

Switching Transistor

PNP Silicon

MMBT4403WT1G

Features

- Moisture Sensitivity Level: 1
- ESD Rating: Human Body Model; 4 kV,
Machine Model; 400 V
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

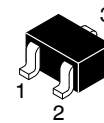
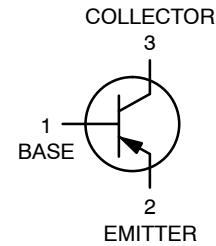
MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector – Emitter Voltage	V_{CEO}	–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

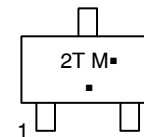
Characteristic	Symbol	Max	Unit
Total Device Dissipation FR–5 Board $T_A = 25^\circ\text{C}$	P_D	150	mW
Thermal Resistance, Junction–to–Ambient	$R_{\theta JA}$	833	$^\circ\text{C/W}$
Junction and Storage Temperature	T_J, T_{stg}	–55 to +150	$^\circ\text{C}$

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.



SC–70
CASE 419
STYLE 3

MARKING DIAGRAM



2T = Specific Device Code
M = Date Code
▪ = Pb-Free Package

(Note: Microdot may be in either location)

*Date Code orientation may vary depending upon manufacturing location.

ORDERING INFORMATION

Device	Package	Shipping [†]
MMBT4403WT1G	SC–70 (Pb–Free)	3000 / 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.

MMBT4403WT1G

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector – Emitter Breakdown Voltage (Note 1) (I _C = –1.0 mA _{dc} , I _B = 0)	V _{(BR)CEO}	–40	–	V _{dc}
Collector – Base Breakdown Voltage (I _C = –0.1 mA _{dc} , I _E = 0)	V _{(BR)CBO}	–40	–	V _{dc}
Emitter – Base Breakdown Voltage (I _E = –0.1 mA _{dc} , I _C = 0)	V _{(BR)EBO}	–5.0	–	V _{dc}
Base Cutoff Current (V _{CE} = –35 V _{dc} , V _{EB} = –0.4 V _{dc})	I _{BEV}	–	–0.1	μA _{dc}
Collector Cutoff Current (V _{CE} = –35 V _{dc} , V _{EB} = –0.4 V _{dc})	I _{CEX}	–	–0.1	μA _{dc}

ON CHARACTERISTICS

DC Current Gain (I _C = –0.1 mA _{dc} , V _{CE} = –1.0 V _{dc}) (I _C = –1.0 mA _{dc} , V _{CE} = –1.0 V _{dc}) (I _C = –10 mA _{dc} , V _{CE} = –1.0 V _{dc}) (I _C = –150 mA _{dc} , V _{CE} = –2.0 V _{dc}) (Note 1) (I _C = –500 mA _{dc} , V _{CE} = –2.0 V _{dc}) (Note 1)	h _{FE}	30 60 100 100 20	– – – 300 –	–
Collector – Emitter Saturation Voltage (Note 1) (I _C = –150 mA _{dc} , I _B = –15 mA _{dc}) (I _C = –500 mA _{dc} , I _B = –50 mA _{dc})	V _{CE(sat)}	– –	–0.4 –0.75	V _{dc}
Base – Emitter Saturation Voltage (Note 1) (I _C = –150 mA _{dc} , I _B = –15 mA _{dc}) (I _C = –500 mA _{dc} , I _B = –50 mA _{dc})	V _{BE(sat)}	–0.75 –	–0.95 –1.3	V _{dc}

SMALL-SIGNAL CHARACTERISTICS

Current – Gain – Bandwidth Product (I _C = –20 mA _{dc} , V _{CE} = –10 V _{dc} , f = 100 MHz)	f _T	200	–	MHz
Collector – Base Capacitance (V _{CB} = –10 V _{dc} , I _E = 0, f = 1.0 MHz)	C _{cb}	–	8.5	pF
Emitter – Base Capacitance (V _{BE} = –0.5 V _{dc} , I _C = 0, f = 1.0 MHz)	C _{eb}	–	30	pF
Input Impedance (I _C = –1.0 mA _{dc} , V _{CE} = –10 V _{dc} , f = 1.0 kHz)	h _{ie}	1.5	15	kΩ
Voltage Feedback Ratio (I _C = –1.0 mA _{dc} , V _{CE} = –10 V _{dc} , f = 1.0 kHz)	h _{re}	0.1	8.0	X 10 ^{–4}
Small – Signal Current Gain (I _C = –1.0 mA _{dc} , V _{CE} = –10 V _{dc} , f = 1.0 kHz)	h _{fe}	60	500	–
Output Admittance (I _C = –1.0 mA _{dc} , V _{CE} = –10 V _{dc} , f = 1.0 kHz)	h _{oe}	1.0	100	μmhos

