G2920

High Input Voltage, High PSRR, Low Quiescent Current LDO Regulator

Features

- **Low Current Consumption , Typically 3.5μA**
- **Output Voltage Accuracy ±2%**
- **Output Adjusts from 1.24 to (V_{IN}-1)V**
- **Low Dropout Voltage of 500mV @ I_O = 100mA**
- **Stable with Ceramic or Tantalum Capacitors**
- **Wide Operating range : 3.5V ~ 36V**
- **Low Shutdown Current , Typically Under 1μA**
- **Good Line Regulation and Load Regulation Specifications**
- **Thermal Shutdown and Current Limit Protection Embedded**
- **SOT-23-5 Package Available**

General Description

The G2920 is a highly accurate, low dropout regulator with 150mA output driving capacity and ultra-low ground current. The G2920 can work in a wide operation range from 3.5V up to 36V. The quiescent current is small even at high input voltage. The typical current consumption is about 3.5μA. It is stable with either ceramic or tantalum output capacitor, the minimum output capacitor is only 1μF required. It is very suitable for the battery-powered portable equipment, especially the keep-alive system. The G2920 can provide the higher performance and a longer battery service life

Applications

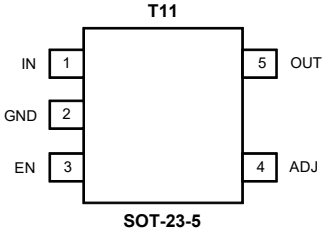
- **USB Type-C Power Supply**
- **Keep-Alive Supply in Notebook and Portable Computers**
- **Logic Supply for High-Voltage Batteries**
- **Automotive Electronics**
- **Battery Powered Systems**
- **3-4 Cell Li-Ion Battery Input Range**

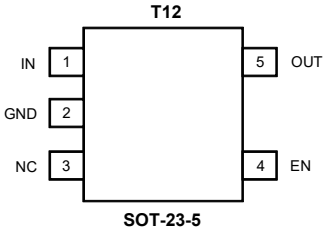
Ordering Information

ORDER NUMBER	MARKING	VOLTAGE	TEMP. RANGE	PACKAGE (Green)
G2920T11U	2920x	3.3V	-40°C to 85°C	SOT-23-5
G2920T12U	290Ax	3.3V	-40°C to 85°C	SOT-23-5
G2920AT11U	292Ax	5.0V	-40°C to 85°C	SOT-23-5

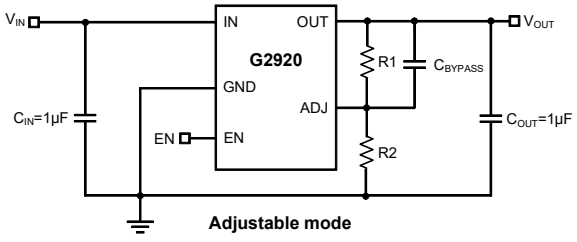
Note:T1: SOT-23-5
1or 2: Bonding Code
U: Tape & Reel
Green : Lead Free / Halogen Free

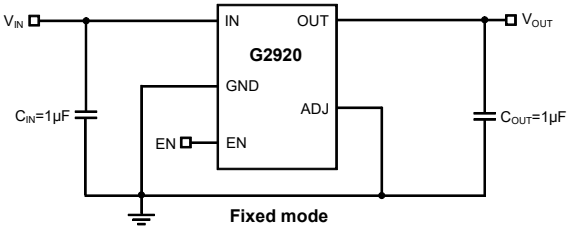
Pin Configuration





Typical Application Circuit





Absolute Maximum Ratings (1)

Supply Voltage
V_{IN} to GND. . . . . -0.3V to +40V
V_{EN} to GND . . . . . -0.3V to +40V
V_{VOUT} to GND . . . . . -0.3V to +22V
V_{ADJ} to GND . . . . . -0.3V to +5.5V
Maximum Junction Temperature, T_J . . . . . .150°C
Storage Temperature Range, T_{STG}. . . -65°C to 150°C
Reflow Temperature (soldering, 10 sec) . . . . . 260°C
Electrostatic Discharge, VESD
Human body Model (HBM) (2) 2000V
Charged-Device Model (CDM) 1000V
Thermal Resistance Junction to Ambient, (θ_{JA})
SOT-23-5 . . . . . 200°C/W

