BL1085

3A Bipolar Linear Regulator

DESCRIPTION

BL1085 is a series of low dropout three terminal regulators with a dropout of 1.3V at 3A load current.

Other than a fixed version (Vout = 1.8V,2.5V,3.3V,5.0V ）, BL1085 has an adjustable version, The adjustable version can set the output voltage with two external resistors.

BL1085 offers thermal shut down and current limit functions, to assure the stability
of chip and power system. And it uses trimming technique to guarantee output voltage accuracy within ±2％.

BL1085 series is available in standard packages of TO-263-2L, TO-263-3L, TO-220 and TO-252

TYPICAL APPLICATION
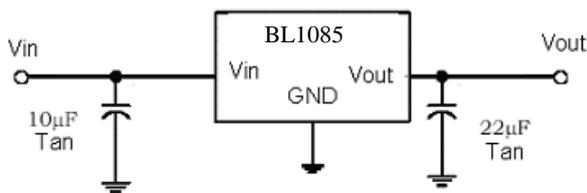
Application circuit of BL1085 fixed version

NOTE: Input capacitor (Cin=10uF) and Output capacitor (Cout=22uF) are recommended in all application circuit. Tantalum capacitor is recommended*.*

FEATURES

- Other than a fixed version and an adjustable version, output value can be customized on command
- Maximum output current is 3A
- Output voltage accuracy is within ±2％
- Range of operation input voltage: Max 15V
- Line regulation: 0.2％ (Typical)
- Load regulation: 0.2％ (Typical)
- Environment Temperature: -40℃~85℃

APPLICATIONS

- Power Management for Computer Mother Board, Graphic Card
- Battery Charger
- Post Regulators for Switching Supplies
- Microprocessor Supply

ELECTRICAL CHARACTERISTICS
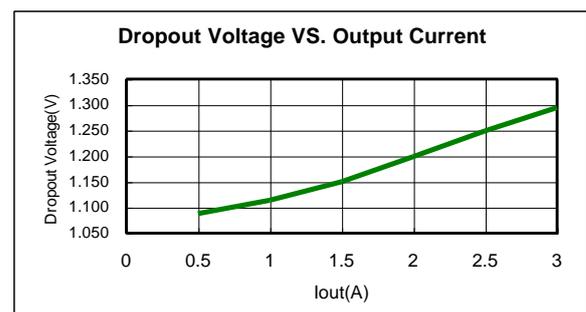
BL1085

ORDERING INFORMATION

BL1085 ①②③

Code	Description
①	Output voltage: e.g. 18=1.8V 33=3.3V AD=Output adjustable
②	Temperature&Rohs: C: -40~85°C ,Pb Free Rohs Std.
③	Package type: Y:TO-252 S:TO-263-2L S1:TO-263-3L Z:TO-220-3L

ABSOLUTE MAXIMUM RATING

| Parameter		Value
Max Input Voltage		15V
Operating Junction Temperature(Tj)		150°C
Ambient Temperature(Ta)		-40°C –85°C
Package Thermal Resistance	TO-252	12.5℃ / W
	TO-263	3℃ / W
	TO-220	3℃ / 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.

RECOMMENDED WORK CONDITIONS

Parameter	Value
Input Voltage Range	Max.15V
Operating Junction Temperature(Tj)	-40°C –85°C

PIN CONFIGURATION
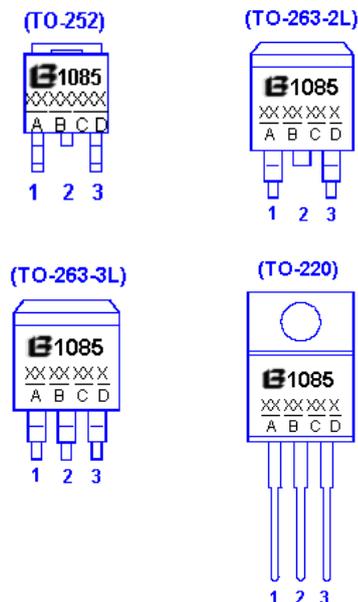
Pin Description：

Fixed Version

Pin No.	Symbol	Definition
1	GND	Ground
2	Vout	Output
3	Vin	Input

Adjustable Version

Pin No.	Symbol	Definition
1	Adj.	Adjustable
2	Vout	Output
3	Vin	Input

Marking information：

A：Means Manufacture Years & weeks

B：Means Manufacture LOT No.

