



DESCRIPTION

The A6500C series is a low-power, low-dropout (LDO) CMOS linear regulator designed to operate from an input voltage range of 2.5V to 7.5V, delivering up to 500mA of output current.

Optimized for RF and analog applications, the A6500C series features low output noise, high power supply rejection ratio (PSRR), low quiescent current, and excellent line and load transient response, making it well suited for noise-sensitive systems.

The device is stable with 1 μ F ceramic capacitors on both the input and output, eliminating the need for an additional noise bypass capacitor under normal operation. For applications requiring even lower output noise, an external bypass capacitor may be connected to the BP pin.

Additional features include an ultra-low 10nA shutdown current with logic-controlled enable, foldback current limiting, and thermal shutdown protection to ensure reliable operation under fault conditions.

The A6500C is available in DFN4(1x1), SOT23, SOT25, SC70-5 and SOT89 packages.

ORDERING INFORMATION

Package Type	Part Number	
SOT-25 SPQ: 3,000pcs/Reel	E5	A6500CE5R-XX
		A6500CE5VR-XX
DFN4 (1X1) SPQ: 10,000pcs/Reel	J4	A6500CJ4R-XX
		A6500CJ4VR-XX
SOT-23 SPQ: 3,000pcs/Reel	E3	A6500CE3R-XX
		A6500CE3VR-XX
SC-70 SPQ: 3,000pcs/Reel	C5	A6500CC5R-XX
		A6500CC5VR-XX
SOT89-3 SPQ: 1,000pcs/Reel	K3	A6500CK3R-XX
		A6500CK3VR-XX
Note XX: 075=0.75V, 18=1.8V, 33=3.3V, 50=5.0V... V: Halogen free Package R: Tape & Reel		
AiT provides all RoHS products		

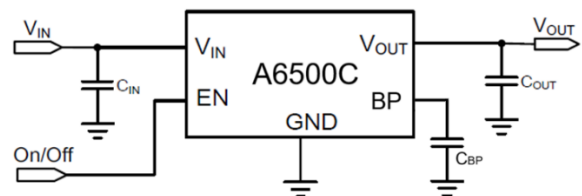
FEATURES

- Low Output Noise
- Low Dropout Voltage
- Thermal-Overload Protection
- Output Current Limit
- 10nA Logic-Controlled Shutdown
- 30 μ A(TYP) Low Supply Current
- 2.5V to 7.5V Input Voltage Range
- Output Voltage: 0.75V, 1.0V, 1.2V, 1.5V, 1.8V, 2.05V, 2.5V, 2.8V, 3.0V, 3.3V, 3.6V, 4.0V, 5.0V
- 500mA Output Current
- -40°C to 85°C Operating Temperature Range

APPLICATION

- Cellular Telephones
- Camera Modules
- Modems
- HiFi Audio Radio Transceivers
- PLL/Synthesizer, Clocking
- Medium-Current, Noise-Sensitive Applications

TYPICAL APPLICATION



NOTE:

- 1) Input capacitor (C_{IN} =1 μ F) and Output capacitor (C_{OUT} =1 μ F) are recommended in all application circuits.
- 2). C_{BP} is optional. Leave the BP pin open during normal operation. To further reduce output noise, connect a 0.01 μ F capacitor between BP and GND. (SOT-25, SC70-5 package)



PIN DESCRIPTION

A6500C SOT-23 SOT-23, E3 Top View	A6500C DFN4 DFN4 (1x1), J4 Top View	A6500C SOT89-3 SOT89-3, K3 Top View			
A6500C SOT-25 SOT-25, E5 Top View	A6500C SC70-5 SC70-5, C5 Top View				
Pin #				Symbol	Function
SOT-23	DFN4	SOT-89-3	SOT-25 SC70-5		
3	4	2	1	V _{IN}	Supply voltage input. Operates from 2.5V to 7.5V. Bypass to GND with a 1μF ceramic capacitor.
1	2	1	2	GND	Ground Pin
	3		3	EN	Enable Pin. Connect this pin to V _{IN} for normal operation.
			4	BP	For internal use, floating and do not connect any pins
2	1	3	5	V _{OUT}	Output Voltage



