

DESCRIPTION

The AP62250 is a 2.5A, synchronous buck converter with a wide input voltage range of 4.2V to 18V. The device fully integrates a 75mΩ high-side power MOSFET and a 45mΩ low-side power MOSFET to provide high-efficiency step-down DC-DC conversion.

The AP62250 device is easily used by minimizing the external component count due to its adoption of Constant On-Time (COT) control to achieve fast transient response, easy loop stabilization, and low output voltage ripple.

The AP62250 design is optimized for Electromagnetic Interference (EMI) reduction. The device has a proprietary gate driver scheme to resist switching node ringing without sacrificing MOSFET turn-on and turn-off times, which reduces high-frequency radiated EMI noise caused by MOSFET switching.

AP62250 is available in TSOT26 packages.

FEATURES

- V_{IN} Range: 4.2V -18V
- Output Voltage range: 0.8V to 7V
- 2.5A Continuous Output Current
- $0.8V \pm 1\%$ Reference Voltage ($T_A = +25^\circ C$)
- 155μA Low Quiescent Current
- 1.3MHz Switching Frequency
- Proprietary Gate Driver Design for Best EMI Reduction
- Protection Circuitry
 - Undervoltage Lockout (UVLO)
 - Cycle-by-Cycle Valley Current Limit
 - Thermal Shutdown
- Totally Lead-Free & Fully RoHS Compliant
- Halogen and Antimony Free. "Green" Device

APPLICATIONS

- Flat Screen TV Sets and Monitors
- White Goods and Small Home Appliances
- 5V and 12V Distributed Power Bus Supplies
- FPGA, DSP, and ASIC Supplies
- Home Audio
- Network Systems
- Gaming Consoles
- Consumer Electronics
- General Purpose Point of Load

