



# MMDT3904

## DUAL NPN GENERAL PURPOSE SWITCHING TRANSISTOR

**VOLTAGE** 40 Volt **POWER** 225 mWatt

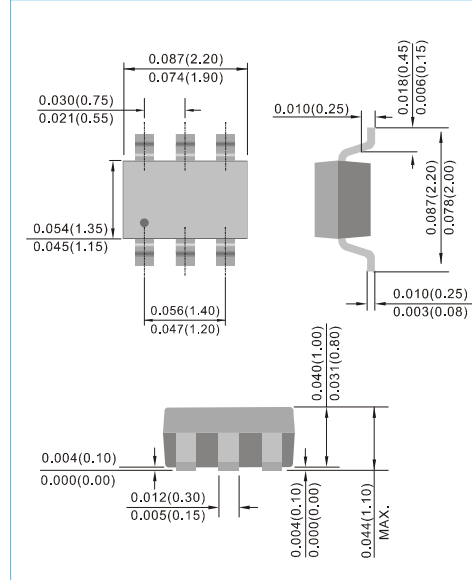
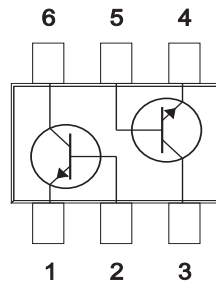
**SOT-363** Unit : inch(mm)

### FEATURES

- NPN epitaxial silicon, planar design
- Collector-emitter voltage  $V_{CE} = 40V$
- Collector current  $I_C = 200mA$
- Lead free in compliance with EU RoHS 2.0
- Green molding compound as per IEC 61249 standard

### MECHANICAL DATA

- Case: SOT-363, Plastic
- Terminals: Solderable per MIL-STD-750, Method 2026
- Approx. Weight: 0.0002 ounces, 0.006 grams
- Marking: S1A



### 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	$R_{\theta JA}$	625	$^{\circ}C/W$
Junction Temperature	$T_J$	-55 to 150	$^{\circ}C$
Storage Temperature	$T_{STG}$	-55 to 150	$^{\circ}C$

Note 1: Transistor mounted on FR-4 board 70 x 60 x 1mm.



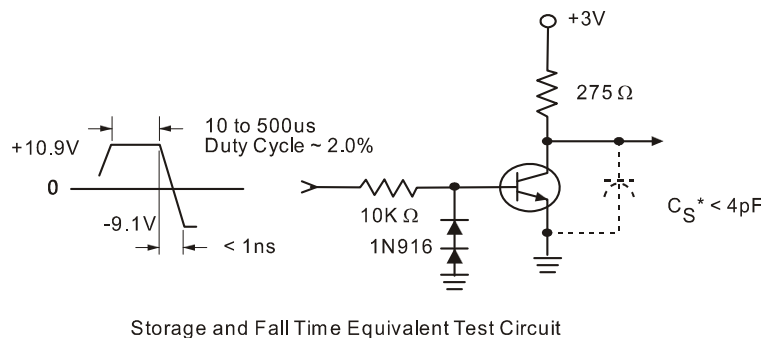
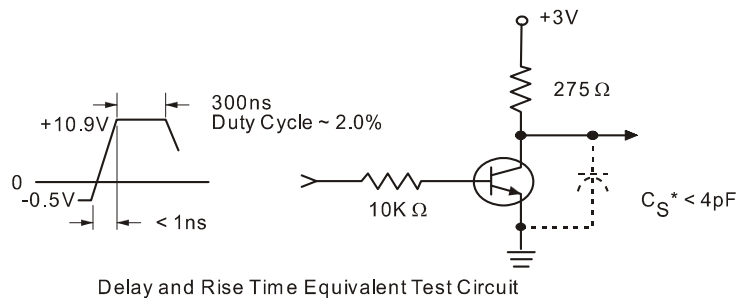
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## ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNITS
Collector - Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C=1.0mA, I_B=0$	40	-	-	V
Collector - Base Breakdown Voltage	$V_{(BR)CBO}$	$I_C=10\mu A, I_E=0$	60	-	-	V
Emitter - Base Breakdown Voltage	$V_{(BR)EBO}$	$I_E=10\mu A, I_C=0$	6.0	-	-	V
Base Cutoff Current	$I_{BI}$	$V_{CE}=30V, V_{EB}=3.0V$	-	-	50	nA
Collector Cutoff Current	$I_{CEX}$	$V_{CE}=30V, V_{EB}=3.0V$	-	-	50	nA
DC Current Gain (Note 2)	$h_{FE}$	$I_C=0.1mA, V_{CE}=1.0V$ $I_C=1.0mA, V_{CE}=1.0V$ $I_C=10mA, V_{CE}=1.0V$ $I_C=50mA, V_{CE}=1.0V$ $I_C=100mA, V_{CE}=1.0V$	40 70 100 60 30	- - - - -	- - 300 - -	-
Collector - Emitter Saturation Voltage (Note 2)	$V_{CE(SAT)}$	$I_C=10mA, I_B=1.0mA$ $I_C=50mA, I_B=5.0mA$	-	-	0.2 0.3	V
Base - Emitter Saturation Voltage (Note 2)	$V_{BE(SAT)}$	$I_C=10mA, I_B=1.0mA$ $I_C=50mA, I_B=5.0mA$	0.65 -	- -	0.85 0.95	V
Collector - Base Capacitance	$C_{CBO}$	$V_{CB}=5V, I_E=0, f=1MHz$	-	-	4.0	pF
Emitter - Base Capacitance	$C_{EBO}$	$V_{CB}=0.5V, I_C=0, f=1MHz$	-	-	8.0	pF
Delay Time	$t_d$	$V_{CC}=3V, V_{BE}=0.5V,$ $I_C=10mA, I_B=1.0mA$	-	-	35	ns
Rise Time	$t_r$	$V_{CC}=3V, V_{BE}=0.5V,$ $I_C=10mA, I_B=1.0mA$	-	-	35	ns
Storage Time	$t_s$	$V_{CC}=3V, I_C=10mA$ $I_{B1}=I_{B2}=1.0mA$	-	-	200	ns
Fall Time	$t_f$	$V_{CC}=3V, I_C=10mA$ $I_{B1}=I_{B2}=1.0mA$	-	-	50	ns

