

### General Description

The ELP3100 DC/DC converter integrates two low noise , high efficiency charge pumps for dual outputs ,which consist of one inverting output and a step-up output. The device operates from 2.5 V to 4.8V input, and provides a step-up output voltage (VP) of 2x the input voltage . The negative inverting output (VN) is-1x inverted from the positive output VP. The ELP3100 is available in a small TDFN-12 pin package that features a bottom side exposed thermal pad to provide optimal heat dissipation . The small package size and low external parts count make the device ideally suit able for TFT LCD applications of mobile products . The device is rated to operate from – 40°C to +85°C ambient temperature range .

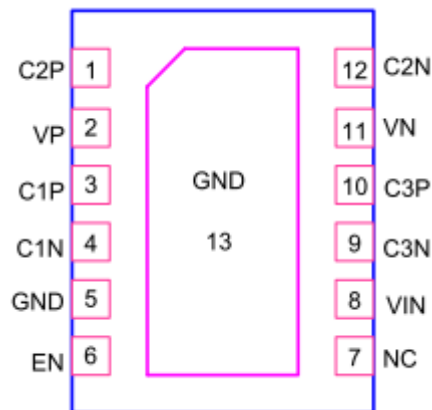
### Features

- ◆ Ultra -low – Noise for RF Application.
- ◆ 2.5 V to 4.8 V Input Supply Voltage Range.
- ◆ Adaptive 1.5x / 2x mode switch over for positive. voltageand-1xmodefornegativevoltage.
- ◆ VP output range : 5.4V to 5.9V.
- ◆ VN output range : -5.4V to -5.9V.
- ◆ High current output : Vin = 3.3V,Iout =±120mA;
- ◆ Built in Power On Sequence.
- ◆ TDFN-12 1.5mmX2.4mm Package

### Applications

- ◆ Mobile Device , Smart Phone.
- ◆ Portable Media Players / MP3 players.
- ◆ Cellular and Smart mobile phone.
- ◆ LCD

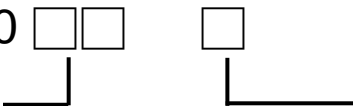
### Pin Assignments



## Pin Description

Pin No.	Pin Name	Description
1	C2P	Flying Capacitor 2 Positive Terminal (C5).
2	VP	Positive output pin .
3	C1P	Flying Capacitor 1 Positive Terminal (C4).
4	C1N	Flying Capacitor 1 Negative Terminal (C4).
6	EN	Device Enable pin.
7	NC	No connector.
8	VIN	Input Supply Voltage . By pass VIN with a low ESR ceramic capacitor to GND.
9	C3N	Flying Capacitor 3 Negative Terminal (C6).
10	C3P	Flying Capacitor 3 Positive Terminal (C6).
11	VN	Negative output pin.
12	C2N	Flying Capacitor 2 Negative Terminal (C5).
5,13(Pad)	GND	Ground pin .

