

APPLICATIONS

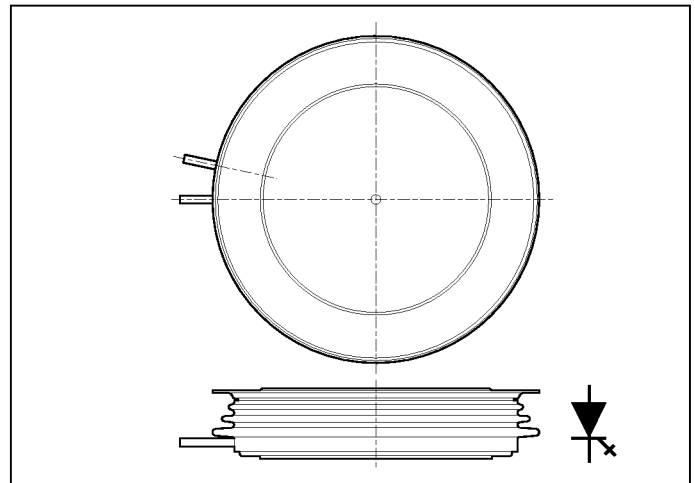
- Variable speed A.C. motor drive inverters (VSD-AC).
- Uninterruptable Power Supplies
- High Voltage Converters.
- Choppers.
- Welding.
- Induction Heating.
- DC/DC Converters.

KEY PARAMETERS

I_{TCM}	3000A
V_{DRM}	4500V
$I_{T(AV)}$	1180A
dV_D/dt	1000V/μs
di_T/dt	300A/μs

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: W. Turn to page 18 for further information.

VOLTAGE RATINGS

Type Number	Repetitive Peak Off-state Voltage V_{DRM}	Repetitive Peak Reverse Voltage V_{RRM}	Conditions
DG858BW45	4500	16	$T_{vj} = 125^\circ\text{C}$, $I_{DM} = 100\text{mA}$, $I_{RRM} = 50\text{mA}$

CURRENT RATINGS

Symbol	Parameter	Conditions	Max.	Units
I_{TCM}	Repetitive peak controllable on-state current	$V_D = 66\% V_{DRM}$, $T_j = 125^\circ\text{C}$, $di_{GQ}/dt = 40\text{A}/\mu\text{s}$, $C_s = 3\mu\text{F}$	3000	A
$I_{T(AV)}$	Mean on-state current	$T_{HS} = 80^\circ\text{C}$. Double side cooled. Half sine 50Hz.	1180	A
$I_{T(RMS)}$	RMS on-state current	$T_{HS} = 80^\circ\text{C}$. Double side cooled. Half sine 50Hz.	1850	A

DG858BW45

SURGE RATINGS

Symbol	Parameter	Conditions	Max.	Units
I_{TSM}	Surge (non-repetitive) on-state current	10ms half sine. $T_j = 125^\circ\text{C}$	20.0	kA
I^2t	I^2t for fusing	10ms half sine. $T_j = 125^\circ\text{C}$	2.0×10^6	A^2s
di_T/dt	Critical rate of rise of on-state current	$V_D = 3000\text{V}$, $I_T = 3000\text{A}$, $T_j = 125^\circ\text{C}$, $I_{FG} > 40\text{A}$, 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} ; $R_{GK} \leq 1.5\Omega$, $T_j = 125^\circ\text{C}$	130	$\text{V}/\mu\text{s}$
		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	$I_T = 3000\text{A}$, $V_D = V_{DRM}$, $T_j = 125^\circ\text{C}$, $dI_{GQ} = 40\text{A}/\mu\text{s}$, $C_S = 3.0\mu\text{F}$	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	100	A
$P_{FG(AV)}$	Average forward gate power		-	20	W
P_{RGM}	Peak reverse gate power		-	24	kW
di_{GQ}/dt	Rate of rise of reverse gate current		20	60	$\text{A}/\mu\text{s}$
$t_{ON(min)}$	Minimum permissible on time		50	-	μs
$t_{OFF(min)}$	Minimum permissible off time		100	-	μs

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	-	0.011	$^\circ\text{C}/\text{W}$		
		Anode side cooled	-	0.017	$^\circ\text{C}/\text{W}$		
		Cathode side cooled	-	0.03	$^\circ\text{C}/\text{W}$		
$R_{th(c-hs)}$	Contact thermal resistance	Clamping force 40.0kN With mounting compound		per contact	-	0.0021	$^\circ\text{C}/\text{W}$
T_{vj}	Virtual junction temperature		-40	125	$^\circ\text{C}$		
T_{OP}/T_{stg}	Operating junction/storage temperature range		-40	125	$^\circ\text{C}$		
-	Clamping force		36.0	44.0	kN		

CHARACTERISTICS

T _j = 125°C unless stated otherwise					
Symbol	Parameter	Conditions	Min.	Max.	Units
V _{TM}	On-state voltage	At 4000A peak, I _{G(ON)} = 10A d.c.	-	4.0	V
I _{DM}	Peak off-state current	V _{DRM} = 4500V, 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	-	1.2	V
I _{GT}	Gate trigger current	V _D = 24V, I _T = 100A, T _j = 25°C	-	4.0	A
I _{RGM}	Reverse gate cathode current	V _{RGM} = 16V, No gate/cathode resistor	-	50	mA
E _{ON}	Turn-on energy	V _D = 2000V	-	2700	mJ
t _d	Delay time	I _T = 3000A, di _T /dt = 300A/μs	-	2.0	μs
t _r	Rise time	I _{FG} = 40A, rise time < 1.0μs	-	6.0	μs
E _{OFF}	Turn-off energy	I _T = 3000A, V _{DM} = V _{DRM} Snubber Cap Cs = 3.0μF, di _{GQ} /dt = 40A/μs	-	13500	mJ
t _{gs}	Storage time		-	25.0	μs
t _{gf}	Fall time		-	2.5	μs
t _{gq}	Gate controlled turn-off time		-	27.5	μs
Q _{GQ}	Turn-off gate charge		-	12000	μC
Q _{GQT}	Total turn-off gate charge		-	24000	μC
I _{GQM}	Peak reverse gate current		-	950	A

