

MMBTA13LT1G, MMBTA14LT1G

Darlington Amplifier Transistors

NPN Silicon



ON Semiconductor®

<http://onsemi.com>

Features

- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

MAXIMUM RATINGS

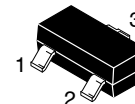
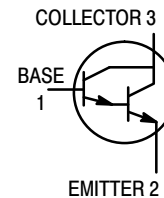
Rating	Symbol	Value	Unit
Collector - Emitter Voltage	V_{CES}	30	Vdc
Collector - Base Voltage	V_{CBO}	30	Vdc
Emitter - Base Voltage	V_{EBO}	10	Vdc
Collector Current - Continuous	I_C	300	mAdc

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board (Note 1) $T_A = 25^\circ\text{C}$ Derate above 25°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°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	$^\circ\text{C}$

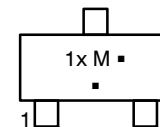
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. FR-5 = $1.0 \times 0.75 \times 0.062$ in.
2. Alumina = $0.4 \times 0.3 \times 0.024$ in. 99.5% alumina.



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

MARKING DIAGRAM



1x = Device Code
 x = M for MMBTA13LT1
 x = N for MMBTA14LT1
 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†
MMBTA13LT1G	SOT-23 (Pb-Free)	3,000 / Tape & Reel
MMBTA14LT1G	SOT-23 (Pb-Free)	3,000 / 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.

MMBTA13LT1G, MMBTA14LT1G

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)CES}	30	-	Vdc
Collector Cutoff Current (V _{CB} = 30 Vdc, I _E = 0)	I _{CBO}	-	100	nAdc
Emitter Cutoff Current (V _{EB} = 10 Vdc, I _C = 0)	I _{EBO}	-	100	nAdc
ON CHARACTERISTICS (Note 3)				
DC Current Gain (I _C = 10 mAdc, V _{CE} = 5.0 Vdc)	h _{FE}	MMBTA13	5000	-
		MMBTA14	10,000	-
	h _{FE}	MMBTA13	10,000	-
(I _C = 100 mAdc, V _{CE} = 5.0 Vdc)		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 = 100 mAdc, V _{CE} = 5.0 Vdc)	V _{BE}	-	2.0	Vdc
SMALL-SIGNAL CHARACTERISTICS				
Current - Gain - Bandwidth Product (Note 4) (I _C = 10 mAdc, V _{CE} = 5.0 Vdc, f = 100 MHz)	f _T	125	-	MHz

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

4. $f_T = |h_{fe}| \cdot f_{test}$.

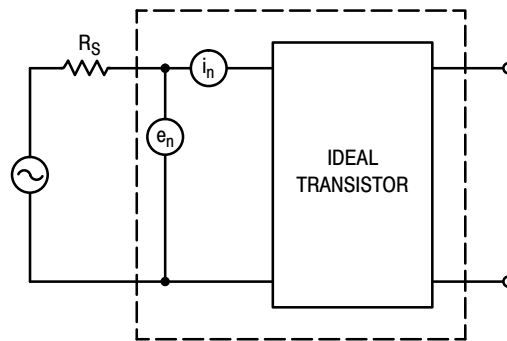


Figure 1. Transistor Noise Model

MMBTA13LT1G, MMBTA14LT1G

NOISE CHARACTERISTICS

($V_{CE} = 5.0 \text{ Vdc}$, $T_A = 25^\circ\text{C}$)

