

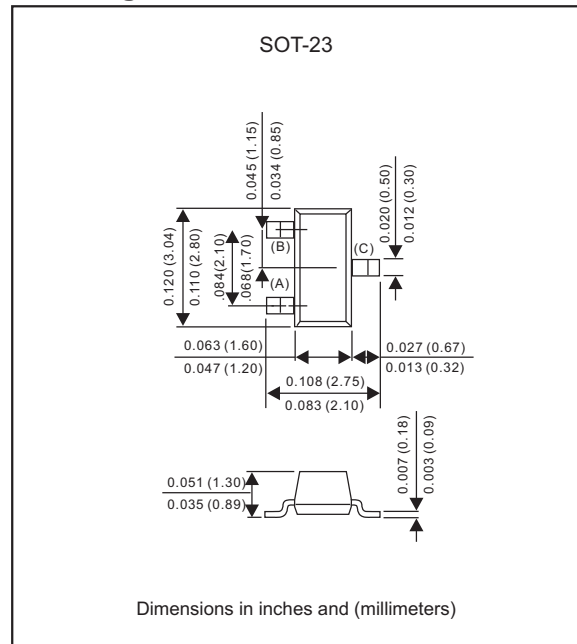
Features

- 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.
- Compliant to Halogen-free
- Suffix "Q1" for AEC-Q101

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

Package outline



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

PARAMETER	Symbol	MMBT2907-Q1	MMBT2907A-Q1	UNIT
Collector-emitter voltage	V_{CEO}	-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)	P_D		225	mW
			Derate above 25°C	
			1.8	mW/ $^\circ\text{C}$
Thermal resistance	$R_{\theta JA}$		556	$^\circ\text{C}/\text{W}$
Total device dissipation alumina substrate(2)	P_D		300	mW
			Derate above 25°C	
			2.4	mW/ $^\circ\text{C}$
Thermal resistance	$R_{\theta JA}$		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.

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-Q1 MMBT2907A-Q1	V(BR)CEO	-40 -60	- -	Vdc
Collector-Base Breakdown Voltage (IC = -10 µAdc, IE = 0)		V(BR)CBO	-60	-	Vdc
Emitter-Base Breakdown Voltage (IE = -10 µAdc, 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-Q1 MMBT2907A-Q1	ICBO	-	-0.020	µAdc
(VCB = -50Vdc, IE = 0, TA = 125°C)	MMBT2907-Q1 MMBT2907A-Q1		-	-0.010	
	MMBT2907-Q1 MMBT2907A-Q1		-	-20 -10	
Base Cutoff Current (VCE = -30Vdc, VEB(off) = -0.5Vdc)	MMBT2907A-Q1	IB	-	-50	nAdc

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

Characteristics	Symbol	Min	Max	Unit	
ON CHARACTERISTICS					
DC Current Gain	MMBT2907-Q1 MMBT2907A-Q1	hFE	35	-	
(IC = -0.1 mAdc, VCE = -10 Vdc)			75	-	
(IC = -1.0 mAdc, VCE = -10 Vdc)			50	-	
(IC = -10 mAdc, VCE = -10 Vdc)			100	-	
(IC = -10 mAdc, VCE = -10 Vdc)			75	-	
(IC = -150 mAdc, VCE = -10 Vdc)	MMBT2907-Q1 MMBT2907A-Q1	100	-	-	
(IC = -150 mAdc, VCE = -10 Vdc)	MMBT2907-Q1 MMBT2907A-Q1	-	-	-	
(IC = -500 mAdc, VCE = -10 Vdc)	MMBT2907-Q1 MMBT2907A-Q1	100	300	-	
(IC = -500 mAdc, VCE = -10 Vdc)	MMBT2907-Q1 MMBT2907A-Q1	30	-	-	
(IC = -500 mAdc, VCE = -10 Vdc)	MMBT2907-Q1 MMBT2907A-Q1	50	-	-	
Collector-Emitter Saturation Voltage (IC = -150 mAdc, IB = -15mAdc)	MMBT2907-Q1 MMBT2907A-Q1	VCE(sat)	-	-0.4	Vdc
(IC = -500 mAdc, IB = -50mAdc)			-	-1.6	
Base-Emitter Saturation Voltage (IC = -150 mAdc, IB = -15mAdc)	MMBT2907-Q1 MMBT2907A-Q1	VBE(sat)	-	-1.3	Vdc
(IC = -500 mAdc, IB = -50mAdc)			-	-2.6	

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 mA, 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 mA, I _{B1} = -15 mA)	t _{on}	-	45	ns
Delay Time		t _d	-	10	
Rise Time		t _r	-	40	
Turn-Off Time	(V _{CC} = -60 Vdc, I _C = -150 mA, I _{B1} = I _{B2} = -15 mA)	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_{fe}| extrapolates to unity.

