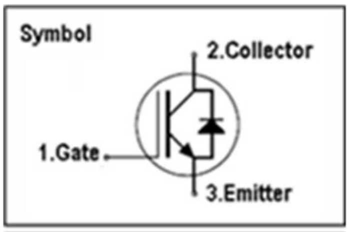
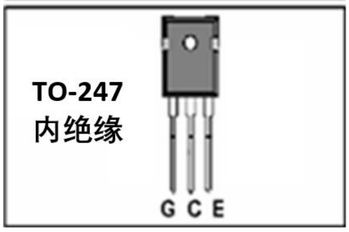
佳恩半导体
JIAENSEMI

JNG40T120HIRU2

IGBT





Features

- 1200V,40A
- $V_{CE(sat)(typ.)}$=1.7V@V_{GE}=15V,I_C=40A
- Positive temperature coefficient
- Fast Switching
- Reliable and Rugged
- Halogen Free and Green Devices Available

General Description

JIAEN Trench IGBTs offer lower losses and higher energy efficiency for application such as UPS, Motor drives, PFC, Portable power station and other soft switching applications.

Absolute Maximum Ratings

Symbol	Parameter	Value	Units
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	± 20	V
I_C	Continuous Collector Current (T_C=25 ℃)	80	A
	Continuous Collector Current (T_C=100℃)	40	A
I_{CM}	Pulsed Collector Current (Note 1)	160	A
I_F	Diode Continuous Forward Current (T_C=100 ℃)	40	A
I_{FM}	Diode Maximum Forward Current (Note 1)	120	A
t_{sc}	Short Circuit Withstand Time	8	us
P_D	Maximum Power Dissipation (T_C=25 ℃)	441	W
T_J	Operating Junction Temperature Range	-55 to +175	℃

Thermal Characteristics

Symbol	Parameter	Max.	Units
$R_{th\ j\text{-}c}$	Thermal Resistance, Junction to case for IGBT	0.34	℃/ W
$R_{th\ j\text{-}c}$	Thermal Resistance, Junction to case for Diode	0.80	℃/ W
$R_{th\ j\text{-}a}$	Thermal Resistance, Junction to Ambient	40	℃/ W

Electrical Characteristics (T_C=25℃ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{CES}	Collector-Emitter Breakdown Voltage	V_{GE}= 0V, I_C= 1mA	1200	-	-	V
I_{CES}	Collector-Emitter Leakage Current	V_{CE}= 1200V, V_{GE}= 0V	-	-	10	uA
I_{GES}	Gate Leakage Current, Forward	V_{GE}= ± 20V, V_{CE}= 0V	-	-	± 200	nA
$V_{GE(th)}$	Gate Threshold Voltage	V_{GE}= V_{CE}, I_C= 1mA	4.3	-	6.3	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	V_{GE}=15V, I_C= 40A	-	1.7	-	V
Q_g	Total Gate Charge	V_{CC}=960V V_{GE}=15V IC=40A	-	346	-	nC
Q_{ge}	Gate-Emitter Charge		-	2.4	-	nC
Q_{gc}	Gate-Collector Charge		-	238	-	nC
$t_{d(on)}$	Turn-on Delay Time	V_{CC}=600V V_{GE}=15V I_C=40A R_G=5Ω Inductive Load T_C=25 ℃	-	25	-	ns
t_r	Turn-on Rise Time		-	28	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	262	-	ns
t_f	Turn-off Fall Time		-	149	-	ns
Eon	Turn-on Switching Loss		-	1.3	-	mJ
Eoff	Turn-off Switching Loss		-	2.3	-	mJ
Ets	Total Switching Loss		-	3.6	-	mJ
C_{ies}	Input Capacitance	V_{CE}=25V V_{GE}=0V f = 1MHz	-	3980	-	pF
C_{oes}	Output Capacitance		-	157	-	pF
C_{res}	Reverse Transfer Capacitance		-	93	-	pF

