PAM2811

4-CHANNEL SINGLE-WIRE DIMMING LED DRIVE with ULTRA LOW DROPOUT CURRENT SINK

Description

The PAM2811 provides 4 regulated current sinks, capable of sinking up to 20mA current to accommodate 4 white LEDs. It requires no charge pump, has no noise and EMI, and significantly improves the efficiency in Li battery range.

LED brightness can be controlled by single-wire dimming techniques. The constant current sink is set by16-step.

The PAM2811 is available in QFN3x3-16L, MSOP-8L, SOT23-8L and DFN2x2-8L packages.

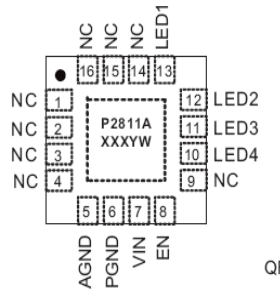
Features

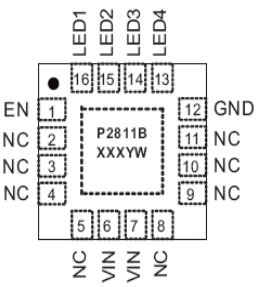
- Support up to 4 LEDs
- LED Sink Current 20mA
- Low Dropout Voltage
- Low Quiescent Supply Current:270μA(typ)
- No Noise and EMI
- Shutdown Current Less than 1μA
- Over Temperature Protection
- 16-Step Brightness Control
- Small Package: QFN3x3-16L,MSOP-8L SOT23-8L, DFN2X2-8L
- Pb-free Package

Applications

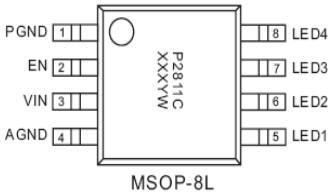
- Mobile Phone
- Digital Camera
- PDA MP3

