High Current LED Driver

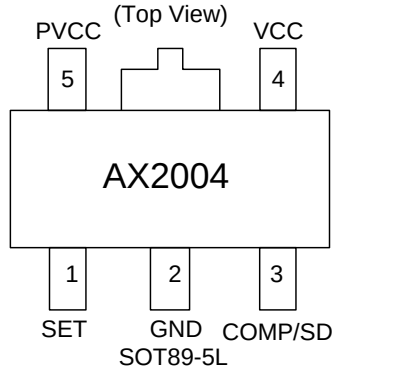
❖ GENERAL DESCRIPTION

AX2004 is a low dropout current regulator for high current LED Driver. The output current was decided by external resistor. Build-in thermal shutdown and current limit protection function.

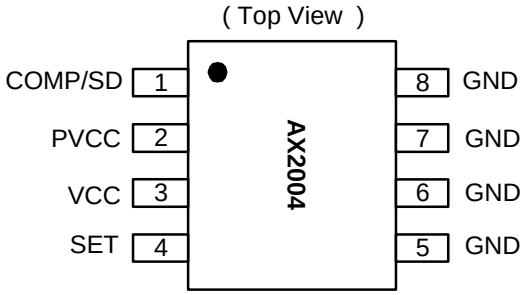
❖ FEATURES

- Input Voltage: 2.5V to 24V
- Up to 1A Maximum Output Current.
- 3% Output current setting accuracy.
- External resistor to set LED Current.
- Built-in thermal shutdown
- Available in SOT89-5L and SOP-8L/TO252-5L Pb-Free Packages

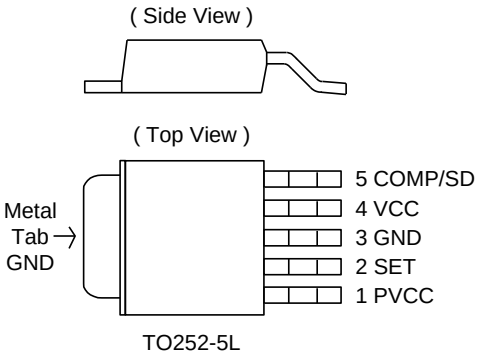
❖ PIN ASSIGNMENT



SOT89-5L



SOP – 8L



TO252-5L

Name	Description
GND	Ground
SET	LED current setting input. Connect a resistor from SET to GND to set LED current.
PVCC	The LEDs are connected from this pin to V_{CC}.
VCC	Input Supply Voltage
COMP/SD	Compensation pin and shutdown function.

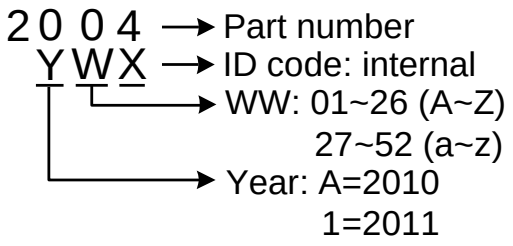
❖ ORDER/MARKING INFORMATION

Order Information

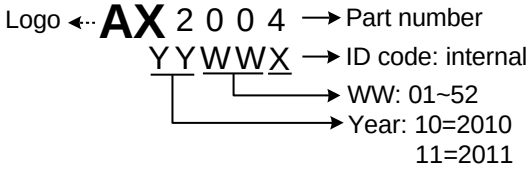
AX2004 X X X

- Package Type
  - S: SOP-8L
  - F5: SOT89-5L
  - D5: TO252-5L
- Packing
  - Blank : Tube
  - A : Taping

Top Marking (SOT89-5L)



Top Marking (SOP-8L/TO252-5L)



