
IRU3137 EVALUATION BOARD USER GUIDE**INTRODUCTION**

The IRU3137 controller IC is designed to provide a low cost and high performance synchronous Buck regulator for on-board DC to DC converter applications. The output voltage can be set as low as 0.8V and higher voltage can be obtained with an external voltage divider. High peak current gate drivers provide fast switching transition for applications requiring high output current in the range of 15A to 20A.

This device features an internal 200KHz oscillator, under-voltage lockout for both V_{cc} and V_c supplies, an external programmable soft-start function as well as output under-voltage detection that latches off the device when an output short is detected.

SPECIFICATION DATAV_{IN} = 5VV_{OUT} = 2.5VI_{OUT} = 15AΔV_{OUT} = 75mVF_S = 200KHz**Supply Voltage:**V_{CC} = V_C = 12V

INPUT/OUTPUT CONNECTIONS

The following is the input/output connections:

Inputs:

JP1: Input (+5V), Gnd

JP4: Input (+12V), Gnd

Outputs:JP2: V_{OUT} (+2.5V)

JP3: Gnd

The connection points is shown in Figure 1. Connect the power supply cables according to this figure, minimize wire lengths to reduce losses in the wire. Test point J1 provides easy connections for the oscilloscope voltage probe to monitor the output voltage.

Note: For proper operation, +5V supply should ramp up first.

