EV1703-3300-A EVALUATION BOARD USER GUIDE

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Introduction

This user guide describes the evaluation board provided for the FS1703 µPOL™ product.

The board generates an output voltage (V_{OUT}) of 3.3V for loads of 0–3A from an input voltage (PV_{IN}) of 5V.

Specifications

- Input voltage (PV_{IN}) = +5V
- Output voltage (V_{OUT}) = +3.3V
- Output load (I_O) = 0–3A
- Switching frequency (F_{SW}) = 580 kHz
- Output capacitance (C_O) = 3x22µF (MLCC)
- In put capacitance (C_{IN}) = 2x22µF (MLCC)
- Dimensions (width x length x thickness) = 63 x 84 x 1.5mm

Connections

Name	Identifier	Description
PV_{IN}	J1	Input voltage (+5V)
Gnd	J2	Ground for input voltage
V_{OUT}	J8	Output voltage (+3.3V)
Gnd	J7	Ground for output voltage
V_{CC}	TP2	Internal supply (V_{CC}) – output of an LDO regulator
Gnd	TP3	Ground for internal supply
En	TP11	Enable
PG	TP12	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 +5V input supply to PV_{IN} (J1) and Gnd (J2).
2. Connect a load of 0–3A to V_{OUT} (J8) and Gnd (J7).

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 FS1703, are mounted on the top side of the board.

Part reference	Quantity	Type	Description
FS1403 µPOL	1	–	Main IC
C10, C21	2	22µF	0805, 16V, X5R
C12	1	0.1µF	0402, 16V, X7R
C13	1	68µF	25V
C14, C15, C16	3	22µF	0805, 6.3V, X5R
C26	1	1µF	0603, 25V, X5R
J1	1	Red	Banana connector
J2, J7	2	Black	Banana connector
J8	1	Green	Banana connector
J10, J11	2	–	3-pin header
R1	1	2.7Ω	10%, 1/8W, 0805 case size
R3, R7	2	49.9kΩ	10%, 1/8W, 0805 case size
R2, R4, R9, R11, R13, R17	6	0Ω	0402 case size
R6	1	24.9kΩ	10%, 1/8W, 0805 case size
R18, R19	2	4.99kΩ	0402 case size
TP1-TP12, SW/NC15, VBUS, VEXTBUS, SCL, SDA	17	–	Test points

