

3A Low Dropout Regulator with Enable

Features

- 0.8V Reference Voltage
- Power-On-Reset Monitoring on Both VIN and VPP pins: $V_{UVLO,VIN}=1V$, $V_{UVLO,VPP}=2.7V$
- 230mV(typical) Dropout at 3A output current
- VO Pull Low Resistance when Disable
- VO Soft Start when Enable
- Low Reverse Leakage (Output to Input)
- Enable Pin
- Over Current and Over Temperature Protection
- Open-Drain Power Good (POK)
- SOP-8(FD) and TDFN3X3-10 Package

Applications

- Battery-powered Device
- Portable Equipment
- Notebook Computers

General Description

The G9458 is a high performance positive voltage regulator designed for use in applications requiring very low Input voltage and very low dropout voltage at up to 3 amps. It operates with a V_{IN} as low as 1V and VPP voltage 2.7V with output voltage as low as 0.8V. The G9458 features ultra low dropout, ideal for applications where V_{OUT} is very close to V_{IN} . Additionally, the G9458 has an enable pin to further reduce power dissipation while shutdown. The G9458 provides excellent regulation over variations in line, load and temperature. A open-drain POK pin indicates the output voltage status with a delay time set internally.

The G9458 is available in the power SOP-8(FD) and TDFN3X3-10 package. It is available with 2.5V internally preset outputs that are also adjustable using external resistors.

Ordering Information

ORDER NUMBER	MARKING	TEMP. RANGE	PACKAGE (Green)
G9458F11U	G9458	-40°C~+85°C	SOP-8 (FD)
G9458RE1U	9458	-40°C~+85°C	TDFN3X3-10

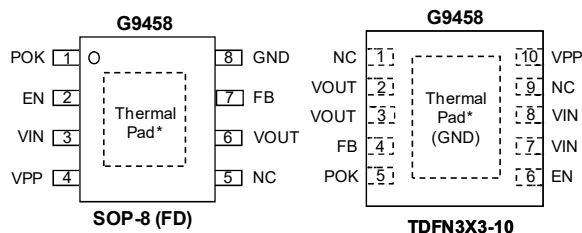
Note: F1:SOP-8 (FD) RE: TDFN3X3-10

1: Bonding Code

U : Tape & Reel

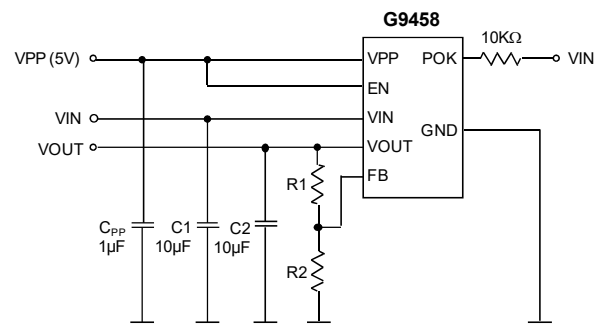
Green : Lead Free / Halogen Free.

Pin Configuration



* Recommend connecting the Thermal Pad* to the Ground for excellent power dissipation.

Typical Application Circuit



$$VO = \frac{0.8(R1+R2)}{R2} \text{ Volts}$$

R2<120kΩ is recommended

ADJ mode: R1||R2>1kΩ is recommended

Fixed 2.5V mode: R2=0Ω is recommended

Absolute Maximum Ratings (Note 1)

VPP, VIN, EN, FB, VOUT, POK Input Voltage
-0.3V~6V
 Maximum Junction Temperature 150°C
 Storage Temperature Range. -65°C ≤ T_J ≤ +150°C
 Reflow Temperature (soldering, 10sec) 260°C

Operation Conditions

VIN Voltage 1.0V ~5.5V
 VPP Voltage 2.7V~5.5V
 (VPP ≥ VIN for normal operation)
 Temperature Range. -40°C ≤ T_A ≤ +85°C

Thermal Information

THERMAL METRIC ⁽¹⁾		G9458		UNIT
		TDFN3X3-10	SOP-8 (FD)	
R _{θJA}	Junction to ambient thermal resistance	58.4	54.6	°C/W
R _{θJC_top}	Junction to case top thermal resistance	74.7	81.1	°C/W
R _{θJB}	Junction to board thermal resistance	29.0	29.2	°C/W
Ψ _{JT}	Junction to top characterization parameter	4.6	13.7	°C/W
Ψ _{JB}	Junction to board characterization parameter	29.1	29.4	°C/W
R _{θJC_bot}	Junction to case bottom thermal resistance	11.2	12.4	°C/W

- Package thermal metric is obtained using the method described in JEDEC specification JESD51-7, using a four-layer board.
- The maximum power dissipation is $P_{D(MAX)} = \frac{(T_{JMAX} - T_A)}{R_{\theta JA}}$, Exceeding the maximum allowable power dissipation results in excessive die temperature, and the device will enter thermal shutdown.

