

### 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
DCR590E24	2400	$T_{vj} = -40^{\circ}\text{C}$ to $125^{\circ}\text{C}$ , $I_{DRM} = I_{RRM} = 30\text{mA}$ , $V_{DRM}, V_{RRM} t_p = 10\text{ms}$ , $V_{DSM}$ & $V_{RSM} =$ $V_{DRM}$ & $V_{RRM} + 100\text{V}$ respectively
DCR590E22	2200	
DCR590E20	2000	

Lower voltage grades available.

### ORDERING INFORMATION

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

For example:

#### DCR590E24

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

### KEY PARAMETERS

$V_{DRM}$	2400 V
$I_{T(AV)}$	590 A
$I_{TSM}$	7800 A
$dV/dt^*$	1000 V/ $\mu\text{s}$
$dI/dt$	200 A/ $\mu\text{s}$

\* Higher  $dV/dt$  selections available

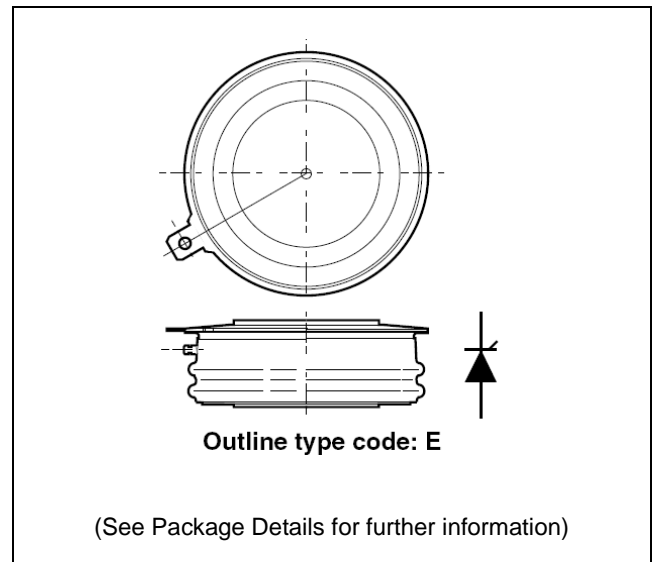


Fig. 1 Package outline

### CURRENT RATINGS

T<sub>case</sub> = 60°C unless stated otherwise

Symbol	Parameter	Test Conditions	Max.	Units
<b>Double Side Cooled</b>				
I <sub>T(AV)</sub>	Mean on-state current	Half wave resistive load	590	A
I <sub>T(RMS)</sub>	RMS value	-	930	A
I <sub>T</sub>	Continuous (direct) on-state current	-	830	A

### SURGE RATINGS

Symbol	Parameter	Test Conditions	Max.	Units
I <sub>TSM</sub>	Surge (non-repetitive) on-state current	10ms half sine, T <sub>case</sub> = 125°C	7.8	kA
I <sup>2</sup> t	I <sup>2</sup> t for fusing	V <sub>R</sub> = 0	0.304	MA <sup>2</sup> s

### THERMAL AND MECHANICAL RATINGS

Symbol	Parameter	Test Conditions	Min.	Max.	Units
R <sub>th(j-c)</sub>	Thermal resistance – junction to case	Double side cooled	-	0.041	°C/W
R <sub>th(c-h)</sub>	Thermal resistance – case to heatsink	Double side cooled	-	0.01	°C/W
T <sub>vj</sub>	Virtual junction temperature	Blocking V <sub>DRM</sub> / V <sub>RRM</sub>	-	125	°C
T <sub>stg</sub>	Storage temperature range		-40	140	°C
F <sub>m</sub>	Clamping force		4	6	kN

