

Insulated Gate Bipolar Transistor

General Description:

Using DongHai's proprietary Trench design and advanced FS technology, the 650V FS IGBT offers superior conduction and switching performances, high avalanche ruggedness and easy parallel operation.


Features:

- FS Trench Technology, Positive temperature coefficient
- Low saturation voltage: $V_{CE(sat)}$, typ = 1.9V
@ $I_C = 20A$ and $T_C = 25^\circ C$
- Extremely enhanced avalanche capability

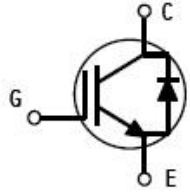
Applications:

Motor Control、PFC、UPS...

V_{CES}	650	V
I_C	20	A
P_{tot} ($T_C=25^\circ C$)	96	W
$V_{CE(SAT)}$	1.9	V



TO-220F



Absolute Maximum Ratings ($T_C = 25^\circ C$ unless otherwise specified):

Symbol	Parameter	Rating	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}^{a1}	Pulsed Collector Current	60	A
I_F	Diode Continuous Forward Current @ $T_C = 100^\circ C$	20	A
I_{FM}	Diode Maximum Forward Current	60	A
P_D	Power Dissipation @ $T_C = 25^\circ C$	96	W
T_J, T_{stg}	Operating Junction and Storage Temperature Range	-55 to +150	$^\circ C$
T_L	Maximum Temperature for Soldering	270L	$^\circ C$

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Thermal Resistance, Junction to case for IGBT	--	4.8	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance, Junction to case for Diode	--	6.9	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	--	62.5	$^\circ C/W$

Electrical Characteristics of the IGBT (Tc= 25°C unless otherwise specified):

OFF Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
BV_{CES}	Collector-Emitter Breakdown Voltage	$V_{GE}=0V, I_{CE}=250\mu A$	650	--	--	V
I_{CES}	Collector-Emitter Leakage Current	$V_{GE}=0V$ $V_{CE}=650V$	--	--	1.0	mA
$I_{GES(F)}$	Gate to Emitter Forward Leakage	$V_{GE}=+20V$	--	--	+250	nA
$I_{GES(R)}$	Gate to Source Reverse Leakage	$V_{GE}=-20V$	--	--	-250	nA

ON Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=20A, V_{GE}=15V$	--	1.9	2.4	V
$V_{GE(TH)}$	Gate Threshold Voltage	$I_C=250\mu A, V_{CE}=V_{GE}$	4.5	5.7	7	V

Pulse width $t_p \leq 300\mu s, \delta \leq 2\%$

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
C_{ies}	Input Capacitance	$V_{CE}=25V, V_{GE}=0V$ $f=1MHz$	--	1095	--	pF
C_{oes}	Output Capacitance		--	60	--	
C_{res}	Reverse Transfer Capacitance		--	32	--	

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$V_{CE}=400V, I_C=15A$ $V_{GE}=15V, R_g=10\Omega$ Inductive Load , $T_a=25^\circ C$	--	30	--	ns
t_r	Rise Time		--	30	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	45	--	
t_f	Fall Time		--	34	--	
E_{on}	Turn-On Switching Loss		--	0.6	--	mJ
E_{off}	Turn-Off Switching Loss		--	0.19	--	
E_{ts}	Total Switching Loss		--	0.79	--	
Q_g	Total Gate Charge	$V_{CE}=400V, I_C=15A$ $V_{GE}=15V$	--	59	--	nC

Electrical Characteristics of the DIODE (Tc= 25°C unless otherwise specified):

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
V _{FM}	Diode Forward Voltage	I _F =10A	--	1.4	--	V
T _{rr}	Reverse Recovery Time	I _F =10A di/dt=100A/uS	--	47	--	ns
I _{rr}	Diode Peak Reverse Recovery Current		--	7.5	--	A
Q _{rr}	Reverse Recovery Charge		--	176	--	nC
Pulse width t _p ≤300μs,δ≤2%						