C:Means Output Voltage Value

D:Means Temp. Range&Rohs Std

ELECTRICAL CHARACTERISTICS

Tj=25℃

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Vref	Reference Voltage	10mA≤Iout≤3A ,1.5V≤Vin-Vout≤5V	1.225	1.25	1.275	V
Vout	Output Voltage	BL1085-1.80V Iout=0mA,Vin=4.8V,Tj=25℃ 10mA≤Iout≤3A ,3.4V≤Vin≤7V	1.773 1.764	1.80 1.80	1.827 1.836	V
		BL1085-2.50V Iout=0mA,Vin=4.8V,Tj=25℃ 10mA≤Iout≤3A ,4.1V≤Vin≤7V	2.462 2.45	2.50 2.50	2.537 2.55	V
		BL1085-3.3V Iout=0mA,Vin=6.3V,Tj=25℃ 10mA ≤Iout≤3A ,4.9V≤Vin≤8V	3.25 3.234	3.3 3.3	3.35 3.366	V
		BL1085-5.0V Iout=0mA,Vin=8.0V,Tj=25℃ 10mA ≤Iout≤3A ,6.6V≤Vin≤10V	4.925 4.90	5.0 5.0	5.075 5.10	V
ΔVout	Line Regulation (note 1)	BL1085-ADJ Iout=10mA 2.85V≤Vin≤10V		10	40	mV
		BL1085-1.8V Iout=10mA 3.4V≤Vin≤10V		10	40	mV
		BL1085-2.5V Iout=10mA 4.1V≤Vin≤10V		10	40	mV
		BL1085-3.3V Iout=10mA 4.9V≤Vin≤10V		10	40	mV
		BL1085-5.0V Iout=10mA 6.6V≤Vin≤10V		10	40	mV
ΔVout	Load Regulation (note 1,2)	BL1085-ADJ Vin-Vout=3V, 10mA≤Iout≤3A		16	50	mV
		BL1085-1.8V Vin-Vout=3V, 0≤Iout≤3A		16	50	mV
		BL1085-2.5V Vin-Vout=3V, 0≤Iout≤3A		16	50	mV
		BL1085-3.3V Vin-Vout=3V, 0≤Iout≤3A		16	50	mV

		BL1085-5.0V Vin-Vout=3V, 0≤Iout≤3A		16	50	mV
Vin-Vout	Dropout Voltage (note 3)	ΔVout, ΔVref =1% , Iout=3A		1.3	1.5	V
Ilimit	Current Limit	Vin-Vout=3V, Tj=25℃	3.2	4.5		A
	Minimum Load Current (note 4)	BL1085-ADJ		3	10	mA
Iq	Quiescent Current	Vin=10V		5	10	mA
IAdj	Adjust Pin Current (Adjustable Version)	Vin=4.25V, Iout=10mA		45	120	uA
Ripple Rejection		F=120Hz,Cout=25uF(tan), Iout=3A,Vin-Vout=3V	60			dB
Ichange	Adjust Pin Current Change	10mA≤Iout≤3A 1.5V≤Vin-Vout ≤6V		0.4	10	uA
	Temperature Stability	Iout=10mA, Vin-Vout=1.5V			0.5	%
θ_{JC}	Thermal Resistance junction to case	TO-252 TO-263 TO-220		12.5 3 3		℃ / W

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

Note2:When Iout varies between 0~3A,Vin-Vout varies between 1.5V~6V under constant junction temperature, the parameter is satisfied the criterion in table. If temperature varies between -40℃≤ TA≤85℃, it needs output current to be larger than 10mA to satisfy the criterion.

Note3:Dropout Voltage is tested under Iout=3A and the following testing conditions: First step is to find out the Vout value(Vout1) when Vin1=Vout+1.5V, second step is to decrease Vin(Vin2) until Vout value is equal to 99%*Vout1(Vout2). Vdropout=Vin2-Vout2.

