



YT-ASC50L4500IC

4500V /5000A

IGCT

Asymmetric IGCT Device



IGCT Outline

■ Applications | 应用

- Modular multilevel converter
- Static var compensator
- High power converter

■ Features | 特点

- High withstand current
- Black-startup capability
- Failure short circuit mode

V_{DRM}	4500	V
I_{TGQM}	5000	A
$I_{T(RMS)}$	3000	A
I_{TSM}	35	kA
V_{TO}	1.22	V
r_T	0.28	mΩ
V_{DCLink}	2800	V

■ Mechanical Data | 机械特性

Symbol	Parameter	Min	Typical	Max	
F	Mounting force	36	40	44	kN
Dp	Pole-piece diameter	-	85	---	mm
H	Housing thickness	-	26	---	mm
m	weight	-	2.8	---	kg
Ds	Surface creepage	33	-	---	mm
Da	distance	10	-	---	mm
L	IGCT Length	-	447.8	---	mm
H	IGCT Height	-	41		mm
W	IGCT Width	-	170		mm

■ Blocking Data | 阻断特性

Symbol	Parameter	Conditions	Min	Typical	Max	
V_{DRM}	Rep. peak off-state voltage	$T_{VJ}=125^{\circ}\text{C}$, $I_D \leq I_{DRM}$, $t_p=10\text{ms}$	-	-	4500	V
I_{DRM}	Rep. peak off-state current	$T_{VJ}=125^{\circ}\text{C}$, $V_D=V_{DRM}$, $t_p=10\text{ms}$	-	-	50	mA
d_v/d_t	Critical rate of rise of anode voltage	$T_{VJ}=125^{\circ}\text{C}$, $V_D=0.67V_{DRM}$	-	-	1000	V/μs
V_{DCLink}	Permanent DC voltage for 100 FIT failure rate of GCT	Allowable intermediate DC voltage of 100FIT failure rate	-	-	2800	V
V_{RRM}	Reverse voltage	\	-	-	17	V

■ On-State Data | 通态特性

Symbol	Parameter	Conditions	Min	Typical	Max	
$I_{T(RMS)}$	Max. RMS on-state current	$T_C = 85^{\circ}\text{C}$, Sin I half wave, double side cooling	-	-	3000	A
I_{TSM} I^2_t	Max. peak non-repetitive surge on-state current Limiting load integral	$T_{VJ} = 125^{\circ}\text{C}$, sin half wave, 10ms, $V_D=V_R=0$	-	-	35 545	KA $10^4\text{A}^2\text{s}$
V_{TM}	On-state voltage	$T_{VJ} = 125^{\circ}\text{C}$, $I_T=5000\text{A}$	-	2.37	2.61	V
V_{TO} r_T	Threshold voltage slope resistance	$T_{VJ} = 125^{\circ}\text{C}$, $I_T = 1000\text{...}5000\text{A}$	-	-	1.22 0.28	V mΩ

■ Turn-on Data | 开通特性

Symbol	Parameter	Conditions	Min	Typical	Max	
di_T/dt	Critical rate of rise of on-state current	$T_{VJ} = 125^\circ\text{C}$, $I_T = 5000\text{A}$, $V_D = 2800\text{V}$, $f=0..500\text{Hz}$	-	-	5000	A/ μs
t_{don}	turn-on delay time	$T_{VJ} = 125^\circ\text{C}$, $I_T = 5000\text{A}$, $V_D = 2800\text{V}$, $di/dt = V_D/L_i$, $C_{CL} = 20\mu\text{F}$, $R_S = 0.4\Omega$ $L_i = 3\mu\text{H}$, $L_{CL} = 0.3\mu\text{H}$	-	-	4	μs
t_{donSF}	Turn-on delay time status feedback		-	-	7	μs
t_r	Rise time (Fall time of anode voltage)		-	-	1	μs
E_{on}	Turn-on energy per pulse		-	-	1.8	J

