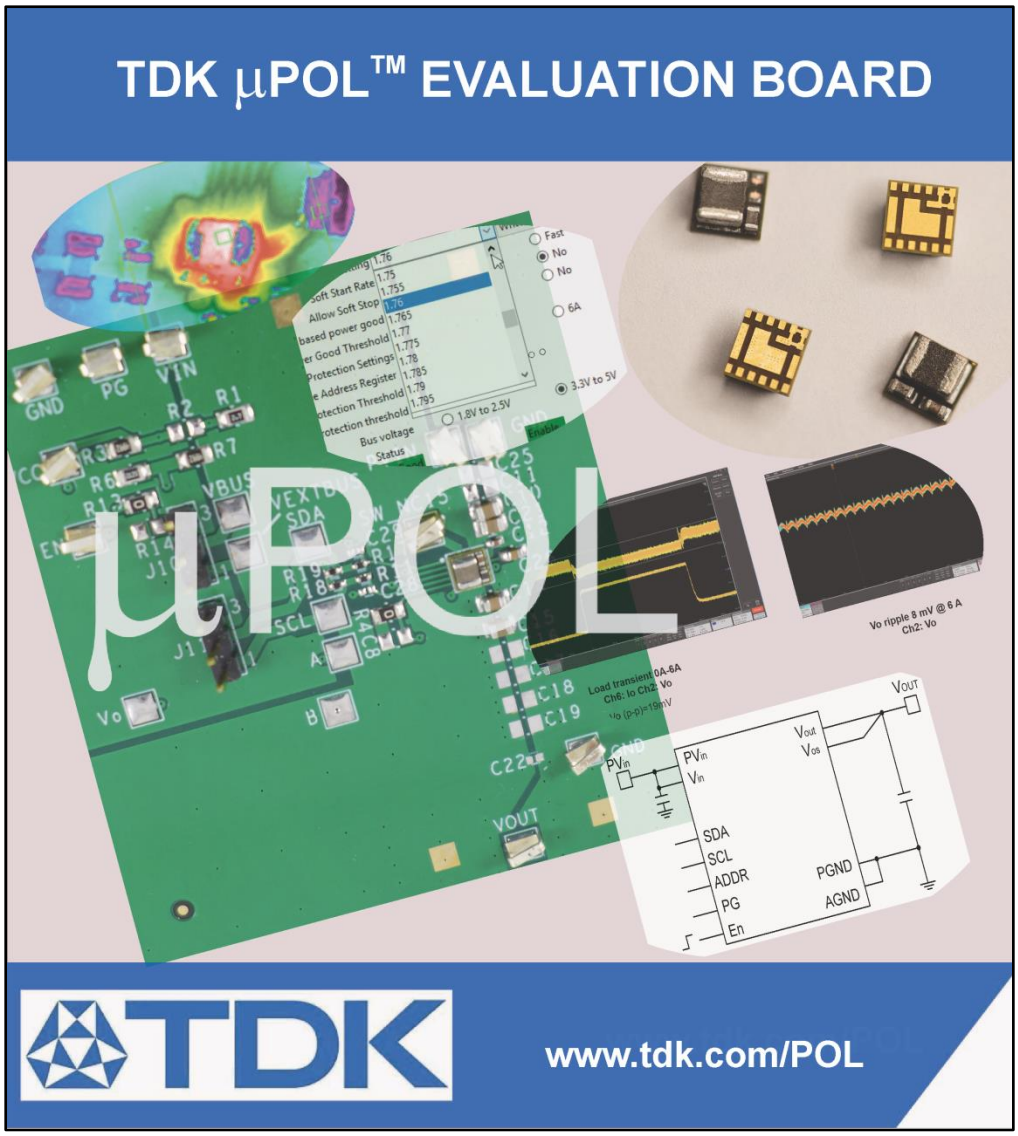

EV1525-0800-50A
EVALUATION BOARD
USER GUIDE

Rev 1.0, March 19, 2025

Introduction

This user guide describes the evaluation board provided for the FS1525 µPOL™ product.

The board generates an output voltage (V_{OUT}) of 0.8V* for loads of 0–50A from an input voltage (PV_{IN}) of 12V.

Specifications

- Input voltage (PV_{IN}) = +12V
- Output voltage (V_{OUT}) = +0.8V
- Output load (I_O) = 0–50A
- Switching frequency (F_{SW}) = 625 kHz
- Output capacitance (C_O) = 14x47µF (MLCC), 12x100µF (MLCC), 2x470µF SP Cap
- Input capacitance (C_{IN}) = 8x22µF (MLCC)
- Dimensions (width x length x thickness) = 110mm x 110mm x 1.6mm

Connections

Name	Identifier	Description
PV_{IN}	J1	Input voltage (+12V)
PGnd	J2	Ground for input voltage
V_{OUT}	J3,J20	Output voltage (+0.8V)
PGnd	J4,J21	Ground for output voltage
V_{IN}	V_{IN}	Test Point for LDO Input
V_{CC}	V_{CC}	Test Point for LDO Output
PGnd	PGnd	Power ground
En	En	Enable
PGood	PGood	Power Good
SCL	J22	PIN1 I2C/PMBUS clock line
SDA	J22	PIN2 I2C/PMBUS data line
ALERT	ALERT	SMBALERT#
FAULT	FAULT	FAULT
Load	J8	Used to connect load: 20-pin Intel Mini Slammer connector
Output transient ripple voltage	J12	Used for measurement: 50Ω ultra-miniature coaxial connector

The board is configured for a single input supply. The Enable (En) input is connected to PV_{IN} through a resistor divider, so that no external Enable signal is needed.

Operation

To use the evaluation board:

1. Connect a well-regulated +12V input supply to PV_{IN} (J1) and Gnd (J2).
2. Connect a load of 0–50A to V_{OUT} (J3,J20) and Gnd (J4,J21).

NOTE – Output Voltages from 0.6V to 1.8V can be obtained by changing the values of Resistor Divider Components. Refer Page 7.

Description

The evaluation board consists of a 6-layer PCB made from FR4 glass-reinforced epoxy laminate material. All layers use 2oz copper. (The major power components, including the FS1525, are mounted on the top side of the board.

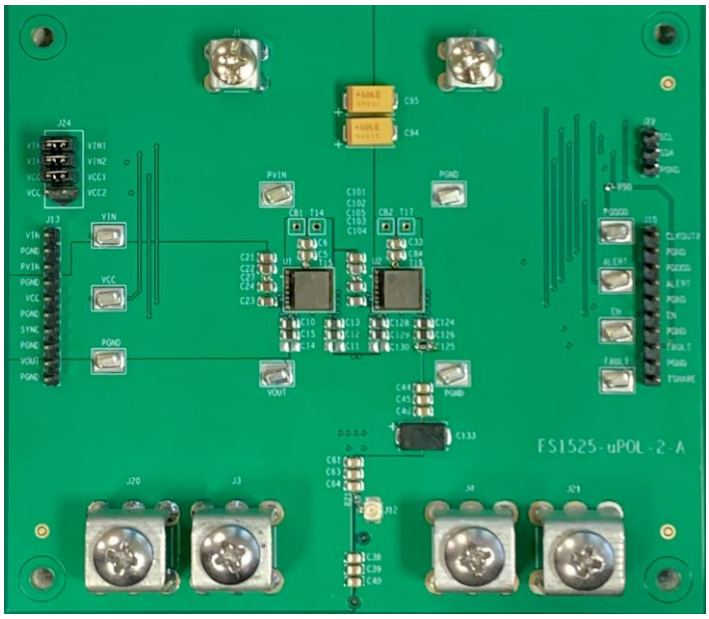

Figure 1 View of board (top)