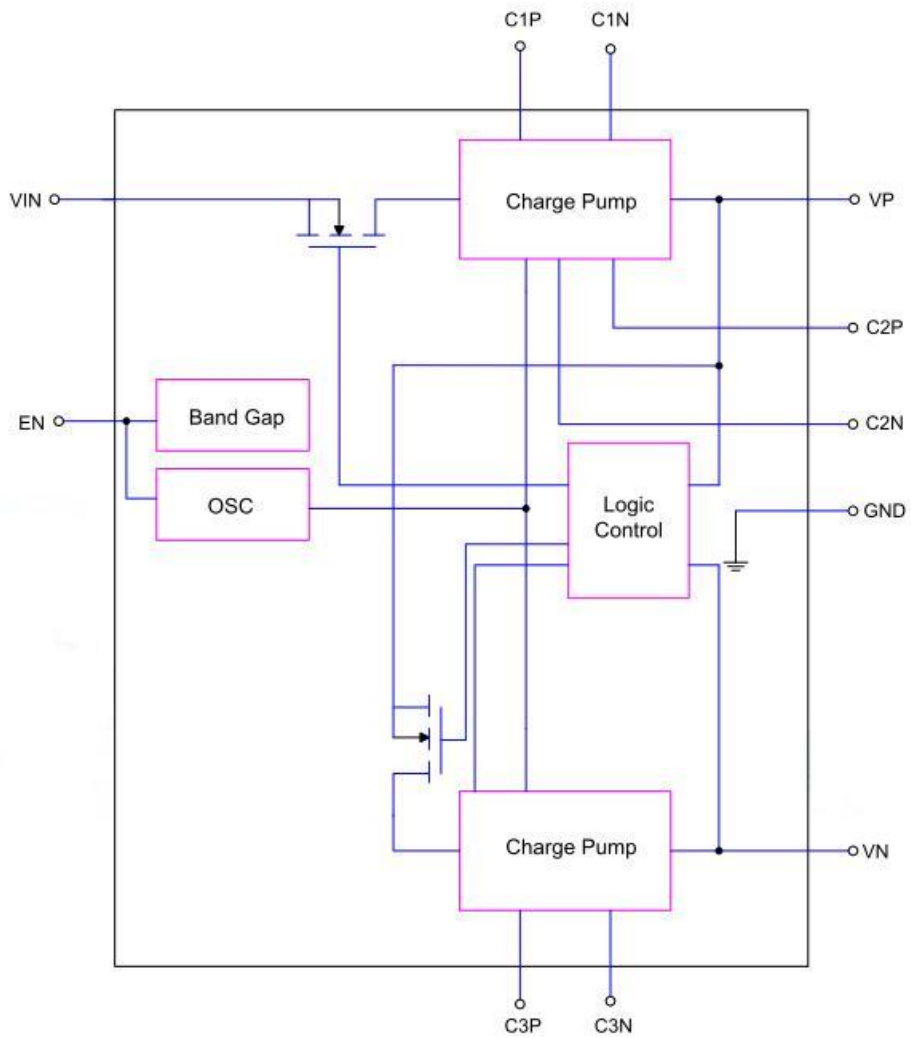
## Ordering Information

ELP3100 

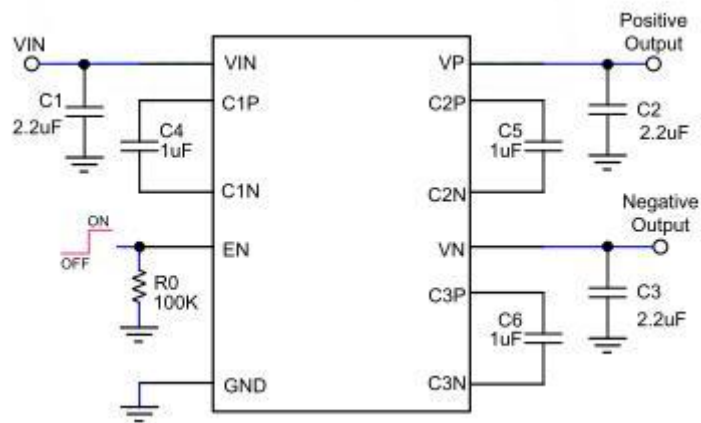
Package type QV:TDFN-12 F : Lead-Free

Device	Package	Marking	Marking Information
ELP3100	TDFN 12L	LP3100 YWX	<ol style="list-style-type: none"> <li>1. Y : Year code</li> <li>2. W : Week code</li> <li>3. X : Product batch</li> </ol>

