

# DCR1576SY

## PHASE CONTROL THYRISTOR

### APPLICATIONS

- High Power Drives.
- High Voltage Power Supplies.
- DC Motor Control.

### KEY PARAMETERS

$V_{DRM}$	5000V
$I_{T(AV)}$	1770A
$I_{TSM}$	40000A
$dV/dt^*$	1000V/ $\mu$ s
$di/dt$	300A/ $\mu$ s

\*Higher dV/dt selections available

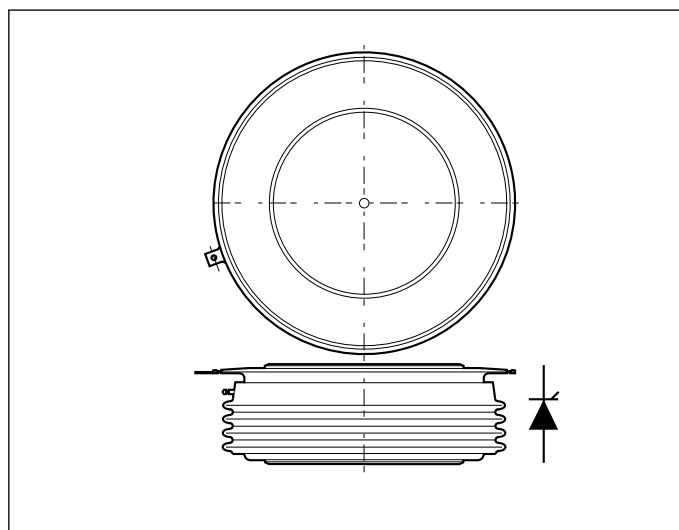
### FEATURES

- Double Side Cooling.
- High Surge Capability.
- High Mean Current.
- Fatigue Free.

### VOLTAGE RATINGS

Type Number	Repetitive Peak Voltages $V_{DRM}$ $V_{RRM}$	Conditions
DCR1576SY5050	5000	$T_{vj} = 0^\circ \text{ to } 125^\circ\text{C}$ , $I_{DRM} = I_{RRM} = 500\text{mA}$ , $V_{DRM}$ $V_{RRM}$ $t_p = 10\text{ms}$ , $V_{DSM}$ & $V_{RSM} =$ $V_{DRM}$ & $V_{RRM} + 100\text{V}$ Respectively
DCR1576SY4848	4800	
DCR1576SY4646	4600	
DCR1576SY4444	4400	
DCR1576SY4242	4200	
DCR1576SY4040	4000	

Lower voltage grades available.



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### CURRENT RATINGS

Symbol	Parameter	Conditions	Max.	Units
<b>Double Side Cooled</b>				
$I_{T(AV)}$	Mean on-state current	Half wave resistive load, $T_{case} = 80^\circ\text{C}$	1770	A
$I_{T(RMS)}$	RMS value	$T_{case} = 80^\circ\text{C}$	2700	A
$I_T$	Continuous (direct) on-state current	$T_{case} = 80^\circ\text{C}$	2500	A
<b>Single Side Cooled (Anode side)</b>				
$I_{T(AV)}$	Mean on-state current	Half wave resistive load, $T_{case} = 80^\circ\text{C}$	1120	A
$I_{T(RMS)}$	RMS value	$T_{case} = 80^\circ\text{C}$	1760	A
$I_T$	Continuous (direct) on-state current	$T_{case} = 80^\circ\text{C}$	1510	A

## SURGE RATINGS

Symbol	Parameter	Conditions	Max.	Units
$I_{TSM}$	Surge (non-repetitive) on-state current	10ms half sine; $T_{case} = 125^{\circ}C$ $V_R = 50\% V_{RRM}$ - 1/4 sine	32.0	kA
$I^2t$	$I^2t$ for fusing		$5.12 \times 10^6$	A <sup>2</sup> s
$I_{TSM}$	Surge (non-repetitive) on-state current	10ms half sine; $T_{case} = 125^{\circ}C$ $V_R = 0$	40.0	kA
$I^2t$	$I^2t$ for fusing		$8.0 \times 10^6$	A <sup>2</sup> s