CURVES

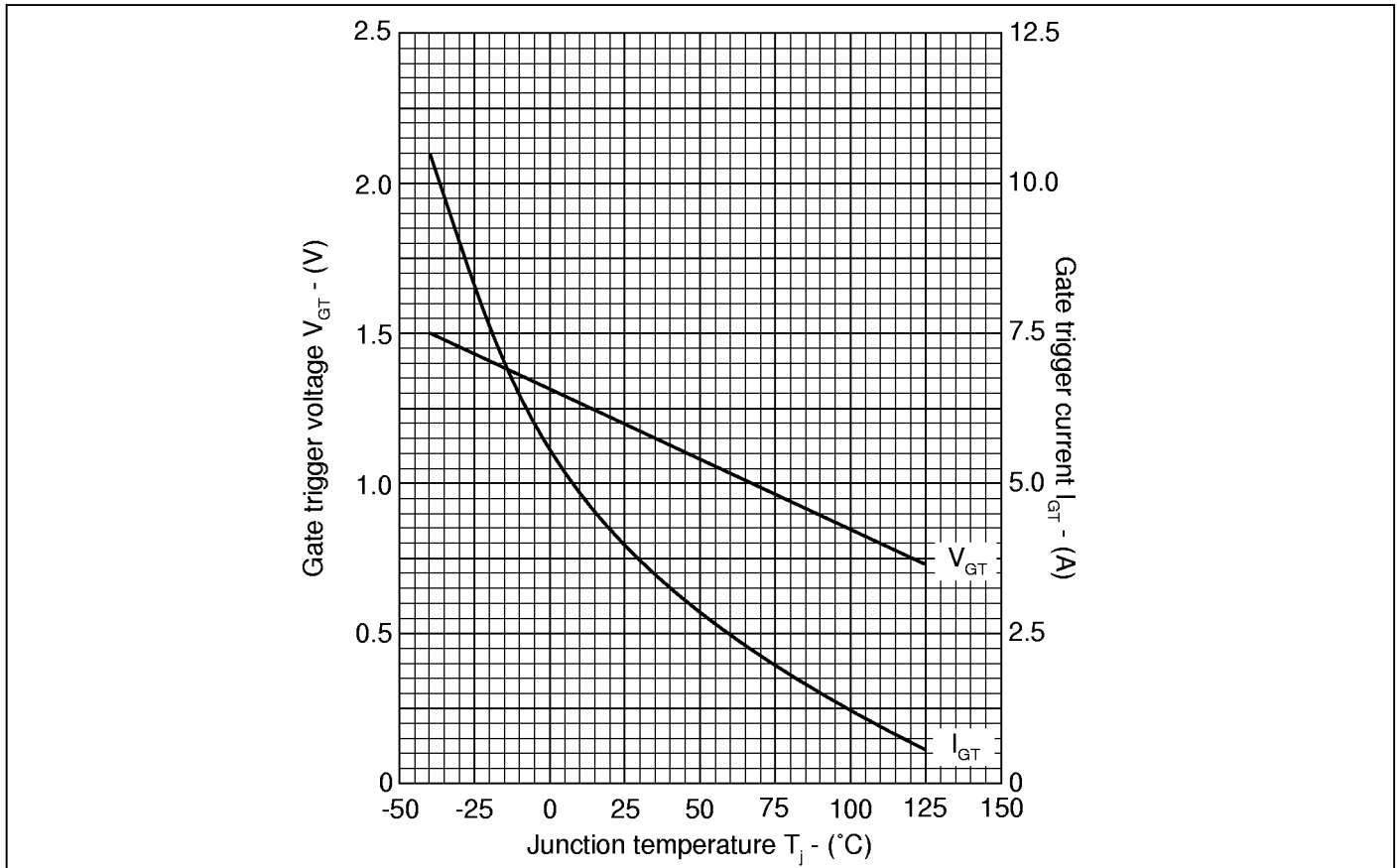


Fig.1 Maximum gate trigger voltage/current vs junction temperature

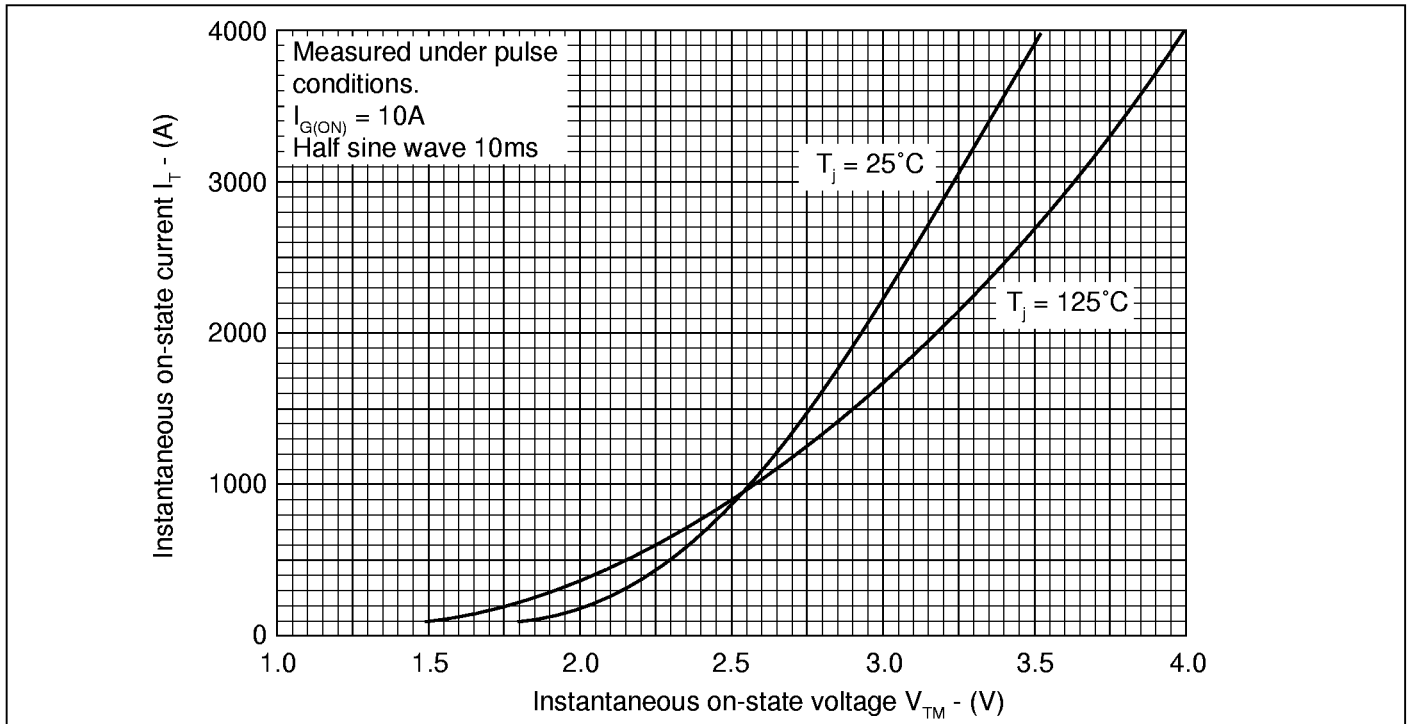


Fig.2 On-state characteristics

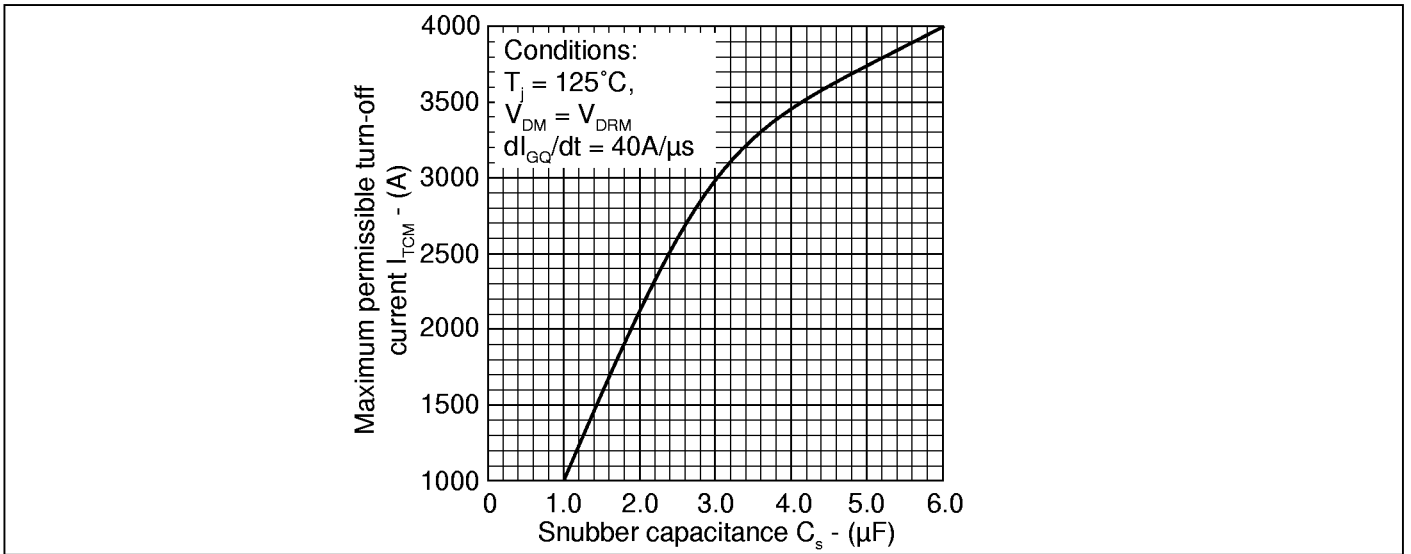


Fig.3 Maximum dependence of I_{TCM} on C_s

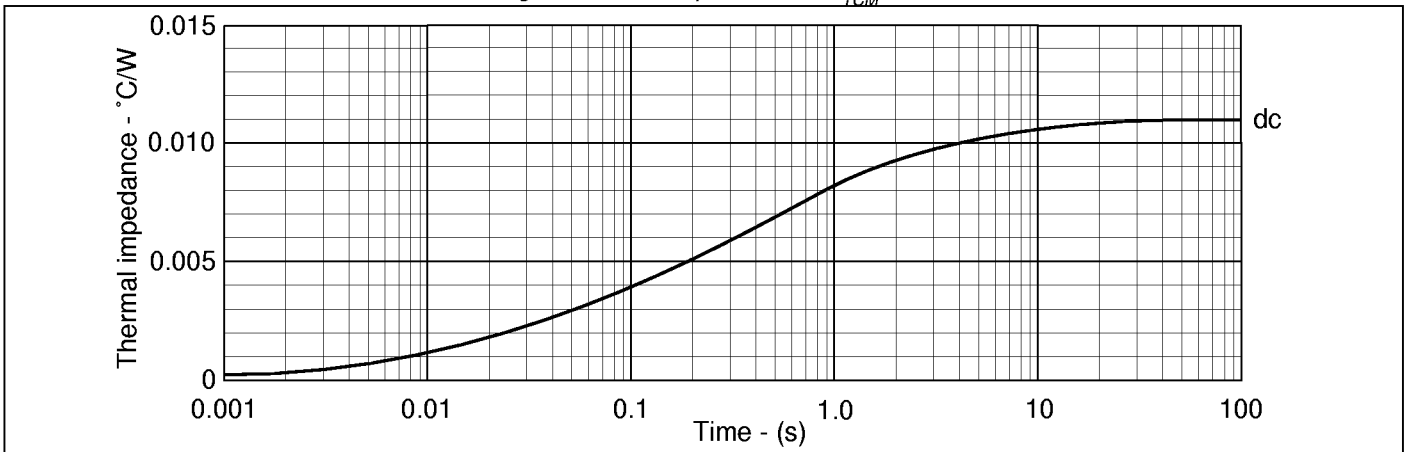


Fig.4 Maximum (limit) transient thermal impedance - double side cooled

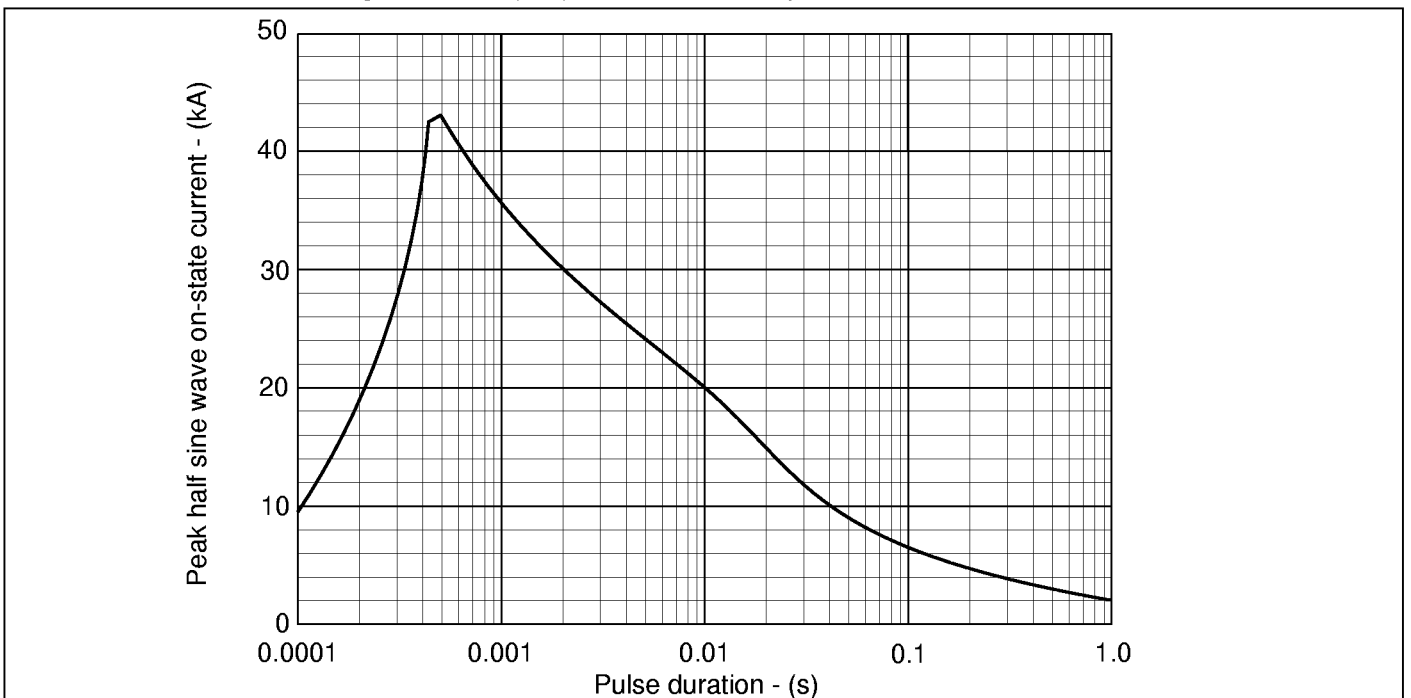


Fig.5 Surge (non-repetitive) on-state current vs time

