

High Current LED Driver

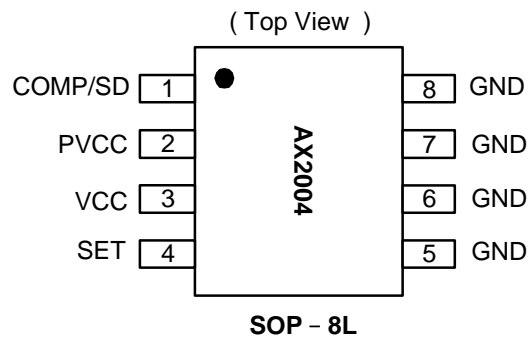
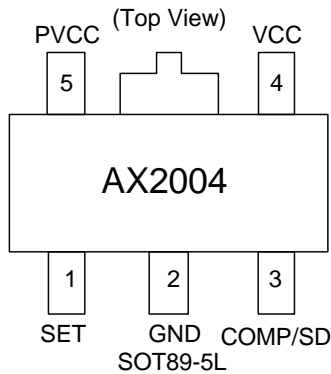
❖ GENERAL DESCRIPTION

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: 4V 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 Pb-Free Packages
- RoHS and Halogen free compliance

❖ PIN ASSIGNMENT



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	
<p>AX2004 X X X</p> <p>Package Type Packing S: SOP-8L Blank : Tube F5: SOT89-5L A : Taping</p>	
Top Marking (SOT89-5L)	Top Marking (SOP-8L)
<p>2 0 0 4 → Part number Y W X → ID code: internal → WW: 01~26 (A~Z) 27~52 (a~z) → Year: A=2010 1=2011 ⋮ 9=2019</p>	<p>Logo ← AX 2 0 0 4 → Part number Y Y W W X → ID code: internal → WW: 01~52 → Year: 10=2010 11=2011 ⋮ 19=2019</p>

❖ 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	SOP8	1.4	W
	SOT89	1.05	
Storage Temperature	T _{ST}	-65 to +150	°C
Thermal Resistance from Junction to case	SOP-8L	25	°C/W
	SOT89-5L	50	
Thermal Resistance from Junction to ambient	SOP-8L	70	°C/W
	SOT89-5L	80	

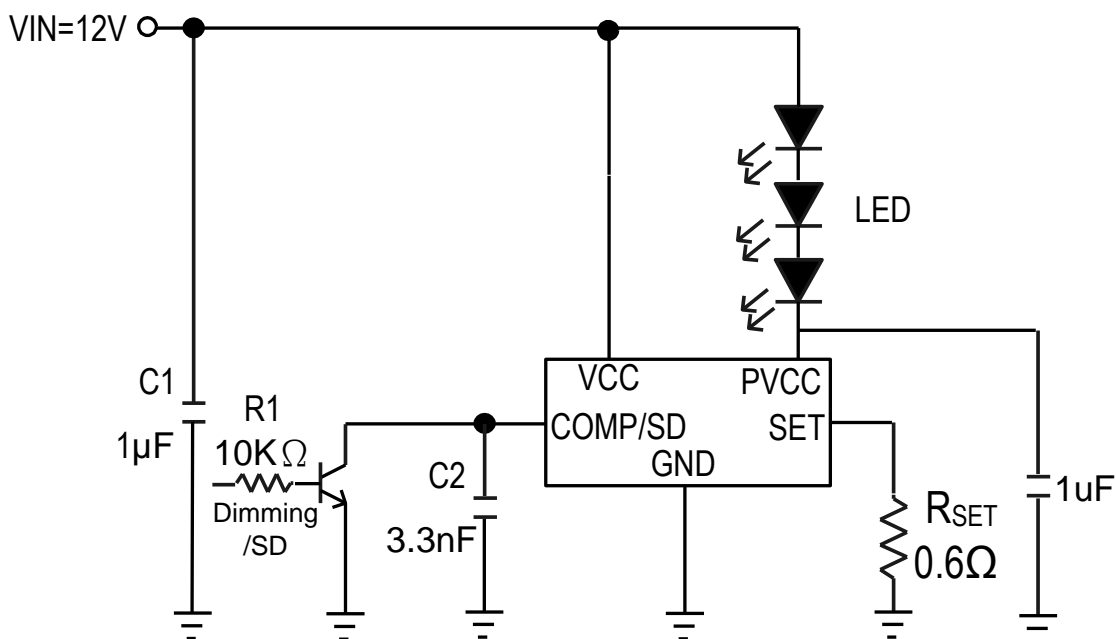
Note: θ_{JA} is measured with the PCB copper area(need connect to GND pins) of approximately 1.0 in² (Multi-layer)

