SHBS Series
100W / Half Brick DC/DC

Applications

Railway | Industry | Military

Automation | Semiconductor | Network / Telecom

Boat | Aviation | Medical

Automobile | Charger

3 Years Warranty

Features

1/2 Brick	2:1 / 4:1 Wide input range	Vicor Pin out	PI FILTER Built-in	2250 VDC Insulation	MLCC No life-span constrained	89% High efficiency	ON / OFF REMOTE
METAL CASE	UVLO	OCP	OVP	OTP			

Model Number Structure

SHBS	110	120	-	V	-	P	-	B	100
Series Name	Input Voltage (VDC)	Output Voltage (VDC)		Pin out		Remote Control Option		Shape	Watt
Supreme series Half Brick Second	**024W** : 9-36 **024** : 18-36 **048W** : 18-75 **110** : 40-160 **300** : 180-425	**050** : 5 **120** : 12 **240** : 24 **280** : 28 **480** : 48		**V** : Vicor		**P** : Positive logic **N** : Negative logic		**B** : Base Plate	**50** **100**

Model Selection Guide

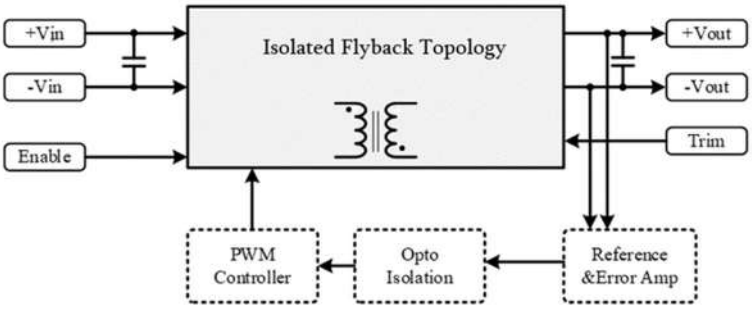
Typical @ Ta=+25 ℃ under nominal line voltage conditions unless noted

Model	Input			Output			Efficiency
	Voltage (V)		Current (A)	Voltage	Current	Power	
	Range	Nominal	Full load	(V)	(A)	(W)	Typ.(%)
SHBS024W050-V-□-B50	9-36	24	2.37	5	10	50	88
SHBS024W120-V-□-B50	9-36	24	2.34	12	4.17	50	89
SHBS024W240-V-□-B50	9-36	24	2.34	24	2.08	50	89
SHBS024W280-V-□-B50	9-36	24	2.34	28	1.79	50	89
SHBS024W480-V-□-B50	9-36	24	2.34	48	1.04	50	89
SHBS024W050-V-□-B100	9-36	24	4.73	5	20	100	88
SHBS024W120-V-□-B100	9-36	24	4.68	12	8.33	100	89
SHBS024W240-V-□-B100	9-36	24	4.68	24	4.17	100	89
SHBS024W280-V-□-B100	9-36	24	4.68	28	3.57	100	89
SHBS024W480-V-□-B100	9-36	24	4.68	48	2.08	100	89
SHBS024050-V-□-B50	18-36	24	2.37	5	10	50	88
SHBS024120-V-□-B50	18-36	24	2.34	12	4.17	50	89
SHBS024240-V-□-B50	18-36	24	2.34	24	2.08	50	89
SHBS024280-V-□-B50	18-36	24	2.34	28	1.79	50	89
SHBS024480-V-□-B50	18-36	24	2.34	48	1.04	50	89
SHBS024050-V-□-B100	18-36	24	4.73	5	20	100	88
SHBS024120-V-□-B100	18-36	24	4.68	12	8.33	100	89
SHBS024240-V-□-B100	18-36	24	4.68	24	4.17	100	89
SHBS024280-V-□-B100	18-36	24	4.68	28	3.57	100	89
SHBS024480-V-□-B100	18-36	24	4.68	48	2.08	100	89
SHBS048W050-V-□-B50	18-75	48	1.18	5	10	50	88
SHBS048W120-V-□-B50	18-75	48	1.17	12	4.17	50	89
SHBS048W240-V-□-B50	18-75	48	1.17	24	2.08	50	89
SHBS048W280-V-□-B50	18-75	48	1.17	28	1.79	50	89
SHBS048W480-V-□-B50	18-75	48	1.17	48	1.04	50	89
SHBS048W050-V-□-B100	18-75	48	2.37	5	20	100	88
SHBS048W120-V-□-B100	18-75	48	2.34	12	8.33	100	89
SHBS048W240-V-□-B100	18-75	48	2.34	24	4.17	100	89
SHBS048W280-V-□-B100	18-75	48	2.34	28	3.57	100	89
SHBS048W480-V-□-B100	18-75	48	2.34	48	2.08	100	89

