CSG25H2500

High-end Power Semiconductor Manufacturer

Gate Turn-off Thyristor

FEATURES

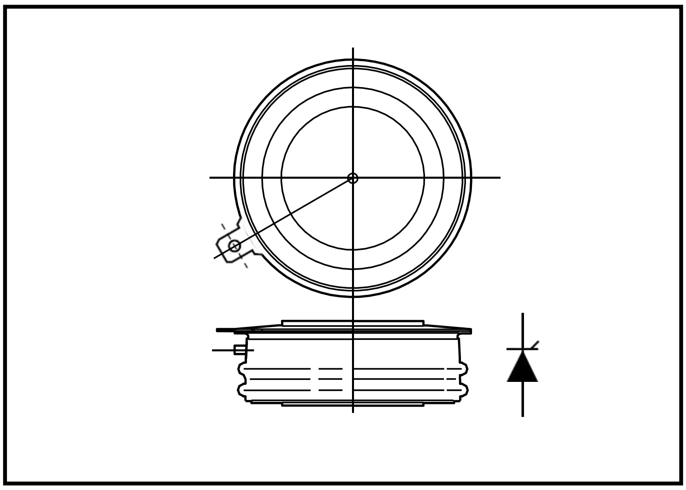
- Double Side Cooling
- High Voltage Capability
- Fault Protection Without Fuses
- High Surge Current Capability
- Turn-off Capability Allows Reduction in Equipment Size and Weight. Low Noise Emission Reduces Acoustic Cladding Necessary

KEY PARAMETERS

V_{DRM}	**2500V**
$I_{T(AV)}$	**865A**
I_{TCM}	**2500A**
dV_D/dt	**1000V/µs**
dI_T/dt	**300A/µs**

APPLICATIONS

- Variable speed AC motor drive inverters (VSD-AC)
- High Voltage Converters
- Choppers
- DC/DC Converters



Outline type code: H.
See Package Details for further information

VOLTAGE RATINGS

Type Number	Repetitive Peak Off-state Voltage V_{DRM} (V)	Repetitive Peak Reverse Voltage V_{RRM} (V)	Conditions
CSG25H2500	2500	17	T_{vj} = 125°C, I_{DM} =50mA, I_{RRM} = 50mA

CURRENT RATINGS

Symbol	Parameter	Conditions	Max.	Units
I_{TCM}	Repetitive peak controllable on-state current	$V_D = V_{DRM}$, T_j = 125°C, dI_{GQ}/dt = 40A/ s, C_S = 6.0 F	2500	A
$I_{T(AV)}$	Mean on-state current	T_{HS} = 80°C, Double side cooled. Half sine 50Hz	865	A
$I_{T(RMS)}$	RMS on-state current	T_{HS} = 80°C, Double side cooled. Half sine 50Hz	1360	A

SURGE RATINGS

Symbol	Parameter	Test Conditions	Max.	Units
I_{TSM}	Surge (non repetitive) on-state current	10ms half sine. T_j = 125°C	16.0	kA
I^2t	I^2t for fusing	10ms half sine. T_j = 125°C	1.40	MA^2s
di_T/dt	Critical rate of rise of on-state current	V_D = 1500V, I_T = 2000A, T_j = 125°C, I_{FG} > 30A, Rise time > 1.0 s	300	A/ s
dV_D/dt	Rate of rise of off-state voltage	To 66% V_{DRM}; R_{GK} 1.5 , T_j = 125°C	135	V/ s
		To 66% V_{DRM}; V_{RG} -2V, T_j = 125°C	1000	V/ s
L_S	Peak stray inductance in snubber circuit	I_T = 2000A, V_{DM} = 2500V, T_j = 125°C, di_{GQ}/dt = 40A/ s, C_S = 2.0 F	200	nH

GATE RATINGS

Symbol	Parameter	Test Conditions	Min.	Max.	Units
V_{RGM}	Peak reverse gate voltage	This value may be exceeded during turn-off	-	16	V
I_{FGM}	Peak forward gate current		20	100	A
$P_{FG(AV)}$	Average forward gate power		-	15	W
P_{RGM}	Peak reverse gate power		-	19	kW
di_{GQ}/dt	Rate of rise of reverse gate current		30	60	A/ s
$t_{ON(min)}$	Minimum permissible on time		50	-	s
$t_{OFF(min)}$	Minimum permissible off time		100	-	s

THERMAL AND MECHANICAL RATINGS

Symbol	Parameter	Test Conditions		Min.	Max.	Units
$R_{th(j-hs)}$	Thermal resistance – junction to heatsink surface	Double side cooled	DC	-	0.018	°C/W
		Single side cooled	Anode DC	-	0.03	°C/W
			Cathode DC	-	0.045	°C/W
$R_{th(c-hs)}$	Contact thermal resistance	Clamping force 20.0kN With mounting compound	Per contact	-	0.006	°C/W
T_{vj}	Virtual junction temperature	On-state (conducting)		-	125	°C
T_{OP}/T_{stg}	Operating junction/storage temperature range			-40	125	°C
F_m	Clamping force			18.0	22.0	kN

GTO CHARACTERISTICS

T_j = 125°C unless stated otherwise

Symbol	Parameter	Test Conditions	Min.	Max.	Units
V_{TM}	On-state voltage	At 2000A peak, $I_{G(ON)}$ = 7A dc	-	2.6	V
I_{DM}	Peak off-state current	V_{DRM} = 2500V, V_{RG} = 0V	-	100	mA
I_{RRM}	Peak reverse current	At V_{RRM}	-	50	mA
V_{GT}	Gate trigger voltage	V_D = 24V, I_T = 100A, T_j = 25°C	-	1.0	V
I_{GT}	Gate trigger current	V_D = 24V, I_T = 100A, T_j = 25°C	-	3.0	A
I_{RGM}	Reverse gate cathode current	V_{RGM} = 16V, No gate/cathode resistor	-	50	mA
E_{ON}	Turn-on energy	V_D = 1500V I_T = 2000A, dI_T/dt = 300A/ s I_{FG} = 30A, rise time < 1.0 s	-	1188	mJ
t_d	Delay time		-	1.5	μs
t_r	Rise time		-	3.5	μs
E_{OFF}	Turn-off energy	I_T = 2000A, V_{DM} = 2500V, Snubber capacitor C_S = 2.0 F, di_{GQ}/dt = 40A/ s	-	4000	mJ
t_{gs}	Storage time		-	17.0	s
t_{gf}	Fall time		-	2.0	s
t_{gq}	Gate controlled turn-off time		-	19.0	s
Q_{GQ}	Turn-off gate charge		-	6600	C
Q_{GQT}	Total turn-off gate charge		-	13200	C
I_{GQM}	Peak reverse gate current		-	650	A

