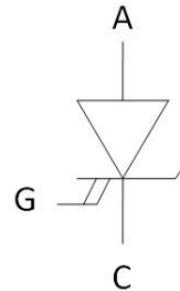




## Integrated Gate Turn-off (IGTO) Thyristor

### FEATURES

- High snubberless turn-off (4000A) capability
- Suitable for high frequency (>1kHz) operation
- Low gate drive power consumption
- Built-in over-current protection
- Optical trigger input and status feedback
- Suitable for series and parallel operation



Product Summary	
$V_{DRM}$	4500V
$I_{TGQM}$	4000A
$I_{TSM}$	25kA
$V_{TO}$	1.2V
$V_{Dclink}$	2800V

Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ , unless otherwise noted				
Parameter	Symbol	Test Conditions	Value	Unit
Rep. Peak Off-state Voltage	$V_{DRM}$	Gate Unit Energized	4500	V
Long Term DC Voltage	$V_{Dclink}$	Ambient Cosmic Radiation at Sea Level in Open Air. Gate Unit Energized	2800	V
Rep. Peak Off-state Current	$I_{DRM}$	$V_D = V_{DRM}$ , Gate Unit Energized	50	mA

Thermal Resistance					
Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
Junction Operating Temperature	$T_{VJ}$	-25	--	125	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-25	--	60	$^\circ\text{C}$
Ambient Temperature	$T_A$	-25	--	50	$^\circ\text{C}$
Thermal Resistance Junction to Case (Double side cooling)	$R_{th(J-C)}$	--	--	12.7	K/kW
Thermal Resistance Case to Heatsink (Double side cooling)	$R_{th(C-H)}$	--	--	3	K/kW



Specifications $T_A = 25^\circ\text{C}$ , unless otherwise noted							
Parameter	Symbol	Test Conditions	Value			Unit	
			Min.	Typ.	Max.		
<b>Static</b>							
Max. Peak Non-repetitive Surge Current	$I_{TSM}$	$T_J = 125^\circ\text{C}$	$T_P = 10\text{ms}$	--	--	25	KA
			$T_P = 1\text{ms}$	--	--	40	
On-state Voltage	$V_T$	$T_J = 125^\circ\text{C}, I_{TGQ} = 2000\text{A}$	--	2.7	2.9	V	
Max. Average On-state Current	$I_{T(AV)M}$	Half Sine Wave, $T_C = 85^\circ\text{C}$ , Double Side Cooling	--	--	1700	A	
Threshold Voltage	$V_{T0}$	$T_J = 125^\circ\text{C}, I_T = 1000\text{...}4000\text{A}$	--	--	1.2	V	
<b>Turn-on Process</b>							
Max. Rate of Rise of On-state Current	$di/dt$	$V_{DM} < V_{DRM}, T_J = 125^\circ\text{C}$ $V_D = 2250\text{V}$	--	1000	--	A/ $\mu\text{s}$	
Turn-on Delay Time	$T_{don}$	$V_{DM} < V_{DRM}, T_J = 125^\circ\text{C}$ $V_D = 2250\text{V}, I_{TGQ} = 4000\text{A}$	--	--	4	$\mu\text{s}$	
Rise Time	$T_r$		--	--	1	$\mu\text{s}$	
Min. On-time	$T_{on(min.)}$		40	--	--	$\mu\text{s}$	
<b>Turn-off Process</b>							
Max. Controllable Turn-off Current	$I_{TGQM}$	$V_{DM} < V_{DRM}, T_J = 125^\circ\text{C}$ $V_D = 2250\text{V}$	--	--	4000	A	
Turn-off Delay Time	$T_{doff}$	$V_{DM} < V_{DRM}, T_J = 125^\circ\text{C}$ $V_D = 2250\text{V}, I_{TGQ} = 4000\text{A}$	--	--	4	$\mu\text{s}$	
Fall Time	$T_f$		--	--	0.8	$\mu\text{s}$	
Min. Off-time	$T_{off(min.)}$		40	--	--	$\mu\text{s}$	

