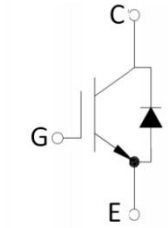
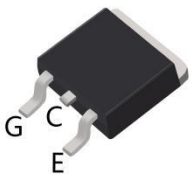
Thunder High Power Products

Silicon Trench NPT IGBT

Description

The THG20T65NQN is use advanced trench NPT technology.
The 650V NPT Trench IGBT offers superior conduction and switching performances.





THUNDER TO-263

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°C
- Maximum junction temperature 175°C

Application

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

Absolute Maximum Ratings @ Tc=25°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 @Tc=100°C	20	A
I_{CM}	Pulsed Collector Current	60	A
I_F	Diode Continuous Forward Current @Tc=100°C	20	A
I_{FM}	Pulsed Diode Forward Current	60	A
P_D	Total Dissipation at @Tc = 25°C	125	W
	Total Dissipation at @Tc = 100°C	62.5	
T_j	Operating Junction and Storage Temperature Range	-55 to +175	°C
T_L	Max Temperature For Soldering	260	°C
T_{SC}	Short circuit withstand time VGE=15V, VCC≤400V, Allowed number of short circuits<1000Time between short circuits:≥1.0s,Tj≤150°C	5	us

Electrical Characteristics @ Tc=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		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	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
$R_{\theta JC}$	Themal Resistance,Junction to case for IGBT	--	1.2	°C/W
$R_{\theta JA}$	Themal Resistance,Junction to Ambient	--	59.5	°C/W

