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HM72XX

5mA~450mA Constant Current Regulator

INTRODUCTION

The HM72XX-series products are linear constant current regulators. With simple features, the HM72XX are economical devices designed to provide a cost-effective solution for current regulation of LED applications. The HM72XXlets LEDs work under stable current and avoid brightness unstable caused by current change, while their low voltage reduces power consumption.

With function of negative temperature coefficient, HM72XX can protect LEDs from thermal runaway at extreme current. HM72XX also provides a wide constant current range from 5mA to 450mA.

Packages of SOT23-3, SOT89-3, SOT223, and TO252 are available.

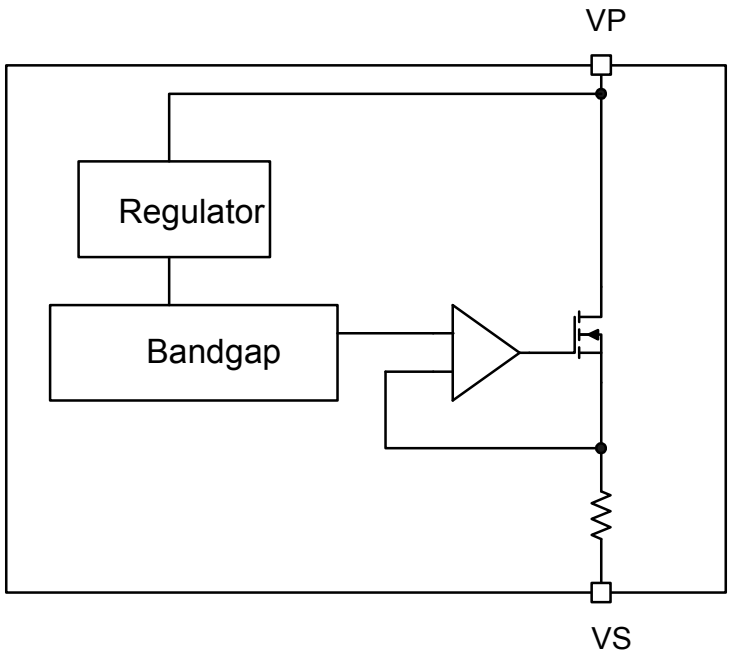
MAIN APPLICATIONS

- LED Light Bars
- LED Bulbs
- LED Fluorescent Lights
- LED Backlight

FEATURE HIGHLIGHTS

- Wide output voltage range: 2V~40V
- Negative temperature coefficient
- Accurate sink current: ±3%
- –40 °C ~+85 °C operation temperature range
- Pb-free and green packages:
  SOT23-3, SOT89-3, SOT223, TO252
- Output current: 5mA~450mA

BLOCK DIAGRAM



HM7200-5 5

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5mA~450mA Constant Current Regulator

ORDERING INFORMATION

Part Number	Current (mA)	Package	Eco	Description
HM7200-5	5	SOT23-3	RoHS compliant	Pb-free
HM7201	10			
HM7202	20			
HM7203	30			
HM7206	60	SOT89-3		
HM7208	80			
HM7210	100			
HM7212	120	SOT223		
HM7215	150			
HM7218	180			
HM7230	300	TO252		
HM7235	350			
HM7240	400			
HM7245	450			

Please contact H&M SEMI for other current selections.

General Notes

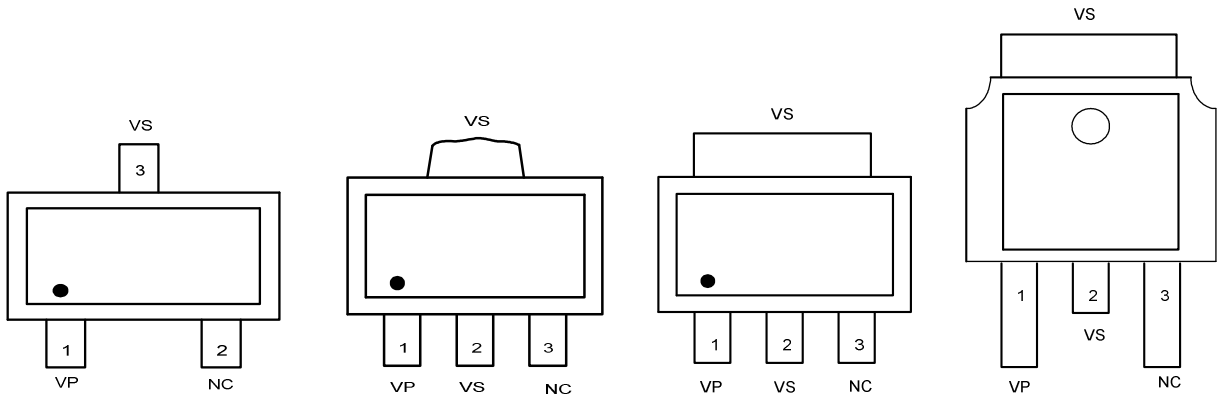
APPLICATION INFORMATION
For improved readability, the specification contains many application data points. When application information is given, it is advisory and does not form part of the specification for the device.

