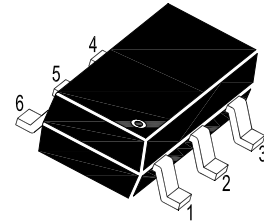
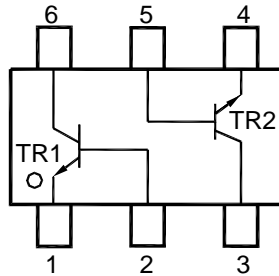


# MMBT3904DW

## NPN Silicon General Purpose Double Transistor

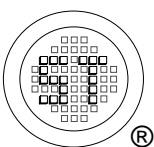
for switching and amplifier applications.



1. Emitter 2. Base 3. Collector  
4. Emitter 5. Base 6. Collector  
SOT-363 Plastic Package

### Absolute Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

Parameter	Symbol	Value	Unit
Collector Base Voltage	$V_{CBO}$	60	V
Collector Emitter Voltage	$V_{CEO}$	40	V
Emitter Base Voltage	$V_{EBO}$	6	V
Collector Current	$I_C$	200	mA
Power Dissipation	$P_{tot}$	200	mW
Junction Temperature	$T_j$	150	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	- 55 to + 150	$^\circ\text{C}$



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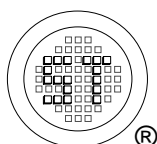
ISO/TS 16949 : 2009 Certificate No. 14-2912-002  
ISO14001 : 2004 Certificate No. 7118  
ISO 9001 : 2008 Certificate No. 0500208  
BS-OHSAS 18001 : 2007 Certificate No. 7118  
IECQ QC 080000 Certificate No. PIC18P4484

Dated : 18/02/2013 Rev: 01

# MMBT3904DW

## Characteristics at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Min.	Max.	Unit
DC Current Gain at $V_{CE} = 1\text{ V}$ , $I_C = 0.1\text{ mA}$	$h_{FE}$	40	-	-
at $V_{CE} = 1\text{ V}$ , $I_C = 1\text{ mA}$	$h_{FE}$	70	-	-
at $V_{CE} = 1\text{ V}$ , $I_C = 10\text{ mA}$	$h_{FE}$	100	300	-
at $V_{CE} = 1\text{ V}$ , $I_C = 50\text{ mA}$	$h_{FE}$	60	-	-
at $V_{CE} = 1\text{ V}$ , $I_C = 100\text{ mA}$	$h_{FE}$	30	-	-
Collector Base Cutoff Current at $V_{CE} = 30\text{ V}$	$I_{CES}$	-	50	nA
Emitter Base Cutoff Current at $V_{EB} = 3\text{ V}$	$I_{EBO}$	-	50	nA
Collector Base Breakdown Voltage at $I_C = 10\text{ }\mu\text{A}$	$V_{(BR)CBO}$	60	-	V
Collector Emitter Breakdown Voltage at $I_C = 1\text{ mA}$	$V_{(BR)CEO}$	40	-	V
Emitter Base Breakdown Voltage at $I_E = 10\text{ }\mu\text{A}$	$V_{(BR)EBO}$	6	-	V
Collector Emitter Saturation Voltage at $I_C = 10\text{ mA}$ , $I_B = 1\text{ mA}$	$V_{CE(sat)}$	-	0.2	V
at $I_C = 50\text{ mA}$ , $I_B = 5\text{ mA}$	$V_{CE(sat)}$	-	0.3	V
Base Emitter Saturation Voltage at $I_C = 10\text{ mA}$ , $I_B = 1\text{ mA}$	$V_{BE(sat)}$	0.65	0.85	V
at $I_C = 50\text{ mA}$ , $I_B = 5\text{ mA}$	$V_{BE(sat)}$	-	0.95	V
Current Gain Bandwidth Product at $V_{CE} = 20\text{ V}$ , $-I_E = 10\text{ mA}$ , $f = 100\text{ MHz}$	$f_T$	300	-	MHz
Collector Output Capacitance at $V_{CB} = 10\text{ V}$ , $f = 100\text{ MHz}$	$C_{ob}$	-	4	pF
Delay Time at $V_{CC} = 3\text{ V}$ , $V_{BE(OFF)} = 0.5\text{ V}$ , $I_C = 10\text{ mA}$ , $I_{B1} = 1\text{ mA}$	$t_d$	-	35	ns
Rise Time at $V_{CC} = 3\text{ V}$ , $V_{BE(OFF)} = 0.5\text{ V}$ , $I_C = 10\text{ mA}$ , $I_{B1} = 1\text{ mA}$	$t_r$	-	35	ns
Storage Time at $V_{CC} = 3\text{ V}$ , $I_C = 10\text{ mA}$ , $I_{B1} = -I_{B2} = 1\text{ mA}$	$t_{stg}$	-	200	ns
Fall Time at $V_{CC} = 3\text{ V}$ , $I_C = 10\text{ mA}$ , $I_{B1} = -I_{B2} = 1\text{ mA}$	$t_f$	-	50	ns



