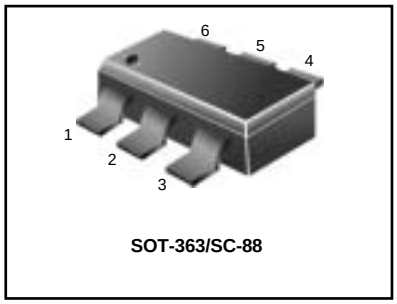
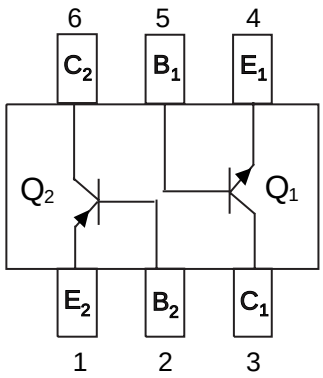
DUAL SMALL SIGNAL SURFACE MOUNT TRANSISTOR

LMBT5541DW1T1G
S-LMBT5541DW1T1G



SOT-363/SC-88



FEATURE

- We declare that the material of product is ROHS compliant and halogen free.
- S- Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

DEVICE MARKING AND ORDERING INFORMATION

Device	Marking	Shipping
LMBT5541DW1T1G S-LMBT5541DW1T1G	GL	3000/Tape&Reel
LMBT5541DW1T3G S-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

