DC-DC Converters, SV48-5 Series
30 to 200W, 36~75Vdc Input

SUPER VERTER™

World's Most Advanced High Density DC-DC Converters.

Size: 60.70mm x 57.91mm x 13.30mm

(2.39in. x 2.28in. x 0.52in.)

MODEL SELECTION

Model Name	Vin(Vdc)	Vout(Vdc)	Io(Amps)	Watts	API P/N
SV48-5-30-1	36-75	5	6	30	API0DC02-001
SV48-5-50-1	36-75	5	10	50	API0DC40-001
SV48-5-60-1 *	36-75	5	12	60	API1DC28-001
SV48-5-75-1	36-75	5	15	75	API0DC14-001
SV48-5-100-1	36-75	5	20	100	API0DC38-001
SV48-5-150-1	36-75	5	30	150	API0DC34-001
SV48-5-200-1	36-75	5	40	200	API-215-99701

DESCRIPTION

The SuperVerter module is a high density DC-DC converter designed for use in distributed power architectures, workstations, EDP equipment, and telecommunication appliciations. The surface mount construction uses a metal baseplate and planar transformers to produce up to 200W in a half brick package. The SuperVerter module is a suitable replacement for all industry standard half brick modules.

OPTION

- Choice Of Remote On/off Logic Configuration
- Heat Sink Available For Extended Operation

FEATURES

- High Power Density - Up to 82W/in^3
- Constant Frequency - 370kHz
- -40 to +100°C Operation
- Over Temperature Protection (100W,150W and 200W Only)
- High Efficiency: 82% Typical
- Low Output Noise
- Industry-Standard Pinout
- Metal Baseplate
- 2:1 Input Voltage Range
- Over Voltage Protection
- Current Limit/Short Circuit Protection
- Adjustable Output Voltage: 60% to 110% of $V_{0,set}$
- Remote Sense
- Logic ON/OFF
- Safety Agency Approval (Except 60W)

SPECIFICATION

ABSOLUTE MAXIMUM RATINGS:

Exceeding absolute maximum ratings may cause permanent damage and reduce reliability

PARAMETER	MIN	MAX	UNITS	CONDITIONS
Input Voltage		80	Vdc	Continuous
Transient Input Voltage		100	Vdc	100 ms max.
Input/Output Isolation		1500	Vdc	
Operating Case Temperature	-40	100	°C	
Storage Temperature	-40	110	°C	

Electrical Specifications: Unless otherwise indicated specifications apply over all operating input voltage, resistive load, and temperature conditions.

INPUT SPECIFICATIONS:

PARAMETER		TYP	MAX	UNITS	CONDITIONS
Operation Input Voltage (V_i)		48	75	V	
Maximum Input Current ($I_{i,max}$):					
SV48-5-30-1	36		1.6	A	V_i = 0Vdc to 75Vdc
SV48-5-50-1			2.5	A	I_o = $I_{o,max}$
SV48-5-60-1			3.0	A	
SV48-5-75-1			3.5	A	
SV48-5-100-1			4.0	A	
SV48-5-150-1(P)			6.5	A	
SV48-5-200-1			8.5	A	
Inrush Transient			1.0	A^2 s	
Input Reflected-Ripple Current:		5		mAp-p	5Hz~20MHz, 12 µH
Peak to Peak		60		dB	Source Impedance
Input Ripple Rejection					@ 120Hz

Caution: This power module is not internally fused. An input line fuse must always be used.

OUTPUT SPECIFICATIONS:

PARAMETER	MIN	TYP	MAX	UNITS	CONDITIONS
Output Voltage Set Point ($V_{o,set}$)	4.92	5.00	5.08	V	T_c=25°C, V_i=48V, I_o= $I_{o,max}$
Line Regulation		0.01	0.1	%	V_i=36V to 75V
Load Regulation		0.05	0.2	%	I_o=0.5A to $I_{o,max}$
Temperature Drift		15	50	mV	Tc=-40°C to 100°C
Total Regulation			1.3	%	
Output Ripple and Noise Voltage:					5Hz to 20MHz
RMS			40	mVrms	
Peak to Peak			150	mV_{p-p}	
External Load Capacitance	0		330	uF	Electrolytic capacitor
Output Current(I_o):					
SV48-5-30-1	0.5		6	A	At I_o< $I_{o,min}$,the modules
SV48-5-50-1	0.5		10	A	may exceed output ripple
SV48-5-60-1	0.5		12	A	specifications
SV48-5-75-1	0.5		15	A	
SV48-5-100-1	0.5		20	A	
SV48-5-150-1(P)	0.5		30	A	
SV48-5-200-1	0.5		40	A	
Output Current limit::					
SV48-5-30-1		7.5	8.5	A	V_o=90% of $V_{o,set}$
SV48-5-50-1		12.0	14.0	A	
SV48-5-60-1		14.4	16.8	A	
SV48-5-75-1		18.0	21.0	A	
SV48-5-100-1		23.0	26.0	A	
SV48-5-150-1(P)		34.5	39.0	A	
SV48-5-200-1		44.0	52.0	A	
Output Short Circuit Current			170	%$I_{o,max}$	Vo=250mV
Switching Frequency		370		kHz	
Efficiency:					
SV48-5-30-1	80	82		%	Tc=70°C V_i=48V
SV48-5-50-1	82	84		%	I_o=$I_{o,max}$
SV48-5-60-1	82	84		%	
SV48-5-75-1	82	85		%	
SV48-5-100-1	82	85		%	
SV48-5-150-1(P)	82	84		%	
SV48-5-200-1	81	82			
Dynamic Response:					25%-50%-75% load
Peak Deviation		3		%$V_{o,set}$	0.1A/ µs
Setting Time			300	µs	Tc=25°C V_i=48V

i. Specifications subject to change without notice.
ii. All illustrations are for reference only.

CONTROL SPECIFICATIONS:

PARAMETER	MIN	TYP	MAX	UNITS	CONDITIONS
Logic On/Off:					
Logic Low: Ion/off			1	mA	Von/off=0V
Von/off			1.2	V	Ion/off<1mA
Logic High:Ion/off (Leakage Current)			50	μA	Von/off=15V
Von/of			15	V	Ion/off=0.0 μA
Turn-On Time		15	25	ms	I_o= 80% of $I_{o,max}$ V_o within +/- 1% $V_{o,set}$
Output Remote Sense Range			0.5	V	
Output Voltage Trim Range	60		110	% $V_{o,set}$	
Over Voltage Protection	5.9		7.0	V	Auto recovery
Over Temperature Protection		105		°C	Auto recovery (100W, 150W and 200W only)

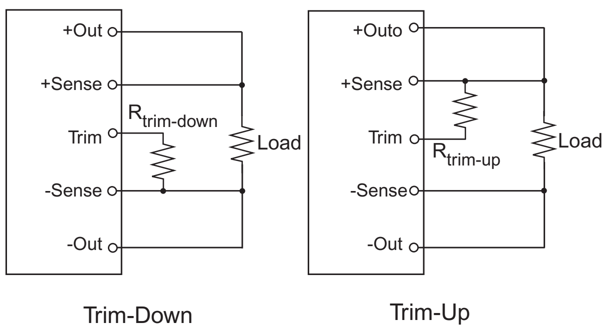
ISOLATION SPECIFICATIONS:

PARAMETER	MIN	TYP	MAX	UNITS	CONDITIONS
Input to Output		1500		Vdc	
Input to Case		1500		Vdc	
Output to Case		500		Vdc	
Input to Output Capacity		2000		pF	
Isolation Resistance	10			Mohm	

GENERAL SPECIFICATIONS:

PARAMETER	MIN	TYP	MAX	UNITS	CONDITIONS
MTBF		1.4		Mhrs	Tc=40°C, I_o =80% of $I_{o,max}$
Weight		118		g	
Size		2.39x2.28x0.52		in^3	

TRIM CIRCUIT



Trim-Down Trim-Up

$R_{trim-down}$= ((100/Δ%)-2) Kohms

$$R_{trim-up}=\left(\frac{Vo(100+\Delta\%)}{1.225\Delta\%}-\frac{100+2\Delta\%}{\Delta\%}\right) \text{Kohms}$$

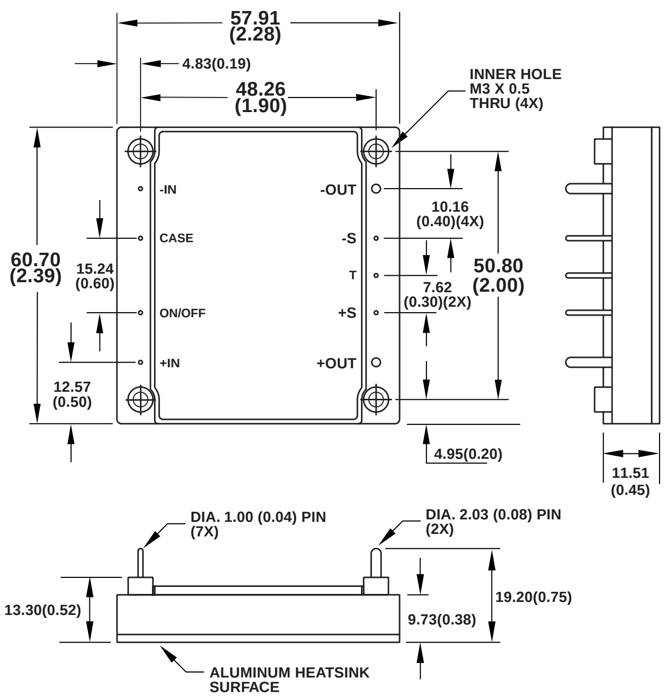
Δ% = Desired Output Voltage Change

Vo = Output Voltage

Rtrim-up= External Resistor Value to Increase Vo

Rtrim-down= External Resistor Value to Decrease Vo

OUTLINE DRAWING



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PERFORMANCE CURVES:

