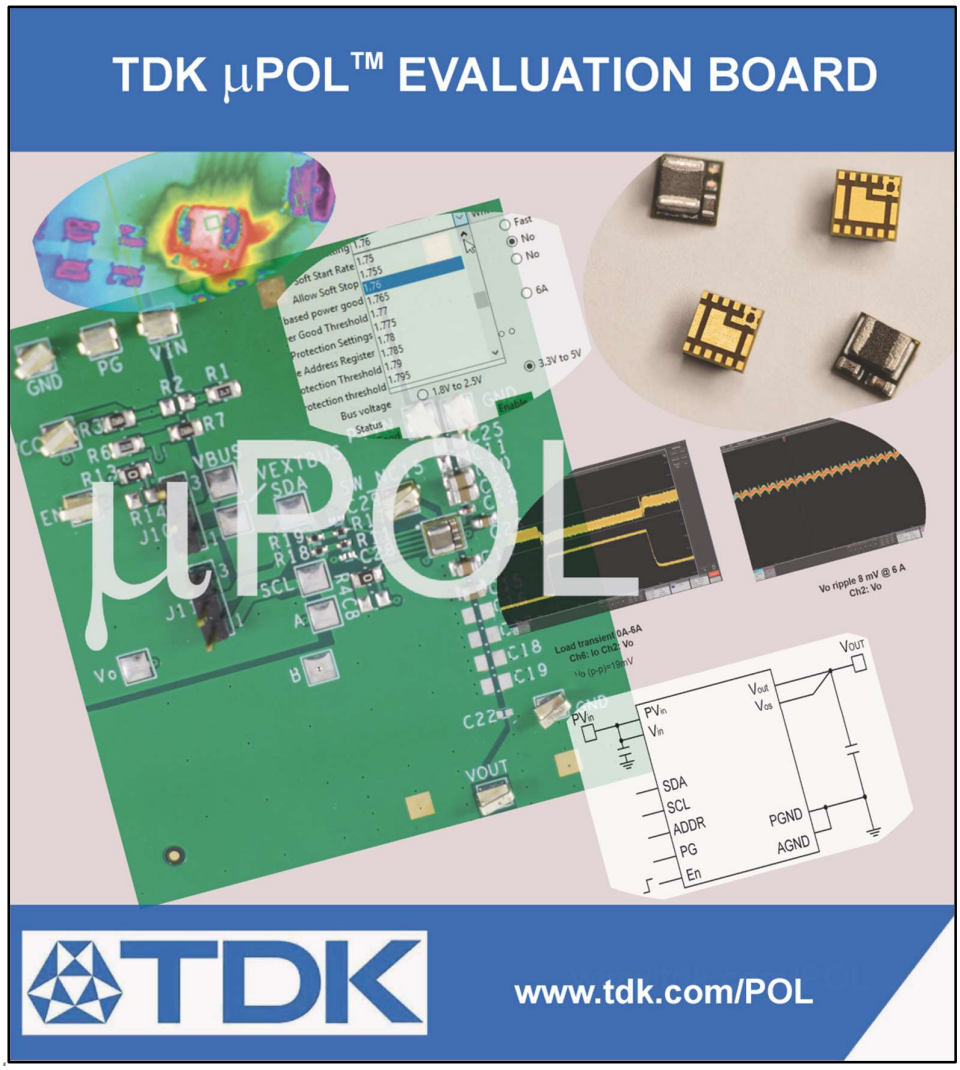

EV1006-5000-A
EVALUATION BOARD
USER GUIDE

Introduction

This user guide describes the evaluation board provided for the FS1006-5000 µPOL™ product.

The board generates an output voltage (V_{OUT}) of 5V for loads of 0–6A from an input voltage (PV_{IN}) of 12V.

Specifications

- Input voltage (PV_{IN}) = +12V
- Output voltage (V_{OUT}) = +5V
- Output load (I_O) = 0–6A
- Switching frequency (F_{SW}) = 2.27 MHz
- Output capacitance (C_O) = 3x22µF (MLCC)
- Input capacitance (C_{IN}) = 2x22µF (MLCC)
- Dimensions (width x length x thickness) = 76.2 x 76.2 x 1.6mm

Connections

Name	Identifier	Description
PV_{IN}	J1	Input voltage (+12V)
Gnd	J1	Ground for input voltage
V_{OUT}	J2	Output voltage (+5V)
Gnd	J2	Ground for output voltage
En	J4	Enable
PG	J5	Power Good

The board is configured for a single input supply. An internal low drop-out regulator generates the internal supply (V_{CC}) from PV_{IN}. The Enable (En) input is connected to PV_{IN} through a resistor divider, so that no Enable signal is needed.

Operation

To use the evaluation board:

1. Connect a well-regulated +12V input supply to PV_{IN} and Gnd.
2. Connect a load of 0–6A to V_{OUT} and Gnd.

Description

The evaluation board consists of a 4-layer PCB made from FR4 glass-reinforced epoxy laminate material. All layers use 2oz copper (equating to a thickness of 0.0694mm). The major power components, including the FS1006, are mounted on the top side of the board.

Part reference	Quantity	Type	Description
FS1006 µPOL	1	–	Main IC
C20	1	100uF	Aluminum capacitor
C2	1	0.1uF	0402, 25V, X7R
C3,C4	2	22uF	0805, 25V, X5R, 10%
C10,C11,C15	3	22uF	0805, 6.3V, X5R, 10%
C7	1	1uF	0603, 25V, X5R, 10%
C8	1	2.2uF	0402, 10V, X7S, 10%
R8	1	12.7K	10%, 1/8W, 0805 case size
R1	1	2.7	10%, 1/8W, 0805 case size
R7,R9	2	49.9K	10%, 1/8W, 0805 case size
R2,R4,R10	3	0	0805 case size
R11	1	0	0603 case size
R5,R6	2	4.99K	0402 case size
L1	1	0.001ohm	1206 case size
J1,J2	2		TERM BLOCK 2POS 5mm, TH
J3,J4	2		3 pin header
J5	1		2 pin header
T1,T2,T3,T4	4	`	Test point

Figure 1 shows the layout of the board and Figure 2 shows a schematic of the electrical circuit.

