

### APPLICATIONS

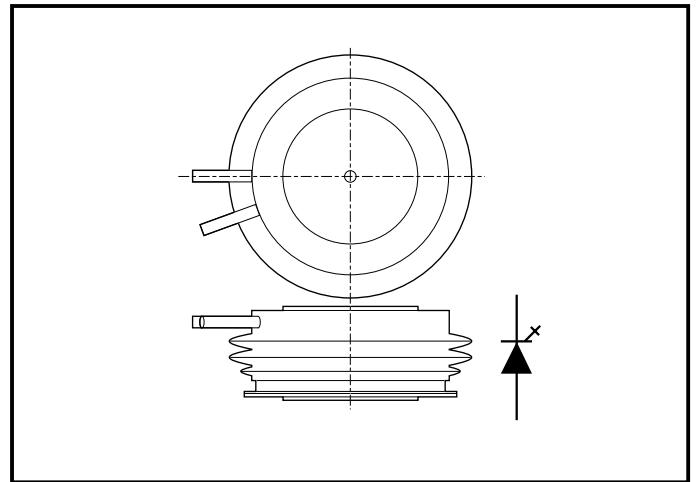
- Variable speed A.C. motor drive inverters (VSD-AC).
- Uninterruptable Power Supplies
- High Voltage Converters.
- Choppers.
- Welding.
- Induction Heating.
- DC/DC Converters.

### KEY PARAMETERS

$I_{TCM}$	1200A
$V_{DRM}$	2500V
$I_{T(AV)}$	500A
$dV_D/dt$	1000V/ $\mu$ s
$di_T/dt$	300A/ $\mu$ s

### FEATURES

- Double Side Cooling.
- High Reliability In Service.
- 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 For Environmental Requirements.



Outline type code: P.  
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
DG406BP25	2500	16	$T_{vj} = 125^{\circ}\text{C}$ , $I_{DM} = 50\text{mA}$ , $I_{RRM} = 50\text{mA}$

### CURRENT RATINGS

Symbol	Parameter	Conditions	Max.	Units
$I_{TCM}$	Repetitive peak controllable on-state current	$V_D = V_{DRM}$ , $T_j = 125^{\circ}\text{C}$ , $di_{GQ}/dt = 30\text{A}/\mu\text{s}$ , $C_s = 1.5\mu\text{F}$	1200	A
$I_{T(AV)}$	Mean on-state current	$T_{HS} = 80^{\circ}\text{C}$ . Double side cooled. Half sine 50Hz.	500	A
$I_{T(RMS)}$	RMS on-state current	$T_{HS} = 80^{\circ}\text{C}$ . Double side cooled. Half sine 50Hz.	630	A

## DG406BP25

### SURGE RATINGS

Symbol	Parameter	Conditions	Max.	Units
$I_{TSM}$	Surge (non-repetitive) on-state current	10ms half sine. $T_j = 125^\circ\text{C}$	8.0	kA
$I^2t$	$I^2t$ for fusing	10ms half sine. $T_j = 125^\circ\text{C}$	$0.32 \times 10^6$	$\text{A}^2\text{s}$
$di_T/dt$	Critical rate of rise of on-state current	$V_D = 2000\text{V}$ , $I_T = 1000\text{A}$ , $T_j = 125^\circ\text{C}$ , $I_{FG} \geq 30\text{A}$ , Rise time $> 1.0\mu\text{s}$	300	$\text{A}/\mu\text{s}$
$dV_D/dt$	Rate of rise of off-state voltage	To 66% $V_{DRM}$ ; $R_{GK} \leq 1.5\Omega$ , $T_j = 125^\circ\text{C}$	500	$\text{V}/\mu\text{s}$
		To 66% $V_{DRM}$ ; $V_{RG} = -2\text{V}$ , $T_j = 125^\circ\text{C}$	1000	$\text{V}/\mu\text{s}$
$L_S$	Peak stray inductance in snubber circuit	$I_T = 1000\text{A}$ , $V_D = V_{DRM}$ , $T_j = 125^\circ\text{C}$ , $di_{GQ}/dt = 30\text{A}/\mu\text{s}$ , $C_s = 1.0\mu\text{F}$	200	nH

### GATE RATINGS

Symbol	Parameter	Conditions	Min.	Max.	Units
$V_{RGM}$	Peak reverse gate voltage	This value maybe exceeded during turn-off	-	16	V
$I_{FGM}$	Peak forward gate current		20	70	A
$P_{FG(AV)}$	Average forward gate power		-	10	W
$P_{RGM}$	Peak reverse gate power		-	15	kW
$di_{GQ}/dt$	Rate of rise of reverse gate current		15	60	$\text{A}/\mu\text{s}$
$t_{ON(min)}$	Minimum permissible on time		20	-	$\mu\text{s}$
$t_{OFF(min)}$	Minimum permissible off time		100	-	$\mu\text{s}$

### THERMAL RATINGS AND MECHANICAL DATA

Symbol	Parameter	Conditions	Min.	Max.	Units
$R_{th(j-hs)}$	DC thermal resistance - junction to heatsink surface	Double side cooled	-	0.041	$^\circ\text{C}/\text{W}$
		Anode side cooled	-	0.07	$^\circ\text{C}/\text{W}$
		Cathode side cooled	-	0.1	$^\circ\text{C}/\text{W}$
$R_{th(c-hs)}$	Contact thermal resistance	Clamping force 12.0kN With mounting compound	-	0.009	$^\circ\text{C}/\text{W}$
$T_{vj}$	Virtual junction temperature		-	125	$^\circ\text{C}$
$T_{OP}/T_{stg}$	Operating junction/storage temperature range		-40	125	$^\circ\text{C}$
-	Clamping force		11.0	15.0	kN

## CHARACTERISTICS

$T_j = 125^\circ\text{C}$ unless stated otherwise					
Symbol	Parameter	Conditions	Min.	Max.	Units
$V_{TM}$	On-state voltage	At 1000A peak, $I_{G(ON)} = 4\text{A d.c.}$	-	2.5	V
$I_{DM}$	Peak off-state current	$V_{DRM} = 2500\text{V}$ , $V_{RG} = 0\text{V}$	-	50	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	$V_D = 24\text{V}$ , $I_T = 100\text{A}$ , $T_j = 25^\circ\text{C}$	-	1.5	A
$I_{RGM}$	Reverse gate cathode current	$V_{RGM} = 16\text{V}$ , No gate/cathode resistor	-	50	mA
$E_{ON}$	Turn-on energy	$V_D = 2000\text{V}$	-	1040	mJ
$t_d$	Delay time	$I_T = 1000\text{A}$ , $di_T/dt = 300\text{A}/\mu\text{s}$	-	1.5	$\mu\text{s}$
$t_r$	Rise time	$I_{FG} = 30\text{A}$ , rise time $\leq 1.0\mu\text{s}$	-	3.0	$\mu\text{s}$
$E_{OFF}$	Turn-off energy		-	2300	mJ
$t_{gs}$	Storage time		-	14.0	$\mu\text{s}$
$t_{gf}$	Fall time	$I_T = 1000\text{A}$ , $V_{DM} = 2500\text{V}$	-	1.5	$\mu\text{s}$
$t_{gq}$	Gate controlled turn-off time	Snubber Cap $C_s = 1.0\mu\text{F}$ ,	-	15.5	$\mu\text{s}$
$Q_{GQ}$	Turn-off gate charge	$di_{GQ}/dt = 30\text{A}/\mu\text{s}$	-	3000	$\mu\text{C}$
$Q_{GQT}$	Total turn-off gate charge		-	6000	$\mu\text{C}$
$I_{GQM}$	Peak reverse gate current		-	420	A

