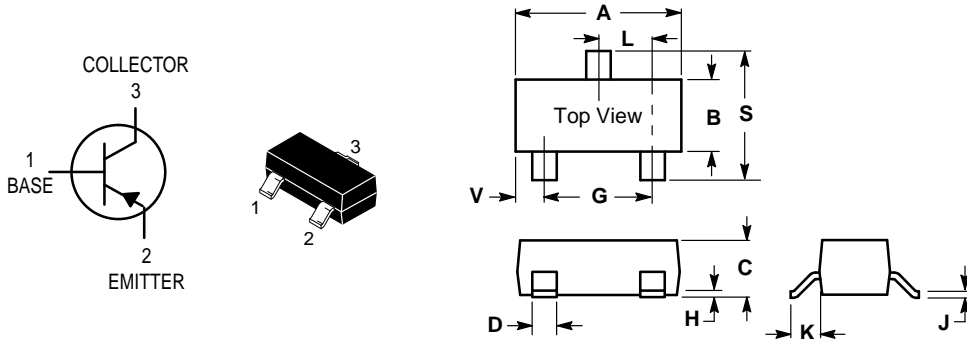


RoHS Compliant Product



SOT-323		
Dim	Min	Max
A	1.800	2.200
B	1.150	1.350
C	0.800	1.000
D	0.300	0.400
G	1.200	1.400
H	0.000	0.100
J	0.100	0.250
K	0.350	0.500
L	0.590	0.720
S	2.000	2.400
V	0.280	0.420
All Dimension in mm		

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 ⁽¹⁾ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	200	mW
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	556	$^\circ\text{C/W}$
Total Device Dissipation Alumina Substrate, ⁽²⁾ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	200	mW
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	417	$^\circ\text{C/W}$
Junction and Storage Temperature	T_J, T_{stg}	-55 to +150	$^\circ\text{C}$

DEVICE MARKING

MMBT4403W = K3T, 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⁾ ($I_C = -1.0 \text{ mAdc}, I_E = 0$)	$V_{(BR)CEO}$	-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

- FR-5 = $1.0 \times 0.75 \times 0.062 \text{ in.}$
- Alumina = $0.4 \times 0.3 \times 0.024 \text{ in.}$ 99.5% alumina.
- 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 ($I_C = -1.0 \text{ mAdc}$, $V_{CE} = -10 \text{ Vdc}$, $f = 1.0 \text{ kHz}$)	h_{ie}	1.5	15	k Ω
Voltage Feedback Ratio ($I_C = -1.0 \text{ mAdc}$, $V_{CE} = -10 \text{ Vdc}$, $f = 1.0 \text{ kHz}$)	h_{re}	0.1	8.0	$\times 10^{-4}$
Small–Signal Current Gain ($I_C = -1.0 \text{ mAdc}$, $V_{CE} = -10 \text{ Vdc}$, $f = 1.0 \text{ kHz}$)	h_{fe}	60	500	—
Output Admittance ($I_C = -1.0 \text{ mAdc}$, $V_{CE} = -10 \text{ Vdc}$, $f = 1.0 \text{ kHz}$)	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 CIRCUIT

