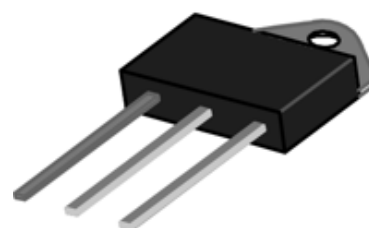
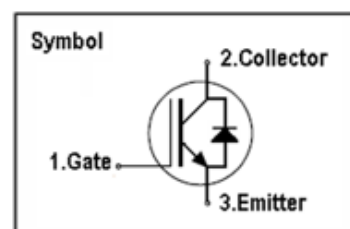


IGBT

Features

- 650V,40A
- $V_{CE(sat)}(typ.)=2.0V @ V_{GE}=15V, I_C=40A$
- High speed switching
- Higher system efficiency
- Soft current turn-off waveforms
- Square RBSOA



General Description

JIAEN Trench IGBTs offer lower losses and higher energy efficiency for application such as Motor control, general inverter and other soft switching applications.

Absolute Maximum Ratings

Symbol	Parameter	Value	Units
V_{CES}	Collector-Emitter Voltage	650	V
V_{GES}	Gate-Emitter Voltage	± 30	V
I_C	Continuous Collector Current ($T_C=25^\circ C$)	80	A
	Continuous Collector Current ($T_C=100^\circ C$)	40	A
I_{CM}	Pulsed Collector Current (Note 1)	120	A
I_F	Diode Continuous Forward Current ($T_C=100^\circ C$)	40	A
I_{FM}	Diode Maximum Forward Current (Note 1)	120	A
t_{sc}	Short Circuit Withstand Time	10	us
P_D	Maximum Power Dissipation ($T_C=25^\circ C$)	278	W
	Maximum Power Dissipation ($T_C=100^\circ C$)	111	W
T_J	Operating Junction Temperature Range	-55 to +150	$^\circ C$
T_{STG}	Storage Temperature Range	-55 to +150	$^\circ C$

Thermal Characteristics

Symbol	Parameter	Max.	Units
$R_{th j-c}$	Thermal Resistance, Junction to case for IGBT	0.45	$^\circ C/W$
$R_{th j-c}$	Thermal Resistance, Junction to case for Diode	1.5	$^\circ C/W$
$R_{th j-a}$	Thermal Resistance, Junction to Ambient	40	$^\circ C/W$

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV _{CES}	Collector-Emitter Breakdown Voltage	V _{GE} = 0V, I _C = 250uA	650	-	-	V
I _{CES}	Collector-Emitter Leakage Current	V _{CE} = 650V, V _{GE} = 0V	-	-	100	uA
I _{GES}	Gate Leakage Current, Forward	V _{GE} =±20V, V _{CE} = 0V	-	-	±100	nA
V _{GE(th)}	Gate Threshold Voltage	V _{GE} = V _{CE} , I _C = 250uA	5.1	-	6.9	V
V _{CE(sat)}	Collector-Emitter Saturation Voltage	V _{GE} =15V, I _C = 40A	-	2.0	2.5	V
Q _g	Total Gate Charge	V _{CC} =480V V _{GE} =15V I _C =40A	-	594		nC
Q _{ge}	Gate-Emitter Charge		-	119		nC
Q _{gc}	Gate-Collector Charge		-	374		nC
t _{d(on)}	Turn-on Delay Time	V _{CC} =400V V _{GE} =15V I _C =40A R _G =15Ω Inductive Load T _C =25 °C	-	19	-	ns
t _r	Turn-on Rise Time		-	65	-	ns
t _{d(off)}	Turn-off Delay Time		-	86	-	ns
t _f	Turn-off Fall Time		-	98	-	ns
E _{on}	Turn-on Switching Loss		-	1.3	-	mJ
E _{off}	Turn-off Switching Loss		-	0.5	-	mJ
E _{ts}	Total Switching Loss		-	1.8	-	mJ
C _{ies}	Input Capacitance	V _{CE} =25V V _{GE} =0V f = 1MHz	-	1340	-	pF
C _{oes}	Output Capacitance		-	98	-	pF
C _{res}	Reverse Transfer Capacitance		-	11.8	-	pF

