

FrelTec

Mathildenstr. 10A
82319 Starnberg
Germany

Transistor Diode
SOT523

SOT523

SPECIFICATION

671	MMBT3904Tx	ST53	E03
Type	Type	Package	Packing
671: Transistor Diode	MMBT3904T	SOT523	E03: Embossed tape and reel for 3k pc (7'REEL)

All products according to RoHS (2015/863/EU)

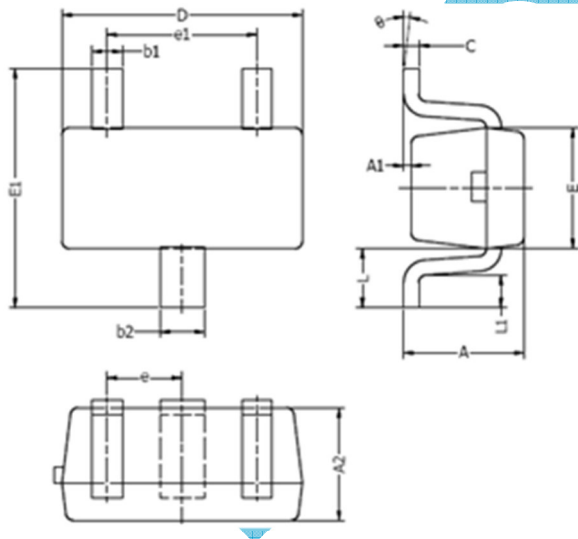
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Transistor Diode

MMBT3904T

PACKAGE OUTLINE



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.70	0.90	0.028	0.035
A1	0.00	0.10	0.000	0.004
A2	0.70	0.80	0.028	0.031
b1	0.15	0.25	0.006	0.010
b2	0.25	0.35	0.010	0.014
c	0.10	0.20	0.004	0.008
D	1.50	1.70	0.059	0.067
E	0.70	0.90	0.028	0.035
E1	1.45	1.75	0.057	0.069
e	0.50 TYP.		0.020 TYP.	
e1	0.90	1.10	0.035	0.043
L	0.40 REF.		0.016 REF.	
L1	0.10	0.30	0.004	0.012
θ	0°	8°	0°	8°

1/30/2022

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Absolute Maximum Ratings TA = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V _{CBO}	Collector-Base Voltage	60	V
V _{CEO}	Collector-Emitter Voltage	40	V
V _{EBO}	Emitter-Base Voltage	6	V
I _C	Collector Current - Continuous	200	mA
P _D	Power Dissipation (FR-4 Board-minimum pad 25°C)	200	mW
R _{θJA}	Typical thermal resistance	500	°C/W
T _J T _{STG}	Storage Temperature Range	-55 to +150	°C

These ratings are limiting values above which the serviceability of the device may be impaired

Electrical Characteristics (TA = 25°C unless otherwise noted)

Off Characteristics

Symbol	Parameter	Test Condition	Limits		Unit
			Min	Max	
V _{(BR)CBO}	Collector-Base Breakdown Voltage	I _C =1mA, I _B =0A	40		Volts
V _{(BR)CEO}	Collector-Emitter Breakdown Voltage	I _C =10μA, I _E =0A	60		Volts
V _{(BR)EBO}	Emitter-Base Breakdown Voltage	I _E =10μA, I _B =0A	6		Volts
I _{BL}	Base cutoff current	V _{CB} =30V, V _{EB} =3V		50	nA
I _{CEX}	Collector Cut-off Current	V _{CB} =30V, V _{EB} =3V		50	nA

Note 1: Pulse Test. Pulse width < 300us, Duty cycle < 2,0%)

