

Low Power Linear Regulator with Current Limiting Function

1 Description

CN88LXXX is a wide voltage input high precision low voltage differential linear regulator with high PSRR and 150mA output current. With short circuit protection, overcurrent protection and overheat protection, there are SOT89-3, DFN2X2-6, SOT23-5, SOT23-3 and other packaging forms.

2 Features

- Low static current: 6 μ A
- High accuracy: $\pm 2\%$
- Differential pressure: 500mV @ $I_{OUT} = 100mA$ @ $V_{OUT} = 5V$
- Maximum output current: 150mA
- Input voltage range: Max. 35V
- Output short circuit protection
- Internal Thermal Overload Protection
- Internal Short-Circuit Limiting
- Recommend Capacitor: 1 μ F~10 μ F

3 Applications

- Smart Electric Meter
- Switch Power

4 Ordering information

Product Number	Package	Quantity/Tape
CN88LXXXDSR	DFN2x2-6	4000/Tape
CN88LXXXTCR	SOT23-5	3000/Tape
CN88LXXXATCR	SOT23-5	3000/Tape
CN88LXXXOGR	SOT89-3	1000/Tape
CN88LXXXAOG	SOT89-3	1000/Tape
CN88LXXXTGR	SOT23-3	3000/Tape

Product Number	Output voltage
CN88L025	Vout=2.5V
CN88L033	Vout=3.3V
CN88L040	Vout=4.0V
CN88L050	Vout=5.0V
CN88L056	Vout=5.6V