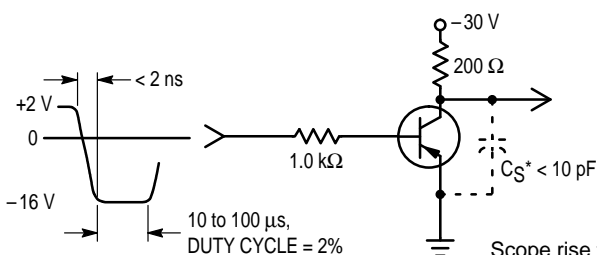


Figure 1. Turn–On Time

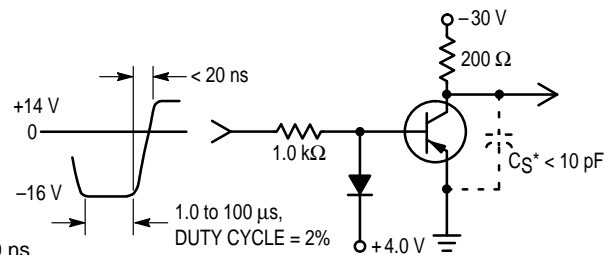


Figure 2. Turn–Off Time

TRANSIENT CHARACTERISTICS

— 25°C - - - 100°C

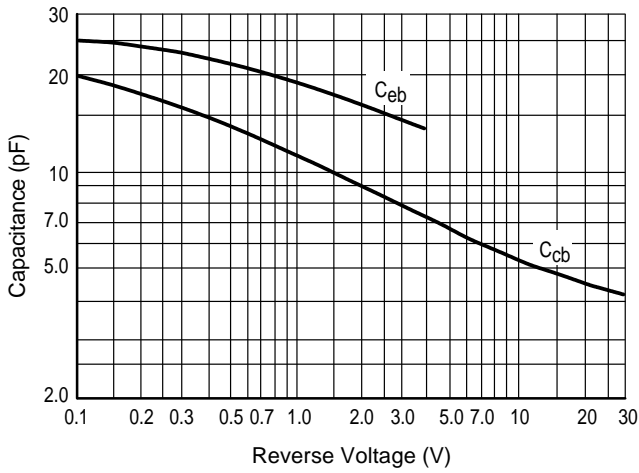


Figure 3. Capacitances

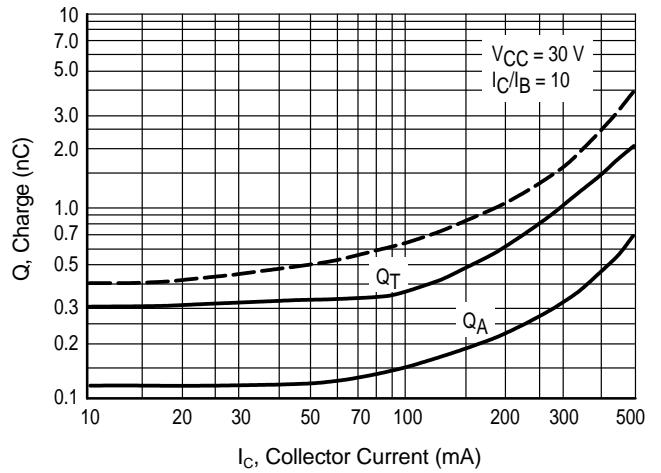


Figure 4. Charge Data

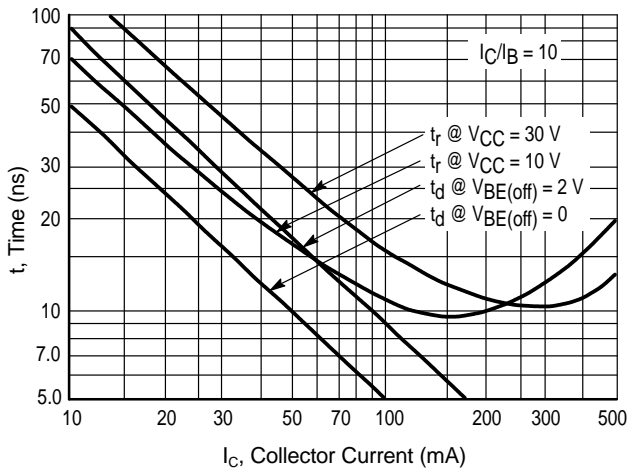


Figure 5. Turn-On Time

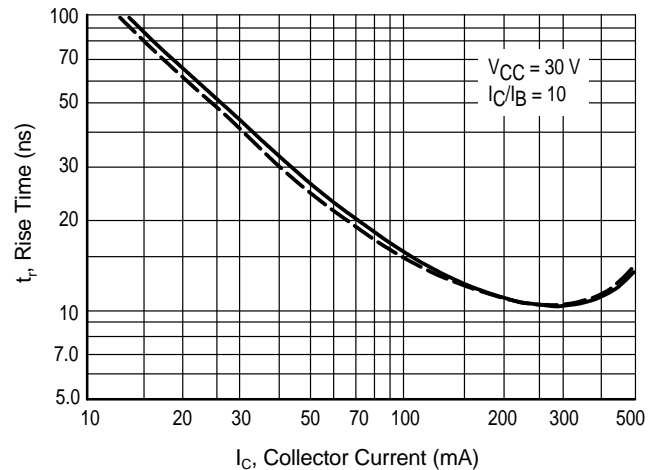


Figure 6. Rise Time

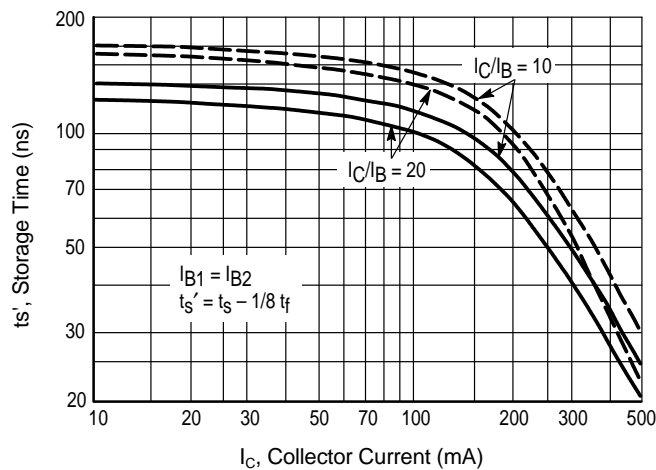


Figure 7. Storage Time

SMALL-SIGNAL CHARACTERISTICS

NOISE FIGURE

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