CONNECTION DIAGRAM

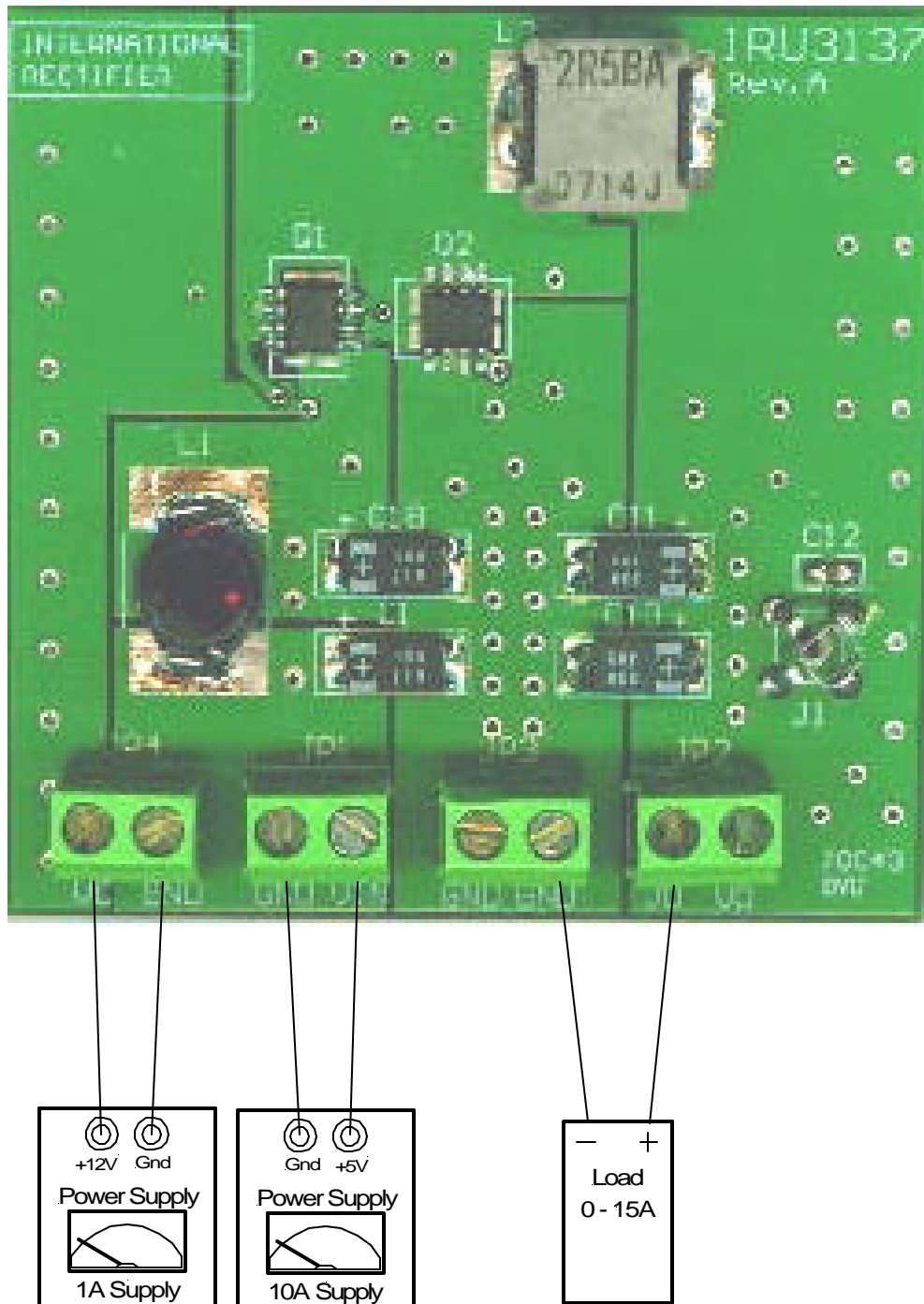


Figure 1 - Connection diagram of evaluation-board for IRU3137.

LAYOUT

The four layers for IRU3137 evaluation board are shown in Figures 2.1-2.4. The layout is designed both for direct FET package and SOIC package for power MOSFETs. The input capacitors are all located close to the MOSFETs. All the decoupling capacitors and feedback components are located close to IC. The feedback re-

sistors are tied to the output voltage at the point of regulation.

The middle layers are dedicated to Power Ground and Analog Ground. Analog Ground is kept separated from the Power Ground and it is connected at a single point as shown in figure 2.3.

