GS2231A Series

5V 3A Ultralow Dropout Linear Regulator

Product Description

The GS2231A is a 3A low dropout linear regulator designed for low dropout and high current applications. This device works with dual supplies, a control input for the control circuitry and a power input as low as 1.0V for providing current to output. It features 3A output current and ultra-low-drop output voltage as well as full protection functions. VOUT can be as low as 0.8V.

The other features include soft start, under voltage protection, current limit protection, Power-On-Reset function, and over temperature protection.

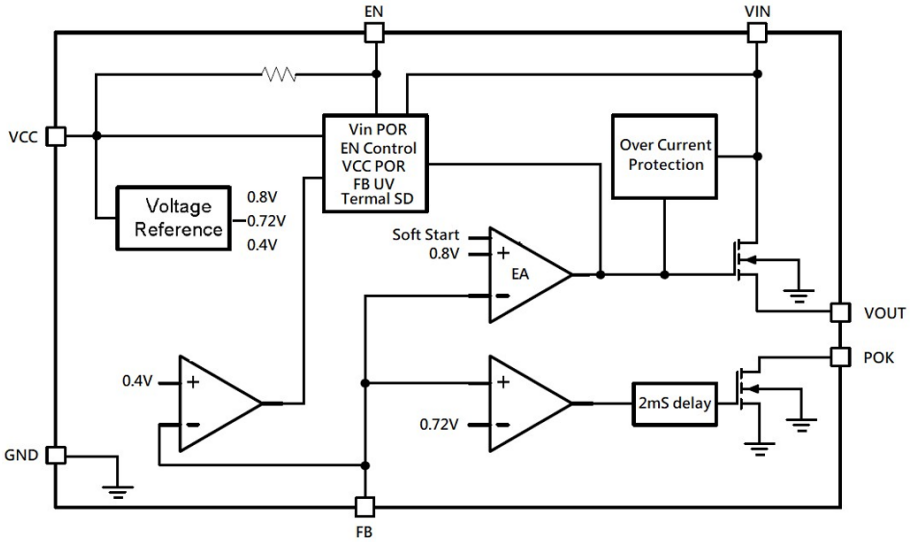
Features

- V_{IN} Range 1.0V to 6.0V
- V_{OUT} is Adjustable (0.8V Min)
- Excellent Line Regulation (0.01%/V typ.)
- Excellent Load Regulation (0.1%/A typ.)
- Internal Thermal Overload Protection
- Internal Short-Circuit Current Limit
- RoHS Compliant and Halogen Free

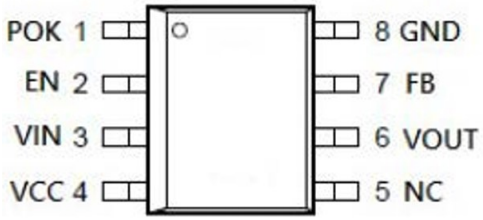
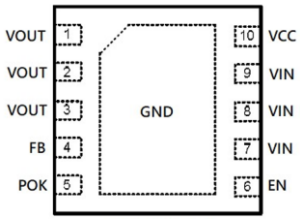
Applications

- Notebook, Netbook, Graphic Cards
- Low Voltage Logic Supplies
- Chipset Supplies
- Server System
- SMPS Post Regulators

Functional Block Diagram



Packages & Pin Assignments

PSOP-8L	DFN3x3-10L(A)
	

NAME	PSOP-8L	DFN3x3-10L(A)	FUNCTION
P_{OK}	1	5	Power OK Indication, Open-Drain Output.
EN	2	6	Enable Pin. Internal Pull High to V_{CC}
V_{IN}	3	7, 8 & 9	Supply Input of Power.
V_{CC}	4	10	Supply Input of Control Circuit.
NC	5	-	No Connect
V_{OUT}	6	1, 2 & 3	Output Voltage
FB	7	4	Feedback Pin
GND	8 & Exposed Pad	Exposed Pad	Ground Pin