Electrical Characteristics of Diode (T_C=25℃ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	I_F=40A	-	2.0	3.5	V
t_{rr}	Diode Reverse Recovery Time	V_{CE} = 600V I_F= 40A di_F/dt = 200A/us	-	84	-	ns
I_{rr}	Diode peak Reverse Recovery Current		-	9.2	-	A
Q_{rr}	Diode Reverse Recovery Charge		-	215	-	nC

Notes:

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

Typical Performance Characteristics

Figure 1: Power Dissipation

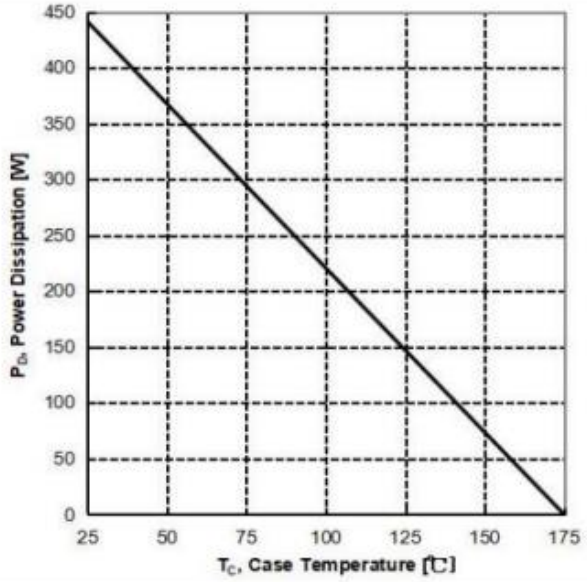


Figure 2: Collector Current vs. Case Temperature

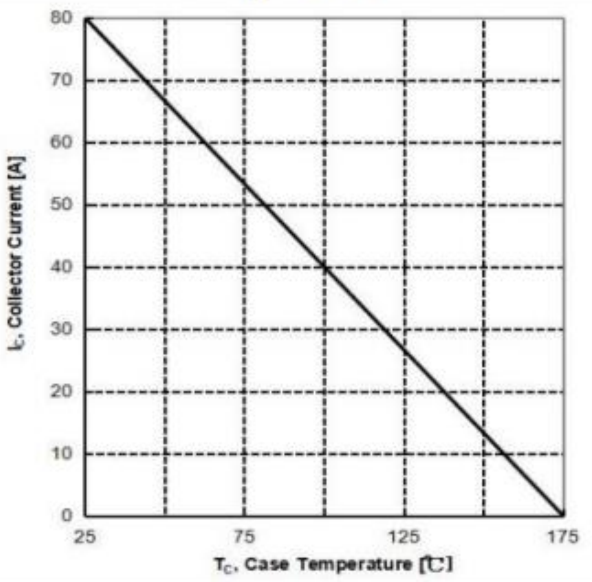


Figure 3: Safe Operation Area

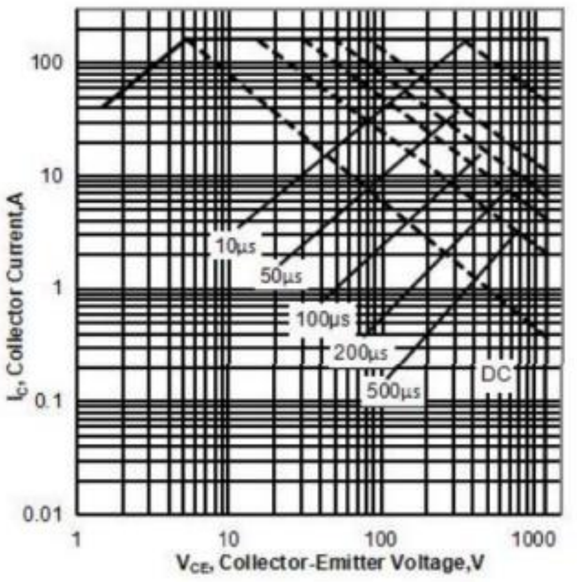
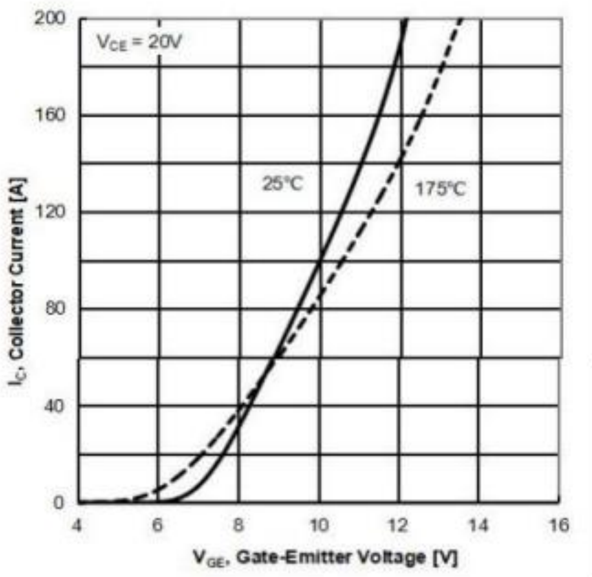


