

Silicon Trench NPT IGBT

Description

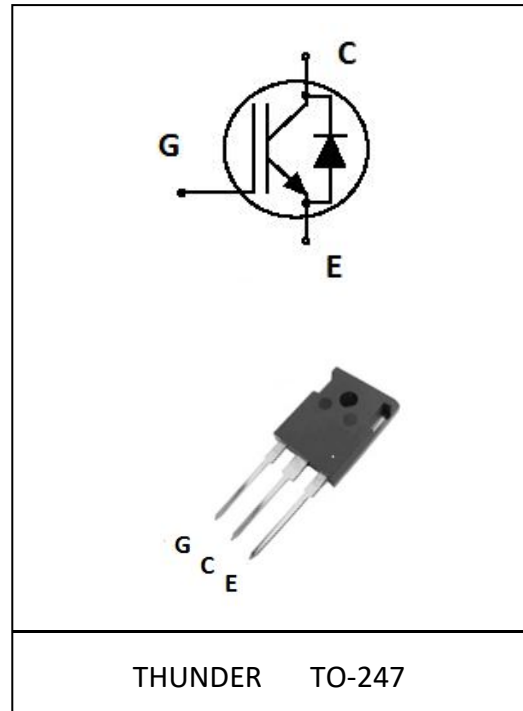
The THG20T65NBK is use advanced trench NPT technology and integrated with Free Wheeling. The 650V Trench NPT IGBT offers superior conduction and switching performances.

General Features

- 650V Breakdown Voltage
- Low saturation voltage: $V_{CE(sat),typ}=1.75V$
@ $I_C=20A$ and $T_C=25^\circ C$
- Trench NPT Technology, Positive temperature coefficient

Application

- Driver Converters
- Welding Converters
- UPS



Electrical Characteristics @ $T_c=25^\circ C$ (unless otherwise specified)

a) Limited Parameters:

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
P_D	Diode Maximum Forward Current	60	A
	Total Dissipation at $T_a=25^\circ C$	175	W
	Total Dissipation at @ $T_c=100^\circ C$	59	
T_j	Operating Junction and Storage Temperature Range	-55 to +175	$^\circ C$
T_L	Max Temperature For Soldering	265	$^\circ C$

b) Electrical Parameters:

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_{CES}	Collector-Emitter Voltage	$V_{GE}=0V, I_{CE}=250\mu A$	650			V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$V_{GE}=15V, I_C=20A$		1.75	2.3	V
$V_{GE(th)}$	Gated Threshold Voltage	$V_{CE}=V_{GE}, I_C=1mA$	4.8	5.7	6.6	V
I_{CES}	Collector-Emitter Leakage Current	$V_{GE}=0V, V_{CE}=650V$			5.0	μA
$I_{GES(F)}$	Gate to Emitter Forward Leakage	$V_{GE}=+20V,$			250	nA
$I_{GES(R)}$	Gate to Emitter Reverse Leakage	$V_{GE}=-20V,$			-250	nA
C_{ies}	Input Capacitance	$V_{GE}=0V,$ $V_{CE}=30V,$ $f=1.0MHz$		2370		pF
C_{oes}	Output Capacitance			59		pF
C_{res}	Reverse Transfer Capacitance			43		pF
Q_g	Total Gate Charge	$V_{CE}=480V$		142		nC
Q_{ge}	Gate to Emitter Charge	$I_C=20A$		23		nC
Q_{gc}	Gate to Collector Charge	$V_{GE}=15V$		75		nC

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
$t_{d(on)}$	Turn-on Delay Time	$V_{CE}=400V, I_C=20A$ $V_{GE}=15V, R_G=10\Omega$		34		nS
t_r	Rise Time			36		nS
$t_{d(off)}$	Turn-off Delay Time			198		nS
t_f	Fall Time			75		nS

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
I_F	Diode Continuous Forward Current	$TC=100^\circ C$	20			A
I_{FM}	Diode Maximum Forward Current	$TC=100^\circ C$	60			A
V_F	Diode Forward Voltage	$I_F=30A$		1.8	2.4	V

Symbol	Parameter	Typ	MAX	Units
$R_{\theta JC}$	Thermal Resistance, Junction to case for IGBT	--	0.6	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	--	40	$^\circ C/W$

