ACE1084

5A Bipolar Linear Regulator

Description

ACE1084 is a series of low dropout three-terminal regulators with a typical dropout voltage of 1.4V at 5A load current.

Other than fixed voltage versions (1.8V, 2.5V, 3.3V, 5.0V), ACE1084 has an adjustable voltage version, with which desired voltage can be achieved by setting the values of two external resistors of the application circuitry.

ACE1084 offers thermal shut down and current limit functions, to assure stability of chip and power system.

ACE1084 series is available in standard pcakages of TO-263-2L, TO-263-3L, TO-220 and TO-252.

Features

- Fixed and adjustable versions.
- Maximum output current is 5A.
- Maximum input voltage: 15V
- Line regulation: 0.2% (typ.)
- Load regulation: 0.2% (typ.)
- On-Chip Thermal Shutdown
- Operation environment Temperature: 0℃~80℃

Application

- Power Management for Computer Mother Board, Graphic Card
- Battery Charger
- Post Regulators for switching supplies
- Microprocessor Supply.

Absolute Maximum Ratings

Parameter		Value
Max Input Valtage		15V
Operating Junction Temperature(Tj)		150°C
Ambient Temperature		0°C-80°C
Package Thermal Resistance	TO-252	12..5°C/W
	TO-263	3.°C/W
	TO-220	3.°C/W
Storage temperature(Ts)		-40°C-150°C
Lead Temperature & Time		260°C,10S

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

Typical Application

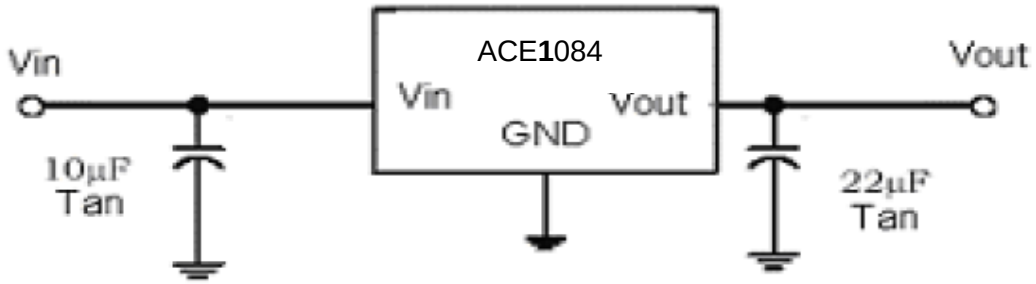
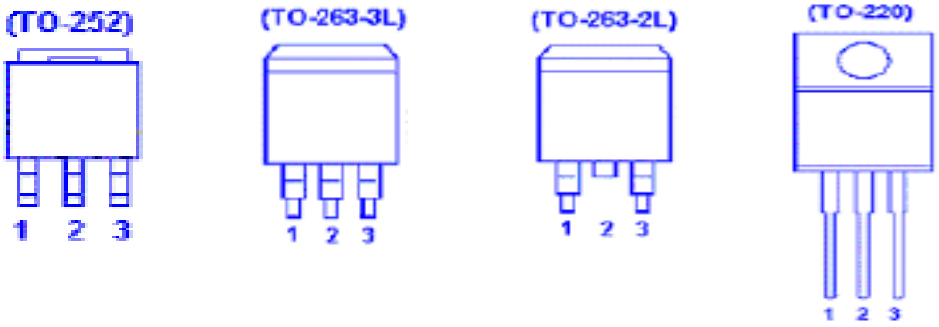


Fig 1. ACE1084 fixed version Application circuit

NOTE: Input capacitor (C_{in}=10uF) and Output capacitor (C_{out}=22uF) are recommended in all application circuit. Tantalum capacitor is preferred.

Packaging Type



TO-252	TO-263-3	TO-263-2	TO-220	Description
1	1	1	1	ADJ/GND
2	2	2	2	Vout
3	3	3	3	Vin

