



300mA CMOS LDO w/ ENABLE

GENERAL DESCRIPTION

The GP1103/GP1104 is a 300mA Low Dropout and Low Noise micro-power Voltage Regulator suitable for battery powered portable equipments.

The GP1103/GP1104 designed stable with output capacitance of 1uF to 10uF and as low as 100mΩ low ESR capacitors. The output remains stable even with 1uF ceramic output capacitor.

The GP1103/GP1104 built-in with internal low R_{DS(on)} PMOS as the pass transistor, which does not cause extra ground current in different load and high Dropout conditions. The shutdown mode of <0.1uA operation current makes the IC suitable for battery-powered devices. Built-in Thermal protection and Current Limit circuits.

The different fixed voltage outputs from 1.3V to 3.3V every 100mV increment is available.

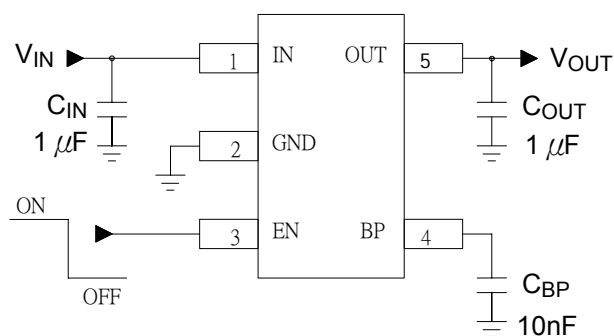
FEATURES

- Integrated 300mA high performance LDO
- Excellent transient response to large current steps
- Stable with Low ESR Output Capacitor
- Very Low Dropout Voltage of 200mV
- Low output Noise @ 10nF C_{BP}
- Wide input voltage capability:2.3V - 6.5V
- Output voltages range from 1.3V to 3.3V in 100mV increments
- Accuracy within 2%
- Low Operation Current - 70uA
- Chip Enable Function
- Low Temperature Coefficient
- Current limit and overheat protection
- Pb-free SOT23-5 / SOT23-6 / SOT23-3 Packages

APPLICATIONS

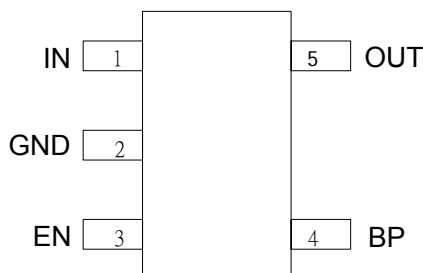
- Cellular Telephones
- Battery-powered Equipment
- MP3 / MP4 Players
- Hand-held Equipment
- Laptop, Notebook, and Palmtop Computers

TYPICAL APPLICATION CIRCUIT

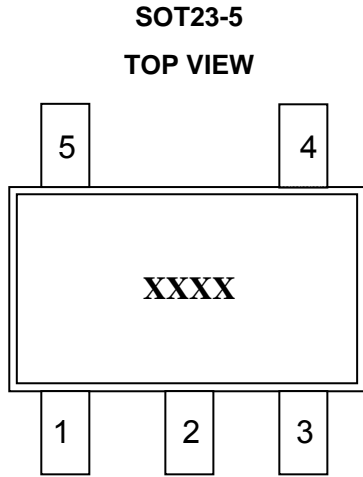


PACKAGE PIN OUT

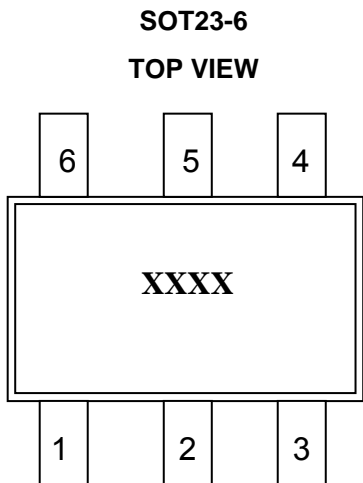
SOT23-5



Package and Pin Configurations

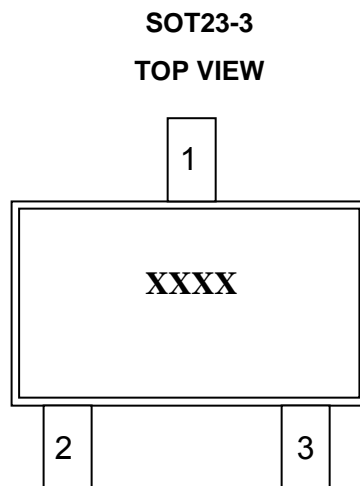


GP1103		
TYPE I	TYPE II	TYPE III
1. IN	1. EN	1. EN
2. GND	2. GND	2. GND
3. EN	3. IN	3. BP
4. BP	4. OUT	4. OUT
5. OUT	5. BP	5. IN



GP1103

1. OUT1
2. GND
3. BP
4. EN
5. IN
6. OUT2



GP1104

1. GND
2. IN
3. OUT

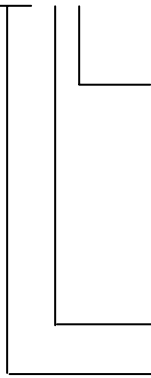
ORDER INFORMATION

GP1103-X X X X

300mA Output current

GP1104-X X X X

300mA Output current, without enable and bypass



Package type: A: SOT23-5 TYPE I
 B: SOT23-5 TYPE II
 C: SOT23-5 TYPE III
 D: SOT23-6
 F: SOT23-3

Operating temperature range: C: Commercial standard

Output voltage:13: 1.3V, 14: 1.4V, 15: 1.5V,....,28: 2.8V, 2A : 2.85V,....,33: 3.3V

