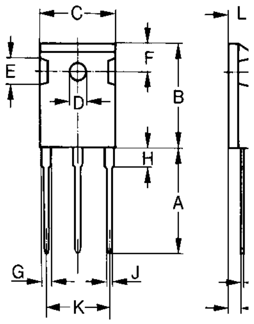
SG40T120DB

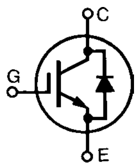
Discrete IGBTs

V_{CES} = 1200V
I_{C100} = 40A
$V_{CE(sat)} \leq$ 2.9V
$t_{fi(typ)}$ = 60ns

G=Gate, C=Collector,
E=Emitter,TAB=Collector

Dimensions TO-247AD





IGBT

SG40T120DB

Dim.	Millimeter Min.	Millimeter Max.	Inches Min.	Inches Max.
A	19.81	20.32	0.780	0.800
B	20.80	21.46	0.819	0.845
C	15.75	16.26	0.610	0.640
D	3.55	3.65	0.140	0.144
E	4.32	5.49	0.170	0.216
F	5.4	6.2	0.212	0.244
G	1.65	2.13	0.065	0.084
H	-	4.5	-	0.177
J	1.0	1.4	0.040	0.055
K	10.8	11.0	0.426	0.433
L	4.7	5.3	0.185	0.209
M	0.4	0.8	0.016	0.031
N	1.5	2.49	0.087	0.102

Symbol	Test Conditions	Maximum Ratings	Unit
V_{CES} V_{CGR}	T_J=25°C to 150°C T_J=25°C to 150°C; R_{GE}=1 MΩ;	1200 1200	V
V_{GES} V_{GEM}	Continuous Transient	±20 ±30	V
I_{C25} I_{C100} I_{CM}	T_C=25°C; limited by leads T_C=100°C T_C=25°C, 1 ms	60 40 180	A
SSOA (RBSOA)	V_{GE}=15V; T_{VJ}=125°C; R_G=5 Ω Clamped inductive load	I_{CM}=120 @ 0.8 V_{CES}	A
P_C	T_C=25°C	300	W
T_J T_{JM} T_{stg}		-55...+150 150 -55...+150	°C
	Maximum lead temperature for soldering 1.6 mm (0.062 in.) from case for 10s Maximum Tab temperature for soldering SMD devices for 10s	300 260	°C °C
M_d	Mounting torque (M3)	1.13/10	Nm/lb.in.
Weight	Typical	6	g

(T_J=25°C, unless otherwise specified)

Symbol	Test Conditions	Characteristic Values min.	typ.	max.	Unit
BV_{CES}	I_C=1mA; V_{GE}=0V	1200			V
$V_{GE(th)}$	I_C=750uA; V_{CE}=V_{GE}	5.0	5.8	6.5	V
I_{CES}	V_{CE}=V_{CES}; T_J=25°C			250	uA
	V_{GE}=0V; T_J=125°C			4	mA
I_{GES}	V_{CE}=0V; V_{GE}=±20V			±200	nA
$V_{CE(sat)}$	I_C=I_{C90}; V_{GE}=15V		2.7	2.9	V

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SG40T120DB

Discrete IGBTs

(T_J=25°C, unless otherwise specified)

Symbol	Test Conditions	Characteristic Values min.	typ.	max.	Unit
g_{ts}	I_C=I_{C90}; V_{CE}=10V Pulse test, t≤300us, duty cycle≤2%	33	44		S
$I_{C(ON)}$	V_{GE}=10V; V_{CE}=10V		220		A
C_{ies} C_{oes} C_{res}	V_{CE}=25V; V_{GE}=0V; f=1MHz		8000 200 120		pF
Q_g Q_{ge} Q_{gc}	I_C=I_{C90}; V_{GE}=15V; V_{CE}=0.5V_{CES}		170 28 57		nC
$t_{d(on)}$ t_{ri} $t_{d(off)}$ t_{fi} E_{off}	Inductive load, T_J=25°C I_C=I_{C90}; V_{GE}=15V; V_{CE}=0.8$V_{CES'}$; R_G=R_{off}=5Ω Remarks:Switching times may increase for V_{CE}(Clamp) > 0.8$V_{CES'}$ higher T_J or increased R_G		80 82 340 60 2	 400 90 2.5	ns ns ns ns mJ
$t_{d(on)}$ t_{ri} E_{on} $t_{d(off)}$ t_{fi} E_{off}	Inductive load, T_J=125°C I_C=I_{C90}; V_{GE}=15V; V_{CE}=0.8$V_{CES'}$; R_G=R_{off}=5Ω Remarks:Switching times may increase for V_{CE}(Clamp) > 0.8$V_{CES'}$ higher T_J or increased R_G		68 75 2.5 400 160 2.5	 2.9 2.9	ns ns mJ ns ns mJ
R_{thJC}				0.42	K/W
R_{thCK}			0.25		K/W