Power Supply of Gate Unit							
Parameter	Symbol	Test Conditions	Value			Unit	
			Min.	Typ.	Max.		
Power Supply Voltage	$V_G$	AC Square Wave Amplitude (15kHz-100kHz) or DC Voltage. NO Galvanic Isolation to Power Circuit	28	35	40	V	
Gate Unit Power Consumption	$P_G$	$f = 1\text{kHz}, \delta = 0.5$	--	--	30	W	



Power Supply of Gate Unit			
Parameter	Symbol	Test Conditions	Connector Description
Receiver for Command Signal	CS	Light Trigger On	HFBR-2521
Transmitter for Status Feedback	SF	Light Output During On-state	HFBR-1521
Transmitter for Current Sensor Output	IS	PWM Light During On-state for Current Through	HFBR-1521
Transmitter for Temperature Sensors Output	TP	PWM Light for Temperature of ETO Cathode	HFBR-1521
Fault Feedback		YES	

Sensor Characteristics	
Symbol	Typical Formula
Duty_I	$Duty\_I = 0.000107 \times I_T + 0.5$
Duty_T	$Duty\_T = 0.0033 \times T + 0.5$

Protection Characteristics				
Parameter	Symbol	Test Conditions	Default Setting	Unit
Over-current Protection	Foc	Anode Current Exceeds Max Setting Value, Set by (1-4KA Adjustable)	3000	A

Protection Characteristics			
Parameter	Symbol	Description	Color
Power Supply Voltage OK	LED1	"light" When Power Supply is OK.	Green
Over-current Protection	LED2	"light" When ETO is Protected.	Red

Power supply of gate unit						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Mounting Force	Fm	--	36	40	44	KN
Weight	M	--	--	3	--	Kg



