



## DESCRIPTION

The MBT2907AL is available in SOT-23 Package.

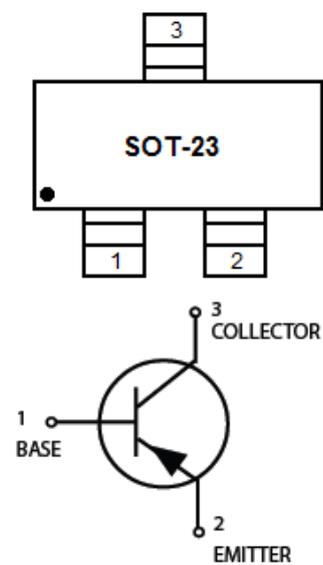
## FEATURES

- Available in SOT-23 Package

## ORDERING INFORMATION

Package Type	Part Number
SOT-23	MBT2907AL
Note	SPQ: 3,000pcs / Reel
AiT provides all RoHS Compliant Products	

## PIN DESCRIPTION





## ABSOLUTE MAXIMUM RATINGS

$T_A = 25^\circ\text{C}$

$V_{CEO}$ , Collector-Emitter Voltage	-40Vdc ~ -60Vdc
$V_{CBO}$ , Collector-Base Voltage	-60Vdc
$V_{EBO}$ , Emitter-Base Voltage	-5.0Vdc
$I_C$ , Collector Current-Continuous	-600mAdc

Stresses above may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated in the Electrical Characteristics are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

## THERMAL CHARACTERISTICS

Parameter	Symbol	Max	Unit
Total Device Dissipation FR-5 Board <sup>NOTE1</sup> $T_A = 25^\circ\text{C}$ 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 <sup>NOTE2</sup> $T_A = 25^\circ\text{C}$ 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	$^\circ\text{C}$

NOTE1: FR-5 = 1.0 x 0.75 x 0.062 in.

NOTE2: Alumina = 0.4 x 0.3 x 0.024 in. 99.5% alumina.



## ELECTRICAL CHARACTERISTICS

T<sub>A</sub> = 25°C unless otherwise noted.

