GQ2131

CMOS Positive Voltage Regulator

Description

The GQ2131 is a fixed 1.2V of positive, linear regulators feature low quiescent current (60μA typ.) with low dropout voltage, making them ideal for battery applications.
This rugged device has both Thermal Shutdown, and Current Fold-back to prevent device failure under the "Worst" of operating conditions.
An additional feature is a "Power Good" detector, which pulls low when the output is out of regulation.
The GQ2131 is stable with an output capacitance of 2.2μF or greater.

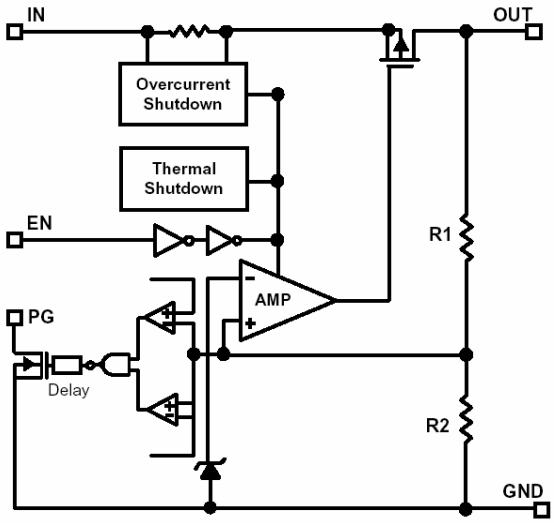
Features

- Very Low Dropout Voltage
- Guaranteed 150mA output
- Over-Temperature Shutdown
- Current Limiting
- Short Circuit Current Fold-back
- Accurate± 3.0%
- Power Good Output Function
- Power-saving Shutdown Mode
- Low Temperature coefficient

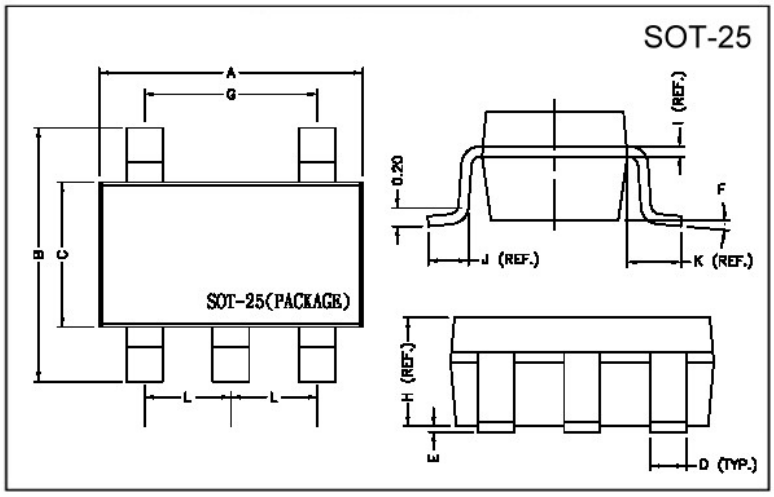
Applications

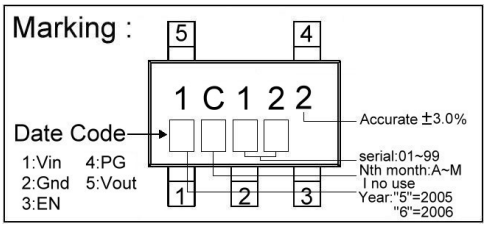
- Battery Powered Widgets
- Instrumentation
- Wireless Devices
- PC Peripherals
- Portable Electronics
- Cordless Phones
- Electronic Scales

Functional Block Diagram



Package Dimensions





REF.	Millimeter		REF.	Dimensions
	Min.	Max.		Millimeter
A	2.70	3.10	G	1.90 REF.
B	2.60	3.00	H	1.20 REF.
C	1.40	1.80	I	0.12 REF.
D	0.30	0.55	J	0.37 REF.
E	0	0.10	K	0.60 REF.
F	0°	10°	L	0.95 REF.

