

APPLICATIONS

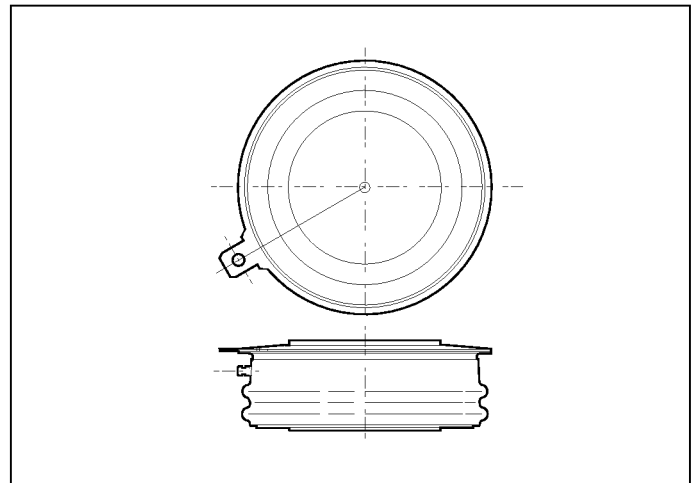
- Variable speed A.C. motor drive inverters (VSD-AC).
- Uninterruptable Power Supplies
- High Voltage Converters.
- Choppers.
- Welding.
- Induction Heating.
- DC/DC Converters.

KEY PARAMETERS

I_{TCM}	600A
V_{DRM}	2500V
$I_{T(AV)}$	225A
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.



Outline type code: E. See package details for further information.

VOLTAGE RATINGS

Type Number	Repetitive Peak Off-state Voltage V_{DRM}	Repetitive Peak Reverse Voltage V_{RRM}	Conditions
DG306AE25	2500	16	$T_{vj} = 125^\circ\text{C}$, $I_{DM} = 50\text{mA}$, $I_{RRM} = 50\text{mA}$, $V_{RG} = 2\text{V}$

CURRENT RATINGS

Symbol	Parameter	Conditions	Max.	Units
I_{TCM}	Repetitive peak controllable on-state current	$V_D = 67\%V_{DRM}$, $T_j = 125^\circ\text{C}$, $di_{GQ}/dt = 15\text{A}/\mu\text{s}$, $C_s = 1.0\mu\text{F}$	600	A
$I_{T(AV)}$	Mean on-state current	$T_{HS} = 80^\circ\text{C}$. Double side cooled. Half sine 50Hz.	225	A
$I_{T(RMS)}$	RMS on-state current	$T_{HS} = 80^\circ\text{C}$. Double side cooled. Half sine 50Hz.	350	A

DG306AE25

SURGE RATINGS

Symbol	Parameter	Conditions	Max.	Units
I_{TSM}	Surge (non-repetitive) on-state current	10ms half sine. $T_j = 125^\circ\text{C}$	3.5	kA
I^2t	I^2t for fusing	10ms half sine. $T_j = 125^\circ\text{C}$	61250	A^2s
di_T/dt	Critical rate of rise of on-state current	$V_D = 2000\text{V}$, $I_T = 600\text{A}$, $T_j = 125^\circ\text{C}$, $I_{FG} > 20\text{A}$, 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	-	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		-	50	A
$P_{FG(AV)}$	Average forward gate power		-	10	W
P_{RGM}	Peak reverse gate power		-	6	kW
di_{GQ}/dt	Rate of rise of reverse gate current		10	50	$\text{A}/\mu\text{s}$
$t_{ON(min)}$	Minimum permissible on time		20	-	μs
$t_{OFF(min)}$	Minimum permissible off time		40	-	μs

THERMAL RATINGS

Symbol	Parameter	Conditions	Min.	Max.	Units	
$R_{th(j-hs)}$	DC thermal resistance - junction to heatsink surface	Double side cooled	-	0.075	$^\circ\text{C}/\text{W}$	
		Anode side cooled	-	0.12	$^\circ\text{C}/\text{W}$	
		Cathode side cooled	-	0.20	$^\circ\text{C}/\text{W}$	
$R_{th(c-hs)}$	Contact thermal resistance	Clamping force 6.0kN With mounting compound	per contact	-	0.018	$^\circ\text{C}/\text{W}$
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		5.0	6.0	kN	

CHARACTERISTICS

$T_j = 125^\circ\text{C}$ unless stated otherwise					
Symbol	Parameter	Conditions	Min.	Max.	Units
V_{TM}	On-state voltage	At 600A peak, $I_{G(ON)} = 2\text{A d.c.}$	-	2.75	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	$V_D = 24\text{V}$, $I_T = 100\text{A}$, $T_j = 25^\circ\text{C}$	-	0.9	V
I_{GT}	Gate trigger current	$V_D = 24\text{V}$, $I_T = 100\text{A}$, $T_j = 25^\circ\text{C}$	-	1.0	A
I_{RGM}	Reverse gate cathode current	$V_{RGM} = 16\text{V}$, No gate/cathode resistor	-	50	mA
E_{ON}	Turn-on energy	$V_D = 2000\text{V}$	-	515	mJ
t_d	Delay time	$I_T = 600\text{A}$, $di_T/dt = 300\text{A}/\mu\text{s}$	-	1.5	μs
t_r	Rise time	$I_{FG} = 20\text{A}$, rise time $< 1.0\mu\text{s}$	-	3.0	μs
E_{OFF}	Turn-off energy	$I_T = 600\text{A}$, $V_{DM} = 2000\text{V}$ Snubber Cap $C_s = 1.0\mu\text{F}$, $di_{GQ}/dt = 15\text{A}/\mu\text{s}$	-	1000	mJ
t_{gs}	Storage time		-	11.4	μs
t_{gf}	Fall time		-	1.5	μs
t_{gq}	Gate controlled turn-off time		-	12.9	μs
Q_{GQ}	Turn-off gate charge		-	1300	μC
Q_{GQT}	Total turn-off gate charge		-	2600	μC
I_{GQM}	Peak reverse gate current		-	190	A

