



CSG25H2500

High-end Power Semiconductor Manufacturer

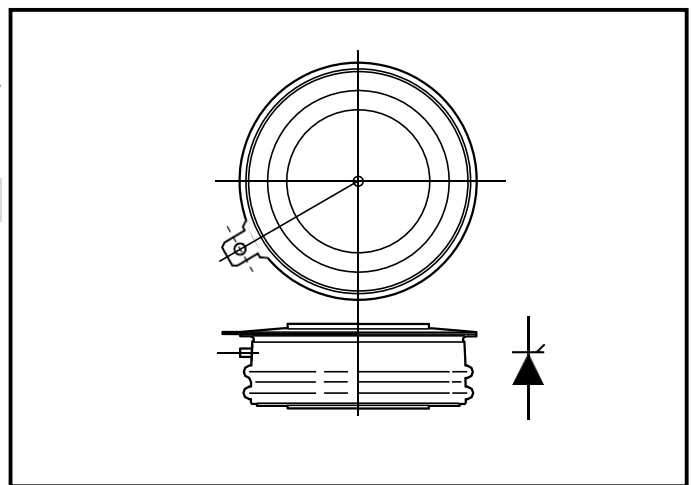
Gate Turn-off Thyristor

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/ μ s
dI_T/dt	300A/ μ s



Outline type code: H.

See Package Details for further information

APPLICATIONS

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

VOLTAGE RATINGS

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

CURRENT RATINGS

Symbol	Parameter	Condition	Max.	Units
I_{TCM}	Repetitive peak controllable on-state current	$V_D = V_{DRM}$, $T_j = 125^{\circ}\text{C}$, $dI_{GQ}/dt = 40\text{A/s}$, $C_S = 6.0 \text{ F}$	2500	A
$I_{T(AV)}$	Mean on-state current	$T_{HS} = 80^{\circ}\text{C}$, Double side cooled. Half sine 50Hz	865	A
$I_{T(RMS)}$	RMS on-state current	$T_{HS} = 80^{\circ}\text{C}$, 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. $T_j = 125^\circ\text{C}$	16.0	kA
I^2t	I^2t for fusing	10ms half sine. $T_j = 125^\circ\text{C}$	1.40	MA^2s
di_T/dt	Critical rate of rise of on-state current	$V_D = 1500\text{V}$, $I_T = 2000\text{A}$, $T_j = 125^\circ\text{C}$, $I_{FG} > 30\text{A}$, Rise time $> 1.0 \mu\text{s}$	300	A/ μs
dV_D/dt	Rate of rise of off-state voltage	To 66% V_{DRM} ; $R_{GK} = 1.5 \Omega$, $T_j = 125^\circ\text{C}$	135	V/ μs
		To 66% V_{DRM} ; $V_{RG} = -2\text{V}$, $T_j = 125^\circ\text{C}$	1000	V/ μs
L_s	Peak stray inductance in snubber circuit	$I_T = 2000\text{A}$, $V_{DM} = 2500\text{V}$, $T_j = 125^\circ\text{C}$, $di_{GQ}/dt = 40\text{A}/\mu\text{s}$, $C_s = 2.0 \mu\text{F}$	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/ μs
$t_{ON(min)}$	Minimum permissible on time		50	-	μs
$t_{OFF(min)}$	Minimum permissible off time		100	-	μs

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	$^\circ\text{C}/\text{W}$
		Single side cooled	Anode DC	-	0.03	$^\circ\text{C}/\text{W}$
			Cathode DC	-	0.045	$^\circ\text{C}/\text{W}$
$R_{th(c-hs)}$	Contact thermal resistance	Clamping force 20.0kN With mounting compound	Per contact	-	0.006	$^\circ\text{C}/\text{W}$
T_{vj}	Virtual junction temperature	On-state (conducting)		-	125	$^\circ\text{C}$
T_{OP}/T_{stg}	Operating junction/storage temperature range			-40	125	$^\circ\text{C}$
F_m	Clamping force			18.0	22.0	kN



