TX71XXM series 50mA Low Power LDO

Features

- Low power consumption
- Low voltage drop
- Low temperature coefficient
- High input voltage (up to 15V)
- Output voltage accuracy: tolerance ±2%
- TO92, SOT89 ,SOT23-3and SOT23 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	TO92 SOT89 SOT23-3 SOT23	71XXA-1(for TO92) 71XX-1(for SOT89) HTXX(for SOT23-3) HTXX(for SOT23)
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	T	Package:TO-92
	P	Package:SOT89
	M	Package:SOT23-3
	N	Package:SOT23
⑤	R	RoHS / Pb Free
	G	Halogen Free

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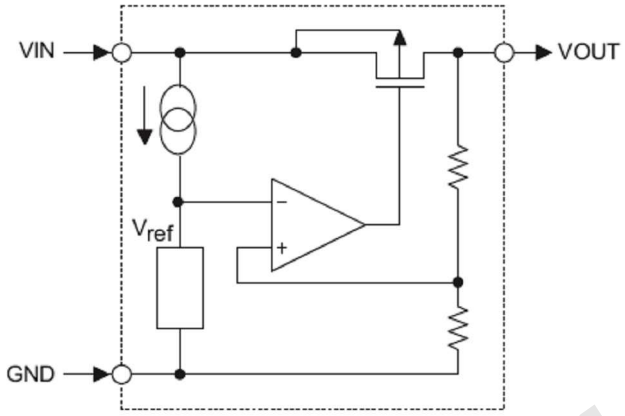
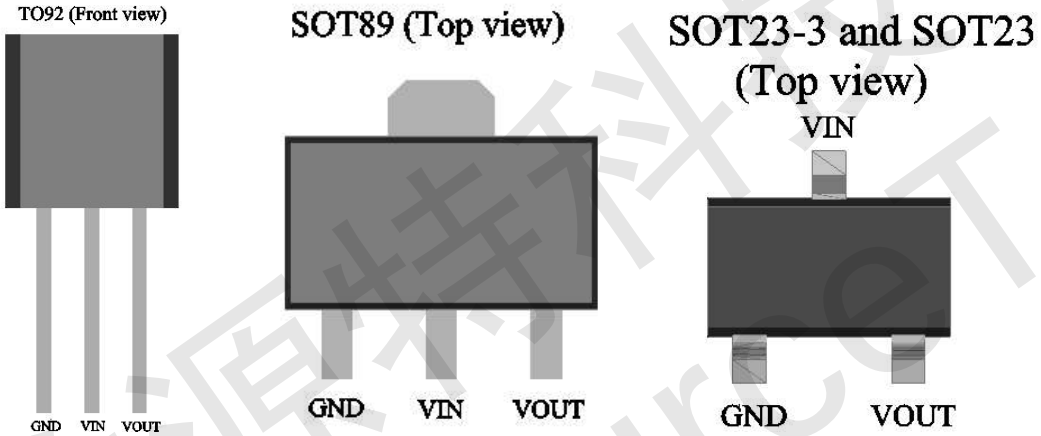
Block Diagram



Pin Assignment



Absolute Maximum Ratings

Supply Voltage .....-0.3V to 18V Storage Temperature .....-50℃ to 125℃

Operating Temperature .....-40℃ to 85℃

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	℃/W
		SOT89	200	℃/W
		SOT23-3	500	℃/W
P_D	Power Dissipation	TO92	0.50	W
		SOT89	0.50	W
		SOT23-3	0.20	W

Note: P_D is measured at Ta= 25℃

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}=10mA	2.058	2.100	2.142	V
I_{OUT}	Output Current	4.1V	-	30	50	-	mA
ΔV_{OUT}	Load Regulation	4.1V	1mA≤I_{OUT}≤20mA	-	60	100	mV
V_{DIF}	Voltage Drop(Note)	-	I_{OUT}=1mA	-	100	-	mV
I_{SS}	Current Consumption	4.1V	No load	-	2.5	3	μA
$\frac{V_{OUT}}{V_{IN}\ V_{OUT}}$	Line Regulation	-	3.1V≤V_{IN}≤16V I_{OUT}=1mA	-	0.2	-	%/V
V_{IN}	Input Voltage	-	-	-	-	15	V
$\frac{V_{OUT}}{Ta}$	Temperature Coefficient	4.1V	I_{OUT}=10mA 0℃<Ta<70℃	-	±0.37	-	mV/℃

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.

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	-	30	50	-	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	-	2.5	3	μA
$\frac{V_{OUT}}{V_{IN}\ V_{OUT}}$	Line Regulation	-	3.3V≤V_{IN}≤16V I_{OUT}=1mA	-	0.2	-	%/V
V_{IN}	Input Voltage	-	-	-	-	15	V
$\frac{V_{OUT}}{Ta}$	Temperature Coefficient	4.3V	I_{OUT}=10mA 0℃<Ta<70℃	-	±0.39	-	mV/℃

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	-	30	50	-	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	-	2.5	3	μA
$\frac{V_{OUT}}{V_{IN}\ V_{OUT}}$	Line Regulation	-	3.5V≤V_{IN}≤16V I_{OUT}=1mA	-	0.2	-	%/V
V_{IN}	Input Voltage	-	-	-	-	15	V
$\frac{V_{OUT}}{Ta}$	Temperature Coefficient	4.5V	I_{OUT}=10mA 0℃<Ta<70℃	-	±0.41	-	mV/℃

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.

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	-	30	50	-	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	-	2.5	3	μA
$\frac{V_{OUT}}{V_{IN}\ V_{OUT}}$	Line Regulation	-	3.7V≤V_{IN}≤16V I_{OUT}=1mA	-	0.2	-	%/V
V_{IN}	Input Voltage	-	-	-	-	15	V
$\frac{V_{OUT}}{Ta}$	Temperature Coefficient	4.7V	I_{OUT}=10mA 0℃<Ta<70℃	-	±0.43	-	mV/℃

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	-	30	50	-	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	-	2.5	3	μA
$\frac{V_{OUT}}{V_{IN}\ V_{OUT}}$	Line Regulation	-	4V≤V_{IN}≤16V I_{OUT}=1mA	-	0.02	-	%/V
V_{IN}	Input Voltage	-	-	-	-	15	V
$\frac{V_{OUT}}{Ta}$	Temperature Coefficient	5V	I_{OUT}=10mA 0℃<Ta<70℃	-	±0.45	-	mV/℃

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.

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	-	30	50	-	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	-	2.5	3	μA
$\frac{V_{OUT}}{V_{IN}\ V_{OUT}}$	Line Regulation	-	4.5V≤V_{IN}≤16V I_{OUT}=1mA	-	0.06	-	%/V
V_{IN}	Input Voltage	-	-	-	-	15	V
$\frac{V_{OUT}}{Ta}$	Temperature Coefficient	5.3V	I_{OUT}=10mA 0℃<Ta<70℃	-	±0.5	-	mV/℃

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.

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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	-	30	50	-	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	-	2.5	3.0	μA
$\frac{V_{OUT}}{V_{IN} \quad V_{OUT}}$	Line Regulation	-	4.6V≤V_{IN}≤16V I_{OUT}=1mA	-	0.02	-	%/V
V_{IN}	Input Voltage	-	-	-	-	15	V
$\frac{V_{OUT}}{Ta}$	Temperature Coefficient	5.6V	I_{OUT}=10mA 0℃<Ta<70℃	-	±0.6	-	mV/℃

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.