ABSOLUTE MAXIMUM RATINGS

Max Input Voltage		-0.3~+8V
V _{EN} , Enable Input Voltage		-0.3 ~V _{IN}
θ _{JA} , Package Thermal Impendence	SOT-23-5	230°C/W
	SOT23-3	295°C/W
	DFN4 1x1	315°C/W
	SC70-5	380°C/W
	SOT89-3	210°C/W
T _J , Junction Temperature		-40°C~150°C
Power Dissipation	Internally Limited W	
T _S , Storage Temperature		-65°C~150°C
Lead Temperature & Time		260°C, 10s
ESD Ratings	Human-body mode (HBM) , per ANSI/ESDA/JEDEC JS-001 ⁽¹⁾	±6000V
	Machine model (MM)	±400V

Stress beyond above listed "Absolute Maximum Ratings" may lead permanent damage to the device. These are stress ratings only and operations of the device at these or any other conditions beyond those indicated in the operational sections of the specifications are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

(1) JEDEC document JEP155 states that 500 V HBM allows safe manufacturing with a standard ESD control process.

RECOMMENDED WORK CONDITIONS

Parameter	Value
V _{IN} , Input voltage range	2.5V to 7.5V
V _{EN} , Enable input voltage	0~V _{IN}
I _{OUT} , Output current	500mA
T _A , Ambient operating temperature	-40°C to 85°C



ELECTRICAL CHARACTERISTICS

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input Voltage	V_{IN}		2.5 ⁽¹⁾	-	7.5	V
Output Voltage Accuracy		$I_{OUT}=0.1mA$	-2.5		2.5	%
Maximum Output Current			500			mA
Dropout Voltage ⁽²⁾	V_{DROP}^*	$V_{OUT}=1.2V$, $I_{OUT}=500mA$	-	900	-	mV
		$V_{OUT}=1.5V$, $I_{OUT}=500mA$	-	630	-	
		$V_{OUT}=3.3V$, $I_{OUT}=500mA$	-	450	600	
Line Regulation	ΔV_{LNR}	$V_{IN} = (V_{OUT} + 0.5V)$ to $5.5V$, $I_{OUT} = 1mA$	-	0.1	0.2	%/V
Load Regulation	ΔV_{LOAD}	$I_{OUT}=0.1mA$ to $500mA$ $C_{OUT}=1\mu F$	-	30	60	mV
Supply Quiescent Current	I_Q	No load	-	30	40	μA
Shutdown supply Current	$I_Q (SHDN)$	$EN=0V$		0.01	1	
Ripple Rejection	PSRR	$I_{LOAD}=30mA$, $C_{BP}=10nF$, $C_{OUT}=1\mu F$, $V_{IN}=V_{OUT}+1$ $V_{RIPPLE}=0.2V_{P-P}$, $f=217Hz$	-	74	-	dB
		$I_{LOAD}=30mA$, $C_{BP}=10nF$, $C_{OUT}=1\mu F$, $V_{IN}=V_{OUT}+1$ $V_{RIPPLE}=0.2V_{P-P}$, $f=1kHz$	-	70	-	
Output Voltage Temperature Coefficient	$\frac{\Delta V_{OUT}}{\Delta T \times V_{OUT}}$	$I_{LOAD} = 0.1mA$	Full	35	-	ppm/ $^\circ C$
EN Input Voltage "H"	V_{ENH}	$V_{IN}=2.5V$	1.4	-	-	V
		$V_{IN}=7.5V$	2.3			
EN Input Voltage "L"	V_{ENL}	$V_{IN}=2.5V$	-	-	0.4	
		$V_{IN}=7.5V$			0.8	
EN Input Bias Current	I_{BH}	$EN=7.5V$		0.01	1	μA
	I_{BL}	$EN=0V$		0.01		
Start-Up time ⁽³⁾	T_{STR}	$C_{OUT}=1\mu F$, No Load	-	180	-	μs
R_{ON} of Discharge MOSFET		$V_{IN}=4.0V$, $V_{EN}=0V$		260	-	Ω
Thermal Shutdown Temp	T_{SD}		-	150	-	$^\circ C$
Thermal Shutdown Hysteresis	T_{SH}		-	15	-	$^\circ C$

NOTES:

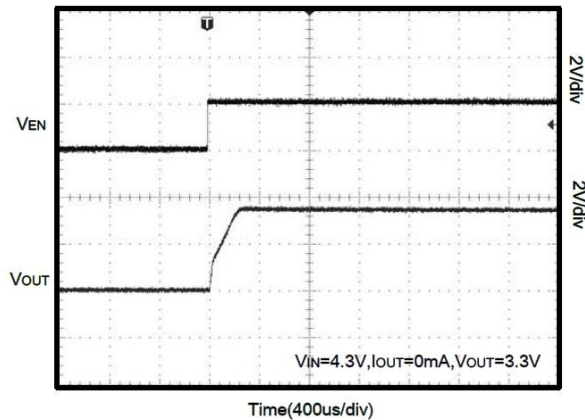
- $V_{IN} = V_{OUT} (NOMINAL) + 0.5V$ or $2.5V$, whichever is greater.
- The dropout voltage is defined as $V_{IN} - V_{OUT}$, when V_{OUT} is 100mV below the value of V_{OUT} for $V_{IN} = V_{OUT} + 0.5V$.
- Time needed for V_{OUT} to reach 90% of final value.
- If output versions below 2V, no hysteresis characteristics during temperature protection.



