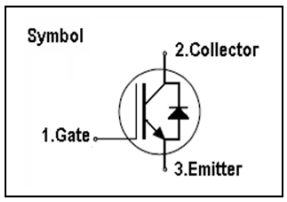
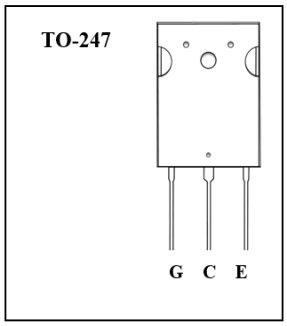
IGBT

Features





- 1200V,25A
- $V_{CE(sat)(typ.)}$=2.2V@V_{GE}=15V,I_C=25A
- High speed switching
- Higher system efficiency
- Soft current turn-off waveforms
- Square RBSOA using NPT technology

General Description

JIAEN NPT IGBTs offer lower losses and higher energy efficiency for application such as IH (induction heating),UPS, general inverter and other soft switching applications.

Absolute Maximum Ratings

Symbol	Parameter	Value	Units
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	± 30	V
I_C	Continuous Collector Current (T_C=25 ℃)	45	A
	Continuous Collector Current (T_C=100℃)	25	A
I_{CM}	Pulsed Collector Current (Note 1)	75	A
I_F	Diode Continuous Forward Current (T_C=100 ℃)	25	A
I_{FM}	Diode Maximum Forward Current (Note 1)	60	A
t_{sc}	Short Circuit Withstand Time	10	us
P_D	Maximum Power Dissipation (T_C=25 ℃)	220	W
	Maximum Power Dissipation (T_C=100℃)	100	W
T_J	Operating Junction Temperature Range	-55 to +150	℃
T_{STG}	Storage Temperature Range	-55 to +150	℃

Thermal Characteristics

Symbol	Parameter	Max.	Units
$R_{th\ j\text{-}c}$	Thermal Resistance, Junction to case for IGBT	0.45	℃/ W
$R_{th\ j\text{-}c}$	Thermal Resistance, Junction to case for Diode	0.85	℃/ 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= 250uA	1200	-	-	V
I_{CES}	Collector-Emitter Leakage Current	V_{CE}= 1200V, V_{GE}= 0V	-	-	250	uA
I_{GES}	Gate Leakage Current, Forward	V_{GE}=30V, V_{CE}= 0V	-	-	100	nA
	Gate Leakage Current, Reverse	V_{GE}= -30V, V_{CE}= 0V	-	-	-100	nA
$V_{GE(th)}$	Gate Threshold Voltage	V_{GE}= V_{CE}, I_C= 250uA	4.5	5.0	5.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	V_{GE}=15V, I_C= 25A	-	2.2	2.7	V
Qg	Total Gate Charge	V_{CC}=960V V_{GE}=15V I_C=25A	-	125		nC
Qge	Gate-Emitter Charge		-	29		nC
Qgc	Gate-Collector Charge		-	67		nC
$t_{d(on)}$	Turn-on Delay Time	V_{CC}=600V V_{GE}=15V I_C=25A R_G=15Ω Inductive Load T_C=25 ℃	-	21	-	ns
t_r	Turn-on Rise Time		-	46	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	253	-	ns
t_f	Turn-off Fall Time		-	38	-	ns
Eon	Turn-on Switching Loss		-	1.5	-	mJ
Eoff	Turn-off Switching Loss		-	0.8	-	mJ
Ets	Total Switching Loss		-	2.3	-	mJ
Cies	Input Capacitance	V_{CE}=25V V_{GE}=0V f = 1MHz	-	1130	-	pF
Coes	Output Capacitance		-	162	-	pF
Cres	Reverse Transfer Capacitance		-	89	-	pF
R_{Gint}	Integrated gate resistor			3.8		Ω

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=25A	-	2.0	2.65	V
t_{rr}	Diode Reverse Recovery Time	V_{CE} = 600V I_F= 25A Rg=15Ω	-	240		ns
I_{rr}	Diode peak Reverse Recovery Current		-	20		A
Q_{rr}	Diode Reverse Recovery Charge		-	1672		nC

