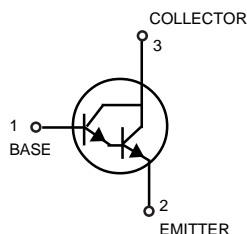
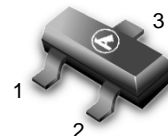


Darlington Amplifier Transistors



LMBTA13LT1
LMBTA14LT1



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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) $T_A = 25^\circ\text{C}$	P_D	225	mW
Derate above 25°C		1.8	mW/ $^\circ\text{C}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	556	$^\circ\text{C}/\text{W}$
Total Device Dissipation Alumina Substrate, (2) $T_A = 25^\circ\text{C}$	P_D	300	mW
Derate above 25°C		2.4	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	$^\circ\text{C}$

DEVICE MARKING

LMBTA13LT1 = 1M; LMBTA14LT1 = 1N

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

Characteristic	Symbol	Min	Max	Unit
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OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage ($I_C = 100 \mu\text{Adc}, V_{BE} = 0$)	$V_{(BR)CEO}$	30	—	Vdc
Collector Cutoff Current ($V_{CB} = 30\text{Vdc}, I_E = 0$)	I_{CBO}	—	100	nAdc
Emitter Cutoff Current ($V_{EB} = 10\text{Vdc}, I_C = 0$)	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.

LMBTA13LT1 LMBTA14LT1

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

Characteristic	Symbol	Min	Max	Unit
ON CHARACTERISTICS (3)				
DC Current Gain ($I_C = 10 \text{ mAdc}, V_{CE} = 5.0 \text{ Vdc}$)	h_{FE}	5,000	—	—
	LMBTA13	5,000	—	—
	LMBTA14	10,000	—	—
($I_C = 100 \text{ mAdc}, V_{CE} = 5.0 \text{ Vdc}$)	LMBTA13	10,000	—	—
	LMBTA14	20,000	—	—
Collector–Emitter Saturation Voltage ($I_C = 100 \text{ mAdc}, I_B = 0.1 \text{ mAdc}$)	$V_{CE(sat)}$	—	1.5	Vdc
Base–Emitter On Voltage ($I_C = 100 \text{ mAdc}, V_{CE} = 5.0 \text{ Vdc}$)	V_{BE}	—	2.0	Vdc

SMALL–SIGNAL CHARACTERISTICS

Current – Gain–Bandwidth Product(4) ($V_{CE} = 5.0 \text{ Vdc}, I_C = 10 \text{ mAdc}, f = 100 \text{ MHz}$)	f_T	125	—	MHz
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3. Pulse Test: Pulse Width $\leq 300 \mu\text{s}$, Duty Cycle $\leq 2.0\%$.

