CN84MXXX

High Precision Low Dropout Linear Regulators

1 Description

The CN84MXXX is a high precision, low dropout voltage linear regulator manufactured using the BCD process. It can supply up to 500mA output current with a quiescent current of 2.5μA. It has internal short circuit protection and thermal shutdown. 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：500mA
- Input Voltage Range：Max 12V
- Enabling Control
- Output short circuit protection
- Thermal shutdown

3 Applications

- Cell phone
- Battery powered equipment
- Wireless telephone，wireless communication equipment
- Camera Recorder
- Portable audio-visual equipment
- Palmtop computer

4 Ordering information

Product Number	Package	Quantity/Tape
CN84MXXXDSR	DFN2x2-6	4000/ Tape
CN84MXXXTCR	SOT23-5	3000/ Tape
CN84MXXXTGR	SOT23-3	3000/ Tape
CN84MXXXOGR	SOT89-3	1000/ Tape
CN84MXXXAOGR	SOT89-3	1000/ Tape
CN84MXXXOBR	SOT89-5	1000/ Tape
CN84MXXXMGR	SOT-223	2500/ Tape
CN84MXXXRGR	TO-252	80/ Tape

Product Number	Output voltage
CN84M018	VOUT=1.8V
CN84M028	VOUT=2.8V
CN84M030	VOUT=3.0V
CN84M033	VOUT=3.3V
CN84M036	VOUT=3.6V
CN84M040	VOUT=4.0V
CN84M050	VOUT=5.0V

5 Marking

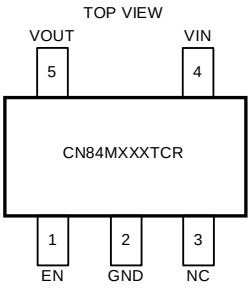
ProductNumber	Marking*
CN84MXXXDSR	84MXX YYWW
CN84MXXXTCR	84MXXX YYWW
CN84MXXXTGR	84MXXT YYWW
CN84MXXXOGR	84MXXX YYWW
CN84MXXXAOGR	84MXXXA YYWW
CN84MXXXOBR	4MXXOBR YYWW
CN84MXXXMGR	84MXXXM YYWW
CN84MXXXRGR	CN84MXXX YYWW

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



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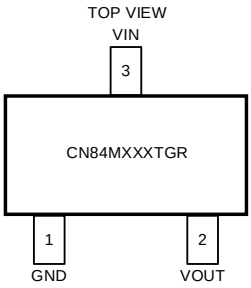

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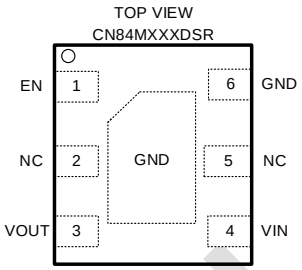
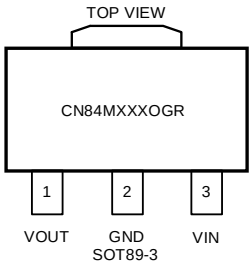


DFN2x2-6



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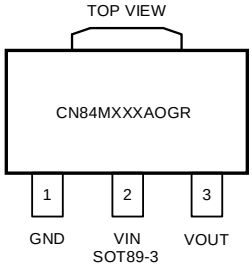

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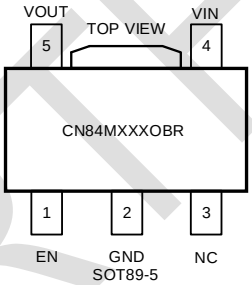

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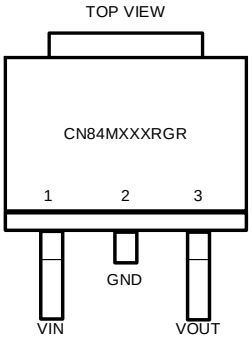
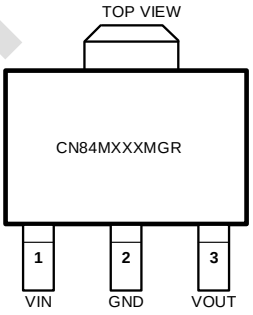
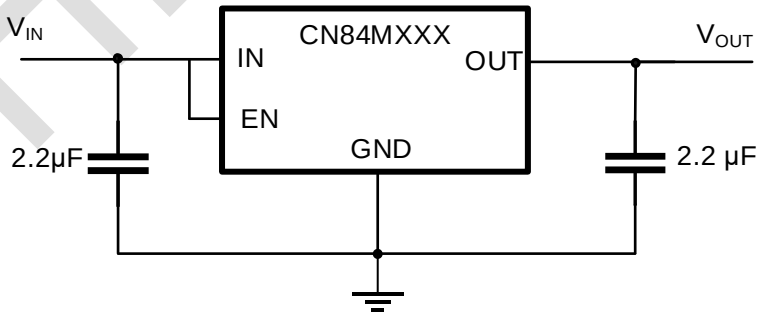


