WL2817

Ultra low dropout, 500mA/1A, CMOS LDO

Http://www.sh-willsemi.com

Descriptions

The WL2817 series are ultra low dropout, Low quiescent current, high PSRR CMOS LDO.

Using CMOS construction, the quiescent current consumed by the WL2817 is typically 160uA over the entire input voltage range, making it attractive for consumer, networking applications that demand high output current. The WL2817 series are available in wide output voltage range version from 1.0V to 3.3V.

The WL2817 series offer thermal shutdown (OTP) and current limit functions, to assure the stability of chip and power system at wrong condition, and it uses trimming technique to guarantee output voltage accuracy within ±2%.

The WL2817 series can choose the output current limit between 1.0A or 500mA by alternating the LCON pin between “H” or “L”.

The WL2817 regulators are available in DFN1612-8L packages. Standard products are Pb-free and Halogen-free.

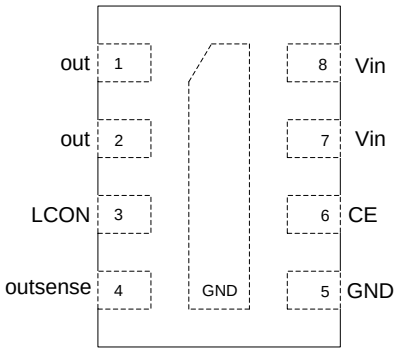
Features

- Input voltage : 2.5V~5.5V
- Output voltage range :1.0V~3.3V
- Output current : 500mA/1A
- PSRR : 60dB(@ Vout=3V)
- Dropout voltage : 70mV @ I_{OUT}=0.5A
- Output noise : 50μV_{RMS}
- Quiescent current : 160μA Typ.

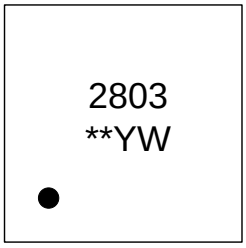
Applications

- LCD TV
- STB
- Computer, Graphic card
- Network communication equipments
- Others portable electronics devices

DFN1612-8L



Pin Configuration (Top View)



B = Device code (A: 3.0V)

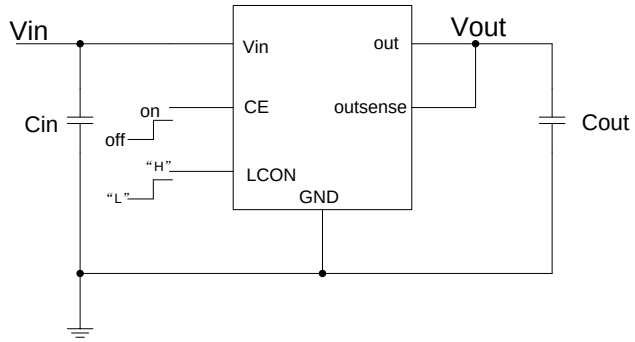
* = Month code (N: 2015.01, O:2015.02, and so on)

Marking

Order Information

For detail information, Please refer to page 9.

Typical Application

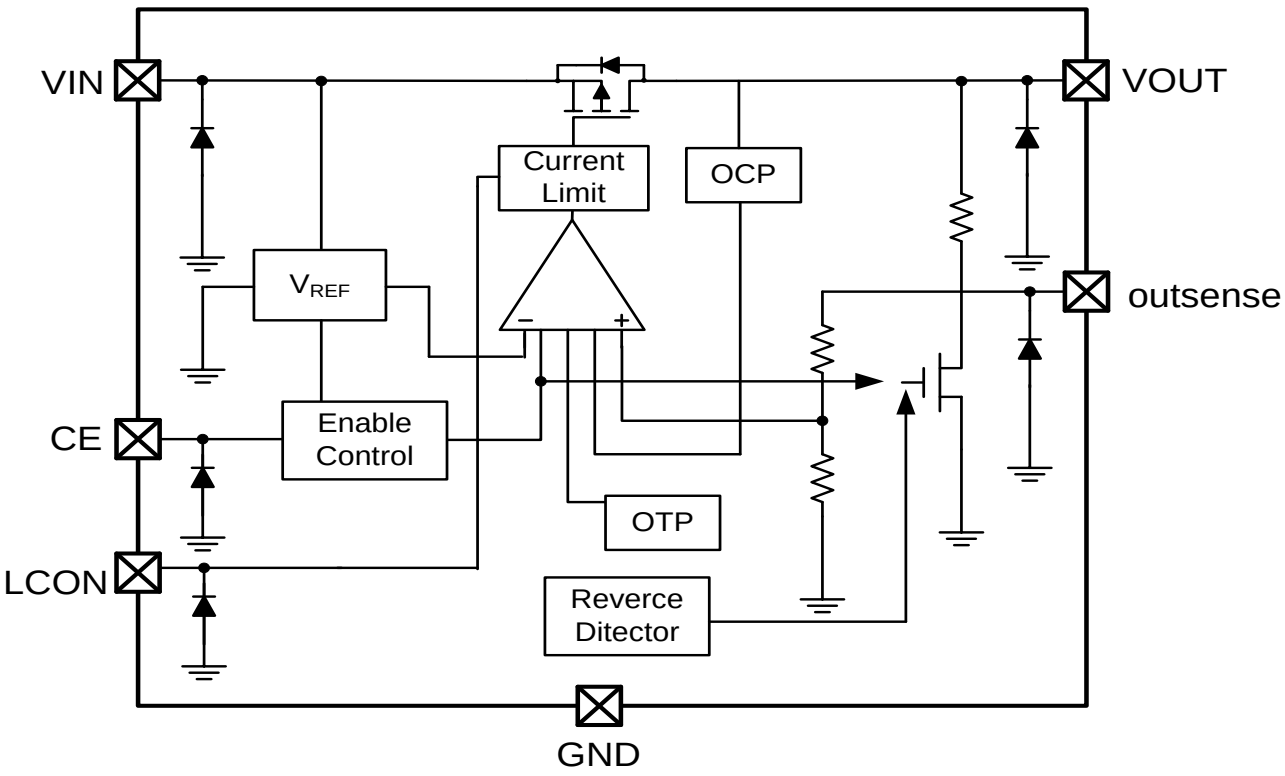


	Min.	Typ.	Max.
C_{IN}		4.7uF	
C_{OUT}		1uF	

Pin Description

PIN	Symbol	Description
1	Vout	Output
2	Vout	Output
3	LCON	Output Current Limit Alternate Pin（"H"=1A，"L"=500mA）
4	outsense	Feedback Pin
5	GND	Ground
6	CE	Enable, Active High
7	VDD	Input
8	VDD	Input