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

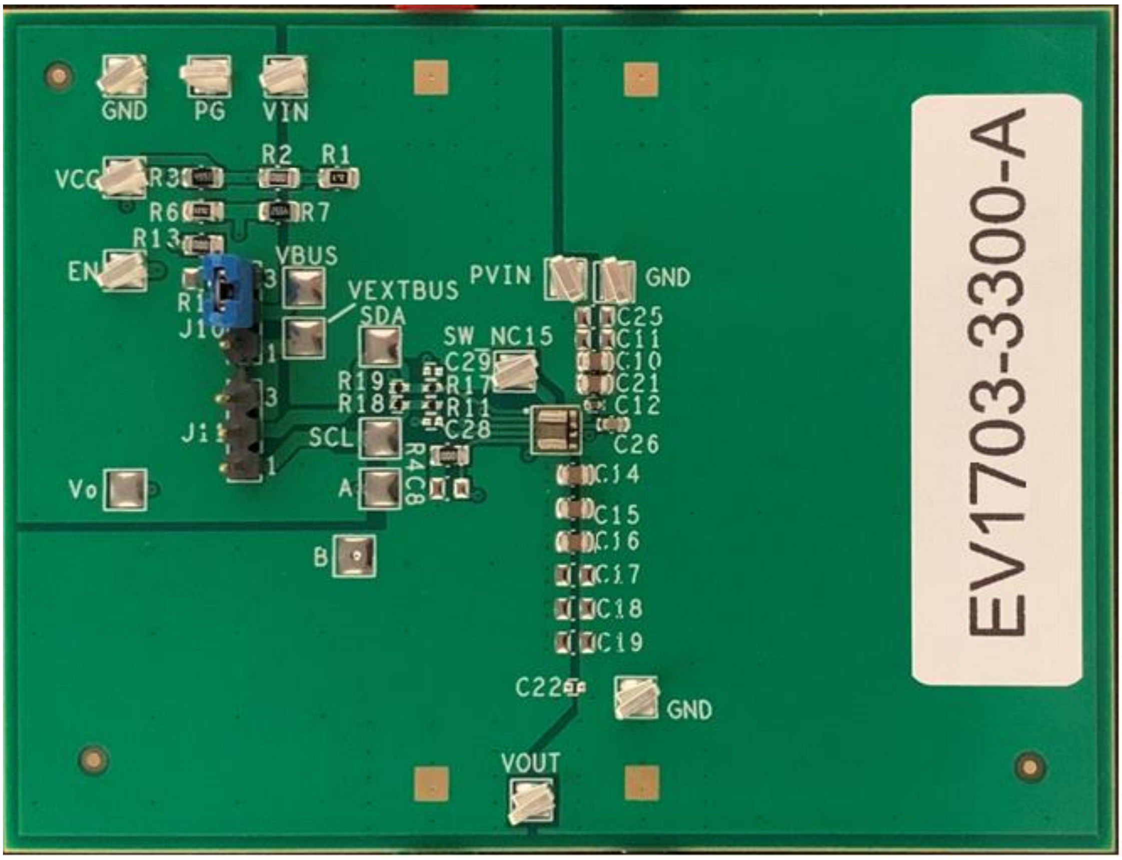

Figure 1 ***Board layout***

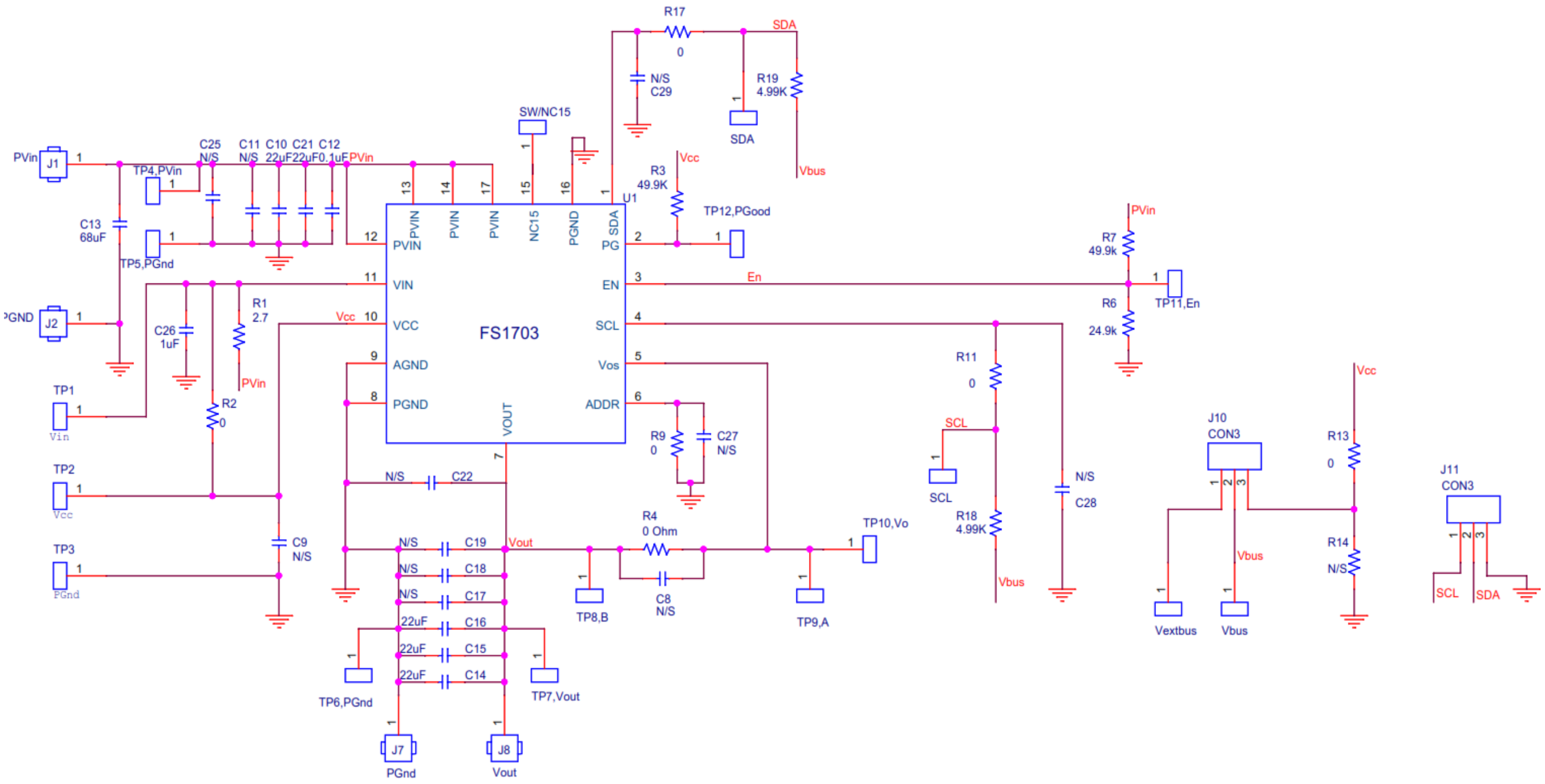

Figure 2 ***Schematic***

Typical performance

Figure 3 to Figure 14 show typical operating waveforms for the evaluation board, while Figure 15 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 5V, V_{OUT} is 3.3V and I_O is 0–3A.

