160A 650V Half bridge module

1 Description

These Insulated Gate Bipolar Transistor used advanced trench and Fieldstop technology design, provided excellent V_{CEsat} and switching speed ,low gate charge. Which accords with the RoHS standard.

2 Features

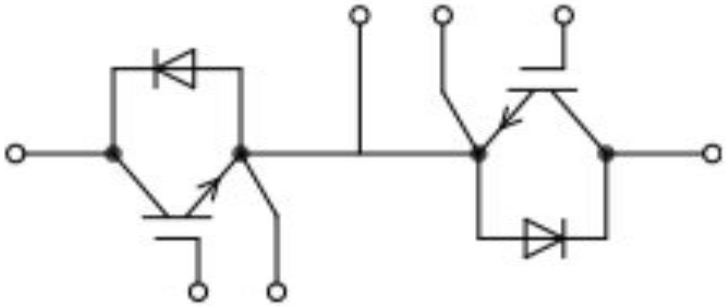
- FS Trench Technology, Positive temperature coefficient
- Low saturation voltage: $V_{CE(sat)}$, typ = 1.8V @ I_C =160A and T_j = 25°C
- Extremely enhanced avalanche capability

3 Applications

- Welding
- UPS
- Three-leve Inverter
- AC and DC servo drive amplifier

Type	V_{CE}	I_C	V_{CEsat},T_j=25℃	T_{jop}	Package
DGA160H65M2T	650V	160A (T_j=100℃)	1.8V (Typ)	175℃	34MM

4 Equivalent Circuit Schematic



5 Electrical Characteristics

5.1 Absolute Maximum Ratings (IGBT) (Tc=25℃,unless otherwise specified)

Parameter		Symbol	Value	Units
Collector-to-Emitter Voltage		V_{CE}	650	V
Gate-to-Emitter Voltage		V_{GE}	±30	V
DC Collector current	T_j=25℃	I_C	240	A
	T_j=100℃		160	A
Pulsed Collector Current #1		I_{CM}	480	A
Short circuit withstand time, V_{GE}=15V, V_{CC}=600V, Allowed number of short circuits < 1000 Time between short circuits: ≥ 1.0s T_j=150℃		T_{SC}	6	μs

Notes: #1 Pulse duration is limited bv $T_{j,max}$

5.2 Absolute Maximum Ratings (Diode) (Tc=25℃,unless otherwise specified)

PARAMETER		SYMBOL	VALUE	UNIT
Peak Repetitive Reverse Voltage		V_{RRM}	650	V
DC Blocking Voltage		V_R	650	V
Average Rectified Forward Current		$I_{F(AV)}$	150	A
Repetitive Peak Surge Current		I_{FRM}	300	A
Nonrepetitive Peak Surge Current(single)	tp=8.3ms	I_{FSM}	400	A

5.53IGBT Module

Parameter	Symbol	VALUE	Units
Junction Temperature Range	T_{jmax}	-45～175	℃
Operating Junction Temperature	T_{jop}	-45～150	℃
Storage Temperature Range	T_{stg}	-45～150	℃
Isolation Voltage R_{MS},f=50Hz,t=1min	V_{ISO}	4000	V

5.4Thermal Characteristics（IGBT Module）

Parameter		Symbol	Rating	Units
Thermal Resistance Junction to Case	IGBT(single)	R_{thJC}	0.16	℃/W
	Diode(single)		0.25	

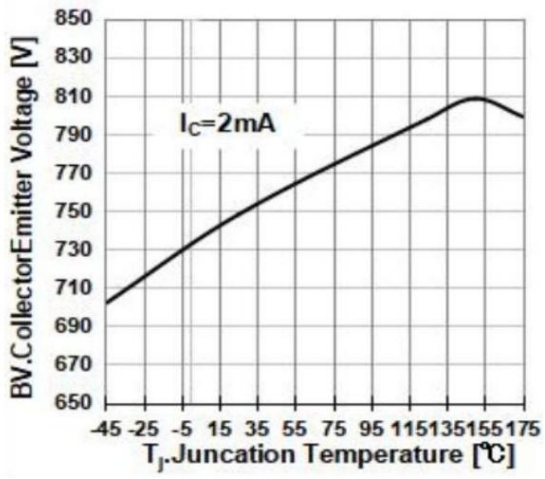
5.5 Electrical Characteristics (IGBT) (Tc=25℃, unless otherwise specified)