MARKING INFORMATION

Part Number	Marking	Output Voltage	Package	Operating temperature
GP1103-13CA	A0ww	1.3V	SOT23-5 TYPEI	Commercial standard
GP1103-14CA	A1ww	1.4V	SOT23-5 TYPEI	Commercial standard
GP1103-15CA	A2ww	1.5V	SOT23-5 TYPEI	Commercial standard
GP1103-16CA	A3ww	1.6V	SOT23-5 TYPEI	Commercial standard
GP1103-17CA	A4ww	1.7V	SOT23-5 TYPEI	Commercial standard
GP1103-18CA	A5ww	1.8V	SOT23-5 TYPEI	Commercial standard
GP1103-19CA	A6ww	1.9V	SOT23-5 TYPEI	Commercial standard
GP1103-20CA	A7ww	2.0V	SOT23-5 TYPEI	Commercial standard
GP1103-21CA	A8ww	2.1V	SOT23-5 TYPEI	Commercial standard
GP1103-22CA	A9ww	2.2V	SOT23-5 TYPEI	Commercial standard
GP1103-23CA	AAww	2.3V	SOT23-5 TYPEI	Commercial standard
GP1103-24CA	ABww	2.4V	SOT23-5 TYPEI	Commercial standard
GP1103-25CA	ACww	2.5V	SOT23-5 TYPEI	Commercial standard
GP1103-26CA	ADww	2.6V	SOT23-5 TYPEI	Commercial standard
GP1103-27CA	AEww	2.7V	SOT23-5 TYPEI	Commercial standard
GP1103-28CA	AFww	2.8V	SOT23-5 TYPEI	Commercial standard
GP1103-2ACA	AGww	2.85V	SOT23-5 TYPEI	Commercial standard
GP1103-29CA	AHww	2.9V	SOT23-5 TYPEI	Commercial standard
GP1103-30CA	AJww	3.0V	SOT23-5 TYPEI	Commercial standard
GP1103-31CA	AKww	3.1V	SOT23-5 TYPEI	Commercial standard

GP1103/GP1104

GP1103-32CA	ALww	3.2V	SOT23-5 TYPEI	Commercial standard
GP1103-33CA	AMww	3.3V	SOT23-5 TYPEI	Commercial standard
GP1103-13CB	B0ww	1.3V	SOT23-5 TYPEII	Commercial standard
GP1103-14CB	B1ww	1.4V	SOT23-5 TYPEII	Commercial standard
GP1103-15CB	B2ww	1.5V	SOT23-5 TYPEII	Commercial standard
GP1103-16CB	B3ww	1.6V	SOT23-5 TYPEII	Commercial standard
GP1103-17CB	B4ww	1.7V	SOT23-5 TYPEII	Commercial standard
GP1103-18CB	B5ww	1.8V	SOT23-5 TYPEII	Commercial standard
GP1103-19CB	B6ww	1.9V	SOT23-5 TYPEII	Commercial standard
GP1103-20CB	B7ww	2.0V	SOT23-5 TYPEII	Commercial standard
GP1103-21CB	B8ww	2.1V	SOT23-5 TYPEII	Commercial standard
GP1103-22CB	B9ww	2.2V	SOT23-5 TYPEII	Commercial standard
GP1103-23CB	BAww	2.3V	SOT23-5 TYPEII	Commercial standard
GP1103-24CB	BBww	2.4V	SOT23-5 TYPEII	Commercial standard
GP1103-25CB	BCww	2.5V	SOT23-5 TYPEII	Commercial standard
GP1103-26CB	BDww	2.6V	SOT23-5 TYPEII	Commercial standard
GP1103-27CB	BEww	2.7V	SOT23-5 TYPEII	Commercial standard
GP1103-28CB	BFww	2.8V	SOT23-5 TYPEII	Commercial standard
GP1103-2ACB	BGww	2.85V	SOT23-5 TYPEII	Commercial standard
GP1103-29CB	BHww	2.9V	SOT23-5 TYPEII	Commercial standard
GP1103-30CB	BJww	3.0V	SOT23-5 TYPEII	Commercial standard
GP1103-31CB	BKww	3.1V	SOT23-5 TYPEII	Commercial standard
GP1103-32CB	BLww	3.2V	SOT23-5 TYPEII	Commercial standard
GP1103-33CB	BMww	3.3V	SOT23-5 TYPEII	Commercial standard
GP1103-13CC	C0ww	1.3V	SOT23-5 TYPEIII	Commercial standard
GP1103-14CC	C1ww	1.4V	SOT23-5 TYPEIII	Commercial standard
GP1103-15CC	C2ww	1.5V	SOT23-5 TYPEIII	Commercial standard
GP1103-16CC	C3ww	1.6V	SOT23-5 TYPEIII	Commercial standard
GP1103-17CC	C4ww	1.7V	SOT23-5 TYPEIII	Commercial standard
GP1103-18CC	C5ww	1.8V	SOT23-5 TYPEIII	Commercial standard
GP1103-19CC	C6ww	1.9V	SOT23-5 TYPEIII	Commercial standard
GP1103-20CC	C7ww	2.0V	SOT23-5 TYPEIII	Commercial standard
GP1103-21CC	C8ww	2.1V	SOT23-5 TYPEIII	Commercial standard
GP1103-22CC	C9ww	2.2V	SOT23-5 TYPEIII	Commercial standard
GP1103-23CC	CAww	2.3V	SOT23-5 TYPEIII	Commercial standard
GP1103-24CC	CBww	2.4V	SOT23-5 TYPEIII	Commercial standard
GP1103-25CC	CCww	2.5V	SOT23-5 TYPEIII	Commercial standard

