



DESCRIPTION

The A7501 Series are VFM Step-Up DC-DC ICs with ultra low supply current by CMOS process and suitable for use with battery-powered instruments.

The A7501 IC consists of an oscillator, a VFM control circuit, a driver transistor (LX switch), a reference voltage unit, and error amplifier, resistors for voltage detection, and a LX switch protection circuit.

A low ripple and high efficiency step-up DC-DC converter can be constructed of this A7501 IC with only three external components. A protection circuit turns off the built-in MOSFET when the voltage at the CONT pin exceeds the limit to prevent it from being damaged. A7501 with a fixed duty ratio of 75 % (Lower Output Voltage) or 88% (Higher Output Voltage).

A7501 is available in SOT-23, SOT-25 and SOT89-3 packages.

ORDER INFORMATION

Package Type	Part Number	
SOT-23 SPQ: 3,000pcs/Reel	E3	A7501E3R-XX
		A7501E3VR-XX
SOT-25 SPQ: 3,000pcs/Reel	E5	A7501E5R-XXD
		A7501E5VR-XXD
SOT89-3 SPQ: 1,000pcs/Reel	K3	A7501K3R-XX
		A7501K3VR-XX
Note	XX: Output Voltage, 27=2.7V, 30=3.0V D: Pin Type R: Tape & Reel V: Halogen free Package	
AiT provides all RoHS products		

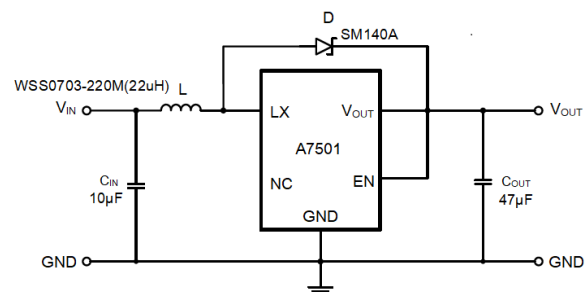
FEATURES

- Minimal Number of External Components, Only an Inductor (AiT-WSS0703-220M), a Diode (AiT-SM140A), and a Capacitor.
- Ultra Low Input Current: 6.5μA at no load
- 1.8V to 5.0V Output Voltage
- ±2% High Output Voltage Accuracy
- Low Ripple and Low Noise
- Low Start-Up Voltage, 0.9V at 1mA
- Duty ratio: 77% Built-in fixed-type PFM controller
- Available in SOT-23, SOT-25 and SOT89-3 packages

APPLICATION

- Power Source for Battery-Powered Equipment
- Power Source for Camera, Camcorder, VCT, PDA, Pager, Electronic Data Bank, Hand-Held Communication Equipment and Audio Equipment.
- Power Source for Applications which require higher voltage than that of batteries used in the appliances.

TYPICAL APPLICATION CIRCUIT





PIN DESCRIPTION

A7501 SOT-23 Top View				A7501 SOT89-3 Top View	
A7501-A SOT-25 Top View				A7501-B SOT-25 Top View	
Pin #				Symbol	Function
SOT-23	SOT-25		SOT89-3		
	A	B			
1	4	4	1	GND	Ground
2	5	5	3	LX	External Coil Connection
3	2	2	2	V _{OUT}	Output
-	1	1	-	EN	Chip Enable
-	3	-	-	NC	No Connect
-	-	3	-	EXT	Connect External MOS



ABSOLUTE MAXIMUM RATINGS

V _{DD} , Input Voltage		V _{SS} -0.3V ~ V _{SS} +6.5V
V _{OUT} , Output Voltage		V _{SS} -0.3V ~ V _{SS} +6.5V
V _{CONT} , Output Voltage		V _{SS} -0.3V ~ V _{SS} +6.5V
I _{LX} , Output Current		1000mA
P _D , Power Dissipation	SOT-23	250mW
	SOT-25	250mW
	SOT89-3	500mW
T _{OPR} , Operating Ambient Temperature		-40°C ~ +80°C
T _{STG} , Storage Ambient Temperature		-40°C ~ +125°C

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.



