

FEATURES

- Double Side Cooling
- High Surge Capability
- Very Low Cosmic Ray FIT Rating
- High dv/dt Rating

KEY PARAMETERS

V_{DRM}	1000V
V_{RRM}	3300V
$I_{T(AV)}$	3200A
I_{TSM}	43000A
dV/dt	10kV/μs
dI/dt	400A/μs

APPLICATIONS

- Multi-level VSC By-pass thyristor for HVDC

VOLTAGE RATINGS

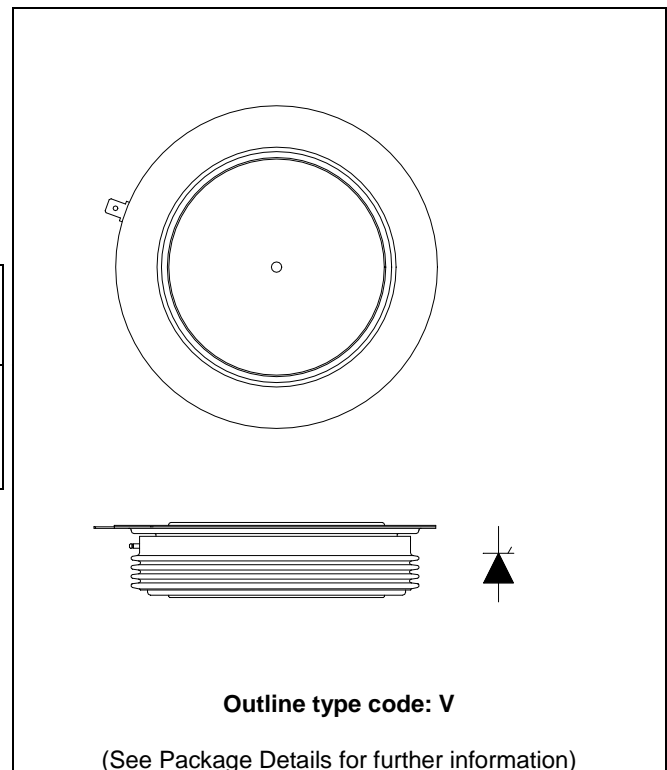
Part and Ordering Number	Repetitive Peak Voltages V_{DRM} and V_{RRM} V	Conditions
ACR3200VR33	1000 / 3300	$T_{vj} = -40^{\circ}\text{C}$ to 125°C , $I_{DRM} = I_{RRM} = 400\text{mA}$, $V_{DRM}, V_{RRM} t_p = 10\text{ms}$,

ORDERING INFORMATION

For example:

ACR3200VR33

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


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	3200	A
$I_{T(RMS)}$	RMS value	-	5026	A
I_T	Continuous (direct) on-state current	-	4900	A

SURGE RATINGS

Symbol	Parameter	Test Conditions	Max.	Units
I_{TSM}	Surge (non-repetitive) on-state current	10ms half sine, $T_{case} = 125^{\circ}\text{C}$	43	kA
I^2t	I^2t for fusing	$V_R = 0$	9.24	MA^2s