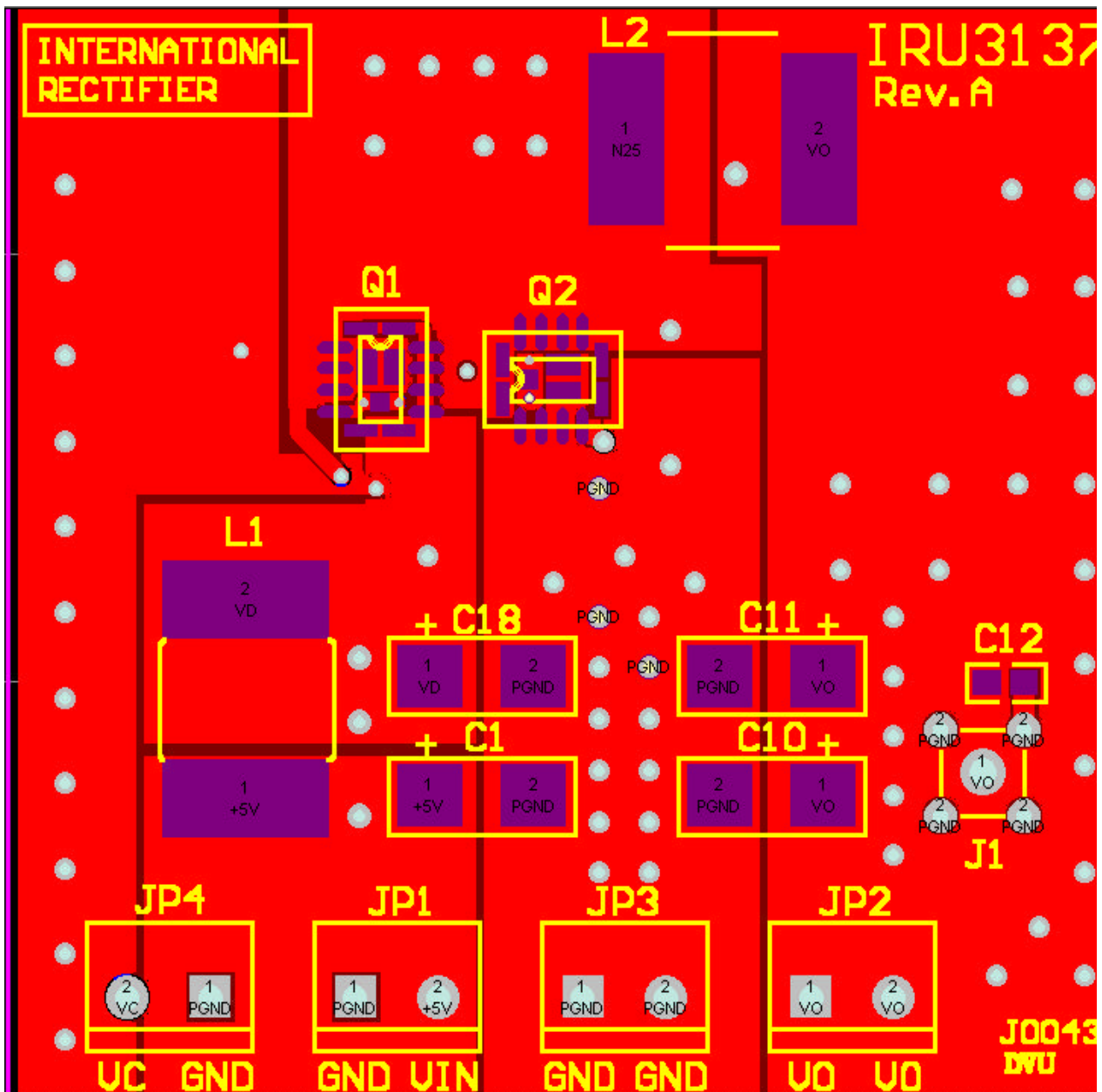


Figure 2.1 - Top layer of evaluation-board for IRU3137.

LAYOUT

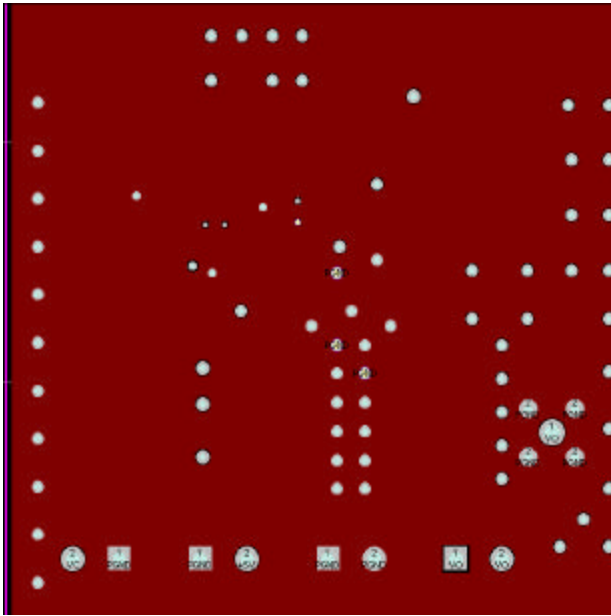


Figure 2.2 - Middle layer 1.

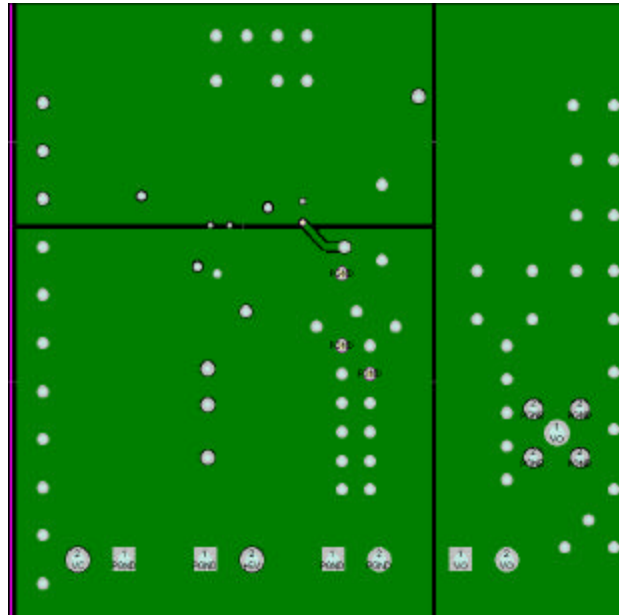


Figure 2.3 - Middle layer 2.