ELECTRICAL CHARACTERISTICS

$T_A=25^{\circ}\text{C}$, $V_{IN}=1.5\text{V}$, $V_{OUT}=3.3\text{V}$, unless otherwise noted

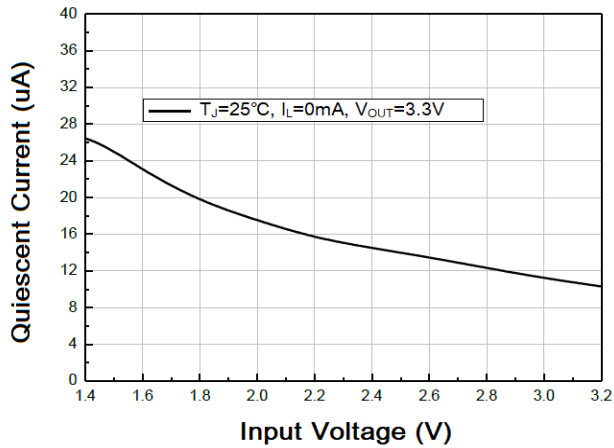
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_{OUT}		$V_{OUT(S)} \times 0.98$	$V_{OUT(S)}$	$V_{OUT(S)} \times 1.02$	V
Input Voltage	V_{IN}		-	-	6.5	
Operation Start Voltage	V_{ST1}	$I_{OUT}=1\text{mA}$	-	0.9	1.1	
Active Current	I_{ACT}	$V_{OUT} = \text{Output voltage} \times 0.9$	-	40	55	μA
Input Current Without Load	I_{SS}	$V_{OUT} = \text{Output voltage} \times 1.1$	-	6.5	7.5	
Line Regulation	ΔV_{OUT1}	$I_{OUT}=30\text{mA}$	-	0.22	0.4	%
Load Regulation	ΔV_{OUT2}	$I_{OUT}=10\mu\text{A} \sim 100\text{mA}$	-	0.35	0.5	
Output Voltage Temperature Coefficient	$\frac{\Delta V_{OUT}}{\Delta T_A \times V_{OUT}}$	$T_A=-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$	-	± 40	-	ppm/ $^{\circ}\text{C}$
Maximum Oscillation Frequency	fosc	$V_{OUT} = \text{Output voltage} \times 0.95$	225	300	375	kHz
Duty Ratio	Duty	$V_{OUT} = \text{Output voltage} \times 0.95$	70	77	84	%
Efficiency	EFFI		-	88	-	%

NOTE: $V_{OUT(S)}$ specified above is the set output voltage value, and V_{OUT} is the typical value of the actual output voltage. fosc is the working frequency.