❖ 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	4	-	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

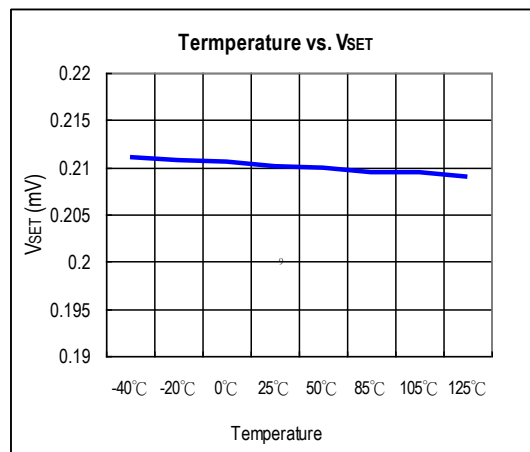
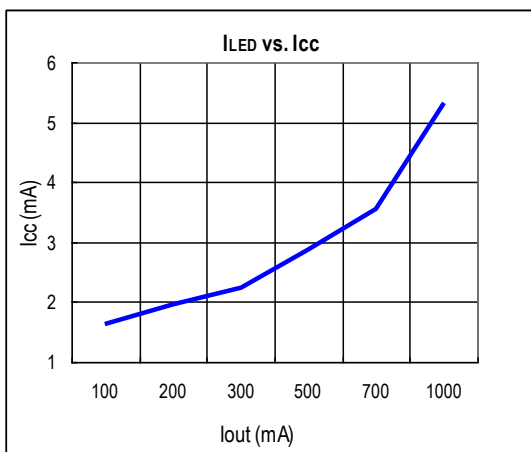
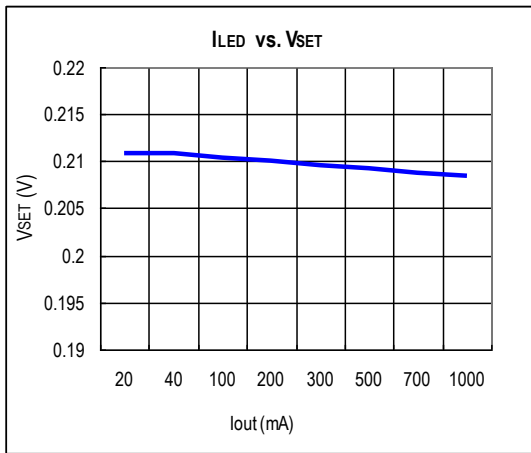
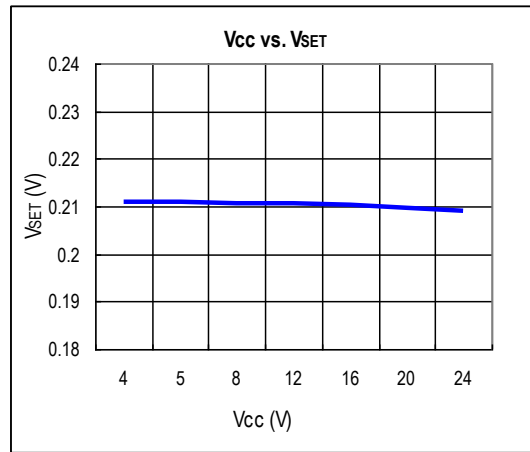
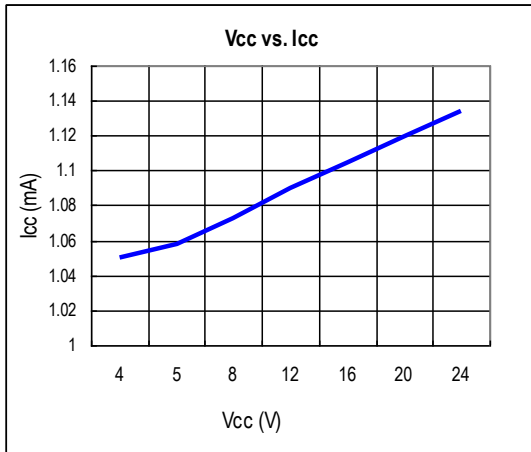