❖ ABSOLUTE MAXIMUM RATINGS

Characteristics	Symbol	Rating	Unit
V_{CC} Output Voltage	V_{CC}	-0.3 to 26	V
PVCC Voltage	P_{VCC}	-0.3 to 24	V
SET pin Voltage	V_{SET}	-0.3 to V_{CC}	V
COMP pin Voltage	V_{COMP}	-0.3 to 6	V
Max output current	I_{LED}	1.5	A
Operating Junction Temperature Range	T_{OP}	-40 to +125	°C
Maximum junction Temperature	T_J	150	°C
Power Dissipation	P_D	SOP8 = 1.4, SOT89 = 1.05, TO252 = 2.2	W
Storage Temperature	T_{ST}	-65 to +150	°C
Thermal Resistance from Junction to case	θ_{JC}	SOP-8L=25, SOT89-5L=50, TO252-5L= 10	°C/W
Thermal Resistance from Junction to ambient	θ_{JA}	SOP-8L=70, SOT89-5L=80, TO252-5L= 45	°C/W

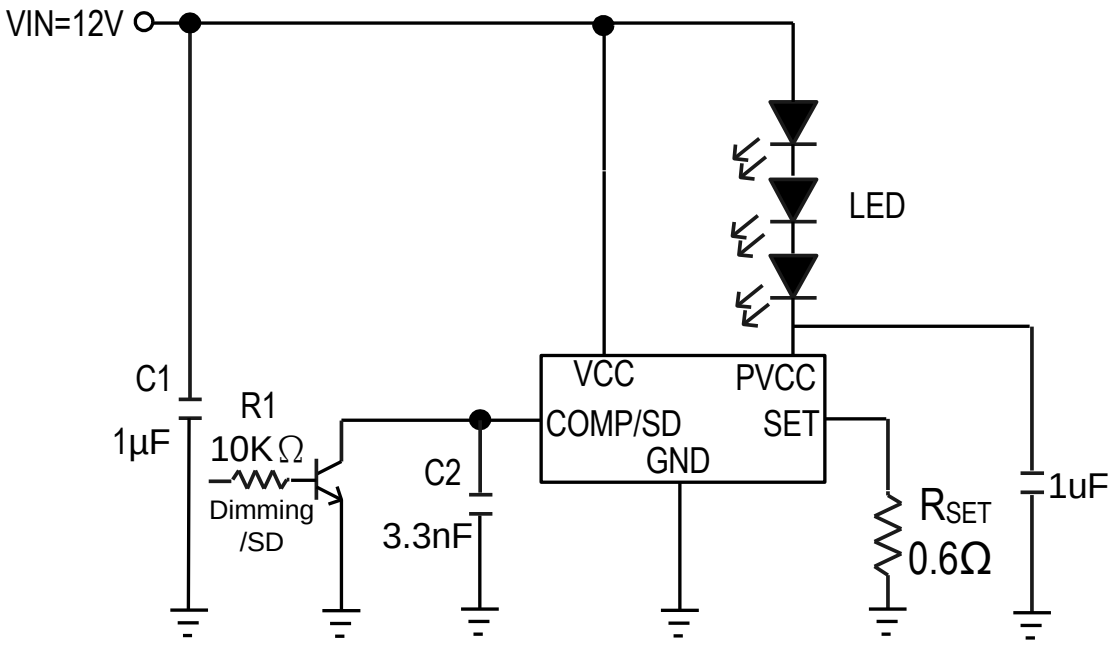
Note : θ_{JA} is measured with the PCB copper area(need connect to GND pins) of approximately 1.0 in^2 (Multi-layer)

❖ ELECTRICAL CHARACTERISTICS

(V_{CC} = 12V, T_A = 25°C, unless otherwise specified)