Note4：Minimum Load Current is defined as the minimum output current required to maintain regulation. When 1.5V≦Vin-Vout≦6V，the device is guaranteed to regulate if the output current is greater than 10mA.

BLOCK DIAGRAM
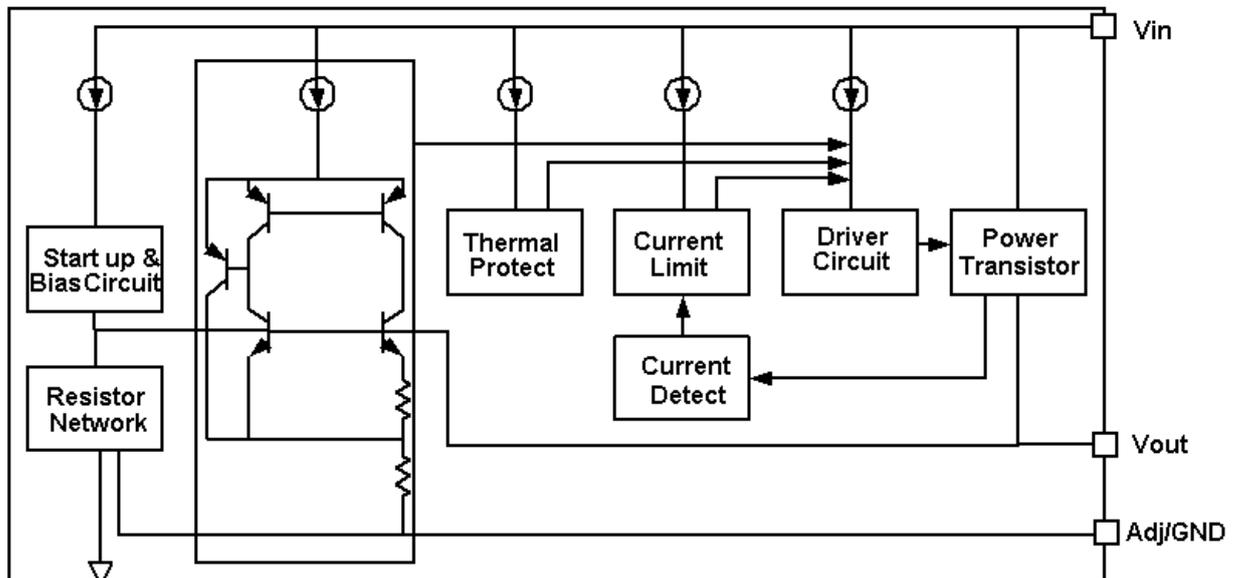
DETAILED DESCRIPTION

BL1085 is a series of low dropout voltage, three terminal regulators. Its application circuit is very simple: the fixed version only needs two capacitors and the adjustable version only needs two resistors and two capacitors to work. It is composed of some modules including start-up circuit, bias circuit, bandgap, thermal shutdown, current limit, power transistors and its driver circuit and so on.

The thermal shut down and current limit modules can assure chip and its application system working safety when the environment temperature is larger than 140℃ or output current is larger than 3.2A.

The bandgap module provides stable reference voltage, whose temperature coefficient is compensated by careful design considerations. The temperature coefficient is under 100ppm/℃.And the accuracy of output voltage is guaranteed by trimming technique.

TYPICAL APPLICATION

 BL1085 has an adjustable version and fixed versions, Chart1 is its typical application：
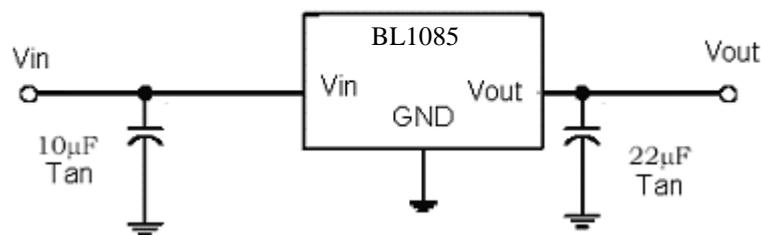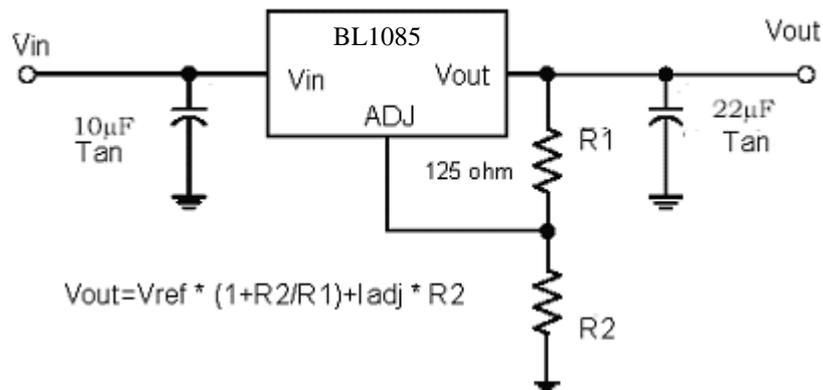
Typical Application of BL1085