SWITCHING CHARACTERISTICS

Delay Time	(V _{CC} = –30 V _{dc} , V _{EB} = –2.0 V _{dc} , I _C = –150 mA _{dc} , I _{B1} = –15 mA _{dc})	t _d	–	15	ns
Rise Time		t _r	–	20	
Storage Time	(V _{CC} = –30 V _{dc} , I _C = –150 mA _{dc} , I _{B1} = I _{B2} = –15 mA _{dc})	t _s	–	225	ns
Fall Time		t _f	–	30	

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

SWITCHING TIME EQUIVALENT TEST CIRCUIT

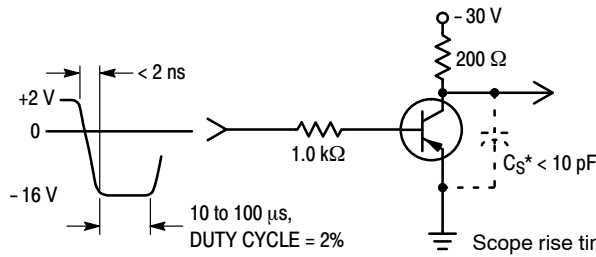


Figure 1. Turn-On Time

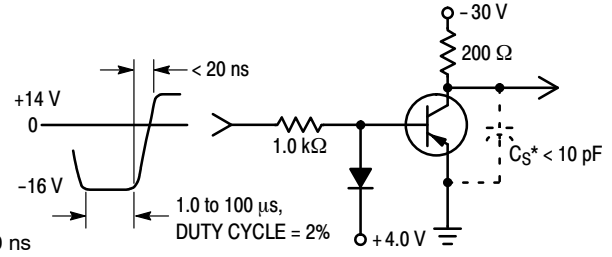


Figure 2. Turn-Off Time

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TRANSIENT CHARACTERISTICS

— 25°C — 100°C

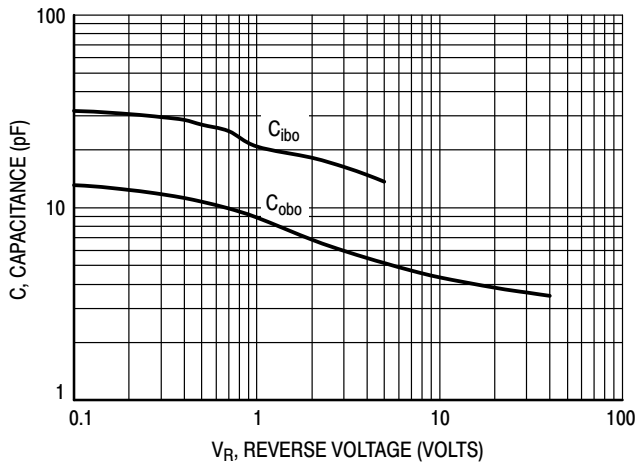


Figure 3. Capacitances

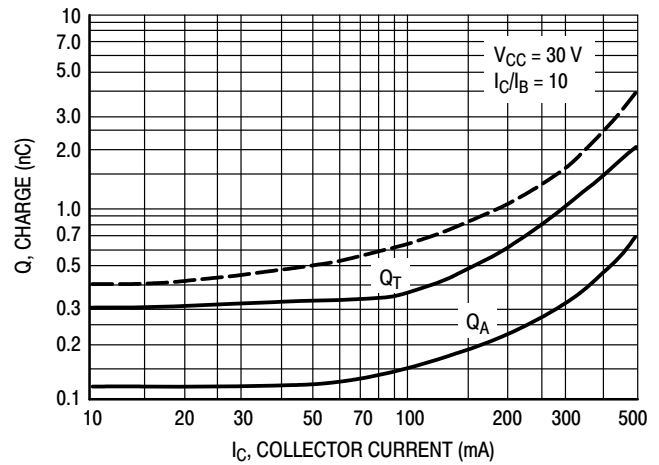


