

# AT55EL Series

## Low Dropout Regulator AT55EL XX Series

Input Voltage: up to 40V Output: 1.8V~5.0V

### GENERATION DESCRIPTION

The AT55EL Series is a 40V  $\mu$ A-power high accuracy LDO regulator. The 1 $\mu$ A power consumption makes it ideal for most HV power-saving systems. The maximum operating voltage can be as high as 40V. The output accuracy is as excellent as  $\pm 1\%$ .

The other features include low dropout voltage, current limiting protection and thermal shutdown protection.

The AT55EL Series is available in the SOT23-5/SOT-89/SOT23-3 packages.

### FEATURES

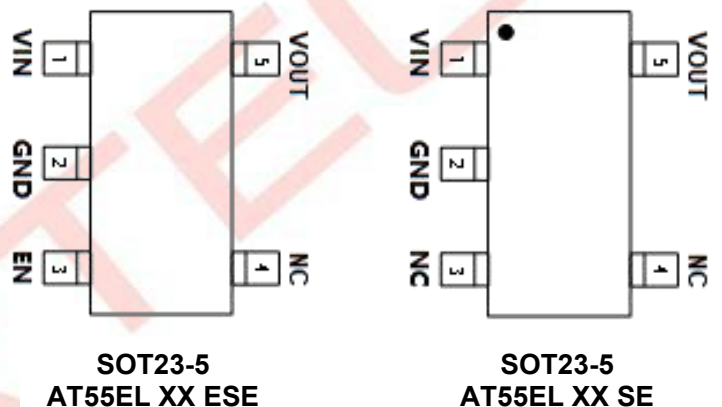
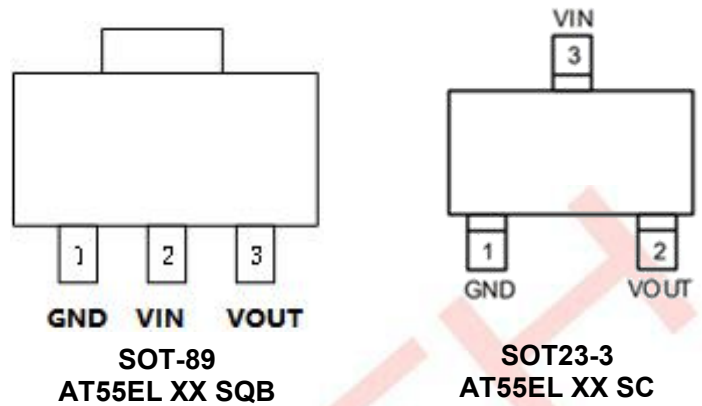
- ◆ Maximum Operating Voltage: 40V
- ◆ Output Voltage: 1.8V, 2.5V, 3.0V, 3.3V, 3.6V, 4.0V, 4.2V and 5.0V
- ◆ Output Accuracy:  $\pm 2\%$
- ◆ Low Power Consumption: 1.5 $\mu$ A
- ◆ <0.1 $\mu$ A Standby Current When Shutdown
- ◆ Low Temperature Coefficient
- ◆ Current Limiting, Thermal Shutdown

### APPLICATIONS

- ◆ Battery Supplied Systems
- ◆ Telecom Systems
- ◆ Audio & Video Devices

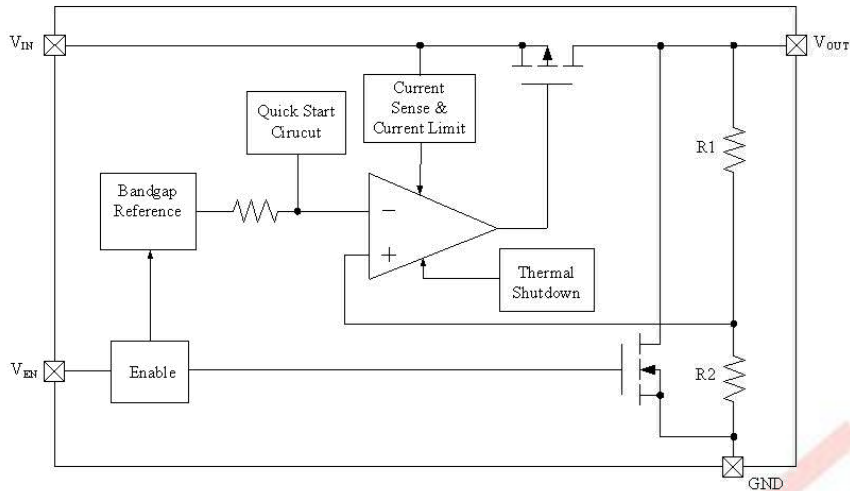
### SELECTION TABLE

AT55EL XX SE/ESE/SQB/SC Series	Designator	Symbol	Description
	XX		18
		25	2.5V
		30	3.0V
		33	3.3V
		36	3.6V
		40	4.0V
		42	4.2V
		50	5.0V



