DESCRIPTION

The A6303E series are positive voltage output, low power consumption, low dropout voltage regulator. The very low power consumption of A6303E (0.8uA, Typ.) can greatly improve the battery life.

The A6303E series consists of a high accuracy voltage reference, error amplifier and output driver module with discharge capability.

The A6303E provides foldback short circuit protection, thermal protection and output current limit function.

The output voltage is selectable in 0.1V increments within the Range of 1.2V to 5V using trimming technologies.

The A6303E is available in space saving SOT-25 and DFN4(1x1) packages

FEATURES

- Maximum output current:300mA
- Low power consumption: 0.8uA (Typ.)
- Stand-by current: less than 0.1μA
- Operating input voltage:1.8V~5.5V
- Low dropout voltage:
  150mV @100mA @V_{OUT}=3.3V (Typ.)
- Low temperature coefficient: ±100ppm/°C
- Build-in chip enable and discharge circuit
- Built-in output current limit circuit
- Available in SOT-25 and DFN4(1x1) packages

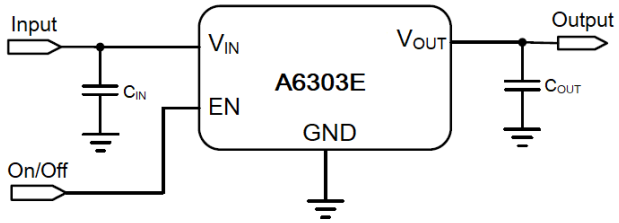
APPLICATION

- Mobile phones, Cordless phones
- Battery powered equipment
- Wireless communication equipment
- Cameras, video recorders
- Portable AV equipment
- PDAs

ORDERING INFORMATION

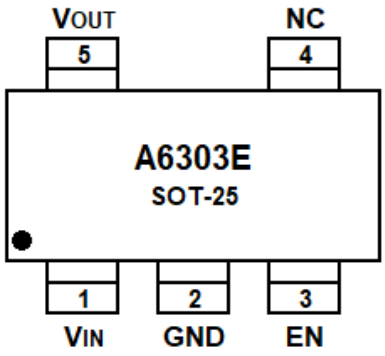
Package Type	Part Number	
SOT-25 SPQ: 3,000pcs/Reel	E5	A6303EE5R-XX
		A6303EE5VR-XX
DFN4(1x1) SPQ: 5,000pcs/Reel	J4	A6303EJ4R-XX
		A6303EJ4VR-XX
Note	XX: Output Voltage 12=1.2V, 18=1.8, 33=3.3V V: Halogen free Package R: Tape & Reel	
AiT provides all RoHS products		

TYPICAL APPLICATION

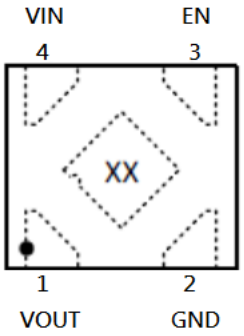


NOTE: Input capacitor (C_{IN}=1μF) and output capacitor (C_{OUT}=1uF) are recommended in all application circuit.

PIN DESCTRIPTION



Top View



Thermal Pad: GND

Top View (DFN 1x1)

Pin #		Symbol	Function
SOT-25	DFN4(1x1)		
1	4	V_{IN}	Supply voltage input
2	2	GND	Ground pin
3	3	EN	Chip enable
4	-	NC	No Connection
5	1	V_{OUT}	Output voltage

ABSOLUTE MAXIMUM RATING

Max Input Voltage		8V
T_J, Operating Junction Temperature		125°C
Output Current		400mA[NOET1]
TA, Ambient Temperature		-40°C ~ 85°C
θ_{JA}, Package Thermal Resistance	SOT-25	220°C/W
	DFN4(1x1)	170°C/W
Power Dissipation	SOT-25	400mW
	DFN4(1x1)	600mW
T_S, Storage Temperature		-40°C ~ 150°C
Lead Temperature & Time		260°C,10s

Stresses beyond 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 in the Electrical Characteristics are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

NOTE1: $I_{OUT}=P_D/(V_{IN}-V_{OUT})$

NOTE2: Exceed these limits to damage to the device. Exposure to absolute maximum rating conditions may affect device reliability.

