



EV1703-3300-A EVALUATION BOARD USER GUIDE



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Introduction

This user guide describes the evaluation board provided for the FS1703 μ POL™ 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) = 3x22 μ F (MLCC)
- Input capacitance (C_{IN}) = 2x22 μ F (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 |
|---|----------|---------------------|---------------------------|
| FS1703 μ POL | 1 | – | Main IC |
| C10, C21 | 2 | 22 μ F | 0805, 16V, X5R |
| C12 | 1 | 0.1 μ F | 0402, 16V, X7R |
| C13 | 1 | 68 μ F | 25V |
| C14, C15, C16 | 3 | 22 μ F | 0805, 6.3V, X5R |
| C26 | 1 | 1 μ F | 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 | 2.7 Ω | 10%, 1/8W, 0805 case size |
| R3, R7 | 2 | 49.9k Ω | 10%, 1/8W, 0805 case size |
| R2, R4, R9 | 3 | 0 Ω | 0805 case size |
| C28, C29 | 2 | 0 Ω (Note 1) | 0402 case size |
| R6 | 1 | 24.9k Ω | 10%, 1/8W, 0805 case size |
| VIN, PG, EN, VCC, SW_NC15, VOUT, PVIN, GNDs | 10 | – | Test points |

Note 1: 0ohm is placed on capacitor footprint to ground NC pin.

