Features

- Vin Range up to 40V
- Output range:1.5V～5.0V
- Maximum output current: 250mA
- PSRR: 80dB @1KHz
- Dropout voltage:400mV @ IOUT=100mA

- Ultra low quiescent current:1.5μA Typ.
- Output voltage tolerances of ±2% Over the temperature range
- Internal thermal overload protection
- Built-in Short-Circuit Protection, Current Limiter

Applications

- E-meters, Water Meters and Gas Meters
- Cellphones, radiophone, digital cameras

- Fire Alarm, Smoke Detector
- Appliances and White Goods

General Description

The TX6513B is ultra-low quiescent current regulator features low dropout voltage and low current in the standby mode. With less than 1.5μA quiescent current at no load, the TX6513B 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 TX6513B 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 TX6513B has 40V maximum operating voltage limit, and -40°C to 125°C operating temperature range, and ±2% output voltage tolerance over the entire output current, input voltage, and temperature range.
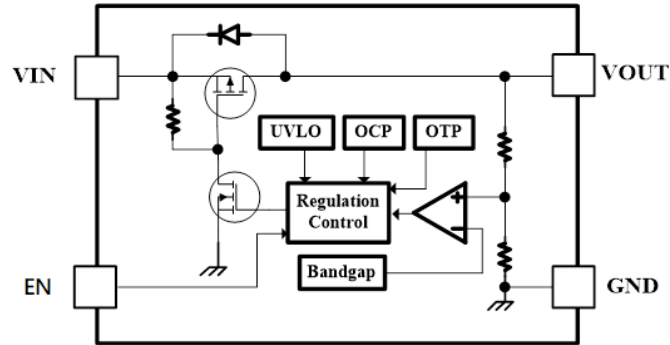
The TX6513B regulators are available in standard SOT23-3, SOT23-5 ， SOT89 and DFN1*1-4 packages.

Order Information

TX6513B-①②③④⑤

Designator	Symbol	Description
①②	Integer	Output Voltage(1.5~5.0V)
③④	M	Package: SOT23-3
	M5	Package: SOT23-5
	P	Package: SOT89A
	PB	Package: SOT89B
	G	Package: SOT223A
	GB	Package: SOT223B
	FC	Package: DFN1*1-4
⑤	G	Halogen Free

Block Diagram

Pin Assignment

SOT23-3 (Top View)
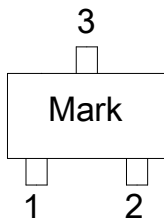
Table1：TX6513B-XXMG series (SOT23-3 PKG)

PIN NO.	PIN NAME	FUNCTION
1	GND	GND pin
2	VOUT	Output voltage pin
3	VIN	Input voltage pin

SOT23-5 (Top View)
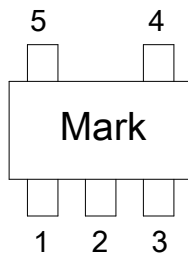
Table2：TX6513B-XXM5G series (SOT23-5 PKG)

PIN NO.	PIN NAME	FUNCTION
1	VIN	Input voltage pin
2	GND	GND pin
3	EN	Enable
4	NC	Not connected
5	VOUT	Output voltage pin

Table3：TX6513B-XXPG series (SOT89A PKG)

PIN NO.	PIN NAME	FUNCTION
1	GND	GND pin
2	VIN	Input voltage pin
3	VOUT	Output voltage pin

SOT89 (Top View)

Table4：TX6513B-XXPBG series (SOT89B PKG)

PIN NO.	PIN NAME	FUNCTION
1	VIN	Input voltage pin
2	GND	GND pin
3	VOUT	Output voltage pin

SOT223 (Top View)

Mark

1   2   3
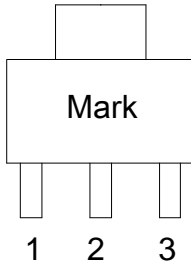
Table5：TX6513B-XXGG series (SOT223A PKG)

