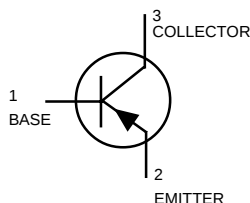
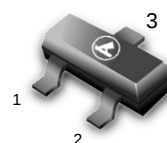


Switching Transistor

PNP Silicon


MMBT3640LT1

 CASE 318-08, STYLE 6
SOT-23 (TO-236AB)

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	-12	Vdc
Collector-Base Voltage	V_{CBO}	-12	Vdc
Emitter-Base Voltage	V_{EBO}	-4.0	Vdc
Collector Current — Continuous	I_C	-80	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	$^\circ\text{C/W}$
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	$^\circ\text{C/W}$
Junction and Storage Temperature	T_J, T_{stg}	-55 to +150	$^\circ\text{C}$

DEVICE MARKING

MMBT3640LT1 = 2J

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 ($I_C = -100 \mu\text{Adc}$, $V_{BE} = 0$)	$V_{(BR)CES}$	-12	—	Vdc
Collector-Emitter Sustaining Voltage(1) ($I_C = -10 \text{ mAdc}$, $I_B = 0$)	$V_{CEO(sus)}$	-12	—	Vdc
Collector-Base Breakdown Voltage ($I_C = -100 \mu\text{Adc}$, $I_E = 0$)	$V_{(BR)CBO}$	-12	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = -100 \mu\text{Adc}$, $I_C = 0$)	$V_{(BR)EBO}$	-4.0	—	Vdc
Collector Cutoff Current ($V_{CE} = -6.0\text{Vdc}$, $V_{BE} = 0$)	I_{CES}	—	-0.01	μAdc
($V_{CE} = -6.0\text{Vdc}$, $V_{BE} = 0$, $T_A = 65^\circ\text{C}$)		—	-1.0	
Base Current Current ($V_{CE} = -6.0\text{Vdc}$, $V_{EB} = 0$)	I_B	—	-10	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.

MMBT3640LT1

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

Characteristic	Symbol	Min	Max	Unit
ON CHARACTERISTICS				
DC Current Gain ($I_C = -10\text{mA}$, $V_{CE} = -0.3\text{Vdc}$) ($I_C = -50\text{mA}$, $V_{CE} = -1.0\text{Vdc}$)	h_{FE}	30 20	120 —	—
Collector–Emitter Saturation Voltage ($I_C = -10\text{mA}$, $I_B = -1.0\text{mA}$) ($I_C = -50\text{mA}$, $I_B = -5.0\text{mA}$) ($I_C = -10\text{mA}$, $I_B = -1.0\text{mA}$, $T_A = 65^\circ\text{C}$)	$V_{CE(sat)}$	— — —	-0.2 -0.6 -0.25	Vdc
Base–Emitter Saturation Voltage ($I_C = -10\text{mA}$, $I_B = -0.5\text{mA}$) ($I_C = -10\text{mA}$, $I_B = -1.0\text{mA}$) ($I_C = -50\text{mA}$, $I_B = -5.0\text{mA}$)	$V_{BE(sat)}$	-0.75 -0.8 —	-0.95 -1.0 -1.5	Vdc

SMALL–SIGNAL CHARACTERISTICS

Current–Gain — Bandwidth Product(3),(4) ($I_C = -10\text{mA}$, $V_{CE} = -5.0\text{Vdc}$, $f = 100\text{MHz}$)	f_T	500	—	MHz
Output Capacitance ($V_{CB} = -5.0\text{Vdc}$, $I_E = 0$, $f = 1.0\text{MHz}$)	C_{obo}	—	3.5	pF
Input Capacitance ($V_{EB} = -0.5\text{Vdc}$, $I_C = 0$, $f = 1.0\text{MHz}$)	C_{ibo}	—	3.5	pF