CURVES

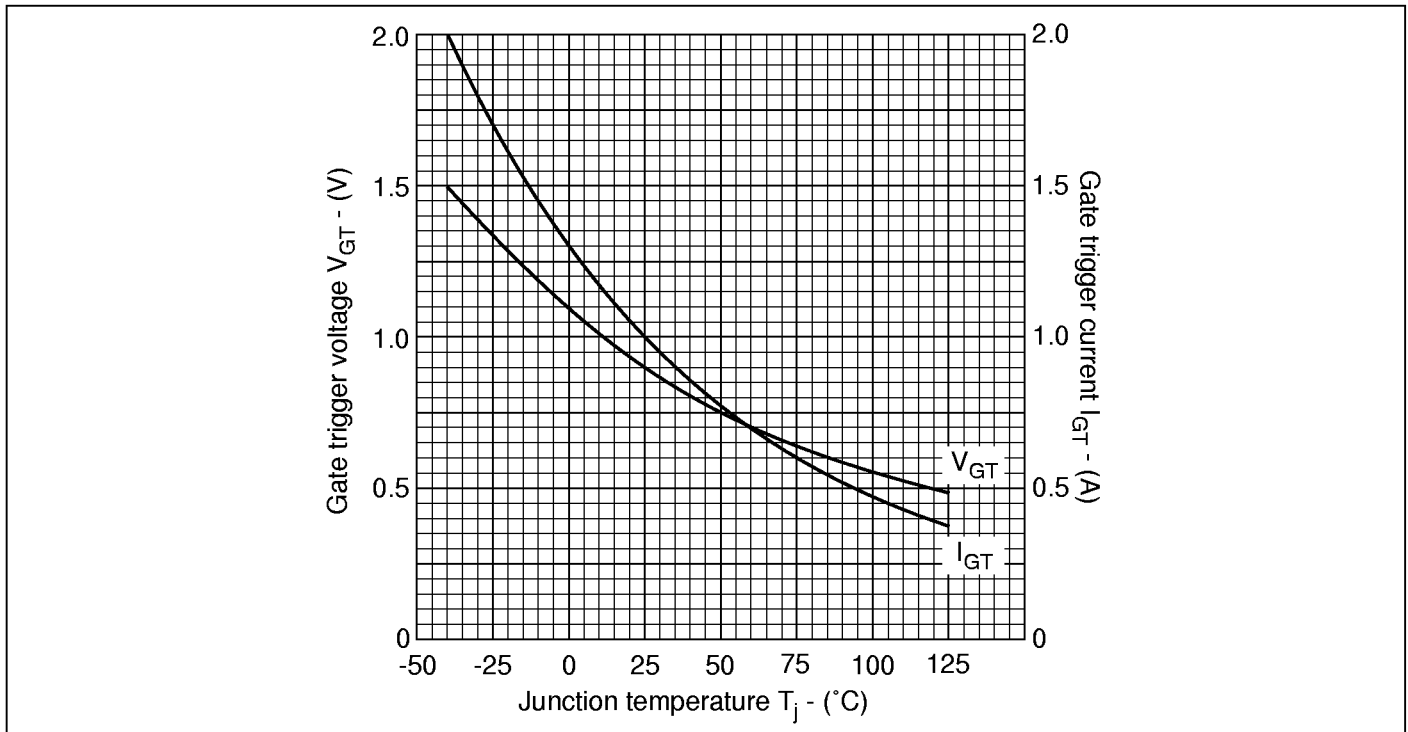


Fig.1 Gate trigger voltage/current vs junction temperature

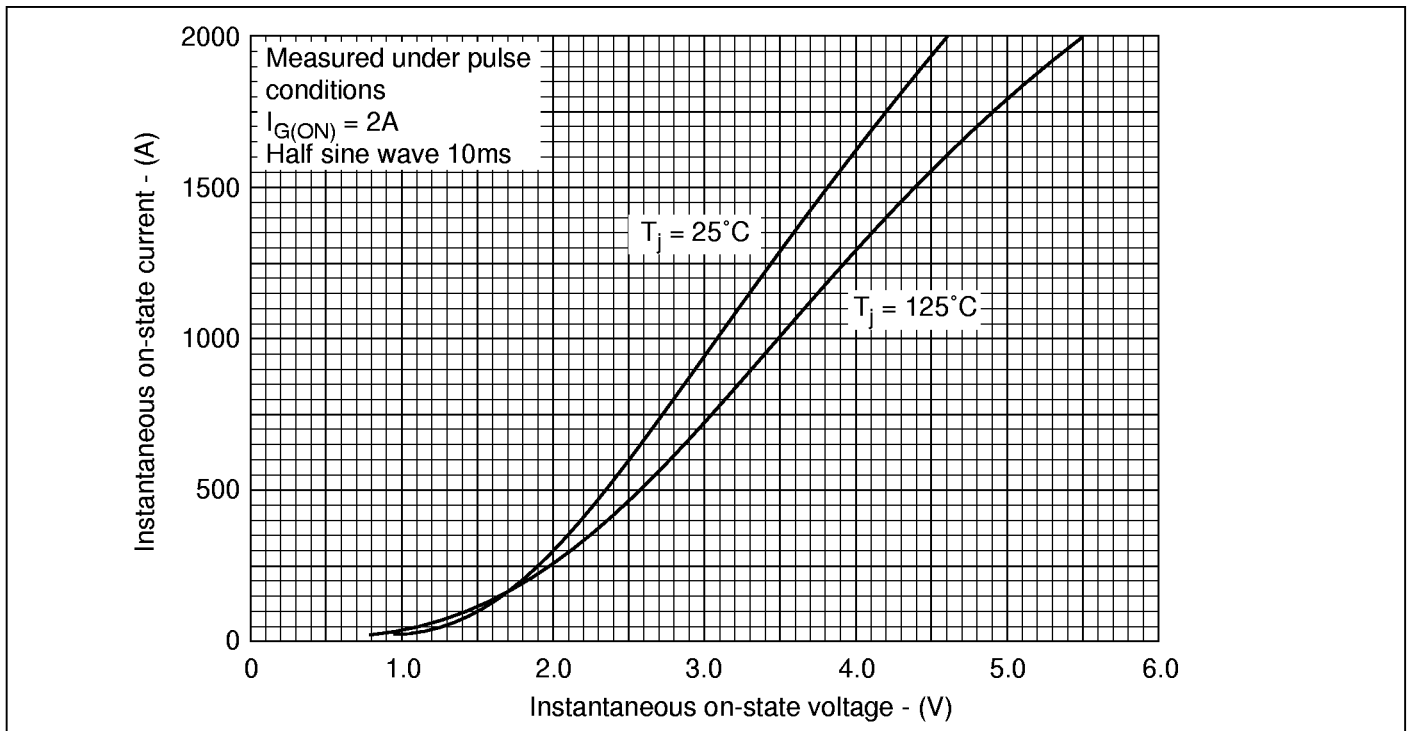


Fig.2 Maximum limit on-state characteristics

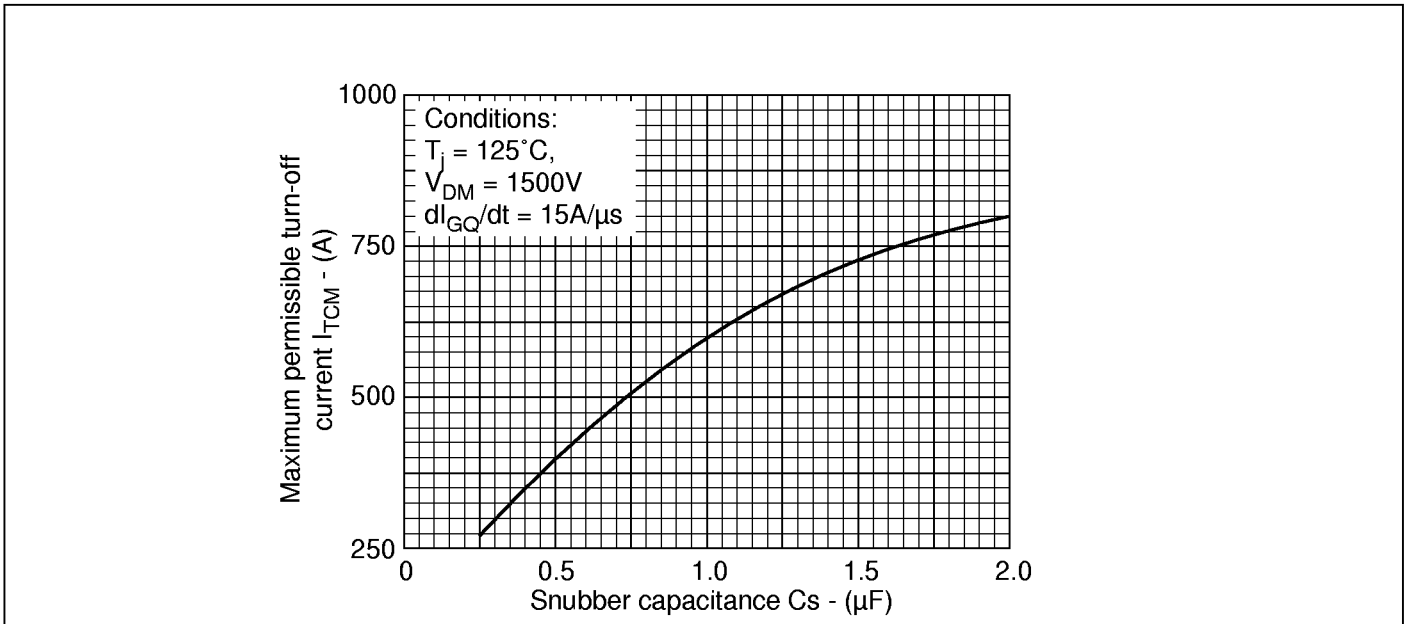


Fig.3 Dependence of I_{TCM} on C_s

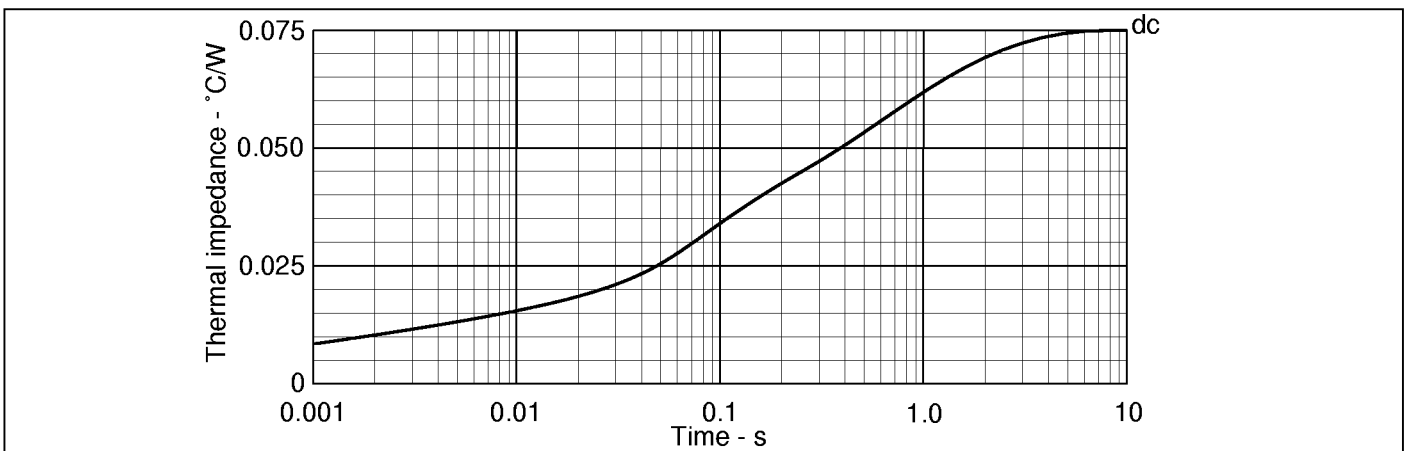


Fig.4 Maximum (limit) transient thermal impedance - double side cooled

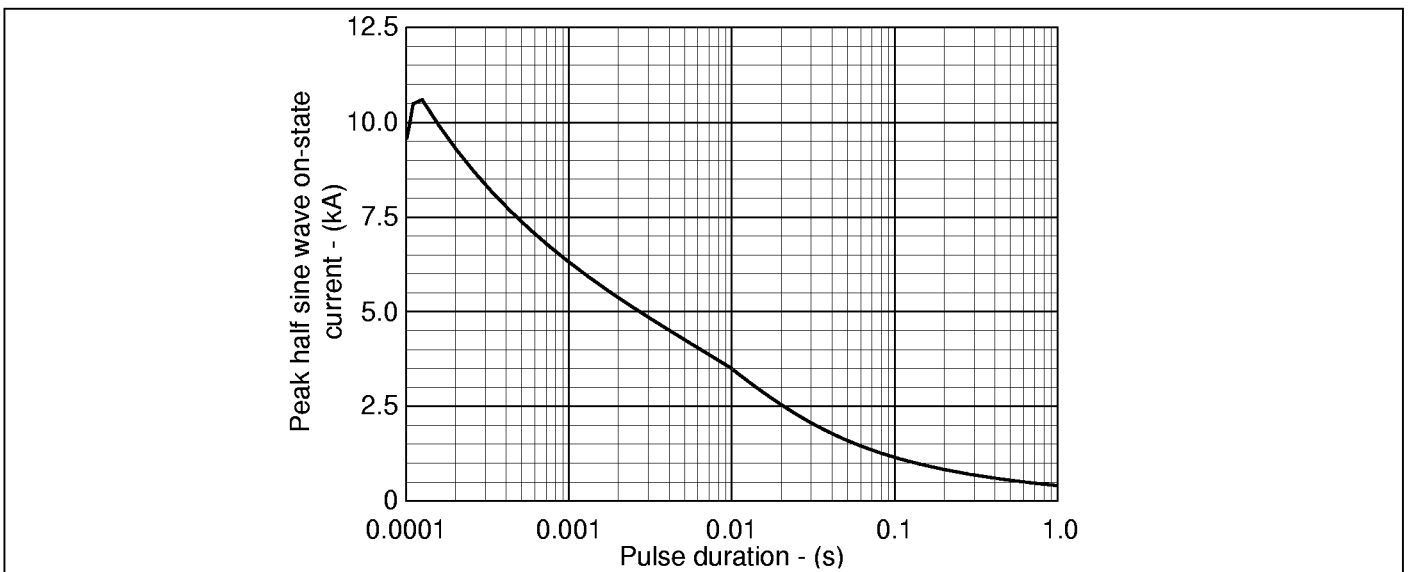


Fig.5 Surge (non-repetitive) on-state current vs time