Notes：

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

Typical Performance Characteristics

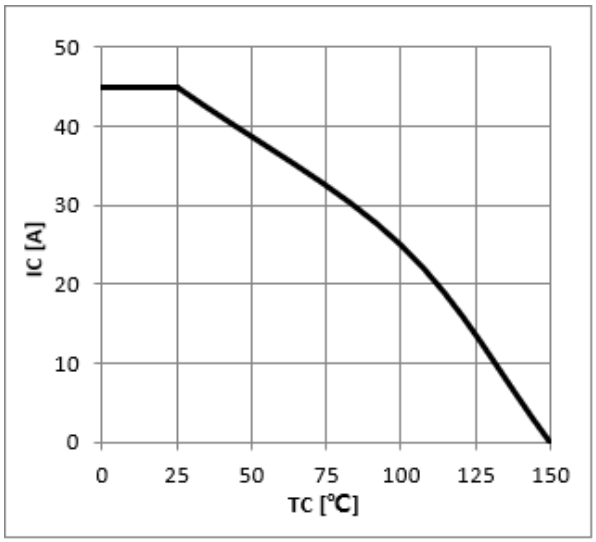


Figure 1: Maximum DC Collector Current VS. case temprature

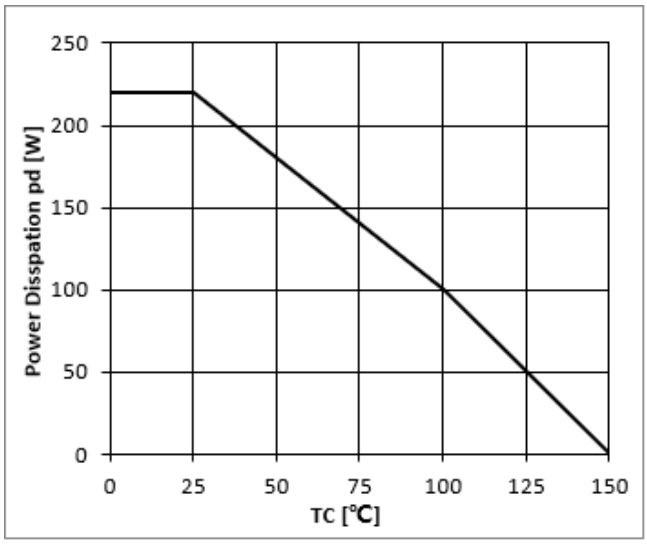


Figure 2: Power Dissipation VS. Case Temperature

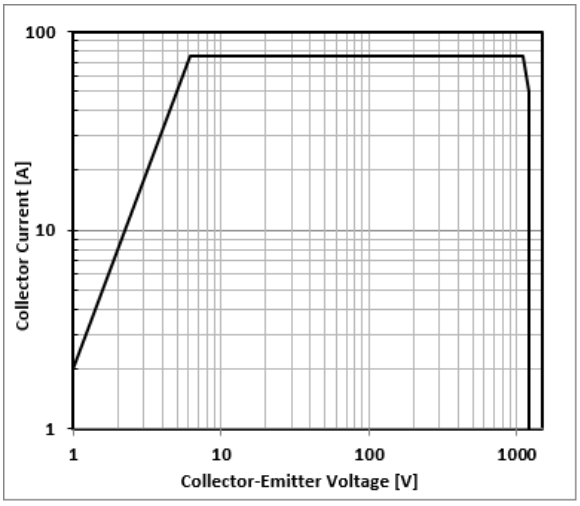


Figure 3: Reverse Bias SOA,TJ=125℃,VGE=15V