GTO CHARACTERISTICS

$T_j = 125^\circ\text{C}$ unless stated otherwise

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

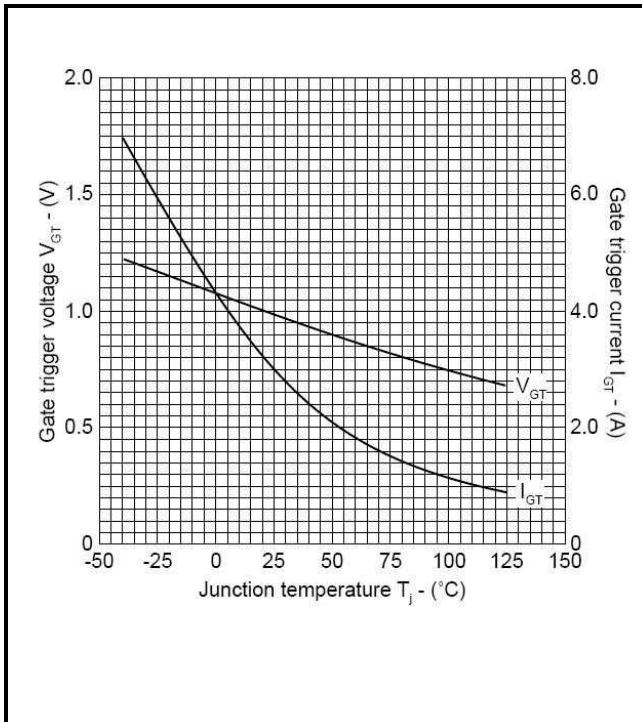


Fig.1 Maximum gate trigger voltage/current vs junction temperature

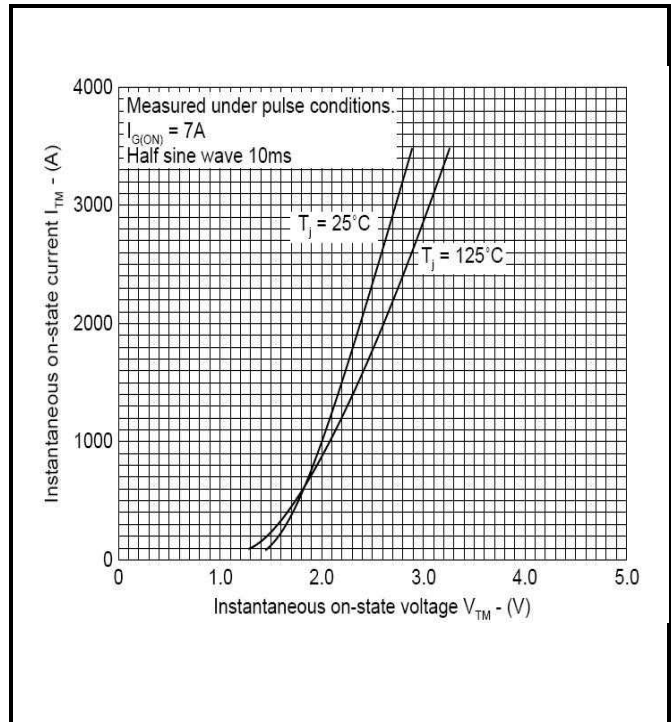


Fig.2 On-state characteristics

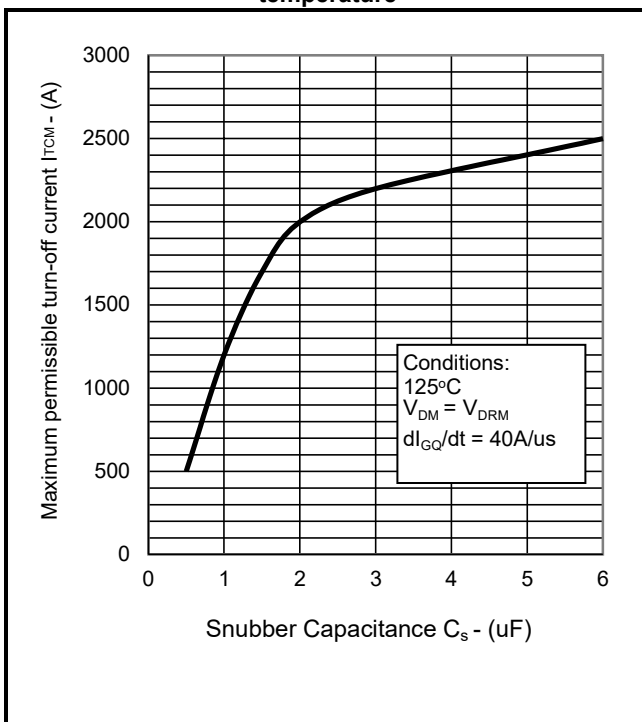


Fig.3 Maximum dependence of I_{TCM} on C_s

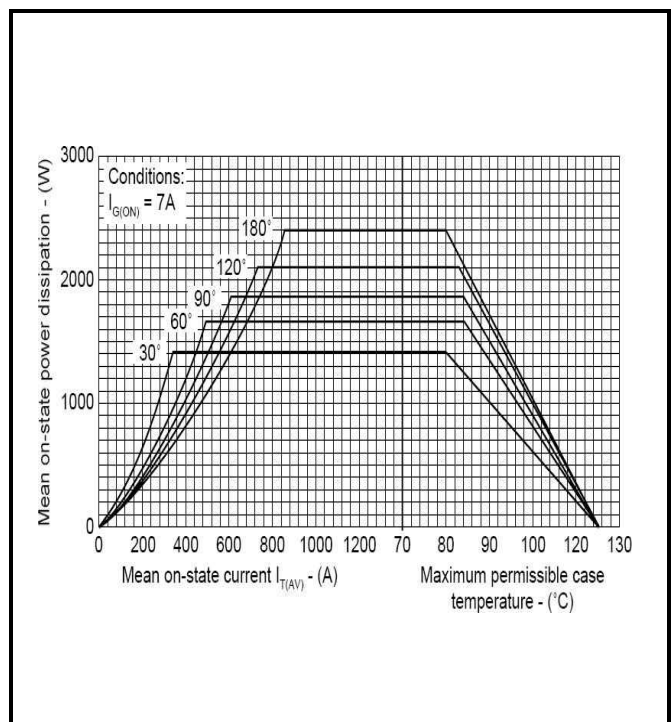