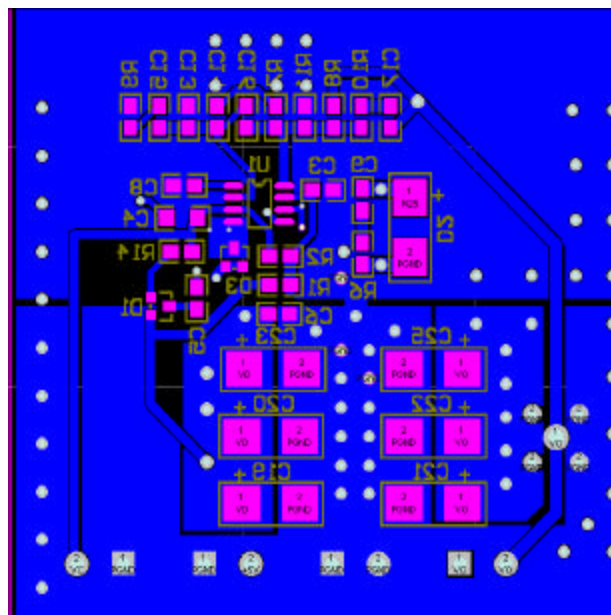


Figure 2.4 - Bottom layer.

SCHEMATIC

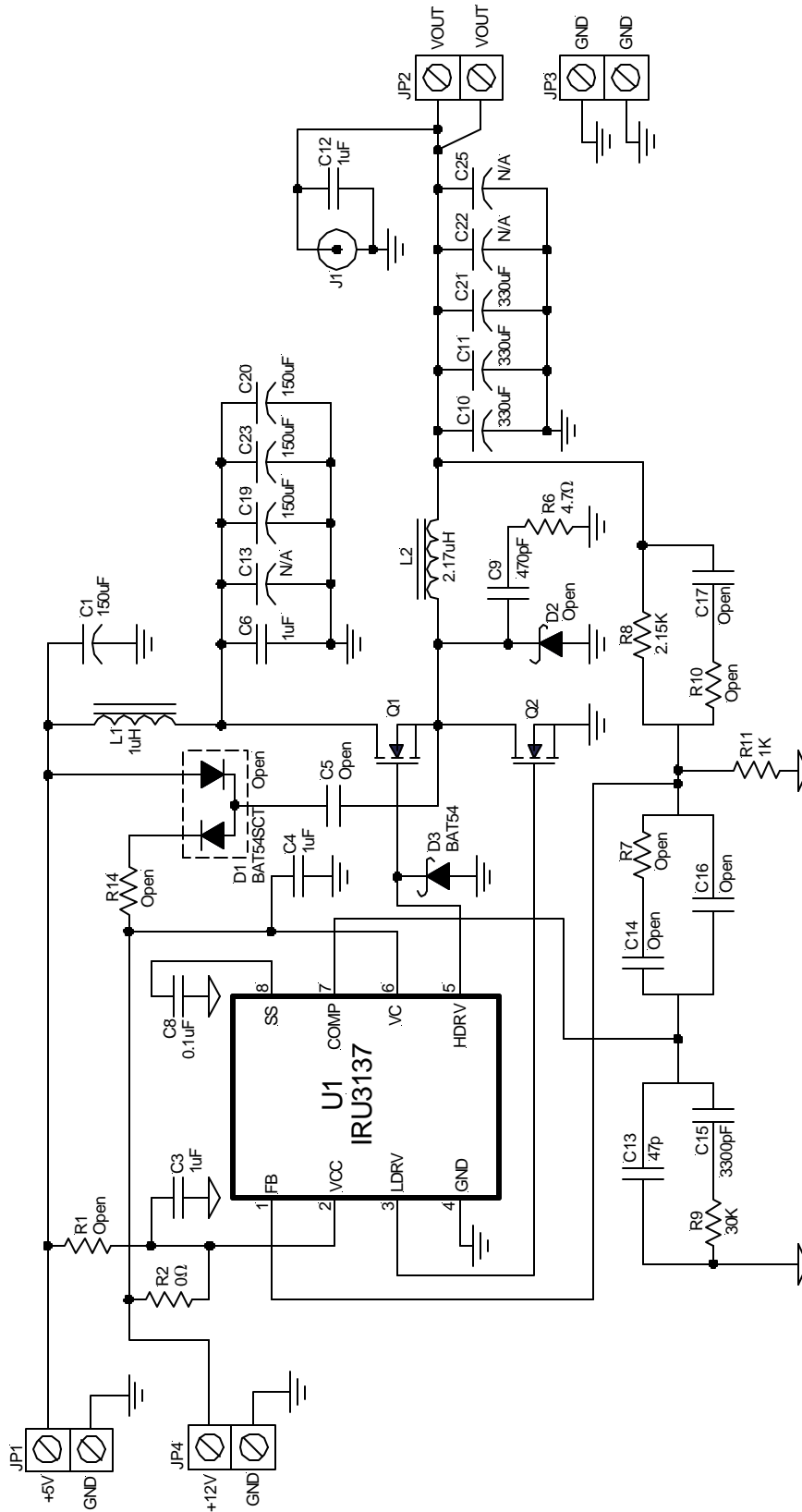


Figure 3 - Schematic of evaluation-board for IRU3137.

BILL OF MATERIAL

| Ref Desig | Description | Value | Qty | Part# | Manuf |
|-------------------|--------------------|------------------|-----|---------------|-----------|
| Q1, Q2 | MOSFET | 30V, 4mΩ, 15A | 2 | IRF7832 | IR |
| U1 | Controller | Synchronous PWM | 1 | IRU3137CS | IR |
| D1, D2 | Schottky Diode | Fast Switching | 2 | N/A Open | IR |
| D3 | Schottky Diode | | 1 | BAT54 | IR |
| L1 | Inductor | 1μH, 10A | 1 | D03316P-102HC | Coilcraft |
| L2 | Inductor | 2.17μH, 17A | 1 | ETQP6F2R5BFA | Panasonic |
| C1,18,19,20,23 | Capacitor, Poscap | 150μF, 6.3V | 5 | 6TPC150M | Sanyo |
| C10,11,21 | Capacitor, Poscap | 330μF, 6.3V | 3 | 6TPC330M | Sanyo |
| C8 | Capacitor | 0.1μF, Y5V, 25V | 1 | ECJ-2VF1E104Z | Panasonic |