Continuous Power Dissipation (T_A= 25°C)
SOT-23-5 . . . . . 0.6W
Thermal Resistance Junction to Case, (θ_{JC})
SOT-23-5 . . . . . 60°C/W

Operating Range

T_A . . . . . -40°C to +85°C
V_{IN} to GND. . . . . .3.5V to 36V
V_{EN} to GND. . . . . 0V to 36V
V_{VOUT} to GND . . . . . .1.24V to 20V
V_{ADJ} to GND. . . . . 0V to 5V

Electrical Characteristics

V_{IN}= V_{OUT}+3V, T_A=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.

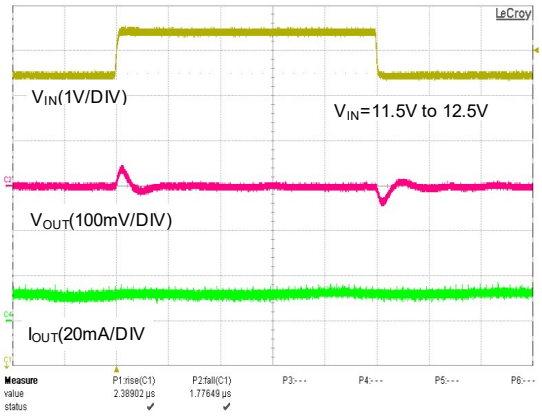
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Input Voltage Range	V_{IN}		3.5	---	36	V
Under Voltage Lockout	V_{UVLO}		---	2.5	---	V
UVLO Hysteresis	V_{Hys}		---	200	---	mV
Output Voltage Range	V_{OUT}	Adjustable Mode, (V_{ADJ}>0.2V)	1.24	---	20	V
		Fixed Mode	3.234	3.3	3.366	V
			4.9	5.0	5.1	
Reference Voltage	V_{REF}	Adjustable Mode, (V_{ADJ}>0.2V)	1.209	1.24	1.271	V
Shutdown Current	I_{SHDN}	EN = 0	---	0.1	1	μA
Quiescent Current	I_Q	I_{OUT} = 0mA	---	3.5	5	μA
EN Input Current	I_{EN}	V_{EN} = 36V	---	0.1	---	μA
Line Regulation	ΔV_{LINE}	I_{LOAD} = 1mA, V_{OUT}+1 <V_{IN}<36V, V_{OUT}>3.3V	---	0.04	0.5	%
		I_{LOAD} = 1mA, V_{OUT}+1 <V_{IN}<36V, V_{OUT}≦3.3V	---	0.04	0.6	%
Load Regulation	ΔV_{LOAD}	0mA < I_{LOAD} <100mA	---	1	3	%
Enable Input Voltage	V_{IH}		0.9	---	---	V
	V_{IL}		---	---	0.4	V
Output Current Limit	I_{LIM}	V_{IN}≥4.8V & V_{IN}≥V_{OUT}(nominal)+1.5V, V_{OUT}=0.5 x V_{OUT}(nominal)	200	300	---	mA
Short Circuits Current	I_{SCKT}	V_{OUT}=0V	---	40	---	mA
Thermal Shutdown Temperature	T_{SD}		---	150	---	°C
	T_{SD_HYS}		---	20	---	°C

Note:(1) : Absolute maximum rating indicates limits beyond which damage to the device may occur.
(2) : Human body model : C = 100pF, R = 1500Ω, 3 positive pulses plus 3 negative pulses

Typical Performance Characteristics

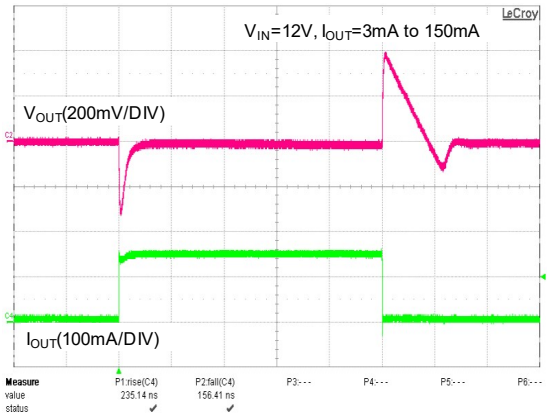
Circuit of Fig. 1, component of table 1, VOUT=3.3V, VIN>2.5V CIN=1μF, COUT=1μF, T_A=25°C, unless otherwise noted.