Ordering and Marking Information

Ordering Information

Part Number	Marking	Package	Quantity/Reel
GS2231APSF	HM6230E □□□□	PSOP-8L	4,000 PCS
GS2231AZFF	HM6230D □□□□	DFN3x3-10L(A)	5,000 PCS

- **Product Code:** GS2231A
- **Package Code:**
  PS is PSOP-8L
  ZF is DFN3x3-10L(A)
- **Green Level:**
  F is RoHS Compliant and Halogen Free

Marking Information

- **Product Code:** HM6230
- **Package Code:**
  E is PSOP-8L
  D is DFN3x3-10L(A)
- **GS Code:** □□□□
- The Dot • denotes Pin 1

Absolute Maximum Ratings (T_A=25ºC, unless otherwise specified)

Symbol	Parameter	Rating	Units
V_{IN}	Supply Voltage	-0.3 - 6	V
V_{CC}	Supply Voltage	-0.3 - 6	V
-	Others	-0.3V to V_{CC}+0.3V	V
T_J	Maximum Junction Temperature	125	ºC
T_{STG}	Storage Temperature Range	-60 - 150	ºC
T_{LEAD}	Lead Temperature (Soldering 10sec)	300	ºC

NOTE:

1. Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability
2. All voltages are with respect to network ground terminal.
3. Device mounted on 1 in^2 FR-4 substrate PCB covered with 2 ounces of copper.

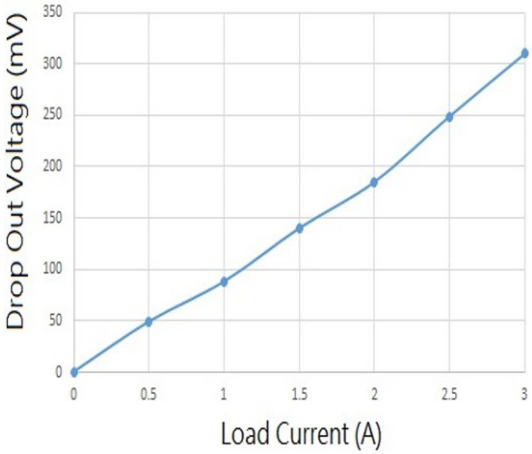
Recommended Operating Range

Symbol	Parameter	Value	Units
V_{CC}	Supply Voltage	3 – 5.5	V
V_{IN}	Supply Voltage	1.05 - V_{CC}	V
T_J	Operating Junction Temperature Range	0 - 125	ºC

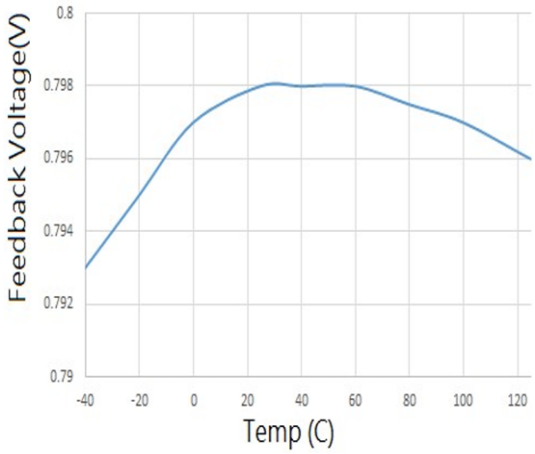
Electrical Characteristics (V_{CC}= 5V and T_A= 25ºC, unless otherwise specified.)