# AT55EL Series

## SIMPLIFIED BLOCK DIAGRAM



### ABSOLUTE MAXIMUM RATINGS (Note 1) (TA =25°C, unless otherwise specified.)

SYMBOL	ITEM	RATING	UNIT
V <sub>IN</sub>	Supply Voltage	-0.3~44	V
V <sub>EN</sub>	EN pin to GND Voltage	-0.3~44	V
V <sub>IO</sub>	V <sub>OUT</sub> pin to GND Voltage	-0.3~6	V
V <sub>IO2</sub>	V <sub>OUT</sub> pin to V <sub>IN</sub> Voltage	-46~0.3	V
P <sub>D</sub>	Maximum Power Dissipation, SOT23-5、SOT23-3	0.4	W
	Maximum Power Dissipation, SOT-89	1.2	W
T <sub>J</sub>	Junction Temperature Range	-40~100	°C
T <sub>STG</sub>	Storage Temperature Range	-50~125	°C
T <sub>OP</sub>	Operating Temperature Range	-45~80	°C
T <sub>SOLDER</sub>	Lead Temperature(Soldering)	260°C, 10s	

Note 1: Absolute Maximum Ratings are threshold limit values that must not be exceeded even for an instant under any condition. Moreover, such values for any two items must not be reached simultaneously. Operation above these absolute maximum ratings may cause degradation or permanent damage to the device. These are stress ratings only and do not necessarily imply functional operation below these limits.

### ELECTRICAL CHARACTERISTICS (V<sub>IN</sub>=V<sub>OUT</sub>+1V, CL=1μF, TA =25°C, unless otherwise specified.)

#### AT55EL18 SE/ESE/SQB/SC(TA=25 °C)

Parameter	Symbol	Conditions	MIN	TYP	MAX	unit
Input Voltage	V <sub>IN</sub>	V <sub>IN</sub> =V <sub>OUT</sub> +1V	2.5		40	V
Output Voltage	V <sub>OUT</sub>	I <sub>OUT</sub> =40mA	1.782	1.80	1.818	V
Maxim Output Current	I <sub>OMAX</sub>	V <sub>IN</sub> =V <sub>OUT</sub> +1V		150		mA
Load Regulation	ΔV <sub>OUT</sub>	1mA<I <sub>OUT</sub> <60mA		25	50	mV
Dropout Voltage	V <sub>DROP</sub>	I <sub>OUT</sub> =40mA, V <sub>OUT</sub> =5V		260		mV
		I <sub>OUT</sub> =100mA, V <sub>OUT</sub> =1.8V		700		mV
Quiescent Current	I <sub>Q</sub>	I <sub>OUT</sub> =0mA		1.3	2	μA
Line Regulation	R <sub>REG</sub>	V <sub>IN</sub> =V <sub>OUT</sub> +1V to 24V, I <sub>OUT</sub> =40mA		0.2	0.3	%/V
Temperature Coefficient	T <sub>C</sub>	I <sub>OUT</sub> =40mA, -40°C~+85°C		±0.7		mV/°C
Thermal Shutdown	T <sub>SD</sub>	Shutdown, Temp increasing		180		°C
Thermal Hysteresis	T <sub>HYS</sub>			20		°C

# AT55ELSeries

## AT55EL25 SE/ESE /SQB/SC(TA=25 °C)

Parameter	Symbol	Conditions	MIN	TYP	MAX	unit
Input Voltage	V <sub>IN</sub>	V <sub>IN</sub> =V <sub>OUT</sub> +1V	2.5		40	V
Output Voltage	V <sub>OUT</sub>	I <sub>OUT</sub> =40mA	2.475	2.50	2.525	V
Maxim Output Current	I <sub>OMAX</sub>	V <sub>IN</sub> =V <sub>OUT</sub> +1V		150		mA
Load Regulation	ΔV <sub>OUT</sub>	1mA<I <sub>OUT</sub> <60mA		25	50	mV
Dropout Voltage	V <sub>DROP</sub>	I <sub>OUT</sub> =40mA, V <sub>OUT</sub> =5V		260		mV
		I <sub>OUT</sub> =100mA, V <sub>OUT</sub> =1.8V		700		mV
Quiescent Current	I <sub>Q</sub>	I <sub>OUT</sub> =0mA		1.3	2	μA
Line Regulation	R <sub>REGI</sub>	V <sub>IN</sub> =V <sub>OUT</sub> +1V to 24V, I <sub>OUT</sub> =40mA		0.2	0.3	%/V
Temperature Coefficient	T <sub>C</sub>	I <sub>OUT</sub> =40mA, -40°C~+85°C		±0.7		mV/°C
Thermal Shutdown	T <sub>SD</sub>	Shutdown, Temp increasing		180		°C
Thermal Hysteresis	T <sub>HYS</sub>			20		°C

## AT55EL30 SE/ESE /SQB/SC(TA=25 °C)

Parameter	Symbol	Conditions	MIN	TYP	MAX	unit
Input Voltage	V <sub>IN</sub>	V <sub>IN</sub> =V <sub>OUT</sub> +1V	2.5		40	V
Output Voltage	V <sub>OUT</sub>	I <sub>OUT</sub> =40mA	2.970	3.00	3.030	V
Maxim Output Current	I <sub>OMAX</sub>	V <sub>IN</sub> =V <sub>OUT</sub> +1V		150		mA
Load Regulation	ΔV <sub>OUT</sub>	1mA<I <sub>OUT</sub> <60mA		25	50	mV
Dropout Voltage	V <sub>DROP</sub>	I <sub>OUT</sub> =40mA, V <sub>OUT</sub> =5V		260		mV
		I <sub>OUT</sub> =100mA, V <sub>OUT</sub> =1.8V		700		mV
Quiescent Current	I <sub>Q</sub>	I <sub>OUT</sub> =0mA		1.3	2	μA
Line Regulation	R <sub>REGI</sub>	V <sub>IN</sub> =V <sub>OUT</sub> +1V to 24V, I <sub>OUT</sub> =40mA		0.2	0.3	%/V
Temperature Coefficient	T <sub>C</sub>	I <sub>OUT</sub> =40mA, -40°C~+85°C		±0.7		mV/°C
Thermal Shutdown	T <sub>SD</sub>	Shutdown, Temp increasing		180		°C
Thermal Hysteresis	T <sub>HYS</sub>			20		°C

