3A Low Dropout Regulator with Enable

Features

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

Applications

- **Battery-powered Device**
- **Portable Equipment**
- **Notebook Computers**

General Description

The G946 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 3V with output voltage as low as 0.8V. The G946 features ultra low dropout, ideal for applications where V_{OUT} is very close to V_{IN}. Additionally, the G946 has an enable pin to further reduce power dissipation while shutdown. The G946 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.

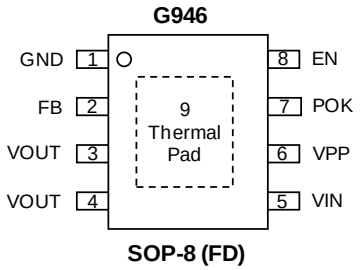
The G946 is available in the power SOP-8 (FD) package.

Ordering Information

ORDER NUMBER	MARKING	TEMP. RANGE	PACKAGE (Green)
G946F11U	G946	-40°C~+85°C	SOP-8 (FD)

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

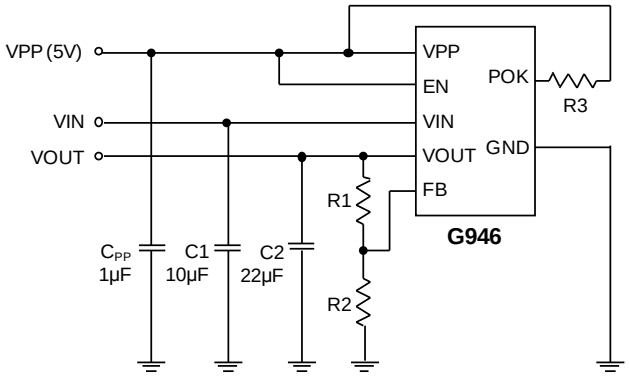
Pin Configuration



SOP-8 (FD)

Note: Recommend connecting the Thermal Pad to the Ground for excellent power dissipation. Thermal Pad can be connected to VIN.

Typical Application Circuit



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

R2<120kΩ is recommended

Absolute Maximum Ratings (Note 1)

VPP, VIN, EN, FB, VOUT, POK Input Voltage. 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 . . . . . 3.0V~5.5V
(VPP ≥ VIN for normal operation)
Temperature Range. . . . . -40°C ≤T_A ≤ +85°C

Thermal Information

THERMAL METRIC(1)		SOP-8 (FD)	UNIT
$R_{\theta JA}$	Junction to ambient thermal resistance	54.6	°C/W
$R_{\theta JC\_top}$	Junction to case top thermal resistance	81.1	°C/W
$R_{\theta JB}$	Junction to board thermal resistance	29.2	°C/W
Ψ_{JT}	Junction to top characterization parameter	13.7	°C/W
Ψ_{JB}	Junction to board characterization parameter	29.4	°C/W
$R_{\theta JC\_bot}$	Junction to case bottom thermal resistance	12.4	°C/W

1. Package thermal metric is obtained using the method described in JEDEC specification JESD51-7, using a four-layer board.
2. 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}=10µF, C_{OUT} =10µF, T_A=T_J=25°C.