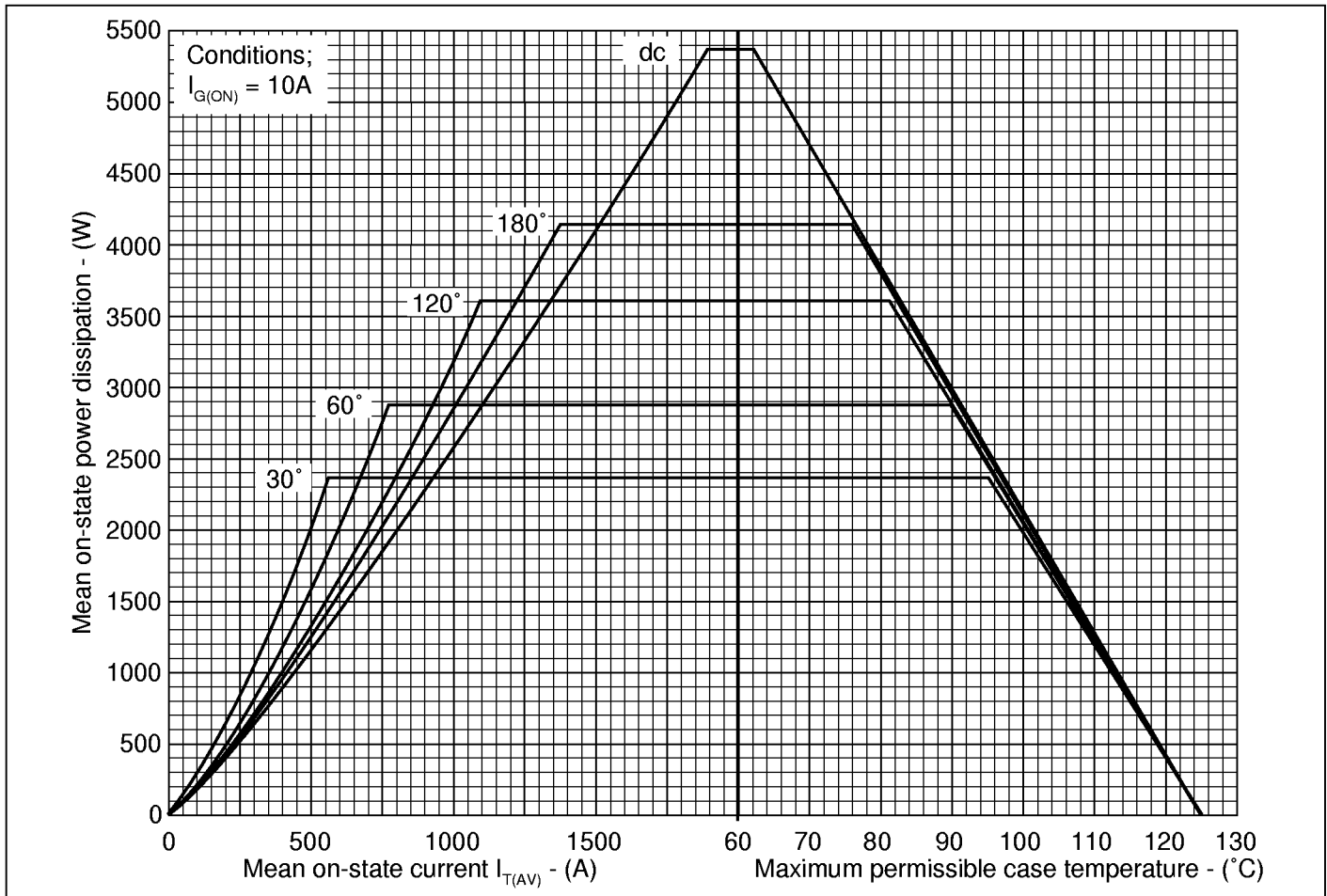


Fig.6 Steady state rectangular wave conduction loss - double side cooled

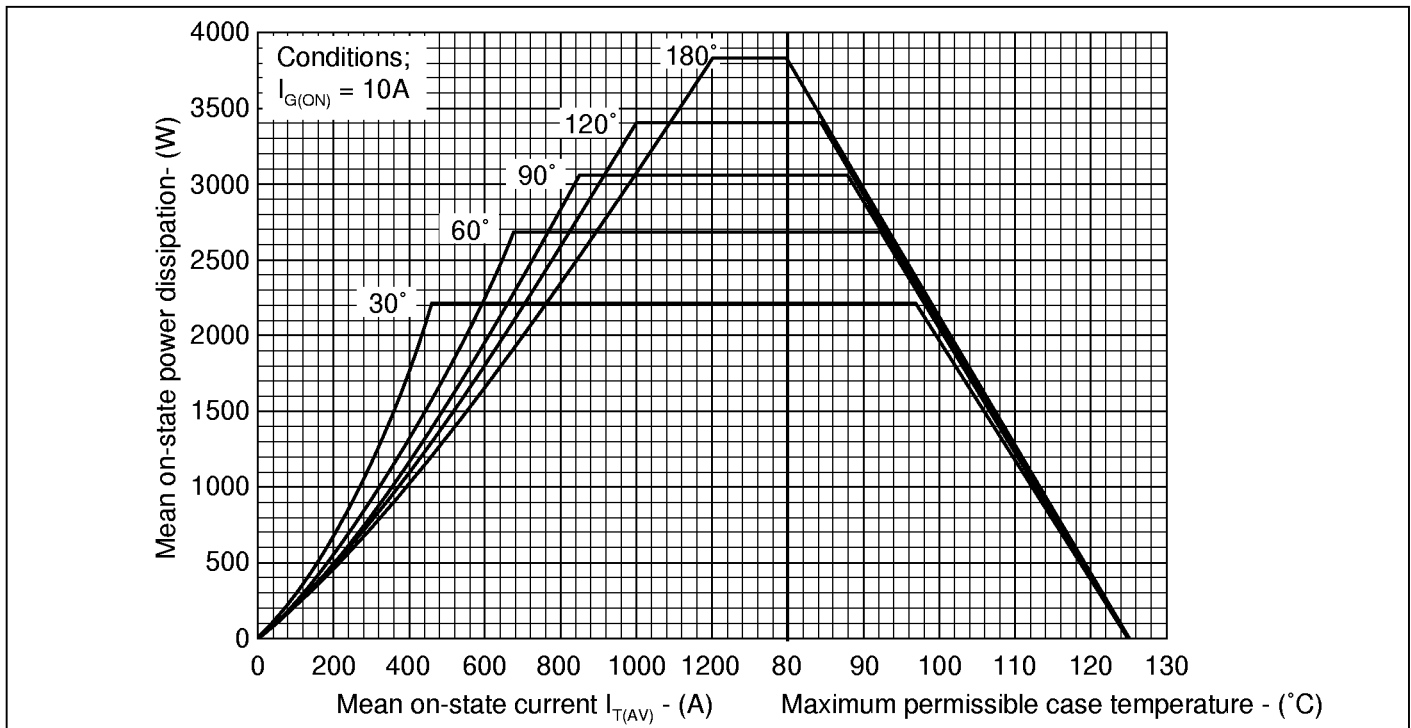


Fig.7 Steady state sinusoidal wave conduction loss - double side cooled

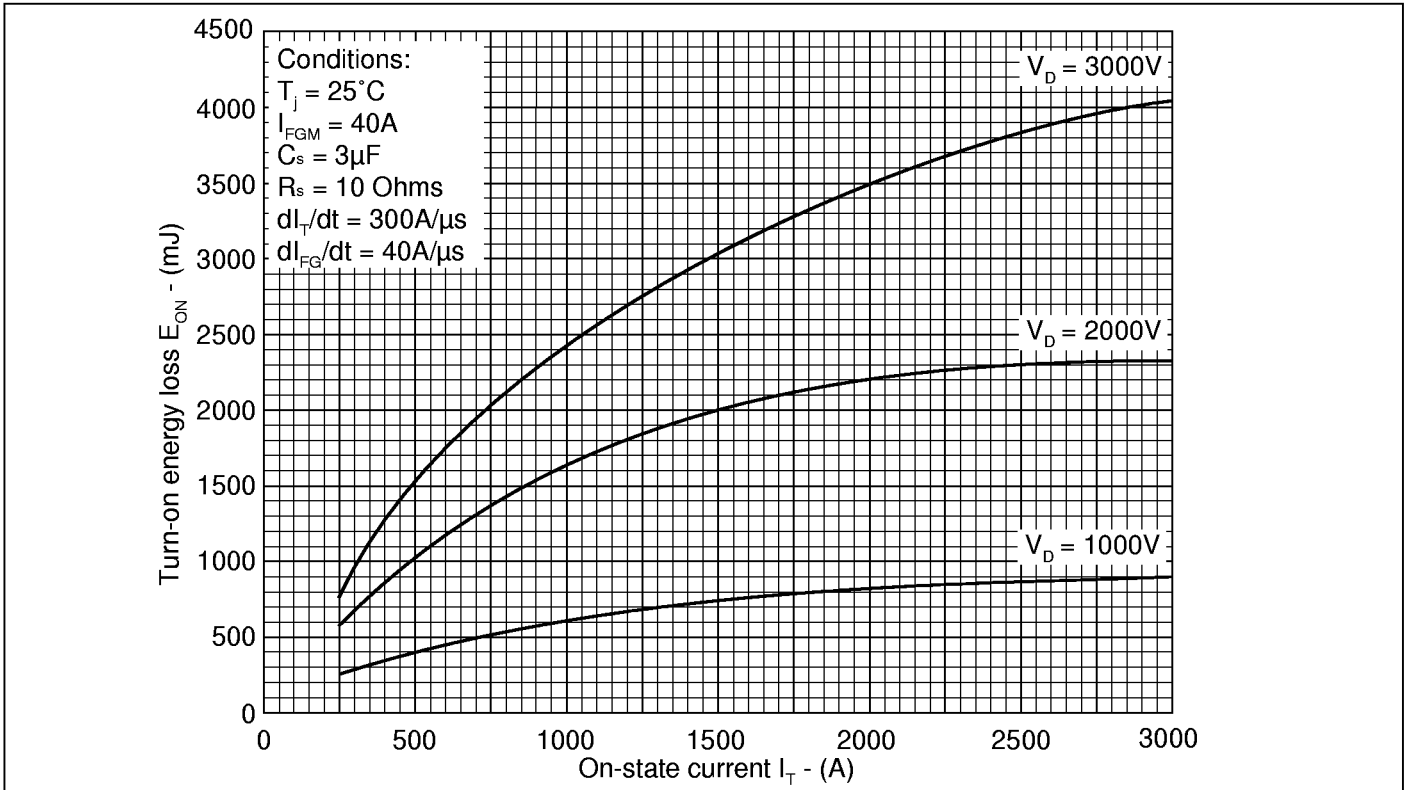


Fig.8 Turn-on energy vs on-state current

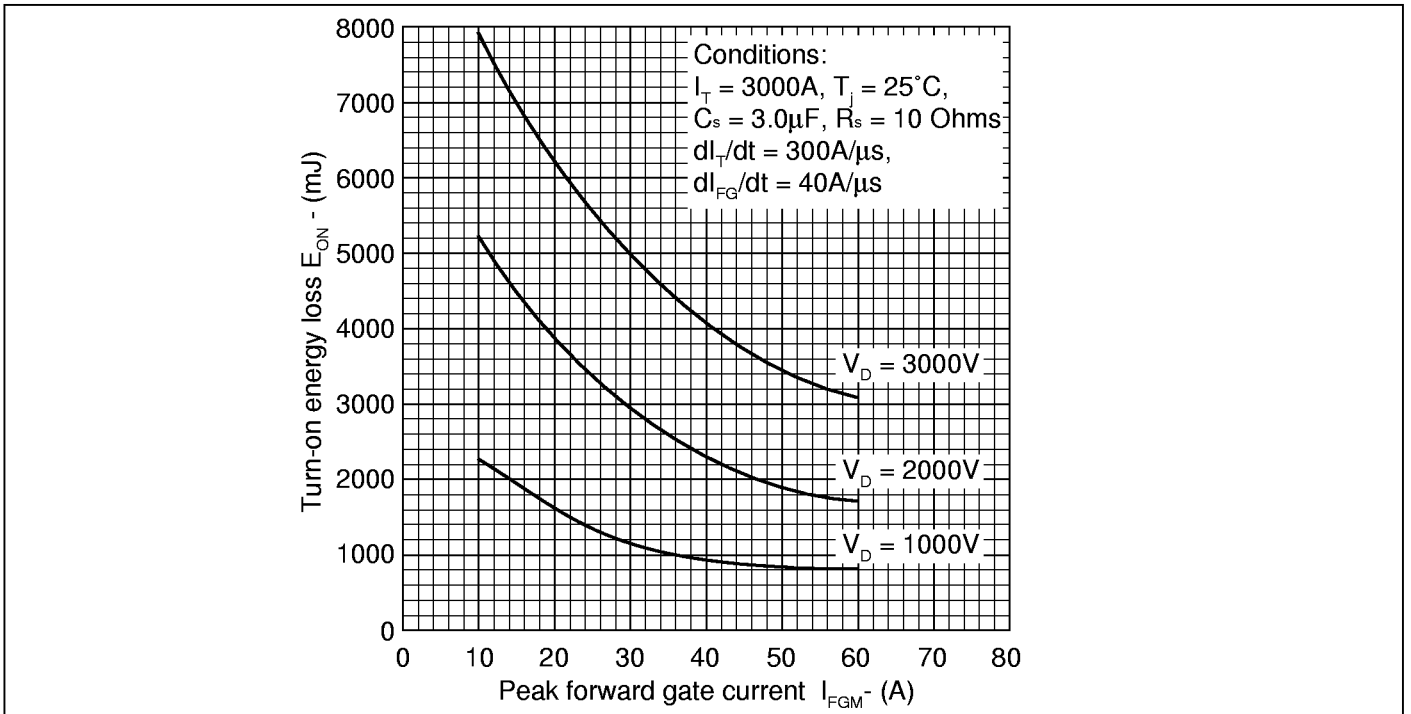


Fig.9 Turn-on energy vs peak forward gate current

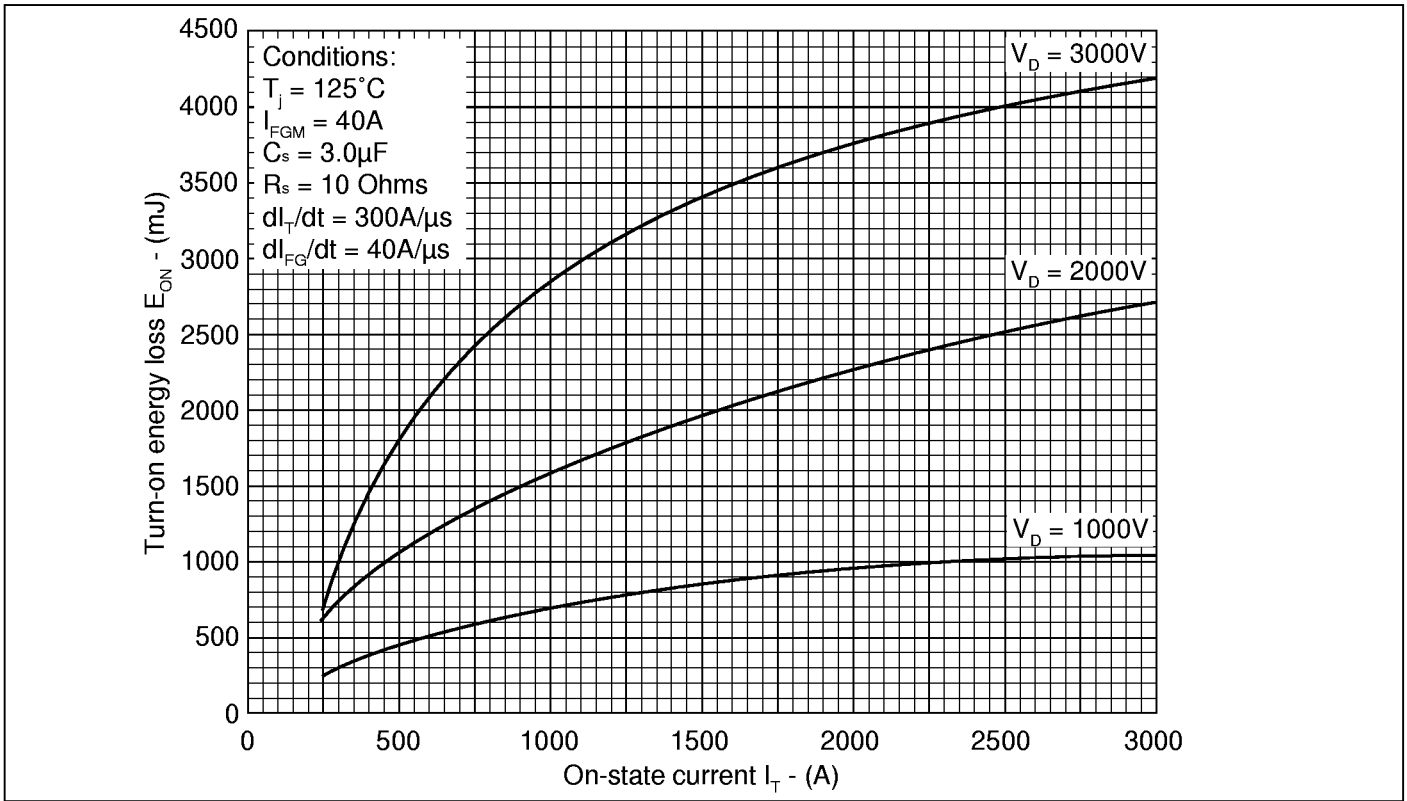


Fig.10 Turn-on energy vs on-state current

