Low Power Linear Regulators with Current Limit Function

1 Description

The CN85LXXX is a low power high PSRR linear regulator with current limiting function that provides 300mA output current. With short circuit protection and thermal protection. It is available in SOT89-3, DFN2X2-6, SOT23-5, SOT23-3 packages.

2 Features

- Ultra-low quiescent current：2.5μA
- High accuracy：±2%
- Low dropout voltage：80mV @ I_{OUT} = 100mA, V_{OUT} =5V
- Maximum output current：300mA
- Input voltage range：Max 20V
- 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
CN85LXXXDSR	DFN2x2-6	4000/Type
CN85LXXXTCR	SOT23-5	3000/Type
CN85LXXXTGR	SOT23-3	3000/Type
CN85LXXXOGR	SOT89-3	1000/Type
CN85LXXXAOGR	SOT89-3	1000/Type

Product Number	output voltage
CN85L018	VOUT=1.8V
CN85L028	VOUT=2.8V
CN85L030	VOUT=3.0V
CN85L033	VOUT=3.3V
CN85L036	VOUT=3.6V
CN85L040	VOUT=4.0V
CN85L050	VOUT=5.0V

5 Marking

Product Number	Marking*
CN85LXXXDSR	CN85XX YYWW
CN85LXXXTCR	85LXXX YYWW
CN85LXXXTGR	85XXXT YYWW
CN85LXXXOGR	CN85LXXX YYWW
CN85LXXXAOGR	CN85LXXXA 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

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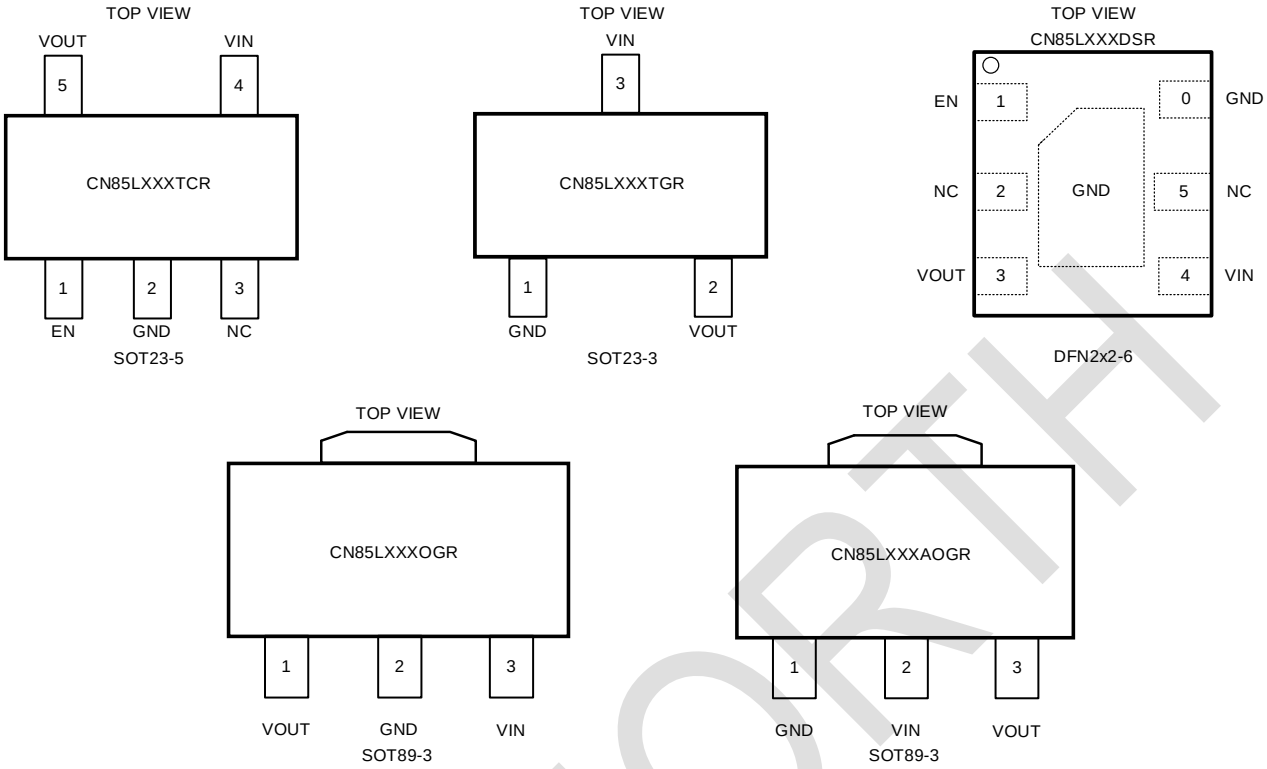
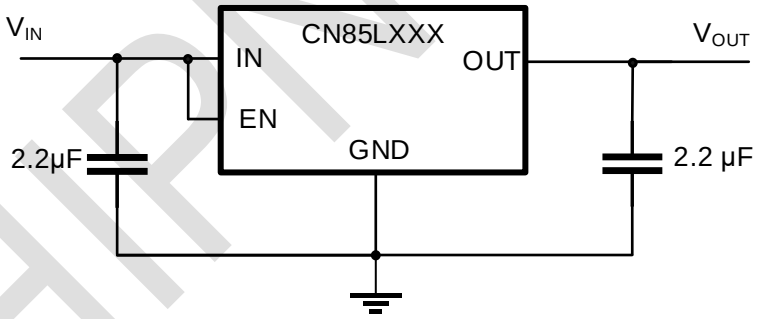
6 Pinout



