Ultra-Fast High PSRR Low Noise Output Current, Low-Dropout Regulator

Features

- **Operating Voltage: 1.5V-7.0V**
- **High PSRR: 90dB@1KH**
- **Output Voltage Accuracy: 1%**
- **Output Voltage: 1.0V,1.2V,1.5V,1.8V,2.5V,2.8V,3.0V,3.3V,4.0V,4.2V and 5.0V Optional Fixed**
- **Low Dropout Voltage:42mV@100mA**
- **Maximum Output Current: 500mA**
- **Excellent Line and Load Regulation**
- **Over-Temperature Protection**
- **Current Limiting Protections**
- **Short Circuit Protections**
- **ESD Rating (HBM): 8kV**
- **Lead Free and Green Device Available (RoHS Compliant), Available in SOT23, SOT23-5L, SOT89-3 and DFN1x1-4L Packages**

Applications

- **Battery-Powered Devices**
- **Reference Voltage Sources**
- **Other Low Voltage Power Suppliers**

General Description

The LTK63320 is a positive voltage regulator with high accuracy, low noise, high speed, low drop-out voltage regulator with Chip Enable Pin, high ripple rejection and fast discharge function.

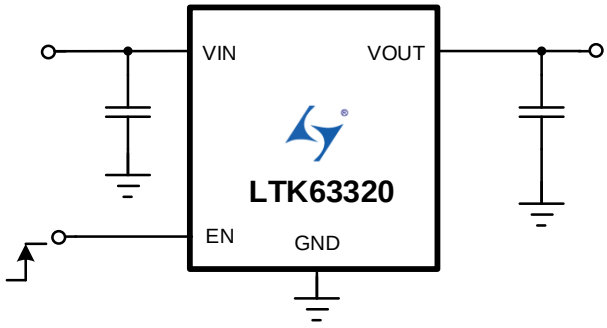
The LTK63320 is designed specifically for applications where high PSRR is a critical parameter. This device maintains low IQ consumption and low noise even in dropout mode.

The LTK63320 has an output voltage from 1.0V, 1.2V, 1.5V, 1.8V, 2.5V, 2.8V, 3.0V, 3.3V, 3.6V, 4.0V, 4.2V and 5.0V or other voltages applicable as customer specified.

The LTK63320 has the current limiter's fold-back circuit operates as a short circuit protection as well as the output current limiter for the output pins.

The LTK63320 is available in SOT23, SOT23-5, SOT89-3 and DFN1x1-4L packages.

Typical Application Circuit



Order and Marking Information

LTK63320 □□□□-□□
- Voltage
- Packge Code

Packge Code
S233: SOT23 S235: SOT23-5L
S893: SOT89-3 D114: DFN1X1-4L
Voltage (presented by digit)
10: 1.0V 12: 1.2V 15: 1.5V 25: 2.5V 28: 2.8V
30: 3.0V 33: 3.3V 36: 3.6V 40: 4.0V 42: 4.2V 50: 5.2V

S235: 63320 / XXXY — Y - Voltage(alphabet), X - Data Code

S233: 63XX — X - Voltage(digit)

S893: 63320Y / XXXX — Y - Voltage(alphabet), X - Data Code

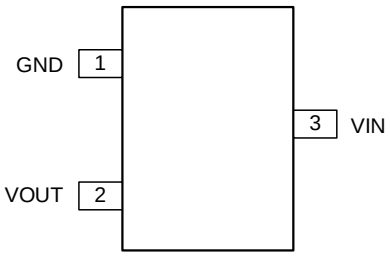
D114: XX / XY — X - Data Code, Y - Voltage(alphabet)

Voltage (presented by alphabet)

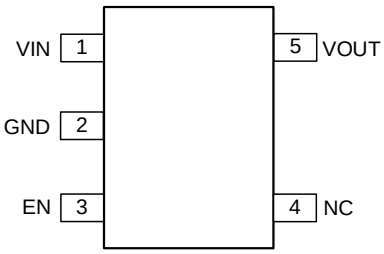
1.0V	1.2V	1.5V	1.8V	2.5V	2.8V	3.0V	3.3V	3.6V	4.0V	4.2V	5.0V
A	B	C	D	G	H	J	L	M	P	Q	S

Note: LTKCHIP lead-free products contain molding compounds/die attach materials and 100% matte tin plate termination finish, which are fully compliant with RoHS and compatible with both SnPb and lead-free soldiering operations. LTKCHIP lead-free products meet or exceed the lead-free requirements of IPC/JEDEC J STD-020C for MSL classification at lead-free peak reflow temperature.
LTKCHIP reserves the right to make changes to improve reliability or manufacturability without notice and advise customers to obtain the latest version of relevant information to verify before placing orders.