TYPICAL APPLICATIONS CIRCUIT

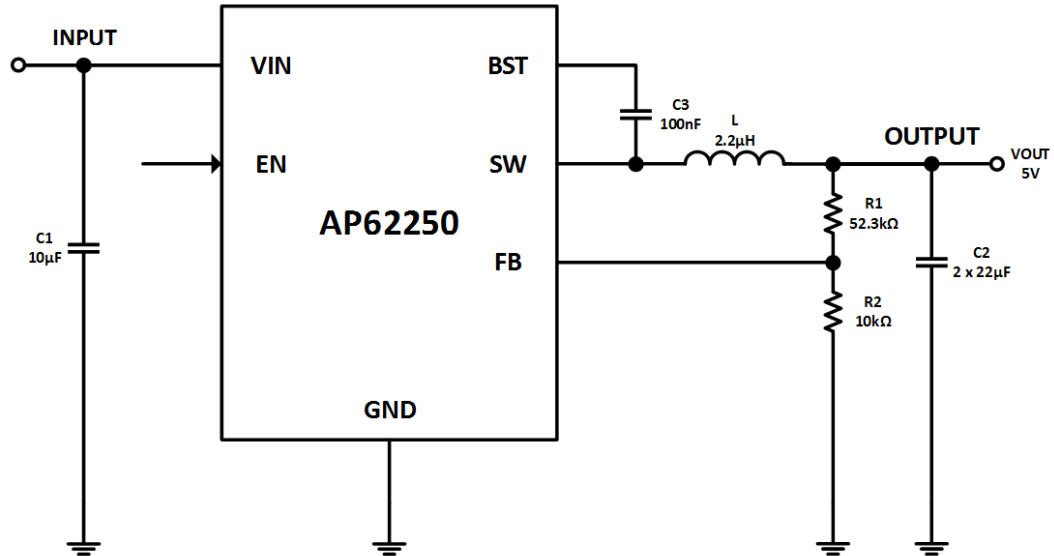


Figure 1. Typical Application Circuit

ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Rating | Unit |
|---------------------------|-------------------------|--|------|
| VIN | Supply Pin Voltage | -0.3 to +20.0 (DC) | V |
| | | -0.3 to 22.0 (400ms) | |
| V _{SW} | Switch Pin Voltage | -1.0 to VIN + 0.3 (DC) | V |
| | | -2.5 to VIN + 2.0 (20ns) | |
| V _{BST} | Bootstrap Pin Voltage | V _{SW} - 0.3 to V _{SW} + 6.0 | V |
| V _{EN} | Enable/UVLO Pin Voltage | -0.3 to +6.0 | V |
| V _{FB} | Feedback Pin Voltage | -0.3 to +6.0 | V |
| T _{ST} | Storage Temperature | -65 to +150 | °C |
| T _J | Junction Temperature | +150 | °C |
| T _L | Lead Temperature | +260 | °C |
| ESD Susceptibility | | | |
| HBM | Human Body Mode | 2000 | V |
| CDM | Charge Device Model | 500 | V |

RECOMMENDED OPERATING CONDITIONS

| Symbol | Parameter | Rating | Unit |
|------------------|--------------------------------|-------------|------|
| V _{IN} | Supply Voltage | 4.2 to 18 | V |
| V _{OUT} | Output Voltage Range | 0.8 to 7 | V |
| T _A | Operating Ambient Temperature | -40 to +85 | °C |
| T _J | Operating Junction Temperature | -40 to +125 | °C |

SETTING OUTPUT VOLTAGE:

Table 1 for AP62250 shows a list of recommended component selections for common output voltages.

| Vout | R1 | R2 | L1 |
|------|--------|------|-------|
| 1.2V | 4.99KΩ | 10KΩ | 1.0μH |
| 1.5V | 8.66KΩ | 10KΩ | 1.0μH |
| 1.8V | 12.4KΩ | 10KΩ | 1.5μH |
| 2.5V | 21.5KΩ | 10KΩ | 1.5μH |
| 3.3V | 31.6KΩ | 10KΩ | 2.2μH |
| 5.0V | 52.3KΩ | 10KΩ | 2.2μH |

