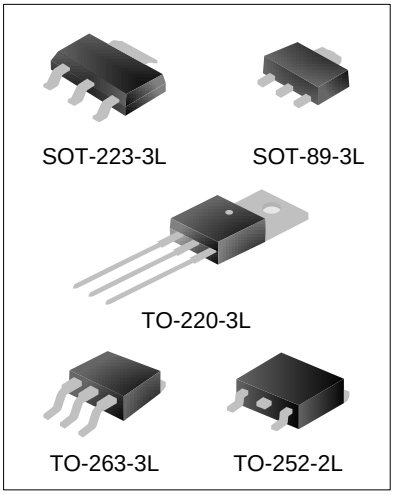
1A Low Dropout Voltage Regulator

General Description

The GGA1117 is a positive low voltage dropout regulator. The voltage dropout is only 1.2V at 1A.

GGA1117 has two versions: a fixed version and an adjustable version. VOUT has a tolerance of less than 1% for fixed versions 1.5V, 1.8V, 2.5V, 3.3V, 5.0V and adjustable version or 2% output accuracy for the 1.2V fixed version.

The GGA1117 integrates overheating protection and current limit circuits. It is an suitable for all electronic products.



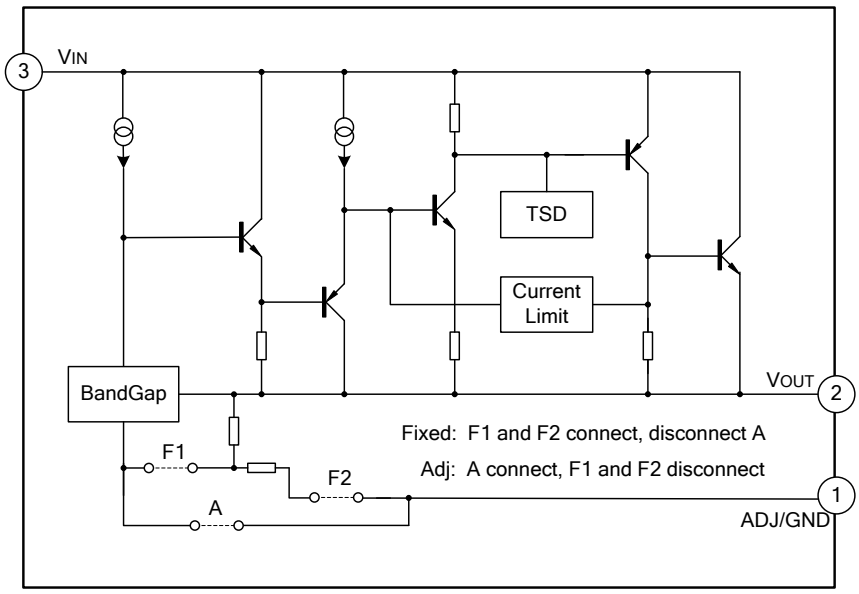
Features

- 1% accuracy for fixed output VOUT while the voltage is 1.5V, 1.8V, 2.5V, 3.3V, 5.0V and the adjustable output VOUT
- 2% output accuracy for fixed version 1.2V
- Low Dropout Voltage: 1.2V at 1A output current
- Current Limiting
- Thermal Shutdown
- Temperature Range: -40°C to 125°C

Applications

- Laptop, Palmtop, and Notebook Computers
- Battery Charger
- SCSI-II Active Terminator
- Cellular Phone
- Cordless Telephones
- Battery Powered Systems
- Portable Devices
- SMPS Post-Regulator

Block Diagram



Absolute Maximum Ratings (Operating Temperature Range Applies Unless Otherwise Specified)

Characteristics	Symbol	Ratings	Unit
Input Supply Voltage	V_{IN}	20	V
Lead Temperature (Soldering, 5 seconds)	T_{Lead}	260	°C
Operating Junction Temperature Range	T_J	150	°C
Storage Temperature Range	T_{STG}	-65 ~ +150	°C
Power Dissipation	P_D	Internally Limited (Note1)	mW
ESD Tolerance (Minimum)	ESD	2000	V

Note 1: The maximum allowable power dissipation is a function of maximum operating junction temperature T_J (max), the junction to ambient thermal resistance θ_{JA}, and the ambient temperature Tamb. The maximum allowable power dissipation at any ambient temperature is given: P_D (max) = (T_J (max) - Tamb)/θ_{JA}, exceeding the maximum allowable power limit will result in excessive die temperature; thus, the regulator will go into thermal shutdown. The junction to ambient thermal resistance θ_{JA} of different packages may be different, and the value of θ_{JA} depends on mounting technique.

