G971M

4A Low Dropout Regulator with Enable

Features

- **Adjustable Output Low to 0.8V**
- **Input Voltage as Low as 1.4V and VPP Voltage 5V**
- **400mV Dropout @ 4A, VO 1.05V**
- **Over Current and Over Temperature Protection**
- **Enable Pin**
- **Low Reverse Leakage (Output to Input)**
- **Power SOP-8 (FD) Packages with Thermal Pad**
- **±2% Output Voltage**
- **VO Power OK Signal**
- **VO Pull Low Resistance when Disable**

Applications

- **Motherboards**
- **Peripheral Cards**
- **Network Cards**
- **Set Top Boxes**
- **Notebook Computers**

General Description

The G971M 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 4 amps. It operates with a V_{IN} as low as 1.4V and VPP voltage 5V with output voltage programmable as low as 0.8V. The G971M features ultra low dropout, ideal for applications where V_{OUT} is very close to V_{IN}. Additionally, the G971M has an enable pin to further reduce power dissipation while shutdown. The G971M provides excellent regulation over variations in line, load and temperature. The G971M provides a power OK signal to indicate if the voltage level of VO reaches 92% of its rating value.

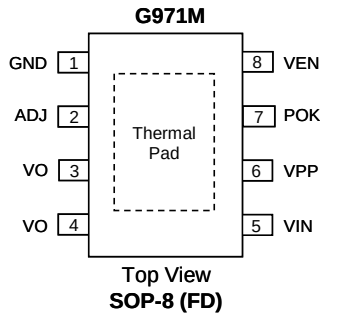
The G971M is available in the power SOP-8 (FD) package. It is adjustable using external resistors.

Ordering Information

ORDER NUMBER	MARKING	TEMP. RANGE	PACKAGE (Green)
G971MF11U	G971M	-40°C~+85°C	SOP-8 (FD)

Note: F1: SOP-8 (FD)
1: Bonding Code
U : Tape & Reel
Green : Lead Free / Halogen Free

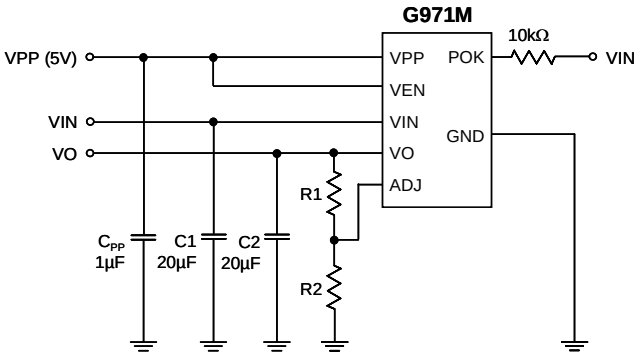
Pin Configuration



Top View
SOP-8 (FD)

* Thermal Pad can be connected to VIN
** Connect Thermal Pad to ground plate will have better thermal performance

Typical Application Circuit



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

R2<120kΩ is recommended

Absolute Maximum Ratings (Note 1)

V_{PP}, V_{IN}, Input Voltage. 7V
Power Dissipation Internally Limited (Note 2)
Maximum Junction Temperature. . . . . 150°C
Storage Temperature Range . . . . . .-65°C ≤T_J ≤ +150°C
Reflow Temperature (soldering, 10sec) . . . . . 260°C
Thermal Resistance Junction to Ambient, (θ_{JA})
SOP-8 (FD). . . . . 143°C/W
SOP-8 (FD) . . . . . 50°C/W(Note 4)
Thermal Resistance Junction to Case, (θ_{JC})
SOP-8 (FD) . . . . . .14°C/W
ESD(HBM) 2KV
ESD(MM) 200V
ESD(CDM) 1KV

Operation Conditions

V_{IN} Voltage . . . . . 1.4V ~5.5V
V_{PP} Voltage . . . . . 3V~5.5V
Temperature Range . . . . . .-40°C ≤T_A ≤ +85°C

