2.5V-15V Input, 4.8A Current Limit Switch

GENERAL DESCRIPTION

PW1555 is a programmable current limit switch with input voltage range selection and output voltage clamping. Extremely low RDS(ON) of the integrated protection N-channel FET helps to reduce power loss during the normal operation. Programmable soft-start time controls the slew rate of the output voltage during the start-up time. Independent enable control allows the complicated system sequencing control. It integrates the over-temperature protection shutdown and autorecovery with hystersis.

This IC along with small DFN3X3-10 footprint provides small PCB area application.

FEATURES

- Wide Input Voltage Range from 2.5V to 15V with surge up to 30V
- Extremely Low RDS(ON) for the Integrated
- Protection Switch: 40 mΩ
- Programmable Soft-Start Time
- Programmable Current Limit
- Short-circuit Protection
- Selectable Input Range and Clamping Output Voltage Threshold.
- Enable Interface Pin
- Thermal Shutdown Protection & Auto Recovery
- RoHS Compliant and Halogen Free
- Compact package: DFN3X3-10

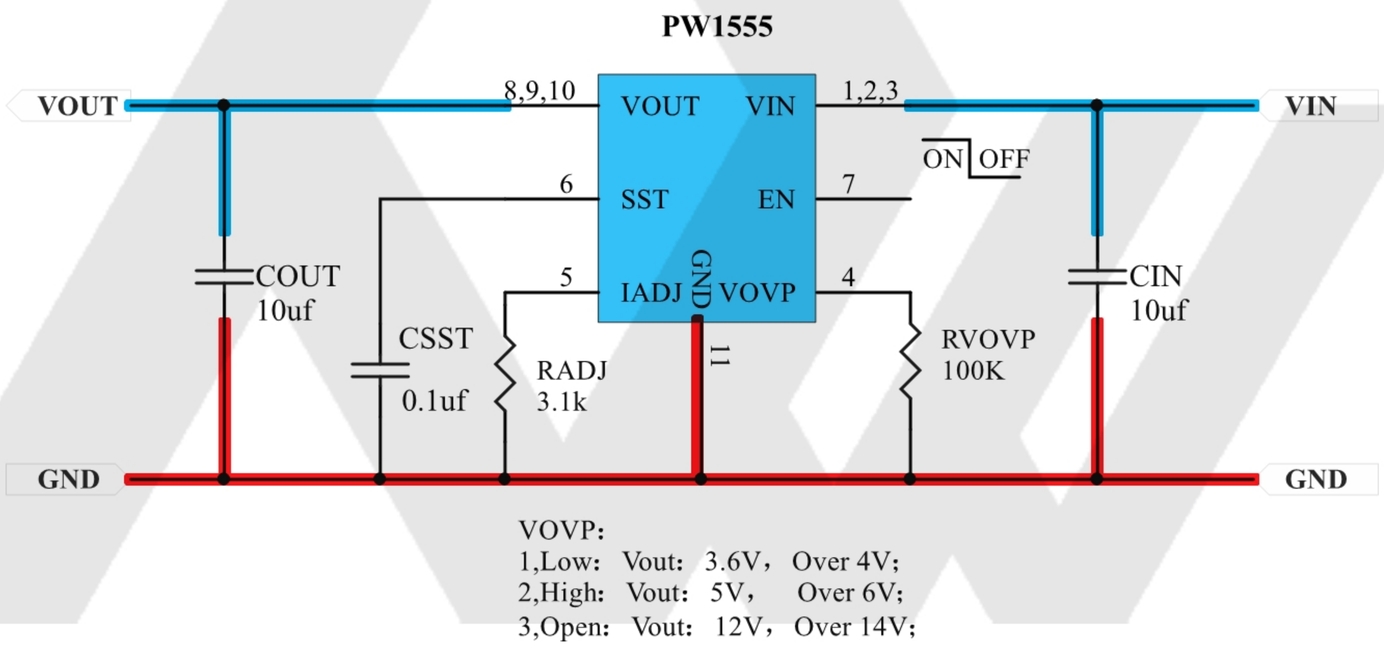
APPLICATIONS

- Server
- Service PC
- Notebook PC
- pad Mini

Products

PCB Design Scheme

TYPICAL APPLICATION CIRCUIT

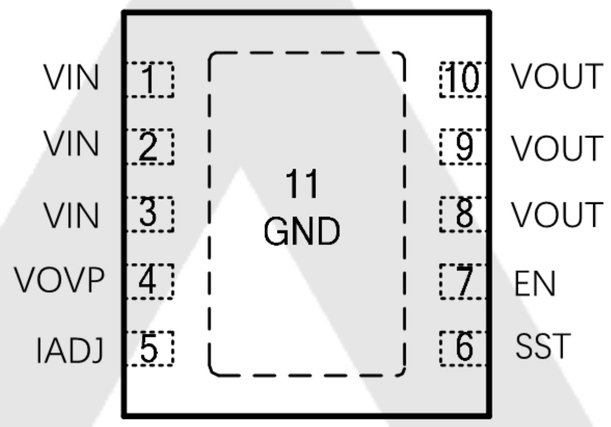


ILIM (A)= 11 / RADJ (KΩ)。RADJ=3.1K，ILIM=3.5A

The minimum current limit is 1A. Current limit beyond 5A is not recommended.