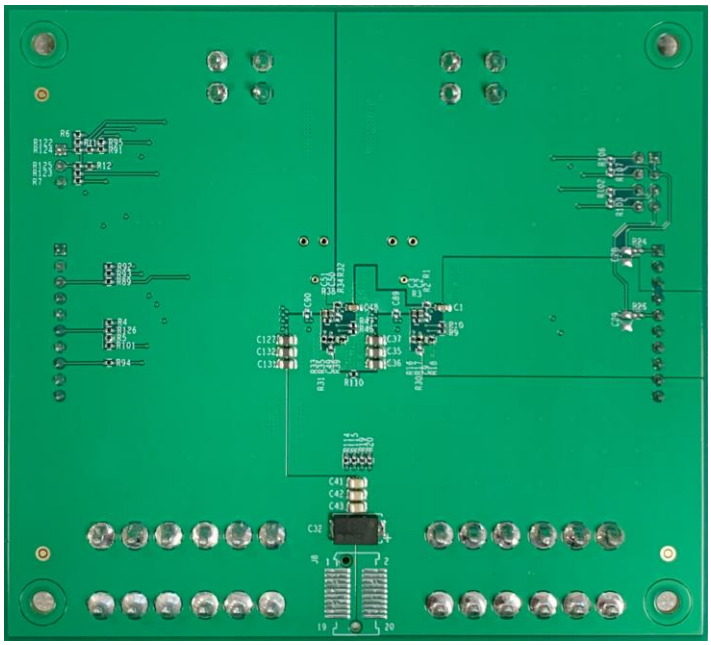

Figure 2 View of board (bottom)

Figure 3 to Figure 8 show the layout of the board layers and Figure 9 shows a schematic of the electric circuit.