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

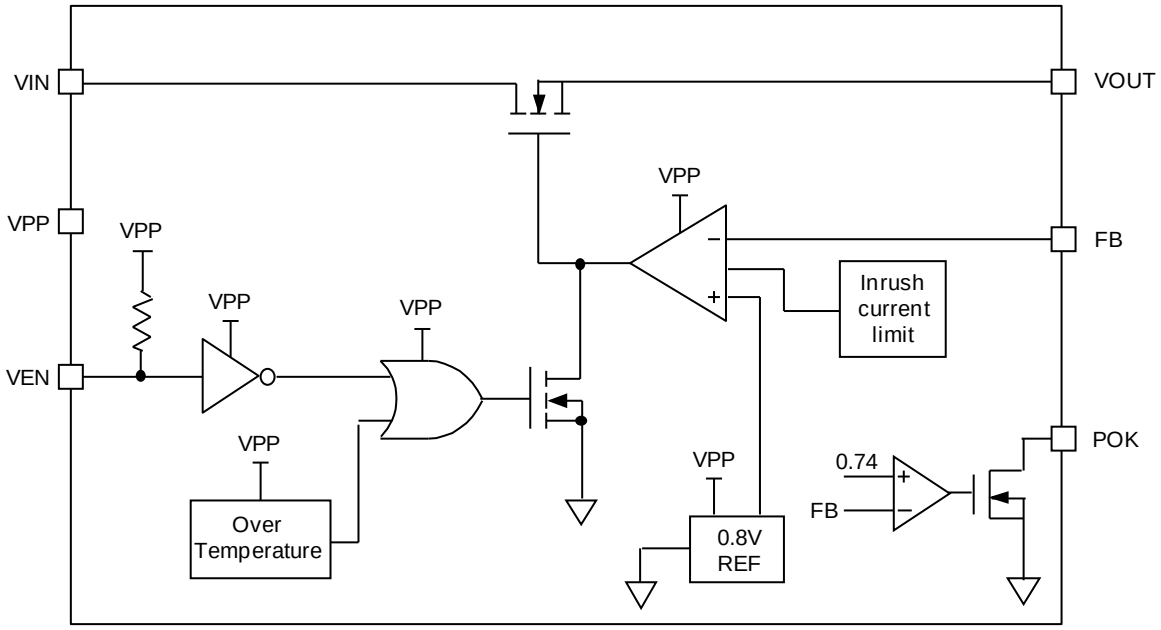
PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT
VIN						
Input Voltage Range	V_{IN}	V_{IN} > V_{OUT}	1.0	---	5.5	V
VPP						
V_{PP} Voltage Range	V_{PP}	V_{PP}>V_{OUT}+1.5V and V_{PP}>3V	3	---	5.5	V
V_{PP} Current	I_{PPH}	V_{OUT} =1.2V	---	60	90	µA
	I_{PPL}	EN=0V	---	0.1	1	µA
VOUT						
Output Voltage	V_{OUT}	V_{IN} =1.0~5V, I_{OUT}=0~3A T_J=-40~125°C	-1.5	---	+1.5	%
Line Regulation		V_{IN}=(V_{OUT} +0.5V) to 5V, I_{OUT}=100mA ($\Delta V_{OUT}/\Delta V_{IN}$*$V_{OUT}$)	---	0.05	0.2	%/V
Ripple Rejection		f=1kHz	---	70	---	db
Load Regulation		10mA≤ I_{OUT} ≤3A	---	0.2	1	%
Dropout Voltage	V_D	I_{OUT}=3A, V_{OUT} =1.8V	---	240	---	mV
Short Circuit Current			---	1.1	---	A
Current Limit	I_{LIM}		---	5.7	---	A
V_O Pull Low Resistance		V_{EN}=0V	---	85	---	Ω
Soft Start Time	T_{SS}	V_{OUT}=10% to 90%	0.3	0.6	1.2	mS
FB						
Reference Voltage	V_{REF}		0.788	0.8	0.812	V
FB Pin Current	I_{ADJ}		---	20	100	nA
EN						
EN Pin Voltage High	V_{ENH}		1.2	---	---	V
EN Pin Voltage Low	V_{ENL}		---	---	0.4	V
EN Pin Pull High Current	I_{EN}		---	3	---	µA
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.

Pin Description

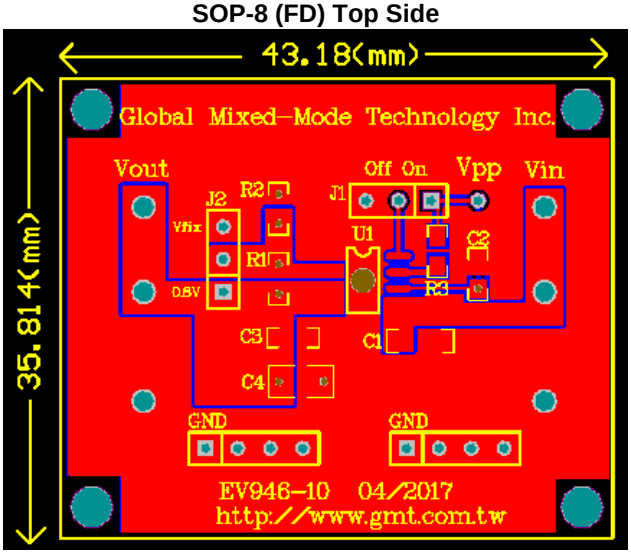
PIN	NAME	FUNCTION
1	GND	Ground.
2	FB	Resistor ratio of external feedback for output voltage by VO = 0.8*(R1+R2)/R2 Volts
3,4	VOUT	The power output of the device. A pull low resistance exists when device deactivated by EN pin.
5	VIN	Input voltage. Large bulk capacitance should be placed closely to this pin. A 10μF ceramic capacitor is recommended at this pin.
6	VPP	Input voltage for controlling circuit.
7	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)
8	EN	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.
9	Thermal Pad	Recommend connecting the Thermal Pad to the Ground for excellent power dissipation. Thermal Pad can be connected to VIN.