Figure 1. Duty\_I vs. Current

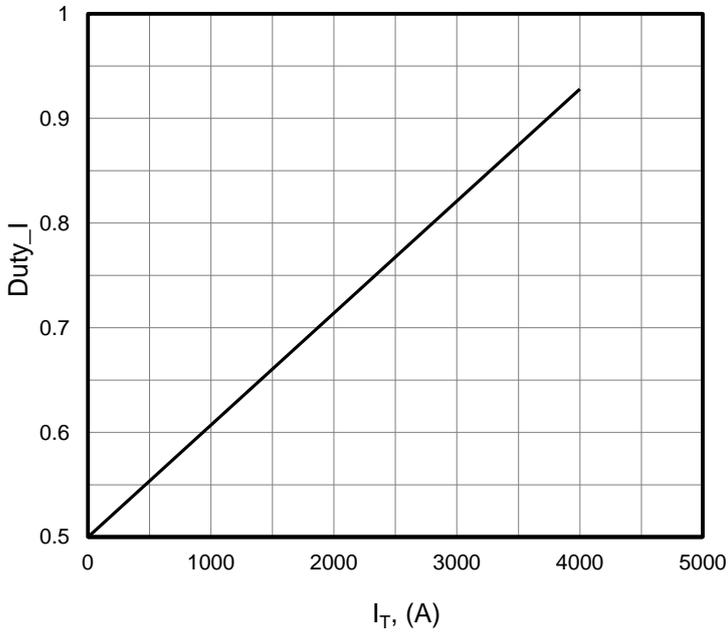


Figure 2. Duty\_T vs. Temperature

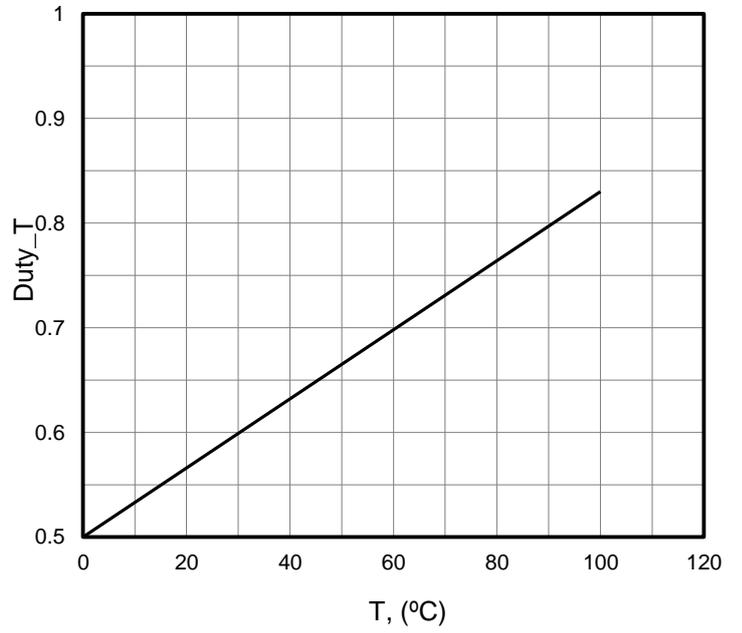


Figure 3. On-state characteristics

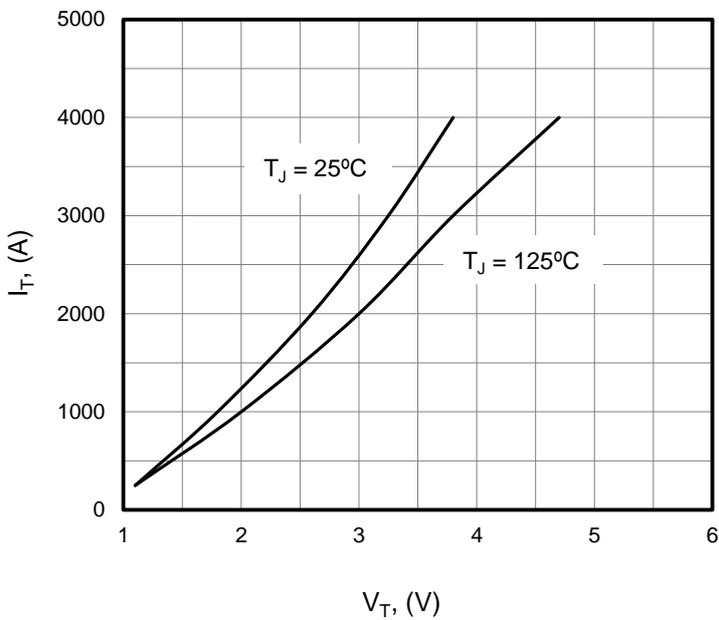