Model	Input			Output			Efficiency
	Voltage (V)		Current (A)	Voltage	Current	Power	
	Range	Nominal	Full load	(V)	(A)	(W)	Typ.(%)
SHBS110050-V-□-B50	40-160	110	0.52	5	10	50	88
SHBS110120-V-□-B50	40-160	110	0.51	12	4.17	50	89
SHBS110240-V-□-B50	40-160	110	0.51	24	2.08	50	89
SHBS110280-V-□-B50	40-160	110	0.51	28	1.79	50	89
SHBS110480-V-□-B50	40-160	110	0.51	48	1.04	50	89
SHBS110050-V-□-B100	40-160	110	1.03	5	20	100	88
SHBS110120-V-□-B100	40-160	110	1.02	12	8.33	100	89
SHBS110240-V-□-B100	40-160	110	1.02	24	4.17	100	89
SHBS110280-V-□-B100	40-160	110	1.02	28	3.57	100	89
SHBS110480-V-□-B100	40-160	110	1.02	48	2.08	100	89
SHBS300050-V-□-B50	180-425	300	0.19	5	10	50	88
SHBS300120-V-□-B50	180-425	300	0.19	12	4.17	50	89
SHBS300240-V-□-B50	180-425	300	0.19	24	2.08	50	89
SHBS300280-V-□-B50	180-425	300	0.19	28	1.79	50	89
SHBS300480-V-□-B50	180-425	300	0.19	48	1.04	50	89
SHBS300050-V-□-B100	180-425	300	0.38	5	20	100	88
SHBS300120-V-□-B100	180-425	300	0.37	12	8.33	100	89
SHBS300240-V-□-B100	180-425	300	0.37	24	4.17	100	89
SHBS300280-V-□-B100	180-425	300	0.37	28	3.57	100	89
SHBS300480-V-□-B100	180-425	300	0.37	48	2.08	100	89

Description

Supreme series - Half Brick - Second generation converter is composed of Isolated, board-mountable, fixed switching frequency DC-DC converters that use synchronous rectification to achieve extremely high-power conversion efficiency. These DC-DC converter modules use advanced power processing, control, and packaging technologies to enhance the performance, flexibility, reliability, and cost effectiveness of mature power components. Each module is six-sided metal case enclosed to provide protection from the harsh environments seen in many industrial and transportation applications.



SHBS Series Block Diagram

Electrical Specifications

Input Specifications (Typical @ Ta=+25°C under nominal line voltage conditions unless noted.)

Parameter	Notes and Conditions	Min.	Typ.	Max.	Unit
Transient Input Voltage Ranges	SHBS024W models (100ms Max) SHBS024 models (100ms Max) SHBS048W models (100ms Max) SHBS110 models (100ms Max) SHBS300 models (100ms Max)			50 50 80 250 500	VDC
Operating Input Voltage Ranges	SHBS024W models SHBS024 models SHBS048W models SHBS110 models SHBS300 models	9 18 18 40 180	24 24 48 110 300	36 36 75 160 425	VDC
Under-Voltage Lockout Start up Voltage	SHBS024W models SHBS024 models SHBS048W models SHBS110 models SHBS300 models			9 18 18 40 180	VDC
Under-Voltage Lockout Shutdown Voltage	SHBS024W models SHBS024 models SHBS048W models SHBS110 models SHBS300 models		8 17 17 38 170		VDC
Input Current	See model selection guide, Standby mode (OFF, UVLO) 8mA				
Enable Function Input	Positive logic ON	Open			VDC
	Positive logic OFF	Short or 0 ~ 1.2			VDC
	Negative logic ON	Short or 0 ~ 1.2			VDC
	Negative logic OFF	Open			VDC