CURVES

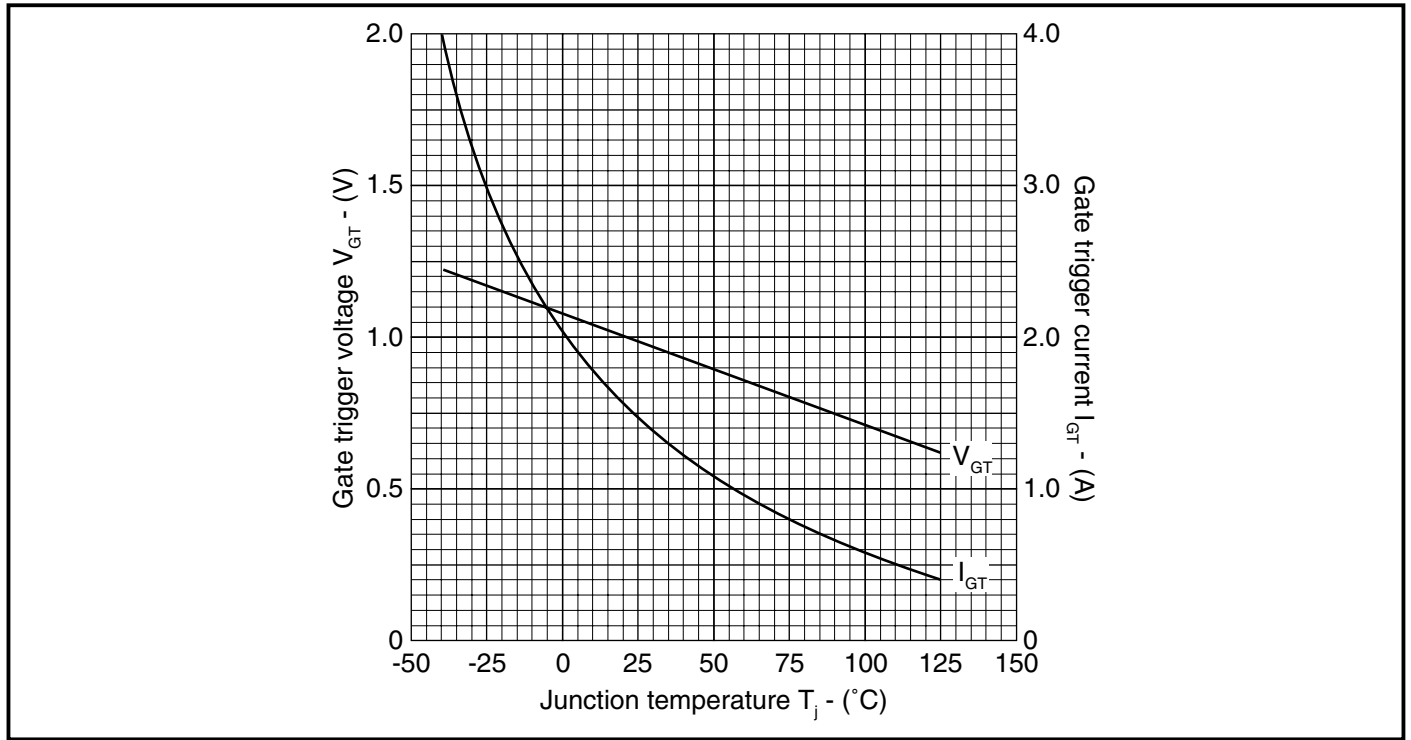


Fig.1 Maximum gate trigger voltage/current vs junction temperature

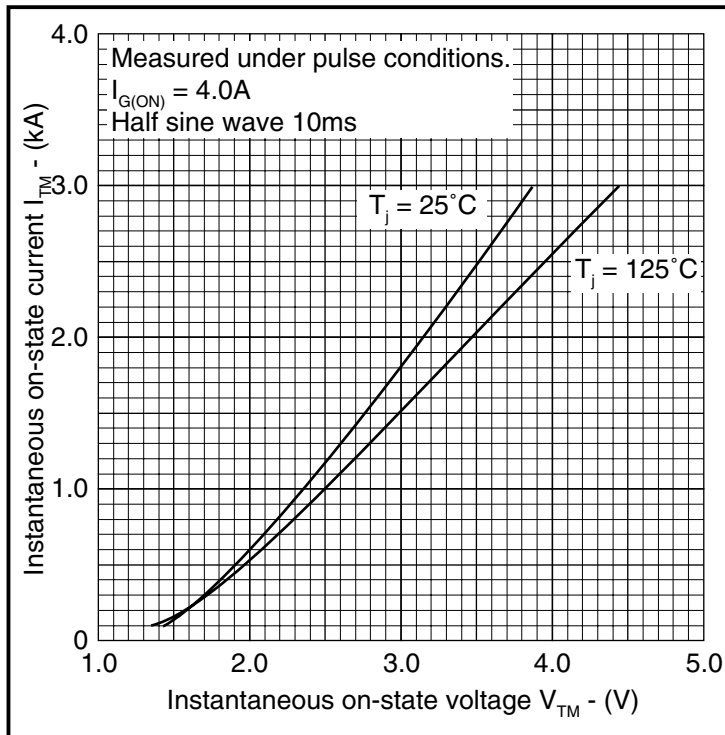


Fig.2 On-state characteristics

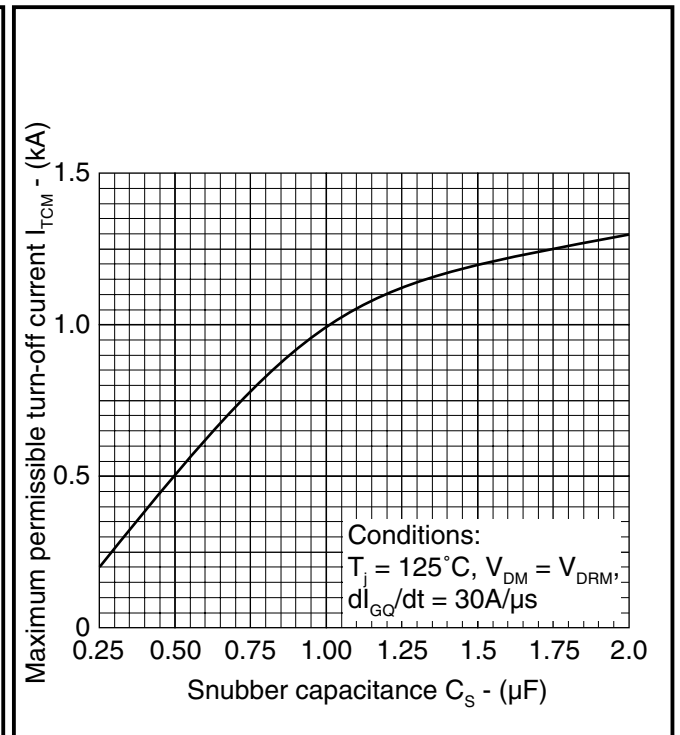


Fig.3 Maximum dependence of  $I_{TCM}$  on  $C_S$

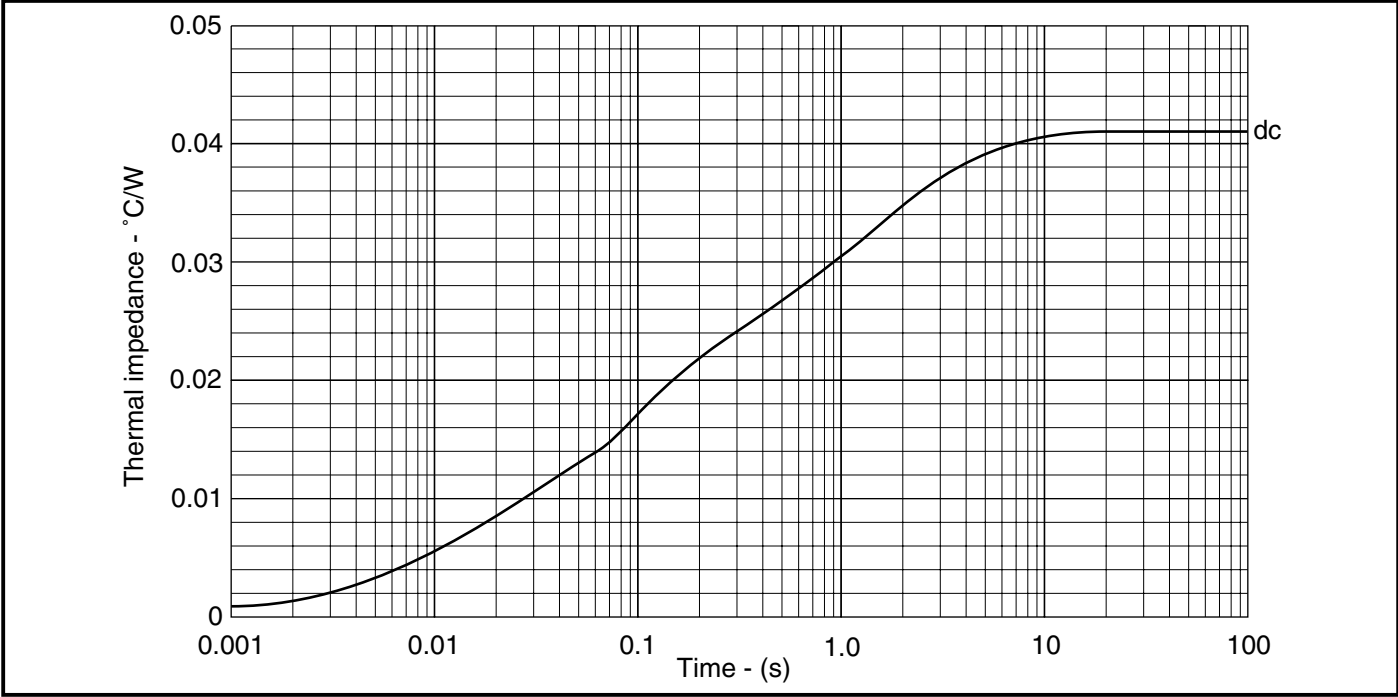


Fig.4 Maximum (limit) transient thermal impedance - double side cooled

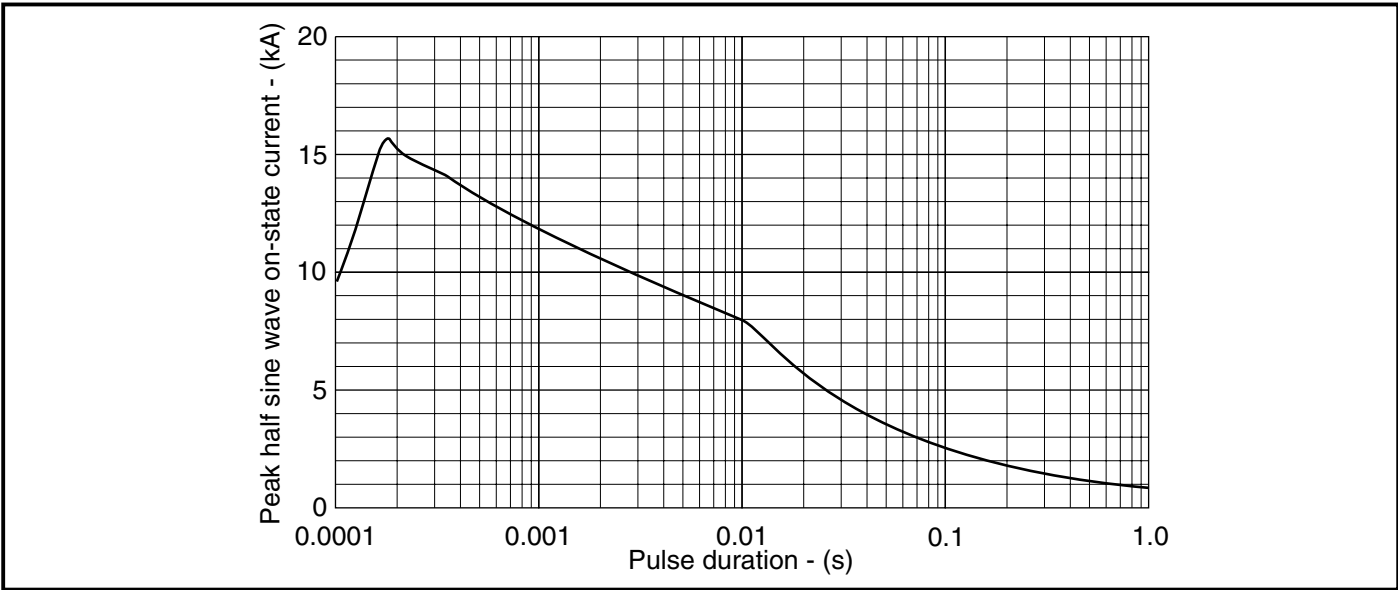


Fig.5 Surge (non-repetitive) on-state current vs time