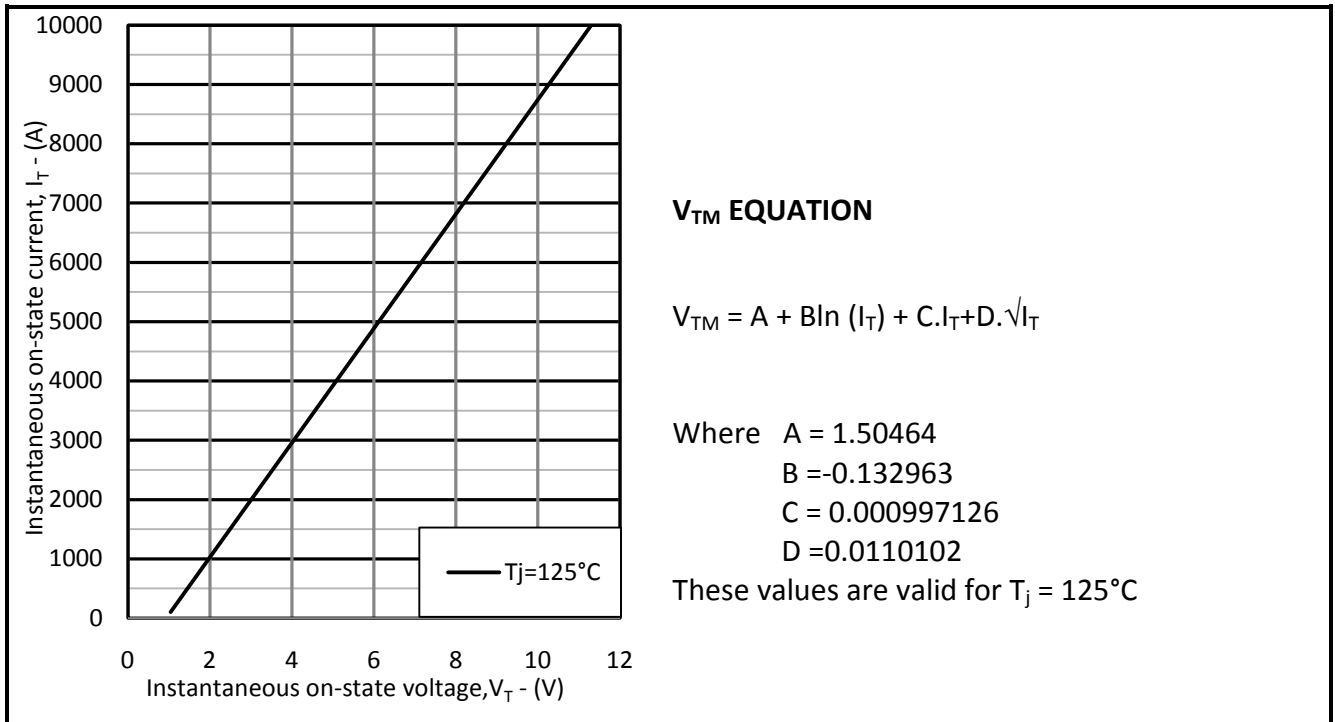
**DYNAMIC CHARACTERISTICS**

Symbol	Parameter	Test Conditions	Min.	Max.	Units	
$I_{RRM}/I_{DRM}$	Peak reverse and off-state current	At $V_{RRM}/V_{DRM}$ , $T_{case} = 125^{\circ}C$	-	30	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/ $\mu s$	
$di/dt$	Rate of rise of on-state current	From 67% $V_{DRM}$ to 1000A Gate source 30V, 10 $\Omega$ , $t_r < 0.5\mu s$ , $T_j = 125^{\circ}C$	Repetitive 50Hz	-	200	A/ $\mu s$
			Non-repetitive	-	1000	A/ $\mu s$
$V_T$	On-state voltage	$I_T = 1500A$ , $T_{case} = 125^{\circ}C$		2.49	V	
$V_{T(TO)}$	Threshold voltage	$T_{case} = 125^{\circ}C$	-	0.94	V	
$r_T$	On-state slope resistance	$T_{case} = 125^{\circ}C$	-	1.036	m $\Omega$	
$t_{gd}$	Delay time	$V_D = 67\% V_{DRM}$ , gate source 30V, 10 $\Omega$ $t_r = 0.5\mu s$ , $T_j = 25^{\circ}C$	-	3.0	$\mu s$	
$I_L$	Latching current	$T_j = 25^{\circ}C$ ,	-	1	A	
$I_H$	Holding current	$T_j = 25^{\circ}C$ ,	-	200	mA	

