5uA Low Iq，40V 150mA LDO

Product Features

- Low Power Consumption:5.0uA（Typ.）
- Maximum Output Current:150mA
- Small Dropout Voltage
- 740mV@100mA (VOUT=3.3V)
- 1300mV@150mA (VOUT=3.3V)
- Input Voltage Range:3V~40V
- Output Voltage Range:1.8V,2.5V,3.0V,3.3V,3.6V,4.4V,5.0V,9.0V ,12V
- Highly Accuracy: ±2%
- Current Limit and Short Protection
- Over Temperature Protection

Product Overview

FS75XX series is a group of positive voltage output 3-terminal linear regulator, capable of delivering 150mA current and working under 40V input voltage. It also features extremely low standby current which is only 5uA, while still keeps very fast load transient response capability. With the extremely low 5uA standby current, FS75XX can greatly improve natural life of batteries.

FS75XX includes high accuracy voltage refer ence, error amplifier, and current limit circuit and output driver module. FS75XX has well load transient response and good temperature characteristic. And it uses trimming technique to guarantee output voltage accuracy within ±2%. FS75XX can provide 1.8V,2.5V,3.0V,3.3V,3.6V, 4.4V,5.0V,9.0V, 12V output value. It also can be custo-mized on command.

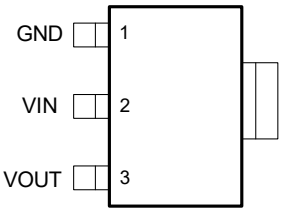
FS75XX is housed in 2 different types of packages, which are SOT23 and SOT89-3.

Application field

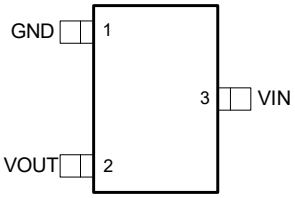
- Wearables
- Toys
- Smart Home Application
- Battery Powered equipment

V0.2(202507)

Chip packaging and pin definition



SOT89-3



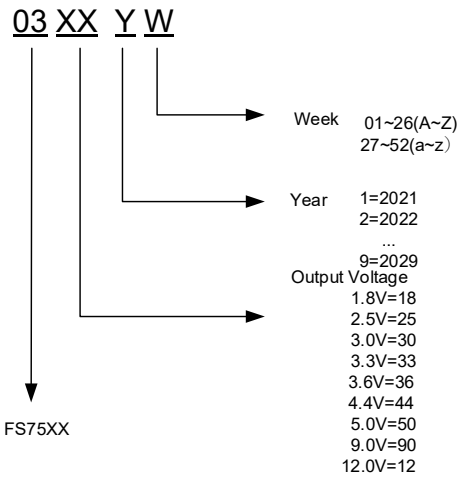
SOT23

FS75XX Pin function description

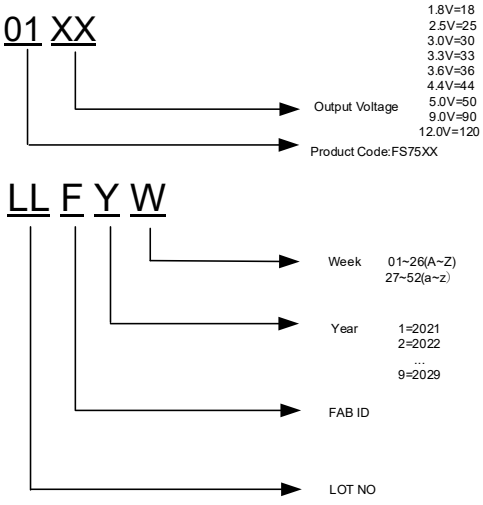
SOT89-3	SOT23	Name of the pin	Description
1	1	GND	Ground
3	2	OUT	Output of the regulator
2	3	VIN	Power Supply Input

Marking Information

Top Marking (SOT23)



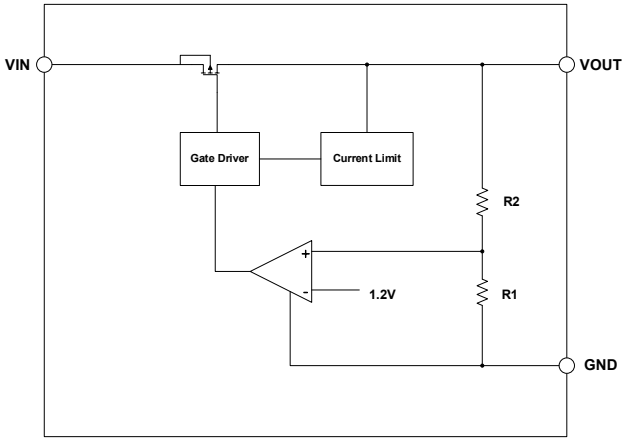
Top Marking (SOT89-3)



