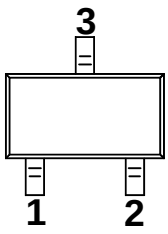
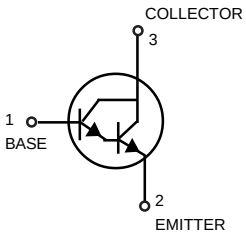
Darlington Amplifier Transistors

SOT–23 (TO–236AB)





MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	V_{CES}	30	Vdc
Collector–Base Voltage	V_{CBO}	30	Vdc
Emitter–Base Voltage	V_{EBO}	10	Vdc
Collector Current — Continuous	I_C	300	mAdc

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
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
Junction and Storage Temperature	T_J , T_{stg}	–55 to +150	°C

DEVICE MARKING

MMBTA13=1M ;MMBTA14=1N

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector–Emitter Breakdown Voltage (I_C = 100 µAdc, V_{BE} = 0)	$V_{(BR)CEO}$	30	—	Vdc
Collector Cutoff Current (V_{CB} = 30Vdc, I_E = 0)	I_{CBO}	—	100	nAdc
Emitter Cutoff Current (V_{EB} = 10Vdc, I_C = 0)	I_{EBO}	—	100	nAdc

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.

DEVICE CHARACTERISTICS

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

Characteristic		Symbol	Min	Max	Unit
ON CHARACTERISTICS (3)					
DC Current Gain		h_{FE}			—
(I_C = 10 mAdc, V_{CE} = 5.0 Vdc)	MMBTA13		5,000	—	
	MMBTA14		10,000	—	
(I_C = 100mAdc, V_{CE} = 5.0Vdc)	MMBTA13		10,000	—	
	MMBTA14		20,000	—	
Collector–Emitter Saturation Voltage (I_C = 100 mAdc, I_B = 0.1 mAdc)		$V_{CE(sat)}$	—	1.5	Vdc
Base–Emitter On Voltage (I_C = 100mAdc, V_{CE} = 5.0Vdc)		V_{BE}	—	2.0	Vdc
SMALL–SIGNAL CHARACTERISTICS					
Current – Gain–Bandwidth Product(4) (V_{CE} = 5.0 Vdc, I_C = 10mAdc, f = 100 MHz)		f_T	125	—	MHz

3. Pulse Test: Pulse Width ≤300 μs, Duty Cycle ≤2.0%.

4. $f_T = |h f_e| * f_{test}$.

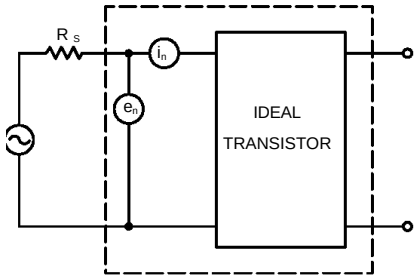

Figure 1. Transistor Noise Model

DEVICE CHARACTERISTICS

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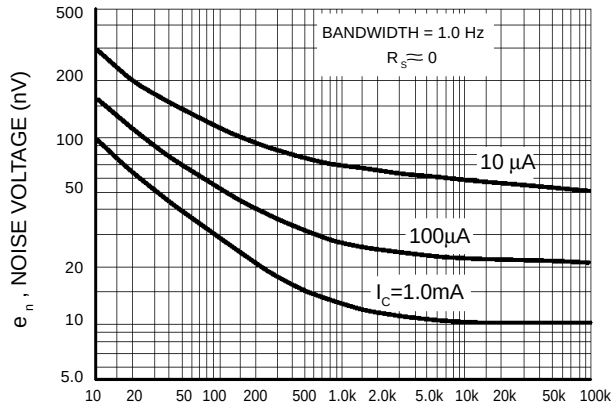
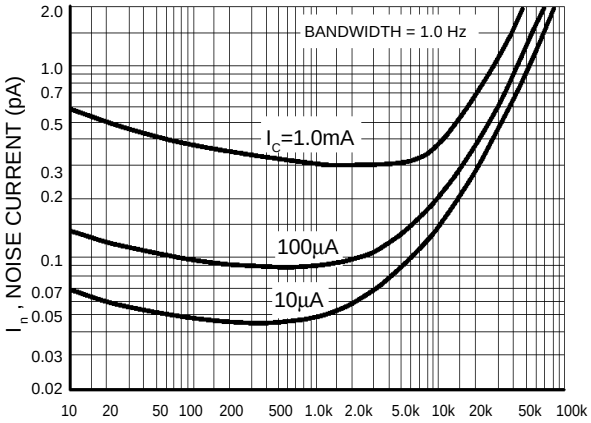
NOISE CHARACTERISTICS

