AT53AL SERIES

40V 250mA Ultralow-Quiescent-Current LDO

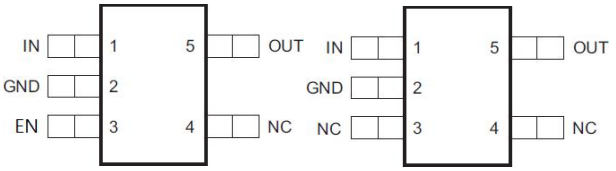
Input Voltage: up to 40V Output:2.5-5.0V

General Description

The AT53AL Series ultra-low quiescent current regulator features low dropout voltage and low current in the standby mode. With less than 1.5μA quiescent current at no load, the AT53AL Series is ideally suited for standby micro-control -unit systems, especially for always-on applications like E -meters, fire alarms, smoke detectors and other battery operated systems.The AT53AL Series retains all of the features that are common to low dropout regulators including a low dropout PMOS pass device, short circuit protection, and thermal shutdown.

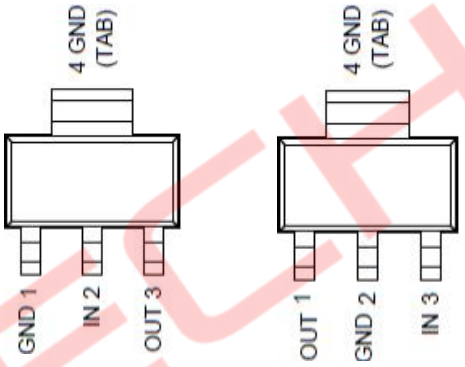
The AT53AL Series has a 40V maximum operating voltage limit,-40°C to 125°C operating temperature range, and ±2% output voltage tolerance over the entire output current, input voltage, and temperature range. The AT53AL Series is available in SOT23-5 and SOT-89 surface mount packages.

Pin Configuration



AT53ALXXESE
SOT23-5

AT53ALXXSE
SOT23-5



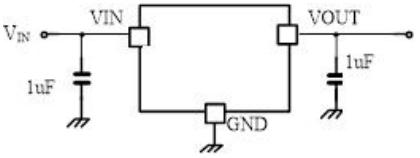
AT53ALXXSQB
SOT-89

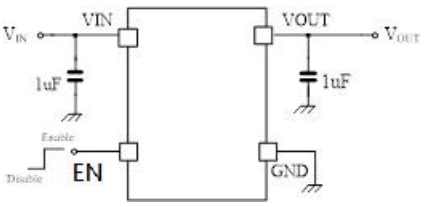
AT53ALXXSQ
SOT-89

Features

- Vin Range up to 40V
- Output Voltage Tolerances of ±2%
- Output Current of 250mA
- Ultra Low Quiescent Current(IQ=1.5uA)
- Dropout Voltage Typically 1200 mV at I_{OUT} = 250 mA
- Internal Thermal Overload Protection
- Internal Short-Circuit Current Limit
- Ceramic Capacitor Stable

Typical Application Circuit





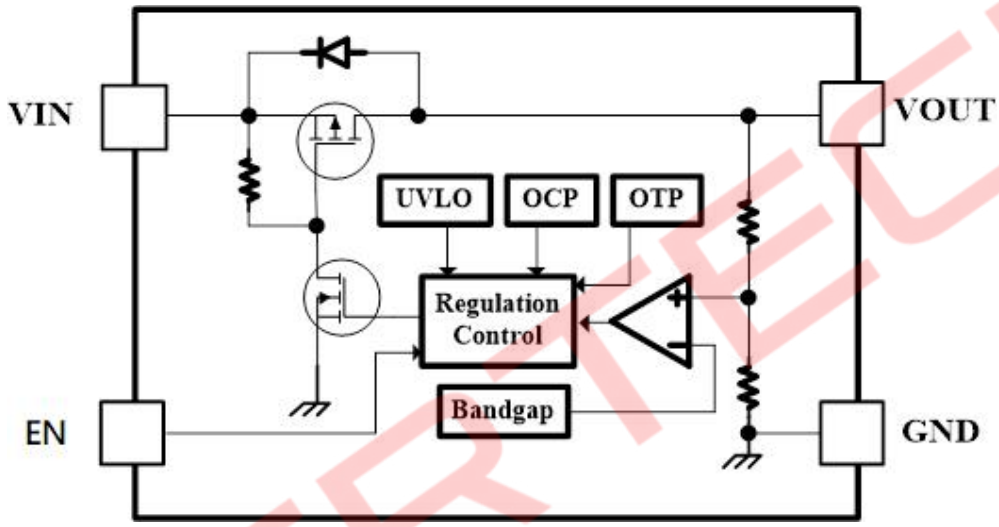
Applications

- E-meters, Water Meters and Gas Meters
- Fire Alarm, Smoke Detector
- Appliances and White Goods