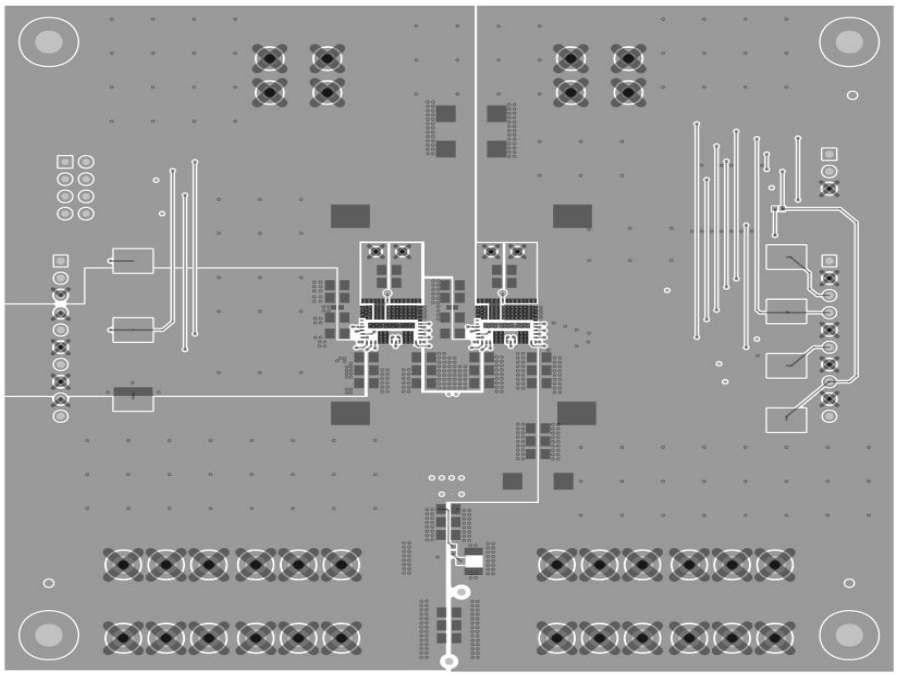

Figure 3 Board layout – layer 1

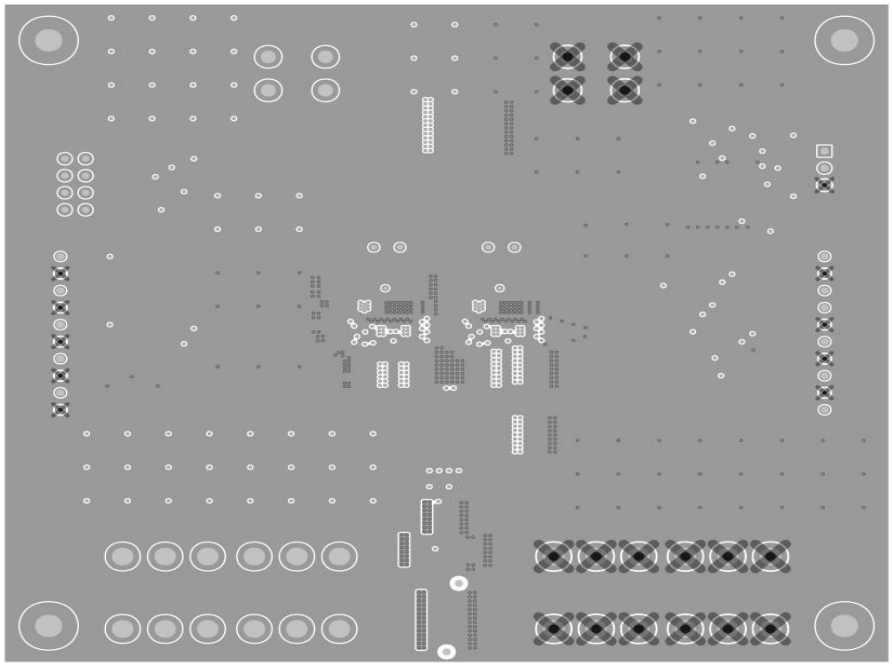

Figure 4 Board layout – layer 2

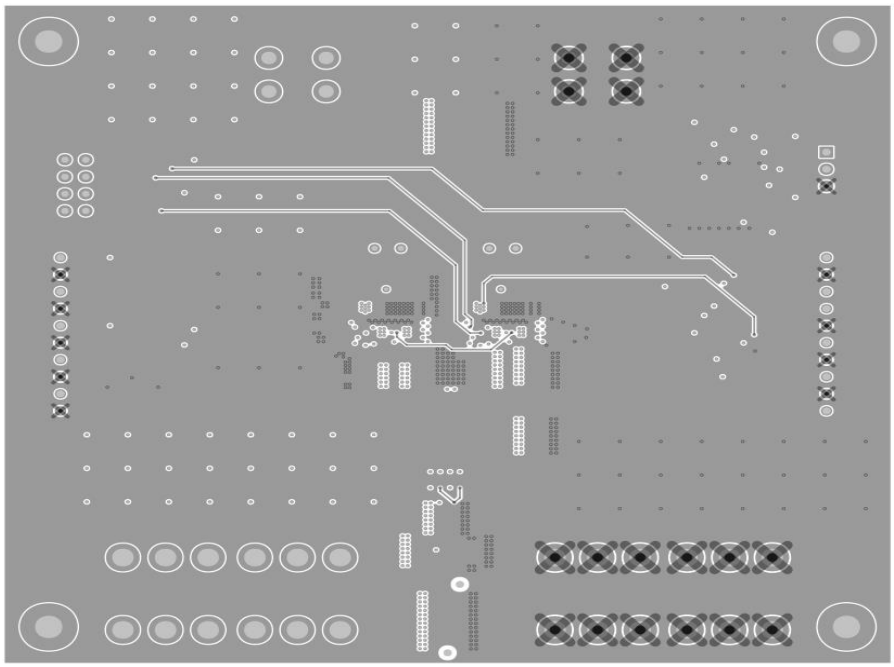

Figure 5 Board layout – layer 3

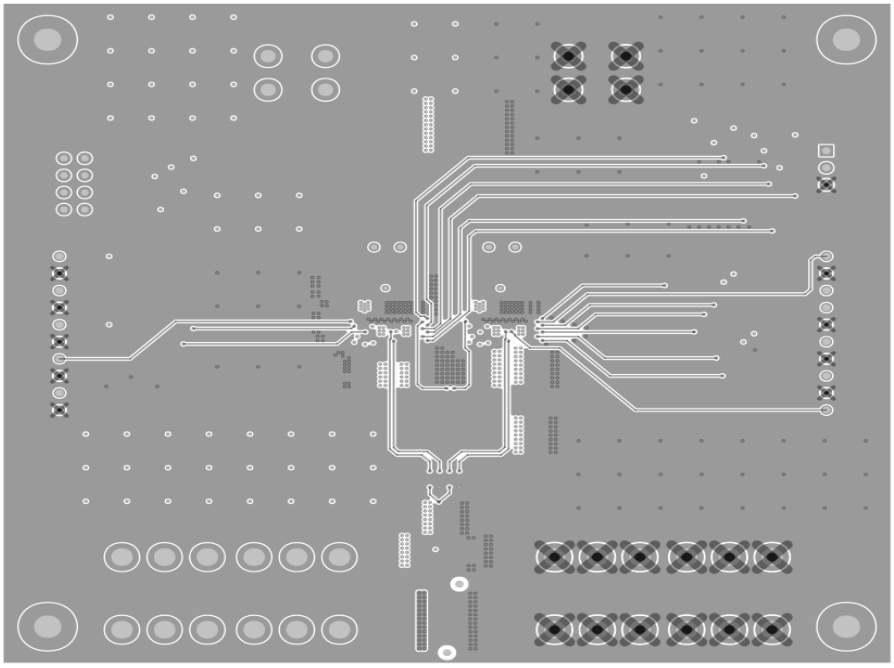

Figure 6 Board layout – layer 4

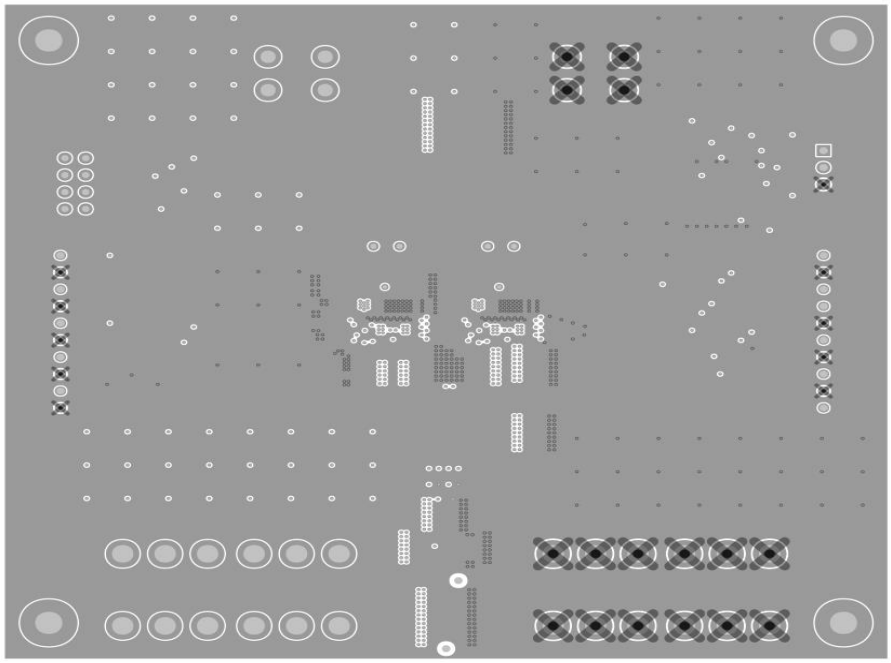

Figure 7 Board layout – layer 5

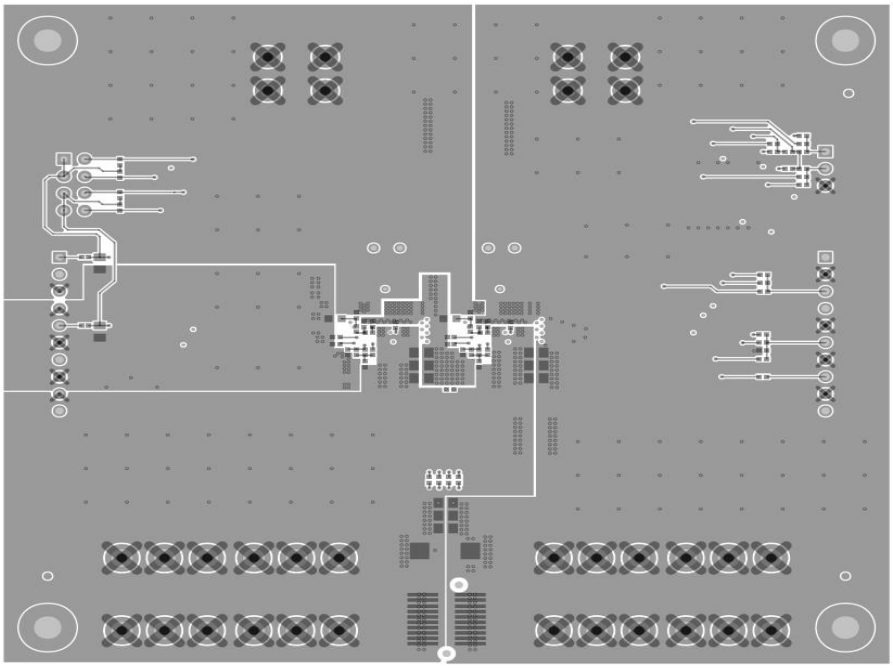

Figure 8 Board layout – layer 6

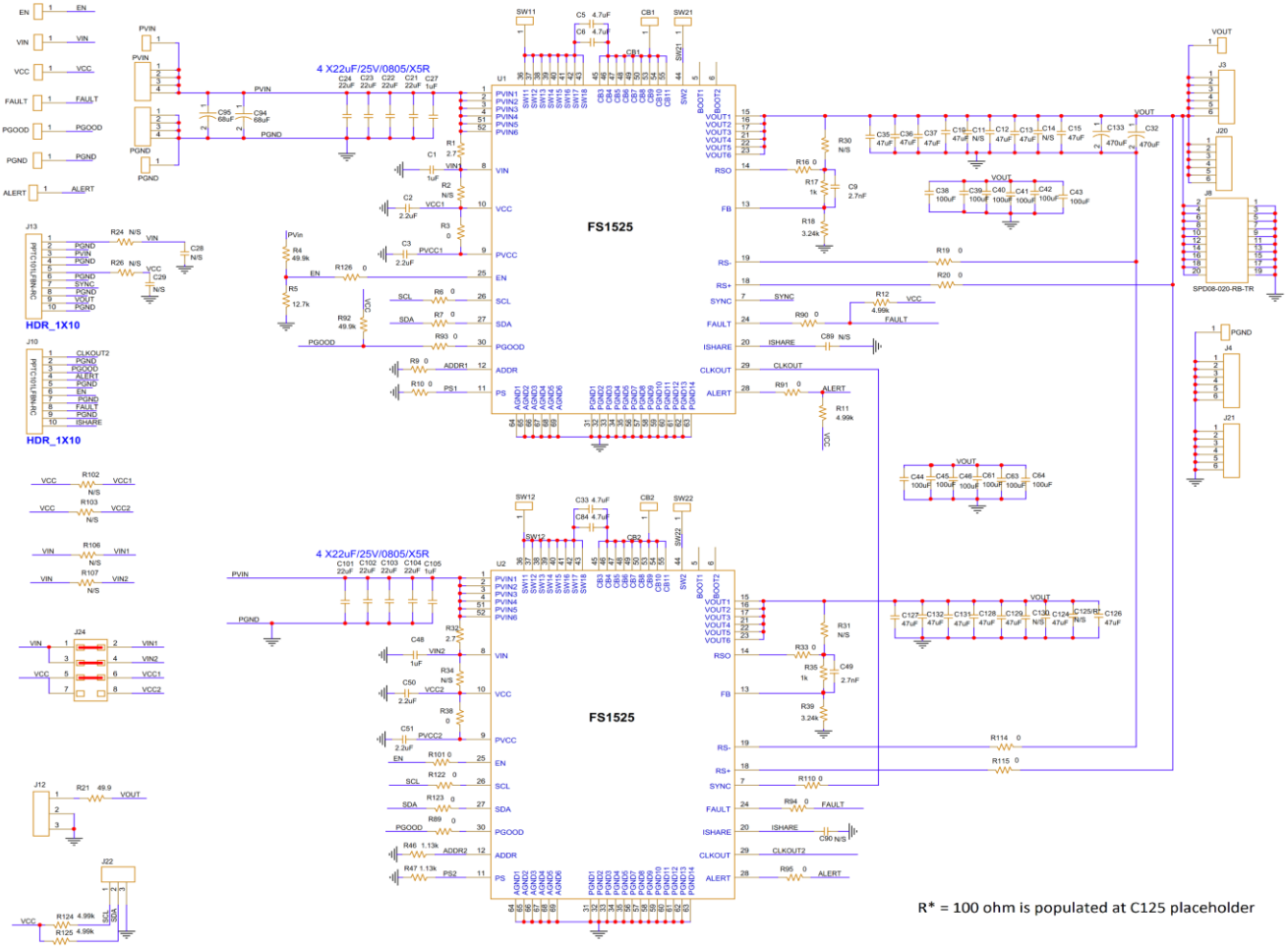

Figure 9 Schematic

V_{OUT} (V)	R_{TOP}/R_{BOTTOM}	V_{OUT} (V)	R_{TOP}/R_{BOTTOM}
0.65	0.0617	1	0.6494
0.7	0.1468	1.05	0.7299
0.72	0.1779	1.1	0.8065
0.8	0.3086	1.2	0.9804
0.85	0.3922	1.25	1.0741
0.9	0.4762	1.5	1.4684
0.95	0.5618	1.8	1.9569

Table 1 Resistor Divider Ratio for Different Output Voltages.

NOTE – Modify R18 & R39 (RBOTTOM) for different VOUT as per the included table. R17, R35 = 1 kΩ (RTOP) & C9, C49 = 2700pF is recommended. For VOUT =0.6V; R17, R35 = 0Ω, C9, C49 = DNP.

R10 = 0Ω for 0.6V = VOUT ≤ 0.9V; for 0.9V < VOUT < 1.2V, R10 = 8.66k; and R10 = 7.87k for VOUT ≥ 1.2V

Item	Quantity	Reference	Description
1	2	C1,C48	CAP CER 1UF 25V X7R 0603
2	2	C27,C105	CAP CER 0.1UF 25V X7R 0402
3	4	C5,C6,C33,C84	CAP CER 4.7UF 16V X7R 0805
4	2	C9,C49	CAP CER 2700PF 16V X7R 0402
5	14	C10,C12,C13,C15,C35,C36,C37,C124,C126,C127,C128,C129,C131,C132	CAP CER 47UF 6.3V X5R 0805
