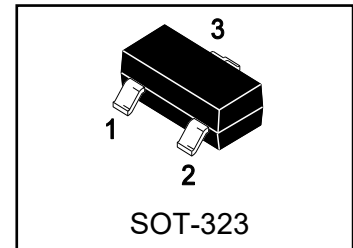


General Purpose Transistors

PNP Silicon

- We declare that the material of product compliance with RoHS requirements.
- S- Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

MBT4403W
S-MBT4403W

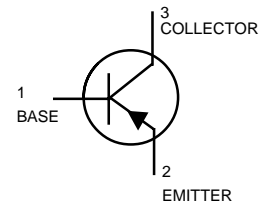


ORDERING INFORMATION

Device	Marking	Shipping
MBT4403W	2T	3000/Tape & Reel
S-MBT4403W	2T	3000/Tape & Reel

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	V_{CE0}	- 40	Vdc
Collector–Base Voltage	V_{CBO}	- 40	Vdc
Emitter–Base Voltage	V_{EBO}	- 5.0	Vdc
Collector Current — Continuous	I_C	- 600	mAdc



THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board $T_A = 25^\circ\text{C}$	P_D	150	mW
Thermal Resistance, Junction–to–Ambient	$R_{\theta JA}$	833	$^\circ\text{C/W}$
Junction and Storage Temperature	T_J, T_{stg}	-55 to +150	$^\circ\text{C}$

DEVICE MARKING

MBT4403W= 2T

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 (3) ($I_C = -1.0 \text{ mAdc}, I_B = 0$)	$V_{(BR)CEO}$	- 40	—	Vdc
Collector–Base Breakdown Voltage ($I_C = -0.1 \text{ mAdc}, I_E = 0$)	$V_{(BR)CBO}$	- 40	—	Vdc
Emitter–Base Breakdown Voltage ($I_E = -0.1 \text{ mAdc}, I_C = 0$)	$V_{(BR)EBO}$	- 5.0	—	Vdc
Base Cutoff Current ($V_{CE} = -35 \text{ Vdc}, V_{EB} = -0.4 \text{ Vdc}$)	I_{BEV}	—	- 0.1	μAdc
Collector Cutoff Current ($V_{CE} = -35 \text{ Vdc}, V_{EB} = -0.4 \text{ Vdc}$)	I_{CEX}	—	- 0.1	μAdc

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



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

Characteristic	Symbol	Min	Max	Unit
ON CHARACTERISTICS				
DC Current Gain ($I_C = -0.1 \text{ mAdc}, V_{CE} = -1.0 \text{ Vdc}$) ($I_C = -1.0 \text{ mAdc}, V_{CE} = -1.0 \text{ Vdc}$) ($I_C = -10 \text{ mAdc}, V_{CE} = -1.0 \text{ Vdc}$) ($I_C = -150 \text{ mAdc}, V_{CE} = -2.0 \text{ Vdc}$)(3) ($I_C = -500 \text{ mAdc}, V_{CE} = -2.0 \text{ Vdc}$)(3)	h_{FE}	30 60 100 100 20	— — — 300 —	—
Collector–Emitter Saturation Voltage(3) ($I_C = -150\text{mAdc}, I_B = -15 \text{ mAdc}$) ($I_C = -500 \text{ mAdc}, I_B = -50 \text{ mAdc}$)	$V_{CE(sat)}$	— —	— - 0.4 - 0.75	Vdc
Base–Emitter Saturation Voltage (3) ($I_C = -150 \text{ mAdc}, I_B = -15 \text{ mAdc}$) ($I_C = -500 \text{ mAdc}, I_B = -50 \text{ mAdc}$)	$V_{BE(sat)}$	— - 0.75 —	— - 0.95 - 1.3	Vdc

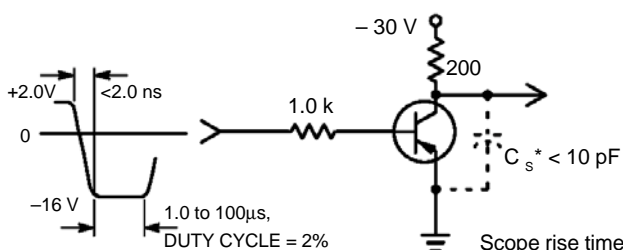
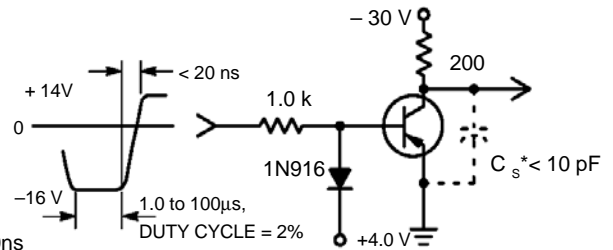
SMALL-SIGNAL CHARACTERISTICS

