CN84AXXX

Low Power Linear Regulators with Current Limit Protection

1 Description

The CN84AXXX is a low power linear regulator with current limit protection. It can provide up to 1A output current with a quiescent current of 2.5μA. It has internal short circuit protection and thermal protection. It is available in SOT89-3, SOT89-5, DFN2X2-6, SOT23-5, SOT23-3, SOT-223, and TO-252 packages.

2 Features

- Ultra-low quiescent current：2.5μA
- High accuracy：±2%
- Low dropout voltage：50mV @ I_{OUT} = 100mA @ V_{OUT} =3.3V
- Maximum output current：1A
- Input Voltage Range：Max 12V
- Enabling Control
- Output short circuit protection
- Thermal shutdown

3 Applications

- Cell phone
- Battery-powered equipment
- Wireless telephones,wireless communication equipment
- Cameras, video recorders
- Portable audio-visual equipment
- Palmtop computer

4 Ordering information

Product Number	Package	Quantity/Tape
CN84AXXXDSR	DFN2x2-6	4000/ Tape
CN84AXXXTCR	SOT23-5	3000/ Tape
CN84AXXXTGR	SOT23-3	3000/ Tape
CN84AXXXOGR	SOT89-3	1000/ Tape
CN84AXXXAOGR	SOT89-3	1000/ Tape
CN84AXXXOBR	SOT89-5	1000/ Tape
CN84AXXXMGR	SOT-223	2500/ Tape
CN84AXXXRGR	TO-252	80/ Tape
CN84AXXXTCRA	SOT23-5	3000/ Tape

Product Number	Output voltage
CN84A018	VOUT=1.8V
CN84A028	VOUT=2.8V
CN84A030	VOUT=3.0V
CN84A033	VOUT=3.3V
CN84A036	VOUT=3.6V
CN84A040	VOUT=4.0V
CN84A050	VOUT=5.0V

5 Marking

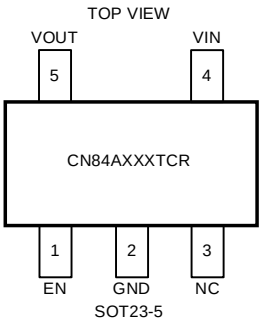
Product Number	Marking*
CN84AXXXDSR	84AXX YYWW
CN84AXXXTCR	84AXXX YYWW
CN84AXXXTGR	84AXXT YYWW
CN84AXXXOGR	CN84AXXX YYWW
CN84AXXXAOGR	84AXXXA YYWW
CN84AXXXOBR	4AXXOBR YYWW
CN84AXXXMGR	CN84AXXX YYWW
CN84AXXXRGR	CN84AXXX YYWW
CN84AXXXTCRA	4AXXXA JYYWW

Note: YY=Year WW=Week.

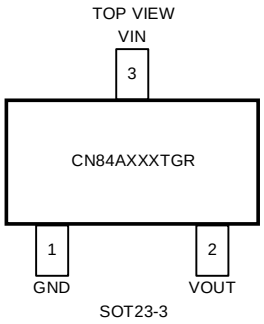
Green (RoHS & HF): CHIPNORTH defines "Green" to mean Pb-Free (RoHS compatible) and free of halogen substances. If you have additional comments or questions, please contact your CHIPNORTH representative directly.

Moisture sensitivity level(MSL):3

6 Pinout



SOT23-5



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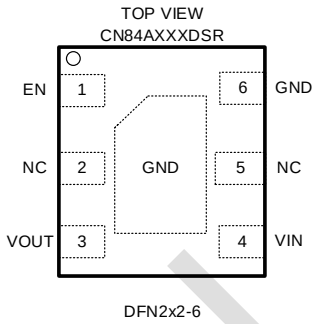
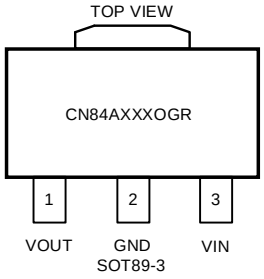
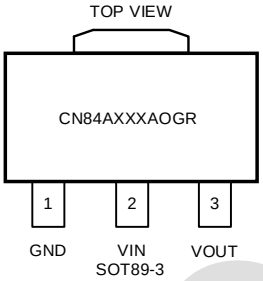


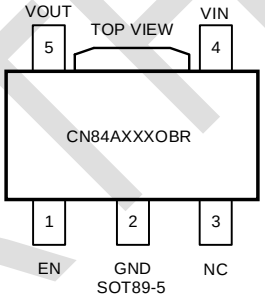
DFN2x2-6



SOT89-3



SOT89-3



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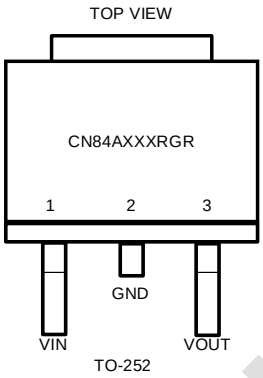
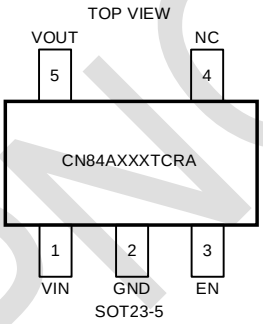
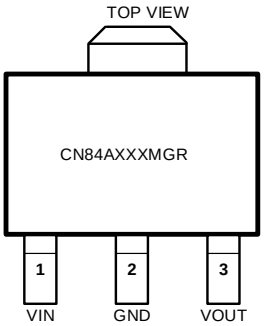


