500nA I_Q, 300mA Low-Dropout Linear Regulator

Description

The FLD0503 ultra-low quiescent current regulator features low dropout voltage and low current in the standby mode. With less than 500nA quiescent current at no load, the FLD0503 is ideally suited for standby micro-control-unit systems, especially for always-on applications like portable, and other battery operated systems. The FLD0503 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 FLD0503 has a 6V maximum operating voltage limit, a 0° C to 100° C operating temperature range, and ±2% output voltage tolerance over the entire output current, input voltage, and temperature range. The FLD0503 is available in SOT89-3, SOT23-5, and DFN1X1 surface mount packages.

Features

- V_{IN} Range up to 6V
- Output Voltage Tolerances of ±2% Over the Temperature Range
- Output Current of 300mA, Supports 450mA peak Output
- Ultar Low Quiescent Current (I_Q = 500nA)
- Dropout Voltage Typically 400mV at I_{OUT} =300mA
- Internal Thermal Overload Protection
- Internal Short-Circuit Current Limit
- Ceramic Capacitor Stable

APPLICATIONS

- Portable, Battery Powered Equipment
- Ultra Low Power Microcontroller
- Notebook computers

TYPICAL APPLICATION

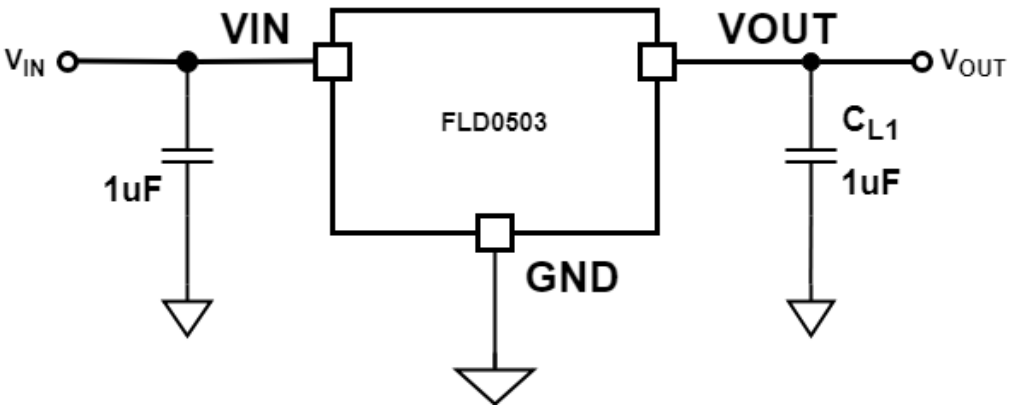


Figure 1.Typicla Application for FLD0503

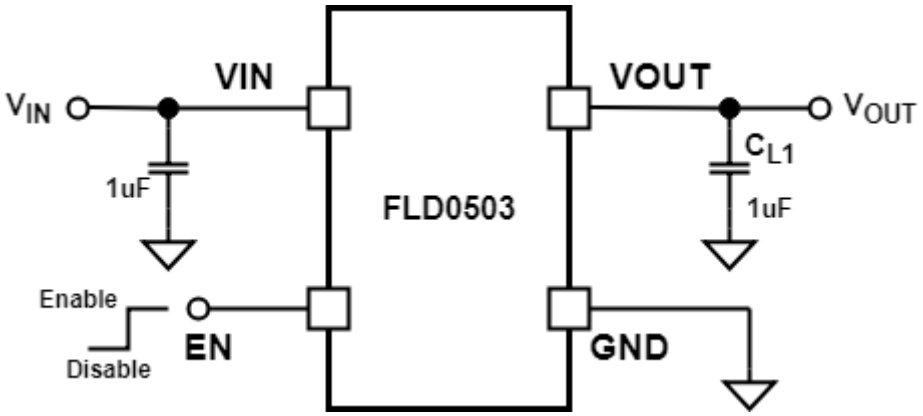


Figure 2.Typicla Application for FLD0503

PIN CONFIGURATION

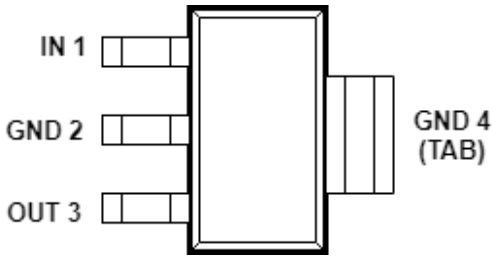


Figure 3. Pin Assignment of FLD0503 Package SOT89-3

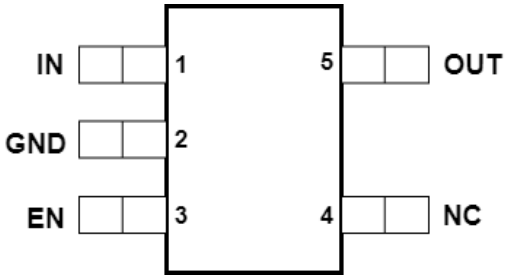


Figure 4. Pin Assignment of FLD0503 Package SOT23-5

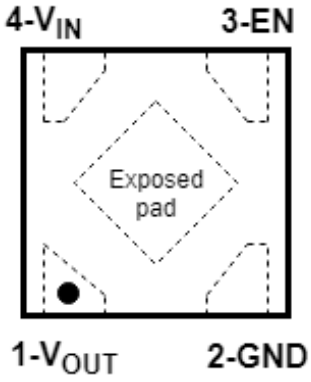


Figure 5. Pin Assignment of FLD0503 Package DFN1X1

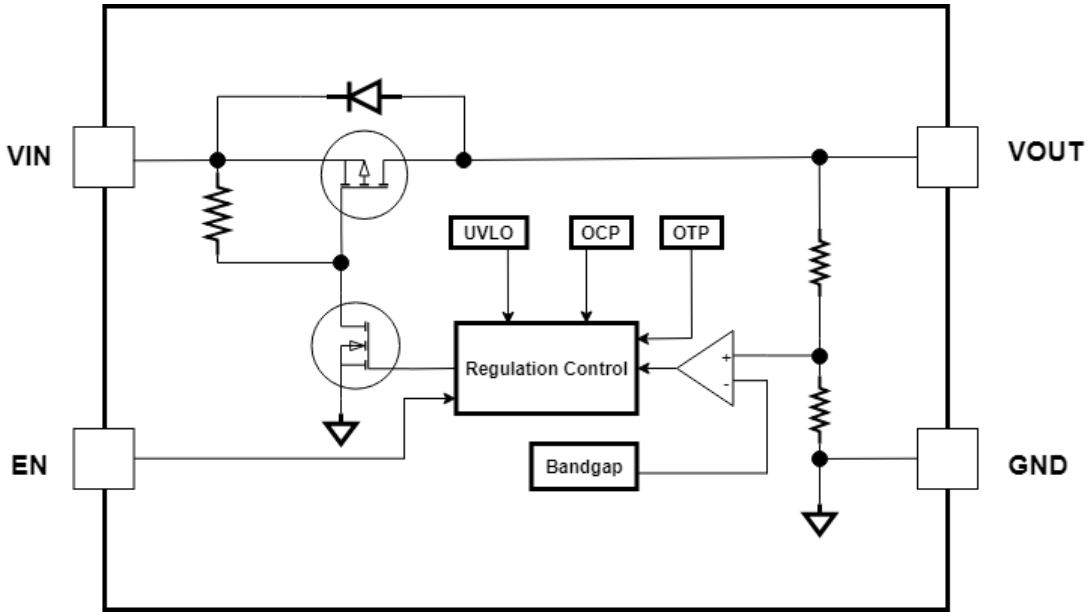
Absolute Maximum Ratings

- VIN----------0.3V to +6.5V
- Junction Temperature ----------125℃
- Lead Temperature (Soldering, 10 sec.) ----------300 ℃
- Storage Temperature----------65℃ to 150℃

PIN DESCRIPTION

Pin Name	Pin No.SOT89-3	Pin No.SOT23-5	Pin No.DFN1X1	Pin Function
VOUT	3	5	1	Output Voltage Pin
GND	2,4	2	2	Ground
VIN	1	1	4	Input Voltage pin
EN	--	3	3	Enable

FUNCTIONAL Block Diagram



ELECTRICAL CHARACTERISTICS

(V_{IN} = V_{OUT} + 1V, I_{OUT} = 1mA, C_{IN} = C_{OUT} = 1uF, T_J = 25℃, unless otherwise specified)