PW1558 Input Voltage Range ：3V~ 20V，PW1555 Input Voltage Range：2.5V-15V（3.6V，5V，12V），

PIN ASSIGNMENT/DESCRIPTION



<table>
<tr><th>Pin Number</th><th>Pin Name</th><th>Function</th></tr>
<tr><td>1</td><td>VIN</td><td rowspan="3">Power input pin. Decouple high frequency noise by connecting at least 0.1uF MLCC to ground.</td></tr>
<tr><td>2</td><td>VIN</td></tr>
<tr><td>3</td><td>VIN</td></tr>
<tr><td>4</td><td>VOVP</td><td>Output clamp voltage selection based on the input voltage. Pull VOVP pin to High by connecting a resistor to VIN, or pull VOVP pin to Low by connecting a resistor to ground, or float VOVP Pin to select different output clamping thresholds. Recommend to decoupling this pin with 0.1uF capacitor.
<table>
<tr><td rowspan="2">VOVP</td><td colspan="2" rowspan="2">VIN</td><td colspan="3">Clamping Threshold</td></tr>
<tr><td>Min</td><td>Typ</td><td>Max</td></tr>
<tr><td>Low</td><td>3.3V</td><td>Over 4V</td><td>3.6V</td><td>3.8V</td><td>4.0V</td></tr>
<tr><td>High</td><td>5V</td><td>Over 6V</td><td>5.4V</td><td>5.7V</td><td>6.0V</td></tr>
<tr><td>Open</td><td>12V</td><td>Over 14V</td><td>12.6V</td><td>13.3V</td><td>14V</td></tr>
</table>
.</td></tr>
<tr><td>5</td><td>IADJ</td><td>Current limit program pin. Program the current limit by connecting a resister to ground. Recommended Formula for RADJ & Current Limit Calculation:
$$\boldsymbol{ILIM\ (A) = 11/R_{ADJ}\ (K\Omega).}$$</td></tr>
<tr><td>6</td><td>SST</td><td>Soft-start time program pin. Connect a capacitor to ground to program the soft start time. Recommended Formula for CSST & Soft-start Time Calculation:
$$T_{SS} = \begin{cases} T_{SS\_DLT}, & \text{No external } C_{SST} \\ \dfrac{C_{SST}}{I_{INT}}, & T_{SS} > T_{SS\_DLT} \end{cases}$$
Where, TSS_DLT is the internally fixed default soft-start time, about 1.4ms, which means there’s no any external CSST; IINT is the internal current source, about 3.6uA.</td></tr>
<tr><td>7</td><td>EN</td><td>Enable interface pin. Pull it High to enable the IC.</td></tr>
<tr><td>8</td><td>VOUT</td><td rowspan="3">Power output pin.</td></tr>
<tr><td>9</td><td>VOUT</td></tr>
<tr><td>10</td><td>VOUT</td></tr>
<tr><td>11 (EP)</td><td>GND</td><td>Ground pin.</td></tr>
</table>

Absolute Maximum Ratings (note1)

Parameter		VALUE	Unit
Supply Input Voltage		30	V
EN pin, VOVP pin		30	V
Power Dissipation, PD @ TA = 25°C		2.6	W
Package Thermal Resistance (Note 2)	θJA	38	°C/W
	θJC	8	°C/W
Junction Temperature Range		125	°C
Lead Temperature (Soldering, 10 sec.)		260	°C
Storage Temperature Range		-65 to 150	°C

RECOMMANDED OPERATING Conditions (note3)

