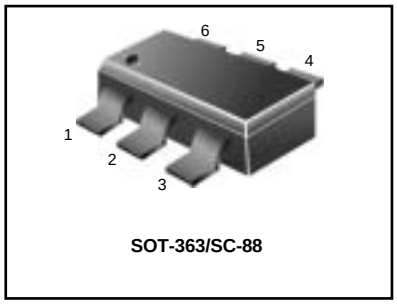
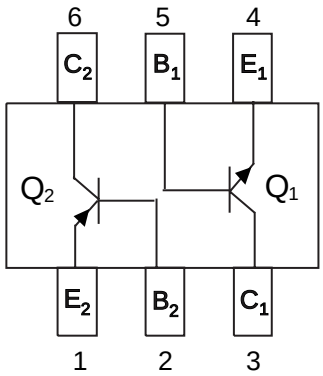
DUAL SMALL SIGNAL SURFACE MOUNT TRANSISTOR

LMBT5541DW1T1G



SOT-363/SC-88



FEATURE

- We declare that the material of product is ROHS compliant and halogen free.

DEVICE MARKING AND ORDERING INFORMATION

Device	Marking	Shipping
LMBT5541DW1T1G	GL	3000/Tape&Reel
LMBT5541DW1T3G	GL	10000/Tape&Reel

MAXIMUM RATINGS – NPN

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	V_{CEO}	140	Vdc
Collector–Base Voltage	V_{CBO}	160	Vdc
Emitter–Base Voltage	V_{EBO}	6.0	Vdc
Collector Current — Continuous	I_C	600	mAdc

MAXIMUM RATINGS – PNP

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	V_{CEO}	-150	Vdc
Collector–Base Voltage	V_{CBO}	-160	Vdc
Emitter–Base Voltage	V_{EBO}	-5.0	Vdc
Collector Current — Continuous	I_C	-50 0	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

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.

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Q1 ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted.)

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector–Emitter Breakdown Voltage(3) (I_C = 1.0 mAdc, I_B = 0)	$V_{(BR)CEO}$	160	—	Vdc
Collector–Base Breakdown Voltage (I_C = 100 µAdc, I_E = 0)	$V_{(BR)CBO}$	180	—	Vdc
Emitter–Base Breakdown Voltage (I_E = 10 µAdc, I_C = 0)	$V_{(BR)EBO}$	6.0	—	Vdc
Collector Cutoff Current (V_{CB} = 120Vdc, I_E = 0) (V_{CB} = 120Vdc, I_E = 0, T_A=100 °C)	I_{CBO}	— —	50 50	nAdc µAdc
Emitter Cutoff Current (V_{BE} = 4.0Vdc, I_C= 0)	I_{EBO}	—	50	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.
3. Pulse Test: Pulse Width = 300 µs, Duty Cycle = 2.0%.

ON CHARACTERISTICS

DC Current Gain (I_C = 1.0 mAdc, V_{CE} = 5.0 Vdc) (I_C = 10 mAdc, V_{CE} = 5.0 Vdc) (I_C = 50 mAdc, V_{CE} = 5.0Vdc)	h_{FE}	 80 80 30	 — 250 —	—
Collector–Emitter Saturation Voltage (I_C = 10 mAdc, I_B = 1.0 mAdc) (I_C = 50 mAdc, I_B = 5.0 mAdc)	$V_{CE(sat)}$	 — —	 0.15 0.20	Vdc
Base–Emitter Saturation Voltage (I_C = 10 mAdc, I_B = 1.0 mAdc) (I_C = 50 mAdc, I_B = 5.0 mAdc)	$V_{BE(sat)}$	 — —	 1.0 1.0	Vdc

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Q2 ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector–Emitter Breakdown Voltage (I_C = –1.0 mAdc, I_B = 0)	$V_{(BR)CEO}$	– 150	—	Vdc
Collector–Base Breakdown Voltage (I_C = –100 µAdc, I_E = 0)	$V_{(BR)CBO}$	– 160	—	Vdc
Emitter-BAse Breakdown Voltage (I_E= –10µAdc,I_C=0)	$V_{(BR)EBO}$	-5.0	—	Vdc
Collector Cutoff Current (V_{CB} = –120 Vdc, I_E= 0)	I_{CBO}	—	– 50	nAdc
(V_{CB} = –120 Vdc, I_E= 0, T_A=100 °C)		—	– 50	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.