Paramter	Symbol	Conditions	Min	Typ	Max	Unit
Output Voltage Accuracy	$\triangle V_{OUT}$		-2%		2%	V
Line Regulation	$\triangle V_{LINE}$	V_{IN} = V_{OUT} + 1V to 5.5V		20	50	mV
Load Regulation	$\triangle V_{LOAD}$	I_{OUT} = 1mA to 150mA		13	25	mV
		I_{OUT} = 1mA to 300mA		25	40	
Dropout Voltage	V_{DROP}	I_{OUT} = 100mA, V_{OUT} = 3.3V		130		mV
		I_{OUT} = 300mA, V_{OUT} = 3.3V		400		mV
Quiescent Current	I_Q	T_J= 25℃		0.5	1	uA
Current Limit	I_{CL}		360	560		mA
Enable high level	V_{ENHI}		0.6			V
Enable low level	V_{ENLO}				0.2	V
Power-supply rejection ratio	PSRR	f = 1kHz		60		dB
Thermal Shutdown	T_{SD}			150		℃

Thermal Shutdown Hy	T_{SDHY}			20		℃

TYPICAL CHARACTERISTICS

VIN = VOUT + 1V, IOUT = 1mA, VOUT = 3.3V, CIN = COUT = 1uF, TJ = 25℃, unless otherwise specified

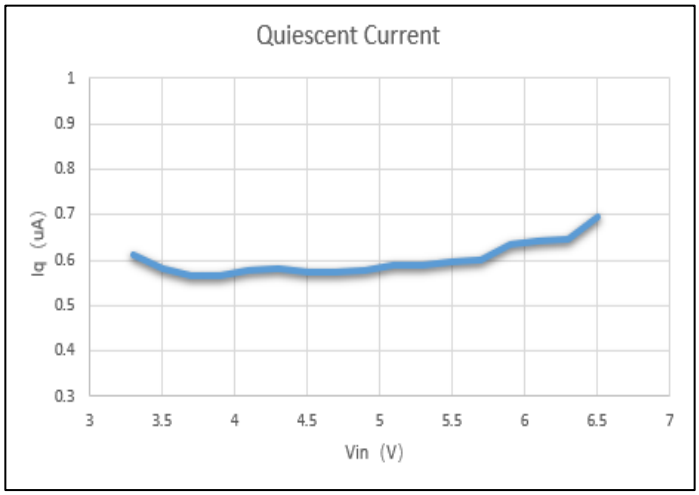


Fig 1. I_Q vs V_{IN} (I_{OUT} = 0mA)

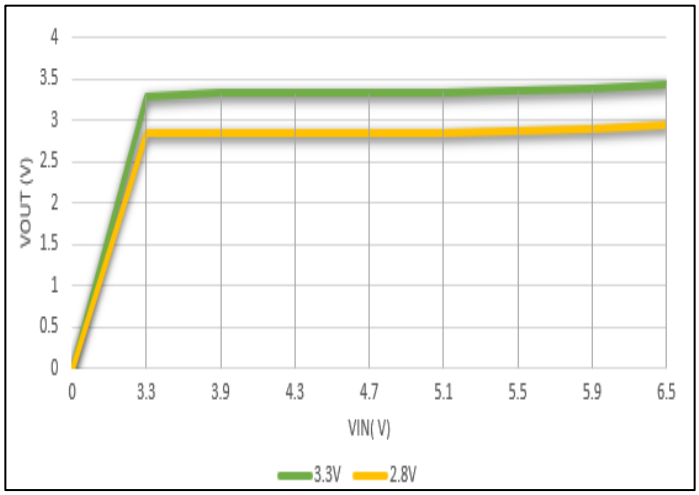


Fig 2. V_{OUT} vs V_{IN} (I_{OUT} = 1mA)