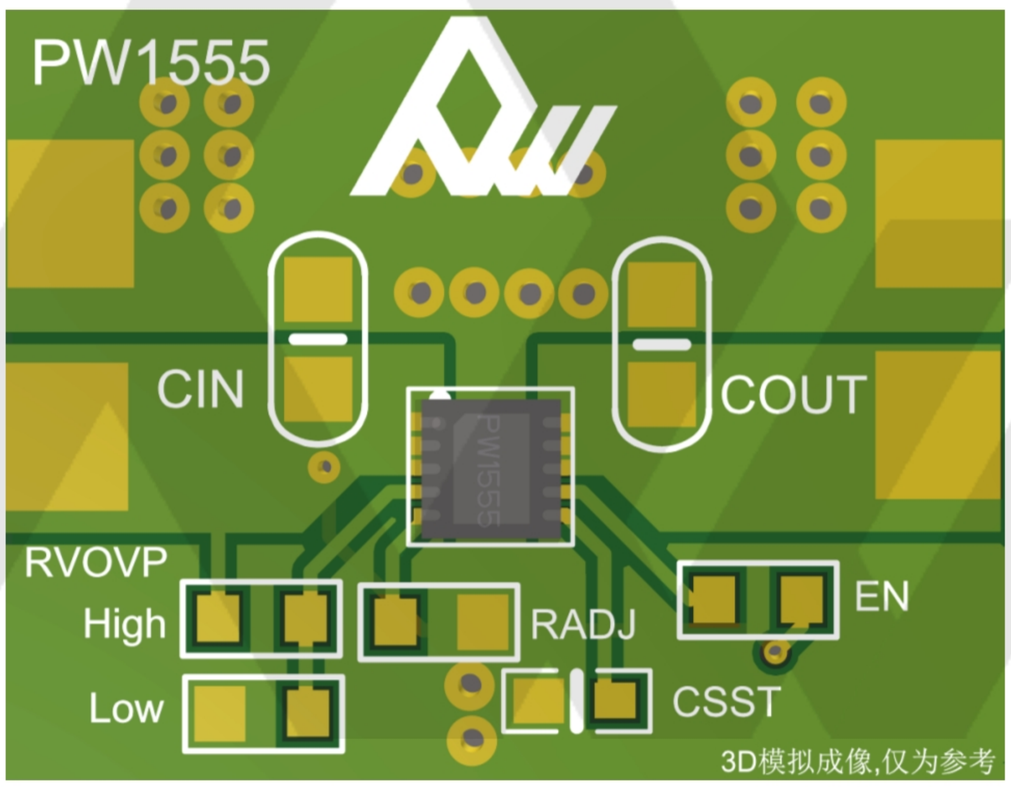
Parameter	VALUE	Unit
Supply Input Voltage	2.5 to 15	V
Junction Temperature Range	-40 to 125	°C
Ambient Temperature Range	-40 to 85	°C

Note 1: Stresses beyond "Absolute Maximum Ratings" may cause permanent damage to the device. These are for stress ratings. Functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions may affect device reliability.

Note 2: θJA is measured in the natural convection at TA = 25°C on a low effective single layer thermal conductivity test board of JEDEC 51-3 thermal measurement standard. Test condition: Device mounted on 2" x 2" FR-4 substrate PCB, 2oz copper, with minimum recommended pad on top layer and thermal vias to bottom layer ground plane.

Note 3: The device is not guaranteed to function outside its operating conditions