Recommended Operating Conditions

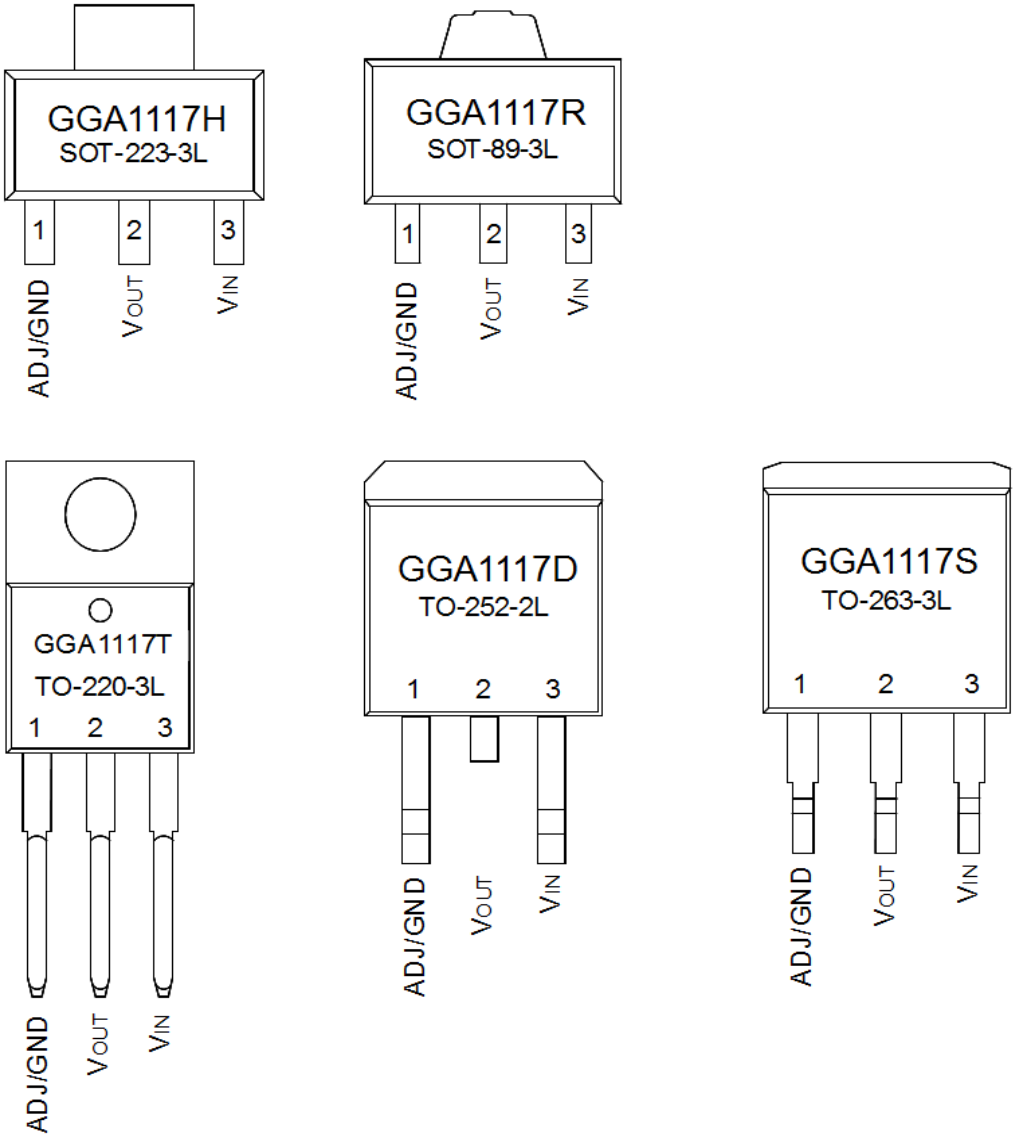
Characteristics	Symbol	Ratings	Unit
Input Voltage	V_{IN}	15	V
Operating Junction Temperature Range	T_J	-40 ~ +125	°C

Electrical Characteristics (T_{AMB}=25°C, Unless Otherwise Specified. Limits appearing in Boldface type apply over the entire junction temperature range for operation, -40°C to 125°C.)

Characteristics	Symbol	Conditions	Min.	Typ.	Max.	Unit
Reference Voltage	V_{REF}	GGA1117-ADJ, I_{OUT}=10mA, V_{IN}-V_{OUT}=2V, T_J=25°C, 10mA≤I_{OUT}≤1A, 1.4V≤V_{IN}-V_{OUT}≤10V	1.238 **1.225**	1.250 1.250	1.262 **1.270**	V
Output Voltage	VOUT	GGA1117-1.2, I_{OUT}=10mA, V_{IN}=3.2V, T_J=25°C, 10mA≤I_{OUT}≤1A, 3.0V≤V_{IN}≤10V	1.176 **1.152**	1.2 1.2	1.224 **1.248**	V
		GGA1117-1.5, I_{OUT}=10mA, V_{IN}=3.5V, T_J=25°C, 10mA≤I_{OUT}≤1A, 3.0V≤V_{IN}≤10V	1.485 **1.470**	1.500 1.500	1.515 **1.530**	V
		GGA1117-1.8, I_{OUT}=10mA, V_{IN}=3.8V, T_J=25°C, 0≤I_{OUT}≤1A, 3.2V≤V_{IN}≤10V	1.782 **1.764**	1.800 1.800	1.818 **1.836**	V
		GGA1117-2.5, I_{OUT}=10mA, V_{IN}=4.5V, T_J=25°C, 0≤I_{OUT}≤1A, 3.9V≤V_{IN} ≤10V	2.475 **2.450**	2.500 2.500	2.525 **2.550**	V
		GGA1117-3.3, I_{OUT}=10mA, V_{IN}=5V, T_J=25°C, 0≤I_{OUT}≤1A, 4.75V≤V_{IN}≤10V	3.267 **3.235**	3.300 3.300	3.333 **3.365**	V