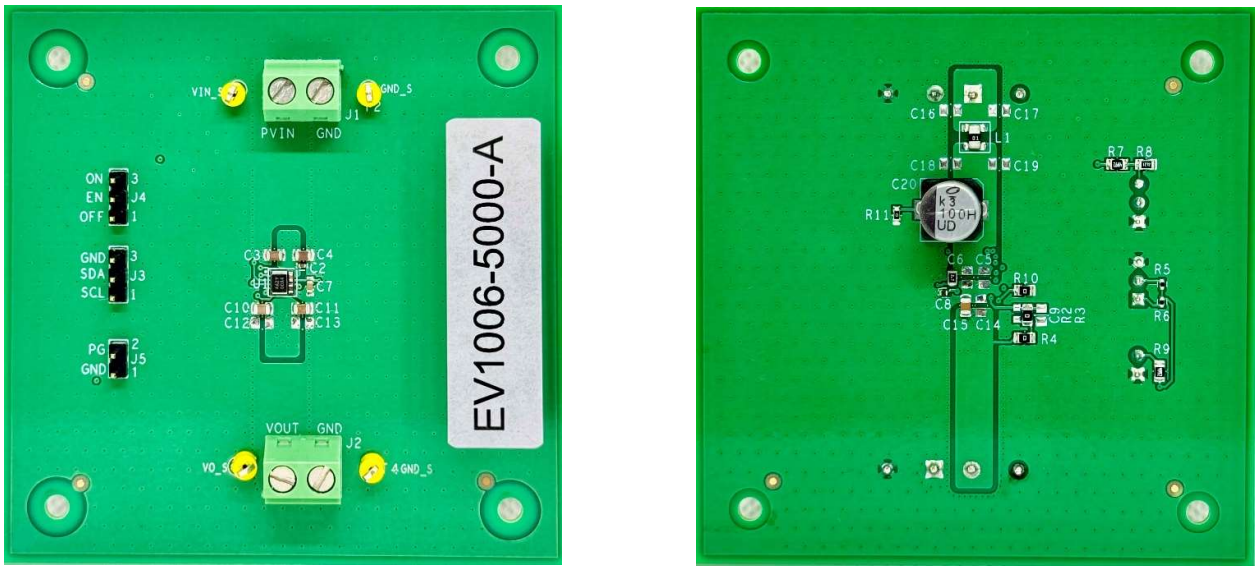

Figure 1 ***Board layout***

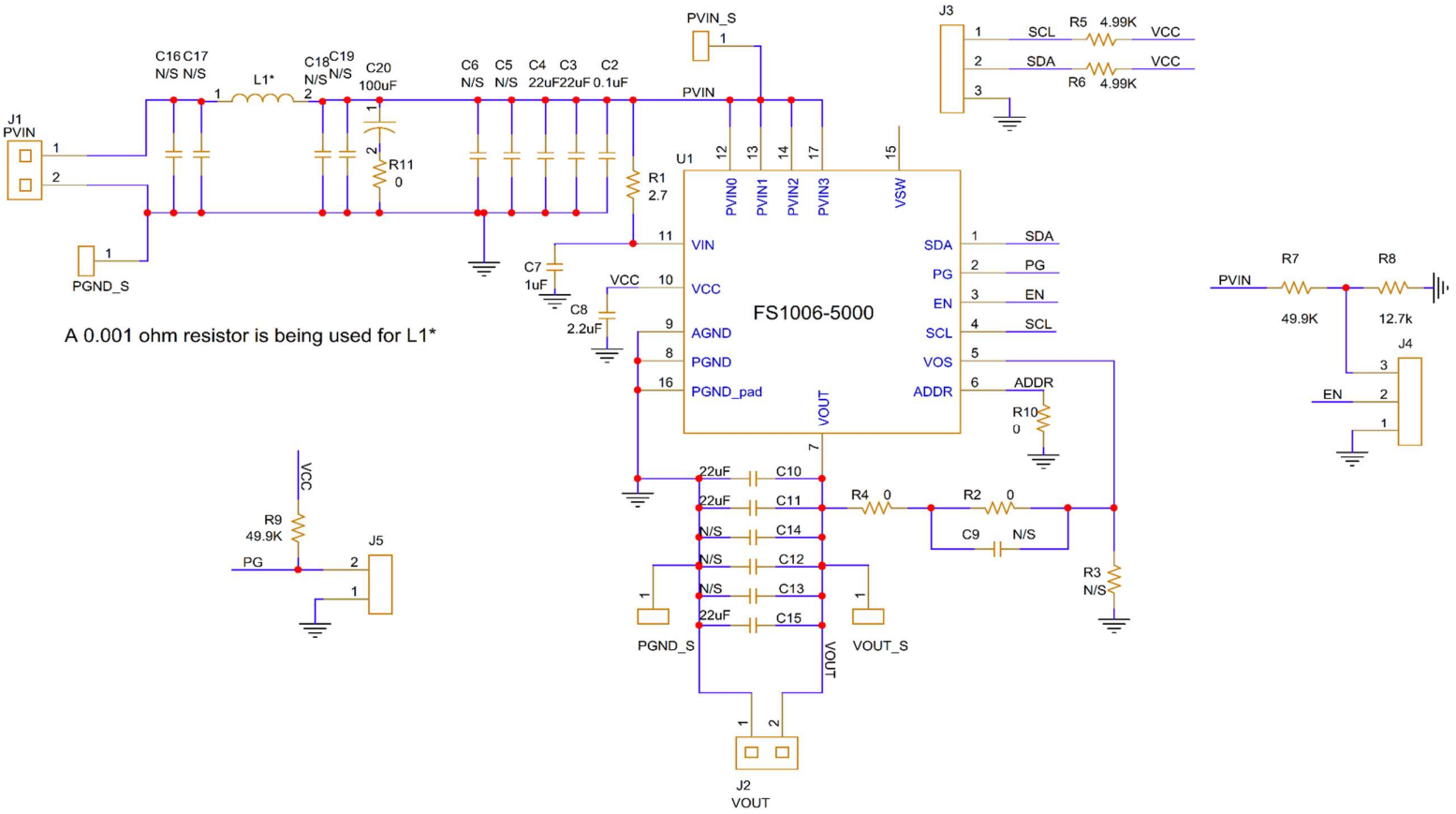

Figure 2 ***Schematic***

Typical performance

Figure 3 to Figure 17 show typical operating waveforms for the evaluation board, while Figure 18 shows a thermal image of the board in operation. In all cases, the board is operating at room temperature with no airflow; PV_{IN} is 12V, V_{OUT} is 5V and I_O is 0–6A.