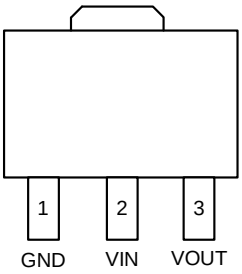
Pin Configuration



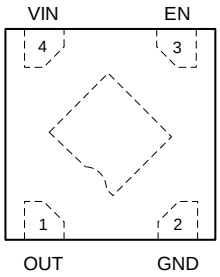
SOT23



SOT23-5L



SOT89-3

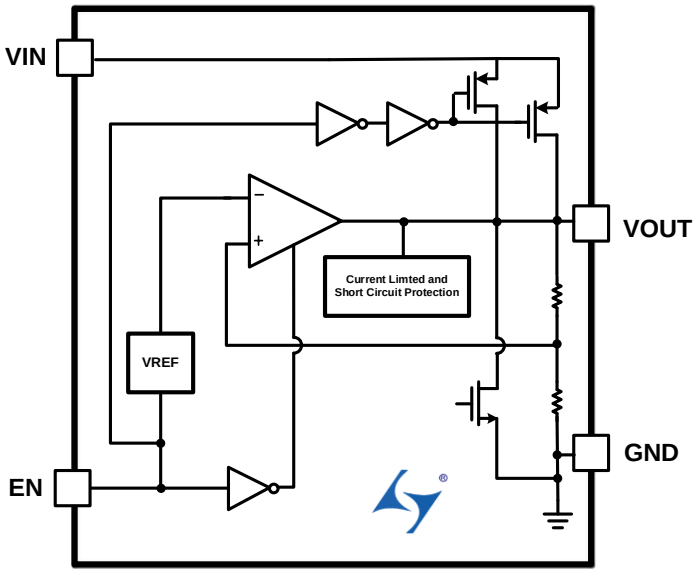


DFN1X1-4L

Pin Function Description

PIN Number				SYMBOL	DESCTRIPTION
SOT23	SOT23-5L	SOT89-3	DFN1X1-4L		
1	1	2	4	VIN	Power Supply Input
12	2	1	2, EP	GND	Ground
--	3	--	3	EN	Chip Enable
--	4	--	--	NC	Not Connected
2	5	3	1	VOUT	Output

Block Diagram



Absolute Maximum Ratings (Note1)

Symbol	Parameter		Rating	Unit
Vin	Supply Voltage (VDD to GND)		-0.3 to 8.0	V
V_{out}	VOUT Pin Voltage		-0.3 to (Vin+0.3)	
P_d	Maximum Power Dissipation	SOT23-5	450	mW
		DFN1X1-4L	380	
		SOT23	400	
		SOT89-3	600	
PTR	Package Thermal Resistance θ_{JA}	SOT23-5	278	°C/W
		DFN1X1-4L	328	
		SOT23	312	
		SOT89-3	208	
T_J	Junction Temperature Range		-40 to +150	°C
T_{STG}	Storage Temperature Range		-40 to +150	
T_{SDR}	Soldering Temperature Range		260	

Note 1. Absolute Maximum Ratings are those values beyond which the life of a device may be impaired. Exposure to absolute maximum rating conditions for extended periods may affect device reliability. Operation above these absolute maximum ratings may cause degradation or permanent damage to the devices. These are stress ratings only and do not necessarily imply functional operation below these limits

Recommended Operating Conditions

Symbol	Items	Value	Unit
Vin	Vin Supply Voltage	1.6 to 7.0	V
T_{OPT}	Operating Temperature	-40 to +85	°C

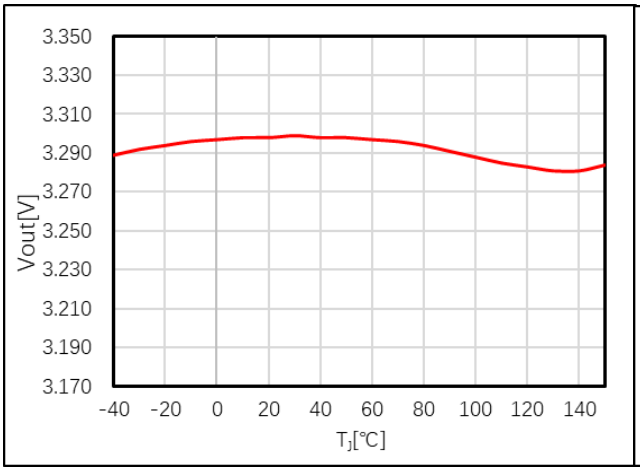
Electrical Characteristics

V_{IN}= V_{OUT} +1V, V_{OUT} =3.3V, C_{IN}= C_{OUT}=1uF, T_A= 25°C (unless otherwise specified)