■ Turn-off Data | 关断特性

Symbol	Parameter name	Test conditions	Min	Typical	Max	
I_{TQM}	Max.controllable turn-off current	$T_{VJ} = 125^\circ\text{C}$, $V_{DM} \leq V_{DRM}$, $V_D = 2800\text{V}$, $L_{CL} = 0.3\mu\text{H}$, $C_{CL} = 20\mu\text{F}$, $R_S = 0.4\Omega$, $f=0..300\text{Hz}$ $D_{FWD} = D_{CL} = SF8.FYB2000-45$	-	-	5000	A
t_{doff}	Surn-off delay time	$T_{VJ} = 125^\circ\text{C}$, $I_{TQM} = 5000\text{A}$, $V_D = 2800\text{V}$, $V_{DM} \leq V_{DRM}$, $C_{CL} = 20\mu\text{F}$, $R_S = 0.4\Omega$, $L_i = 4\mu\text{H}$, $L_{CL} = 0.3\mu\text{H}$ $D_{FWD} = D_{CL} = SF8.FYB2000-45$	-	-	8	μs
t_{doffSF}	Turn-off delay time status feedback		-	-	7	μs
t_f	Fall time		-	-	1	μs
E_{off}	Turn-off energy per pulse		-	28	33	J

■ Thermal Data | 热特性

Symbol	Parameter	Conditions	Min	Typical	Max	
T_{VJ}	Junction operating temperature	/	0	-	125	$^\circ\text{C}$
T_{STG}	Storage temperature range		-40	-	60	$^\circ\text{C}$
R_{thJC}	Thermal resistance, junction-to- Case	Double sided cooling	-	-	8.5	K/kW
R_{thCH}	Thermal resistance, case-to- heatsink		-	-	3	K/kW

■ Gate Unit | 门极单元

Gate power supply | 门极电源

Symbol	Parameter	Conditions	Min	Typical	Max	
$V_{GIN RMS}$	Gate unit voltage	DC voltage or AC square wave amplitude (15kHz - 100kHz). No galvanic isolation to power circuit.	28	-	40	V
$P_{GIN MAX}$	Max. Gate unit power consumption	/	-	-	130	W
$I_{GIN MIN}$	Min. Current needed to power up and Gate Unit	Min. Current needed to power up and gate unit	2	-	-	A
$I_{GIN MAX}$	Internal current limitation	Rectified average current limited by the gate unit	-	-	8	A

■ Optical Control input/output | 光控输入/输出

$t_{on(min)}$	Min on- time	/	40	-	-	μ s
$t_{off(min)}$	Min off -time	/	40	-	-	μ s
$P_{on CS}$	CS Optical input power	Valid for 1mm plastic optical fiber(POF)	-15	-	-1	dBm
$P_{off CS}$	CS Optical noise power		-	-	-45	dBm
$P_{on SF}$	SF Optical output power		-19	-	-1	dBm
$P_{off SF}$	SF Optical noise power		-	-	-50	dBm
t_{GLITCH}	Pulse width threshold	Max. pulse width without response	-	-	400	ns
t_{retrig}	External retrigger pulse width	/	700	-	1100	ns
CS	Receiver for command signal	Agilent, Type:HFBR-2521				
SF	Transmitter for status feedback	Agilent, Type:HFBR-1521				

■ Visual Feedback | LED 状态反馈

LED1(Green)	Power Supply OK	Light on when power supply is within specified range
LED2(Green)	Gate off	Light on when GCT is off
LED3(Yellow)	Gate on	Light on when gate-current is flowing
LED4(Red)	Fault	Light on when gate drive capacitor is under voltage, or gate drive voltage is inconsistance with CS, or GCT is short circuited
LED5(Yellow)	TBD	TBD
LED6(Red)	TBD	TBD

