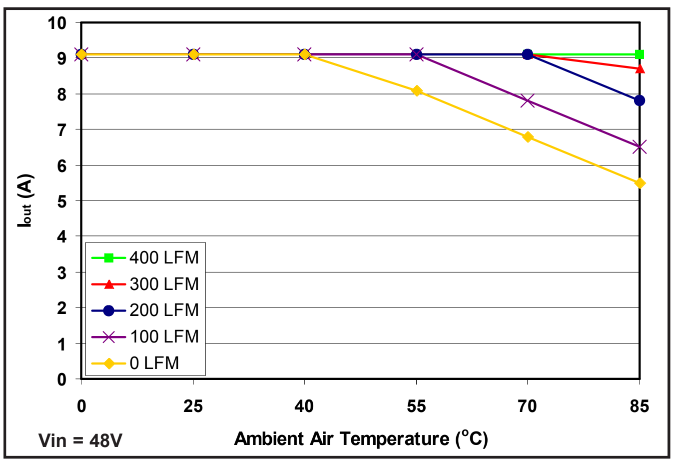


Figure 15: *Max output power-derating curves vs. air temp for 0 to 400 LFM, pin 1 to pin 3. 50% load (9A) on 3.3V output and 50% load (6A) on 5.0V output. At derating points, 3.3V output decreases while 5V ouptput remains unchanged.*

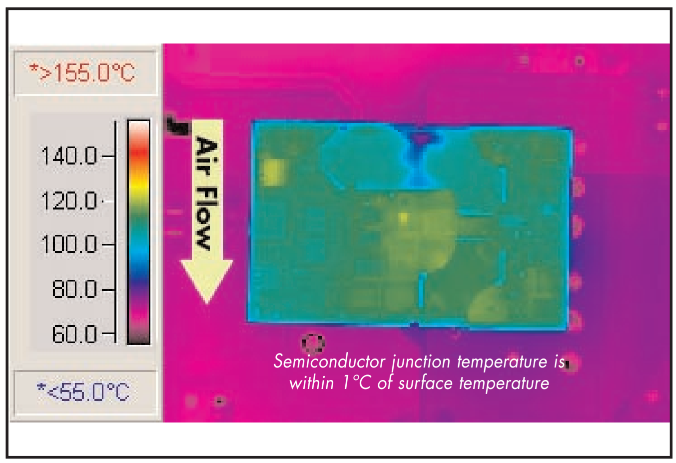


Figure 16: *Thermal plot of converter at 9 amp load on 3.3V ouput and 6 amp load on 5.0V output with 70°C air flowing at 200 LFM. Air flow across the converter is from pin 1 to pin 3 (nominal input voltage)*

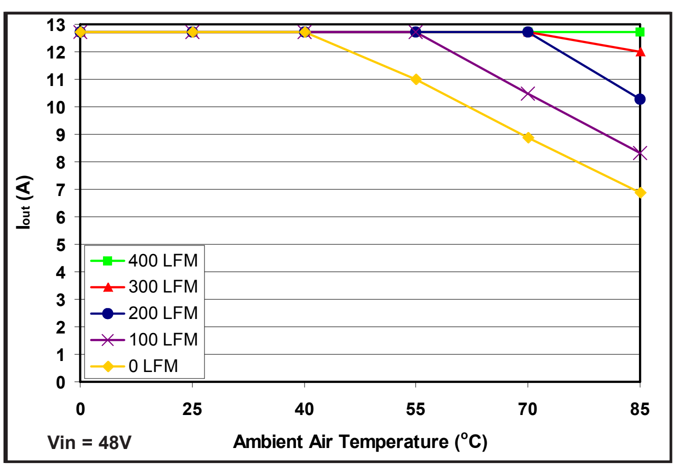


Figure 17: *Max output power derating curves vs. air temp for 0 to 400 LFM, pin 1 to pin 3. 70% load (12.7A) on 3.3V output and 30% load (3.6A) on 5.0V output. At derating points, 3.3V output decreases while 5V output remains unchanged.*

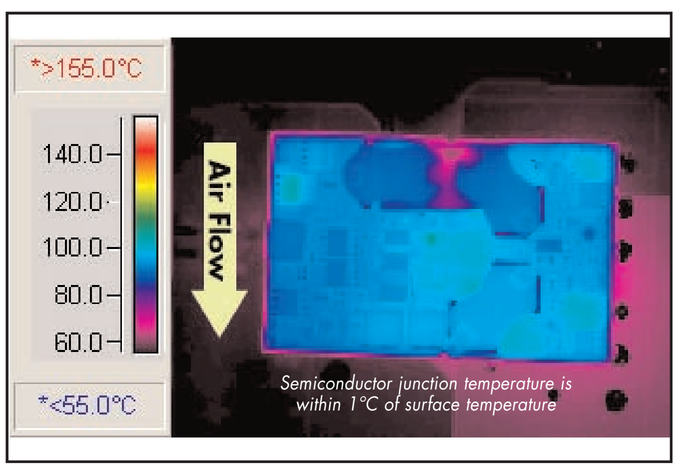


Figure 18: *Thermal plot of converter at 12.7 amp load on 3.3V ouput and 3.6 amp load on 5.0V output with 55°C air flowing at 200 LFM. Air flow across the converter is from pin 1 to pin 3 (nominal input voltage).*