Figure 4: Typical Transfer Characteristics



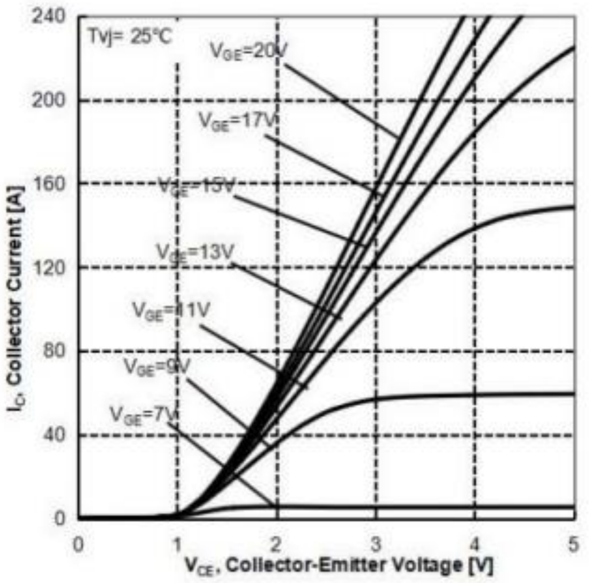


Figure 5: Typical Output Characteristics

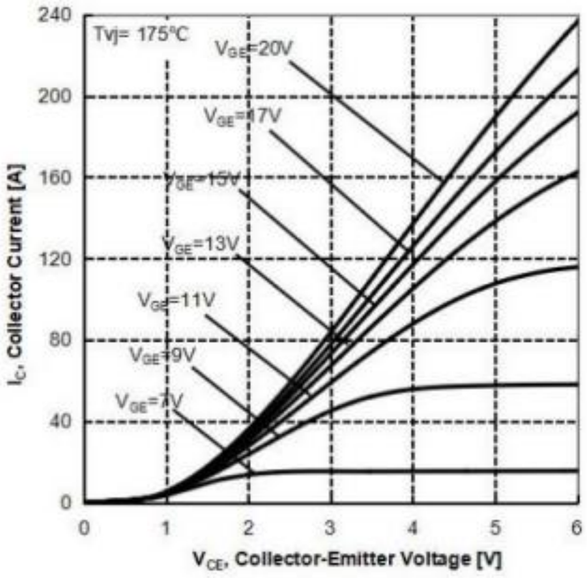


Figure 6: Typical Output Characteristics

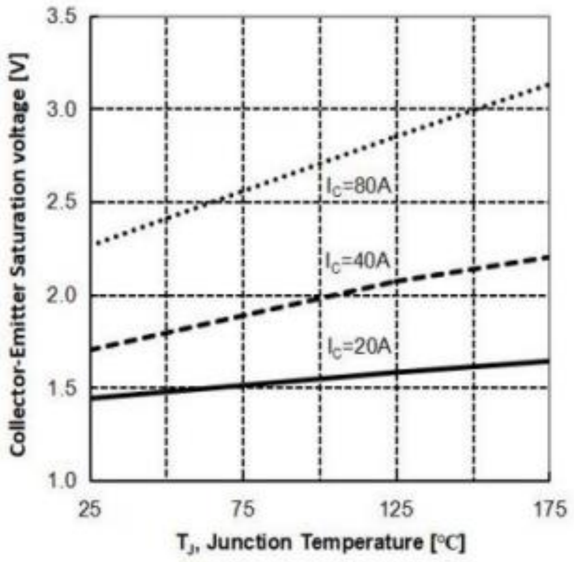


Figure 7: Typical Collector-Emitter Saturation Voltage vs. Junction Temperature

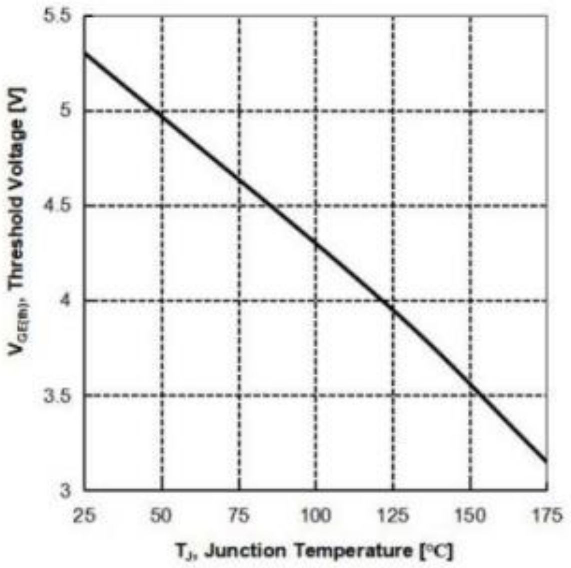


Figure 8: Typical Gate-Emitter Threshold Voltage vs. Junction Temperature

