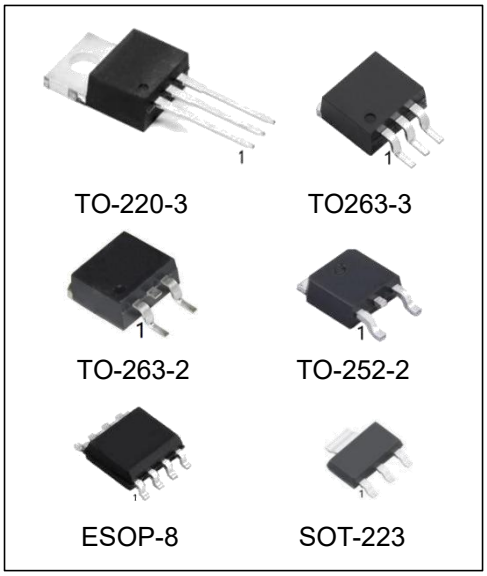
3-Terminal Adjustable Negative Regulator

Features

- Output voltage adjustable from −1.2V to −37V
- 1.5A output current guaranteed, -40°C to +125°C
- Line regulation typically 0.01%/V
- Excellent thermal regulation, 0.002%/W
- Excellent rejection of thermal transients
- Temperature-independent current limit
- Internal thermal overload protection
- 77 dB ripple rejection
- 50 ppm/°C temperature coefficient
- Load regulation typically 0.3%
- P+ Product Enhancement tested
- Output is short circuit protected



Ordering Information

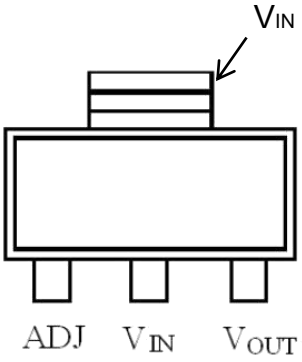
DEVICE	Package Type	MARKING	Packing	Packing Qty
LM337T/HG	TO-220-3	LM337	TUBE	50pcs/tube 1000pcs/box
LM337MDT/TR-HG	TO-252-2	LM337	REEL	2500pcs/reel
LM337MP/TR-HG	SOT-223	N02A	REEL	2500pcs/reel
LM337S/TR-HG	TO-263-3	LM337	REEL	500pcs/reel
LM337S2/TR-HG	TO-263-2	LM337	REEL	500pcs/reel
LM337LME/TR-HG	ESOP-8	LM337	REEL	2500pcs/reel

General Description

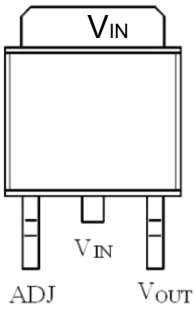
The LM337 are adjustable 3-terminal negative voltage regulators capable of supplying in excess of −1.5A over an output voltage range of −1.2V to −37V. These regulators are exceptionally easy to apply, requiring only 2 external resistors to set the output voltage and 1 output capacitor for frequency compensation. The circuit design has been optimized for excellent regulation and low thermal transients.

The LM337 serve a wide variety of applications including local on-card regulation, programmable-output voltage regulation or precision current regulation. The LM337 is ideal complements to the LM337 adjustable positive regulators.

