JIANGSU RUNAU ELECTRONICS MANUFACTURING CO.,LTD

CSG07E1400

High-end Power Semiconductor Manufacturer

Gate Turn-off Thyristor

APPLICATION

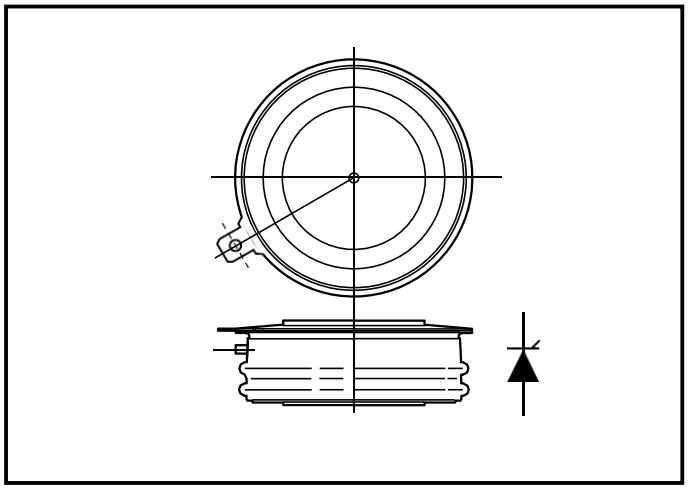
- Variable Speed AC Motor Drive Inverter (VSD-AC)
- UPS
- High Voltage Converter
- Chopper
- Welder
- Induction Heating
- DC / DC Converter

KEY PARAMETERS

I_{TCM}	700A
V_{DRM}	1400V
$I_{T(AV)}$	250A
dV_D/dt	500V/μs
di_T/dt	500A/μs

FEATURES

- Double Sides Cooled
- High Reliability
- High Voltage Capability
- Fast Fuse Protection Not Required
- High Surge Current Capacity
- Excellent Turn-off performance
- Reduce Equipment Size and Weight, Low noise



Outline type code: E.
See Package Details for further information.

VOLTAGE RATINGS

Mode	Repetitive Peak Off-state Voltage V_{DRM}	Repetitive Peak Reverse Voltage V_{RRM}	Test Conditions
CSG07E1400	1400 V	100 V	T_{vj} = 125℃, I_{DM} = 50mA, I_{RRM} = 50mA, V_{RG} = 2V

CURRENT RATINGS

Symbol	Parameter	Test Conditions	Max.	Unit
I_{TCM}	Repetitive peak controllable on-state current	V_D = 60%V_{DRM}, T_j = 125℃, di_{GQ}/dt = 15A/μs, Cs = 2.0μF	700	A
$I_{T(AV)}$	Mean on-state current	T_{HS} = 80℃. Double side cooled. Half sine 50Hz.	250	A
$I_{T(RMS)}$	RMS on-state current	T_{HS} = 80℃. Double side cooled. Half sine 50Hz.	390	A

SURGE RATINGS

Symbol	Parameter	Test Conditions	Max.	Unit
I_{TSM}	Surge (non-repetitive) on-state current	10ms half sine. T_j = 125°C	4.0	kA
I^2t	I^2t for fusing	10ms half sine. T_j=125°C	80000	A^2s
di_T/dt	Critical rate of rise of on-state current	V_D = 60% V_{DRM}, I_T = 700A, T_j = 125°C, I_{FG} > 20A, Rise time < 1.0μs	500	A/μs
dV_D/dt	Rate of rise of off-state voltage	To 80% V_{DRM}; $R_{GK} \leq 1.5\Omega$, T_j = 125°C	500	V/μs

GATE RATINGS

Symbol	Parameter	Test Conditions	Min.	Max.	Unit
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	A/μs
$t_{ON(min)}$	Minimum permissable on time		20	-	μs
$t_{OFF(min)}$	Minimum permissable off time		40	-	μs

THERMAL AND MECHANICAL RATINGS

Symbol	Parameter	Test Conditions		Min.	Max.	Unit
$R_{th(j-hs)}$	DC thermal resistance - junction to heatsink surface	Double side cooled		-	0.075	°C/W
		Anode side cooled		-	0.12	°C/W
		Cathode side cooled		-	0.20	°C/W
$R_{th(c-hs)}$	Contact thermal resistance	Clamping force 5.5kN With mounting compound	per contact	-	0.018	°C/W
T_{vj}	Virtual junction temperature			-	125	°C
T_{OP}/T_{stg}	Operating junction/storage temperature range			-40	125	°C
-	Clamping force			5.0	6.0	kN

GTO CHARACTERISTICS

T_j = 125℃ unless stated otherwise

Symbol	Parameters	Test Conditions	Min.	Max.	Unit
V_{TM}	On-state voltage	At 600A peak, $I_{G(ON)}$ = 2A d.c.	-	2.2	V
I_{DM}	Peak off-state current	At = V_{DRM}, V_{RG} = 2V	-	25	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	-	0.9	V
I_{GT}	Gate trigger current	V_D = 24V, I_T = 100A, T_j = 25°C	-	1.0	A
I_{RGM}	Reverse gate cathode current	V_{RGM} = 16V, No gate/cathode resistor	-	50	mA
E_{ON}	Turn-on energy	V_D = 900V, I_T = 600A, dI_T/dt = 300A/μs I_{FG} = 20A, rise time < 1.0μs R_L = (Residual inductance 3μH)	-	130	mJ
t_d	Delay time		-	1.5	μs
t_r	Rise time		-	3.0	μs
E_{OFF}	Turn-off energy	I_T =600A, V_{DM} = 750V Snubber Cap Cs = 1.5μF, di_{GQ}/dt = 15A/μs R_L = (Residual inductance 3μH)	-	350	mJ
t_{tail}	Tail time		-	10	μs
t_{gs}	Storage time		-	11	μs
t_{gf}	Fall time		-	0.9	μs
t_{gq}	Gate controlled turn-off time		-	11.9	μs
Q_{GQ}	Turn-off gate charge		-	700	μC
Q_{GQT}	Total turn-off gate charge		-	1400	μC