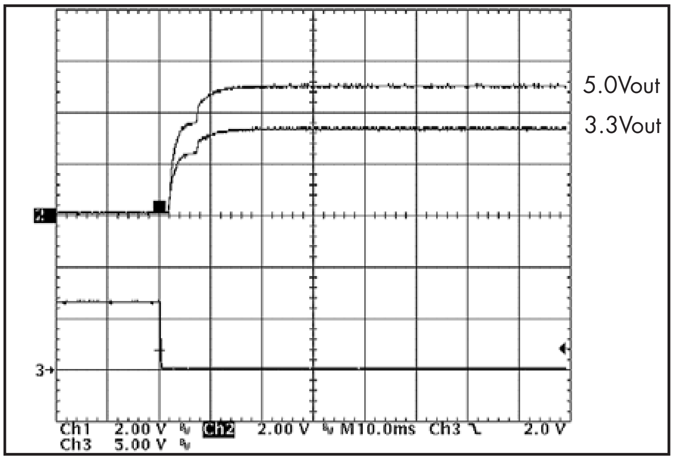


Figure 19: *Turn-on transient at full rated load current (resistive load) (10 ms/div). Ch 1: 3.3Vout (2V/div); Ch 2: 5.0Vout (2V/div) Ch 3: ON/OFF input (5V/div)*

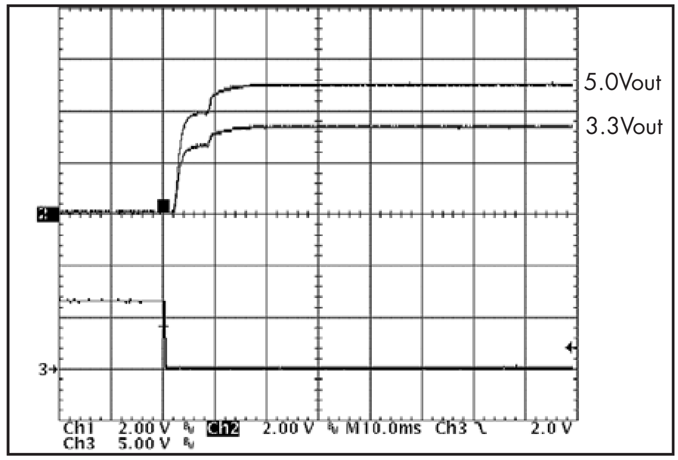


Figure 20: *Turn-on transient at zero load current (10 ms/div). Ch 1: 3.3Vout (2V/div); Ch 2: 5.0Vout (2V/div) Ch 3: ON/OFF input (5V/div)*

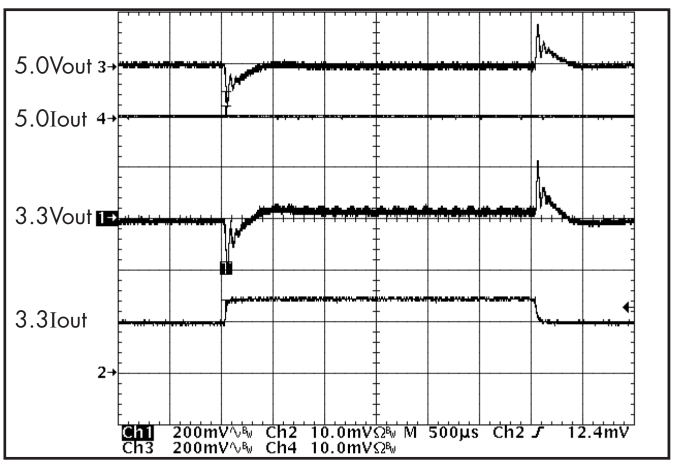


Figure 21: *Output voltage response to step-change in Iout1 (50%-75%-50% of Imax; dI/dt = 0.1A/µs). Load cap: 15µF, 300 mΩ ESR tantalum cap & 1µF ceramic cap. Vout (200mV/div), Iout (10A/div). Ch1: Vout1; Ch2 Iout1; Ch 3: Vout2; Ch 4 Iout2*

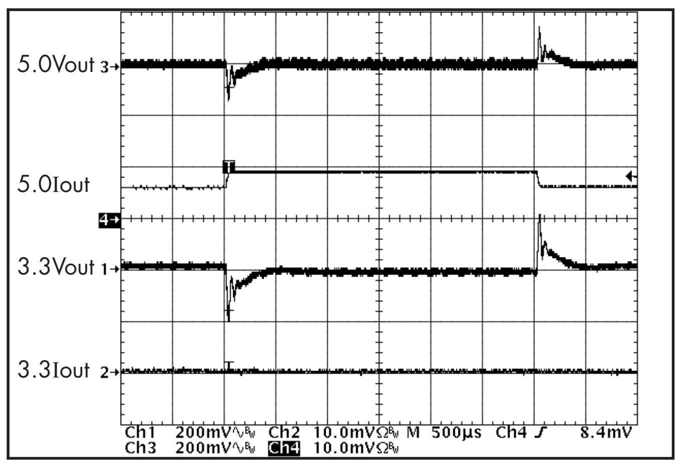


Figure 22: *Output voltage response to step-change in Iout2 (50%-75%-50% of Imax; dI/dt = 0.1A/µs). Load cap: 15µF, 300 mΩ ESR tantalum cap & 1µF ceramic cap.. Vout (200mV/div), Iout (10A/div). Ch1: Vout1; Ch2 Iout2; Ch 3: Vout2; Ch 4 Iout2*

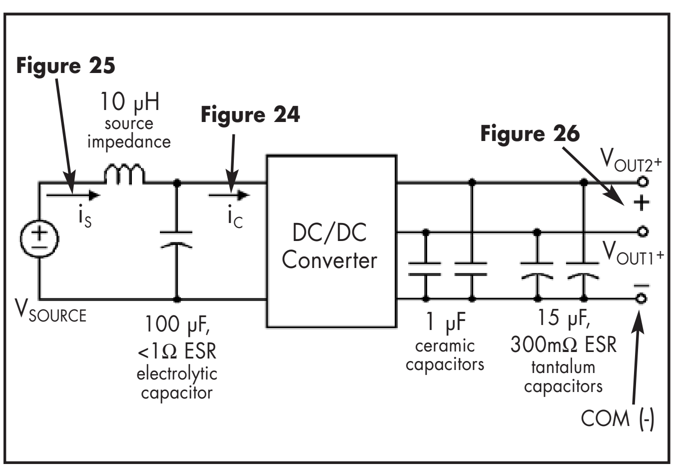


Figure 23: *Test set-up diagram showing measurement points for Input Terminal Ripple Current (Figure 24), Input Reflected Ripple Current (Figure 25) and Output Voltage Ripple (Figure 26).*

