ACE5172C

2A Low Consumption Linear Regulator

Description

ACE5172C is a series of low power consumption, low dropout voltage regulator with a typical dropout voltage of 1.0V at 2A load current.

ACE5172C can provide output value in the range of 1.2V~5.0V in 0.1V steps. It also can customize on command.

Other than every voltage version can be used as an adjustable voltage version, with which desired voltage can be achieved by setting the values of two external resistors of the application circuitry.

ACE5172C has well load transient response and good temperature characteristic, and it uses trimming technique to guarantee output voltage accuracy within±2%.

ACE5172C series is available in standard packages of SOT-223 and TO-252.

Features

- Low Power Consumption:3.0uA (Typ.)
- Maximum output current : 2A
- Maximum input voltage: 18V
- Line regulation: 0.2% (Typical)
- Output Voltage Range:1.2V~5.0V
- Highly Accurate:±2%(±1% customized)
- Typical Dropout Voltage: 850mV@1.5A (Vout=3.3V)
- Operation environment Temperature:-40℃~85℃

Applications

- Battery Charger
- Battery Powered equipment
- Post Regulators for Switching Supplies
- Reference Voltage Source Regulation after Switching Power

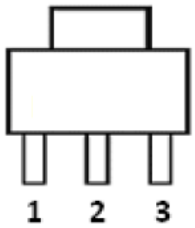
Absolute Maximum Rating

Parameter		Value
Max Input Voltage		20V
Operating Junction Temperature(Tj)		125℃
Ambient Temperature(Ta)		-40~85℃
Package Thermal Resistance	SOT-223	20℃/W
	TO-252	12℃/W
Storage Temperature(Ts)		- 40 to 150℃
Lead Temperature & Time		260℃,10S

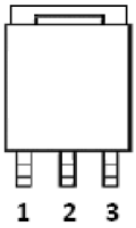
Note: Exceed these limits to damage to the device. Exposure to absolute maximum rating conditions may affect device reliability.

Packaging Type

SOT-223



TO-252



Pin Configuration

SOT-223	T0-252	Description
1	1	V_{SS}/ADJ
2	2	V_{OUT}
3	3	V_{DD}

Recommended work conditions

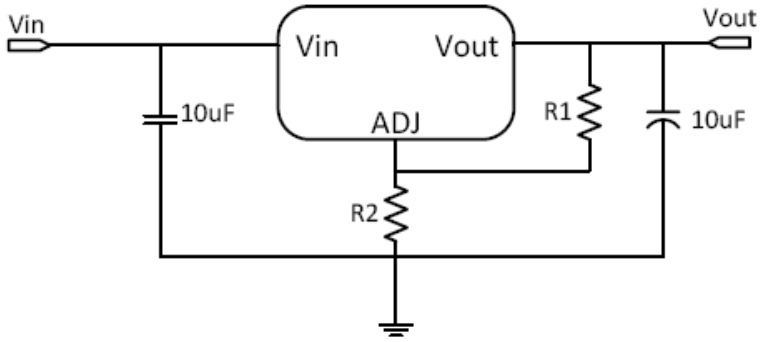
Parameter	Value
Input Voltage Range	Max. 18V
Ambient Temperature	-40 ~ 85 ^{o}C

