

Silicon Trench NPT IGBT

Description

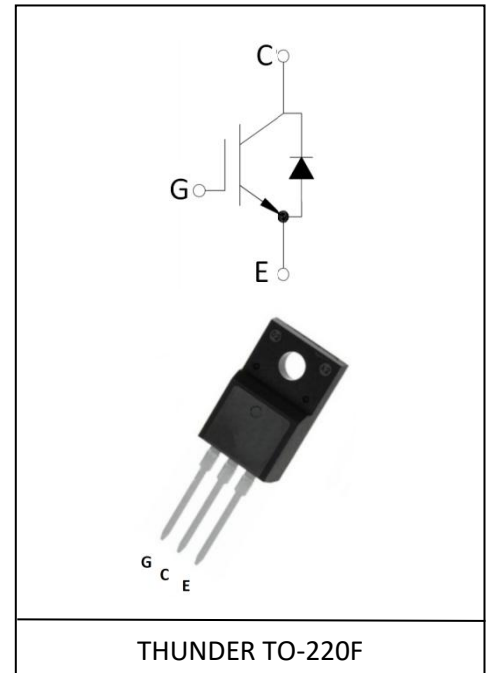
The THG15T65NBF is use advanced trench NPT technology. The 650V NPT Trench IGBT offers superior conduction and switching performances.

General Features

- High Speed Switching & Low Power Loss
- Low saturation voltage: $V_{CE(sat)} = 1.95V @ I_c = 15A$
- $E_{off} = 0.3mJ @ T_c = 25^{\circ}C$
- Maximum junction temperature $175^{\circ}C$

Application

- Solar Converters
- Welding Converters
- UPS
- PFC
- PV Inverter



Absolute Maximum Ratings @ $T_c=25^{\circ}C$ (unless otherwise specified)

Symbol	Parameter	Value	Units
V_{CES}	Collector-Emitter Voltage	650	V
V_{GES}	Gate-Emitter Voltage	± 20	V
I_c	Collector Current	30	A
	Collector Current @ $T_c=100^{\circ}C$	15	A
I_{CM}	Pulsed Collector Current	60	A
I_F	Diode Continuous Forward Current @ $T_c=100^{\circ}C$	8	A
I_{FM}	Diode Maximum Forward Current	16	A
	Total Dissipation at @ $T_c = 25^{\circ}C$	80	W
	Total Dissipation at @ $T_c = 100^{\circ}C$	40	
T_j	Operating Junction and Storage Temperature Range	-55 to +175	$^{\circ}C$
T_L	Max Temperature For Soldering	260	$^{\circ}C$
T_{SC}	Short circuit withstand time $V_{GE}=15V, V_{CC} \leq 400V$, Allowed number of short circuits < 1000 Time between short circuits: $\geq 1.0s, T_j \leq 150^{\circ}C$	5	us

Electrical Characteristics @ T_c=25°C (unless otherwise specified)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit	
Static Characteristics							
V _{CE(S)}	Collector-Emitter Voltage	V _{GE} =0V, I _{CE} =250μA	650	—	—	V	
V _{CE(sat)}	Collector-Emitter Saturation Voltage	V _{GE} =15V, I _C =15A	T _J = 25°C	—	1.95	2.50	V
			T _J = 175°C	—	2.15	—	V
V _{GE(th)}	Gated Threshold Voltage	V _{CE} =V _{GE} , I _C =0.5mA	4.8	5.7	6.6	V	
I _{CE(S)}	Collector-Emitter Leakage Current	V _{GE} =0V, V _{CE} =650V	—	—	10	uA	
I _{GES(F)}	Gate to Emitter Forward Leakage	V _{GE} = +20V, V _{CE} = 0V	—	—	200	nA	
I _{GES(R)}	Gate to Emitter Reverse Leakage	V _{GE} = -20V, V _{CE} = 0V	—	—	-200	nA	
Dynamic Characteristics							
C _{ies}	Input Capacitance	V _{GE} =0V, V _{CE} =25V, f=1.0MHZ	—	1200	—	pF	
C _{oes}	Output Capacitance		—	90	—	pF	
C _{res}	Reverse Transfer Capacitance		—	15.1	—	pF	
Q _g	Total Gate Charge	V _{CE} =480V, I _C =15A, V _{GE} =15V	—	72	—	nC	
Q _{ge}			—	12	—		
Q _{gc}			—	37	—		
Switching Characteristics							
t _{d(on)}	Turn-on Delay Time	V _{CE} =400V, I _C =15A V _{GE} =15V, R _G =10 Ω	—	30	—	nS	
t _r	Rise Time		—	24	—		
t _{d(off)}	Turn-off Delay Time		—	170	—		
t _f	Fall Time		—	22	—		
E _{on}	Turn-on Switching Loss		—	0.221	—	mJ	
E _{off}	Turn-off Switching Loss		—	0.586	—		