Reverse Diode (FRED)

(T_J=25°C, unless otherwise specified)

Symbol	Test Conditions	Characteristic Values min.	typ.	max.	Unit
V_F	I_F=40A; T_{VJ}=150°C T_{VJ}=25°C		2.9 3.3		V
I_{RM}	V_R=100V; I_F=40A; -di_F/dt=100A/us L≤0.05uH; T_{VJ}=100°C		12		A
t_{rr}	I_F=1A; -di/dt=50A/us; V_R=30V; T_J=25°C		40		ns
R_{thJC}	Diode		1.1	1.2	K/W

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Features

- Trench Field Stop IGBT technology
- Low switching losses
- Switching frequency up to 30 kHz
- Square RBSOA, no latch up
- High short circuit capability
- Positive temperature coefficient for easy parallelling
- MOS input, voltage controlled
- Ultra fast free wheeling diodes

Application

- AC and DC motor control
- AC servo and robot drives
- power supplies
- welding inverters

Advantages

- space and weight savings
- reduced protection circuits

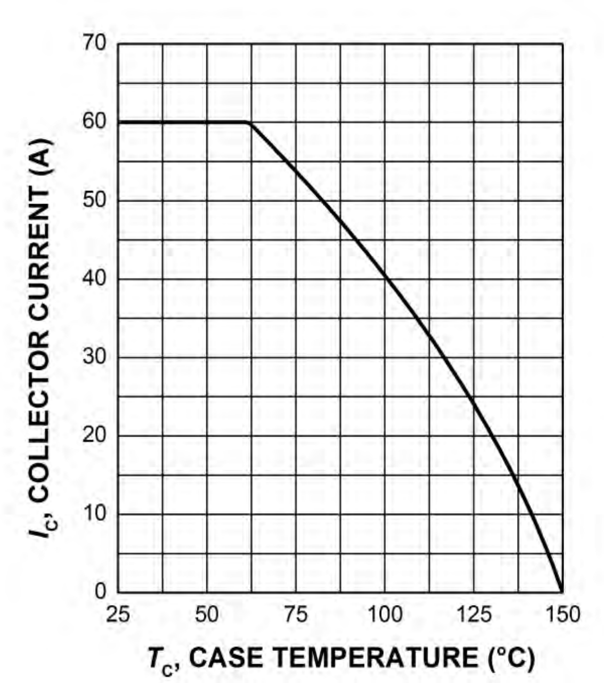

Figure 1. Maximum collector current as a function of case temperature ($V_{GE} \geq 15V$, $T_j \leq 150°C$)

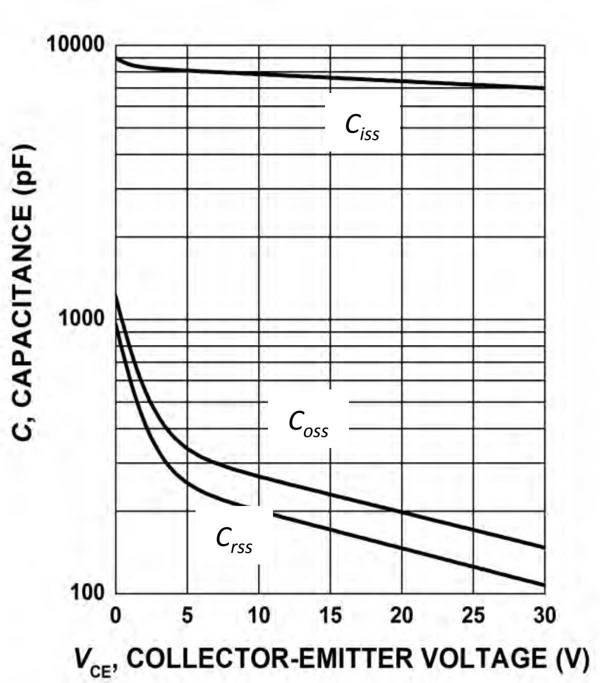

Figure 2. Typical capacitance as a function of collector-emitter voltage (V_{GE}=0V, f = 1 MHz)