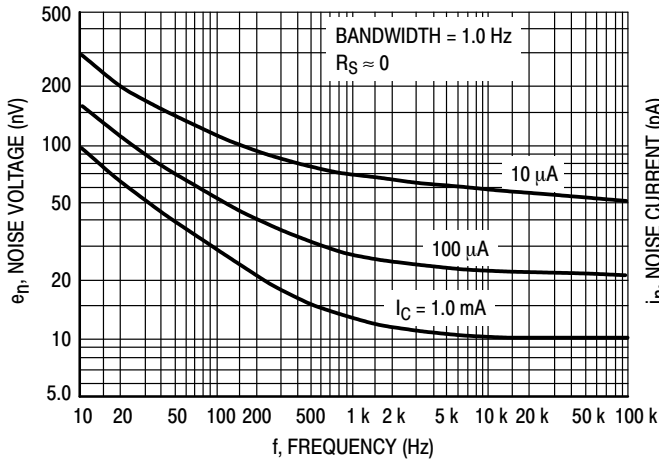


Figure 2. Noise Voltage

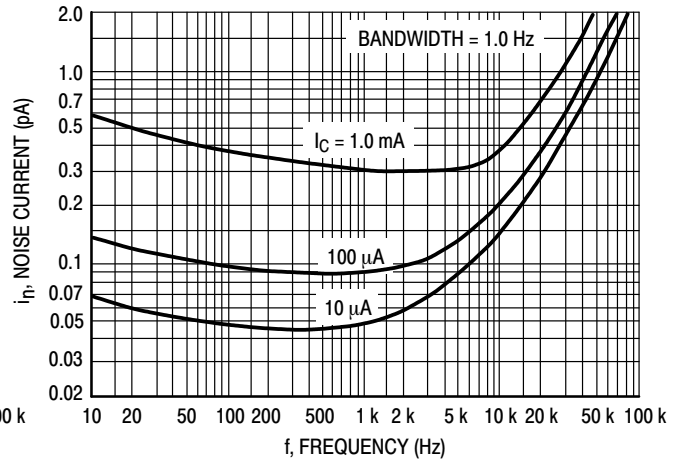


Figure 3. Noise Current

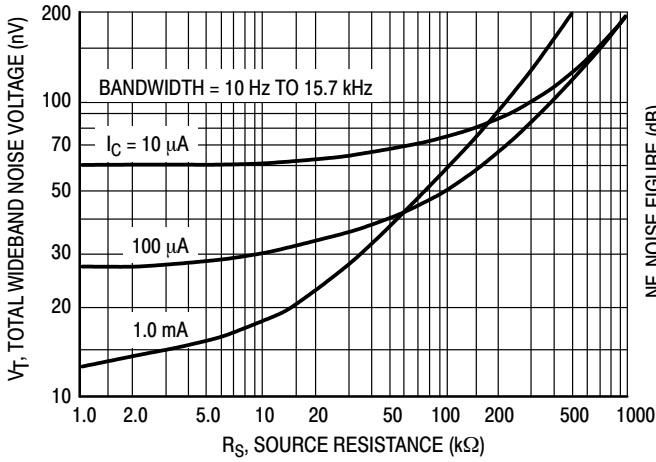


Figure 4. Total Wideband Noise Voltage

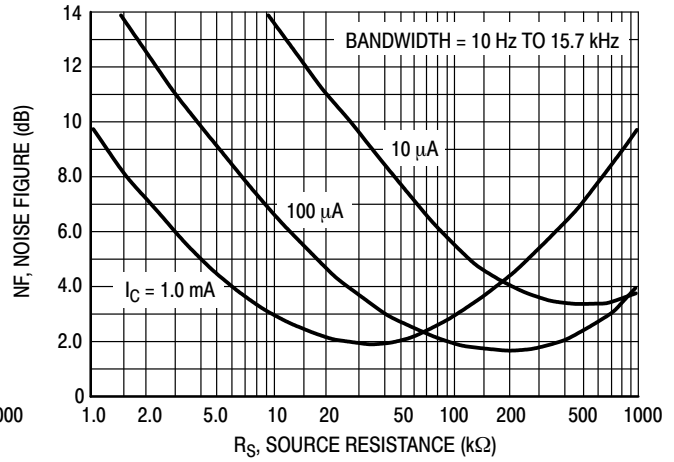


Figure 5. Wideband Noise Figure

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SMALL-SIGNAL CHARACTERISTICS