Typical Application Circuit

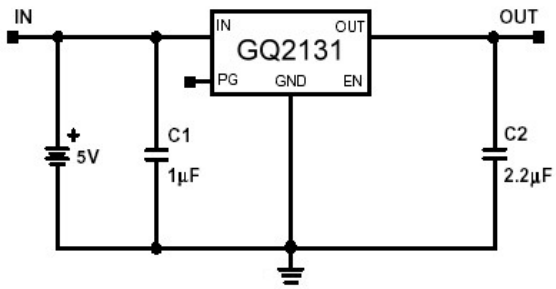


Fig 1. Typical Application Schematic

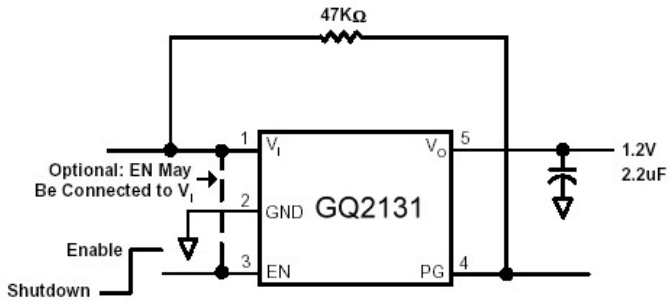
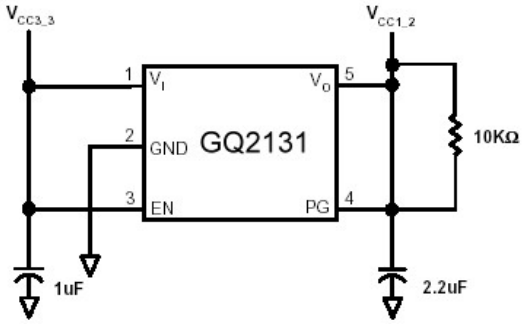


Fig 2. Typical Application For Processor VID Code Power Sequencing Schematic



Pin Description

Pin Number	Pin Name	Pin Function
1	VIN	Supply Input
2	Gnd	Ground
3	EN	Enable/Shutdown (Input): CMOS compatible input. Logic high= enable; Logic low= shutdown. Do not leave open.
4	PG	Power Good Output
5	VOUT	Regulator Output

Ordering Information (contd.)

Part Number	Marking	Output Voltage	Part Number	Marking	Output Voltage
GQ2131-12	1C122 XXXX	1.2V			

Detailed Description

The GQ2131 of COMS regulator contains a PMOS pass transistor, voltage reference, error amplifier, over -current protection, thermal shutdown and Power Good function.

The P-channel pass transistor receives data from the error amplifier, over-current shutdown, and thermal protection circuits. During normal operation, the error amplifier compares the output voltage to a precision reference. Over-current and Thermal shutdown circuits become active when the junction temperature exceeds 150℃, or the current exceeds 300mA. During thermal shutdown, the output voltage remains low. Normal operation is restored when the junction temperature drops below 120℃.

The GQ2131 switches from voltage mode to current mode when the load exceeds the rated output current. This prevents over-stress. The GQ2131 also incorporates current fold-back to reduce power dissipation when the output is short circuited. This feature becomes active when the output drops below 0.8 volts, and reduces the current flow by 65%. Full current is restored when the voltage exceeds 0.8 volts.

External Capacitors

The GQ2131 is stable with an output capacitance to ground of 2.2μF or greater. Ceramic capacitors have the lowest ESR, and will offer the best AC performance. Conversely, Aluminum Electrolytic capacitors exhibit the highest ESR, resulting in the poorest AC response. Unfortunately, large value ceramic capacitors are comparatively expensive. One option is to parallel a 0.1μF ceramic capacitor with a 10μF Aluminum Electrolytic. The benefit is low ESR, high capacitance, and low overall cost.

A second capacitor is recommended between the input and ground to stabilize Vin. The input capacitor should be at least 0.1μF to have a beneficial effect.

All capacitors should be placed in close proximity to the pins. A “Quiet” ground termination is desirable. This can be achieved with a “Star” connection.

Enable

The Enable pin normally floats high. When actively, pulled low, the PMOS pass transistor shuts off, and all internal circuits are powered down. In this state, the quiescent current is less than 1μA. This pin behaves much like an electronic switch.

Power Good

The GQ2131 includes the Power Good feature. When the output is not within ±15% of the specified voltage, it pulls low. This can occur under the following conditions:

1) Input Voltage too low.
2) During Over-Temperature.
3) During Over-Current.
4) If output is pulled up.

(Note: PG pin is an open-drain output.)

Absolute Maximum Ratings

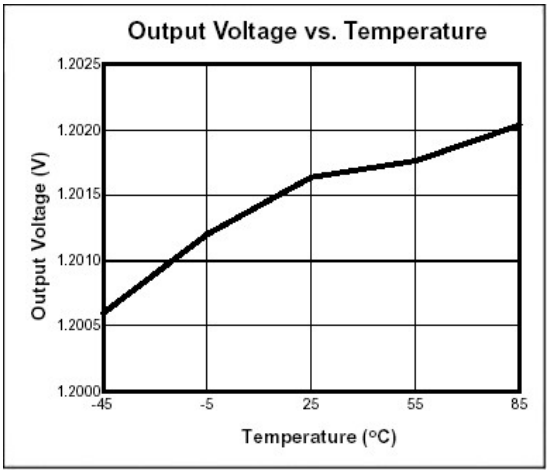
Parameter	Symbol	Ratings	Unit
Input Max Voltage	V_{IN}	7	V
Output Current	I_{OUT}	$P_D/(V_{IN}-V_O)$	mA
Input, Output Voltage		GND-0.3 to V_{IN}+0.3	V
Operating Ambient Temperature	Topr	-40 ~ +85	℃
Junction Temperature	Tj	-40 ~ +125	℃
Maximum Junction Temperature	Tj Max	150	℃
Thermal Resistance	θja	260	℃/W
Power Dissipation(△T=100℃)	PD	380	mW
EDS Classification		B	