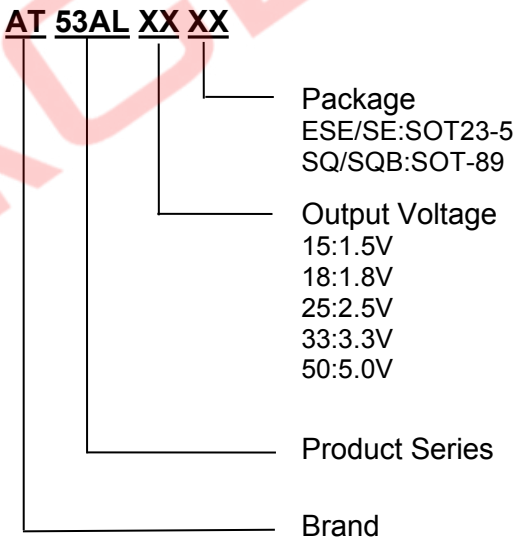
Pin Assignment

Pin Name	SOT23-5		SOT-89		Pin Function
	AT53ALXXESE	AT53ALXXSE	AT53ALXXSQB	AT53ALXXSQ	
V_{OUT}	5	5	3	1	Output Voltage Pin
GND	2	2	1	2,4	Ground
V_{IN}	1	1	2,4	3	Input Voltage Pin
EN	3	---	---	---	Enable
CN	4	3,4	---	---	/

Function Block Diagram



Selection Guide



Electrical Characteristics(Ratings at 25℃ ambient temperature unless otherwise specified)

Parameter		Value	Unit
VOUT to GND Voltage		-0.3~7	V
VIN to GND Voltage		-0.3~45	V
EN Pin to GND Voltage		-0.3~45	V
Power Dissipation	SOT-89	1	W
	SOT23-5L	0.5	
Thermal Resistance, Junction-to-Ambient	SOT-89	100	℃/W
	SOT23-5L	200	
Operating temperature range		-40~125	℃

Electrical Characteristics (V_{IN}=12V, I_{OUT}=1mA, C_{IN}=C_{OUT}=1uF, T_J=25℃, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Output Voltage Range	V_{OUT}		1.5		5.5	V
Output Voltage Accuracy	$\triangle V_{OUT}$		-2		2	%
Line Regulation	$\triangle V_{LINE}$	V_{IN} = V_{OUT} + 1V to 40V, or V_{IN} = 5V to 40V, if V_{OUT} < 4V		2	10	mV
Load Regulation	$\triangle V_{LOAD}$	I_{OUT} = 1mA to 100mA		0.25		%
		I_{OUT} = 1mA to 250mA		1		
Dropout Voltage	V_{DROP}	I_{OUT} = 100mA		400		mV
		I_{OUT} = 250mA		1200		mV
Quiescent Current	I_Q	T_J = 25℃		1.5	2.5	uA
Current Limit	I_{CL}		270	320		mA
Enable high level	V_{ENHI}		0.9			V
Enable low level	V_{ENLO}				0.4	V
Enable pin pull high	I_{EN}			0.3		uA
Thermal Shutdown	T_{SD}			140		℃
Thermal Shutdown	T_{HY}			20		℃
Power-supply rejection ratio	PSRR	f = 1kHz		80		dB
		f = 10kHz		60		dB
Human body model	HBM		3			KV
Charged device model	CDM		200			V

AT53AL SERIES

Typical Characteristics (V_{IN}=12V, I_{OUT}=1mA, V_{OUT}=3.3V, C_{IN}=C_{OUT}=1uF, T_J=25℃, unless otherwise specified)

