ET7H2XX - 16V Input 30uA 200mA LDO

General Description

ET7H2XX series are 30μA LDO with 200mA output ability, it uses an advanced CMOS process and a PMOSFET pass device to achieve low noise, fast start-up and excellent output accuracy. The dynamic transient boost feature improves device transient response for wireless communication applications.

ET7H2XX series are offered SOT89-3, SOT23-5, SOT23-3, DNF4(1mm × 1mm) packages

Features

- Wide Input Voltage Range From 2.5V to 16V
- Up to 200mA Load Current
- I_Q is 30μA Typical
- Dropout is 1000mV at 200mA Load @V_{OUT} = 1.2V
- Dropout is 680mV at 200mA Load @V_{OUT} = 1.8V
- Short Current Protection is 100mA
- Excellent Load/Line Transient Response
- Line Regulation is 0.01%/V Typical
- Packages are SOT89-3, SOT23-5, SOT23-3, DFN4 (1mm × 1mm)

Device information

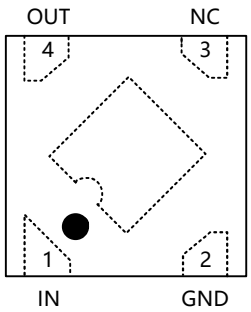
ET 7H2 XX X

XX Output Voltage		X Package		
XX	Output X.X-V For Example, 18 is 1.8V output	B	F	SOT89-3
		Y		DFN4(1mm × 1mm)
		S		SOT23-3
		T		SOT23-5
		/		SOT23-5 (Default)

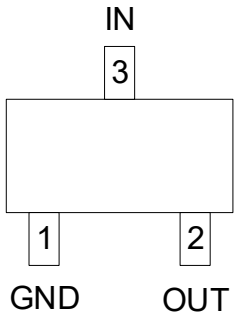
Mark Specification Label

Part No.	Marking						V_{OUT}
	SOT89-3		SOT23-3	DFN4	SOT23-5		
	XXB	XXF	XXS	XXY	XX	XXT	
ET7H212	12B	12F	12S	XA	12	12T	1.2V
ET7H218	18B	18F	18S	XC	18	18T	1.8V
ET7H230	30B	30F	30S	XG	30	30T	3.0V
ET7H233	33B	33F	33S	XE	33	33T	3.3V
ET7H236	36B	36F	36S	XR	36	36T	3.6V
ET7H250	50B	50F	50S	X5	50	50T	5.0V

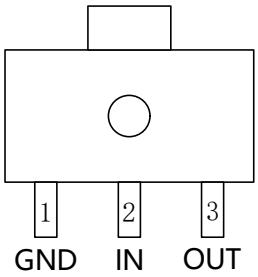
Pin Configuration



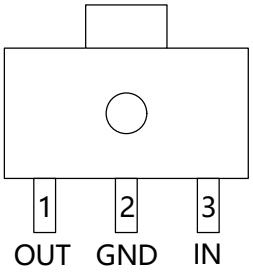
ET7H2XXY(DFN4)



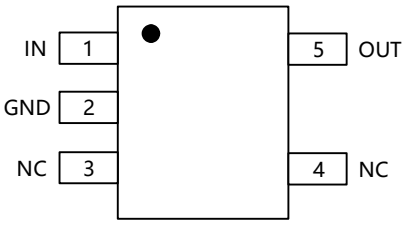
ET7H2XXS(SOT23-3)



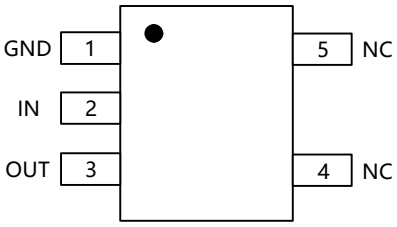
ET7H2XXB(SOT89-3)



ET7H2XXF(SOT89-3)



ET7H2XXT(SOT23-5)