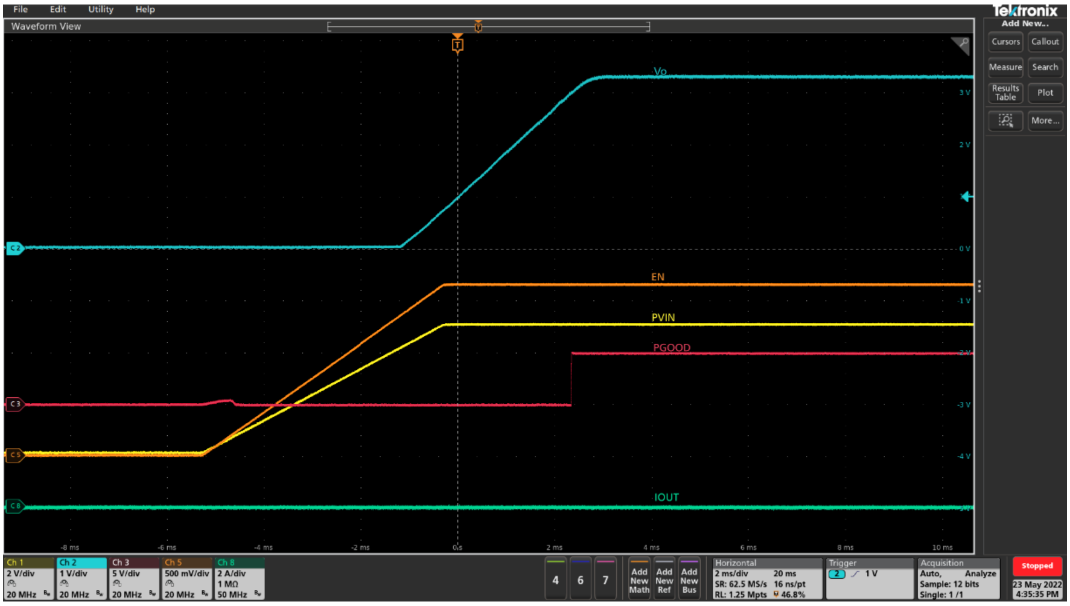

Figure 3 ***Startup with no load (Ch1: PV_{IN}, Ch2: V_{OUT}, Ch3: PG, Ch5: Enable, Ch8: I_{OUT})***

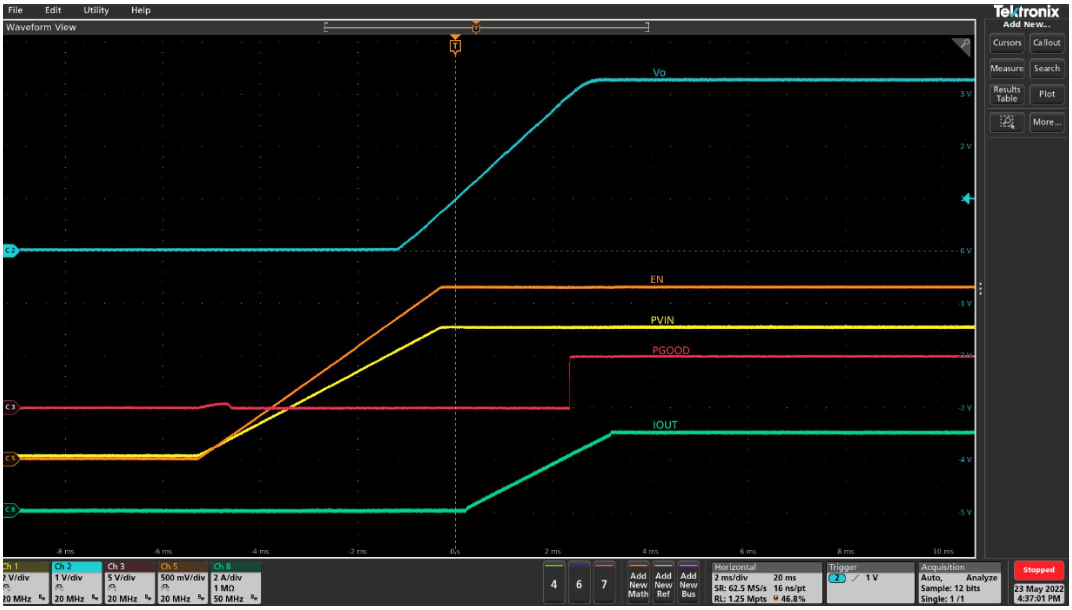

Figure 4 ***Startup with 3A load (Ch1: PV$_{IN}$, Ch2: V$_{OUT}$, Ch3: PG, Ch5: Enable, Ch8: I$_{OUT}$)***

