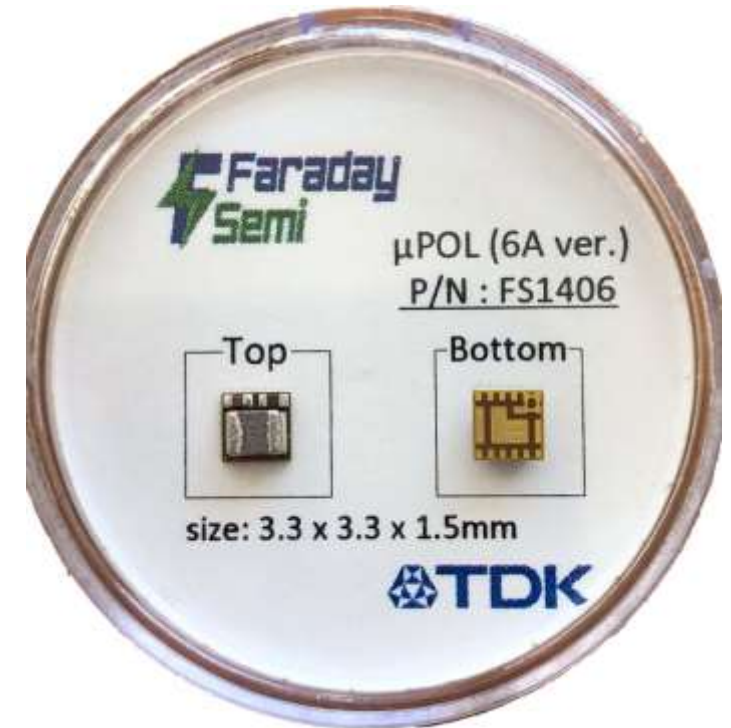


Attracting Tomorrow



μ POLTM Technology FS1406, User Guide

$P_{Vin}=5V, V_o=1V@6A$



User Guide for FS1406 Evaluation Board

-This board facilitates the evaluation of the FS1406 μ POL[®]. The Output voltage is 1V, up to 6A from input voltage 5V.

-PVin: J1, Input for 5V (+)

-Gnd: J2, Input for 5V (-)

-Vout: J8, Output (+)

-Vout: J7, Output (-)

User Guide for FS1406 Evaluation Board

-Board Features:

- $V_{in} = +5V$
- $V_o = 1V$
- $I_o = 0A - 6A$
- $F_s = 1.3 \text{ MHz}$
- $C_o = 6 \times 22\mu F \text{ MLCC}$
- $C_{in} = 2 \times 22\mu F \text{ MLCC}$
- Output Voltage Ripple $< \pm 0.5\%$

Connection and Operating Instruction

- A well regulated +5V input supply should be connected to PVIN (**J1**) and GND (**J2**).
- A maximum of 6A load should be connected to VOUT(**J8**) and GND (**J7**). The input and output connections of the board are listed in Table I.
- One single 5V input supply is used to power up FS1406. VIN and VCC are tied together. VIN is connected to PVIN through a 2.7ohm resistor.
- Enable is connected to PVIN via a 49.9kohm resistor.

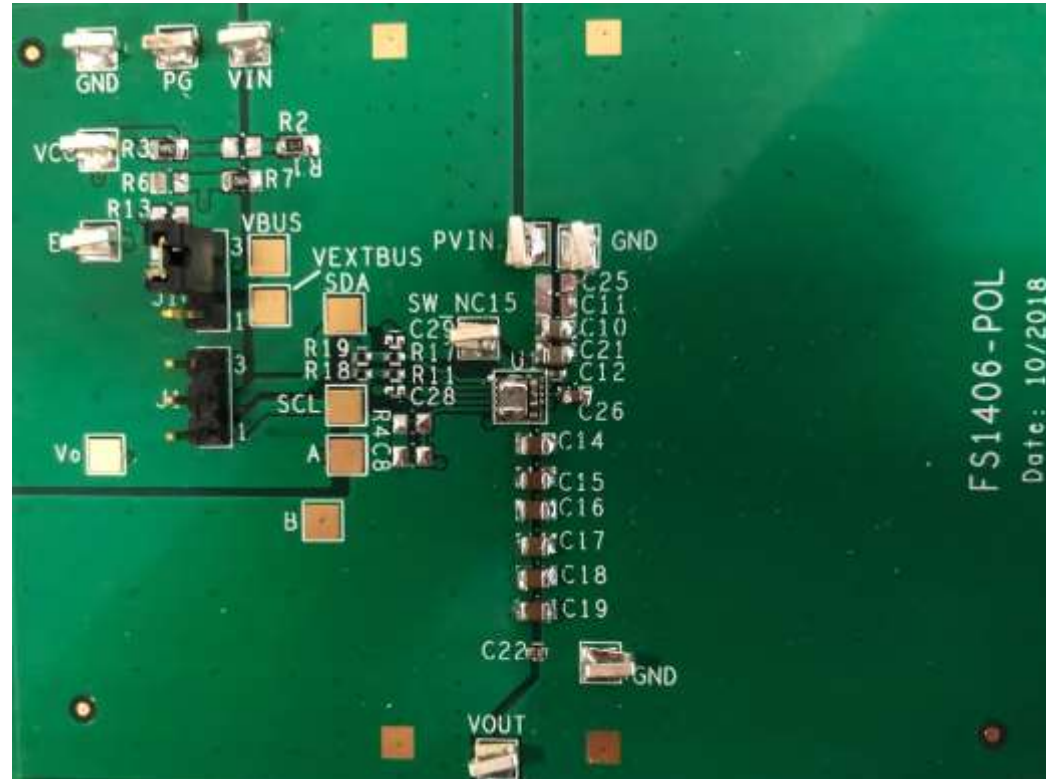
Table I, Connection

| Connection | Signal Name |
|------------|------------------------------------|
| Pvin (J1) | Input Supply (5V) |
| GND (J2) | Ground connection for Input Supply |
| VOOUT(J8) | Vo (1V) |
| GND (J7) | Ground connection for output |
| Vcc (TP2) | Vcc / LDO output |
| GND (TP3) | Ground for Vcc |
| EN (TP11) | Enable |
| PG (TP12) | Power Good |

Layout

The PCB is a 4-layer board (63mmx84mm) using FR4 material. All layers use 2 Oz. copper. The PCB thickness is 1.5mm. The FS1406 and other major power components are mounted on the top side of the board.