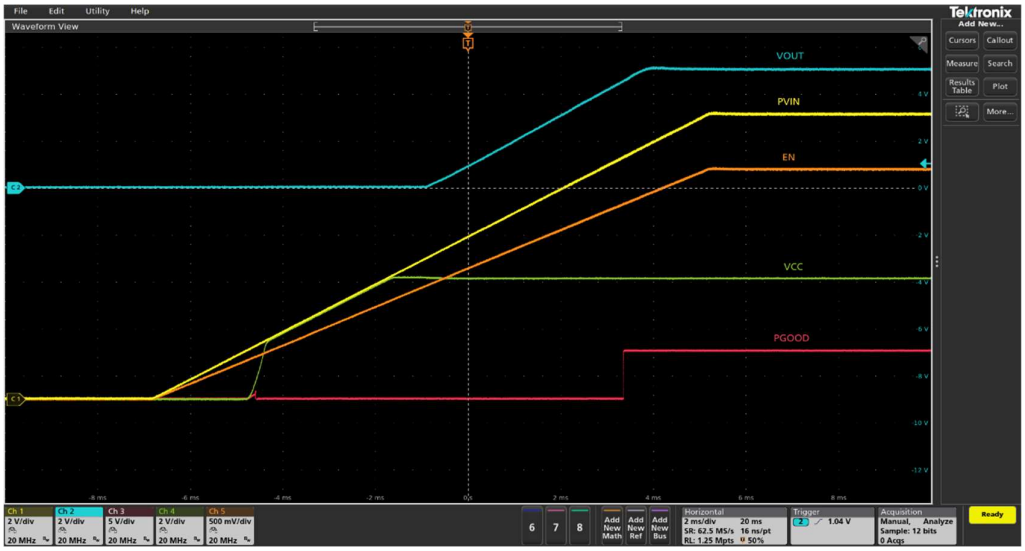

Figure 3 ***Startup with no load (Ch1 :PV_{IN}, Ch2: V_{OUT}, Ch3: PG, Ch4:V_{CC}, Ch5: Enable)***

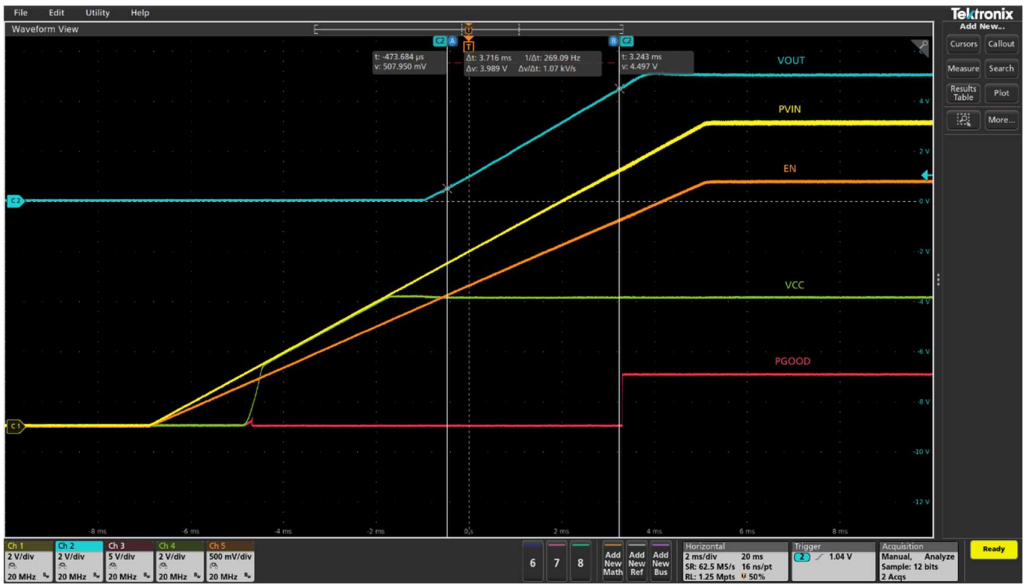

Figure 4 ***Startup with 6A load (Ch1:PV_{IN}, Ch2: V_{OUT}, Ch3: PG, Ch4:V_{CC}, Ch5: Enable)***

Figure 5 ***Shutdown with Enable de-assertion at 6A load (Ch1:PV_{IN}, Ch2: V_{OUT}, Ch3: PG, Ch4:V_{CC}, Ch5: Enable)***