Parameter	Symbol	Conditions	Value			Units
			Min	Typ	Max	
Static Characteristics						
Collector-to-Emitter Breakdown Voltage	$V_{(BR)CES}$	I_C=250μA,V_{GE}=0V,T_j=25℃	650	--	--	V
Collector-to-Emitter Leakage Current	I_{CES}	V_{CE}=650V,V_{GE}=0V,T_j=25℃	--	--	20	μA
		V_{CE}=650V,V_{GE}=0V,T_j=150℃	--	--	1.0	mA
Gate-to-Emitter Leakage Current	I_{GES}	V_{GE}=±30V,V_{CE}=0V,T_j=25℃	--	--	±200	nA
		V_{GE}=±30V,V_{CE}=0V,T_j=150℃	--	--	±400	nA
Gate Threshold Voltage	$V_{GE(th)}$	V_{CE}=V_{GE},I_C=1mA	4	5.5	7	V
Collector-emitter saturation voltage	V_{CEsat}	V_{GE}=15V,I_C=160A,T_j=25℃	--	1.8	2.3	V
		V_{GE}=15V,I_C=160A,T_j=150℃	--	2.2	-	V
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{CE}=25V,V_{GE}=0V, f=1MHz,T_a=25℃	--	12244	--	pF
Output Capacitance	C_{oss}		--	464	--	
Reverse Transfer Capacitance	C_{rss}		--	128	--	
IGBT Characteristics						
Turn-on delay time	$t_{d(on)}$	V_{CE}=400V,I_C=160A, R_g=5.5Ω,V_{GE}=15V, 感性负载,T_j=25℃	--	66	--	nS
Rise time	t_r		--	253	--	nS
Turn-off delay time	$t_{d(off)}$		--	214	--	nS
Fall time	t_f		--	179	--	nS
Turn-on energy	E_{on}		--	11.1	--	mJ
Turn-off energy	E_{off}		--	6.45	--	mJ
Total switching energy	E_{ts}		--	17.55	--	mJ
Turn-on delay time	$t_{d(on)}$	V_{CE}=400V,I_C=160A, R_g=5.5Ω,V_{GE}=15V, 感性负载,T_j=150℃	--	63	--	nS
Rise time	t_r		--	257	--	nS
Turn-off delay time	$t_{d(off)}$		--	238	--	nS
Fall time	t_f		--	207	--	nS
Turn-on energy	E_{on}		--	11.8	--	mJ
Turn-off energy	E_{off}		--	7.34	--	mJ
Total switching energy	E_{ts}		--	19.14	--	mJ
Gate charge	Q_g	V_{CE}=400V,I_C=120A, V_{GE}=15V	--	419	--	nC

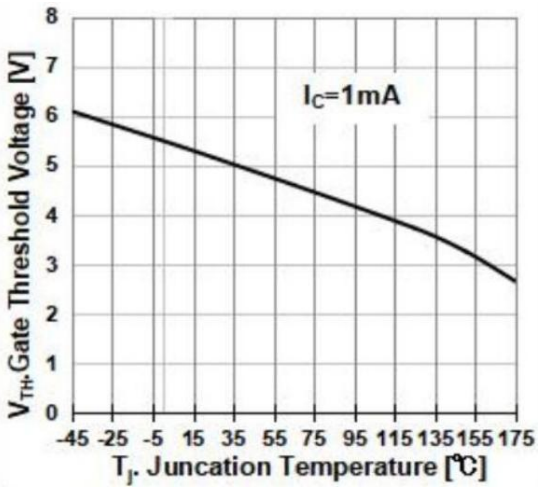
5.6Electrical Characteristics (Diode)(Tc=25℃, unless otherwise specified)