CURVES

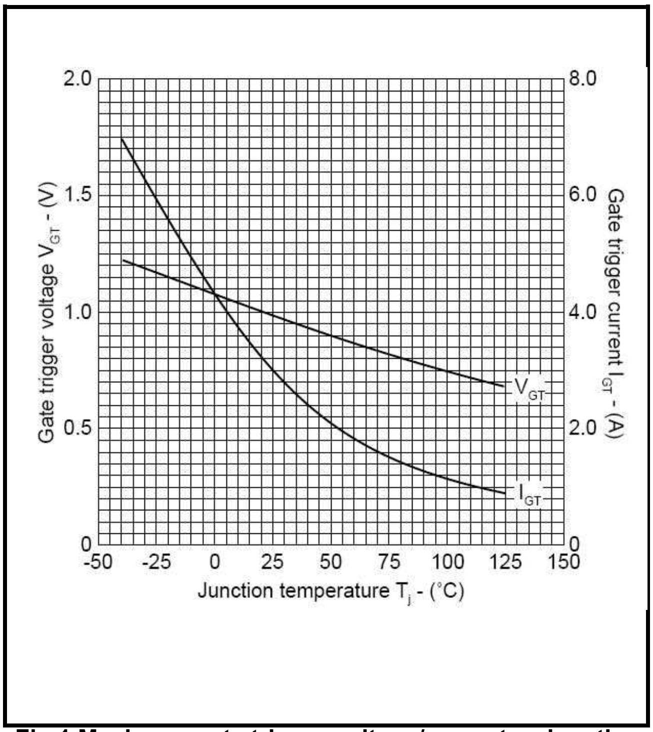


Fig.1 Maximum gate trigger voltage/current vs junction temperature

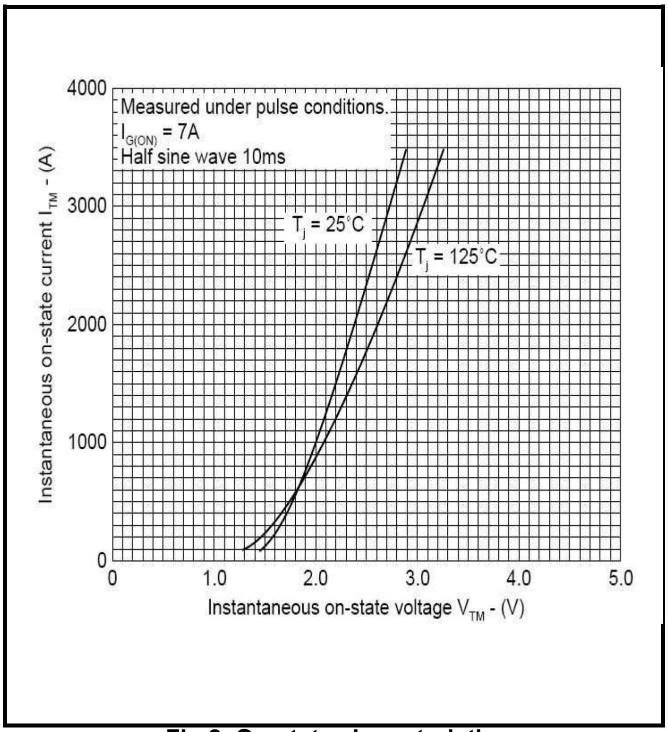


Fig.2 On-state characteristics

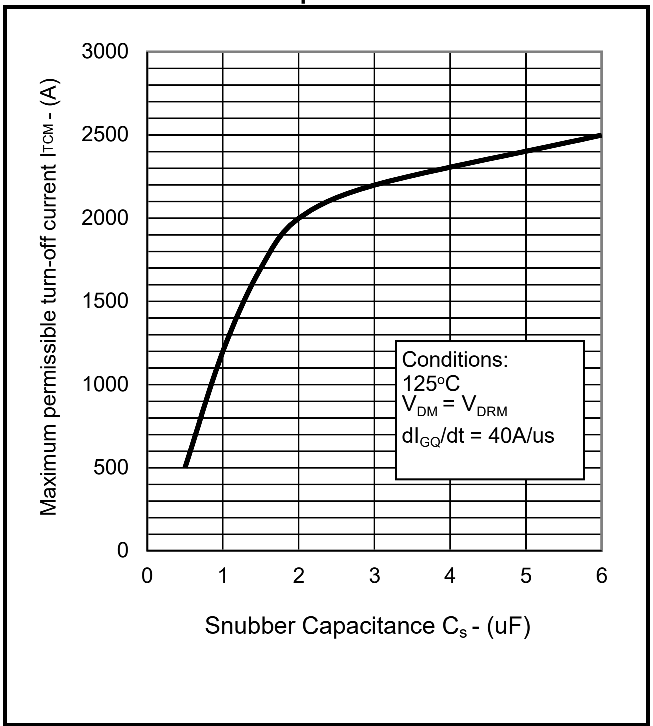


Fig.3 Maximum dependence of I_{TCM} on C_S

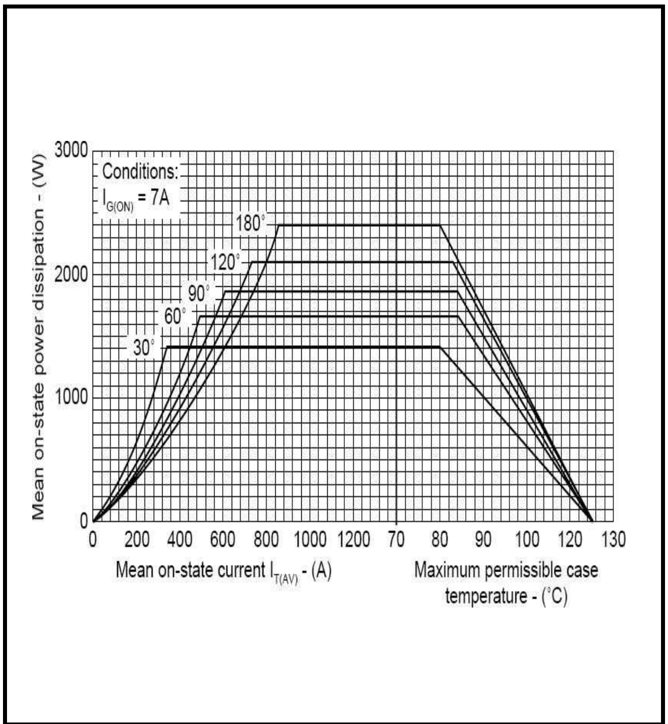


Fig.4 Steady state sinusoidal wave conduction loss – double side cooled