$$I_{LED} = \frac{V_{SET}}{R_{SET}}, V_{SET} = 0.21V$$

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

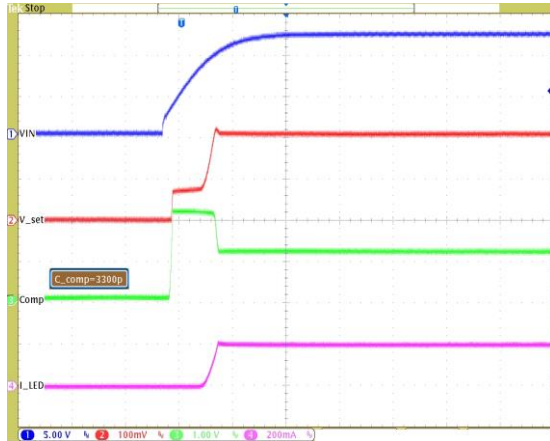
$$0.2\Omega \leq R_{SET} \leq 1K$$

❖ TYPICAL CHARACTERISTICS

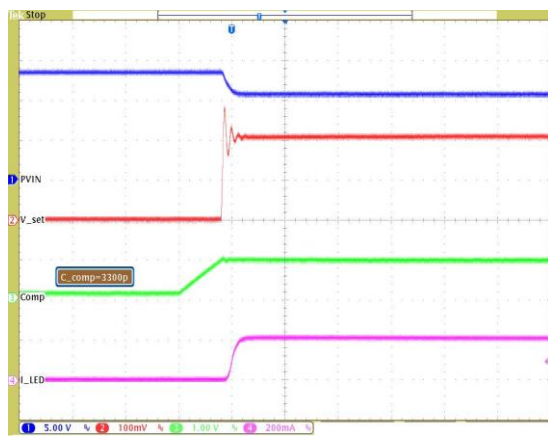


❖ TYPICAL CHARACTERISTICS (CONTINUOUS)

