

**Features**

- Operation Voltage from 12V to 90V
- Maximum Duty Cycle up to 100%
- Minimum Drop Out 0.5V
- Adjust VOUT from 1.25V to VIN - 2V
- Max. IOUT=0.5A at VOUT=5V
- Max. IOUT=0.3A at VOUT=12V or 15V
- Max. output power less than 5W
- Fixed 150KHz Switching Frequency
- Internal Optimize HV Power MOSFET
- High efficiency up to 85%
- Excellent line and load regulation
- Built in output short Protection Function
- Built in current limit function
- SOP8-EP (Exposed PAD) package

**Applications**

- Ebike Controller Power Supply
- Telecom / Networking Equipment

**General Description**

The XL7016 is a 150KHz fixed frequency PWM buck (step-down) DC/DC converter, capable of driving a 0.5A load with high efficiency, low ripple and excellent line and load regulation. Requiring a minimum number of external components, the regulator is simple to use and include internal frequency compensation and a fixed-frequency oscillator.

The PWM control circuit is able to adjust the duty ratio linearly from 0 to 100%.

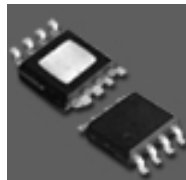


Figure1. Package Type of XL7016

## Pin Configurations

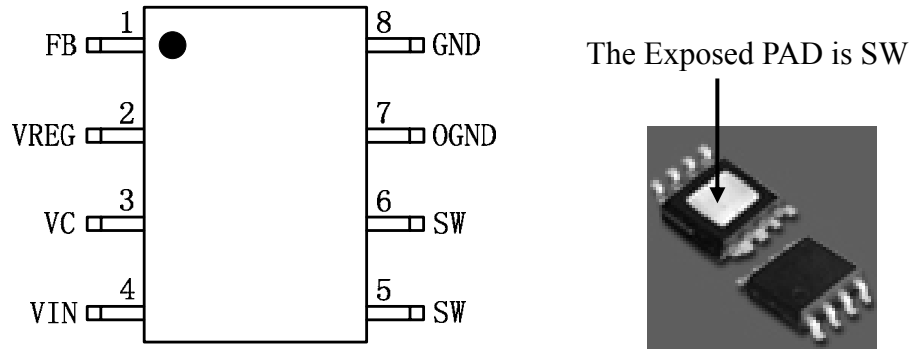


Figure2. Pin Configuration of XL7016 (Top View)

Table 1 Pin Description

Pin Number	Pin Name	Description
1	FB	Feedback Pin (FB). Through an external resistor divider network, Feedback senses the output voltage and regulates it. The feedback threshold voltage is 1.25V.
2	VREG	Supply Voltage Input Pin. A 10 $\mu$ F ceramic decoupling capacitor is required. An external voltage between 7V and 9V can be applied to this pin to reduce internal power dissipation.
3	VC	Internal Voltage Regulator Bypass Capacity. In typical system application, The VC pin connect a 1uF capacitor to VIN.
4	VIN	Supply Voltage Input Pin. XL7016 operates from 12V to 90V DC voltage. Bypass Vin to GND with a suitably large capacitor to eliminate noise on the input.
5,6	SW	Power Switch Output Pin (SW). Output is the switch node that supplies power to the output. The exposed PAD is SW.
7	OGND	Output Ground Pin.
8	GND	Ground Pin. Care must be taken in layout. This pin should be placed outside of the Schottky Diode to output capacitor ground path to prevent switching current spikes from inducing voltage noise into XL7016.