Pin Assignments

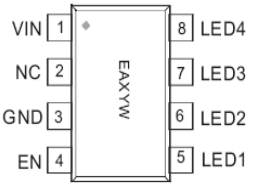




QFN3x3-16L

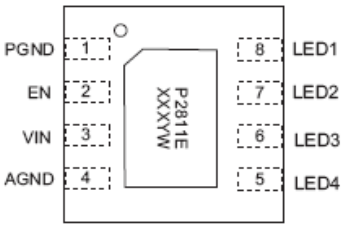


MSOP-8L

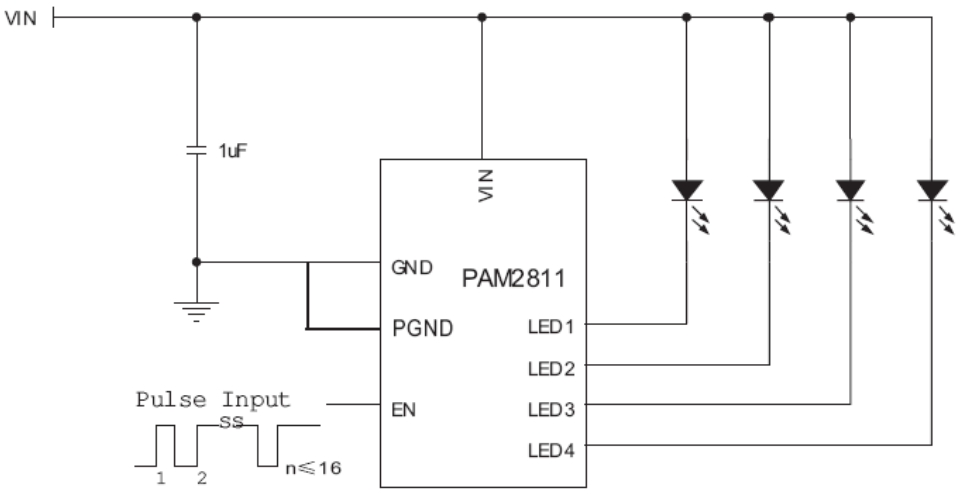


SOT23-8

DFN 2X2-8



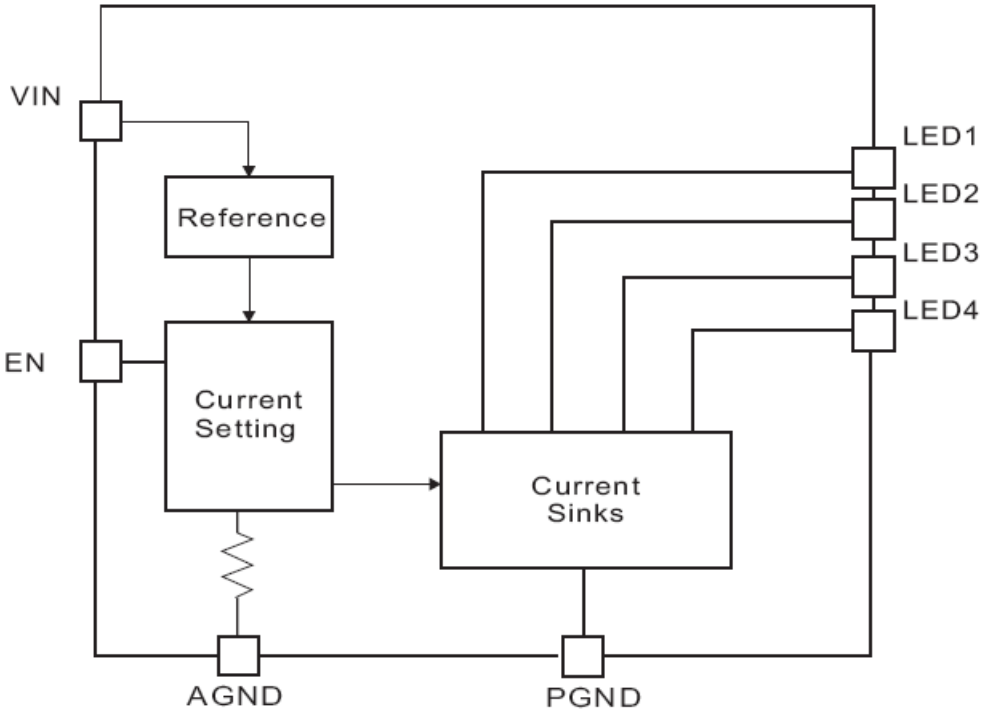
Typical Applications Circuit

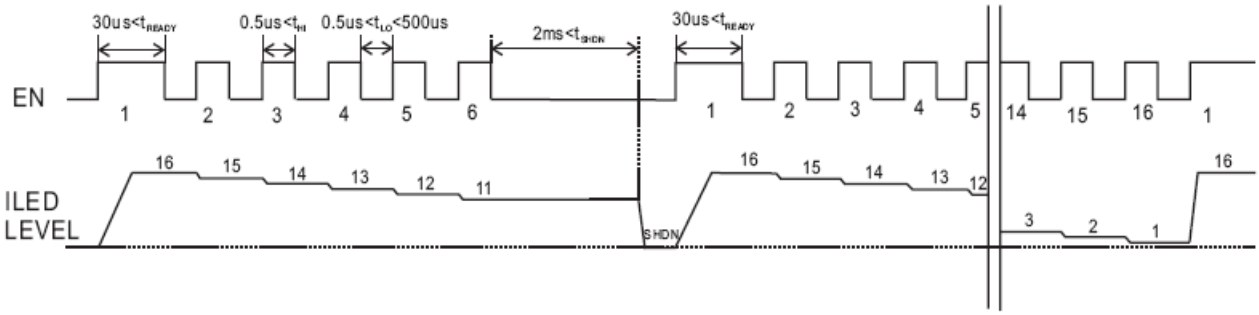


Pin Descriptions

Pin Name	Pin Number					Function
	QFN3x3-16L P2811A	QFN3x3-16L P2811B	MSOP-8L P2811C	SOT23-8 P2811D	DFN2x2-8L P2811E	
NC	1	2	—	—	—	Not Connected
NC	2	3	—	2	—	Not Connected
NC	3	4	—	—	—	Not Connected
NC	4	5	—	—	—	Not Connected
AGND	5	—	4	3	4	Analog Ground
PGND	6	12	1	—	1	Power Ground
VIN	7	6	3	1	3	Supply Input
VIN		7		—		Supply Input
EN	8	1	2	4	2	Enable Pin. Active high, with an internal 150kΩ pull-down resistor.
NC	9	8	—	—	—	Not Connected
LED4	10	13	8	8	5	LED4 Pin, Connect to the LED cathode, leave it to connect GND or open if unused.
LED3	11	14	7	7	6	LED3 Pin, Connect to the LED cathode, leave it to connect GND or open if unused.
LED2	12	15	6	6	7	LED2 Pin, Connect to the LED cathode, leave it to connect GND or open if unused.
LED1	13	16	5	5	8	LED1 Pin, Connect to the LED cathode, leave it to connect GND or open if unused.
NC	14	9	—	—	—	Not Connected
NC	15	10	—	—	—	Not Connected
NC	15	11	—	—	—	Not Connected

Functional Block Diagram





Absolute Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

These are stress ratings only and functional operation is not implied. Exposure to absolute maximum ratings for prolonged time periods may affect device reliability. All voltages are with respect to ground.