SV48-5-30

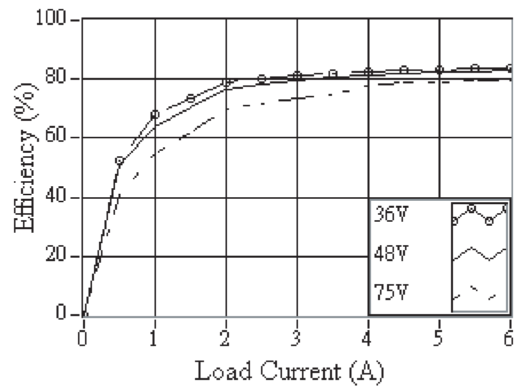


Figure 1. *Efficiency at nominal output voltage vs. load current for 36V, 48V and 75V input voltage at Tc=25°C*

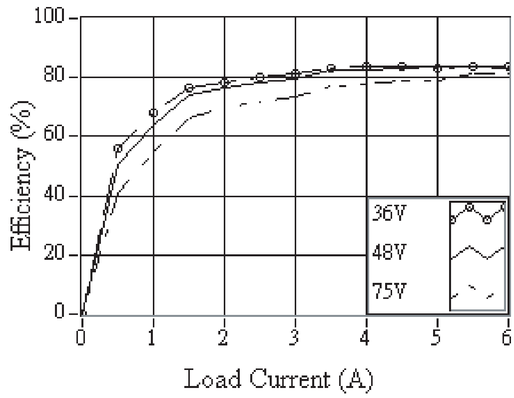


Figure 2. *Efficiency at nominal output voltage vs. load current for 36V, 48V and 75V input voltage at Tc=70°C*

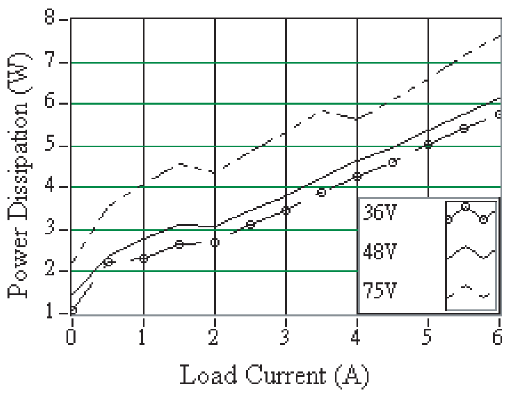


Figure 3. *Power dissipation at nominal output voltage vs. load current for 36V, 48V and 75V input voltage at Tc=25°C*

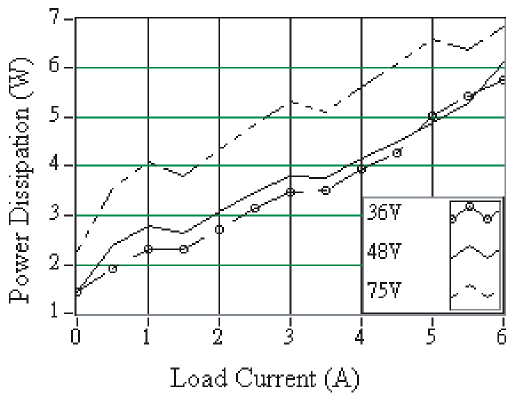


Figure 4. *Power dissipation at nominal output voltage vs. load current for 36V, 48V and 75V input voltage at Tc=70°C*

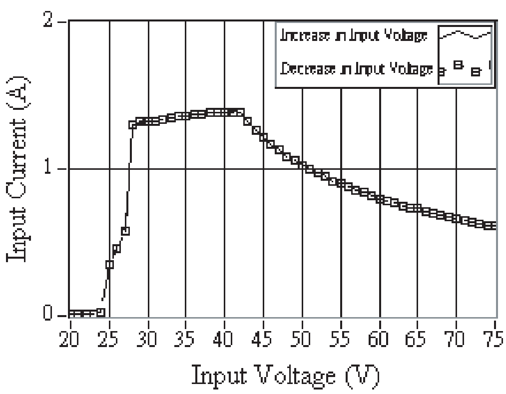


Figure 5. *Input current vs. input voltage for maximum load current*

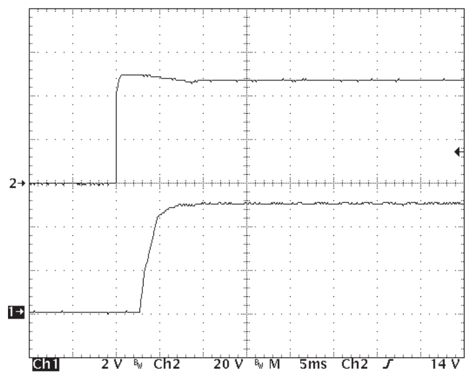


Figure 6. *Typical start-up at 0.8Io,max load current (5ms/div)*
Top Trace: 48V input voltage (20V/div)
Bottom Trace: Output voltage (2V/div)

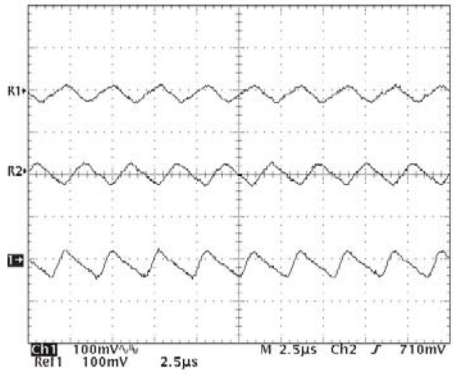


Figure 7. *Output voltage ripple at maximum output current (2.5µs/div)*
Top Trace: 36V input voltage (100mV/div)
Middle Trace: 48V input voltage (100mV/div)
Bottom Trace: 75V input voltage (100mV/div)

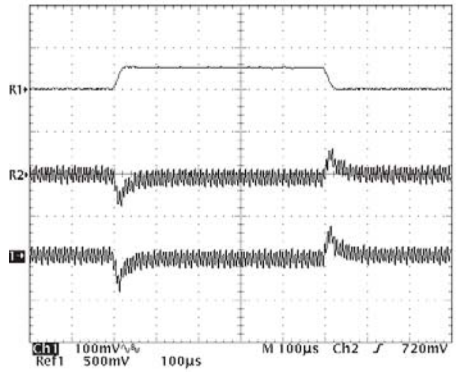


Figure 8. *Output voltage response to step-change in load current at 48V input voltage and dI/dt=0.1A/µs (100µs/div)*
Top Trace: Step change in 25% of Io,max (0.5V/div)
Middle Trace: 25%-50%-25% of Io,max (100mV/div)
Bottom Trace: 50%-75%-50% of Io,max (100mV/div)

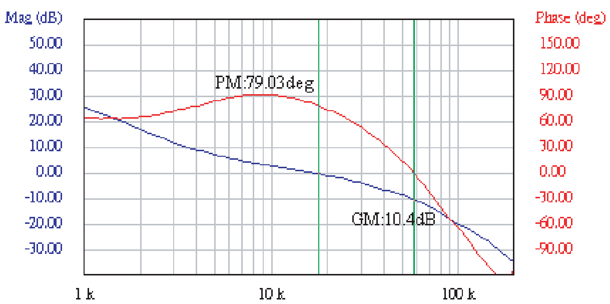


Figure 9. *Magnitude and phase of loop gain for 48V input voltage at full rated power, with a 680µF capacitor connected in parallel with the output*

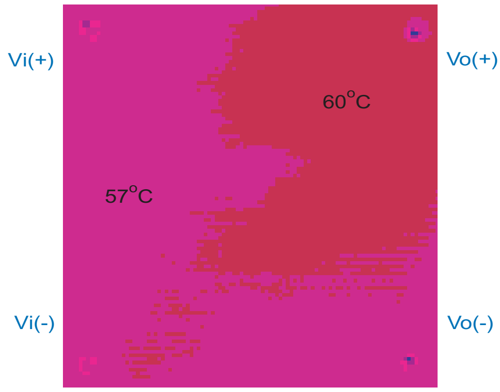


Figure 10. *Thermal plot without heat sink at 48V input voltage, maximum load current and room temperature, measured after half an hour*

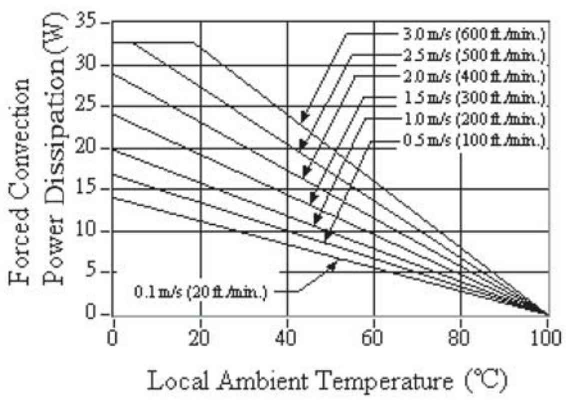


Figure 11. *Forced convection power dissipation vs. local ambient temperature with no heat sink for either orientation*

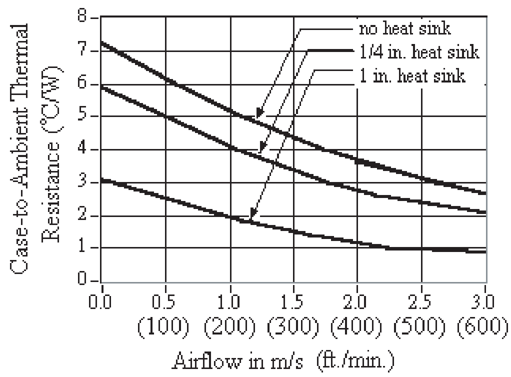
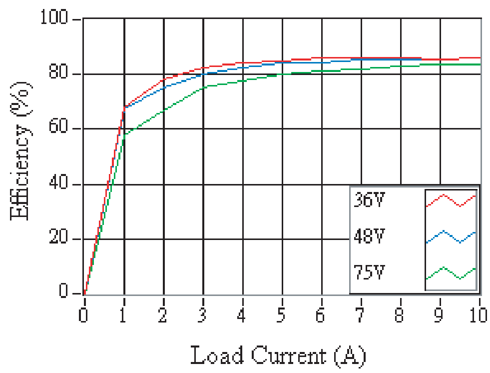