## Function Block

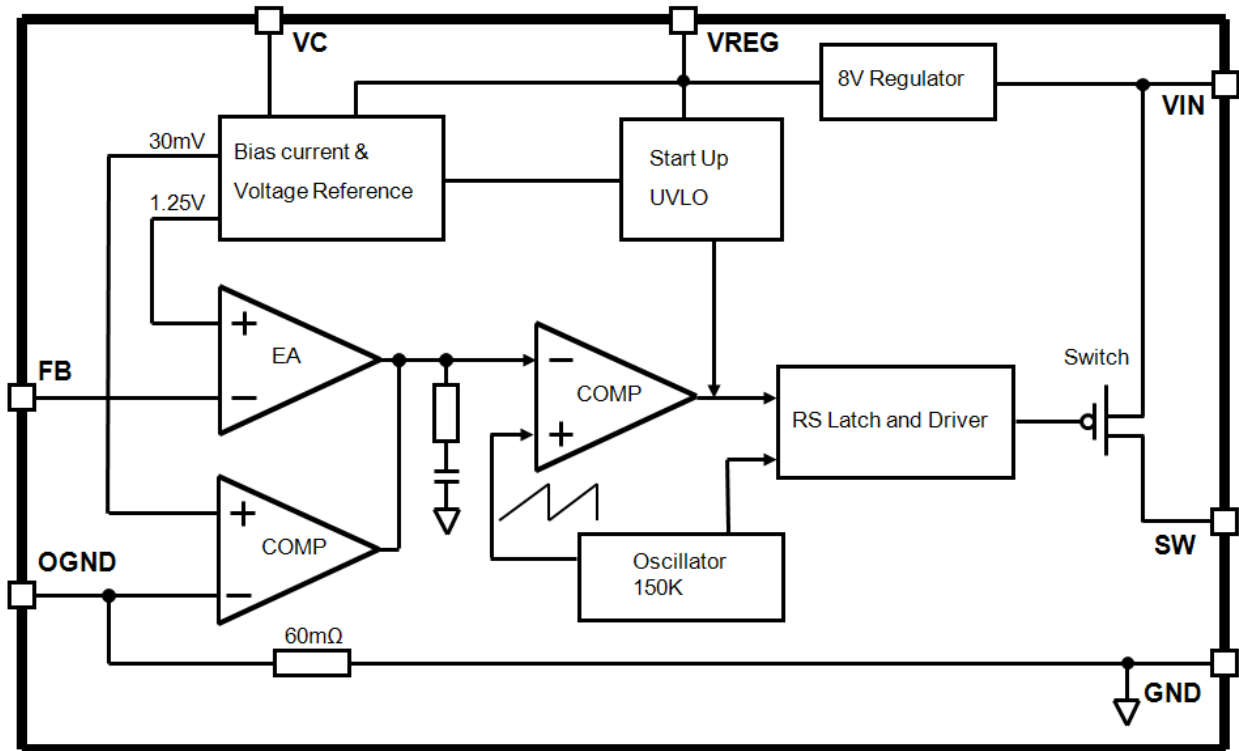


Figure3. Function Block Diagram of XL7016

## Typical Application Circuit

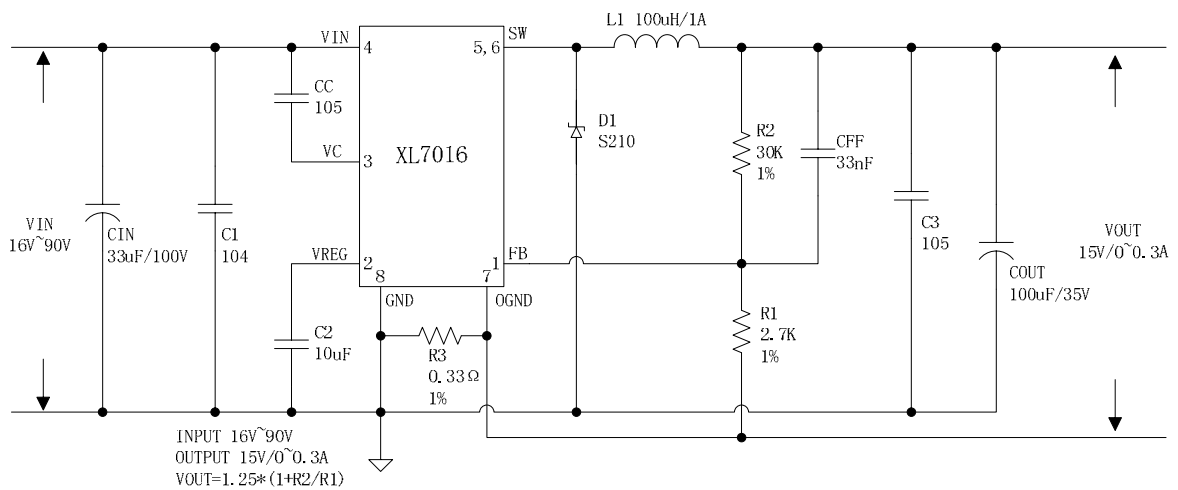


Figure4. XL7016 Typical Application Circuit

0.5A 150KHz 100V Buck DC to DC Converter

XL7016

## Ordering Information

Order Information	Marking ID	Package Type	Packing Type Supplied As
XL7016	XL7016	SOP8-EP	2500 Units on Tape & Reel