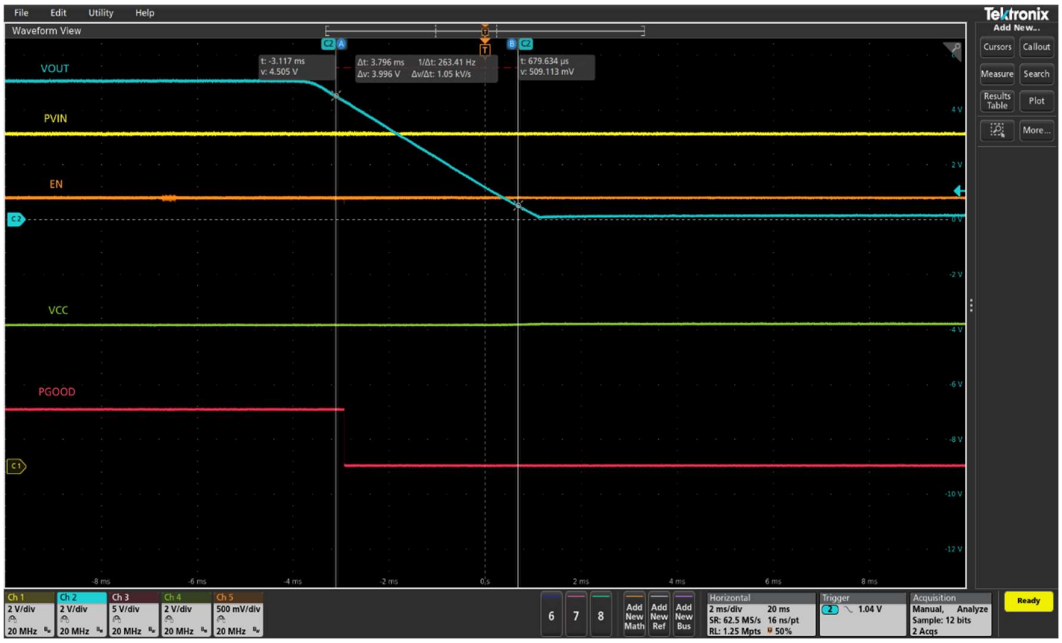

Figure 6 ***Soft turn off at 0A (Ch1:PV_{IN}, Ch2: V_{OUT}, Ch3: PG, Ch4:V_{CC}, Ch5: Enable***

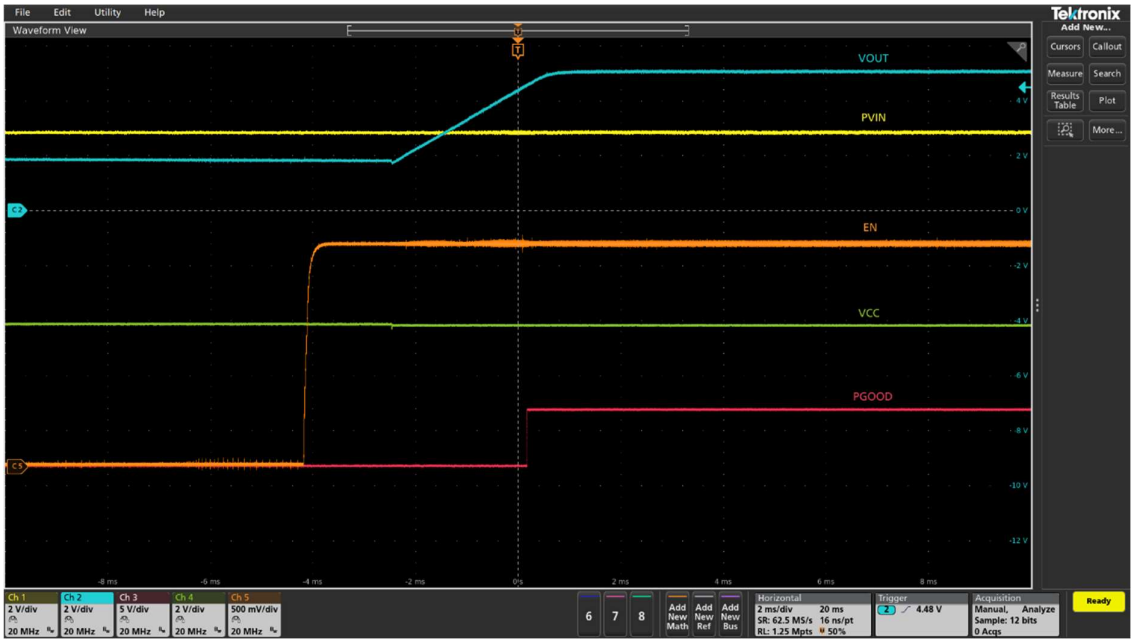

Figure 7 ***Startup into pre-bias (Ch1:PV_{IN}, Ch2: V_{OUT}, Ch3: PG, Ch4:V_{CC}, Ch5: Enable)***

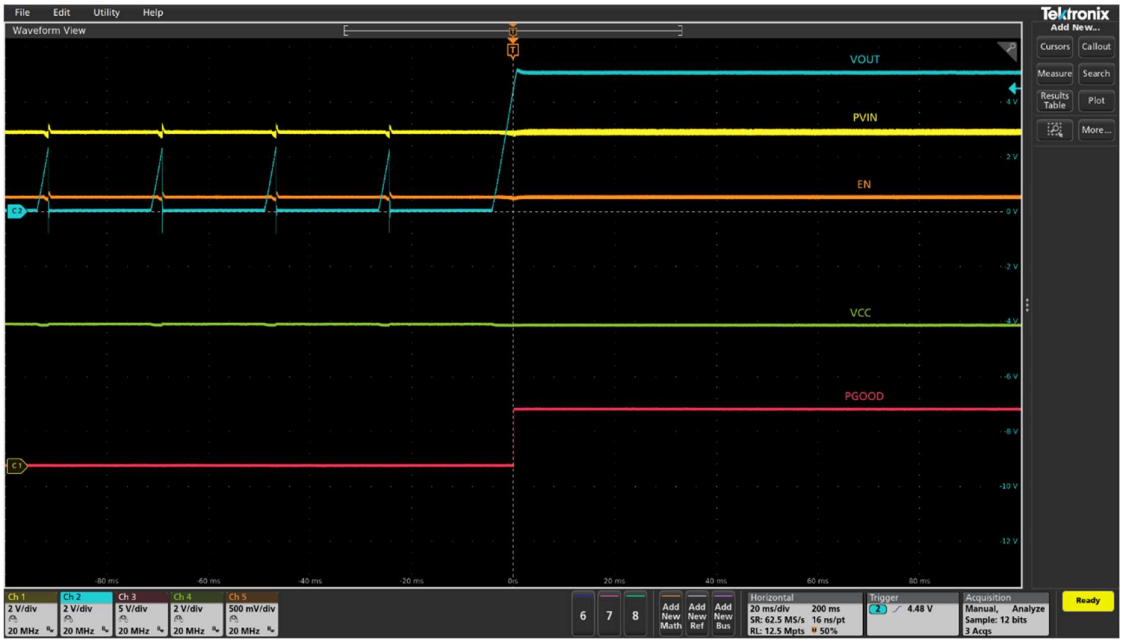

Figure 8 ***Over-current protection and auto-recover to 6A (Ch1:PV_{IN}, Ch2: V_{OUT}, Ch3: PG, Ch4:V_{CC}, Ch5: Enable)***

