Murata Power Solutions

HHS04

High-Efficiency 200W Half Brick DC/DC Converter

Discontinued

FEATURES

- 52.5V 200W Half-Brick DC/DC Converter
- High-Efficiency 92% at Full Load
- 2250Vdc Isolation
- Remote-Sense
- Remote on/off
- Trim Capability
- Industry Standard Pin-out
- 0.42" (10.67mm) Height

DESCRIPTION

The HHS04-520 is an industry standard foot-print half-brick DC/DC converter that complies with IEEE802.3af standard for Power over LAN applications, which requires basic isolation of 2250Vdc and stringent start-up characteristics and low-noise operation. It delivers 200W of isolated 52.5V at 92% efficiency over voltage input range of 36V to 75V. Standard features are remote on/off, remote sense, trim capability, over-voltage, over-current and over-temperature protection. The HHS04-520 can operate in parallel for additional power with external circuitry. The HHS04-520 measures 2.40"(L) x 2.28"(W) x 0.43"(H) and has an operating temperature range of –40°C to +100°C.

SELECTION GUIDE

Order Code	Input Voltage	Output Voltage	Output Current	Output Power	Efficiency
	V (nom.)	V	A	W (MAX.)	% (TYP.)
HHS04-520-0B	48	52.5	3.81	200	92.0%

INPUT CHARACTERISTICS

Parameter	Conditions	MIN.	TYP.	MAX.	Units
Input Voltage		36	48	75	V
Under Voltage Lockout	Turn-on	32		36	
	Turn-off	30		34	
	Turn-on	75		79	
	Turn-off	76		80	
Reflected Ripple	12µH Source Inductance			7.5	mA p-p
Inrush Transient				2	A^2s

OUTPUT CHARACTERISTICS

Parameter	Conditions	MIN.	TYP.	MAX.	Units
Voltage set point		51.30	52.50	53.88	Vdc
Risetime	10% to 90%	5		30	mSec
Turn-on delay	Enable <2V to V_{OUT} >10%			100	mSec
Line regulation				±0.1%	V_{OUT}
Load regulation				±0.22%	
Total regulation[1]		50.93		54.08	V_{DC}
Output trim[6]		-2.5		+0.5	
Remote-sense[6]		0.5			
Transient response	50% to 75% of Iomax 1A/µs		±3%		Vo
	50% to 25% of Iomax 1A/µs		±3%		
Over-voltage (latching)		58		65	V_{DC}
Over-current (self recovery)		4.5		6.5	A_{DC}
Output ripple & noise[2]	<500kHz			150	mV p-p
	500kHz to 1MHz			50	
	>1MHz			30	
External capacitance[3]		200		1000	µF

GENERAL CHARACTERISTICS

The enable signal is logic low, referenced to Vi(-). The pin should be tied to Vi(-) if it is not used. (Isink = 1mA MAX., Voff =15V MAX.).

TEMPERATURE CHARACTERISTICS

Parameter	Conditions	MIN.	TYP.	MAX.	Units
Operating[4]	Measured on baseplate	-40		100	°C
Storage		-55		125	

PROTECTION CHARACTERISTICS

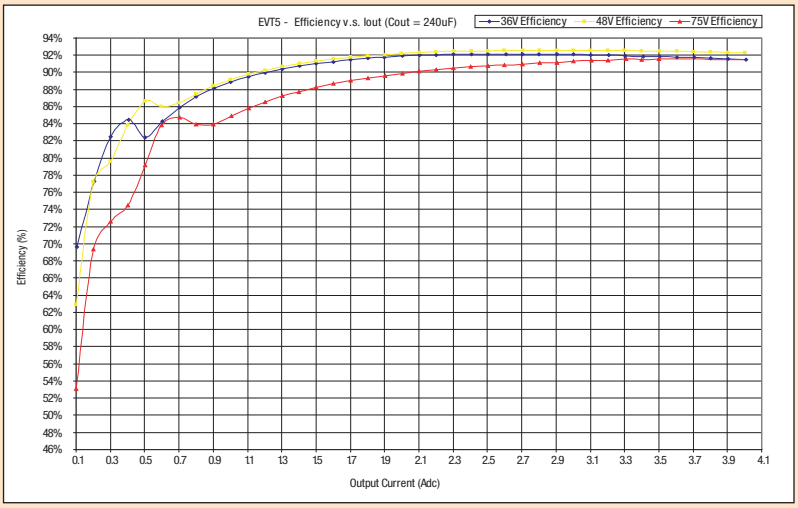
Parameter	Conditions	MIN.	TYP.	MAX.	Units
Over-temperature[5] (Self-recovery)	Temperature at sensor	109	115	121	°C