Electrical Characteristics

$V_{PP}=5V$, $V_{IN}=3.3V$, $V_{EN}=V_{PP}$, $I_{OUT}=10mA$, $C_{IN}=10\mu F$, $C_{OUT}=10\mu F$, $T_A=T_J=25^{\circ}C$.

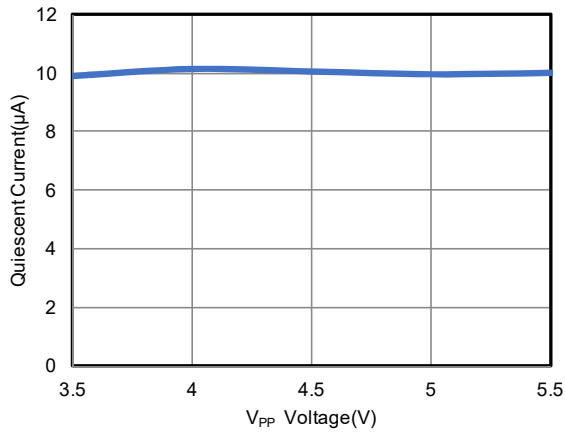
The device is not guaranteed to function outside its operating conditions. Parameters with MIN and/or MAX limits are 100% tested at $+25^{\circ}C$, unless otherwise specified.

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT
VIN						
Input Voltage Range	V_{IN}	$V_{IN} > V_{OUT} + V_D$ and $V_{IN} > 1V$	1	---	5.5	V
VIN Supply Current	I_{VIN}	$V_{OUT}=V_{FB}$, without feedback resistors	---	10	20	μA
VIN Shutdown Current		$EN=0V$	---	---	1	μA
VPP						
V_{PP} Voltage Range	V_{PP}	$V_{PP} > V_{OUT} + 1.5V$ and $V_{PP} > 2.7V$	2.7	---	5.5	V
V_{PP} Current	I_{PPH}	$V_{OUT}=V_{FB}$, without feedback resistors	---	60	90	μA
	I_{PPL}	$EN=0V$	---	0.1	1	μA
VOUT						
Output Voltage	V_{OUT}	$V_{IN}=1.0\sim 5V$, $I_{OUT}=0\sim 3A$ $T_J=-40\sim 125^{\circ}C$	-1.5	---	+1.5	%
Line Regulation		$V_{IN}=(V_{OUT}+0.5V)$ to $5V$, $I_{OUT}=100mA$ ($\Delta V_{OUT}/\Delta V_{IN} \cdot V_{OUT}$)	---	0.05	0.2	%/V
Ripple Rejection		$f=1kHz$	---	70	---	db
Load Regulation		$10mA \leq I_{OUT} \leq 3A$	---	0.2	1	%
Dropout Voltage	V_D	$I_{OUT}=3A$, $V_{OUT}=1.8V$	---	230	280	mV
Short Circuit Current			---	1.1	---	A
Current Limit	I_{LIM}	$V_{IN} > V_{OUT} + V_D$	4	---	---	A
V_O Discharge Resistor		$V_{EN}=0V$	---	70	---	Ω
Soft Start Time	T_{SS}	$V_{OUT}=10\%$ to 90%	0.7	1.5	3	ms
FB						
Reference Voltage	V_{REF}		0.788	0.8	0.812	V
FB Pin Current	I_{ADJ}		---	20	100	nA
POK						
POK Threshold Voltage		V_{FB} rising	---	92.5	---	%/V
POK Hysteresis			---	5	---	%/V
POK Output Low Voltage		$I_{SINK,POK}=20mA$	---	0.3	---	V
EN						
EN Pin Voltage High	V_{ENH}		1.1	---	---	V
EN Pin Voltage Low	V_{ENL}		---	---	0.4	V
EN Pin Pull Low Resistor	R_{EN}		---	2.2	---	M Ω
Over Temperature Protection						
Over Temperature	T_{OT}		---	150	---	$^{\circ}C$
Over Temperature Hysteresis	T_{OTHY}		---	30	---	$^{\circ}C$

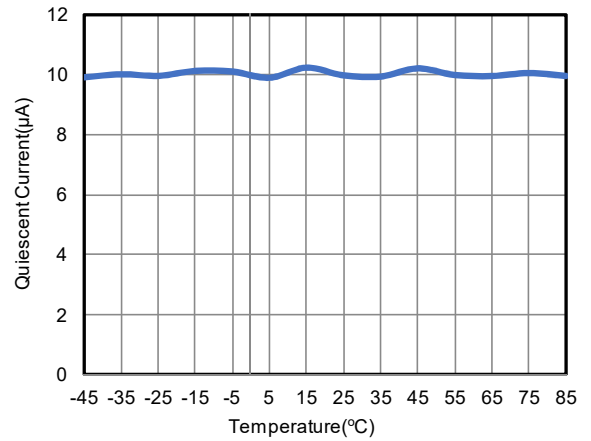
Note 1: Absolute Maximum Ratings are limits beyond which damage to the device may occur. Operating Conditions are conditions under which the device functions but the specifications might not be guaranteed. For guaranteed specifications and test conditions see the Electrical Characteristics.