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

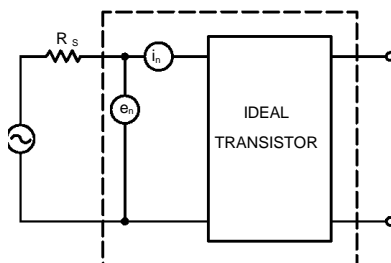


Figure 1. Transistor Noise Model

LMBTA13LT1 LMBTA14LT1

NOISE CHARACTERISTICS

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

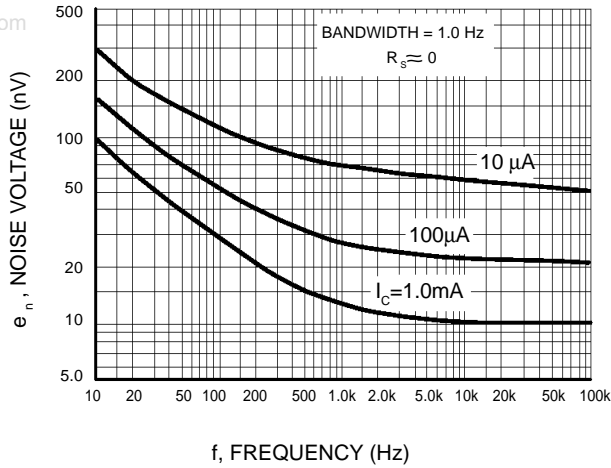


Figure 2. Noise Voltage

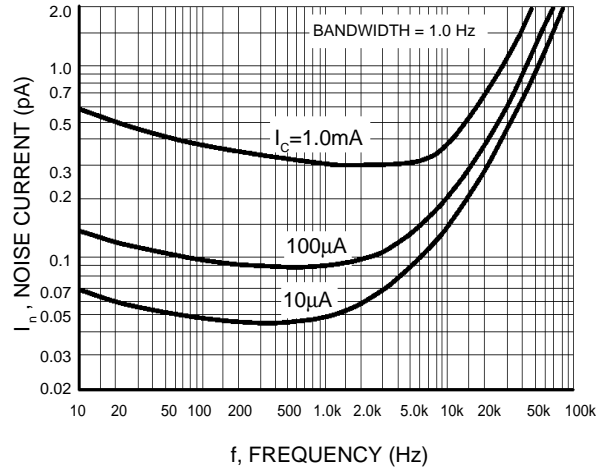


Figure 3. Noise Current

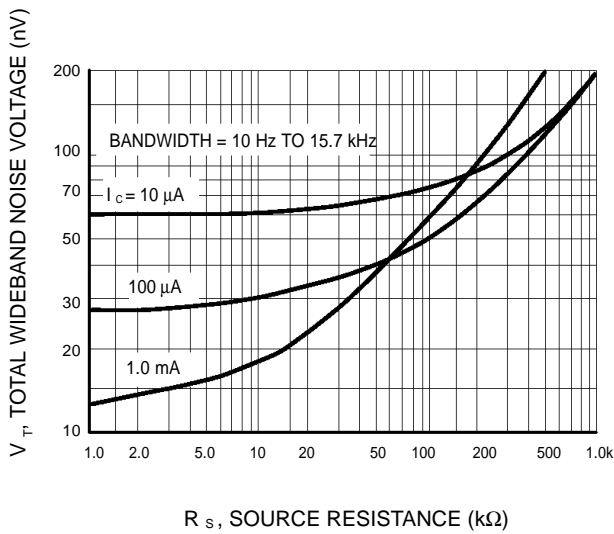


Figure 4. Total Wideband Noise Voltage

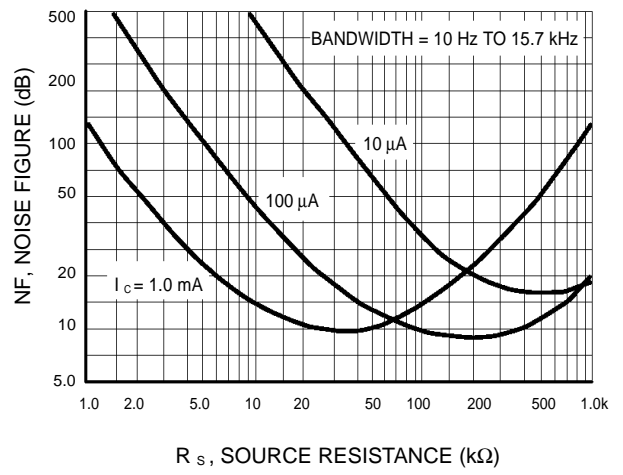
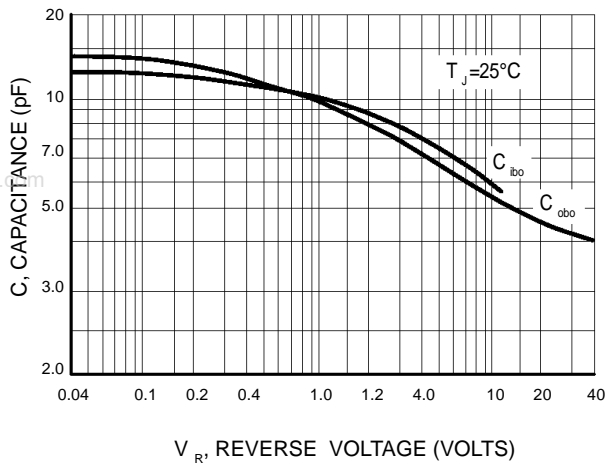


