



# PAM2811

## 4-Channel Single-Wire Dimming LED Drive with Ultra Low Dropout Current Sink

### Features

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

### 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.

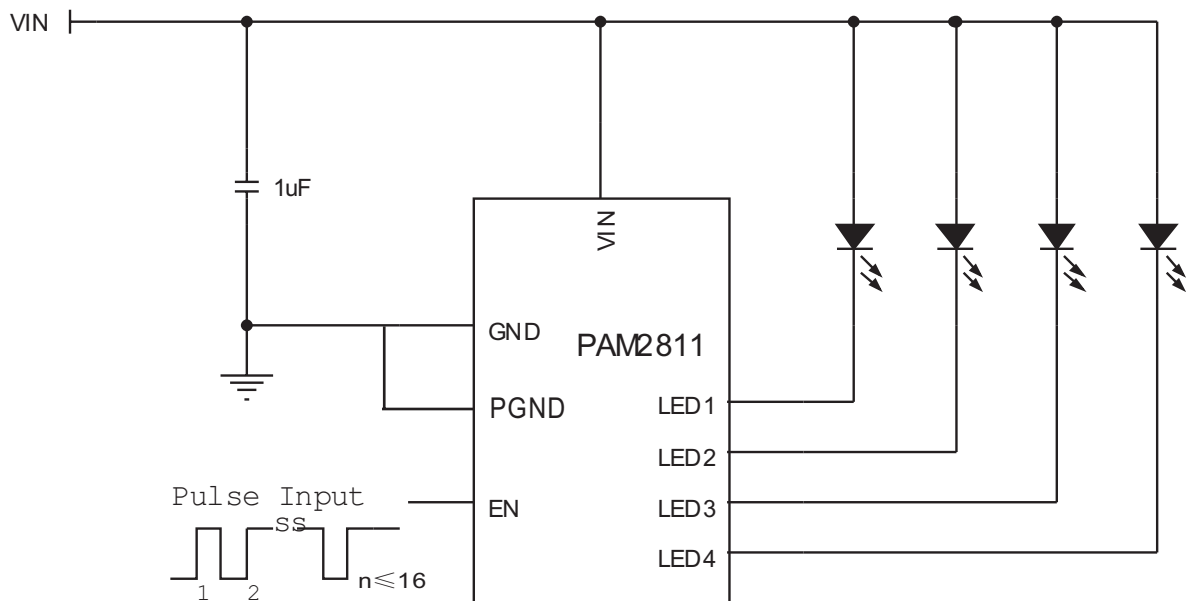
LED brightness can be controlled by Single-wire dimming techniques. The constant current sink is set by 16-step.

The PAM2811 is available in QFN3x3-16L,MSOP-8L, SOT23-8L and DFN2X2-8L Packages.