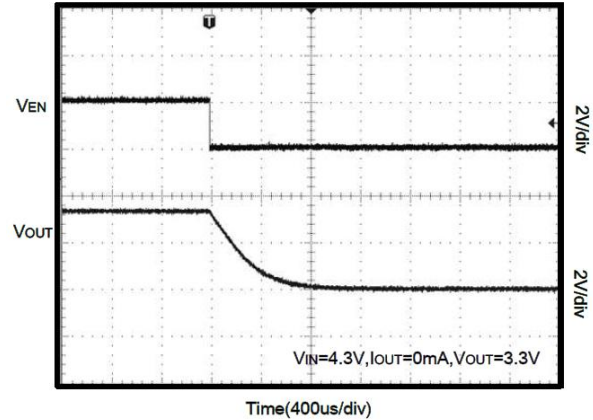
TYPICAL PERFORMANCE CHARACTERISTICS

$V_{IN} = V_{OUT (NOMINAL)} + 0.5V$, $V_{OUT}=3.3V$, $C_{IN} = 1\mu F$, $C_{OUT} = 1\mu F$, $T_A = +25^\circ C$, unless otherwise noted.

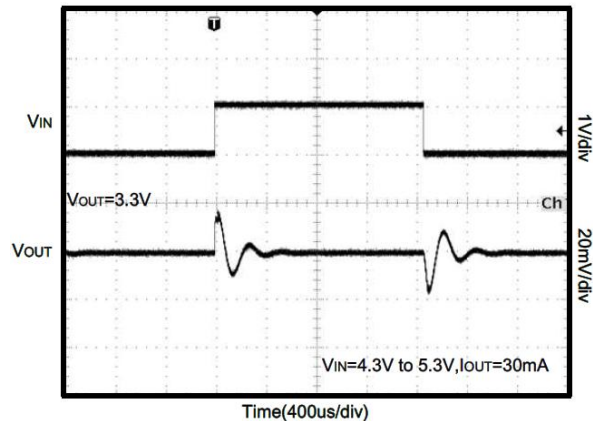
1. Turn On Speed With EN Pin



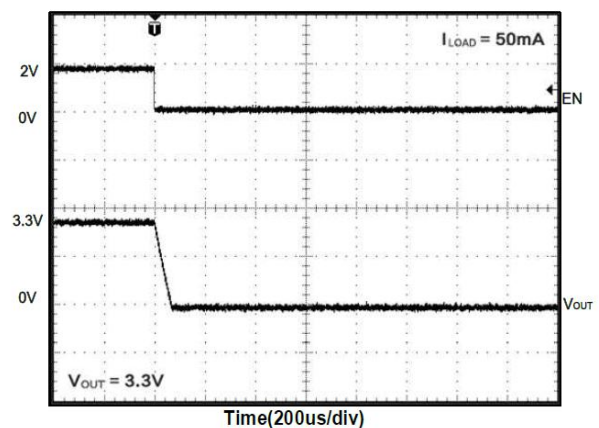
2. Turn Off Speed With EN Pin



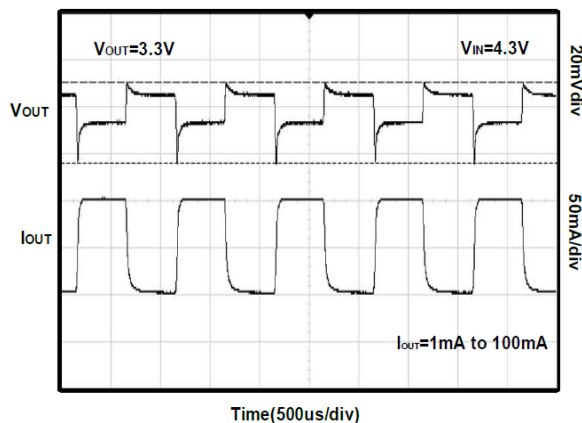
3. Line Transient Response



