



EV8128-Q-00A

1A, DiSEqC 1.x and 2.x Compatible, LNB Voltage Regulator with I²C Interface Evaluation Board

DESCRIPTION

The EV8128-Q-00A is an evaluation board designed to demonstrate the capabilities of the MP8128, a highly integrated, DiSEqC 1.x and DiSEqC 2.x compatible, low-noise block (LNB) voltage regulator. It provides efficient, low-noise power and interface signals to a satellite receiver's LNB antenna ports.

The device integrates a boost regulator and a tracking linear voltage regulator. The boost regulator provides a power source 1.1V above the LNB output voltage. The tracking linear voltage regulator provides clean power and protects the output from overloads and shorts. The MP8128 features voltage selection, over-current protection (OCP), an I²C interface, and a selectable 22kHz tone signal.

The MP8128 offers a simple solution with a low component count, and is available in a QFN-20 (3mmx3mm) package.

ELECTRICAL SPECIFICATIONS

Parameter	Symbol	Value	Units
Input voltage	V _{IN}	8 to 14	V
LNB output voltage ⁽¹⁾	LNB_OUT	10.33 to 20	V
LNB output current	I _{OUT}	0 to 1	A

Note:

1) Use the I²C interface to set the LNB output voltage.

FEATURES

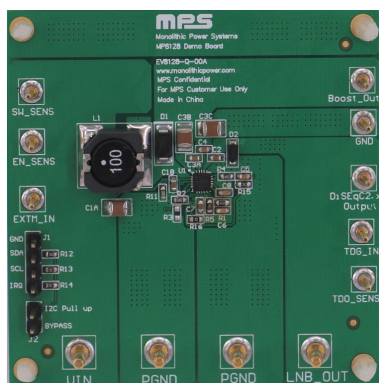
- 8V to 14V Input Voltage (V_{IN}) Range
- Up to 1A Configurable Current
- DiSEqC 1.x and DiSEqC 2.x Compatible
- Integrated I²C Bus
- Low-Noise LDO Output
- 440kHz Switching Frequency (f_{sw})
- Selectable 22kHz Internal or External Signal Source
- Selectable LNB Output Voltage
- Over-Current Protection (OCP), Short-Circuit Protection (SCP), and Over-Voltage Protection (OVP)
- Thermal Shutdown
- Available in a QFN-20 (3mmx3mm) Package

APPLICATIONS

- LNB Power Supplies and Controls for Satellite Set-Top Boxes
- TV Satellite Receivers
- Personal Computer (PC) Satellite Card Receivers

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EV8128-Q-00A EVALUATION BOARD

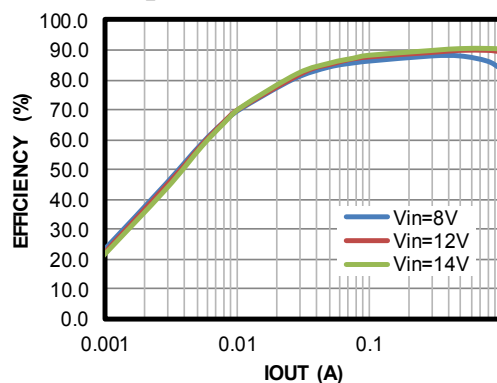


LxW (63.5mmx63.5mm)

Board Number	MPS IC Number
EV8128-Q-00A	MP8128GQ

Efficiency vs. Output Current

V_{LNB_OUT} = 18V



QUICK START GUIDE

1. Connect the load ($\leq 1A$) terminals to:
 - a. Positive (+): LNB_OUT
 - b. Negative (-): GND
2. Preset the power supply between 8V and 14V.
3. Turn off the power supply.
4. Connect the power supply terminals to:
 - a. Positive (+): VIN
 - b. Negative (-): GND
5. Install the MP8128 GUI software.⁽²⁾
6. Connect the computer to the board via the USB cable.⁽³⁾
7. Turn on the power supply.
8. Open the GUI, then click the “Part Numbers” drop-down menu. Select “MP8128” in the drop-down menu.
9. Set the MP8128 registers via the I²C. ⁽⁴⁾ To set the registers, follow steps 10 through 12:
10. Read UVLO status register 02h, bit[3].
11. To set the LNB voltage (V_{LNB_OUT}), write VSEL register 00h, bits[4:3]. For example, to set V_{LNB_OUT} to 18V, write 11 to bits[4:3].
12. To set the LNB line drop voltage compensation, write the VLINE register 00h, bits[2:0]. To set the voltage compensation to 0V, write 000 to bits[2:0]. Once VLINE is changed from 111 to any other value, the board should start up automatically.

Notes:

- 2) The MPS GUI software can be downloaded from the MPS website.
- 3) The EVKT-MP8128 includes a USB to I²C communication interface for GUI control.
- 4) The MP8128 address is set to 0x08h by default.

EVALUATION BOARD SCHEMATIC

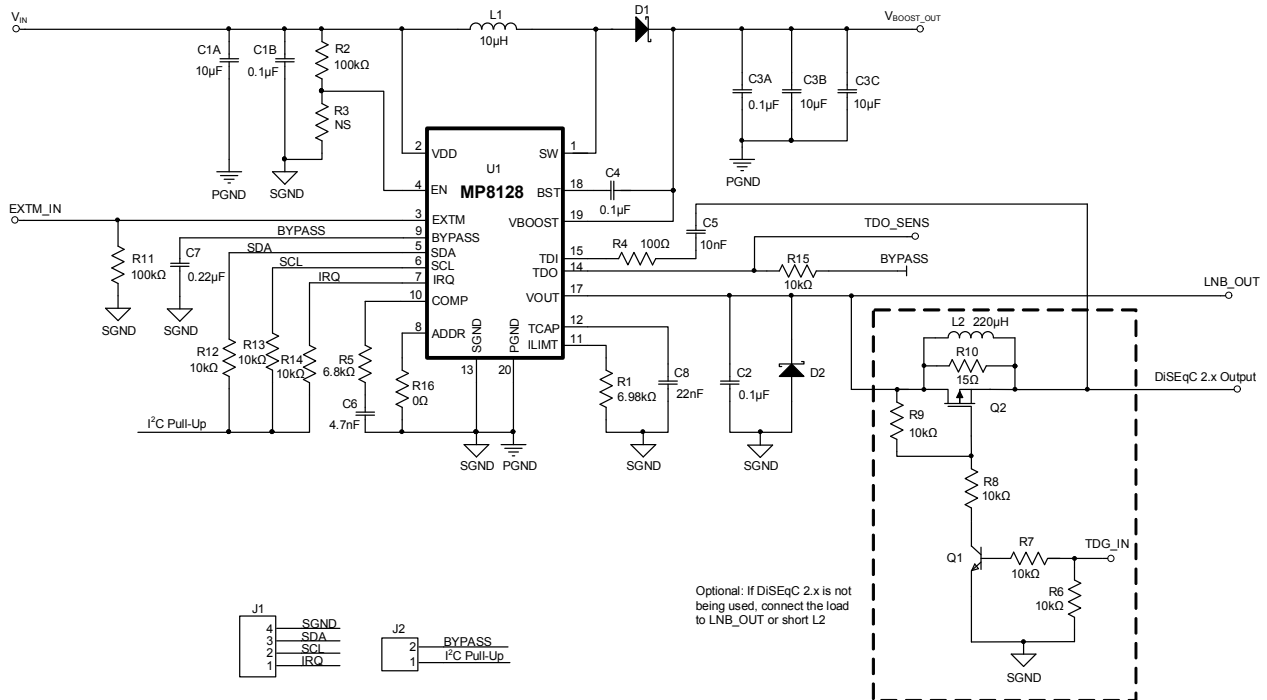


Figure 1: Evaluation Board Schematic ⁽⁵⁾

Note:

