

General Description

The TP152C series are a group of low-dropout (LDO) voltage regulators offering the benefits of wide input voltage range from 1.2V to 5.5V, low dropout voltage, low power consumption, and miniaturized packaging. Quiescent current of only 2μA makes these devices ideal for powering the battery-powered, always-on systems that require very little idle-state power dissipation to a longer service life. There is an option of

shutdown mode by selecting the parts with the EN pin and pulling it low. The shutdown current in this mode goes down to only 10nA (typical).

The TP152C series of linear regulators are stable with the ceramic output capacitor over its wide input range from 1.2V to 5.5V and the entire range of output load current (0mA to 450mA).

Features

- 2μA Ground Current at no Load
- ±2% Output Accuracy
- 450mA Output Current
- 10nA Disable Current (by option)
- Wide Operating Input Voltage Range: 1.2V to 5.5V
- Dropout Voltage: 0.18V at 300mA ($V_{OUT}=3.3V$)
- Support Fixed Output Voltage 0.8V, 0.9V, 1.2V, 1.5V, 1.8V, 2.5V, 2.8V, 3.0V, 3.3V
- Adjustable Output Voltage Available by Specific Application
- Stable with Ceramic or Tantalum Capacitor
- Current Limit Protection
- Over-Temperature Protection
- SOT-23-3, SOT-23-5, DFN-4L 1x1 and DFN-6L 2x2 Packages Available

Applications

- Portable, Battery Powered Equipment
- Low Power Microcontrollers
- Laptop, Palmtops and PDAs
- Wireless Communication Equipment
- Audio/Video Equipment

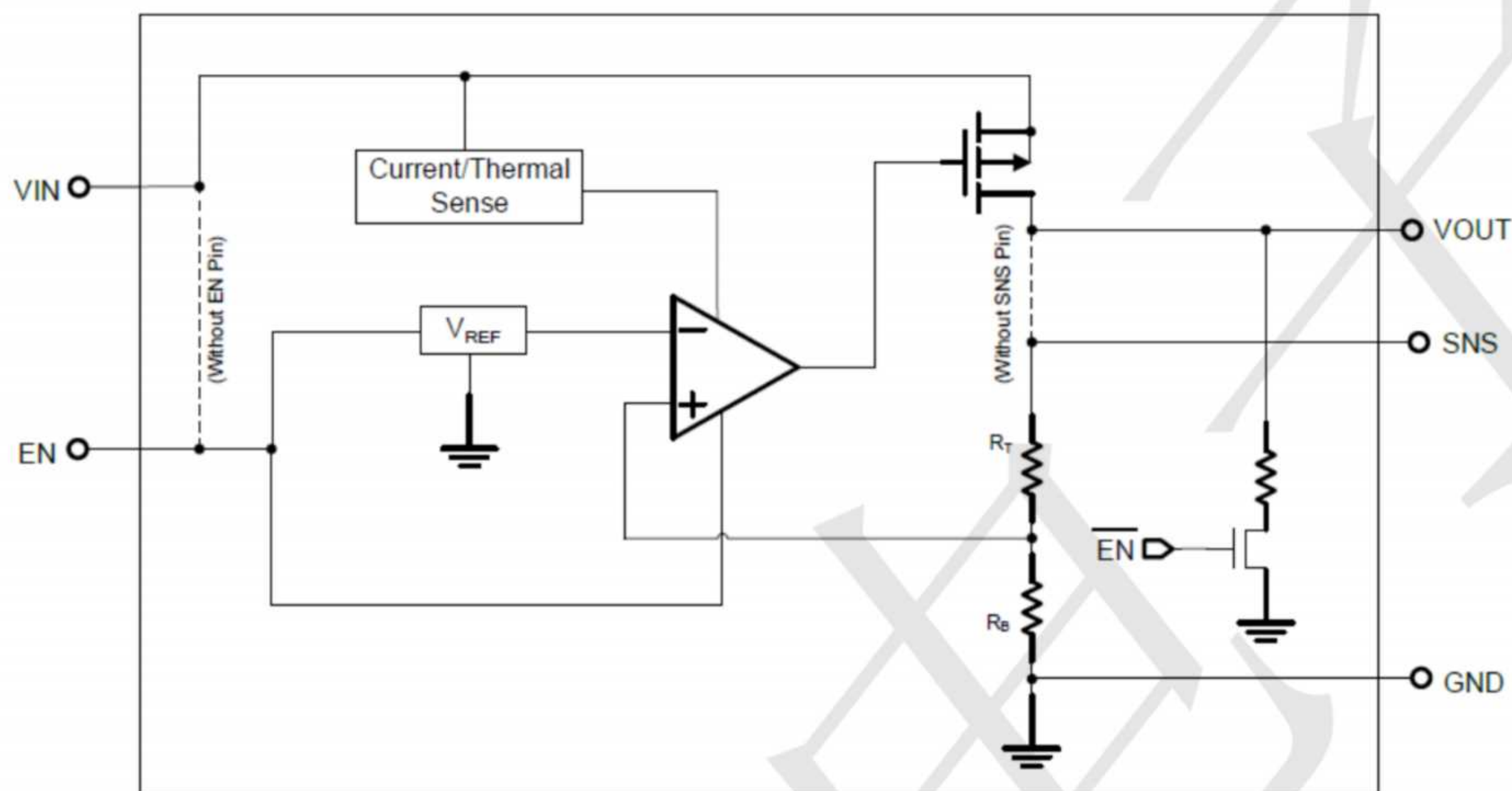
Ordering Information

TP152C33S5

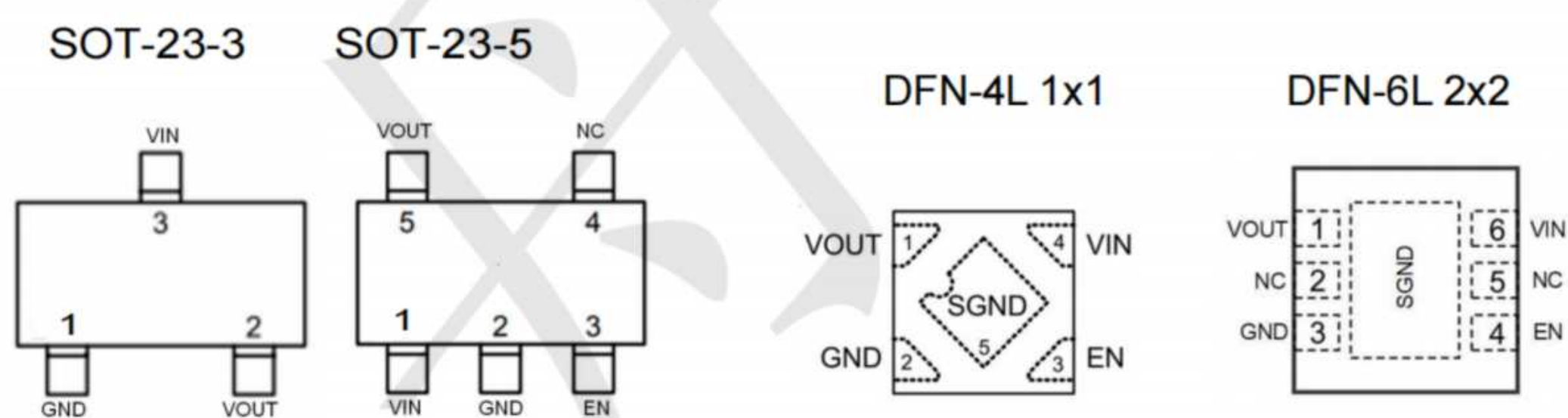
S5:SOT23-5 Package
S3L:SOT23-3 Package
D4:DFN1X1 Package
D6:DFN2X2 Package

Output voltage: 12=1.2V
15=1.5V
18=1.8V
30=3.0V
33=3.3V
XX=X.XV

BLOCK DIAGRAM



PIN CONFIGURATION



Pin No				Pin Name	Pin Function
SOT-23-3	SOT-23-5	DFN-1X1	DFN-2X2		
1	2	2	3	GND	Ground
2	5	1	1	VOUT	Output of the Regulator
3	1	4	6	VIN	Input of Supply Voltage.
	3	3	4	EN	Enable Control Input.
	4		2,5	NC	No internal connection

Electrical Characteristics (T = 25°C unless otherwise noted)

(V_{IN}=5V, V_{EN}=5V, T_A=25°C, unless otherwise specified) (Note 1)

PARAMETER	TEST CONDITIONS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage		V _{IN}	1.2		5.5	V
DC Output Voltage Accuracy	I _{LOAD} =0.1mA		-2		2	%
SNS Input Current	SNS=V _{OUT}	I _{SNS}		0.5		μA
Dropout Voltage (Note 2)	I _{LOAD} =300mA, V _{OUT} ≥3V	V _{DROP_3V}		0.18		V
	I _{LOAD} =300mA, V _{OUT} =2.8V	V _{DROP_2.8V}		0.23		
	I _{LOAD} =300mA, V _{OUT} =2.5V	V _{DROP_2.5V}		0.23		
	I _{LOAD} =300mA, V _{OUT} =1.8V	V _{DROP_1.8V}		0.28		
	I _{LOAD} =300mA, V _{OUT} =1.5V	V _{DROP_1.5V}		0.36		
	I _{LOAD} =300mA, V _{OUT} =1.2V	V _{DROP_1.2V}		0.45		
GND Current	I _{LOAD} =0mA	I _Q		2	5	μA
Shutdown GND Current	V _{EN} =0V, V _{OUT} =0V	I _{SD}		0.1	0.5	μA
V _{OUT} Shutdown Leakage Current	V _{EN} =0V, V _{OUT} =0V	I _{LEAK}		0.1	0.5	μA
Enable Threshold Voltage	EN Rising	V _{IH}	1.0			V
	EN Falling	V _{IL}			0.4	
EN Input Current	V _{EN} =5V	I _{EN}		10	100	nA
Line Regulation	I _{LOAD} =30mA, 1.5V≤V _{IN} ≤5.5V or (V _{OUT} +0.2V)≤V _{IN} ≤5.5V	ΔLINE		0.2		%
Load Regulation	10mA≤I _{LOAD} ≤300mA	ΔLOAD		0.2		%
Output Current Limit	V _{OUT} =0V	I _{LIM}	450	600		mA
Power Supply Rejection Ratio	V _{OUT} =1.2V, I _{LOAD} =5mA, V _{IN} =2V, f=100Hz	PSRR		78		dB
	V _{OUT} =1.2V, I _{LOAD} =5mA, V _{IN} =2V, f=1kHz			75		
Output Voltage Noise	V _{IN} =3.5V, I _{LOAD} =0.1A, BW=10Hz to 100kHz, C _{OUT} =1μF, V _{OUT} =1.2V			80		μV _{RMS}
	V _{IN} =3.5V, I _{LOAD} =0.1A, BW=10Hz to 100kHz, C _{OUT} =1μF, V _{OUT} =2.8V			120		
Thermal Shutdown Temperature	I _{LOAD} =10mA	T _{SD}		155		°C
Thermal Shutdown Hysteresis	I _{LOAD} =10mA	ΔT _{SD}		15		°C
Discharge Resistance	V _{EN} =0V, V _{OUT} =0.1V			100		Ω