Typical Performance Characteristics

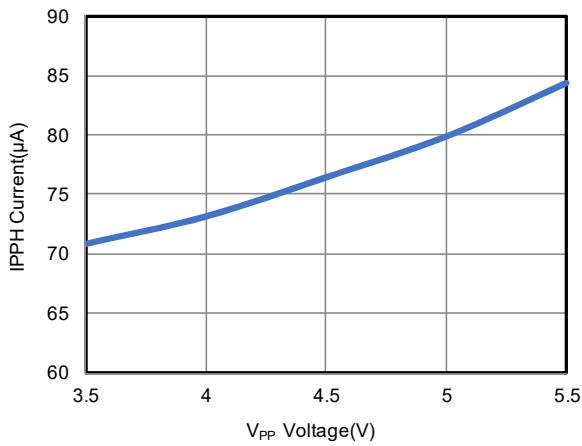
I_{VIN} Quiescent Current vs. V_{PP} Voltage



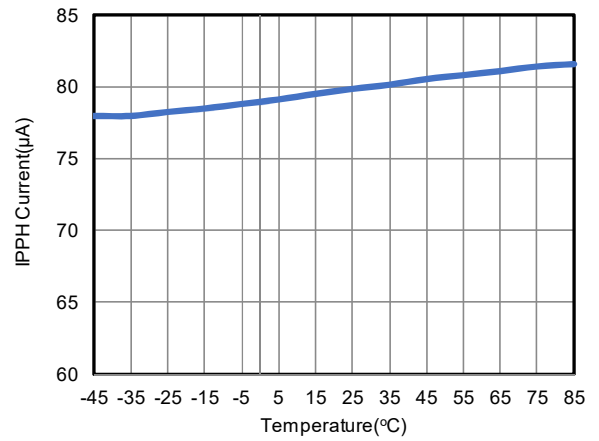
I_{VIN} Quiescent Current vs. Temperature



