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TDS1084-3.3-TD

產品規格說明書

Features

- 1.4V Maximum Dropout at Full Load Current
- Built-in Thermal Shutdown
- Output Current Limiting
- Adjustable Output Voltage or Fixed 1.5V, 1.8V, 2.5V,3.3V, 5.0V
- Fast Transient Response
- Good Noise Rejection
- Lead Free Packages: TO252-3L, TO263-3L and TO220-3L
- TO252-3L, TO263-3L and TO220-3L: Available in “Green” Molding Compound (No Br, Sb)
- Lead Free Finish/RoHS Compliant (Note 1)

General Description

TDS1084 is a low dropout positive adjustable or fixed-mode regulator with 5. 0Aoutput current capability. The product is specifically designed to provide well-regulated supply for low voltage IC applications such as high-speed bus termination and low current 3.3V logic supply.

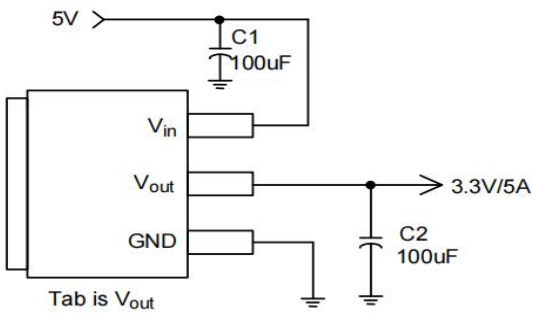
TDS1084is also well suited for otherapplications such as VGA cards.

TDS1084is guaranteed to have lower than 1.4V

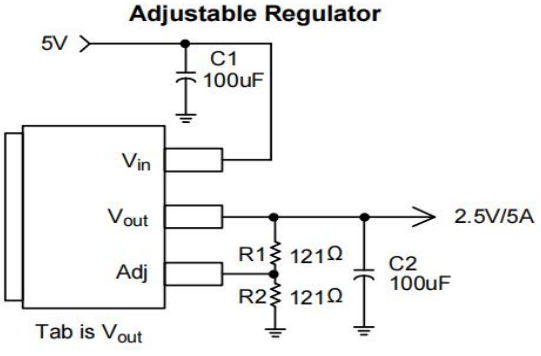
dropout at full load current making it ideal to provide well-regulated outputs of 1.25 to 3.3V with 4.7 to 12V input supply.

Typical Application Circuit

5.0V to 3.3V Fixed Mode Regulator



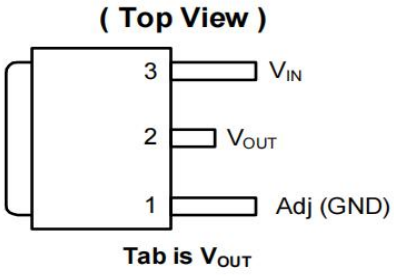
Adjustable Regulator



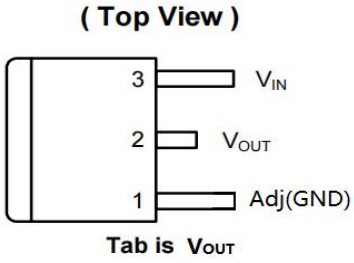
Note: $V_O = V_{REF} * (1 + \frac{R_2}{R_1})$