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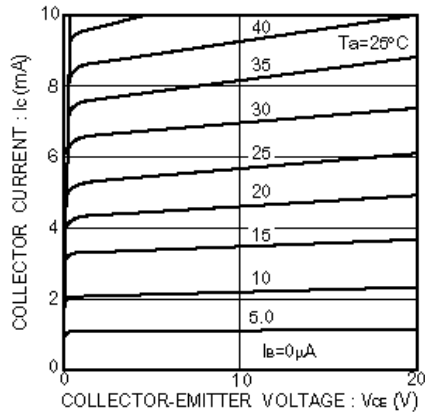


Fig.1 Grounded emitter output characteristics

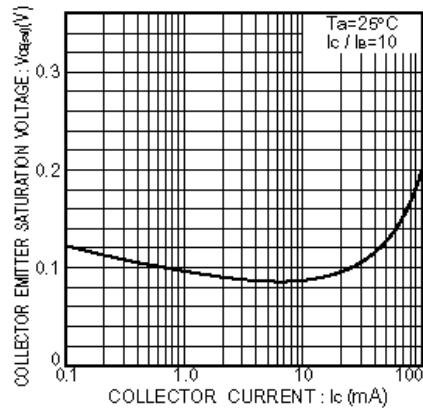


Fig.2 Collector-emitter saturation voltage vs. collector current

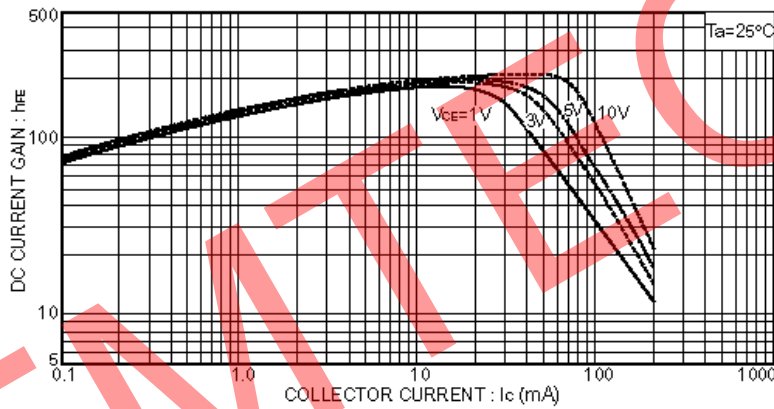


Fig.3 DC current gain vs. collector current ( I )

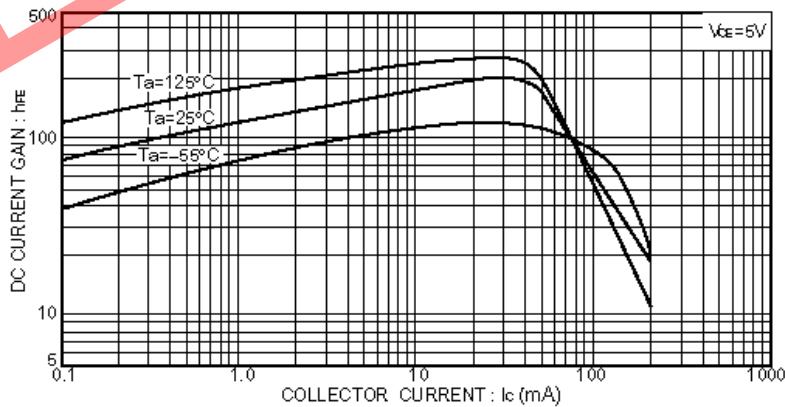
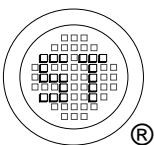