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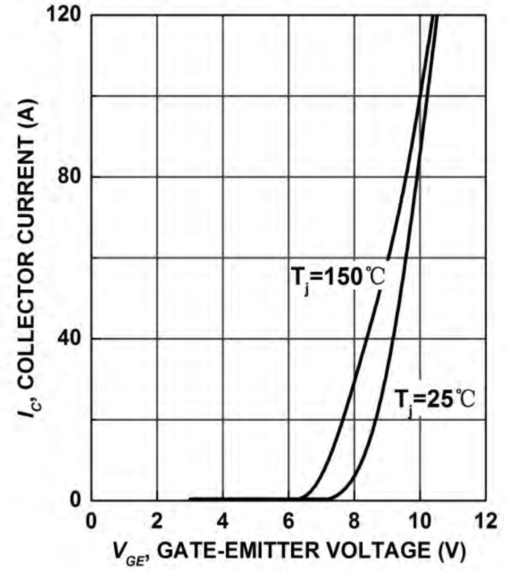

Figure 3. Typical transfer characteristic (V_{CE}=15V)

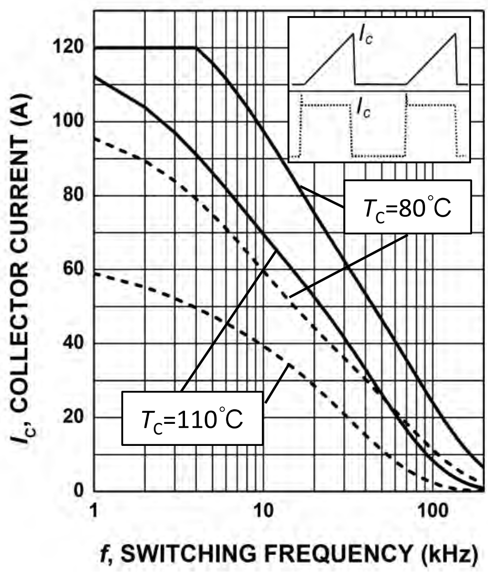

Figure 4. Collector current as a function of switching frequency (T_j≤150°C, D = 0.5, V_{CE} = 600V, V_{GE} = 0/+15V, R_G = 12Ω)

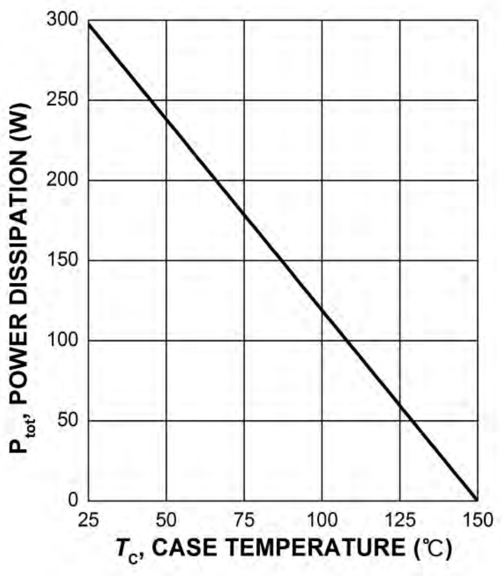

Figure 5. Maximum power dissipation as a function of case temperature (T_j ≤ 150°C)

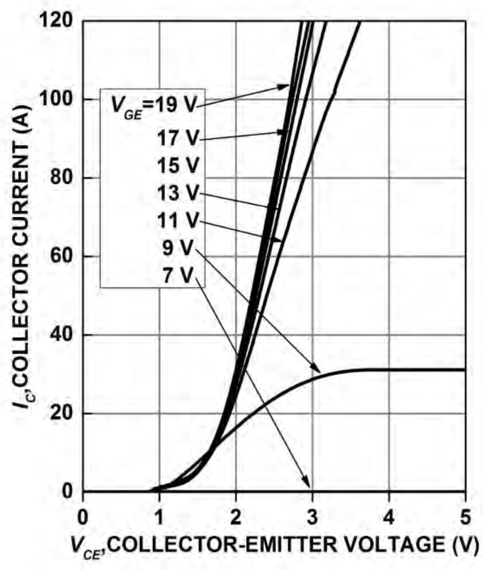

Figure 6. Typical output characteristic (T_j = 25°C)