Order information

Part No	Package	Voltage option	Marking	Tape & Reel
FS7518R3A	SOT23	1.8V	0318YW	3K/Reel
FS7525R3A	SOT23	2.5V	0325YW	3K/Reel
FS7530R3A	SOT23	3.0V	0330YW	3K/Reel
FS7533R3A	SOT23	3.3V	0333YW	3K/Reel
FS7536R3A	SOT23	3.6V	0336YW	3K/Reel
FS7544R3A	SOT23	4.4V	0344YW	3K/Reel
FS7550R3A	SOT23	5.0V	0350 YW	3K/Reel
FS7590R3A	SOT23	9.0V	0390YW	3K/Reel
FS75120R3A	SOT23	12.0V	03120YW	3K/Reel
FS7518FA	SOT89-3	1.8V	0118 LLFYW	1K/Reel
FS7525FA	SOT89-3	2.5V	0125 LLFYW	1K/Reel
FS7530FA	SOT89-3	3.0V	0130 LLFYW	1K/Reel
FS7533FA	SOT89-3	3.3V	0133 LLFYW	1K/Reel
FS7536FA	SOT89-3	3.6V	0136 LLFYW	1K/Reel
FS7544FA	SOT89-3	4.4V	0144 LLFYW	1K/Reel
FS7550FA	SOT89-3	5.0V	0150 LLFYW	1K/Reel
FS7590FA	SOT89-3	9.0V	0190 LLFYW	1K/Reel
FS75120FA	SOT89-3	12.0V	01120 LLFYW	1K/Reel

Block Diagram



FS75XX Block diagram

Absolute Maximum Ratings

Maximum working range

Parameter	value
V_{IN} (1)	42V
Out Voltage	-0.3V ~ +20V
Operating Junction Temperature(Tj)	125℃
Operating Temperature Range	-40℃~ 85℃
Storage Temperature Range	-55℃ ~125℃
ESD Human body mode	2KV
Lead Temperature & Time	260°C,10S

Notes:

(1) Exceeding these ratings may damage the device.

Electrical Characteristics

All typical values are at Tj=25°C (unless otherwise noted)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Input Voltage range		3		40	V
Output Voltage range		1.8		12	V

Output Accuracy		-2		2	%
Ground supply current	No load		5	10	μA
Max output current	Vin-Vout=2V	150			mA
Line regulation	Iload=1mA		0.01	0.1	%
Load regulation	Iload=1-100mA		2	4	%
Dropout Voltage	Iload=100mA,Vout>3V		740	1000	mV
Current Limit			200		mA
Short current			200		mA
PSRR@100Hz	Vin=Vout+0.5V,Iload=1mA		65		dB
Startup time			500		uS
OTP			165		℃
OTP hysteresis			30		℃

Note1: All tests are conducted under ambient temperature 25°C and within a short period of time 20ms

Function Descriptions

A minimum of 1uF capacitor must be connected from Vout to ground to insure stability. Input capacitor of 1uF is recommended to ensure the input voltage does not sag below the minimum dropout voltage during load transient event. Vin pin must always be dropout voltage higher than Vout in order for the device to regulate properly.

Application Information

Like any low-dropout regulators, FS75XX requires input and output decoupling capacitors. These capacitors must be correctly selected for good performance. Both input and output capacitors are recommended to be placed as close to chip pin as possible.

Capacitor Selection

Normally, use a 1uF capacitor on the input and a 1uF capacitor on the output of the FS75XX. Larger input capacitor values and lower ESR (X5R, X7R) provide better supply noise rejection and transient response..

Input-Output (Dropout) Voltage

A regulator's minimum input-to-output voltage differential (dropout voltage) determines the lowest usable supply voltage. In battery-powered systems, this determines the useful end-of-life battery voltage. Because the device uses a PMOS, its dropout voltage is a function of drain to source on resistance, RDS (on), multiplied by the load current:

$$V_{dropout} = V_{in} - V_{out} = R_{DS(on)} \times I_{out}$$

Current Limit and Thermal Shutdown Protection

In order to prevent overloading or thermal condition from damaging the device, FS75XX has internal thermal and current limiting functions designed to protect the device. It will rapidly shut off PMOS pass element during overloading or over temperature condition.

