EV3213DH-00B

700KHz/1.3MHz Boost Converter with a 3.5A Switch Evaluation Board

The Future of Analog IC Technology

DESCRIPTION

The EV3213DH-00B is a Low Noise Block (LNB) power supply evaluation board for the MP3213. It is configured to provide a digitally switchable 13.2V or 19.5V output at up to 0.5A from a 12V input. The output is set to 13.2V when EN2 is low and 19.2V when EN2 is high. The circuit also provides output disconnect when EN1 is low and overload and short circuit protection.

The high switching frequency (700KHz or 1.3MHz) of the MP3213 allows for smaller external components, producing a compact solution for a wide range of load currents. Two user-selectable frequency options offer flexibility for easy filtering and low noise. The PCB heatsink with the exposed pad improves thermal performance and efficiency at medium to heavy loads.

FEATURES

- Pin Selectable 700KHz or 1.3MHz Fixed Switching Frequency
- 19.5V at 500mA from 12V Input
- Output Disconnect when EN1 is Low
- Overload and Short Circuit Protection
- Fully Assembled and Tested

APPLICATIONS

- Low Noise Blocks (LNBs) in Satellite Receivers

ELECTRICAL SPECIFICATIONS

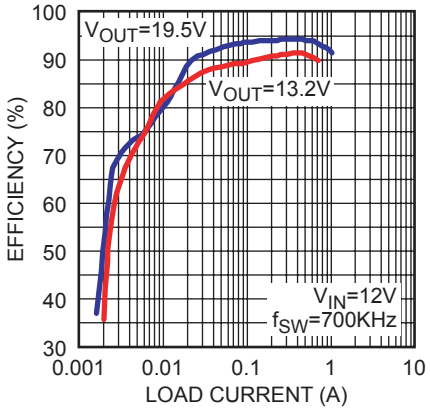
Parameter	Symbol	Value	Units
Input Voltage	V_{IN}	12	V
Frequency Select	f_{SEL}	700	KHz
Output Current	I_{OUT}	0.5	A
Output Voltage	V_{OUT}	13.2 or 19.5	V

EV3213DH-00B EVALUATION BOARD

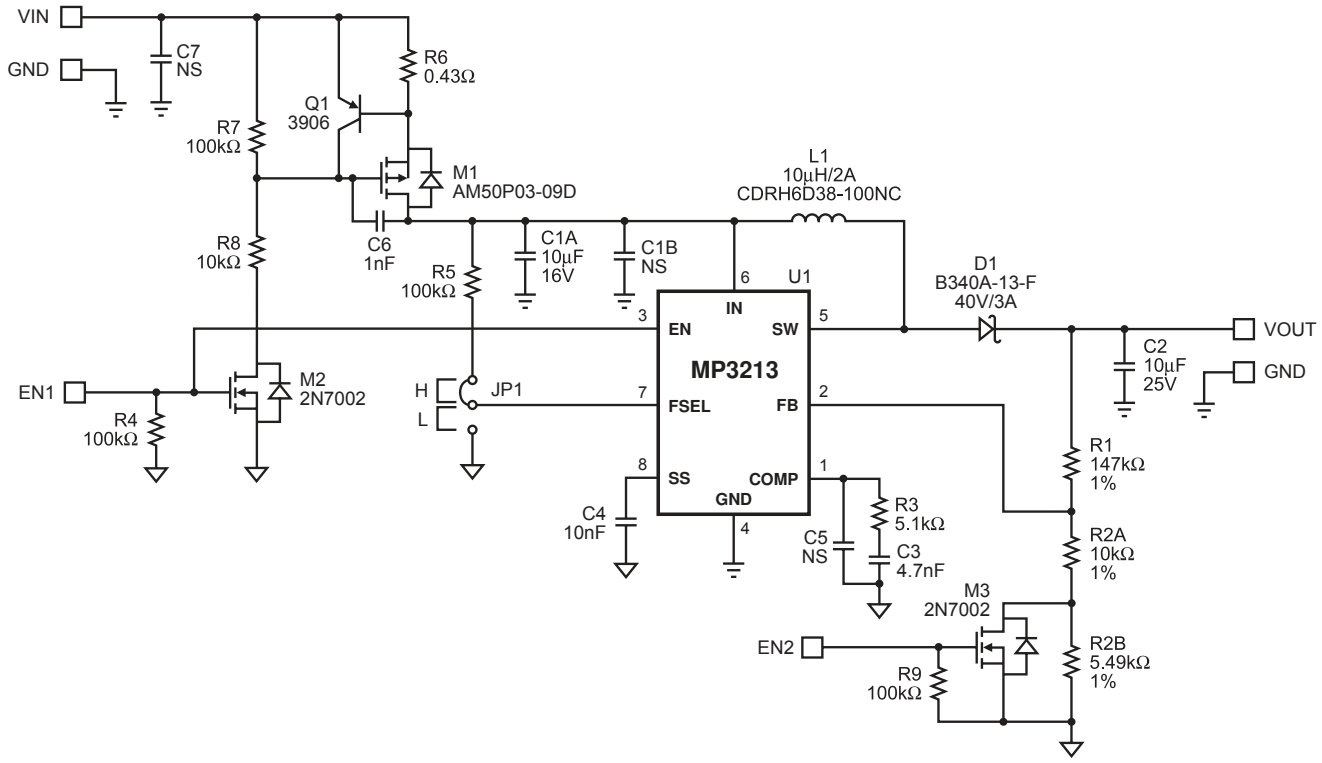
(L x W x H) 2.5" x 2.4" x 0.5"
(6.3cm x 6.1cm x 1.1cm)