## AT55EL33 SE/ESE /SQB/SC(TA=25 °C)

Parameter	Symbol	Conditions	MIN	TYP	MAX	unit
Input Voltage	V <sub>IN</sub>	V <sub>IN</sub> =V <sub>OUT</sub> +1V	2.5		40	V
Output Voltage	V <sub>OUT</sub>	I <sub>OUT</sub> =40mA	3.267	3.30	3.333	V
Maxim Output Current	I <sub>OMAX</sub>	V <sub>IN</sub> =V <sub>OUT</sub> +1V		150		mA
Load Regulation	ΔV <sub>OUT</sub>	1mA<I <sub>OUT</sub> <60mA		25	50	mV
Dropout Voltage	V <sub>DROP</sub>	I <sub>OUT</sub> =40mA, V <sub>OUT</sub> =5V		260		mV
		I <sub>OUT</sub> =100mA, V <sub>OUT</sub> =1.8V		700		mV
Quiescent Current	I <sub>Q</sub>	I <sub>OUT</sub> =0mA		1.3	2	μA
Line Regulation	R <sub>REGI</sub>	V <sub>IN</sub> =V <sub>OUT</sub> +1V to 24V, I <sub>OUT</sub> =40mA		0.2	0.3	%/V
Temperature Coefficient	T <sub>C</sub>	I <sub>OUT</sub> =40mA, -40°C~+85°C		±0.7		mV/°C
Thermal Shutdown	T <sub>SD</sub>	Shutdown, Temp increasing		180		°C
Thermal Hysteresis	T <sub>HYS</sub>			20		°C

# AT55ELSeries

## AT55EL36 SE/ESE /SQB/SC(TA=25 °C)

Parameter	Symbol	Conditions	MIN	TYP	MAX	unit
Input Voltage	V <sub>IN</sub>	V <sub>IN</sub> =V <sub>OUT</sub> +1V	2.5		40	V
Output Voltage	V <sub>OUT</sub>	I <sub>OUT</sub> =40mA	3.564	3.60	3.636	V
Maxim Output Current	I <sub>OMAX</sub>	V <sub>IN</sub> =V <sub>OUT</sub> +1V		150		mA
Load Regulation	ΔV <sub>OUT</sub>	1mA<I <sub>OUT</sub> <60mA		25	50	mV
Dropout Voltage	V <sub>DROP</sub>	I <sub>OUT</sub> =40mA, V <sub>OUT</sub> =5V		260		mV
		I <sub>OUT</sub> =100mA, V <sub>OUT</sub> =1.8V		700		mV
Quiescent Current	I <sub>Q</sub>	I <sub>OUT</sub> =0mA		1.3	2	μA
Line Regulation	R <sub>REGI</sub>	V <sub>IN</sub> =V <sub>OUT</sub> +1V to 24V, I <sub>OUT</sub> =40mA		0.2	0.3	%/V
Temperature Coefficient	T <sub>C</sub>	I <sub>OUT</sub> =40mA, -40°C~+85°C		±0.7		mV/°C
Thermal Shutdown	T <sub>SD</sub>	Shutdown, Temp increasing		180		°C
Thermal Hysteresis	T <sub>HYS</sub>			20		°C

## AT55EL40 SE/ESE/SQB/SC(TA=25 °C)

Parameter	Symbol	Conditions	MIN	TYP	MAX	unit
Input Voltage	V <sub>IN</sub>	V <sub>IN</sub> =V <sub>OUT</sub> +1V	2.5		40	V
Output Voltage	V <sub>OUT</sub>	I <sub>OUT</sub> =40mA	3.960	4.00	4.040	V
Maxim Output Current	I <sub>OMAX</sub>	V <sub>IN</sub> =V <sub>OUT</sub> +1V		150		mA
Load Regulation	ΔV <sub>OUT</sub>	1mA<I <sub>OUT</sub> <60mA		25	50	mV
Dropout Voltage	V <sub>DROP</sub>	I <sub>OUT</sub> =40mA, V <sub>OUT</sub> =5V		260		mV
		I <sub>OUT</sub> =100mA, V <sub>OUT</sub> =1.8V		700		mV
Quiescent Current	I <sub>Q</sub>	I <sub>OUT</sub> =0mA		1.3	2	μA
Line Regulation	R <sub>REGI</sub>	V <sub>IN</sub> =V <sub>OUT</sub> +1V to 24V, I <sub>OUT</sub> =40mA		0.2	0.3	%/V
Temperature Coefficient	T <sub>C</sub>	I <sub>OUT</sub> =40mA, -40°C~+85°C		±0.7		mV/°C
Thermal Shutdown	T <sub>SD</sub>	Shutdown, Temp increasing		180		°C
Thermal Hysteresis	T <sub>HYS</sub>			20		°C

