



CSG30J4500 Gate Turn-off Thyristor

High-end Power Semiconductor Manufacturer

APPLICATION

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

KEY PARAMETERS

I_{TCM}	3000A
V_{DRM}	4500V
$I_{T(AV)}$	870A
dV_D/dt	1000V/ μ s
di_T/dt	300A/ μ 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.



VOLTAGE RATINGS

Type Number	Repetitive Peak Off-state Voltage V_{DRM}	Repetitive Peak Reverse Voltage V_{RRM}	Conditions
CSG30J4500	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	$V_D = 66\% V$, $T_j = 125^{\circ}\text{C}$, $di/dt = 40\text{A}/\mu\text{s}$, $C_s = 6\mu\text{F}$.	3000	A
$I_{T(AV)}$	Mean on-state current	$T_{HS} = 80^{\circ}\text{C}$. Double side cooled. Half sine 50Hz.	870	A
$I_{T(RMS)}$	RMS on-state current	$T_{HS} = 80^{\circ}\text{C}$. Double side cooled. Half sine 50Hz.	1365	A



SURGE RATINGS

Symbol	Parameter	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. $T_j = 125^\circ\text{C}$	1.28×10^6	A^2s
di_T/dt	Critical rate of rise of on-state current	$V_D = 3000\text{V}$, $I_T = 3000\text{A}$, $T_j = 125^\circ\text{C}$, $I > I_{FG}$, 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} ; $R_{GK} \leq 1.5\Omega$, $T_j = 125^\circ\text{C}$	100	$\text{V}/\mu\text{s}$
		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	-	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		-	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		30	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 AND MECHANICAL RATINGS

Symbol	Parameter	Conditions	Min.	Max.	Units
$R_{th(j-hs)}$	DC thermal resistance - junction to heatsink surface	Double side cooled	-	0.0146	$^\circ\text{C}/\text{W}$
		Anode side cooled	-	0.0233	$^\circ\text{C}/\text{W}$
		Cathode side cooled	-	0.0392	$^\circ\text{C}/\text{W}$
$R_{th(c-hs)}$	Contact thermal resistance	Clamping force 35.0kN With mounting compound	per contact	-	0.0036 $^\circ\text{C}/\text{W}$
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		33.0	37.0	kN



GTO CHARACTERISTICS

$T_j = 125^\circ\text{C}$ unless stated otherwise					
Symbol	Parameter	Conditions	Min.	Max.	Units
V_{TM}	On-state voltage	At 3000A peak, $I_{G(ON)} = 8\text{A d.c.}$	-	4.0	V
I_{DM}	Peak off-state current	$V_{DRM} = 4500\text{V}$, $V_{RG} = 0\text{V}$	-	100	mA
I_{RRM}	Peak reverse current	At V_{RRM}	-	50	mA
V_{GT}	Gate trigger voltage	$V_D = 24\text{V}$, $I_T = 100\text{A}$, $T_j = 25^\circ\text{C}$	-	1.2	V
I_{GT}	Gate trigger current	$V_D = 24\text{V}$, $I_T = 100\text{A}$, $T_j = 25^\circ\text{C}$	-	3.5	A
I_{RGM}	Reverse gate cathode current	$V_{RGM} = 16\text{V}$, No gate/cathode resistor	-	50	mA
E_{ON}	Turn-on energy	$V_D = 2250\text{V}$	-	3000	mJ
t_d	Delay time	$I_T = 3000\text{A}$, $dI_T/dt = 300\text{A}/\mu\text{s}$	-	1.5	μs
t_r	Rise time	$I_{FG} = 40\text{A}$, rise time $< 1.0\mu\text{s}$	-	3.0	μs
E_{OFF}	Turn-off energy	$I_T = 3000\text{A}$, $V_{DM} = 3000\text{V}$ Snubber Cap $C_s = 6.0\mu\text{F}$, $di_{GQ}/dt = 40\text{A}/\mu\text{s}$	-	6300	mJ
t_{gs}	Storage time		-	20.6	μs
t_{gf}	Fall time		-	2.2	μs
t_{gq}	Gate controlled turn-off time		-	22.8	μs
Q_{GQ}	Turn-off gate charge		-	10000	μC
Q_{GQT}	Total turn-off gate charge		-	20000	μC
I_{GQM}	Peak reverse gate current		-	830	A



CURVES

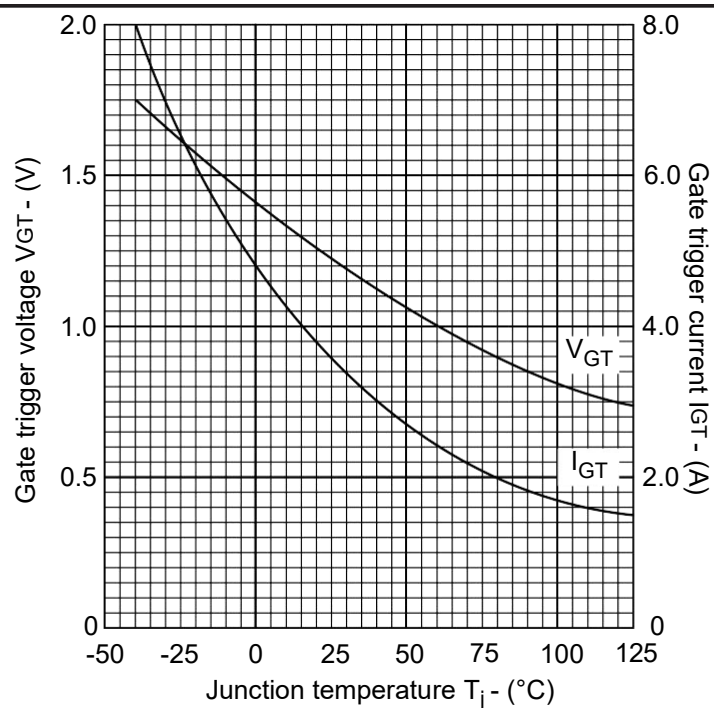


Fig.1 Maximum gate trigger voltage/current vs junction temperature

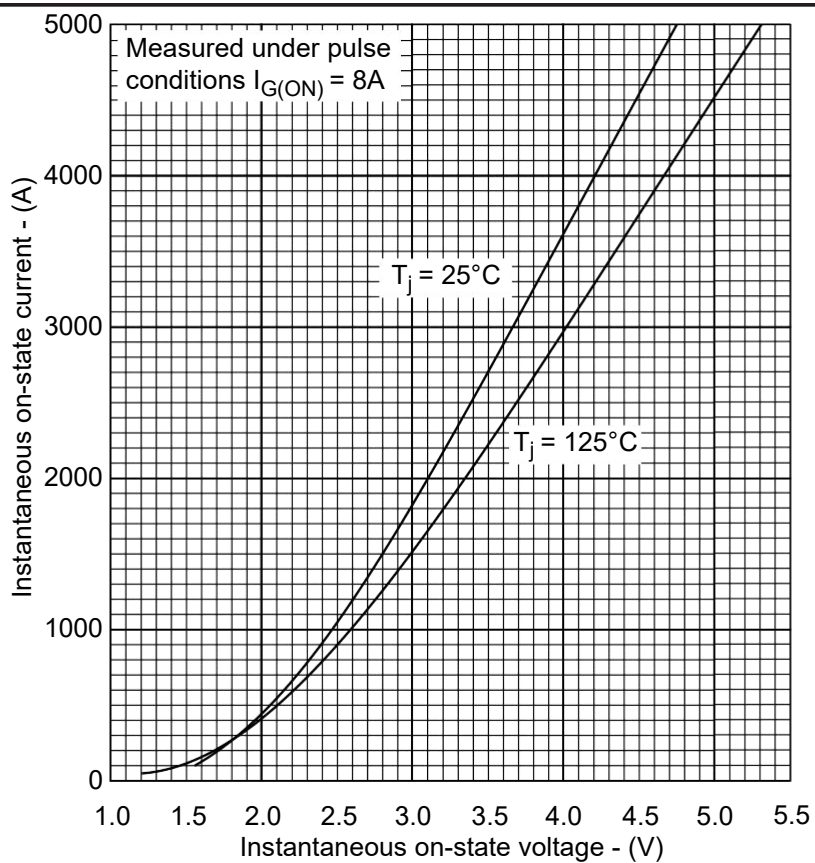


Fig.2 On-state characteristics



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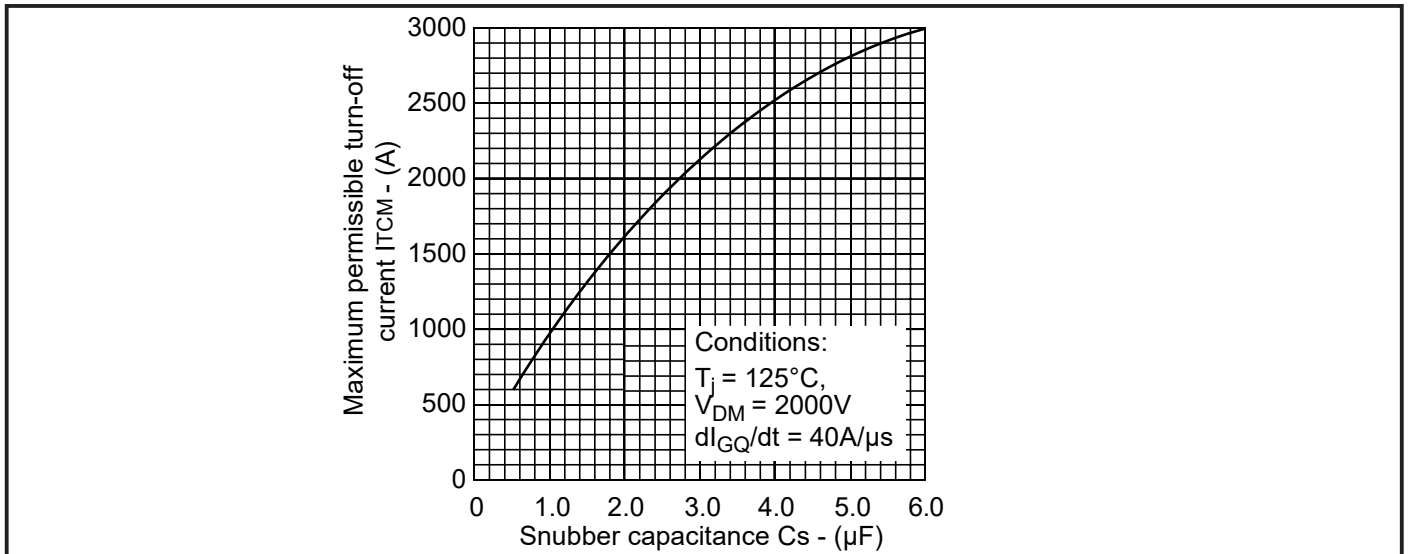


