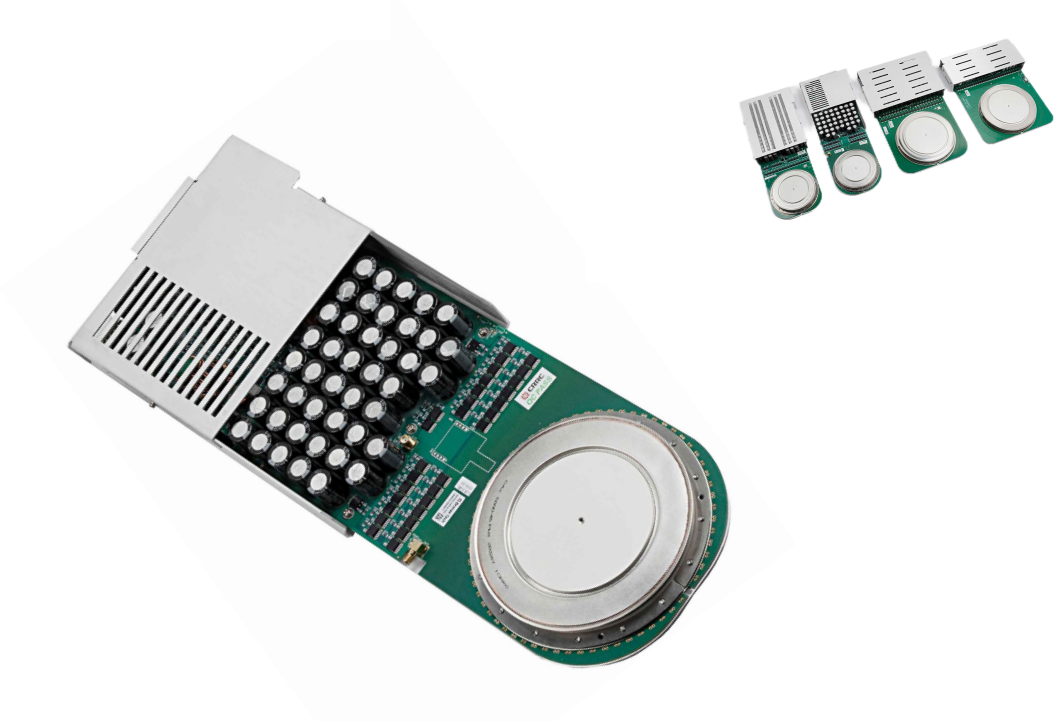
Beijing World E To Technology Co., Ltd

YT-ASC40L6500IC

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

■ Key Parameters 关键参数

V_{DRM}	6500	V
I_{TGQM}	4000	A
I_{TSM}	26	kA
V_{TO}	1.88	V
r_T	0.56	mQ
V_{DClink}	4000	V

■ Mechanical Data| 机械特性

Symbol	Parameter name	Min	Typical	Max	
F	Mounting force	36	40	44	kN
Dp	Pole-piece diameterr	-	85	——	mm
H	Housing thickness	-	26	——	mm
m	Weight	-	TBD	——	kg
Ds	Surface creepage	33	-	——	mm
Da	Air strike 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℃, $I_D \le I$ DRM, t_p=10ms	-	-	4500	V
I_{DRM}	Rep. peak off-state current	T_{VJ}=125℃, V_D=V DRM, t_p=10ms	-	-	50	mA
d_v/d_t	Critical rate of rise of anode voltage	T_{VJ}=125℃, V_D=0.67V_{DRM}	-	-	1000	V/μs
V_{DClinK}	Intermediate DC voltage	Permanent DC voltage for 100 FIT failure rate of GCT	-	-	4000	V
V_{RRM}	Reverse voltage	\	-	-	17	V