Electrical Characteristics of the Diode @T_c= 25°C unless otherwise specified

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
I _F	Diode Continuous Forward Current	T _C = 100°C	5	—	—	A
I _{FM}	Diode Maximum Forward Current	T _C = 100°C	100	—	—	A
V _F	Diode Forward Voltage	I _F =8A	—	1.75	2.15	V
t _{rr}	Reverse Recovery Time	T _J =25°C, I _F =8A di/dt=200A/us	—	80	—	nS
Q _{rr}	Reverse Recovery Charge		—	4.9	—	nC
*Pulse Test: Pulse Width <= 300μs, Duty Cycle< =2%						

Thermal Characteristic

Symbol	Paramter	Typ	MAX	Units
$R_{\theta JC}$	Themal Resistance,Junction to case for IGBT	--	3.5	$^{\circ}\text{C}/\text{W}$
$R_{\theta JC}$	Themal Resistance,Junction to case for Diode	--	4.6	$^{\circ}\text{C}/\text{W}$
$R_{\theta JA}$	Themal Resistance,Junction to Ambient	--	62.5	$^{\circ}\text{C}/\text{W}$

Typical Performance Characteristics

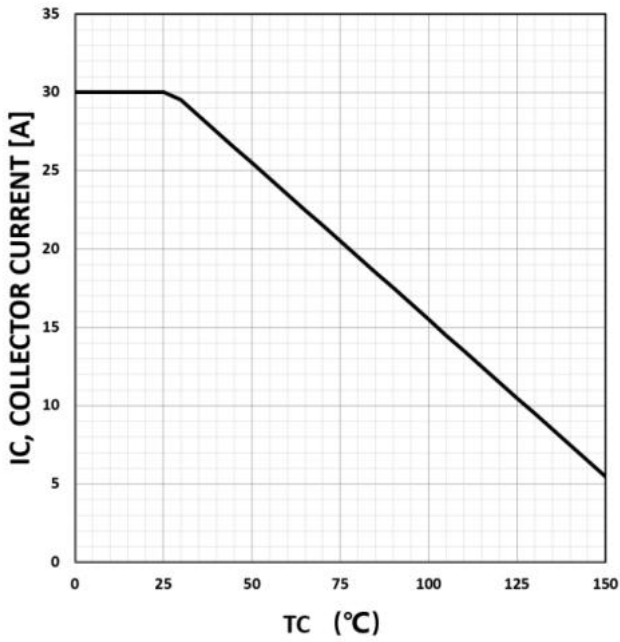


Figure1:maximum DC collector current VS. case temperature

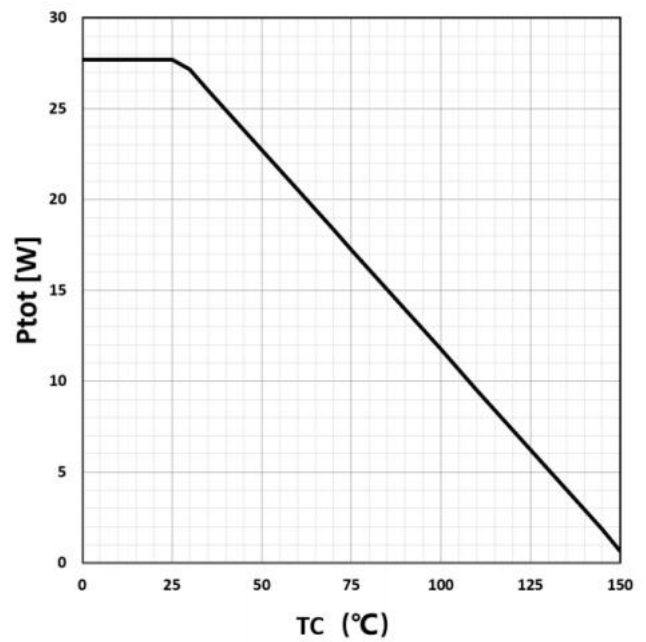


Figure2:power dissipation VS. case temperature

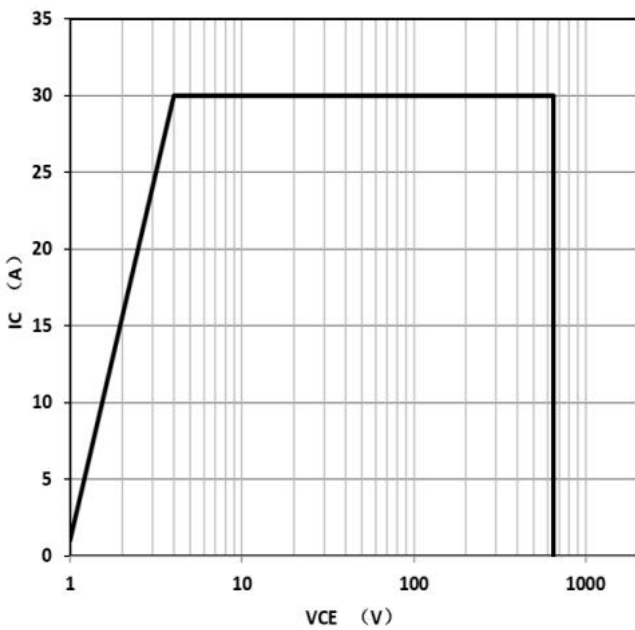