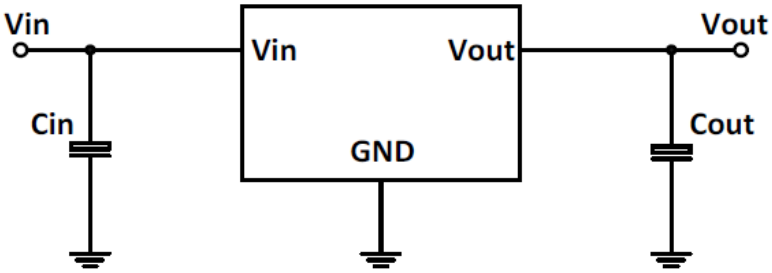
Ordering information

ACE5172C XX XX + H

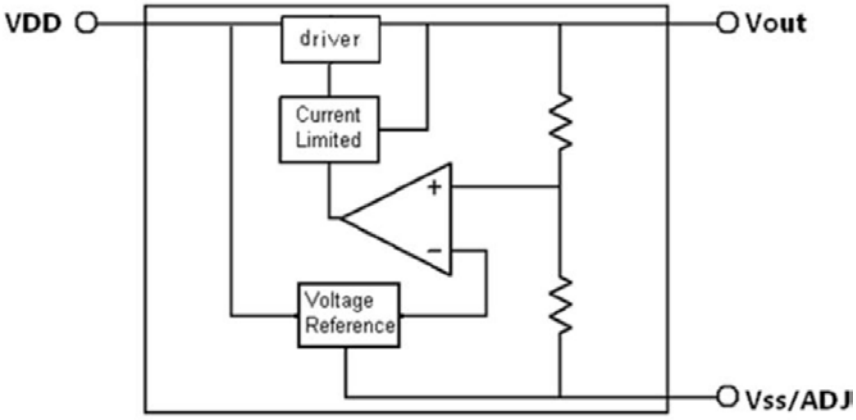
- Halogen - free
- Pb - free
- XM: SOT-223
  YM: TO-252
- Output Voltage：1.3V/1.5V …../5.0V/ Default：1.2V=Adjustable Version

Typical Application





Block Diagram



Electrical Characteristics

Test conditions: Cin=1uF, Cout=1uF, T_A=25℃, unless otherwise specified.

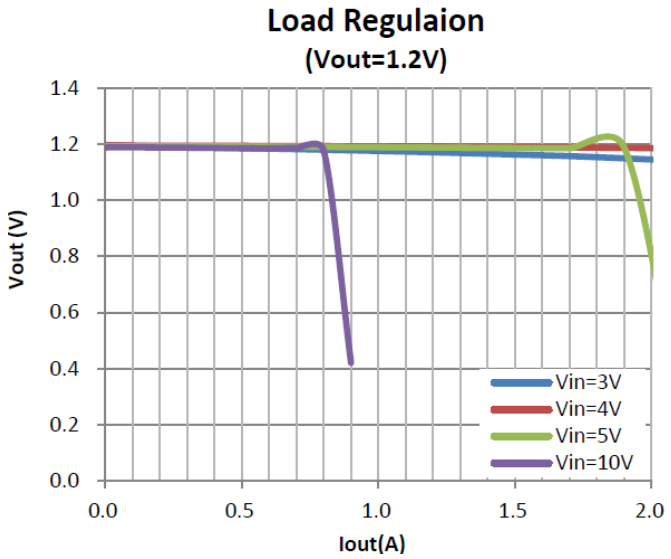
Parameter	Symbol	Conditions		Min	Typ	Mum	Unit
Input Voltage	Vin					18	V
Output Voltage	Vout			V_{OUT} *0.98		V_{OUT} *1.02	V
FB Voltage	V_{FB}	I_{OUT}=1mA		1.176	1.2	1.224	V
Maximum Output Current	Iout (Max.)	Vin-Vout=1.9V	Vout<1.5V	2			A
		Vin-Vout=1.5V	1.5V≦Vout<2.0V				
		Vin-Vout=1 V	Vout≧2.0V				
Input-Output Voltage Differential(note3)	Dropout Voltage	Iout≦1.5A	Vout<1.5V		1600	1800	mV
			1.5V≦Vout<2.0V		1200	1400	
			Vout≧2.0V		850	950	
Line Regulation (note1)	$\frac{\triangle Vout}{\triangle Vin \bullet Vout}$	Iout =10mA Set Vout+1V≦Vin≦18V			0.1	0.3	%/V
Line Regulation (note1,2)	$\triangle V_{OUT}$	1mA≦Iout≦1.5A	Vout<1.5V		40	60	mV
			1.5V≦Vout<2.0V		20	40	
			Vout≧2.0V		10	30	
Quiescent Current	Iq	Vin= Set Vout+1V			3.0	5.0	uA
Output Voltage Temperature Coefficient	$\frac{\triangle Vout}{\triangle T \bullet Vout}$	Iout =100mA			200		ppm/℃
Thermal Resistance junction to case	θ_{JC}	SOT-223			20		℃/W
		TO-252			12		