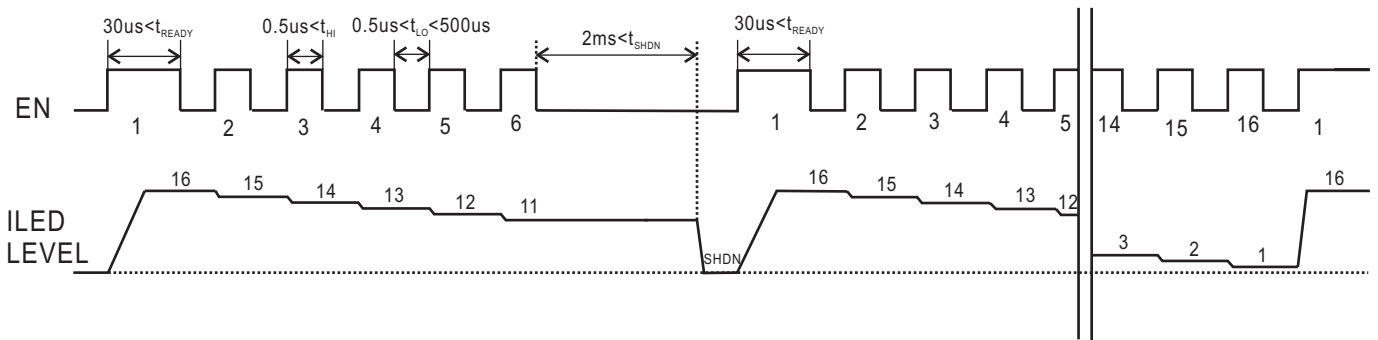
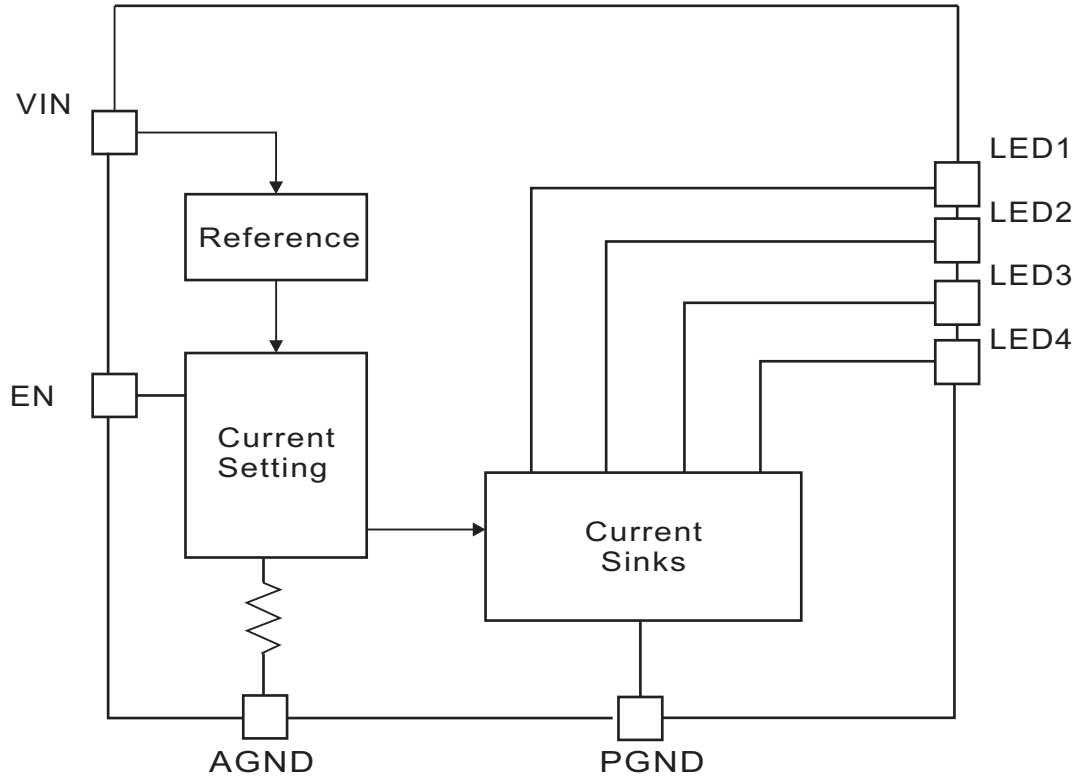
### Applications