Parameter	Symbol	Conditions	Value			Units
			Min	Typ	Max	
Diode forward voltage	V_F	I_F=150A, T_j=25℃	--	1.8	2.5	V
		I_F=150A, T_j=150℃	--	1.35	--	V
Diode reverse recovery time	t_{rr}	I_F=0.5A, I_R=1.0A,I_{rr}=0.25A	--	50	--	ns
Diode reverse recovery time	t_{rr}	I_F=150A , di/dt=250A/uS ,	--	110	--	ns
Diode peak reverse recovery curren	I_{rrm}		--	7.1	--	A
Diode reverse recovery charge	Q_{rr}		--	185	--	nC
Maximum Instantaneous Reverse	I_R	V_R = 650V	--	--	5.0	uA
		V_R = 650V, T_C = 150℃	--	--	1.0	mA

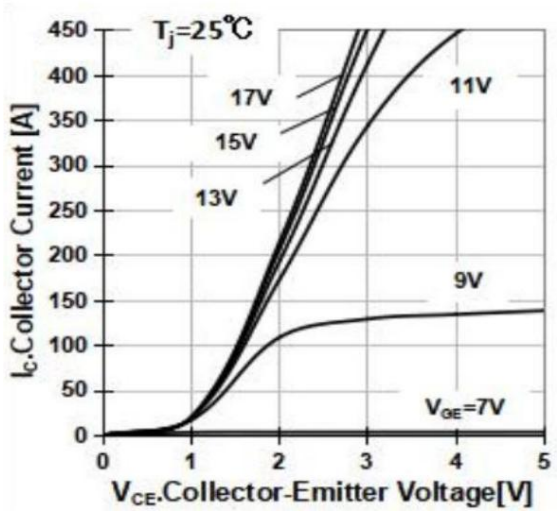
6 Typical Characteristic Curves



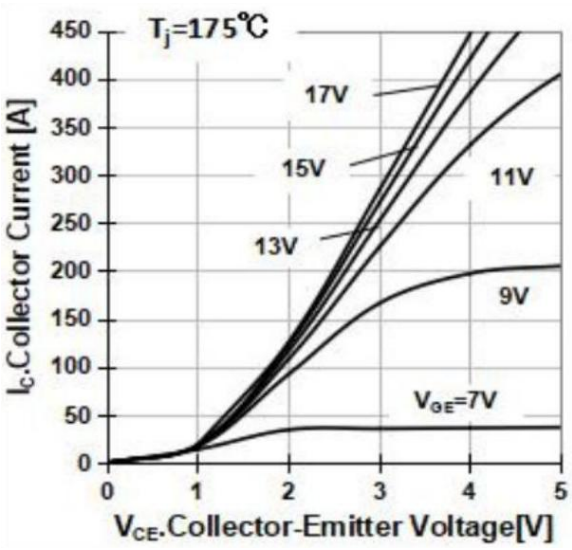
Collector-to-Emitter Breakdown Voltage Temperature characteristic



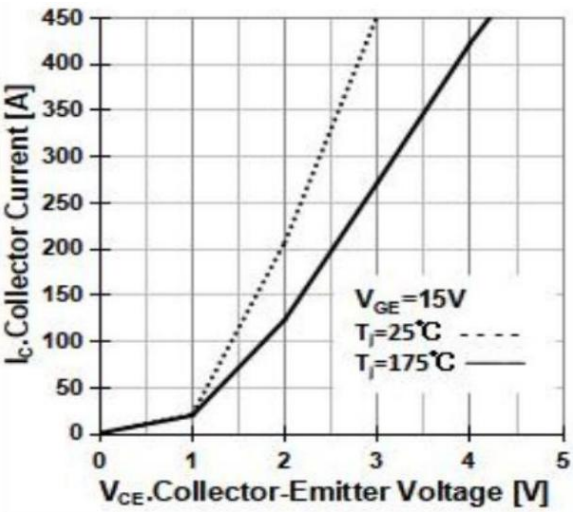
Gate Threshold Voltage Temperature characteristic



