Ultra Fast High PSRR Low Noise CMOS Voltage Regulators

CJ6211 Series

■ INTRODUCTION

The CJ6211 series are a group of positive voltage regulators manufactured by CMOS technologies with high ripple rejection, ultra low noise, low power consumption and low dropout voltage, which can prolong battery life in portable electronics. The CJ6211 series work with low-ESR ceramic capacitors, reducing the amount of board space necessary for power applications. The CJ6211 series consume less than 0.1μA in shutdown mode and have fast turn-on time less than 50μs.The series are very suitable for the battery-powered equipments, such as RF applicationsand other systems requiring a quiet voltage source.

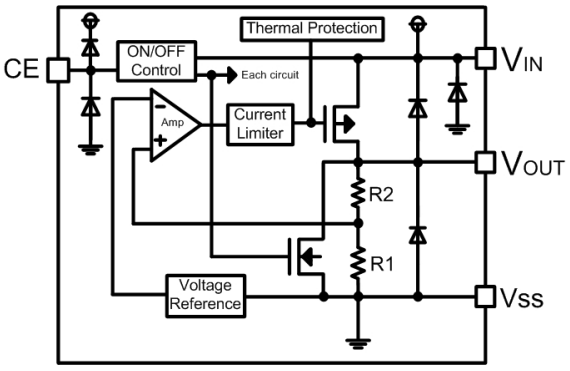
■ FEATURES

- High Ripple Rejection: 80dB@1kHz
- Low Dropout Voltage: 55mV@100mA
- Low Quiescent Current: 50μA
- Excellent Line and Load Transient Response
- Operating Voltage Range: 1.8V ~ 6.0V
- Output Voltage Range: 0.8V ~ 5.0V
- High Accuracy: ±2% (Typ.)
- Output Noise Voltage: 40 μV_{RMS} (V_{OUT} = 3.3V, 10Hz ~ 100kHz)
- Built-in Current Limiter, Short-Circuit Protection
- TTL- Logic-Controlled Shutdown Input

■ APPLICATIONS

- Cellular and Smart Phones
- Laptop, Palmtops and PDA
- Digital Still and Video Cameras
- Portable Audio Video Equipments
- Radio control systems
- Battery-Powered Equipments

■ BLOCK DIAGRAM



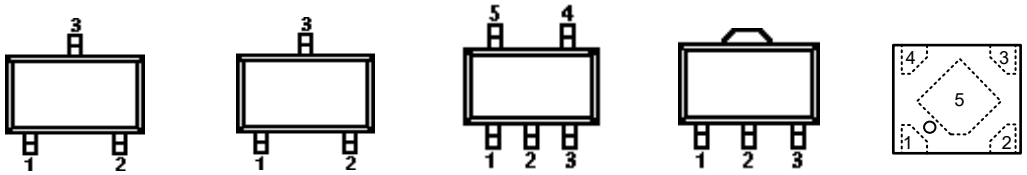
■ ORDER INFORMATION

CJ6211①②③④

DESIGNATOR	SYMBOL	DESCRIPTION
①	A	Standard
	B	High Active, pull-down resistor built in, with C_{OUT} discharge resistor
②③	Integer	Output Voltage e.g.1.8V=②:1, ③:8
④	N	Package:SOT-23
	M	Package:SOT-23-3L/5L
	P	Package:SOT-89-3L
	F	Package:DFNWB1x1-4L

Pin Configuration

SOT-23 SOT-23-3L SOT-23-5L SOT-89-3L DFNWB1×1-4L



PIN NAME	SOT-23	SOT-23-3L	SOT-23-5L	SOT-89-3L	DFNWB1×1-4L	I / O	DESCRIPTION
	AxxN	AxxM	BxxM	AxxP	BxxF		
V_{IN}	3	3	1	2	4	I	Input to the device.
V_{SS}	1	1	2	1	2	-	Regulator ground.
CE	-	-	3	-	3	I	Enable pin. Logic high to enable, logic low to disable. Don't float the pin, if CE pin is not used, connect the CE to IN.
NC	-	-	4	-	-	-	Internal not connected.
V_{OUT}	2	2	5	3	1	O	Output of the regulator.
Thermal Pad	-	-	-	-	5	-	Internal connection to GND.

