

Key Parameters

V_{DRM}	6000	V
I_{TGQM}	3000	A
I_{TSM}	27.5	kA
V_{TO}	1.50	V
r_T	0.650	mΩ
V_{DClink}	3600	V

Mechanical Data

Symbol	Parameter	min	typ	max	Unit
F	Mounting force	36	40	44	kN
D_p	Pole-piece diameter	-	85	-	mm
H	Housing thickness	-	26	-	mm
m	Weight	-	2.8	-	kg
D_s	Surface creepage distance	33	-	-	mm
D_a	Air strike distance	10	-	-	mm
l	Length	-	439	-	mm
h	Height	-	41.5	-	mm
w	Width	-	174	-	mm

Applications

- High power converter
- Motor drive equipment
- Flexible transmission system

Features

- With self turn-off capacity
- Low operation losses
- Be fit for application in series

Outline

Blocking Data

Symbol	Parameter	Conditions	min	typ	max	Unit
V_{DRM}	Rep. peak off-state voltage	Gate Unit energized, $T_{VJ}=125^{\circ}\text{C}$, $I_D \leq I_{DRM}$, $t_p=10\text{ms}$	-	-	6000	V
I_{DRM}	Rep. peak off-state current	Gate Unit energized, $T_{VJ}=125^{\circ}\text{C}$, $V_D=V_{DRM}$, $t_p=10\text{ms}$	-	-	50	mA
V_{DClink}	Permanent DC voltage for 100 FIT failure rate of GCT	Ambient cosmic radiation at sea level in open air, Gate Unit energized	-	-	3600	V
V_{RRM}	Reverse voltage		-	-	17	V

GCT data
On-State Data

Symbol	Parameter	Conditions	min	typ	max	Unit
$I_{T(AV)}$	Max. average on-state current	Half sine wave, $T_C=85^{\circ}\text{C}$	-	-	1300	A
$I_{T(RMS)}$	Max. RMS on-state current	Double side cooled	-	-	2000	A
I_{TSM}	Max. peak non-repetitive surge on-state current	$t_p=10\text{ms}$, $T_{VJ}=125^{\circ}\text{C}$, Half sine wave, after surge: $V_D=V_R=0$	-	-	27.5	kA
I^2t	Limiting load integral		-	-	512	$10^4\text{A}^2\text{s}$
V_{TM}	On-state voltage	$T_{VJ}=125^{\circ}\text{C}$, $I_T=3000\text{A}$	-	3.00	3.40	V
V_{TO}	Threshold voltage	$T_{VJ}=125^{\circ}\text{C}$, $I_T=1000\text{...}5000\text{A}$	-	-	1.50	V
r_T	Slope resistance		-	-	0.65	mΩ

Turn-on

Symbol	Parameter	Conditions	min	typ	max	Unit
di_T/dt	Critical rate of rise of on-state current	$T_{VJ}=125^{\circ}\text{C}$, $I_T=2000\text{A}$, $V_D=3600\text{V}$, $f=0\text{...}500\text{Hz}$	-	-	1000	A/μs
t_{don}	Turn-on delay time		-	-	3	μs
t_{donSF}	Turn-on delay time status feedback	$T_{VJ}=125^{\circ}\text{C}$, $I_T=2000\text{A}$, $V_D=3600\text{V}$, $di/dt=V_D/L_i$, $C_{CL}=10\text{μF}$, $R_S=0.4\text{Ω}$,	-	-	7	μs
t_r	Rise time	$L_i=4\text{μH}$, $L_{CL}=0.3\text{μH}$	-	-	1	μs
E_{on}	Turn-on energy per pulse		-	1	1.5	J