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

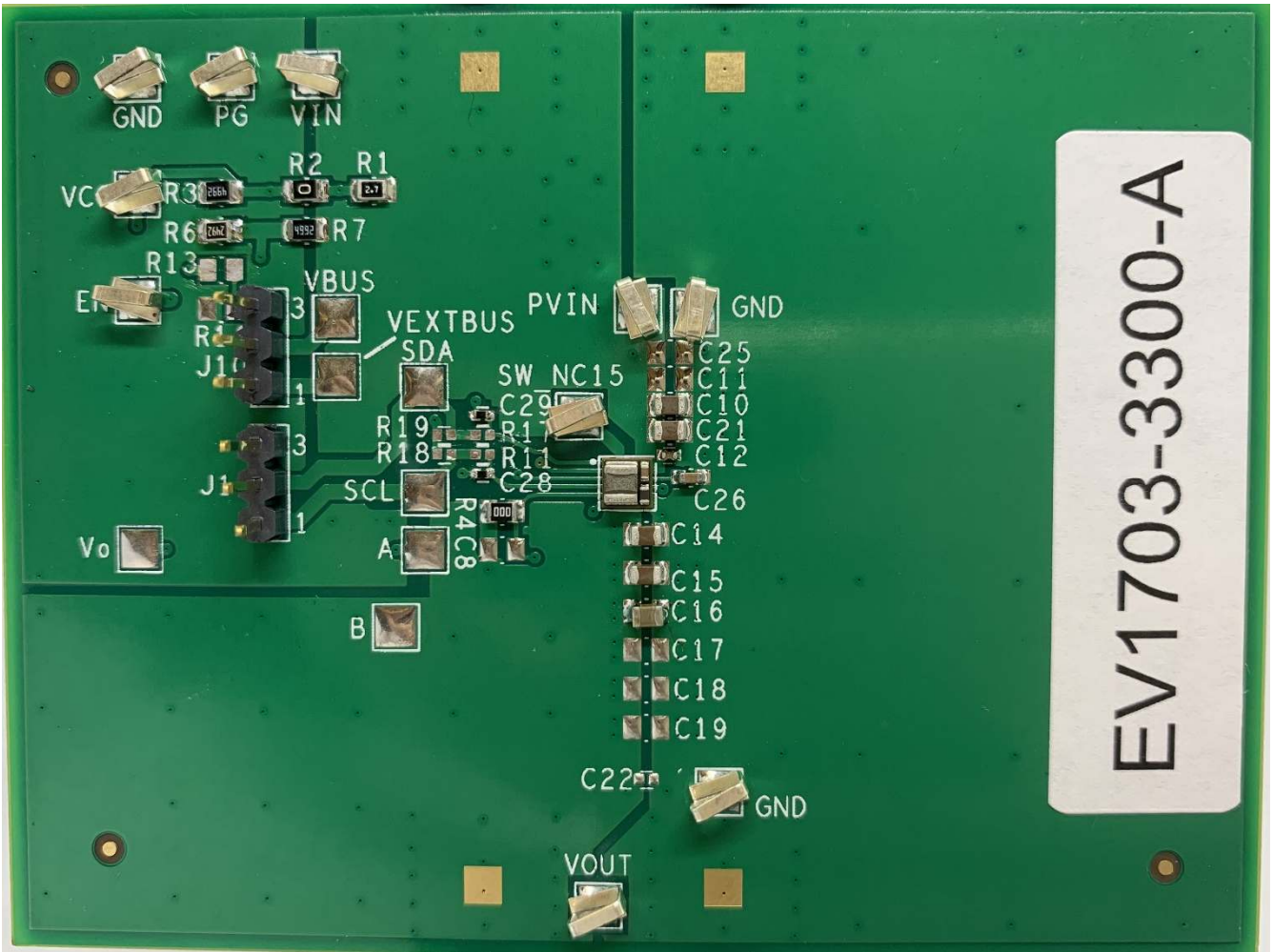


Figure 1 Board layout

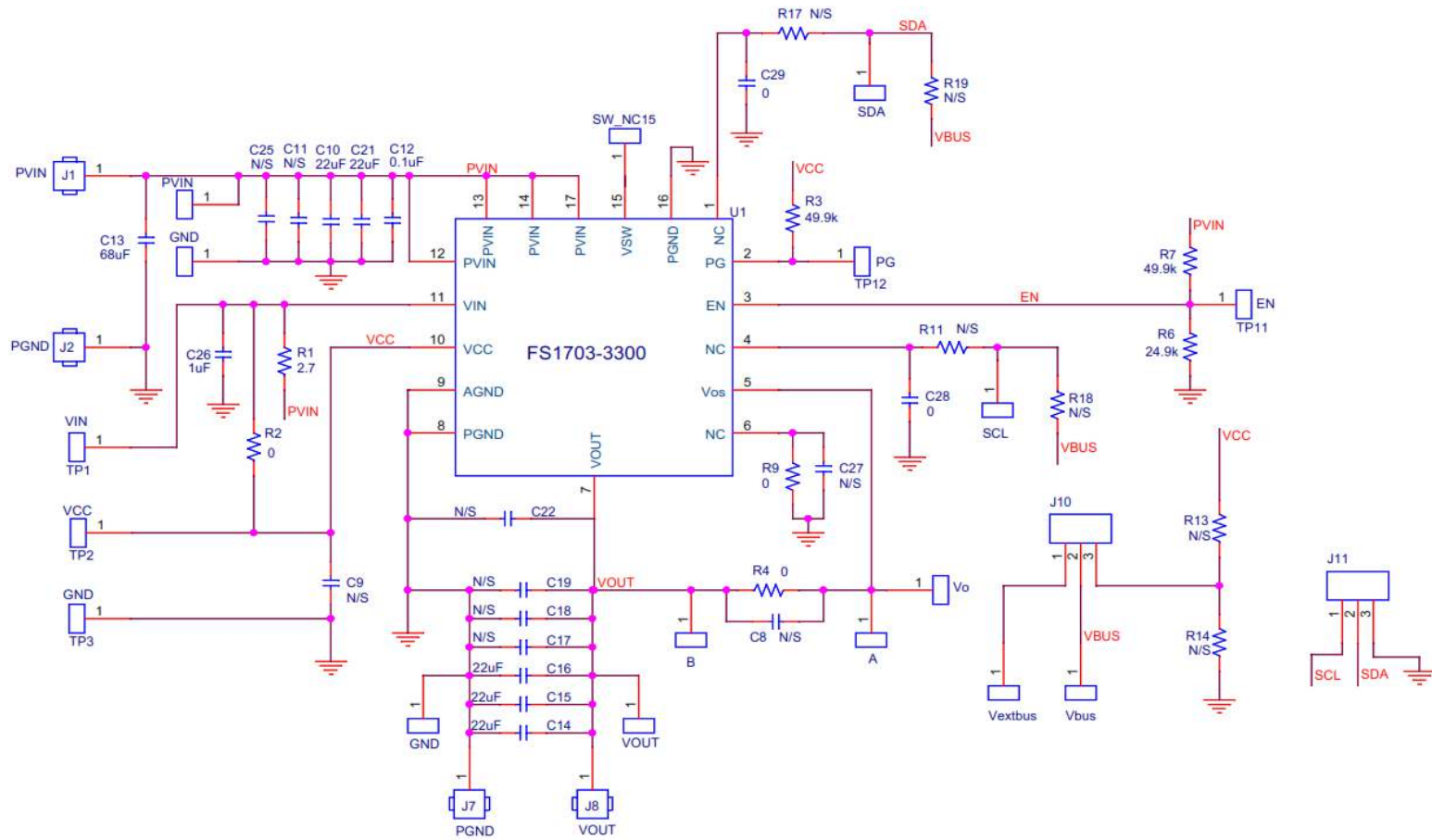


Figure 2 Schematic

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.

