SE5232E

Low Noise, High PSRR, Low Quiescent LDO

DESCRIPTION

The SE5232 series of fixed output low dropout linear regulators are designed to meet the new requirements of high PSRR, fast dynamic response, low noise, low dropout voltage and low power consumption in today's portable battery powered applications such as cellular phones, surveillance system, Bluetooth, wireless and other portable electronic devices.

The short-circuit protection has a fold-back current limiter which will reduce the excessive heat during short circuiting. SE5232 also have standard Over-Temperature Protection

The SE5232 are available in standard SOT23-5L, SOT89 and DFN1x1-4L packages. Standard products are Halogen-free.

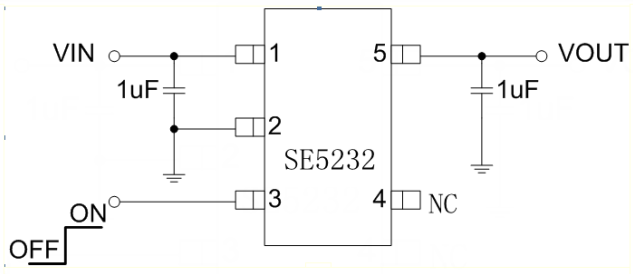
FEATURES

- Input voltage : 2.5V~6.5V
- Output range : 1.0V~3.6V
- PSRR: 75dB @1KHz
- Dropout voltage: 220mV @ I_{OUT}=200mA
- Quiescent current : 35μA Typ.
- Shut-down current: <1μA
- Recommend capacitor: 1μF
- Ultra-low output noise: 20μV_{RMS}
- Maximum output current: 400mA
- SOT23-5, SOT89 (Other Pkg available upon request)

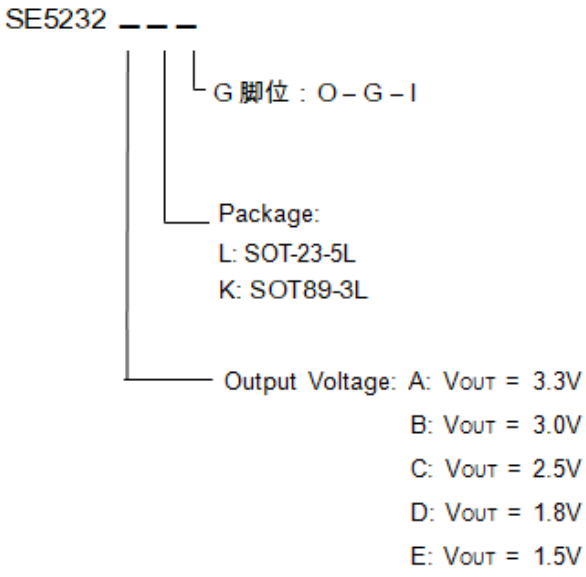
Application

- USB removable devices
- Cellphones
- Hand-Held Instrumentation.
- Display and TV sets
- Digital camera

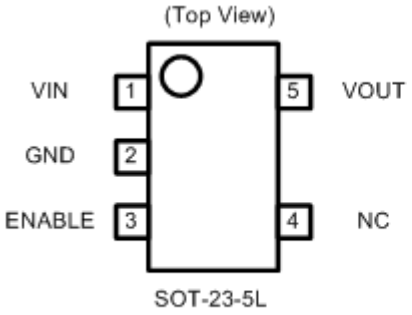
Typical Application

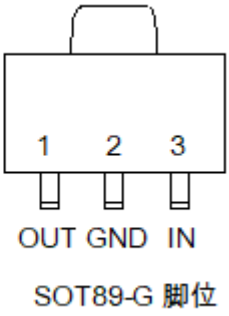


Ordering Information



Pin Configuration

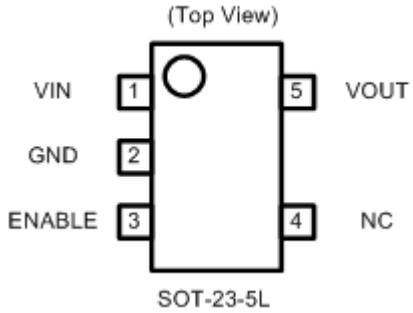
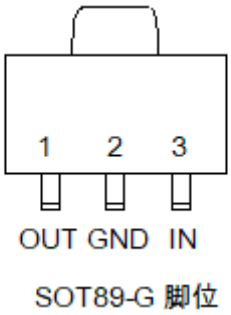