CURVES

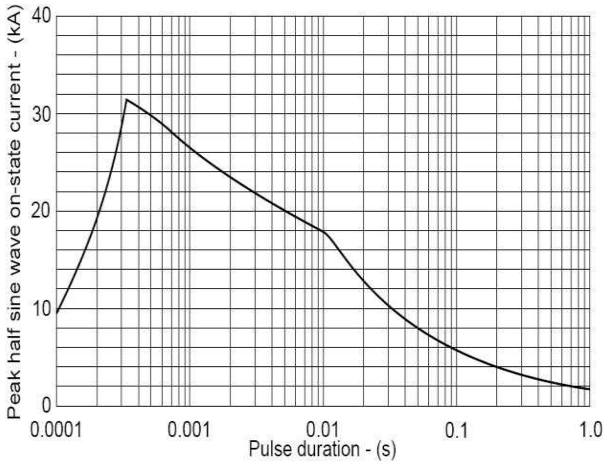


Fig.5 Surge (non-repetitive) on-state current vs time

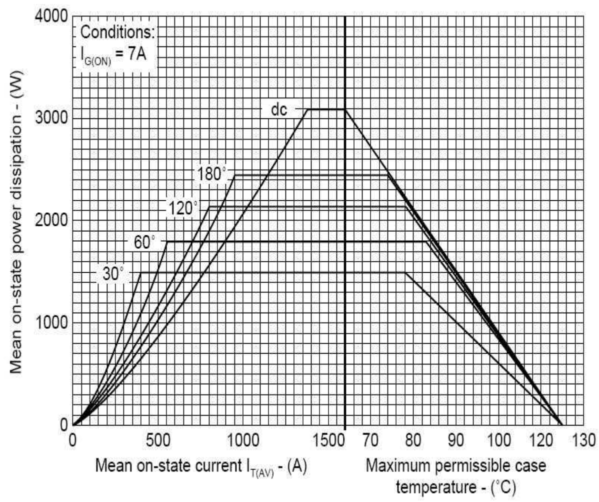


Fig.6 Steady state rectangular wave conduction loss – double side cooled

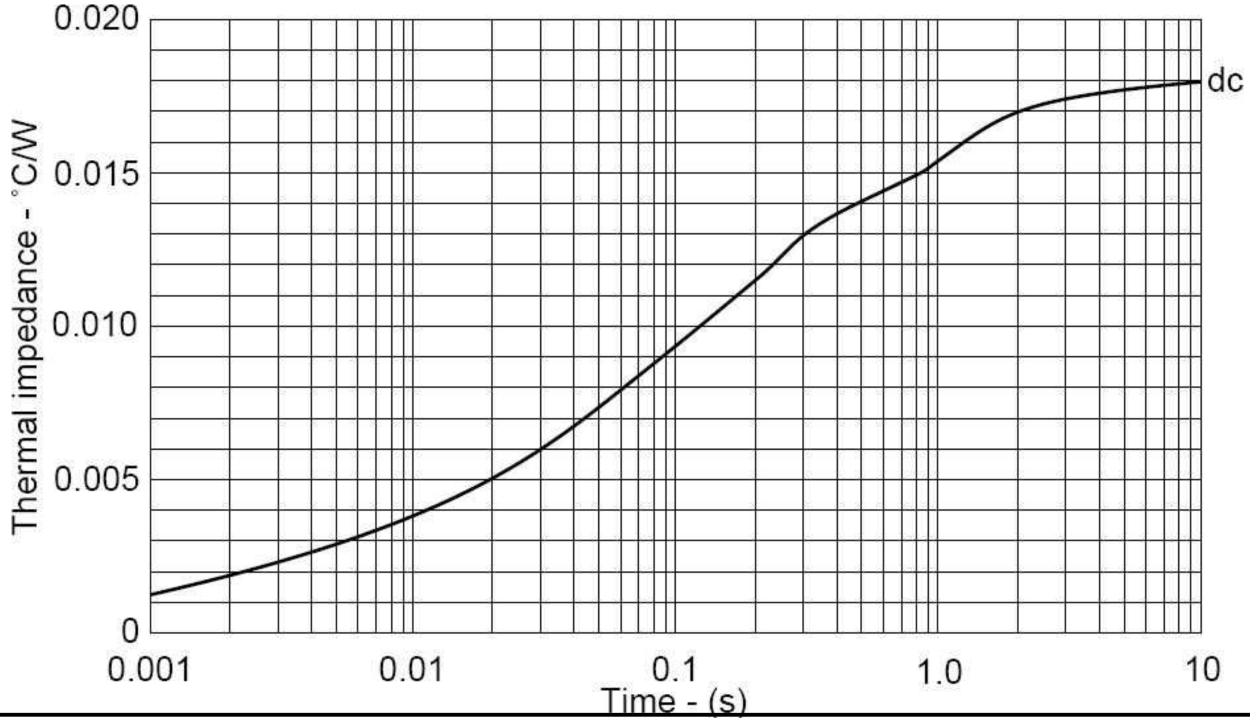


Fig.7 Maximum (limit) transient thermal impedance – junction to case (°C/kW)