## THERMAL AND MECHANICAL DATA

Symbol	Parameter	Conditions		Min.	Max.	Units
$R_{th(j-c)}$	Thermal resistance - junction to case	Double side cooled	dc	-	0.0095	°C/W
		Single side cooled	Anode dc	-	0.019	°C/W
			Cathode dc	-	0.019	°C/W
$R_{th(c-h)}$	Thermal resistance - case to heatsink	Clamping force 50.0kN with mounting compound	Double side	-	0.002	°C/W
			Single side	-	0.004	°C/W
$T_{vj}$	Virtual junction temperature	On-state (conducting)		-	135	°C
		Reverse (blocking)		-	125	°C
$T_{stg}$	Storage temperature range			-55	150	°C
-	Clamping force			45.0	55.0	kN

## DYNAMIC CHARACTERISTICS

Symbol	Parameter	Conditions		Min.	Max.	Units
V <sub>TM</sub>	Maximum on-state voltage	At 6500A peak, T <sub>case</sub> = 25°C		-	2.9	V
I <sub>RRM</sub> /I <sub>DRM</sub>	Peak reverse and off-state current	At V <sub>RRM</sub> /V <sub>DRM</sub> , T <sub>case</sub> = 125°C		-	300	mA
dV/dt	Maximum linear rate of rise of off-state voltage	To 67% V <sub>DRM</sub> T <sub>j</sub> = 125°C.		-	1000	V/μs
dI/dt	Rate of rise of on-state current	From 67% V <sub>DRM</sub> to 2x I <sub>T(AV)</sub> Gate source 20V, 20Ω t <sub>r</sub> < 1μs.	Repetitive 50Hz	-	150	A/μs
			Non-repetitive	-	300	A/μs
V <sub>T(TO)</sub>	Threshold voltage	At T <sub>vj</sub> = 125°C		-	1.05	V
r <sub>T</sub>	On-state slope resistance	At T <sub>vj</sub> = 125°C		-	0.34	mΩ
t <sub>gd</sub>	Delay time	V <sub>D</sub> = 67% V <sub>DRM</sub> , Gate source 30V, 15Ω Rise time 0.5μs, T <sub>j</sub> = 25°C		-	2.5	μs
I <sub>L</sub>	Latching current	T <sub>j</sub> = 25°C, V <sub>D</sub> = 5V		-	550	mA
I <sub>H</sub>	Holding current	T <sub>j</sub> = 25°C, R <sub>g-k</sub> = ∞		-	150	mA
t <sub>q</sub>	Turn-off time	I <sub>T</sub> = 800A, t <sub>p</sub> = 1ms, T <sub>j</sub> = 125°C, V <sub>RM</sub> = 50V, dI <sub>RR</sub> /dt = 20A/μs, V <sub>DR</sub> = 67% V <sub>DRM</sub> , dV <sub>DR</sub> /dt = 20V/μs linear		1.0	-	ms

\*Typical value.

## GATE TRIGGER CHARACTERISTICS AND RATINGS

Symbol	Parameter	Conditions	Typ.	Max.	Units
$V_{GT}$	Gate trigger voltage	$V_{DRM} = 5V$ , $T_{case} = 25^{\circ}C$	-	3.0	V
$I_{GT}$	Gate trigger current	$V_{DRM} = 5V$ , $T_{case} = 25^{\circ}C$	-	300	mA
$V_{GD}$	Gate non-trigger voltage	At $V_{DRM}$ , $T_{case} = 125^{\circ}C$	-	0.25	V
$V_{FGM}$	Peak forward gate voltage	Anode positive with respect to cathode	-	30	V
$V_{FGN}$	Peak forward gate voltage	Anode negative with respect to cathode	-	0.25	V
$V_{RGM}$	Peak reverse gate voltage		-	5	V
$I_{FGM}$	Peak forward gate current	Anode positive with respect to cathode	-	30	A
$P_{GM}$	Peak gate power	$t_p = 100\mu s$	-	150	W
$P_{G(AV)}$	Mean gate power		-	10	W