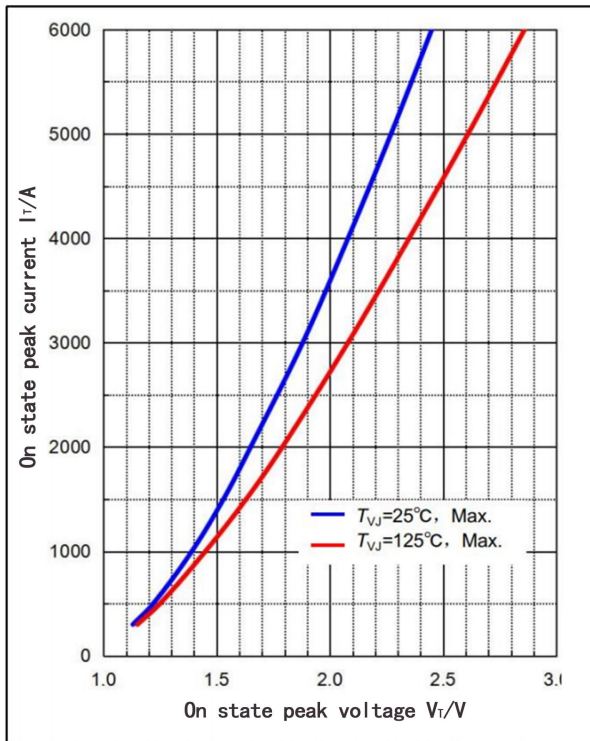


Fig.1 On-state Voltage Characteristics

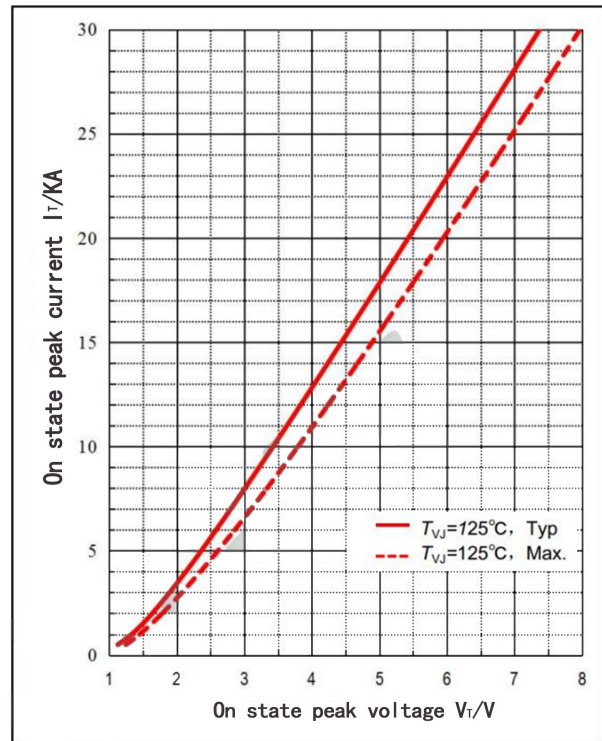


Fig.2 On-state Voltage Characteristics under Large Current Condition

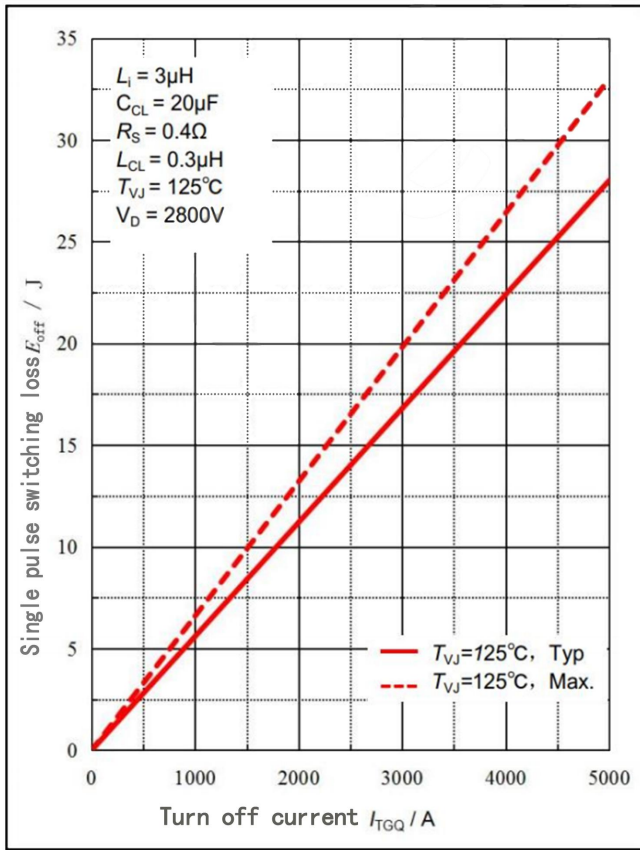