Turn-off

Symbol	Parameter	Conditions	min	typ	max	Unit
I_{TGQM}	Max. controllable turn-off current	$T_{VJ} = 125\text{ }^{\circ}\text{C}$, $V_{DM} \leq V_{DRM}$, $V_D = 2800\text{ V}$, $L_{CL} = 0.3\text{ }\mu\text{H}$, $C_{CL} = 10\mu\text{F}$, $R_S = 0.4\Omega$	-	-	3000	A
t_{doff}	Turn-off delay time	$T_{VJ} = 125\text{ }^{\circ}\text{C}$, $I_{TGQ} = 4000\text{ A}$, $V_D = 3600\text{ V}$, $V_{DM} \leq V_{DRM}$, $C_{CL} = 10\text{ }\mu\text{F}$, $R_S = 0.4\text{ }\Omega$, $L_i = 3\text{ }\mu\text{H}$, $L_{CL} = 0.3\text{ }\mu\text{H}$	-	-	7	μs
t_{doffSF}	Turn-off delay time status feedback		-	-	7	μs
t_f	Max. current falling time		-	-	1	μs
E_{off}	Turn-off energy per pulse		-	16.5	20	J

Thermal Data

Symbol	Parameter	Conditions	min	typ	max	Unit
T_{VJ}	Junction operation temperature		0	-	125	$^{\circ}\text{C}$
T_{STG}	Storage temperature range	/	-40	-	60	$^{\circ}\text{C}$
T_{AMB}	Ambient operational temperature		0	-	50	$^{\circ}\text{C}$
R_{thJC}	Thermal resistance junction-to-case of GCT	Double side cooled	-	-	0.0085	K/W
R_{thCH}	Thermal resistance case-to-heatsink of GCT		-	-	0.0030	K/W

Gate Unite

Symbol	Parameter	Conditions	min	typ	max	Unit
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Power supply

$V_{GIN\text{ RMS}}$	Gate Unit voltage	AC square wave amplitude(15~100kHz) or DC voltage.No galvanic isolation to power circuit.	28	-	40	V
$P_{GIN\text{ MAX}}$	Gate Unit power consumption	/	-	-	100	W
$I_{GIN\text{ MIN}}$	Min. current for powering up	Min.average current supplied by charged Gate unit	2.1	-	-	A
$I_{GIN\text{ MAX}}$	Internal current limitation	Rectified average current limited by Gate Unit	-	-	8	A
$X1$	Gate Unit power connector	/	AMP:MTA-156			

Optical Control input/output

$t_{on(min)}$	Min. on-time	/	40	-	-	μs
$t_{off(min)}$	Min. off-time		40	-	-	μs
$P_{on\text{ CS}}$	Optical input power	Valid for 1mm plastic optical fiber(POF)	-15	-	-1	dBm
$P_{off\text{ CS}}$	Optical noise power		-	-	-45	dBm
$P_{on\text{ SF}}$	Optical output power		-19	-	-1	dBm
$P_{off\text{ SF}}$	Optical noise power		-	-	-50	dBm
$t_{G\text{ LITCH}}$	Pluse width threshold	Max. pulse width without response	-	-	400	ns
t_{retrig}	External retrigger pulse width	/	700	-	1100	ns
CS	CS reciever	Agilent, type:HFBR-2529Z				
SF	SF transmitter	Agilent, type:HFBR-1528Z				

Visual Feedback

LED1(green)	Gate OFF	"Light" when GCT is off
LED2(yellow)	Gate ON	"Light" when gate-current is flowing
LED3(red)	Fault	"Light" when not ready/Failure
LED4(green)	Power supply voltage OK	"Light" when power supply is within specified range