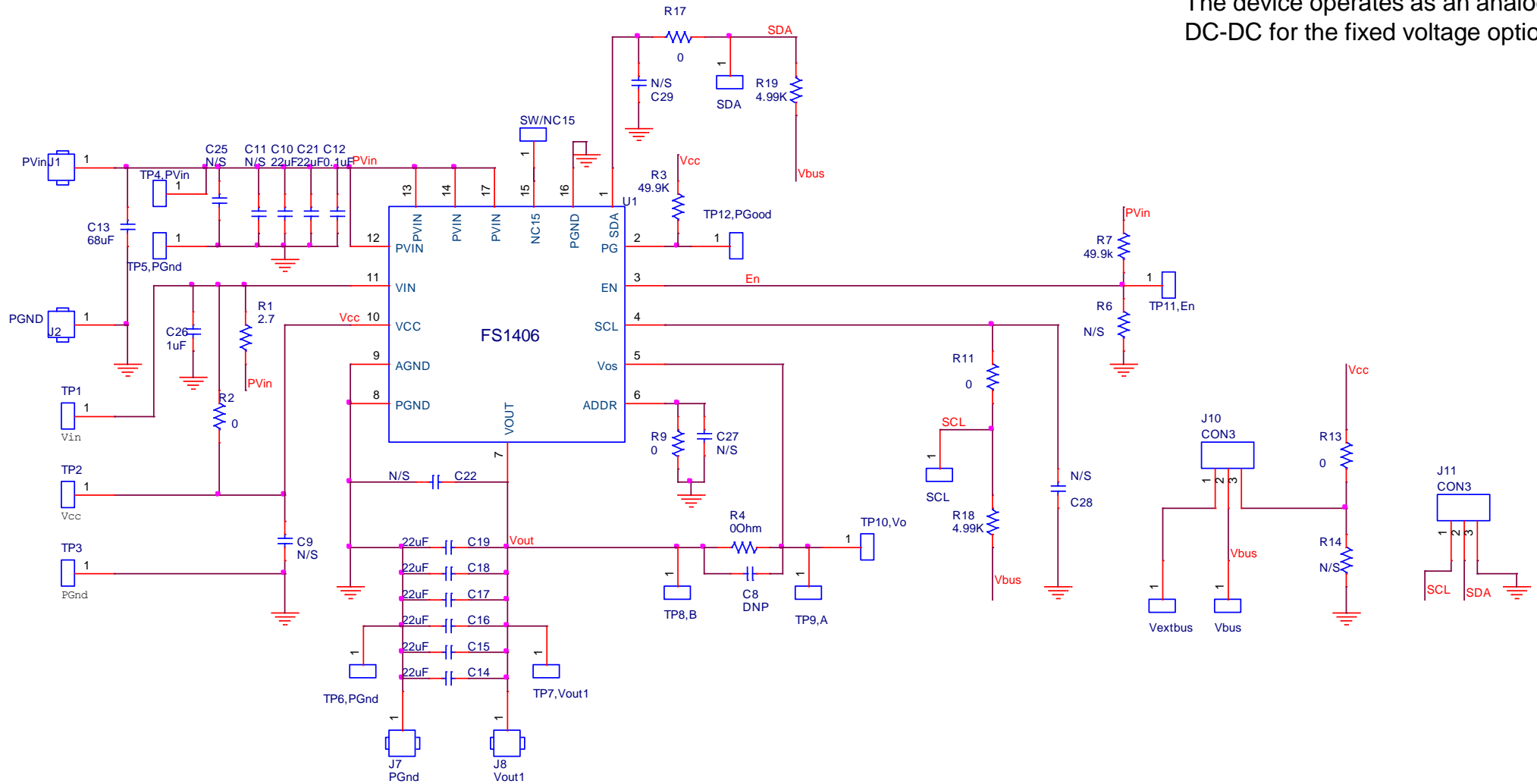
Connection Diagram



- The Board is configured so it can start up by applying only 5V supply.

Schematic

Note: The I2C circuitry is optional.
The device operates as an analog DC-DC for the fixed voltage options.



BOM

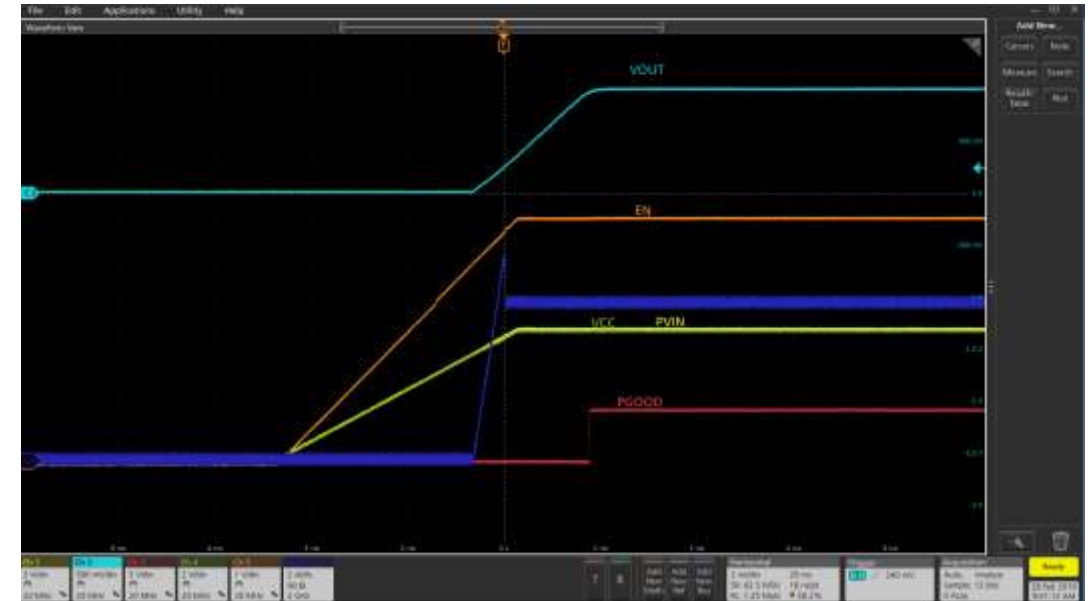
| Part reference | Qty | Value | Description |
|--|-----|---------|---------------------------|
| FS1406 POL | 1 | | Main IC |
| C13 | 1 | 68uF | 25V |
| C14,C15,C16,C17,C18,C19 | 6 | 22uF | 0805, 6.3V, X7S |
| C12 | 1 | 0.1uF | 0402, 16V, X7R |
| C10, C21 | 2 | 22uF | 0805, 16V, X7R |
| R1 | 1 | 2.7 Ohm | 10%, 1/8W, 0805 case size |
| R3,R7 | 2 | 49.9K | 10%, 1/8W, 0805 case size |
| C26 | 1 | 1uF | 0603,16V, X7R |
| R18,R19 | 2 | 4.99K | 0402 case size |
| R2, R4, R9, R13, R11, R17 | 6 | 0 Ohm | 0402 case size |
| TP1-TP12, Sw/NC15, Vbus, Vextbus, SCL, SDA | 17 | | Test Point |
| J1 | 1 | RED | Banana Connector |
| J2,J7 | 2 | Black | Banana Connector |
| J8 | 1 | Green | Banana Connector |
| J10, J11 | 2 | | 3 pin header |