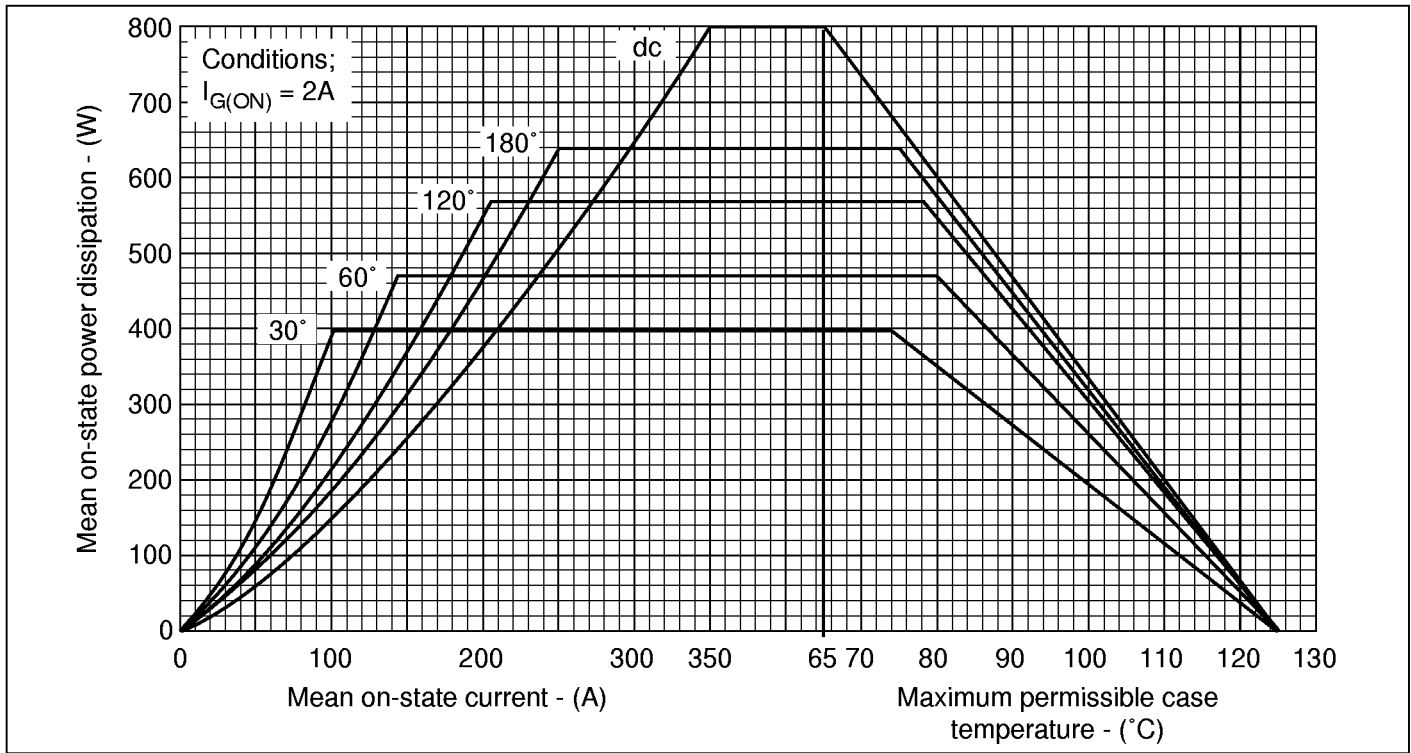


Fig.6 Steady state rectangular wave conduction loss - double side cooled

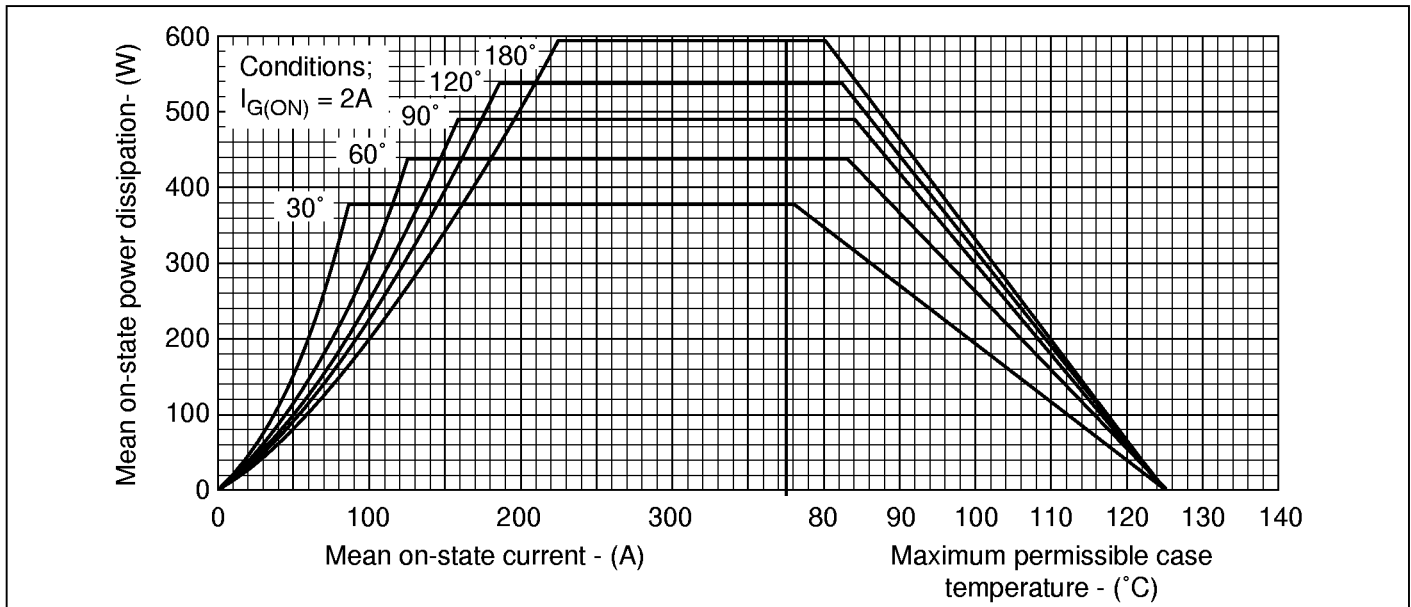


Fig.7 Steady state sinusoidal wave conduction loss - double side cooled

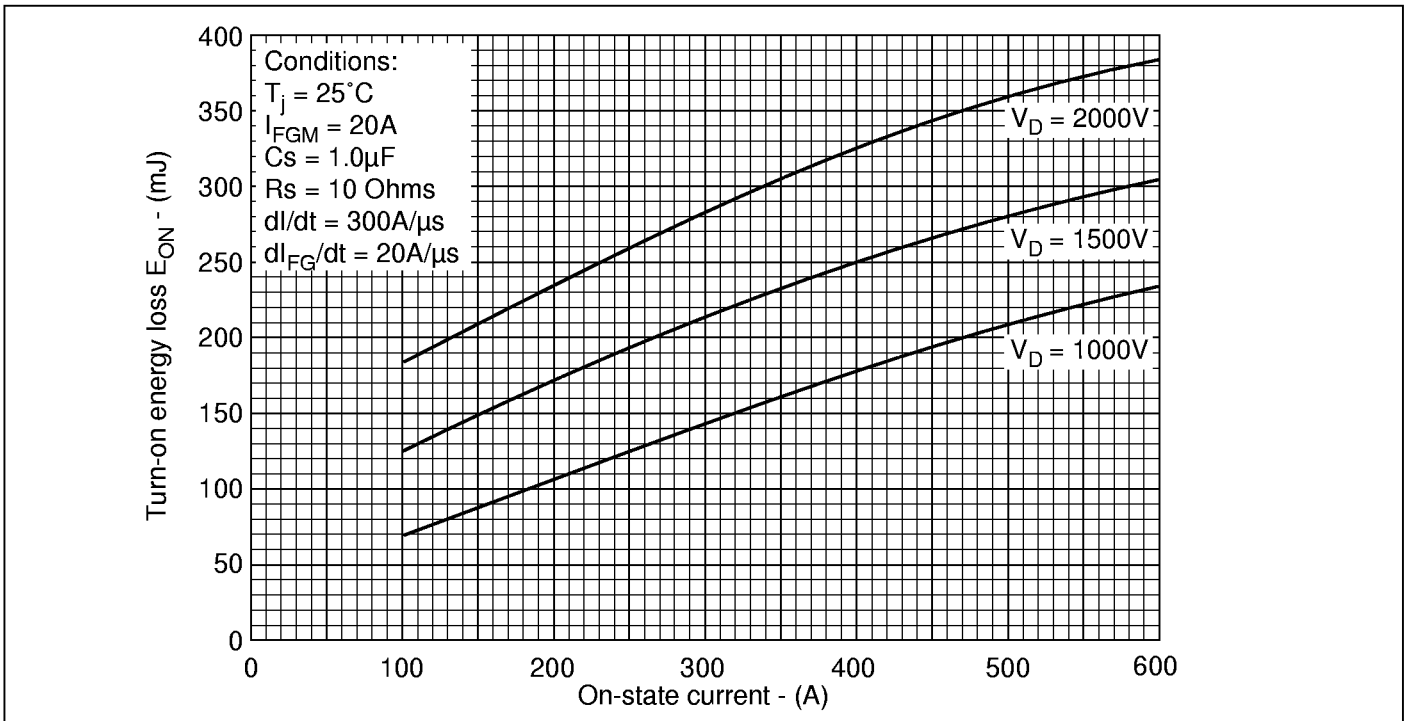


Fig.8 Turn-on energy vs on-state current

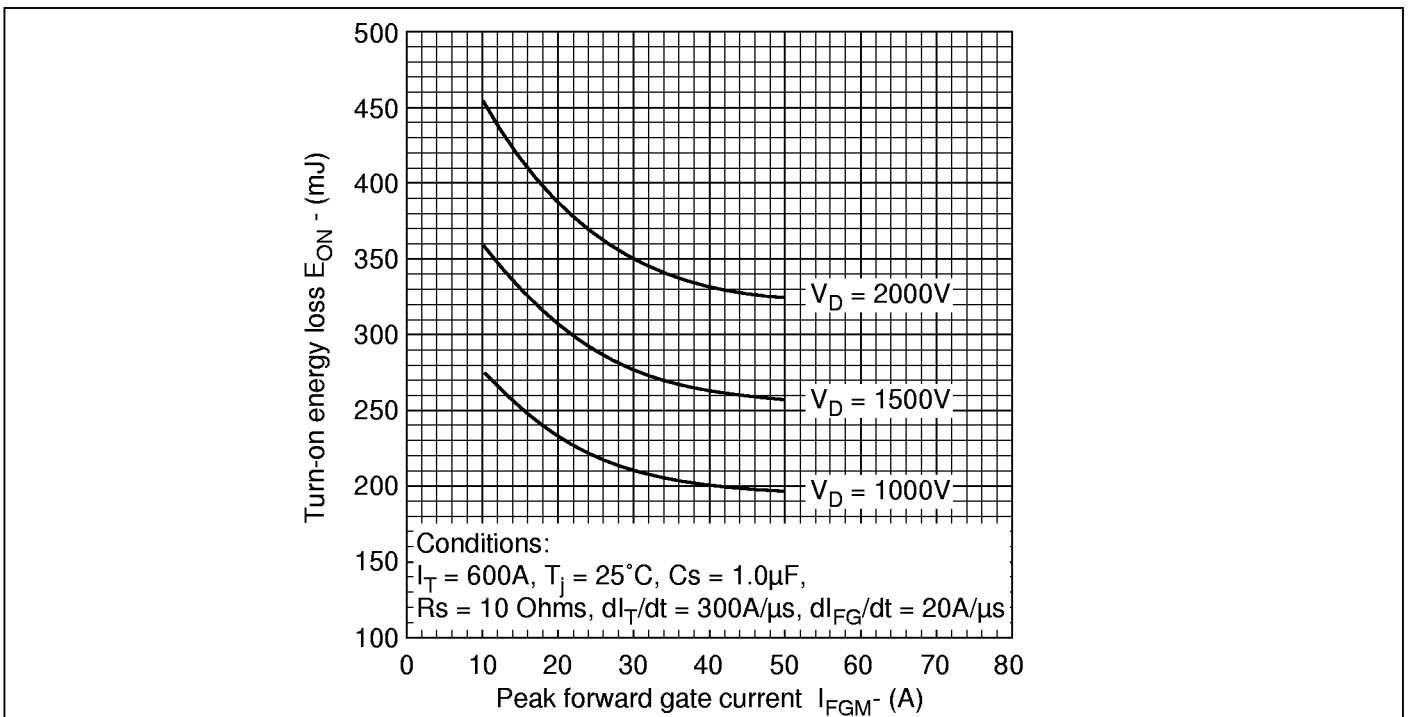


Fig.9 Turn-on energy vs peak forward gate current

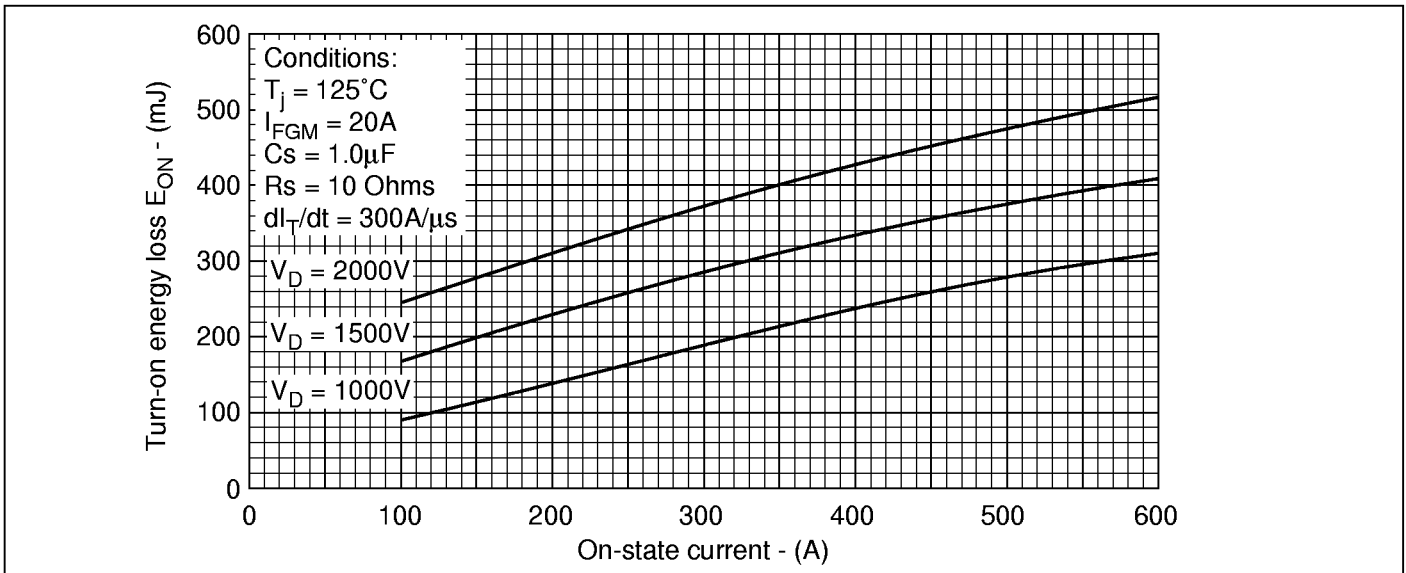


Fig.10 Turn-on energy vs on-state current