TYPICAL APPLICATION

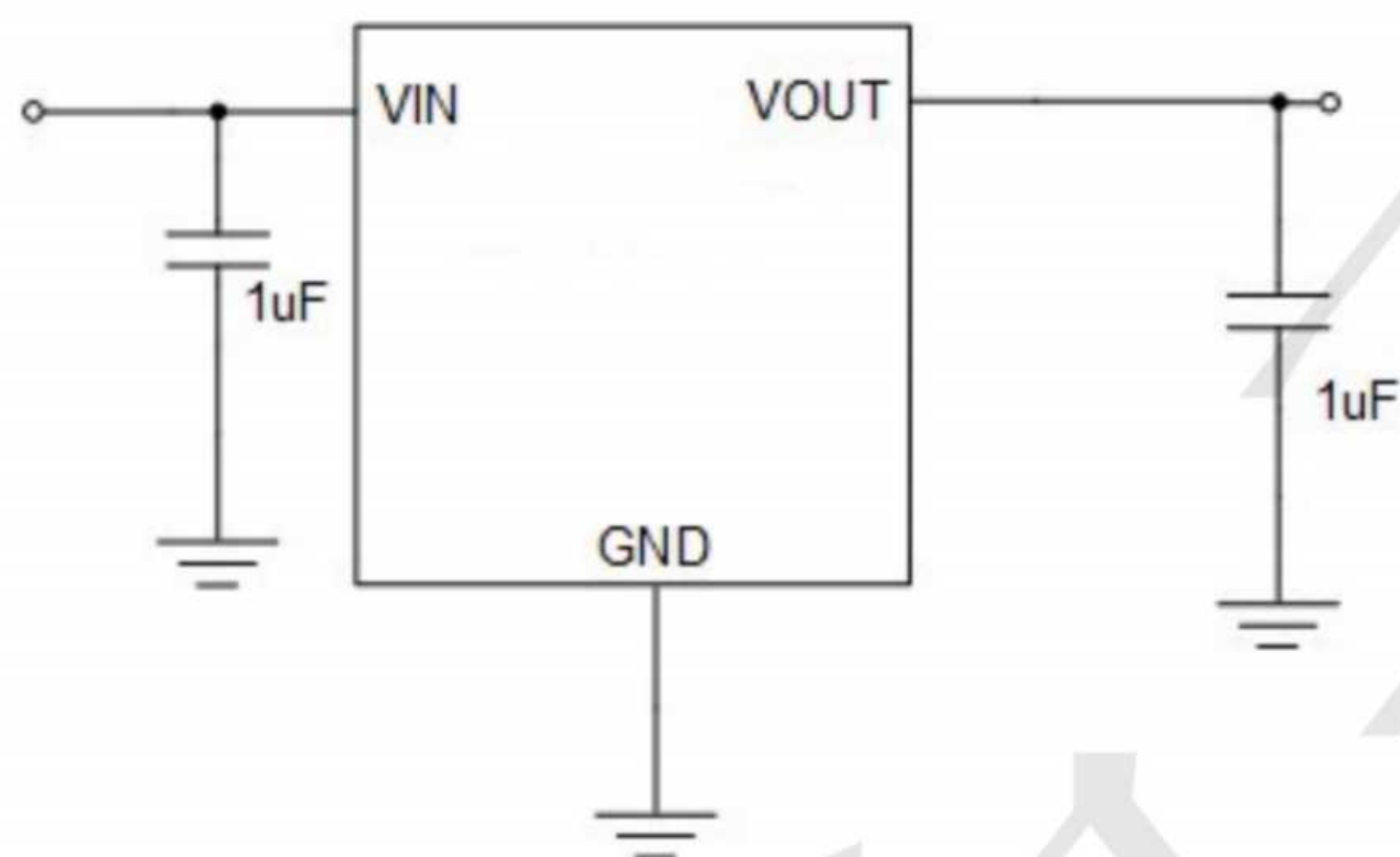


Figure 1: Application circuit of Fixed V_{OUT} LDO

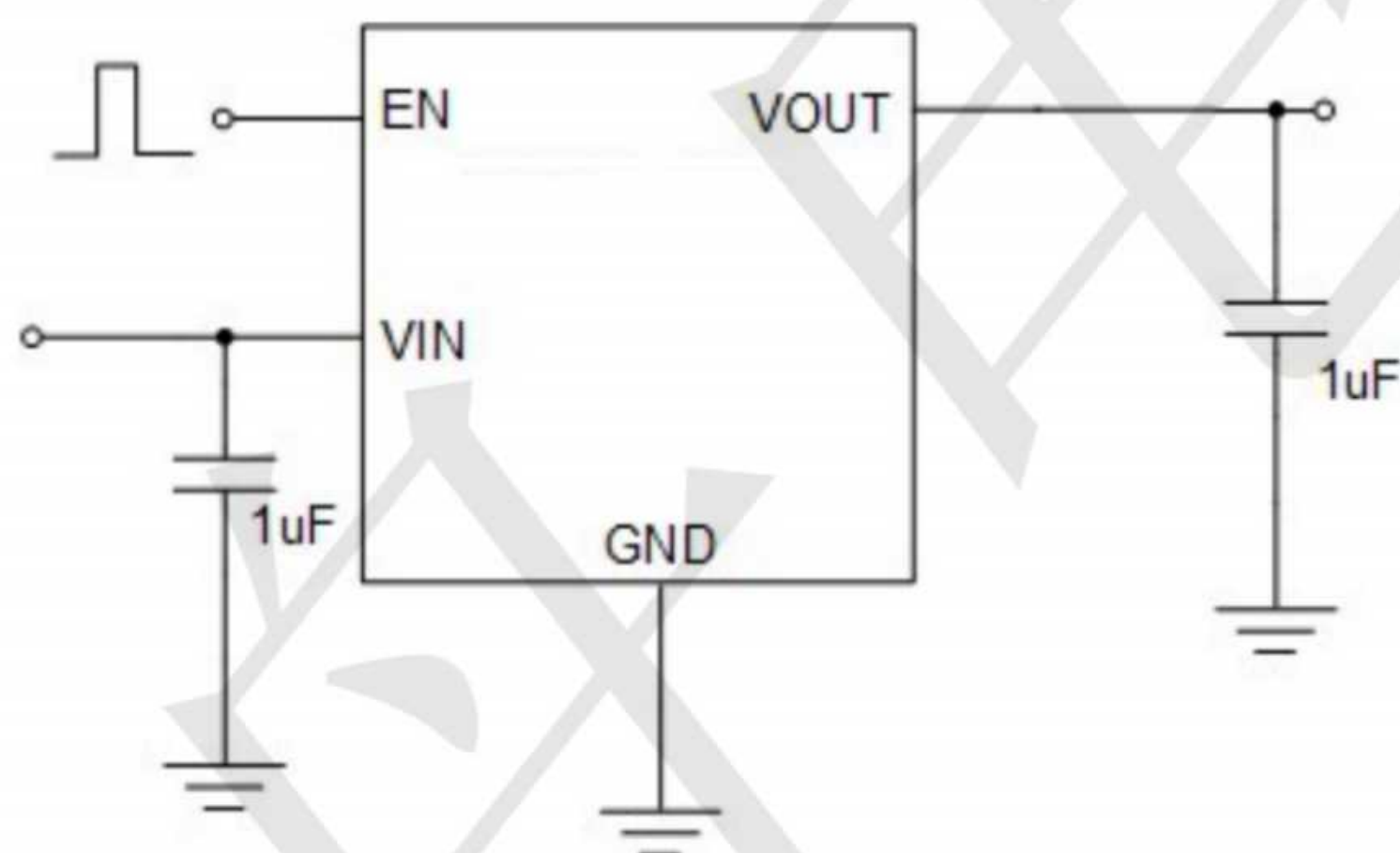