THERMAL AND MECHANICAL RATINGS

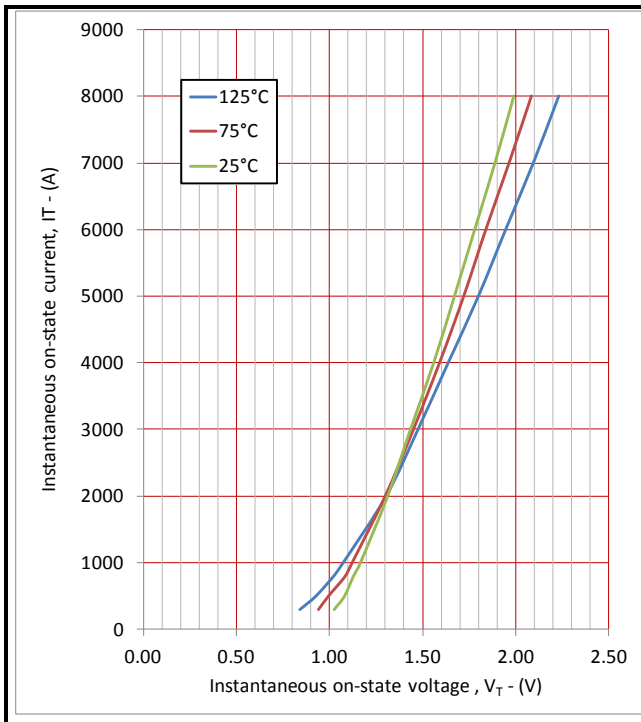
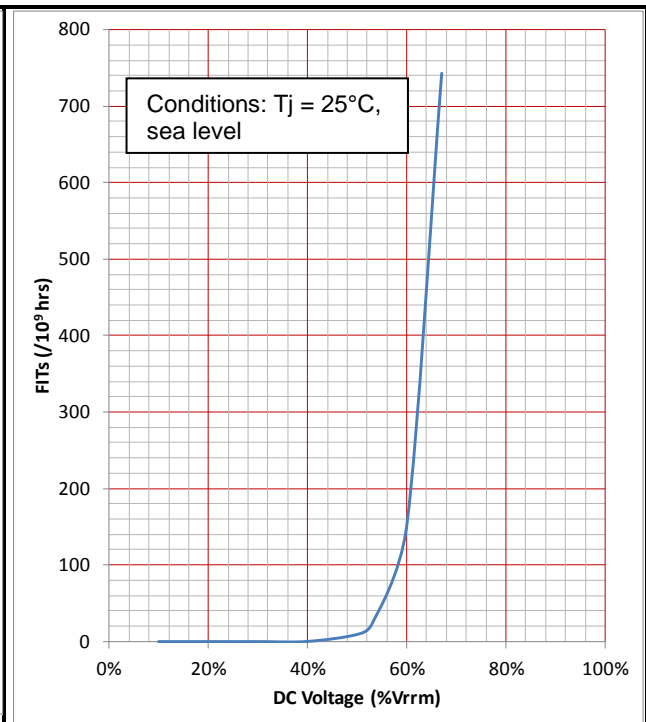
Symbol	Parameter	Test Conditions	Min.	Max.	Units	
$R_{th(j-c)}$	Thermal resistance – junction to case	Double side cooled	DC	-	0.00746	$^{\circ}\text{C/W}$
		Single side cooled	Anode DC	-	0.0130	$^{\circ}\text{C/W}$
			Cathode DC	-	0.0178	$^{\circ}\text{C/W}$
$R_{th(c-h)}$	Thermal resistance – case to heatsink	Clamping force 54kN (with mounting compound)	Double side	-	0.002	$^{\circ}\text{C/W}$
			Single side	-	0.004	$^{\circ}\text{C/W}$
T_{vj}	Virtual junction temperature	Blocking V_{DRM} / V_{RRM}	-	125	$^{\circ}\text{C}$	
T_{stg}	Storage temperature range		-55	125	$^{\circ}\text{C}$	
F_m	Clamping force		48.0	59.0	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} , $T_{case} = 125^{\circ}C$	-	400	mA
dV/dt	Max. linear rate of rise of off-state voltage	To 67% V_{DRM} , $T_j = 60^{\circ}C$, gate open circuit	-	10000	V/ μ s
di/dt	Rate of rise of on-state current	From 67% V_{DRM} to $2x I_{T(AV)}$ Gate source 30V, 10 Ω , $t_r < 0.5\mu$ s, $T_j = 125^{\circ}C$	-	400	A/ μ s
$V_{T(TO)}$	Threshold voltage – Low level	300A to 2400A at $T_{case} = 125^{\circ}C$	-	0.8383	V
	Threshold voltage – High level	2400A to 9000A at $T_{case} = 125^{\circ}C$	-	1.0419	V
r_T	On-state slope resistance – Low level	300A to 2400A at $T_{case} = 125^{\circ}C$	-	0.2374	m Ω
	On-state slope resistance – High level	2400A to 9000A at $T_{case} = 125^{\circ}C$	-	0.1490	m Ω
t_{gd}	Delay time	$V_D = 67\% V_{DRM}$, $I_g=3A$, $t_r = 0.5\mu$ s, $T_j = 25^{\circ}C$, $t_p = 40\mu$ s	3	3	μ s
DC FITs	DC Cosmic Ray FIT Rating	$T_j = 25^{\circ}C$, $V_R = 50\% V_{RRM}$, sea level		24	Per 10^9
		$T_j = 25^{\circ}C$, $V_R = 67\% V_{RRM}$, sea level		743	hours
V_{pu}	Pick-up Voltage	$I_g=3A$, $t_r = 0.5\mu$ s, $T_j = 25^{\circ}C$, $t_p = 40\mu$ s		2	V
I_L	Latching current	$T_j = 25^{\circ}C$, $V_D = 5V$	-	3	A
I_H	Holding current	$T_j = 25^{\circ}C$, $R_{G-K} = \infty$, $I_{TM} = 500A$, $I_T = 5A$	-	300	mA

GATE TRIGGER CHARACTERISTICS AND RATINGS

Symbol	Parameter	Test Conditions	Max.	Units
V _{GT}	Gate trigger voltage	V _{DRM} = 5V, T _{case} = 25°C	1.5	V
V _{GD}	Gate non-trigger voltage	At V _{DRM} , T _{case} = 125°C	TBD	V
I _{GT}	Gate trigger current	V _{DRM} = 5V, T _{case} = 25°C	350	mA
I _{GD}	Gate non-trigger current	V _{DRM} = 5V, T _{case} = 25°C	TBD	mA