Typical Performance Characteristics

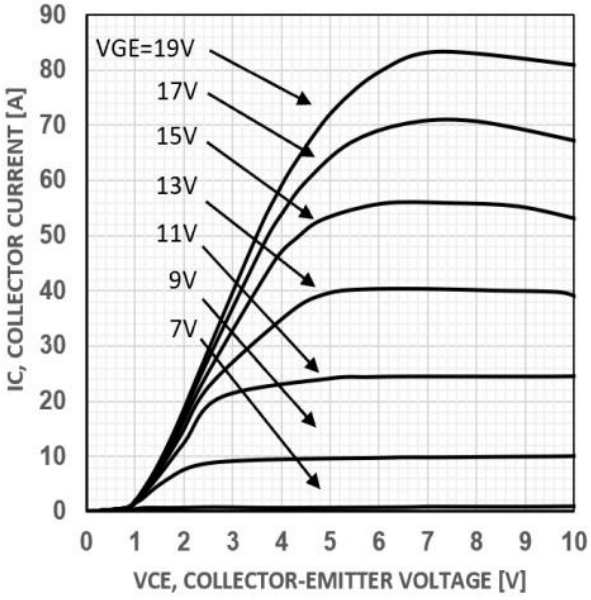


Figure1:typical IGBT output characteristics, TC=25℃

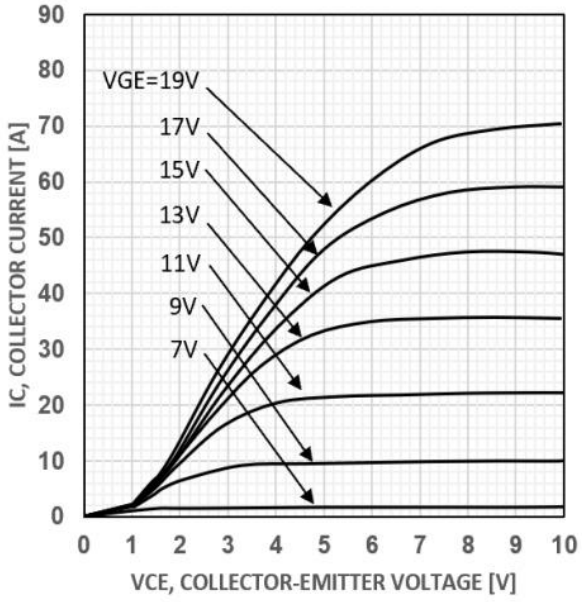


Figure2: typical IGBT output characteristics TC=125℃

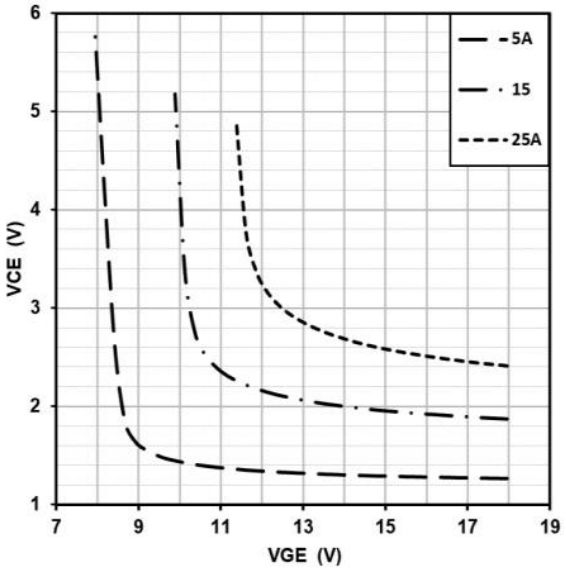


Figure3: typical VCE VS. VGE,TJ=25℃

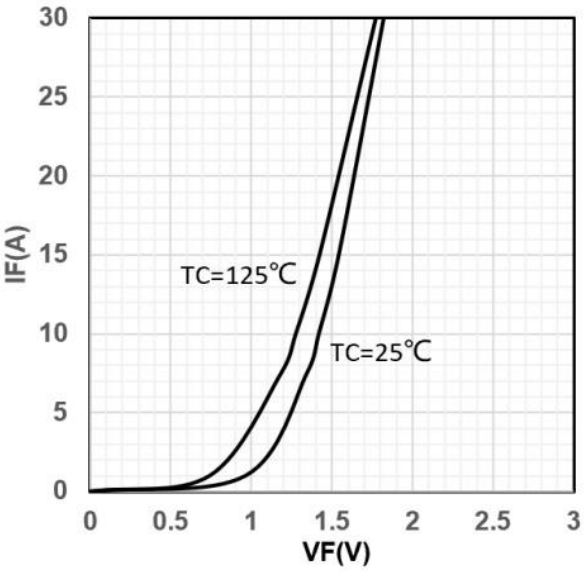


Figure4:typical diode forward characteristic

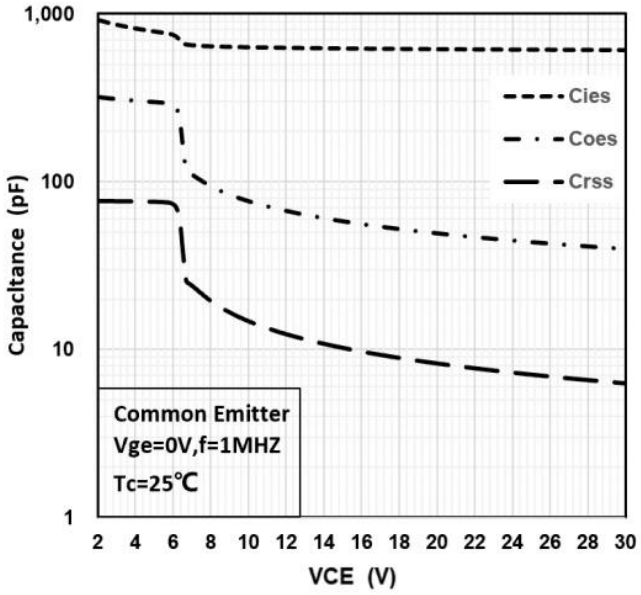


Figure5:typical capacitance VS. VCE,VGE=0V,f=100kHz

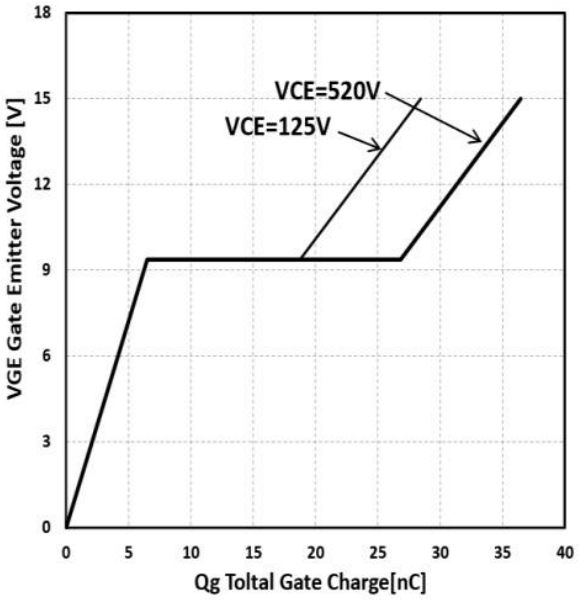