SWITCHING CHARACTERISTICS

Delay Time ($V_{CC} = -6.0\text{Vdc}$, $V_{EB(off)} = -1.9\text{Vdc}$, $I_C = -50\text{mA}$, $I_{B1} = -5.0\text{mA}$)	t_d	—	10	ns
Rise Time ($V_{CC} = -6.0\text{Vdc}$, $I_C = -50\text{mA}$, $I_{B1} = -5.0\text{mA}$)	t_r	—	30	ns
Storage Time ($V_{CC} = -6.0\text{Vdc}$, $I_C = -50\text{mA}$, $I_{B1} = I_{B2} = -5.0\text{mA}$)	t_s	—	20	ns
Fall Time ($V_{CC} = -6.0\text{Vdc}$, $I_C = -50\text{mA}$, $I_{B1} = I_{B2} = -5.0\text{mA}$)	t_f	—	12	ns
Turn–On Time ($V_{CC} = -6.0\text{Vdc}$, $I_C = -50\text{mA}$, $V_{EB(off)} = -1.9\text{Vdc}$, $I_{B1} = -5.0\text{mA}$) ($V_{CC} = -1.5\text{Vdc}$, $I_C = -10\text{mA}$, $I_{B1} = -5.0\text{mA}$)	t_{on}	— —	25 60	ns
Turn–Off Time ($V_{CC} = -6.0\text{Vdc}$, $I_C = -50\text{mA}$, $V_{EB(off)} = -1.9\text{Vdc}$, $I_{B1} = I_{B2} = -5.0\text{mA}$) ($V_{CC} = -1.5\text{Vdc}$, $I_C = -10\text{mA}$, $I_{B1} = I_{B2} = -0.5\text{mA}$)	t_{off}	— —	35 75	ns

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

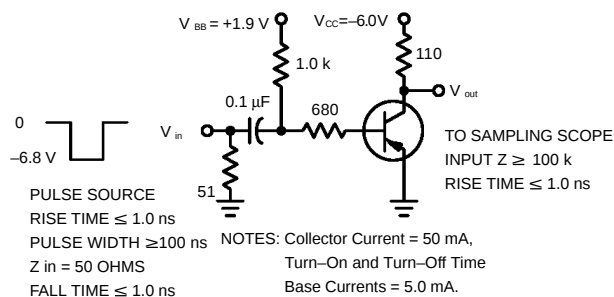


Figure 1.

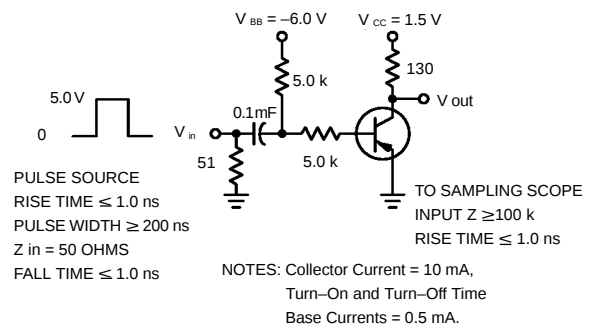


Figure 2.