Fig.4 Steady state sinusoidal wave conduction loss – double side cooled

CURVES

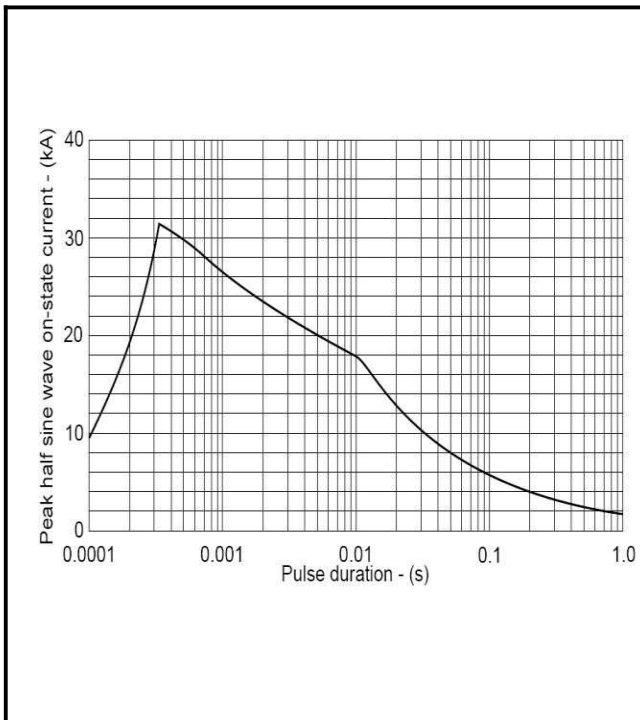


Fig.5 Surge (non-repetitive) on-state current vs time

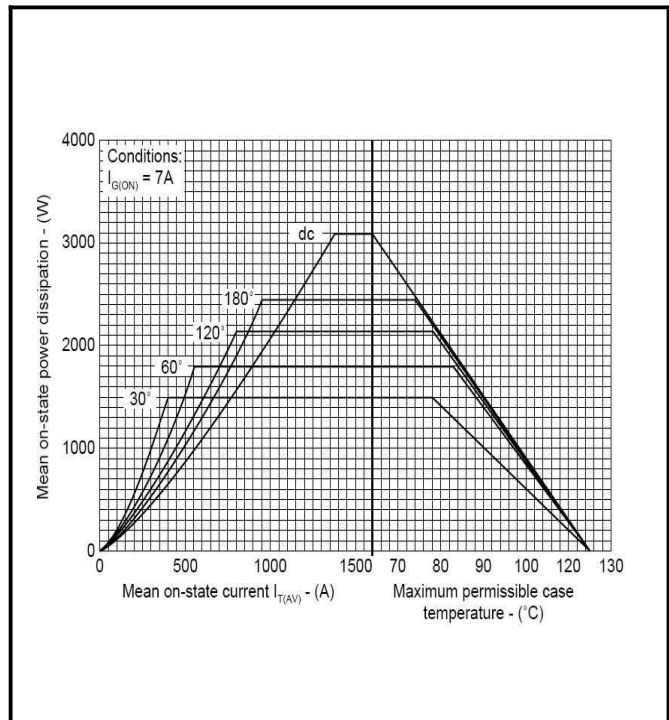


Fig.6 Steady state rectangular wave conduction loss – double side cooled

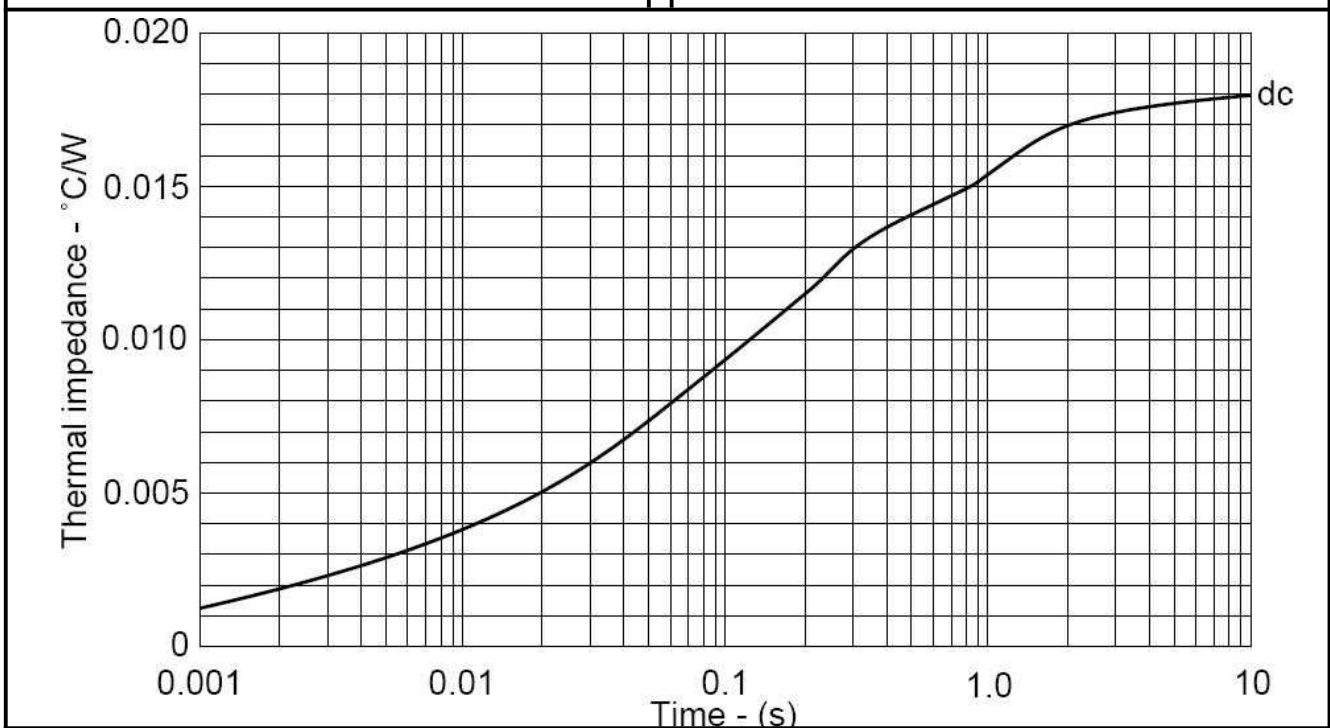


Fig.7 Maximum (limit) transient thermal impedance – junction to case ($^{\circ}$ C/kW)

