

Description

The GF15N65NPTD is use advanced trench NPT technology. The 650V NPT Trench IGBT offers superior conduction and switching performances.



Features

- High Speed Switching , Low Power Loss
- Low saturation voltage: $V_{CE(sat)}(typ.) = 1.95V @ I_C = 5A$
- $E_{off} = 0.3mJ @ T_C = 25^{\circ}C$
- Maximum Junction Temperature $175^{\circ}C$

Product Summary		
$V_{CES}(V)$	$V_{CESAT}(V)Typ$	$I_C(A)$
650	1.95 @ 15V,15A	15

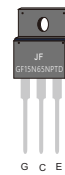
Mechanical Data

- Case: ITO-220 Package

Application

- Uninterrupted Power Supply
- Welding Converters
- Solar Converters
- PV Inverter

ITO-220
GF15N65NPTD



Block Diagram

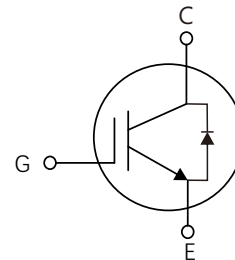


Table1 Absolute Maximum Ratings ($T_C = 25^{\circ}C$, unless otherwise specified)

Parameters	Symbol	Value	Unit
Collector-Emmitter Voltage	V_{CES}	650	V
Gate-Emmitter Voltage	V_{GES}	± 20	V
Collector Current-continuous	I_C	$T_C = 25^{\circ}C$	30
		$T_C = 100^{\circ}C$	15
Collector Current – pulse (Note 1)	I_{CM}	60	A
Diode Continuous Forward Current $T_C = 100^{\circ}C$	I_F	8	A
Diode Maximum Forward Current	I_{FM}	16	A
Power Dissipation	P_D	$T_C = 25^{\circ}C$	80
		$T_C = 100^{\circ}C$	40
Operating Junction Temperature	T_J	$-55 \sim +175$	$^{\circ}C$
Storage Temperature Range	T_{STG}	$-55 \sim +175$	

Table 2. Thermal Characteristics

Parameters	Symbol	Value	Unit
IGBT Thermal resistance Junction to Ambient	$R_{\theta JA}$	62.5	$^{\circ}\text{C}/\text{W}$
IGBT Thermal resistance Junction to Case	$R_{\theta JC}$	3.5	$^{\circ}\text{C}/\text{W}$
Diode Thermal resistance Junction to Case	$R_{\theta JC}$	4.6	$^{\circ}\text{C}/\text{W}$

 Table 3. Electrical Characteristics ($T_C=25^{\circ}\text{C}$, unless otherwise specified)

Parameters	Symbol	Test Conditions	Min	Typ	Max	Unit
Off Characteristics						
Collector-Emmitter Voltage	BV_{CES}	$V_{GE}=0\text{V}, I_C=200\mu\text{A}$	650			V
Zero Gate Voltage Collector Current	I_{CES}	$V_{CE}=650\text{V}, V_{GE}=0\text{V}$			10	μA
Gate-body Leakage Current	Forward	$V_{GS}=20\text{V}, V_{DS}=0\text{V}$			200	nA
	Reverse	$V_{GS}=-20\text{V}, V_{DS}=0\text{V}$			-200	nA
On Characteristics						
Gate Threshold Voltage	$V_{GE(TH)}$	$V_{CE}=V_{GE}, I_C=0.5\text{mA}$	4.8	5.7	6.6	V
Collector-Emmitter saturation Voltage	V_{CESAT}	$V_{GE}=15\text{V}, I_C=15\text{A},$	$T_j=25^{\circ}\text{C}$	1.95	2.5	V
			$T_j=175^{\circ}\text{C}$	2.15		
Dynamic Characteristics						
Input Capacitance	C_{IES}	$V_{CE}=25\text{V}, V_{GE}=0\text{V}, f=1\text{MHz}$		1200		pF
Output Capacitance	C_{OES}			90		pF
Reverse Transfer Capacitance	C_{RES}			15.1		pF
Switching Characteristics						
Turn-On Delay Time	$t_{d(on)}$	$V_{CE}=400\text{V}, I_C=15\text{A},$ $V_{GE}=15\text{V}, R_G=10\Omega,$ $T_C=25^{\circ}\text{C}$		30		ns
Turn-On Rise Time	t_r			24		ns
Turn-Off Delay Time	$t_{d(off)}$			170		ns
Turn-Off Fall Time	t_f			22		ns
Turn-On energy	E_{on}			0.221		mJ
Turn-Off energy	E_{off}			0.586		mJ
Total Gate Charge	Q_G		$V_{CE}=480\text{V}, I_C=15\text{A},$ $V_{GE}=15\text{V}$		72	
Gate to emitter charge	Q_{GE}			12		nC
Gate to collector charge	Q_{GC}			37		nC
Diode Characteristics						
Diode Continuous Forward Current	I_F	$T_C=100^{\circ}\text{C}$	5			
Diode Continuous Forward Current	I_{FM}	$T_C=100^{\circ}\text{C}$	100			
Diode Forward Voltage	V_F	$I_F=8\text{A}$		1.75	2.15	V
Reverse Recovery Time	T_{rr}	$I_F=8\text{A}, T_j=25^{\circ}\text{C}$		80		ns
Reverse Recovery Charge	Q_{rr}	$di/dt=200\text{A}/\mu\text{s}$		4.9		nC