CURVES

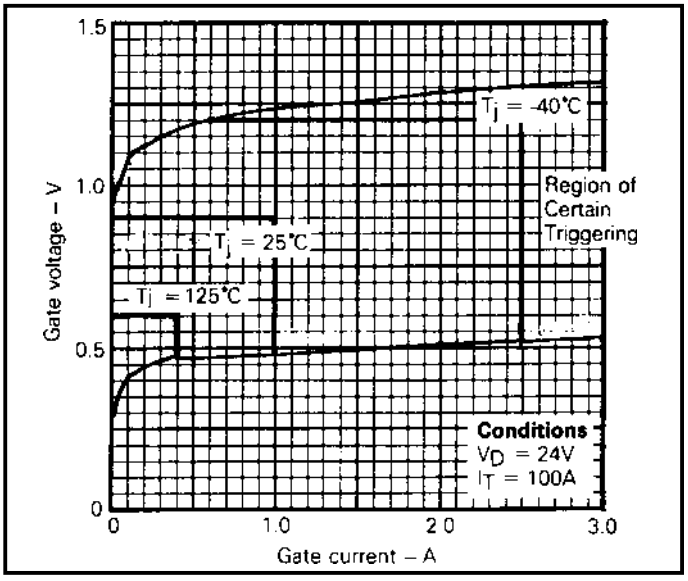


Fig.1 Gate characteristics

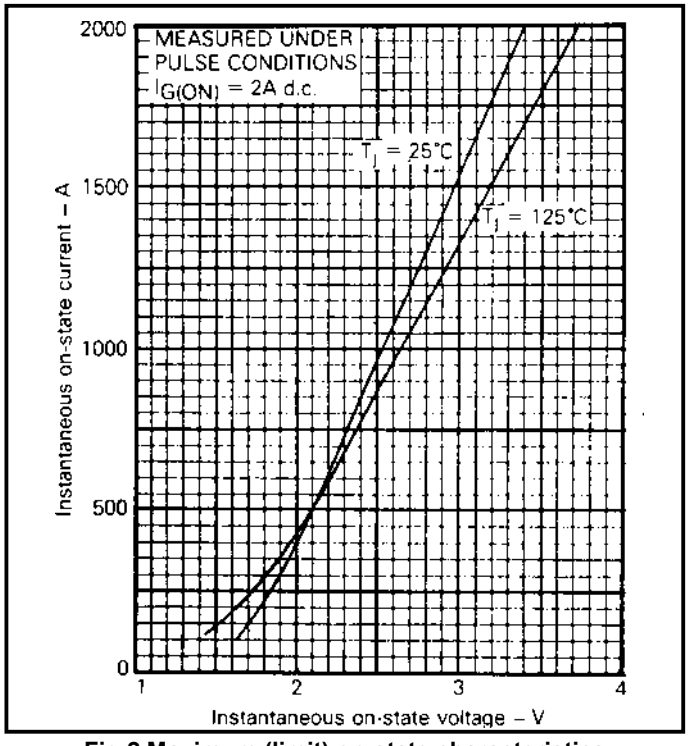


Fig.2 Maximum (limit) on-state characteristics

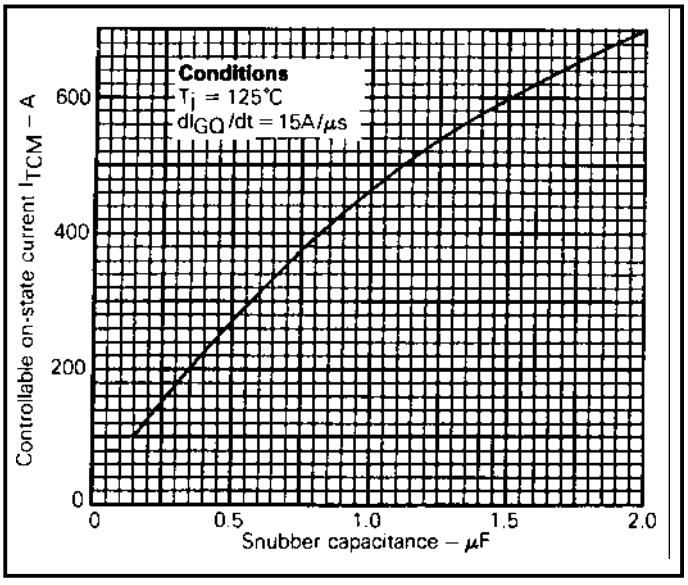


Fig.3 Dependence of I_{TCM} on C_S

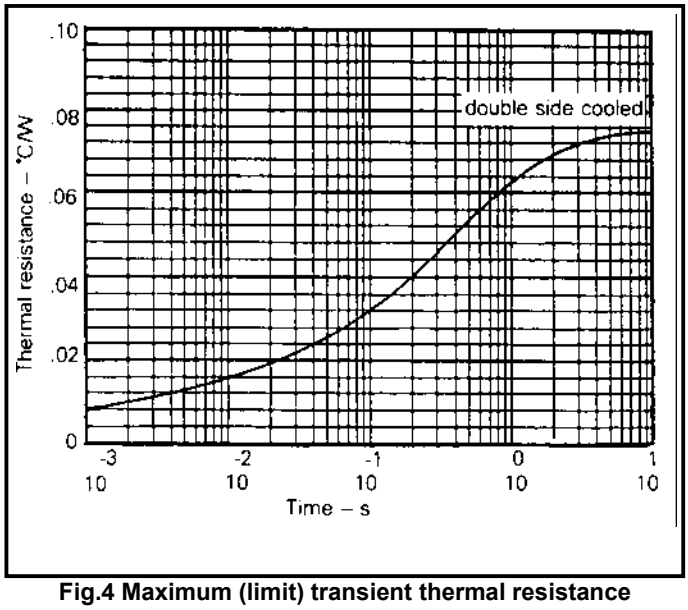


Fig.4 Maximum (limit) transient thermal resistance

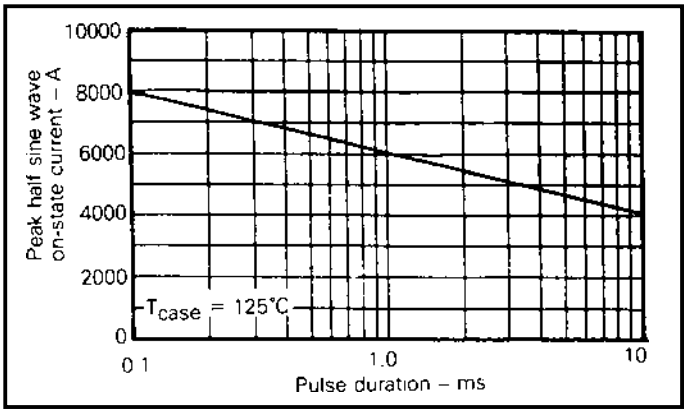


Fig.5 Surge (non-repetitive) on-state current vs time

CURVES

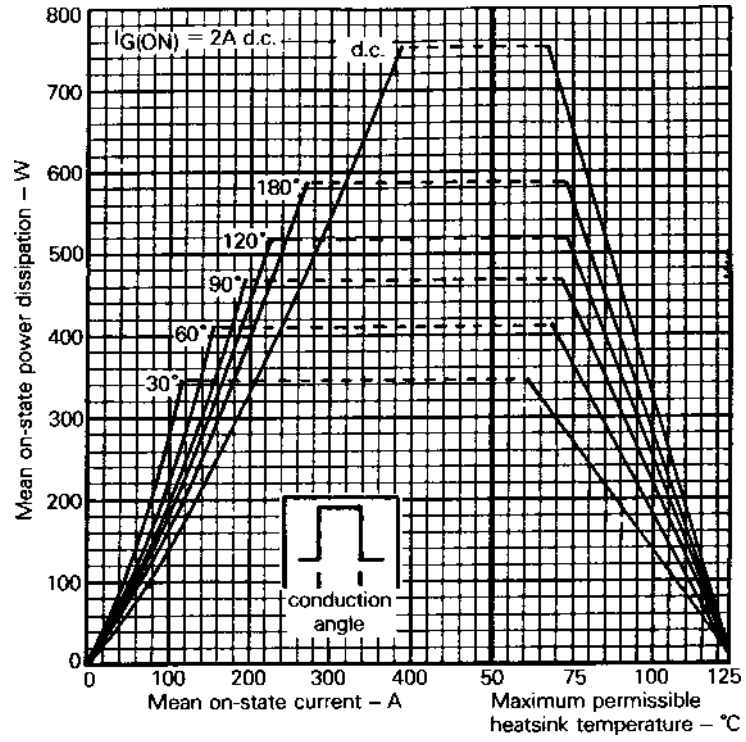