Fig.3 Turn-off Energy Per Pulse vs. Turn-off Current

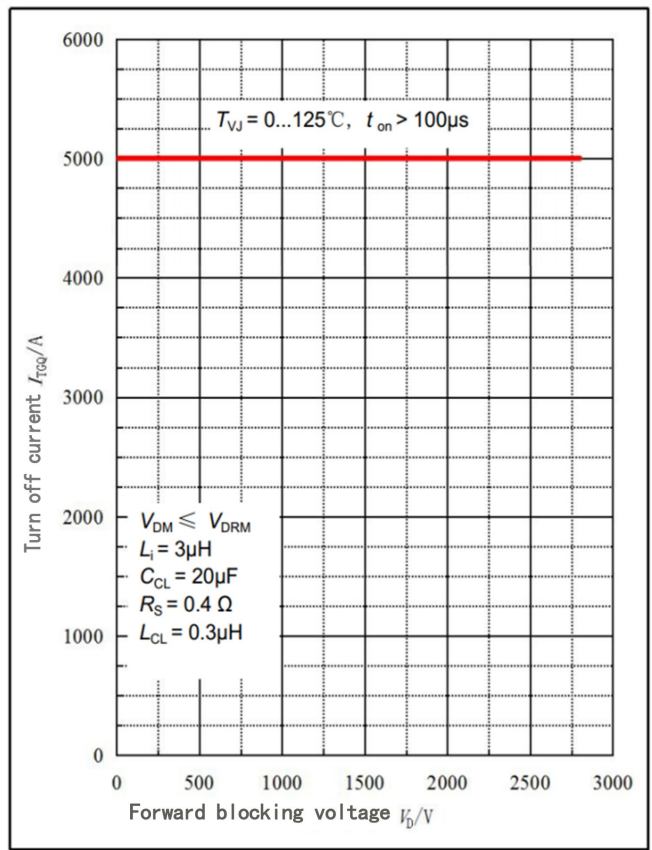


Fig.4 Safe Operating Area

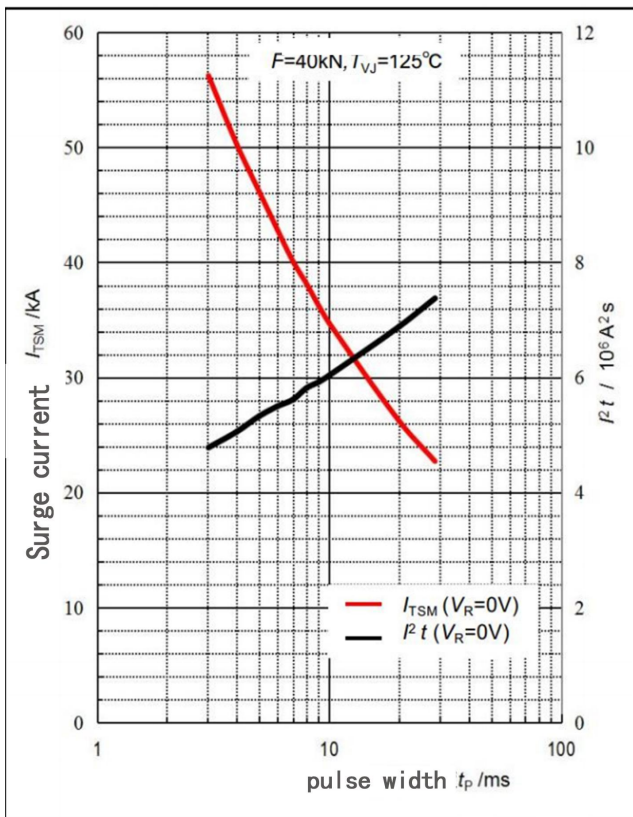


Fig.5 Surge on-state Current vs. Pulse Length, half-sine wave, no reapplied voltage