ON CHARACTERISTICS (2)

DC Current Gain	h_{FE}			—
(I_C = –1.0mAdc, V_{CE} = –5.0 Vdc)		50	—	
(I_C = –10 mAdc, V_{CE} = –5.0 Vdc)		60	240	
(I_C = –50 mAdc, V_{CE} = –5.0 Vdc)		50	—	
Collector–Emitter Saturation Voltage	$V_{CE(sat)}$			Vdc
(I_C = –10 mAdc, I_B = –1.0 mAdc)		—	– 0.2	
(I_C = –50 mAdc, I_B = –5.0 mAdc)		—	– 0.5	
Base–Emitter Saturation Voltage	$V_{BE(sat)}$			Vdc
(I_C = –10 mAdc, I_B = –1.0 mAdc)		—	– 1.0	
(I_C = –50 mAdc, I_B = –5.0 mAdc)		—	– 1.0	

SMALL–SIGNAL CHARACTERISTICS

Current–Gain — Bandwidth Product	f_T			MHz
(I_C = –10 mAdc, V_{CE}= –10 Vdc, f = 100 MHz)		100	300	
Output Capacitance	C_{obo}			pF
(V_{CB}= –10 Vdc, I_E = 0, f = 1.0 MHz)		—	6.0	
Small–Signal Current Gain	h_{fe}			—
(I_C= –1.0mAdc, V_{CE} = –10Vdc, f = 1.0 kHz)		40	200	
Noise Figure	NF			dB
(I_C = –200 µAdc, V_{CE}= –5.0 Vdc,R_S=10Ω, f = 1.0 kHz)		—	8.0	

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Q1 TYPICAL PNP CHARACTERISTICS