Output Specifications

Parameter	Notes and Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy	V_{NOM} 50% Load			±1.5	%
Line Regulation	Low Line to High Line			±0.3	%
Load Regulation	10% to 100% Load			±0.5	%
Output Ripple & Noise Voltage	Bandwidth 20MHz and with 10µF MLCC Output Capacitor		1.5		$\%V_{pk-pk}$
Temperature Coefficient				±0.04	% /˚C
Transient Recovery Time	25% load step change		800		µSec.
Transient Peak Deviation	ΔIo/Δt=2.5A/us		±2		%Vo
Start-Up Time	When use Enable Function		20		mSec.
Trimming Output Voltage	V_{NOM} 10% Load		±10		%
Over Voltage Protection	V_{NOM} 10% Load		120		%
Output Power Protection	V_{NOM}		120		%

General Specifications & Environmental Specifications

Parameter	Notes and Conditions	Min.	Typ.	Max.	Unit
Switching Frequency	V_{NOM}	180		300	kHz
Storage Temperature Range	All models	-60		125	˚C
Operating Case Temperature	All models	-40		100	˚C
Over temperature Protection	All models, Auto. Recovery		105		
Isolation Voltage	All models, 1 Minute	2250			VDC
Input to Output					
Input & Output to Case		1500			
Isolation Resistance	All models, 500VDC, At 70%RH	100			MΩ
Input to Output					
Isolation Capacitance	All models		1500		pF
Input to Output					
Humidity (non condensing)	All models			95	%
Calculated MTBF	BellCore-TR-332@ 50˚C G.B		1.5		M HR
Thermal shock	Environmental Engineering Experimental Tests	MIL-STD-810F			
Vibration		MIL-STD-810F			
Drop		MIL-STD-810F			
Weight	Shape-B	95(3.35)			g (oz.)
Dimensions	Shape-B	2.42” x 2.40” x 0.59” (61.4 x 61.0 x 15.0mm)			
Case Material	Aluminum				
Potting Material	Silicone				

Standards Compliance

Parameter	Standard	Test Conditions	Performance Criteria
Environmental Compliance	Reach; RoHS		PASS
EMI	EN55022		Class A / Class B
ESD	EN61000-4-2	±4 kV Air Discharge ±4 kV Contact Discharge	Crit. A
Radiated Immunity	EN61000-4-3	Level 2, 3 V/m	Crit. A
Fast Transient	EN61000-4-4	±2 kV Applied	Crit. A
Surge	EN61000-4-5	±2 kV Applied	Crit. A
Conducted Immunity	EN61000-4-6	Level 2, 3 V rms	Crit. A

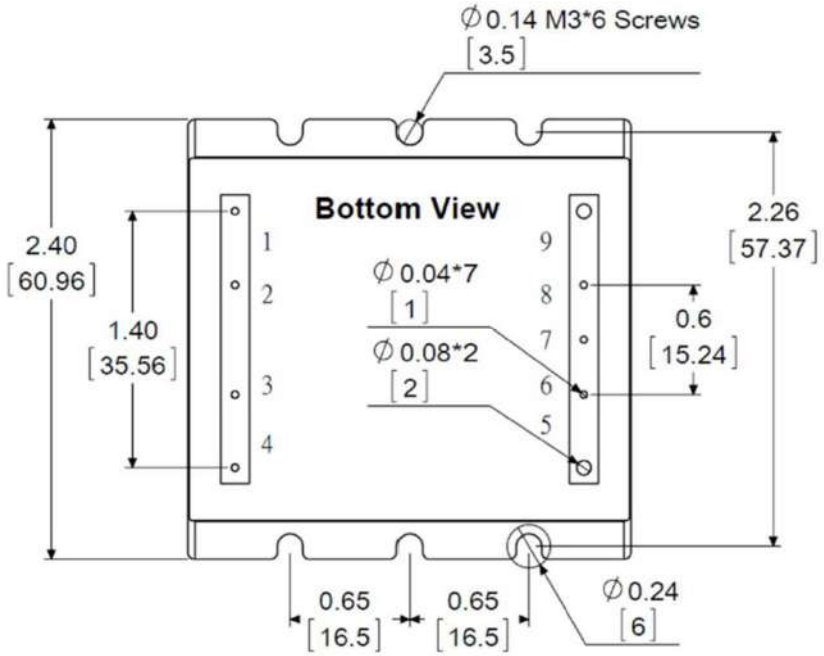
It is recommended to protect the input by fuses or other protection devices.