Figure3:reverse bias SOA,TJ=150°C,VGE=15V

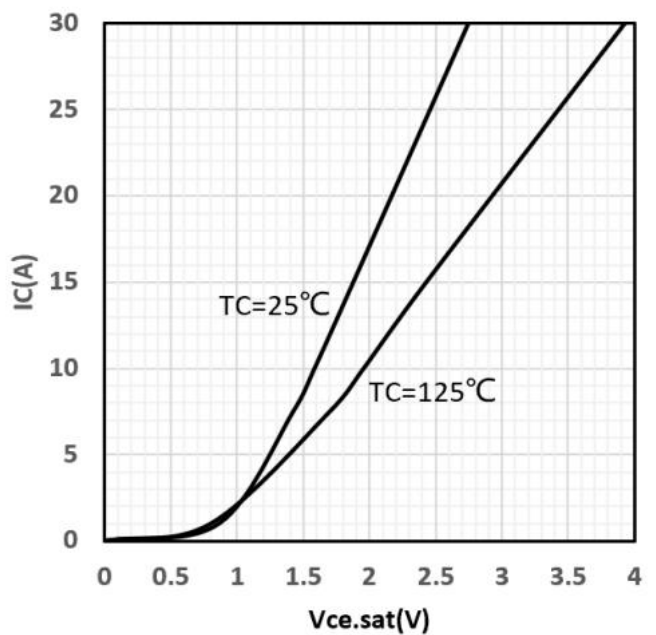


Figure4:Vce.sat VS IC

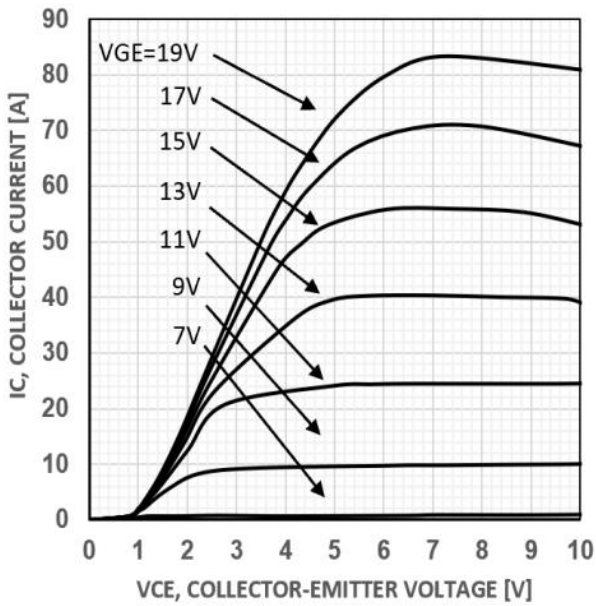


Figure5: typical IGBT output characteristics,
TC=25°C

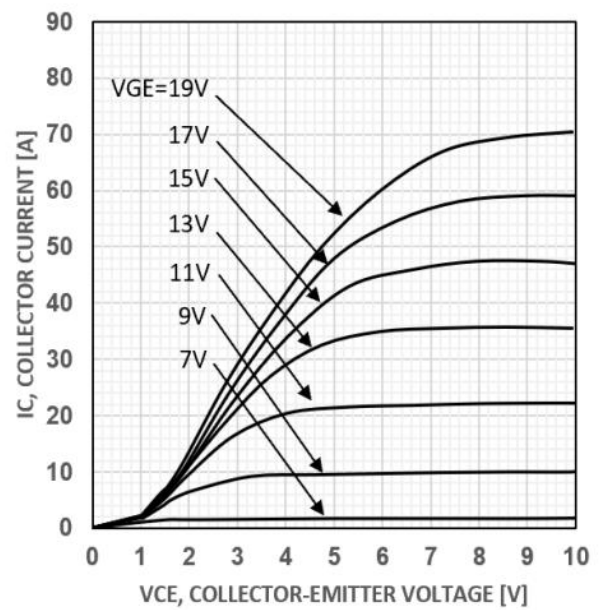


Figure6: typical IGBT output characteristics
TC=125°C

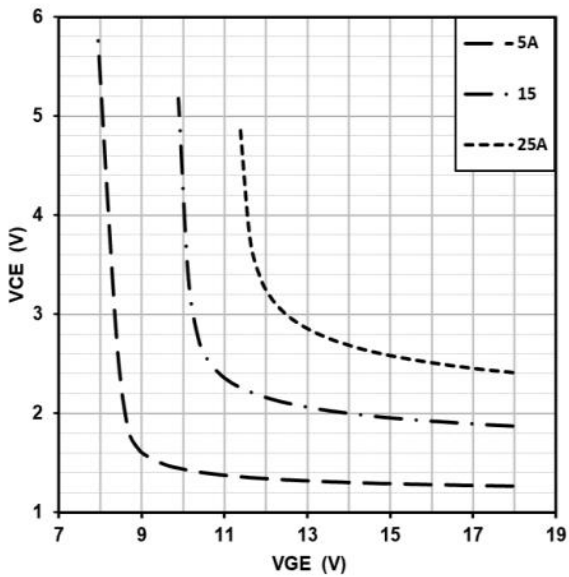


Figure7: typical VCE VS. VGE, TJ=25°C

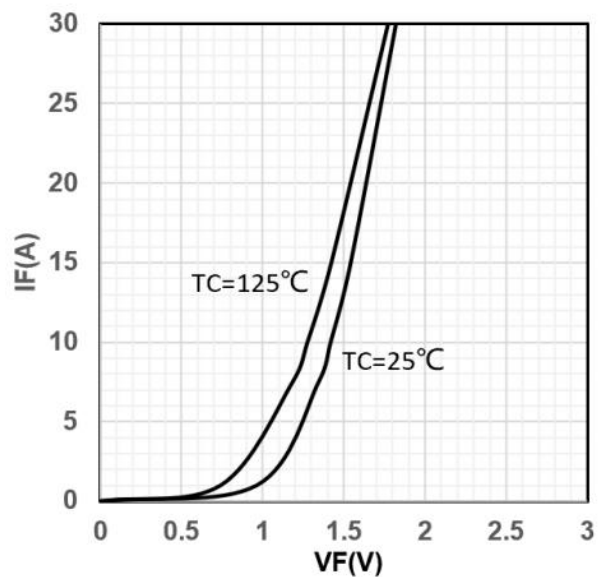


Figure8: typical diode forward characteristic

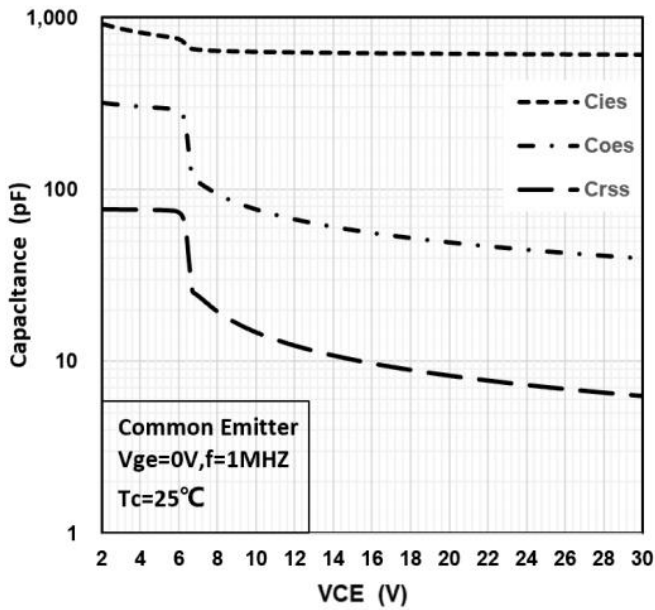