^{a1}: Repetitive rating; pulse width limited by maximum junction temperature

Characteristics Curve

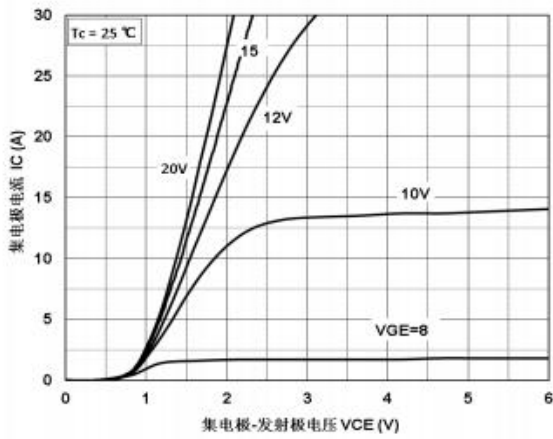


图 1. 输出特性

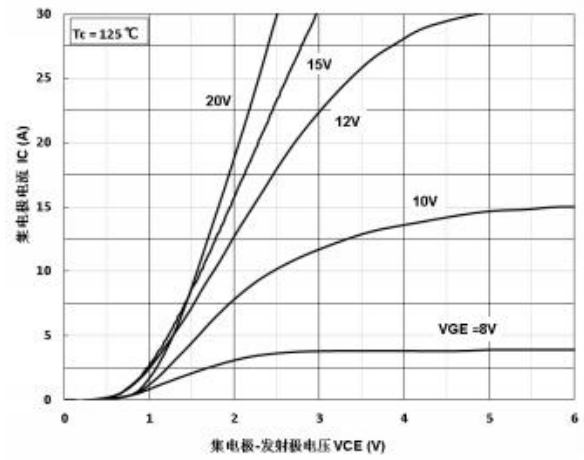


图 2. 输出特性

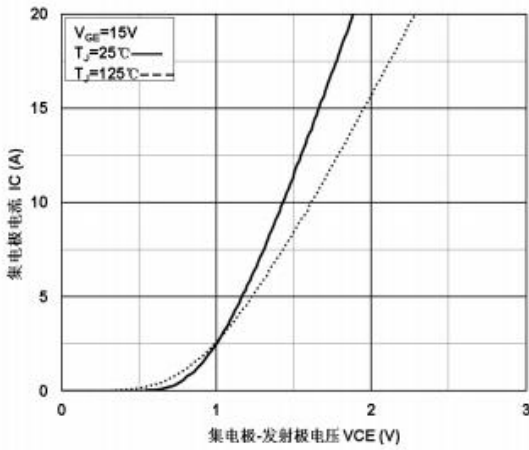


图 3. 饱和压降特性

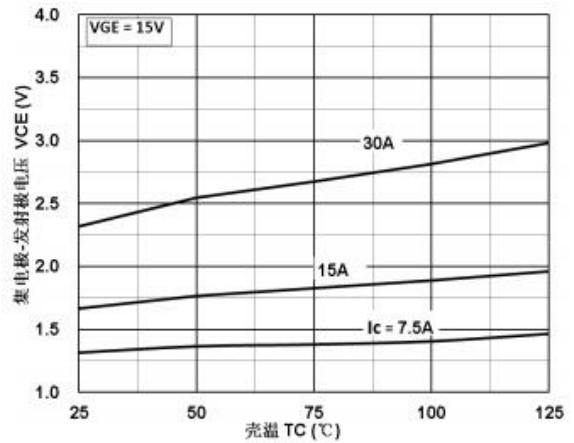


图 4. 饱和压降—温度特性

