

Silicon Trench NPT IGBT

Description

The THG20T65NQN is use advanced trench NPT technology.

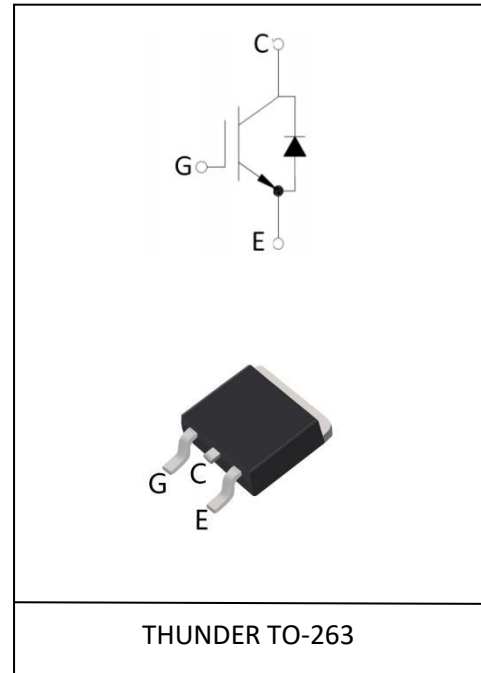
The 650V NPT Trench IGBT offers superior conduction and switching performances.

General Features

- High Speed Switching & Low Power Loss
- Low saturation voltage: $V_{CE(sat)} = 1.95V @ I_C = 20A$
- $E_{off} = 0.6mJ @ T_C = 25^{\circ}C$
- 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	40	A
	Collector Current @ $T_C=100^{\circ}C$	20	A
I_{CM}	Pulsed Collector Current	60	A
I_F	Diode Continuous Forward Current @ $T_C=100^{\circ}C$	20	A
I_{FM}	Pulsed Diode Forward Current	60	A
P_D	Total Dissipation at @ $T_C = 25^{\circ}C$	125	W
	Total Dissipation at @ $T_C = 100^{\circ}C$	62.5	
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 _{CES}	Collector-Emitter Voltage	V _{GE} =0V, I _{CE} =250μA		650	—	—	V
V _{CE(sat)}	Collector-Emitter Saturation Voltage	V _{GE} =15V, I _C =20A	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 _{CES}	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 =20A, 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 =20A V _{GE} =15V, R _G =10Ω		—	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
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	20	—	—	A
I _{FM}	Pulsed Diode Forward Current	T _C = 25°C	60	—	—	A
V _F	Diode Forward Voltage	I _F =20A	—	1.6	2.4	V
t _{rr}	Reverse Recovery Time	T _J =25°C, I _F =20A 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
$R_{\theta JC}$	Thermal Resistance,Junction to case for IGBT	--	1.2	$^{\circ}\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance,Junction to Ambient	--	59.5	$^{\circ}\text{C}/\text{W}$

