

FEATURES

- Double Side Cooling
- High Surge Capability

APPLICATIONS

- High Power Drives
- High Voltage Power Supplies
- Static Switches

VOLTAGE RATINGS

Part and Ordering Number	Repetitive Peak Voltages V_{DRM} and V_{RRM} V	Conditions
DCR650G34 DCR650G32 DCR650G30 DCR650G28	3400 3200 3000 2800	$T_{vj} = -40^{\circ}\text{C}$ to 125°C , $I_{DRM} = I_{RRM} = 60\text{mA}$, $V_{DRM}, V_{RRM} t_p = 10\text{ms}$, $V_{DSM} \& V_{RSM} =$ $V_{DRM} \& V_{RRM} + 100\text{V}$ respectively

Lower voltage grades available.

ORDERING INFORMATION

When ordering, select the required part number shown in the Voltage Ratings selection table.

For example:

DCR650G34

Note: Please use the complete part number when ordering and quote this number in any future correspondence relating to your order.

KEY PARAMETERS

V_{DRM}	3400 V
$I_{T(AV)}$	650 A
I_{TSM}	8400 A
dV/dt^*	1000 V/μs
dI/dt	150 A/μs

* Higher dV/dt selections available

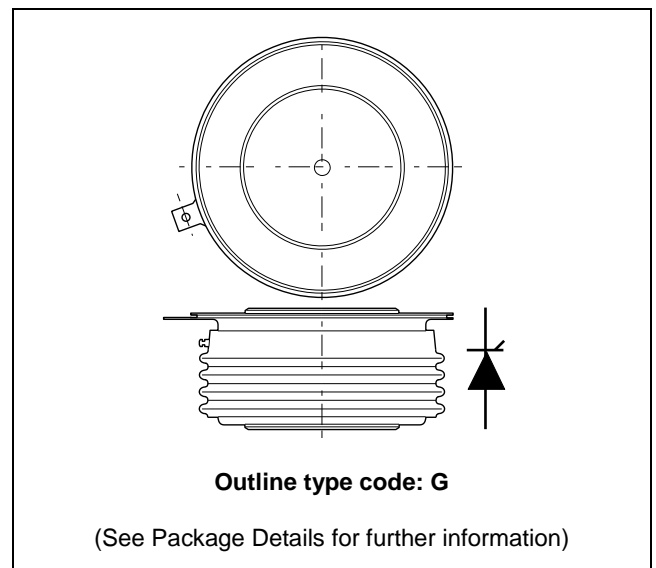


Fig. 1 Package outline

CURRENT RATINGS

$T_{case} = 60^{\circ}\text{C}$ unless stated otherwise

Symbol	Parameter	Test Conditions	Max.	Units
Double Side Cooled				
$I_{T(AV)}$	Mean on-state current	Half wave resistive load	650	A
$I_{T(RMS)}$	RMS value	-	1020	A
I_T	Continuous (direct) on-state current	-	920	A

SURGE RATINGS

Symbol	Parameter	Test Conditions	Max.	Units
I_{TSM}	Surge (non-repetitive) on-state current	10ms half sine, $T_{case} = 125^{\circ}\text{C}$	8.4	kA
I^2t	I^2t for fusing	$V_R = 0$	0.353	MA^2s

THERMAL AND MECHANICAL RATINGS

Symbol	Parameter	Test Conditions	Min.	Max.	Units
$R_{th(j-c)}$	Thermal resistance – junction to case	Double side cooled DC	-	0.035	$^{\circ}\text{C/W}$
$R_{th(c-h)}$	Thermal resistance – case to heatsink	Double side cooled DC	-	0.008	$^{\circ}\text{C/W}$
T_{vj}	Virtual junction temperature	Blocking V_{DRM} / V_{RRM}	-	125	$^{\circ}\text{C}$
T_{stg}	Storage temperature range		-40	140	$^{\circ}\text{C}$
F_m	Clamping force		12	18	kN