Parameter	Rating	Unit
Input Voltage Range	-0.3 to +6.0	V
PWM Pin Voltage	-0.3 to (V_{IN} +0.3)/+6	
Maximum Junction Temperature	150	°C
Storage Temperature	-65 to +150	
Soldering Temperature	300, 5sec	

Recommended Operating Conditions (@T_A = +25°C, unless otherwise specified.)

Parameter	Rating	Unit
Input Voltage	2.7 to 5.5	V
Junction Temperature Range	-40 to +125	°C
Ambient Temperature Range	-40 to +85	

Thermal Information

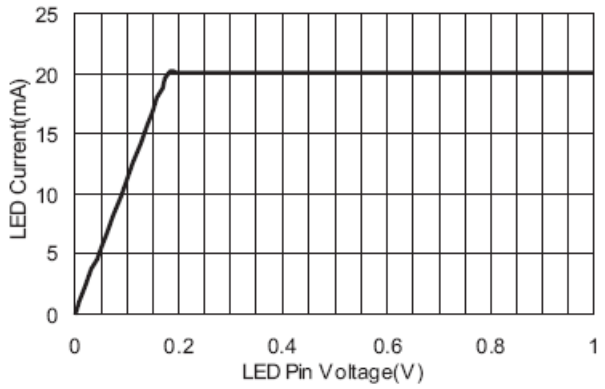
Parameter	Package	Symbol	Max	Unit
Thermal Resistance (Junction to Ambient)	QFN3x3-16L	θ_{JA}	35	°C/W
	MSOP-8L		180	
	SOT23-8		250	
	DFN2x2-8L		80	
Thermal Resistance (Junction to Case)	QFN3x3-16L	θ_{JC}	14	
	MSOP-8L		75	
	SOT23-8		130	
	DFN2x2-8L		20	

Electrical Characteristics (@T_A = +25°C, V_{IN} = 3.6V, unless otherwise specified.)

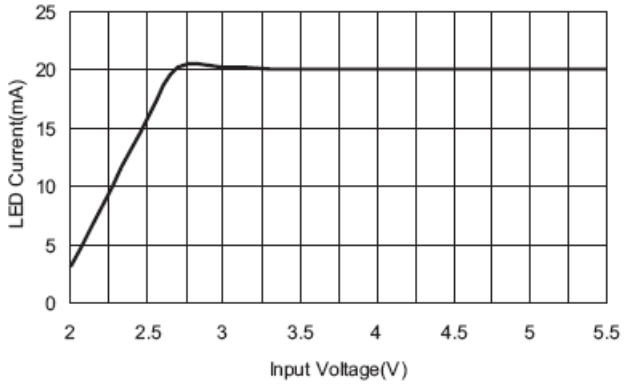
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Input Voltage	V_{IN}		2.7		5.5	V
Output Current	I_{LED}	All LEDs 100% setting	18	20	22	mA
Current Matching		All LEDs 100% setting	-3		+3	%
LED Dropout Voltage	V_{DO}	I_{LED} = 20mA		60		mV
Quiscent Current	I_Q	I_{LED} = 0		270		μA
Shutdown Current	I_{SD}	V_{EN} = 0V, V_{IN} = 5.5V		0.1	1.0	μA
Startup Time	T_{ON}			30		μs
EN Input Logic High	V_{HI}		1.5			V
EN Input Logic Low	V_{LO}				0.4	V
EN Low Time for Dimming	T_{LO}		0.5		500	μs
EN High Time for Dimming	T_{HI}		0.5			μs
Shutdown Delay Time	T_{OFF}	V_{EN} = 0V		1000	2000	μs
Thermal Shutdown Temperature	T_P			150		°C
Hysteresis Temperature				30		°C