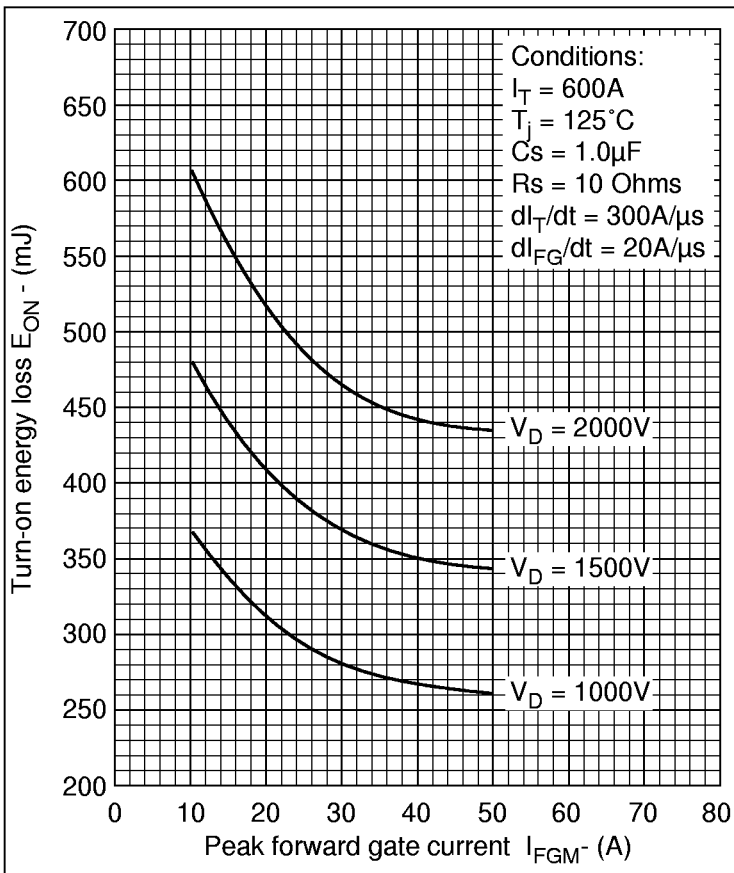


Fig.11 Turn-on energy vs peak forward gate current

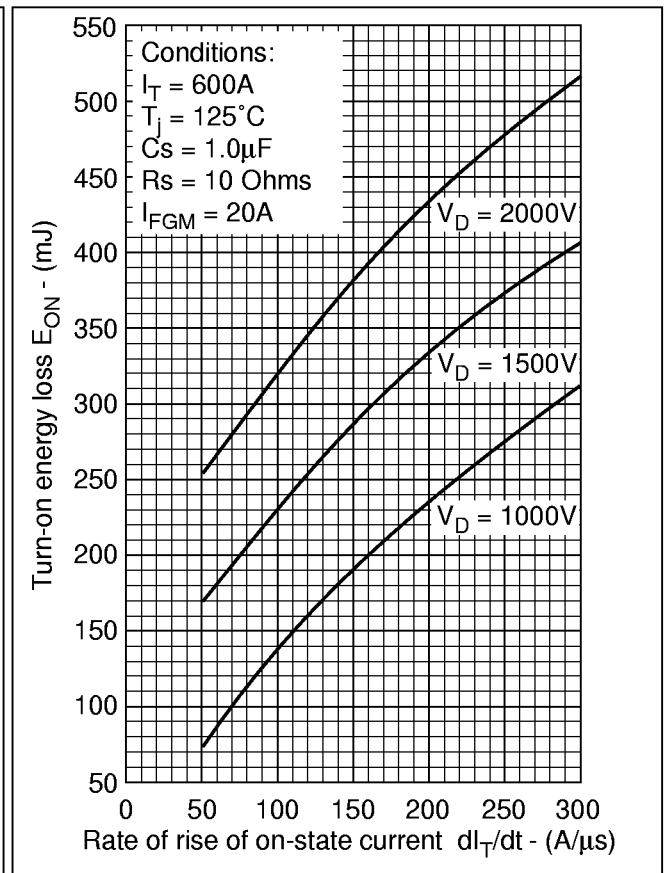


Fig.12 Turn-on energy vs rate of rise of on-state current

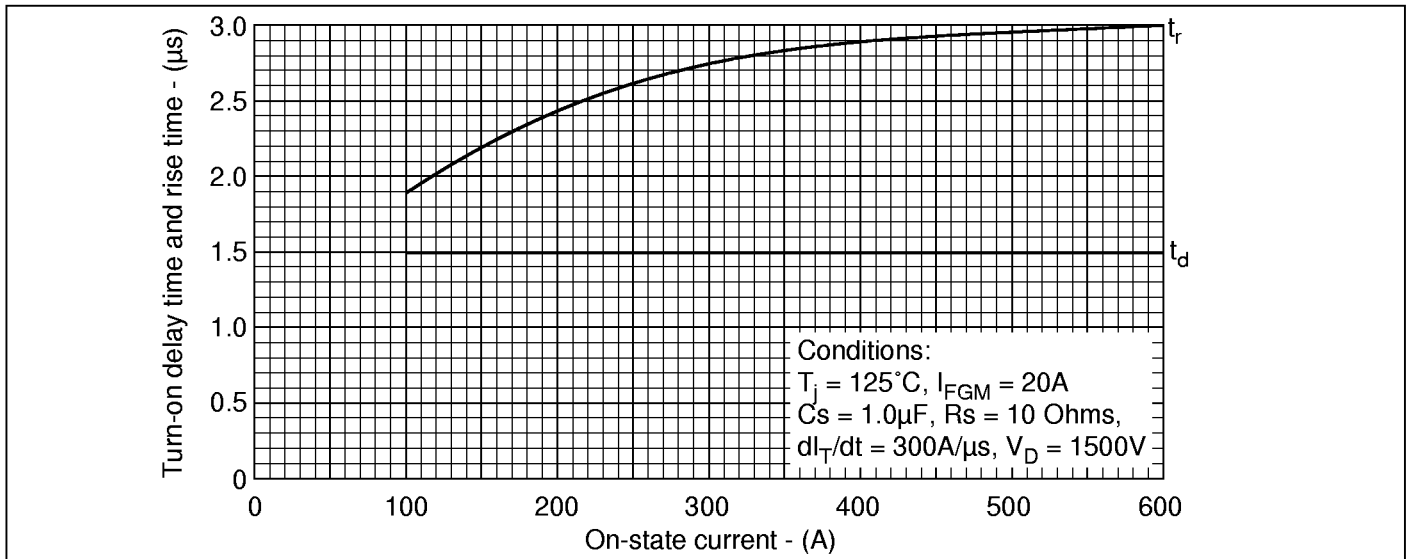


Fig.13 Delay & rise time vs turn-on current

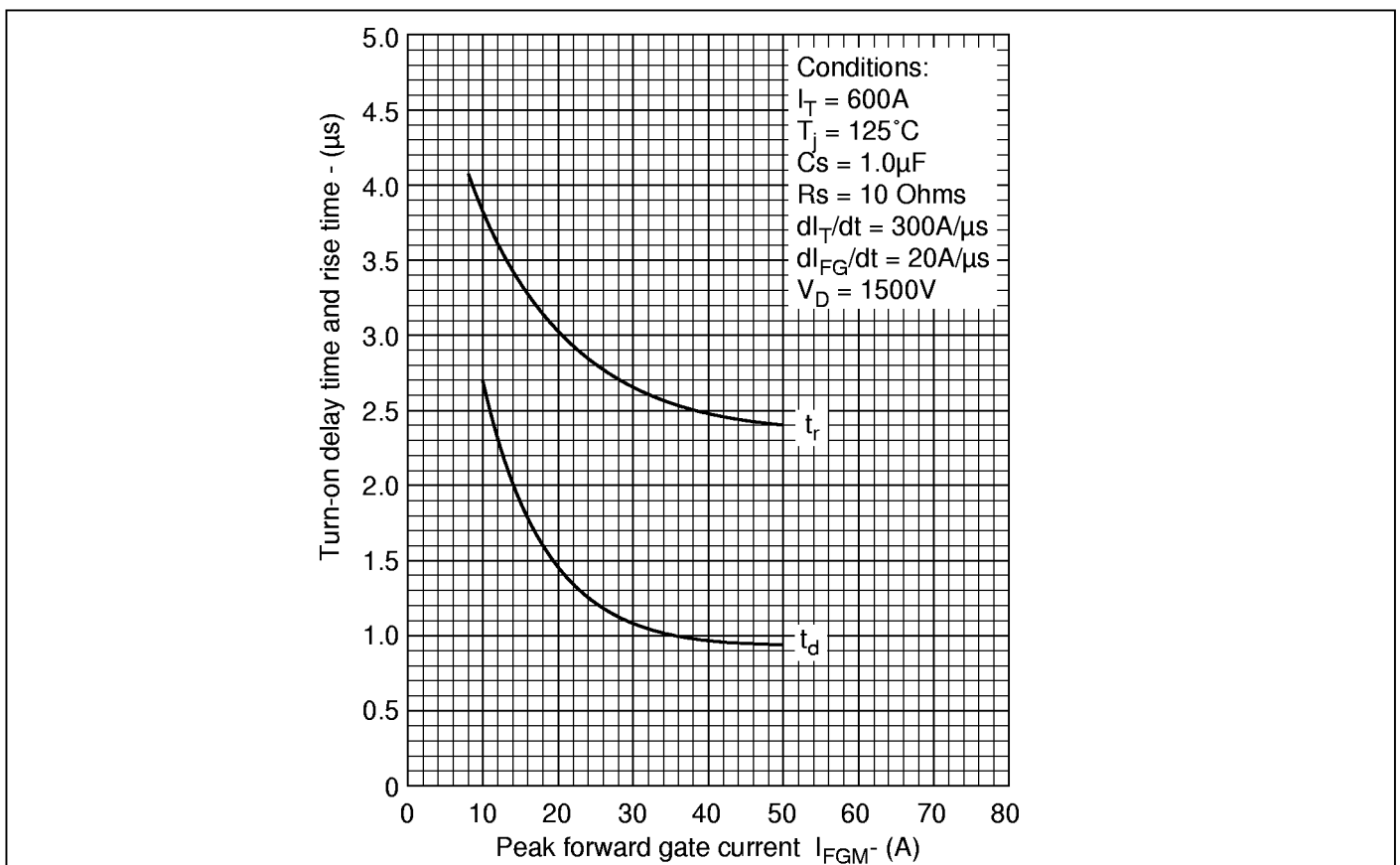


Fig.14 Delay time & rise time vs peak forward gate current

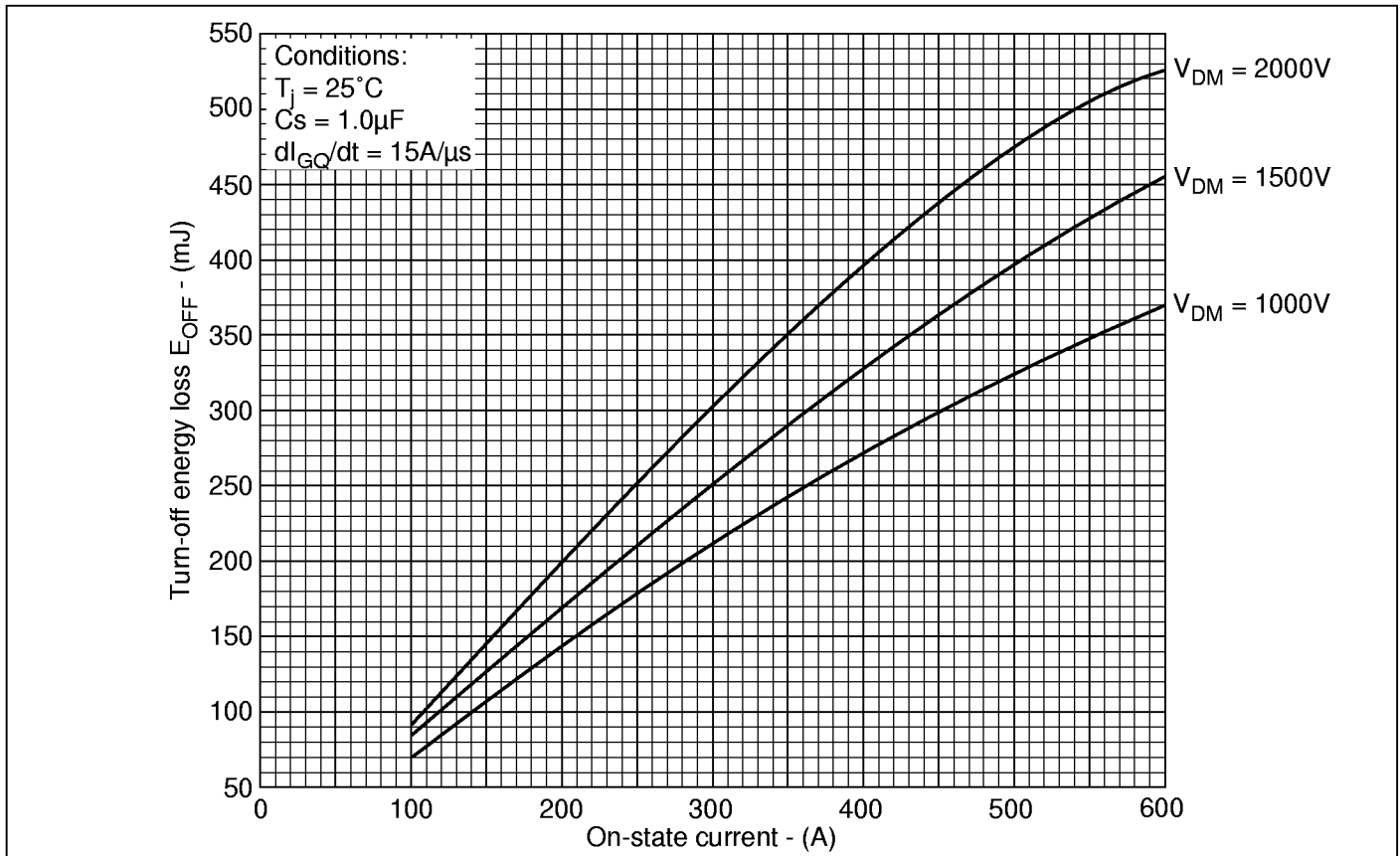


Fig.15 Turn-off energy loss vs on-state current