Thermal Considerations

The FS75XX series can deliver a current of up to 150mA over the full operating junction temperature range. However, the maximum output current must be controlled at higher ambient temperature to ensure the junction temperature does not exceed 150°C. With all possible conditions, the junction temperature must be within the range specified under operating conditions. Power dissipation can be calculated based on the output current and the voltage drop across regulator.

$$P_d = (V_{in} - V_{out}) \times I_{out}$$

The final operating junction temperature for any set of conditions can be estimated by the following thermal equation:

$$P_{d(max)} = (T_{j(max)} - T_a) / \theta_{ja}$$

Where $T_{j(max)}$ is the maximum junction temperature of the die (150°C) and T_a is the maximum ambient temperature.

When junction temperature exceeds 150°C, over temperature protection may be triggered to prevent device from over heat

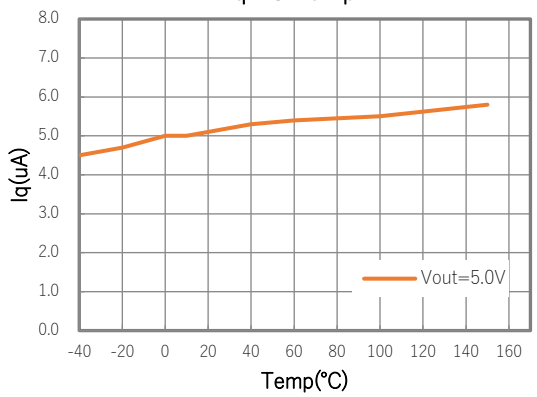
PCB Layout

An input capacitance of 1uF is required between the FS75XX input pin and ground (the amount of the capacitance may be increased without limit), this capacitor must be located a distance of not more than 1cm from the input and return to a clean analog ground. Input capacitor can filter out the input voltage spikes caused by the surge current due to the inductive effect of the package pin and the printed circuit board's routing wire. Otherwise, the actual voltage at the Vin pin may exceed the absolute maximum rating. The output capacitor also must be located a distance of not more than 1cm from output to a clean analog ground. Because it can filter out the output spike caused by the surge current due to the inductive effect of the package pin and the printed circuit board's routing wire.