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V _F	Diode Forward Voltage	I _F =40A	-	1.5	3.0	V
t _{rr}	Diode Reverse Recovery Time	V _{CE} = 400V I _F = 40A R _G =15 Ω	-	148		ns
I _{rr}	Diode peak Reverse Recovery Current		-	13.8		A
Q _{rr}	Diode Reverse Recovery Charge		-	1055		nC

Notes:

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

Typical Performance Characteristics

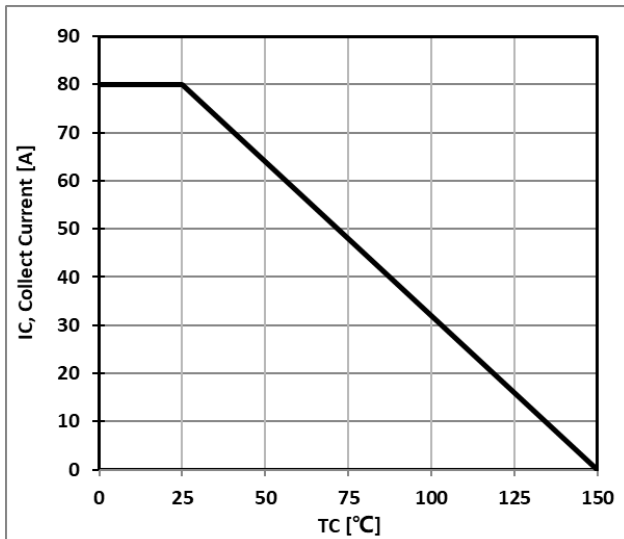


Figure 1: Maximum DC Collector Current
VS. case temprature