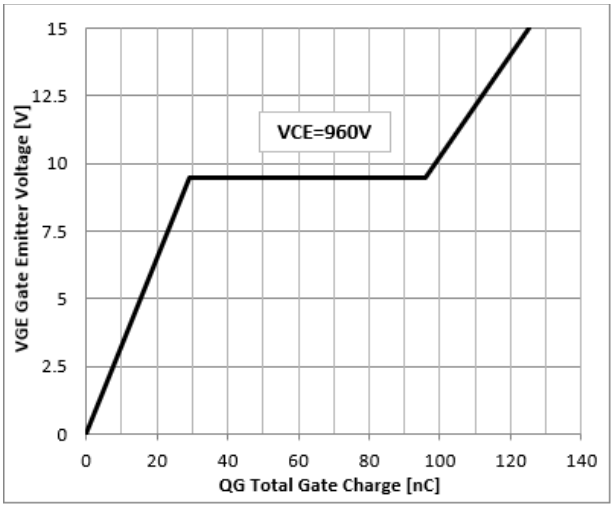


Figure 4: Typical Gate charge VS. VGE,IC=25A

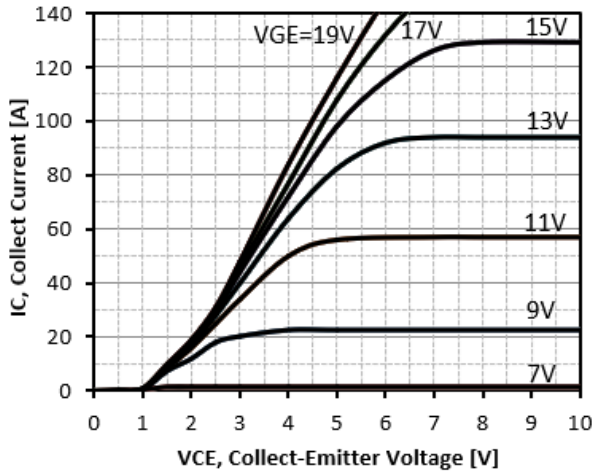


Figure 5: Typical IGBT Output characteristics, TC=25℃;tp=300us

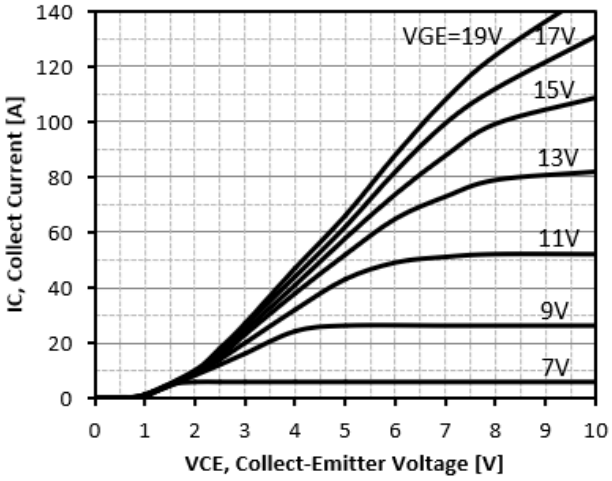


Figure 6: Typical IGBT Output characteristics, C=150℃;tp=300us

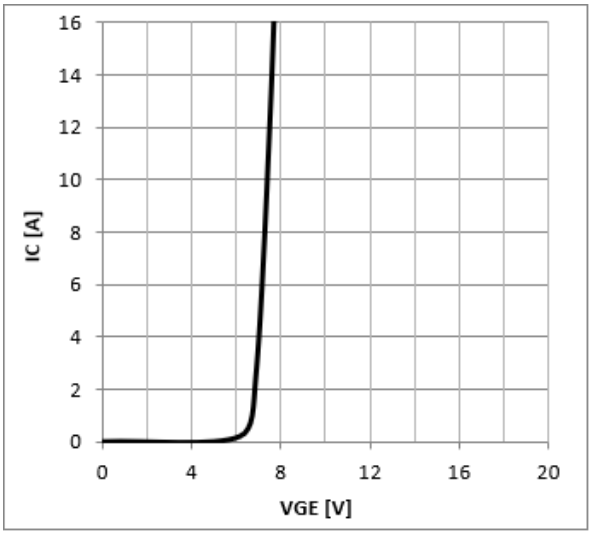