Typical Electrical Characteristics

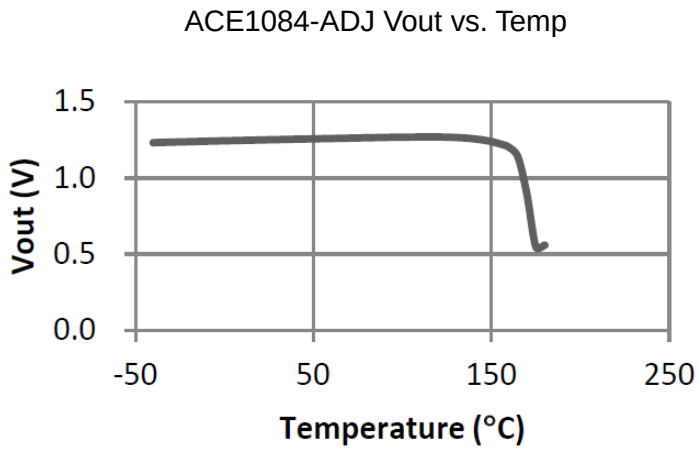


Fig 2. Dropout Voltage VS. Output Current

Recommended work conditions

Parameter	Value
Input Voltage Range	Max. 15V
Operating Junction Temperature (T_J)	0 °C ~ 125 °C

Ordering information

ACE1084 XX XX + H

- H: Halogen - free
- +: Pb - free
- XX: YM : TO-252; 2WN: TO-263-2; 1WN :TO-263-3; ZM : TO-220
- XX: Output Voltage : 1.8 / 3.3V / Default: Adjustable Version

Electrical Characteristics

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Reference Voltage	Vref	10mA≦Iout≦SA,1.5V≦Vin-Vout≦5V	1.225	1.25	1.275	V
Output Voltage	Vout	ACE1084-1.80V Iout=0mA,Vin=4.8V,Tj=25°C 10mA≦Iout≦5A, 3.4V≦Vin≦7V	1.773 1.764	1.80 1.80	1.827 1.836	V
		ACE1084-2.50V Iout=0mA,Vin=5.5V,Tj=25°C 10mA≦Iout≦5A, 4.1V≦Vin≦7V	2.462 2.45	2.50 2.50	2.537 2.55	V
		ACE1084-5.0V Iout=0mA,Vin=8.0V,Tj=25°C 10mA≦Iout≦5A, 6.6V≦Vin≦10V	3.25 3.234	3.3 3.3	2.350 3.366	V
		ACE1084-3.3V Iout=0mA,Vin=6.3V,Tj=25°C 10mA≦Iout≦5A, 4.9V≦Vin≦8V	4.925 4.90	5.0 5.0	5.075 5.10	V
Line Regulation	ΔVout	ACE1084-ADJ Iout=10mA, 2.85V≦Vin≦10V		10	40	mV
		ACE1084-1.8V Iout=10mA, 3.4V≦Vin≦10V		10	40	
		ACE1084-2.5V Iout=10mA, 4.1V≦Vin≦10V		10	40	
		ACE1084-3.3V Iout=10mA, 4.9V≦Vin≦10V		10	40	
		ACE1084-5.0V Iout=10mA, 6.6V≦Vin≦10V		10	40	
Load Regulation	ΔVout	ACE1084-ADJ Vin-Vout=1.6v, 0≦Iout≦4A		16	50	mV
		ACE1084-1.8V Vin-Vout=1.6v, 0≦Iout≦4A		16	50	
		ACE1084-2.5V Vin-Vout=1.6v, 0≦Iout≦4A		16	50	
		ACE1084-3.3V Vin-Vout=1.6v, 0≦Iout≦4A		16	50	
		ACE1084-5.0V Vin-Vout=1.6v, 0≦Iout≦4A		16	50	
Quiescent Current	I_Q	ACE1084-1.2V, Vin=10V		2	5	mA
		ACE1084-1.8V, Vin=12V		2	5	
		ACE1084-2.5V, Vin=12V		2	5	
		ACE1084-3.3V, Vin=12V		2	5	

		ACE1084-5.0V, Vin=12V		2	5	
		ACE1084-12.0V, Vin=20V		2	5	
Drupout Voltage (note 3)	I_{ADJ}.I_{OUT}			1.4		V
Iadj change	Ichange	10mA≦Iout≦5A 1.5V≦Vin-Vout≦6V		0.4	10	uA
Current Limit		V_{in}-V_{out}=2V, T_J=25℃		7		A
Minimum load Current	Imin	ACE1084-ADJ		3	10	mA
Quiescent Current	I_q	Vin=10V		5	10	mA
Adjust Pin Current(Adjustable Version)	I_{Adj}	2.85V≦ViN≦4.25V,10mA≦Iout≦5A		45	120	uA
Ripple Rejection		F-120Hz,Cout=25uF(tan), Lout=5A,Vin-Vout=3V	60			dB
Adjust Pin Current Change	I_{change}	10mA ≦Iout≦5A 1.5V≦Vin-Vout≦6V		0.4	10	uA
Temperature Stability		Lout=10Ma, Vin-Vout=1.5v			0.5	%
Thermal Resistance Junction to case	θ_{JC}	TO-252 TO-263 TO-220		12.5 3 3		°C/W
Over Temperature Protection	OTP			150		°C