Pin Description

Pin Name	Description
Vin	Power Supply Input Voltage
GND	Power Suply Ground
EN	Shutdown Pin ,When not in use ,this pin should connected to Vin
Vout	Fixed output Voltage
NC	Not Connected

Ordering/Marking Information

Package	Ordering Information		Marking Information	
 	3.3V	SE5232ALG-HF	218ALX	HF: Helogan free. 218: Internal Code Starting with 2, a bar on top of 2 is for production year 2001, and underlined 2 is for year 2002. The next character is marked on top for 2003, and underlined for 2004. The naming pattern continues with consecutive characters for later years. The last character is the week code. (A-Z: 1-26, a-z: 27-52) SE5232-SOT89: 成品印章上有两行，第一行代表成品名称，第二行代表年代码和周代码； G 脚位：O – G – I
	3.0V	SE5232BLG-HF	218BLX	
	2.5V	SE5232CLG-HF	218CLX	
	1.8V	SE5232DLG-HF	218DLX	
	1.5V	SE5232ELG-HF	218ELX	
	3.3V	SE5232AKG-HF	5232AKG YYWW-HF	
	1.8V	SE5232DKG-HF	5232DKG YYWW-HF	

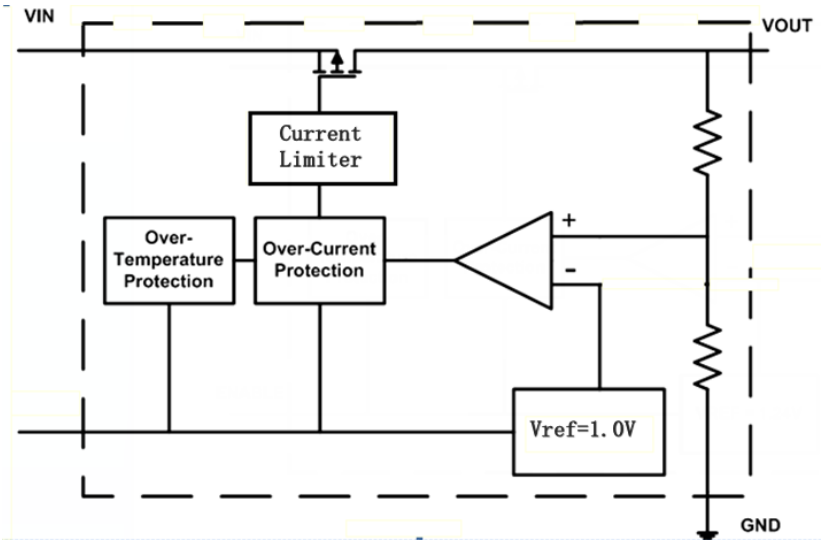
Absolute Maximum Rating (1)

Parameter	Symbol	Value	Units
Input Voltage	V_{IN}	6.5	V
Enable Voltage	V_{EN}	-0.3 to V_{IN}	V
Output Voltage	V_{OUT}	-0.3 to 4.6	V
Power Dissipation	P_D	Internally Limited (3)	
Output Short Circuit Duration		Infinite	
Thermal Resistance, Junction-to-Ambient	Θ_{JA}	230	°C/W
Lead Temperature (Soldering, 10 sec.)		260	°C
Junction Temperature	T_J	0 to +150	°C
Storage Temperature	T_S	-40 to +150	°C

Operating Rating (2)

Parameter	Symbol	Value	Units
Supply Input Voltage Range	V_{IN}	2.5 ~ 5.5	V
Junction Temperature Range	T_J	-40 to +125	°C

Block Diagram



Electrical Characteristics

V_{IN} = 5V; V_{EN}=V_{IN}; C_{IN} = 1μF; C_{OUT} = 1μF; I_{OUT} = 10mA; T_J = 25°C; unless otherwise noted

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage Accuracy	SE5232 – 1.5 (VIN=1.8V) SE5232 – 1.8 (VIN=3.3V) SE5232 – 2.5 SE5232 – 3.0 SE5232 – 3.3	1.470 1.764 2.450 2.940 3.234	1.5 1.8 2.5 3.0 3.3	1.530 1.836 2.550 3.060 3.366	V
ΔV_{OUT}	Line Regulation	V_{IN} = (V_{OUT} + 0.8)V to 5.5V	--	0.2	--	%/V