6	8	C21,C22,C23,C24,C101,C102,C103,C104	CAP CER 22UF 25V X5R 0805
7	12	C38,C39,C40,C41,C42,C43,C44,C45,C46,C61,C63,C64	CAP CER 100UF 4V X5R 0805
8	2	C94,C95	CAP TANT 68UF 20% 25V 2917
9	2	C32, C133	CAP ALUM POLY 470UF 20% 2V SMD
10	6	J1,J2,J3,J4,J21,J20	TERM SCREW M4 4 PIN PCB
11	11	T1,T2,T3,T4,T5,T6,T7,T8,T9,T10,T11	PC TEST POINT COMPACT
12	1	J22	CONN HEADER VERT 3POS 2.54MM
13	1	J12	CONN U.FL RCPT STR 50 OHM SMD
14	2	J10,J13	CONN HEADER VERT 10POS 2.54MM
15	1	J24	CONN HEADER VERT 8POS 2.54MM
16	2	R1,R32	RES 2.7 OHM 1% 1/16W 0402
17	23	R3,R6,R7,R9,R10,R16,R19,R20,R33,R38,R89,R90,R91,R93,R94,R95,R101,R110,R114,R115,R122,R123,R126	RES SMD 0 OHM JUMPER 1/10W 0402
18	2	R4,R92	RES 49.9K OHM 1% 1/16W 0402
19	1	R5	RES 12.7K OHM 1% 1/16W 0402
20	4	R11,R12,R124,R125	RES SMD 4.99K OHM 1% 1/10W 0402
21	1	R21	RES 49.9 OHM 1% 1/16W 0402
22	2	R17,R35	RES 1K OHM 1% 1/16W 0402
23	3	R18,R39	RES 3.24K OHM 1% 1/16W 0402
24	2	R46,R47	RES 1.13K OHM 1% 1/16W 0402
25	2	U1,U2	FS1525

Typical performance

Figure 10 to Figure 20 show typical operating waveforms for the evaluation board, while Figure 21 & 22 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 0.8V and I_O is 0–50A.

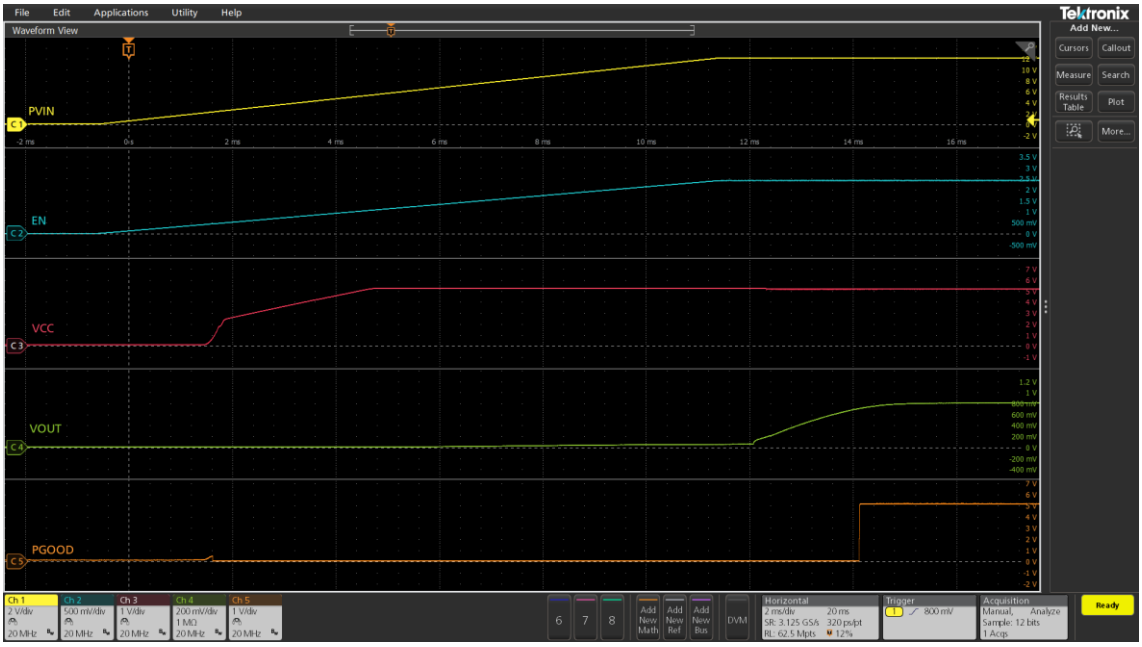

Figure 10 Startup with no load (Ch1:PV_{IN}, Ch2: Enable, Ch3: V_{CC}, Ch4: V_{OUT}, Ch5: PGood)