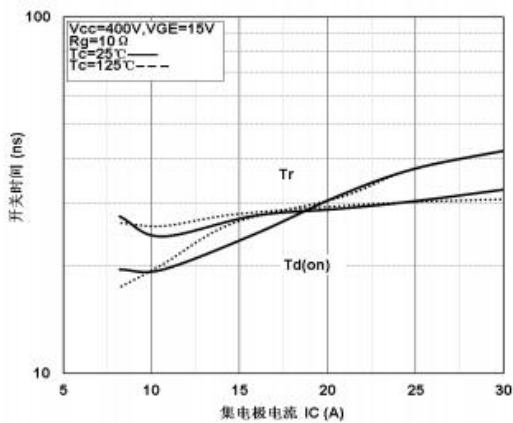


图 5. 开通时间— I_C 特性

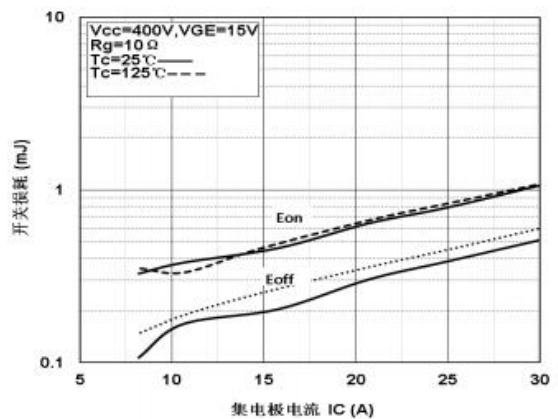


图 6. 开关损耗— I_C 特性

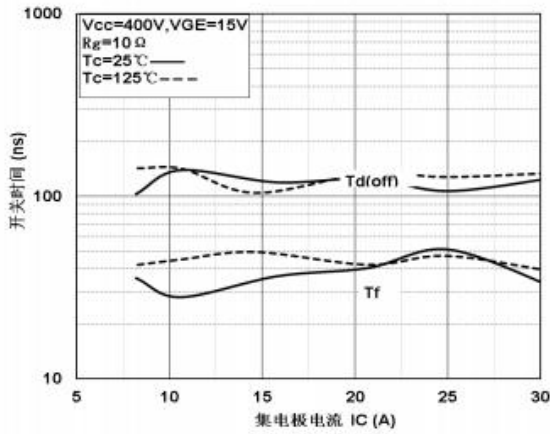


图 7. 关断时间— I_c 特性

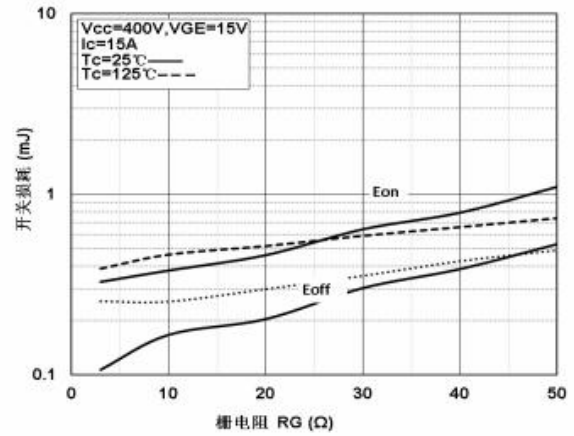


图 8. 开关损耗— R_g 特性

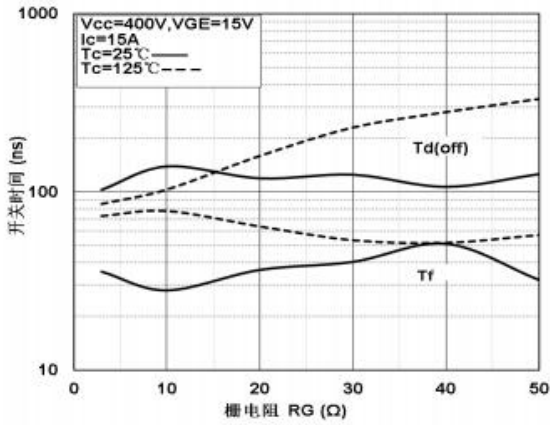


图 9. 开通时间— R_g 特性

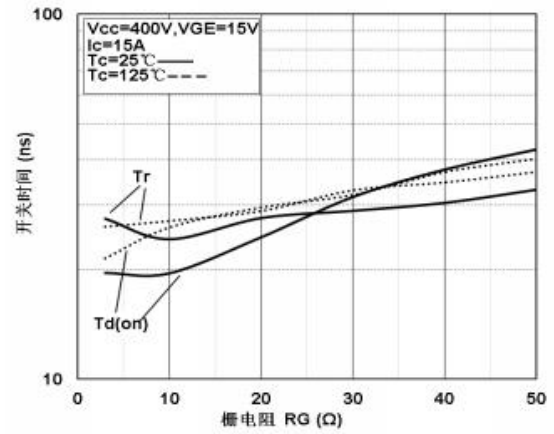