Electrical Characteristics (Continued)

V_{IN} = 5V; C_{IN} = 1μF; C_{OUT} = 1μF; I_{OUT} = 10mA; T_J = 25°C; unless otherwise noted

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
ΔV_{OUT}	Load Regulation	V_{OUT}=2.8V, I_{OUT}=1~300mA	--	40	70	mV
V_{DROP}	Dropout Voltage	I_{OUT} = 200mA	--	220	250	mV
		I_{OUT} = 300mA	--	320	350	
$T_{PROTECTION}$	Thermal Protection	Thermal Protection Temperature	--	140	--	°C
		Protection Hysterisys	--	30	--	
e_{NO}	Output Noise Voltage	10Hz to 100kHz, I_{OUT}=200mA,C_{OUT}=1uF	--	20	--	μV_{RMS}
PSRR	Ripple Rejection	V_{IN}=5V_{DC}+0.5V_{P-P} F=1KHz,I_{OUT}=10mA	--	75	--	dB
		V_{IN}=5V_{DC}+0.5V_{P-P} F=1MHz, I_{OUT}=10mA		55		
I_Q	Quiescent Current	V_{EN} = 0.4V	--	0.1	--	μA
		V_{EN} = V_{IN}, I_{OUT}=0mA	--	35	--	
$V_{TH(EN)}$	Enable Input Threshold Voltage	Voltage Raising, Output Turns On, Logic High	1.6	--	--	V
		Voltage Falling, Output Turns Off, Logic Low	--	--	0.4	
I_{LIMIT}	Current Limit		--	500	--	mA
I_{Short}	Fold Back Currrent	Vin=4V, Short Circuit		160	220	mA

Note 1: Exceeding the absolute maximum rating may damage the device.

Note 2: The device is not guaranteed to function outside its operating rating.

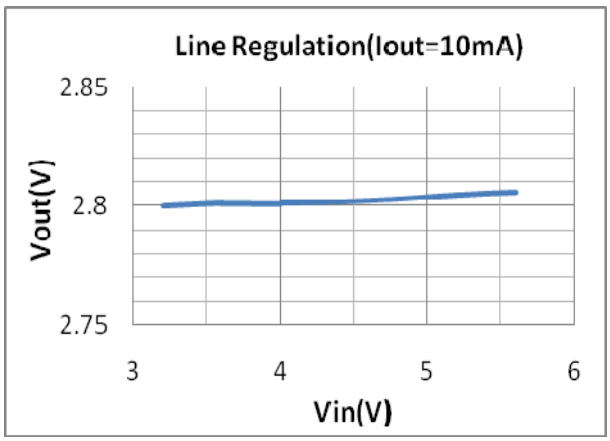
Note 3: The maximum allowable power dissipation at any T_A (ambient temperature) is calculated using: $P_{D(MAX)}$ = ($T_{J(MAX)}$ – T_A)/Θ_{JA}. Exceeding the maximum allowable power dissipation will result in excessive die temper ature, and the regulator will go into thermal shutdown. See “Thermal Consideration” section for details

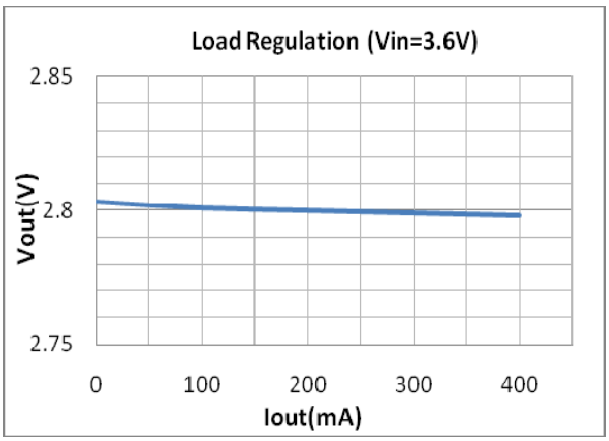
Note 4: Output voltage temperature coefficient is the worst case voltage change divided by the total temperature range.