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	-	30	50	-	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	-	2.5	3.0	μA
$\frac{V_{OUT}}{V_{IN} \quad V_{OUT}}$	Line Regulation	-	5.4V≤V_{IN}≤16V I_{OUT}=1mA	-	0.02	-	%/V
V_{IN}	Input Voltage	-	-	-	-	15	V
$\frac{V_{OUT}}{Ta}$	Temperature Coefficient	6.4V	I_{OUT}=10mA 0℃<Ta<70℃	-	±0.7	-	mV/℃

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

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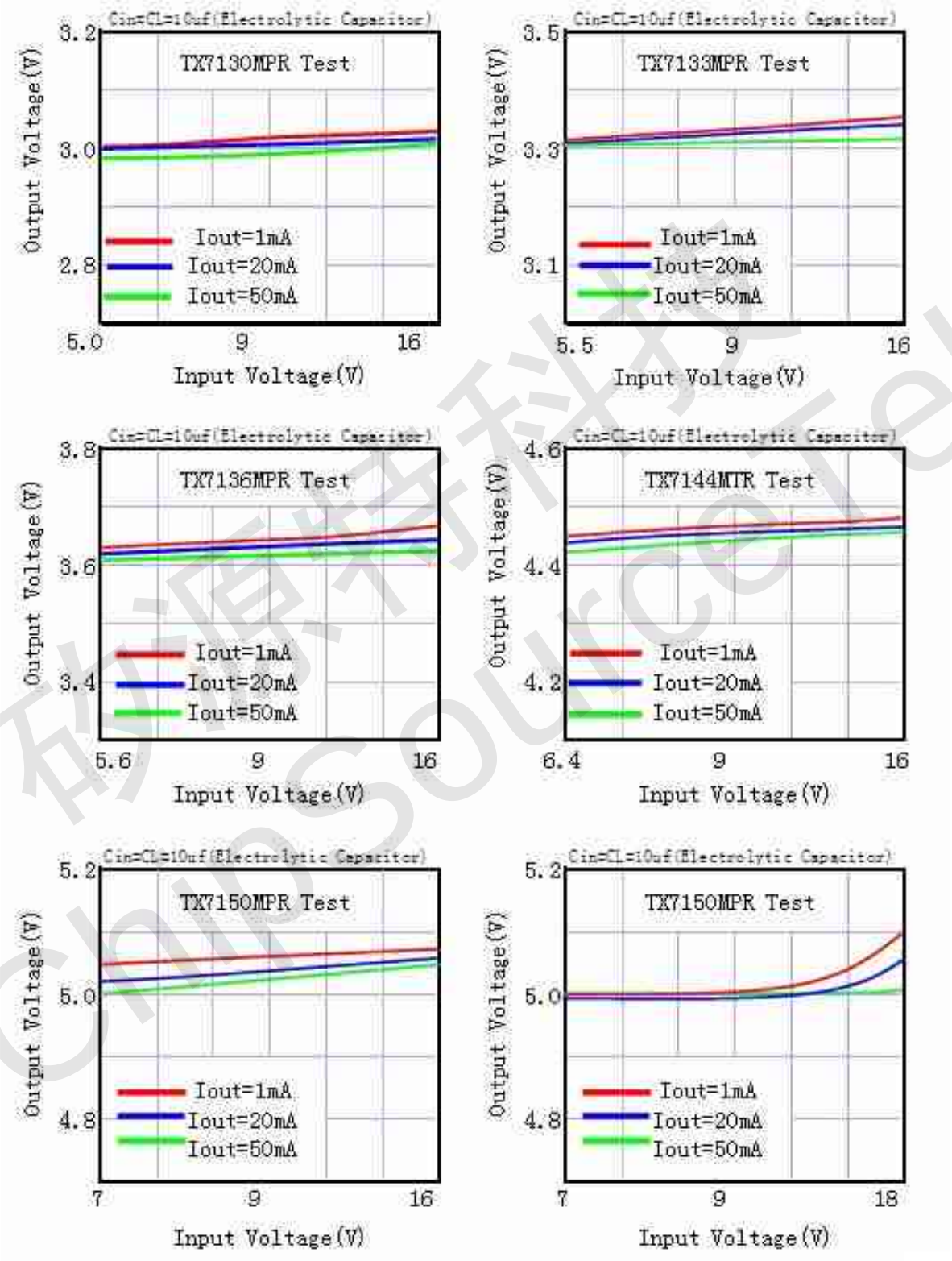
Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{IN}	Conditions				
V_{OUT}	Output Voltage	7V	I_{OUT}=10mA	4.9	5.00	5.1	V
I_{OUT}	Output Current	7V	-	30	50	-	mA
ΔV_{OUT}	Load Regulation	7V	1mA≤I_{OUT}≤20mA	-	25	100	mV
V_{DIF}	Voltage Drop(Note)	-	I_{OUT}=1mA	-	20	-	mV
I_{SS}	Current Consumption	7V	No load	-	2.5	3.0	μA
$\frac{V_{OUT}}{V_{IN} \quad V_{OUT}}$	Line Regulation	-	6V≤V_{IN}≤16V I_{OUT}=1mA	-	0.04	-	%/V
V_{IN}	Input Voltage	-	-	-	-	15	V
$\frac{V_{OUT}}{Ta}$	Temperature Coefficient	7V	I_{OUT}=10mA 0℃<Ta<70℃	-	±0.75	-	mV/℃