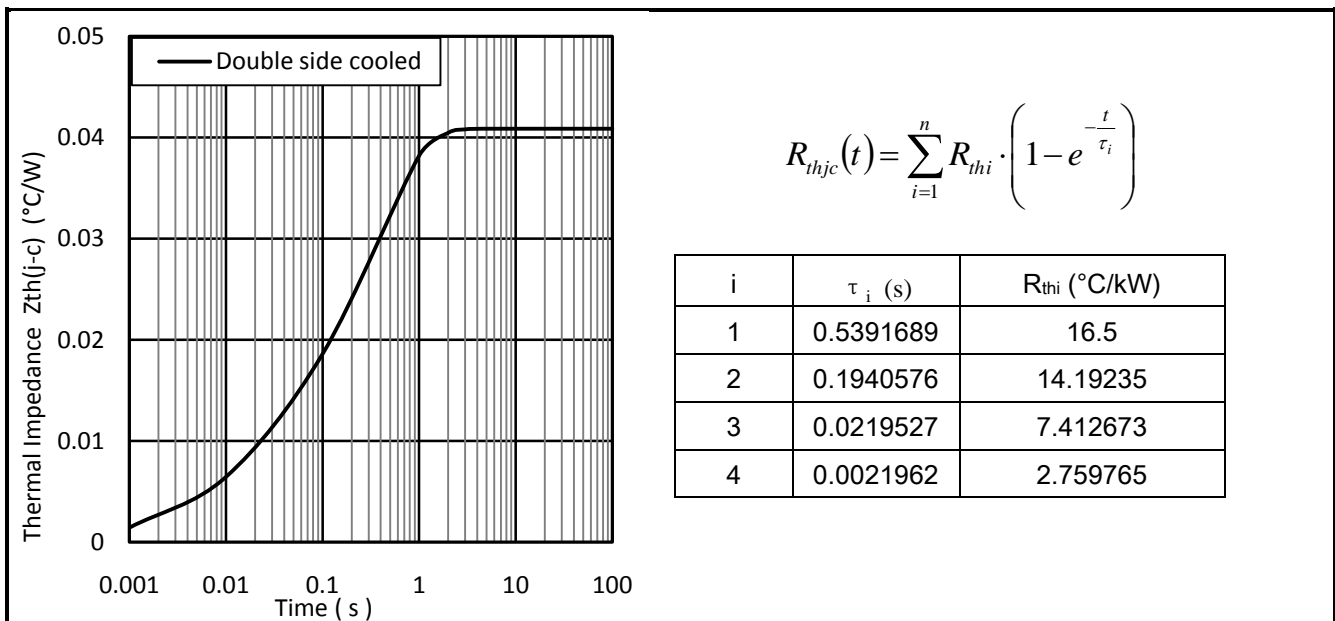
**GATE TRIGGER CHARACTERISTICS AND RATINGS**

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% $V_{DRM}$ , $T_{case} = 125^{\circ}C$	TBD	V
$I_{GT}$	Gate trigger current	$V_{DRM} = 5V$ , $T_{case} = 25^{\circ}C$	300	mA
$I_{GD}$	Gate non-trigger current	At 40% $V_{DRM}$ , $T_{case} = 125^{\circ}C$	TBD	mA