Typical Performance Characteristics

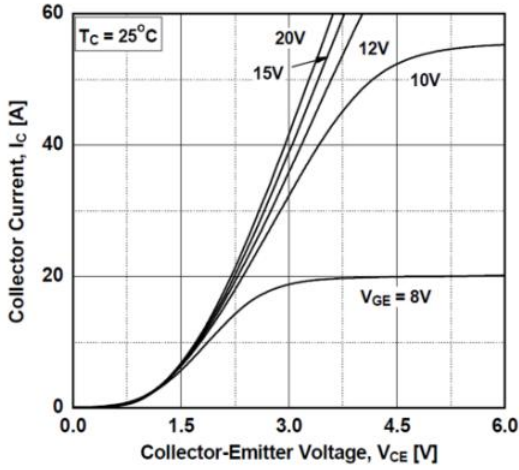


Fig 1. Output characteristics

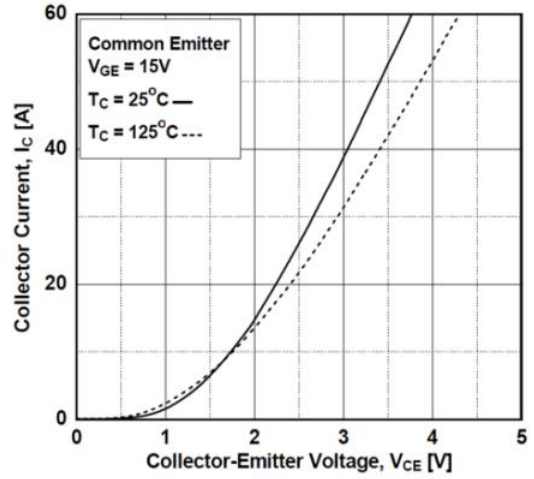


Fig 2. Typical Saturation Voltage Characteristics

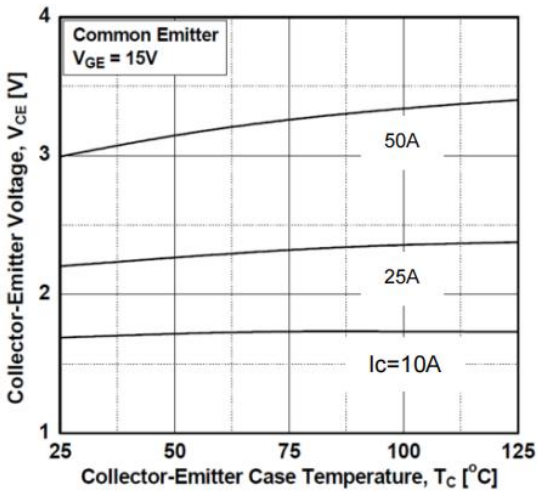


Figure 3. Saturation Voltage vs. Case Temperature at Variant Current Level

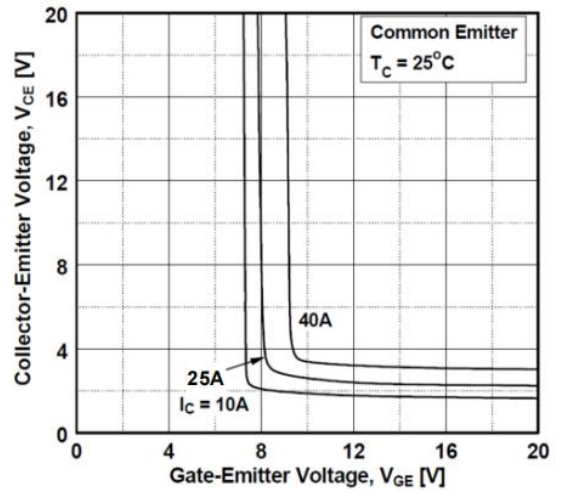


Figure 4. Saturation Voltage vs. V_{GE}

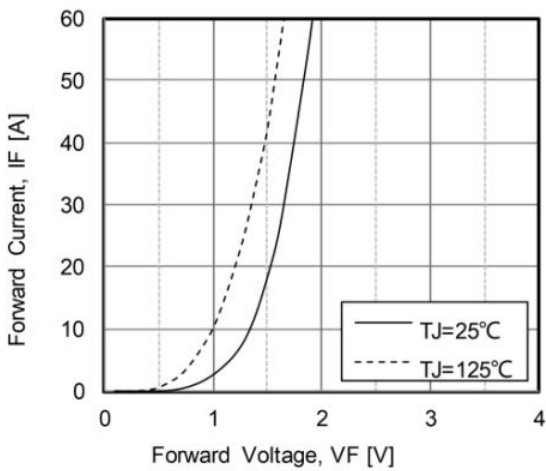


