MMBT3904

NPN GENERAL PURPOSE SWITCHING TRANSISTOR

VOLTAGE	40 Volt	POWER	225 mWatt

FEATURES

- NPN epitaxial silicon, planar design
- Collector-emitter voltage VCE = 40V
- Collector current IC = 200mA
- Transition frequency f_T>300MHz @ I_C=10mAdc, V_{CE}=20Vdc,f=100MHz
- Lead free in compliance with EU RoHS 2.0
- Green molding compound as per IEC 61249 standard

MECHANICAL DATA

Case: SOT-23, Plastic

Terminals: Solderable per MIL-STD-750, Method 2026

Approx. Weight: 0.0003 ounces, 0.0084 grams

Marking: S1A

SOT-23 Unit : inch(mm)

ABSOLUTE RATINGS

PARAMETER	Symbol	Value	Units
Collector - Emitter Voltage	V_{CEO}	40	V
Collector - Base Voltage	V_{CBO}	60	V
Emitter - Base Voltage	V_{EBO}	6.0	V
Collector Current - Continuous	I_C	200	mA

THERMAL CHARACTERISTICS

PARAMETER	Symbol	Value	Units
Max Power Dissipation (Note 1)	P_{TOT}	225	mW
Thermal Resistance , Junction to Ambient	$R_{\theta JA}$	556	^{o}C/W
Junction Temperature	T_J	-55 to 150	^{o}C
Storage Temperature	T_{STG}	-55 to 150	^{o}C

Note 1: Transistor mounted on FR-5 board 1.0 x 0.75 x 0.062 in.

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ELECTRICAL CHARACTERISTICS

PARAMETER	Symbol	Test Condition	MIN.	TYP.	MAX.	Units
Collector - Emitter Breakdown Voltage	$V_{(BR)CEO}$	IC=1.0mA, IB=0	40	-	-	V
Collector - Base Breakdown Voltage	$V_{(BR)CBO}$	IC=10uA, IE=0	60	-	-	V
Emitter - Base Breakdown Voltage	$V_{(BR)EBO}$	IE=10uA, IC=0	6.0	-	-	V
Base Cutoff Current	I_{BL}	VCE=30V, VEB=3.0V	-	-	50	nA
Collector Cutoff Current	I_{CEX}	VCE=30V, VEB=3.0V	-	-	50	nA
DC Current Gain (Note 2)	h_{FE}	IC=0.1mA, VCE=1.0V IC=1.0mA, VCE=1.0V IC=10mA, VCE=1.0V IC=50mA, VCE=1.0V IC=100mA, VCE=1.0V	40 70 100 60 30	- - - - -	- - 300 - -	-
Collector - Emitter Saturation Voltage (Note 2)	$V_{CE(SAT)}$	IC=10mA, IB=1.0mA IC=50mA, IB=5.0mA	-	-	0.2 0.3	V
Base - Emitter Saturation Voltage (Note 2)	$V_{BE(SAT)}$	IC=10mA, IB=1.0mA IC=50mA, IB=5.0mA	0.65 -	- -	0.85 0.95	V
Collector - Base Capacitance	C_{CBO}	VCB=5V, IE=0, f=1MHz	-	-	4.0	pF
Emitter - Base Capacitance	C_{EBO}	VEB=0.5V, IC=0, f=1MHz	-	-	8.0	pF
Delay Time	td	VCC=3V,VBE=0.5V, IC=10mA ,IB=1.0mA	-	-	35	ns
Rise Time	tr	VCC=3V,VBE=0.5V, IC=10mA ,IB=1.0mA	-	-	35	ns
Storage Time	ts	VCC=3V,IC=10mA IB1=IB2=1.0mA	-	-	200	ns
Fall Time	tf	VCC=3V,IC=10mA IB1=IB2=1.0mA	-	-	50	ns

Note 2: Pulse Test: Pulse Width < 300 us, Duty Cycle < 2.0%.

SWITCHING TIME EQUIVALENT TEST CIRCUITS

Delay and Rise Time Equivalent Test Circuit

Storage and Fall Time Equivalent Test Circuit

ELECTRICAL CHARACTERISTICS CURVE

Fig. 1. Typical h_{FE} vs Collector Current

Fig. 2. Typical V_{BE} vs Collector Current

Fig. 3. Typical V_{CE} (sat) vs Collector Current

Fig. 4. Typical V_{BE} (sat) vs Collector Current

Fig. 5. Typical Capacitances vs Reverse Voltage

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MOUNTING PAD LAYOUT

SOT-23 Unit : inch(mm)

ORDER INFORMATION

- Packing information

  T/R - 12K per 13" plastic Reel

  T/R - 3K per 7” plastic Reel

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Part No_packing code_Version

MMBT3904_R1_00001
MMBT3904_R2_00001

For example :

RB500V-40_R2_00001

- **Part No.**
- **Serial number**
- **Version code means HF**
- **Packing size code means 13"**
- **Packing type means T/R**

Packing Code XX				Version Code XXXXX		
Packing type	1st Code	Packing size code	2nd Code	HF or RoHS	1st Code	2nd~5th Code
Tape and Ammunition Box (T/B)	A	N/A	0	HF	0	serial number
Tape and Reel (T/R)	R	7"	1	RoHS	1	serial number
Bulk Packing (B/P)	B	13"	2			
Tube Packing (T/P)	T	26mm	X			
Tape and Reel (Right Oriented) (TRR)	S	52mm	Y			
Tape and Reel (Left Oriented) (TRL)	L	PANASERT T/B CATHODE UP (PBCU)	U			
FORMING	F	PANASERT T/B CATHODE DOWN (PBCD)	D			

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