3.3V 2A Low Dropout Regulator with Disable

Features

- **Dropout voltage 0.5V @ I_O = 2A**
- **Output current in excess of 2A**
- **Output voltage accuracy ±2.5%**
- **Quiescent current, typically 5mA**
- **Internal short circuit current limit**
- **Internal over temperature protection**
- **TO220 4pin Full-Mold package**
- **ON/OFF control**

General Description

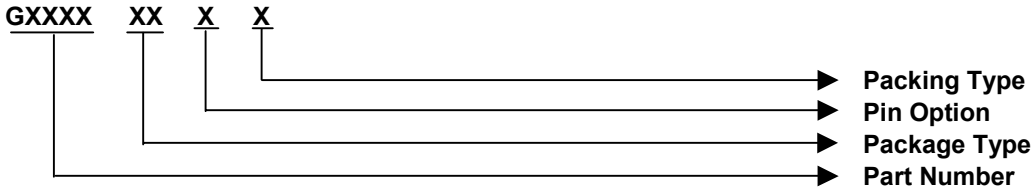
The G9233 positive 3.3V voltage regulator features the ability to source 2A of output current. The dropout voltage is 0.5V at 2A output current. The typical quiescent current is 5mA. Furthermore, the quiescent current is smaller when the regulator is in the dropout mode (V_{IN} < 3.3V).

Familiar regulator features such as over temperature and over current protection circuits are provided to prevent it from being damaged by abnormal operating conditions. A V_{dis} pin is provided to disable the output when needed.

Ordering Information

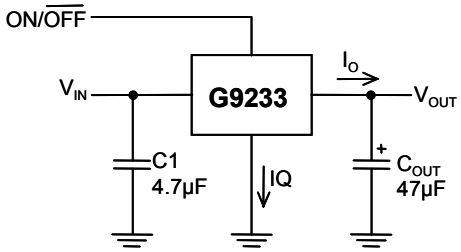
ORDER NUMBER	MARKING	TEMP. RANGE	PACKAGE	PIN OPTION			
				1	2	3	4
G9233TF1T	G9233	-40°C to +85°C	TO220F-4L	V_{IN}	V_O	GND	V_{dis}
G9233TH1T	G9233	-40°C to +85°C	TO220F-4L	V_{IN}	V_O	GND	V_{dis}
G9233TH1Tf	G9233	-40°C to +85°C	TO220F-4L (Pb free)	V_{IN}	V_O	GND	V_{dis}

Order Number Identification

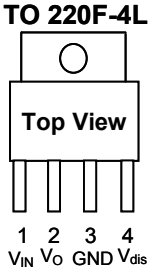


PACKAGE TYPE	PIN OPTION				PACKING
TF : TO220F-4L (short lead)	1	2	3	4	T : Tube
TH : TO220F-4L (long lead)	1.: V_{IN}	V_O	GND	V_{dis}	

Typical Application



Package Type



Absolute Maximum Ratings (Note 1)

Input Voltage……..……..……..8V
V_{dis} Voltage……..……..……8V
Power Dissipation Internally Limited (Note 2)
Maximum Junction Temperature…...……..……...150°C
Storage Temperature Range……...-65°C ≤ T_J ≤+150°C
Lead Temperature, Time for Wave Soldering
TO220 Package……..……..……260°C, 10s
Continuous Power Dissipation (T_A = +25°C)
TO220 No heatsink……..……..……1.5W
TO220 with infinite heatsink……..……..……15W

Operating Conditions (Note 1)

Input Voltage……..3.6V~7V
Temperature Range……..…...-40°C ≤ T_A ≤85°C

Electrical Characteristics

V_{IN} =5V, I_O = 0.5A, C_{IN} = 4.7µF, C_{OUT} =47µF, T_A = T_J = 25°C unless otherwise specified [Note 3]

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT
Output Voltage		I_O =0.5A	3.22	3.3	3.38	V
Line Regulation		4V ≤ V_{IN} ≤ 7V, I_O = 10mA	---	0.5	2	%
Load Regulation		50mA ≤ I_O ≤ 2A	---	0.5	2	%
Quiescent Current		V_{IN} = 5V	---	5	10	mA
Ripple Rejection		fi = 120Hz, 1V_{P-P}, I_O = 100mA	---	45	---	dB
Dropout Voltage		I_O = 2A	---	---	0.5	V
Short Circuit Current			---	0.8	---	A
Over Temperature			---	150	---	°C
Disable Voltage High	V_{disH}	Output Active	2.0	---	---	V
Disable Voltage Low	V_{disL}	Output Disabled	---	---	0.8	V
Disable Bias Current High	I_{disH}	V_{dis} = 2.7V	---	---	20	µA
Disable Bias Current Low	I_{disL}	V_{dis} = 0.4V	---	---	20	µA

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. For the TO 220 package, θ_{JA} is 60°C/W (No heat sink).

