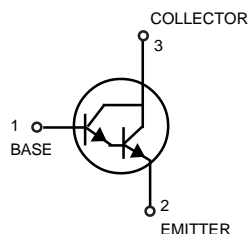
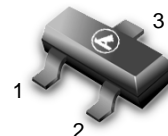


Darlington Amplifier Transistors



LMBTA13LT1
LMBTA14LT1



SOT-23

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
----------------	--------	-----	-----	------

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 = $1.0 \times 0.75 \times 0.062$ in.

2. Alumina = $0.4 \times 0.3 \times 0.024$ 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
---	-------	-----	---	-----

3. Pulse Test: Pulse Width $\leq 300 \mu\text{s}$, Duty Cycle $\leq 2.0\%$.

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

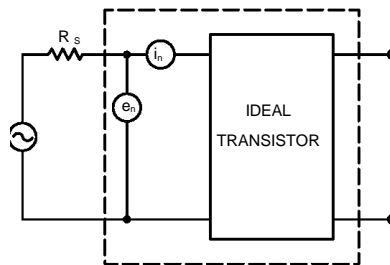


Figure 1. Transistor Noise Model

LMBTA13LT1 LMBTA14LT1

NOISE CHARACTERISTICS

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

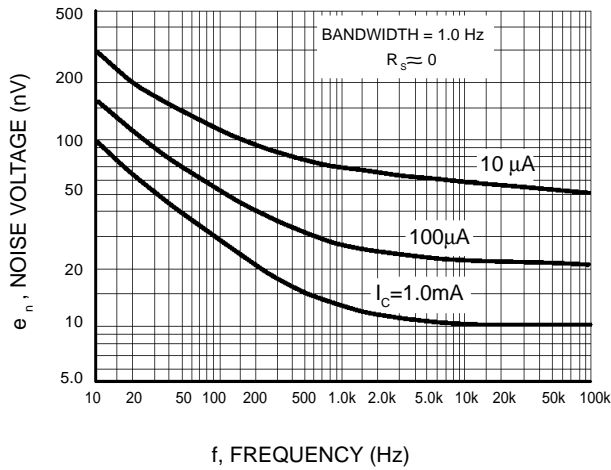


Figure 2. Noise Voltage

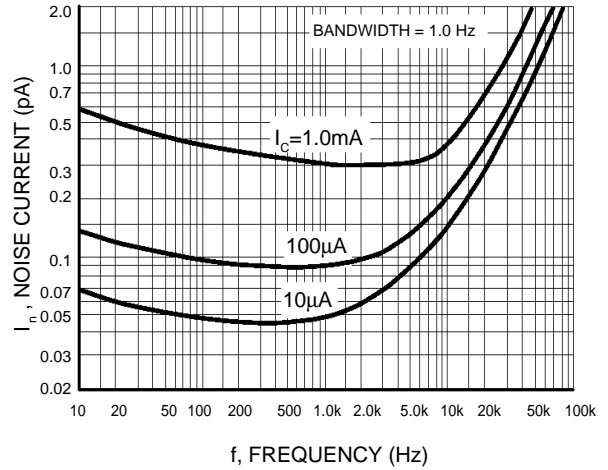


Figure 3. Noise Current

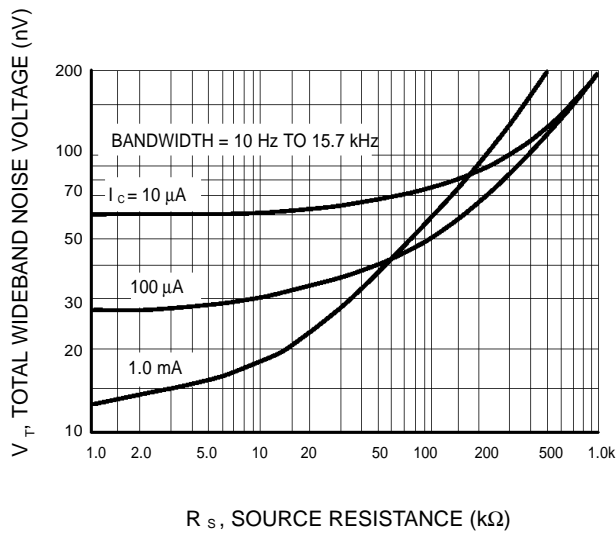


Figure 4. Total Wideband Noise Voltage

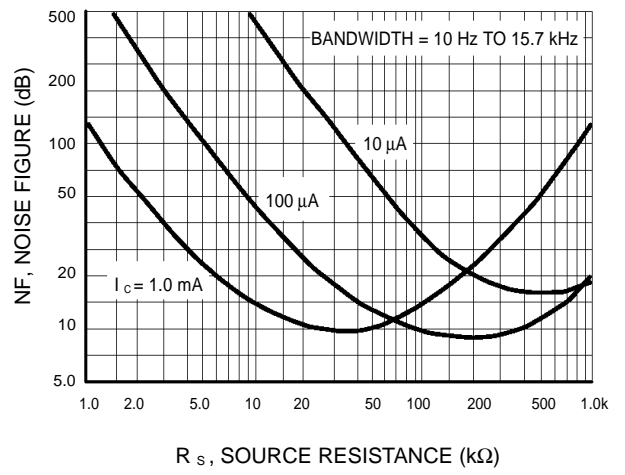
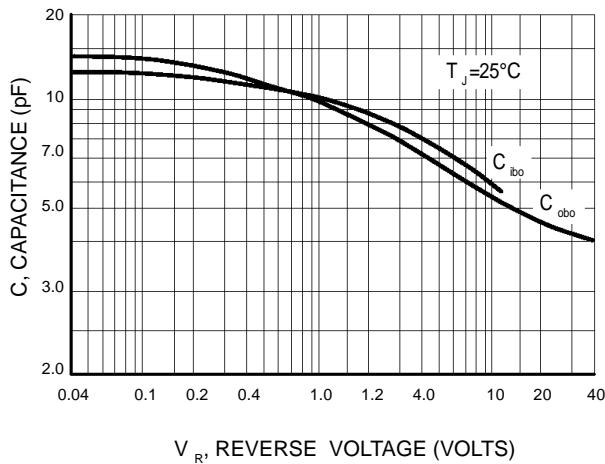