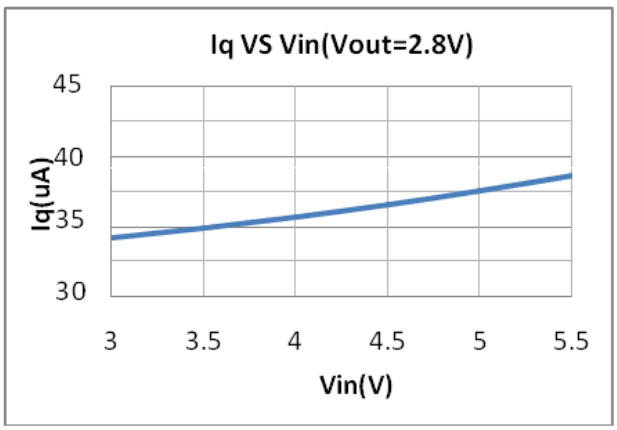
Note 5: Regulation is measured at constant junction temperature using low duty cycle pulse testing. Parts are tested for load regulation in the load range from 0.1mA to 300mA. Changes in output voltage due to heating effects are covered by the thermal regulation specification.

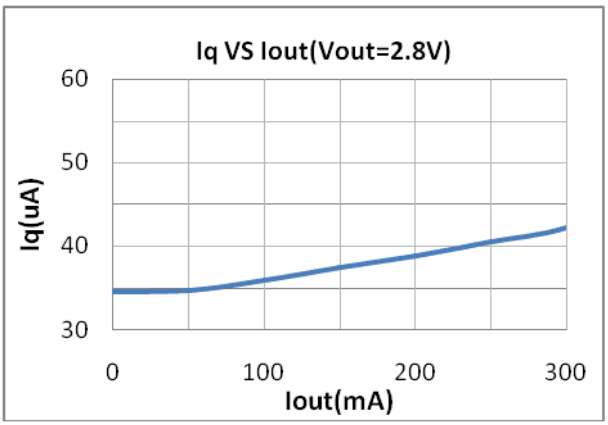
Note 6: Dropout voltage is defined as the input to output differential at which the output voltage drops 100mV below its nominal value measured at 0.8V differential.

Note 7: The Cin or Cout should be chosen carefully. Please refer to the Application Hints