Electrical Characteristics

V_{PP}=5V, V_{IN} =3.3V, V_{EN}=V_{PP}, I_O=10mA, C_{IN}=22µF, C_{OUT} =22µF, T_A=T_J=25°C unless otherwise specified. (Note 3)

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT
VIN						
Input Voltage Range	V_{IN}		1.4	---	5.5	V
Quiescent Current (Ground Current)	I_Q	V_O=1.2V, I_O=0A	---	0.4	1	mA
VPP						
V_{PP} Voltage Range	V_{PP}		3	---	5.5	V
V_{PP} Current	I_{PPH}	V_O=1.2V	---	0.7	1	mA
	I_{PPL}	V_{EN}=0V	---	30	60	µA
VO						
Output Voltage	V_O	V_{IN}=V_O+0.5V,V_O=2.5V	2.45	2.5	2.55	V
Line Regulation		V_{IN}=(V_O+0.5V) to 5V	---	0.1	0.2	%
Load Regulation		10mA≤I_O≤4A	---	0.2	1	%
Dropout Voltage	V_D	I_O=4A, V_O=1.05V	---	340	400	mV
Short Circuit Current			---	3	---	A
V_O Pull Low Resistance		V_{EN}=0V	---	100	130	Ω
ADJ						
Reference Voltage	V_{REF}	V_{ADJ}=V_O	0.784	0.8	0.816	V
Adjust Pin Current	I_{ADJ}		---	20	100	nA
VEN						
V_{EN} Threshold Voltage	V_{ENTH}		0.4	0.8	1.1	V
V_{EN} Pin Bias Current	I_{ENH}	V_{EN}=VPP	---	---	10	µA
V_{EN} Soft Start Time	T_{SS}		0.3	0.6	1.2	ms
POK						
V_O Power OK Voltage	V_{THPOK}		---	92	---	%
Hysteresis	V_{HYPOK}		---	7	---	%
Over Temperature Protection						
Over Temperature	T_{OT}		---	150	---	°C
Over Temperature Hysteresis	T_{OTHY}		---	30	---	°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.

Note2: The maximum power dissipation is a function of the maximum junction temperature, T_{Jmax} ; total thermal resistance, θ_{JA}, and ambient temperature T_A. The maximum allowable power dissipation at any ambient temperature is (T_{jmax}-T_A) / θ_{JA}. If this dissipation is exceeded, the die temperature will rise above 150°C and IC will go into thermal shutdown.

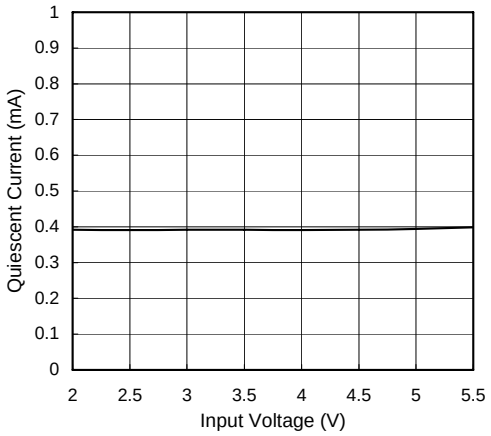
Note3: Low duty pulse techniques are used during test to maintain junction temperature as close to ambient as possible.

Note4: The package is placed on a 2-layer PCB (1oz/1oz) with 3vias.Please refer to Demo Board Footprint section.

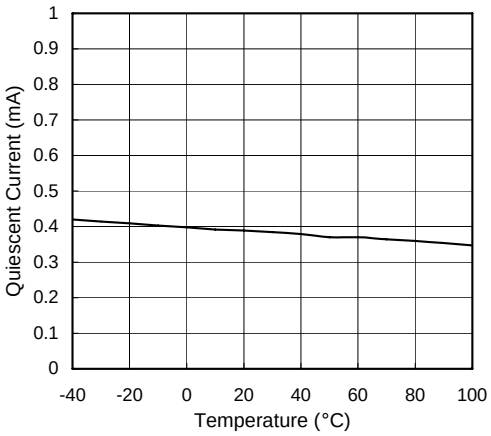
Typical Performance Characteristics

(V_{IN}= 2V, V_{PP}= 5V, V_{EN}=V_{PP}, C_{IN}=C_{OUT}=22μF, C_{PP}=1μF, T_A=25°C, unless otherwise noted.)