Fig.3 Maximum dependence of I_{TCM} on C_s

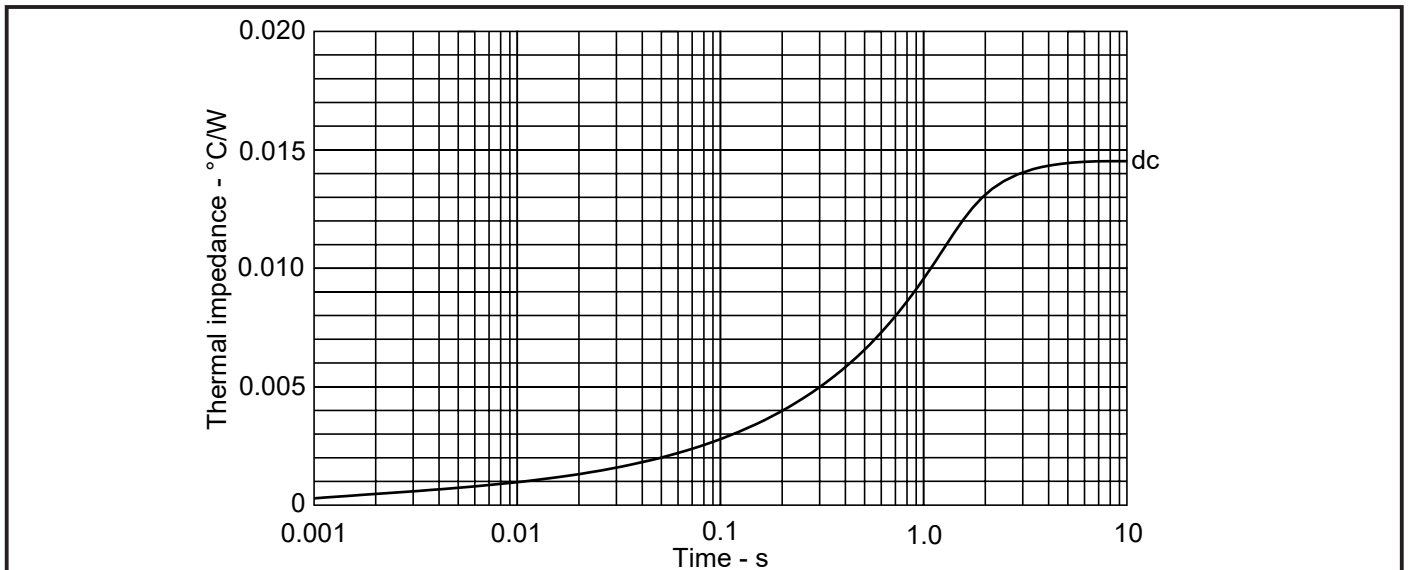


Fig.4 Maximum (limit) transient thermal impedance - double side cooled

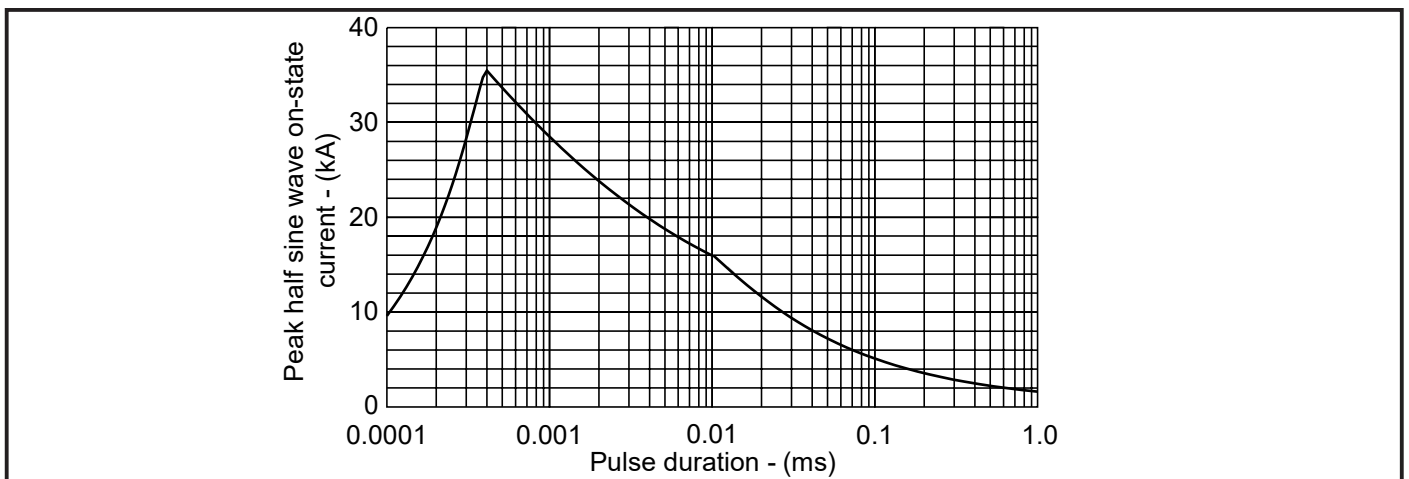


Fig.5 Surge (non-repetitive) on-state current vs time



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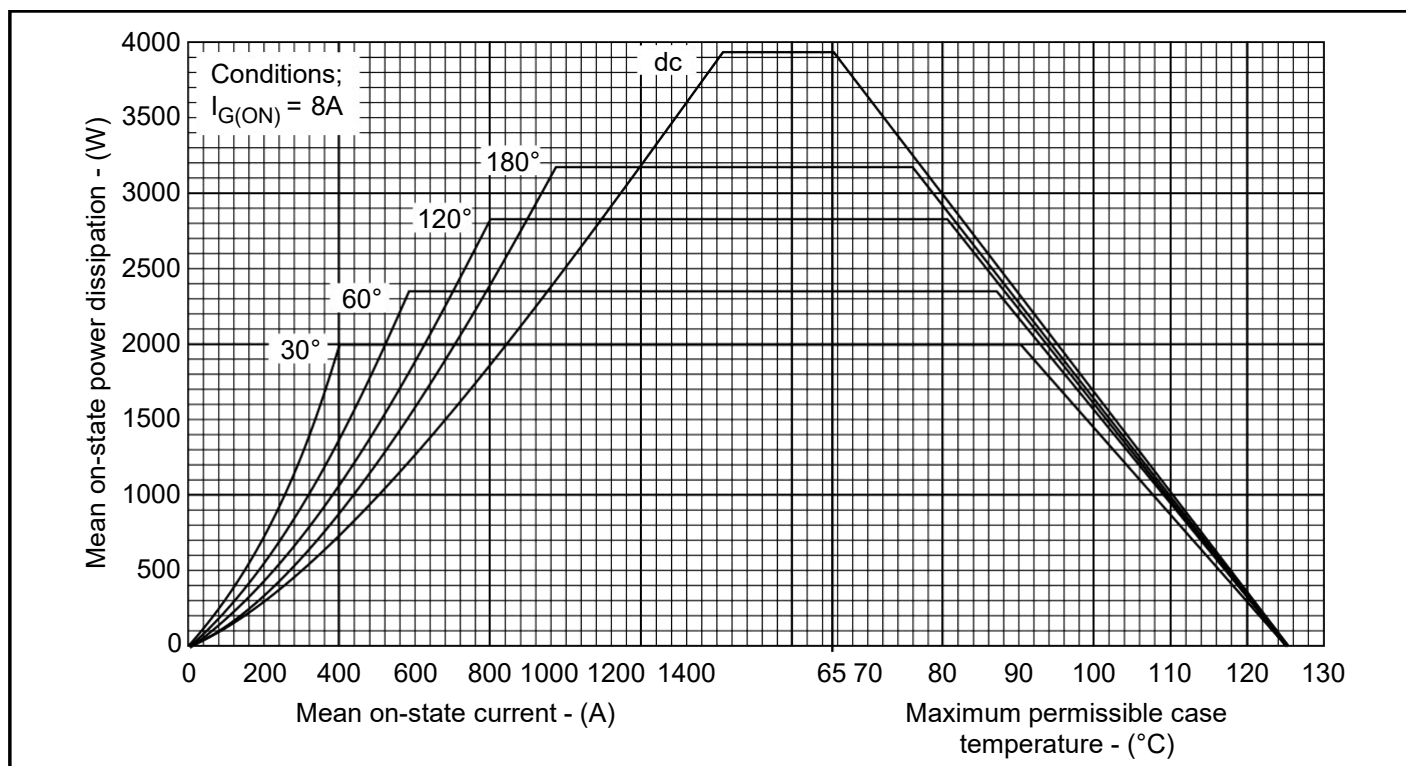