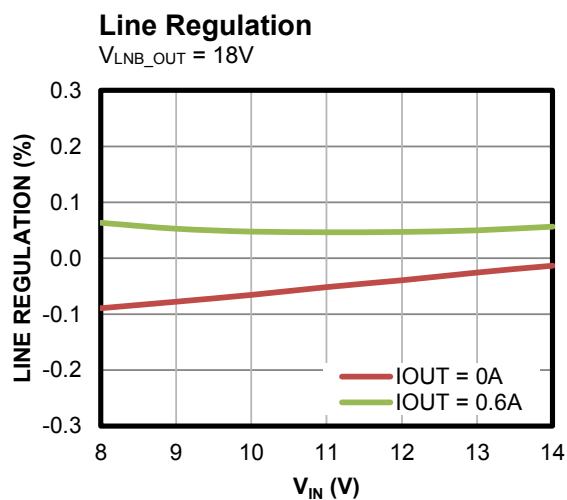
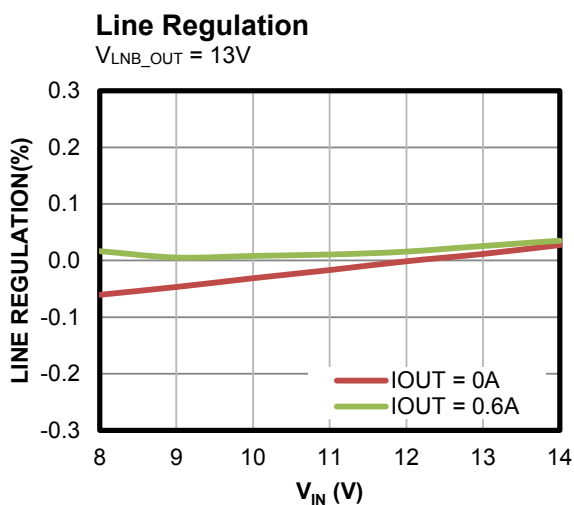
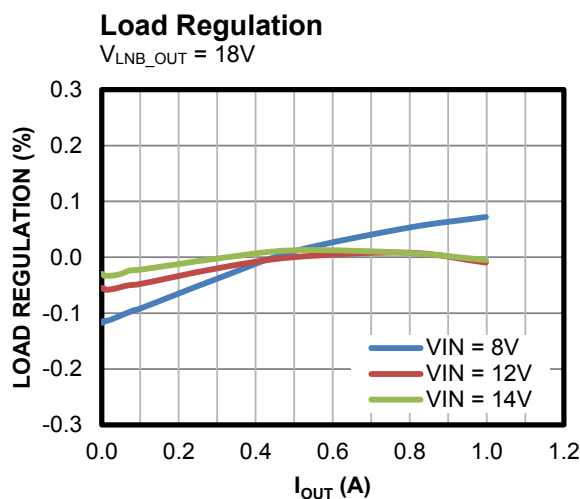
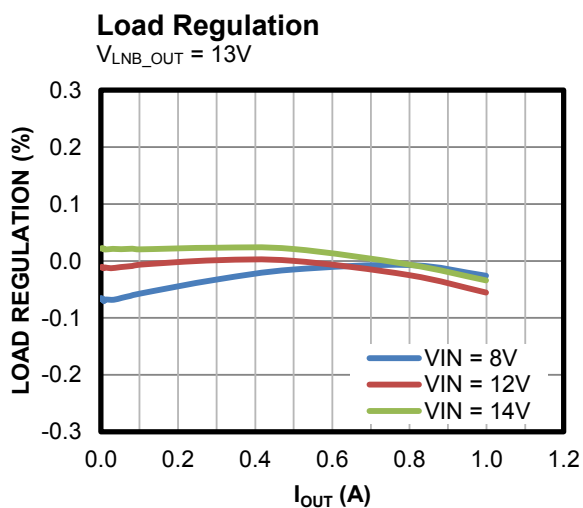
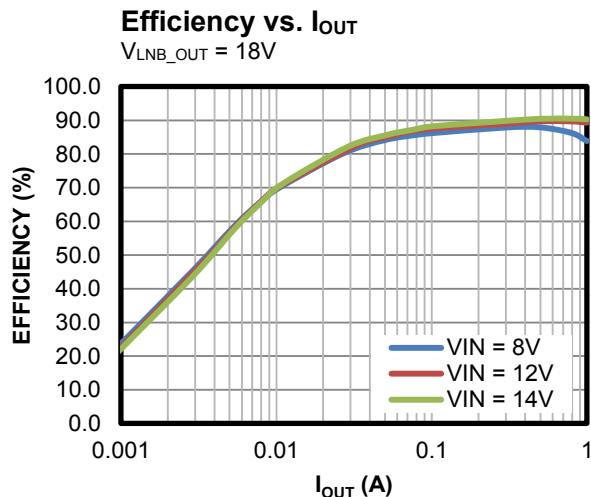
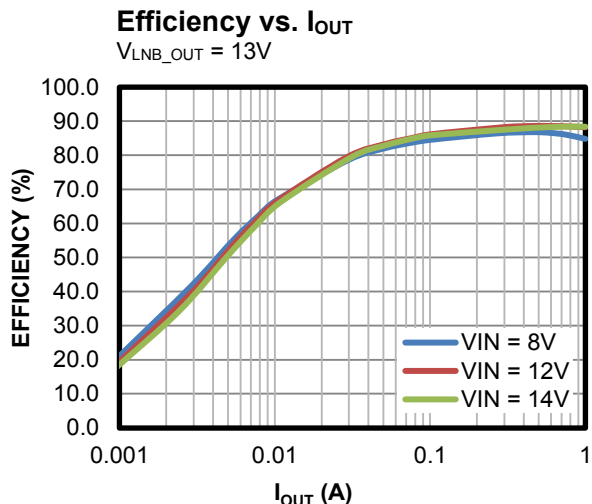
- 5) The MP8128 address is set to 0x08h by default.

