

MMBT2907 / MMBT2907A

General Purpose PNP Transistor

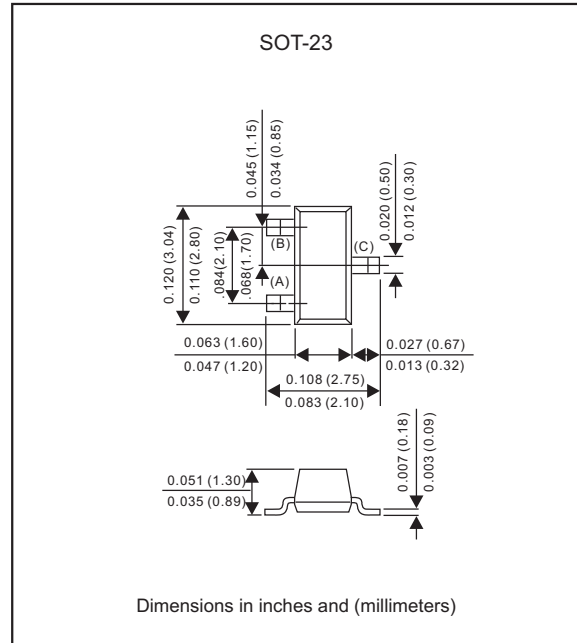
Features

- High collector-emitter breakdown voltage.
- PNP silicon epitaxial planar transistor, is designed for general purpose and amplifier applications.
- Capable of 225mW power dissipation.
- Lead-free parts meet RoHS requirements.
- Suffix "-H" indicates Halogen-free part, ex.MMBT2907-H.

Mechanical data

- Epoxy: UL94-V0 rated flame retardant
- Case : Molded plastic, SOT-23
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026
- Mounting Position : Any
- Weight : Approximated 0.008 gram

Package outline

Maximum ratings (AT $T_A=25^\circ\text{C}$ unless otherwise noted)

PARAMETER	Symbol	MMBT2907	MMBT2907A	UNIT
Collector-emitter voltage	V_{CE0}	-40	-60	V
Collector-base voltage	V_{CBO}	-60		V
Emitter-base voltage	V_{EBO}	-5.0		V
Collector current - continuous	I_C	-600		mA
Total device dissipation FR-5 board (1) $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	225		mW
		1.8		mW/ $^\circ\text{C}$
Thermal resistance Junction to ambient	R_{BJA}	556		$^\circ\text{C}/\text{W}$
Total device dissipation alumina substrate(2) $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	300		mW
		2.4		mW/ $^\circ\text{C}$
Thermal resistance Junction to ambient	R_{BJA}	417		$^\circ\text{C}/\text{W}$
Operating junction temperature range	T_J	-55 to +150		$^\circ\text{C}$
Storage temperature range	T_{STG}	-55 to +150		$^\circ\text{C}$

1.FR-5 = 1.0 X 0.75 X 0.062 in.

2.Alumina = 0.4 X 0.3 X 0.024 in. 99.5% alumina.

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ELECTRICAL CHARACTERISTICS (TA = 25°C unless otherwise noted)

Characteristics		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (IC= -10 mAdc, IB=0)	MMBT2907 MMBT2907A	V(BR)CEO	-40 -60	- -	Vdc
Collector-Base Breakdown Voltage (IC= -10 uAdc, IE=0)		V(BR)CBO	-60	-	Vdc
Emitter-Base Breakdown Voltage (IE= -10 uAdc, IC=0)		V(BR)EBO	-5.0	-	Vdc
Collector Cutoff Current (VCE= -30 Vdc, VEB(off) = -0.5Vdc)		ICEX	-	-50	nAdc
Collector Cutoff Current (VCB= -50 Vdc, IE=0)	MMBT2907 MMBT2907A	ICBO	-	-0.020	uAdc
(VCB= -50Vdc, IE=0, TA=125°C)	MMBT2907 MMBT2907A		-	-0.010	
			-	-20 -10	
Base Cutoff Current (VCE= -30Vdc, VEB(off) = -0.5Vdc)	MMBT2907A	IB	-	-50	nAdc

ELECTRICAL CHARACTERISTICS (TA = 25°C unless otherwise noted) (Continued)