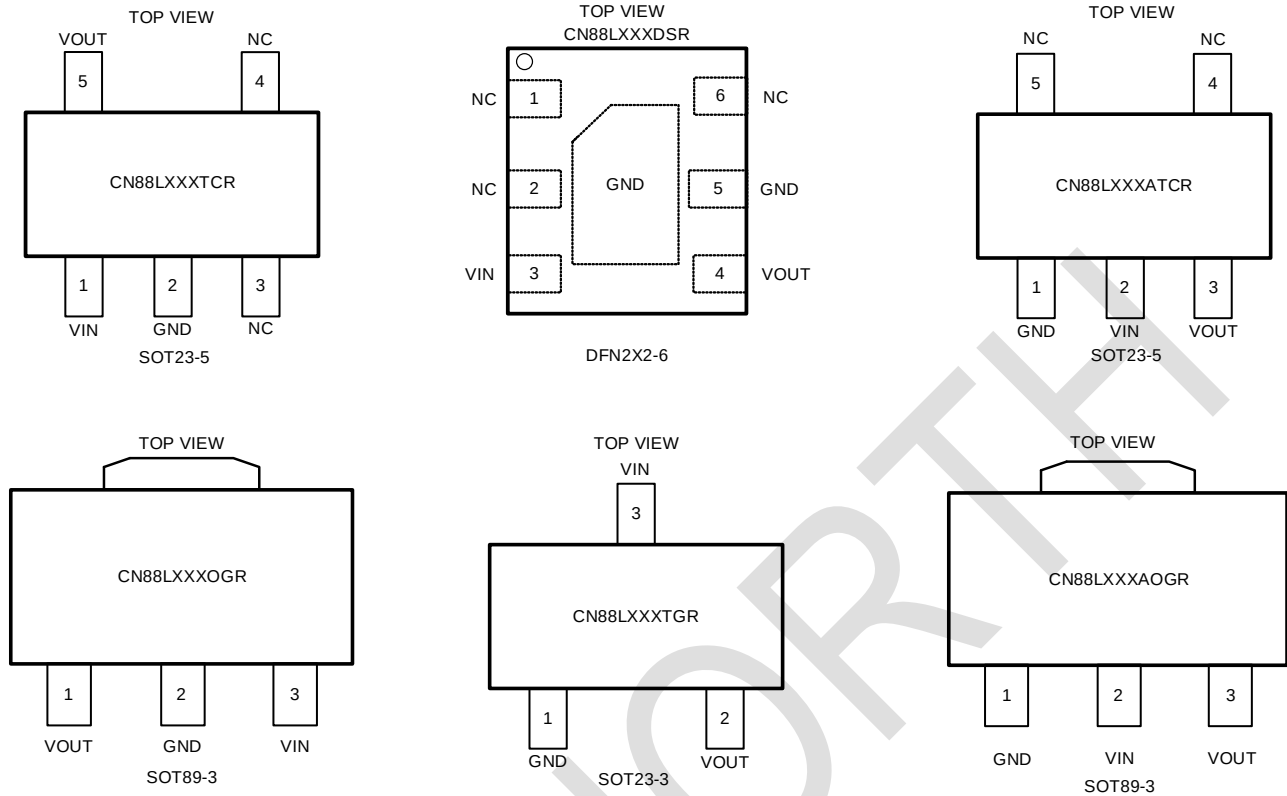
5 Marking

Product Number	Marking
CN88LXXXDSR	CN88XX YYWW
CN88LXXXTCR	88LXXX YYWW
CN88LXXXATCR	88LXXXA YYWW
CN88LXXXOGR	CN88LXXX YYWW
CN88LXXXAOG	CN88LXXXA YYWW
CN88LXXXTGR	88XXXT YYWW

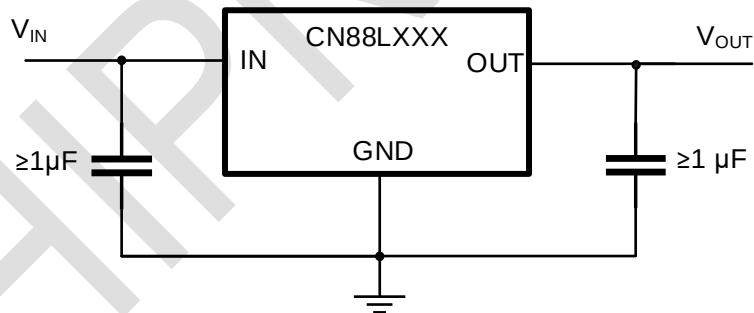
Note: YY=Year WW=Week.

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

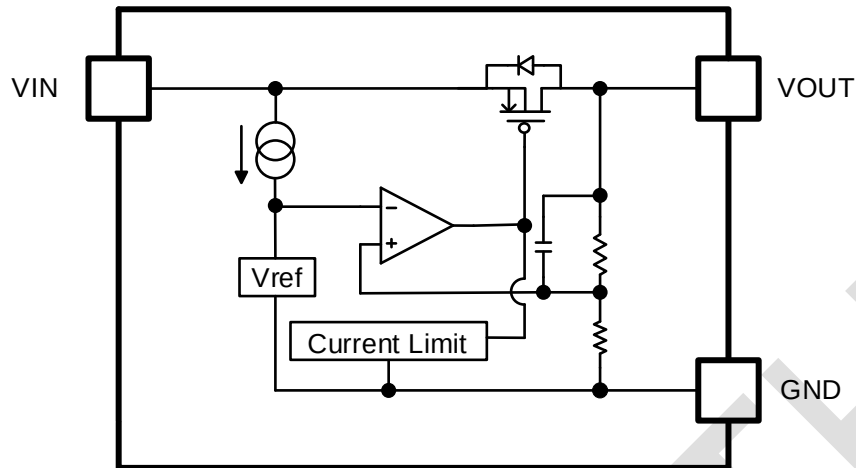


7 Typical Application



Note: Input capacitance $C_{IN} \geq 1\mu F$ is recommended for general application circuits, close to the chip input end; Output capacitance $C_{OUT} \geq 1\mu F$, close to the chip output end.

8 Block Diagram



9 Pin Descriptions

Pin Name	Pin Number						Description
	CN88L XXXAOG	CN88L XXXOGR	CN88L XXXDSR	CN88L XXXTCR	CN88L XXATCR	CN88L XXTGR	
GND	1	2	5	2	1	1	GND
VIN	2	3	3	1	2	3	Input
VOUT	3	1	4	5	3	2	Output
NC			1、2、6	3、4	4、5		No Connect

10 Specifications

10.1 Absolute Maximum Ratings

Parameter	Symbol	Value	Units
Maximum input voltage	V_{IN}	-0.3 ~ 40	V
Maximum output voltage	V_{SS}	-0.3 ~ 12	V
Storage temperature range	T_{STG}	-55 ~ 150	°C
Soldering temperature	T_{LEAD}	260(Soldering 10s)	°C

(1) Stress exceeding the values listed under the absolute maximum rating may cause permanent damage to the device. These listed values are stress levels only and do not indicate that the device will operate properly under these conditions and under any other conditions other than the recommended operating conditions. Prolonged operation under maximum absolute rated conditions will affect device reliability.