(V_{CE} = 5.0 Vdc, T_A = 25°C)



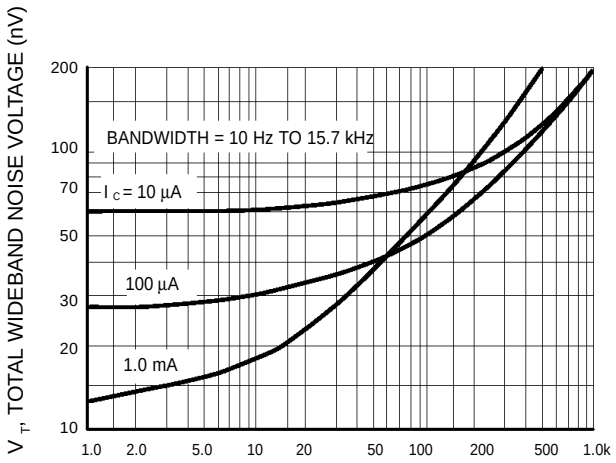
f, FREQUENCY (Hz)

Figure 2. Noise Voltage



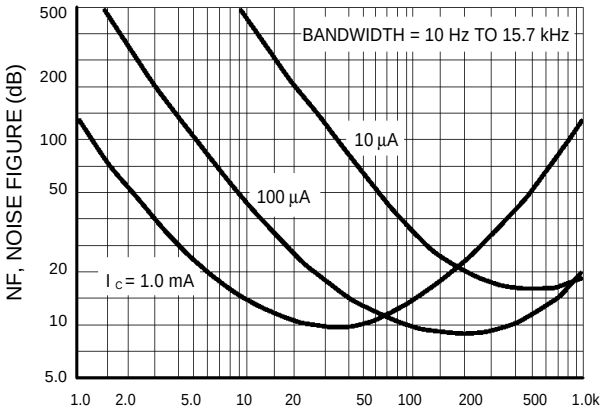
f, FREQUENCY (Hz)

Figure 3. Noise Current



R_S, SOURCE RESISTANCE (kΩ)

Figure 4. Total Wideband Noise Voltage



R_S, SOURCE RESISTANCE (kΩ)