- Mobile phone
- Digital camera
- PDA Mp3

### Typical Application



### Block Diagram



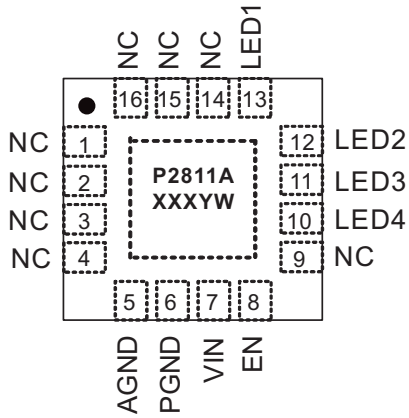


# PAM2811

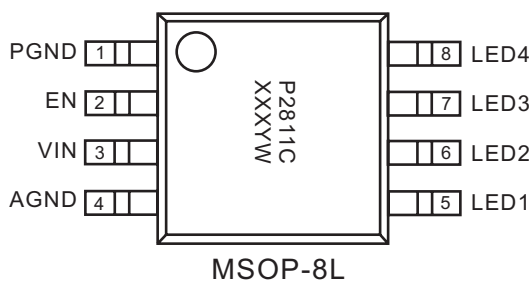
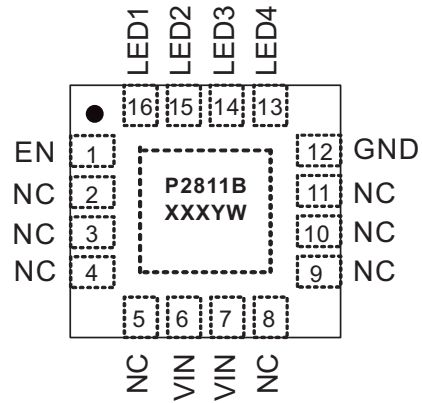
## 4-Channel Single-Wire Dimming LED Drive with Ultra Low Dropout Current Sink

### Pin Configuration & Marking Information

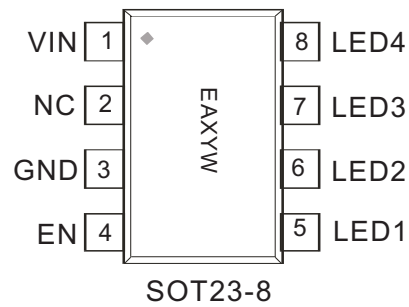
Top View



QFN3x3-16L

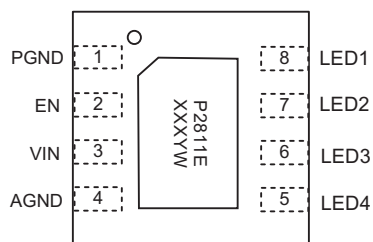


MSOP-8L



SOT23-8

DFN 2X2-8



Y: Year  
W: Week  
X: Internal Code



# PAM2811

## 4-Channel Single-Wire Dimming LED Drive with Ultra Low Dropout Current Sink

### Pin Description

P2811A	P2811B	P2811C	P2811D	P2811E	Symbol	Function
1	2	-	-	-	NC	
2	3	-	2	-	NC	
3	4	-	-	-	NC	
4	5	-	-	-	NC	
5		4	3	4	AGND	Analog Ground
6	12	1		1	PGND	Power Ground
7	6	3	1	3	VIN	Supply Input
	7				VIN	Supply Input
8	1	2	4	2	EN	Enable Pin. Active high, with an internal 150k $\Omega$ pull-down resistor.
9	8	-	-	-	NC	
10	13	8	8	5	LED4	LED4 Pin, Connect to the LED cathode, leave it to connect GND or open if unused
11	14	7	7	6	LED3	LED3 Pin, Connect to the LED cathode, leave it to connect GND or open if unused
12	15	6	6	7	LED2	LED2 Pin, Connect to the LED cathode, leave it to connect GND or open if unused
13	16	5	5	8	LED1	LED1 Pin, Connect to the LED cathode, leave it to connect GND or open if unused
14	9	-	-	-	NC	
15	10	-	-	-	NC	
16	11	-	-	-	NC	



# PAM2811

## 4-Channel Single-Wire Dimming LED Drive with Ultra Low Dropout Current Sink

### Absolute Maximum Ratings

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.

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

### Recommended Operating Conditions

Input Voltage Range.....2.7V to 5.5V	Junction Temperature Range.....-40°C to 125°C
	Ambient Temperature Range.....-40°C to 85°C

### Thermal Information

Parameter	Package	Symbol	Maximum	Unit
Thermal Resistance (Junction to Ambient)	QFN 3x3-16L	$\theta_{JA}$	35	°C/W
	MSOP-8L		180	
	SOT23-8		250	
	DFN2X2-8L		80	
Thermal Resistance (Junction to Case)	QFN 3x3-16L	$\theta_{JC}$	14	°C/W
	MSOP-8L		75	
	SOT23-8		130	
	DFN2X2-8L		20	

### Electrical Characteristic

$T_A=25^\circ\text{C}$ ,  $V_{IN}=3.6\text{V}$ , unless otherwise noted.