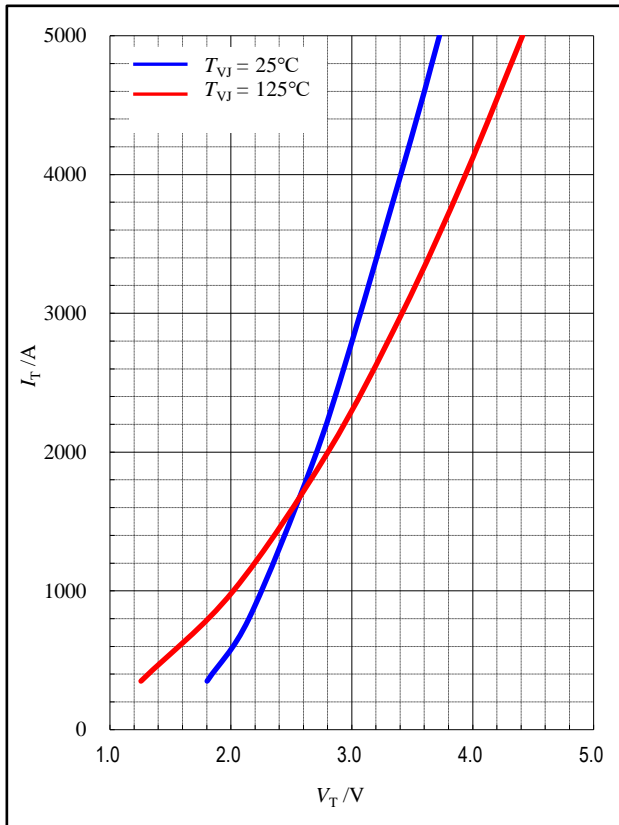


Fig.1 On-state voltage characteristics

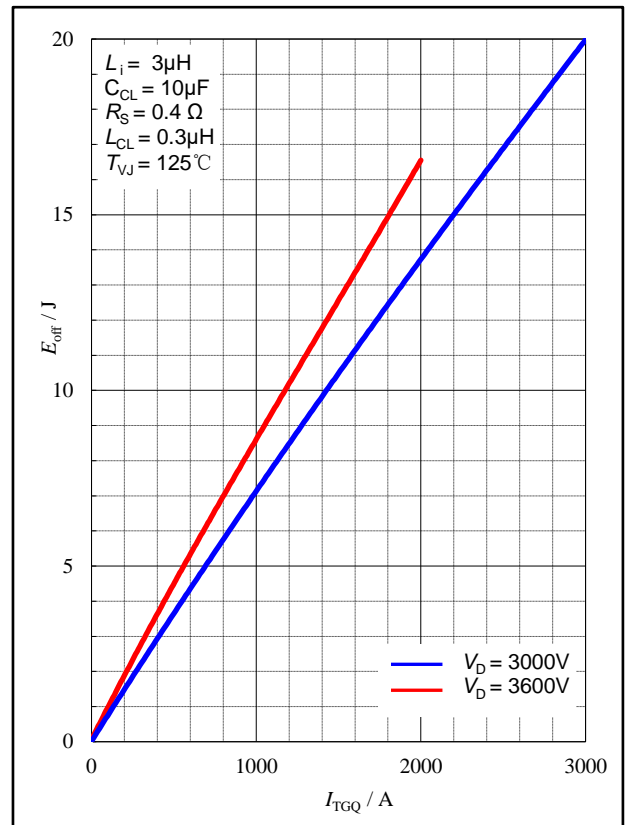


Fig.2 Turn-off energy per pulse vs. turn-off current