Figure9: typical capacitance VS. VCE, VGE=0V, f=100kHz

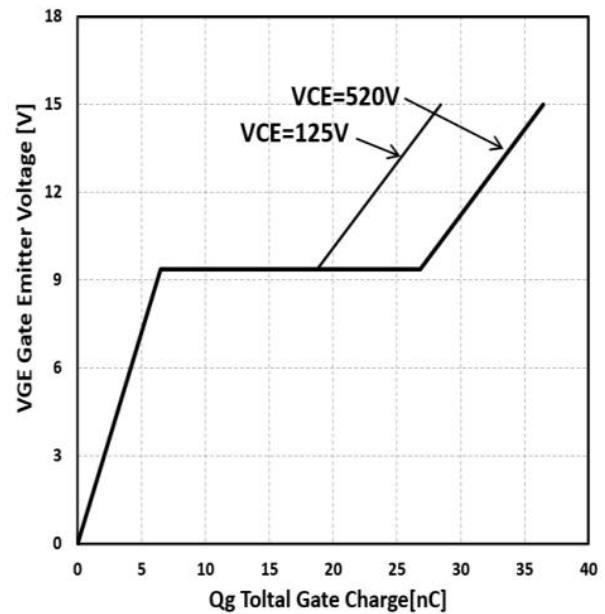


Figure10: typical gate charge VS. VGE, IC=15A

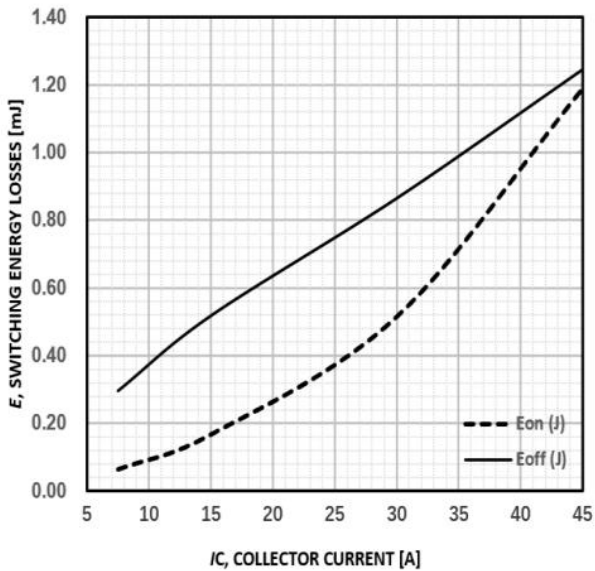


Figure11: typical energy loss VS. IC, TC=25°C,

L=500uH, VCE=400V, VGE=15V, Rg=10Ω

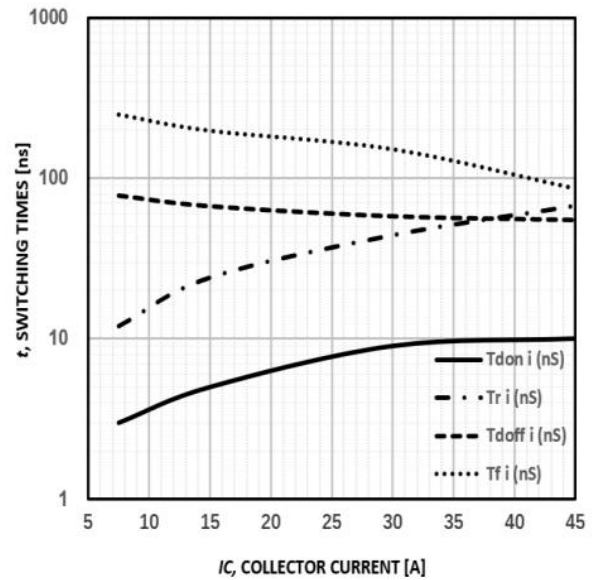


Figure12: typical switching time VS. IC, TC=25°C,

L=500uH, VCE=400V, VGE=15V, Rg=10Ω

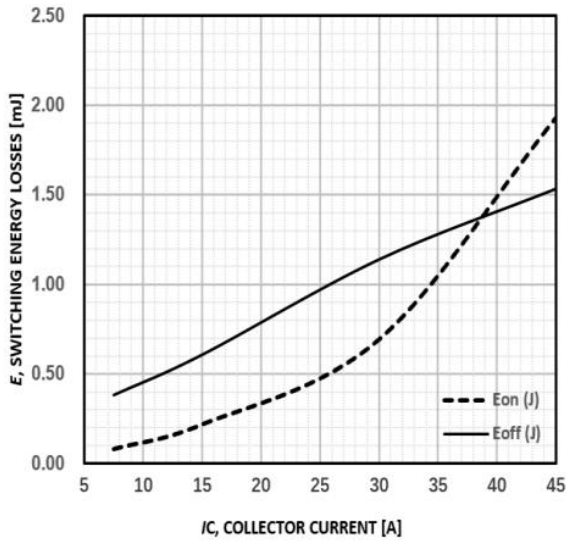


Figure13: typical energy loss VS. IC, TC=125°C,
L=500uH , VCE=400V,VGE=15V,Rg=10Ω