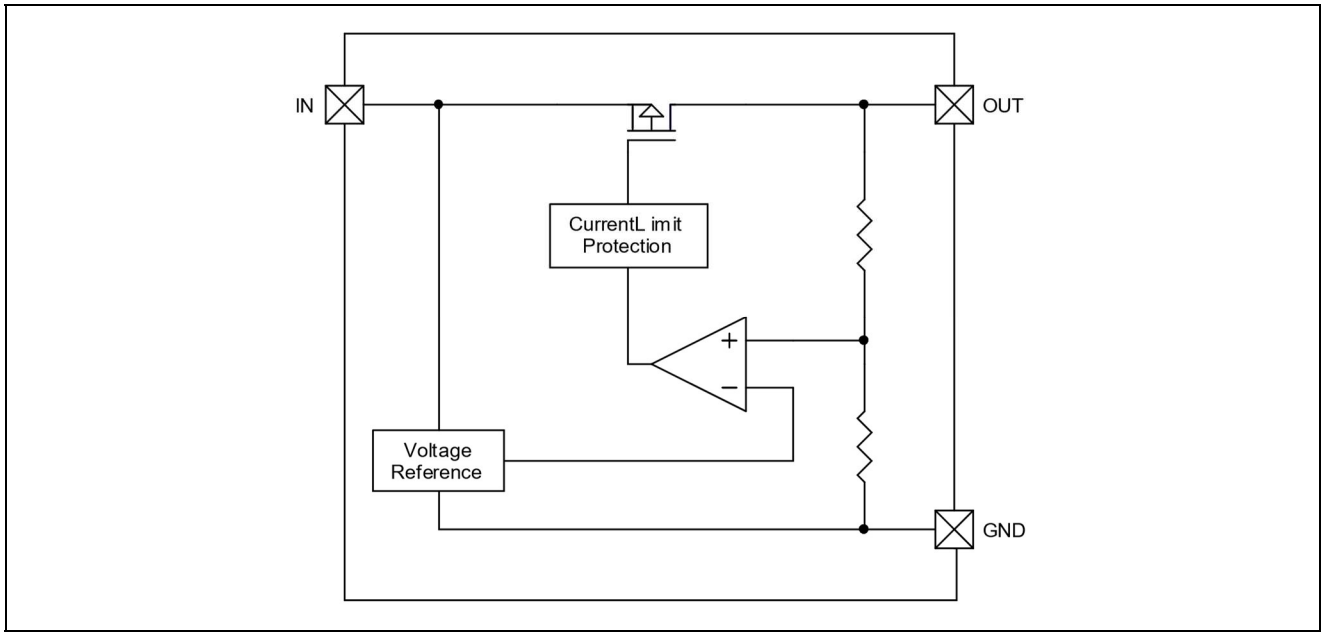
ET7H2XX(SOT23-5)

Top View

Pin Function

Pin No.						Pin Name	Pin Function
SOT89-3		SOT23-5		SOT23-3	DFN4		
(B)	(F)	(Default)	(T)	(S)	(Y)		
1	2	1	2	1	2	GND	Ground Pin.
2	3	2	1	3	1	IN	Supply Input Pin. Need a 1μF or greater capacitor closely decoupled to GND
3	1	3	5	2	4	OUT	Output Pin. Bypass a 1μF or greater capacitor from this pin to ground.
-	-	4	3	-	3	NC	No Connection.
-	-	5	4	-	-	NC	No Connection.

Block Diagram



Functional Description

Input Capacitor

A 1μF~10uF ceramic capacitor is recommended to connect between V_{IN} and GND pins to decouple input power supply glitch and noise. The amount of the capacitance may be increased without limit. This input capacitor must be located as close as possible to the device to assure input stability and less noise. For PCB layout, a wide copper trace is required for both V_{IN} and GND.

Output Capacitor

An output capacitor is required for the stability of the LDO. The recommended output capacitance is from 1μF to 10μF, Equivalent Series Resistance (ESR) is from 5mΩ to 100mΩ, and temperature characteristics are X7R or X5R. Higher capacitance values help to improve load/line transient response.