Typical Performance Characteristics (@T_A = +25°C, V_{IN} = 5.0V, unless otherwise specified.)

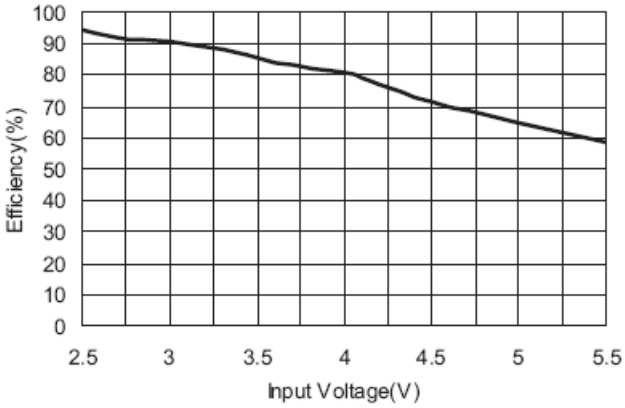
LED Current VS LED Pin Voltage



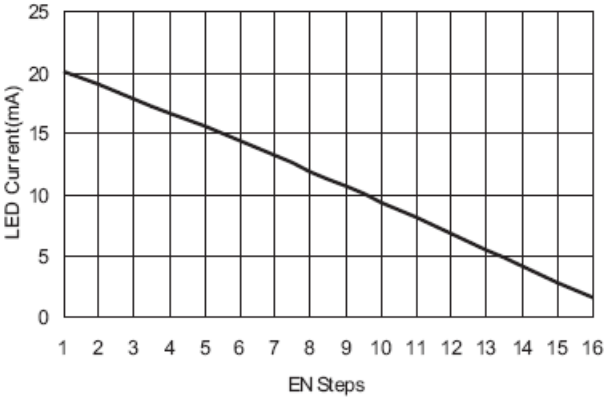
LED Current VS Input Voltage



Efficiency VS Input Voltage



LED Current VS EN Steps



Application Information

The PAM2811 is a 4-channel programmable white-LED driver. It is capable of supplying 20mA per channel with a total of 80mA output current available. LED brightness control of PAM2811 can be achieved with a Pulses signal.

Enable Input

The EN input is used to enable or disable the PAM2811. Pulling the EN pin higher than 1.5V will enable the device. For producing constant, nonpulsating output current compare to conventional pulse width modulation (PWM) dimming scheme. The PAM2811 incorporates a 4-bit DAC for brightness control to program the output current at 16 continuous steps: 20 to1.25mA. Table1 shows details for current setting.

Table 1 Current Setting

Data	Current (mA)	Data	Current (mA)
16	20.00	8	10.00
15	18.75	7	8.75
14	17.50	6	7.50
13	16.25	5	6.25
12	15.00	4	5.00
11	13.75	3	3.75
10	12.50	2	2.50
9	11.25	1	1.25

Page 2 shows the detail operation of 16-steps brightness control. When single-wire pulse counting dimming is used, the ready time is recommended to be greater than 30μs for enabling the device, the pulse high time THI recommended to be greater than 0.5μs, and the pulse low time T_{LO} is recommended to be greater than0.5μs and less than 500μs. A constant current is sourced as long as the EN signal remains high. The shutdown feature reduces quiescent current to less than 0.1μA.

