

# MMBT2907ALT1

## General Purpose Transistors

### PNP Silicon

#### Features

- Pb-Free Packages are Available

#### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector - Emitter Voltage	$V_{CEO}$	-60	Vdc
Collector - Base Voltage	$V_{CBO}$	-60	Vdc
Emitter - Base Voltage	$V_{EBO}$	-5.0	Vdc
Collector Current - Continuous	$I_C$	-600	mAdc
Collector Current - Peak (Note 3)	$I_{CM}$	-1200	mAdc

#### THERMAL CHARACTERISTICS

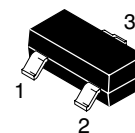
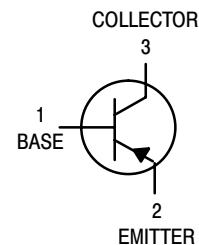
Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board (Note 1) @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	225 1.8	mW mW/ $^\circ\text{C}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	556	$^\circ\text{C}/\text{W}$
Total Device Dissipation Alumina Substrate, (Note 2) @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	300 2.4	mW mW/ $^\circ\text{C}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	417	$^\circ\text{C}/\text{W}$
Junction and Storage Temperature	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

- FR-5 =  $1.0 \times 0.75 \times 0.062$  in.
- Alumina =  $0.4 \times 0.3 \times 0.024$  in. 99.5% alumina.
- Reference SOA curve.

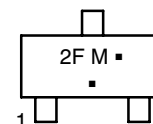


ON Semiconductor®



SOT-23 (TO-236AB)  
CASE 318  
STYLE 6

#### MARKING DIAGRAM



- 2F = Device Code  
M = Date Code\*  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

\*Date Code orientation and/or overbar may vary depending upon manufacturing location.

#### ORDERING INFORMATION

Device	Package	Shipping†
MMBT2907ALT1	SOT-23	3000 Tape & Reel
MMBT2907ALT1G	SOT-23 (Pb-Free)	3000 Tape & Reel
MMBT2907ALT3	SOT-23	10,000 Tape & Reel
MMBT2907ALT3G	SOT-23 (Pb-Free)	10,000 Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

# MMBT2907ALT1

## ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Collector-Emitter Breakdown Voltage (Note 4) ( $I_C = -1.0\text{ mA}$ , $I_B = 0$ ) ( $I_C = -10\text{ mA}$ , $I_B = 0$ )	$V_{(BR)CEO}$	-60 -60	-	Vdc
Collector-Base Breakdown Voltage ( $I_C = -10\ \mu\text{A}$ , $I_E = 0$ )	$V_{(BR)CBO}$	-60	-	Vdc
Emitter-Base Breakdown Voltage ( $I_E = -10\ \mu\text{A}$ , $I_C = 0$ )	$V_{(BR)EBO}$	-5.0	-	Vdc
Collector Cutoff Current ( $V_{CE} = -30\text{ Vdc}$ , $V_{EB(off)} = -0.5\text{ Vdc}$ )	$I_{CEX}$	-	-50	nAdc
Collector Cutoff Current ( $V_{CB} = -50\text{ Vdc}$ , $I_E = 0$ ) ( $V_{CB} = -50\text{ Vdc}$ , $I_E = 0$ , $T_A = 125^\circ\text{C}$ )	$I_{CBO}$	-	-0.010 -10	$\mu\text{Adc}$
Base Cutoff Current ( $V_{CE} = -30\text{ Vdc}$ , $V_{EB(off)} = -0.5\text{ Vdc}$ )	$I_{BL}$	-	-50	nAdc

## ON CHARACTERISTICS

DC Current Gain ( $I_C = -0.1\text{ mA}$ , $V_{CE} = -10\text{ Vdc}$ ) ( $I_C = -1.0\text{ mA}$ , $V_{CE} = -10\text{ Vdc}$ ) ( $I_C = -10\text{ mA}$ , $V_{CE} = -10\text{ Vdc}$ ) ( $I_C = -150\text{ mA}$ , $V_{CE} = -10\text{ Vdc}$ ) ( $I_C = -500\text{ mA}$ , $V_{CE} = -10\text{ Vdc}$ ) (Note 4)	$h_{FE}$	75 100 100 100 50	-	-
Collector-Emitter Saturation Voltage (Note 4) ( $I_C = -150\text{ mA}$ , $I_B = -15\text{ mA}$ ) (Note 4) ( $I_C = -500\text{ mA}$ , $I_B = -50\text{ mA}$ )	$V_{CE(sat)}$	-	-0.4 -1.6	Vdc
Base-Emitter Saturation Voltage (Note 4) ( $I_C = -150\text{ mA}$ , $I_B = -15\text{ mA}$ ) ( $I_C = -500\text{ mA}$ , $I_B = -50\text{ mA}$ )	$V_{BE(sat)}$	-	-1.3 -2.6	Vdc

