

Features

- Low power consumption
- Low voltage drop
- Low temperature coefficient
- High input voltage (up to 15V)
- Output voltage accuracy: tolerance $\pm 2\%$
- SOT23, SOT23-3, SOT89 and TO92 package

Applications

- Battery-powered equipment
- Communication equipment
- Audio/Video equipment

General Description

The TX71XXM series is a set of three-terminal low power high voltage regulators implemented in CMOS technology. They allow input voltages as high as 15V. They are available with several fixed output voltages ranging from 2.1V to 5.0V. CMOS

technology ensures low voltage drop and low quiescent current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain variable voltages and currents.

Selection Table

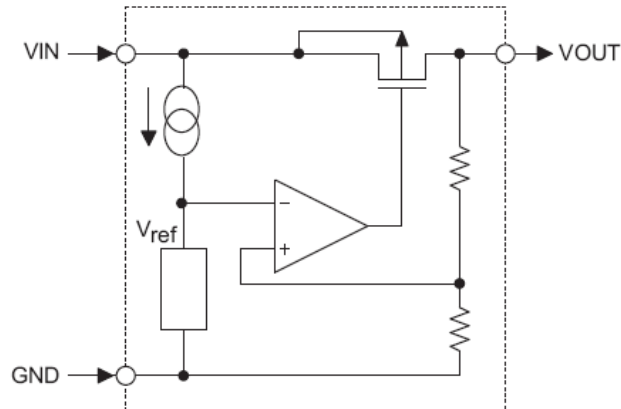
Part No.	Output Voltage	Package	Marking
TX7121Mxx	2.1V	SOT23 SOT23-3 SOT89 TO92	HTXX(for SOT23) HTXX(for SOT23-3) 71XX-1(for SOT89) 71XXA-1(for TO92)
TX7123Mxx	2.3V		
TX7125Mxx	2.5V		
TX7127Mxx	2.7V		
TX7130Mxx	3.0V		
TX7133Mxx	3.3V		
TX7136Mxx	3.6V		
TX7144Mxx	4.4V		
TX7150Mxx	5.0V		

Order Information

TX71①②③④⑤

Designator	Symbol	Description
① ②	Integer	Output Voltage(2.1~5.0V)
③	M	Standard
④	N	Package:SOT23
	M	Package:SOT23-3
	P	Package:SOT89
	T	Package:TO-92
⑤	R	RoHS / Pb Free
	G	Halogen Free

Block Diagram



Pin Assignment

SOT23 and SOT23-3 (Top View)

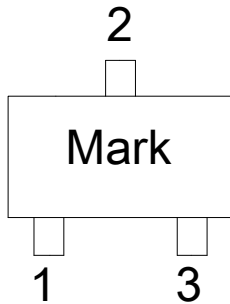


Table1: TX71XXMNR/TX71XXMMR series (SOT23/SOT23-3 PKG)

PIN NO.	PIN NAME	FUNCTION
1	GND	GND pin
2	VIN	Input voltage pin
3	VOUT	Output voltage pin

SOT89 (Top View)

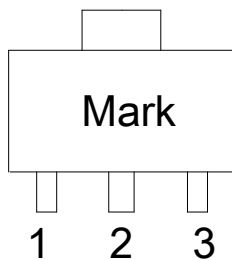


Table2: TX71XXMPR series (SOT89 PKG)

PIN NO.	PIN NAME	FUNCTION
1	GND	GND pin
2	VIN	Input voltage pin
3	VOUT	Output voltage pin

TO92 (Top View)

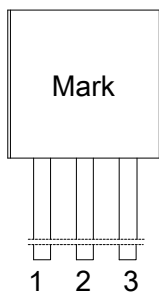


Table3: TX71XXMTR series (TO92 PKG)

PIN NO.	PIN NAME	FUNCTION
1	GND	GND pin
2	VIN	Input voltage pin
3	VOUT	Output voltage pin

Absolute Maximum Ratings

Supply Voltage-0.3V to 18V Storage Temperature-50°C to 125°C
 Operating Temperature-40°C to 85°C

Note: These are stress ratings only. Stresses exceeding the range specified under “Absolute Maximum Ratings” may cause substantial damage to the device. Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability.

Thermal Information

Symbol	Parameter	Package	Max.	Unit
θ_{JA}	Thermal Resistance (Junction to Ambient) (Assume no ambient airflow, no heat sink)	TO92	200	°C/W
		SOT89	200	°C/W
		SOT23-3	500	°C/W
		SOT23	500	°C/W
P_D	Power Dissipation	TO92	0.50	W
		SOT89	0.50	W
		SOT23-3	0.20	W
		SOT23	0.20	W

Note: P_D is measured at $T_a = 25^\circ\text{C}$

Electrical Characteristics

TX7121Mxx, +2.1V Output Type

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{IN}	Conditions				
V_{OUT}	Output Voltage	4.1V	$I_{OUT}=10\text{mA}$	2.058	2.100	2.142	V
I_{OUT}	Output Current	4.1V	-	130	150	-	mA
ΔV_{OUT}	Load Regulation	4.1V	$1\text{mA} \leq I_{OUT} \leq 20\text{mA}$	-	60	100	mV
V_{DIF}	Voltage Drop(Note)	-	$I_{OUT}=1\text{mA}$	-	100	-	mV
I_{SS}	Current Consumption	4.1V	No load	-	1.5	3	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN}} \times V_{OUT}$	Line Regulation	-	$3.1\text{V} \leq V_{IN} \leq 16\text{V}$ $I_{OUT}=1\text{mA}$	-	0.2	-	%/V
V_{IN}	Input Voltage	-	-	-	-	15	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	4.1V	$I_{OUT}=10\text{mA}$ $0^\circ\text{C} < T_a < 70^\circ\text{C}$	-	± 0.37	-	mV/°C

Note: Dropout voltage is defined as the input voltage minus the output voltage that produces a 2% change in the output voltage from the value at $V_{IN} = V_{OUT} + 2\text{V}$ with a fixed load.