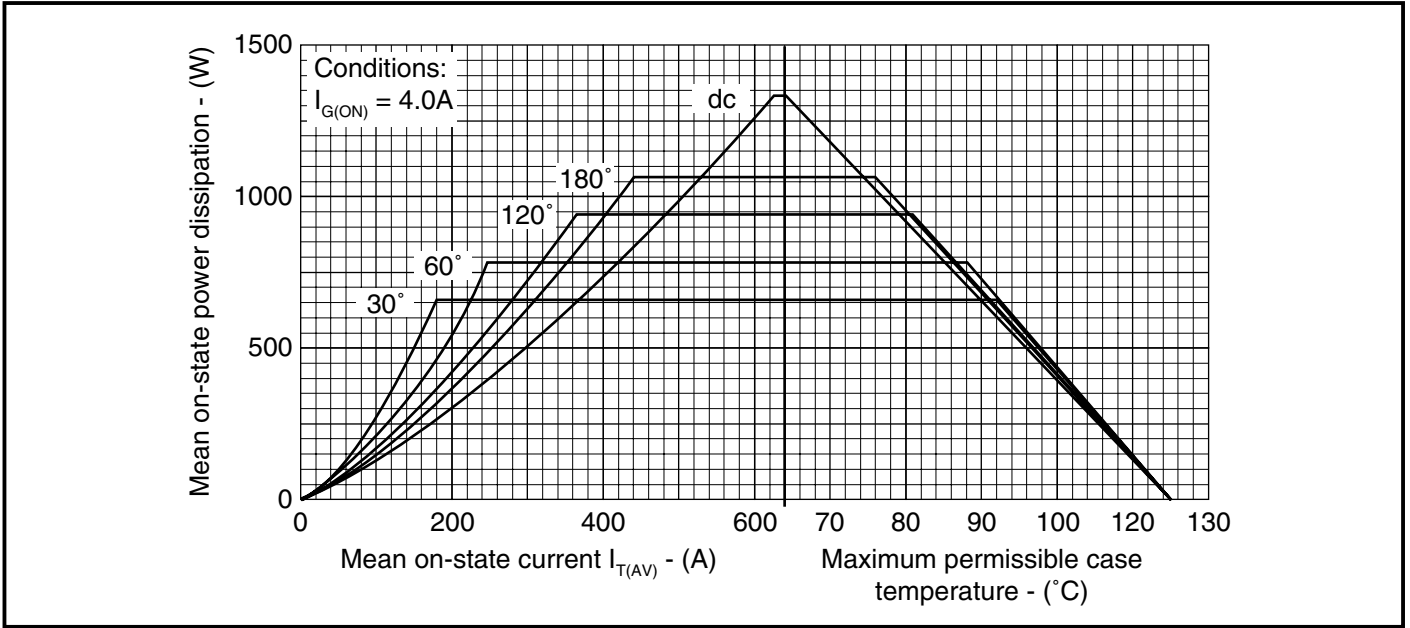


Fig.6 Steady state rectangular wave conduction loss - double side cooled

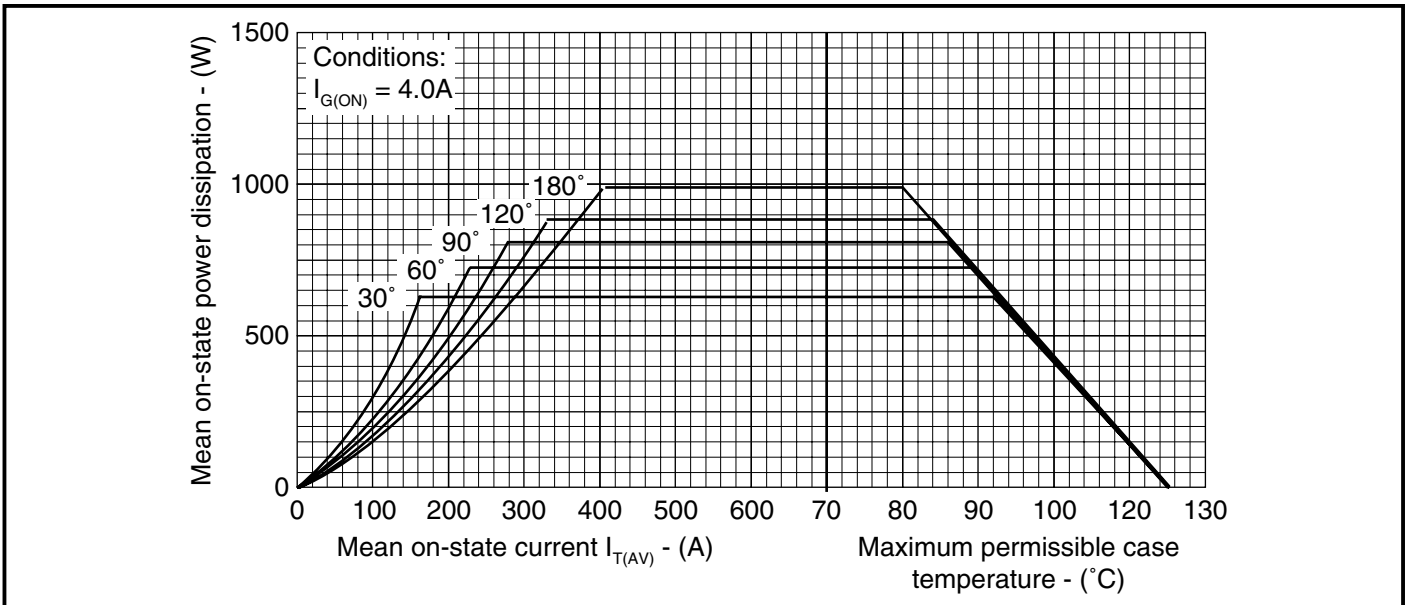


Fig.7 Steady state sinusoidal wave conduction loss - double side cooled

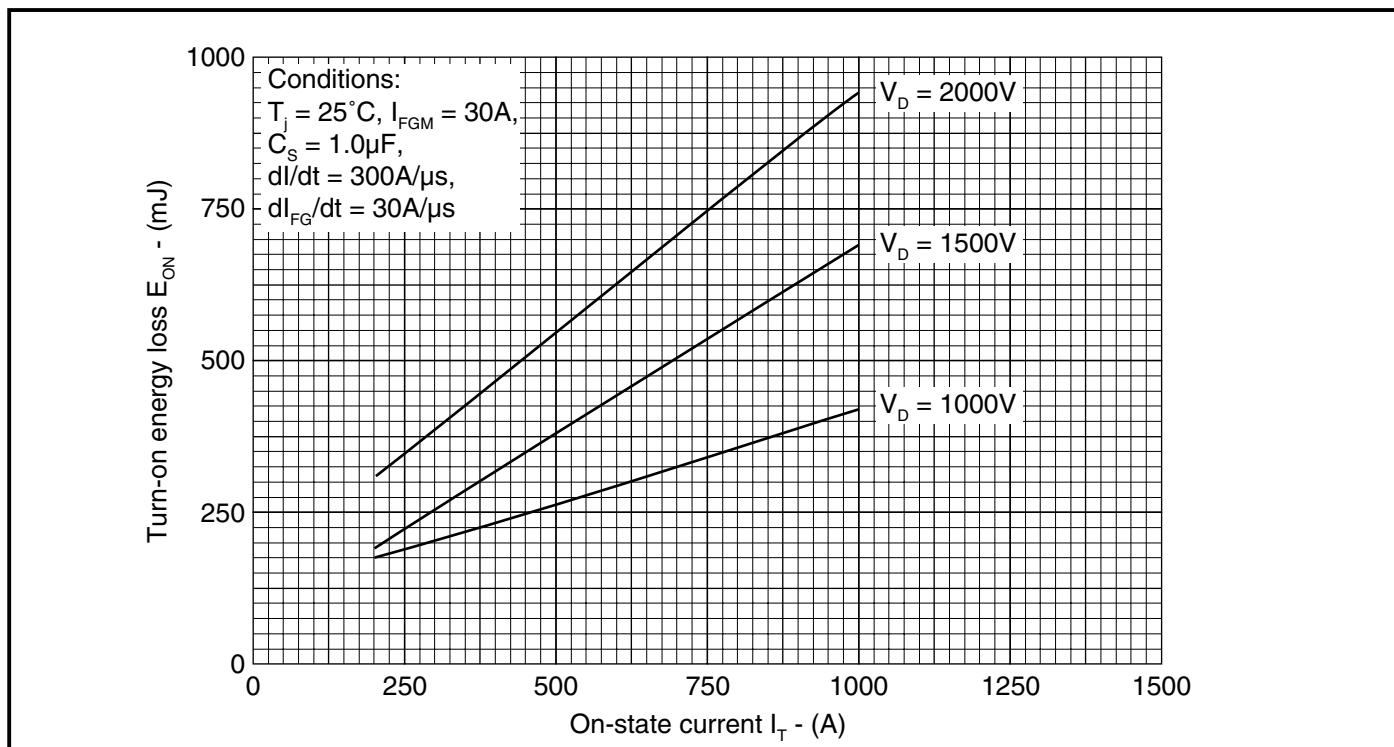


Fig.8 Turn-on energy vs on-state current

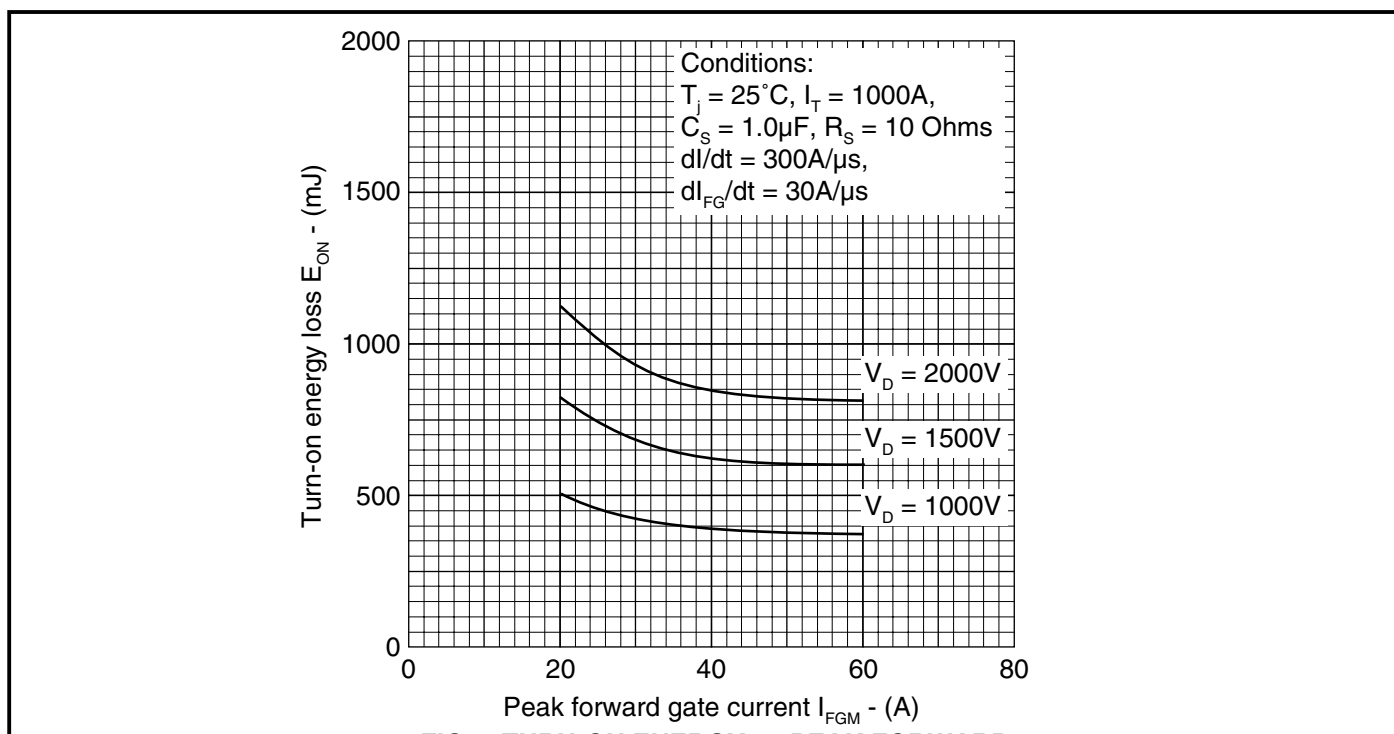


Fig.9 Turn-on energy vs peak forward gate current

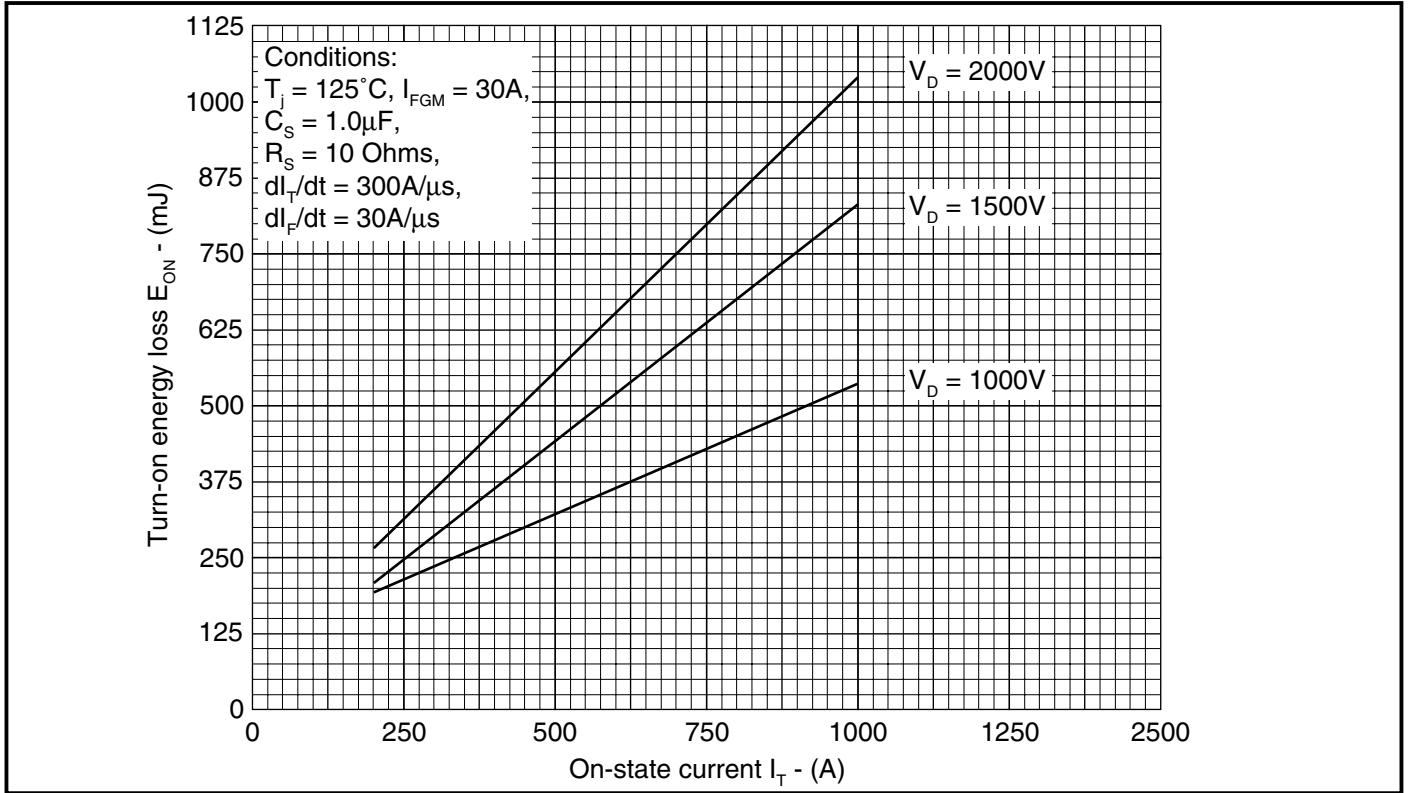


Fig.10 Turn-on energy vs on-state current

