

NG1001 Series
Low Dropout Regulator



Description

Small. The NG1001 Series Can Deliver 150mA Output Current And Allow An Input Voltage As High As 60V. The Series Are Very Suitable For The Battery-Powered Equipments, Such As Rf Applications And Other Systems Requiring a Quiet Voltage Source.

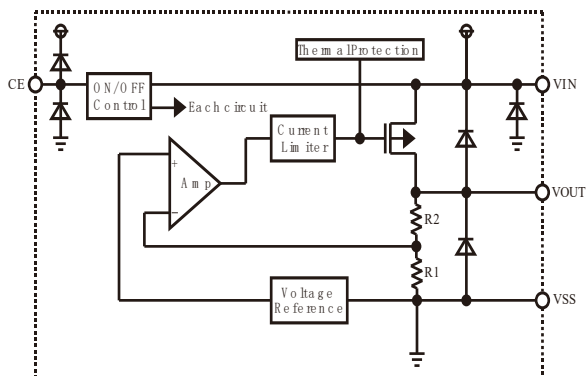
Features

- Low Quiescent Current: 3 μ A
- Operating Voltage Range: 2.5V ~ 60V
- Output Current: 150mA
- Low Dropout Voltage: 500mV @ 50mA (VOUT = 3.3V)
- Output Voltage: 1.2V ~ 12.0V
- High Accuracy: $\pm 2\%$ / $\pm 1\%$ (Typ.)
- High Power Supply Rejection Ratio: 80dB @ 1kHz
- Low Output Noise: 27xVOUT μ VRMS(10Hz ~ 100kHz)
- Excellent Line and Load Transient Response
- Over Current Protection(OCP)
- Over Temperature Protection(OTP)
- Short Circuit Protection(SCP)

Application

- Various Types Of Power Equipment
- Communication Equipment
- Application Of Microcontrollers
- Household Appliances