## AT55EL42 SE/ESE/SQBB/SC(TA=25 °C)

Parameter	Symbol	Conditions	MIN	TYP	MAX	unit
Input Voltage	V <sub>IN</sub>	V <sub>IN</sub> =V <sub>OUT</sub> +1V	2.5		40	V
Output Voltage	V <sub>OUT</sub>	I <sub>OUT</sub> =40mA	4.158	4.20	4.242	V
Maxim Output Current	I <sub>OMAX</sub>	V <sub>IN</sub> =V <sub>OUT</sub> +1V		150		mA
Load Regulation	ΔV <sub>OUT</sub>	1mA<I <sub>OUT</sub> <60mA		25	50	mV
Dropout Voltage	V <sub>DROP</sub>	I <sub>OUT</sub> =40mA, V <sub>OUT</sub> =5V		260		mV
		I <sub>OUT</sub> =100mA, V <sub>OUT</sub> =1.8V		700		mV
Quiescent Current	I <sub>Q</sub>	I <sub>OUT</sub> =0mA		1.3	2	μA
Line Regulation	R <sub>REGI</sub>	V <sub>IN</sub> =V <sub>OUT</sub> +1V to 24V, I <sub>OUT</sub> =40mA		0.2	0.3	%/V
Temperature Coefficient	T <sub>C</sub>	I <sub>OUT</sub> =40mA, -40°C~+85°C		±0.7		mV/°C
Thermal Shutdown	T <sub>SD</sub>	Shutdown, Temp increasing		180		°C
Thermal Hysteresis	T <sub>HYS</sub>			20		°C

# AT55ELSeries

## AT55EL50 SE/ESE/SQB/SC(TA=25 °C)

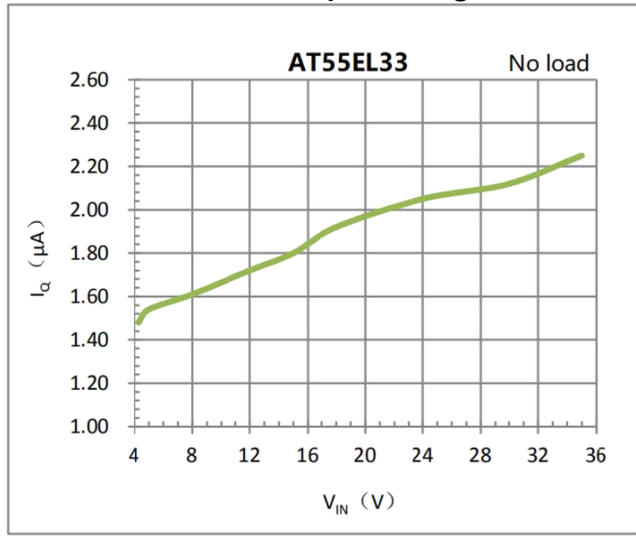
Parameter	Symbol	Conditions	MIN	TYP	MAX	unit
Input Voltage	V <sub>IN</sub>	V <sub>IN</sub> =V <sub>OUT</sub> +1V	2.5		40	V
Output Voltage	V <sub>OUT</sub>	I <sub>OUT</sub> =40mA	4.950	5.00	5.050	V
Maxim Output Current	I <sub>OMAX</sub>	V <sub>IN</sub> =V <sub>OUT</sub> +1V		150		mA
Load Regulation	ΔV <sub>OUT</sub>	1mA<I <sub>OUT</sub> <60mA		25	50	mV
Dropout Voltage	V <sub>DROP</sub>	I <sub>OUT</sub> =40mA, V <sub>OUT</sub> =5V		260		mV
		I <sub>OUT</sub> =100mA, V <sub>OUT</sub> =1.8V		700		mV
Quiescent Current	I <sub>Q</sub>	I <sub>OUT</sub> =0mA		1.3	2	μA
Line Regulation	R <sub>REGI</sub>	V <sub>IN</sub> =V <sub>OUT</sub> +1V to 24V, I <sub>OUT</sub> =40mA		0.2	0.3	%/V
Temperature Coefficient	T <sub>C</sub>	I <sub>OUT</sub> =40mA, -40°C~+85°C		±0.7		mV/°C
Thermal Shutdown	T <sub>SD</sub>	Shutdown, Temp increasing		180		°C
Thermal Hysteresis	T <sub>HYS</sub>			20		°C