ELECTRICAL CHARACTERISTICS

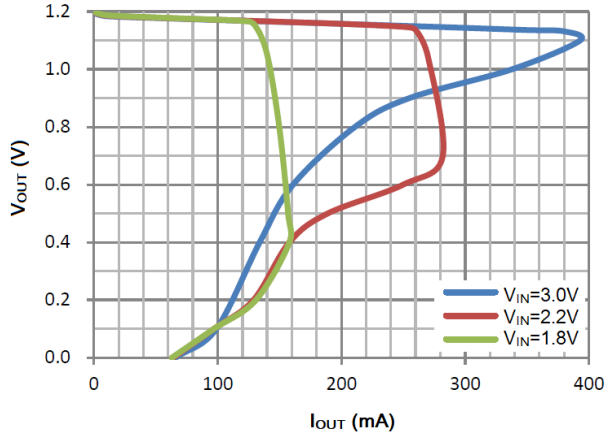
Test Conditions: C_{IN}=1μF, C_{OUT}=1μF,T_A=25℃, unless otherwise specified.

Parameter	Symbol	Conditions	Min	Typ.	Max	Unit
Input Voltage	V_{IN}		1.8	-	5.5	V
Output Voltage	V_{OUT}	V_{OUT}≤1.5V, V_{IN}=2.5V, I_{OUT}=0mA	V_{OUT} x0.98	V_{OUT}	V_{OUT} x1.02	V
		V_{OUT} >1.5V, V_{IN}=V_{OUT}+1V, I_{OUT}=0mA				
Max Output Current	$I_{OUT(MAX)}$	V_{OUT}≤1.5V, V_{IN}=2.5V	300	-	-	mA
		V_{OUT} >1.5V, V_{IN}=V_{OUT}+1V				
Dropout Voltage	V_{DROP} NOTE3	V_{OUT}=1.2V, I_{OUT}=300mA	-	1200	1450	
		V_{OUT}=1.8V, I_{OUT}=300mA	-	780	950	mV
		V_{OUT}=3.3V,I_{OUT}=300mA	-	460	550	mV
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	I_{OUT}=10mA, V_{OUT}≤1.3V, 1.8V≤V_{IN}≤5V	-	0.5	-	%/V
		I_{OUT}=10mA, V_{OUT}>1.3V, V_{OUT}+0.5V≤V_{IN}≤5V				
Load Regulation	ΔV_{OUT}	V_{OUT}≤1.5V, V_{IN}=2.5V 0mA≤I_{OUT}≤300mA	-	55	85	mV
		V_{OUT}>1.5V, V_{IN}=V_{OUT}+1V 0mA≤I_{OUT}≤300mA				
Supply Current	I_{SS}	V_{IN}=Set V_{OUT}+1V	-	0.8	1.5	uA
Supply Current (Standby)	$I_{STANDBY}$	V_{IN}=Set V_{OUT}+1V V_{EN}=GND	-	0.01	0.1	uA
Short Current Limit	I_{SHORT}	V_{OUT}=0V	-	60	-	mA
Output Voltage Temperature Coefficient	$\frac{\Delta V_{OUT}}{\Delta T \times V_{OUT}}$	I_{OUT}=10mA	-	±100	-	ppm/℃
Discharge Resistor	$R_{DISCHARGE}$	EN=0, V_{OUT}=3V	-	250	300	ohm
Thermal Shutdown Temp	T_{SD}	V_{IN}=Set V_{OUT}+1V, I_{OUT}=10mA	-	160	-	℃
Thermal Shutdown Hysteresis	T_{SH}	V_{IN}=Set V_{OUT}+1V, I_{OUT}=10mA	-	30	-	℃
EN “L” Level Voltage	V_{ENL}	V_{IN}=Set V_{OUT}+1V	0	-	0.4	V
EN “H” Level Voltage	V_{ENH}	V_{IN}=Set V_{OUT}+1V	1.5	-	5.5	V

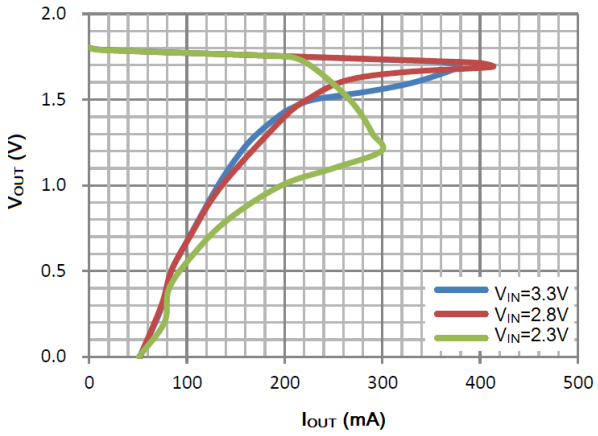
NOTE3: V_{DROP}=V_{IN1}-(V_{OUT2}*0.98), V_{OUT2} is the output voltage when V_{IN}=V_{OUT}1+1.0V and I_{OUT}=300mA. V_{IN1} is the input voltage at which the output voltage becomes 98% of V_{OUT1} after gradually decreasing the input voltage.