Block Diagram



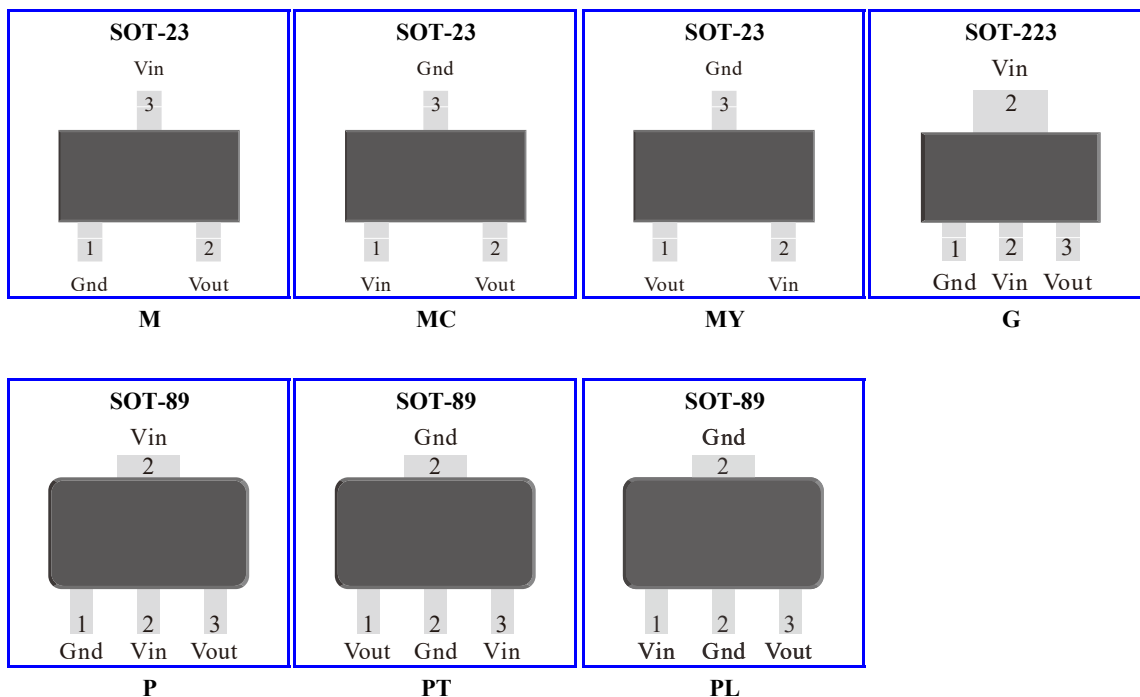
Order Information

NG1001①②③④⑤⑥⑦

Designator	Description	Symbol	Value
①	Standard	A	
	With Shutdown Function	B	
②③④	Output Voltage	Integer	120=12.0V 50=5.0V 33=3.3V
⑤⑥	Package	M/MC/MY P/PT/PL G	SOT-23 SOT-89 SOT-223
⑦	Accuracy	- 1	2% 1%

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Function	SOT-23	SOT-23	SOT-23	Pin Name
	M	MC	MY	
Ground	1	3	3	Gnd
Output	2	2	1	Vout
Power input	3	1	2	Vin

Function	SOT-233	Pin Name
	G	
Ground	1	Gnd
Output	3	Vout
Power input	2	Vin

Function	SOT-89	SOT-89	SOT-89	Pin Name
	P	PT	PL	
Ground	1	2	2	Gnd
Output	3	1	3	Vout
Power input	2	3	1	Vin

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Absolute Maximum Ratings(Operating temperature range applies unless otherwise specified)

Parameter	Test Condition	Symbol	Ratings	Unit
Input Voltage		V_{IN}	-0.3 ~ 65	V
Output Voltage		V_{OUT}	-0.3 ~ 15	V
CE Pin Voltage		V_{CE}	-0.3 ~ $V_{IN}+0.3$	V
Output Current		I_{OUT}	400	mA
Power Dissipation	SOT-23	P_D	400	mW
	SOT-233		600	
	SOT-89		800	
Electrostatic Discharge Capability	Human Body Mode (HBM)	E_{SD}	2	kV
	Machine Model (MM)		200	V

Electrical Characteristics (Ta=25°C Unless Otherwise Noted, $C_{IN}=1\mu F$, $V_{CE}=V_{IN}=V_{OUTNOM}+2V$, $C_{OUT}=10\mu F$)

Characteristic	Test Condition	Symbol	Min.	Typ.	Max.	Unit
Input Voltage		V_{IN}	2.5	-	60	V
Output Voltage		V_{OUT}	1.2	-	12.0	V
DC Output Accuracy	$I_{OUT}=1mA$		-2	-	2	%
			-1	-	1	
Dropout Voltage	$I_{OUT}=50mA, V_{OUT}=3.3V$	V_{DROP}	-	500	-	mV
Supply Current	$I_{OUT}=0mA$	I_{SS}	$V_{OUT} \leq 5V$	3.0	6.0	uA
			$V_{OUT} > 5V$	5.0	10.0	
Standby Current	$CE=V_{SS}$	I_{STBY}	-	0.1	0.5	uA
Load Regulation	$V_{IN}=V_{OUT}+1V, 1mA \leq I_{OUT} \leq 100mA$	ΔV_{OUT}	-	10.0	-	mV
Line Regulation	$I_{OUT}=10mA$, $V_{OUT}+1V \leq V_{IN} \leq 18V$	$\frac{\Delta V_{OUT}}{V_{OUT} * \Delta V_{IN}}$	-	0.01	0.3	%/V
Temperature Coefficient	$I_{OUT}=10mA$, $-40^\circ C < T_A < 125^\circ C$	$\frac{\Delta V_{OUT}}{V_{OUT} * \Delta T_A}$	-	50	-	ppm/°C
Current Limit Value	$V_{IN}=5V, V_{OUT}=0.5V * V_{OUT}$	I_{LIMIT}	150	250	-	mA
Short-Circuit Current	$V_{OUT}=V_{SS}$	I_{SHORT}	-	20	-	mA
Power Supply Rejection Ratio	$I_{OUT}=50mA$	P_{SRR}	100Hz	75	-	dB
			1KHz	80	-	
			10KHz	60	-	
			100KHz	45	-	
Output Noise Voltage	$BW = 10Hz \text{ to } 100kHz$	V_{ON}	-	$27 * V_{OUT}$	-	uV _{RMS}
Thermal Shutdown Temperature		T_{SD}	-	170	-	°C
Thermal Shutdown Hysteresis		ΔT_{SD}	-	20	-	°C
CE "High" Voltage		$V_{CE} "H"$	1.5	20	V_{IN}	V
CE "Low" Voltage		$V_{CE} "L"$	-	-	0.3	V