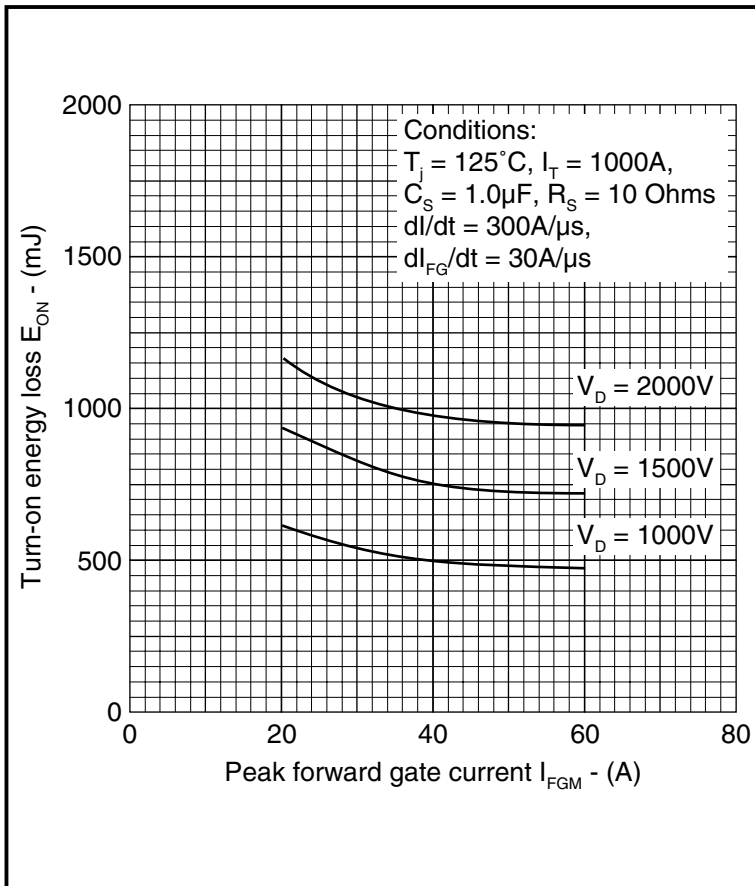


Fig.11 Turn-on energy vs peak forward gate current

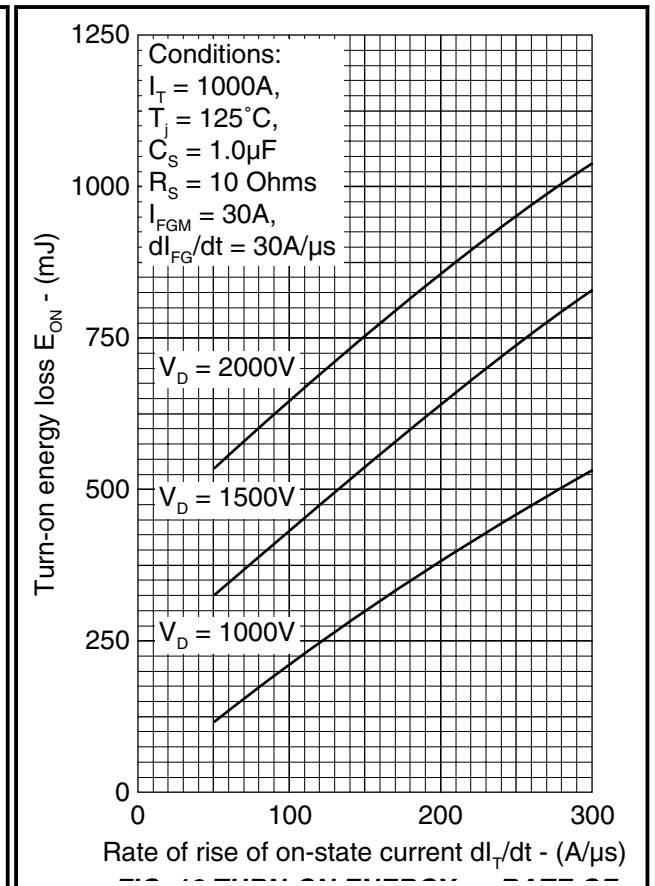


Fig.12 Turn-on energy vs rate of rise of on-state current



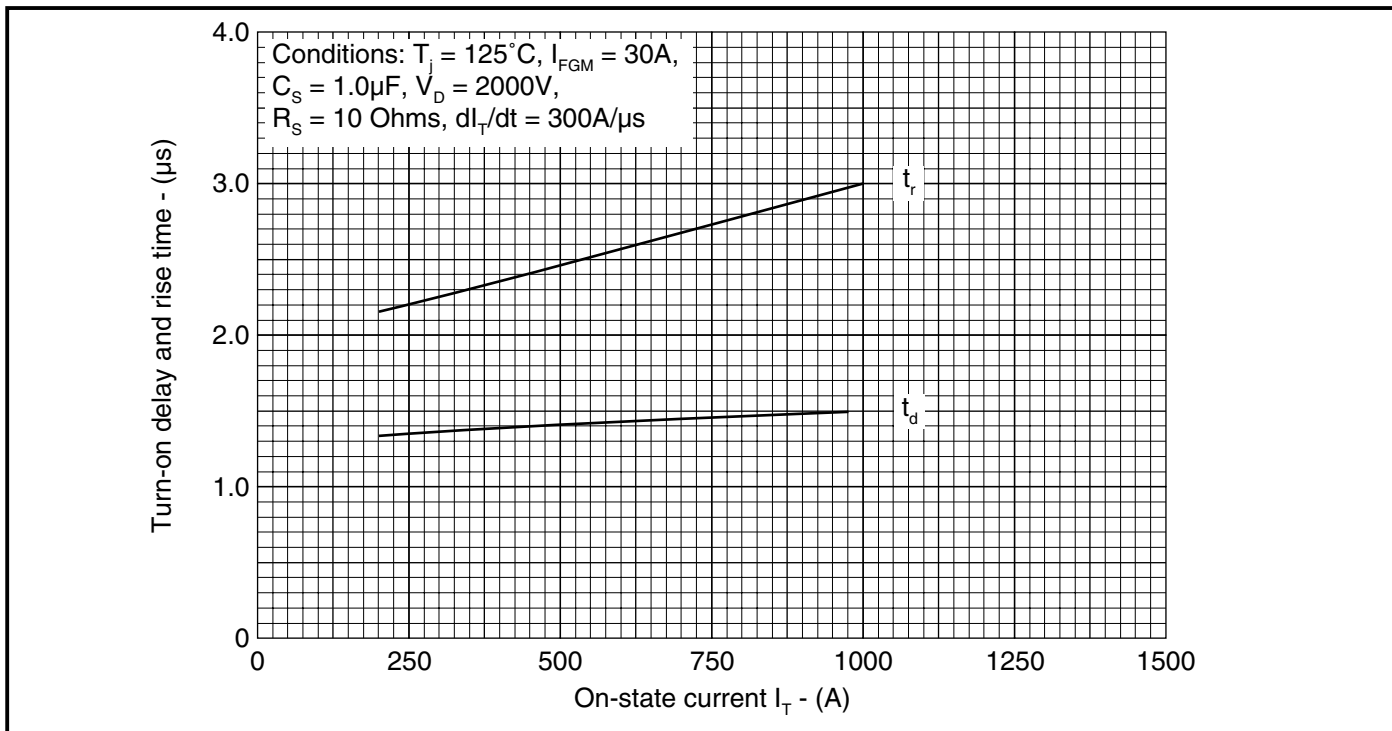


Fig.13 Delay time & rise time vs turn-on current

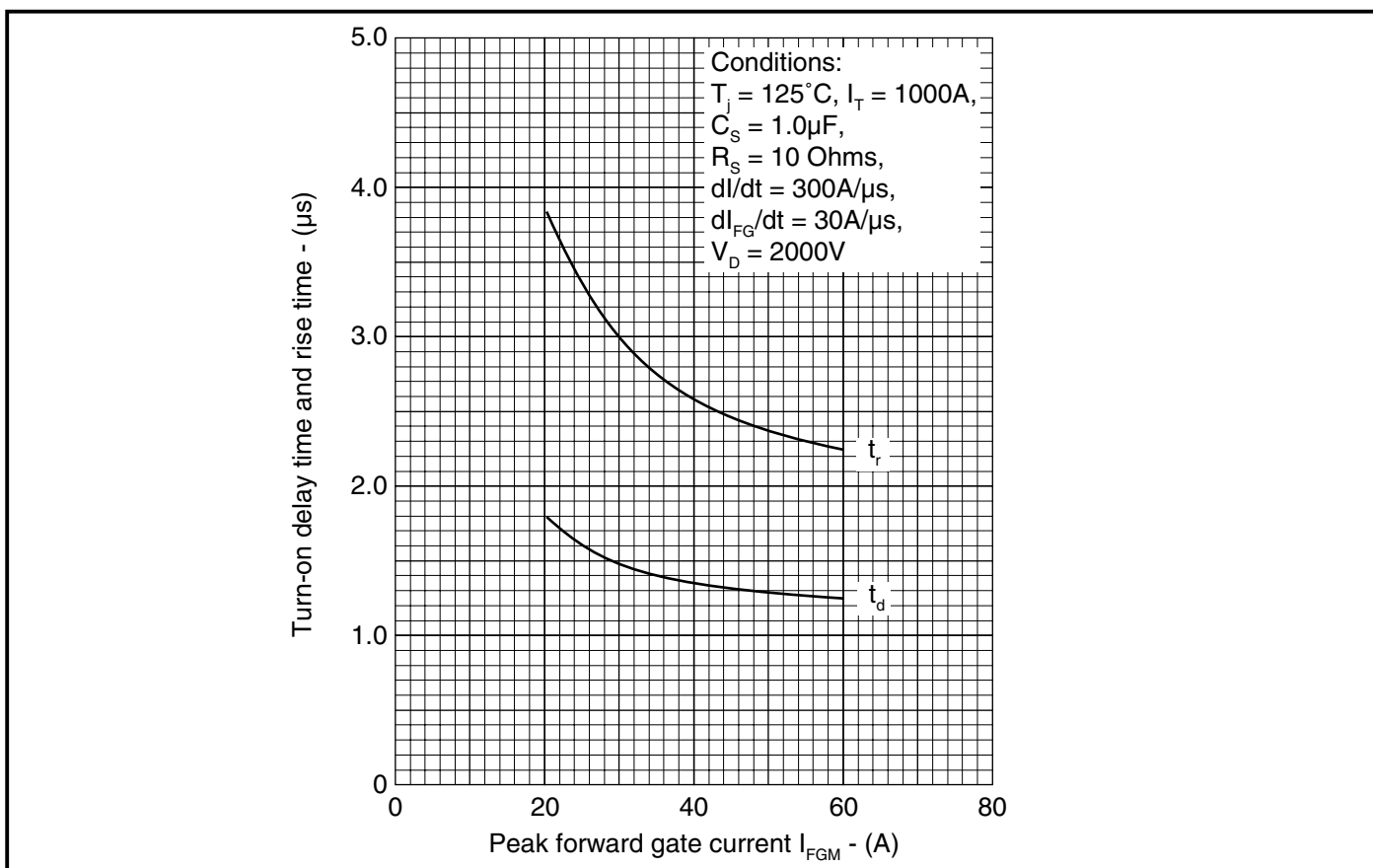


Fig.14 Delay time & rise time vs peak forward gate current

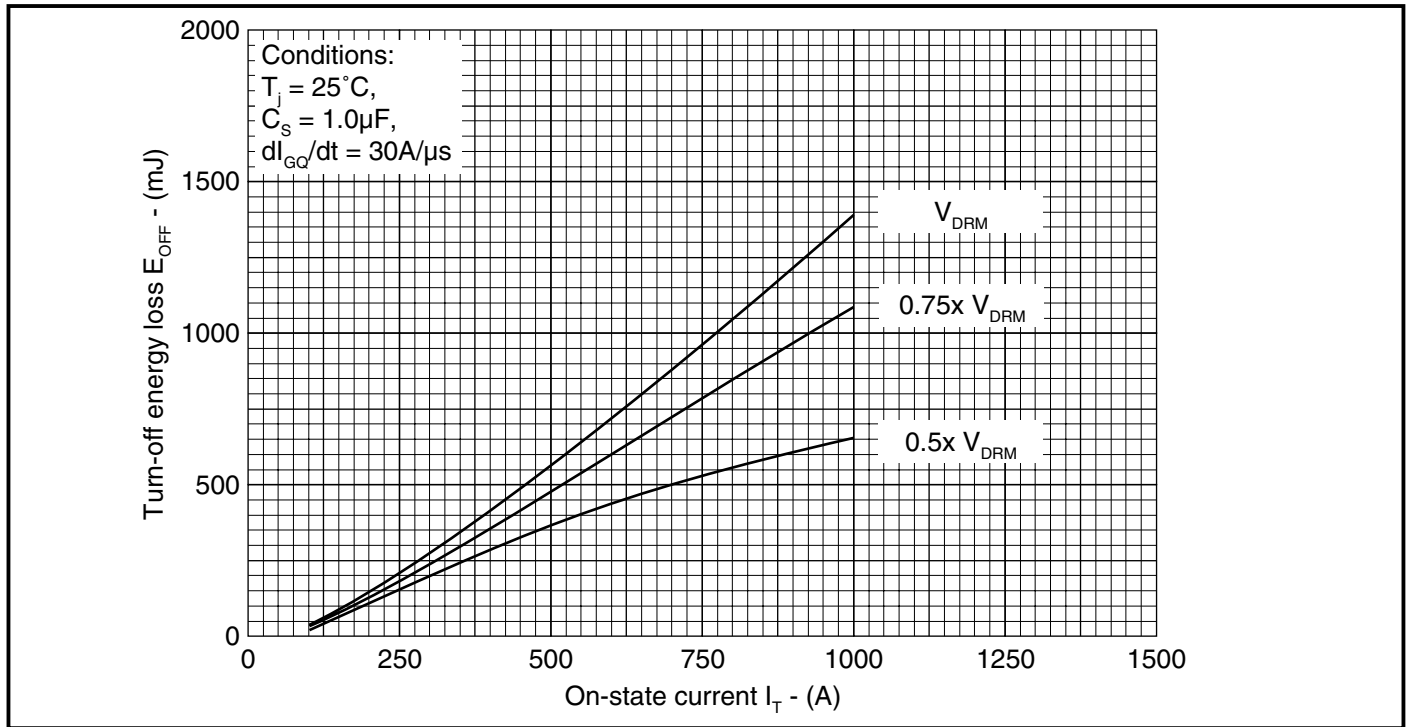


Fig.15 Turn-off energy vs on-state current