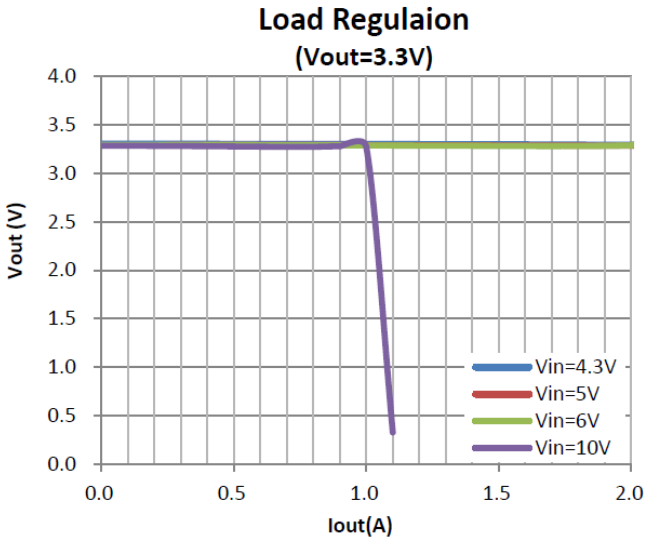
Note1: Line Regulation and Load Regulation in Table1 are tested under constant junction temperature.

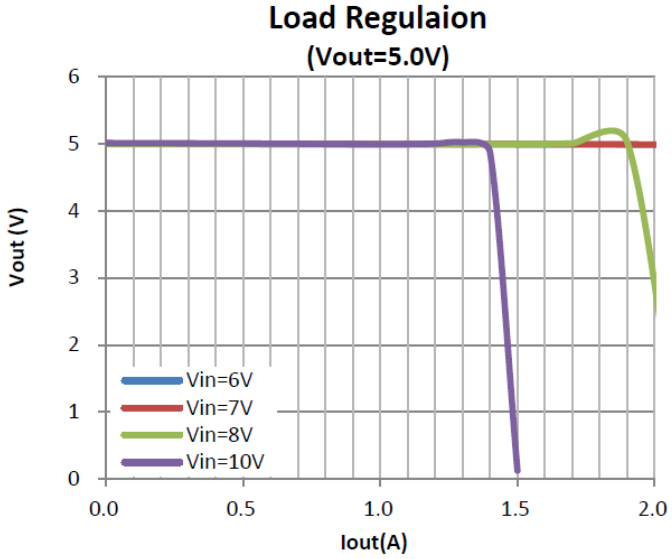
Note2: When load current varies between 0~2A and Vin-Vout ranges from 1V~18V at constant junction temperature, the parameter is satisfied the criterion in table.

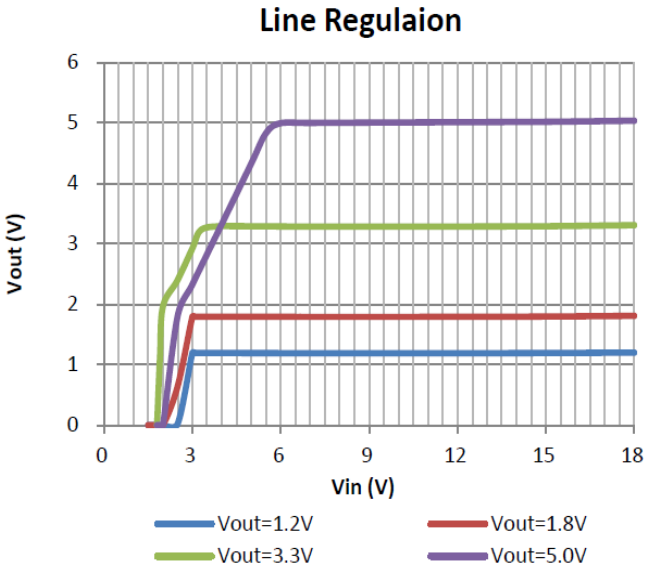
Note3: Dropout Voltage is the voltage difference between the input and output pin when the input voltage is mini mum to maintain the lowest spec output voltage.