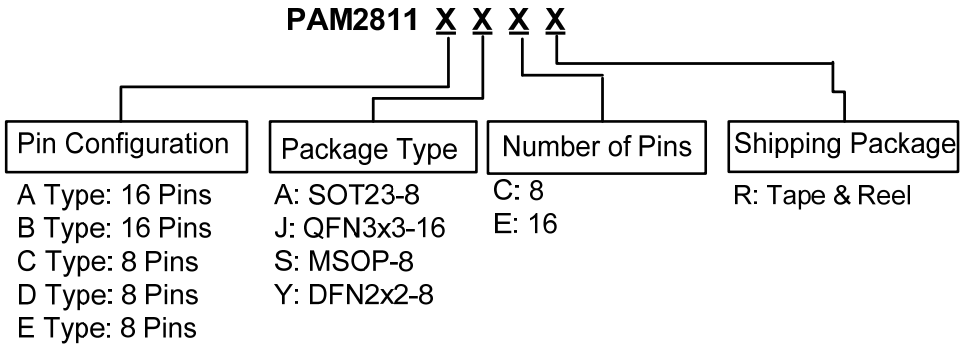
LED Connection

The PAM2811 supports up to 4 white LEDs. The four LEDs are connected from VIN to LEDx respectively. If the LED is not used, it should be connected to GND or open.

Over Temperature Protection

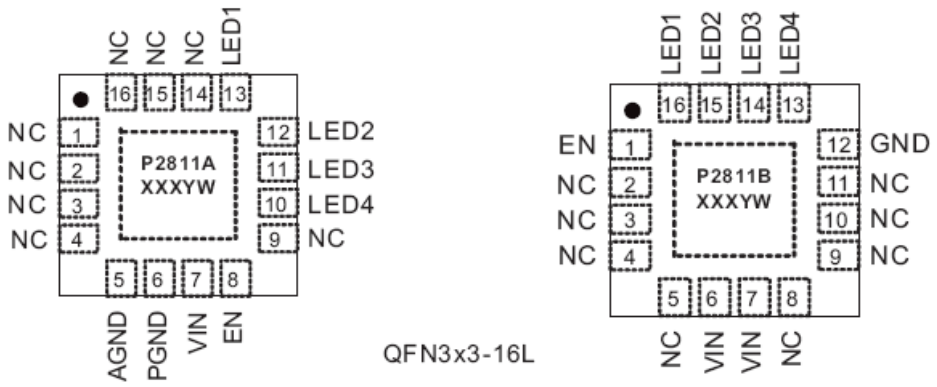
The PAM2811 equips over temperature protection. When the junction temperature (T_J) exceeds +150°C, the current source turns off automatically. The device will turn on again after the IC's T_J cools down under +120°C. Operating at absolute maximum temperature is not recommended.

Ordering Information

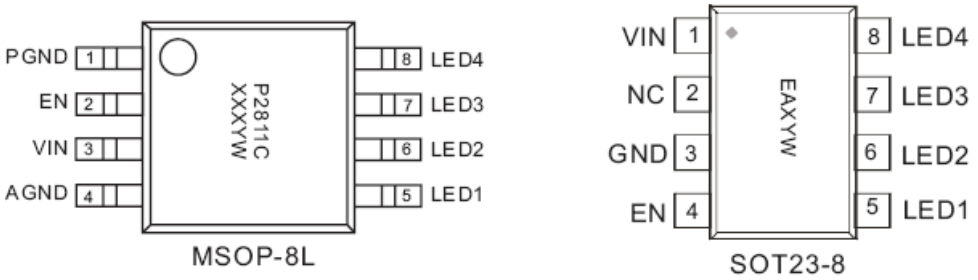


Part Number	Part Marking	Package Type	Standard Package
PAM2811AJER	P2811A XXXYW	QFN3x3-16L	3000 Units/Tape & Reel
PAM2811BJER	P2811B XXXYW	QFN3x3-16L	3000 Units/Tape & Reel
PAM2811CSCR	P2811C XXXYW	MSOP-8L	2500 Units/Tape & Reel
PAM2811DACR	EAXYW	SOT23-8	3000 Units/Tape & Reel
PAM2811EYCR	P2811E XXXYW	DFN3x3-8L	3000 Units/Tape & Reel