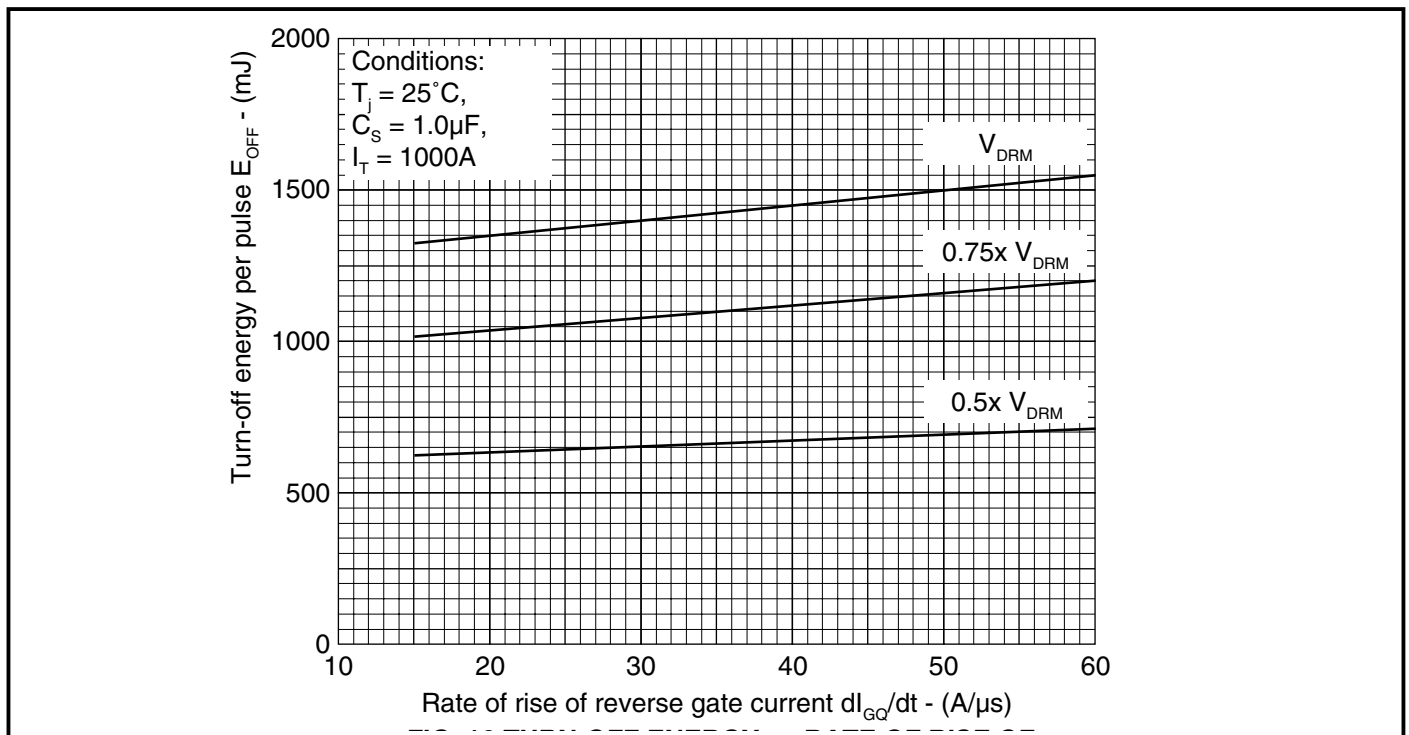


Fig.16 Turn-off energy vs rate of rise of reverse gate current

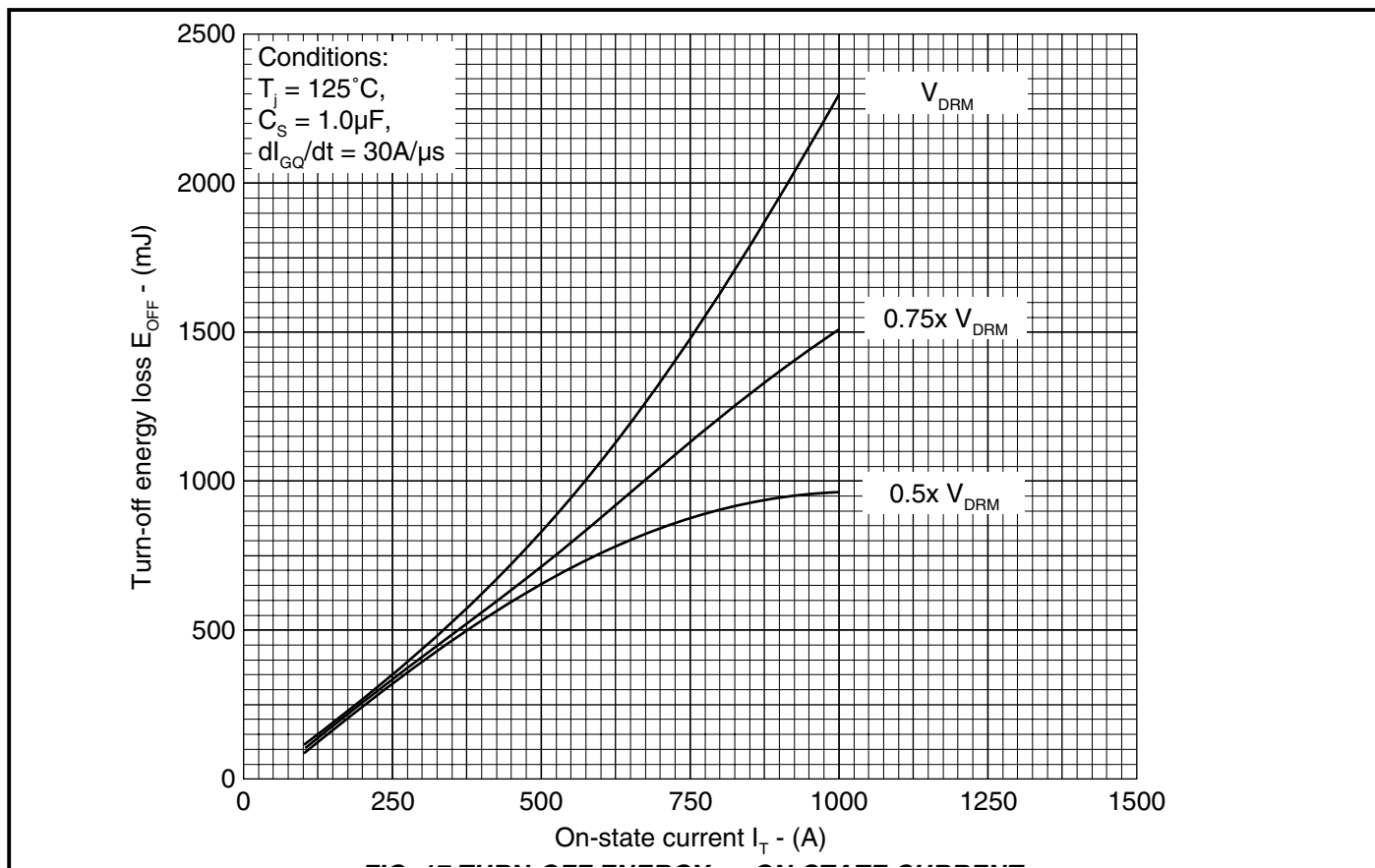


Fig.17 Turn-off energy vs on-state current

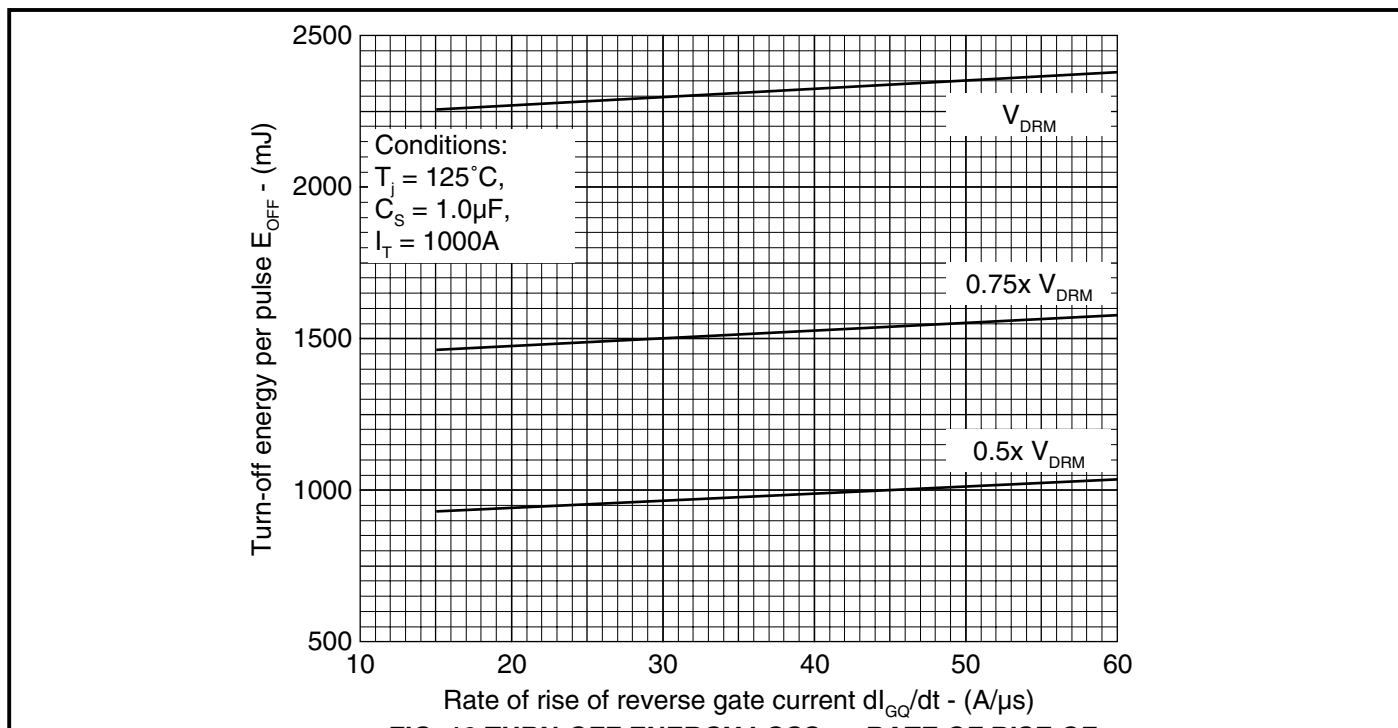


Fig.18 Turn-off energy loss vs rate of rise of reverse gate current

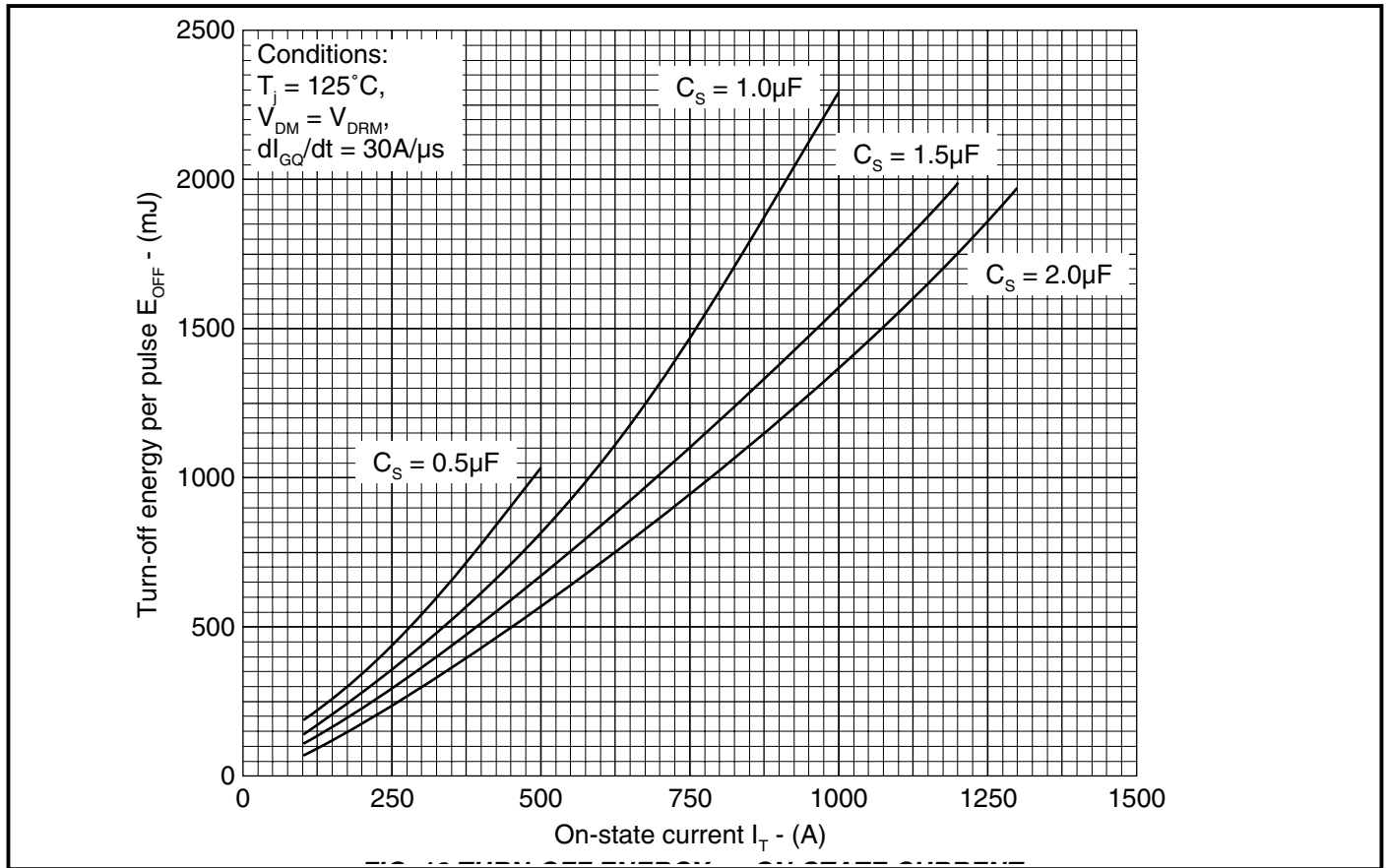


Fig.19 Turn-off energy vs on-state current

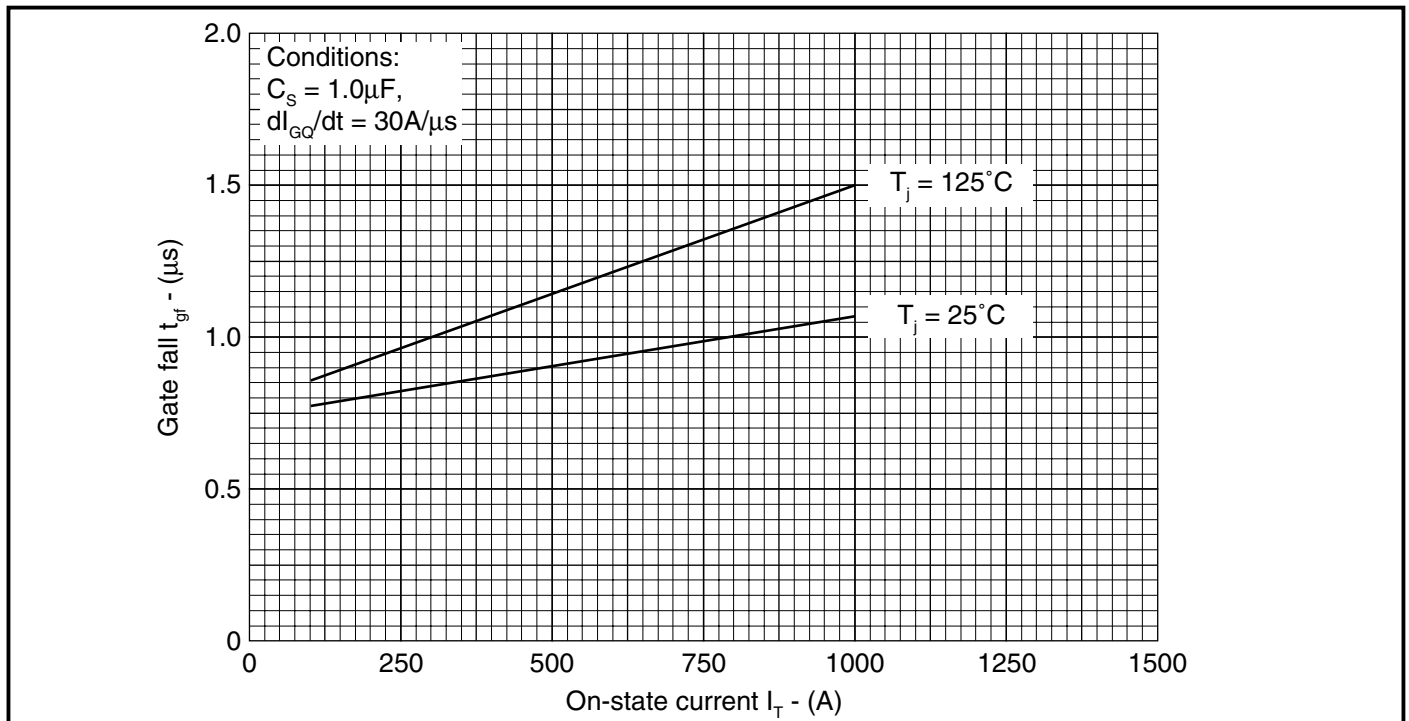


Fig.20 Gate fall time vs on-state current

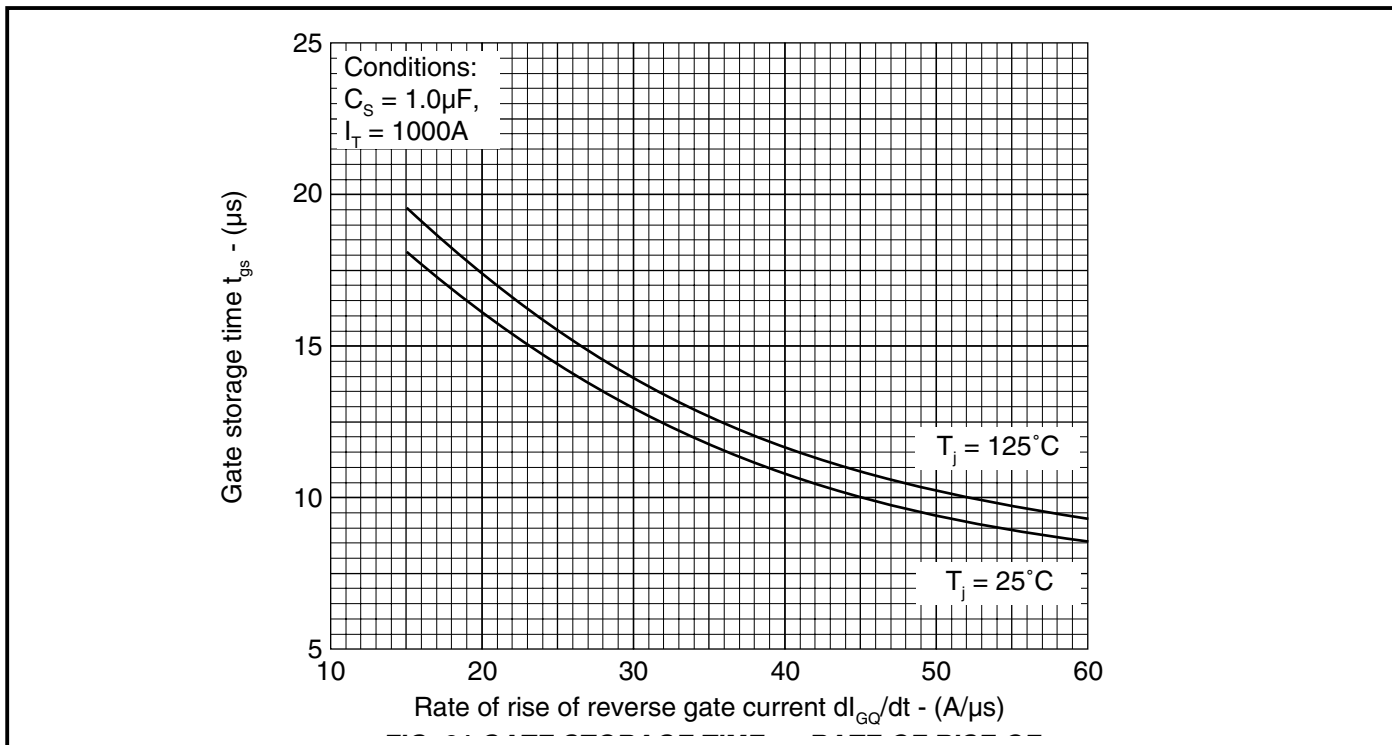