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GP1103-26CC	CDww	2.6V	SOT23-5 TYPEIII	Commercial standard
GP1103-27CC	CEww	2.7V	SOT23-5 TYPEIII	Commercial standard
GP1103-28CC	CFww	2.8V	SOT23-5 TYPEIII	Commercial standard
GP1103-2ACC	CGww	2.85V	SOT23-5 TYPEIII	Commercial standard
GP1103-29CC	CHww	2.9V	SOT23-5 TYPEIII	Commercial standard
GP1103-30CC	CJww	3.0V	SOT23-5 TYPEIII	Commercial standard
GP1103-31CC	CKww	3.1V	SOT23-5 TYPEIII	Commercial standard
GP1103-32CC	CLww	3.2V	SOT23-5 TYPEIII	Commercial standard
GP1103-33CC	CMww	3.3V	SOT23-5 TYPEIII	Commercial standard
GP1103-13CD	D0ww	1.3V	SOT23-6	Commercial standard
GP1103-14CD	D1ww	1.4V	SOT23-6	Commercial standard
GP1103-15CD	D2ww	1.5V	SOT23-6	Commercial standard
GP1103-16CD	D3ww	1.6V	SOT23-6	Commercial standard
GP1103-17CD	D4ww	1.7V	SOT23-6	Commercial standard
GP1103-18CD	D5ww	1.8V	SOT23-6	Commercial standard
GP1103-19CD	D6ww	1.9V	SOT23-6	Commercial standard
GP1103-20CD	D7ww	2.0V	SOT23-6	Commercial standard
GP1103-21CD	D8ww	2.1V	SOT23-6	Commercial standard
GP1103-22CD	D9ww	2.2V	SOT23-6	Commercial standard
GP1103-23CD	DAww	2.3V	SOT23-6	Commercial standard
GP1103-24CD	DBww	2.4V	SOT23-6	Commercial standard
GP1103-25CD	DCww	2.5V	SOT23-6	Commercial standard
GP1103-26CD	DDww	2.6V	SOT23-6	Commercial standard
GP1103-27CD	DEww	2.7V	SOT23-6	Commercial standard
GP1103-28CD	DFww	2.8V	SOT23-6	Commercial standard
GP1103-2ACD	DGww	2.85V	SOT23-6	Commercial standard
GP1103-29CD	DHww	2.9V	SOT23-6	Commercial standard
GP1103-30CD	DJww	3.0V	SOT23-6	Commercial standard
GP1103-31CD	DKww	3.1V	SOT23-6	Commercial standard
GP1103-32CD	DLww	3.2V	SOT23-6	Commercial standard
GP1103-33CD	DMww	3.3V	SOT23-6	Commercial standard
GP1104-13CF	F0ww	1.3V	SOT23-3	Commercial standard
GP1104-14CF	F1ww	1.4V	SOT23-3	Commercial standard
GP1104-15CF	F2ww	1.5V	SOT23-3	Commercial standard
GP1104-16CF	F3ww	1.6V	SOT23-3	Commercial standard
GP1104-17CF	F4ww	1.7V	SOT23-3	Commercial standard
GP1104-18CF	F5ww	1.8V	SOT23-3	Commercial standard

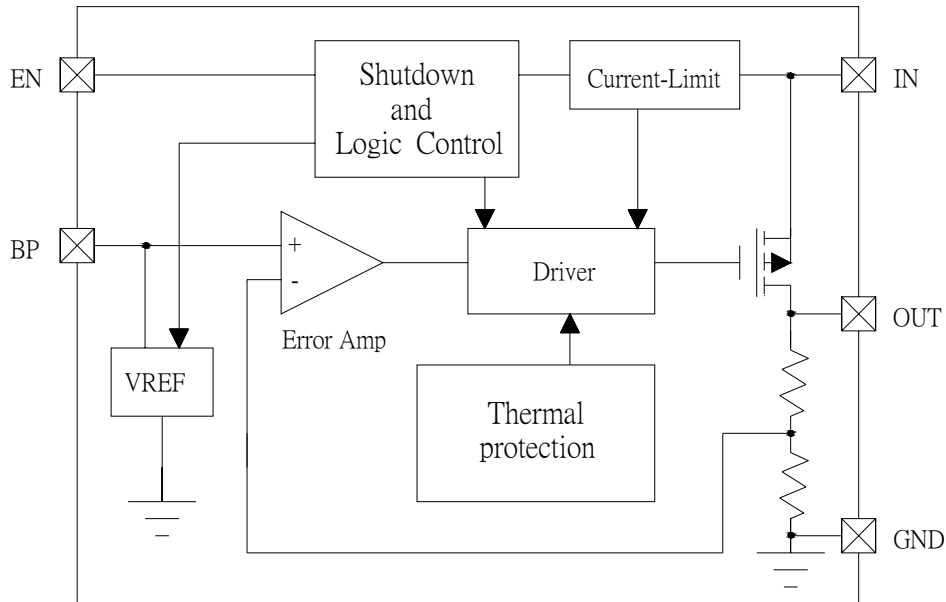
GP1103/GP1104

GP1104-19CF	F6ww	1.9V	SOT23-3	Commercial standard
GP1104-20CF	F7ww	2.0V	SOT23-3	Commercial standard
GP1104-21CF	F8ww	2.1V	SOT23-3	Commercial standard
GP1104-22CF	F9ww	2.2V	SOT23-3	Commercial standard
GP1104-23CF	FAww	2.3V	SOT23-3	Commercial standard
GP1104-24CF	FBww	2.4V	SOT23-3	Commercial standard
GP1104-25CF	FCww	2.5V	SOT23-3	Commercial standard
GP1104-26CF	FDww	2.6V	SOT23-3	Commercial standard
GP1104-27CF	FEww	2.7V	SOT23-3	Commercial standard
GP1104-28CF	FFww	2.8V	SOT23-3	Commercial standard
GP1104-2ACF	FGww	2.85V	SOT23-3	Commercial standard
GP1104-29CF	FHww	2.9V	SOT23-3	Commercial standard
GP1104-30CF	FJww	3.0V	SOT23-3	Commercial standard
GP1104-31CF	FKww	3.1V	SOT23-3	Commercial standard
GP1104-32CF	FLww	3.2V	SOT23-3	Commercial standard
GP1104-33CF	FMww	3.3V	SOT23-3	Commercial standard