## SMALL-SIGNAL CHARACTERISTICS

Current-Gain - Bandwidth Product (Notes 4, 5), ( $I_C = -50\text{ mA}$ , $V_{CE} = -20\text{ Vdc}$ , $f = 100\text{ MHz}$ )	$f_T$	200	-	MHz
Output Capacitance ( $V_{CB} = -10\text{ Vdc}$ , $I_E = 0$ , $f = 1.0\text{ MHz}$ )	$C_{obo}$	-	8.0	pF
Input Capacitance ( $V_{EB} = -2.0\text{ Vdc}$ , $I_C = 0$ , $f = 1.0\text{ MHz}$ )	$C_{ibo}$	-	30	pF

## SWITCHING CHARACTERISTICS

Turn-On Time	$(V_{CC} = -30\text{ Vdc}, I_C = -150\text{ mA}, I_{B1} = -15\text{ mA})$	$t_{on}$	-	45	ns
Delay Time		$t_d$	-	10	
Rise Time		$t_r$	-	40	
Turn-Off Time	$(V_{CC} = -6.0\text{ Vdc}, I_C = -150\text{ mA}, I_{B1} = I_{B2} = -15\text{ mA})$	$t_{off}$	-	100	
Storage Time		$t_s$	-	80	
Fall Time		$t_f$	-	30	

4. Pulse Test: Pulse Width  $\leq 300\ \mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .  
5.  $f_T$  is defined as the frequency at which  $|h_{fe}|$  extrapolates to unity.

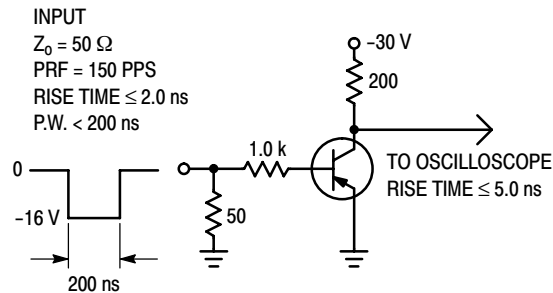


Figure 1. Delay and Rise Time Test Circuit

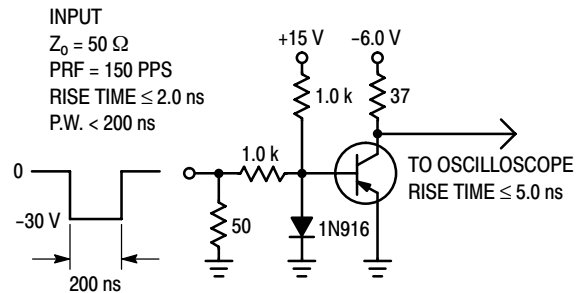
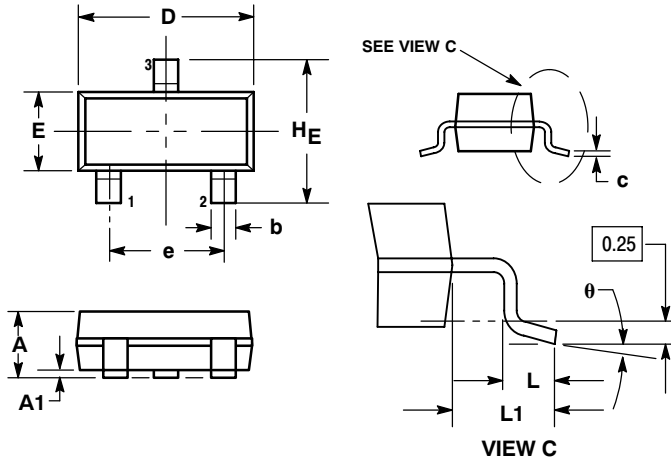


Figure 2. Storage and Fall Time Test Circuit

# MMBT2907ALT1

## PACKAGE DIMENSIONS

SOT-23 (TO-236)  
CASE 318-08  
ISSUE AN



NOTES:

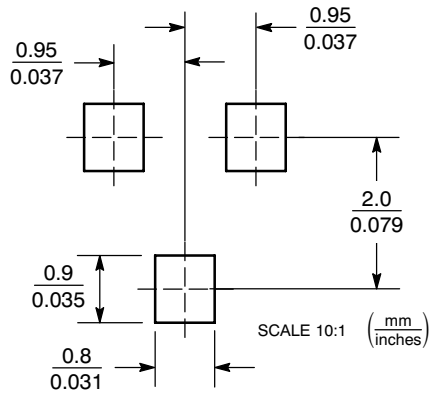
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. 318-01 THRU -07 AND -09 OBSOLETE, NEW STANDARD 318-08.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.89	1.00	1.11	0.035	0.040	0.044
A1	0.01	0.06	0.10	0.001	0.002	0.004
b	0.37	0.44	0.50	0.015	0.018	0.020
c	0.09	0.13	0.18	0.003	0.005	0.007
D	2.80	2.90	3.04	0.110	0.114	0.120
E	1.20	1.30	1.40	0.047	0.051	0.055
e	1.78	1.90	2.04	0.070	0.075	0.081
L	0.10	0.20	0.30	0.004	0.008	0.012
L1	0.35	0.54	0.69	0.014	0.021	0.029
HE	2.10	2.40	2.64	0.083	0.094	0.104

STYLE 6:

1. BASE
2. EMITTER
3. COLLECTOR

### SOLDERING FOOTPRINT\*



\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.