Characteristics	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_{OUT}	GGA1117-5.0, I_{OUT}=10mA, V_{IN}=7V, T_J=25°C, 0≤ I_{OUT}≤1A, 6.5V≤V_{IN}≤12V	4.950 **4.900**	5.000 5.000	5.05 **5.10**	V
Output Voltage Temperature Stability	TS_{OUT}			0.3		%
Line Regulation	R_{line}	V_{INMIN} ≤V_{IN}≤ 12V,V_{OUT}=Fixed/Adj, I_{OUT}=10mA		3	7	mV
Load Regulation	R_{load}	10mA≤I_{OUT}≤ 1A,V_{OUT}=Fixed/Adj		6	**12**	mV
Dropout Voltage	V_{drop}	I_{OUT}=100mA I_{OUT}=500mA I_{OUT}=1A		1.00 1.05 1.10	**1.20** **1.25** **1.30**	V
Quiescent Current	I_q	4.25V≤V_{IN}≤ 6.5V		5	**10**	mA
Ripple Rejection	PSRR	f_{RIPPLE}=120Hz, (V_{IN}-V_{OUT})=3V, V_{RIPPLE}=1VPP	**60**	75		dB
Adjust pin Current	I_{adj}			60	120	μA
Adjust pin Current Change		0≤ I_{OUT}≤1A,1.4V ≤V_{IN}-V_{OUT}≤10V		0.2	5	μA
Thermal shutdown	TSD			150		°C
Current limiting	I_{limit}		1.2	1.4	1.5	A
Temperature Stability				0.5		%
Long Term Stability		T_{amb}=125°C, 1000Hrs		0.3		%
RMS Output Noise		% of V_{OUT}, 10Hz≤f≤10kHz		0.003		%
Thermal Resistance (No Heat-sink)	θ_{JA}	SOT-223-3L		120		°C/W
		TO-252-2L		100		
		TO-263-3L		60		
		SOT-89-3L		165		
		TO-220-3L		60		

Pin Configuration



Pin Description

Pin No.	Pin name	I/O	Functions
1	GND/ADJ	--/O	Ground/ADJ
2	V_{OUT}	O	Output voltage
3	V_{IN}	I	Input supply voltage

Functional Description

The GGA1117 is a LDO regulator, its pass transistor is made up of a single NPN transistor being driven by a PNP. The dropout voltage is defined as: $V_{DROP} = V_{BE} + V_{SAT}$.

The GGA1117 has two versions: the fixed output version and the adjustable output version. Output voltages can be 1.2V, 1.5V, 1.8V, 2.5V, 3.3V, and 5.0V. An on-chip thermal shut-down circuit provides protection against overload and overheating that would create excessive junction temperature.

The adjustable output version requires a 22μF or larger tantalum capacitor at the output for stability of the GGA1117. The capacitor for fixed output version can be smaller and should be determined base on actual application. Generally, the linear regulator stability decreases with output currents increase.

Applications Circuits

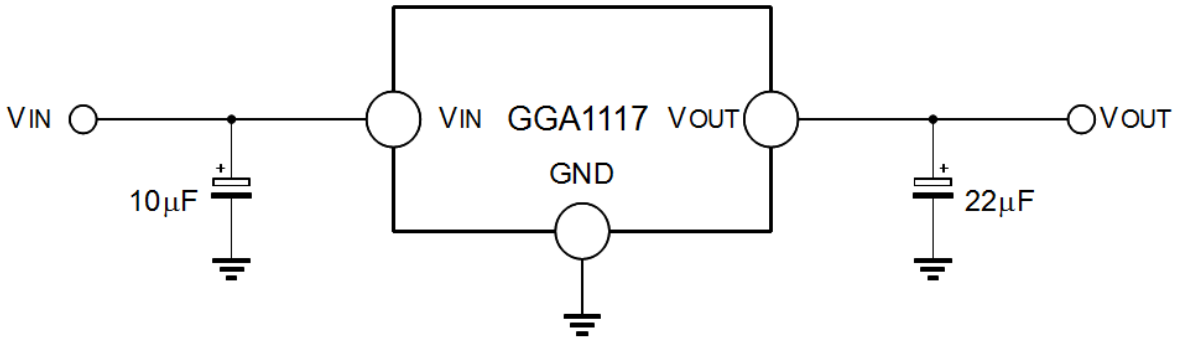


Figure 1. Typical Fixed Output Voltage

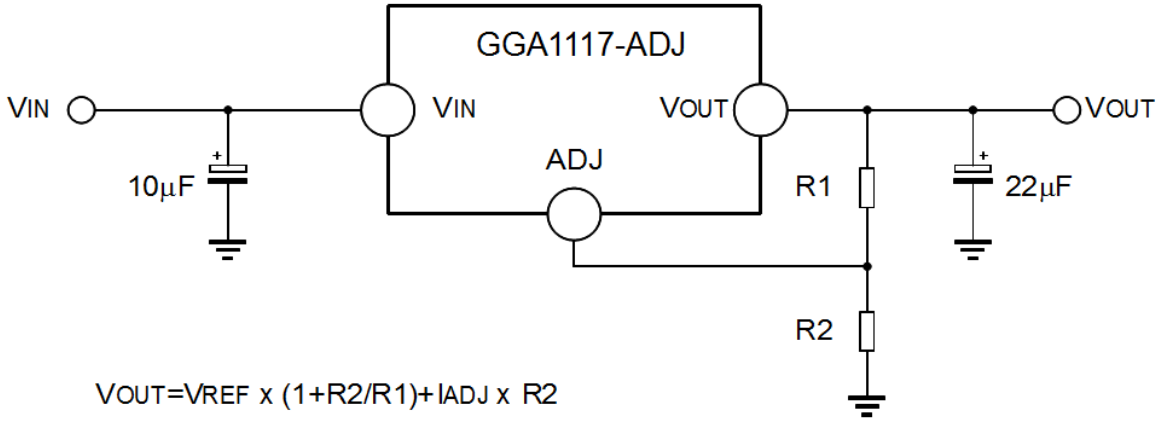
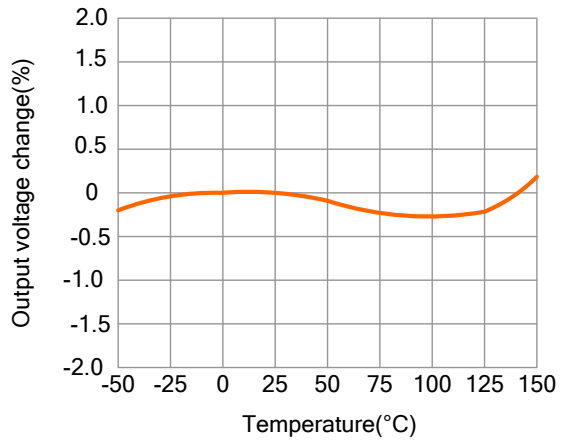