Figure 4. Turn-off loss

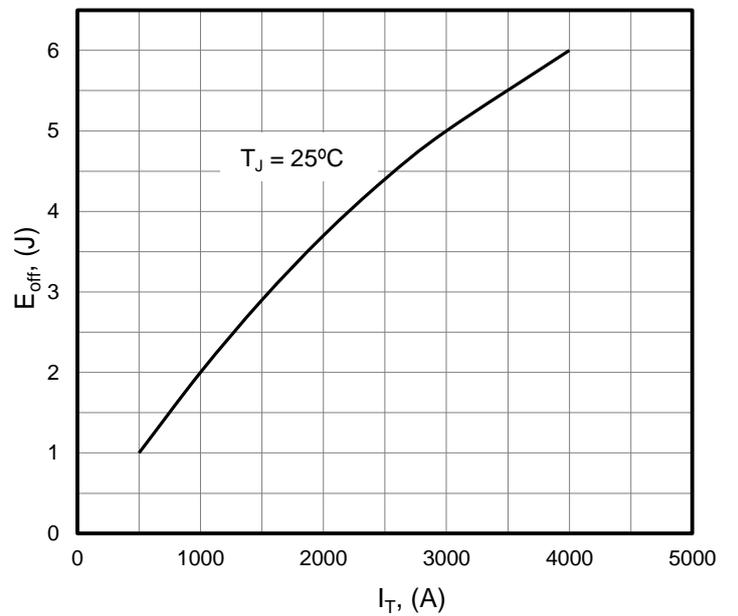




Figure 5. Gate Unit input power

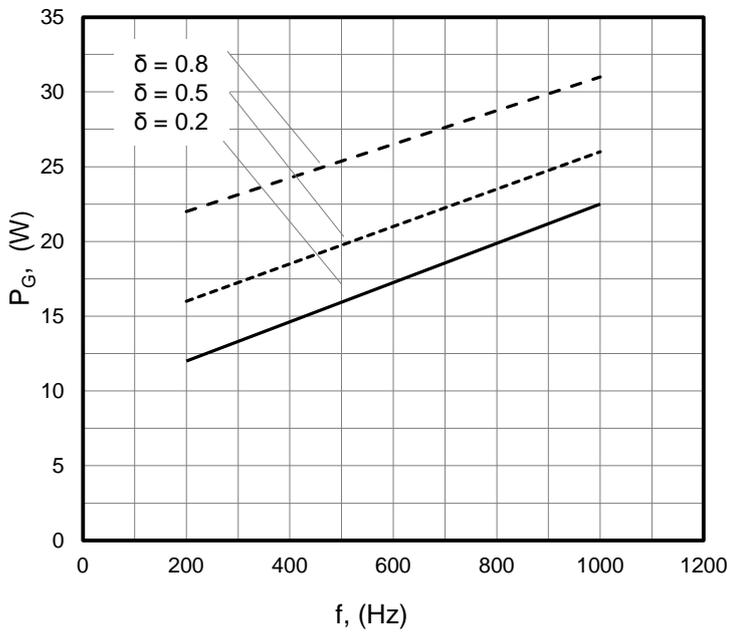




Figure 6. Outline Drawing (all dimensions are in MM)

