

GQ2181

CMOS Positive Voltage Regulator

Description

The GQ2181 series of positive, linear regulators feature low quiescent current (50µA typ.) with low dropout voltage and excellent PSRR, thus making them ideal for Telecommunications and other battery applications. These rugged devices have both Thermal Shutdown, and Current Fold-back to prevent device failure under the "Worst" of operating conditions.

As an additional feature, the GQ2181 is stable with an output capacitance of just extended 0.22µF or greater.

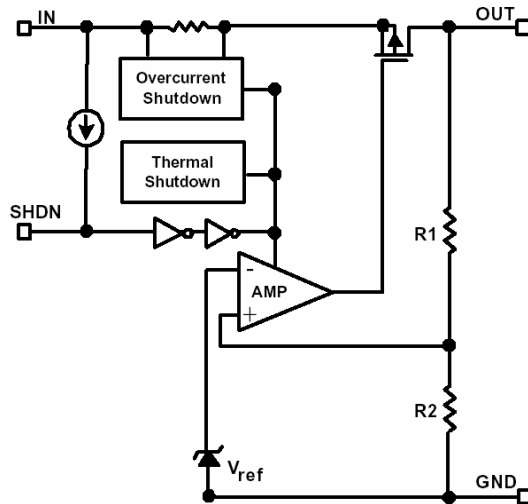
Features

- Very Low Dropout Voltage
- Guaranteed 150mA output
- Over-Temperature Shutdown
- Current Limiting
- Short Circuit Current Fold-back
- Excellent PSRR Type 70dB
- Noise Reduction Bypass Capacitor
- Power-saving Shutdown Mode
- Factor Pre-set Output Voltage

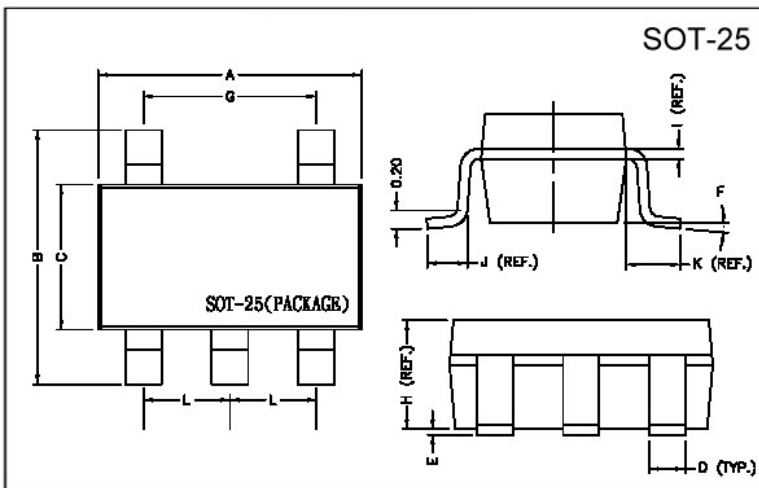
Applications

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

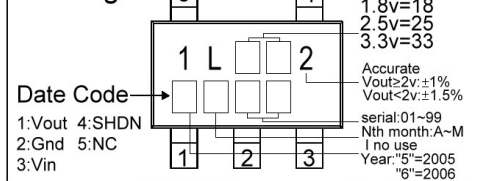
Functional Block Diagram



Package Dimensions

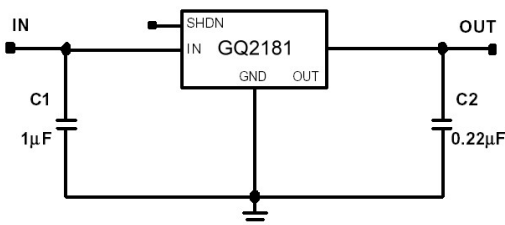


Marking :



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



Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Input Max Voltage	V _{IN}	6	V
Output Current	I _{OUT}	PD/(V _{IN} -V _O)	mA
Output Voltage	V _{OUT}	1.5~3.3	V
Operating Ambient Temperature	T _{opr}	-40 ~ +85	°C
Junction Temperature	T _j	-40 ~ +125	°C
Maximum Junction Temperature	T _{j Max}	150	°C
Power Dissipation(ΔT=100°C)	PD	380	mW
EDS Classification		B	