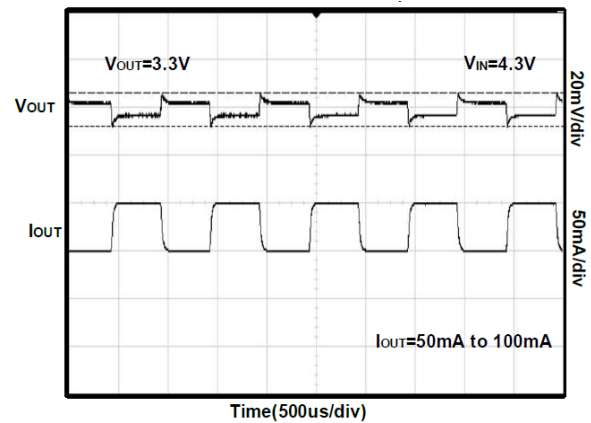
4. Shutdown



5. Load Transient Response

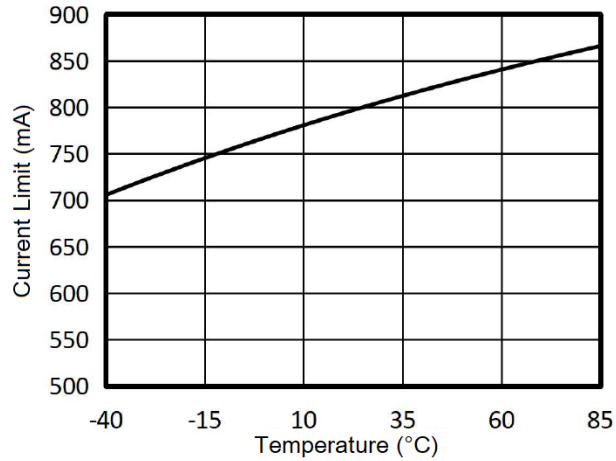


6. Load Transient Response

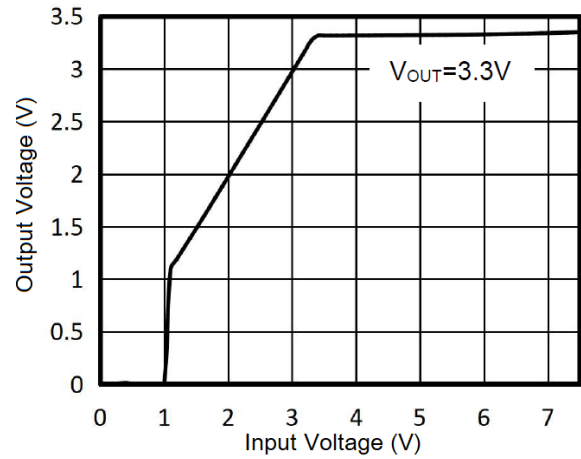




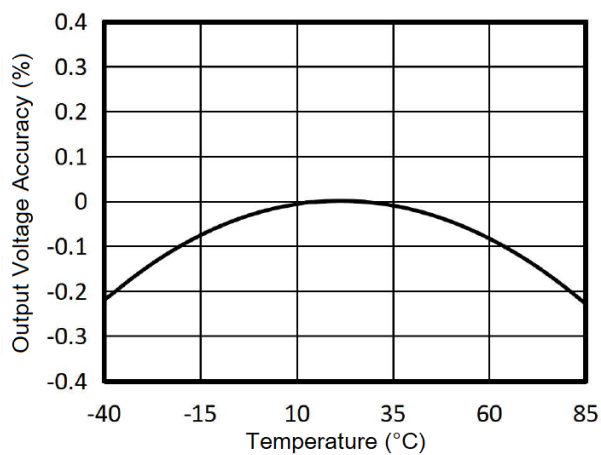
7. Current Limit vs. Temperature



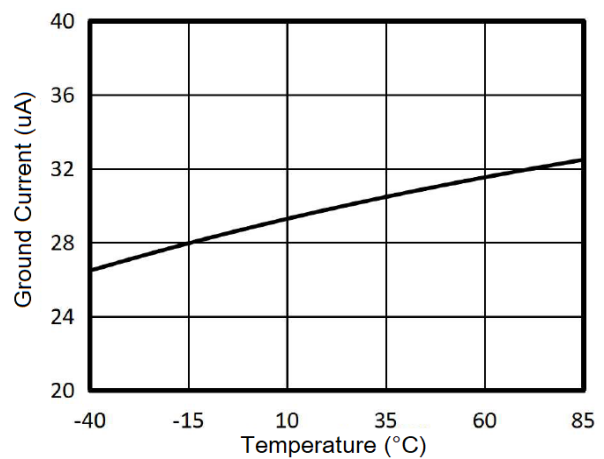
8. Output Voltage vs. Input Voltage



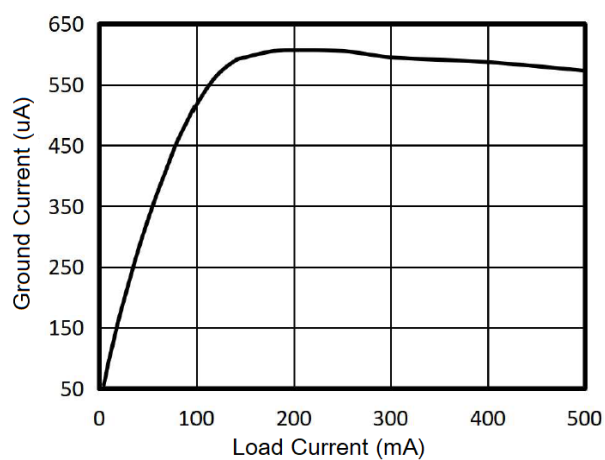
9. Output Voltage Accuracy vs. Temperature