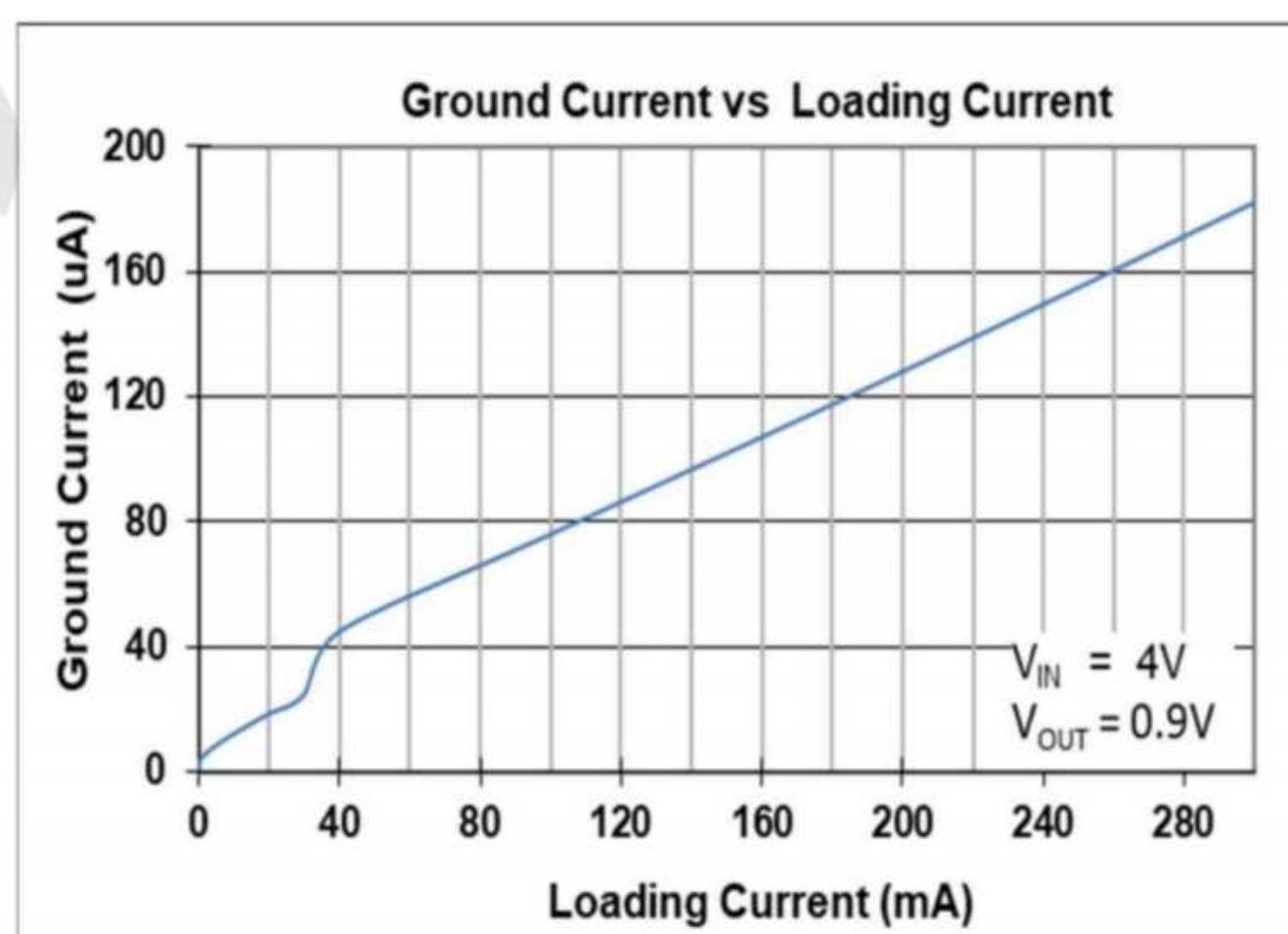
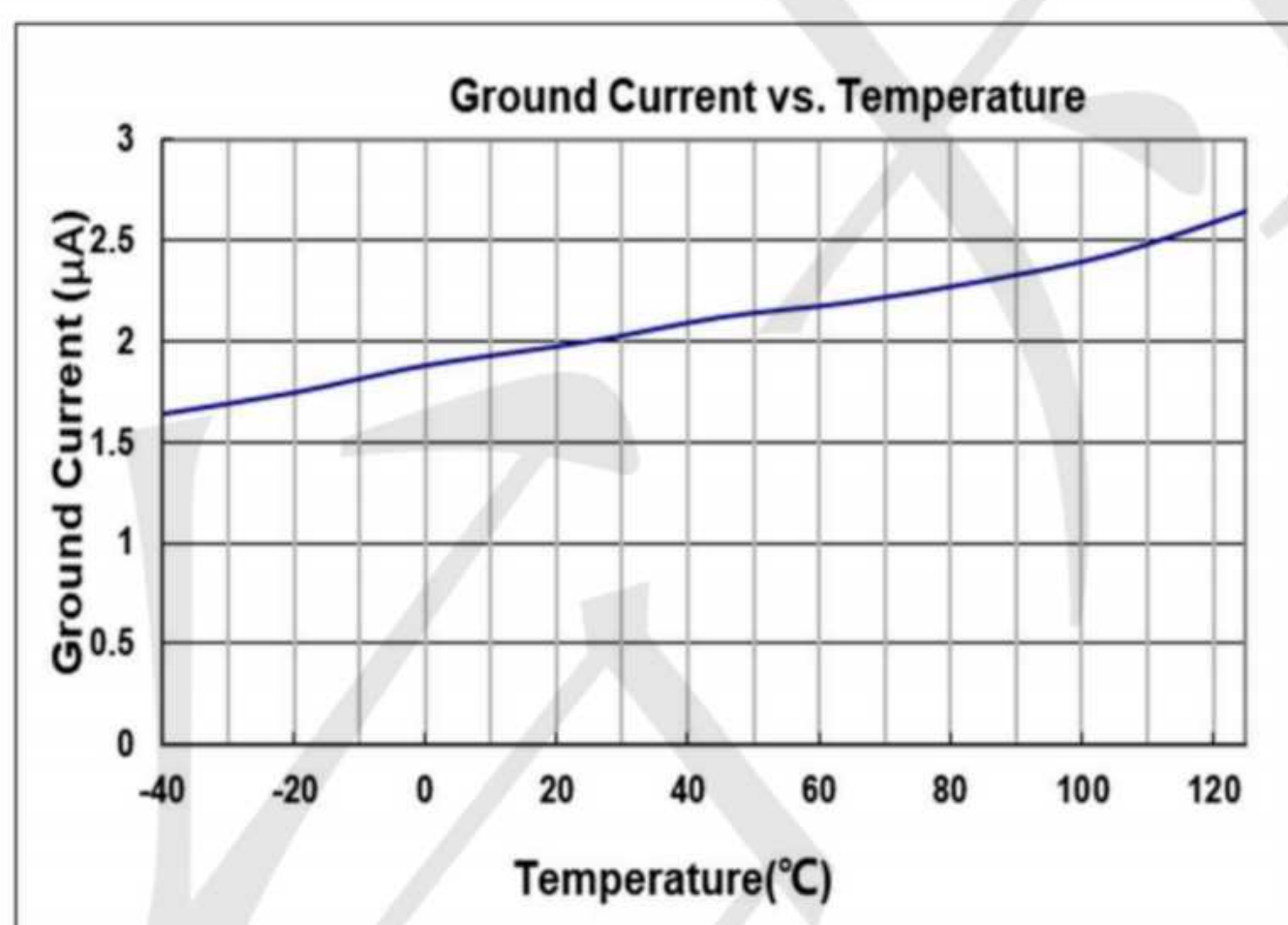
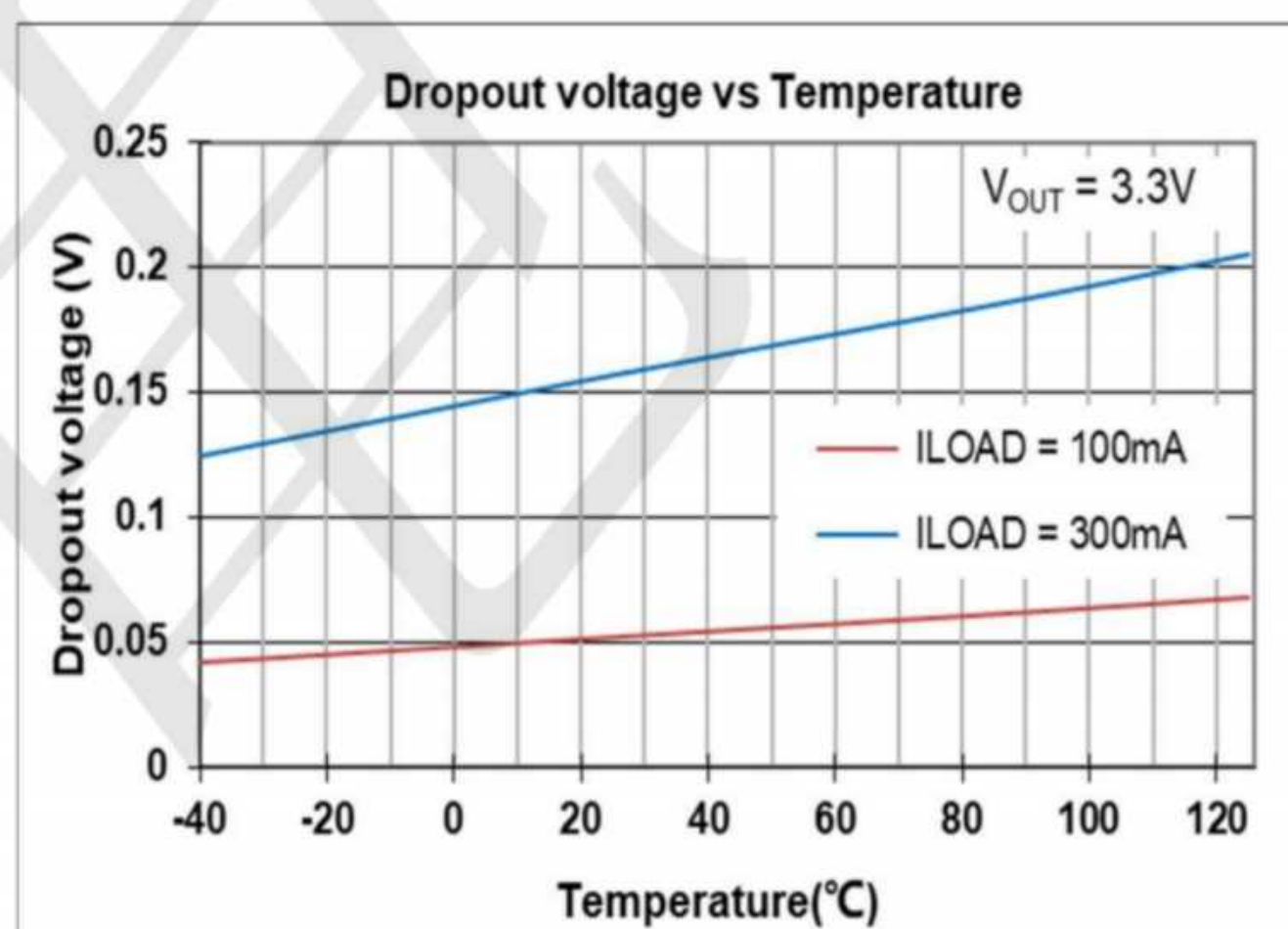