TX71XXM series

150mA Low Power LDO

TX7123Mxx, +2.3V Output Type

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V _{IN}	Conditions				
V _{OUT}	Output Voltage	4.3V	I _{OUT} =10mA	2.254	2.300	2.346	V
I _{OUT}	Output Current	4.3V	-	130	150	-	mA
ΔV _{OUT}	Load Regulation	4.3V	1mA≤I _{OUT} ≤20mA	-	60	100	mV
V _{DIF}	Voltage Drop(Note)	-	I _{OUT} =1mA	-	100	-	mV
I _{SS}	Current Consumption	4.3V	No load	-	1.5	3	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	-	3.3V≤V _{IN} ≤16V I _{OUT} =1mA	-	0.2	-	%/V
V _{IN}	Input Voltage	-	-	-	-	15	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	4.3V	I _{OUT} =10mA 0°C<T _a <70°C	-	±0.39	-	mV/°C

Note: Dropout voltage is defined as the input voltage minus the output voltage that produces a 2% change in the output voltage from the value at V_{IN} = V_{OUT}+2V with a fixed load.

TX7125Mxx, +2.5V Output Type

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V _{IN}	Conditions				
V _{OUT}	Output Voltage	4.5V	I _{OUT} =10mA	2.45	2.500	2.55	V
I _{OUT}	Output Current	4.5V	-	130	150	-	mA
ΔV _{OUT}	Load Regulation	4.5V	1mA≤I _{OUT} ≤20mA	-	60	100	mV
V _{DIF}	Voltage Drop(Note)	-	I _{OUT} =1mA	-	100	-	mV
I _{SS}	Current Consumption	4.5V	No load	-	1.5	3	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	-	3.5V≤V _{IN} ≤16V I _{OUT} =1mA	-	0.2	-	%/V
V _{IN}	Input Voltage	-	-	-	-	15	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	4.5V	I _{OUT} =10mA 0°C<T _a <70°C	-	±0.41	-	mV/°C

Note: Dropout voltage is defined as the input voltage minus the output voltage that produces a 2% change in the output voltage from the value at V_{IN} = V_{OUT}+2V with a fixed load.

TX71XXM series

150mA Low Power LDO

TX7127Mxx, +2.7V Output Type

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V _{IN}	Conditions				
V _{OUT}	Output Voltage	4.7V	I _{OUT} =10mA	2.646	2.700	2.754	V
I _{OUT}	Output Current	4.7V	-	130	150	-	mA
ΔV _{OUT}	Load Regulation	4.7V	1mA≤I _{OUT} ≤20mA	-	60	100	mV
V _{DIF}	Voltage Drop(Note)	-	I _{OUT} =1mA, ΔV _{OUT} =2%	-	100	-	mV
I _{SS}	Current Consumption	4.7V	No load	-	1.5	3	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	-	3.7V≤V _{IN} ≤16V I _{OUT} =1mA	-	0.2	-	%/V
V _{IN}	Input Voltage	-	-	-	-	15	V
$\frac{\Delta V_{OUT}}{\Delta Ta}$	Temperature Coefficient	4.7V	I _{OUT} =10mA 0°C<Ta<70°C	-	±0.43	-	mV/°C

Note: Dropout voltage is defined as the input voltage minus the output voltage that produces a 2% change in the output voltage from the value at V_{IN} = V_{OUT}+2V with a fixed load.

TX7130Mxx, +3.0V Output Type

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V _{IN}	Conditions				
V _{OUT}	Output Voltage	5V	I _{OUT} =10mA	2.94	3.00	3.06	V
I _{OUT}	Output Current	5V	-	130	150	-	mA
ΔV _{OUT}	Load Regulation	5V	1mA≤I _{OUT} ≤20mA	-	20	100	mV
V _{DIF}	Voltage Drop(Note)	-	I _{OUT} =1mA	-	30	-	mV
I _{SS}	Current Consumption	5V	No load	-	1.5	3	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	-	4V≤V _{IN} ≤16V I _{OUT} =1mA	-	0.02	-	%/V
V _{IN}	Input Voltage	-	-	-	-	15	V
$\frac{\Delta V_{OUT}}{\Delta Ta}$	Temperature Coefficient	5V	I _{OUT} =10mA 0°C<Ta<70°C	-	±0.45	-	mV/°C

Note: Dropout voltage is defined as the input voltage minus the output voltage that produces a 2% change in the output voltage from the value at V_{IN} = V_{OUT}+2V with a fixed load.

TX71XXM series

150mA Low Power LDO

TX7133Mxx, +3.3V Output Type

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V _{IN}	Conditions				
V _{OUT}	Output Voltage	5.3V	I _{OUT} =10mA	3.234	3.300	3.366	V
I _{OUT}	Output Current	5.3V	-	130	150	-	mA
ΔV _{OUT}	Load Regulation	5.3V	1mA≤I _{OUT} ≤20mA	-	40	100	mV
V _{DIF}	Voltage Drop(Note)	-	I _{OUT} =1mA	-	30	-	mV
I _{SS}	Current Consumption	5.3V	No load	-	1.5	3	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	-	4.5V≤V _{IN} ≤16V I _{OUT} =1mA	-	0.06	-	%/V
V _{IN}	Input Voltage	-	-	-	-	15	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	5.3V	I _{OUT} =10mA 0°C<T _a <70°C	-	±0.5	-	mV/°C

Note: Dropout voltage is defined as the input voltage minus the output voltage that produces a 2% change in the output voltage from the value at V_{IN} = V_{OUT}+2V with a fixed load.

TX7136Mxx, +3.6V Output Type

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V _{IN}	Conditions				
V _{OUT}	Output Voltage	5.6V	I _{OUT} =10mA	3.528	3.600	3.672	V
I _{OUT}	Output Current	5.6V	-	130	150	-	mA
ΔV _{OUT}	Load Regulation	5.6V	1mA≤I _{OUT} ≤20mA	-	30	100	mV
V _{DIF}	Voltage Drop(Note)	-	I _{OUT} =1mA	-	25	-	mV
I _{SS}	Current Consumption	5.6V	No load	-	1.5	3.0	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	-	4.6V≤V _{IN} ≤16V I _{OUT} =1mA	-	0.02	-	%/V
V _{IN}	Input Voltage	-	-	-	-	15	V
$\frac{\Delta V_{OUT}}{\Delta T_a}$	Temperature Coefficient	5.6V	I _{OUT} =10mA 0°C<T _a <70°C	-	±0.6	-	mV/°C

Note: Dropout voltage is defined as the input voltage minus the output voltage that produces a 2% change in the output voltage from the value at V_{IN} = V_{OUT}+2V with a fixed load.

