

# FrelTec

Mathildenstr. 10A  
82319 Starnberg  
Germany

Transistor Diode  
SOT523

## SOT523

## SPECIFICATION

671	MMBT3906Tx	ST53	E03
Type	Type	Package	Packing
671: Transistor Diode	MMBT3906T	SOT523	E03: Embossed tape and reel for 3k pc (7'REEL)

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

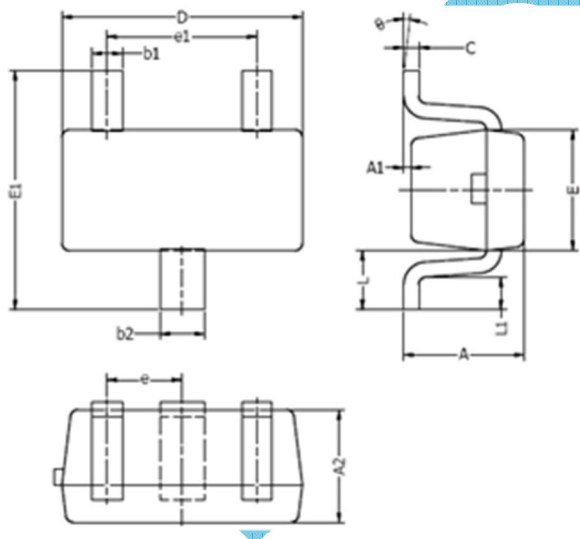
FrelTec

SOT523

FrelTec  
Transistor Diode

MMBT3906T

**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

© FrelTec® GmbH

Please read cautions and warnings and important notes at the end of this document.

3/8

www.freltec.com

## SOT523

Absolute Maximum Ratings TA = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V <sub>CBO</sub>	Collector-Base Voltage	-40	V
V <sub>CEO</sub>	Collector-Emitter Voltage	-40	V
V <sub>EBO</sub>	Emitter-Base Voltage	-5	V
I <sub>C</sub>	Collector Current - Continuous	-200	mA
P <sub>D</sub>	Power Dissipation (FR-4 Board-minimum pad 25°C)	200	mW
R <sub>θJA</sub>	Typical thermal resistance	600	°C/W
T <sub>J</sub> T <sub>STG</sub>	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 <sub>(BR)CBO</sub>	Collector-Base Breakdown Voltage	I <sub>C</sub> =1mA, I <sub>B</sub> =0A	-40		Volts
V <sub>(BR)CEO</sub>	Collector-Emitter Breakdown Voltage	I <sub>C</sub> =-10μA, I <sub>E</sub> =0A	-40		Volts
V <sub>(BR)EBO</sub>	Emitter-Base Breakdown Voltage	I <sub>E</sub> =-10μA, I <sub>B</sub> =0A	-5		Volts
I <sub>BL</sub>	Base cutoff current	V <sub>CB</sub> =-30V, V <sub>EB</sub> =-3V		-50	nA
I <sub>CEX</sub>	Collector Cut-off Current	V <sub>CB</sub> =-30V, V <sub>EB</sub> =-3V		-50	nA

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

On Characteristics(Note 1)

h <sub>FE</sub>	DC Current Gain	I <sub>C</sub> =-0,1mA, V <sub>CE</sub> =-1V	40	-	---
		I <sub>C</sub> =-1,0mA, V <sub>CE</sub> =-1V	70	-	
		I <sub>C</sub> =-10mA, V <sub>CE</sub> =-1V	100	300	
		I <sub>C</sub> =-50mA, V <sub>CE</sub> =-1V	60	-	
		I <sub>C</sub> =-100mA, V <sub>CE</sub> =-1V	30	-	
V <sub>CE(sat)</sub>	Collector-Emitter Saturation Voltage	I <sub>C</sub> =-10mA, I <sub>B</sub> =-1mA	-	0,2	Volts
		I <sub>C</sub> =-50mA, I <sub>B</sub> =-5mA	-	0,3	
V <sub>BE(sat)</sub>	Base-Emitter Saturation Voltage	I <sub>C</sub> =-10mA, I <sub>B</sub> =-1mA	0,65	0,85	Volts
		I <sub>C</sub> =-50mA, I <sub>B</sub> =-5mA	-	0,95	