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

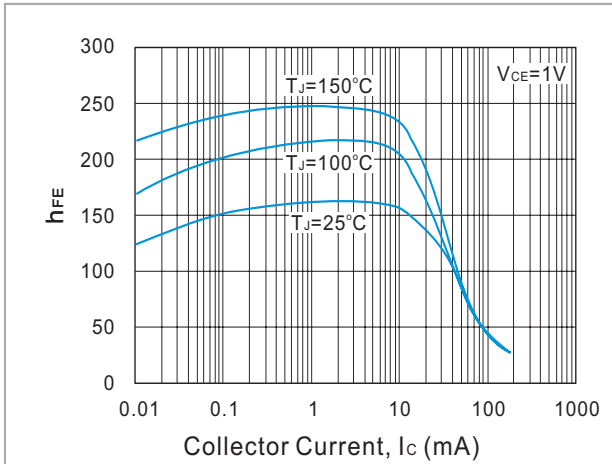
### SWITCHING TIME EQUIVALENT TEST CIRCUITS



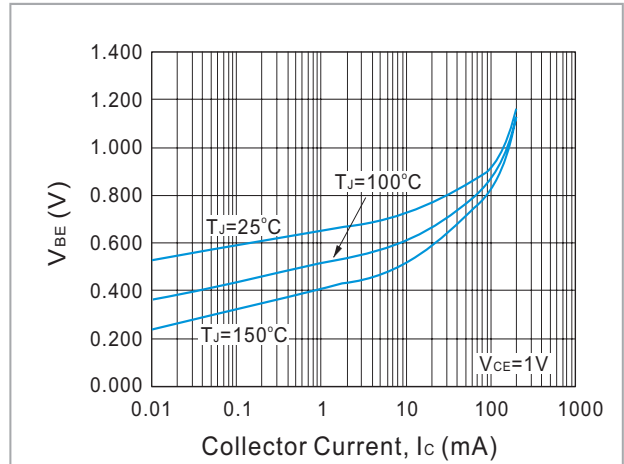


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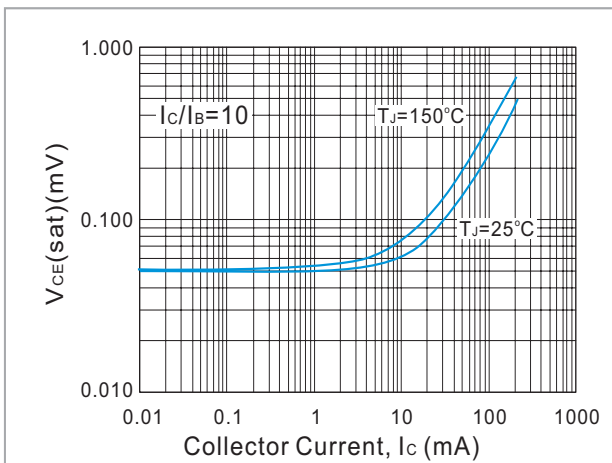
## ELECTRICAL CHARACTERISTICS CURVE