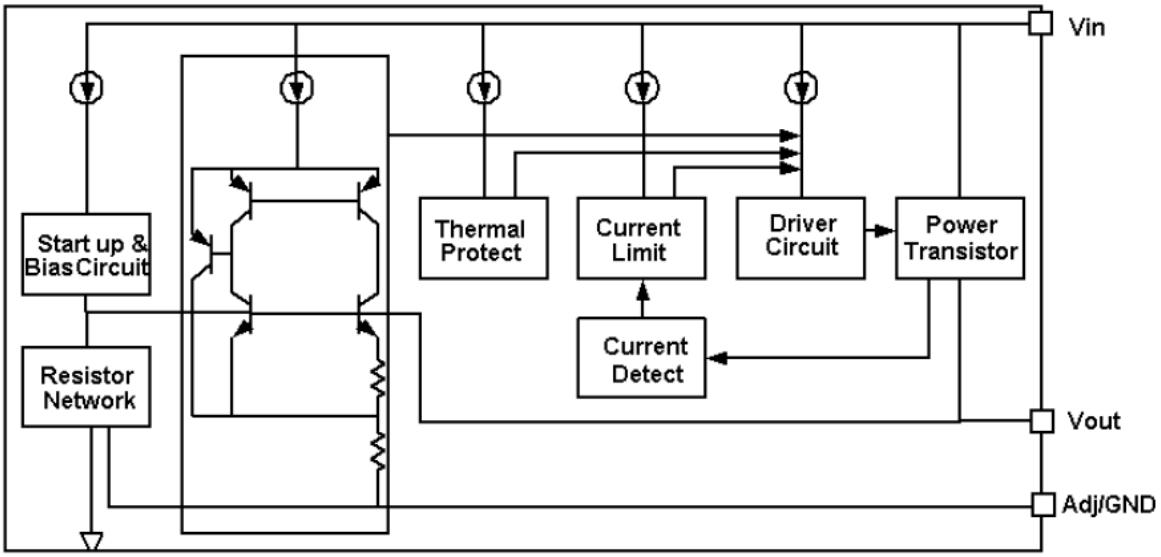
Note1: Line Regulation and Load Regulation in Table1 are tested under constant junction temperature.

Note2: When load current varies between 0~5A and Vin-Vout ranges from 1.5V~6V at constant junction temperature, the parameter is satisfied the criterion in table. If temperature varies between 0°C≤TA≤80°C，it needs output current to be larger than 10mA to satisfy the criterion.

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

Note4: Minimum Load Current is defined as the minimum output current necessary to maintain regulation. Specified output accuracy can be met when the output current exceeds the minimum load current (10mA) and the dropout voltage (V_{in}-V_{out}) lies between 1.5V and 6V.

Block Diagram



Detailed Description

ACE1084 is a series of low dropout voltage three terminal regulators. Its circuit has a trimmed bandgap reference to ensure output voltage accuracy independent of temperature variance.

On-chip thermal shutdown provides protection against overload and conditions as elevated ambient temperature.

Its application circuitry requires minimum number of external components. Both fixed voltage and adjustable voltage versions need input and output capacitors to assure output voltage stability. Any desired output voltage from 1.25V to 10V can be achieved with adjustable version by assigning proper values to two external resistors in its application circuitry (as shown in Fig.4, as R1, R2 are the two external resistors.)

Typical Application

ACE1084 has an adjustable version and fixed versions, Fig.4 shows their typical application circuitry. A 10uF tan capacitor connected between input and GND as bypass capacitor and a 22uF tan capacitor between output and GND are recommended for all application. Using a bypass capacitor (CAdj) 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 CAdj should be less than the resistance of R1 to prevent ripple from being amplified at any frequency. As R1 is normally in the range of 120Ω~200Ω, the value of CAdj should satisfy the following condition:

$1/(2\pi * Frequency_{Ripple} * Cadj) < R_1$

A 10μF tan capacitor is recommended.