CURVES

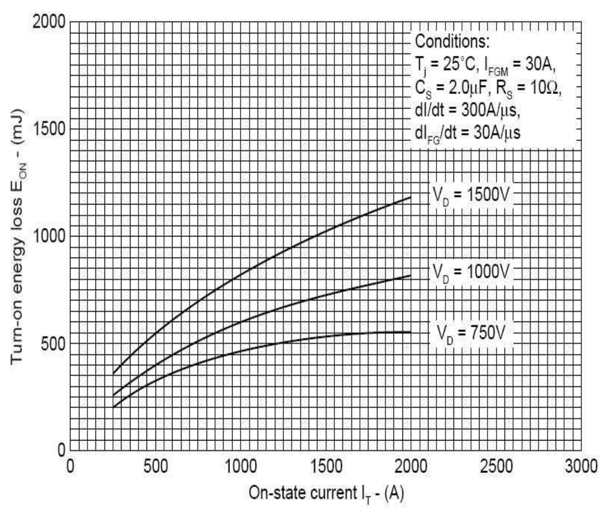


Fig.8 Turn-on energy vs on-state current

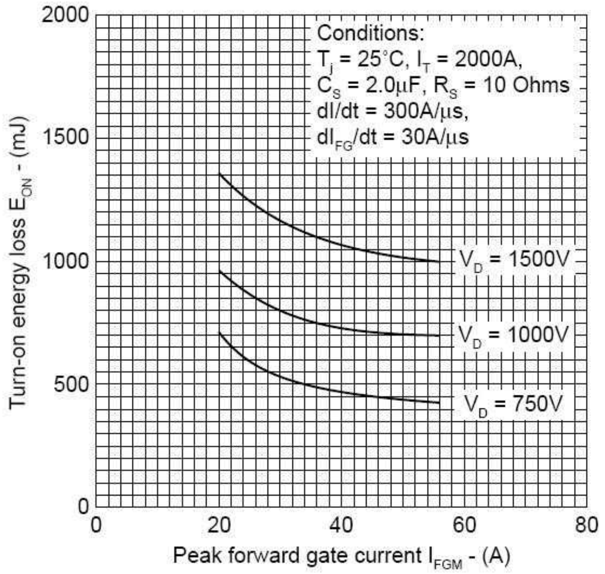


Fig.9 Turn-on energy vs peak forward gate current

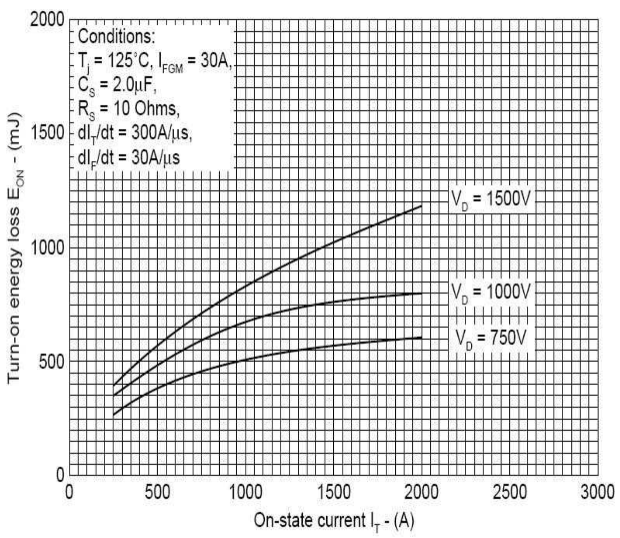


Fig.10 Turn-on energy vs on-state current

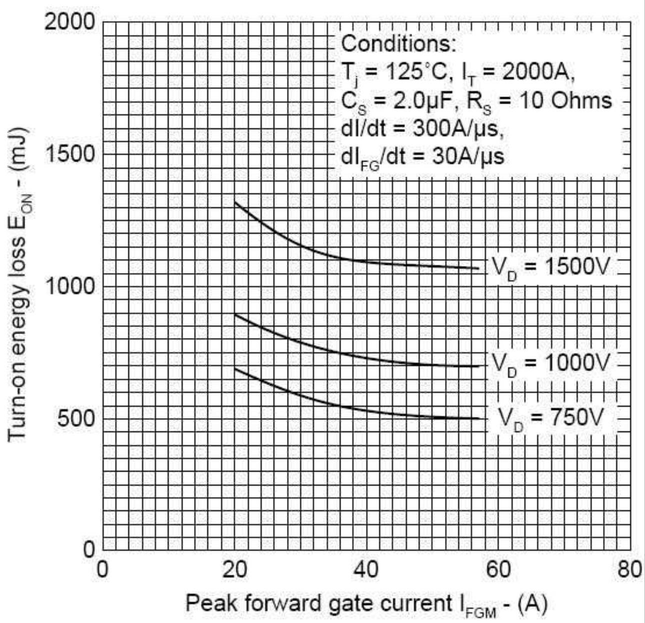


Fig.11 Turn-on energy vs peak forward gate current

CURVES

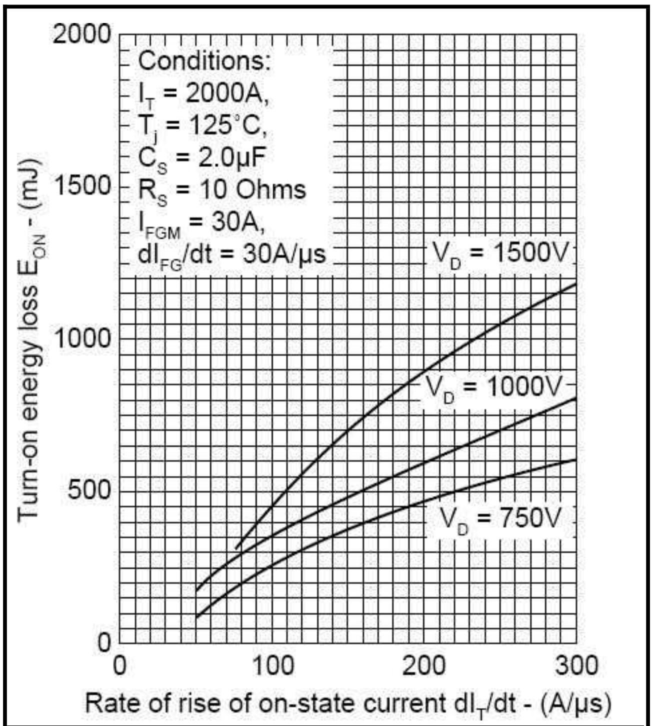


Fig.12 Turn-on energy vs rate of rise of on-state current

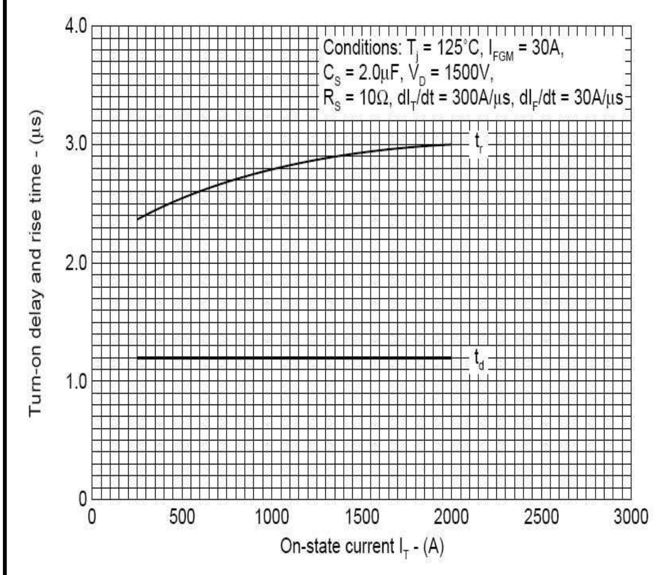


