

## 100A 1700V Half bridge module

### 1 Description

These Insulated Gate Bipolar Transistor used advanced trench and Fieldstop technology design, provided excellent  $V_{CE(sat)}$  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 = 2.25V @  $I_c = 100A$  and  $T_j = 25^\circ C$
- Extremely enhanced avalanche capability

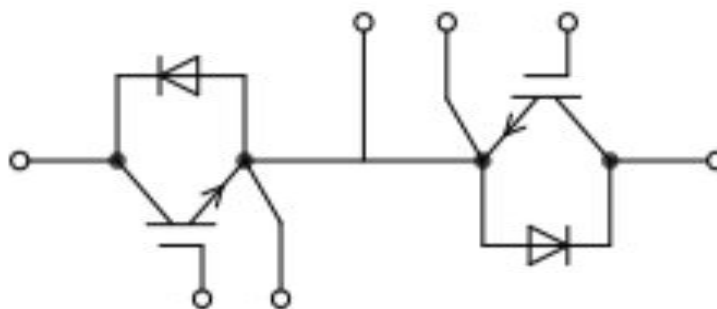
### 3 Applications

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



Type	$V_{CE}$	$I_c$	$V_{CE(sat)}, T_j=25^\circ C$	$T_{jop}$	Package
DGA100H170M2T	1700V	100A ( $T_j=100^\circ C$ )	2.25V (Typ)	175 $^\circ C$	34MM

### 4 Equivalent Circuit Schematic



## 5 Electrical Characteristics

### 5.1 Absolute Maximum Ratings (IGBT) (Tc=25°C,unless otherwise specified)

Parameter	Symbol	Value	Units
Collector-to-Emitter Voltage	$V_{CE}$	1700	V
Gate-to-Emitter Voltage	$V_{GE}$	±20	V
DC Collector current	$I_C$	$T_j=25^{\circ}\text{C}$	200
		$T_j=100^{\circ}\text{C}$	100
Pulsed Collector Current #1	$I_{CM}$	400	A

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

### 5.2 Absolute Maximum Ratings (Diode) (Tc=25°C,unless otherwise specified)

PARAMETER	SYMBOL	VALUE	UNIT
Peak Repetitive Reverse Voltage	$V_{RRM}$	1700	V
DC Blocking Voltage	$V_R$	1700	V
Average Rectified Forward Current	$I_{F(AV)}$	100	A
Repetitive Peak Surge Current	$I_{FRM}$	200	A
Nonrepetitive Peak Surge Current(single)	$t_p=1.0\text{ms}$ $I_{FSM}$	500	A

### 5.3 IGBT Module

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

### 5.4 Thermal Characteristics (IGBT Module)

Parameter	Symbol	Rating	Units
Thermal Resistance Junction to Case	IGBT	0.22	°C/W
	Diode	0.42	

**5.5 Electrical Characteristics (IGBT) (Tc=25°C, unless otherwise specified)**

Parameter	Symbol	Conditions	Value			Units
			Min	Typ	Max	
<b>Static Characteristics</b>						
Collector-to-Emitter Breakdown Voltage	$V_{(BR)CES}$	$I_C=1mA, V_{GE}=0V, T_j=25^\circ C$	1700	--	--	V
Collector-to-Emitter Leakage Current	$I_{CES}$	$V_{CE}=1700V, V_{GE}=0V, T_j=25^\circ C$	--	--	100	$\mu A$
		$V_{CE}=1700V, V_{GE}=0V, T_j=125^\circ C$	--	200	--	$\mu A$
		$V_{CE}=1700V, V_{GE}=0V, T_j=175^\circ C$	--	4.0	--	mA
Gate-to-Emitter Leakage Current	$I_{GES}$	$V_{GE}=\pm 20V, V_{CE}=0V, T_j=25^\circ C$	--	--	$\pm 500$	nA
		$V_{GE}=\pm 20V, V_{CE}=0V, T_j=150^\circ C$	--	--	$\pm 1.0$	$\mu A$
Gate Threshold Voltage	$V_{GE(th)}$	$V_{CE}=V_{GE}, I_C=6mA$	4.5	-	6.5	V
Collector-emitter saturation voltage	$V_{CEsat}$	$V_{GE}=15V, I_C=100A, T_j=25^\circ C$	--	2.25	2.6	V
		$V_{GE}=15V, I_C=100A, T_j=125^\circ C$	--	2.55	--	V
		$V_{GE}=15V, I_C=100A, T_j=175^\circ C$	--	2.75	--	V
Internal gate resistance	$R_{Gint}$		--	5.9	--	$\Omega$
<b>Dynamic Characteristics</b>						
Input Capacitance	$C_{iss}$	$V_{CE}=25V, V_{GE}=0V, f=1MHz, T_a=25^\circ C$	--	6100	--	pF
Output Capacitance	$C_{oss}$		--	350	--	
Reverse Transfer Capacitance	$C_{rss}$		--	240	--	
<b>IGBT Characteristics</b>						
Turn-on delay time	$t_{d(on)}$	$V_{CE}=900V, I_C=100A, R_g=4.4\Omega, V_{GE}=15V, \text{感性负载}, T_j=25^\circ C$	--	195	--	nS
Rise time	$t_r$		--	70	--	nS
Turn-off delay time	$t_{d(off)}$		--	250	--	nS
Fall time	$t_f$		--	160	--	nS
Turn-on energy	$E_{on}$		--	23	--	mJ
Turn-off energy	$E_{off}$		--	15	--	mJ
Total switching energy	$E_{ts}$		--	38	--	mJ
Turn-on delay time	$t_{d(on)}$	$V_{CE}=900V, I_C=100A, R_g=4.4\Omega, V_{GE}=15V, \text{感性负载}, T_j=175^\circ C$	--	210	--	nS
Rise time	$t_r$		--	80	--	nS
Turn-off delay time	$t_{d(off)}$		--	320	--	nS
Fall time	$t_f$		--	200	--	nS
Turn-on energy	$E_{on}$		--	38	--	mJ
Turn-off energy	$E_{off}$		--	33	--	mJ
Total switching energy	$E_{ts}$		--	71	--	mJ
Gate charge	$Q_g$	$V_{CE}=900V, I_C=100A, V_{GE}=15V$	--	700	--	nC
Short circuit current	$I_{sc}$	$tpsc \leq 10 \mu s, V_{GE} = 15 V, T_{vj} = 175^\circ C, V_{CC} = 1300 V, V_{CEM} CHIP \leq 1700 V$	--	310	--	A