Fig.6 Steady state rectangulerwave conduction loss - double side cooled

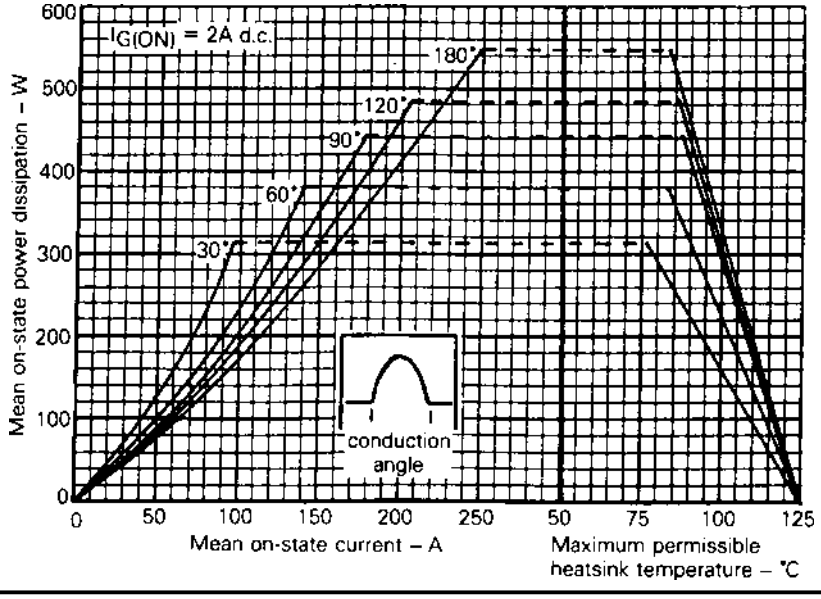


Fig.7 Steady state sinusoidal wave conduction loss - double side cooled

CURVES

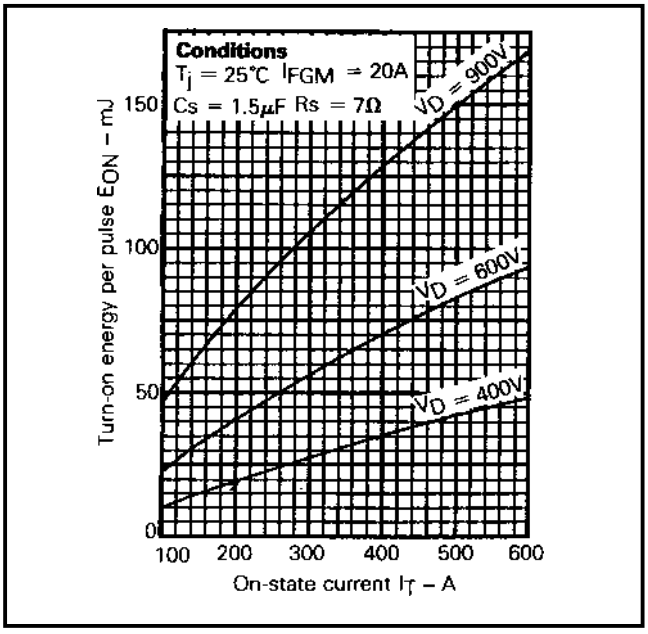


Fig.8 Turn-on energy vs on-state current

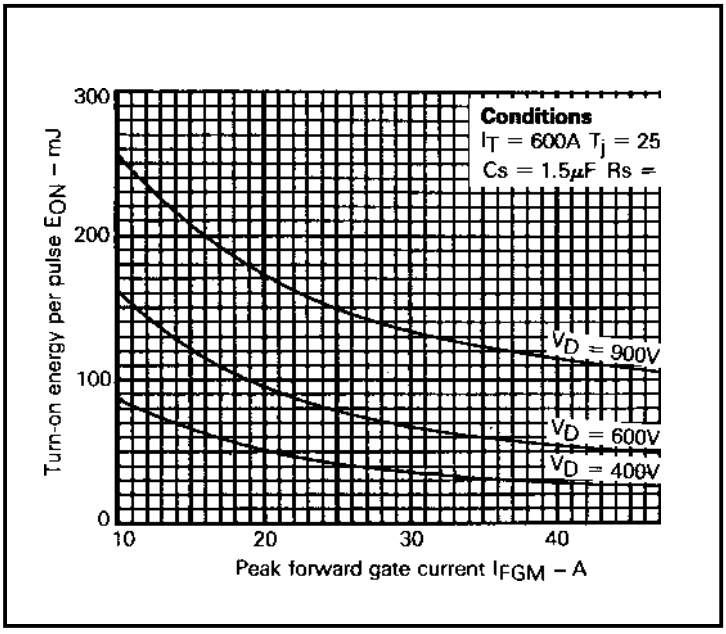


Fig.9 Turn-on energy vs peak forward gate current

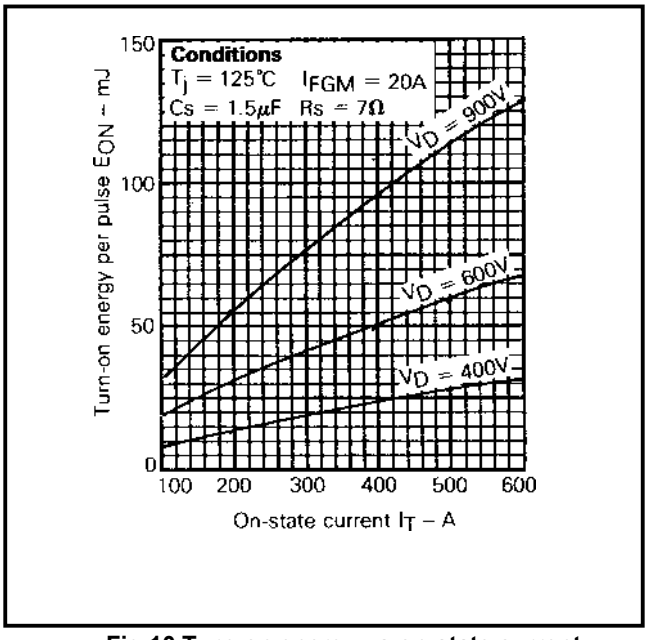


Fig.10 Turn-on energy vs on-state current

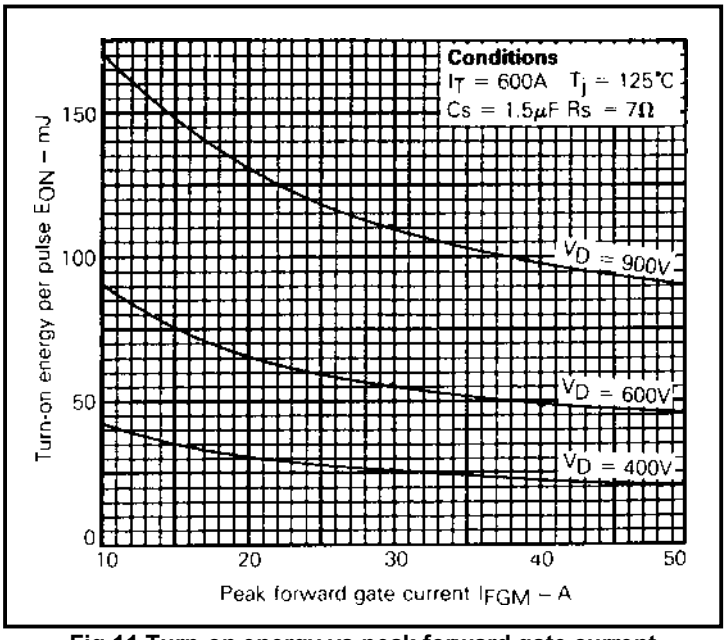