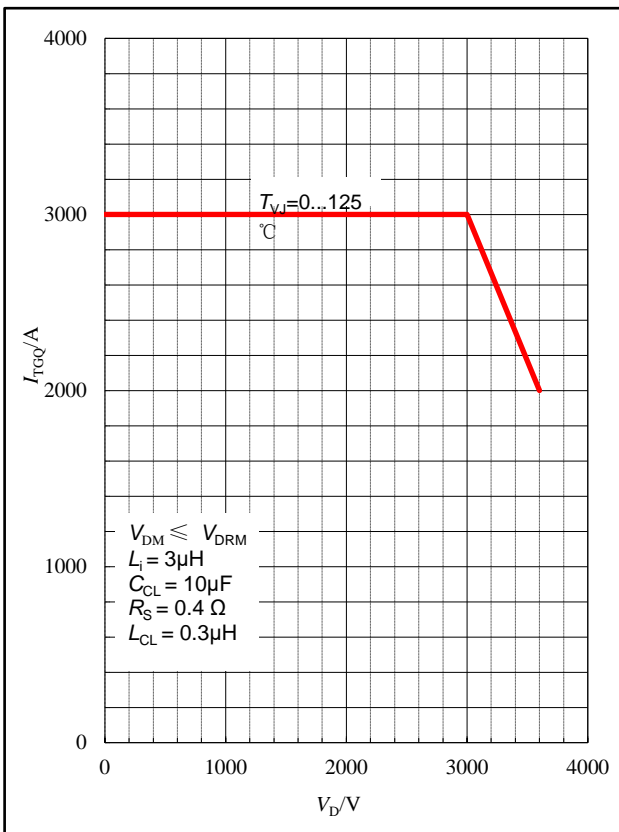


Fig.3 Safe operating area

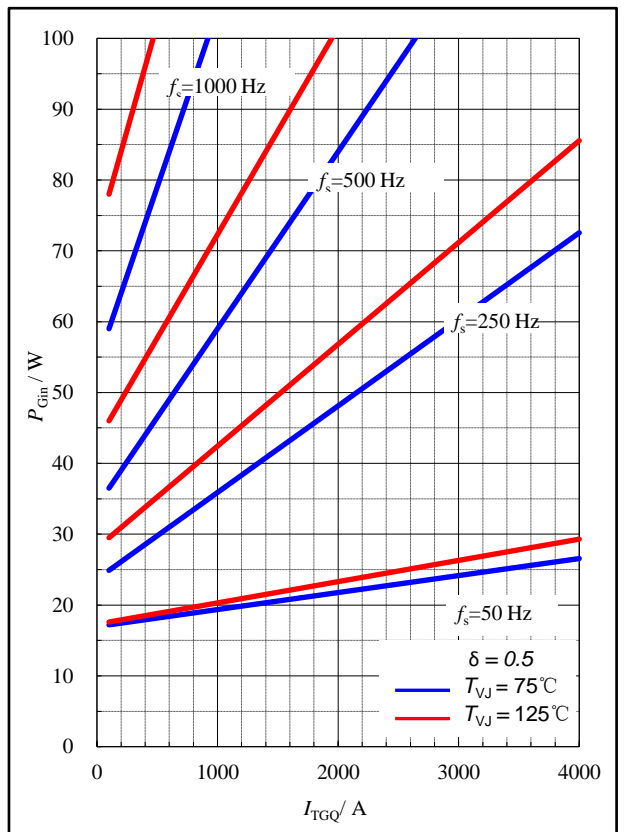


Fig.4 Max. Gate unit input power in chopper mode

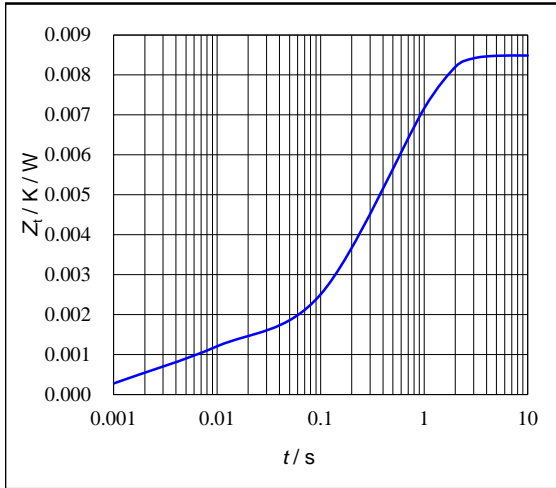