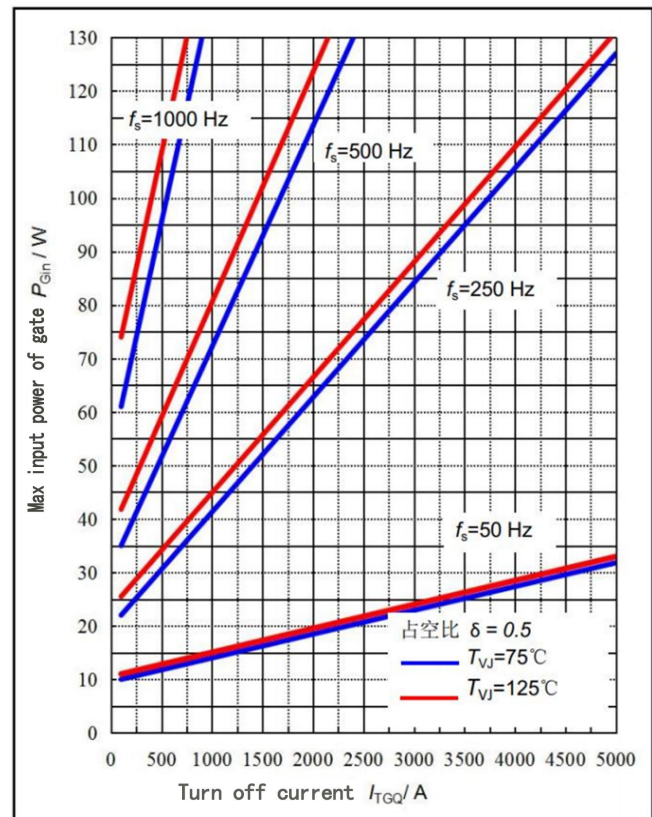


Fig.6 Max. Gate Unit Input Power in Chopper

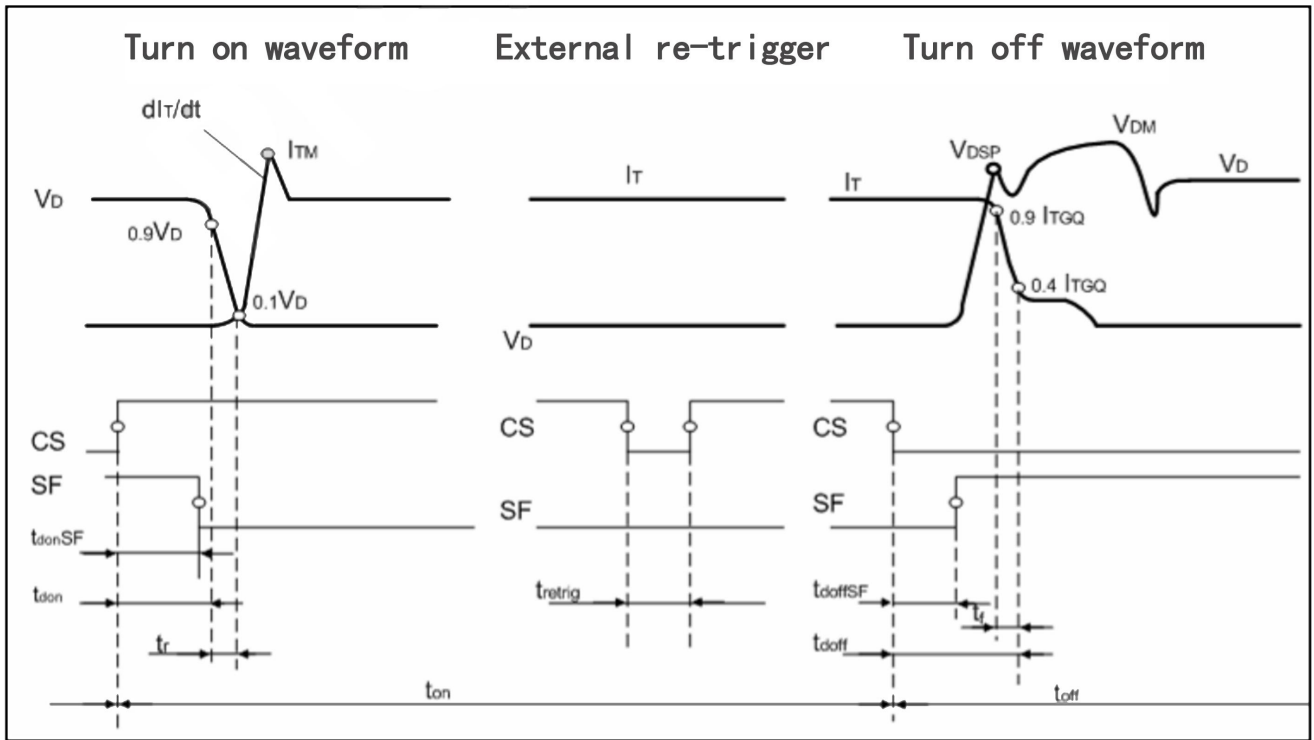


Fig.7 IGCT Voltage and Current waveforms