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

10.2 ESD Ratings

Discharge mode	Norm	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	V_{IN}	$V_{OUT}+1$	35	V
Operating 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	100	°C/W

10.5 Electrical Characteristics

Test Condition: $V_{IN}=V_{OUT}+1V$, $C_{IN}=1\mu F$, $C_{OUT}=1\mu F$, $T_A=25^{\circ}C$, unless otherwise specified.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Input voltage range	V_{IN}	$I_{OUT}=10mA$	$V_{OUT}+1V$		35	V
Output voltage	V_{OUT}	$V_{IN}=V_{OUT}+2V$, $I_{OUT}=1mA$	V_{OUT} $\times 0.98$	V_{OUT}	V_{OUT} $\times 1.02$	V
Output voltage accuracy	$V_{OUT}\%$	$V_{IN}=V_{OUT}+2V$, $I_{OUT}=10mA$	98%		102%	
Linear adjustment rate	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	$V_{IN}=V_{SET}+1V \sim 19V$ $I_{OUT}=1mA @ V_{OUT}=5V$		0.04		%/V
Load adjustment rate	ΔV_{OUT}	$V_{IN}=V_{OUT}+2V$ $I_{OUT}=1 \sim 150mA @ V_{OUT}=5V$			40	mV
Static current	I_Q	$V_{IN}=12V$, $I_{OUT}=0mA$		5.5	12	μA
Pressure drop	V_{DROP}	$I_{OUT}=100mA @ V_{OUT}=5V$		500		mV
Maximum output current	I_{OUT_MAX}			150		mA
Current limitation	I_{LIMIT}	$V_{IN}=V_{OUT}+1.0V$		230		mA
Temperature protection point				150		$^{\circ}C$
Temperature protection point hysteresis				30		$^{\circ}C$
PSRR		$V_{IN}=8-16V$, $F=120HZ$ $I_{OUT}=50mA$, $T_J=25^{\circ}C$		60		dB

Note:

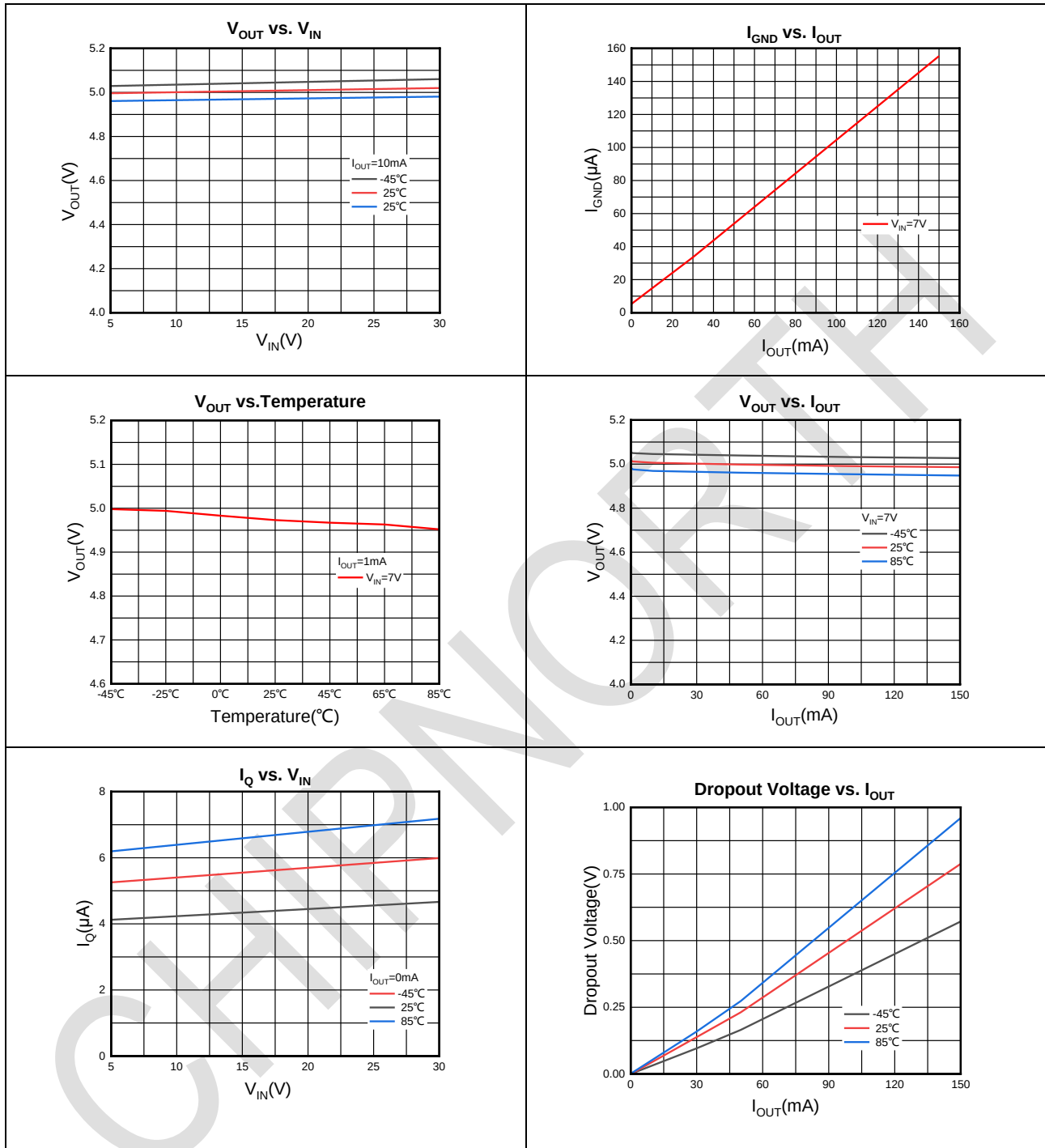
$V_{OUT(S)}$: Output voltage when $V_{IN} = V_{OUT} + 1V$, $I_{OUT} = 1mA$.