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

Parameter	Symbol	Conditions	Value			Units
			Min	Typ	Max	
Diode forward voltage	V <sub>F</sub>	I <sub>F</sub> =100A, T <sub>J</sub> =25°C	--	1.8	2.3	V
		I <sub>F</sub> =100A, T <sub>J</sub> =150°C	--	1.9	--	V
Diode reverse recovery time	t <sub>rr</sub>	I <sub>F</sub> =100A ,	--	540	--	ns
Diode peak reverse recovery current	I <sub>rrm</sub>	di/dt=1300A/uS ,	--	90	--	A
Diode reverse recovery charge	Q <sub>rr</sub>	V <sub>R</sub> =900V	--	29	--	uC
Maximum Instantaneous Reverse	I <sub>R</sub>	V <sub>R</sub> = 1700V	--	--	100	uA
		V <sub>R</sub> = 1700V, T <sub>C</sub> = 150°C	--	1.8	--	mA

6 Typical Characteristic Curves

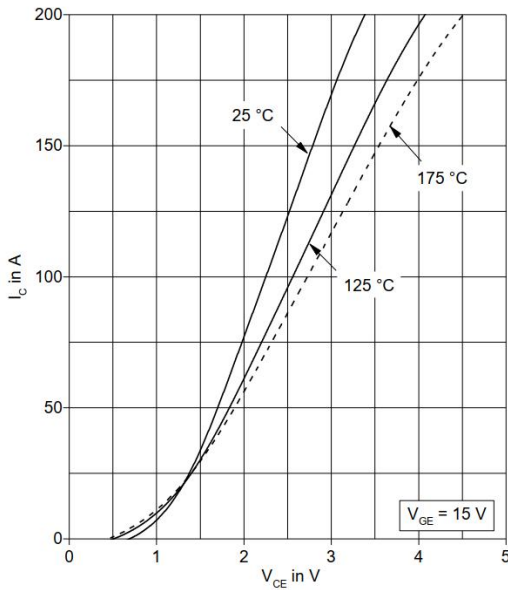


Fig1. Typical on-state characteristics, chip level

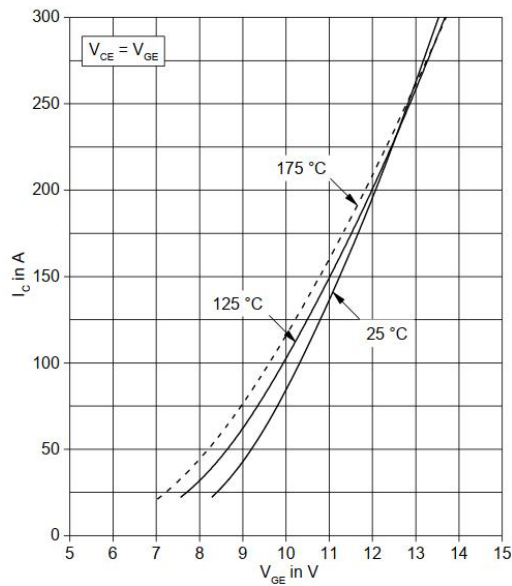


Fig2. Typical transfer characteristics, chip level

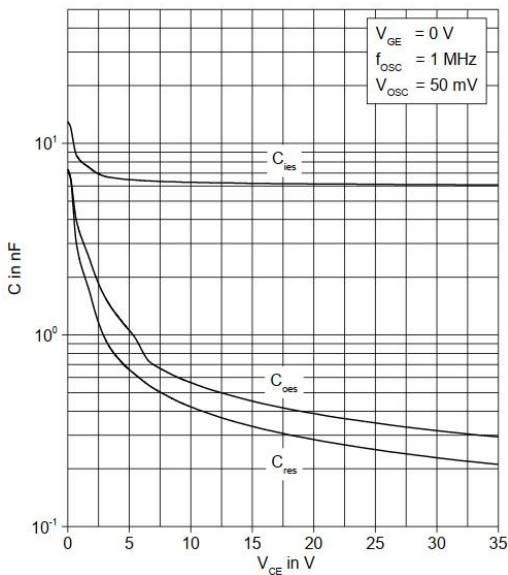


Fig3. Typical capacitance as a function of collector-emitter voltage

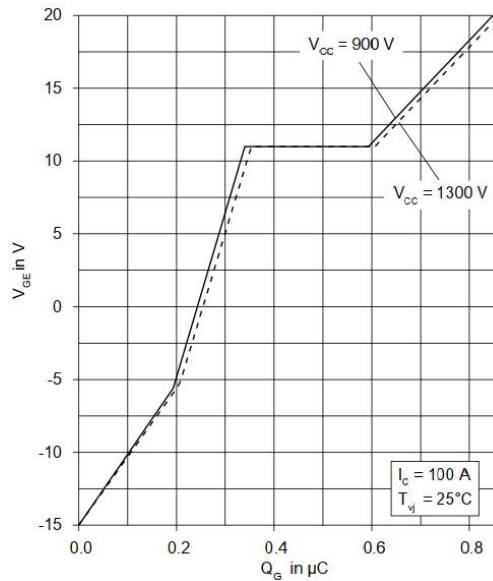


Fig14. Typical gate charge

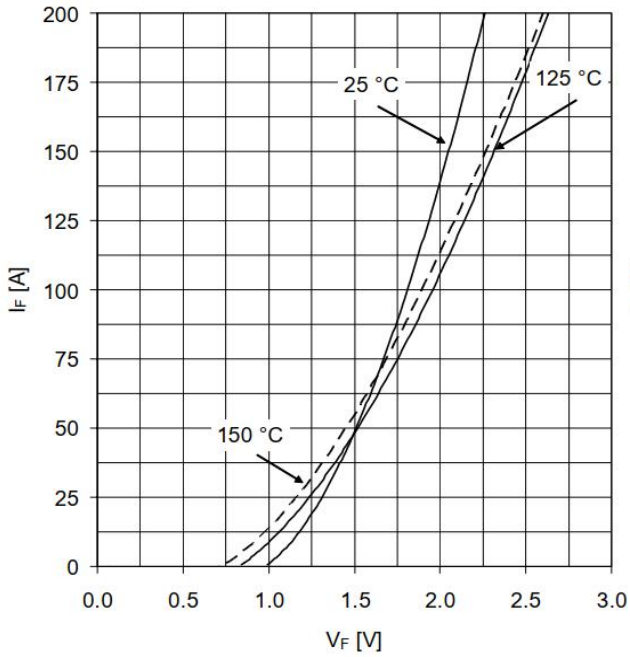


Fig5. Typical diode forward characteristics, chip level

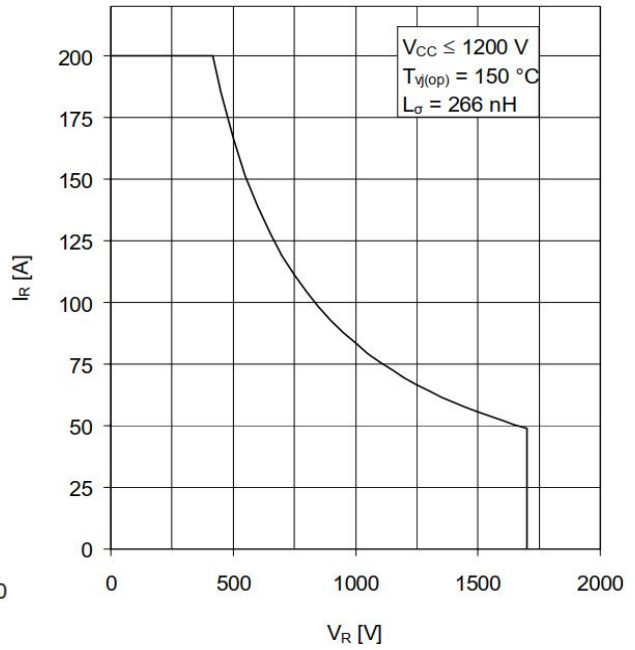


Fig6. Safe operating area (FBSOA)