MMBT3640LT1

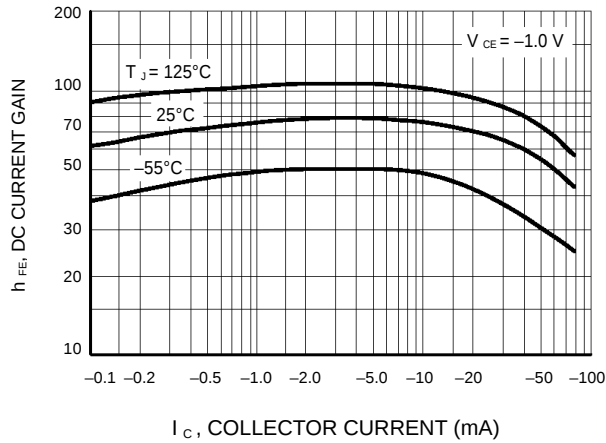


Figure 3. DC Current Gain

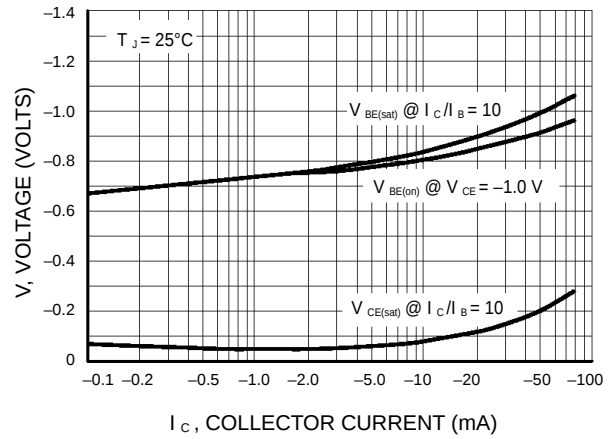


Figure 4. "On" Voltages

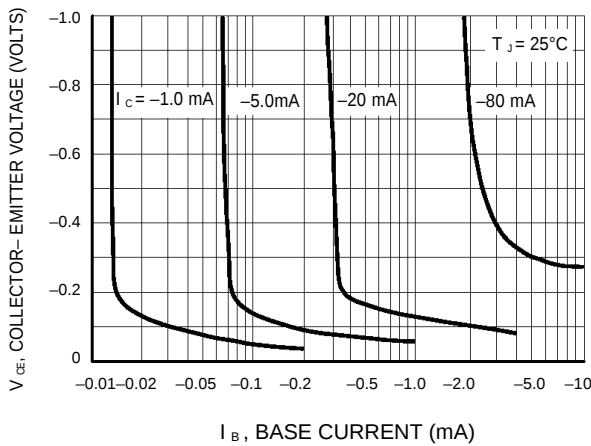


Figure 5. Collector Saturation Region

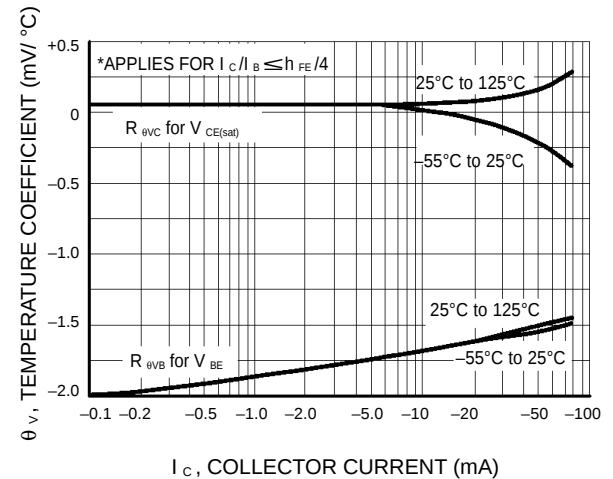


Figure 6. Temperature Coefficients

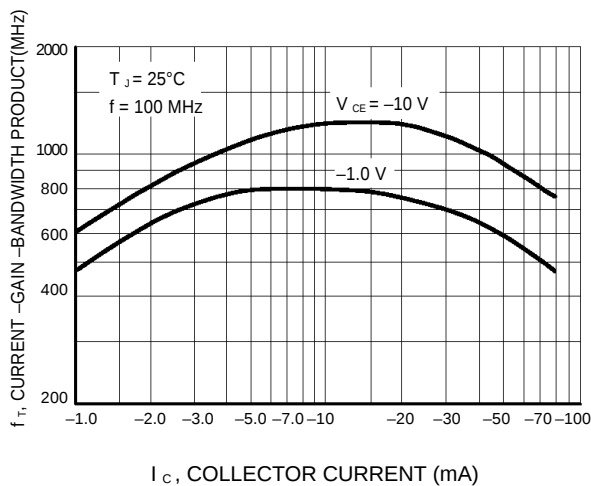


Figure 7. Current-Gain — Bandwidth Product

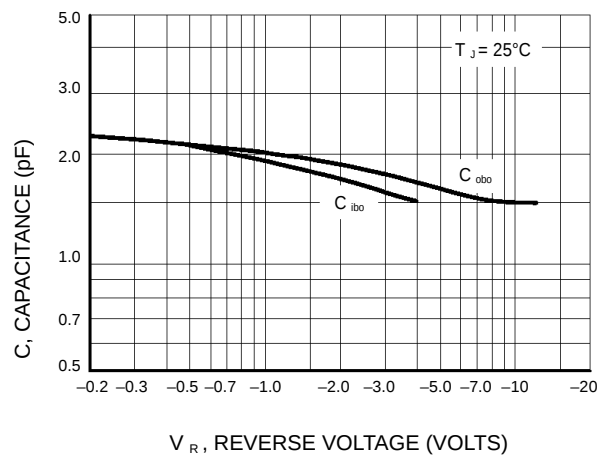


Figure 8. Capacitance