Figure 4. Charge Data

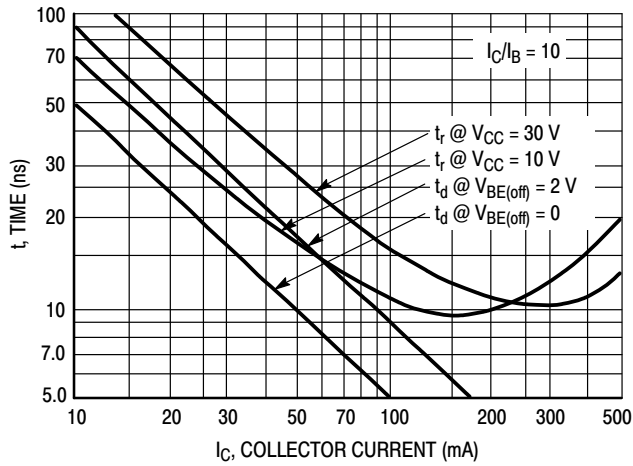


Figure 5. Turn-On Time

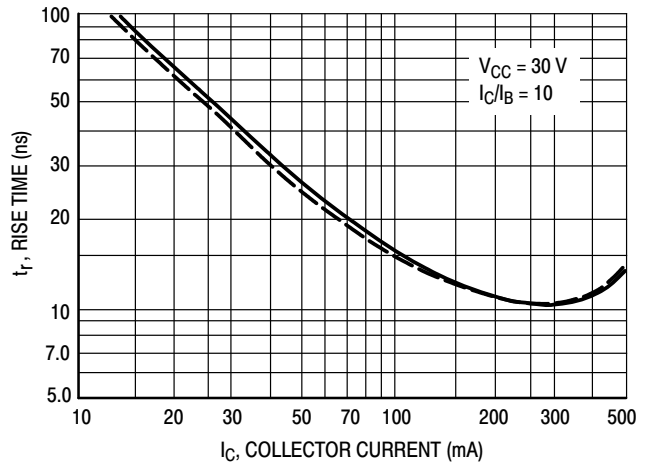


Figure 6. Rise Time

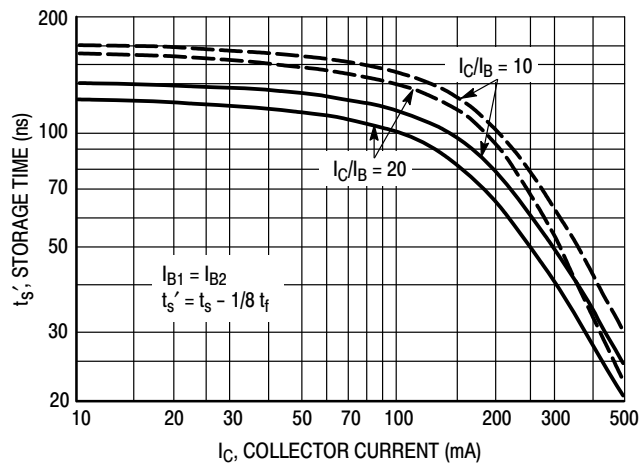


Figure 7. Storage Time

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SMALL-SIGNAL CHARACTERISTICS NOISE FIGURE

$V_{CE} = -10 \text{ Vdc}$, $T_A = 25^\circ\text{C}$; Bandwidth = 1.0 Hz

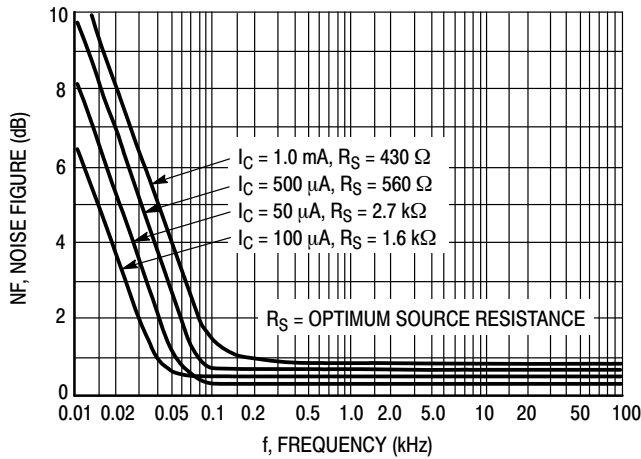


Figure 8. Frequency Effects

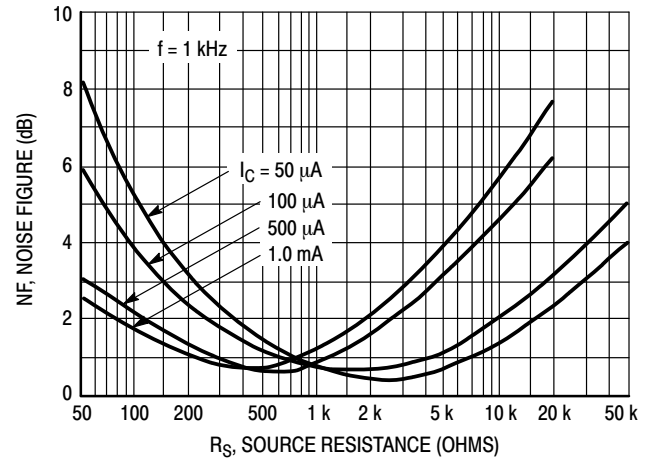


Figure 9. Source Resistance Effects

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 MMBT4403WT1 lines, and the same units were used to develop the correspondingly numbered curves on each graph.