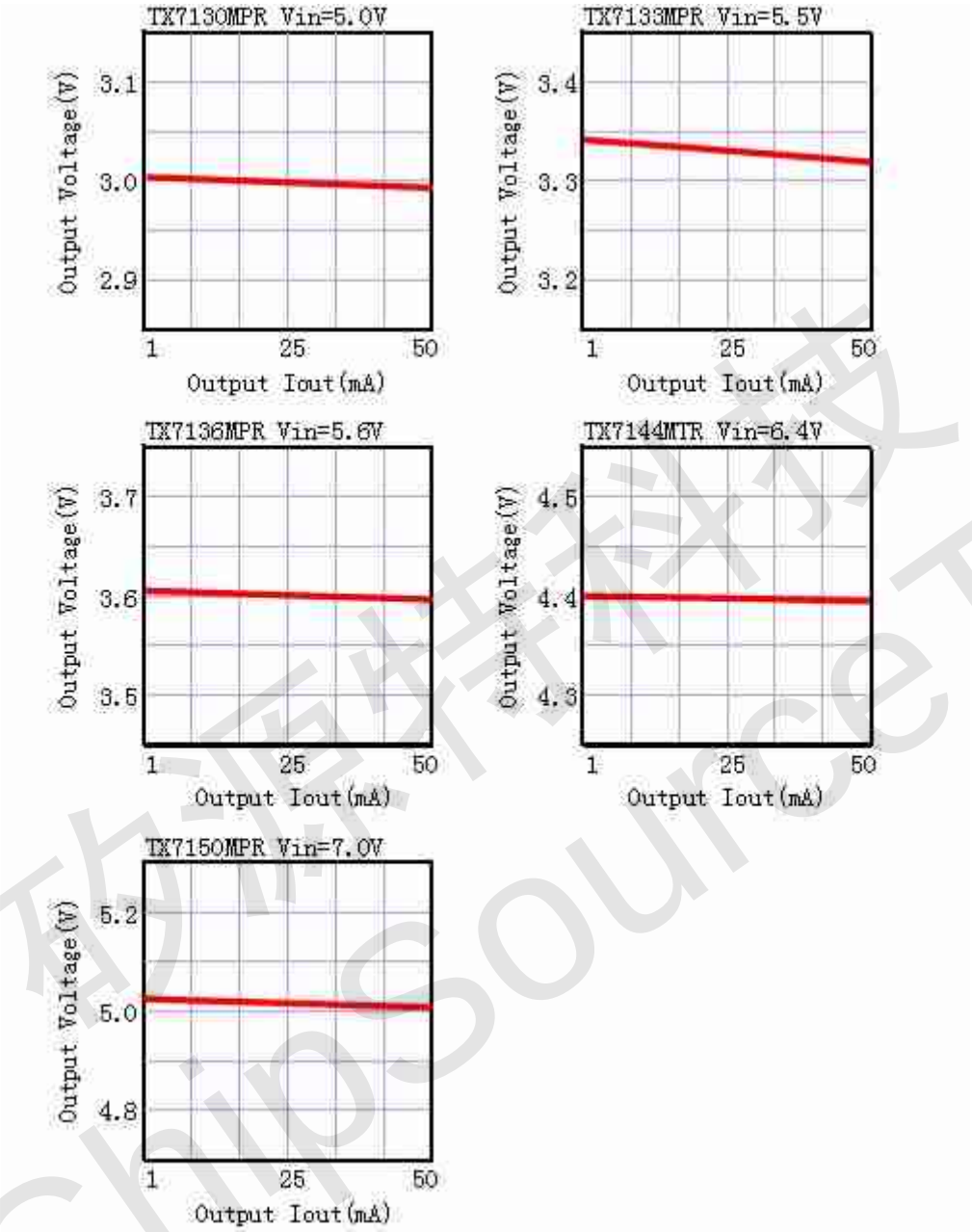
Note: Dropout voltage is defined as the input voltage minus the output voltage that produces a 2% change in the output voltage from the value at V_{IN} = V_{OUT}+2V with a fixed load.

