XTP2021

Ultra-Low Power Consumption LDO

* Information furnished is believed to be accurate and reliable. However, XTX Technology Inc. assumes no responsibility for the consequences of use of such information or for any infringement of patents of other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent rights of XTX Technology Inc. Specifications mentioned in this publication are subjected to change without notice. This publication supersedes and replaces all information previously supplied. XTX Technology Inc. products are not authorized for use as critical components in life support devices or systems without express written approval of XTX Technology Inc. The XTX logo is a registered trademark of XTX Technology Inc. All other names are the property of their respective own.

1μA, 300mA Low Dropout Voltage Linear Regulator

General Description

The XTP2021 is a ultra-low-power, low-step-down linear regulator that supports a wide voltage input of 1.8V to 5.5V and a standby current of 1μA, making these devices ideal for battery-powered systems that spend most of their time in standby mode, requiring minimal standby power consumption to extend the life of the device. Integrated enable control mode that reduces current to only 100nA(typical) when the low level enable signal is turned off.

XTP2021 only needs 1uF ceramic capacitor to work normally. The XTP2021 integrated short-circuit current limiting and thermal shutdown protection. And has automatic discharge function, can be disabled in the state of rapid discharge V_{OUT}.

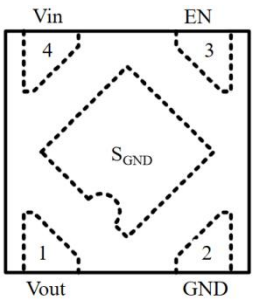
The operating temperature range is -40℃~ +85℃.

Features

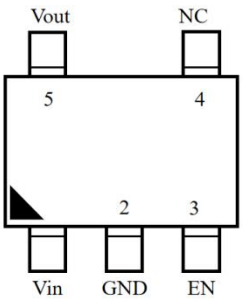
- 1μA Ground Current at no Load
- ±2% Output Accuracy
- 300mA Output Current
- 10nA Shutdown Current
- Input Voltage Range: 1.8V to 5.5V
- Dropout Voltage: 0.18V at 300mA
- Fixed Output Voltage 0.9V,1.05V,1.2V, 1.5V, 1.8V, 1.9V, 2.5V, 2.7V, 2.8V, 2.85V, 2.9V, 3.0V, 3.3V
- Stable with Ceramic or Tantalum Capacitor
- Current Limit Protection
- Over-Temperature Protection
- DFN1x1-4L，SOT-23-5 Packages Available