Table 1. Common Output Voltages

EVALUATION BOARD

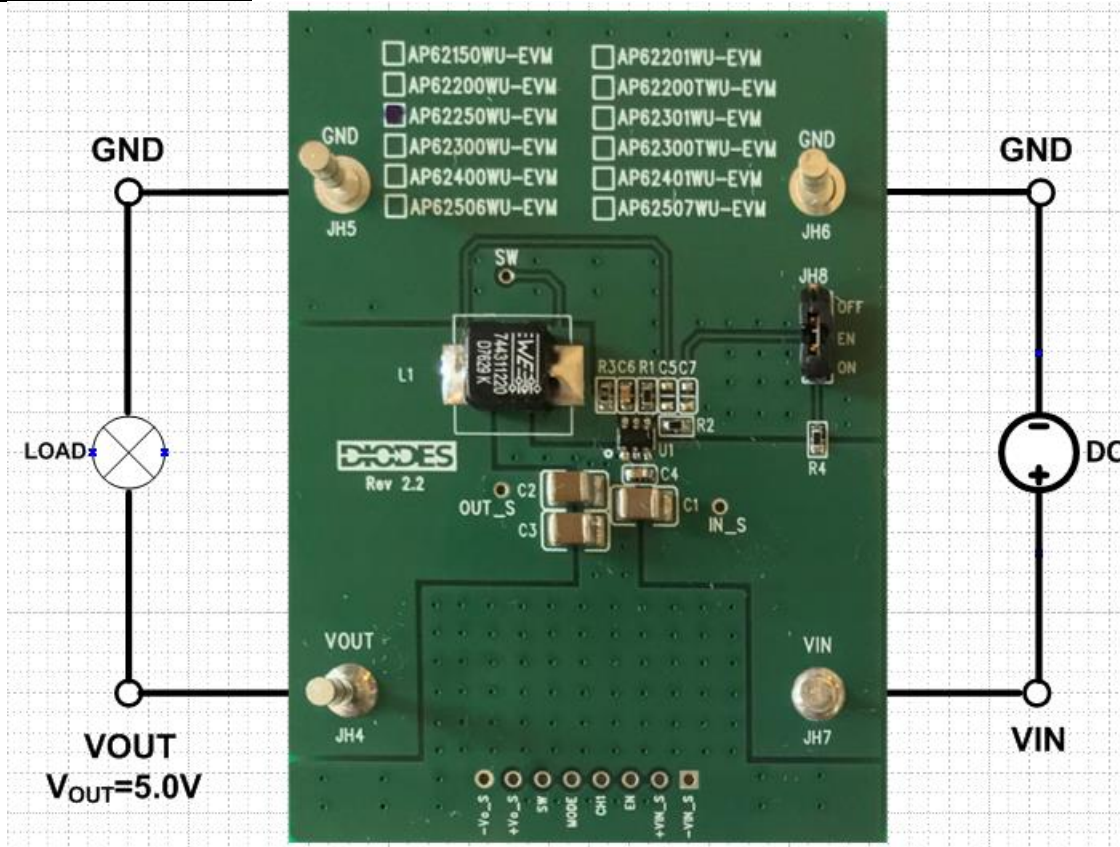


Figure 2. AP62250WU-EVM

QUICK START GUIDE

The AP62250WU-EVM has a simple layout and allows access to the appropriate signals through test points. To evaluate the performance of the AP62250WU, follow the procedure below:

1. Connect a power supply to the input terminals V_{IN} and GND. Set V_{IN} to 12V.
2. Connect the positive terminal of the electronic load to V_{OUT} and negative terminal to GND.
3. For Enable, place a jumper at JH8 to “ON” position to connect EN pin to V_{IN} through 100K Ω resistor to enable IC or leave it OPEN. Jump to “OFF” position to disable IC.
4. The evaluation board should now power up with a 5.0V output voltage.
5. Check for the proper output voltage of 5.0V ($\pm 1\%$) at the output terminals V_{OUT} and GND. Measurement can also be done with a multimeter with the positive and negative leads between V_{OUT} and GND.
6. Set the load to 2.5A through the electronic load. Check for the stable operation of the SW signal on the oscilloscope. Measure the switching frequency.

MEASUREMENT/PERFORMANCE GUIDELINES:

- 1) When measuring the output voltage ripple, maintain the shortest possible ground lengths on the oscilloscope probe. Long ground leads can erroneously inject high frequency noise into the measured ripple.
- 2) For efficiency measurements, connect an ammeter in series with the input supply to measure the input current. Connect an electronic load to the output for output current.