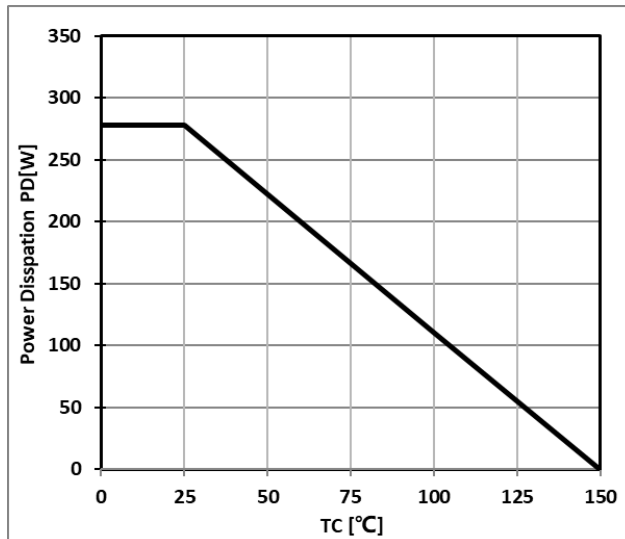


Figure 2: Power Dissipation VS. Case Temperature

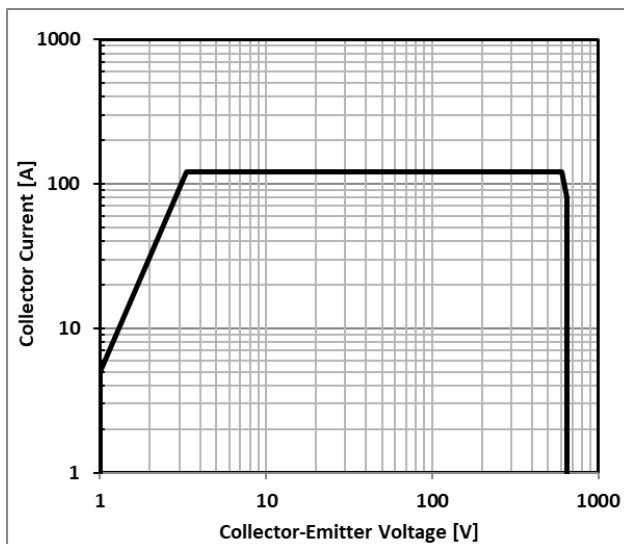


Figure 3: Reverse Bias SOA, $T_J=125^{\circ}\text{C}$, $V_{GE}=15\text{V}$

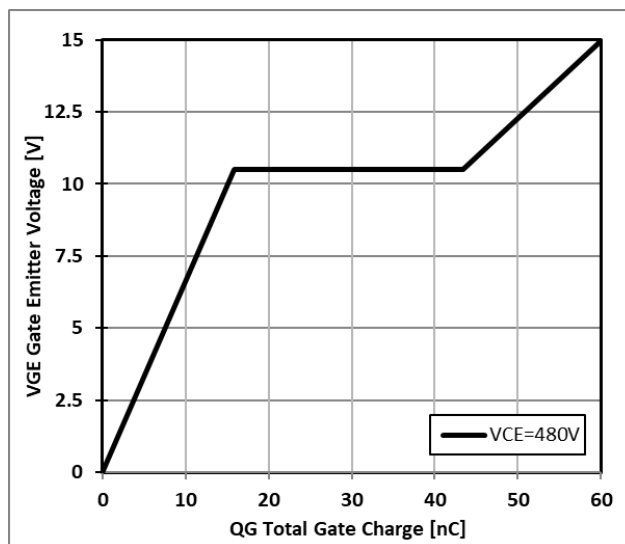


Figure 4: Typical Gate charge VS. V_{GE} , $I_C=40\text{A}$

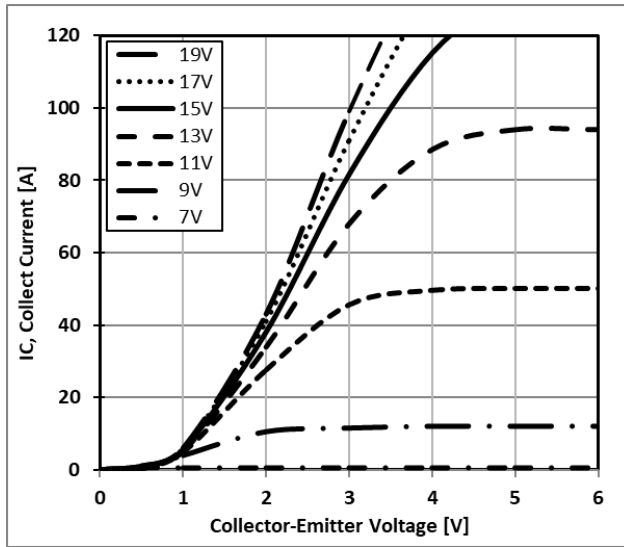


Figure 5: Typical IGBT Output characteristics,
TC=25°C;tp=300us

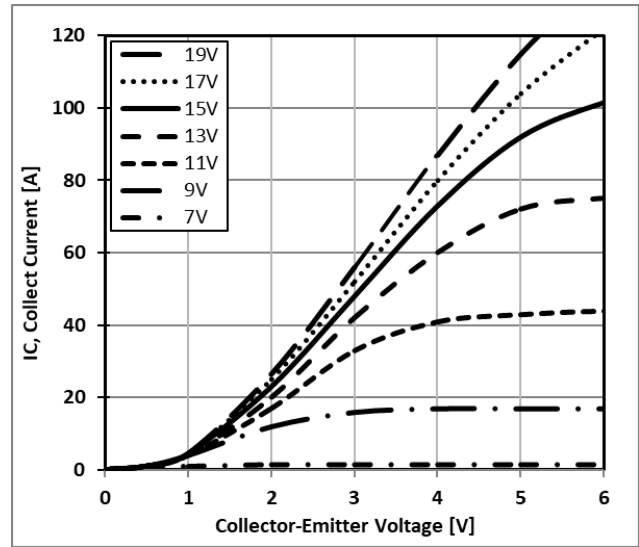