EV8128-Q-00A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer PN
3	C1A, C3B, C3C	10 μ F	Ceramic capacitor, 25V, X7R	1210	Murata	GRM32DR71E106KA12L
4	C1B, C2, C3A, C4	0.1 μ F	Ceramic capacitor, 50V, X7R	0603	Murata	GRM188R71H104KA93D
1	C5	10nF	Ceramic capacitor, 16V, X7R	0603	Murata	GRM188R71H103KA01D
1	C6	4.7nF	Ceramic capacitor, 50V, X7R	0603	Murata	GRM188R71H472KA01D
1	C7	0.22 μ F	Ceramic capacitor, 25V, X7R	0603	Murata	GRM188R71E224KA88D
1	C8	22nF	Ceramic capacitor, 25V, X7R	0603	Murata	GRM188R71E223KA01D
1	R1	6.98k Ω	Film resolution, 1%	0603	Yageo	RC0603FR-076K98L
2	R2, R11	100k Ω	Film resolution, 1%	0603	Royal Ohm	RL0603FR-07100KL
0	R3	NS				
1	R4	100 Ω	Film resolution, 1%	0603	Royal Ohm	RL0603FR-07100RL
1	R5	6.8k Ω	Film resolution, 1%	0603	Royal Ohm	RL0603FR-076K8L
8	R6, R7, R8, R9, R12, R13, R14, R15	10k Ω	Film resolution, 1%	0603	Royal Ohm	RL0603FR-0710KL
1	R10	15 Ω	Film resolution, 1%	0805	Yageo	RC0805FR-0715RL
1	R16	0 Ω	Film resolution, 1%	0603	Yageo	RC0603FR-070RL
1	L1	10 μ H	Inductor, DCR = 16.3m Ω , I _{RATED} = 7.2A, I _{SAT} = 8.5A	SMD	Würth	7443251000
1	L2	220 μ H	Inductor, DCR = 434m Ω , I _{SAT} = 1.47A	SMD	TDK	VLF10045T-221MR90
1	D1	40V	Schottky diode, 3A	SMA	Diodes, Inc.	B340
1	D2	40V	Schottky diode, 1A	SOD-123	Diodes, Inc.	1N5819HW
1	Q1	25V	NPN, BJT transistor, 625mW, 1.5A	SOT-23	Any	
1	Q2	340m Ω	P-channel MOSFET, 60V, 1.25A	SOT-23	Vishay	SI2309DS-T1-E3
1	U1	MP8128	LNB power regulator with I ² C interface, 1A	QFN-20 (3mmx3mm)	MPS	MP8128GQ

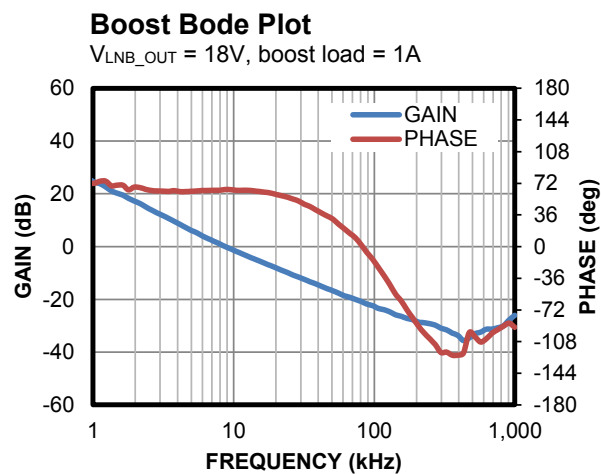
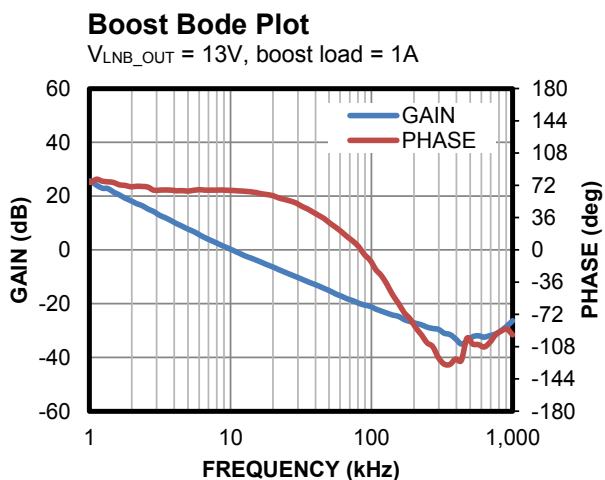
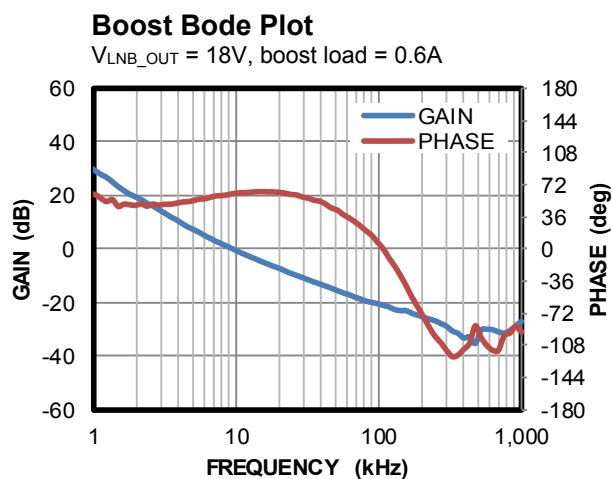
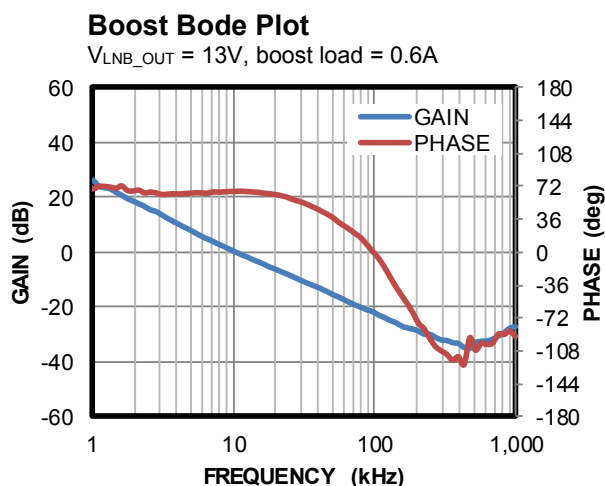
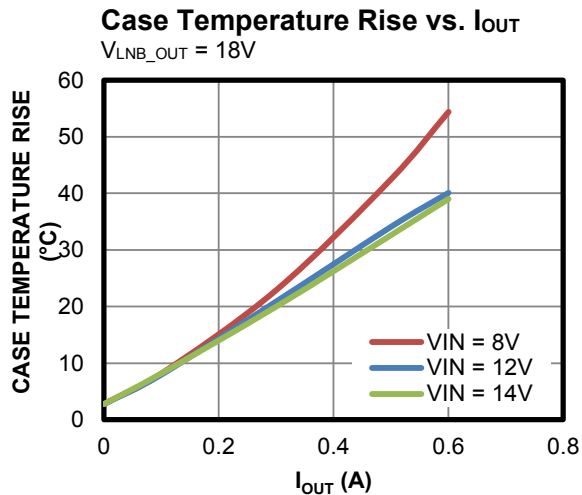
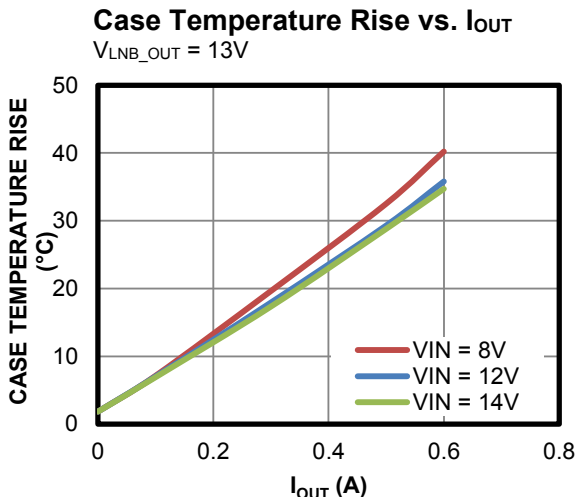
EVB TEST RESULTS