PIN NO.	PIN NAME	FUNCTION
1	GND	GND pin
2	VIN	Input voltage pin
3	VOUT	Output voltage pin

Table6：TX6513B-XXGBG series (SOT223B PKG)

PIN NO.	PIN NAME	FUNCTION
1	VIN	Input voltage pin
2	GND	GND pin
3	VOUT	Output voltage pin

DFN1*1-4 (Top View)

Mark

4   3
1   2
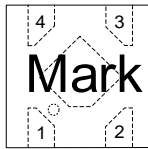
Table7：TX6513B-XXFCG series (DFN1*1-4 PKG)

PIN NO.	PIN NAME	FUNCTION
1	VOUT	Output voltage pin
2	GND	GND pin
3	EN	Enable
4	VIN	Input voltage pin

Marking Rule

①②:

Symbol	Product Code
① ②	H4

③ Output Voltage

Symbol	Voltage(V)	Symbol	Voltage(V)	Symbol	Voltage(V)	Symbol	Voltage(V)
a	0.9	A	3.5	n	2.2	N	4.8
b	1.0	B	3.6	o	2.3	O	4.9
c	1.1	C	3.7	P	2.4	P	5.0
d	1.2	D	3.8	q	2.5	Q	5.1
e	1.3	E	3.9	r	2.6	R	5.2
f	1.4	F	4.0	s	2.7	S	5.3
g	1.5	G	4.1	t	2.8	T	5.4
h	1.6	H	4.2	u	2.9	U	5.5
i	1.7	I	4.3	v	3.0	V	5.6
j	1.8	J	4.4	w	3.1	W	5.7
k	1.9	K	4.5	x	3.2	X	5.8
l	2.0	L	4.6	y	3.3	Y	5.9
m	2.1	M	4.7	z	3.4	Z	6.0

④Lot NO: R

TX6513B series

40V 250mA Ultra Low Current Consumption CMOS Voltage Regulator

Absolute Maximum Ratings

Input Voltage…………………………-0.3V to 45V   Storage Temperature ....-65℃ to 150℃

V_{EN}……………………………………-0.3V to Vin   Lead Temperature(Soldering, 10 sec.). ....300℃

V_{OUT}………………………………..……-0.3V to 7V   Junction Temperature…………… -40℃ to 125℃

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.

Electrical Characteristics

The following specifications apply for V_{IN}=12V, I_{OUT}=1mA, C_{IN}=C_{OUT}=1uF, T_J=25℃, unless specified otherwise

SYMBOL	ITEMS	CONDITIONS	MIN	TYP	MAX	UNIT
V_{IN}	Input Voltage		2.7	--	40	V
V_{OUT}	Output Range		1.5	---	5.5	V
ΔV_{OUT}	Output Voltage Accuracy		-2	V_{OUT}	2	%
I_Q	Quiescent Current	T_J = 25℃	---	1.5	2.5	μA
I_{LIMIT}	Current Limit		270	320	---	mA
V_{DROP}	Dropout Voltage	I_{OUT}=100mA	---	400	---	mV
		I_{OUT}=250mA	---	1200	---	
$\triangle V_{LINE}$	Line Regulation	V_{IN} = V_{OUT} + 1V to 40V, or V_{IN} = 5V to 40V, if V_{OUT} < 4V	---	2	10	mV
$\triangle V_{LOAD}$	Load Regulation	I_{OUT} = 1mA to 100mA	---	0.25	---	%
		I_{OUT} = 1mA to 250mA	---	1	---	
PSRR	Power Supply Rejection Rate	F=1KHz	---	80	---	dB
		F=10KHz	---	60	---	
V_{ENH}	EN logic high voltage		0.9	---	---	V
V_{ENL}	EN logic low voltage		---	---	0.4	V
I_{EN}	EN Input Current		---	0.3	---	μA
T_{SD}	Thermal Shutdown		---	140	---	℃
T_{HY}	Thermal Shutdown Hysteresis		---	20	---	℃