Modules could meet EN55022 Class A and Class B standard with external components.

The information and specifications contained in this data sheet are believed to be correct at time of publication. All specifications are subject to change without notice. No rights under any patent accompany the sale of any such products or information contained herein.

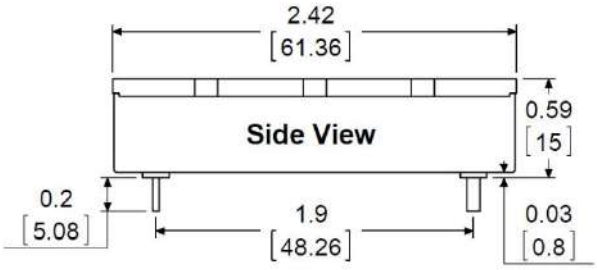
Mechanical Dimensions & Pin Assignments

Shape – B



Pin Assignments:

Pin#	Function
1	-Vin
2	NC
3	Enable
4	+Vin
5	+Vout
6	+Sense
7	Trim
8	-Sense
9	-Vout

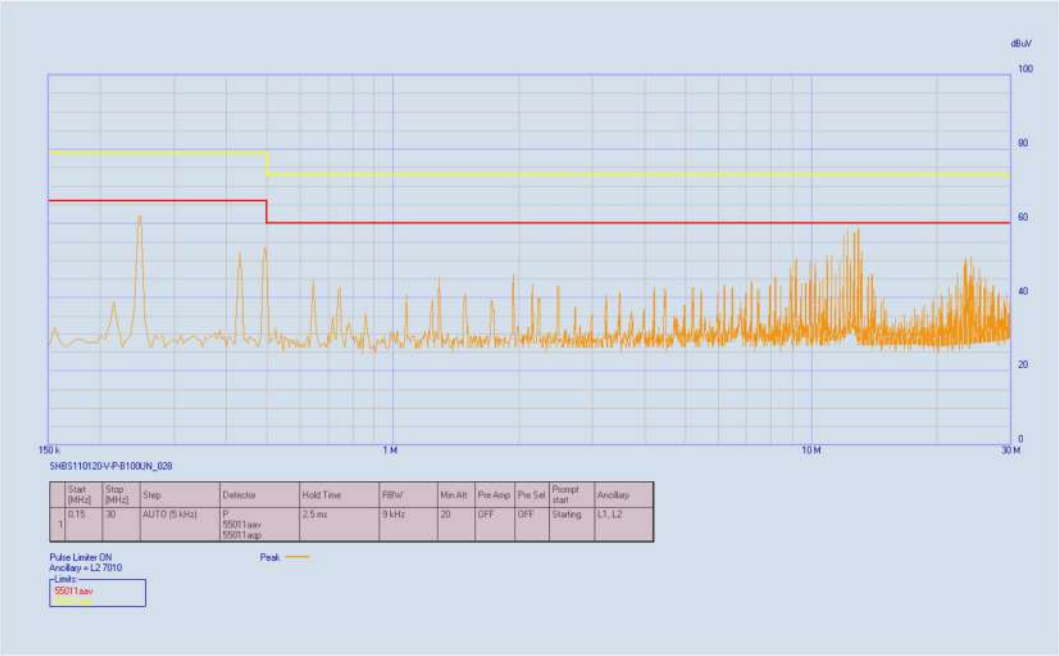


Note:

Pin Material: Copper Alloy
Pin Plating: Gold
Dimensions in inches [mm]
Tolerances: .XX±0.02 [.X±0.5mm]

Conducted EMI

Input terminal value (typ.) SHBS110120-V-P-B100 @Vin = 110VDC, Iout = 8.3A



The fundamental switching frequency of the module is 260 kHz.