Fig.13 Delay time & rise time vs turn-on current

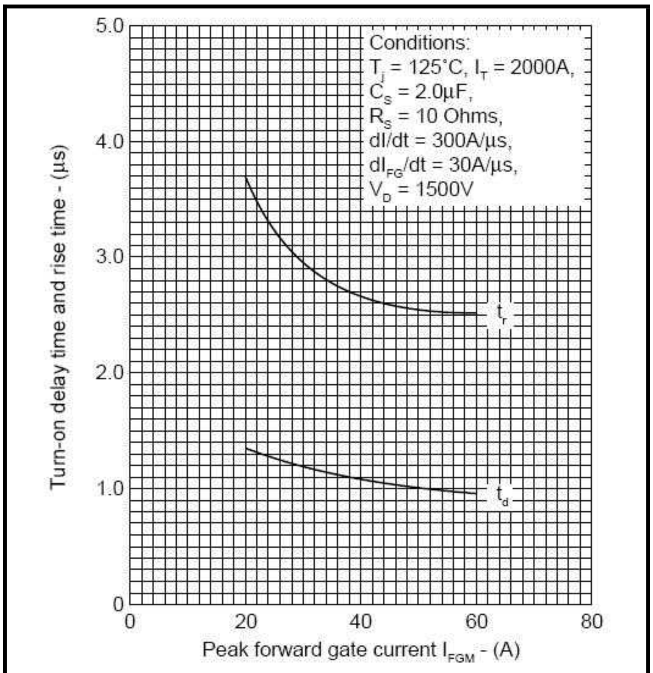


Fig.14 Delay time & rise time vs peak forward gate current

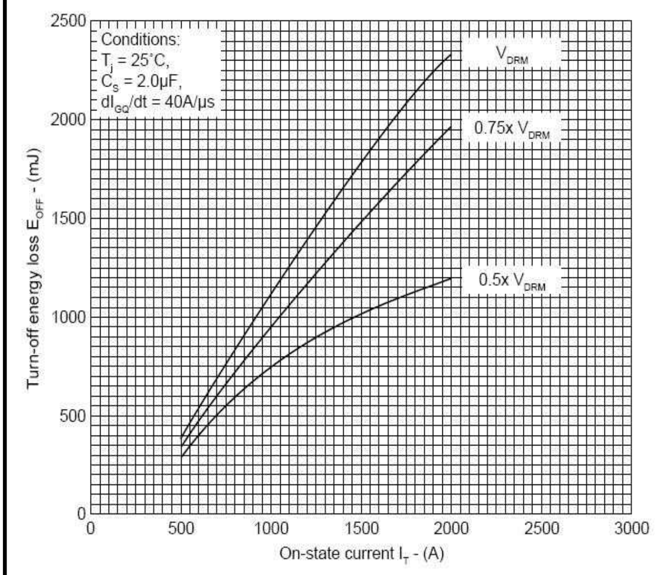


Fig.15 Turn-off energy vs on-state current

CURVES

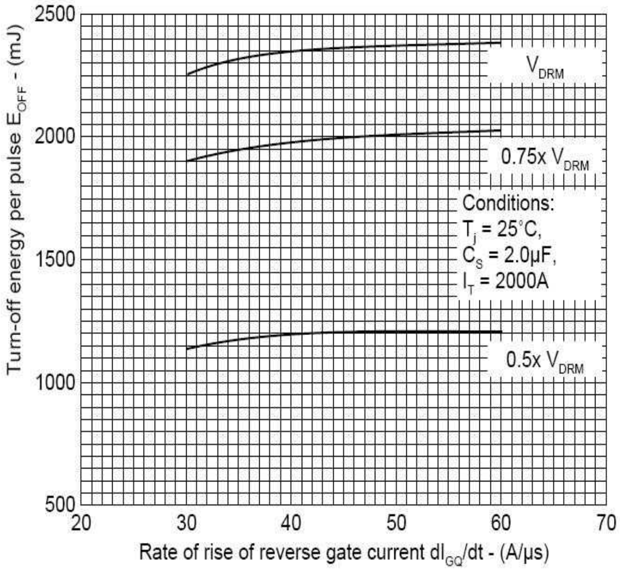


Fig.16 Turn-off energy vs rate of rise of reverse gate current

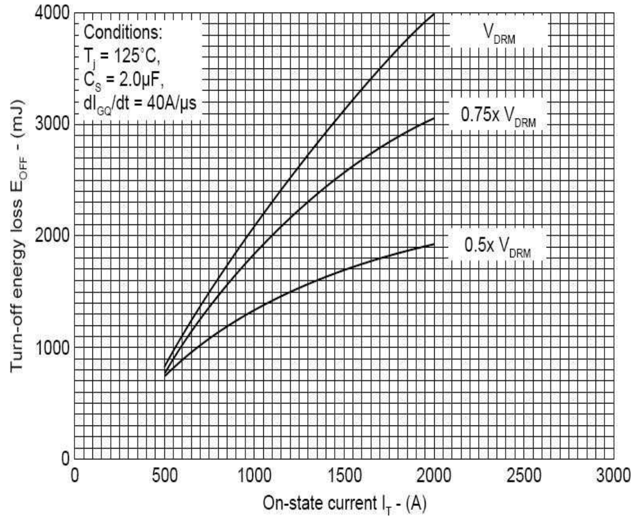


Fig.17 Turn-off energy vs on-state current

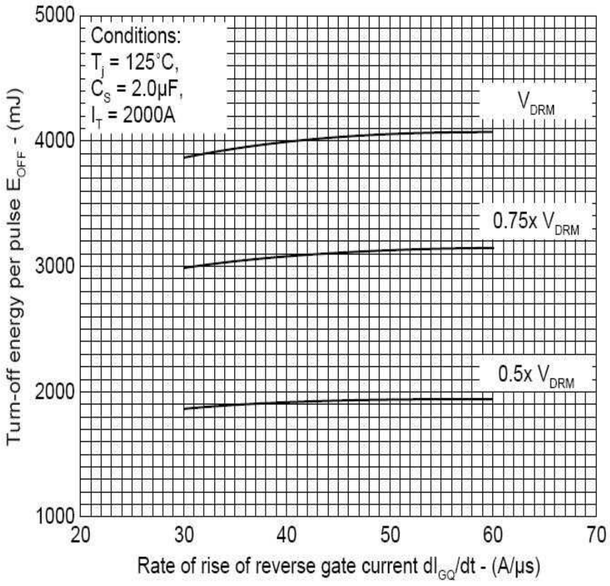