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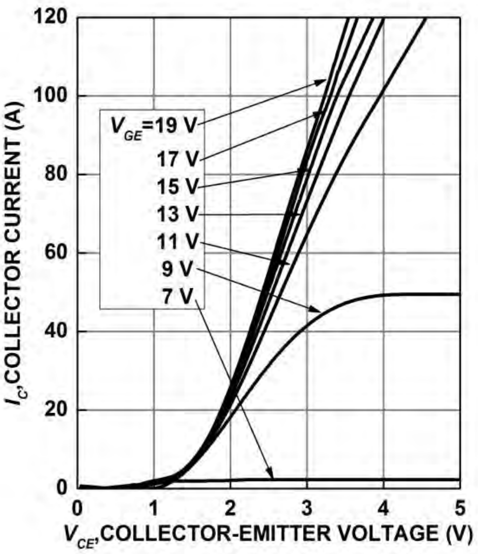

Figure 7. Typical output characteristic (T_j = 150°C)

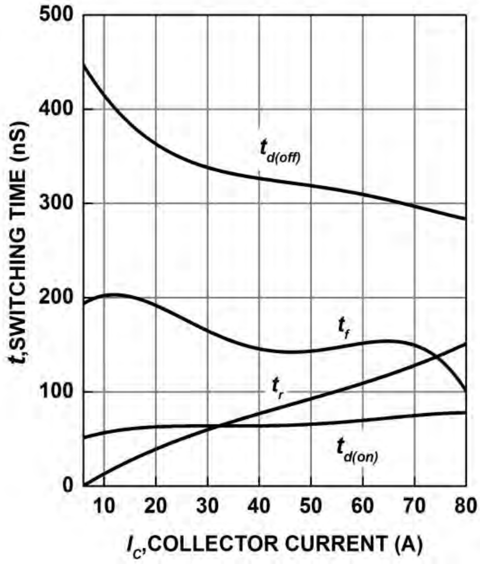

Figure 8. Typical switching times as a function of collector current (inductive load, T_j=150°C, V_{CE}=600V, V_{GE}=0/15V, R_G=12Ω, Dynamic test circuit in Figure D)

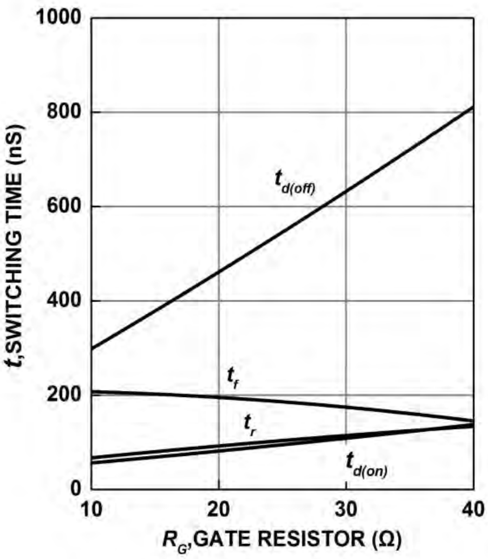

Figure 9. Typical switching times as a function of gate resistor (inductive load, T_j=150°C, V_{CE}=600V, V_{GE}=0/15V, I_C=40A, Dynamic test circuit in Figure D)

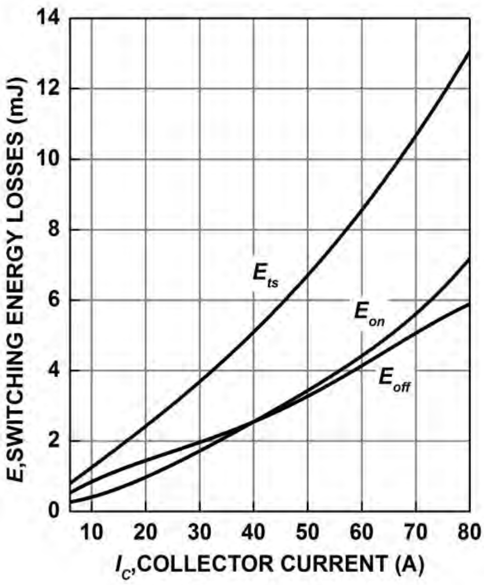

Figure 10. Typical switching energy losses as a function of collector current (inductive load, T_j=150°C, V_{CE}=600V, V_{GE}=0/15V, R_G=12Ω, Dynamic test circuit in Figure D)