■ On-State Data|通态特性

Symbol	Parameter	Conditions	Min	Typical	Max	
I_{DC}	Max. RMS on-state current	T_C = 85℃, DC, Double side cooled	-	-	2000	A
I_{TSM} I^2t	Max. peak non-repetitive surge on- state current Limiting load integral	T_{VJ} = 125℃, since half wave, 10ms, V_D=V_R=0	- -	- -	26 338	KA 10^4A^2s
V_{TM}	On-state voltage	T_{VJ} = 125℃, I_T =4000A	-	3.75	4.11	V
V_{TO}	Threshold voltage	T_{VJ} = 125℃, I_T =	-	-	1.88	V

r_T	slope resistance	1000…4000A			0.55	mΩ

■ Turn-on Data|开通特性

Symbol	Parameter name	Test conditions	Min	Typical	Max	
di_T/dt	Critical rate of rise of on-state current	T_{VJ} = 125°C, I_T =4000A, V_D = 2800V, f=0..500Hz	-	-	5000	A/μs
t_{don}	Turn-on delay time	T_{VJ} = 125℃, I_T = 5000A, V_D = 4000V, di /dt = V_D/L_i , C_{CL} =20μF, L_i = 3μH, L_{CL} = 0.3μH	-	-	3	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		-	-	3.3	J

■ Turn-off Data|关断特性

Symbol	Parameter	Conditions	Min	Typical	Max	
I_{TGQM}	Max.controllable turn-off current	T_{VJ} = 125℃, $V_{DM} \le V_{DRM}$, V D =4000V, L_{CL} = 0.3μH, C_{CL} = 20μF, R_S = 0.4Ω， f=0..300Hz D_{FWD} = D_{CL}= FY_B 1100-60	-	-	4000	A
t_{doff}	Turn-off delay time	T_{VJ} = 125℃, I_{TGQ} = 4000A, V_D =4000V, $V_{DM} \le V_{DRM}$, C_{CL} = 20μF, R_S = 0.4Ω, L_i =3μH, L_{CL} = 0.3μH D_{FWD} = D_{CL}= FYB 1100-60	-	-	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		-	442.5	46.3	J

■ Thermal Data|热特性

Symbol	Parameter name	Test conditions	Min	Typical	Max	
T_{VJ}	Junction operating temperature	/	0	-	125	℃
T_{STG}	Storage temperature range		-40		60	℃
R_{thJC}	Thermal resistance, junction-to-case	Double side cooled	-	-	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 name	Test 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	-	-	μs
$t_{off(min)}$	Min. off -time		40	-	-	μs
$P_{on\ CS}$	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

