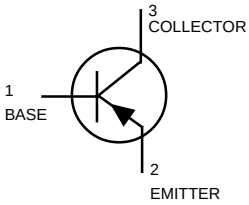
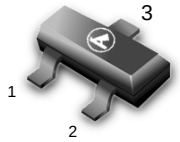
Switching Transistor

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°C	P_D	225	mW
Derate above 25°C		1.8	mW/°C
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	556	°C/W
Total Device Dissipation Alumina Substrate, (2) T_A = 25°C	P_D	300	mW
Derate above 25°C		2.4	mW/°C
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	417	°C/W
Junction and Storage Temperature	T_J , T_{stg}	–55 to +150	°C

DEVICE MARKING

MMBT3640LT1 = 2J

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector–Emitter Breakdown Voltage (I_C = –100 µAdc, V_{BE} = 0)	$V_{(BR)CES}$	–12	—	Vdc
Collector–Emitter Sustaining Voltage(1) (I_C = –10 mAdc, I_B = 0)	$V_{CEO(sus)}$	–12	—	Vdc
Collector–Base Breakdown Voltage (I_C = –100 µAdc, I_E = 0)	$V_{(BR)CBO}$	–12	—	Vdc
Emitter–Base Breakdown Voltage (I_E = –100 µAdc, I_C = 0)	$V_{(BR)EBO}$	–4.0	—	Vdc
Collector Cutoff Current	I_{CES}			µAdc
(V_{CE} = –6.0Vdc, V_{BE} = 0)		—	–0.01	
(V_{CE} = –6.0Vdc, V_{BE} = 0, T_A= 65°C)		—	–1.0	
Base Current Current (V_{CE} = –6.0Vdc, 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°C unless otherwise noted) (Continued)

Characteristic	Symbol	Min	Max	Unit
ON CHARACTERISTICS				
DC Current Gain	h_{FE}			—
(I_C = –10mAdc, V_{CE} = –0.3 Vdc)		30	120	
(I_C = –50mAdc, V_{CE} = –1.0 Vdc)		20	—	
Collector–Emitter Saturation Voltage	$V_{CE(sat)}$			Vdc
(I_C = –10mAdc, I_B = –1.0 mAdc)		—	–0.2	
(I_C = –50 mAdc, I_B = –5.0 mAdc)		—	–0.6	
(I_C = –10 mAdc, I_B = –1.0 mAdc, T_A=65°C)		—	–0.25	
Base–Emitter Saturation Voltage	$V_{BE(sat)}$			Vdc
(I_C = –10mAdc, I_B = –0.5 mAdc)		–0.75	–0.95	
(I_C = –10mAdc, I_B = –1.0 mAdc)		–0.8	–1.0	
(I_C = –50mAdc, I_B = –5.0 mAdc)		—	–1.5	
SMALL–SIGNAL CHARACTERISTICS				
Current–Gain — Bandwidth Product(3),(4) (I_C = –10mAdc, V_{CE}= –5.0Vdc, f = 100MHz)	f_T	500	—	MHz
Output Capacitance (V_{CB} = –5.0Vdc, I_E = 0, f = 1.0 MHz)	C_{obo}	—	3.5	pF
Input Capacitance (V_{EB} = –0.5Vdc, I_C = 0, f = 1.0 MHz)	C_{ibo}	—	3.5	pF
SWITCHING CHARACTERISTICS				
Delay Time (V_{CC} = –6.0 Vdc,$V_{EB(off)}$=–1.9Vdc, I_C = –50 mAdc, I_{B1} = –5.0 mAdc)	t_d	—	10	ns
Rise Time	t_r	—	30	ns
Storage Time (V_{CC} = –6.0 Vdc, I_C = –50 mAdc,I_{B1} = I_{B2} = –5.0 mAdc)	t_s	—	20	ns
Fall Time	t_f	—	12	ns
Turn–On Time	t_{on}			ns
(V_{CC} = –6.0 Vdc, I_C = –50 mAdc, $V_{EB(off)}$=–1.9Vdc,I_{B1} = –5.0 mAdc)		—	25	
(V_{CC} = –1.5 Vdc, I_C = –10 mAdc, I_{B1} = –5.0 mAdc)		—	60	
Turn–Off Time	t_{off}			ns
(V_{CC} = –6.0 Vdc, I_C = –50 mAdc, $V_{EB(off)}$=–1.9Vdc, I_{B1} = I_{B2} = –5.0 mAdc)		—	35	
(V_{CC} = –1.5 Vdc, I_C = –10 mAdc, I_{B1} = I_{B2} = –0.5 mAdc)		—	75	

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

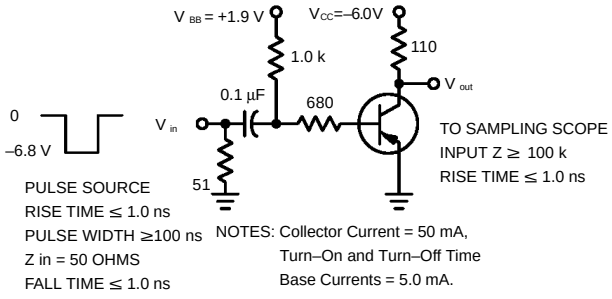


Figure 1.

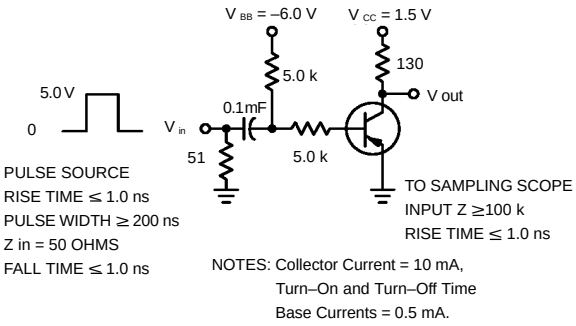


Figure 2.