Line Transient Response



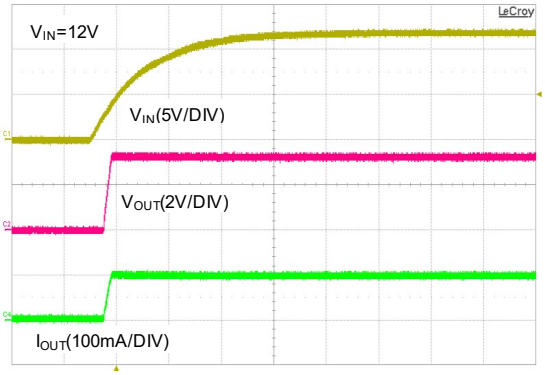
50µs/DIV

Load Transient Response



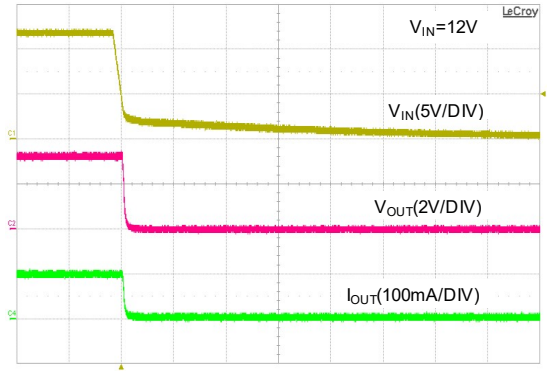
100µs/DIV

Power On from VIN



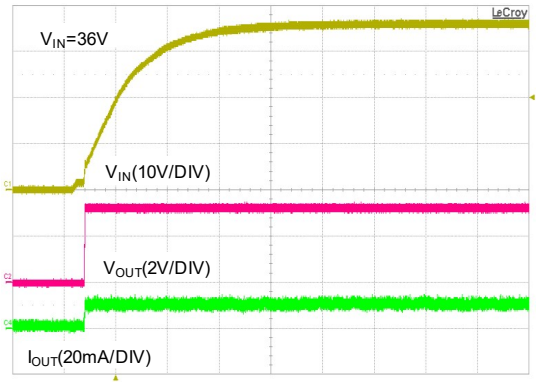
5ms/DIV

Power Off from VIN



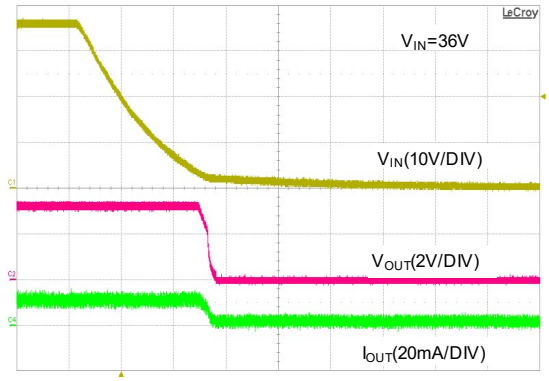
100ms/DIV

Power On from VIN



50ms/DIV

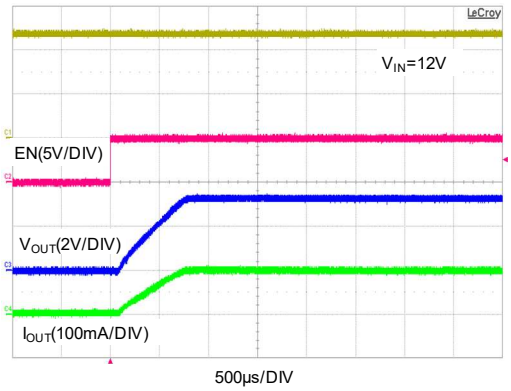
Power Off from VIN



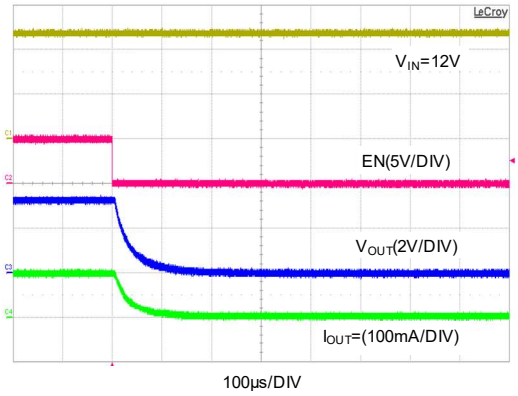
500ms/DIV

Typical Performance Characteristics (continued)