Applications

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



DFN1x1-4L



SOT-23-5

Ordering Information

MODEL	PACKAGE DESCRIPTION	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
XTP2021-0.9	DFN1x1-4L	XTP2021-090AD1CT	1A YW	Tape and Reel, 12000
XTP2021-1.05	DFN1x1-4L	XTP2021-105AD1CT	1B YW	Tape and Reel, 12000
XTP2021-1.2	DFN1x1-4L	XTP2021-120AD1CT	1C YW	Tape and Reel, 12000
XTP2021-1.5	DFN1x1-4L	XTP2021-150AD1CT	1D YW	Tape and Reel, 12000
XTP2021-1.8	DFN1x1-4L	XTP2021-180AD1CT	1E YW	Tape and Reel, 12000
XTP2021-1.9	DFN1x1-4L	XTP2021-190AD1CT	1F YW	Tape and Reel, 12000
XTP2021-2.5	DFN1x1-4L	XTP2021-250AD1CT	1G YW	Tape and Reel, 12000
XTP2021-2.7	DFN1x1-4L	XTP2021-270AD1CT	1H YW	Tape and Reel, 12000
XTP2021-2.8	DFN1x1-4L	XTP2021-280AD1CT	1I YW	Tape and Reel, 12000
XTP2021-2.85	DFN1x1-4L	XTP2021-285AD1CT	1J YW	Tape and Reel, 12000
XTP2021-2.9	DFN1x1-4L	XTP2021-290AD1CT	1K YW	Tape and Reel, 12000
XTP2021-3.0	DFN1x1-4L	XTP2021-300AD1CT	1L YW	Tape and Reel, 12000
XTP2021-3.3	DFN1x1-4L	XTP2021-330AD1CT	1M YW	Tape and Reel, 12000
XTP2021-0.9	SOT-23-5	XTP2021-090AS2CT	P2021A YWZZX	Tape and Reel, 3000
XTP2021-1.05	SOT-23-5	XTP2021-105AS2CT	P2021B YWZZX	Tape and Reel, 3000
XTP2021-1.2	SOT-23-5	XTP2021-120AS2CT	P2021C YWZZX	Tape and Reel, 3000
XTP2021-1.5	SOT-23-5	XTP2021-150AS2CT	P2021D YWZZX	Tape and Reel, 3000
XTP2021-1.8	SOT-23-5	XTP2021-180AS2CT	P2021E YWZZX	Tape and Reel, 3000
XTP2021-1.9	SOT-23-5	XTP2021-190AS2CT	P2021F YWZZX	Tape and Reel, 3000
XTP2021-2.5	SOT-23-5	XTP2021-250AS2CT	P2021G YWZZX	Tape and Reel, 3000
XTP2021-2.7	SOT-23-5	XTP2021-270AS2CT	P2021H YWZZX	Tape and Reel, 3000
XTP2021-2.8	SOT-23-5	XTP2021-280AS2CT	P2021I YWZZX	Tape and Reel, 3000
XTP2021-2.85	SOT-23-5	XTP2021-285AS2CT	P2021J YWZZX	Tape and Reel, 3000
XTP2021-2.9	SOT-23-5	XTP2021-290AS2CT	P2021K YWZZX	Tape and Reel, 3000
XTP2021-3.0	SOT-23-5	XTP2021-300AS2CT	P2021L YWZZX	Tape and Reel, 3000
XTP2021-3.3	SOT-23-5	XTP2021-330AS2CT	P2021M YWZZX	Tape and Reel, 3000

MARKING INFORMATION

NOTE：
1X/P2021X：Device Code.
YW ：Date Code.
ZZX：Inside Cod

Description of Functional Pins

Pin No DFN1x1-4L	Pin Name	Pin Function
1	V_{OUT}	Output of the Regulator
2	GND	Ground
3	EN	Enable Control Input
4	V_{IN}	Input of Supply Voltage
Exposed Pad	S_{GND}	Substrate of Chip. Leave floating or tie to GND

Pin No SOT-23-5L	Pin Name	Pin Function
1	V_{IN}	Input of Supply Voltage
2	GND	Ground
3	EN	Enable Control Input
4	NC	No internal connection
5	V_{OUT}	Output of the Regulator