Electrical Characteristics TA=25°C unless otherwise noted(V_{OUT(T)}>2.0V V_{IN}=V_{OUT(T)}+0.5V; V_{OUT(T)}≤2.0V V_{IN}=V_{OUT(T)}+1V; V_{SHDN}=V_{IN}, C_{IN}=C_{OUT}=1μF)

Parameter	Symbol	Condition	Min	TYP	Max	Unit
Output Voltage	V _{OUT(E)} (Note1)	I _O =0.1mA, V _{OUT(T)} ≥2.0V	-1.0	V _{OUT(T)} (Note2)	1.0	%
		I _O =0.1mA, V _{OUT(T)} <2.0V	-1.5		1.5	
		I _O =150mA	-2.0		2.0	
Current Limit	I _{LIM}	V _O >800mV	150	200	-	mA
Fold-back Current	I _{FB}	V _O =0V	-	80	-	μA
Load Regulation	REG _{LOAD}	I _O =0.1 to 150mA V _{OUT} >2.0V V _{IN} =V _{OUT(T)} +0.5V	-1	0.5	1	%
		V _{OUT} ≤2.0V V _{IN} =V _{OUT(T)} +1V	-2	-	2	
Dropout Voltage	V _{DROPOUT}	I _O =150mA V _O =V _{OUT(E)} -2%				mV
		V _{OUT(T)} ≥2.0V	-	300	500	
		1.8V≤V _{OUT(T)} <2.0V	-	700	1000	
		1.5V≤V _{OUT(T)} <1.8V	-	900	1300	
Quiescent Current	I _Q	V _{IN} =5V, I _O =0mA	-	60	-	μA
Ground Pin Current	I _{GND}	V _{IN} =5V, I _O =1mA to 150mA	-	50	-	μA
Line Regulation	REG _{LINE}	I _O =0.1mA, V _{OUT} >2.0V V _{IN} =V _{OUT(T)} +0.5V to 5.5V	-0.2	0.1	0.2	%
		I _O =0.1mA, V _{OUT} ≤2.0V V _{IN} =V _{OUT(T)} +1V to 5.5V	-0.4	-	0.4	
Input Voltage	V _{IN}		Note3	-	5.5	V
Over Temperature Shutdown	OTS		-	137	-	°C
Over Temperature Hysteresis	OTH		-	23	-	°C
Output Voltage Temperature Coefficient	TC		-	30	-	ppm/°C
Power Supply Rejection	PSRR	R _o =100Ω, C _o =2.2mF, f=1kHz	-	70	-	dB
Output Voltage Noise	e _N	f=10Hz~100kHz, I _O =10mA, C _o =2.2μF	-	30	-	μVrms
SHDN Input Threshold	V _{SHDNH}	V _{SHDN} =0.8* V _{IN}	0.8* V _{IN}	-	V _{IN}	V
	V _{SHDNL}	V _{SHDN} =0.6V	0	-	0.6	V
SHDN Input Bias Current		V _{IN} =5V, EN=0v, or 5V	-	0.01	-	μA
Shutdown Supply Current	I _{SD}	V _{IN} =5V, V _O =0V	-	0.5	1	μA
Shutdown Output Voltage	V _{O,SD}	Output Loadings≤1200Ω, V _O =0V	0	-	0.4	V

Note 1: V_{OUT(E)} =Effective Output Voltage (i.e. the output voltage when "V_{OUT(T)}>2.0V V_{IN}=V_{OUT(T)}+0.5V; V_{OUT(T)}≤2.0V V_{IN}=V_{OUT(T)}+1V; V_{SHDN}=V_{IN}" is provided at the V_{IN} pin while maintaining a certain I_{OUT} value).

2: V_{OUT(T)} =Specified Output Voltage

3: V_{IN(MIN)} =V_{OUT}+V_{DROPOUT}

Ordering Information (contd.)

Part Number	Marking	Output Voltage	Part Number	Marking	Output Voltage
GQ2181-15	1L152 XXXX	1.5V	GQ2181-18	1L182 XXXX	1.8V
GQ2181-20	1L202 XXXX	2.0V	GQ2181-25	1L252 XXXX	2.5V
GQ2181-27	1L272 XXXX	2.7V	GQ2181-28	1L282 XXXX	2.8V
GQ2181-2H	1L2H2 XXXX	2.85V	GQ2181-30	1L302 XXXX	3.0V
GQ2181-32	1L322 XXXX	3.2V	GQ2181-33	1L332 XXXX	3.3V

Detailed Description

The GQ2181 series of COMS regulators contain a PMOS pass transistor, voltage reference, error amplifier, over-current protection, and thermal shutdown.