## SOT523

## Small-signal Characteristics

Symbol	Parameter	Test Condition	Limits		Unit
			Min	Max	
$f_T$	Current-Gain-Bandwidth Product	$I_C = -10\text{mA}$ , $V_{CE} = -20\text{V}$ , $f = 100\text{MHz}$	250	-	MHz
$C_{obo}$	Output Capacitance	$V_{CB} = -5\text{V}$ , $I_E = 0\text{A}$ , $f = 1,0\text{MHz}$	-	4,5	pF
$C_{ibo}$	Input Capacitance	$V_{CB} = -0,5\text{V}$ , $I_C = 0\text{A}$ , $f = 1,0\text{KHz}$	-	10	pF
$H_{ie}$	Input Impedance	$V_{CB} = -10\text{V}$ , $I_C = -1\text{mA}$ , $f = 1,0\text{KHz}$	2	12	$\text{K}\Omega$
$H_{re}$	Voltage Feedback Ratio	$V_{CB} = -10\text{V}$ , $I_C = -1\text{mA}$ , $f = 1,0\text{KHz}$	0,1	10	$\times 10^{-4}$
$H_{fe}$	Small-signal Current Gain	$V_{CB} = -10\text{V}$ , $I_C = -1\text{mA}$ , $f = 1,0\text{KHz}$	100	400	$\mu\text{A}$
$H_{oe}$	Output Admittance	$V_{CB} = 1-0\text{V}$ , $I_C = -1\text{mA}$ , $f = 1,0\text{KHz}$	3	60	0 mhos
NF	Noise Figure	$V_{CB} = -5\text{V}$ , $I_C = -100\mu\text{A}$ , $R_s = 1,0\text{k}\Omega$ $f = 1,0\text{KHz}$		4	dB

## Switching Characteristics

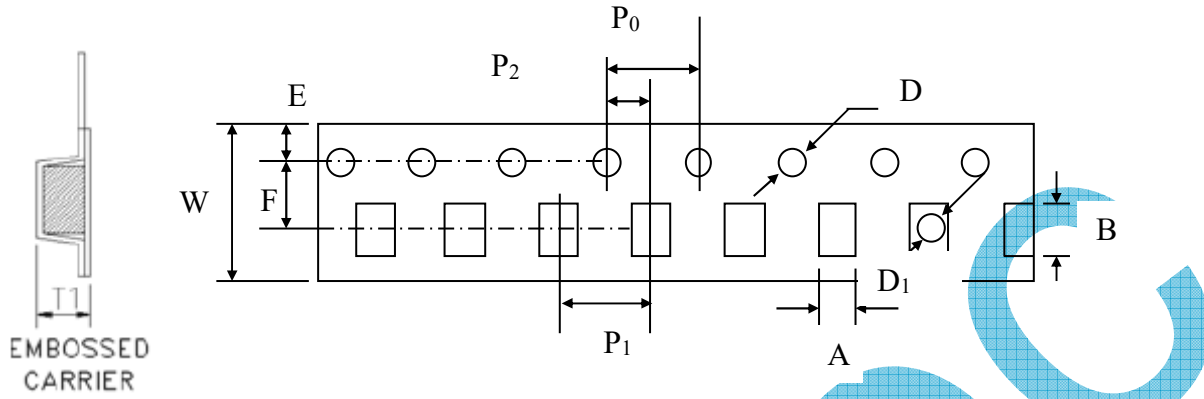
Symbol	Parameter	Test Condition	Limits		Unit
			Min	Max	
$t_d$	Delay Time	$V_{CC} = -3\text{V}$ , $V_{BE} = -0,5\text{V}$ , $I_C = -10\text{mA}$ , $I_{B1} = -1\text{mA}$	-	35	nS
$t_r$	Rise time		-	35	
$t_s$	Storage Time	$V_{CC} = -3\text{V}$ , $I_C = -10\text{mA}$ , $I_{B1} = I_{B2} = -1\text{mA}$	-	225	nS
$t_f$	Fall time		-	75	