Figure 9: Typical Switching Times vs. Gate Resistor (T_J=25℃, V_{CE}=600V, V_{GE}=15V, I_C=40A)

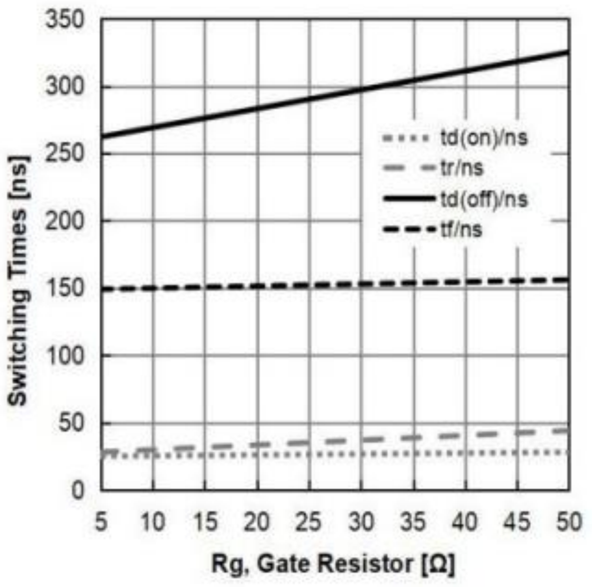


Figure 10: Typical Switching Energy vs. Gate Resistor (T_J=25℃, V_{CE}=600V, V_{GE}=15V, I_C=40A)

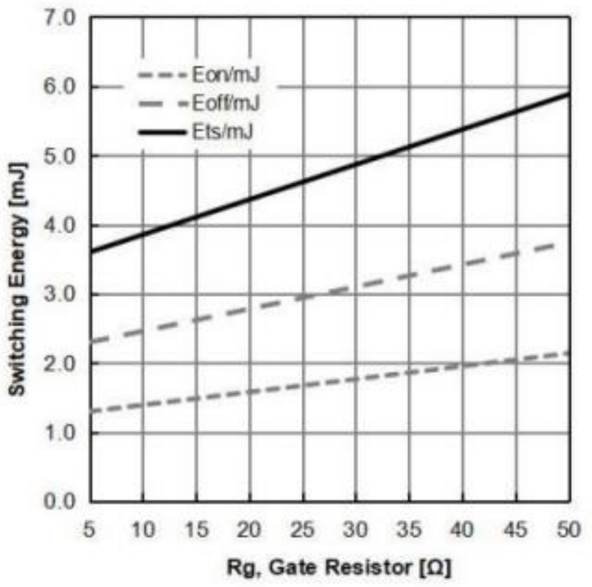


Figure 11: Typical Switching Times vs. Junction Temperature (V_{CE}=600V, V_{GE}=15V, I_C=40A,Rg=5Ω)