Current–Gain — Bandwidth Product ($I_C = -20\text{mAdc}, V_{CE} = -10 \text{ Vdc}, f = 100 \text{ MHz}$)	f_T	200	—	MHz
Collector–Base Capacitance ($V_{CB} = -10 \text{ Vdc}, I_E = 0, f = 1.0 \text{ MHz}$)	C_{cb}	—	8.5	pF
Emitter–Base Capacitance ($V_{BE} = -0.5 \text{ Vdc}, I_C = 0, f = 1.0 \text{ MHz}$)	C_{eb}	—	30	pF
Input Impedance ($V_{CE} = -10 \text{ Vdc}, I_C = -1.0 \text{ mAdc}, f = 1.0 \text{ kHz}$)	h_{ie}	1.5	15	$k\Omega$
Voltage Feedback Ratio ($V_{CE} = -10 \text{ Vdc}, I_C = -1.0 \text{ mAdc}, f = 1.0 \text{ kHz}$)	h_{re}	0.1	8.0	$\times 10^{-4}$
Small–Signal Current Gain ($V_{CE} = -10 \text{ Vdc}, I_C = -1.0 \text{ mAdc}, f = 1.0 \text{ kHz}$)	h_{fe}	60	500	—
Output Admittance ($V_{CE} = -10 \text{ Vdc}, I_C = -1.0 \text{ mAdc}, f = 1.0 \text{ kHz}$)	h_{oe}	1.0	100	μmhos

SWITCHING CHARACTERISTICS

Delay Time	$(V_{CC} = -30 \text{ Vdc}, V_{EB} = -2.0 \text{ Vdc}, I_C = -150\text{mAdc}, I_{B1} = -15 \text{ mAdc})$	t_d	—	15	ns
Rise Time		t_r	—	20	
Storage Time	$(V_{CC} = -30 \text{ Vdc}, I_C = -150 \text{ mAdc}, I_{B1} = I_{B2} = -15 \text{ mAdc})$	t_s	—	225	ns
Fall Time		t_f	—	30	