**CURVES**



**Fig.2 Maximum & minimum on-state characteristics**



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

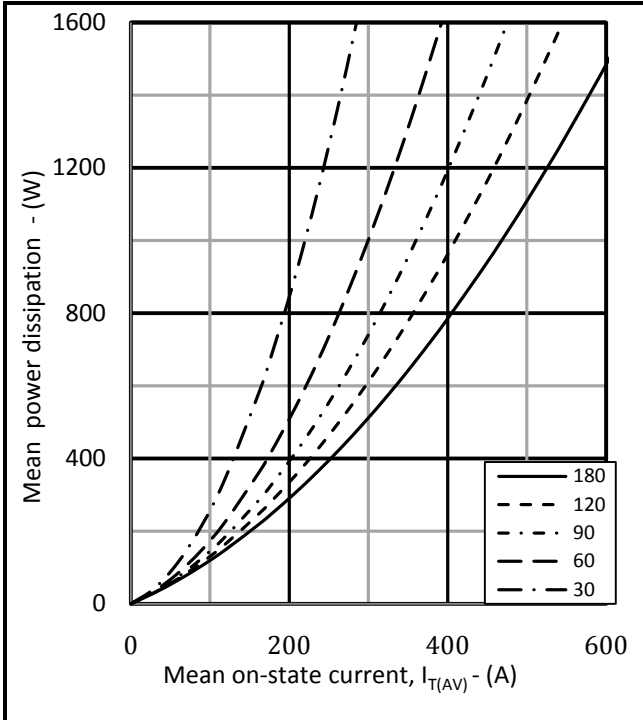


Fig.4 On-state power dissipation – sine wave

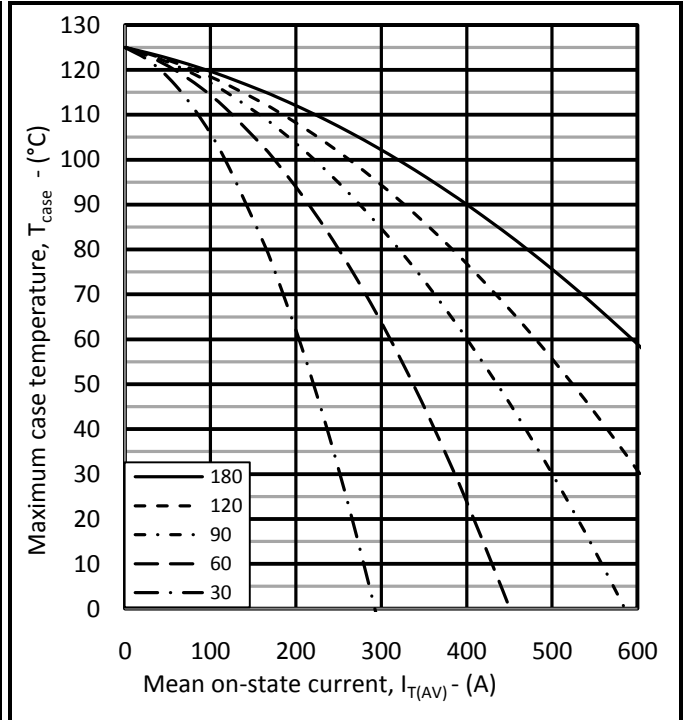


Fig.5 Maximum permissible case temperature, double side cooled – sine wave

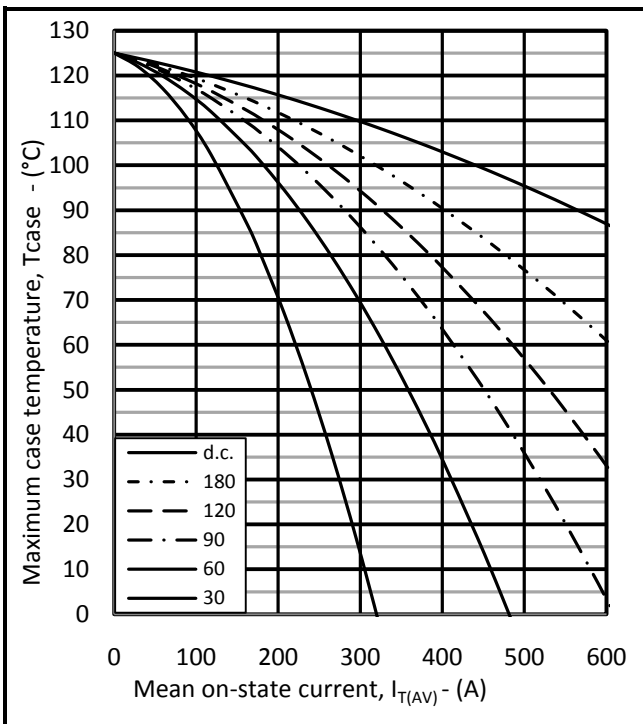


Fig.6 Maximum permissible case temperature, double side cooled – rectangular wave