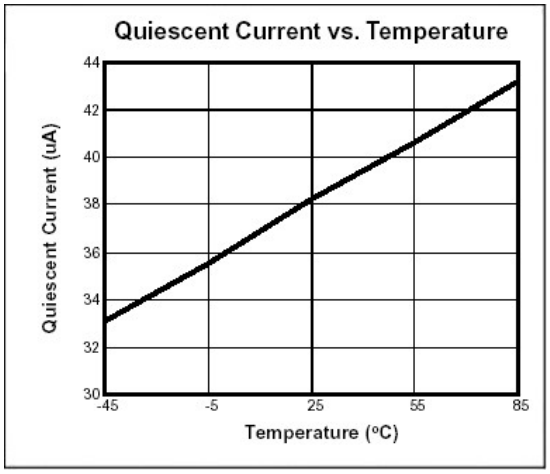
Electrical Characteristics Ta=25℃ V_{IN}=2.7V, V_{EN}= V_{IN}, I_O=100uA unless otherwise noted

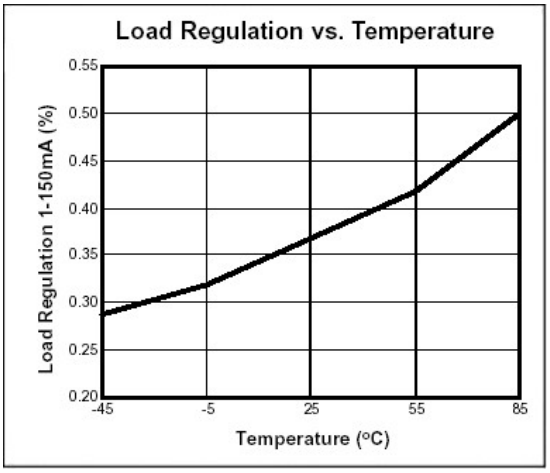
Parameter	Symbol	Condition		Min	TYP	Max	Unit
Output Voltage	V_O	I_O=0.1mA		-3.0%	-	3.0%	V
Current Limit	I_{LIM}	V_O<0.1V		150	350	-	mA
Load Regulation	REG_{LOAD}	I_O=0.1mA to 150mA		-4	1	4	%
Dropout Voltage	$V_{DROPOUT}$	I_O=150mA, V_{OUT}=V_O-2%		-	-	1300	mV
Quiescent Current	I_Q	V_{IN}=6V, I_O=0mA, V_O=$V_{O(NOM)}$		-	60	80	μA
Ground Pin Current	I_{GND}	V_{IN}=6V, I_O=1mA to150mA		-	65	-	μA
Line Regulation	REG_{LINE}	I_O=0.1mA, V_{IN}=2.7V to 6V		-0.3	-	0.3	%
Input Voltage	V_{IN}			2.7	-	6	V
Over Temperature Shutdown	OTS			-	150	-	℃
Over Temperature Hysterisis	OTH			-	30	-	℃
Output Voltage Temperature Coefficient	TC			-	30	-	ppm/℃
Power Supply Rejection	PSRR	Io=100mA Co=2.2μF	f=1kHz	-	50	-	dB
			f=10kHz	-	20	-	
			f=100kHz	-	15	-	
Output Voltage Noise	eN	f=10Hz to 100kHz Io=10mA	Co=2.2μF	-	30	-	μVrms
EN Input Threshold	V_{EH}			1.6	-	V_{IN}	V
	V_{EL}			0	-	0.4	V
EN Input Bias Current	I_{EH}	V_{EN}=V_{IN}		-	0.1	-	μA
	I_{EL}	V_{EN}= 0V		-	0.1	-	μA
Shutdown Supply Current	I_{SD}	V_{IN}=5V, V_O=0V, V_{EN}=0V		-	0.5	1	μA
Shutdown Output Voltage	$V_{O,SD}$	Output Loading≦1200Ω, V_{EN}=0V		0	-	0.4	V
Output Under Voltage	V_{UV}	PG ON @ % of V_{OUT}		-	-	95	%$V_{O(NOM)}$
PG Leakage Current	I_{LC}	V_{PG}=6V, PG is off		-	0.1	-	μA
PG Voltage Low	V_{OL}	I_{SINK}=0.1mA		-	-	0.1	V
V_{PG} Delay	T_{PGD}	See Timing Diagram on page 5		1.5	-	5	ms