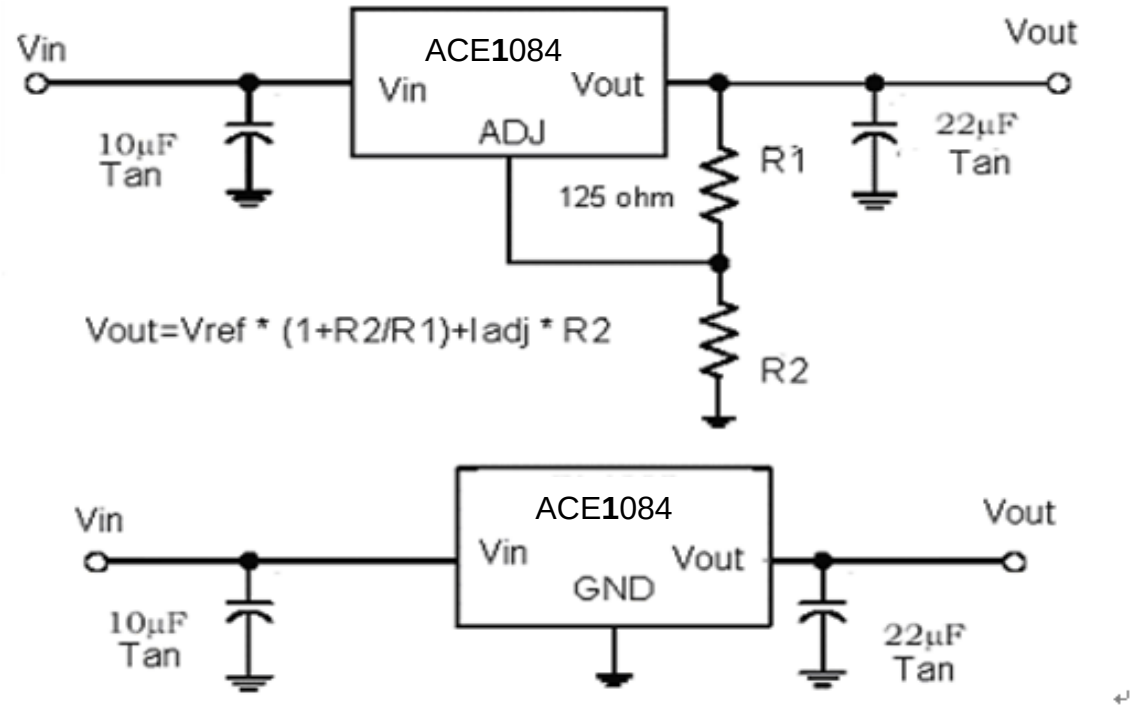


Fig 3. Typical Application circuit of ACE1084

EXPLANATION

The output voltage of adjustable version satisfies this followed equation:

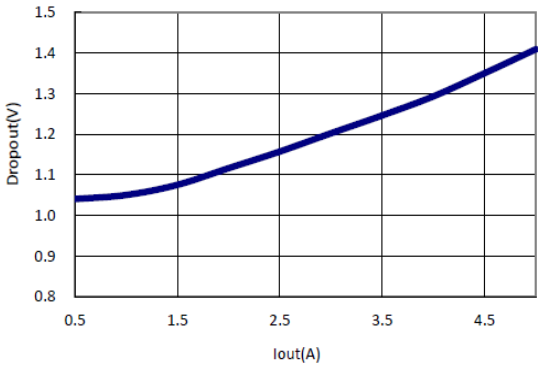
$$V_{out=} V_{Ref} x(1+R_2/R_1)+I_{Adj} \times R_2.$$

The second term $I_{Adj} \times R_2$ can be ignored since the adjustable pin current I_{Adj} (~ 50μA) is much less than the current through R_1 (~ 4mA).

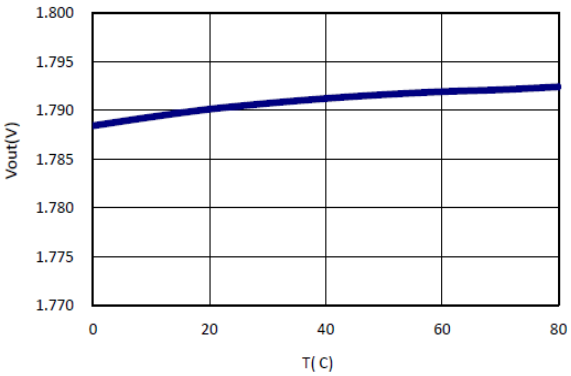
The value of R_1 is preferred in the range of 120Ω～200Ω and the total output current of the adjustable version of LC1084 needs to exceed 10mA to assure normal chip operation.