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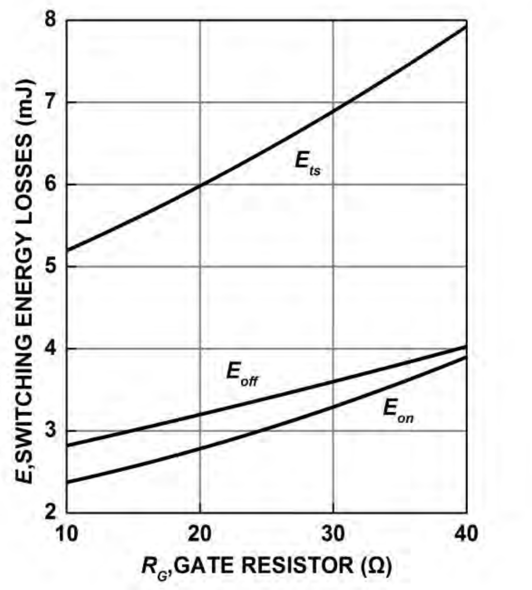

Figure 11. Typical switching energy losses as a function of gate resistor (inductive load, T_j=150°C, V_{CE}=600V, V_{GE}=0/15V, I_C=40A,
Dynamic test circuit in Figure D)

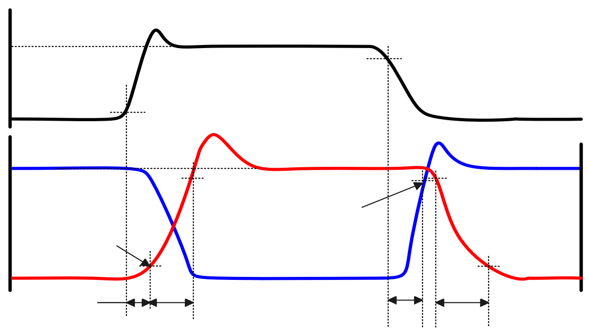

Figure A. Definition of switching times

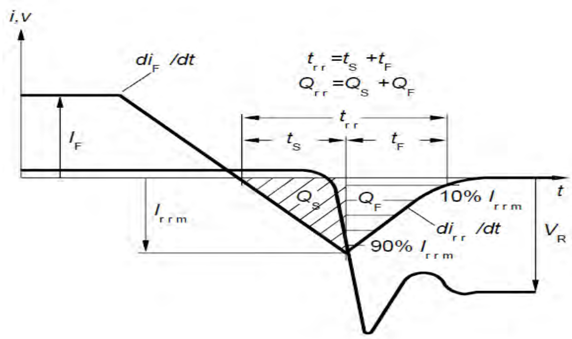

Figure C. Definition of diodes switching characteristics

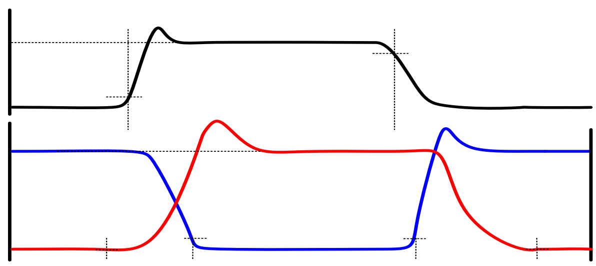

Figure B. Definition of switching losses

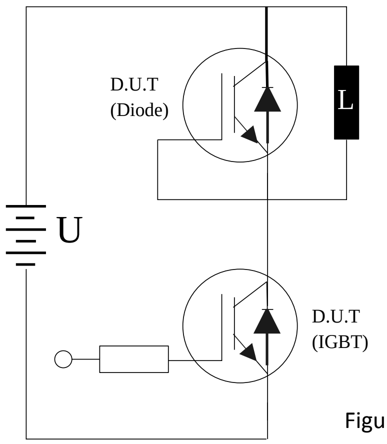

Figure D. Dynamic test circuit

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