Performance waveforms are tested on the evaluation board. $V_{IN} = 12V$, $V_{LNB_OUT} = 18V$, $L = 10\mu H$, $T_A = 25^\circ C$, unless otherwise noted.



EVB TEST RESULTS (continued)

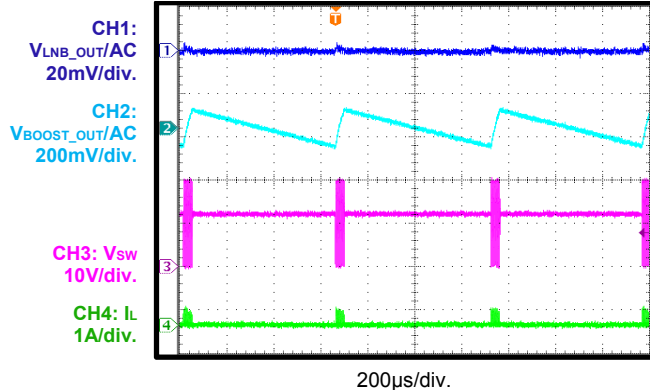
Performance waveforms are tested on the evaluation board. $V_{IN} = 12V$, $V_{LNB_OUT} = 18V$, $L = 10\mu H$, $T_A = 25^\circ C$, unless otherwise noted.



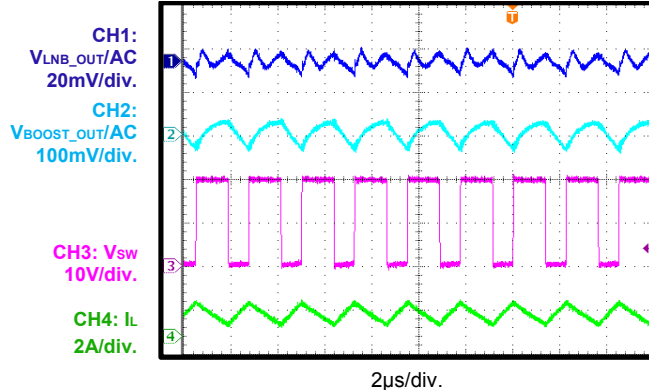
EV8 TEST RESULTS (continued)

Performance waveforms are tested on the evaluation board. $V_{IN} = 12V$, $V_{LNB_OUT} = 18V$, $L = 10\mu H$, $T_A = 25^\circ C$, unless otherwise noted.