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°C, or the current exceeds 150mA. During thermal shutdown, the output voltage remains low. Normal operation is restored when the junction temperature drops below 120°C.

The GQ2181 switches from voltage mode to current mode when the load exceeds the rated output current. This prevents over-stress. The GQ2181 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 GQ2181 is stable with an output capacitance to ground of 0.22µF 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.

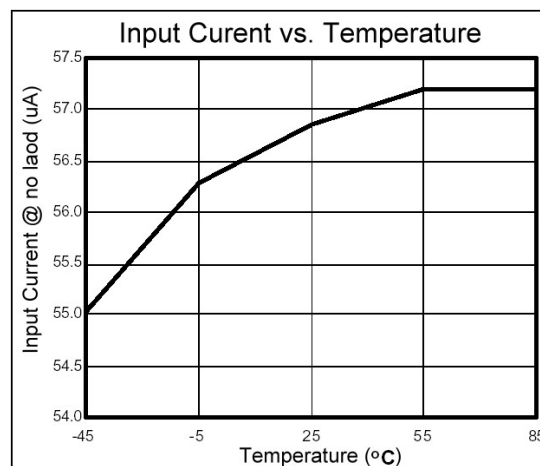
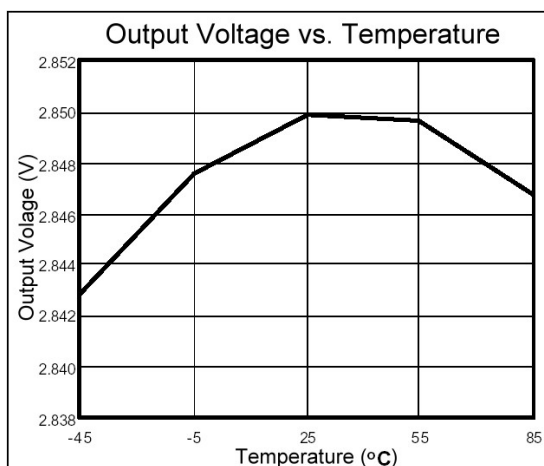
A second capacitor is recommended between the input and ground to stabilize Vin. The input capacitor should be at least 1µF to have a beneficial effect.