Figure 6: Typical IGBT Output characteristics,
TC=150°C;tp=300us

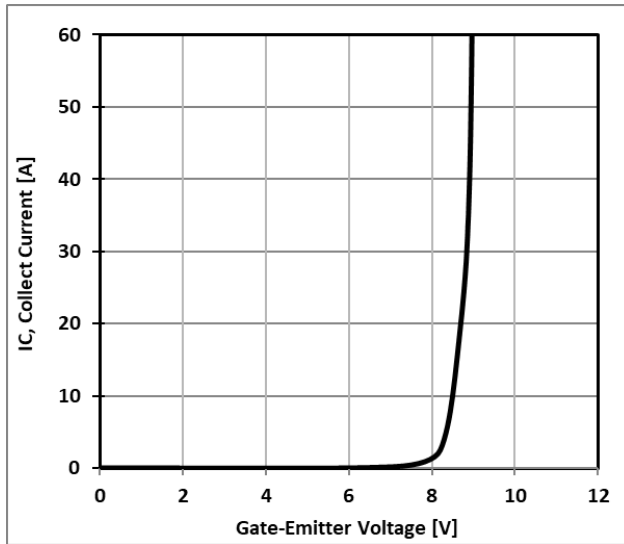


Figure 7: Typical Gate Threshold Voltage

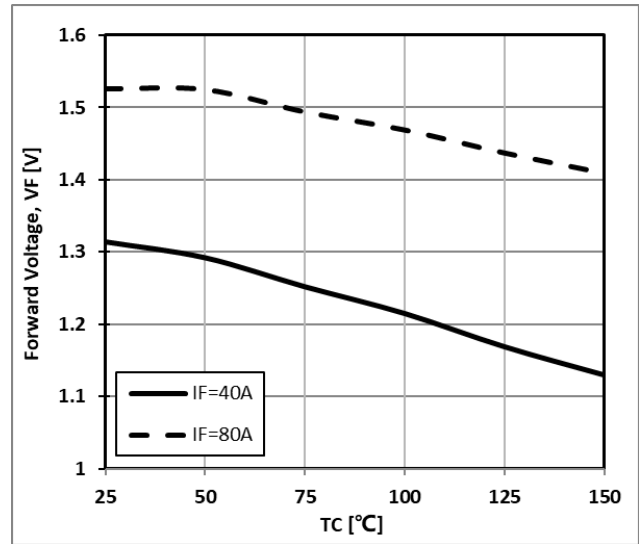


Figure 8: Typical Forward Voltage vs IF

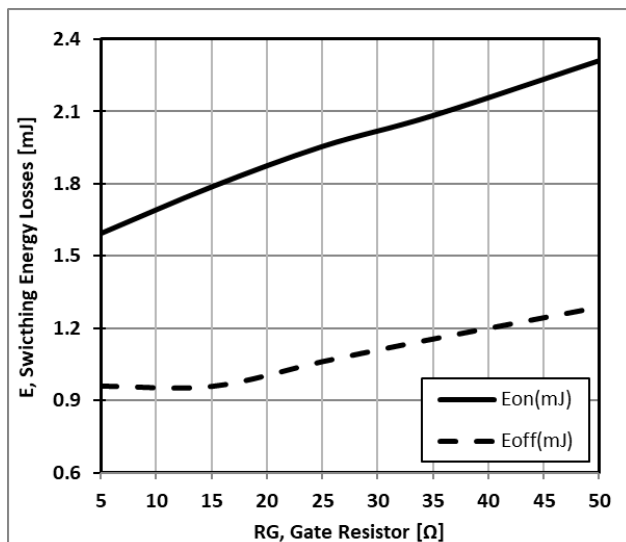


Figure 9: Typical Energy Loss VS. RG, TC=25°C,
L=200uH, VCE=400V, VGE=15V, IC=40A

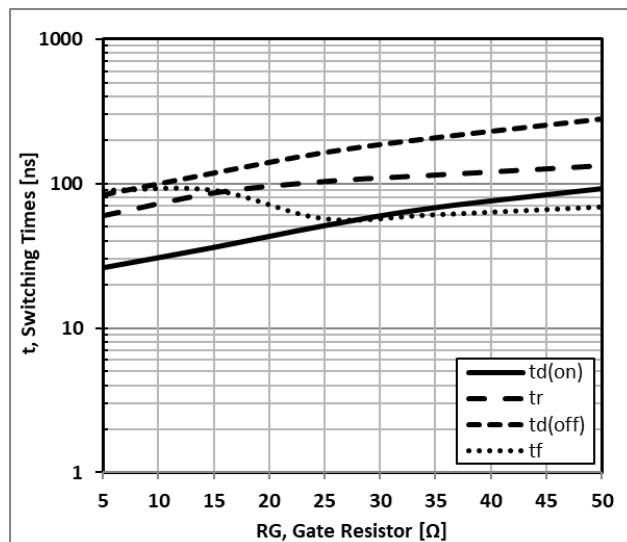


Figure 10: Typical Switching Time VS. RG, TC=25°C,
L=200uH, VCE=400V, VGE=15V, IC=40A