Typical Performance Characteristics

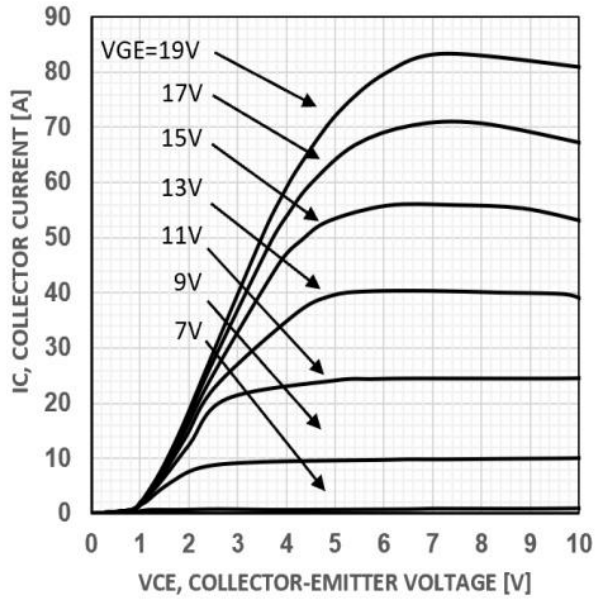


Figure1: typical IGBT output characteristics,
TC=25°C

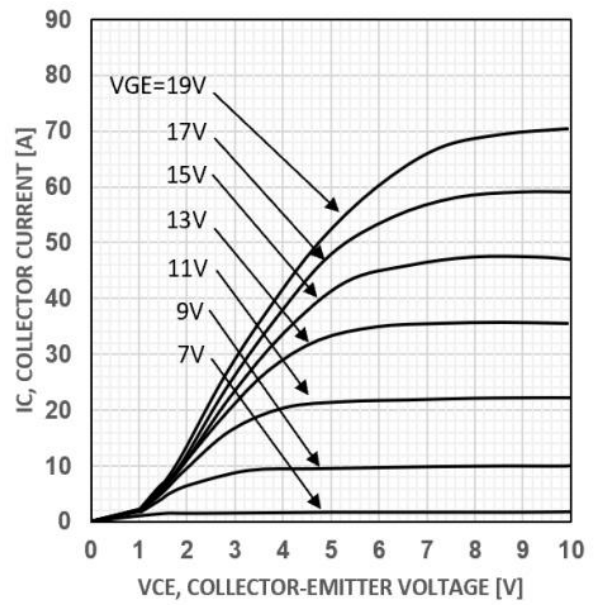


Figure2: typical IGBT output characteristics
TC=125°C

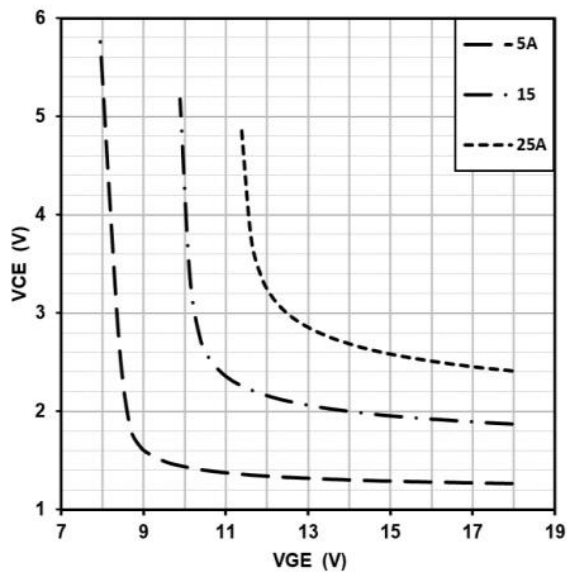


Figure3: typical VCE VS. VGE, TJ=25°C

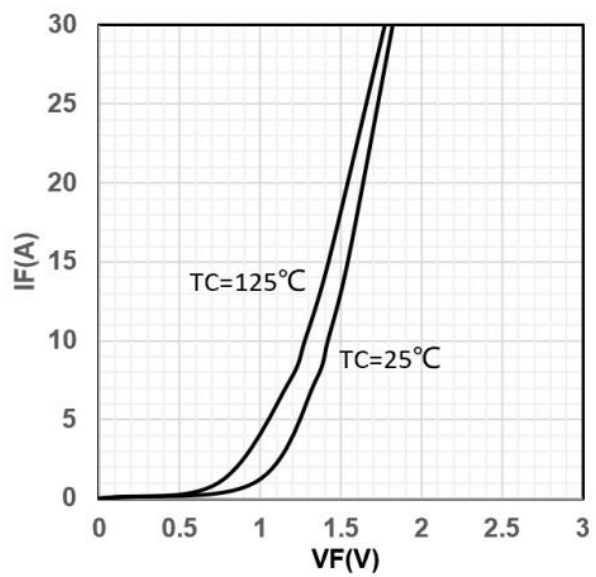