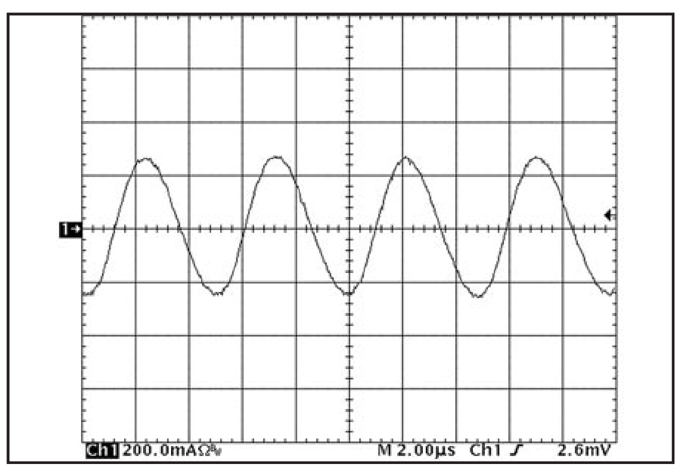


Figure 24: *Input Terminal Ripple Current, 3.3V & 5.0V outputs at 50% rated output current and nominal input voltage with 10µH source impedance and 100µF electrolytic capacitor (200 mA/div). (see Fig. 23)*

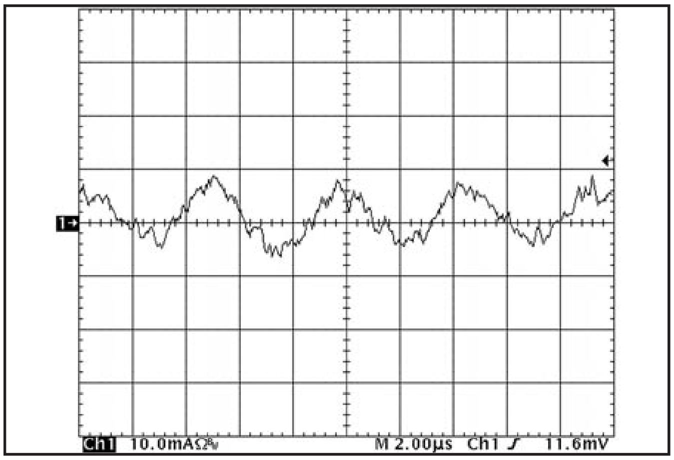


Figure 25: *Input reflected ripple current, i_S, through a 10 µH source inductor at nominal input voltage and rated load current (5 mA/div). 3.3V and 5.0V outputs at 50% rated load current. (see Fig. 23)*

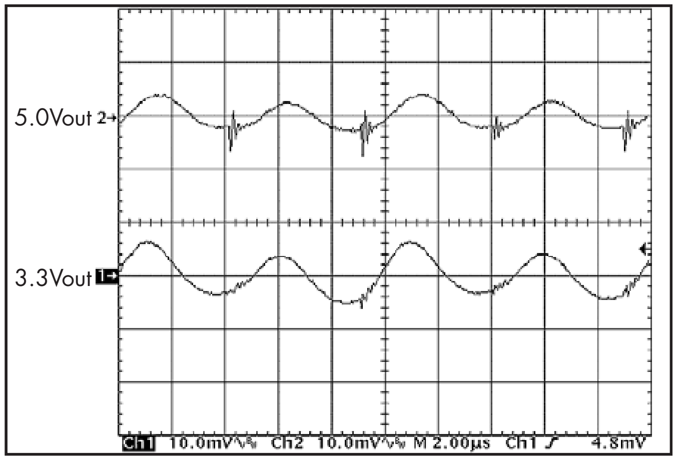


Figure 26: *Output voltage ripple at nominal input voltage and 50% rated load current on both outputs (10 mV/div). Load capacitance: 1µF ceramic cap & 15µF tantalum cap. Bandwidth: 20 MHz. (see Fig. 23)*

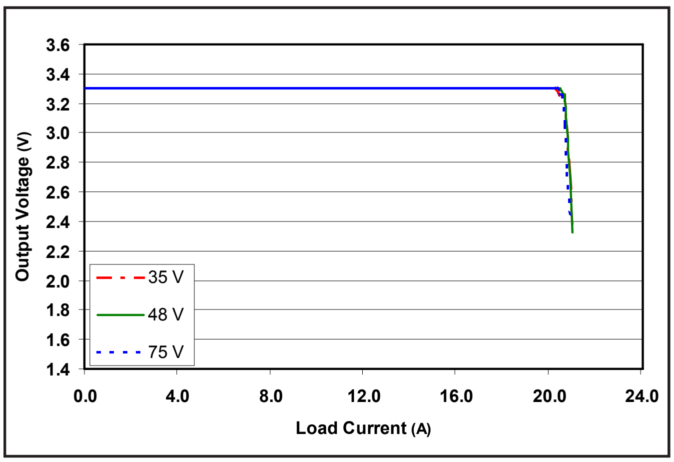


Figure 27: *Output voltage vs. load current showing typical current limit curves and converter shutdown points for the* ***3.3V*** *output. 5.0V load is at 0A.*