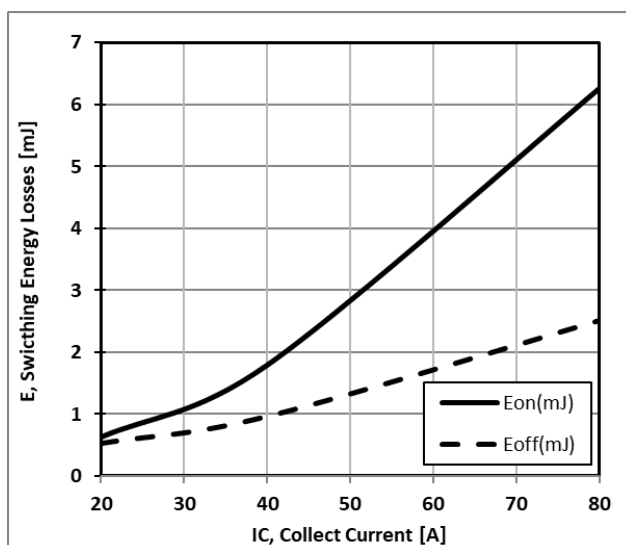


Figure 11: Typical Energy Loss VS. IC, TC=25°C,
L=200uH, VCE=400V, VGE=15V, RG=15Ω

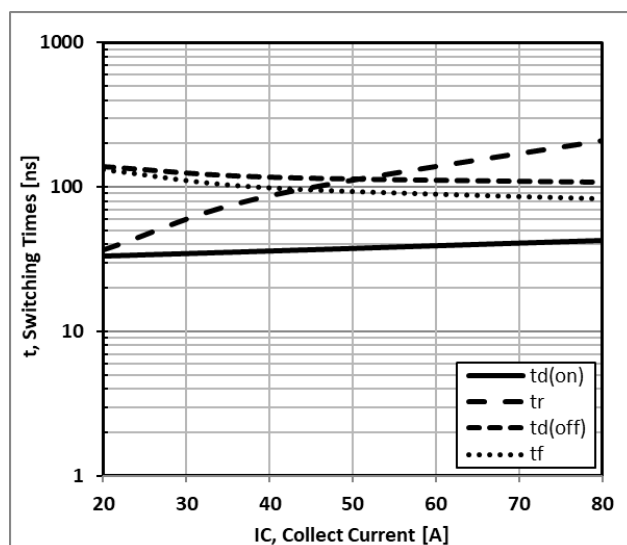


Figure 12: Typical Switching Time VS. IC, TC=25°C,
L=200uH, VCE=400V, VGE=15V, RG=15Ω