TO-252

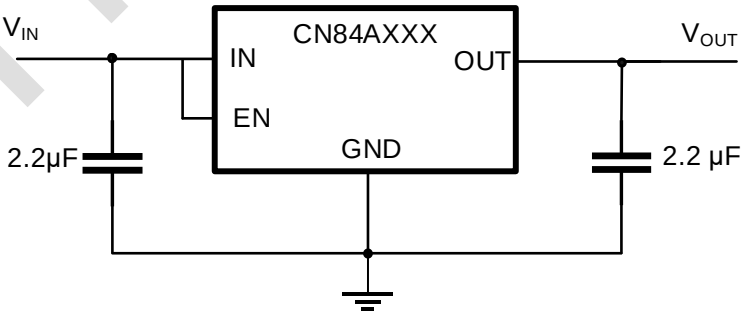


SOT23-5



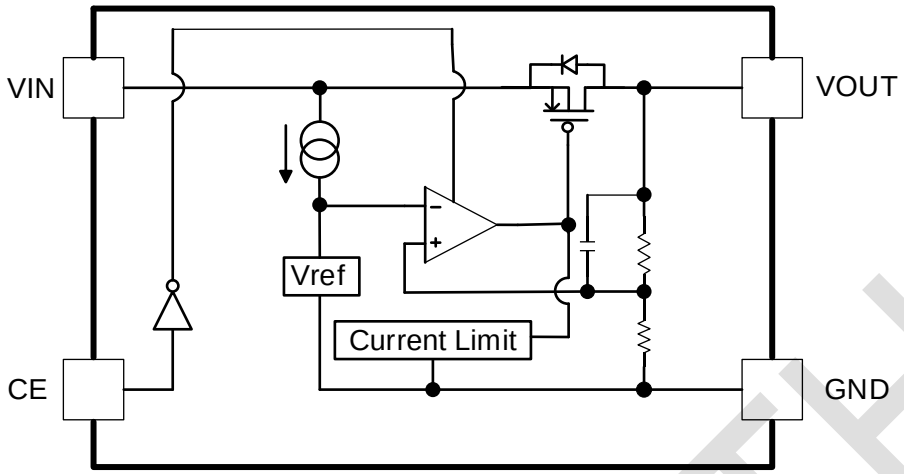
SOT-223

7 Typical Application



Note: General application circuits are recommended input capacitance CIN = 2.2μF, near the chip input; output capacitance COUT = 2.2μF, near the chip output.

8 Block Diagram



9 Pin Descriptions

Pin No.						Descriptions
Pin Name	CN84AXXX OGR	CN84AXXX AOGR	CN84AXXX OBR	CN84AXXX RGR	CN84AXXX TCR	
GND	2	1	2	2	2	GND
VIN	3	2	4	1	4	Input
VOUT	1	3	5	3	5	Output
EN			1		1	Enable
NC			3		3	No Connect

Pin No.						Descriptions
Pin Name	CN84AXXX TGR	CN84AXXX MGR	CN84AXXX DSR	CN84AXXX TCRA		
GND	1	2	6	2		GND
VIN	3	1	4	1		Input
VOUT	2	3	3	5		Output
EN			1	3		Enable
NC			2、5	4		No Connect

10 Specifications

10.1 Absolute Maximum Ratings

Parameter	Symbol	Value	Units
Maximum Input Voltage	V_{IN}	-0.3 ~ 14	V
Maximum Output Voltage	V_{OUT}	-0.3 ~ 8	V
EN enable voltage	V_{EN}	-0.3 ~ 14	V
Ambient temperature	T_A	-40 ~ 105	°C
Storage temperature range	T_{STG}	-55 ~ 150	°C
Soldering temperature	T_{LEAD}	260（Soldering,10s）	°C

(1) Stresses exceeding the values listed under Absolute Maximum Ratings may cause permanent damage to the device. These listed values are stress ratings only and do not imply that the device will operate properly under these conditions or any other conditions other than the recommended operating conditions. Prolonged operation at maximum absolute rating conditions can affect device reliability.

(2) All voltage values are based on the ground terminal.

10.2 ESD Ratings

Discharge mode	Standardize	Value	Unit
HBM	ESDA/JEDEC JS-001-2017	±4000	V
CDM	ESDA/JEDEC JS-002-2018	±2000	V

10.3 Recommended Operating Ran

Parameter	Symbol	Min.	Max.	Units
Input Voltage Range	V_{IN}	V_{OUT}+1	12	V
Ambient temperature	T_A	-40	105	°C

10.4 Thermal Information

Parameter	Package	Value	Unit
Junction to ambient thermal resistance ($R_{\theta JA}$)	SOT23-3	220	°C/W
	SOT23-5	188	°C/W
	DFN2X2-6	140	°C/W
	SOT89-3(OGR)	100	°C/W
	SOT89-3(AOGR)	165	°C/W
	SOT89-5	70	°C/W
	TO-252	30	°C/W
	SOT-223	62	°C/W

(1) Thermal resistance is not a fixed constant; its value is influenced by the following factors: PCB heat dissipation capacity, number and thickness of copper layers, ambient temperature, airflow velocity, etc.