Block Diagram



Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Input voltage range	V_{IN}	-0.3～6.5	V
EN voltage range	V_{EN}	-0.3～V_{IN}	V
LCON voltage range	V_{LCON}	-0.3～V_{IN}	V
Output voltage range	V_{OUT}	-0.3～V_{IN}	V
Power dissipation *[1]	P_D	625	mW
Thermal resistance	$R_{\theta JA}$	165	°C/W
Junction temperature	T_J	150	°C
Lead temperature(10s)	T_L	260	°C
Storage temperature	Tstg	-55 ~ 150	°C
ESD Ratings	HBM	2000	V
	MM	200	V

Note: These are stress ratings only. Stresses exceeding the range specified under “Absolute Maximum Ratings” may cause substantial damage to the device. Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability.

***1:** Power dissipation is calculate by $P_D = (V_{IN}-V_{OUT}) \times I_{OUT}$

Recommend Operating Ratings

Parameter	Symbol	Value	Unit
Operating Supply voltage	V_{IN}	2.5～5.5	V
Operating Temperature Range	Topr	-40～85	°C

Electronics Characteristics (Ta=25°C, V_{IN}=V_{OUT}+1V, C_{IN}=4.7uF, Cout=1uF，Iout=1mA，LCON=EN=Vin，unless otherwise noted)

Parameter	Symbol	Condition		Min.	Typ.	Max.	Unit
Output Voltage	V_{OUT}	Vout ＞ 1.5V		-2%		+2%	
		Vout ≤ 1.5V		-3%		+3%	
Current Limit	I_{LIM}	Vin=Vset+0.5V	LCON=“H”	1			A
			LCON=“L”	0.5			A
Dropout Voltage	V_{DROP}	Vout=Vout*0.97	Iout=0.5A		70		mV
Load Regulation	$\triangle V_{Load}$	Vin=Vset+0.5V 脉冲法测试	LCON=“H”：1mA≤Iout≤1A		3.5		mV
			LCON=“L”：1mA≤Iout≤0.5A		1.5		mV
UVLO	V_{uvlo}				2		V
Line Regulation	$\triangle V_{LINE}$	Vset+0.5V≤Vin≤5.5V（Vin≥UVLO）			5	10	mV
Quiescent Current	I_Q	I_{OUT}=0			160	220	uA
Shut-down Current	I_{SHDN}	V_{EN} = 0V			1	3	uA
Vout Temperature Coefficient	$\Delta V_{out}/\Delta T$	-40℃≤T≤85℃			100		Ppm/℃
Short Current Limit	I_{sc}	Vout=0V	LCON=“H”		160		mA
			LCON=“L”		80		mA
Inrush Current Limit	I_{rush}*1	CC mode	LCON=“H”		500		mA
			LCON=“L”		250		mA
Reverse Current	I_{rev}*2	Vout=Vset+1V；EN=0；0≤Vin≤Vrev_del			4.5	10	uA
Detector offset voltage in reverse current protection mode	V_{rev_det}*3	Vout=Vset+1V；EN=0			0.5		V
Release offset voltage in reverse current protection mode	Vrev_rel*4	Vout=Vset+1V；EN=0			0.35		V
Max reverse Current	I_{revmax}*5	Vout=Vset+1V；EN=0			70		uA
Discharge resistance	R_{dis}	EN=0			60		Ω
Power Supply Ripple Rejection	PSRR	V_{IN}=(V_{OUT}+1V)$_{DC}$+0.2V_{P-P} F=1KHz ,I_{OUT}=10mA			60		dB
Output noise voltage	e_{NO}	BW=10Hz to 100KHz Io=0			40		μV_{RMS}
		BW=10Hz to 100KHz Io=10mA			60		
EN logic high voltage	V_{ENH}	V_{IN}=5.5V, I_{OUT}=1mA		1.2			V
EN logic low voltage	V_{ENL}	V_{IN}=5.5V, I_{OUT}=0mA				0.4	V
EN pull-down current	I_{en}				0.2	1	uA

LCON pull-down current	I_{LCON}			0.2	1	uA
EN logic high voltage	V_{ENH}		1.2			V
EN logic low voltage	V_{ENL}				0.4	V
LCON logic high voltage	V_{ENH}		1.2			V
LCON logic low voltage	V_{ENL}				0.4	V
Thermal shutdown threshold	T_{SD}			165		^{o}C
Thermal shutdown hysteresis	$\triangle T_{SD}$			30		^{o}C

*1: For CC (Constant Current) mode, please refer to Start-up Characteristics.

*2 *3 *4 *5: Please refer to reverse current protection mode

Start-up Characteristics

Constant slope circuit is included in the WL2817 to prevent the overshoot of the output voltage. If inrush current increases due to the large capacitance of C_{out}, the operation mode will be shift from Constant Slope (CS) mode to Constant Current (CC) mode. The CC mode maintains a constant inrush current. In the CC mode, t_{on} varies with the size of C_{out} and the load current.

Reverse Current Protection Circuit

The WL2817 include a Reverse Current Protection Circuit, which stop the reverse current from V_{out} pin to V_{in} pin or GND pin when V_{out} becomes higher than V_{in}.

Following figure shows the load characteristics of each mode. When giving the V_{out} pin a constant voltage and decreasing the V_{in} voltage,the V_{in} voltage will become lower than V_{out}-V_{rev_det}, the reverse current protection starts to function to stop the load current. By increasing the V_{in} voltage higher than V_{out}-V_{rev_rel}, the protection mode will be released to let the load current to flow. When V_{in} voltage is between V_{out} and V_{rev_det}, the parasitic diode between V_{in} pin and V_{out} pin becomes forward direction. As a result, the current flows from V_{out} pin to V_{in} pin, and the maximum of the current is I_{revmax}.