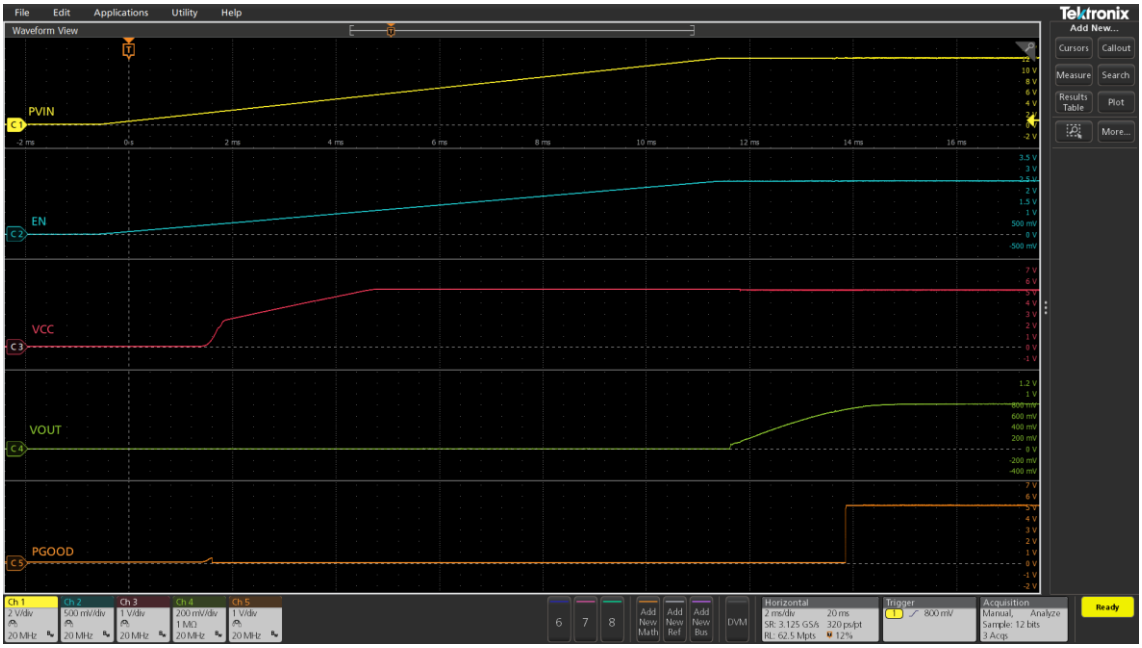

Figure 11 Startup with 50A load (Ch1:PV_{IN}, Ch2: Enable, Ch3: V_{CC}, Ch4: V_{OUT}, Ch5: PGood)

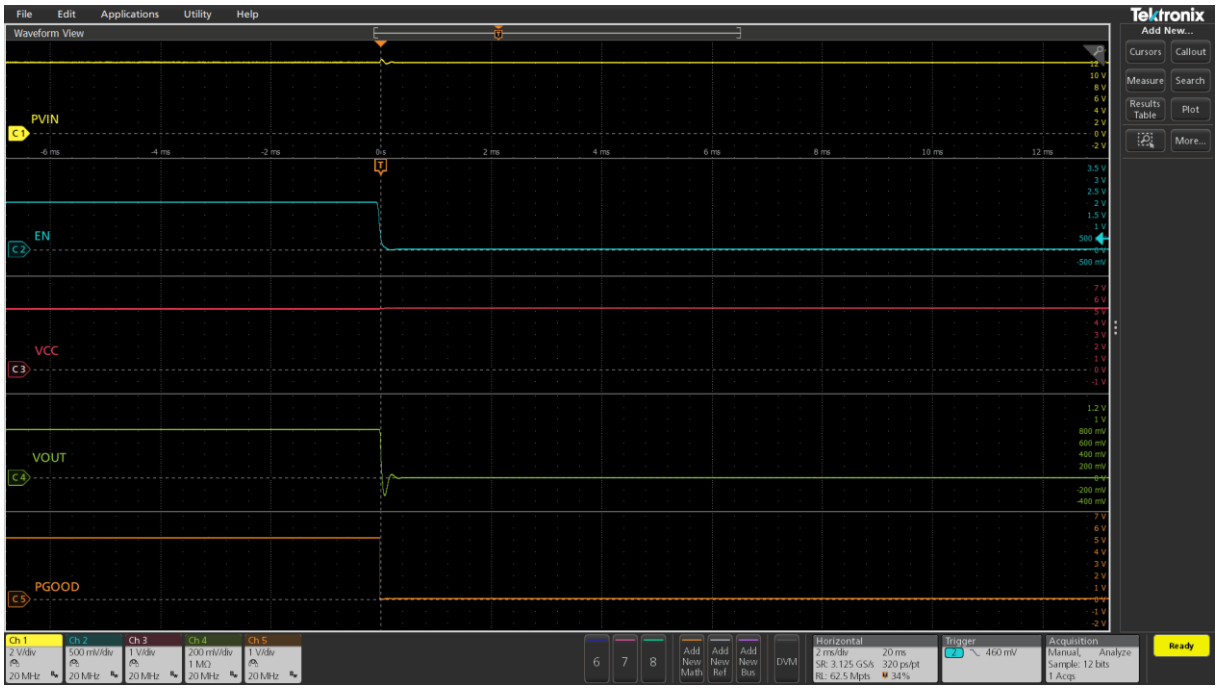

Figure 12 Shutdown with Enable de-assertion at 50A load (Ch1:PV_{IN}, Ch2: Enable, Ch3: V_{CC}, Ch4: V_{OUT}, Ch5: PGood)