TO-252



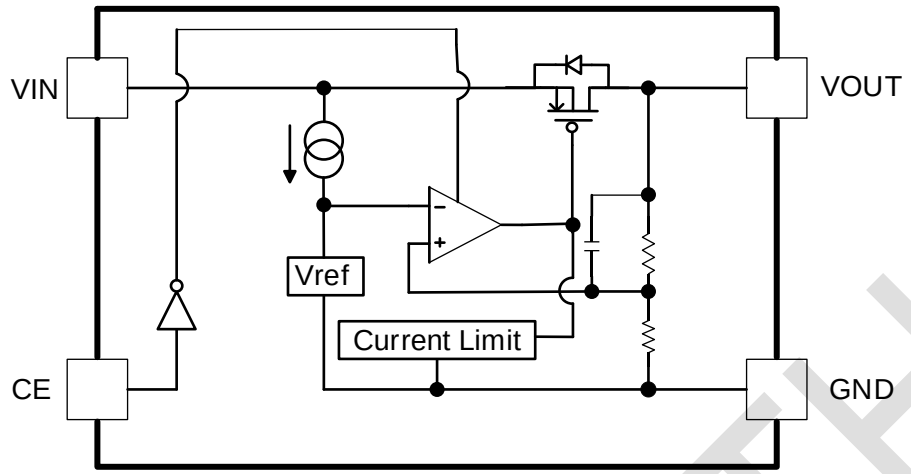
SOT-223

7 Typical Application



Note: General application circuits are recommended input capacitance C_{IN} = 2.2μF, near the chip input; output capacitance C_{OUT} = 2.2μF, near the chip output.

8 Block Diagram



9 Pin Descriptions

Pin No.						Descriptions
Pin Name	CN84MXXX OGR	CN84MXXX AOGR	CN84MXXX OBR	CN84MXXX RGR	CN84MXXX 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	CN84MXXX TGR	CN84MXXX MGR	CN84MXXX DSR			
GND	1	2	6			GND
VIN	3	1	4			Input
VOUT	2	3	3			Output
EN			1			Enable
NC			2、5			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 ~ V_{IN}-0.3	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	Units
HBM	ESDA/JEDEC JS-001-2017	±4000	V
CDM	ESDA/JEDEC JS-002-2018	±2000	V

10.3 Recommended Operating Range

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	Units
Junction to ambient thermal resistance ($R_{\theta JA}$)	SOT23-3	220	°C/W
	SOT23-5	188	°C/W
	DFNWB-4	208	°C/W
	SOT89-3	100	°C/W
	TO-252	30	°C/W
	SOT-223	62	°C/W

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} x 0.98	V_{OUT}	V_{OUT} x 1.02	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}=3.3 V			0.1	%/V
Load Adjustment Ratio	ΔV_{OUT}	V_{IN}=V_{SET}+1V I_{OUT}=0~1A@V_{OUT}=3.3 V		35	70	mV
Quiescent current	I_Q	V_{IN}=12V, I_{OUT} =0mA	0.8	2.5	4.2	uA
Dropout voltage*2	V_{DROP}	I_{OUT}=100mA@V_{OUT}=3.3V	20	50	80	mV
Maximum Output Current	I_{OUT_MAX}		500			mA
Current Limit *3	I_{LIMIT}	V_{IN}=V_{OUT}+1.0V	500	720		mA
OTP threshold		95% rated V_{OUT}		160		°C
OTP hystereis				30		°C
PSRR		100Hz		60		dB

Note*:

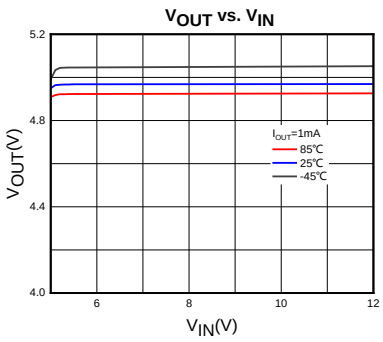
*1, $V_{OUT(S)}$: output voltage when V_{IN} = V_{OUT} + 1V, I_{OUT} = 1mA.

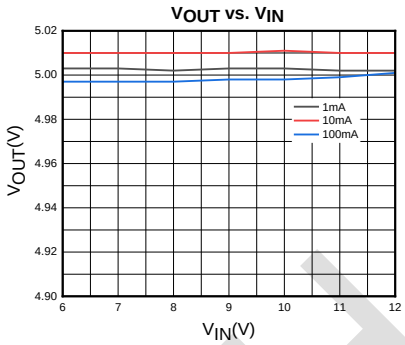
*2, V_{DROP}=V_{IN}-(V_{OUT_REG}*0.98), V_{OUT_REG} is the output voltage when V_{IN} = V_{OUT} + 1.0V and I_{OUT} = 100mA. V_{IN} is the input voltage, and when the input voltage is gradually reduced, the output voltage becomes 98% of V_{OUT_REG}.