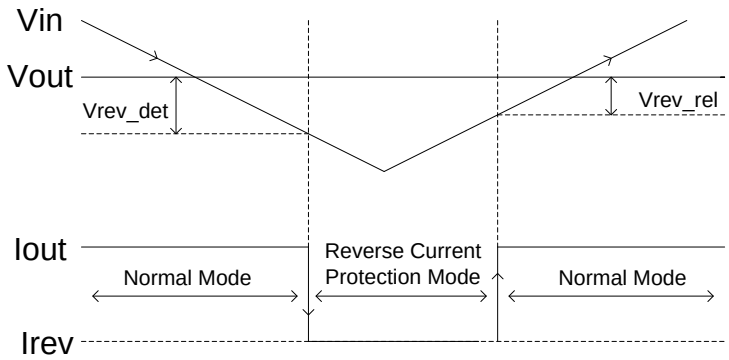
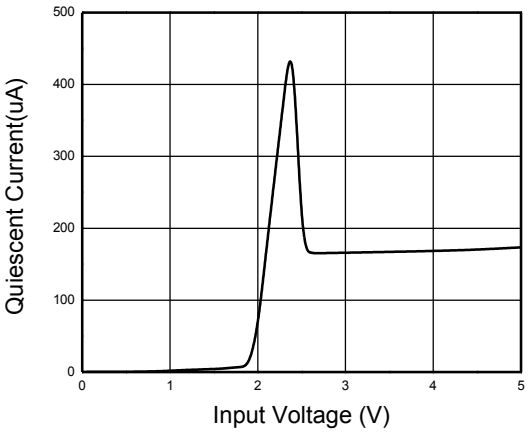
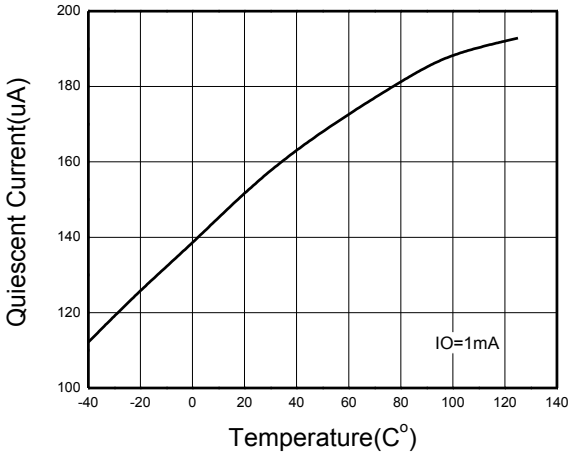


Figure1.Detection/Release Threshold value of Reverse Current Protection

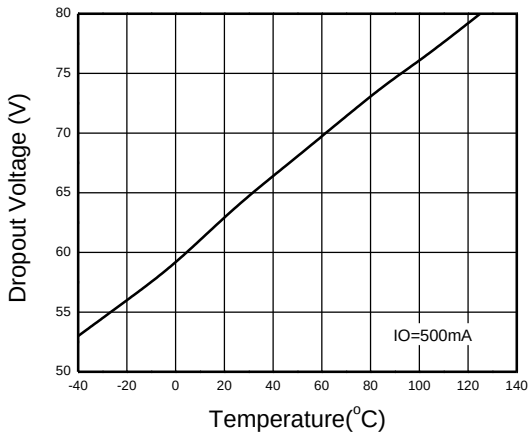
Typical characteristics (Ta=25°C, V_{IN}=V_{OUT}+1V, C_{IN}=4.7uF，C_{OUT}=1uF, unless otherwise noted)