BARE DIE DISCLAIMER
All die are tested and are guaranteed to comply with all data sheet limits up to the point of wafer sawing. There is no post waffle saw/pack testing performed on individual die. Although the latest modern processes are utilized for wafer sawing and die pick-&-place into waffle pack carriers, H&M SEMI has no control of third party procedures in the handling, packing or assembly of the die. Accordingly, it is the responsibility of the customer to test and qualify their application in which the die is to be used. H&M SEMI assumes no liability for device functionality or performance of the die or systems after handling, packing or assembly of the die.

LIFE SUPPORT APPLICATIONS
These devices are not designed for use in life support appliances, or systems where malfunction of these products can reasonably be expected to result in personal injuries. Customer using or selling these products for use in such applications do so at their own risk.

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PIN DESCRIPTION



SOT23-3 SOT89-3 SOT223 TO252

SOT23-3

No	Pin	Type	Description
1	V_P	I	Current Input
2	NC	--	No connection
3	V_S	O	Current Out

SOT89-3

No	Pin	Type	Description
1	V_P	I	Current Input
2	V_S	O	Current Out
3	NC	--	No connection

SOT233

No	Pin	Type	Description
1	V_P	I	Current Input
2	V_S	O	Current Out
3	NC	--	No connection

TO252

No	Pin	Type	Description
1	V_P	I	Current Input
2	V_S	O	Current Out
3	NC	--	No connection

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MAXIMUM RATING

Symbol	Parameter		Max.	Unit	Note
V_P	Supply voltage		44	V	
I_{VP}	Saturation current	HM7200-5	5.5	mA	
		HM7201	11	mA	
		HM7202	22	mA	
		HM7203	33	mA	
		HM7206	66	mA	
		HM7208	88	mA	
		HM7210	110	mA	
		HM7212	132	mA	
		HM7215	165	mA	
		HM7218	198	mA	
		HM7230	330	mA	
		HM7235	385	mA	
		HM7240	440	mA	
		HM7245	450	mA	
T_{OPR}	Operation Temperature		–40 ~ +85	°C	
T_J	Junction Temperature		135	°C	
R_{TH} (j-a)	Thermal Resistance (junction to ambient)	SOT23-3	215	°C/W	
R_{TH} (j-c)	Thermal Resistance (junction to case)		50	°C/W	
P_D	Power Dissipation at T_A=25°C		0.55	W	
R_{TH} (j-a)	Thermal Resistance (junction to ambient)	SOT89-3	150	°C/W	
R_{TH} (j-c)	Thermal Resistance (junction to case)		40	°C/W	
P_D	Power Dissipation at T_A=25°C		1	W	Note1
R_{TH} (j-a)	Thermal Resistance (junction to ambient)	SOT223	140	°C/W	
R_{TH} (j-c)	Thermal Resistance (junction to case)		30	°C/W	
P_D	Power Dissipation at T_A=25°C		1.5	W	Note2
R_{TH} (j-a)	Thermal Resistance (junction to ambient)	TO252	110	°C/W	
R_{TH} (j-c)	Thermal Resistance (junction to case)		15	°C/W	
P_D	Power Dissipation at T_A=25°C		3	W	Note3

Note:

1. The conditions for the power dissipation (SOT89-3) are as below:
   Double-sided, FR4 PCB size: 50mmx50mmx1.6nn, Copper ratio: top side approx. 10%, back side approx. 100%,
   No through-holes, Ta=25°C.
2. When surface mounted to an FR4 board using a minimum recommended pad size (Cu. area = 0.341 in^2)
3. Double-sided, FR4 PCB size: 50mmx50mmx1.6nn, Copper ratio: top side approx. 20%, back side approx. 100%,

DC CHARACTERISTICS

VP=3.0V, Cp = 0.1uF, Ta =25°C; unless otherwise specified.