APPLICATION HINTS

Recommend using 10uF tan capacitor as bypass capacitor for all application circuit.

Recommend using 22uF tan capacitor to assure circuit stability.

Using a bypass capacitor(C_{Adj}) between the adjust terminal and ground can improve ripple rejection, This bypass capacitor prevents ripple from being amplified as the output voltage is increased. The impedance of C_{Adj} should be less than the resistor's(R1) which is between output and adjust pins to prevent ripple from being amplified at any ripple frequency. As R1 is normally in the range of $120\,\Omega \sim 200\,\Omega$,the value of C_{Adj} should satisfy this equation: $2*Fripple*C_{Adj}<R1$. Recommend using 10uF tan capacitor.

OUTPUT VOLTAGE OF ADJUSTABLE VERSION

The BL1085 adjustable version provide 1.25V Reference Voltage. Any output voltage between 1.25V~13.8V can be available by choosing two external resistors (connection method is shown in chart 1). In chart 1, R1,R2 is the two external resistors.

EXPLANATION

The output voltage of adjustable version satisfies this followed equation: $VOut=VRef*(1+R2/R1)+IAdj*R2$. We can ignore IAdj because IAdj (about 50uA) is much less than the current of R1(about 4mA).

How to choose R1：The value of R1 should be in the range of $120\,\Omega \sim 200\,\Omega$ to assure chip working normally without any load. To assure the electrical performance showed in table 1, the output current should be larger than 5mA. If R1 is too large, the minimum output current should be larger than 4mA , The best working condition is to assure that the output current exceeds 10mA.

BL1085

TYPICAL PERFORMANCE CHARACTERISTICS

Dropout Voltage VS.Output Current
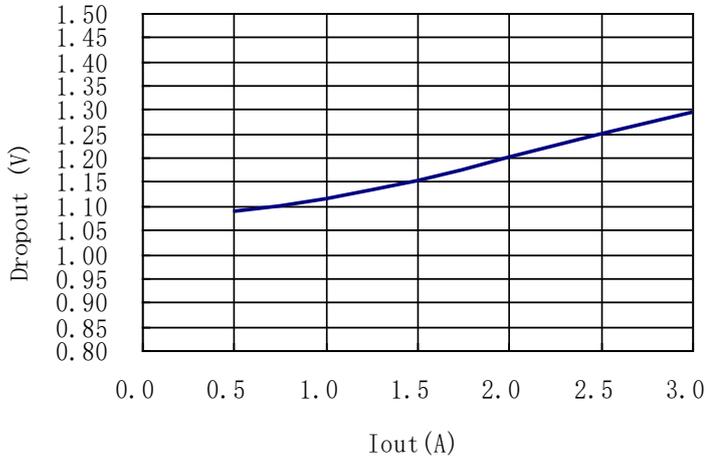
Reference Voltage VS.Temperature
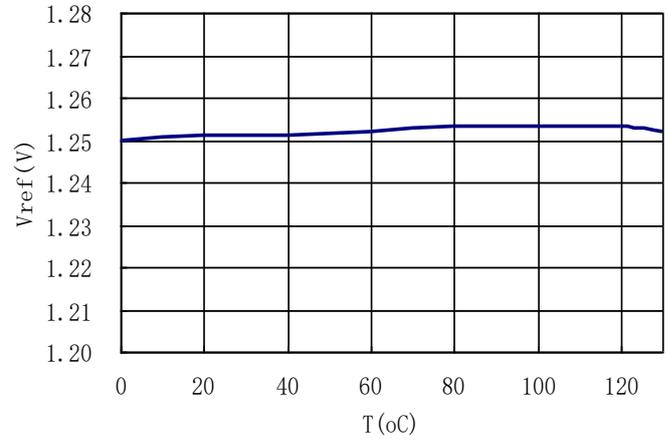
Reference Voltage VS. Thermal Protection