1. Includes line & load regulation/thermal & aging effects on regulation.
2. 10µF low ESR electrolytic + 1µF ceramic de-coupling capacitor at measurement point.
3. At least minimum external capacitance required.
4. Baseplate operating temperature measured at indicated Temperature Measurement Location with 200LFM airflow over entire converter.
5. Over-Temperature Protection sensor trip range. Sensor is located on inner surface of FR4 PC Board to protect components on entire converter.
6. Remote Sense and Output Trim are not additive.

ISOLATION CHARACTERISTICS

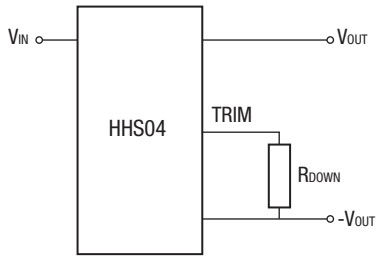
Parameter	Conditions	MIN.	TYP.	MAX.	Units
Input-Output				2250	Vdc
Input-case/Output-case				1125	
Isolation capacitance		1500		4500	pF
Isolation resistance		10			MΩ
Insulation class, Certified to C-CSA-US, 60950	Basic				

EFFICIENCY CURVES

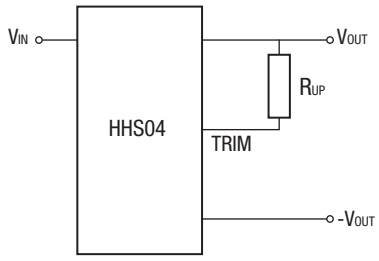


OUTPUT VOLTAGE ADJUSTMENT

TRIM DOWN



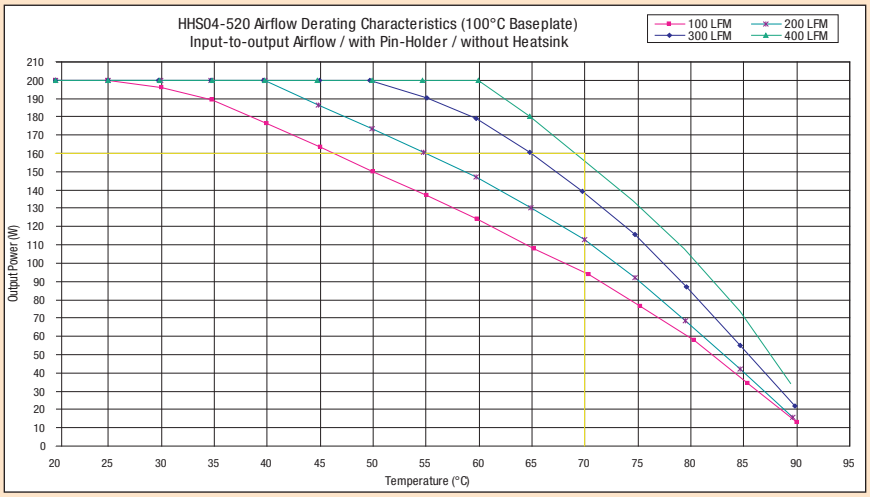
TRIM UP

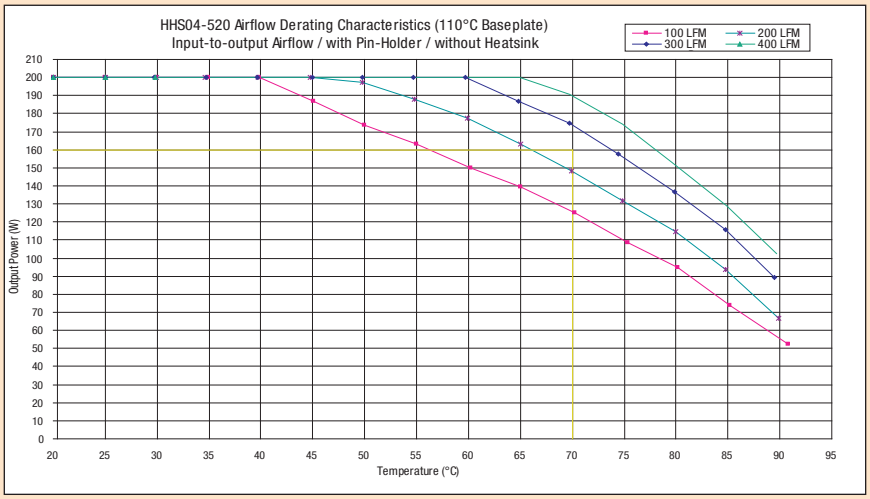


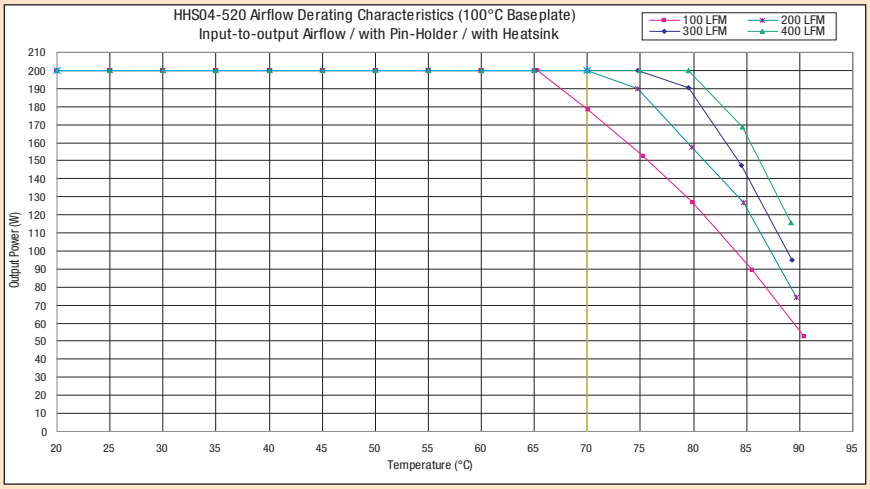
When the output voltage is trimmed up, output current must be derated so that the maximum output power (shown in the selection table) is not exceeded.

$$\text{Rtrim\_down:} = \frac{100}{\Delta\%} - 2 \ (\text{k}\Omega) \qquad \text{Rtrim\_up:} = \frac{Vo\cdot(100+\Delta\%)}{1.225\cdot\Delta\%} - \frac{100+2\cdot\Delta\%}{\Delta\%} \ (\text{k}\Omega)$$

THERMAL DERATING GRAPHS

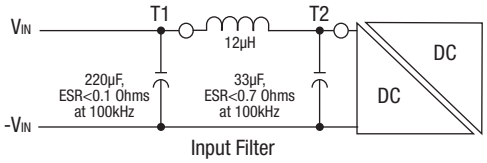






Heatsink used is 2.28" L x 2.4" W x 0.7" H, non-anodized, mounted to baseplate, where noted above.

INPUT REFLECTED RIPPLE



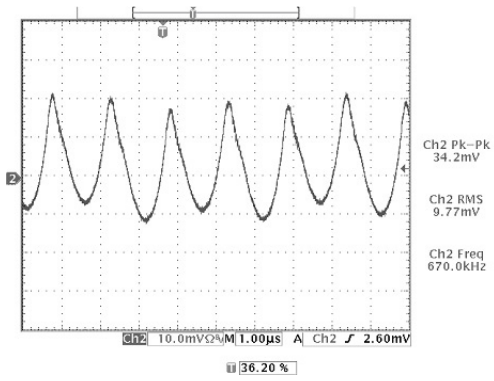
T1: measured between the 48V power supply and the filter.