(2) The thermal resistance values listed in the datasheet are provided solely for customers to compare the thermal performance of different packages. Since the heat dissipation conditions of the PCB in actual customer applications differ from those of our test boards, the actual measured thermal resistance values may vary from the nominal values in the datasheet. Customers should conduct verification on their own system boards to ensure that the thermal design meets the requirements of the product application.

10.5 Electrical Characteristics

Test conditions：V_{IN}=V_{OUT}+1V, C_{IN}=2.2μF, C_{OUT}=2.2μF, T_A=25℃, unless otherwise specified.

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Input Voltage Range	V_{IN}	I_{OUT}=10mA	V_{OUT}+0.1V		12	V
Output voltage*1	V_{OUT}	V_{IN}=V_{OUT}+2V, I_{OUT}=10mA	V_{OUT} x0.98	V_{OUT}	V_{OUT} x1.02	V
Output Voltage Accuracy	V_{OUT}%	V_{IN}=V_{OUT}+2V, I_{OUT}=10mA	98%		102%	
Linear rate of adjustment	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	V_{IN}=V_{SET}+1V~12V I_{OUT}=10mA@V_{OUT}=3.3V			0.1	%/V
Load Adjustment Ratio	ΔV_{OUT}	V_{IN}=V_{SET}+1V I_{OUT}=0~1A@V_{OUT}=3.3V		50	100	mV
Quiescent current	I_Q	V_{IN}=12V, I_{OUT} =0mA	0.8	2.5	4.2	μA
Dropout voltage*2	V_{DROP}	I_{OUT}=100mA@V_{OUT}=3.3V	20	50	80	mV
Maximum Output Current	I_{OUT_MAX}			1		A
Current Limit*3	I_{LIMIT}	V_{IN}=V_{OUT}+1.0V	1	1.5		A
OTP threshold		95% rated V_{OUT}		160		°C
OTP hysteresis				30		°C
PSRR		100Hz		60		dB

Note*:

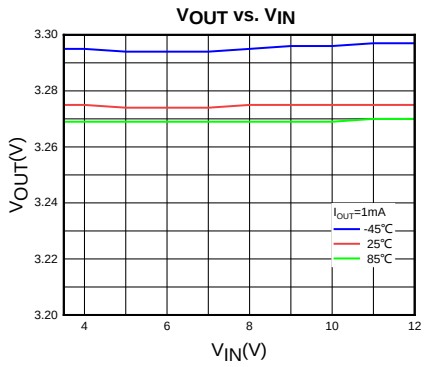
$V_{OUT(S)}$: output voltage when V_{IN} = V_{OUT} + 1V and I_{OUT} = 10mA.

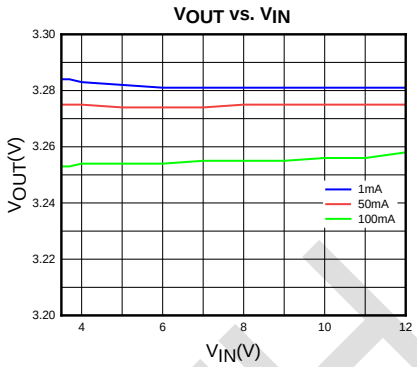
V_{DROP}=V_{IN}-(V_{OUT_REG}*0.98), V_{OUT_REG} is the output voltage when V_{IN} = V_{OUT} + 1.0V and I_{OUT} = 100mA.V_{IN} is the input voltage, and when the input voltage decreases gradually, the output voltage becomes 98% of V_{OUT_REG}.

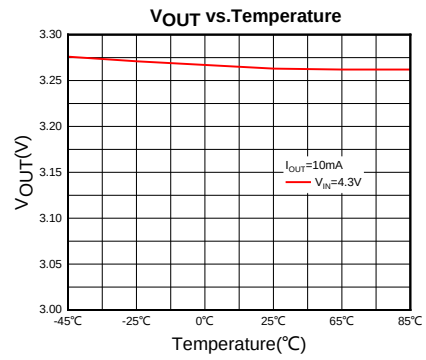
I_{LIMIT}: Output current when V_{IN} = V_{OUT} + 1V and V_{OUT} = 0.95 x $V_{OUT(S)}$.

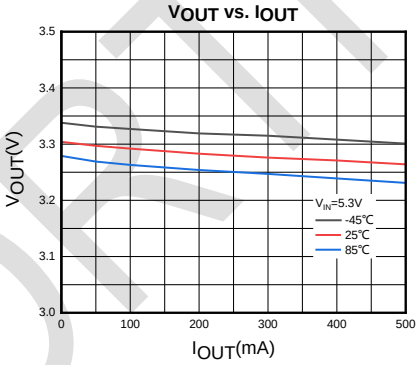
10.6 Characteristics Curve（CN84A033OBR）

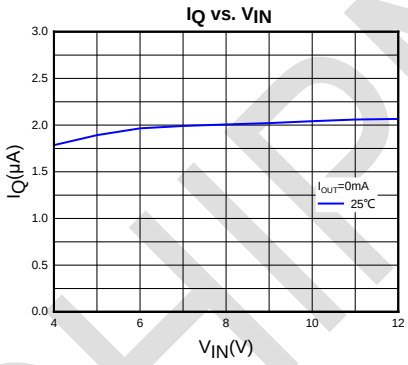
Test conditions: V_{IN}=V_{OUT}+1V, C_{IN}=2.2μF, C_{OUT}=2.2μF, T_A=25℃, unless otherwise specified.