CURVES

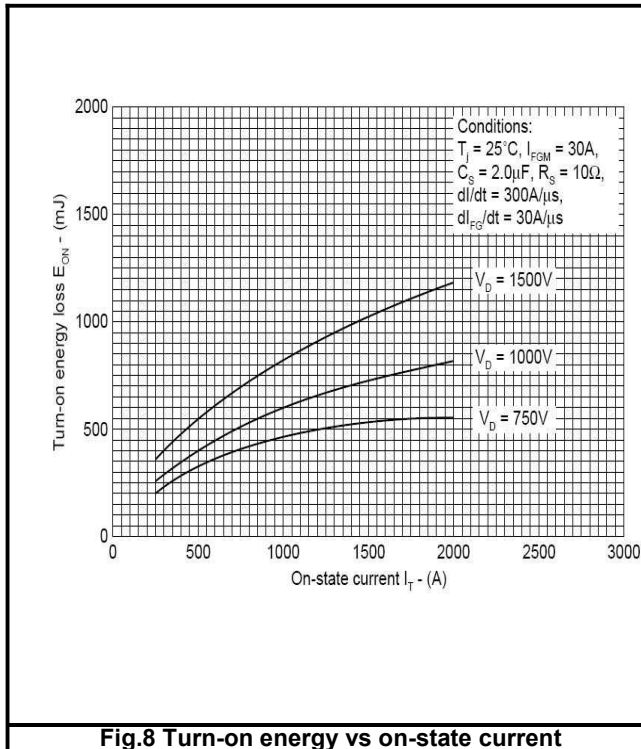


Fig.8 Turn-on energy vs on-state current

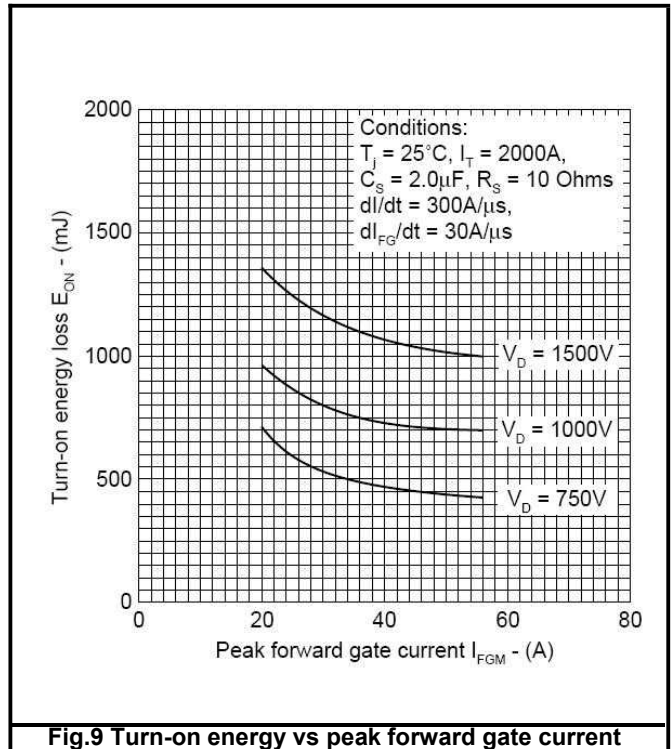


Fig.9 Turn-on energy vs peak forward gate current

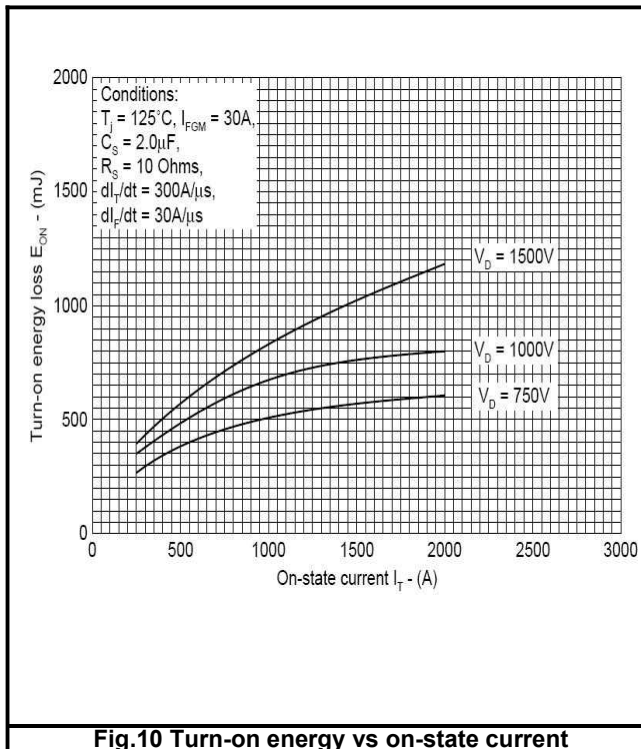


Fig.10 Turn-on energy vs on-state current

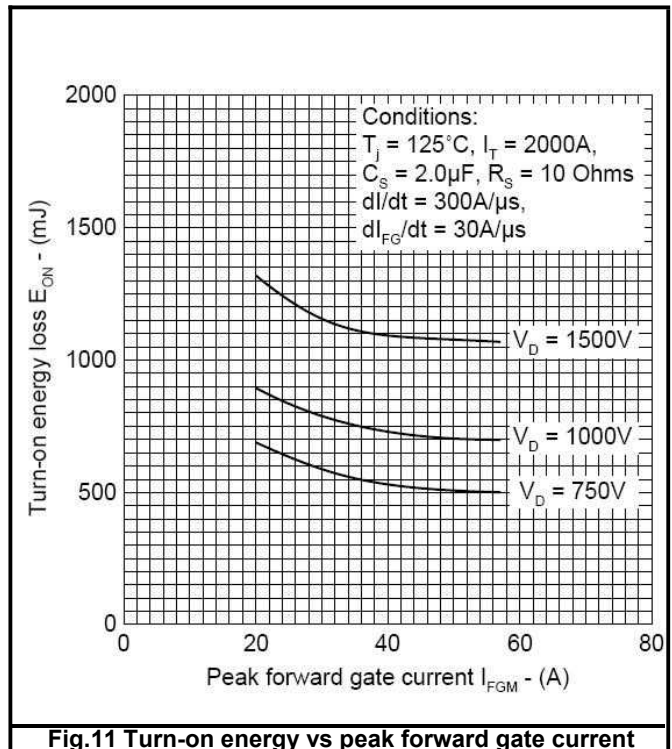


Fig.11 Turn-on energy vs peak forward gate current

CURVES

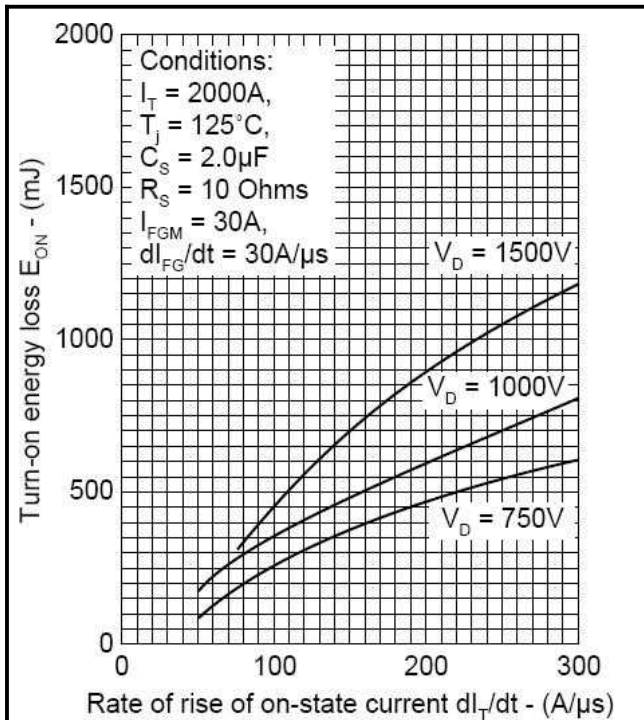


Fig.12 Turn-on energy vs rate of rise of on-state current