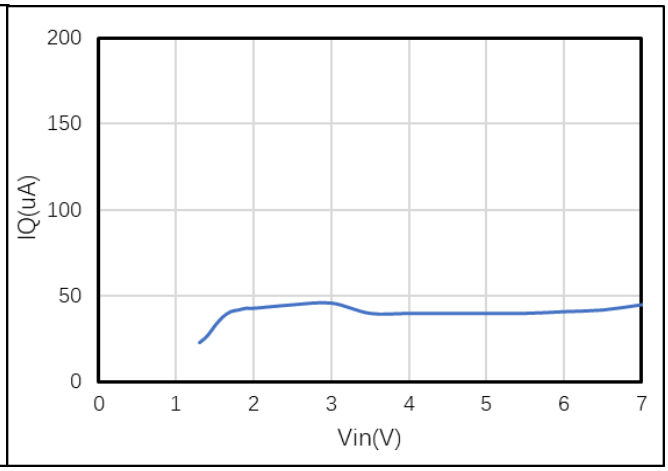
Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V_{IN}	Input Voltage		1.6		7	V
V_{UVLO}	UVLO threshold			1.2		V
V_{OUT}	Output Accuracy	I_{OUT}=1mA	-1.5		1.5	%
I_{LIM}	Current Limit	V_{IN}=5V	500	700		mA
I_Q	Quiescent Current	V_{IN}=5V, V_{EN}=5V, No Load		40	60	μA
I_{SHD}	Shutdown Current	V_{EN}=0V		0.01	0.1	μA
V_{DROP}	Dropout Voltage	I_{OUT}=100mA		42		mV
		I_{OUT}=300mA		130		
		I_{OUT}=500mA		230		
S_{LINE}	Line Regulation	V_{IN}= V_{OUT} +1.0V to 7V, I_{OUT}=1mA		1	10	mV
S_{LOAD}	Load Regulation	V_{IN}= V_{OUT} +1V, I_{OUT}=1mA<>500mA		10		mV
I_{SHORT}	Short Current	V_{OUT}=0V		100		mA
V_{ENH}	EN High Voltage	V_{IN}= V_{OUT} +0.5V to 5.5V, I_{OUT}=1mA	1.4			V
V_{ENL}	EN Low Voltage				0.5	V
T_{START}	Startup Time	V_{EN} low to high to V_{OUT} =95%		25		μS
PSRR	Power Supply Rejection Ratio	I_{OUT}=10mA, Freq=217Hz		92		dB
		I_{OUT}=10mA, Freq=1kHz		90		
		I_{OUT}=10mA, Freq=10kHz		80		
V_{NOISE}	Output Noise Voltage	Freq from 10Hz to 100KHz,		50		μV_{RMS}
T_C	Output Voltage Temperature Coefficient	I_{OUT}=10mA, T_A= -40 to 85°C		±0.1		mV/°C
T_{SD}	Overheat Protection	Shut down when temperature increasing		150		°C

Characteristic curve test condition (TA=25℃)

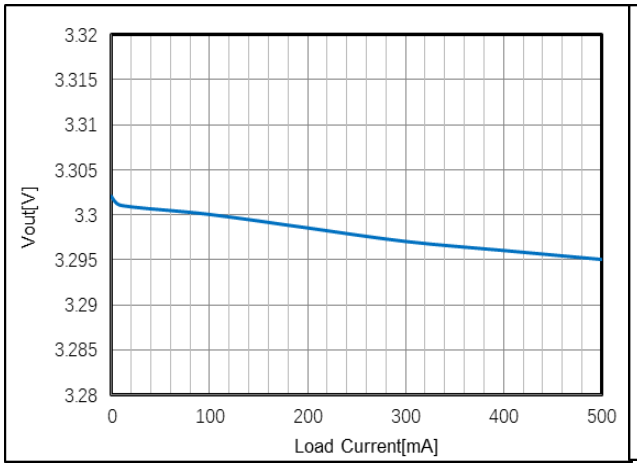
1. V_{OUT} vs T_J
(V_{IN}=4.3V, V_{OUT} =3.3V, I_{OUT}=10mA)



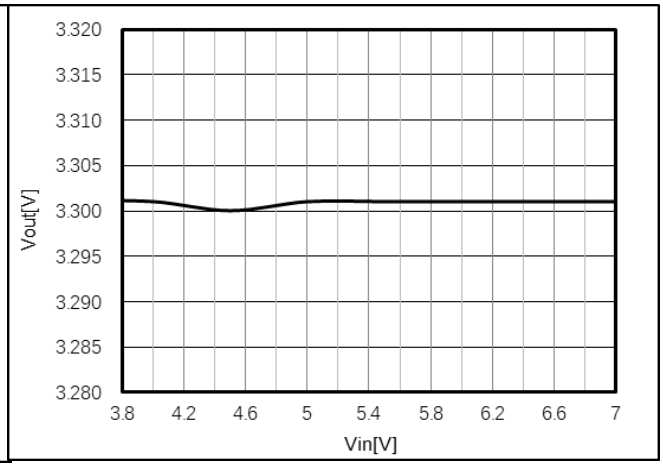
2. I_Q vs V_{IN}
(V_{OUT} =3.3V, I_{OUT}=0mA)