# AT55ELSeries

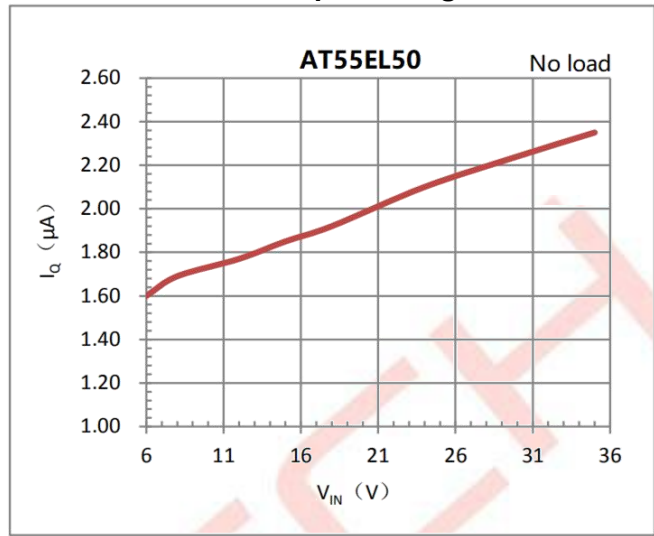
## Typical Performance Characteristics

$C_{IN} = 1\mu F$ ,  $C_{OUT} = 10\mu F$ ,  $T_{OPT} = 25^{\circ}C$ , unless specified otherwise