Fig.6 Steady state rectangular wave conduction loss - double side cooled

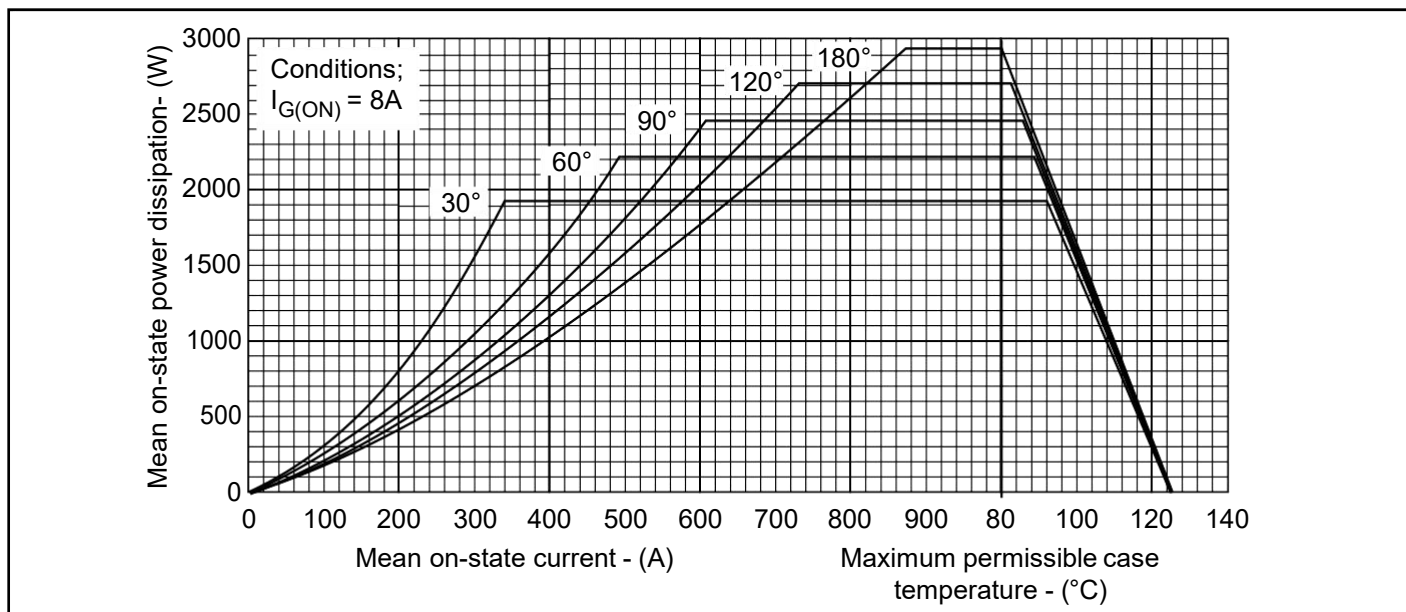


Fig.7 Steady state sinusoidal wave conduction loss - double side cooled



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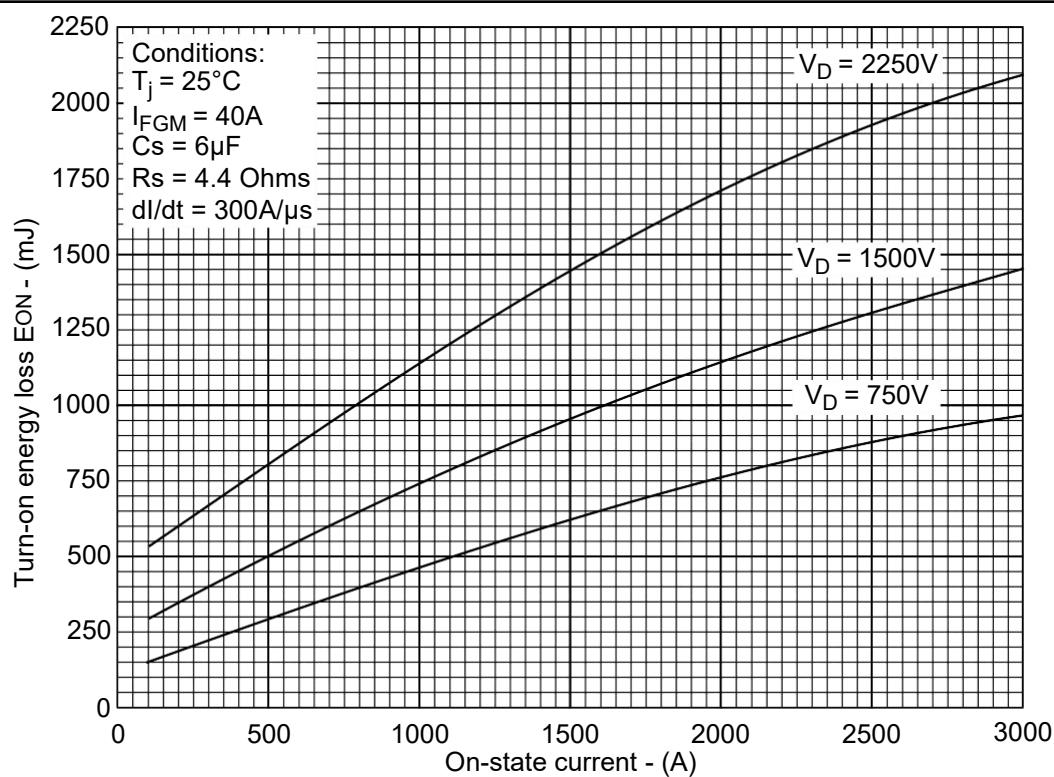


Fig.8 Turn-on energy vs on-state current

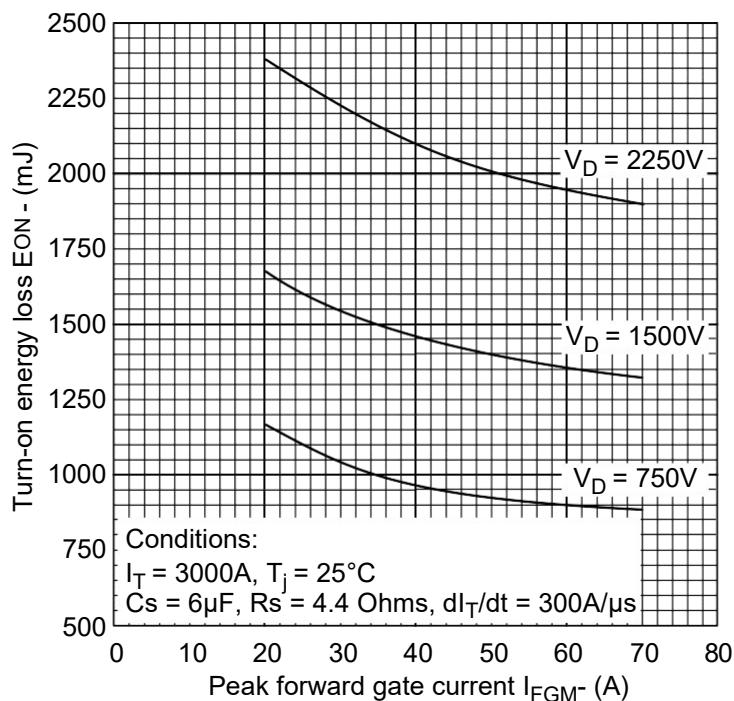


Fig.9 Turn-on energy vs peak forward gate current



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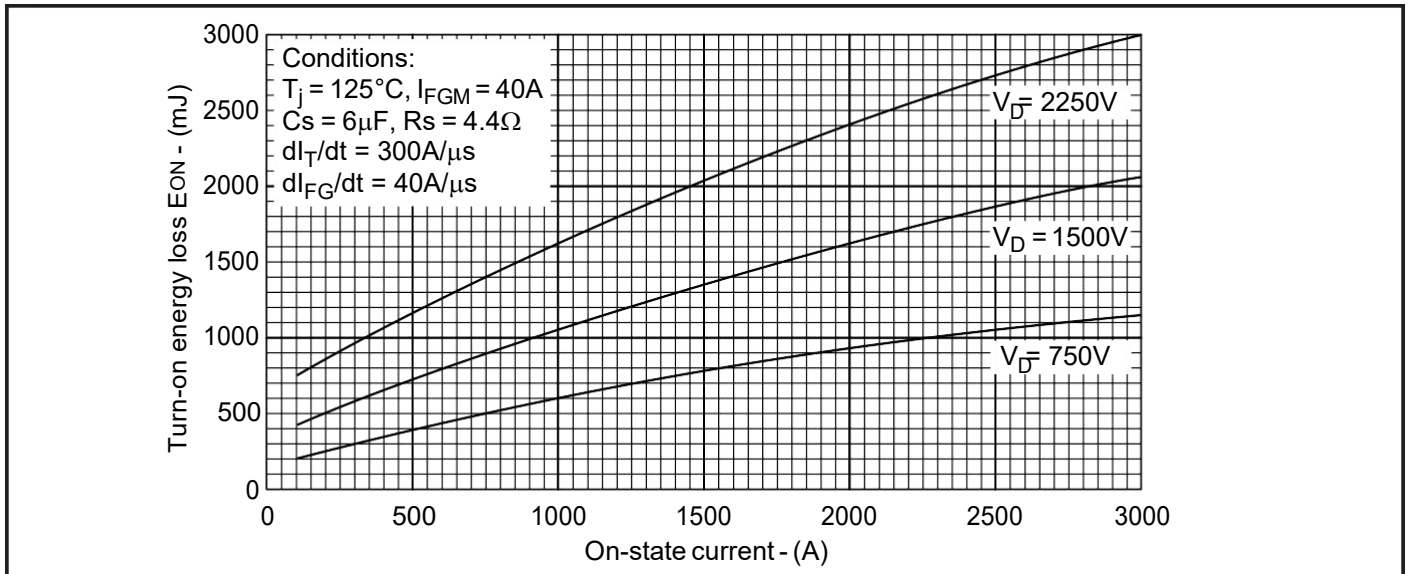