DYNAMIC CHARACTERISTICS

Symbol	Parameter	Test Conditions	Min.	Max.	Units	
I_{RRM}/I_{DRM}	Peak reverse and off-state current	At V_{RRM}/V_{DRM} , $T_{case} = 125^{\circ}C$	-	60	mA	
dV/dt	Max. linear rate of rise of off-state voltage	To 67% V_{DRM} , $T_j = 125^{\circ}C$, gate open	1000	-	V/ μ s	
di/dt	Rate of rise of on-state current	From 67% V_{DRM} to 1000A	Repetitive 50Hz	-	150	A/ μ s
		Gate source 30V, 10 Ω , $t_r < 0.5\mu$ s, $T_j = 125^{\circ}C$	Non-repetitive	-	1000	A/ μ s
V_T	On-state voltage	$I_T = 1500A$, $T_{case} = 125^{\circ}C$		2.49	V	
$V_{T(TO)}$	Threshold voltage	$T_{case} = 125^{\circ}C$	-	1.03	V	
r_T	On-state slope resistance	$T_{case} = 125^{\circ}C$	-	0.97	m Ω	
t_{gd}	Delay time	$V_D = 67\% V_{DRM}$, gate source 30V, 10 Ω $t_r = 0.5\mu$ s, $T_j = 25^{\circ}C$	-	3.0	μ s	
t_q	Turn-off time	$T_j = 125^{\circ}C$, $V_R = 100V$, $di/dt = 10A/\mu$ s, $dV_{DR}/dt = 20V/\mu$ s linear to 67% V_{DRM}	-	600	μ s	
Q_S	Stored charge	$I_T = 1000A$, $t_p = 1000\mu$ s, $T_j = 125^{\circ}C$, $di/dt = 10A/\mu$ s,	-	2700	μ C	
I_{RR}	Reverse recovery current		-	130	A	
I_L	Latching current	$T_j = 25^{\circ}C$,	-	1	A	
I_H	Holding current	$T_j = 25^{\circ}C$,	-	200	mA	

GATE TRIGGER CHARACTERISTICS AND RATINGS

Symbol	Parameter	Test Conditions	Max.	Units
V_{GT}	Gate trigger voltage	$V_{DRM} = 5V$, $T_{case} = 25^{\circ}C$	3	V
V_{GD}	Gate non-trigger voltage	At 40% V_{DRM} , $T_{case} = 125^{\circ}C$	0.3	V
I_{GT}	Gate trigger current	$V_{DRM} = 5V$, $T_{case} = 25^{\circ}C$	300	mA
I_{GD}	Gate non-trigger current	At 40% V_{DRM} , $T_{case} = 125^{\circ}C$	20	mA