TX71XXM series

150mA Low Power LDO

TX7144Mxx, +4.4V Output Type

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V _{IN}	Conditions				
V _{OUT}	Output Voltage	6.4V	I _{OUT} =10mA	4.312	4.400	4.488	V
I _{OUT}	Output Current	6.4V	-	130	150	-	mA
ΔV _{OUT}	Load Regulation	6.4V	1mA ≤ I _{OUT} ≤ 20mA	-	20	100	mV
V _{DIF}	Voltage Drop(Note)	-	I _{OUT} =1mA	-	20	-	mV
I _{SS}	Current Consumption	6.4V	No load	-	1.5	3.0	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	-	5.4V ≤ V _{IN} ≤ 16V I _{OUT} =1mA	-	0.02	-	%/V
V _{IN}	Input Voltage	-	-	-	-	15	V
$\frac{\Delta V_{OUT}}{\Delta Ta}$	Temperature Coefficient	6.4V	I _{OUT} =10mA 0°C < Ta < 70°C	-	±0.7	-	mV/°C

Note: Dropout voltage is defined as the input voltage minus the output voltage that produces a 2% change in the output voltage from the value at V_{IN} = V_{OUT}+2V with a fixed load.

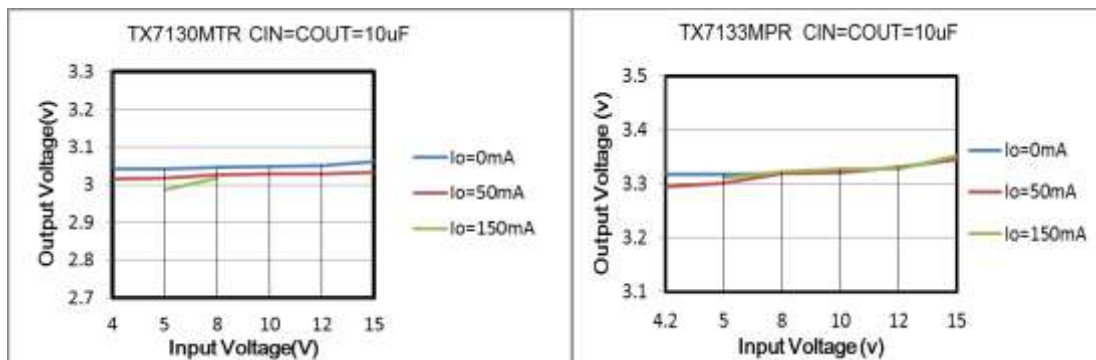
TX7150Mxx, +5.0V Output Type

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V _{IN}	Conditions				
V _{OUT}	Output Voltage	7V	I _{OUT} =10mA	4.9	5.00	5.1	V
I _{OUT}	Output Current	7V	-	130	150	-	mA
ΔV _{OUT}	Load Regulation	7V	1mA ≤ I _{OUT} ≤ 20mA	-	25	100	mV
V _{DIF}	Voltage Drop(Note)	-	I _{OUT} =1mA	-	20	-	mV
I _{SS}	Current Consumption	7V	No load	-	1.5	3.0	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line Regulation	-	6V ≤ V _{IN} ≤ 16V I _{OUT} =1mA	-	0.04	-	%/V
V _{IN}	Input Voltage	-	-	-	-	15	V
$\frac{\Delta V_{OUT}}{\Delta Ta}$	Temperature Coefficient	7V	I _{OUT} =10mA 0°C < Ta < 70°C	-	±0.75	-	mV/°C

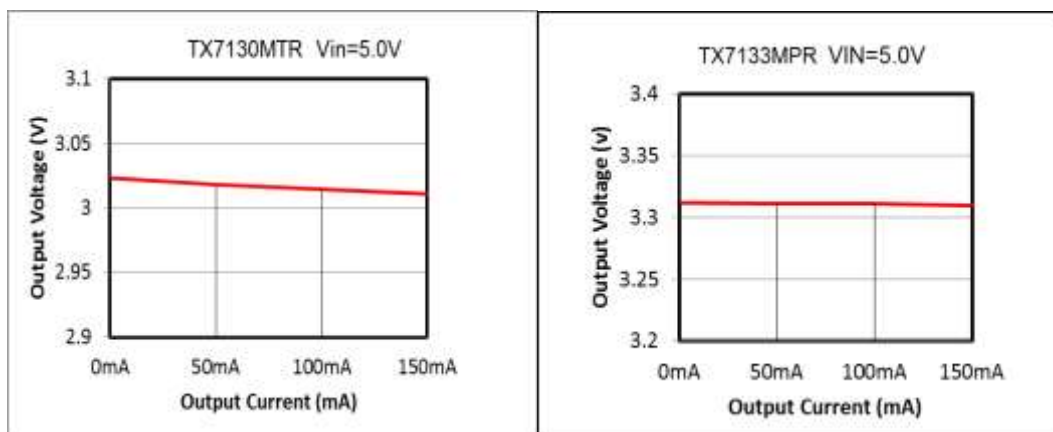
Note: Dropout voltage is defined as the input voltage minus the output voltage that produces a 2% change in the output voltage from the value at V_{IN} = V_{OUT}+2V with a fixed load.