TYPICAL PERFORMANCE CHARACTERISTICS

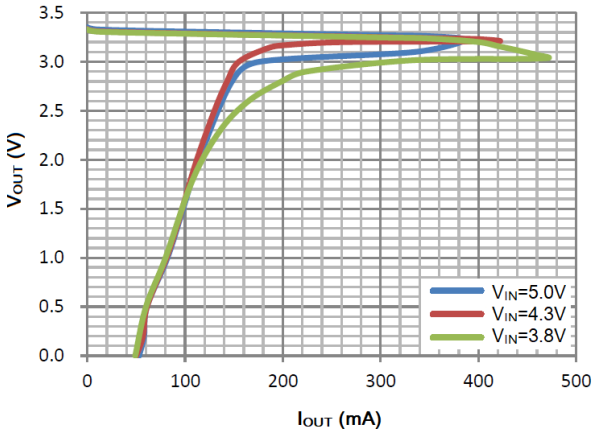
1. Load Regulation (V_{OUT}=1.2V)



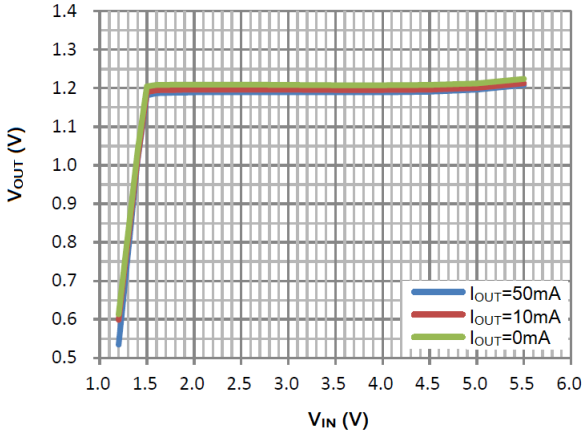
2. Load Regulation (V_{OUT}=1.8V)



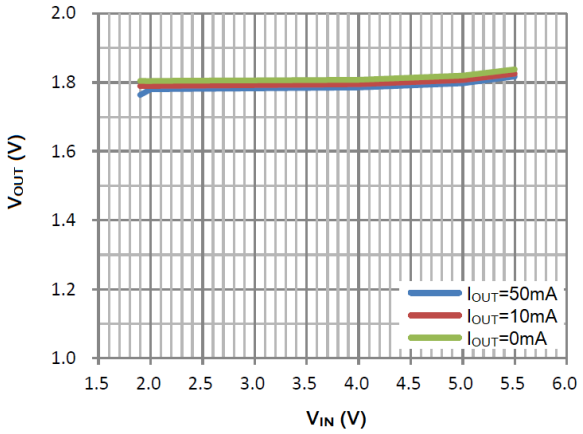
3. Load Regulation (V_{OUT}=3.3V)



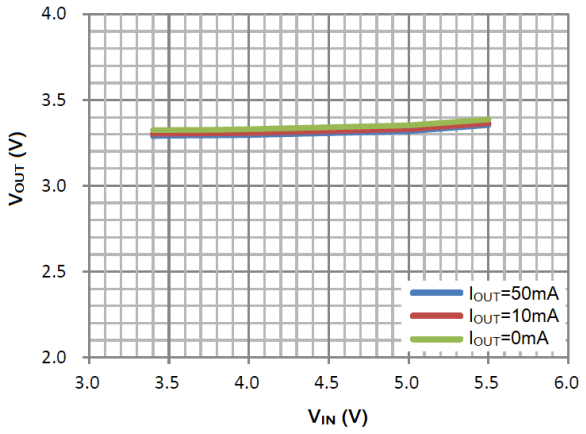
4. Line Regulation (V_{OUT}=1.2V)



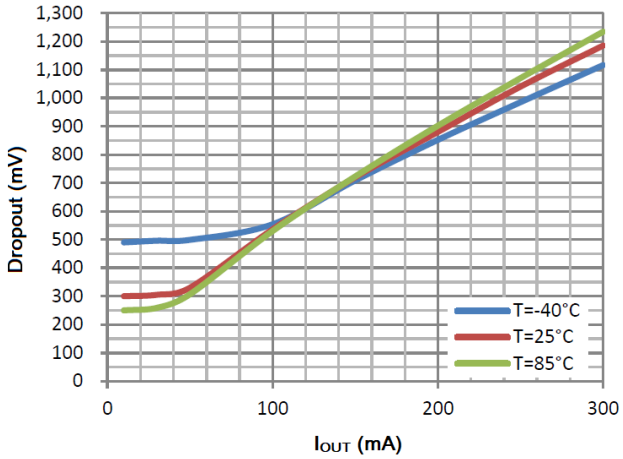
5. Line Regulation (V_{OUT}=1.8V)