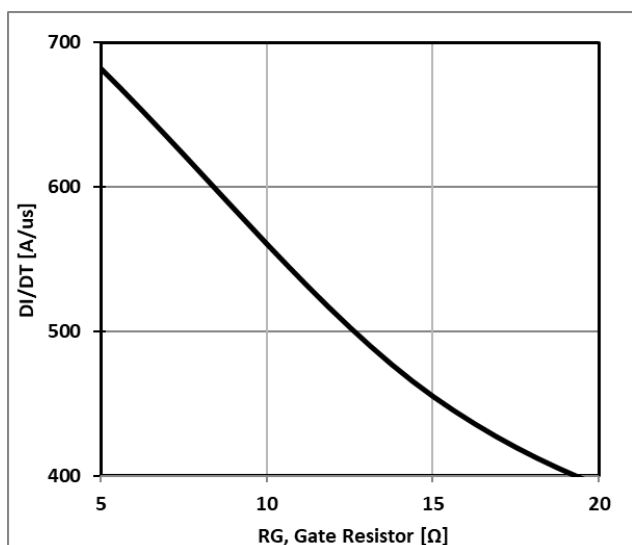


Figure 13: Typical Diode DI/DT VS. RG, TC=25°C
VCC=400V, VGE=15V, IF=40A

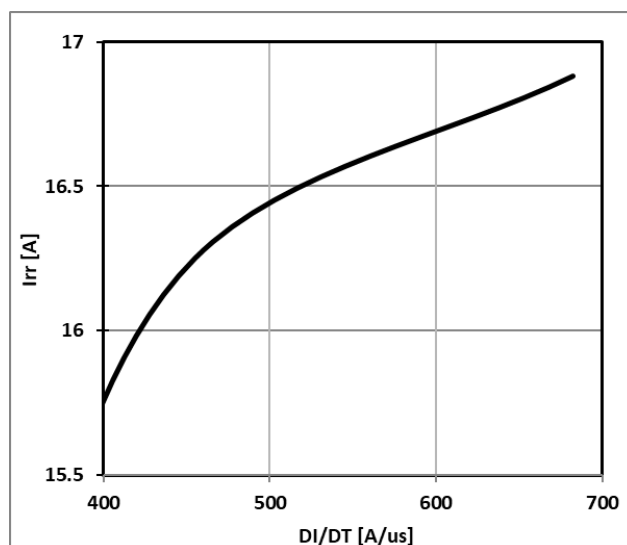


Figure 14: Typical Diode IRR VS. DI/DT, TC=25°C
VCC=400V, VGE=15V, IF=40A

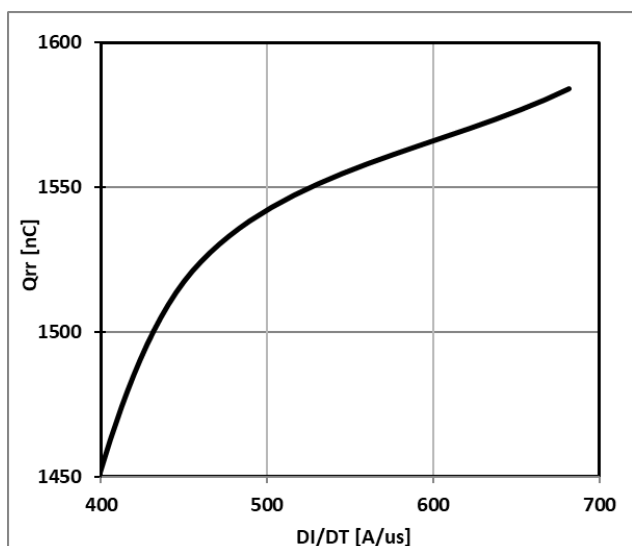


Figure 15: Typical Diode Qrr VS. DI/DT, TC=25°C
VCC=400V, VGE=15V, IF=40A

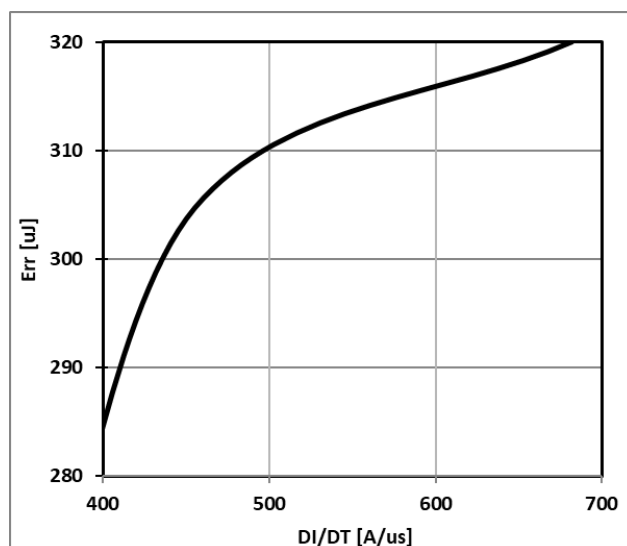


Figure 16: Typical Diode Err VS. DI/DT, TC=25°C
VCC=400V, VGE=15V, IF=40A

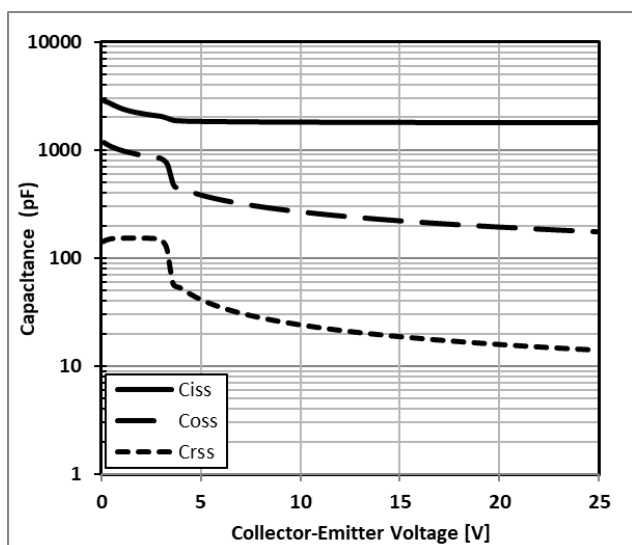


Figure 17: Typical Capacitance VS. VCE,
VGE=0V, f=1MHz

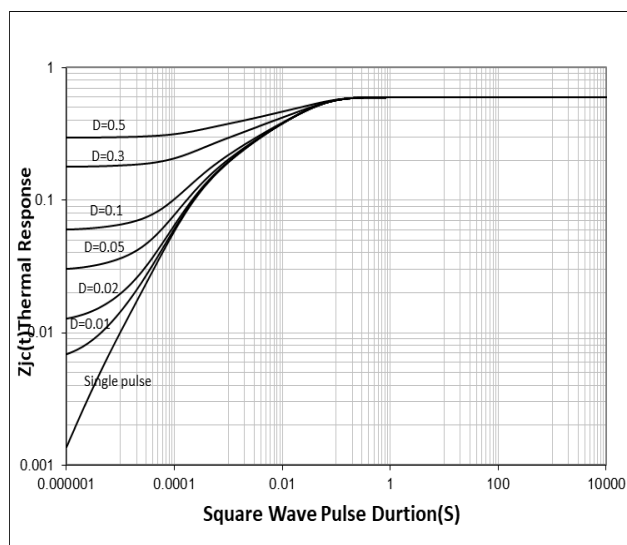