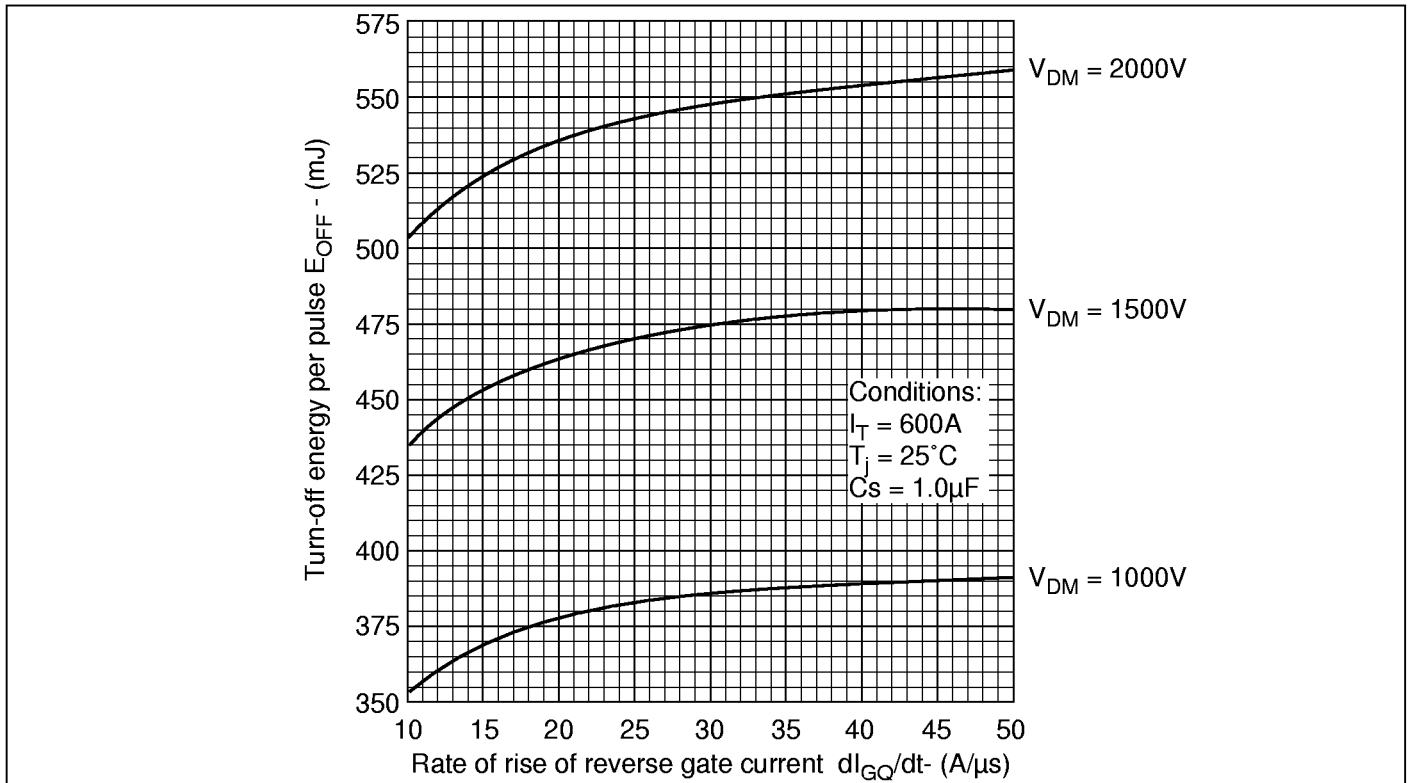


Fig.16 Turn-off energy vs rate of rise of reverse gate current

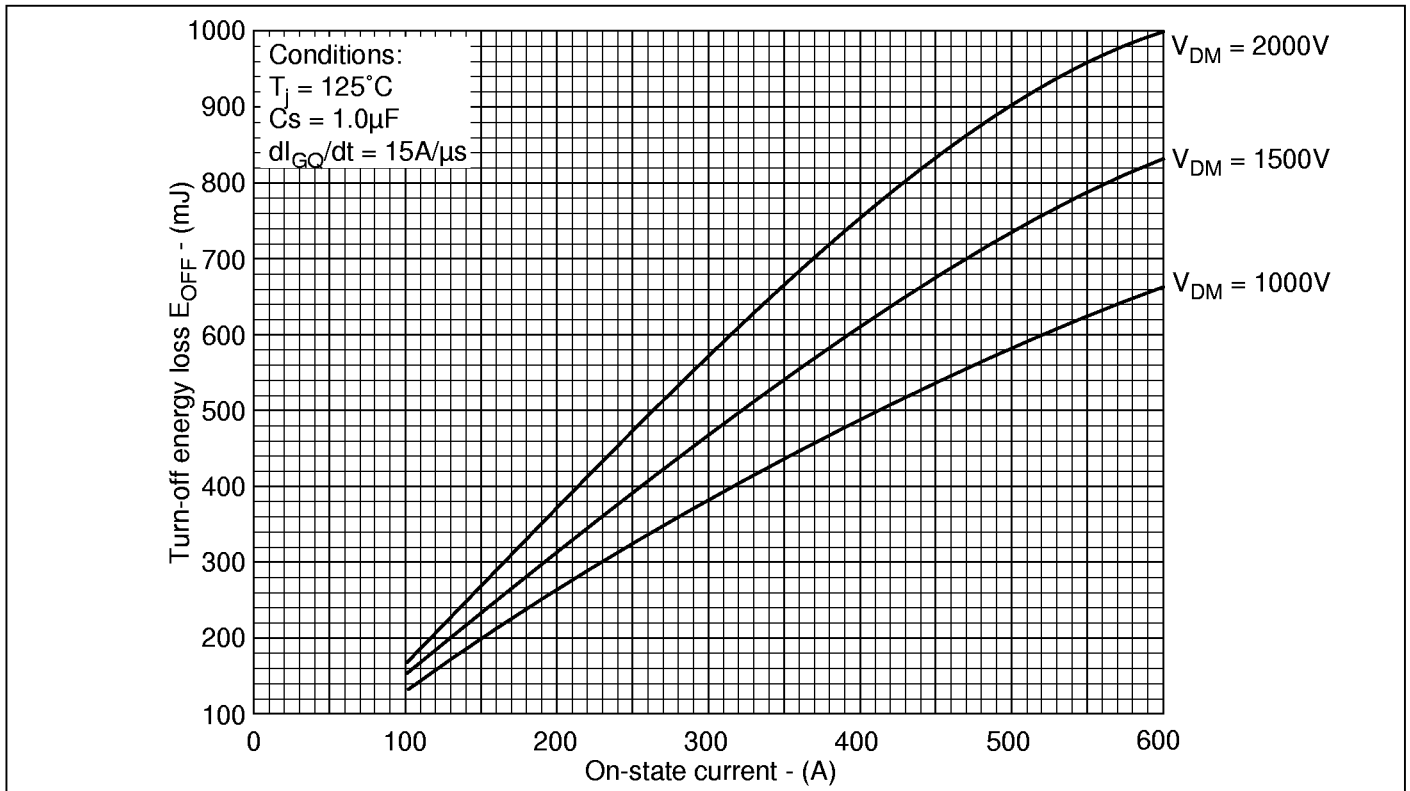


Fig.17 Turn-off energy vs on-state current

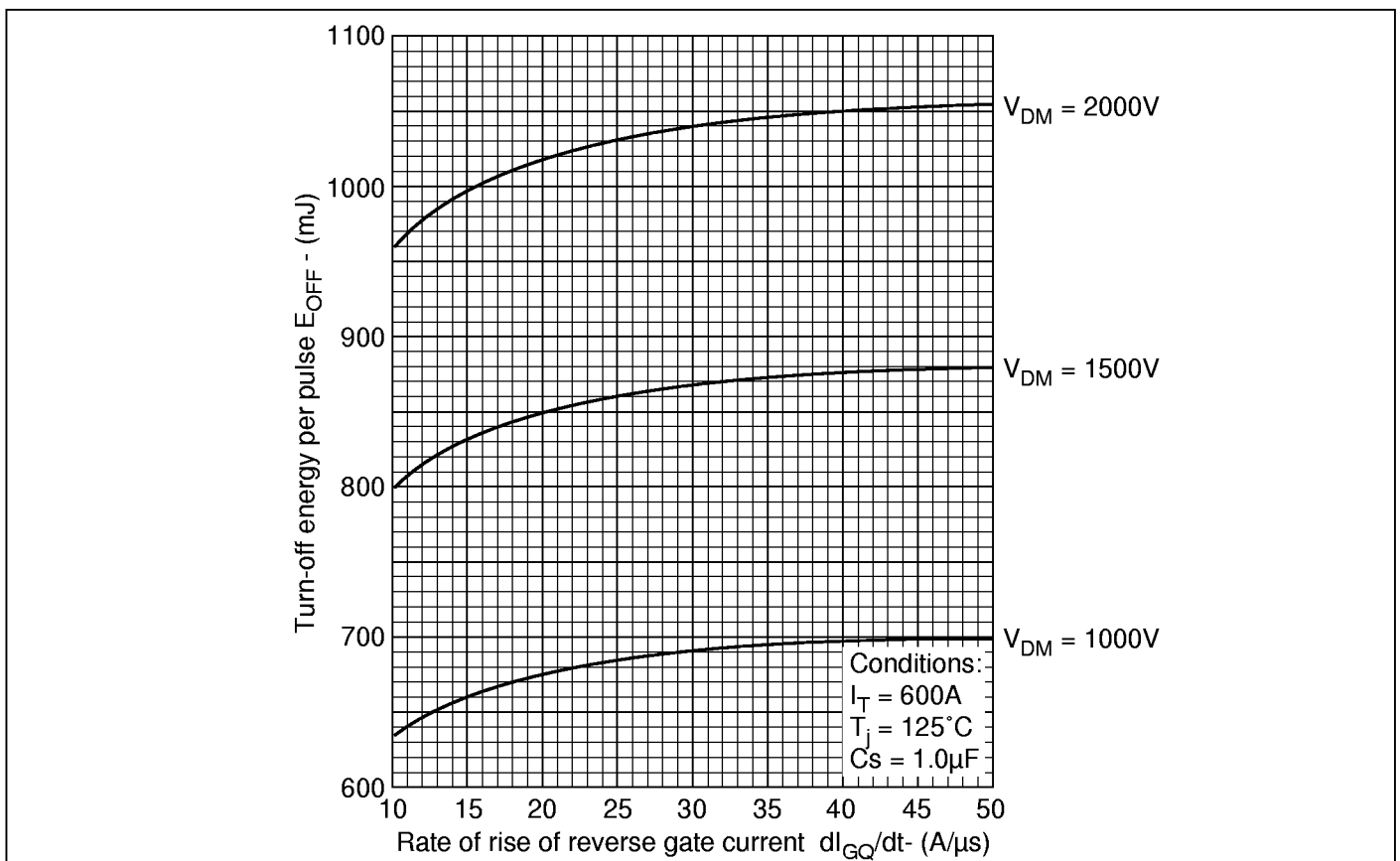


Fig.18 Turn-off energy loss vs rate of rise of reverse gate current

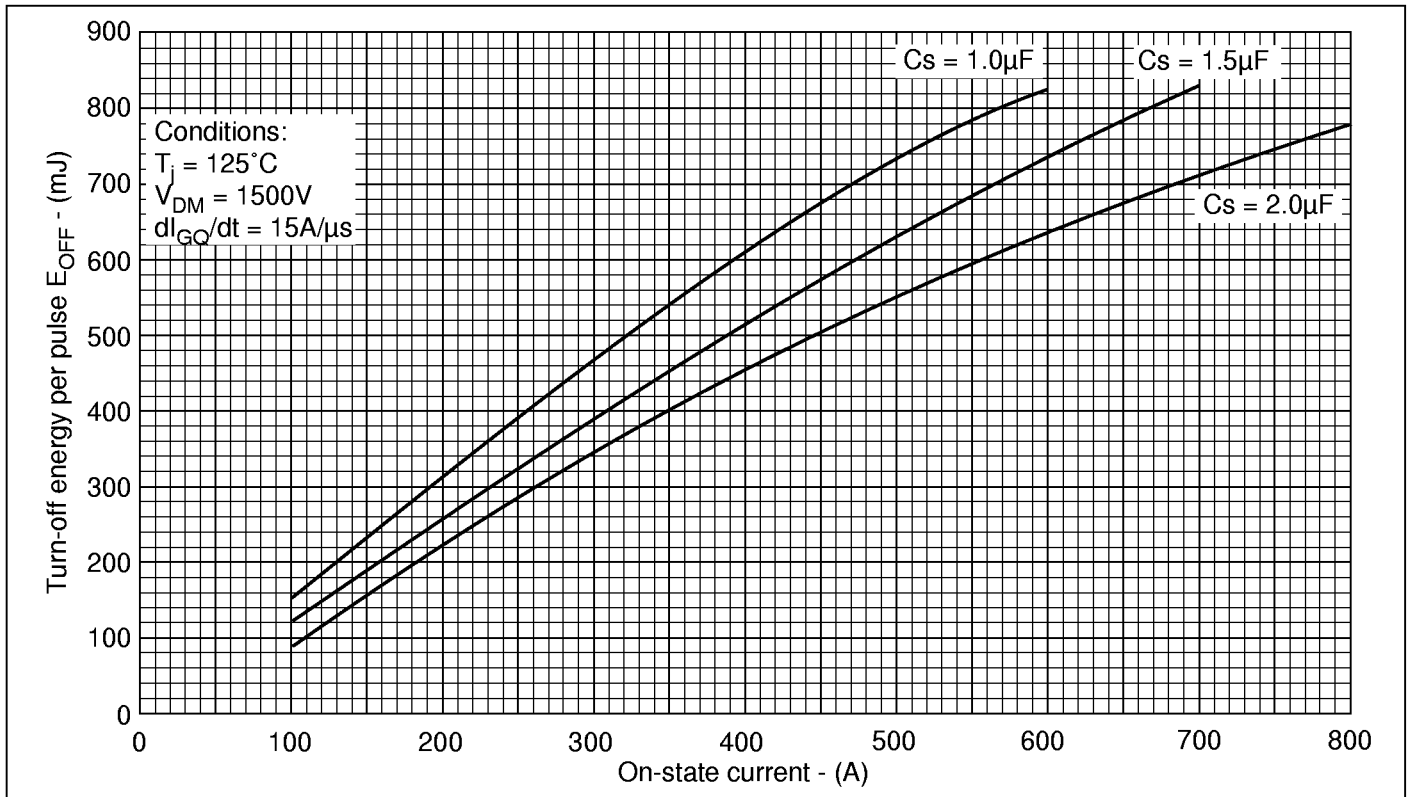


Fig.19 Turn-off energy vs on-state current

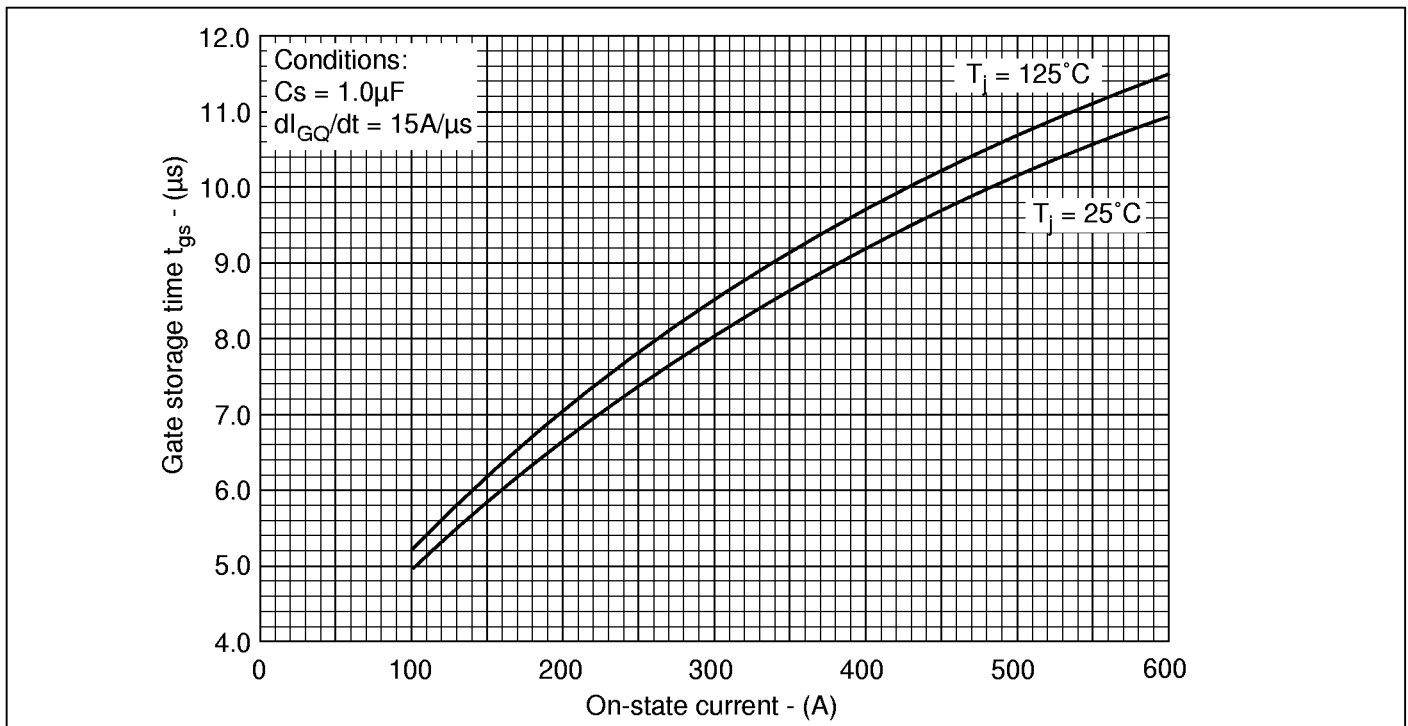


Fig.20 Gate storage time vs on-state current