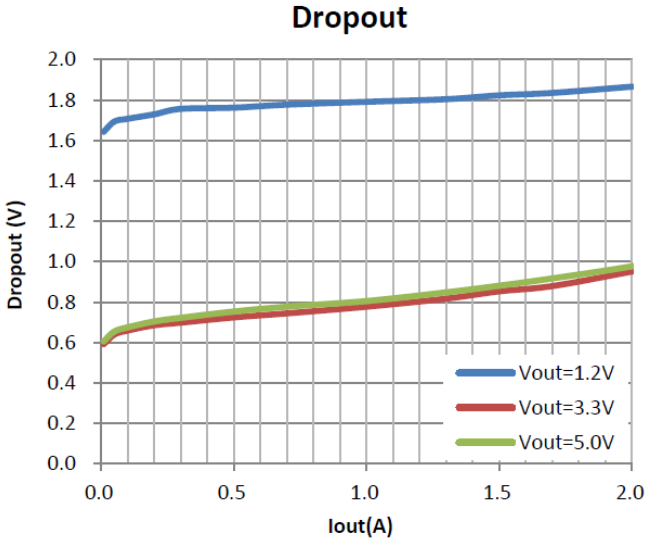
Typical Performance Characteristic

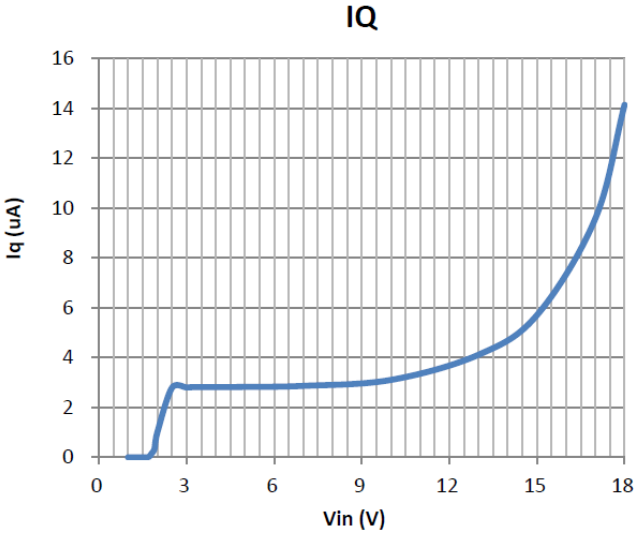








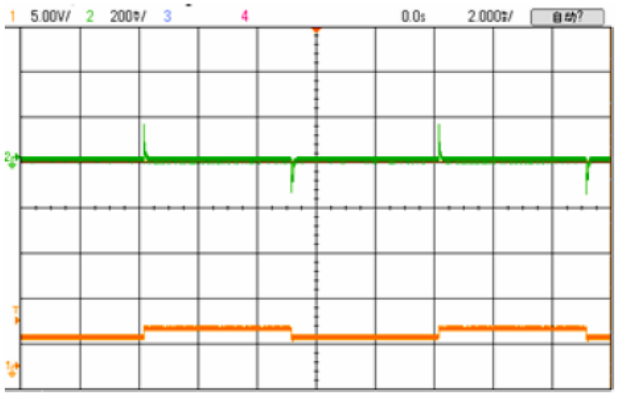




Line Transient Response

Iout=100mA,Vin=3.3V to 4.3V

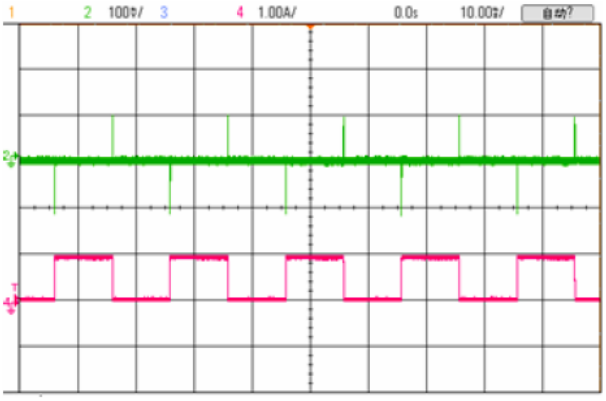
(Orange: Vin, Green: Vout)