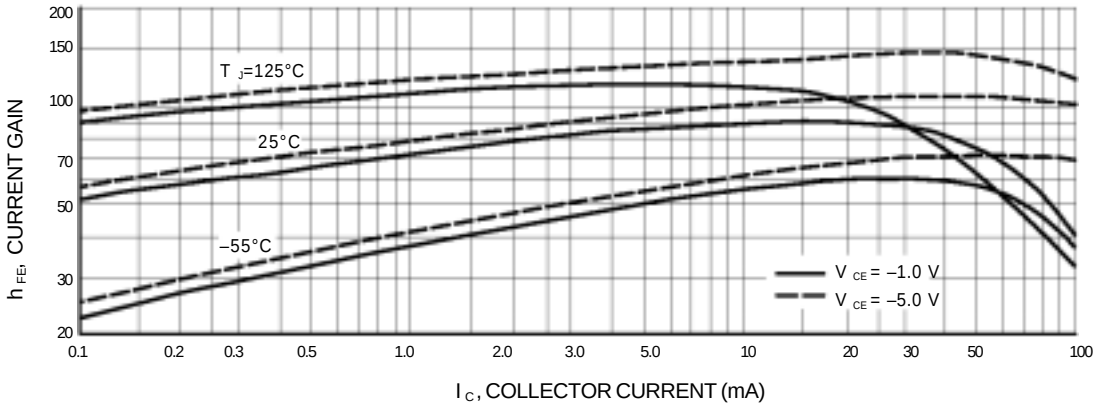

Figure 1. DC Current Gain

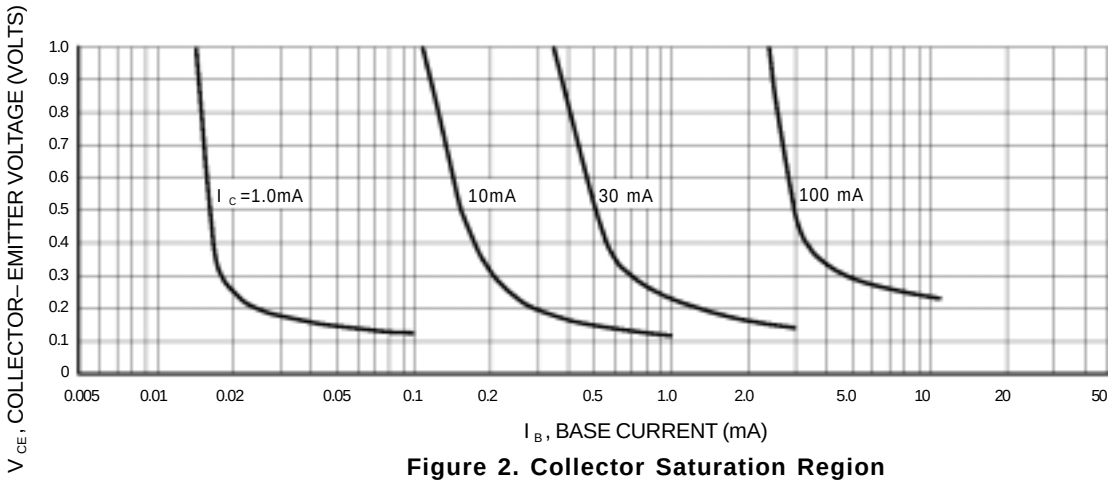

Figure 2. Collector Saturation Region

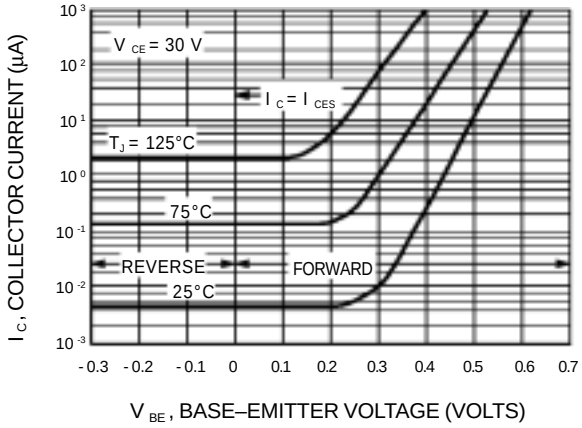

Figure 3. Collector Cut–Off Region

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Q1 TYPICAL PNP CHARACTERISTICS