CURVES

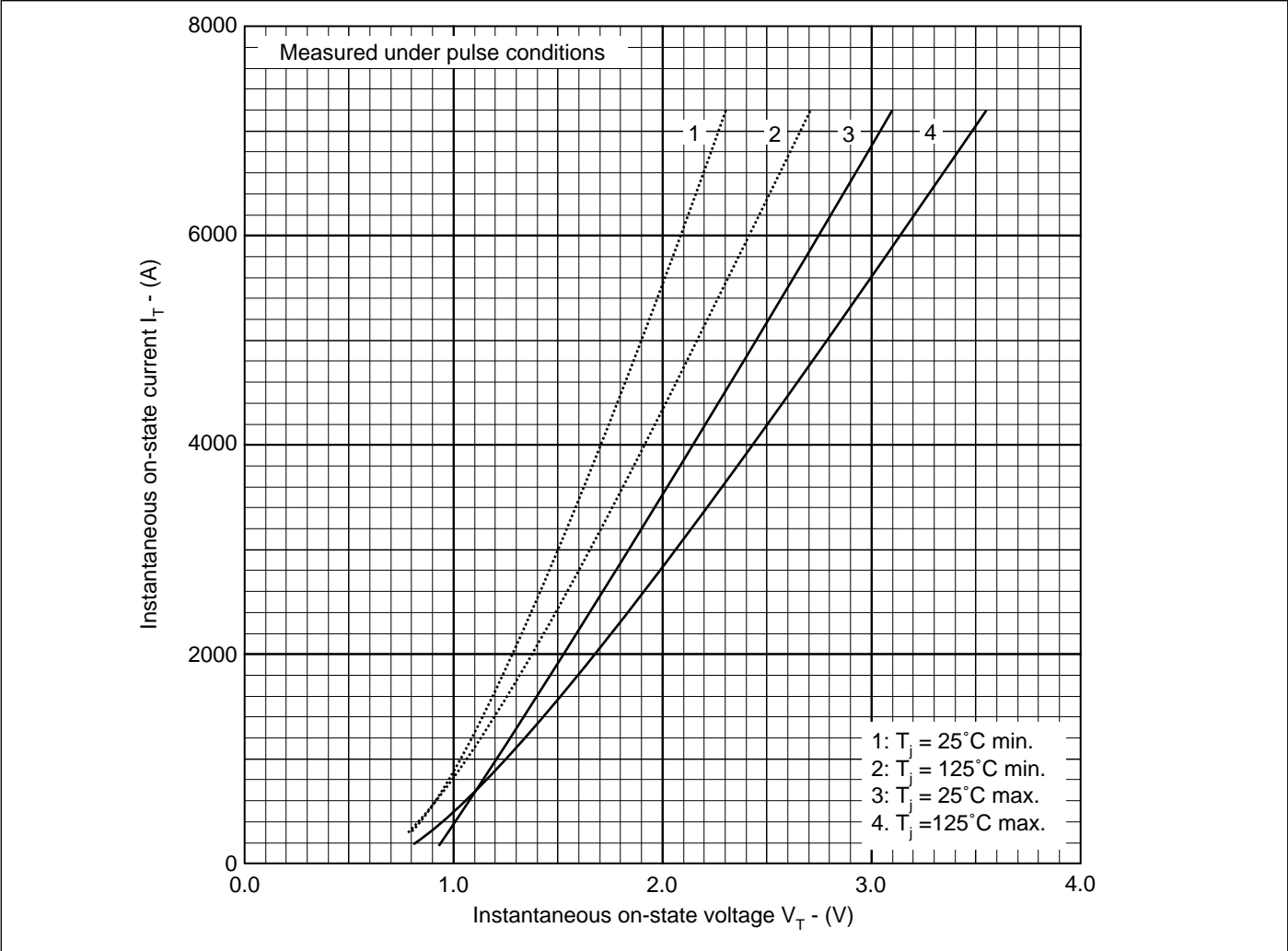