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

Note4: The type of output capacitor should be tantalum or aluminum.

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.

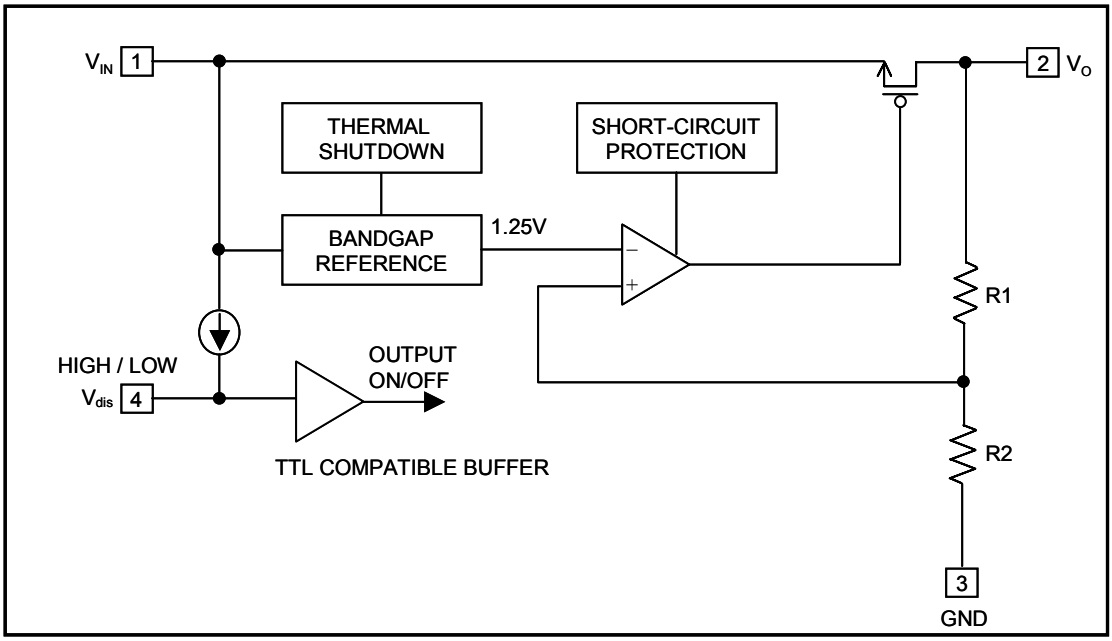
Line Regulation
The change in output voltage for a change in input voltage. The measurement is made under conditions of low dissipation or by using pulse techniques such that average chip temperature is not significantly affected.

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.

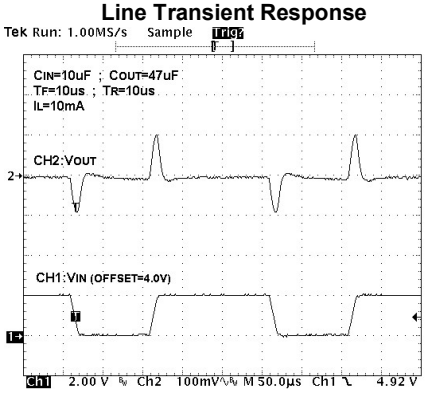
Block Diagram



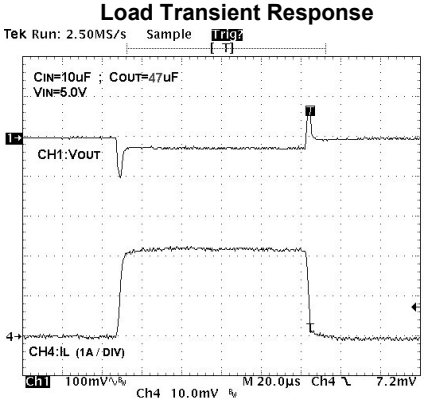
Typical Performance Characteristics

(V_{IN}=5V, C_{IN}=10µF, C_{OUT} =47µF, T_A=25°C, unless otherwise noted.)