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.

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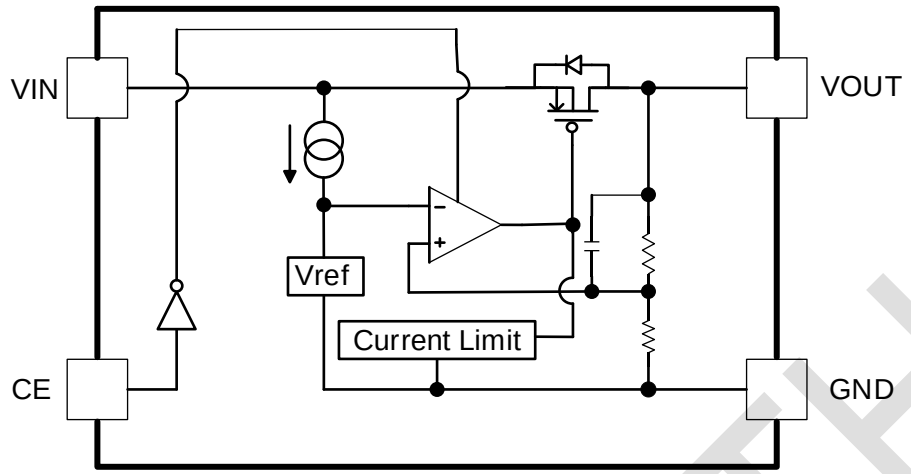
8 Block Diagram



9 Pin Descriptions

Pin No.						Descriptions
Pin Name	CN85LXXX AOGR	CN85LXXX OGR	CN85LXXX TGR	CN85LXXX DSR	CN85LXXX TCR	
GND	1	2	1	6	2	GND
VIN	2	3	3	4	4	Input
VOUT	3	1	2	3	5	Output
EN				1	1	Enable
NC				2、5	3	No Connect

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10 Specifications

10.1 Absolute Maximum Ratings

Parameter	Symbol	Value	Units
Maximum Input Voltage	V_{IN}	-0.3 ~ 22	V
Maximum output Voltage	V_{OUT}	-0.3 ~ V_{IN}-0.3	V
EN enable voltage	V_{EN}	-0.3 ~ 14	V
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	20	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
	DFN2x2-6	140	°C/W
	SOT89-3（OGR）	100	°C/W
	SOT89-3（AOGR）	165	°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.

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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		20	V
Output voltage *1	V_{OUT}	V_{IN}=V_{OUT}+2V, I_{OUT}=1mA	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~20V I_{OUT}=1mA@V_{OUT}=5V			0.01	%/V
Load Adjustment Ratio	ΔV_{OUT}	V_{IN}=V_{SET}+1V I_{OUT}=0~300mA@V_{OUT}=5V		28	45	mV
Quiescent current	I_Q	V_{IN}=12V, I_{OUT} =0mA	1	2.5	4.2	μA
Dropout voltage*2	V_{DROP}	I_{OUT}=100mA@V_{OUT}=5V	35	80	125	mV
Maximum Output Current	I_{OUT_MAX}			300		mA
Current Limit *3	I_{LIMIT}	V_{IN}=V_{OUT}+1.0V	0.3		1	A
OTP threshold				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 $V_{OUT(S)}$.