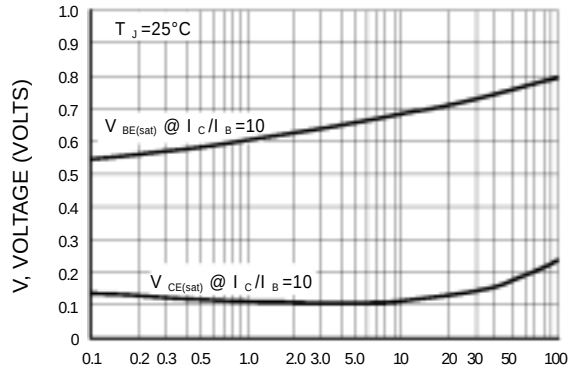

Figure 4. "On" Voltages

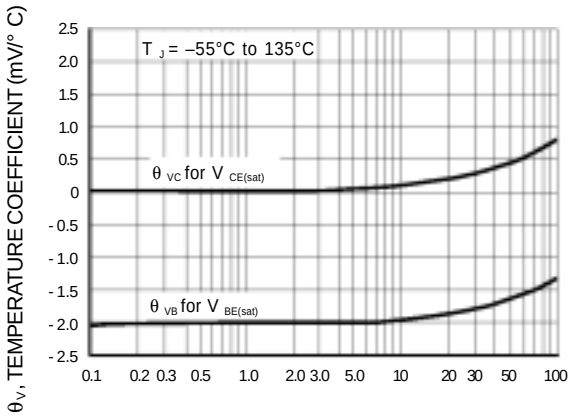

Figure 5. Temperature Coefficients

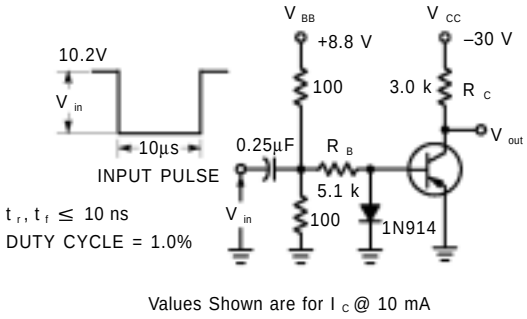

Figure 6. Switching Time Test Circuit

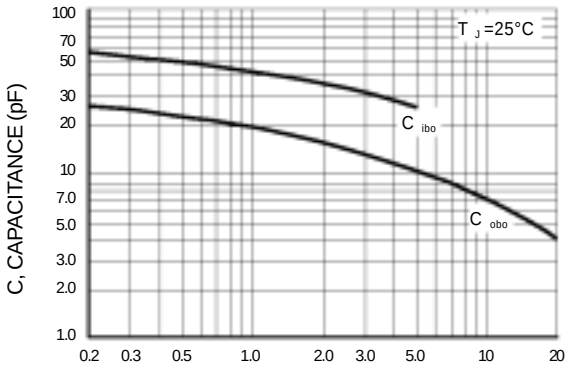

Figure 7. Capacitances

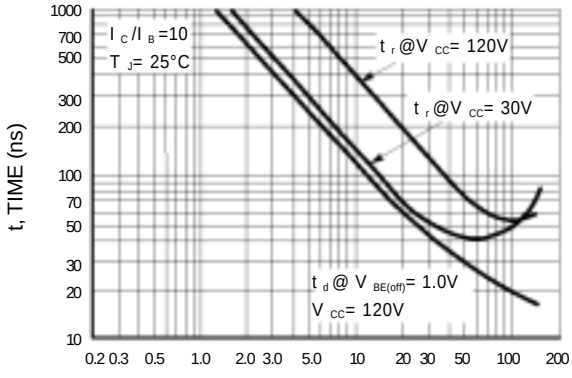

Figure 8. Turn–On Time

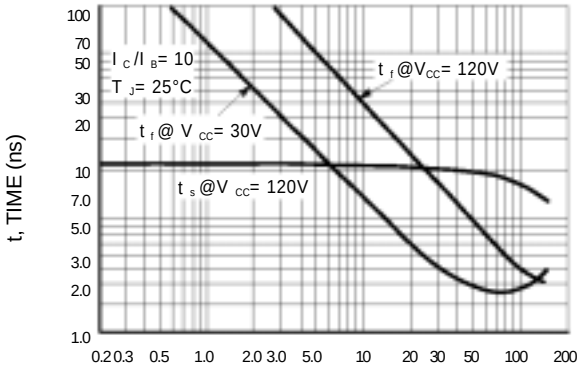

Figure 9. Turn–Off Time

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Q2 TYPICAL NPN CHARACTERISTICS

