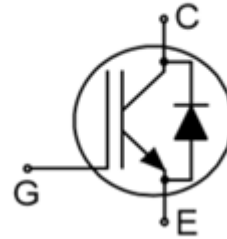


Trench Field-Stop Technology IGBT

Features

- 1200V, 15A
- $V_{CE(sat)(typ.)} = 2.00V @ V_{GE} = 15V, I_C = 15A$
- Low Switching Losses
- $V_{CE(sat)}$ with Positive Temperature Coefficient
- Pb-free Lead Plating; RoHS Compliant
-



Applications

- Frequency Converters
- Uninterrupted Power Supply
- Air Conditioning
- Motor Drives

Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	± 20	V
I_C	Continuous Collector Current ($T_C = 25^\circ C$)	30	A
	Continuous Collector Current ($T_C = 100^\circ C$)	15	A
I_{CM}	Pulsed Collector Current (Note 1)	45	A
I_F	Diode Continuous Forward Current ($T_C = 100^\circ C$)	15	A
I_{FM}	Diode Maximum Forward Current (Note 1)	45	A
t_{sc}	Short Circuit Withstand Time	10	us
P_D	Maximum Power Dissipation ($T_C = 25^\circ C$)	245	W
	Maximum Power Dissipation ($T_C = 100^\circ C$)	122	W
T_J	Operating Junction Temperature Range	-40 to 175	$^\circ C$
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$

Thermal Data

Symbol	Parameter	Max.	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case for IGBT	0.61	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance, Junction to Case for Diode	0.77	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	40	$^\circ C/W$

Electrical Characteristics (T_c=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{CES}	Collector-Emitter Breakdown Voltage	V _{GE} =0V, I _C =500uA	1200	---	---	V
I _{CES}	Collector-Emitter Leakage Current	V _{CE} =1200V, V _{GE} =0V	---	---	1	mA
I _{GES}	Gate Leakage Current, Forward	V _{GE} =20V, V _{CE} =0V	---	---	400	nA
	Gate Leakage Current, Reverse	V _{GE} =-20V, V _{CE} =0V	---	---	-400	nA
V _{GE(th)}	Gate Threshold Voltage	V _{GE} =V _{CE} , I _C =480uA	5.2	5.8	6.4	V
V _{CE(sat)}	Collector-Emitter Saturation Voltage	V _{GE} =15V, I _C =15A	---	2.0	2.25	V
Q _G	Total Gate Charge	V _{CC} =960V	---	68	---	nC
Q _{GE}	Gate-Emitter Charge	V _{GE} =15V	---	12.8	---	nC
Q _{GC}	Gate-Collector Charge	I _C =15A	---	50.2	---	nC
t _{d(on)}	Turn-on Delay Time	V _{CC} =600V V _{GE} =±15V I _C =15A R _G =39Ω Inductive Load T _C =25°C	---	36	---	ns
t _r	Turn-on Rise Time		---	28	---	ns
t _{d(off)}	Turn-off Delay Time		---	215	---	ns
t _f	Turn-off Fall Time		---	226	---	ns
E _{on}	Turn-on Switching Loss		---	1.62	---	mJ
E _{off}	Turn-off Switching Loss		---	1.11	---	mJ
E _{ts}	Total Switching Loss		---	2.73	---	mJ
C _{ies}	Input Capacitance	V _{CE} =25V	---	903	---	pF
C _{oes}	Output Capacitance	V _{GE} =0V	---	94	---	pF
C _{res}	Reverse Transfer Capacitance	f =1MHz	---	48	---	pF

Diode Characteristics (T_C=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V _F	Diode Forward Voltage	I _F =15A	---	2.6	3.2	V
t _{rr}	Diode Reverse Recovery Time	V _{CE} =600V I _F =15A di _F /dt=450A/us	---	131.5	---	ns
I _{rr}	Diode Peak Reverse Recovery Current		---	7.2	---	A
Q _{rr}	Diode Reverse Recovery Charge		---	466	---	nC