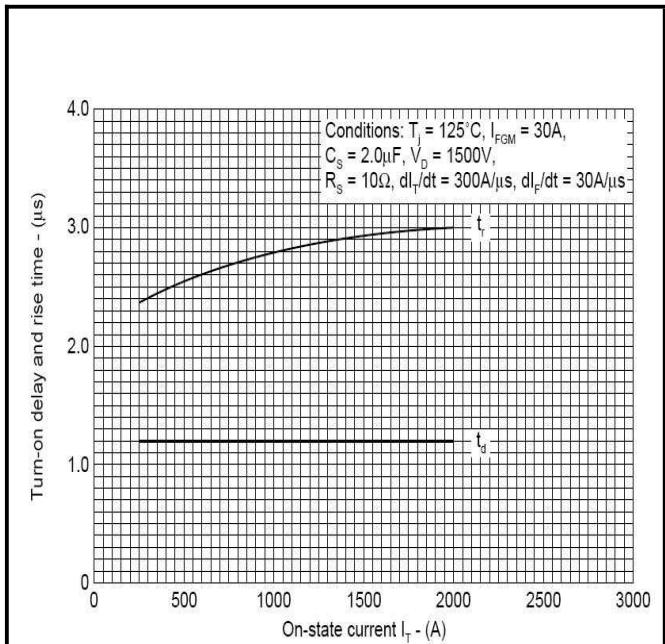


Fig.13 Delay time & rise time vs turn-on current

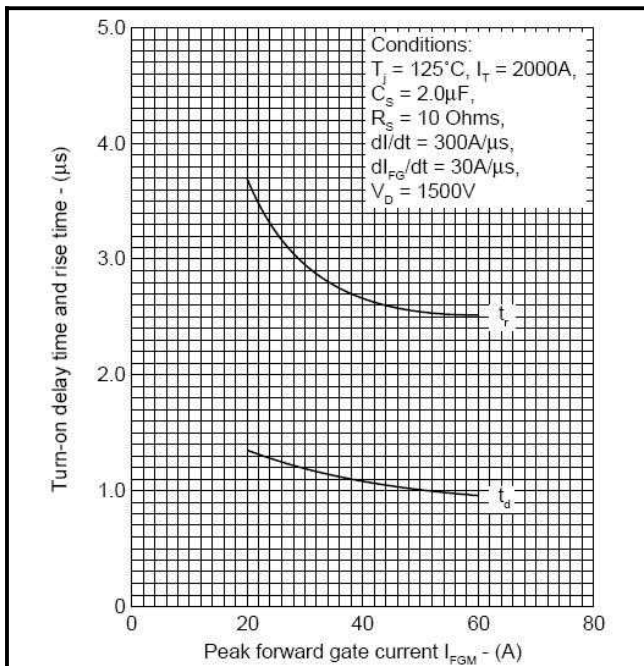


Fig.14 Delay time & rise time vs peak forward gate current

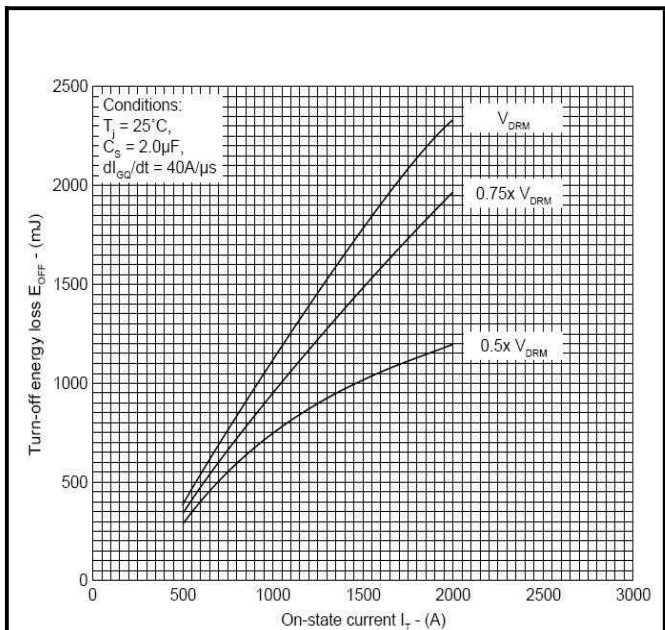


Fig.15 Turn-off energy vs on-state current

CURVES

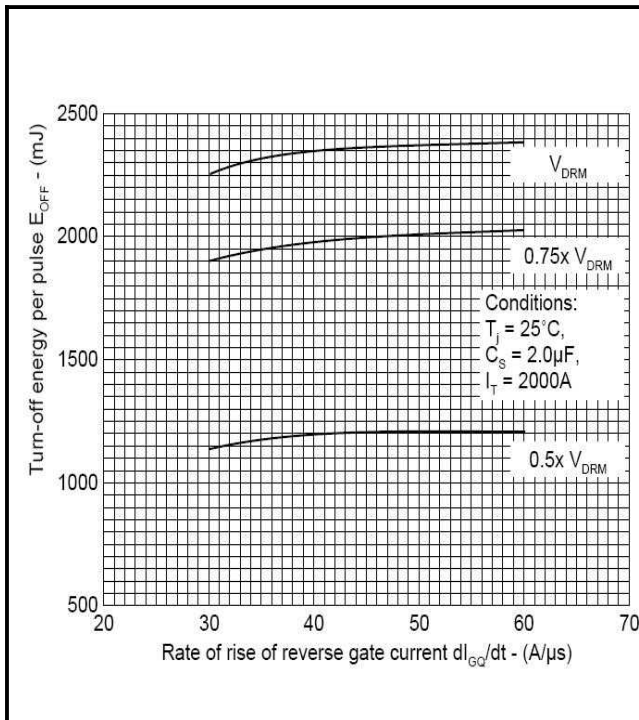


Fig.16 Turn-off energy vs rate of rise of reverse gate current

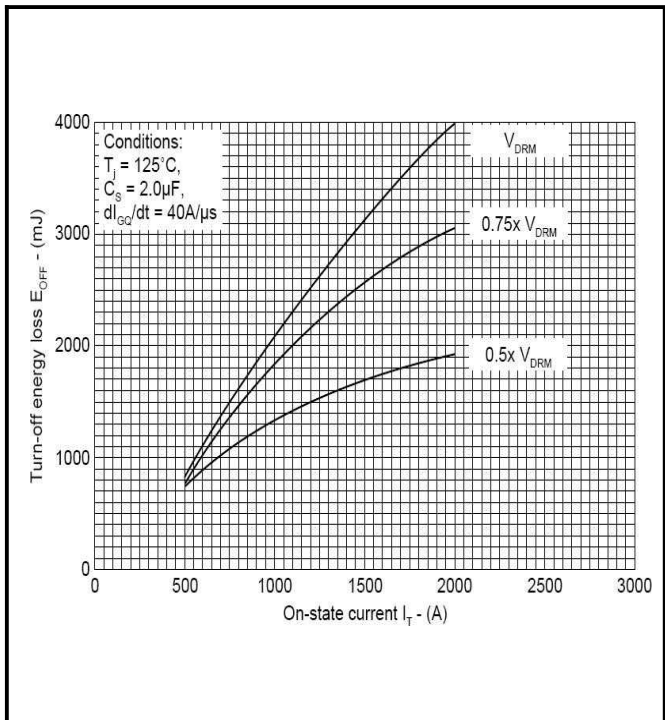


Fig.17 Turn-off energy vs on-state current