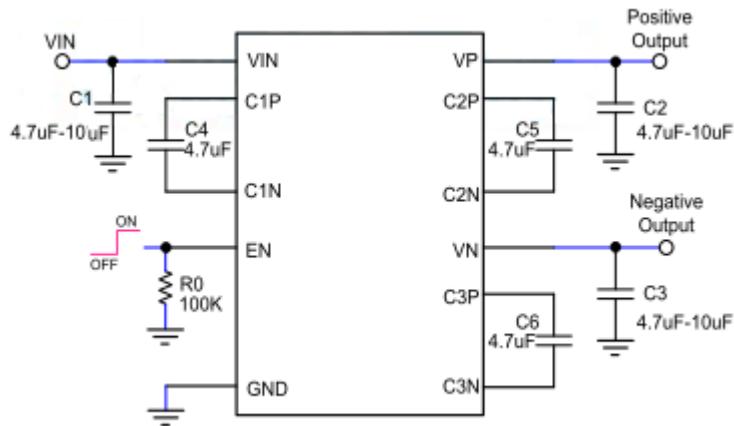
### Function Block Diagram



### Typical 60mA Application Circuit



### Typical 120mA Application Circuit



### Absolute Maximum Ratings

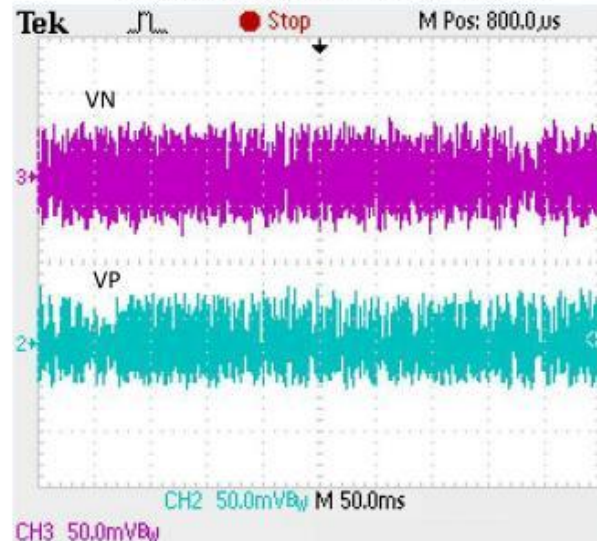
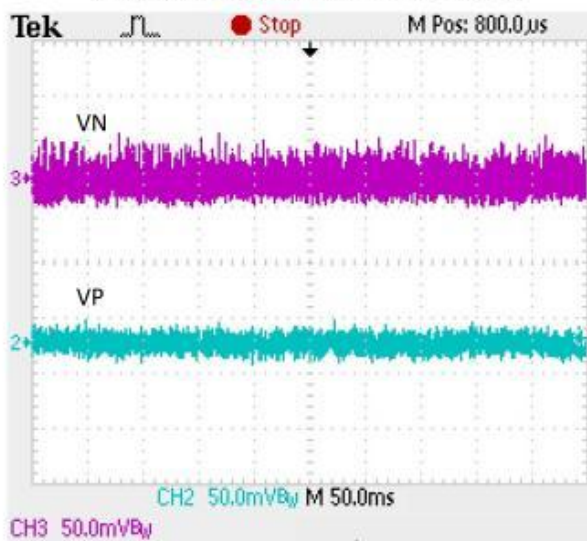
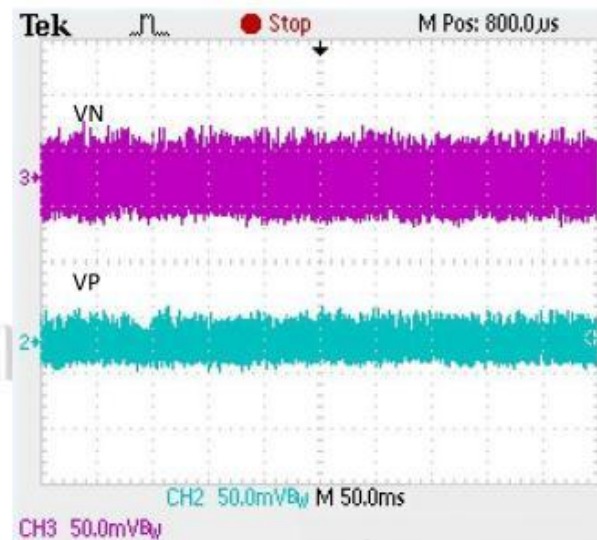
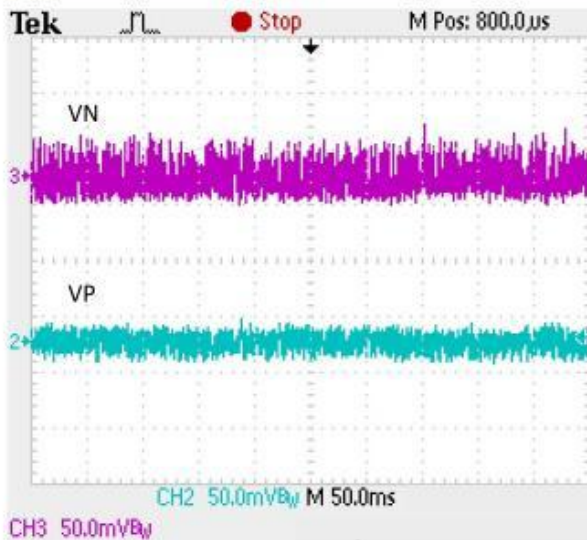
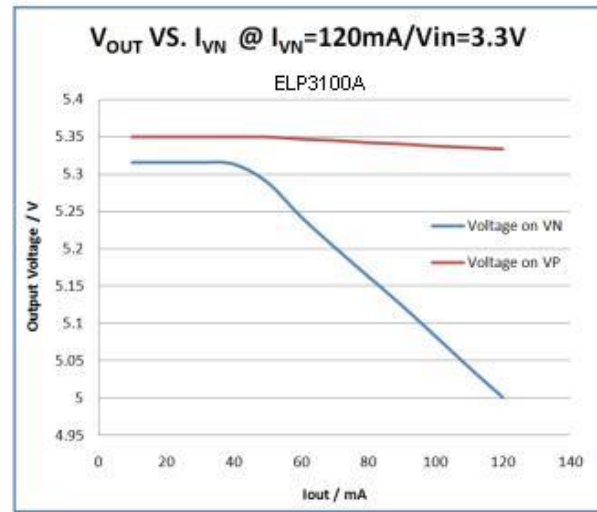
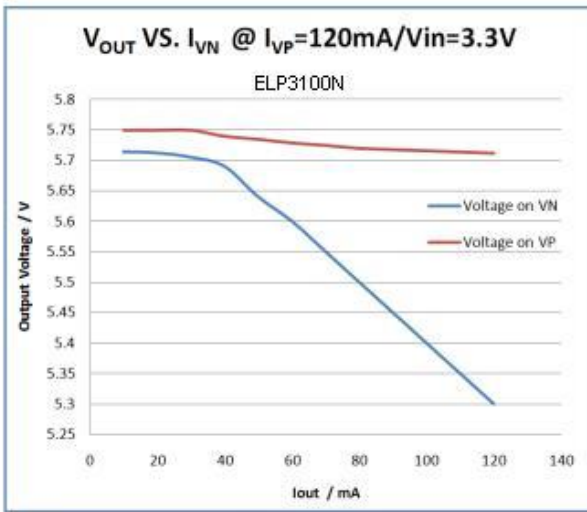
- ◆ Input / Outpt Voltage to GND----- -0.3V to +6V
- ◆ EN to GND----- 0V to  $V_{IN}$
- ◆ Operating Junction Temperature Range(TJ)----- -40°C to 150°C
- ◆ Maximum Soldering Temperature(at leads, 10sec)----- 260°C
- ◆ Storage Temperature Range----- -65°C to 150°C
- ◆ Operation Ambient Temperature Range----- 0°C to 85°C
- ◆ Maximum Power Dissipation(PD,  $T_A < 40^\circ\text{C}$ )----- 1.5W
- ◆ Thermal Resistance(JA)----- 68°C/W