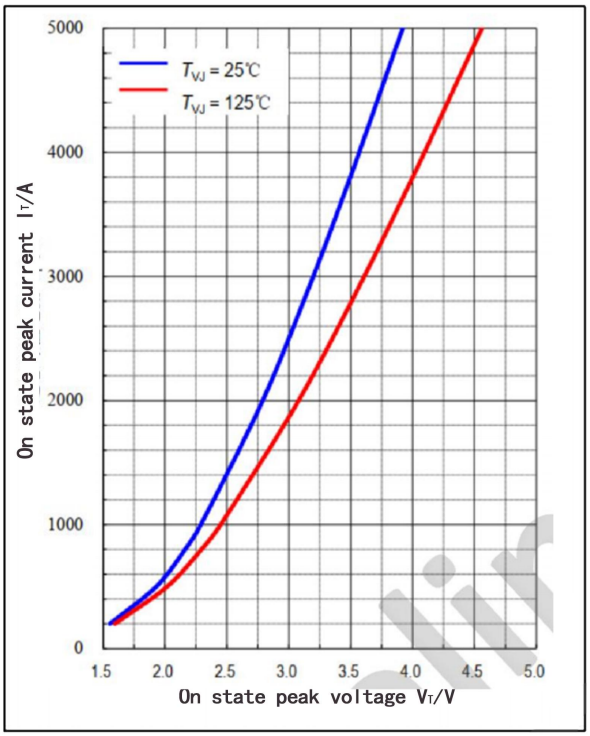


Fig.1 On-state Voltage Characteristics

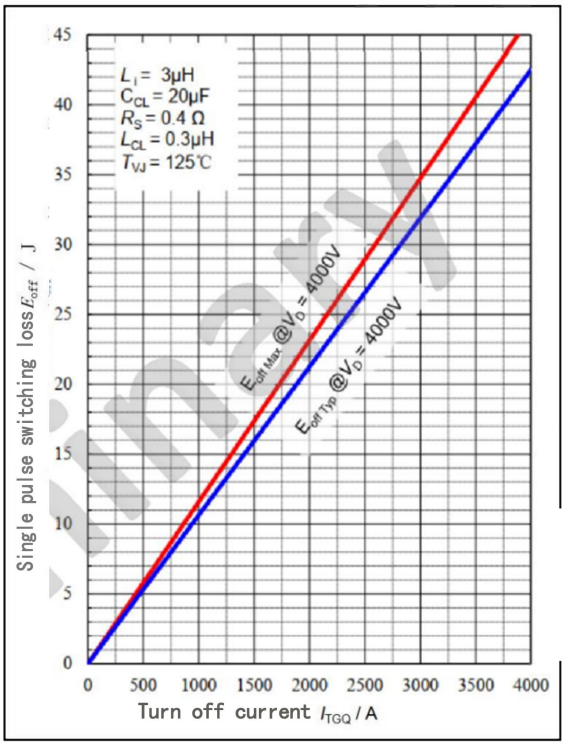


Fig.2 Turn-off Energy Per Pulse vs. Turn-off Current

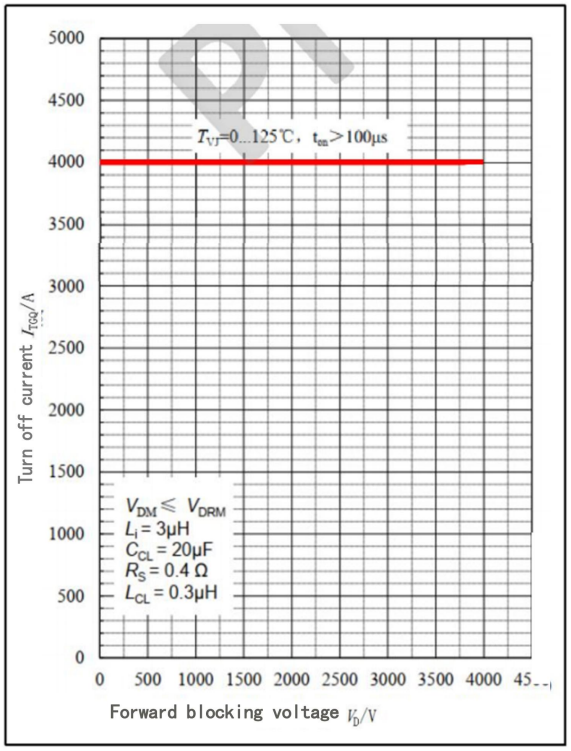