Figure4: typical diode forward characteristic

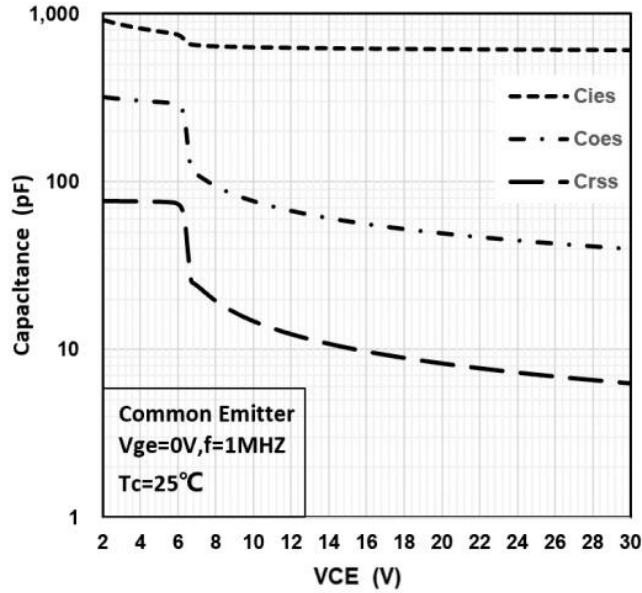


Figure 5: typical capacitance VS. VCE, VGE=0V, f=100kHz

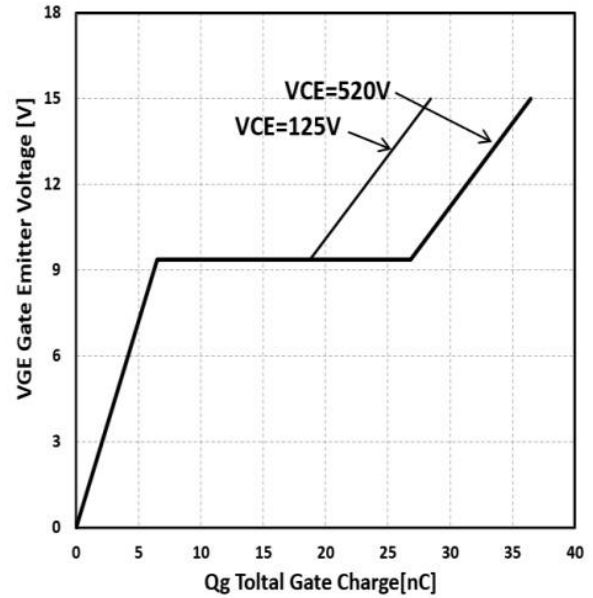


Figure 6 : typical gate charge VS. VGE, IC=15A

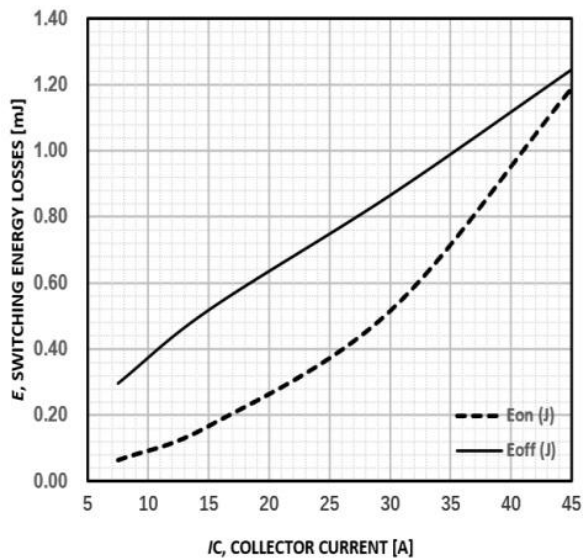


Figure 7 : typical energy loss VS. IC, TC=25°C,

L=500uH, VCE=400V, VGE=15V, Rg=10Ω