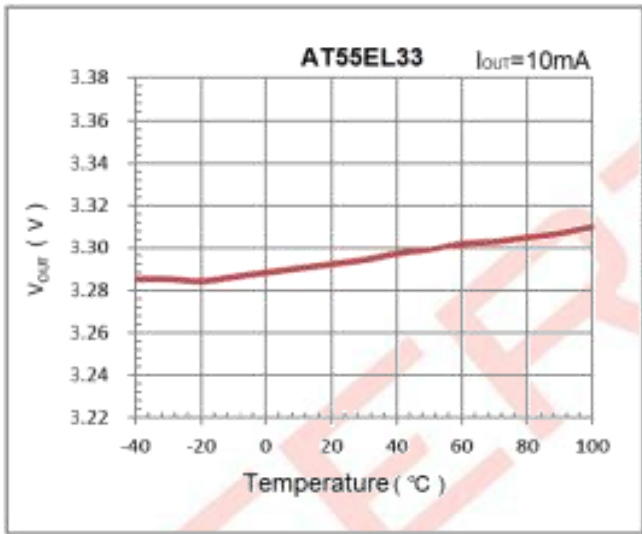
**IQ vs Input Voltage**



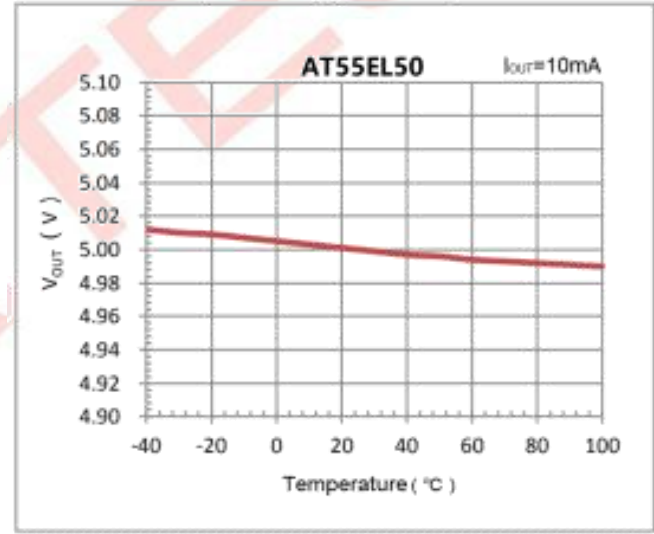
**IQ vs Input Voltage**



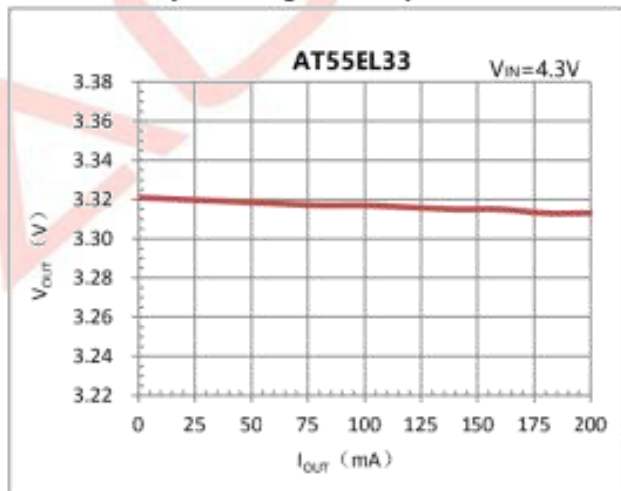
**Output Voltage vs Temperature**



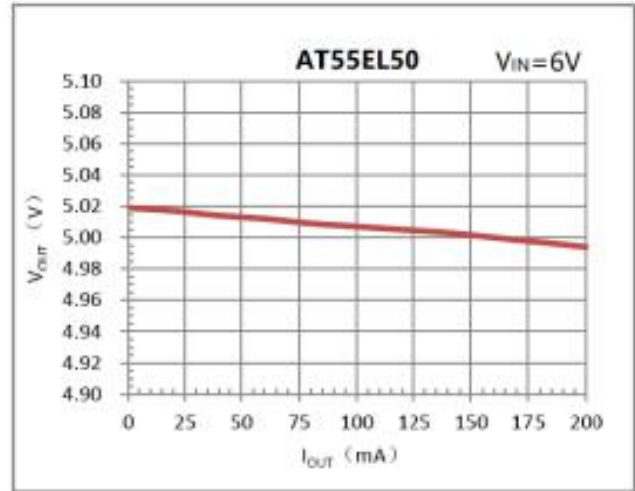
**Output Voltage vs Temperature**



**Output Voltage vs Output current**

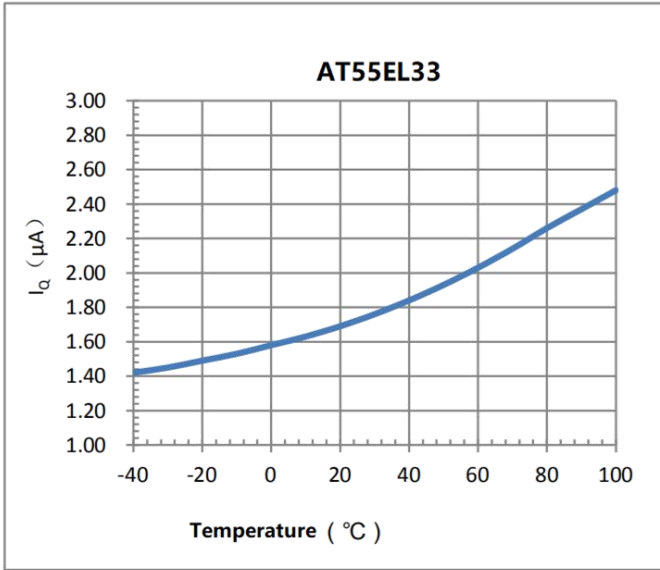


**Output Voltage vs Output current**

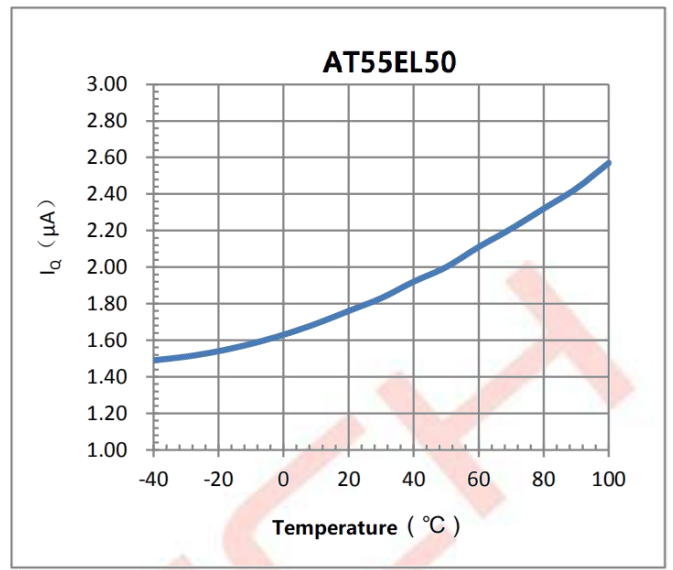


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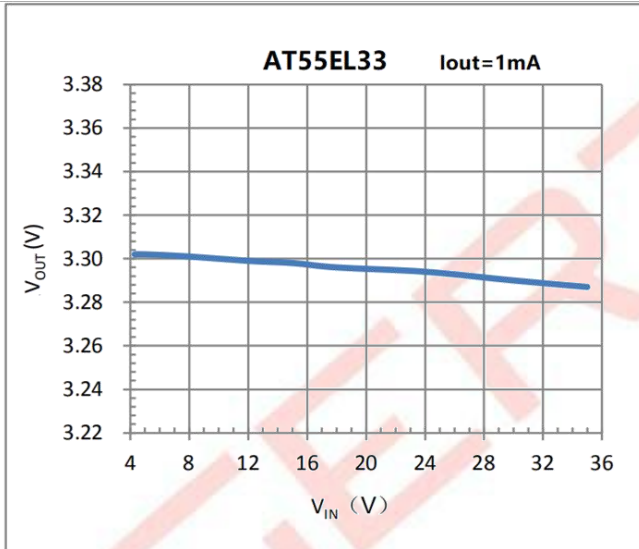
**IQ vs Temperature**