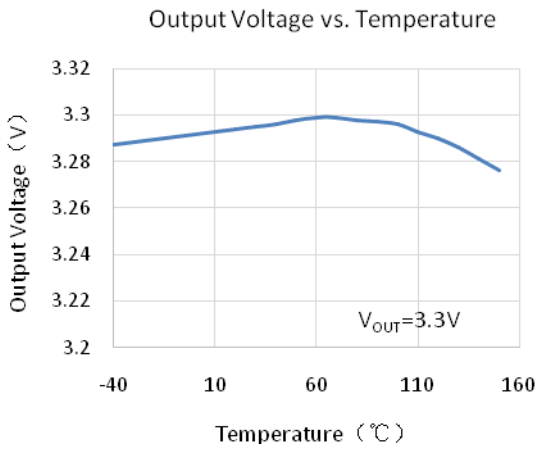






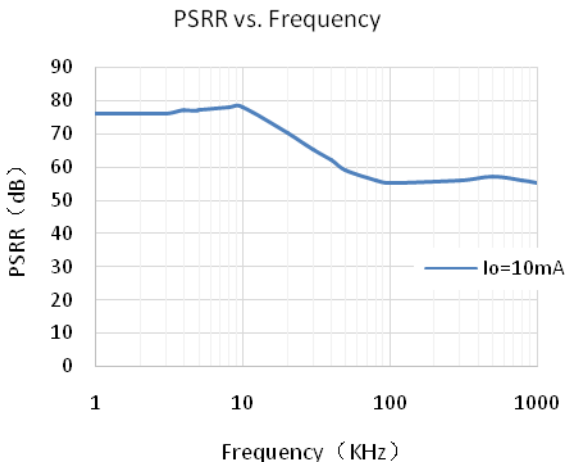
Vout vs Temperature

Vin=3.6V to 5V



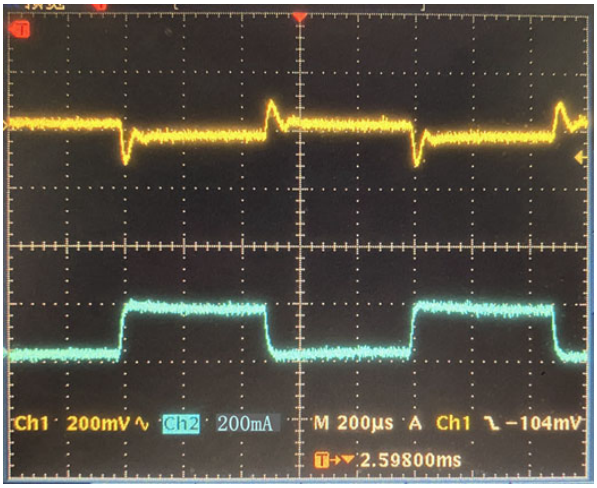
PSRR

I_{out}=10mA ,V_{in}=V_{out}+1V+1V p-p



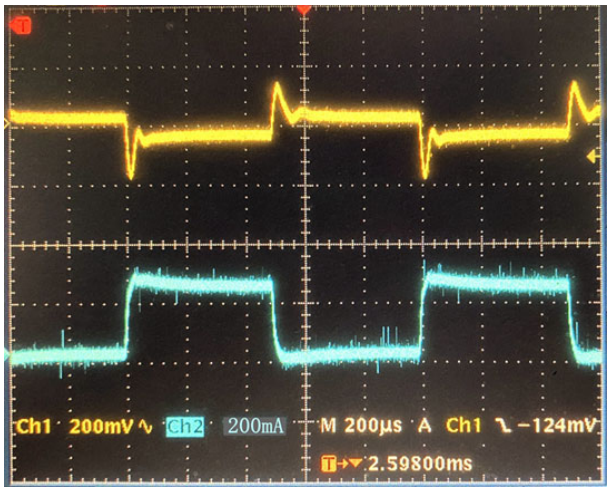
Load Transient Response

Iout=10mA to 200mA

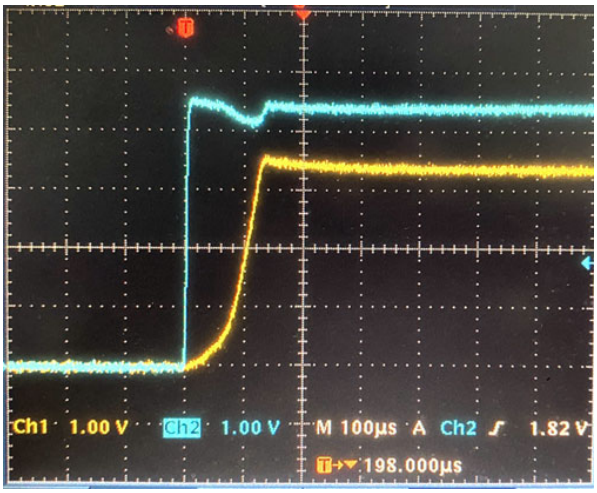


Load Transient Response

Iout=10mA to 300mA

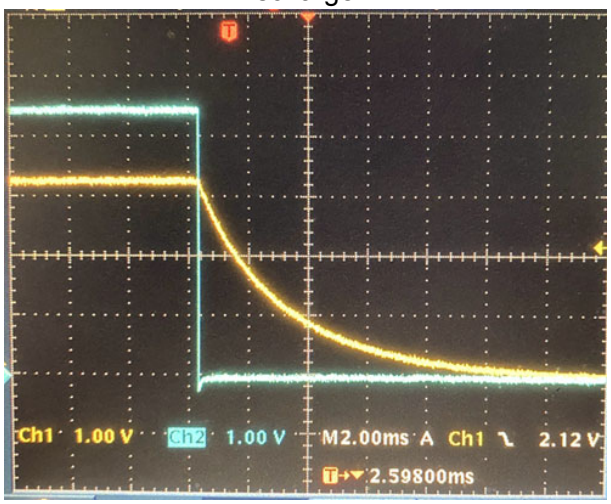


EN Power ON

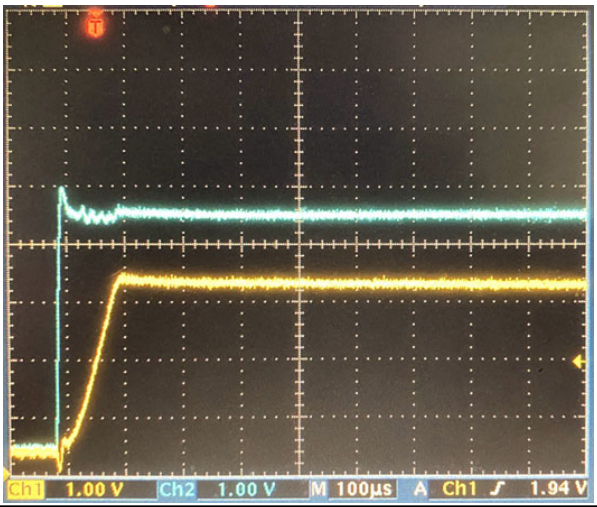


EN Power OFF

Discharge



VCC Power ON



Application Hints

SE5232E requires external capacitors to ensure stability. The external capacitors must be carefully selected to ensure performance.