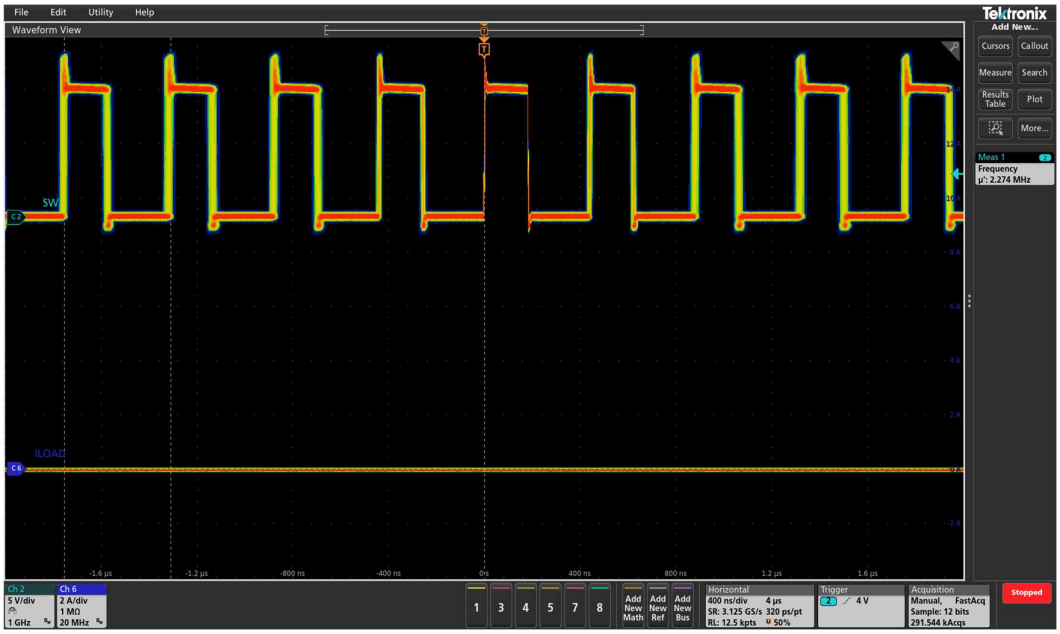

Figure 9 ***Sw at 0A (Ch2: Sw, Ch6: I_O), F_{SW} = 2.27 MHz***

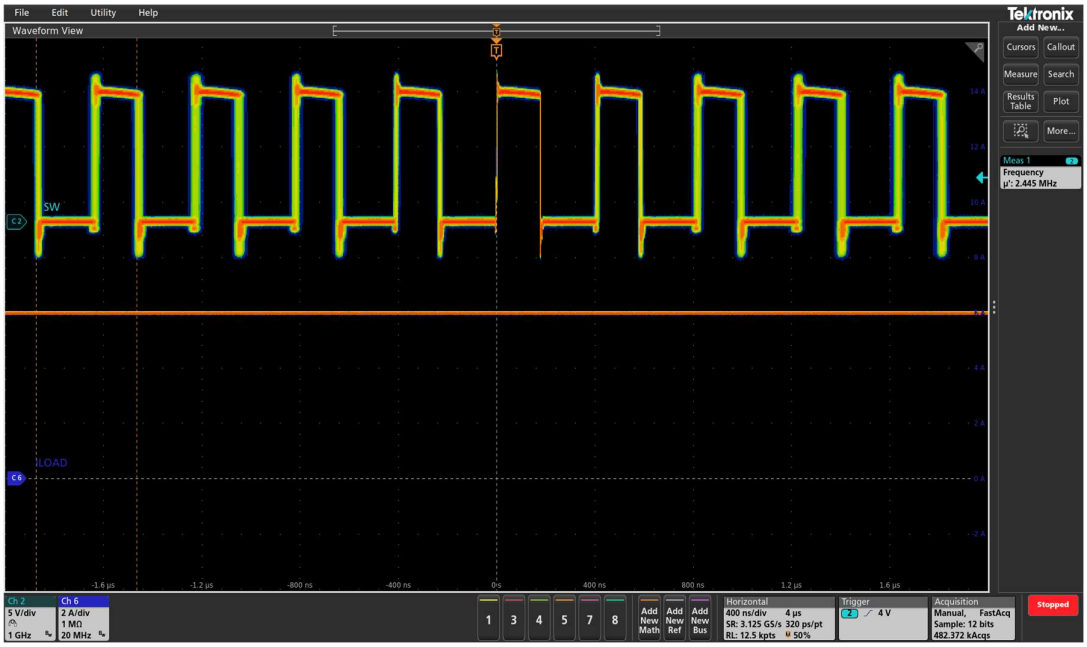

Figure 10 ***Sw at 6A (Ch2: Sw, Ch6: I_O), F_{SW} = 2.45 MHz***

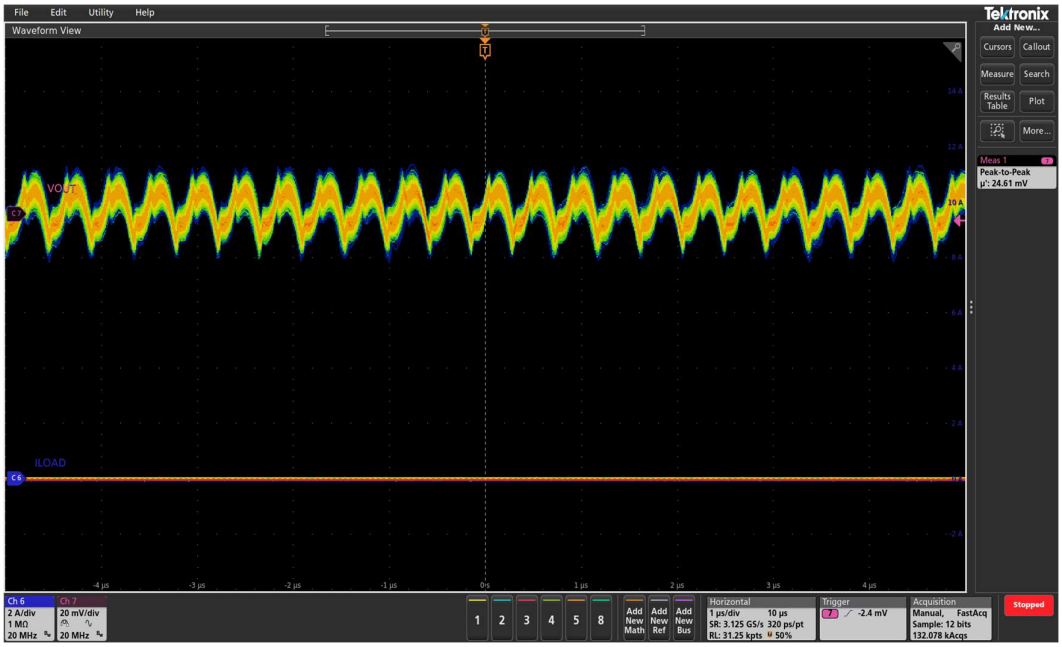

Figure 11 *V_{OUT} ripple at 0A (Ch6:I_O , Ch7:V_{OUT}), Peak-Peak V_{OUT} ripple = 24.6 mV*