Fig.10 Turn-on energy vs on-state current

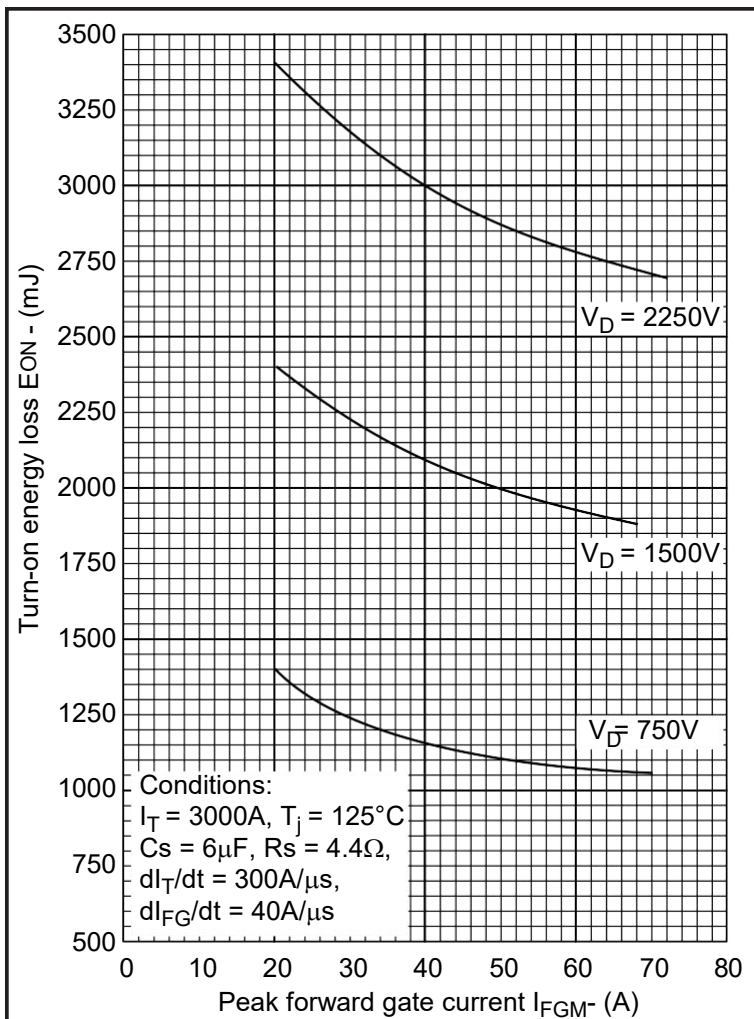


Fig.11 Turn-on energy vs peak forward gate current

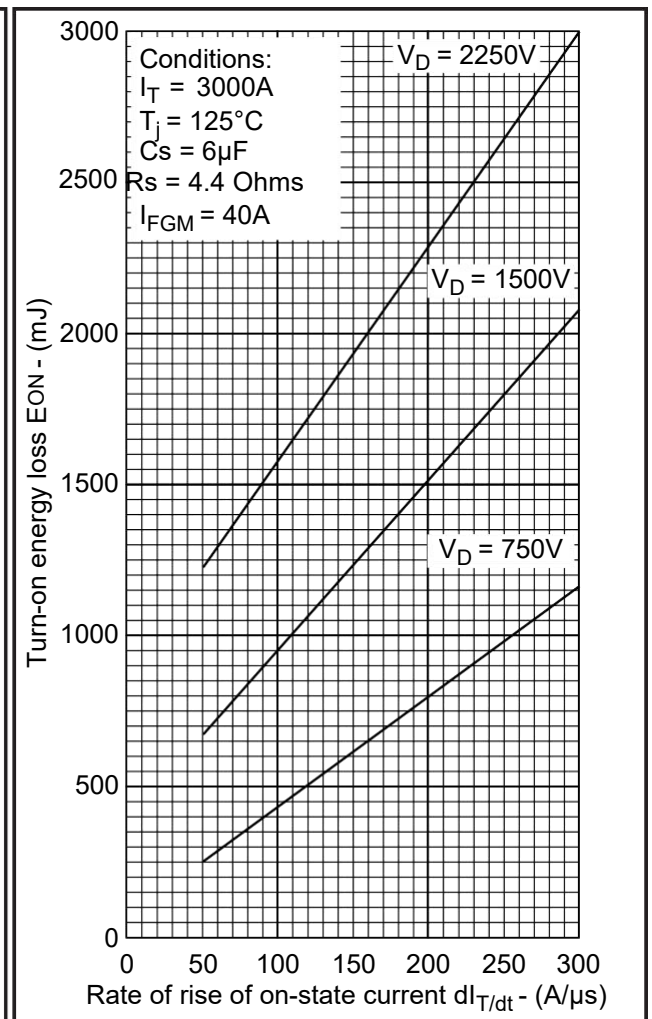


Fig.12 Turn-on energy vs rate of rise of on-state current



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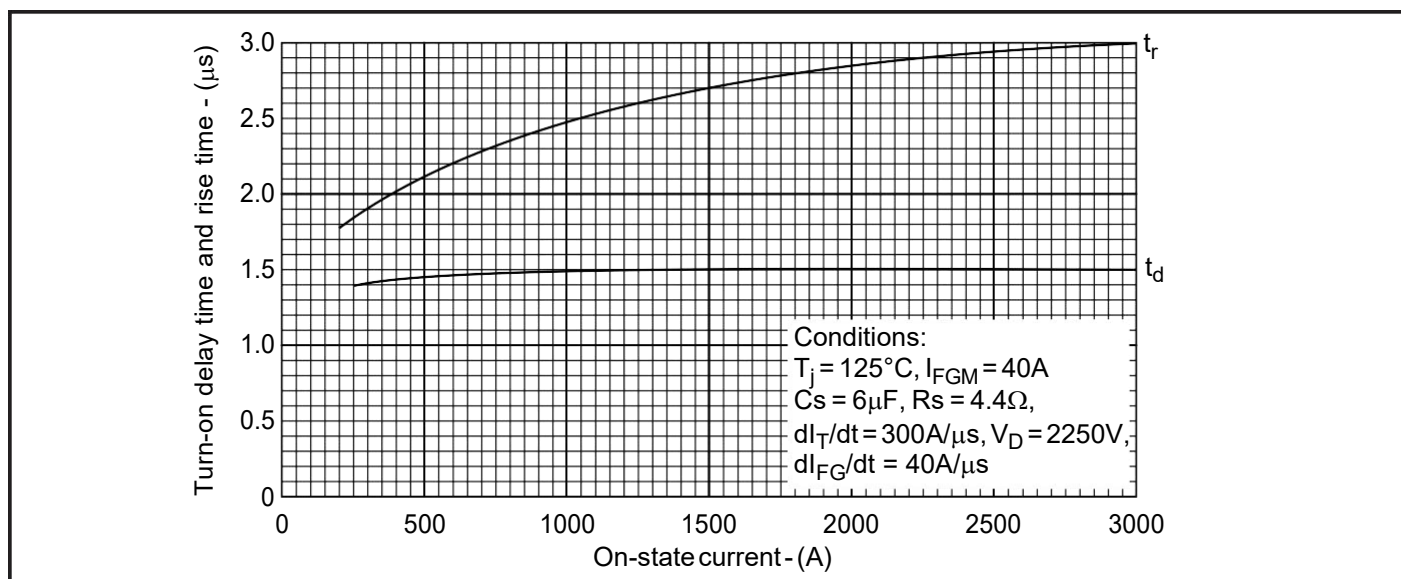