Typical Performance Characteristics

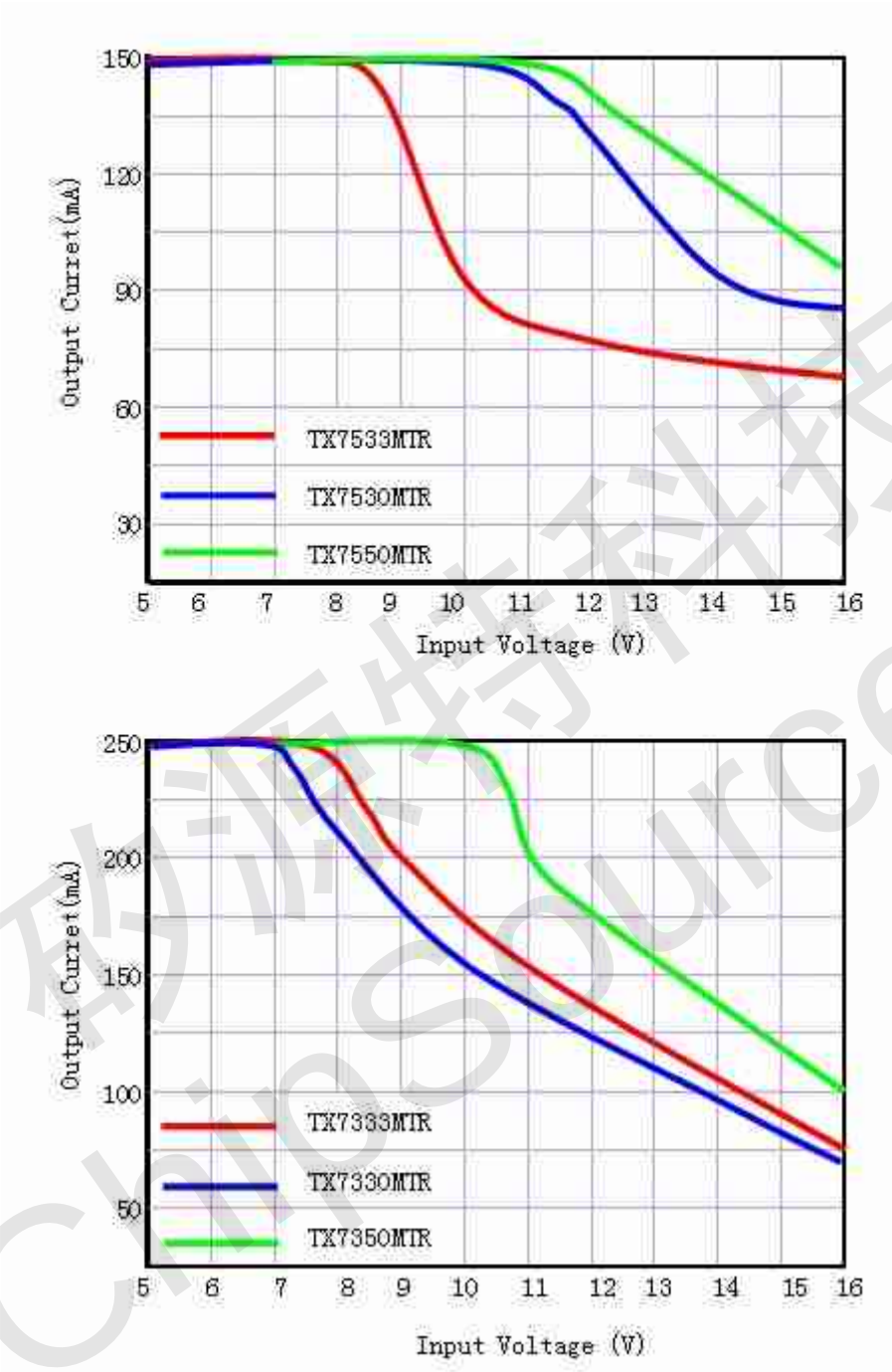
(1) Output Voltage vs Input voltage



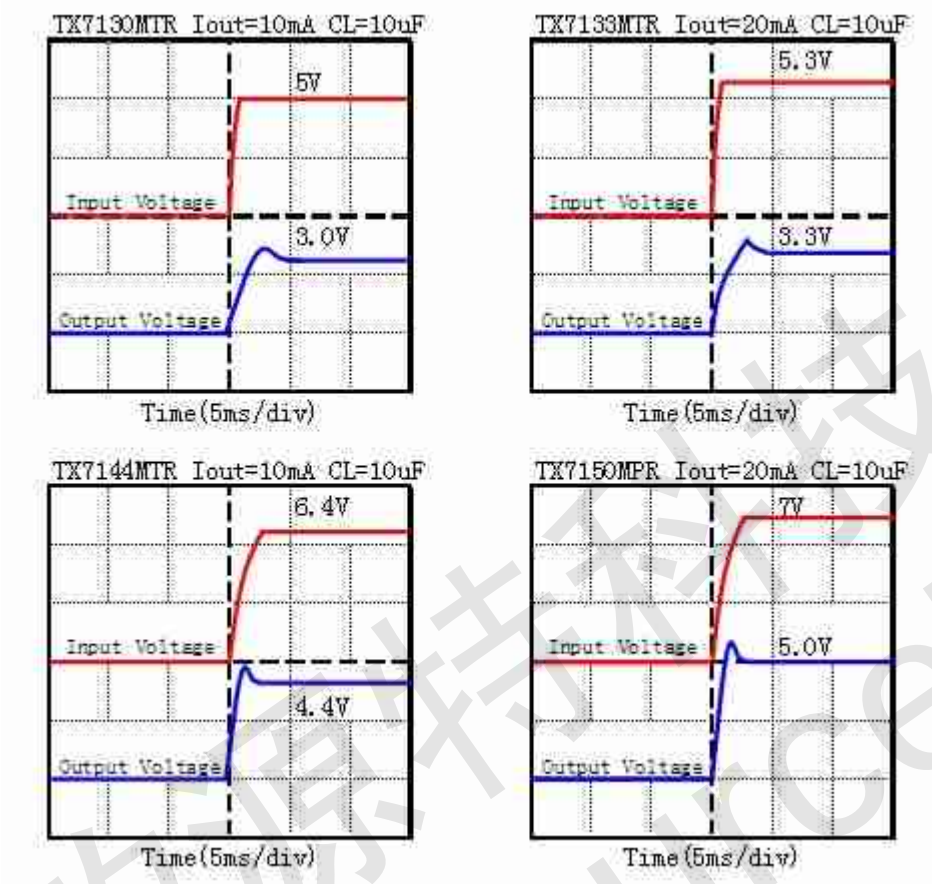
(2) Output Voltage vs.Output Current



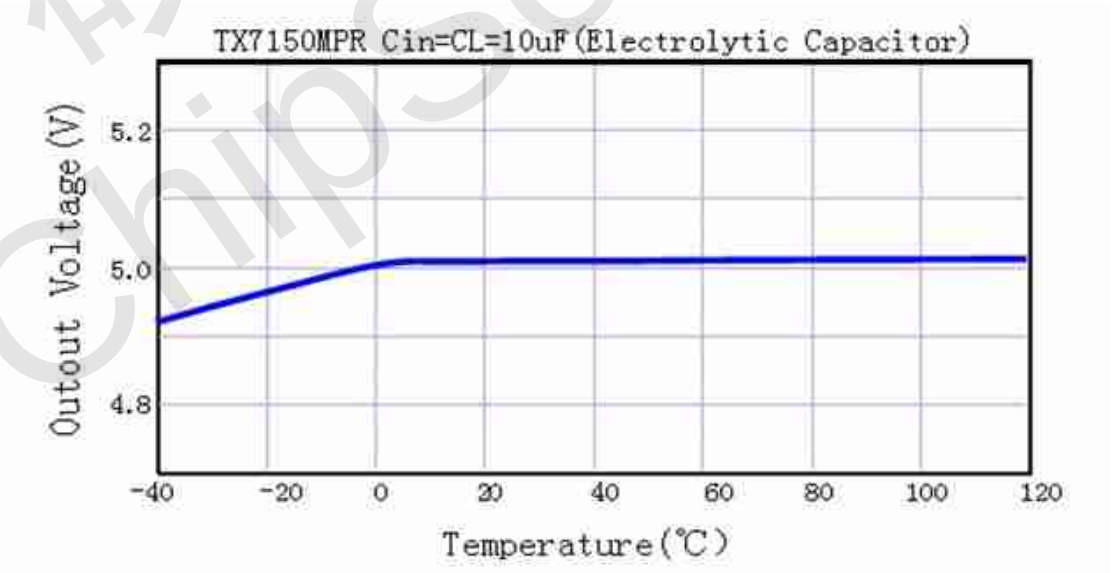
(3) Input Voltage vs.Output Current



(4) Input Transient Response 1



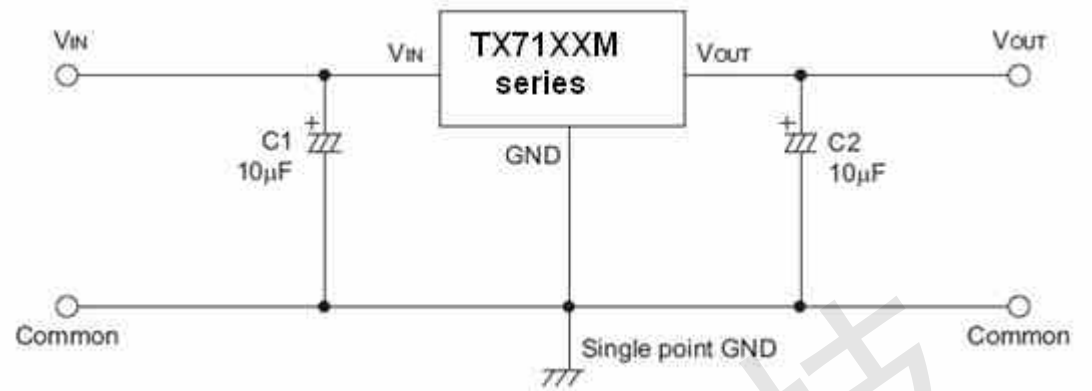
（5）Output Voltage vs.Ambient Temperature