The output capacitance may be increased to keep low undershoot/overshoot. Place output capacitor as close as possible to OUT and GND pins.

Low Quiescent Current

The ET7H2XX consuming only around 30μA for all input range and output loading, provides great power saving in portable and low power applications.

Current Limit Protection

When output current at the OUT pin is higher than current limit threshold or the OUT pin, the current limit protection will be triggered and clamp the output current to approximately 500mA to prevent over-current and to protect the regulator from damage due to overheating.

Absolute Maximum Ratings

Symbol	Rating	Value	Unit
V_{IN} (1)	Input Voltage	-0.3~24	V
V_{OUT}	Output Voltage	-0.3~6	V
T_{JMAX}	Maximum Junction Temperature	150	°C
T_{STG}	Storage Temperature	-65~150	°C
V_{ESD} (2)	HBM Capability	±2000	V

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

Note1. Refer to Electrical Characteristics and Application Information for Safe Operating Area.

Note2. This device series incorporates ESD protection and is tested by the following methods:

ESD Human Body Model tested per JEDEC JS-001;

Thermal Characteristics

Symbol	Package	Ratings	Value	Unit
$R_{\theta JA}$	SOT89-3	Thermal Characteristics, Thermal Resistance, Junction-to-Air	135	°C/W
	SOT23-5		250	
	SOT23-3		360	
	DFN4		250	
P_D	SOT89-3	Power Dissipation@25°C PCB board dimension: 50mm x 50mm (2layer) Copper :1oz	750	mW
	SOT23-5		400	
	SOT23-3		280	
	DFN4		400	

Recommended Operating Conditions

Symbol	Item	Rating	Unit
V_{IN}	Input Voltage	2.5 to 16	V
I_{OUT}	Output Current	0 to 200	mA
T_J	Operating Junction Temperature	-40 to 125	°C
C_{IN}	Effective Input Ceramic Capacitor Value	1.0 to 10	μF
C_{OUT}	Effective Output Ceramic Capacitor Value	1.0 to 10	μF
ESR	Input and Output Capacitor Equivalent Series Resistance (ESR)	5 to 100	mΩ

Electrical Characteristics

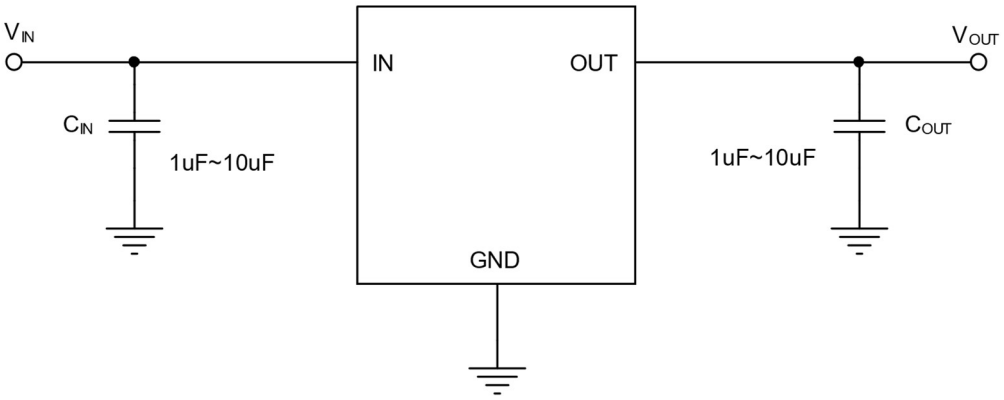
(V_{IN} = V_{OUT} + 2V, T_A = 25°C, C_{IN} = C_{OUT} = 1uF, unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input Voltage Operation Range	V_{IN}		2.5		16	V
Dropout Voltage[3]	V_{DROP}	V_{OUT} = 1.2V, I_{OUT} = 200mA		1000	1300	mV
		V_{OUT} = 1.8V, I_{OUT} = 200mA		680	1000	
DC Supply Quiescent Current	I_Q	I_{OUT} = 0mA, 25°C		30	60	μA
Regulated Output Voltage	V_{OUT}	I_{OUT} = 1mA, 25°C	-2%		+2%	V
Output Voltage Line Regulation[3]	Reg_{LINE}	V_{IN} = V_{OUT} + 1V to 16V, I_{OUT} = 10mA (ΔV_{OUT} / ΔV_{IN} / V_{OUT})		0.01	0.1	%/V
Output Voltage Load Regulation[3]	Reg_{LOAD}	I_{OUT} from 1mA to 200mA V_{IN} = V_{OUT} + 2V		30	60	mv
Over Current Protection	I_{LIMT}	R_{OUT} = 1Ω		500		mA
Power Supply Rejection Ratio	PSRR	f = 1kHz, C_{OUT} = 1μF, I_{OUT} = 20mA		53		dB
Output Noise	e_N	10Hz to 100kHz, I_{OUT} = 20mA, V_{OUT} = 1.2V		90* V_{OUT}		μV_{RMS}