Figure 6 :typical gate charge VS. VGE,IC=15A

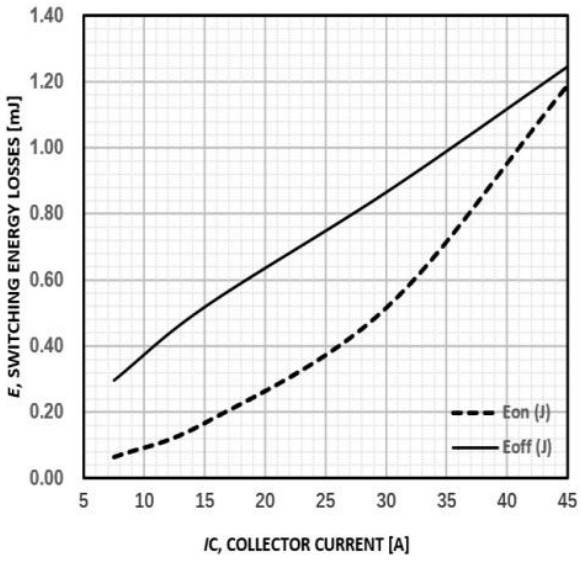


Figure 7 : typical energy loss VS. IC, TC=25℃,

L=500uH， VCE=400V,VGE=15V,Rg=10Ω

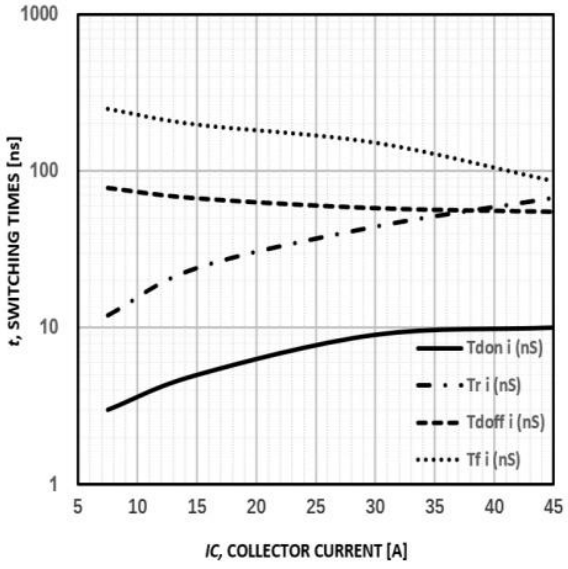


Figure 8 : typical switching time VS. IC, TC=25℃,

L=500uH, VCE=400V,VGE=15V,Rg=10Ω

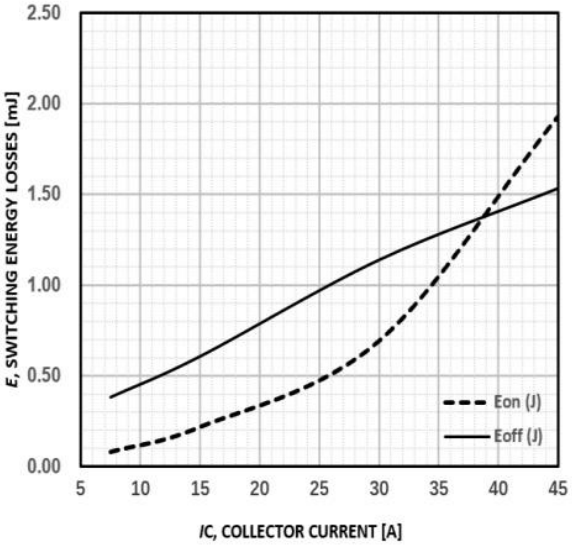


Figure 9 : typical energy loss VS. IC, TC=125℃,

L=500uH， VCE=400V,VGE=15V,Rg=10Ω

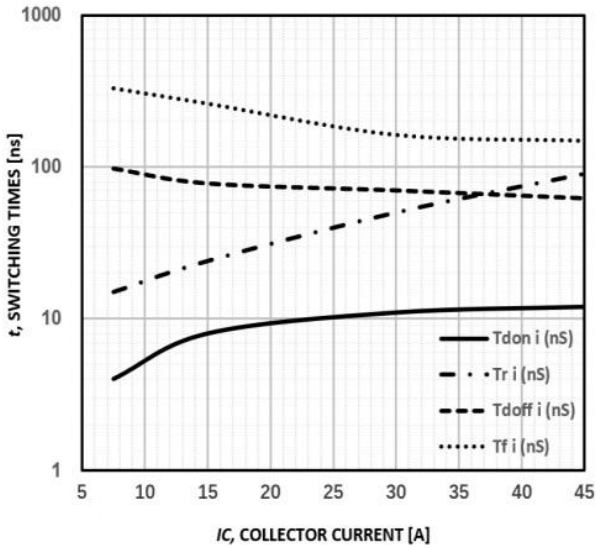


Figure10: typical switching time VS. IC, TC=125℃,