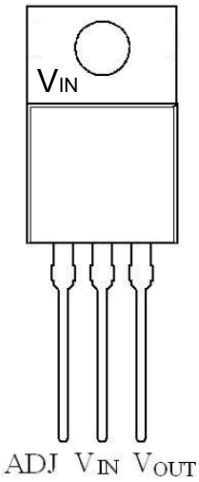
Pin Configuration



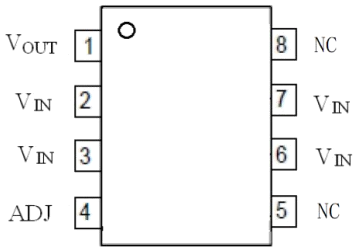
SOT-223



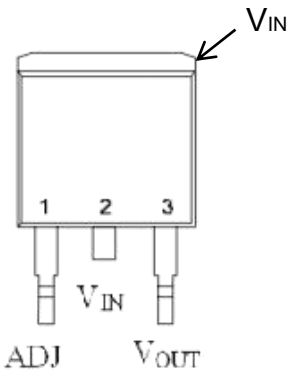
TO-252-2



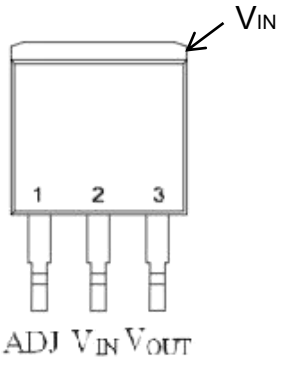
TO-220-3



ESOP-8

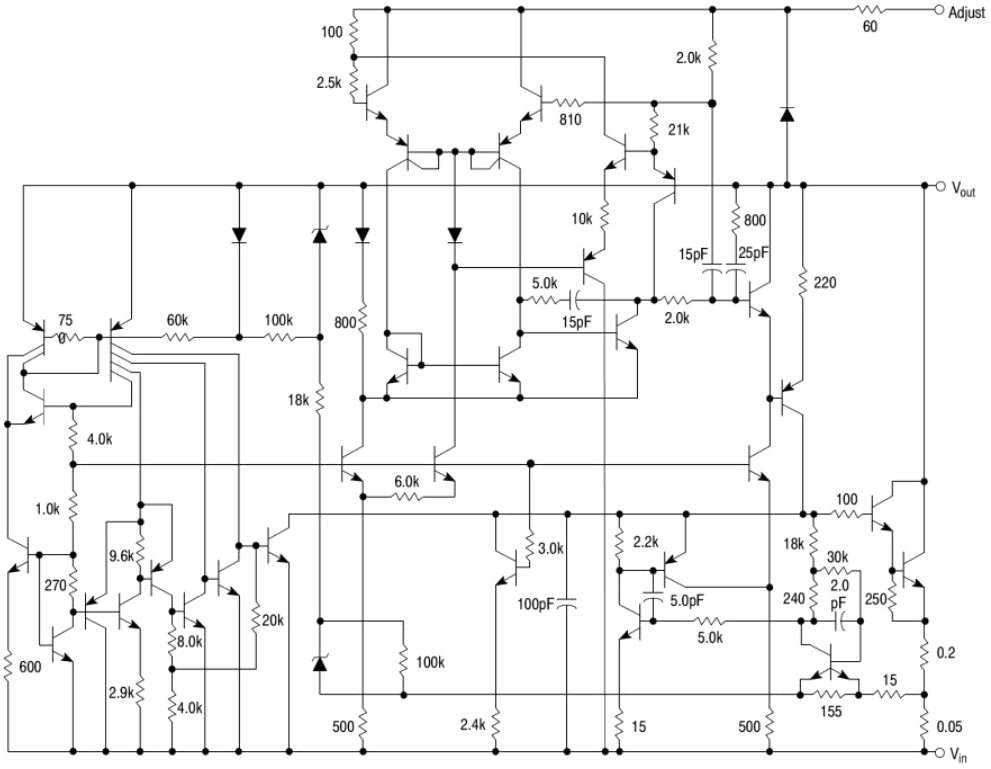


TO-263-2



TO-263-3

Block Diagram



Absolute Maximum Ratings *1

Characteristic		Value	Unit
Power dissipation		Internally limited	
Input- output voltage differential		40	V
Operating junction temperature range*2	TO-263/TO-220/TO-252 /SOT-223	-40 ~ +125	°C
	ESOP-8	-40 ~ +85	°C
Storage temperature		-65 ~ +150	°C
Lead temperature (soldering, 10 sec.)	TO-220/TO-263	245	°C
	TO-252/SOT-223/ESOP-8	260	
ESD rating		2k	V

Note:*1. Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is intended to be functional, but specific performance is not ensured.
*2. Operating junction temperature range: -40°C to +125°C. This product is designed for industrial grade applications. For automotive grade versions compliant with AEC-Q100, please conduct internal screening per the standard or contact our sales team for availability.