Fig.5 Transient thermal impedance vs. time

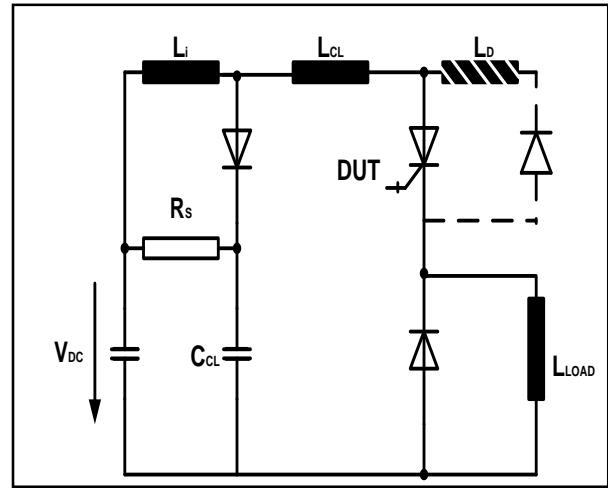


Fig.6 IGCT test circuit

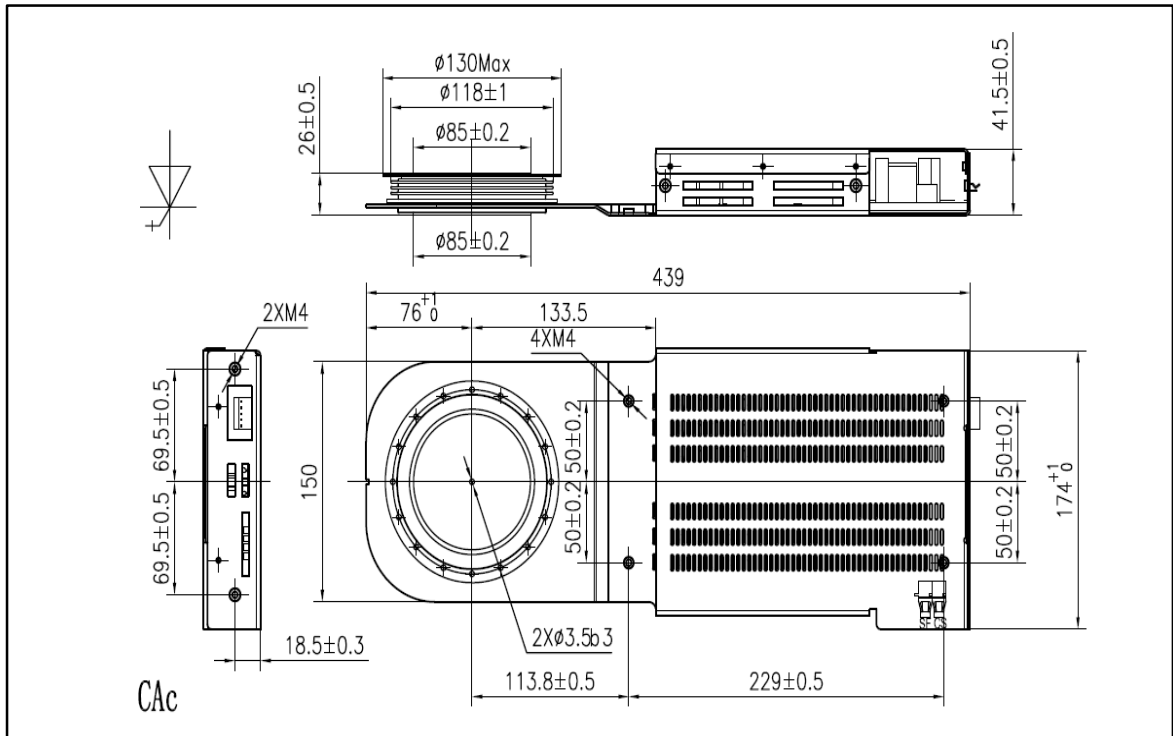


Fig.7 IGCT outline(Unit: mm)