Figure 12. *Case-to-ambient thermal resistance vs. airflow for either orientation*

SV48-5-50



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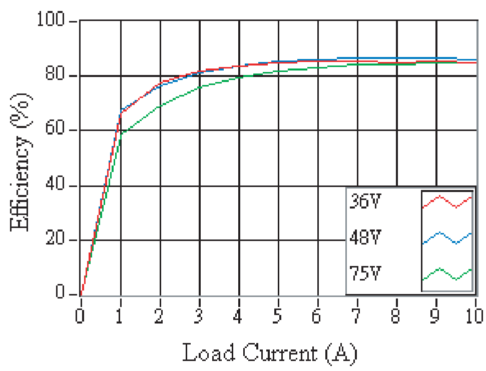
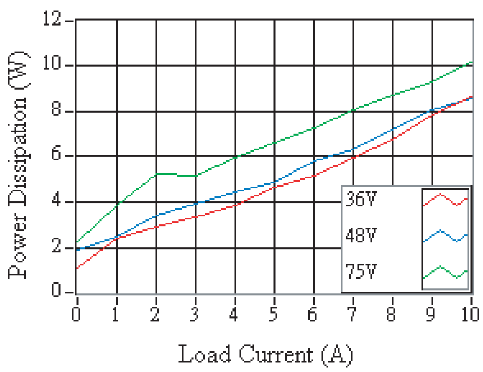


Figure 2. *Efficiency at nominal output voltage vs. load current for 36V, 48V and 75V input voltage at Tc=70°C*



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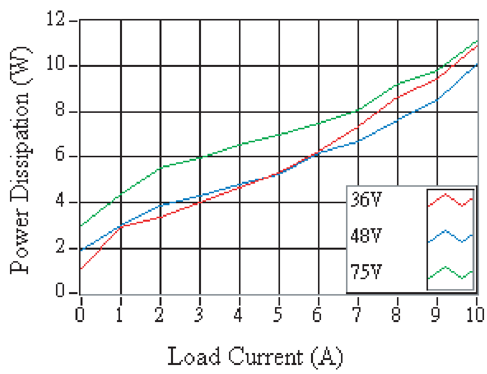

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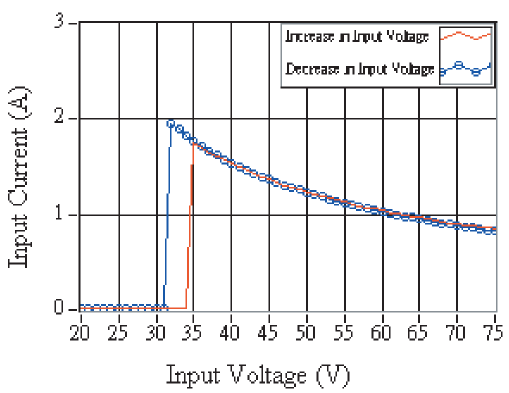

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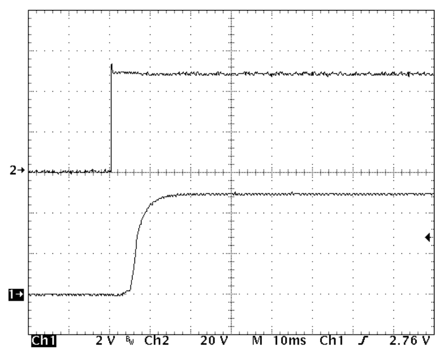

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Top Trace: 48V input voltage (20V/div)
Bottom Trace: Output voltage (2V/div)

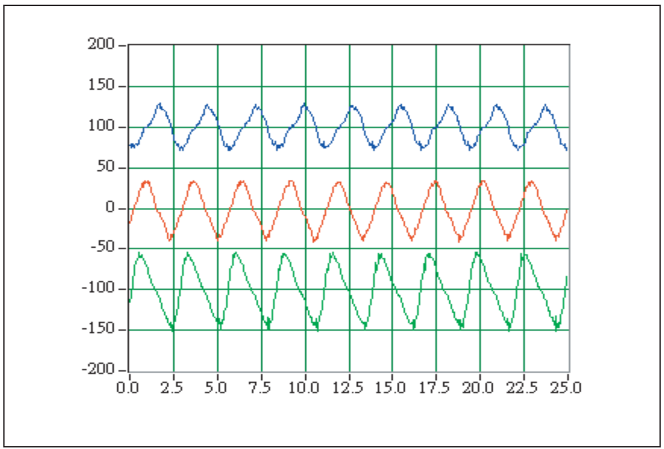
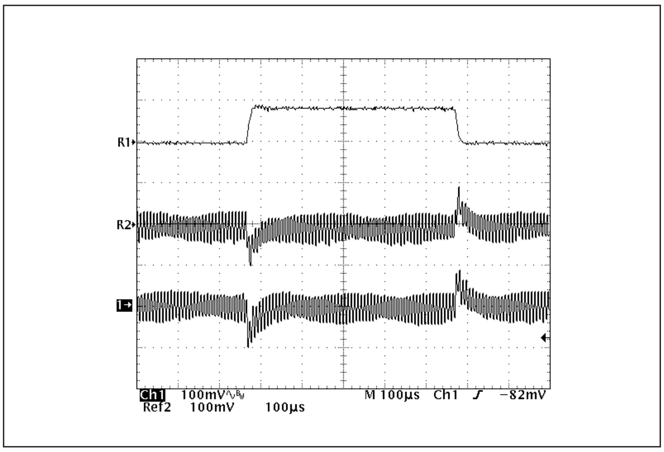


Figure 7. Output voltage ripple at maximum output current (2.5μs/div)
Top Trace: 36V input voltage (100mV/div)
Middle Trace: 48V input voltage (100mV/div)
Bottom Trace: 75V input voltage (100mV/div)



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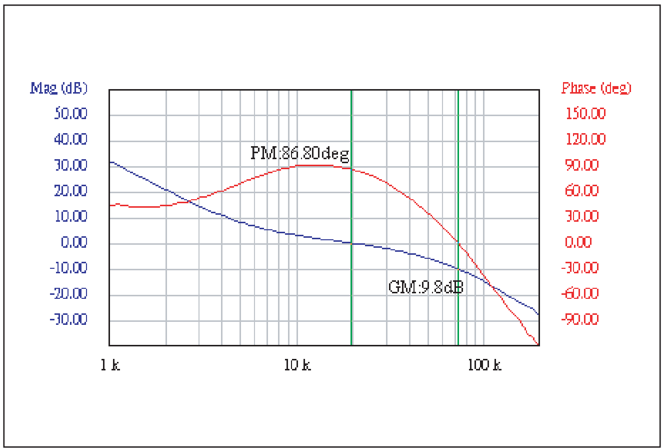
Top Trace: Step change in 25% of Io,max (1V/div)
Middle Trace: 25%-50%-25% of Io,max (100mV/div)
Bottom Trace: 50%-75%-50% of Io,max (100mV/div)



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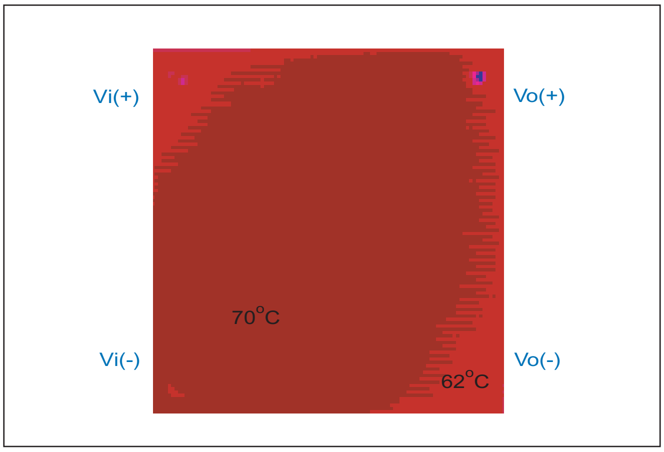


Figure 10. Thermal plot without heat sink at 48V input voltage, maximum load current and room temperature, measured after half an hour

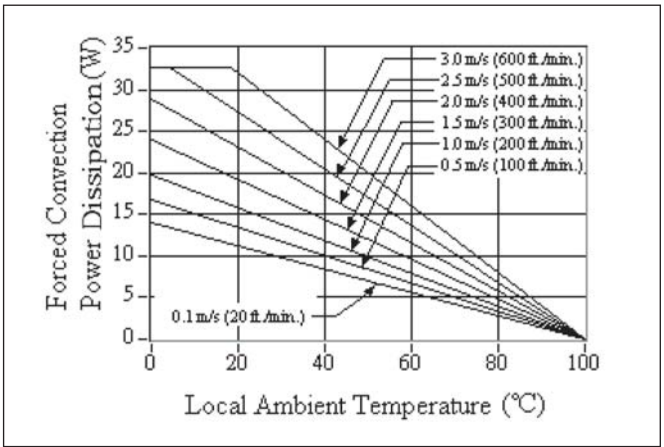


Figure 11. Forced convection power dissipation vs. local ambient temperature with no heat sink for either orientation