T2: measured between the filter and the unit under test.

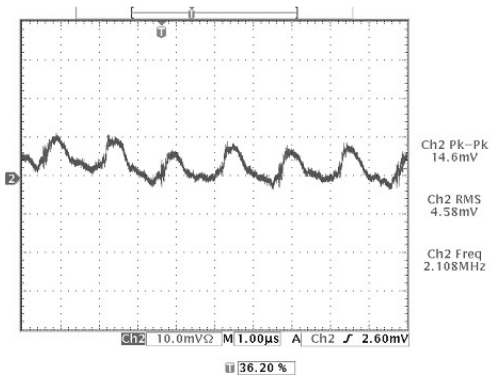
COUT=200µF

	IOUT=0.38A		IOUT=3.8A	
	T1	T2	T1	T2
	(mA pk-pk)	(mA pk-pk)	(mA pk-pk)	(mA pk-pk)
	(mA rms)	(mA rms)	(mA rms)	(mA rms)
36V input	1.62	65.2	2.13	87.6
	0.348	22.8	0.67	24
48V input	0.922	53.2	1.46	68.4
	0.413	15.48	0.458	19.9
75V input	0.84	30.6	1.01	34
	0.404	8.81	0.51	10.6

T2: VIN=48V IOUT:3.8A 20mA/div

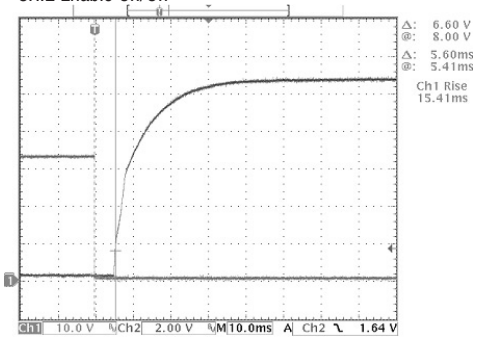


T1: VIN=48V IOUT:3.8A 1mA/div

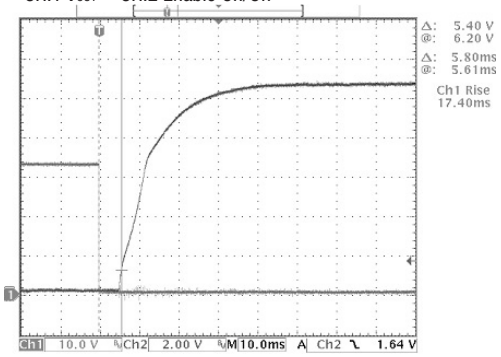


START-UP

VIN=48V IOUT=1.0A COUT=240µF
CH.1 VOUT CH.2 Enable On/Off