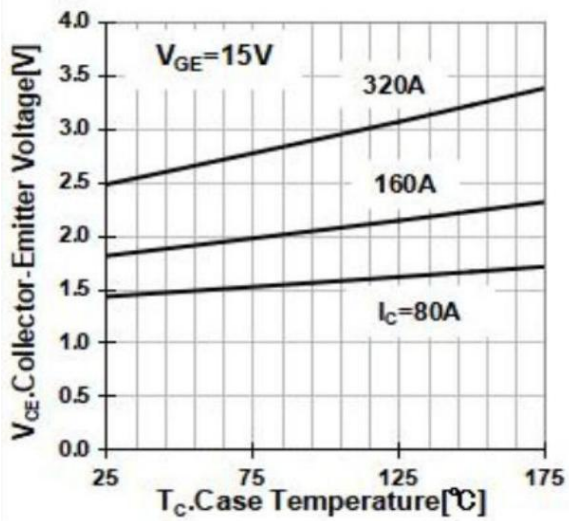
Typical output characteristic



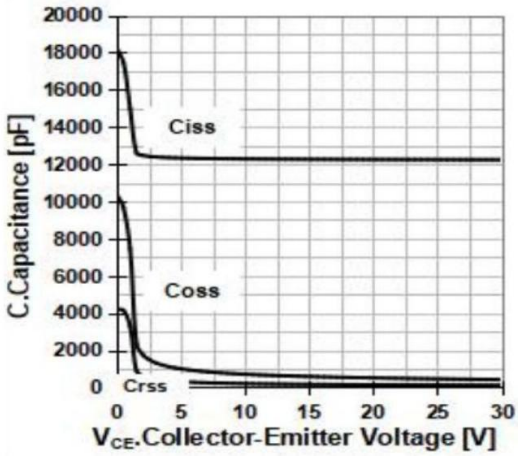
Typical output characteristic



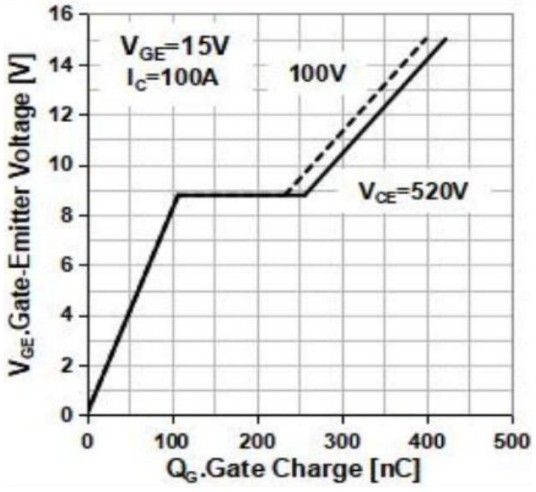
Collector-emitter saturation voltage Characteristic



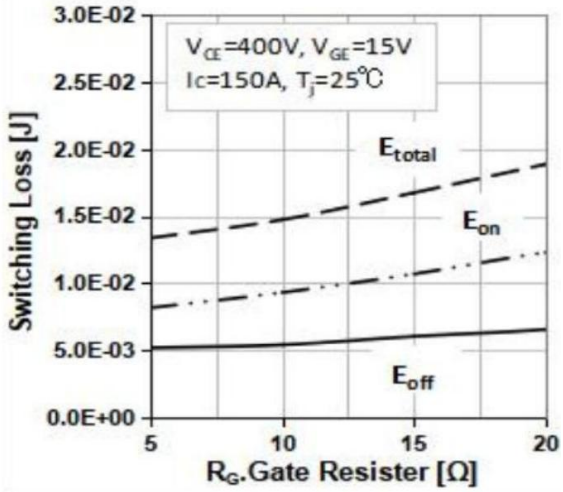
Collector-emitter saturation voltage Temperature Characteristic