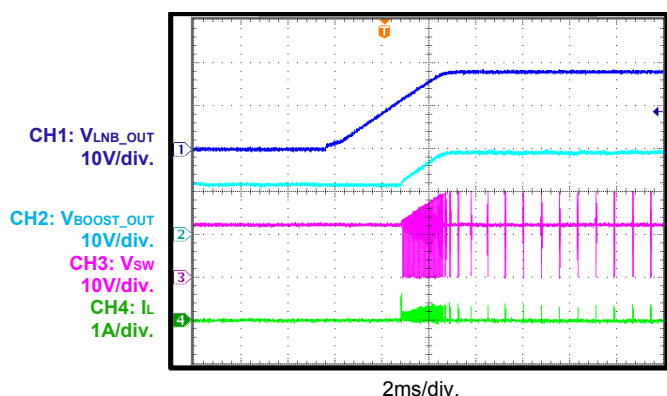
Steady State

 $I_{OUT} = 0A$


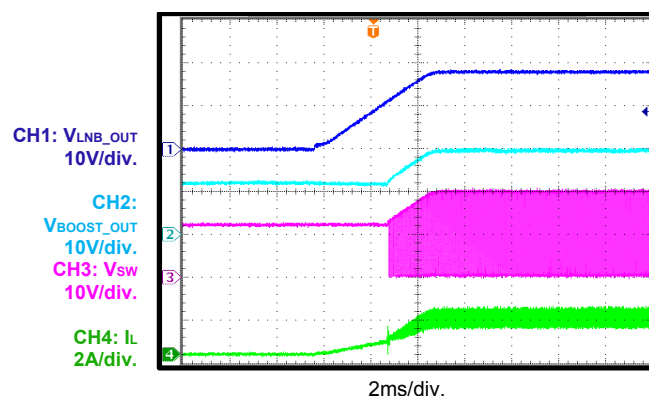
Steady State

 $I_{OUT} = 0.6A$


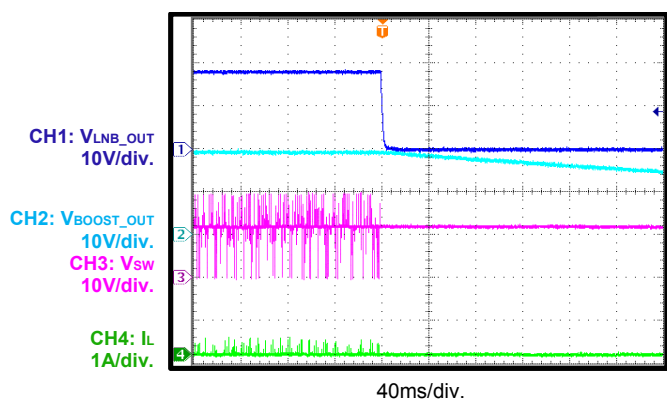
Start-Up through the I²C

 $I_{OUT} = 0A$, VLINE bits set to 000


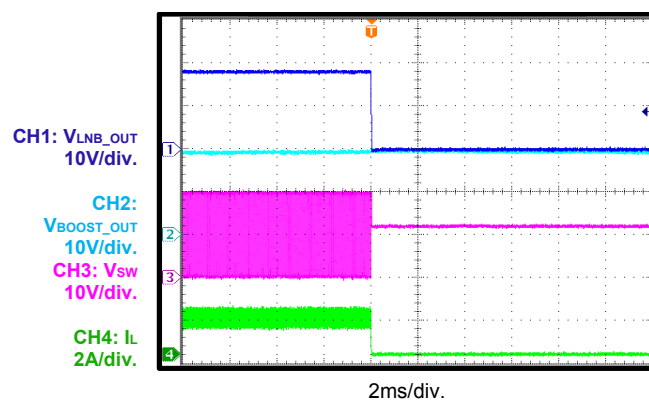
Start-Up through the I²C

 $I_{OUT} = 1A$, VLINE bits set to 000


Shutdown through the I²C

 $I_{OUT} = 0A$, VLINE bits set to 111


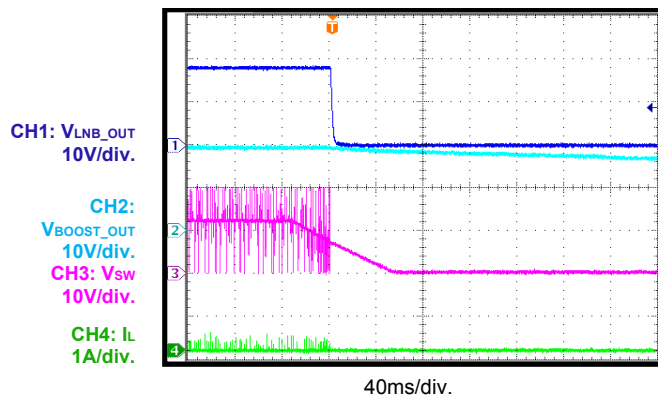
Shutdown through the I²C

 $I_{OUT} = 1A$, VLINE bits set to 111


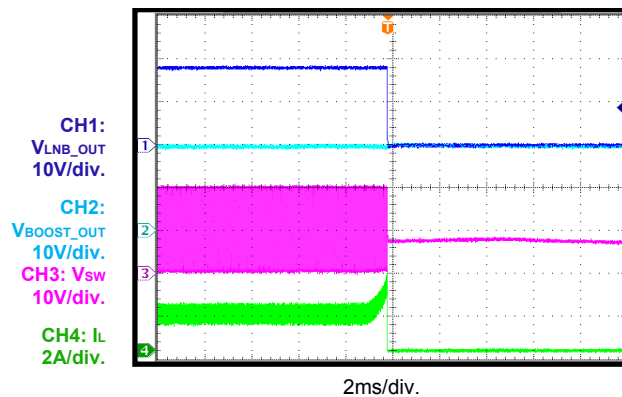
EVB TEST RESULTS (continued)

Performance waveforms are tested on the evaluation board. $V_{IN} = 12V$, $V_{LNB_OUT} = 18V$, $L = 10\mu H$, $T_A = 25^\circ C$, unless otherwise noted.

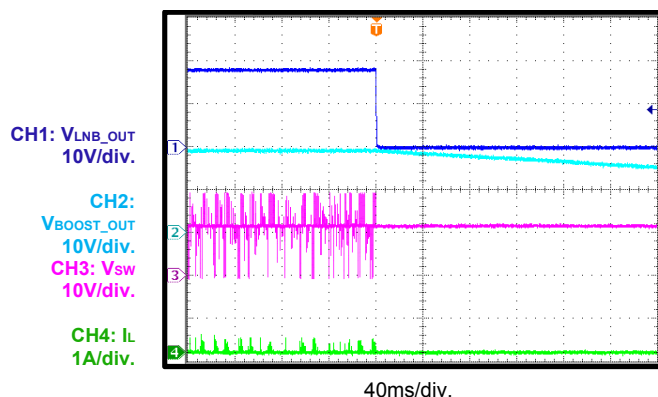
Shutdown through VIN

 $I_{OUT} = 0A$


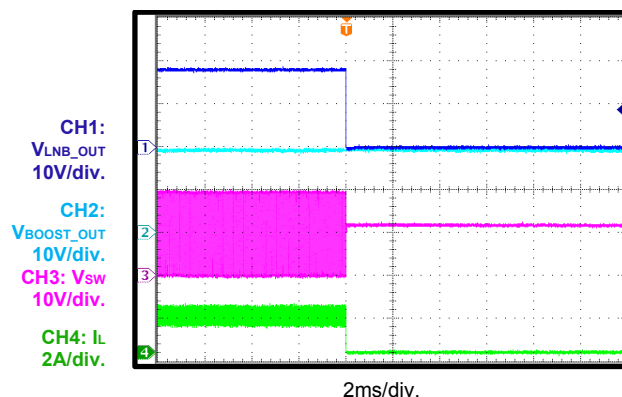
Shutdown through VIN

 $I_{OUT} = 1A$


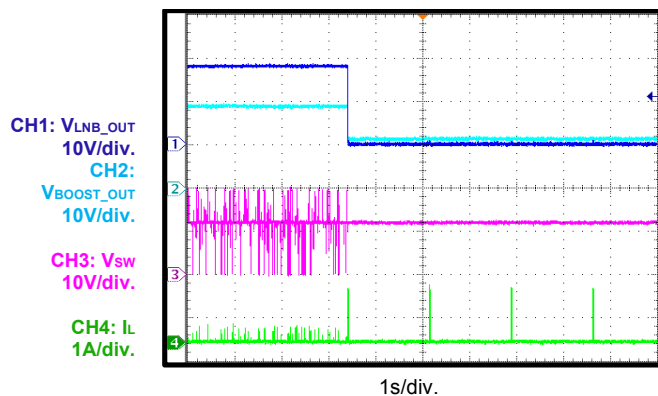
Shutdown through EN

 $I_{OUT} = 0A$


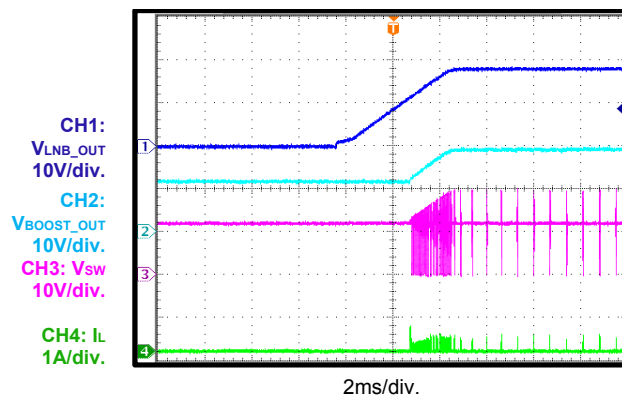
Shutdown through EN

 $I_{OUT} = 1A$


SCP Entry

 $I_{OUT} = 0A$, $OCR = 0$, $DCL = 1$


SCP Recovery

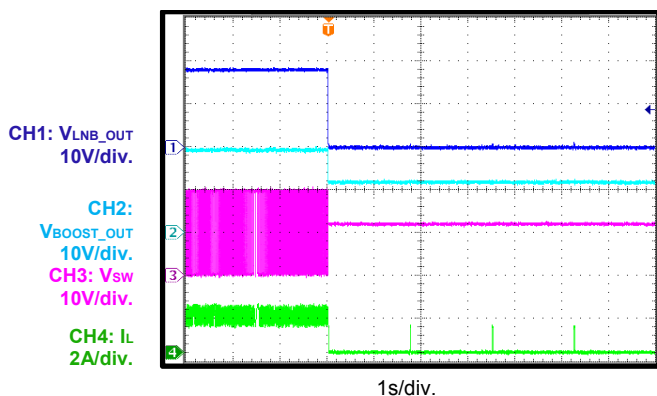
 $I_{OUT} = 0A$, $OCR = 0$, $DCL = 1$


EVB TEST RESULTS (continued)

