

40V 250mA Ultralow-Quiescent-Current LDO

Description

The FLD4025 ultra-low quiescent current regulator features low dropout voltage and low current in the standby mode. With less than 1.5uA quiescent current at no load, the FLD4025 is ideally suited for standby micro-control-unit systems, especially for always-on applications like E-meters, fire alarms, smoke detectors and other battery operated systems. The FLD4025 retains all of the features that are common to low dropout regulators including a low dropout PMOS pass device, short circuit protection, and thermal shutdown.

The FLD4025 has a 40V maximum operating voltage limit, a -40°C to 125°C operating temperature range, and $\pm 2\%$ output voltage tolerance over the entire output current, input voltage, and temperature range. The FLD4025 is available in SOT23-5, ESOP8, MSOP8, SOT23-3, SOT89-3, surface mount packages.

Features

- V_{IN} Range up to 40V
- Output Voltage Tolerances of $\pm 2\%$ Over the Temperature Range
- Output Current of 250mA
- Ultra Low Quiescent Current ($I_Q = 1.5\mu A$)
- Dropout Voltage Typically 1200mV at $I_{OUT} = 250mA$
- Internal Thermal Overload Protection
- Internal Short-Circuit Current Limit
- Ceramic Capacitor Stable

APPLICATIONS

- E-meters, Water Meters and Gas Meters
- Fire Alarm, Smoke Detector
- Appliances and White Goods