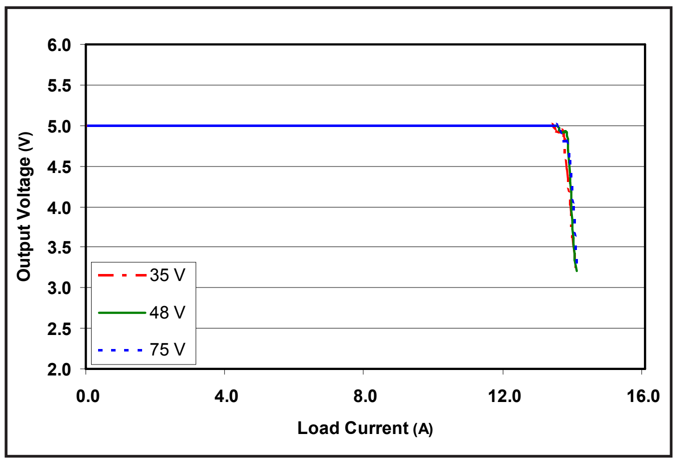


Figure 28: *Output voltage vs. load current showing typical current limit curves and converter shutdown points for the* ***5.0V*** *output. 3.3V load is at 0A.*

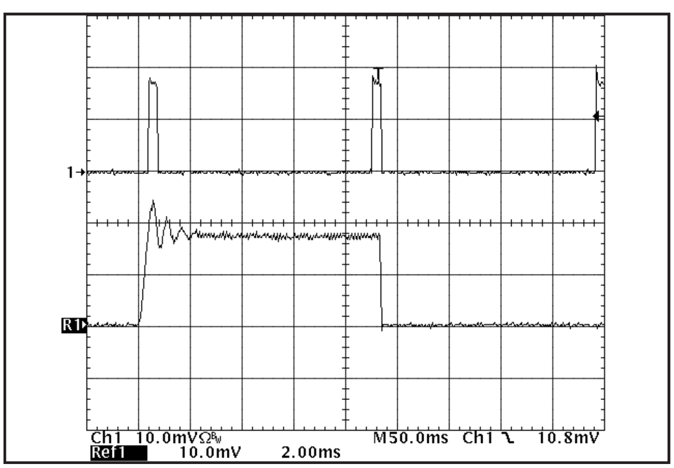


Figure 29: *Load current for* ***3.3V*** *output (10A/div) as a function of time when the converter attempts to turn on into a 10 mΩ short circuit. Top trace is an expansion of the on-time portion of the bottom trace.*

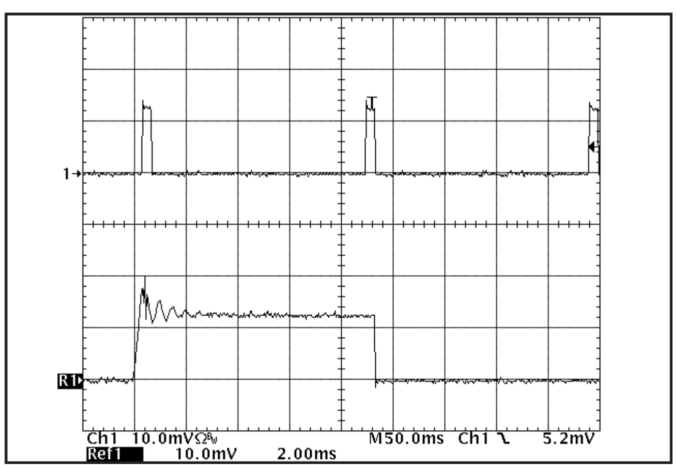


Figure 30: *Load current for* ***5.0V*** *output (10A/div) as a function of time when the converter attempts to turn on into a 10 mΩ short circuit. Top trace is an expansion of the on-time portion of the bottom trace.*

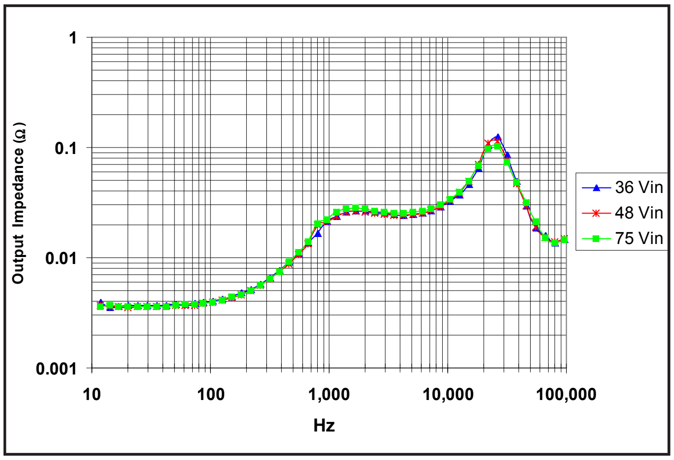


Figure 31: *Output impedance ($Z_{out1} = V_{out1}/I_{out1}$) for minimum, nominal, and maximum input voltage at full rated power, for **3.3V** output.*

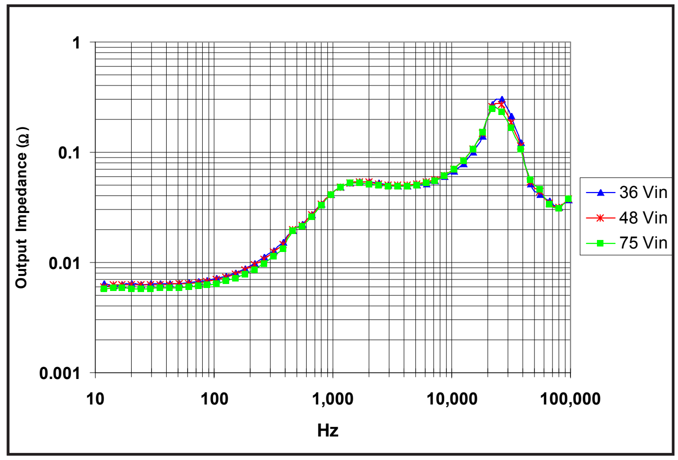


Figure 32: *Output impedance ($Z_{out2} = V_{out2}/I_{out2}$) for minimum, nominal, and maximum input voltage at full rated power, for **5.0V** output.*