Parameter	Symbol	Conditions	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>					
Collector-Emitter Breakdown Voltage <sup>NOTE3</sup>	V <sub>(BR)CEO</sub>	I <sub>C</sub> = -10mA <sub>dc</sub> , I <sub>B</sub> = 0	-60	-	V <sub>dc</sub>
Collector-Emitter Breakdown Voltage	V <sub>(BR)CBO</sub>	I <sub>C</sub> = -10μA <sub>dc</sub> , I <sub>E</sub> = 0	-60	-	V <sub>dc</sub>
Emitter-Base Breakdown Voltage	V <sub>(BR)EBO</sub>	I <sub>E</sub> = -10μA <sub>dc</sub> , I <sub>C</sub> = 0	-5.0	-	V <sub>dc</sub>
Collector Cutoff Current	I <sub>CEX</sub>	V <sub>CB</sub> = -30V <sub>dc</sub> , V <sub>BE(OFF)</sub> = -0.5V <sub>dc</sub>	-	-50	nA <sub>dc</sub>
Collector Cutoff Current	I <sub>CBO</sub>	V <sub>CB</sub> = -50V <sub>dc</sub> , I <sub>E</sub> = 0	-	-0.010	μA <sub>dc</sub>
		V <sub>CB</sub> = -50V <sub>dc</sub> , I <sub>E</sub> = 0, T <sub>A</sub> = 125°C	-	-10	
Base Current	I <sub>B</sub>	V <sub>CE</sub> = -30V <sub>dc</sub> , V <sub>EB(OFF)</sub> = -0.5V <sub>dc</sub>	-	-50	nA <sub>dc</sub>
<b>ON CHARACTERISTICS</b>					
DC Current Gain	h <sub>FE</sub>	I <sub>C</sub> = -0.1mA <sub>dc</sub> , V <sub>CE</sub> = -10V <sub>dc</sub>	75	-	-
		I <sub>C</sub> = -10mA <sub>dc</sub> , V <sub>CE</sub> = -10V <sub>dc</sub>	100	-	
		I <sub>C</sub> = -1.0mA <sub>dc</sub> , V <sub>CE</sub> = -10V <sub>dc</sub>	100	-	
		I <sub>C</sub> = -150mA <sub>dc</sub> , V <sub>CE</sub> = -10V <sub>dc</sub> <sup>NOTE3</sup>	100	300	
		I <sub>C</sub> = -500mA <sub>dc</sub> , V <sub>CE</sub> = -10V <sub>dc</sub> <sup>NOTE3</sup>	50	-	
Collector-Emitter Saturation Voltage <sup>NOTE3</sup>	V <sub>CE(sat)</sub>	I <sub>C</sub> = -150mA <sub>dc</sub> , I <sub>B</sub> = -15mA <sub>dc</sub>	-	-0.4	V <sub>dc</sub>
		I <sub>C</sub> = -500mA <sub>dc</sub> , I <sub>B</sub> = -50mA <sub>dc</sub>	-	-1.6	
Base-Emitter Saturation Voltage <sup>NOTE3</sup>	V <sub>BE(sat)</sub>	I <sub>C</sub> = -150mA <sub>dc</sub> , I <sub>B</sub> = -15mA <sub>dc</sub>	-	-1.3	V <sub>dc</sub>
		I <sub>C</sub> = -500mA <sub>dc</sub> , I <sub>B</sub> = -50mA <sub>dc</sub>	-	-2.6	
<b>SMALL-SIGNAL CHARACTERISTICS</b>					
Current-Gain-Bandwidth Product <sup>NOTE3,4</sup>	f <sub>T</sub>	I <sub>C</sub> = -50mA <sub>dc</sub> , V <sub>CE</sub> = -20V <sub>dc</sub> , f = 100MHz	200	-	MHz
Output Capacitance	C <sub>obo</sub>	V <sub>CB</sub> = -10V <sub>dc</sub> , I <sub>E</sub> = 0, f = 1.0MHz	-	8.0	pF
Input Capacitance	C <sub>ibo</sub>	V <sub>EB</sub> = -2.0V <sub>dc</sub> , I <sub>C</sub> = 0, f = 1.0MHz	-	30	pF
Turn-On Time	t <sub>on</sub>	V <sub>CC</sub> = -30V <sub>dc</sub> , I <sub>C</sub> = -150mA <sub>dc</sub> , I <sub>B1</sub> = -15mA <sub>dc</sub>	-	45	ns
Delay Time	t <sub>d</sub>		-	10	
Rise Time	t <sub>r</sub>		-	40	
Fall Time	t <sub>f</sub>	V <sub>CC</sub> = -6.0V <sub>dc</sub> , I <sub>C</sub> = -150mA <sub>dc</sub> , I <sub>B1</sub> = I <sub>B2</sub> = 15mA <sub>dc</sub>	-	30	ns
Storage Time	t <sub>s</sub>		-	80	
Turn-Off Time	t <sub>off</sub>		-	100	

NOTE3: Pulse Test: Pulse Width < 300 μs, Duty Cycle < 2.0%.

NOTE4: f<sub>T</sub> is defined as the frequency at which |h<sub>f e</sub>| extrapolates to unity.