Fig.21 Gate storage time vs rate of rise of reverse gate current

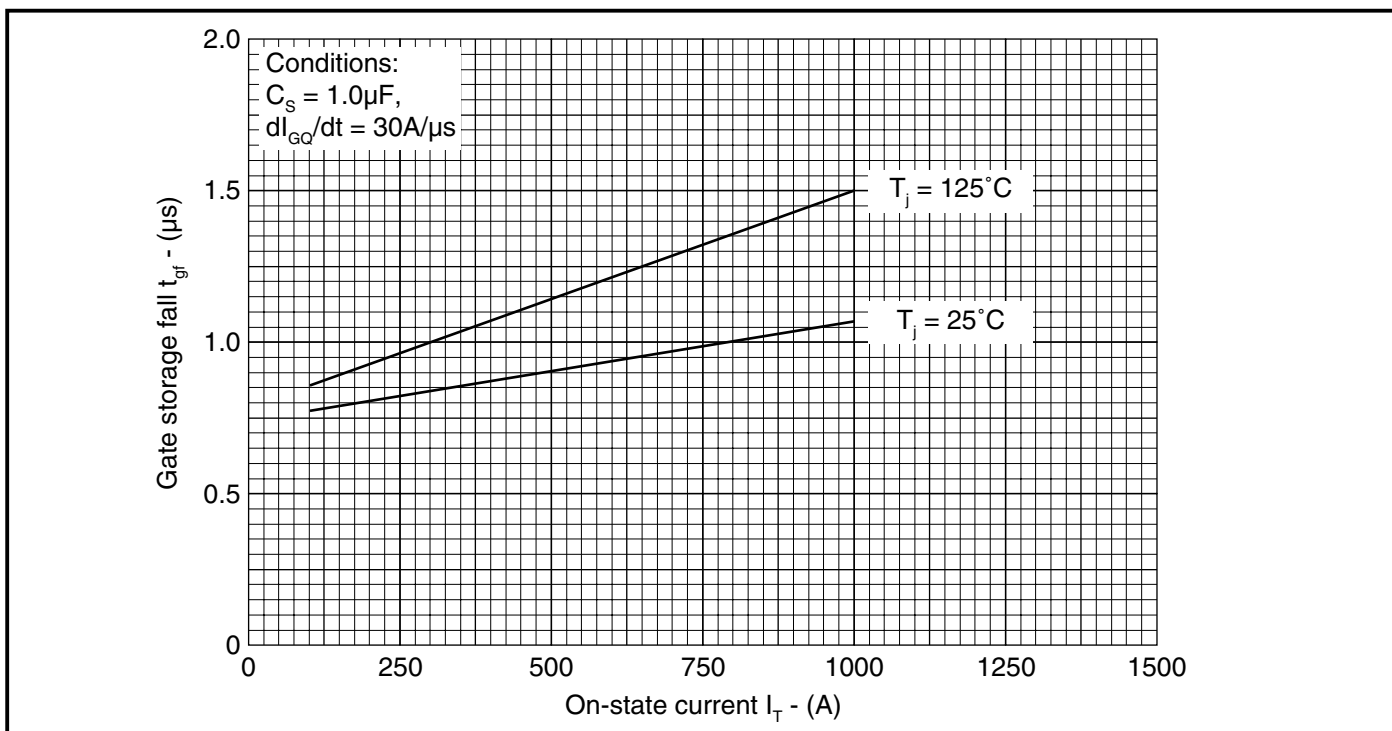


Fig.22 Gate fall time vs on-state current

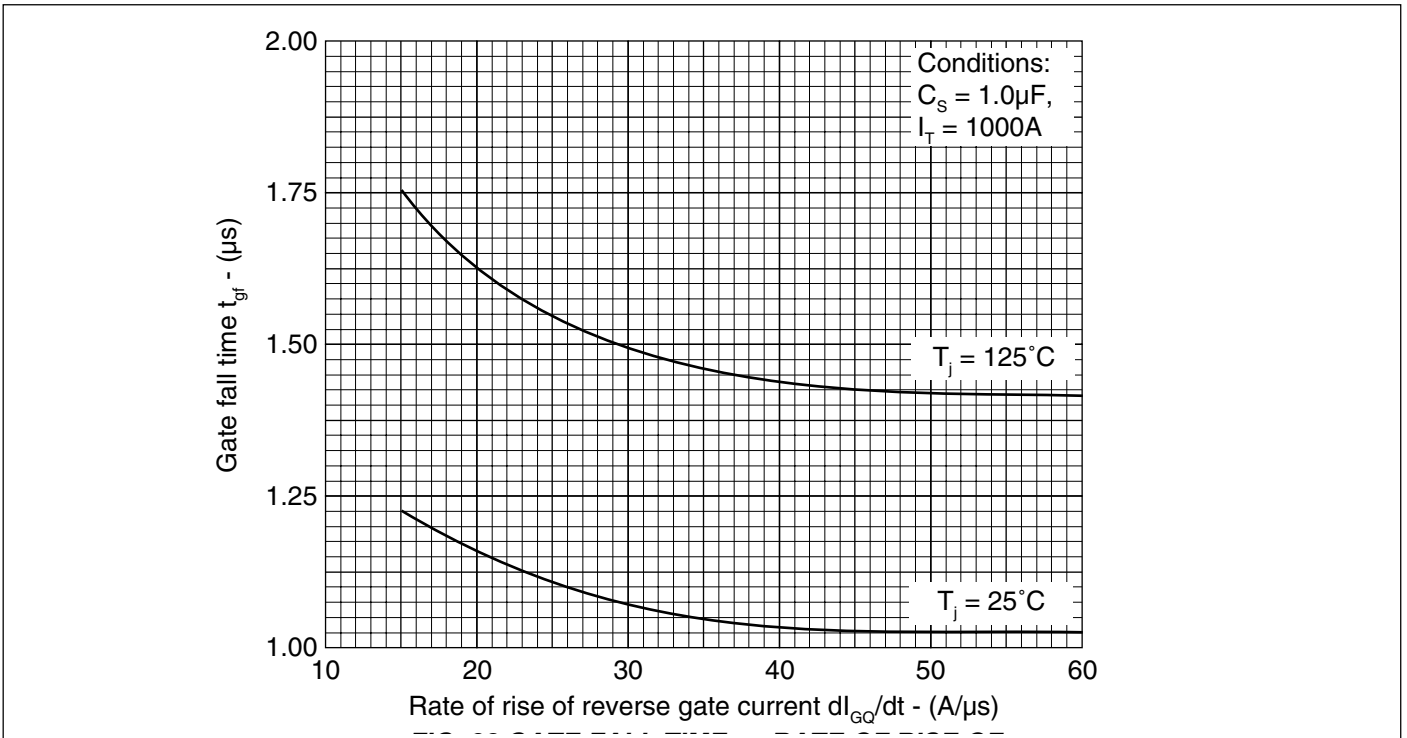


Fig.23 Gate fall time vs rate of rise of reverse gate current

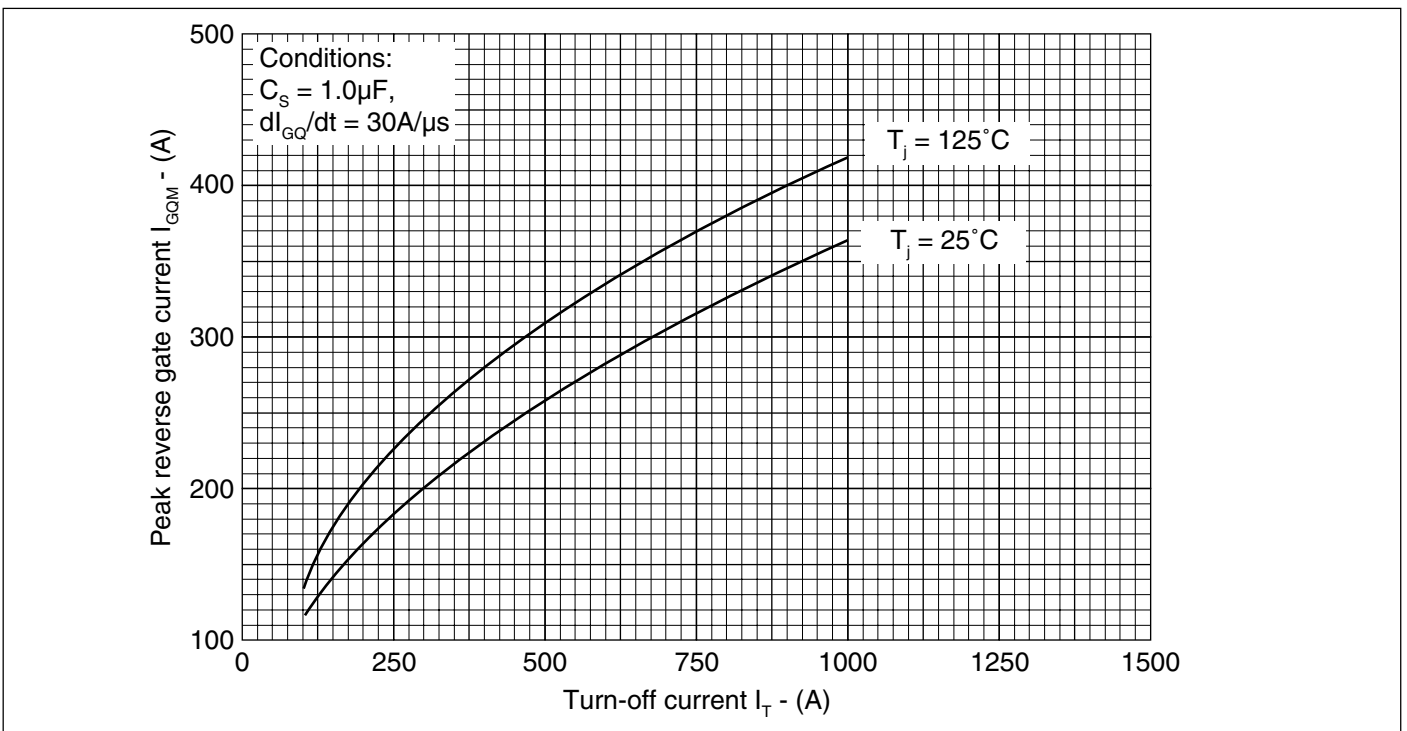


Fig.24 Peak reverse gate current vs turn-off current

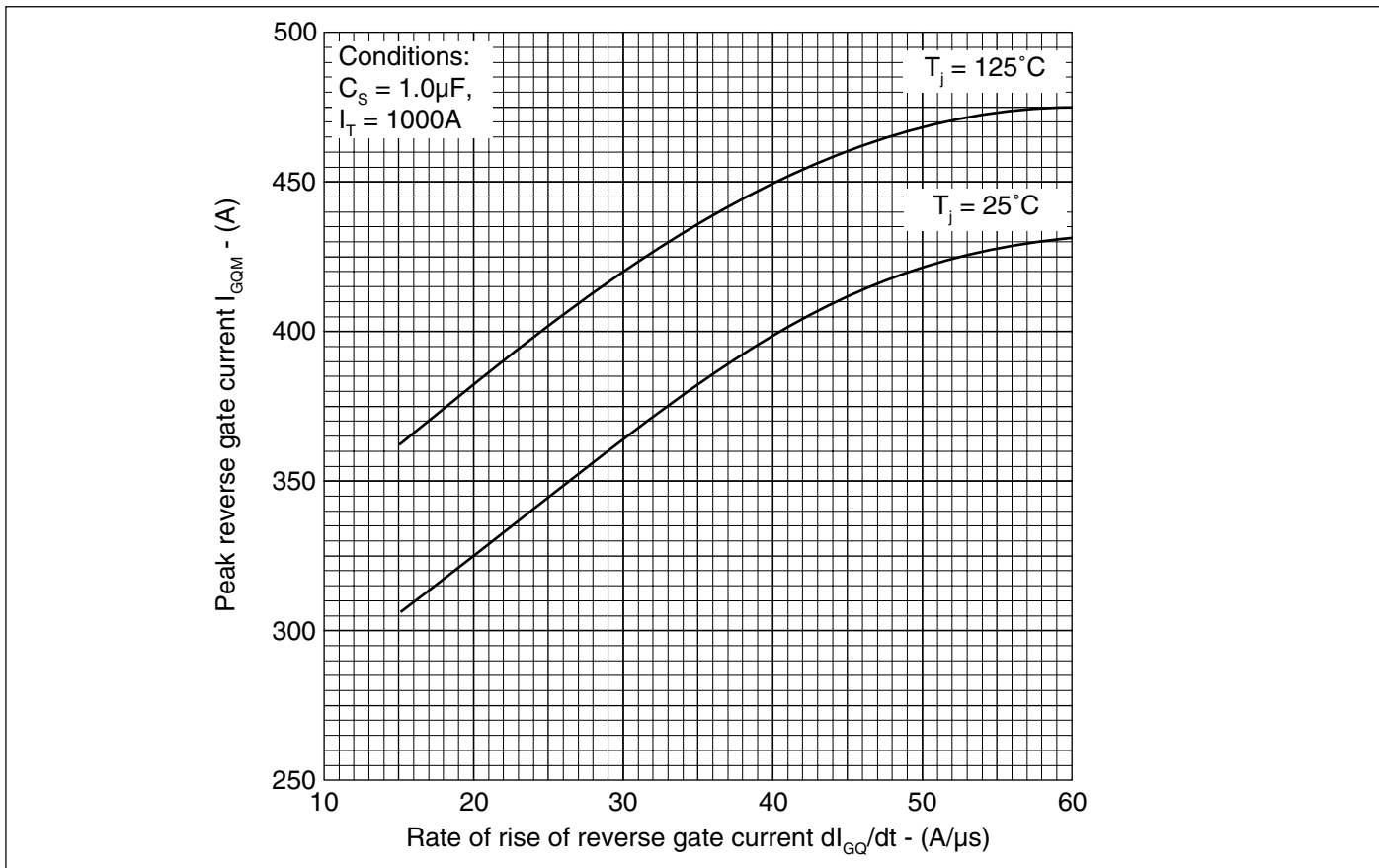


Fig.25 Peak reverse gate current vs rate of rise of reversegate current

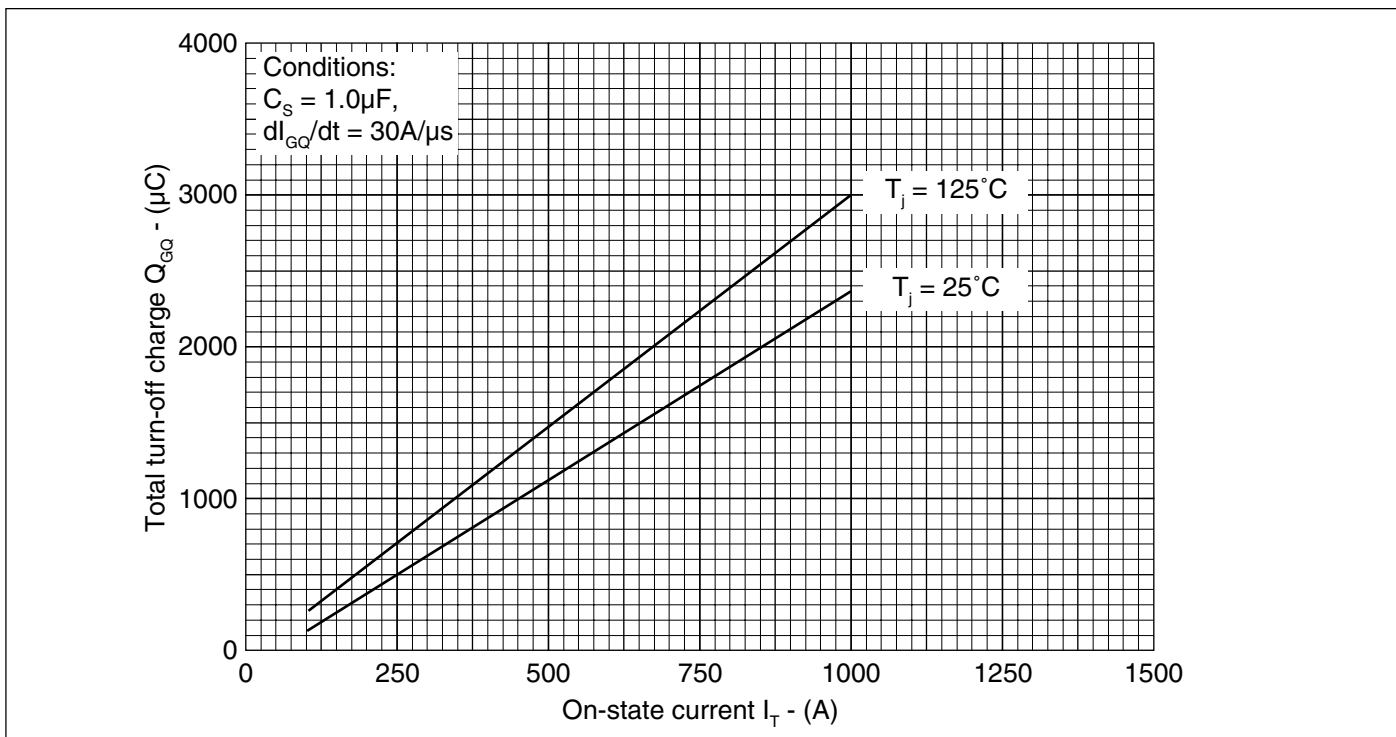