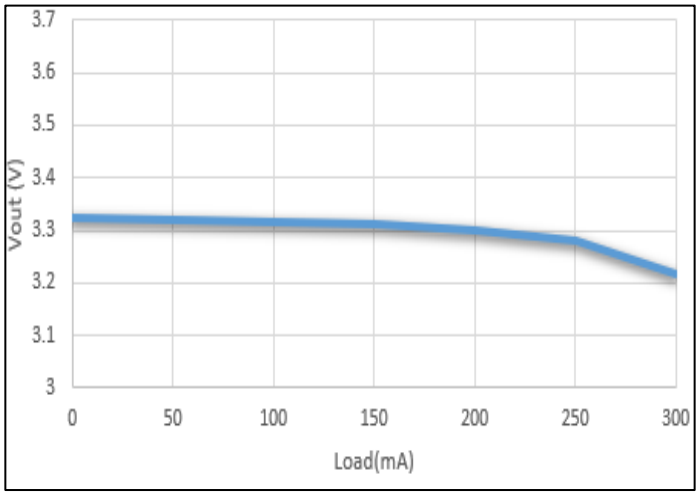


Fig 3. V_{OUT} vs Load

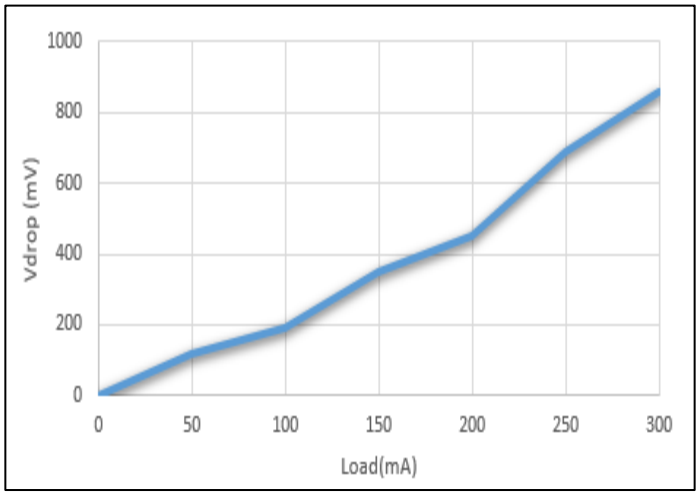


Fig 4. V_{DROP} vs Load

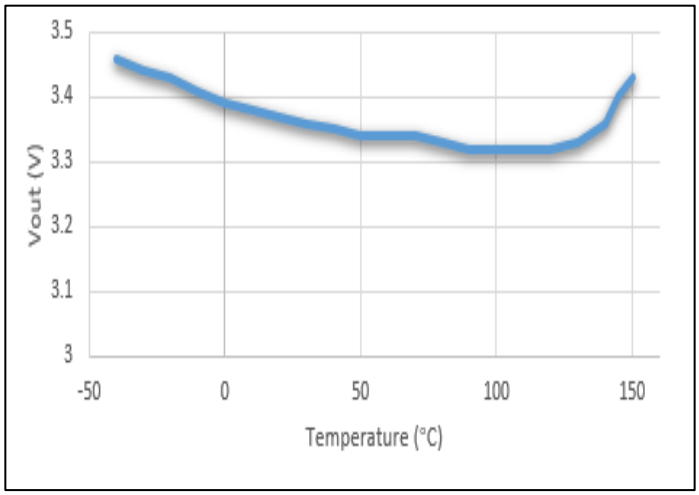


Fig 5. V_{OUT} vs Temperature (I_{OUT} = 1mA)

Operating Waveforms

VIN=5V,VOUT=3.3V,TA=25° C,IOUT=300mA, unless otherwise specified

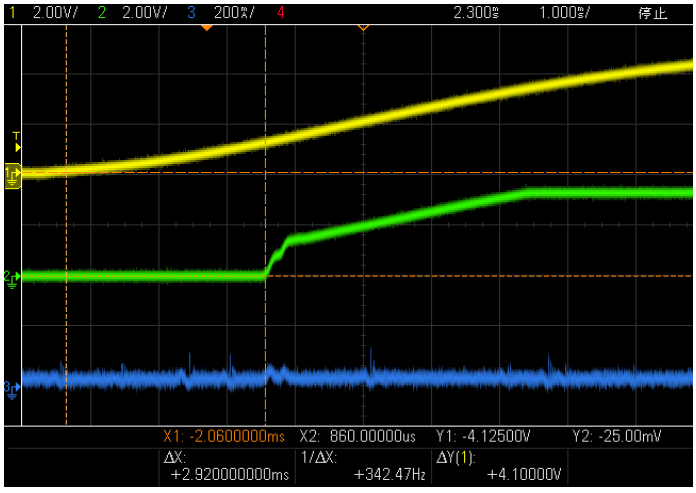


Fig 1. VIN Power ON(I_{OUT}=0mA)
CH1:V_{IN},2V/Div,DC; CH2:V_{OUT},2V/Div,DC
CH3:I_{OUT},200mA/Div,DC; TIME:1ms/Div