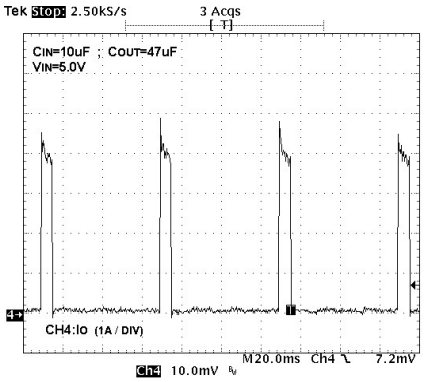
Line Transient Response



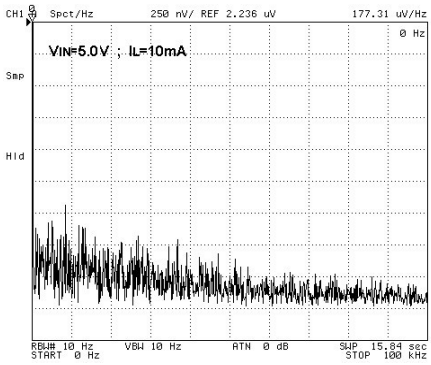
Load Transient Response



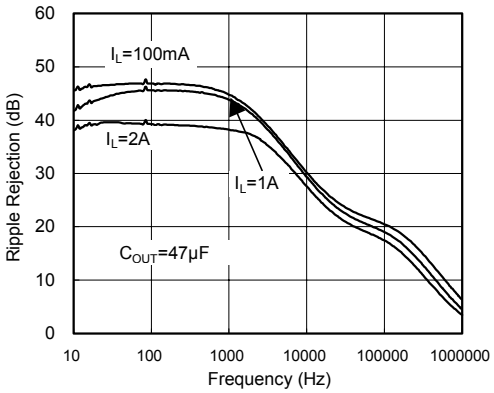
Short Circuit-Current



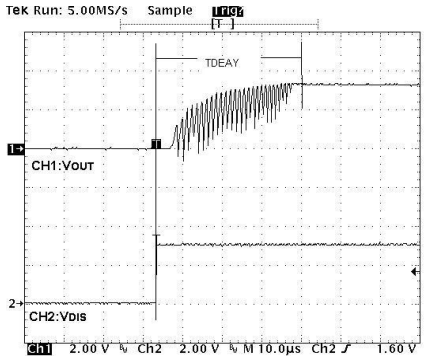
Output Noise



Ripple Rejection

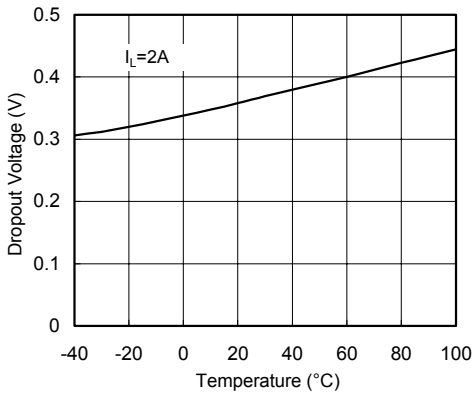


Disable- ON

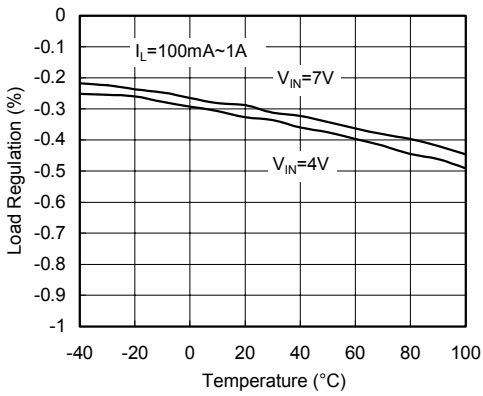


Typical Performance Characteristics (continued)