10. Ground Current vs. Temperature

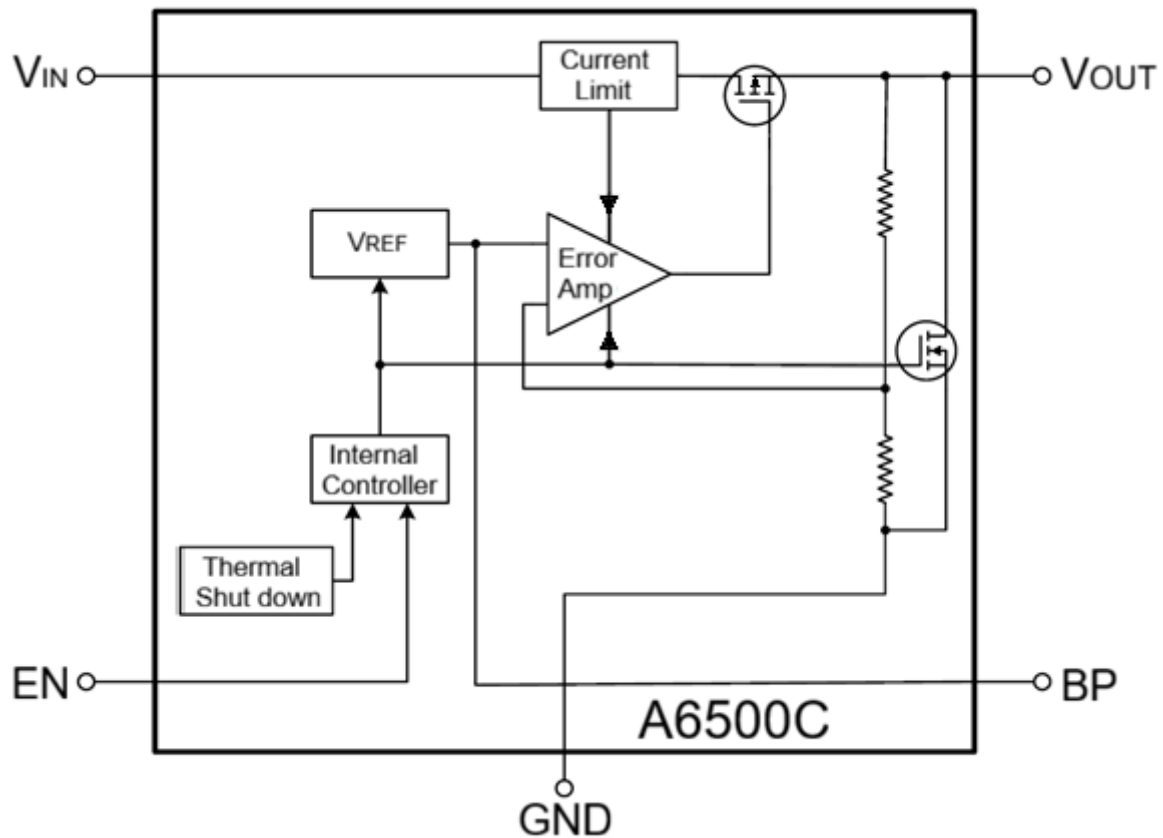


11. Ground Current vs. Load Current