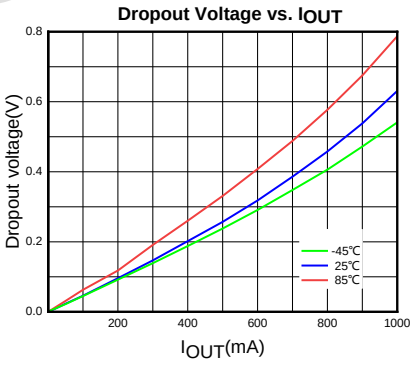


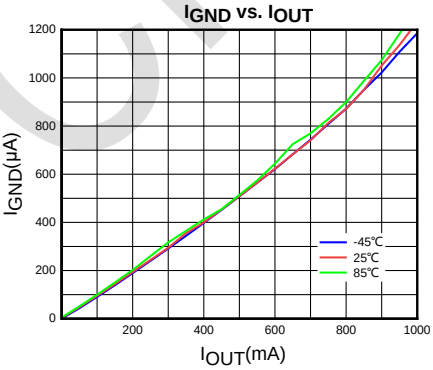


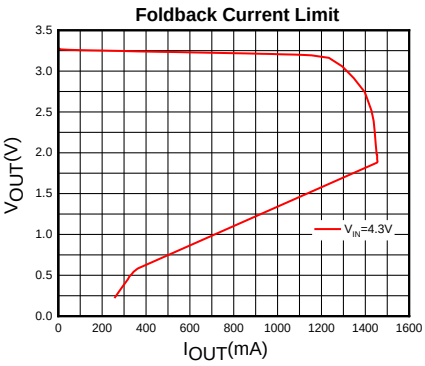












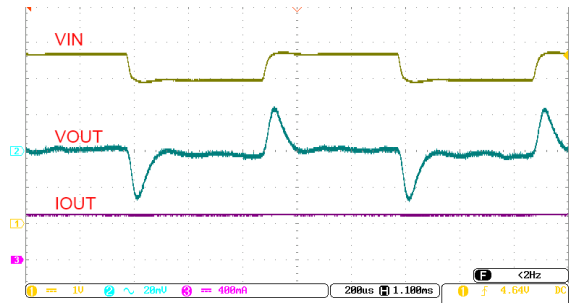


Figure 1 Line Transient

(V_{IN}=from V_{OUT}+1V to 7V to V_{OUT}+1V, I_{OUT}=0.5A)

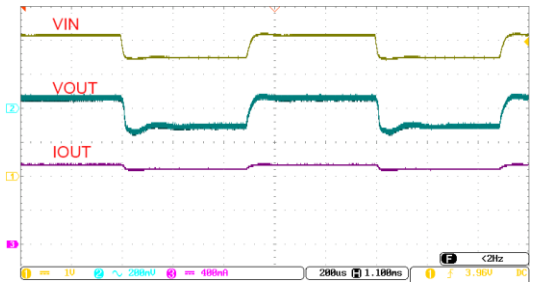


Figure 2 Line Transient

(V_{IN}=from V_{OUT}+1V to 7V to V_{OUT}+1V, I_{OUT}=1A)

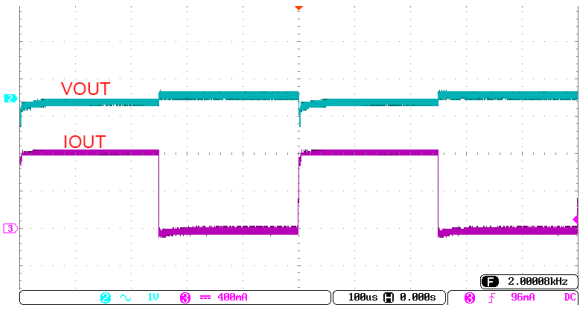


Figure 3 Load Transient

(V_{IN}=V_{OUT}+1V, I_{OUT}=0A-1A-0A)