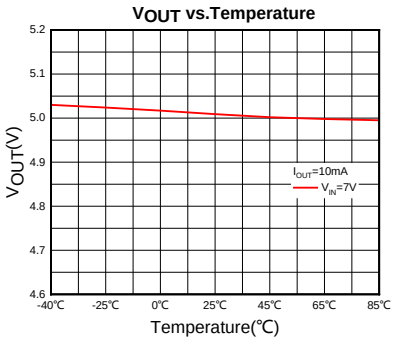
*3, I_{LIMIT}: Output current when V_{IN} = V_{OUT} + 1V and V_{OUT} = 0.95 x $V_{OUT(S)}$.

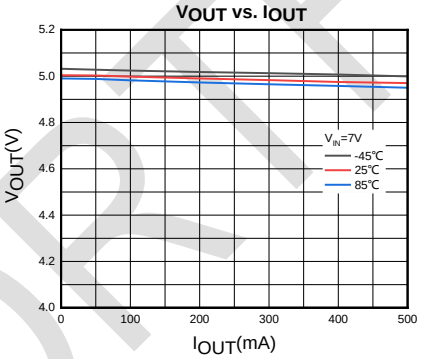
10.6 Characteristics Curve（CN84M050MGR）

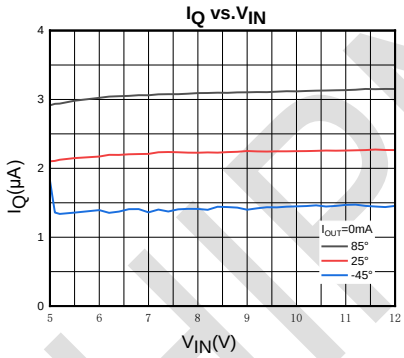
Test conditions：V_{IN}=V_{OUT}+1V, C_{IN}=2.2μF, C_{OUT}=2.2μF, T_A=25°C, unless otherwise specified.