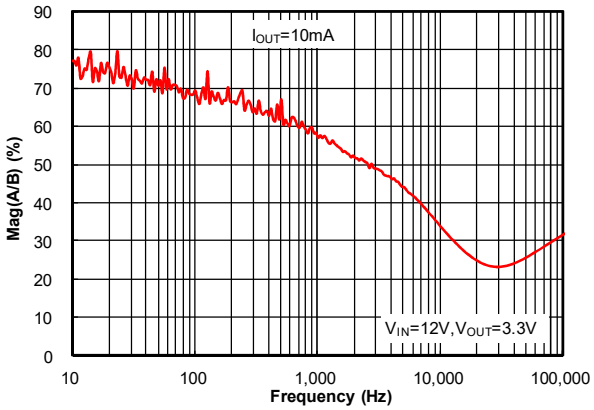
Power On from EN



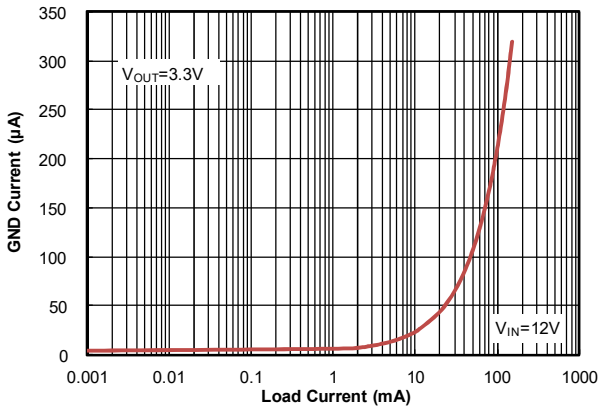
Power Off from EN



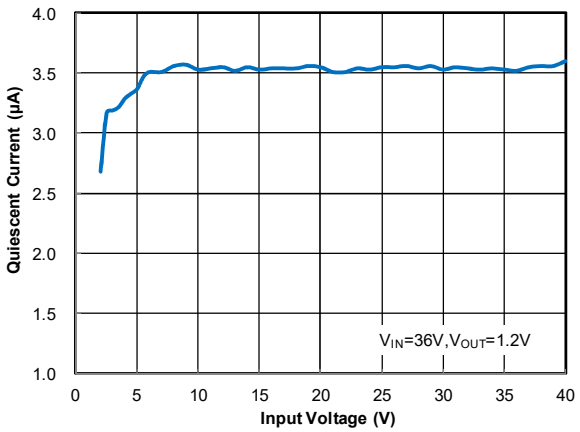
PSRR



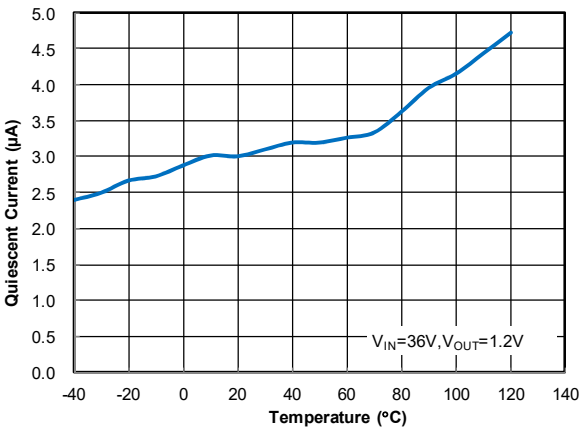
GND Current VS. Load Current



Quiescent Current vs. Input Voltage

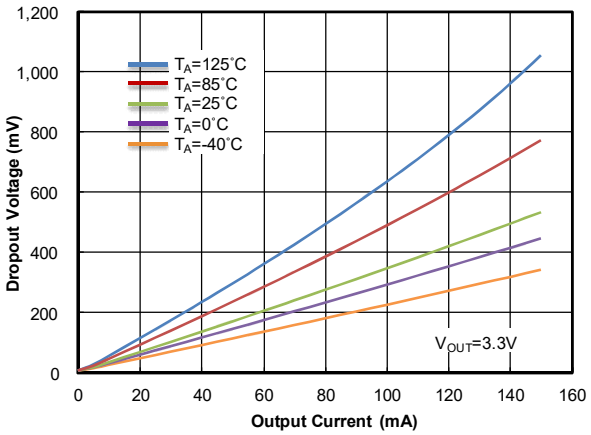


Quiescent Current vs. Temperature

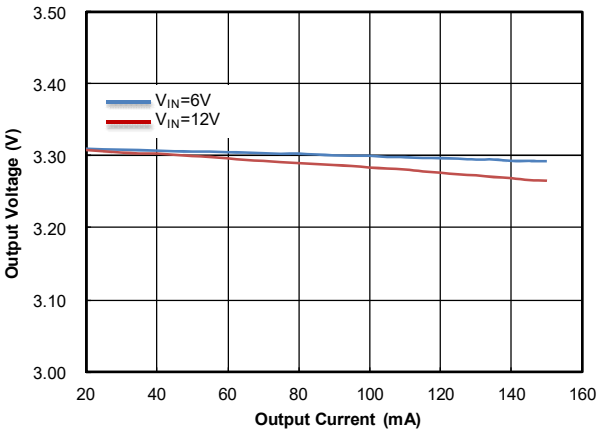


Typical Performance Characteristics

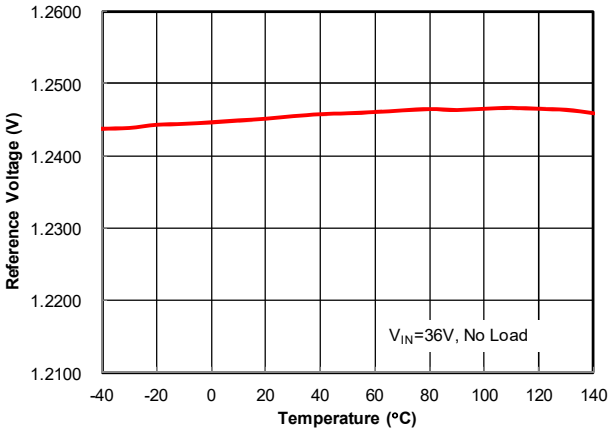
Dropout Voltage vs. Output Current



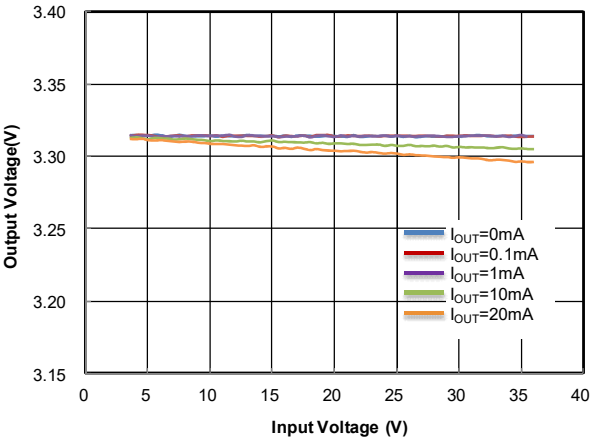
Output Voltage vs. Output Current



Reference Voltage vs. Temperature

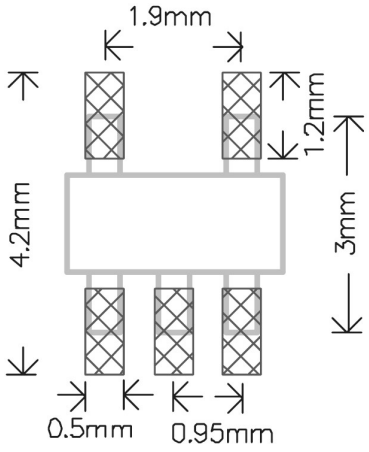


Output Voltage vs. Input Voltage



Minimum Footprint PCB Layout Section