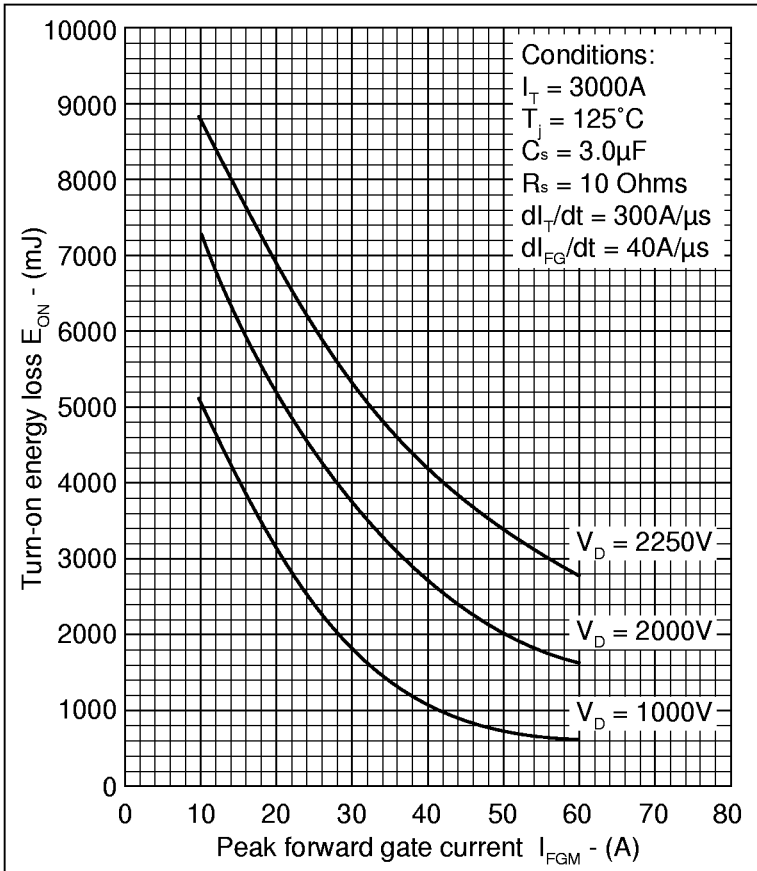


Fig.11 Turn-on energy vs peak forward gate current

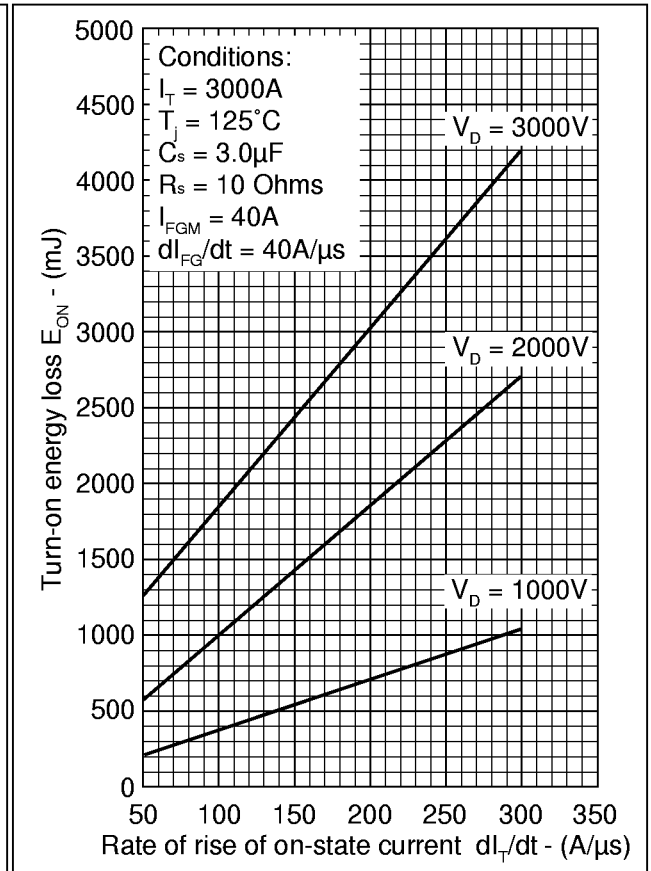


Fig.12 Turn-on energy vs rate of rise of on-state current

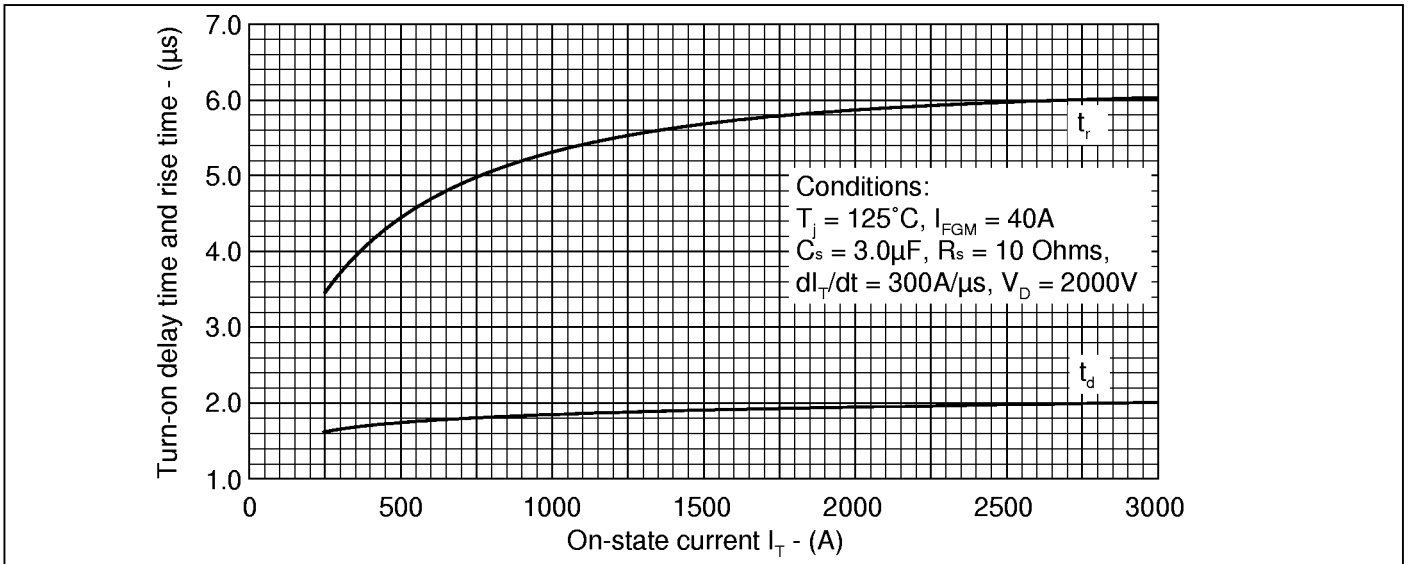


Fig.13 Delay and rise time vs on-state current

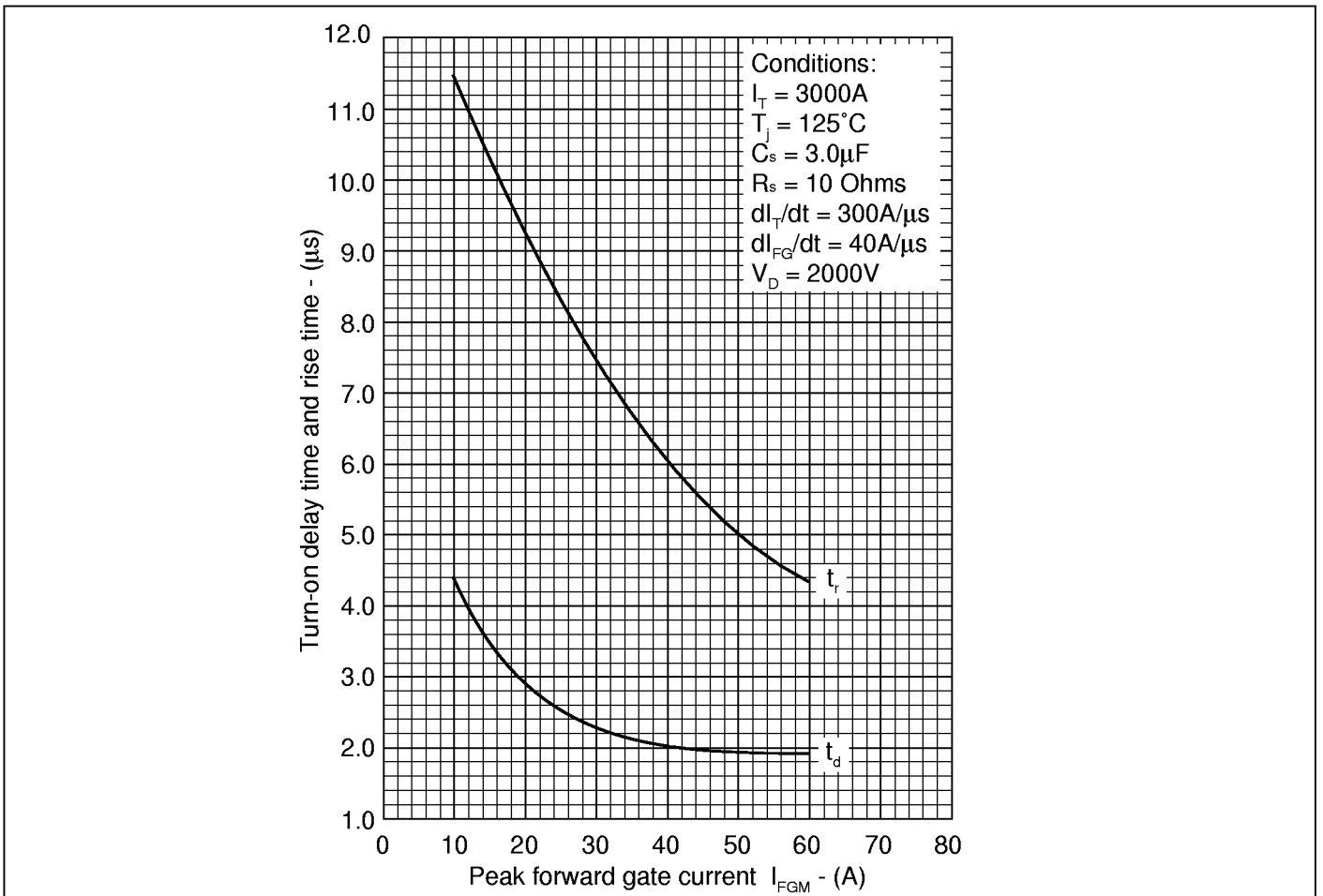


Fig.14 Delay and rise time vs peak forward gate current

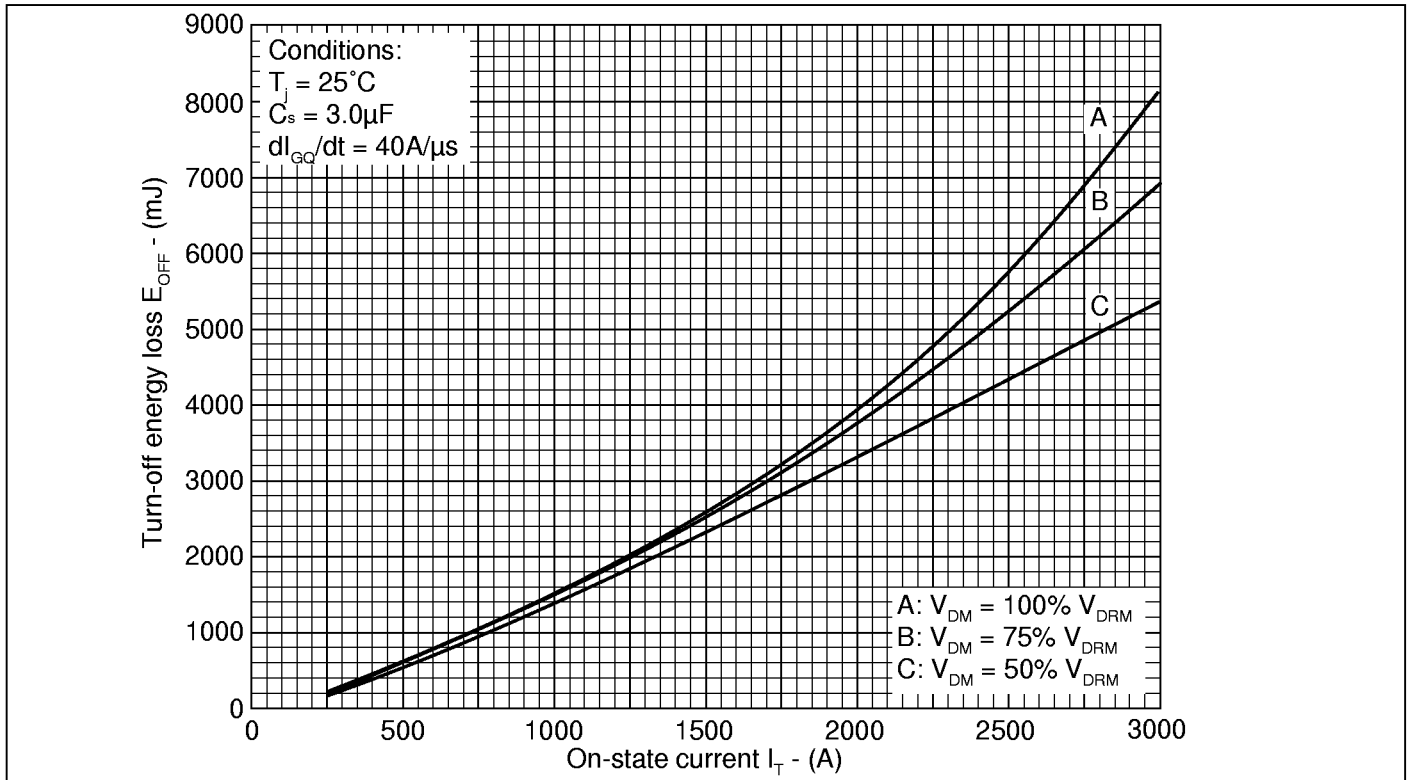


Fig.15 Turn-off energy loss vs on-state current