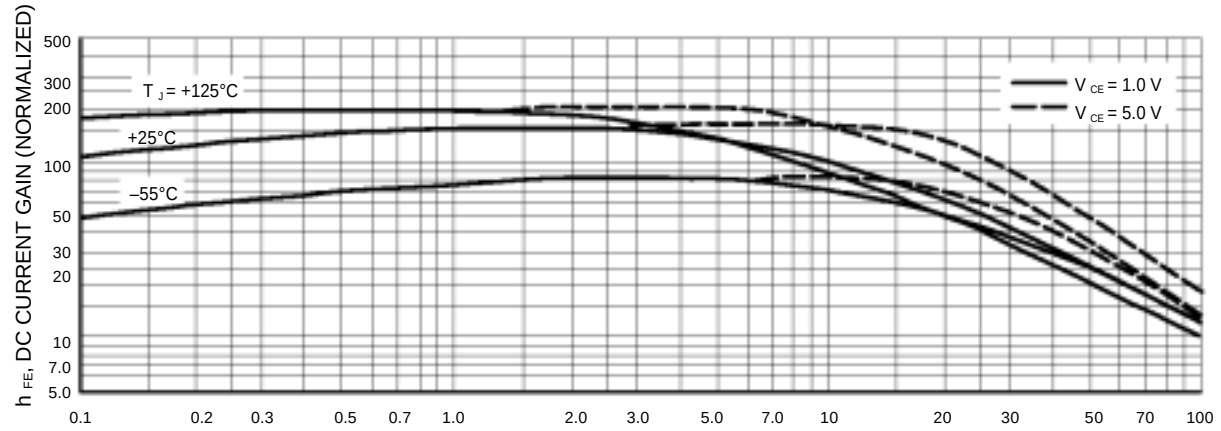


Figure 15. DC Current Gain

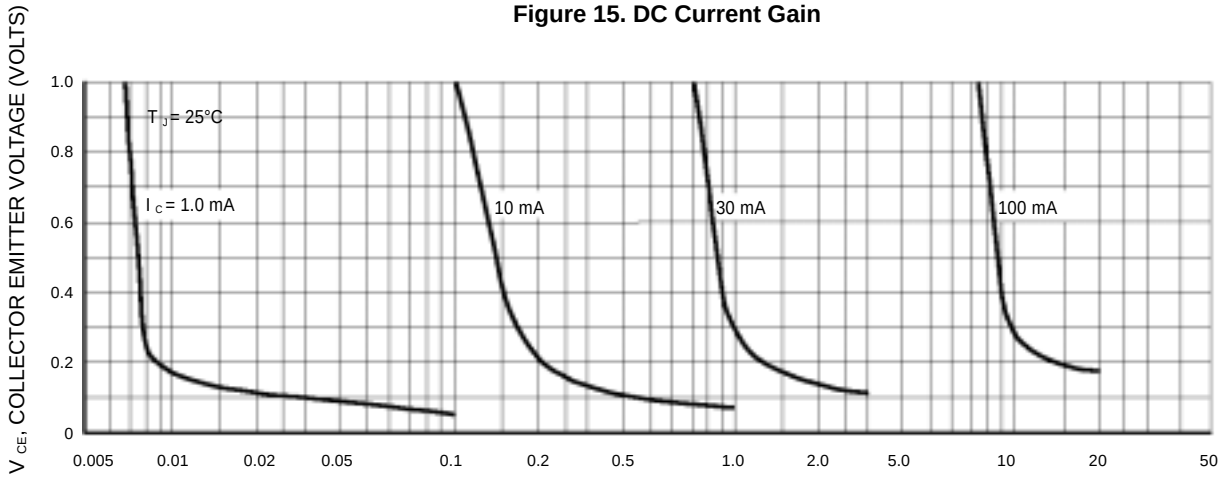


Figure 16. Collector Saturation Region

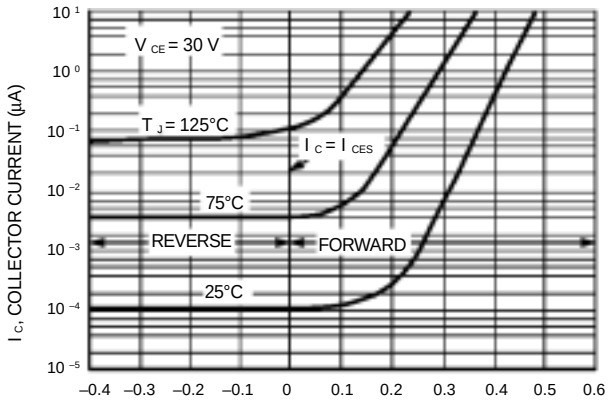


Figure 3. Collector Cut–Off Region

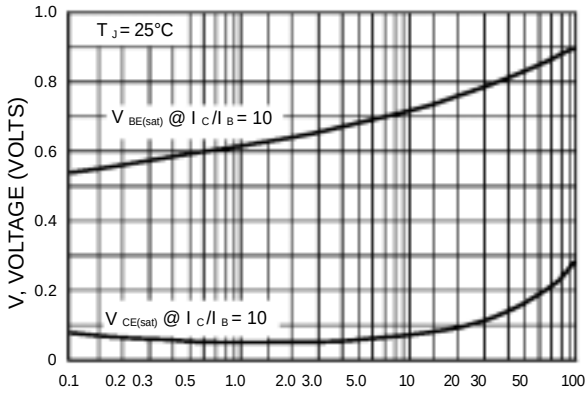


Figure 4. “On” Voltages

LMBT5541DW1T1G