PARAMETER	Symbol	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	$V_{DO}$	$I_{LED}=20\text{mA}$		60		mV
Quiescent Current	$I_Q$	$I_{LED}=0$		270		$\mu\text{A}$
Shutdown Current	$I_{SD}$	$V_{EN}=0\text{V}$ , $V_{IN}=5.5\text{V}$		0.1	1	$\mu\text{A}$
Startup Time	$T_{ON}$			30		$\mu\text{s}$
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	$\mu\text{s}$
EN High Time for Dimming	$T_{HI}$		0.5			$\mu\text{s}$
Shutdown Delay Time	$T_{OFF}$	$V_{EN}=0\text{V}$		1000	2000	$\mu\text{s}$
Thermal Shutdown Temperature	$T_P$			150		°C
Hysteresis Temperature				30		°C



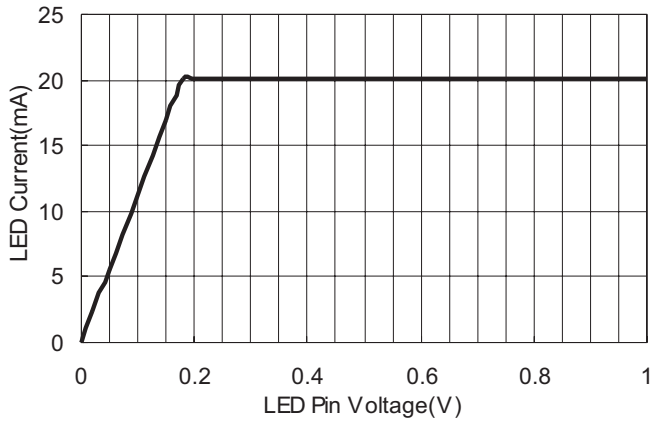
# PAM2811

## 4-Channel Single-Wire Dimming LED Drive with Ultra Low Dropout Current Sink

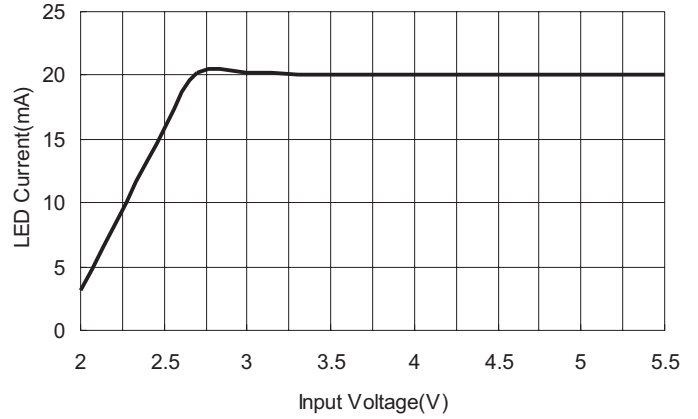
### Typical Performance Characteristics

$V_{IN}=5.0V, T_A=25^{\circ}C$ , unless otherwise noted.