| C15 | Capacitor, Ceramic | 3300pF, X7R, 50V | 1 | ECJ-2VB1H332K | Panasonic |
| C9 | Capacitor, Ceramic | 470pF, X7R, 50V | 1 | ECJ-2VC1H471J | Panasonic |
| C13 | Capacitor, Ceramic | 47pF, NPO | 1 | ECJ-2VC1H470J | Panasonic |
| C3,4,6,12 | Capacitor, Ceramic | 1μF, Y5V, 16V | 4 | ECJ-2VF1C105Z | Panasonic |
| R6 | Resistor | 4.7Ω, 1% | 1 | | |
| R8 | Resistor | 2.15K, 1% | 1 | | |
| R9 | Resistor | 30K, 1% | 1 | | |
| R11 | Resistor | 1K, 1% | 1 | | |
| R2 | Resistor | 0Ω | 1 | | |
| R1,7,10,14 | Resistor | N/A Open | 4 | | |
| C5,14,16,17,22,25 | Capacitor | N/A Open | 6 | | |
| JP1,JP2,JP3,JP4 | | 2-Pos Terminal | 4 | ED1973-ND | Digikey |
| J1 | | | 1 | 131-5031-00 | Tektronix |

TYPICAL OPERATING CHARACTERISTICS

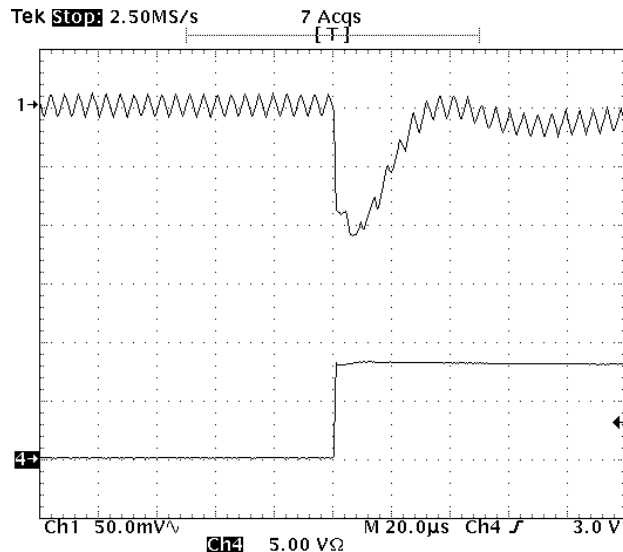


Figure 4 - Transient load response at $I_{OUT}=0A - 8A$.
 Ch1: V_{OUT}
 Ch4: I_{OUT} (5A/div)