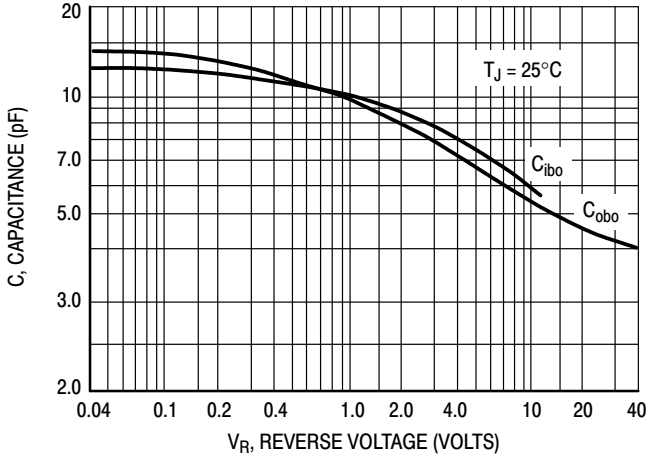


Figure 6. Capacitance

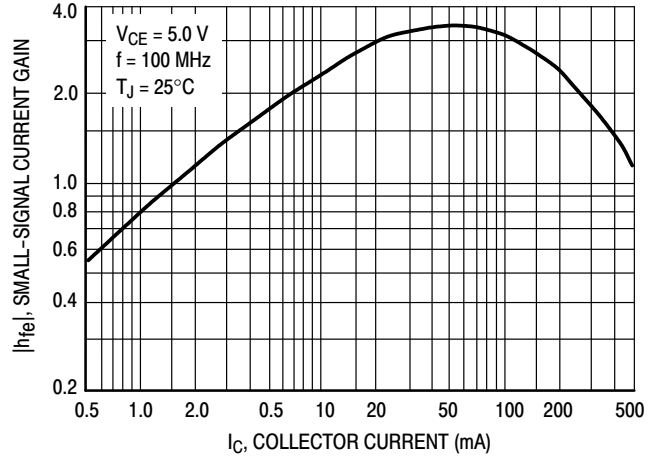


Figure 7. High Frequency Current Gain

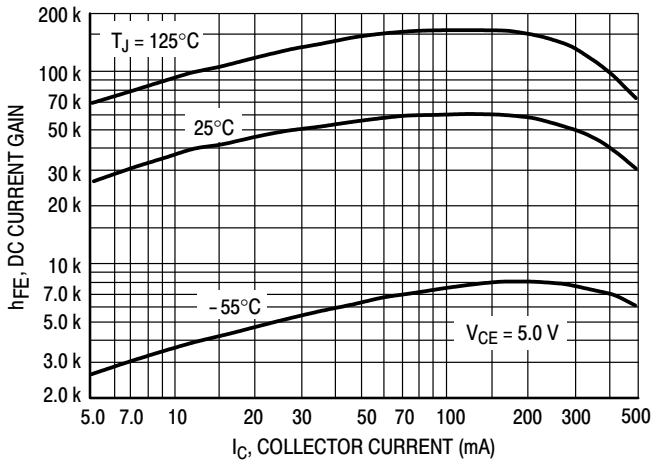


Figure 8. DC Current Gain

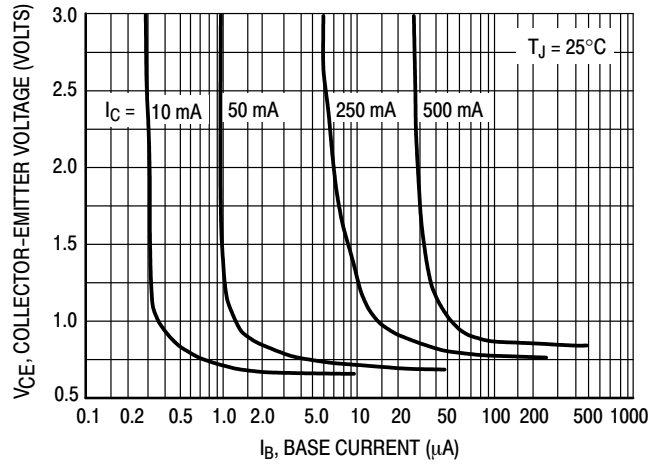