MMBT3640LT1

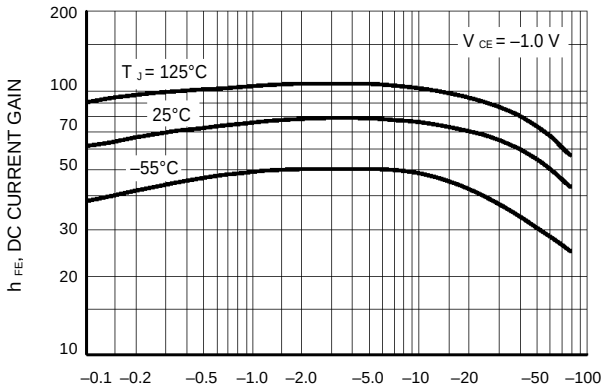


Figure 3. DC Current Gain

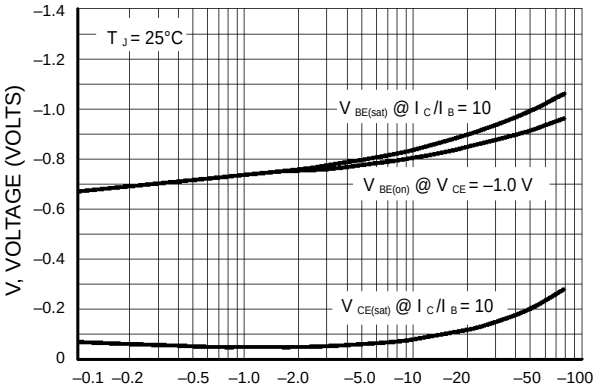


Figure 4. “On” Voltages

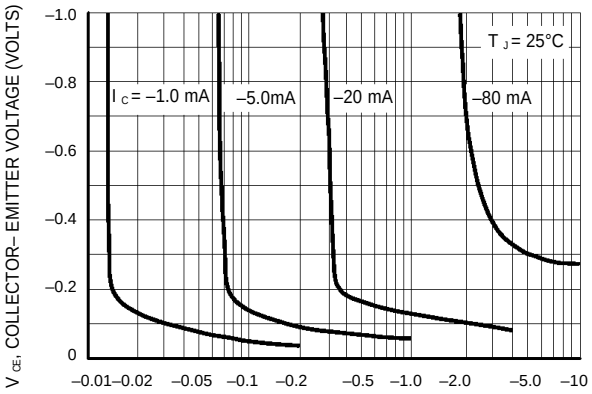


Figure 5. Collector Saturation Region

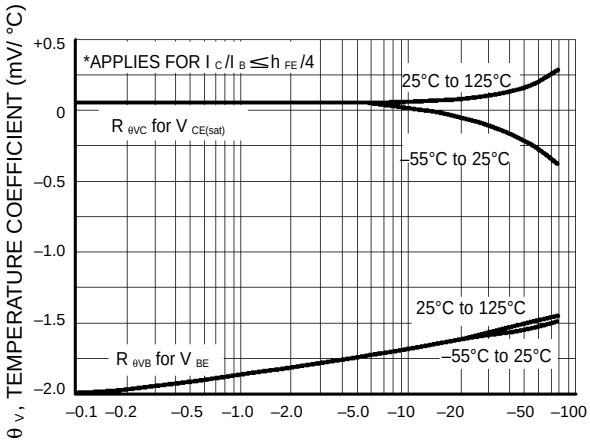


Figure 6. Temperature Coefficients

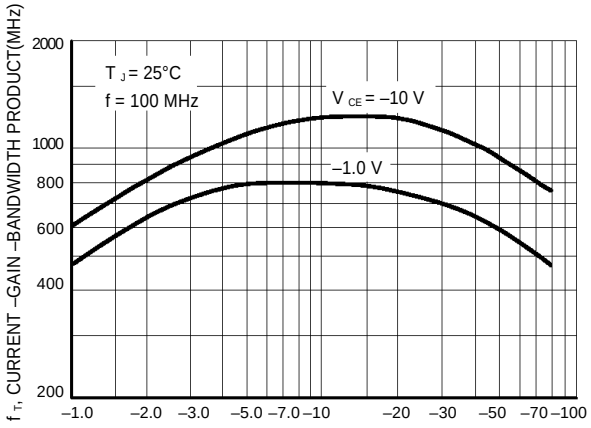


Figure 7. Current–Gain — Bandwidth Product

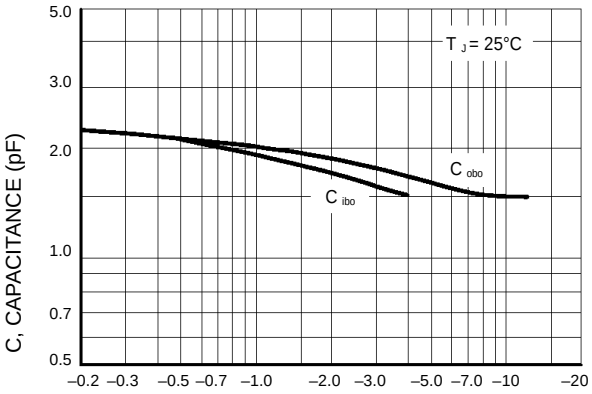


Figure 8. Capacitance