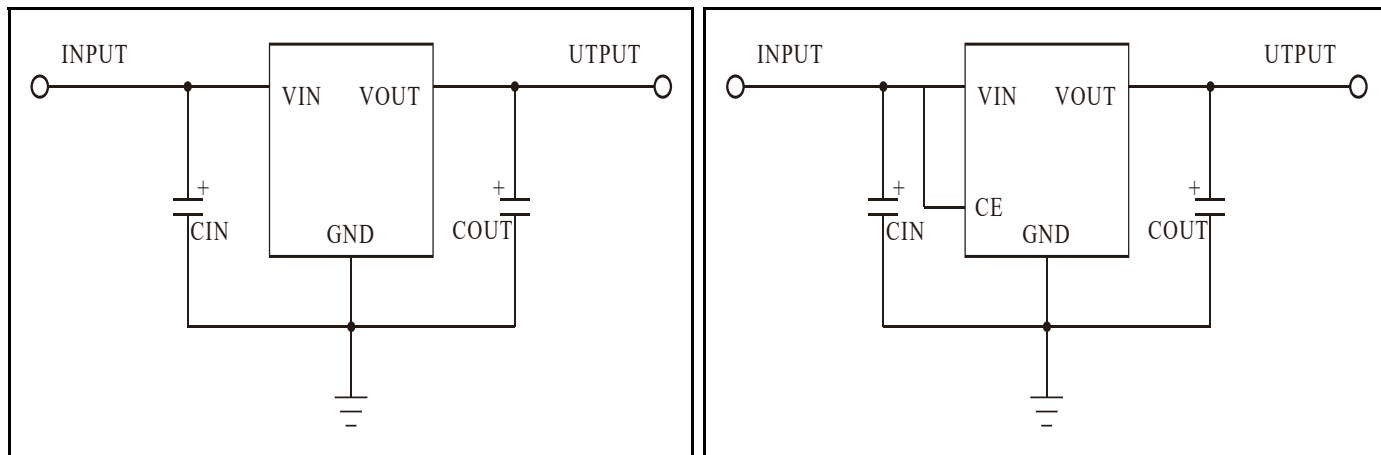
Thermal Characteristics

Parameter	Test Condition	Symbol	Ratings	Unit
Operating Junction Temperature		T_J	-40 to 150	°C
Storage temperature range		T_{STG}	-55 to 150	

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Typical Application Circuit



External Components List

Symbol	Description
CIN	1.0 μ F or more
COUT	1.0 μ F or more, 10 μ F is recommended

External Components List

Selection of Input/ Output Capacitors

Phase compensation is provided to secure operation even when the load current is varied. For this purpose, use a 1.0 μ F or more output capacitor (COUT) with good frequency characteristics and proper ESR (Equivalent Series Resistance). Connect a 1.0 μ F or more input capacitor (CIN) between the VIN pin and the VSS pin as close as possible to the pins. The value of the output overshoot or undershoot transient response varies depending on the value of the output capacitor. When selecting the output capacitor, perform sufficient evaluation, including evaluation of temperature characteristics, on the actual device.

In the design of portable devices the ceramic capacitors are often chosen because of their small size, low equivalent series resistance (ESR) and high RMS current capability. Also, designers have been looking to ceramic capacitors due to shortages of tantalum capacitors.

Unfortunately, using ceramic capacitors for input filtering can cause problems. Applying a voltage step to a ceramic capacitor causes a large current surge that stores energy in the inductances of the power leads. A large voltage spike is created when the stored energy is transferred from these inductances into the ceramic capacitor. These voltage spikes can easily be twice the amplitude of the input voltage step.