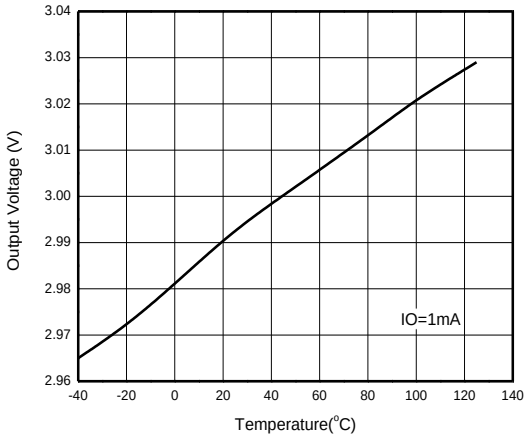
Quiescent current vs. Supply voltage



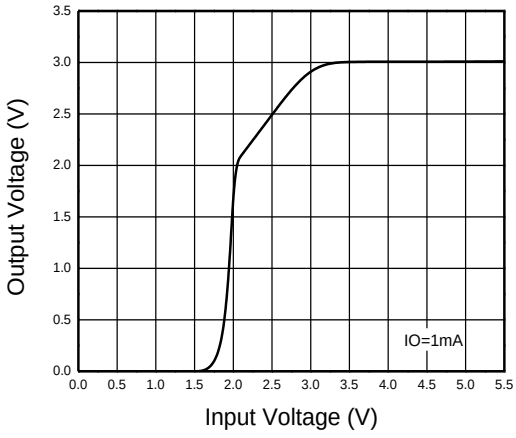
Quiescent current vs. Temperature



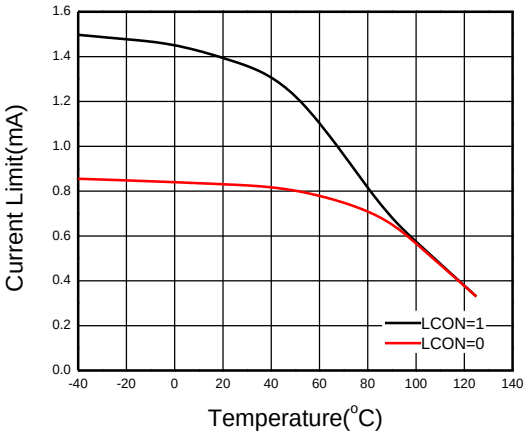
DROP Voltage vs. Temperature



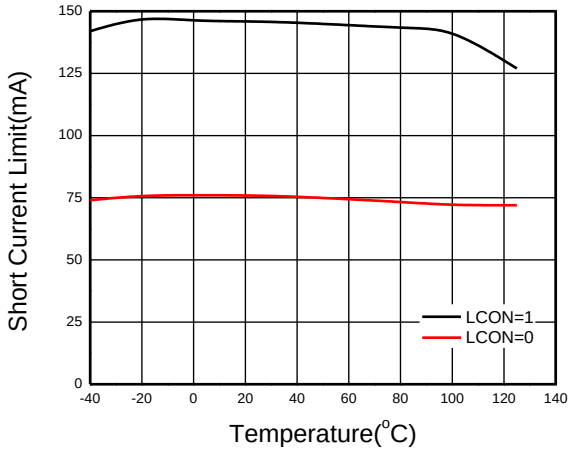
Output Voltage vs. Temperature



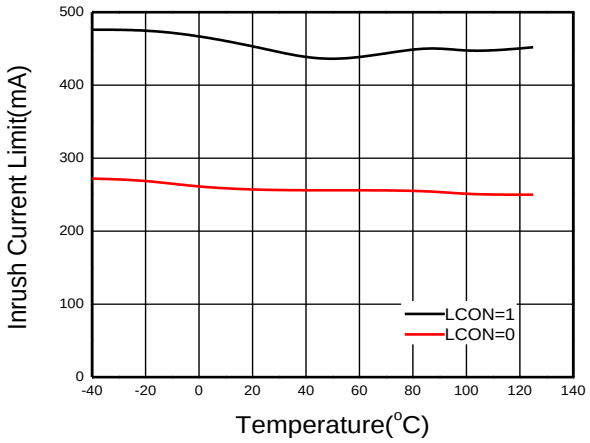
Output voltage vs. Supply voltage



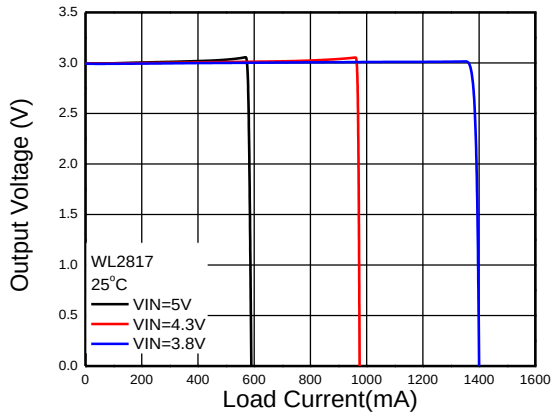
Current Limit vs. Temperature



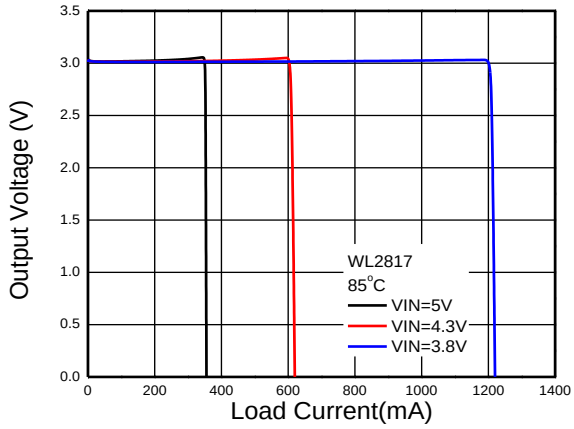
Short Current Limit vs. Temperature



Inrush Current Limit vs. Temperature



Output Voltage vs. Load Current



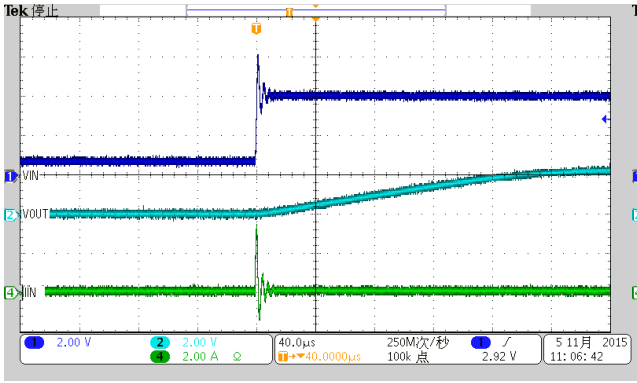