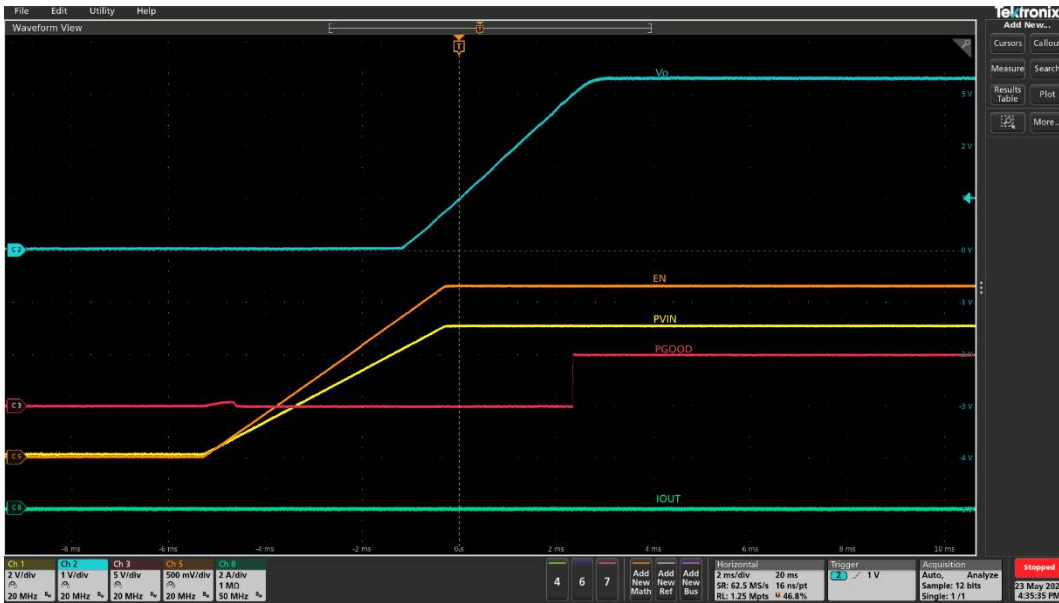


Figure 3 Startup with no load (Ch1: PV_{IN} , Ch2: V_{OUT} , Ch3: PG, Ch5: Enable, Ch8: I_{OUT})

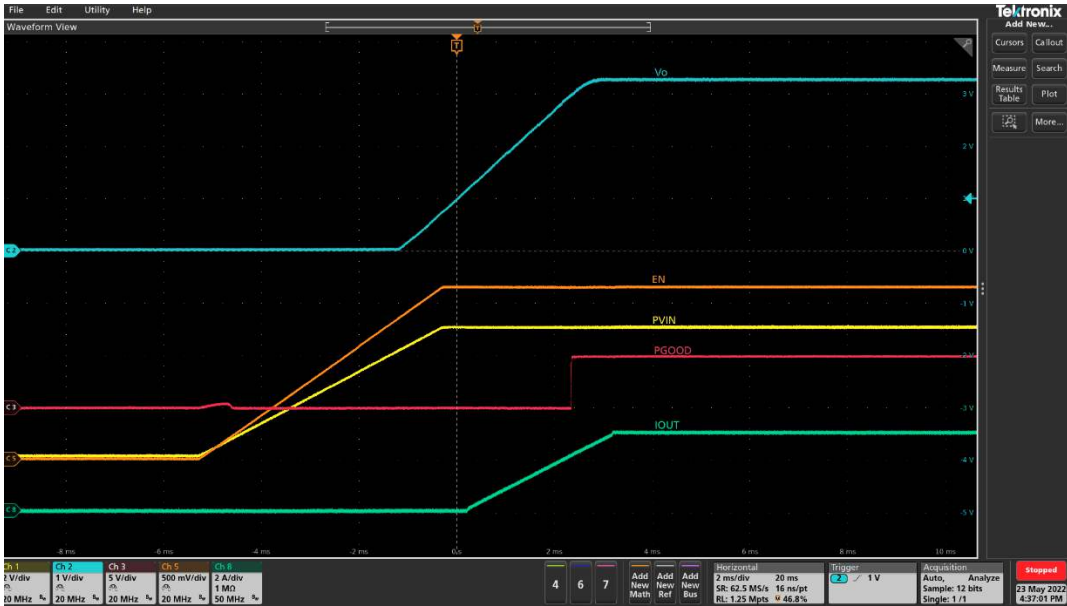


Figure 4 Startup with 3A load (Ch1: PV_{IN}, Ch2: V_{OUT}, Ch3: PG, Ch5: Enable, Ch8: I_{OUT})