Figure 9. Collector Saturation Region

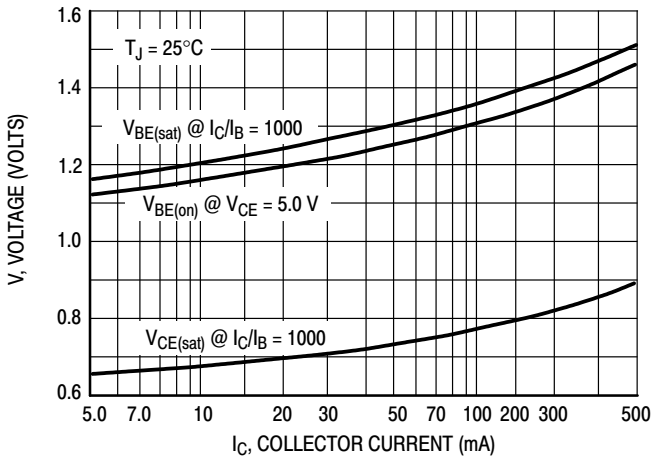


Figure 10. "On" Voltages

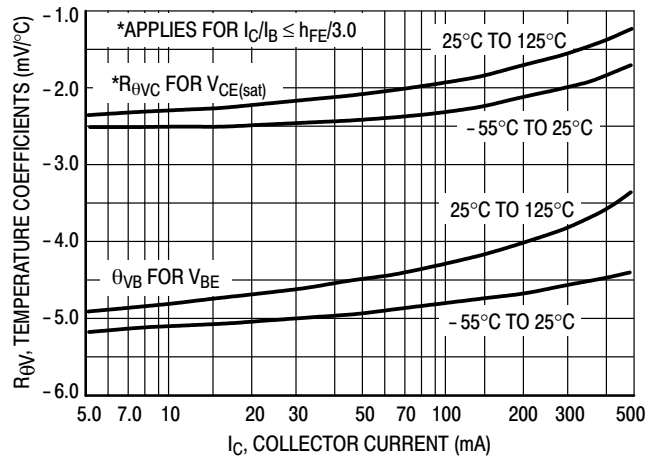


Figure 11. Temperature Coefficients

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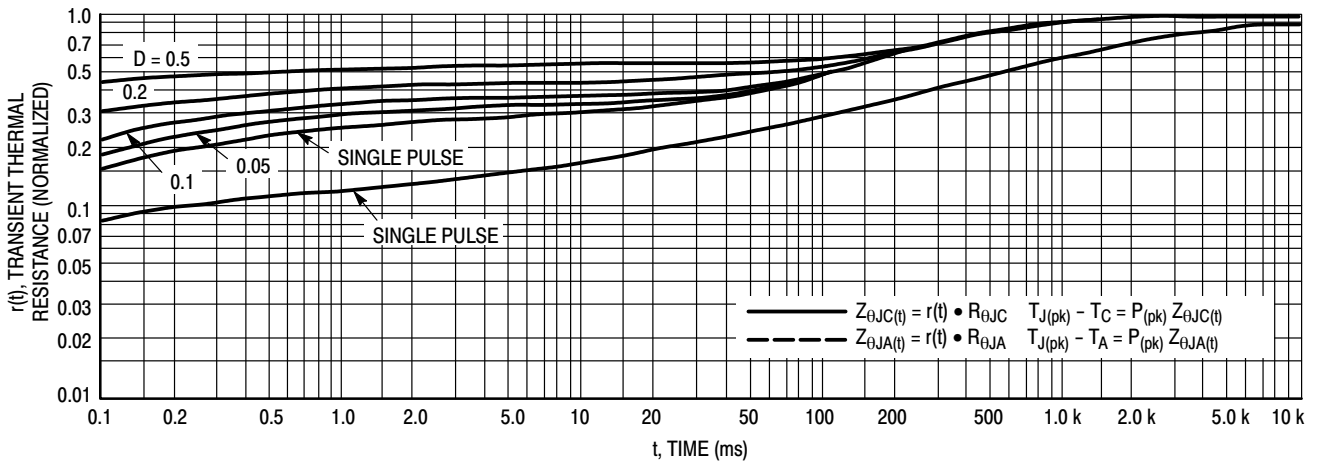