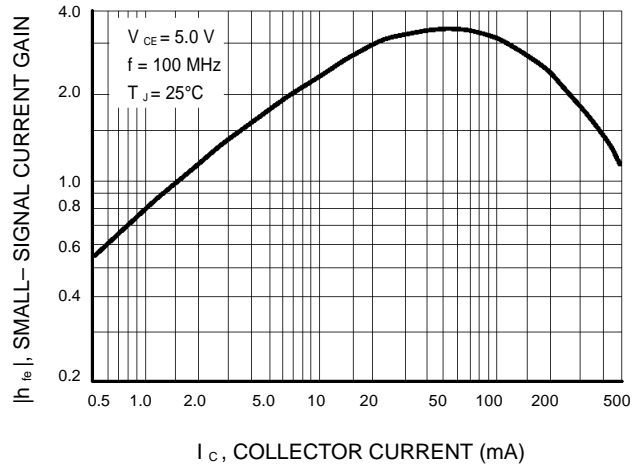
Figure 5. Wideband Noise Figure

LMBTA13LT1 LMBTA14LT1

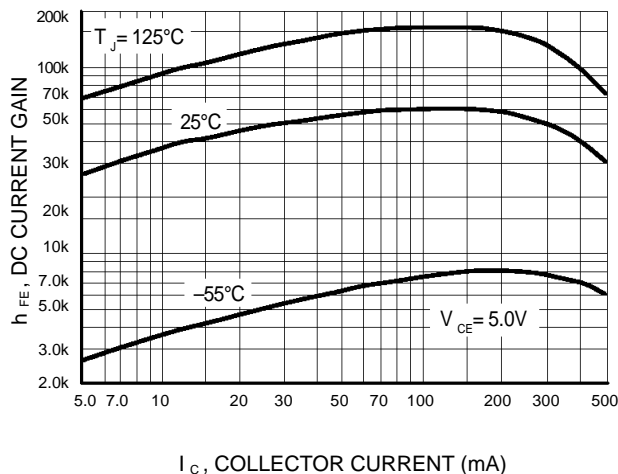
SMALL-SIGNAL CHARACTERISTICS



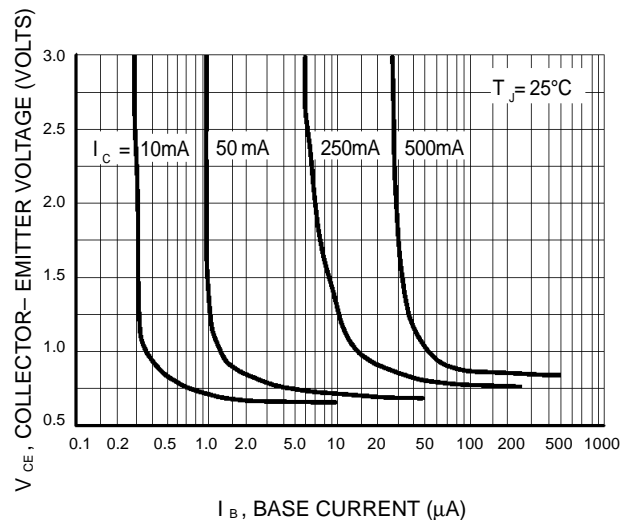
V_{R1} , REVERSE VOLTAGE (VOLTS)
Figure 6. Capacitance