Fig.13 Delay time & rise time vs turn-on current

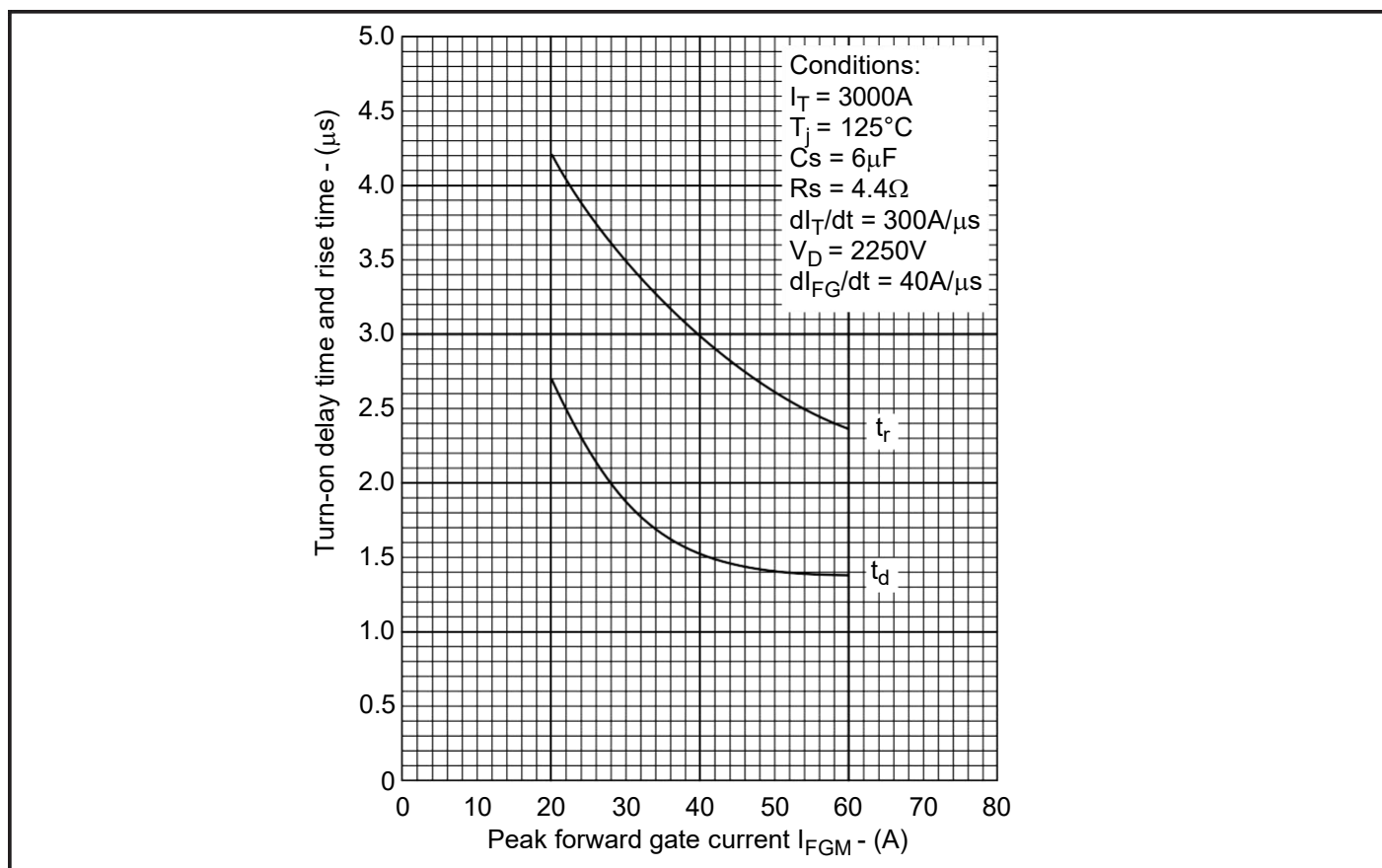


Fig.14 Delay time & rise time vs peak forward gate current



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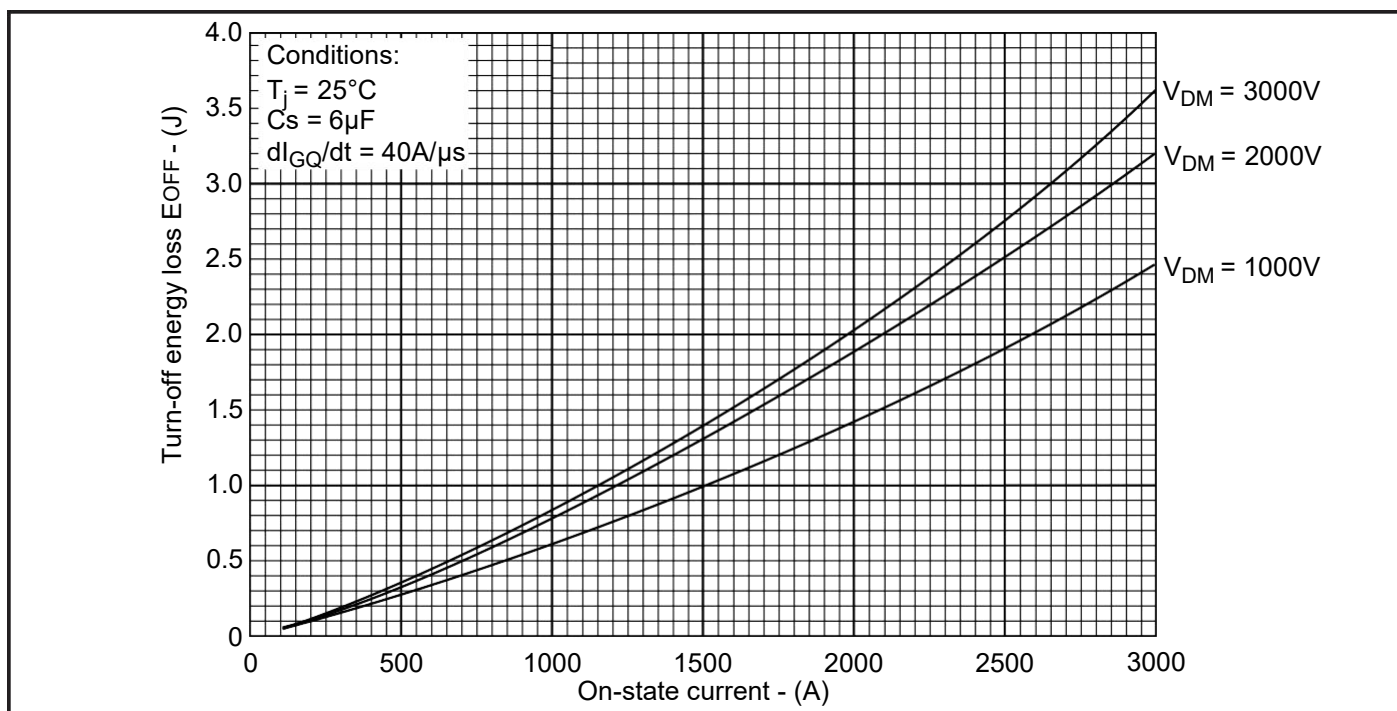


Fig.15 Turn-off energy vs on-state current

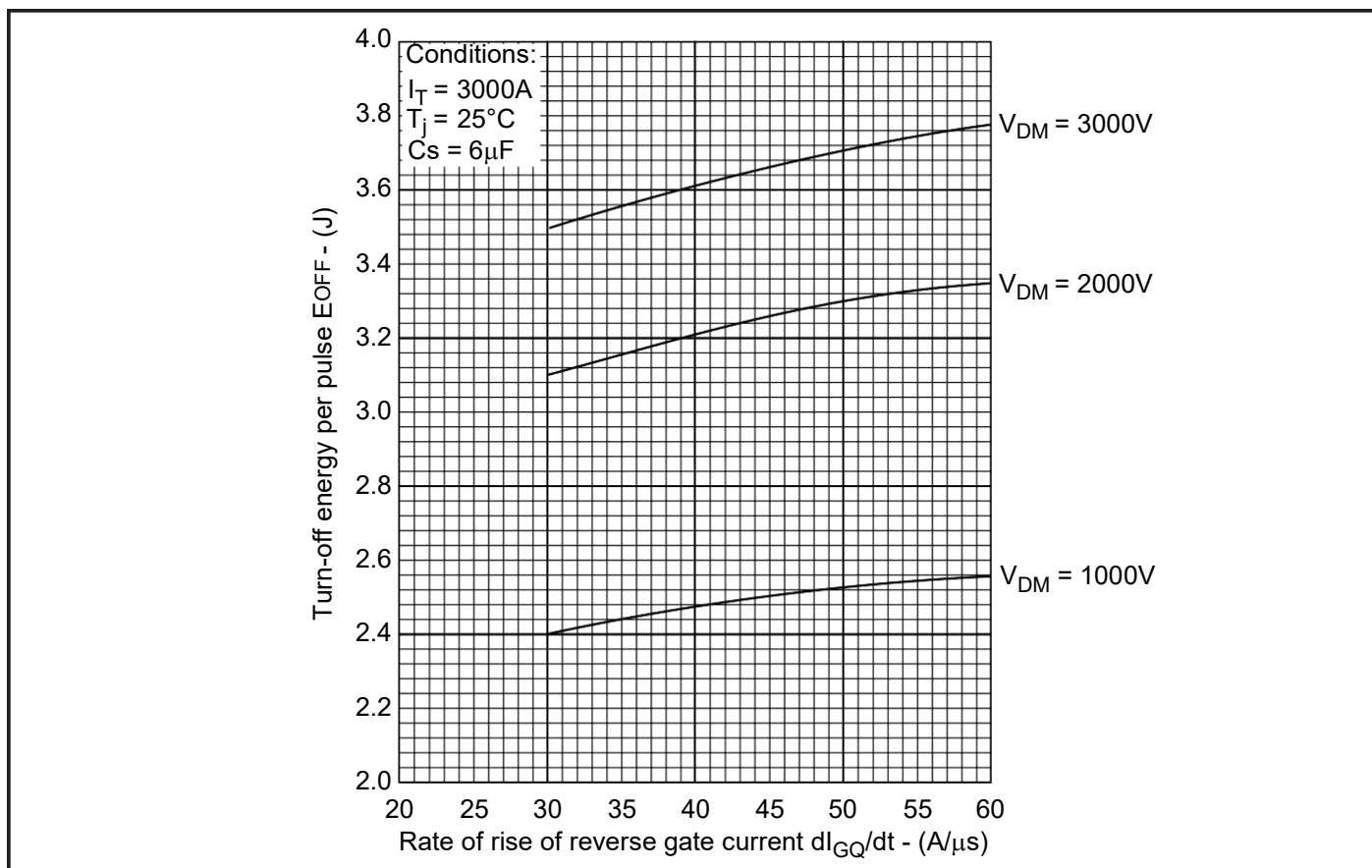


Fig.16 Turn-off energy vs rate of rise of reverse gate current



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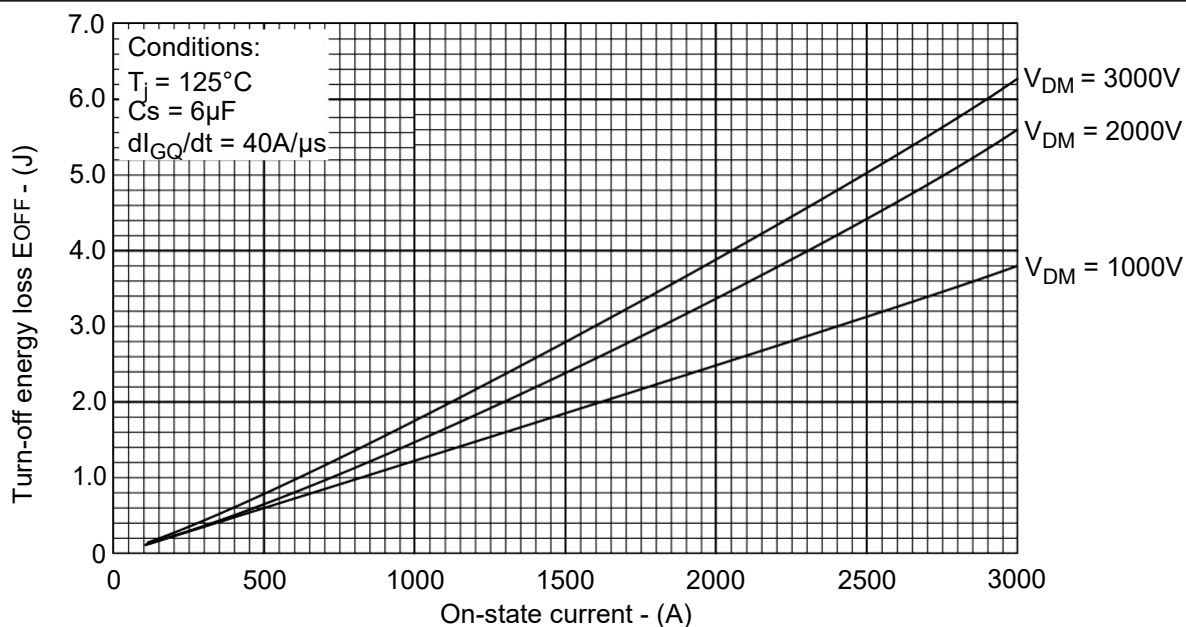