Pin Assignment

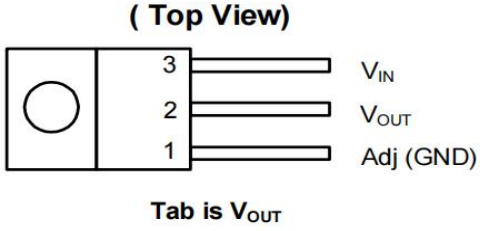
(1) TO252-3L



(2) TO263-3L



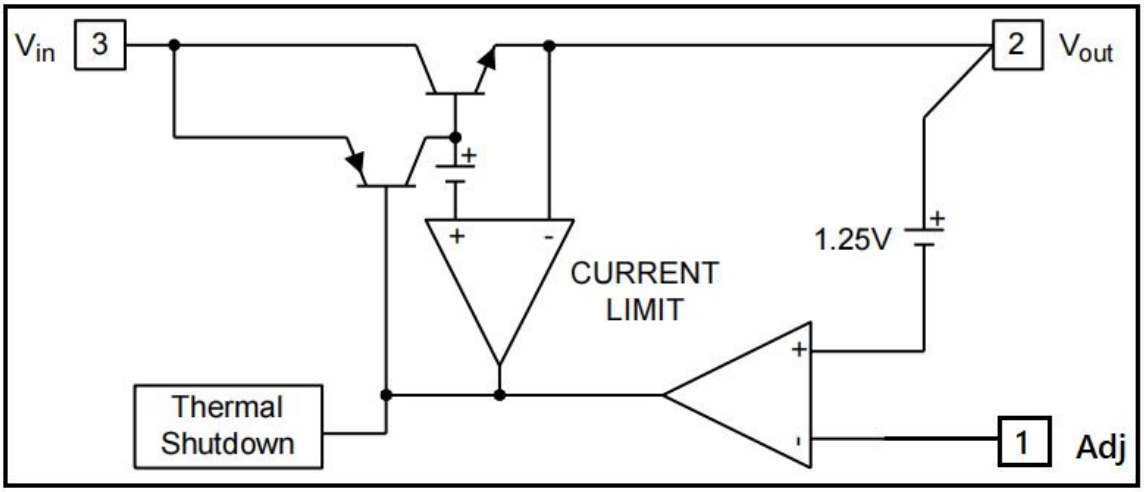
(3) TO220-3L



Pin Description

Pin Name	I/O	Pin #	Description
Adj(GND)	I	1	Adjustable(Ground only for fixed mode) A resistor divider from this pin to the V_{OUT} Pin and ground sets the output voltage(Ground only for Fixed-Mode)
V_{OUT}	O	2	The output of the regulator.A minimum of 10uF(0.15Ω≤ESR≤20Ω)capacitor must be connected from this pin to ground to insure stability.
V_{IN}	I	3	The input pin of regulator.Typically a large storage capacitor is connected from this pin to ground to insure that the input voltage does not sag below the minimum dropout voltage during the load transient response.This pin must always be 1.4V(1.3V)higher than V_{OUT} in order for the device to regulate properly.

Block Diagram



Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
V_{IN}	DC Supply Voltage	-0.3 to 12	V
T_{ST}	Storage Temperature	-65 to +150	℃
T_{MJ}	Maximum Junction Temperature	150	℃

Recommended Operating Conditions

Symbol	Parameter	Min	Max	Unit
T_{OP}	Operating Junction Temperature Range	0	125	℃

Electrical Characteristics (Under Operating Conditions)