TYPICAL APPLICATION

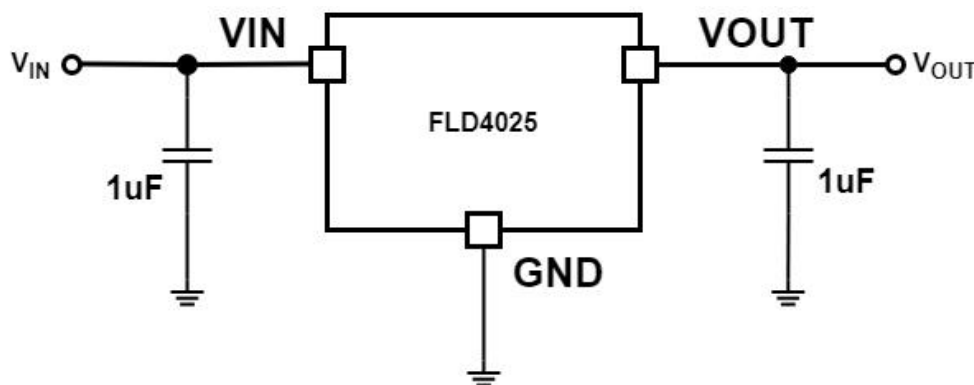


Figure 1. Typical Application for FLD4025

PIN CONFIGURATION

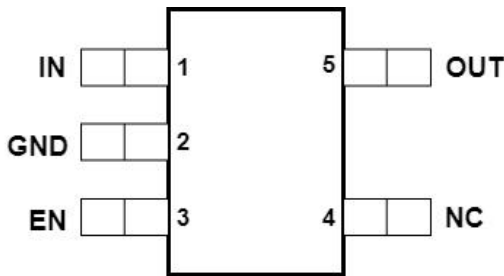


Figure 2. Pin Assignment of FLD4025 Package SOT23-5

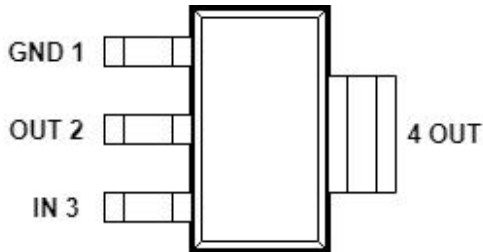


Figure 3 . Pin Assignment of FLD4025 Package SOT89-3

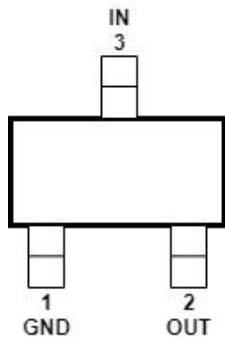


Figure 4 . Pin Assignment of FLD4025 Package SOT23-3

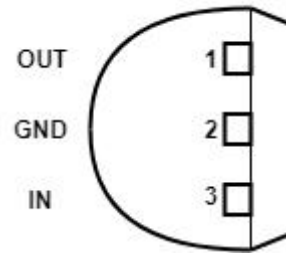


Figure 4 . Pin Assignment of FLD4025 Package TO92

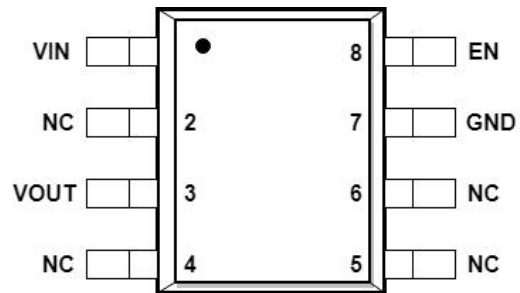


Figure 4 . Pin Assignment of FLD4025 Package ESOP-8/MSOP8

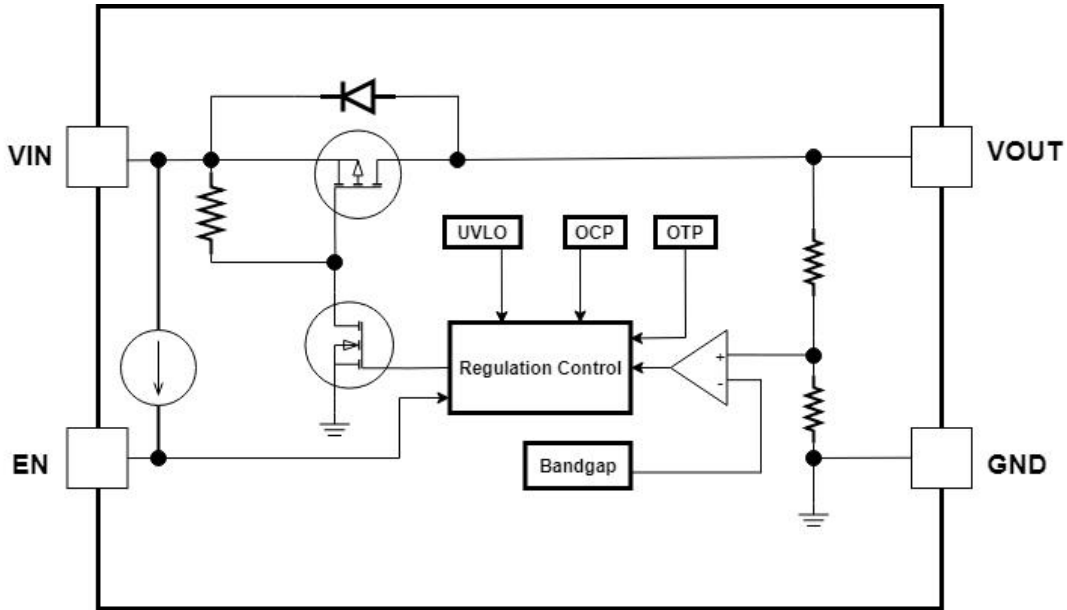
Absolute Maximum Ratings

- VIN-----0.3V to +45V
- Junction Temperature -----125°C
- Lead Temperature (Soldering, 10 sec.) -----300°C
- Storage Temperature-----65°C to 150°C

PIN DESCRIPTION

Pin Name	Pin No.SOT23-5	Pin No.SOT89-3	Pin No.SOT233	Pin No.TO92	Pin No.ESOP8/MSOP8	Pin Function
VOUT	5	2	2	1	3	Output Voltage Pin
GND	2	1	1	2	7	Ground
VIN	1	3	3	3	1	Input Voltage pin
EN	3	--	--	--	--	Enable
NC	4	--	--	--	2,4,5,6	Non-Connection

FUNCTIONAL Block Diagram



ELECTRICAL CHARACTERISTICS

$V_{IN}=12V, I_{OUT}=1mA, C_{IN}=C_{OUT}=1\mu F, T_J=25^\circ C$, unless otherwise specified