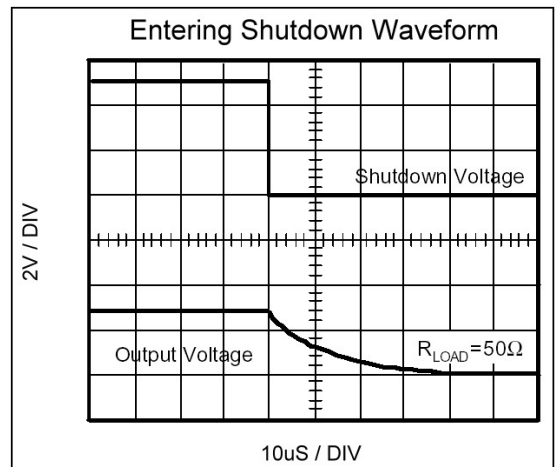
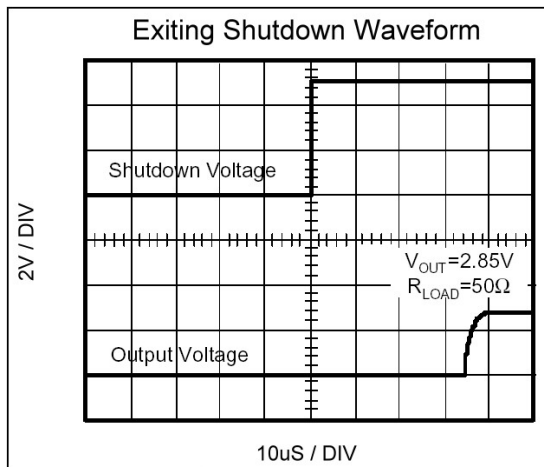
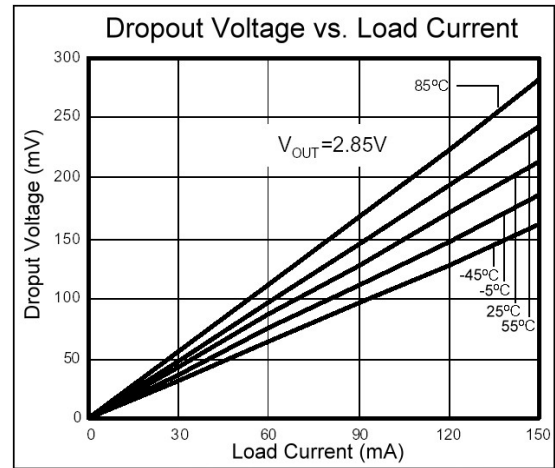
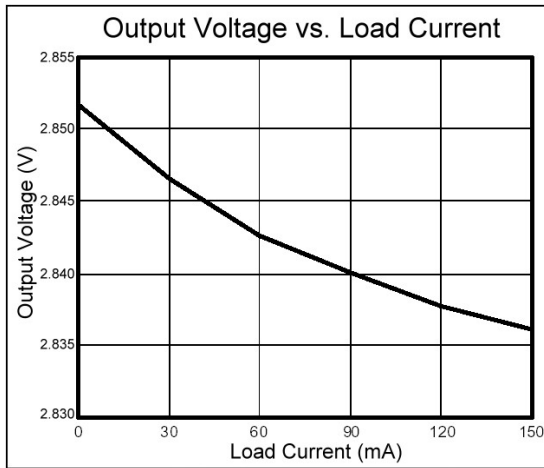
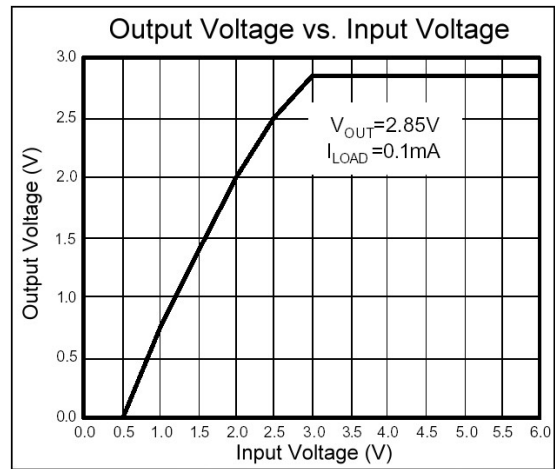
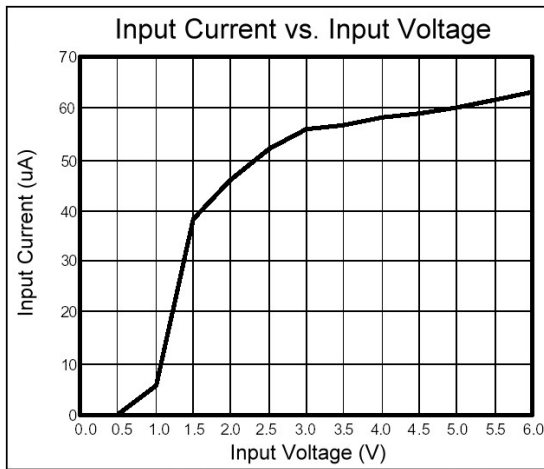
A large capacitor improves the AC ripple rejection, but also makes the output come up slowly. This "Soft" turn-on is desirable in some applications to limit turn-on surges.

