SHB Series
300W / Half Brick
DC/DC

Applications

Railway | Industry | Military

Automation | Semiconductor | Network / Telecom

Boat | Aviation | Medical

Automobile | Charger

3 Years Warranty

CE RoHS COMPLIANT ISO REACH

Features

1/2 Brick	**2:1 / 4:1** Wide input range	**DOSA** Pin out	**Vicor** Pin out	**PI FILTER** Built-in	**2250 VDC** Insulation	**MLCC** No life-span constrained	**92 %** High efficiency
ON / OFF REMOTE	**METAL CASE**	**M3 thread** (optional)	**UVLO**	**OCP**	**OVP**	**OTP**	

Model Number Structure

SHB 110 120 - S - P - B 300

Series Name	Input Voltage (VDC)	Output Voltage (VDC)	Pin out	Remote Control Option	Shape	Watt
Supreme series **H**alf **B**rick	**018** : 9-36 **024** : 18-36 **036** : 18-75 **110** : 40-180 **300** : 180-425	**050** : 5 **120** : 12 **240** : 24 **280** : 28 **480** : 48	**S** : Dosa **V** : Vicor	**P** : Positive logic **N** : Negative logic	**B** : Base Plate	**200** **300**

Model Selection Guide

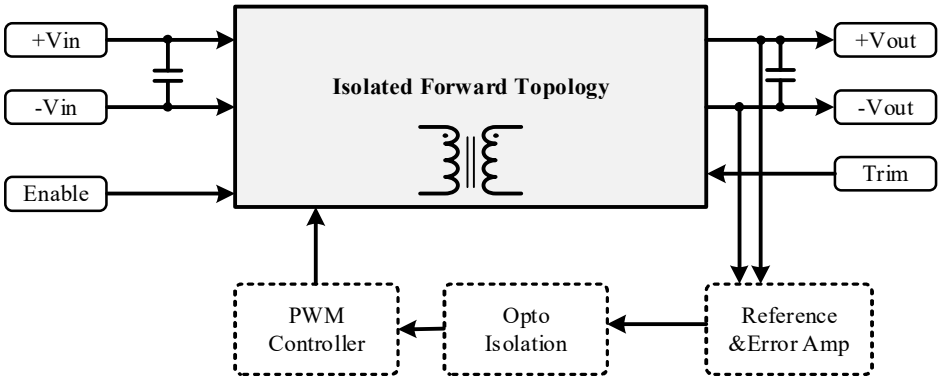
Typical @ Ta=+25 ℃ under nominal line voltage conditions unless noted

Model	Input			Output			Efficiency
	Voltage (V)		Current (A)	Voltage	Current	Power	
	Range	Nominal	Full load	(V)	(A)	(W)	Typ. (%)
SHB018050-□-□-B200	9-36	18	12.63	5	40	200	88
SHB018120-□-□-B200	9-36	18	12.63	12	16.67	200	88
SHB018240-□-□-B200	9-36	18	12.63	24	8.33	200	88
SHB018280-□-□-B200	9-36	18	12.63	28	7.14	200	88
SHB018480-□-□-B200	9-36	18	12.48	48	4.17	200	89
SHB018120-□-□-B300	9-36	18	19.16	12	25	300	87
SHB018240-□-□-B300	9-36	18	19.16	24	12.5	300	87
SHB018280-□-□-B300	9-36	18	19.16	28	10.71	300	87
SHB018480-□-□-B300	9-36	18	18.73	48	6.25	300	89
SHB024050-□-□-B200	18-36	24	9.26	5	40	200	90
SHB024120-□-□-B200	18-36	24	9.16	12	16.67	200	91
SHB024240-□-□-B200	18-36	24	9.06	24	8.33	200	92
SHB024280-□-□-B200	18-36	24	9.06	28	7.14	200	92
SHB024480-□-□-B200	18-36	24	9.06	48	4.17	200	92
SHB024120-□-□-B300	18-36	24	13.74	12	25	300	91
SHB024240-□-□-B300	18-36	24	13.74	24	12.5	300	91
SHB024280-□-□-B300	18-36	24	13.74	28	10.71	300	91
SHB024480-□-□-B300	18-36	24	13.74	48	6.25	300	91
SHB036050-□-□-B200	18-75	36	6.31	5	40	200	88
SHB036120-□-□-B200	18-75	36	6.17	12	16.67	200	90
SHB036240-□-□-B200	18-75	36	6.17	24	8.33	200	90
SHB036280-□-□-B200	18-75	36	6.17	28	7.14	200	90
SHB036480-□-□-B200	18-75	36	6.17	48	4.17	200	90
SHB036120-□-□-B300	18-75	36	9.36	12	25	300	89
SHB036240-□-□-B300	18-75	36	9.36	24	12.5	300	89
SHB036280-□-□-B300	18-75	36	9.36	28	10.71	300	89
SHB036480-□-□-B300	18-75	36	9.36	48	6.25	300	89