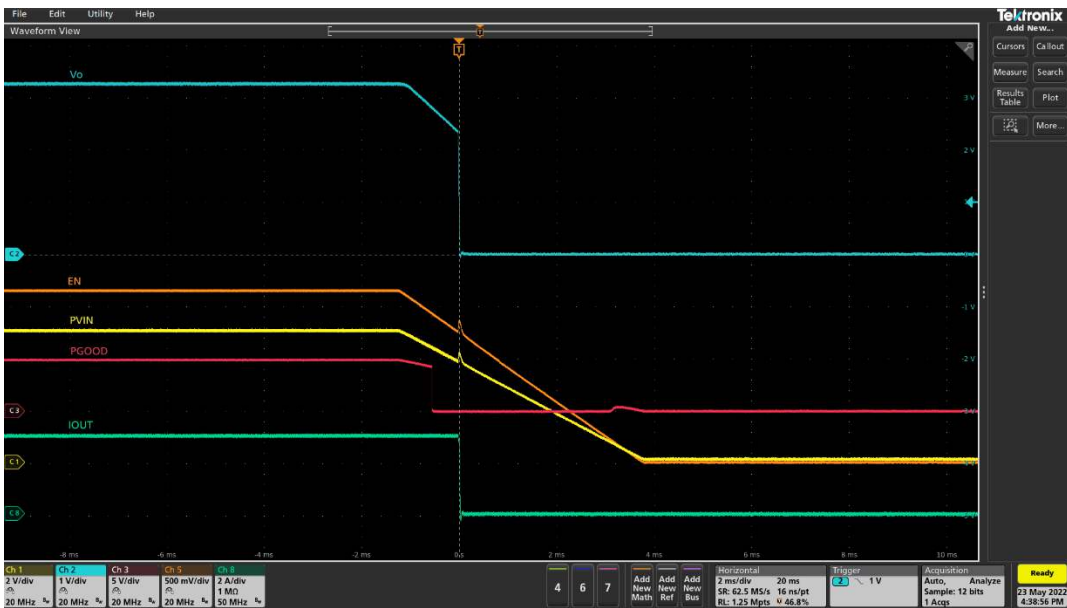


Figure 5 Shutdown with VCC UVLO at 3A load (Ch1: PV_{IN}, Ch2: V_{OUT}, Ch3: PG, Ch5: Enable, Ch8: I_{OUT})

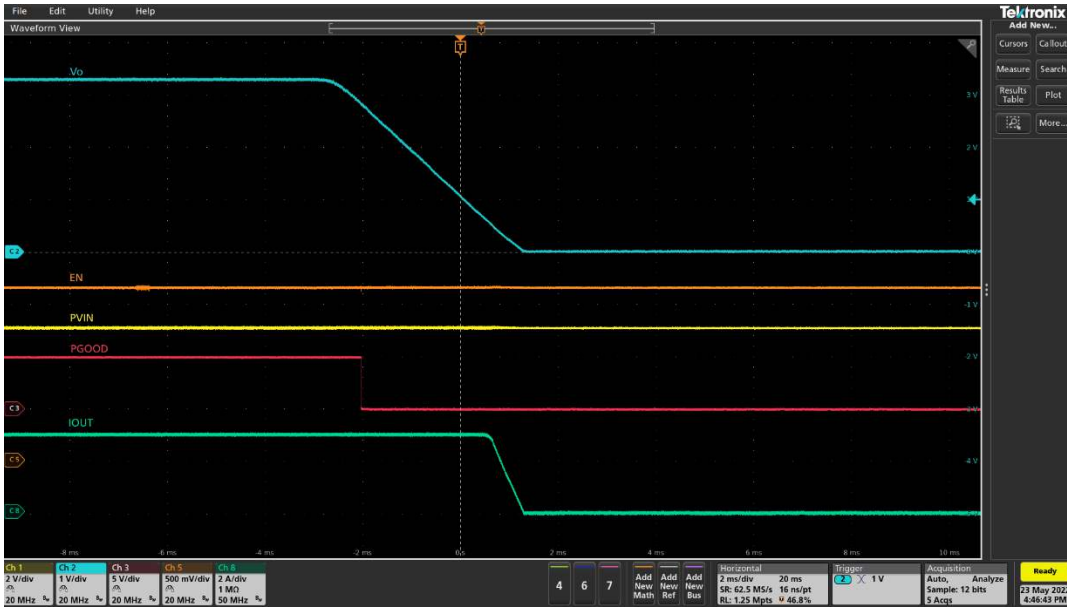


Figure 6 Soft turn off at 3A (Ch1: PV_{IN} , Ch2: V_{OUT} , Ch3: PG, Ch5: Enable, Ch8: I_{OUT})