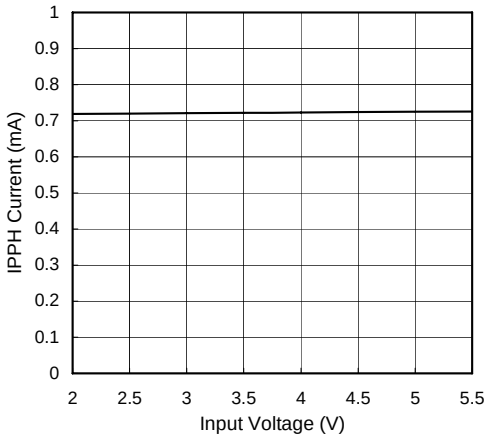
Quiescent Current vs. Input Voltage



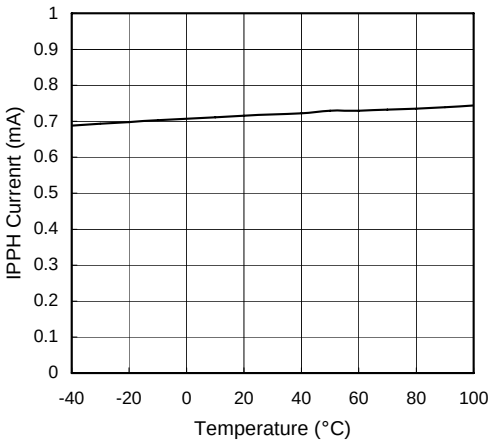
Quiescent Current vs. Temperature



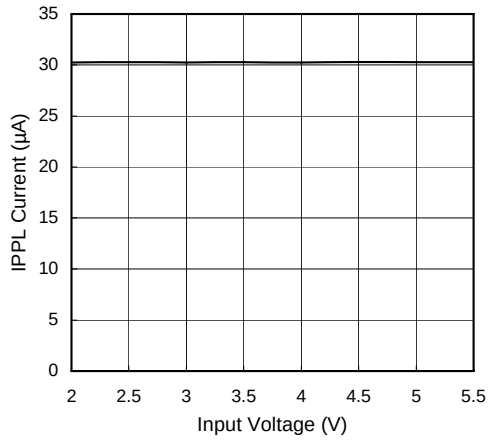
IPPH Current vs. Input Voltage



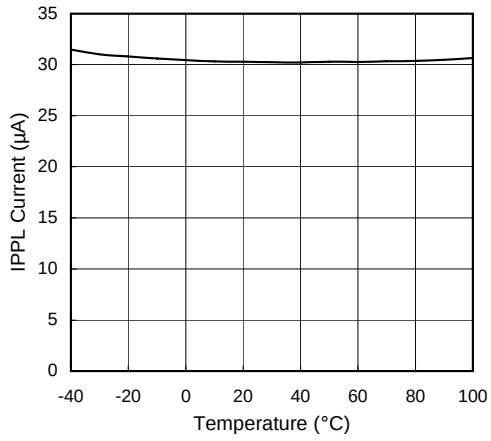
IPPH Current vs. Temperature



IPPL Current vs. Input Voltage

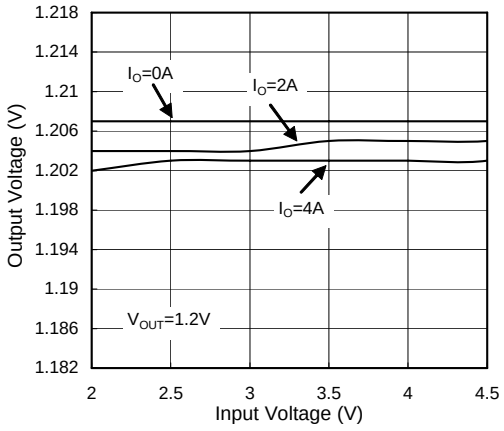


IPPL Current vs. Input Voltage

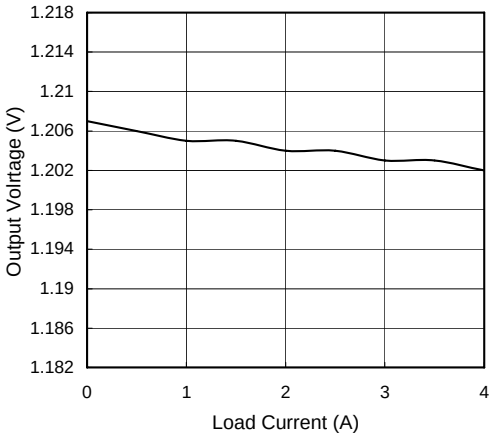


Typical Performance Characteristics (continued)