**TYPICAL CHARACTERISTICS**

Figure 1. Delay and Rise Time Test Circuit

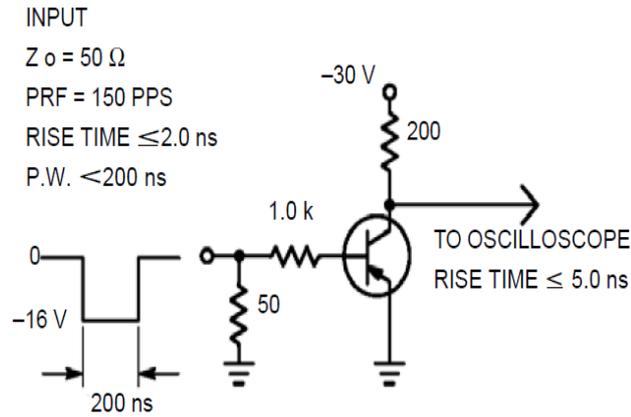


Figure 2. Storage and Fall Time Test Circuit

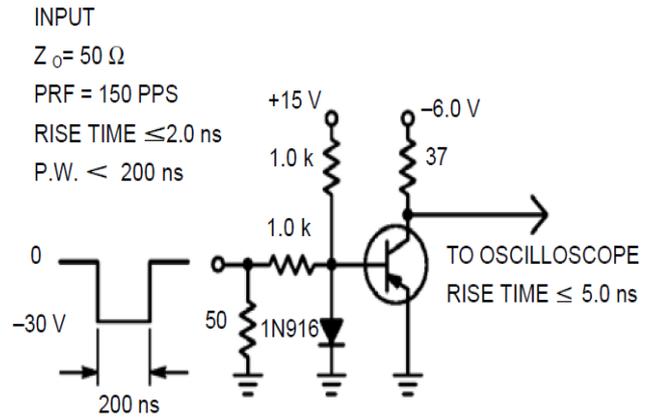


Figure 3. DC Current Gain