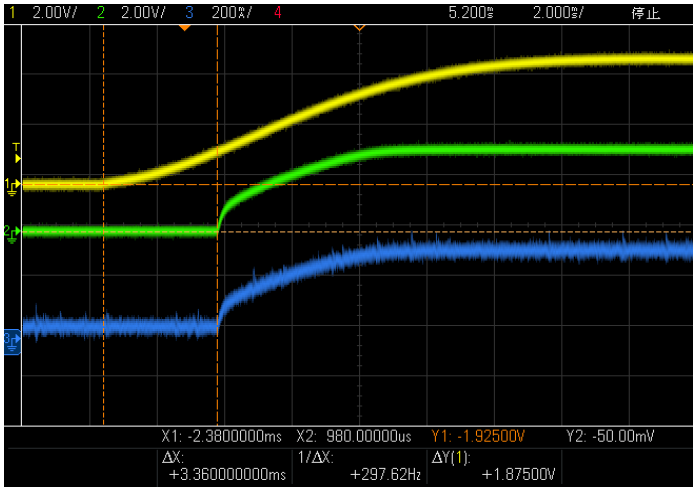


Fig 2. VIN Power ON(I_{OUT}=300mA)
CH1:V_{IN},2V/Div,DC; CH2:V_{OUT},2V/Div,DC
CH3:I_{OUT},200mA/Div,DC; TIME:2ms/Div

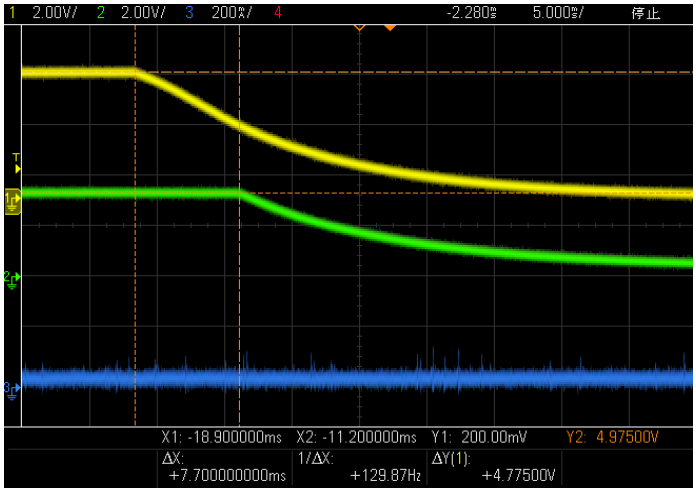


Fig 3. VIN Power OFF(I_{OUT}=0mA)
CH1:V_{IN},2V/Div,DC; CH2:V_{OUT},2V/Div,DC
CH3:I_{OUT}, 200mA/Div,DC; TIME:5ms/Div

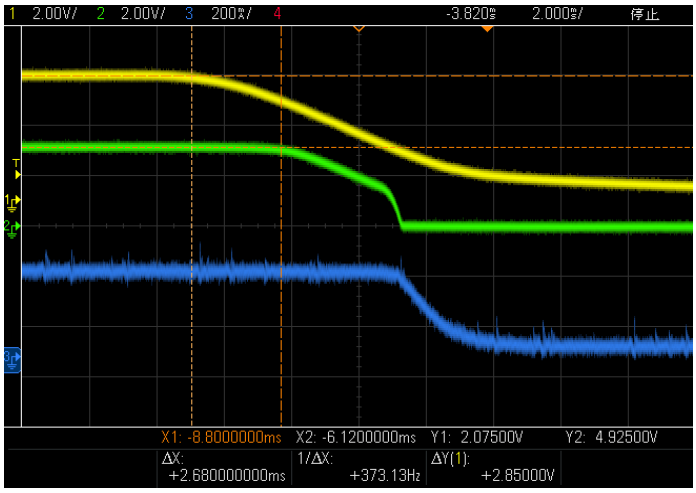


Fig 4. VIN Power OFF(I_{OUT}=300mA)
CH1:V_{IN},2V/Div,DC; CH2:V_{OUT},2V/Div,DC
CH3:I_{OUT},200mA/Div,DC; TIME:2ms/Div

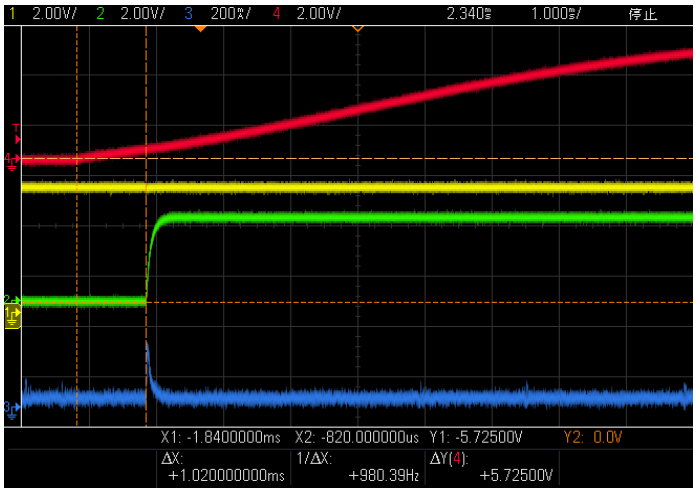


Fig 5. EN Power ON(I_{OUT}=0mA)
CH1:V_{IN},2V/Div,DC; CH2:V_{OUT},2V/Div,DC
CH3:I_{OUT},200mA/Div,DC; CH4:EN,2V/Div,DC
TIME:1ms/Div