Characteristics	Symbol	Conditions	Min	Typ	Max	Unit
V_{CC} input voltage	V_{CC}	R_{SET} = 20Ω	2.5	-	24	V
Quiescent Current	I_{CCQ}	LED open, I_{OUT}=0mA	-	1.5	3	mA
SET Voltage	V_{SET}	V_{CC}-V_{LED} > 2.5V	204	210	216	mV
Dropout Voltage	PV_{CC} - V_{SET}	ΔV_{SET}=2%V_{SET}; R_{SET} = 1Ω	-	0.2	0.5	V
Output Current limit	C_L		1.2	-	-	A
Dimming Frequency	F_{DIM}		-	-	2	KHZ
Comp Current	I_{COMP}	V_{COMP} = 0V, V_{CC} = 12V	-	80	120	μA
Shutdown Current	I_{VCC-SD}	V_{COMP} = 0V	-	1	2	mA
	$I_{PVCC-SD}$		-	-	1	μA
Shutdown voltage	V_{SD}		-	-	0.8	V
Thermal shutdown	T_{SD}		-	150	-	°C
Thermal Shutdown Hysteresis	T_{SH}		-	40	-	°C

❖ APPLICATION CIRCUIT

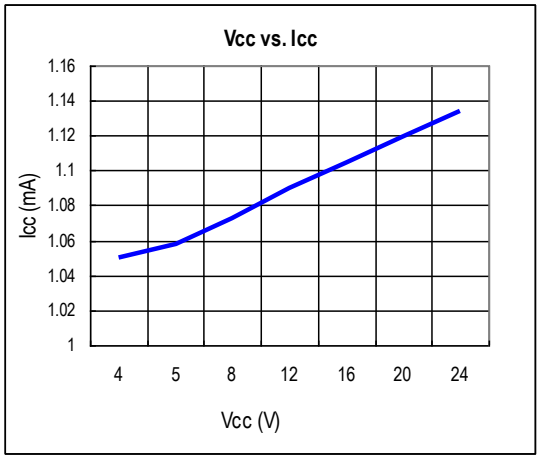


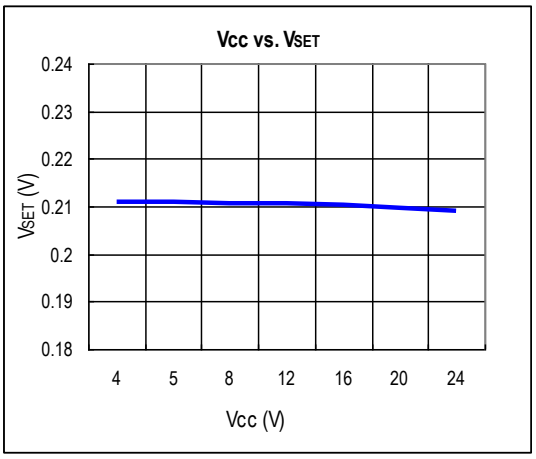
$$I_{LED} = \frac{V_{SET}}{R_{SET}}, V_{SET} = 0.21V$$