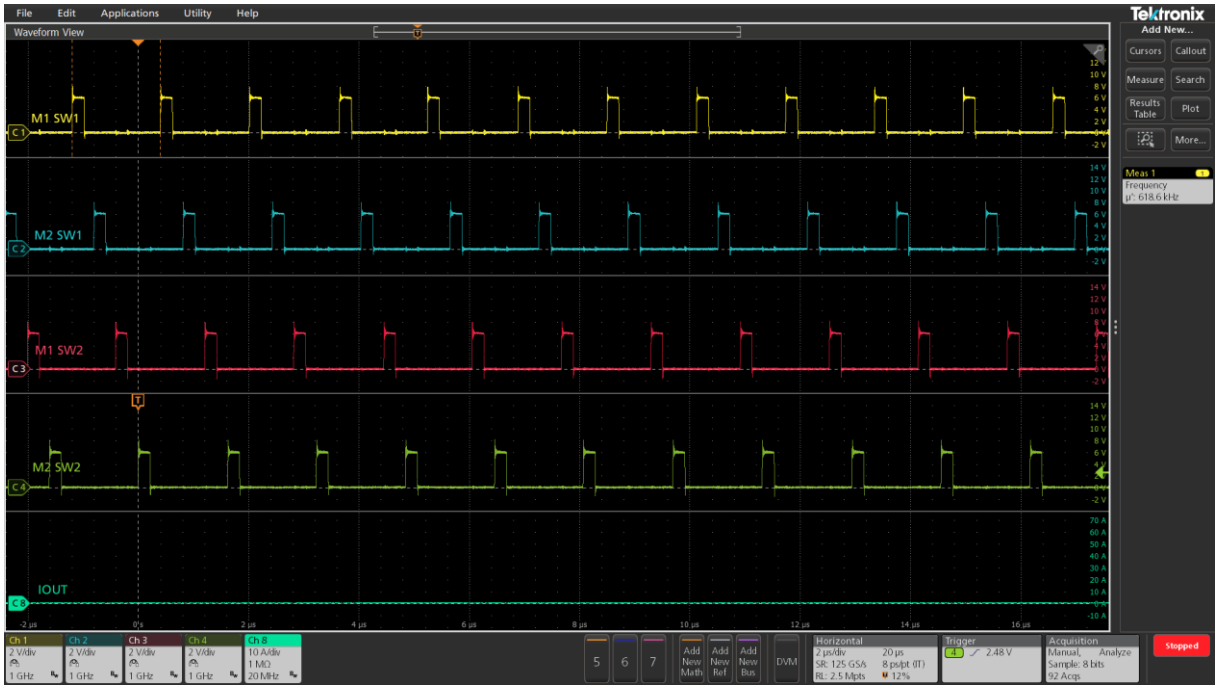

Figure 13 Switch node waveforms at no load

Figure 14 Switch node waveforms at 50A

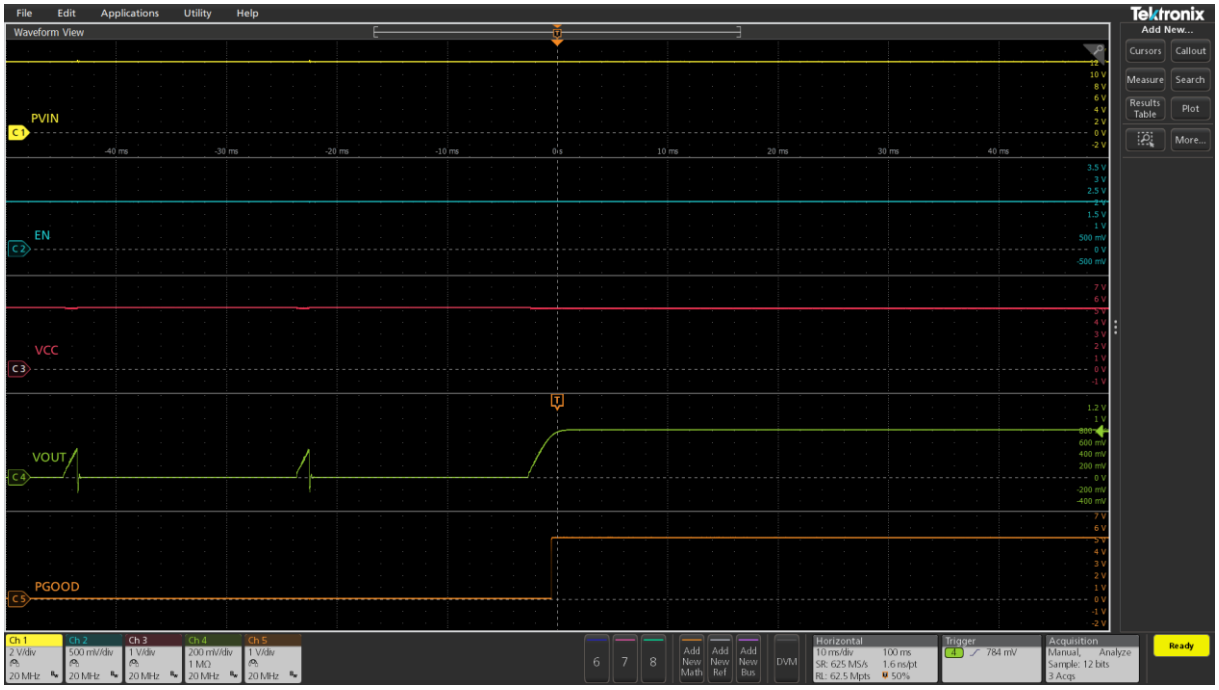

Figure 15 OCP Recovery to 50A (Ch1:PV_{IN}, Ch2: Enable, Ch3: V_{CC}, Ch4: V_{OUT}, Ch5: PGood)

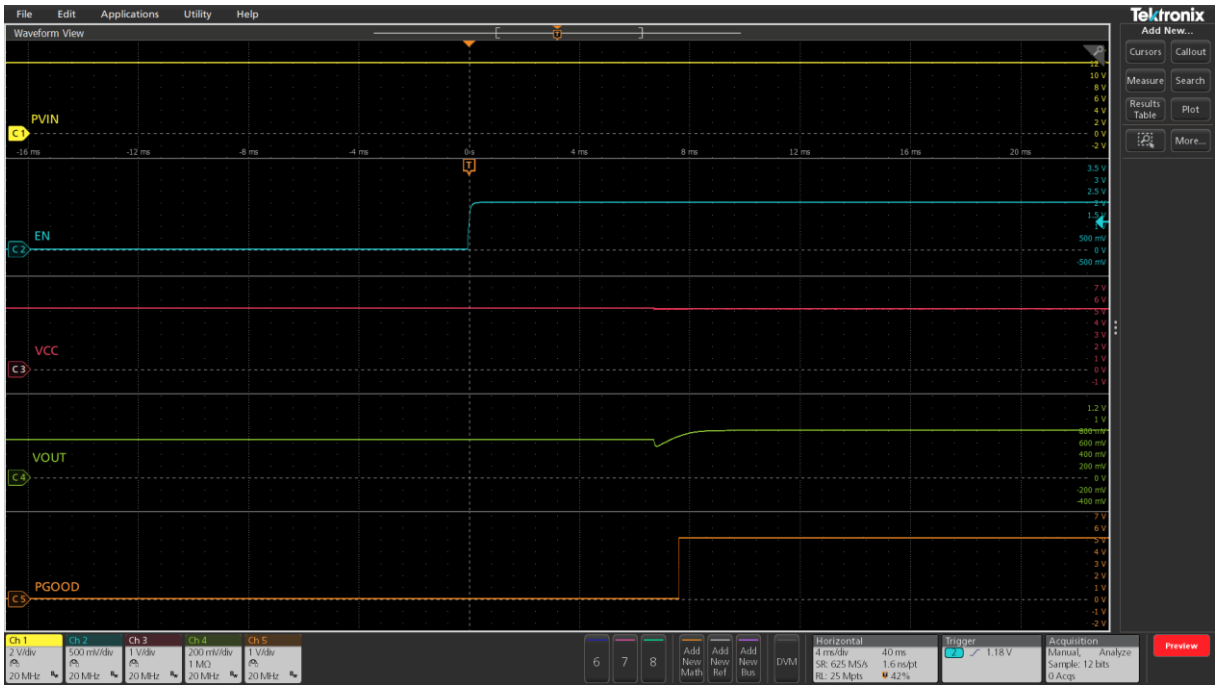

Figure 16 Startup into 80% Prebias (Ch1:PV_{IN}, Ch2: Enable, Ch3: V_{CC}, Ch4: V_{OUT}, Ch5: PGood)

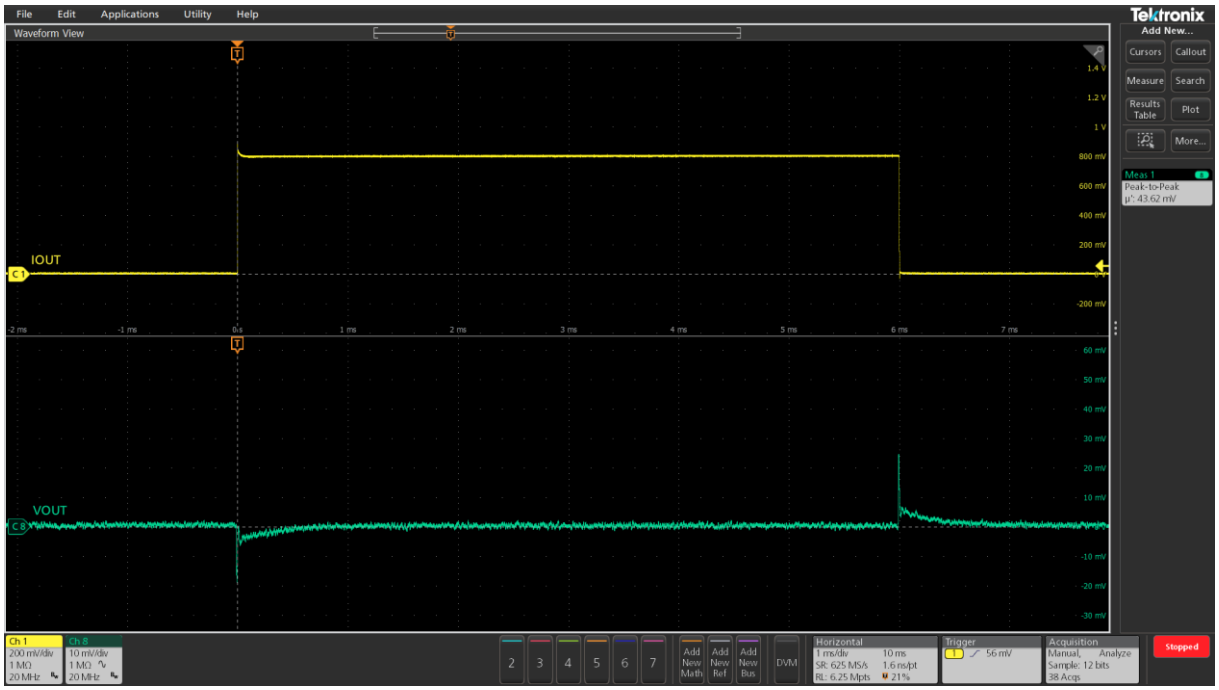

Figure 17 Transient response 0A to 16A (Ch1: I_{OUT}, Ch8: V_{OUT}), peak-peak deviation = 44mV, load slew rate = 10A/µs