CURVES

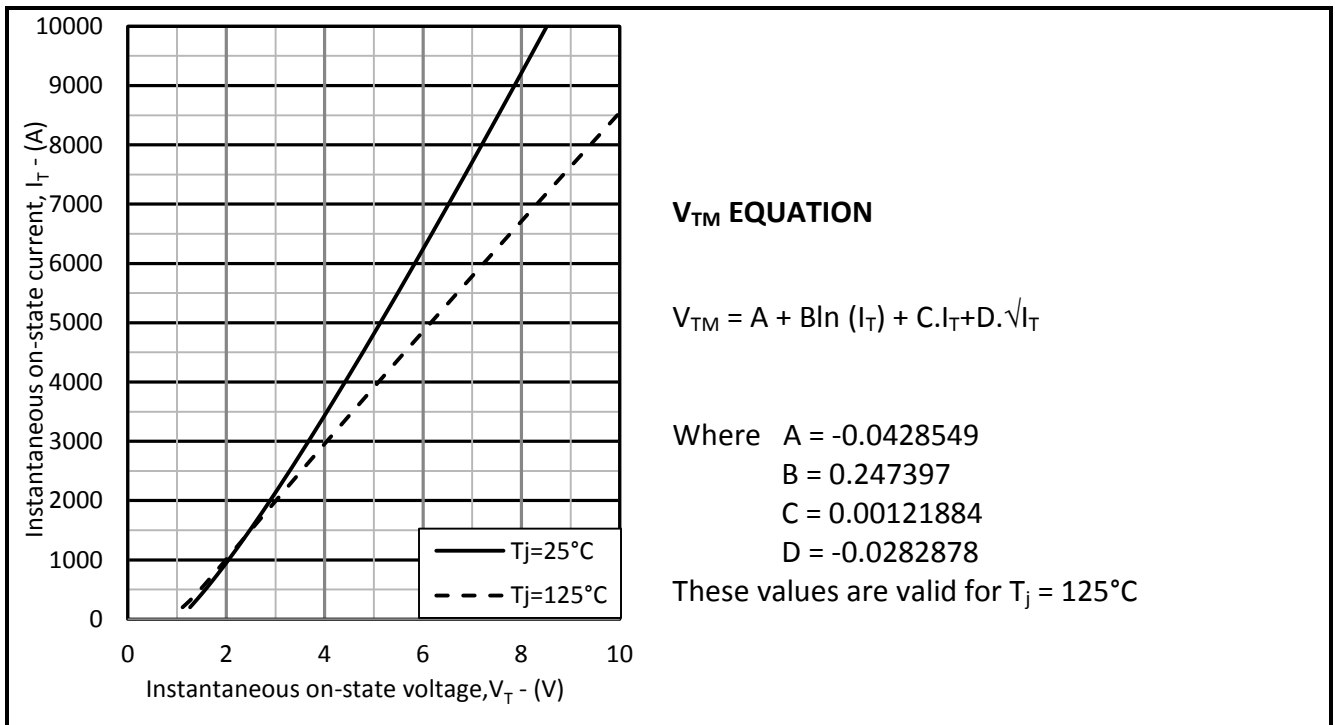


Fig.2 Maximum & minimum on-state characteristics

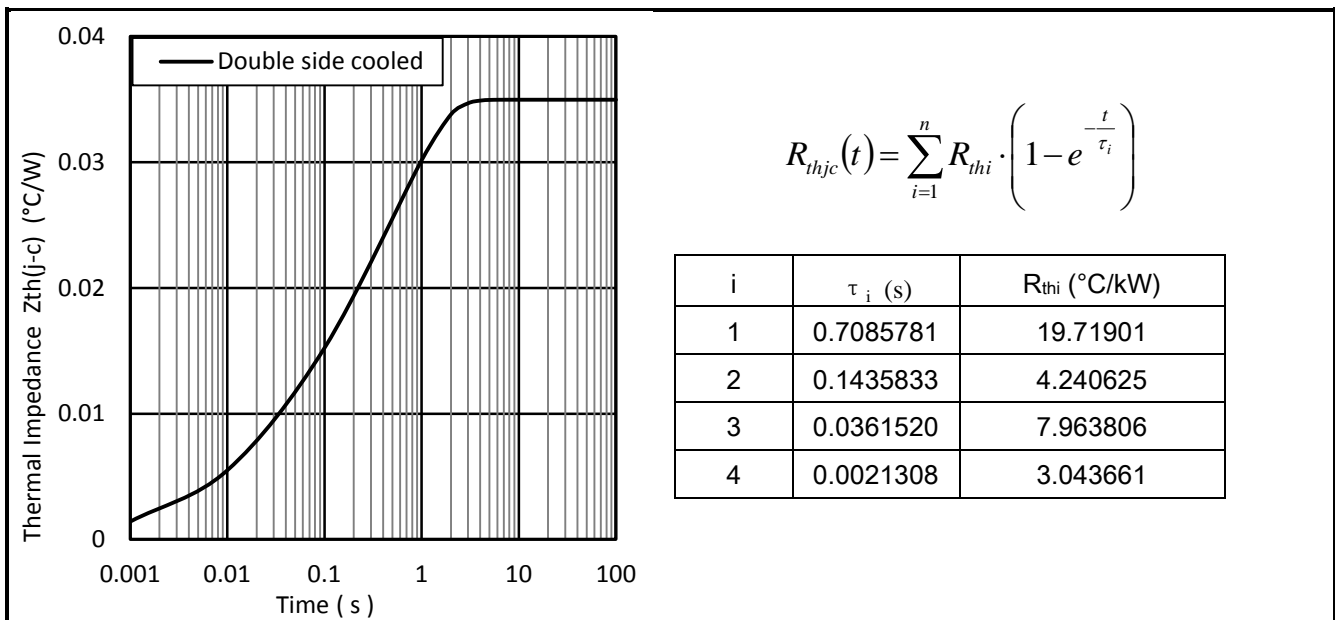


Fig.3 Maximum (limit) transient thermal impedance – junction to case (°C/W)