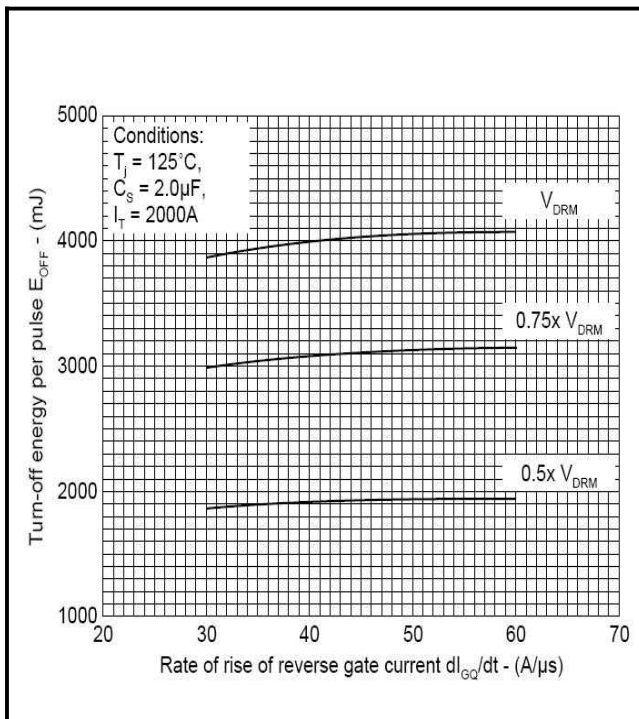


Fig.18 Turn-off energy vs rate of rise of reverse gate current

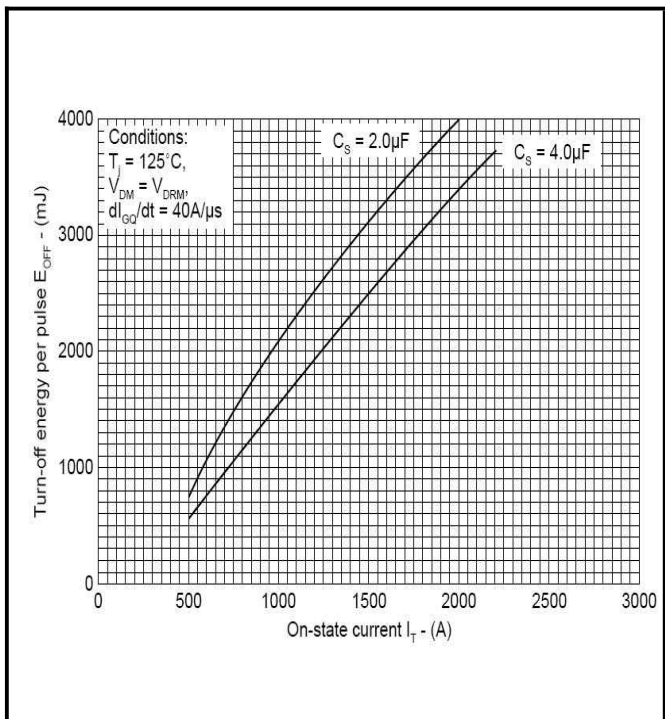


Fig.19 Turn-off energy vs on-state current

CURVES

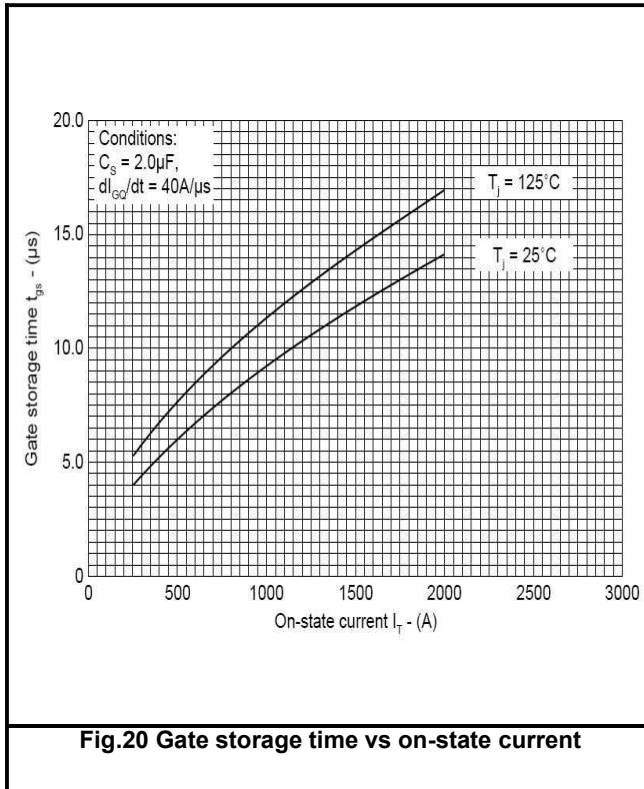


Fig.20 Gate storage time vs on-state current

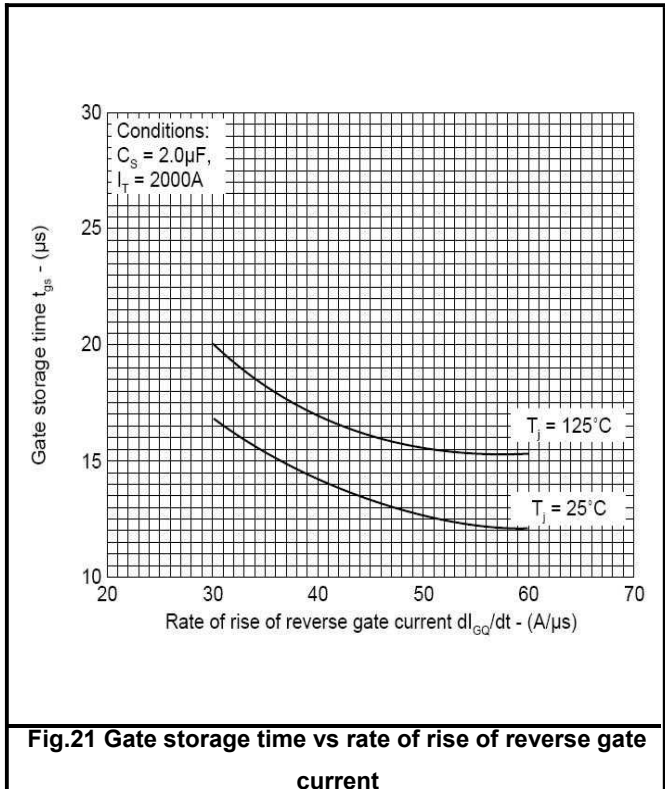


Fig.21 Gate storage time vs rate of rise of reverse gate current

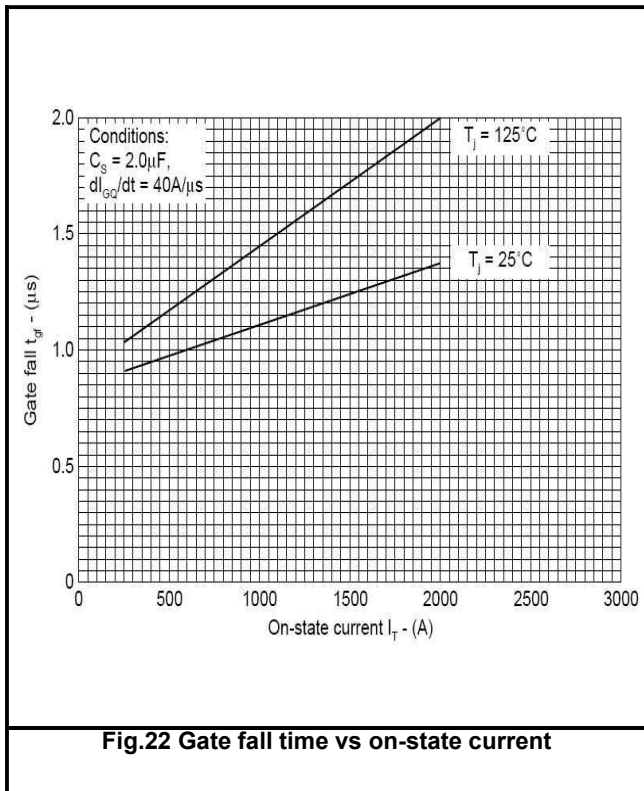


Fig.22 Gate fall time vs on-state current