Figure 5. Wideband Noise Figure

DEVICE CHARACTERISTICS

MMBTA13/14

SMALL–SIGNAL CHARACTERISTICS

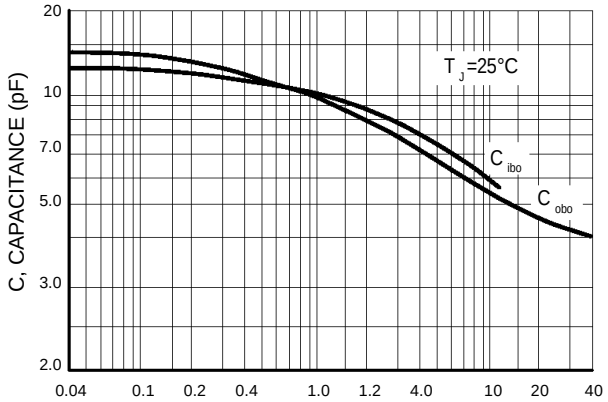


Figure 6. Capacitance

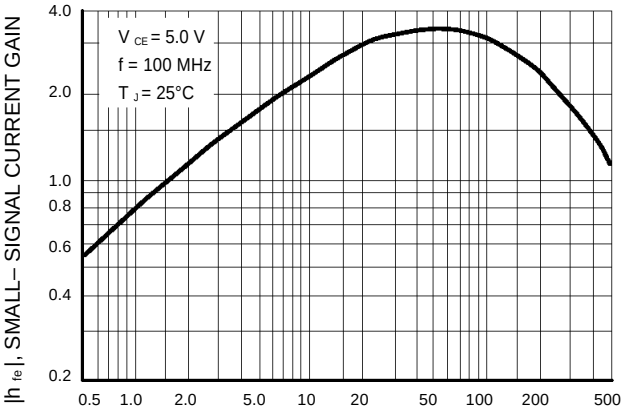


Figure 7. High Frequency Current Gain

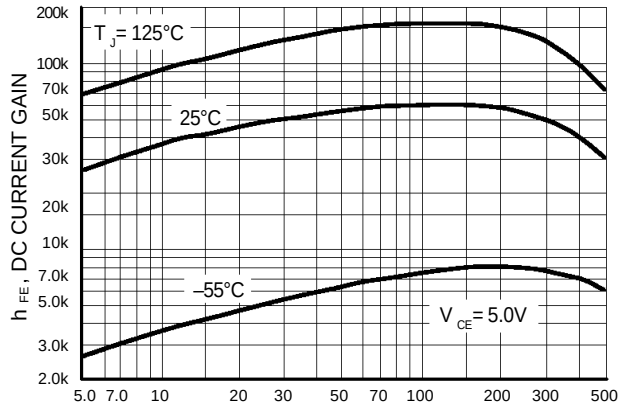


Figure 8. DC Current Gain

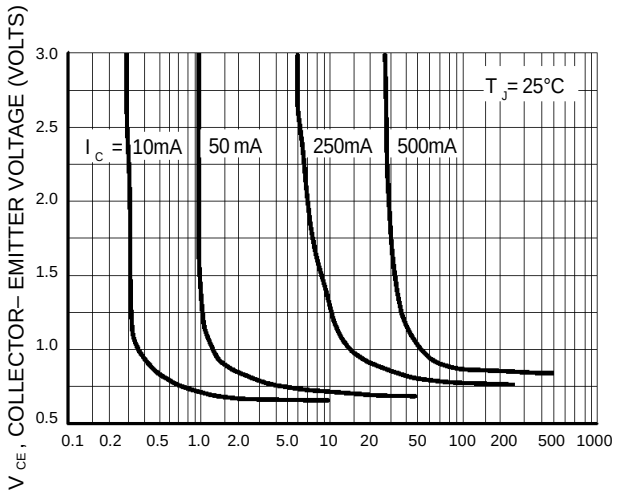


Figure 9. Collector Saturation Region

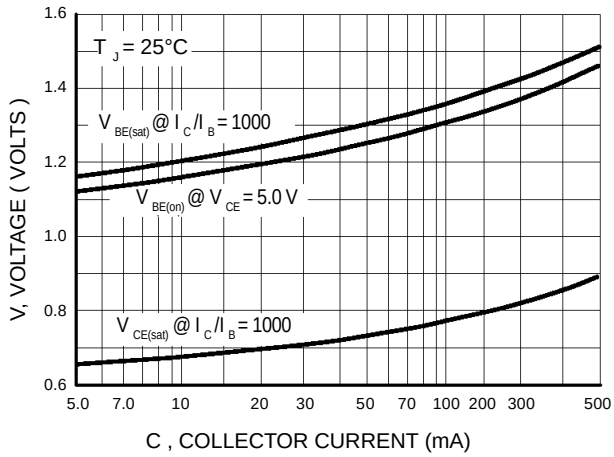


Figure 10. “ON” Voltages

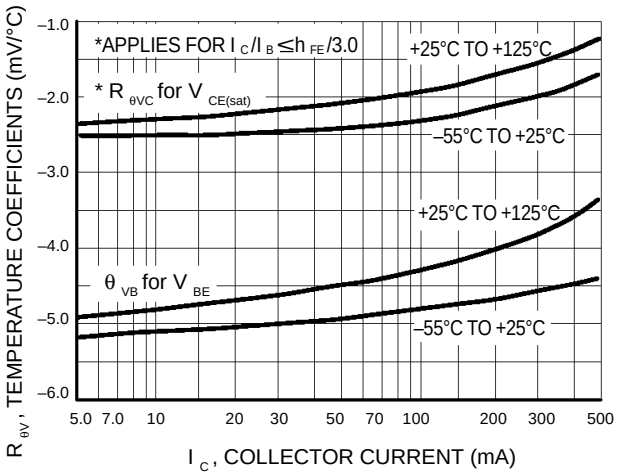


Figure 11. Temperature Coefficients

DEVICE CHARACTERISTICS

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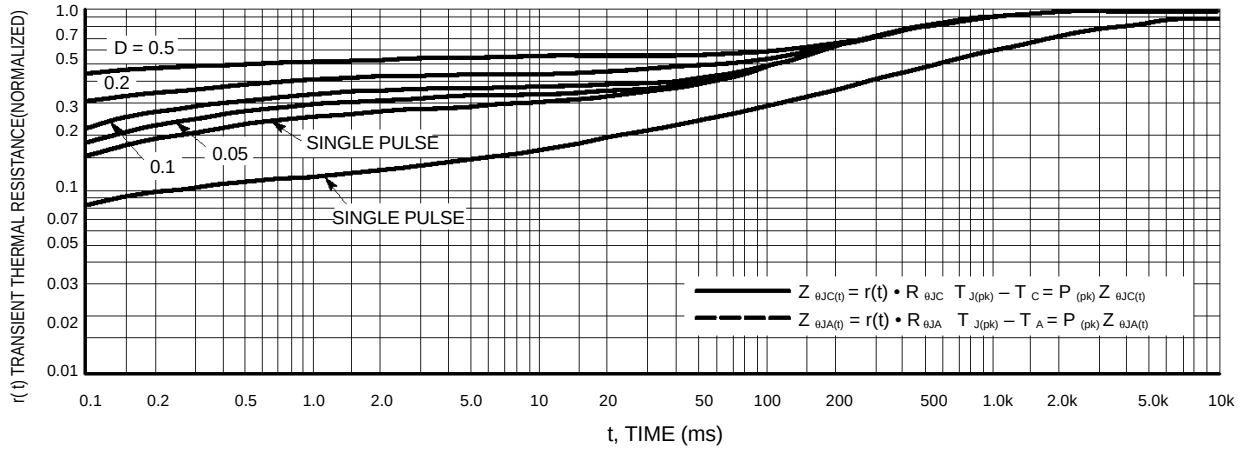


Figure 12. Thermal Response