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

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

10.6 Characteristics Curve (CN88L050A0GR)

Test condition: $V_{IN}=V_{OUT}+1V$, $C_{IN}=1\mu F$, $C_{OUT}=1\mu F$, $T_A=25^{\circ}C$, unless otherwise noted.



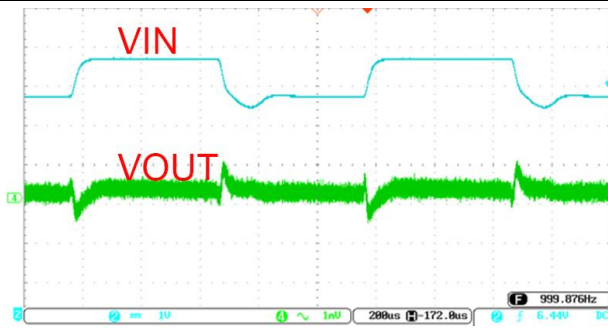
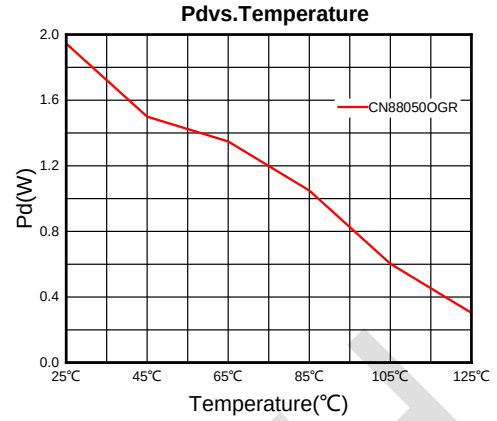
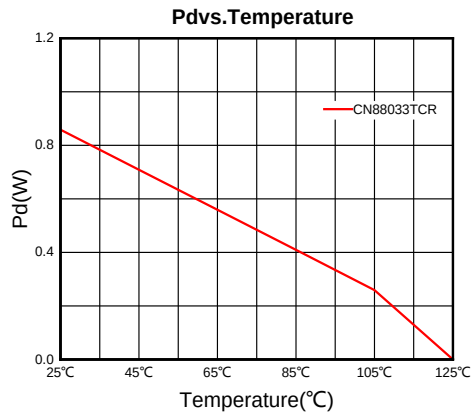