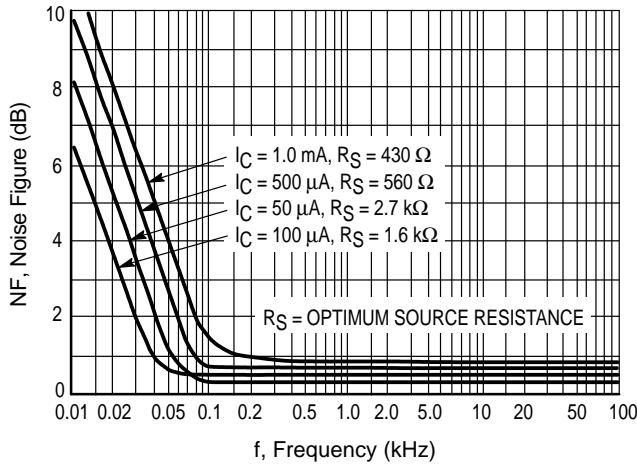


Figure 8. Frequency Effects

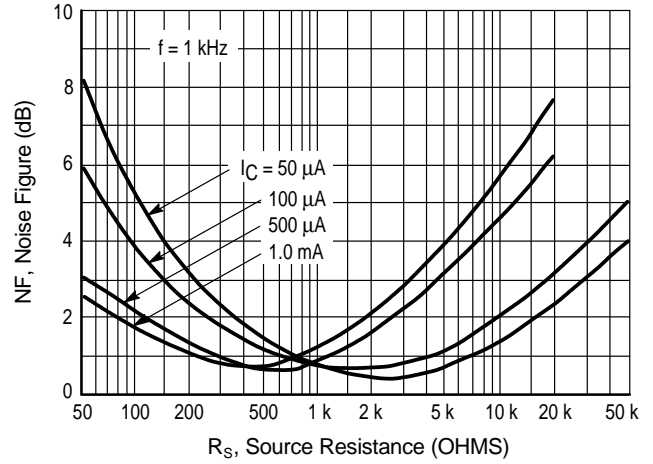


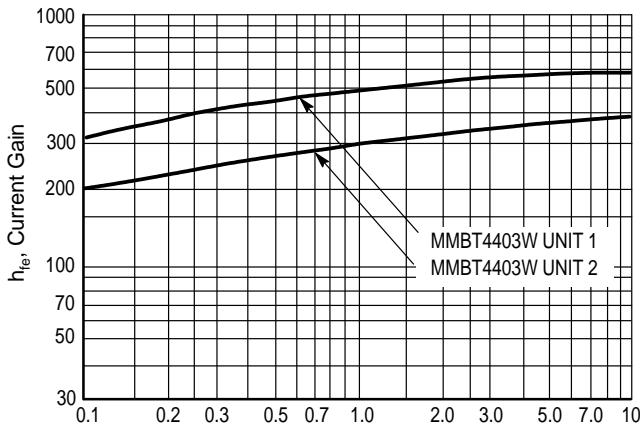
Figure 9. Source Resistance Effects

h PARAMETERS

$V_{CE} = -10 \text{ Vdc}$, $f = 1.0 \text{ kHz}$, $T_A = 25^\circ\text{C}$

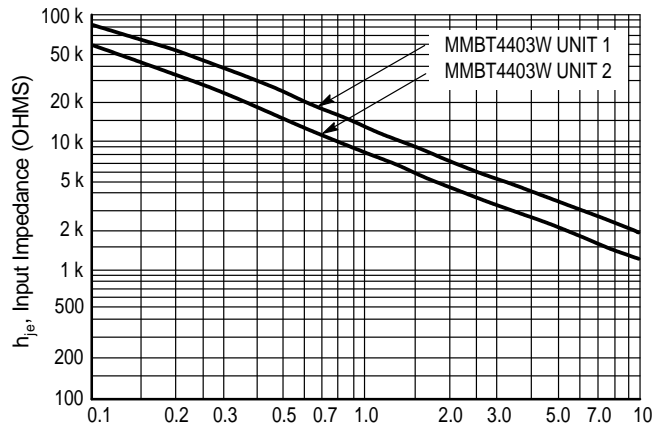
This group of graphs illustrates the relationship between h_{fe} and other "h" parameters for this series of transistors. To obtain these curves, a high-gain and a low-gain unit were

selected from the MMBT4403W lines, and the same units were used to develop the correspondingly-numbered curves on each graph.