Characteristic Curves

Testing conditions are at typical input, Ta=+25˚C, full load (horizontal mount) Unless otherwise indicated

The figures of SHBS024W240-V-P-B100

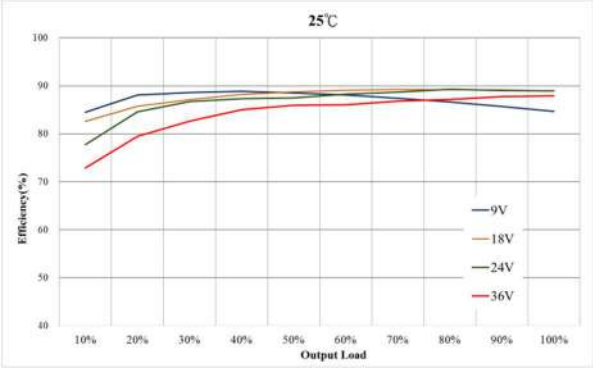


Figure 1 : Efficiency at Minimum, Nominal and Maximum Input Voltages VS. Output Load.

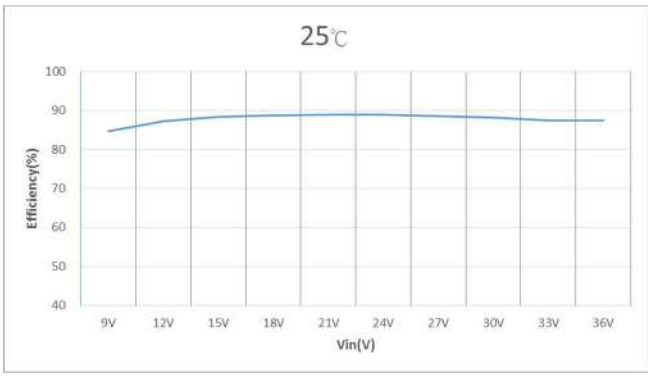


Figure 2 : Efficiency VS. Input Voltages at 100% rated power

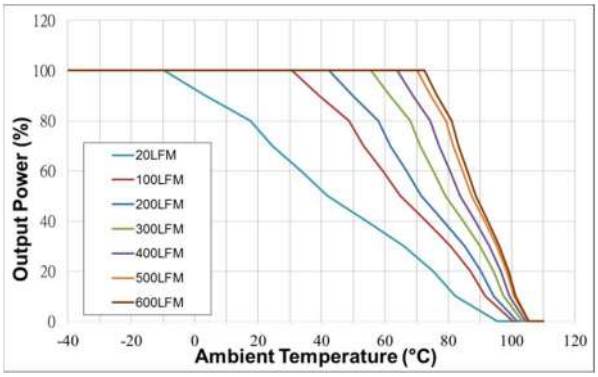


Figure 3 : Ambient Temperature VS. Output Power Derating Curves(Note: 20LFM = Free Air)

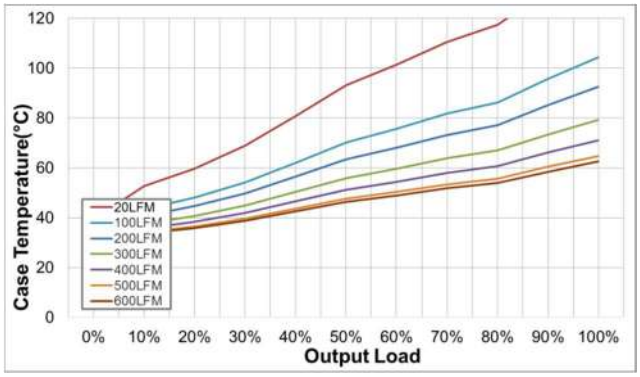


Figure 4 : Case Temperature VS. Output rated Power (Note: 20LFM = Free Air)