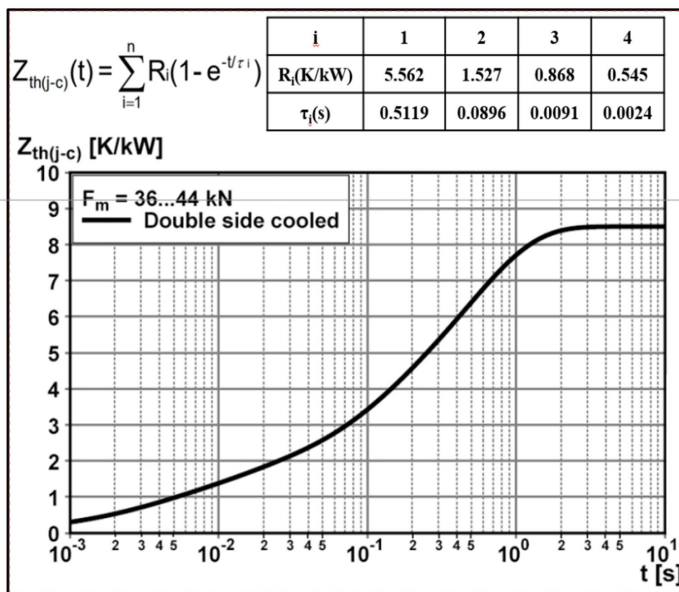


Fig.8 Transient Thermal Impedance vs. Time

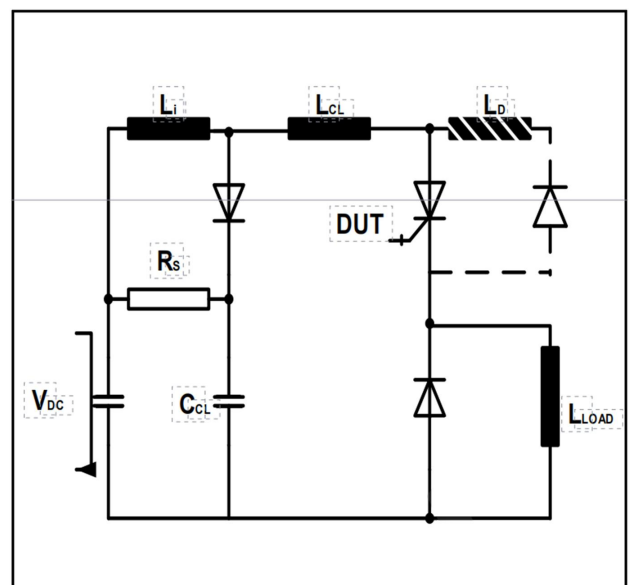


Fig.9 IGCT Test Circuit