Note3. At high temperatures, the maximum load current can be calculated according to the following formula：

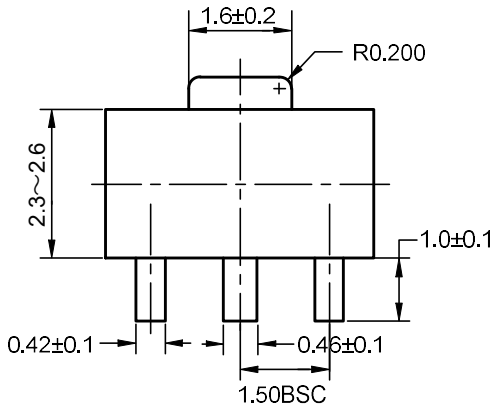
$$I_{OUT_MAX} = (T_J - T_A) / R_{\theta JA} / (V_{IN} - V_{OUT})$$

Application Circuits

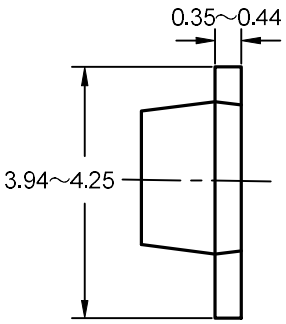


Package Dimension

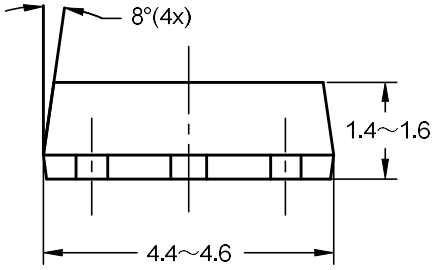
SOT89-3



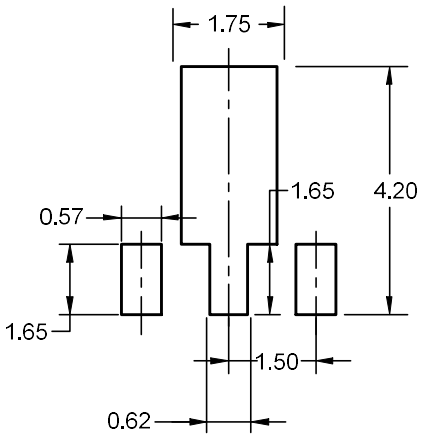
Top View



Side View



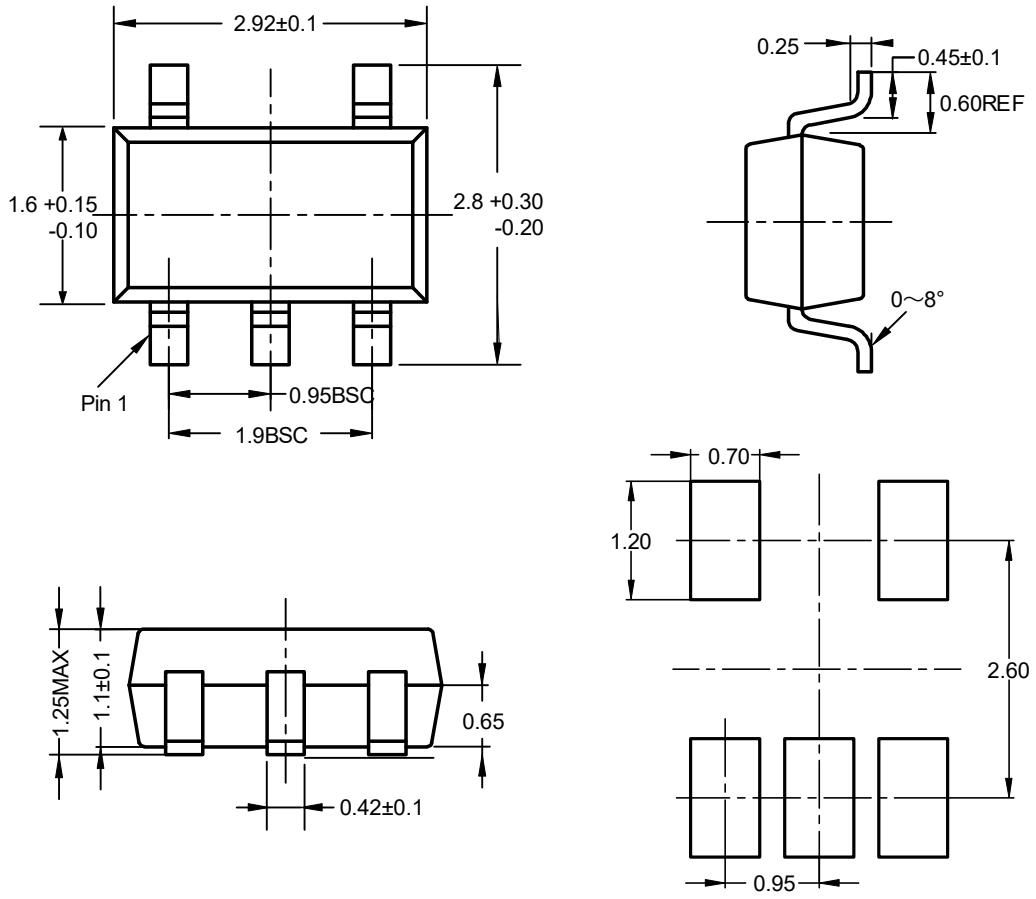
Side View



Recommended Land Pattern

Unit: mm

