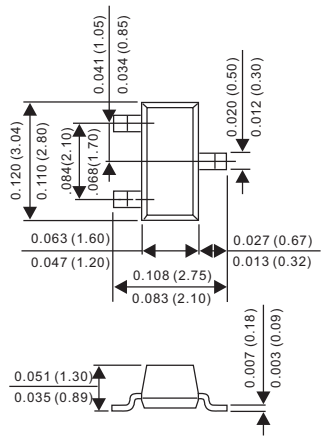
HMBT2907 / HMBT2907A

General Purpose Transistor
PNP Silicon

Package outline

SOT-23



Dimensions in inches and (millimeters)

Features

- High collector-emitterbreakdien 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.HMBT2907-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

Maximum ratings (AT T_A=25°C unless otherwise noted)

Parameter		Symbol	HMBT2907	HMBT2907A	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)	T_A = 25°C	P_D	225		mW
	Derate above 25°C		1.8		mW/°C
Thermal resistance	Junction to ambient	$R_{\theta JA}$	556		°C/W
Total device dissipation alumina substrate(2)	T_A = 25°C	P_D	300		mW
	Derate above 25°C		2.4		mW/°C
Thermal resistance	Junction to ambient	$R_{\theta JA}$	417		°C/W
Operating junction temperature range		T_J	-55 to +150		°C
Storage temperature range		T_{STG}	-55 to +150		°C

1.FR-5 = 1.0 X 0.75 X0.062 in.
2.Alumina = 0.4 X 0.3 X 0.024 in. 99.5% alumina.

HMBT2907 / HMBT2907A

Electrical characteristics (AT T_A=25°C unless otherwise noted)

Off characteristics

Parameter	Conditions		Symbol	MIN.	TYP.	MAX.	Unit
Collector-emitter breakdown voltage (2)	I_C = -10mA, I_B = 0	HMBT2907 HMBT2907A	$V_{(BR)CEO}$	-40 -60			V
Collector-base breakdown voltage	I_C = -10μA, I_E = 0		$V_{(BR)CBO}$	-60			V
Emitter-base breakdown voltage	I_E = -10μA, I_C = 0		$V_{(BR)EBO}$	-5.0			V
Collector cutoff current	V_{CB} = -30V, $I_{BE(off)}$ = -0.5V		I_{CEX}			-50	nA
Collector cutoff current	V_{CB} = -50V, I_E = 0	HMBT2907 HMBT2907A	I_{CBO}			-0.02 -0.01	μA
	V_{CB} = -50V, I_E = 0, T_A = 125°C	HMBT2907 HMBT2907A				-20 -10	
Base current	V_{CE} = -30V, $V_{EB(off)}$ = -0.5V		I_B			-50	nA

On characteristics

Parameter	Conditions		Symbol	MIN.	TYP.	MAX.	Unit
DC current gain	I_C = -0.1mA, V_{CE} = -10V	HMBT2907 HMBT2907A	h_{FE}	35 75			
	I_C = -1.0mA, V_{CE} = -10V	HMBT2907 HMBT2907A		50 100			
	I_C = -10mA, V_{CE} = -10V	HMBT2907 HMBT2907A		75 100			
	I_C = -150mA, V_{CE} = -10V (2)	HMBT2907 HMBT2907A		- 100		- 300	
	I_C = -500mA, V_{CE} = -10V (2)	HMBT2907 HMBT2907A		30 50			
Collector-emitter saturation voltage (2)	I_C = -150mA, I_B = -15mA I_C = -500mA, I_B = -50mA		$V_{CE(sat)}$			-0.4 -1.6	V
Base-emitter saturation voltage (2)	I_C = -150mA, I_B = -15mA I_C = -500mA, I_B = -50mA		$V_{BE(sat)}$			-1.3 -2.6	V

Small-signal characteristics

Parameter	Conditions	Symbol	MIN.	TYP.	MAX.	Unit
Current-gain-bandwidth produc (2,3)	I_C = -50mA, V_{CE} = -20V, f = 100MHz	f_T	200			MHz
Output capacitance	V_{CB} = -10V, I_E = 0, f = 1.0MHz	C_{obo}			8.0	pF
Input capacitance	V_{EB} = -2.0V, I_C = 0, f = 1.0MHz	C_{ibo}			30	pF