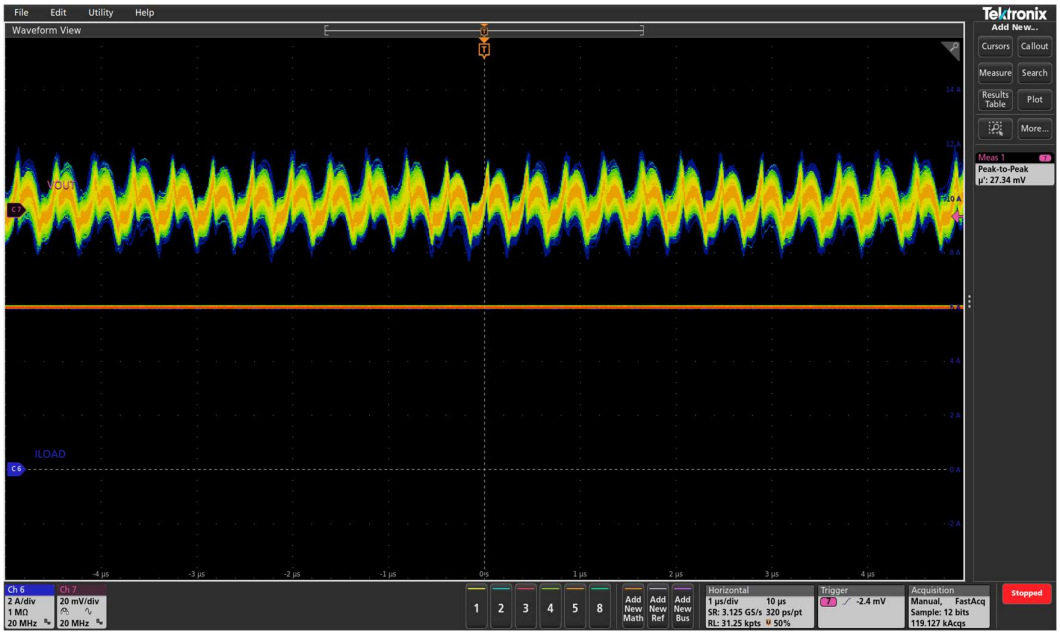

Figure 12 *V_{OUT} ripple at 6A (Ch6:I_O , Ch7:V_{OUT}), Peak-Peak V_{OUT} ripple = 27.3 mV*

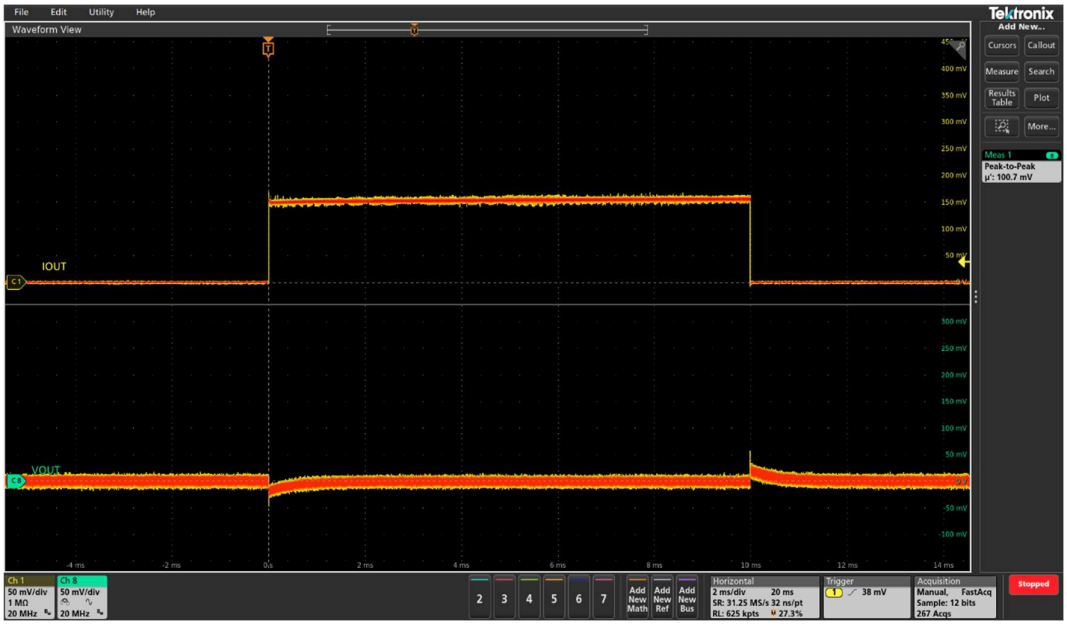

Figure 13 ***Transient response 0A to 3A @ 3A/us (Ch1:I_O, Ch8: V_{OUT}), peak-peak deviation = 100.7 mV***