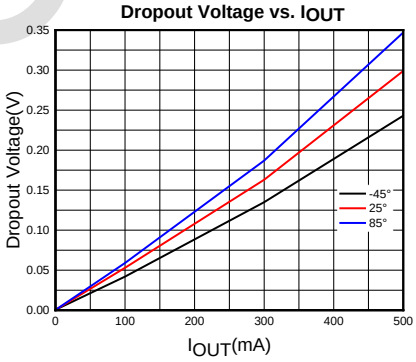


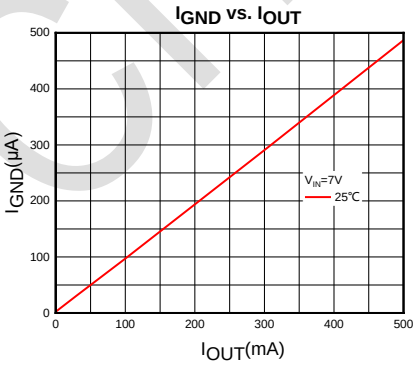


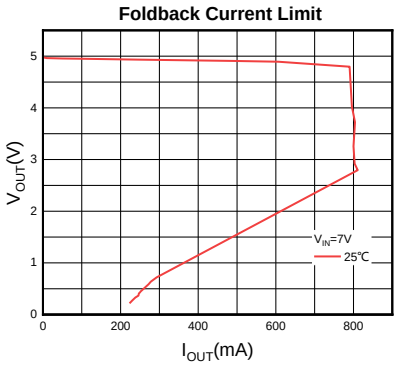












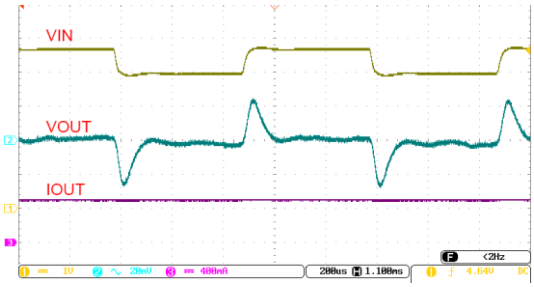


Figure 1 Line Transient

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

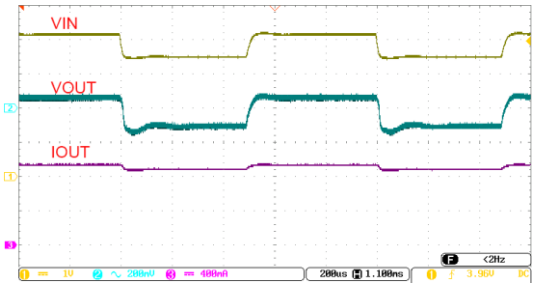


Figure 2 Line Transient

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

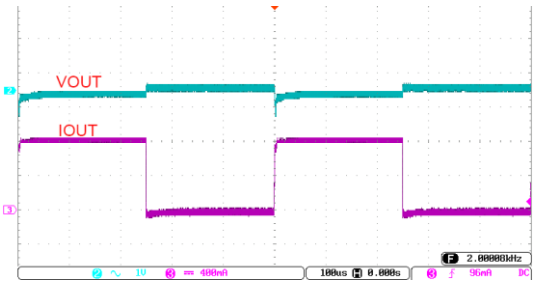


Figure 3 Load Transient

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

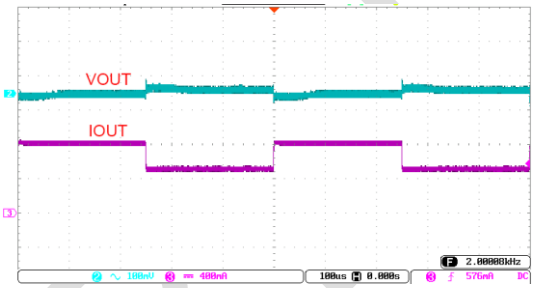
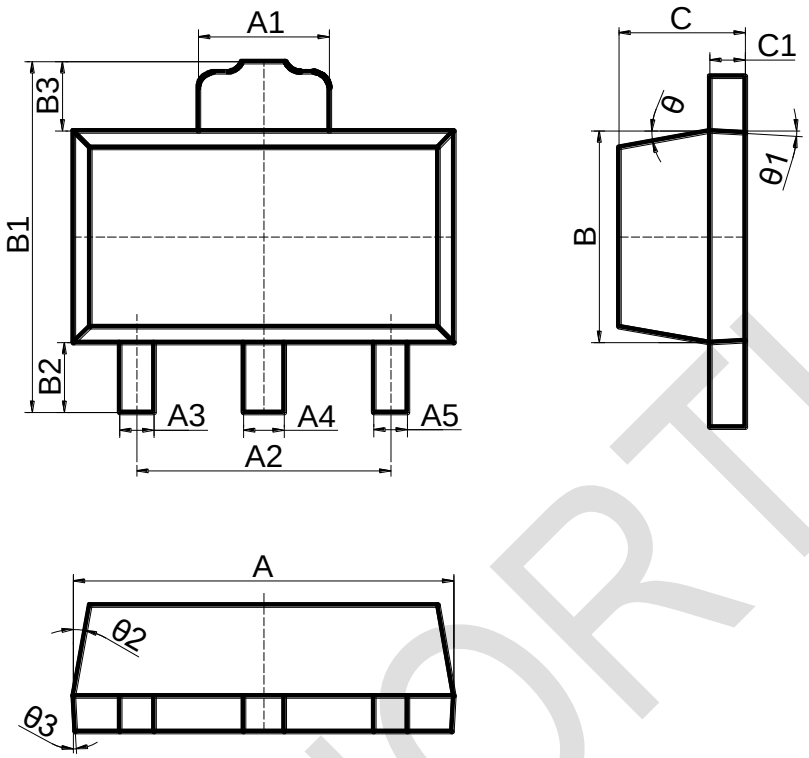