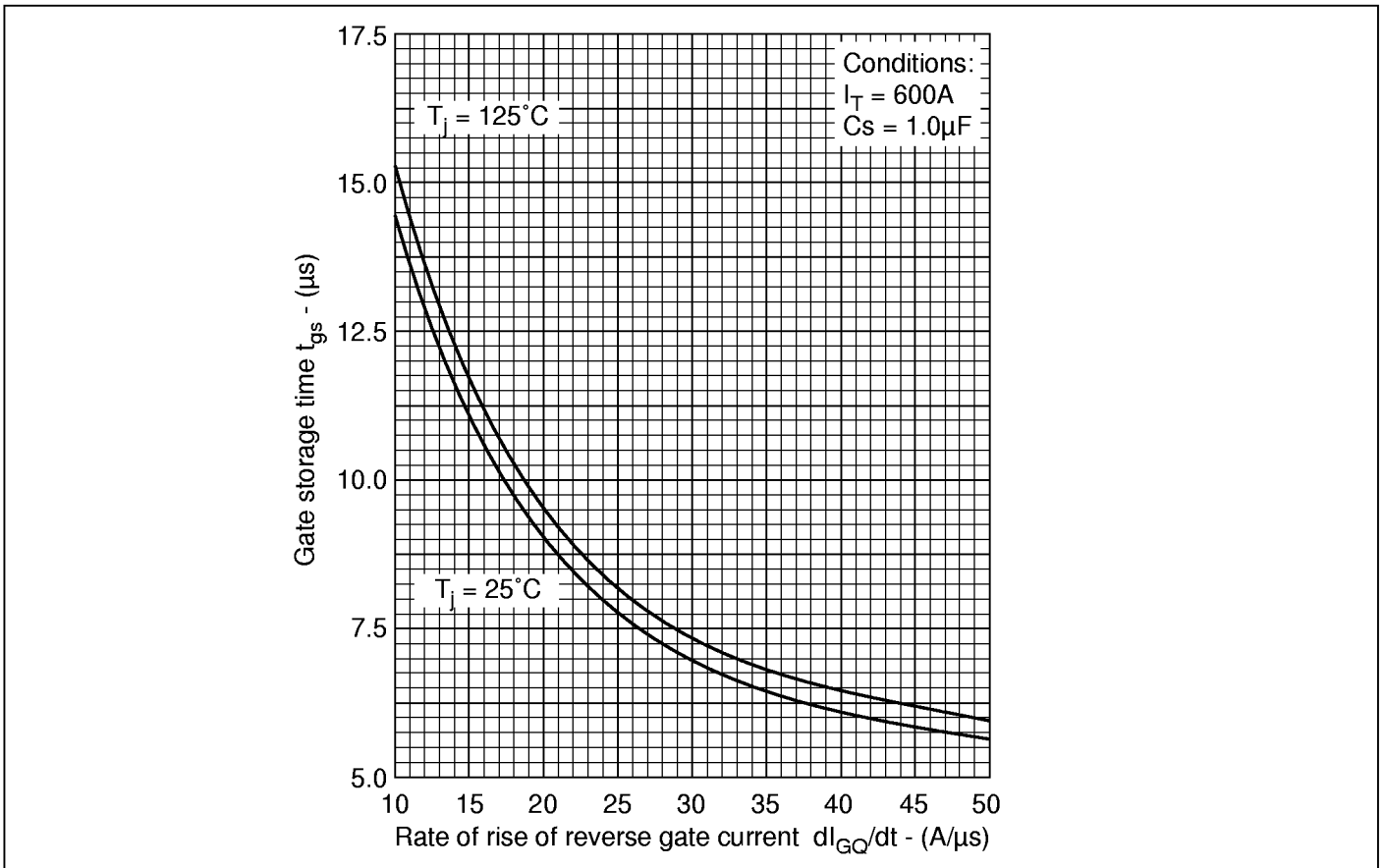


Fig.21 Gate storage time vs rate of rise of reverse gate current

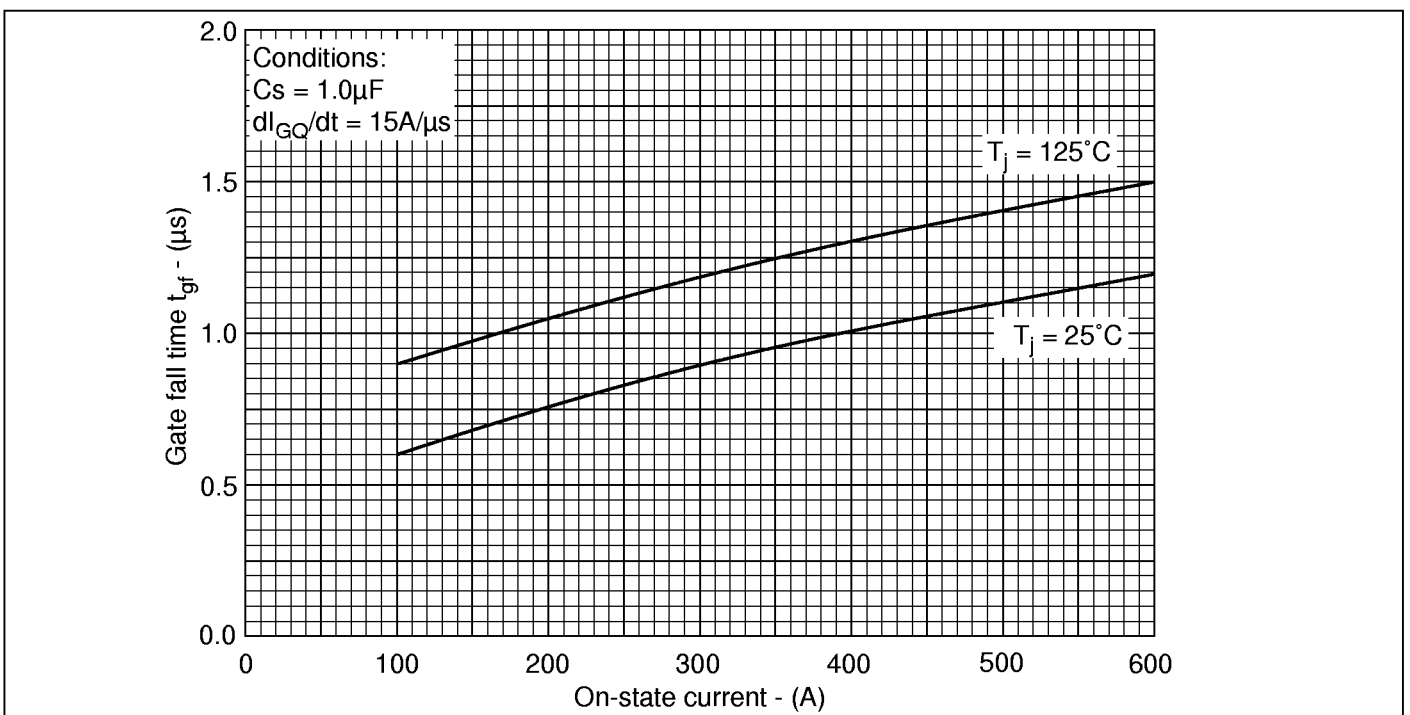


Fig.22 Gate fall time vs on-state current

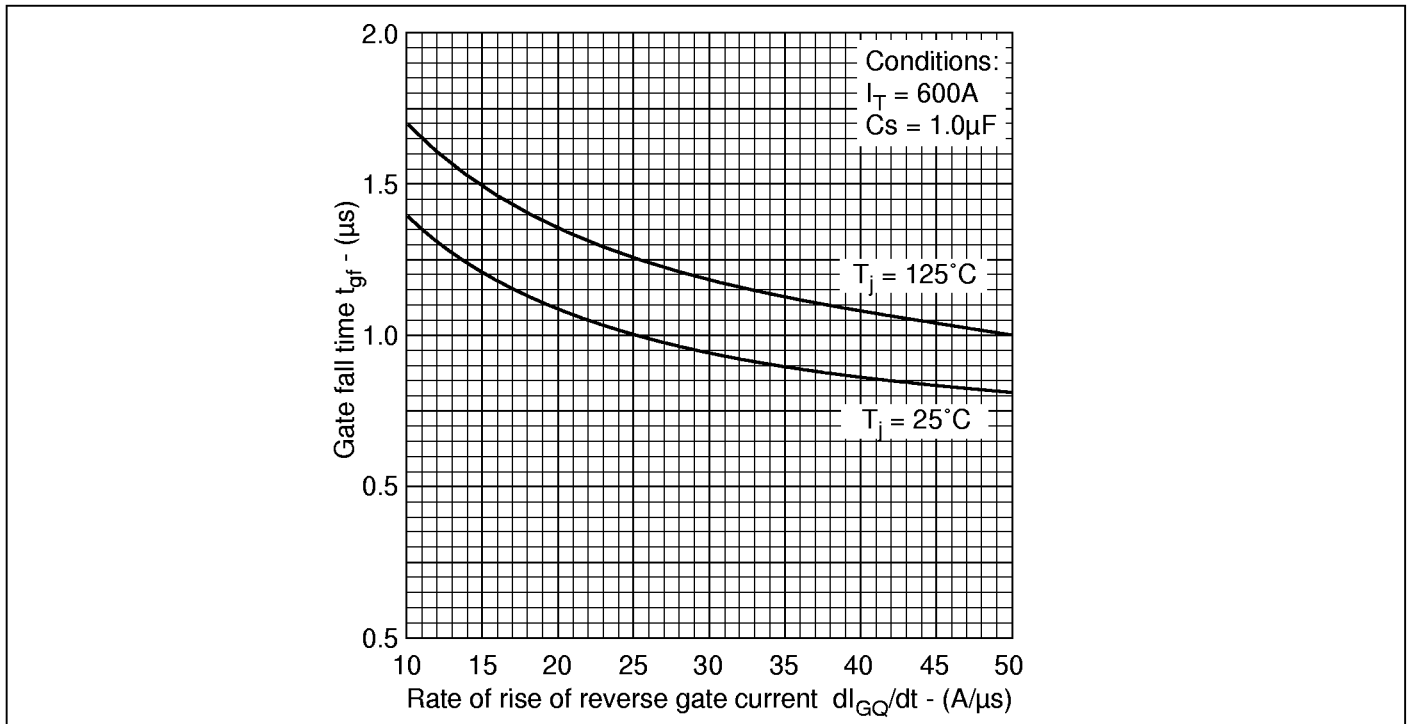


Fig.23 Gate fall time vs rate of rise of reverse gate current

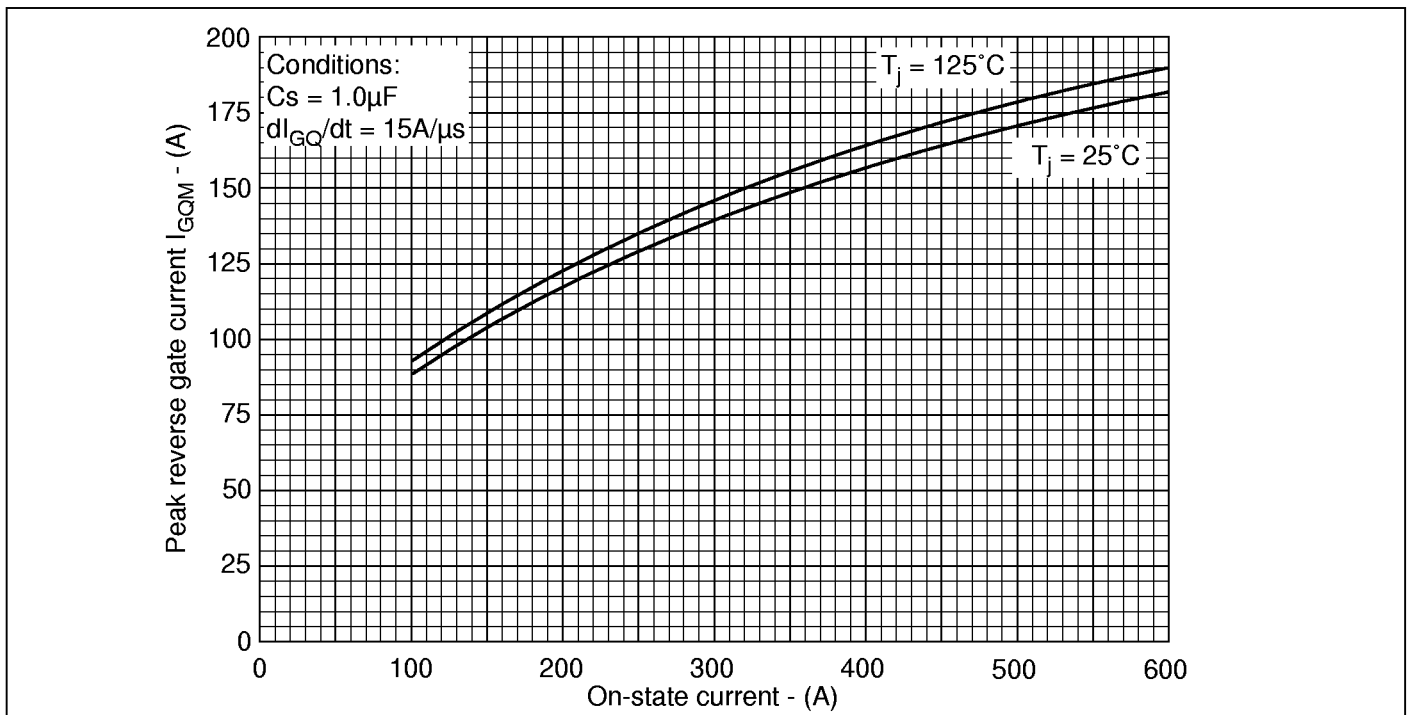


Fig.24 Peak reverse gate current vs on-state voltage

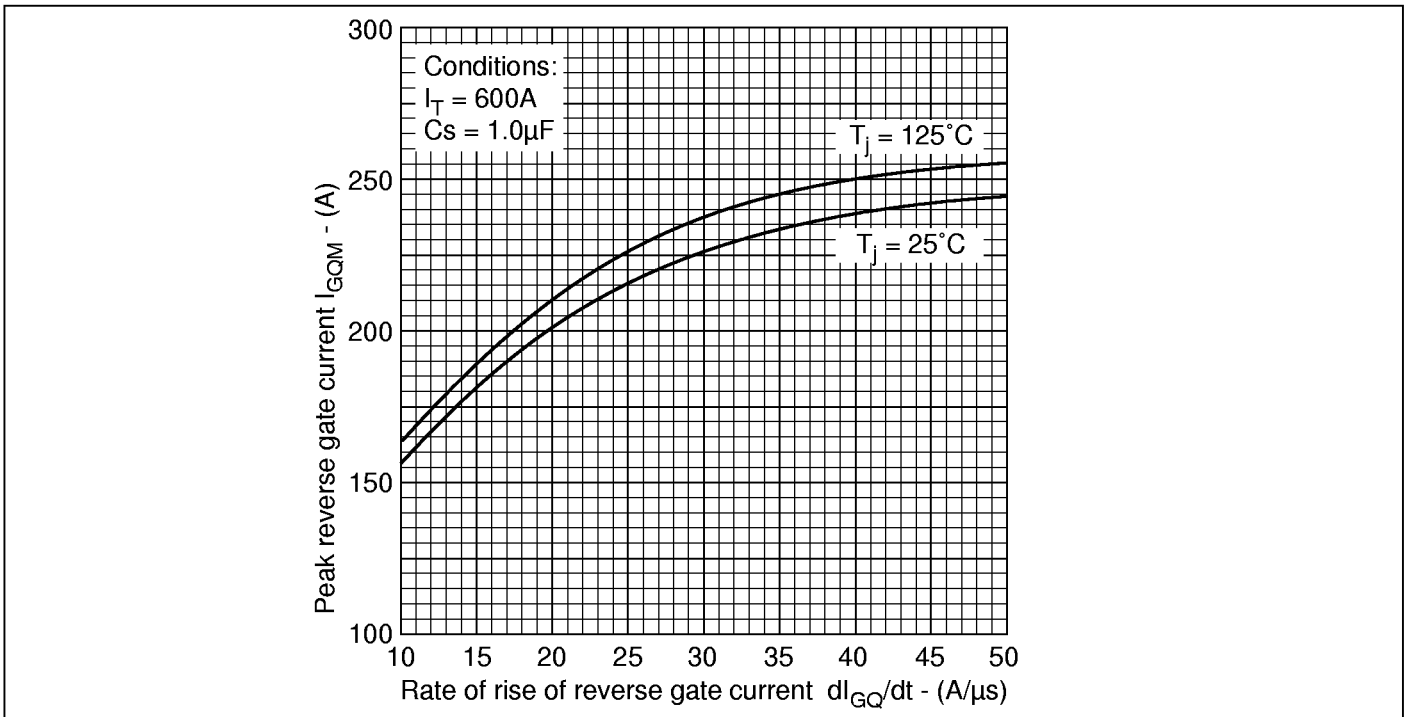


Fig.25 Reverse gate current vs rate of rise of reverse gate current