L=500uH, VCE=400V,VGE=15V,Rg=10Ω

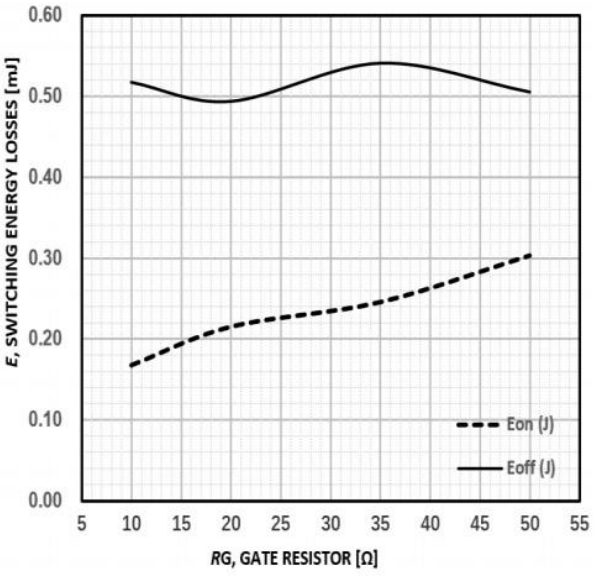


Figure11: typical energy loss VS. Rg,TC=25℃,

L=500uH, VCE=400V, VGE=15V ,IC=15A

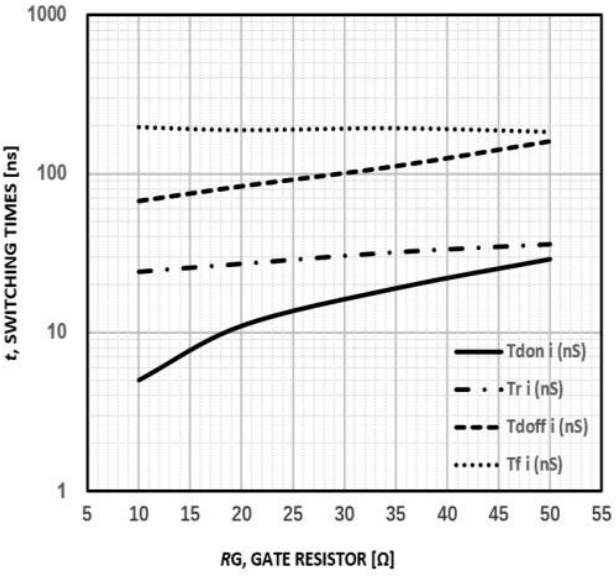


Figure12: typical switching time VS. Rg,TC=25℃,

L=500uH,VCE=400V,VGE=15V,IC=15A

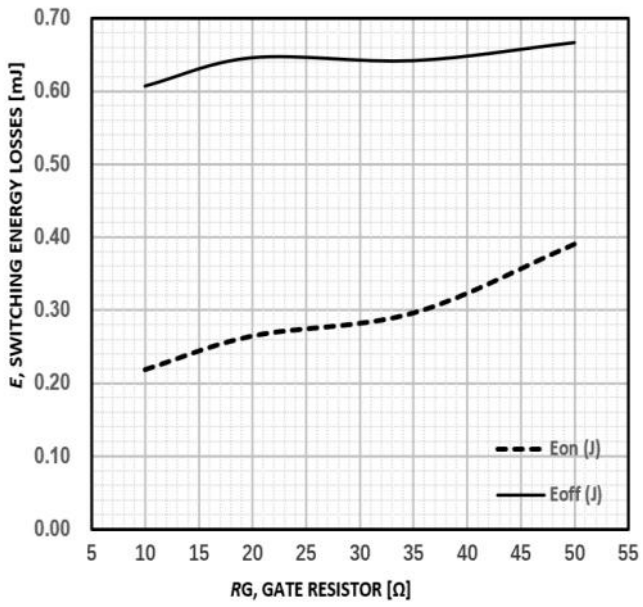


Figure13: typical energy loss VS. Rg,TC=125℃,
L=500uH, VCE=400V, VGE=15V ,IC=15A

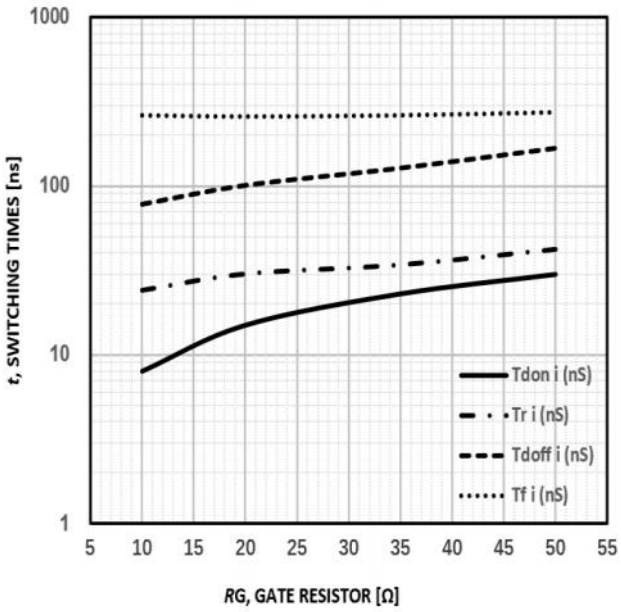


Figure14: typical switching time VS. Rg,TC=125℃,