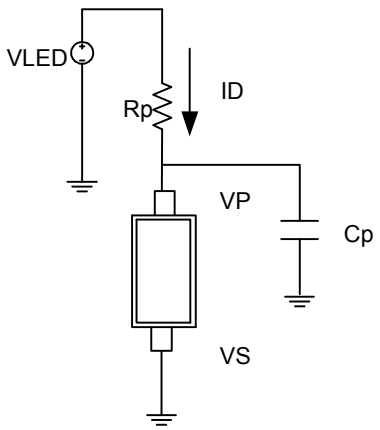
Symbol	Parameter	Condition		Min.	Typ.	Max.	Unit
VP	Supply voltage	HM7200-5~HM7203		1.5		40	V
		HM7206~HM7210		2		40	
		HM7212~HM7218		2.5		40	
		HM7230~HM7245		3		40	
IVP	Saturation current	VP=1.5V~8V	HM7200-5		**5**		mA
			HM7201		**10**		
			HM7202		**20**		
			HM7203		**30**		
		VP=2V~8V	HM7206		**60**		
			HM7208		80		
			HM7210		100		
		VP=2.5V~7V	HM7212		120		
			HM7215		150		
			HM7218		180		
		VP=3V~6V	HM7230 (Note 2)		300		
			HM7235 (Note 2)		350		
			HM7240 (Note 2)		400		
			HM7245 (Note 2)		450		
IAC	Current Accuracy	(Note 1)		-3		+3	%
Tc	Temperature Coefficient	Ta=-40°C~125°C			-500		ppm/°C

Note:

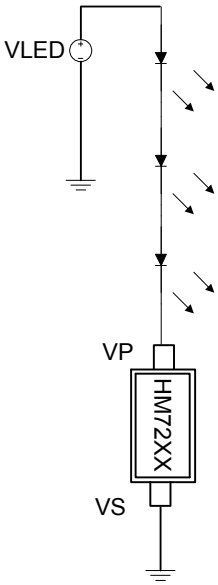
(1) The condition can be achieved with the test circuit only. The Current Accuracy may be affected by negative temperature coefficient and inappropriate package.

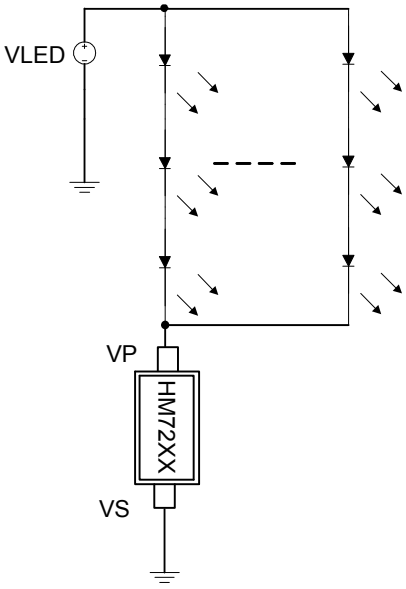
(2) For HM7230/HM7235/HM7240/HM7245 high current applications, it is necessary to add a heat sink to lower the case temperature to below 50°C to guarantee the current accuracy of ±3%.