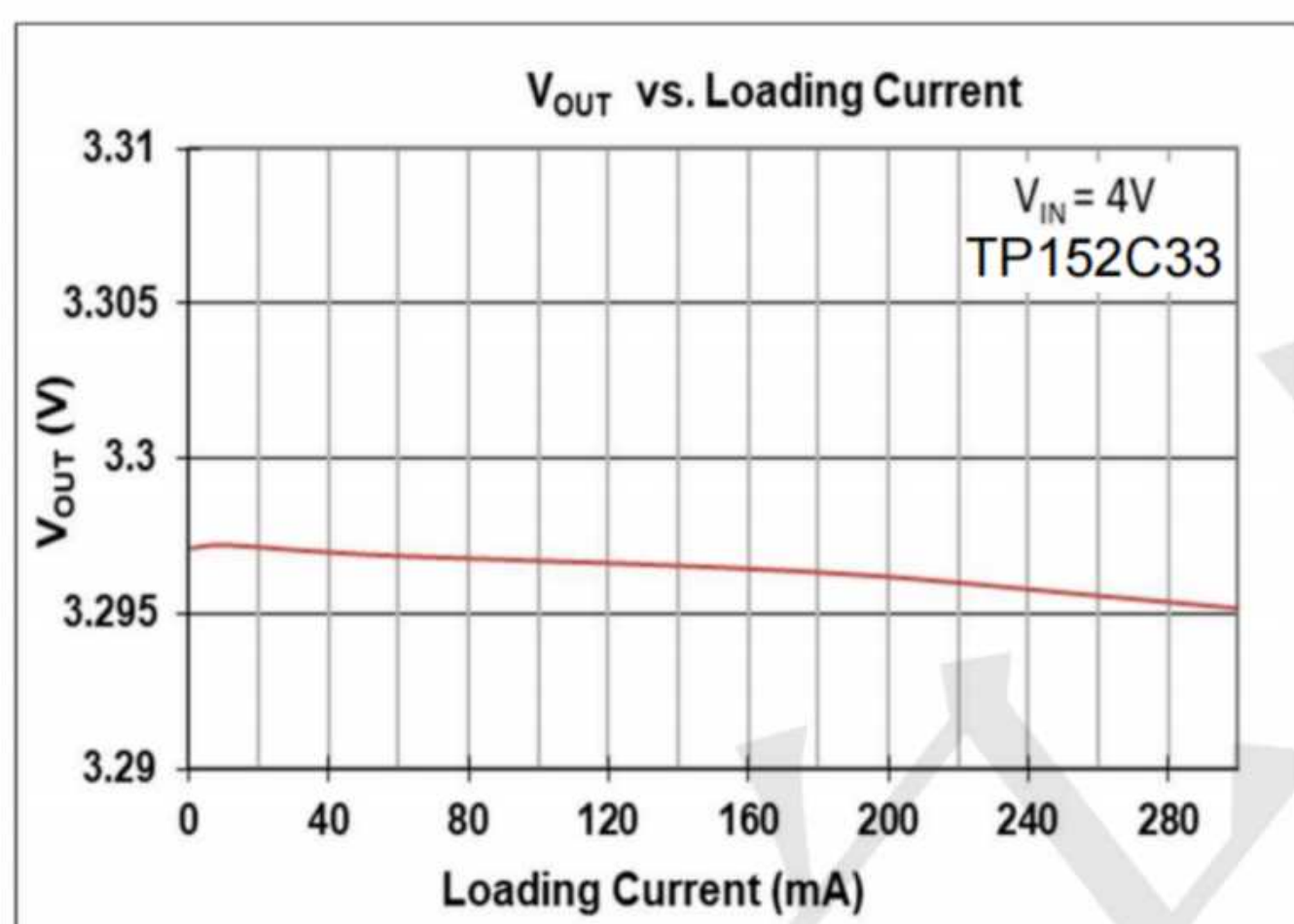
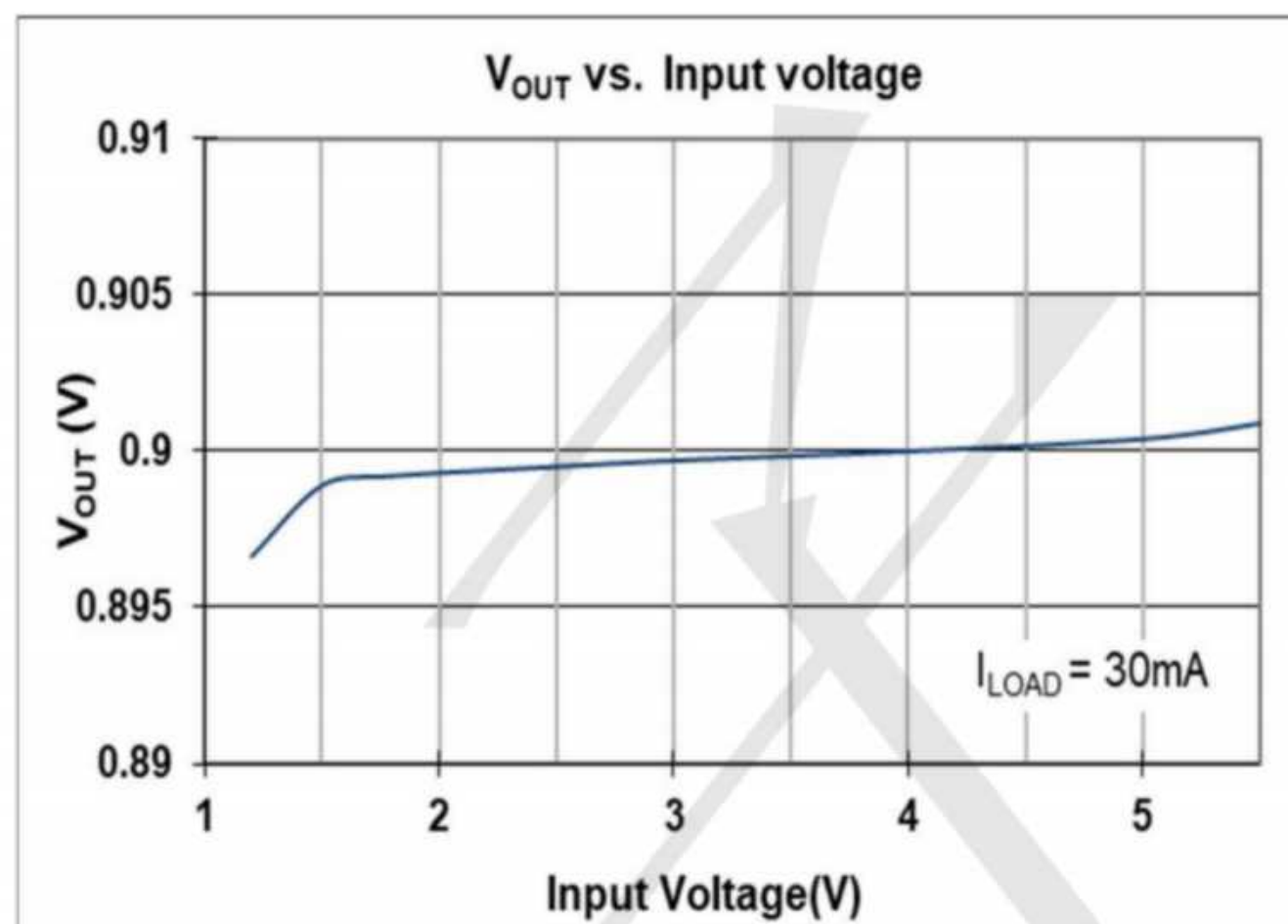
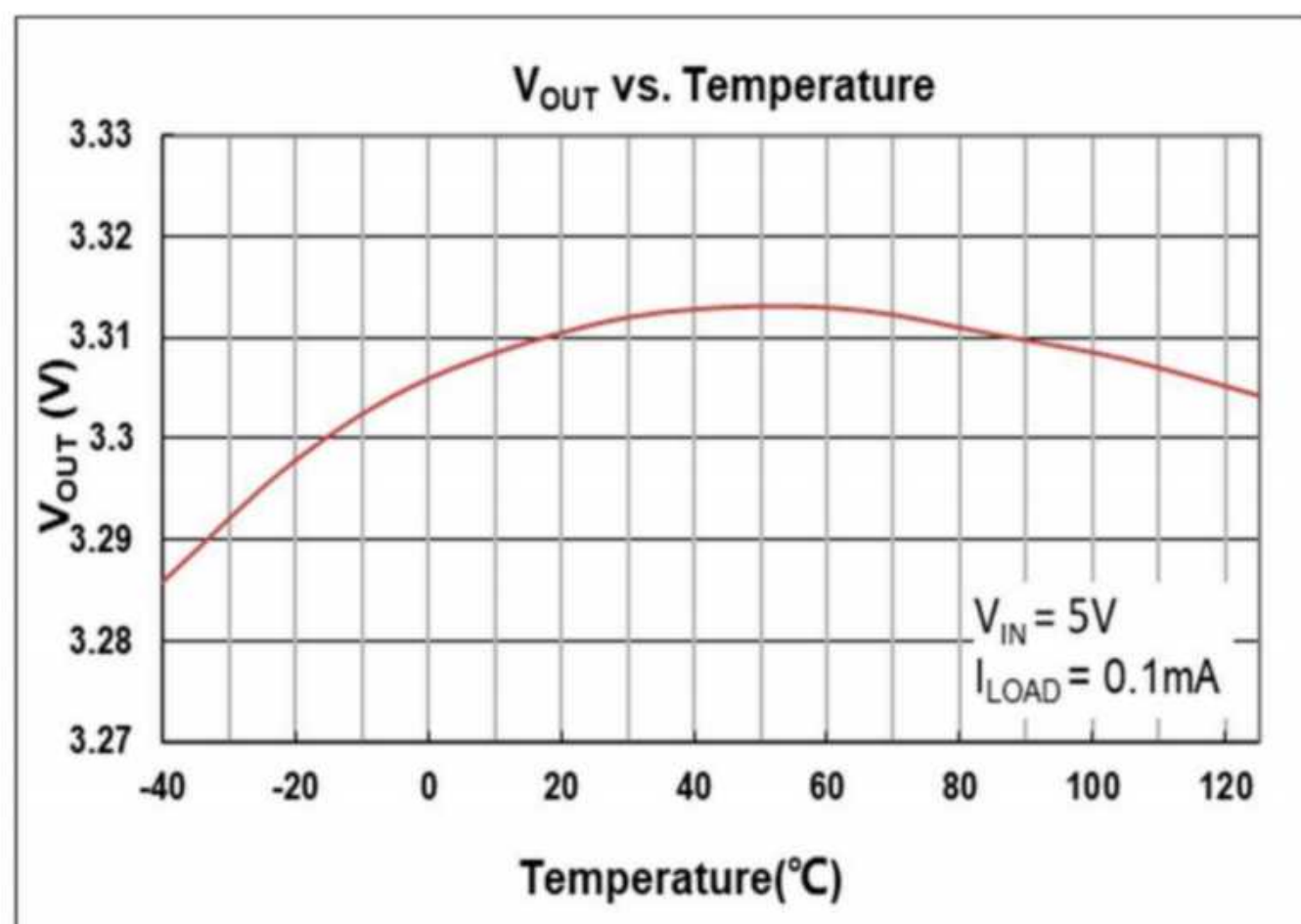
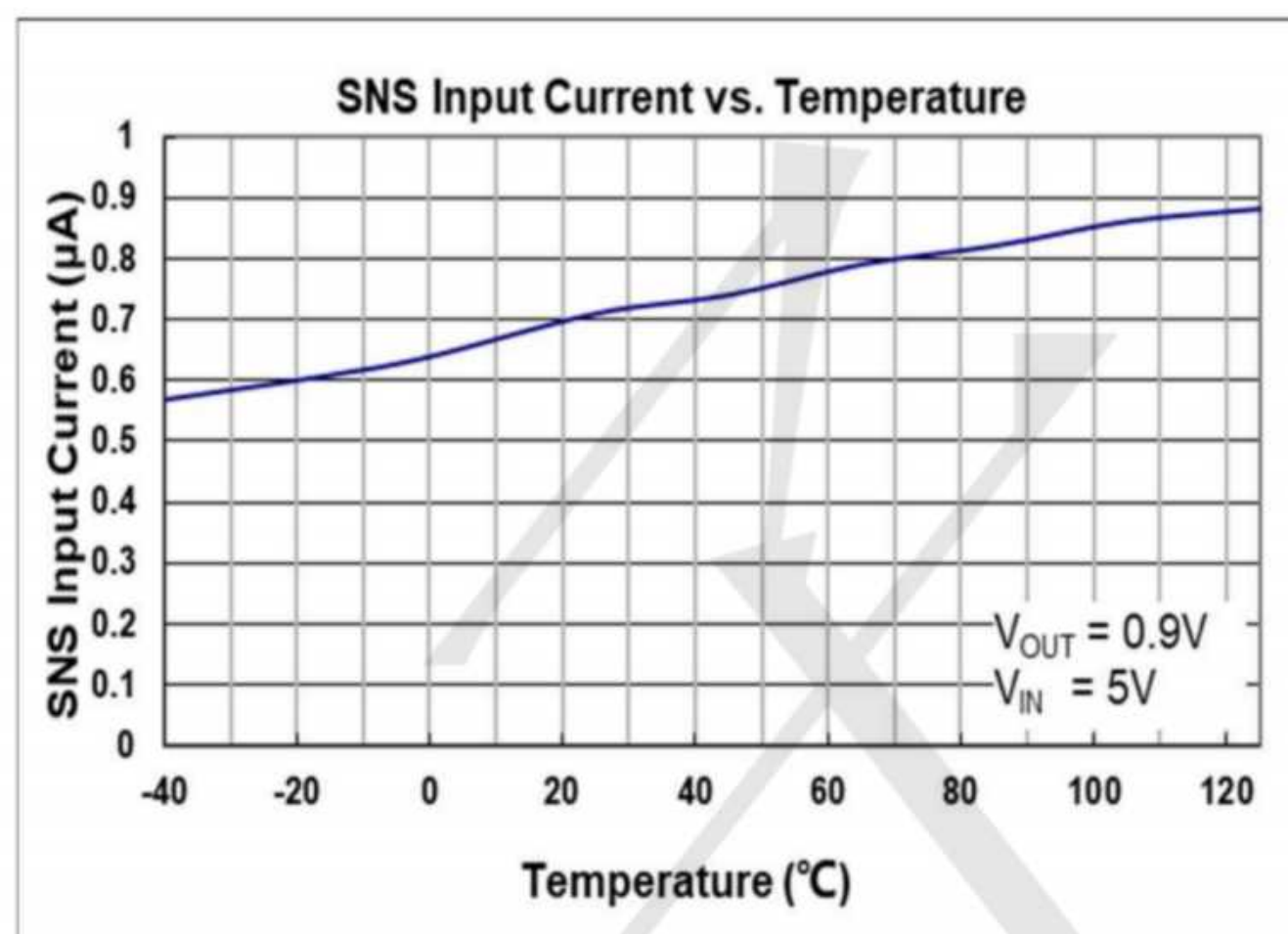