L=500uH,VCE=400V,VGE=15V,IC=15A

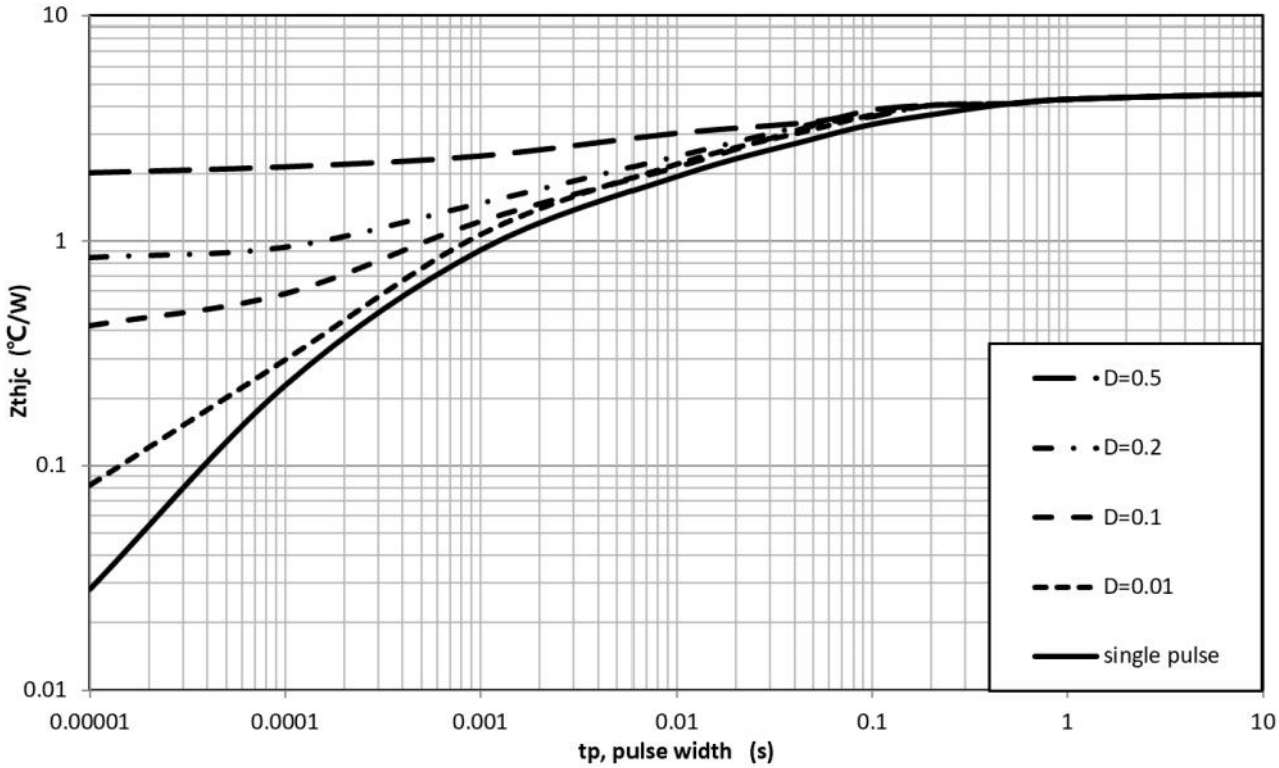
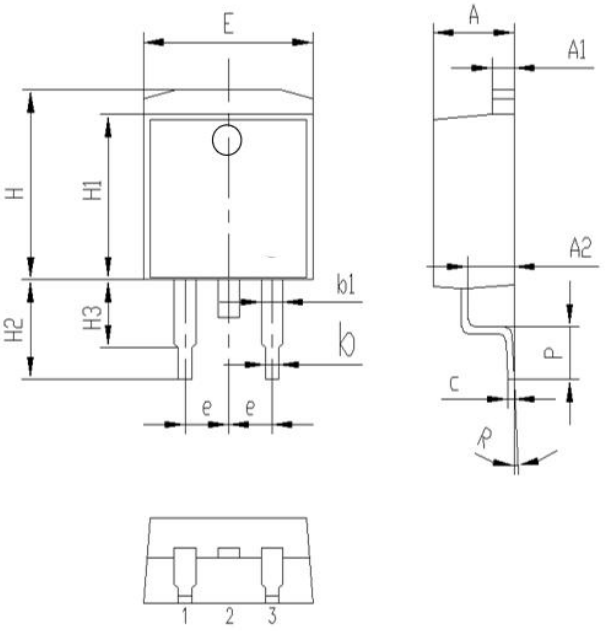


Figure15:normalized transient thermal impedance, junction-to-case

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

Notice

Thunder Microelectronics Incorporated Limited reserves the right to make changes without further notice to any products or specifications herein. When use the product, be sure to obtain the latest specification.

Thunder Microelectronics Incorporated Limited does not assume any liability arising out of the application or any product described herein. When using Thunder Microelectronics Incorporated Limited products in your equipment, you are requested to take adequate safety measures to prevent the equipment from causing a physical injury ,fire or other problem if any of the products become faulty.

-Headquarters

WuXi Thunder Microelectronics Incorporated Limited

Building E1-9, No.200 LingHu Road, XinWu district, WuXi, China 214135

Tel:+86-510-85160109 Fax:+86-510-85160109