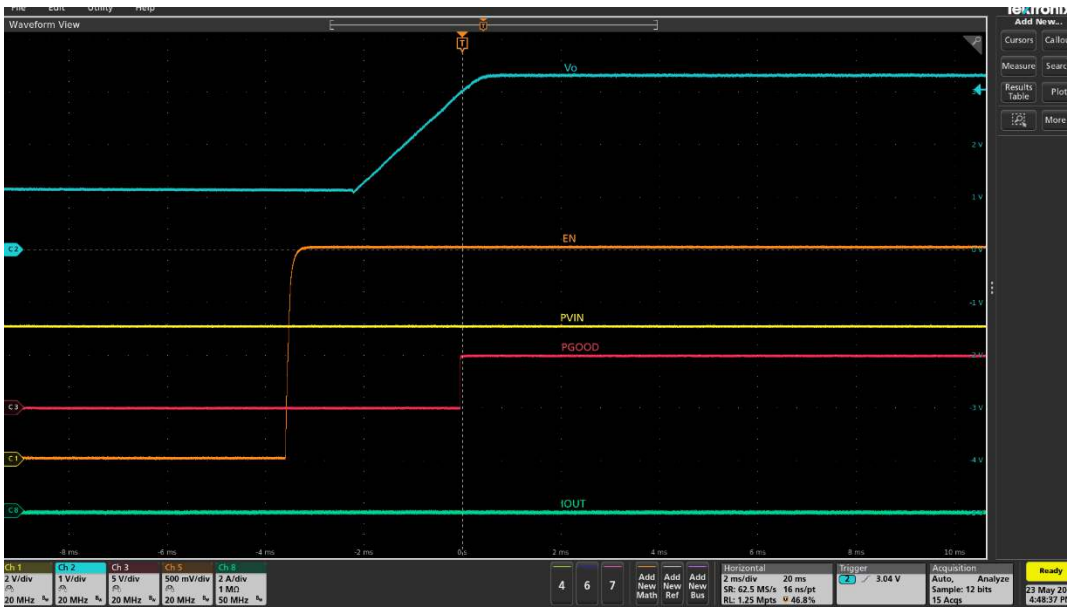


Figure 7 Startup into pre-bias (Ch1: PV_{IN} , Ch2: V_{OUT} , Ch3: PG, Ch5: Enable, Ch8: I_{OUT})

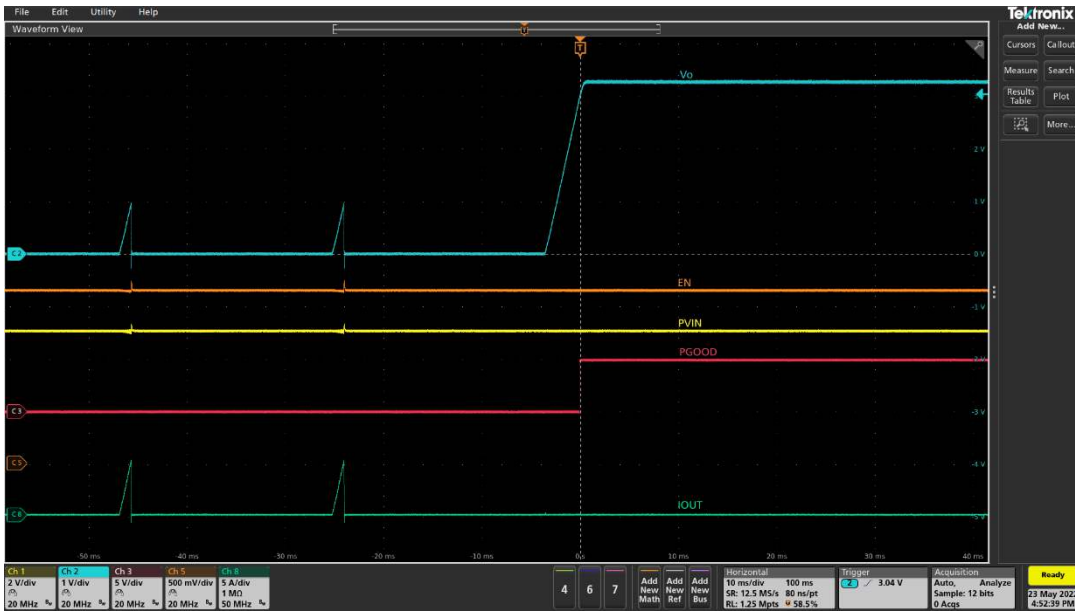


Figure 8 Over-current protection and auto-recover to 3A
 (Ch1: PV_{IN} , Ch2: V_{OUT} , Ch3: PG, Ch5: Enable, Ch8: I_{OUT})

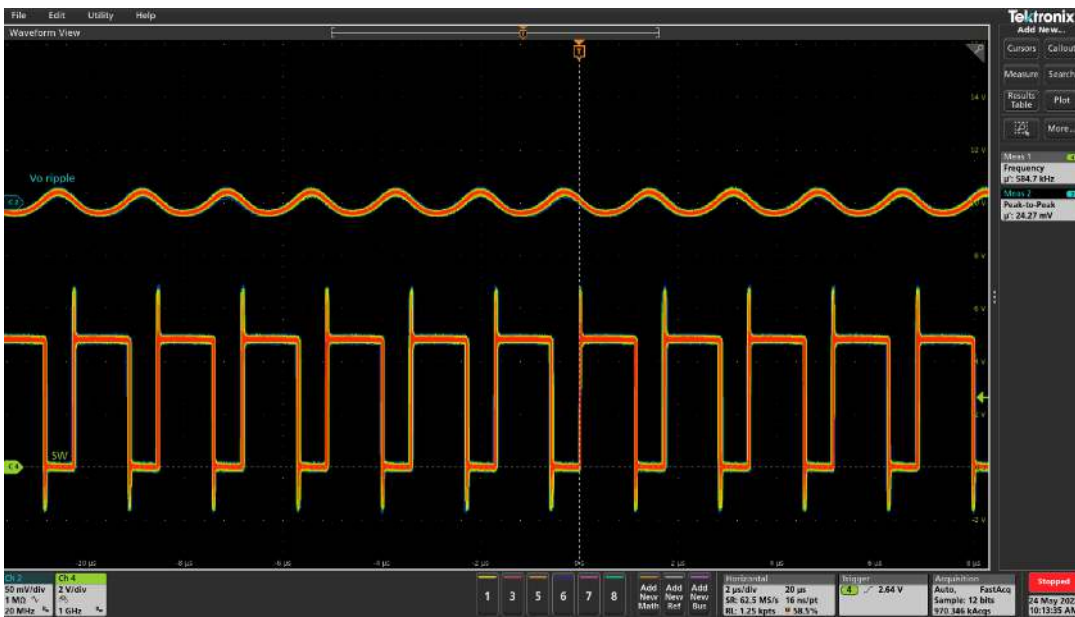


Figure 9 Sw and V_{OUT} ripple at 0A (Ch2: V_{OUT} Ripple, Ch4: Sw)