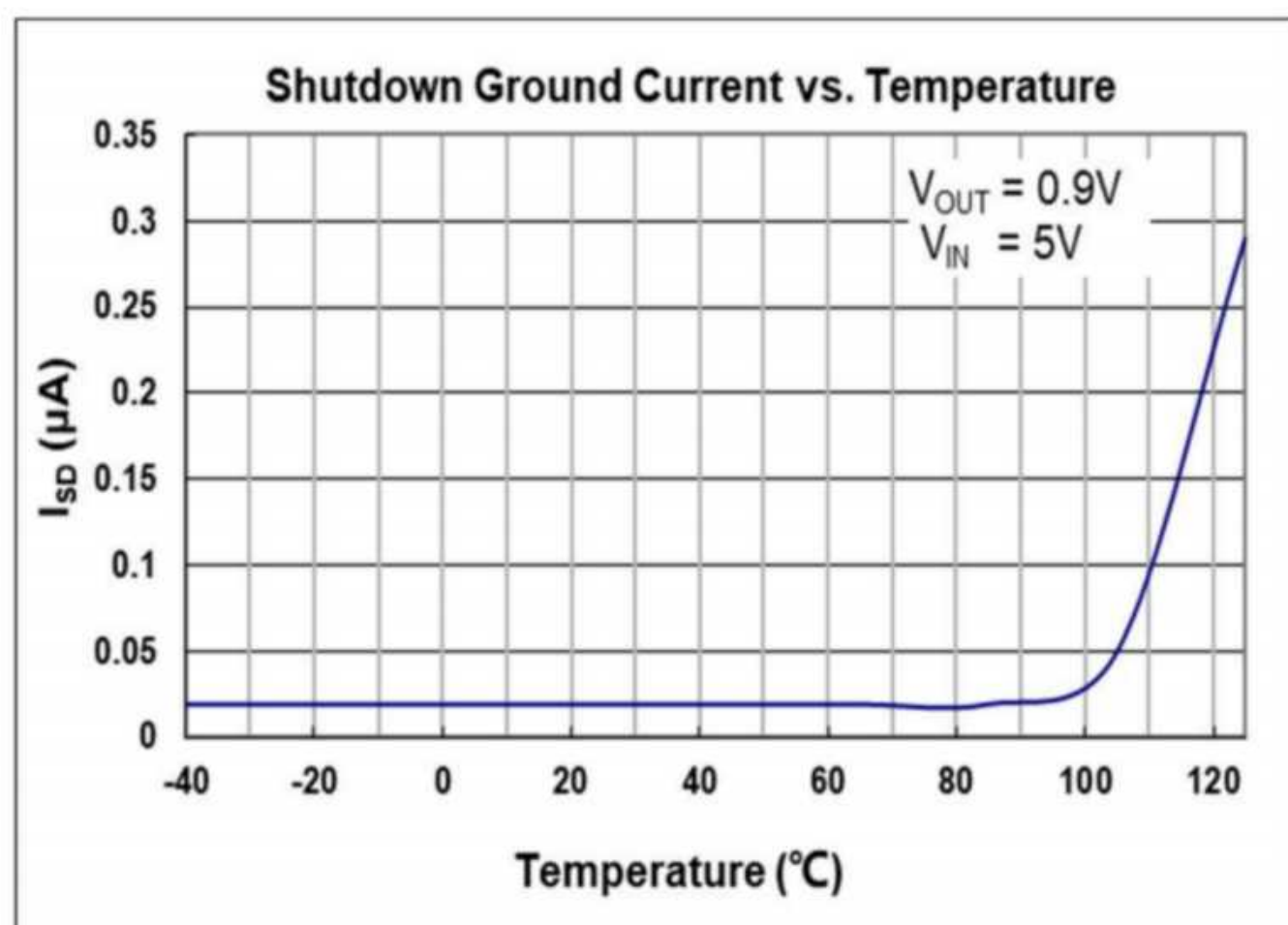
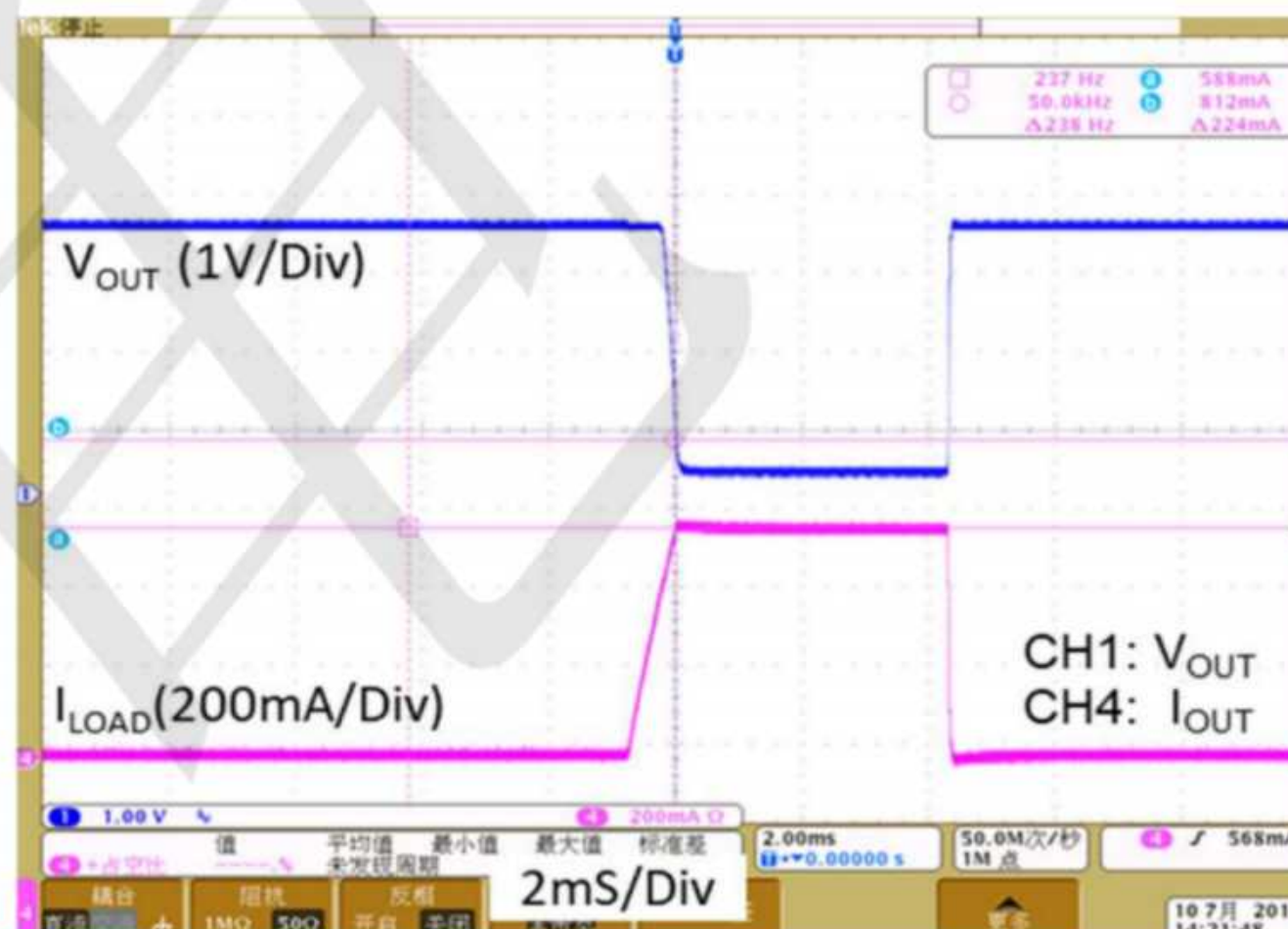
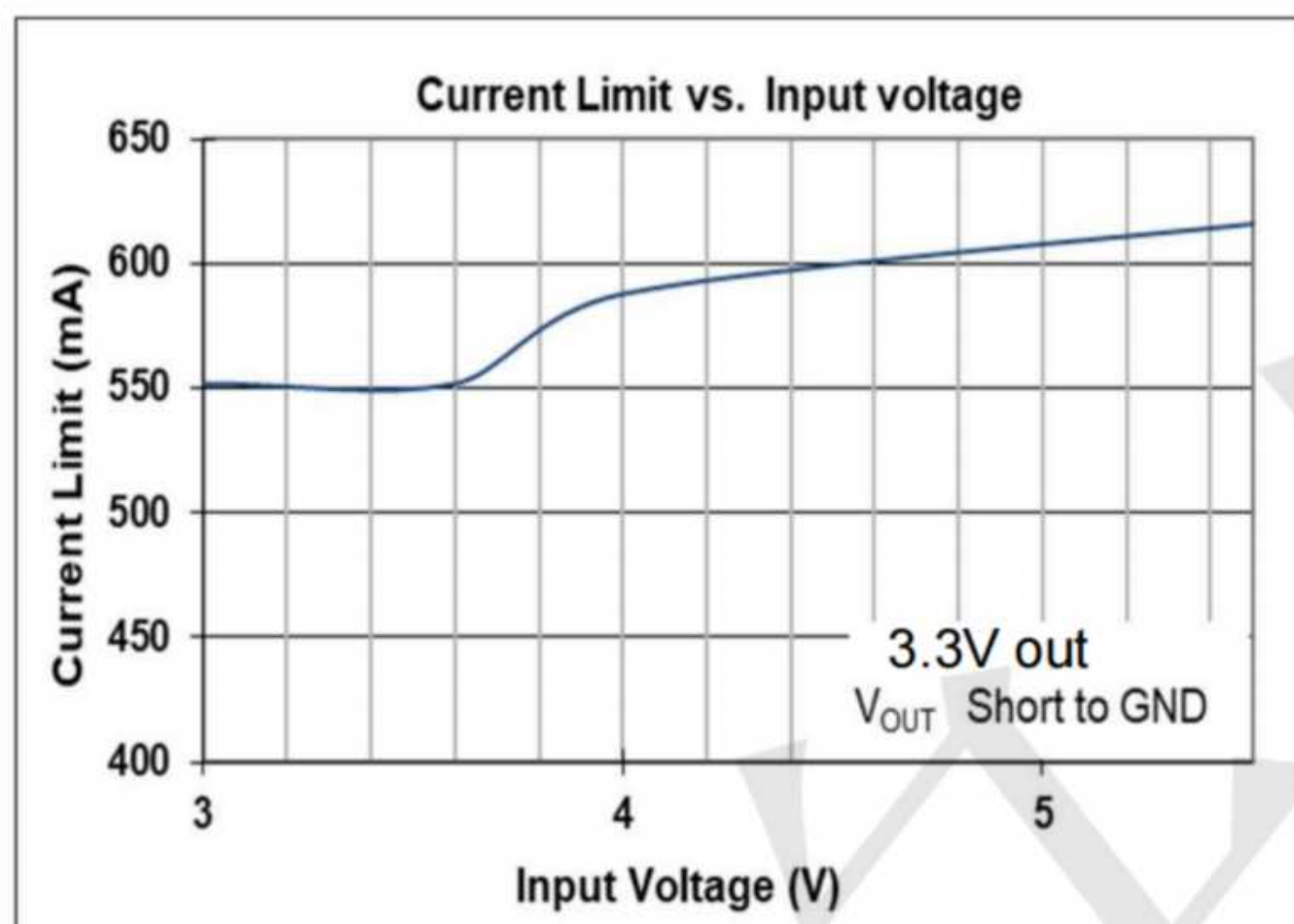