Typical Operating Waveforms

PVin=5.0V, Vo=1V, Io=0-6A, Room Temperature, no airflow



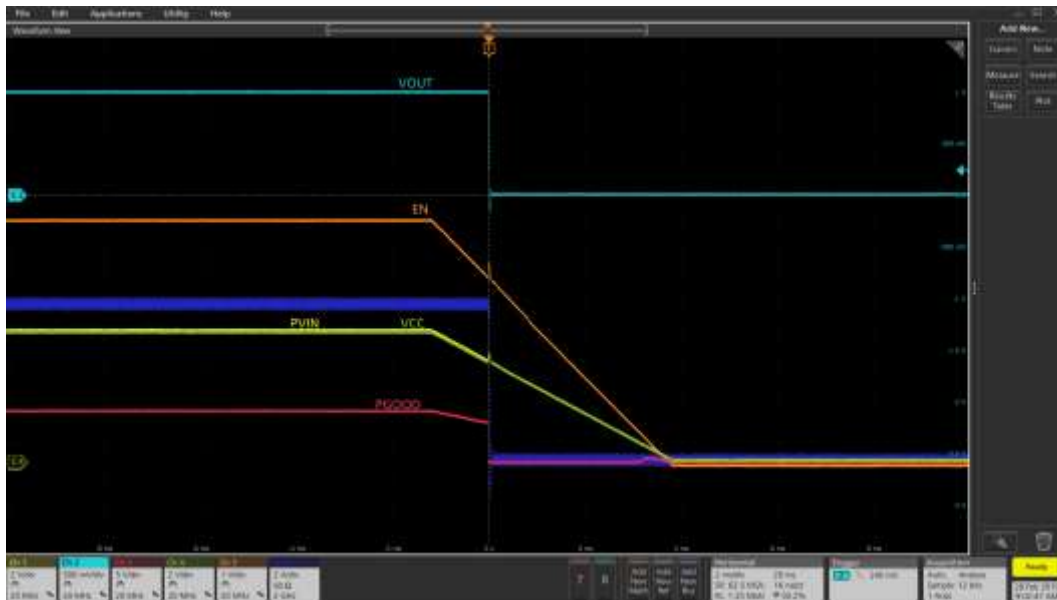
Start Up @ 0A
 Ch1:Vin Ch2:Vo Ch3:PGood
 Ch4:Vcc Ch5:En Ch6:Iout



Start Up @ 6A
 Ch1:Vin Ch2:Vo Ch3:PGood
 Ch4:Vcc Ch5:En Ch6:Iout

Typical Operating Waveforms

PVin=5.0V, Vo=1V, Io=0-6A, Room Temperature, no airflow



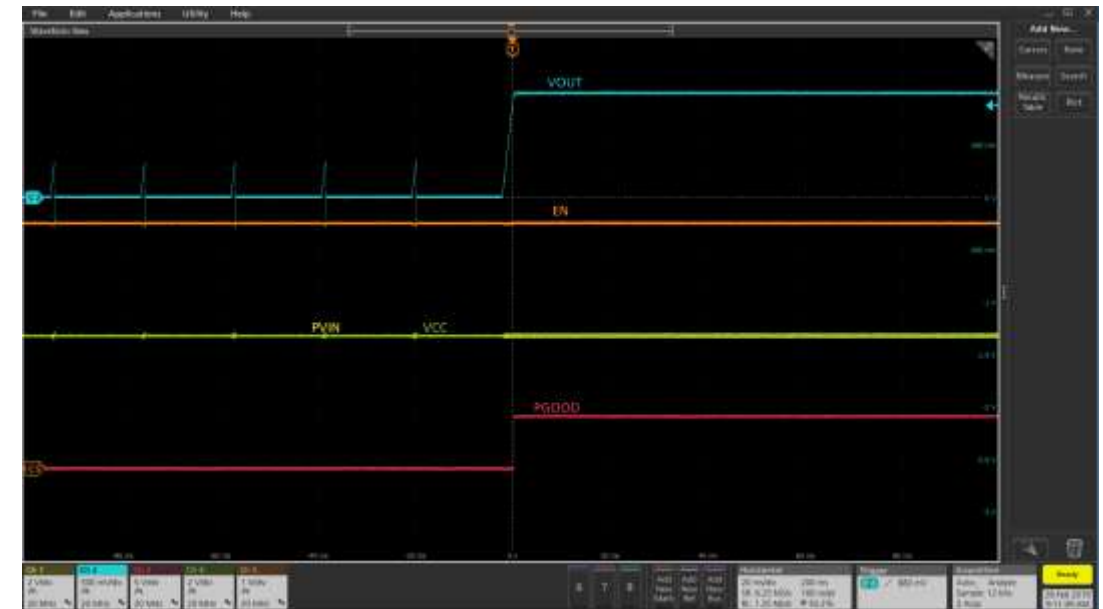
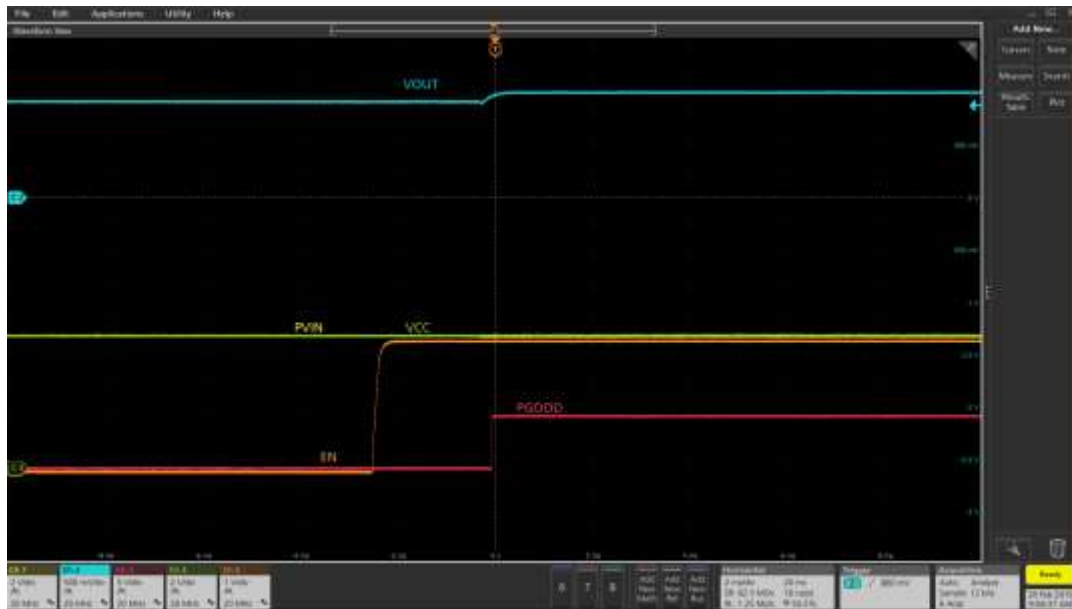
Shutdown at VCC UVLO
 Ch1:Vin Ch2:Vo Ch3:PGood
 Ch4:Vcc Ch5:En Ch6:Iout