Figure 5. Forward Characteristics

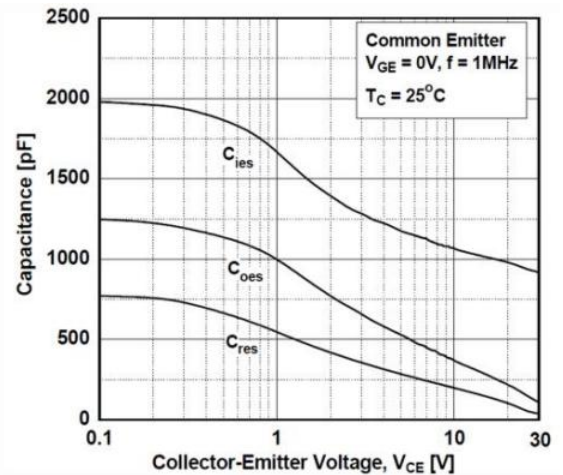


Figure 6. Capacitance Characteristics

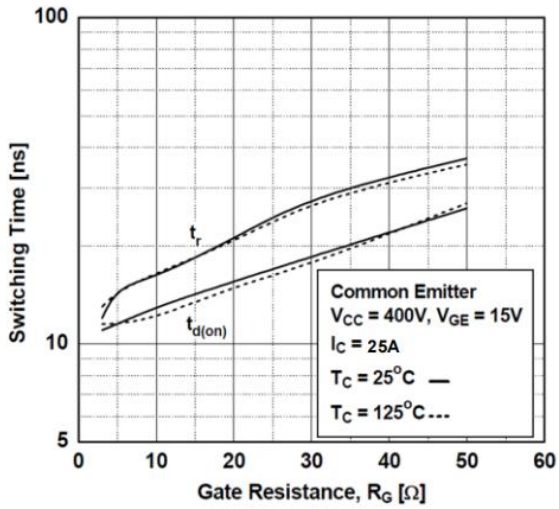


Figure 7. Turn-On Characteristics vs. Gate Resistance

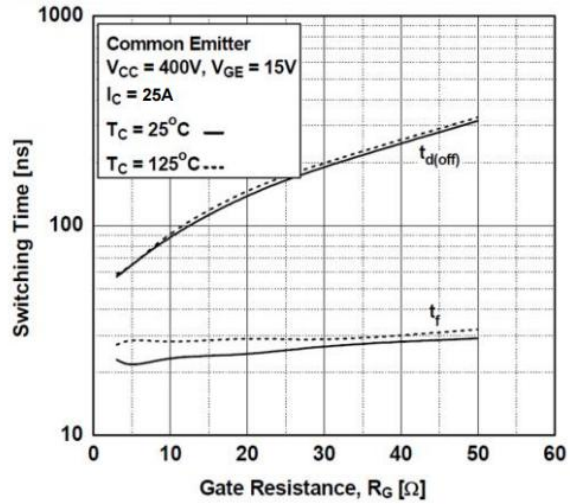


Figure 8. Turn-Off Characteristics vs. Gate Resistance

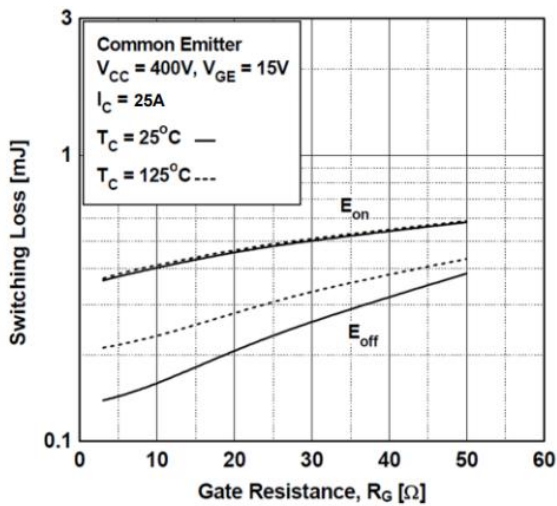


Figure 9. Switching Loss vs. Gate Resistance

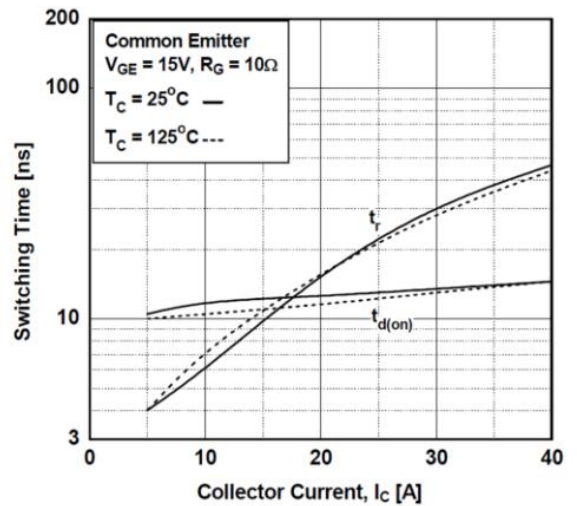