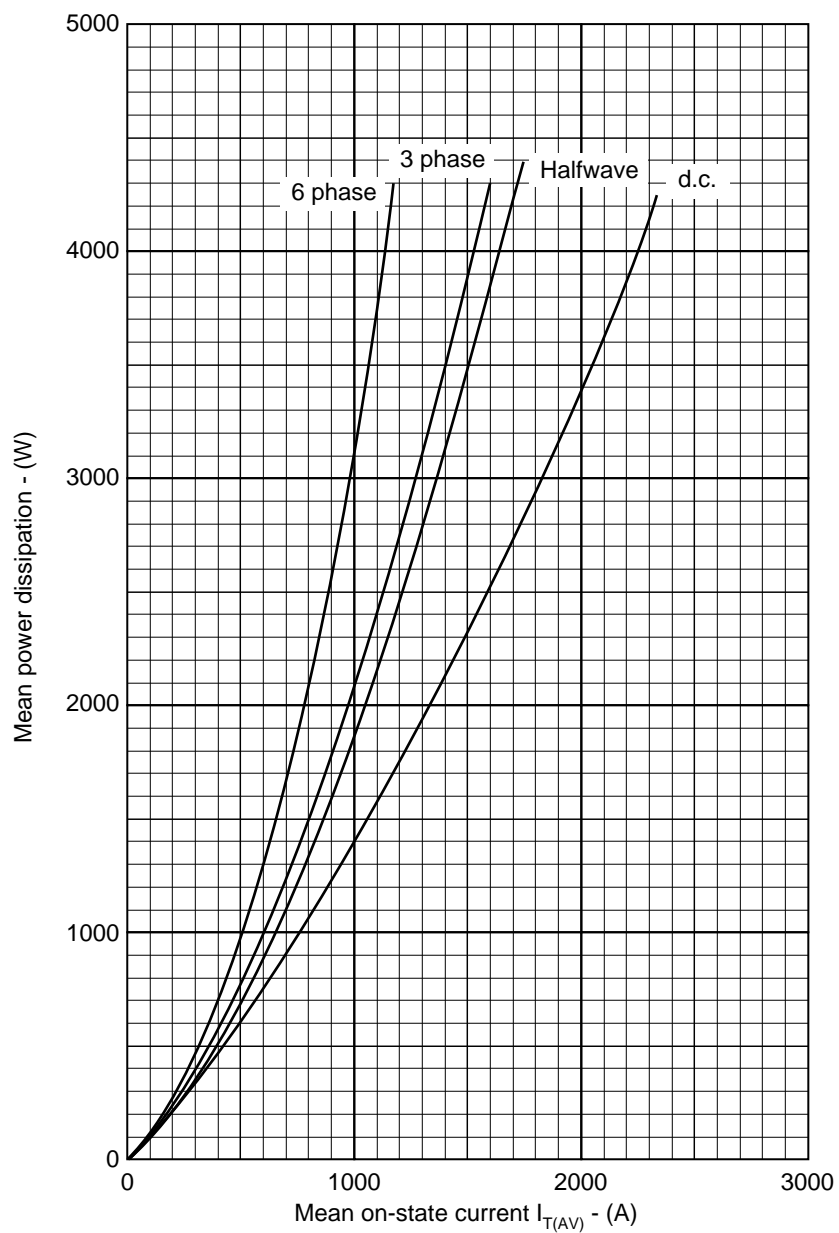