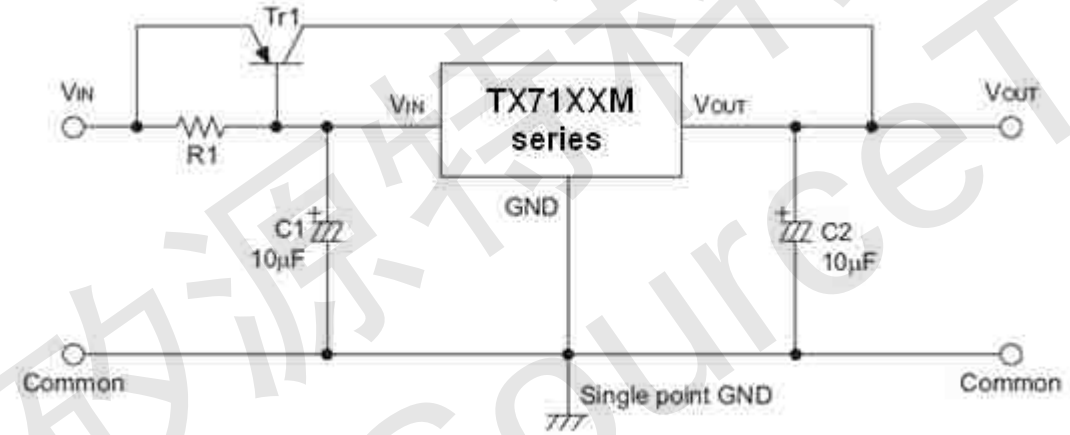
Application Circuits

TX71XXM

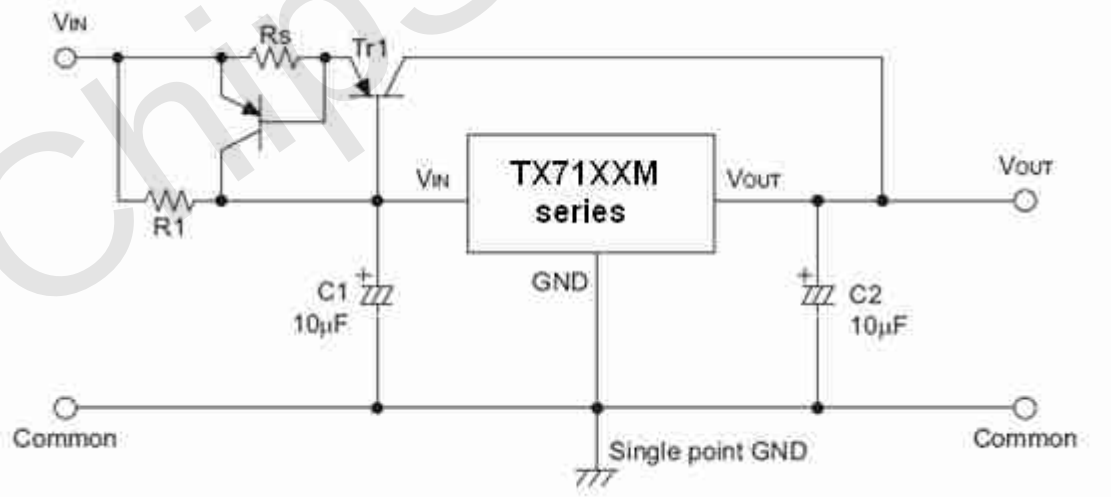
Basic Circuits



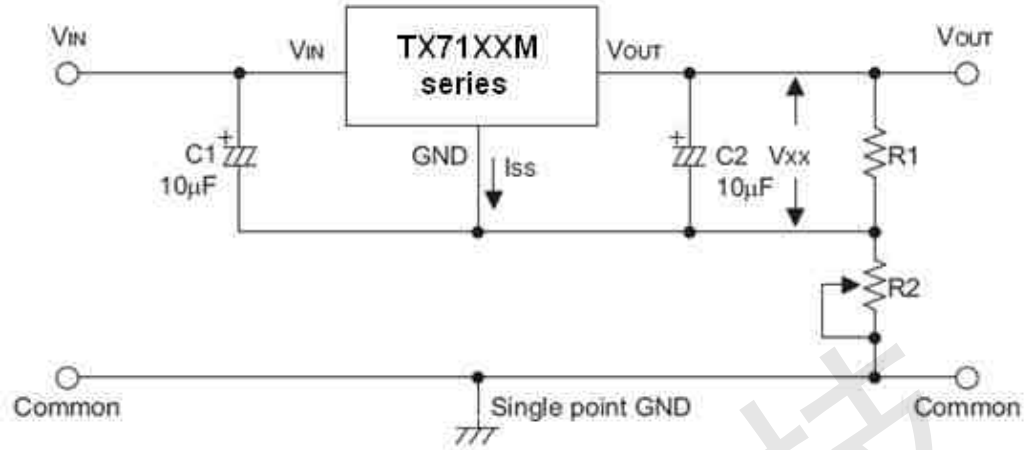
High Output Current Positive Voltage Regulator