Model	Input			Output			Efficiency
	Voltage (V)		Current (A)	Voltage	Current	Power	
	Range	Nominal	Full load	(V)	(A)	(W)	Typ. (%)
SHB110050-□-□-B200	40-180	110	2.07	5	40	200	88
SHB110120-□-□-B200	40-180	110	2.04	12	16.67	200	89
SHB110240-□-□-B200	40-180	110	2.04	24	8.33	200	89
SHB110280-□-□-B200	40-180	110	2.04	28	7.14	200	89
SHB110480-□-□-B200	40-180	110	2.04	48	4.17	200	89
SHB110120-□-□-B300	40-180	110	3.06	12	25	300	89
SHB110240-□-□-B300	40-180	110	3.06	24	12.5	300	89
SHB110280-□-□-B300	40-180	110	3.06	28	10.71	300	89
SHB110480-□-□-B300	40-180	110	3.06	48	6.25	300	89
SHB300050-□-□-B200	180-425	300	0.74	5	40	200	90
SHB300120-□-□-B200	180-425	300	0.74	12	16.67	200	90
SHB300240-□-□-B200	180-425	300	0.74	24	8.33	200	90
SHB300280-□-□-B200	180-425	300	0.74	28	7.14	200	90
SHB300480-□-□-B200	180-425	300	0.74	48	4.17	200	90
SHB300120-□-□-B300	180-425	300	1.11	12	25	300	90
SHB300240-□-□-B300	180-425	300	1.10	24	12.5	300	91
SHB300280-□-□-B300	180-425	300	1.11	28	10.71	300	90
SHB300480-□-□-B300	180-425	300	1.11	48	6.25	300	90

Description

Supreme series - Half Brick 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.



SHB 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	SHB018 models (100ms Max) SHB024 models (100ms Max) SHB036 models (100ms Max) SHB110 models (100ms Max) SHB300 models (100ms Max)			50 50 100 250 500	VDC
Operating Input Voltage Ranges	SHB018 models SHB024 models SHB036 models SHB110 models SHB300 models	9 18 18 40 180	18 24 36 110 300	36 36 75 180 425	VDC
Under-Voltage Lockout Start up Voltage	SHB018 models SHB024 models SHB036 models SHB110 models SHB300 models			9 18 18 40 180	VDC
Under-Voltage Lockout Shutdown Voltage	SHB018 models SHB024 models SHB036 models SHB110 models SHB300 models		8 17 17 38 175		VDC
Over-Voltage Lockout Turn OFF Threshold	SHB018 models SHB024 models SHB036 models SHB110 models SHB300 models			48 48 85 195 470	VDC
Over-Voltage Lockout Turn ON Threshold	SHB018 models SHB024 models SHB036 models SHB110 models SHB300 models	36 36 75 180 425			VDC
Input Current	See model selection guide, Standby mode (OFF, UVLO) 8mA				
Enable Function Input	Positive logic ON Positive logic OFF	Open Short or 0 ~ 1.2			VDC
	Negative logic ON Negative logic OFF	Short or 0 ~ 1.2 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 1μF 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}		250		kHz
Storage Temperature Range	All models	-60		125	˚C
Operating Case Temperature	All models	-45		105	˚C
Over temperature Protection	All models, Auto. Recovery		110		
Isolation Voltage Input to Output	All models, 1 Minute	2250			VDC
Isolation Resistance Input to Output	All models, 500VDC, At 70%RH	100			MΩ
Isolation Capacitance Input to Output	All models		1500		pF
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	117(4.13)			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