Symbol	Parameters	Test Conditions	Min.	Typ.	Max.	Units
V_{CC}	V_{CC} Operating Range	V_{OUT}= V_{REF}	3.0	-	6	V
V_{CC_POR}	V_{CC} POR Threshold	V_{CC} Rising	2.5	-	2.9	V
ΔV_{CC_POR}	V_{CC} POR Hysteresis	V_{CC} Falling	-	0.4	-	V
V_{IN}	V_{IN} Operating Range	V_{OUT}= V_{REF}	1.05	-	V_{CC}	V
V_{IN_POR}	V_{IN} POR Threshold	V_{IN} Rising	0.8	-	1.0	V
ΔV_{IN_POR}	V_{IN} POR Hysteresis	V_{IN} Falling	0.2	-	0.5	V
tDEG	V_{IN} POR Deglitch Time			100		µs
I_{CC_SD}	Control Input Current in Shutdown	V_{IN}=V_{CC}=5.0V V_{EN}=0V	-	10	30	µA
I_Q	Quiescent Current	V_{IN}=V_{CC}=5.0V V_{EN}=5.0V, I_{OUT}=0A	-	0.9	1.5	mA
V_{REF}	Reference Voltage	V_{IN}=V_{CC}=5.0V V_{EN}=5.0V, I_{OUT}=0A	0.785	0.8	0.815	V
ΔV_{LINE}	Line Regulation	V_{CC}=V_{EN}=5.0V I_{OUT}=1mA V_{IN}=1.05 to 5.0V	-	0.01	0.1	%/V
ΔV_{LOAD}	Load Regulation	V_{IN}=V_{CC}=V_{EN}=5.0V I_{OUT}=0 to 3A	-	0.1	0.5	%/A
V_{DROP}	Dropout Voltage	V_{OUT}=1.2V I_{OUT}=3A	-	250	360	mV
R_{PULL}	V_{OUT} Pull-Low Resistance	V_{EN}=0V	-	-	150	Ω
t_{SS}	Output Voltage Ramp Up Time	-	0.6	1	2	ms
Enable						
V_{ENH}	Enable Threshold	Logic-High Voltage	1.1	-	-	V
V_{ENL}		Logic-Low Voltage	-	-	0.3	
I_{EN}	EN Input Bias Current	V_{EN}=0V	-	5	10	µA
Power OK						
POK_H	POK High Threshold	V_{FB} Rising	-	92	-	%
POK_L	POK Low Threshold	V_{FB} Falling	-	82	-	%
V_{POKL}	POK Sink Voltage	Sink Current 5mA	-	-	0.4	V
t_{POK_DT}	POK Delay Time	From V_{OUT}>92% to POK rising	1	2	4	ms
Protection						
OCP	OCP Threshold Level		3.2	4.5	-	A
T_{SD}	Thermal Shutdown Temperature	-	-	165	-	ºC
ΔT_{SD}	Thermal Shutdown Hysteresis	-	-	30	-	ºC

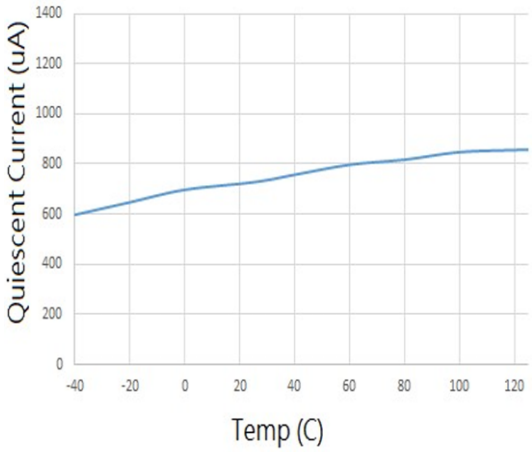
Performance Characteristics (T_A =25ºC, unless otherwise specified.)