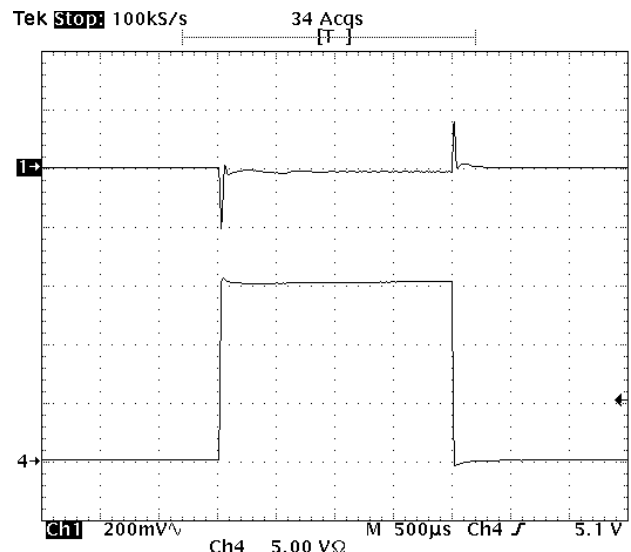


Figure 6 - Transient load response at $I_{OUT}=0A - 15A$.
 Ch1: V_{OUT}
 Ch4: I_{OUT} (5A/div)

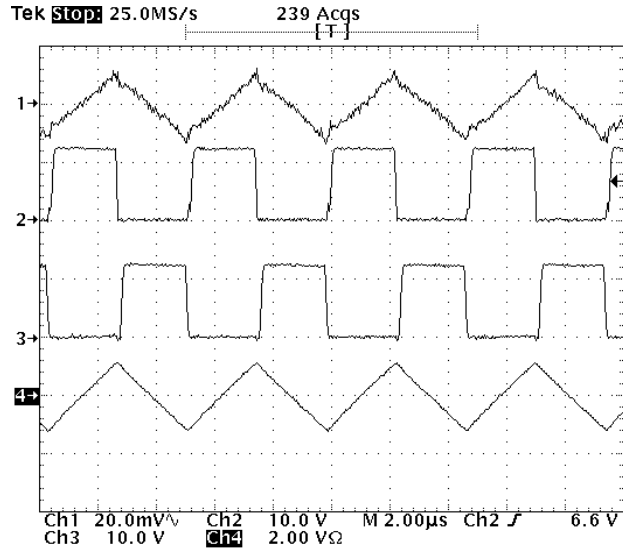


Figure 5 - Normal condition at N/L.
 Ch1: Output Voltage Ripple (20mV/div)
 Ch2: HDrv
 Ch3: LDrv
 Ch4: Inductor Current (2A/div)

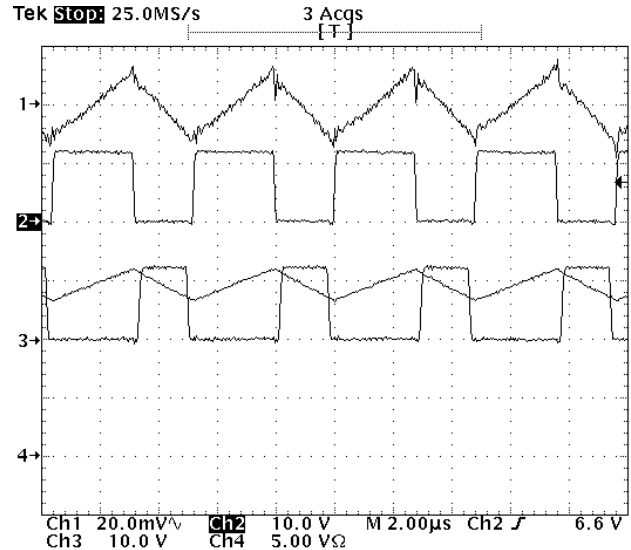


Figure 7 - Normal condition at 15A.
 Ch1: Output Voltage Ripple (20mV/div)
 Ch2: HDrv
 Ch3: LDrv
 Ch4: Inductor Current (5A/div)