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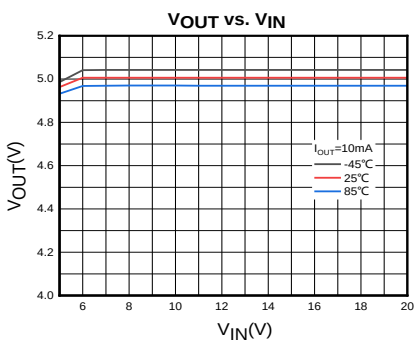
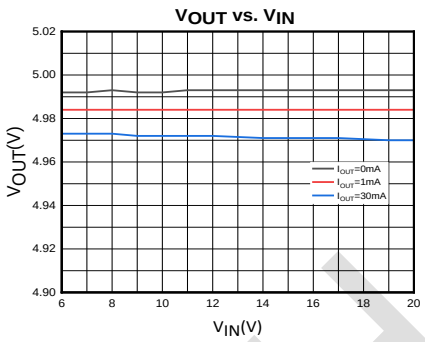
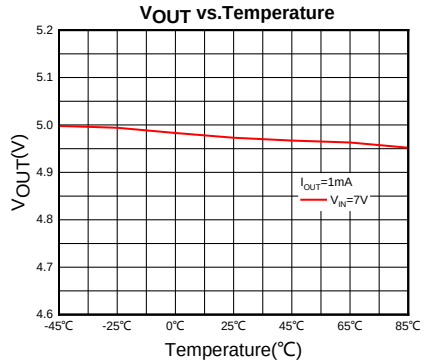
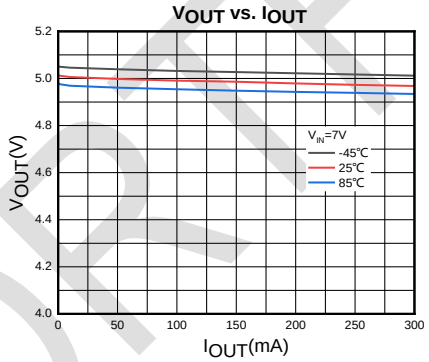
10.6 Characteristics Curve（CN85L050OGR）

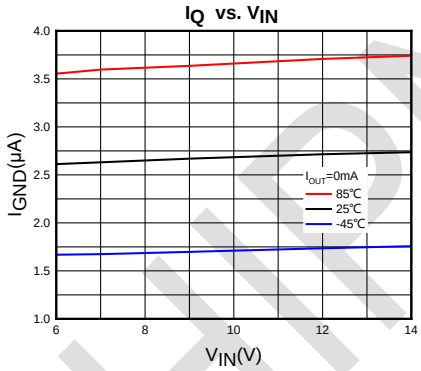
Test conditions：V_{IN}=V_{OUT}+1V, C_{IN}=2.2μF, C_{OUT}=2.2μF, T_A=25°C, unless otherwise specified.