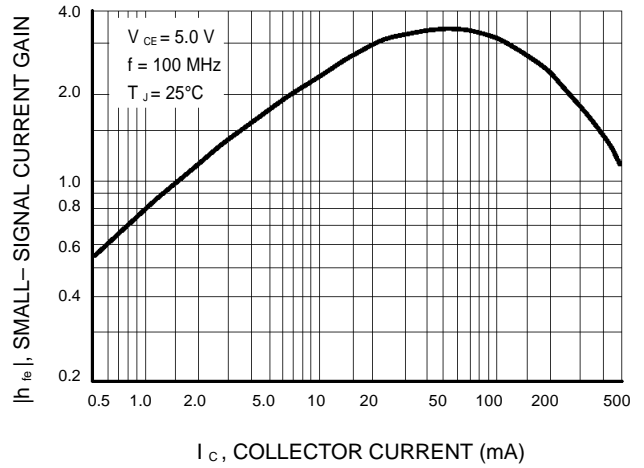
Figure 5. Wideband Noise Figure

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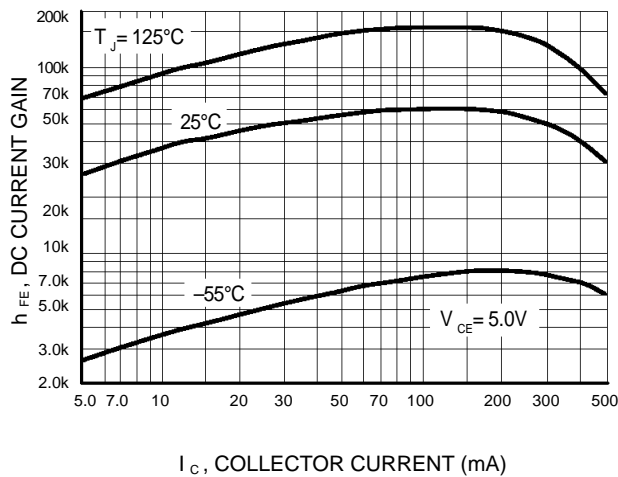
SMALL-SIGNAL CHARACTERISTICS



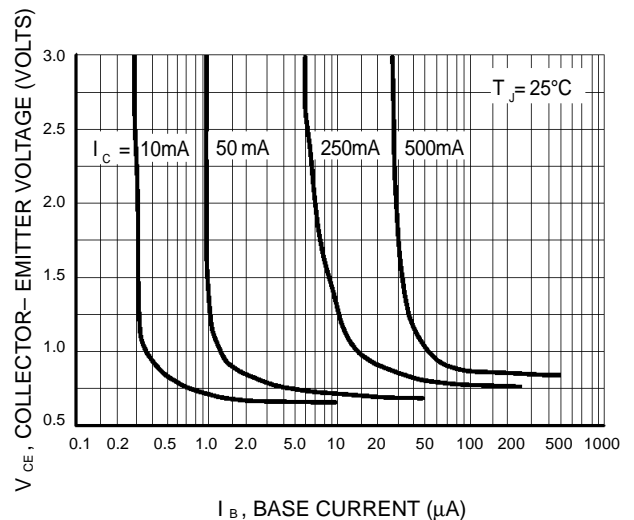
V_{R1} , REVERSE VOLTAGE (VOLTS)
Figure 6. Capacitance



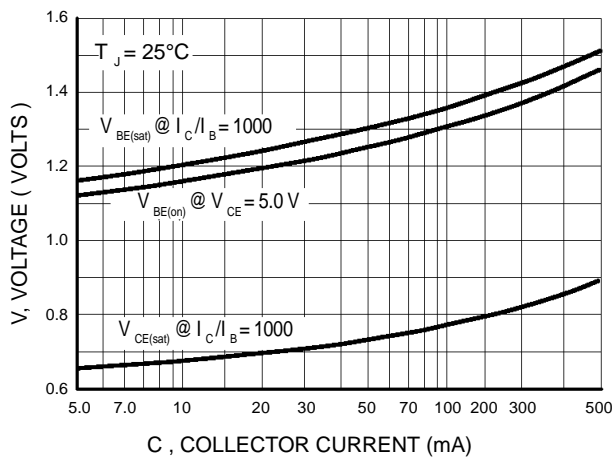
I_C , COLLECTOR CURRENT (mA)
Figure 7. High Frequency Current Gain



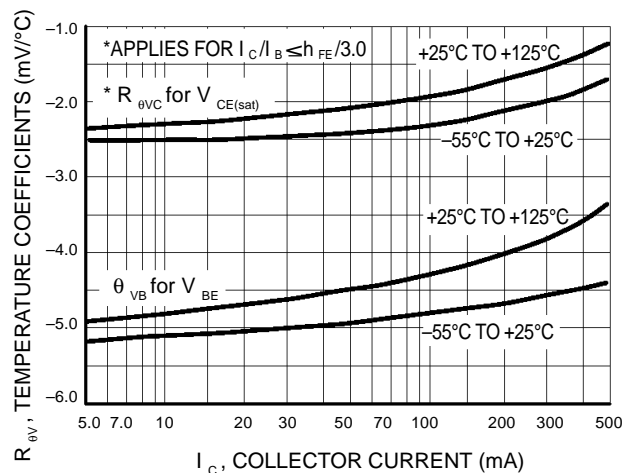
I_C , COLLECTOR CURRENT (mA)
Figure 8. DC Current Gain