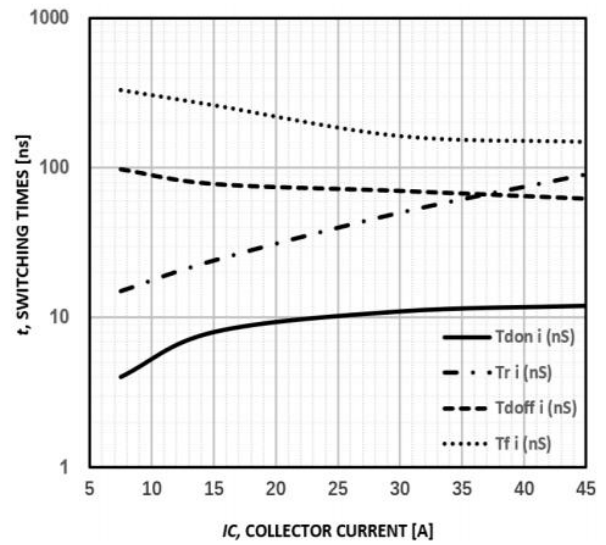


Figure14: typical switching time VS. IC, TC=125°C,
L=500uH, VCE=400V,VGE=15V,Rg=10Ω

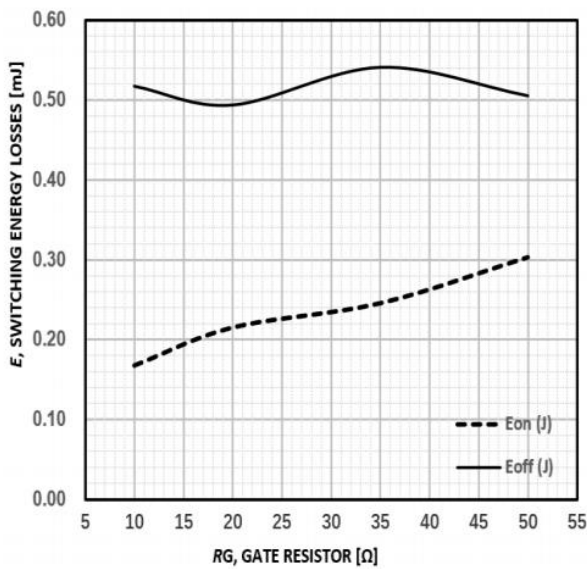


Figure15: typical energy loss VS. Rg, TC=25°C,
L=500uH, VCE=400V, VGE=15V ,IC=15A

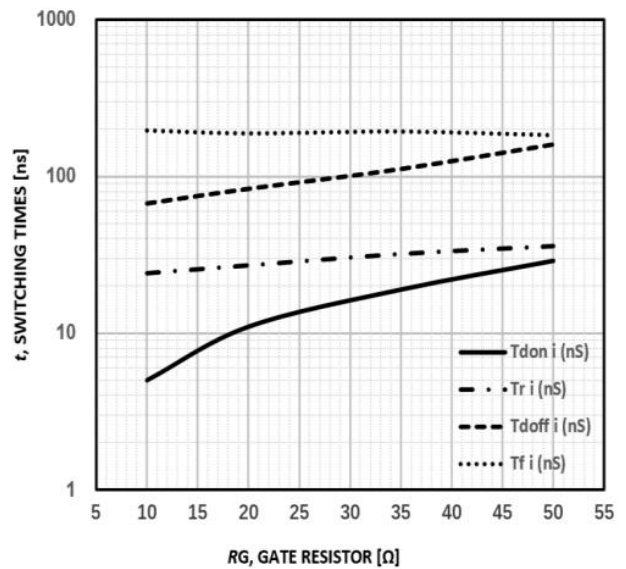


Figure16: typical switching time VS. Rg, TC=25°C,
L=500uH, VCE=400V, VGE=15V, IC=15A