Note 1: Repetitive Rating: Pulse width limited by maximum junction temperature

Typical Characteristics

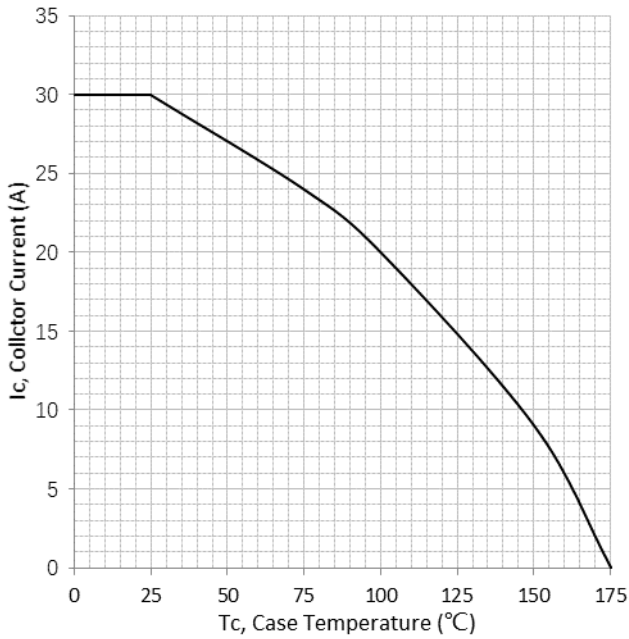


Fig. 1 Maximum DC Collector Current vs. Case Temperature

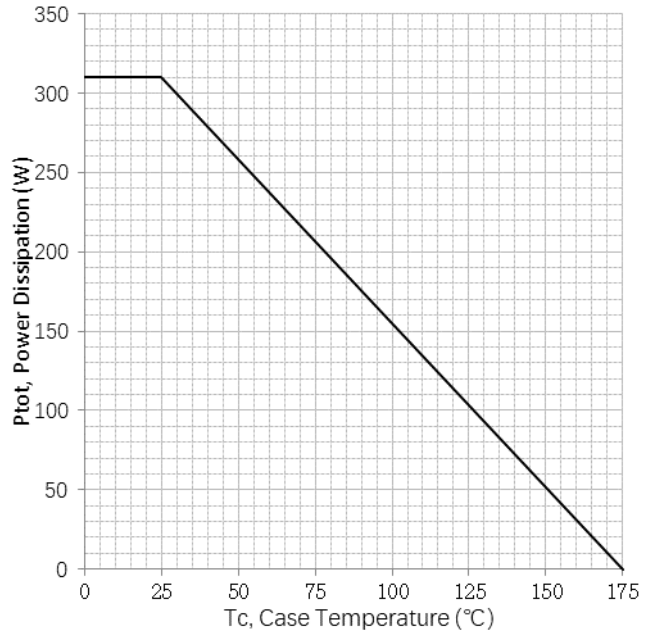


Fig. 2 Power Dissipation vs. Case Temperature

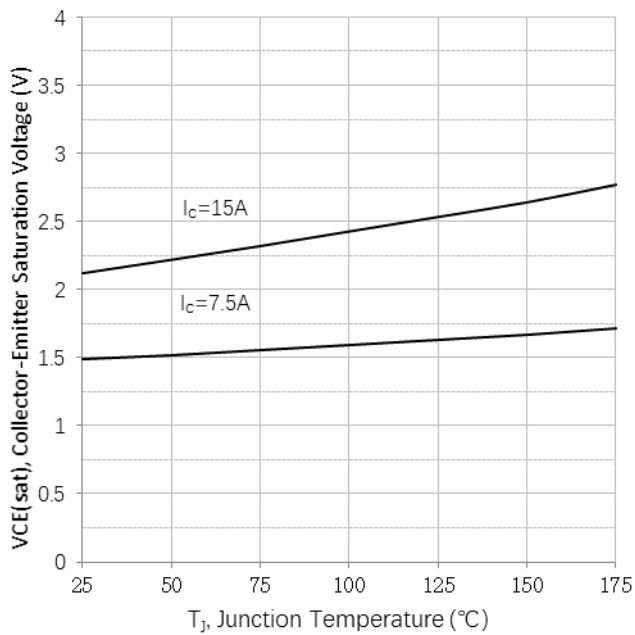


Fig. 3 Typical Collector-Emitter Saturation Voltage vs. Junction Temperature ($V_{GE}=15V$)