ww: production date code

1. For other output voltages contact GPS marketing.
2. Order quantity
SOT23-3 order minimum 3,000 ea per Tape/Reel
SOT23-5 order minimum 3,000 ea per Tape/Reel
SOT23-6 order minimum 3,000 ea per Tape/Reel
3. GPS Pb-free plus anneal products employ with molding compounds, die attach material and and 100% matte tin plate termination finish which are Rohs compliant and compatible with both SnPb and Pb-free soldering operations.

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS (Note 1)	
Input Voltage	8V
Power Dissipation, P_D @ $T_A = 25^\circ\text{C}$	380mW
Operating Junction Temperature Range	-40°C to 125°C
Storage Temperature Range	-65°C to 150°C
SOT23-5, θ_{JA} , Package Thermal Resistance	$260^\circ\text{C}/\text{W}$
SOT23-6, θ_{JA} , Package Thermal Resistance	$260^\circ\text{C}/\text{W}$
Lead Temperature (Soldering, 5 sec.)	260°C
ESD Protection (Note 2)	>2000V

Note 1: Exceeding these ratings could cause damage to the device. All voltages are with respect to Ground.

Note 2: For testing purposes, ESD was applied using human body model.

Caution: these devices are sensitive to electrostatic discharge, follow proper integrated circuit handling procedures.

RECOMMENDED OPERATING CONDITIONS					
Parameter	Symbol	Recommended Operating			Units
		Min.	Typ.	Max.	
Input Voltage	V_{IN}	2.3		6.5	V
Input Capacitor (V_{IN} to GND)		1.0			μF
Output Capacitor with ESR of 10Ω max.,		1.0			μF
Ambient Temperature Range	T_A	- 40		85	$^\circ\text{C}$
Junction temperature	T_J	- 40		125	$^\circ\text{C}$

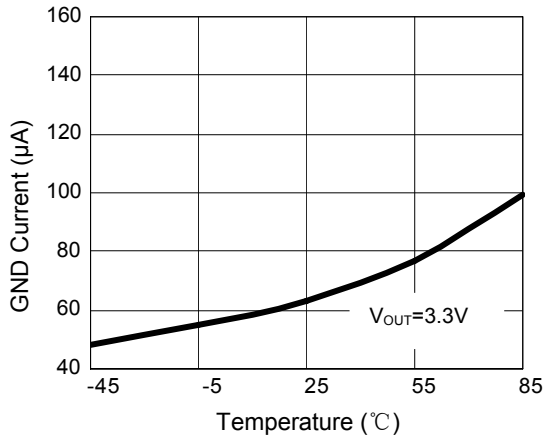
ELECTRICAL CHARACTERISTICS

Unless otherwise specified, $V_{IN} = 5V$, $C_{IN} = 1\mu F$, $C_{OUT} = 1\mu F$, $T_A = 25^\circ C$.							
Parameter	Symbol	Test Conditions	GP1103/GP1104			Units	
			Min	Typ	Max		
Output Voltage Accuracy	V_O	$I_O = 10mA$	-1.5		1.5	%	
		$I_O = 300mA$	-2.0		2.0		
Output Current	I_O		300			mA	
Line Regulation	ΔV_{OI}	$I_O = 10mA$ $V_{IN} = V_O + 1$ $V_O + 2$	$1.3V \leq V_O \leq 1.4V$	-0.2		0.2	%
			$1.4V < V_O \leq 2.0V$	-0.15		0.15	
			$2.0V < V_O < 4.0V$	-0.1	0.02	0.1	
			$4.0V \leq V_O$	-0.4	0.2	0.4	
Load Regulation	ΔV_{OL}	$I_O = 1mA$ to $300mA$	-1	0.2	1	%	
Dropout Voltage	ΔV	$I_O = 300mA$ $V_O = V_O$ (nom) -2.0%	$1.3V \leq V_O$ (nom) $\leq 2.0V$		500	700	mV
			$2.0V < V_O$ (nom) $\leq 2.8V$		250	350	
			$2.8V < V_O$ (nom)		200	280	
Quiescent Current	I_Q	$I_O = 0mA$		50	70	μA	
GND Pin Current	I_G	$I_O = 100mA$		50	70	μA	
		$I_O = 200mA$		60	70		
		$I_O = 300mA$		60	70		
Current Limit	I_{CL}	$R_{LOAD} = 1\Omega$	300			mA	
Over Temperature Shutdown	OTS			155		$^\circ C$	
Over Temperature Hysteresis	OTH			20		$^\circ C$	
EN Input Threshold	V_{EH}	$V_{IN} = 2.7V$ to $5.5V$	1.6			V	
	V_{EL}	$V_{IN} = 2.7V$ to $5.5V$			0.4		
EN Input Bias Current	I_{EH}				0.1	μA	
Shutdown Supply Current	I_{GSD}	$V_O = 0V$, $V_{EN} < V_{EL}$		0.01	0.1	μA	
Output Voltage Noise (Note a)	eNO	$C_{BP} = 10nF$, $C_{OUT} = 10\mu F$		300		nV/\sqrt{Hz}	
Power Supply Rejection Ratio (Note a)	PSRR	$F = 100Hz$, $C_{BP} = 10nF$, $C_{OUT} = 10\mu F$		69		dB	