Typical Performance Characteristic

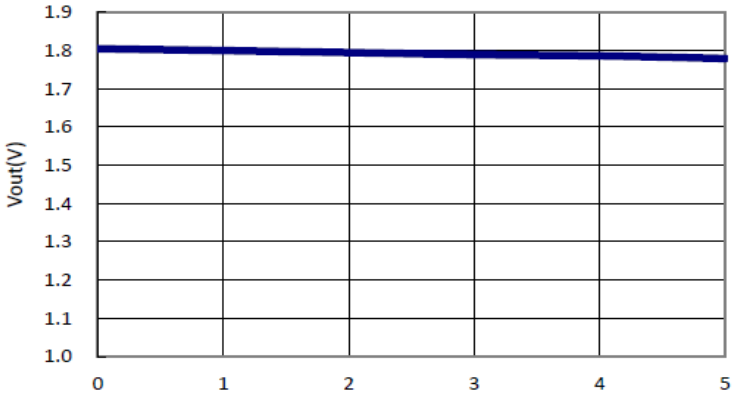
Dropout Voltage VS. Output Current



Output Voltage VS. Temperature



Output Voltage VS. Output Current



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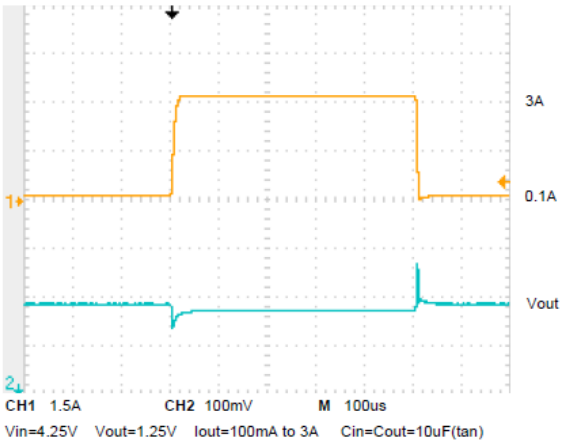
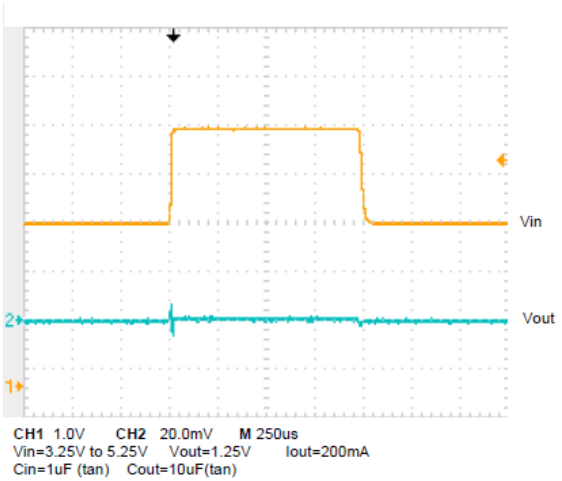
Load Transient Response