Fig.11 Turn-on energy vs peak forward gate current

CURVES

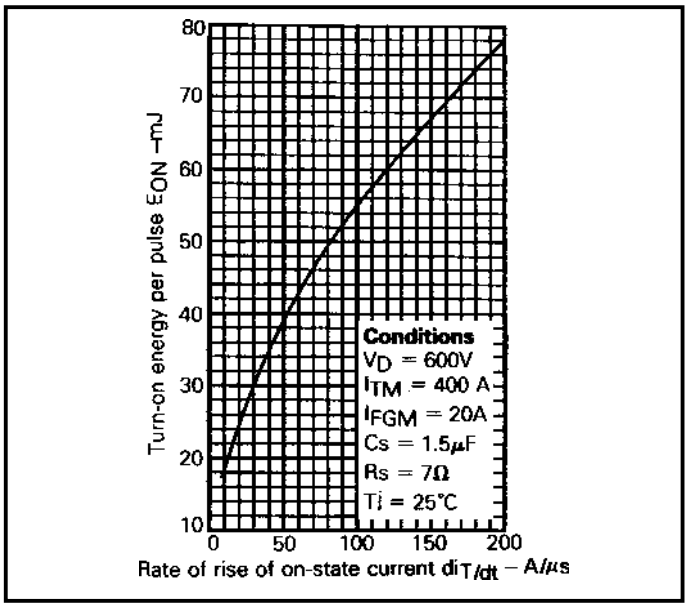


Fig.12 Turn-on energy vs rate of rise of on-state current

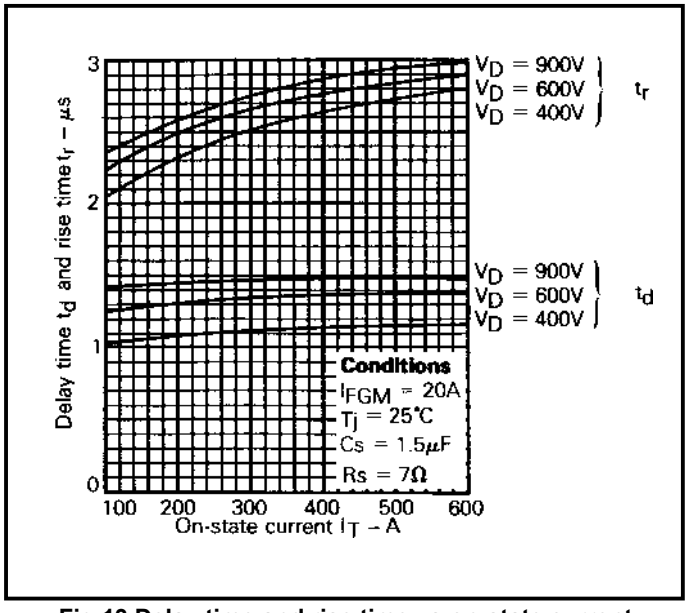


Fig.13 Delay time and rise time vs on-state current

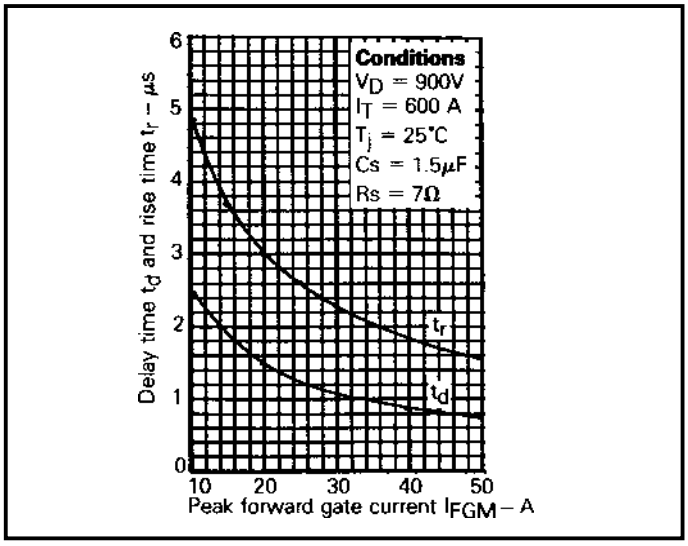


Fig.14 Delay time and rise time vs peak forward gate current

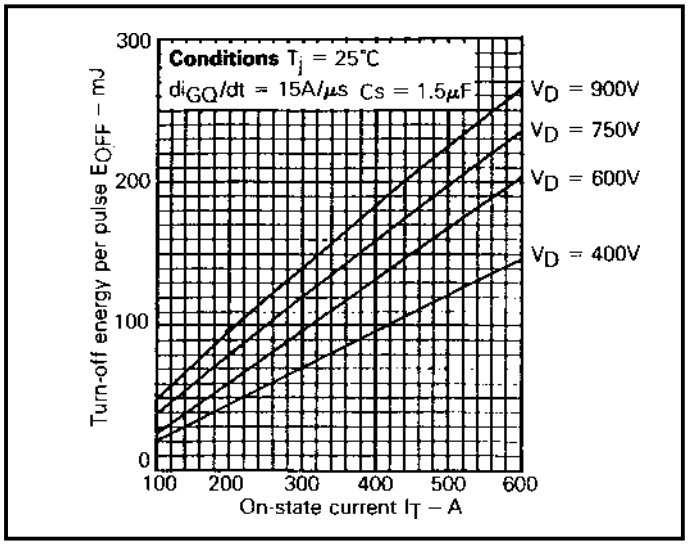


Fig.15 Turn-off energy vs on-state current

CURVES

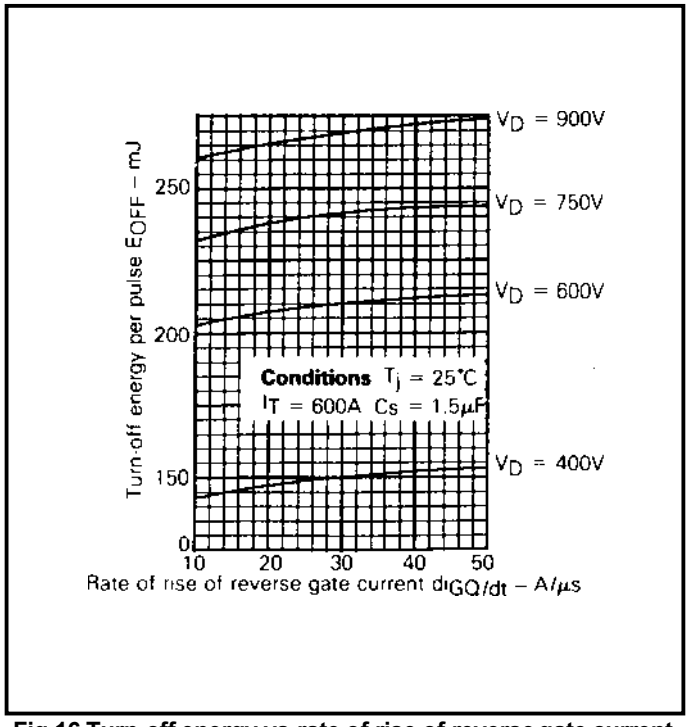