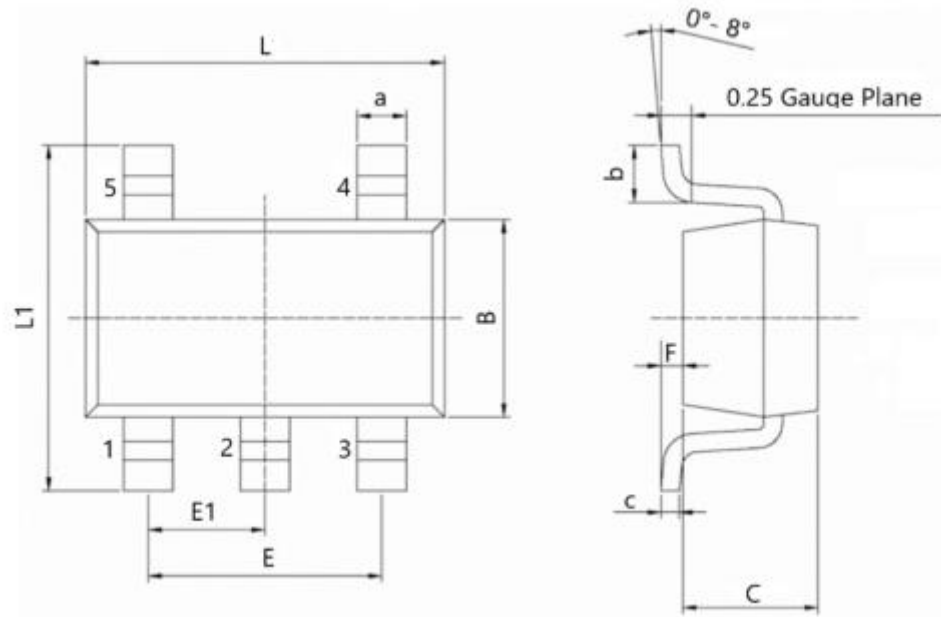
BLOCK DIAGRAM





PACKAGE INFORMATION

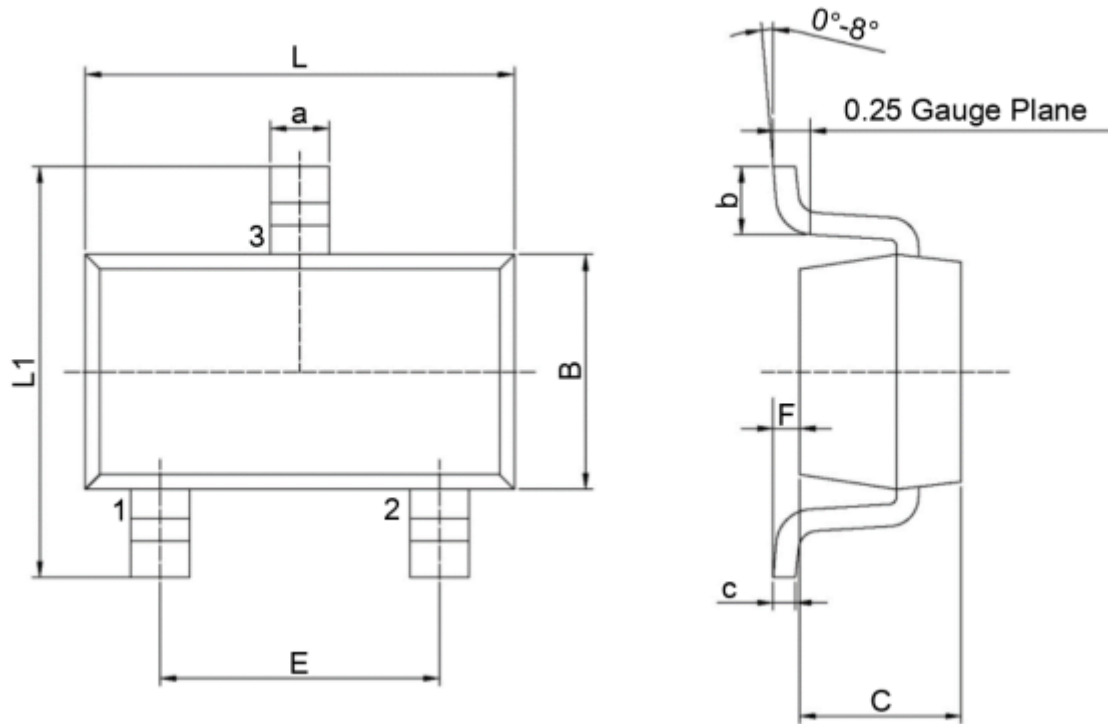
Dimension in SOT-25 (Unit: mm)