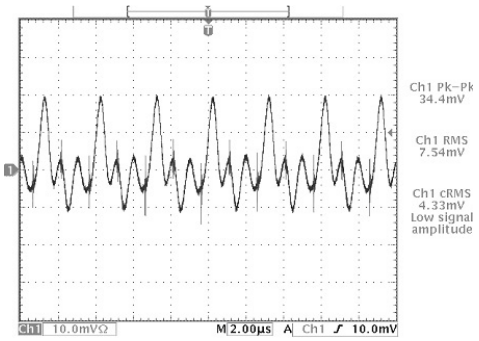


VIN=48V IOUT=1.0A COUT=1020µF
CH.1 VOUT CH.2 Enable On/Off

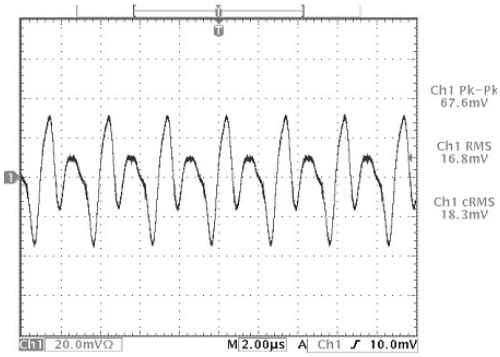


OUTPUT RIPPLE

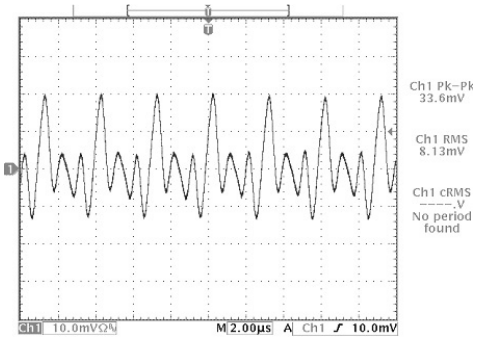
V_{IN}=36V I_{OUT}=3.81A C_{OUT}=240µF



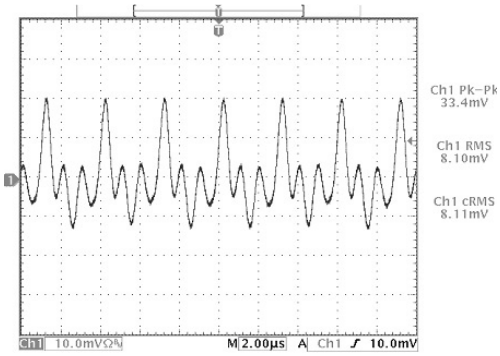
V_{IN}=75V I_{OUT}=3.81A C_{OUT}=240µF



V_{IN}=48V I_{OUT}=0.81A C_{OUT}=240µF

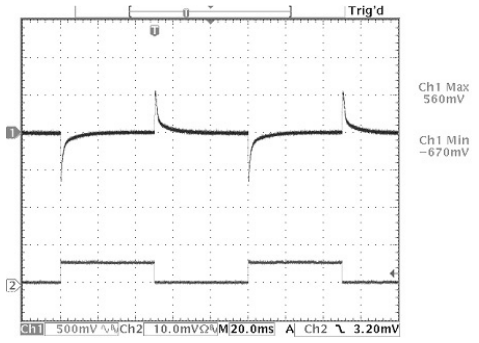


V_{IN}=48V I_{OUT}=3.81A C_{OUT}=240µF

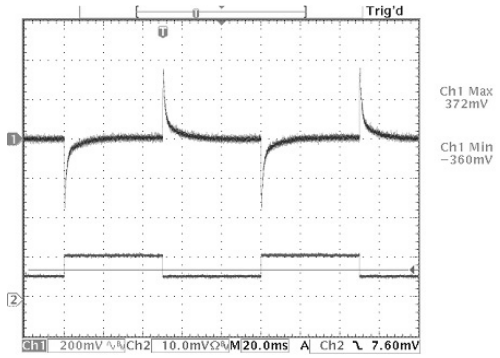


OUTPUT TRANSIENT RESPONSE

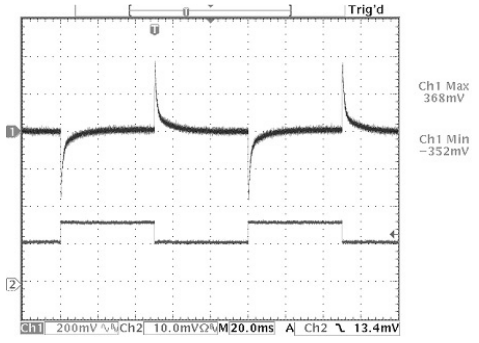
V_{IN}=48V I_{OUT}=0A-1A C_{OUT}=240µF
CH.1 V_{OUT} CH.2 I_{OUT} (1A/10mV)