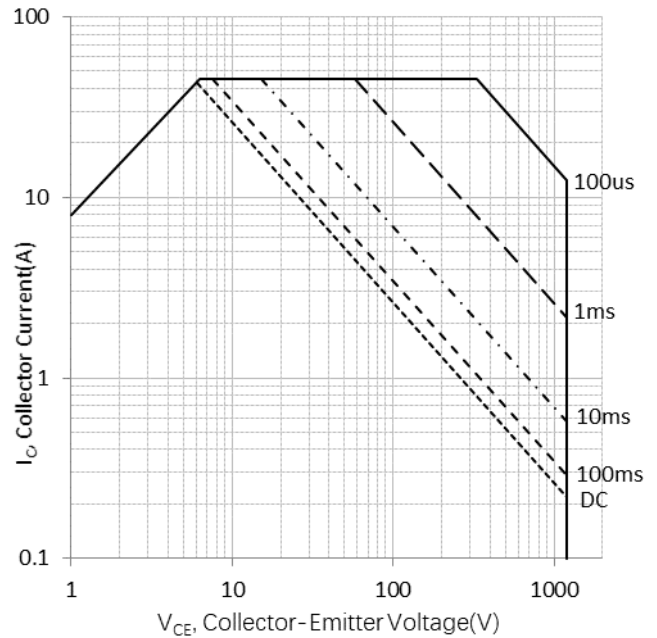


Fig. 4 Safe Operating Area at $T_c=25^\circ C$ and $T_j \leq 175^\circ C$

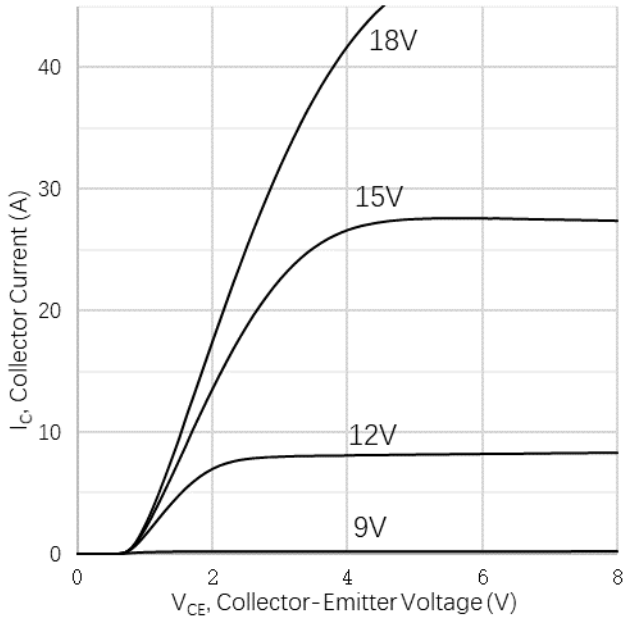


Fig. 5 Typical IGBT Output Characteristics at $T_J=25^\circ\text{C}$

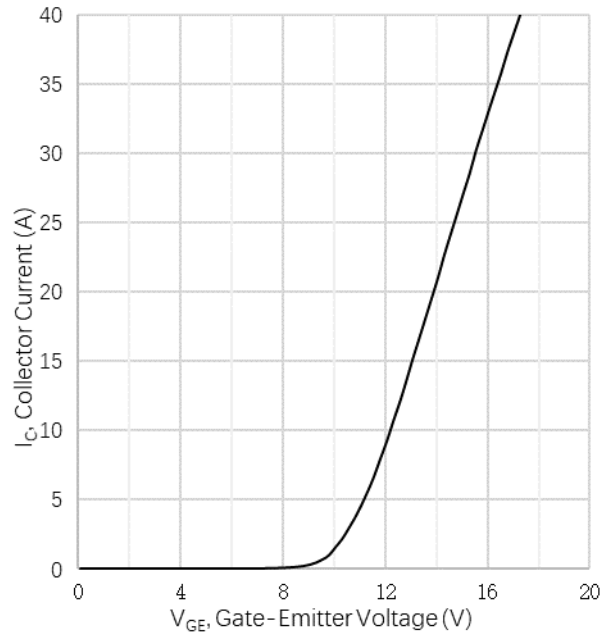


Fig. 6 Typical Transfer Characteristics at $V_{CE}=20\text{V}$