## Absolute Maximum Ratings ( Note1 )

Parameter	Symbol	Value	Unit
VIN Pin Voltage	V <sub>IN</sub>	-0.3 to 100	V
FB Pin Voltage	V <sub>FB</sub>	-0.3 to V <sub>IN</sub>	V
SW Pin Voltage	V <sub>SW</sub>	-0.3 to V <sub>IN</sub>	V
Power Dissipation	P <sub>D</sub>	Internally limited	mW
Thermal Resistance (SOP8-EP) (Junction to Ambient, No Heatsink, Free Air)	R <sub>JA</sub>	60	°C/W
Maximum Junction Temperature	T <sub>J</sub>	-40 to 150	°C
Operating Junction Temperature	T <sub>J</sub>	-40 to 125	°C
Storage Temperature	T <sub>STG</sub>	-65 to 150	°C
Lead Temperature (Soldering, 10 sec)	T <sub>LEAD</sub>	260	°C
ESD (HBM)		>3000	V

**Note1:** Stresses greater than those listed under Maximum Ratings may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operation is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

0.5A 150KHz 100V Buck DC to DC Converter

XL7016

## XL7016 Electrical Characteristics

$T_a = 25$  ; unless otherwise specified.

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
<i>System parameters test circuit figure4</i>						
VFB	FB Voltage	$V_{in} = 20V$ to $90V$ $I_{load} = 0.1A$ to $0.3A$	1.225	1.25	1.275	V
$\eta$	Efficiency	$V_{in} = 24V$ , $V_{out} = 15V$ $I_{out} = 0.3A$	-	93	-	%
$\eta$	Efficiency	$V_{in} = 36V$ , $V_{out} = 15V$ $I_{out} = 0.3A$	-	88	-	%
$\eta$	Efficiency	$V_{in} = 48V$ , $V_{out} = 15V$ $I_{out} = 0.3A$	-	85	-	%
$\eta$	Efficiency	$V_{in} = 60V$ , $V_{out} = 15V$ $I_{out} = 0.3A$	-	80	-	%

## Electrical Characteristics (DC Parameters)

$V_{in} = 48V$ ,  $GND = 0V$ ,  $V_{in}$  &  $GND$  parallel connect a  $33\mu f/100V$  capacitor;  $I_{out} = 0.2A$ ,  $T_a = 25$  ; the others floating unless otherwise specified.

Parameters	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Input operation voltage	$V_{in}$		12		90	V
VIN UVLO	$V_{in\_uvlo}$			10	11	V
VREG voltage	$V_{reg}$			8		V
Quiescent Supply Current	$I_q$	$V_{FB} = 2V$		3	5	mA
Oscillator Frequency	$F_{osc}$		120	150	180	KHz
Switch Current Limit	$I_L$	$V_{FB} = 0$ , $R3 = 0.33$		0.6		A
Output Power PMOS	$R_{dson}$	$V_{in} = 48V$ , $I_{SW} = 0.3A$		180	210	mohm
Max. Duty Cycle	$D_{MAX}$	$V_{FB} = 0V$		100		%