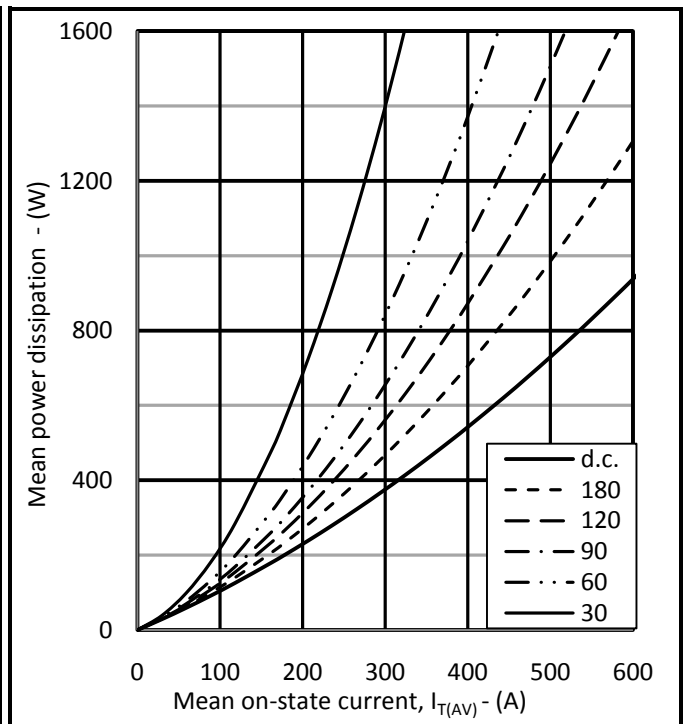


Fig.7 On-state power dissipation – rectangular wave

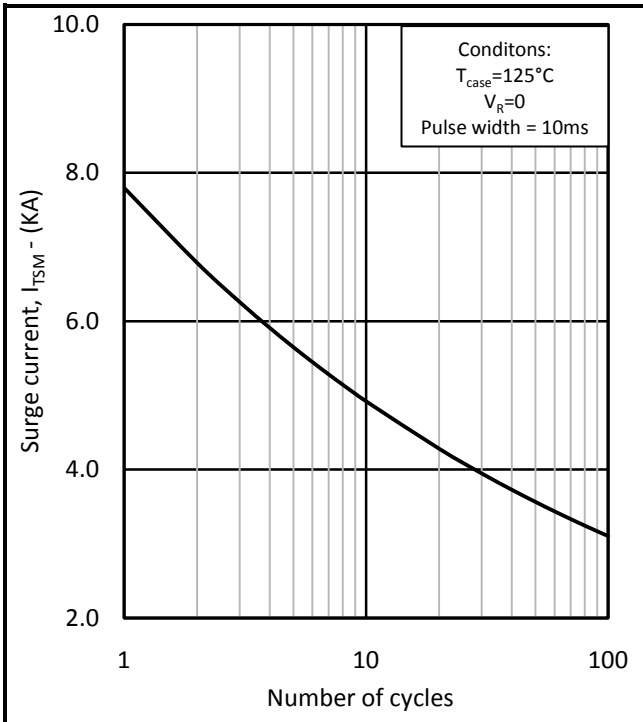