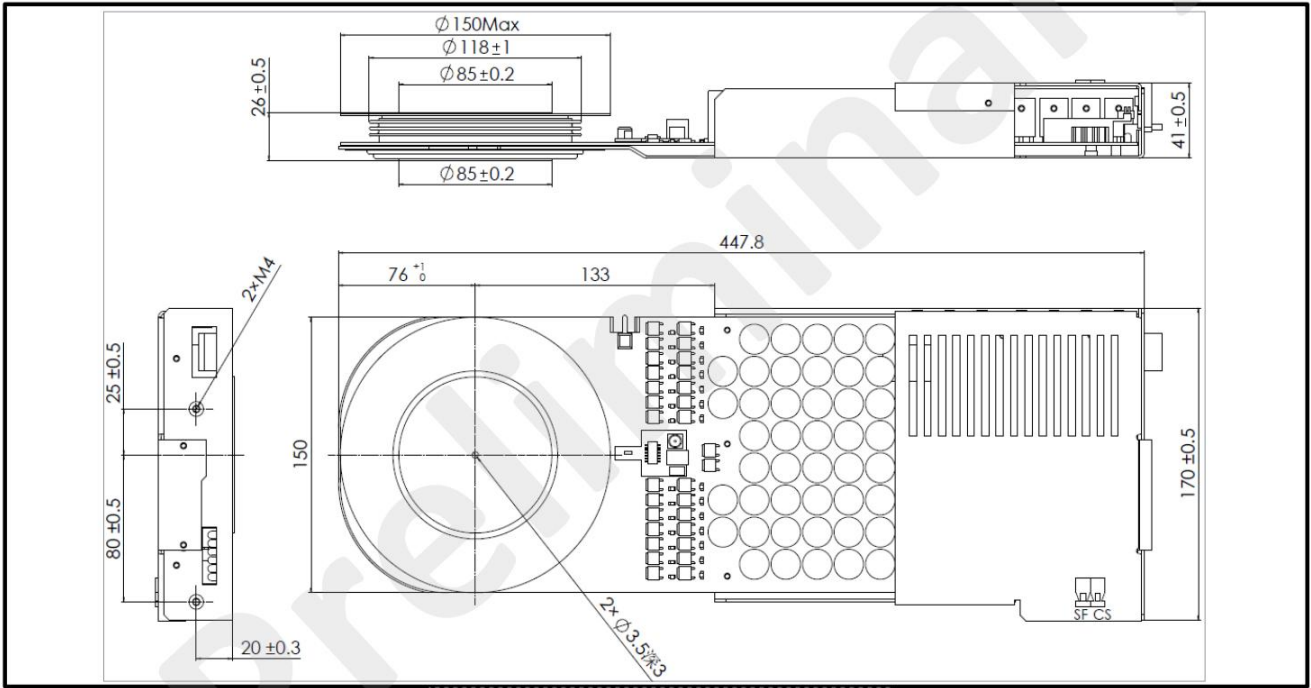


Fig.10 IGCT Outline Drawing (Unit: mm)

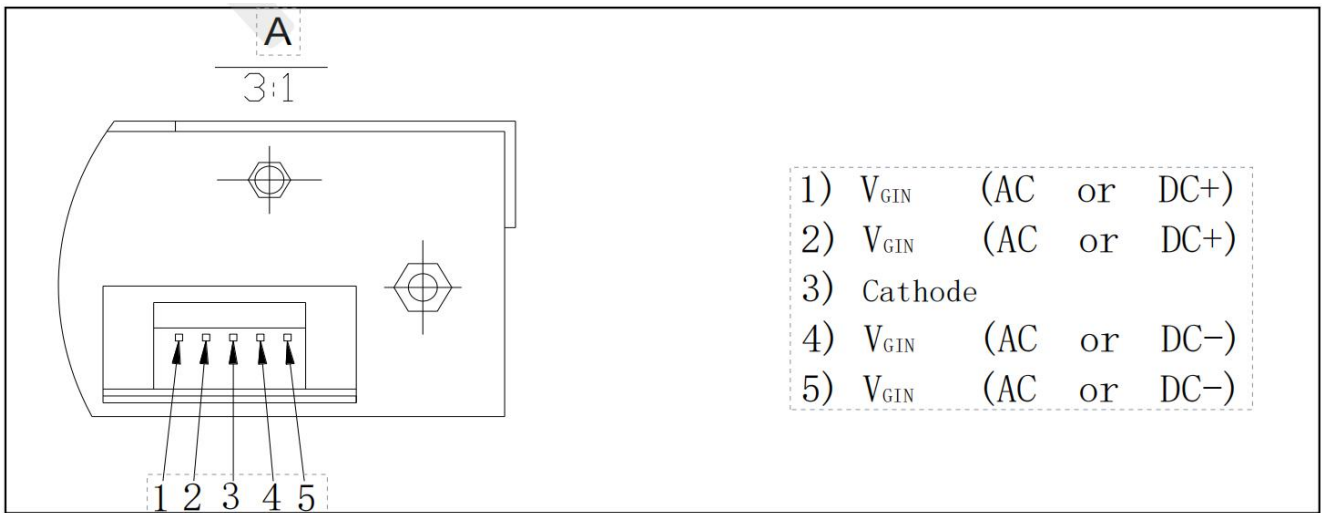


Fig.11 Pin Out of Power Supply Connector of Gate Unit