Figure 2. Typical Adjustable Output Voltage

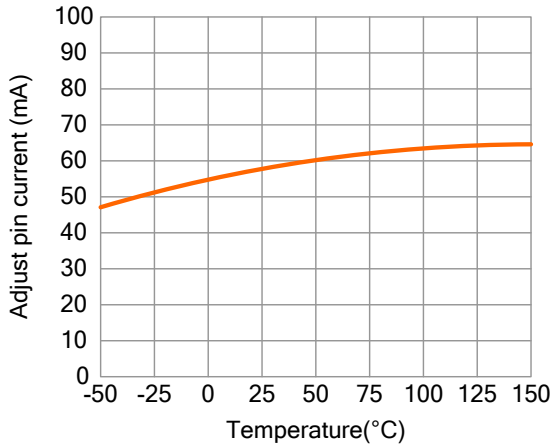
Note: The above circuit and parameters are reference only, please set the parameters of the real application circuit based on the real test.

Typical Characteristics

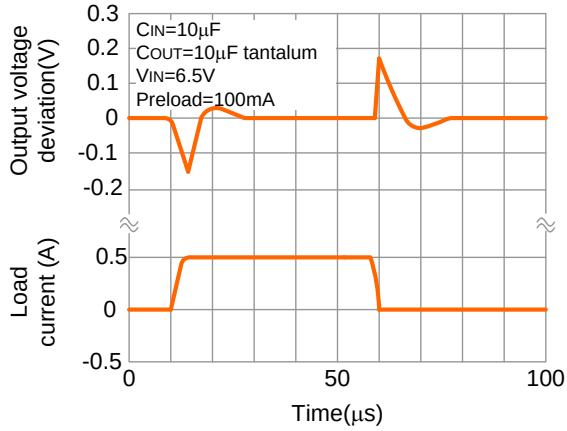
Temperature Stability



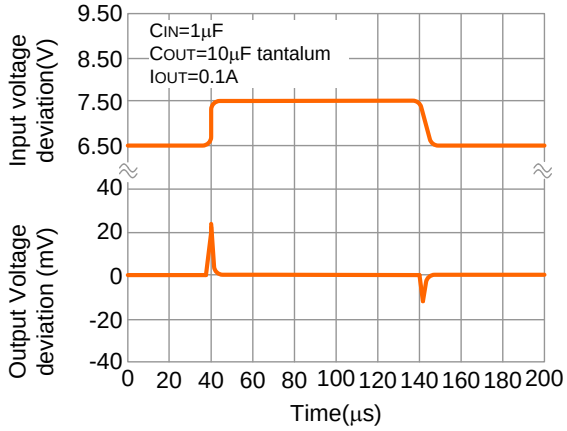
Adjust Pin Current



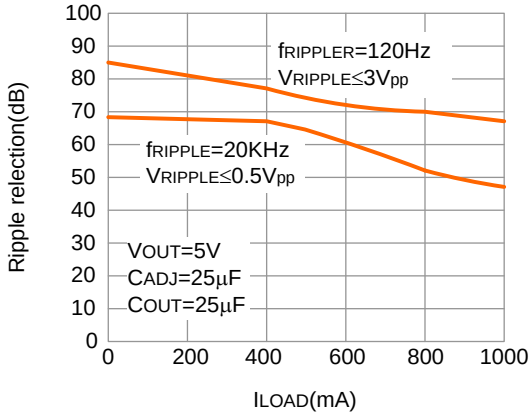
V_{OUT}=5 V Load Transient Response



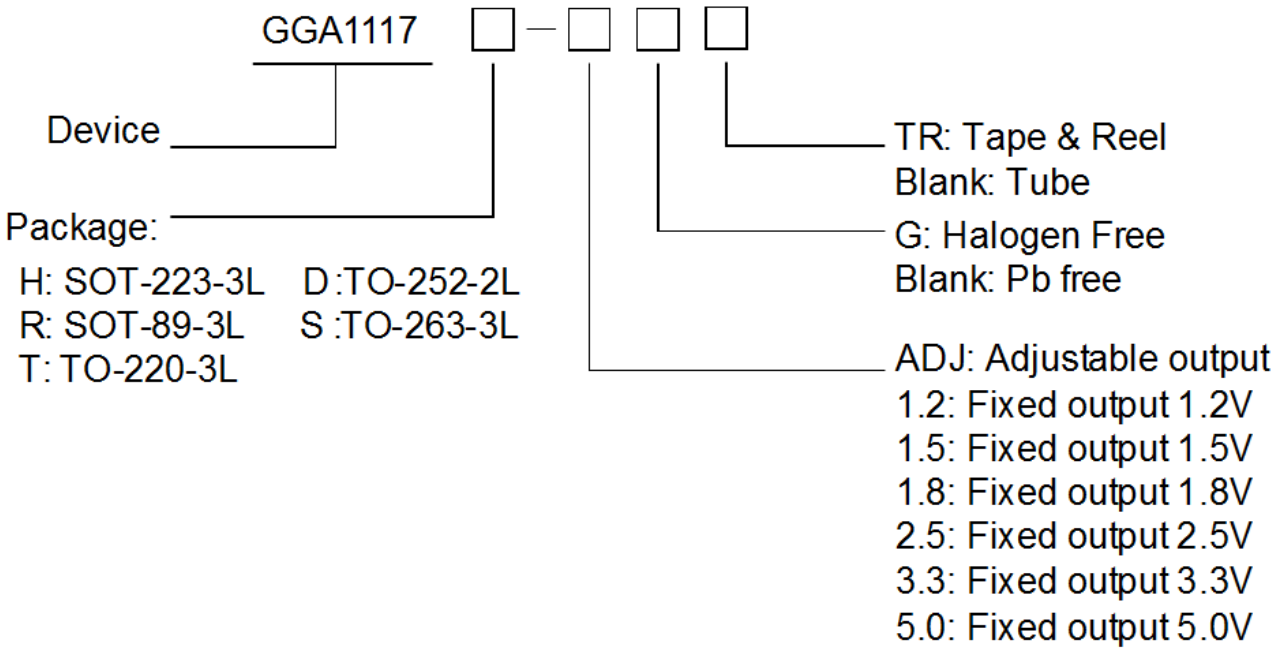
V_{OUT}=5 V Line Transient Response



Ripple Rejection Vs Current



Ordering Information (Temperature range: -40°C ~125°C)



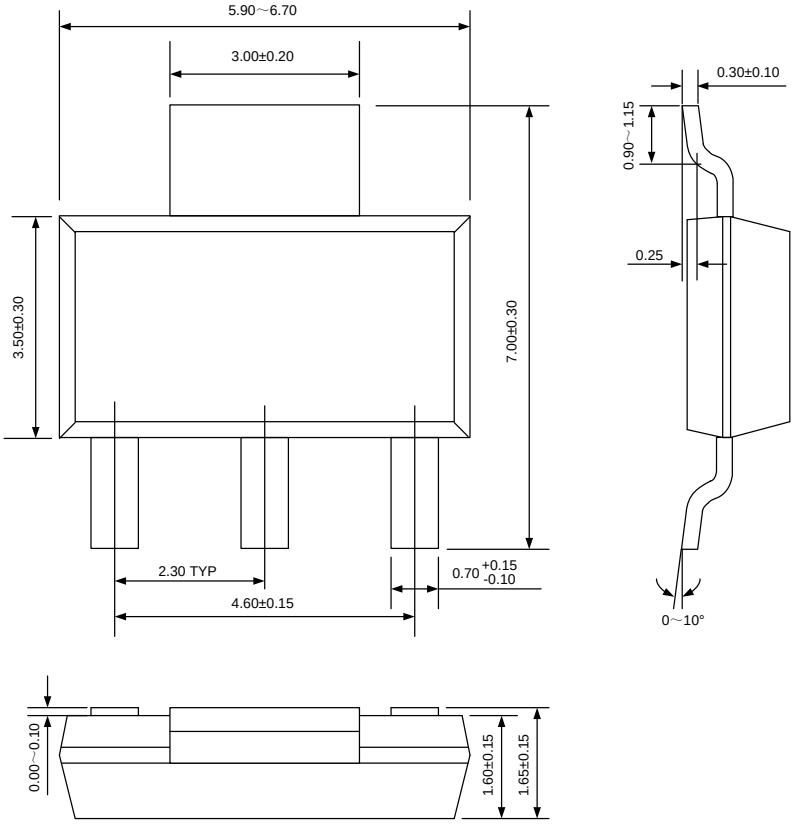
Part No.	Package	Marking	Material	Packing Type
GGA1117H-ADJTR	SOT-223-3L	GGA1117H-ADJ	Pb free	Tape & Reel
GGA1117H-1.2TR		GGA1117H-1.2	Pb free	Tape & Reel
GGA1117H-1.5TR		GGA1117H-1.5	Pb free	Tape & Reel
GGA1117H-1.8TR		GGA1117H-1.8	Pb free	Tape & Reel
GGA1117H-2.5TR		GGA1117H-2.5	Pb free	Tape & Reel
GGA1117H-3.3TR		GGA1117H-3.3	Pb free	Tape & Reel
GGA1117H-5.0TR		GGA1117H-5.0	Pb free	Tape & Reel
GGA1117R-ADJ TR	SOT-89-3L	SAJR	Pb free	Tape & Reel
GGA1117R-1.2TR		S12R	Pb free	Tape & Reel
GGA1117R-1.5TR		S15R	Pb free	Tape & Reel
GGA1117R-1.8TR		S18R	Pb free	Tape & Reel
GGA1117R-2.5TR		S25R	Pb free	Tape & Reel