Figure 7: Typical Gate Threshold Voltage

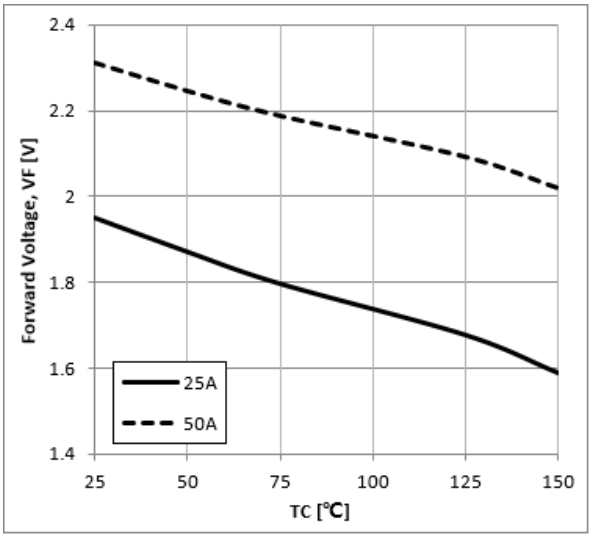


Figure 8: Typical Forward Voltage vs IF

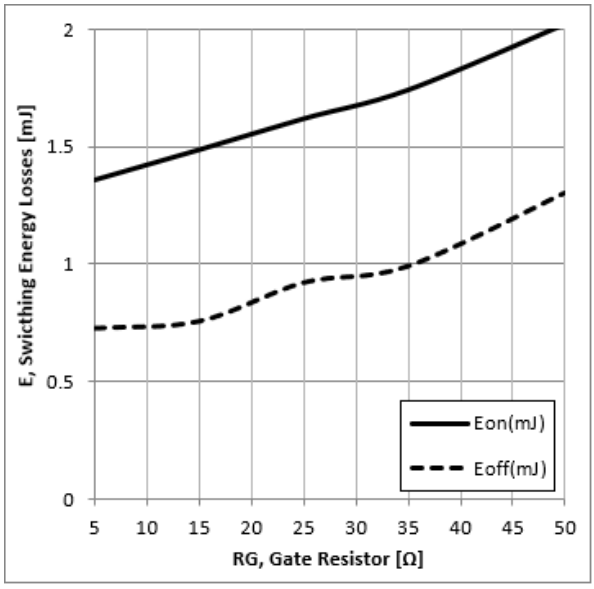


Figure 9: Typical Energy Loss VS. RG, TC=25℃, L=100uH,VCE=600V,VGE=15V,IC=25A

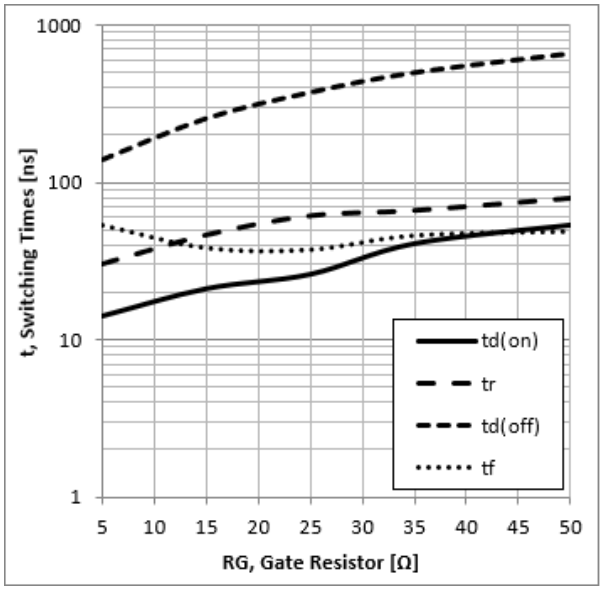


Figure 10: Typical Switching Time VS. RG, TC=25℃, L=100uH,VCE=600V,VGE=15V,IC=25A