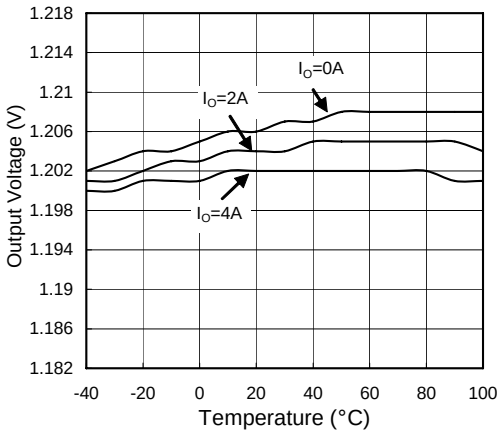
Output Voltage vs. Input Voltage



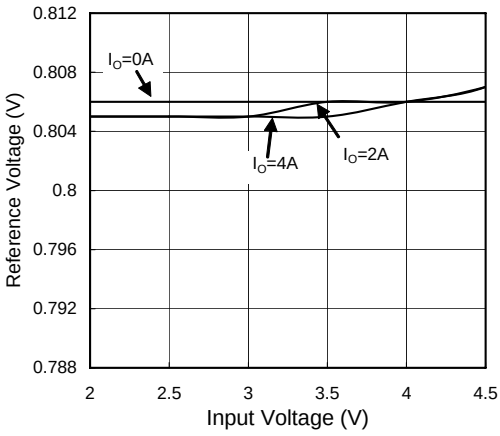
Output Voltage vs. Load Current



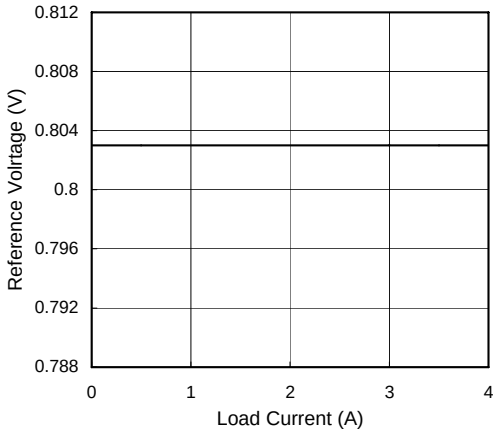
Output Voltage vs. Temperature



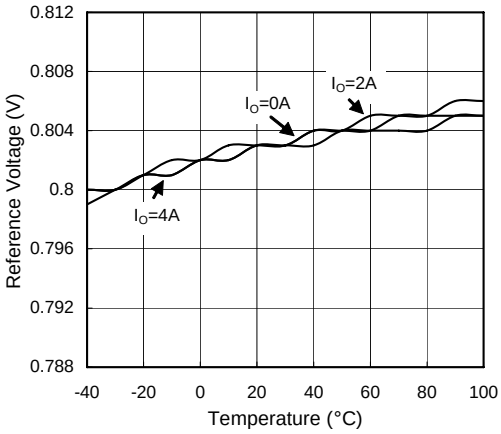
Reference Voltage vs. Input Voltage



Reference Volrtage vs. Load Current

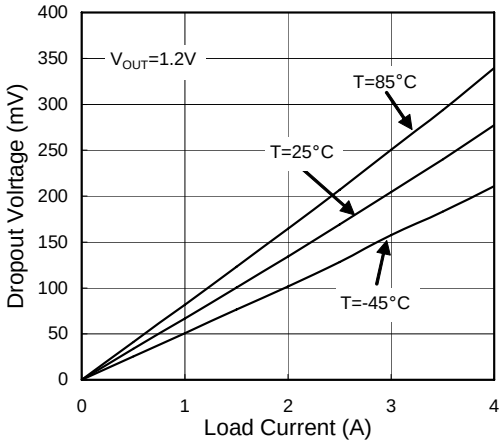