Figure 2: Application circuit of Fixed V_{OUT} LDO with enable function

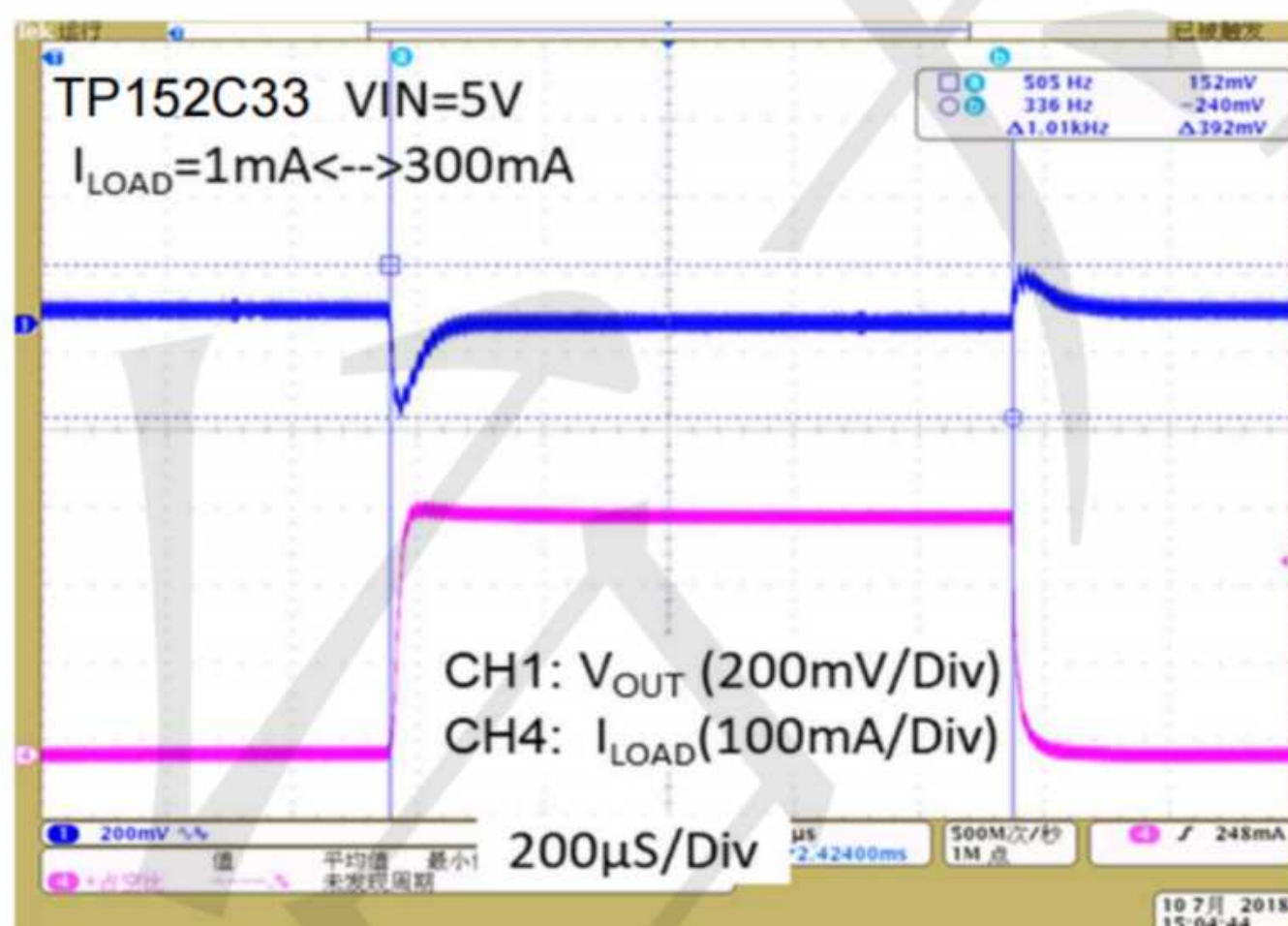




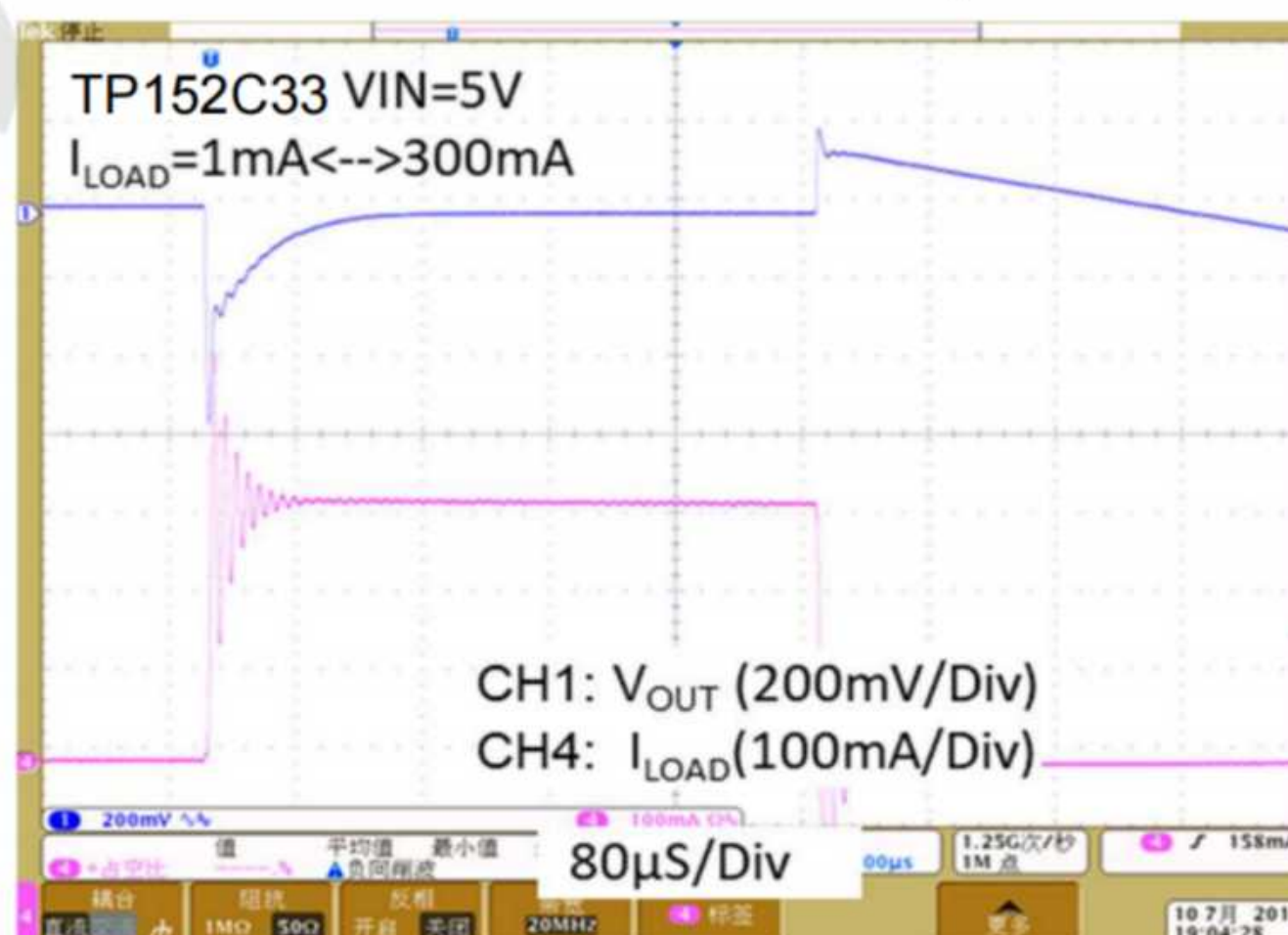
Current Limit Response



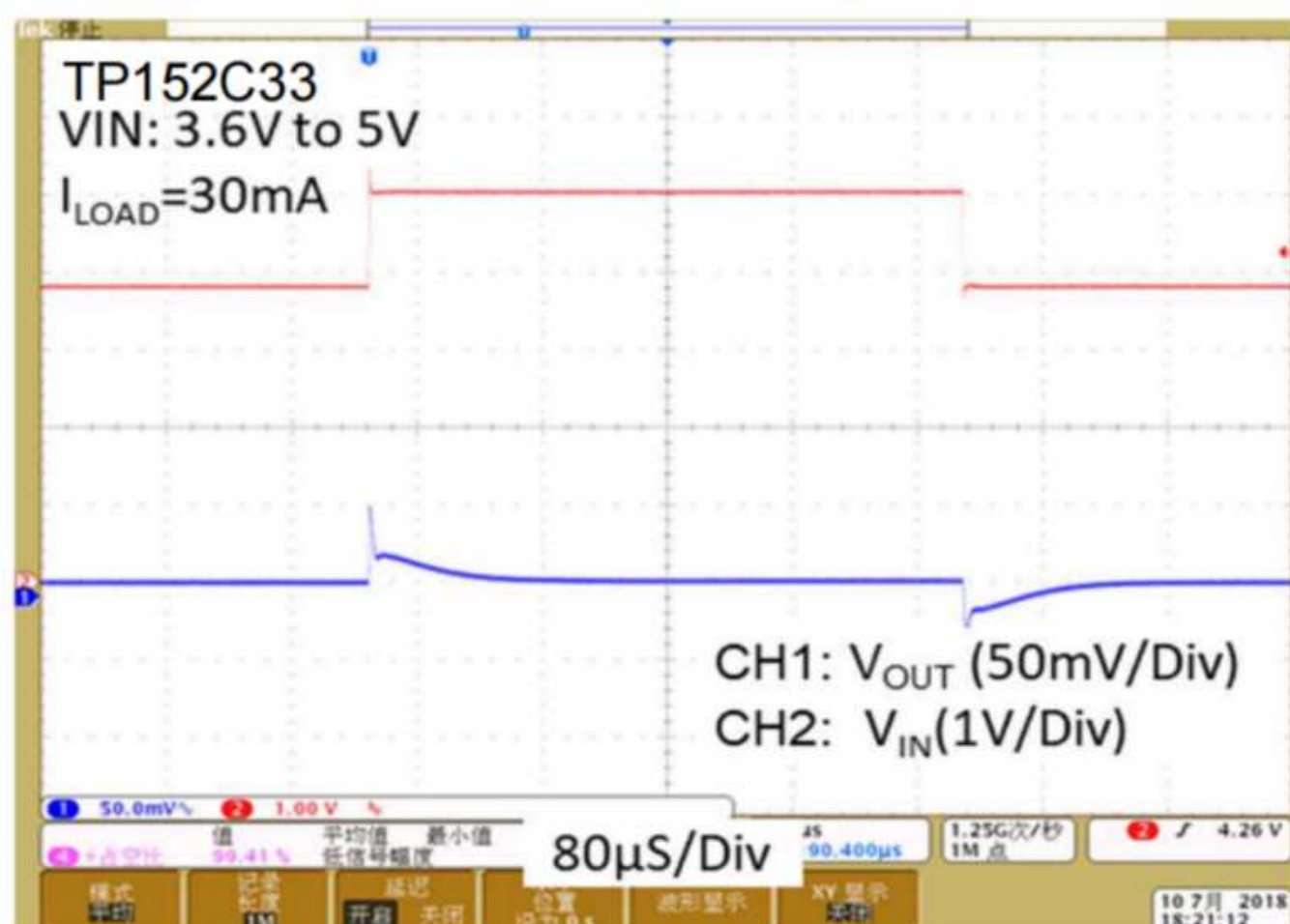