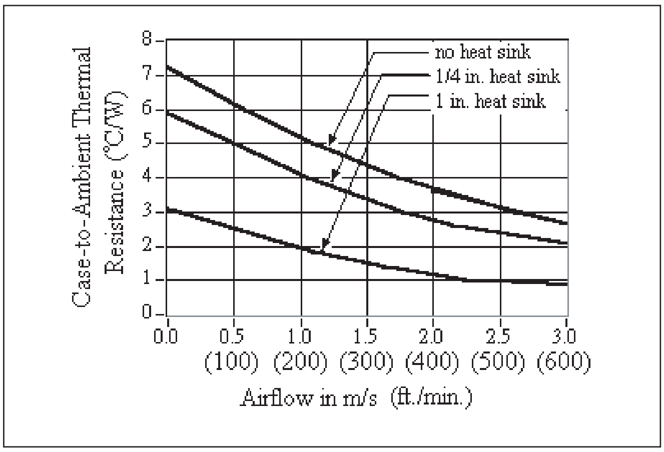
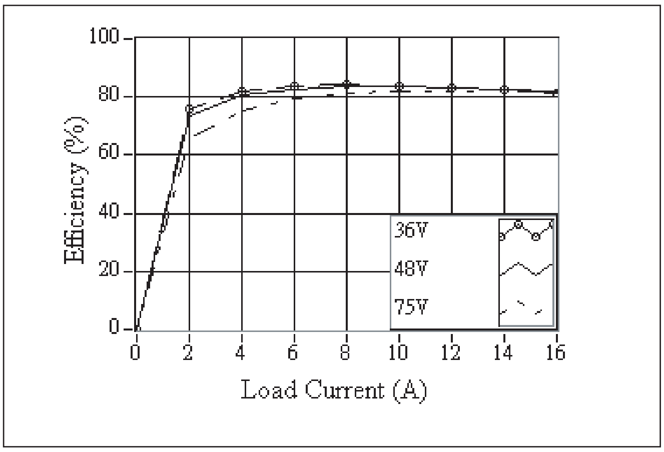


Figure 12. Case-to-ambient thermal resistance vs. airflow for either orientation

SV48-5-75



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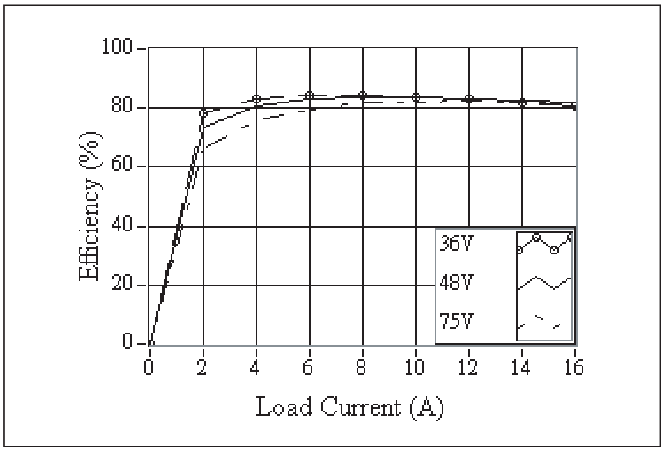

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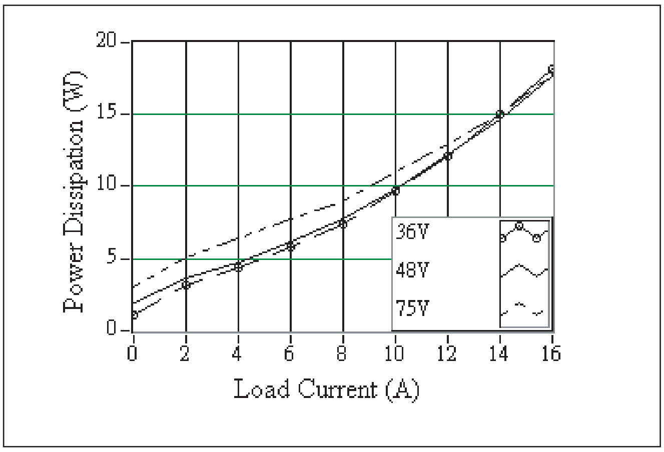

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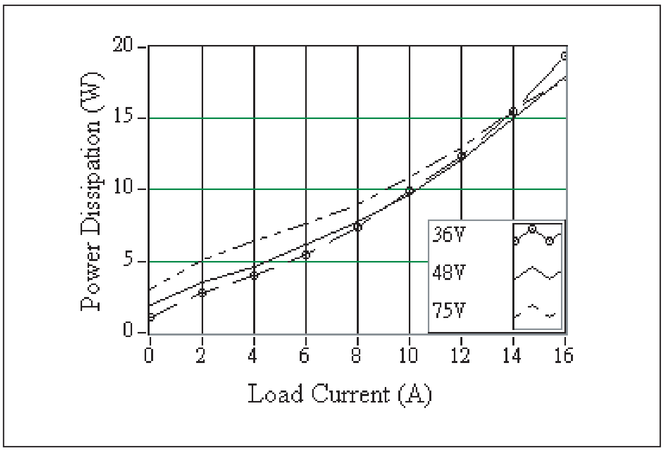

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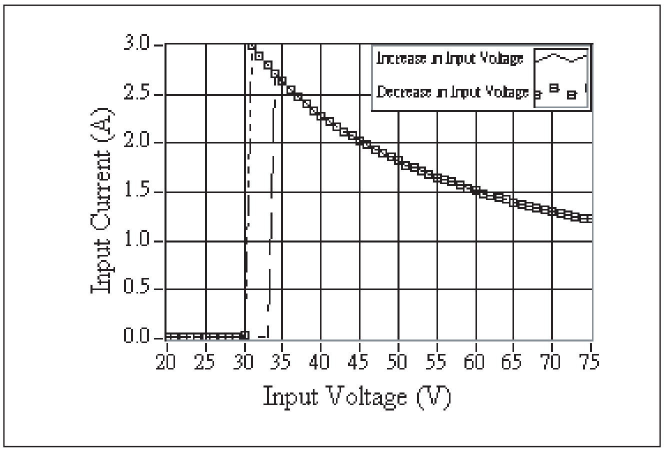

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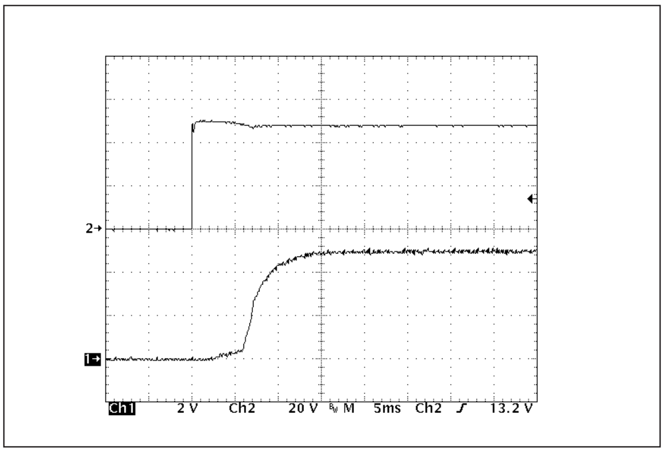

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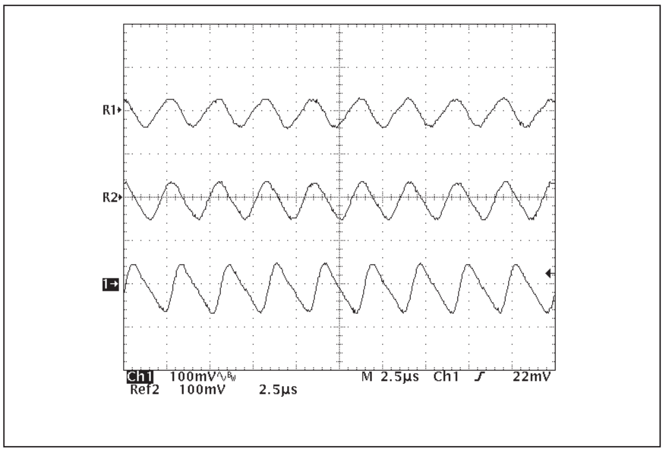

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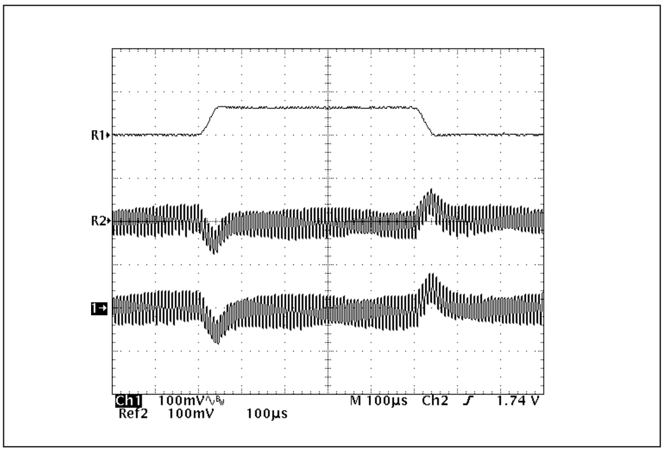

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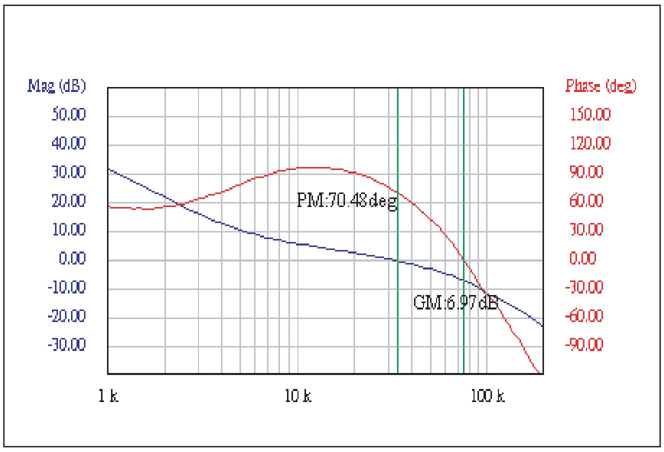