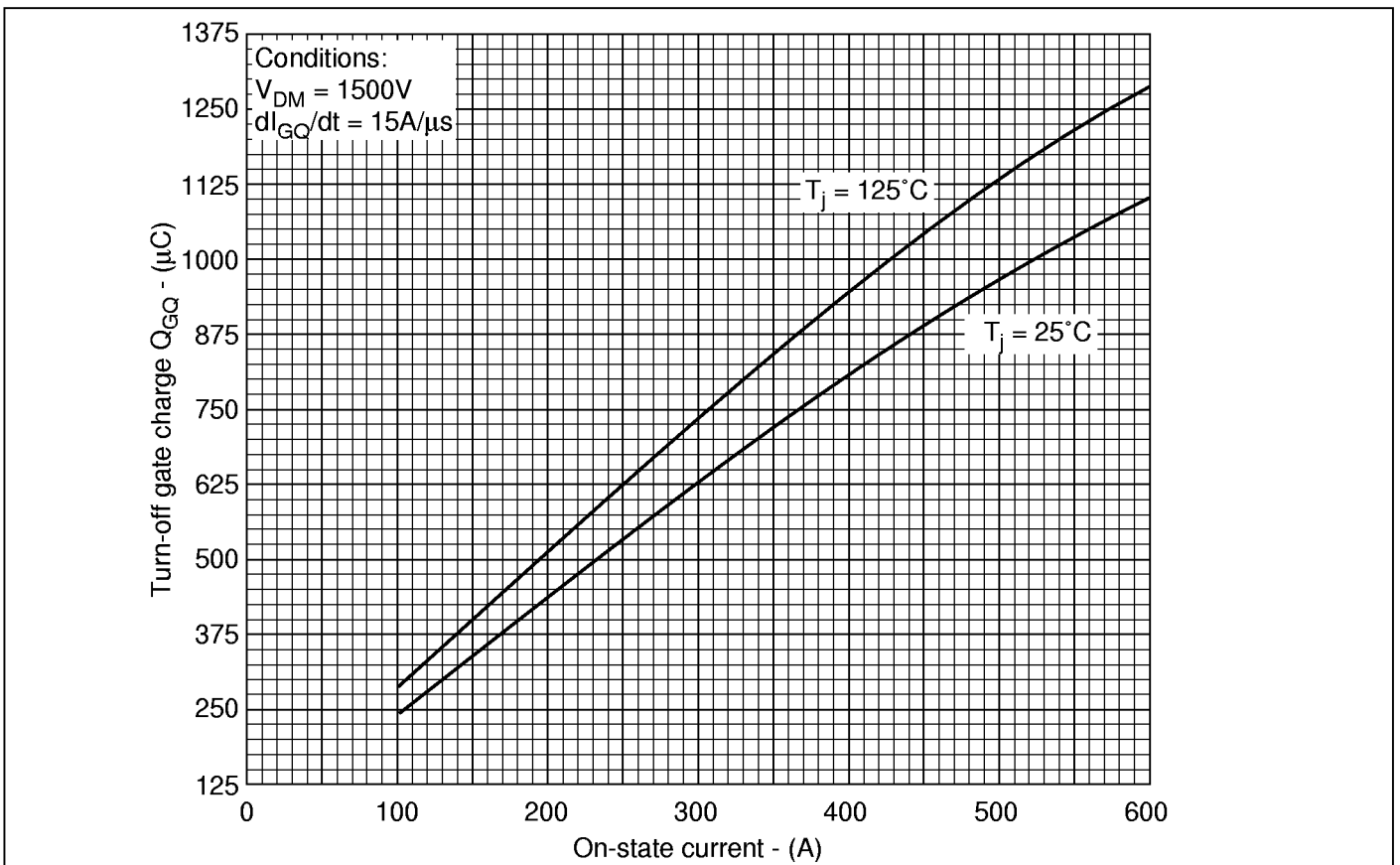


Fig.26 Turn-off gatecharge vs on-state voltage

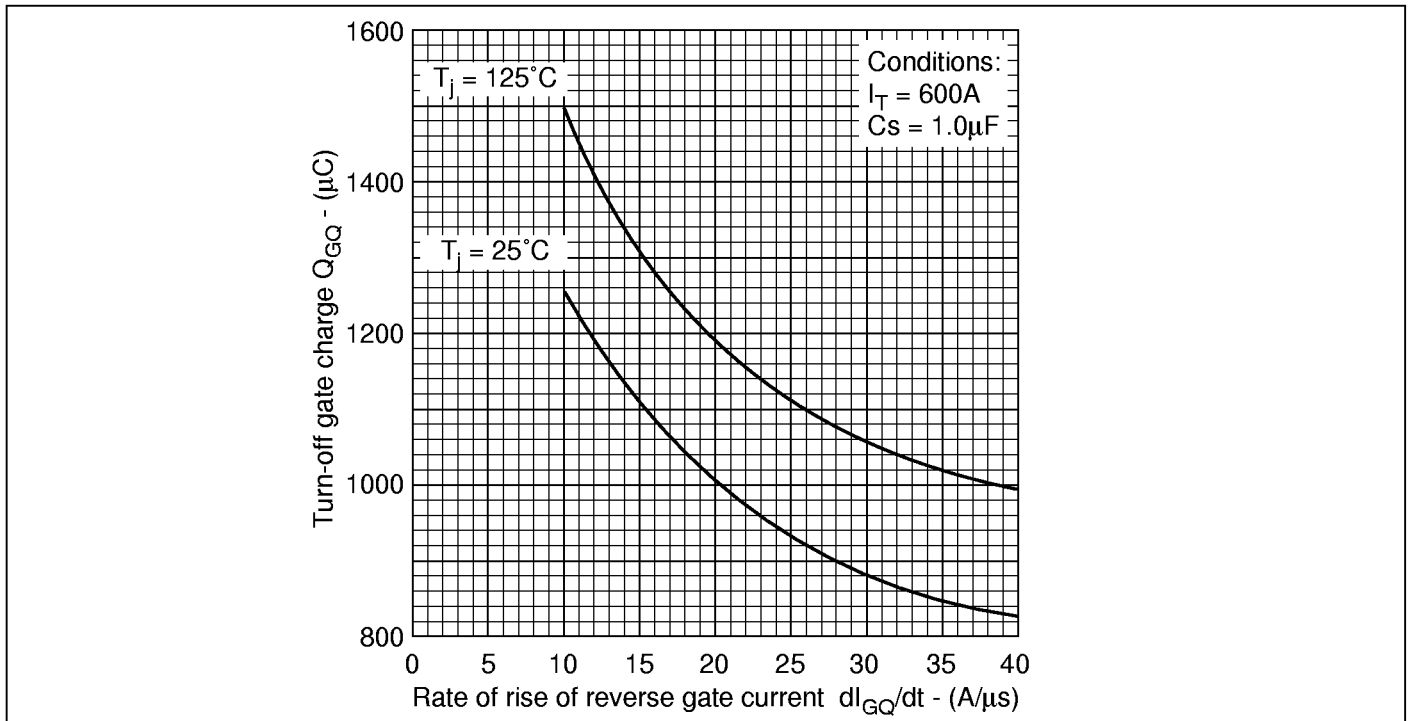


Fig.27 Turn-off gate charge vs rate of rise or reverse gate current

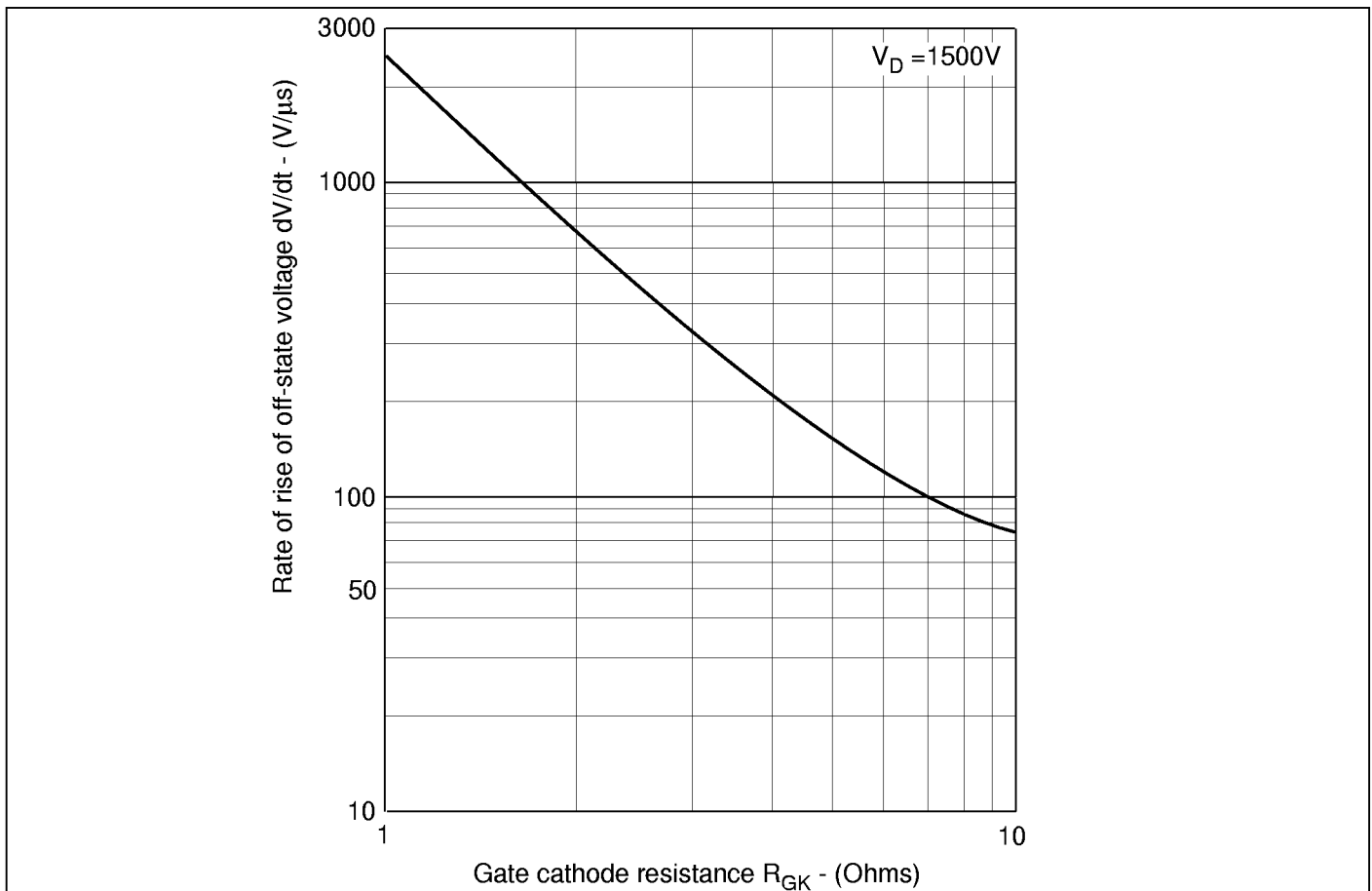
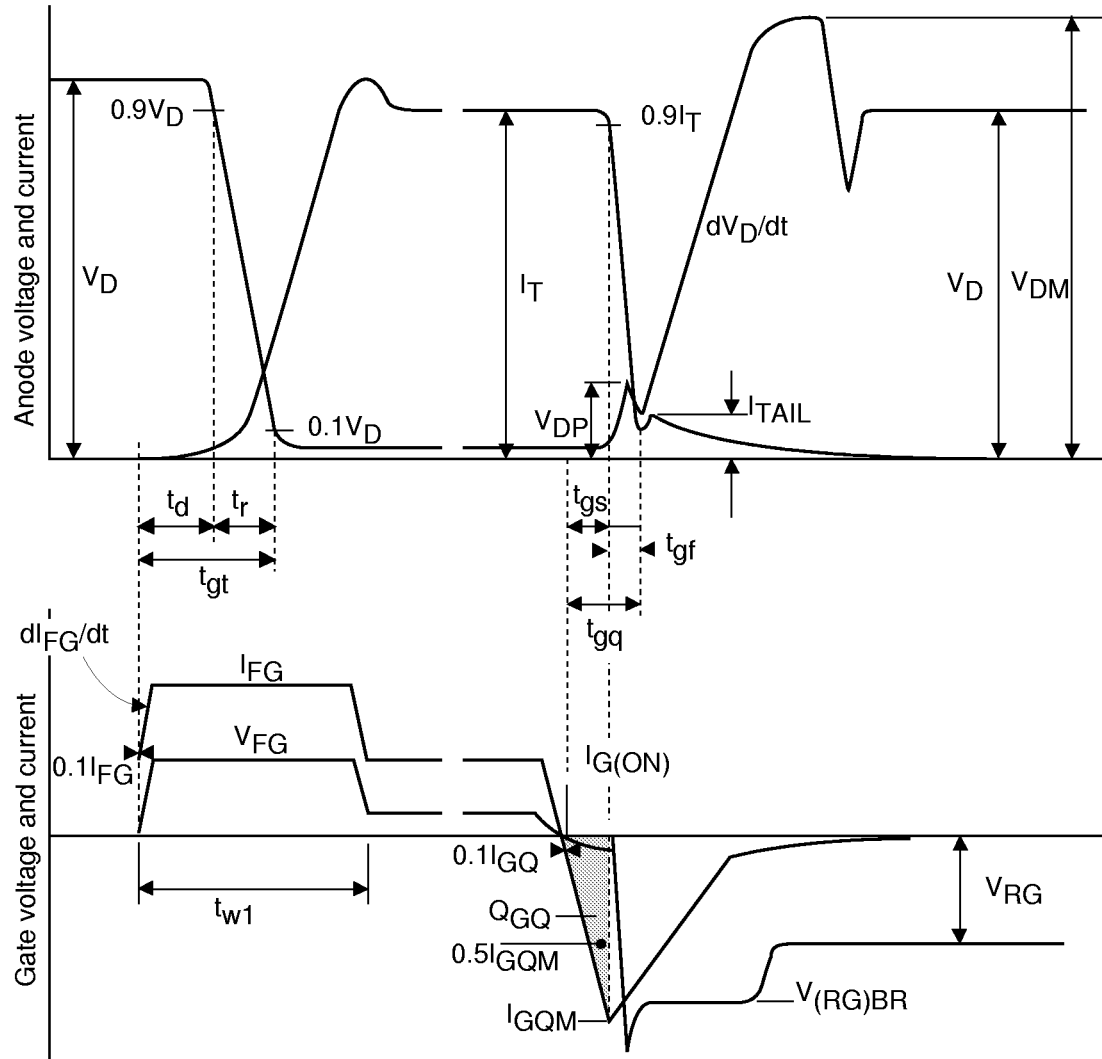


Fig.28 Typical rate of rise of off-state voltage vs gate cathode resistance



Recommended gate conditions:

- $I_{TCM} = 600A$
- $I_{FG} = 20A$
- $I_{G(ON)} = 2A$ d.c.