Symbol	Parameter	Conditions	Min	Typ.	Max	Unit
V_{REF}	Reference Voltage	I_O=10mA,T_A=25℃,(V_{IN}-V_{OUT})=1.5V	1.225	1.250	1.275	V
Line Regulation	TDS1084-XXX	I_O=10mA,V_{OUT}+1.5V＜V_{IN}＜12V,T_A=25℃			0.2	%
	TDS1084-1.5	I_{OUT}=10mA,T_A=25℃,3V≦V_{IN}≦12V	1.47	1.500	1.53	V
	TDS1084-1.8	I_{OUT}=10mA,T_A=25℃,3.3V≦V_{IN}≦12V	1.764	1.800	1.836	V
	TDS1084-2.5	I_{OUT}=10mA,T_A=25℃,4V≦V_{IN}≦12V	2.45	2.500	2.55	V
	TDS1084-3.3	I_{OUT}=10mA,T_A=25℃,4.8V≦V_{IN}≦12V	3.235	3.300	3.365	V
	TDS1084-5.0	I_{OUT}=10mA,T_A=25℃,6.5V≦V_{IN}≦12V	4.9	5.000	5.100	V
Load Regulation	TDS1084-Adj	V_{IN}=3.3V,0mA＜I_O＜5A， T_A=25℃			1	%
	TDS1084-1.5	V_{IN}=3V,0mA＜I_O＜5A， T_A=25℃ (Note 3,4)		12	15	mV
	TDS1084-1.8	V_{IN}=3.3V,0mA＜I_O＜5A， T_A=25℃(Note 3,4)		15	18	mV
	TDS1084-2.5	V_{IN}=4V,0mA＜I_O＜5A， T_A=25℃ (Note 3,4)		20	25	mV
	TDS1084-3.3	V_{IN}=5V,0mA＜I_O＜5A， T_A=25℃ (Note 3,4)		26	33	mV
	TDS1084-5.0	V_{IN}=8V,0mA＜I_O＜5A， T_A=25℃ (Note 3,4)		40	50	mV
$\triangle V_O$	Dropout Voltage	I_O=5.0A($\triangle V_{OUT}$=1% V_{OUT})		1.3	1.4	V
	Current Limit	V_{IN}-V_{OUT}=5V	5.1			A
	Minimum Load Current			5	10	mA
	Temperature Stability	I_O=10mA		0.5		%
T_{SD}	Thermal Shutdown Temperature			150		℃
θ_{JA}	Thermal Resistance Junction-to-Ambient (Note 5)	TO220-3L		78		℃/W
		TO252-3L		73		
		TO263-3L		60		
θ_{JC}	Thermal Resistance Junction-to-Case (Note 5)	TO220-3L:Control Circuitry/Power Transistor		3.5		℃/W
		TO252-3L:Control Circuitry/Power Transistor		12		
		TO263-3L:Control Circuitry/Power Transistor		3.5		

Notes: 3. See thermal regulation specifications for changes in output voltage due to heating effects. Line and load regulation are measured at a constant junction temperature by low duty cycle pulse testing. Load regulation is measured at the output lead = 1/18" from the package.

4. Line and load regulation are guaranteed up to the maximum power dissipation of 15W. Power dissipation is determined by the difference between input and output and the output current. Guaranteed maximum power dissipation will not be available over the full input/output range.

5. Test conditions for TO220-3L, TO252-3L and TO263-3L: Devices mounted on FR-4 substrate, single sided PC board, 2oz copper, with minimum recommended pay layout, no air flow. The case point of θ_{JC} is located on the thermal tab.

Functional Description

Introduction

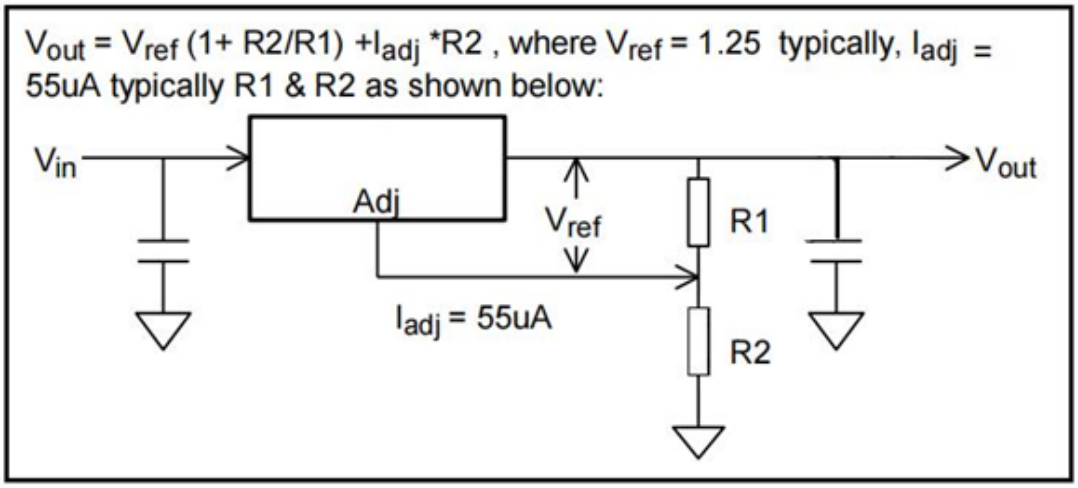
The TDS1084 adjustable Low Dropout (LDO regulator is a 3 terminal device that can easily be programmed with the addition of two external resistors to any voltages within the range of 1.25V to Vin-1.4V. The TDS1084only needs 1.4V