Fig.1 Maximum (limit) on-state characteristics



**Fig.2 Dissipation curves**

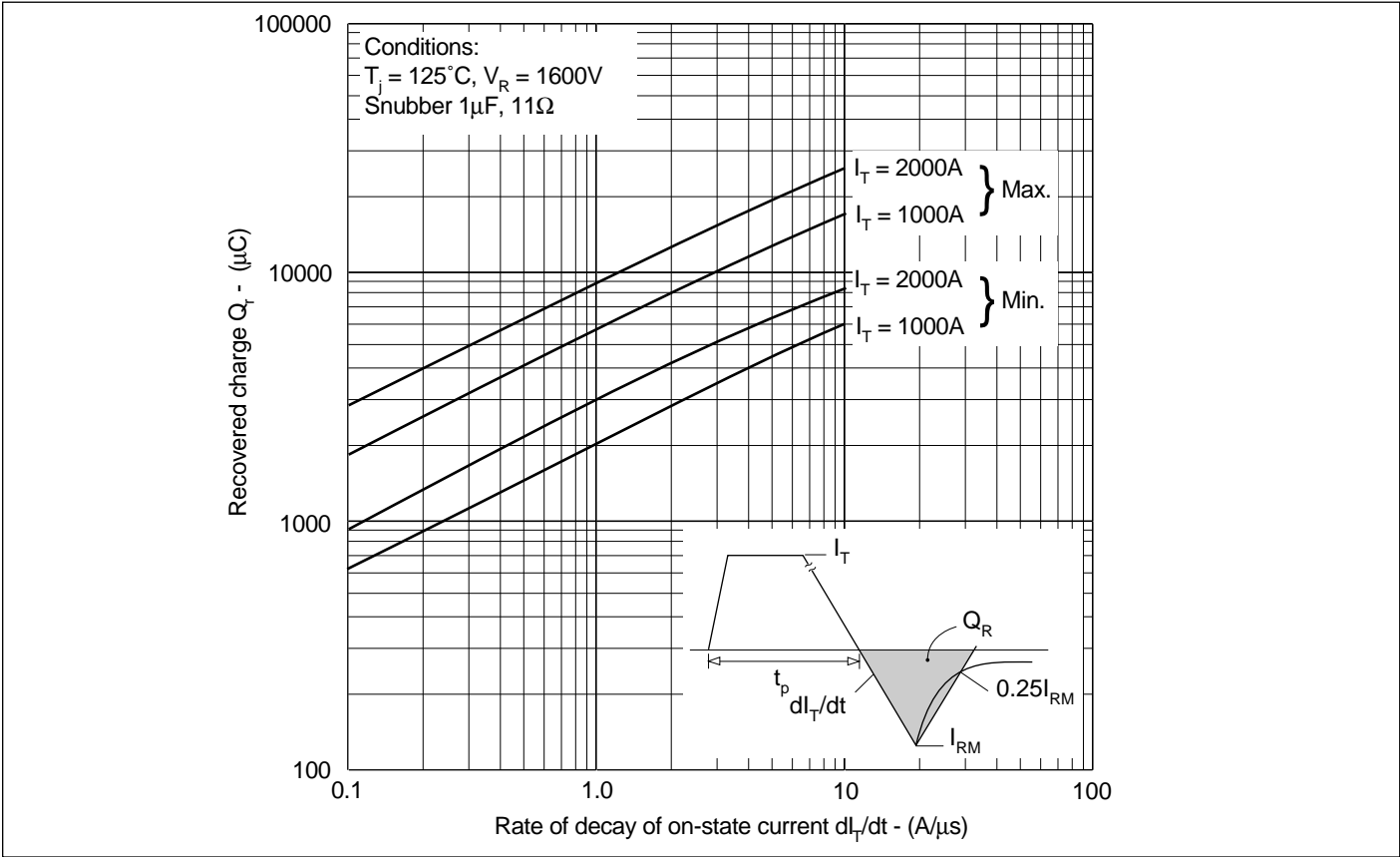