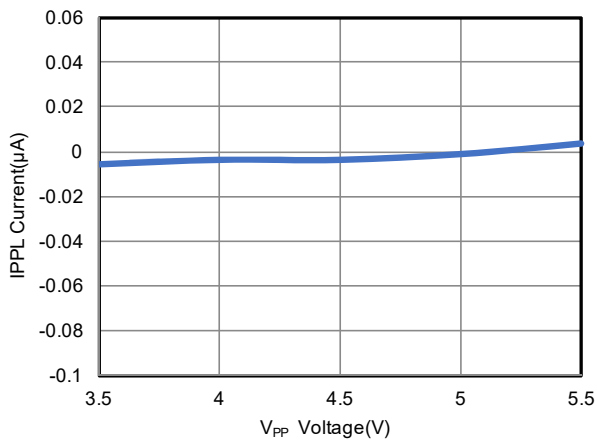
I_{PPH} Current vs. V_{PP} Voltage



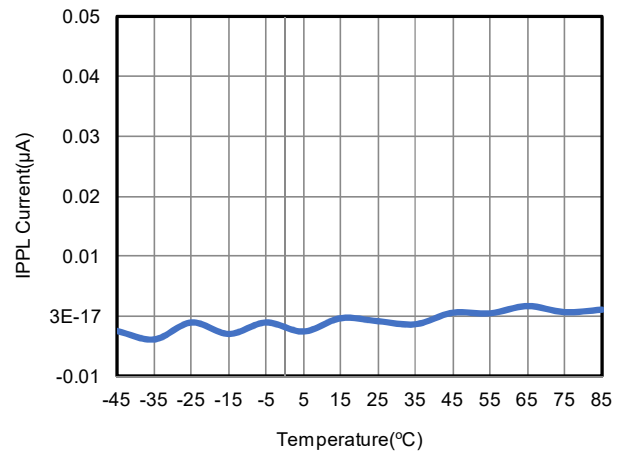
I_{PPH} Current vs. Temperature



I_{PPL} Current vs. V_{PP} Voltage

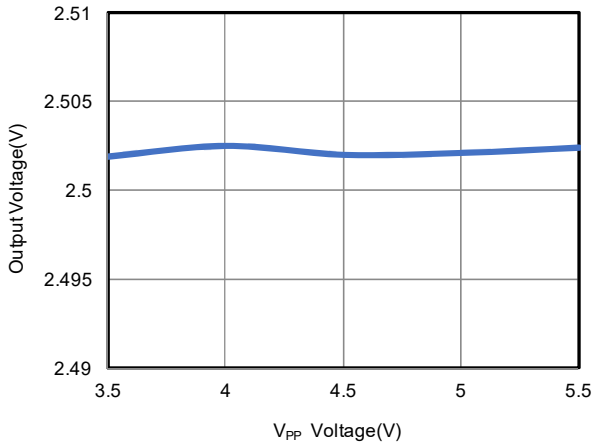


I_{PPL} Current vs. Temperature

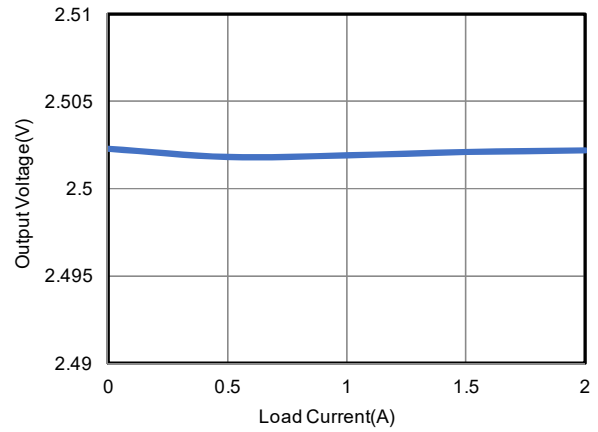


Typical Performance Characteristics (continued)