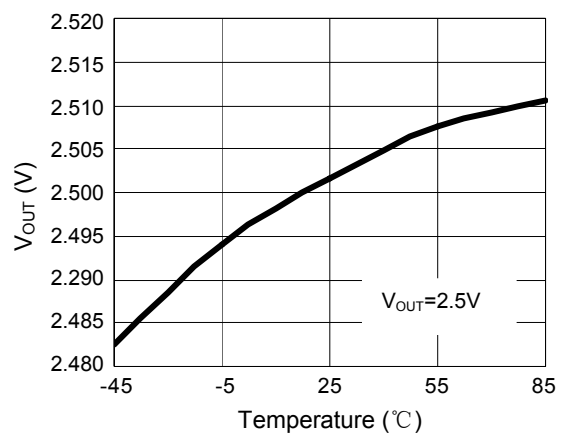
Note a: These parameters, although guaranteed, are not tested in production.

CHARACTERIZATION CURVES

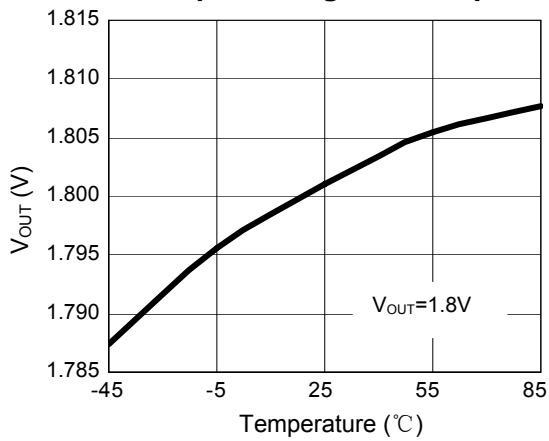
GND Current vs. Temp.



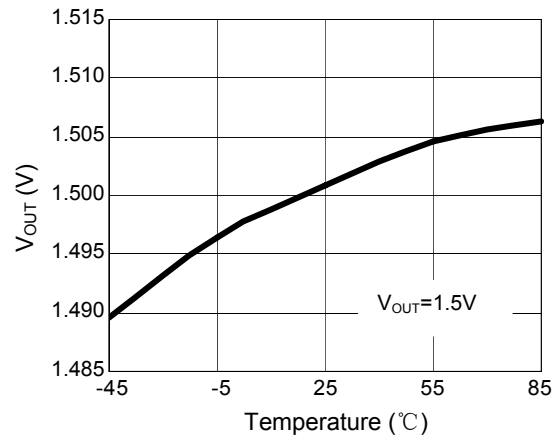
Output Voltage vs. Temp.



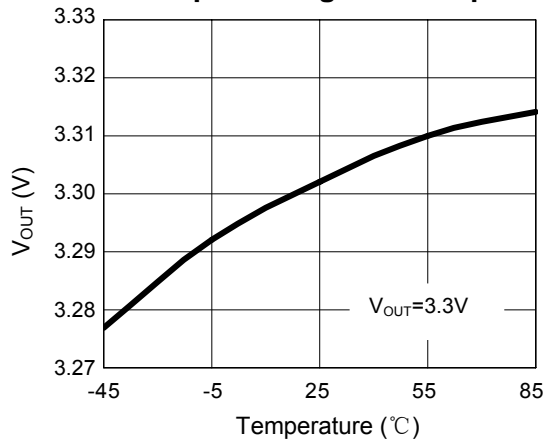
Output Voltage vs. Temp.



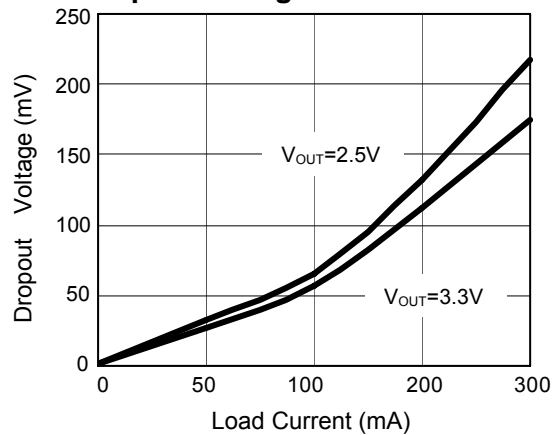
Output Voltage vs. Temp.