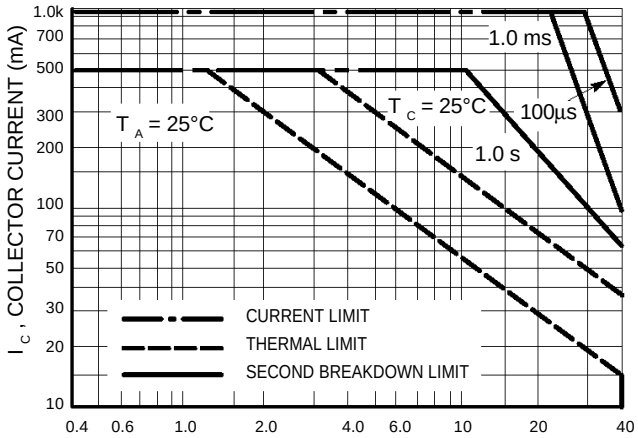
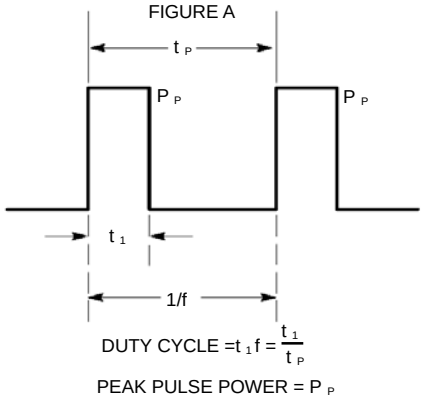


Figure 13.Active Region Safe Operating Area

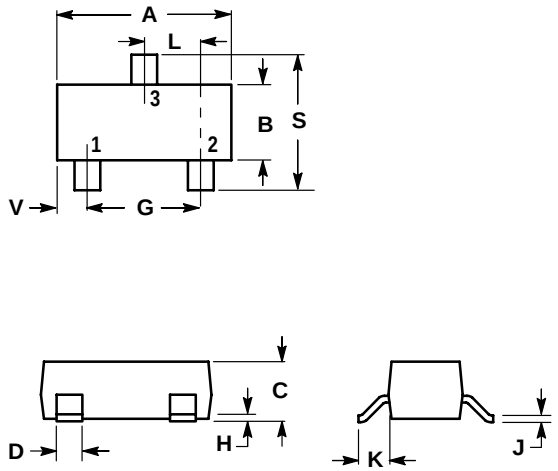


Design Note: Use of Transient Thermal Resistance Data

PACKAGE OUTLINE & DIMENSIONS

MMBTA13/14

SOT–23



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M,1982
2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.1102	0.1197	2.80	3.04
B	0.0472	0.0551	1.20	1.40
C	0.0350	0.0440	0.89	1.11
D	0.0150	0.0200	0.37	0.50
G	0.0701	0.0807	1.78	2.04
H	0.0005	0.0040	0.013	0.100
J	0.0034	0.0070	0.085	0.177
K	0.0140	0.0285	0.35	0.69
L	0.0350	0.0401	0.89	1.02
S	0.0830	0.1039	2.10	2.64
V	0.0177	0.0236	0.45	0.60