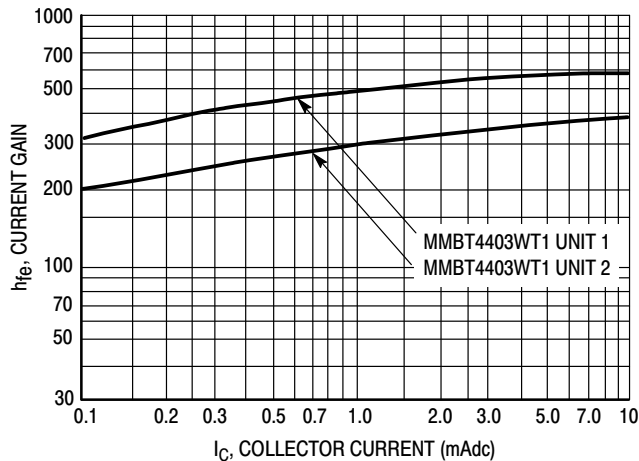


Figure 10. Current Gain

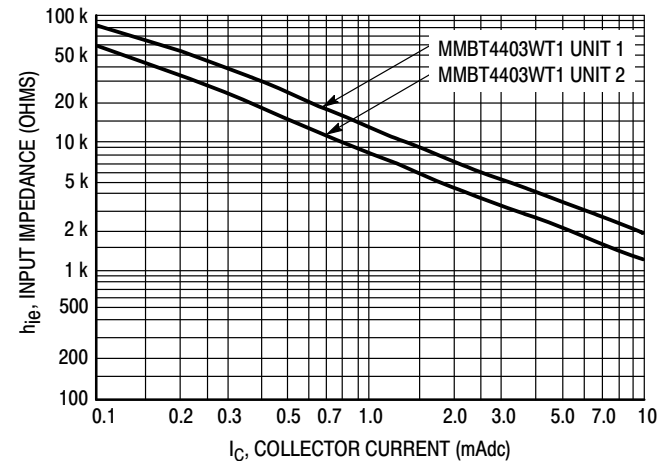


Figure 11. Input Impedance

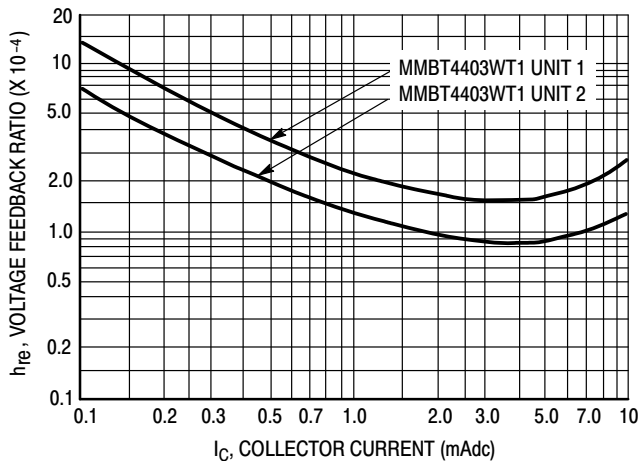


Figure 12. Voltage Feedback Ratio

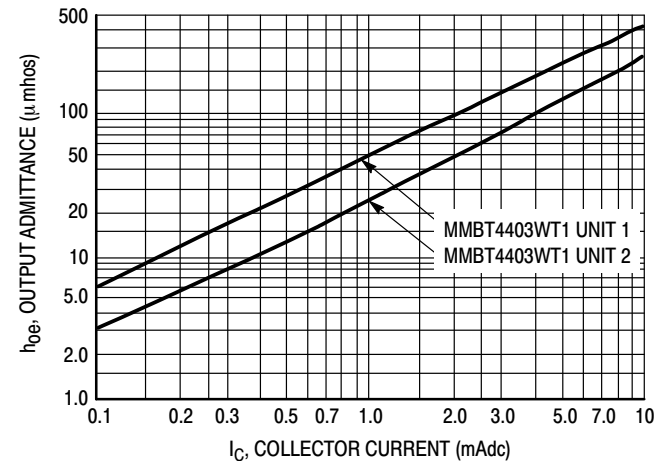


Figure 13. Output Admittance

STATIC CHARACTERISTICS

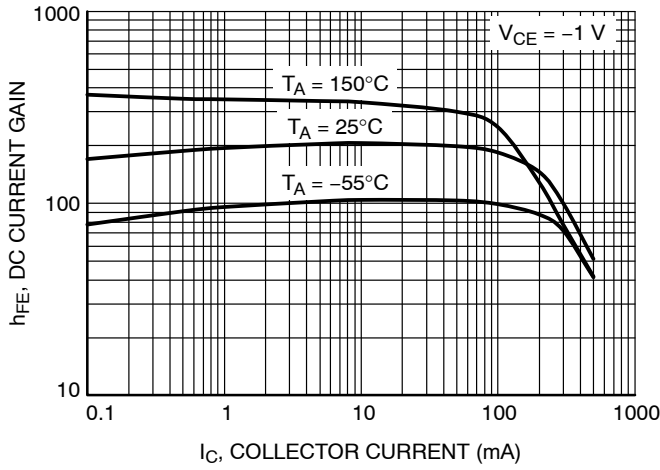


Figure 14. DC Current Gain vs. Collector Current

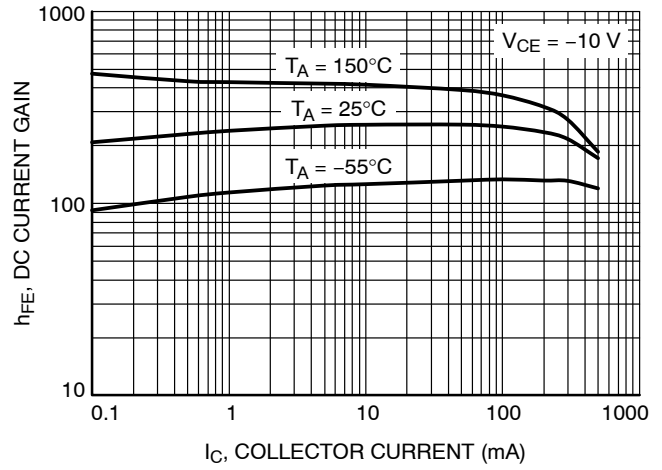


Figure 15. DC Current Gain vs. Collector Current

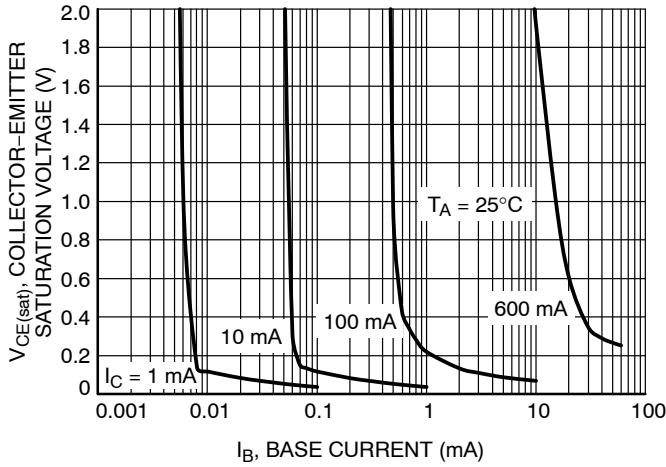


Figure 16. Saturation Region

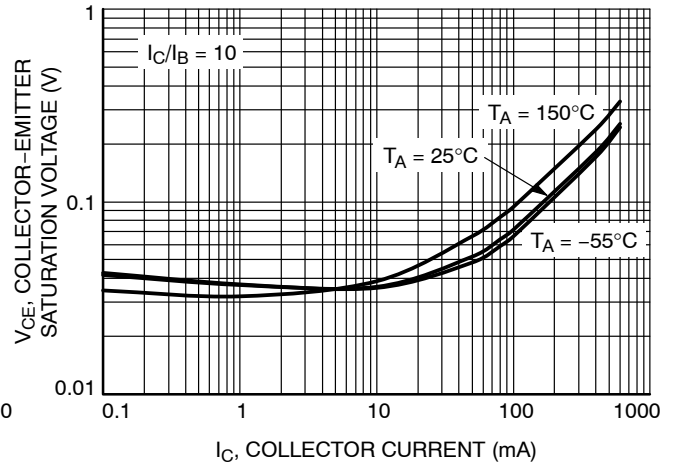