Application Circuits

VIN o——————[1]   [5]——————o VOUT

1uF

ON o————[3]   [4]

OFF
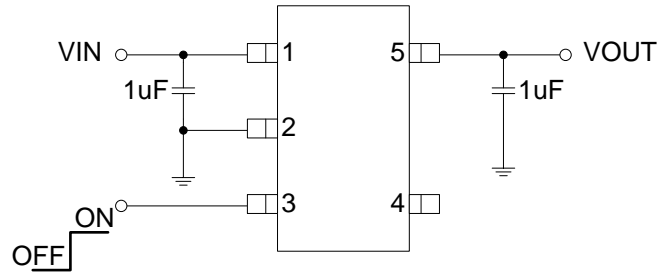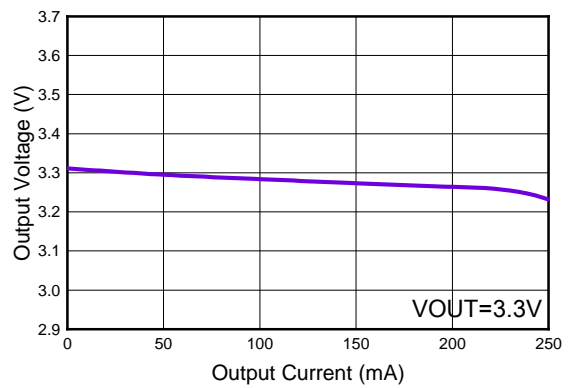
Typical Performance Characteristics

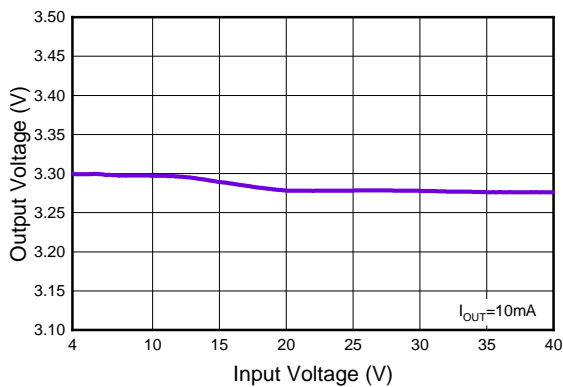C_{IN}=1uF, C_{OUT}=1uF, V_{IN}=5.3V, V_{OUT}=3.3V T_J=25°C, unless specified otherwise