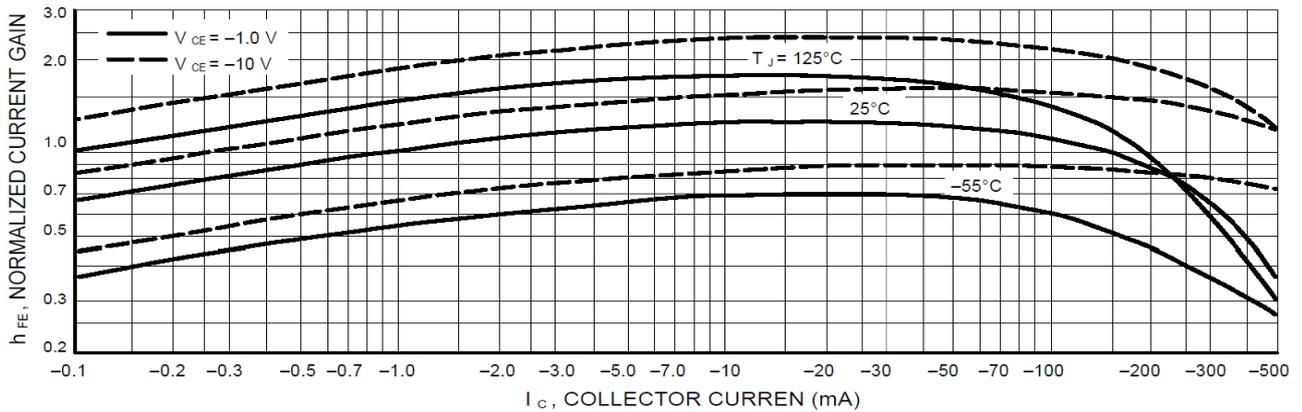


Figure 4. Collector Saturation Region

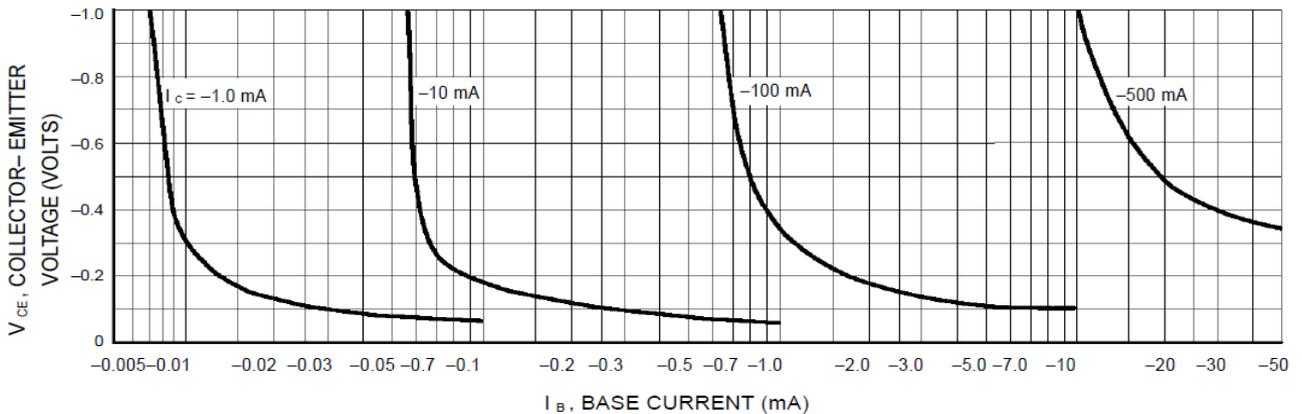




Figure 5. Turn-On Time

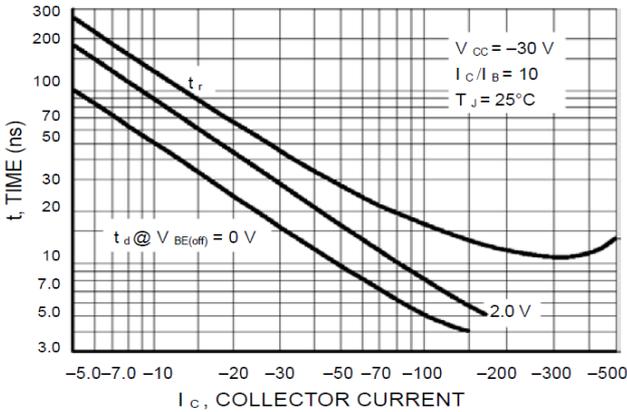
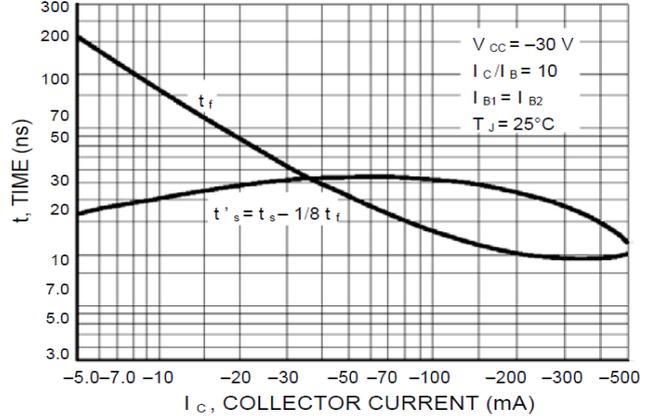