On Characteristics(Note 1)

h _{FE}	DC Current Gain	I _C =0,1mA, V _{CE} =1V	40	-	---
		I _C =1,0mA, V _{CE} =1V	70	-	
		I _C =10mA, V _{CE} =1V	100	300	
		I _C =50mA, V _{CE} =1V	60	-	
		I _C =100mA, V _{CE} =1V	30	-	
V _{CE(sat)}	Collector-Emitter Saturation Voltage	I _C =10mA, I _B =1mA	-	0,2	Volts
		I _C =50mA, I _B =5mA	-	0,3	
V _{BE(sat)}	Base-Emitter Saturation Voltage	I _C =10mA, I _B =1mA	0,65	0,85	Volts
		I _C =50mA, I _B =5mA	-	0,95	

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Small-signal Characteristics

Symbol	Parameter	Test Condition	Limits		Unit
			Min	Max	
f_T	Current-Gain-Bandwidth Product	$I_C=10\text{mA}$, $V_{CE}=20\text{V}$, $f=100\text{MHz}$	200	-	MHz
C_{obo}	Output Capacitance	$V_{CB}=5\text{V}$, $I_E=0\text{A}$, $f=1,0\text{MHz}$	-	4	pF
C_{ibo}	Input Capacitance	$V_{CB}=0,5\text{V}$, $I_C=0\text{A}$, $f=1,0\text{KHz}$	-	8	pF
H_{ie}	Input Impedance	$V_{CB}=10\text{V}$, $I_C=1\text{mA}$, $f=1,0\text{KHz}$	1	10	$\text{K}\Omega$
H_{re}	Voltage Feedback Ratio	$V_{CB}=10\text{V}$, $I_C=1\text{mA}$, $f=1,0\text{KHz}$	0,5	8	$\times 10^{-4}$
H_{fe}	Small-signal Current Gain	$V_{CB}=10\text{V}$, $I_C=1\text{mA}$, $f=1,0\text{KHz}$	100	400	μA
H_{oe}	Output Admittance	$V_{CB}=10\text{V}$, $I_C=1\text{mA}$, $f=1,0\text{KHz}$	1	40	0 mhos
NF	Noise Figure	$V_{CB}=5\text{V}$, $I_C=100\mu\text{A}$, $R_s=1,0\text{k}\Omega$ $f=1,0\text{KHz}$		5	dB

Switching Characteristics

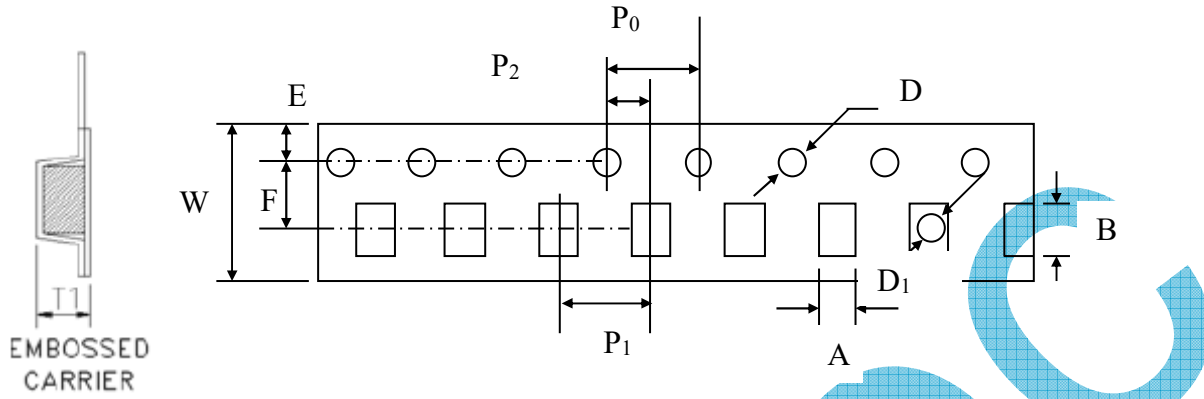
Symbol	Parameter	Test Condition	Limits		Unit
			Min	Max	
t_d	Delay Time	$V_{CC}=3\text{V}$, $V_{BE}=0,5\text{V}$	-	35	nS
t_r	Rise time	$I_C=10\text{mA}$, $I_{B1}=1\text{mA}$	-	35	
t_s	Storage Time	$V_{CC}=3\text{V}$, $I_C=10\text{mA}$,	-	200	nS
t_f	Fall time	$I_{B1}=I_{B2}=1\text{mA}$	-	50	