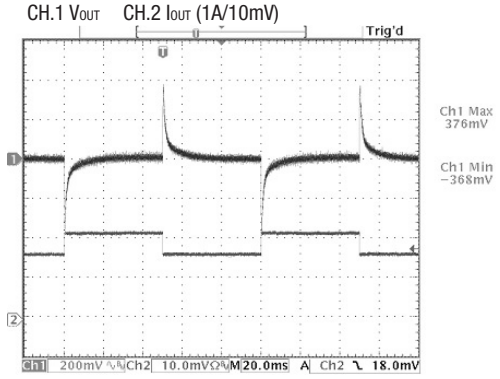
V_{IN}=48V I_{OUT}=1A-2A C_{OUT}=240µF
CH.1 V_{OUT} CH.2 I_{OUT} (1A/10mV)



V_{IN}=48V I_{OUT}=2A-3A C_{OUT}=240µF
CH.1 V_{OUT} CH.2 I_{OUT} (1A/10mV)



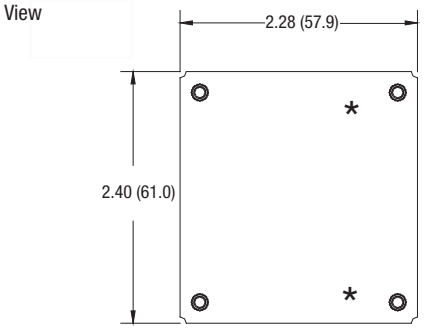
V_{IN}=48V I_{OUT}=3A-4A C_{OUT}=240µF
CH.1 V_{OUT} CH.2 I_{OUT} (1A/10mV)



PACKAGE SPECIFICATIONS

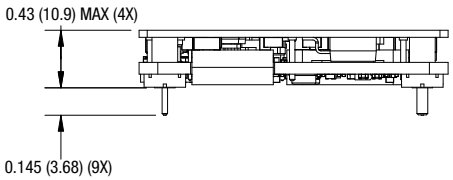
MECHANICAL DIMENSIONS

Top View



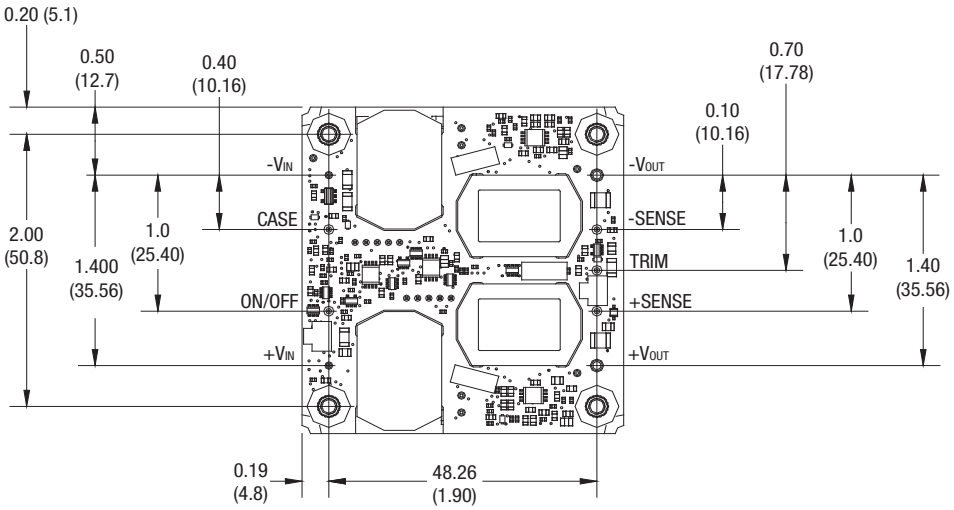
* Temperature measurement location

Side View



Dimensions: 2.28 (57.9) L x 2.4 (61.0) W x 0.42 (10.6) H
All dimensions in inches (mm).

Bottom View



PIN CONNECTIONS

Pin	Diameter	Function
1	0.040 (1.016)	-V_{IN}
2	0.040 (1.016)	CASE
3*	0.040 (1.016)	ON/OFF
4	0.040 (1.016)	+V_{IN}
5	0.080 (2.032)	+V_{OUT}
6	0.040 (1.016)	+SENSE
7	0.040 (1.016)	TRIM
8	0.040 (1.016)	-SENSE
9	0.080 (2.032)	-V_{OUT}

* See General Characteristics