Iout=1A
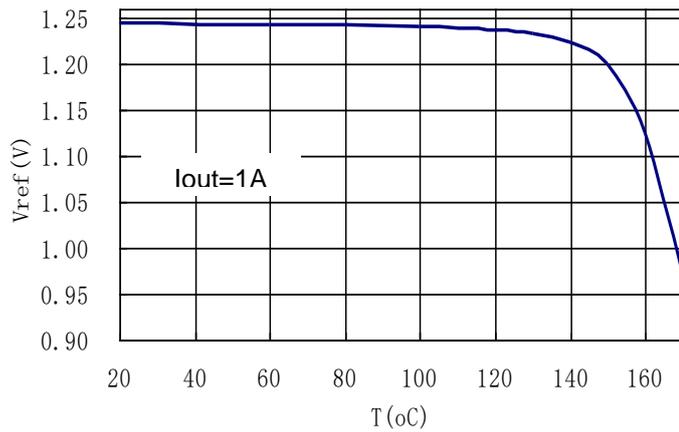
Output Voltage VS. Output Current

Vin=2.55

Load Transient Response

3A

0.1A

Vout

CH1 1.5A   **CH2** 100mV   **M** 100us
Vin=4.25V   Vout=1.25V   Iout=100mA to 3A   Cin=Cout=10uF(tan)

Line Transient Response

Vin

Vout

CH1 1.0V   **CH2** 20.0mV   **M** 250us
Vin=3.25V to 5.25V   Vout=1.25V   Iout=200mA
Cin=1uF (tan)   Cout=10uF(tan)
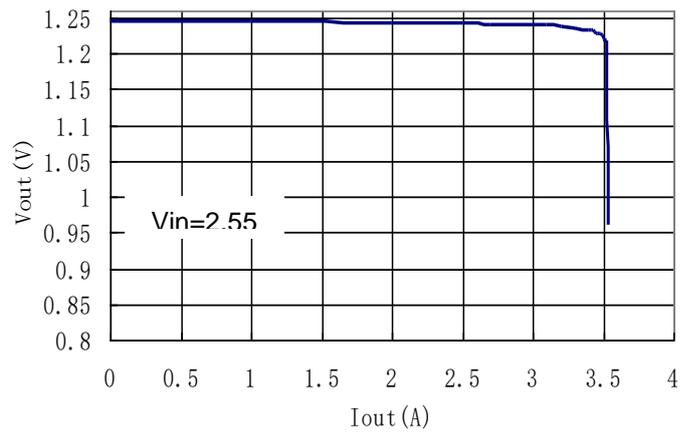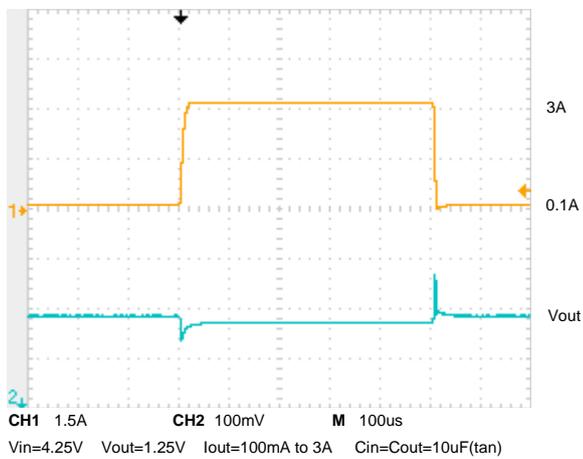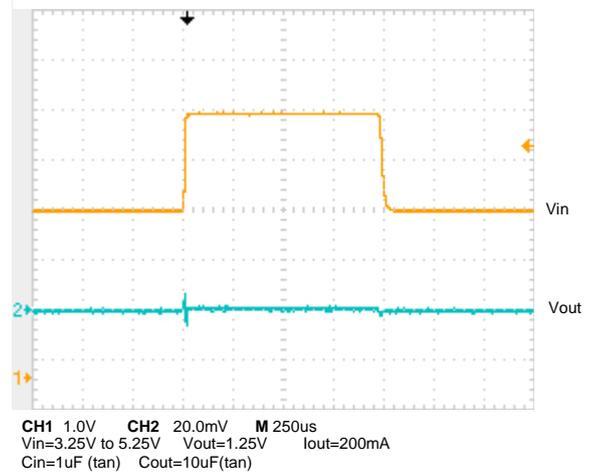
PACKAGE LINE