Characteristics		Symbol	Min	Max	Unit
ON CHARACTERISTICS					
DC Current Gain		hFE			
(IC= -0.1 mAdc, VCE= -10 Vdc)	MMBT2907 MMBT2907A		35 75	- -	
(IC= -1.0 mAdc, VCE= -10 Vdc)	MMBT2907 MMBT2907A		50 100	- -	
(IC= -10 mAdc, VCE= -10 Vdc)	MMBT2907 MMBT2907A		75 100	- -	
(IC= -150 mAdc, VCE= -10 Vdc)	MMBT2907 MMBT2907A		- 100	- 300	
(IC= -500 mAdc, VCE= -10 Vdc)	MMBT2907 MMBT2907A		30 50	- -	
Collector-Emitter Saturation Voltage (IC= -150 mAdc, IB= -15mAdc) (IC= -500 mAdc, IB= -50mAdc)		VCE(sat)	- -	-0.4 -1.6	Vdc
Base-Emitter Saturation Voltage (IC= -150 mAdc, IB= -15mAdc) (IC= -500 mAdc, IB= -50mAdc)		VBE(sat)	- -	-1.3 -2.6	Vdc

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ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted) (Continued)

Characteristics	Symbol	Min	Max	Unit
SMALL-SIGNAL CHARACTERISTICS				
Current-Gain-Bandwidth Product (1),(2) (I _C = -50 mAdc, V _{CE} = 20 Vdc, f = 100MHz)	f _T	200	-	MHz
Output Capacitance (V _{CB} = -10 Vdc, I _E = 0, f = 1.0MHz)	C _{obo}	-	8.0	pF
Input Capacitance (V _{EB} = -2.0 Vdc, I _C = 0, f = 1.0MHz)	C _{ibo}	-	30	pF

SWITCHING CHARACTERISTICS

Turn-On Time	(V _{CC} = -30 Vdc, I _C = -150 mAdc, I _{B1} = -15 mAdc)	t _{on}	-	45	ns
Delay Time		t _d	-	10	
Rise Time		t _r	-	40	
Turn-Out Time	(V _{CC} = -60 Vdc, I _C = -150 mAdc, I _{B1} = I _{B2} = -15 mAdc)	t _{off}	-	100	
Storage Time		t _s	-	80	
Fall Time		t _f	-	30	

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.
2. f_T is defined as the frequency at which |h_{f e}| extrapolates to unity.

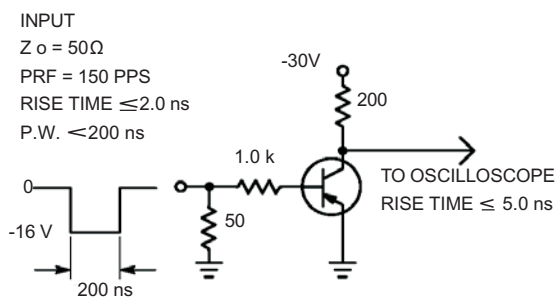


Figure 1. Delay and Rise Time Test Circuit

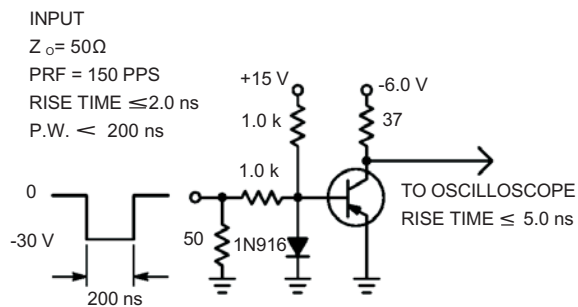


Figure 2. Storage and Fall Time Test Circuit

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Rating and characteristic curves