Performance waveforms are tested on the evaluation board. $V_{IN} = 12V$, $V_{LNB_OUT} = 18V$, $L = 10\mu H$, $T_A = 25^\circ C$, unless otherwise noted.

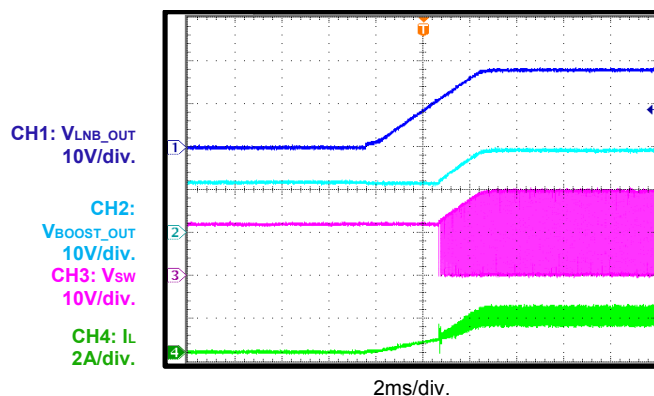
SCP Entry

$I_{OUT} = 1A$, $OCR = 0$, $DCL = 1$



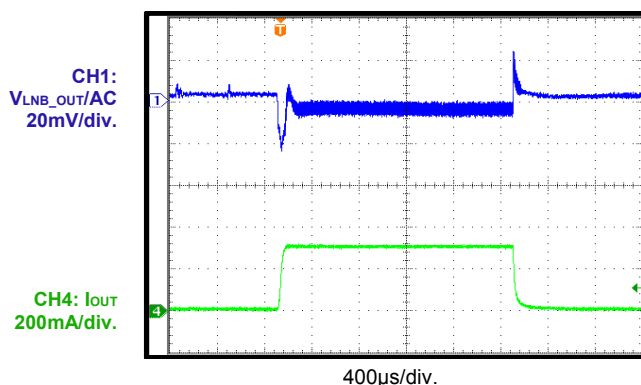
SCP Recovery

$I_{OUT} = 1A$, $OCR = 0$, $DCL = 1$



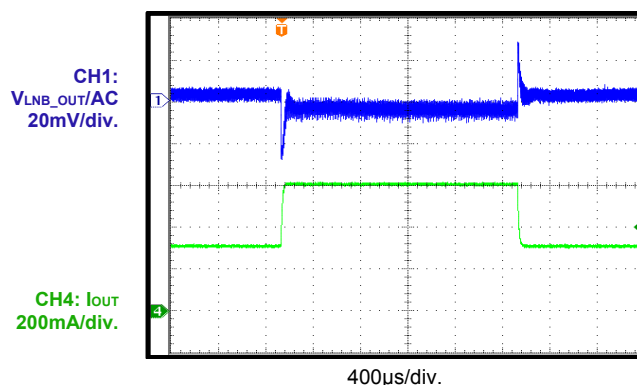
Load Transient

$I_{OUT} = 0A$ to $0.3A$



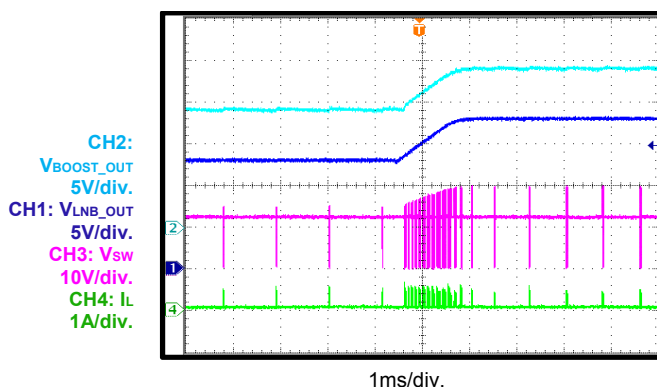
Load Transient

$I_{OUT} = 0.3A$ to $0.6A$



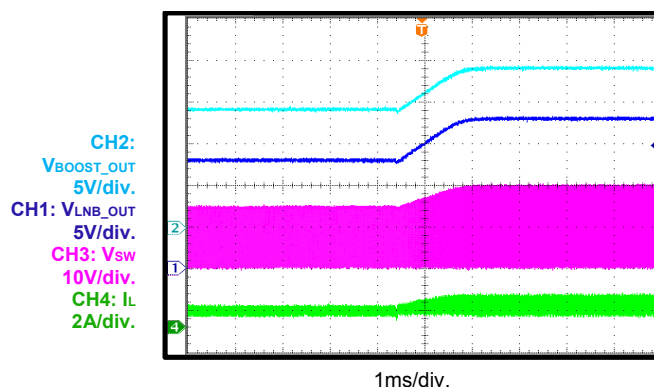
Switching from 13V to 18V

$I_{OUT} = 0A$



Switching from 13V to 18V

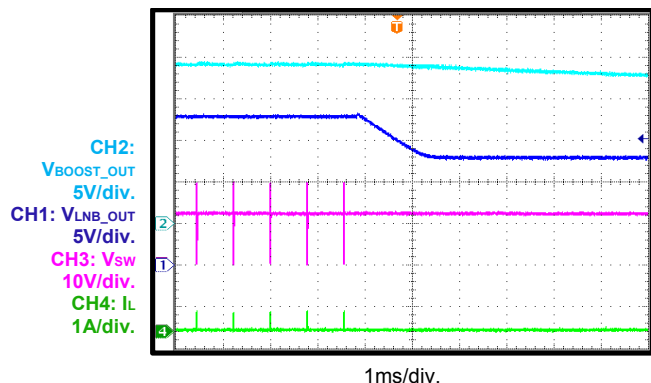
$I_{OUT} = 0.6A$



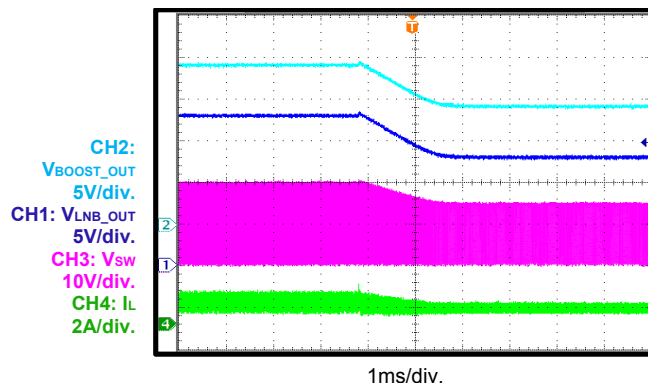
EVB TEST RESULTS (continued)

Performance waveforms are tested on the evaluation board. $V_{IN} = 12V$, $V_{LNB_OUT} = 18V$, $L = 10\mu H$, $T_A = 25^\circ C$, unless otherwise noted.