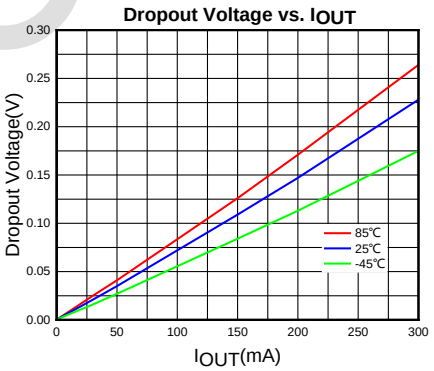


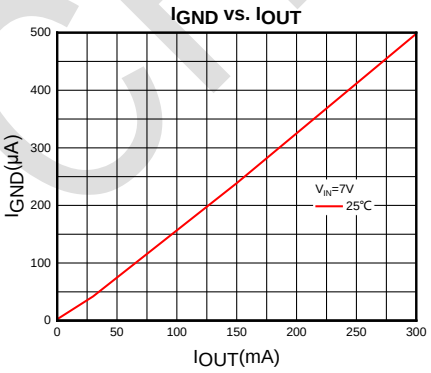


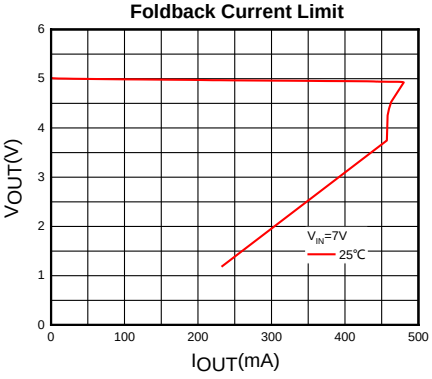












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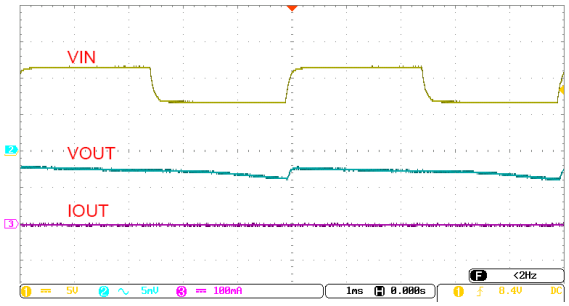

Figure 1 Line Transient

(V_{IN}=from 6V to 12V toV_{OUT}+1V I_{OUT}=0mA)

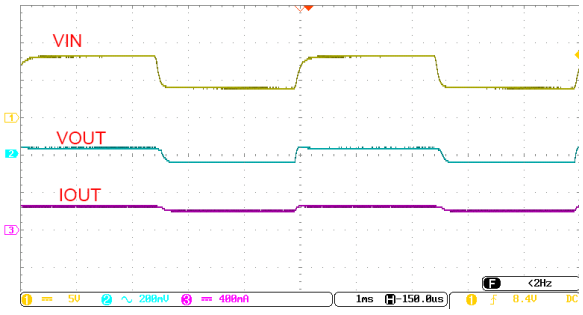

Figure 2 Line Transient

(V_{IN}=from 6V to 12V toV_{OUT}+1V I_{OUT}=300mA)

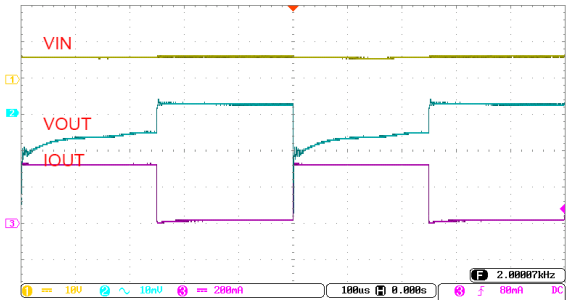

Figure 3 Load Transient

(V_{IN}=7V, I_{OUT}=0mA-300mA-0mA)

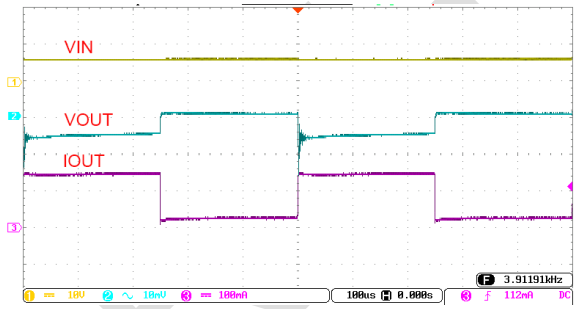

Figure 4 Load Transient

(V_{IN}=7V, I_{OUT}=1mA-150mA-1mA)

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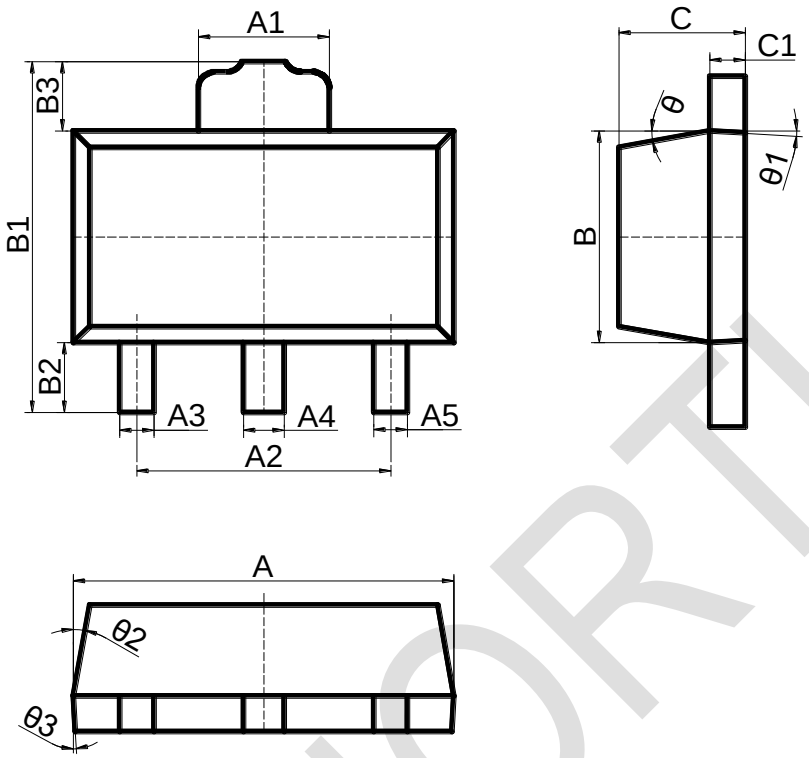
11 Package Information