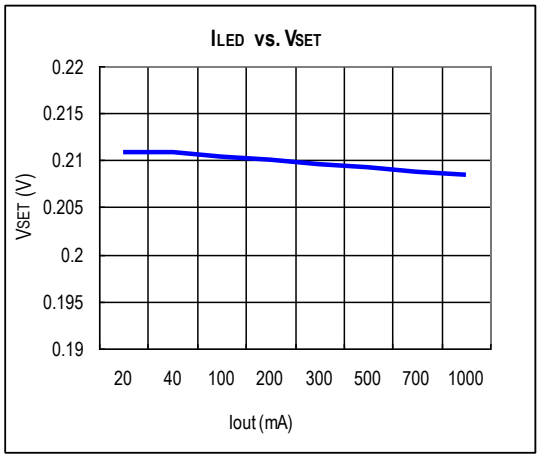
$$PD = (12V - VLED) \times I_{LED}$$

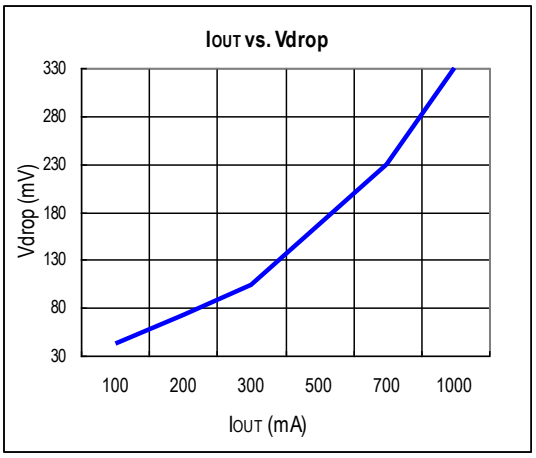
$$0.2\Omega \leqq R_{SET} \leqq 1K$$

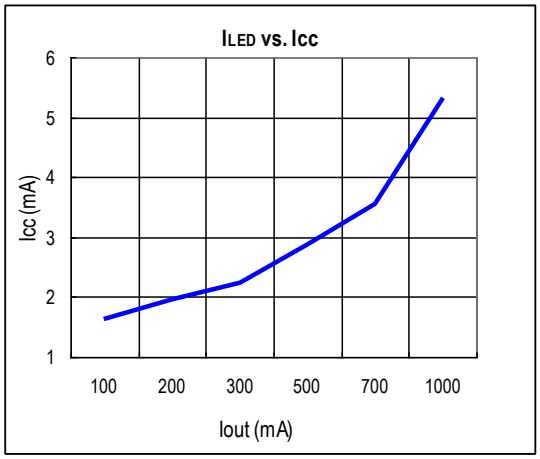
❖ TYPICAL CHARACTERISTICS

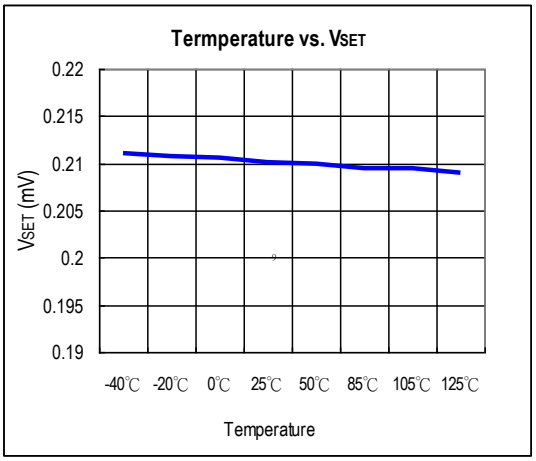






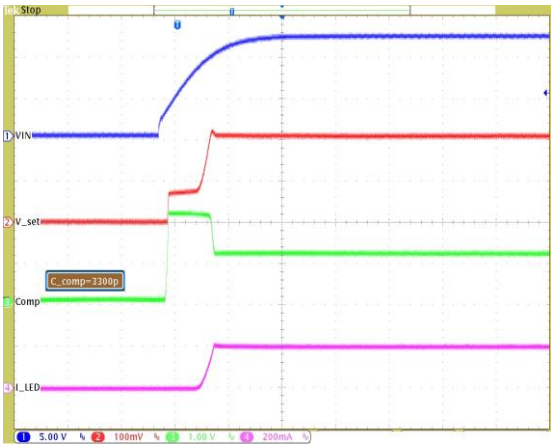




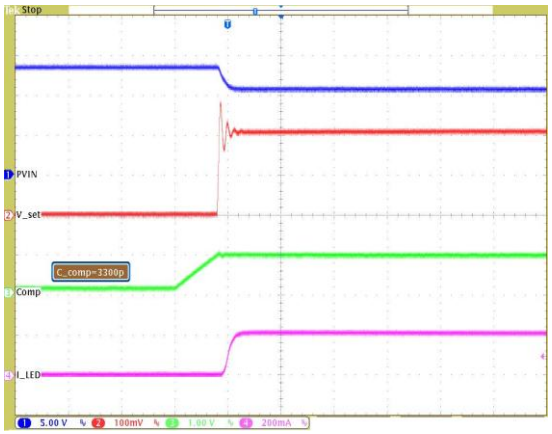


❖ TYPICAL CHARACTERISTICS (CONTINUOUS)