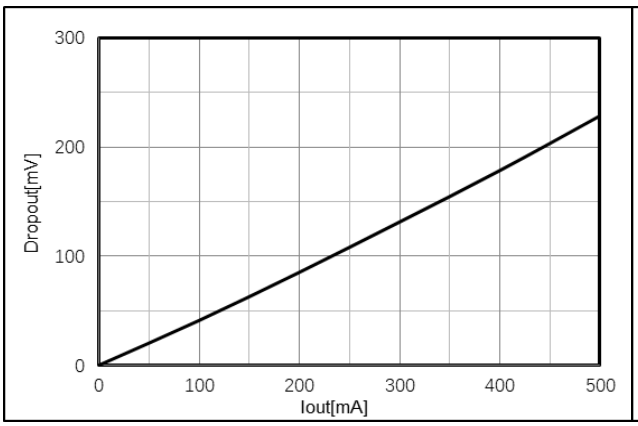
3. Load Regulation
(V_{IN}=4.3V, V_{OUT} =3.3V, I_{OUT}=0→500mA)



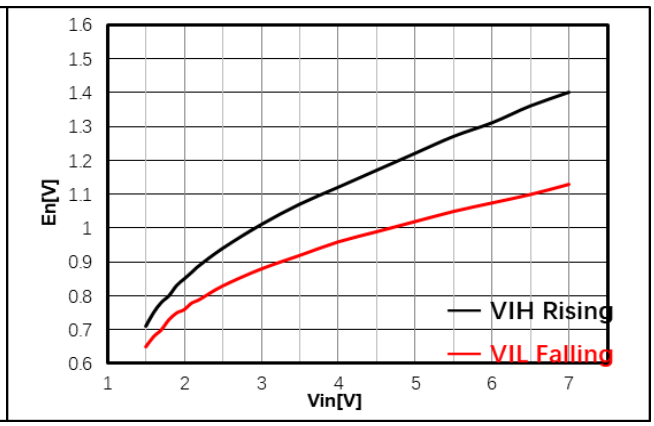
4. Line Regulation
(V_{IN}=3.8V→7.0V, V_{OUT} =3.3V,I_{OUT}=1mA)



5. Dropout Voltage
(V_{EN}=4.3V, V_{OUT} =95%*3.3V, I_{OUT}=0→500mA)

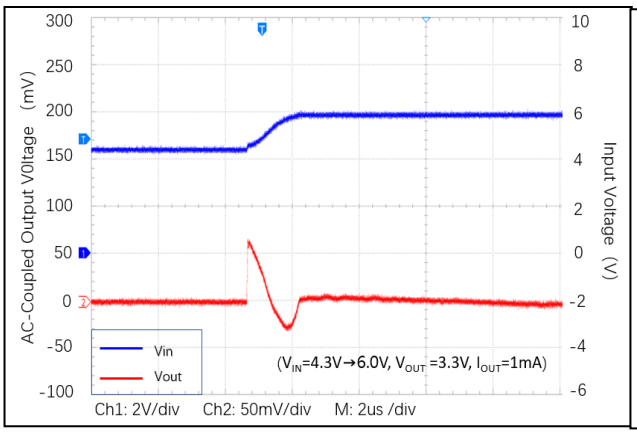


6. V_{EN} Thresholds vs V_{IN}



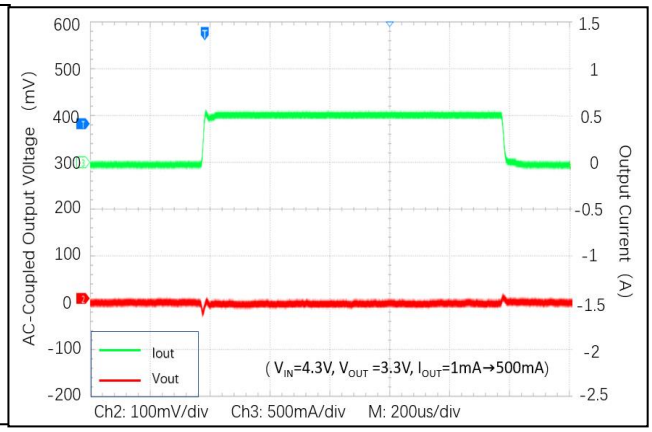
7. Line Transient

(V_{IN}=4.3V→6.0V, V_{OUT} =3.3V, I_{OUT}=1mA)



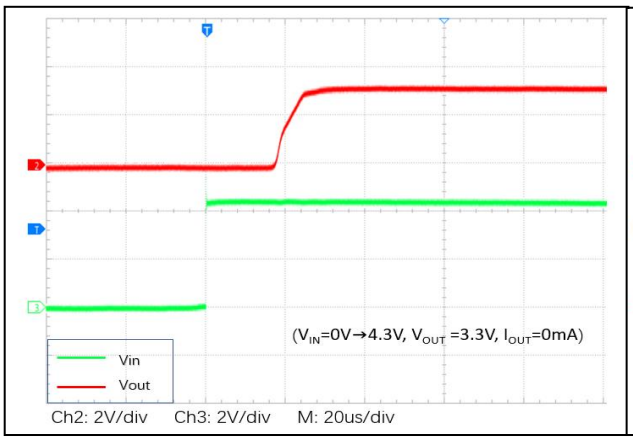
8. Load Transient

(V_{IN}=4.3V, V_{OUT} =3.3V, I_{OUT}=1→500mA)