### Electrical Characteristics

( $V_{IN}=V_{EN}$ ,  $C_1=C_2=C_3=10\mu\text{F}$ ,  $C_4=C_5=C_6=4.7\mu\text{F}$ , Typical values are  $T_A=25^\circ\text{C}$ )

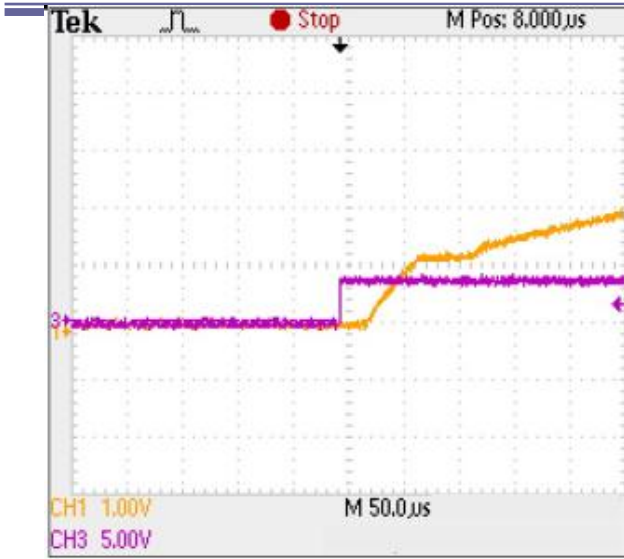
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
VIN	Input Voltage		2.5		4.8	V
IO	Output Current	Positive Output Current		120		mA
		Negative Output Current		120		
VP	Positive Output Voltage	ELP3100	5.4		5.9	V
VN	Negative Output Voltage	ELP3100	-5.9		-5.4	
ISHDN	Shut down Current	EN=GND, $V_{IN}=3.6\text{V}$			1	$\mu\text{A}$
FOSC	Oscillator Frequency	IVP=IVN=10mA		300		KHz
VOL	EN Logic Low				0.4	V
VOH	EN Logic High		1.4			V
IEN	EN Pin Current				0.5	$\mu\text{A}$
TSD	Thermal Shut down Temperature			145		$^\circ\text{C}$