Figure 4 Load Transient

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

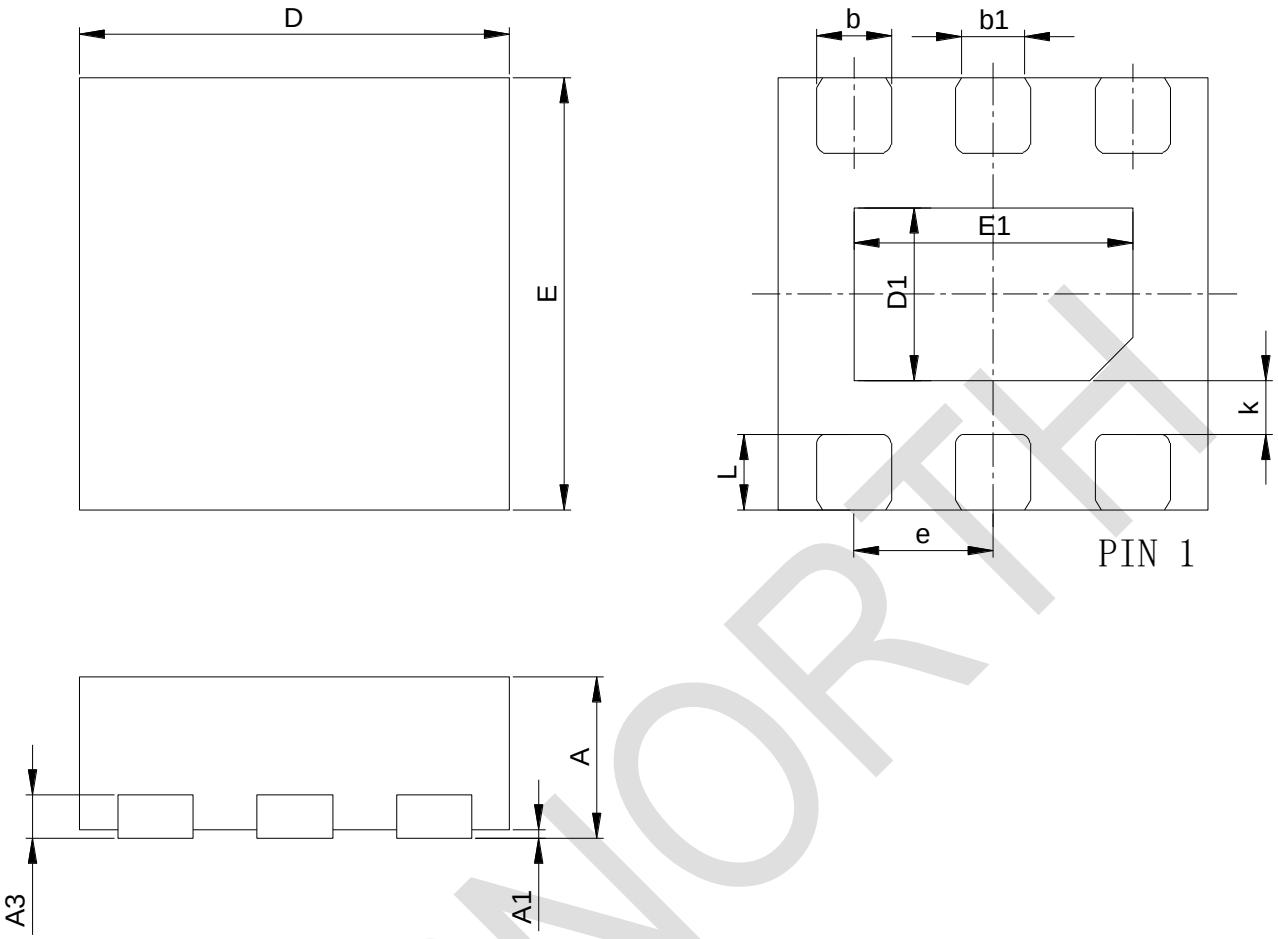
11 Package Information

SOT89-3



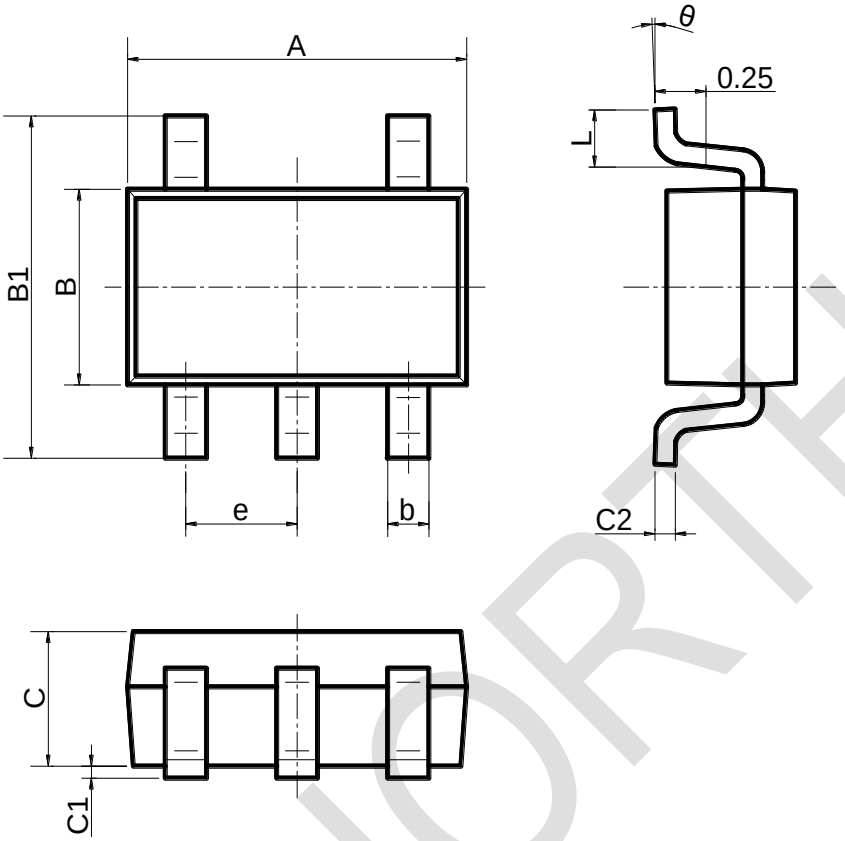
Dimension / Symbol	Min (mm)	Nom (mm)	Max (mm)
A	4.4	4.5	4.6
A1	1.4	1.6	1.8
A2	2.8	3.0	3.2
A4	0.37	0.47	0.57
A5	0.22	0.42	0.62
B	2.4	2.5	2.6
B1	-	-	4.25
B2	0.8	-	-
C	1.4	1.5	1.6
C1	0.3	0.4	0.5