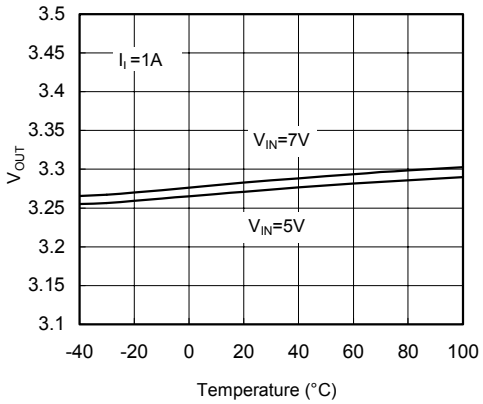
Dropout Voltage vs. Temperature



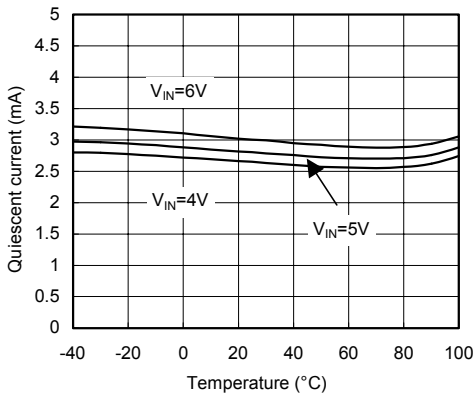
Load Regulation



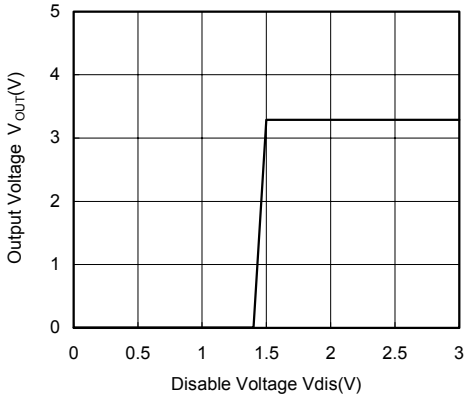
Output Voltage vs. Temperature



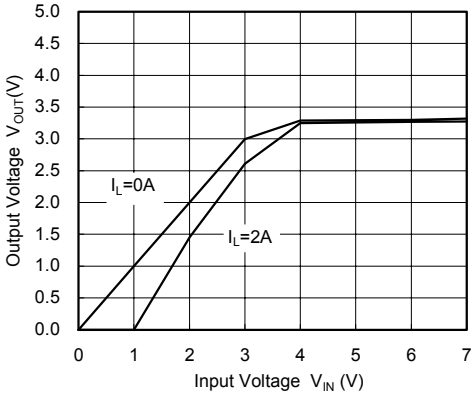
Quiescent Current vs. Temperature



Output Voltage vs. Disable Voltage

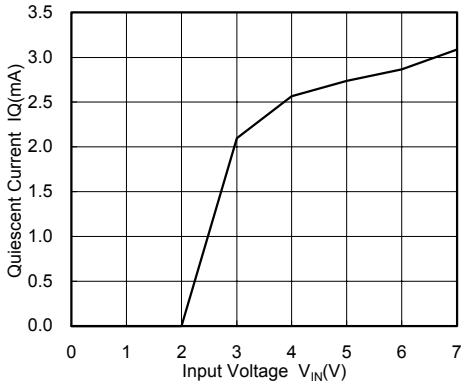


Output Voltage vs. Input Voltage

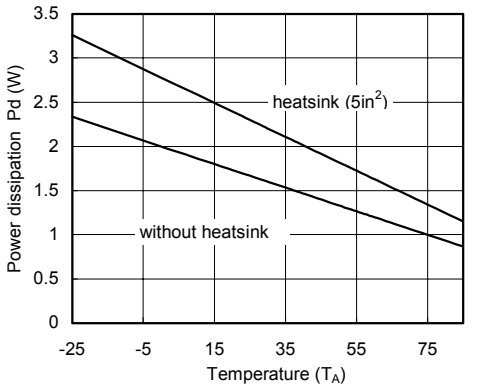


Typical Performance Characteristics (continued)

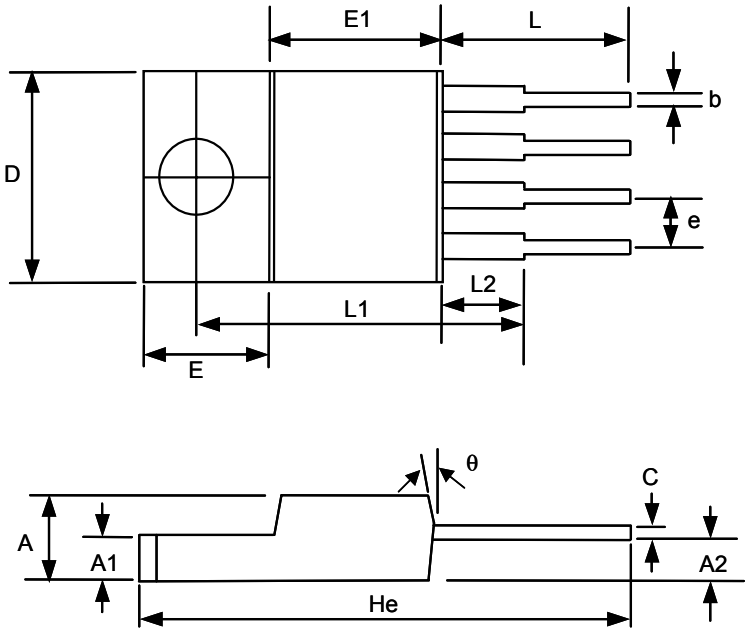
Quiescent Current vs. Input Voltage



Power Dissipation vs. Temperature (T_A)