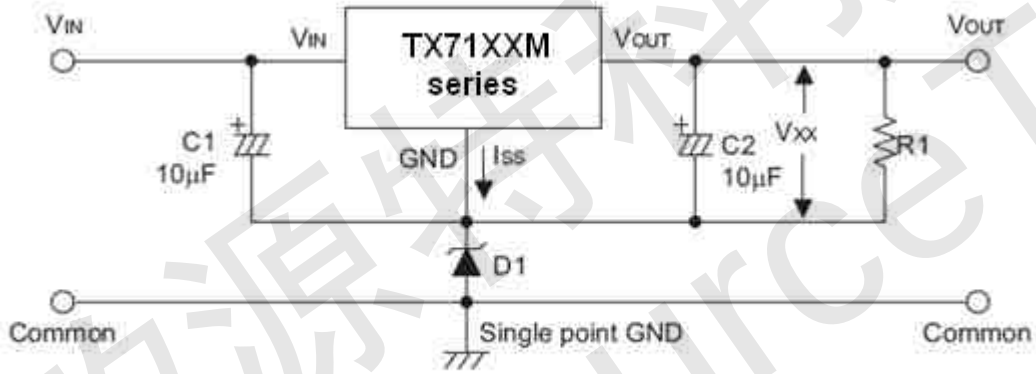
Short-Circuit Protection by Tr1



Circuit for Increasing Output Voltage

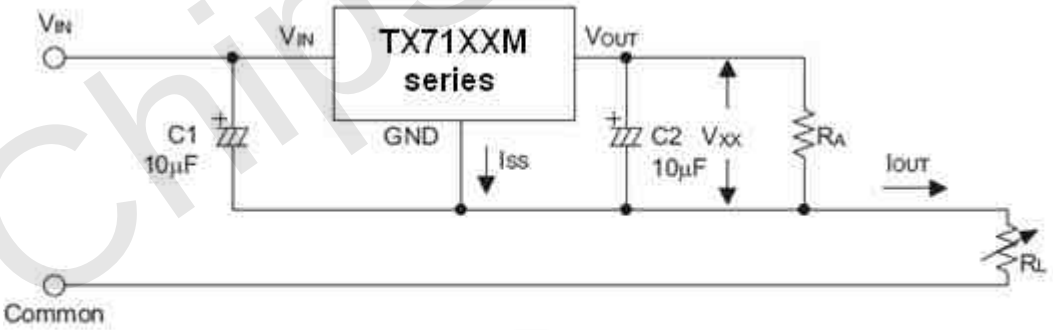


Circuit for Increasing Output Voltage



$V_{OUT}=V_{XX}+V_{D1}$

Constant Current Regulator



$$I_{OUT} = \frac{V_{XX}}{R_A} + I_{SS}$$

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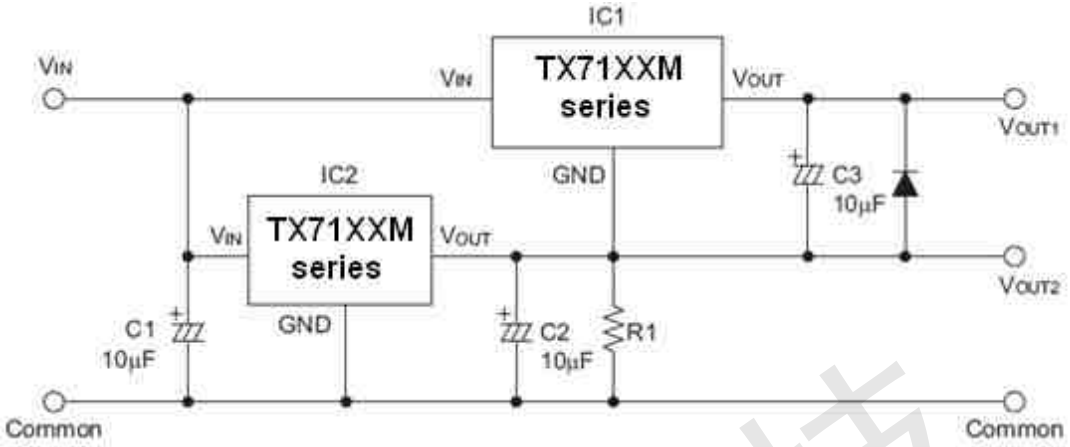
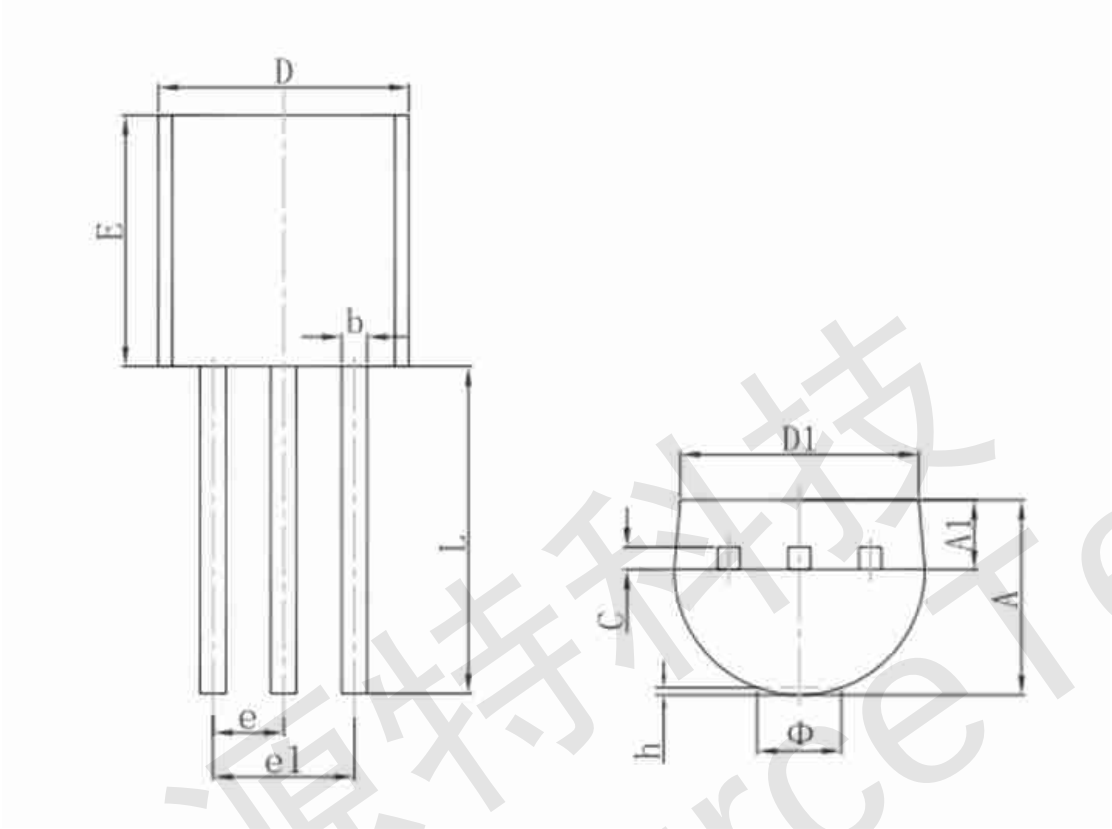
Dual Supply



TX71XXM

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
Φ		1.600		0.063
h	0.000	0.380	0.000	0.015

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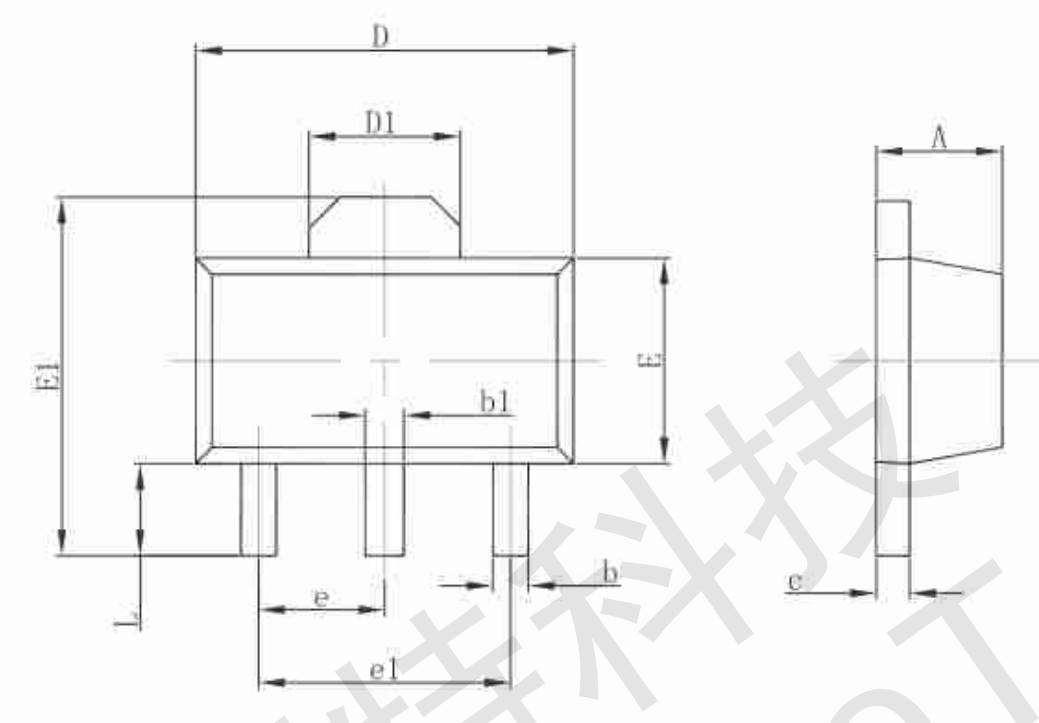
3-pin SOT89 Outline Dimensions



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

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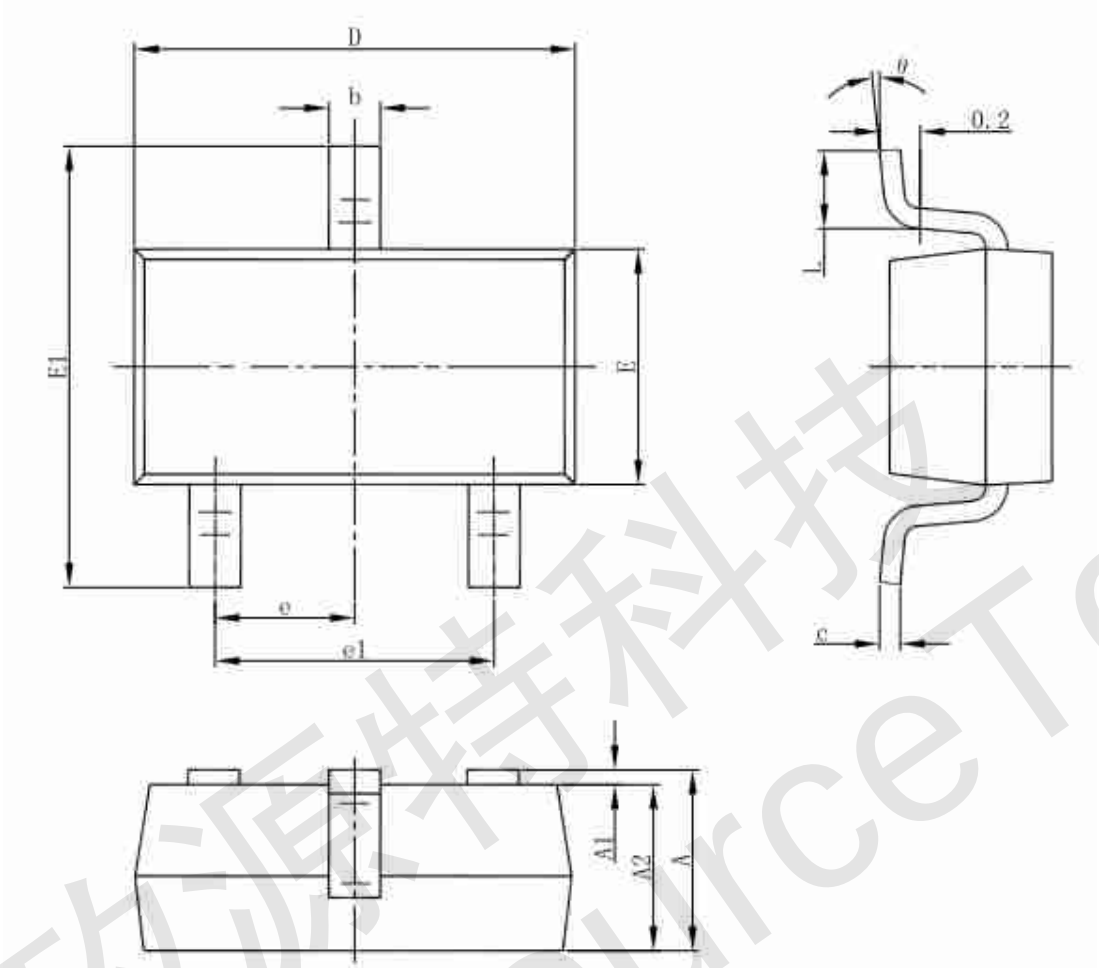
TX71XXM