differential between V_{IN} and V_{OUT} to maintain output regulation. In addition, the output voltage tolerances are also extremely tight and they include the transient response as part of the specification. For example, Intel VRE specification calls for a total of +/- 100mV including initial tolerance, load regulation and 0 to 5.0A load step.

The TDS1084is specifically designed to meet the fast current transient need sas well as providing an accurate initial voltage,
reducing the overall system costwith the need for fewer output capacitors.

Output Voltage Setting

The TDS1084 can be programmed to any voltages in the range of 1.25V to Vin-1.4Vwith the addition of R1 and R2 external resistors
according to the following formula:



The TDS1084 keeps a constant 1.25V between the output pin and the adjust pin. Byplacing a resistor R1 across these two pins a constant current flows through R1, adding to the Iadj current and into the R2 resistor producing a voltage equal to the (1.25/R1)*R2+Iadj*R2 which will be added to the 1.25V to set the output voltage. This is summarized in the above equation. Since the minimum load current requirement of the TDS1084is 10mA, R1 is typically selected to be 121Ω
resistor so that it utomaticallysatisfies the minimum current requirement.
Notice that since Iadj is typically in the
range of 55uA it only adds a small error to the output voltage and should only be considered when a very precise output voltage setting is required. For example, in a typical 3.3V application where R1=121Ω and R2=200Ω the error due to Iadj is only 0.3% of the nominal set point.

Load Regulation

Since the TDS1084 is only a 3 terminal device, it is not possible to provide trueremote sensing of the output voltage at the load . The best load regulation is achieved when the bottom side of R2 is connected to the load and the top-side of R1 resistor is connected directly to the case or the VOUT pin of the regulator and not to the load. It is important to note that for high current applications, this can re-present a significant percentage of the overall load regulation and one must keep the path from the regulator to the load as short as possible to minimize this effect.

Stability

The TDS1084 requires the use of an output capacitor as part of the frequency compensation in order to make the regulator stable. For most applications a minimum of 10uF aluminum electrolytic capacitor insures both stability and good transient response.

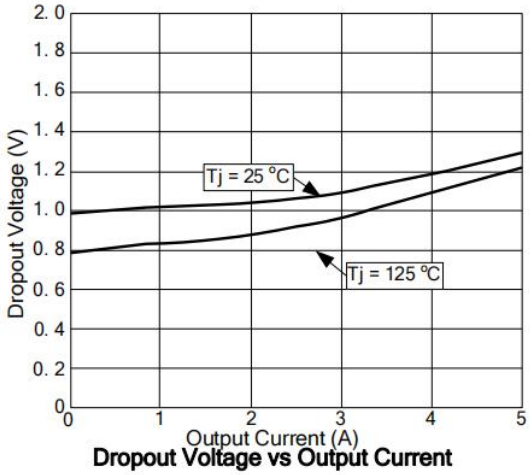
Thermal Design

The TDS1084 incorporates an internal thermal shutdown that protects the device when the junction temperature exceeds the maximum allowable junction temperature. Although this device can operate with junction temperatures in the range of 150oC, it is recommended that the selected heat sink be chosen such that during maximum ontinuous load operation the junction temperature is kept below that temperature.