Figure 1 Line Transient
(VIN=from 5.6V to 12V to 5.6V IOUT=0mA)



Figure 2 Line Transient
(VIN=from 5.6V to 7V to 5.6V IOUT=150mA)

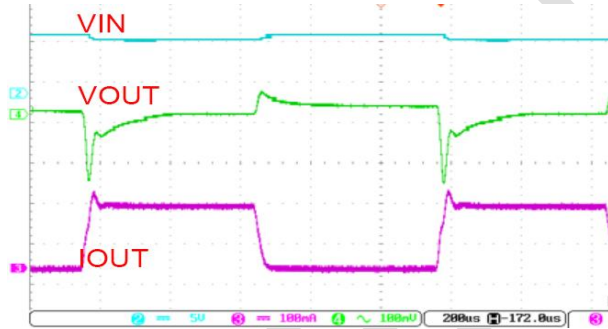


Figure 3 Load Transient
(VIN=7V, IOUT=0mA-150mA-0mA)

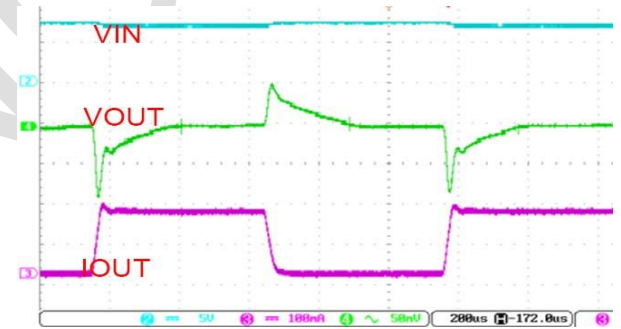
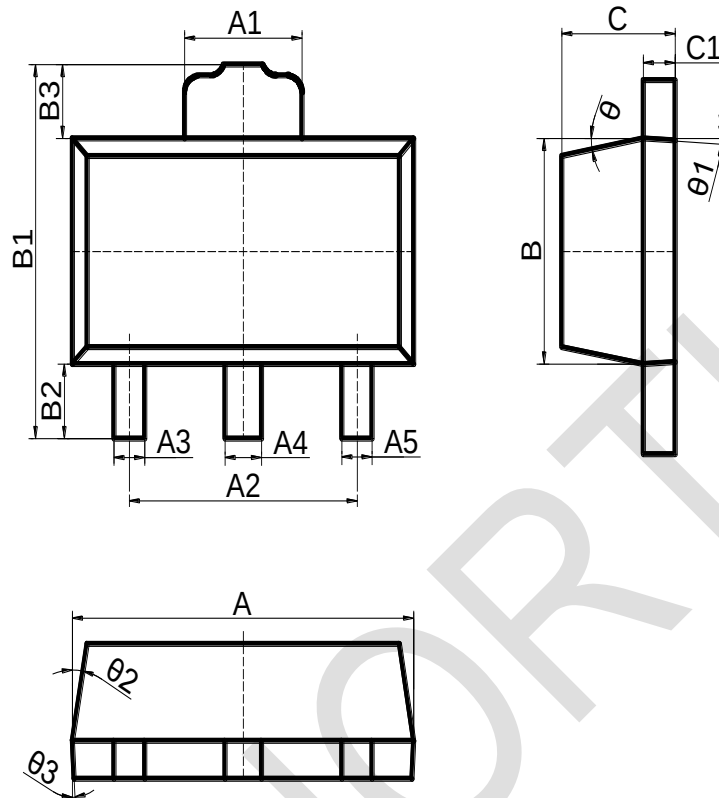


Figure 4 Load Transient
(VIN=7V, IOUT=1mA-150mA-1mA)