Q2 TYPICAL NPN CHARACTERISTICS

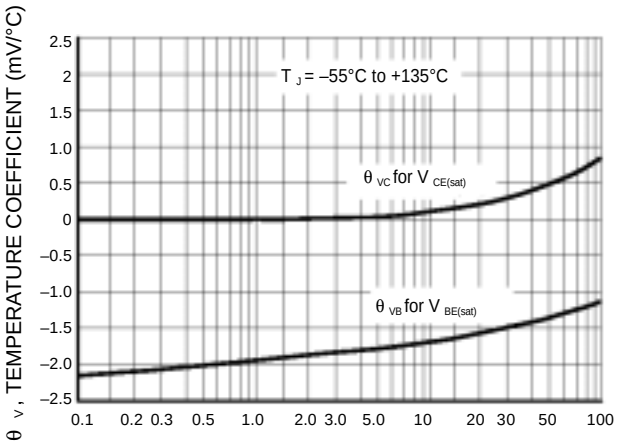
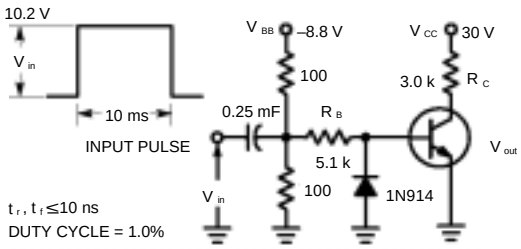


Figure 5. Temperature Coefficients



Values Shown are for I C @ 10 mA

Figure 6. Switching Time Test Circuit

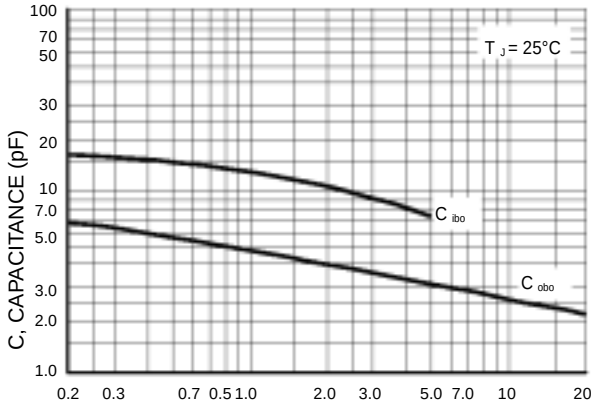
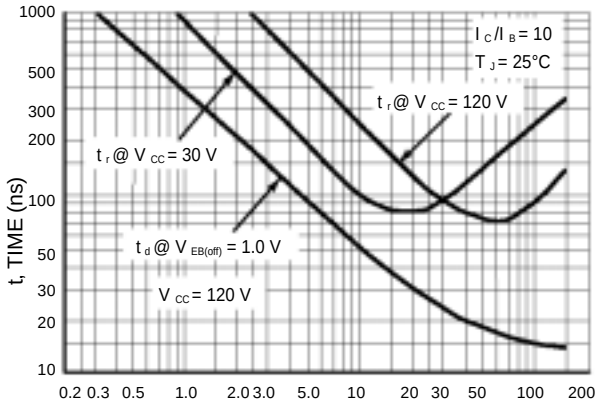