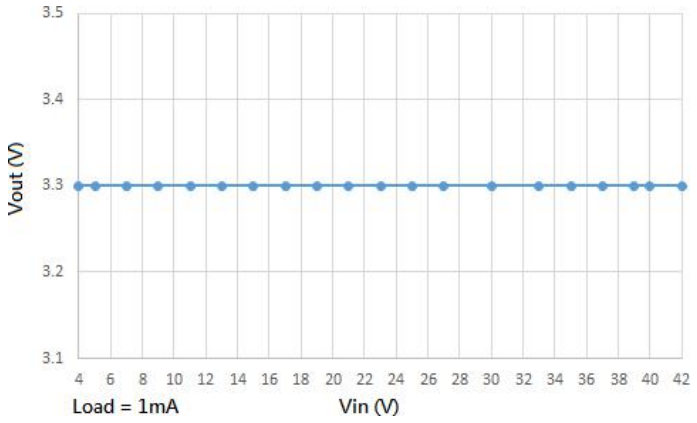


Fig 1 Vout vs Vin

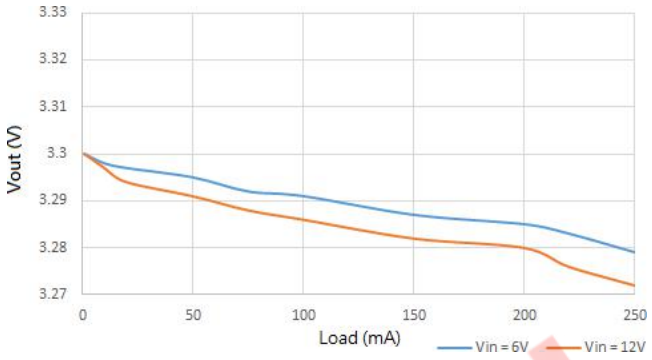


Fig 2 Vout vs Load

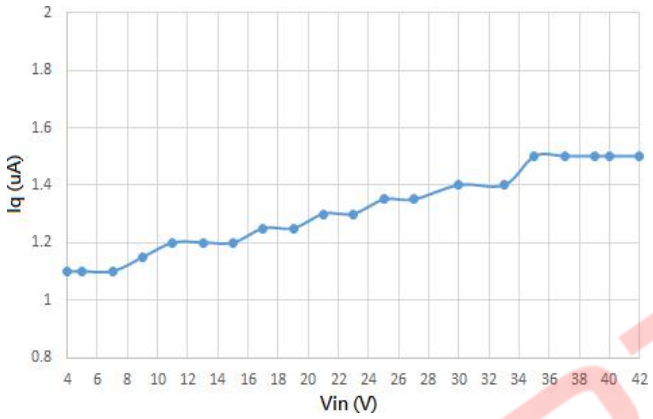


Fig 3 Iq vs Vin

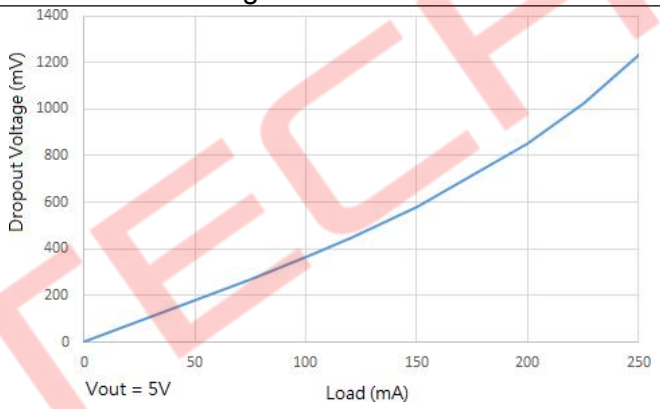
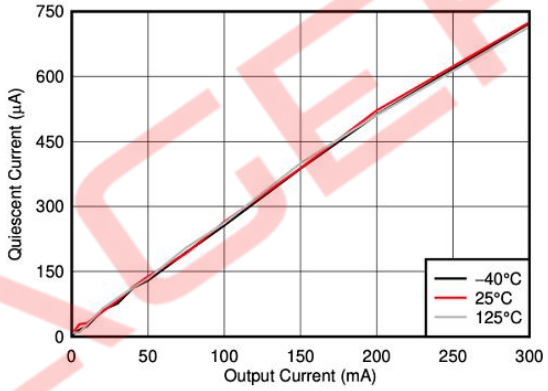