Fig.3 Recovered charge

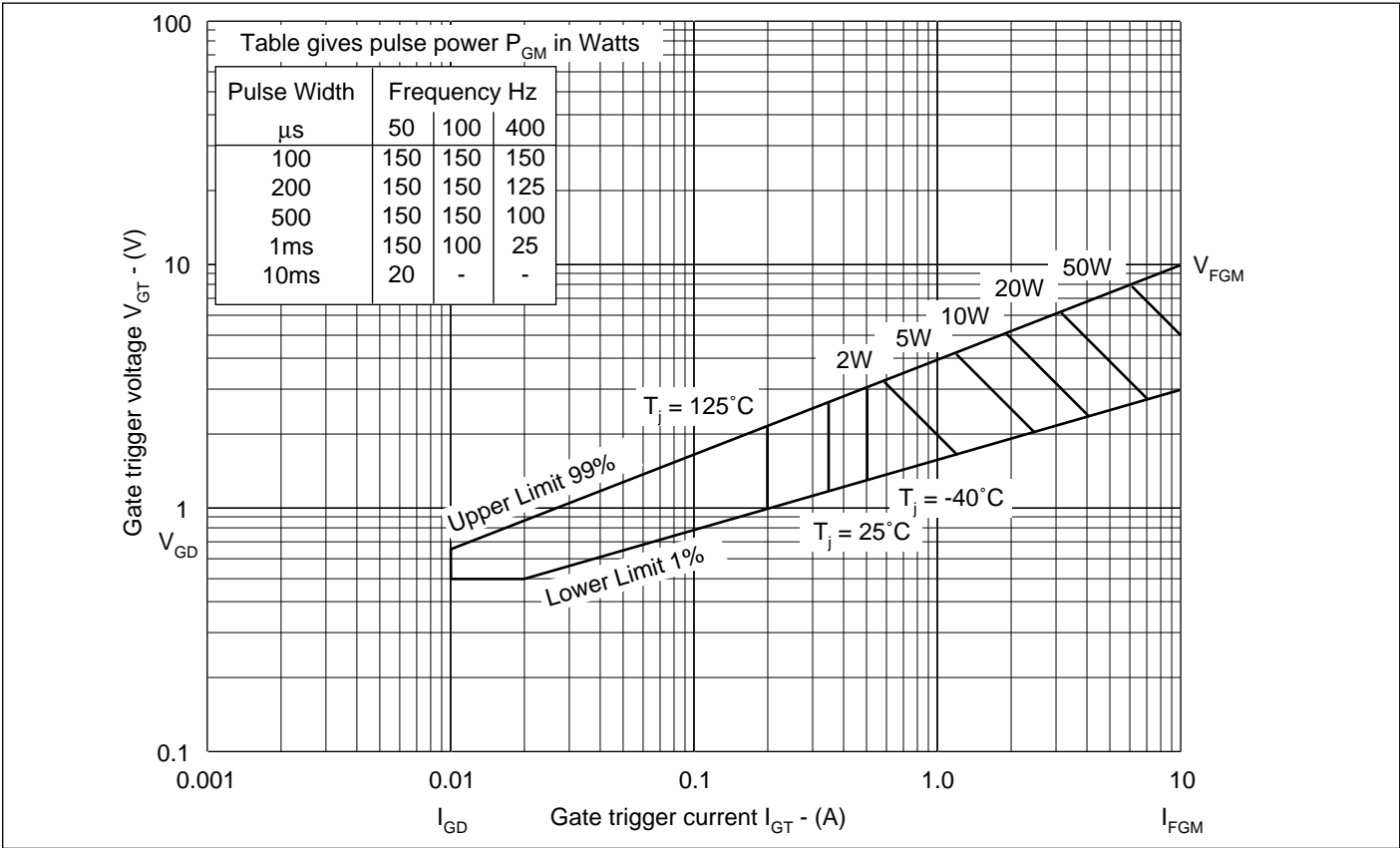


Fig.4 Gate characteristics