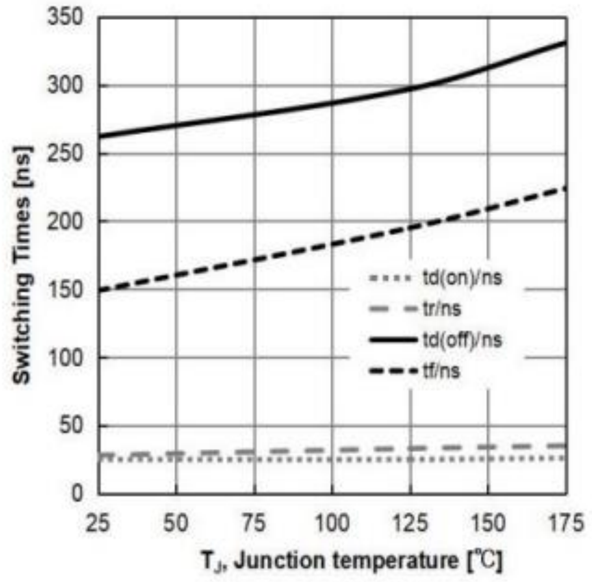


Figure 12: Typical Switching Energy vs. Junction Temperature (V_{CE}=600V, V_{GE}=15V, I_C=40A,Rg=5Ω)

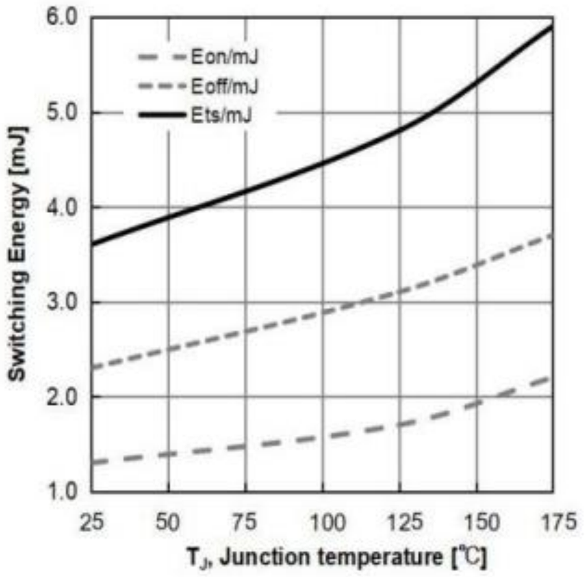


Figure 13: Typical Switching Times vs. Collector Current (T_J=25℃, V_{CE}=600V, V_{GE}=15V,Rg=5Ω)

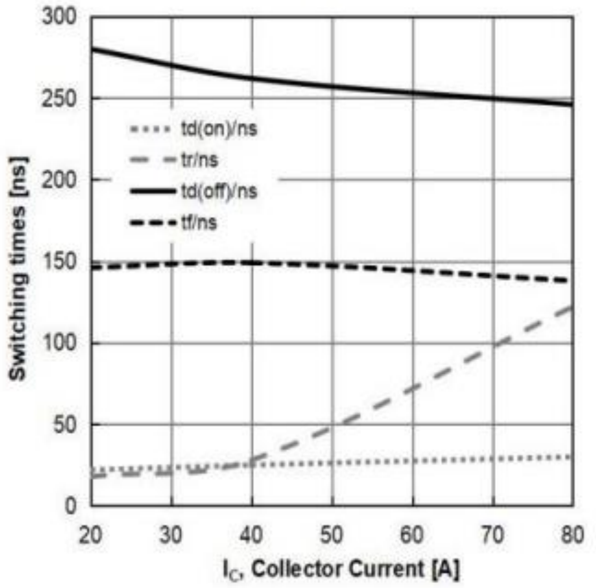


Figure 14: Typical Switching Energy vs. Collector Current (T_J=25℃, V_{CE}=600V, V_{GE}=15V,Rg=5Ω)