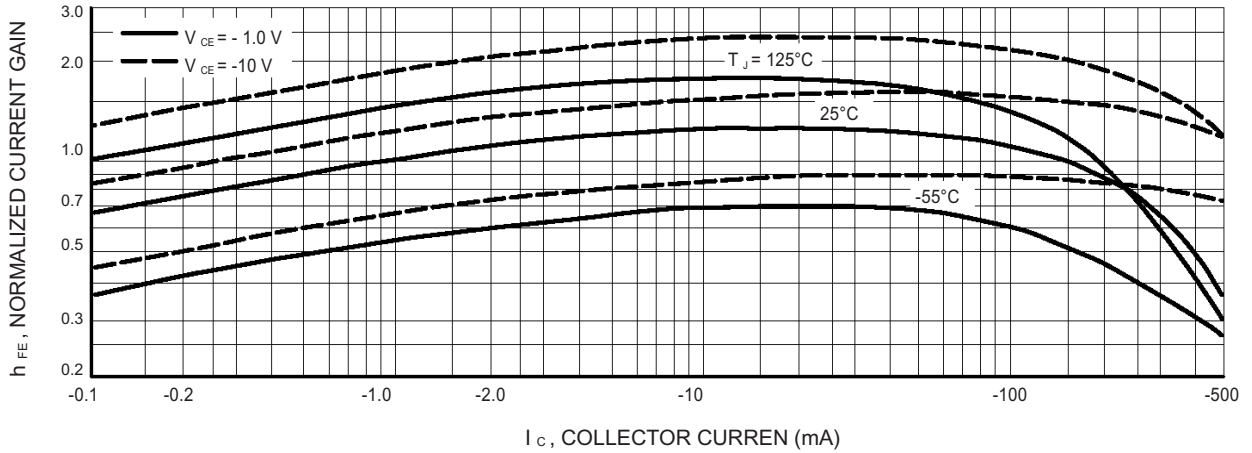


Figure 3. DC Current Gain

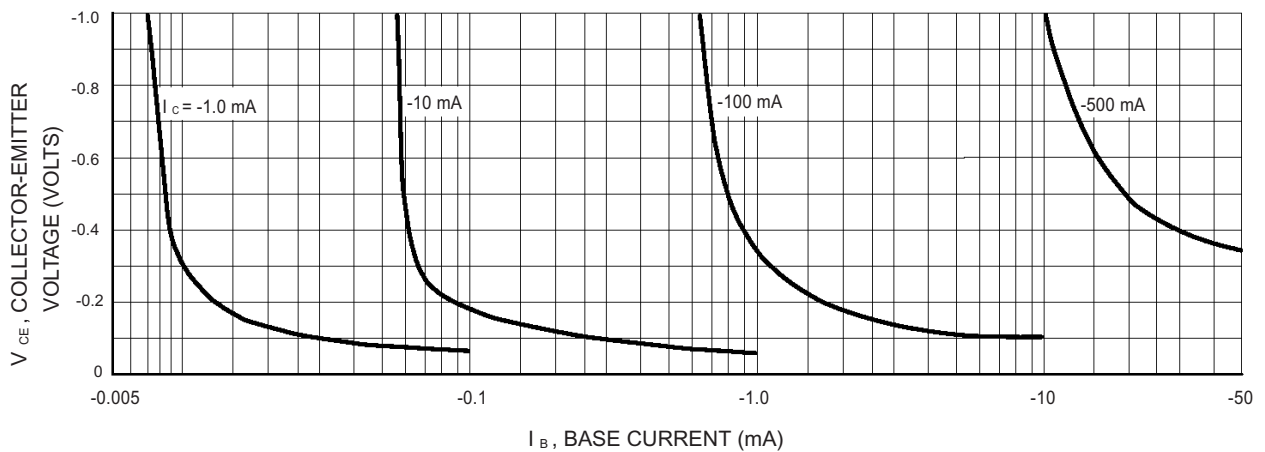


Figure 4. Collector Saturation Region

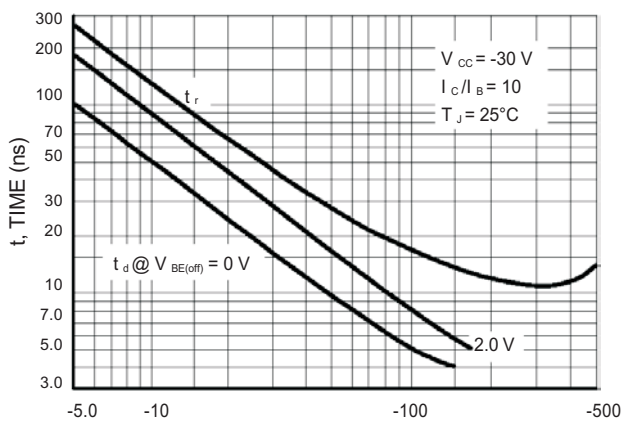


Figure 5. Turn-On Time

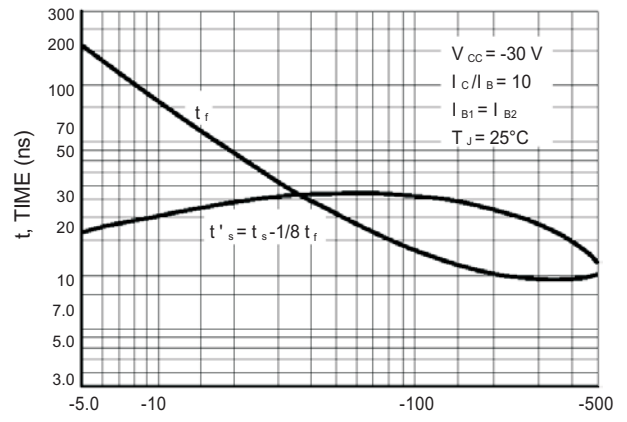


Figure 6. Turn-off Time

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Rating and characteristic curves