PCB Layout Guideline

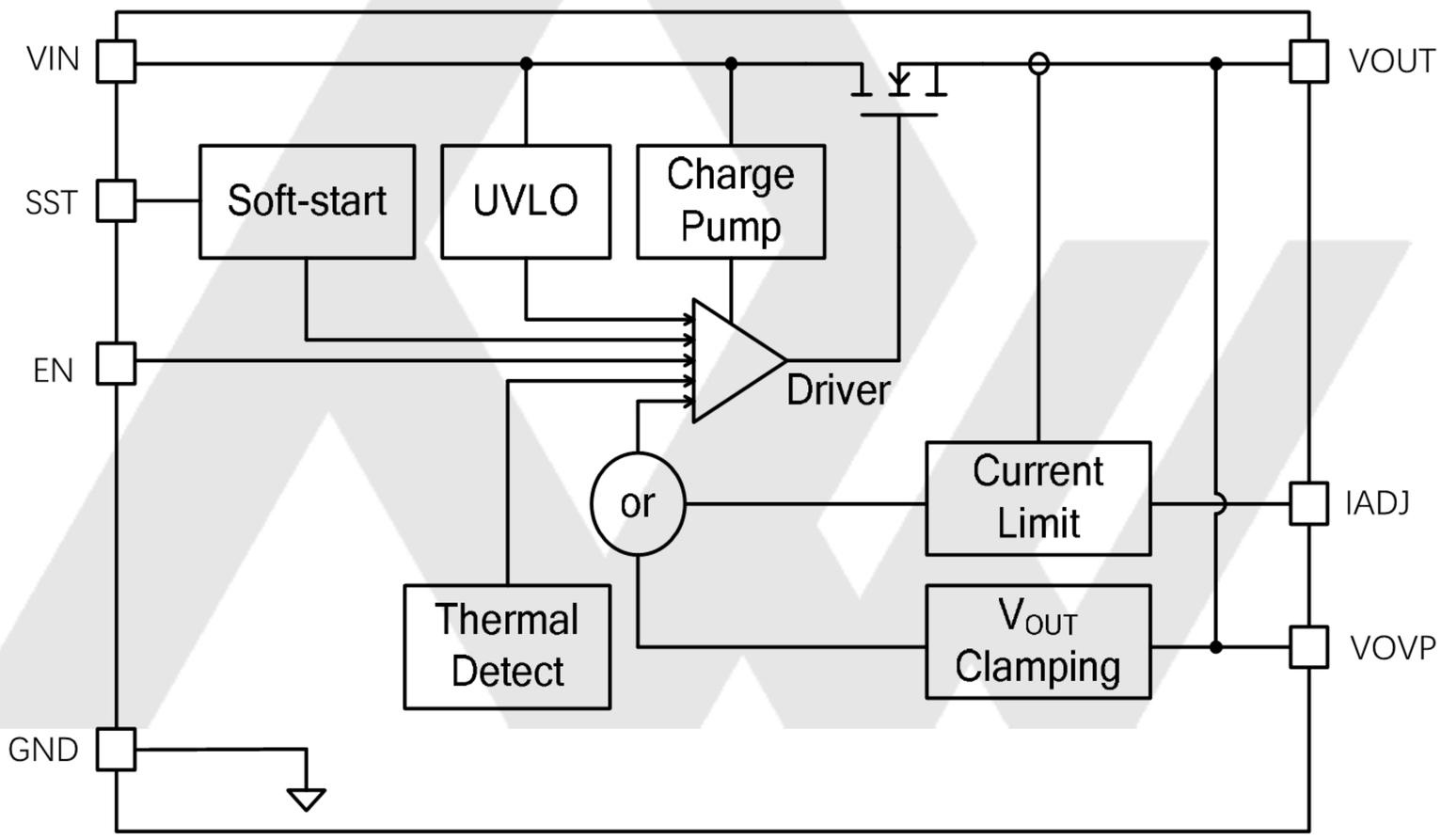


ELECTRICAL CHARACTERISTICS

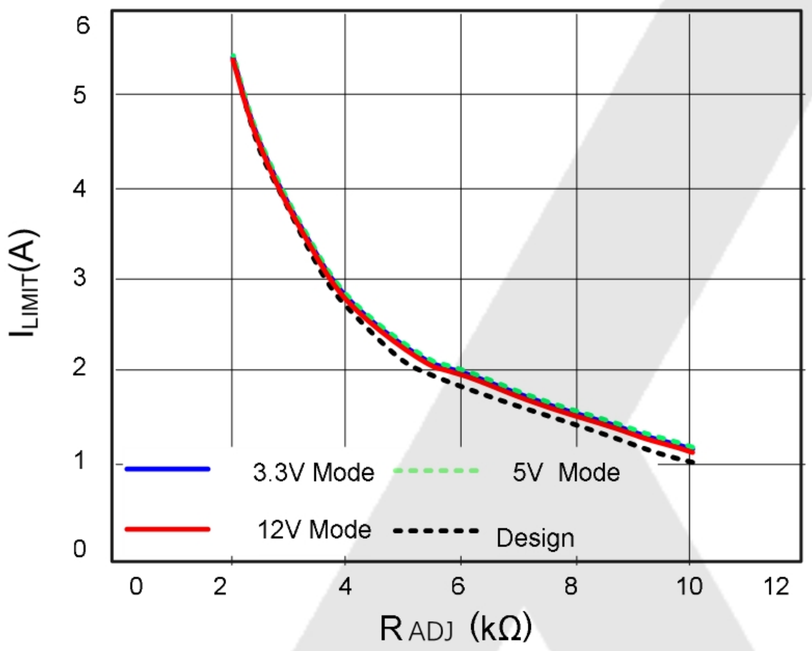
(VIN = 5V, RADJ=10kΩ, CSST=105nF, CIN = 10uF, COUT = 10uF, TA = 25°C, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input Voltage Range	VIN		2.5		30	V
Input UVLO Threshold	VUVLO	VOVP=LOW	2.2		2.4	V
		VOVP =HIGH	3.4		3.8	V
		VOVP =OPEN	8.1		9.0	V
UVLO hysteresis	VHYS	VOVP =LOW	0.05	0.085	0.13	V
		VOVP =HIGH	0.06	0.095	0.15	V
		VOVP =OPEN	0.1	0.19	0.29	V
Bias Current	IBIAS			200		μA
Shutdown Current	ISHDN	EN=0		10		μA
Protection FET RON	RDS(ON)			40	70	mΩ
Current Limit Accuracy				30%ILIM		
Current Limit Program Range	ILIM		1		5	A
Clamping Output Voltage	VCLP	VOVP =LOW	3.6	3.8	4.0	V
		VOVP =HIGH	5.4	5.7	6.0	V
		VOVP =OPEN	12.6	13.3	14.0	V
Soft-start Time	TSST	CSST=105nF		29.4		ms
Soft-start Time Accuaracy				±30%TSST		
EN Turn-on Threshold	VEN_ON		2			V
EN Turn-off Threshold	VEN_OFF				0.4	V
Thermal Shutdown Temperature	TSD			140		°C
Thermal Shutdown Hysteresis	THYS			20		°C