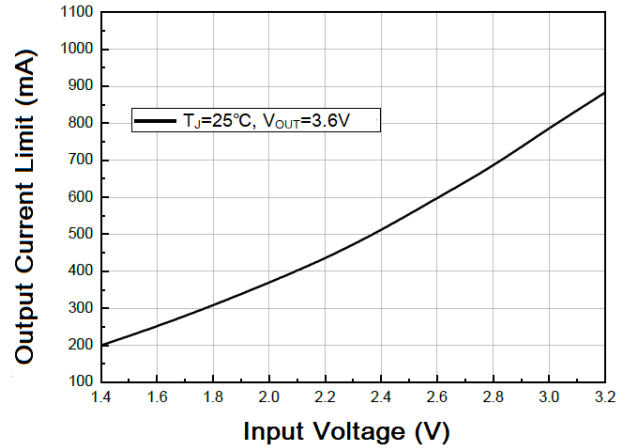


TYPICAL PERFORMANCE CHARACTERISTICS

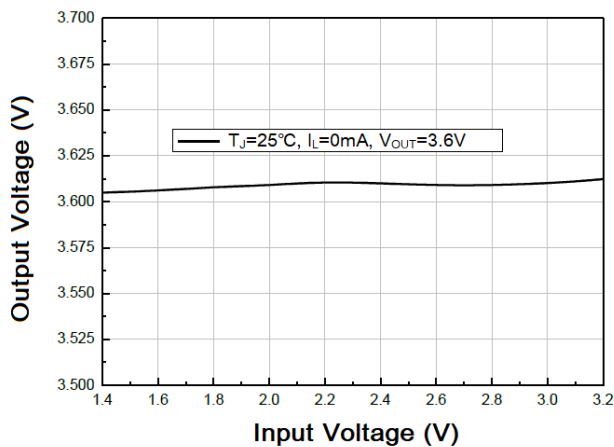
1. Quiescent Current vs. Input Voltage



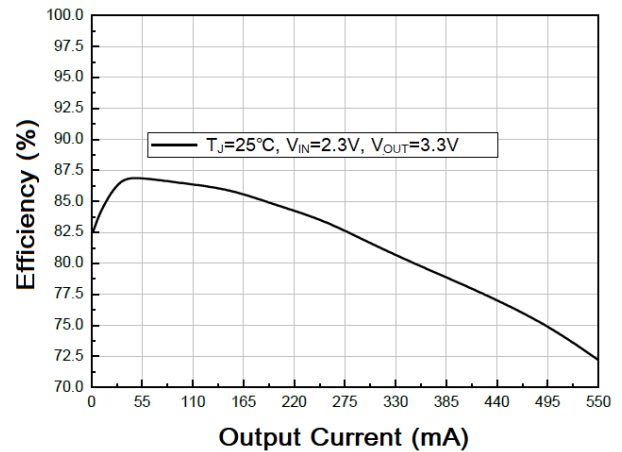
2. Output Current Limit vs. Input Voltage