Board Number	MPS IC Number
EV3213DH-00B	MP3213DH

Efficiency vs Load Current



EVALUATION BOARD SCHEMATIC



EV3213DH-00B BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer P/N
1	C1A	10µF	Ceramic Capacitor, X7R, 16V	1210	TDK: C3225X7R1C106M
3	C1B, C5, C7		Not Stuffed		
1	C2	10µF	Ceramic Capacitor, X7R, 25V	1210	TDK: C3225X7R1E106M
1	C3	4.7nF	Ceramic Capacitor, X7R, 50V	0603	TDK: C1608X7R1H472K
1	C4	10nF	Ceramic Capacitor, X7R, 50V	0603	TDK: C1608X7R1H103K
1	C6	1nF	Ceramic Capacitor, X7R, 50V	0603	TDK: C1608X7R1H102K
1	D1		Diode Schottky, 40V, 3A	SMA	Diodes Inc: B340A-13-F
1	JP1		Connector, 3-Pin, 0.100"		Any: Any
1	L1	10µH	Inductor, 2A	SMD	Sumida: CDRH6D38-100NC
1	M1		MOSFET, P-CH	D-Pak	Analog Power: AM50P03-09D

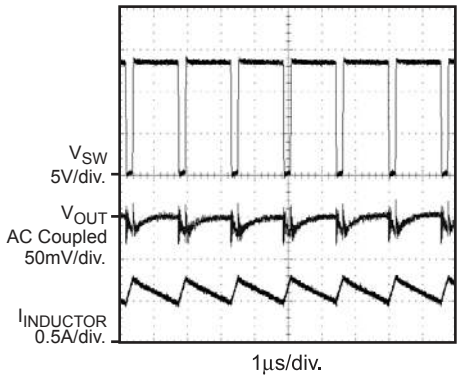
EV3213DH-00B BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer P/N
2	M2, M3		MOSFET, N-CH	SOT-23	Diodes Inc: 2N7002-7-F
1	Q1		Transistor, PNP, 40V, 200mA	SOT-23	Fairchild: MMBT3906
1	R1	147kΩ	Resistor, 1%	0603	Panasonic: ERJ-3EKF1473V
1	R2A	10kΩ	Resistor, 1%	0603	Panasonic: ERJ-3EKF1002V
1	R2B	5.49kΩ	Resistor, 1%	0603	Panasonic: ERJ-3EKF5491V
1	R3	5.1kΩ	Resistor, 5%	0603	Panasonic: ERJ-3GEYJ512V
4	R4, R5, R7, R9	100kΩ	Resistor, 5%	0603	Panasonic: ERJ-3GEYJ104V
1	R6	0.43Ω	Resistor, 1%	2512	Panasonic: ERJ-1TRQFR43U
1	R8	10kΩ	Resistor, 5%	0603	Panasonic: ERJ-3GEYJ103V
1	U1		DC-DC Converter	MSOP-8	MPS: MP3213DH