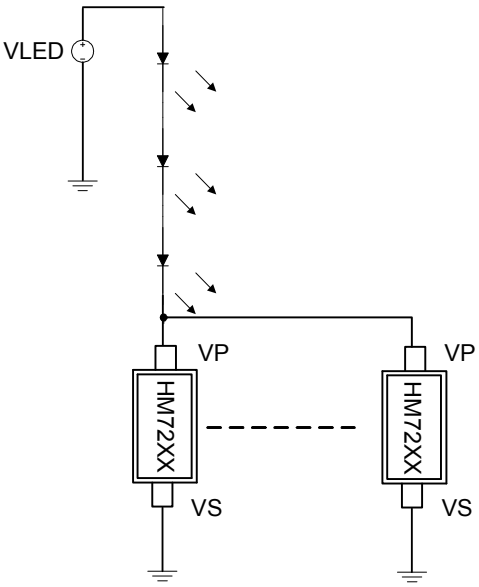
TEST CIRCUIT

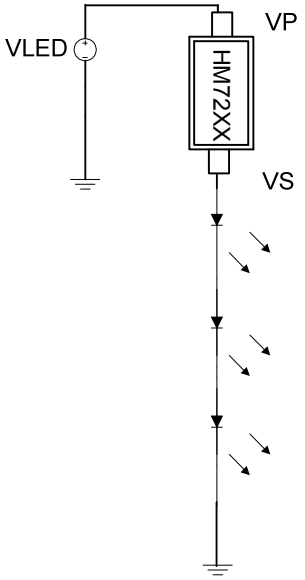


APPLICATION SCHEMATIC





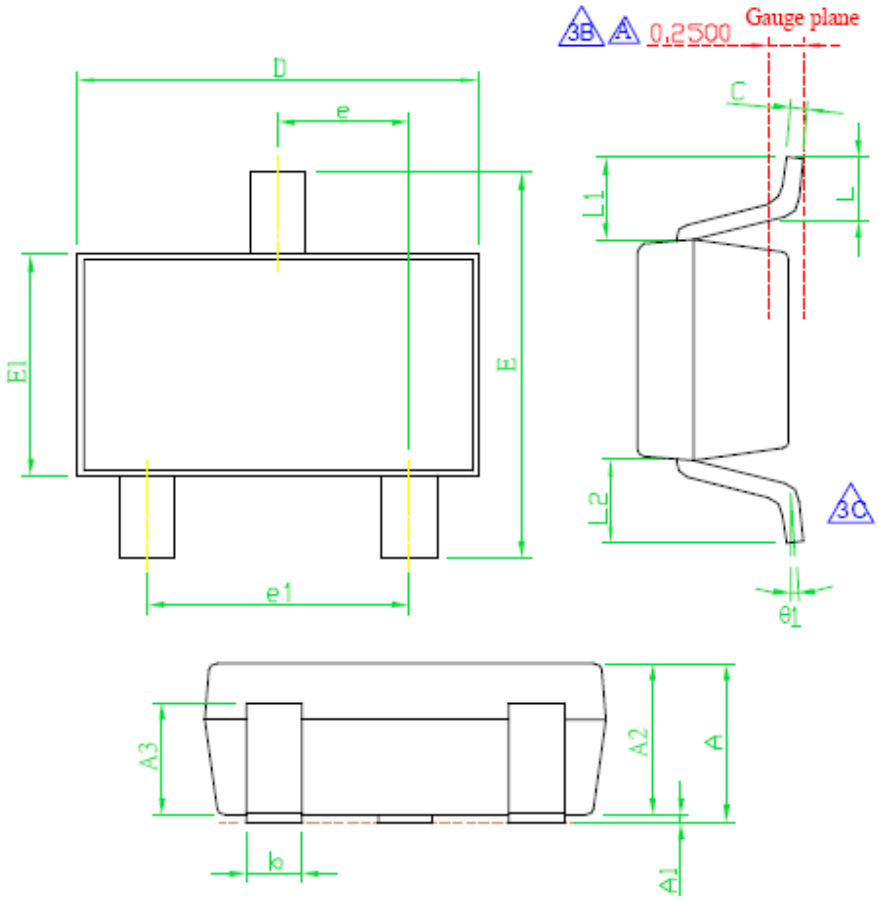




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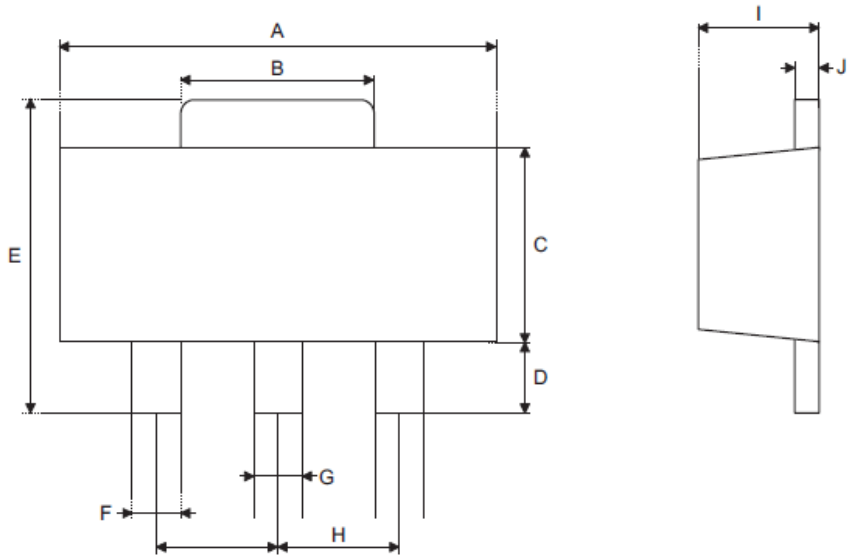
PACKAGE INFORMATION