Soft turn off @ 6A
 Ch1:Vin Ch2:Vo Ch3:PGood
 Ch4:Vcc Ch5:En Ch6:Iout

Typical Operating Waveforms

$P_{Vin}=5.0V$, $V_o=1V$, $I_o=0-6A$, Room Temperature, no airflow

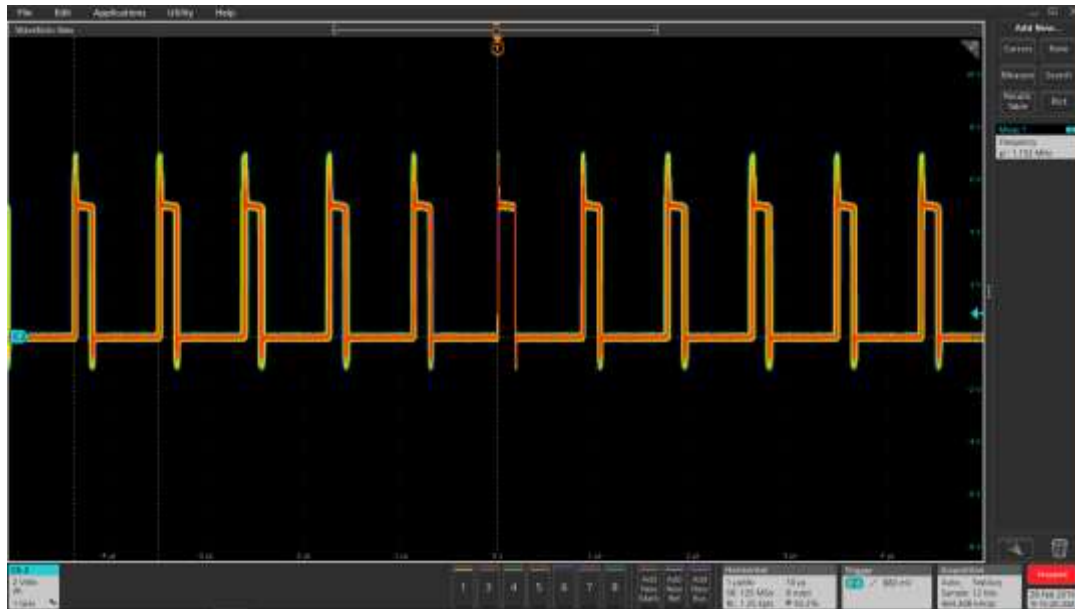


Startup into prebias
 Ch1:Vin Ch2:Vo Ch3:PGood Ch4:Vcc Ch5:En

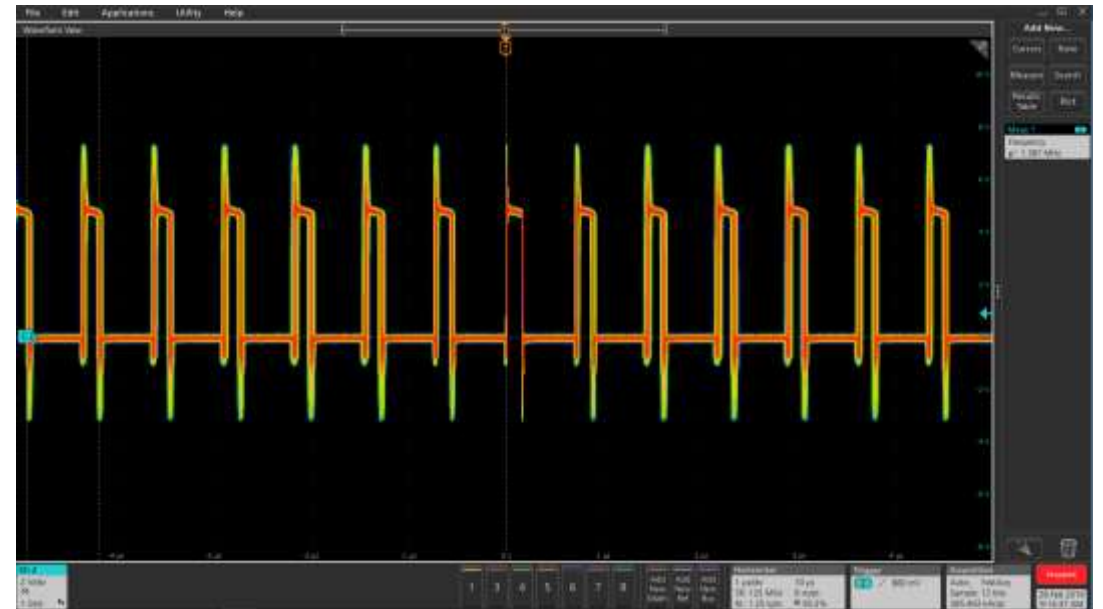
Over Current Protection and Auto Recover to 6A
 Ch1:Vin Ch2:Vo Ch3:PGood Ch4:Vcc Ch5:En