Many types of capacitors can be used for input by passing, however, caution must be exercised when using multilayer ceramic capacitors (MLCC). Because of the self-resonant and high Q characteristics of some types of ceramic capacitors, high voltage transients can be generated under some start-up conditions, such as connecting the LDO input to a live power source. Adding a 3 Ω resistor in series with an X5R ceramic capacitor will minimize start-up voltage transients.

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Typical Characteristics Curves

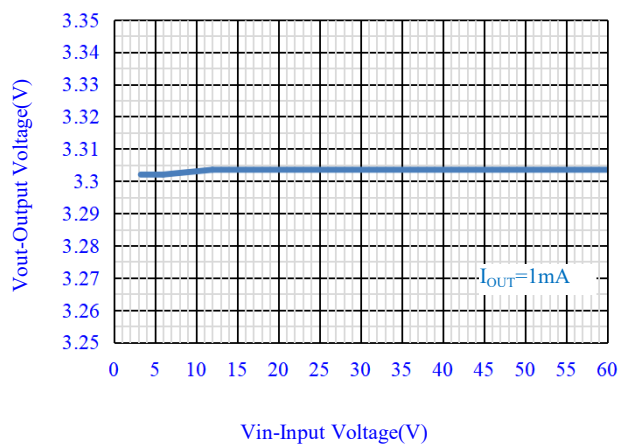