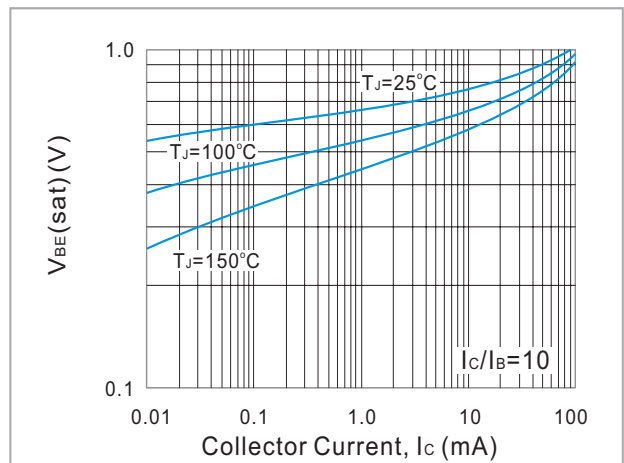
**Fig. 1. Typical  $h_{FE}$  vs. Collector Current**



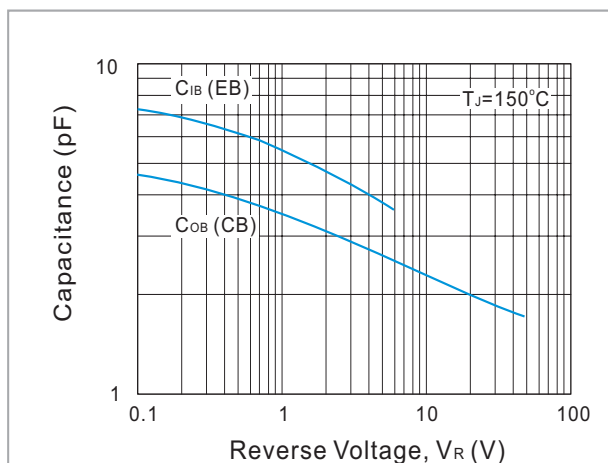
**Fig. 2. Typical  $V_{BE}$  vs. Collector Current**



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



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

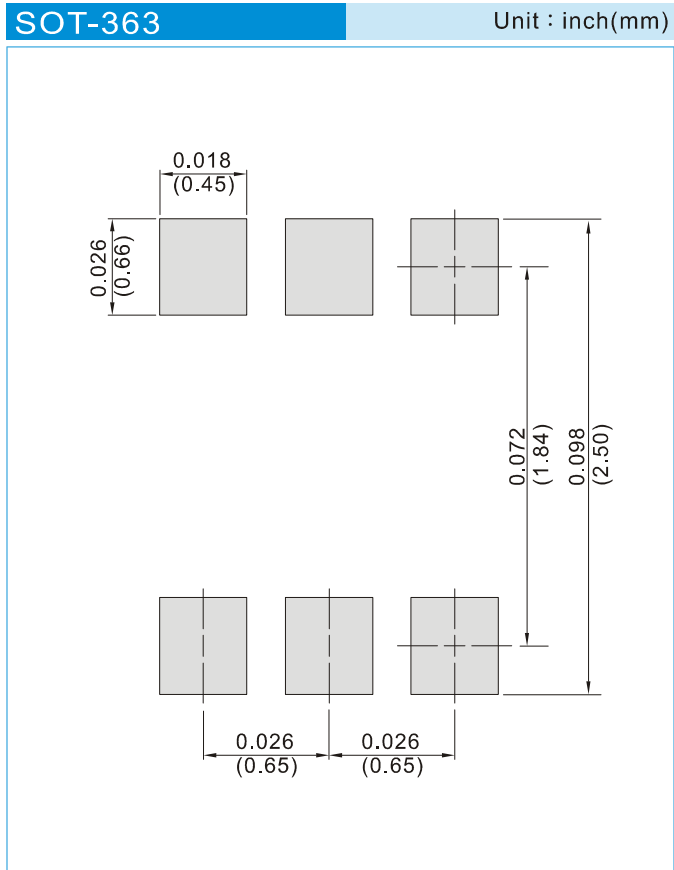


**Fig. 5. Typical Capacitances vs. Reverse Voltage**



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## MOUNTING PAD LAYOUT



## ORDER INFORMATION

- Packing information  
T/R - 10K per 13" plastic Reel  
T/R - 3K per 7" plastic Reel



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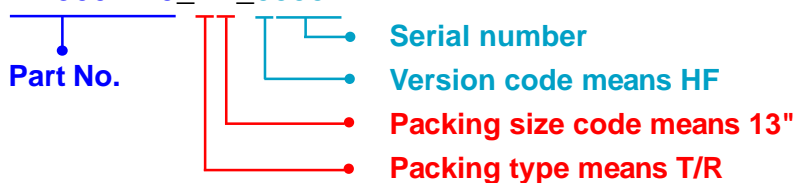
## Part No\_packing code\_Version

MMDT3904\_R1\_00001

MMDT3904\_R2\_00001

For example :

**RB500V-40\_R2\_00001**



Packing Code <b>XX</b>				Version Code <b>XXXXX</b>		
Packing type	1 <sup>st</sup> Code	Packing size code	2 <sup>nd</sup> Code	HF or RoHS	1 <sup>st</sup> Code	2 <sup>nd</sup> ~5 <sup>th</sup> 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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