Typical Operating Waveforms

PVin=5.0V, Vo=1V, Io=0-6A, Room Temperature, no airflow



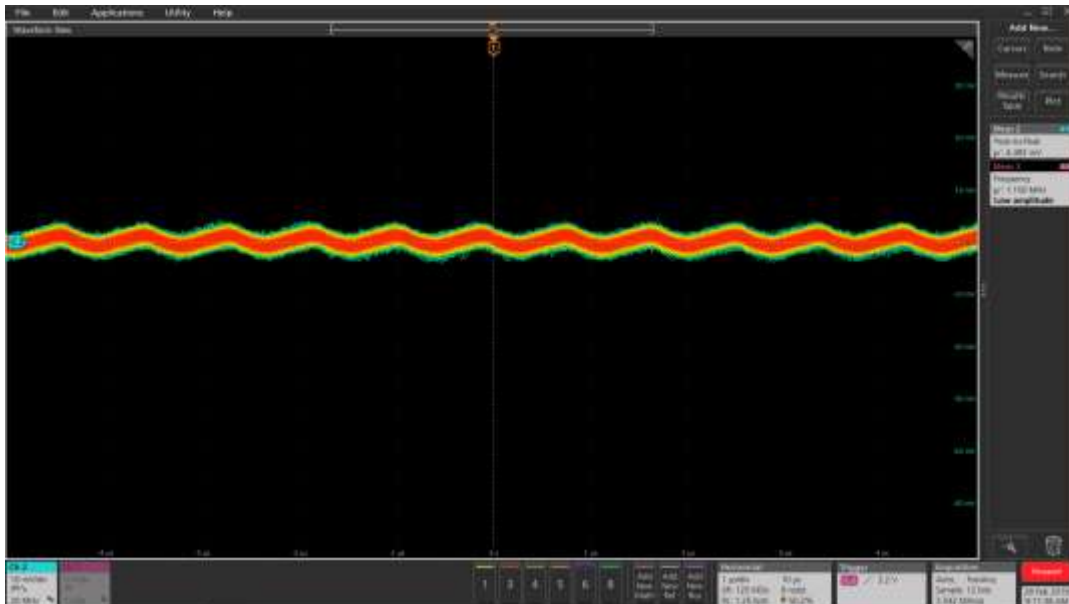
SW@0A
Ch 2: SW



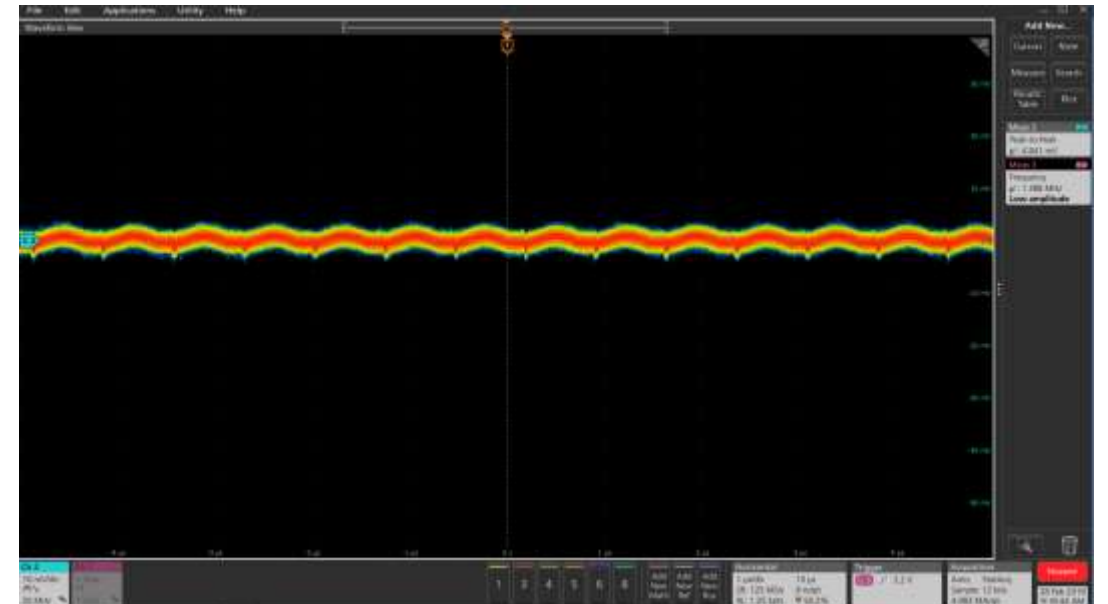
SW@6A
Ch 2: SW

Typical Operating Waveforms

PVin=5.0V, Vo=1V, Io=0-6A, Room Temperature, no airflow



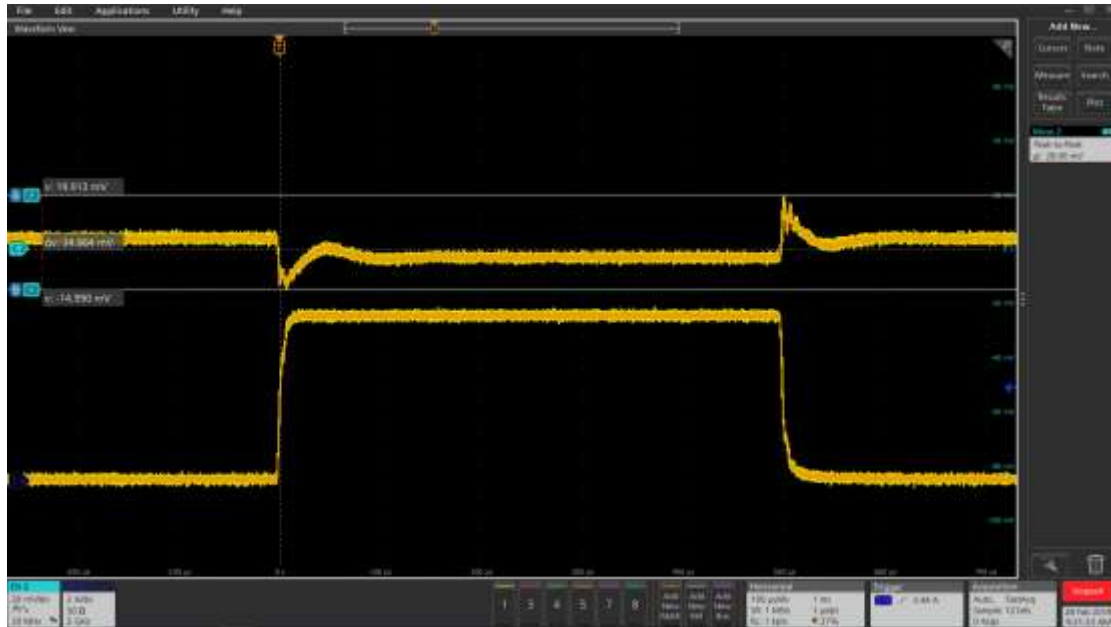
Vo ripple 4.5 mV @ 0 A
Ch2: Vo



Vo ripple 4.8 mV @ 6 A
Ch2: Vo

Typical Operating Waveforms

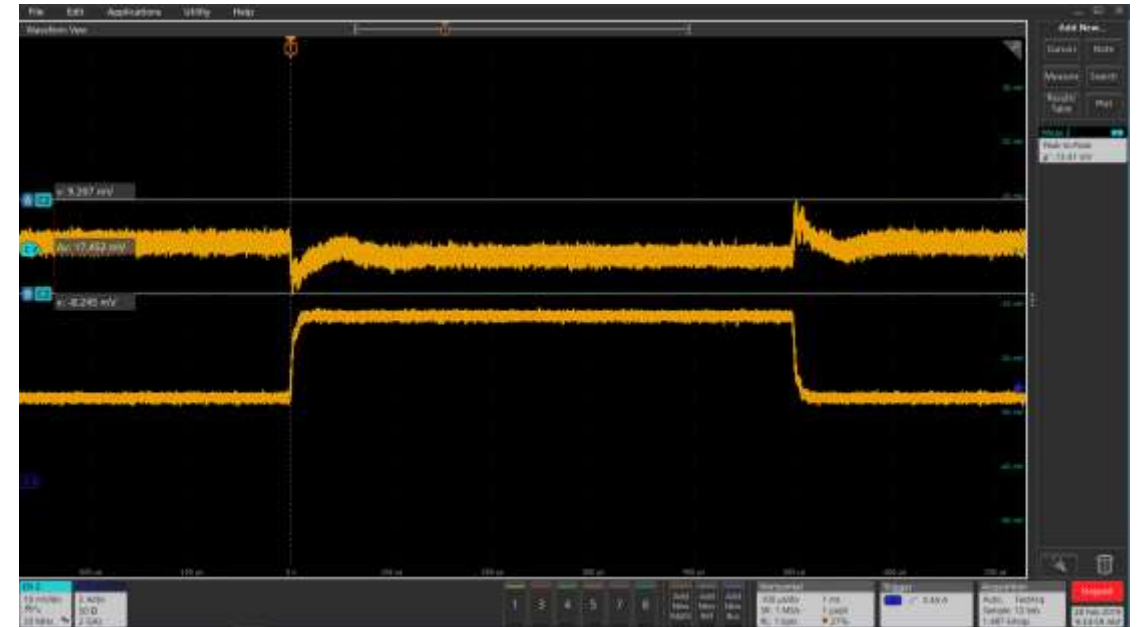
PVin=5.0V, Vo=1V, Io=0-6A, Room Temperature, no airflow