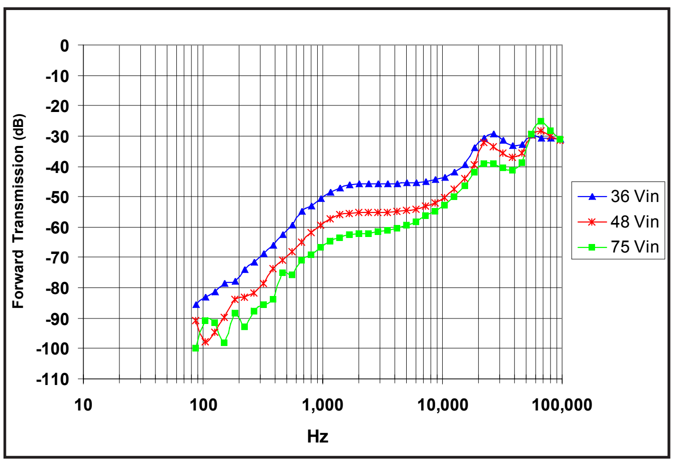


Figure 33: *Forward Transmission ($FT_1 = V_{out1}/V_{in}$) for minimum, nominal, and maximum input voltage at full rated power, for **3.3V** output.*

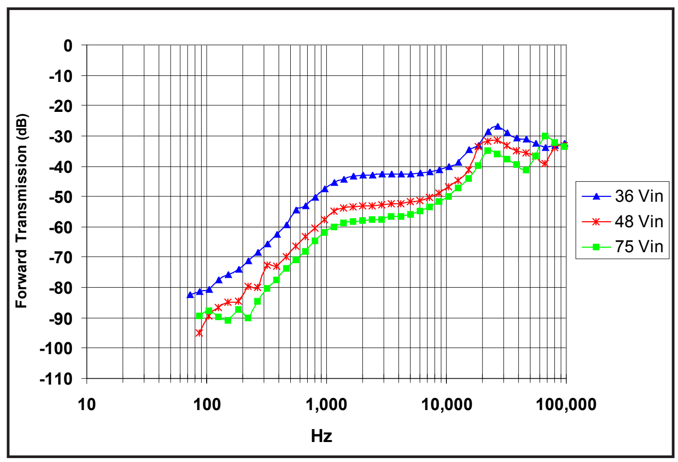


Figure 34: *Forward Transmission ($FT_2 = V_{out2}/V_{in}$) for minimum, nominal, and maximum input voltage at full rated power, for **5.0V** output.*

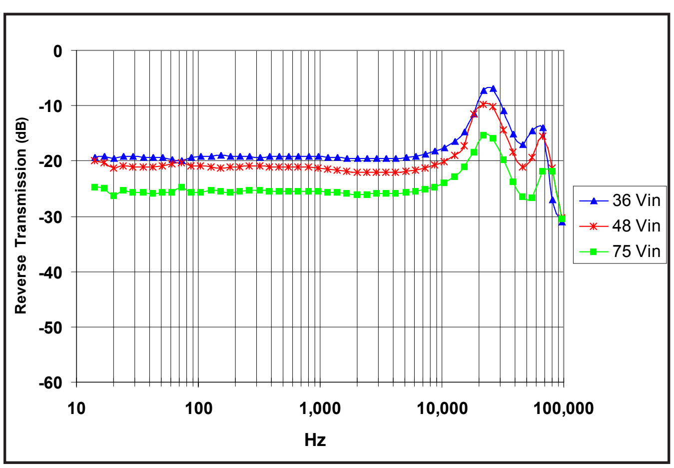


Figure 35: *Reverse Transmission ($RT_1 = I_{in}/I_{out1}$) for minimum, nominal, and maximum input voltage at full rated power, for **3.3V** output.*

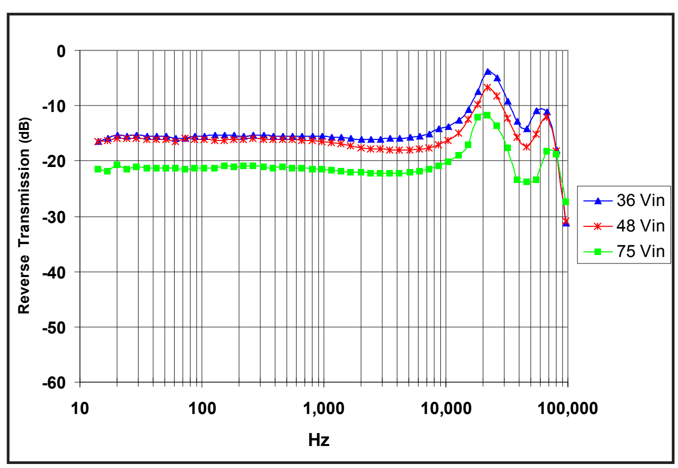


Figure 36: *Reverse Transmission ($RT_2 = I_{in}/I_{out2}$) for minimum, nominal, and maximum input voltage at full rated power, for **5.0V** output.*

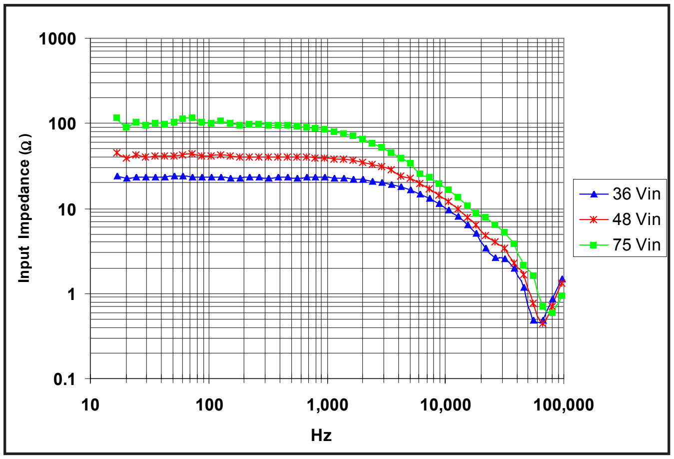


Figure 37: *Input impedance ($Z_{in} = V_{in}/I_{in}$) for minimum, nominal, and maximum input voltage at full rated power.*

BASIC OPERATION AND FEATURES

The *Dual*Qor series converter uses a two-stage power circuit topology in which the two output voltages are cross regulated. The first stage is a buck-converter that keeps the output voltage constant over variations in line, load, and temperature. The second stage uses a transformer to provide the functions of input/output isolation and voltage step-down to achieve the low output voltage required.