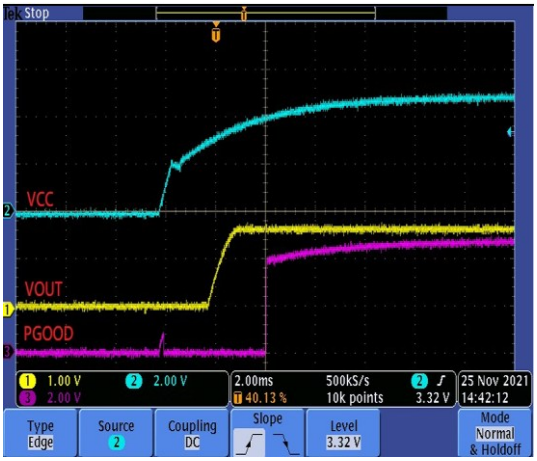
Dropout Voltage



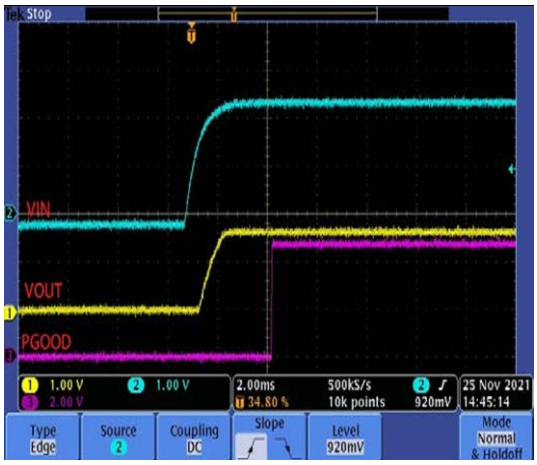
V_{FB} vs. Temperature



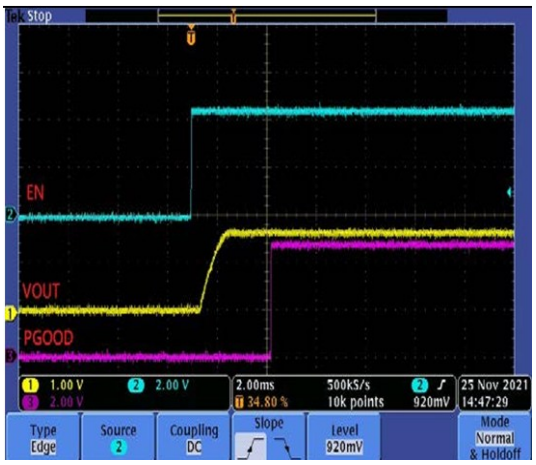
I_Q vs. Temperature



V_{CC} Power ON

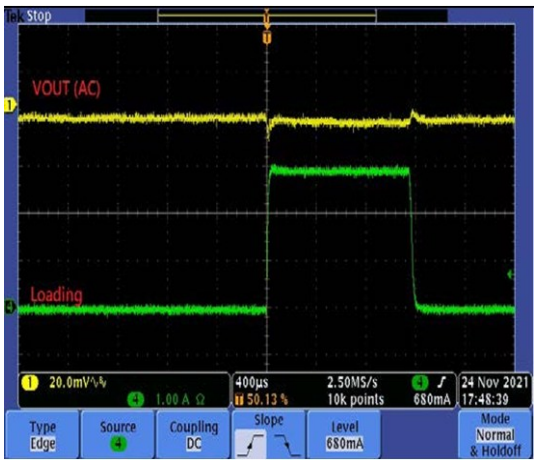


V_{IN} Power ON

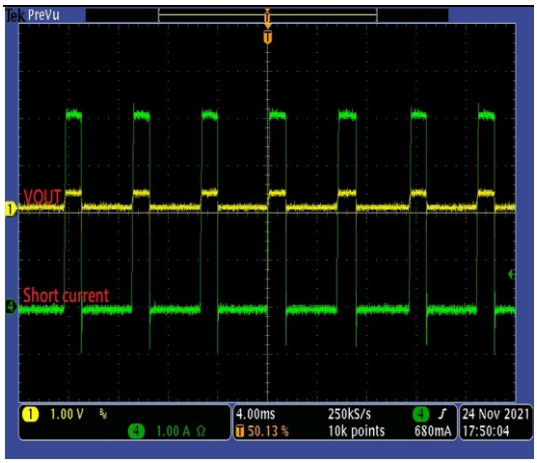


EN Power ON

Performance Characteristics (T_A =25ºC, unless otherwise specified.)