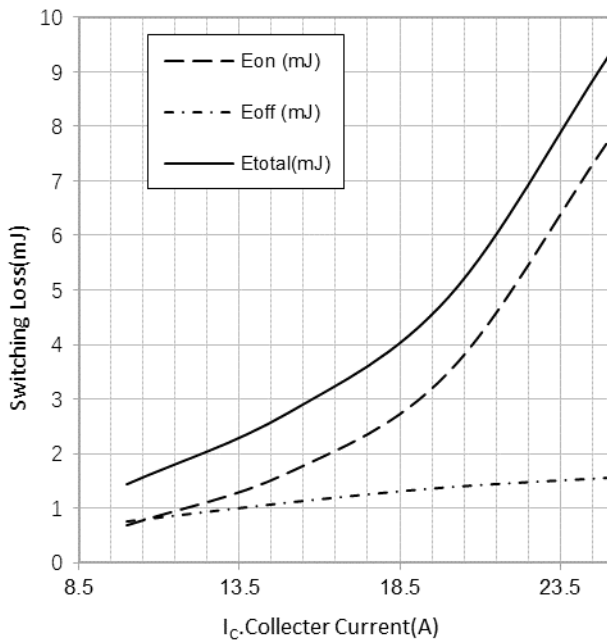


Fig. 7 Typical Energy Loss vs. I_C at $T_C=25^\circ\text{C}$, $V_{CE}=600\text{V}$, $V_{GE}=\pm 15\text{V}$ and $R_g=39\Omega$

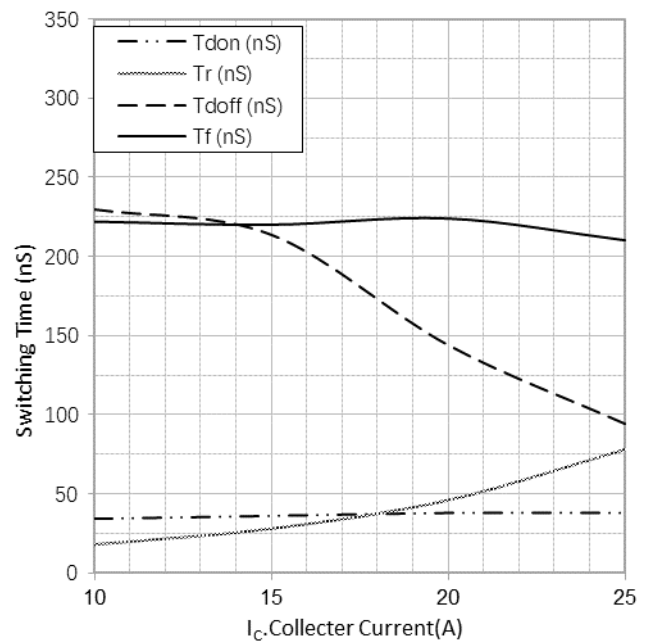


Fig. 8 Typical Switching Time vs. I_C at $T_C=25^\circ\text{C}$, $V_{CE}=600\text{V}$, $V_{GE}=\pm 15\text{V}$ and $R_g=39\Omega$