Typical Application Circuit

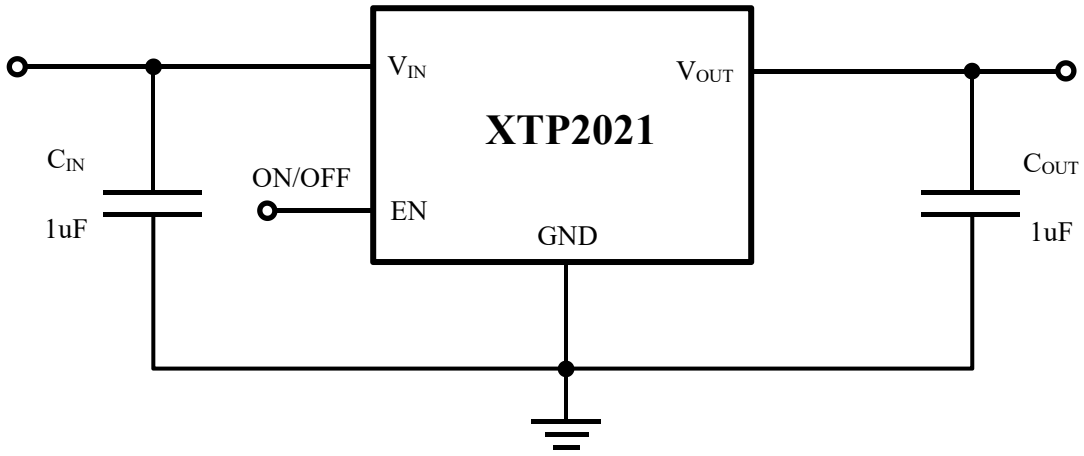
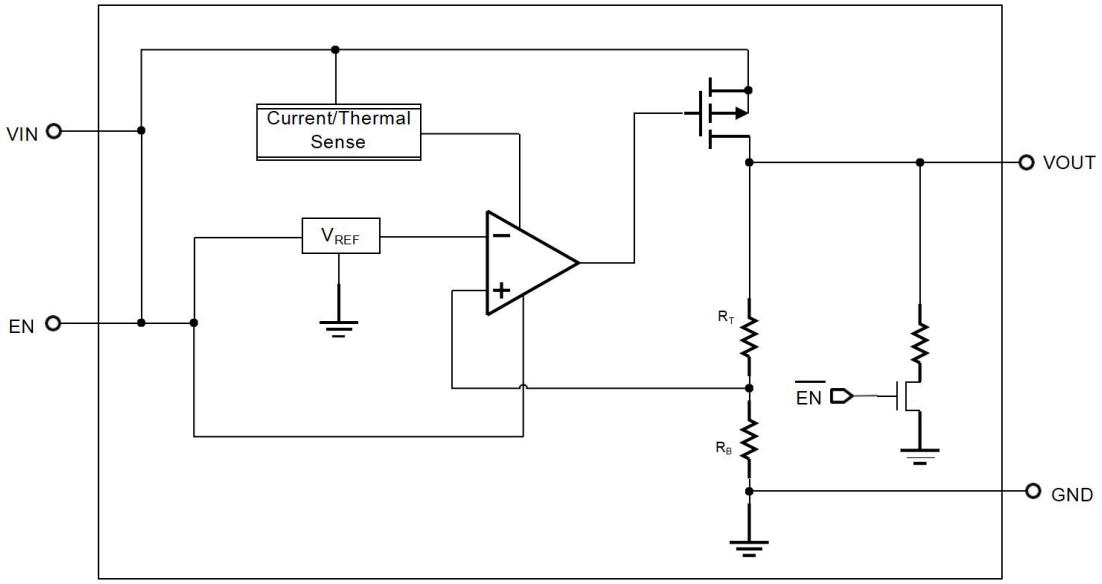


Figure 1: Application circuit of Fixed VOUT LDO with enable function

Function Block Diagram



Absolute Maximum Ratings

PARAMETER		Min	Typ	Max	Unit
V_{IN} to GND		-0.3		6.5	V
V_{OUT}, EN to GND		-0.3		6	V
V_{OUT} to V_{IN}		-6		0.3	V
Package Thermal Resistance,θ_{JA}	DFN1x1-4L		195		℃/W
	SOT-23-5L		200		℃/W
Lead Temperature (Soldering, 10 sec)				260	℃
Junction Temperature		-40		150	℃
Storage Temperature Range		-60		150	℃

ESD Susceptibility

	Symbol		Value	Unit
Electrostatic discharge	V_{ESD}	HBM	2	KV
		MM	200	V
		CDM	1	KV

Recommended Operating Conditions

	Symbol	Min	Typ	Max	Unit
Input Voltage	V_{IN}	1.8		5.5	V
Junction Temperature Range	T_J	-40		125	℃
Ambient Temperature Range	T_A	-40		85	℃