EVALUATION BOARD SCHEMATIC

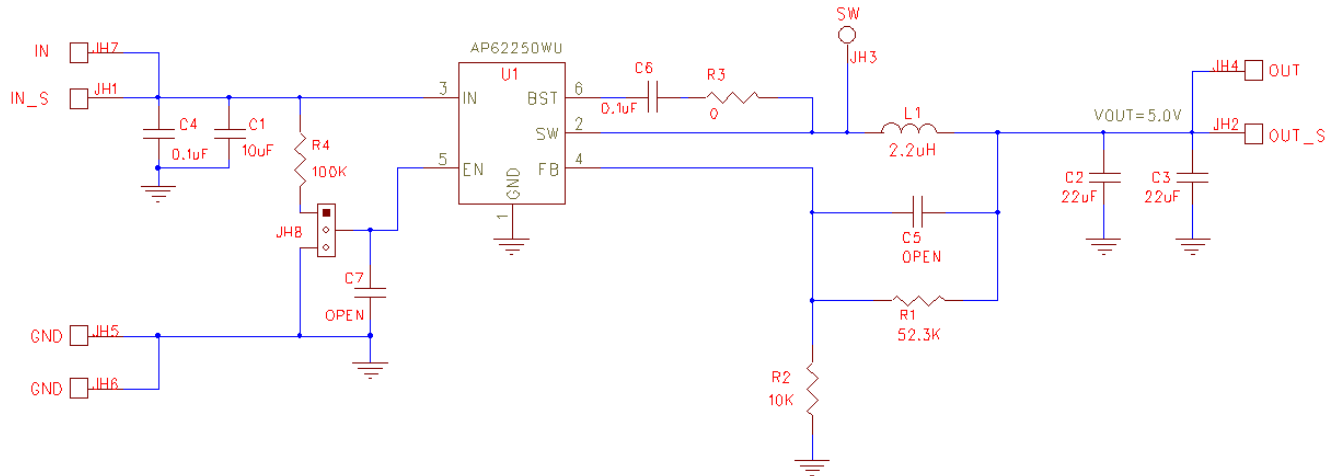


Figure 3. AP62250WU-EVM Schematic

PCB TOP/BOTTOM LAYOUT

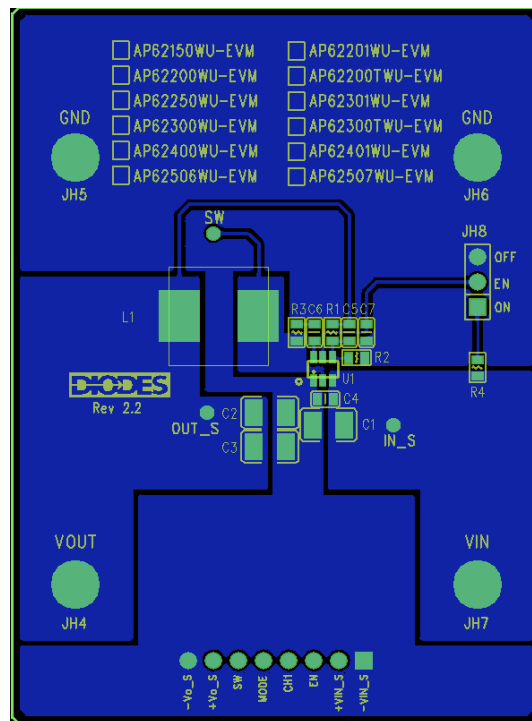


Figure 4. AP62250WU-EVM – Top Layer

PCB TOP/BOTTOM LAYOUT

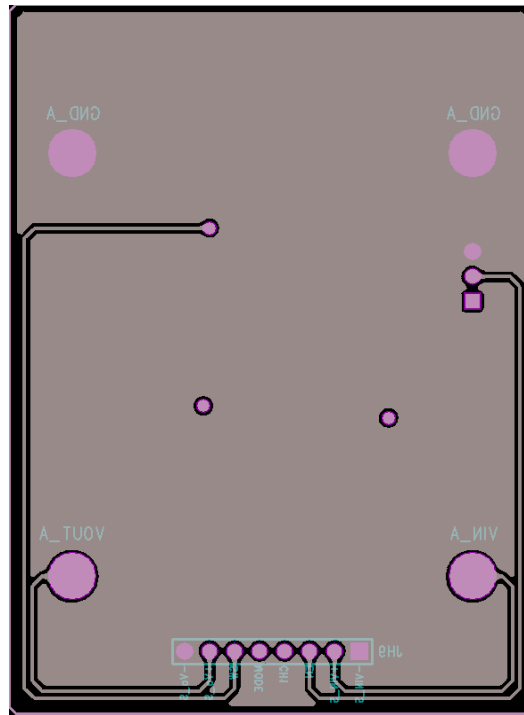


Figure 5. AP62250WU-EVM – Bottom Layer

BILL OF MATERIALS for AP62250WU-EVM for $V_{OUT}=5V$

| Ref | Value | Description | Qty | Size | Vendor Name | Manufacturer PN |
|--------------------|----------------|---|-----|------------------|-------------------|--------------------|
| C1 | 10 μ F | Ceramic Capacitor, 25V, X5R | 1 | 1210 | Murata | GRM32DR61E106KA12L |
| C2, C3 | 22 μ F | Ceramic Capacitor, 25V, X5R | 2 | 1210 | AVX | 12103D226KAT2A |
| C4, C6 | 0.1 μ F | Ceramic Capacitor, 50V, X7R, 10% | 2 | 0603 | Samsung | GCJ188R71H104KA12D |