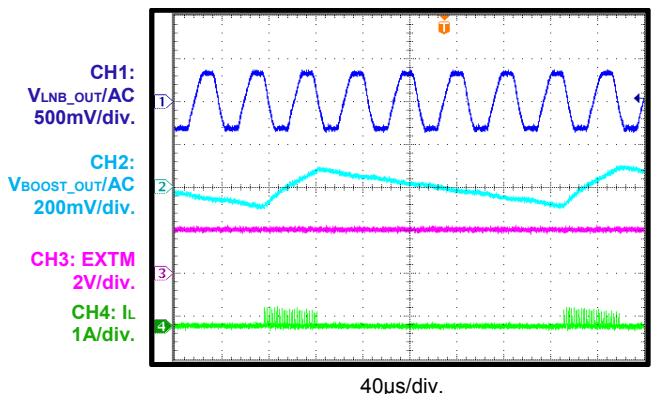
Switching from 18V to 13V

 $I_{OUT} = 0A$


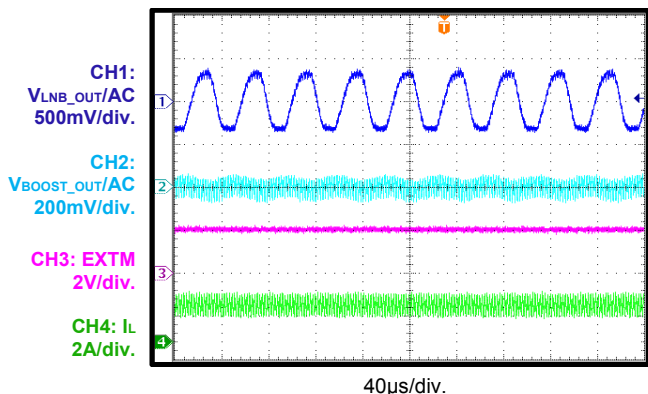
Switching from 18V to 13V

 $I_{OUT} = 0.6A$


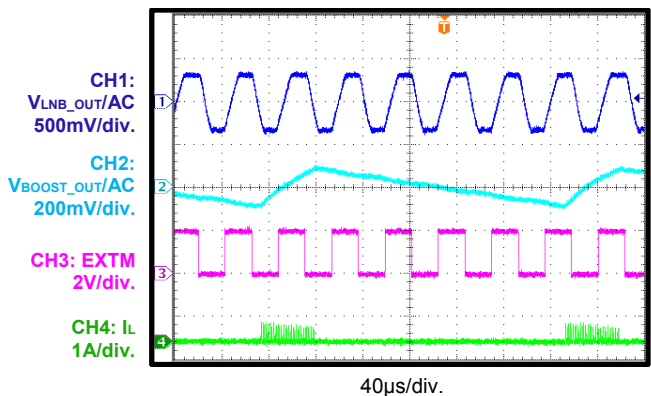
Tone Signal Steady State

 $EXTM = 2V$, $TCTRL = 0$, $I_{OUT} = 0A$


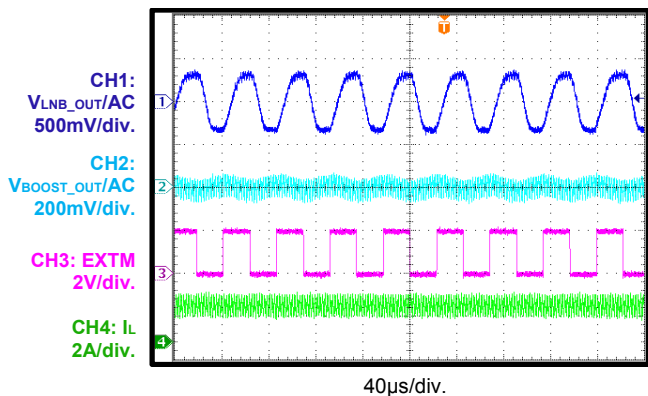
Tone Signal Steady State

 $EXTM = 2V$, $TCTRL = 0$, $I_{OUT} = 1A$


Tone Signal Steady State

 $EXTM = 22kHz$ square wave, $TCTRL = 1$, $I_{OUT} = 0A$


Tone Signal Steady State

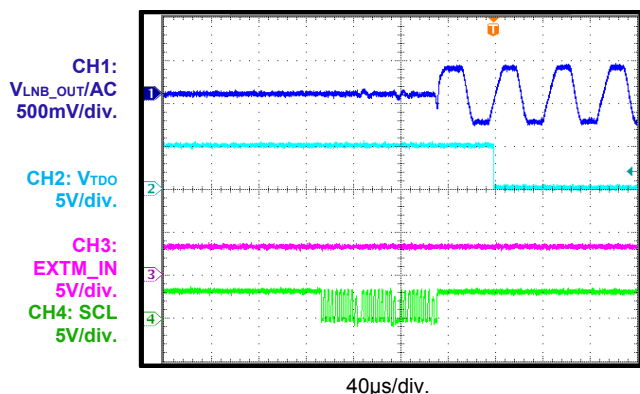
 $EXTM = 22kHz$ square wave, $TCTRL = 1$, $I_{OUT} = 1A$


EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the evaluation board. $V_{IN} = 12V$, $V_{LNB_OUT} = 18V$, $L = 10\mu H$, $T_A = 25^\circ C$, unless otherwise noted.