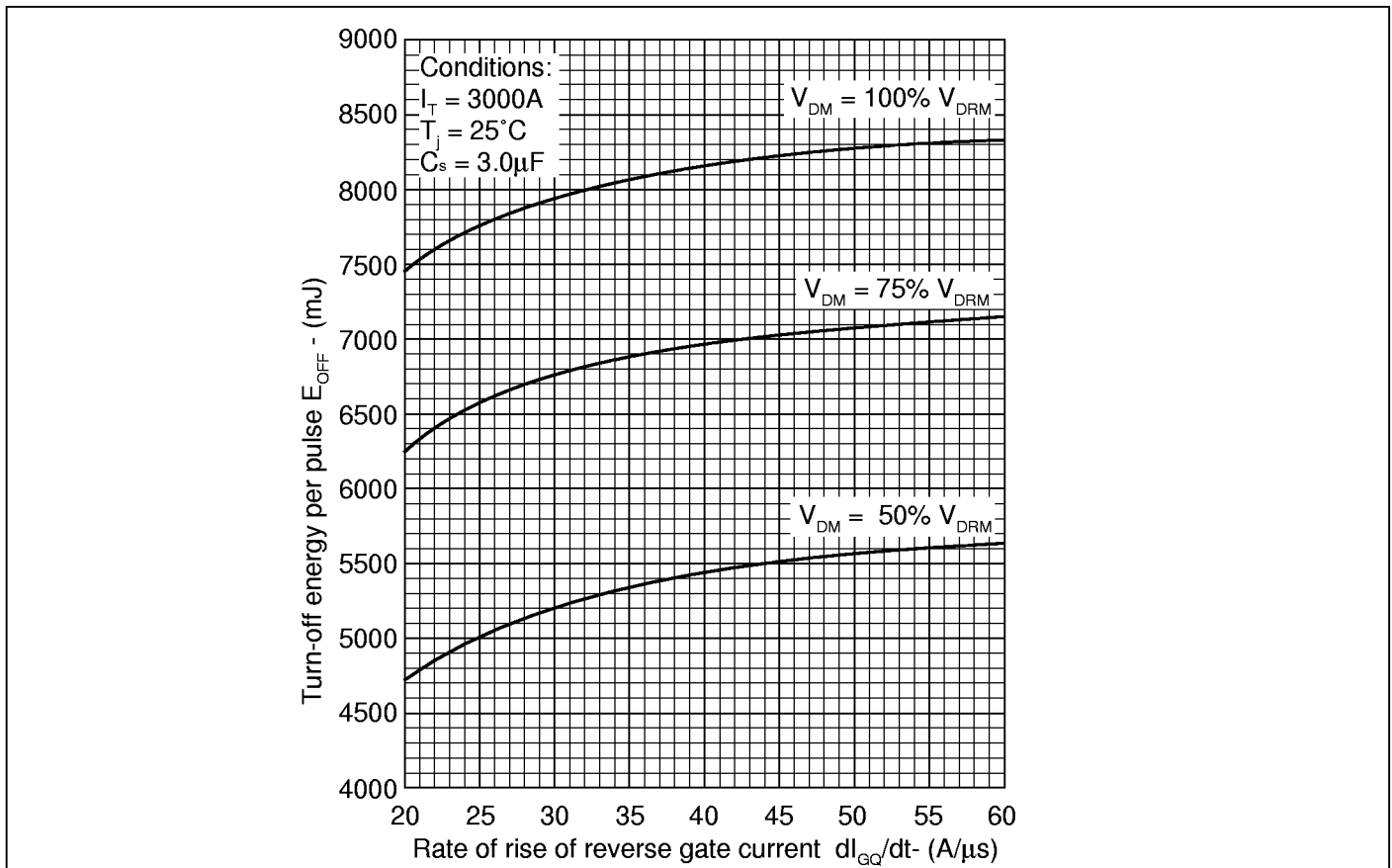


Fig.16 Turn-off energy vs rate of rise of reverse gate current

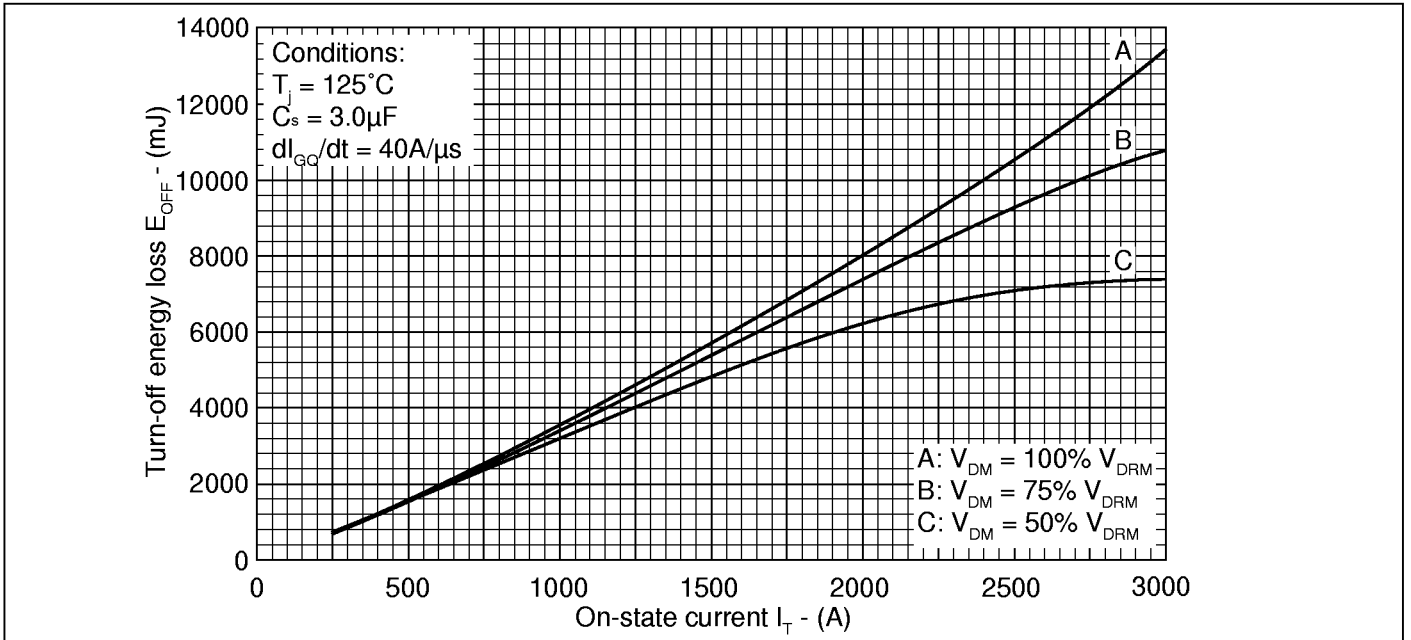


Fig.17 Turn-off energy vs on-state current

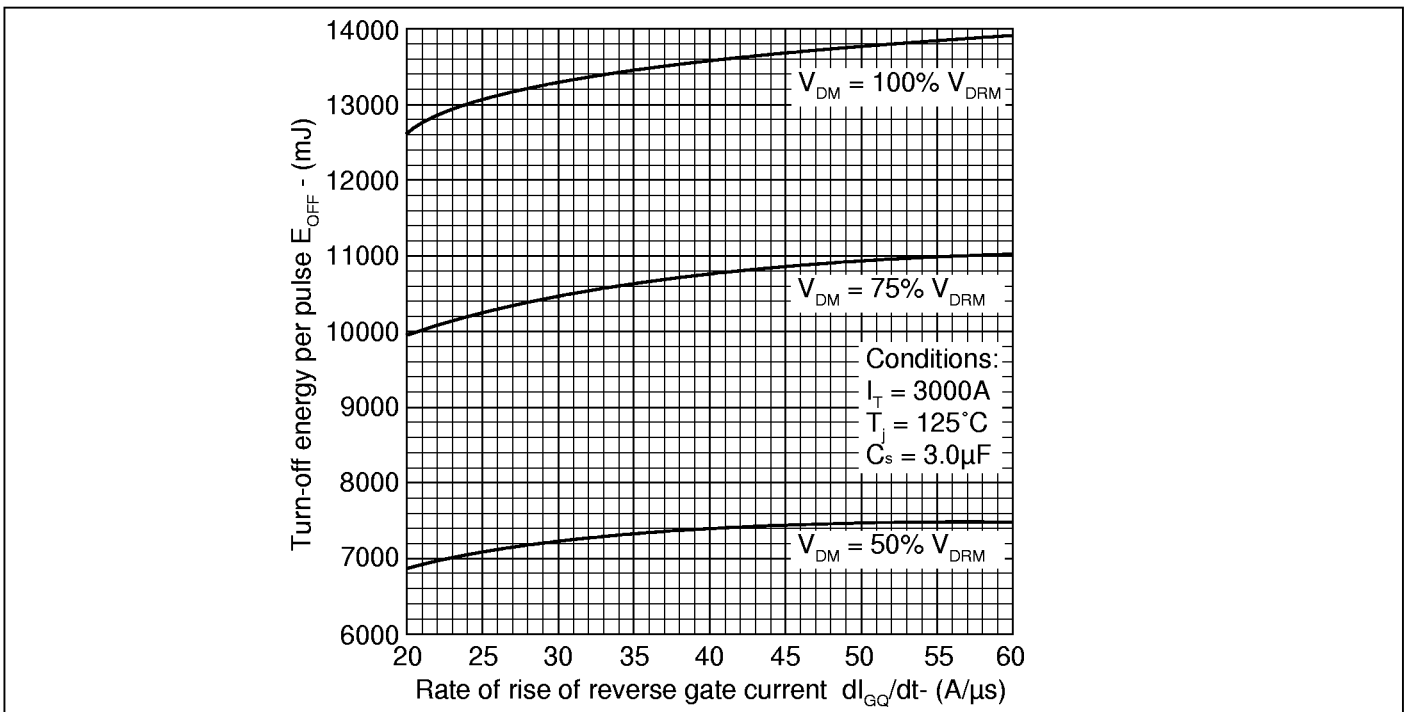


Fig.18 Turn-off energy loss vs rate of rise of reverse gate current

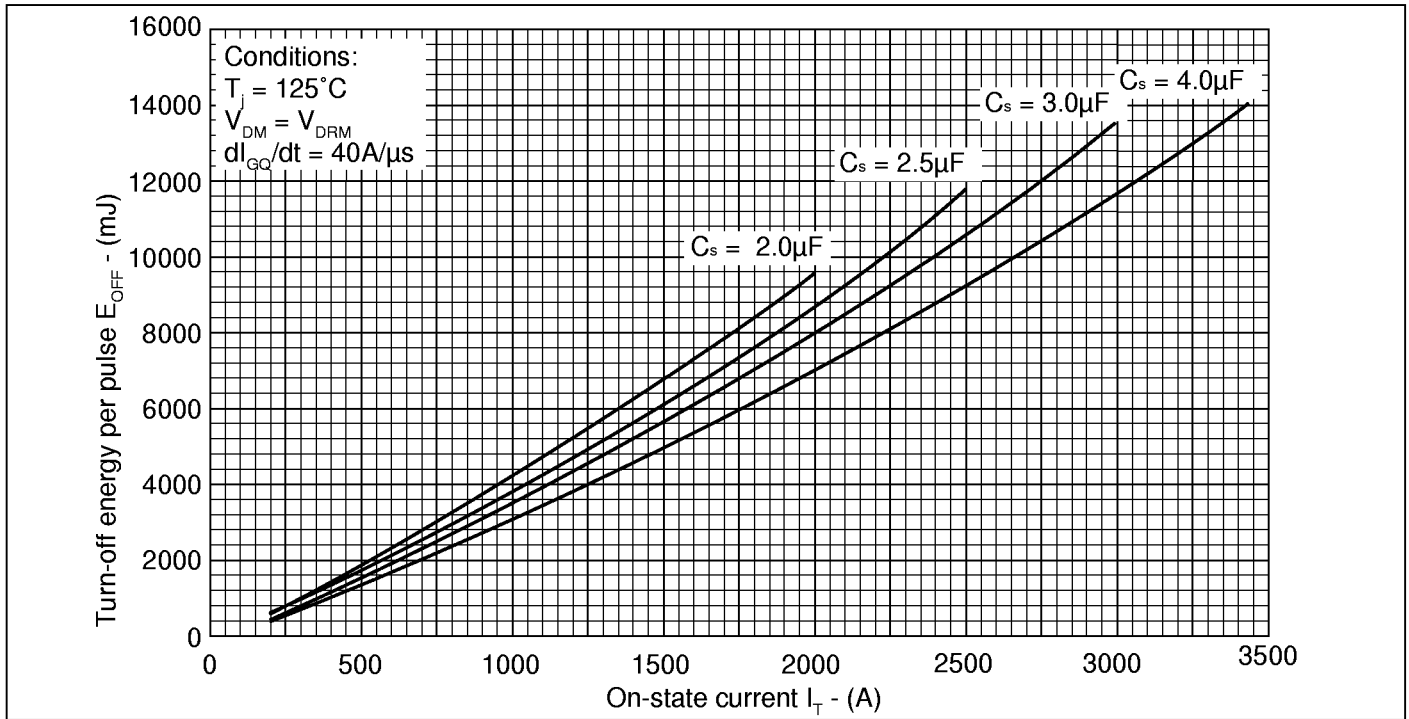


Fig.19 Turn-off energy vs on-state current

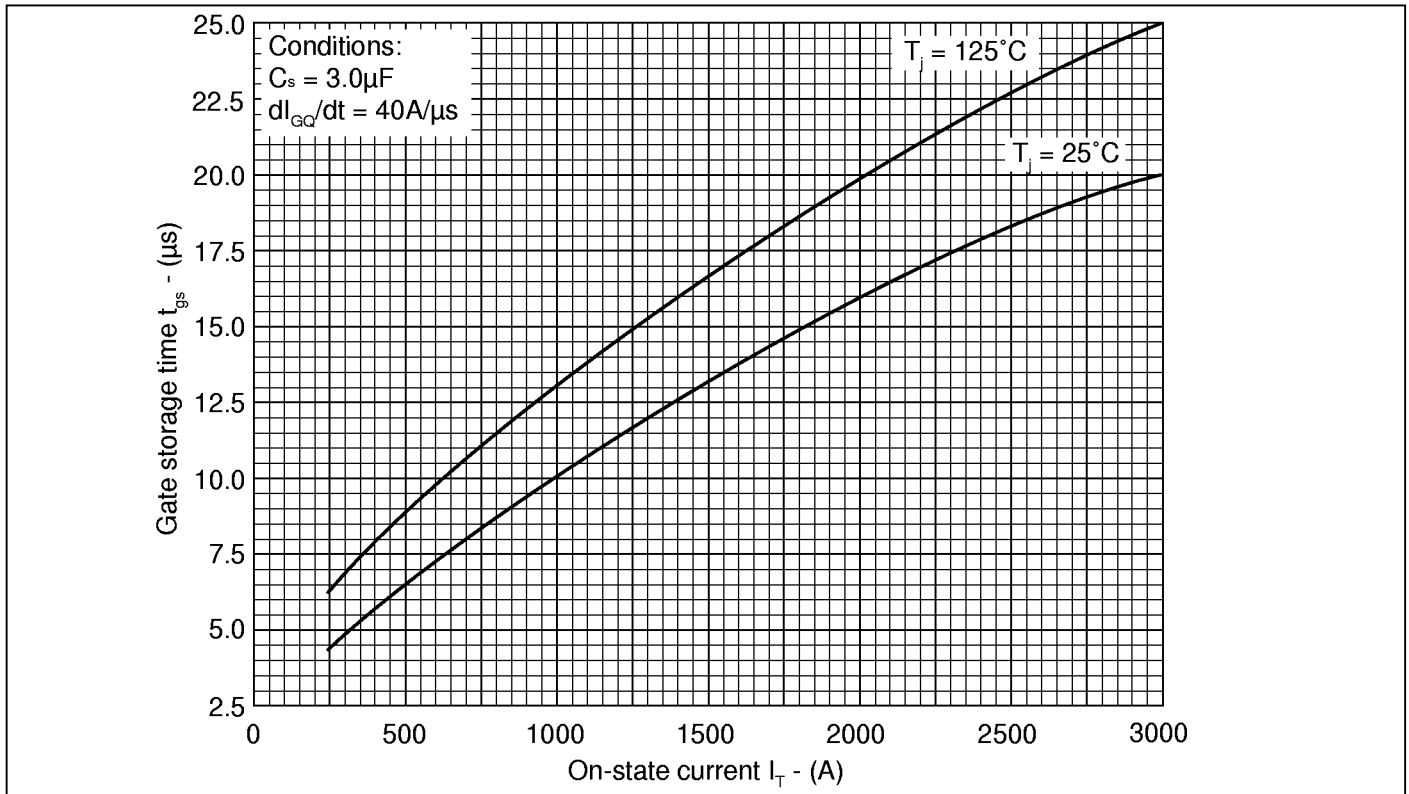


Fig.20 Gate storage time vs on-state current