Fig.17 Turn-off energy vs on-state current

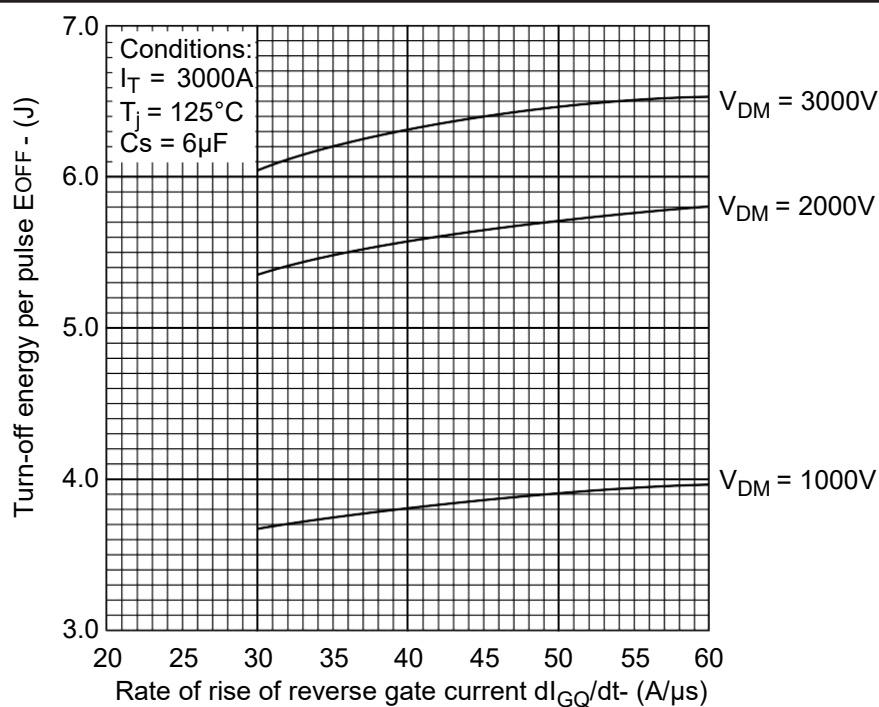


Fig.18 Turn-off energy loss vs rate of rise of reverse gate current



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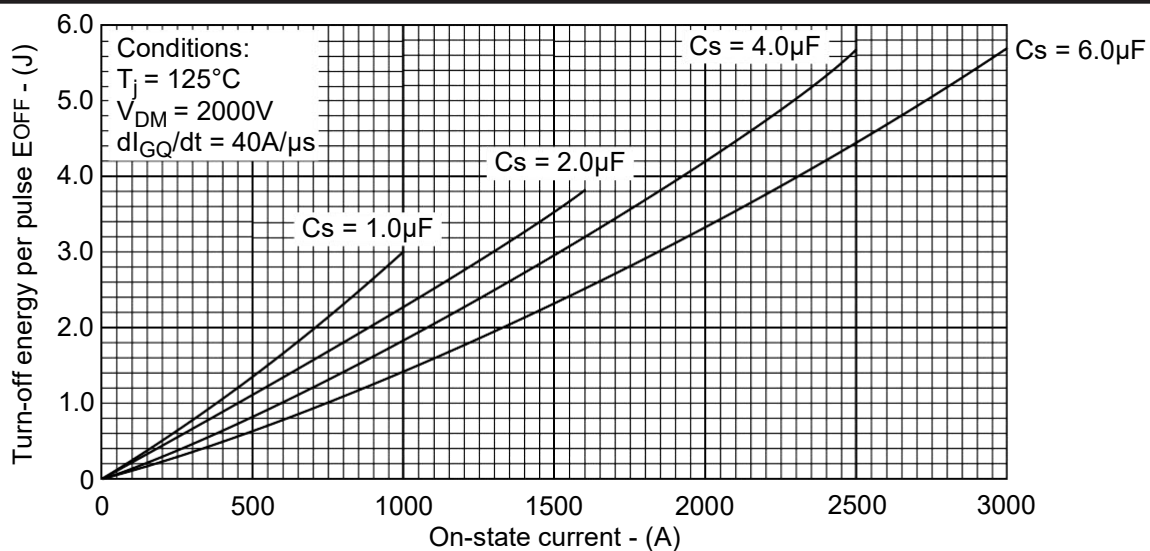


Fig.19 Turn-off energy vs on-state current

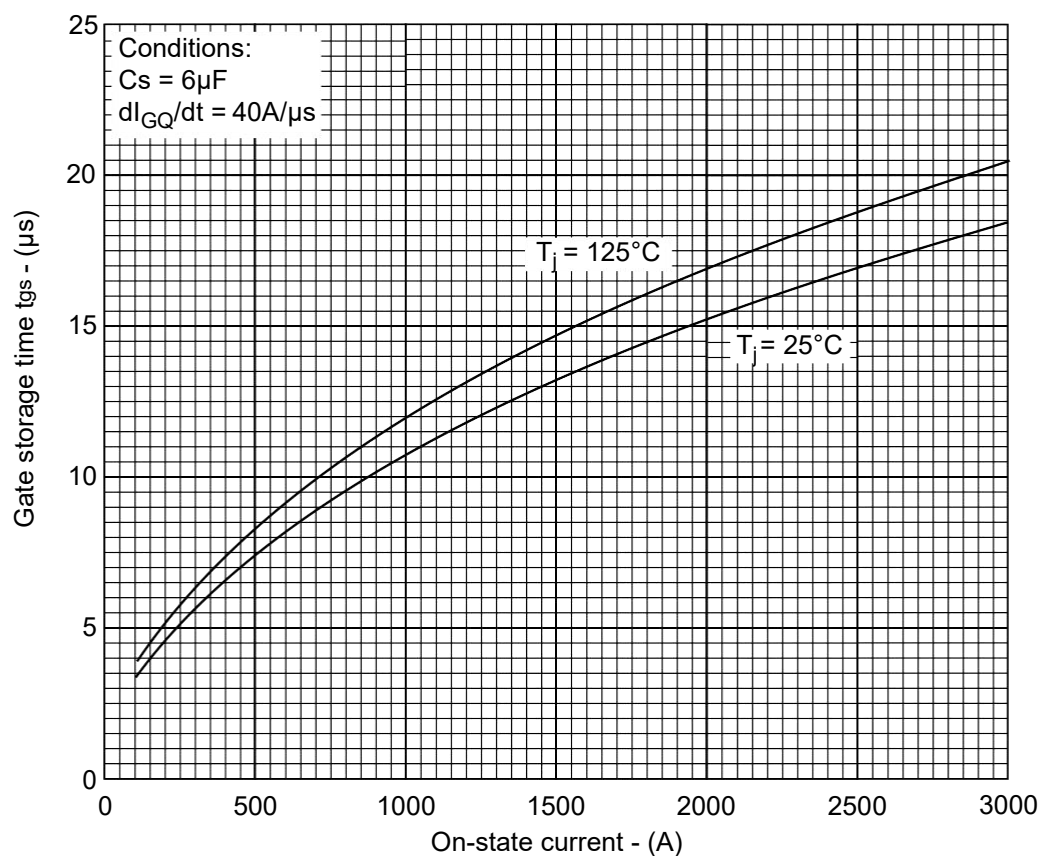


Fig.20 Gate storage time vs on-state current



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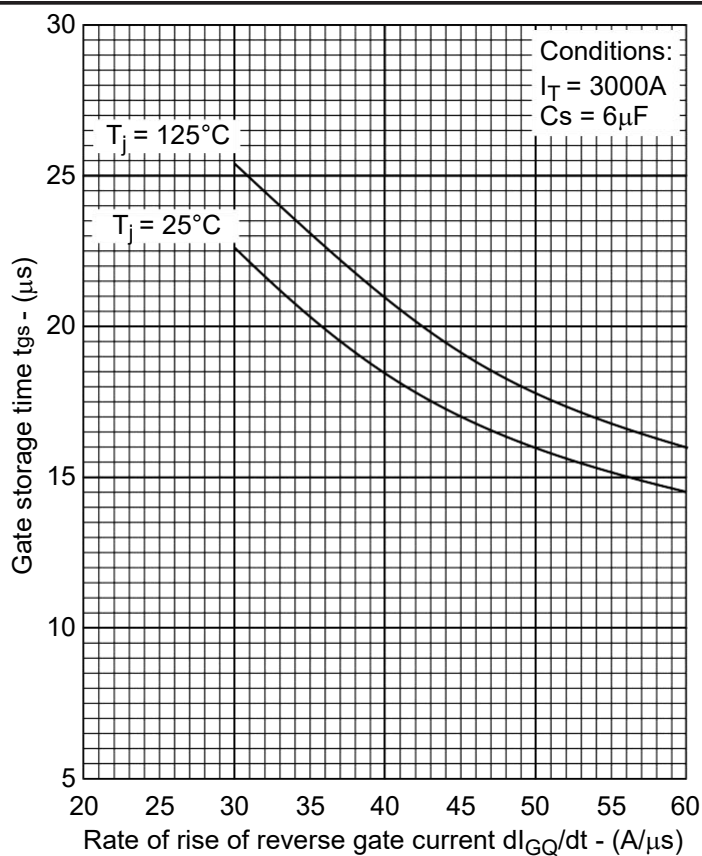