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

Typical Characteristics Diagrams

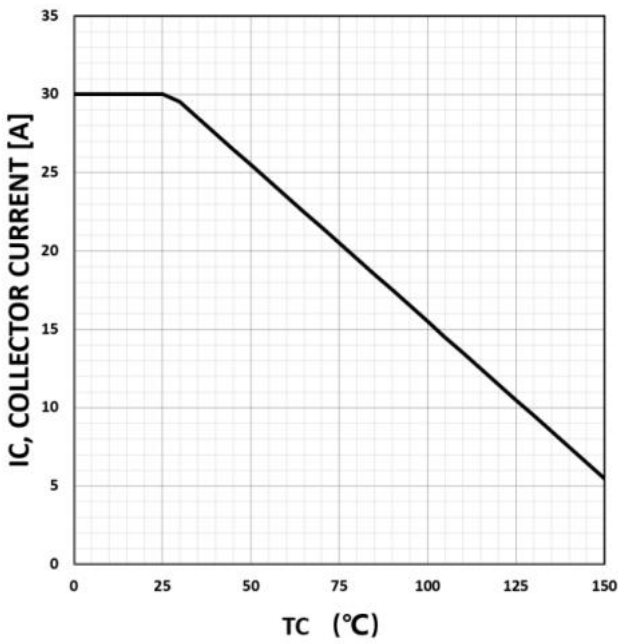


Figure1:maximum DC collector current VS. case temperature

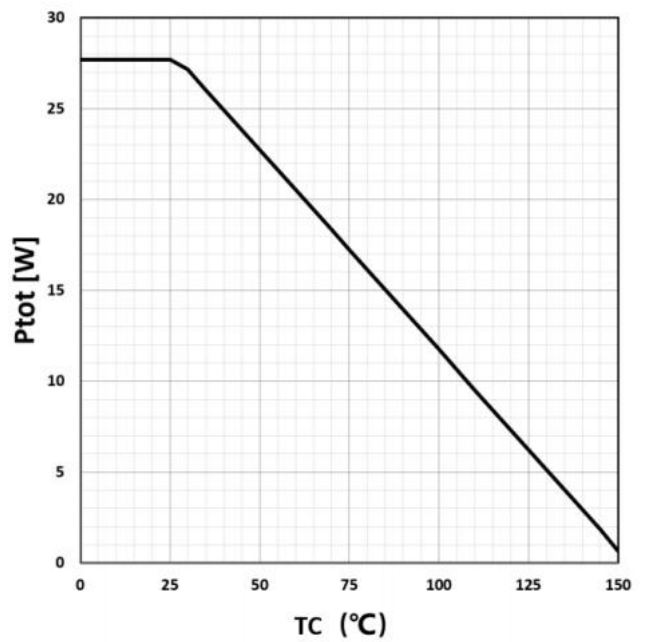


Figure2:power dissipation VS. case temperature

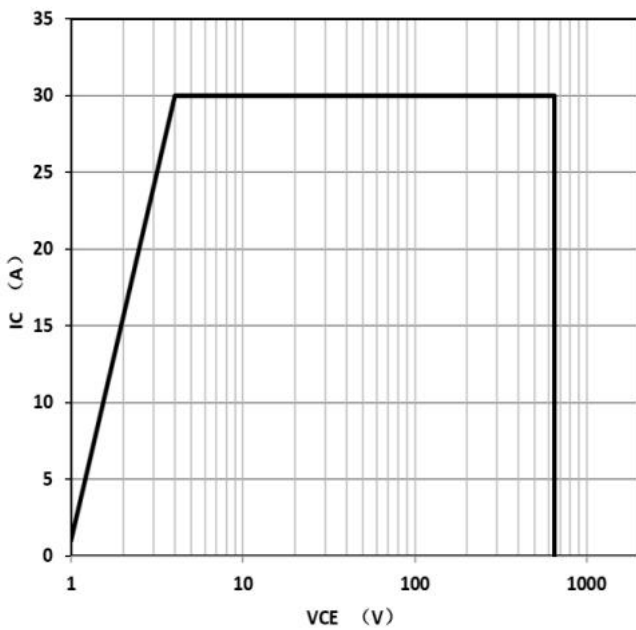