图 10. 关断时间— R_g 特性

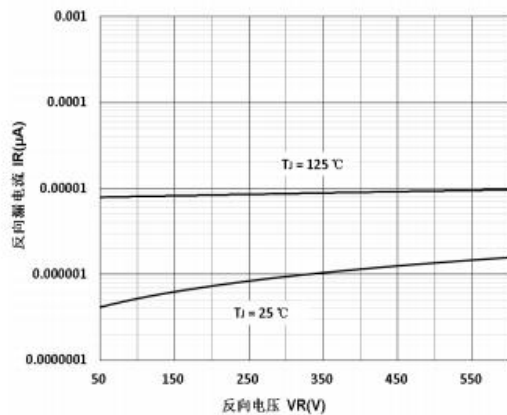


图 11. 二极管的反向漏电特性

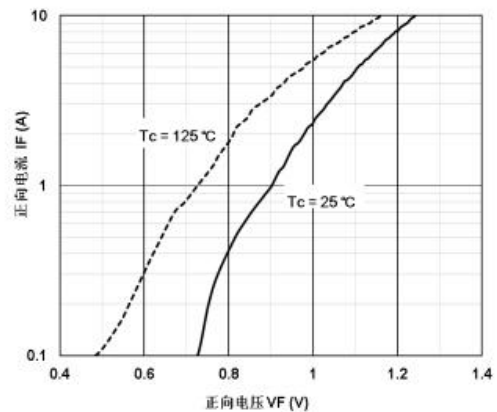


图 12. 二极管的正向压降特性

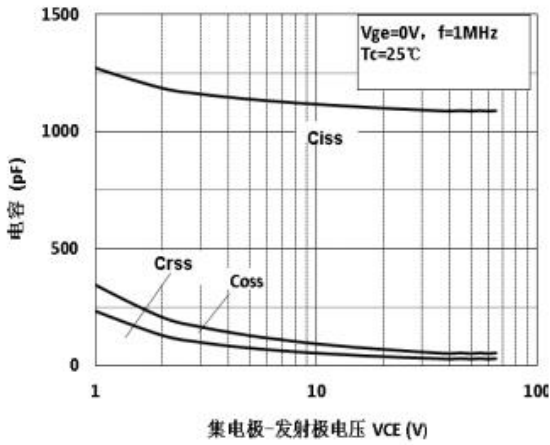


图 13. 电容特性

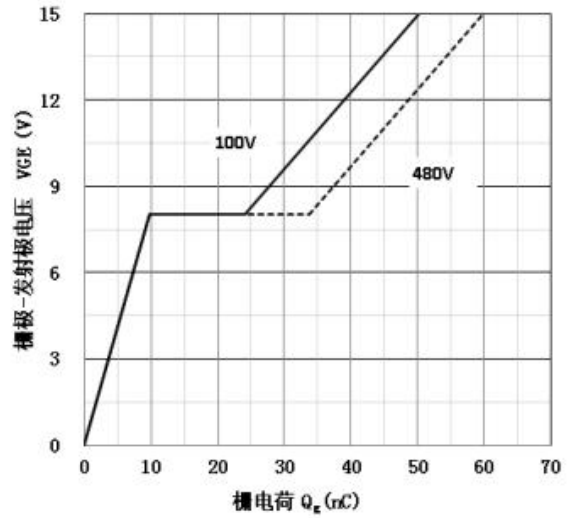


图 14. 栅电荷特性

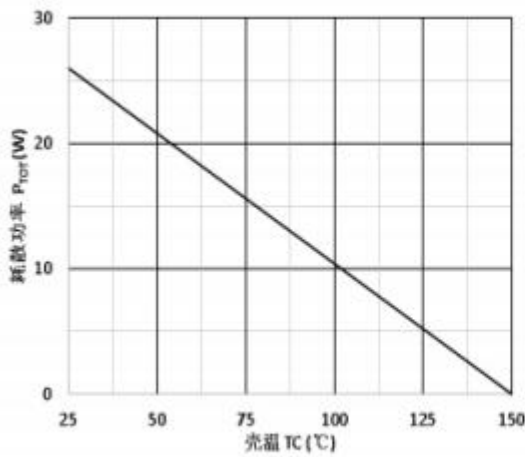


图 15. 耗散功率-壳温 Tc 特性 (T0-220F)