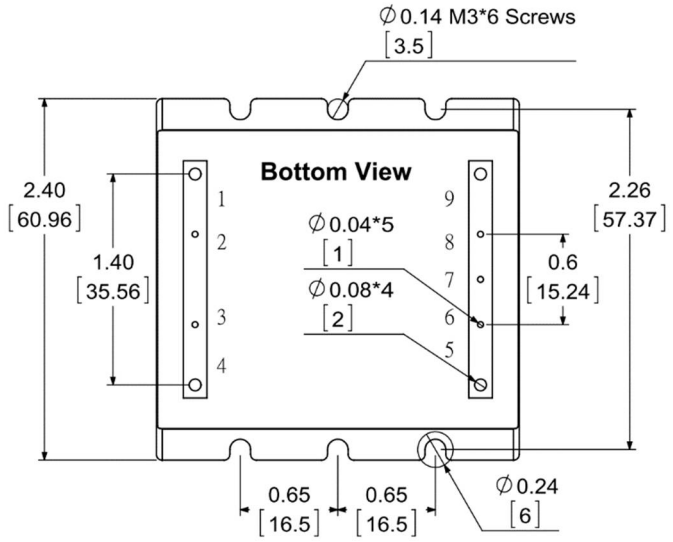
Parameter	Standard	Test Conditions	Performance Criteria
Environmental Compliance	Reach; RoHS		PASS
EMI	EN55022		Class A / Class B
ESD	EN61000-4-2	±4 kV Air Discharge ±4 kV Contact Discharge	Crit. A
Radiated Immunity	EN61000-4-3	Level 2, 3 V/m	Crit. A
Fast Transient	EN61000-4-4	±2 kV Applied	Crit. A
Surge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

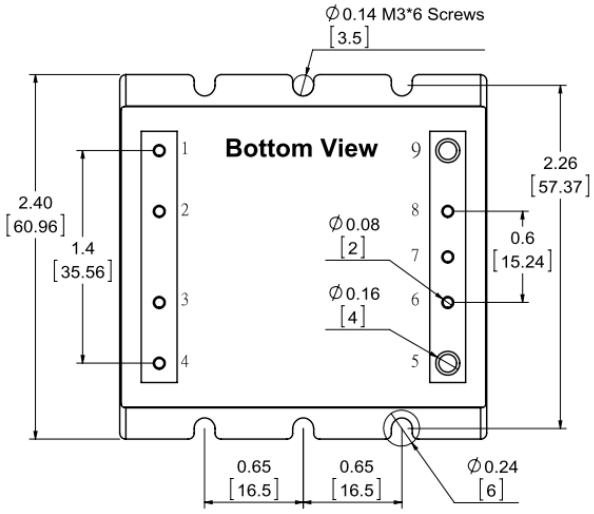
Modules could meet EN55022 Class A and Class B standard with external components.

Mechanical Dimensions & Pin Assignments

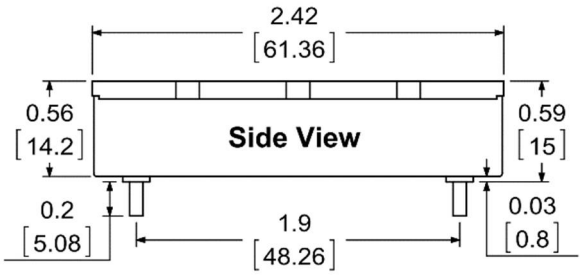
Shape – B (Base Plate with DOSA pinout)



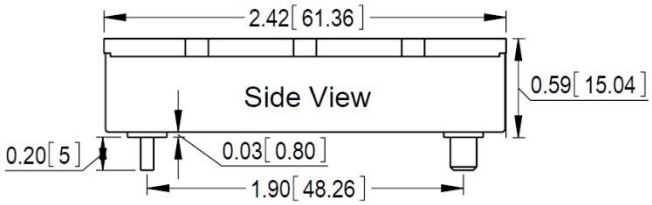
Shape – B (Base Plate with Vicor pinout)



Shape – B (Base Plate with DOSA pinout)



Shape – B (Base Plate with Vicor pinout)



Pin Assignments:

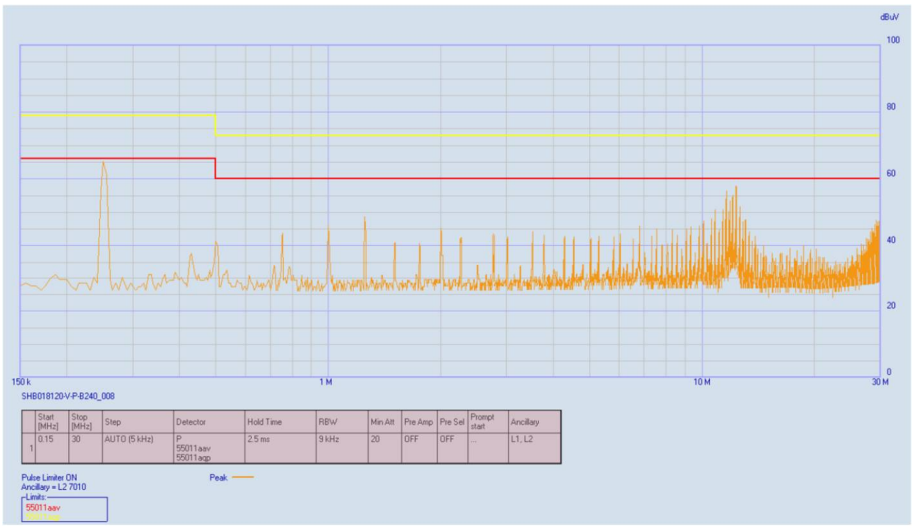
Pin#	Function
1	-Vin
2	NC
3	Enable
4	+Vin
5	+Vout
6	+Sense
7	Trim
8	-Sense
9	-Vout

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.) SHB018120-V-P-B300 @Vin = 18VDC, Iout = 25A



The fundamental switching frequency of the module is 220 kHz.

Characteristic Curves

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

The figures of SHB018120-S-P-B300

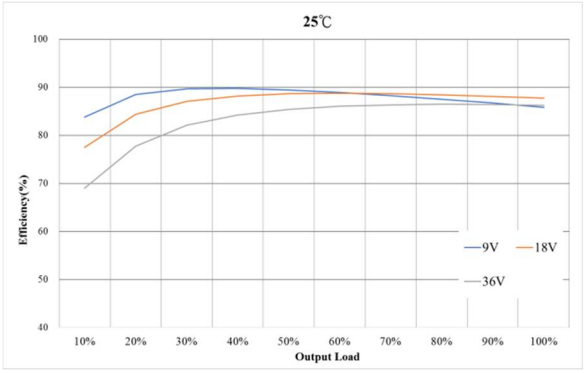


Figure 1 : Efficiency at Minimum, Nominal and Maximum Input Voltages VS. Output Load.

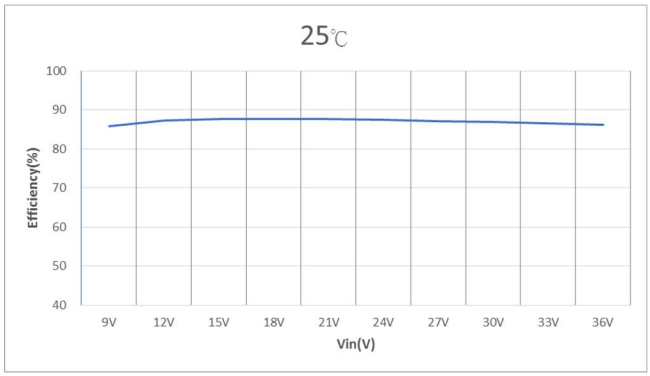


Figure 2 : Efficiency VS. Input Voltages at 100% rated power

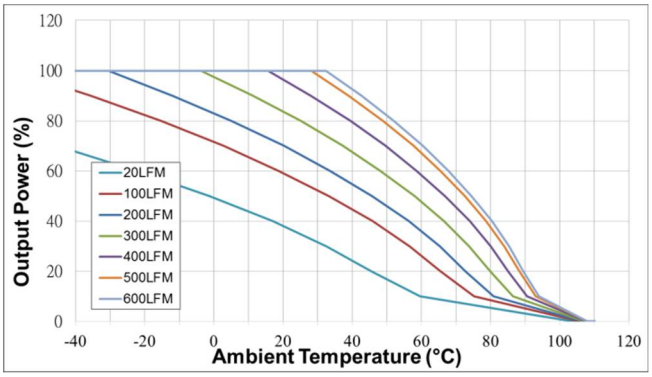


Figure 3 : Ambient Temperature VS. Output Power Derating Curves (Note:20LFM=Free Air)