Figure 5 ***Shutdown with VCC UVLO at 3A load (Ch1: PV$_{IN}$, Ch2: V$_{OUT}$, Ch3: PG, Ch5: Enable, Ch8: I$_{OUT}$)***

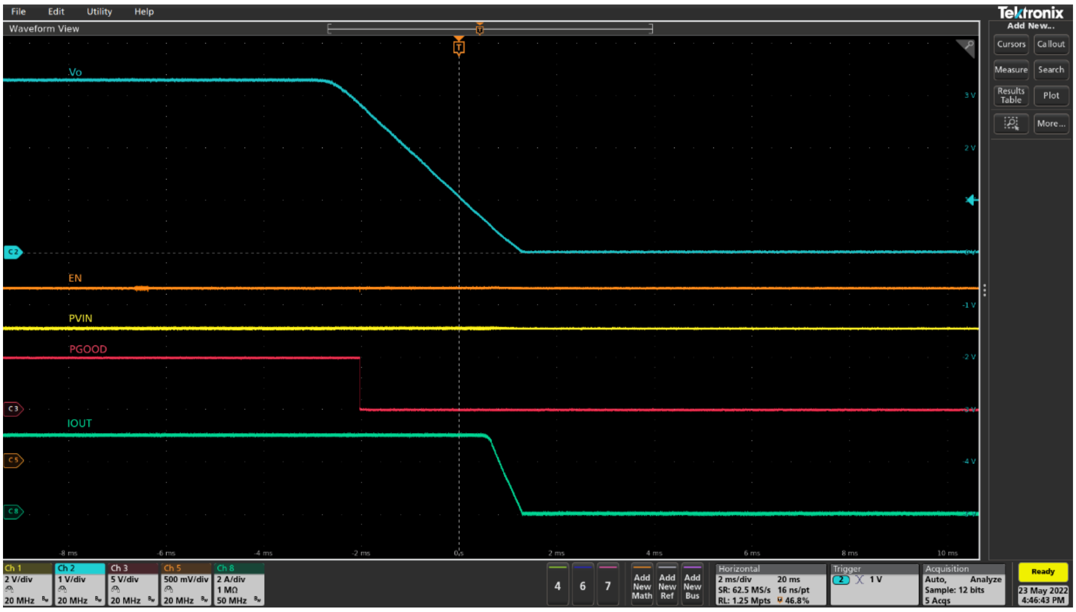

Figure 6 *Soft turn off at 3A (Ch1: PV_{IN}, Ch2: V_{OUT}, Ch3: PG, Ch5: Enable, Ch8: I_{OUT})*

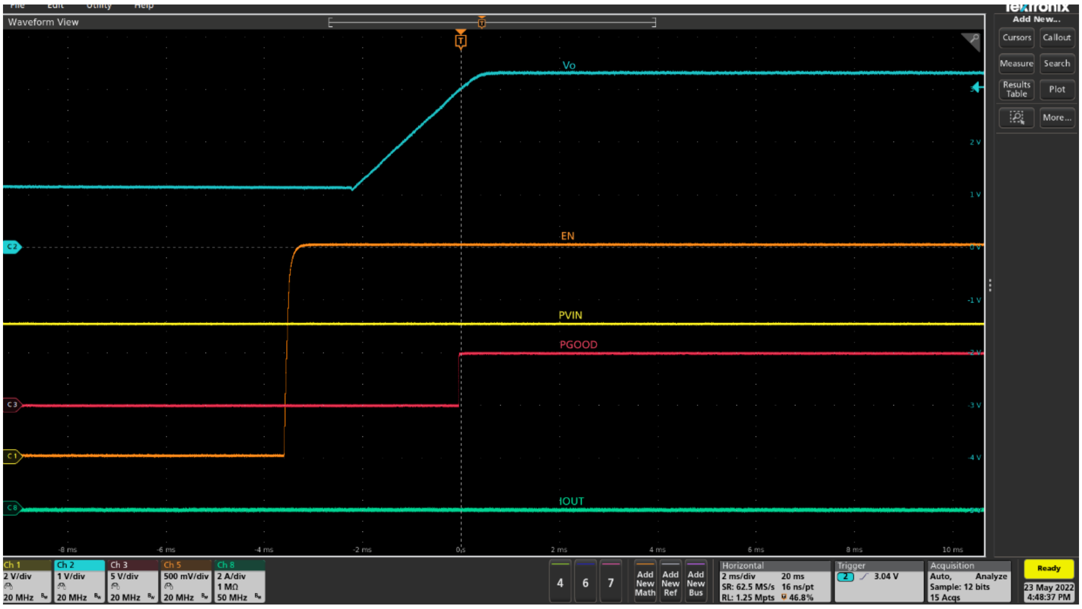

Figure 7 *Startup into pre-bias (Ch1: PV_{IN}, Ch2: V_{OUT}, Ch3: PG, Ch5: Enable, Ch8: I_{OUT})*