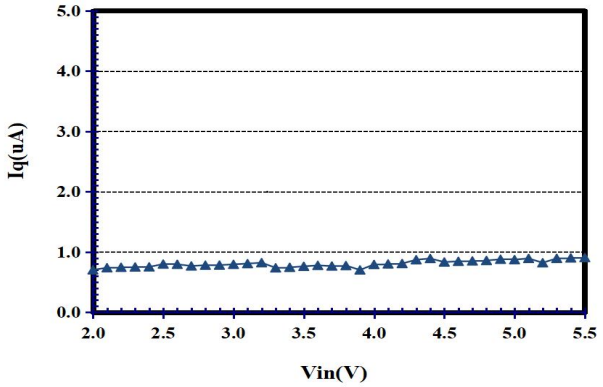
Electrical Characteristics

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

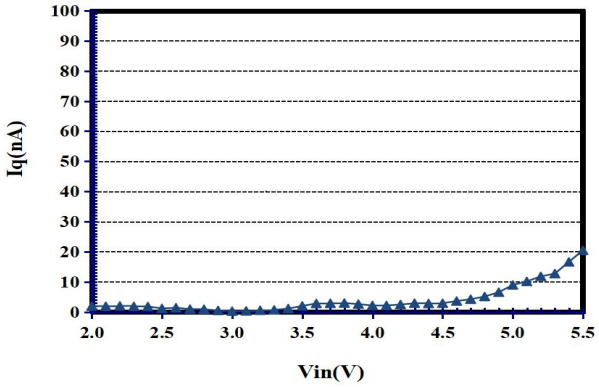
Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit
Supply Voltage	V_{IN}			1.8		5.5	V
DC Output Voltage Accuracy		I_{LOAD} =0.1mA		-2		2	%
Dropout Voltage (Vout=3.3V)	V_{DROP}	I_{LOAD} = 50mA			26		mV
	V_{DROP}	I_{LOAD} = 150mA			80		
	V_{DROP}	I_{LOAD} = 250mA			135		
Ground Current	I_Q	I_{LOAD} = 0mA			1		μA
Shutdown Ground Current	I_{SD}	V_{EN} = 0V				0.01	μA
Enable Threshold Voltage	V_{IH}	V_{EN} Rising		0.9			V
	V_{IL}	V_{EN} Falling				0.60	
EN Input Current	I_{EN}	V_{EN} = 5V		0.001	0.005	0.01	uA
Line Regulation	Δ_{LINE}	I_{LOAD} = 10mA, 4V≤V_{IN}≤5.5V			0.025	0.035	%
Load Regulation	Δ_{LOAD}	0.1mA ≤ I_{LOAD} ≤ 300mA			0.06	0.26	%
Output Current Limit	I_{LIM}	V_{OUT} = 0.9V x $V_{OUT(normal)}$			410		mA
V_{OUT} Shutdown Leakage Current	I_{LEAK}	V_{OUT} = 0V			255		mA
Power Supply Rejection Ratio(I_{LOAD} =5mA)	PSRR	V_{OUT} = 3.3V V_{IN} = 4.6V	f = 100kHz		50		dB
			f = 1kHz		75		
Output Voltage Noise(BW = 10Hz to 100kHz, C_{OUT}=1μF)		V_{IN} = 3.5V I_{LOAD} =0.3A	V_{OUT} =1.5V		67		μV_{RMS}
Thermal Shutdown Temperature	T_{SD}	I_{LOAD} =10mA			150		°C
Thermal Shutdown Hysteresis	ΔT_{SD}				20		°C
Discharge Resistance		V_{EN} = 0V,V_{OUT} = 0.1V			130		Ω