■ THERMAL METRIC

THERMAL METRIC	SYMBOL	CJ6211 Series			UNIT
Junction-to-ambient thermal resistance	$R_{\Theta JA}$	SOT-23	SOT-23-3L	SOT-23-5L	°C/W
		357.2	261.3	252.5	
		SOT-89-3L	DFNWB1×1-4L		
		162.9	219.2		
Junction-to-case thermal resistance	$R_{\Theta JC}$	SOT-23	SOT-23-3L	SOT-23-5L	°C/W
		135.7	66.2	65.4	
		SOT-89-3L	DFNWB1×1-4L		
		54.4	115.8		
Reference maximum power dissipation for continuous operation	$P_{D\ Ref}$	SOT-23	SOT-23-3L	SOT-23-5L	W
		0.28	0.38	0.40	
		SOT-89-3L	DFNWB1×1-4L		
		0.63	0.45		

Thermal metric is measured in still air with T_A = 25°C and mounted on a 1 in^2 FR-4 substrate PCB covered with 2 ounces of copper.

■ ABSOLUTE MAXIMUM RATINGS(1)

(Unless otherwise specified, T_A=25°C)

PARAMETER	SYMBOL	RATINGS	UNITS
Input Voltage(2)	V_{IN}	-0.3~7	V
Output Voltage(2)	V_{OUT}	-0.3~V_{IN}+0.3	V
Output Current	I_{OUT}	700	mA
Operating free air temperature range	T_A	-40~85	°C
Operating Junction Temperature Range(3)	T_J	-40~125	°C
Storage Temperature	T_{stg}	-40~125	°C
Lead Temperature(Soldering, 10 sec)	T_{solder}	260	°C
ESD rating(4)	Human Body Model(HBM)	2	kV
	Machine Model(MM)	200	V

(1) Stresses beyond those listed under absolute maximum ratings may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under recommended operating conditions is not implied. Exposure to absolute-maximum-rated conditions for extended periods my affect device reliability.

(2) All voltages are with respect to network ground terminal.

(3) This IC includes over temperature protection that is intended to protect the device during momentary overload. Junction temperature will exceed 125°C when over temperature protection is active. Continuous operation above the specified maximum operating junction temperature may impair device reliability.

(4) ESD testing is performed according to the respective JESD22/JEDEC standard. The human body model is a 100pF capacitor discharged through a 1.5kΩ resistor into each pin. The machine model is a 200pFcapacitor discharged directly into each pin.

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	MIN.	NOM.	MAX.	UNITS
Supply Voltage at V_{IN}	1.8		6	V
Operating Junction Temperature Range, T_j	0		125	°C
Operating Free Air Temperature Range, T_A	0		85	°C

Electrical Characteristics

(V_{IN}=V_{OUT}+1V, C_{IN}=C_{OUT}=1μF, T_A=25℃,unless otherwise specified)

PARAMETER		SYMBOL	CONDITIONS	MIN.	TYP. (3)	MAX.	UNITS
Output Voltage		V_{OUT}(E) (4)	I_{OUT}=1mA	V_{OUT}(5)	V_{OUT}(5)	V_{OUT}(5)	V
Supply Current		I_{SS}	I_{OUT}=0		50	90	μA
Standby Current		I_{STBY}	CE = V_{SS}		0.1	1	μA
Output Current		I_{OUT}	V_{OUT}≥1.8V	500	700		mA
			V_{OUT}≥0.8V	300	500		
Dropout Voltage		V_{DO}(6)	V_{OUT} = 3.3V I_{OUT} =100mA		55		mV
Load Regulation		ΔV_{OUT}	V_{IN}= V_{OUT} +1V		1		mV
Line Regulation		$\frac{\Delta V_{OUT}}{V_{OUT} \times \Delta V_{IN}}$	I_{OUT} =10mA V_{OUT} +1V≤V_{IN}≤6V		0.01	0.2	%/V
Output Voltage Temperature		$\frac{\Delta V_{OUT}}{\Delta T \times V_{OUT}}$	I_{OUT} =10mA -40≤T≤+85°C		50		ppm
Short Current		I_{Short}	V_{OUT} =V_{SS}		100		mA
Input Voltage		V_{IN}	—	1.8		6.0	V
Power Supply Rejection Rate	100Hz	PSRR	I_{OUT}=50mA		75		dB
	1kHz				80		
	10kHz				70		
CE "High" Voltage		V_{CE}"H"		1.5		V_{IN}	V
CE "Low" Voltage		V_{CE}"L"				0.3	V
Thermal Shutdown		T_{SD}			160		°C
Thermal Shutdown		ΔT_{SD}			20		°C
C_{OUT} Auto-Discharge		$R_{DISCHRG}$	V_{IN}=5V		100		Ω

(3) Typical numbers are at 25°C and represent the most likely norm.