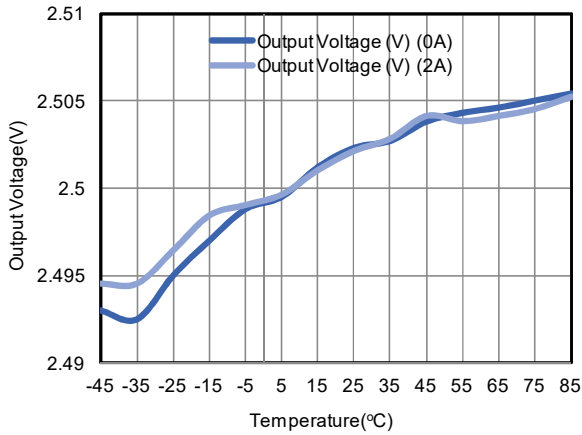
Output Voltage vs. V_{PP} Voltage



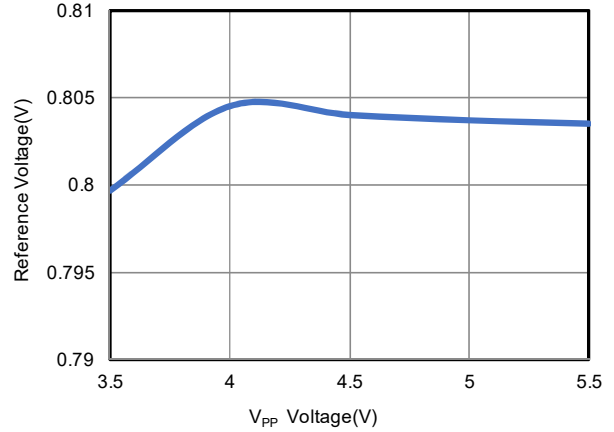
Output Voltage vs. Load Current



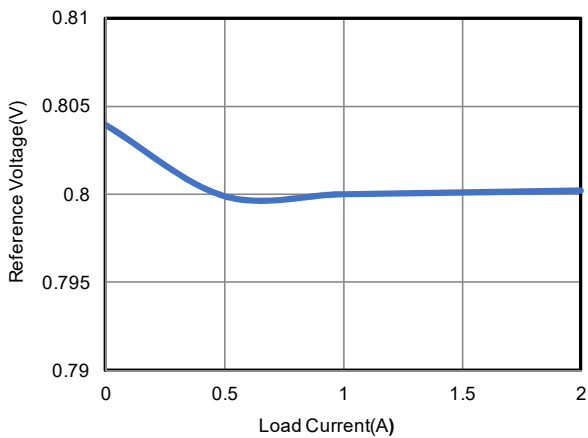
Output Voltage vs. Temperature



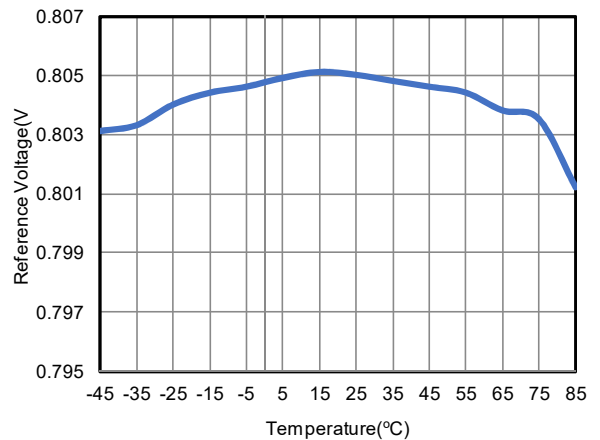
Reference Voltage vs. V_{PP} Voltage



Reference Voltage vs. Load Current

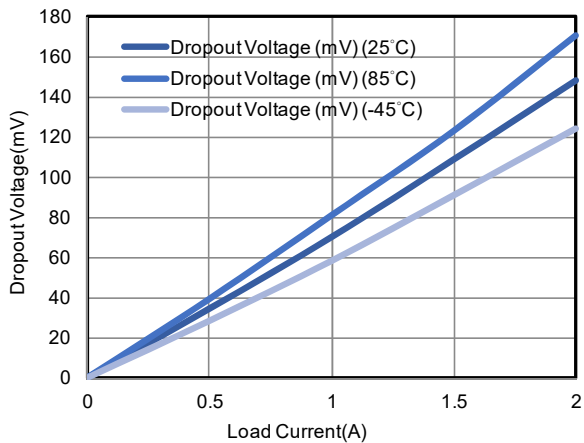


Reference Voltage vs. Temperature

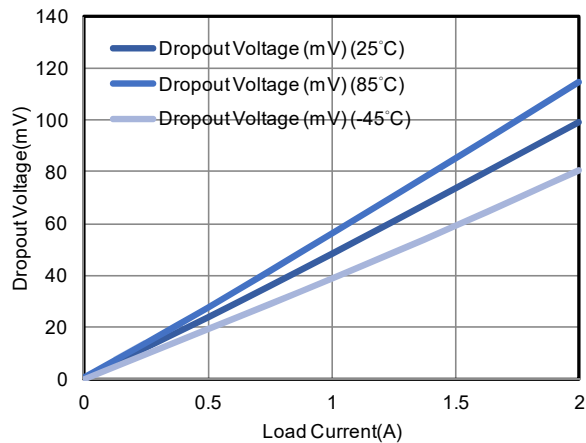


Typical Performance Characteristics (continued)