Load Transient Response

Vin=3.3V, Iout=0.1A to 1A

(Pink: Iout, Green: Vout)



Detailed Description

ACE5172C is a series of low dropout voltage and low power consumption regulator. Its application circuitry requires minimum number of external components. Both fixed voltage and adjustable voltage application circuits need input and output capacitors to assure output voltage stability. Any desired output voltage from fixed voltage to 18V can be achieved by assigning proper values to two external resistors in its application circuitry (as R1, R2 are the two external resistors.).

ACE5172C uses trimming technique to assure the accuracy of output value within ±2%, at the same time, temperature compensation is elaborately considered in this chip, which makes ACE5172C's temperature coefficient within 100ppm/℃

Typical Application

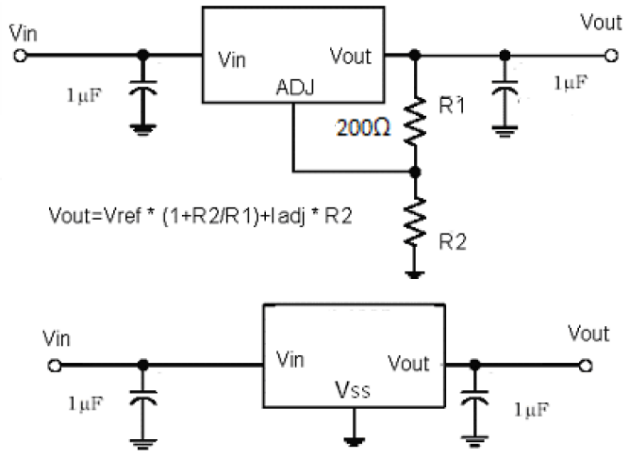
ACE5172C has fixed voltage and adjustable voltage application mode, typical application circuitry.

A 1uF ceramic capacitor connected between input and GND as bypass capacitor and a 1uF ceramic capacitor between output and GND are recommended for all application.

Using a bypass capacitor (C_{Adj}) between the adjust terminal and ground can improve ripple rejection. The bypass capacitor prevents ripple from being amplified in case the output voltage is increased. The impedance of C_{Adj} should be less than the resistance of R_1 to prevent ripple from being amplified at any frequency. As R1 is normally in the range of 200Ω~220Ω, the value of C_{Adj} should satisfy the following condition:

$1/(2\ \pi^* \text{Frequency}_{Ripple} * C_{adj}) < R1$

A 0.1μF ceramic capacitor is recommended.



Explanation

The output voltage of adjustable application satisfies this followed equation:

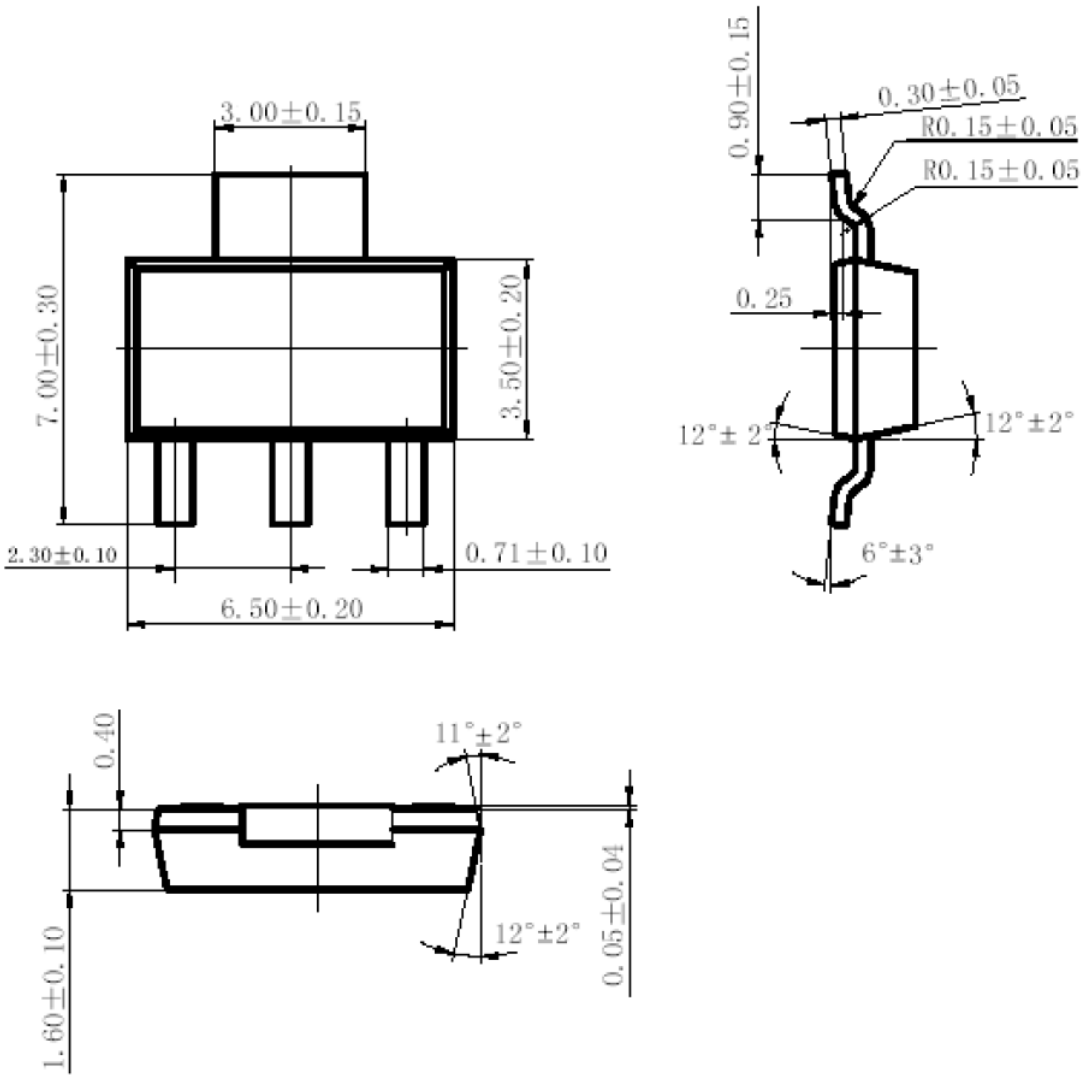
$V_{out}=V_{Ref}\times (1+R2/R1)+I_{Adj}\times R2$.

The second term $I_{Adj}\times R2$ can be ignored since the adjustable pin current I_{Adj} (~ 2μA) is much less than the current through R1 (~1mA).

The value of R1 is preferred in the range of 200Ω～220Ω and the value of V_{Ref} is the output voltage of typical fixed voltage application circuit.