Figure 10. Turn-On Characteristics vs. Collector Current

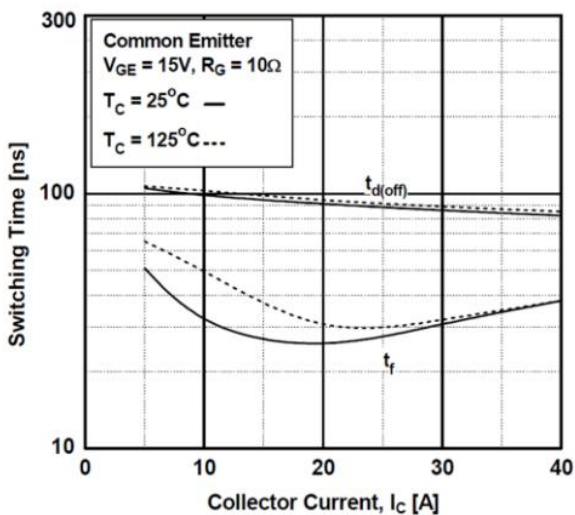


Figure 11. Turn-Off Characteristics vs. Collector Current

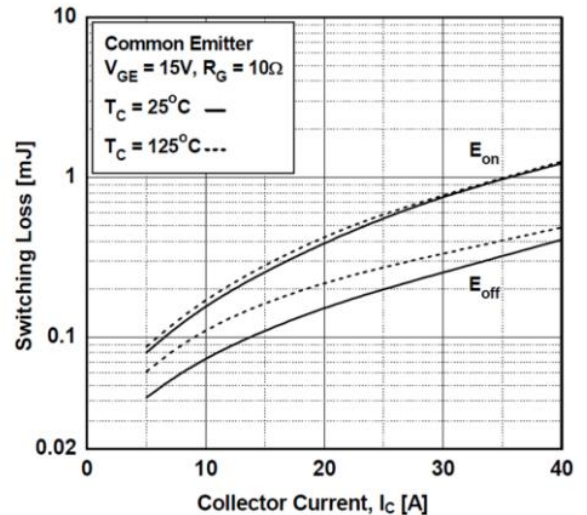


Figure 12. Switching Loss vs. Collector Current

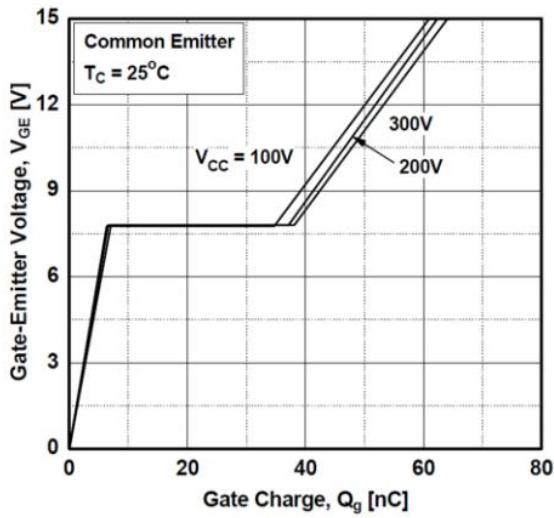


Figure 13. Gate Charge Characteristics

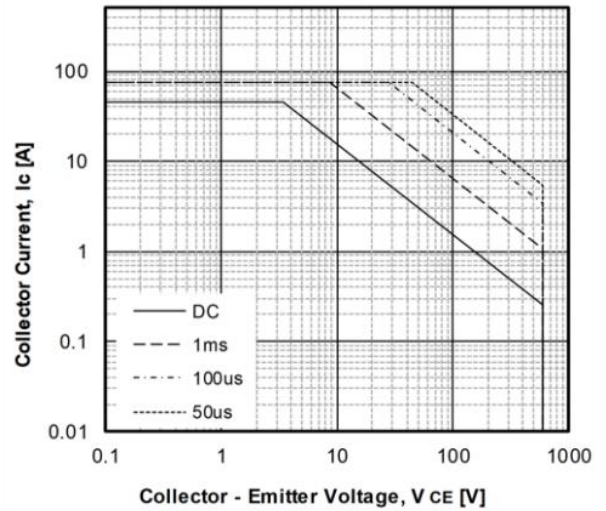


Figure 14. SOA Characteristics