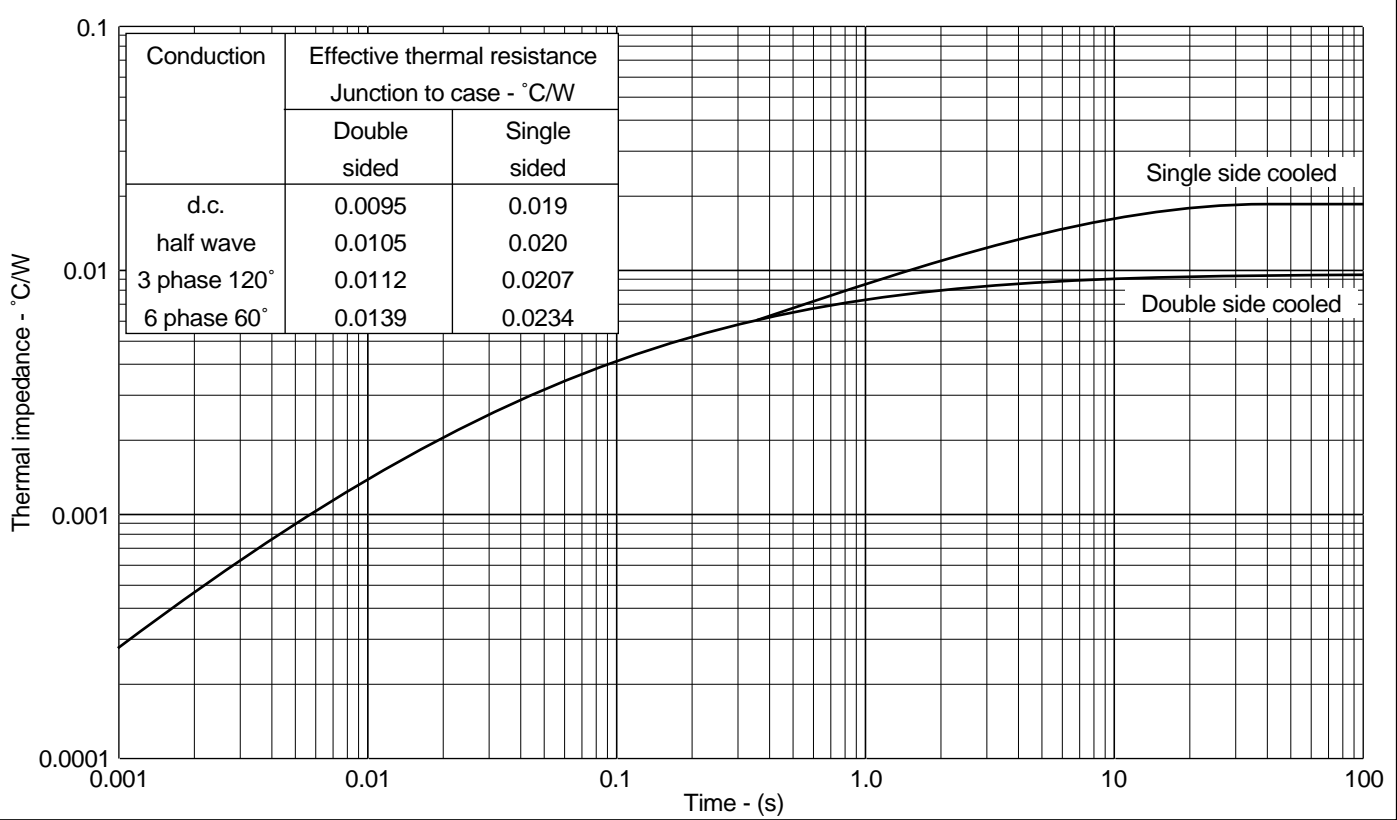


Fig.5 Maximum (limit) transient thermal impedance - junction to case - (°C/W)