Fig.4 DC current gain vs. collector current ( II )



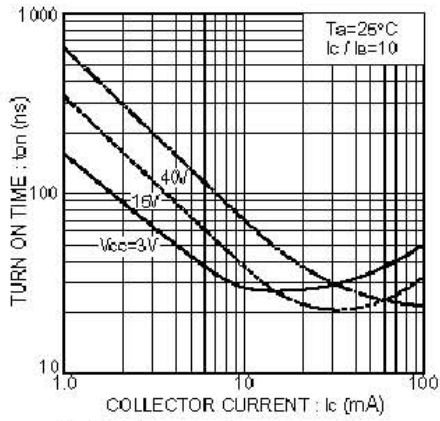


Fig.5 Turn-on time vs. collector current

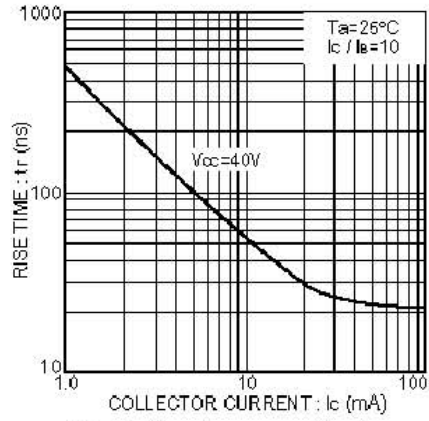


Fig.6 Rise time vs. collector current

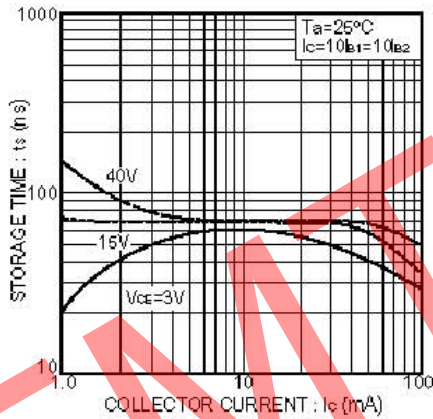


Fig.7 Storage time vs. collector current

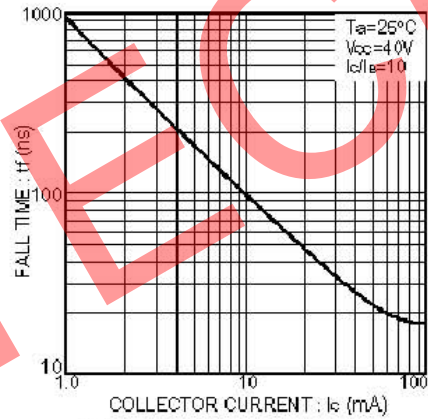


Fig.8 Fall time vs. collector current

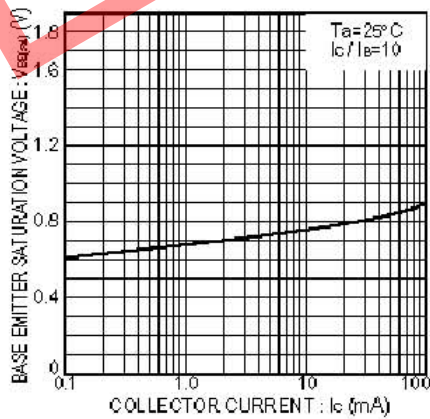


Fig.9 Base-emitter saturation voltage vs. collector current

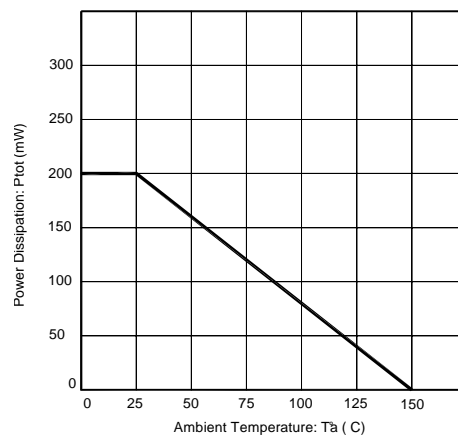


Fig.10 Power Dissipation vs Ambient Temperature