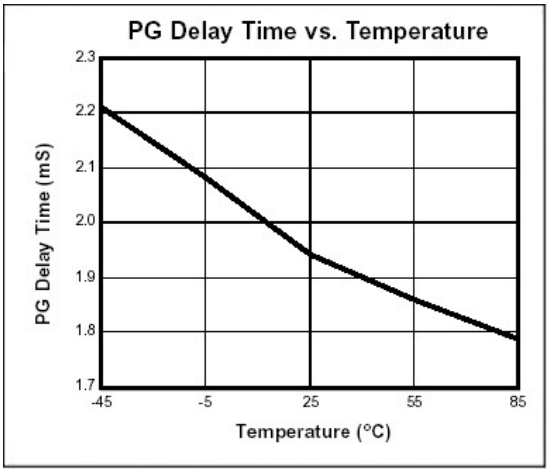
Note 1: $V_{IN\ (MIN)}$ =V_{OUT}+$V_{DROPOUT}$

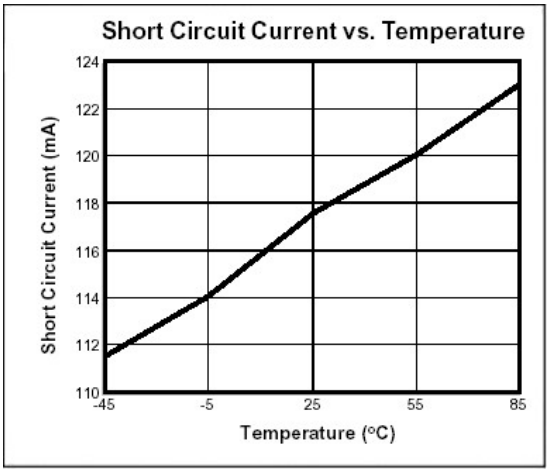
Characteristics Curve

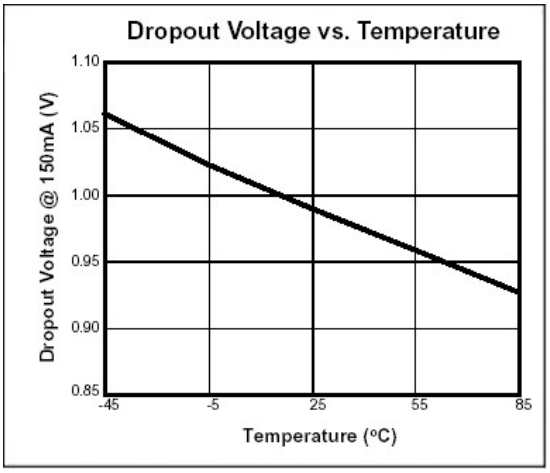




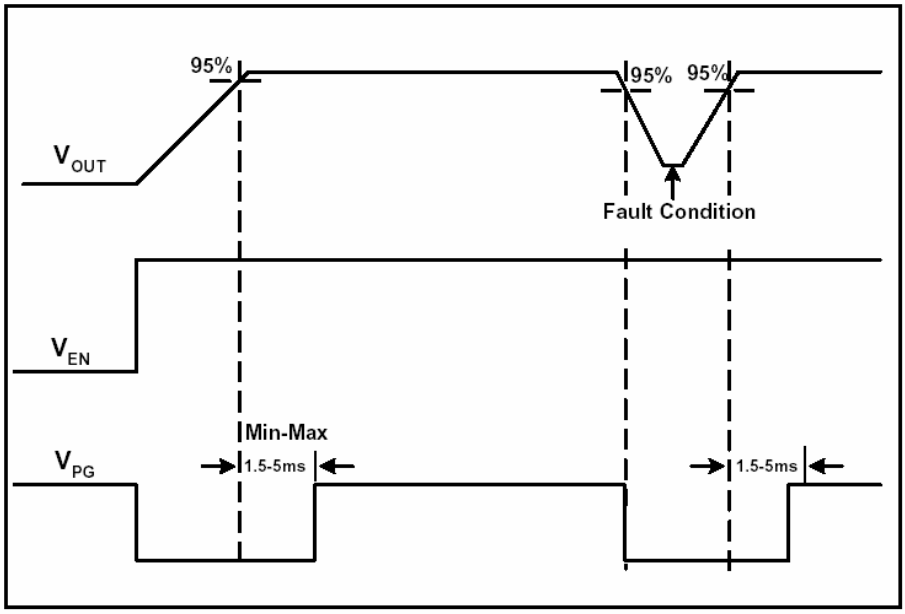








Timing Diagram



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