Electrical Characteristics *1

Characteristics	Test conditions	Min	Typ	Max	Unit
Line regulation	Tj=25°C,3V≤｜V_{IN}-V_{OUT}｜≤40V *2 IL=10mA		0. 01	0. 04	%/ V
Load regulation	Tj=25°C, 10mA≤I_{OUT}≤I_{MAX}		0. 3	1. 0	%
Thermal regulation	Tj=25°C, 10ms pulse		0. 003	0. 04	%/W
Adjustment pin current			65	100	μ A
Adjustment pin current charge	10mA≤I_L≤I_{MAX},T_A=25°C 3V≤｜V_{IN}-V_{OUT}｜≤40V		2	5	μ A
Reference voltage	Tj=25°C *3 3V≤｜V_{IN}-V_{OUT}｜≤40V *3 10mA≤I_{OUT}≤I_{MAX}, P≤P_{MAX}	-1.213 -1.200	-1.250 -1.250	-1.287 -1.300	V
Line regulation	3V≤｜V_{IN}-V_{OUT}｜≤40V *2		0. 02	0. 07	%/ V
Load regulation	10mA≤I_{OUT}≤I_{MAX} *2		0. 3	1. 5	%
Temperature stability	T_{MIN}≤Tj≤T_{MAX}		0. 6		%
Minimum load current	｜V_{IN}-V_{OUT}｜≤40V ｜V_{IN}-V_{OUT}｜≤10V		2. 5 1. 5	10 6	mA
Current limit	｜V_{IN}-V_{OUT}｜≤15V ｜V_{IN}-V_{OUT}｜=40V, T_j=25°C	1. 5 0. 15	2. 2 0. 4	3. 7	A
RMS output noise,% of VOUT	T_j=25°C, 10Hz ≤ f ≤10kHz		0. 003		%
Ripple rejection ratio	V_{OUT} =- 10 V, f= 120 Hz C_{ADJ} =10 μ F	66	60 77		dB
Long- term stability	Tj=125°C, 1000 Hours		0. 3	1	%
Thermal resistance, junction to case	SOT 223 TO 220 TO 252		2. 3 12 4	3 15	°C/W
Thermal resistance, junction to ambient (no heat sink)	SOT 223 TO 220 TO 252		35 140 50		°C/W

*1 : Unless otherwise specified, these specifications apply -40°C ≤ Tj ≤ +125 °C for the LM337; V_{IN} − V_{OUT} = 5V; and I_{OUT} = 0.5A for the TO252 , SOT223 and TO220 packages. Although power dissipation is internally limited, these specifications are applicable for power dissipations of 2W for the SOT223 (see Application Hints), and 20W for the TO252 , and TO220 . I_{MAX} is 1.5A for the TO252 , SOT223 and TO220 packages.

*2: Regulation is measured at constant junction temperature , using pulse testing with a low duty cycle . Change s in output voltage due to heating effects are covered under the specification for thermal regulation. Load regulation is measured on the output pin at a point 1⁄8" below the base of the TO252 packages.

*3: Selected devices with tightened tolerance reference voltage available .

Application Summary

When a value for $\theta_{(H-A)}$ is found using the equation shown, a heatsink must be selected that has a value that is less than or equal to this number.

Heatsinking SOT223 Package Parts

The SOT223 packages use a copper plane on the PCB and the PCB itself as a heatsink. To optimize the heat sinking ability of the plane and PCB, solder the tab of the package to the plane.