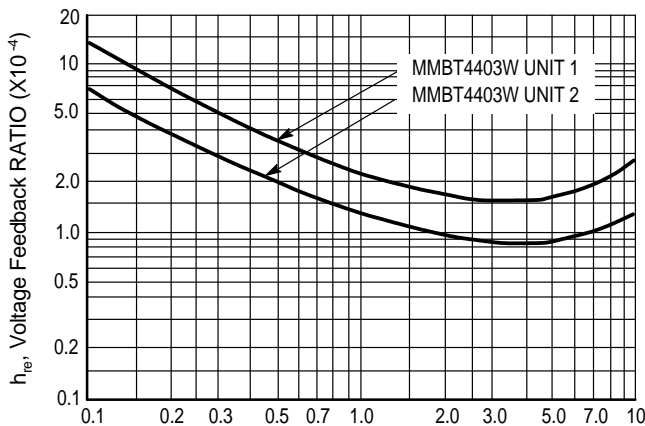
I_C , Collector Current (mA)

Figure 10. Current Gain



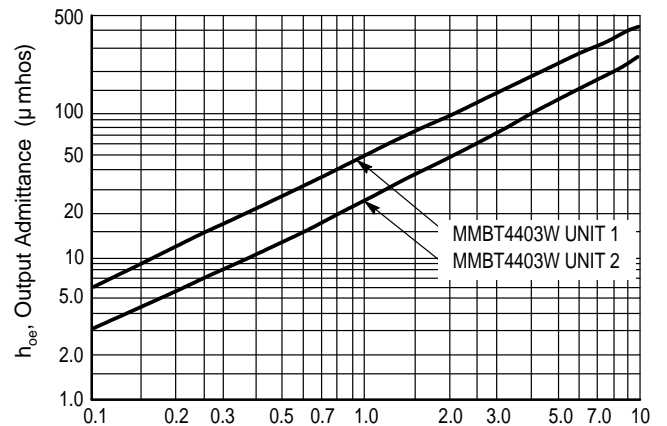
I_C , Collector Current (mA)

Figure 11. Input Impedance



I_C , Collector Current (mA)

Figure 12. Voltage Feedback Ratio



I_C , Collector Current (mA)