Reference Voltage vs. Temperature

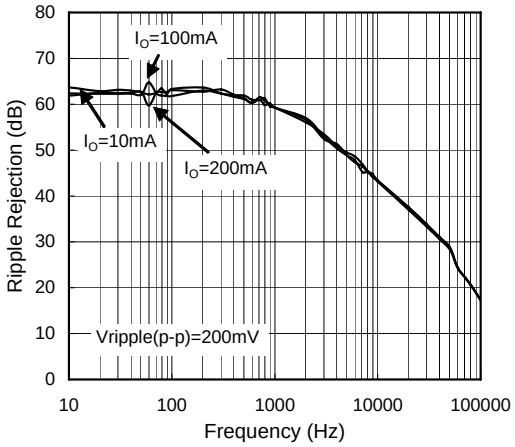


Typical Performance Characteristics (continued)

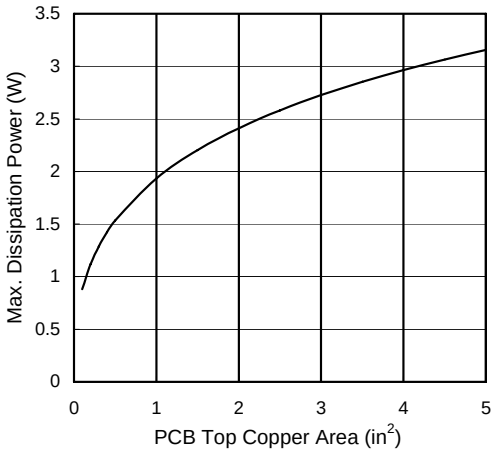
Dropout Volrtage vs. Load Current



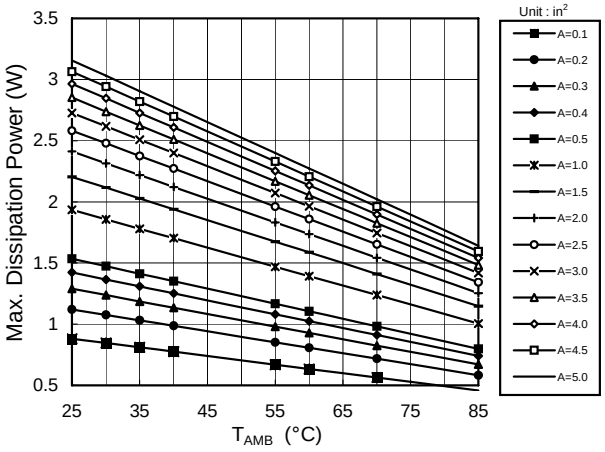
Ripple Rejection



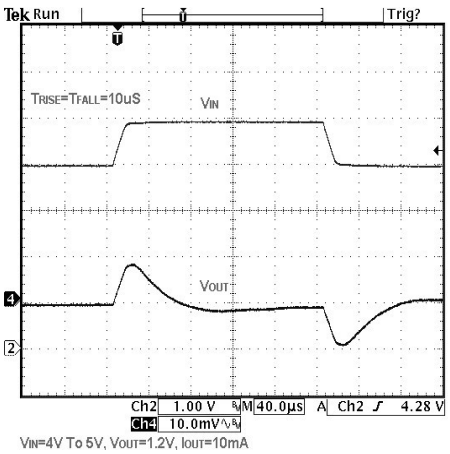
Max. Power Dissipation vs. PCB Top Copper Area