Fig.26 Turn-off gate charge vs on-state current

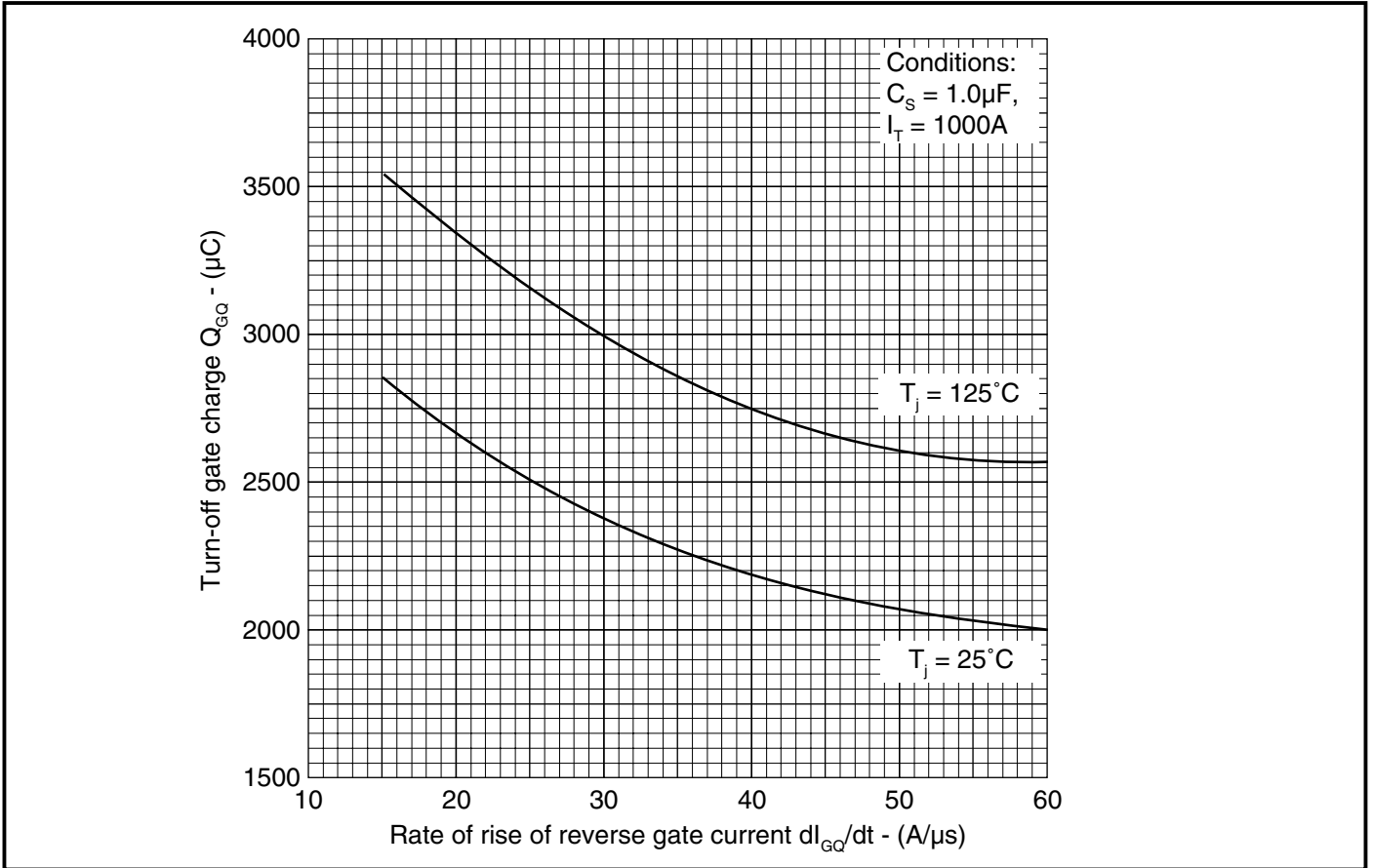


Fig.27 Turn-off gate charge vs rate of rise of reverse gate current

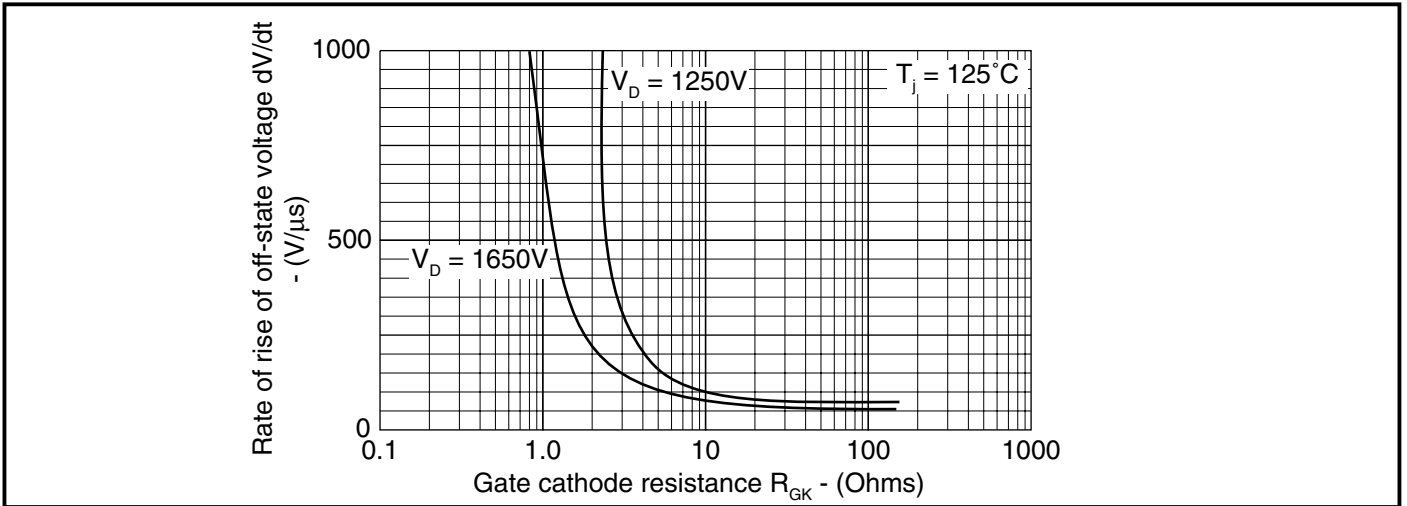
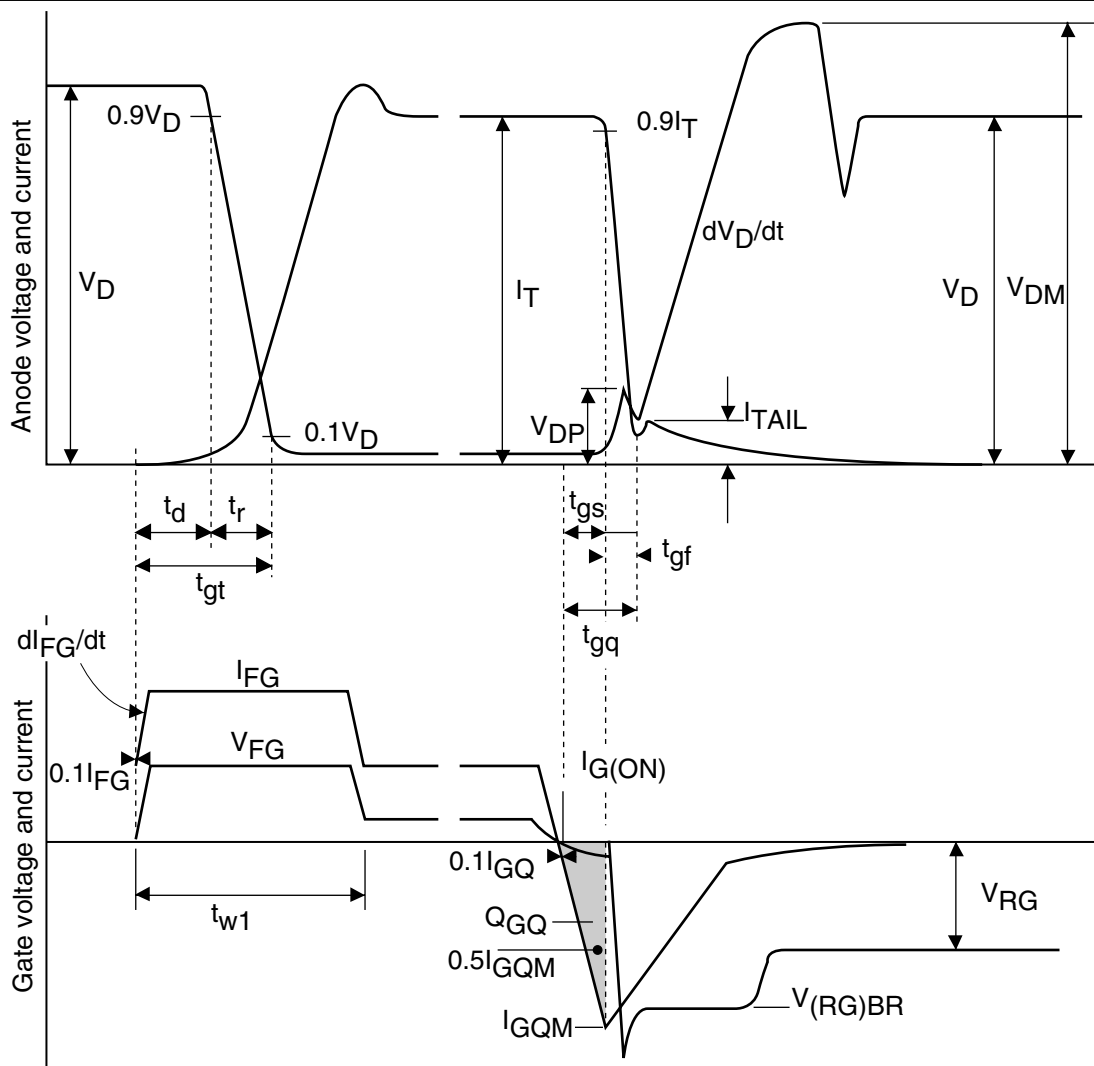


Fig.28 Rate of rise of off-state voltage vs gate cathode resistance





Recommended gate conditions:

- $I_{TCM} = 1000A$
- $I_{FG} = 30A$
- $I_{G(ON)} = 4A$  d.c.
- $t_{w1(min)} = 10\mu s$
- $I_{GQM} = 420A$
- $di_{GQ}/dt = 30A/\mu s$