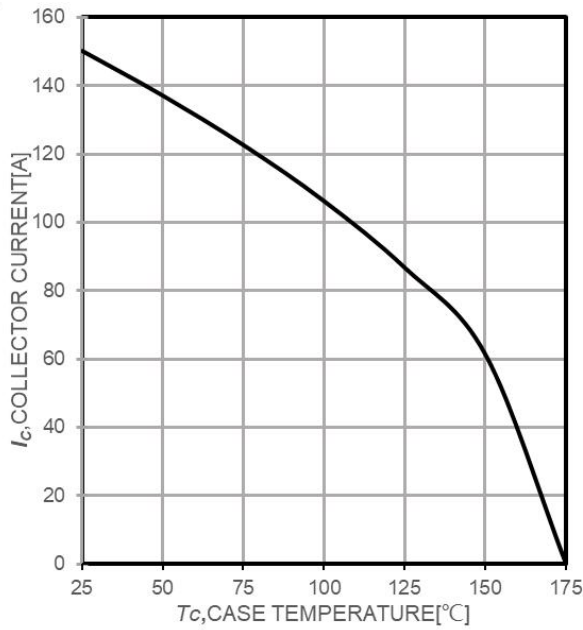


Fig7. Collector current as a function of case temperature ( $V_{GE}=15$ V)

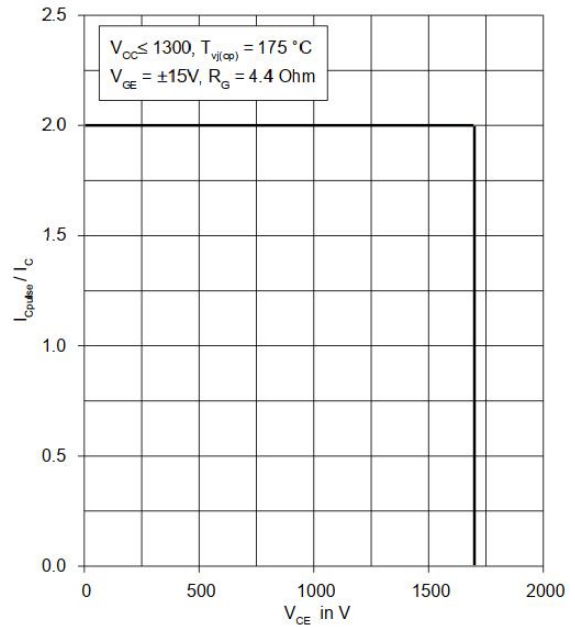
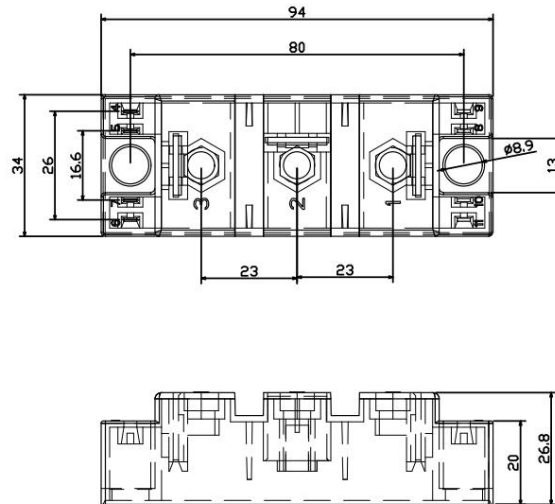
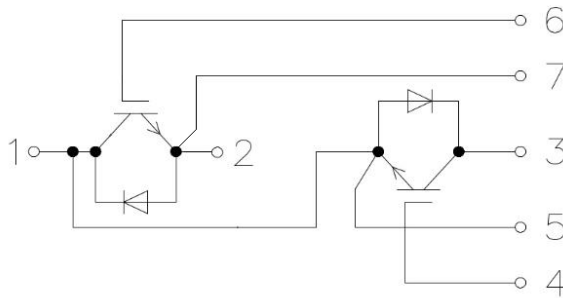


Fig8. Safe operation area (RBSOA)

7 Dimensions



7.1 Circuit Schematic



8 Attentions

- Jiangsu Donghai Semiconductor Technology CO.,LTD. reserves the right to change the specification without prior notice! The customer should obtain the latest version of the information before making the order and verify that the information is complete and up to date.
- 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
2023.2.8	1.0	Original	