Load transient 0A-6A

Ch2: Vo Ch6: Io

Vo (p-p)=35mV



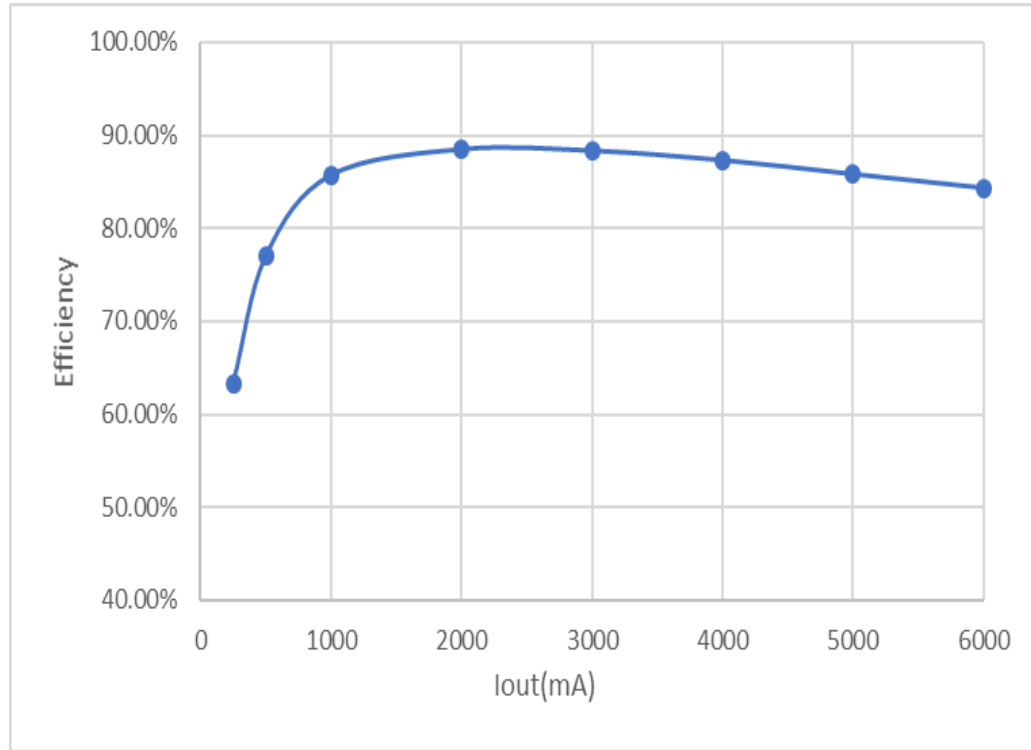
Load transient 0A-3A

Ch2: Vo Ch6: Io

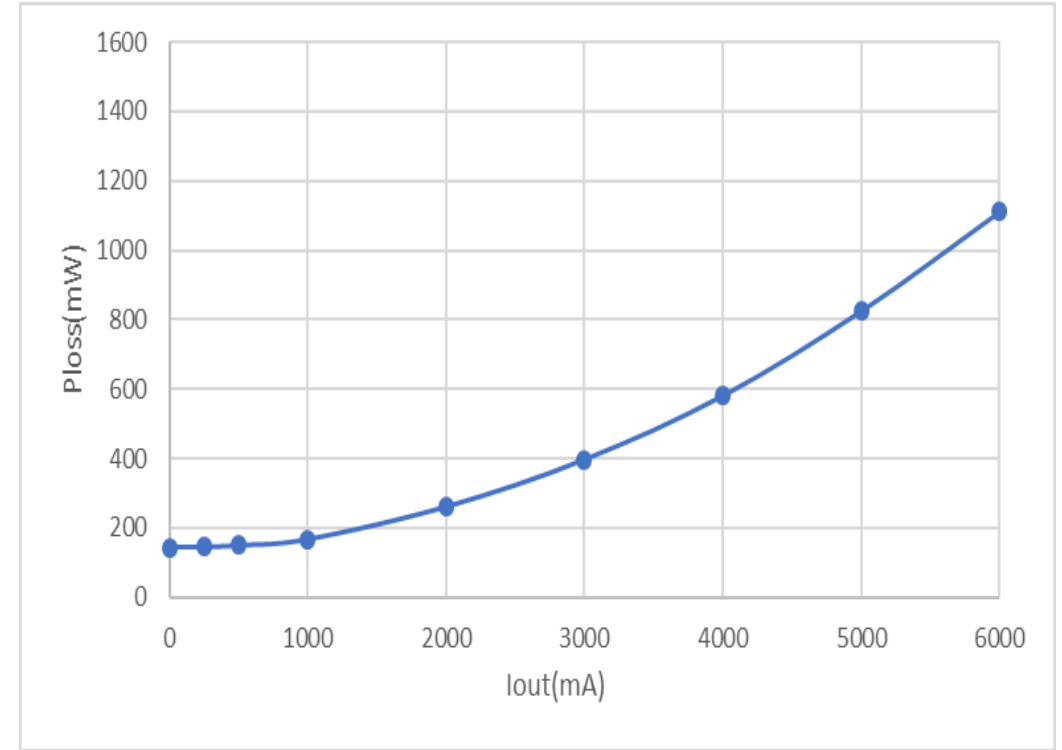
Vo (p-p)=17mV

Typical Operating Waveforms

$P_{Vin}=5.0V$, $V_o=1V$, $I_o=0-6A$, Room Temperature, no airflow