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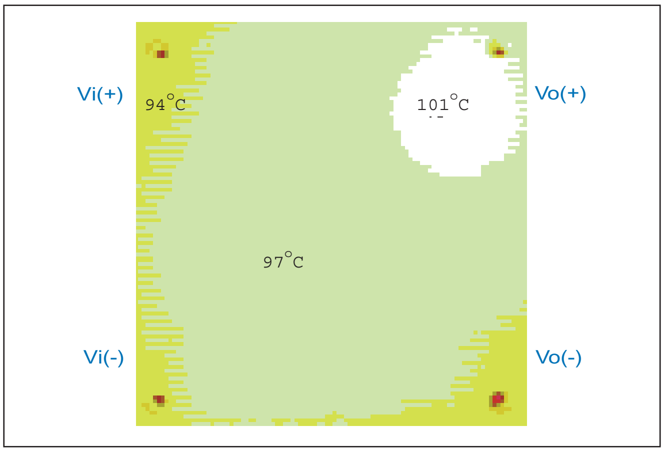

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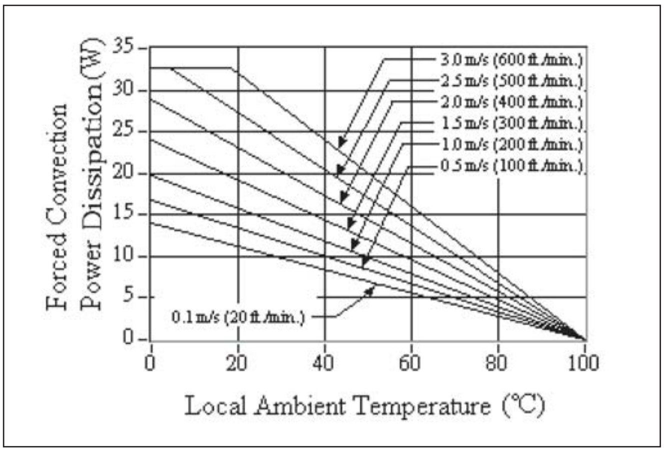

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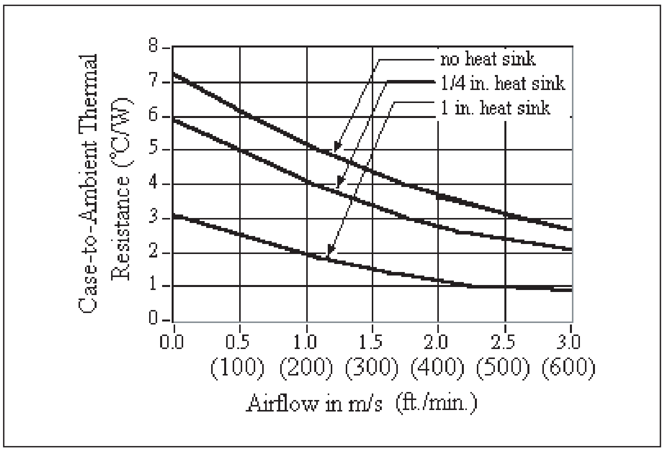

Figure 12. *Case-to-ambient thermal resistance vs. airflow for either orientation*

SV48-5-100

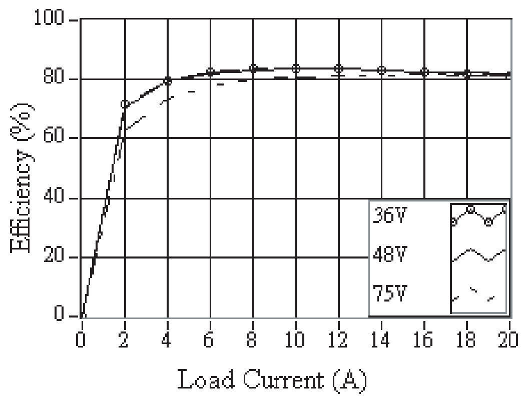

Figure 1. *Efficiency at nominal output voltage vs. load current for 36V, 48V and 75V input voltage at Tc=25°C*

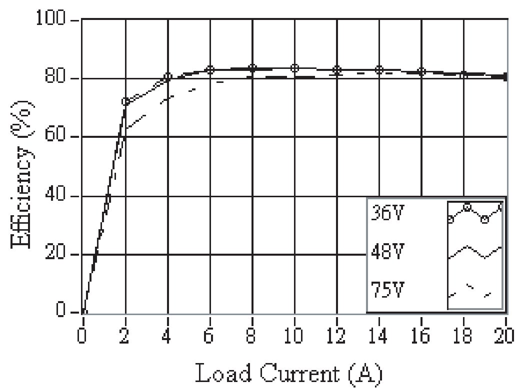

Figure 2. *Efficiency at nominal output voltage vs. load current for 36V, 48V and 75V input voltage at Tc=70°C*

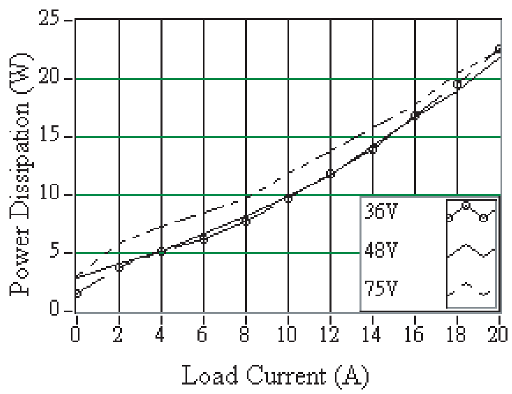

Figure 3. *Power dissipation at nominal output voltage vs. load current for 36V, 48V and 75V input voltage at Tc=25°C*

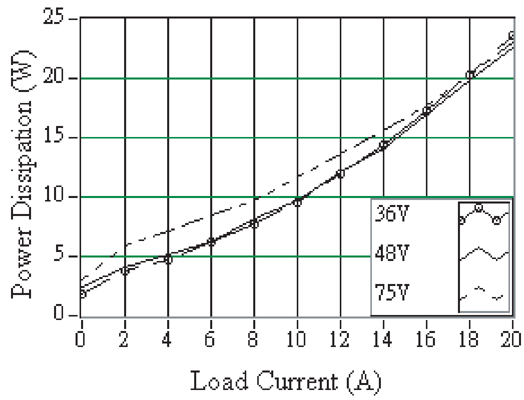

Figure 4. *Power dissipation at nominal output voltage vs. load current for 36V, 48V and 75V input voltage at Tc=70°C*

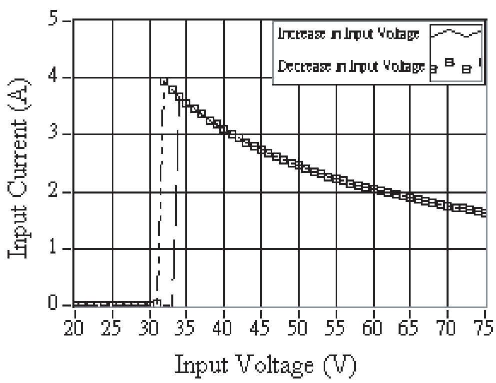

Figure 5. *Input current vs. input voltage for maximum load current*

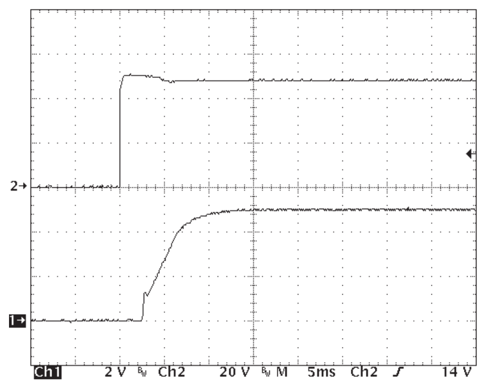

Figure 6. *Typical start-up at 0.8Io,max load current (5ms/div)*
Top Trace: 48V input voltage (20V/div)
Bottom Trace: Output voltage (2V/div)

i. Specifications subject to change without notice.
ii. All illustrations are for reference only.