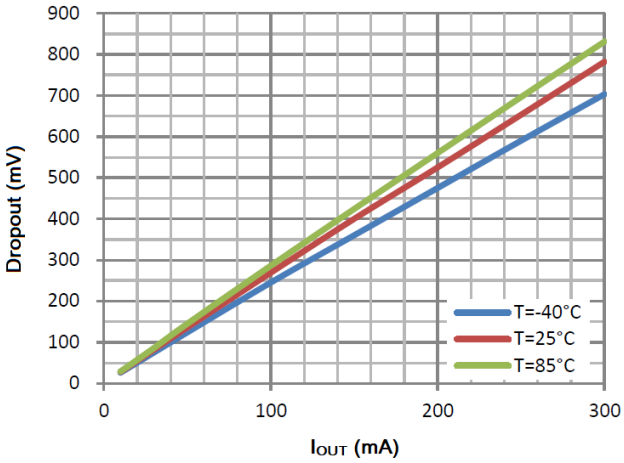
6. Line Regulation (V_{OUT}=3.3V)



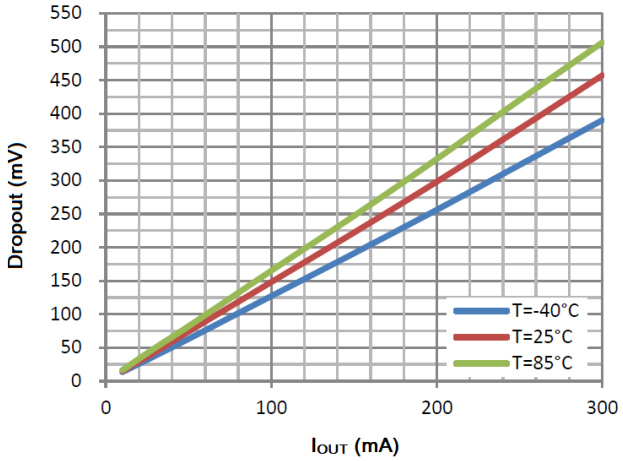
7. Dropout Voltage vs. Temp (V_{OUT}=1.2V)



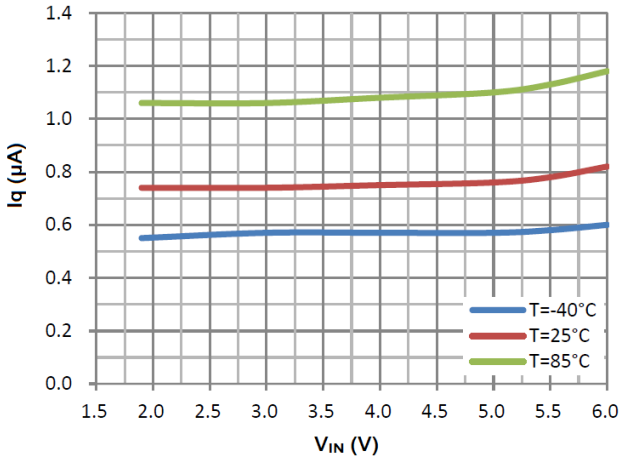
8. Dropout Voltage vs. Temp (V_{OUT}=1.8V)



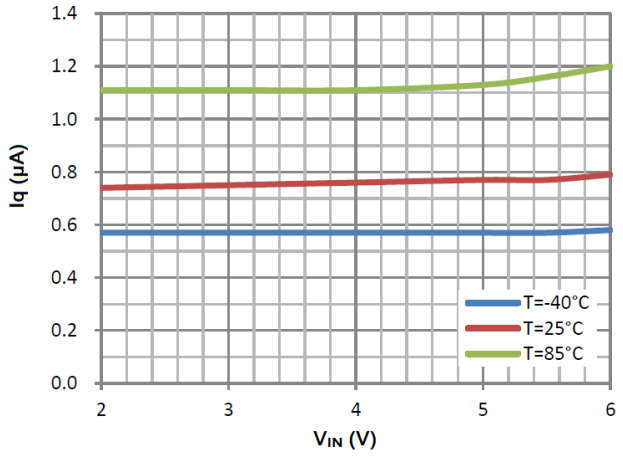
9. Dropout Voltage vs. Temp (V_{OUT}=3.3V)