Paramter	Symbol	Conditions	Min	Typ	Max	Unit
Output Voltage	ΔV_{OUT}		-2%		2%	V
Line Regulation	ΔV_{LINE}	$V_{IN}=V_{OUT} + 1V$ to 40V		2	12	mV
Load Regulation	ΔV_{LOAD}	$I_{OUT} = 1mA$ to 100mA		20	30	mV
		$I_{OUT} = 1mA$ to 250mA		50	80	
Dropout Voltage	V_{DROD}	$I_{OUT} = 100mA$		400		mV
		$I_{OUT} = 250mA$		1200		mV
Quiescent Current	I_Q	$T_J= 25^\circ C$		1.5	4.0	μA
Current Limit	I_{CL}		270	340		mA
Enable high level	V_{ENLO}		0.9			V
Enable low level	V_{ENLO}				0.4	V
Enable pin pull high current	I_{EN}			0.1		μA
Thermal Shutdown	T_{SD}			140		$^\circ C$
Thermal Shutdown Hy	T_{SDHY}			20		$^\circ C$

TYPICAL PERFORMANCE CHARACTERISTICS

$V_{IN}=12V$, $I_{OUT}=1mA$, $V_{OUT}=3.3V$, $C_{IN}=C_{OUT}=1\mu F$, $T_J=25^\circ C$, unless otherwise specified

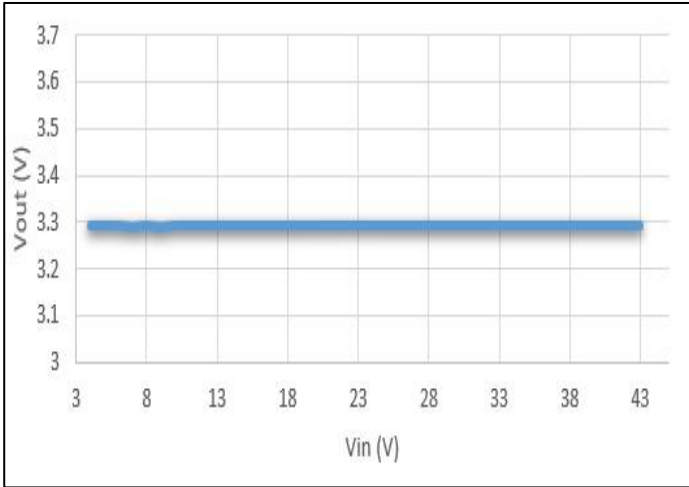


Fig 1 Vout vs Vin

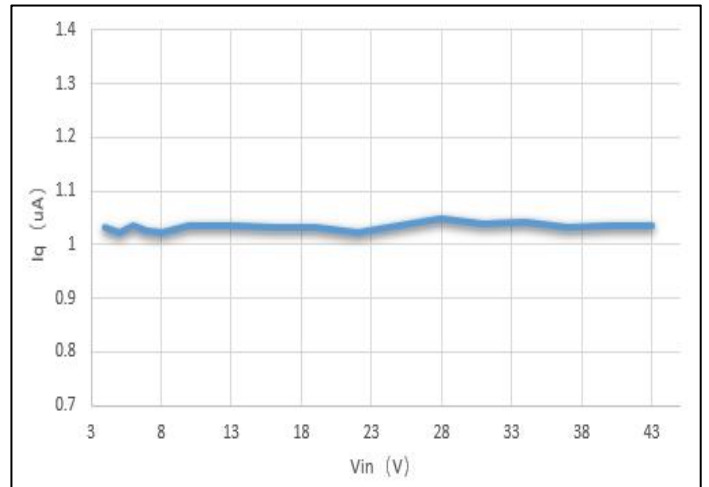


Fig 2. Quiescent Current vs Input Voltage(Load=0mA)