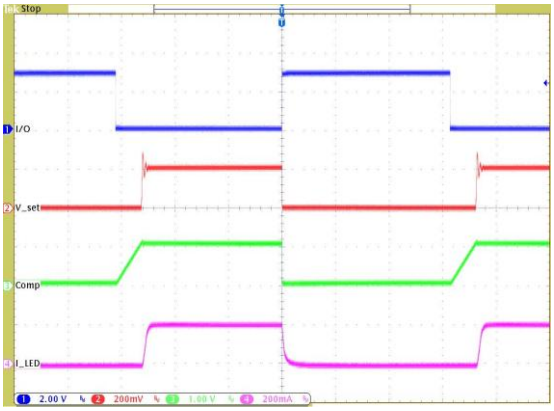
Start up



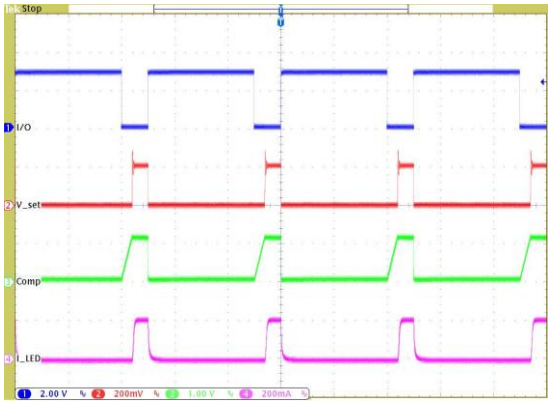
TSD to Release



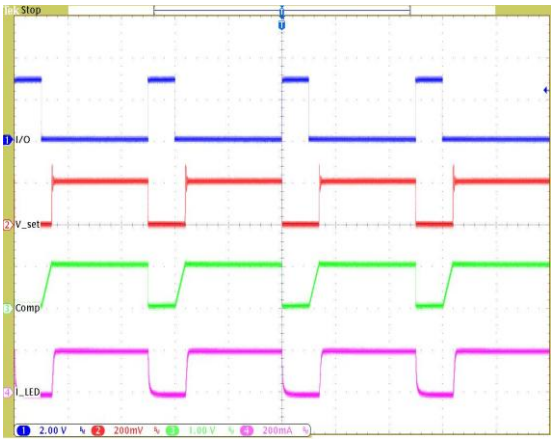
2KHz Dimming Duty 50%



2KHz Dimming Duty 20%

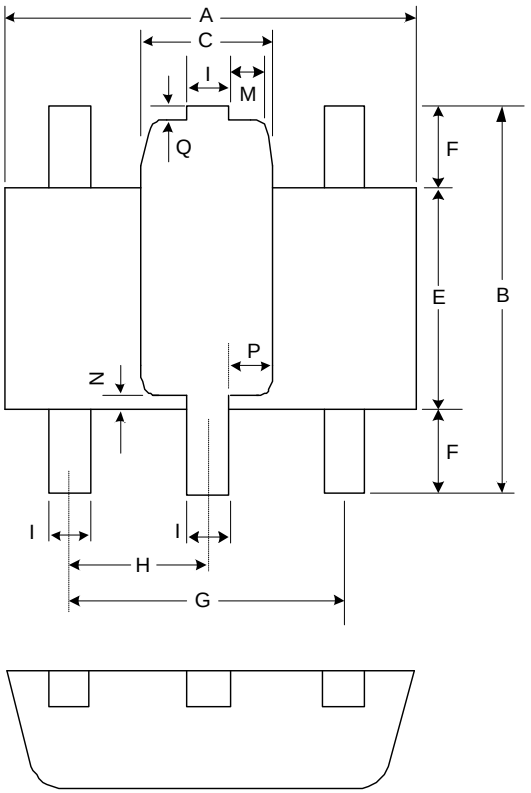