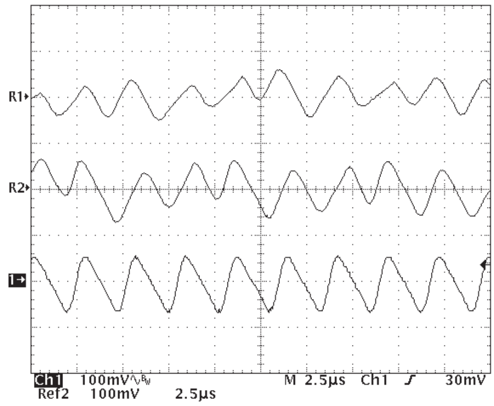

Figure 7. Output voltage ripple at maximum output current and (2.5µs/div)
Top Trace: 36V input voltage (100mV/div)
Middle Trace: 48V input voltage (100mV/div)
Bottom Trace: 75V input voltage (100mV/div)

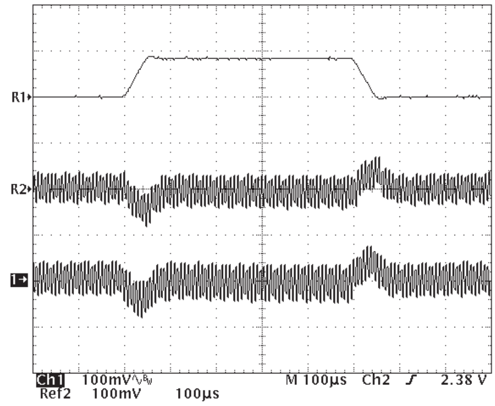

Figure 8. Output voltage response to step-change in load current at 48V input voltage and dI/dt=0.1A/µs (100µs/div)
Top Trace: Step change in 25% of Io,max (1V/div)
Middle Trace: 25%-50%-25% of Io,max (100mV/div)
Bottom Trace: 50%-75%-50% of Io,max (100mV/div)

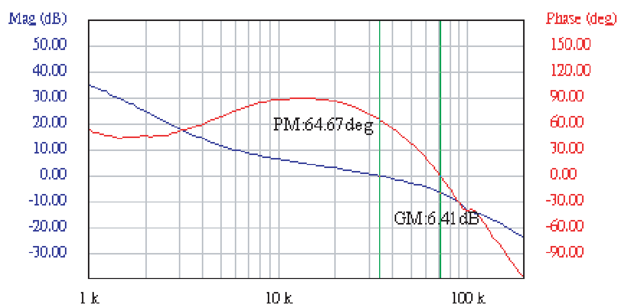

Figure 9. Magnitude and phase of loop gain for 48V input voltage at full rated power, with a 680µF capacitor connected in parallel with the output

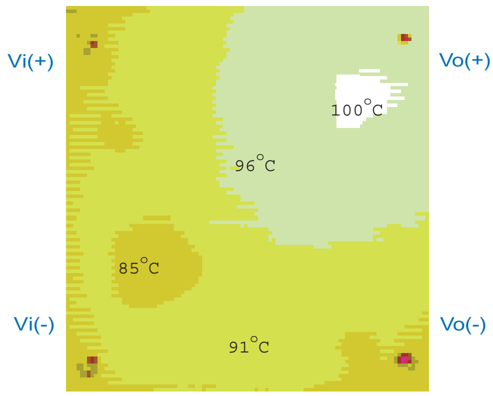

Figure 10. Thermal plot without heat sink at 48V input voltage, maximum load current and room temperature, measured at over temperature shutdown

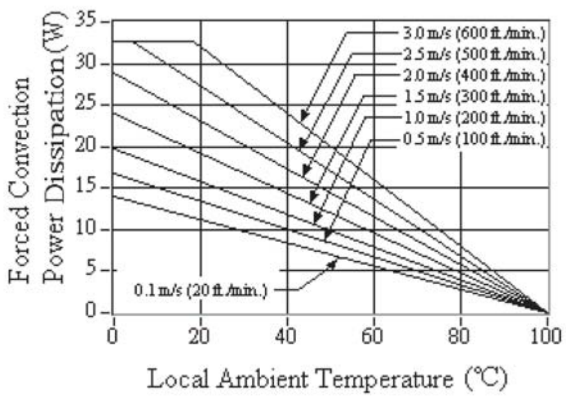

Figure 11. Forced convection power dissipation vs. local ambient temperature with no heat sink for either orientation

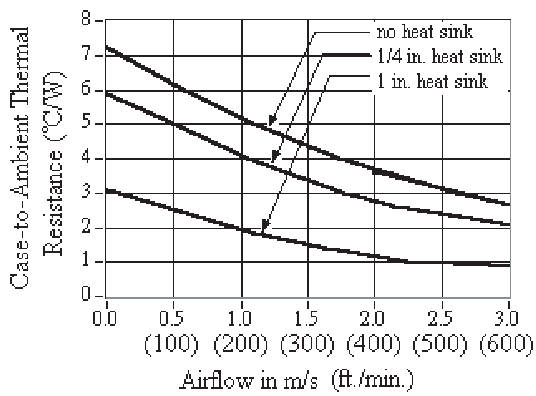

Figure 12. Case-to-ambient thermal resistance vs. airflow for either orientation

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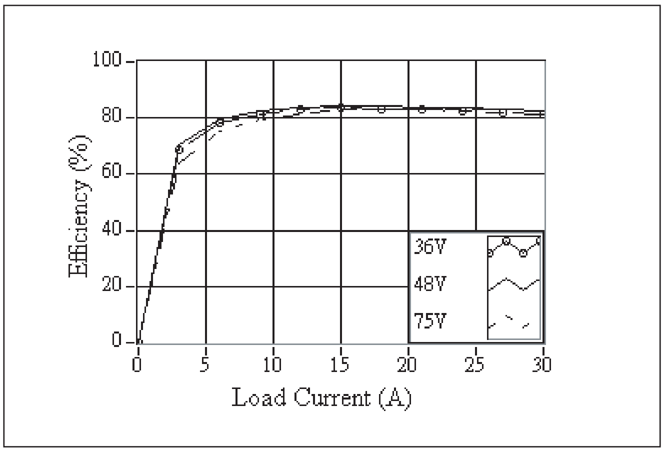

Figure 1. *Efficiency at nominal output voltage vs. load current for 36V, 48V and 75V input voltage at Tc=25°C*

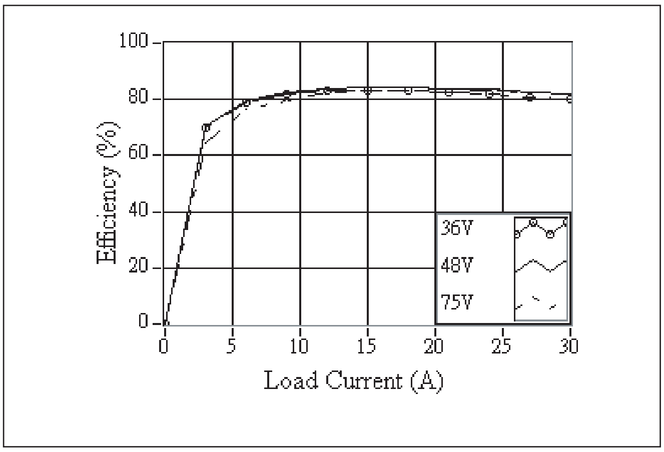

Figure 2. *Efficiency at nominal output voltage vs. load current for 36V, 48V and 75V input voltage at Tc=70°C*

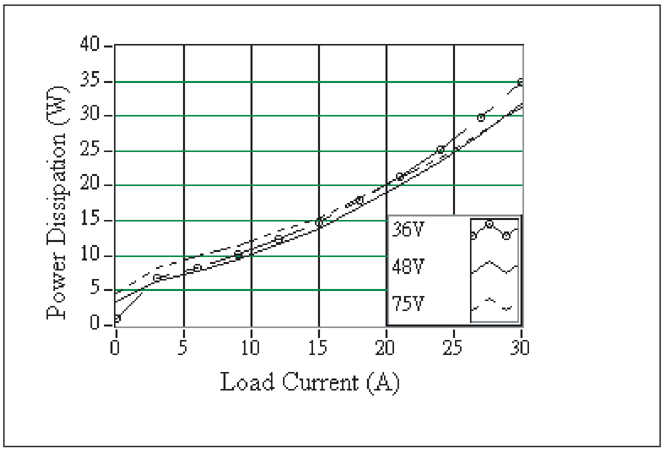

Figure 3. *Power dissipation at nominal output voltage vs. load current for 36V, 48V and 75V input voltage at Tc=25°C*

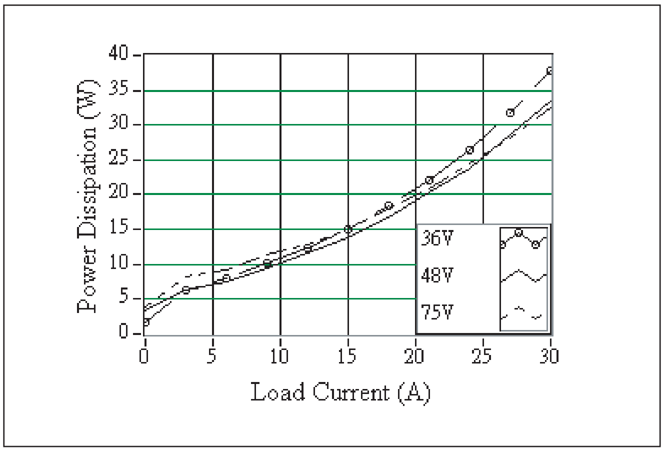

Figure 4. *Power dissipation at nominal output voltage vs. load current for 36V, 48V and 75V input voltage at Tc=70°C*

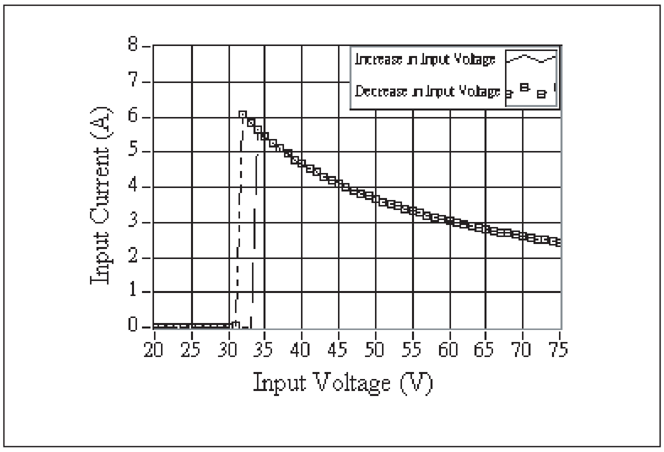

Figure 5. *Input current vs. input voltage for maximum load current*

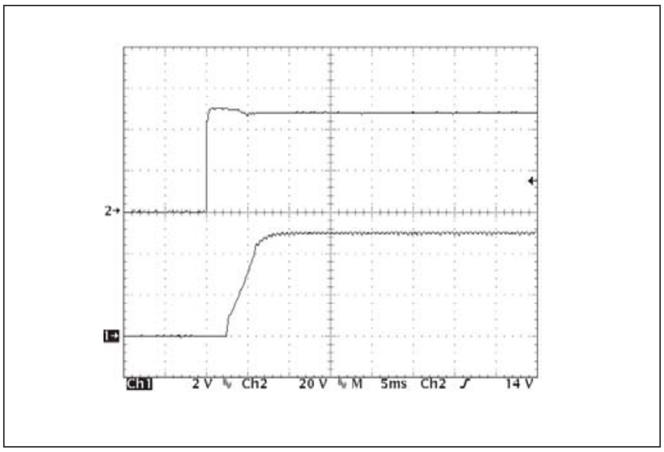

Figure 6. *Typical start-up at 0.8Io,max load current (5ms/div)*
Top Trace: 48V input voltage (20V/div)
Bottom Trace: Output voltage (2V/div)