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

SWITCHING TIME EQUIVALENT TEST CIRCUITS

Figure 1. Turn–On Time

Figure 2. Turn–Off Time

 Scope rise time $< 4.0\text{ns}$

*Total shunt capacitance of test jig connectors, and oscilloscope



TYPICAL TRANSIENT CHARACTERISTICS

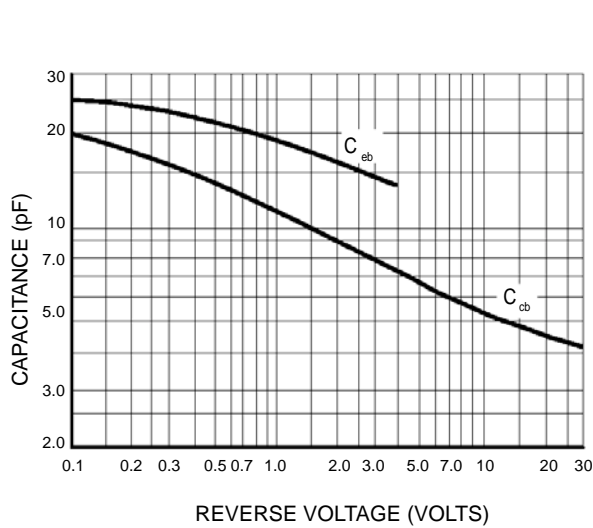


Figure 3. Capacitance

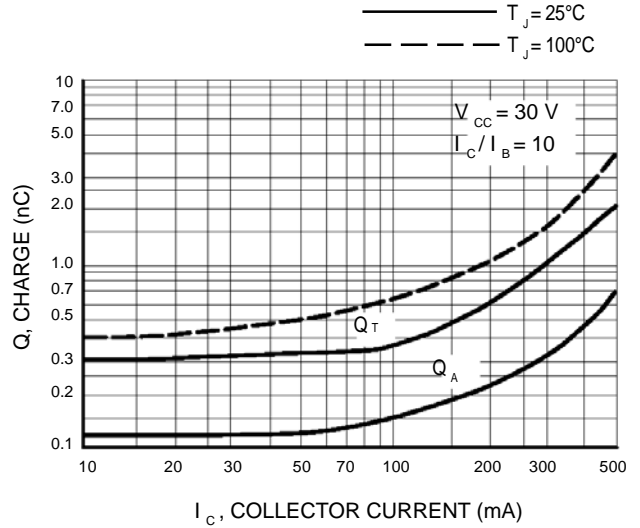


Figure 4. Charge Data

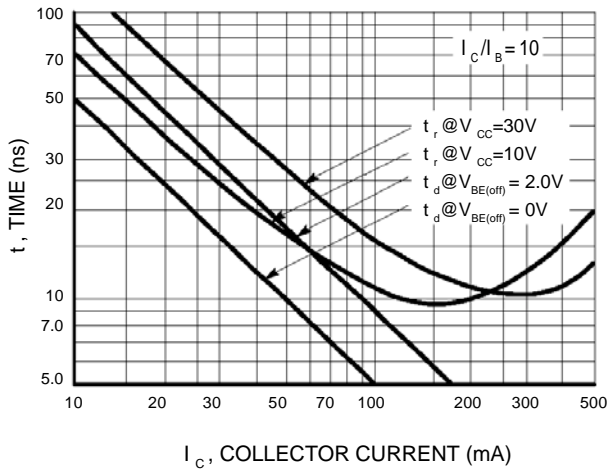


Figure 5. Turn-On Time

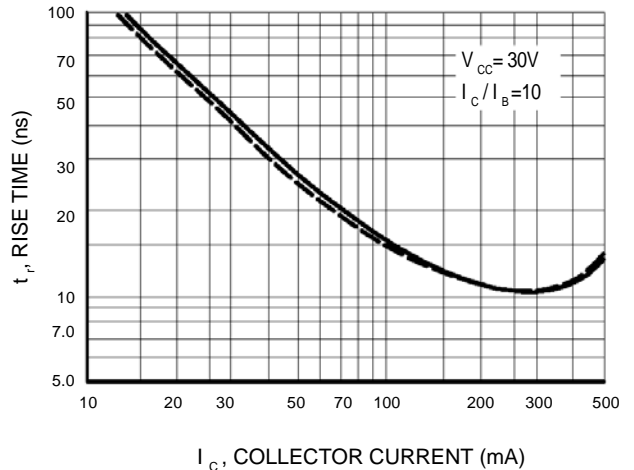


Figure 6. Rise Time

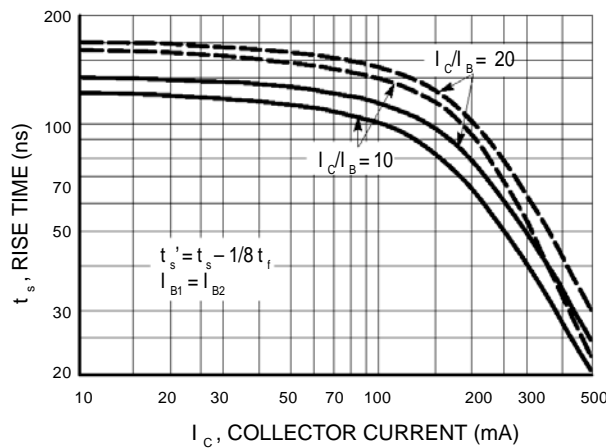
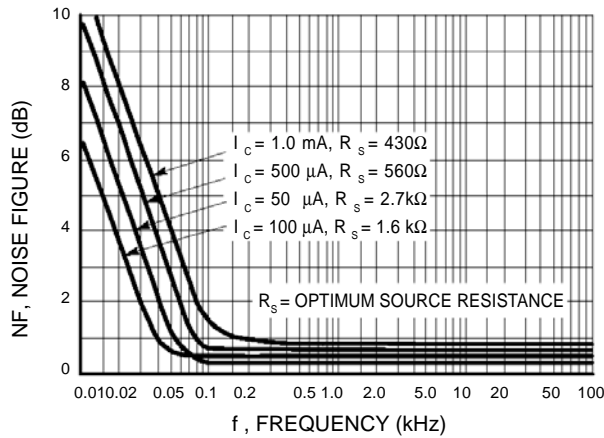
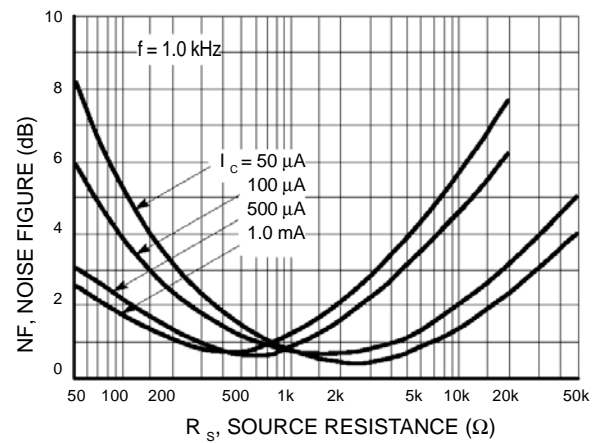