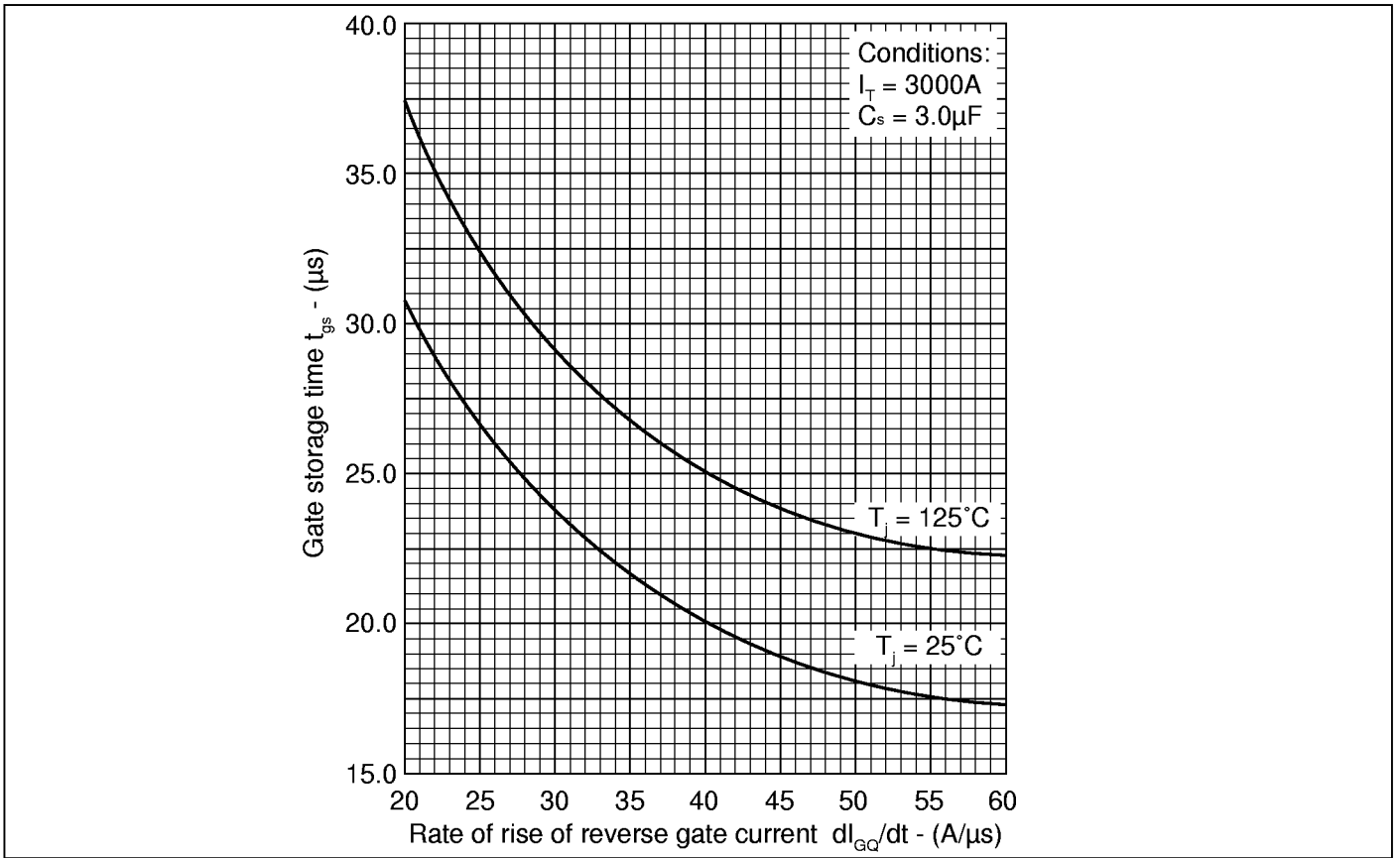


Fig.21 Gate storage time vs rate of rise of reverse gate current

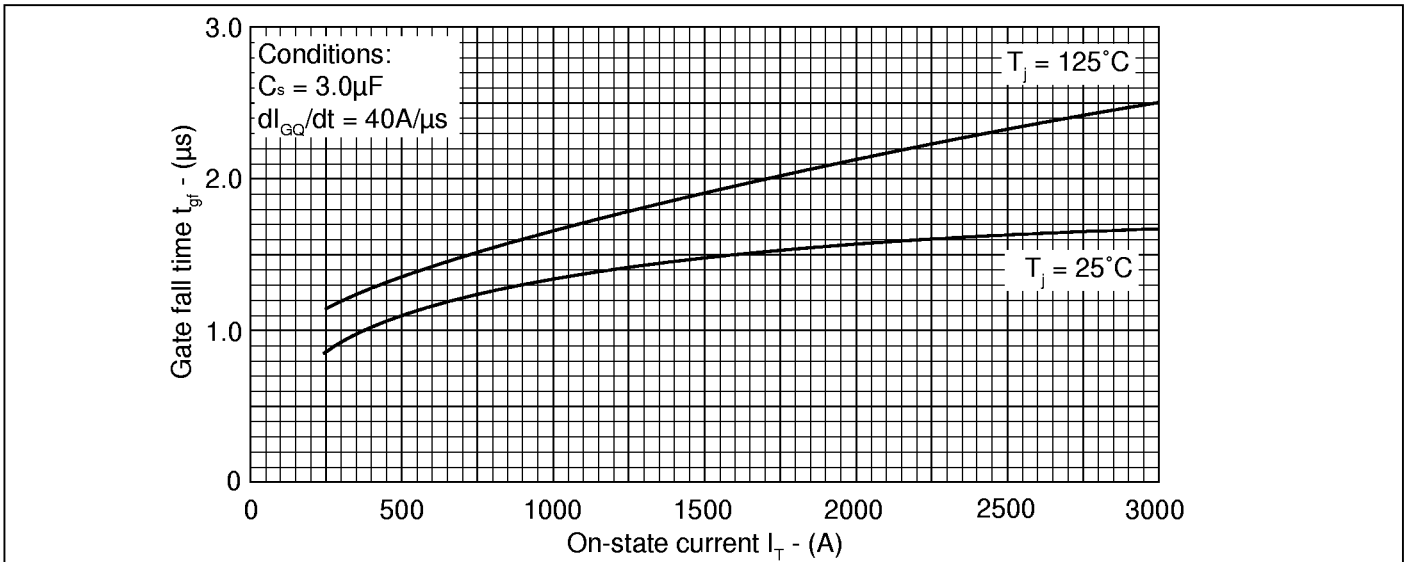


Fig.22 Gate fall time vs on-state current

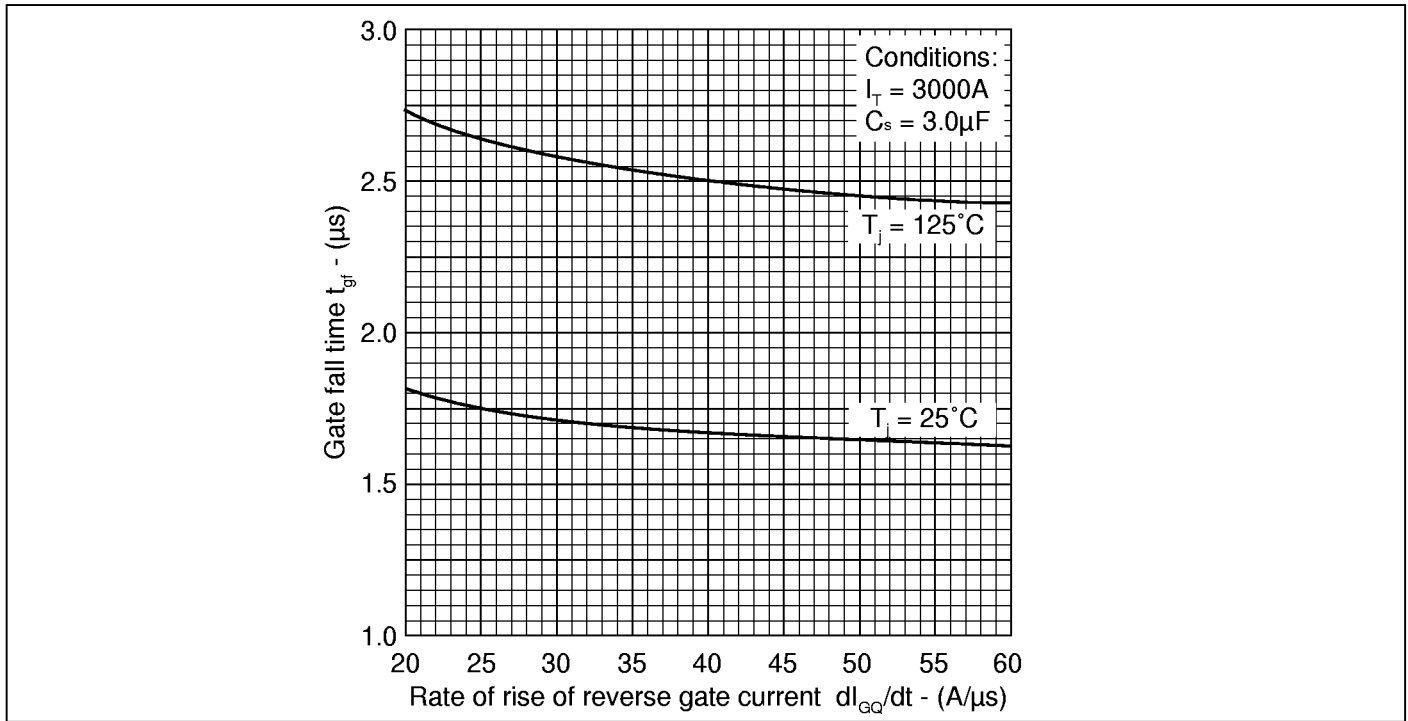


Fig.23 Gate fall time vs rate of rise of reverse gate current

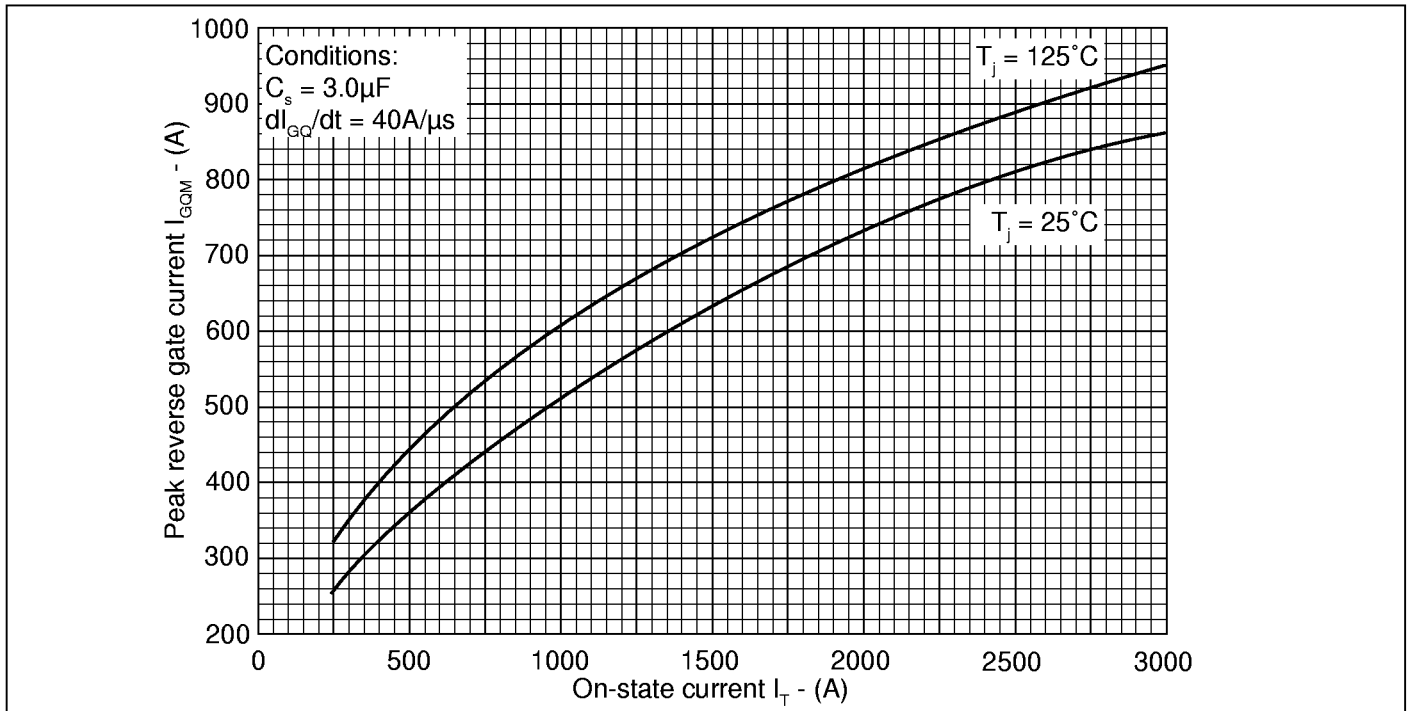


Fig.24 Peak reverse gate current vs on-state current

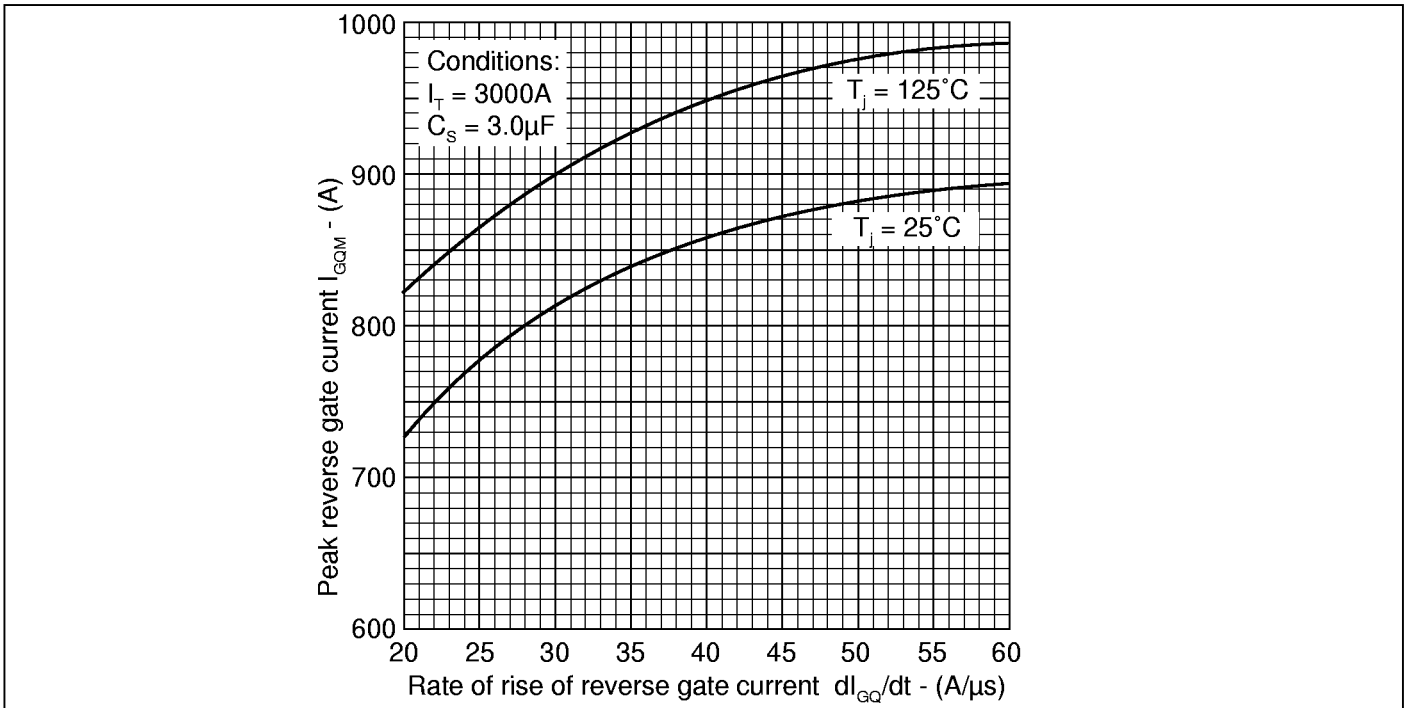


Fig.25 Reverse gate current vs rate of rise of reverse gate current