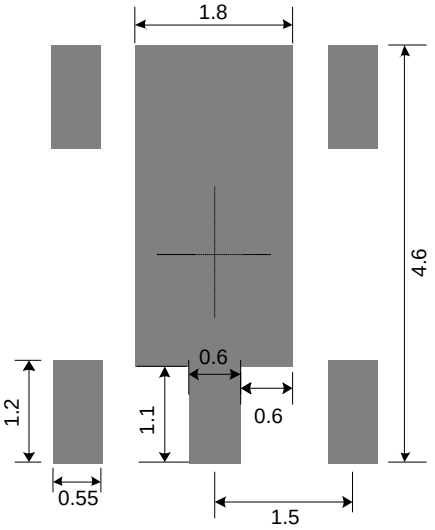
2KHz Dimming Duty 80%



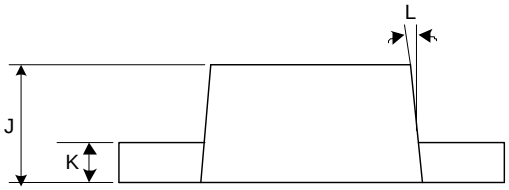
❖ PACKAGE OUTLINES

(1) SOT89-5L





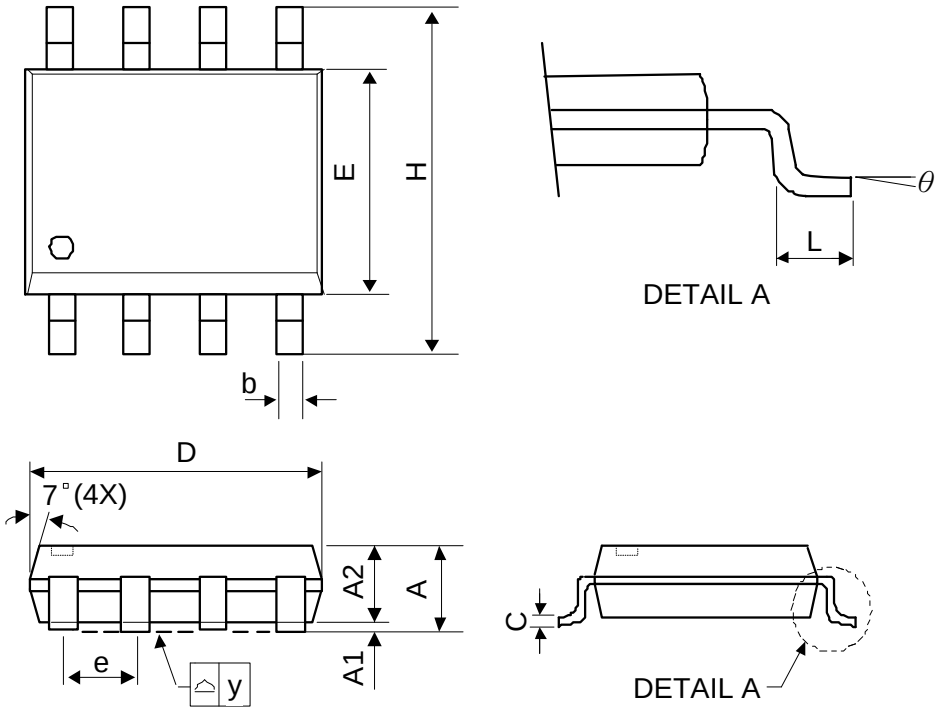
Land Pattern Recommendation (Unit: mm)