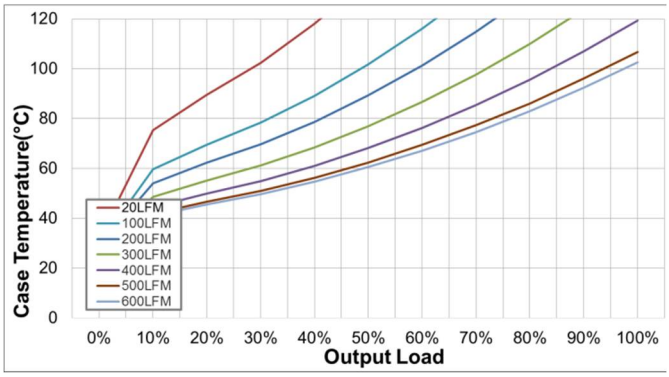


Figure 4 : Case Temperature VS. Output rated Power (Note:20LFM=Free Air)

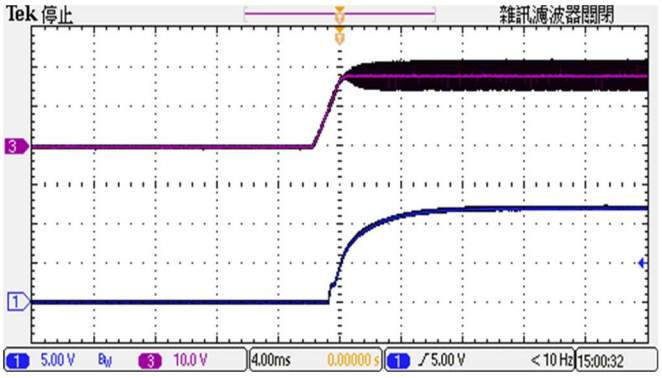


Figure 5 : CH1 = Vout, CH3 = Nominal Input Typical Start-up waveform at Full load.

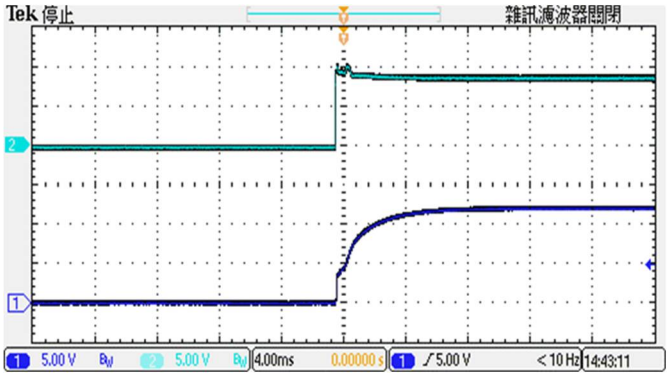


Figure 6 : CH1 = Vout, CH3 = Enable Pin Typical Start-up waveform. Input voltage pre-applied

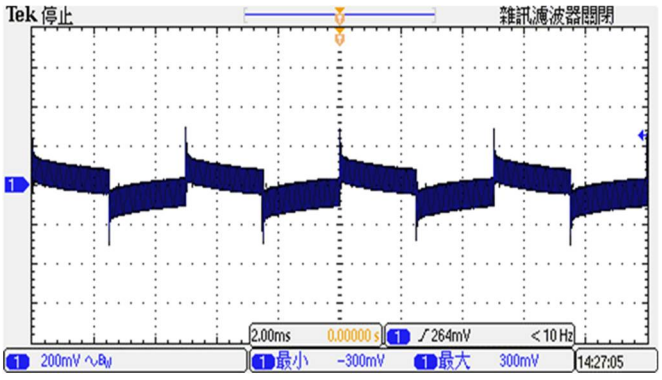


Figure 7 : Transient Response at Output step load (Vin: Typical ,50~75% of output current; ΔIo/Δt =1A/μS)

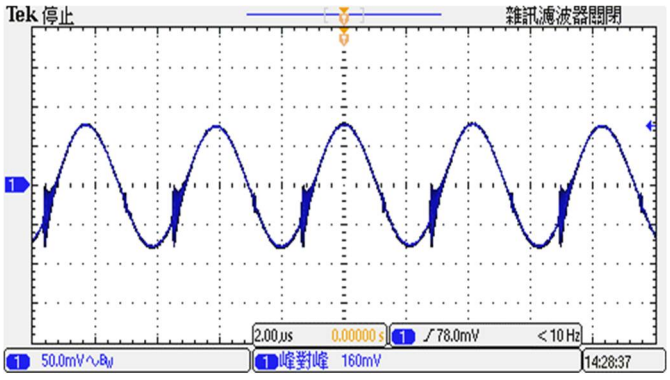


Figure 8 : Output Voltage Ripple & Noise at full load. (Vin: Typical, With Output Capacitor to add 1μF MLCC)

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.