Typical Characteristics

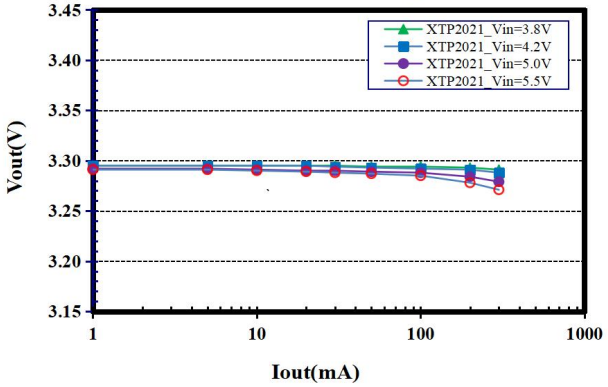
EN=Vin&Iin



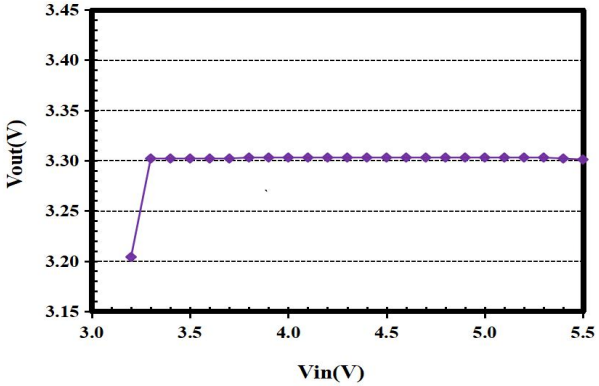
EN=GND,Vin&Iin



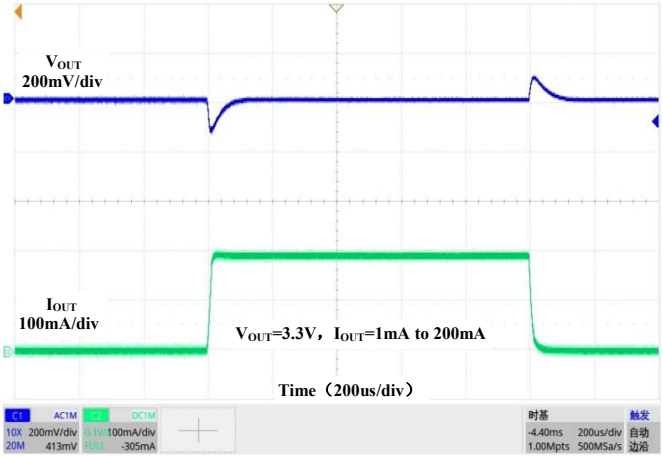
XTP2021 Iout& Temp.25℃



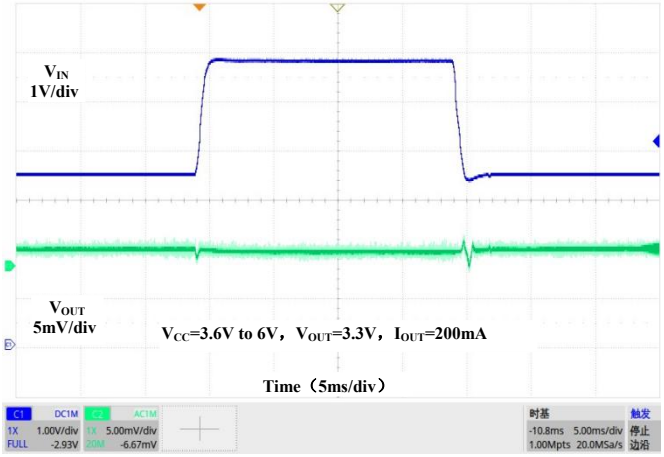
XTP2021 _3.3V Vin&Vout，Iout=10mA