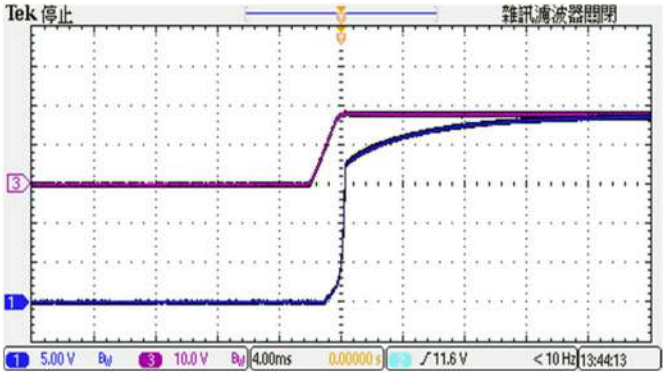


Figure 5 : CH1 = Vout, CH3 = Nominal Input Typical Start-up waveform at Full load.

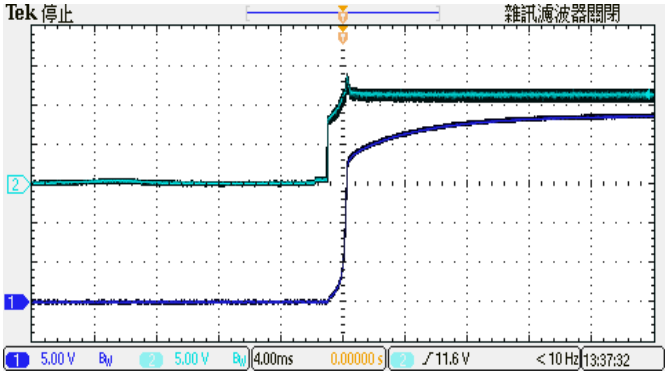


Figure 6 : CH1 = Vout, CH3 = Enable Pin Typical Start-up waveform. Input voltage pre-applied

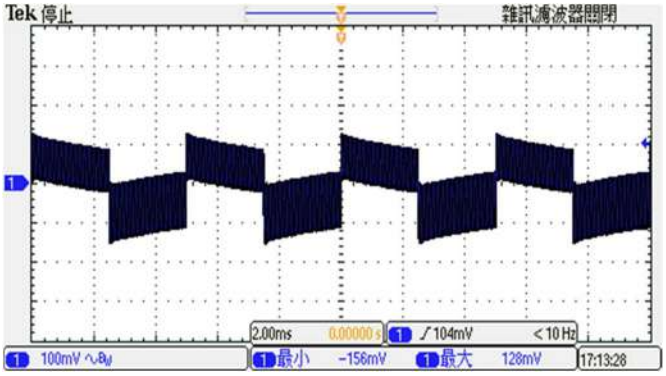


Figure 7 : Transient Response at Output step load (Vin: Typical ,50~75% of output current; ΔIo/Δt =1A/µS)

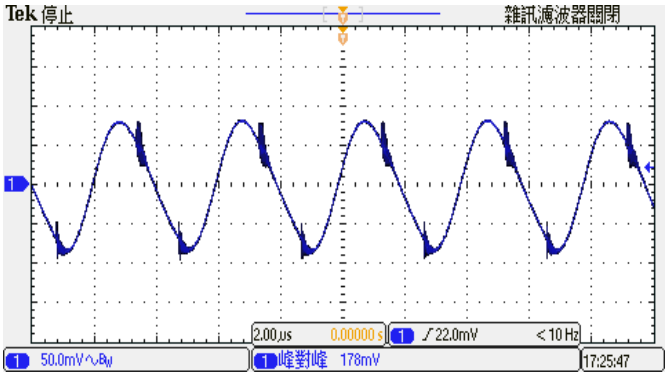


Figure 8 : Output Voltage Ripple & Noise at full load. (Vin: Typical, With Output Capacitor to add 1uF MLCC)

Trimming Output Voltage – for Single output models

Only the single output converters have a trim function. That allows users to adjust the output voltage from +10% to –10%, please refer to the trim table that follow for details. Adjustments to the output voltage can be used with a simple fixed resistor as shown in Figures 1 and 2. A single fixed resistor can increase or decrease the output voltage depending on its connection.