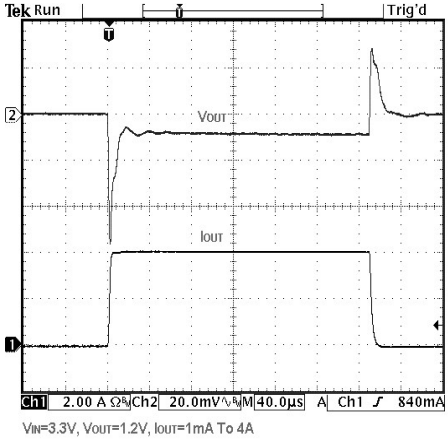
Max. Power Dissipation vs. T_{AMB} (still air)



Line Transient

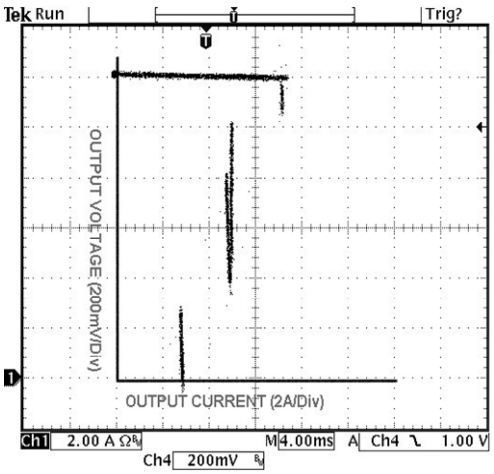


Load Transient

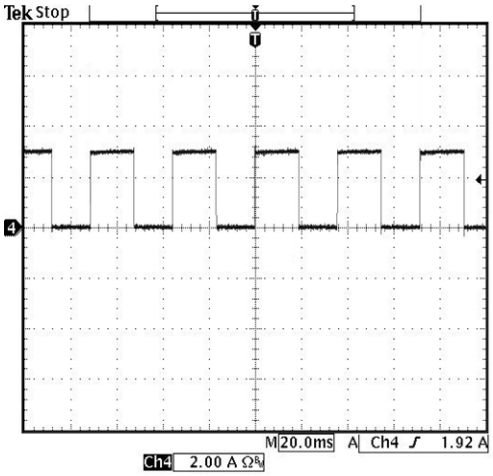


Typical Performance Characteristics (continued)