Fig.18 Turn-off energy vs rate of rise of reverse gate current

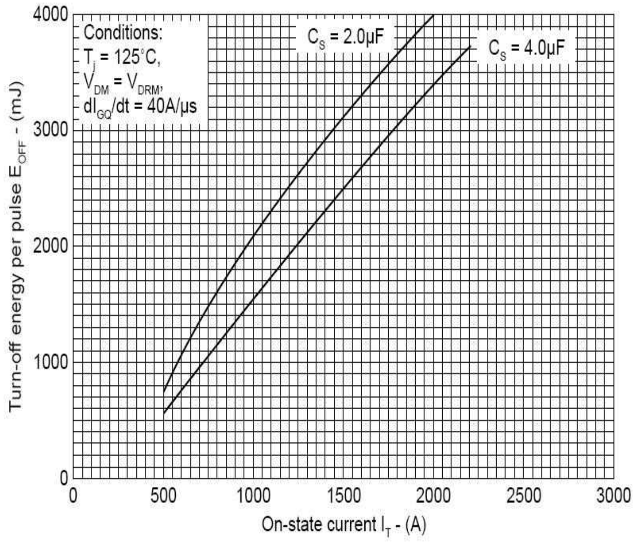


Fig.19 Turn-off energy vs on-state current

CURVES

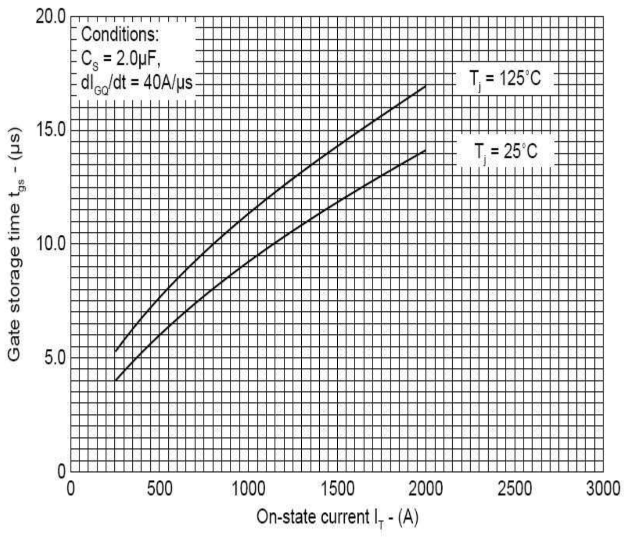


Fig.20 Gate storage time vs on-state current

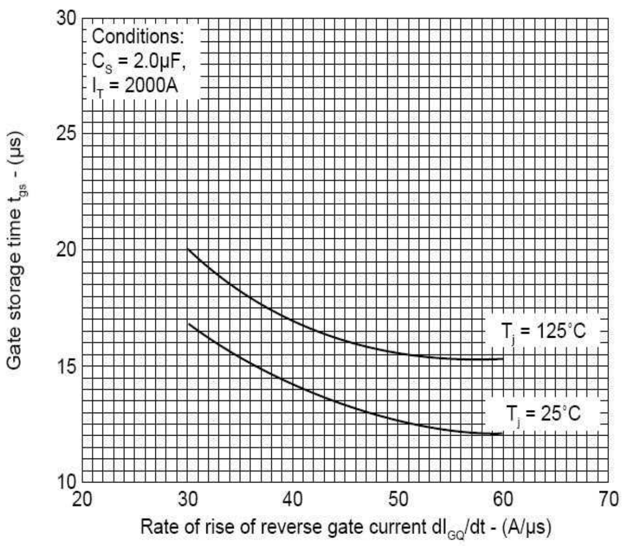


Fig.21 Gate storage time vs rate of rise of reverse gate current

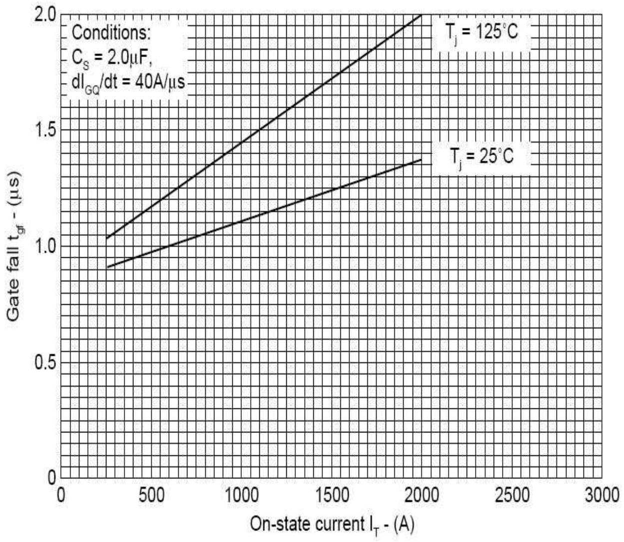


Fig.22 Gate fall time vs on-state current

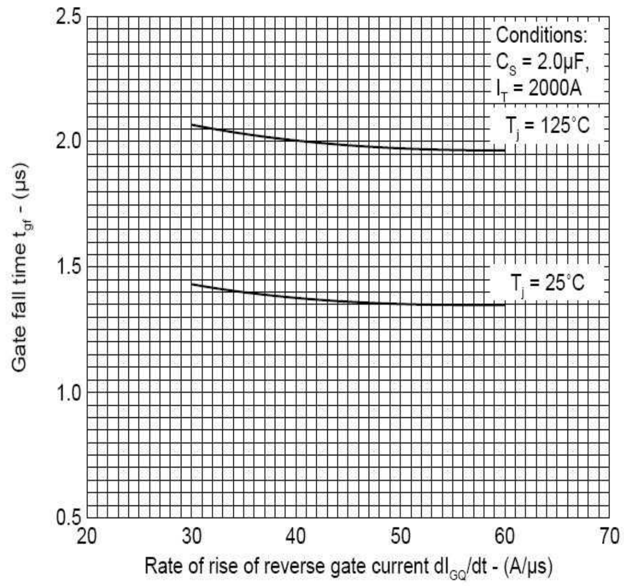


Fig.23 Gate fall time vs rate of rise of reverse gate current