Input Capacitor

An input capacitor of at least 1μF is required. Both Ceramic or Electrolytic capacitor is accepted. It is preferred to place the capacitor as close to Vin as possible. The value can be increased without upper limit. The larger the value, typically the smaller the ripple.

Output Capacitor

An output capacitor is required for stability. It should be placed as close as possible between V_{OUT} and GND pins. Both Ceramic or Electrolytic capacitor is accepted. The minimum value is 1μF but may be increased without limit.

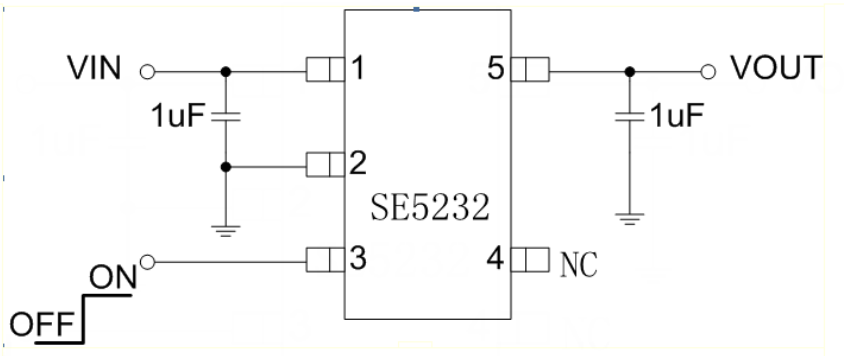
Thermal Considerations

It is important that the thermal limit of the package is not exceeded. The SE5232 has built-in thermal protection. When the thermal limit is exceeded, the IC will enter protection, and V_{OUT} will be pulled to ground. The power dissipation for a given application can be calculated as following:

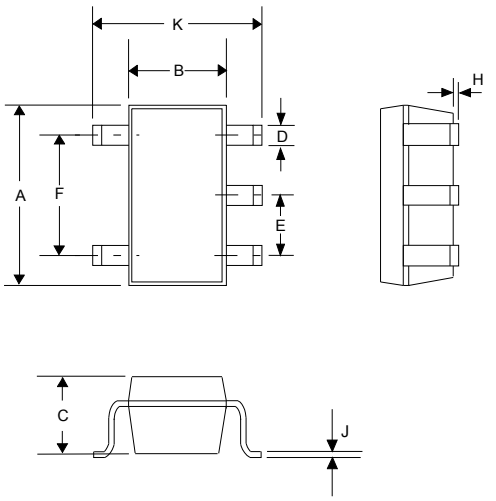
The power dissipation (P_D) is

$P_D = I_{OUT} * [V_{IN} – V_{OUT}]$

The thermal limit of the package is then limited to $P_{D(MAX)} = [T_J – T_A]/\Theta_{JA}$ where T_J is the junction temperature, TA is the ambient temperature, and Θ_{JA} is around 230°C/W for SE5232E. SE5232 is designed to enter thermal protection at 150°C. For example, if T_A is 25°C then the maximum P_D is limited to about 0.6W. In other words, if $I_{OUT(MAX)}$ = 300mA, then $[V_{IN} – V_{OUT}]$ cannot exceed 2V.