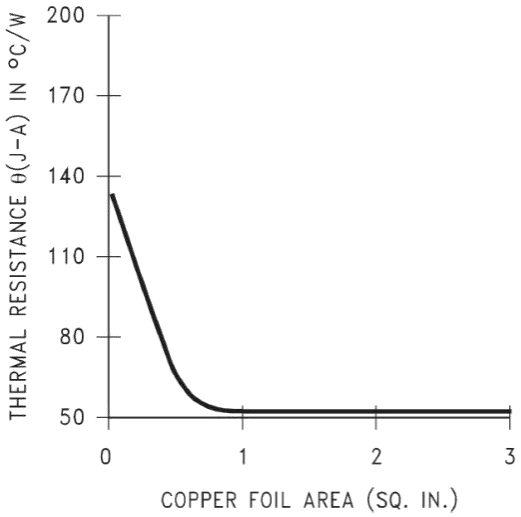


Fig. θ(J−A) vs Copper (2 ounce) Area for the SOT223 Package

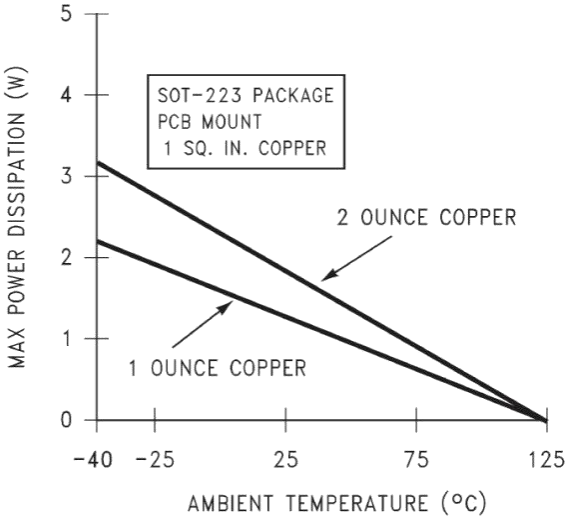
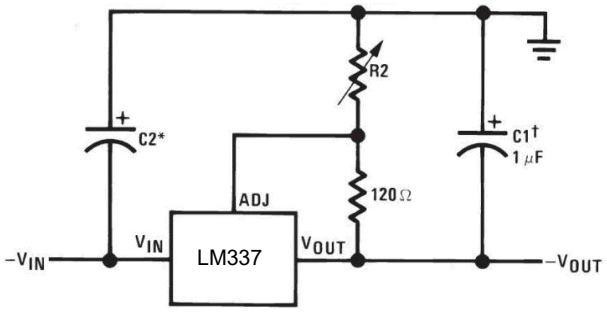


Fig. Maximum Power Dissipation vs. TAMB for the SOT223 Package

Typical Application

Adjustable Negative Voltage Regulator



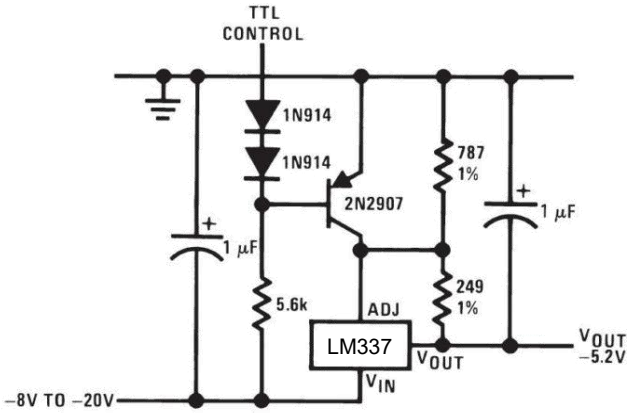
Full output current not available at high input-output voltages

$$-V_{OUT} = -1.25V\left(1+\frac{R2}{120}\right)+\left(-I_{ADJ}*R2\right)$$

† C1 = 1 μF solid tantalum or 10 μF aluminum electrolytic required for stability
*C2 = 1 μF solid tantalum is required only if regulator is more than 4" from power-supply filter capacitor

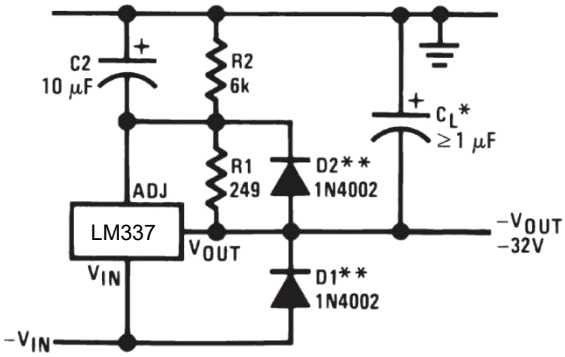
Output capacitors in the range of 1 μF to 1000 μF of aluminum or tantalum electrolytic are commonly used to provide improved output impedance and rejection of transients

-5.2V Regulator with Electronic Shutdown*



*Minimum output = -1.3V when control input is low

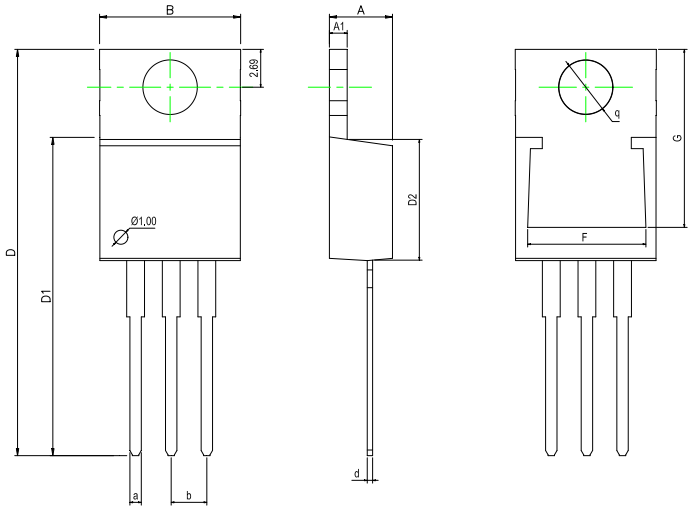
Negative Regulator with Protection Diodes