Figure3:reverse bias SOA, TJ=150°C, VGE=15V

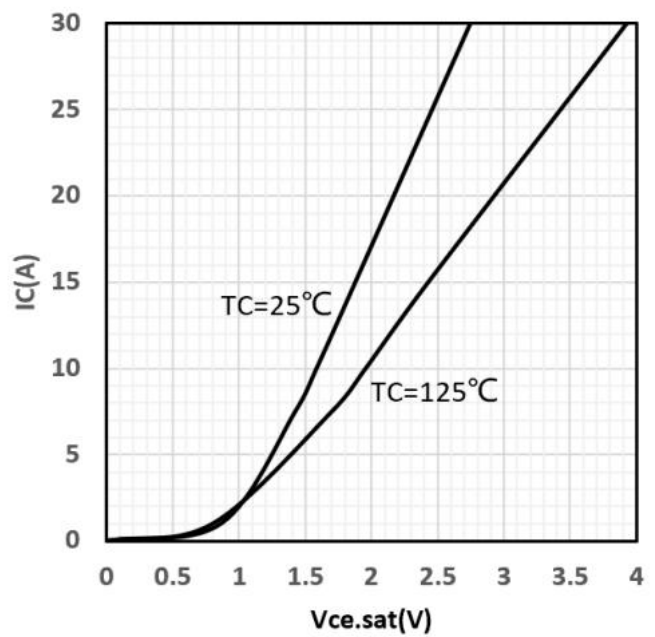


Figure4:Vce.sat VS IC

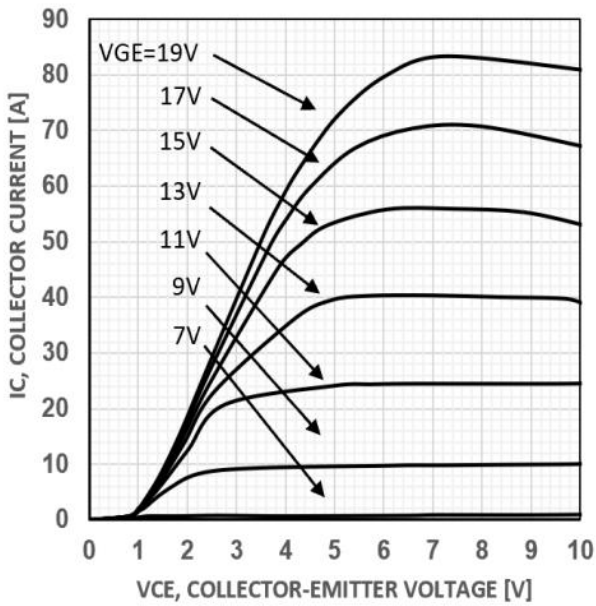


Figure5: typical IGBT output characteristics,
TC=25°C

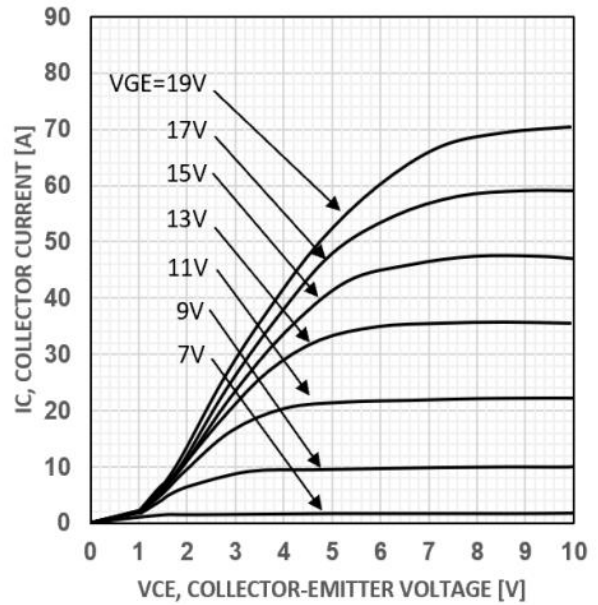


Figure6: typical IGBT output characteristics