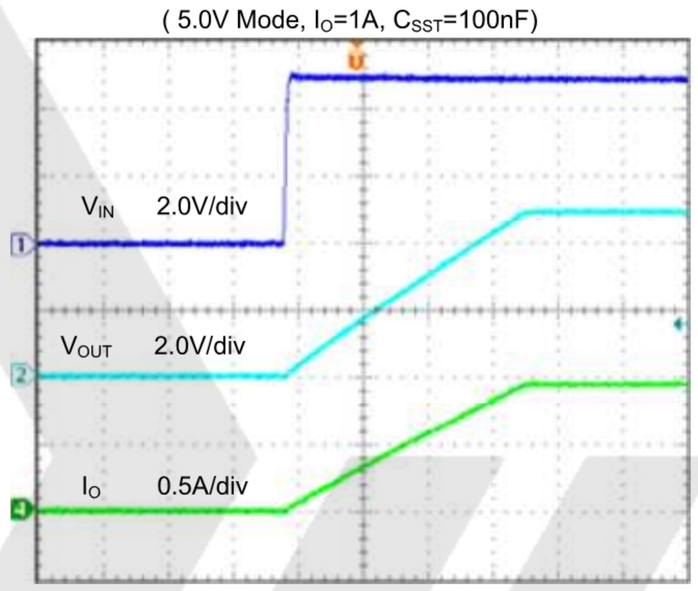
Block Diagram



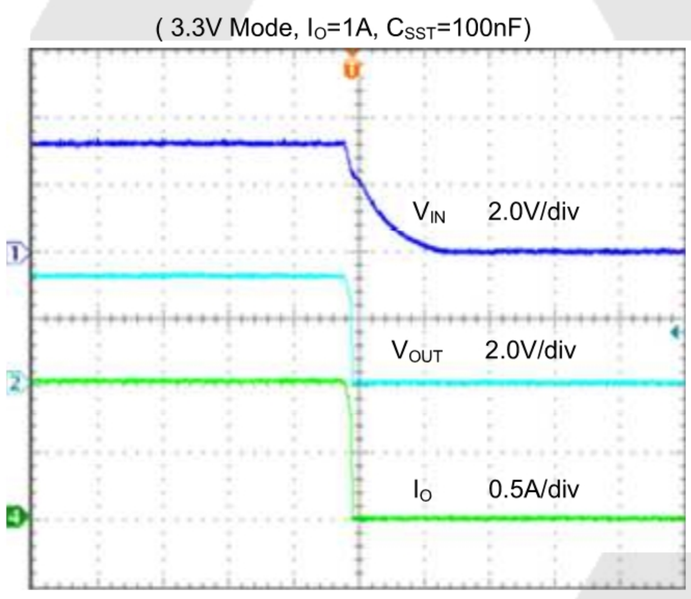
Typical Performance Characteristics



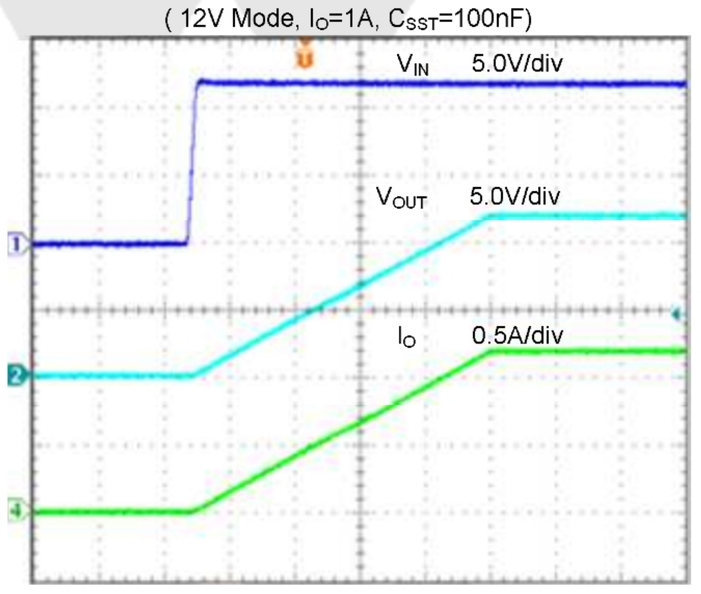
Programmable Cueernt Limit



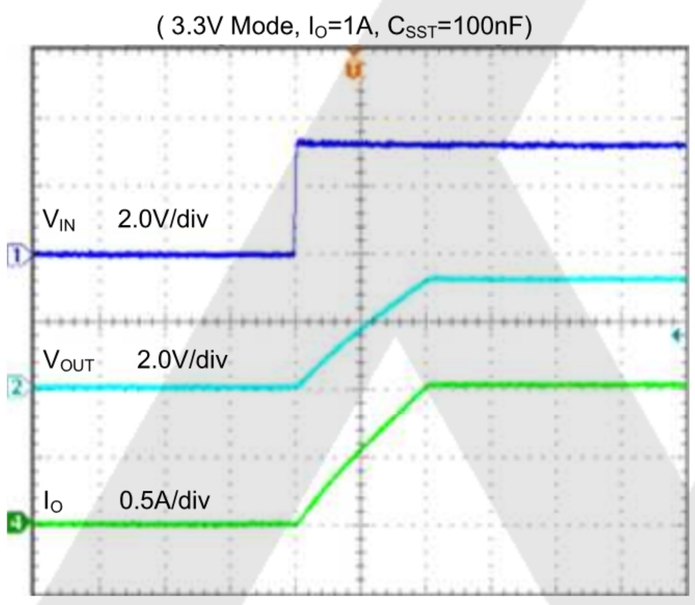
Programmable Soft-start Time



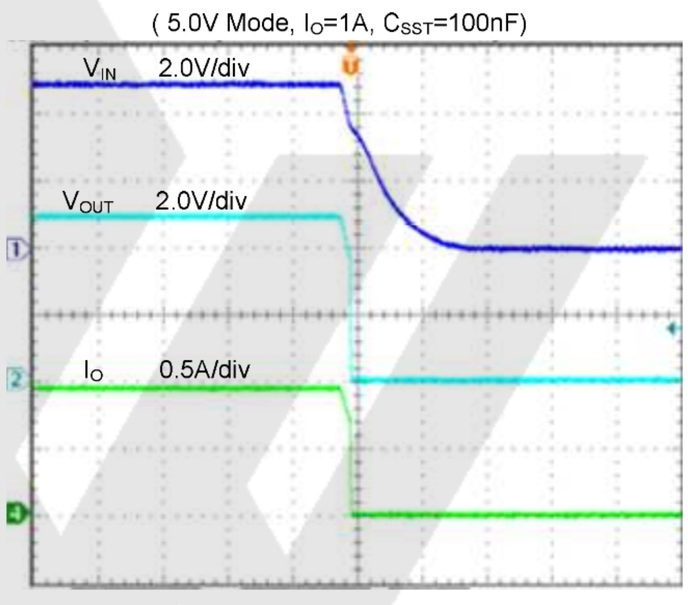