Load Transient Response I



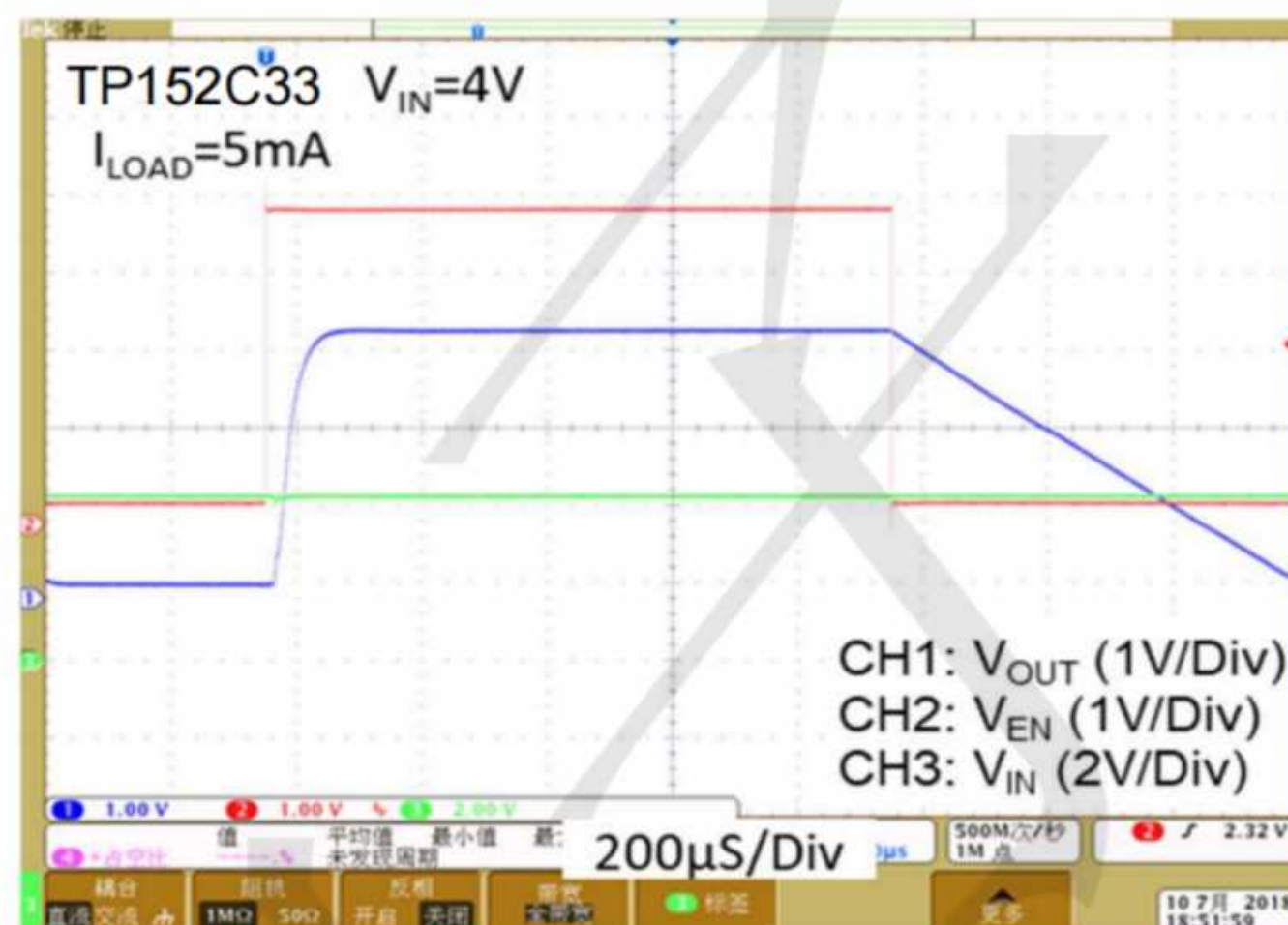
Load Transient Response II



Line Transient Response

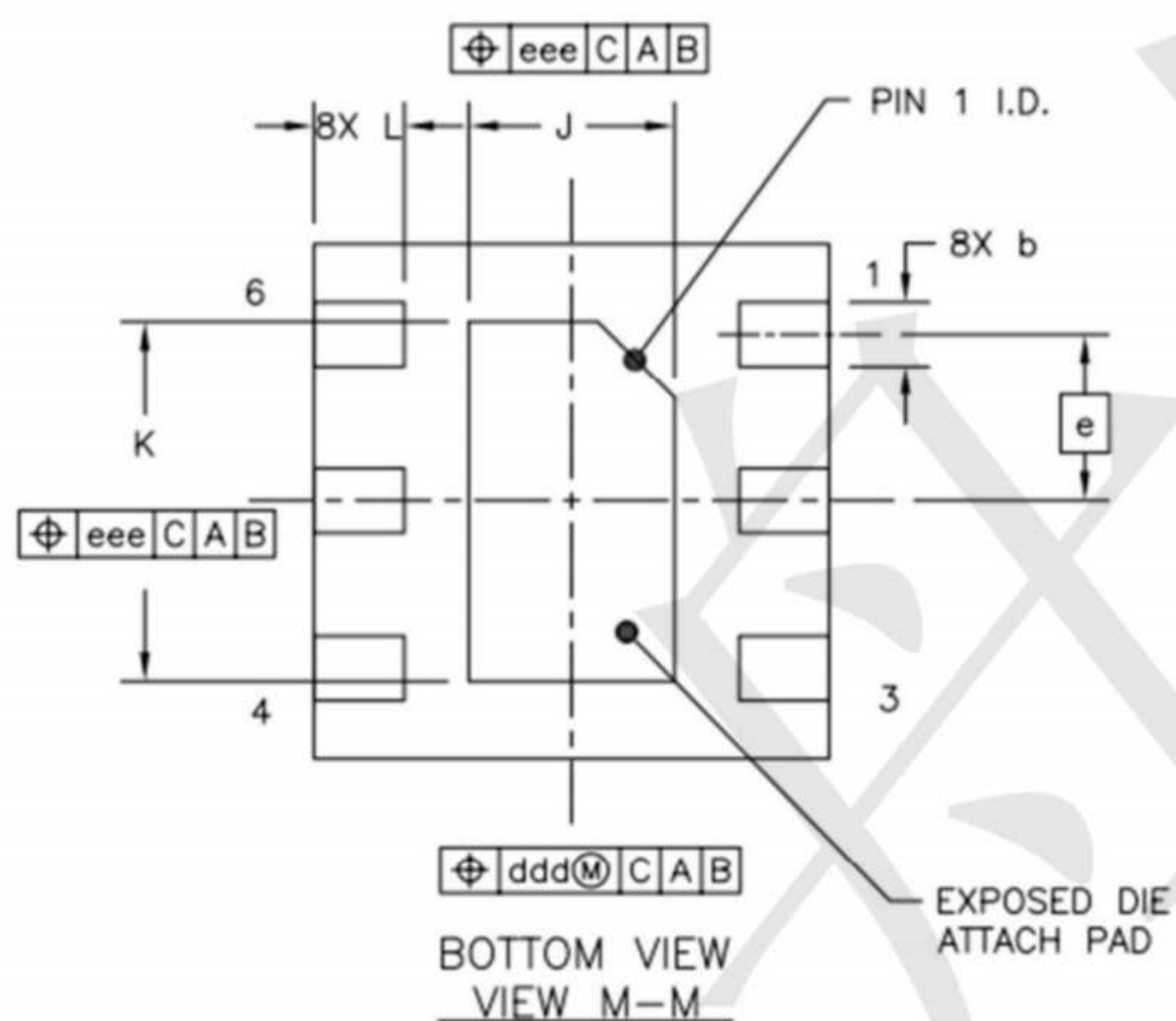
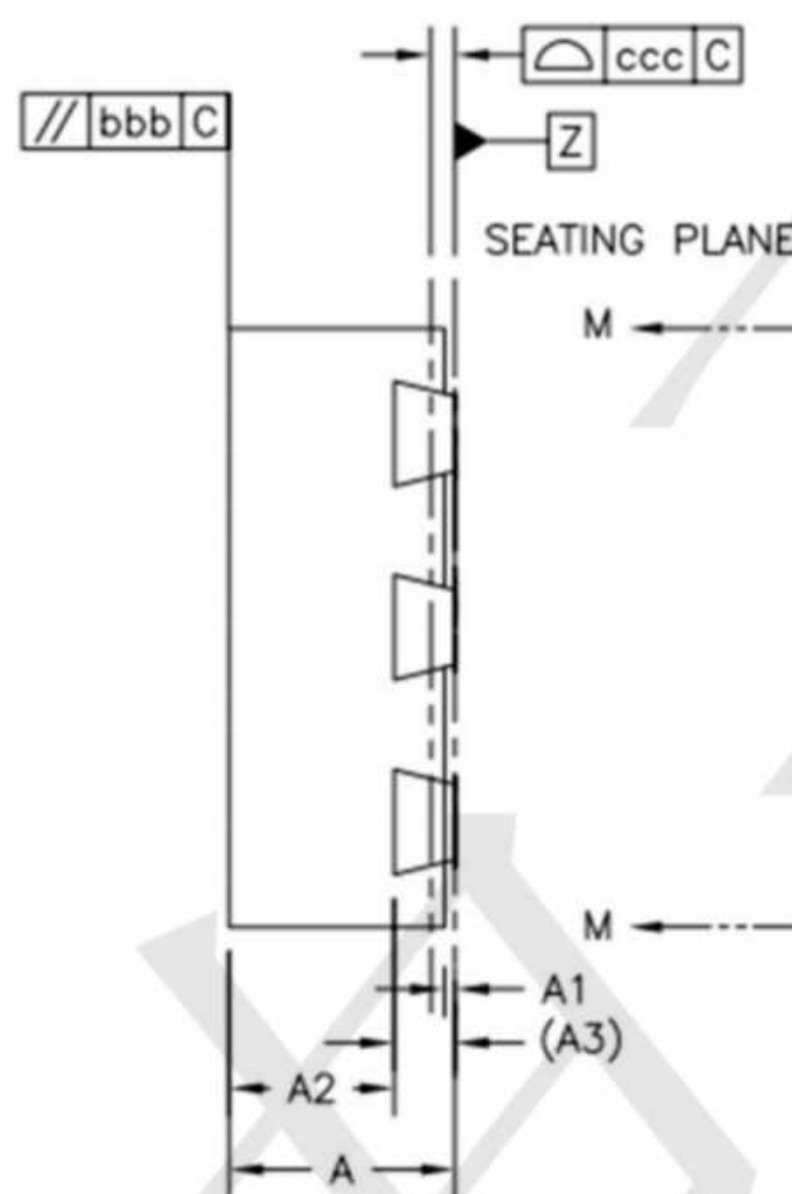
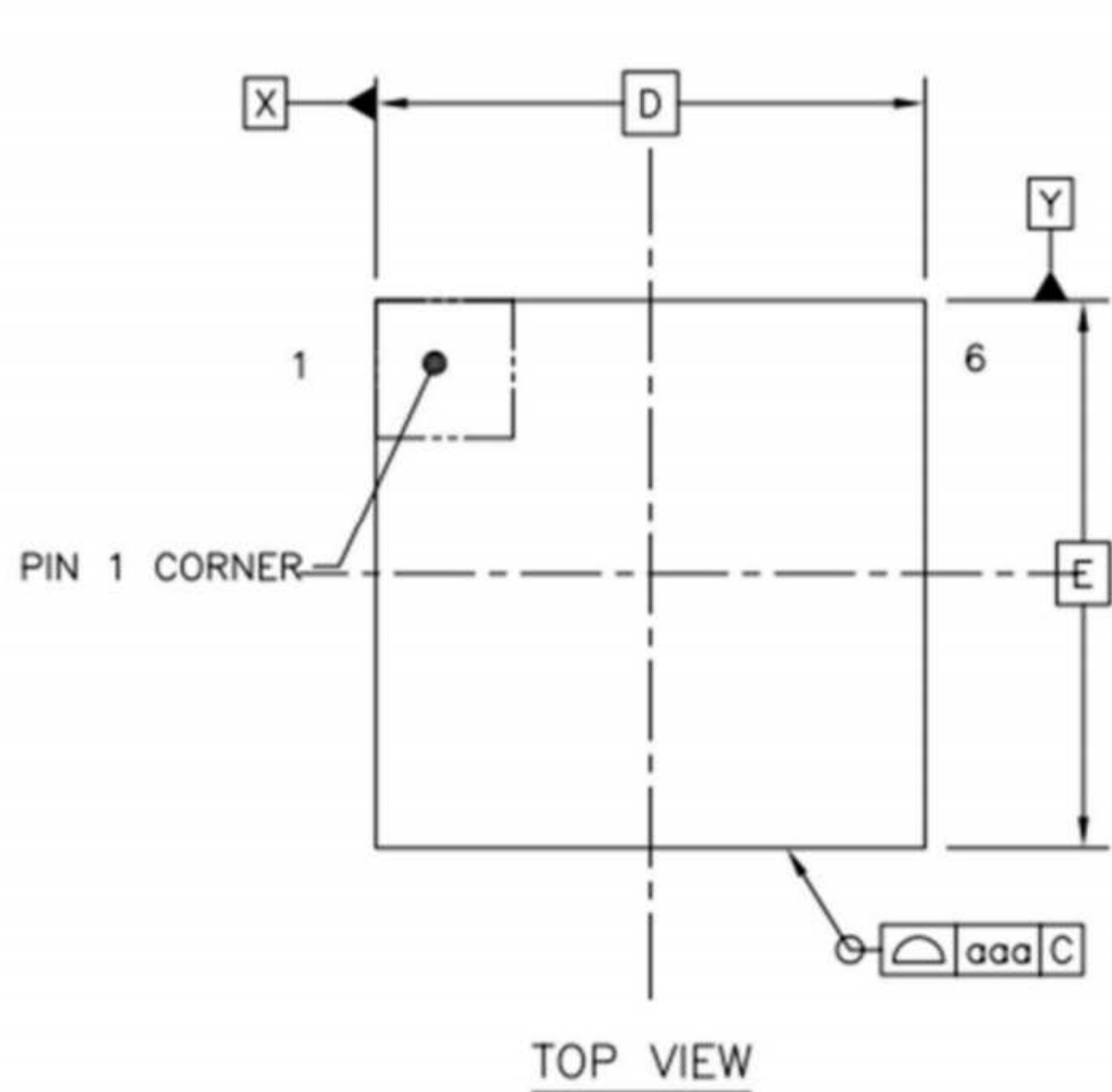