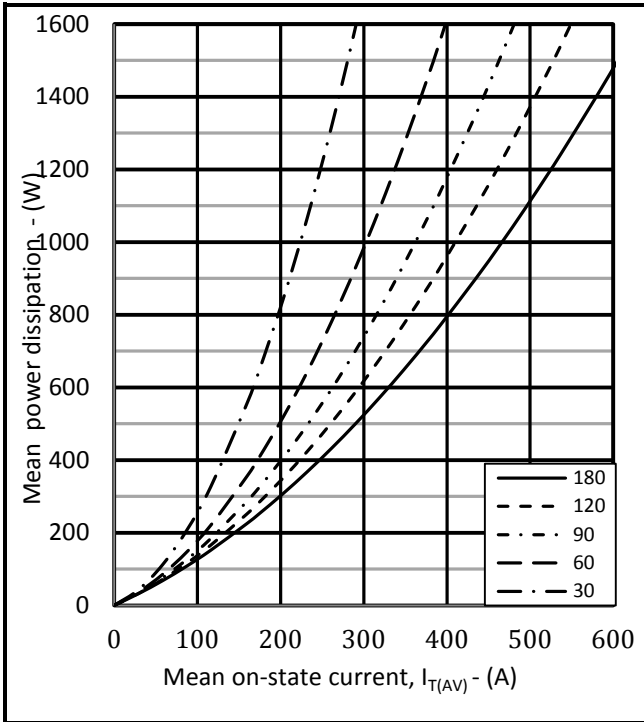


Fig.4 On-state power dissipation – sine wave

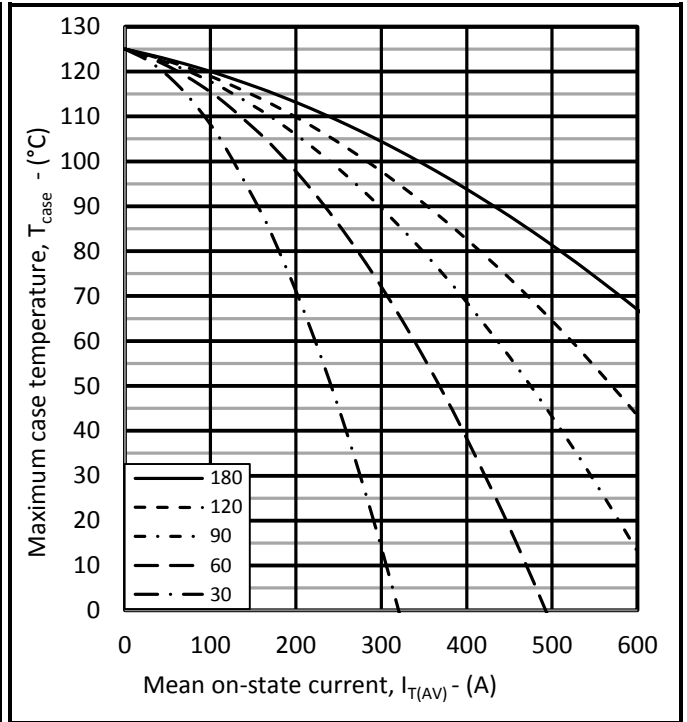


Fig.5 Maximum permissible case temperature, double side cooled – sine wave

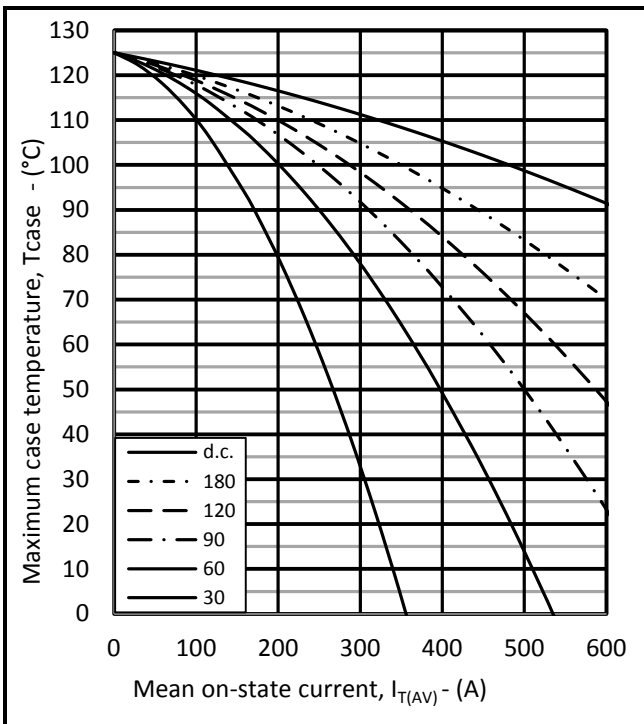


Fig.6 Maximum permissible case temperature, double side cooled – rectangular wave