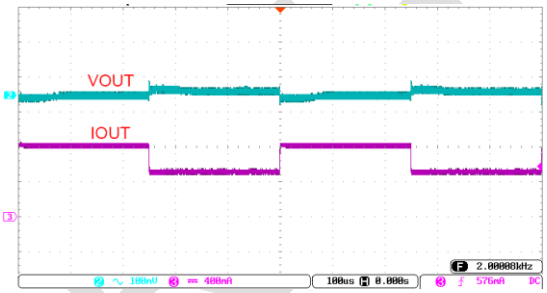
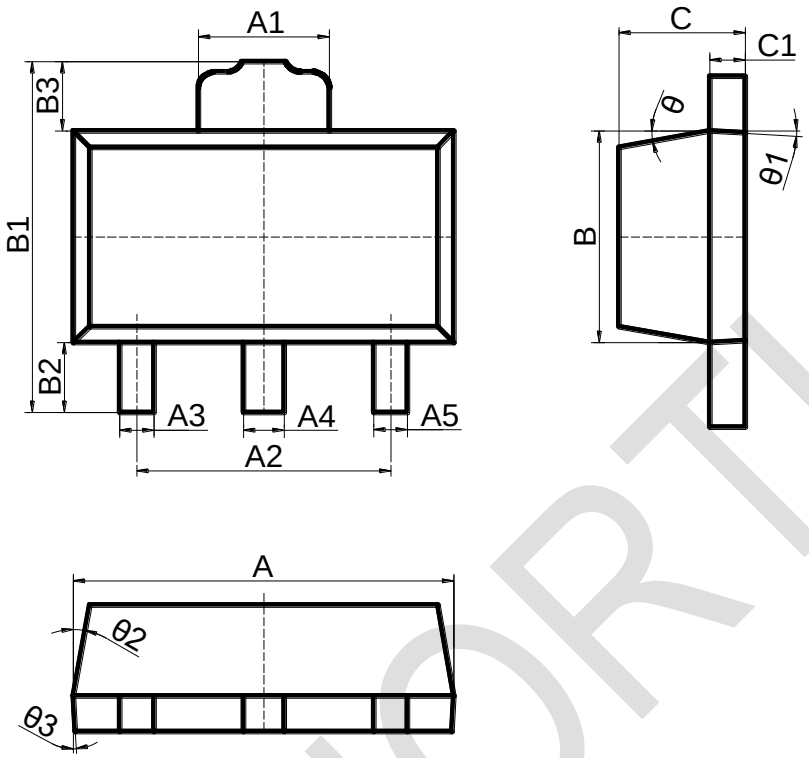


Figure 4 Load Transient

(V_{IN}=V_{OUT}+1V, I_{OUT}=0.5A-1A-0.5A)

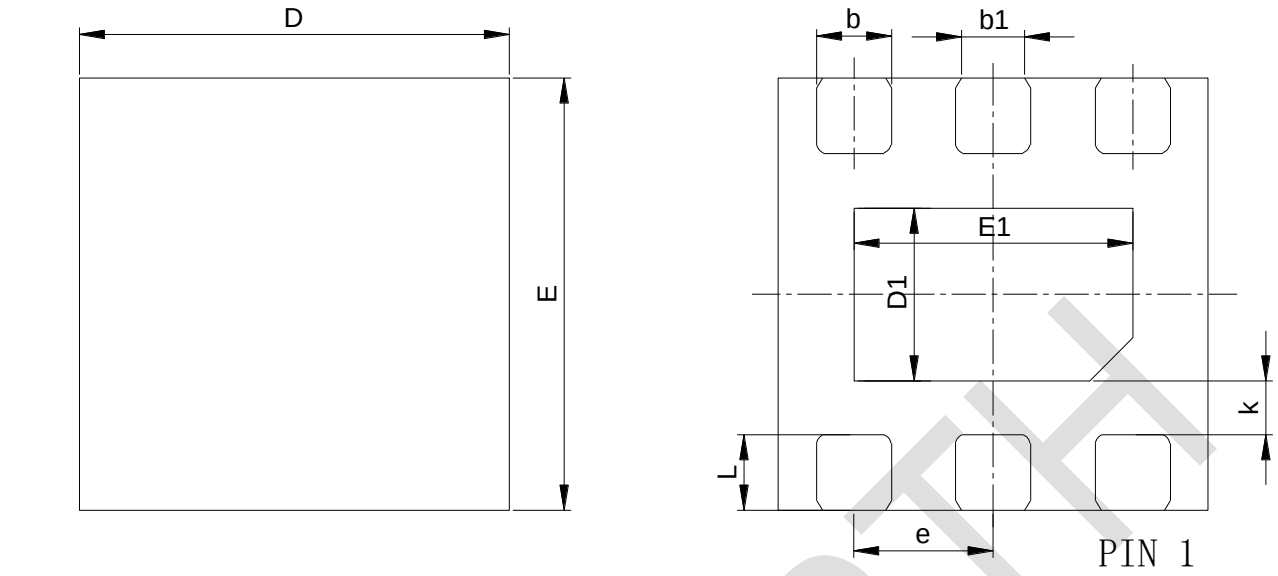
11 Package Information

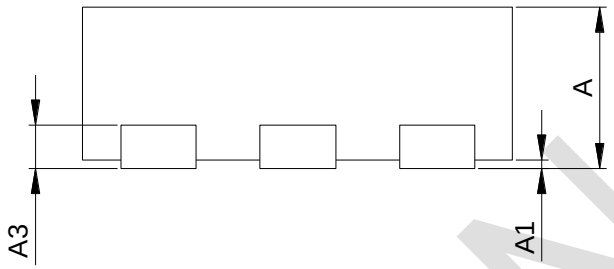
SOT89-3



Dimension / Symbol	Min （mm）	Nom (mm)	Max (mm)
A	4.4	4.5	4.6
A1	1.4	1.6	1.8
A2	2.8	3.0	3.2
A4	0.37	0.47	0.57
A5	0.22	0.42	0.62
B	2.4	2.5	2.6
B1	-	-	4.25
B2	0.8	-	-
C	1.4	1.5	1.6
C1	0.3	0.4	0.5