Figure 17. Collector Emitter Saturation Voltage vs. Collector Current

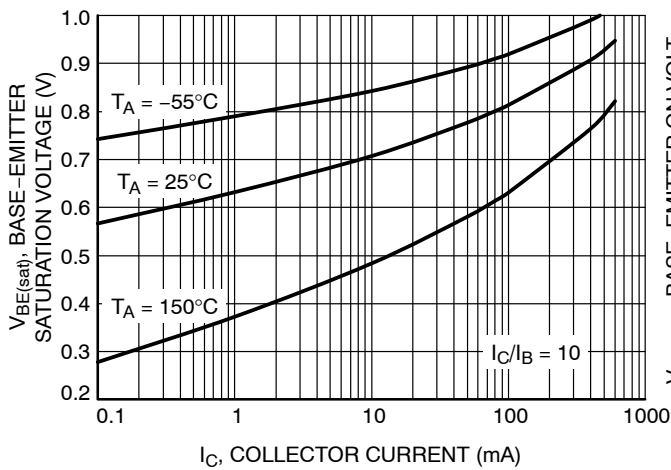


Figure 18. Base Emitter Saturation Voltage vs. Collector Current

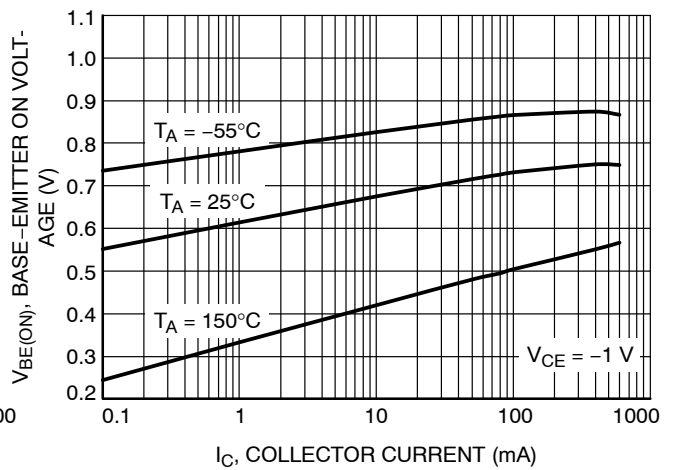


Figure 19. Base-Emitter Turn-On Voltage vs. Collector Current

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STATIC CHARACTERISTICS

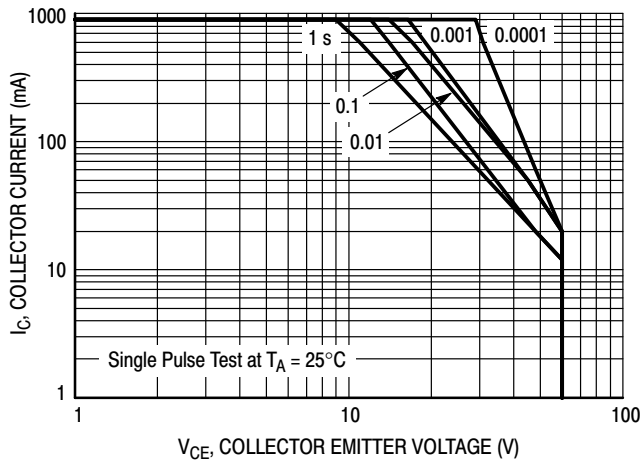


Figure 20. Safe Operating Area

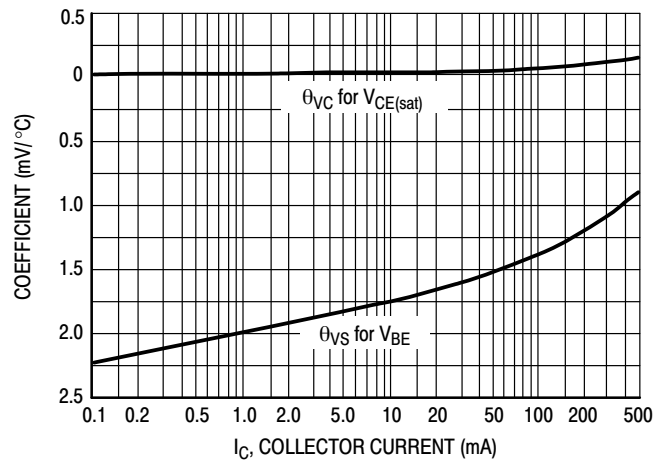
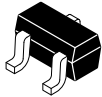


Figure 21. Temperature Coefficients



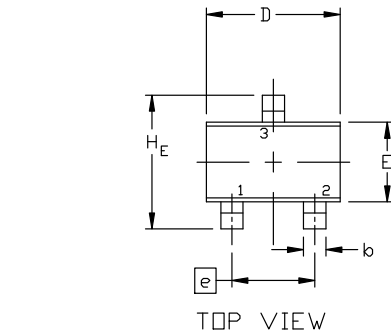
SCALE 4:1

SC-70 (SOT-323)
CASE 419