TYPICAL SMALL-SIGNAL CHARACTERISTICS

NOISE FIGURE

$V_{CE} = 10 \text{ Vdc}$, $T_A = 25^\circ\text{C}$

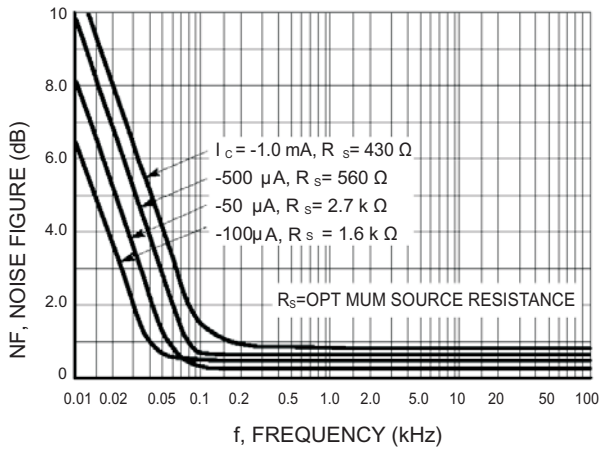


Figure 7. Frequency Effects

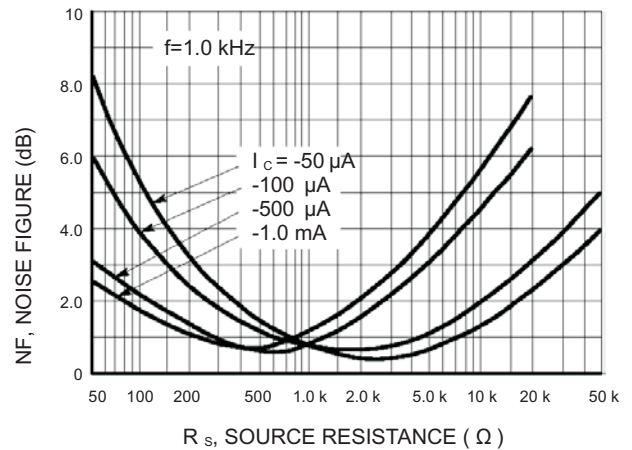


Figure 8. Source Resistance Effects

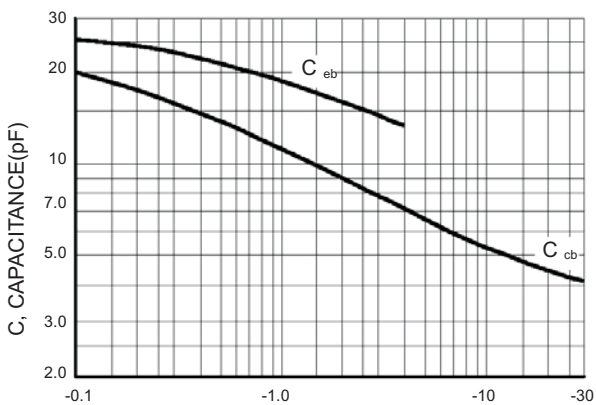


Figure 9. Capacitances

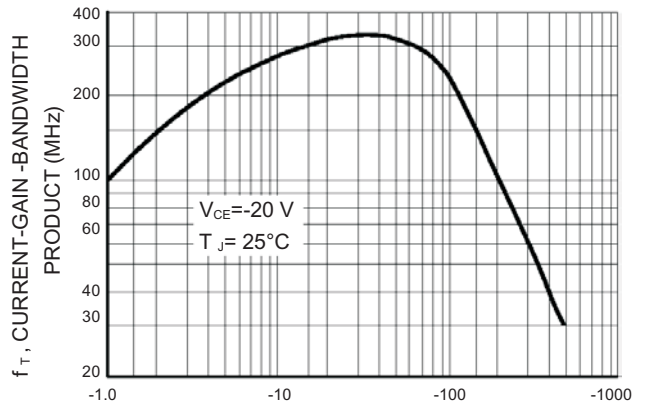


Figure 10. Current-Gain-Bandwidth Product

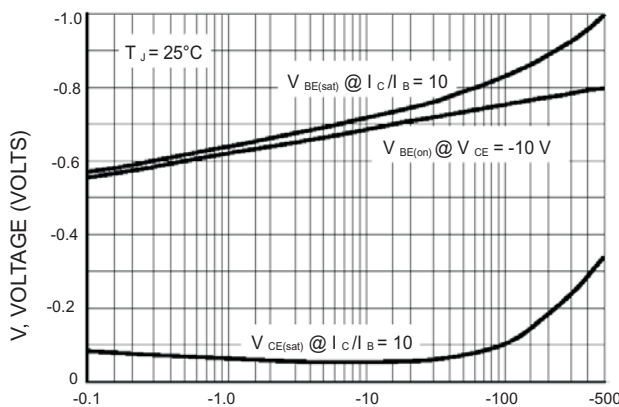


Figure 11. "On" Voltage

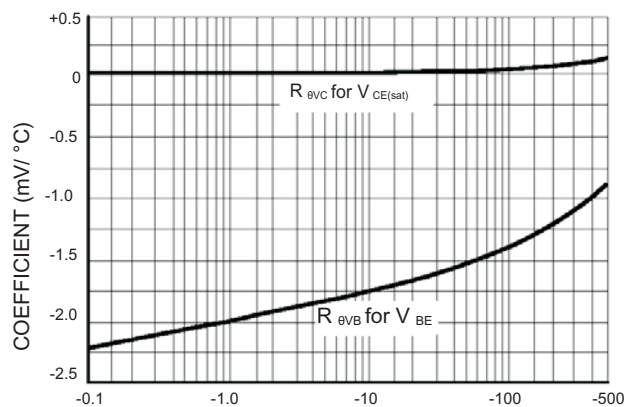


Figure 12. Temperature Coefficients

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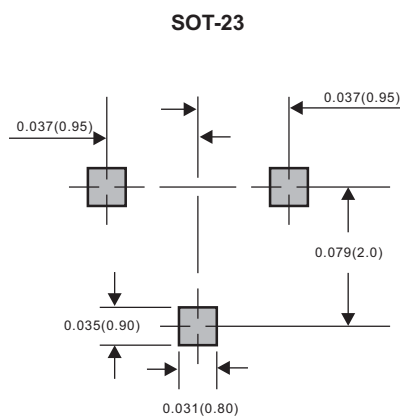
Pinning information

Pin	Simplified outline	Symbol
PinB Base PinC Collector PinE Emitter		

Marking

Type number	Marking code
MMBT2907	M2B
MMBT2907A	2F

Suggested solder pad layout



Dimensions in inches and (millimeters)

Reel packing

PACKAGE	REEL SIZE	REEL (pcs)	COMPONENT SPACING (m/m)	BOX (pcs)	INNER BOX (m/m)	REEL DIA, (m/m)	CARTON SIZE (m/m)	CARTON (pcs)	APPROX. GROSS WEIGHT (kg)
SOT-23	7"	3,000	4.0	30,000	183*123*183	178	382*257*387	240,000	11.6