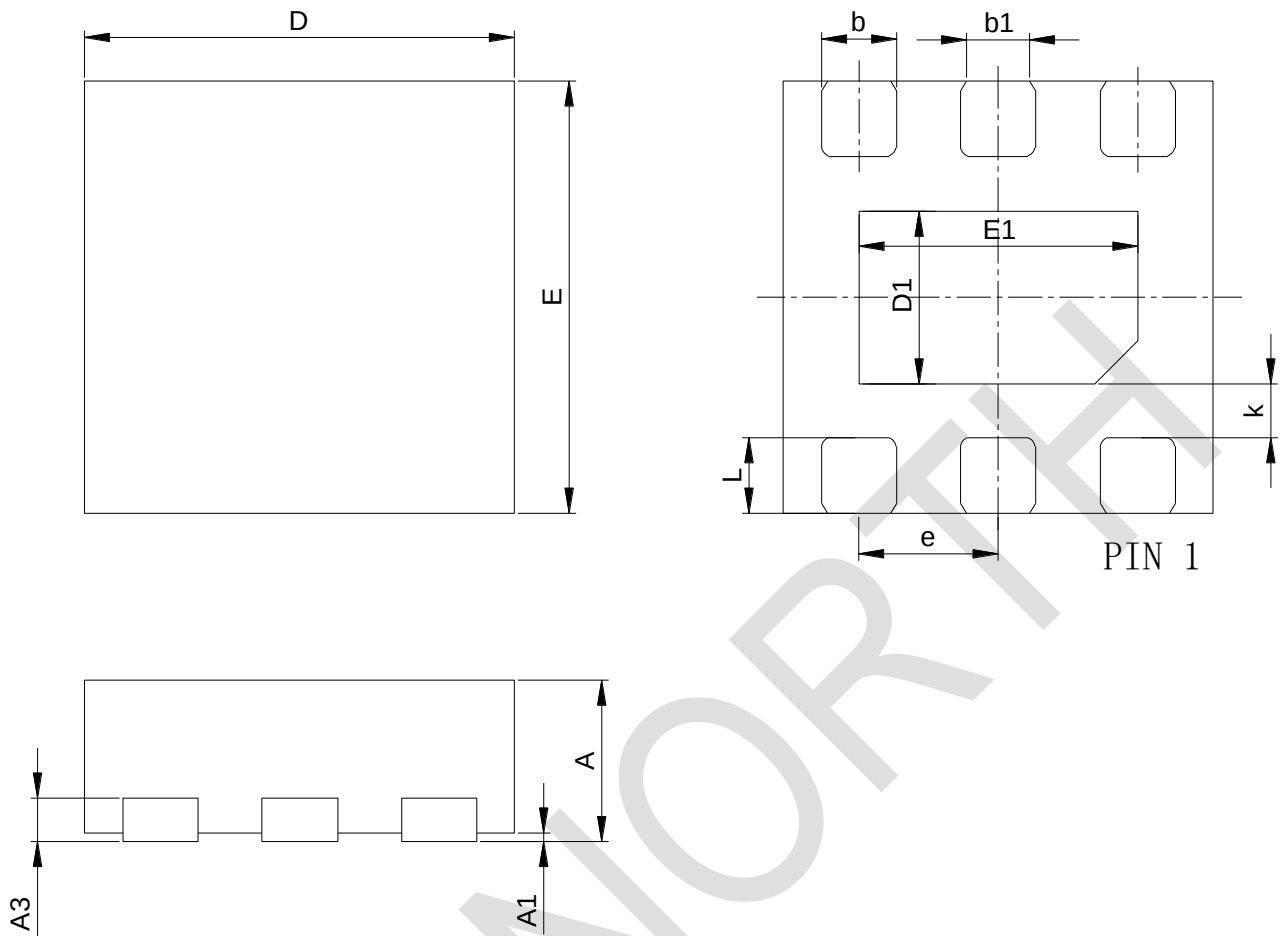
11 Package Information

SOT89-3



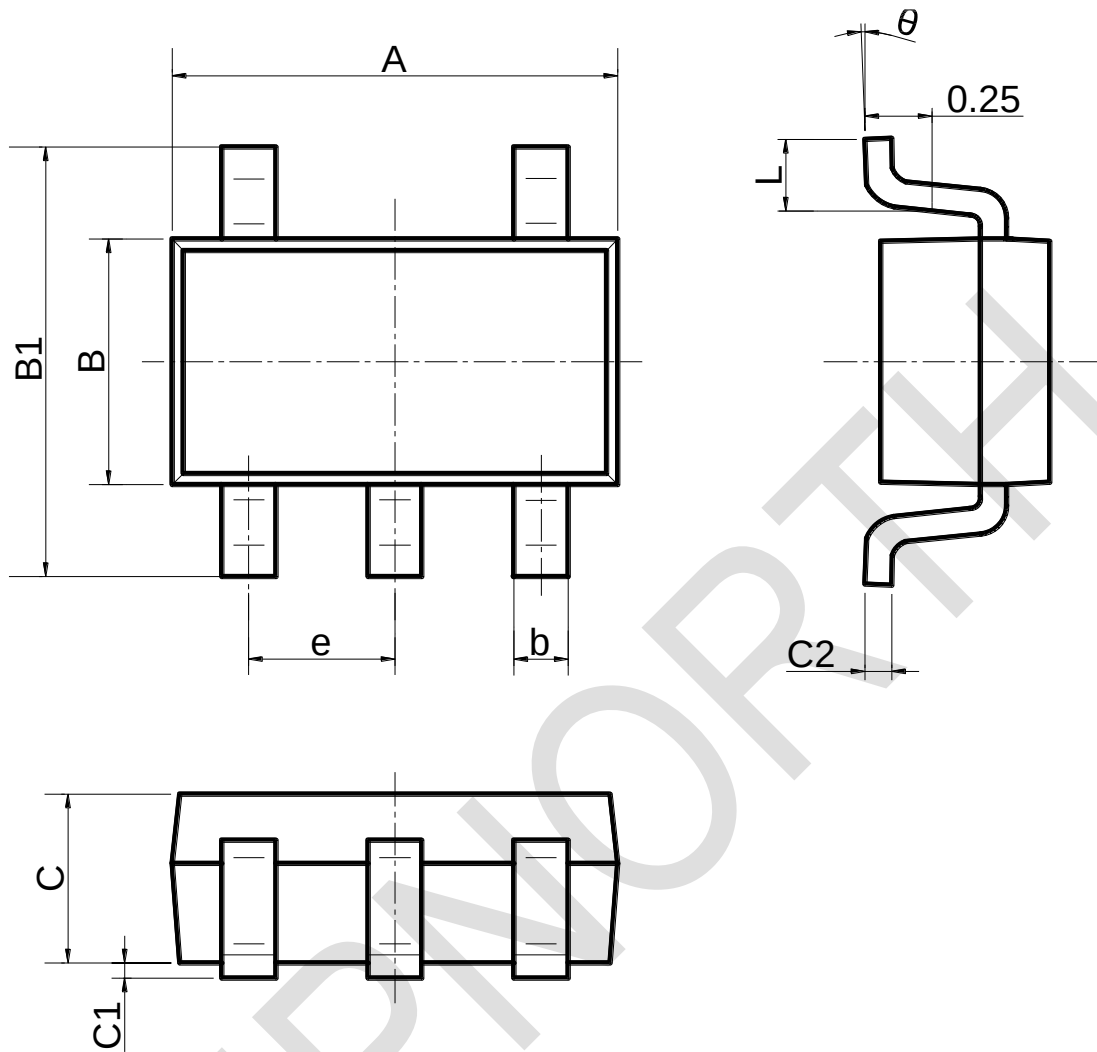
Dimension Symbol	Min (mm)	Nom (mm)	Max (mm)
A	4.4	4.5	4.6
A1	1.4	1.6	1.8
A2	2.8	3.0	3.2
A4	0.37	0.47	0.57
A5	0.22	0.42	0.62
B	2.4	2.5	2.6
B1	-	-	4.25
B2	0.8	-	-
C	1.4	1.5	1.6
C1	0.3	0.4	0.5