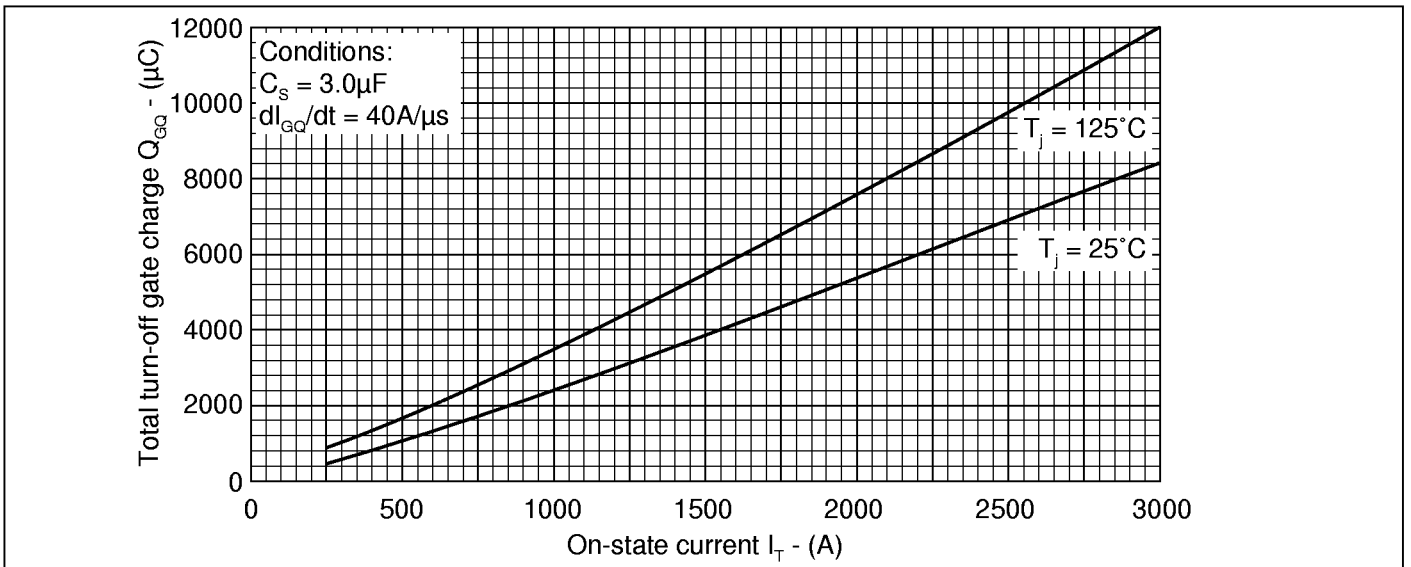


Fig.26 Turn-off gate charge vs on-state current

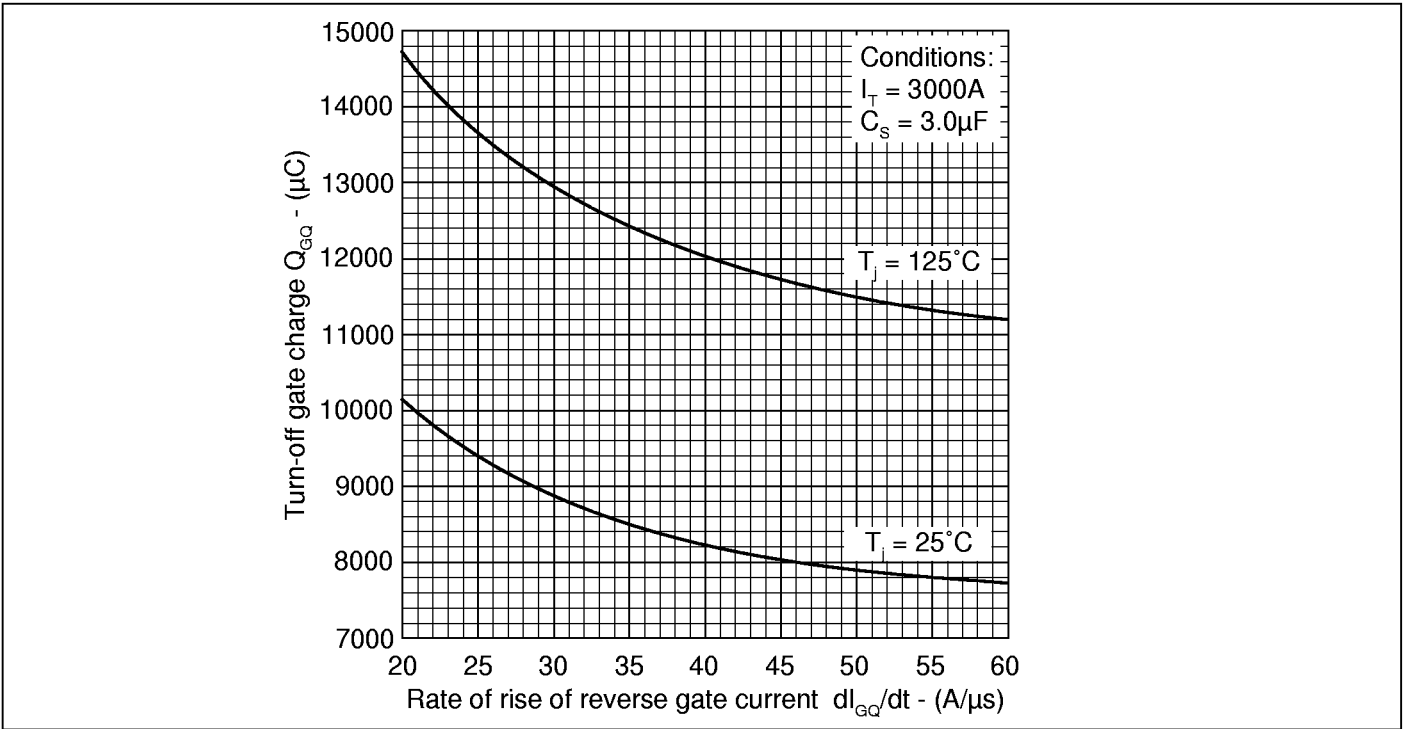


Fig.27 Turn-off gate charge vs rate of rise of reverse gate current

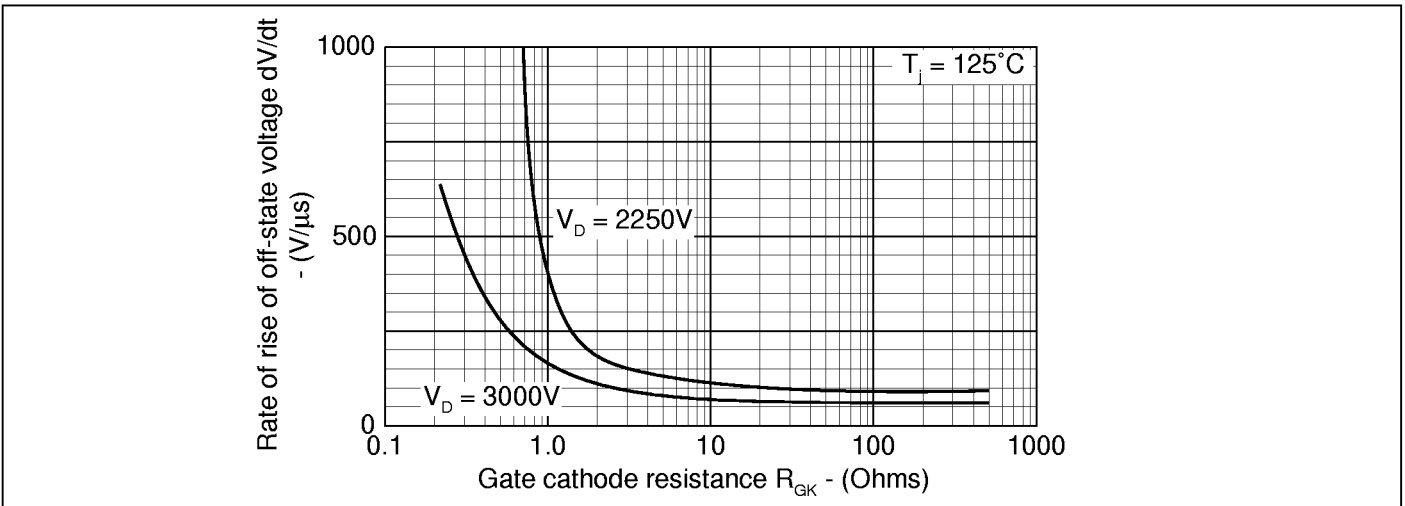
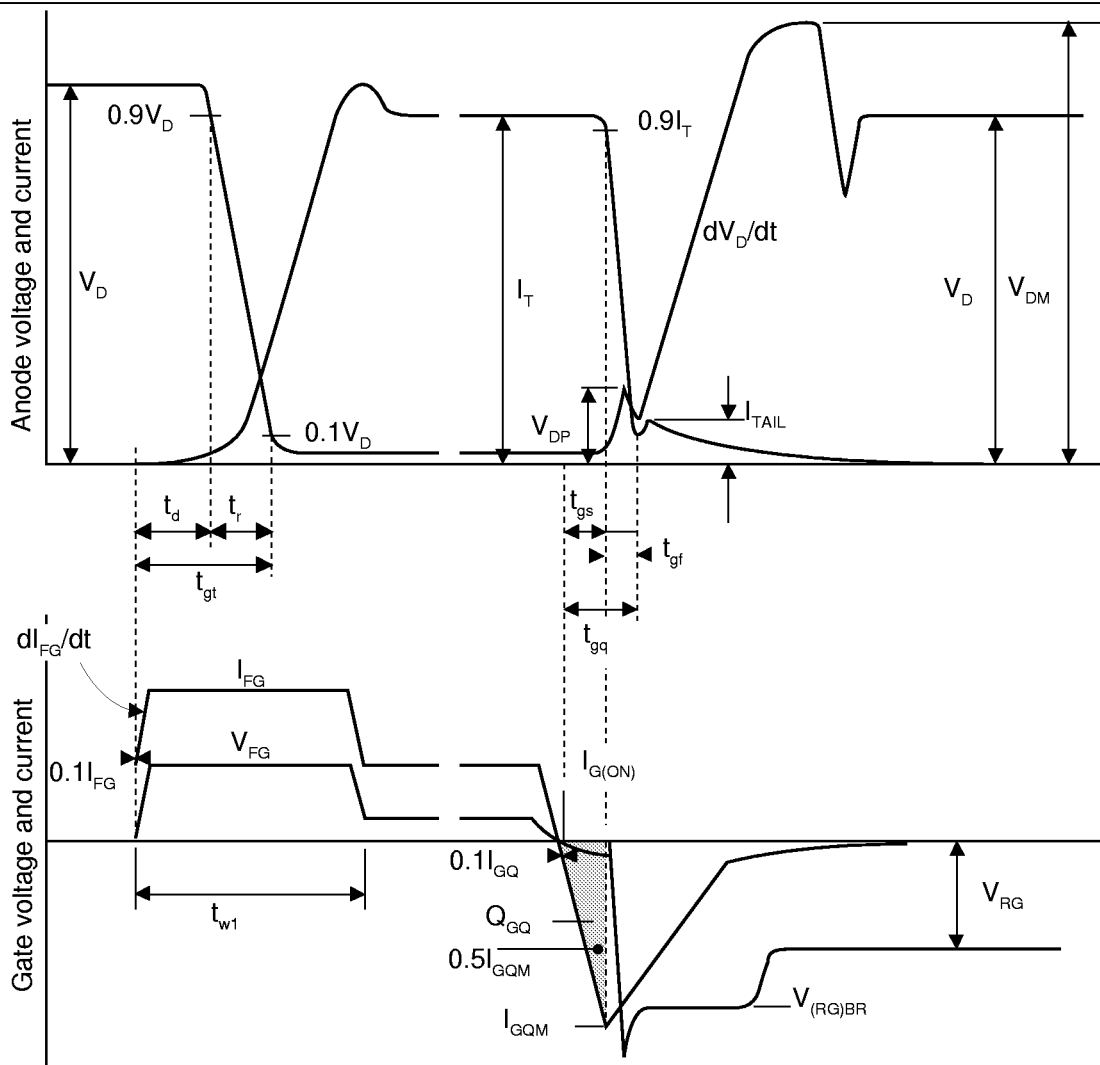


Fig.28 Rate of rise of off-state voltage vs gate cathode resistance



Recommended gate conditions:

- $I_{TCM} = 3000A$
- $I_{FG} = 40A$
- $I_{G(ON)} = 10A$ d.c.