TC=125°C

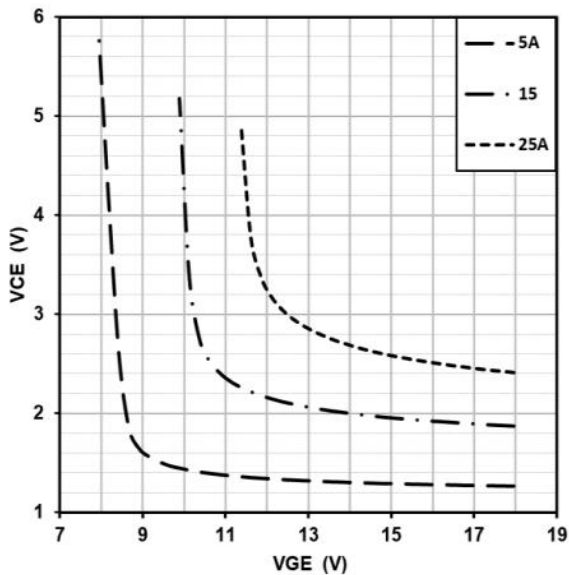


Figure7: typical VCE VS. VGE, TJ=25°C

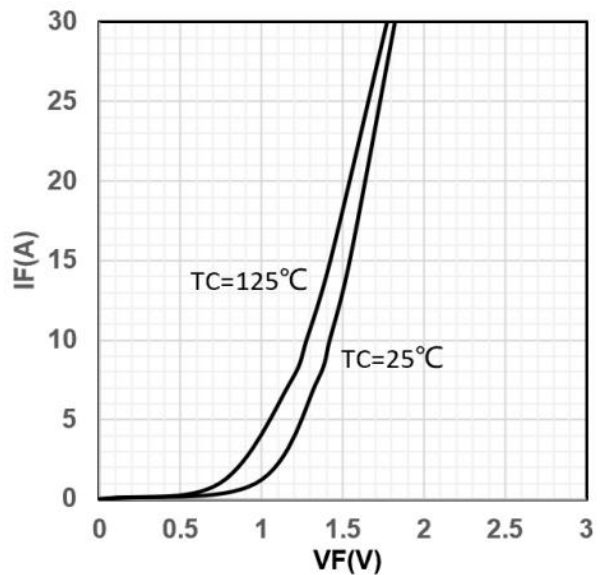


Figure8: typical diode forward characteristic

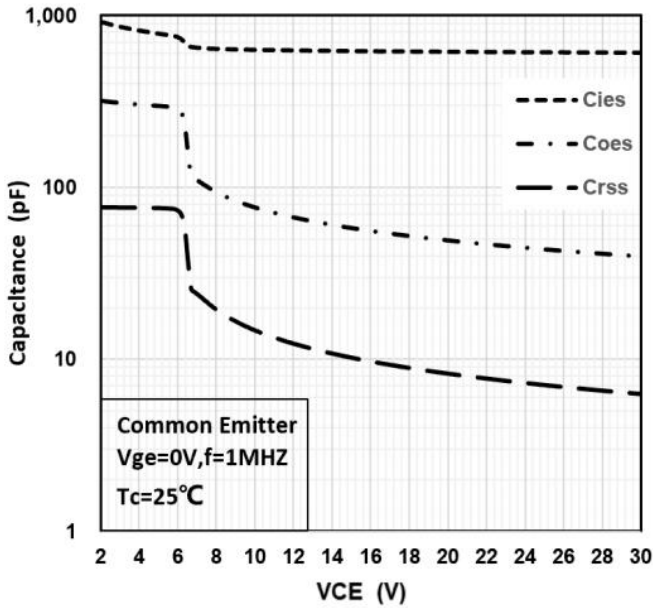


Figure9: typical capacitance VS. VCE, VGE=0V, f=100kHz

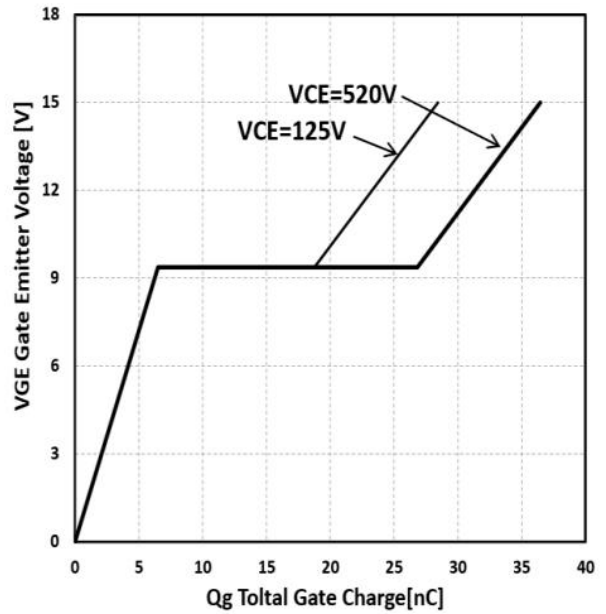