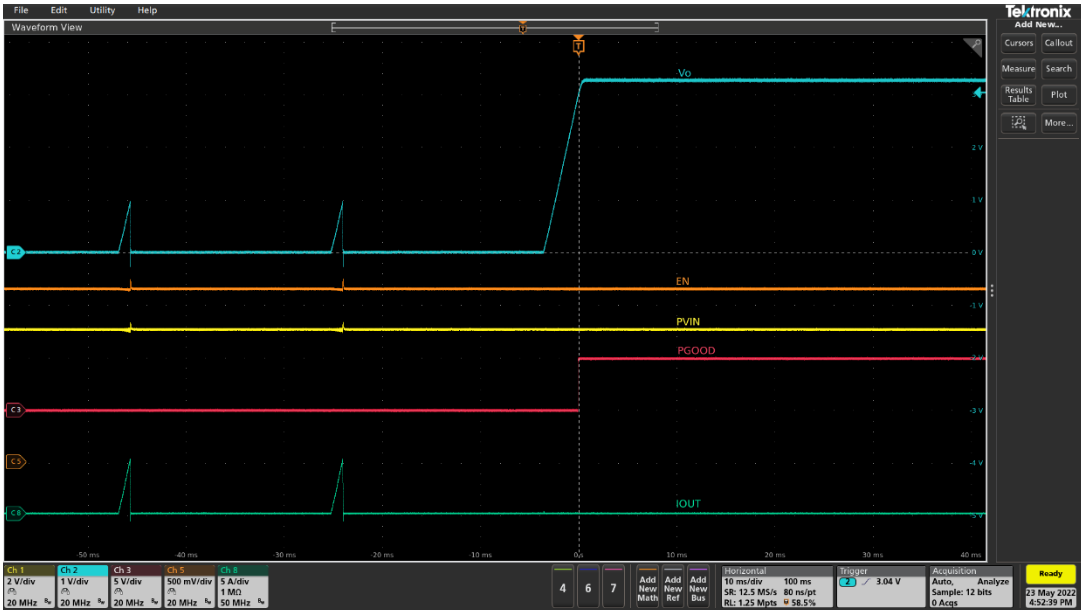

Figure 8 ***Over-current protection and auto-recover to 3A (Ch1: PV_{IN}, Ch2: V_{OUT}, Ch3: PG, Ch5: Enable, Ch8: I_{OUT})***