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°

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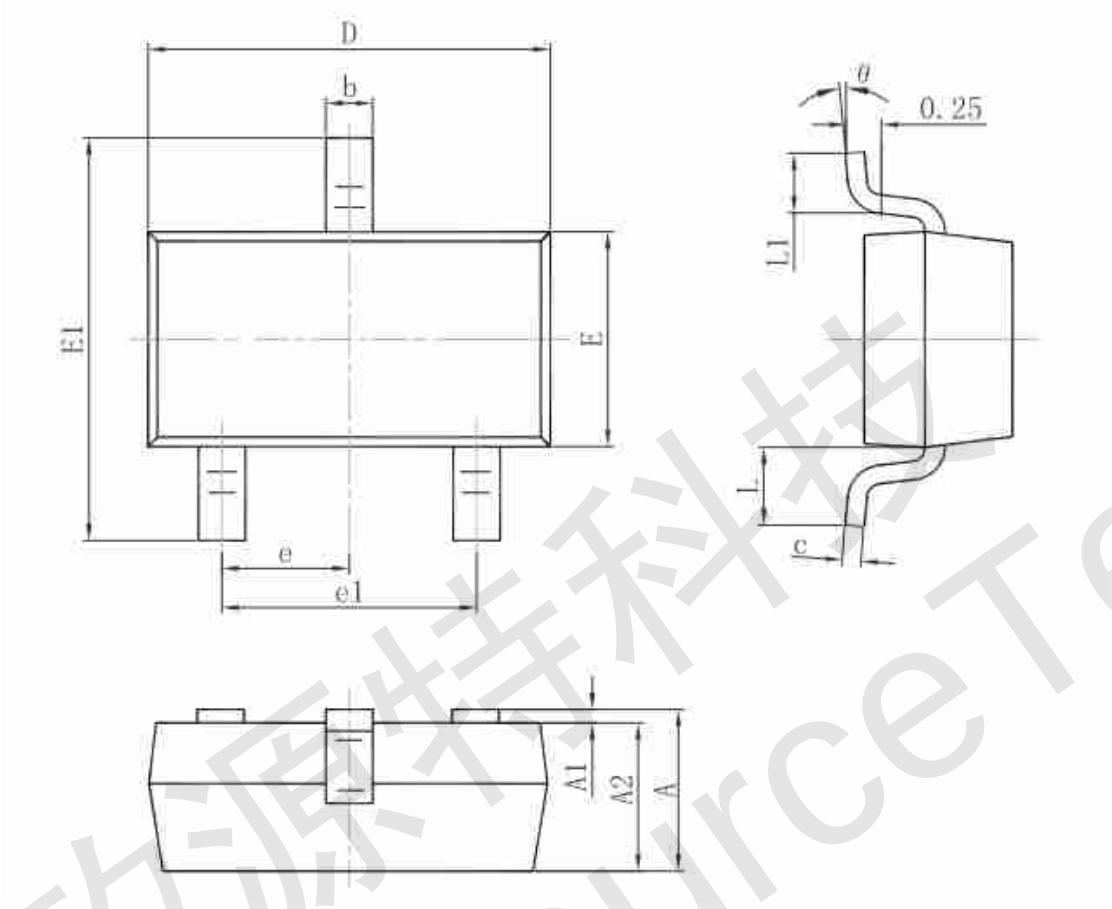
3-pin SOT23 Outline Dimensions