Figure10: typical gate charge VS. VGE, IC= 15A

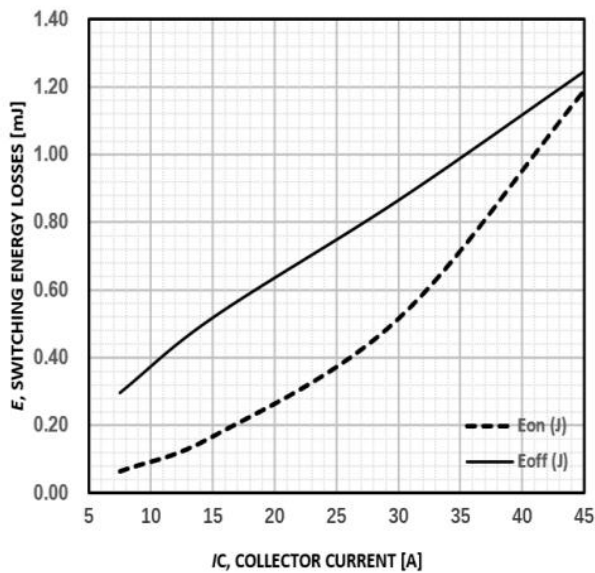


Figure11: typical energy loss VS. IC, TC=25°C,
L=500uH , VCE=400V, VGE=15V, Rg=10Ω

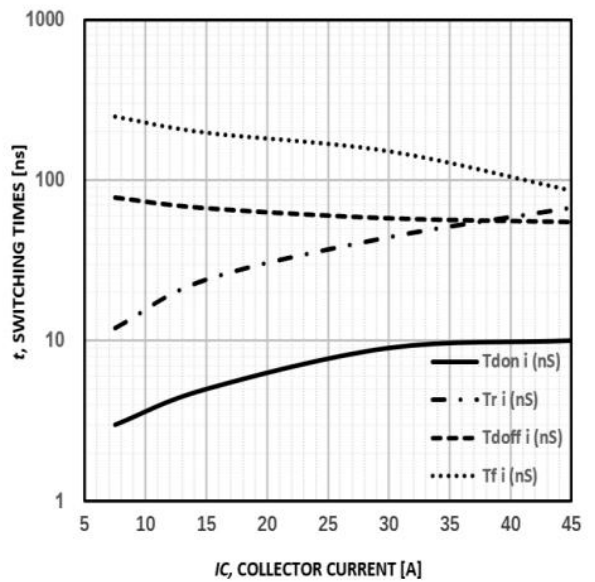


Figure12: typical switching time VS. IC, TC=25°C,
L=500uH, VCE=400V, VGE=15V, Rg=10Ω