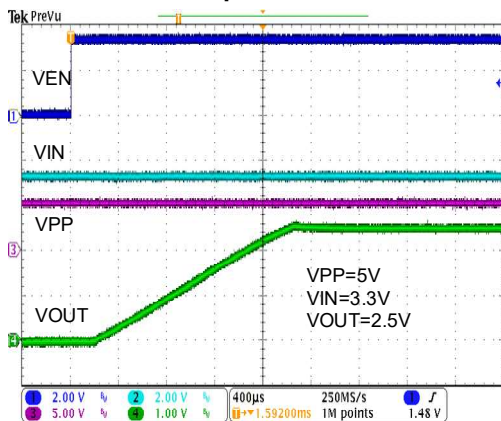
Vdrop vs. ILoad @V_{PP}=3.3V,V_O=1.8V



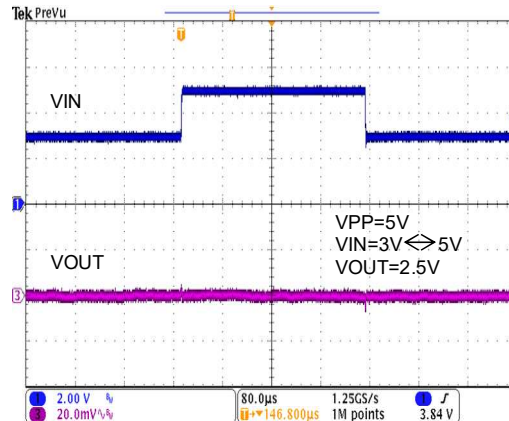
Vdrop vs. ILoad @ $V_{PP}=5V, V_O=2.5V$



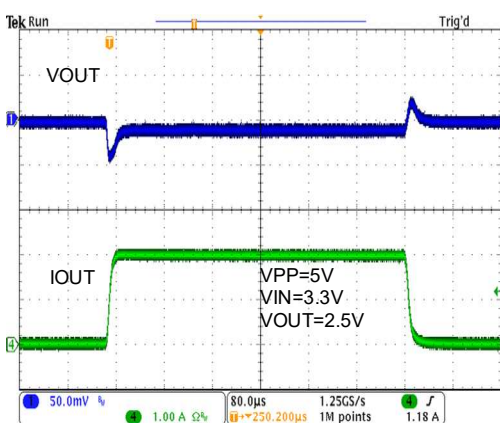
V_{EN} Start up Waveform



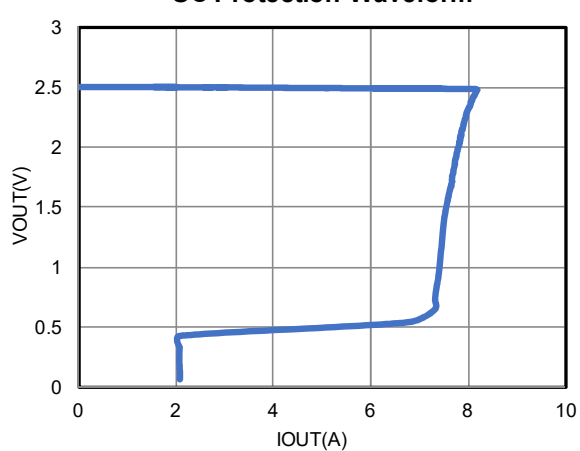
Line Transient



Load Transient

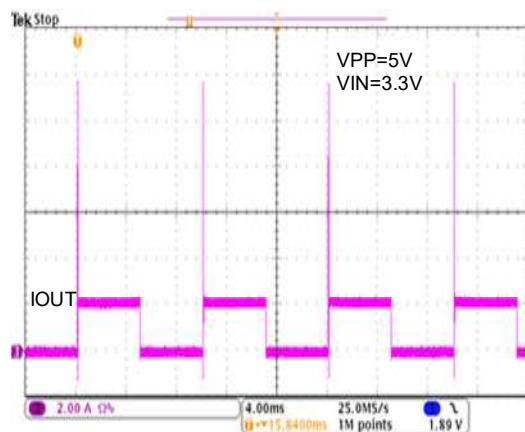


OC Protection Waveform

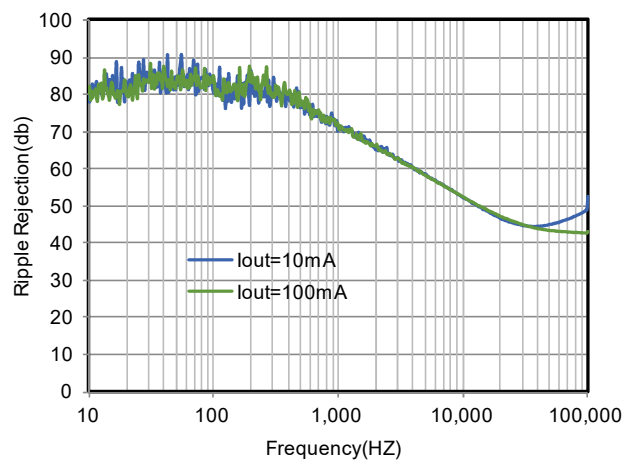


Typical Performance Characteristics (continued)

Short Circuit Current

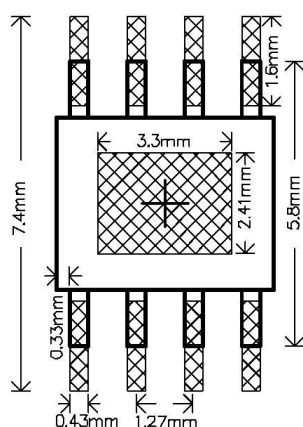


Ripple Rejection vs. Frequency

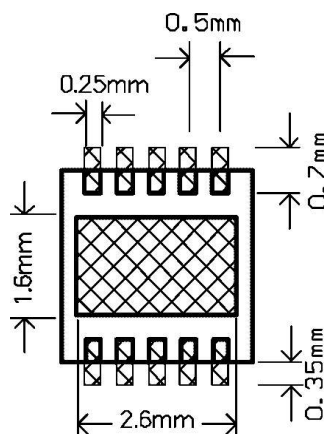


Minimum Footprint PCB Layout Section

SOP-8 (FD)