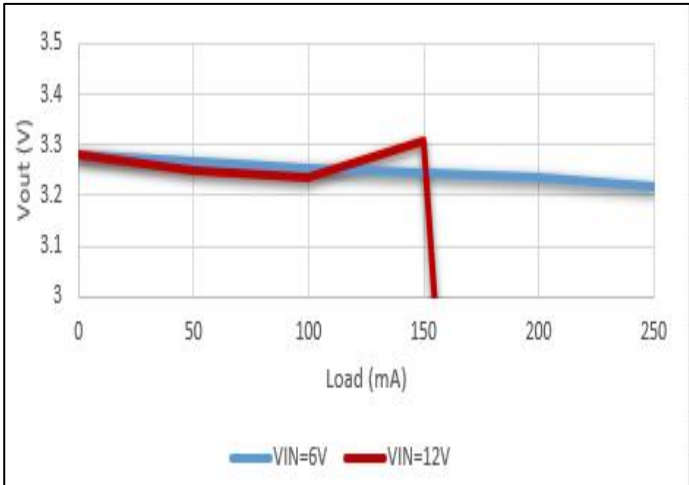


Fig 3. Vout vs Load

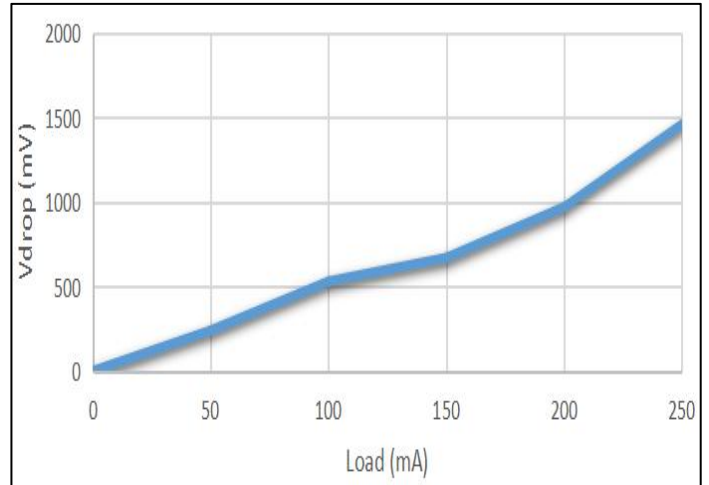


Fig 4. Dropout vs Load

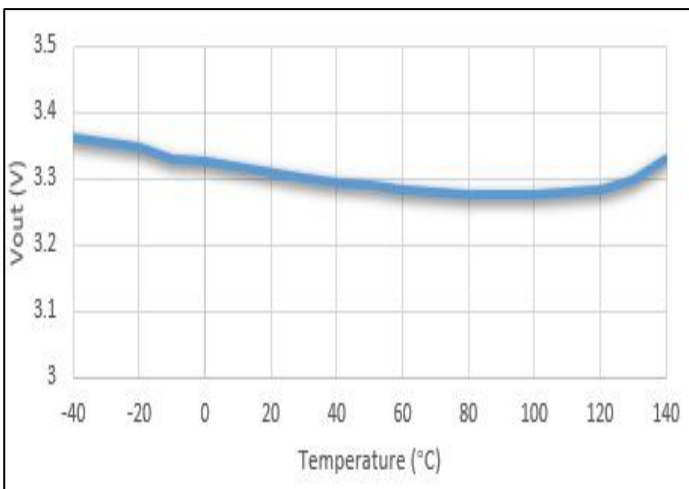


Fig5. Vout (3.3V) vs Temperature

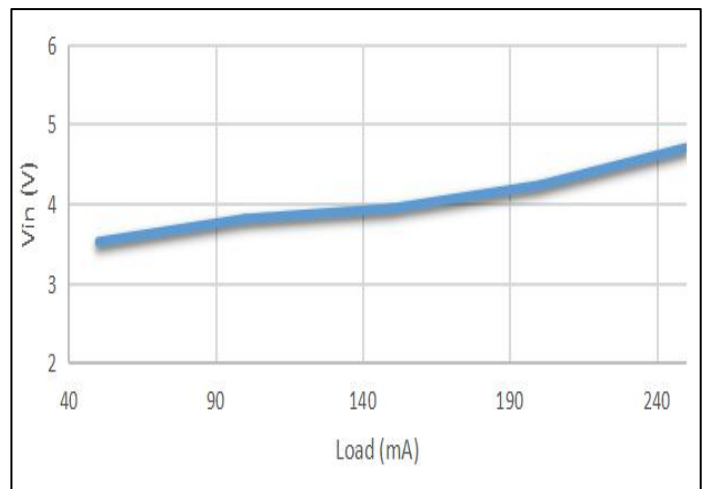


Fig6. Vin vs Load

Operating Waveforms

$V_{IN}=12V$, $V_{OUT}=3.3V$, $C_{IN}=C_{OUT}=1\mu F$, $T_J=25^\circ C$, unless otherwise specified