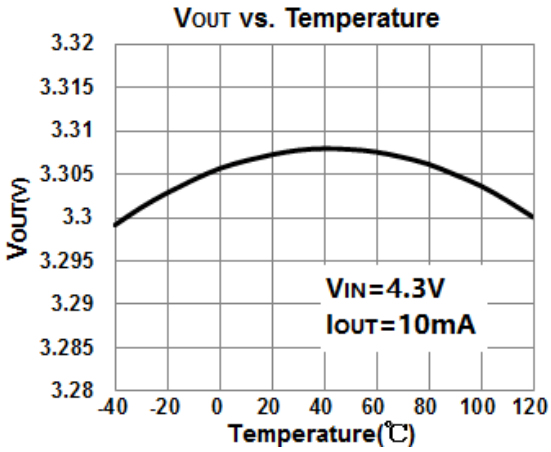
(4) V_{OUT} (E): Effective output voltage (I.e. The output voltage when V_{IN} = (V_{OUT} +1.0V) and maintain a certain I_{OUT} value).

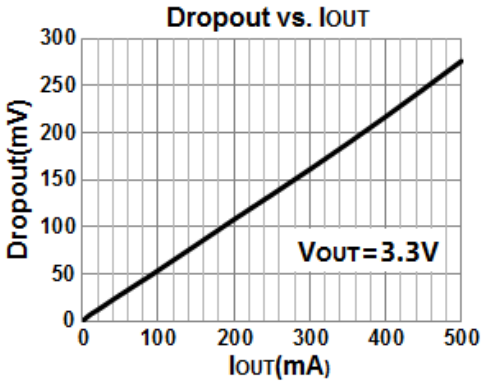
(5) V_{OUT}: Specified output voltage.

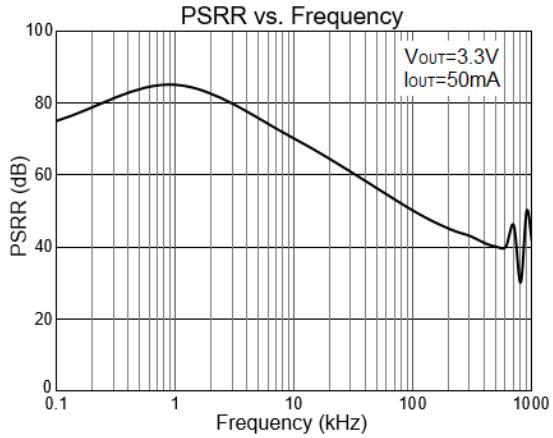
(6) V_{DO}: Test the difference of output voltage and input voltage when input voltage is decreased gradually till output voltage equals to 98% of V_{OUT} (E).

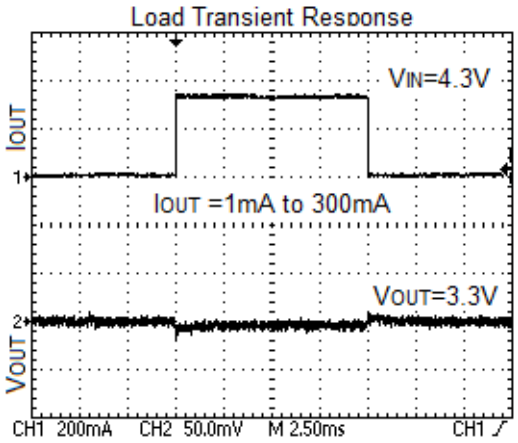
Typical Characteristics

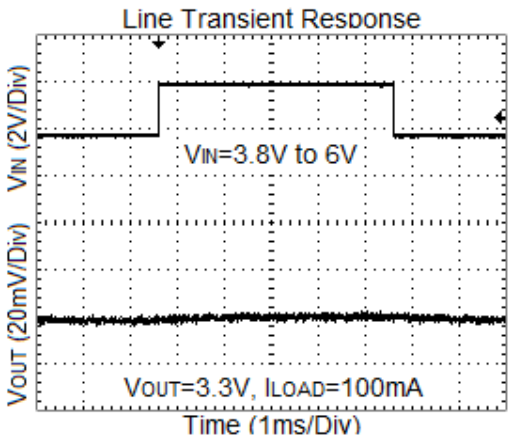
(V_{CE} = V_{IN} = V_{OUT} +1V, C_{IN} = 1μF, C_{OUT} = 1μF, T_A = 25℃, unless otherwise specified)