Fig.16 Turn-off energy vs rate of rise of reverse gate current

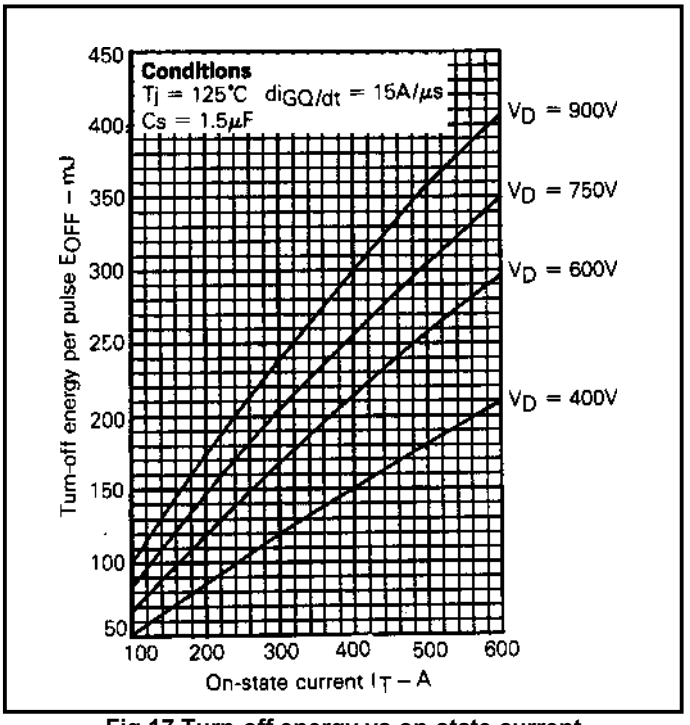


Fig.17 Turn-off energy vs on-state current

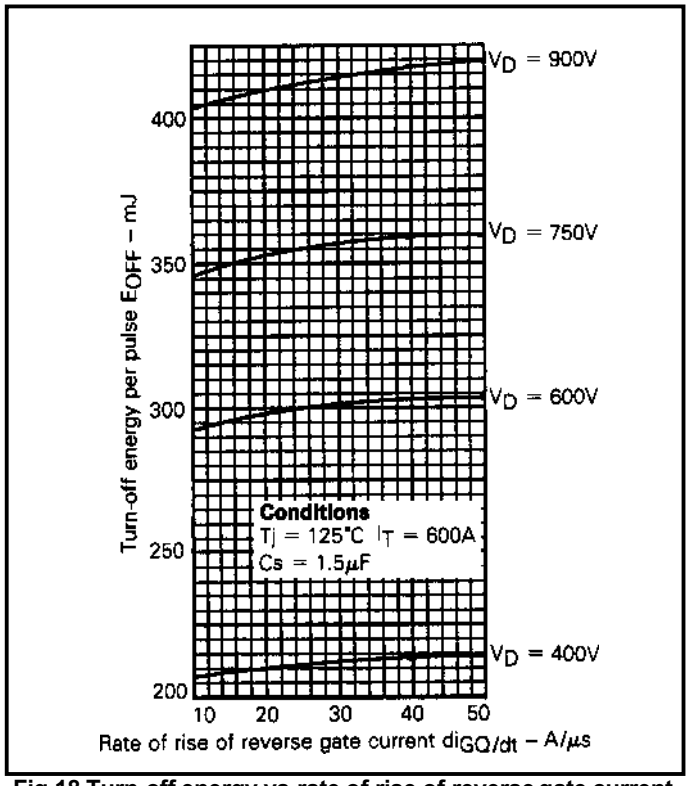


Fig.18 Turn-off energy vs rate of rise of reverse gate current

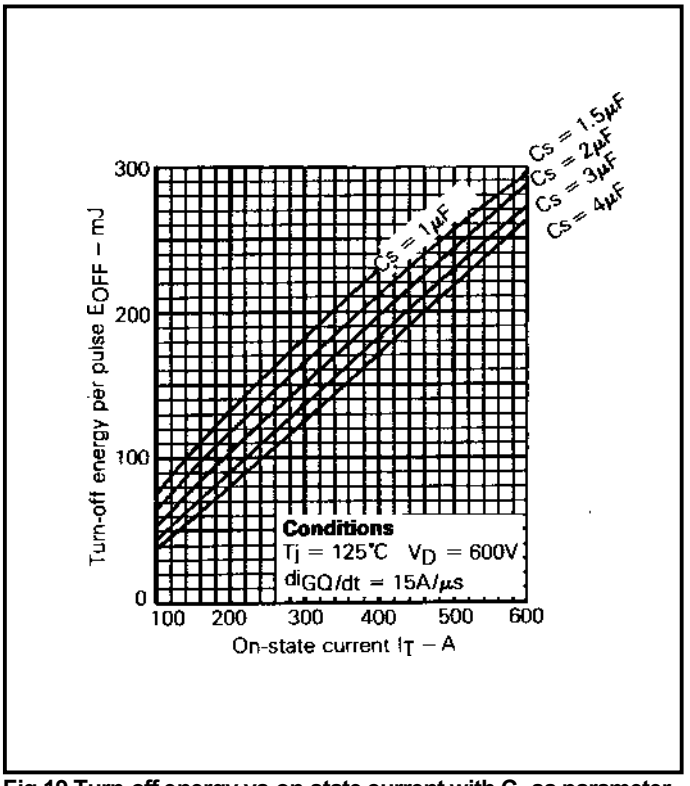


Fig.19 Turn-off energy vs on-state current with C_S as parameter

CURVES

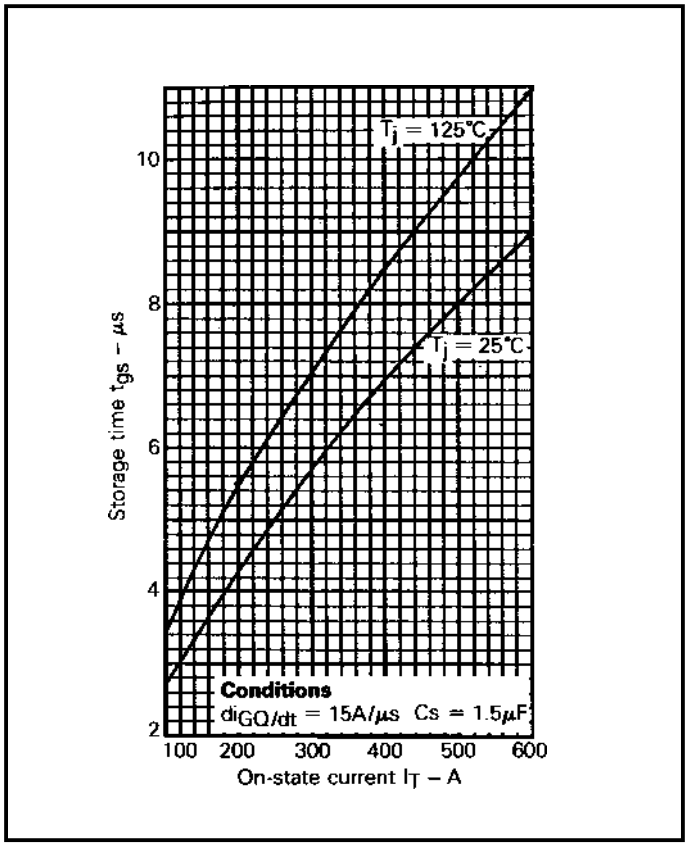


Fig.20 Storage time vs on-state current

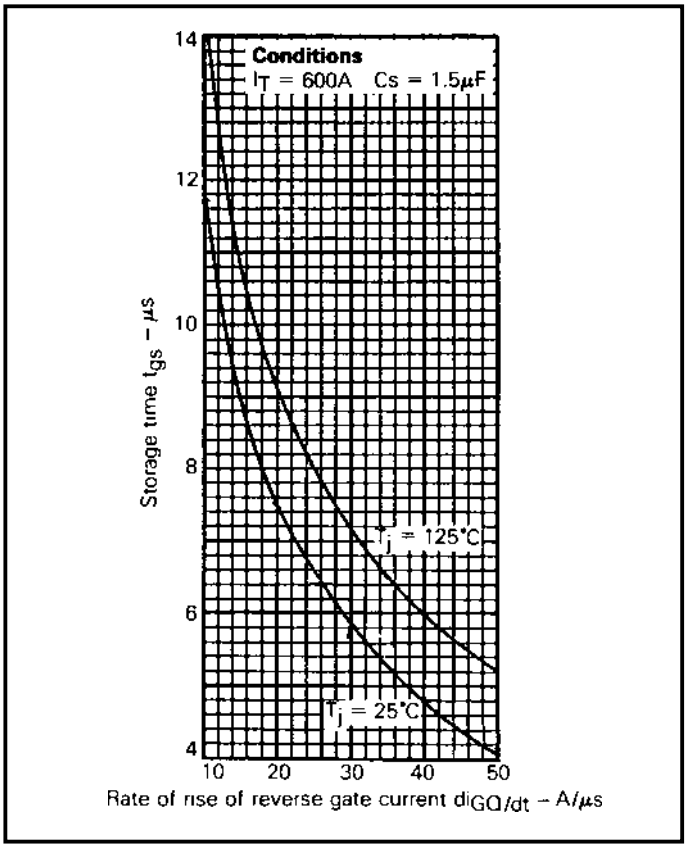