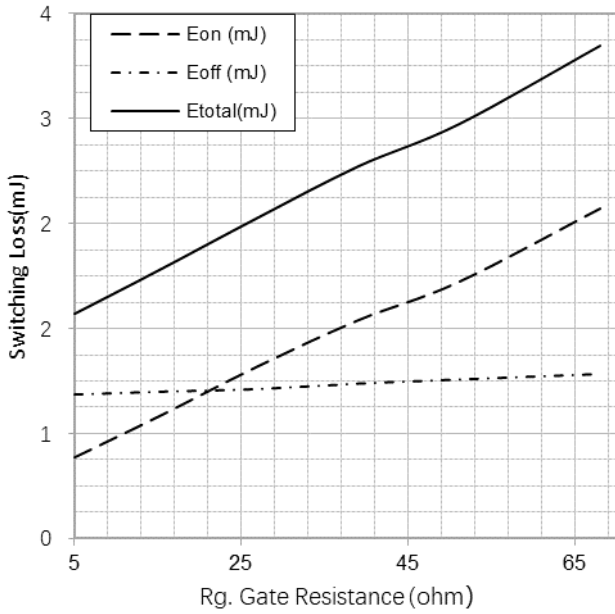


Fig. 9 Typical Energy Loss vs. Rg at $T_C=25^\circ\text{C}$, $V_{CE}=600\text{V}$, $V_{GE}=15\text{V}$, $I_C=15\text{A}$ and $R_g=39\Omega$

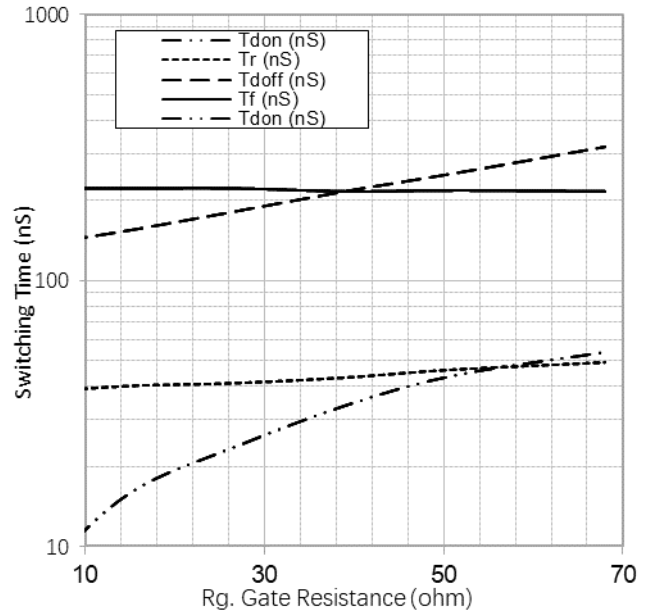


Fig. 10 Typical Switching Time vs. Rg at $T_C=25^\circ\text{C}$, $V_{CE}=600\text{V}$, $V_{GE}=15\text{V}$, $I_C=15\text{A}$ and $R_g=39\Omega$