Marking Information



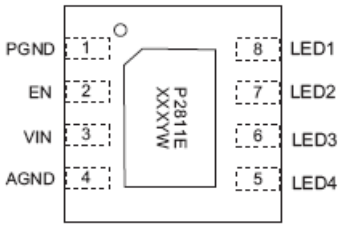
QFN3x3-16L



MSOP-8L

SOT23-8

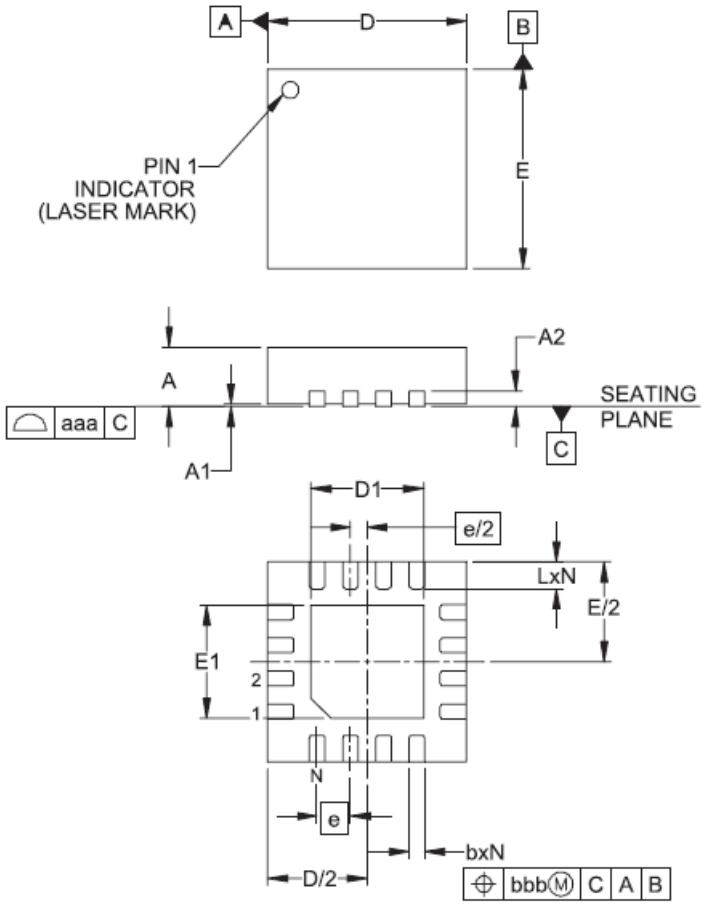
DFN 2X2-8



Y: Year
W: Week
X: Internal Code

Package Outline Dimensions (All dimensions in mm.)