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Tape And Reel Package

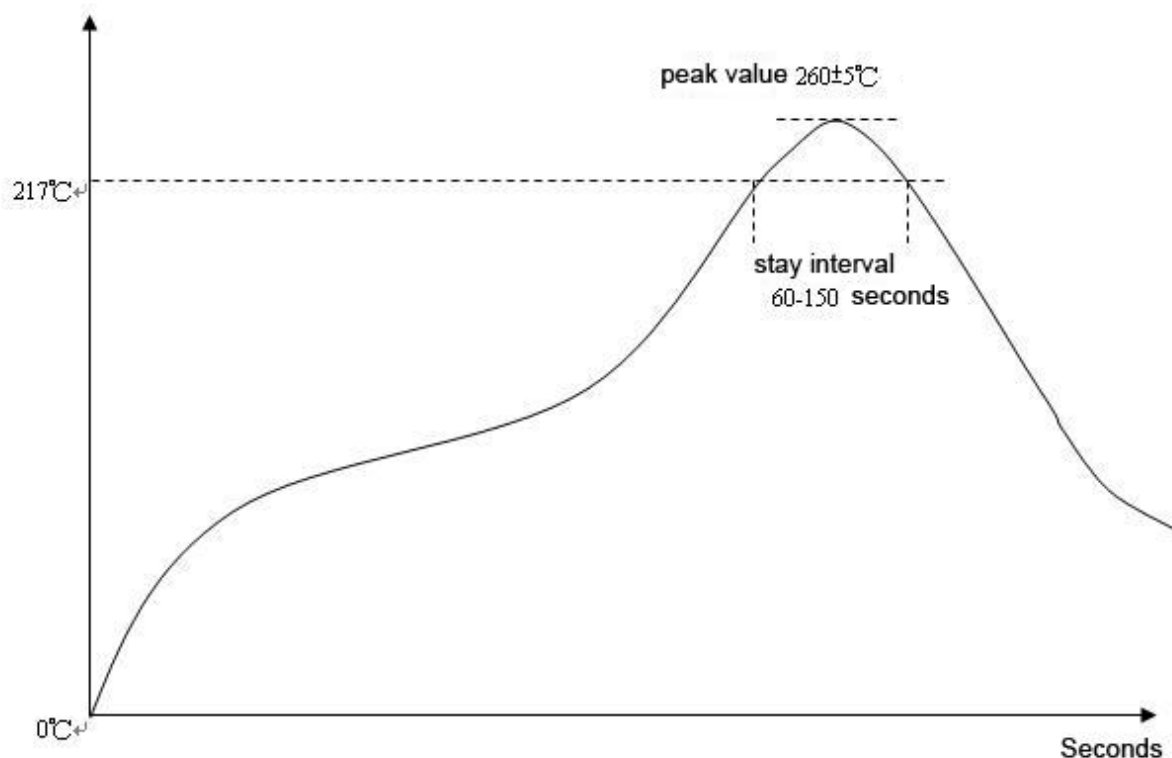


Type	A	B	W	E	F	P ₀	P ₁	P ₂	ΦD	ΦD ₁	T1
	1,73 ±0,1	1,85 ±0,1	8 ±0,30	1,75±0,01	3,5 ±0,05	4,00±0,10	4,00±0,10	2,00±0,05	1,55±0,03	0,4 ±0,5	1 ±0,1

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Lead Free Reflow Soldering Profile

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Stock period

The performance of these products, including the solderability, is guaranteed for 12 month, provided that they remain packed as they were when delivered and stored at a temperature of $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$ and a relative humidity less than 80%RH

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