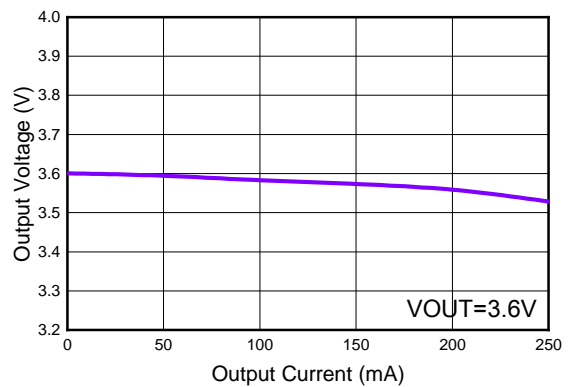(1)   Quiescent Current VS Input Voltage
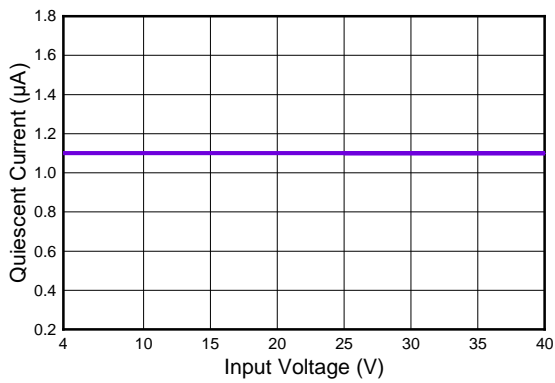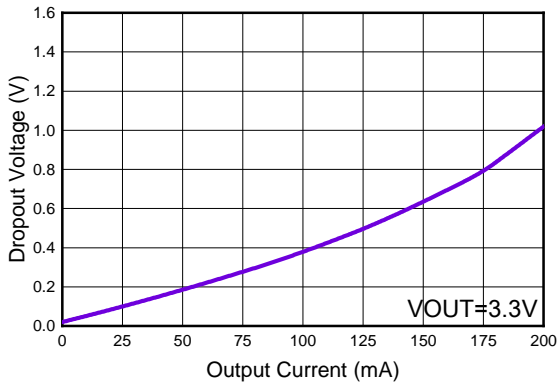
(2)   Output Voltage VS Output Current
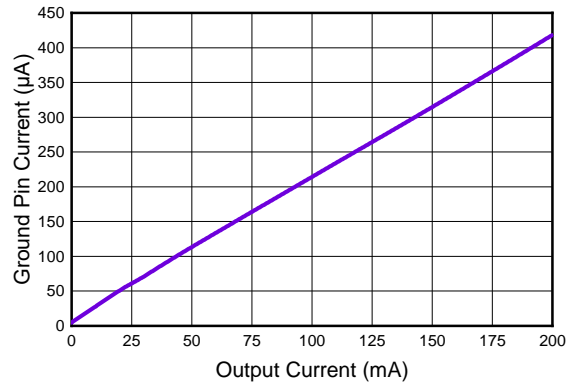
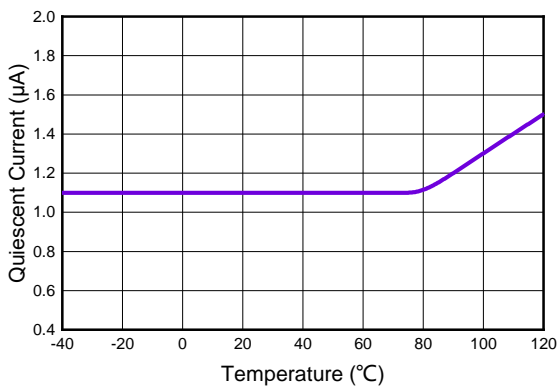(3)   Output Voltage VS Input Voltage

(4)   Output Voltage VS Output Current

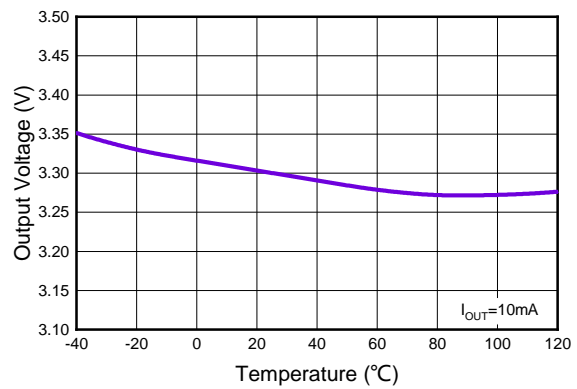(5) Dropout Voltage VS Output Current
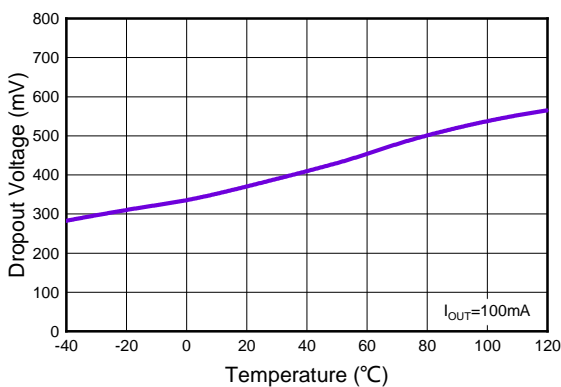