Fig.1-Output Voltage Vs Input Voltage

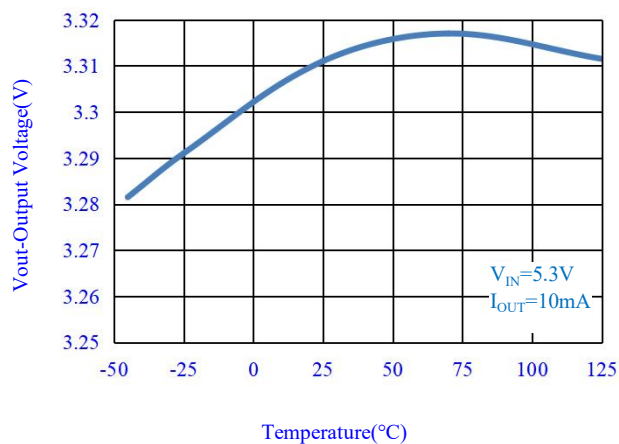


Fig.2-Output Voltage VS Temperature

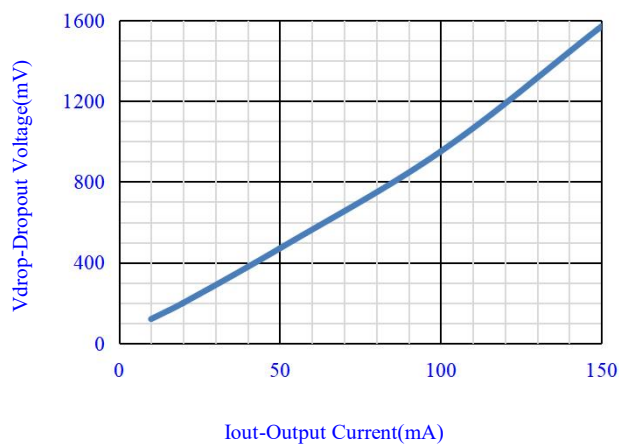


Fig.3-Dropout Voltage VS Output Current

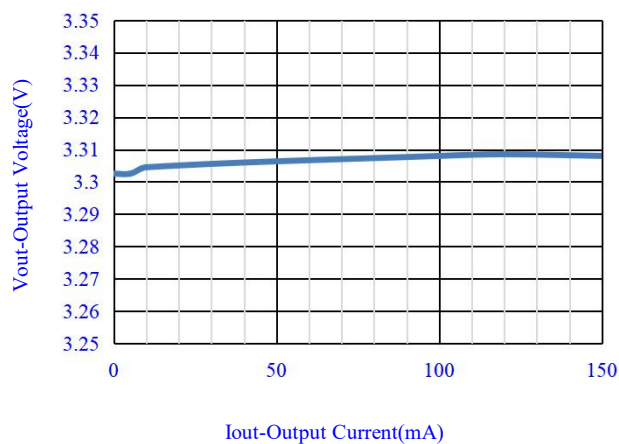


Fig.4-Output Voltage Vs Output Current

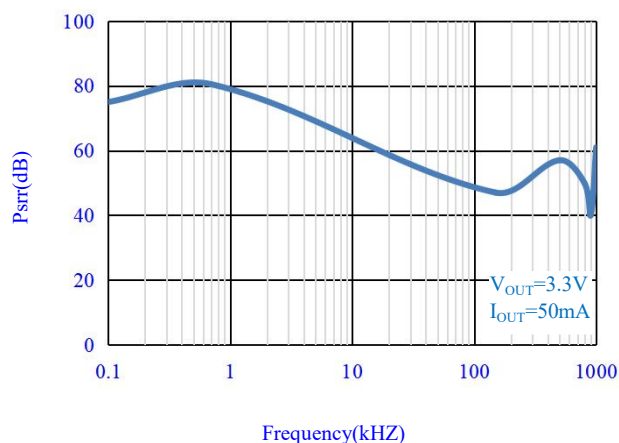


Fig.5-Psrr VS Frequency

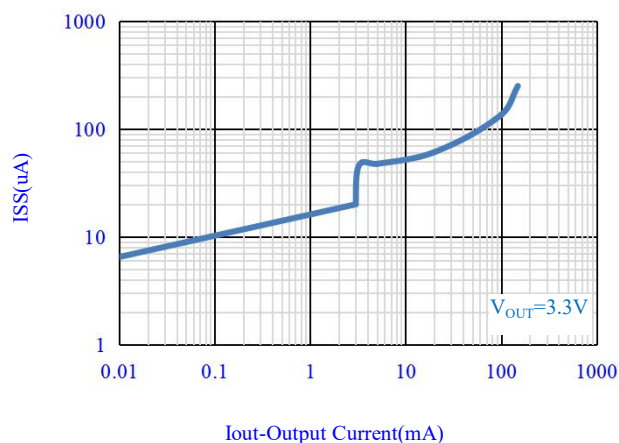
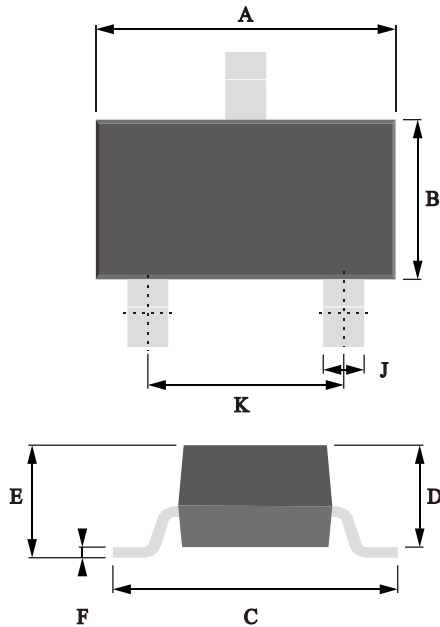


Fig.6-Iss VS Output Current

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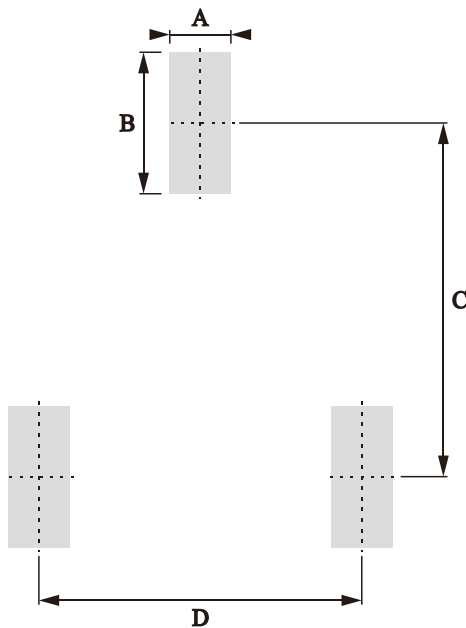
OUTLINE DRAWINGS