Package	TO-252	Devices per reel	2500	Unit	mm

Package specification：

COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	2.20	2.30	2.38
A1	0	–	0.10
A2	0.90	1.01	1.10
b	0.72	–	0.85
b1	0.71	0.76	0.81
b2	0.72	–	0.90
b3	5.13	5.33	5.46
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	2.186	2.286	2.386
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
L4	0.60	0.80	1.00
L5	0.15	–	0.75
L6		1.80REF	
θ	0°	–	8°
θ1	5°	7°	9°
θ2	5°	7°	9°

Package	TO-220	Devices per tube	50	Unit	mm

Package specification：
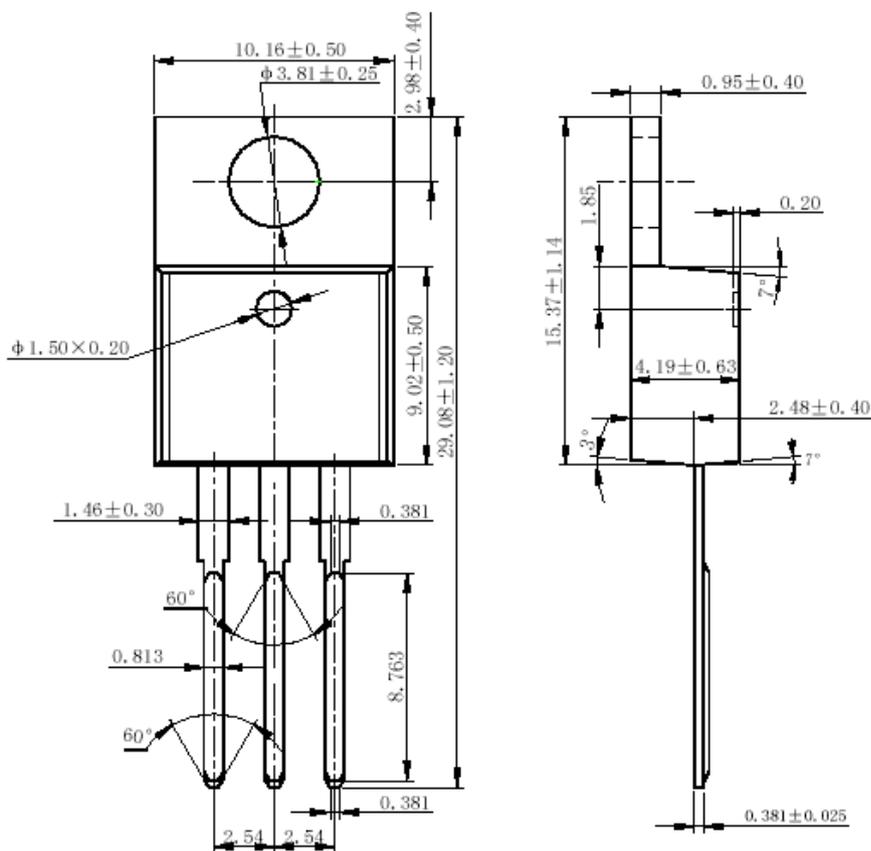
Package	TO-263-2L	Devices per reel	800	Unit	mm

Package specification：

BL1085

Package	TO-263-3L	Devices per reel	800	Unit	mm

Package specification：

BL1085

Package	TO-263-3L	Devices per reel	800	Unit	mm

Package specification：