Fig.8 Multi-cycle surge current

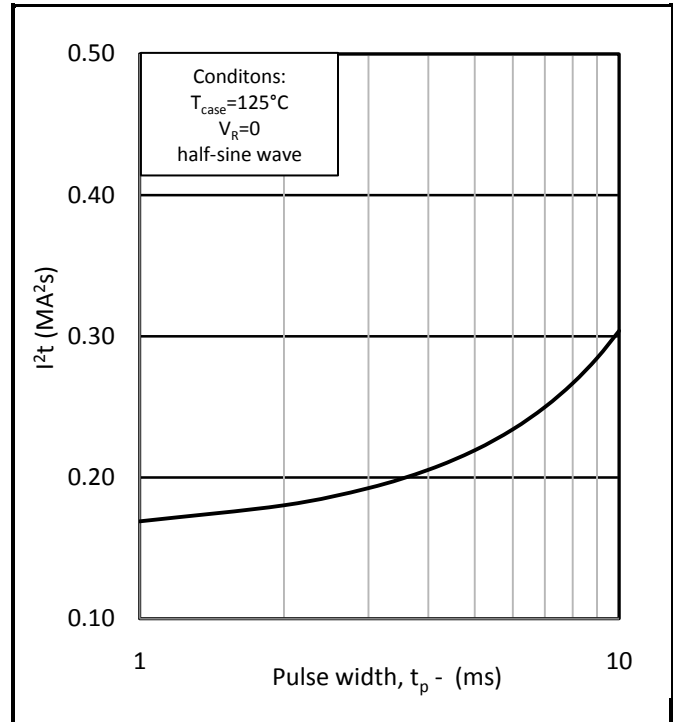


Fig.9 Single-cycle  $I^2t$

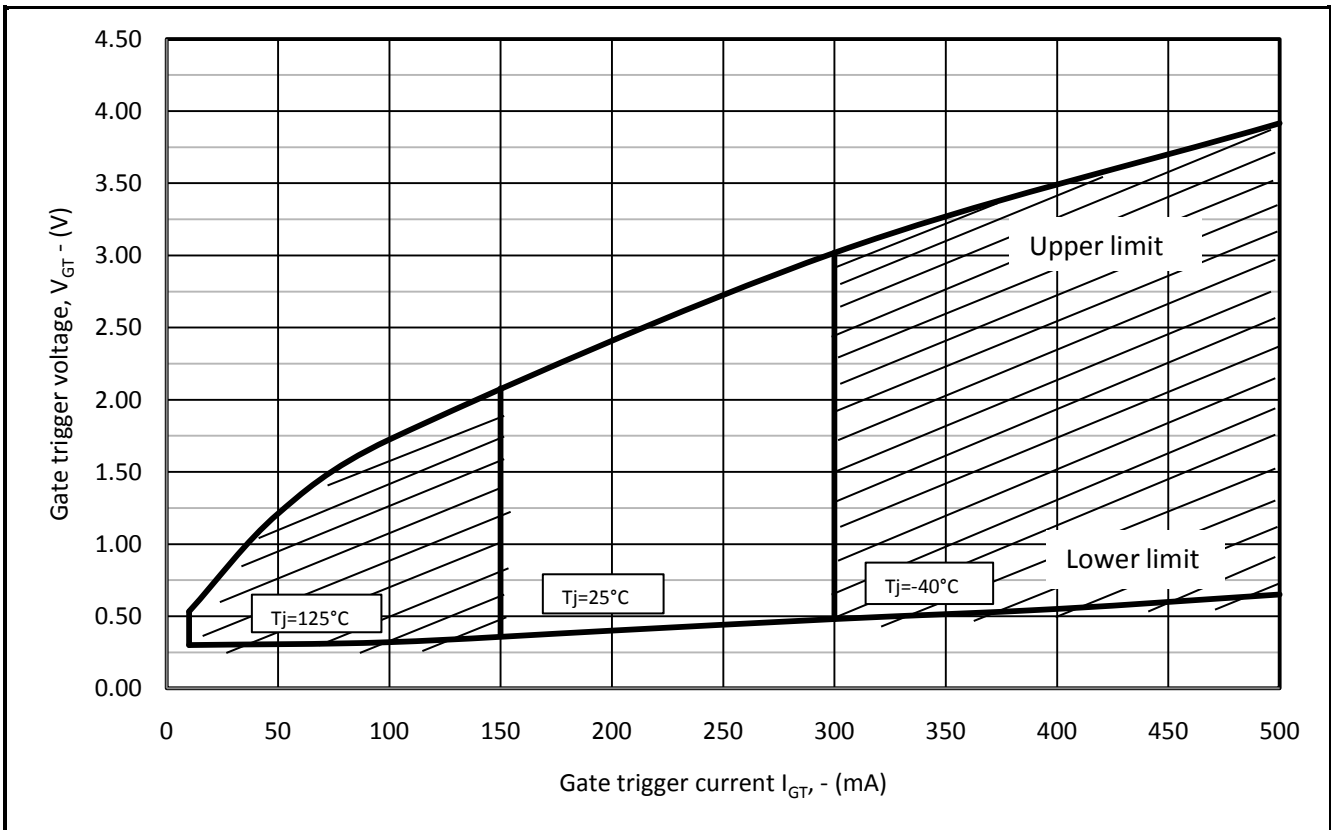