Fig.21 Storage time vs rate of rise of reverse gate current

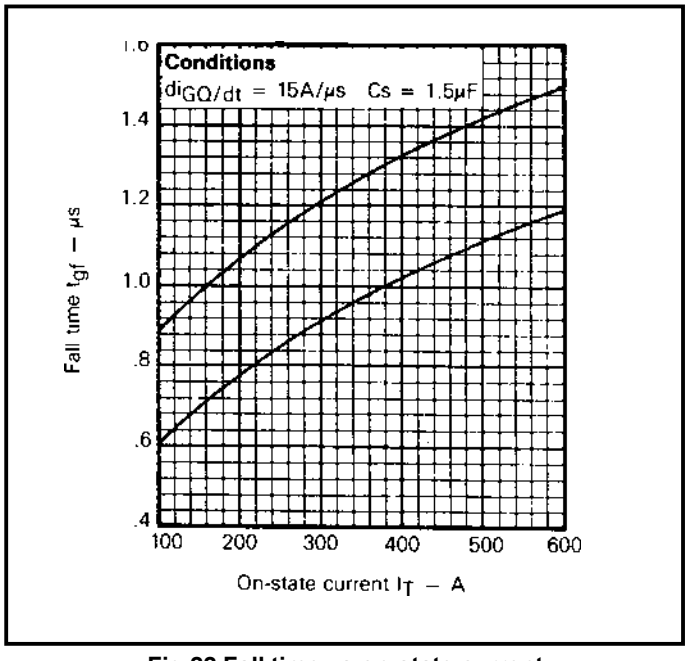


Fig.22 Fall time vs on-state current

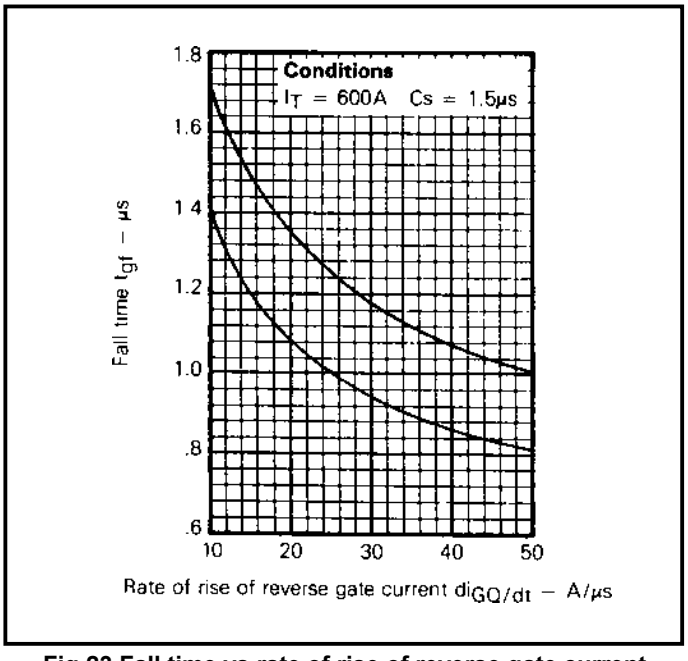


Fig.23 Fall time vs rate of rise of reverse gate current

CURVES

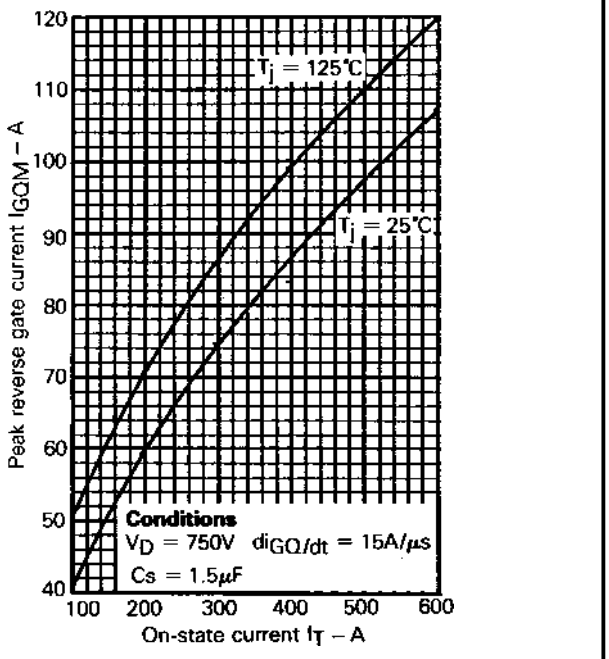


Fig.24 Peak reverse gate current vs on-state current

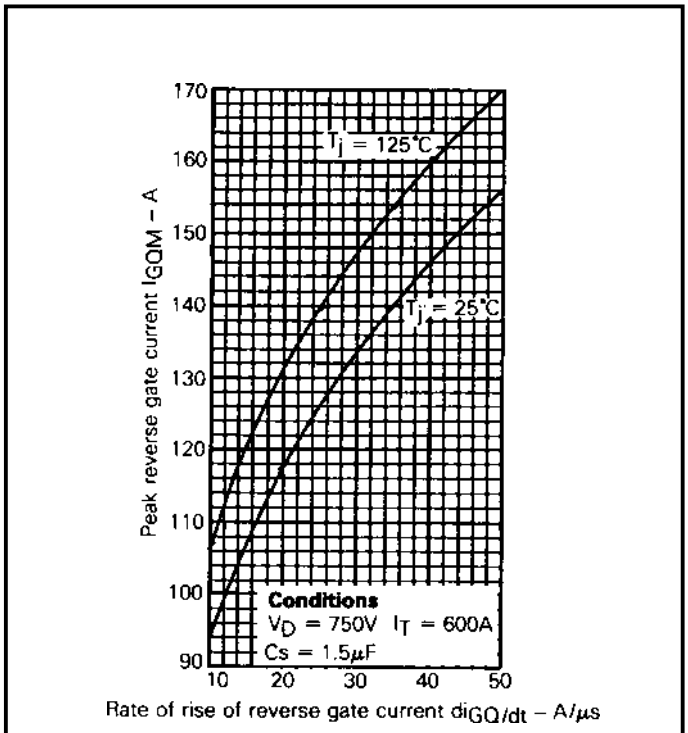


Fig.25 Peak reverse gate current vs rate of rise of reverse gate current

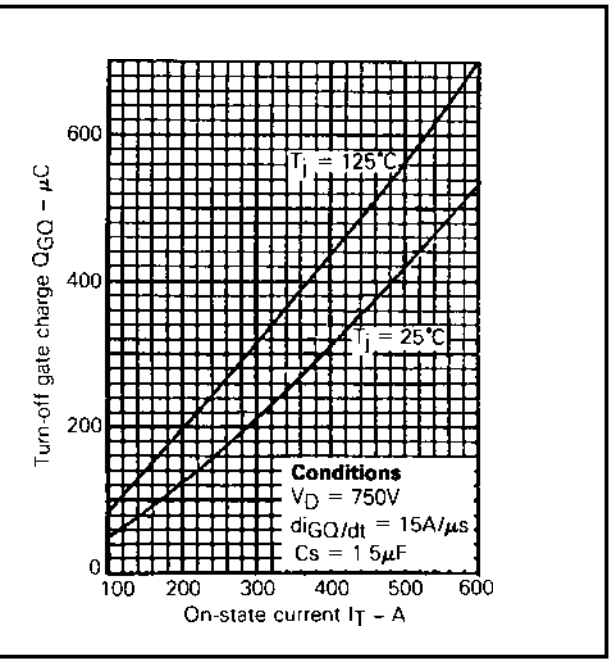