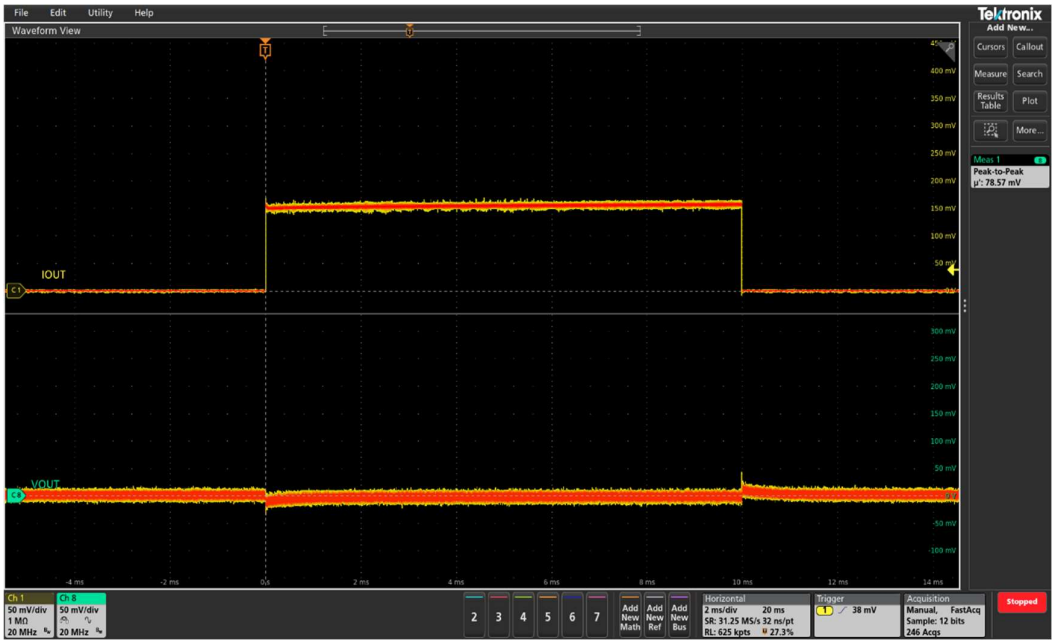

Figure 14 ***Transient response 3A to 6A @ 3A/us (Ch1:I_O, Ch8: V_{OUT}), peak-peak deviation = 78.6 mV***