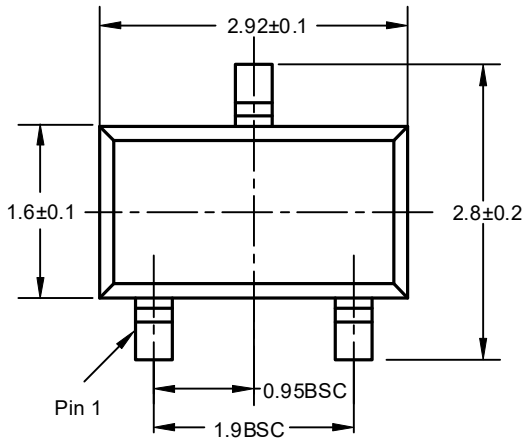
SOT23-5

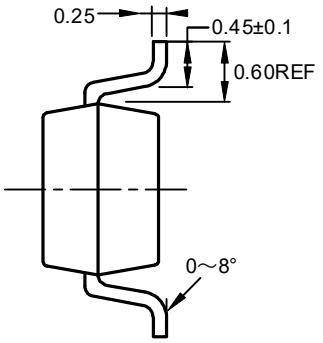


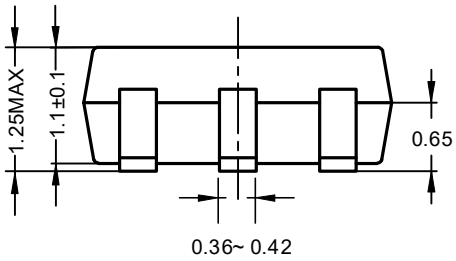
Recommended Land Pattern

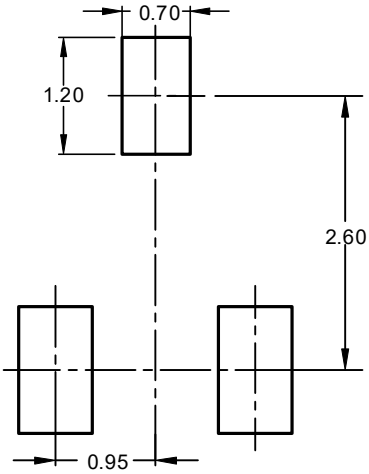
Unit: mm

SOT23-3





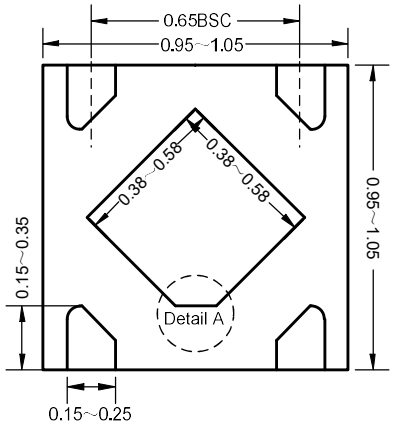


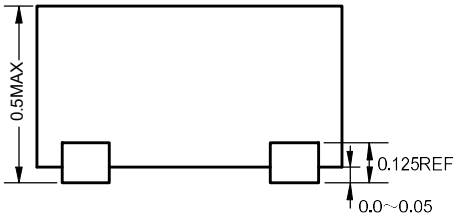


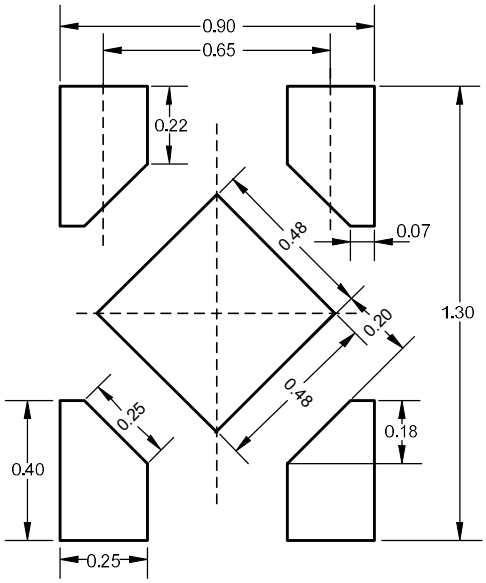
Recommended Land Pattern

Unit: mm

DFN4(1mm x 1mm)

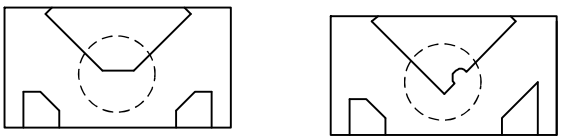






Recommended Land Pattern

Detail A: (PIN1 shape)



Unit: mm

Marking Information

DFN4



$\overline{X}^{(1)}$ – Tracking Number

$\overline{X}^{(2)}$ – V_{OUT} Version

DFN4 Marking Information

Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
0.1	2022-3-21	Preliminary Version	Wuhan shibo	Liuxm	Liujy
1.0	2023-3-22	Updata Typset	Tuguozhu	Liuxm	Liujy
1.1	2025-4-28	Update Package Dimension	shibo	Liuxm	Liujy
1.1.a	2026-07-20	Update Recommended Operating Conditions	Yangxiaoxu	Yangxiaoxu	Liujy
1.1.b	2026-09-24	Update SOT23-5 Package Size	Yangxiaoxu	Yangxiaoxu	Liujy