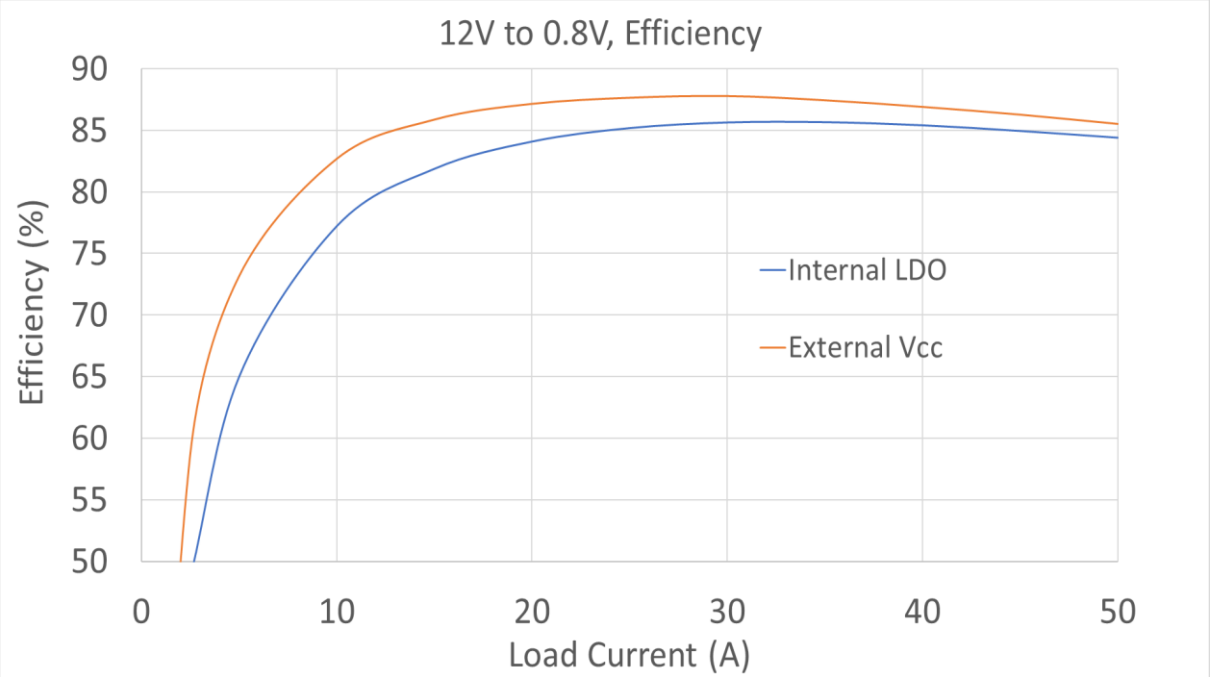

Figure 18 Efficiency

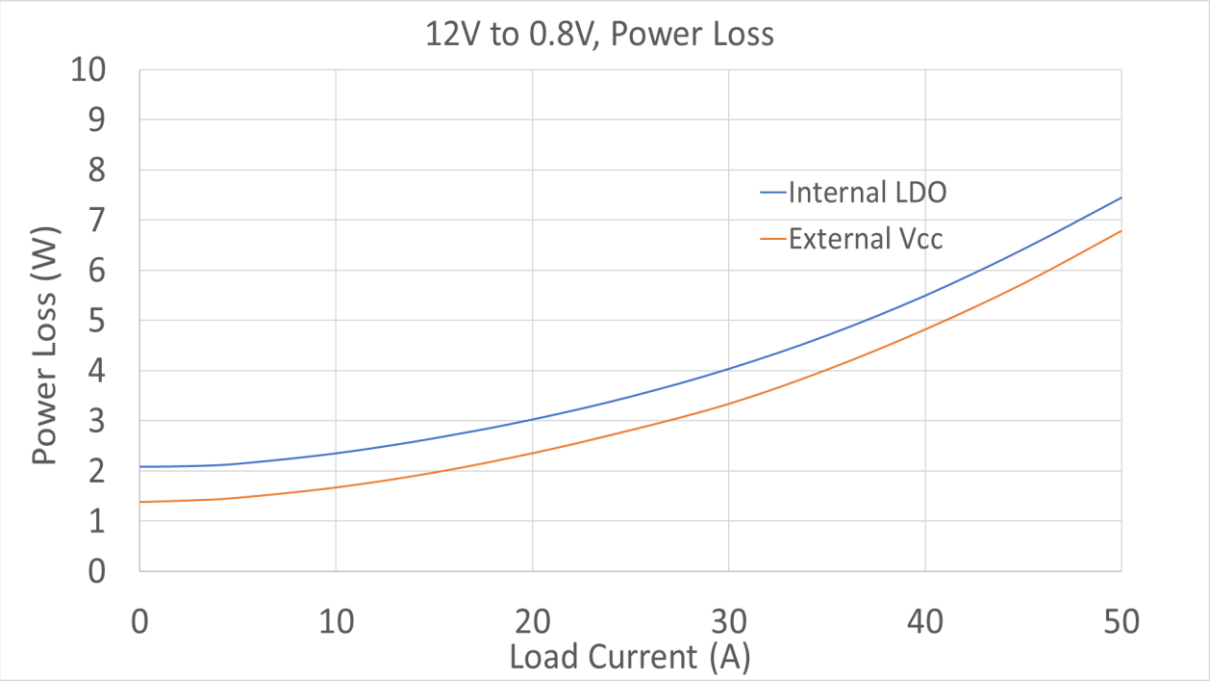

Figure 19 Power loss

NOTE – For External Vcc Connection, Remove R1,R32, Install R2, R34 = 0 ohm & C2, C3, C50, C51 = 2.2µF (10V 0402)