Fig.26 Turn-off gate charge vs on-state current

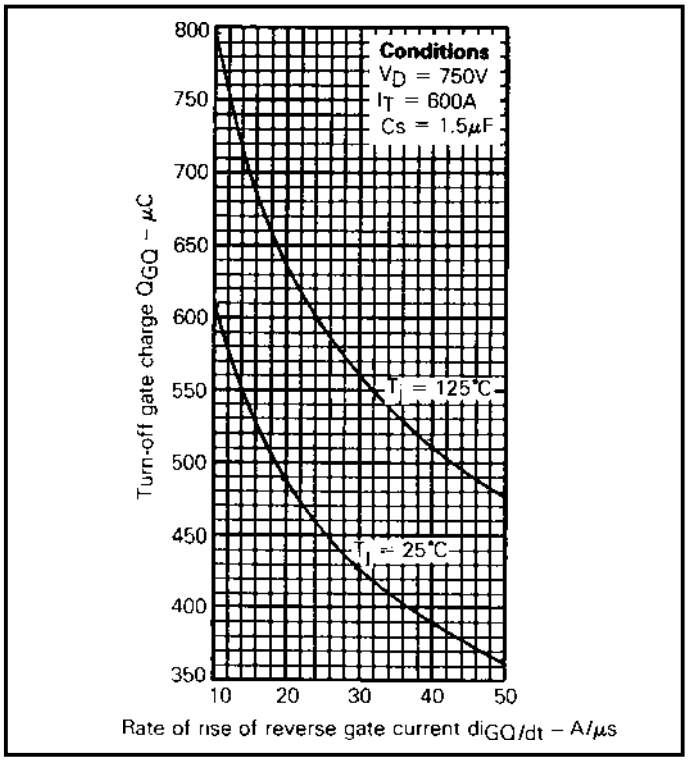


Fig.27 Turn-off gate charge vs rate of rise of reverse gate current

CURVES

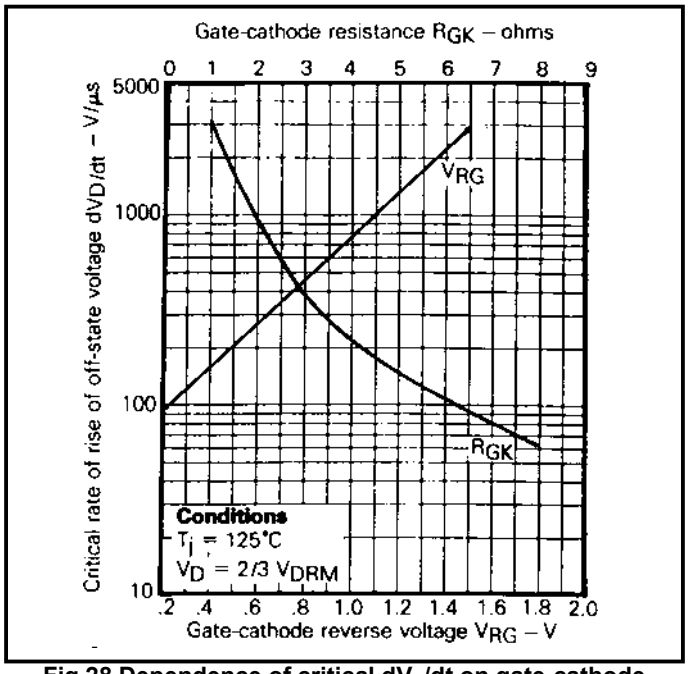


Fig.28 Dependence of critical dV_D/dt on gate-cathode resistance and gate-cathode reverse voltage

Snubber Capacitor Cs (μF)	Snubber Resistor Rs (Ω)	Minimum Reset Time (μs)
2	7	35
	5	30
1.5	7	26
	5	22
1	7	17
	5	15

Table of snubber discharge time variation with snubber capacitor value.