Figure 7. Storage Time

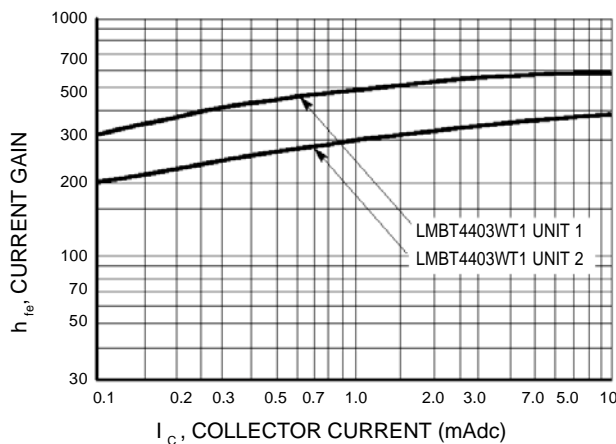
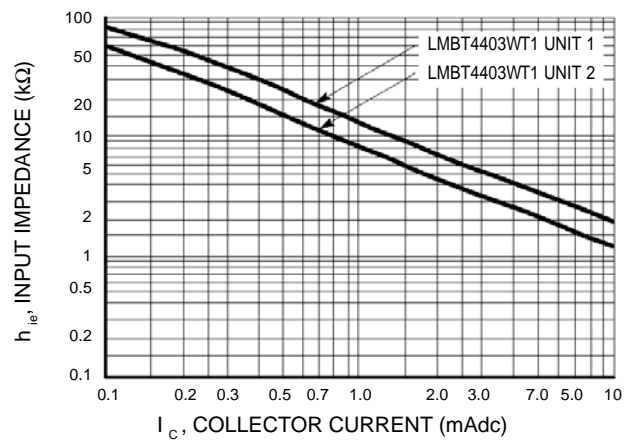
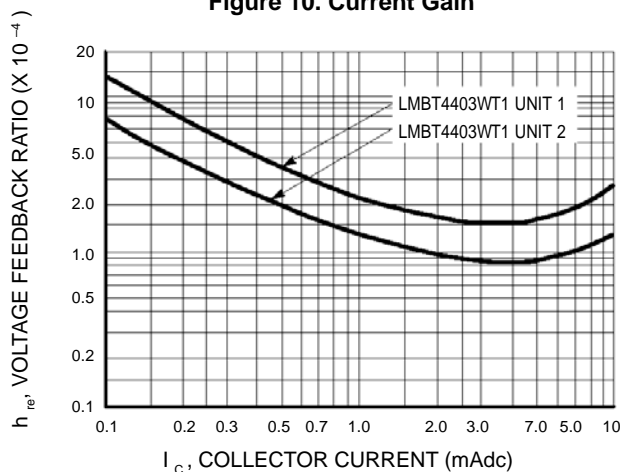
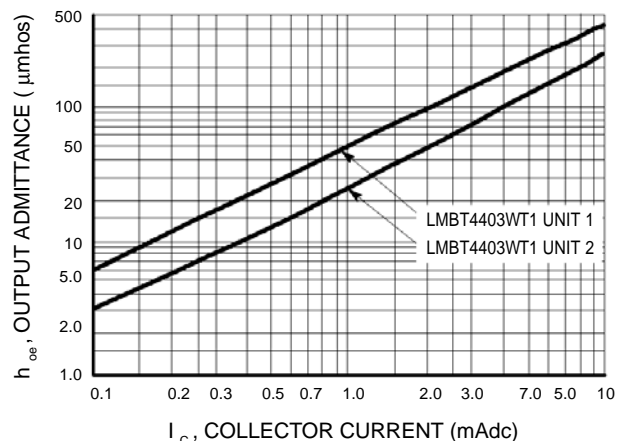