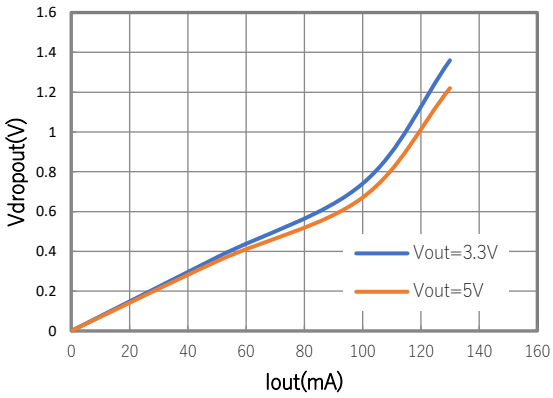
Fypical Characteristics

C_{IN}=C_{OUT}=1uF, T_A = 25°C, unless otherwise specified

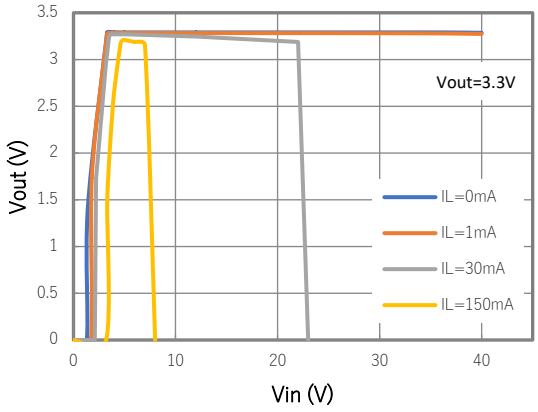
Iq VS.Temp



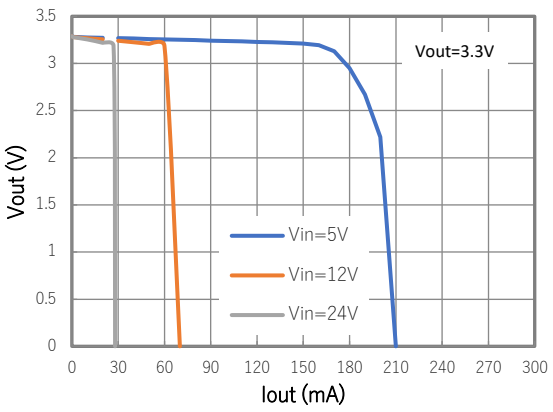
Iout VS. Dropout



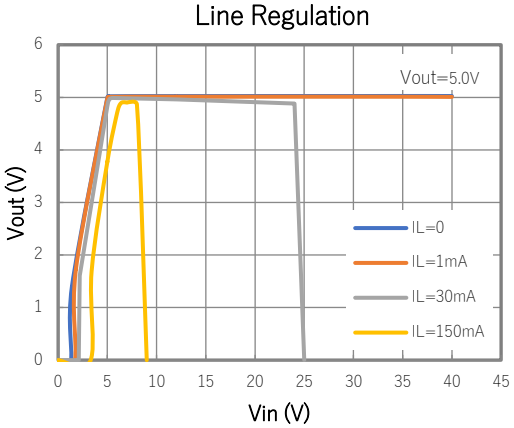
Line Regulation



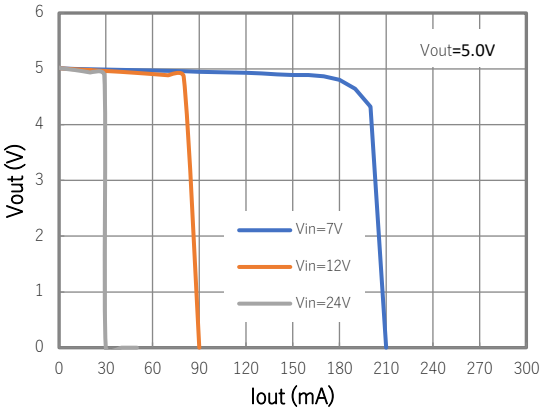
Load Regulation

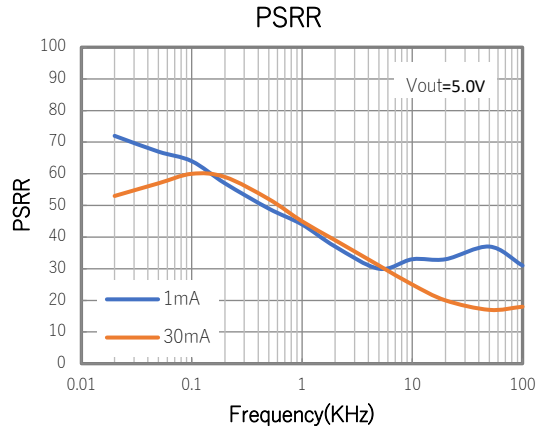


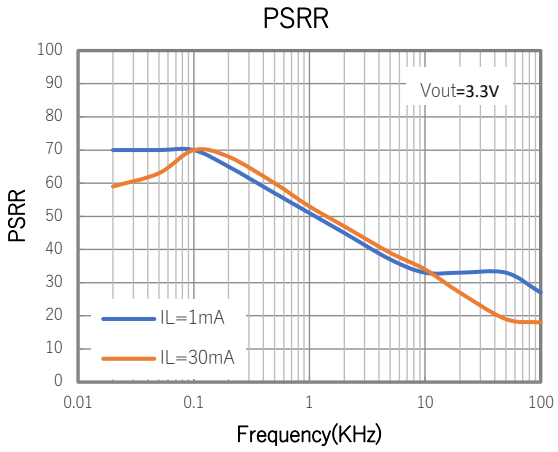
Line Regulation



Load Regulation

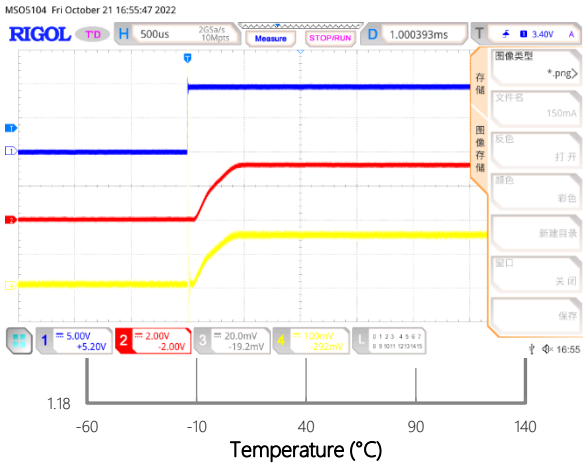


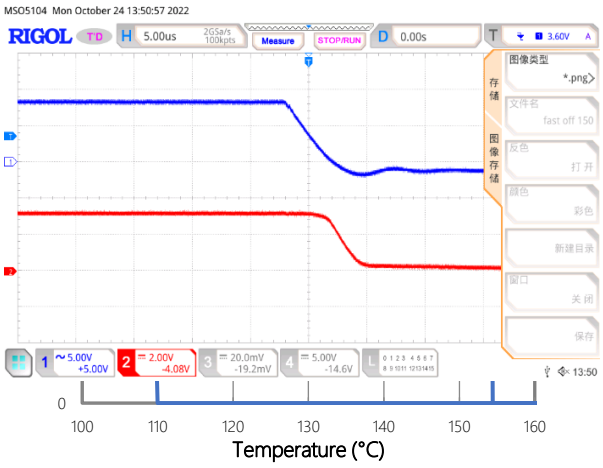




Vin fast on 150mA, Vout=3.3V

Vin fast off 150mA, Vout=3.3V



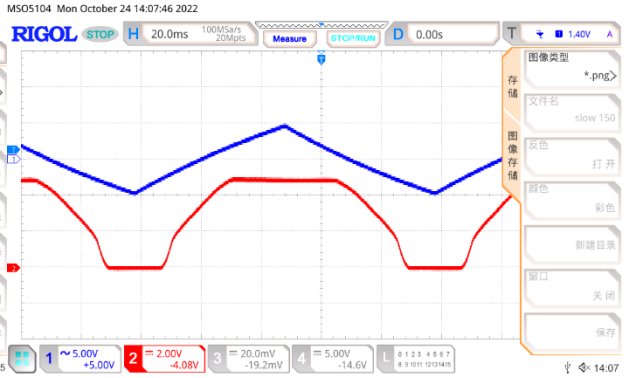


Vin fast on 150mA, Vout=5.0V