*When C_L is larger than 20 μF, D1 protects the LM137 in case the input supply is shorted
**When C2 is larger than10 μF and $-V_{ouT}$ is larger than -25V,D2 protects the LM137 in case the output is shorted

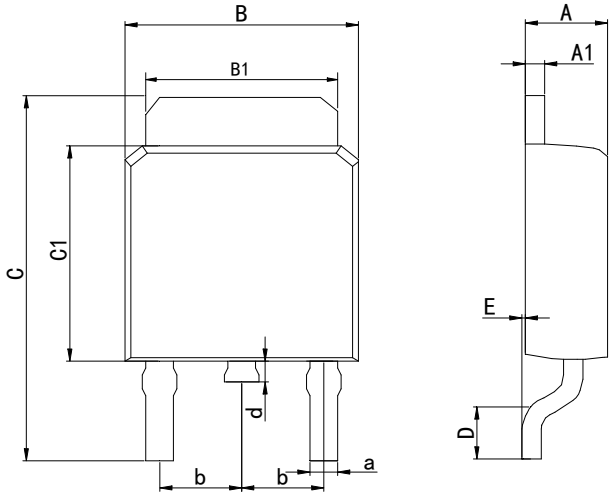
Physical Dimensions

TO-220-3



Dimensions In Millimeters(TO-220-3)												
Symbol:	A	A1	B	D	D1	D2	F	G	a	d	b	q
Min:	4.45	1.22	10	28.2	22.22	8.50	8.30	12.55	0.71	0.33	2.54	3.80
Max:	4.62	1.32	10.4	28.9	22.62	9.10	8.55	12.75	0.97	0.42	BSC	TYP

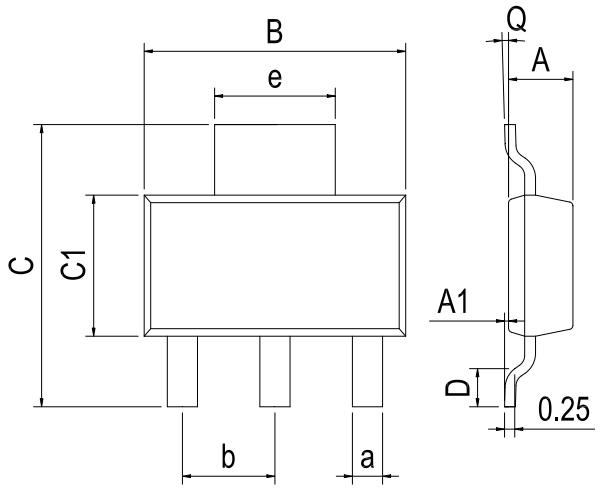
TO-252-2



Dimensions In Millimeters(TO-252-2)											
Symbol:	A	A1	B	B1	C	C1	D	E	a	d	b
Min:	2.10	0.45	6.40	5.10	9.20	5.30	0.90	0	0.50	0.60	2.28
Max:	2.50	0.70	6.80	5.50	10.6	6.30	1.75	0.23	0.80	1.20	BSC

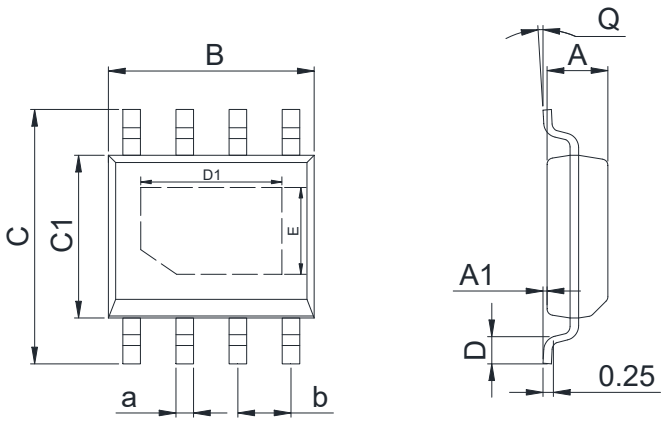
Physical Dimensions

SOT-223



Dimensions In Millimeters(SOT-223)										
Symbol:	**A**	**A1**	**B**	**C**	**C1**	**D**	**Q**	**a**	**b**	**e**
Min:	1.50	0.05	6.30	6.70	3.30	0.65	0°	0.66	2.30 BSC	3.00 BSC
Max:	1.70	0.20	6.70	7.30	3.70	1.10	8°	0.84		