Switching characteristics

Parameter	Conditions	Symbol	MIN.	TYP.	MAX.	Unit
Turn-on time	V_{CC} = -30V, I_C = -150mA, I_{B1} = -15mA	t_{on}			45	ns
Delay time		t_d			10	
Rise time		t_r			40	
Storage time	V_{CC} = -6.0V, I_C = -150mA, I_{B1} = I_{B2} = -15mA	t_s			225	
Fall time		t_f			60	
Turn-off time		t_{off}			280	

2.Pulse test : pulse width ≦ 300μs, duty cycle ≦ 2.0%.

3. f_T is defined as the frequency at which $|h_{fe}|$ extrapolates to unity.

Rating and characteristic curves (HMBT2907 / HMBT2907A)

Figure 1. Delay and Rise Time Test Circuit

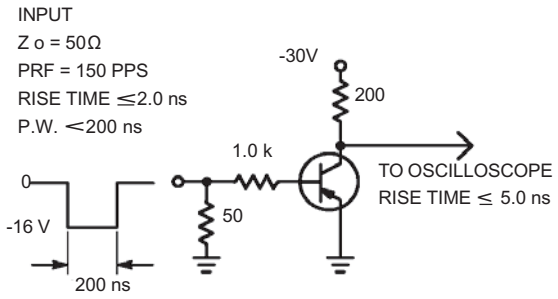


Figure 2. Storage and Fall Time Test Circuit

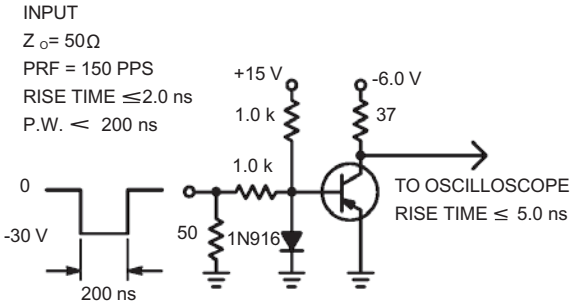


Figure 3. DC Current Gain

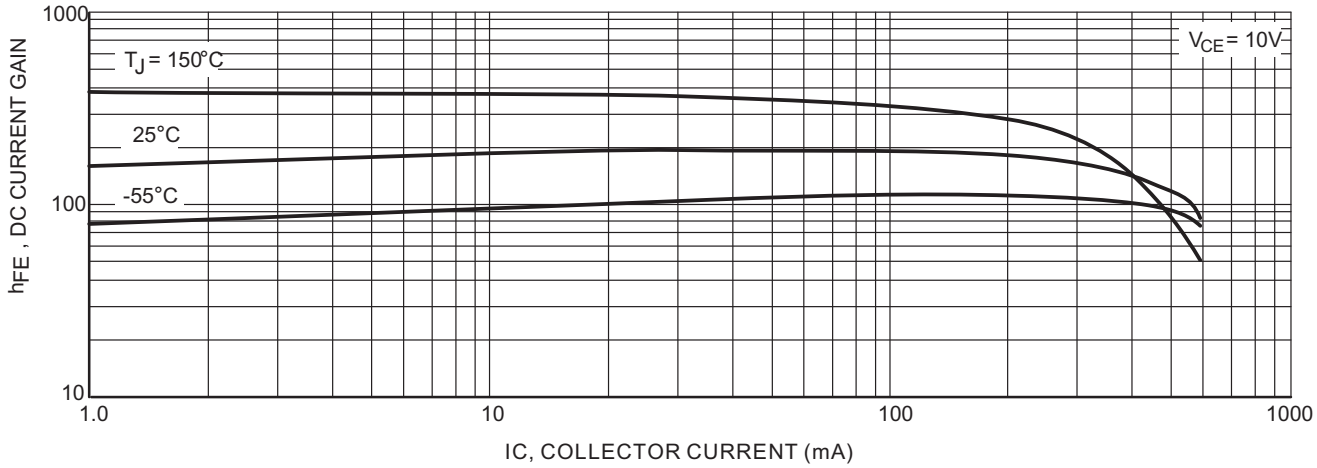
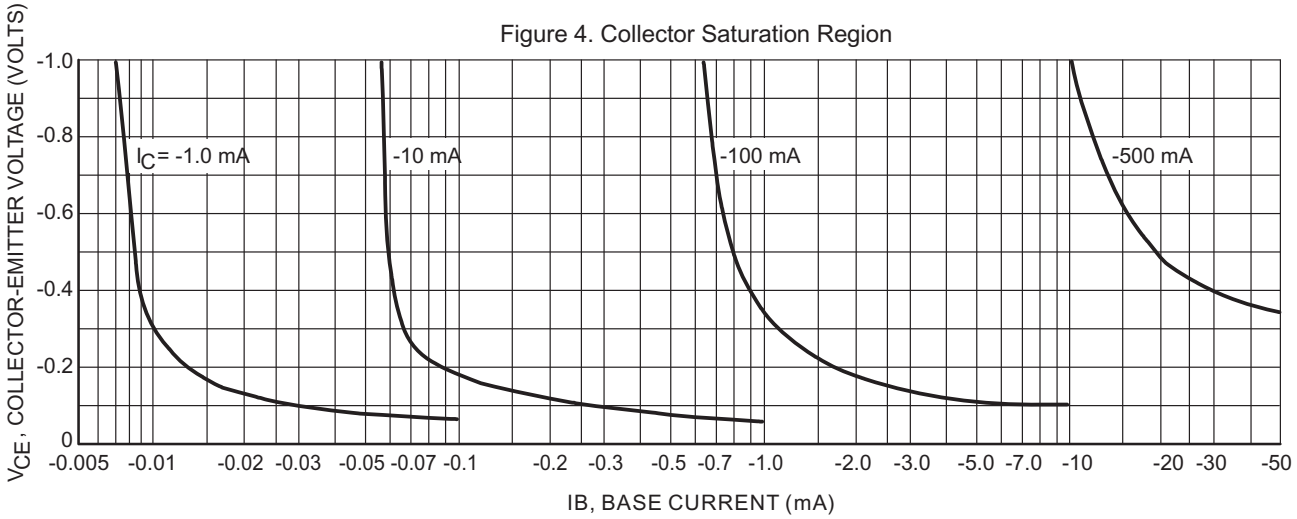


Figure 4. Collector Saturation Region



Rating and characteristic curves (HMBT2907 / HMBT2907A)

Figure 5. Turn-on Time

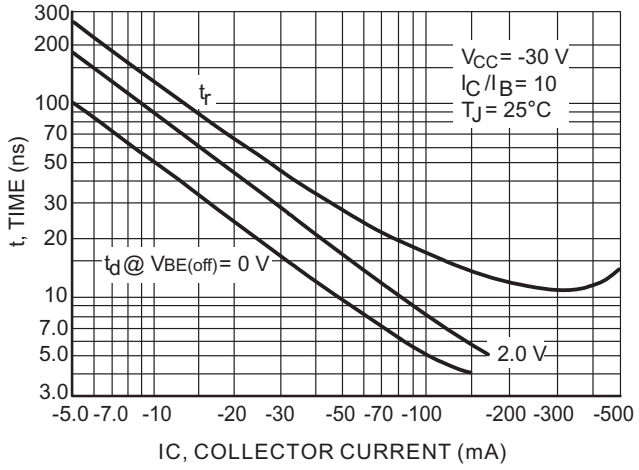
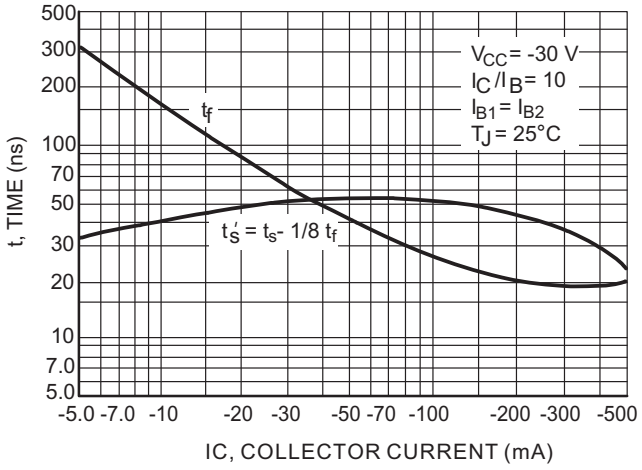