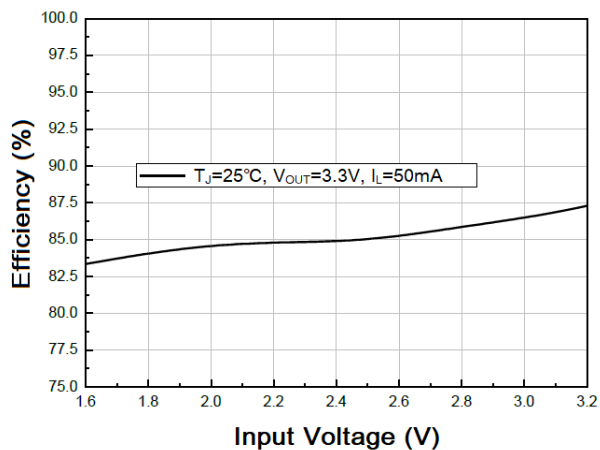
3. Output Voltage vs. Input Voltage



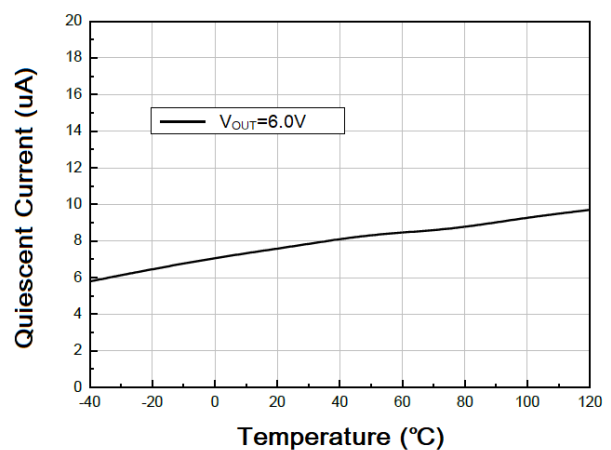
4. Efficiency vs. Output Current



5. Efficiency vs. Input Voltage

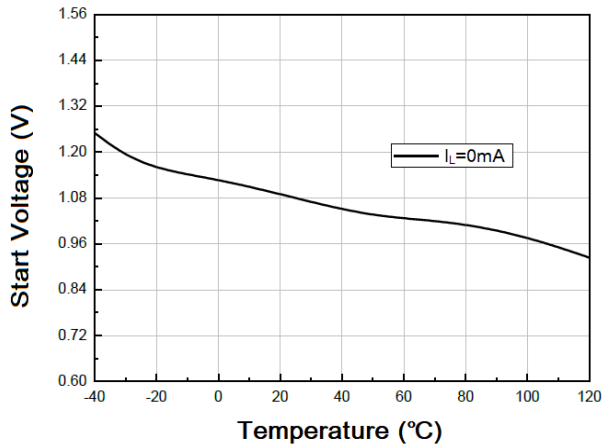


6. Quiescent Current vs. Temperature

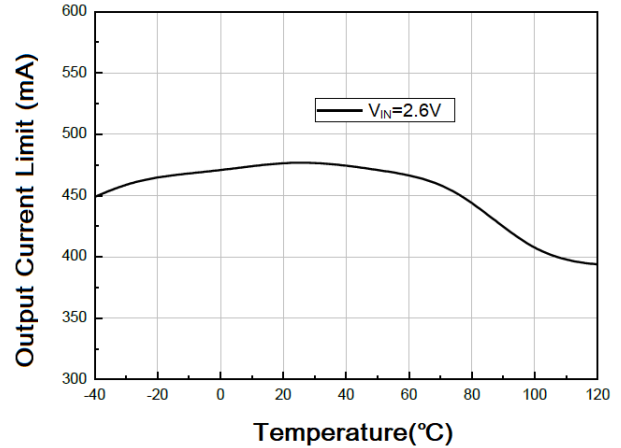




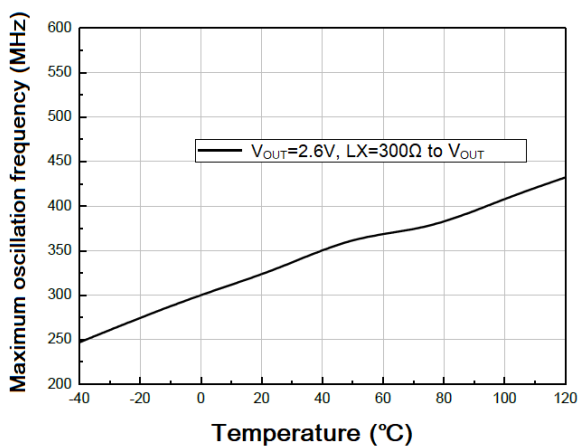
7. Start Voltage vs. Temperature



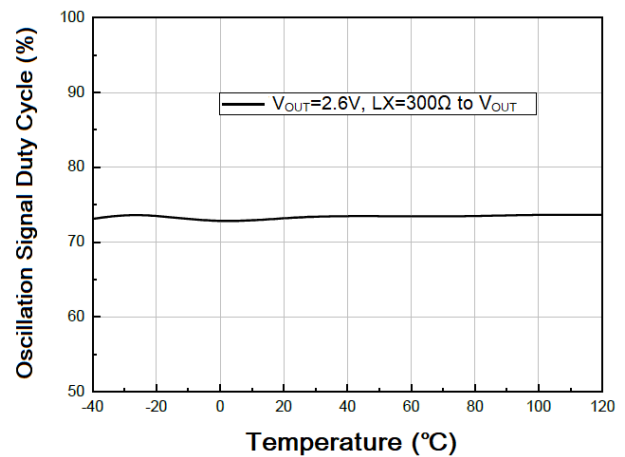
8. Output Current Limit vs. Temperature



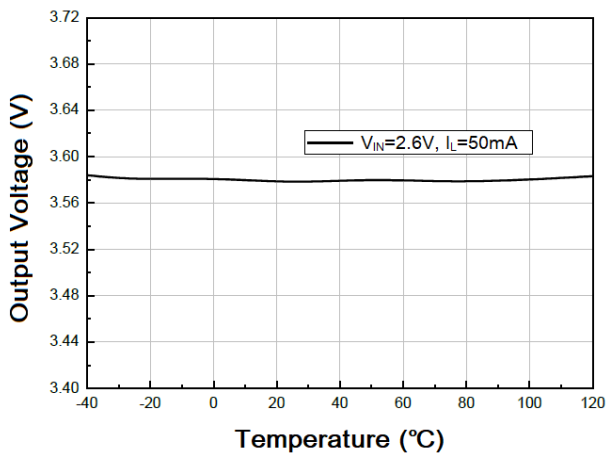
9. Maximum oscillation frequency vs. Temperature