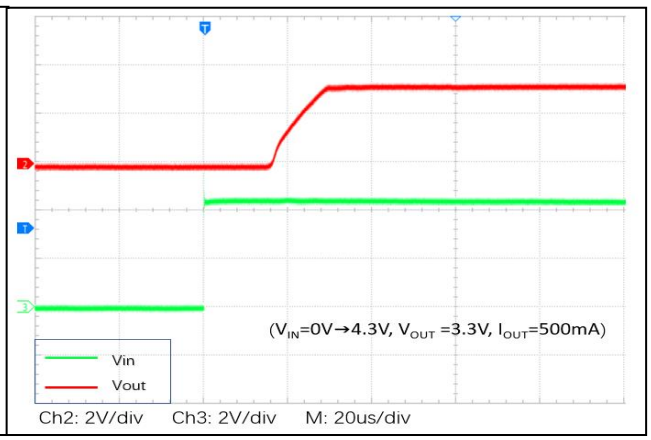
9. Start-Up

(V_{IN}=0V→4.3V, V_{OUT} =3.3V, I_{OUT}=0mA)



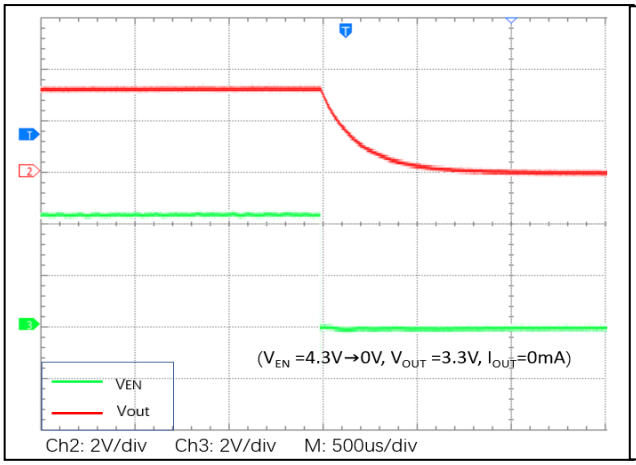
10. Start-Up

(V_{IN}=0V→4.3V, V_{OUT} =3.3V, I_{OUT}=500mA)



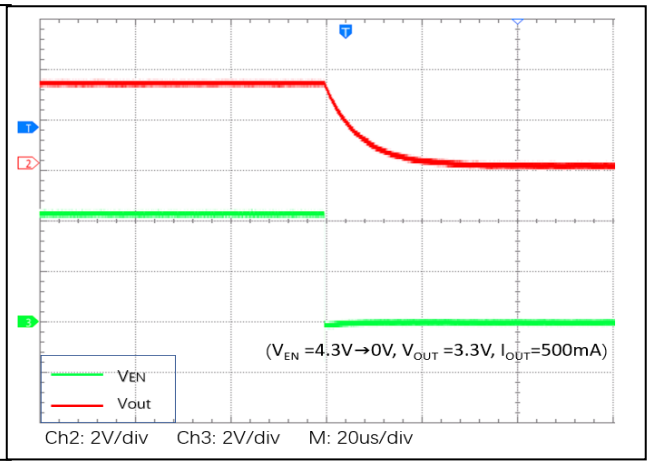
11. Shut-Down

(V_{EN}=4.3V→0V, V_{OUT} =3.3V, I_{OUT}=0mA)