Fig 7. Vin Start up



Fig 8. Vin power off

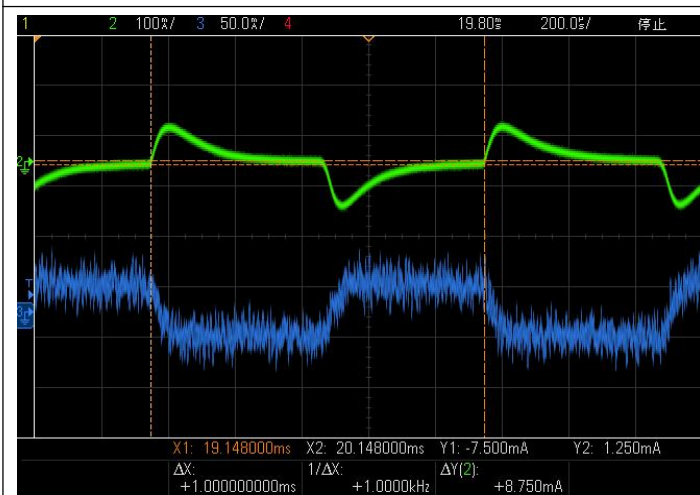


Fig 9. Vout Load Transient (0 to 50mA)

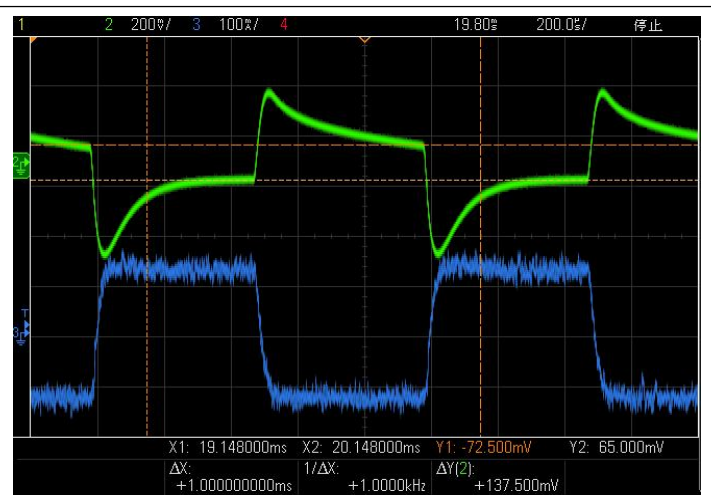


Fig 10. Vout Load Transient (1 to 250mA)

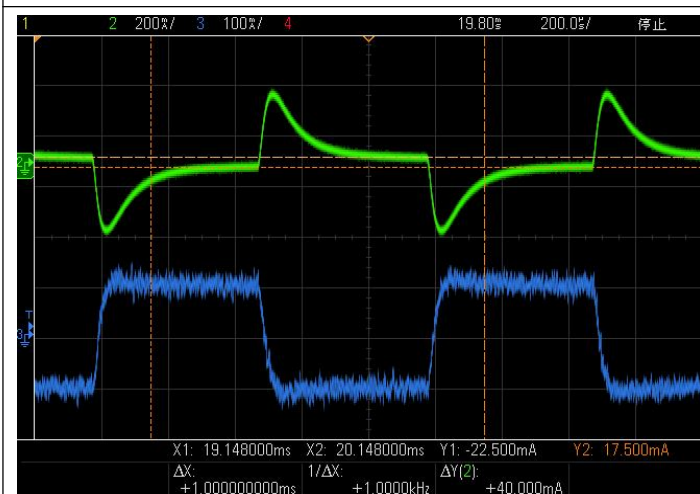
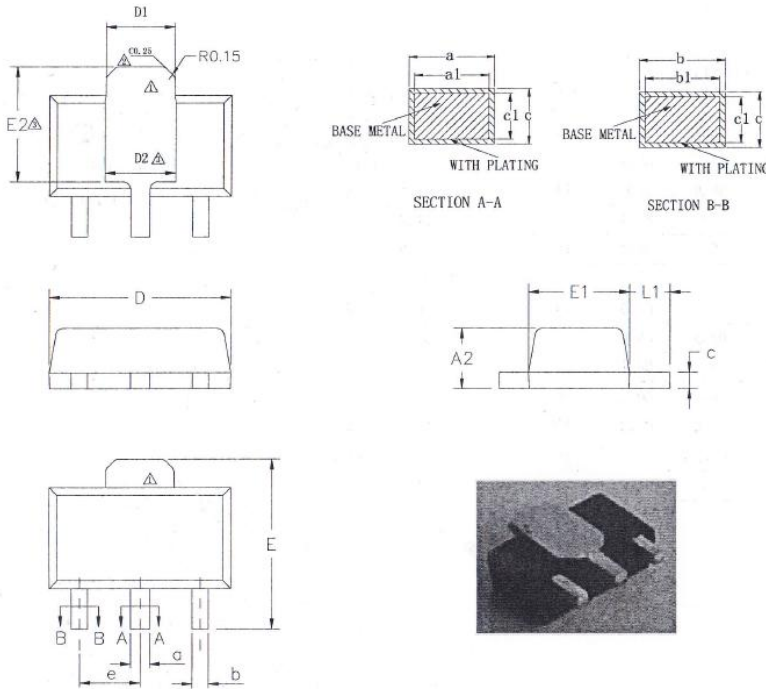