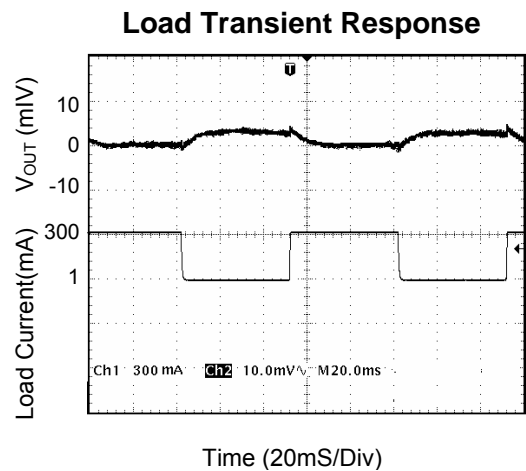
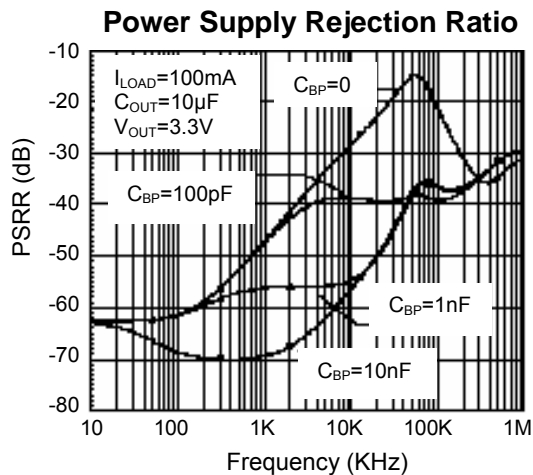
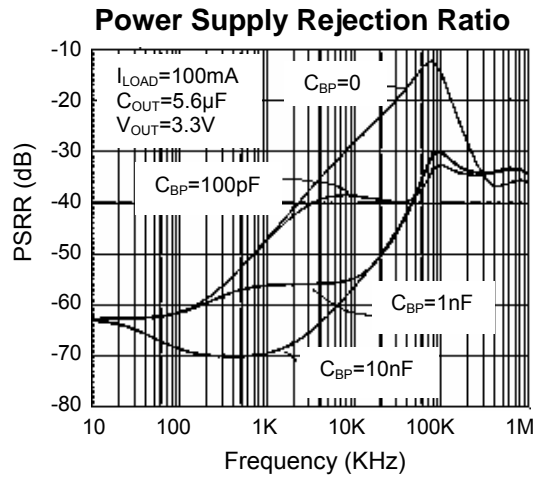
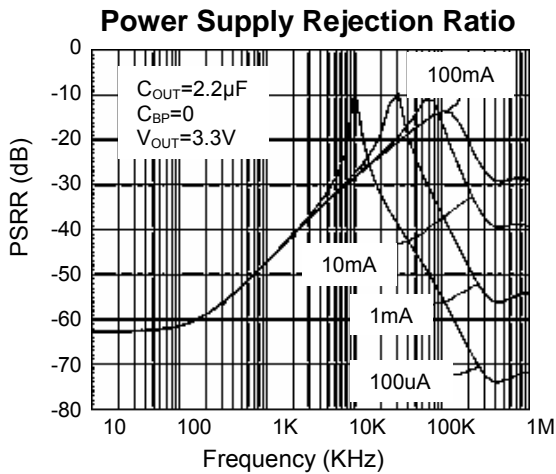
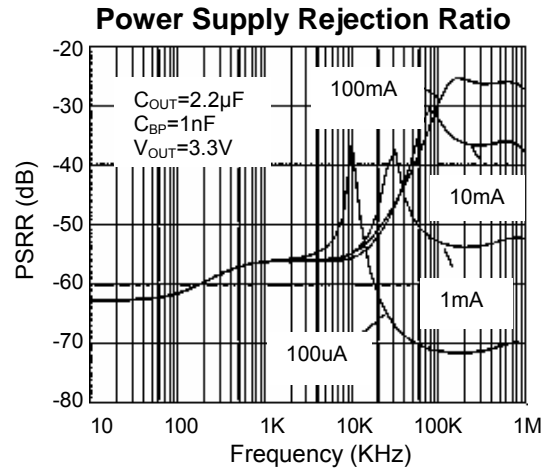
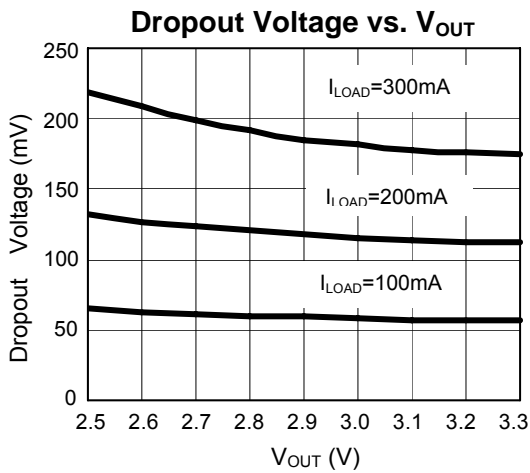