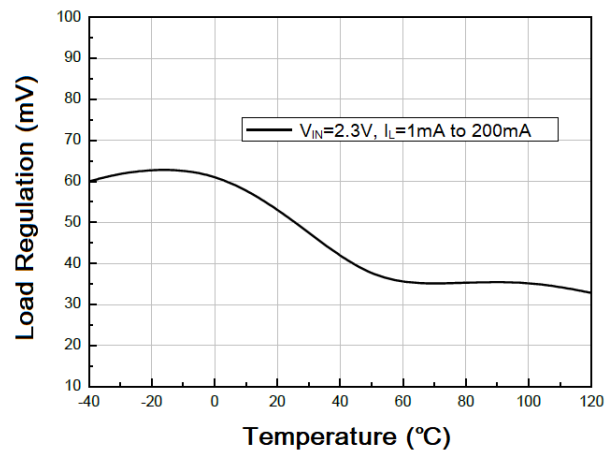
10. Oscillation Signal Duty Cycle vs. Temperature



11. Output Voltage vs. Temperature

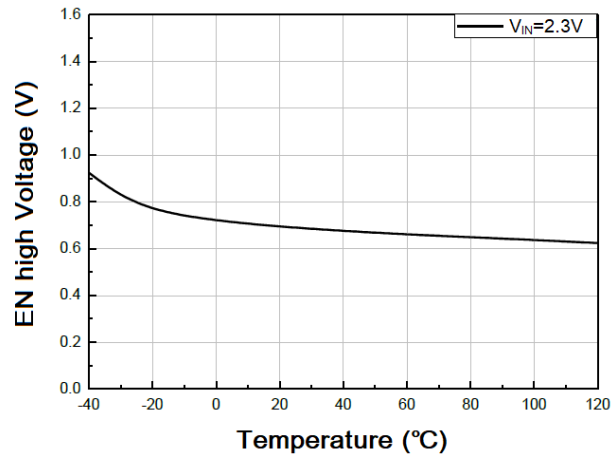


12. Load Regulation vs. Temperature





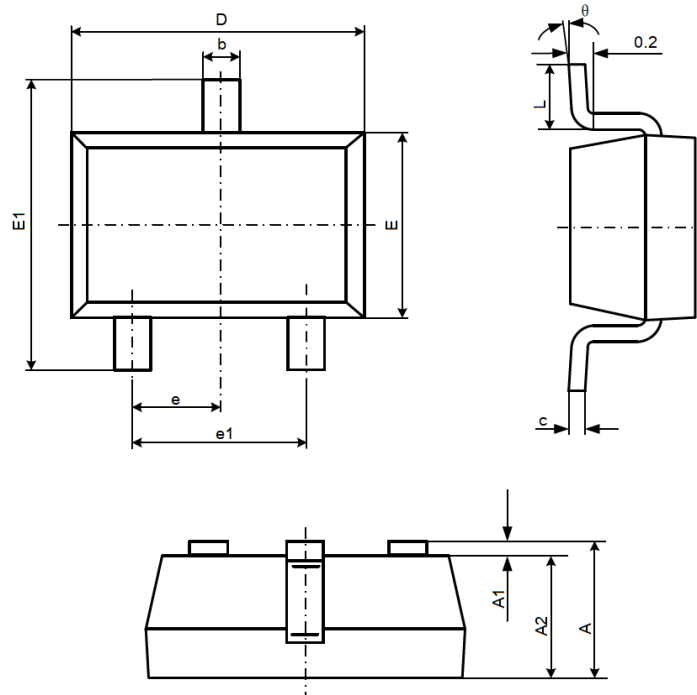
13. EN High Voltage vs. Temperature





PACKAGE INFORMATION

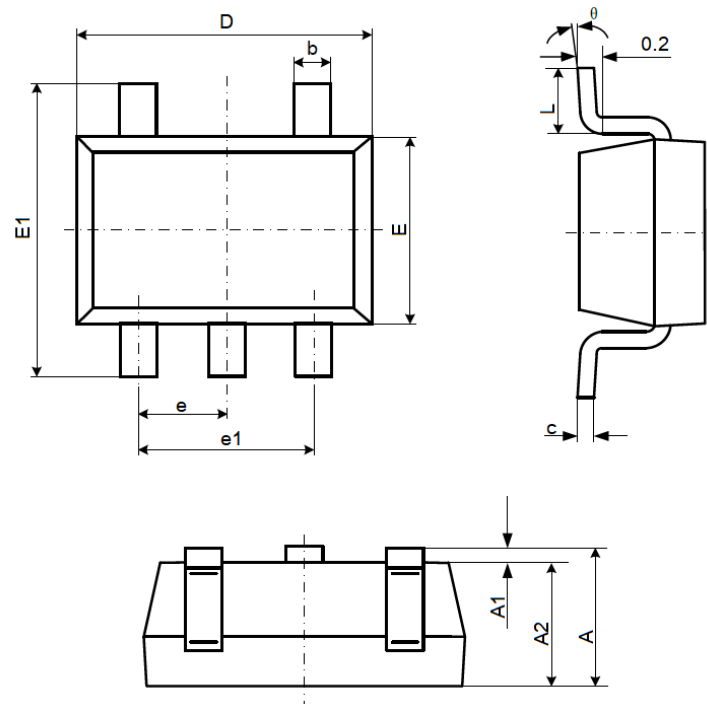
Dimension in SOT-23 Package (Unit: mm)