Figure 6. Turn-Off Time



**TYPICAL SMALL-SIGNAL CHARACTERISTICS, NOISE FIGURE ( $V_{CE} = 10V_{dc}$ ,  $T_A = 25^\circ C$ )**

Figure 7. Frequency Effects

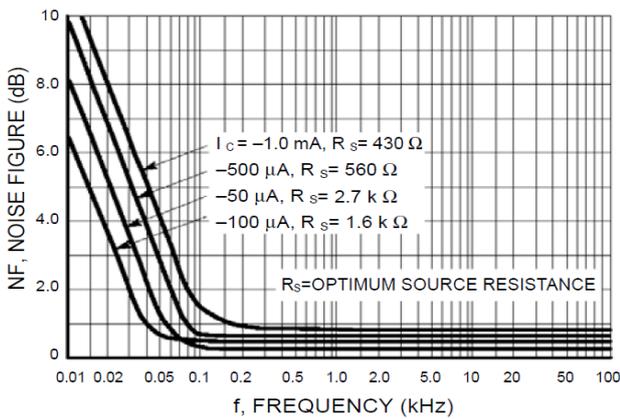


Figure 8. Source Resistance Effects

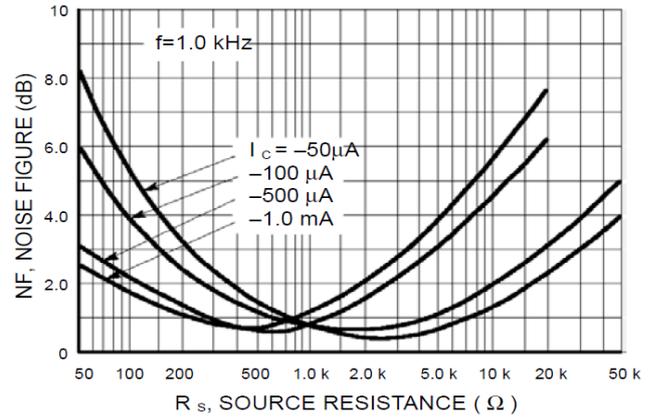


Figure 9. Capacitances

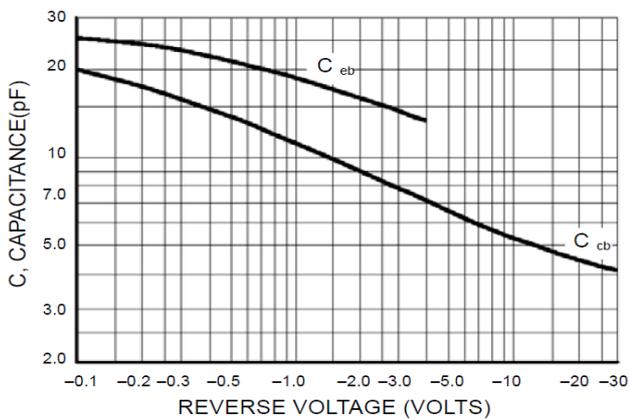


Figure 10. Current-Gain — Bandwidth Product

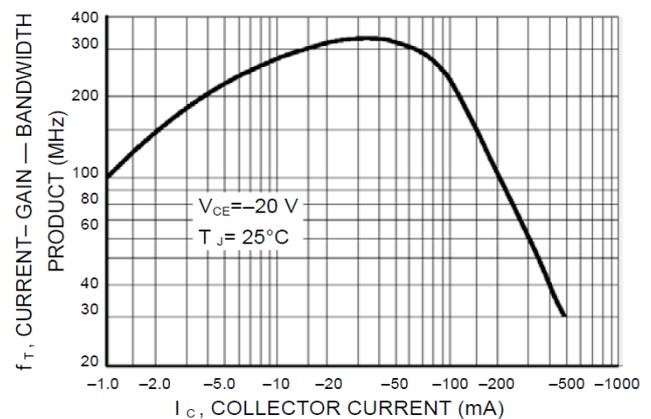




Figure 11. "On" Voltage

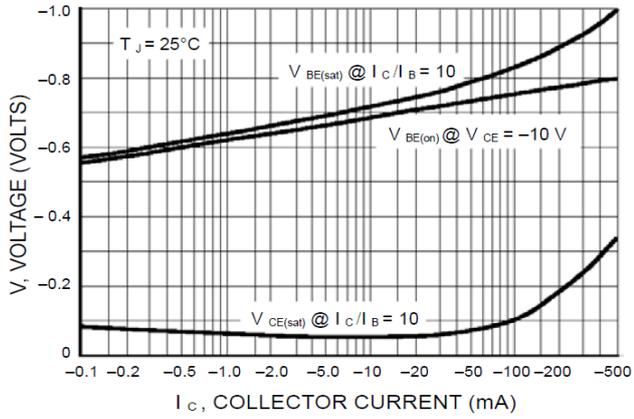
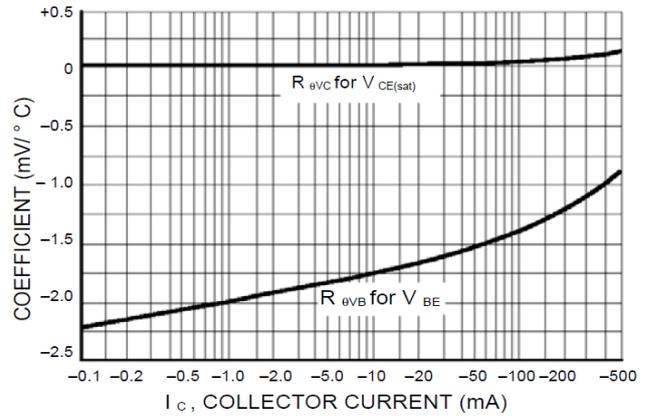