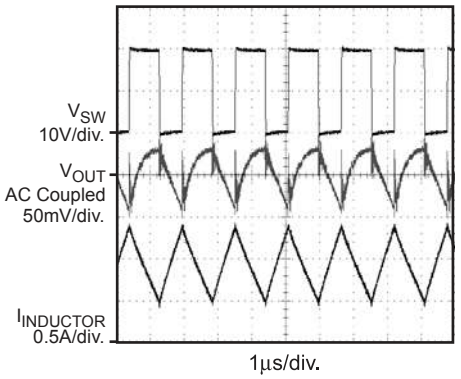
TYPICAL PERFORMANCE CURVES

V_{IN} = 12V, f_{SW} = 700KHz, T_A = +25°C, unless otherwise noted.

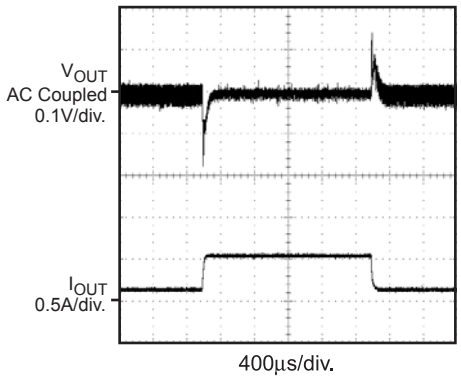
Steady State Operation
V_{OUT} = 13.2V, I_{OUT} = 0.5A



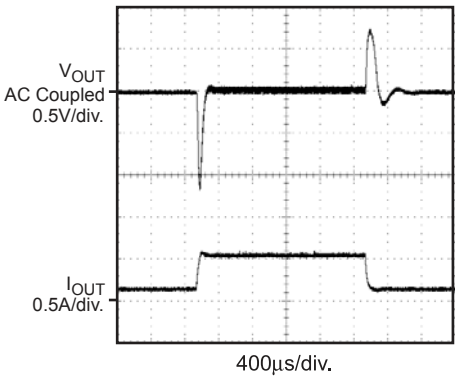
Steady State Operation
V_{OUT} = 19.5V, I_{OUT} = 0.5A



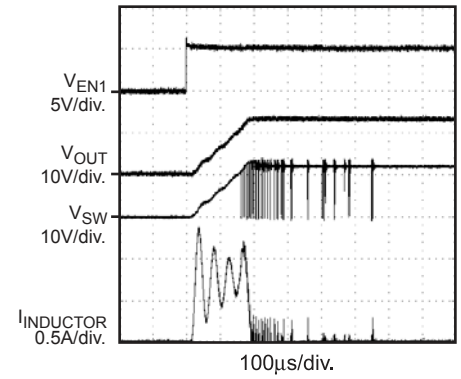
Load Transient Response
V_{OUT} = 13.2V, I_{OUT} = 0.1A - 0.5A