Symbol	Millimeters		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	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
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°



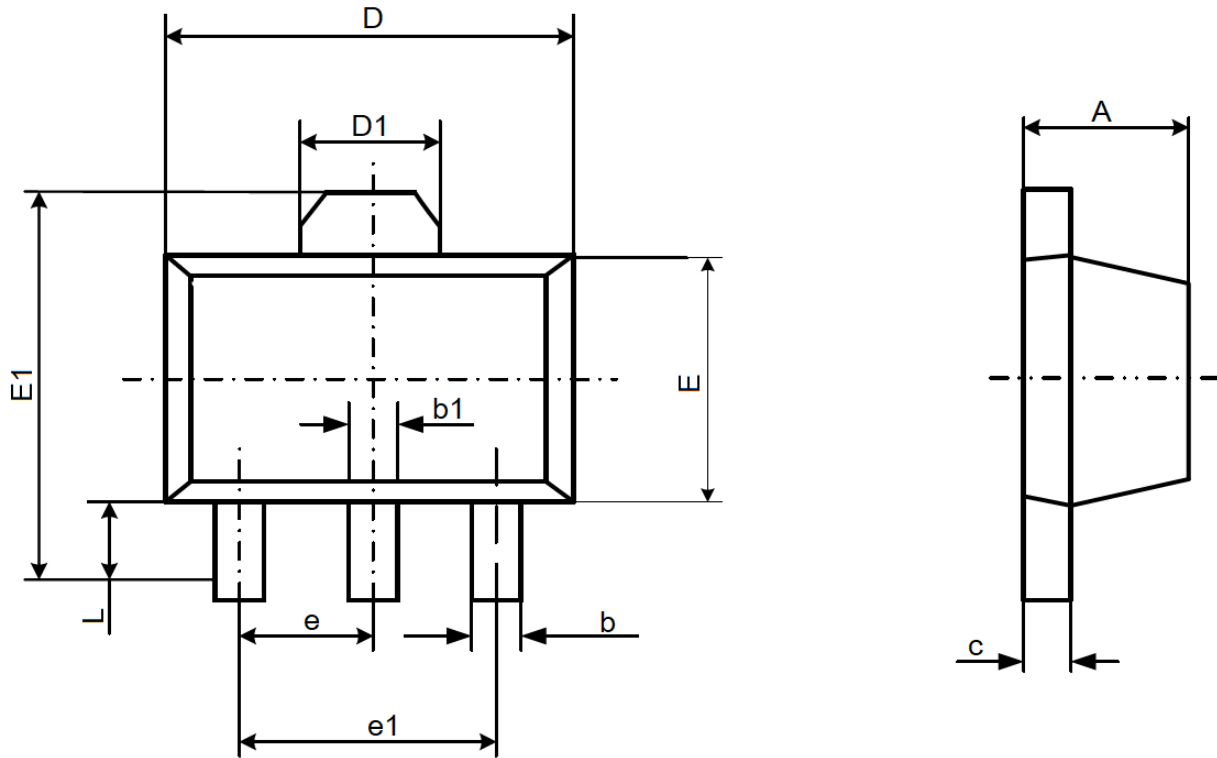
Dimension in SOT-25 Package (Unit: mm)



Symbol	Millimeters		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	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
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°



Dimension in SOT89-3 Package (Unit: mm)



Symbol	Millimeters		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	0.400	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.500 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



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