Fig.3 Safe Operating Area

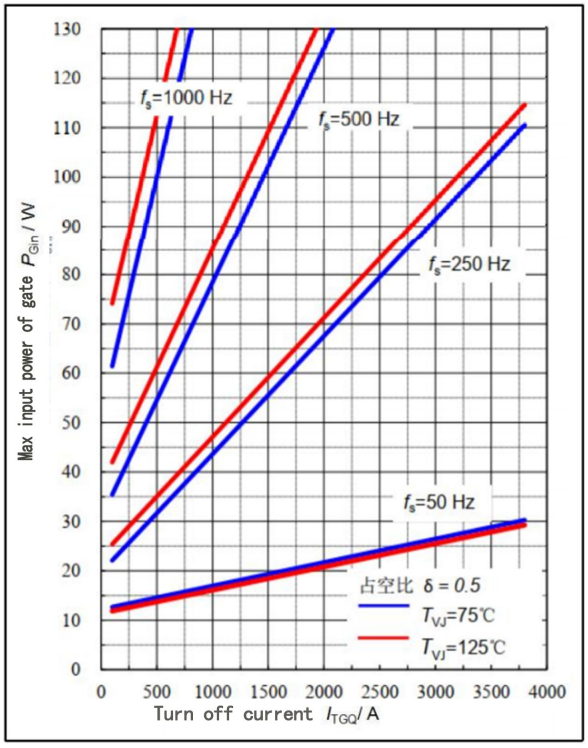


Fig.4 Max. Gate Unit Input Power In Chopper Mode

$$Z_{th(j-c)}(t) = \sum_{i=1}^{n} R_i(1-e^{-t/\tau_i})$$

i	1	2	3	4
R_i(K/kW)	5.562	1.527	0.868	0.545