Fig 11. Vout Load Transient (50 to 250mA)

Package Outline Dimensions(All dimensions in mm.)

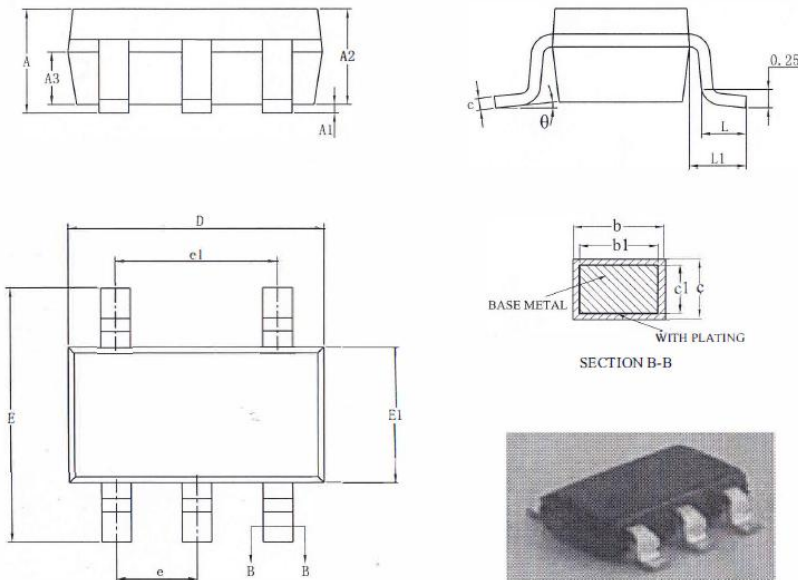
(1) Package Type: SOT89-3



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A2	1.40	1.50	1.60
b	0.38	—	0.46
b1	0.37	0.40	0.43
c	0.38	—	0.42
c1	0.37	0.38	0.39
a	0.46	—	0.56
a1	0.45	0.48	0.51
D	4.40	4.50	4.60
D1	1.62	—	1.83
E	3.95	—	4.25
E1	2.40	2.50	2.60
e	1.50BSC		
L1	0.89	—	1.20

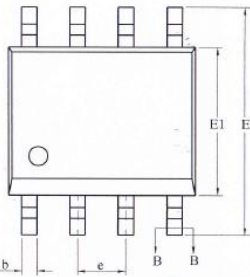
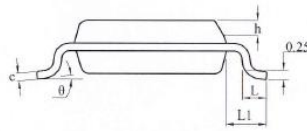
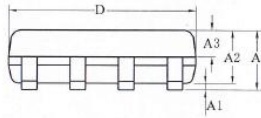
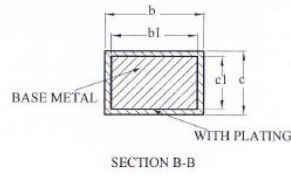
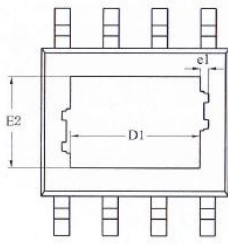
LF Size (mm)	△ D2	△ E2
66.9*63	1.75REF	2.84REF

(2) Package Type: SOT23-5



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	1.25
A1	0.04	—	0.10
A2	1.00	1.10	1.20
A3	0.60	0.65	0.70
b	0.33	—	0.41
b1	0.32	0.35	0.38
c	0.15	—	0.19
c1	0.14	0.15	0.16
D	2.82	2.92	3.02
E	2.60	2.80	3.00
E1	1.50	1.60	1.70
e	0.95BSC		
e1	1.90BSC		
L	0.30	—	0.60
L1	0.60REF		
θ	0	—	8°