CURVES

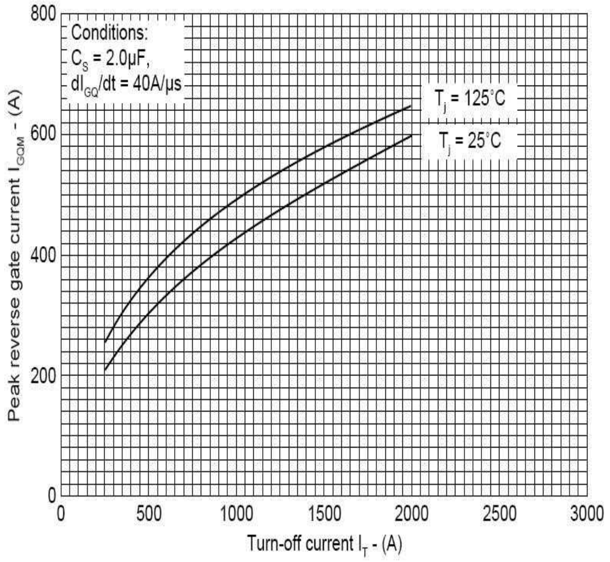


Fig.24 Peak reverse gate current vs turn-off current

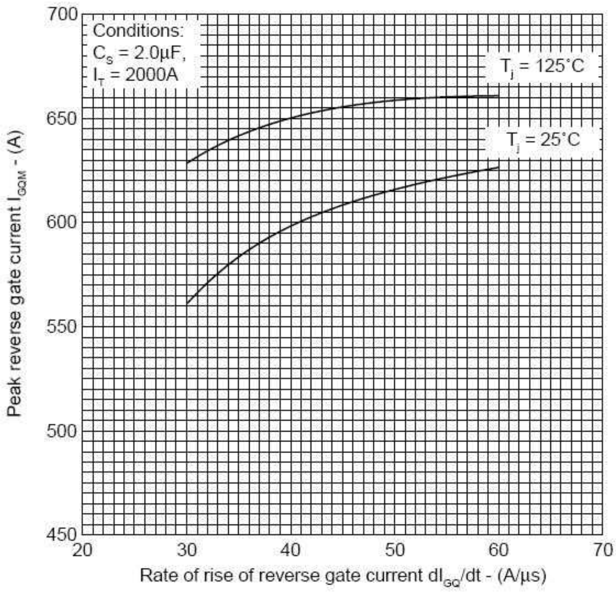


Fig.25 Peak reverse gate current vs rate of rise of reverse gate current

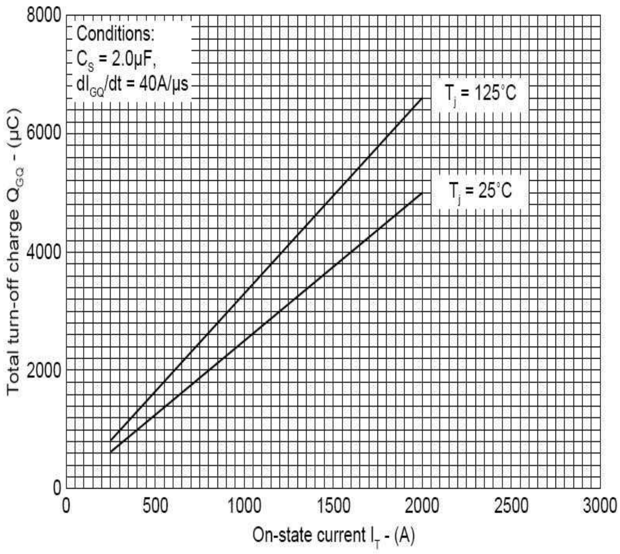


Fig.26 Turn-off gate charge vs on-state current

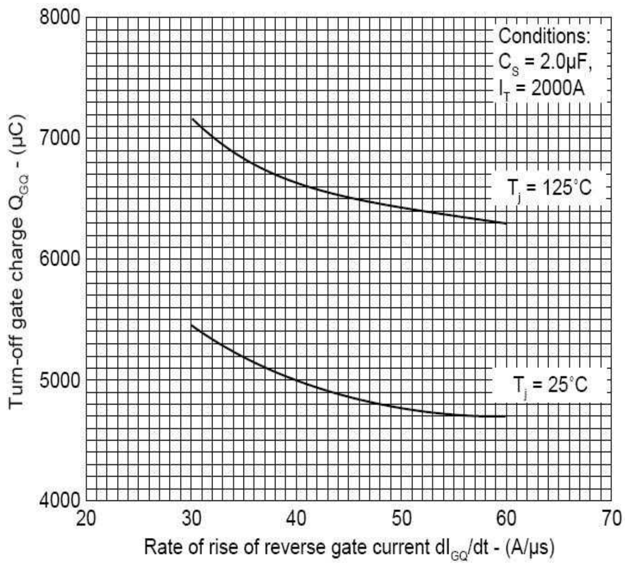


Fig.27 Turn-off gate charge vs rate of rise of reverse gate current

CURVES

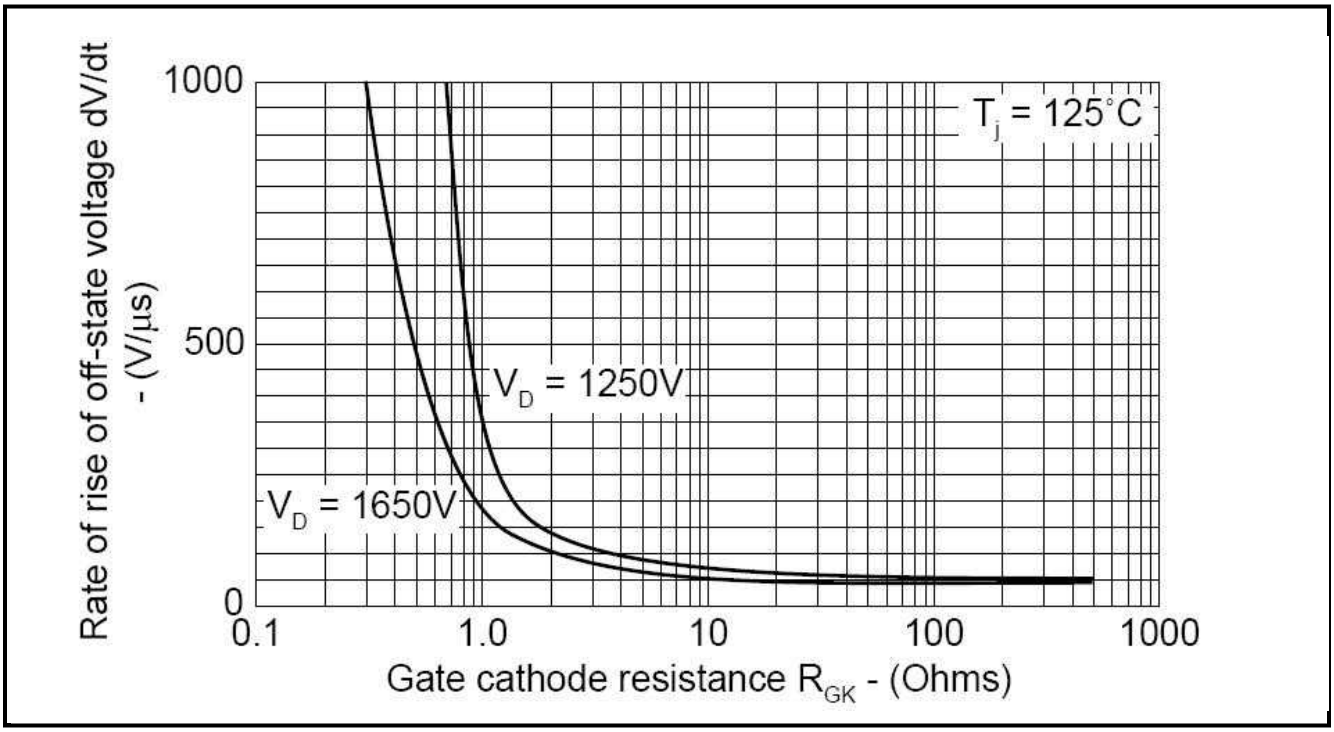
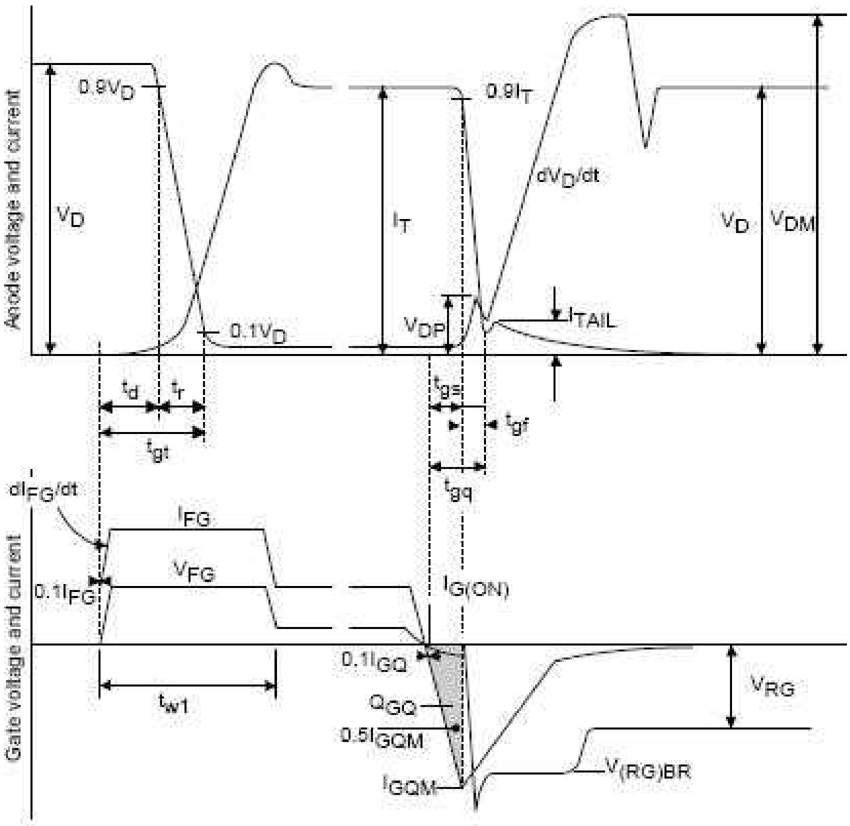