| L1 | 2.2 μ H | DCR=20m Ω , Ir=4.2A | 1 | 7.30x7.30x4.50mm | Wurth Electronics | 7447779002 |
| R1 | 52.3K Ω | SMD Resistor, 1% | 1 | 0603 | Panasonic | ERJ-3EKF5232V |
| R2 | 10K Ω | SMD Resistor, 1% | 1 | 0603 | Panasonic | ERJ-3EKF1002V |
| R3 | 0 Ω | SMD Resistor, 1% | 1 | 0603 | Panasonic | ERJ-3GEY0R00V |
| R4 | 100K Ω | SMD Resistor, 1% | 1 | 0603 | Panasonic | ERJ-3EKF1003V |
| JH4, JH5, JH6, JH7 | 1598 | Terminal Turret Triple 0.094" L (Test Points) | 4 | Through-Hole | Keystone Circuit | 1598-2 |
| JH8 | | PCB Header, 40 POS | 1 | 1X3 | 3M | 2340-6111TG |
| U1 | AP62250 | Sync Buck DC-DC converter | 1 | TSOT26 | Diodes Inc | AP62250WU-7 |

TYPICAL PERFORMANCE CHARACTERISTICS

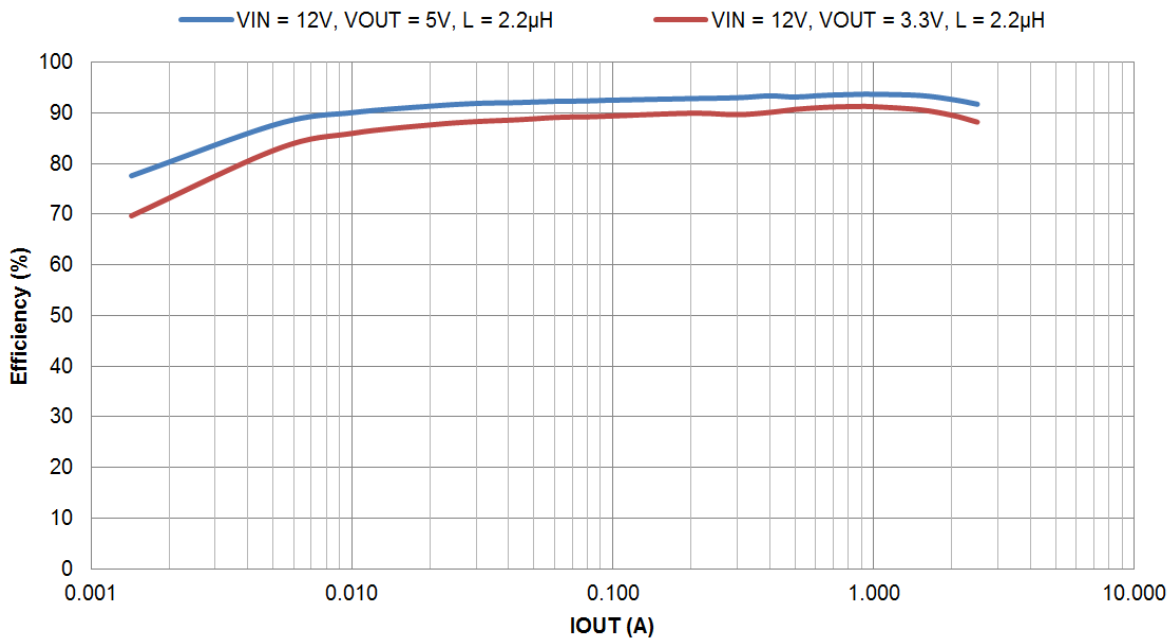


Figure 6. Efficiency (%) vs IOU (A)