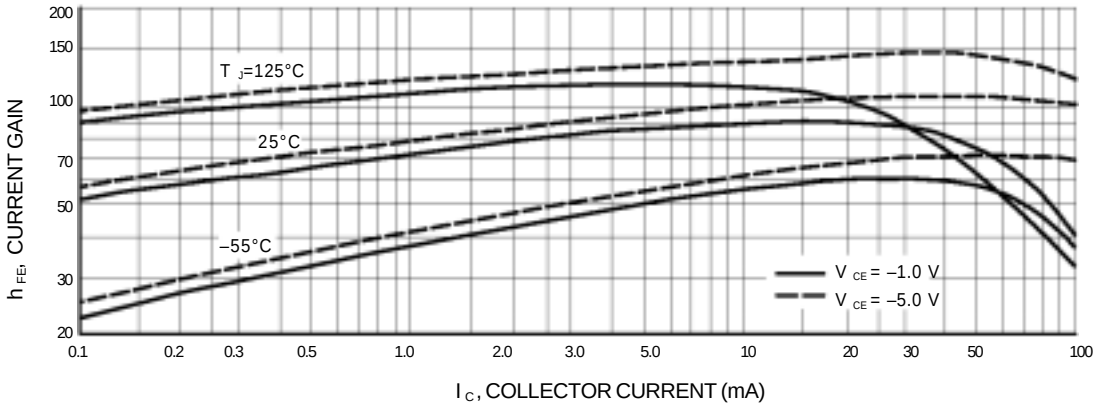

Figure 1. DC Current Gain

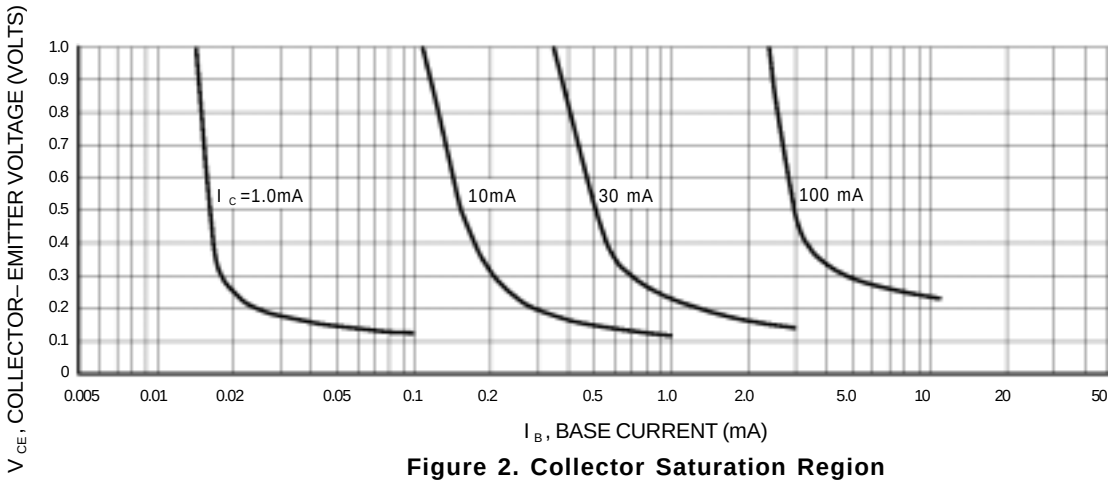

Figure 2. Collector Saturation Region

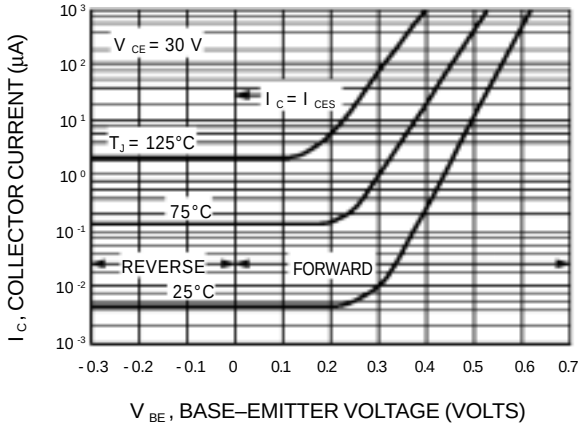

Figure 3. Collector Cut–Off Region

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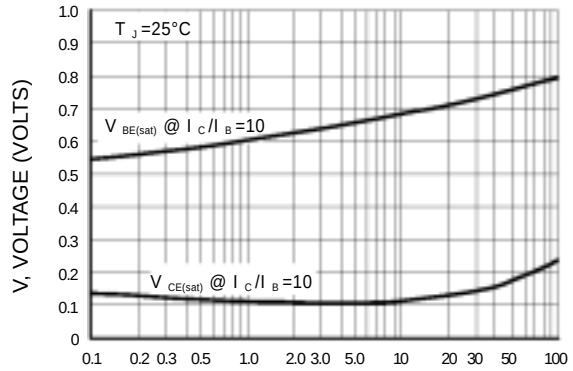
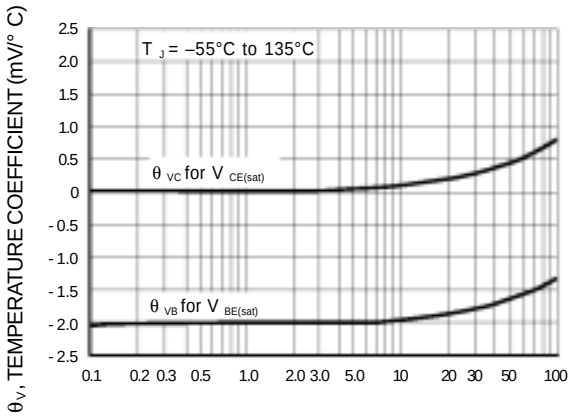
Q1 TYPICAL PNP CHARACTERISTICS



I C, COLLECTOR CURRENT (mA)

Figure 4. "On" Voltages



I C, COLLECTOR CURRENT (mA)

Figure 5. Temperature Coefficients

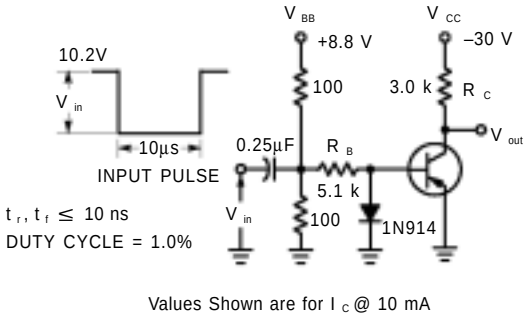
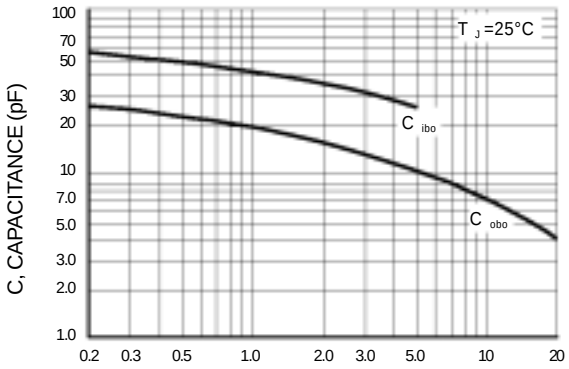
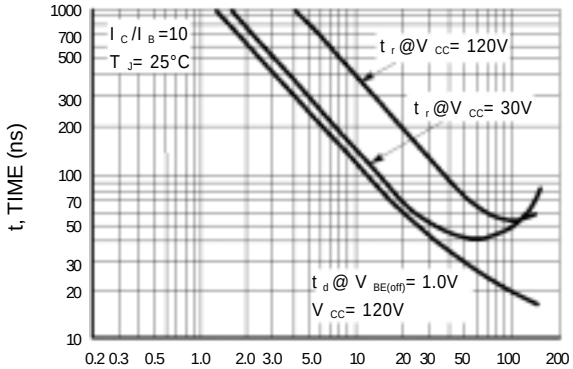