V_{OUT} Turn On/Off by EN



Package information

DFN2X2-6L Outline Dimensions



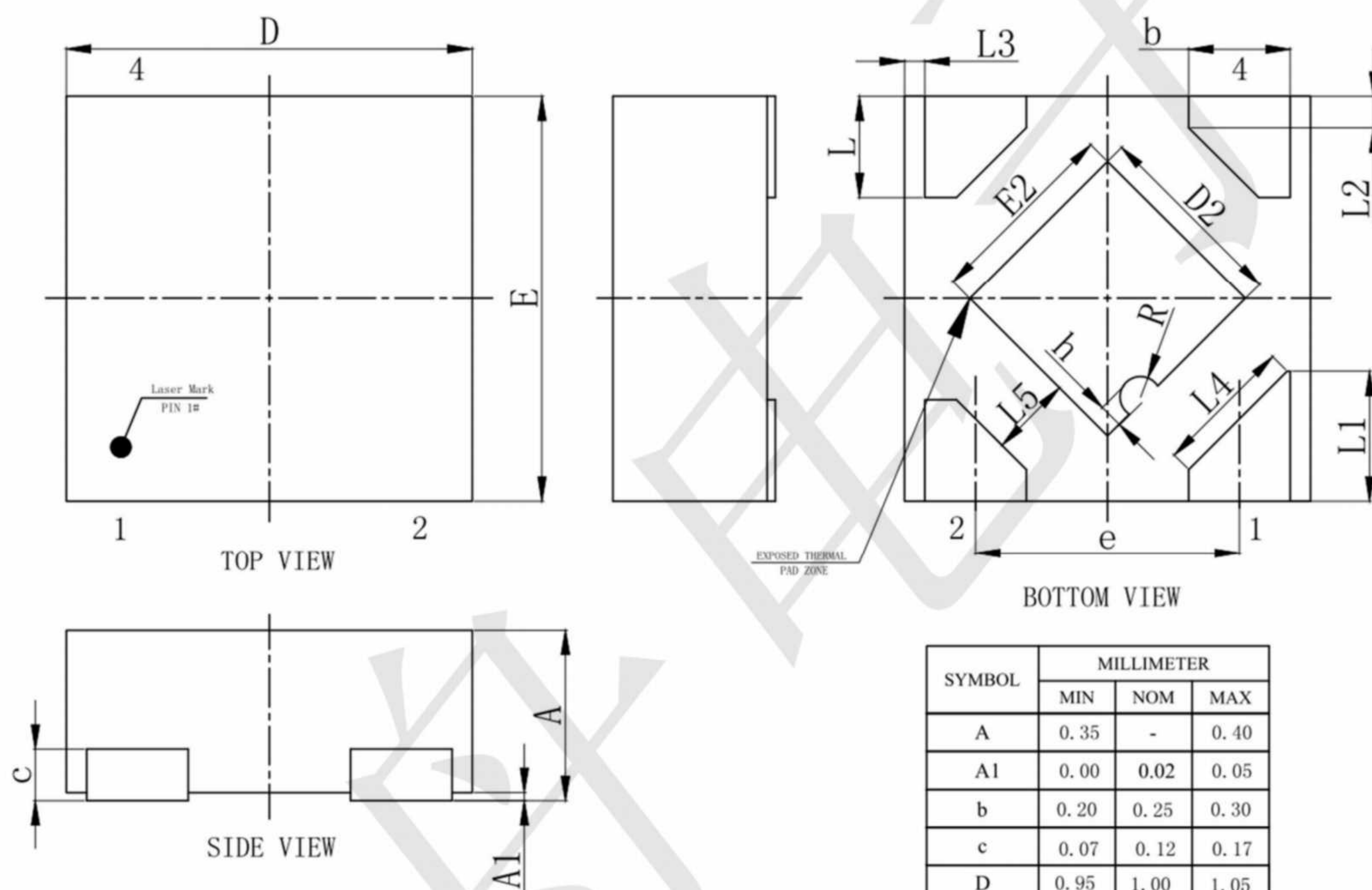
DESCRIPTION	SYMBOL	MILLIMETER		
		MIN	NOM	MAX
TOTAL THICKNESS	A	0.7	0.75	0.8
STAND OFF	A1	0	0.035	0.05
MOLD THICKNESS	A2	---	0.55	0.575
L/F THICKNESS	A3	0.203 REF		
LEAD WIDTH	b	0.20	0.25	0.30
BODY SIZE	X D	2 BSC		
	Y E	2 BSC		
LEAD PITCH	e	0.65 BSC		
EP SIZE	X J	0.75	0.8	0.85
	Y K	1.35	1.4	1.45
LEAD LENGTH	L	0.30	0.35	0.40
PACKAGE EDGE TOLERANCE	aaa		0.05	
MOLD FLATNESS	bbb		0.1	
COPLANARITY	ccc		0.08	
LEAD OFFSET	ddd		0.1	
EXPOSED PAD OFFSET	eee		0.1	

NOTES

1.0 COPLANARITY APPLIES TO LEADS, CORNER LEADS AND DIE ATTACH PAD.

Package information

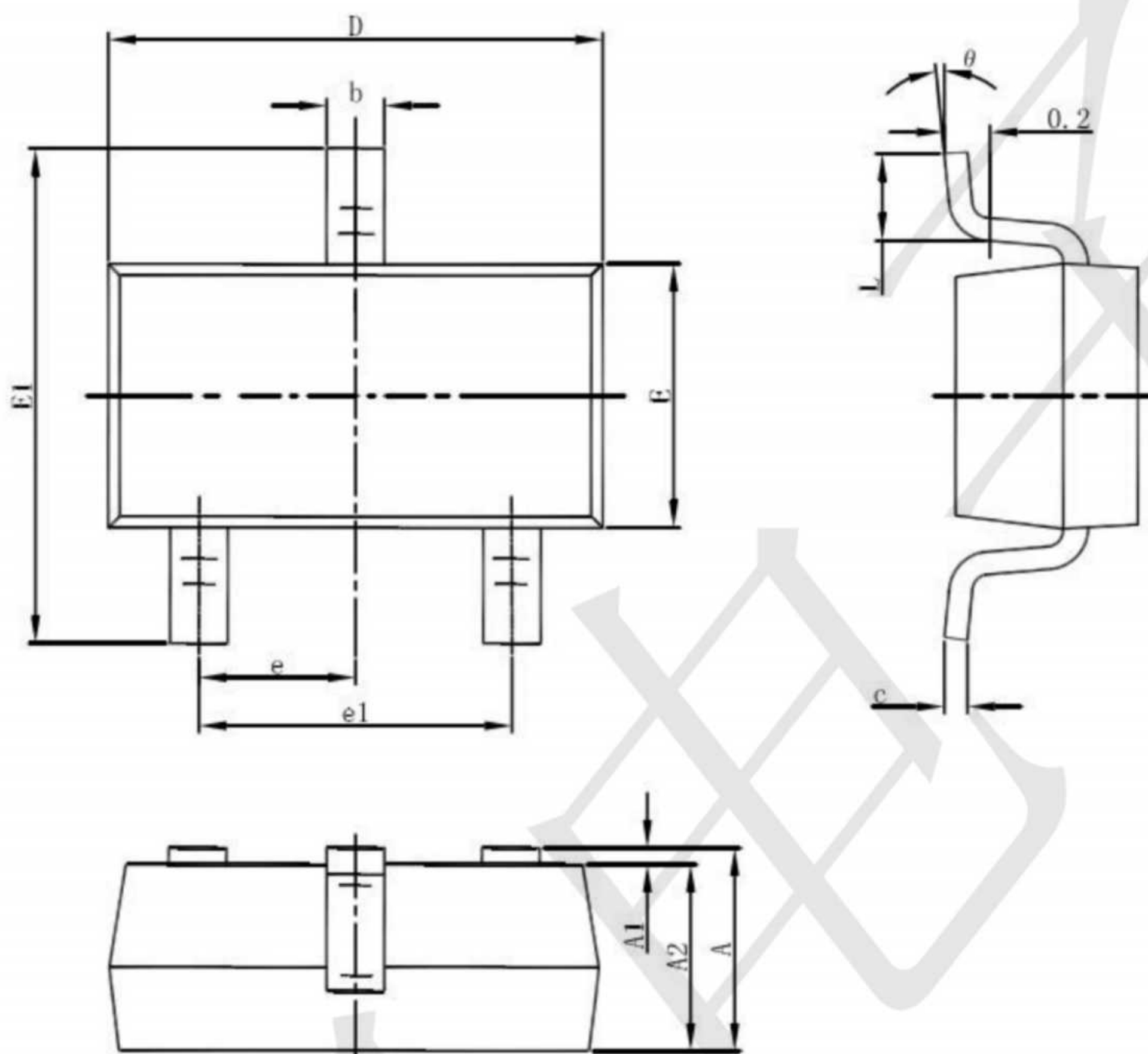
4-pin DFN-4L Outline Dimensions



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.35	-	0.40
A1	0.00	0.02	0.05
b	0.20	0.25	0.30
c	0.07	0.12	0.17
D	0.95	1.00	1.05
D2	0.38	0.48	0.58
e	0.65BSC		
E	0.95	1.00	1.05
E2	0.38	0.48	0.58
L	0.20	0.25	0.30
L1	0.27	0.32	0.37
L2	0.077REF		
L3	0.05REF		
L4	0.34REF		
L5	0.20REF		
R	0.05REF		
h	0.06REF		

Package informantion

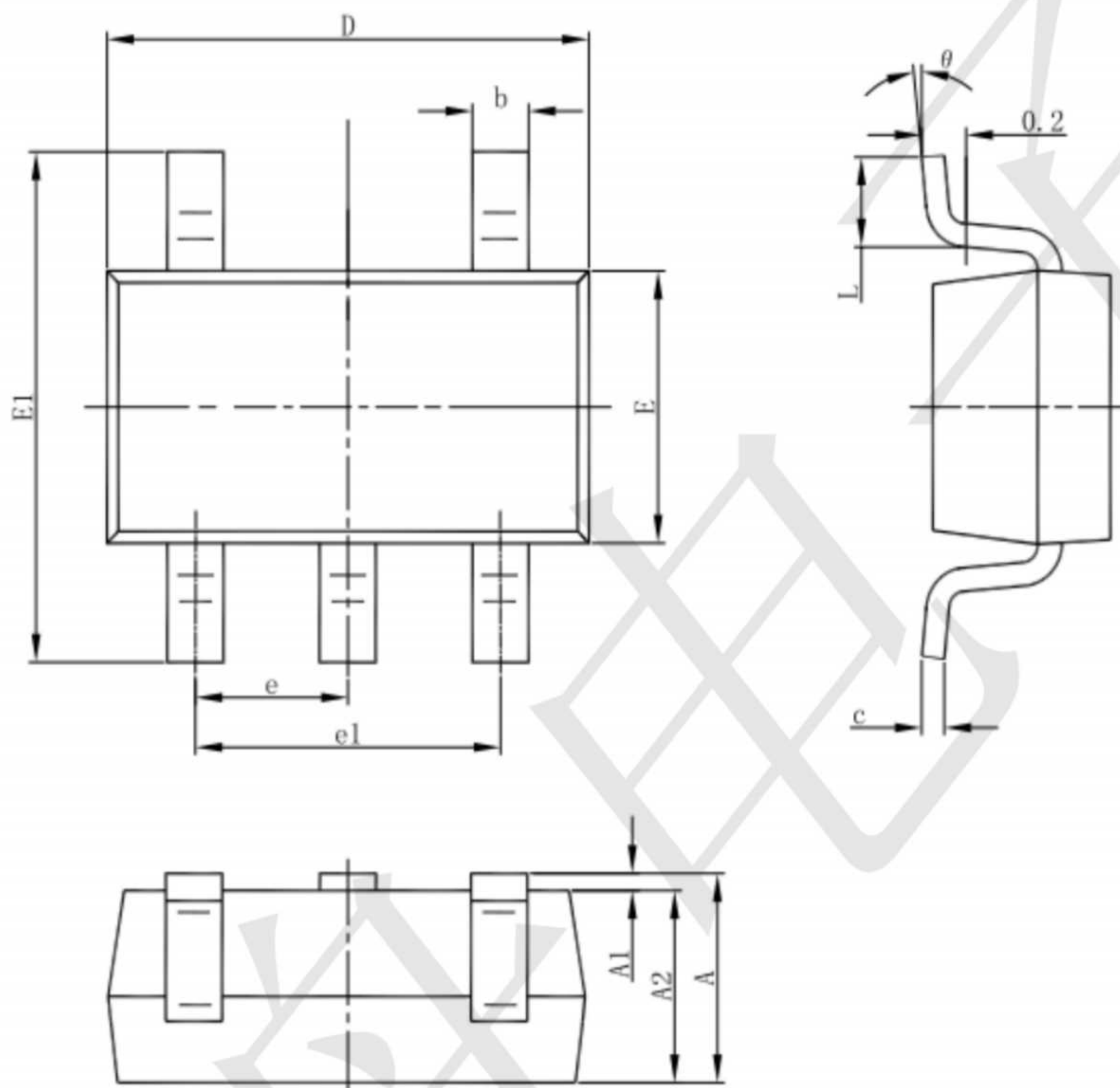
3-pin SOT23-3 Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

Package informantion

3-pin SOT23-5 Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

Absolute Maximum Rating ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

VIN Pin to GND Pin Voltage	-0.3V to 6.5V	
VOOUT Pin and EN Pin to GND Pin Voltage	-0.3V to 6V	
VOOUT Pin to VIN Pin Voltage	-6V to 0.3V	
Storage Temperature Range	-60°C~150°C	
Lead Temperature (Soldering, 10 sec)	260°C	
Junction Temperature	150°C	
Operating Ambient Temperature Range T _A	-40°C~85°C	
Thermal Resistance Junction to Case, R _{θJC}	SOT23-3	115°C/W
	SOT23-5	115°C/W
	DFN-4(1x1)	65°C/W
	DFN-6(2x2)	30°C/W
Thermal Resistance Junction to Ambient, R _{θJA}	SOT23-3	250°C/W
	SOT23-5	250°C/W
	DFN-4(1x1)	195°C/W
	DFN-6(2x2)	165°C/W