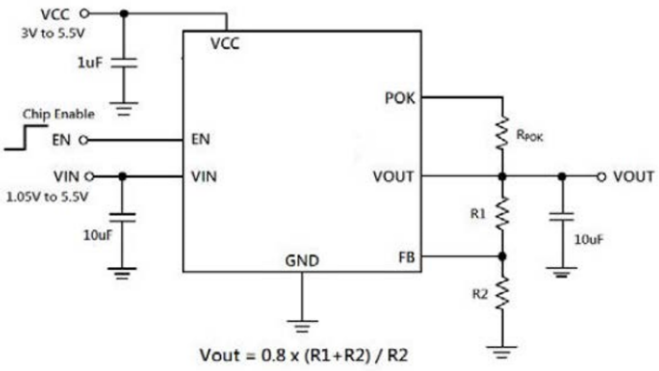


Load Transient



Short Circuit

Typical Application Circuit



Output Voltage Setting

The output voltage is programmed by the resistor divider connected to the FB pin. The preset output voltage is calculated by the following equation:

$$V_{OUT} = 0.8 \cdot \left(1 + \frac{R1}{R2}\right) \quad \text{..... (V)}$$

Where R1 is the resistor connected from V_{OUT} to FB with Kelvin sensing connection and R2 is the resistor connected from FB to GND and the 10Kohm is recommended typically.

Enable Control

A logic Low signal applied to this pin shuts down the output. A logic High signal enables the device to output a regulated power when V_{CC} and V_{IN} power supplies are ready. Enable pin is pulled high to V_{CC} internally.

Power-OK and Delay

The power okay pin is an open-drain output and a 100kΩ pull up resistor has to be used to connect between POK pin to V_{OUT} to obtain an effective signal.
As the V_{FB} rises and reaches the rising Power-OK voltage threshold, an internal delay function starts to work. At the end of the delay time, the POK output HIGH to indicate the output is ok.
As the V_{FB} falls and reaches the falling Power-OK voltage threshold, the POK output LOW.

Power-On-Reset

A Power-On-Reset (POR) circuit monitors both of supply voltages on V_{CC} and V_{IN} pins to prevent wrong logic controls. The POR function initiates a soft-start process after both of the supply voltages exceed their rising POR voltage thresholds during powering on.

Soft-Start

An internal soft-start function controls rise rate of the output voltage to limit the current surge during start-up. The typical soft-start interval is about 1.0ms.

Current-Limit Protection

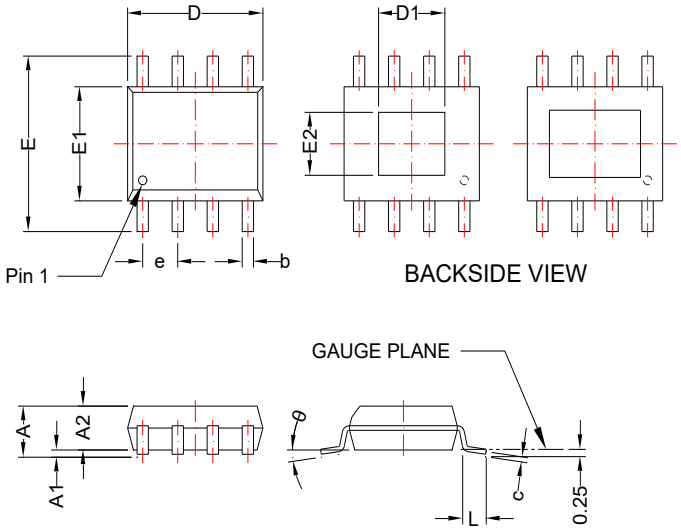
The GS2231A monitors the current flowing through the output NMOS and limits the maximum current to prevent load and GS2231A from damages during current overload conditions.

Thermal Shutdown Protection

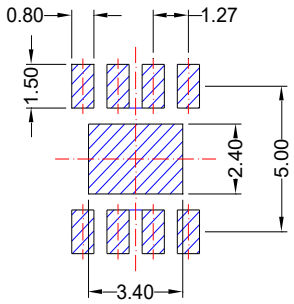
Thermal protection limits power dissipation to prevent IC over temperature.
When the junction temperature exceeds 165°C, the over temperature protection circuit starts the thermal shutdown function and turns the pass transistor off. The pass transistor turns on again after the junction temperature cools by 30°C.