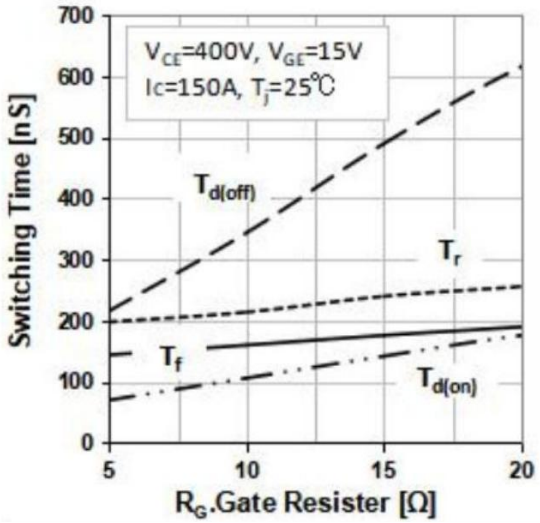
Typical capacitance as a function of collector-emitter voltage



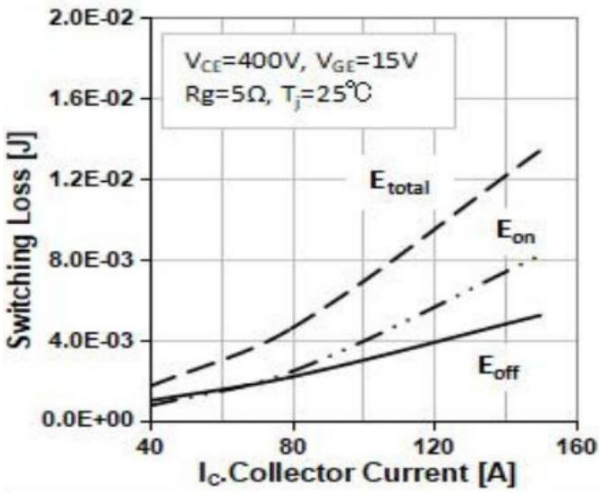
Typical gate charge



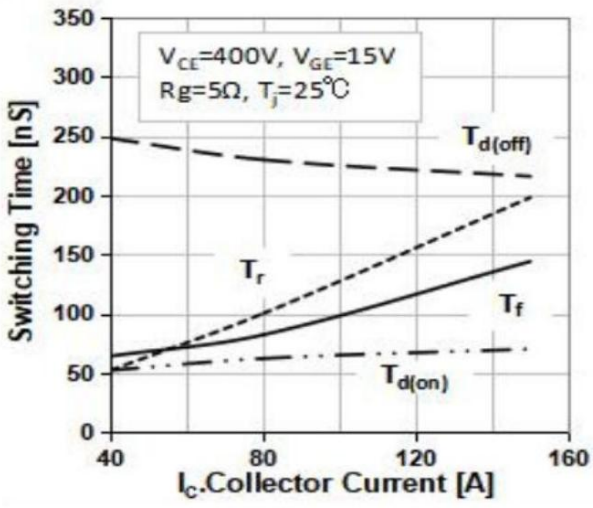
Typical switching energy losses as a function of gate resistor