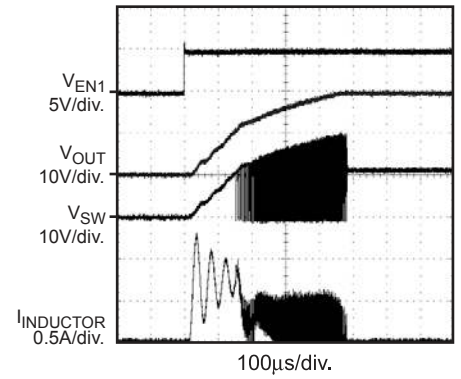
Load Transient Response
V_{OUT} = 19.5V, I_{OUT} = 0.1A - 0.5A



Startup into No Load
V_{OUT} = 13.2V, I_{OUT} = 0A



Startup into No Load
V_{OUT} = 19.5V, I_{OUT} = 0A

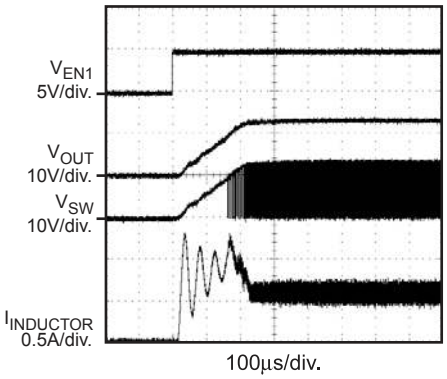


TYPICAL PERFORMANCE CURVES *(continued)*

V_{IN} = 12V, f_{SW} = 700KHz, T_A = +25°C, unless otherwise noted.