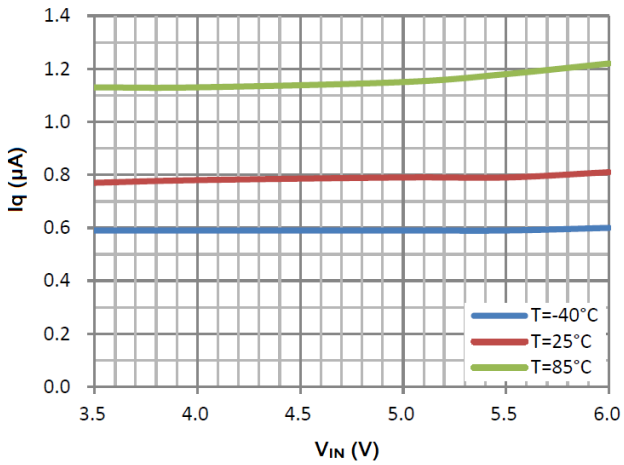
10. Iq (V_{OUT}=1.2V)



11. Iq (V_{OUT}=1.8V)

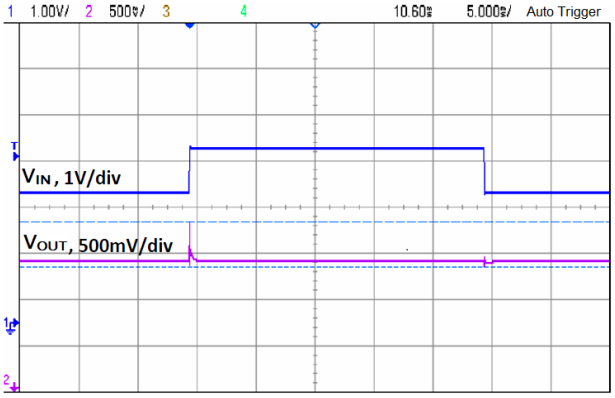


12. Iq (V_{OUT}=3.3V)



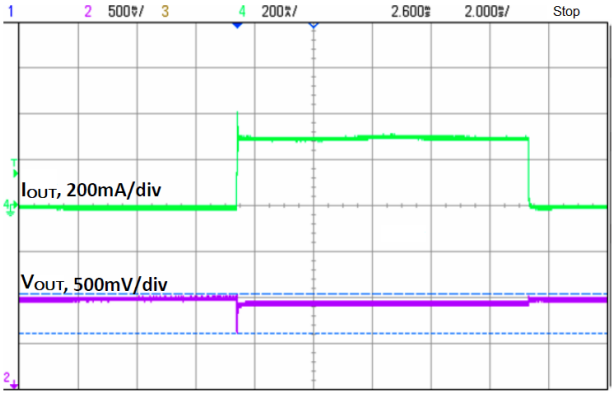
13. Line Transient Response

V_{IN}=2.8-3.8V, I_{OUT}=10mA, V_{OUT}=1.8V



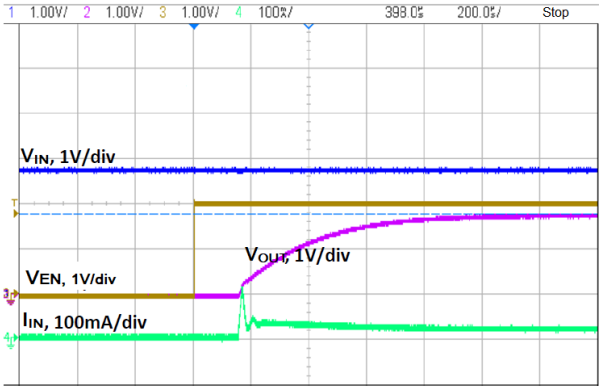
14. Load Transient Response

I_{OUT}=1-300mA, V_{IN}=2.8V, V_{OUT}=1.8V



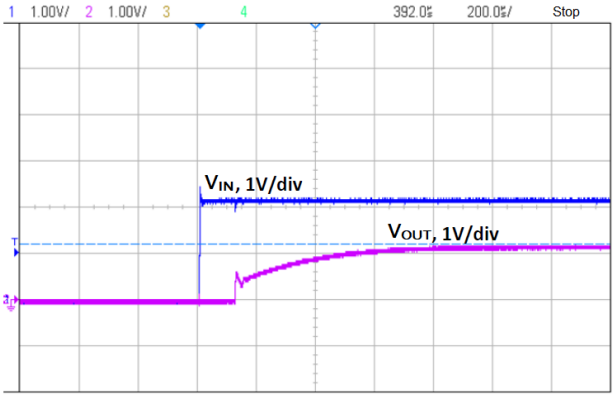
15. EN rising response time