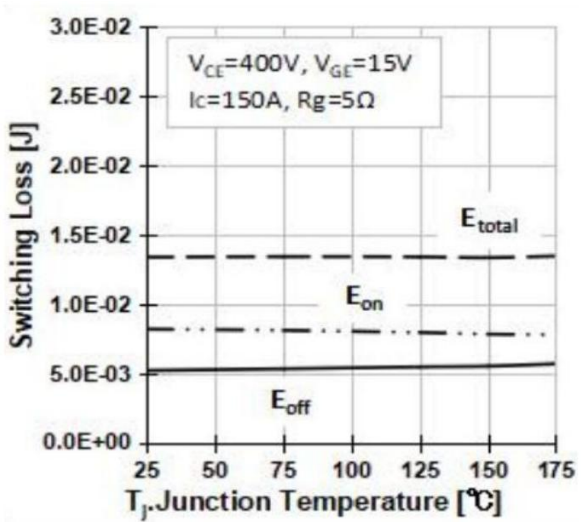
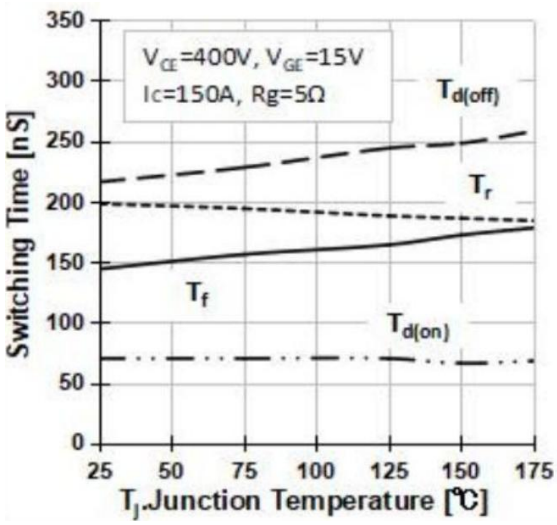
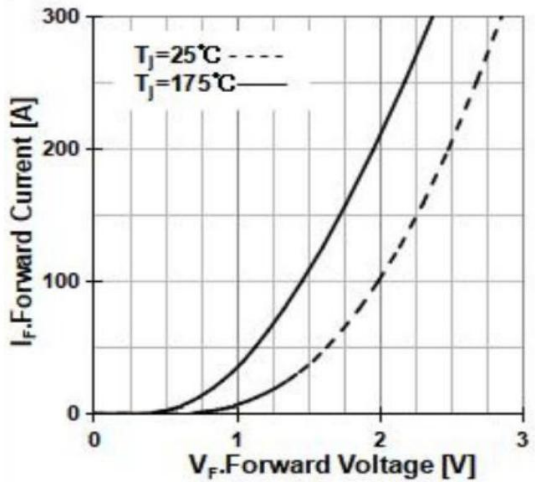
Typical switching times as a function of gate resistor



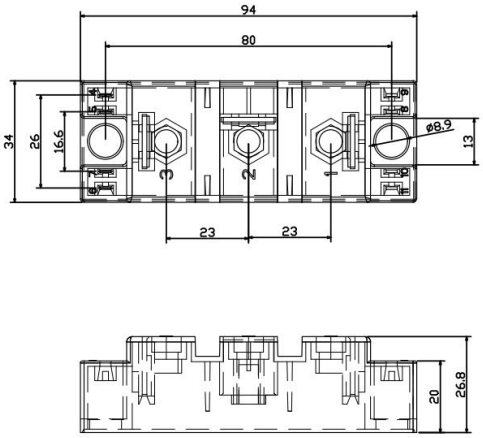
Typical switching energy losses as a function of Collector Current



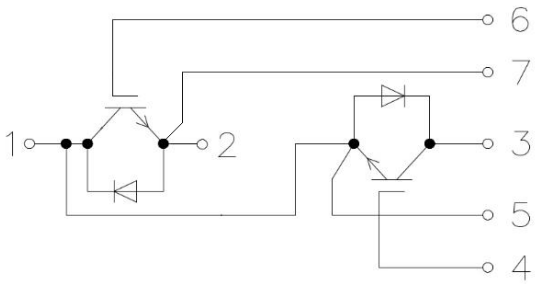
Typical switching times as a function of Collector Current

	
Typical switching energy losses as a function of Junction temperature	Typical switching times as a function of Junction temperature
	--
Typical diode forward current as a function of forward voltage	--

7 Dimensions



7.1 Circuit Schematic



8 Attentions

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- It is the responsibility of the purchaser for any failure or failure of any semiconductor product under certain conditions. It is the responsibility of the purchaser to comply with safety standards and to take safety measures in the system design and machine manufacturing of Donghai products in order to avoid potential risk of failure. Injury or property damage.
- Product promotion is endless, our company will be dedicated to provide customers with better products.

9 Appendix

Revision history:

Date	REV.	Description	Page
2023.12.12	1.0	Original	