Figure 6. Switching Time Test Circuit



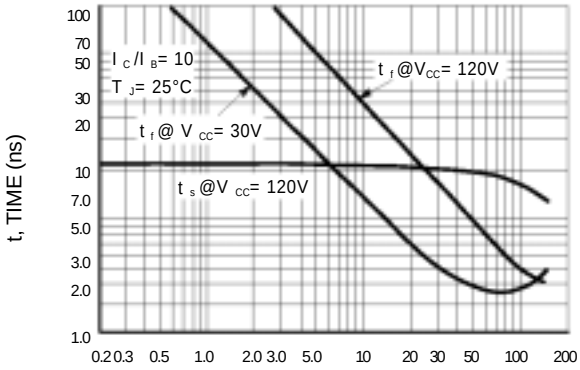
V R, REVERSE VOLTAGE (VOLTS)

Figure 7. Capacitances



I C, COLLECTOR CURRENT (mA)

Figure 8. Turn–On Time



I C, COLLECTOR CURRENT (mA)

Figure 9. Turn–Off Time

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Q2 TYPICAL NPN CHARACTERISTICS

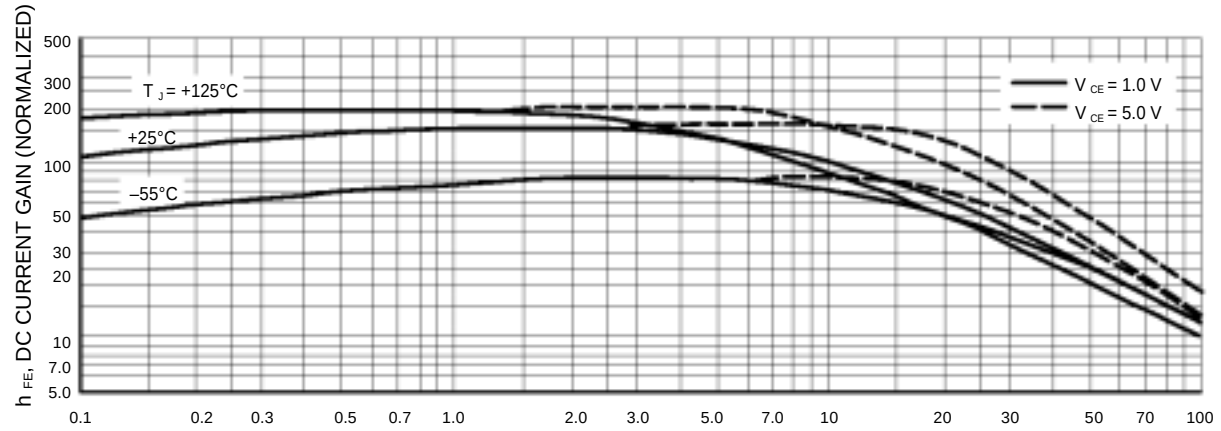


Figure 15. DC Current Gain