GGA1117R-3.3TR		S33R	Pb free	Tape & Reel
GGA1117R-5.0TR		S50R	Pb free	Tape & Reel
GGA1117T-ADJ	TO-220-3L	GGA1117T-ADJ	Pb free	Tube
GGA1117T-1.2		GGA1117T-1.2	Pb free	Tube
GGA1117T-1.5		GGA1117T-1.5	Pb free	Tube
GGA1117T-1.8		GGA1117T-1.8	Pb free	Tube
GGA1117T-2.5		GGA1117T-2.5	Pb free	Tube
GGA1117T-3.3		GGA1117T-3.3	Pb free	Tube
GGA1117T-5.0		GGA1117T-5.0	Pb free	Tube
GGA1117D-ADJ	TO-252-2L	GGA1117D-ADJ	Pb free	Tube
GGA1117D-ADJTR		GGA1117D-ADJ	Pb free	Tape & Reel
GGA1117D-1.2		GGA1117D-1.2	Pb free	Tube
GGA1117D-1.2TR		GGA1117D-1.2	Pb free	Tape & Reel
GGA1117D-1.5		GGA1117D-1.5	Pb free	Tube
GGA1117D-1.5TR		GGA1117D-1.5	Pb free	Tape & Reel
GGA1117D-1.8		GGA1117D-1.8	Pb free	Tube
GGA1117D-1.8TR		GGA1117D-1.8	Pb free	Tape & Reel
GGA1117D-2.5		GGA1117D-2.5	Pb free	Tube
GGA1117D-2.5TR		GGA1117D-2.5	Pb free	Tape & Reel
GGA1117D-3.3		GGA1117D-3.3	Pb free	Tube
GGA1117D-3.3TR		GGA1117D-3.3	Pb free	Tape & Reel
GGA1117D-5.0		GGA1117D-5.0	Pb free	Tube
GGA1117D-5.0TR		GGA1117D-5.0	Pb free	Tape & Reel
GGA1117S-ADJ	TO-263-3L	GGA1117S-ADJ	Pb free	Tube
GGA1117S-ADJTR		GGA1117S-ADJ	Pb free	Tape & Reel
GGA1117S-1.2		GGA1117S-1.2	Pb free	Tube
GGA1117S-1.2TR		GGA1117S-1.2	Pb free	Tape & Reel
GGA1117S-1.5		GGA1117S-1.5	Pb free	Tube
GGA1117S-1.5TR		GGA1117S-1.5	Pb free	Tape & Reel