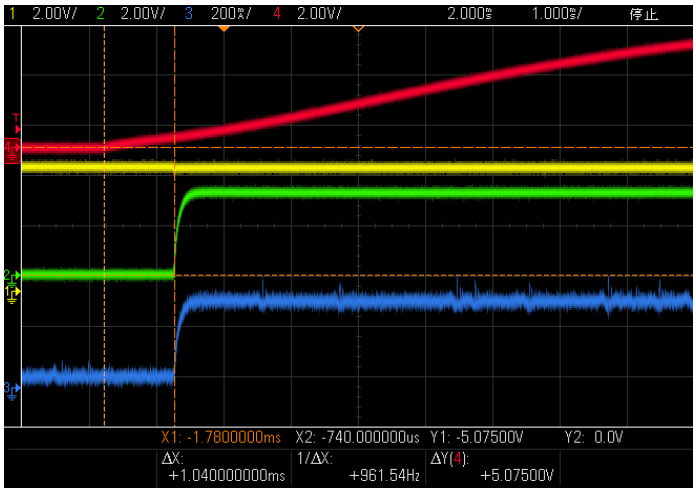


Fig 6. EN Power ON(I_{OUT}=300mA)
CH1:V_{IN},2V/Div,DC; CH2:V_{OUT},2V/Div,DC
CH3:I_{OUT},200mA/Div,DC; CH4:EN,2V/Div,DC
TIME:1ms/Div

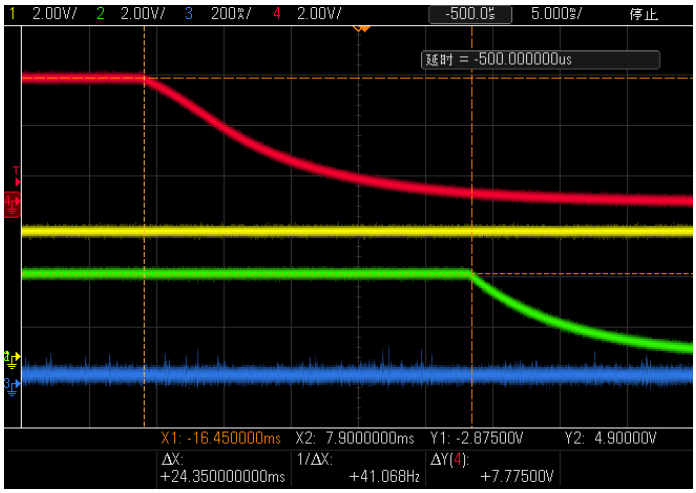


Fig 7. EN Power OFF(I_{OUT}=0mA)