- $Q_{GQ} = 3000\mu C$
- $V_{RG(min)} = 2V$
- $V_{RG(max)} = 16V$

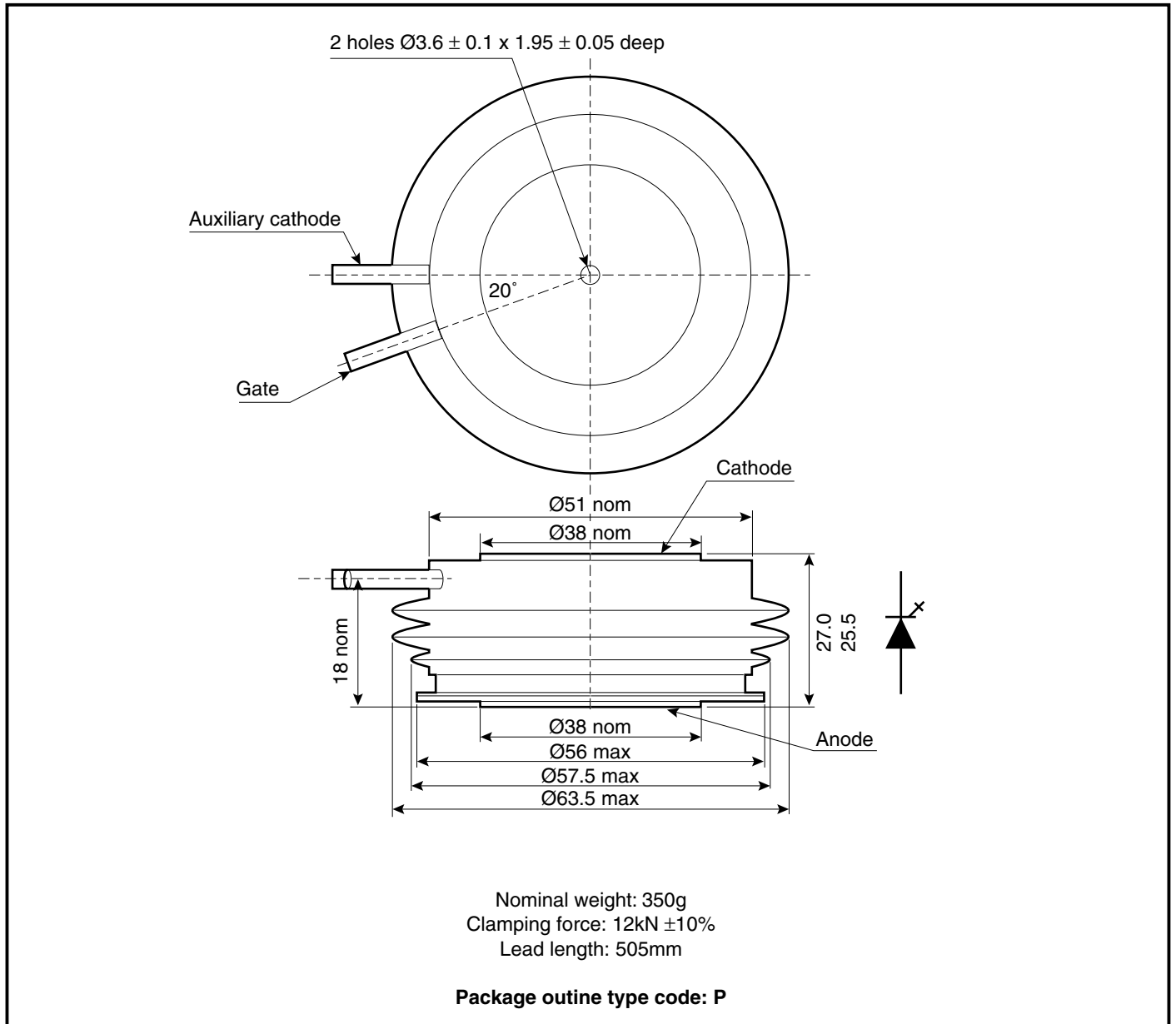
These are recommended Dynex Semiconductor conditions. Other conditions are permitted according to users gate drive specifications.

Fig.29 General switching waveforms

# DG406BP25

## PACKAGE DETAILS

For further package information, please contact Customer Services. All dimensions in mm, unless stated otherwise.  
DO NOT SCALE.





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