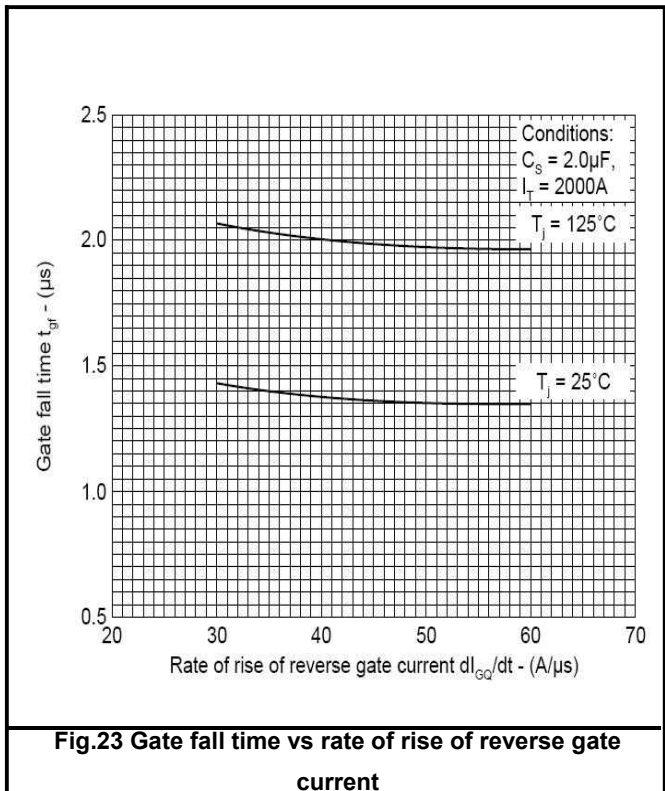


Fig.23 Gate fall time vs rate of rise of reverse gate current

CURVES

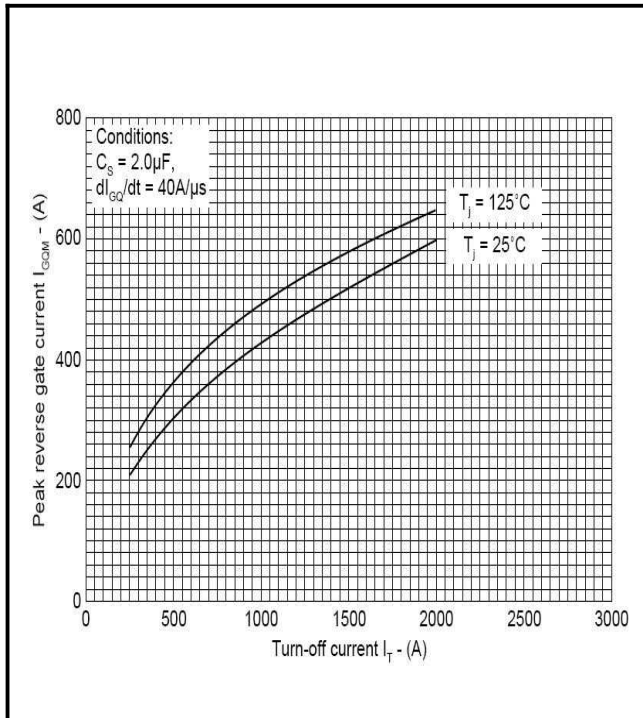


Fig.24 Peak reverse gate current vs turn-off current

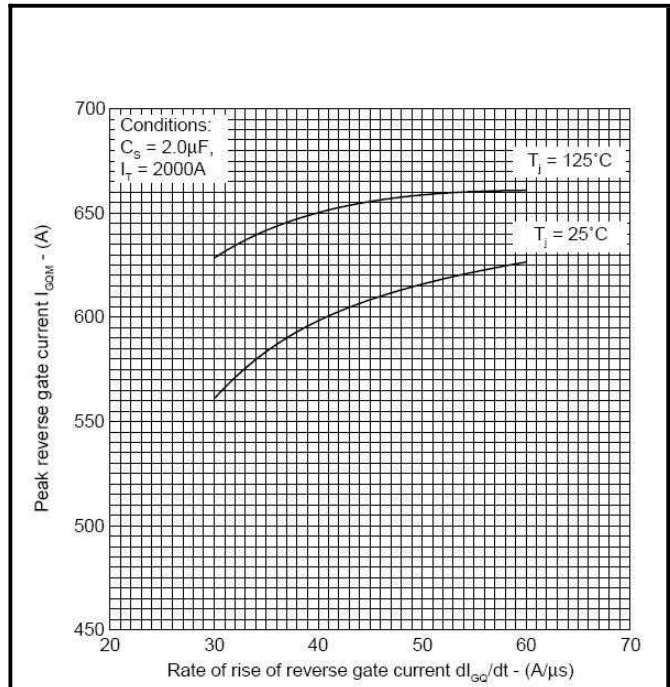


Fig.25 Peak reverse gate current vs rate of rise of reverse gate current

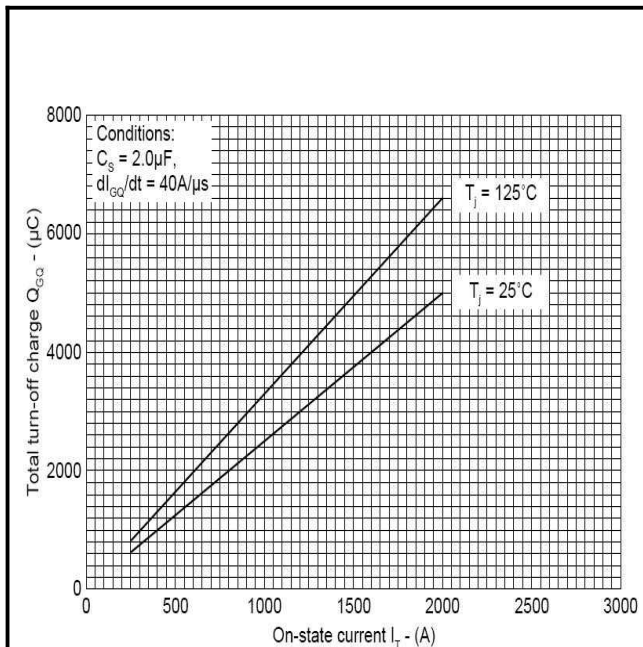


Fig.26 Turn-off gate charge vs on-state current

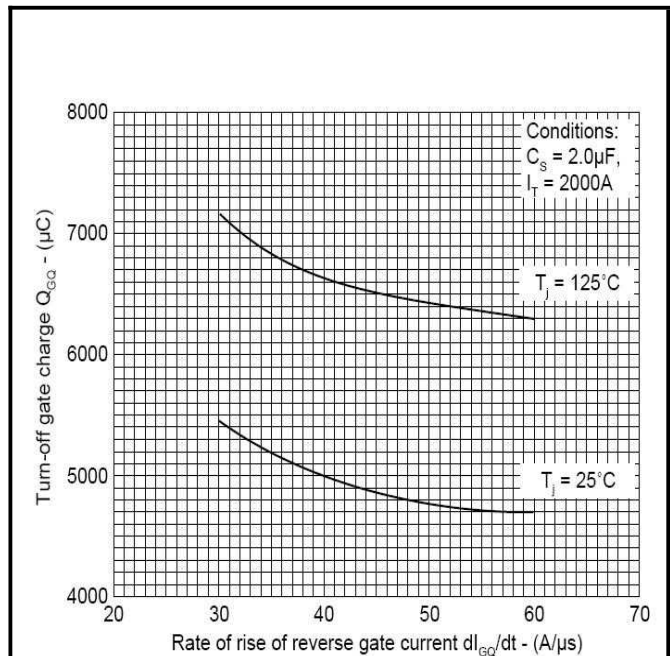