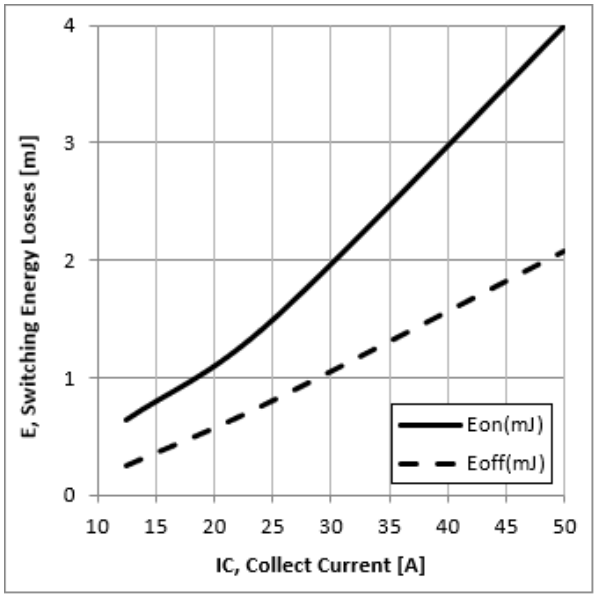


Figure 11: Typical Energy Loss VS. IC,TC=25℃, L=100uH, VCE=600V, VGE=15V,RG=15Ω

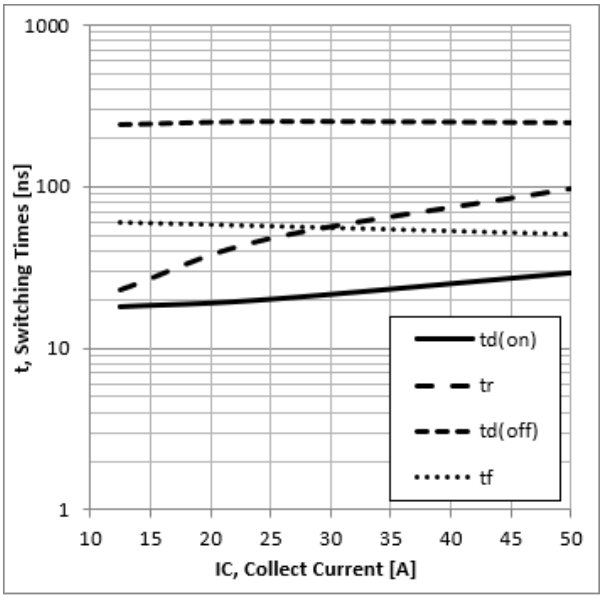


Figure 12: Typical Switching Time VS. IC,TC=25℃, L=100uH,VCE=600V,VGE=15V,RG=15Ω

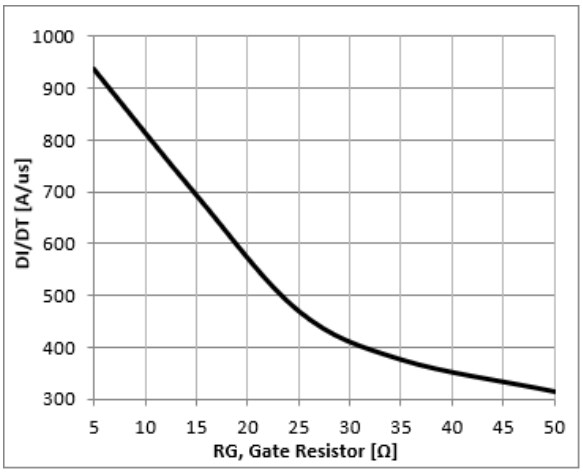


Figure 13: Typical Diode DI/DT VS. RG,TC=25℃
VCC=600V, VGE=15V, IF=25A

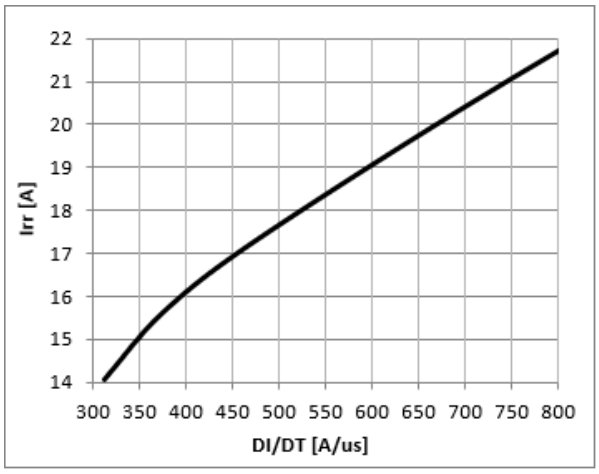


Figure 14: Typical Diode IRR VS. DI/DT,TC=25℃
VCC=600V,VGE=15V, IF=25A

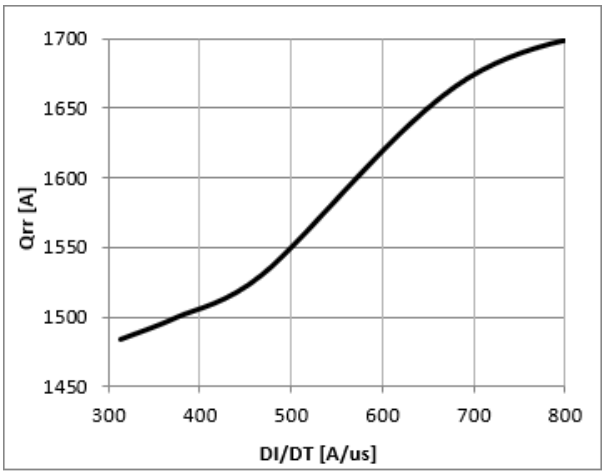


Figure 15: Typical Diode Qrr VS. DI/DT,TC=25℃