C_{OUT} Auto-Discharge Function

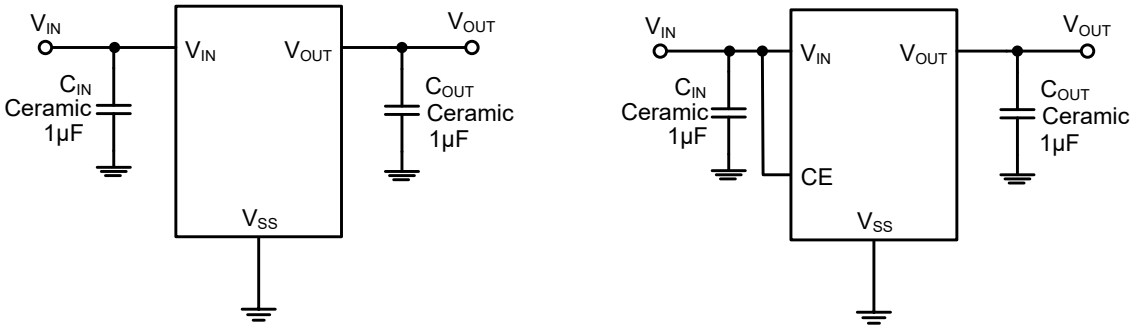
CJ6211 series can discharge the electric charge in the output capacitor (C_{OUT}), when a low signal to the CE pin, which enables a whole IC circuit turn off, is inputted via the N-channel transistor located between the V_{OUT} pin and the V_{SS} pin (cf. BLOCK DIAGRAM). The C_{OUT} auto-discharge resistance value is set at 60Ω(V_{OUT}=3.0V @ V_{IN}=5.0V at typical). The discharge time of the output capacitor (C_{OUT}) is set by the C_{OUT} auto-discharge resistance (R) and the output capacitor (C_{OUT}). By setting time constant of a C_{OUT} auto-discharge resistance value [$R_{DISCHRG}$] and an output capacitor value (C_{OUT}) as τ(τ=C x $R_{DISCHRG}$), the output voltage after discharge via the N-channel transistor is calculated by the following formulas.

$V=V_{OUT(E)} \times e^{-t/T}$ or $t=\tau \ln(V/V_{OUT(E)})$

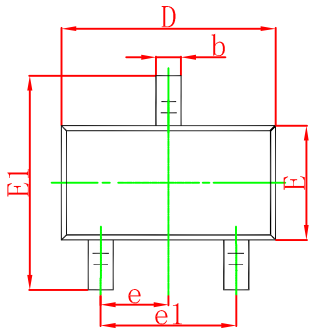
(V : Output voltage after discharge, $V_{OUT(E)}$: Output voltage, t: Discharge time,

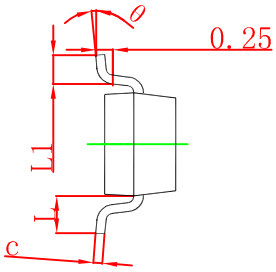
τ: C_{OUT} auto-discharge resistance $R_{DISCHRG}$×Output capacitor (C_{OUT}) value C)

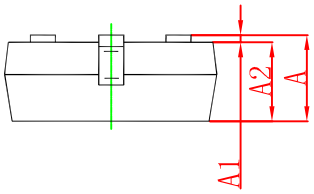
■ TYPICAL APPLICATION



SOT-23 Package Outline Dimensions

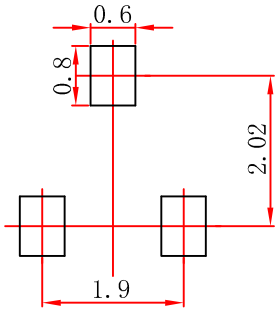






Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP.		0.037 TYP.	
e1	1.800	2.000	0.071	0.079
L	0.550 REF.		0.022 REF.	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