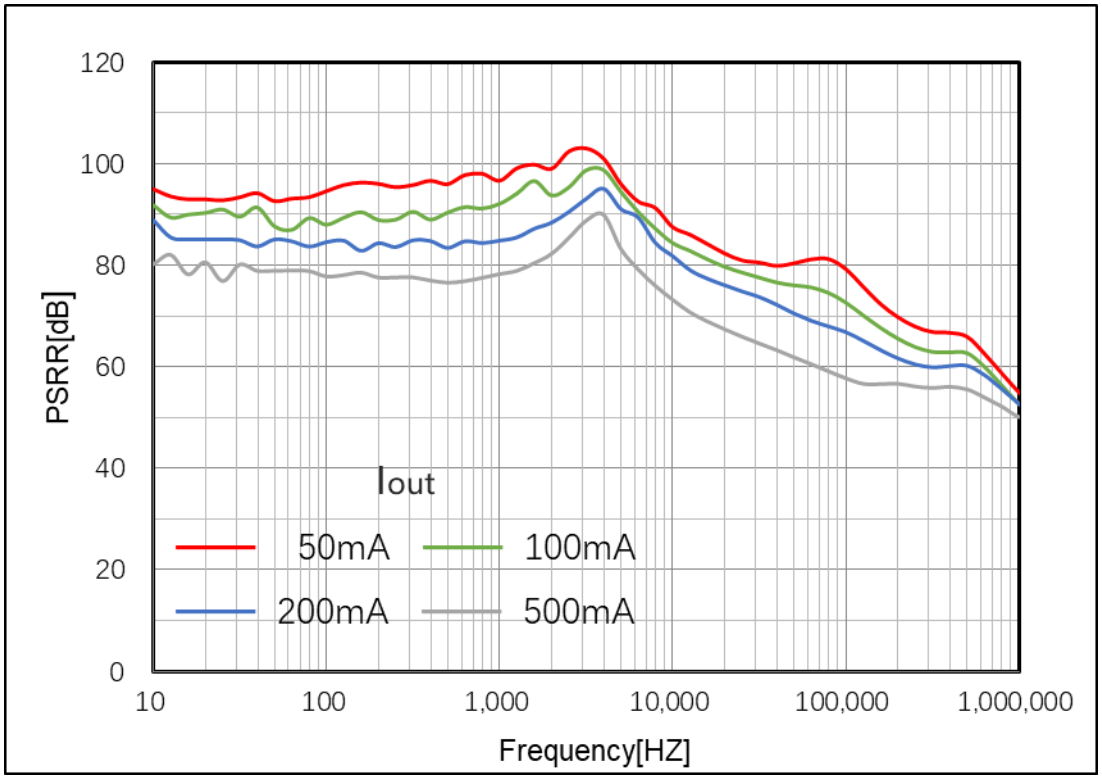
12.Shut-Down

(V_{EN}=4.3V→0V, V_{OUT} =3.3V, I_{OUT}=500mA)



13. PSRR

(V_{IN}=4.3V, V_{OUT} =3.3V, C_{IN}=none, C_{OUT} =1uF)



Application Information

Input Capacitor Selection

The input capacitors used with the LTK63320 must be carefully selected for regulator stability and performance. Using a capacitor whose value is >1uF one the LTK63320 input and amount of capacitance can be increased without limit. The input capacitor must be located no more than 0.5-inch distance from the input pin of the IC and retured to a clean analog ground. Any good quality ceramic or tantalum can be used for this capacitor. The capacitor with larger value and lower ESR provides better PSRR and line-transient response.

Output Capacitor Selection

The LTK63320 requires surface-mount multi-layer ceramic capacitors. These capacitors are small, inexpensive, and have very low ESR (<15ohm typical). Tantalum capacitors, and aluminum electrolytic capacitors generally are not recommended for use with LTK63320 due to their high ESR compared to ceramic capacitors.

For most applications, ceramic capacitors with an X7R or X5R temperature characteristic are preferred for use with the LTK63320. These capacitors have tight capacitance tolerance(as good as ±10%) and hold their value over temperature (X7R: ±15% over -55°C to 125°C;X5R: ±15% over -55°C to 85°C)

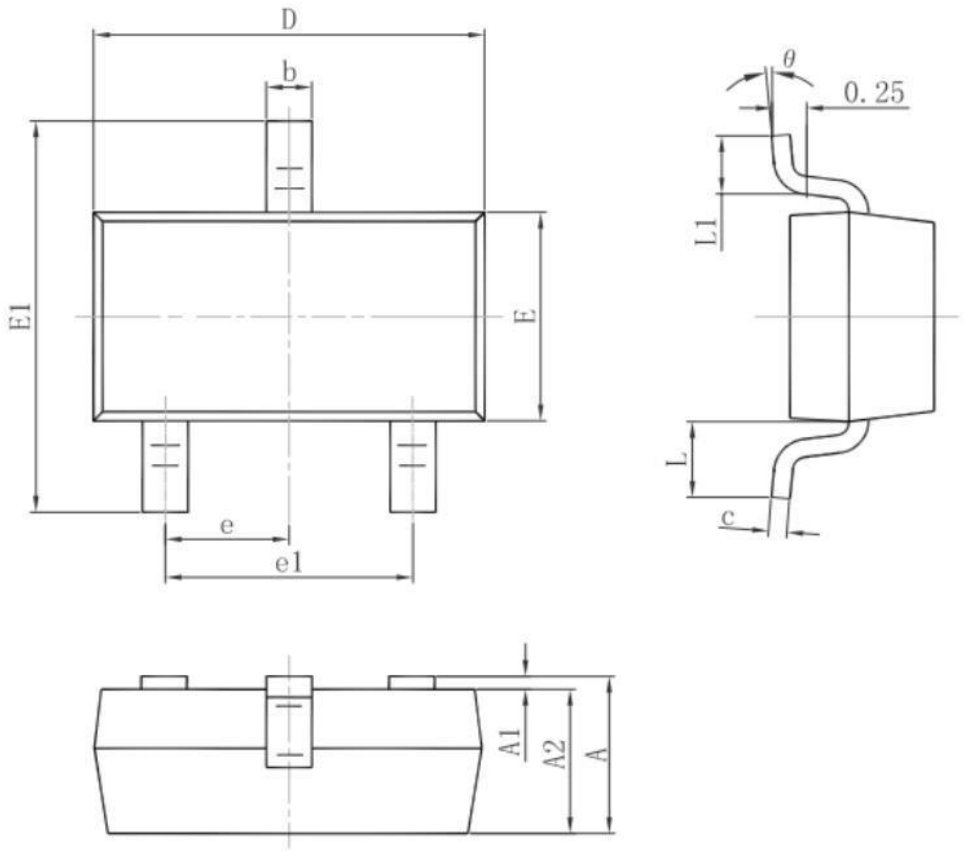
Output capacitor of larger capacitance can reduce noise and improve load transient response, stability, and PSRR. The ouput capacitor should be located no more than 0.5-inch distance from the Vout Pin of the LTK63320 and returned to a clean analog ground.