Symbol	Dimensions in Millimeters			Dimensions in Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	4.4	4.5	4.6	0.173	0.177	0.181
B	4.05	4.15	4.25	0.159	0.163	0.167
C	1.4	1.6	1.7	0.055	0.062	0.067
E	2.4	2.5	2.6	0.094	0.098	0.102
F	0.8	-	-	0.031	-	-
G	3.00 REF.			0.118 REF.		
H	1.50 REF.			0.059 REF.		
I	0.36	0.46	0.53	0.014	0.018	0.02
J	1.4	1.5	1.6	0.055	0.059	0.063
K	0.35	0.39	0.43	0.014	0.015	0.017
L	8° TYP.			8° TYP.		
M	0.38	0.47	0.6	0.015	0.019	0.024
N	0.2	0.18	0.4	0.008	0.007	0.026
P	0.48	0.57	0.67	0.019	0.022	0.027
Q	-	-	0.4	-	-	0.016

JEDEC outline: NA

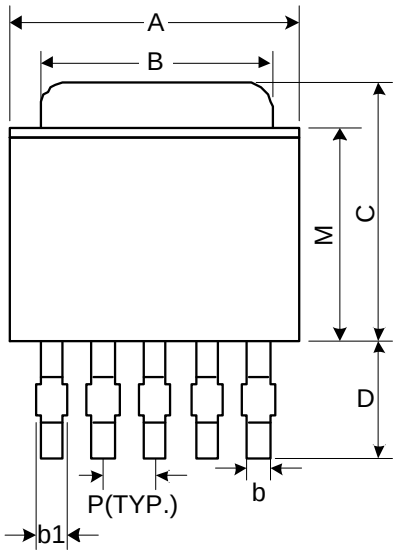
(2) SOP-8L

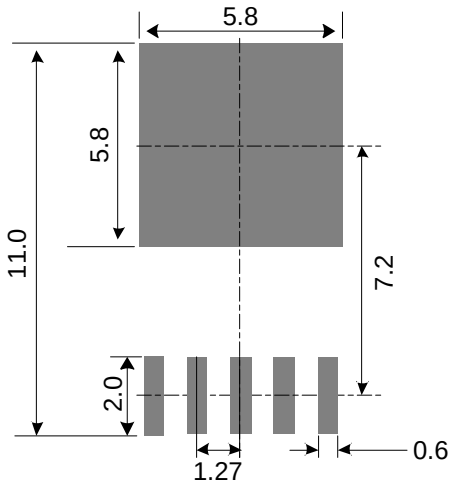


Symbol	Dimensions in Millimeters			Dimensions in Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	-	-	1.75	-	-	0.069
A1	0.1	-	0.25	0.04	-	0.1
A2	1.25	-	-	0.049	-	-
C	0.1	0.2	0.25	0.0075	0.008	0.01
D	4.7	4.9	5.1	0.185	0.193	0.2
E	3.7	3.9	4.1	0.146	0.154	0.161
H	5.8	6	6.2	0.228	0.236	0.244
L	0.4	-	1.27	0.015	-	0.05
b	0.31	0.41	0.51	0.012	0.016	0.02
e	1.27 BSC			0.050 BSC		
y	-	-	0.1	-	-	0.004
θ	0°	-	8°	0°	-	8°

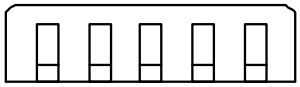
Mold flash shall not exceed 0.25mm per side
JEDEC outline: MS-012 AA

(3) TO252-5L





Land Pattern Recommendation (Unit: mm)



Symbol	Dimensions in Millimeters			Dimensions in Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	6.35	6.6	6.73	0.25	0.26	0.265
B	5.21	5.33	5.46	0.205	0.21	0.215
C	6.86	7.24	7.62	0.27	0.285	0.3
D	2.67 REF			0.105 REF		
P	1.27 REF			0.050 REF		
H	2.18	2.29	2.39	0.086	0.09	0.094
J	0.46	0.51	0.58	0.018	0.02	0.023
K	0	0.08	0.13	0	0.003	0.005
L	1.4	1.6	1.78	0.055	0.063	0.07
M	5.33	5.46	5.59	0.21	0.215	0.22
b	0.38	0.56	0.71	0.015	0.022	0.028
b1	0.38	0.53	0.66	0.015	0.021	0.026

Mold flash shall not exceed 0.005inch per side