Figure 6. Turn-off Time



Rating and characteristic curves (HMBT2907 / HMBT2907A)

TYPICAL SMALL-SIGNAL CHARACTERISTICS

NOISE FIGURE

V_{CE} = 10 Vdc, T_A = 25°C

Figure 7. Frequency Effects

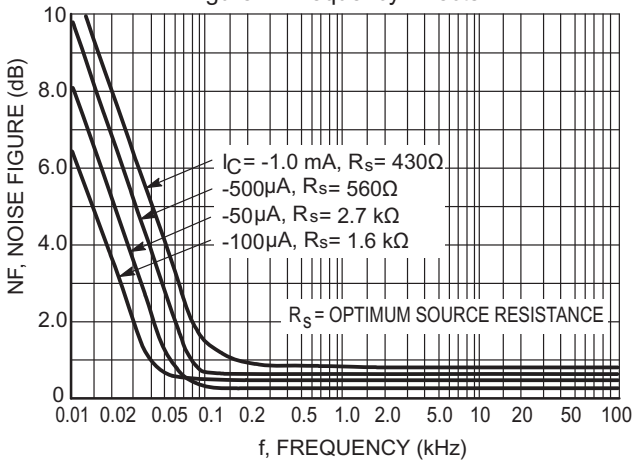


Figure 8. Source Resistance Effects

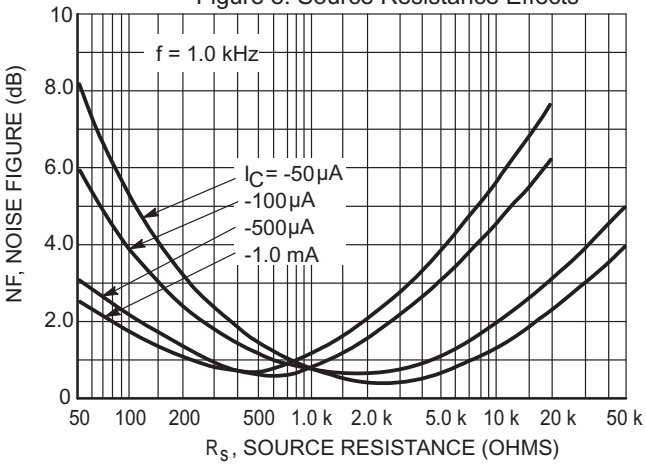


Figure 9. Capacitances

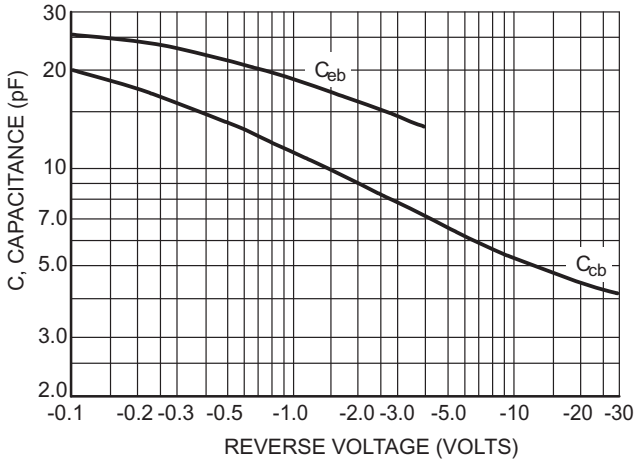