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°

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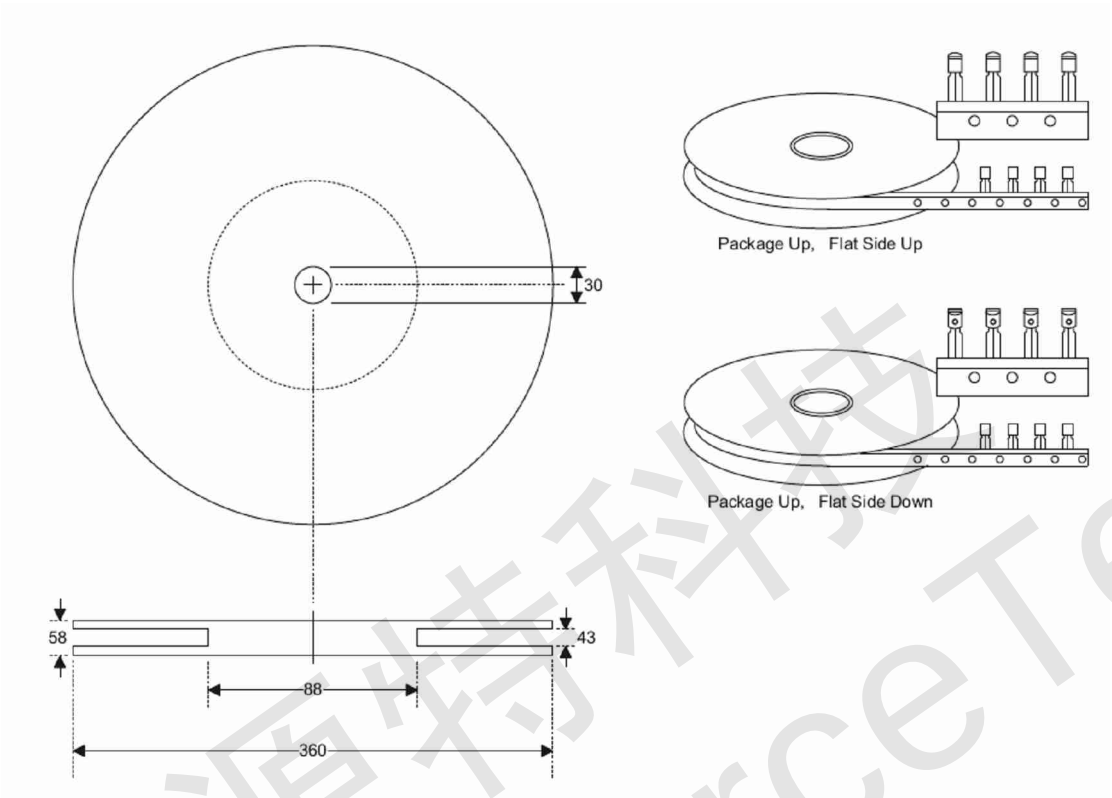
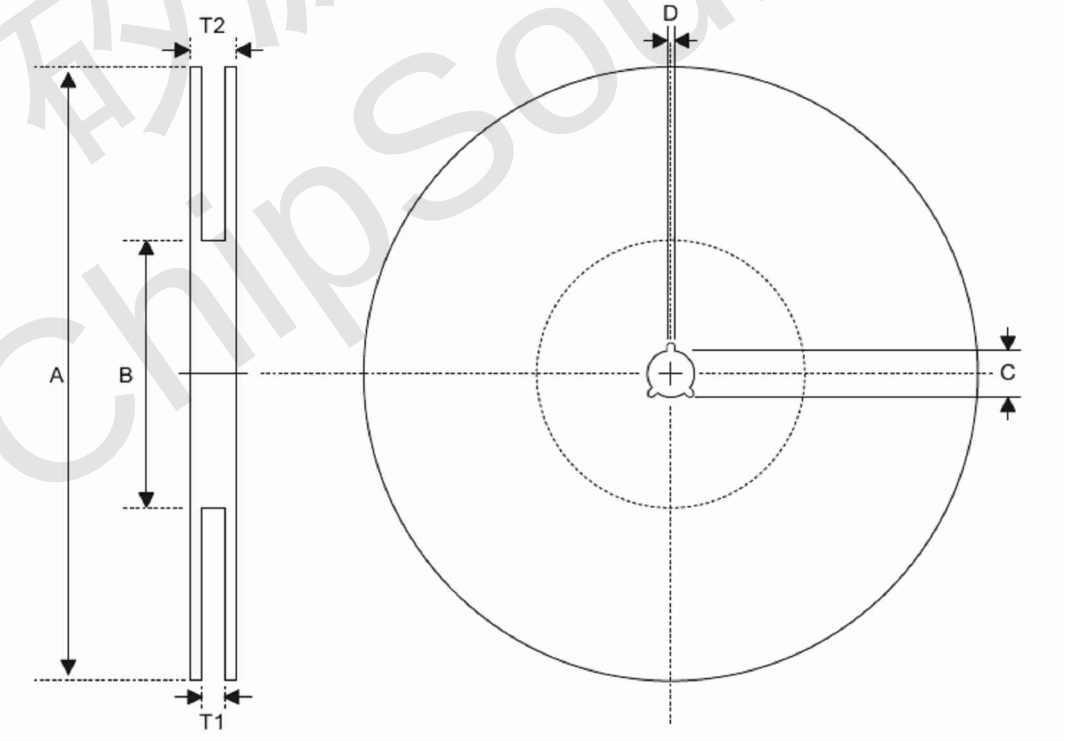
TX71XXM

Product Tape and Reel Specifications

3-pin TO92 Reel Dimensions (Unit: mm)



Reel Dimensions



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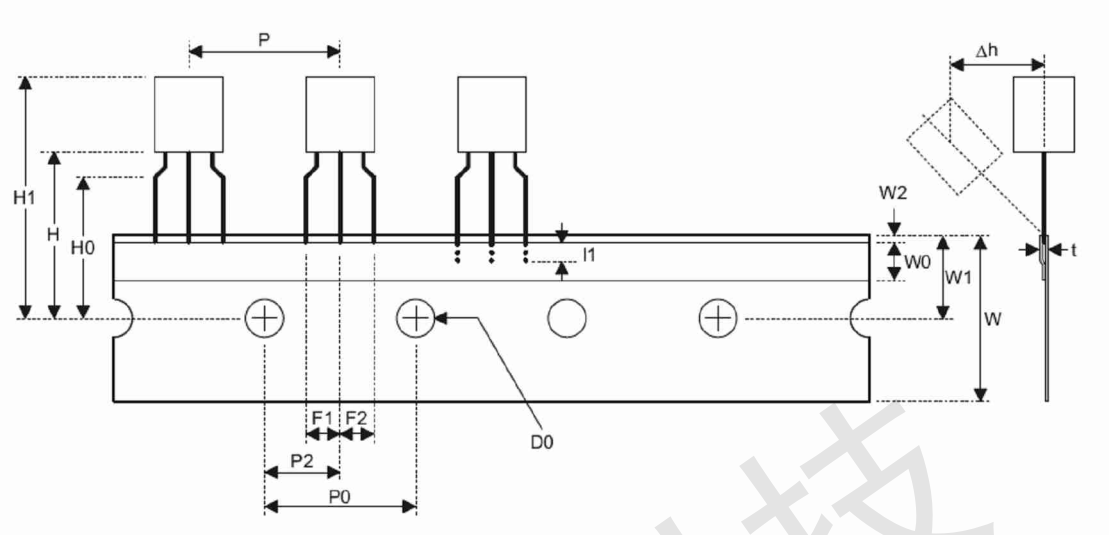
SOT89

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	$17.0^{+0.0/-0.4}$

TX71XXM

Carrier Tape Dimensions



TO92

Symbol	Description	Dimensions in mm
I1	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

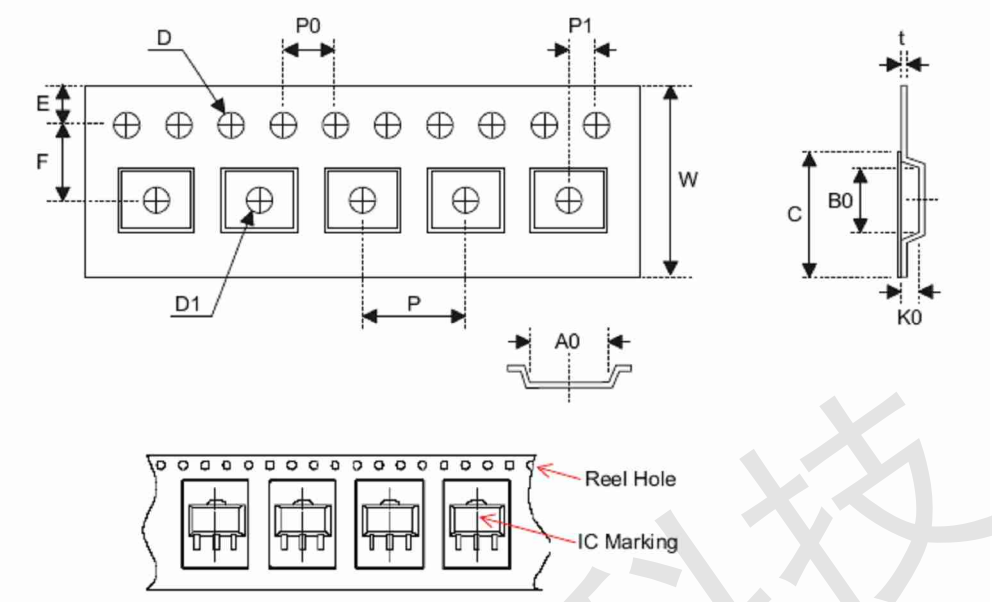
Note: Thickness less than 0.38_0.05mm~0.5mm

P0 Accumulated pitch tolerance: _1mm/20pitches.

( ) Bracketed figures are for consultation only

Carrier Tape Dimensions

TX71XXM



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

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