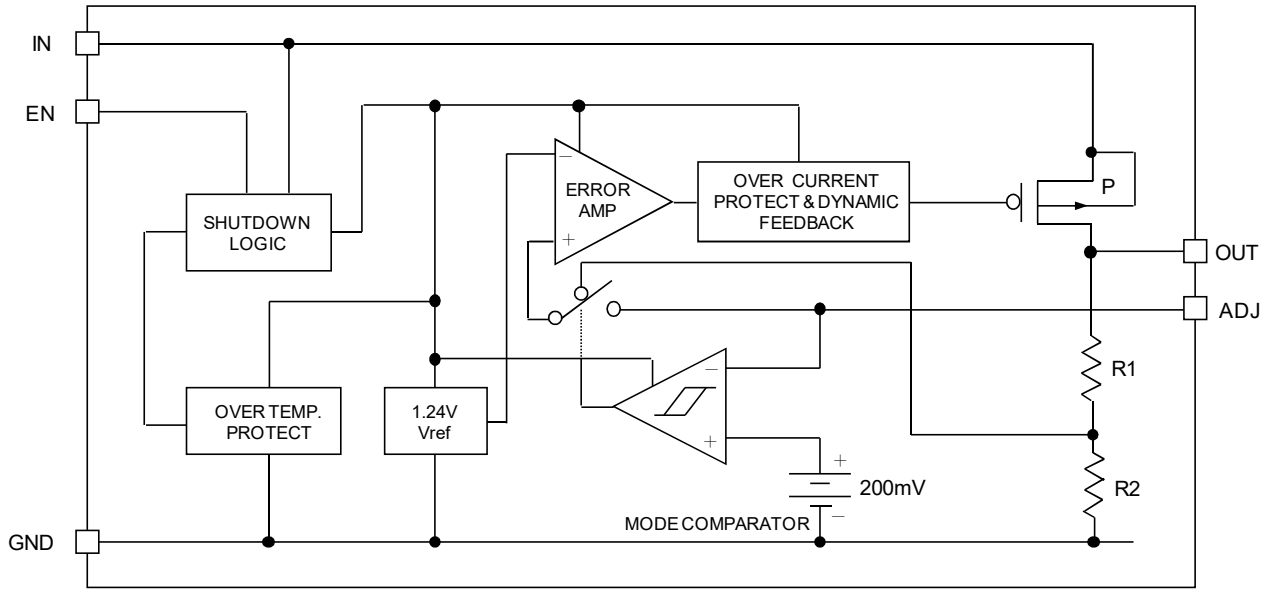
SOT-23-5



Pin Description

PIN		NAME	FUNCTION
T11	T12		
1	1	IN	Supply Input
2	2	GND	Ground
3	4	EN	Enable: logic low = shutdown; logic high = enable
4	---	ADJ	In Adjustable Mode: Feedback input. Connect to resistive voltage-divider network. In Fixed Mode :Connect ADJ to GND
5	5	OUT	Regulator Output

Block Diagram



Description

Enable operation

The G2920 comes with an active-high enable pin that allows the regulator to be shutdown. The G2920 enters shutdown mode by driving the Enable input low, and turns on by pulling the Enable input high. The quiescent current is under 1μA in shutdown state.

Mode Select

The mode comparator compares the ADJ pin voltage with an internal 200mV reference. If the ADJ pin voltage is less than 200mV, the internal feedback voltage divider's central tap is connected to the non-inverting input of the error amplifier. The mode is in fixed mode. The LDO output would be the pre-set voltage 3.3V/5.0V.

When external voltage divider is used, the ADJ pin voltage will be larger than 200mV. The non-inverting input of the amplifier will be connected to the external voltage divider. That would select to the adjustable mode.

Input Capacitor

The input capacitor whose value is ≥ 1μF is required. The value may be increased if the source supply has high ripple. Low ESR, small ceramic capacitors are recommended.

The G2920 can operate up to 36V. The input capacitor must have capability to sustain high voltage used on the input.