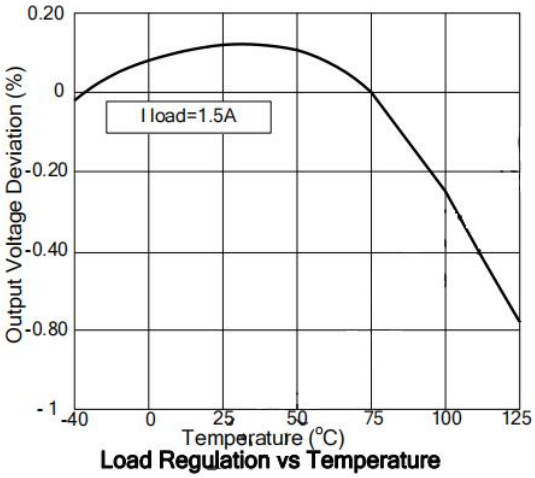
Layout Consideration

The output capacitors must be located as close to the VOUT terminal of the device as possible. It is recommended to use a section of a layer of the PC board as a plane to connect the VOUT pin to the output capacitors to prevent any high frequency scillation that may result due to excessive trace inductance.

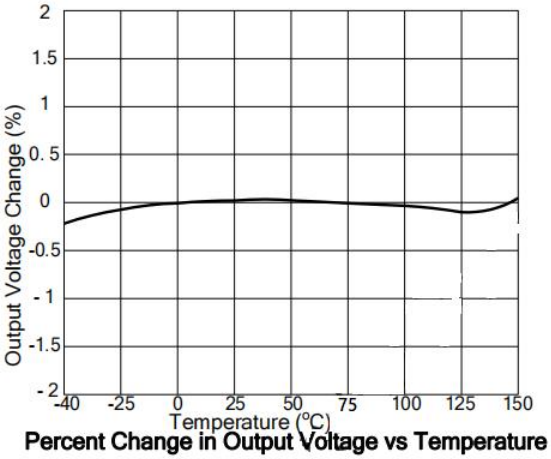
Typical Performance Characteristics