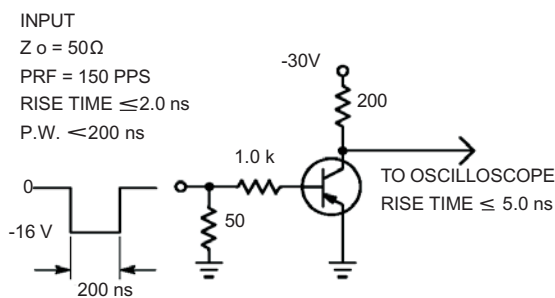


Figure 1. Delay and Rise Time Test Circuit

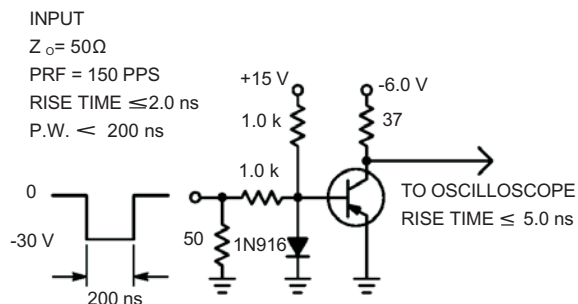


Figure 2. Storage and Fall Time Test Circuit

Rating and characteristic curves

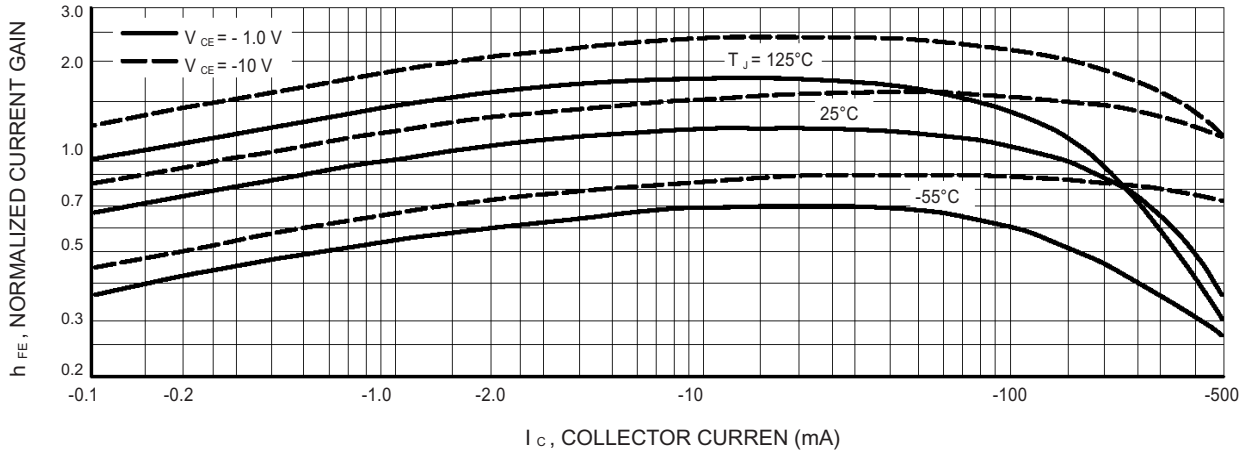


Figure 3. DC Current Gain

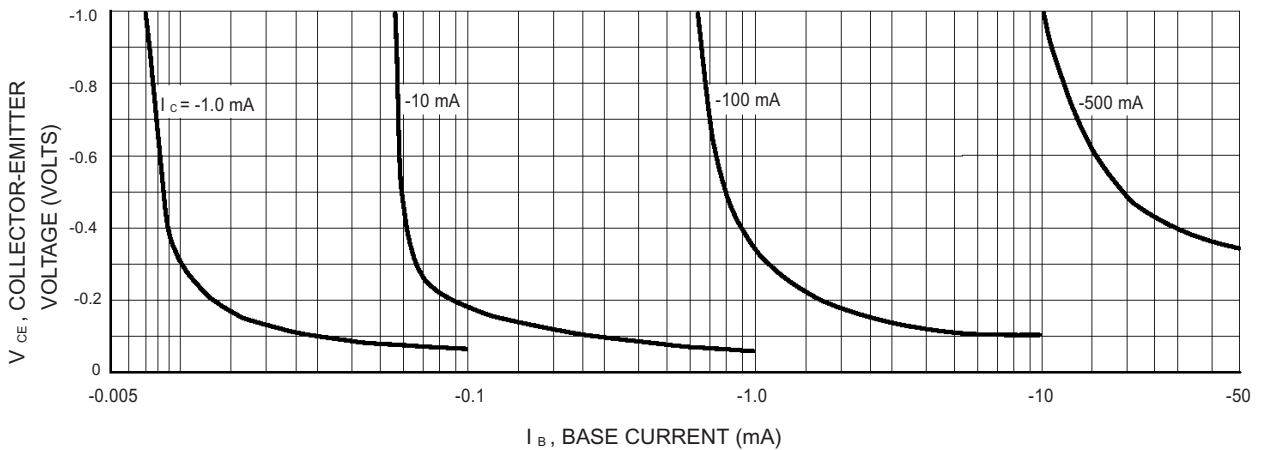


Figure 4. Collector Saturation Region

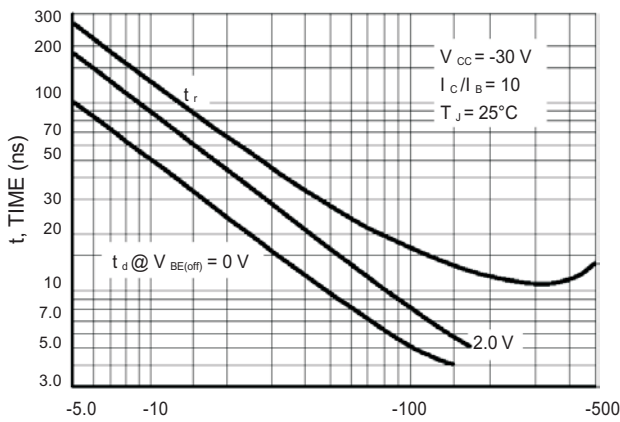


Figure 5. Turn-On Time