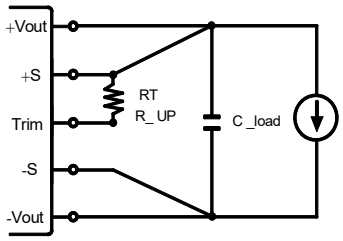


Figure 1. Trim Connections To increase Output Voltages Using Fixed Resistors

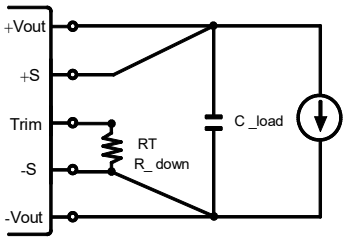


Figure 2. Trim Connections To Decrease Output Voltages Using Fixed Resistors

	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.

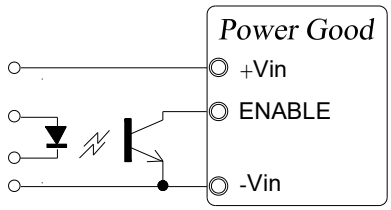


Figure 3. Driving the Enable Control pin

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.

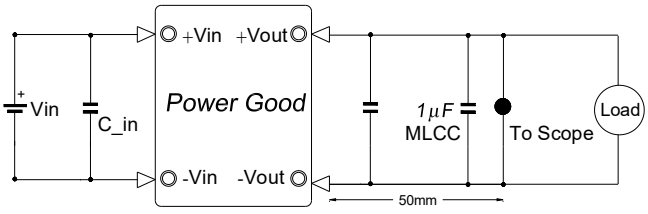
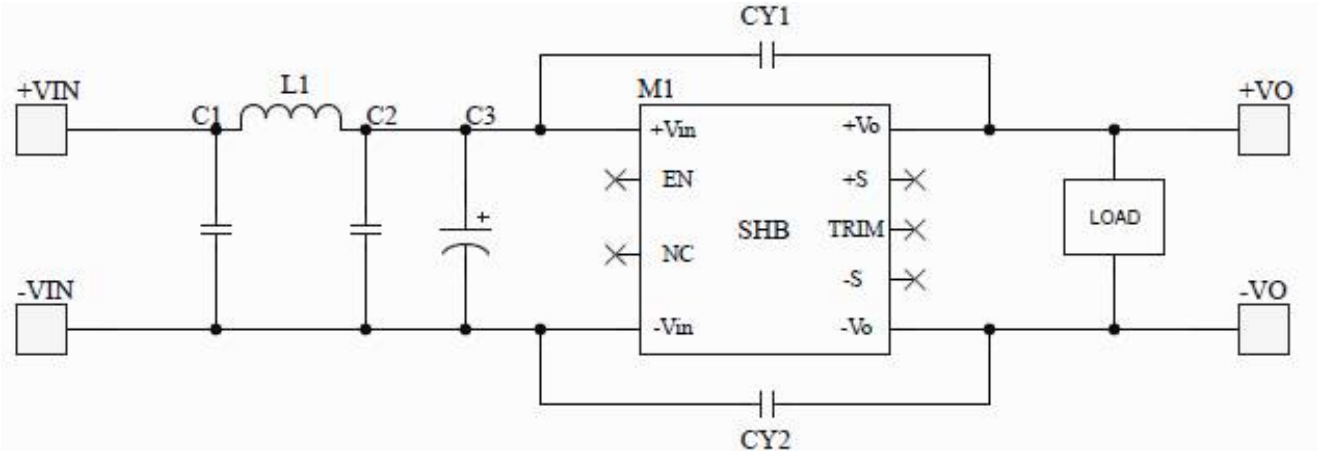


Figure 4. Measuring Output Ripple/Noise(20MHz bandwidth)

Recommended Circuit Diagram for conducted EMI Class A



Bill Of Materials

Model No.	C1	C2	C3	L1	CY1	CY2
SHB018XXX	10μF/50V/MLCC	10μF/50V/MLCC	470μF/50V	2.2μH	NC	3300pF/Y Cap
SHB110XXX	1μF/250V/MLCC	1μF/250V/MLCC	100μF/250V	7μH	1500pF/Y Cap	NC
SHB300XXX	0.22μF/500V/MLCC	0.22μF/500V/MLCC	100μF/450V	220μH	1500pF/Y Cap	NC

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