Fig 4 Dropout vs Load



V_{OUT} = 5 V

Fig 5 Iq vs Vout

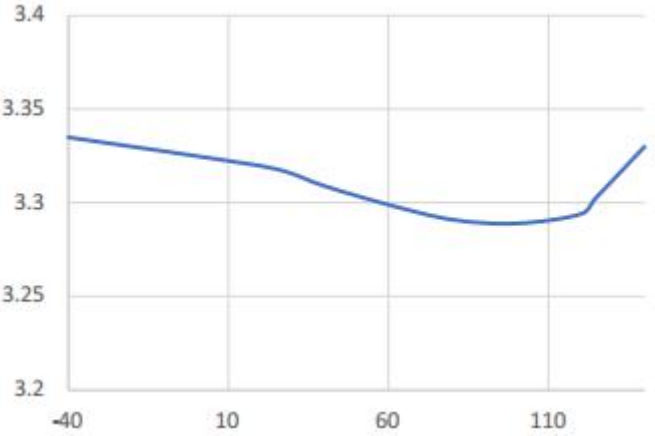


Fig 6 Vout(3.3V) vs Temperature

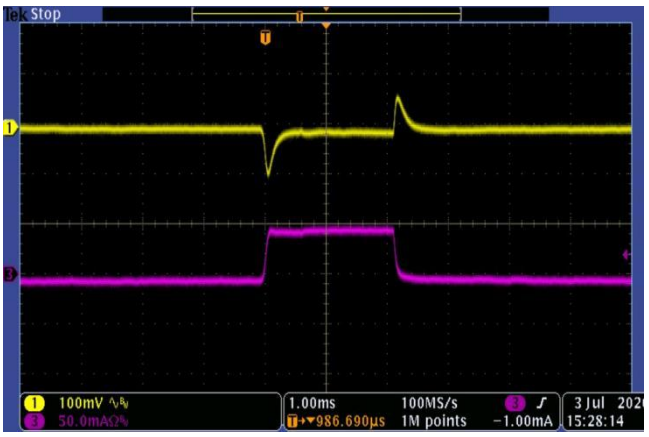


Fig 7 Vout Load transient(0 to 50mA)

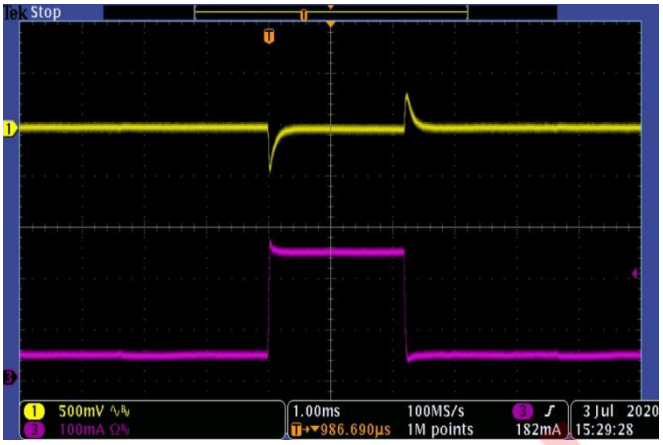


Fig 8 Vout Load Transient(50 to 250mA)

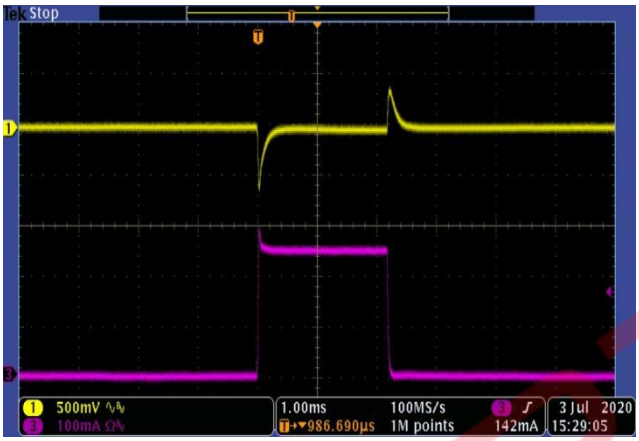


Fig 9 Vout Load Transient(1 to 250mA)