The two-stage solution is ideal for converters with multiple cross-regulated output voltages. The first-stage compensates for any variations in line voltage. Therefore, the dependence of the output voltage on line variations is minimized.

Both, the first stage and second stage switch at a fixed frequency for predictable EMI performance. Rectification of the transformer's output is accomplished with synchronous rectifiers. These devices, which are MOSFETs with a very low on-state resistance, dissipate far less energy than schottky diodes used in conventional dc/dc converters. This is the primary reason that the *Dual*Qor series of converters has such high efficiency - even at very low output voltages and high output currents.

Dissipation throughout the converter is so low that the *Dual*Qor converter requires no heatsink. However, base-plated versions are available for optional heatsinking in severe thermal environments.

The *Dual*Qor series converter uses the industry standard pin-out configuration. The unit is pin for pin compatible with the C&D VSX series.

The *Dual*Qor has many standard control and protection features. All shutdown features are non-latching, meaning that the converter shuts off for 200 ms before restarting. (See Figure F)

- An **ON/OFF** input permits the user to control when the converter is on and off in order to properly sequence different power supplies and to reduce power consumption during s stand by condition.
- An **output voltage trim** input permits the user to trim the output voltages up or down to achieve a custom voltage level or to do voltage margining.
- An **input under-voltage lockout** avoids input system instability problems while the input voltage is rising.
- The **output current limit** protects both the converter and board on which it is mounted against a short circuit condition.
- A sensor located in a central spot of the PCB provides a **PCB temperature limit**. If, due to an abnormal condition, this spot gets too hot, the converter will turn off. Once the converter has cooled, it will automatically turn on again without the need to recycle the input power.

CONTROL PIN DESCRIPTIONS

Pin 2 (ON/OFF): The ON/OFF input, Pin 2, permits the user to control when the converter is *on* or *off*. This input is referenced to the return terminal of the 48V input bus. There are two versions of the *Dual*Qor series converter that differ by the sense of the logic used for the ON/OFF input. In the DQxyyyyQMAzzPxx version, the ON/OFF input is active

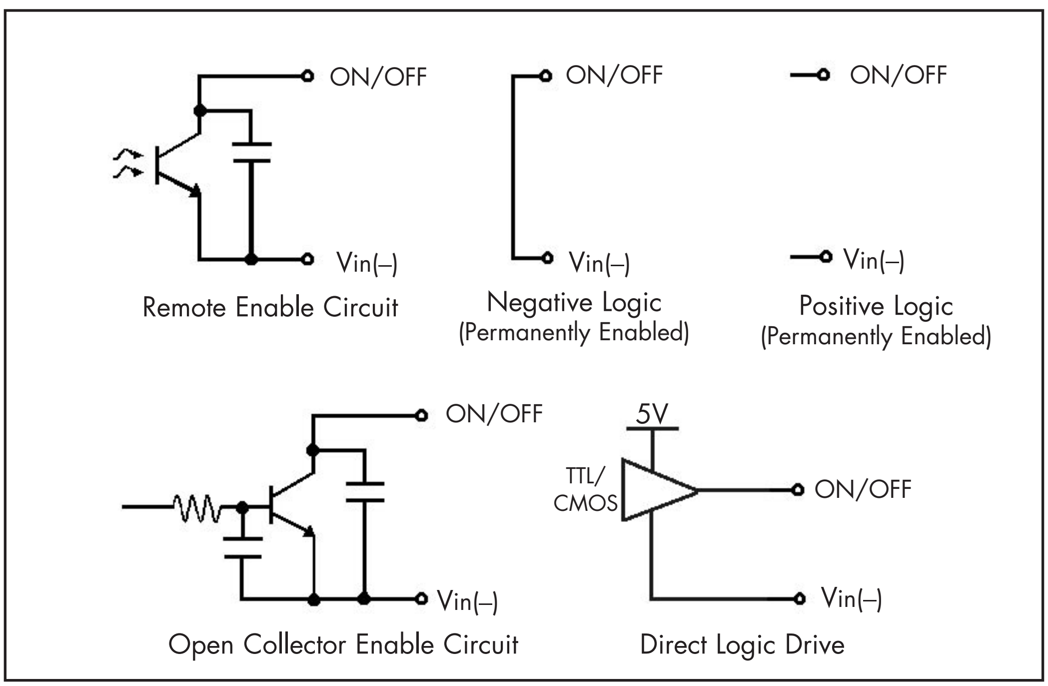


Figure A: *Various circuits for driving the ON/OFF pin.*

high (meaning that a high turns the converter *on*). In the DQxyyyyQMAzzNxx version, the ON/OFF signal is active low (meaning that a low turns the converter *on*). Figure A details five possible circuits for driving the ON/OFF pin.

Pin 6 (TRIM): The TRIM input permits the user to adjust the output voltages up or down to a maximum of 10%. It is important to recognize that adjusting one output will also adjust the second output proportionally. To lower the output voltage, the user should connect a resistor between Pin 6 and Pin 4, which is the 3.3 V output voltage terminal. To raise the output voltage, the user should connect a resistor between Pin 6 and Pin 5, which is the output voltage return. The following table shows the resistor values needed to trim the output voltage up or down.