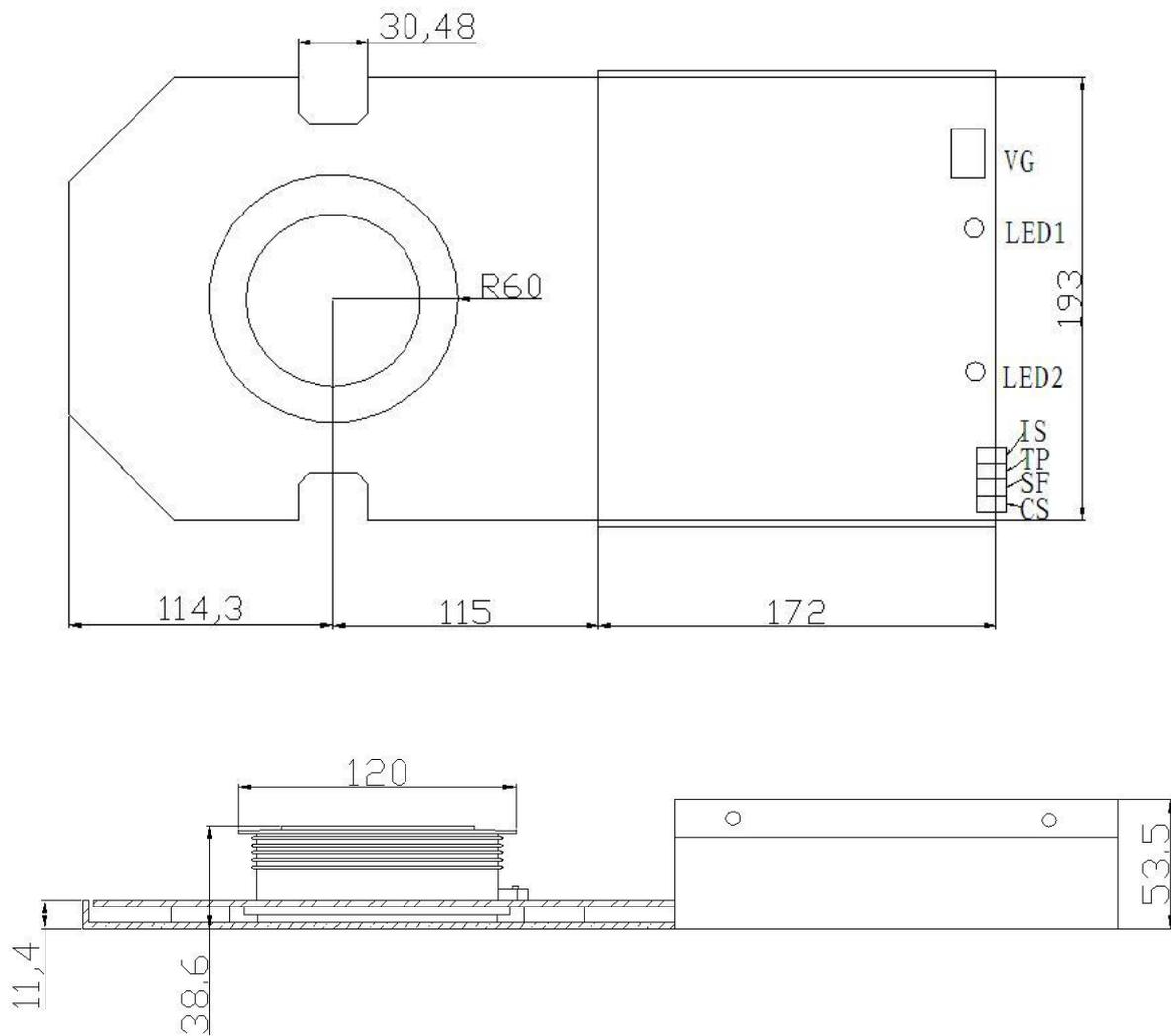
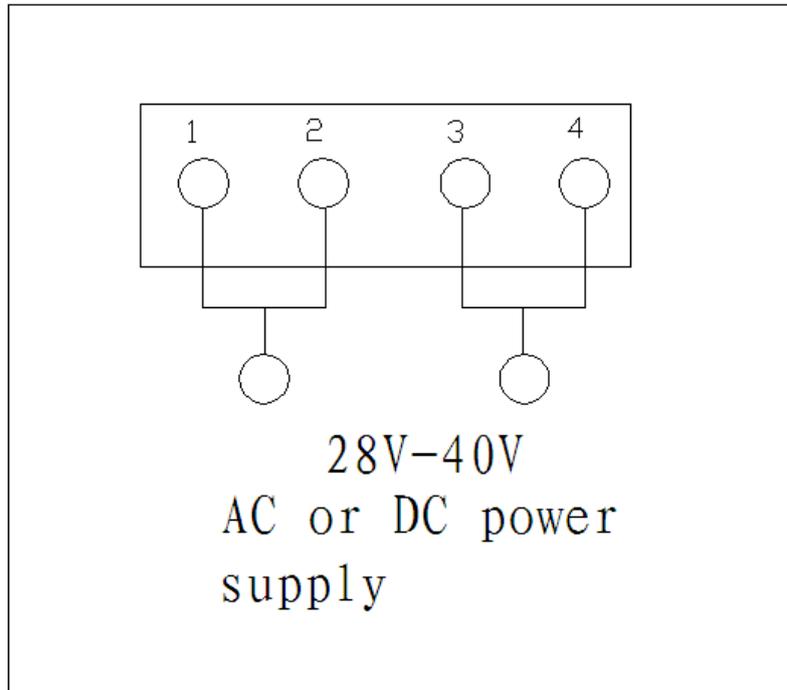




Figure 7. Explanation of power supply terminal





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