Figure 10. Current– Gain – Bandwidth Product

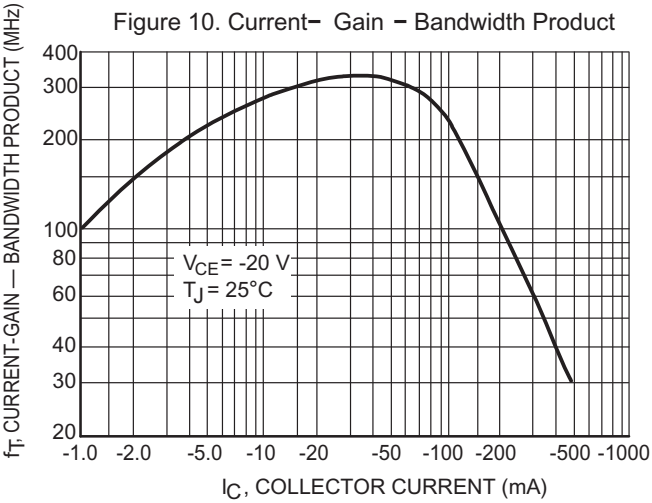


Figure 11. Collector Emitter Saturation Voltage vs. Collector Current

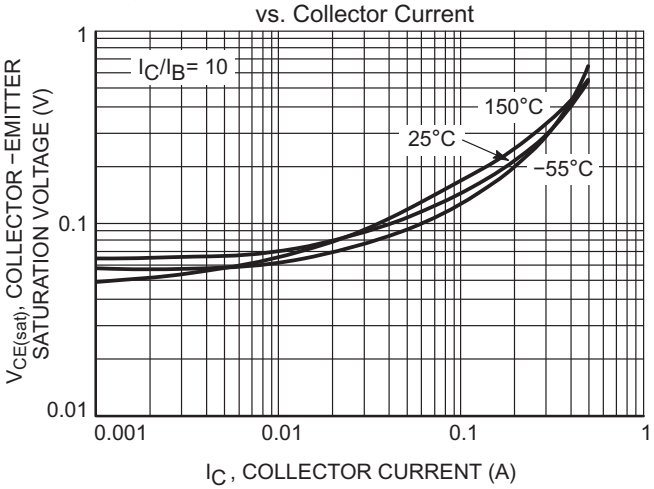
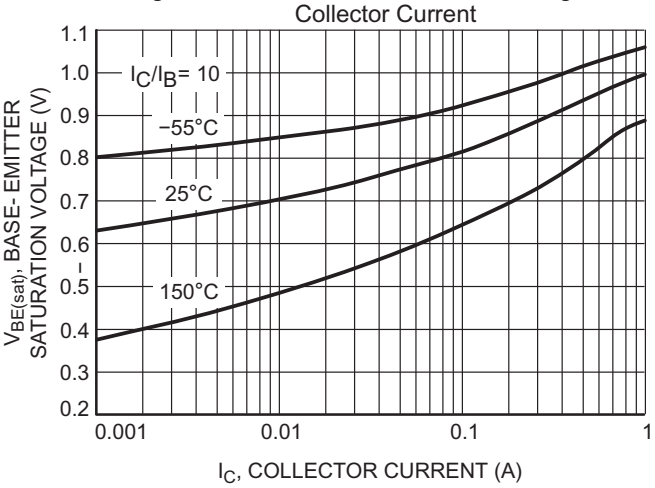


Figure 12. Base Emitter Saturation Voltage vs. Collector Current



Rating and characteristic curves (HMBT2907 / HMBT2907A)