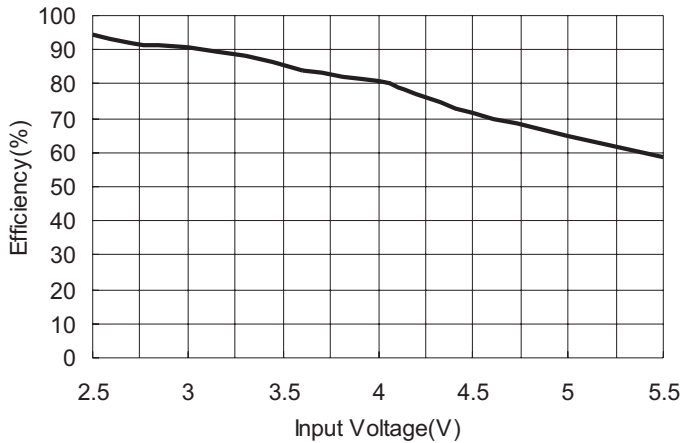
LED Current VS LED Pin Voltage



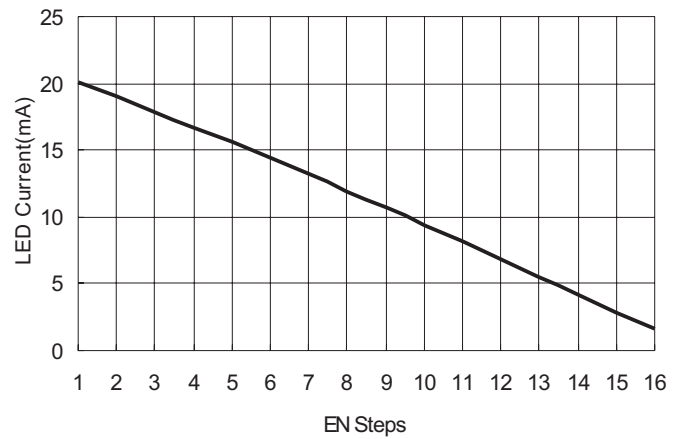
LED Current VS Input Voltage



Efficiency VS Input Voltage



LED Current VS EN Steps





# PAM2811

## 4-Channel Single-Wire Dimming LED Drive with Ultra Low Dropout Current Sink

### 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, non-pulsating 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:20~1.25mA. Table1 shows details for current setting.

Table 1 Current Setting

Data	Current(mA)	Data	Current(mA)
16	20	8	10
15	18.75	7	8.75
14	17.5	6	7.5
13	16.25	5	6.25
12	15	4	5
11	13.75	3	3.75
10	12.5	2	2.5
9	11.25	1	1.25

Page2 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 30us for enabling the device, the pulse high time THl recommended to be greater than 0.5us, and the pulse low time TLo is recommended to be greater than 0.5us and less than 500us. A constant current is sourced as long as the EN signal remains high. The shutdown feature reduces quiescent current to less than 0.1uA.

#### 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

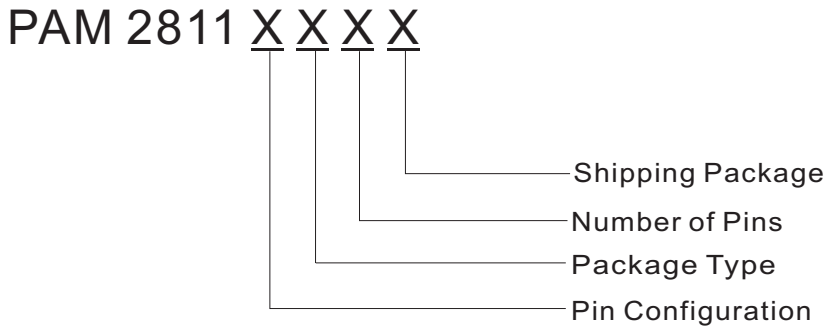
The PAM2811 equips over temperature protection. When the junction temperature ( $T_j$ ) exceeds +150°C, the current source turns off automatically. The device will turn on again after the IC's  $T_j$  cools down under +120°C. Operating at absolute maximum temperature is not recommended.



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## 4-Channel Single-Wire Dimming LED Drive with Ultra Low Dropout Current Sink

### Ordering Information



Part Number	Marking	Package Type	Shipping Package
PAM2811AJER	P2811A XXXYW	QFN3x3-16L	3,000Units/Tape&Real
PAM2811BJER	P2811B XXXYW	QFN3x3-16L	3,000Units/Tape&Real
PAM2811CSCR	P2811C XXXYW	MSOP-8L	2,500Units/Tape&Real
PAM2811DACR	EAXYW	SOT23-8	3,000Units/Tape&Real
PAM2811EYCR	P2811E XXXYW	DFN2X2-8L	3,000Units/Tape&Real