DFN2x2-6



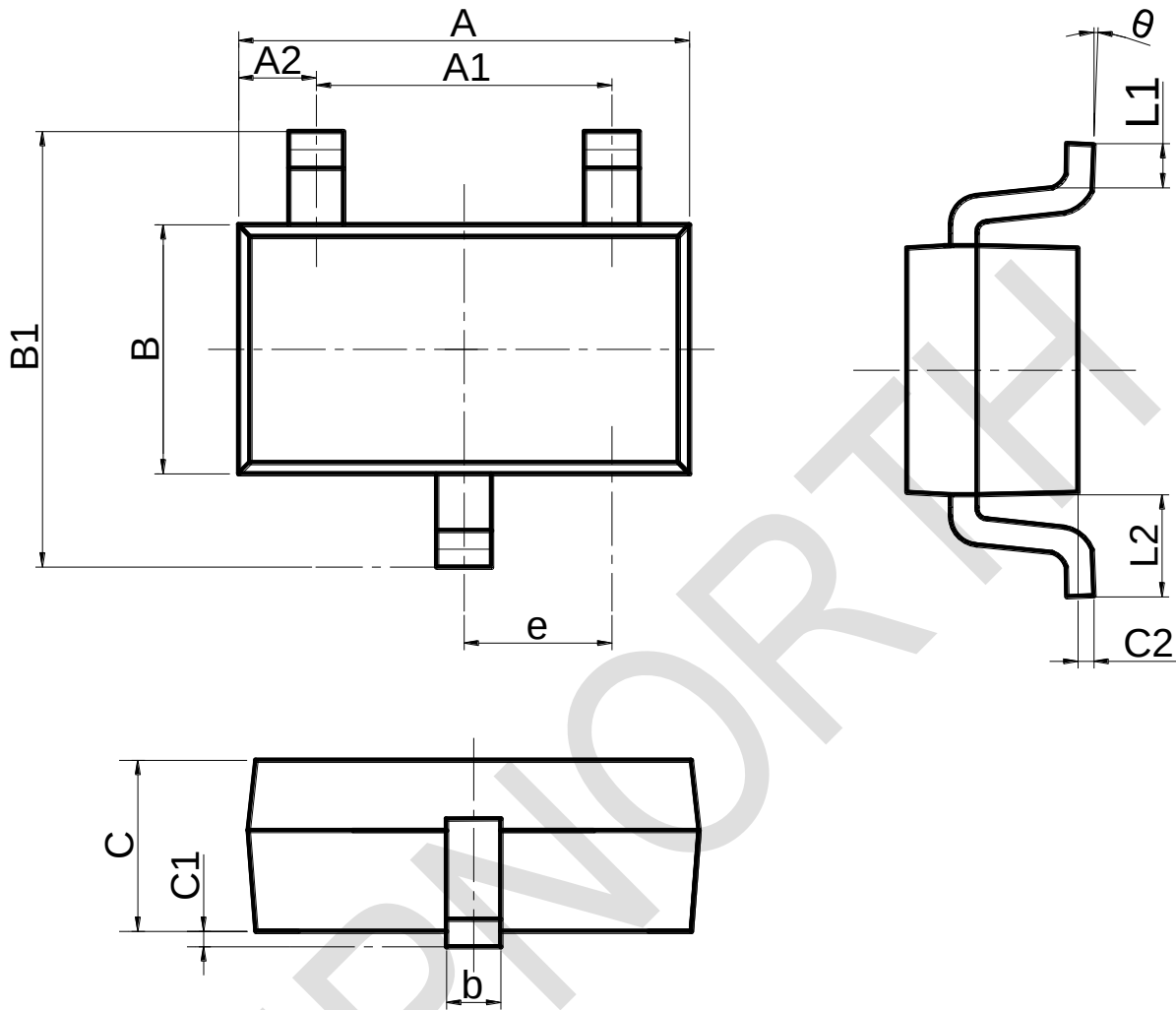
Dimension Symbol	Min (mm)	Nom (mm)	Max (mm)	Dimension Symbol	Min (mm)	Nom (mm)	Max (mm)
A	0.7	0.75	0.8	E1	1.5	1.6	1.7
A1	0	0.025	0.05	k	0.25REF		
A3	0.203REF			b	0.25	0.3	0.35
D	1.9	2.0	2.1	b1	0.22REF		
E	1.9	2.0	2.1	e	0.65REF		
D1	0.9	1.0	1.1	L	0.2	0.25	0.3

SOT23-5



Dimension Symbol	Min (mm)	Max (mm)	Dimension Symbol	Min (mm)	Max (mm)
A	2.82	3.02	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°

SOT23-3



Dimension Symbol	Min (mm)	Nom (mm)	Max (mm)
A	2.70	2.90	3.10
A1	1.70	1.90	2.10
A2	-	-	0.6
e	0.85	0.95	1.05
b	0.30	0.40	0.50
B	1.50	1.60	1.80
B1	2.60	2.80	3.00
C	1.00	1.10	1.20
C1	-	-	0.10
C2	0.02	-	0.08
L1	0.20	-	0.55
L2	-	0.60	-
θ	0°	-	15°

12 Important Statement

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