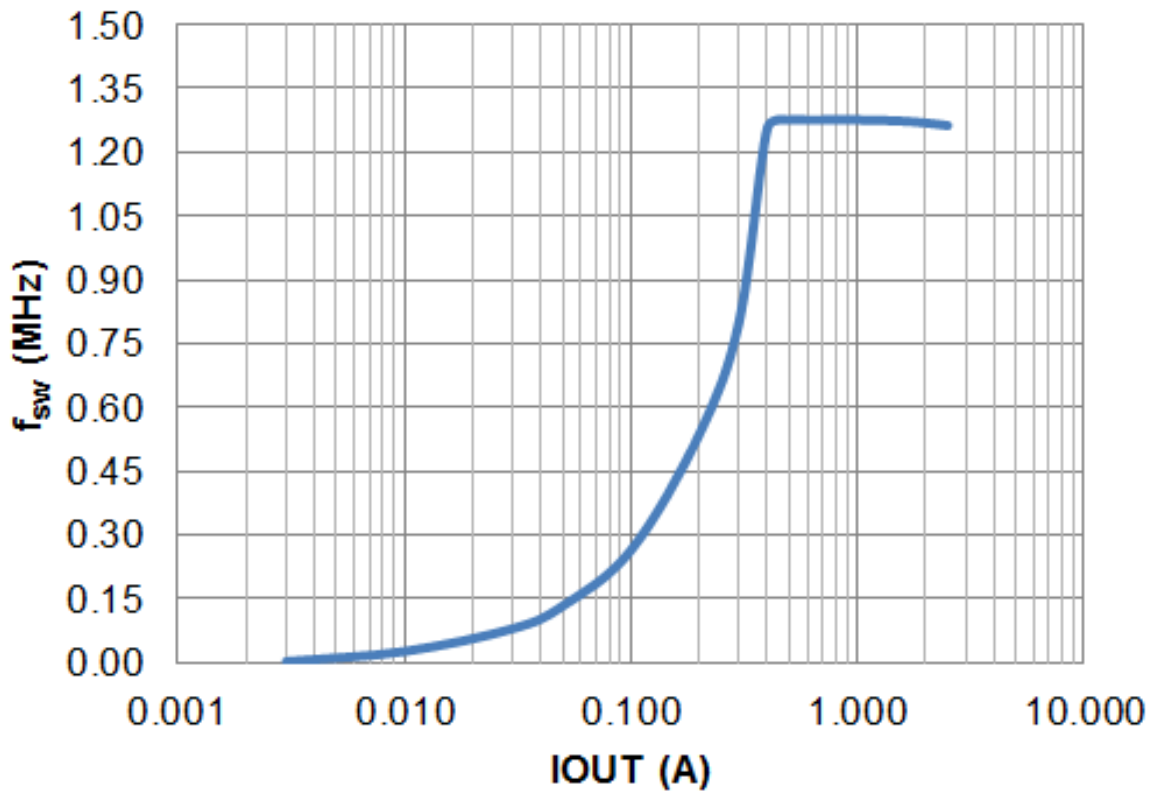


Figure 7. fsw vs Load

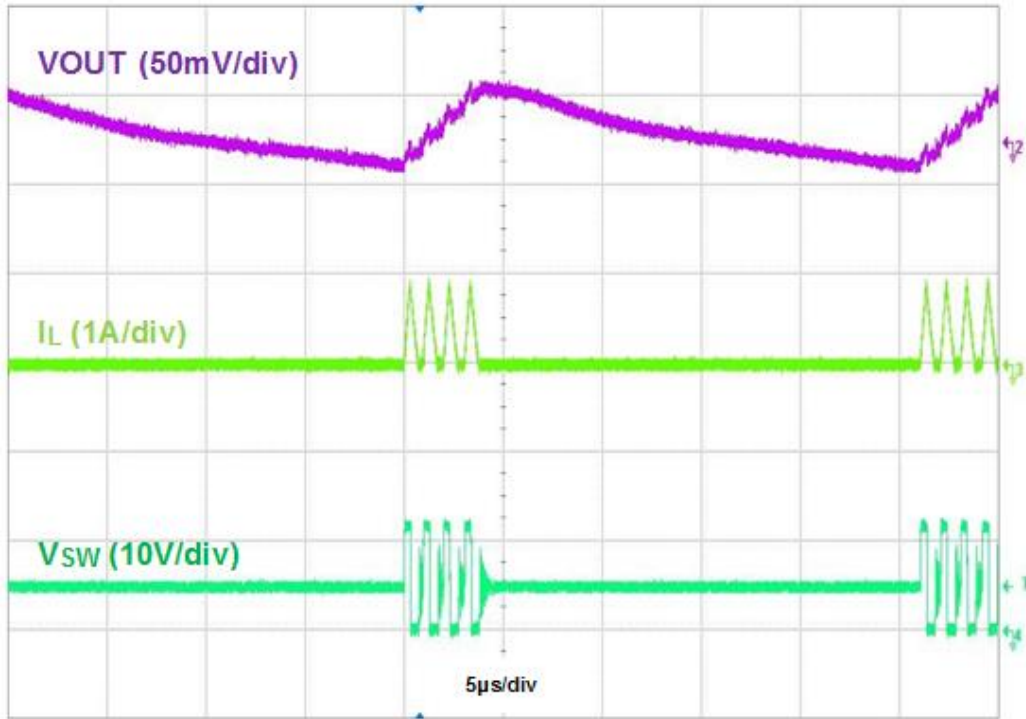


Figure 8. Output Voltage Ripple, VOUT=5V, IOUT=50mA