Fig.10 Gate characteristics

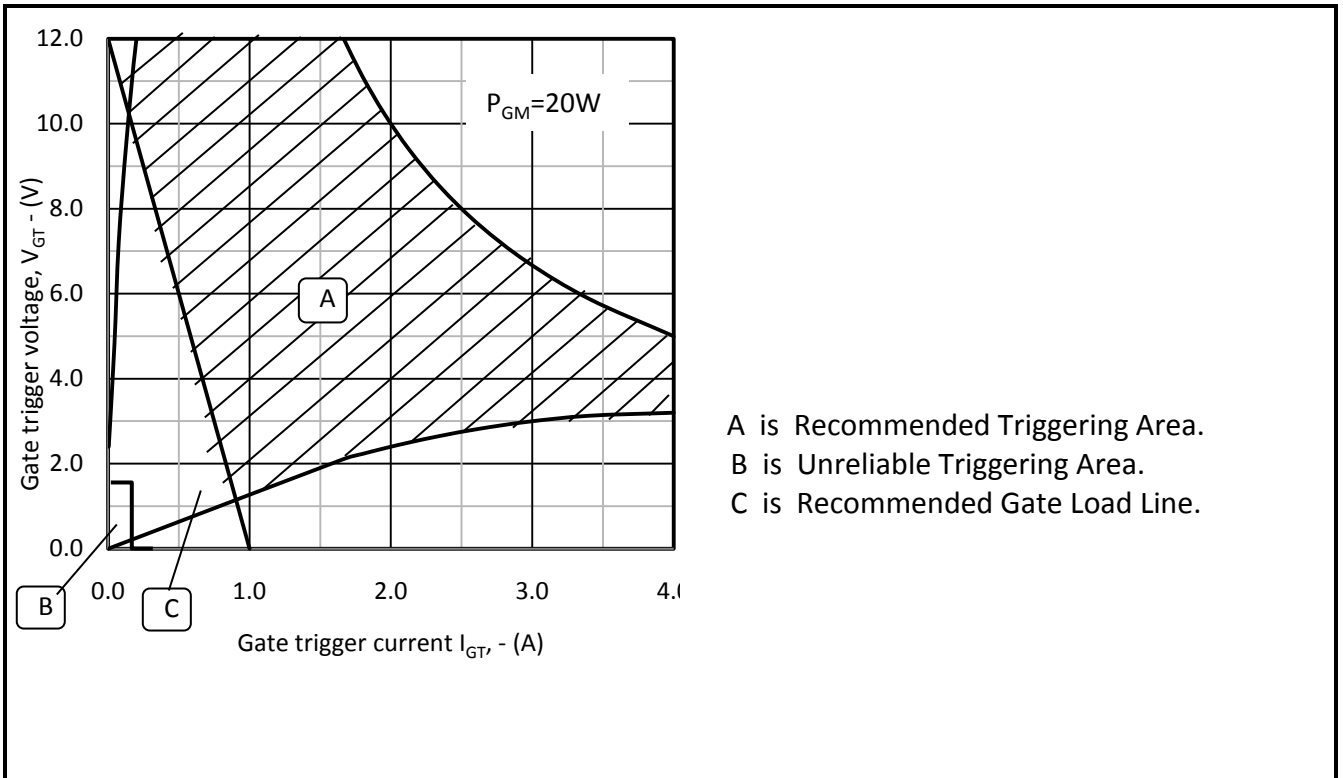
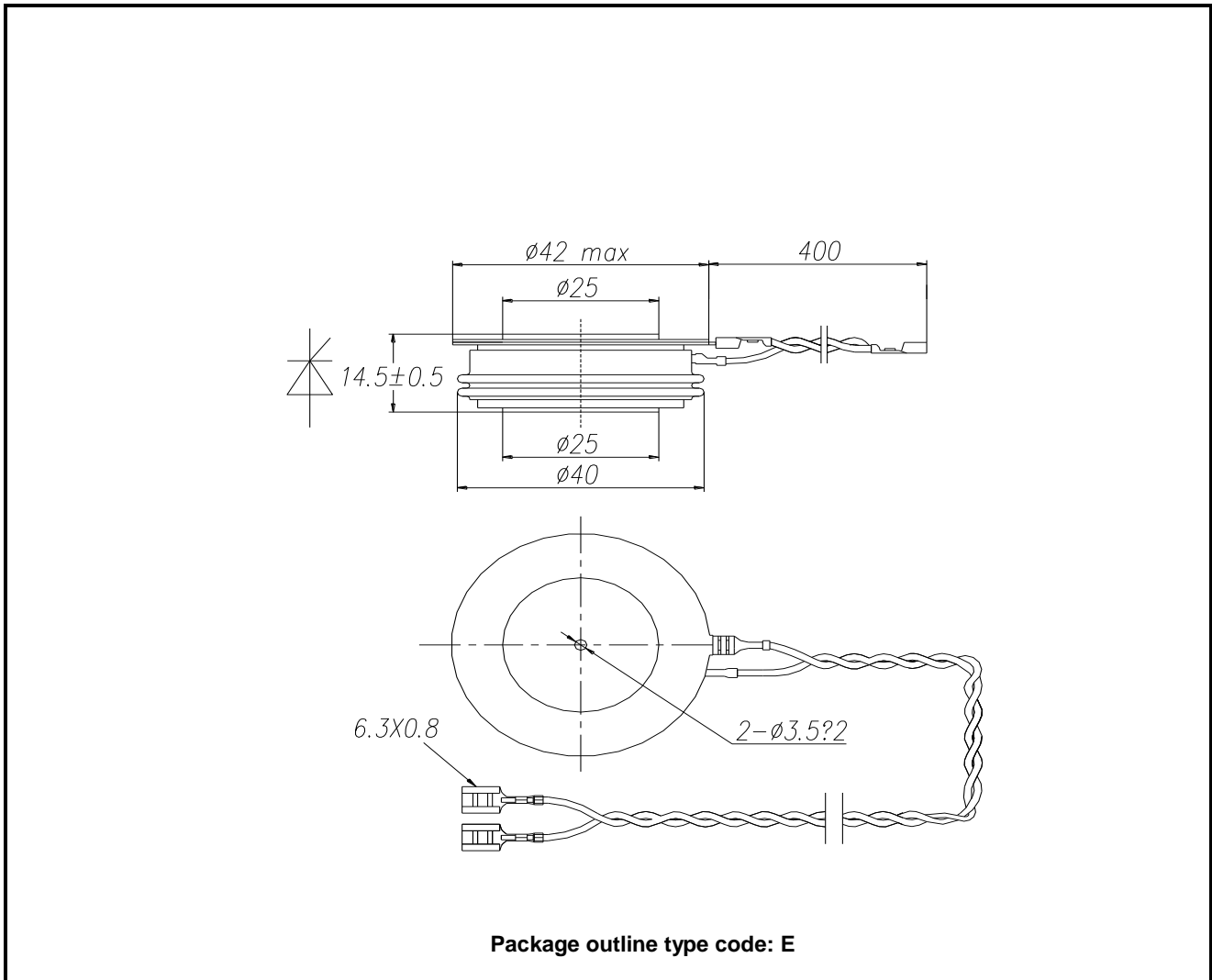


Fig.11 Gate characteristics

**PACKAGE DETAILS**

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



**Fig.12 Package outline**



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