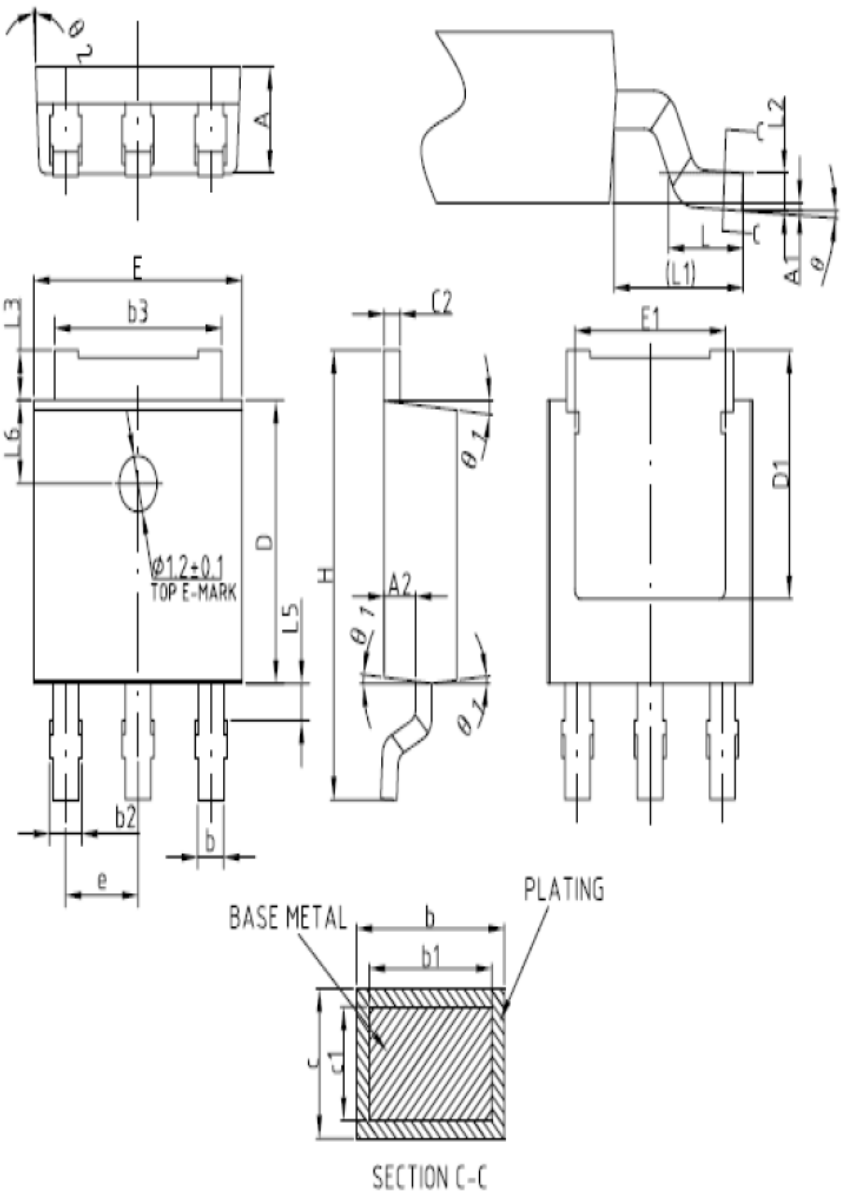


Line Transient Response



Packing Information

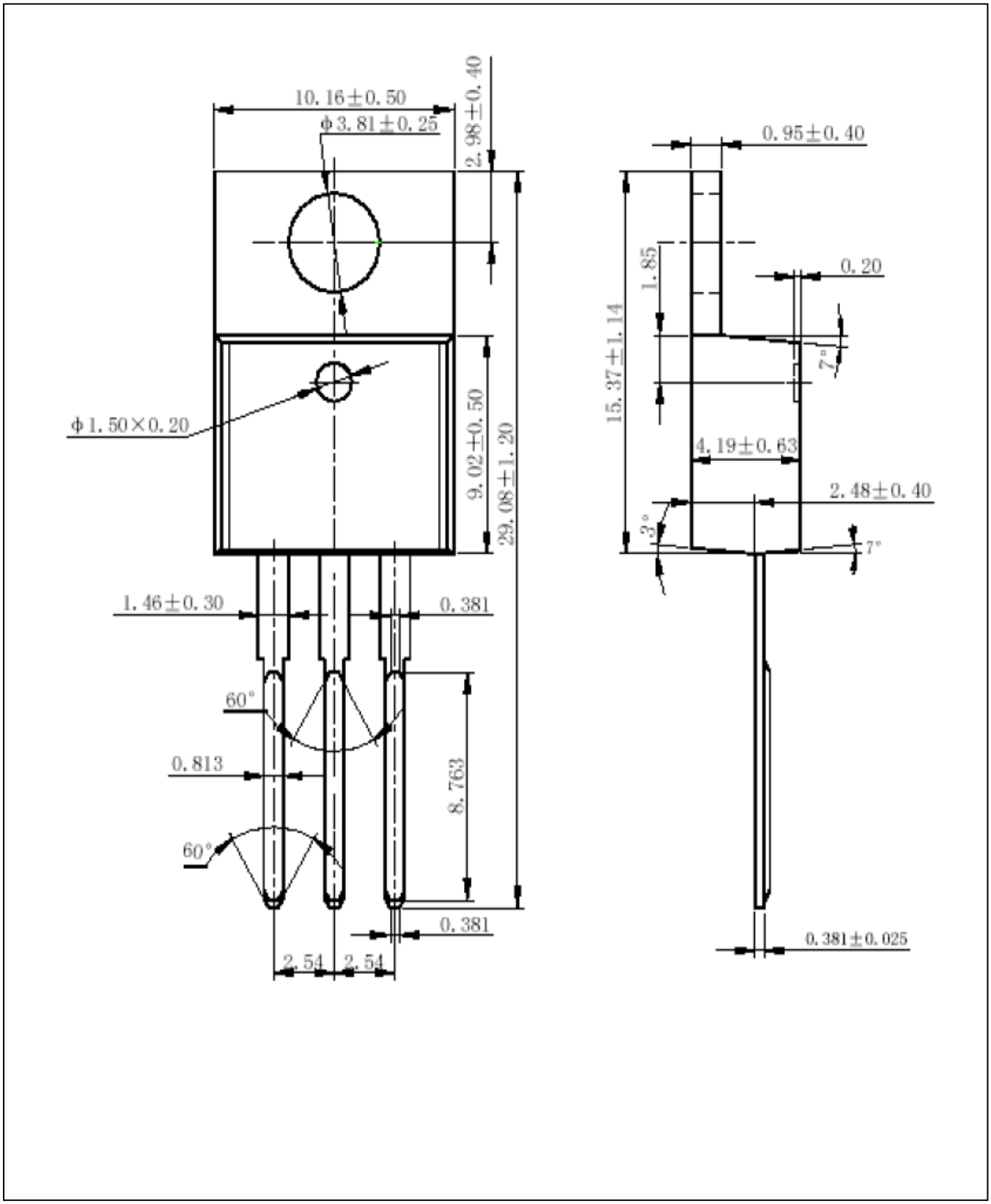
TO-252



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°