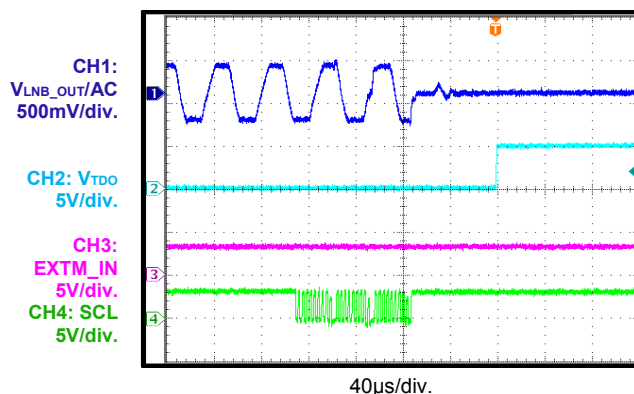
Tone Entry

EXTM = 3.3V, TCTRL = 0, $I_{OUT} = 0A$,
TEN = 0 to 1



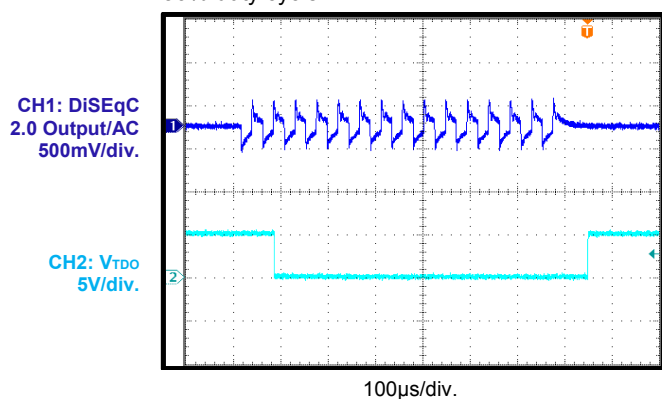
Tone Exit

EXTM = 3.3V, TCTRL = 0, $I_{OUT} = 0A$,
TEN = 1 to 0



Tone Signal Detected from Load

DiSEqC 2.0 output load = 0mA to 40mA,
load transient frequency = 22kHz,
50% duty cycle



PCB LAYOUT

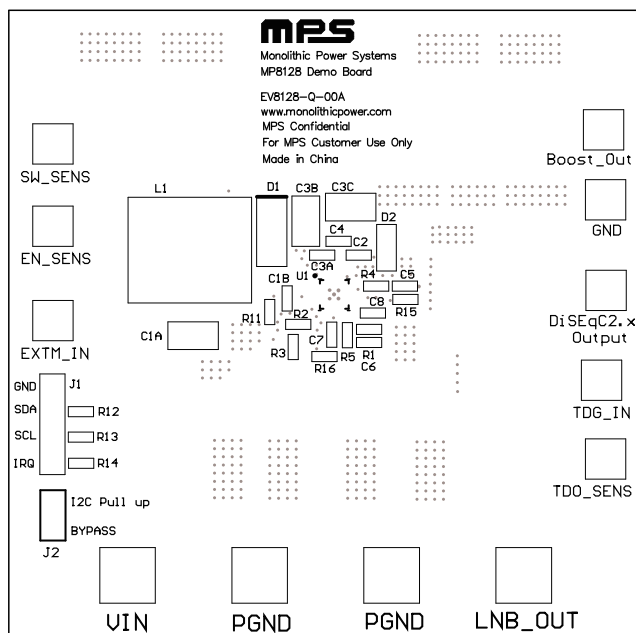


Figure 2: Top Silk

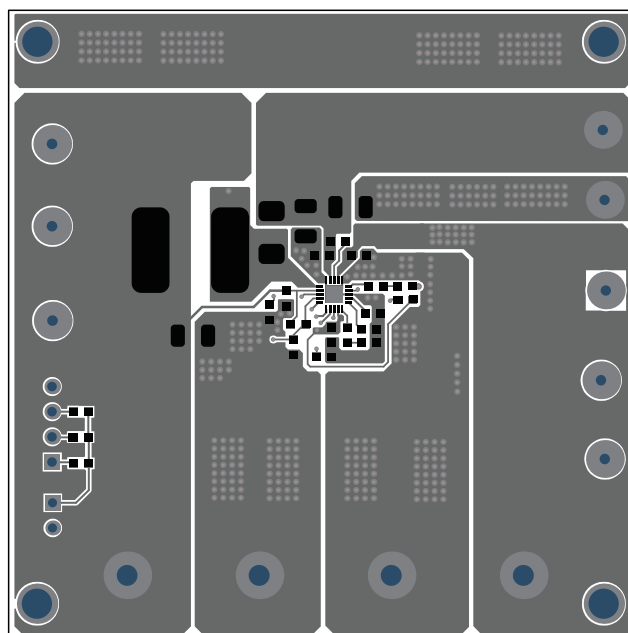


Figure 3: Top Layer

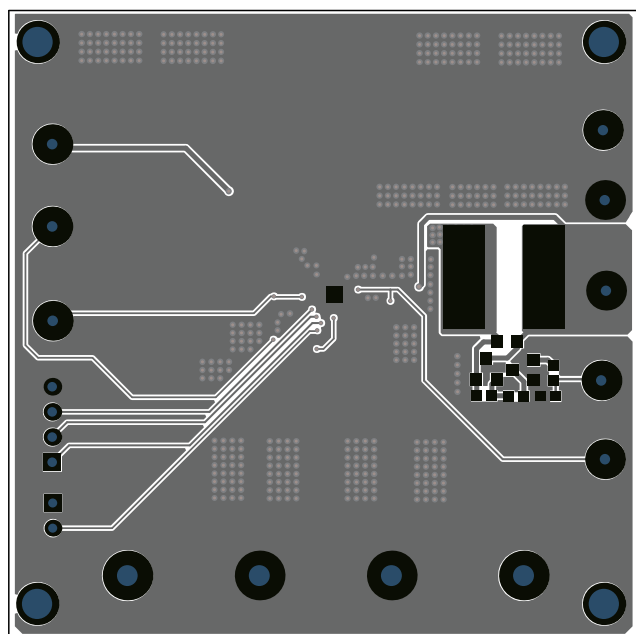


Figure 4: Bottom Layer

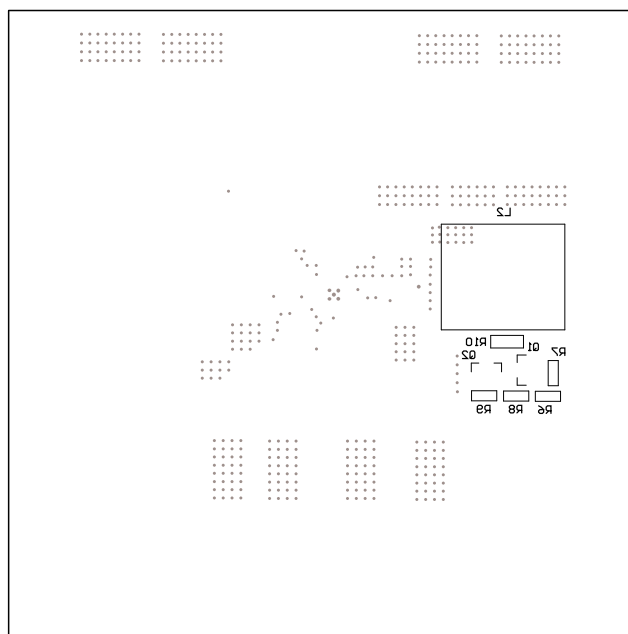


Figure 5: Bottom Silk



REVISION HISTORY

Revision #	Revision Date	Description	Pages Updated
1.0	12/18/2017	Initial Release	-
1.1	9/23/2021	Grammar and formatting updates, including headers and footers	All

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