VCC=600V, VGE=15V, IF=25A

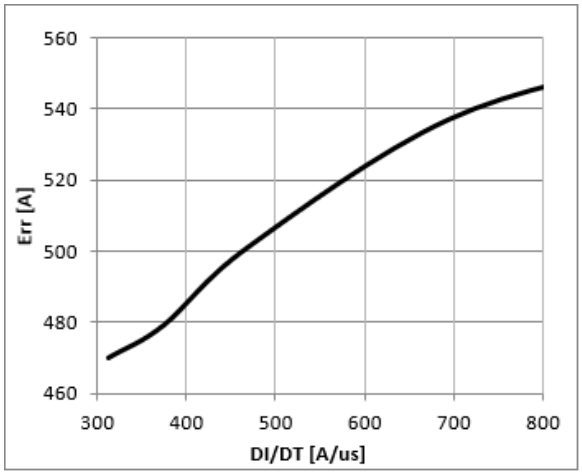


Figure 16: Typical Diode Err VS. DI/DT,TC=25℃
VCC=600V, VGE=15V, IF=25A

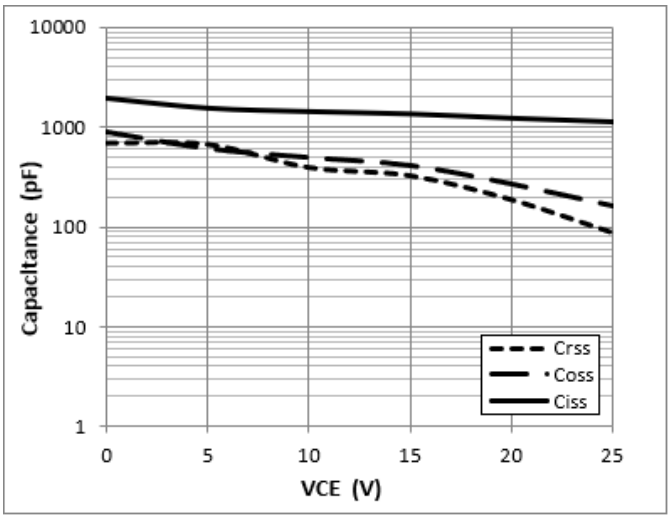


Figure 17: Typical Capacitance VS. VCE,
VGE=0V,f=100kHz

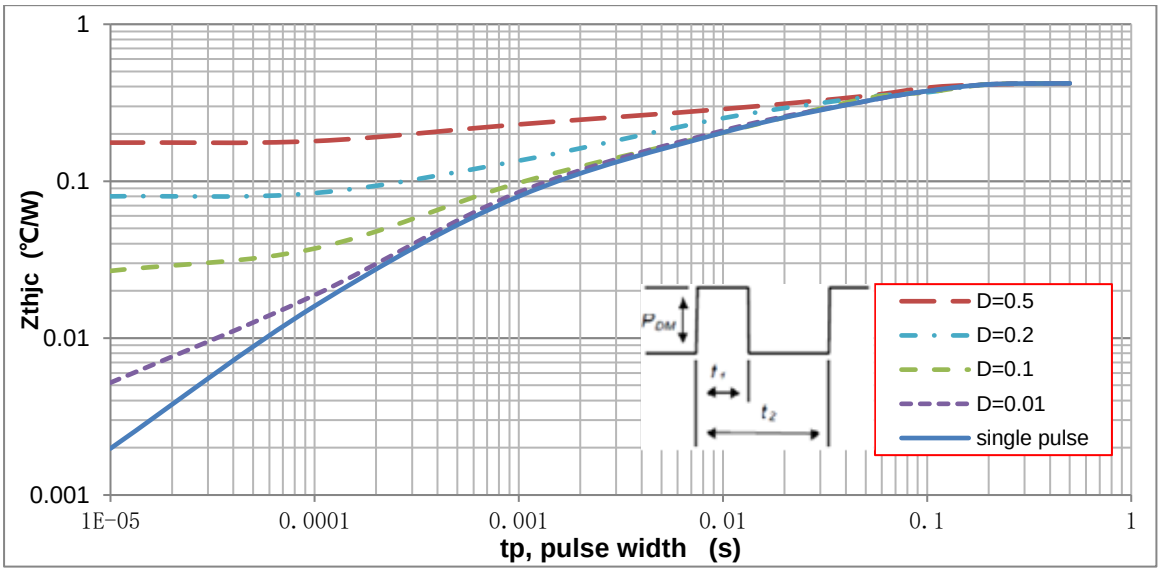
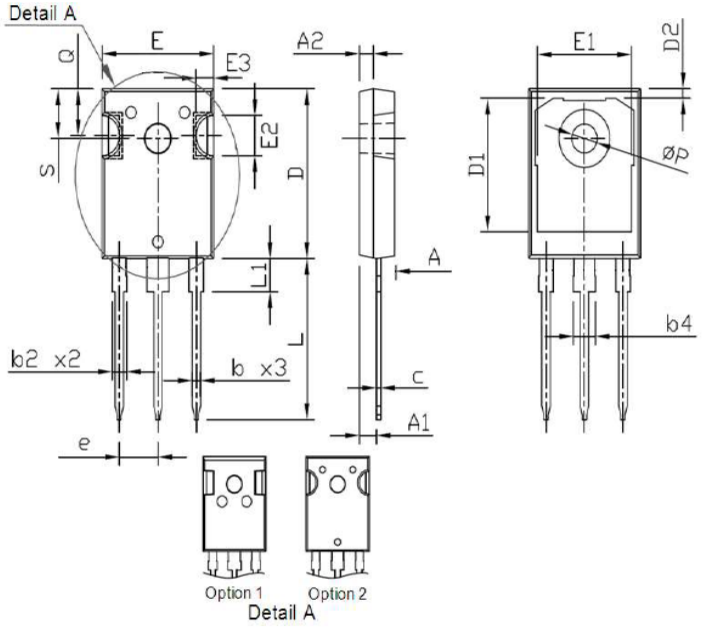


Figure 18: Normalized transient thermal impedance, junction-to-case
Note1.Duty factor D=t1/t2; Note2:peak TJ=PDM×Zthjc+TC

TO247 PACKAGE OUTLINE



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.70	5.30	0.185	0.209
A1	2.20	2.60	0.087	0.102
A2	1.50	2.49	0.059	0.098
b	1.04	1.33	0.041	0.052
b2	1.90	2.41	0.075	0.095
b4	2.87	3.43	0.113	0.135
c	0.55	0.70	0.022	0.028
D	20.70	21.30	0.815	0.839
D1	16.25	17.65	0.640	0.695
D2	0.51	1.40	0.020	0.055
e	5.44 BSC.		0.214 BSC.	
E	15.50	16.30	0.610	0.642
E1	13.08	14.16	0.515	0.557
E2	3.80	5.49	0.150	0.216
E3	1.00	2.75	0.039	0.108
L	19.72	20.32	0.776	0.800
L1	3.85	4.50	0.152	0.177
Q	5.25	6.25	0.207	0.246
P	3.50	3.70	0.138	0.146
S	6.04	6.30	0.238	0.248

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