SOT23-3 Package Outline Drawing



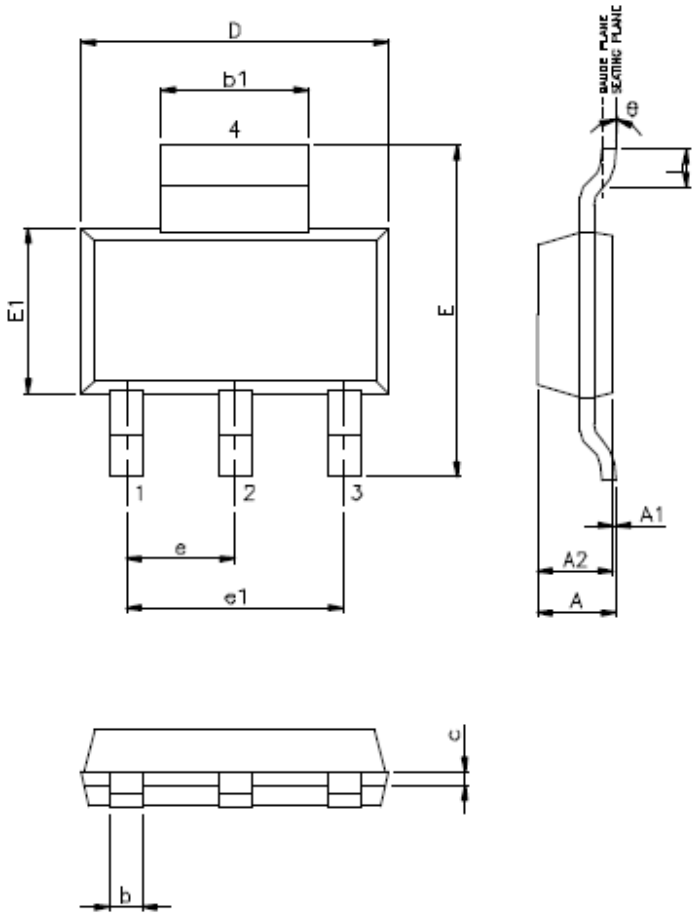
Symbol	Dimensions in mm		
	Min.	Nom	Max.
A	1.00	1.10	1.40
A1	0.00	0.05	0.10
A2	1.00	1.10	1.30
A3	0.70	0.80	0.90
B	0.35	0.40	0.50
C	0.12	0.125	0.225
D	2.70	2.90	3.10
E	2.60	2.80	3.00
E1	1.40	1.60	1.80
e	---	0.95 (Typ.)	---
e1	---	1.90 (Typ.)	---
θ1	1°	5°	9°
L	0.37	---	---
L1	---	0.6REF	---
L1-L2	---	---	0.12
---	---	---	---

SOT89-3 Package Outline Drawing



Symbol	Dimensions in mm			Dimensions in inch		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	4.39	--	4.60	0.173	--	0.181
B	1.50	--	1.83	0.059	--	0.072
C	2.29	--	2.59	0.090	--	0.102
D	0.89	--	1.19	0.035	--	0.047
E	3.94	--	4.24	0.155	--	0.167
F	0.36	--	0.48	0.014	--	0.019
G	0.43	--	0.56	0.017	--	0.022
H	--	1.50	--	--	0.059	--
I	1.40	--	1.60	55	--	63
J	0.36	--	0.43	14	--	17