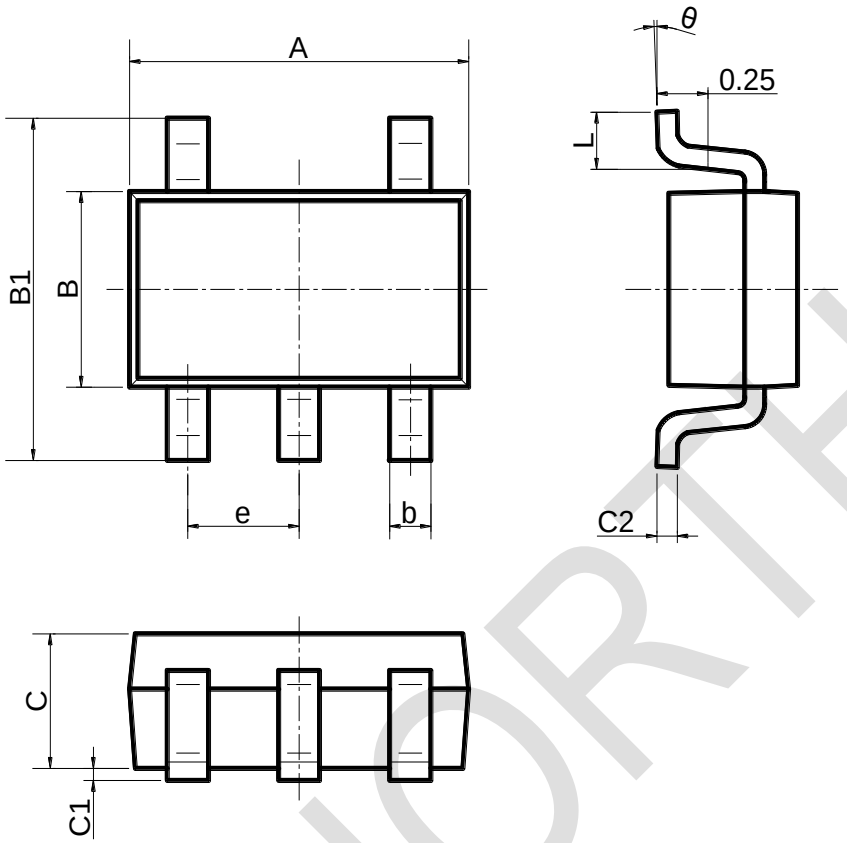
DFN2x2-6





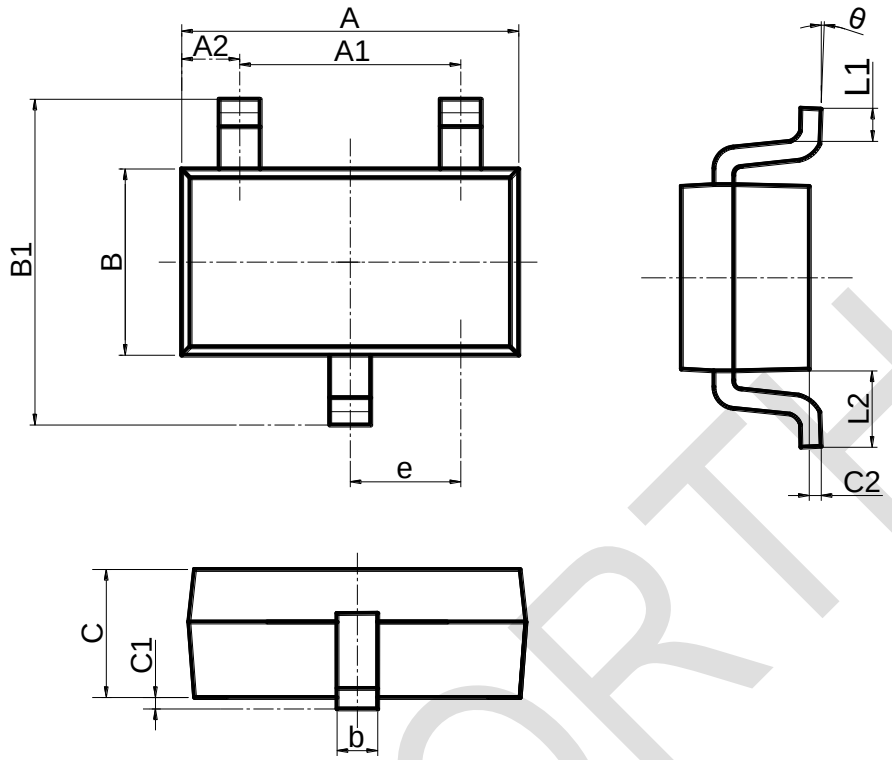
Dimension / Symbol	Min (mm)	Nom (mm)	Max (mm)	Dimension / Symbol	Min (mm)	Nom (mm)	Max (mm)
A	0.7	0.75	0.8	E1	1.5	1.6	1.7
A1	0	0.025	0.05	k		0.25REF	
A3		0.203REF		b	0.25	0.3	0.35
D	1.9	2.0	2.1	b1		0.22REF	
E	1.9	2.0	2.1	e		0.65REF	
D1	0.9	1.0	1.1	L	0.2	0.25	0.3