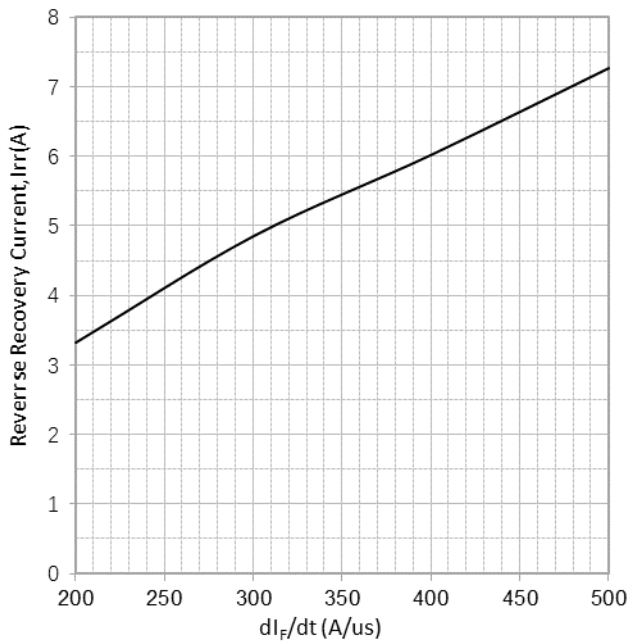


Fig. 11 Typical Diode Irr vs. di_F/dt at $V_{CC}=600\text{V}$ and $V_F=15\text{A}$