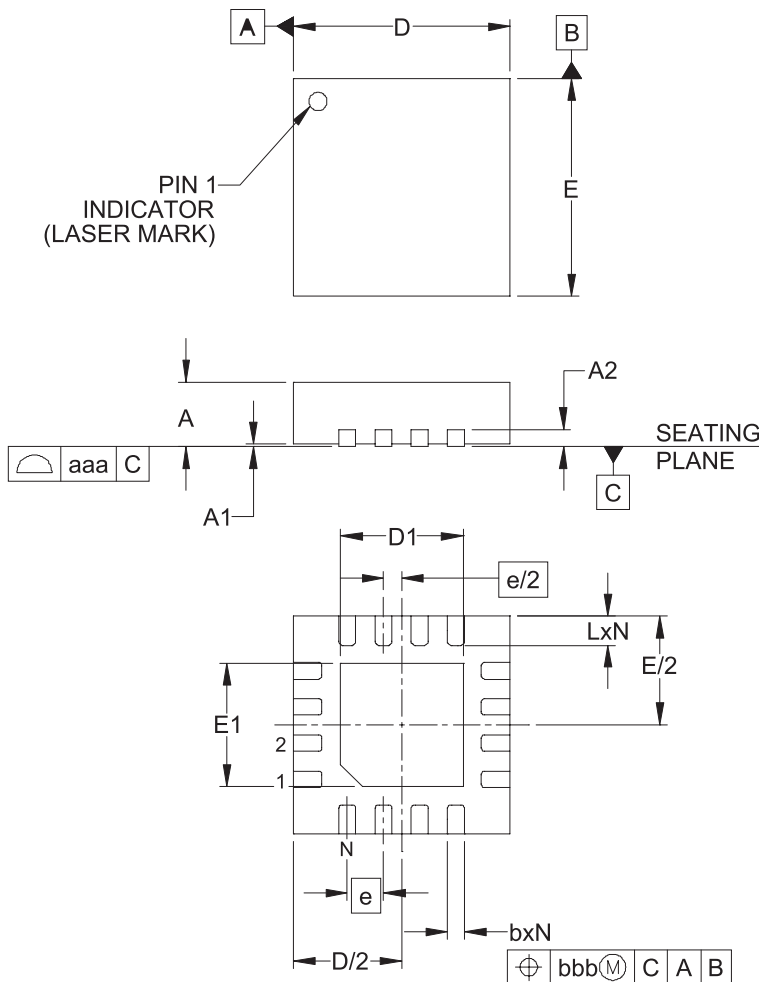


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## 4-Channel Single-Wire Dimming LED Drive with Ultra Low Dropout Current Sink