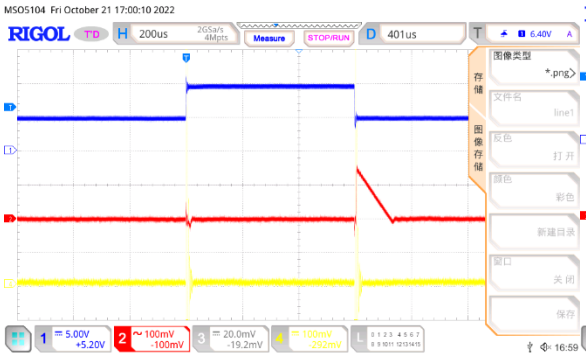
Vin fast off 150mA,Vout=5.0V

Vin slow on/off 150mA, Vout=3.3V

Vin slow on/off 150mA, Vout=5.0V



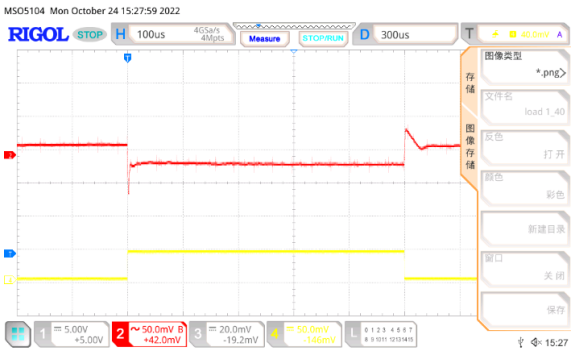
Line transient Vout=3.3V, Iout=1mA



Line transient Vout=5.0V, Iout=1mA

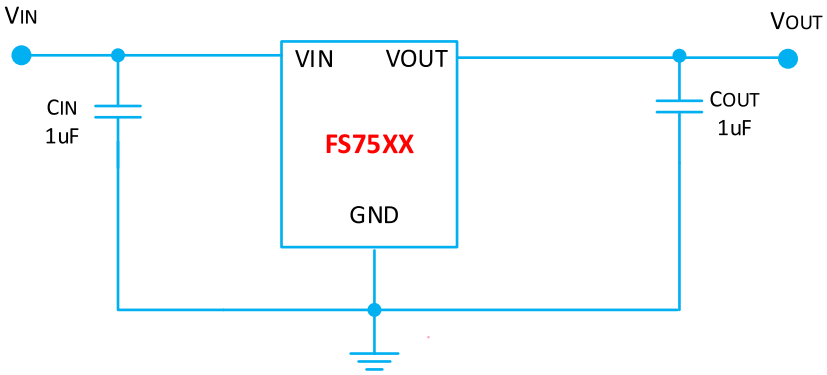
Load transient Vout=3.3V, Iout=1mA-50mA

Load transient Vout=5.0V, Iout=1mA-40mA



Application example

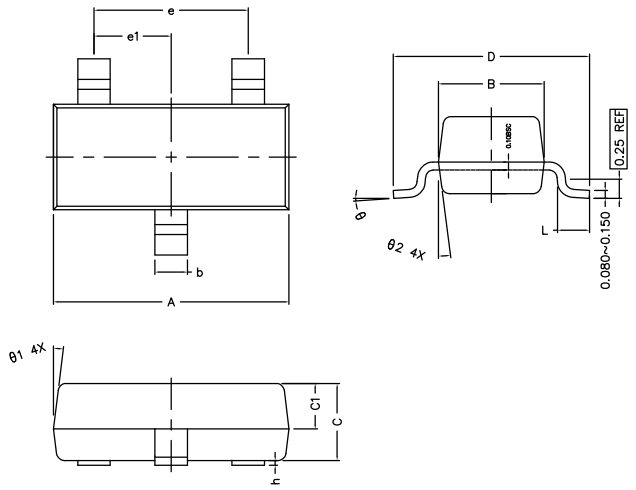
Note:
Input capacitor (C_{IN}=1uF) and Output capacitor (C_{OUT}≥1uF) are recommended in all application circuit.



Package outline drawing

Package SOT23 Devices per reel 3000 pcs

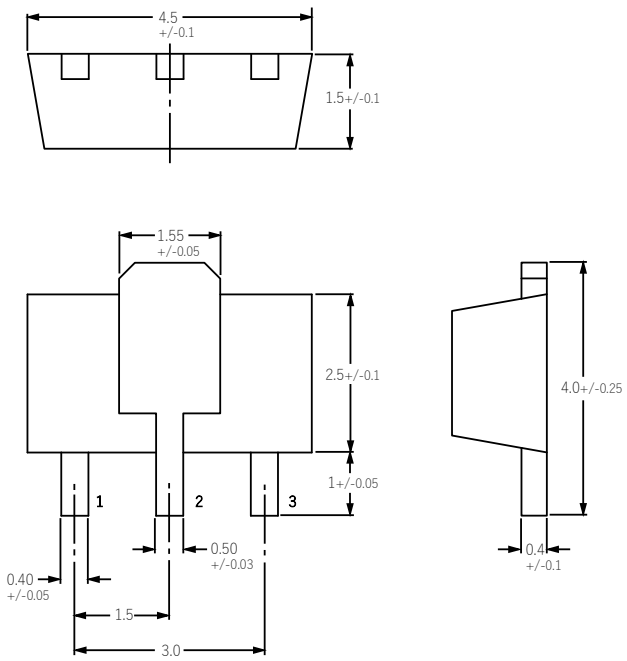
Package dimension (mm):



Symbol	MIN	NORM	MAX
A	2.800	2.900	3.000
B	1.200	1.300	1.400
C	0.900	1.000	1.1 00
C1	0.500	0.550	0.600
D	2.250	2.400	2.550
L	0.300	0.400	0.500
h	0.010	0.050	0.100
b	0.300	0.400	0.500
e	1.90 TYP		
e1	0.95 TYP		
θ1	7° TYP		
θ2	7° TYP		
θ	0°~7°		

Package SOT89-3 Devices per reel 1000 pcs

Package dimension (mm):



Company information and statement

HQ

E2-503, China Internet of Things International Innovation Park, No. 200, Linghu Avenue, Xinwu District, Wuxi City

Website：www.fastsoc.com

Wechat public Account.：fastsoc

Sales and technical support

Contact：Mr. Gu

Mobilephone：1895-248-8621

E-mail：gejing@fastsoc.com

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