Figure 7. Capacitances Figure



8. Turn–On Time

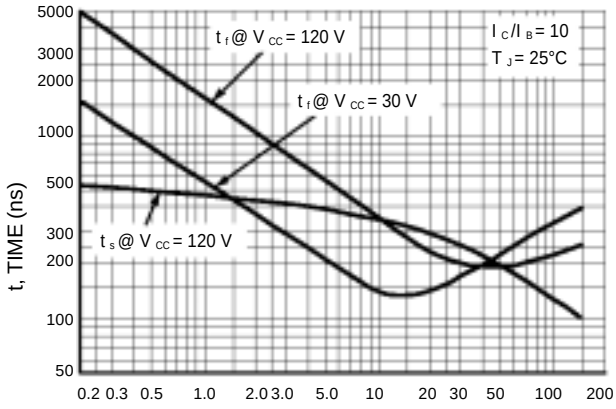


Figure 9. Turn–Off Time

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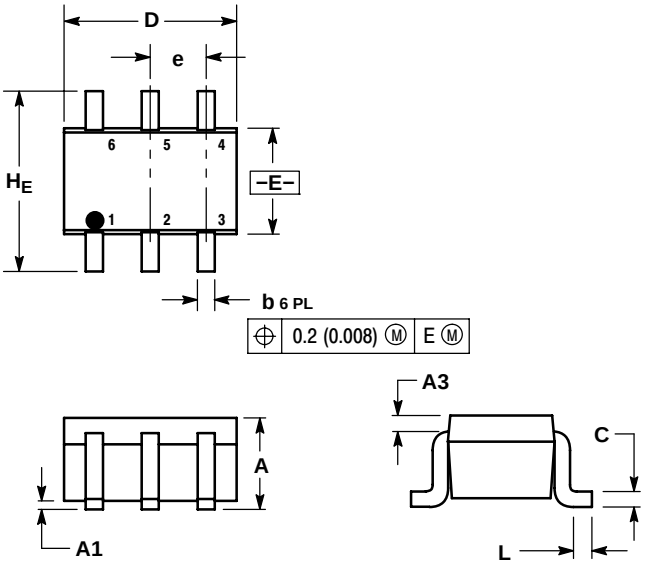
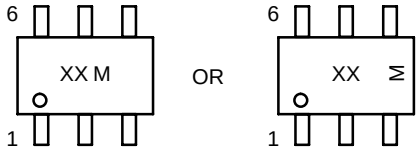


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 419B−01 OBSOLETE, NEW STANDARD 419B−02.

	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
A	0.80	0.95	1.10	0.031	0.037	0.043
A1	0.00	0.05	0.10	0.000	0.002	0.004
A3		0.20 REF			0.008 REF	
b	0.10	0.21	0.30	0.004	0.008	0.012
C	0.10	0.14	0.25	0.004	0.005	0.010
D	1.80	2.00	2.20	0.070	0.078	0.086
E	1.15	1.25	1.35	0.045	0.049	0.053
e		0.65 BSC			0.026 BSC	
L	0.10	0.20	0.30	0.004	0.008	0.012
H_E	2.00	2.10	2.20	0.078	0.082	0.086

GENERIC MARKING DIAGRAM*



XX = Specific Device Code
M = Date Code