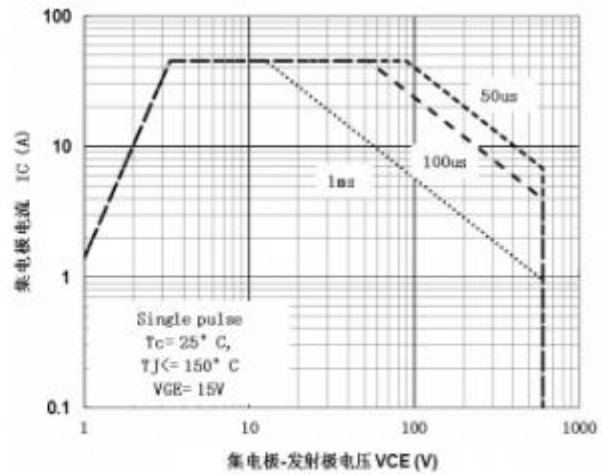


图 16. 安全工作区 (T0-220F)

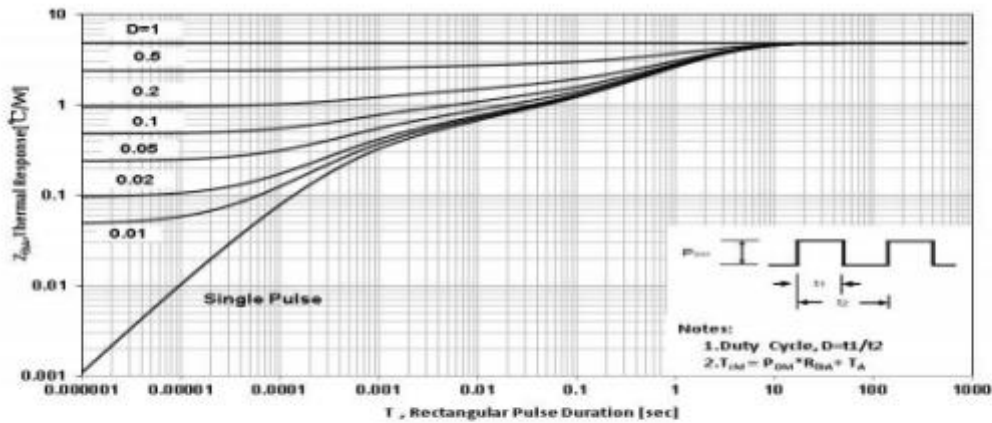
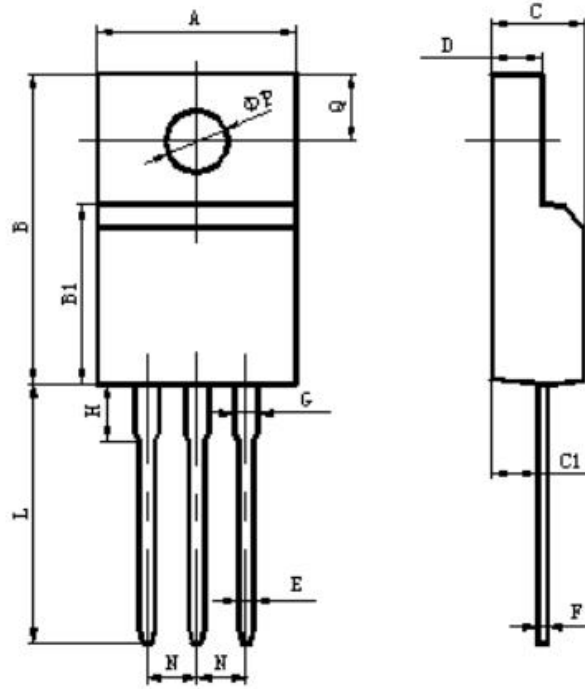


图 17. IGBT 瞬态热阻特性 (T0-220F)

外形图 (TO-220F):



Items	Values(mm)	
	MIN	MAX
	A	9.60
B	15.4	16.2
B1	8.90	9.50
C	4.30	4.90
C1	2.10	3.00
D	2.40	3.00
E	0.60	1.00
F	0.30	0.60
G	1.12	1.42
H	3.40	3.80
	1.60	2.90
L*	12.0	14.0
N	2.34	2.74
Q	3.15	3.55
ϕP	2.90	3.30