ISSUE R

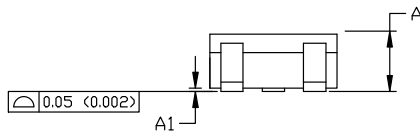
DATE 11 OCT 2022

NOTES:

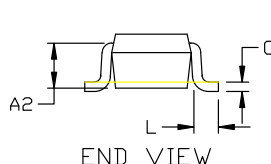
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH



TOP VIEW

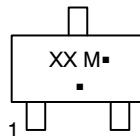


SIDE VIEW



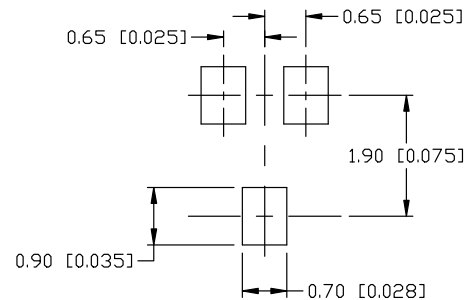
END VIEW

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	0.70 REF			0.028 BSC		
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	2.00	2.20	0.071	0.080	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	0.20	0.38	0.56	0.008	0.015	0.022
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. Some products may not follow the Generic Marking.



* For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

SOLDERING FOOTPRINT

STYLE 1:
CANCELLED

STYLE 2:
PIN 1. ANODE
2. N.C.
3. CATHODE

STYLE 3:
PIN 1. BASE
2. EMITTER
3. COLLECTOR

STYLE 4:
PIN 1. CATHODE
2. CATHODE
3. ANODE

STYLE 5:
PIN 1. ANODE
2. ANODE
3. CATHODE

STYLE 6:
PIN 1. EMITTER
2. BASE
3. COLLECTOR

STYLE 7:
PIN 1. BASE
2. EMITTER
3. COLLECTOR

STYLE 8:
PIN 1. GATE
2. SOURCE
3. DRAIN

STYLE 9:
PIN 1. ANODE
2. CATHODE
3. CATHODE-ANODE

STYLE 10:
PIN 1. CATHODE
2. ANODE
3. ANODE-CATHODE

STYLE 11:
PIN 1. CATHODE
2. CATHODE
3. CATHODE

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