Block Diagram

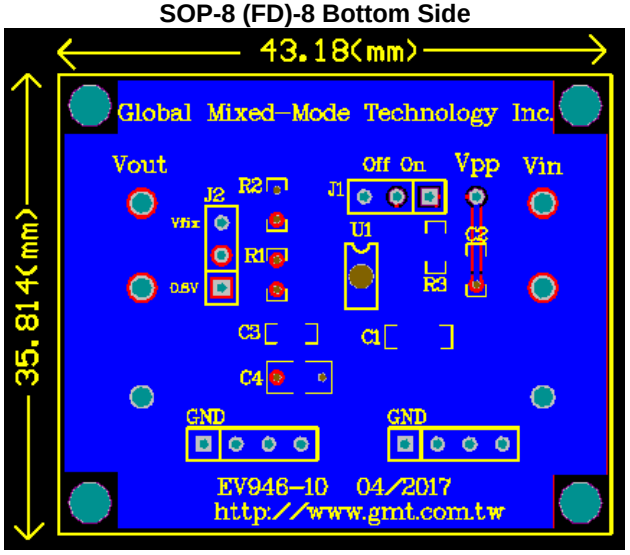


Demo Board Footprint

SOP-8 (FD) Top Side

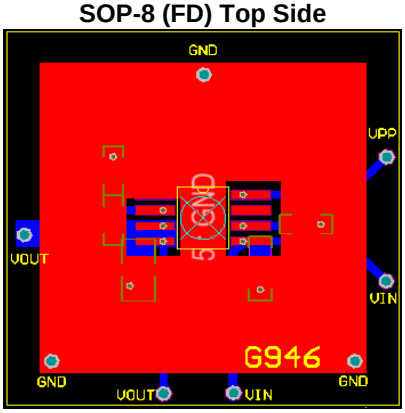


SOP-8 (FD)-8 Bottom Side

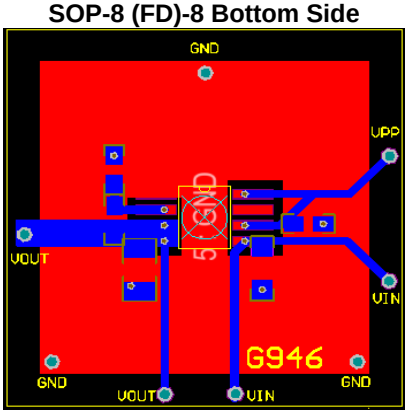


1in^2 of 1oz PCB Layout Section

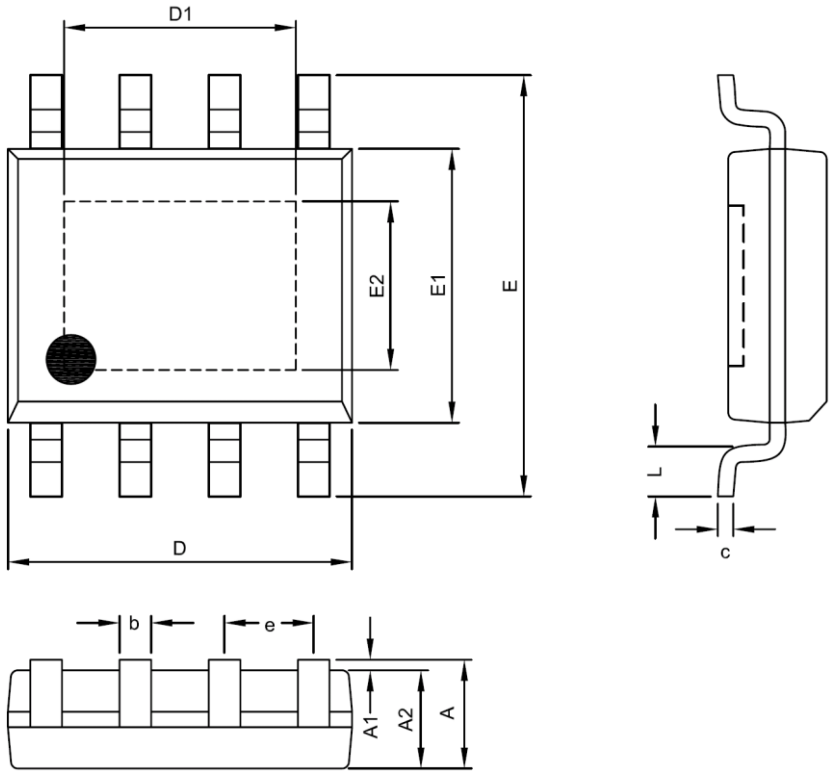
SOP-8 (FD) Top Side



SOP-8 (FD)-8 Bottom Side



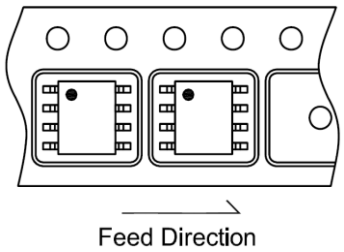
Package Information



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



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