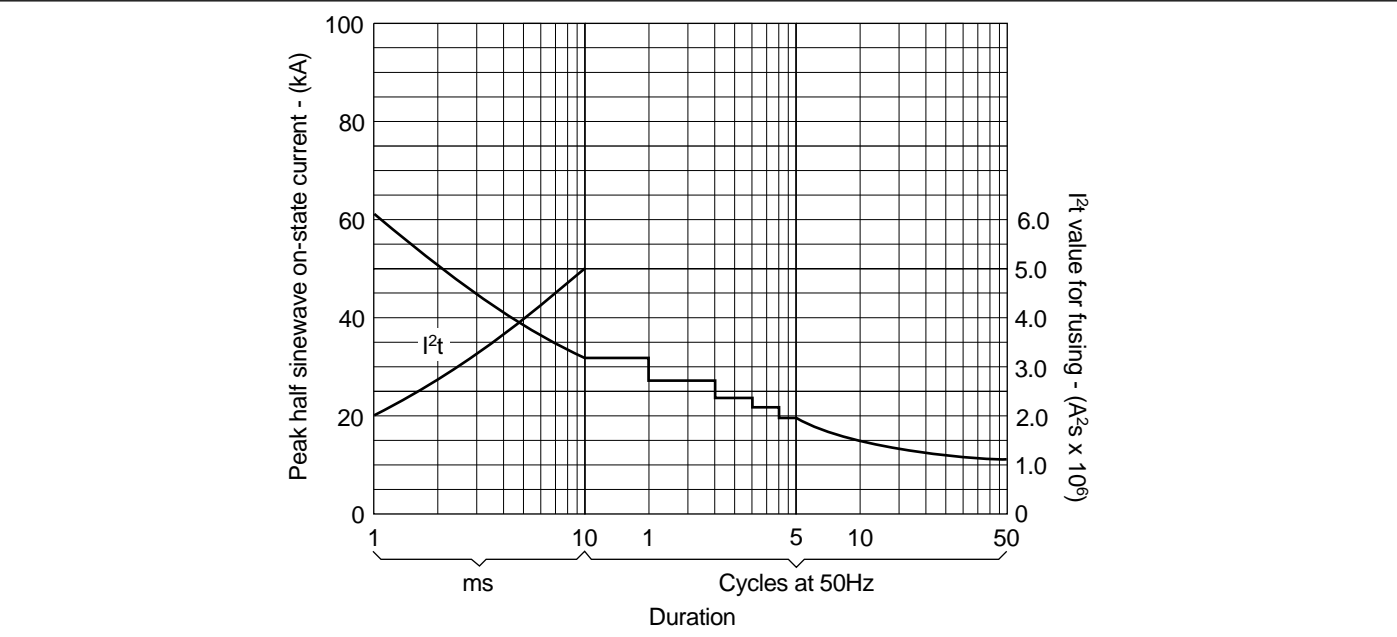
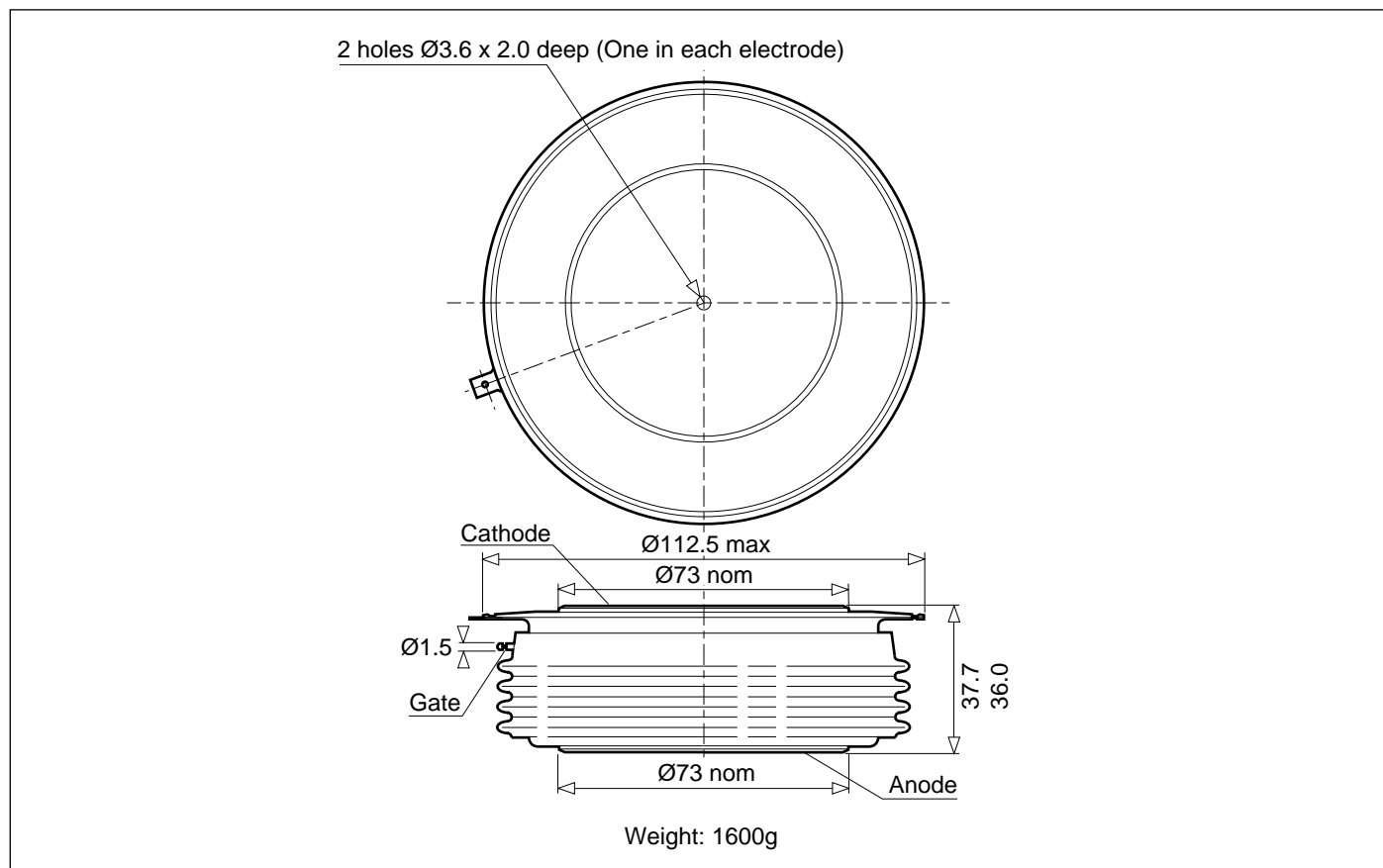


Fig.6 Surge(non-repetitive) on-state current vs time

**PACKAGE DETAILS - Y**

For further package information, please contact your local Customer Service Centre. All dimensions in mm, unless stated otherwise. DO NOT SCALE.

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