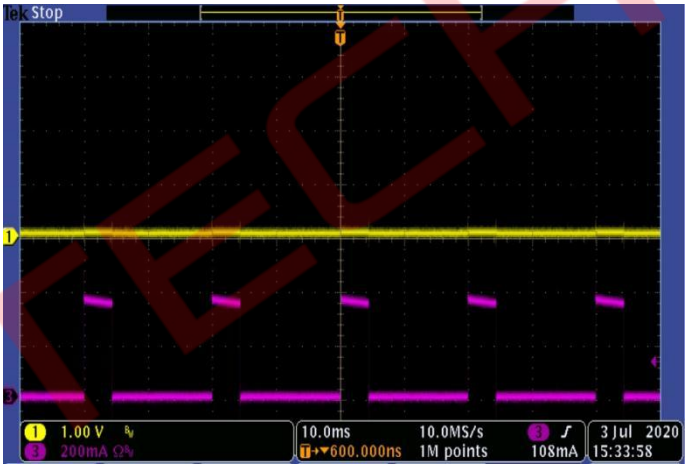


Fig 10 Vout short to GND

Fig 11 Vin Start up

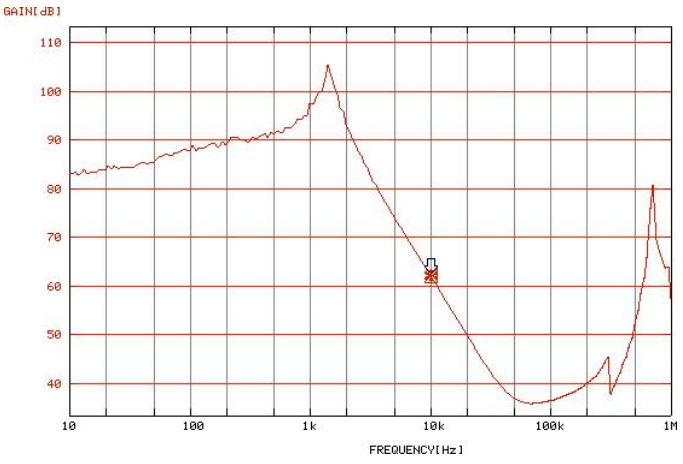
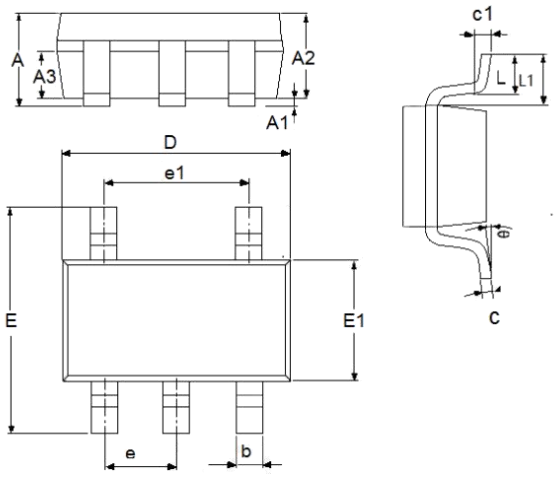


Fig 12 PSRR vs. Frequency(Vin=9V,Vout=3.3V)

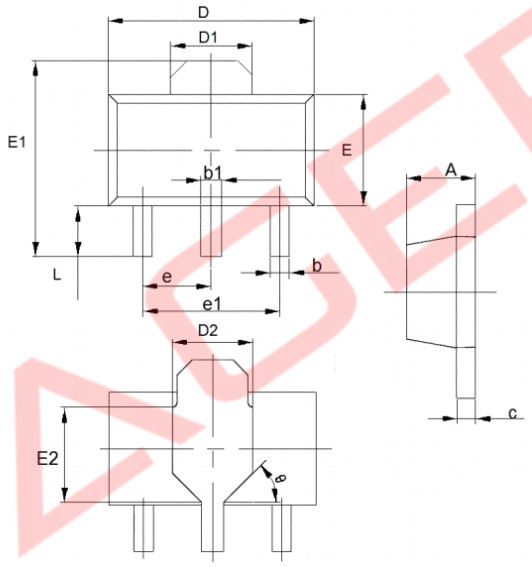
PACKAGEOUTLINE

SOT23-5



DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	1.05	1.45	0.0413	0.0571
A1	0	0.15	0.0000	0.0059
A2	0.9	1.3	0.0354	0.0512
A3	0.6	0.7	0.0236	0.0276
b	0.25	0.5	0.0098	0.0197
c	0.1	0.23	0.0039	0.0091
D	2.82	3.05	0.1110	0.1201
e1	1.9(TYP)		0.0748(TYP)	
E	2.6	3.05	0.1024	0.1201
E1	1.5	1.75	0.0512	0.0689
e	0.95(TYP)		0.0374(TYP)	
L	0.3	0.6	0.0118	0.0236
L1	0.59(TYP)		0.0232(TYP)	
θ	0	8°	0.0000	8°
C1	0.2(TYP)		0.0079(TYP)	

SOT-89



DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	1.4	1.6	0.0551	0.0630
b	0.32	0.52	0.0126	0.0205
b1	0.4	0.58	0.0157	0.0228
c	0.35	0.45	0.0138	0.0177
D	4.4	4.6	0.1732	0.1811
D1	1.55(TYP)		0.061(TYP)	
D2	1.75(TYP)		0.0689(TYP)	
e1	3.0(TYP)		0.1181(TYP)	
E	2.3	2.6	0.0906	0.1023
E1	3.94	4.4	0.1551	0.1732
E2	1.9(TYP)		0.0748(TYP)	
e	1.5(TYP)		0.0591(TYP)	
L	0.8	1.2	0.0315	0.0472
θ	45°		45°	