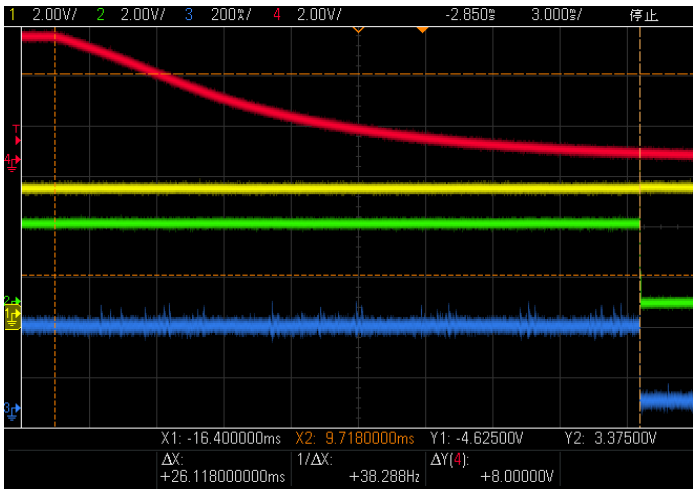
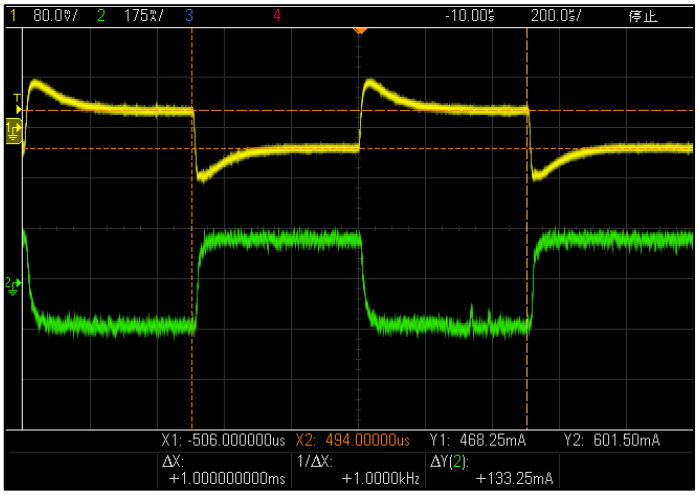
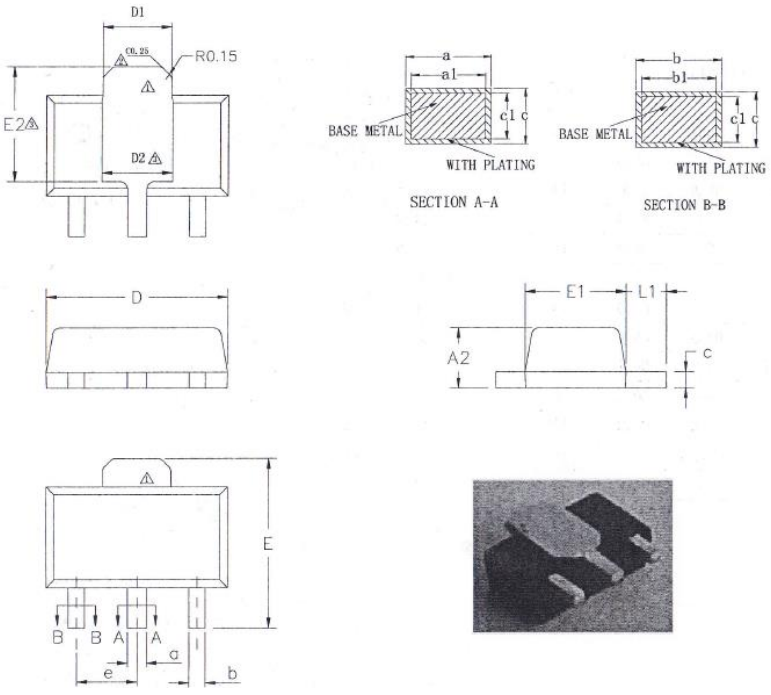


Fig 8. EN Power OFF(IOUT=300mA)

CH1:V_{IN},2V/Div,DC; CH2:V_{OUT},2V/Div,DC CH3:I_{OUT},200mA/Div,DC; CH4:EN,2V/Div,DC TIME:5ms/Div	CH1:VIN,2V/Div,DC; CH2:VOUT,2V/Div,DC CH3:IOUT,200mA/Div,DC; CH4:EN,2V/Div,DC TIME:3ms/Div
 Fig 9. Load Transient (1mA to 300mA)	

Package Outline Dimensions(All dimensions in mm.)