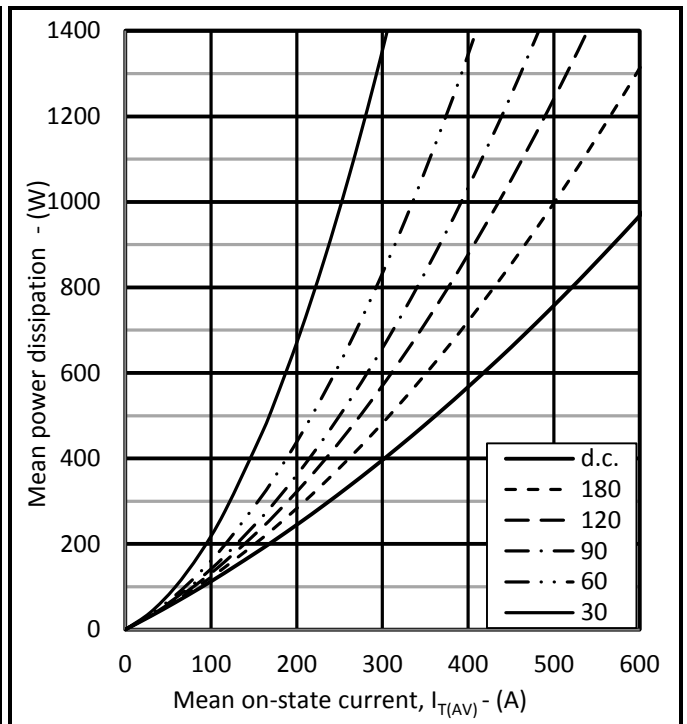


Fig.7 On-state power dissipation – rectangular wave

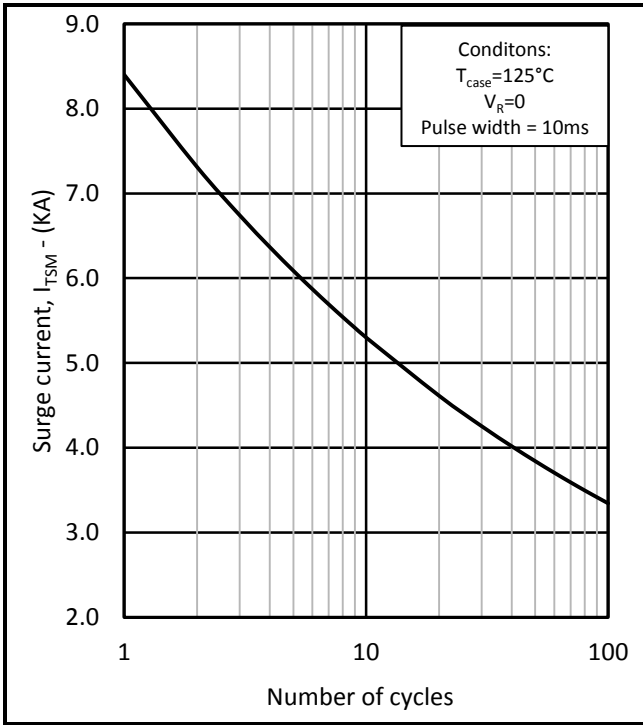


Fig.8 Multi-cycle surge current

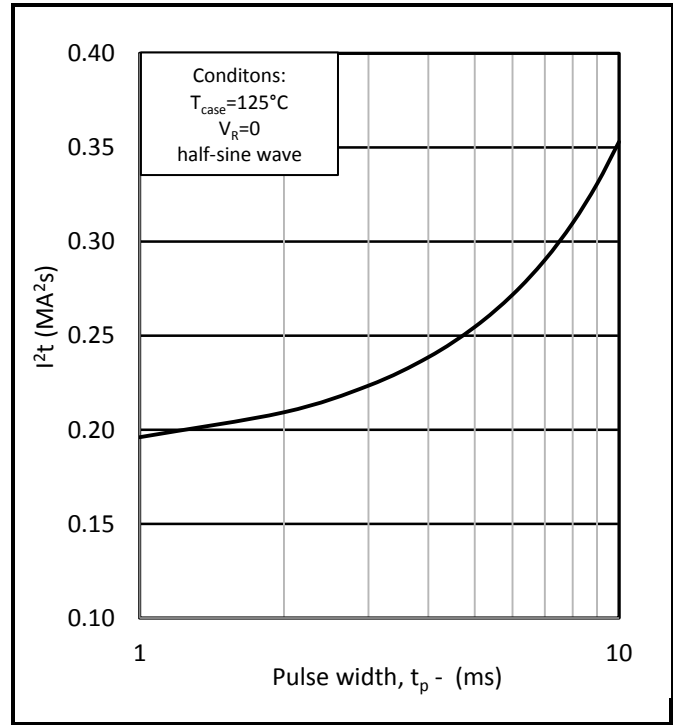