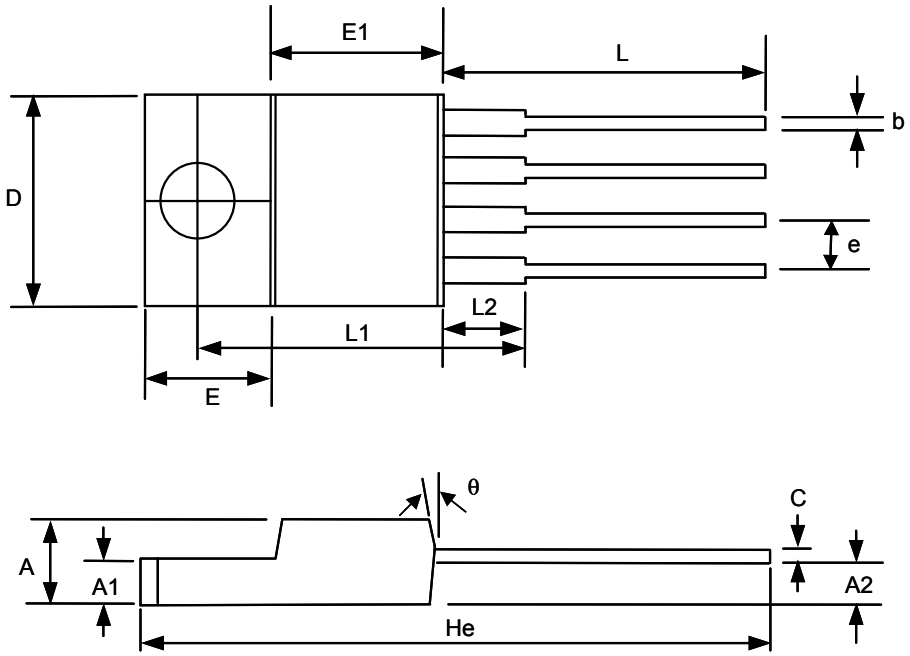


Package Information



TO220F-4L Package (short lead)

SYMBOL	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	4.42	4.57	4.72	0.174	0.180	0.186
A1	2.69	2.79	2.89	0.106	0.110	0.114
A2	1.68	1.78	1.88	0.066	0.070	0.074
D	10.00	10.10	10.20	0.394	0.398	0.402
E	6.85	6.95	7.05	0.269	0.273	0.278
E1	8.54	8.64	8.74	0.336	0.340	0.344
L	8.32	8.52	8.72	0.328	0.335	0.343
L1	16.56	16.66	16.76	0.652	0.656	0.660
L2	3.60	3.70	3.80	0.142	0.146	0.150
He	23.72	24.22	24.72	0.934	0.953	0.93
C	-----	0.48	-----	-----	0.019	-----
e	-----	2.54(TYP)	-----	-----	0.1(TYP)	-----
b	-----	0.635(TYP)	-----	-----	0.025(TYP)	-----
θ	4°	7°	11°	4°	7°	11°



TO220F-4L Package (long lead)

SYMBOL	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	4.42	4.57	4.72	0.174	0.180	0.186
A1	2.69	2.79	2.89	0.106	0.110	0.114
A2	1.68	1.78	1.88	0.066	0.070	0.074
D	10.00	10.10	10.20	0.394	0.398	0.402
E	6.85	6.95	7.05	0.269	0.273	0.278
E1	8.54	8.64	8.74	0.336	0.340	0.344
L	13.15	13.35	13.55	0.518	0.526	0.533
L1	16.56	16.66	16.76	0.652	0.656	0.660
L2	3.60	3.70	3.80	0.142	0.146	0.150
He	28.44	28.94	29.44	1.119	1.139	1.159
C	-----	0.48	-----	-----	0.019	-----
e	-----	2.54(TYP)	-----	-----	0.1(TYP)	-----
b	-----	0.635(TYP)	-----	-----	0.025(TYP)	-----
θ	4°	7°	11°	4°	7°	11°

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