SOT23-5



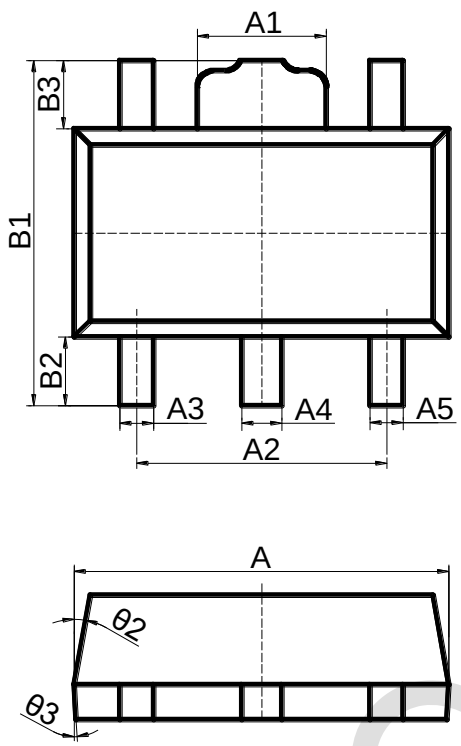
Dimension / Symbol	Min (mm)	Max (mm)	Dimension / Symbol	Min (mm)	Max (mm)
A	2.82	3.02mm	C	1.05	1.15
e	0.95(BSC)		C1	0.03	0.15
b	0.28	0.45	C2	0.12	0.23
B	1.50	1.70	L	0.35	0.55
B1	2.75	3.05	θ	0°	8°

SOT23-3L



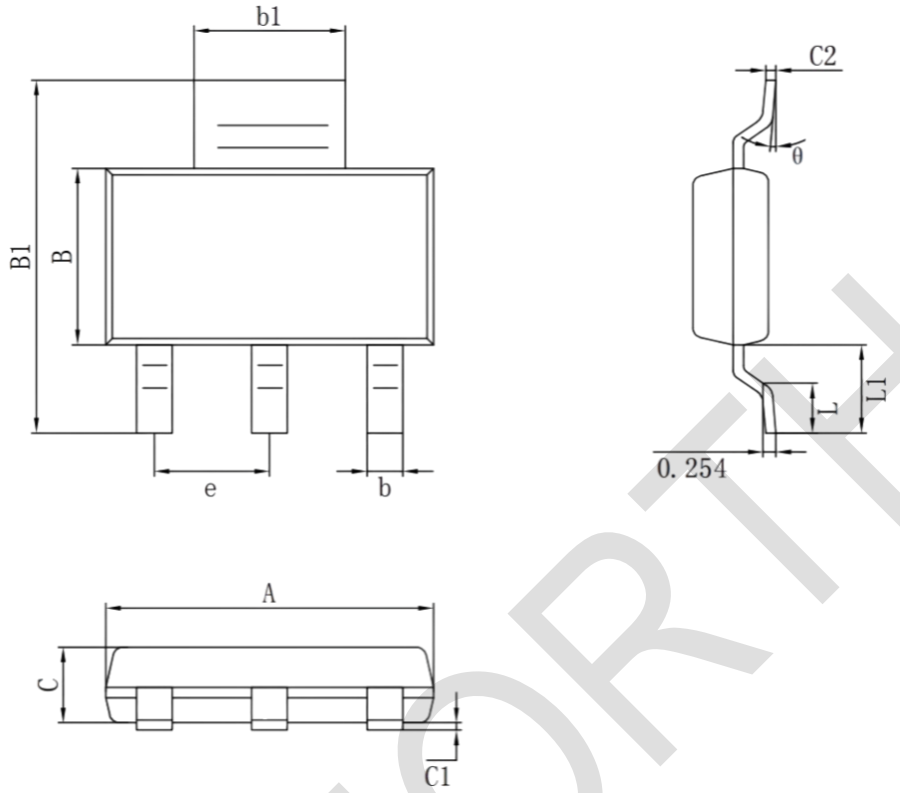
Dimension / Symbol	Min (mm)	Max (mm)	Min (inch)	Max (inch)
A	2.820	3.020	0.111	0.119
A1	1.800	2.000	0.071	0.079
B	1.500	1.700	0.059	0.067
B1	2.650	2.950	0.104	0.116
b	0.300	0.500	0.012	0.020
e	0.950(BSC)		0.037(BSC)	
C	1.050	1.250	0.041	0.049
C1	0.000	0.100	0.000	0.004
C2	0.100	0.200	0.004	0.008
L1	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