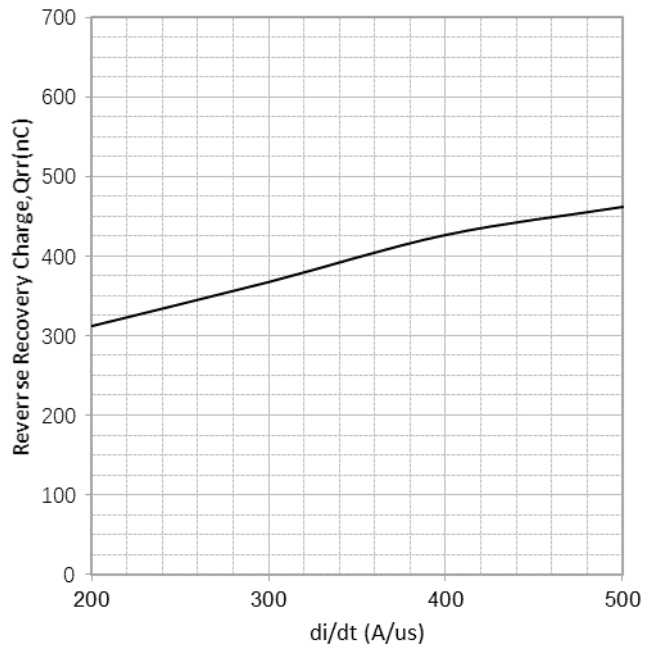


Fig. 12 Typical Diode Qrr vs. di/dt at $V_{CC}=600\text{V}$ and $V_F=15\text{A}$

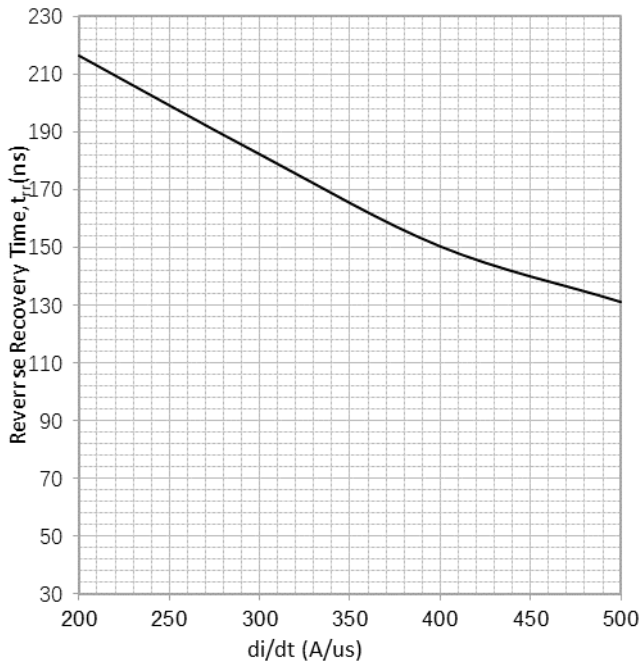


Fig. 13 Typical Diode t_{rr} vs. di/dt at $V_{CC}=600V$ and $V_F=15A$

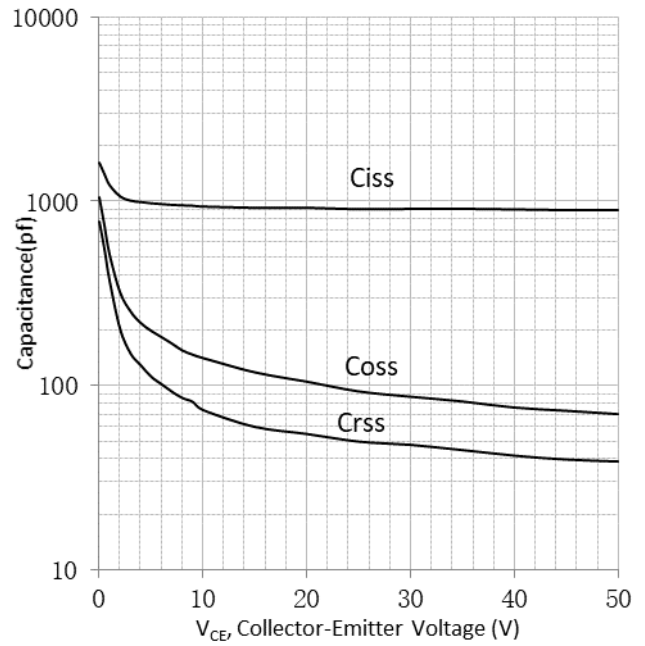


Fig. 14 Typical Capacitance vs. V_{CE} at $V_{GE}=0V$ and $f=1MHz$

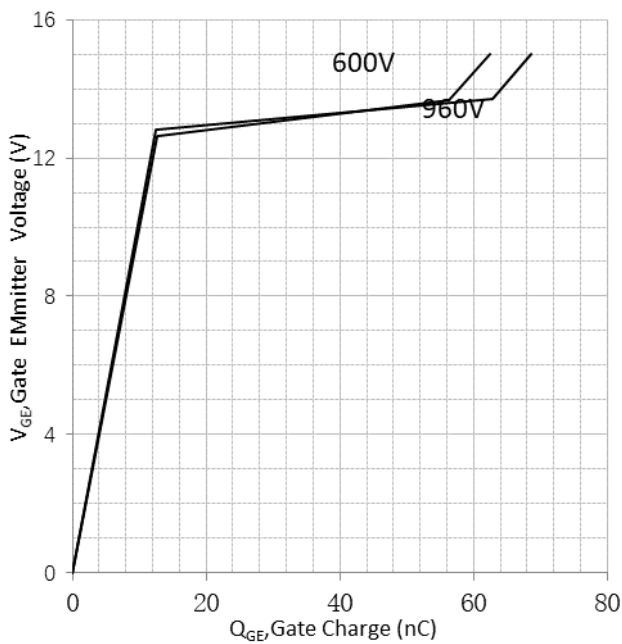


Fig. 15 Typical Gate Charge vs. V_{GE} at $I_C=15A$

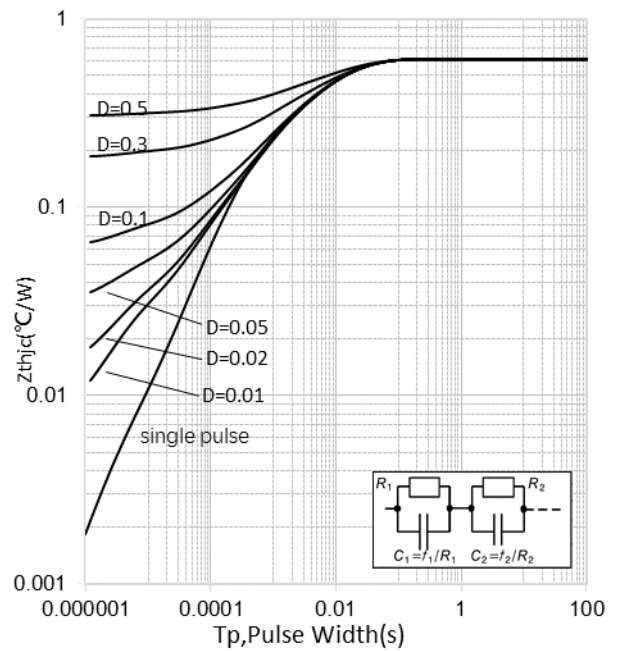
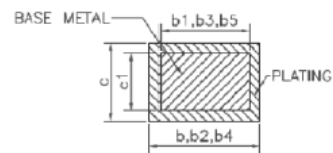
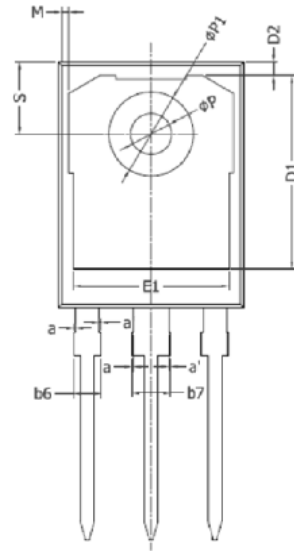
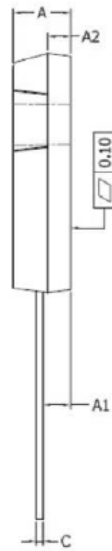
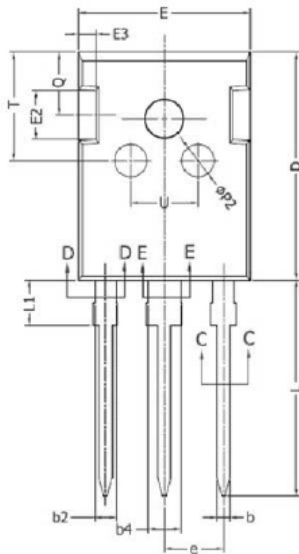


Fig. 16 IGBT Transient Thermal Resistance ($D=t_p / T$)

Package Information

TO-247



SECTION C-C, D-D & E-E

COMMON DIMENSIONS