Fig.21 Gate storage time vs rate of rise of reverse gate current

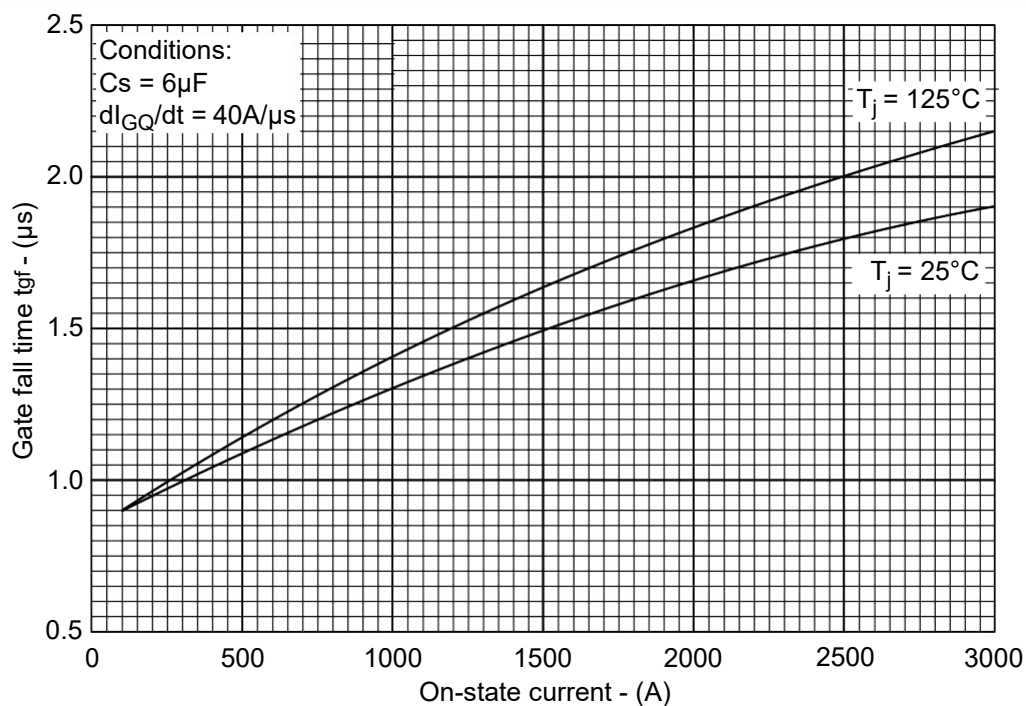


Fig.22 Gate fall time vs on-state current



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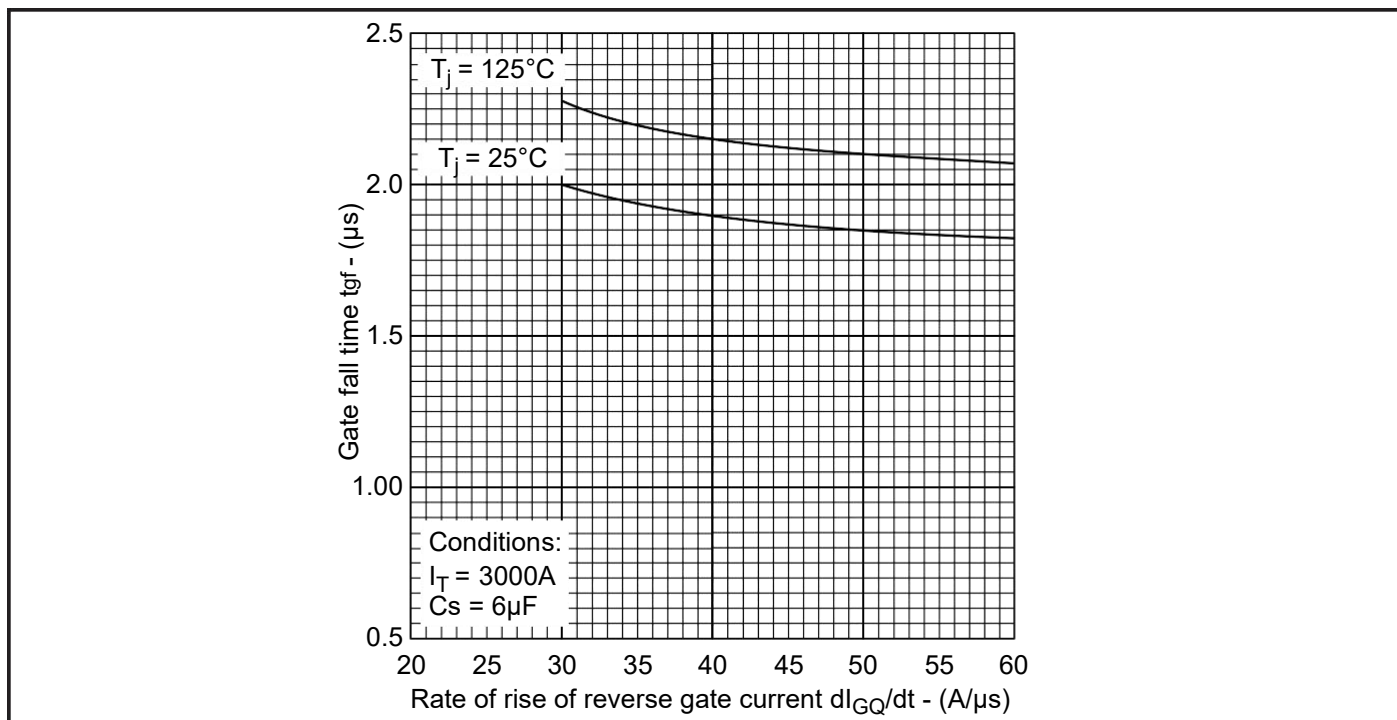


Fig.23 Gate fall time vs rate of rise of reverse gate current

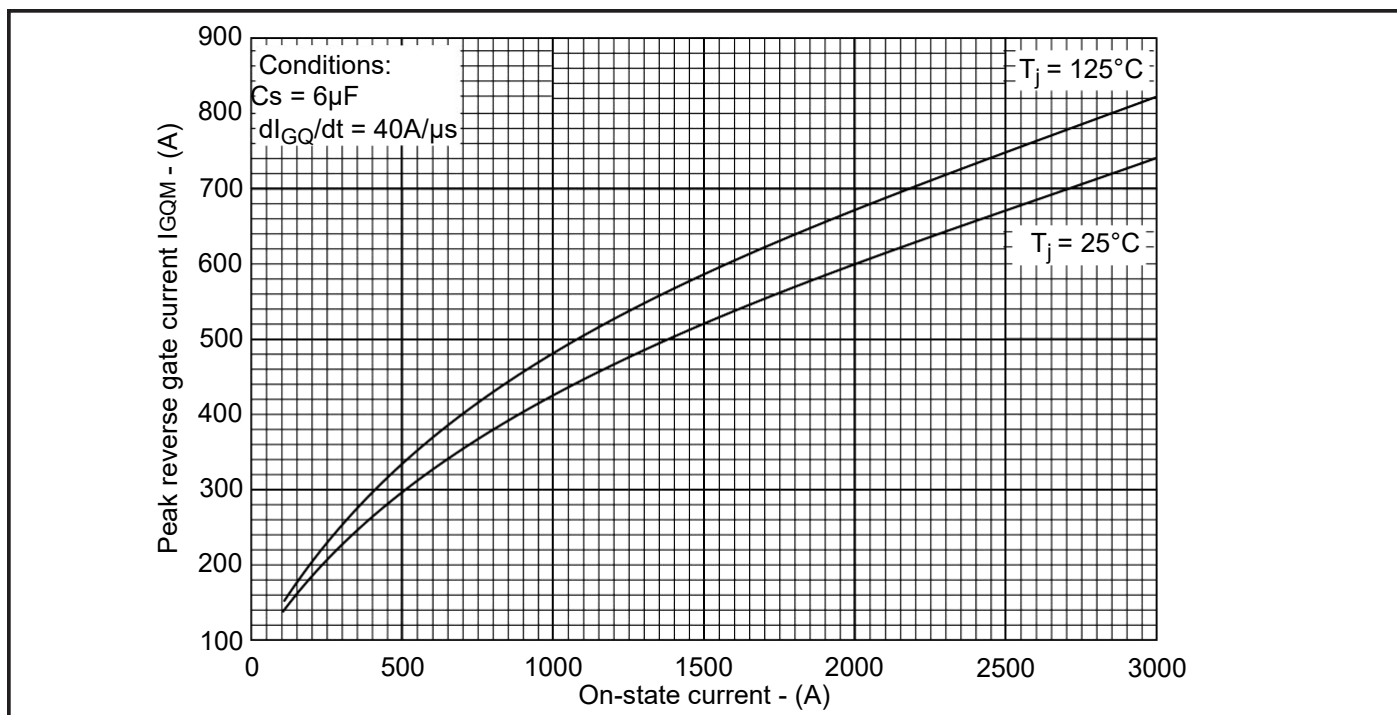


Fig.24 Peak reverse gate current vs turn-off current



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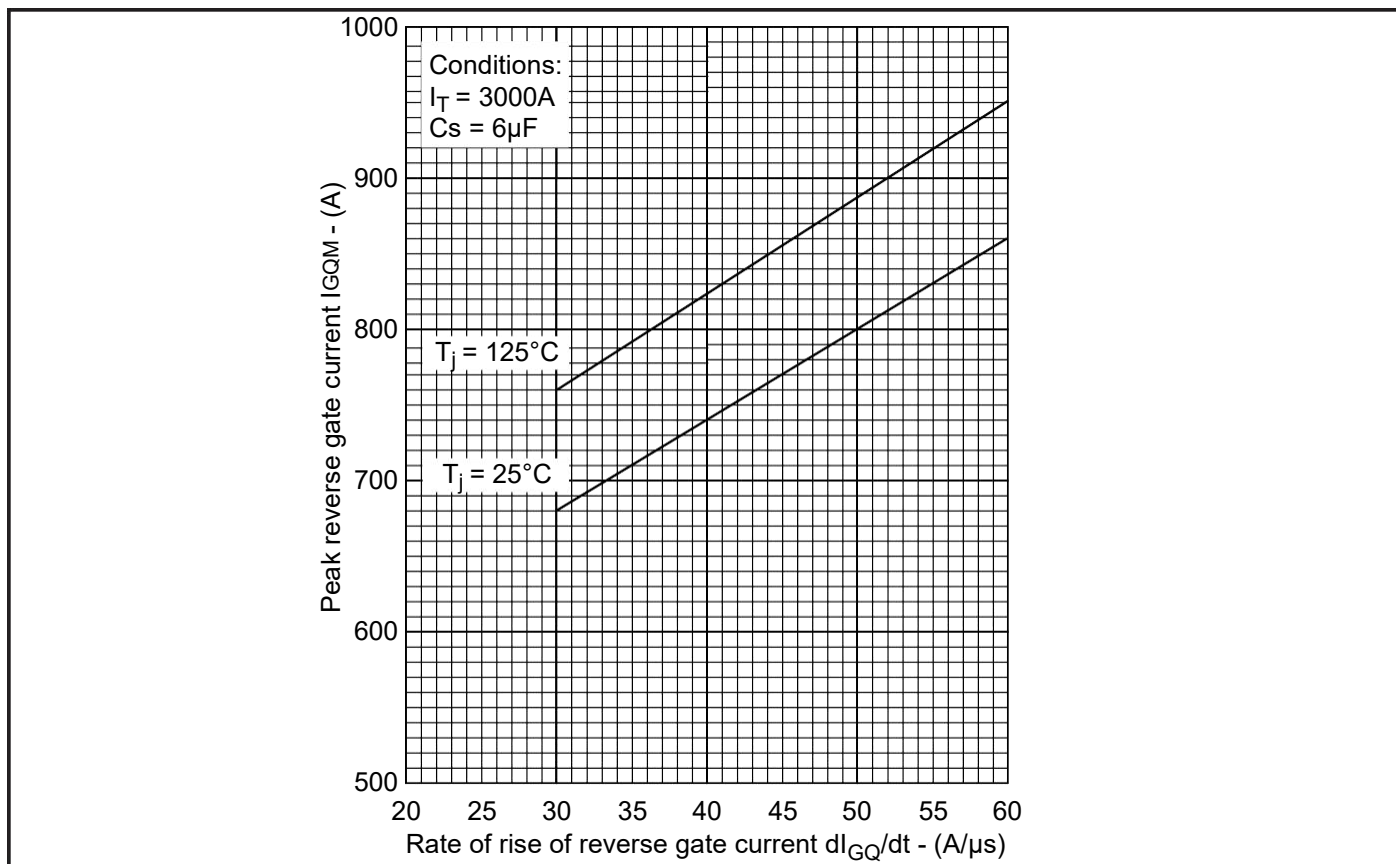