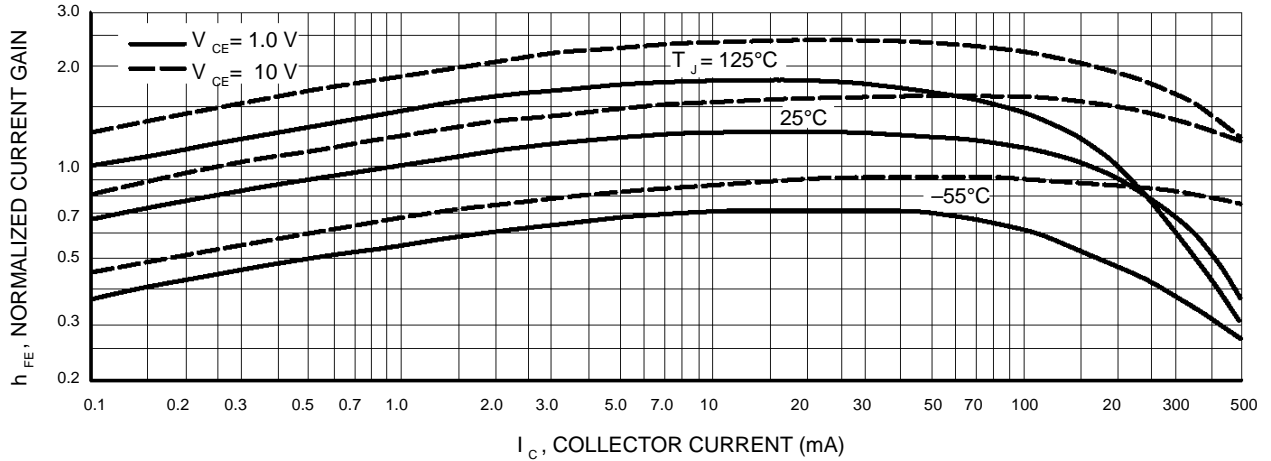
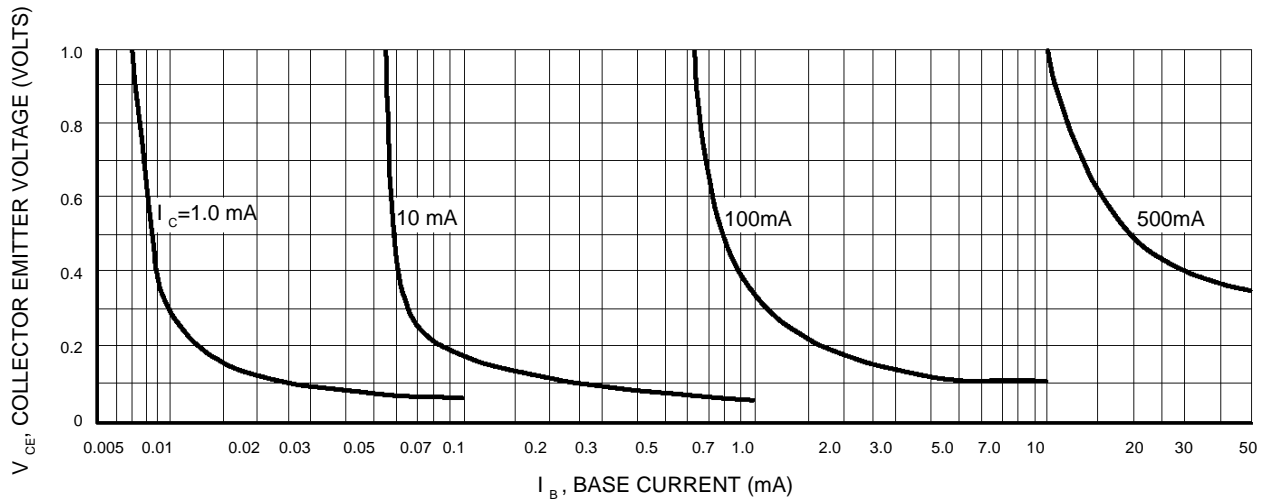
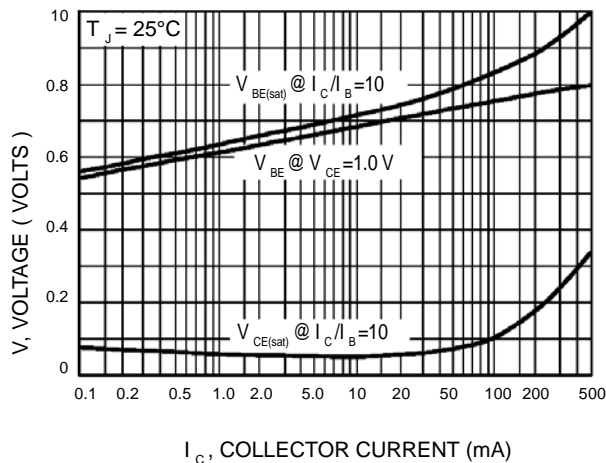
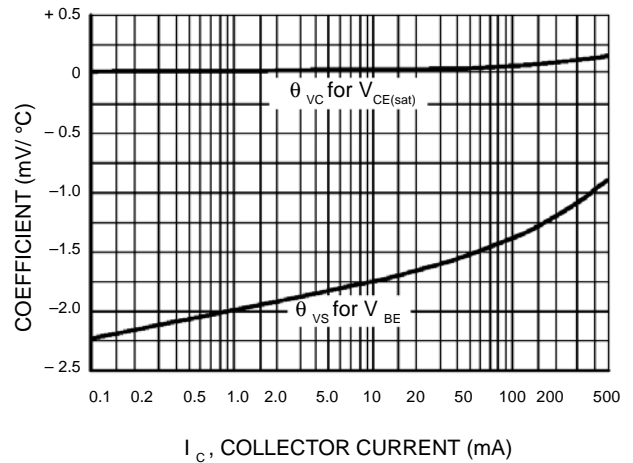
SMALL-SIGNAL CHARACTERISTICS
NOISE FIGURE
 $V_{CE} = -10 \text{ Vdc}, T_A = 25^\circ\text{C}$