(6) Ground Pin Current VS Output Current
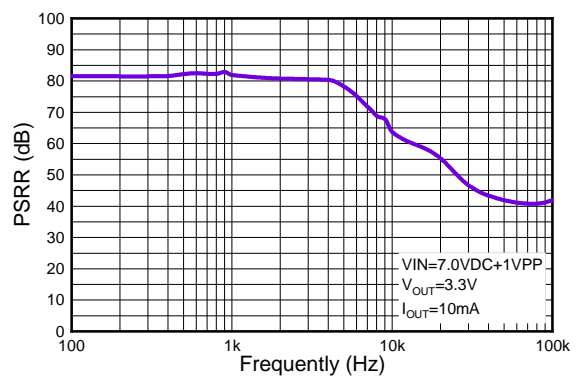

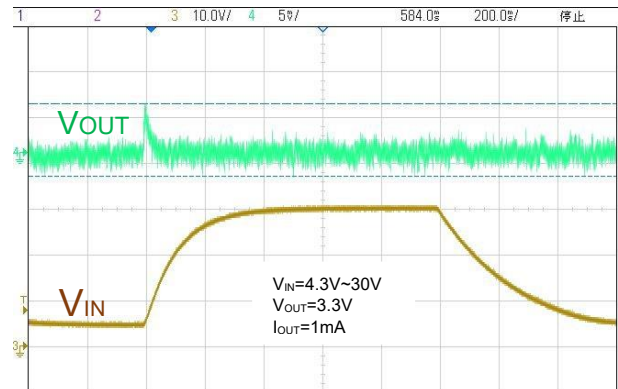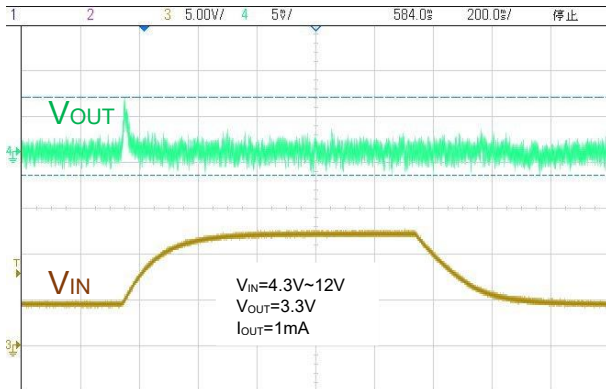(7) Quiescent Current VS Temperature