### Typical System Application (VOUT=15V, IOUT=0~0.3A)

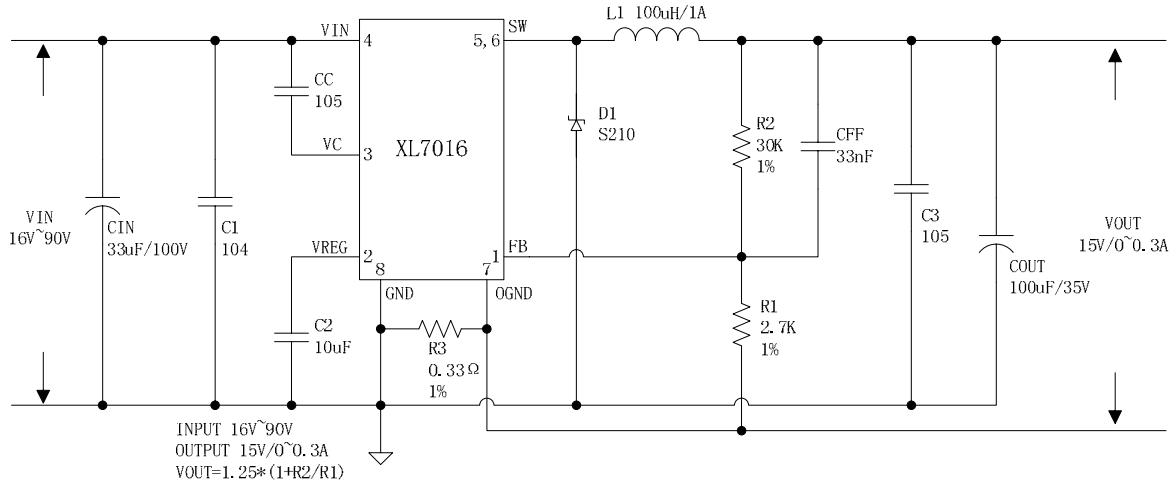


Figure5. XL7016 System Application (VIN=16V~90V, VOUT=15V, IOUT=0~0.3A)

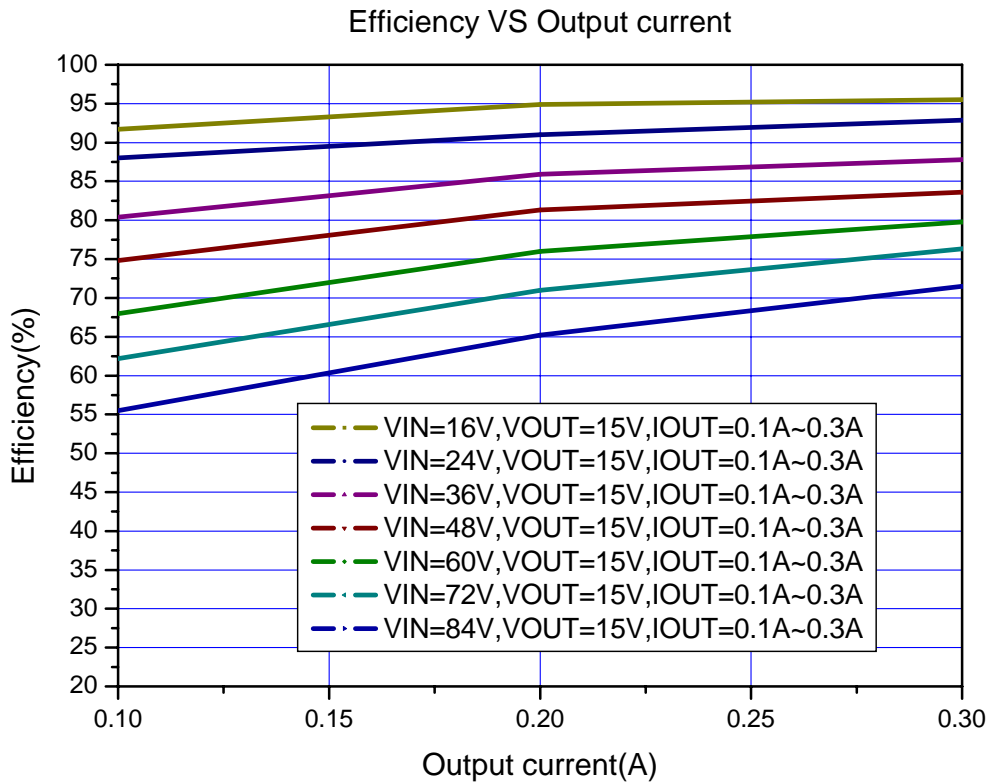


Figure6. XL7016 System Application (Efficiency VS Output Current)