Fig.27 Turn-off gate charge vs rate of rise of reverse gate current

CURVES

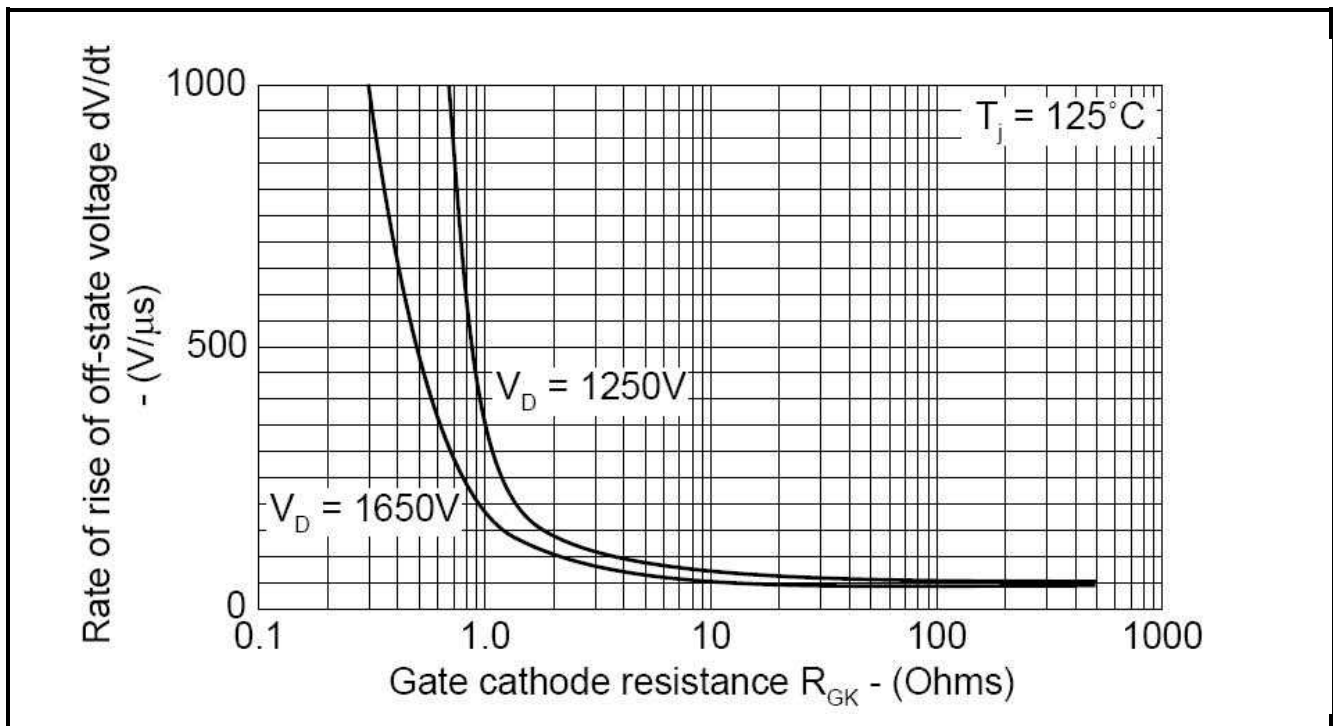


Fig.28 Rate of rise of off-state voltage vs gate cathode resistance

CURVES

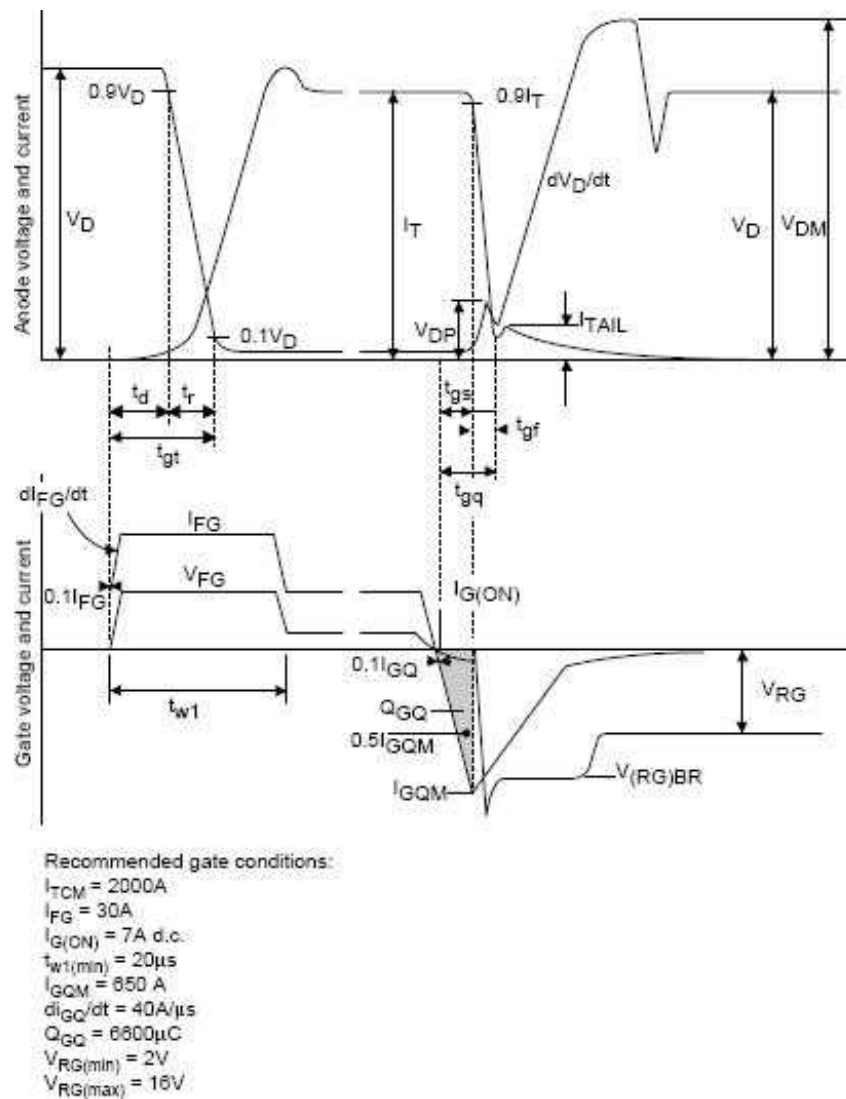
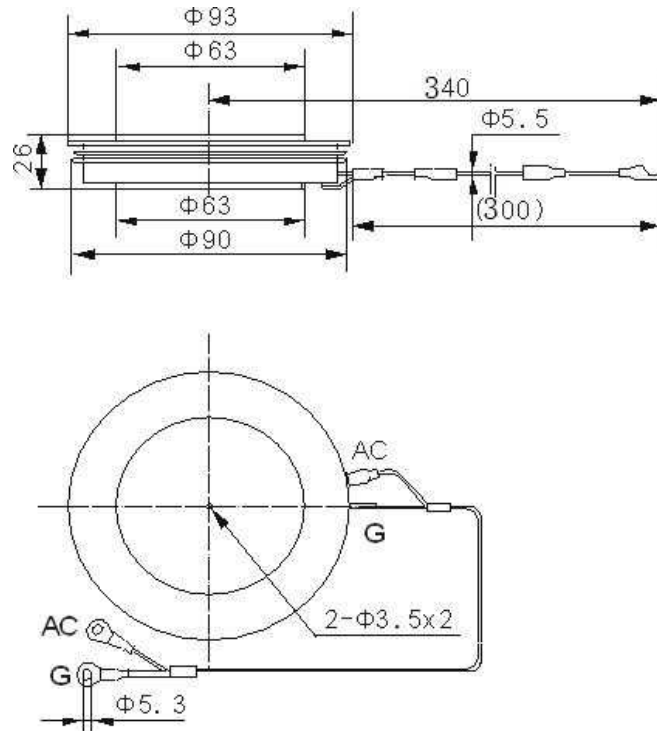


Fig.29 General switching waveforms

PACKAGE DETAILS

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



GTOH

Clamping force: 20kN $\pm 10\%$
Lead coaxial, length: 300mm

Fig.30 Package outline