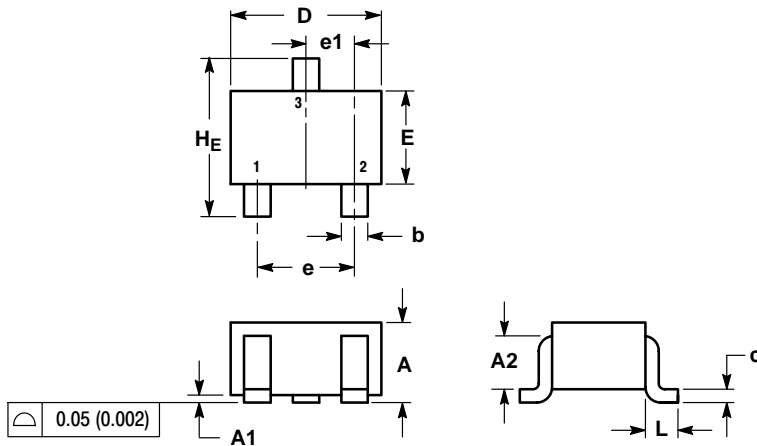
Bandwidth = 1.0 Hz


Figure 8. Frequency Effects

Figure 9. Source Resistance Effects
h PARAMETERS
 $(V_{CE} = -10 \text{ Vdc}, f = 1.0 \text{ kHz}, T_A = 25^\circ\text{C})$

This group of graphs illustrates the relationship between h_{fe} and other "h" parameters for this series of transistors. To obtain these curves, a high-gain and a low-gain unit were selected from the LMBT4403WT1 lines, and the same units were used to develop the correspondingly numbered curves on each graph.

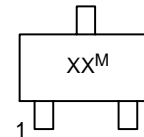

Figure 10. Current Gain

Figure 11. Input Impedance

Figure 12. Voltage Feedback Ratio

Figure 13. Output Admittance


STATIC CHARACTERISTICS

Figure 14. DC Current Gain

Figure 15. Collector Saturation Region

Figure 16. "On" Voltages

Figure 17. Temperature Coefficients


SOT-323


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

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.80	0.90	1.00	0.032	0.035	0.040
A1	0.00	0.05	0.10	0.000	0.002	0.004
A2	0.7 REF			0.028 REF		
b	0.30	0.35	0.40	0.012	0.014	0.016
c	0.10	0.18	0.25	0.004	0.007	0.010
D	1.80	2.10	2.20	0.071	0.083	0.087
E	1.15	1.24	1.35	0.045	0.049	0.053
e	1.20	1.30	1.40	0.047	0.051	0.055
e1	0.65 BSC			0.026 BSC		
L	0.425 REF			0.017 REF		
H _E	2.00	2.10	2.40	0.079	0.083	0.095

GENERIC MARKING DIAGRAM


- XX = Specific Device Code
- M = Date Code
- = Pb-Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present.