Fig.9 Single-cycle I^2t

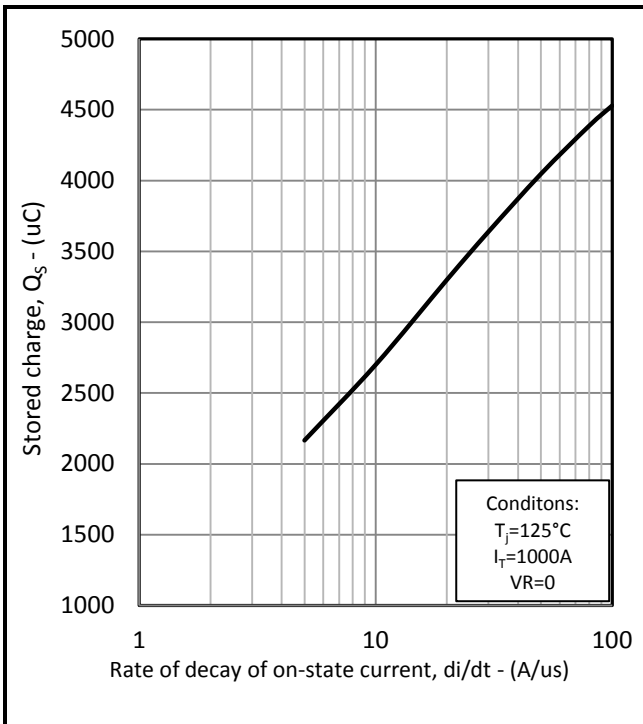


Fig.10 Stored charge vs di/dt

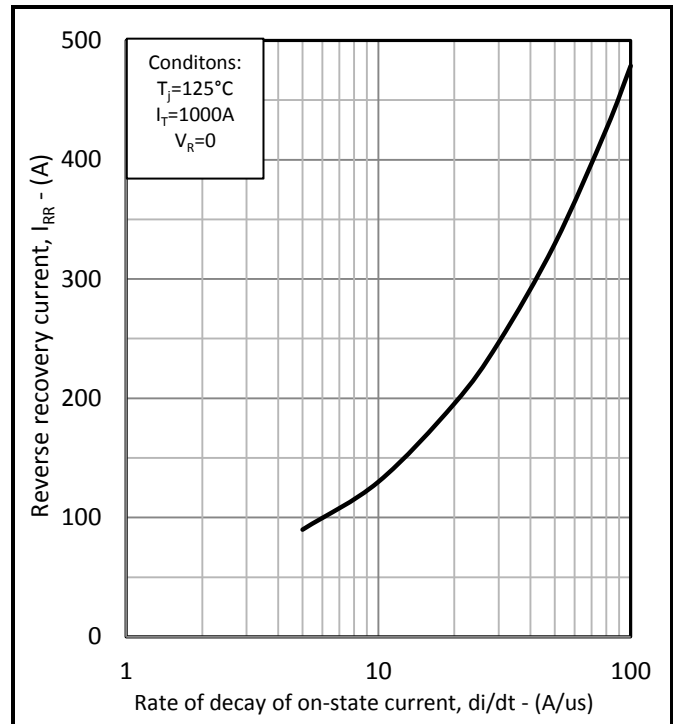


Fig.11 Reverse recovery current vs di/dt