TYPICAL SMALL − SIGNAL Characteristics

NOISE FIGURE

V_{CE} = 10 Vdc, T_A = 25°C

Figure 13. Base Emitter Voltage vs. Collector Current

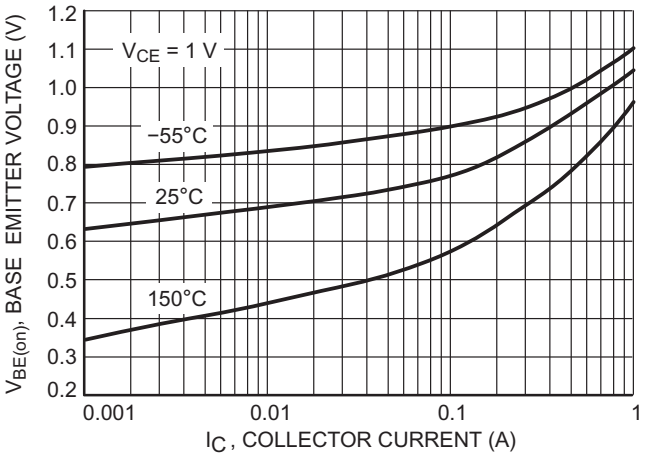


Figure 14. Temperature Coefficients

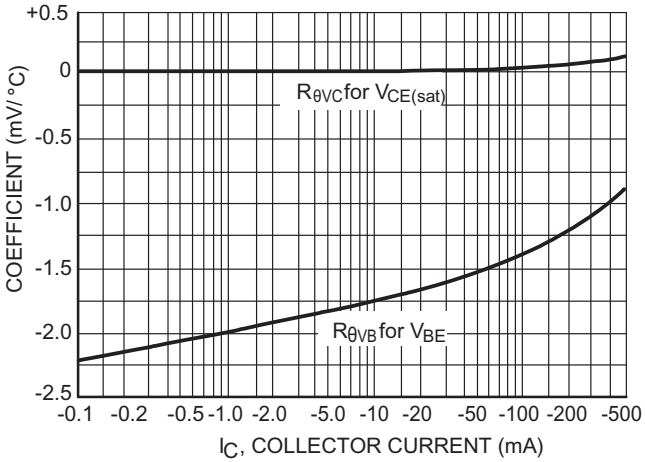
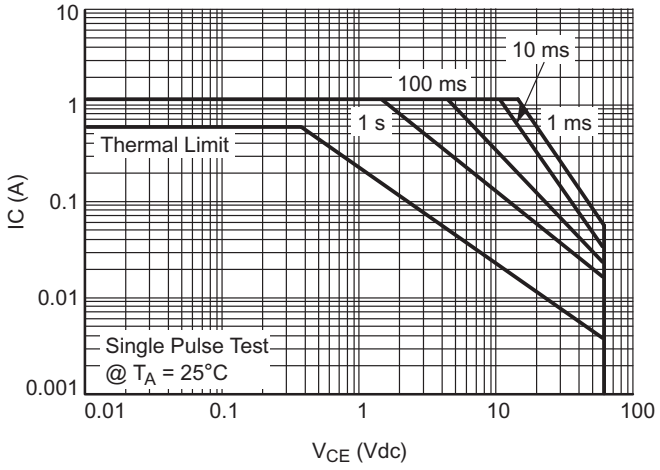
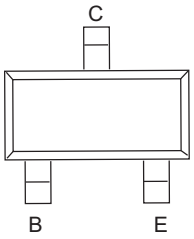
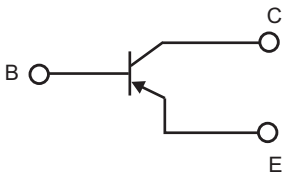


Figure 15. Safe Operating Area



HMBT2907 / HMBT2907A

Pinning information

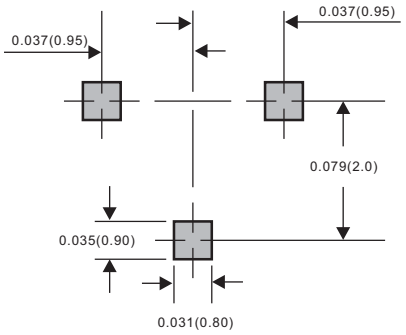
Pin	Simplified outline	Symbol
PinB Base PinC Collector PinE Emitter		

Marking

Type number	Marking code
HMBT2907	M2B
HMBT2907A	2F

Suggested solder pad layout

SOT-23



Dimensions in inches and (millimeters)