Typical Performance Characteristics

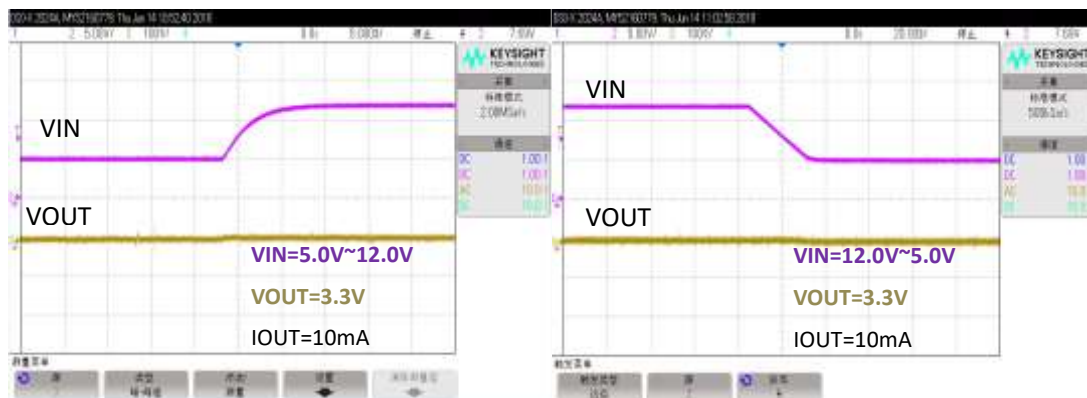
(1) Output Voltage vs Input voltage



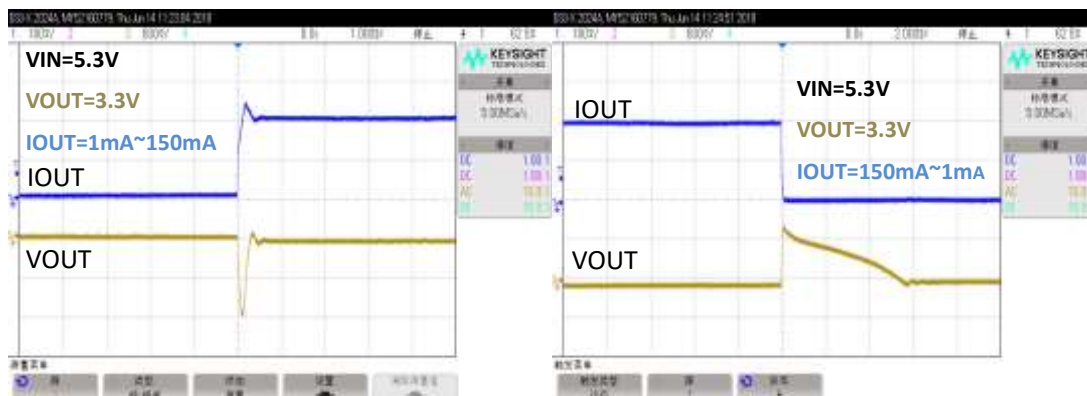
(2) Output Voltage vs. Output Current



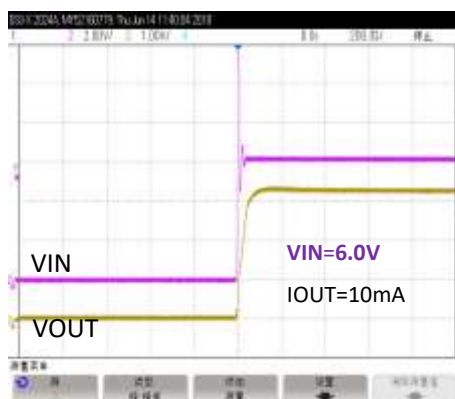
(3) Input Transient Response



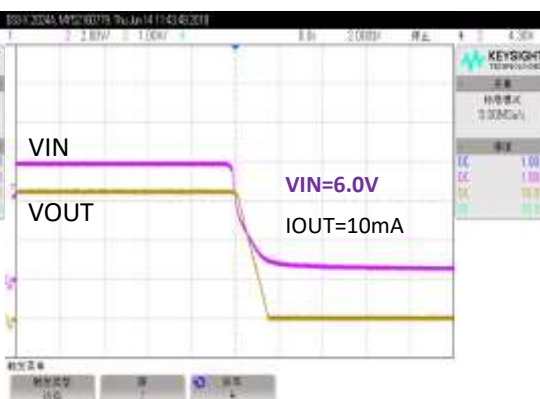
(4) Load Transient Response



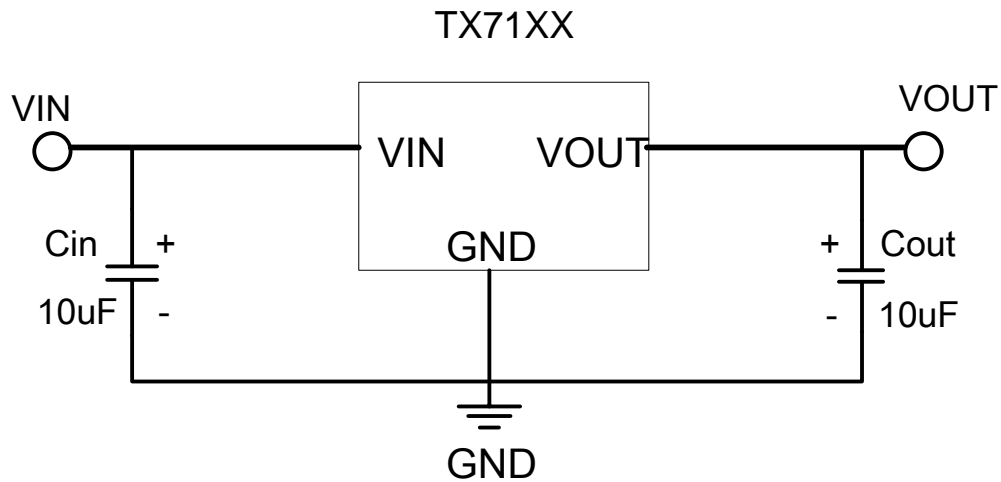