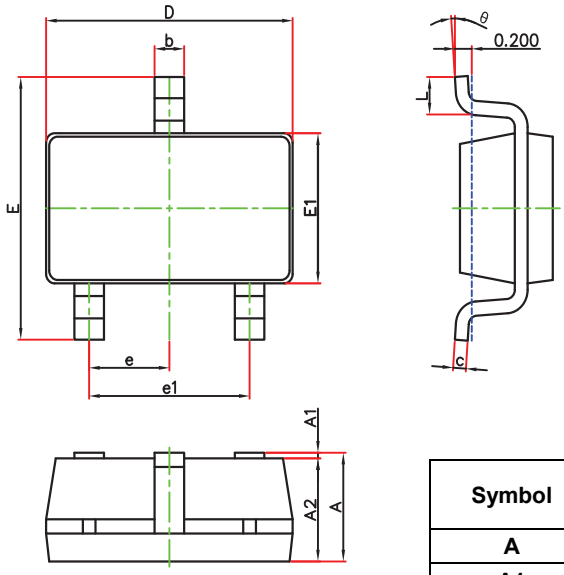
SOT-23 Suggested Pad Layout



NOTE:

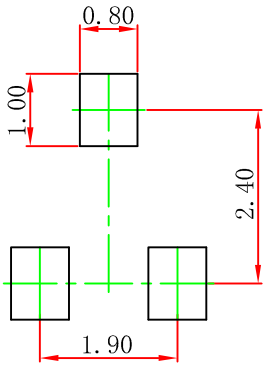
1. Controlling dimension: in millimeters.
2. General tolerance: ±0.05mm.
3. The pad layout is for reference purposes only.

SOT-23-3L Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	2.650	2.950	0.104	0.116
E1	1.500	1.700	0.059	0.067
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

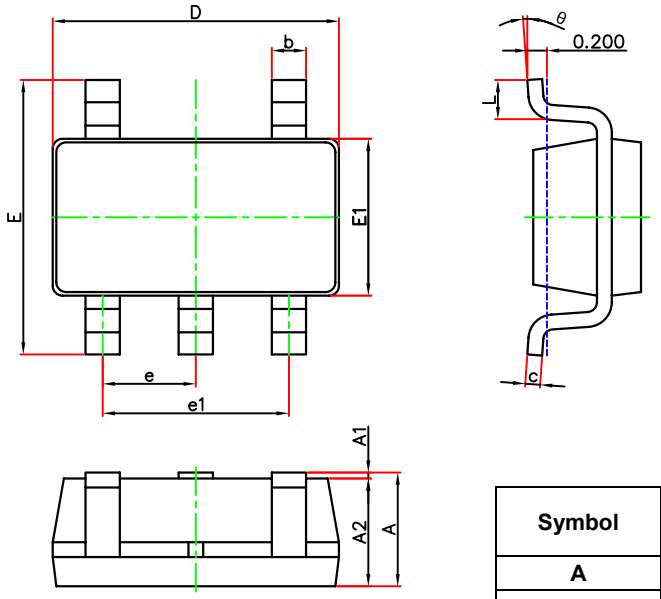
SOT-23-3L Suggested Pad Layout



NOTE:

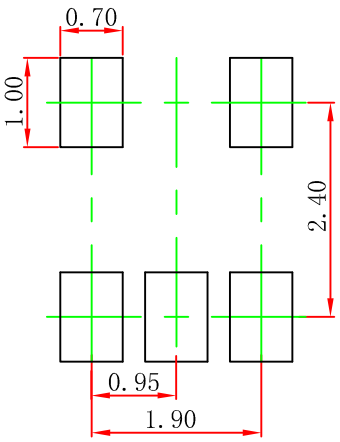
1. Controlling dimension: in millimeters.
2. General tolerance: ±0.05mm.
3. The pad layout is for reference purposes only.