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

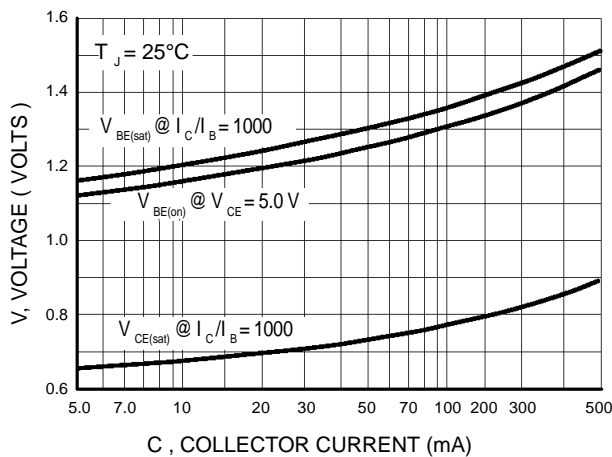


Figure 17. "ON" Voltages

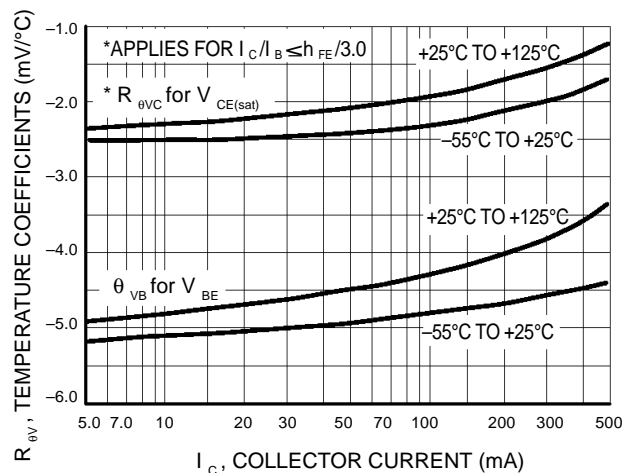


Figure 18. Temperature Coefficients

LMBTA13LT1 LMBTA14LT1

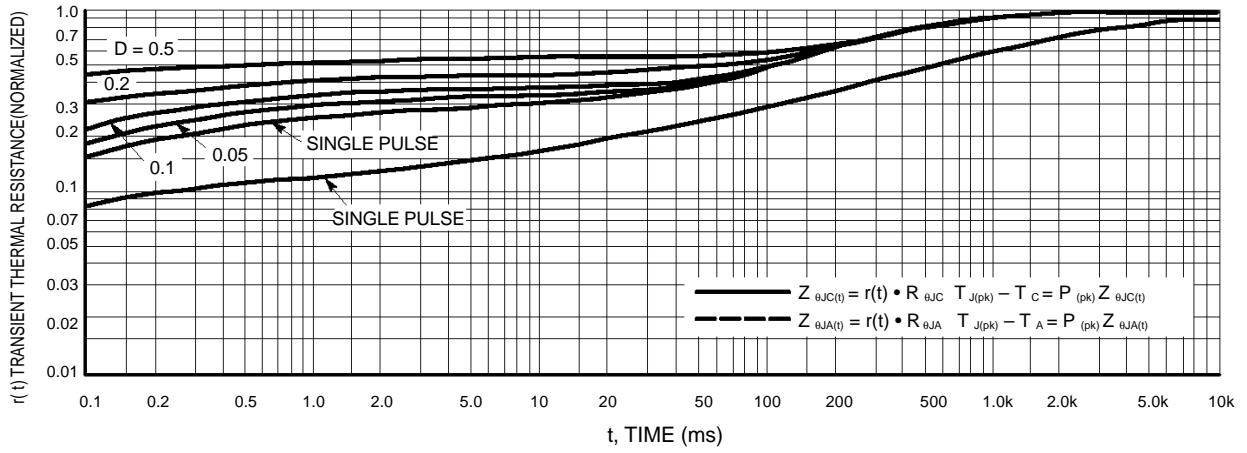


Figure 12. Thermal Response

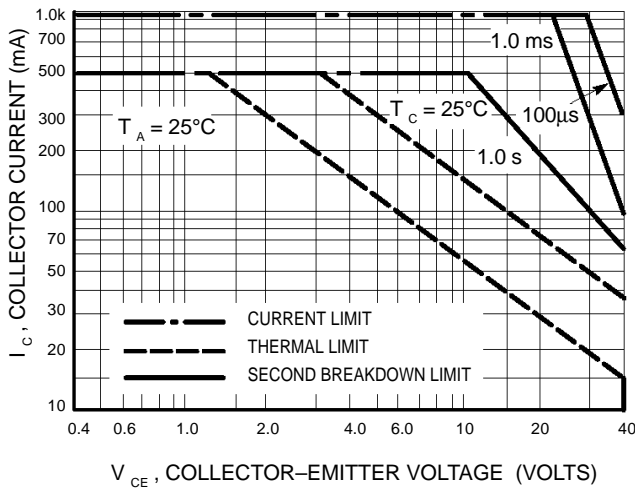