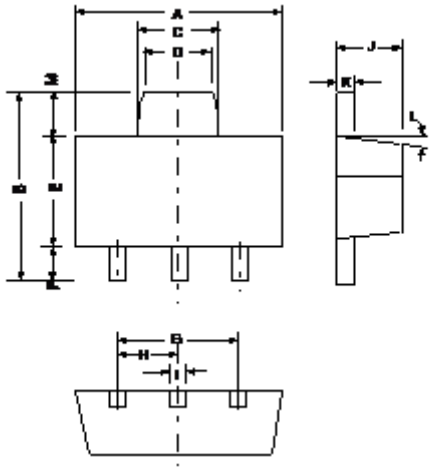


OUTLINE DRAWING SOT-23-5L



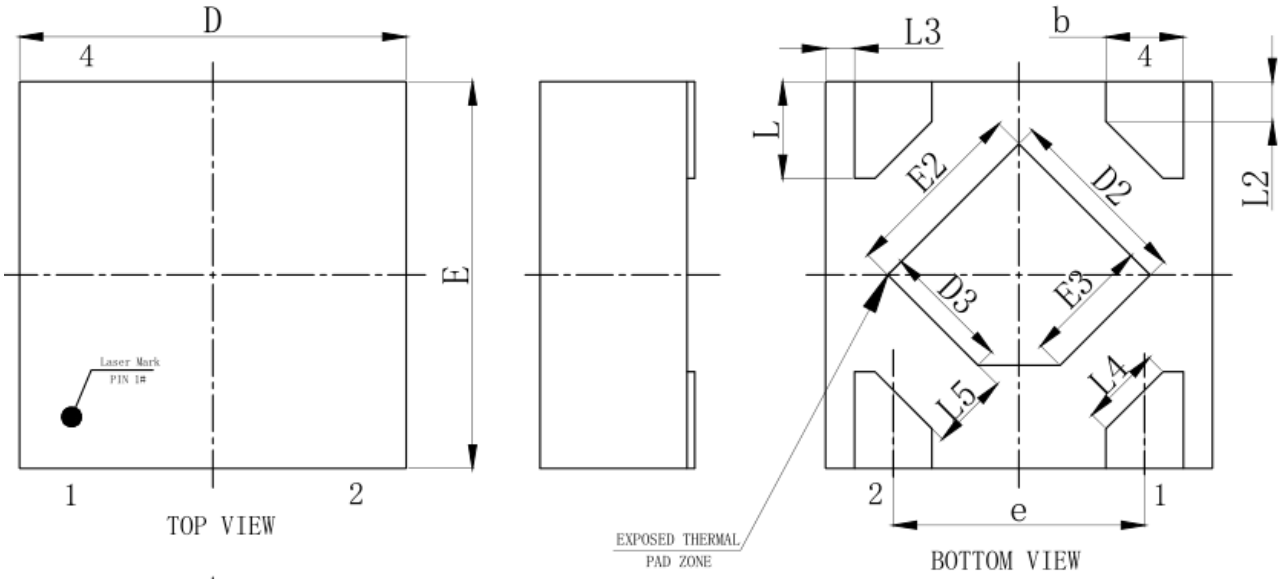
DIMENSIONS				
DIM[N]	INCHES		MM	
	MIN	MAX	MIN	MAX
A	0.110	0.120	2.80	3.05
B	0.059	0.070	1.50	1.75
C	0.036	0.051	0.90	1.30
D	0.014	0.020	0.35	0.50
E	-	0.037	-	0.95
F	-	0.075	-	1.90
H	-	0.006	-	0.15
J	0.0035	0.008	0.090	0.20
K	0.102	0.118	2.60	3.00

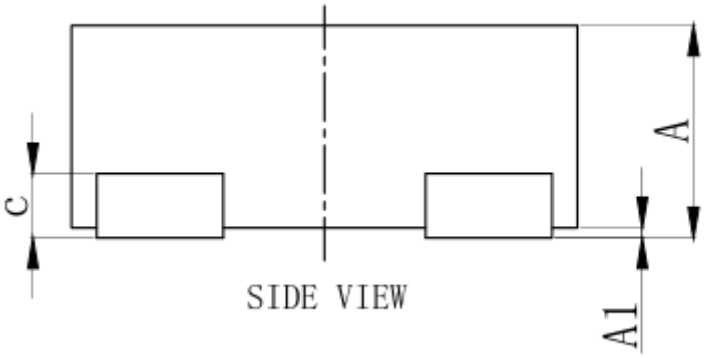
OUTLINE DRAWING SOT89-3L



DIMENSIONS				
DIM[N]	INCHES		MM	
	MIN	MAX	MIN	MAX
A	0.173	0.181	4.400	4.600
B	0.159	0.167	4.050	4.250
C	0.067	0.075	1.700	1.900
D	0.051	0.059	1.300	1.500
E	0.094	0.102	2.400	2.600
F	0.035	0.047	0.890	1.200
G	0.118REF		3.00REF	
H	0.059REF		1.50REF	
I	0.016	0.020	0.400	0.520
J	0.055	0.063	1.400	1.600
K	0.014	0.016	0.350	0.410
L	10°TYP		10°TYP	
M	0.028REF		0.70REF	

OUTLINE DRAWING DFN1*1-4L





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		

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