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

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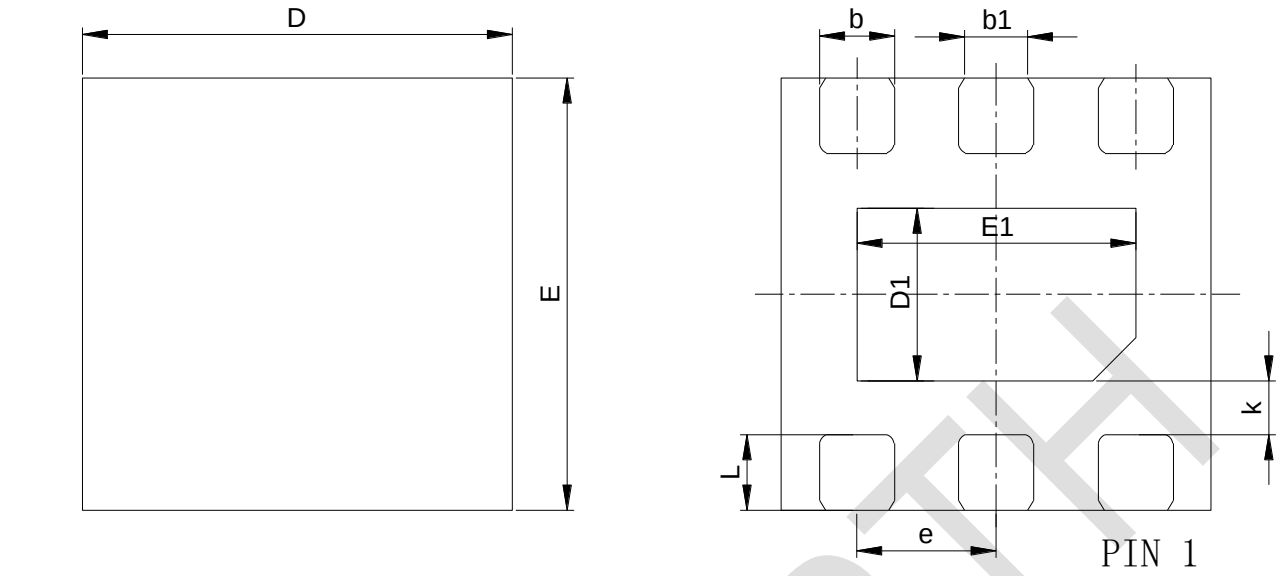
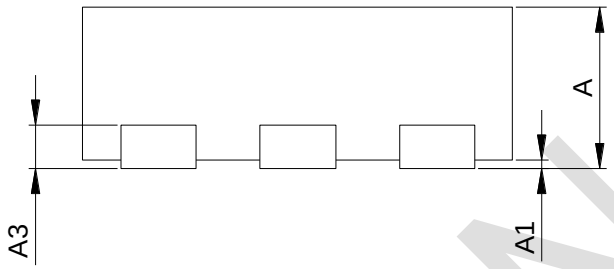
DFN2x2-6