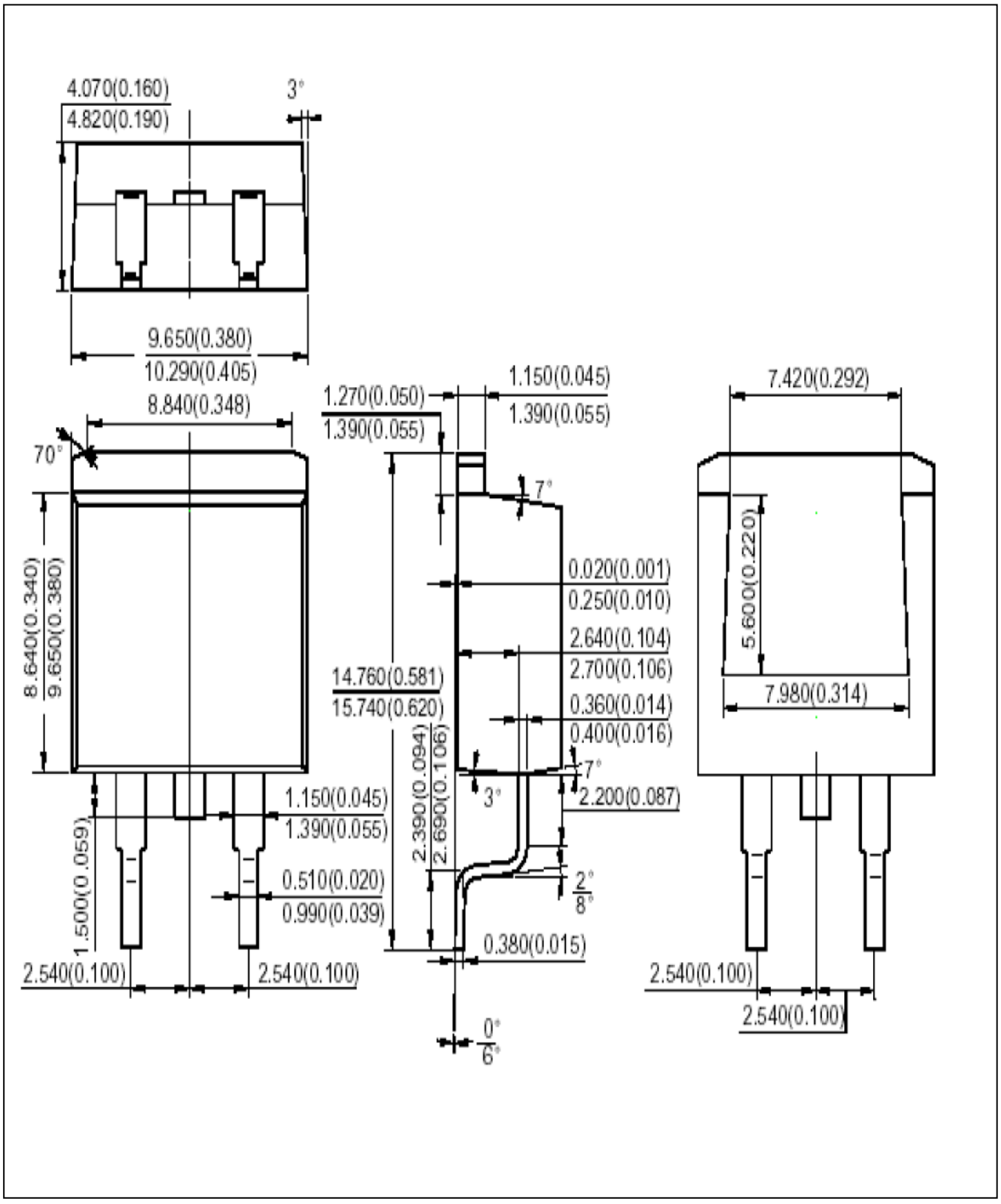
Packing Information

TO-220



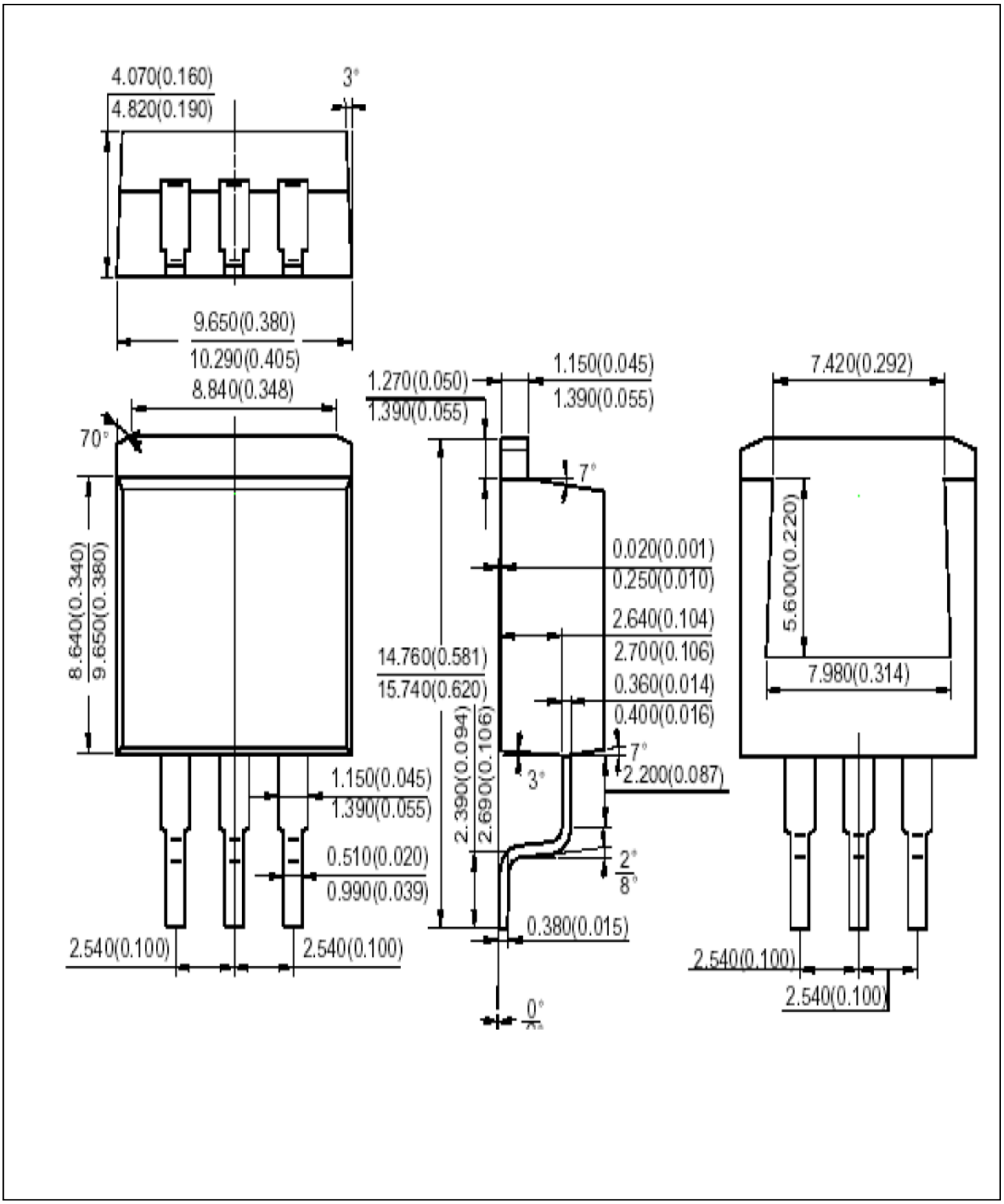
Packing Information

TO-263-3



Packing Information

TO-263-2



Notes

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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.

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