### Outline Dimensions

3x3 mm QFN 16



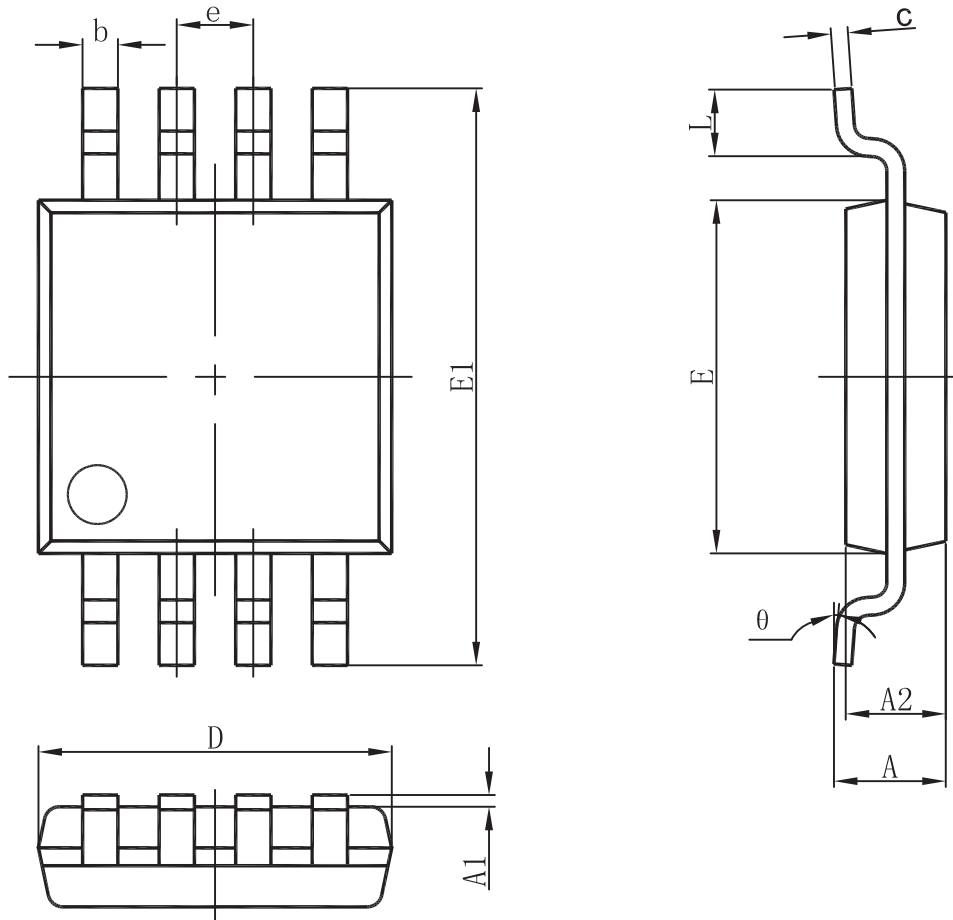
DIMENSIONS (Millimeters)			
	MIN	TYP	MAX
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
A2	0.20		
b	0.18	0.25	0.30
D	2.90	3.00	3.10
D1	1.55	1.70	1.80
E	2.90	3.00	3.10
E1	1.55	1.70	1.80
e	0.50BSC		
L	0.30	0.40	0.50
N	16		
aaa	0.08		
bbb	0.10		