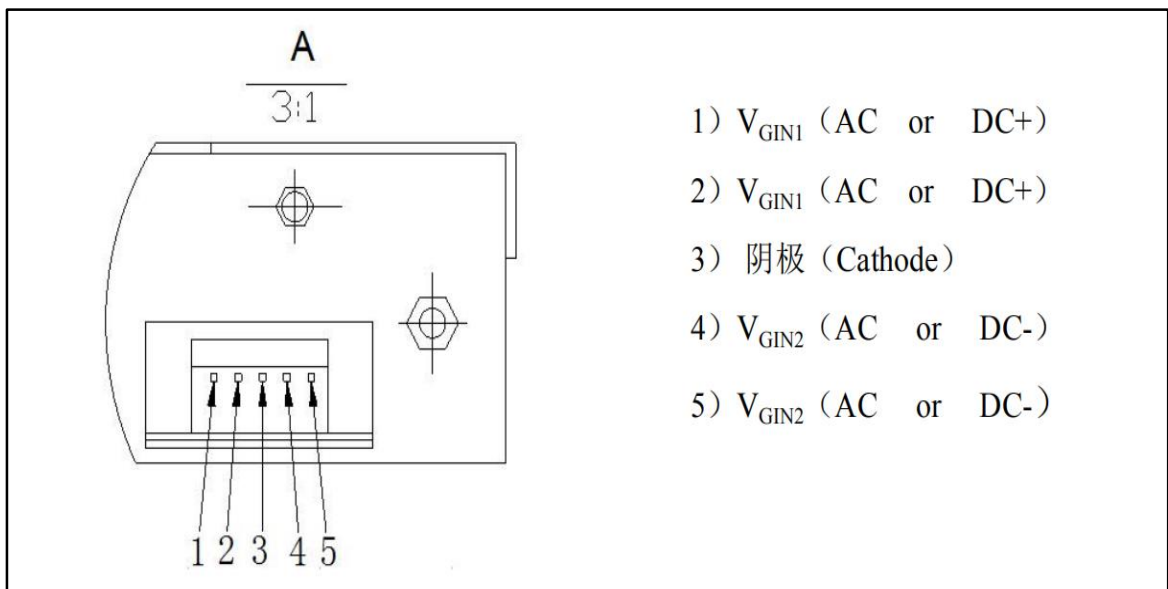


Fig.8 Gate Unit Power connector

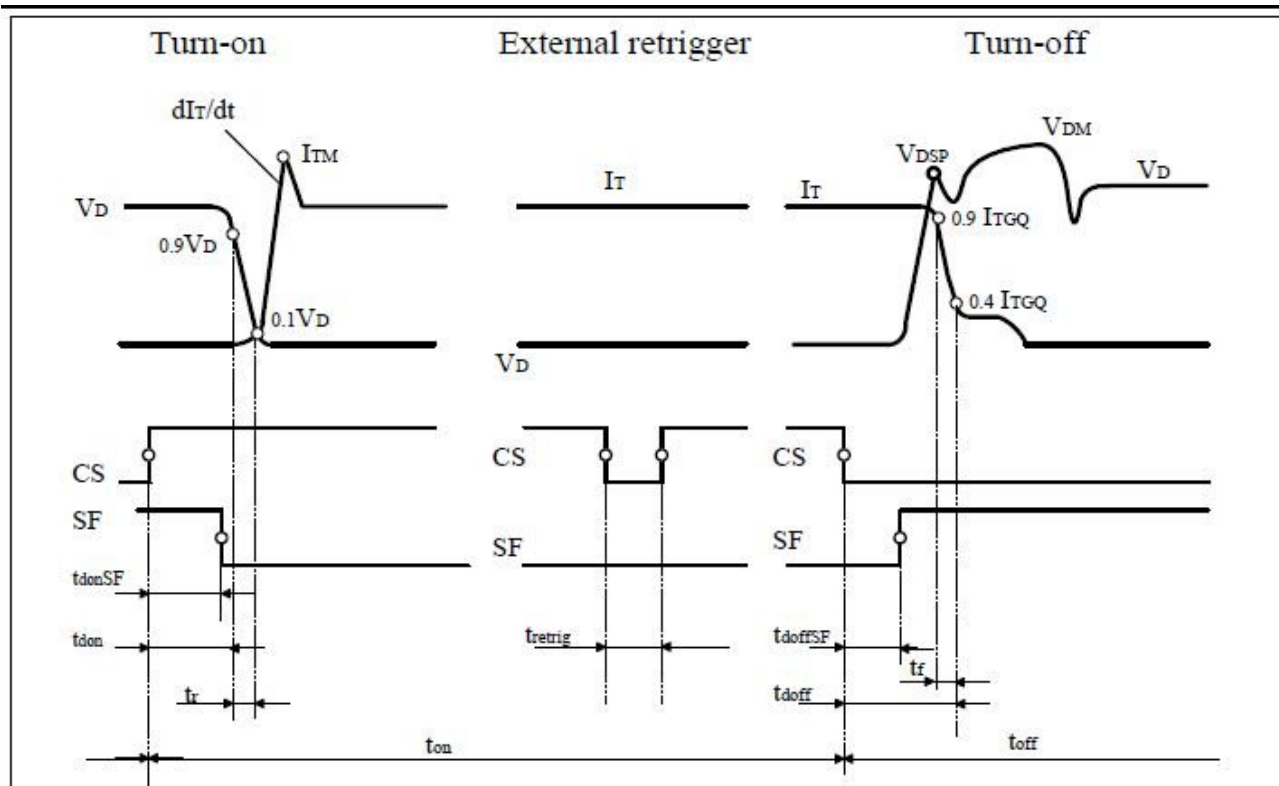