I_{OUT}=30mA, V_{IN}=2.8V, V_{EN}=0V-->2V, V_{OUT}=1.8V



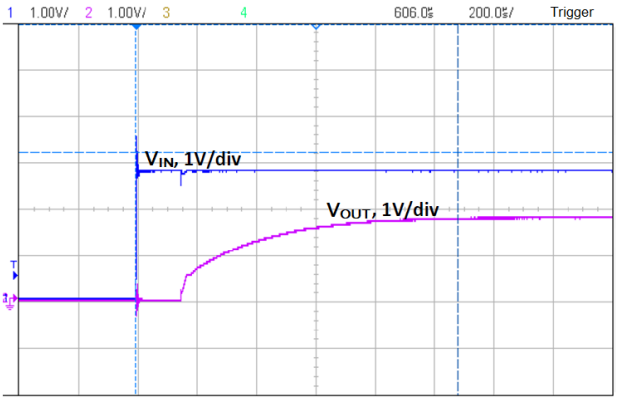
16. Rising response time

V_{IN}=V_{EN}=2.2V, I_{OUT}=30mA, V_{OUT}=1.2V



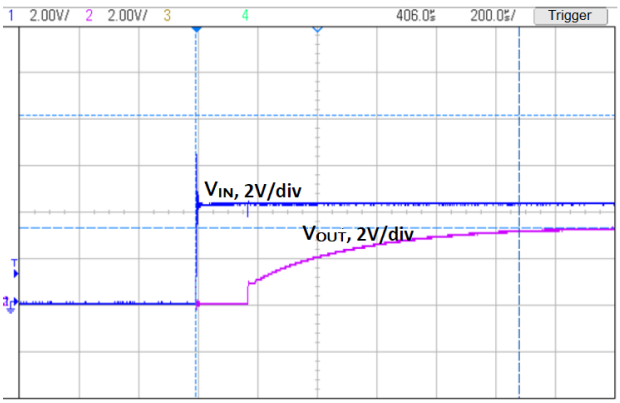
17. Rising response time

V_{IN}=V_{EN}=2.8V, I_{OUT}=30mA, V_{OUT}=1.8V

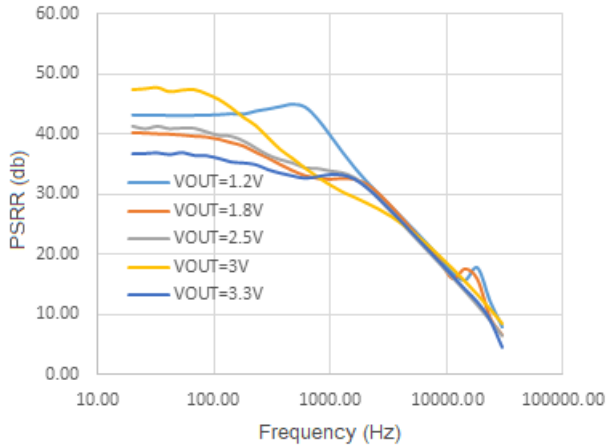


18. Rising response time

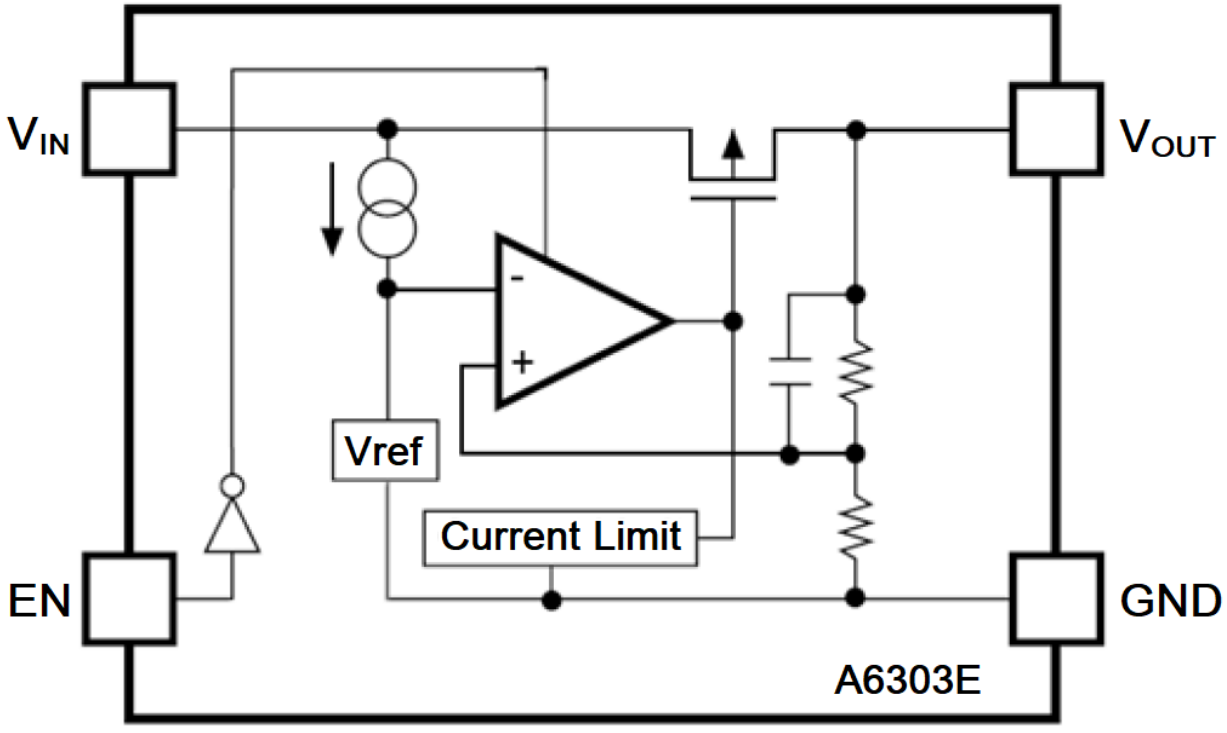
V_{IN}=V_{EN}=4.3V, I_{OUT}=30mA, V_{OUT}=3.3V