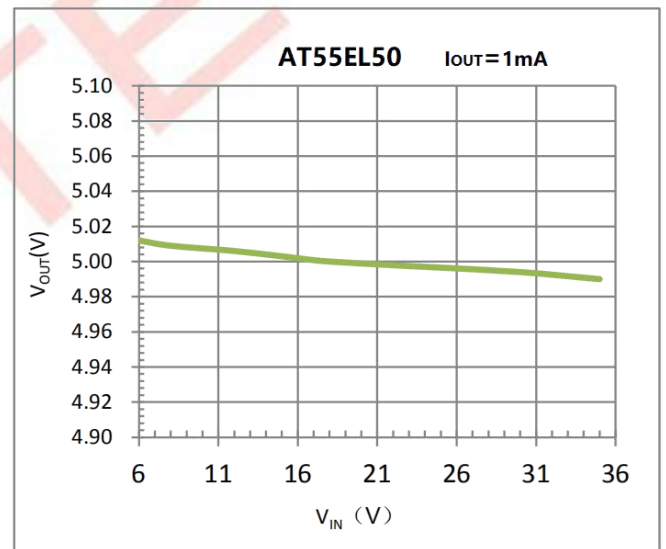
**IQ vs Temperature**



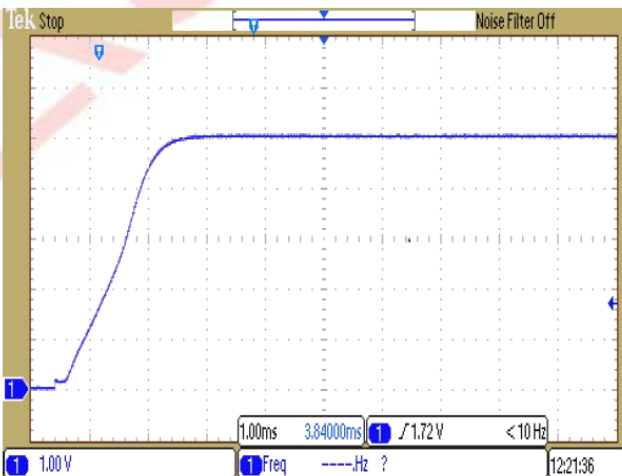
**Output Voltage vs Input Voltage**



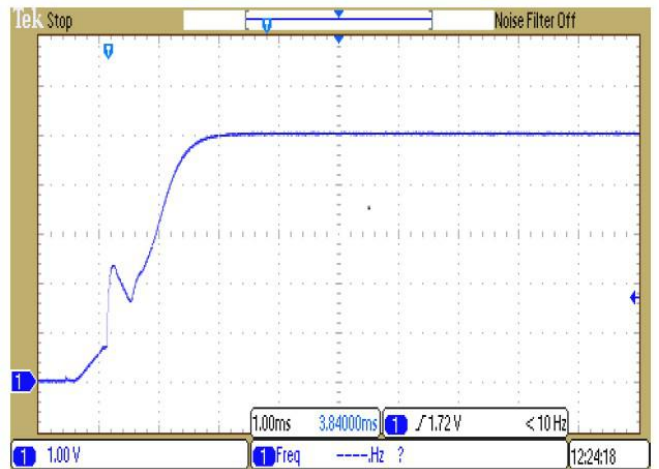
**Output Voltage vs Input Voltage**



**Power ON** C<sub>OUT</sub>=10uF



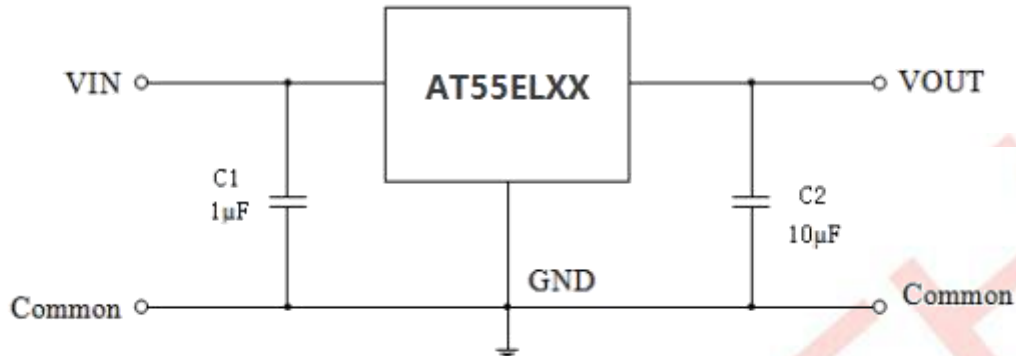
**Load 30mA ON** C<sub>OUT</sub>=10uF



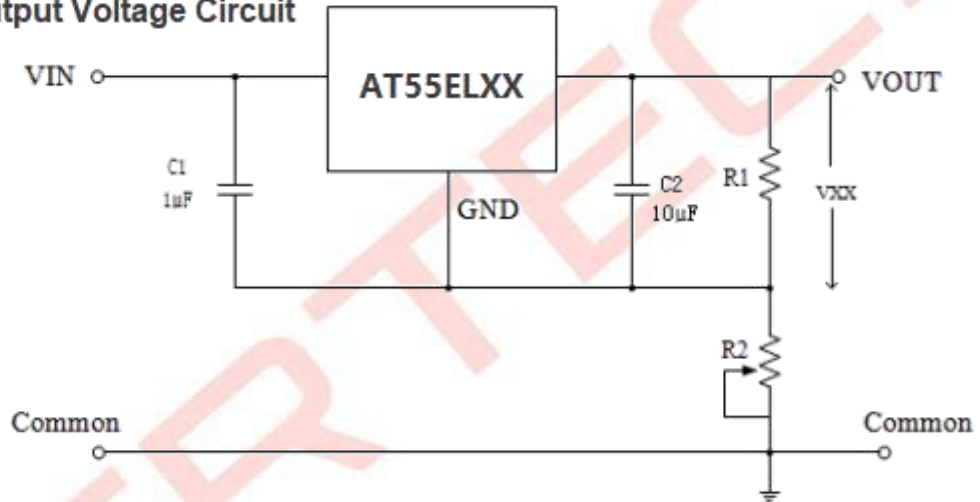
# AT55ELSeries

## TYPICAL APPLICATION CIRCUIT

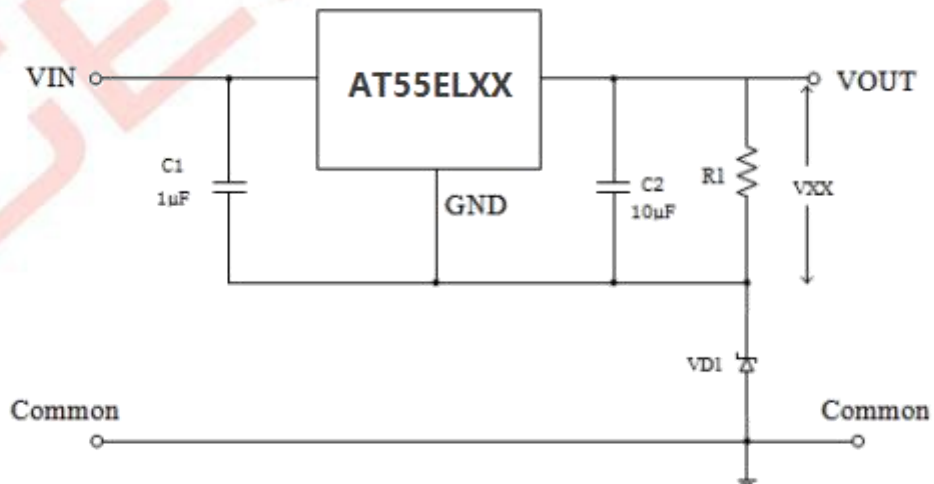
### Typical Application



### Increasing Output Voltage Circuit



### Increasing Output Voltage Circuit

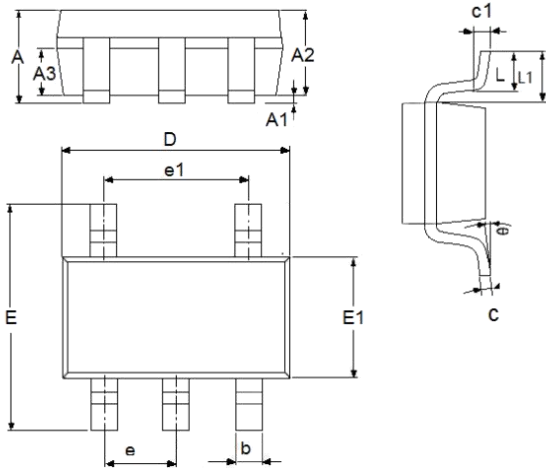




# AT55ELSeries

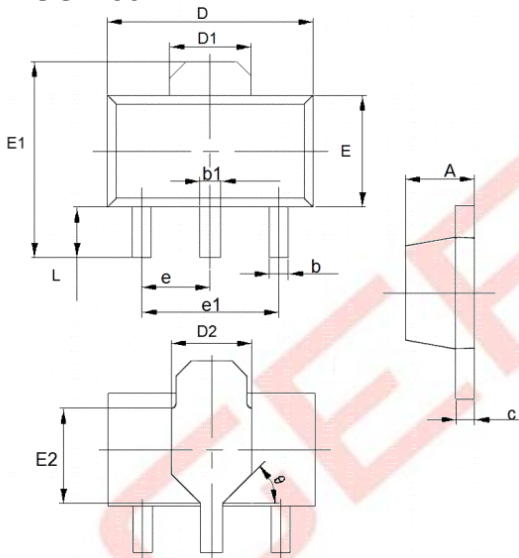
## PACKAGEOUTLINE

### SOT23-5



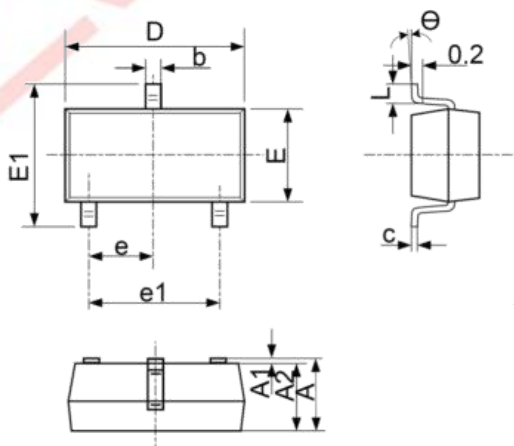
DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	1.05	1.45	0.0413	0.0571
A1	0	0.15	0.0000	0.0059
A2	0.9	1.3	0.0354	0.0512
A3	0.6	0.7	0.0236	0.0276
b	0.25	0.5	0.0098	0.0197
c	0.1	0.23	0.0039	0.0091
D	2.82	3.05	0.1110	0.1201
e1	1.9(TYP)		0.0748(TYP)	
E	2.6	3.05	0.1024	0.1201
E1	1.5	1.75	0.0512	0.0689
e	0.95(TYP)		0.0374(TYP)	
L	0.3	0.6	0.0118	0.0236
L1	0.59(TYP)		0.0232(TYP)	
$\theta$	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
$\theta$	45°		45°	

### SOT23-3L



DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	1.05	1.25	0.041	0.049
A1	0.000	0.10	0.000	0.004
A2	1.05	1.15	0.041	0.045
b	0.30	0.50	0.012	0.020
c	0.10	0.20	0.004	0.008
D	2.82	3.02	0.111	0.119
E	1.50	1.70	0.059	0.067
E1	2.65	2.95	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.80	2.00	0.071	0.079
L	0.30	0.60	0.012	0.024
$\theta$	0°	8°	0°	8°

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