**0.5A 150KHz 100V Buck DC to DC Converter** **XL7016**

**Typical System Application (VOUT=5V,IOUT=0~0.5A)**

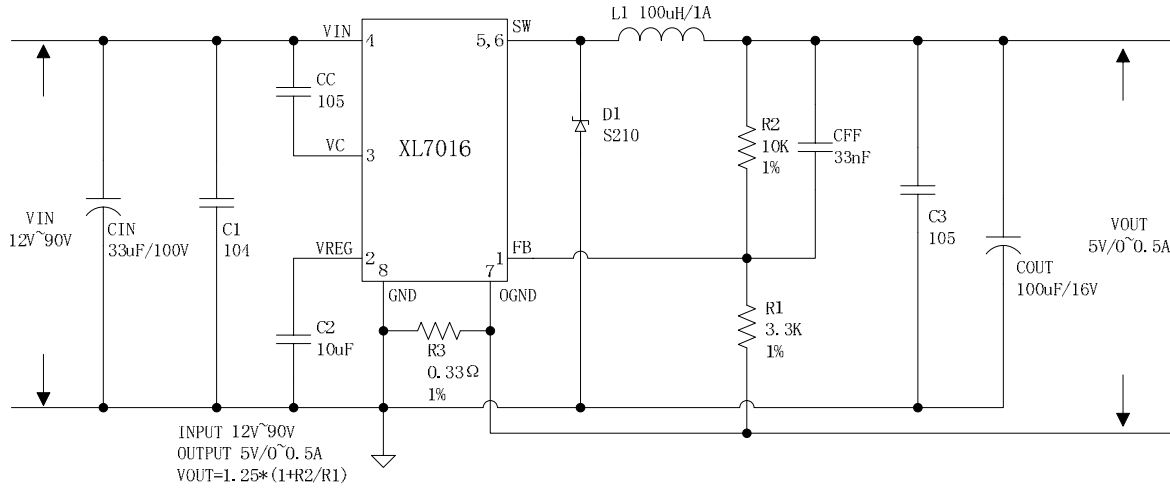


Figure7. XL7016 System Application (VIN=12V~90V, VOUT=5V, IOUT=0~0.5A)