SOT223 Package Outline Drawing



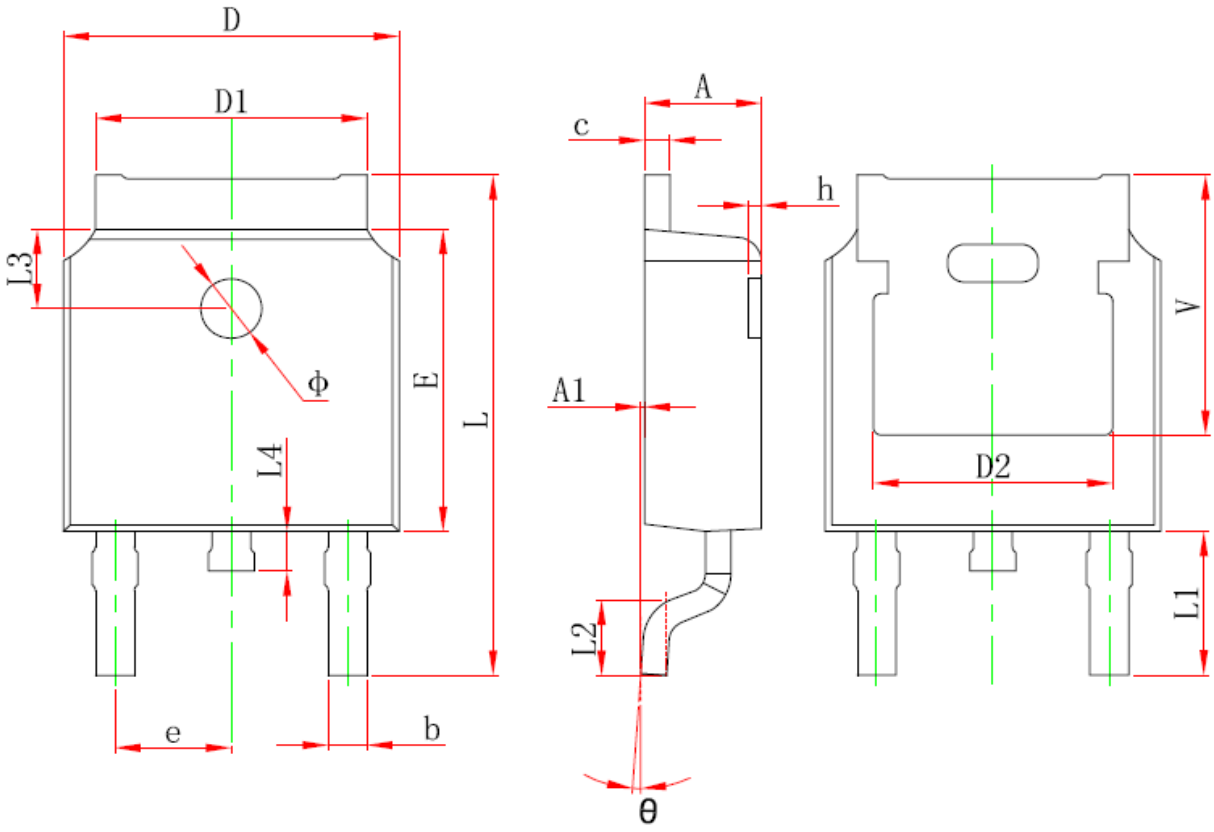
VARIATION(ALL DIMENSIONS SHOWN IN MM)

SYMBOL	MIN.	NOM.	MAX.
A	–	–	1.80
A1	0.02		0.10
A2	1.50	1.60	1.70
b	0.66	0.70	0.84
⚠1 b1	2.90	3.00	3.10
c	0.23	0.30	0.35
D	6.30	6.50	6.80
E	6.70	7.00	7.30
E1	3.30	3.50	3.70
e	2.30 BASIC		
e1	4.60 BASIC		
L	0.75	–	–
θ	0°	–	10°

NOTE : 1.JEDEC OUTLINE : TO-261 AA

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TO252 Package Outline Drawing



Symbol	Dimensions in mm		Dimensions in inch	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 REF.		0.190 REF.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 REF.		0.114 REF.	
L2	1.400	1.700	0.055	0.067
L3	1.600 REF.		0.063 REF.	
L4	0.600	1.000	0.024	0.039
ϕ	1.100	1.300	0.043	0.051
Θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 REF		0.211 REF.	