(5) Power On



(6) Power Off

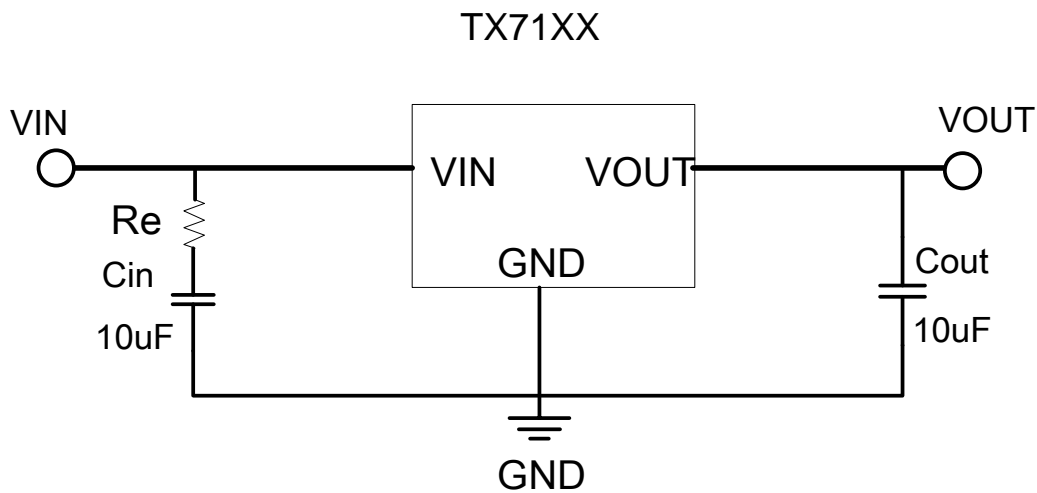


Application Circuits



Note1: $C_{in}=C_{out}=10\mu F$. (10 μF Electrolytic capacitor is recommended).

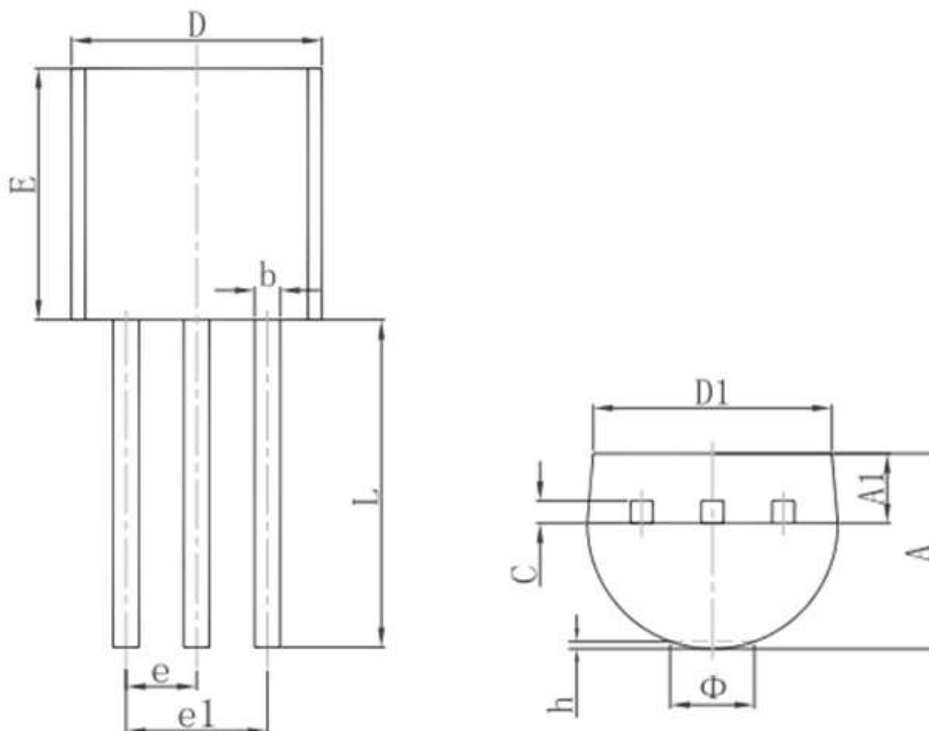
Note2: If the input and output capacitors are ceramic, add a resistor at the input, as follows.



Note: $R_e = (1.2 \sim 1.8) \Omega$.