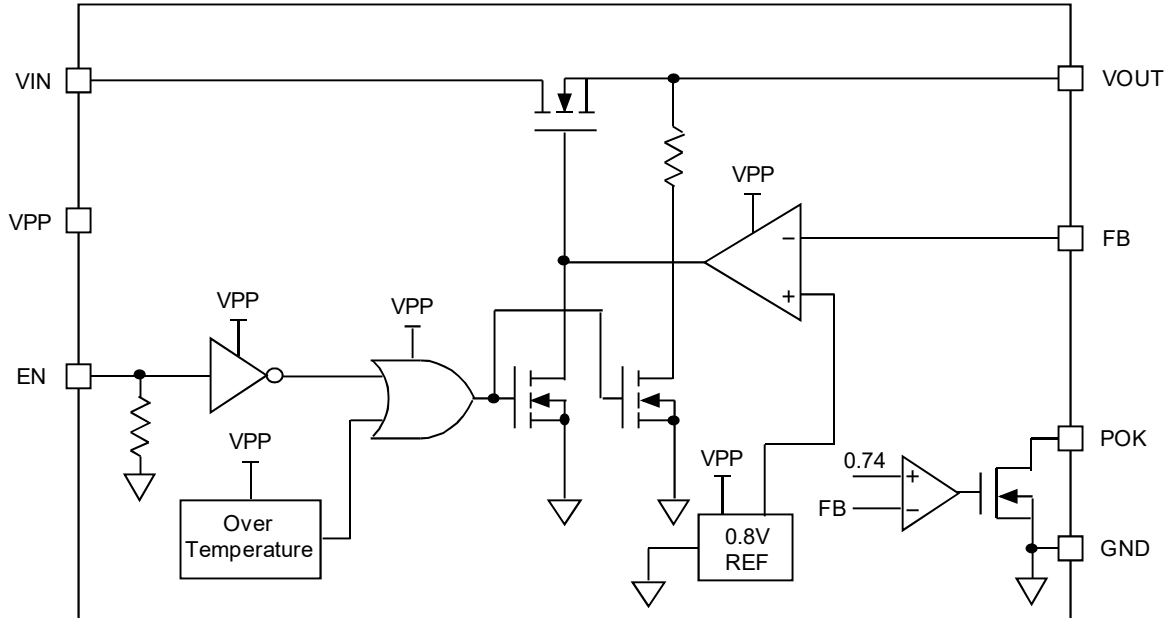
TDFN3X3-10

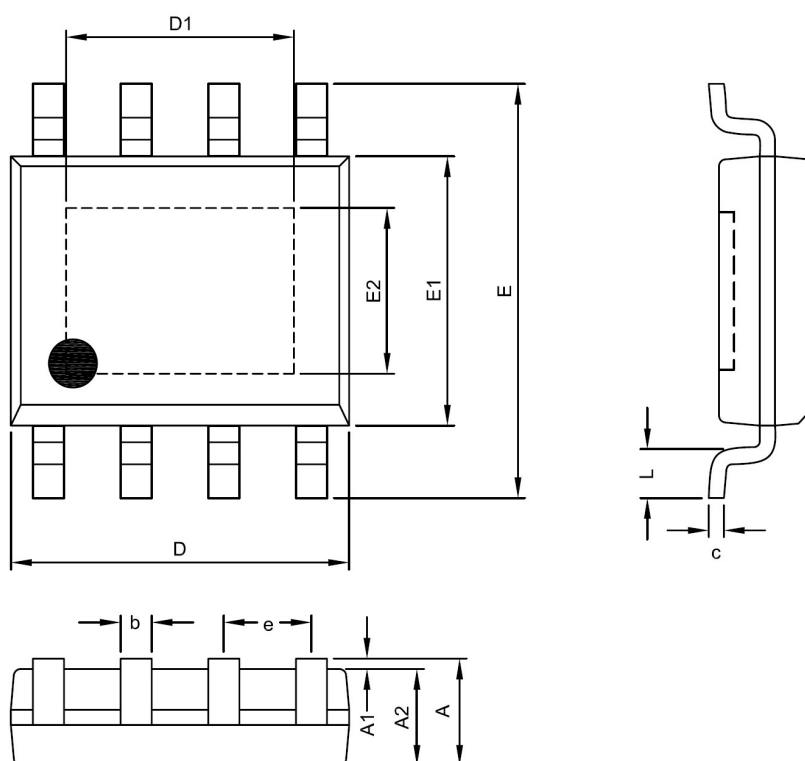


Pin Description

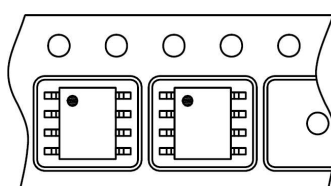
PIN		NAME	FUNCTION
SOP-8 (FD)	TDFN3X3-10		
1	5	POK	Open-drain Power Good. Use a 10kΩ resistor to connect POK pin to VPP. When V_{ADJ} rises beyond 0.74V, POK will be high (closed to VPP). When V_{ADJ} falls below 0.7V, POK will be low (closed to ground)
2	6	EN	Enable Input. Pulling this pin below 0.4V turns the regulator off, reducing the quiescent current to a fraction of its operating value.
3	7,8	VIN	Input voltage. Large bulk capacitance should be placed closely to this pin. A 10μF ceramic capacitor is recommended at this pin.
4	10	VPP	Input voltage for controlling circuit.
5	1,9	NC	No connect.
6	2,3	VOUT	The power output of the device
7	4	FB	ADJ mode Resistor ratio of external feedback for output voltage by $V_O = 0.8 \cdot (R1+R2)/R2$ Volts. $R1 R2 > 1k\Omega$ is recommended.
			Fixed 2.5V mode Connect FB pin to ground. VOUT is internally preset 2.5V.
8	---	GND	Ground.
---	11	Thermal Pad	Recommend connecting the Thermal Pad to the Ground for excellent power dissipation.