Resistor values in Kohms for the desired increase/decrease (typical) in output voltage (%)

Vo(%)	1	2	3	4	5	6	7	8	9	10
R up	50	23	14	9.2	6.4	4.5	3.1	2.1	1.3	0
R down	67	30	17	11	7.8	5.4	3.7	2.4	1.4	0

Note: The TRIM feature does not affect the voltage at which the output over-voltage protection circuit is triggered. Trimming the output voltage too high may cause the over-voltage protection circuit to engage, particularly during transients.

PROTECTION FEATURES

Input Under-Voltage Lockout: The converter is designed to turn off when the input voltage is too low, helping avoid an input system instability problem, described in more detail below. The lockout circuitry is a comparator with dc hysteresis. When the input voltage is rising, it must exceed a typical value of 33 V before the converter will turn on. Once the converter is on, the input voltage must fall below a typical value of 29.5 V before the converter will turn off.

Output Current Limit: The current limit does not change appreciably as the output voltage drops. However, once the impedance of the short across the output is small enough to make the output voltage drop below approximately 60 % of its nominal value, the converter turns off.

The converter then enters a mode where it repeatedly turns on and off at a 5 Hz (nominal frequency with a 5 % duty cycle until the short circuit condition is removed. This prevents excessive heating of the converter or the load board.

Output Over-Voltage Limit: If the voltage across the output pins exceeds the O.V. threshold, the converter will immediately stop switching. This prevents damage to the load circuit due to 1) a sudden unloading of the converter, 2) a release of a short-circuit condition, or 3) a release of a current limit condition. Load capacitance determines exactly how high the output voltage will rise in response to these conditions. After 200 ms the converter will automatically restart.

Thermal Shutdown: The *Dual*Qor series has a temperature sensor located such that is senses the average temperature of the converter. The thermal shutdown circuit is designed to turn the converter off when the temperature at the sensed location reaches 125 degrees C. It will allow the converter to turn on again when the temperature of the sensed location falls below 115°C.

APPLICATION CONSIDERATIONS

Input System Instability: This condition can occur because a dc/dc converter appears incrementally as a negative resistance load. A detailed application note titled "Input System Instability" is available on the SynQor web site (www.synqor.com) which provides an understanding of why this instability arises, and shows the preferred solution for correcting it.

Application Circuits: *Figure D* provides a typical circuit diagram which is useful when using input filtering and voltage trimming. Figure E is a detailed look of the internal ON/OFF circuitry that is shown in Figure A.

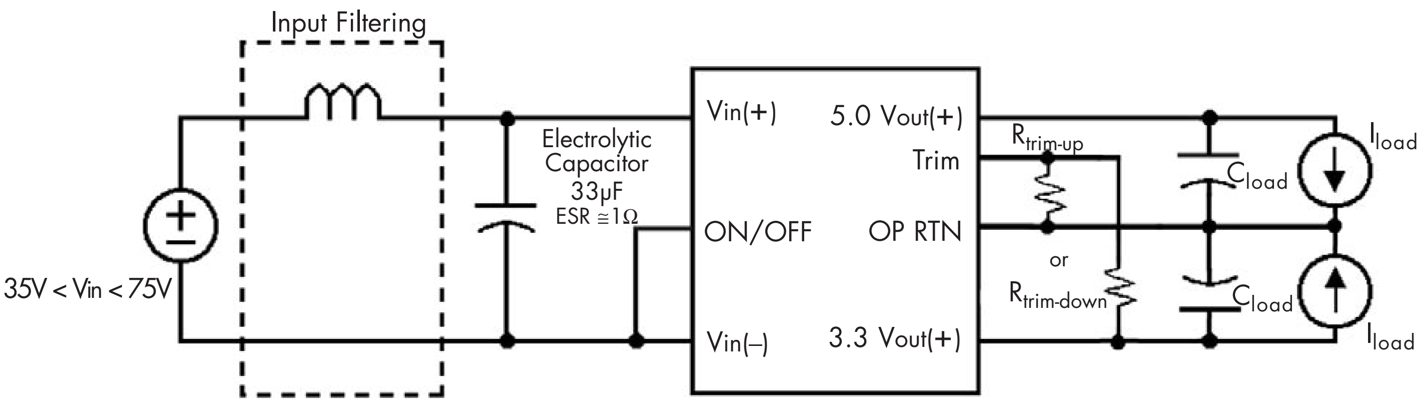


Figure D: *Typical application circuit (negative logic unit, permanently enabled).*

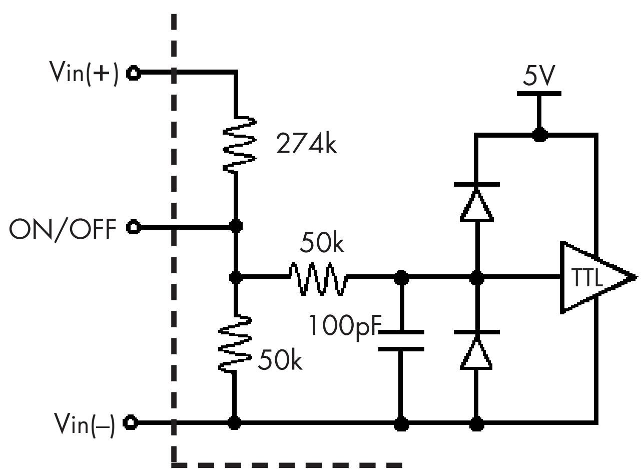


Figure E: *Internal ON/OFF pin circuitry*

STARTUP INHIBIT PERIOD

The Startup Inhibit Period ensures that the converter will remain off for at least 200ms when it is shut down for any reason. When an output short is present, this generates a 5Hz "hiccup mode," which prevents the converter from overheating. In all, there are six ways that the converter can be shut down, initiating a Startup Inhibit Period:

- Input Under-Voltage Lockout
- Output Over-Voltage Protection
- Over Temperature Shutdown
- Current Limit
- Short Circuit Protection
- Turned off by the ON/OFF input

Figure F shows three turn-on scenarios, where a Startup Inhibit Period is initiated at t_0, t_1, and t_2:

Before time t_0, when the input voltage is below 34V (typ.), the unit is disabled by the Input Under-Voltage Lockout feature. When the input voltage rises above 34V, the Input Under-Voltage Lockout is released, and a Startup Inhibit Period is initiated. At the end of this delay, the ON/OFF pin is evaluated, and since it is active, the unit turns on.