DFN2x2-6



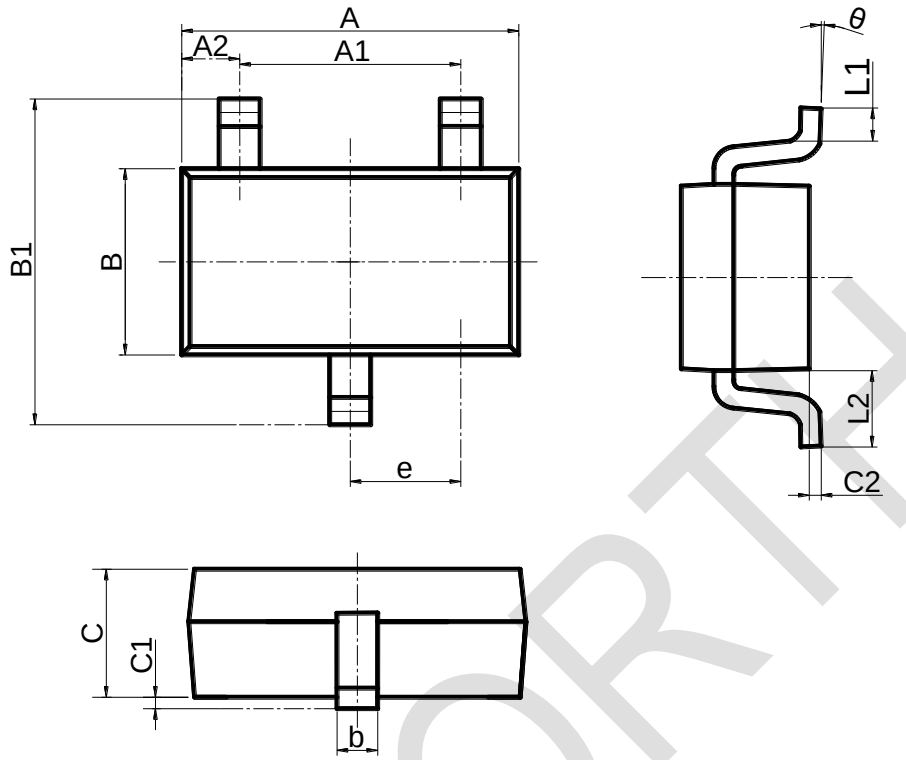
Dimension / Symbol	Min (mm)	Nom (mm)	Max (mm)	Dimension / Symbol	Min (mm)	Nom (mm)	Max (mm)
A	0.7	0.75	0.8	E1	1.5	1.6	1.7
A1	0	0.025	0.05	k	0.25REF		
A3	0.203REF			b	0.25	0.3	0.35
D	1.9	2.0	2.1	b1	0.22REF		
E	1.9	2.0	2.1	e	0.65REF		
D1	0.9	1.0	1.1	L	0.2	0.25	0.3

SOT23-5



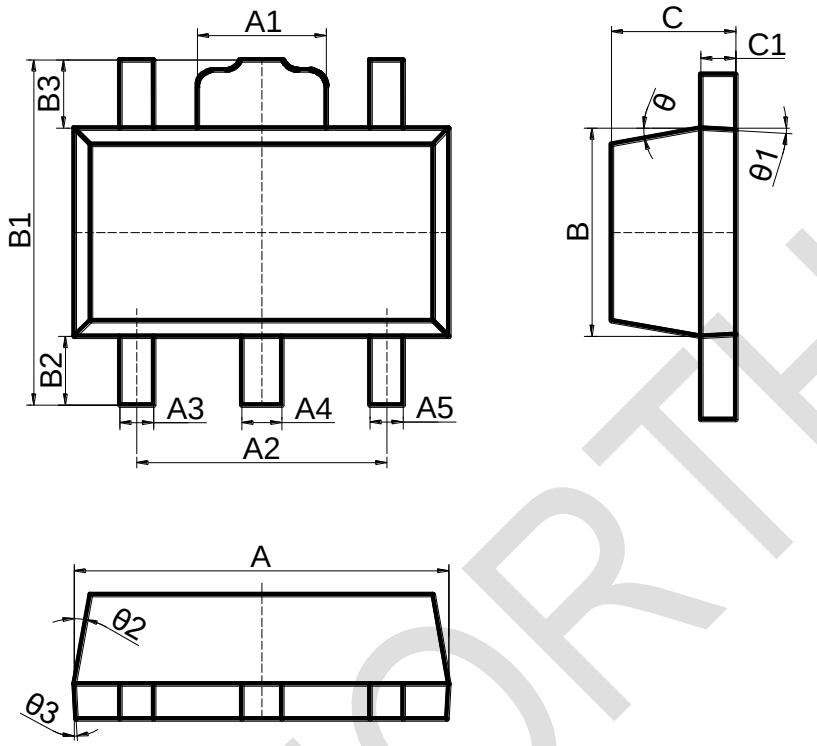
Dimension / Symbol	Min (mm)	Max (mm)	Dimension / Symbol	Min (mm)	Max (mm)
A	2.82	3.02mm	C	1.05	1.15
e	0.95(BSC)		C1	0.03	0.15
b	0.28	0.45	C2	0.12	0.23
B	1.50	1.70	L	0.35	0.55
B1	2.75	3.05	θ	0°	8°