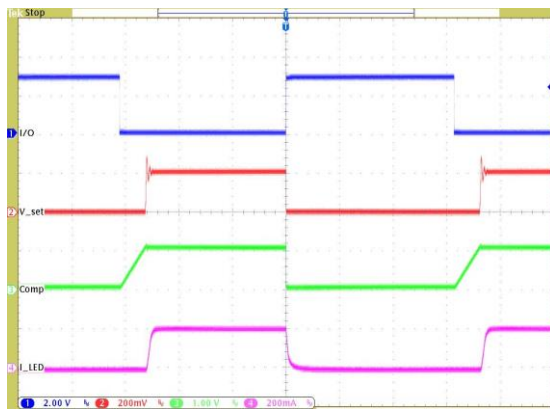
Start up



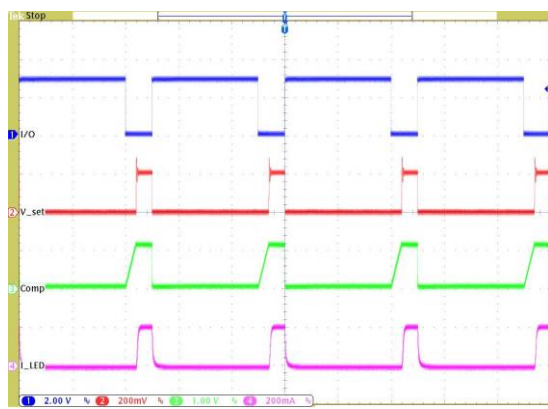
TSD to Release



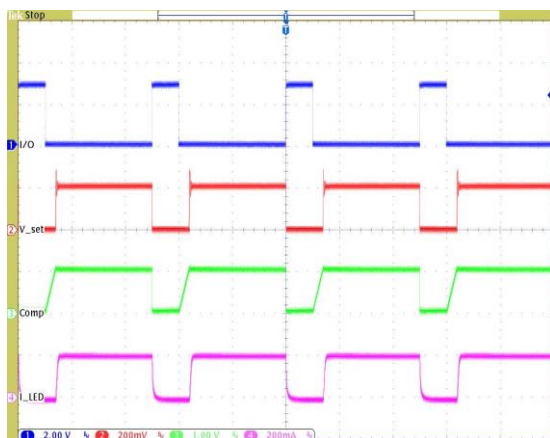
2KHz Dimming Duty 50%



2KHz Dimming Duty 20%

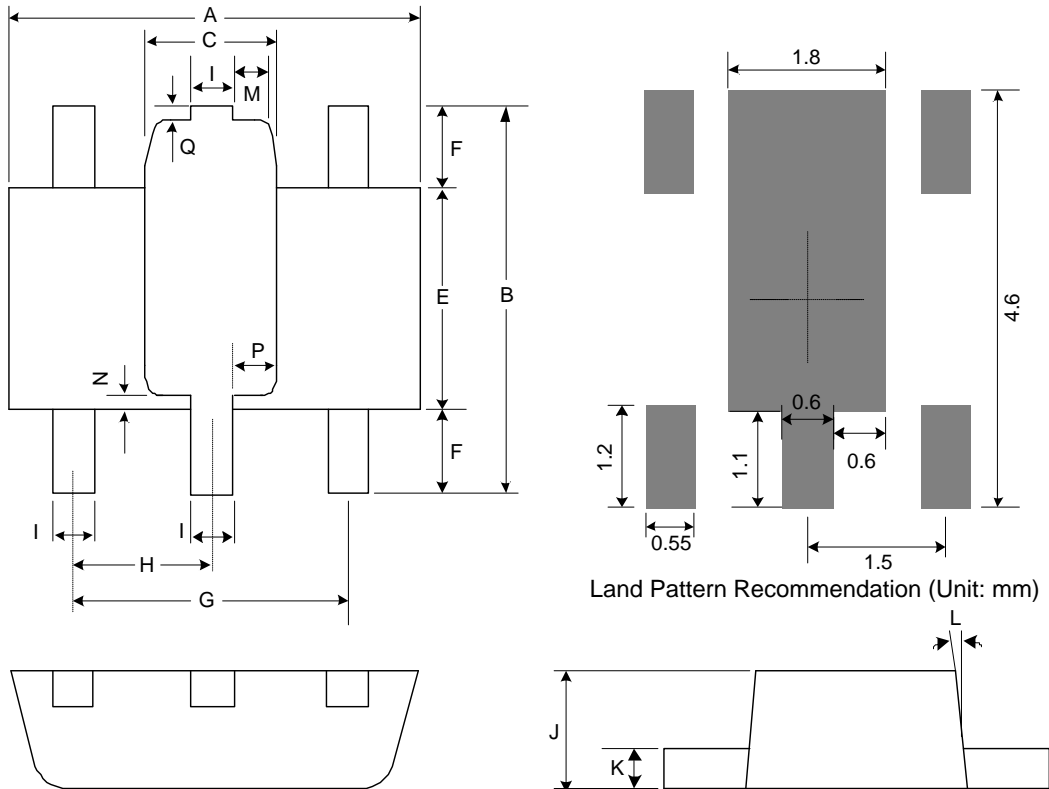


2KHz Dimming Duty 80%



❖ PACKAGE OUTLINES

(1) SOT89-5L

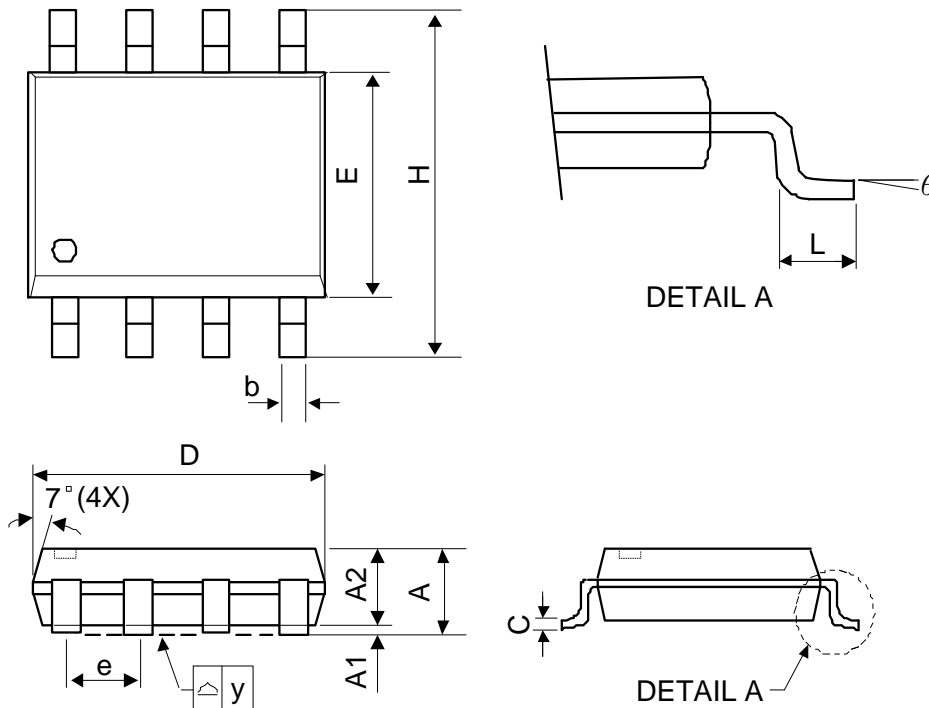


Land Pattern Recommendation (Unit: mm)

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