(8) Output Voltage VS Temperature

(9) Dropout Voltage VS Temperature

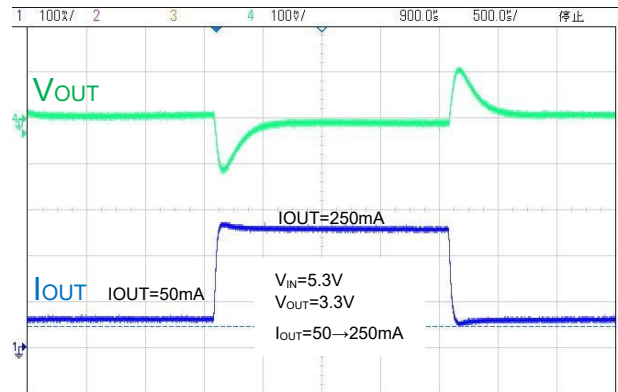(10) PSRR VS Frequency

(11)　　Input Transient Response

V_{IN}=4.3V~12V
V_{OUT}=3.3V
I_{OUT}=1mA

V_{IN}=4.3V~30V
V_{OUT}=3.3V
I_{OUT}=1mA

(12)　　Load Transient Response

IOUT=100mA

V_{IN}=5.3V
V_{OUT}=3.3V

I_{OUT}=1→100mA

IOUT=250mA

IOUT=50mA

V_{IN}=5.3V
V_{OUT}=3.3V

I_{OUT}=50→250mA

(13)　　Power ON

V_{IN}=0→5V
V_{OUT}=3.3V
I_{OUT}=1mA

(14) Power OFF

V_{IN}=5→0V
V_{OUT}=3.3V
I_{OUT}=1mA

(15)　EN ON

| 1 | 5.00V/ | 2 | 2.00V/ | 3 | | 4 | 2.00V/ | | 200.0⅍ | 100.0⅍/ | 停止 |

V$_{IN}$

EN

V$_{OUT}$

V$_{IN}$=4.5V
V$_{CE}$=0→4V
V$_{OUT}$=3.3V
I$_{OUT}$=10mA

(16)　EN OFF

| 1 | 5.00V/ | 2 | 2.00V/ | 3 | | 4 | 2.00V/ | | 1.000⅍ | 1.000⅍/ | 停止 |

V$_{IN}$

EN

V$_{OUT}$

V$_{IN}$=4.5V
V$_{CE}$=4→0V
V$_{OUT}$=3.3V
I$_{OUT}$=10mA
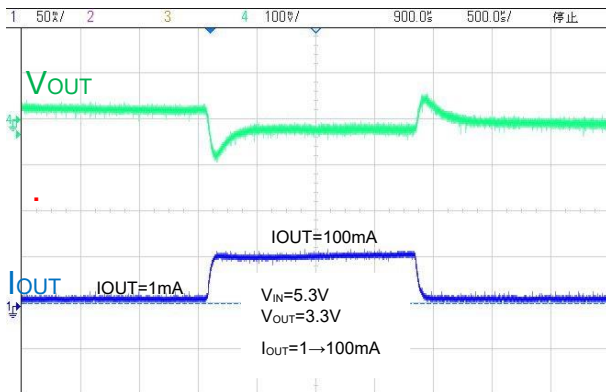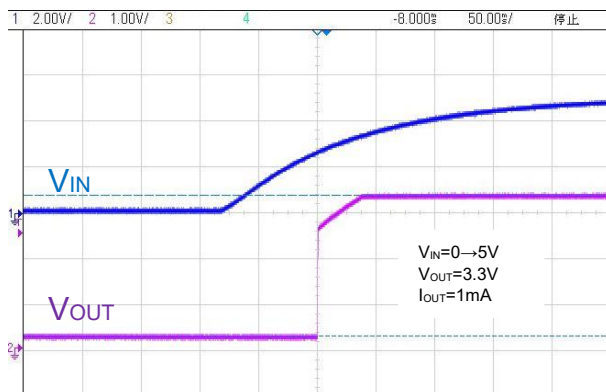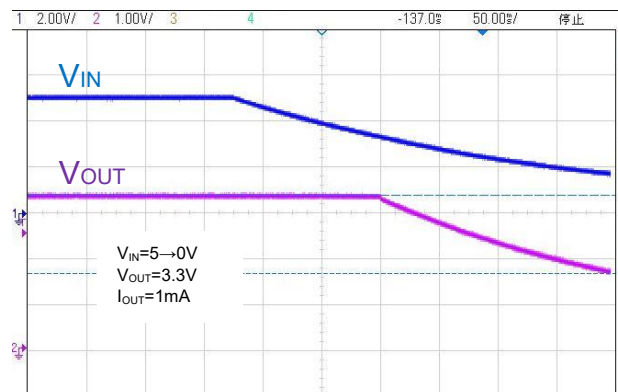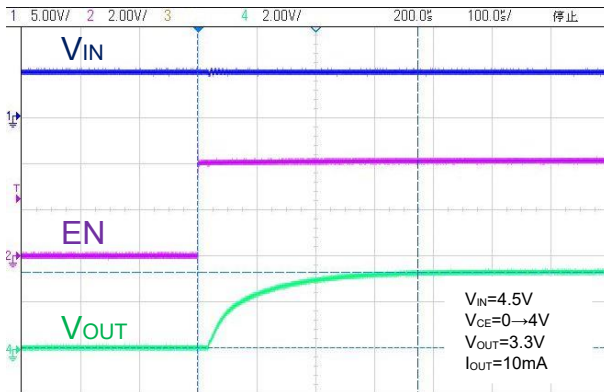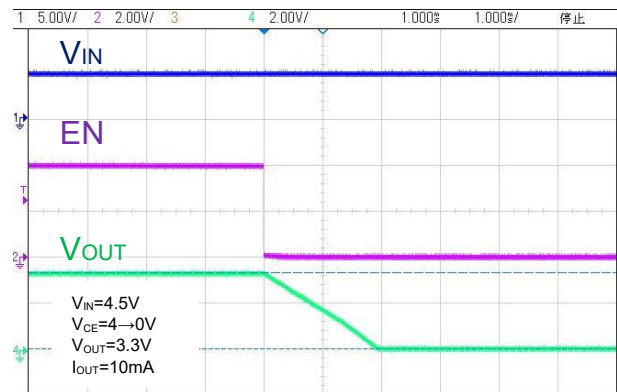
Package Information