**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.

### Outline Dimensions

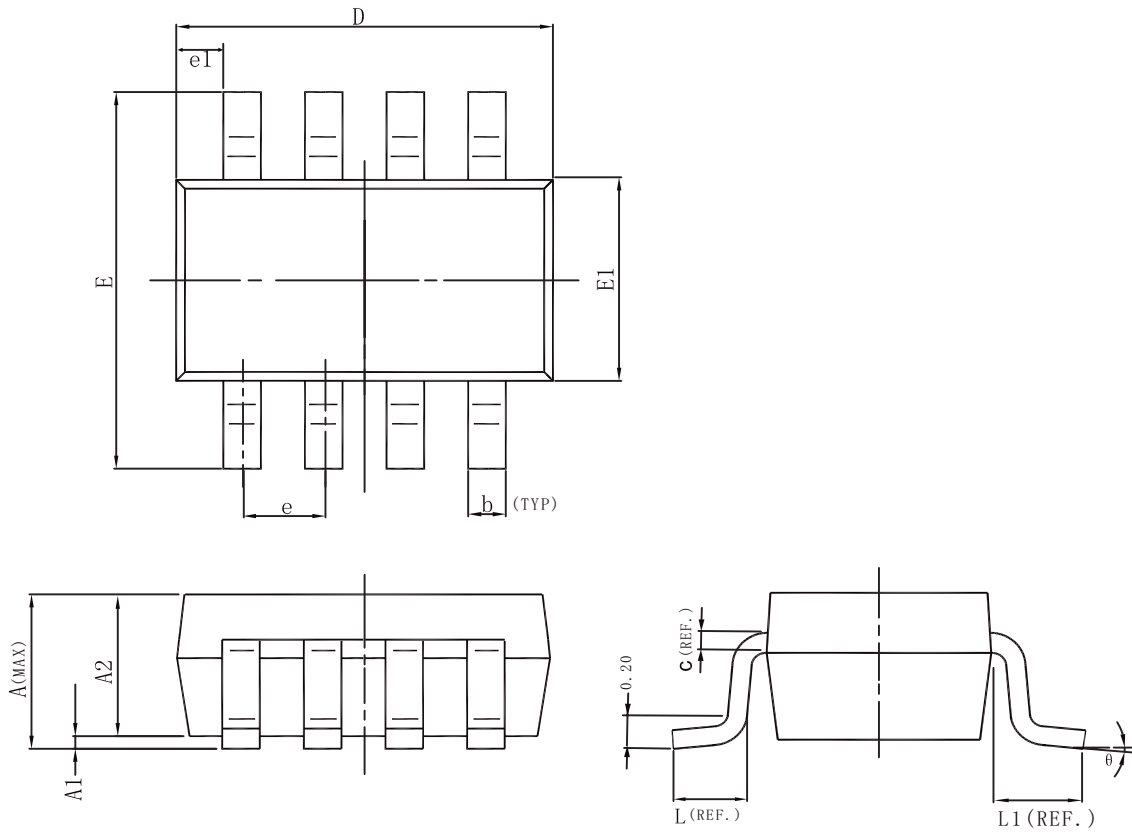
MSOP-8



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

### Outline Dimensions

#### 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	$\theta$	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			

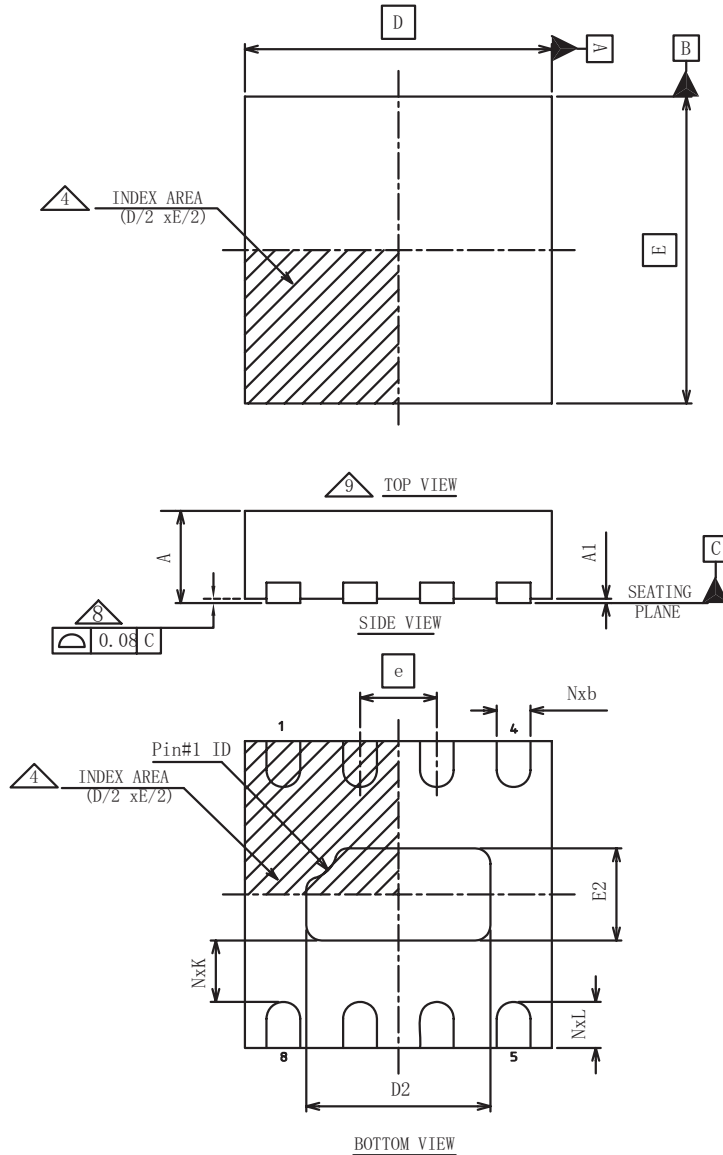


# PAM2811

## 4-Channel Single-Wire Dimming LED Drive with Ultra Low Dropout Current Sink

### Outline Dimensions

DFN 2x2



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	

SYMBOL	COMMON DIMENSION		
	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

Unit: Millimeters