Shutdown



Programmable Soft-start Time

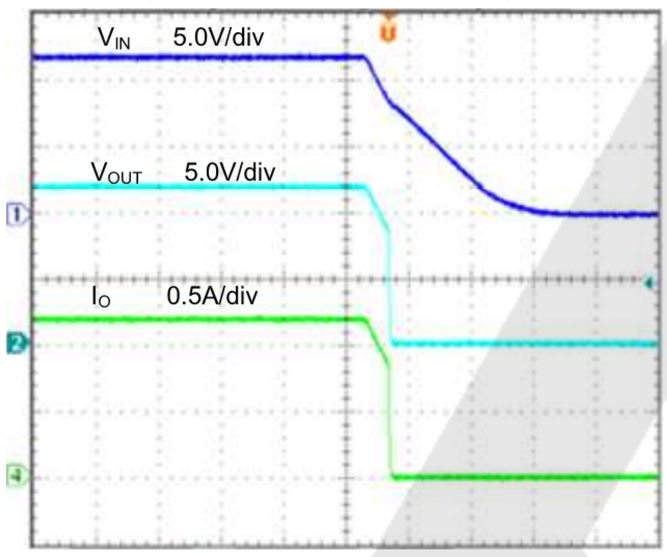


Programmable Soft-start Time



Shutdown

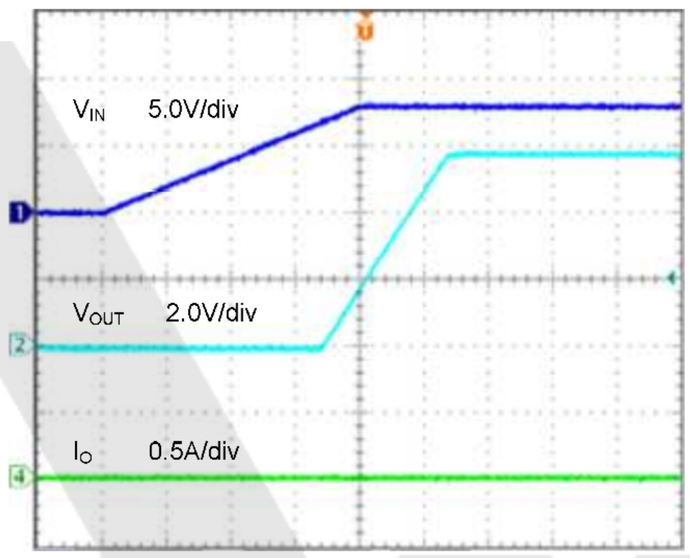
(12V Mode, I_O=1A, C_{SST}=100nF)



Time (10ms/div)

Shutdown

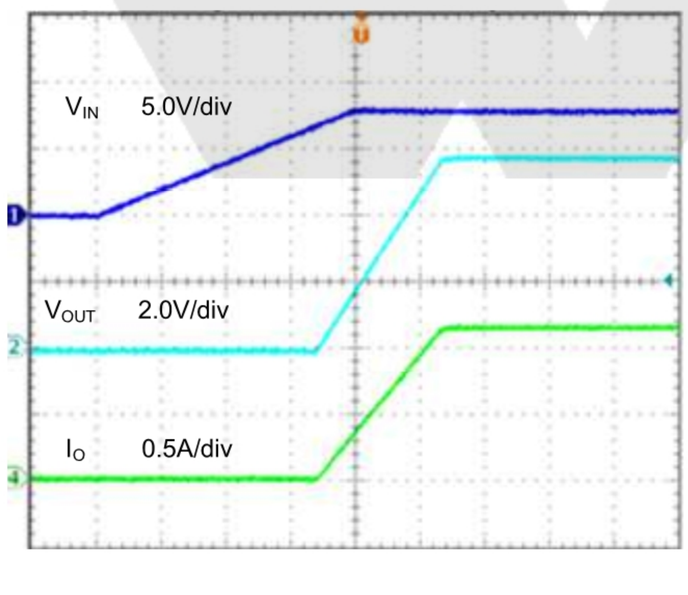
(5V Mode, V_{IN}=8V, I_O=0A)