τ_i(s)	0.5119	0.0896	0.0091	0.0024

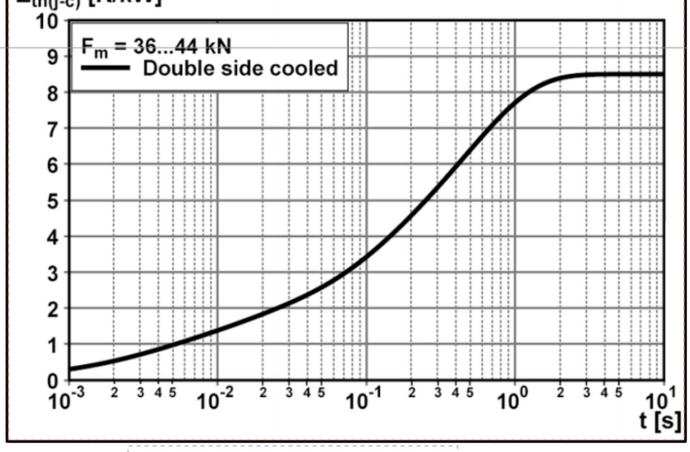


Fig.5 Transient Thermal Impedance vs. Time

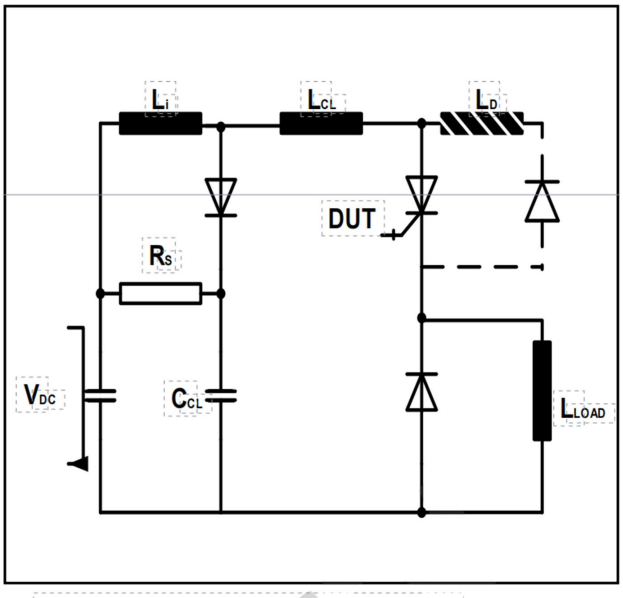


Fig.6 IGCT Test Circuit

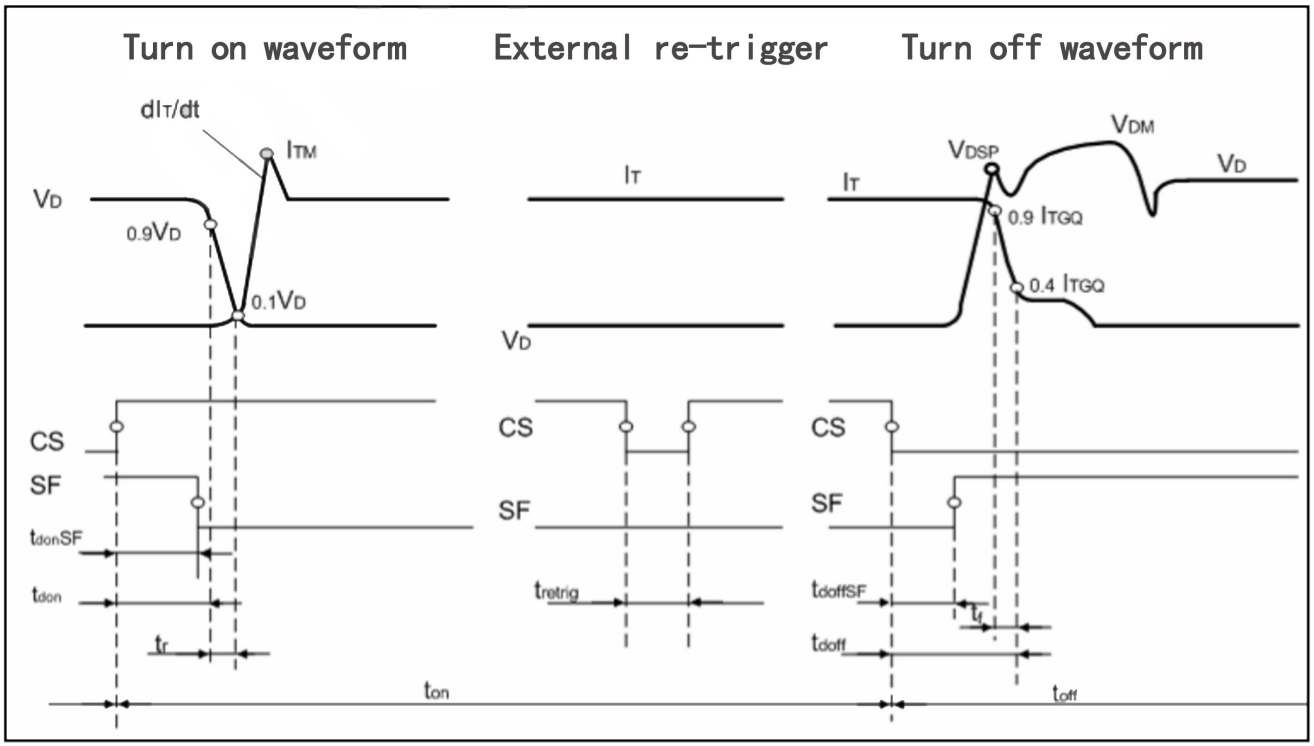