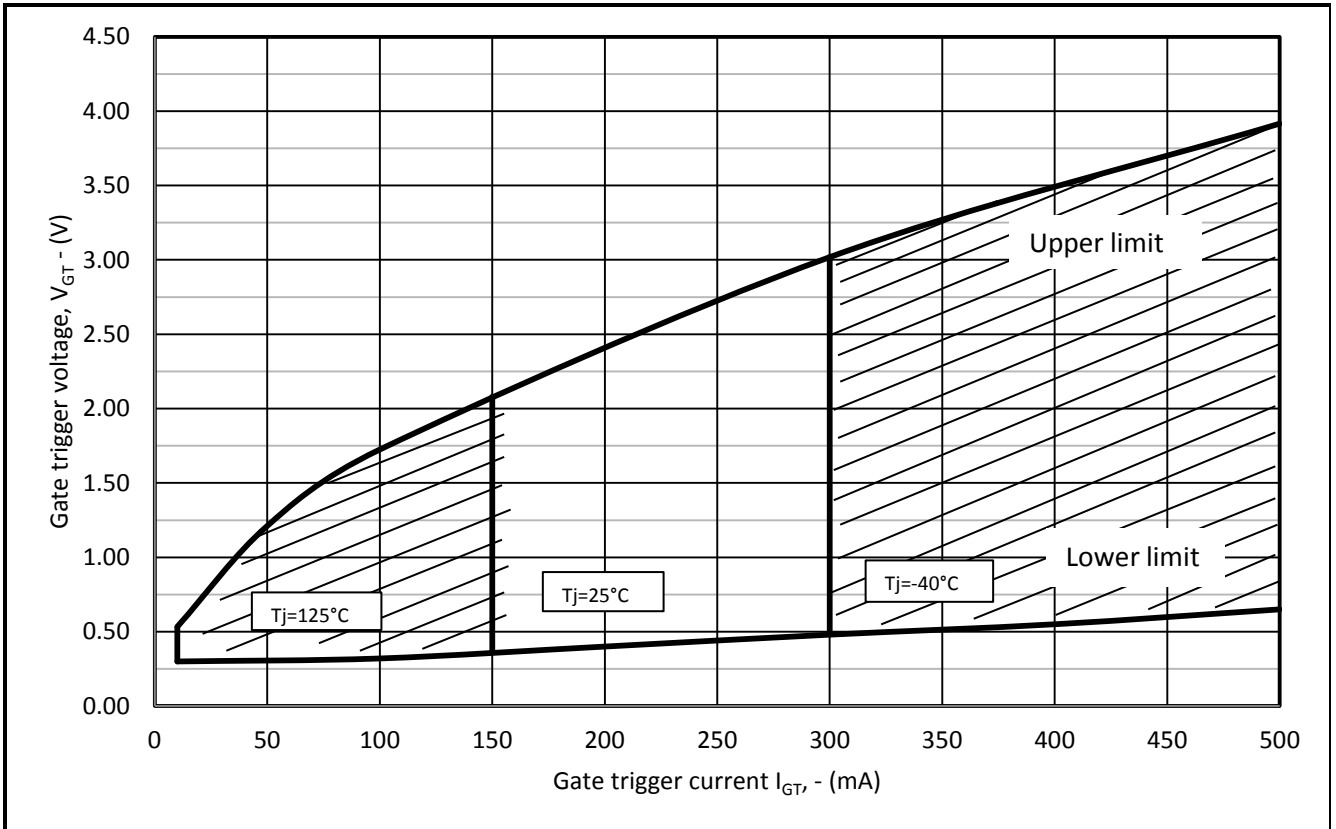
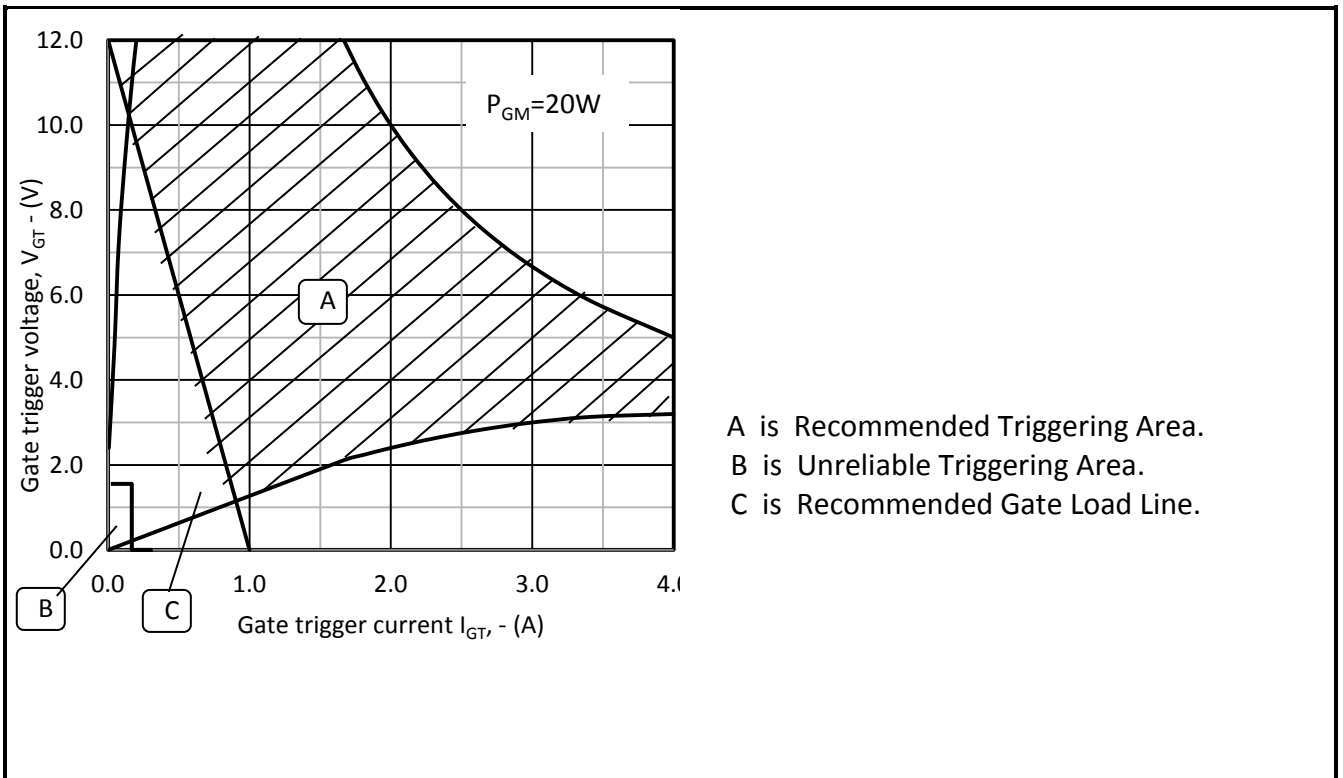


Fig.12 Gate characteristics



A is Recommended Triggering Area.
 B is Unreliable Triggering Area.
 C is Recommended Gate Load Line.