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

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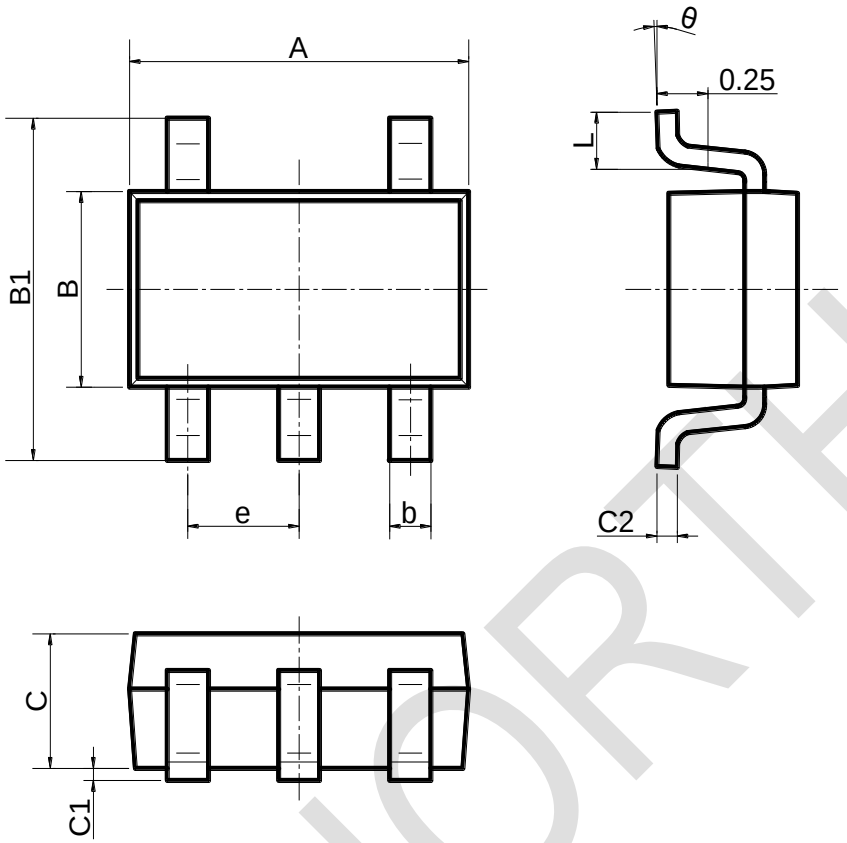
SOT23-5



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°

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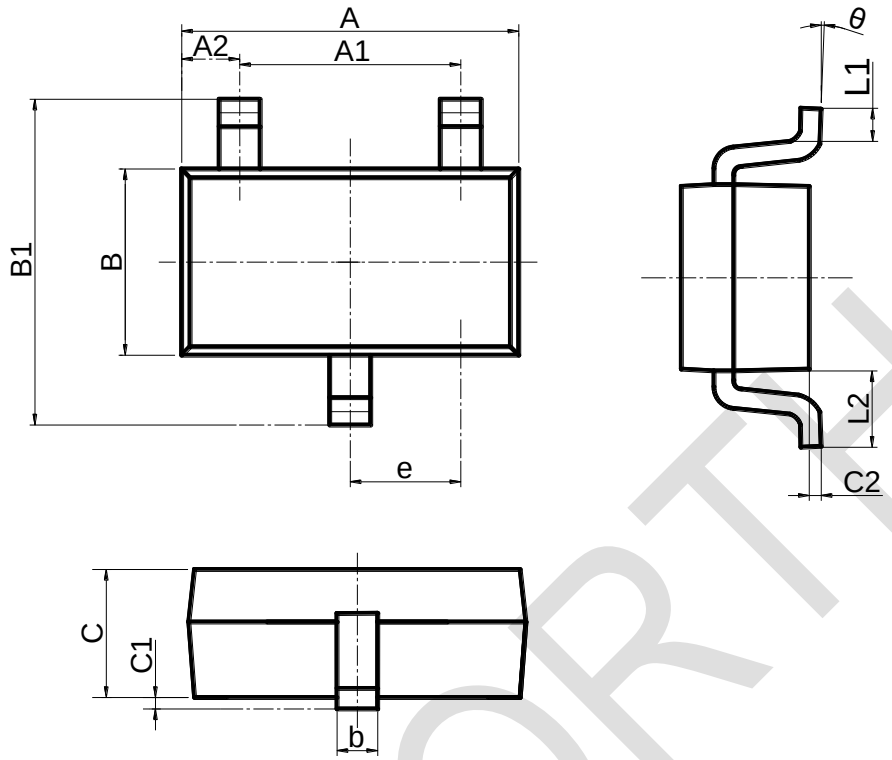
SOT23-3L



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°

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12 Important Statement

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