Fig.28 Rate of rise of off-state voltage vs gate cathode resistance

CURVES



Recommended gate conditions:

I_{TCM} = 2000A

I_{FG} = 30A

$I_{G(ON)}$ = 7A d.c.

$t_{w1(min)}$ = 20μs

I_{GQM} = 650 A

di_{GQ}/dt = 40A/μs

Q_{GQ} = 6800μC

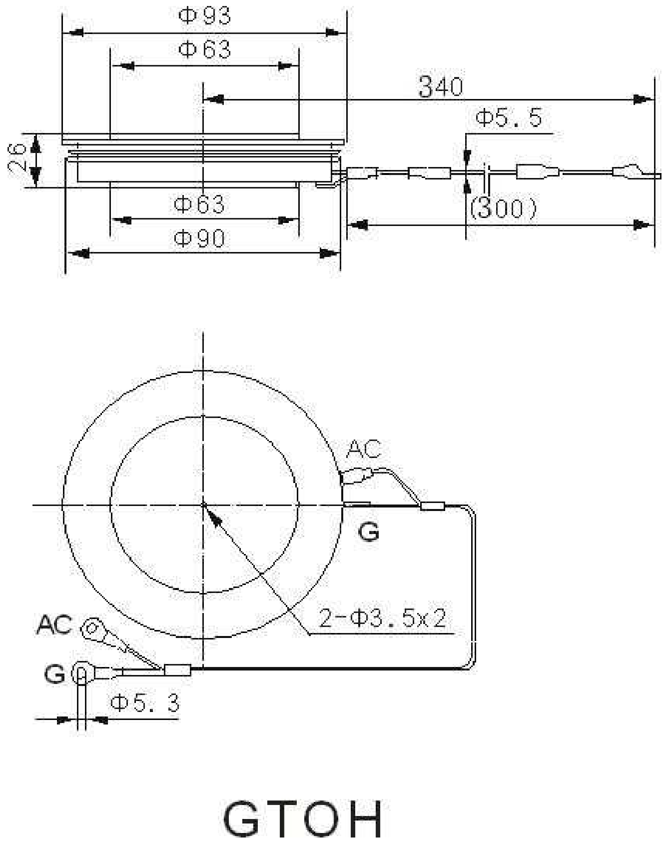
$V_{RG(min)}$ = 2V

$V_{RG(max)}$ = 16V

Fig.29 General switching waveforms

PACKAGE DETAILS

All dimensions in mm, unless stated otherwise. DO NOT SCALE.



Clamping force: 20kN ±10%
Lead coaxial, length: 300mm

Fig.30 Package outline