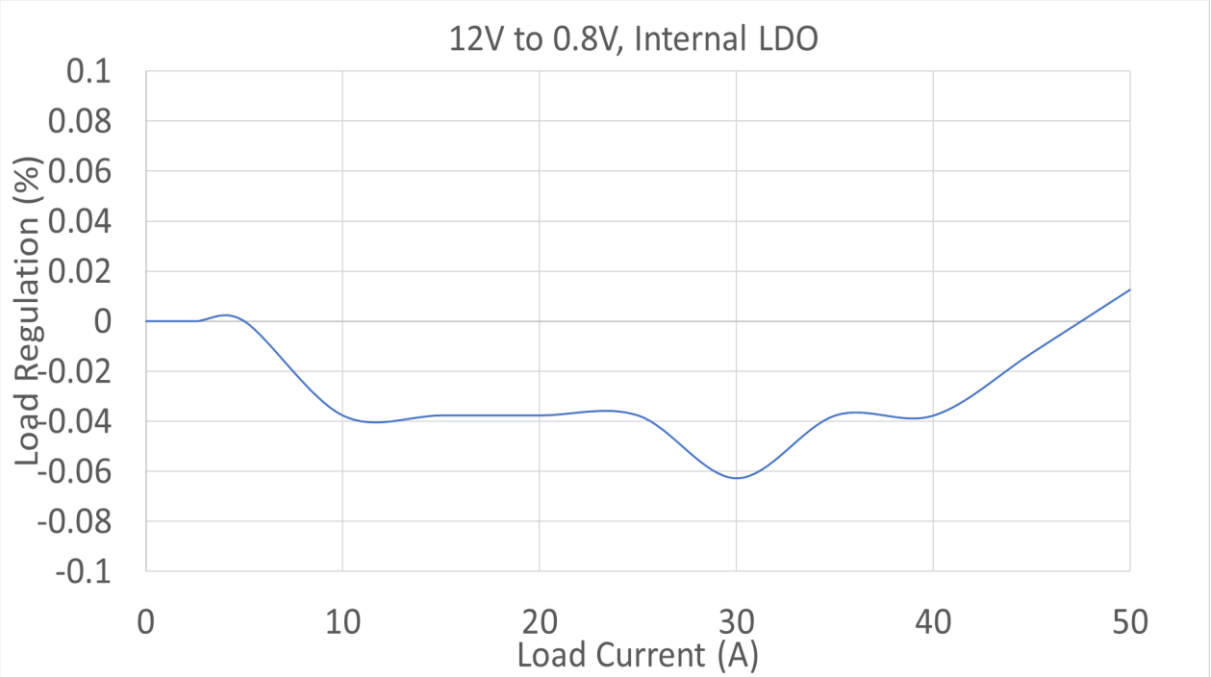

Figure 20 Load regulation (I_O = 0–50A)

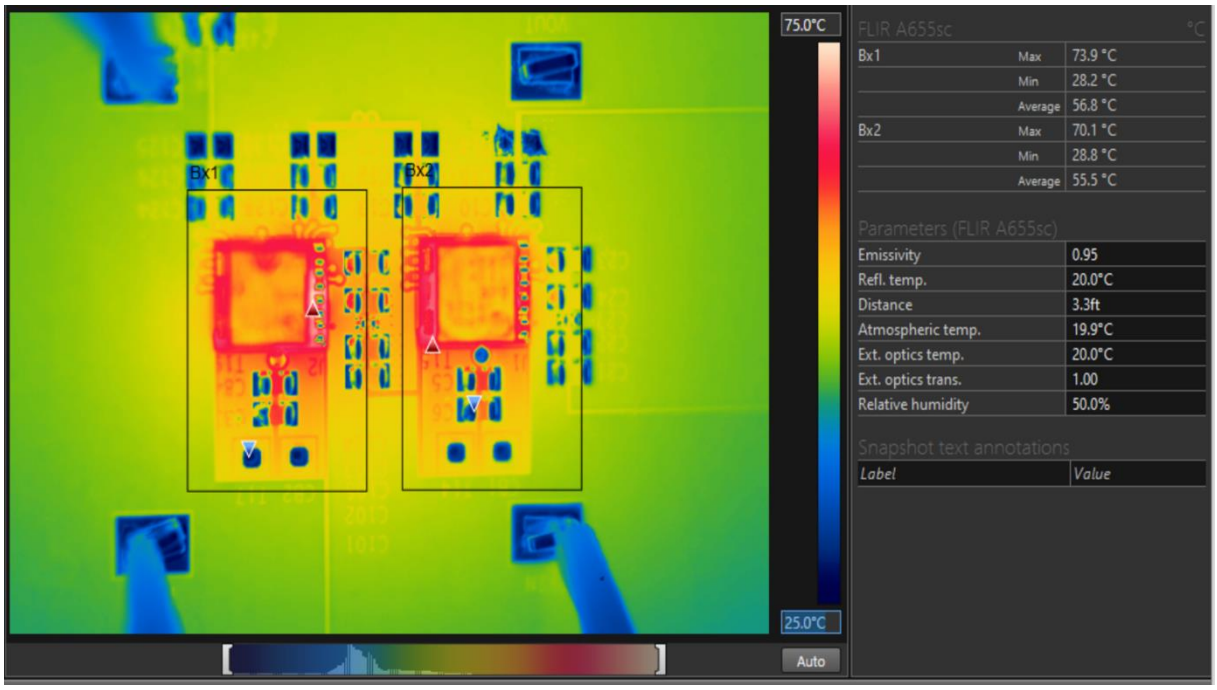

Figure 21 Thermal image at PV_{IN} = 12V, V_{OUT} = 0.8V, I_O = 50A, room temperature, no airflow, using internal LDO, FS1525 maximum temperature rise = 48.9°C

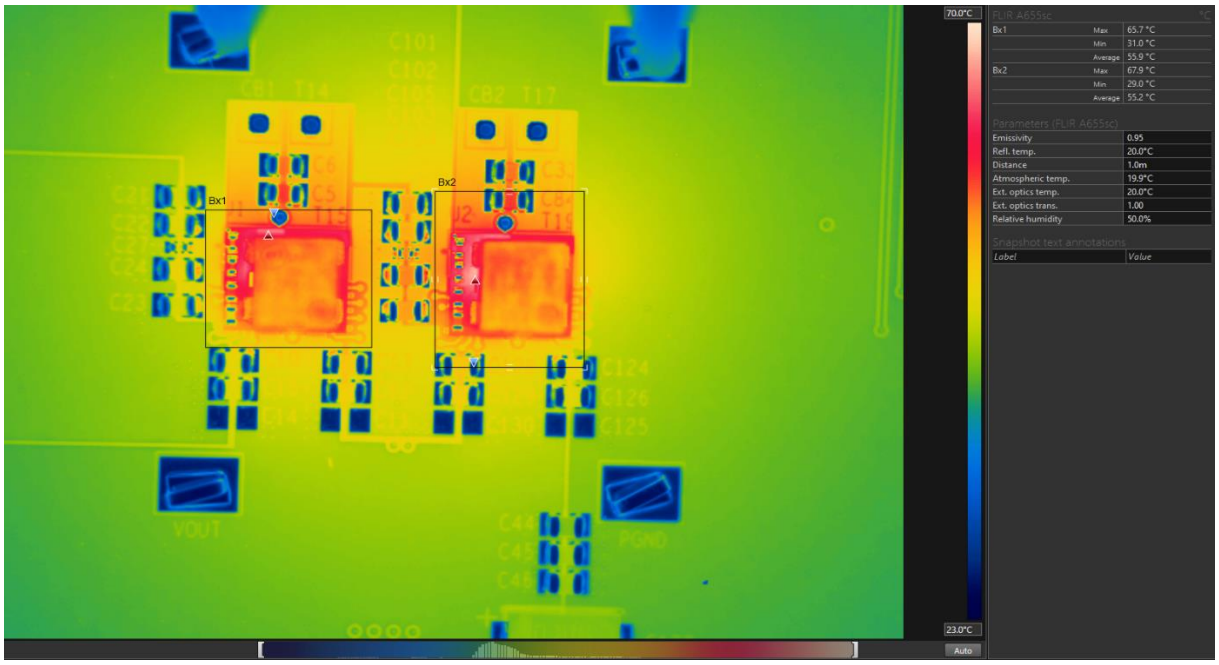

Figure 22 Thermal image at PV_{IN} = 12V, V_{OUT} = 0.8V, I_O = 50A, room temperature, no airflow, using External Vcc (5V), FS1525 maximum temperature rise = 44.9°C*

***NOTE – For External Vcc Connection, Remove R1,R32, Install R2, R34 = 0 ohm & C2, C3, C50, C51 = 2.2µF (10V 0402)**

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3. Medical equipment
4. Power-generation control equipment
5. Atomic energy related equipment
6. Seabed equipment
7. Transportation control equipment
8. Public Information-processing equipment
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11. Disaster prevention/crime prevention equipment
12. Safety equipment
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