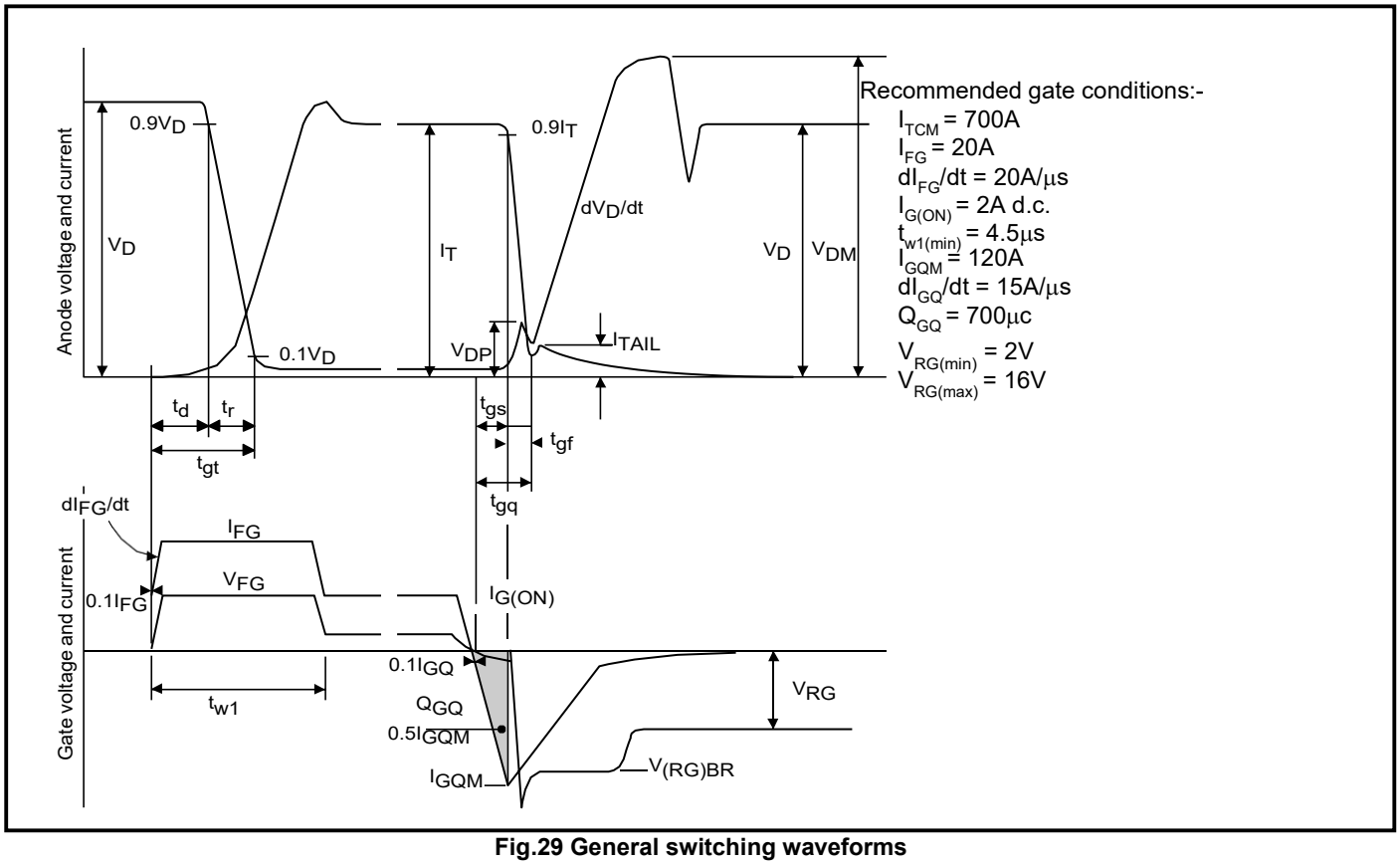
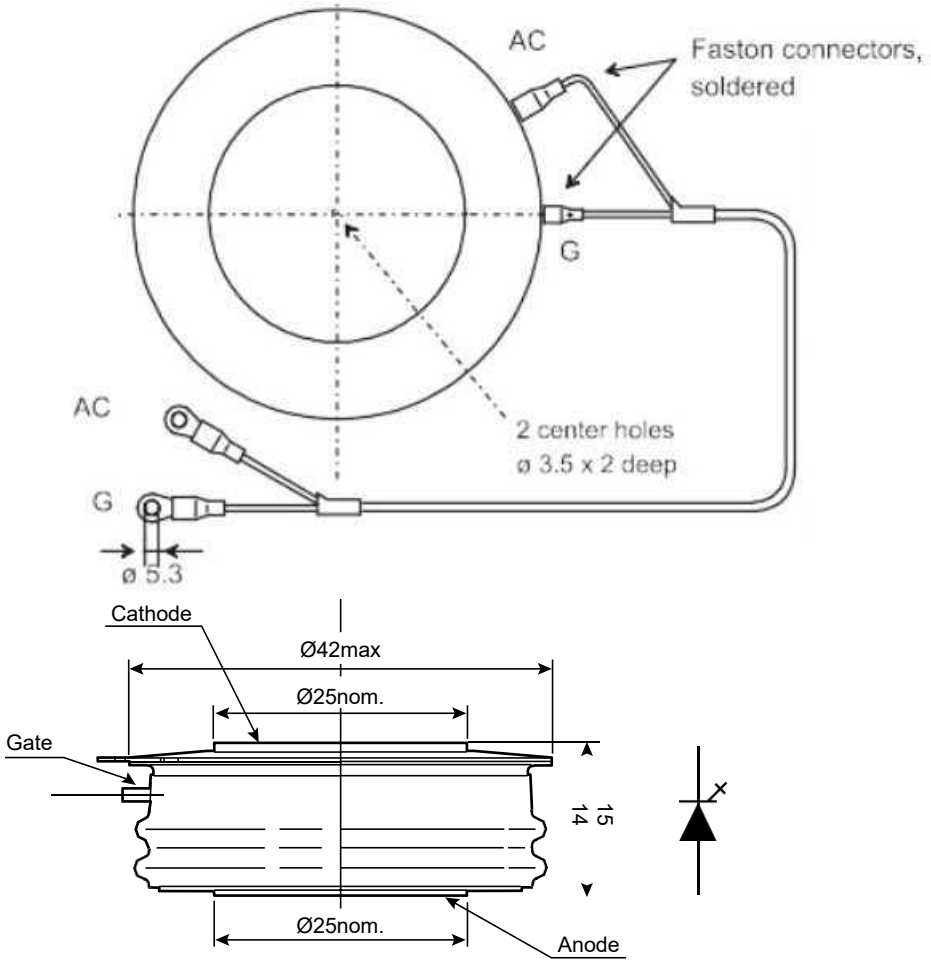


Fig.29 General switching waveforms

OUTLINE AND DIMENSION

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



Nominal weight: 82g
Clamping force: 6kN ±10%
Leads 12AWG cable160mm long

Package outline type code: E