Symbol	Min.	Max.
a	0.350	0.500
B	1.500	1.700
b	0.350	0.550
C	0.900	1.300
c	0.100	0.200
E	1.800	2.000
E1	0.850	1.050
F	0.000	0.150
L	2.820	3.020
L1	2.600	3.000



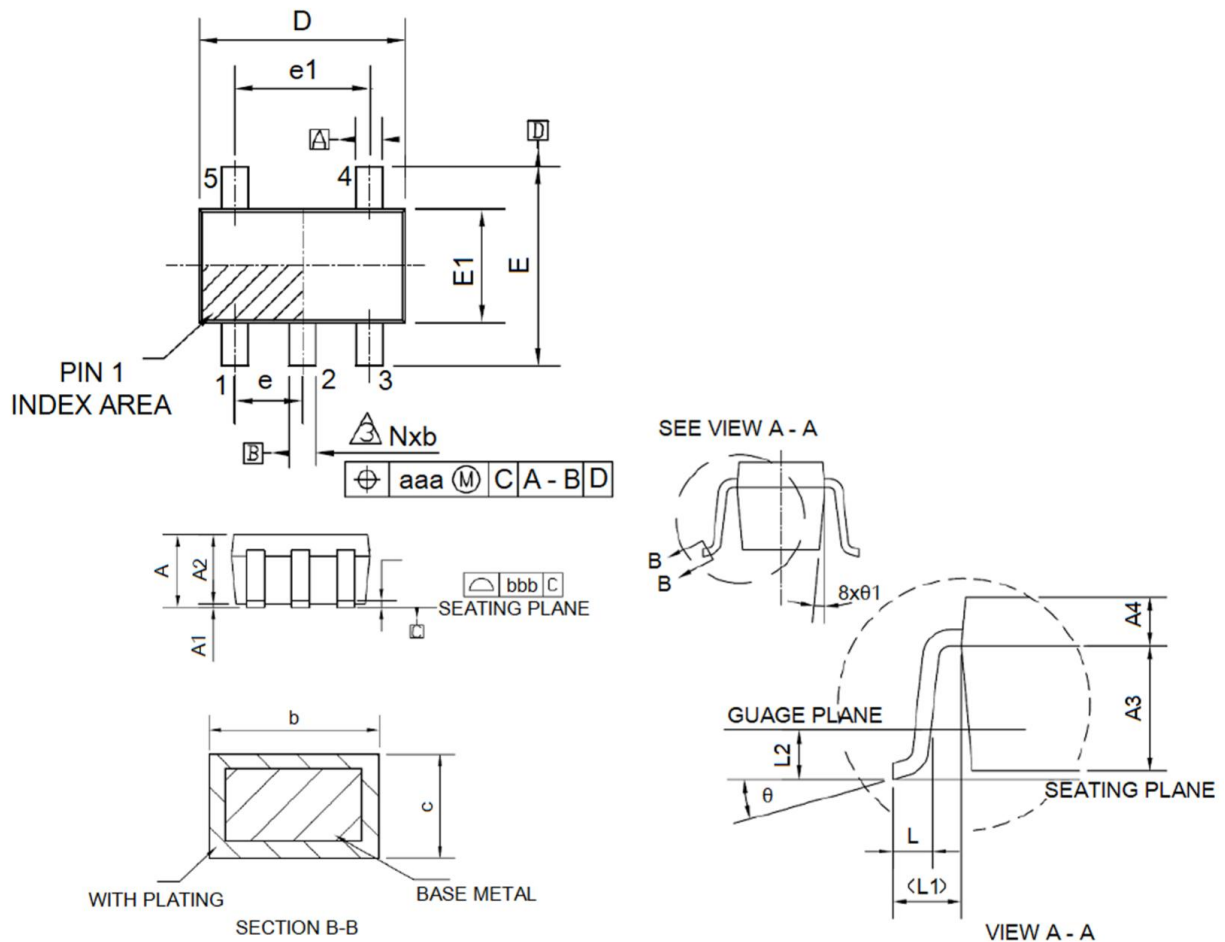
Dimension in SOT-23 (Unit: mm)



Symbol	MILLIMETERS	
	Min.	Max.
a	0.350	0.500
B	1.500	1.700
b	0.350	0.550
C	0.900	1.300
c	0.100	0.200
E	1.800	2.000
F	0	0.150
L	2.820	3.020
L1	2.600	3.000