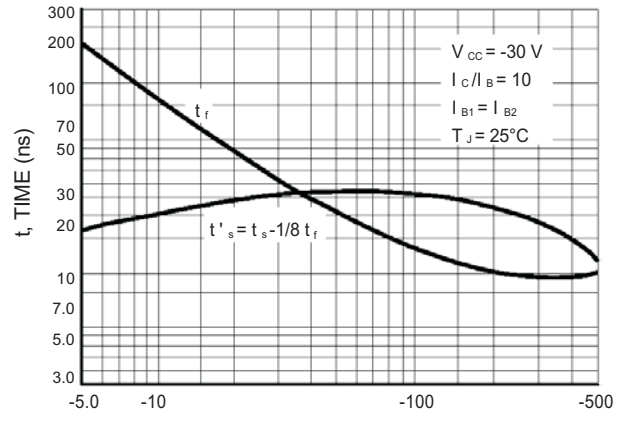


Figure 6. Turn-off Time

Rating and characteristic curves

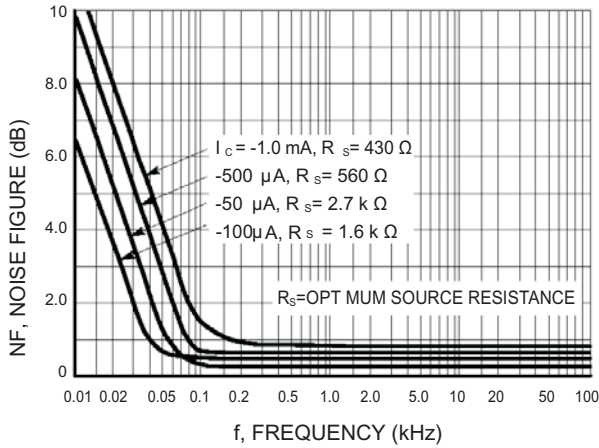


Figure 7. Frequency Effects

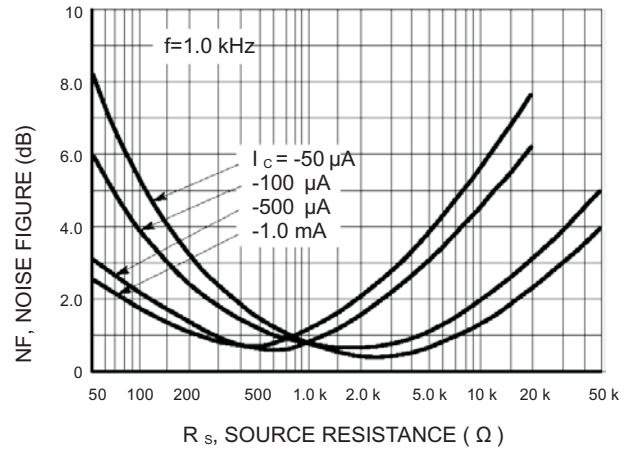


Figure 8. Source Resistance Effects

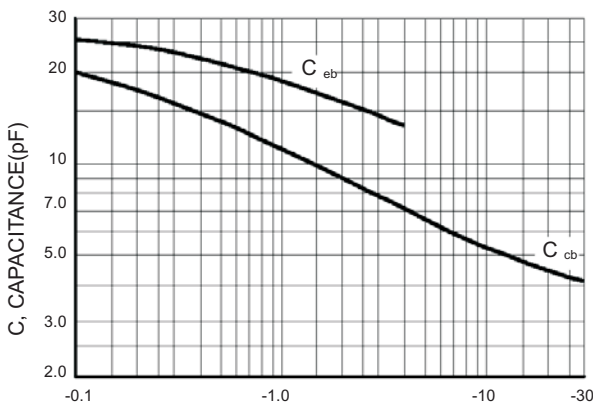


Figure 9. Capacitances

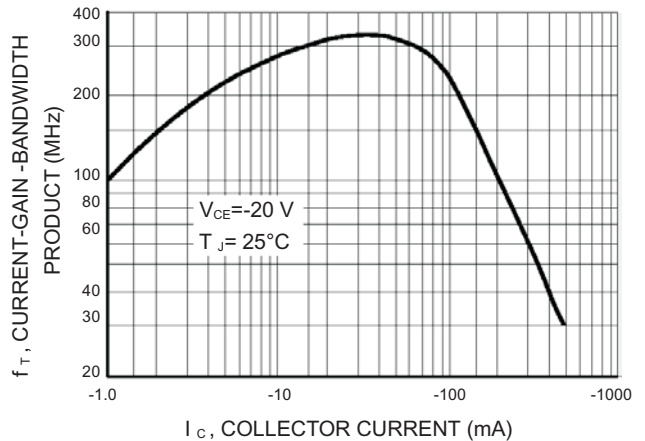


Figure 10. Current-Gain-Bandwidth Product

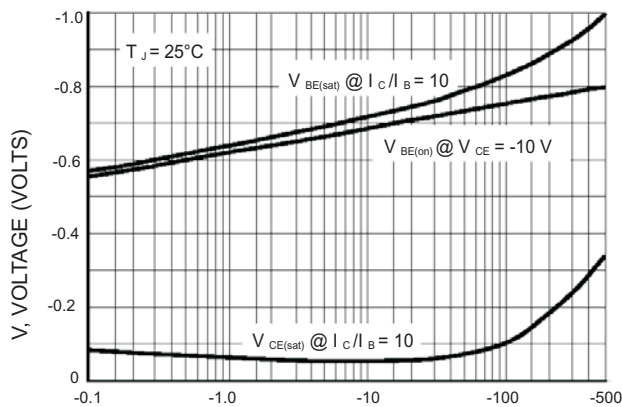