- $t_{w1(min)} = 20\mu s$
- $I_{GQM} = 950A$
- $di_{GQ}/dt = 40A/\mu s$
- $Q_{GQ} = 12000\mu C$
- $V_{RG(min)} = 2V$
- $V_{RG(max)} = 16V$

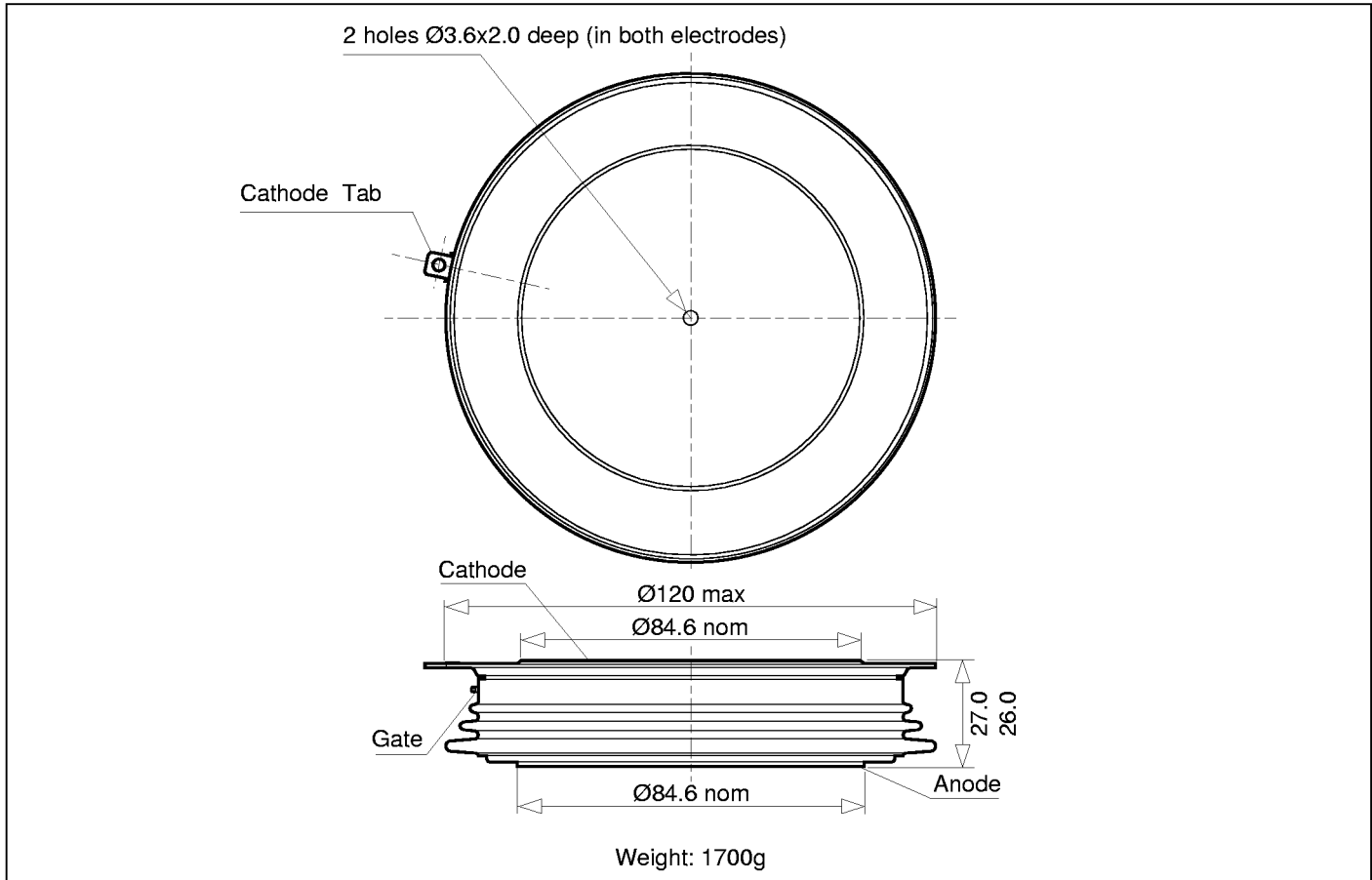
These are recommended Mitel Semiconductor conditions. Other conditions are permitted according to users gate drive specifications.

Fig.29 General switching waveforms

DG858BW45

PACKAGE DETAILS - W

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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