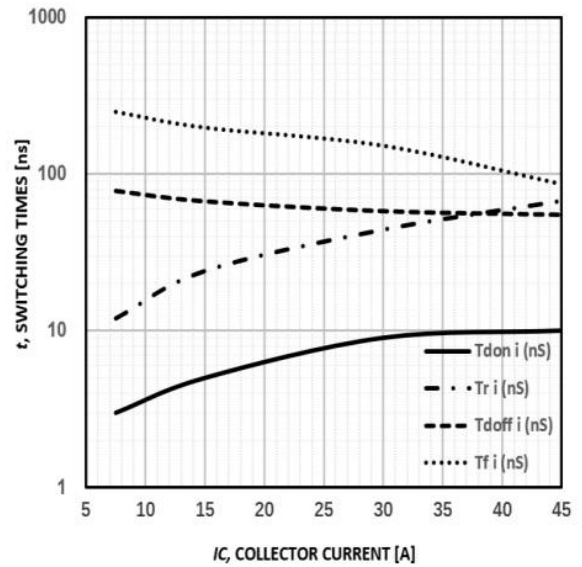


Figure 8 : typical switching time VS. IC, TC=25°C,

L=500uH, VCE=400V, VGE=15V, Rg=10Ω

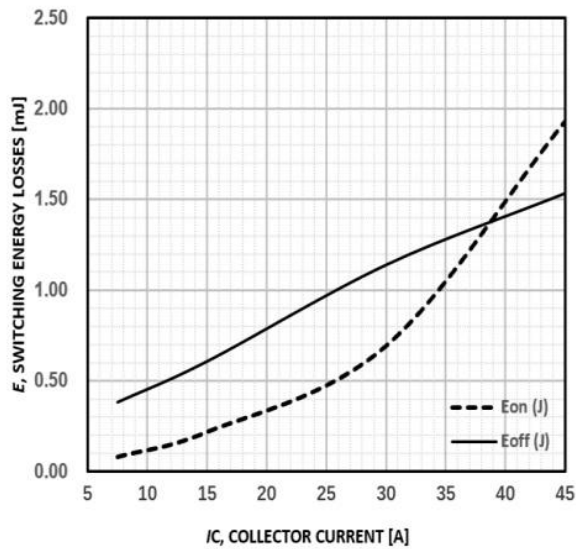


Figure 9 : typical energy loss VS. IC, TC=125°C,
L=500uH , VCE=400V,VGE=15V,Rg=10Ω

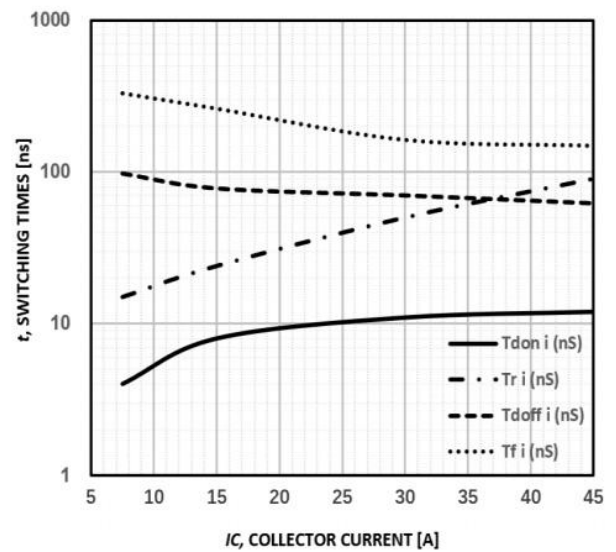


Figure10: typical switching time VS. IC, TC=125°C,
L=500uH, VCE=400V,VGE=15V,Rg=10Ω