Output Voltage vs. Load Current

1.Start up

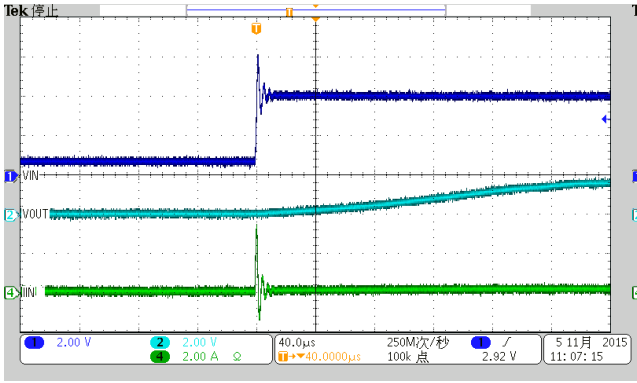
A：不同负载电阻启动

LCON=0

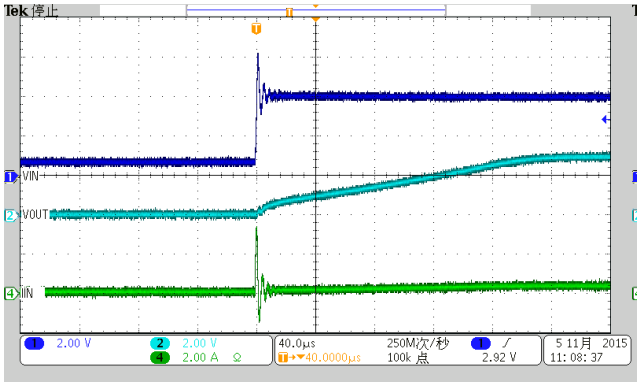
VIN=4V,IO=0mA



VIN=4V,IO=100mA

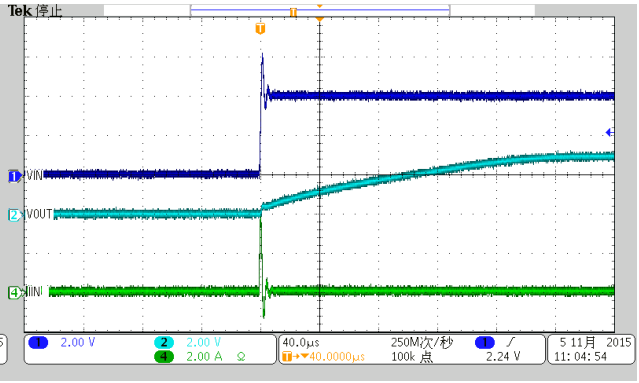


VIN=4V,IO=300mA

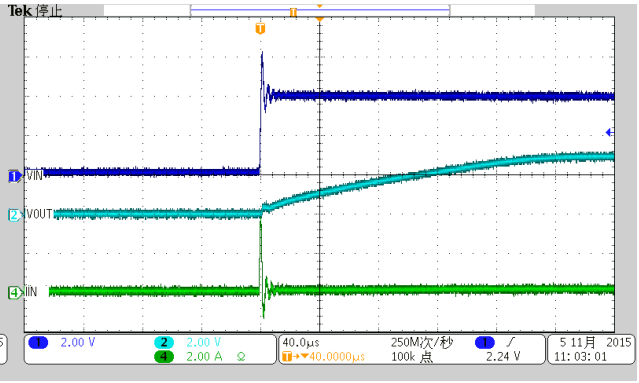


LCON=1

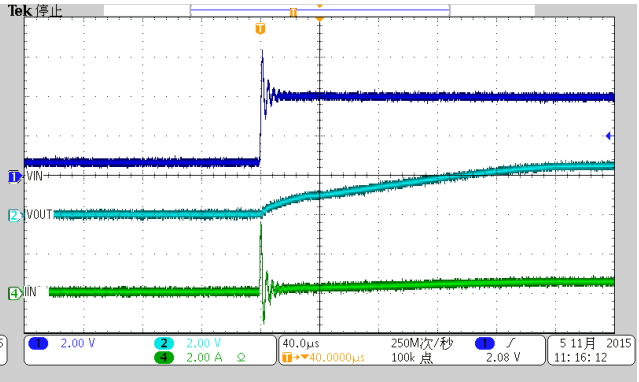
VIN=4V,IO=0mA



VIN=4V,IO=100mA



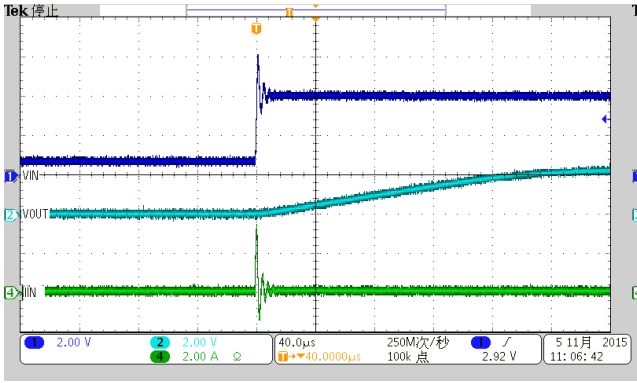
VIN=4V,IO=600mA



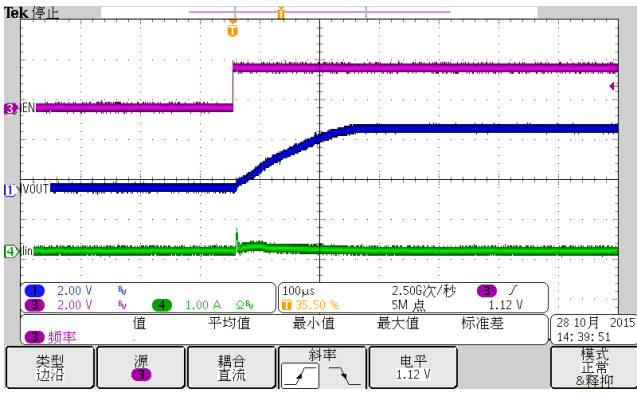
B：不同的负载电容启动

LCON=0

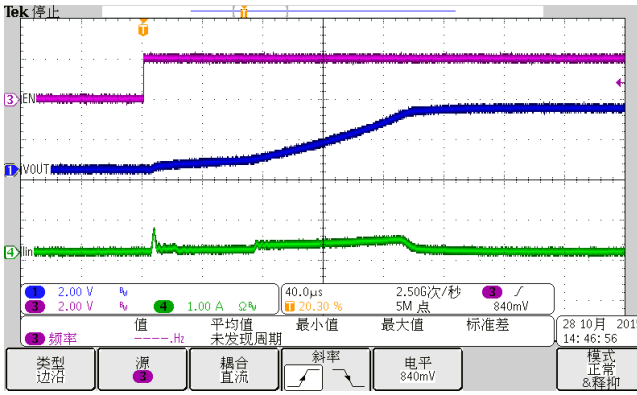
VIN=4V，COUT=1uF



VIN=4V，COUT=4.7uF

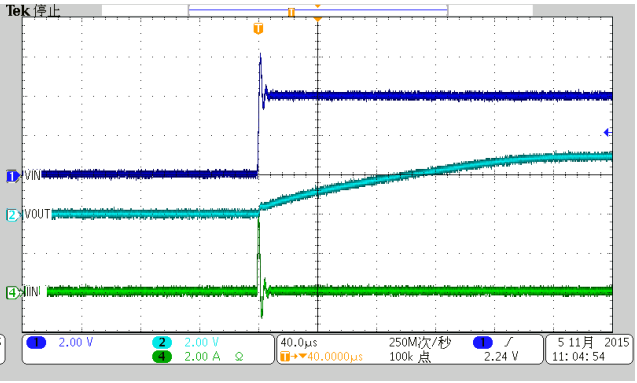


VIN=4V，COUT=10uF