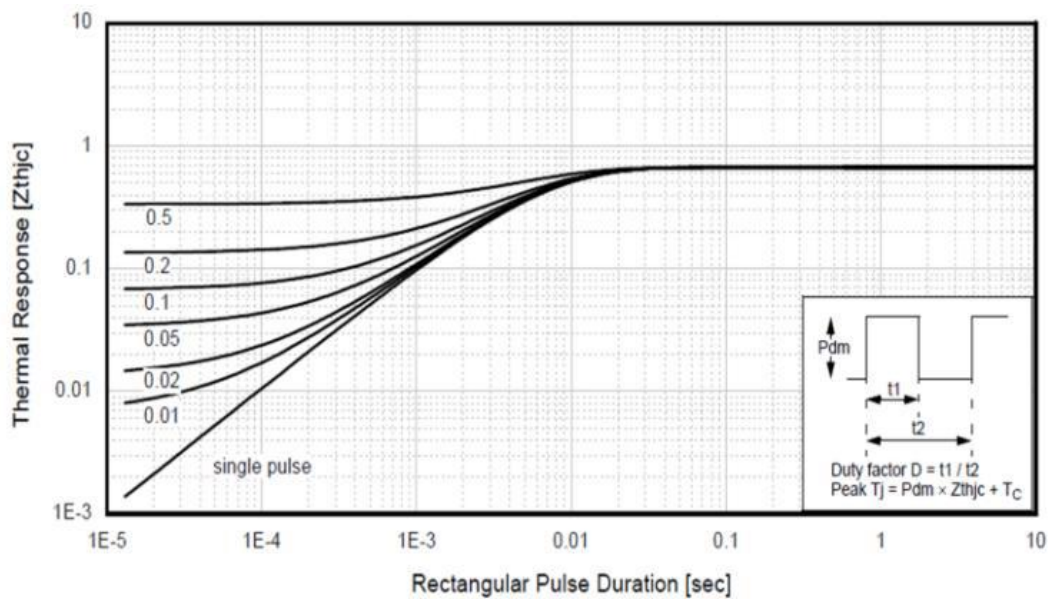
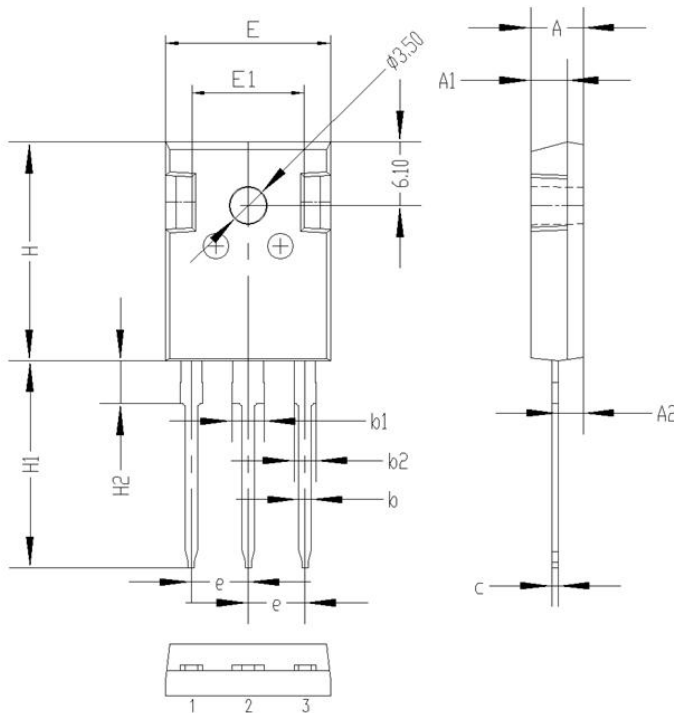


Figure 15. Transient Thermal Impedance of IGBT

Package Information

TO-247 PACKAGE



Symbol	Dimensions(millimeters)	
	Min.	Max.
A	4.80	5.20
A1	3.30	3.70
A2	2.10	2.50
b	1.00	1.40
b1	2.90	3.30
b2	1.90	2.30
c	0.40	0.80
e	5.25	5.65
E	15.6	16.0
E1	10.6	11.00
H	20.8	21.2
H1	19.4	20.4
H2	3.90	4.30
G	5.90	6.30
ΦP	3.30	3.70

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