Time (20ms/div)

Over Voltage Protection

(5V Mode, V_{IN}=8V, I_O=1A)

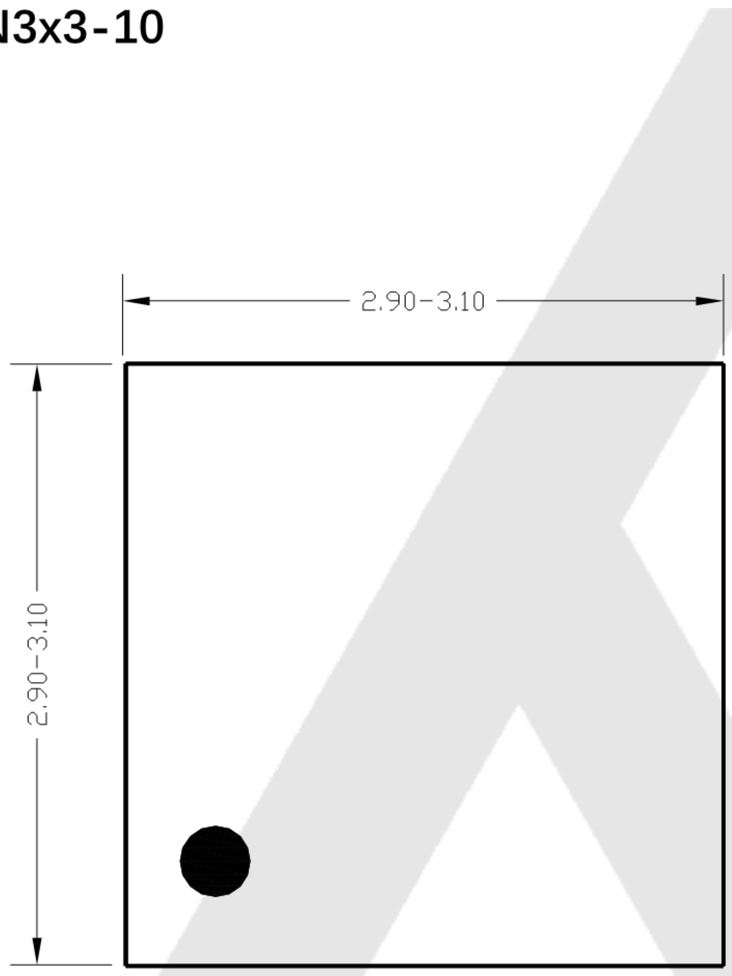


Time (20ms/div)