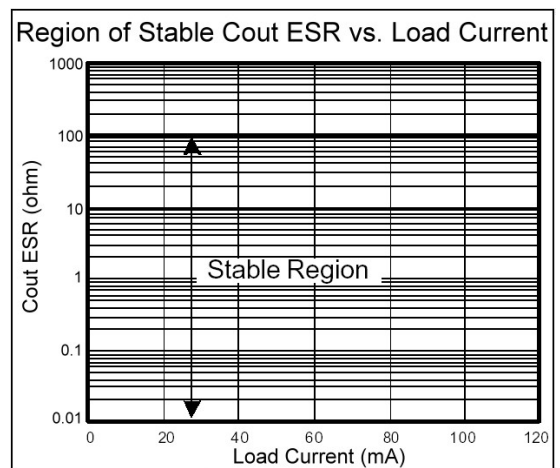
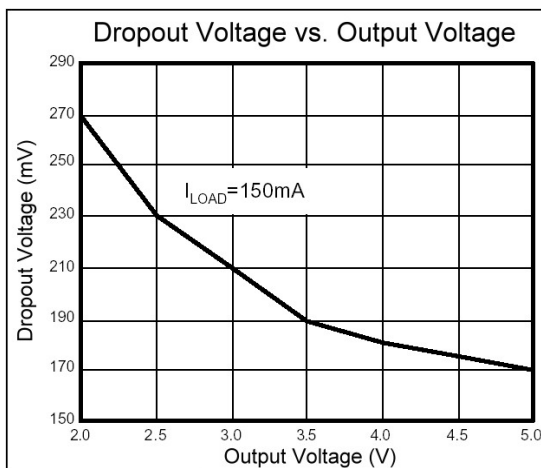
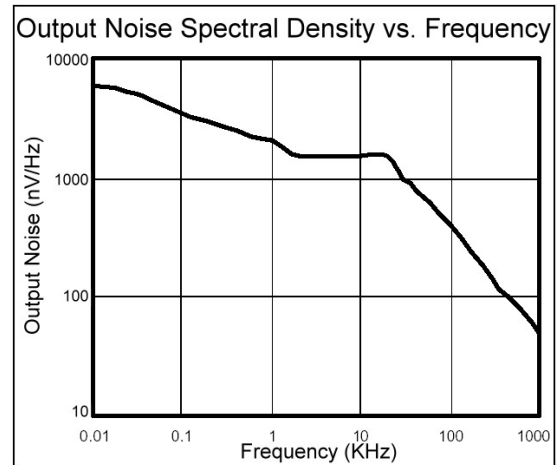
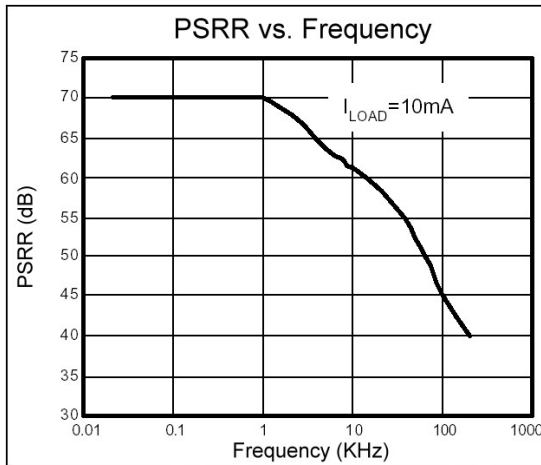
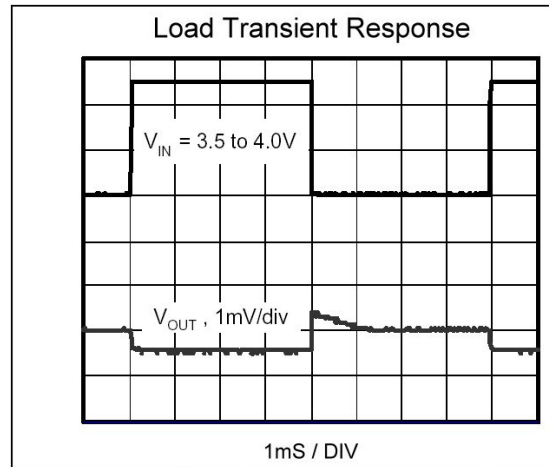
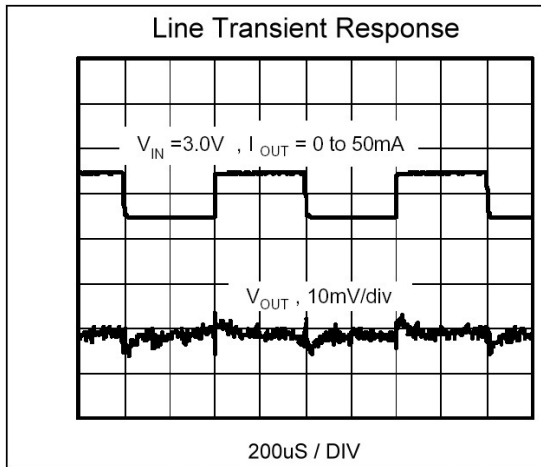
All capacitors should be placed in close proximity to the pins. A "Quiet" ground termination is desirable. This can be achieved with a "Star" connection.

Shutdown

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.

Characteristics Curve





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