Note:

※ Trim adjustments higher than the specified range can have an adverse effect on the converter's performance and are not recommended.

※ If the trim function is not used, leave the trim pin open.

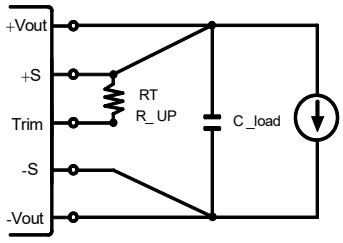


Figure 1. Trim Connections To increase Output Voltages Using Fixed Resistors

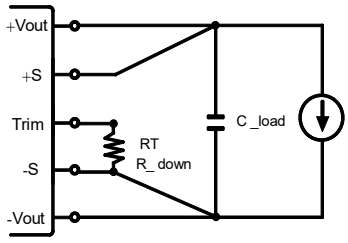


Figure 2. Trim Connections To Decrease Output Voltages Using Fixed Resistors

	Trim up resistor value(KΩ)									
Vout	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
5	109	50	30	20	14	10	7	5	3.3	2
12	258	115	67	44	29	20	13	7.8	3.8	0.6
24	514	232	137	90	62	43	30	20	12	5.5
28	602	271	161	105	72	50	34	22	13	5.9
48	1039	464	273	177	120	81	54	34	18	5

	Trim down resistor value(KΩ)									
Vout	-1%	-2%	-3%	-4%	-5%	-6%	-7%	-8%	-9%	-10%
5	137	62	37	25	17	12	9	6	4	2.2
12	358	162	96	63	44	31	21	14	8.9	4.5
24	769	352	213	143	102	74	54	39	28	18
28	860	392	236	158	111	80	57	41	28	17
48	1413	638	380	251	173	121	85	57	35	18

Enable Control Function

The primary-side, Enable Control function can be specified to operate with either positive or negative polarity. Positive-polarity devices are enabled when the enable pin is left open or is pulled high. See "Enable Function Input.

Positive-polarity devices are disabled when the enable pin is pulled low (under +1.0V with respect to –input). Negative-polarity devices are off when the enable pin is high/open and on when the enable pin is pulled low. See Figure 3.

Output Ripple Noise

The two copper strips simulate real-world PCB impedances between the converter and its load. Scope measurements should be made using BNC connectors or the probe ground should be less than 1/2 inch and soldered directly to the fixture.

All external capacitors should have appropriate voltage ratings and be located as close to the converter as possible.

Temperature variations for all relevant parameters should be taken into consideration. The most effective combination of external I/O capacitors will be a function of line voltage and source impedance, as well as particular load and layout conditions. See Figure 4.

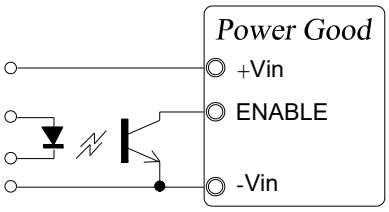


Figure 3. Driving the Enable Control pin

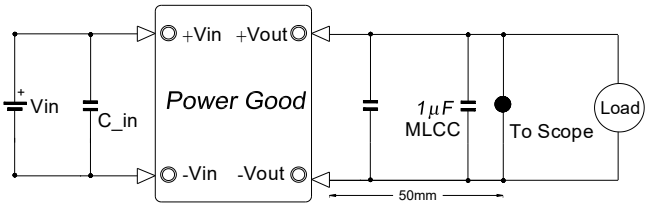


Figure 4. Measuring Output Ripple/Noise(20MHz bandwidth)

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MORE INFO