SOT-23

OUTLINE DIMENSIONS						
Dim.	Milimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.80	-	3.20	0.1102	-	0.1260
B	1.15	-	1.45	0.0453	-	0.0571
C	2.25	-	2.65	0.0886	-	0.1043
D	0.85	-	1.15	0.0335	-	0.0453
E	0.90	-	1.20	0.0354	-	0.0472
F	0.08	-	0.18	0.0031	-	0.0071
J	0.30	-	0.50	0.0118	-	0.0197
K	1.70	-	2.10	0.0669	-	0.0827

COMPONENT PITCH DIMENSION DIAGRAM



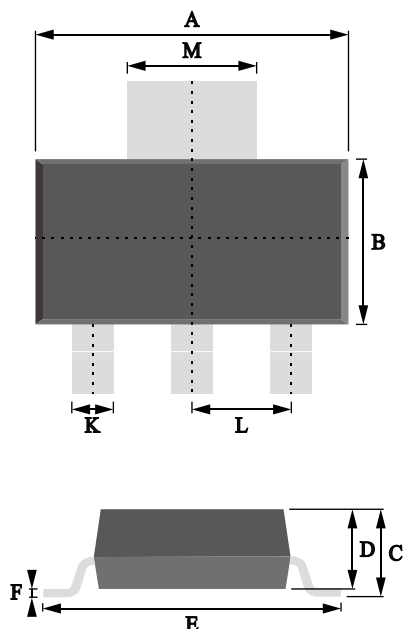
SOT-23

OUTLINE DIMENSIONS						
Dim.	Milimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	-	0.60	-	-	0.0000	-
B	-	0.80	-	-	0.0315	-
C	-	2.00	-	-	0.0787	-
D	-	1.90	-	-	0.0748	-

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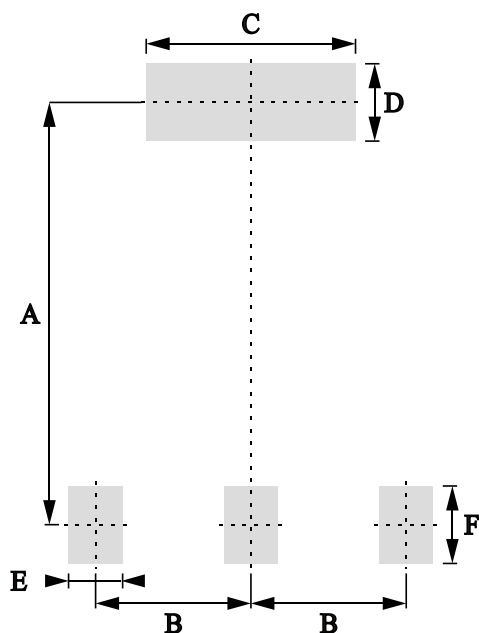
OUTLINE DRAWINGS



SOT-223

OUTLINE DIMENSIONS						
Dim.	Milimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	6.05	-	6.60	0.2382	-	0.2598
B	3.30	-	3.70	0.1299	-	0.1457
C	1.45	-	1.85	0.0571	-	0.0728
D	1.40	-	1.80	0.0551	-	0.0709
E	6.70	-	7.20	0.2638	-	0.2835
F	0.20	-	0.40	0.0079	-	0.0157
K	0.55	-	0.85	0.0217	-	0.0335
L	2.10	-	2.50	0.0827	-	0.0984
M	2.85	-	3.25	0.1122	-	0.1280