Fig.9 General current and voltage waveforms of IGCT

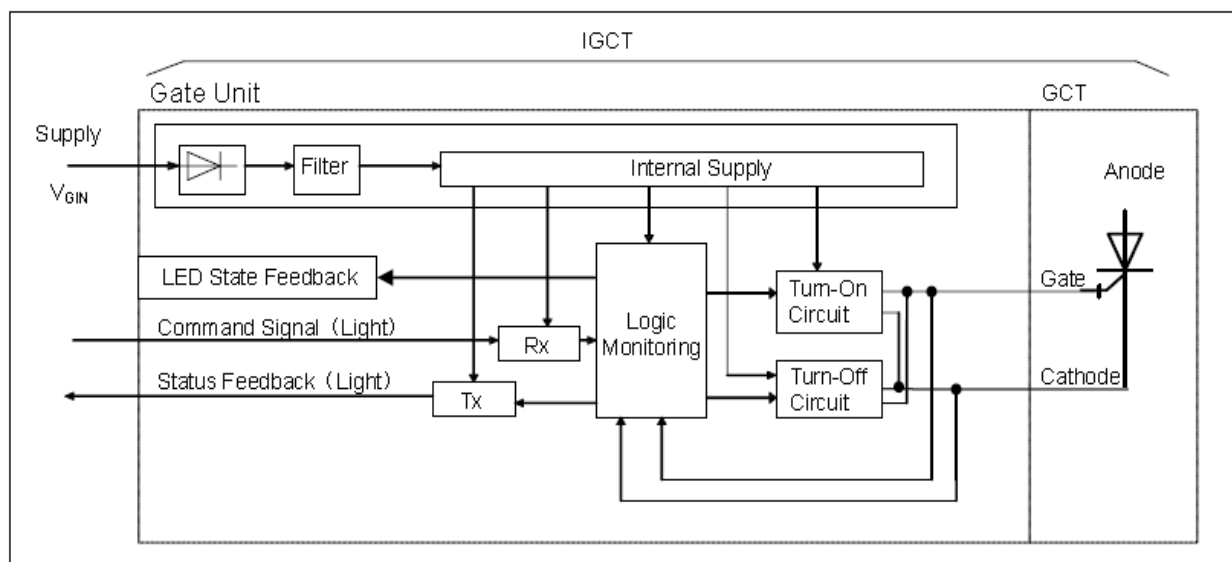


Fig.10 Block diagram of an IGCT Gate Unit