QFN3x3-16

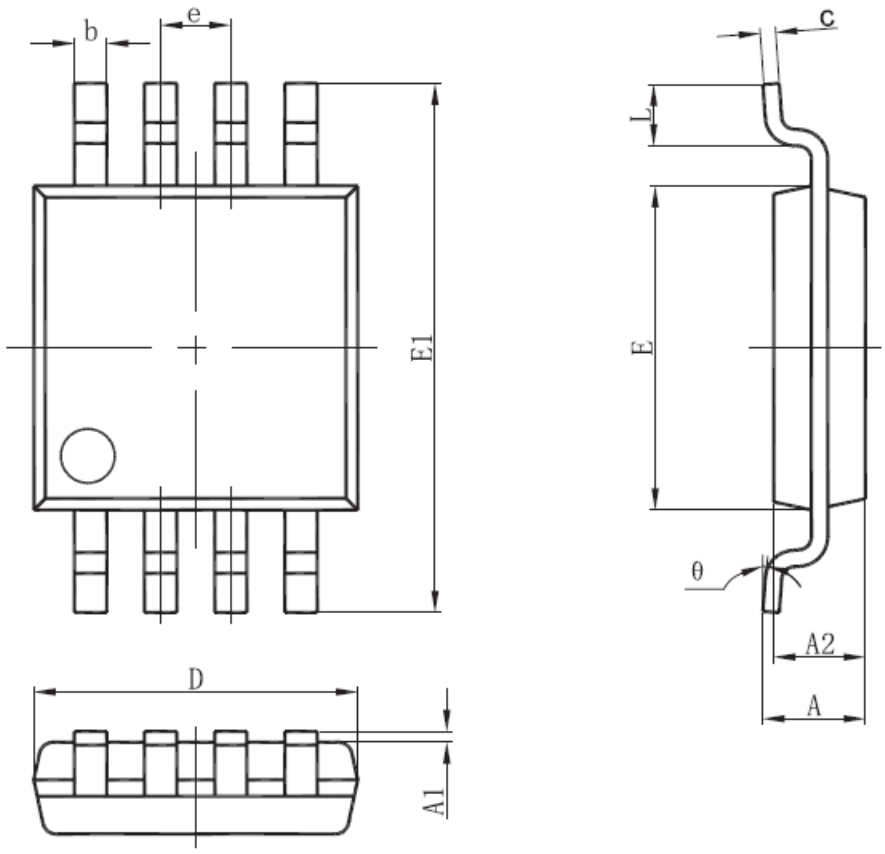


DIMENSIONS (Millieters)			
	MIN	TYP	MAX
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
A2		0.20	
b	0.18	0.25	0.30
D	2.90	3.00	3.10
D1	1.55	1.70	1.80
E	2.90	3.00	3.10
E1	1.55	1.70	1.80
e		0.50BSC	
L	0.30	0.40	0.50
N		16	
aaa		0.08	
bbb		0.10	

Notes: 1. Controlling dimensions are in millimeters (angles in degrees)
2. Coplanarity applies to the exposed pad as well as the terminals.
3. DAP is 1.90 x 1.90mm.

Package Outline Dimensions (cont.) (All dimensions in mm.)

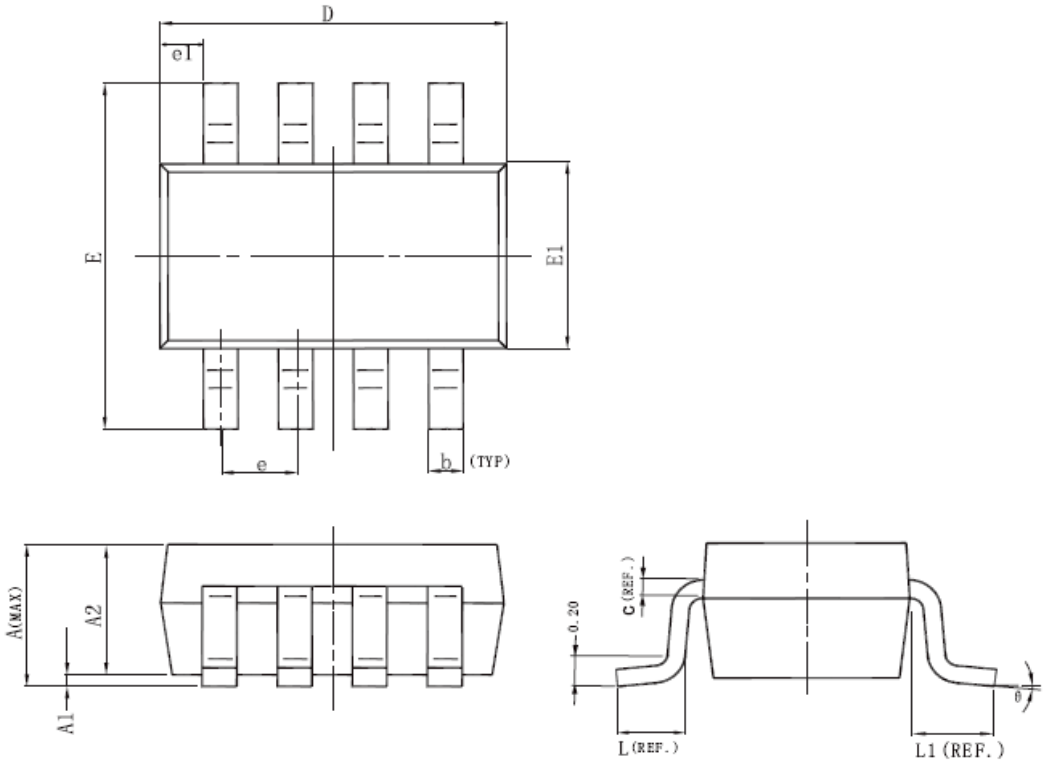
MSOP-8



REF	Millimeter	
	Min	Max
A	--	1.10
A1	0.05	0.15
A2	0.78	0.94
b	0.22	0.38
c	0.08	0.23
D	2.90	3.10
E	2.90	3.10
E1	4.75	5.05
e	0.65BSC	
L	0.40	0.70

Package Outline Dimensions (cont.) (All dimensions in mm.)