GGA1117S-1.8	TO-263-3L	GGA1117S-1.8	Pb free	Tube
GGA1117S-1.8TR		GGA1117S-1.8	Pb free	Tape & Reel
GGA1117S-2.5		GGA1117S-2.5	Pb free	Tube
GGA1117S-2.5TR		GGA1117S-2.5	Pb free	Tape & Reel
GGA1117S-3.3		GGA1117S-3.3	Pb free	Tube
GGA1117S-3.3TR		GGA1117S-3.3	Pb free	Tape & Reel
GGA1117S-5.0		GGA1117S-5.0	Pb free	Tube
GGA1117S-5.0TR		GGA1117S-5.0	Pb free	Tape & Reel
GGA1117H-ADJGTR	SOT-223-3L	1117H-ADJG	Halogen free	Tape & Reel
GGA1117H-1.2GTR		1117H-1.2G	Halogen free	Tape & Reel
GGA1117H-1.5GTR		1117H-1.5G	Halogen free	Tape & Reel
GGA1117H-1.8GTR		1117H-1.8G	Halogen free	Tape & Reel
GGA1117H-2.5GTR		1117H-2.5G	Halogen free	Tape & Reel
GGA1117H-3.3GTR		1117H-3.3G	Halogen free	Tape & Reel
GGA1117H-5.0GTR		1117H-5.0G	Halogen free	Tape & Reel
GGA1117R-ADJGTR	SOT-89-3L	RAJG	Halogen free	Tape & Reel
GGA1117R-1.2GTR		R12G	Halogen free	Tape & Reel
GGA1117R-1.5GTR		R15G	Halogen free	Tape & Reel
GGA1117R-1.8GTR		R18G	Halogen free	Tape & Reel
GGA1117R-2.5GTR		R25G	Halogen free	Tape & Reel
GGA1117R-3.3GTR		R33G	Halogen free	Tape & Reel
GGA1117R-5.0GTR		R50G	Halogen free	Tape & Reel
GGA1117T-ADJG	TO-220-3L	1117T-ADJG	Halogen free	Tube
GGA1117T-1.2G		1117T-1.2G	Halogen free	Tube
GGA1117T-1.5G		1117T-1.5G	Halogen free	Tube
GGA1117T-1.8G		1117T-1.8G	Halogen free	Tube
GGA1117T-2.5G		1117T-2.5G	Halogen free	Tube
GGA1117T-3.3G		1117T-3.3G	Halogen free	Tube
GGA1117T-5.0G		1117T-5.0G	Halogen free	Tube
GGA1117D-ADJG	TO-252-2L	1117D-ADJG	Halogen free	Tube
GGA1117D-ADJGTR		1117D-ADJG	Halogen free	Tape & Reel
GGA1117D-1.2G		1117D-1.2G	Halogen free	Tube
GGA1117D-1.2GTR		1117D-1.2G	Halogen free	Tape & Reel
GGA1117D-1.5G		1117D-1.5G	Halogen free	Tube
GGA1117D-1.5GTR		1117D-1.5G	Halogen free	Tape & Reel
GGA1117D-1.8G		1117D-1.8G	Halogen free	Tube
GGA1117D-1.8GTR		1117D-1.8G	Halogen free	Tape & Reel
GGA1117D-2.5G		1117D-2.5G	Halogen free	Tube
GGA1117D-2.5GTR		1117D-2.5G	Halogen free	Tape & Reel