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°

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℃

SOT89-3L Outline Dimensions
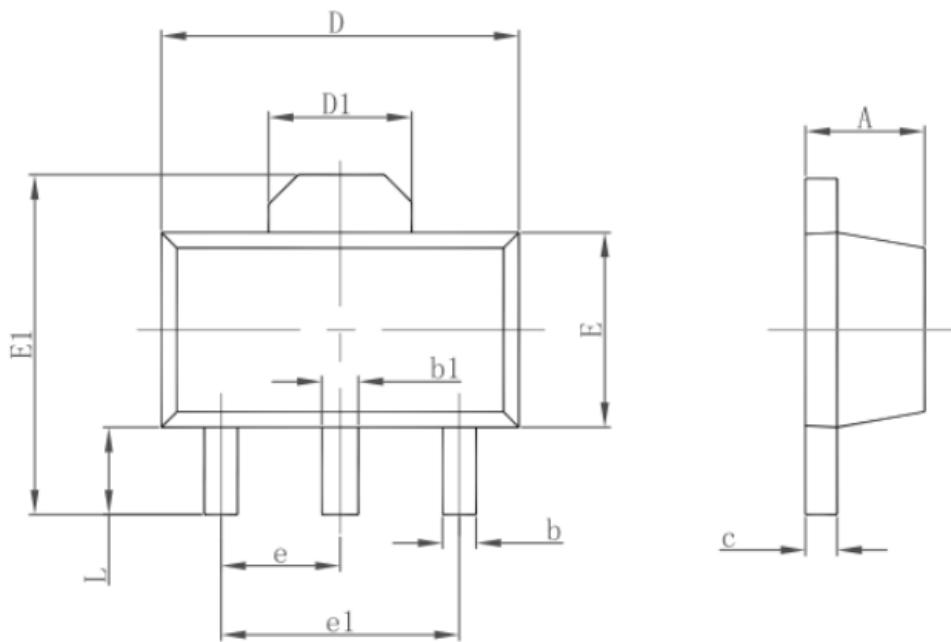
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF.		0.061 REF.	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP.		0.060 TYP.	
e1	3.000 TYP.		0.118 TYP.	
L	0.900	1.200	0.035	0.047