SOT23-3L



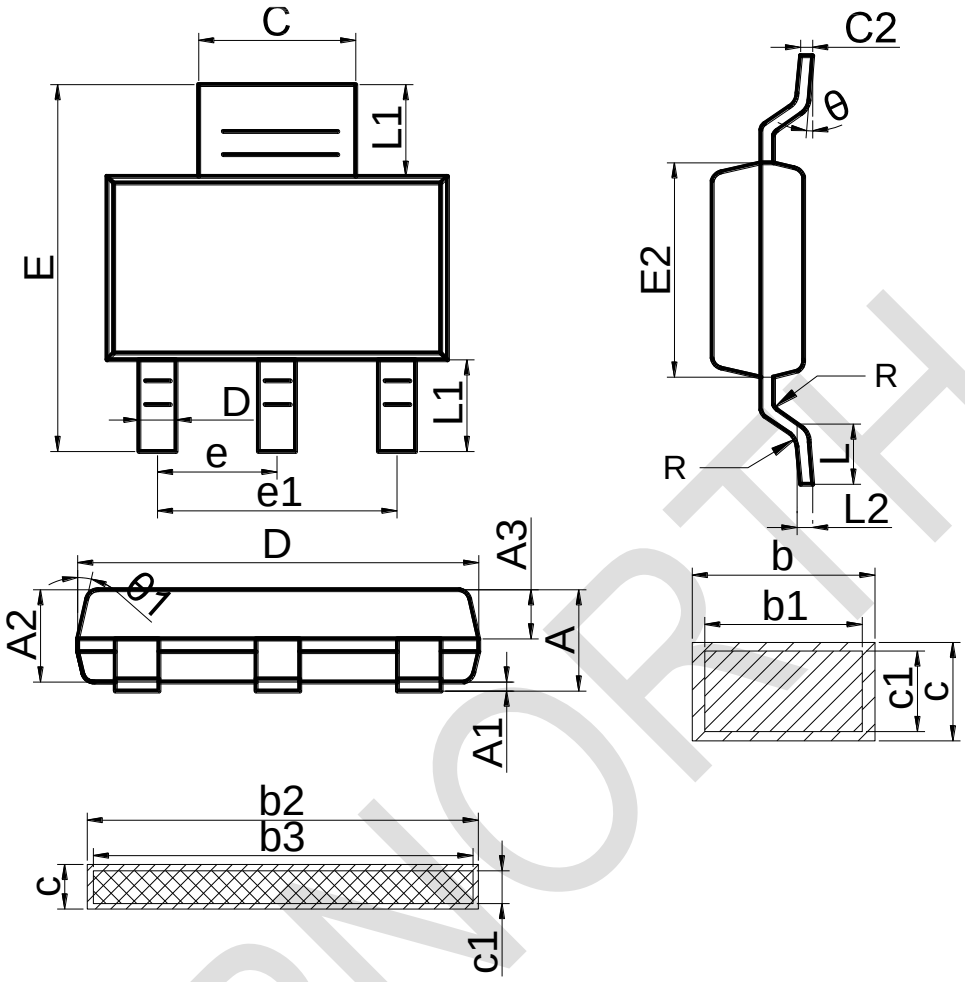
Dimension / Symbol	Min (mm)	Max (mm)	Min (inch)	Max (inch)
A	2.820	3.020	0.111	0.119
A1	1.800	2.000	0.071	0.079
B	1.500	1.700	0.059	0.067
B1	2.650	2.950	0.104	0.116
b	0.300	0.500	0.012	0.020
e	0.950(BSC)		0.037(BSC)	
C	1.050	1.250	0.041	0.049
C1	0.000	0.100	0.000	0.004
C2	0.100	0.200	0.004	0.008
L1	0.300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