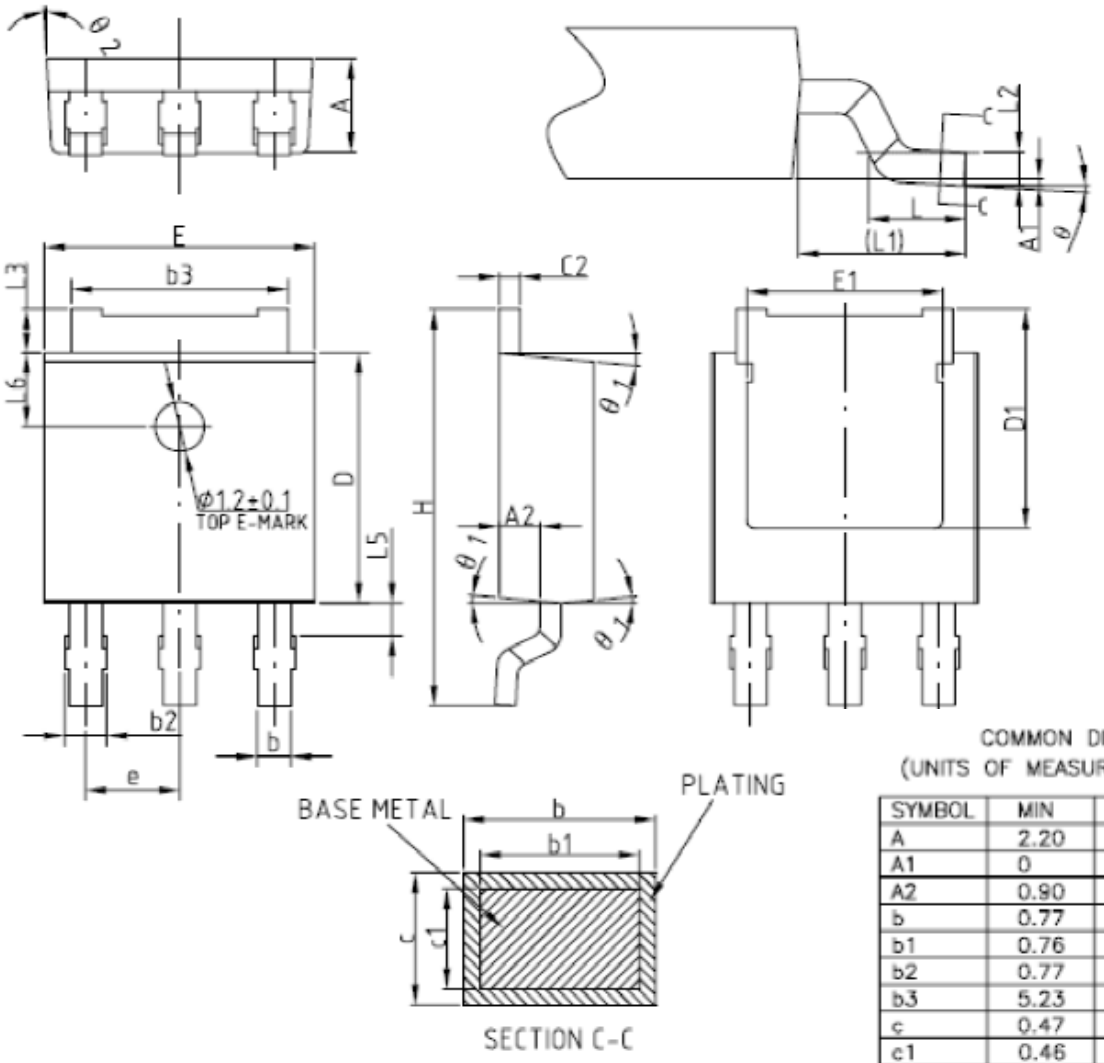
Packing Information

SOT-223



Packing Information

TO-252



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	2.20	2.30	2.38
A1	0	–	0.10
A2	0.90	1.00	1.10
b	0.77	–	0.89
b1	0.76	0.81	0.86
b2	0.77	–	1.10
b3	5.23	5.33	5.43
c	0.47	–	0.60
c1	0.46	0.51	0.56
c2	0.47	–	0.60
D	6.00	6.10	6.20
D1	5.25	–	–
E	6.50	6.60	6.70
E1	4.70	–	–
e		2.28BSC	
H	9.80	10.10	10.40
L	1.40	1.50	1.70
L1		2.90REF	
L2		0.51BSC	
L3	0.90	–	1.25
L5	0.90	–	1.50
L6		1.80REF	
θ	0°	–	8°
θ1	3°	5°	7°
θ2	1°	3°	5°

Notes

ACE does not assume any responsibility for use as critical components in life support devices or systems without the express written approval of the president and general counsel of ACE Electronics Co., LTD. As sued herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and shoes failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.