SOT-23-5L Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	2.650	2.950	0.104	0.116
E1	1.500	1.700	0.059	0.067
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

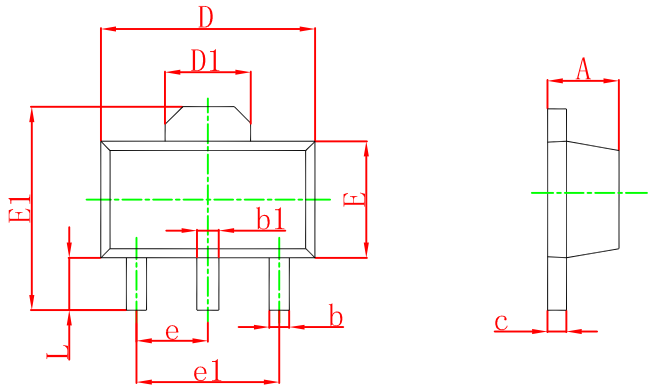
SOT-23-5L Suggested Pad Layout



NOTE:

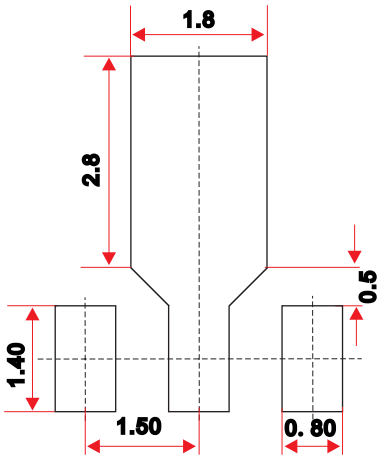
1. Controlling dimension: in millimeters.
2. General tolerance: ±0.05mm.
3. The pad layout is for reference purposes only.

SOT-89-3L Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF.		0.061 REF.	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP.		0.060 TYP.	
e1	3.000 TYP.		0.118 TYP.	
L	0.900	1.200	0.035	0.047

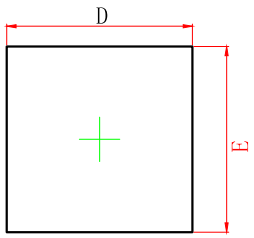
SOT-89-3L Suggested Pad Layout



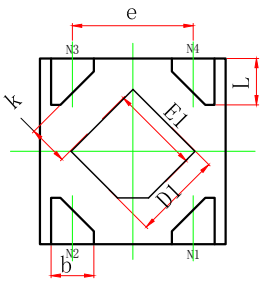
NOTE:

1. Controlling dimension: in millimeters.
2. General tolerance: ±0.05mm.
3. The pad layout is for reference purposes only.

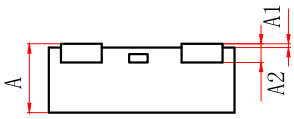
DFNWB1*1-4L Package Outline Dimensions



TOP VIEW



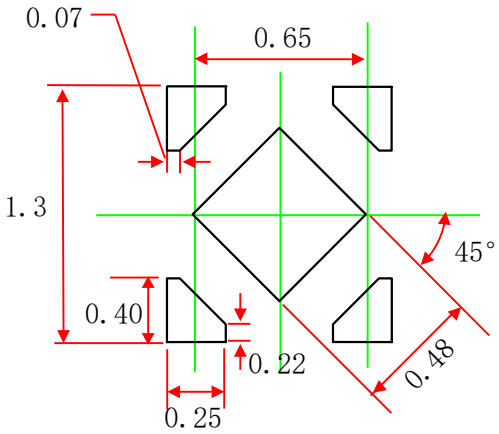
BOTTOM VIEW



SIDE VIEW

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.320	0.400	0.013	0.016
A1	0.000	0.050	0.000	0.002
A2	0.100 REF.		0.004 REF.	
D	0.950	1.050	0.037	0.041
E	0.950	1.050	0.037	0.041
D1	0.430	0.530	0.017	0.021
E1	0.430	0.530	0.017	0.021
k	0.150MIN.		0.006MIN.	
b	0.180	0.280	0.007	0.011
e	0.650TYP.		0.026TYP.	
L	0.200	0.300	0.008	0.012
L1	0.200	0.300	0.008	0.012

DFNWB1*1-4L Suggested Pad Layout



NOTE:

1. Controlling dimension: in millimeters.
2. General tolerance: ±0.05mm.
3. The pad layout is for reference purposes only.

DISCLAIMER

IMPORTANT NOTICE, PLEASE READ CAREFULLY

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Any person who purchases or uses SZCJ products for design shall: 1. Select products suitable for circuit application and design; 2. Design, verify and test the rationality of circuit design; 3. Procedures to ensure that the design complies with relevant laws and regulations and the requirements of such laws and regulations. SZCJ makes no warranty or representation as to the accuracy or completeness of the information contained in this data sheet and assumes no responsibility for the application or use of any of the products described in this data sheet.

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