(UNITS OF MEASURE = MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	4.90	5.00	5.10
A1	2.31	2.41	2.51
A2	1.90	2.00	2.10
a	0	---	0.15
a'	0	---	0.15
b	1.16	---	1.26
b1	1.15	1.2	1.22
b2	1.96	---	2.06
b3	1.95	2.00	2.02
b4	2.96	---	3.06
b5	2.96	3.00	3.02
b6	---	---	2.25
b7	---	---	3.25
c	0.59	---	0.66
c1	0.58	0.60	0.62
D	20.90	21.00	21.10
D1	16.25	16.55	16.85
D2	1.05	1.17	1.35
E	15.70	15.80	15.90
E1	13.10	13.30	13.50
E2	4.40	4.50	4.60
E3	1.50	1.60	1.70
e	5.436 BSC		
L	19.80	19.92	20.10
L1	---	---	4.30
M	0.35	---	0.95
P	3.40	3.50	3.60
P1	7.00	---	7.40
P2	2.40	2.50	2.60
Q	5.60	---	6.00
S	6.05	6.15	6.25
T	9.80	---	10.20
U	6.00	---	6.40

NOTES:

ALL DIMENSIONS REFER TO JEDEC STANDARD TO-247 AND
DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS.

EJECTION MARK DEPTH $0.10^{+0.15}_{-0.10}$

Revision History

Ver.	Date	Change Notice
1.0	2020/10/11	Released