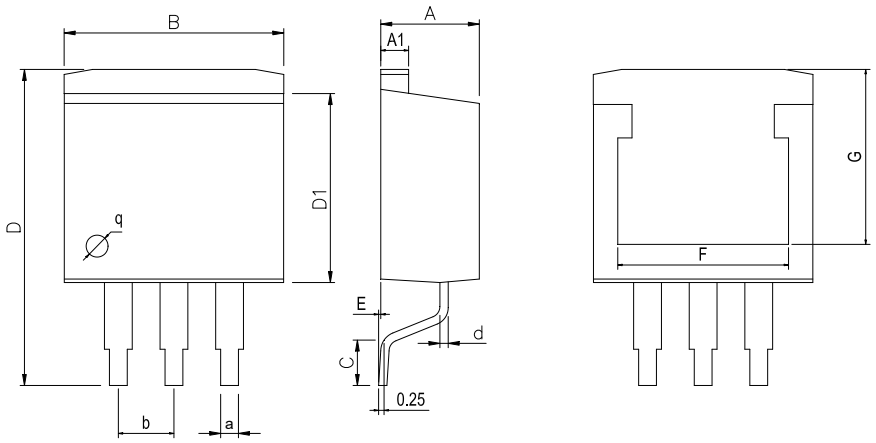
ESOP-8



Dimensions In Millimeters(ESOP-8)											
Symbol:	**A**	**A1**	**B**	**C**	**C1**	**D**	**D1**	**E**	**Q**	**a**	**b**
Min:	1.35	0.05	4.90	5.80	3.80	0.40	3.20	2.31	0°	0.35	1.27 BSC
Max:	1.55	0.20	5.10	6.20	4.00	0.80	3.40	2.51	8°	0.45	

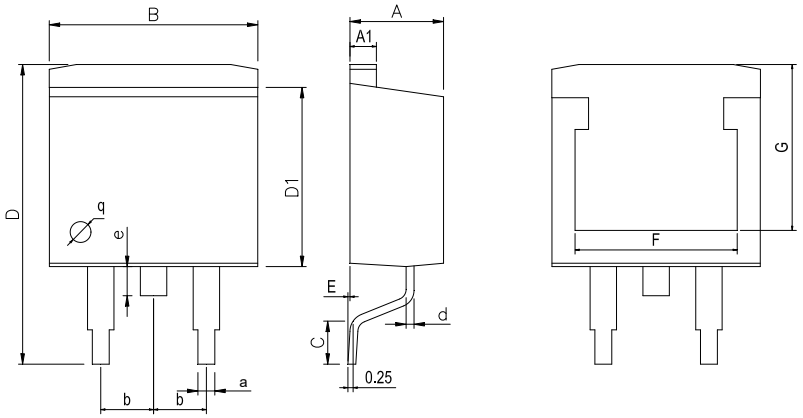
Physical Dimensions

TO-263-3



Dimensions In Millimeters(TO-263-3)											
Symbol:	**A**	**A1**	**B**	**C**	**D**	**D1**	**E**	**F**	**G**	**a**	**b**
Min:	4.45	1.22	10	1.89	14.1	8.38	0	7.20	7.20	0.71	2.54BSC
Max:	4.62	1.32	10.4	2.19	15.3	8.89	0.305	8.10	8.10	0.97	

TO-263-2



Dimensions In Millimeters(TO-263-2)												
Symbol:	**A**	**A1**	**B**	**C**	**D**	**D1**	**E**	**F**	**G**	**a**	**e**	**b**
Min:	4.45	1.22	10	2.25	14.5	8.45	0	7.20	7.20	0.71	1.10	2.54BSC
Max:	4.62	1.32	10.4	2.85	15.4	9.10	0.305	8.10	8.10	0.97	1.70	

Revision History

REVISION NUMBER	DATE	REVISION	PAGE
V1.0	2014-8	New	1-10
V1.1	2024-11	Update Lead Temperature	3
V1.2	2025-11	Update important statements,Add ESOP-8, TO-263 package	11、1
V1.3	2025-12	Update TO263-2 and TO263-3 Dimension drawing	9

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