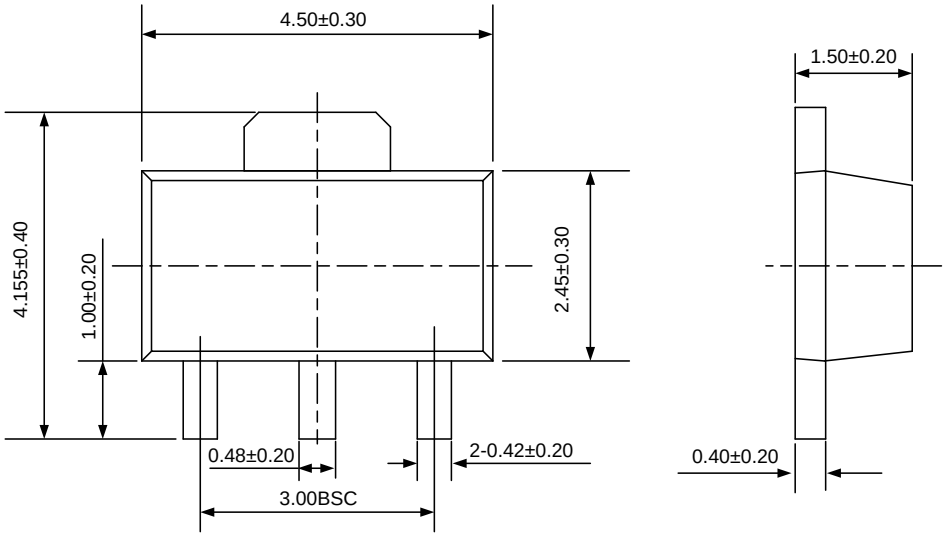
GGA1117D-3.3G	TO-252-2L	1117D-3.3G	Halogen free	Tube
GGA1117D-3.3GTR		1117D-3.3G	Halogen free	Tape & Reel
GGA1117D-5.0G		1117D-5.0G	Halogen free	Tube
GGA1117D-5.0GTR		1117D-5.0G	Halogen free	Tape & Reel
GGA1117S-ADJG	TO-263-3L	1117S-ADJG	Halogen free	Tube
GGA1117S-ADJGTR		1117S-ADJG	Halogen free	Tape & Reel
GGA1117S-1.2G		1117S-1.2G	Halogen free	Tube
GGA1117S-1.2GTR		1117S-1.2G	Halogen free	Tape & Reel
GGA1117S-1.5G		1117S-1.5G	Halogen free	Tube
GGA1117S-1.5GTR		1117S-1.5G	Halogen free	Tape & Reel
GGA1117S-1.8G		1117S-1.8G	Halogen free	Tube
GGA1117S-1.8GTR		1117S-1.8G	Halogen free	Tape & Reel
GGA1117S-2.5G		1117S-2.5G	Halogen free	Tube
GGA1117S-2.5GTR		1117S-2.5G	Halogen free	Tape & Reel
GGA1117S-3.3G		1117S-3.3G	Halogen free	Tube
GGA1117S-3.3GTR		1117S-3.3G	Halogen free	Tape & Reel
GGA1117S-5.0G		1117S-5.0G	Halogen free	Tube
GGA1117S-5.0GTR		1117S-5.0G	Halogen free	Tape & Reel