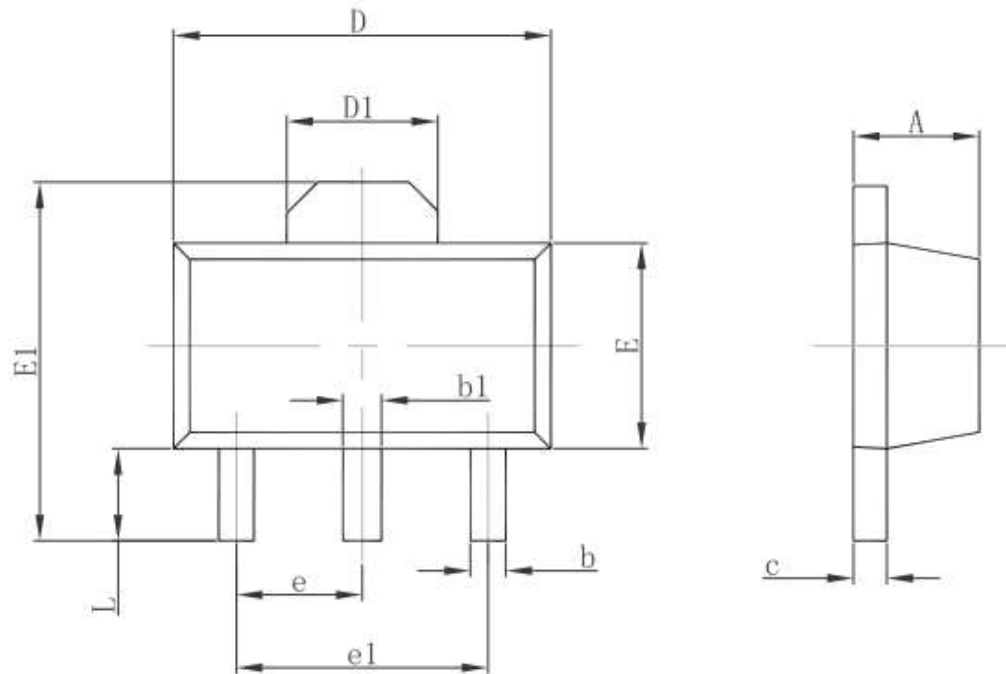
Package Information

3-pin TO92 Outline Dimensions



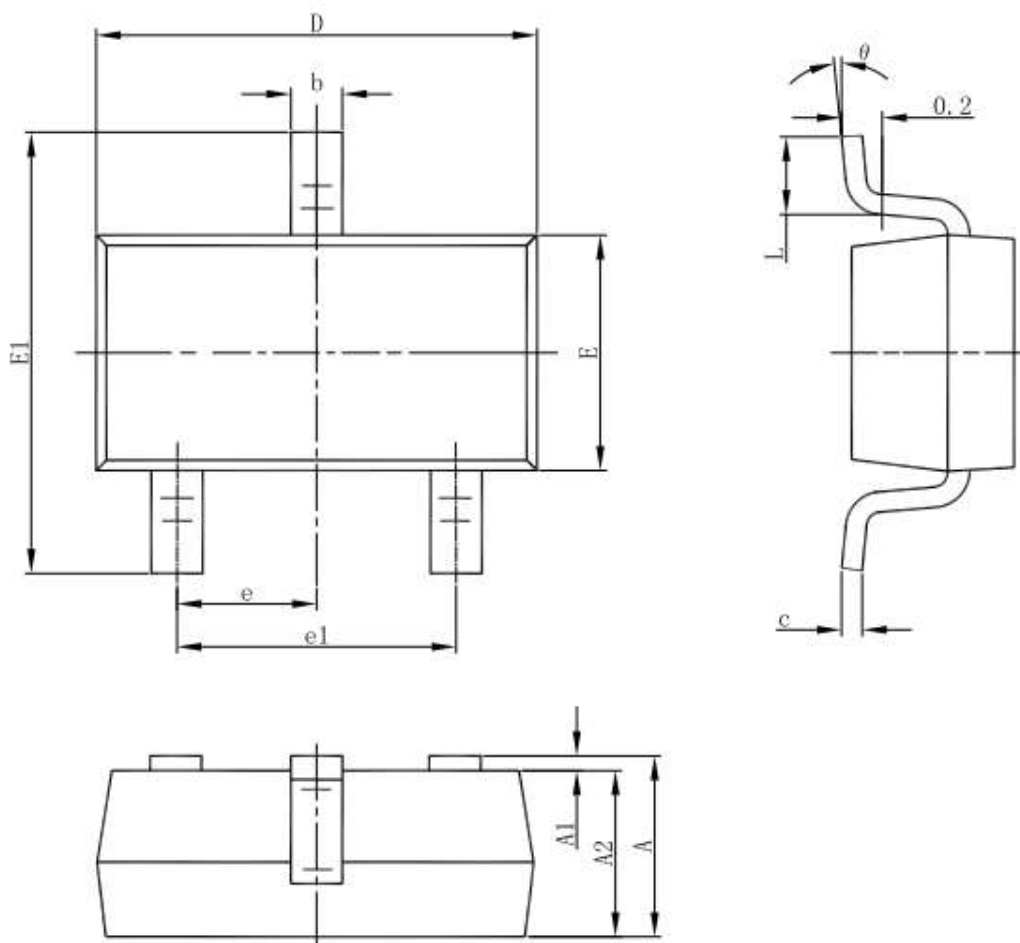
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	3.300	3.700	0.130	0.146
A1	1.100	1.400	0.043	0.055
b	0.380	0.550	0.015	0.022
c	0.360	0.510	0.014	0.020
D	4.300	4.700	0.169	0.185
D1	3.430		0.135	
E	4.300	4.700	0.169	0.185
e	1.270 TYP.		0.050 TYP.	
e1	2.440	2.640	0.096	0.104
L	14.100	14.500	0.555	0.571
Phi		1.600		0.063
h	0.000	0.380	0.000	0.015

3-pin SOT89 Outline Dimensions



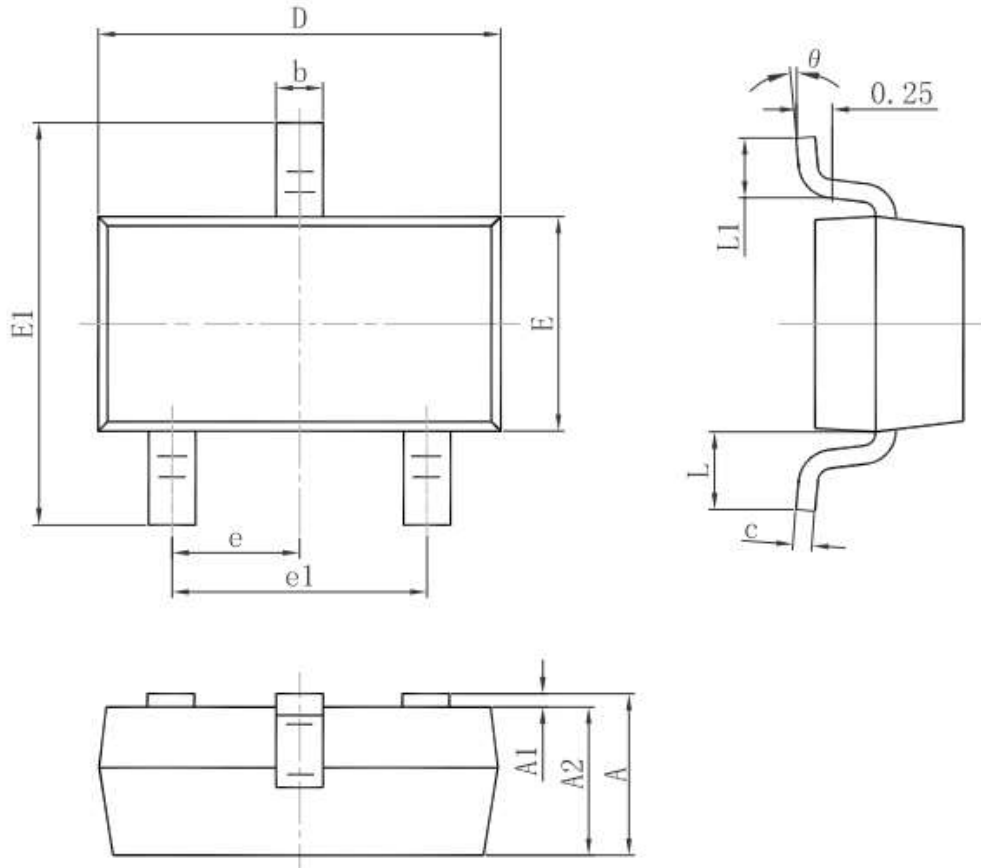
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF.		0.061 REF.	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP.		0.060 TYP.	
e1	3.000 TYP.		0.118 TYP.	
L	0.900	1.200	0.035	0.047