Figure 13. Output Admittance

STATIC CHARACTERISTICS

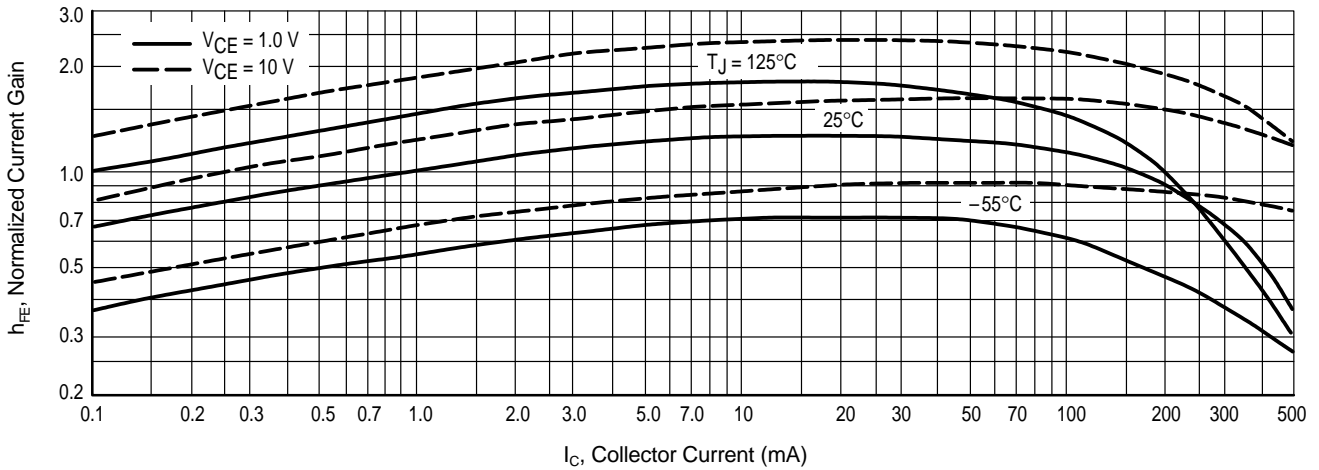


Figure 14. DC Current Gain

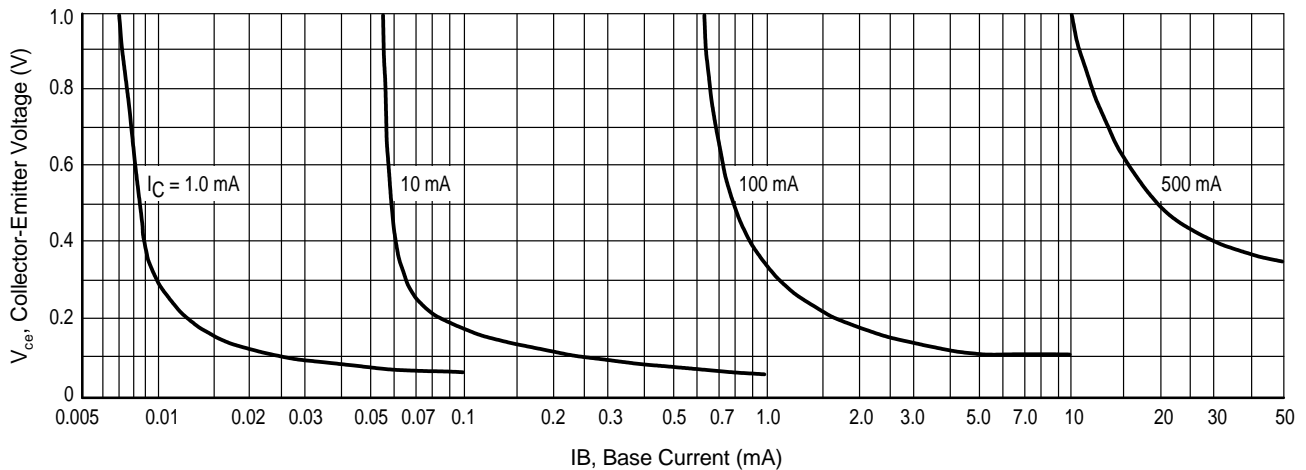


Figure 15. Collector Saturation Region

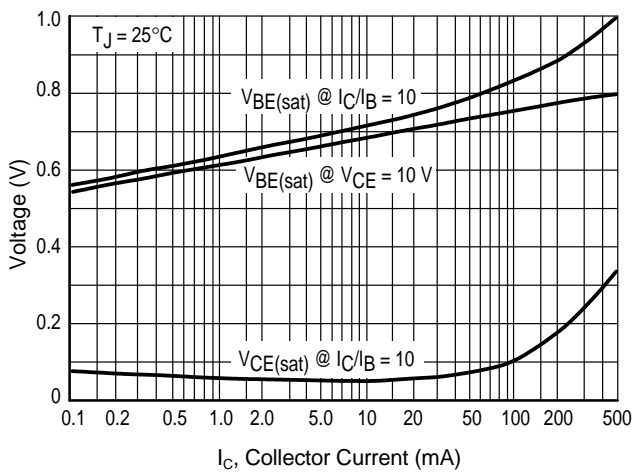


Figure 16. "On" Voltages

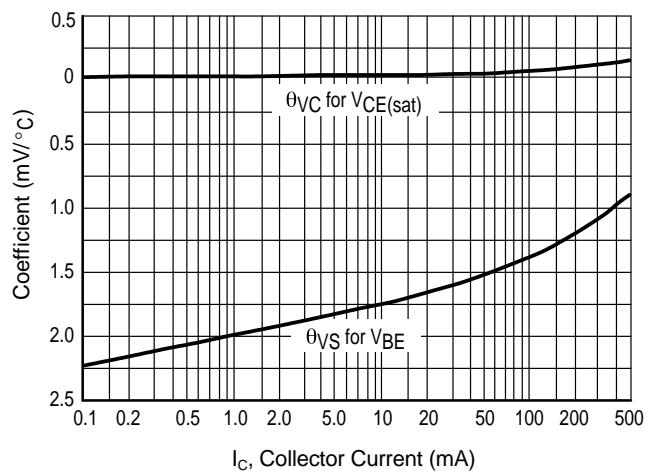


Figure 17. Temperature Coefficients