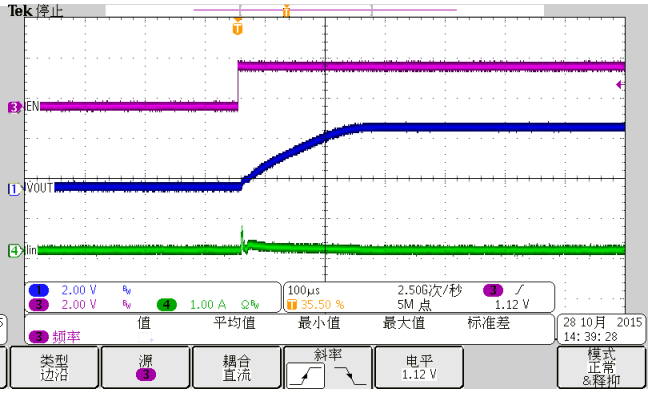


LCON=1

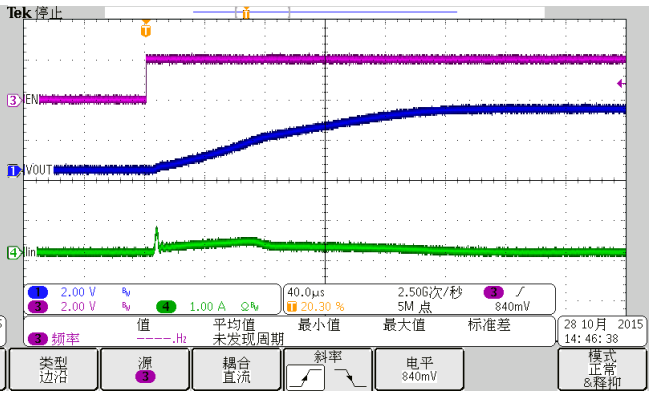
VIN=4V，COUT=1uF



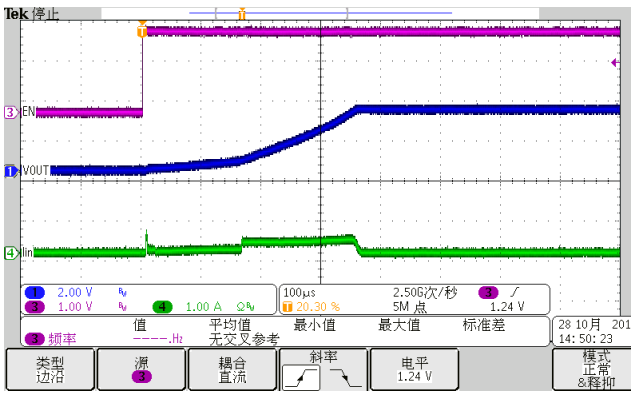
VIN=4V，COUT=4.7uF



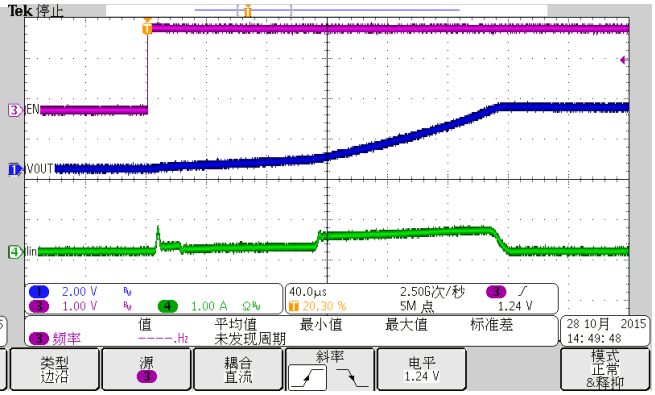
VIN=4V，COUT=10uF



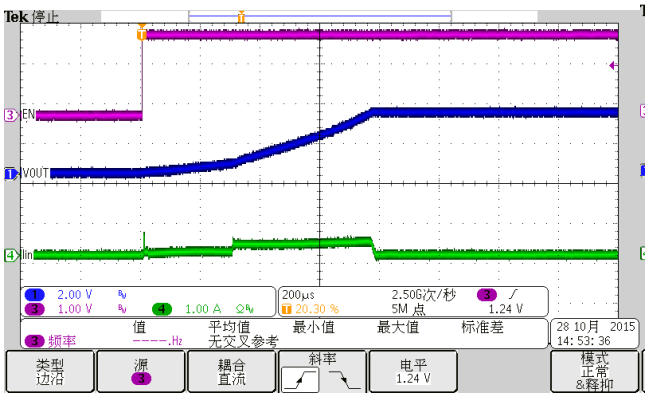
VIN=4V，COUT=22uF



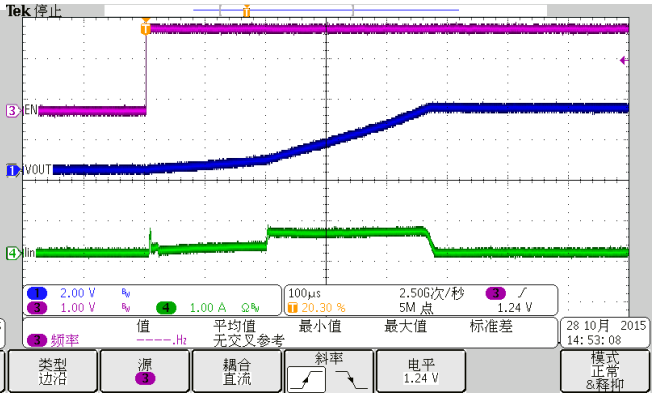
VIN=4V，COUT=22uF



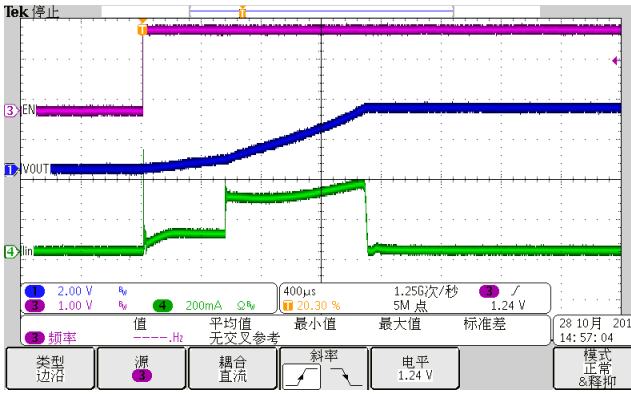
VIN=4V，COUT=47uF



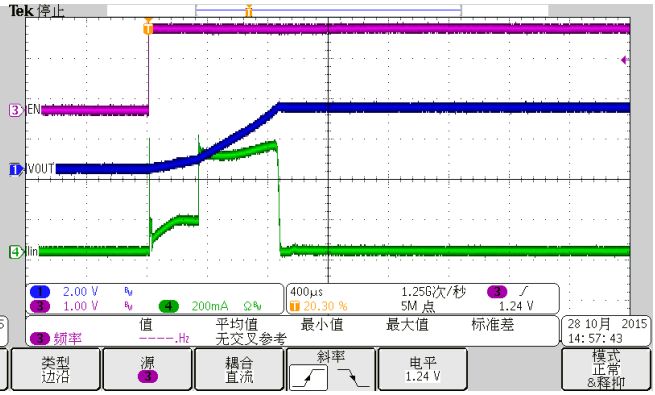
VIN=4V，COUT=47uF



VIN=4V，COUT=100uF

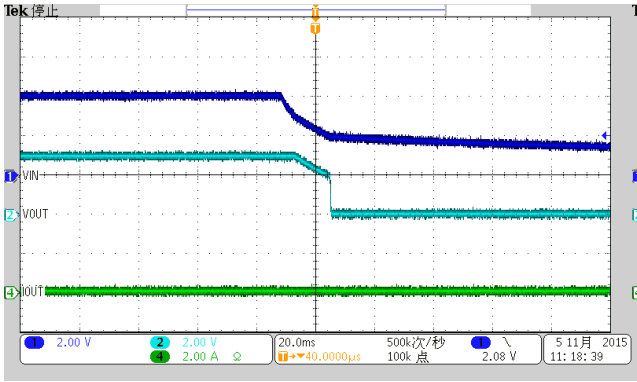


VIN=4V，COUT=100uF

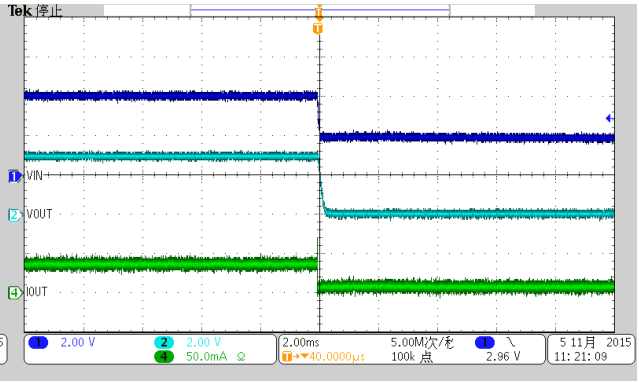


2.Shut down

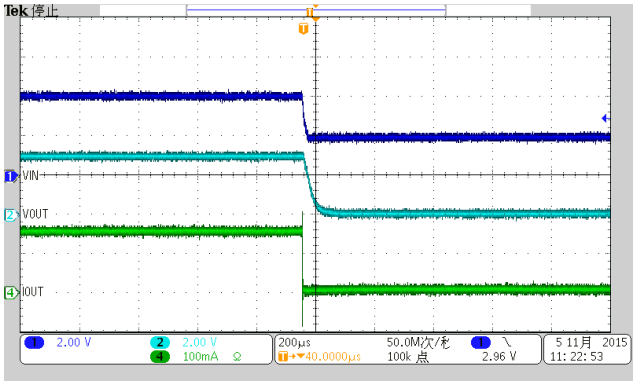