Layout Considerations

To improve AC performance such as PSRR, output noise, and transient response, it is recommended that the PCB be designed with separate ground planes for Vin and Vout, with each ground plane connected only at the GND pin of the device. A true ground plane and short connections to all capacitors will improve performance and ensure proper regulation under all conditions.

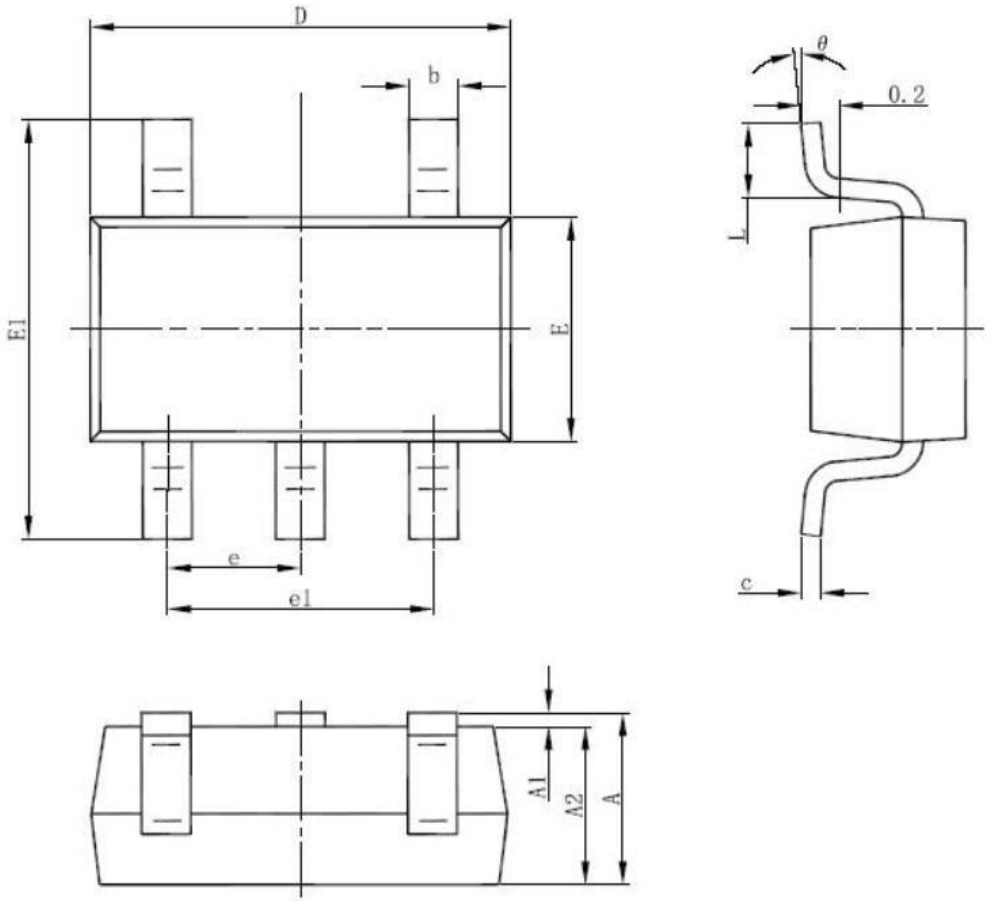
Packaging Information

SOT23



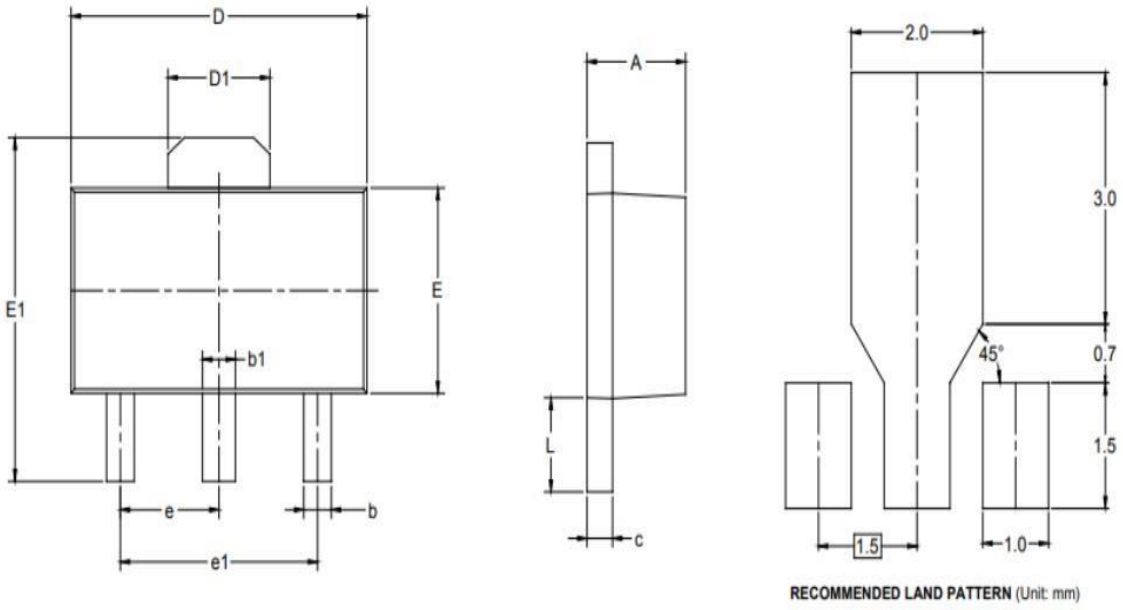
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP.		0.037 TYP.	
e1	1.800	2.000	0.071	0.079