Figure 11. "On" Voltage

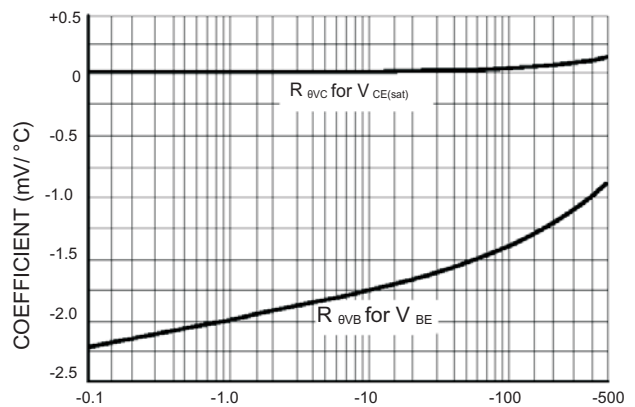
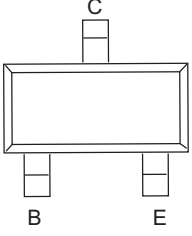
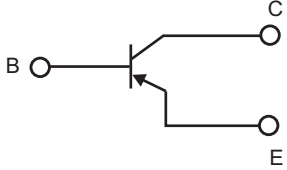


Figure 12. Temperature Coefficients

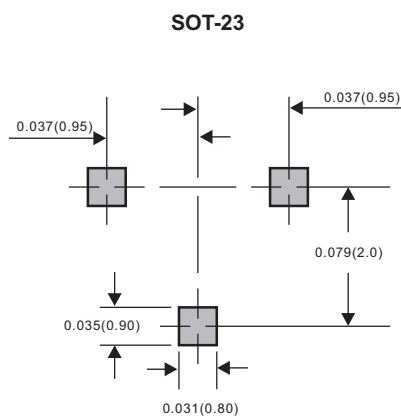
Pinning information

Pin	Simplified outline	Symbol
PinB Base PinC Collector PinE Emitter		

Marking

Type number	Marking code
MMBT2907-Q1	M2B
MMBT2907A-Q1	2F

Suggested solder pad layout



Dimensions in inches and (millimeters)