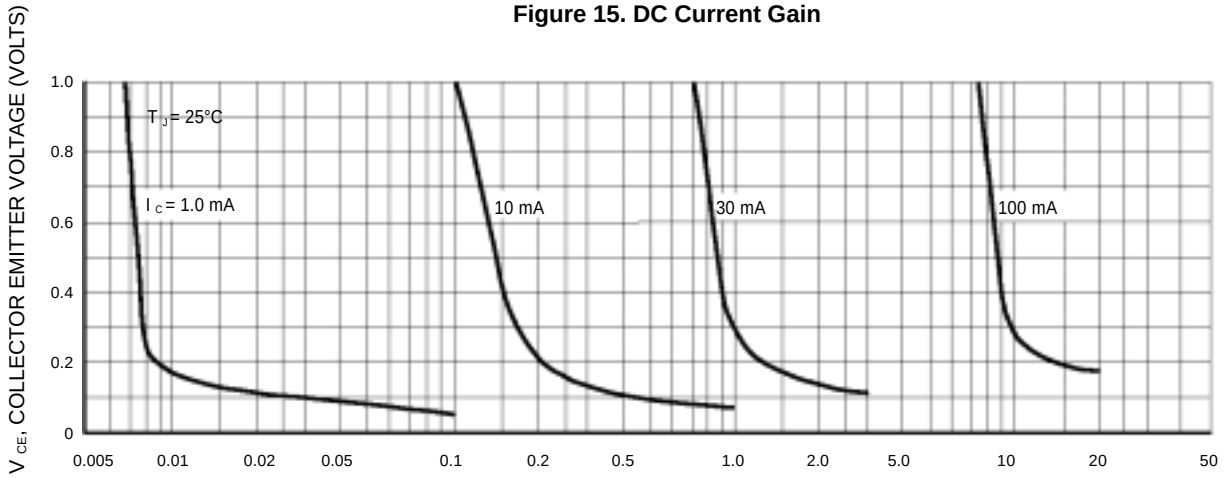


Figure 16. Collector Saturation Region

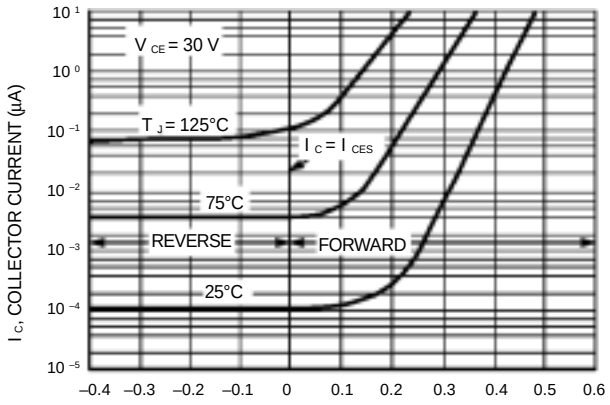


Figure 3. Collector Cut–Off Region

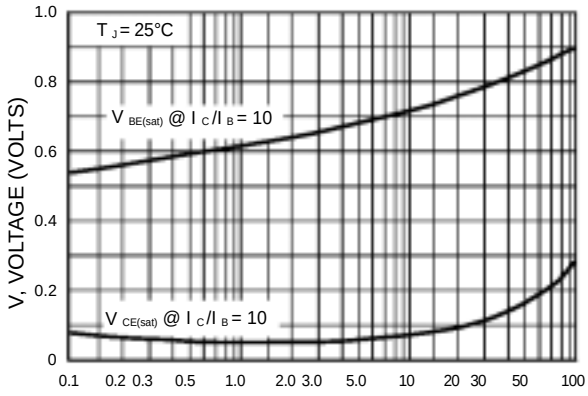


Figure 4. “On” Voltages

LMBT5541DW1T1G , S-LMBT5541DW1T1G

Q2 TYPICAL NPN CHARACTERISTICS

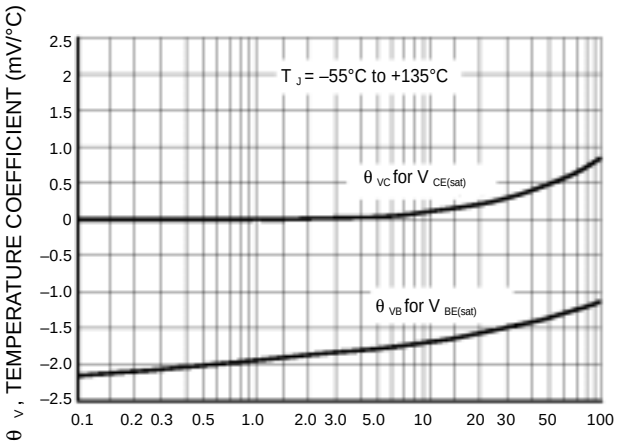
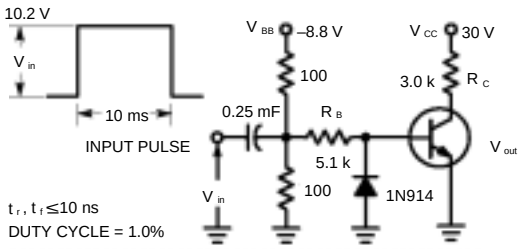