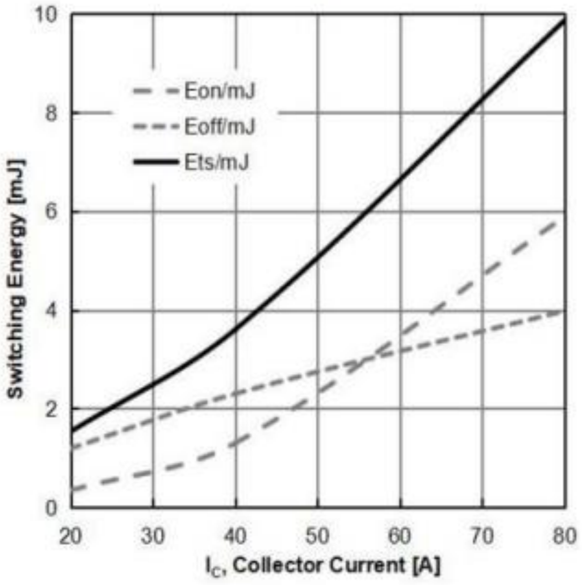


Figure 15: Typical Switching Times vs. VCE (T_J=25℃, V_{GE}=15V, I_C=40A,Rg=5Ω)

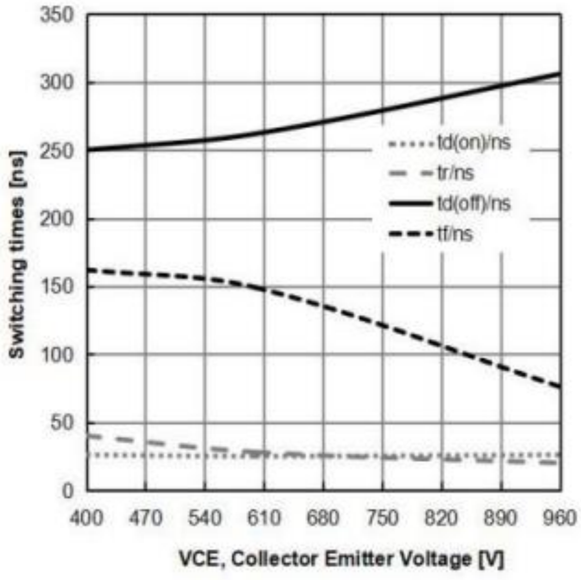


Figure 16: Typical Switching Energy vs. VCE (T_J=25℃, V_{GE}=15V, I_C=40A,Rg=5Ω)