19. PSRR



BLOCK DIAGRAM



DETAILED INFORMATION

Output Voltage

The A6303E can provide output value of fixed version. The output voltage is selectable in 0.1V increments within the Range of 1.2V to 5V using trimming technologies.

Short Protection Circuit

The A6303E regulator offers circuit protection by means of a built-in foldback circuit. When the load current reaches the current limit level, the fixed current limiter circuit operates and output voltage drops. As a result of this drop in output voltage, the foldback circuit operates, the output voltage drops further and output current decreases. When the output pin is shorted, a current of about 60mA flows.

EN Pin

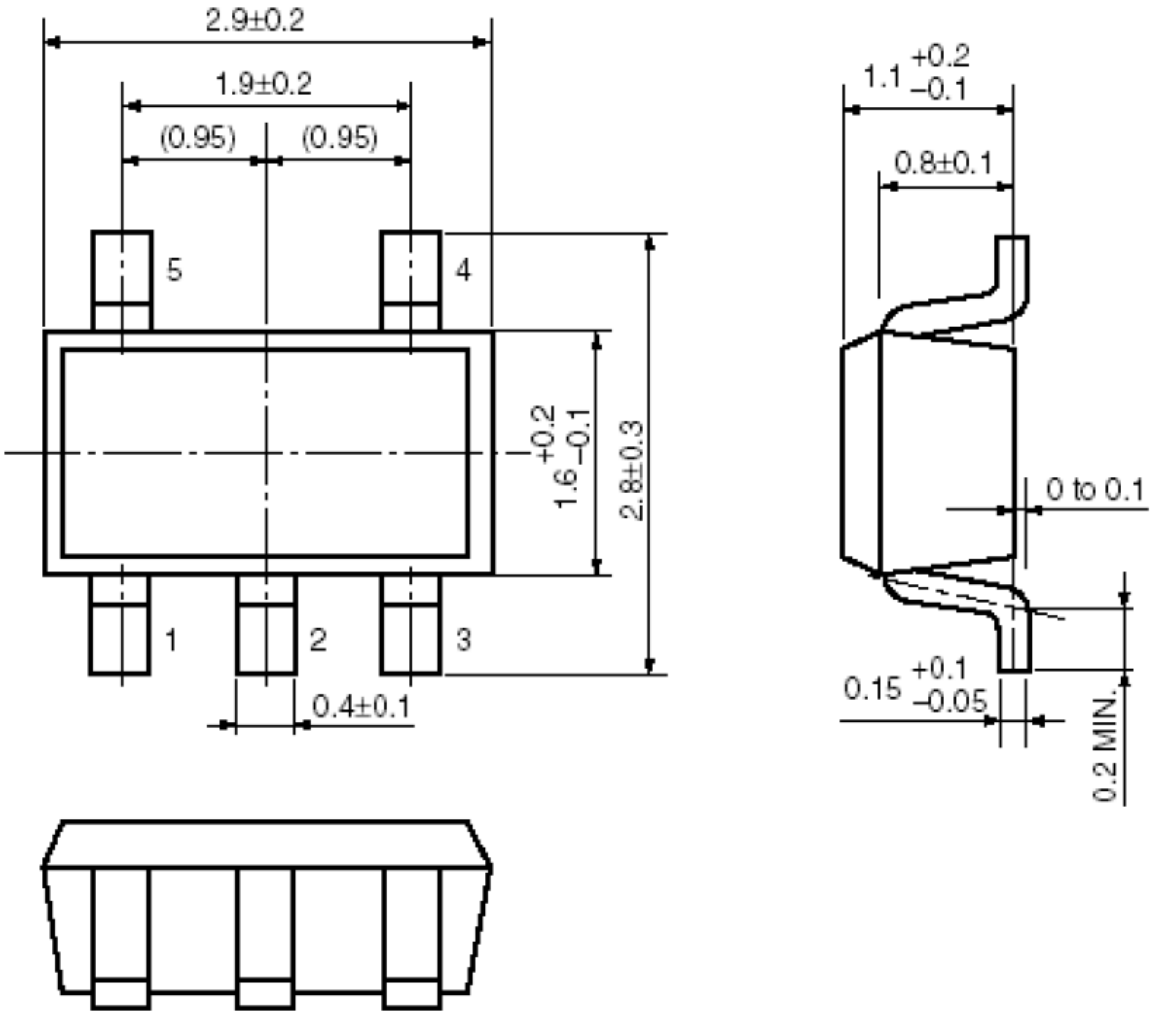
The IC's internal circuitry can be operated or shutdown via the signal from the EN pin with the A6303E. Note that the A6303E regulator is “High Active/No Pull-Down”, operations will become unstable with the EN pin open. We suggest that you use this IC with either a V_{IN} voltage or a GND voltage input at the EN pin. If this IC is used with the correct specifications for the EN pin, the operational logic is fixed and the IC will operate normally. Otherwise, supply current may increase as a result of through current in the IC's internal circuitry.