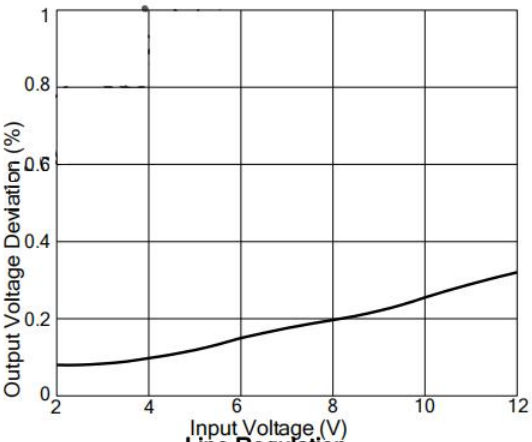
Dropout Voltage vs Output Current



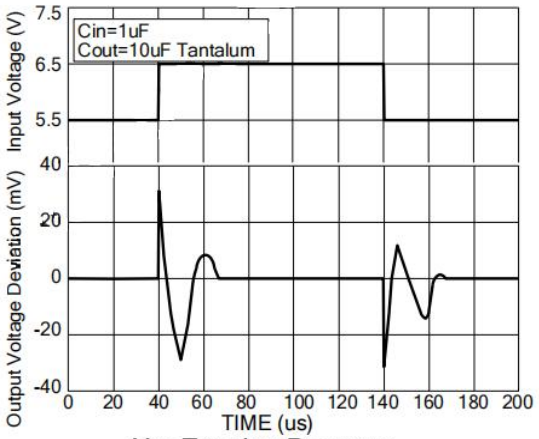
Load Regulation vs Temperature



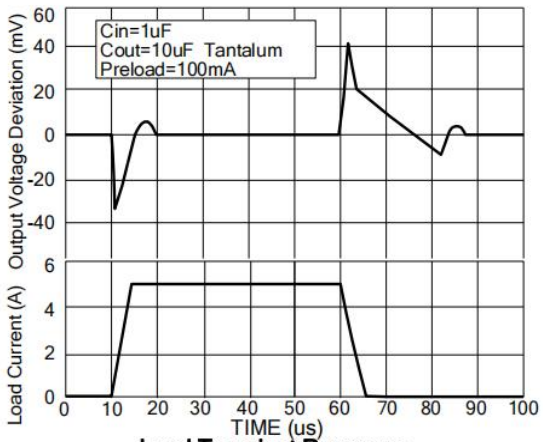
Percent Change in Output Voltage vs Temperature



Line Regulation



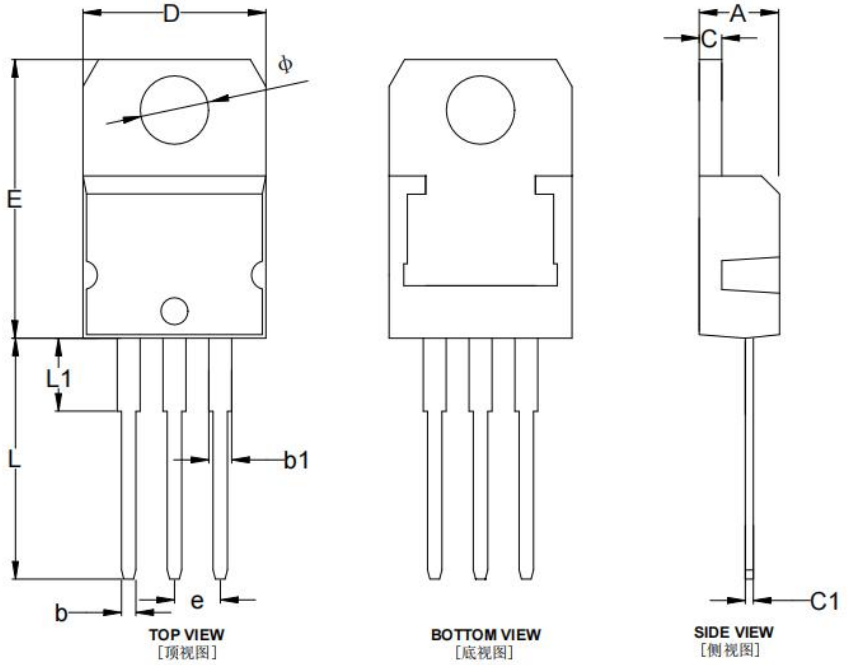
Line Transient Response



Load Transient Response

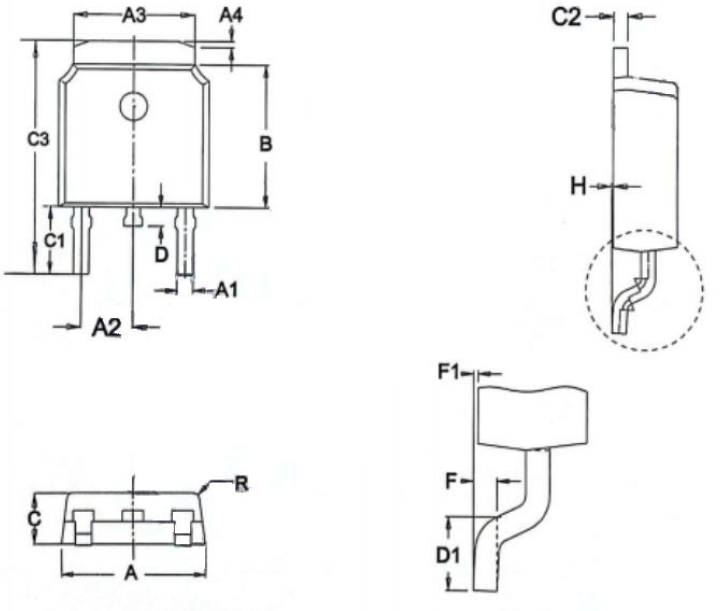
Package Information)