COMPONENT PITCH DIMENSION DIAGRAM



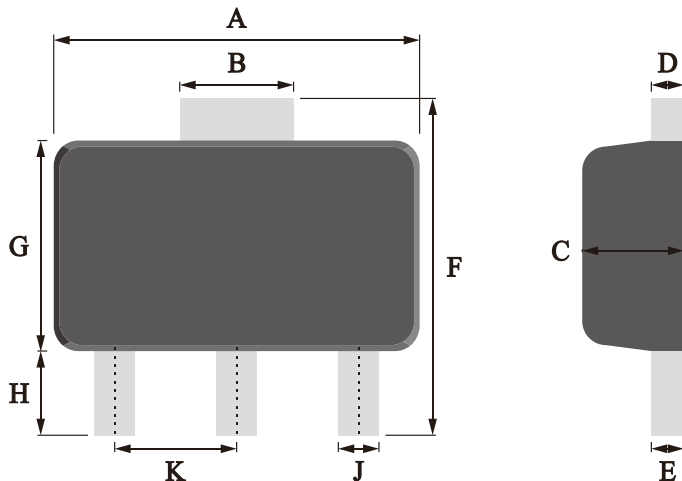
SOT-223

OUTLINE DIMENSIONS						
Dim.	Milimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	-	6.00	-	-	0.0000	-
B	-	2.30	-	-	0.0906	-
C	-	3.10	-	-	0.1220	-
D	-	1.10	-	-	0.0433	-
E	-	0.80	-	-	0.0315	-
F	-	1.10	-	-	0.0433	-

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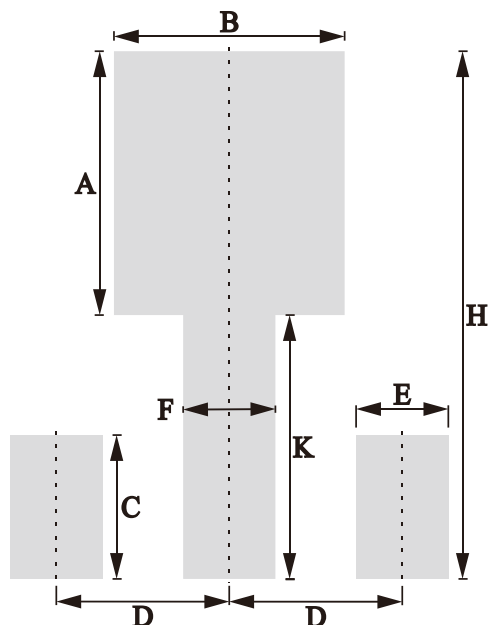
OUTLINE DRAWINGS



SOT-89

OUTLINE DIMENSIONS						
Dim.	Milimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.00	-	5.00	0.1575	-	0.1969
B	1.40	-	1.80	0.0551	-	0.0709
C	1.25	-	1.75	0.0492	-	0.0689
D	0.20	-	0.60	0.0079	-	0.0236
E	0.20	-	0.60	0.0079	-	0.0236
F	3.60	-	4.40	0.1417	-	0.1732
G	2.20	-	2.80	0.0866	-	0.1102
H	0.80	-	1.20	0.0315	-	0.0472
J	0.30	-	0.70	0.0118	-	0.0276
K	1.25	-	1.75	0.0492	-	0.0689

COMPONENT PITCH DIMENSION DIAGRAM



SOT-89

OUTLINE DIMENSIONS						
Dim.	Milimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	-	2.20	-	-	0.0866	-
B	-	2.00	-	-	0.0787	-
C	-	1.20	-	-	0.0472	-
D	-	1.50	-	-	0.0591	-
E	-	0.80	-	-	0.0315	-
F	-	0.80	-	-	0.0315	-
H	-	47.00	-	-	1.8504	-
K	-	2.20	-	-	0.0866	-

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PACKAGE TYPE :SOT-23 MARKING

MARKING INSTRUCTION



AFXYM=Make
AF=Product Number,Unchange
X=Output Voltage Code
YM=Date Code,According To Actual Changes

PACKAGE TYPE :SOT-223 MARKING

MARKING INSTRUCTION



AFXYM=Make
AF=Product Number,Unchange
X=Output Voltage Code
YM=Date Code,According To Actual Changes