Fig.13 Gate characteristics

PACKAGE DETAILS

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

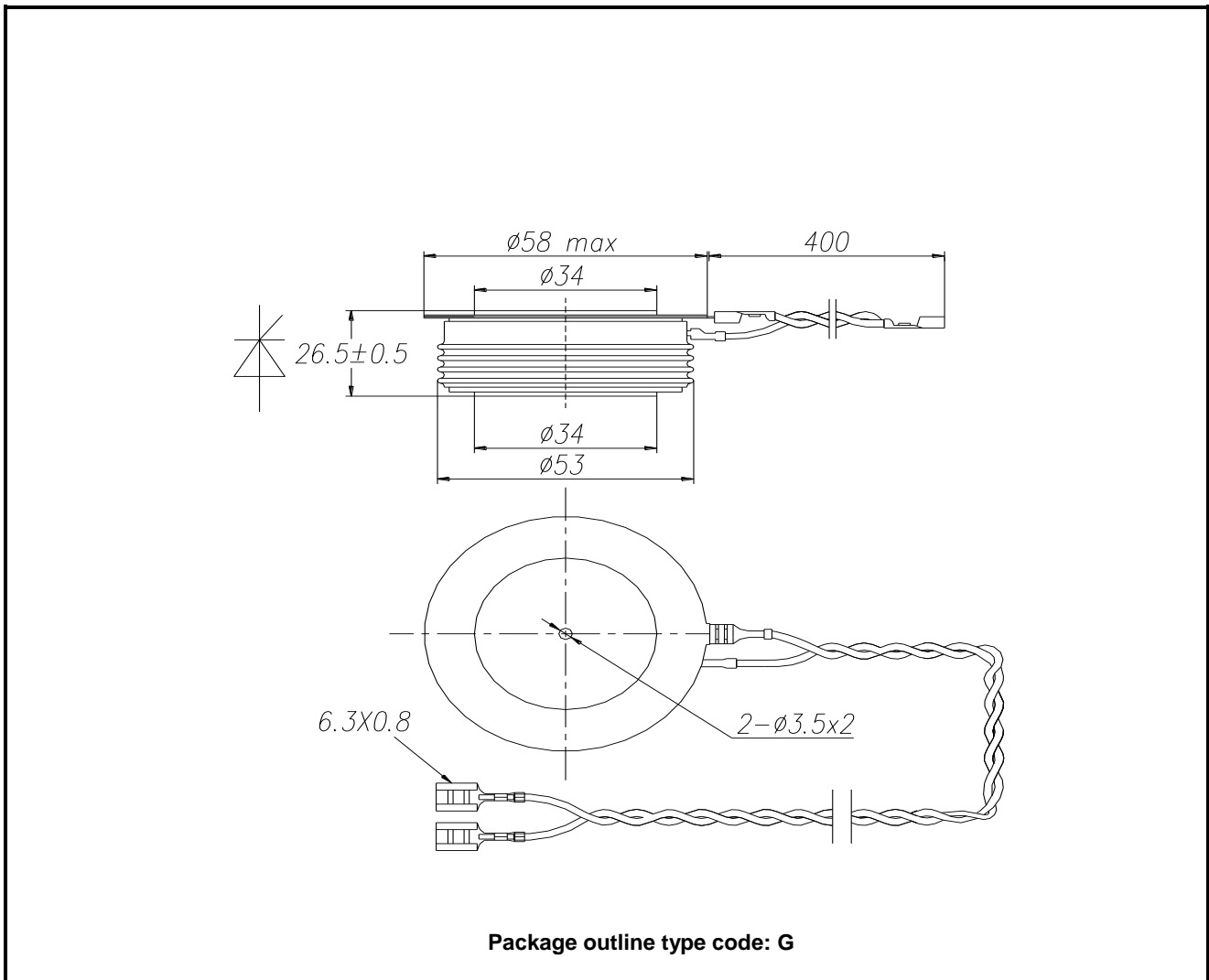


Fig.14 Package outline

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The products must not be touched when operating because there is a danger of electrocution or severe burning. Always use protective safety equipment such as appropriate shields for the product and wear safety glasses. Even when disconnected any electric charge remaining in the product must be discharged and allowed to cool before safe handling using protective gloves.

Extended exposure to conditions outside the product ratings may affect reliability leading to premature product failure. Use outside the product ratings is likely to cause permanent damage to the product. In extreme conditions, as with all semiconductors, this may include potentially hazardous rupture, a large current to flow or high voltage arcing, resulting in fire or explosion. Appropriate application design and safety precautions should always be followed to protect persons and property.

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