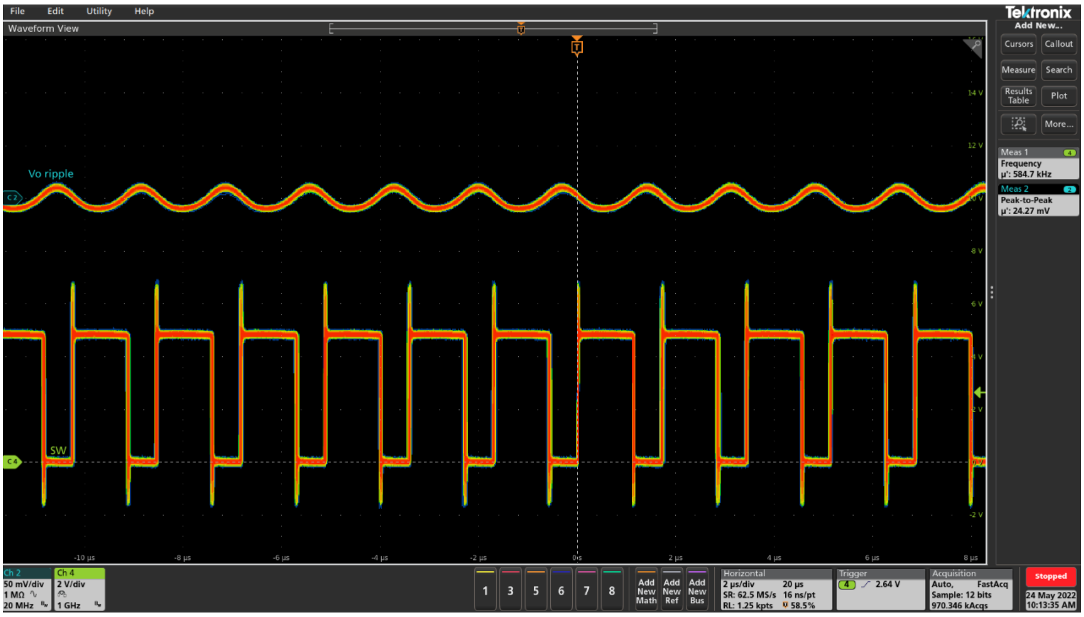

Figure 9 ***Sw and V_{OUT} ripple at 0A (Ch2: V_{OUT} Ripple, Ch4: Sw)***

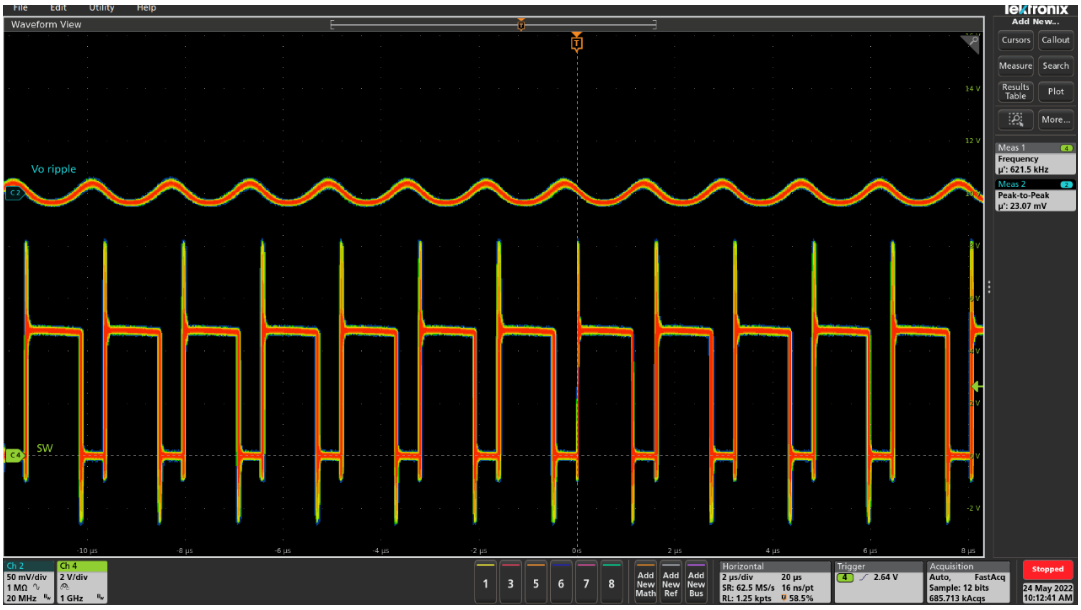

Figure 10 *Sw and V_{OUT} ripple at 3A (Ch2: V_{OUT} Ripple, Ch4: Sw)*

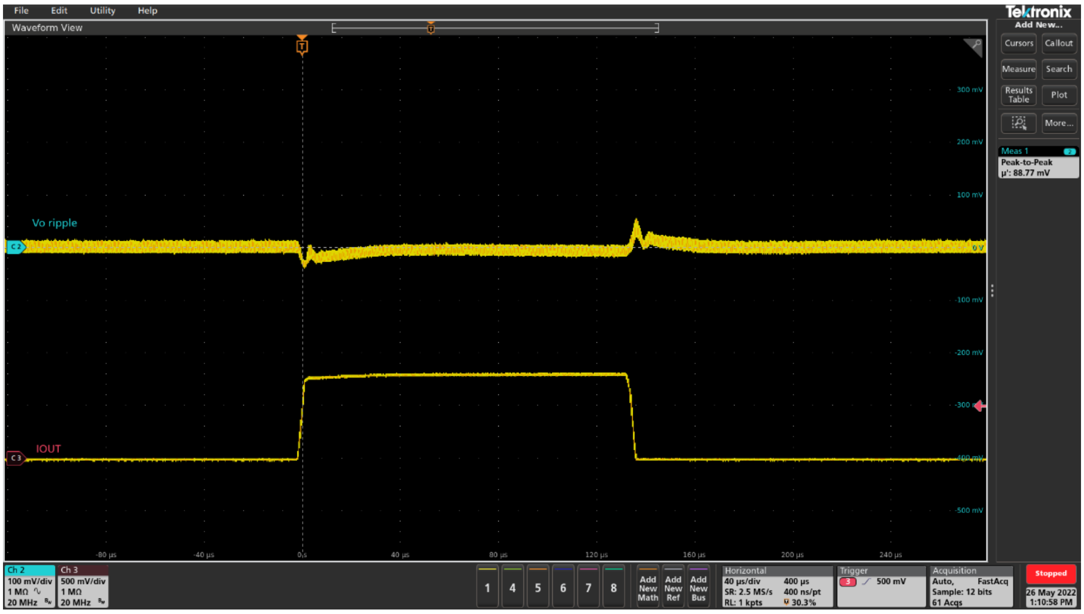

Figure 11 *Transient response 0A to 1.5A (Ch2: V_{OUT} rIpple, Ch3: I_{OUT}), peak-peak deviation = 89mV*