TO220-3L Unit:mm



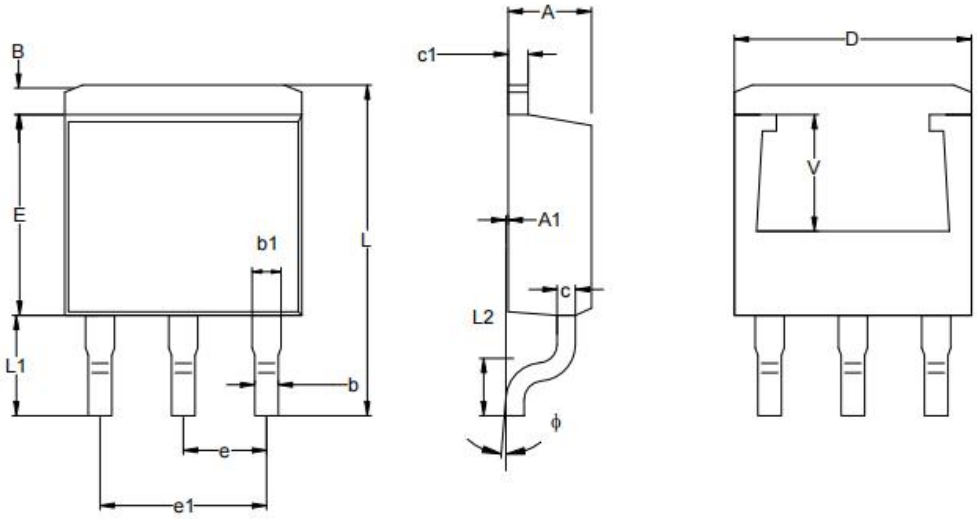
编号	尺寸(mm)		
	Min	TYP	Max
A	4.150	4.200	4.250
C	0.985	1.000	1.015
C1	0.365	0.380	0.395
D	10.060	10.080	10.100
E	15.250	15.500	15.750
ϕ	3.700	3.800	3.900
e	2.540TYP		
b	0.770	0.800	0.830
b1	1.230	1.270	1.290
L	13.000	13.500	14.000
L1	3.500	3.700	3.900

TO252 Unit:mm



尺寸 标注	最小值 （mm）	平均值 （mm）	最大值 （mm）
A	6.550	6.600	6.650
A1	0.640	0.690	0.740
A2		2.286	
A3	5.234	5.334	5.434
A4	0.070	0.270	0.470
B	6.050	6.100	6.150
C	2.250	2.300	2.350
D	0.700	0.800	0.900
D1	1.400	1.500	1.600
F		0.508	
F1	0	0.050	0.100
H	0	0.050	0.100
R		0.250	
C1	2.650	2.780	2.950
C2	0.504	0.508	0.510
C3	9.750	9.850	10.00

TO263-3L Unit:mm



TOP VIEW
[顶视图]

SIDE VIEW
[侧视图]

SIDE VIEW
[侧视图]

编号	尺寸(mm)		
	Min	TYP	Max
A	4.470	4.570	4.670
A1	0.000	0.075	0.150
B	1.120	1.270	1.420
b	0.710	0.810	0.910
b1	1.170	1.270	1.370
c	0.310	0.420	0.530
c1	1.170	1.270	1.370
D	10.010	10.160	10.310
E	8.700	9.050	9.400
e	2.540TYP		
e1	4.980	5.080	5.180
L	14.940	15.220	15.500
L1	4.950	5.200	5.450
L2	2.340	2.540	2.740
V	5.600REF		
ϕ	0°	4°	8°