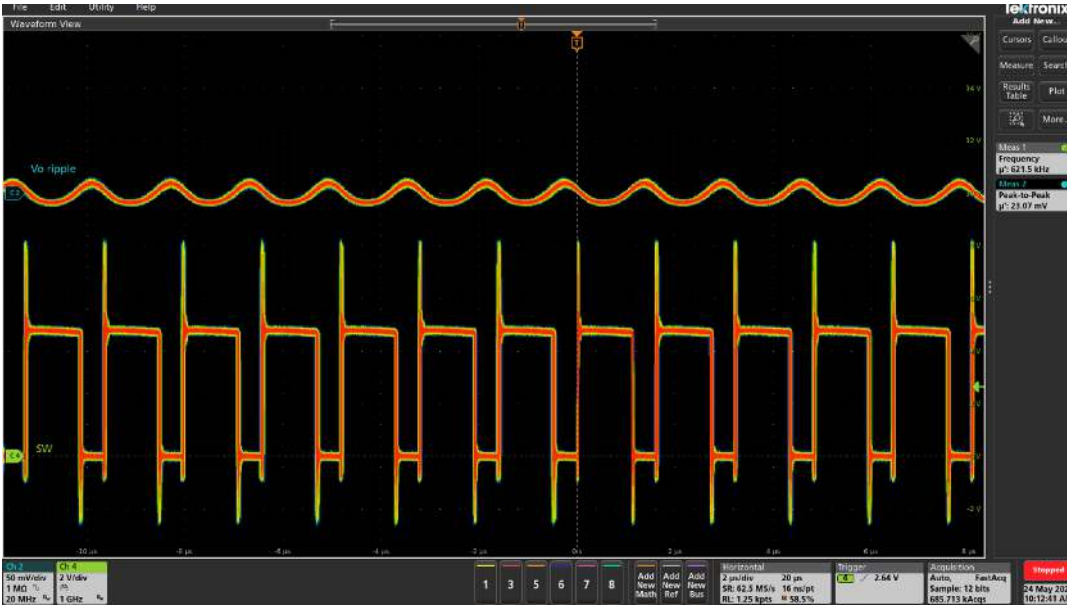


Figure 10 *Sw and V_{OUT} ripple at 3A (Ch2: V_{OUT} Ripple, Ch4: Sw)*

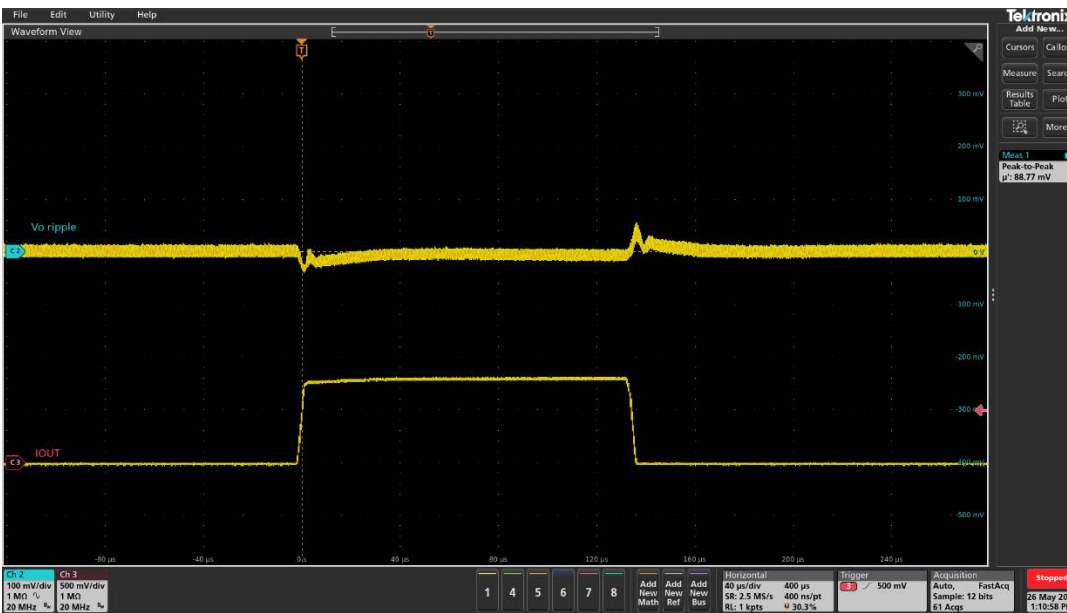


Figure 11 *Transient response 0A to 1.5A (Ch2: V_{OUT} ripple, Ch3: I_{OUT}), peak-peak deviation = 89mV*