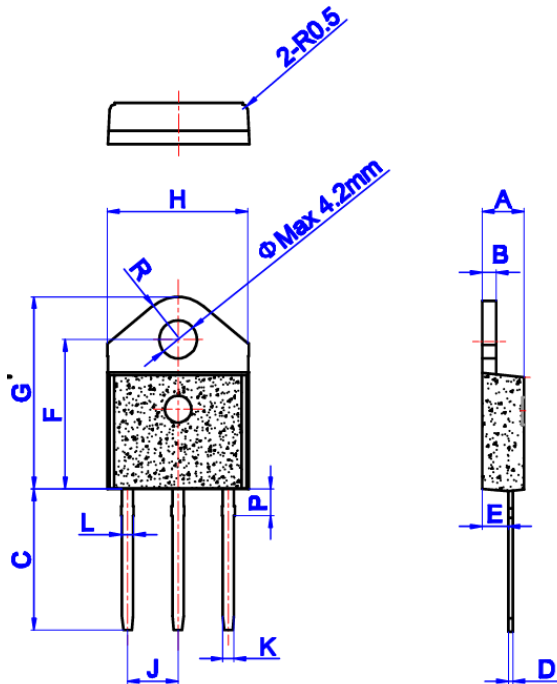


Figure 18: Normalized transient thermal impedance
junction-to-case

TO-3P-II PACKAGE OUTLINE



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.40		4.80	0.173		0.181
B	1.45		1.55	0.057		0.061
C	14.35		15.60	0.565		0.614
D	0.50		0.70	0.020		0.028
E	2.70		2.90	0.106		0.114
F	15.80		16.50	0.622		0.650
G	20.40		21.10	0.803		0.831
H	15.10		15.50	0.594		0.610
J	5.40		5.85	0.213		0.222
K	1.10		1.40	0.043		0.055
L	1.35		1.50	0.053		0.059
P	2.80		3.00	0.110		0.118
R		4.35			0.171	

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