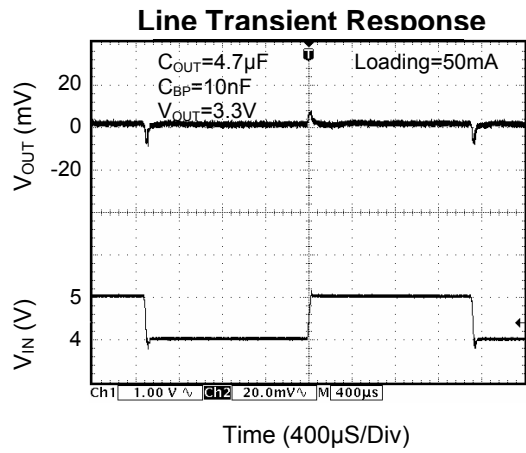
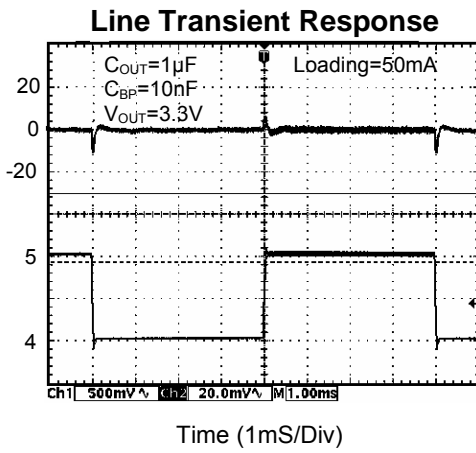
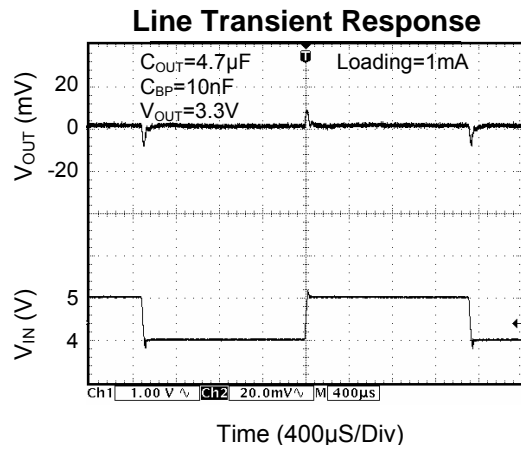
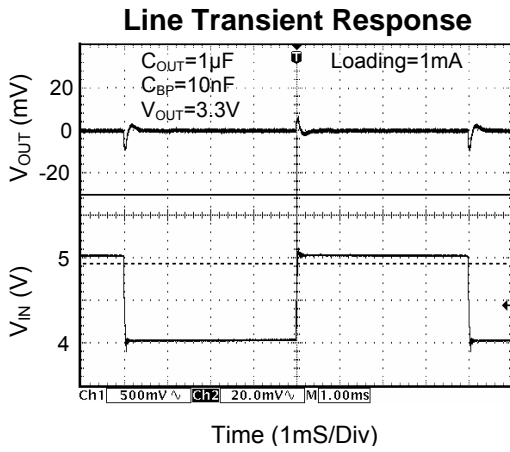
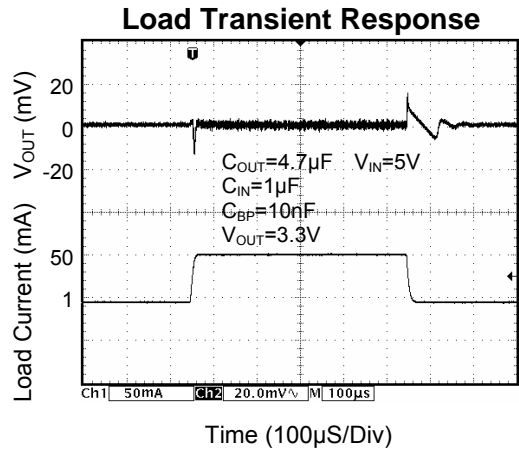
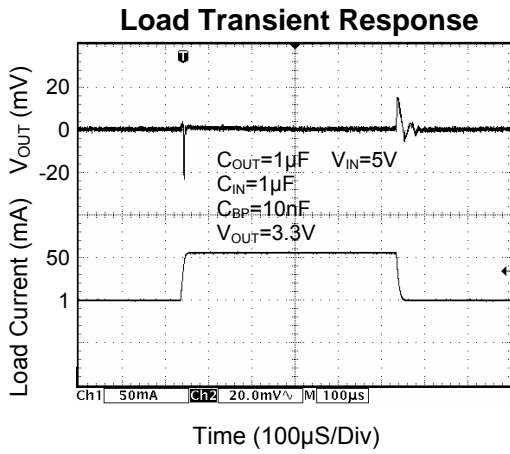
Output Voltage vs. Temp.

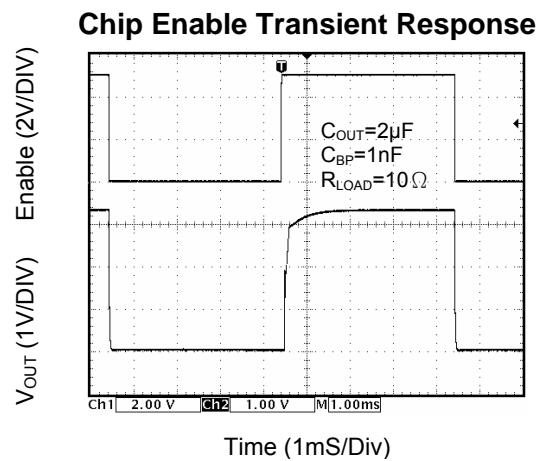
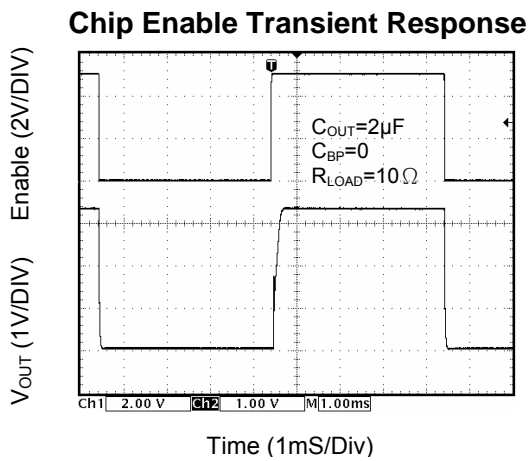


Dropout Voltage vs. Load Current









Note: For those of application concern the power on surge current, may increase the CBP to larger value will result “soft-start” to limit the current surge at power on.

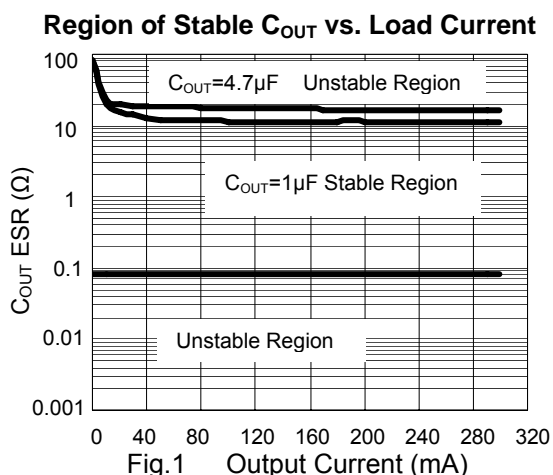
Detailed Description

The GP1103/GP1104 are 300mA CMOS LDO designed with a Low RDSON PMOS pass transistor, Bandgap voltage reference, Error amplifier, Current limit, and Thermal shutdown protection function. The P-channel pass transistor receives control signal from the Error amplifier, Current limit, and Thermal shutdown circuits. During normal operation, the Error amplifier compares the output voltage to an internal trimmed precision Bandgap reference to regulate and output a preset voltage.