TYPICAL OPERATING CHARACTERISTICS

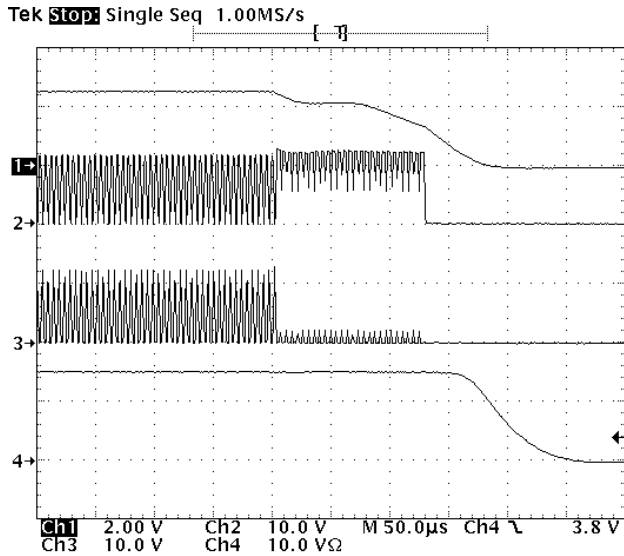


Figure 8 - Shutdown by pulling down the soft-start pin.

- Ch1: V_{OUT}
- Ch2: HDrv
- Ch3: LDrv
- Ch4: I_{OUT} (10A/div)

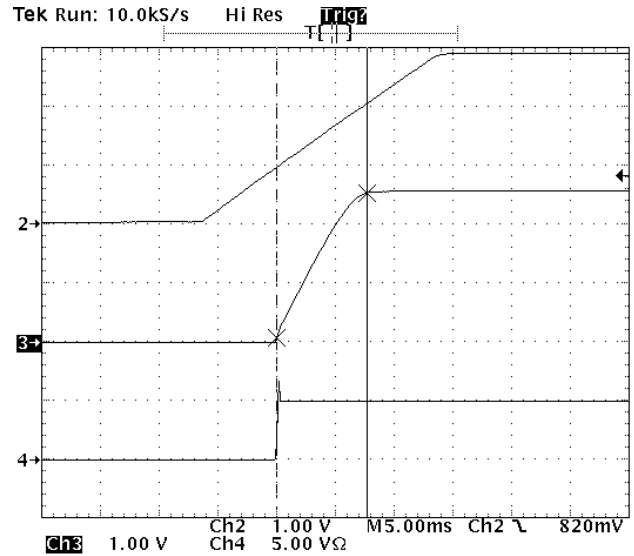


Figure 9 - Start-Up.

- Ch2: V_{SS} (Soft-Start Voltage)
- Ch3: V_{OUT}
- Ch4: I_{OUT} (5A/div)

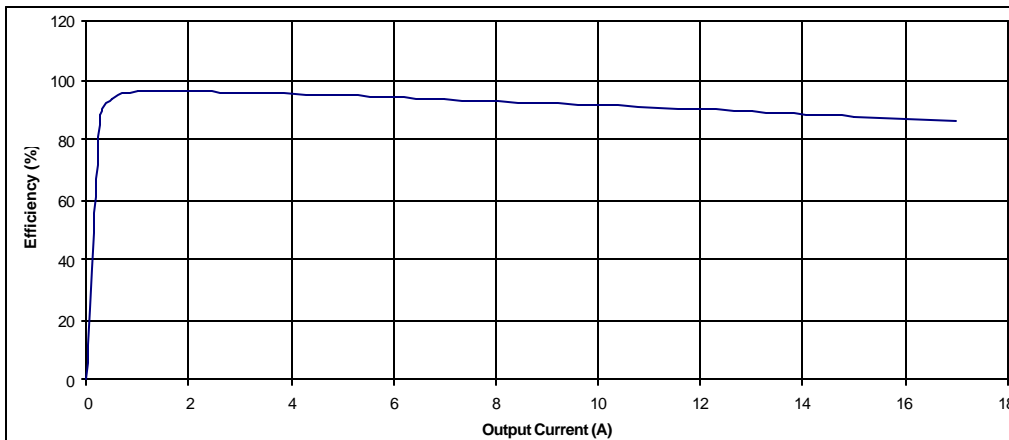


Figure 10 - Application circuit efficiency at ambient temperature.
5V to 2.5V