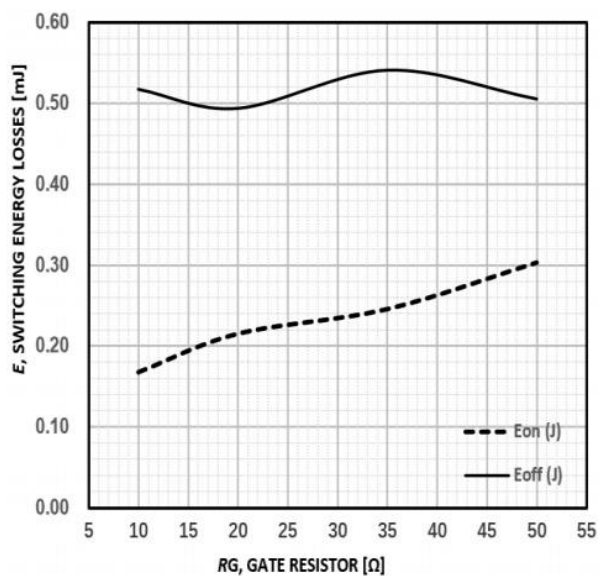


Figure11: typical energy loss VS. Rg,TC=25°C,
L=500uH, VCE=400V, VGE=15V, IC=15A

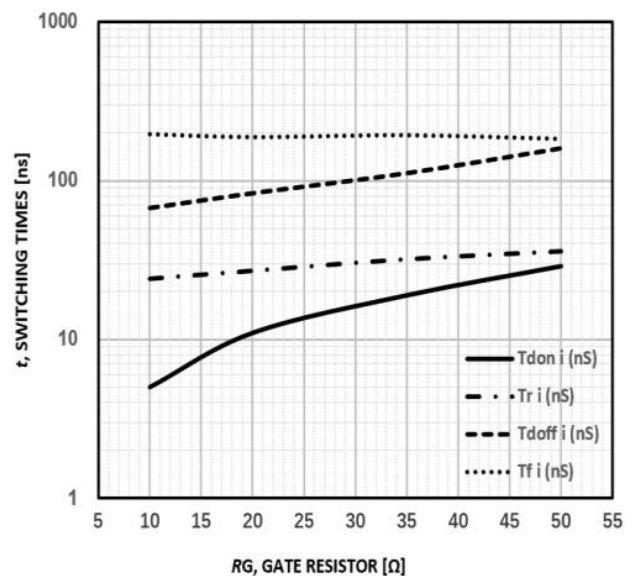


Figure12: typical switching time VS. Rg,TC=25°C,
L=500uH,VCE=400V,VGE=15V,IC=15A

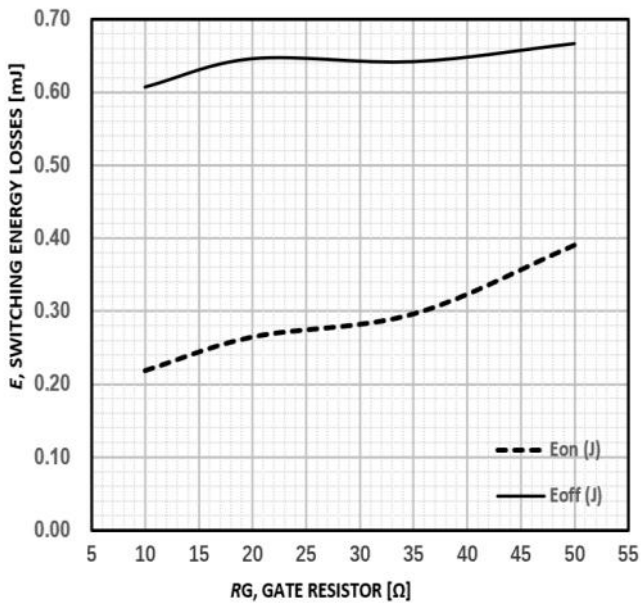


Figure13: typical energy loss VS. R_g, TC=125°C,
L=500uH, VCE=400V, VGE=15V, IC=15A

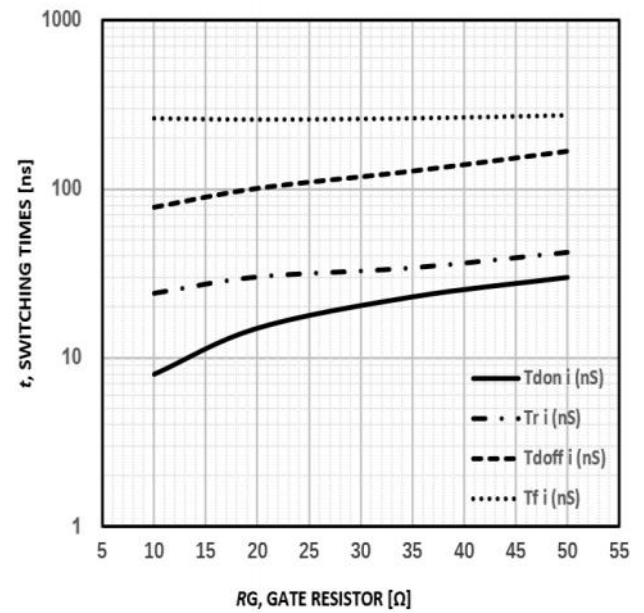


Figure14: typical switching time VS. R_g, TC=125°C,
L=500uH, VCE=400V, VGE=15V, IC=15A