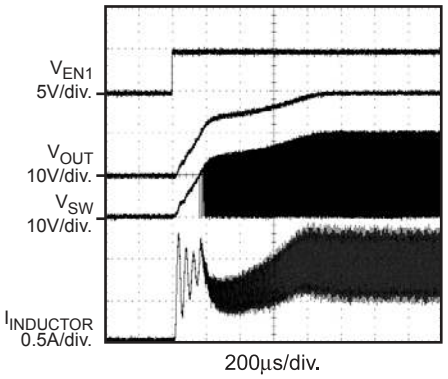
Startup into Load

V_{OUT} = 13.2V, R_{OUT} = 26Ω



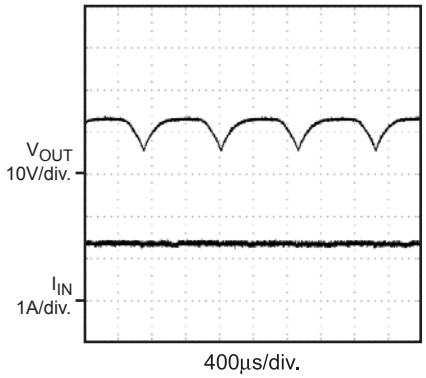
Startup into Load

V_{OUT} = 19.5V, R_{OUT} = 39Ω



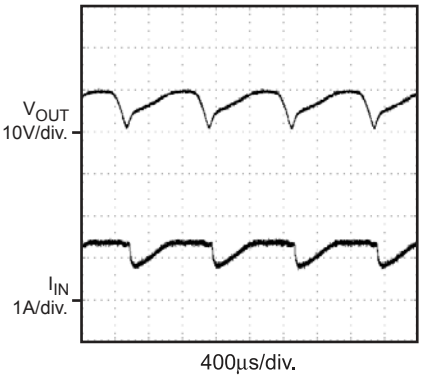
Overload and Short Circuit Protection

Protection Circuit Activates, EN2 = L



Overload and Short Circuit Protection

Protection Circuit Activates, EN2 = H



PRINTED CIRCUIT BOARD LAYOUT

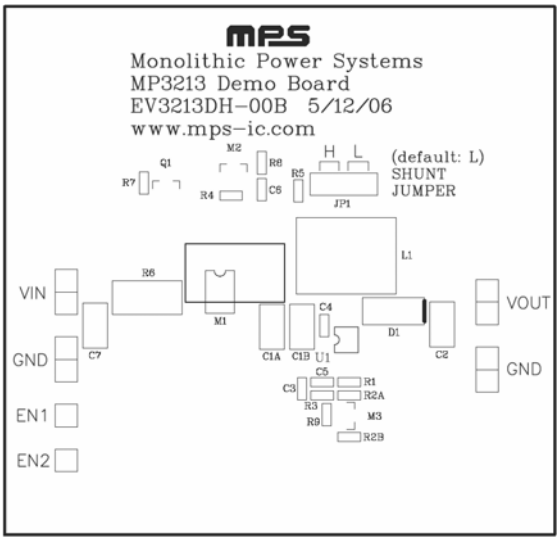


Figure 1—Top Silk Layer

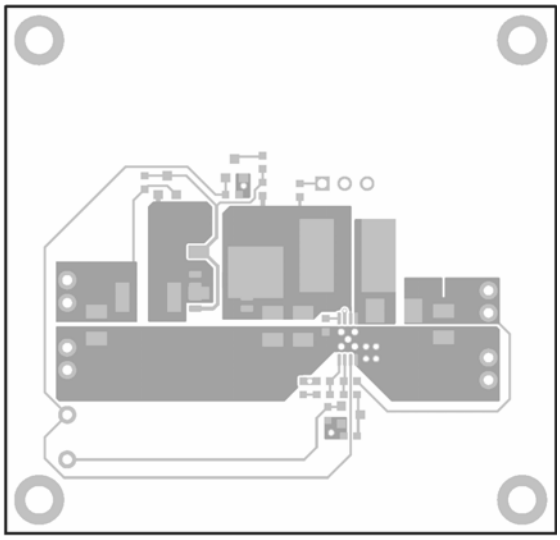


Figure 2—Top Layer

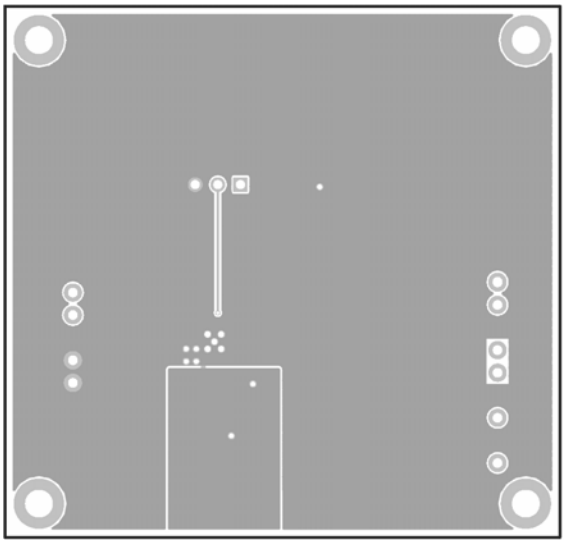


Figure 3—Bottom Silk Layer

QUICK START GUIDE

The output voltage of this board is set to either 13.2V (EN2 = low) or 19.5V (EN2 = high). The board layout accommodates most commonly used inductors and output capacitors.

1. Preset Power Supply to 12V.
2. Turn Power Supply off.
3. Place jumper J1 at the H position for 1.3MHz operation, or at the L position for 700KHz operation (the inductor may need to be adjusted accordingly). 700KHz is recommended due to small duty cycle operation at 13.2V output.
4. Connect the power supply terminals to:

   Positive (+): VIN

   Negative (–): GND
5. Connect the load to:

   Positive (+): VOUT

   Negative (–): GND
6. Turn on the power supply after making connections.
7. The MP3213 is enabled on the evaluation board once EN1 is pulled high with another power supply set between 1.5V and 6V. To disable the MP3213, disconnect EN1.
8. The output voltage V_{OUT} is set by the resistors R1, R2A and R2B:

$$V_{OUT} = \left(\frac{R1}{R2A + R2B} + 1\right) \times V_{FB} \text{ if EN2 is low}$$

$$V_{OUT} = \left(\frac{R1}{R2A} + 1\right) \times V_{FB} \text{ if EN2 is high}$$