Package Outline

SOT-223-3L **Unit: mm**

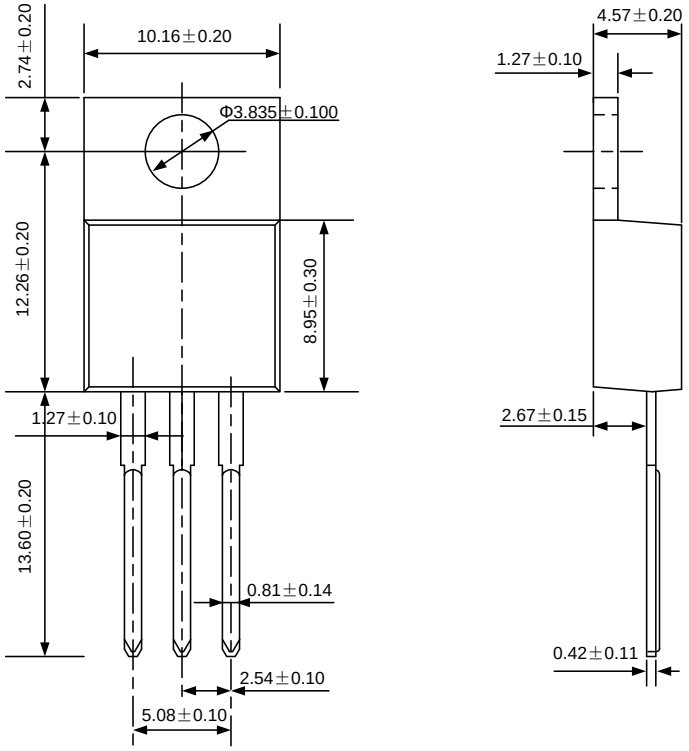


SOT-89-3L **Unit: mm**

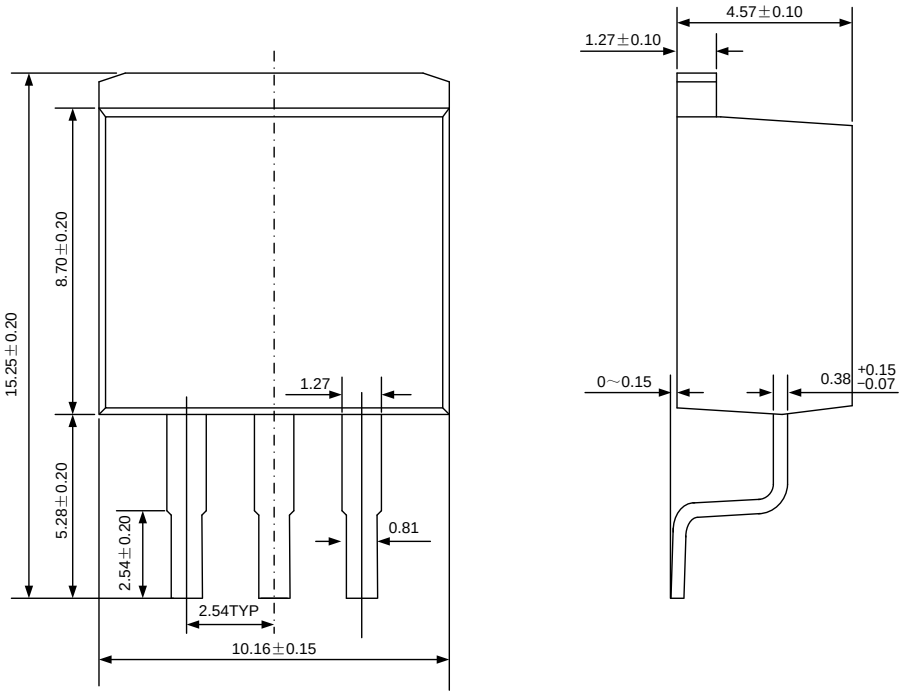


Package Outline

TO-220-3L **Unit: mm**

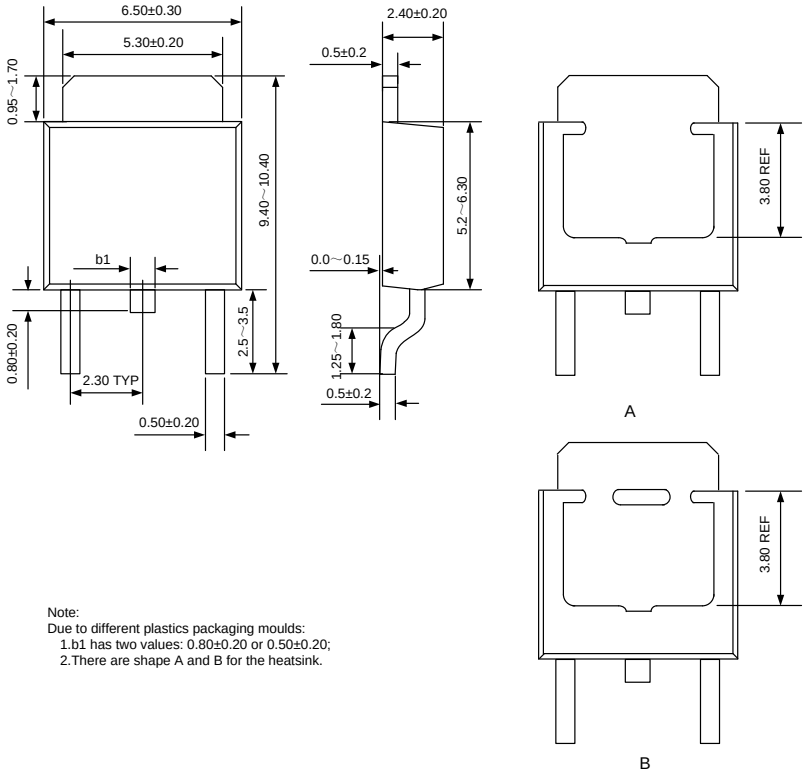


TO-263-3L **Unit: mm**

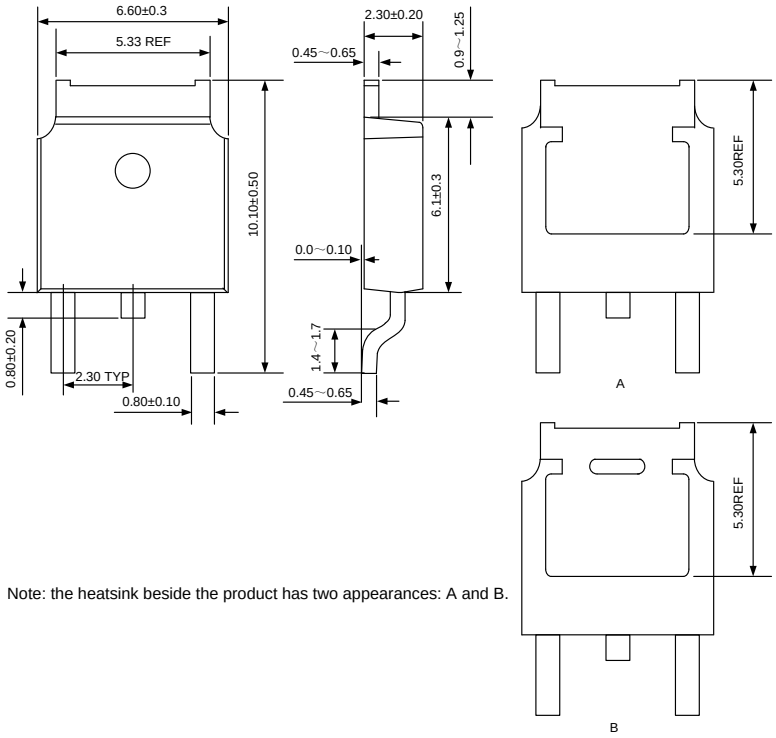


Package Outline

TO-252-2L **Unit: mm**



Note:
Due to different plastics packaging moulds:
1.b1 has two values: 0.80±0.20 or 0.50±0.20;
2.There are shape A and B for the heatsink.



Note: the heatsink beside the product has two appearances: A and B.

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