Output Capacitor

The G2920 must require an output capacitor for stable operation. Lager valued and low ESR capacitors help to improve transient response. Ceramic capacitors have lower ESR and lower cost than Tantalum capacitors. X7R/X5R dielectric-type ceramic capacitors are recommended because of their temperature performance.

Feed forward Capacitor

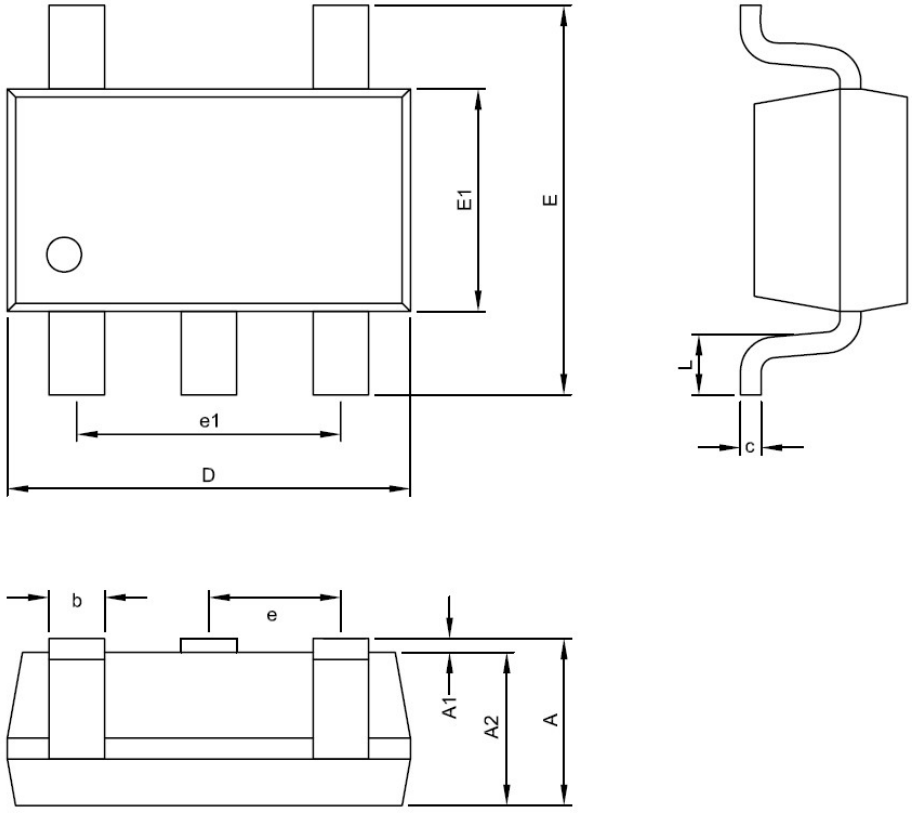
The feed forward capacitors is optional (see Typical Application Circuit in page 1), it can improve stability and decrease output noise. The G2920 can reduce overshoot curve during transient operation by adding a bypass capacitor.

External Resistors

The G2920 can be adjusted from 1.24V to (input voltage − 1)V in the adjustable mode. The output voltage is set by two external resistors by the following formula:

$$V_{OUT} = 1.24x(1+\frac{R1}{R2})$$

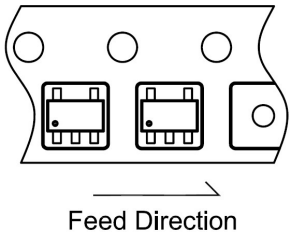
Package Information



SOT-23-5 Package

Symbol	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.95	1.10	1.45	0.037	0.043	0.057
A1	0.00	- - -	0.15	0.000	- - -	0.006
A2	0.90	1.10	1.30	0.035	0.043	0.051
D	2.70	2.90	3.10	0.106	0.114	0.122
E	2.60	2.80	3.00	0.102	0.110	0.118
E1	1.50	1.60	1.70	0.059	0.063	0.067
c	0.08	0.15	0.25	0.003	0.006	0.010
b	0.30	0.40	0.50	0.012	0.016	0.020
e	0.95 BSC			0.037 BSC		
e1	1.90 BSC			0.075 BSC		
L	0.30	0.45	0.60	0.012	0.018	0.024

Taping Specification



PACKAGE	Q'TY/BY REEL
SOT-23-5	3,000 ea