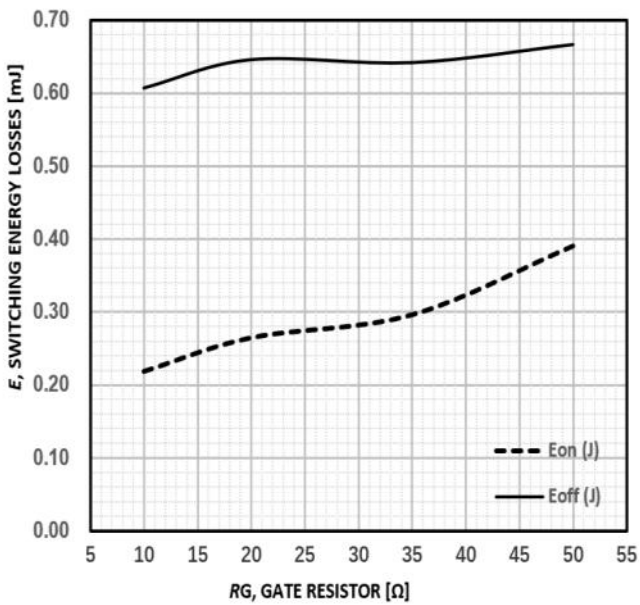


Figure17: typical energy loss VS. Rg,TC=125°C,
L=500uH, VCE=400V, VGE=15V ,IC=15A

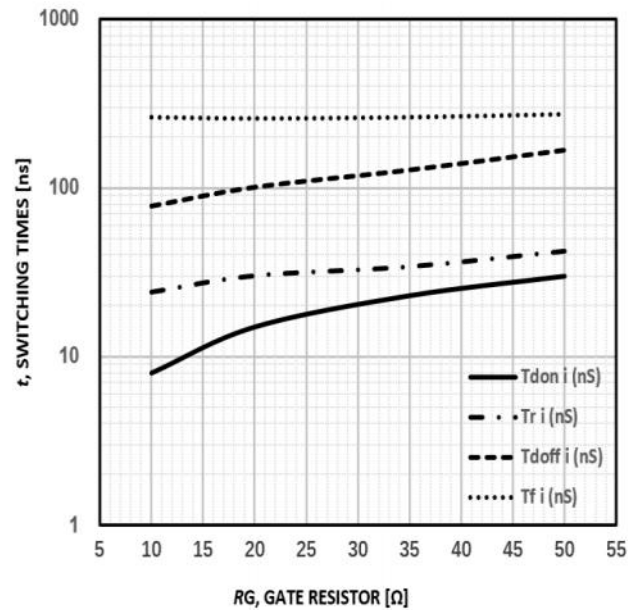


Figure17: typical switching time VS. Rg,TC=125°C,
L=500uH, VCE=400V, VGE=15V, IC=15A