At time t_1, the unit is disabled by the ON/OFF pin, and it cannot be enabled again until the Startup Inhibit Period has elapsed.

When the ON/OFF pin goes high after t_2, the Startup Inhibit Period has elapsed, and the output turns on within the 4ms (typ.) "Turn On Time."

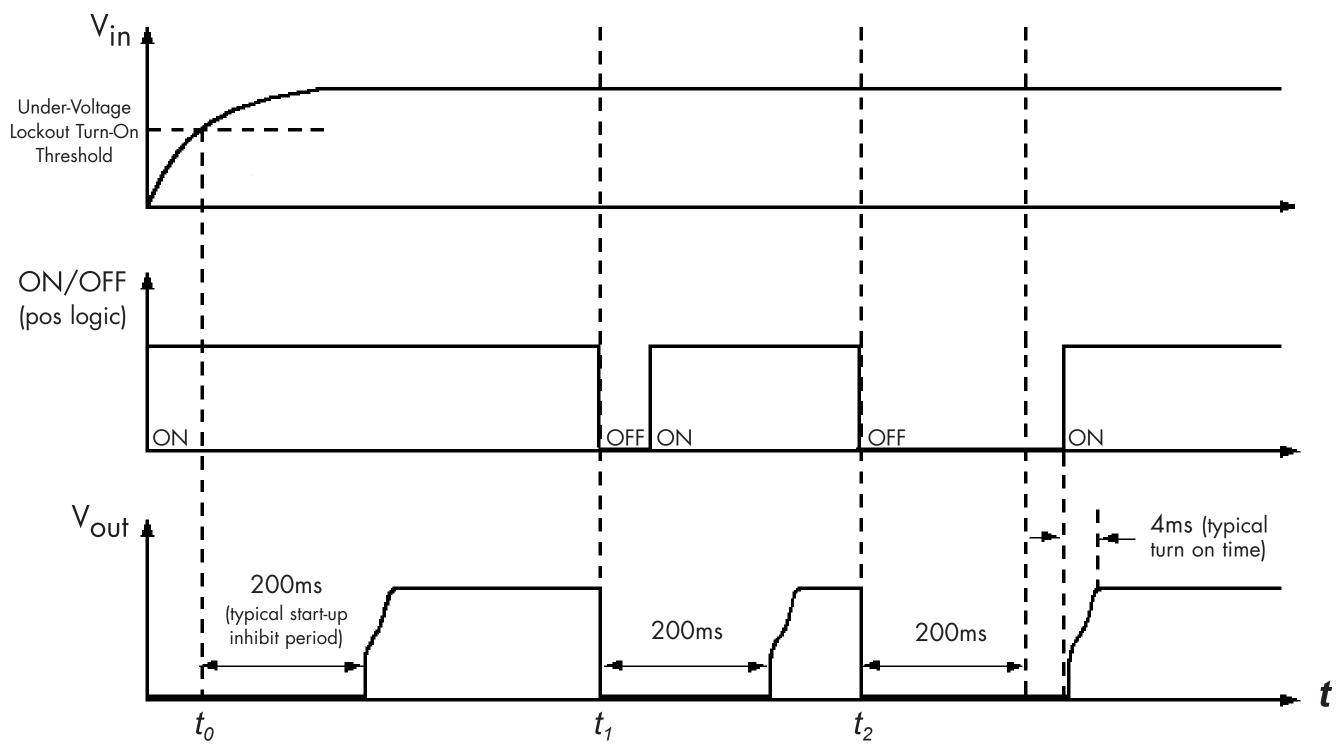


Figure F: *Startup Inhibit Period (turn-on time not to scale)*

PART NUMBERING SYSTEM

The part numbering system for SynQor's *Dual*Qor DC/DC converters has the following format:

Dual Output Product Family and Part Numbering Scheme										
Product Family	Input Voltage	Output Voltage 1	Output Voltage 2	Package Size	Performance Series	Thermal Design	Total Power	Pos./Neg. Logic	Pin Length	Features
DQ	6	50	33	Q	M	A	06	N	N	S
DQ - DualQor	6 - (36v-75v)	050 - 5.0V	033 - 3.3V	Q - Quarter Brick	M - Mega	A - Open Frame B - Baseplate	06 - 60 Watts	P - Positive N - Negative	K - 0.110" N - 0.145" R - 0.180" Y - 0.250"	S - Standard
This is the base part number								*Added to indicate options*		

Example part #: DQ65033QMA06NNS

This part number indicates a *Dual*Qor dual output converter with 48Vin nominal (100V transient), 5.0 and 3.3Vout, quarter-brick size, Mega performance level, open air design, 60 watts total output power, negative logic, 0.145" pins, and the standard feature set.

Although there are no default values for enable logic and pin length, the most common options are negative logic and 0.145" pins. These part numbers are more likely to be readily available in stock for evaluation and prototype quantities.

When ordering SynQor converters, please ensure that you use the complete 15 character part number.

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Warranty
SynQor offers a three (3) year limited warranty. Complete warranty information is listed on our web site or is available upon request from SynQor.