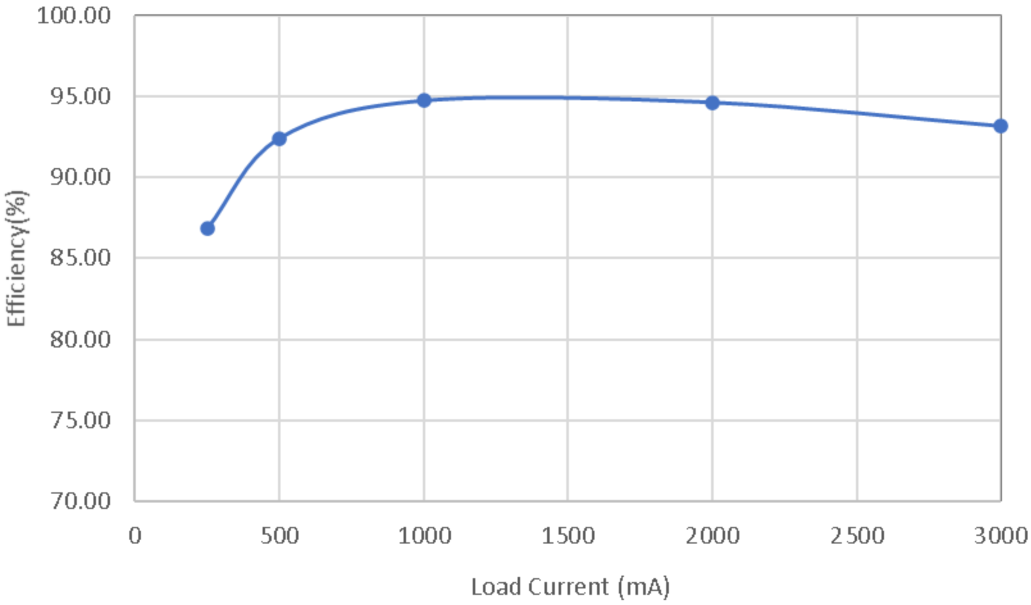

Figure 12 ***Efficiency***

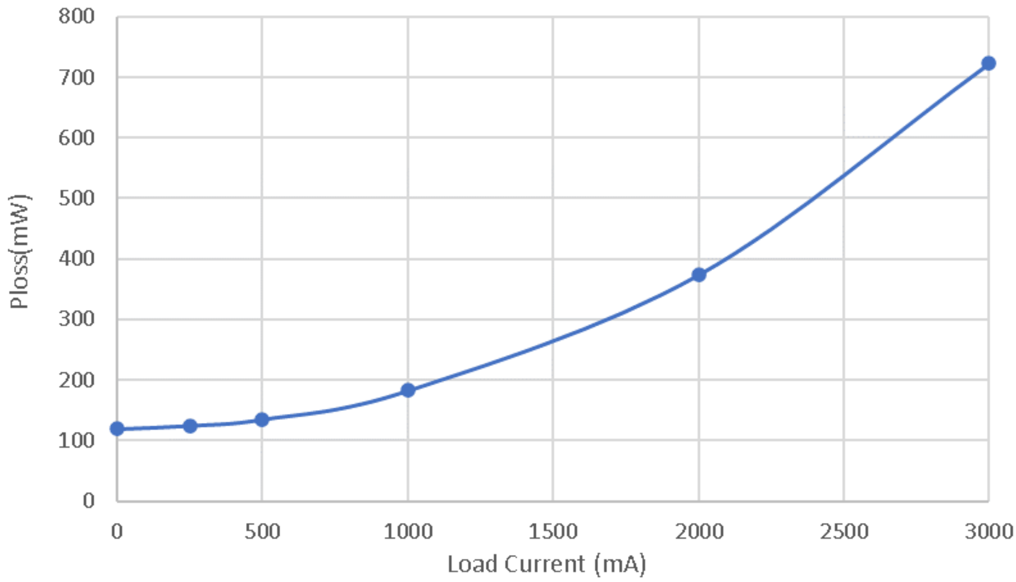

Figure 13 ***Power loss***

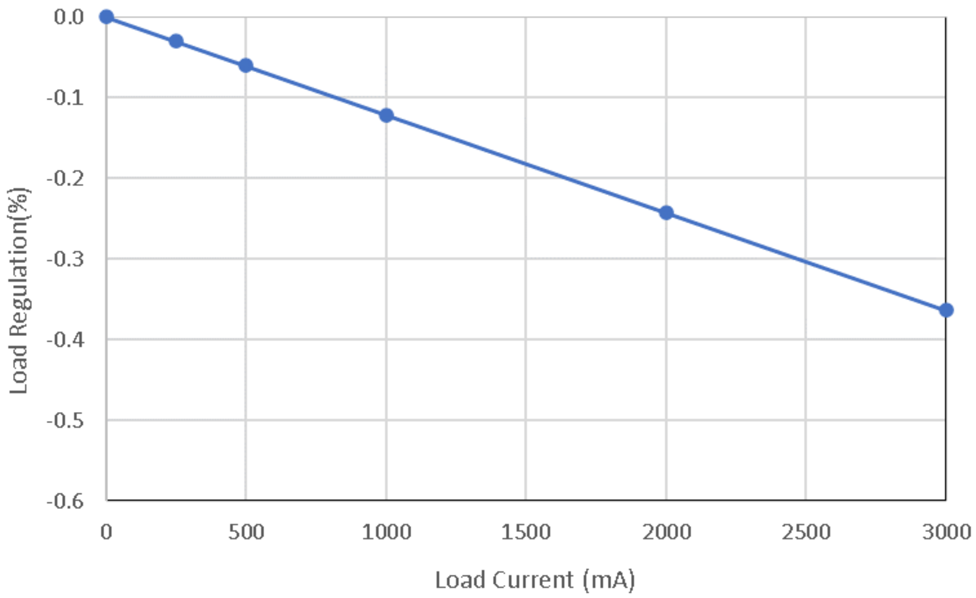

Figure 14 ***Load regulation (I_{OUT} = 0–3A)***

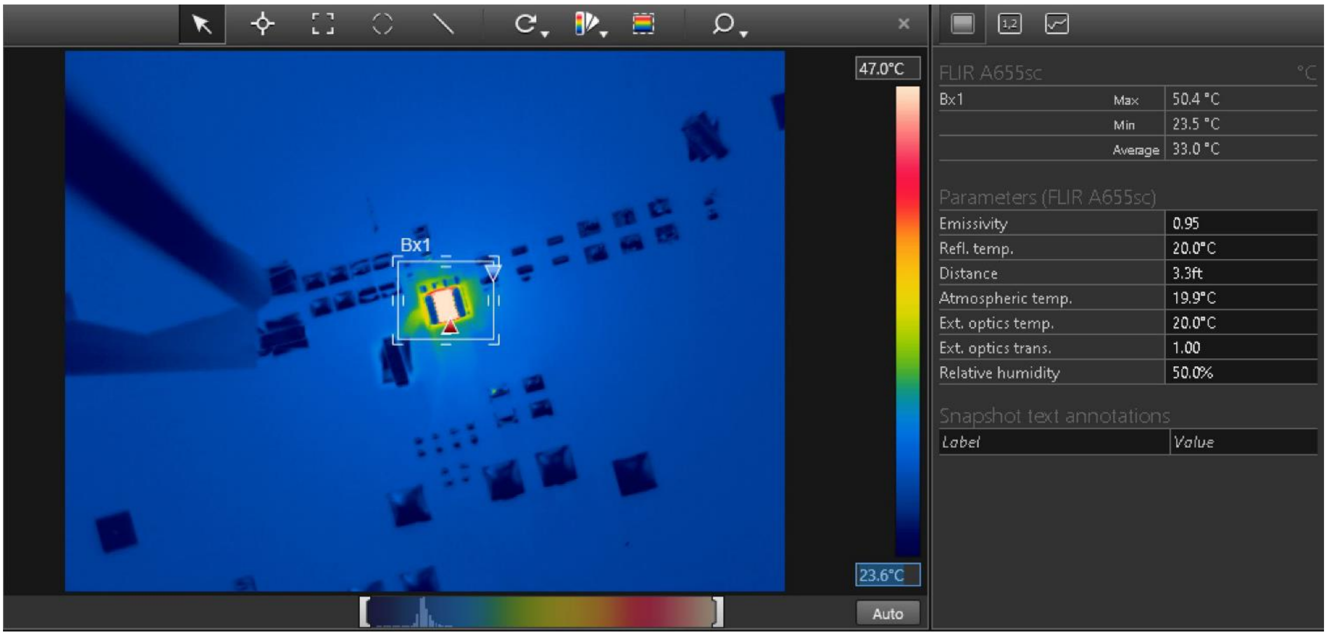

Figure 15 ***Thermal image (PVIN=5V, I_{OUT} =3A) – maximum temperature rise = 30°C***

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REMINDER

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11. Disaster prevention/crime prevention equipment
12. Safety equipment
13. Other applications that are not considered general-purpose applications

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AU	**3287379M 3287437AA 3290643AA 3291357AA**
CN	**10371856C 10452610C 10458656C 10459360C 10465848C 1069332A 11124619A 11346682A 1685299A 1685459A 1685582A 1685583A 1698023A 1802619A**
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Document revision history

For more information about TDK's µPOL™ products, contact parviz.parto@tdk-electronics.tdk.com.

Revision	Date	Description	Author
1.0	06-1-2022	First formal version	Katherine Zhang