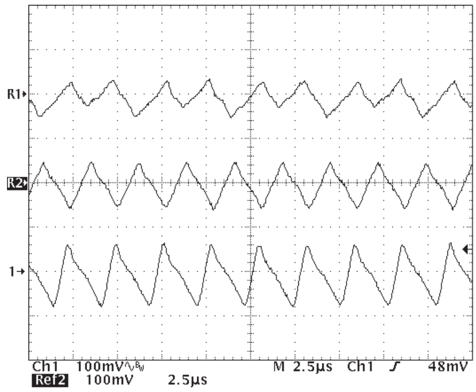

Figure 7. *Output voltage ripple at maximum output current (2.5µs/div)*
Top Trace: 36V input voltage (100mV/div)
Middle Trace: 48V input voltage (100mV/div)
Bottom Trace: 75V input voltage (100mV/div)

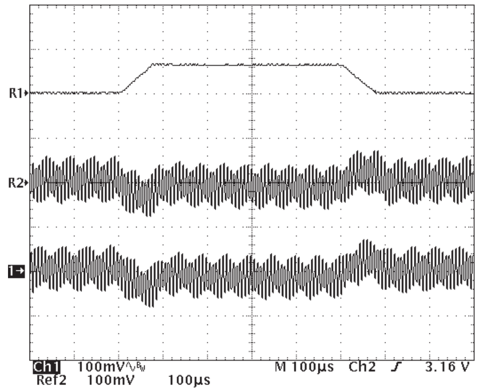

Figure 8. *Output voltage response to step-change in load current at 48V input voltage and dI/dt=0.1A/µs (100µs/div)*
Top Trace: Step change in 25% of Io,max (1V/div)
Middle Trace: 25%-50%-25% of Io,max (100mV/div)
Bottom Trace: 50%-75%-50% of Io,max (100mV/div)

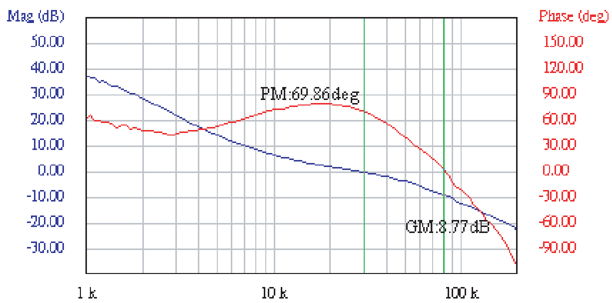

Figure 9. *Magnitude and phase of loop gain for 48V input voltage at full rated power*

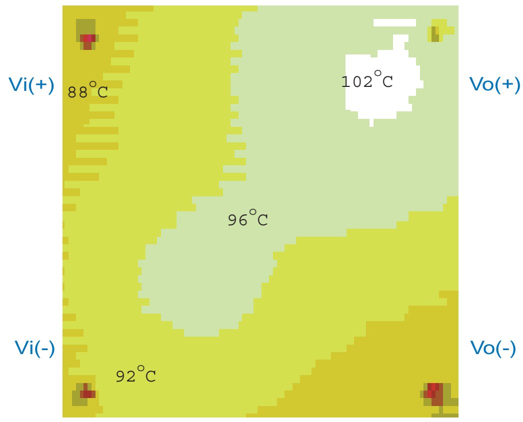

Figure 10. *Thermal plot without heat sink at 48V input voltage, maximum load current and room temperature, measured at over temperature shutdown*

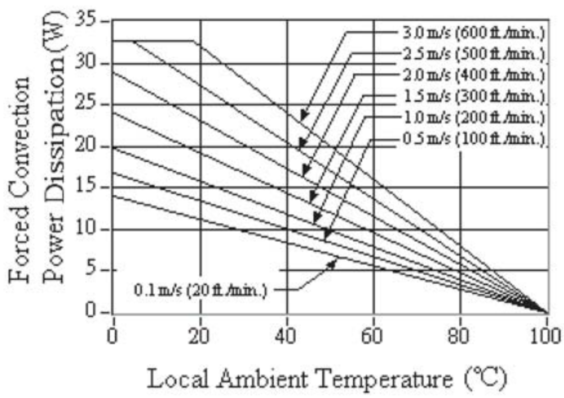

Figure 11. *Forced convection power dissipation vs. local ambient temperature with no heat sink for either orientation*

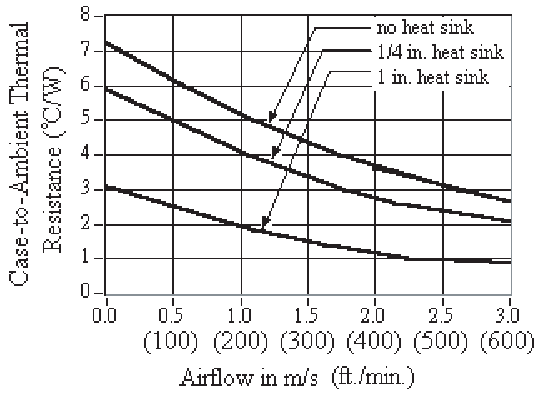

Figure 12. *Case-to-ambient thermal resistance vs. airflow for either orientation*

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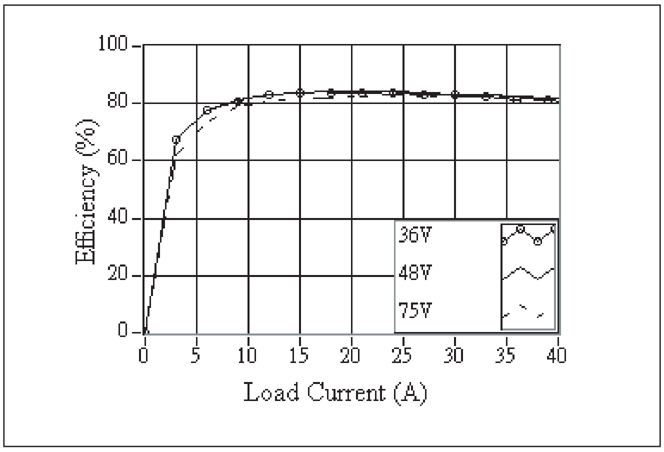

Figure 1. *Efficiency at nominal output voltage vs. load current for 36V, 48V and 75V input voltage at Tc=25°C*

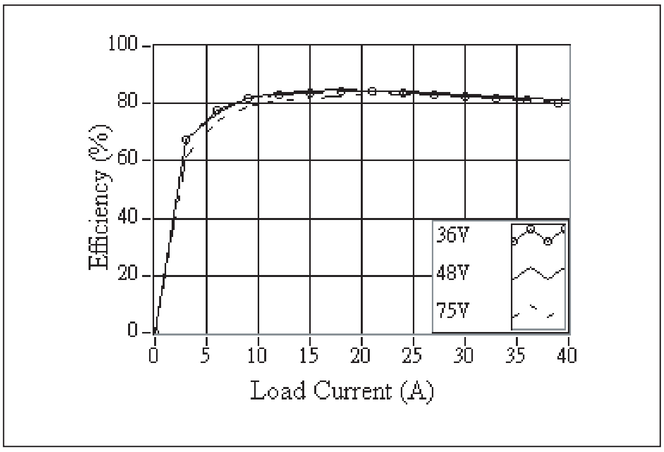

Figure 2. *Efficiency at nominal output voltage vs. load current for 36V, 48V and 75V input voltage at Tc=70°C*

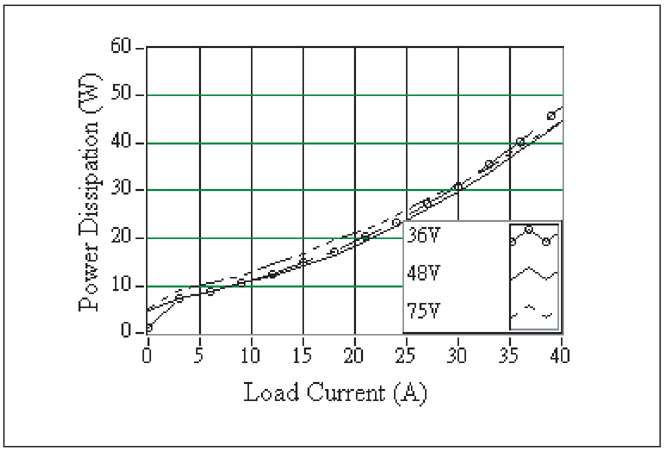

Figure 3. *Power dissipation at nominal output voltage vs. load current for 36V, 48V and 75V input voltage at Tc=25°C*