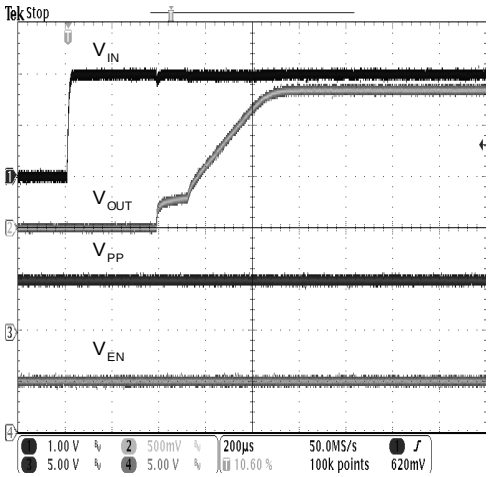
OC Protection Waveform



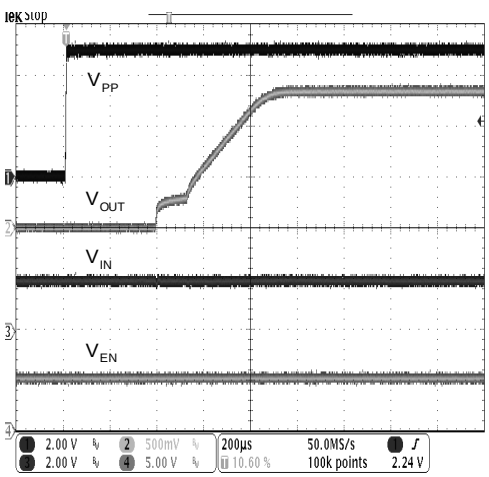
Short Circuit Current



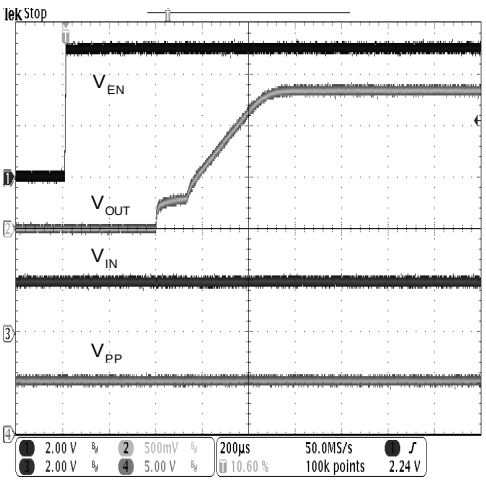
V_{IN} Start up Waveform



V_{PP} Start up Waveform

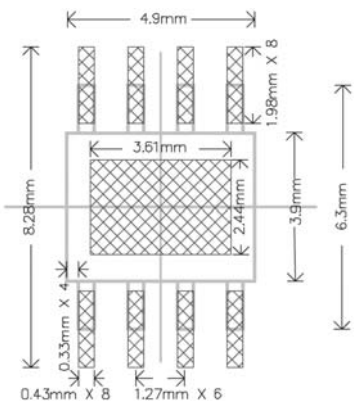


V_{EN} Start up Waveform



Minimum Footprint PCB Layout Section

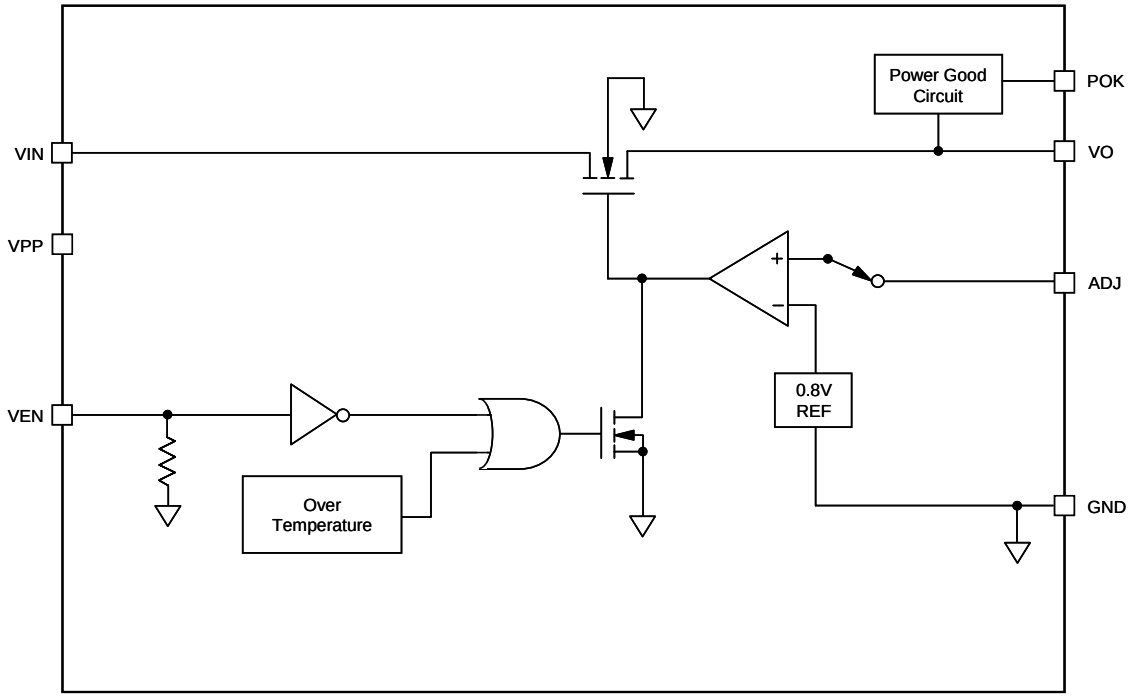
SOP-8 (FD)