SOT89-5



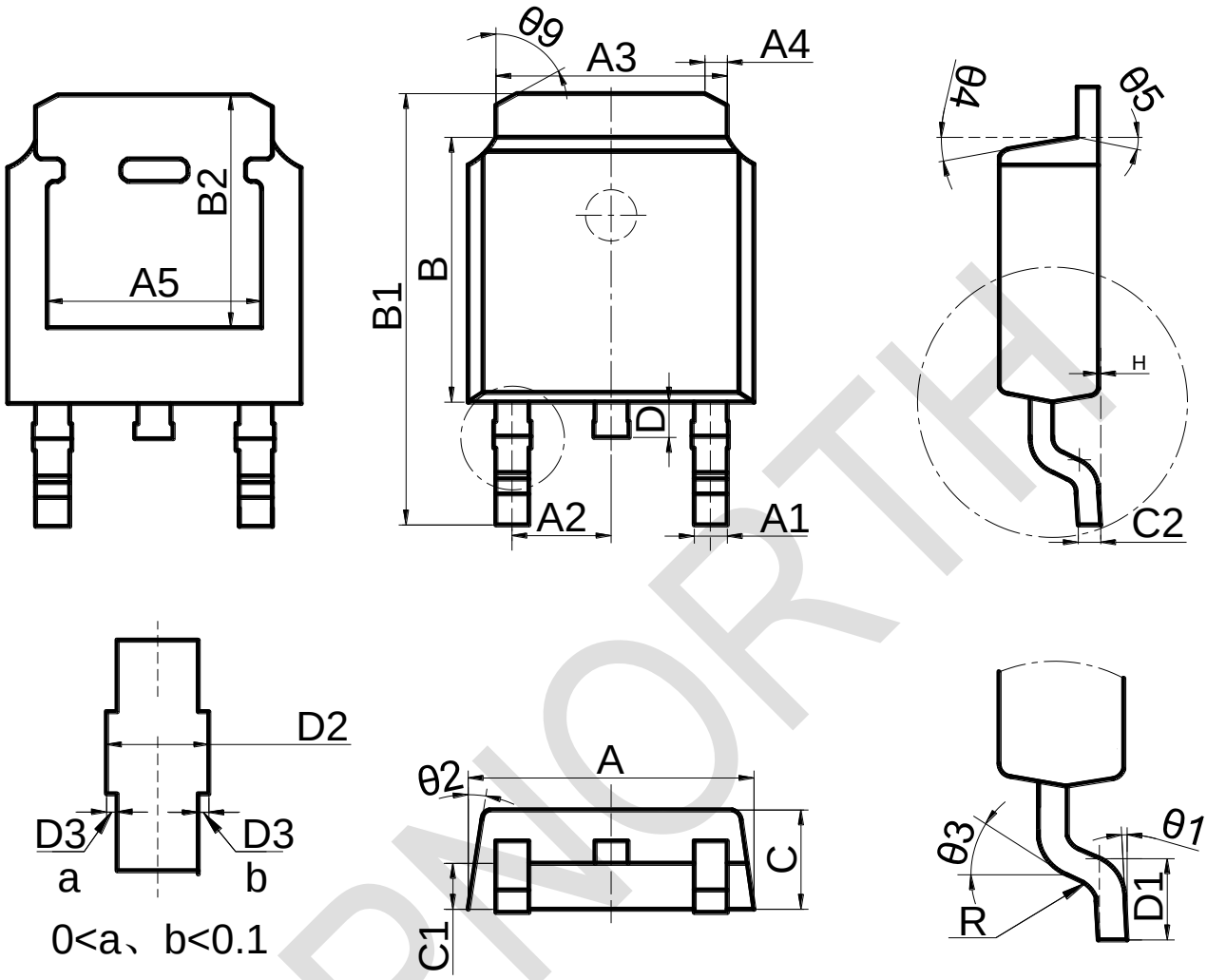
Dimension / Symbol	Min (mm)	Max (mm)	Min (inch)	Max (inch)
A	4.400	4.600	0.173	0.181
A1	1.400	1.800	0.055	0.071
A2	2.900	3.100	0.114	0.122
A4	0.360	0.560	0.014	0.022
A5	0.320	0.520	0.013	0.020
B	2.300	2.600	0.091	0.102
B1	3.940	4.250	0.155	0.167
B2	0.900	1.100	0.035	0.043
C	1.400	1.600	0.055	0.063
C1	0.350	0.440	0.014	0.017

SOT-223



尺寸 / 标注	最小（mm）	最大(mm)	尺寸 / 标注	最小（mm）	最大(mm)
A	6.40	6.60	C	1.45	1.65
e	2.286(BSC)		C1	0.03	0.15
b	0.66	0.76	C2	0.20	0.35
b1	2.95	3.05	L	0.76	1.16
B	3.40	3.60	L1	1.70	1.80
B1	6.85	7.15	θ	0°	8°

TO-252



Dimension / Symbol	Min (mm)	Nom (mm)	Max (mm)	Dimension / Symbol	Min (mm)	Nom (mm)	Max (mm)
A1	0.75		0.84	C1	1.02	1.067	1.12
A2	2.286(BSC)			C2	0.49		0.57
A3	5.30(REF)			C	2.20	2.30	2.40
A5	4.70			D1	1.40	1.50	1.60
A	6.50	6.60	6.79	D2	0.75		0.84
B1	9.90	10.10	10.30	D3	0.01		0.05
B2	5.30(REF)			D	0.60	0.80	1.00
B	6.0	6.10	6.20	θ1	0°		8°

12 Important Statement

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