### Typical Operation Characteristics

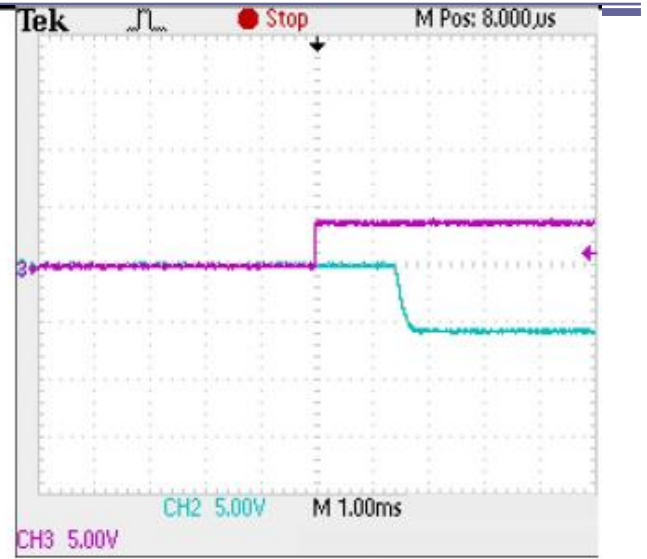




# Dual Channel Charge Pump Power Solution For TFT LCD Panel



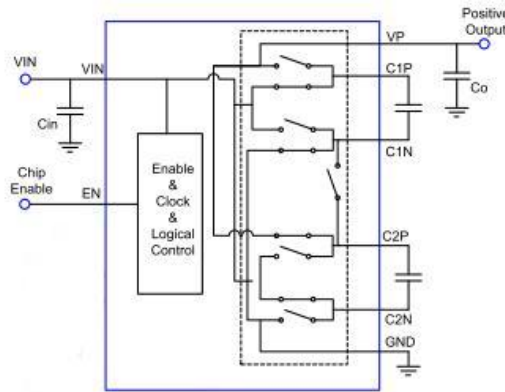
Start up Waveform with VP



Start up Waveform with VN

### Application Information

The ELP3100 offers dual channel output voltage for powering on specified power in TFT LCD panels . The device integrates a positive charge pump and a Negative charge pump. Enable Control(EN) To turn on the ELP3100, the EN pin must be at logic high. When the EN pin is pulled to a logic low, the device is disabled and the supply current reduces to less than 1 $\mu$  A.



The ELP3100 positive charge pump provides an Output voltage VP of 1.5x or 2x the input voltage. The positive charge pump uses two external flying capacitors to generate the required output voltage . For the selected output to input ratio, the charge pump will configure the internal switches to charge the flying capacitors. Figure1shows the functional diagram of the positive charge pump .

### NegativeChargePumpController

The negative charge pump uses one external flying capacitor to generate an inverted negative voltage that is  $-1x$  of VP. Figure 2 shows the functional block diagram of the negative charge pump .

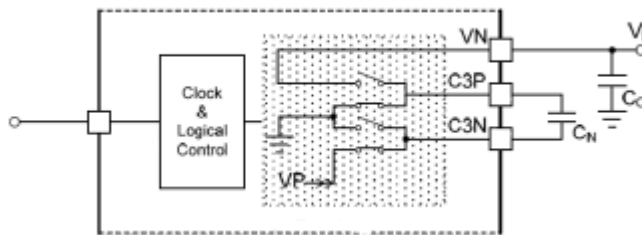


Figure 2. Negative Charge Pump Functional Block Diagram

### Layout Consideration

Use a ground plane for the ELP3100 device that can be connected to the device expose pad and ground pin for optimal thermal characteristics .