Pin Description

PIN	NAME	FUNCTION
1	GND	Reference ground.
2	ADJ	This pin sets the output voltage by external feedback resistors. The output voltage will be VO = 0.8(R1+R2)/R2 Volts.
3,4	VO	The power output of the device. A pull low resistance exists when deactivate device by VEN.
5	VIN	Input voltage. Large bulk capacitance should be placed closely to this pin. A 20µF ceramic capacitor is recommended at this pin.
6	VPP	Input voltage for controlling circuit.
7	POK	Assert high once VO reaches 92% of its rating voltage. Open-drain output.
8	VEN	Enable Input. Pulling this pin below 0.4V turns the regulator off, reducing the quiescent current to a fraction of its operating value. The device will be enabled if this pin is left open.

Block Diagram



Definitions

Dropout Voltage

The input/output Voltage differential at which the regulator output no longer maintains regulation against further reductions in input voltage. Measured when the output drops 2% below its nominal value, dropout voltage is affected by junction temperature, load current and minimum input supply requirements.

Line Regulation

The change in output voltage for a change in input voltage. The measurement is made under conditions of low dissipation or by using pulse techniques such that average chip temperature is not significantly affected.

Load Regulation

The change in output voltage for a change in load current at constant chip temperature. The measurement is made under conditions of low dissipation or by using pulse techniques such that average chip temperature is not significantly affected.

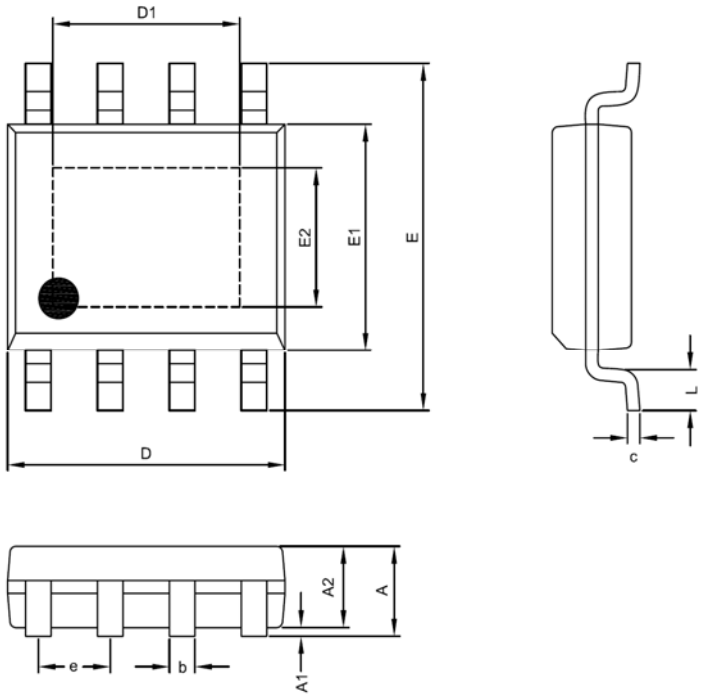
Maximum Power Dissipation

The maximum total device dissipation for which the regulator will operate within specifications.

Quiescent Bias Current

Current which is used to operate the regulator chip and is not delivered to the load.

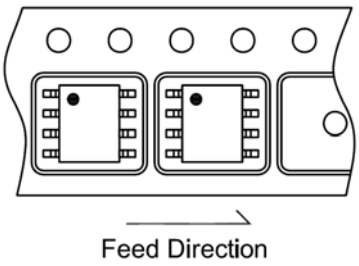
Package Information



SOP- 8 (FD) Package

Symble	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	1.35	1.55	1.60	0.053	0.061	0.063
A1	0.00	---	0.10	0.000	---	0.004
A2	1.15	1.35	1.50	0.045	0.053	0.059
D	4.80	4.90	5.00	0.189	0.192	0.197
D1	2.29	---	3.71	0.090	---	0.146
E	5.80	6.00	6.20	0.228	0.236	0.244
E1	3.80	3.90	4.00	0.150	0.153	0.157
E2	2.29	---	2.64	0.090	---	0.104
c	0.19	0.23	0.27	0.007	0.009	0.011
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	1.00	0.016	0.028	0.039

Taping Specification



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

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