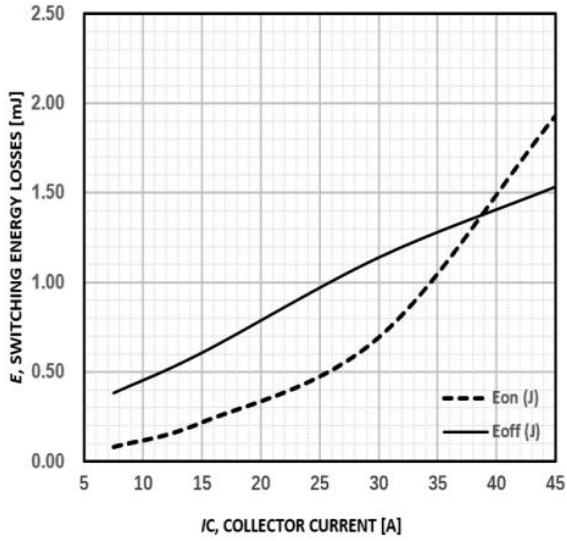


Figure13: typical energy loss VS. IC, TC=125°C,
L=500uH , VCE=400V,VGE=15V,Rg=10Ω

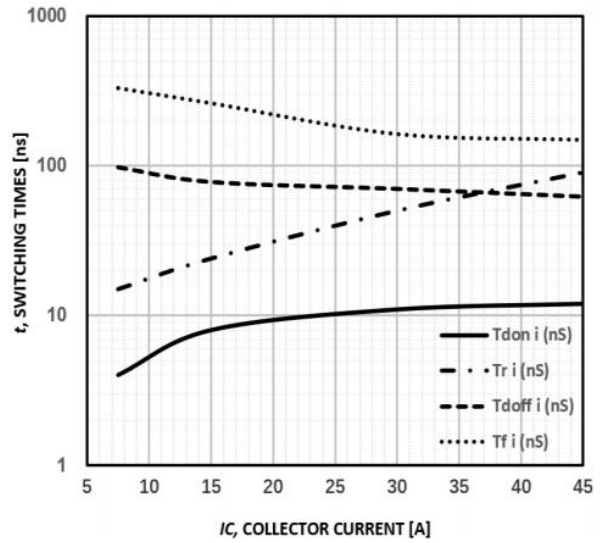


Figure14: typical switching time VS. IC, TC=125°C,
L=500uH, VCE=400V,VGE=15V,Rg=10Ω