SOT89-5



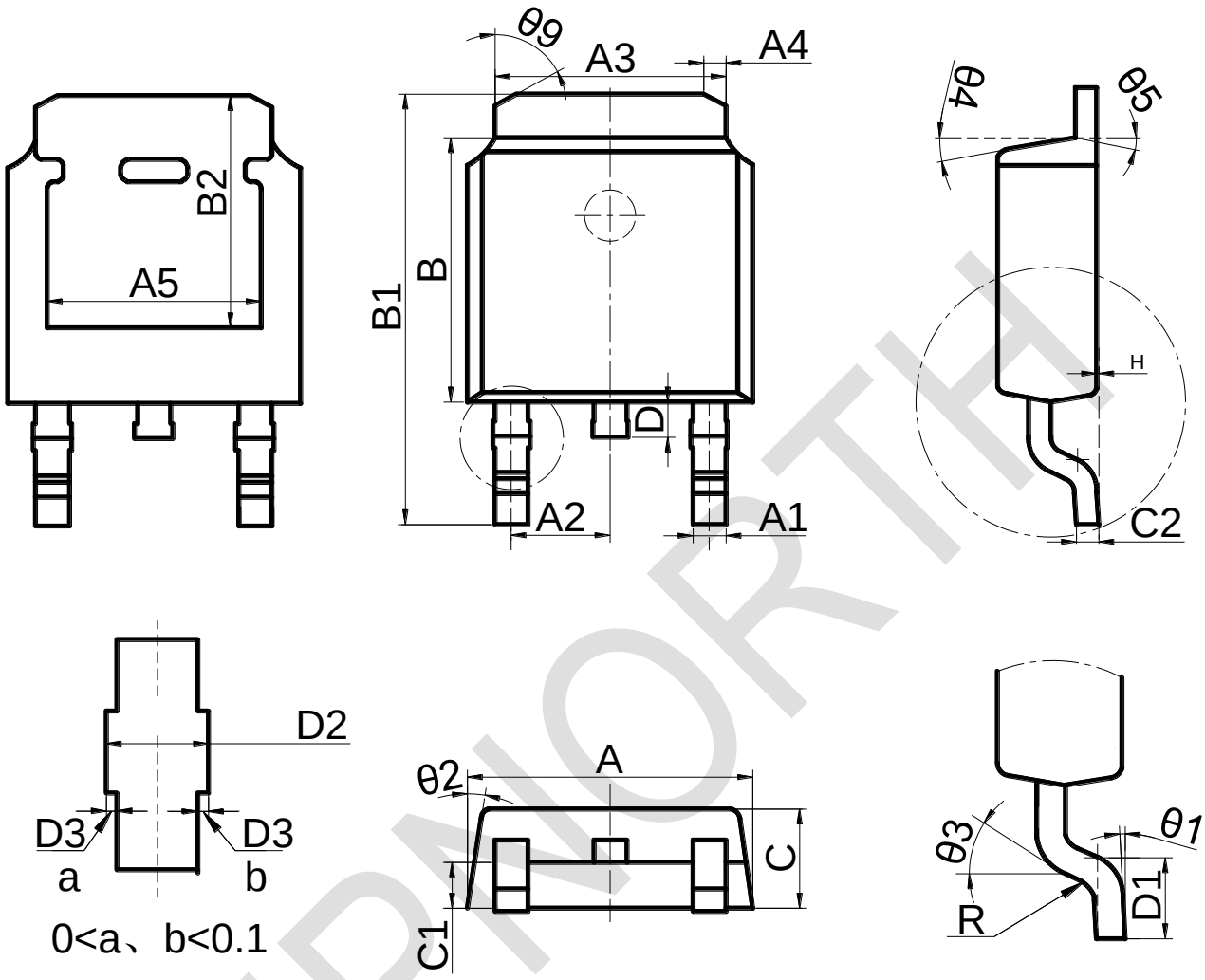
Dimension / Symbol	Min (mm)	Max (mm)	Min (inch)	Max (inch)
A	4.400	4.600	0.173	0.181
A1	1.400	1.800	0.055	0.071
A2	2.900	3.100	0.114	0.122
A4	0.360	0.560	0.014	0.022
A5	0.320	0.520	0.013	0.020
B	2.300	2.600	0.091	0.102
B1	3.940	4.250	0.155	0.167
B2	0.900	1.100	0.035	0.043
C	1.400	1.600	0.055	0.063
C1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

SOT-223



Dimension / Symbol	Min (mm)	Nom (mm)	Max (mm)	Dimension / Symbol	Min (mm)	Nom (mm)	Max (mm)
A			1.80	E	6.80		7.20
A1	0.02		0.10	R	0.10		
A2	1.50	1.60	1.70	E2	3.33	3.43	3.53
A3	0.80	0.90	1.00	e	2.30(BSC)		
b	0.67		0.80	e1	4.60(BSC)		
b1	0.66	0.71	0.76	L	0.80	1.00	1.20
b2	296		3.09	L1	1.75(REF)		
b3	2.95	3.00	3..05	L2	4.60(BSC)		
c	0.30	6.53	6.58	θ	0°		8°
c1	0.29	0.30	0.31	θ1	10°	12°	14°
D	6.48	6.53	6.58				

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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