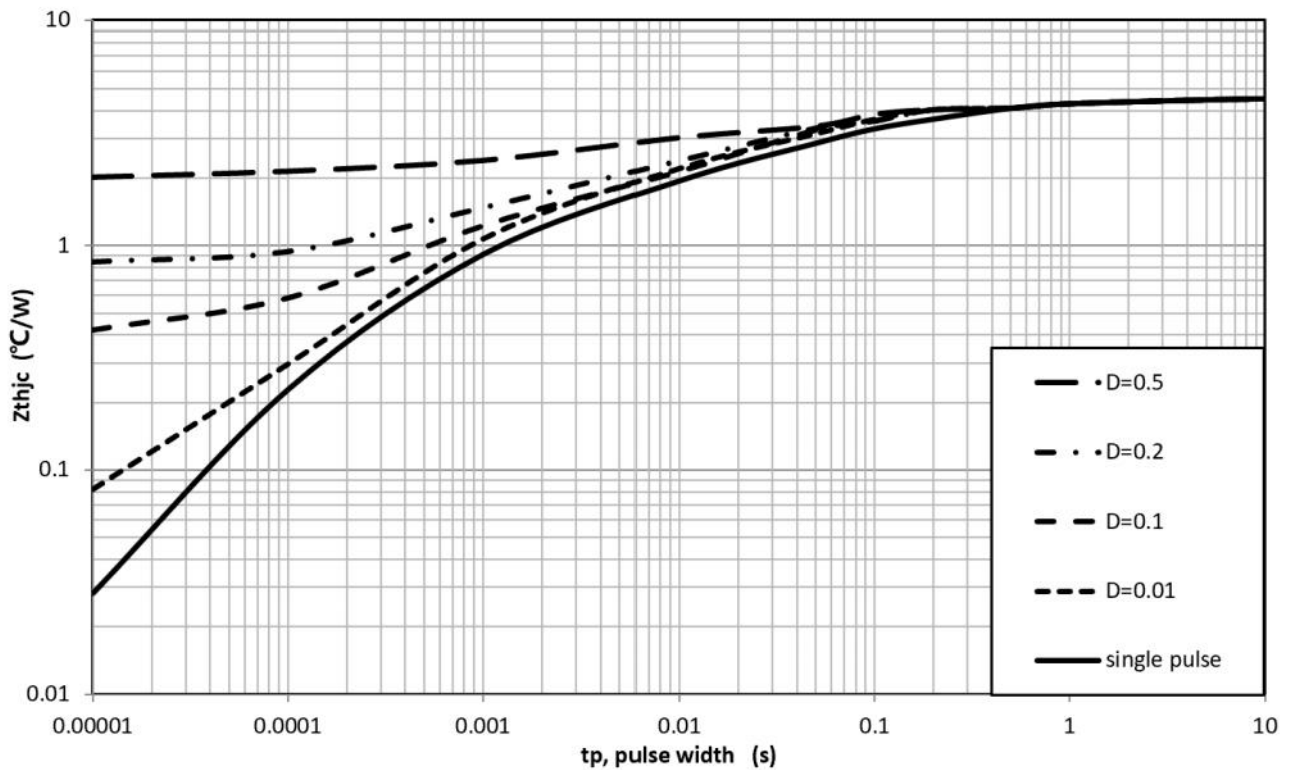
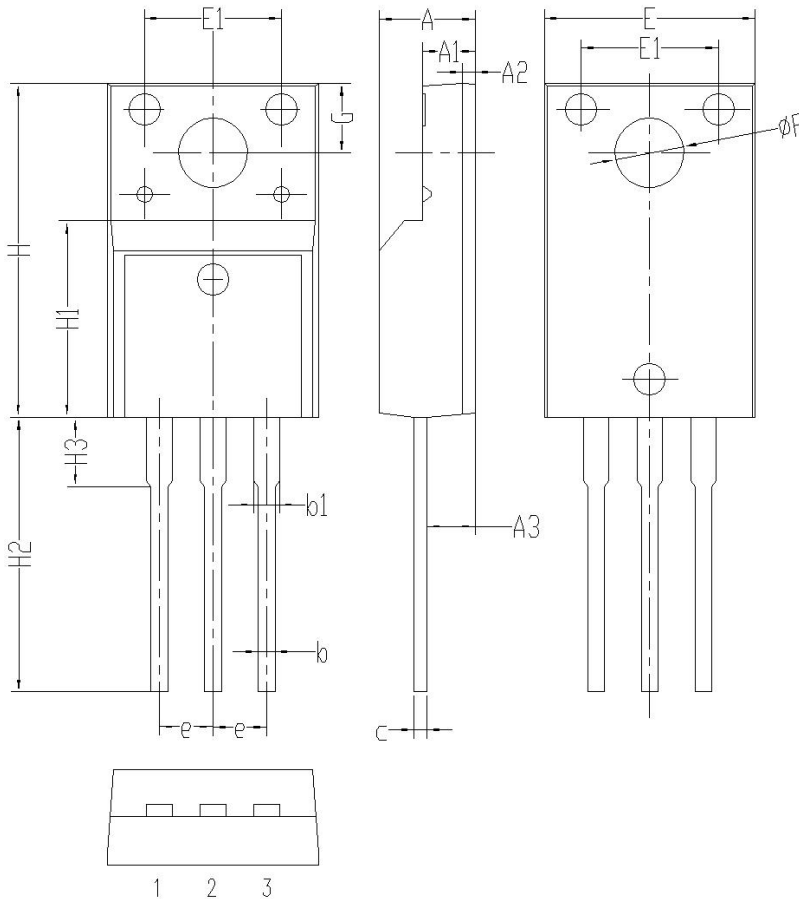


Figure11:normalized transient thermal impedance, junction-to-case

Package Information

TO-220F PACKAGE



	单位: mm		
	MIN	NOM	MAX
A	4.35	4.55	4.75
A 1	2.3	2.5	2.7
A 2	0.4	0.6	0.8
A 3	2.1	2.3	2.5
b	0.6	0.8	1.0
b 1	1.0	1.2	1.4
c	0.3	0.5	0.7
e	2.3	2.5	2.7
E	9.8	10	10.2
E 1	6.3	6.5	6.7
H	15.6	15.8	16.0
H 1	8.8	9	9.2
H 2	12.9	13.2	13.5
H 3	3.1	3.3	3.5
G	3.1	3.3	3.5
ΦP	3.1	3.3	3.5

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