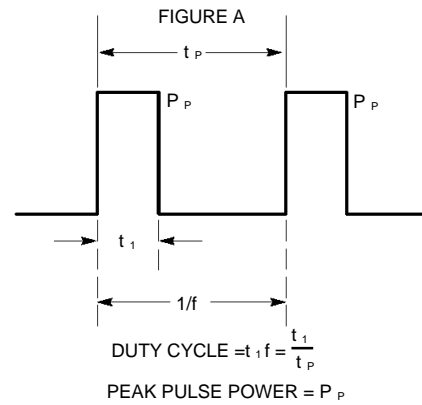


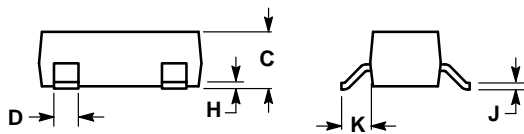
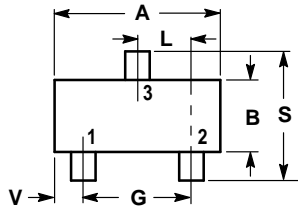
Figure 13. Active Region Safe Operating Area



Design Note: Use of Transient Thermal Resistance Data

LMBTA13LT1 LMBTA14LT1

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

- PIN 1. BASE
 2. EMITTER
 3. COLLECTOR