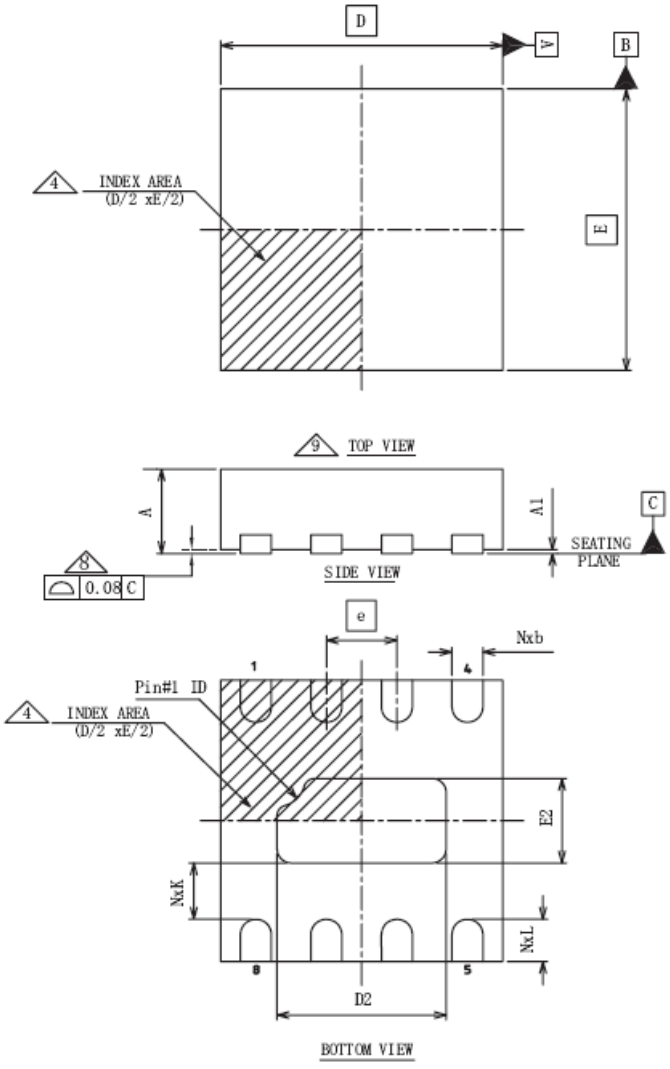
SOT23-8



Symbol	Dimensions In Millimeters		Symbol	Dimensions In Millimeters	
	Min	Max		Min	Max
A	1.45 MAX		L	0.30	0.60
A1	0	0.10	L1	0.60 (REF)	
A2	1.10	1.30	θ	0°	10°
c	0.12 (REF)		b	0.22	0.38
D	2.70	3.10	e	0.65 (REF)	
E	2.60	3.00	e1	0.33 (REF)	
E1	1.40	1.80			

Package Outline Dimensions (cont.) (All dimensions in mm.)

DFN2x2-8



	COMMON DIMENSION		
SYMBOL	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0.00	0.02	0.05

Summary Table			
Lead Pitch (e)	Lead Count	Body Size	Pin #1 ID
0.50	8	2X2	R0.20

D BSC		2.00
E BSC		2.00
b	MIN	0.18
	NOM	0.25
	MAX	0.30
D2	MIN	1.05
	NOM	1.20
	MAX	1.30
E2	MIN	0.45
	NOM	0.60
	MAX	0.70
L	MIN	0.20
	NOM	0.30
	MAX	0.40
N		8

Unit: Millimeters

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