Block Diagram



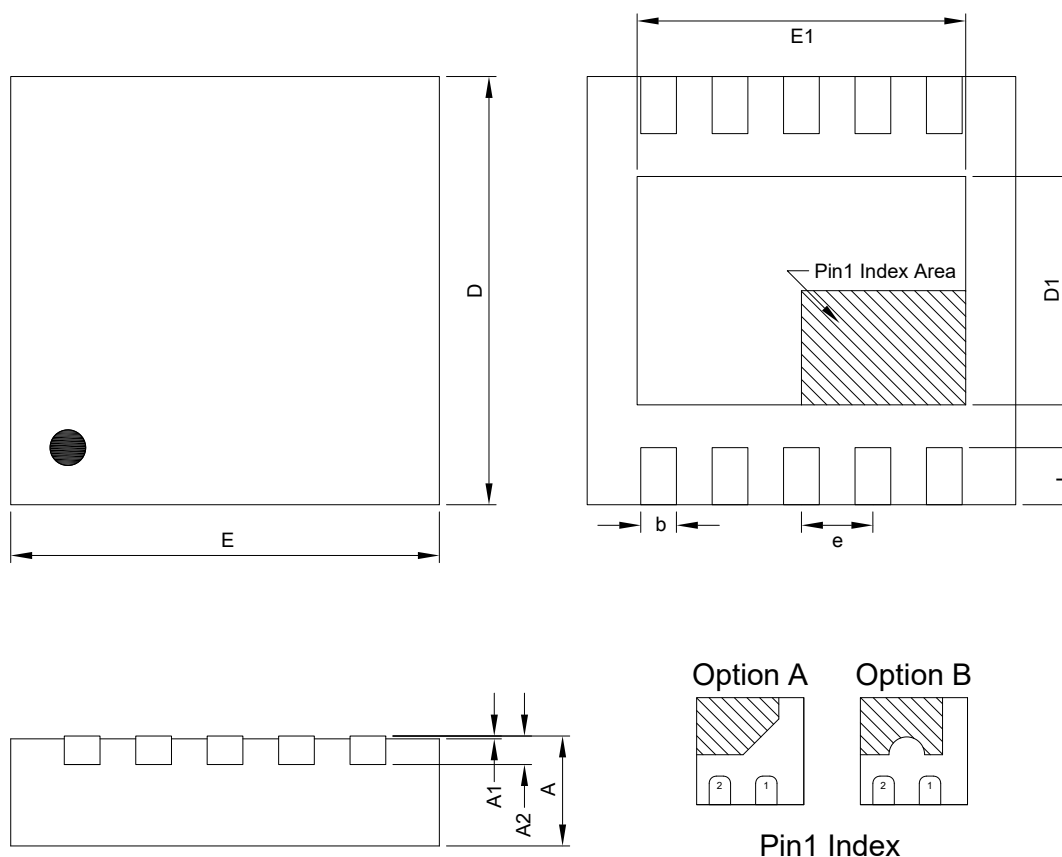
Package Information

SOP- 8 (FD) Package

Symbol	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	1.35	1.55	1.70	0.053	0.061	0.067
A1	0.00	---	0.10	0.000	---	0.004
A2	1.15	1.35	1.60	0.045	0.053	0.063
D	4.80	4.90	5.00	0.189	0.193	0.197
D1	3.30 BSC			0.130 BSC		
E	5.80	6.00	6.20	0.228	0.236	0.244
E1	3.80	3.90	4.00	0.150	0.154	0.157
E2	2.41 BSC			0.095 BSC		
c	0.20 REF			0.008 REF		
b	0.33	0.43	0.53	0.013	0.017	0.021
e	1.27 BSC			0.050 BSC		
L	0.40	0.70	1.27	0.016	0.028	0.050

Taping Specification


Feed Direction

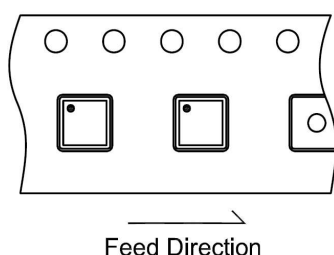
PACKAGE	Q'TY/REEL
SOP-8 (FD)	2,500 ea



TDFN3X3-10 Package

Symbol	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.70	0.75	0.80	0.0276	0.0295	0.0315
A1	0.00	---	0.05	0.0000	---	0.0020
A2	0.20 REF			0.0079 REF		
D	2.95	3.00	3.05	0.1161	0.1181	0.1201
E	2.95	3.00	3.05	0.1161	0.1181	0.1201
D1	1.50	1.60	1.75	0.0591	0.0630	0.0689
E1	2.20	2.60	2.70	0.0866	0.1024	0.1063
b	0.18	0.25	0.30	0.0071	0.0098	0.0118
e	0.50 BSC			0.0197 BSC		
L	0.30	0.40	0.50	0.0118	0.0157	0.0197

Taping Specification



PACKAGE	Q'TY/REEL
TDFN3X3-10	3,000 ea

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