Thermal Shutdown

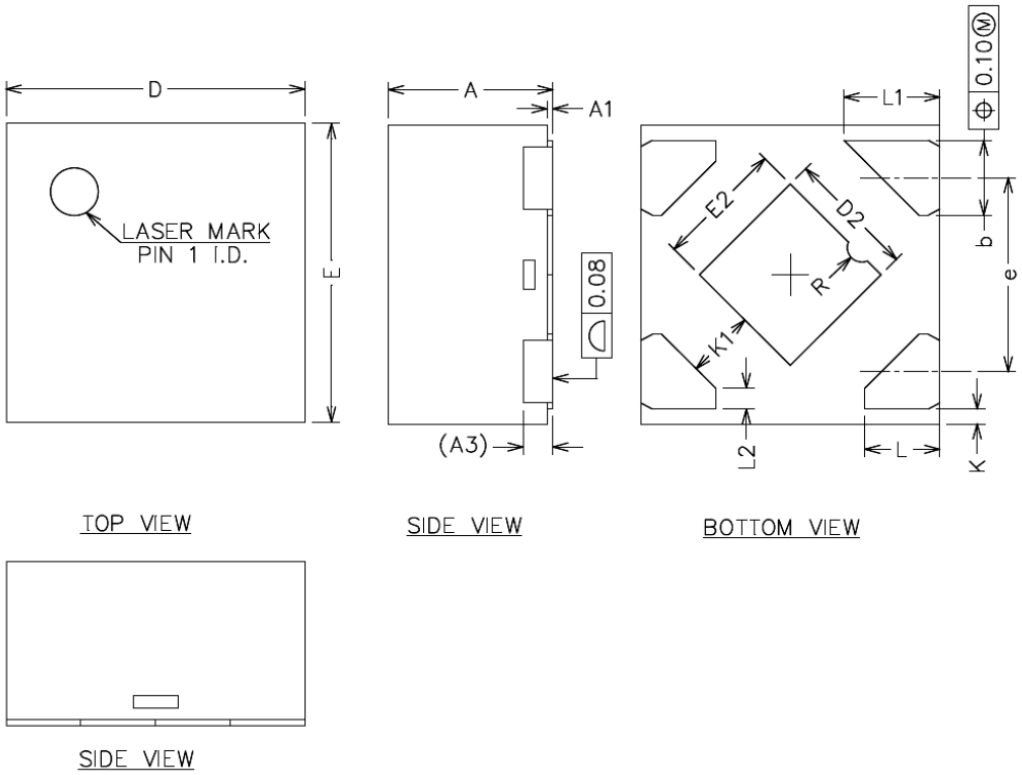
When the junction temperature of the built-in driver transistor reaches the temperature limit, the thermal shutdown circuit operates and the driver transistor will be set to OFF. The IC resumes its operation when the thermal shutdown function is released and the IC’s operation is automatically restored because the junction temperature drops to the level of the thermal shutdown release voltage.

PACKAGE INFORMATION

Dimension in SOT-25 (Unit: mm)



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



Symbol	Min	Max
A	0.50	0.60
A1	0.00	0.05
A3	0.100REF	
b	0.20	0.30
D	0.95	1.05
E	0.95	1.05
D2	0.38	0.48
E2	0.38	0.48
e	0.60	0.70
K	0.05REF	
K1	0.195	-
L	0.20	0.30
L1	0.27	0.37
L2	0.07REF	
R	0.049REF	

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