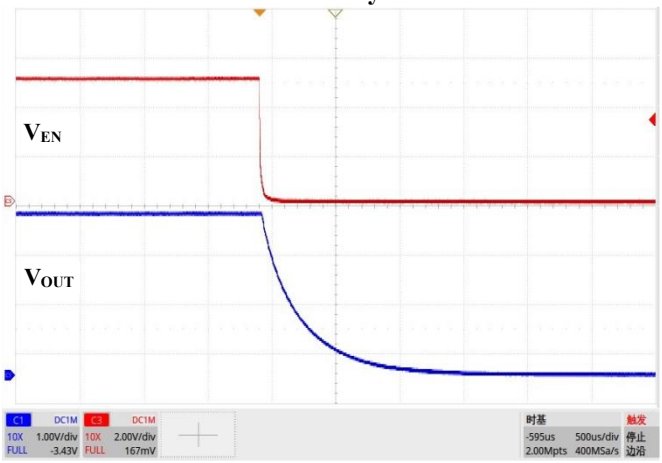
Load Transient Response



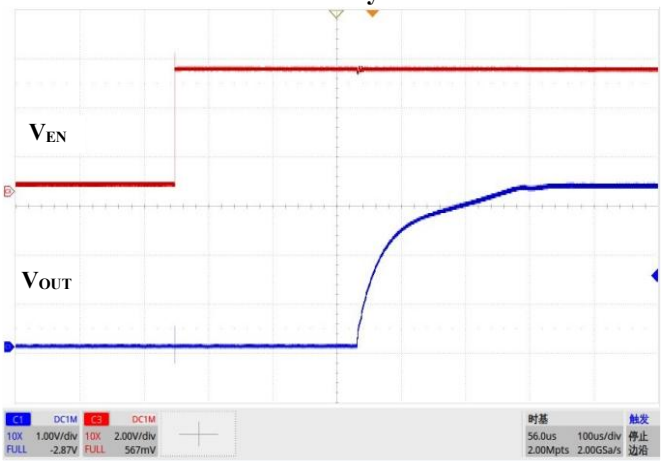
Line Transient Response



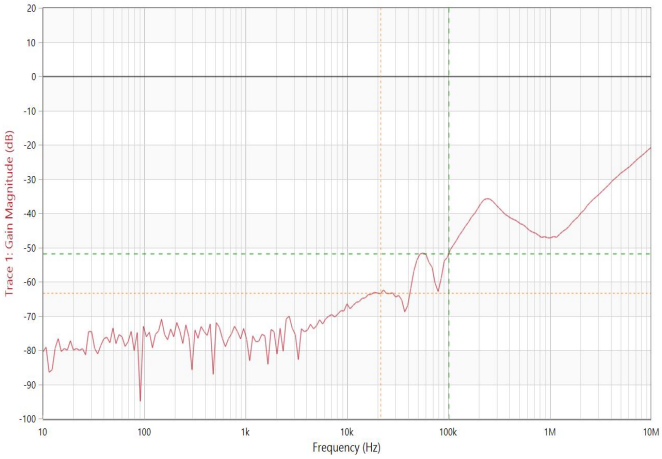
Turn Off by EN



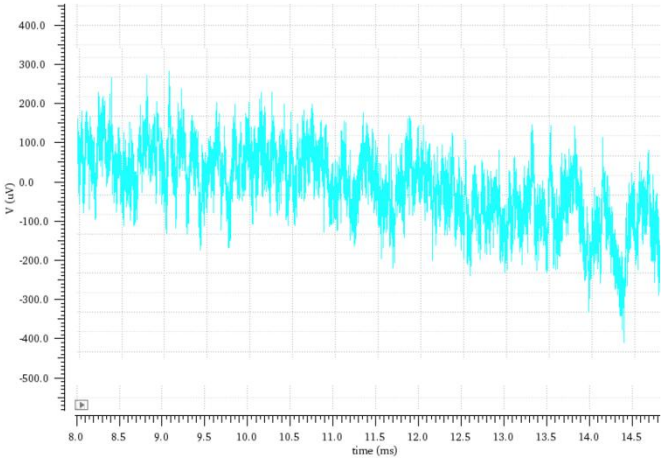
Turn On by EN



PSRR vs. Frequency

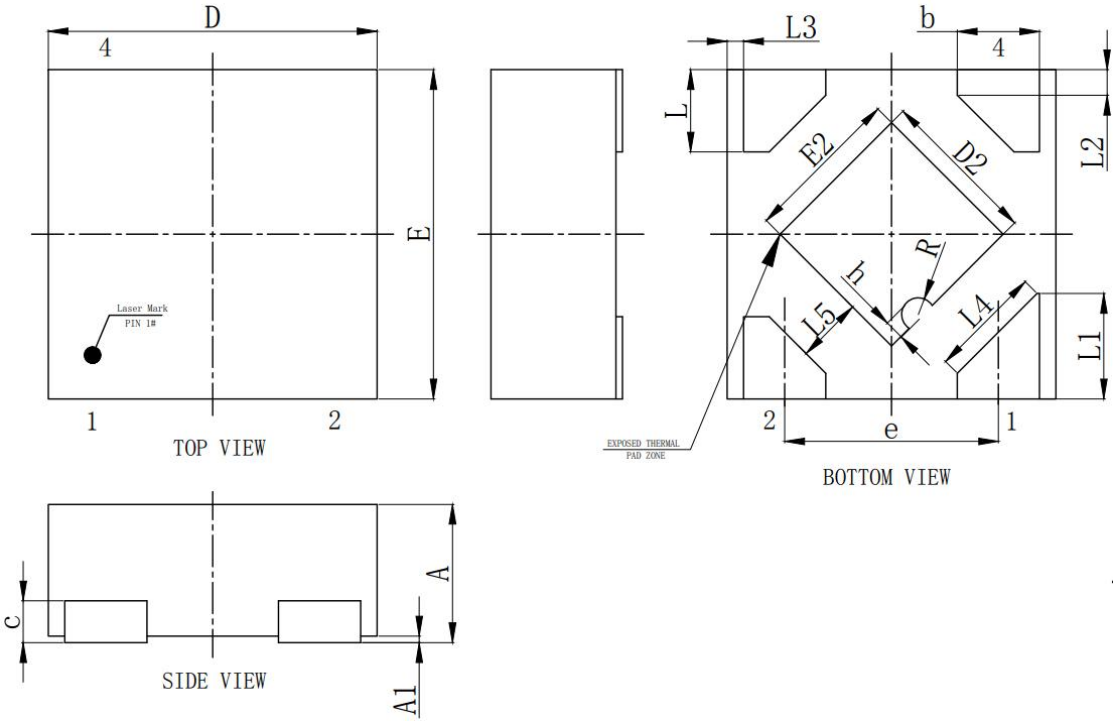