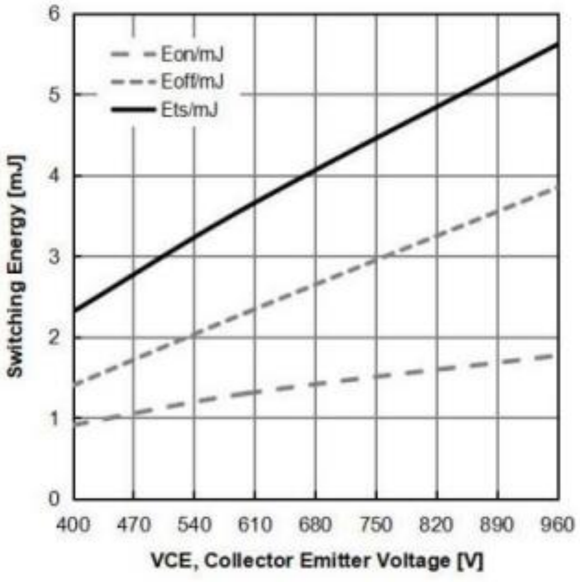


Figure 17: Typical Capacitance vs. Collector- Emitter Voltage

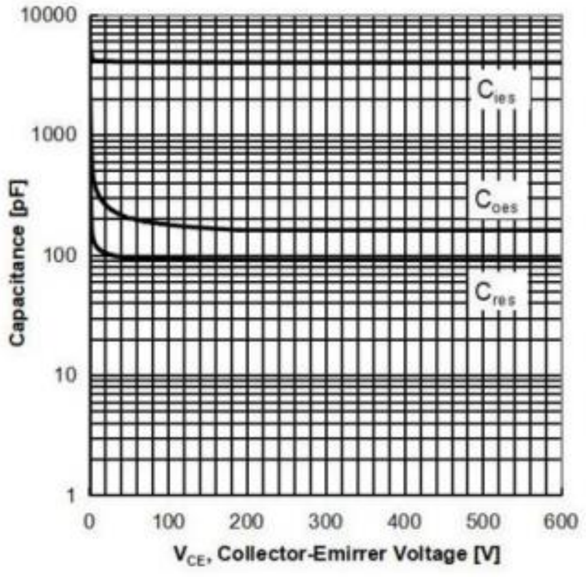


Figure 18: Typical Gate Charge

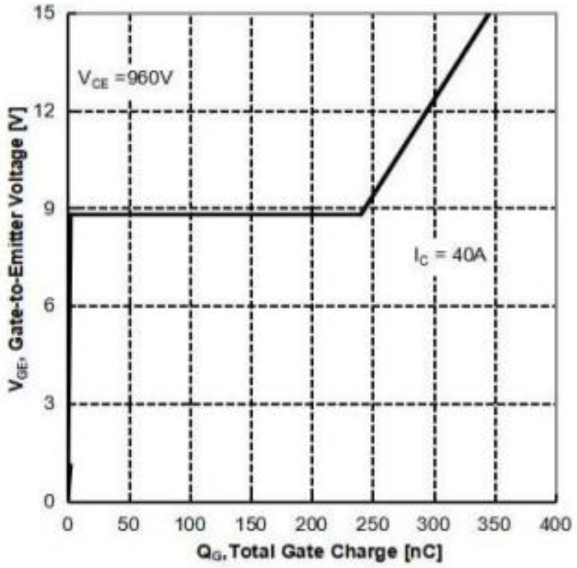


Figure 19: IGBT Transient Thermal Impedance vs. Pulse Width

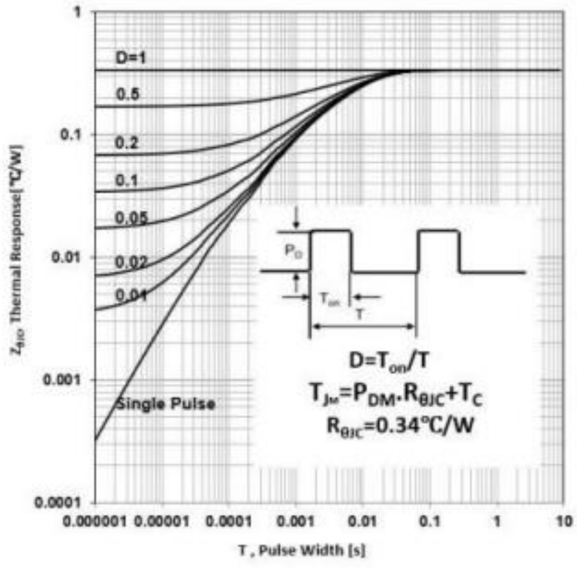


Figure 20: Diode Transient Thermal Impedance vs. Pulse Width

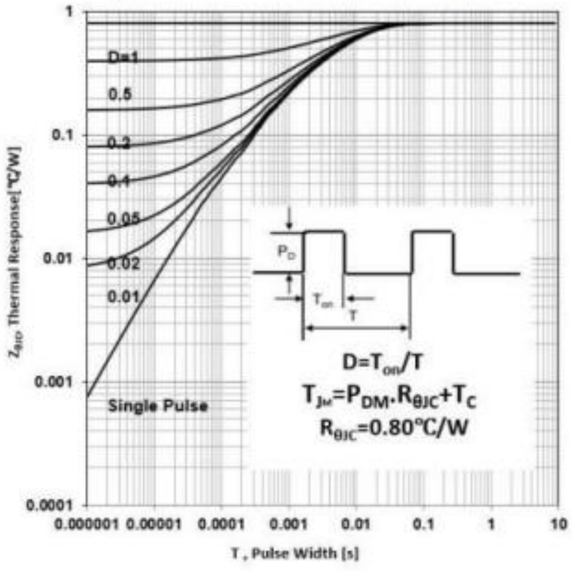
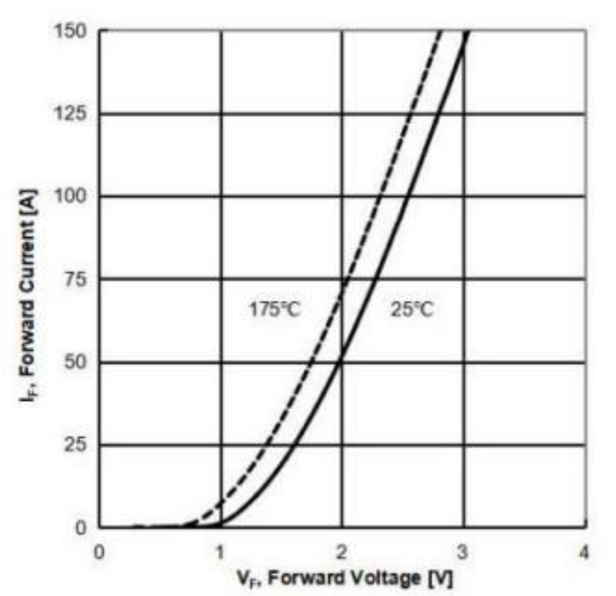