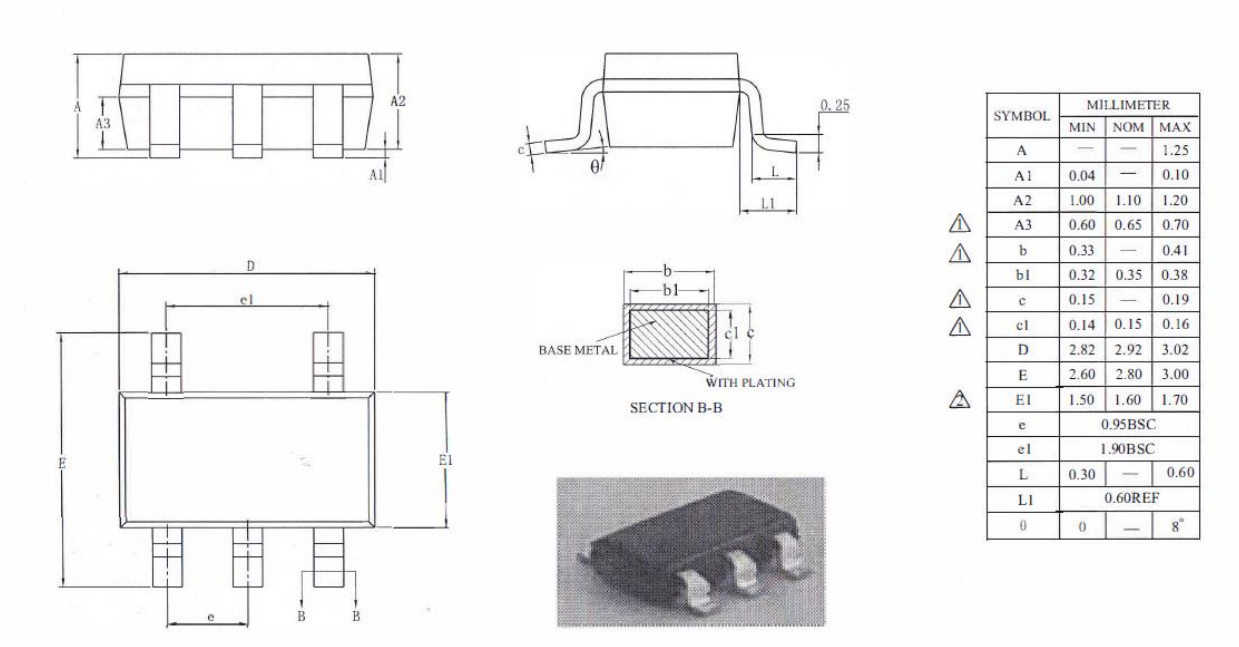
(1) Package Type: SOT89-3



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

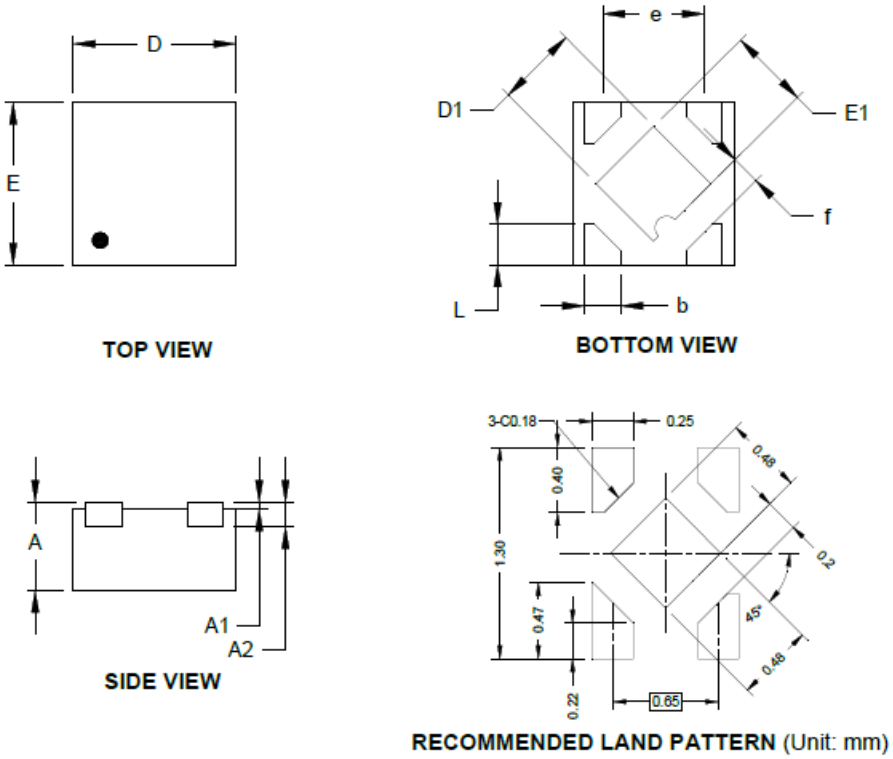
L/F Size / Size(mm)	3 D2	3 E2
66.9*63	1.75REF	2.84REF

(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: DFN1X1



Symbol	Dimensions In Millimeters		
	MIN	MOD	MAX
A	0.500	0.550	0.600
A1	0.000		0.050
A2	0.152 REF		
D	0.950	1.000	1.050
D1	0.450	0.500	0.550
E	0.950	1.000	1.050
E1	0.450	0.500	0.550
b	0.175	0.225	0.275
e	0.625 BSC		
f	0.195 REF		
L	0.200	0.250	0.300