Fig.25 Peak reverse gate current vs rate of rise of reversegate current

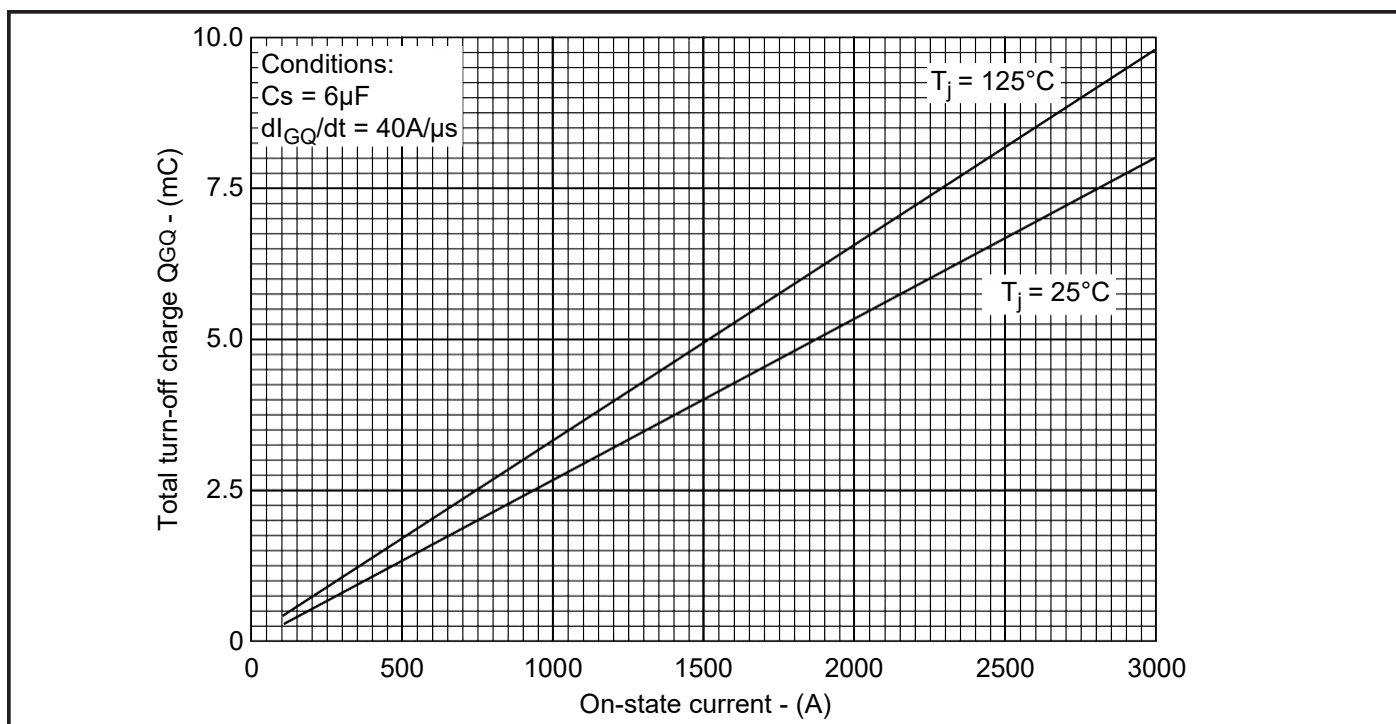


Fig.26 Turn-off gate charge vs on-state current



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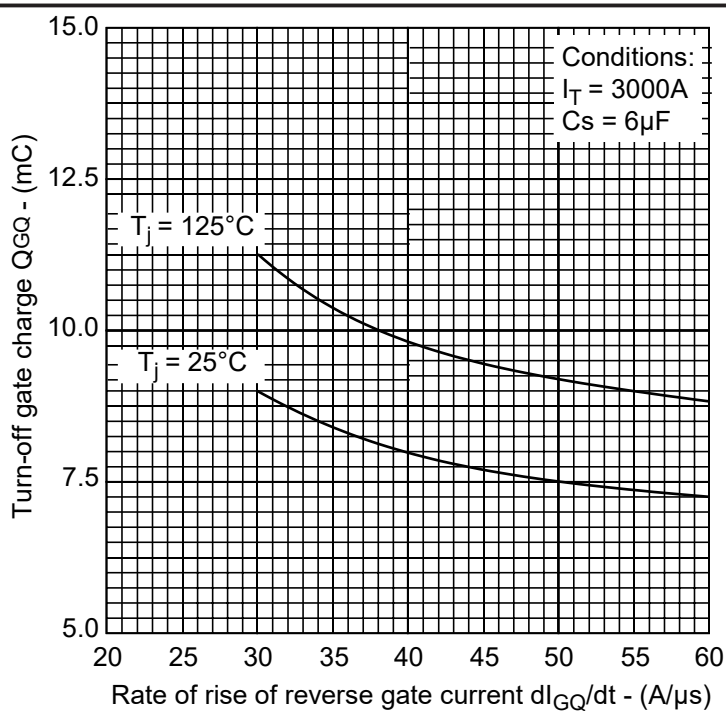


Fig.27 Turn-off gate charge vs rate of rise of reverse gate current

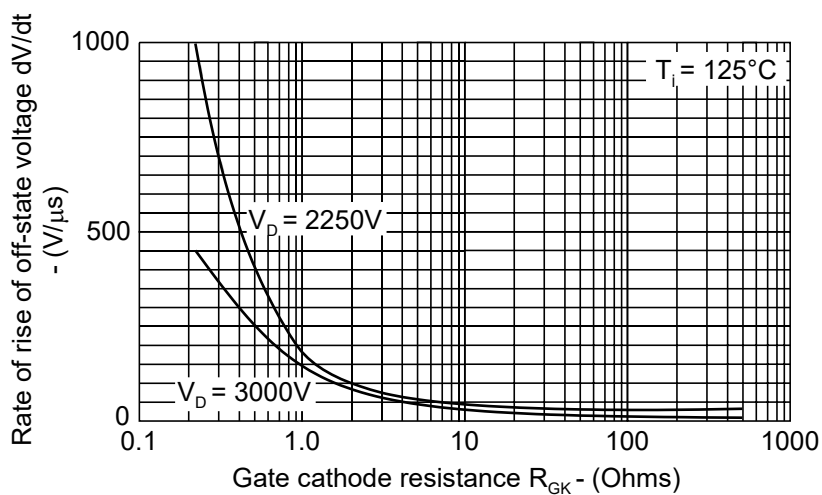
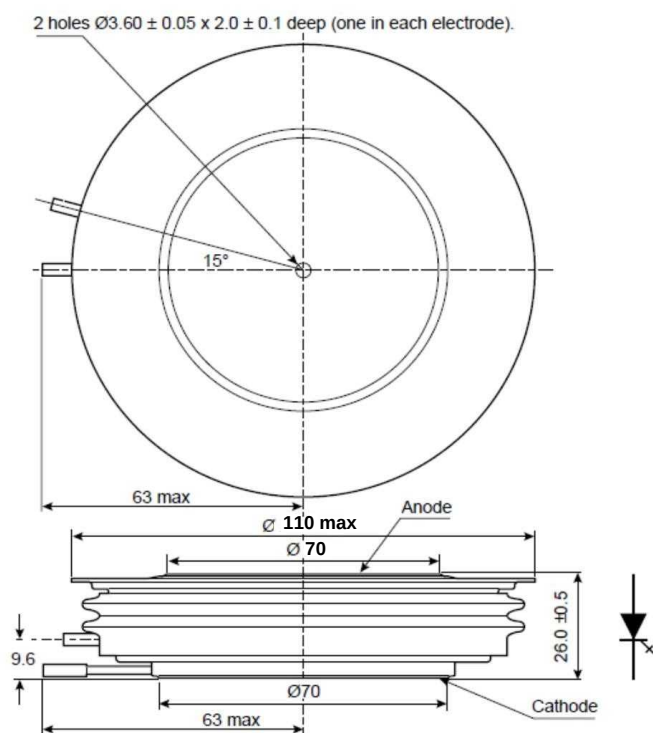


Fig.28 Rate of rise of off-state voltage vs gate cathode resistance



OUTLINE

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



Nominal weight: 1200g
Clamping force: 35kN $\pm 10\%$
Lead coaxial, length: 600mm