PSOP-8L

Package Dimension



Recommended Land Pattern



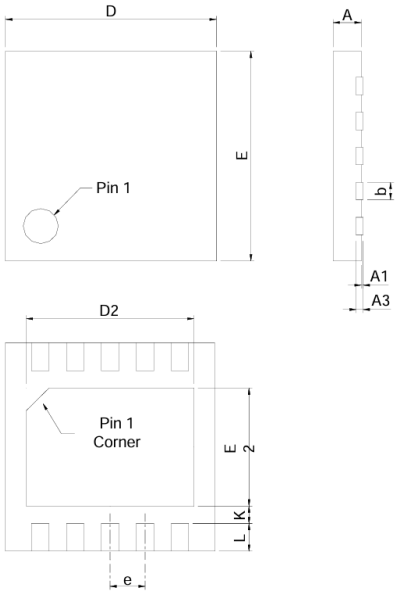
Unit: mm

Dimensions				
SYMBOL	Millimeters		Inches	
	MIN	MAX	MIN	MAX
A	-	1.75	-	0.069
A1	0.10	0.15	0.004	0.006
A2	1.25	-	0.049	-
b	0.31	0.51	0.012	0.020
c	0.10	0.25	0.004	0.010
D	4.70	5.10	0.185	0.201
D1	1.50	-	0.059	-
E	5.80	6.20	0.228	0.244
E1	3.80	4.00	0.150	0.157
E2	1.00	-	0.039	-
e	1.27 BSC		0.050 BSC	
L	0.4	1.27	0.016	0.050
θ	0°	8°	0°	8°

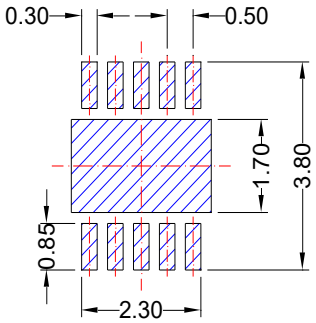
NOTE:
Dimensions are exclusive of Burrs, Mold Flash & Tie Bar extrusions.

DFN3X3-10L(A)

Package Dimension



Recommended Land Pattern



Unit: mm

Dimensions				
SYMBOL	Millimeters		Inches	
	MIN	MAX	MIN	MAX
A	0.70	0.80	0.028	0.031
A1	0.00	0.05	0.000	0.002
A3	0.020 REF		0.008 REF	
b	0.18	0.30	0.007	0.012
D	2.90	3.10	0.114	0.122
D2	2.20	2.70	0.087	0.106
E	2.90	3.10	0.114	0.122
E2	1.40	1.80	0.055	0.071
e	0.50 BSC		0.020 BSC	
L	0.30	0.50	0.012	0.020
K	0.20		0.008	

NOTE:
Dimensions are exclusive of Burrs, Mold Flash & Tie Bar extrusions.

NOTICE

- Globaltech Semiconductor assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all Globaltech Semiconductor products described or contained herein. Globaltech Semiconductor products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner.

- Applications shown on the herein document are examples of standard use and operation. Customers are responsible in comprehending the suitable use in particular applications. Globaltech Semiconductor makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

- Information furnished is believed to be accurate and reliable. However, Globaltech Semiconductor assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties, which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of Globaltech Semiconductor. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information without express written approval of Globaltech Semiconductor.

CONTACT US

GS Headquarter	
	4F, NO.43-1, Lane 11, Sec. 6, Minquan E. Rd Neihu District, Taipei City 114761, Taiwan (R.O.C).
	886-2-2657-9980
	886-2-2657-3630
	sales_twn@gs-power.com

RD Division	
	824 Bolton Drive Milpitas. CA. 95035
	1-408-457-0587