L	0.550 REF.		0.022 REF.	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

SOT23-5L



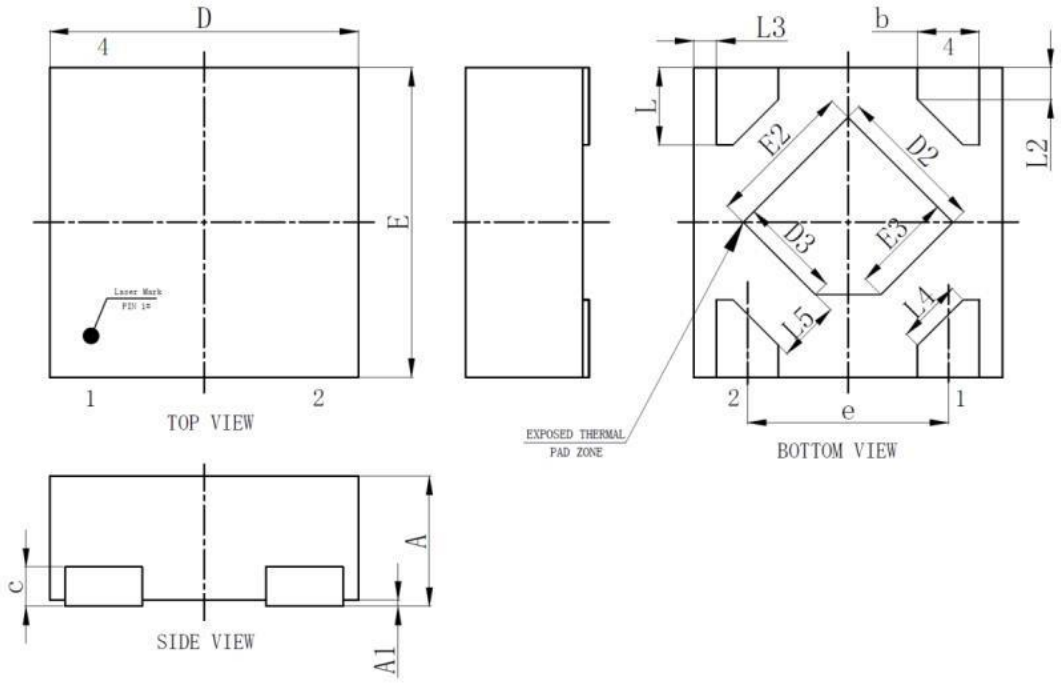
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)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

SOT89-3



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

DFN1X1-4L



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.35	-	0.40
A1	0.00	0.02	0.05
b	0.15	0.20	0.25
c	0.127REF		
D	0.95	1.00	1.05
D2	0.38	0.48	0.58
D3	0.23	0.33	0.43
e	0.65BSC		
E	0.95	1.00	1.05
E2	0.38	0.48	0.58
E3	0.23	0.33	0.43
L	0.20	0.25	0.30
L2	0.103REF		
L3	0.075REF		
L4	0.208REF		
L5	0.200REF		