VIN=4V，IO=0mA



VIN=4V，IO=30mA

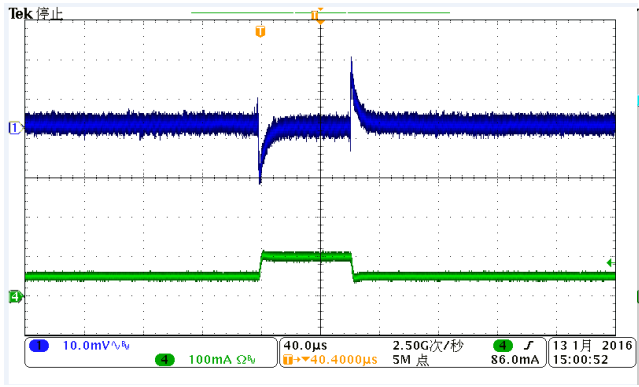


VIN=4V，IO=150mA

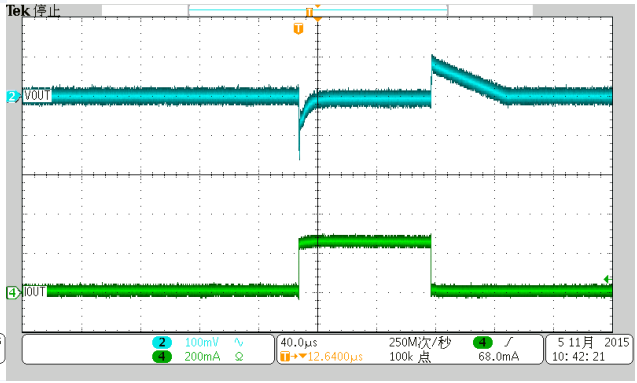


3.Load Step

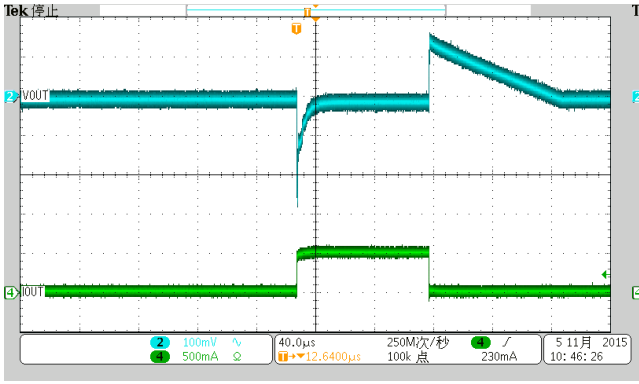
VIN=4V,IO=50mA-100mA



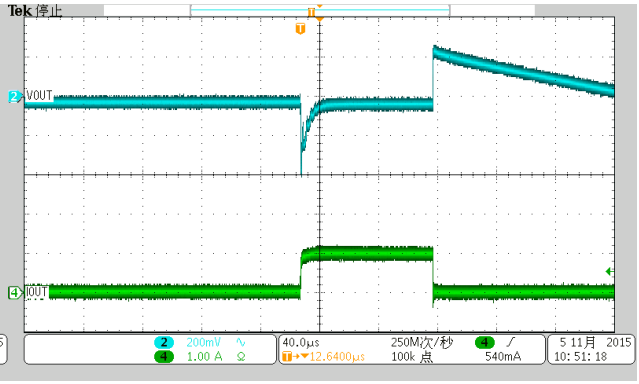
VIN=4V,IO=1mA-250mA



VIN=4V,IO=1mA-500mA

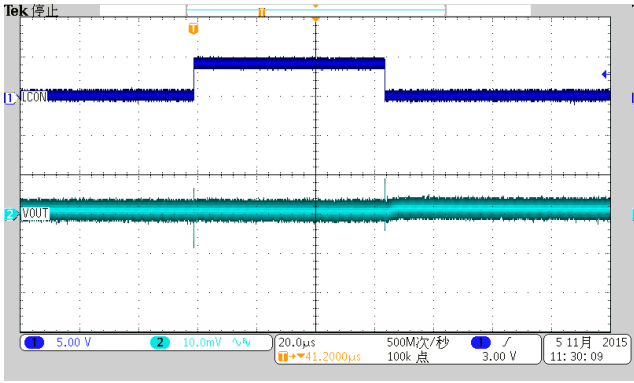


VIN=4V,IO=1mA-1A

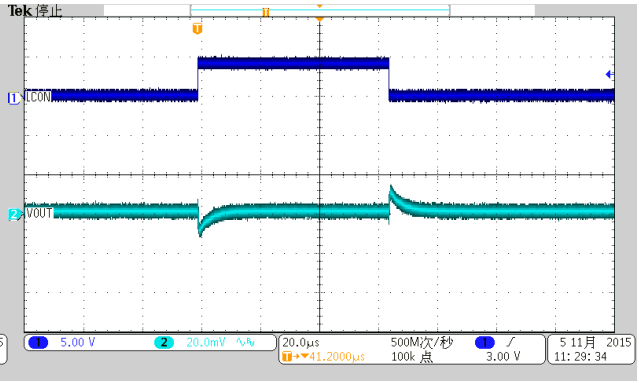


4.LCON Step

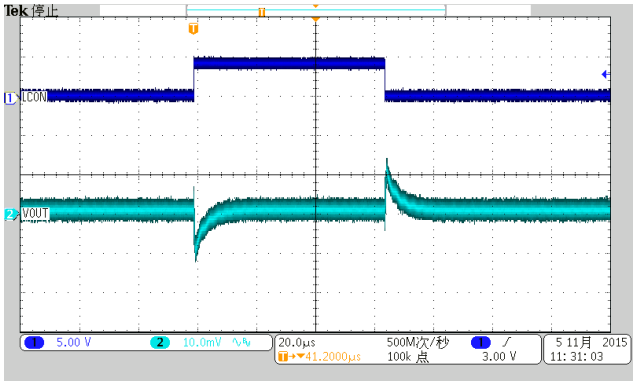
VIN=4V，IO=0mA



VIN=4V，IO=150mA

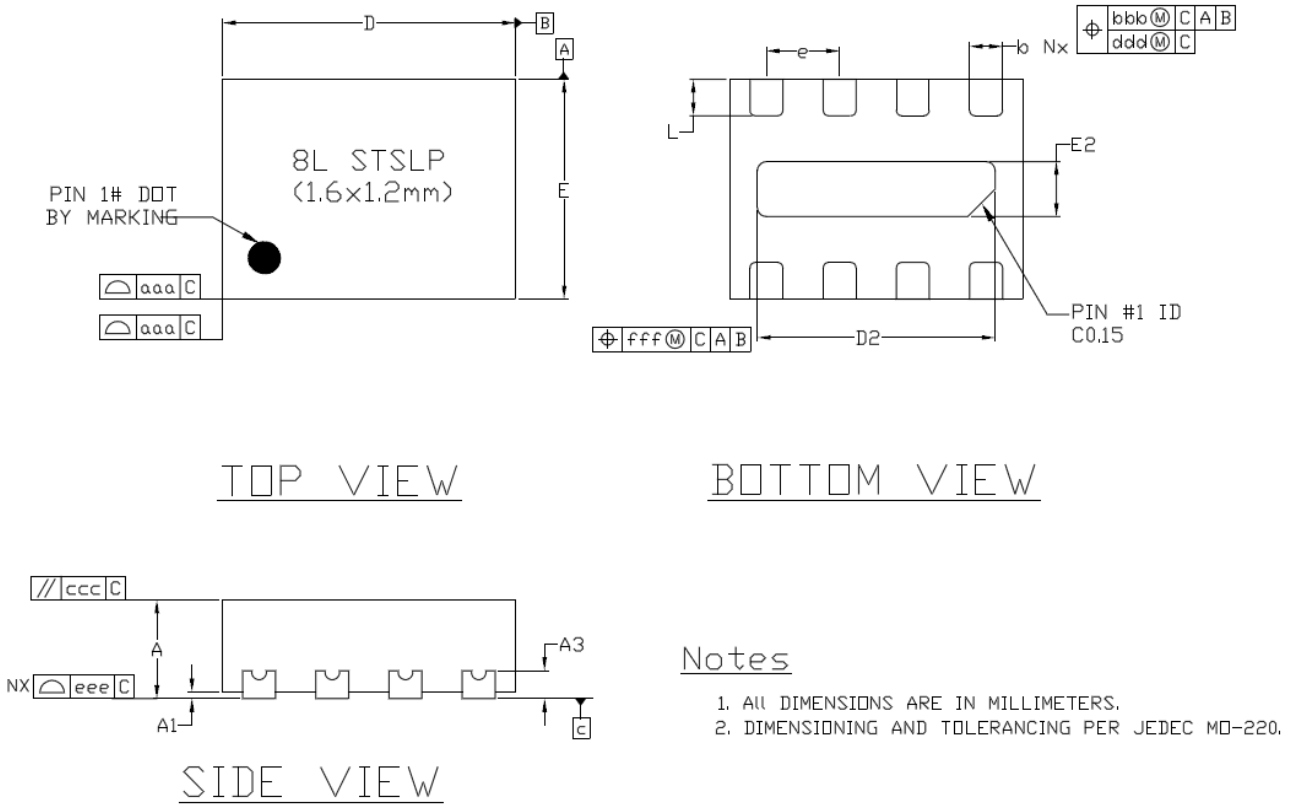


VIN=4V，IO=500mA



Package outline dimensions

DFN1612-8L



Symbol	Dimensions in millimeter		
	Min.	Typ.	Max.
A	0.500	0.550	0.600
A1	---	---	0.050
A3	0.152 REF.		
D	1.550	1.600	1.650
E	1.150	1.200	1.250
D2	1.250	1.300	1.350
E2	0.250	0.300	0.350
--	--		
b	0.130	0.180	0.230
e	0.400 BSC		
L	0.150	0.200	0.250
Tol. Of Form&Position			
aaa	0.10		
bbb	0.10		
ccc	0.10		
ddd	0.05		
eee	0.08		
fff	0.10		

ORDER INFORMATION

Ordering No.	V_{OUT} (V)	Package	Marking	Operating Temperature	Shipping
WL2817DA30-8/TR	3.0	DFN1612-8L	A*	-40 ~ +85°C	3000/Tape and Reel
WL2817DA10-8/TR	1.0	DFN1612-8L	C*	-40 ~ +85°C	3000/Tape and Reel
WL2817DA18-8/TR	1.8	DFN1612-8L	D*	-40 ~ +85°C	3000/Tape and Reel
WL2817DA28-8/TR	2.8	DFN1612-8L	E*	-40 ~ +85°C	3000/Tape and Reel