I_B , BASE CURRENT (μA)
Figure 9. Collector Saturation Region



I_C , COLLECTOR CURRENT (mA)
Figure 17. "ON" Voltages



I_C , COLLECTOR CURRENT (mA)
Figure 18. Temperature Coefficients

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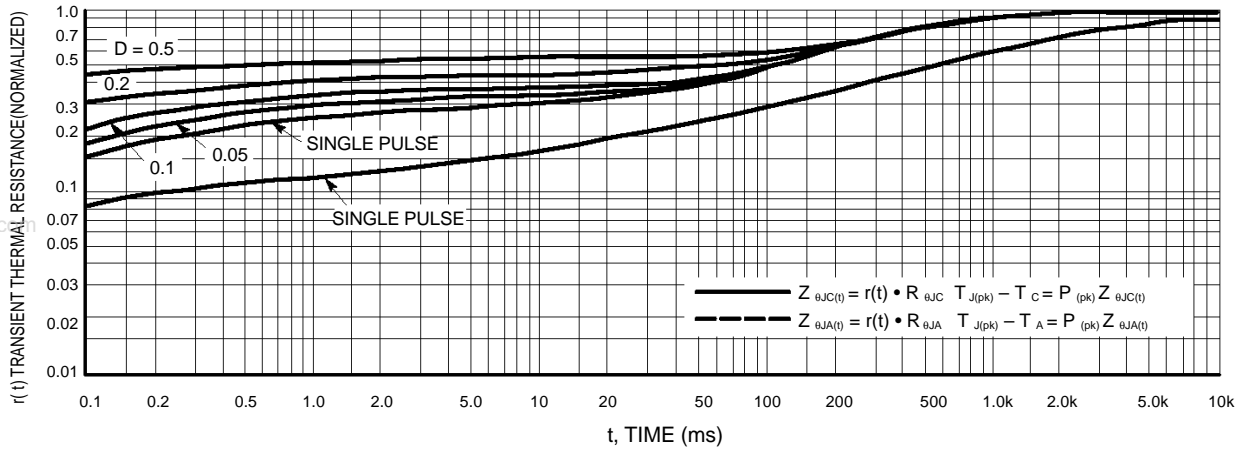


Figure 12. Thermal Response

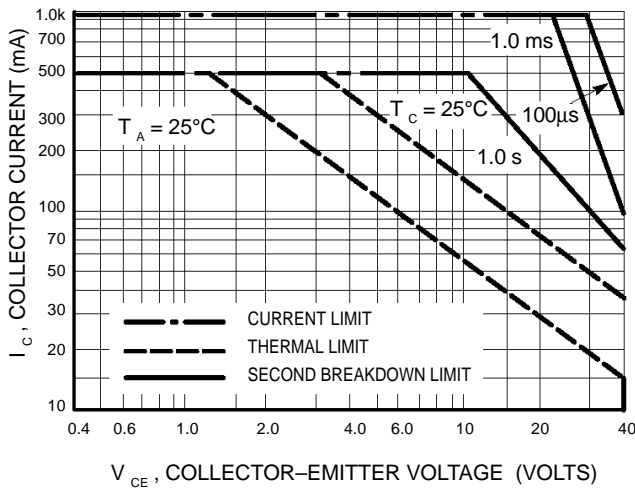
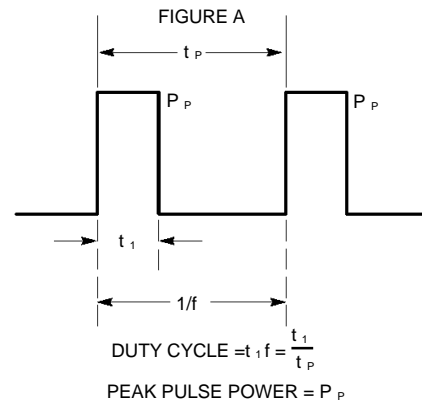


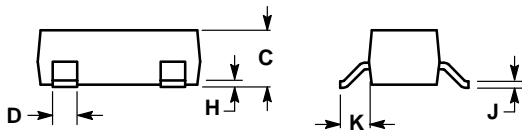
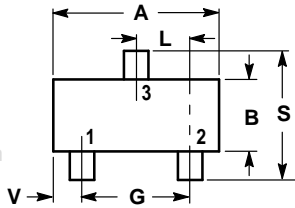
Figure 13. Active Region Safe Operating Area



Design Note: Use of Transient Thermal Resistance Data

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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

- PIN 1. BASE
 2. EMITTER
 3. COLLECTOR