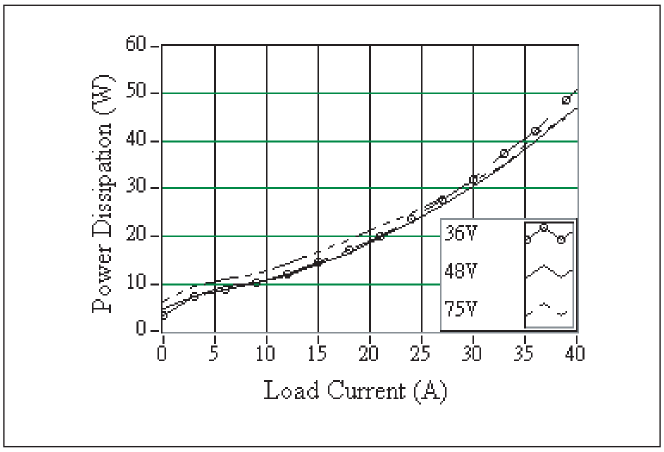

Figure 4. *Power dissipation at nominal output voltage vs. load current for 36V, 48V and 75V input voltage at Tc=70°C*

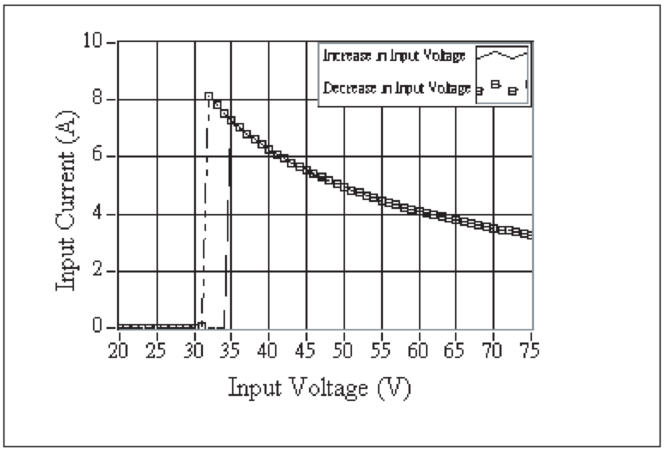

Figure 5. *Input current vs. input voltage for maximum load current*

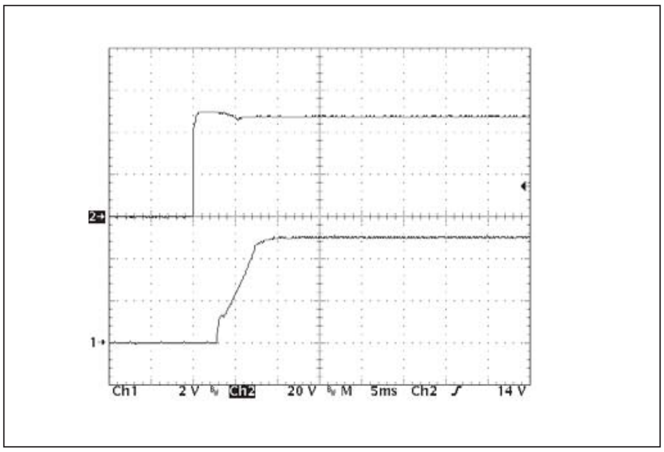

Figure 6. *Typical start-up at 0.8Io,max load current (5ms/div)*
Top Trace: 48V input voltage (20V/div)
Bottom Trace: Output voltage (2V/div)

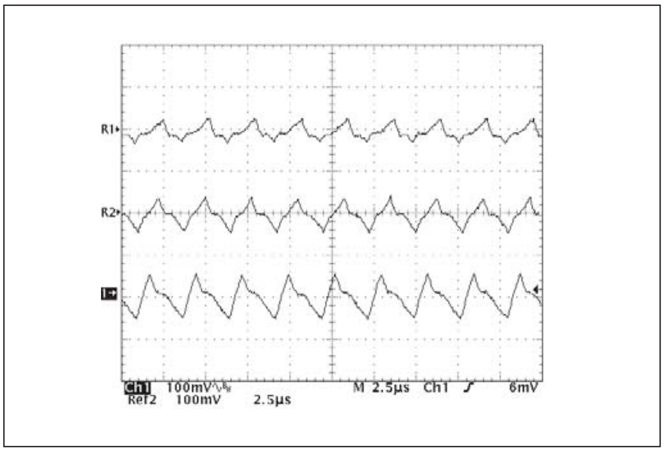

Figure 7. *Output voltage ripple at maximum output current (2.5µs/div)*
Top Trace: 36V input voltage (100mV/div)
Middle Trace: 48V input voltage (100mV/div)
Bottom Trace: 75V input voltage (100mV/div)

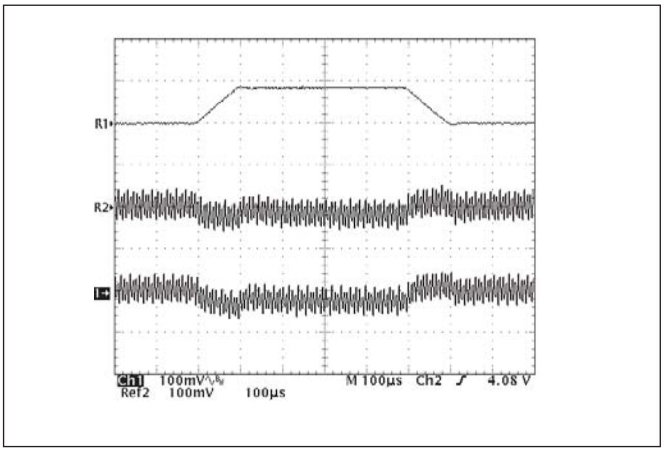

Figure 8. *Output voltage response to step-change in load current at 48V input voltage and dI/dt=0.1A/µs (100µs/div)*
Top Trace: Step change in 25% of Io,max (1V/div)
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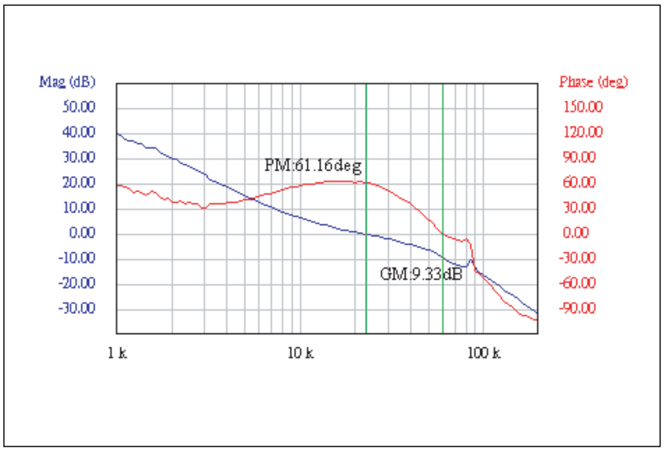

Figure 9. *Magnitude and phase of loop gain for 48V input voltage at full rated power*

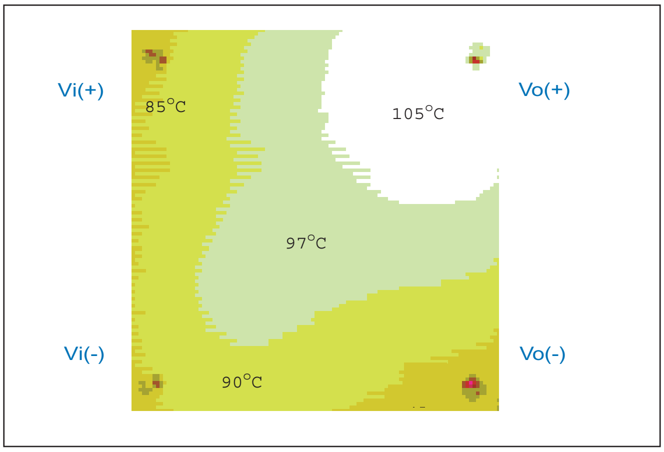

Figure 10. *Thermal plot without heat sink at 48V input voltage, maximum load current and room temperature, measured at over temperature shutdown*

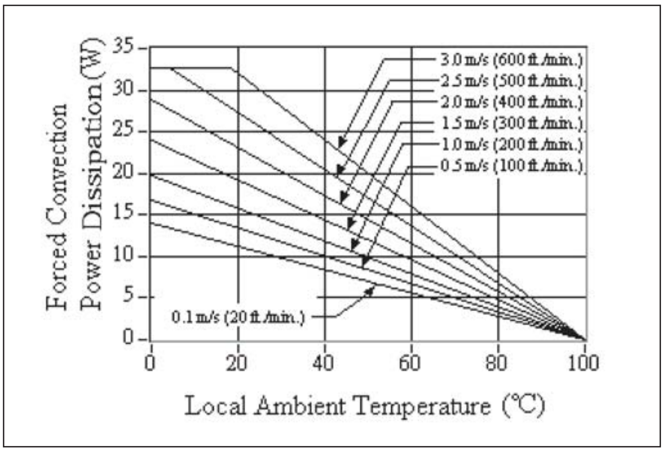

Figure 11. *Forced convection power dissipation vs. local ambient temperature with no heat sink for either orientation*

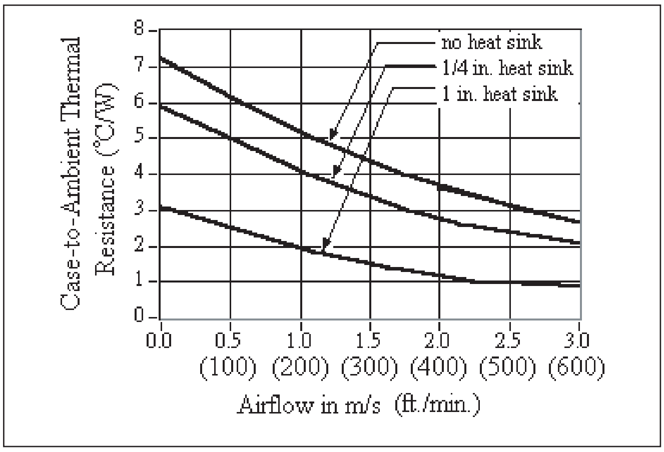

Figure 12. *Case-to-ambient thermal resistance vs. airflow for either orientation*