External Capacitor Selection

The GP1103/GP1104 is stable with an output capacitor to ground of 1 μ F or greater and > 100m ohm ESR. Ceramic or tantalum capacitors can be used. The capacitor with larger value and lower ESR provides better PSRR and line-transient response.

Fig.1 shows the curves of allowable ESR range. Ceramic capacitors have the lowest ESR, and will offer the best AC performance. Aluminum Electrolytic capacitors present the highest ESR and resulting in the poorest AC response.



A 1nF~10nF capacitor can be connected between the BYPASS pin and GND pin for lower output voltage noise. This capacitor can be a low cost Polyester Film variety. A larger capacitor improves the AC ripple rejection, but also makes the output voltage raise up slowly. This "Soft" turn-on is desirable in some applications to limit turn-on surges in some applications. In addition to the >1 μ F capacitor connect to Vin,

recommend to add a >0.1 μ F capacitor between Vin to Ground to stabilize Vin.

Enable

The GP1103/GP1104 enter shutdown mode by pulling the EN pin lower than 0.4V, and turn on the chip by driving the EN input to higher than 1.6V.

If this feature is not used the EN input should tie to the Vin to turn on the regulator all the time.

Thermal Protection

A thermal-shutdown protection circuit (over-temperature protection circuit) is built in to prevent the IC from thermal breakdown when using the IC over the thermal dissipation allowed to the package. In case of the IC is left running over the allowable power dissipation, the junction temperature rises, and the thermal-shutdown circuit activate when the junction temperature over 155 $^{\circ}$ C (typ.) (the shutdown logic turning off the pass transistor). When the junction temperature drops to below 135 $^{\circ}$ C (typ.), the IC start operating again.

Current Limit

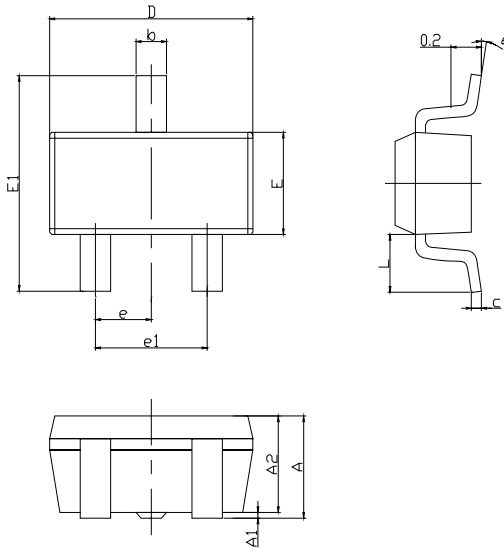
GP1103/GP1104 built in with Current Limit protection circuit, which monitors and controls the gate of the pass transistor and limiting the output current to 300mA (Min.).

Dropout Voltage

Current flow through regulator's pass PMOS transistor cause Input-Output voltage drop, it determines the lowest usable supply voltage. The GP1103/GP1104 PMOS pass switch low RDSON only present 200mV dropout voltage at 300mA I_{LOAD}, it further extend the battery useful end-of-life voltage.

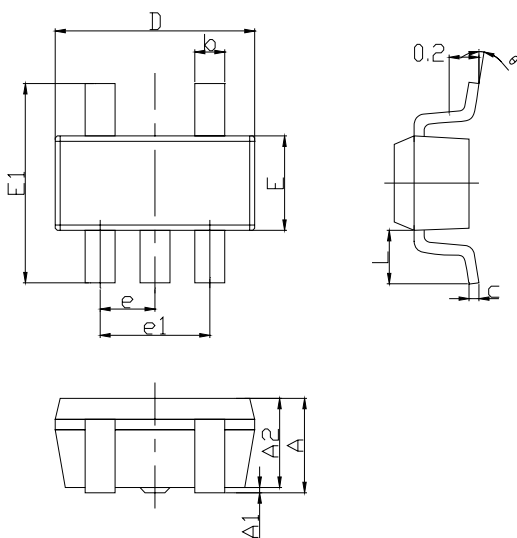
Package Information

SOT23-3 DIMENSION



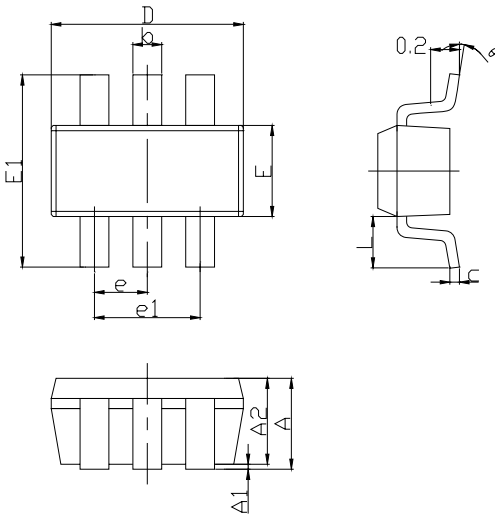
Symbol	Dimensions in millimeters		Dimensions in	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.499	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

SOT23-5 DIMENSION



Symbol	Dimensions in millimeters		Dimensions in inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

SOT23-6 DIMENSION



Symbol	Dimensions in millimeters		Dimensions in inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.499	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

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