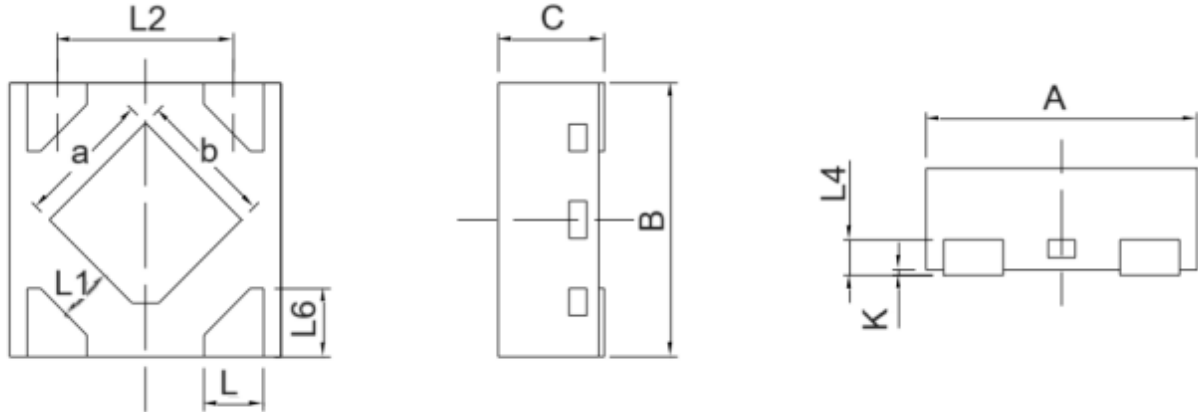


Dimension in SC70-5 (Unit: mm)





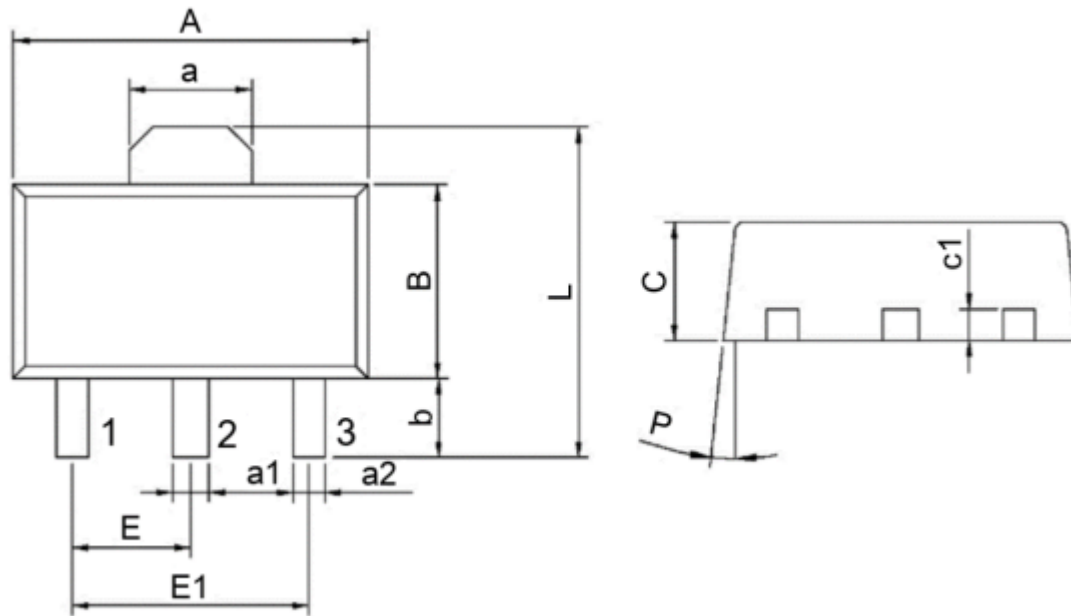
Dimension in DFN4(1x1) (Unit: mm)



Symbol	Min.	Max.
A	0.950	1.050
a	0.430	0.530
B	0.950	1.050
b	0.430	0.530
C	0.340	0.400
K	0.000	0.050
L	0.170	0.270
L1	0.150	-
L2	0.650 TYP.	
L4	0.100 TYP.	
L6	0.200	0.300



Dimension in SOT89-3 (Unit: mm)



Symbol	Millimeters	
	Min	Max
A	4.400	4.700
a	1.450	1.650
a1	0.360	0.560
a2	0.300	0.500
B	2.350	2.650
b	0.800	1.200
C	1.400	1.700
c1	0.350	0.500
E	1.400	1.600
E1	2.800	3.200
L	3.878	4.478
P	6°	



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