# SOT523

# FrelTec Transistor Diode

## SPECIFICATION

### *Tape And Reel Package*

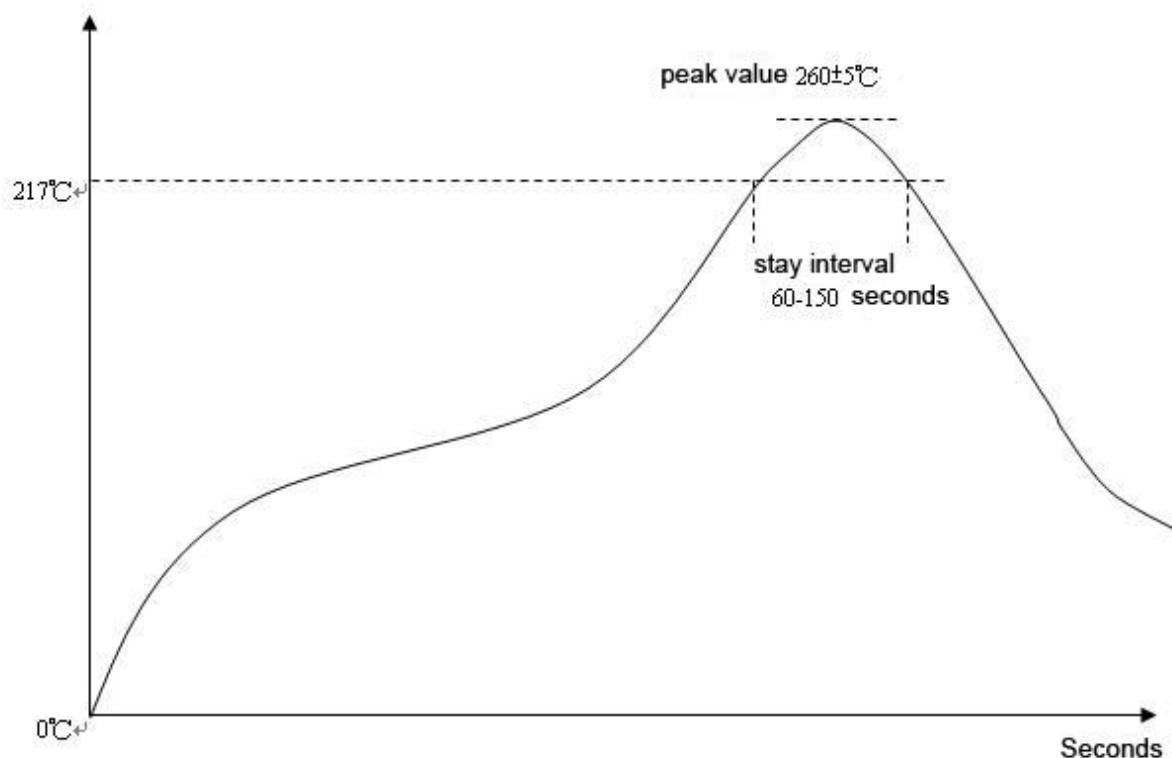


Type	A	B	W	E	F	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>	ΦD	ΦD <sub>1</sub>	T1
	1,73 ±0,1	1,85 ±0,1	8 ±0,30	1,75±0,01	3,5 ±0,05	4,00±0,10	4,00±0,10	2,00±0,05	1,55±0,03	0,4 ±0,5	1 ±0,1

# SOT523

## Lead Free Reflow Soldering Profile

FrelTec  
Transistor Diode



FrelTec

### 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

1/30/2022

© FrelTec® GmbH

Please read cautions and warnings and important notes at the end of this document.

7/8

[www.freltec.com](http://www.freltec.com)

Published by FrelTec® GmbH  
Mathildenstr. 10A; 82319 Starnberg; Germany  
© 2021 FrelTec® GmbH. All Rights Reserved.

The following applies to all products named in this publication:

1. The information describes the type of component and shall not be considered as assured characteristics.
2. Terms of delivery and rights to change design reserved.
3. Some parts of this publication contain statements about the suitability of our products for certain areas of application. These statements are based on our knowledge of typical requirements that are often placed on our products in the areas of application concerned. Nevertheless, we explicitly point out that such statements cannot be regarded as binding statements about the suitability of our products for a particular customer application. As a rule, FrelTec® is either unfamiliar with individual customer applications or less familiar with them than the customers themselves. For these reasons, it is always ultimately incumbent on the customer to check and decide whether a FrelTec® product with the properties described in the product specification is suitable for use in a particular customer application.
4. We also point out that in individual cases, a malfunction of electronic components or failure before the end of their usual service life cannot be completely ruled out in the current state of the art, even if they are operated as specified. In customer applications requiring a very high level of operational safety and especially in customer applications in which the malfunction or failure of an electronic component could endanger human life or health (e.g. in accident prevention or life-saving systems), it must therefore be ensured by means of suitable design of the customer application or other action taken by the customer (e.g. installation of protective circuitry or redundancy) that no injury or damage is sustained by third parties in the event of malfunction or failure of an electronic component.
5. The warnings, cautions and product-specific notes must be observed.
6. In order to satisfy certain technical requirements, some of the products described in this publication may contain substances subject to restrictions in certain jurisdictions (e.g. because they are classed as "hazardous"). Useful information on this will be found in our Material Data Sheets. Should you have any more detailed questions, please contact our sales offices.
7. We constantly strive to improve our products. Consequently, the products described in this publication may change from time to time. The same is true for the corresponding product specifications. Please check therefore to what extent product descriptions and specifications contained in this publication are still applicable before or when you place an order. We also reserve the right to discontinue production and delivery of products. Consequently, we cannot guarantee that all products named in this publication will always be available.
8. Unless otherwise agreed in individual contracts, all orders are subject to the current version of the "General conditions for the supply of products and services of the electrical and electronics industry" published by the German Electrical and Electronics Industry Association (ZVEI), available at [www.freltec.com](http://www.freltec.com).
9. As far as patents or other rights of third parties are concerned, liability is only assumed for components per se, not for applications, processes and circuits implemented within components or assemblies.
10. The trade name FrelTec® is a trademark registered or pending in Europe and in other countries.