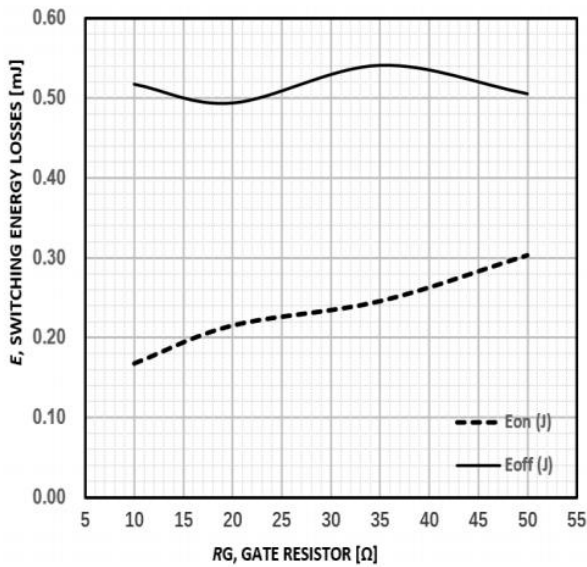


Figure15: typical energy loss VS. Rg,TC=25°C,
L=500uH, VCE=400V, VGE=15V, IC=15A

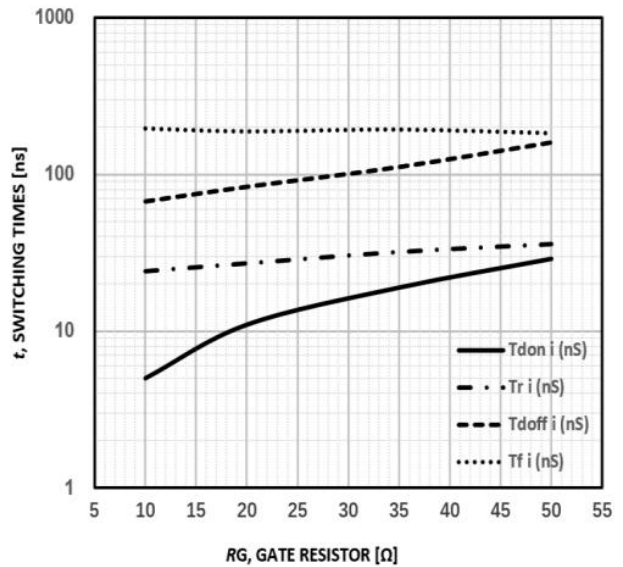


Figure16: typical switching time VS. Rg,TC=25°C,
L=500uH,VCE=400V,VGE=15V,IC=15A

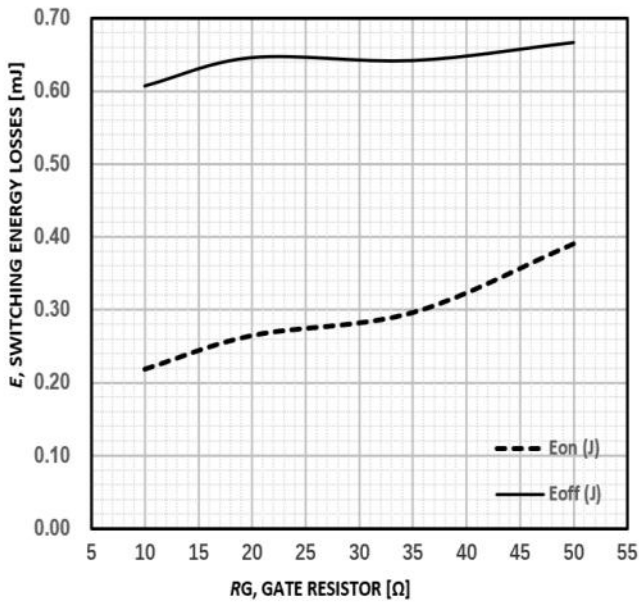


Figure17: typical energy loss VS. Rg,TC=125°C,
L=500uH, VCE=400V, VGE=15V ,IC=15A

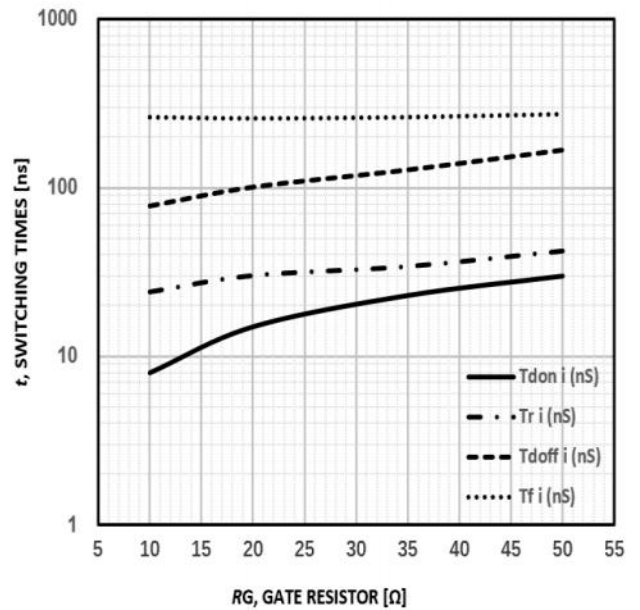


Figure18: typical switching time VS. Rg,TC=125°C,
L=500uH,VCE=400V,VGE=15V,IC=15A