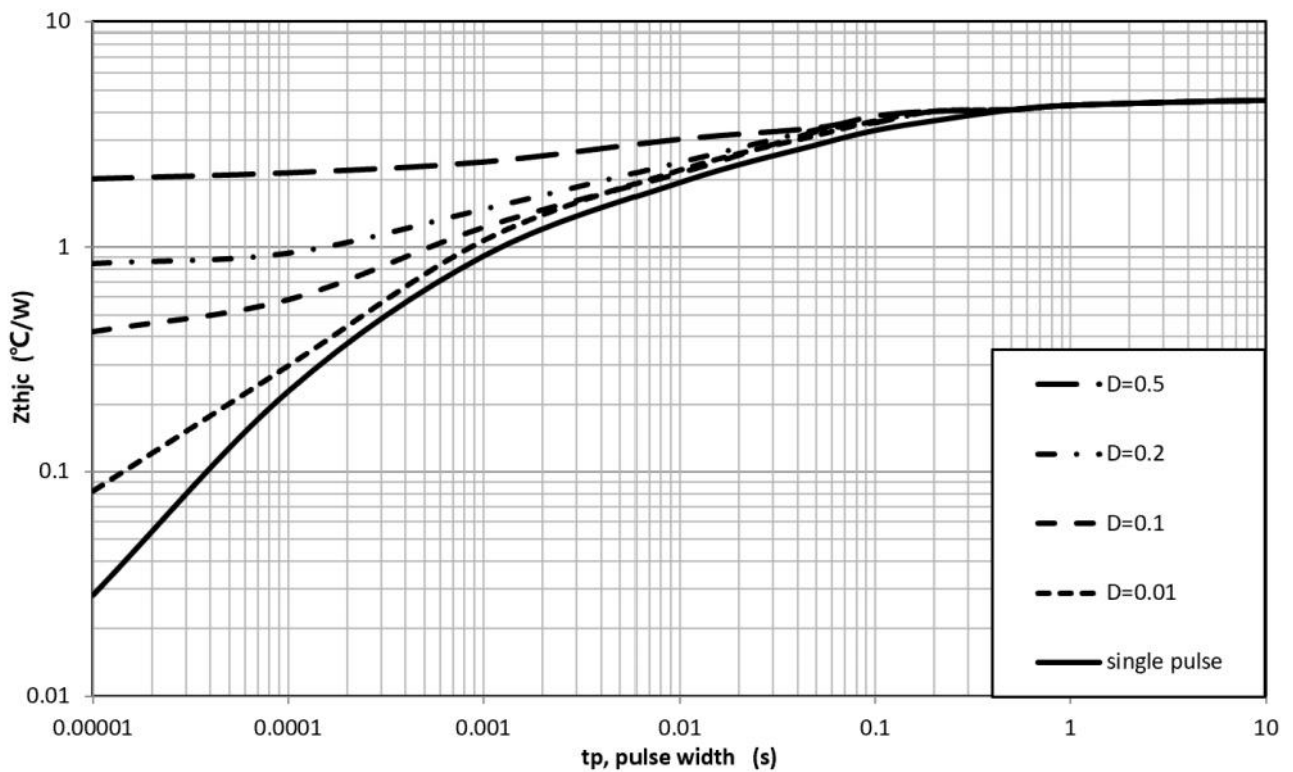
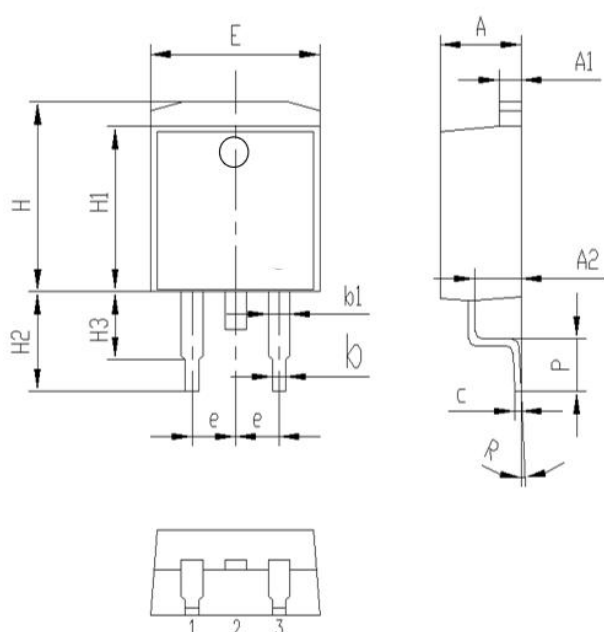


Figure15: normalized transient thermal impedance, junction-to-case

Package Information

TO-263 PACKAGE

基本尺寸



Symbol	单位 mm		
	Min	Nom	Max
A	4.40	4.6	4.80
A1	1.17	1.27	1.37
A2	2.40	2.6	2.80
b	0.60	0.8	1.00
b1	1.05	1.25	1.45
c	0.28	0.38	0.48
e	2.34	2.54	2.74
E	9.9	10.1	10.3
H	9.90	10.1	10.3
H1	8.50	8.7	8.90
H2	4.80	5.00	5.20
H3	2.60	2.8	3.00
R	0°	3°	6°
P	2.40	2.70	3.00

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