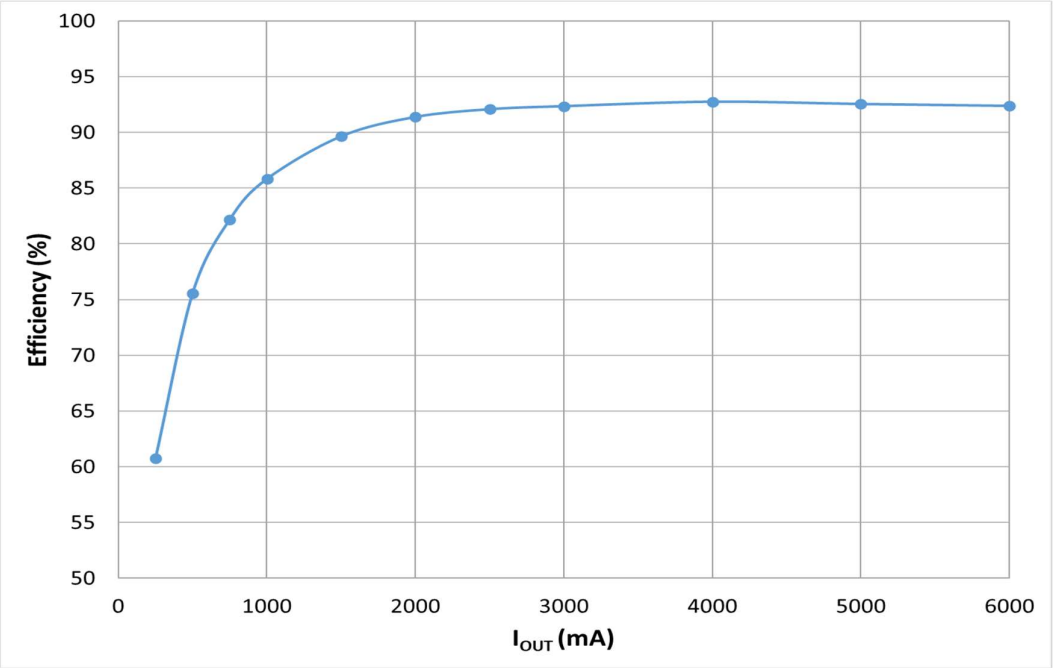

Figure 15 ***Efficiency***

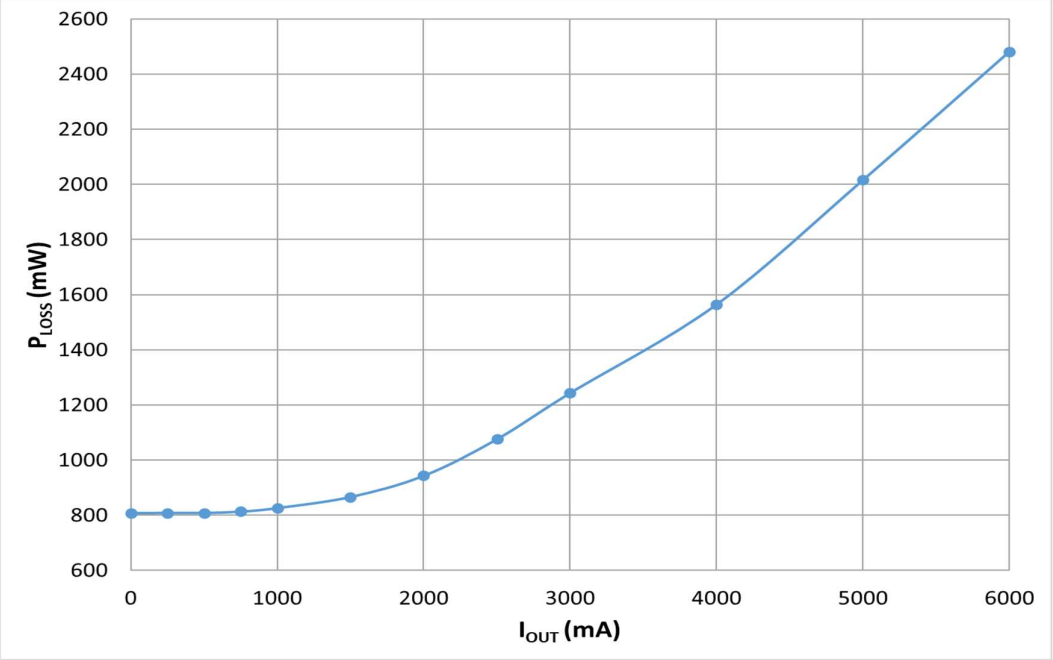

Figure 16 ***Power loss***

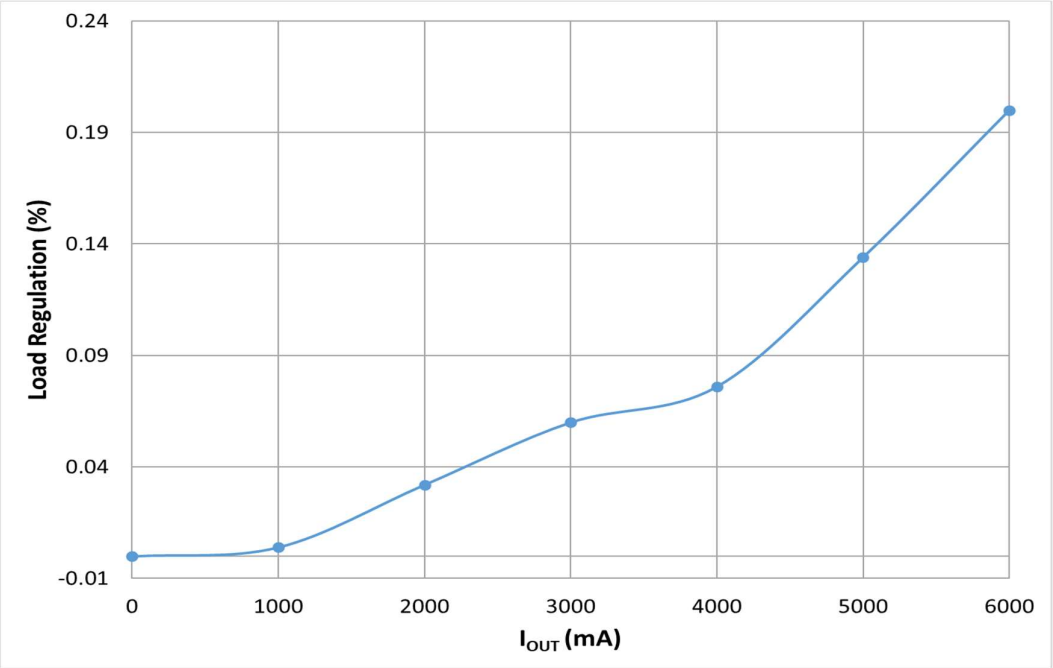

Figure 17 ***Load Regulation***

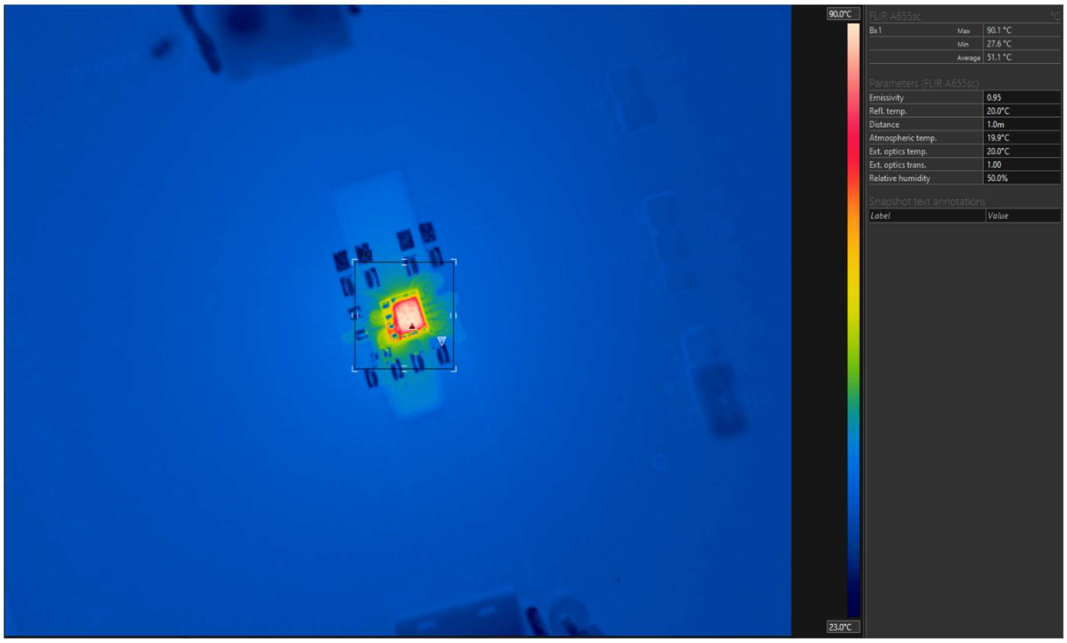

Figure 18 ***Thermal image(PVIN=12V, I_{OUT}=6A) – maximum temperature rise = 67°C***

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