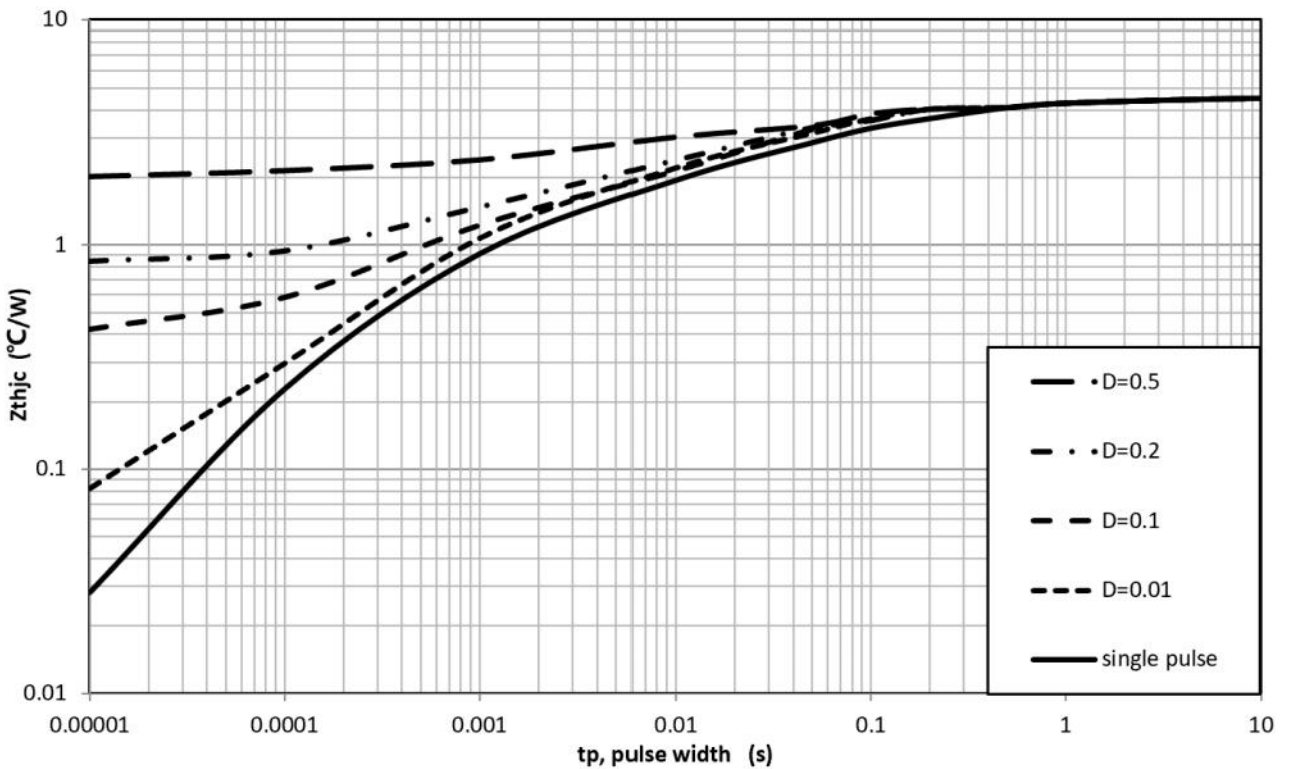
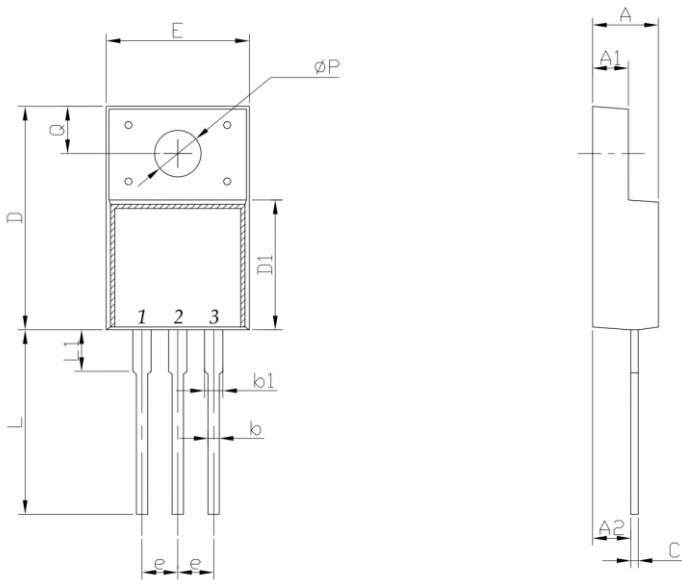


Figure19:normalized transient thermal impedance, junction-to-case

Dimensions

ITO-220 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	4.24	4.9	0.167	0.193
A1	2.3	2.92	0.091	0.115
A2	2.61	2.81	0.103	0.111
b	0.3	1	0.012	0.039
b1	0.9	1.55	0.035	0.061
C	0.3	0.7	0.012	0.028
D	14.5	16.36	0.571	0.644
D1	8.8	9.41	0.346	0.370
E	9.5	10.5	0.374	0.413
e	2.3	2.75	0.091	0.108
L	12.6	14	0.496	0.551
L1	2.45	4.3	0.096	0.169
P	2.9	3.8	0.114	0.150
Q	2.5	3.55	0.098	0.140

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