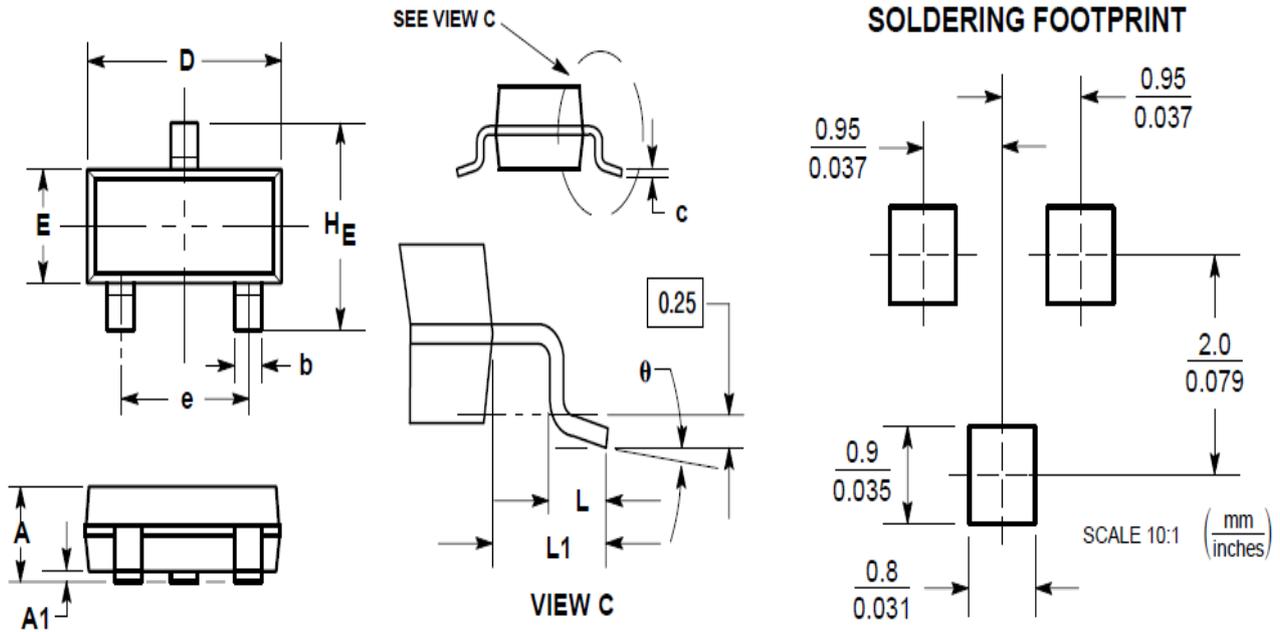
Figure 12. Temperature Coefficients





**PACKAGE INFORMATION**

Dimension in SOT-23 Package (Unit: mm)



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.035	0.044	0.89	1.11
A1	0.001	0.004	0.01	0.10
b	0.015	0.020	0.37	0.50
c	0.003	0.007	0.09	0.18
D	0.110	0.120	2.80	3.04
E	0.047	0.055	1.20	1.40
e	0.070	0.081	1.78	2.04
L	0.004	0.012	0.10	0.30
L1	0.014	0.029	0.35	0.69
HE	0.083	0.104	2.10	2.64



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