3-pin SOT23-3 Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

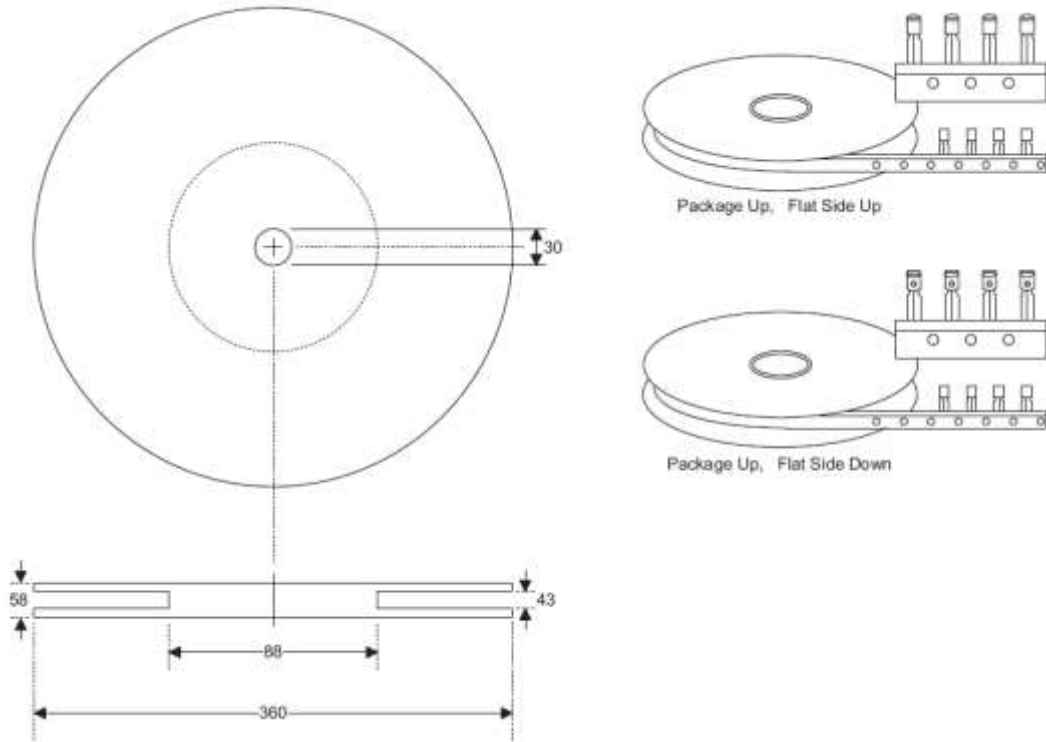
3-pin SOT23 Outline Dimensions



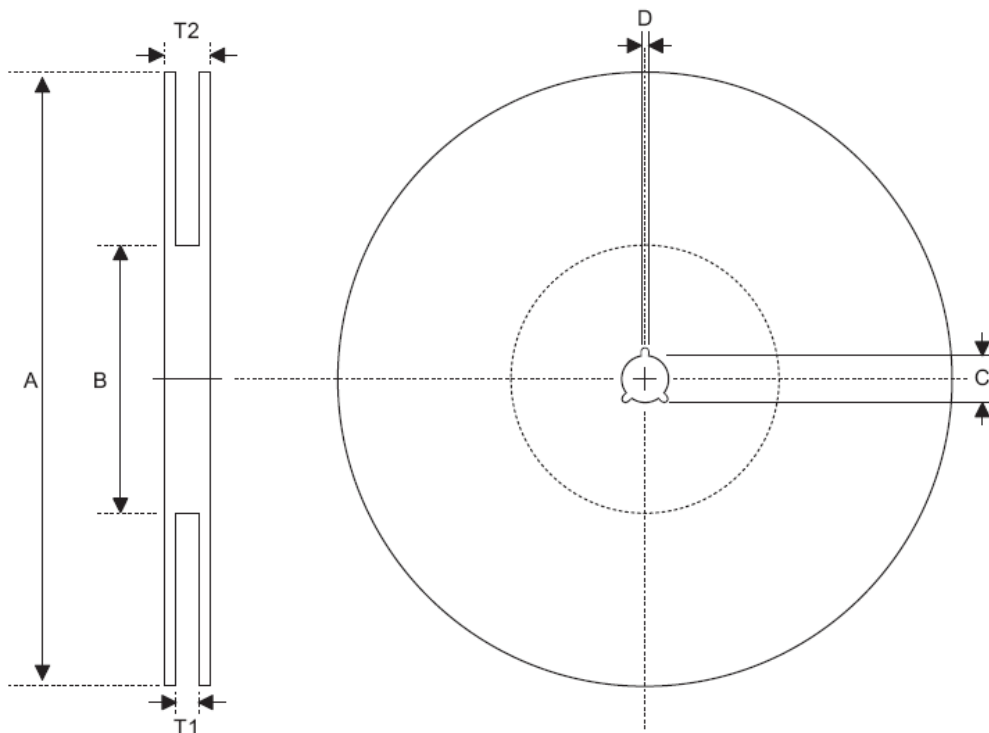
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP.		0.037 TYP.	
e1	1.800	2.000	0.071	0.079
L	0.550 REF.		0.022 REF.	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