Figure 21: Typical Diode Forward Current vs. Forward Voltage



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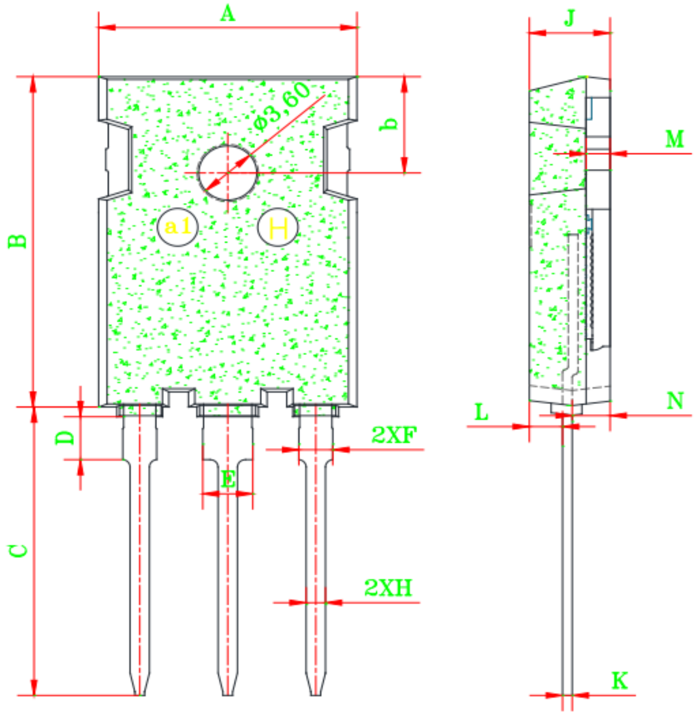

Ref.	Dimensions		
	Millimeters		
	Min.	Typ.	Max.
A	15.70	16.00	16.30
b	6.10	6.30	6.20
B	20.70	21.90	22.10
C	18.80	19.10	19.40
D	2.64	2.84	3.04
E	2.90	3.10	3.30
F	1.90	2.10	2.30
G	5.25	5.45	5.65
H	1.10	1.20	1.30
J	4.90	5.00	5.10
K	0.55	0.60	0.65
L	1.85	2.00	2.15
M	1.40	1.50	1.60
N	2.10	2.30	2.50

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