Figure 12. Thermal Response

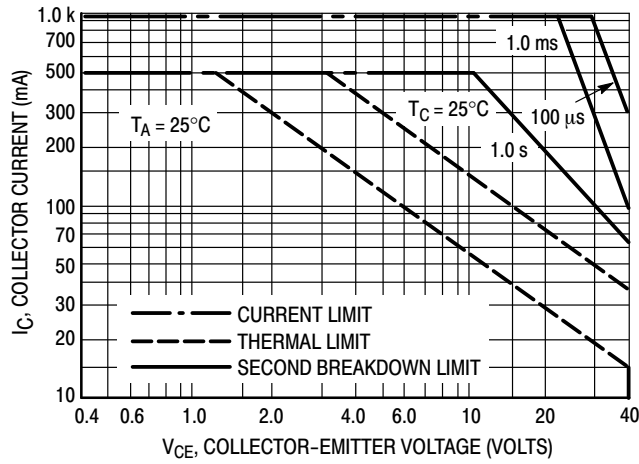


Figure 13. Active Region Safe Operating Area

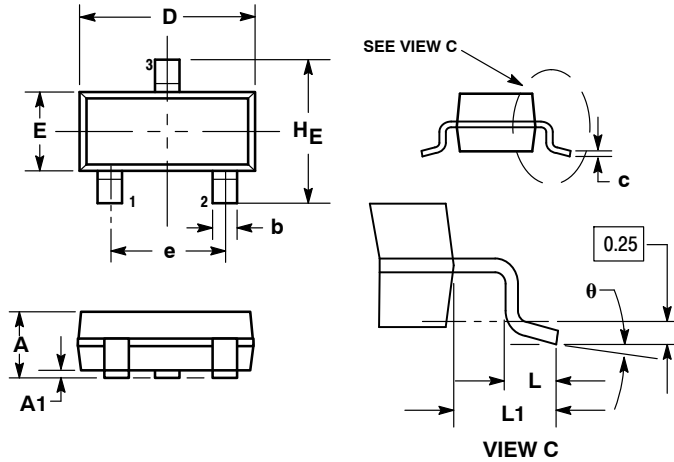


Design Note: Use of Transient Thermal Resistance Data

MMBTA13LT1G, MMBTA14LT1G

PACKAGE DIMENSIONS

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



NOTES:

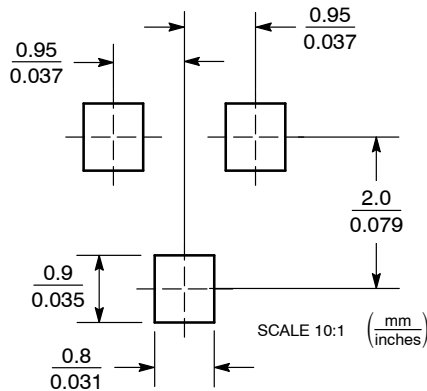
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. 318-01 THRU -07 AND -09 OBSOLETE, NEW STANDARD 318-08.

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.

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