PACKING INFORMATION

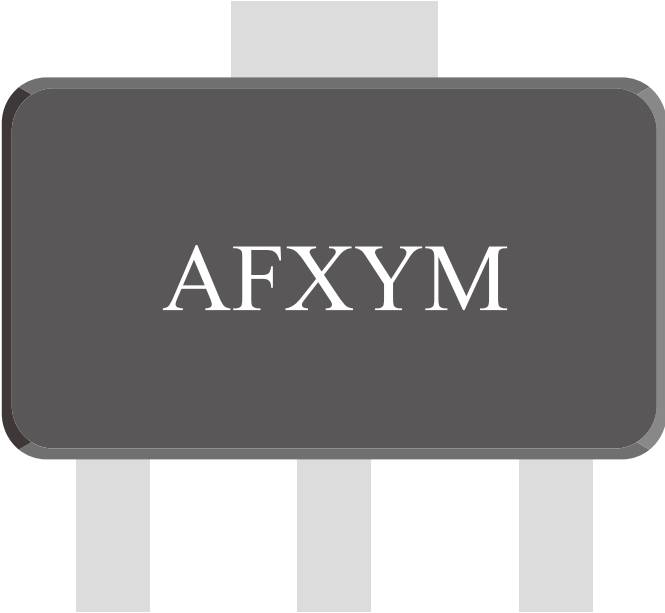
Package Type	Package Code	Product Weight Approx(g/Pcs)	Package Method	Quantity (Pcs/Min. Pack.)	Quantity (Pcs/Inner Box)	Quantity (Pcs/Carton)
SOT-23	P1	0.008	7" Reel	3000	45000	180000
SOT-223	P1	0.19	13" Reel	2500	5000	50000

NG1001 Series

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PACKAGE TYPE :SOT-89 MARKING



MARKING INSTRUCTION

AFXYM=Make
AF=Product Number,Unchange
X=Output Voltage
YM=Date Code,According To Actual Changes

PACKING INFORMATION

Package Type	Package Code	Product Weight Approx(g/Pcs)	Package Method	Quantity (Pcs/Min. Pack.)	Quantity (Pcs/Inner Box)	Quantity (Pcs/Carton)
SOT-89	P1	0.055	7" Reel	1000	10000	40000

NG1001 Series

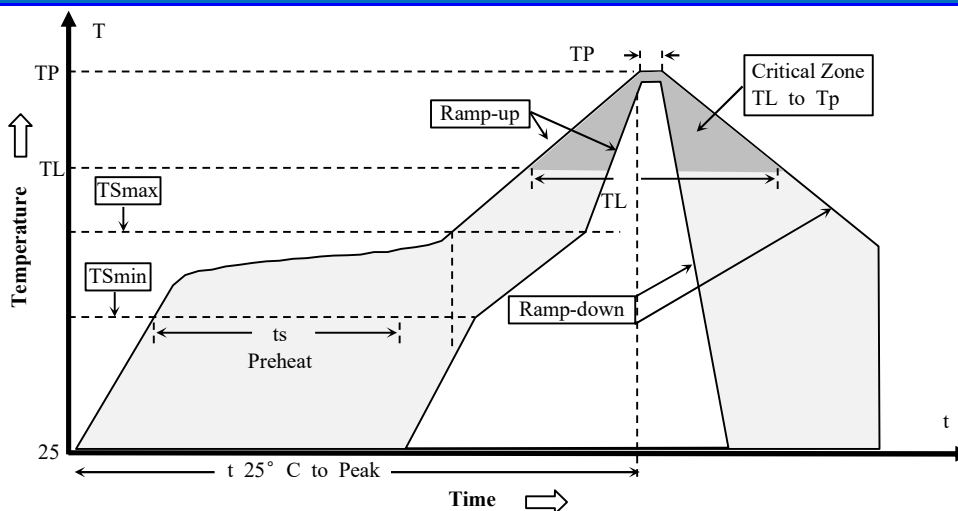
Low Dropout Regulator



Recommended wave soldering condition

Product	Peak Temperature	Soldering Time
Pb-free devices	260 +0/-5 °C	5 +1/-1 seconds

Recommended temperature profile for IR reflow



Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (T _{smax} to T _p)	3°C/second max.	3°C/second max.
Preheat -Temperature Min(TS min) -Temperature Max(TS max) -Time(ts min to ts max)	100°C 150°C 60-120 seconds	150°C 200°C 60-180 seconds
Time maintained above: -Temperature (TL) - Time (tL)	183°C 60-150 seconds	217°C 60-150 seconds
Peak Temperature(TP)	240 +0/-5 °C	260 +0/-5 °C
Time within 5°C of actual peak temperature(tp)	10-30 seconds	20-40 seconds
Ramp down rate	6°C/second max.	6°C/second max.
Time 25 °C to peak temperature	6 minutes max.	8 minutes max.

Note : All temperatures refer to topside of the package, measured on the package body surface.

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