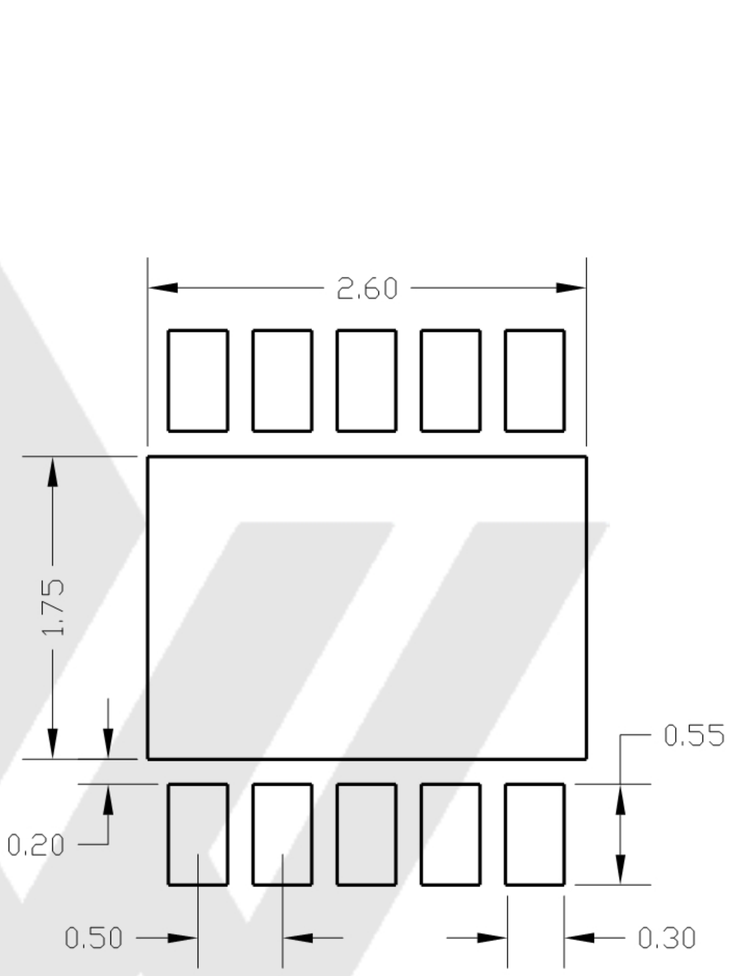
Over Voltage Protection

PACKAGE DESCRIPTION

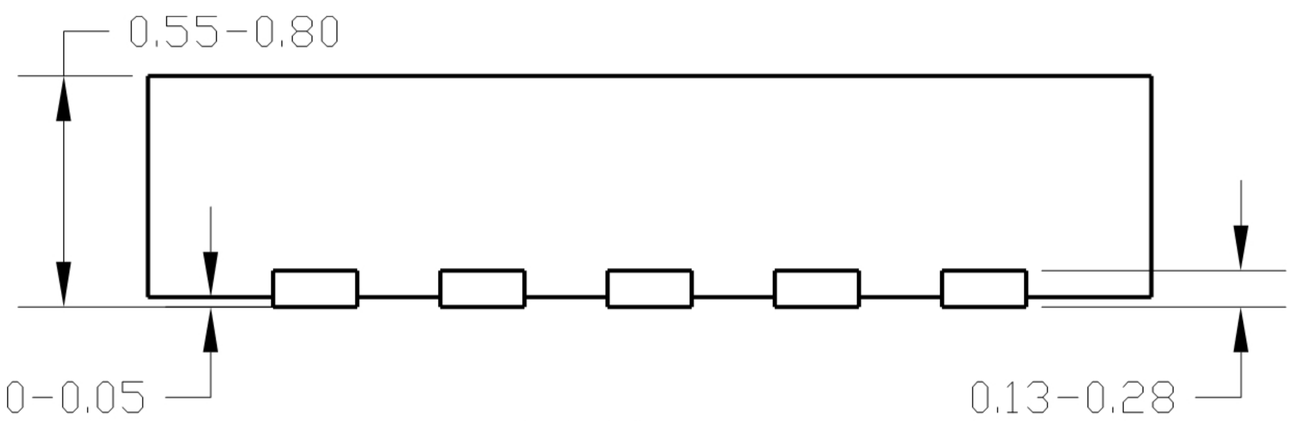
DFN3x3-10



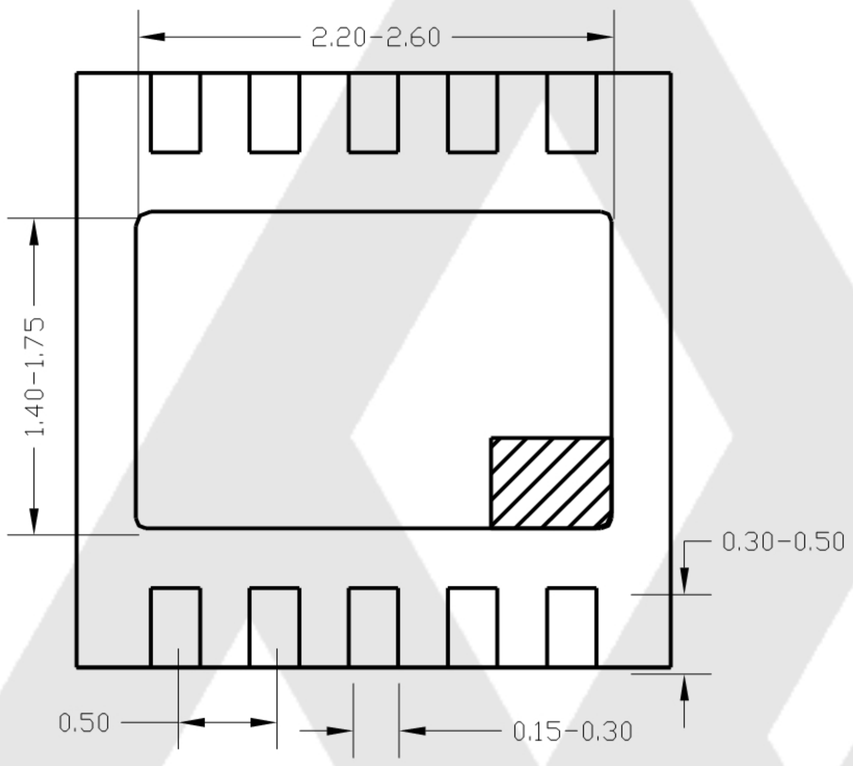
Top View

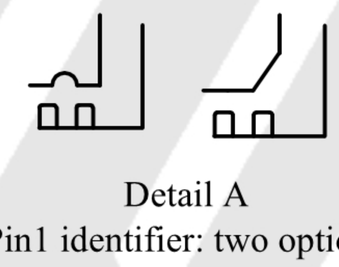


PCB layout (recommended)



Side View





Detail A
Pin1 identifier: two options

Bottom View

Notes: All dimensions are in millimeters and exclude mold flash & metal burr.

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