Noise Density Spectrum



Package Information

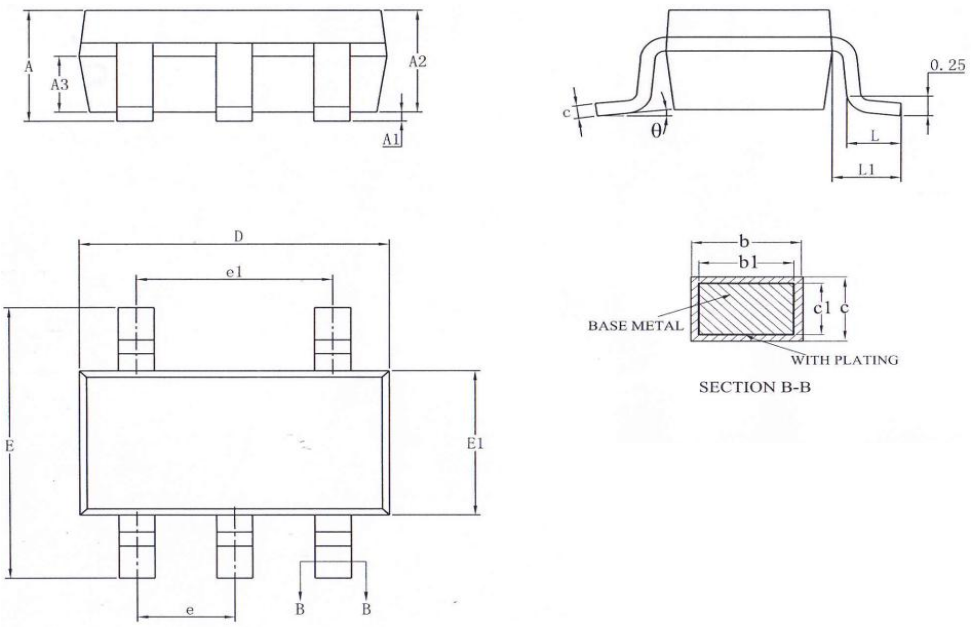
DFN1x1-4L



Symbol	Millimeters		
	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 Information

SOT-23-5L



Symbol	Millimeters		
	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°