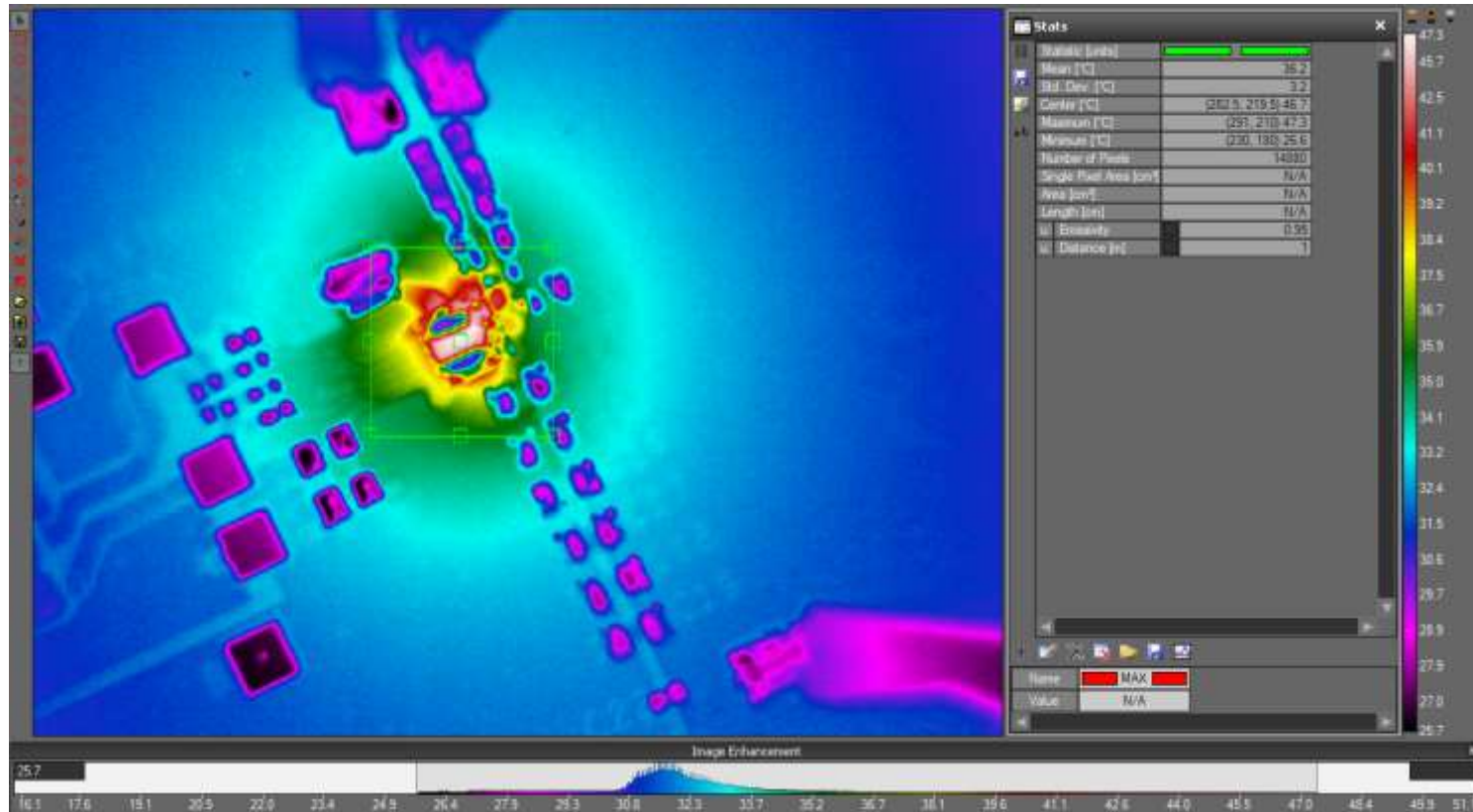
Efficiency



Power Loss

Typical Operating Waveforms

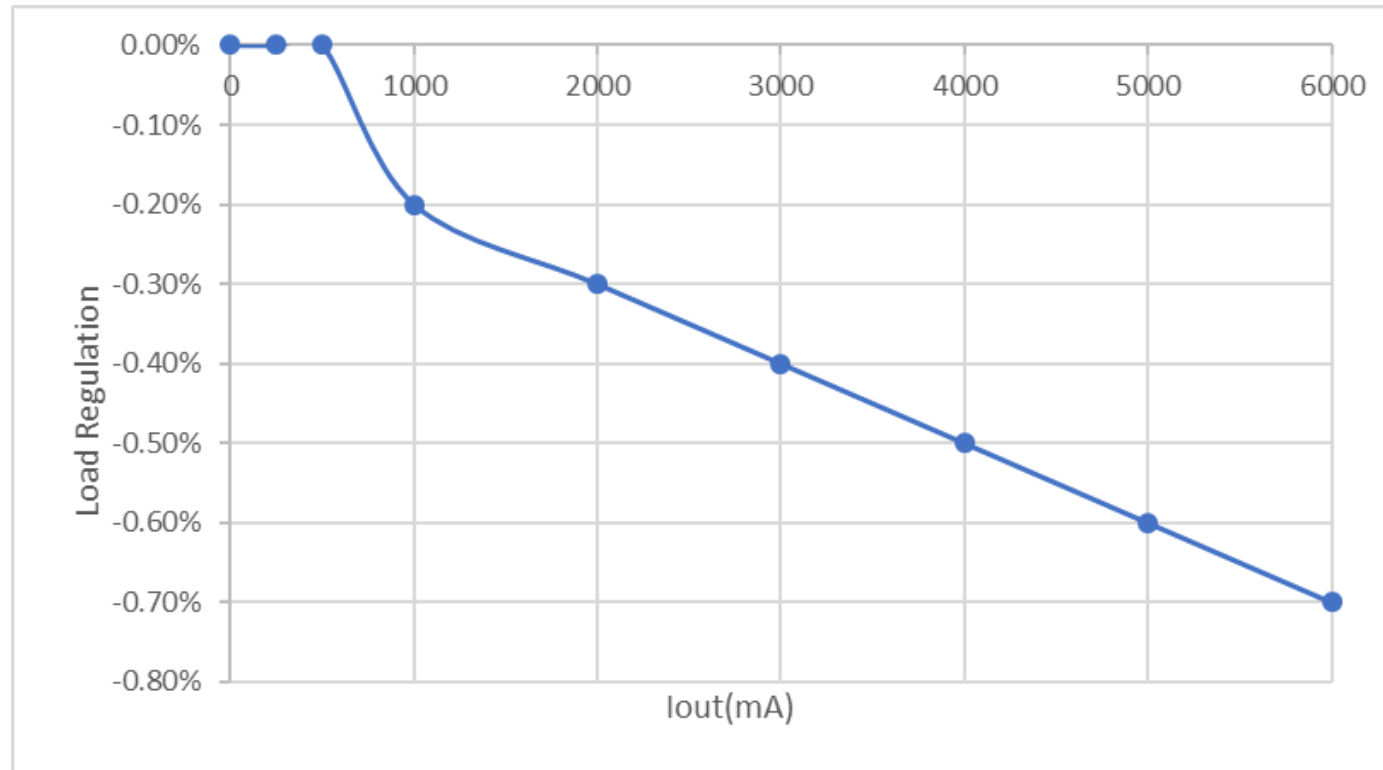
PVin=5.0V, Vo=1V, Io=0-6A, Room Temperature 24°C, no airflow



Io=6A
47°C

Typical Operating Waveforms

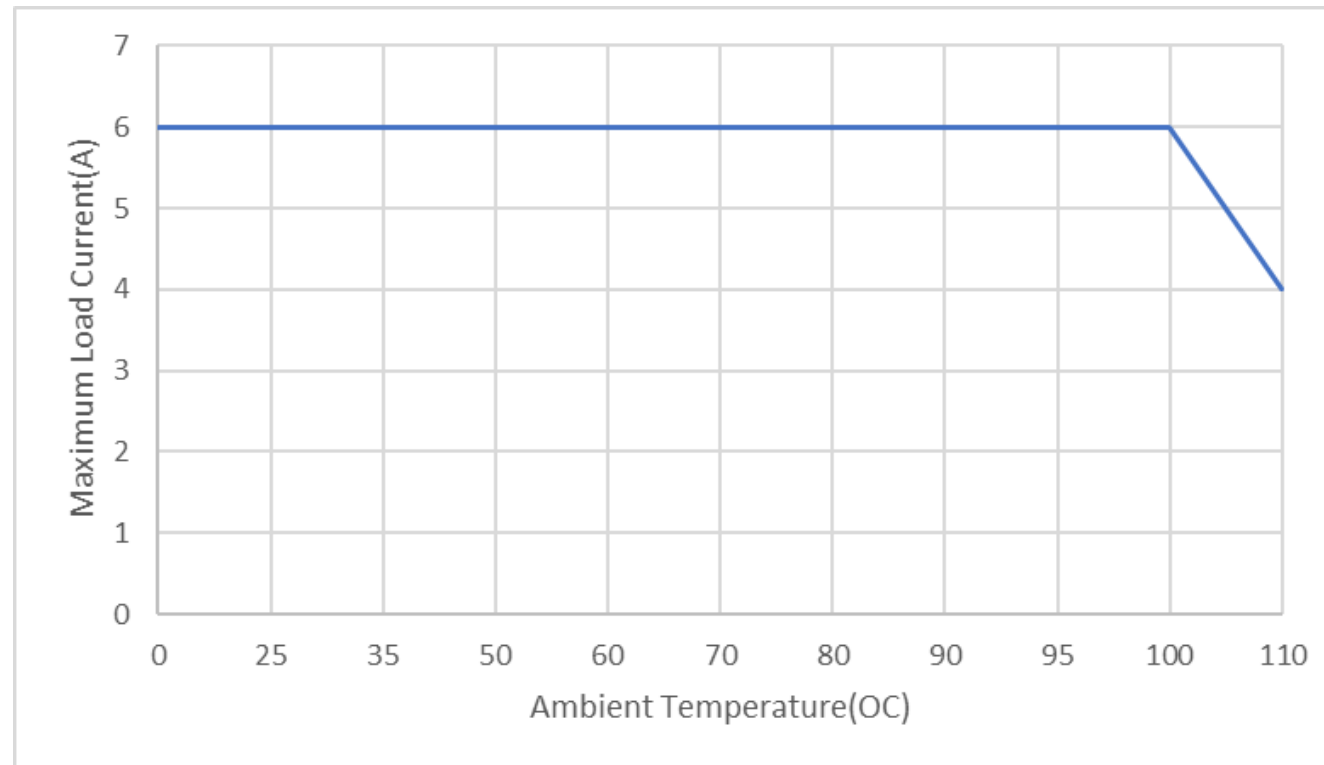
$P_{Vin}=5.0V$, $V_o=1V$, $I_o=0-6A$, Room Temperature, no airflow



**$I_o=0A-6A$
Load Regulation**

Typical Operating Waveforms

PVin=5.0V, Vo=1V, Io=0-6A, Ambient Temperature from 0°C to 110°C, no airflow



**Derating, VIN=5V, VOUT=1V,
LFM=0, FS1406 Demo Board**

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