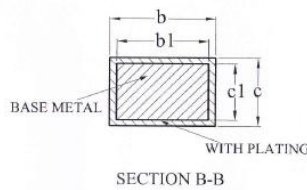
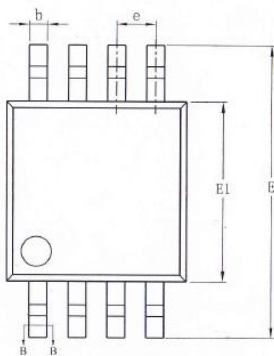
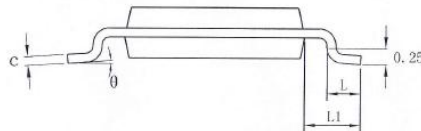
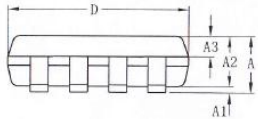
(3) Package Type: ESOP8



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	1.65
A1	0.05	—	0.15
A2	1.30	1.40	1.50
A3	0.60	0.65	0.70
b	0.39	—	0.47
b1	0.38	0.41	0.44
c	0.20	—	0.24
c1	0.19	0.20	0.21
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27BSC		
h	0.25	—	0.50
L	0.50	0.60	0.80
L1	1.05REF		
θ	0	—	8°

Size (mm)	D1	E2	c1
90*90 L1P 012 (mil)	2.09REF	2.09REF	0.16REF
95*130	3.10REF	2.21REF	0.10REF

(4) Package Type: MSOP8



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	1.10
A1	0.05	—	0.15
A2	0.75	0.85	0.95
A3	0.30	0.35	0.40
b	0.28	—	0.36
b1	0.27	0.30	0.33
c	0.15	—	0.19
c1	0.14	0.15	0.16
D	2.90	3.00	3.10
E	4.70	4.90	5.10
E1	2.90	3.00	3.10
e	0.65BSC		
L	0.40	—	0.70
L1	0.95REF		
θ	0	—	8°

Order Information

Mode	VOUT(V)	Package	Ordering Number	Packing Option
FLD4025-1.5	1.5	SOT23-3	FLD4025-1.5YSOT233G/TR	Tape and Reel,3000
FLD4025-1.5	1.5	SOT23-5	FLD4025-1.5YSOT235G/TR	Tape and Reel,3000
FLD4025-1.5	1.5	SOT89-3	FLD4025-1.5YSOT893G/TR	Tape and Reel,3000
FLD4025-1.5	1.5	ESOP8	FLD4025-1.5YESOP8G/TR	Tape and Reel,3000
FLD4025-1.5	1.5	TO92	FLD4025-1.5YTO92G/TR	Tape and Reel,3000
FLD4025-3.3	3.3	SOT23-3	FLD4025-3.3YSOT233G/TR	Tape and Reel,3000
FLD4025-3.3	3.3	SOT23-5	FLD4025-3.3YSOT235G/TR	Tape and Reel,3000
FLD4025-3.3	3.3	SOT89-3	FLD4025-3.3YSOT893G/TR	Tape and Reel,3000
FLD4025-3.3	3.3	ESOP8	FLD4025-3.3YESOP8G/TR	Tape and Reel,3000
FLD4025-3.3	3.3	TO92	FLD4025-3.3YTO92G/TR	Tape and Reel,3000
FLD4025-5.0	5.0	SOT23-3	FLD4025-5.0YSOT233G/TR	Tape and Reel,3000
FLD4025-5.0	5.0	SOT23-5	FLD4025-5.0YSOT235G/TR	Tape and Reel,3000
FLD4025-5.0	5.0	SOT89-3	FLD4025-5.0YSOT893G/TR	Tape and Reel,3000
FLD4025-5.0	5.0	ESOP8	FLD4025-5.0YESOP8G/TR	Tape and Reel,3000
FLD4025-5.0	5.0	MSOP8	FLD4025-5.0YMSOP8G/TR	Tape and Reel,3000
FLD4025-5.0	5.0	TO92	FLD4025-5.0YTO92G/TR	Tape and Reel,3000
FLD4025-5.0	5.0	TO252-5L	FLD4025-5.0YTO252G/TR	Tape and Reel,3000