- $t_{w1(min)} = 10\mu s$
- $I_{GQM} = 190A$
- $di_{GQ}/dt = 15A/\mu s$
- $Q_{GQ} = 1300\mu C$
- $V_{RG(min)} = 2.0V$
- $V_{RG(max)} = 16V$

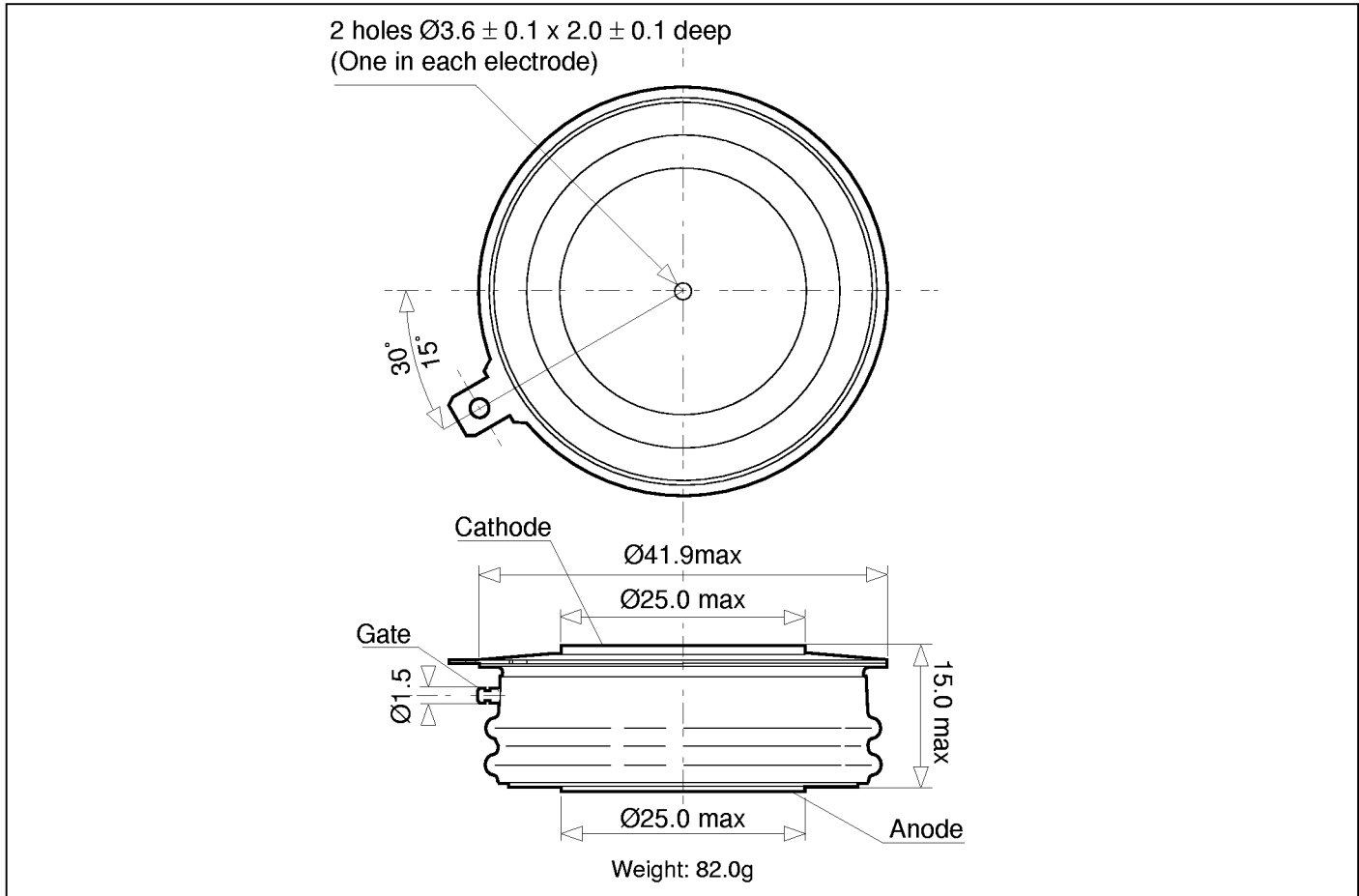
These are recommended Mitel Semiconductor conditions. Other conditions are permitted according to users gate drive specifications.

Fig.29 General switching waveforms

DG306AE25

PACKAGE DETAILS - E

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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