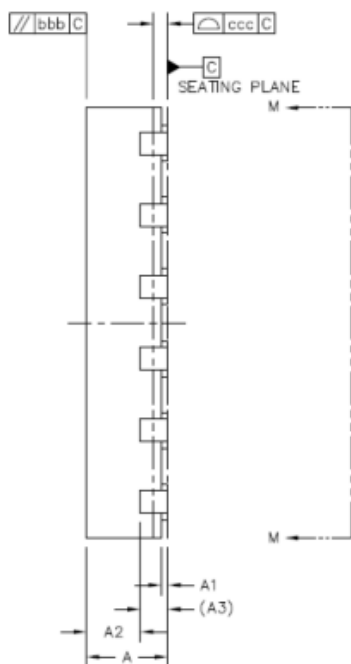
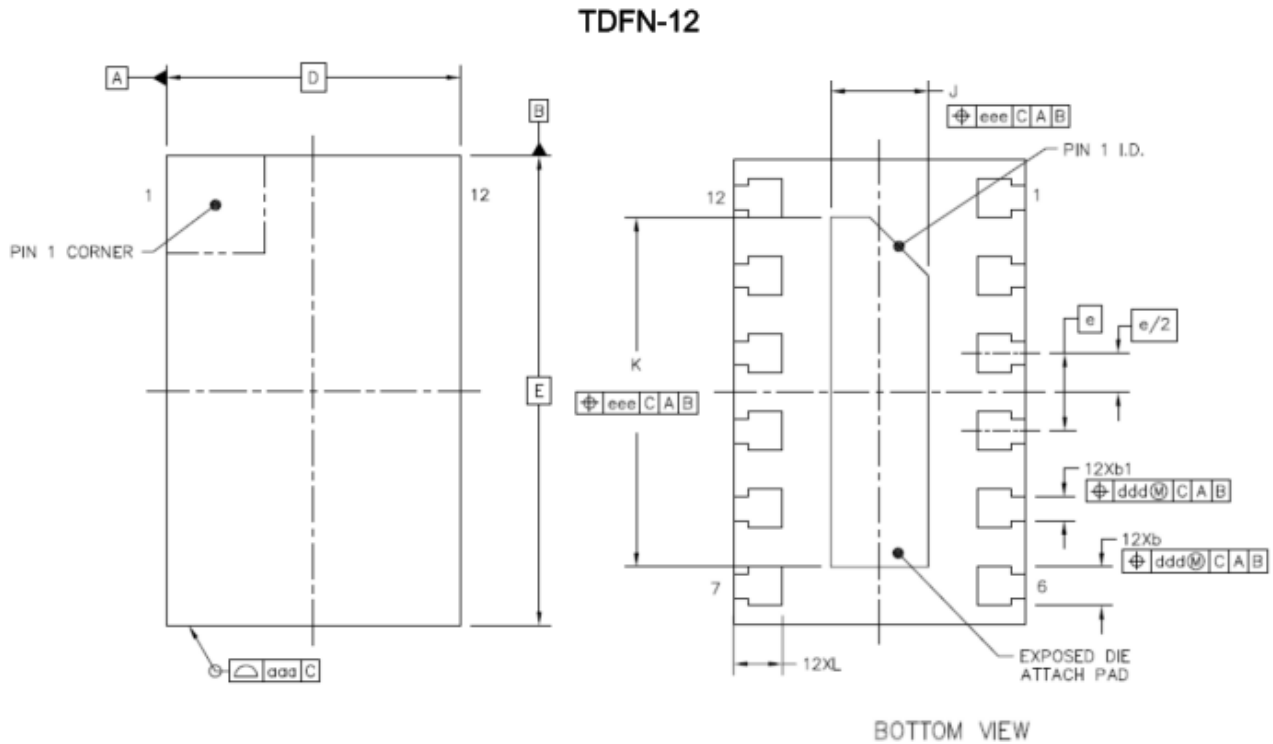
### By pass Capacitors

Place VIN, VP, and VN by pass capacitors as close as possible to the device pin. Keep the ground traces from the by pass to the ground plane as short as possible.

### Flying Capacitors

Place the flying capacitors as close to the device pins as possible to minimize trace noise since the flying capacitors to the pins will generate high transient voltage (dv / dt ) switching signals .

### Package Information



	SYMBOL	MIN	NOM	MAX	
TOTAL THICKNESS	A	0.4	0.45	0.5	
STAND OFF	A1	0	0.035	0.05	
MOLD THICKNESS	A2	---	0.3	---	
L/F THICKNESS	A3	0.152 REF			
LEAD WIDTH	b	0.15	0.2	0.25	
	b1	0.075	0.125	0.175	
BODY SIZE	X	1.5 BSC			
	Y	2.4 BSC			
LEAD PITCH	e	0.4 BSC			
EP SIZE	X	J	0.4	0.5	0.6
	Y	K	1.7	1.8	1.9
LEAD LENGTH	L	0.2	0.25	0.3	
PACKAGE EDGE TOLERANCE	aaa	0.1			
MOLD FLATNESS	bbb	0.1			
COPLANARITY	ccc	0.08			
LEAD OFFSET	ddd	0.1			
EXPOSED PAD OFFSET	eee	0.1			