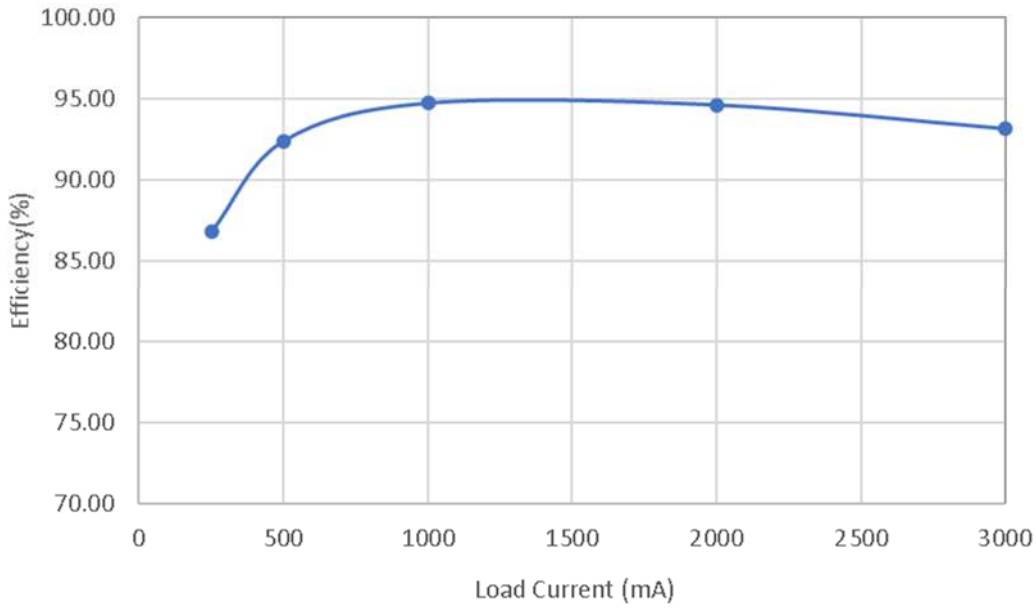


Figure 12 *Efficiency*

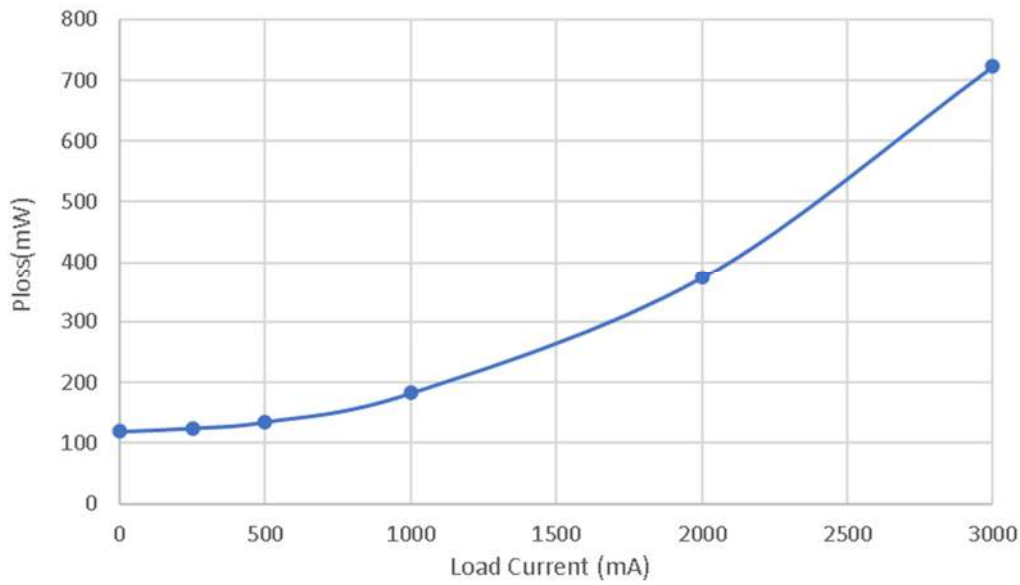


Figure 13 *Power loss*

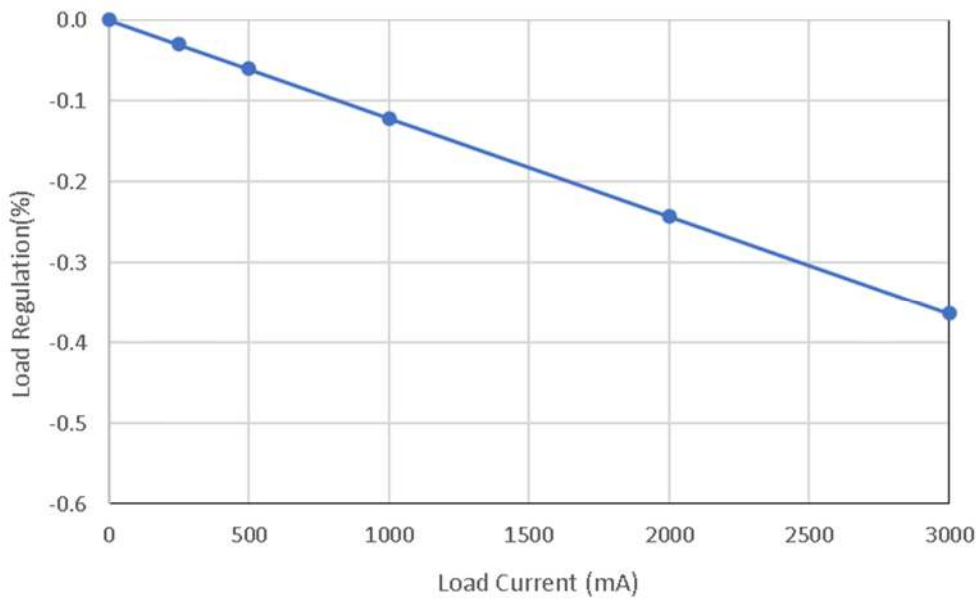


Figure 14 Load regulation ($I_{OUT} = 0-3A$)

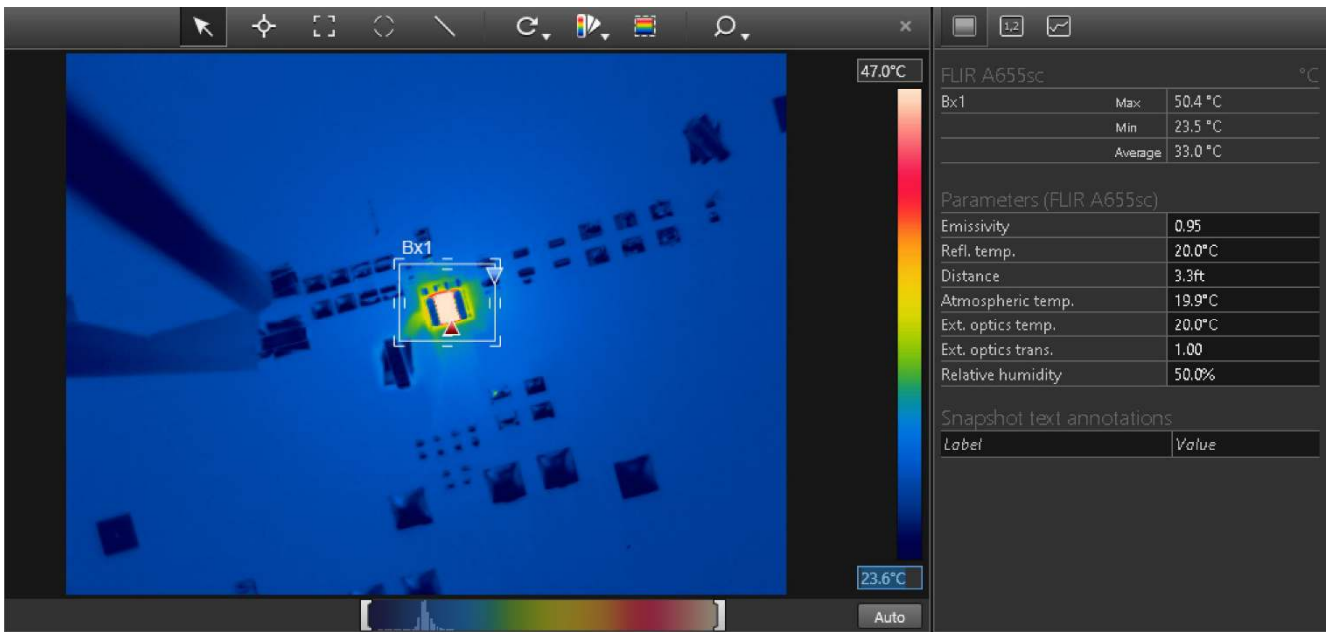


Figure 15 Thermal image ($P_{VIN}=5V, I_{OUT}=3A$) – maximum temperature rise = 30°C

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REMINDER

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5. Atomic energy related equipment
6. Seabed equipment
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9. Military equipment
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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 |
| EP | 1561156A1 1561268A2 1576710A1 1576711A1 1604254A4 1604264A4 1714369A2 1745536A4 1769382A4 1899789A2 1984801A2 |
| US | 20040246754 2004090219A1 2004093533A1 2004123164A1 2004123167A1 2004178780A1 2004179382A1 20050200344 20050223252 2005209373A1 20060061214 2006015619A1 20060174145 20070226526 20070234095 20070240000 20080052551 20080072080 20080186006 6741099 6788036 6936999 6949916 7000125 7049798 7069021 7080265 7249267 7266709 7315156 7372682 7373527 7394445 7456617 7459892 7493504 7526660 |
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