Product Tape and Reel Specifications

3-pin TO92 Reel Dimensions (Unit: mm)



Reel Dimensions



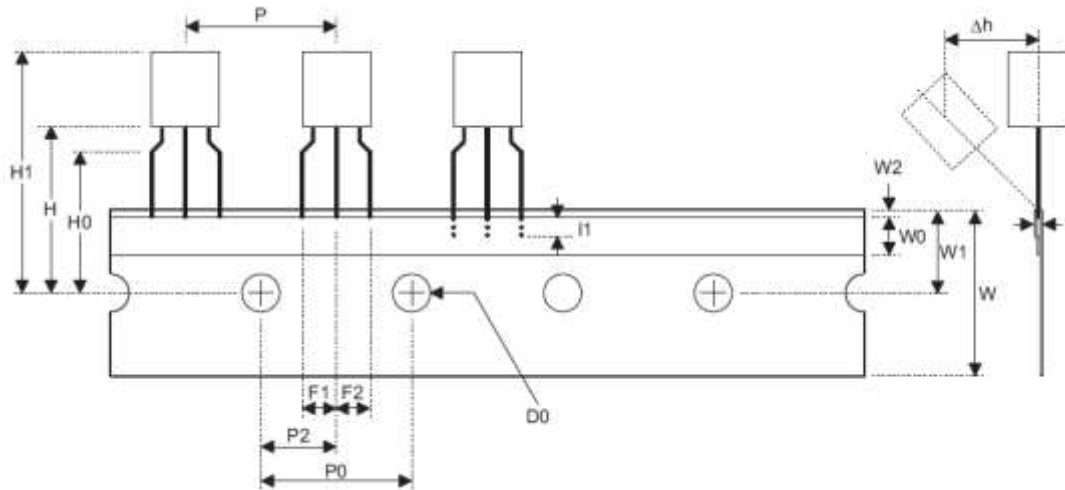
TX71XXM series

150mA Low Power LDO

SOT89

Symbol	Description	Dimensions in mm
A	Reel Outer Diameter	180.0±1.0
B	Reel Inner Diameter	62.0±1.5
C	Spindle Hole Diameter	12.75 ^{+0.15/-0.00}
D	Key Slit Width	1.90±0.15
T1	Space Between Flange	12.4 ^{+0.2/-0.00}
T2	Reel Thickness	17.0 ^{+0.0/-0.4}

Carrier Tape Dimensions



TO92

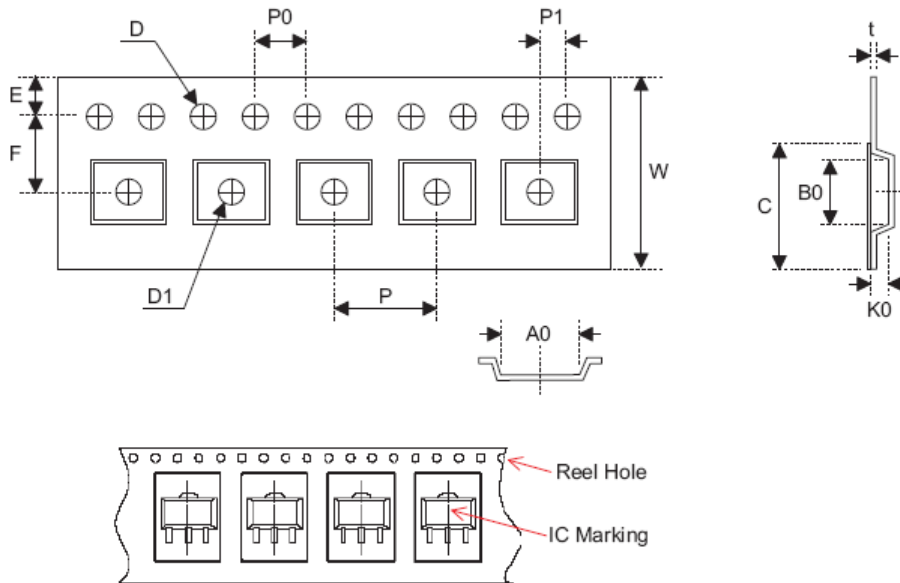
Symbol	Description	Dimensions in mm
l1	Taped Lead Length	(2.5)
P	Component Pitch	12.7±1.0
P ₀	Perforation Pitch	12.7±0.3
P ₂	Component to Perforation (Length Direction)	6.35±0.40
F ₁	Lead Spread	2.5 ^{+0.4/-0.1}
F ₂	Lead Spread	2.5 ^{+0.4/-0.1}
Δh	Component Alignment	0.0±0.1
W	Carrier Tape Width	18.0 ^{+1.0/-0.5}
W ₀	Hold-down Tape Width	6.0±0.5
W ₁	Perforation Position	9.0±0.5
W ₂	Hold-down Tape Position	(0.5)
H ₀	Lead Clinch Height	16.0±0.5
H ₁	Component Height	Less than 24.7
D ₀	Perforation Diameter	4.0±0.2
t	Taped Lead Thickness	0.7±0.2
H	Component Base Height	19.0±0.5

Note: Thickness less than 0.38_0.05mm~0.5mm

P₀ Accumulated pitch tolerance: _1mm/20pitches.

() Bracketed figures are for consultation only

Carrier Tape Dimensions



SOT89

Symbol	Description	Dimensions in mm
W	Carrier Tape Width	12.0 ^{+0.3/-0.1}
P	Cavity Pitch	8.0±0.1
E	Perforation Position	1.75±0.10
F	Cavity to Perforation (Width Direction)	5.50±0.05
D	Perforation Diameter	1.5 ^{+0.1/-0.0}
D1	Cavity Hole Diameter	1.5 ^{+0.1/-0.0}
P0	Perforation Pitch	4.0±0.1
P1	Cavity to Perforation (Length Direction)	2.0±0.1
A0	Cavity Length	4.8±0.1
B0	Cavity Width	4.5±0.1
K0	Cavity Depth	1.8±0.1
t	Carrier Tape Thickness	0.300±0.013
C	Cover Tape Width	9.3±0.1