Fig.7 IGCT Voltage and Current waveforms

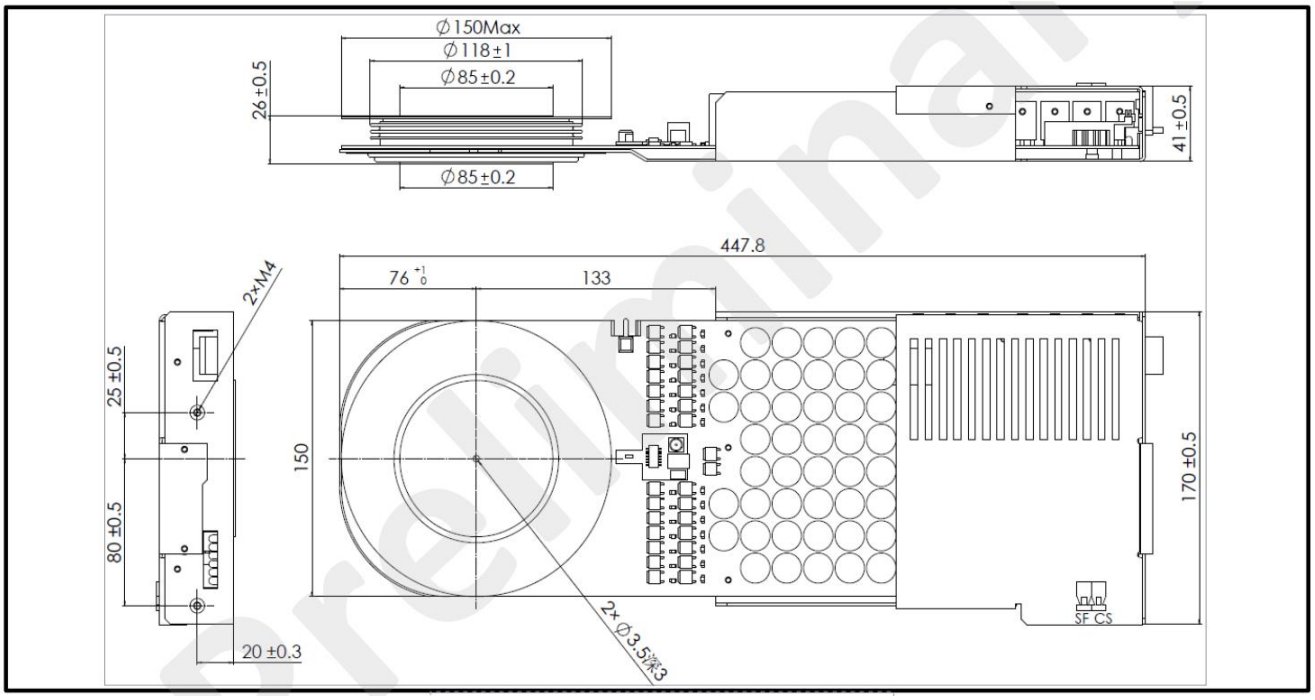


Fig.8 IGCT Outline Drawing (Unit: mm)

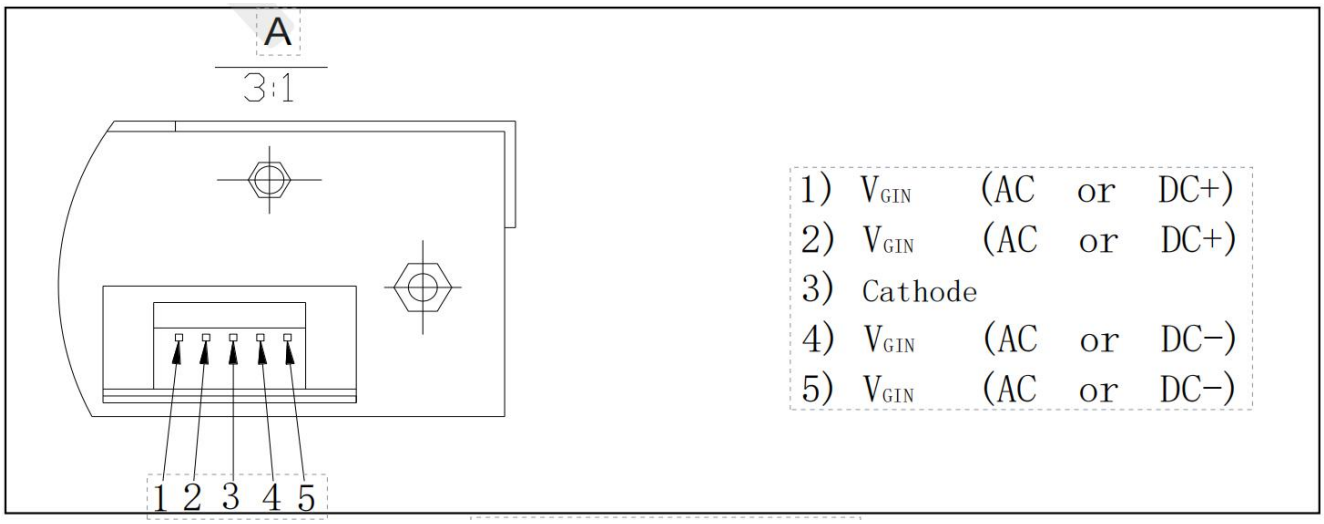


Fig.9 Pin Out of Power Supply Connector of Gate Unit