Figure 5. Temperature Coefficients



Values Shown are for I C @ 10 mA

Figure 6. Switching Time Test Circuit

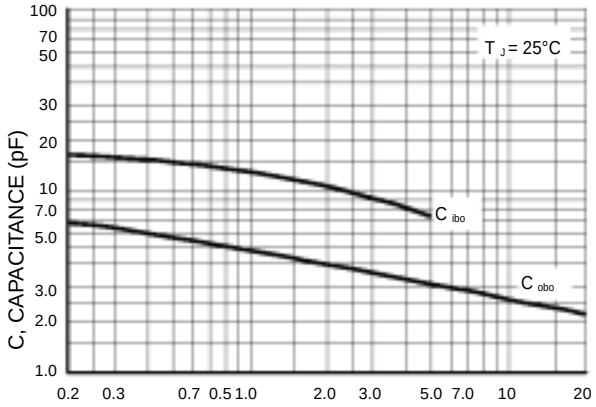
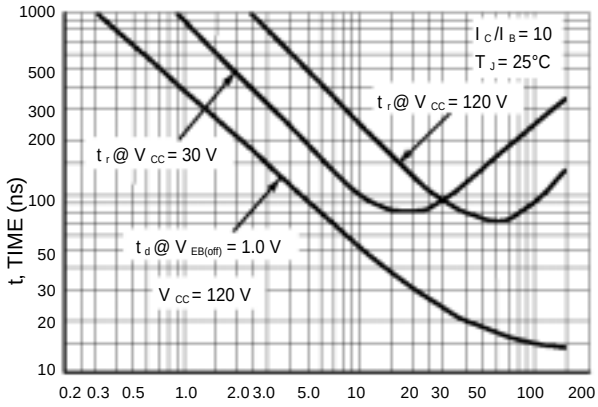


Figure 7. Capacitances Figure



8. Turn–On Time

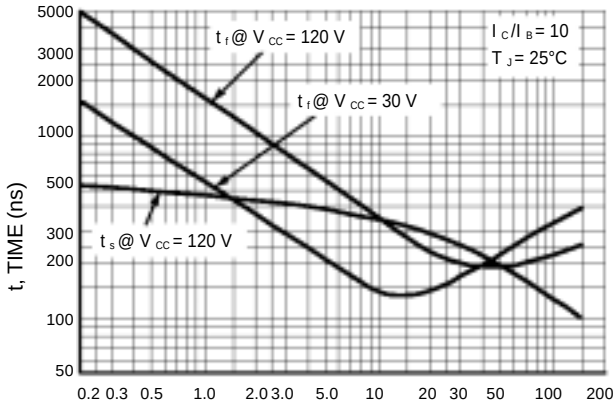


Figure 9. Turn–Off Time

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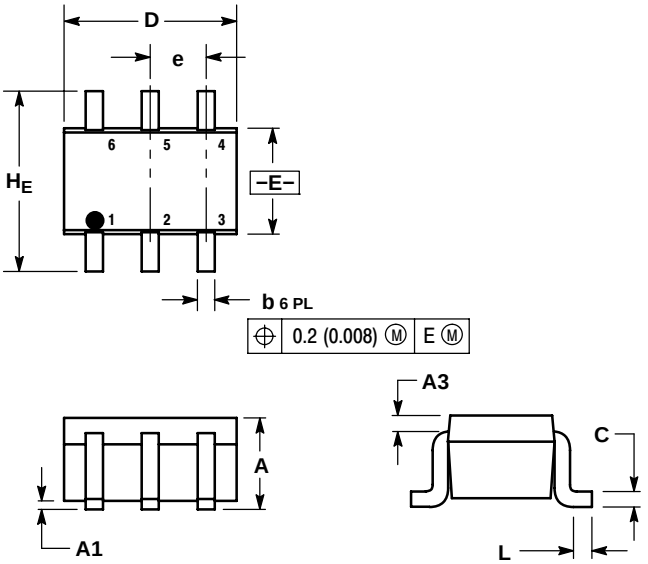
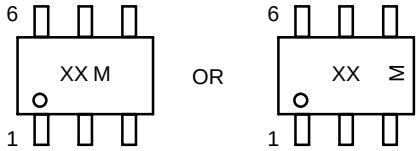


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 419B−01 OBSOLETE, NEW STANDARD 419B−02.

	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