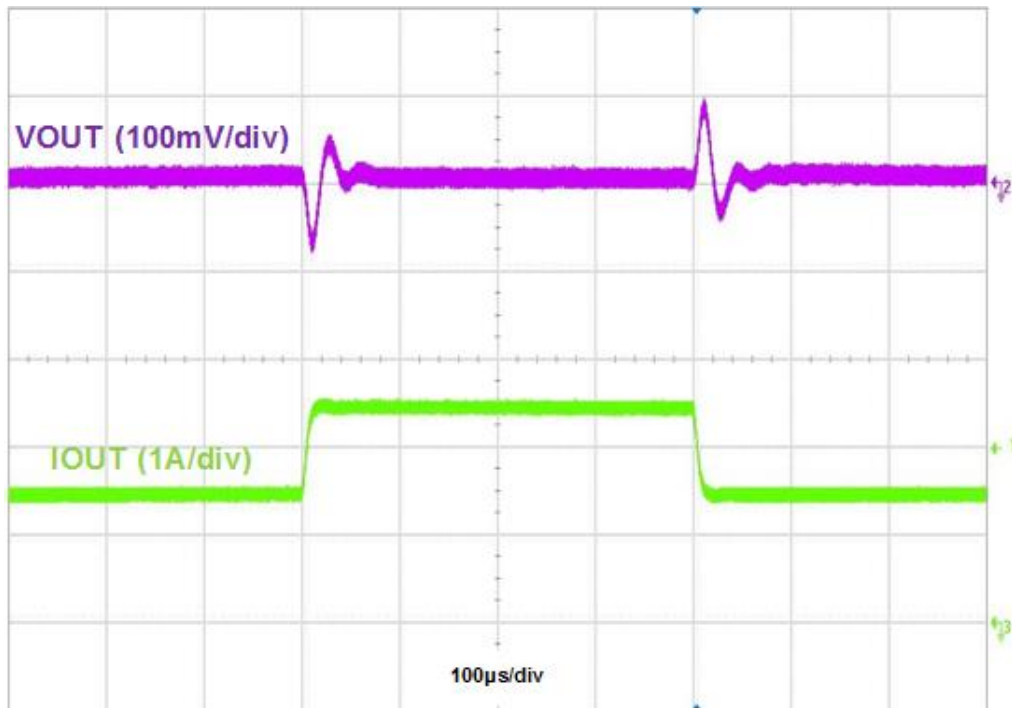


Figure 9. Load Transient, IOUT=1.5A to 2.5A to 1.5A

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