SOT223 Outline Dimensions
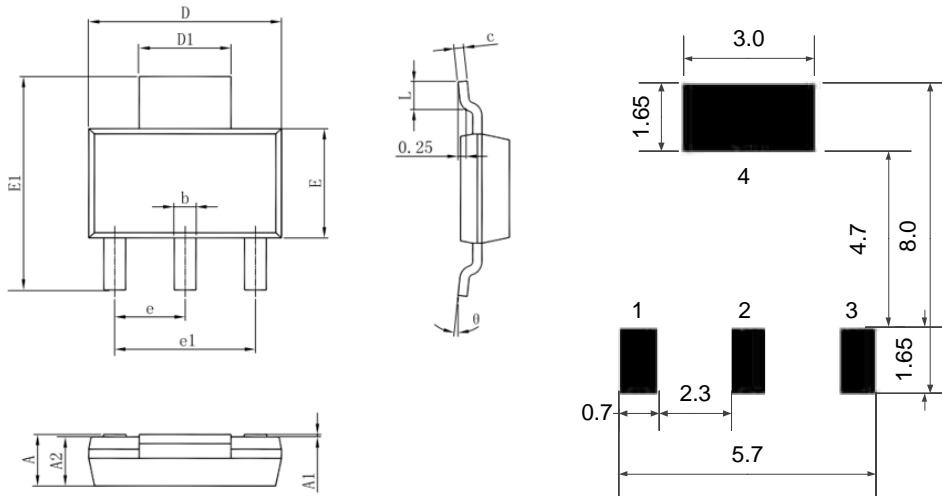
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.520	1.800	0.060	0.071
A1	0.000	0.100	0.000	0.004
A2	1.500	1.700	0.059	0.067
b	0.660	0.820	0.026	0.032
c	0.250	0.350	0.010	0.014
D	6.400	6.600	0.252	0.260
D1	2.900	3.100	0.114	0.122
E	3.300	3.700	0.130	0.146
E1	6.830	7.070	0.269	0.278
e	2.300(BSC)		0.091(BSC)	
e1	4.500	4.700	0.177	0.185
L	0.900	1.150	0.035	0.045
θ	0°	10°	0°	10°

DFN1*1-4 Outline Dimensions
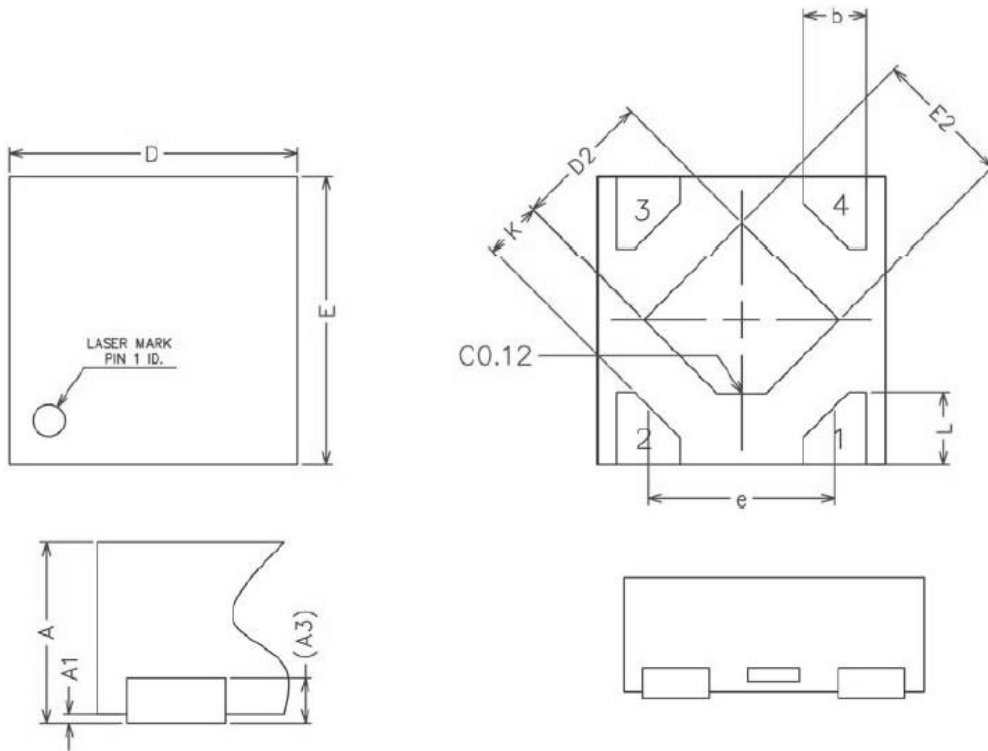
COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	0.34	0.37	0.40
A1	0.00	0.02	0.05
A3		0.100REF	
b	0.17	0.22	0.27
D	0.95	1.00	1.05
E	0.95	1.00	1.05
D2	0.43	0.48	0.53
E2	0.43	0.48	0.53
L	0.20	0.25	0.30
e	—	0.65	—
K	0.15	—	—