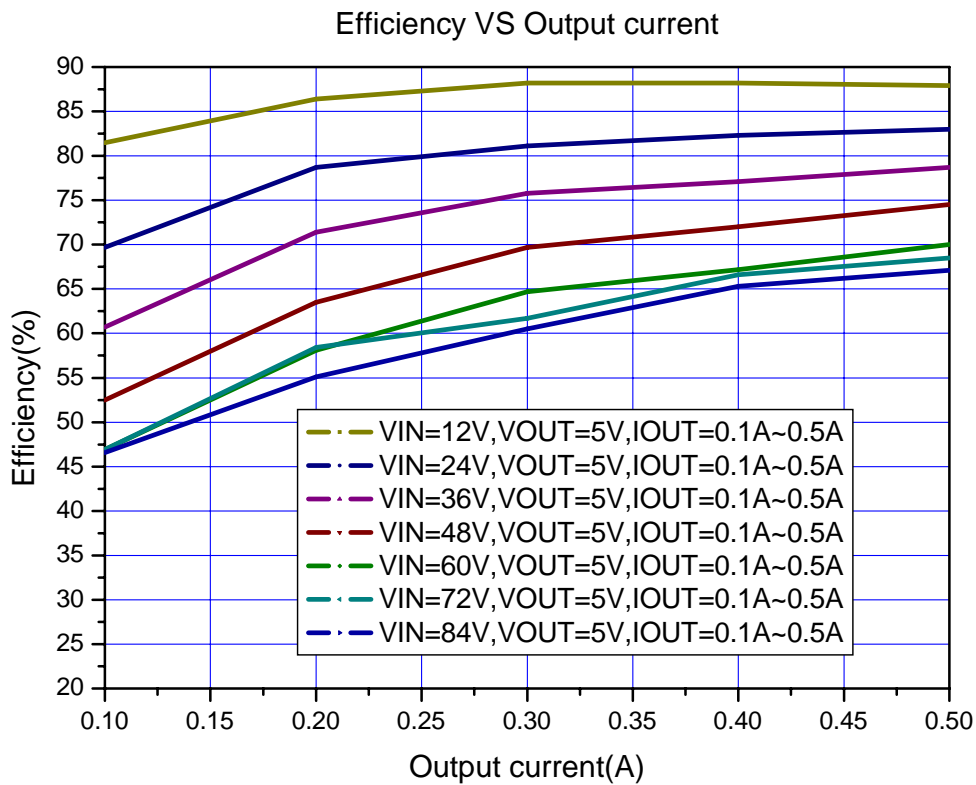
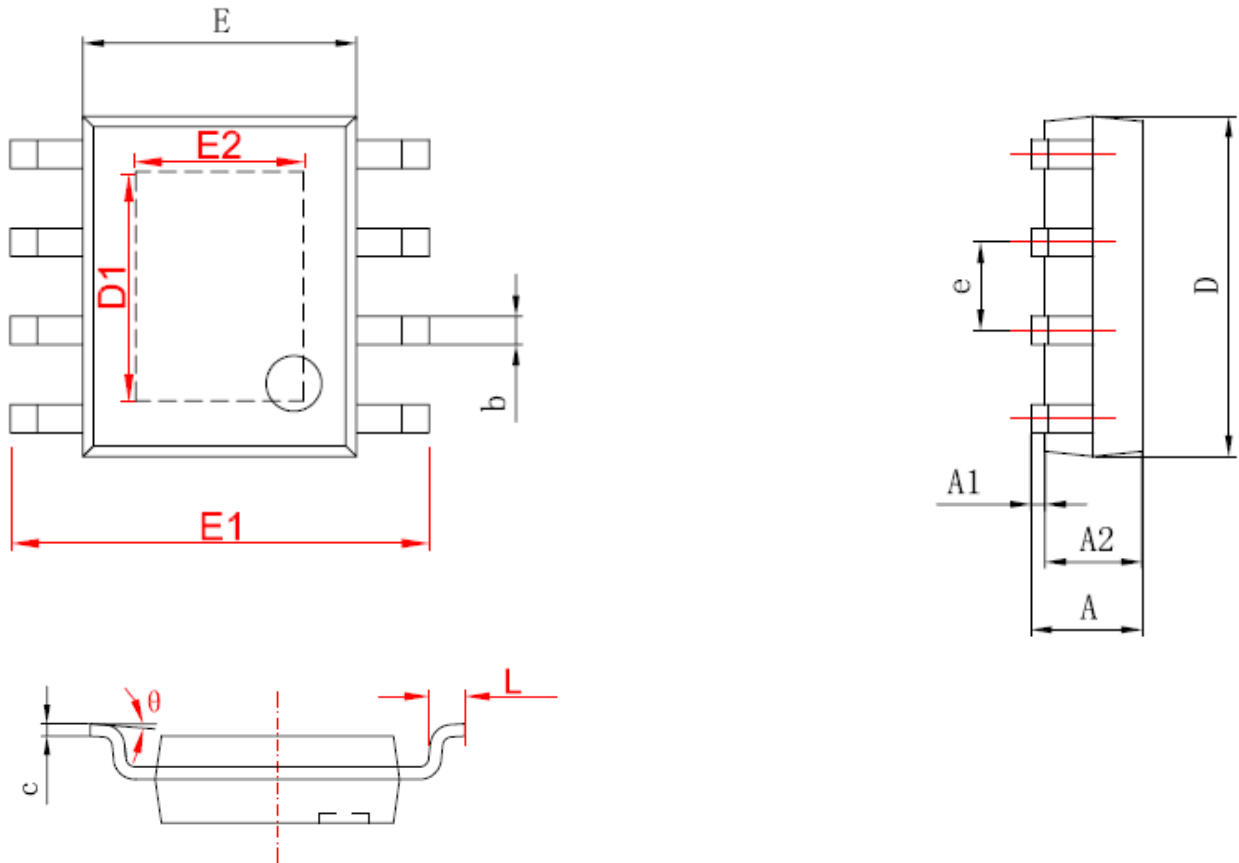


Figure8. XL7016 System Application (Efficiency VS Output Current)

## Package Information

### Package Information (SOP8-EP)



字符	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.050	0.150	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
D1	3.202	3.402	0.126	0.134
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
E2	2.313	2.513	0.091	0.099
e	1.270 (BSC)		0.050 (BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°



**Important Notice**

XLSEMI reserve the right to make modifications, enhancements, improvements, corrections or other changes without notice at any time. XLSEMI does not assume any liability arising out of the application or use of any product described herein; neither does it convey any license under its patent rights, nor the rights of others. XLSEMI assumes no liability for applications assistance or the design of Buyers' products. Buyers are responsible for their products and applications using XLSEMI components. To minimize the risks associated with Buyers' products and applications, Buyers should provide adequate design and operating safeguards. XLSEMI warrants performance of its products to the specifications applicable at the time of sale, in accordance with the warranty in XLSEMI's terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent XLSEMI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed. For the latest product information, go to [www.xlsemi.com](http://www.xlsemi.com).