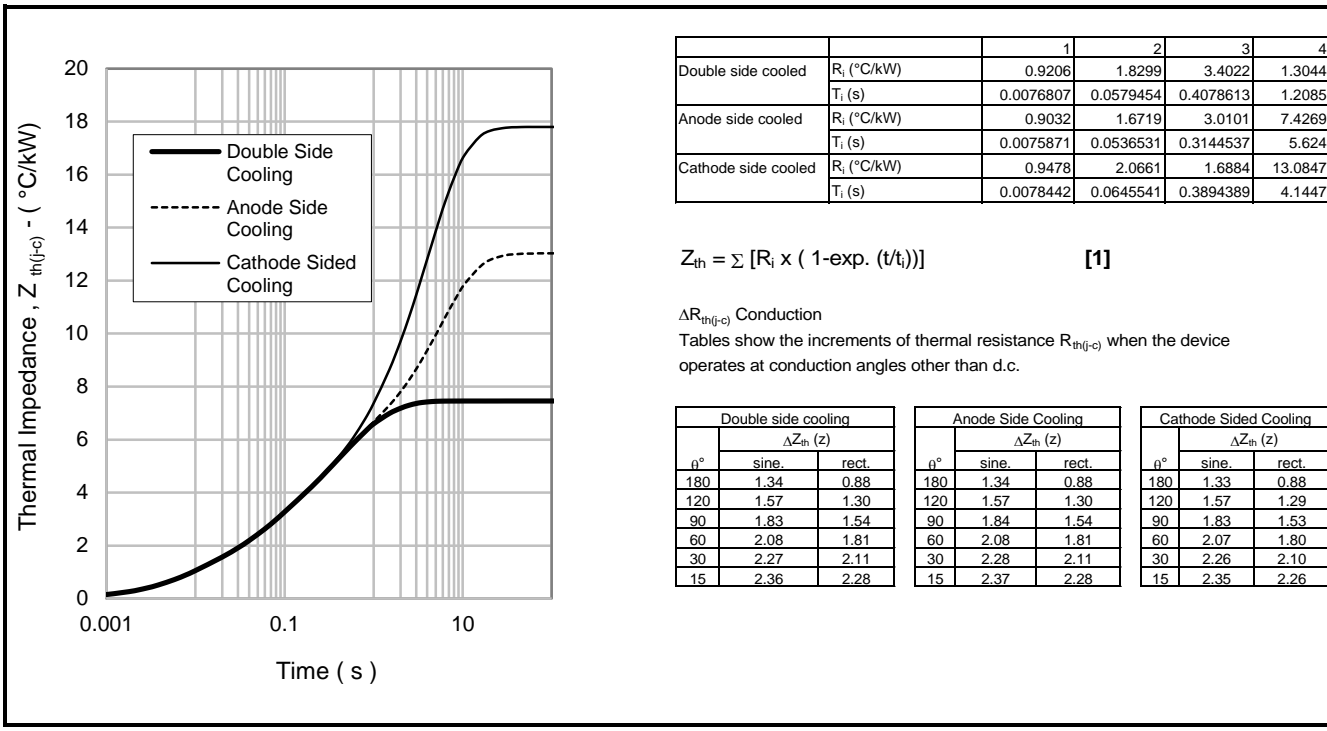
CURVES

Fig.2 Maximum & minimum on-state characteristics

Fig.3 Cosmic Ray DC FIT Rating
V_{TM} EQUATION

$$V_{TM} = A + B \cdot \ln(I_T) + C \cdot I_T + D \cdot \sqrt{I_T}$$

Where

- A = -0.303672
- B = 0.216168
- C = 0.000164
- D = -0.007999

these values are valid for T_j = 125°C for I_T 300A to 9000



		1	2	3	4
Double side cooled	R _i (°C/kW)	0.9206	1.8299	3.4022	1.3044
	T _i (s)	0.0076807	0.0579454	0.4078613	1.2085
Anode side cooled	R _i (°C/kW)	0.9032	1.6719	3.0101	7.4269
	T _i (s)	0.0075871	0.0536531	0.3144537	5.624
Cathode side cooled	R _i (°C/kW)	0.9478	2.0661	1.6884	13.0847
	T _i (s)	0.0078442	0.0645541	0.3894389	4.1447

$$Z_{th} = \sum [R_i \times (1 - \exp. -(t/t_i))] \quad [1]$$

$\Delta R_{th(j-c)}$ Conduction
 Tables show the increments of thermal resistance $R_{th(j-c)}$ when the device operates at conduction angles other than d.c.

Double side cooling			Anode Side Cooling			Cathode Sided Cooling		
ρ°	$\Delta Z_{th} (z)$		ρ°	$\Delta Z_{th} (z)$		ρ°	$\Delta Z_{th} (z)$	
	sine.	rect.		sine.	rect.		sine.	rect.
180	1.34	0.88	180	1.34	0.88	180	1.33	0.88
120	1.57	1.30	120	1.57	1.30	120	1.57	1.29
90	1.83	1.54	90	1.84	1.54	90	1.83	1.53
60	2.08	1.81	60	2.08	1.81	60	2.07	1.80
30	2.27	2.11	30	2.28	2.11	30	2.26	2.10
15	2.36	2.28	15	2.37	2.28	15	2.35	2.26

Fig.4
Maximum (limit) transient thermal impedance – junction to case (°C/kW)

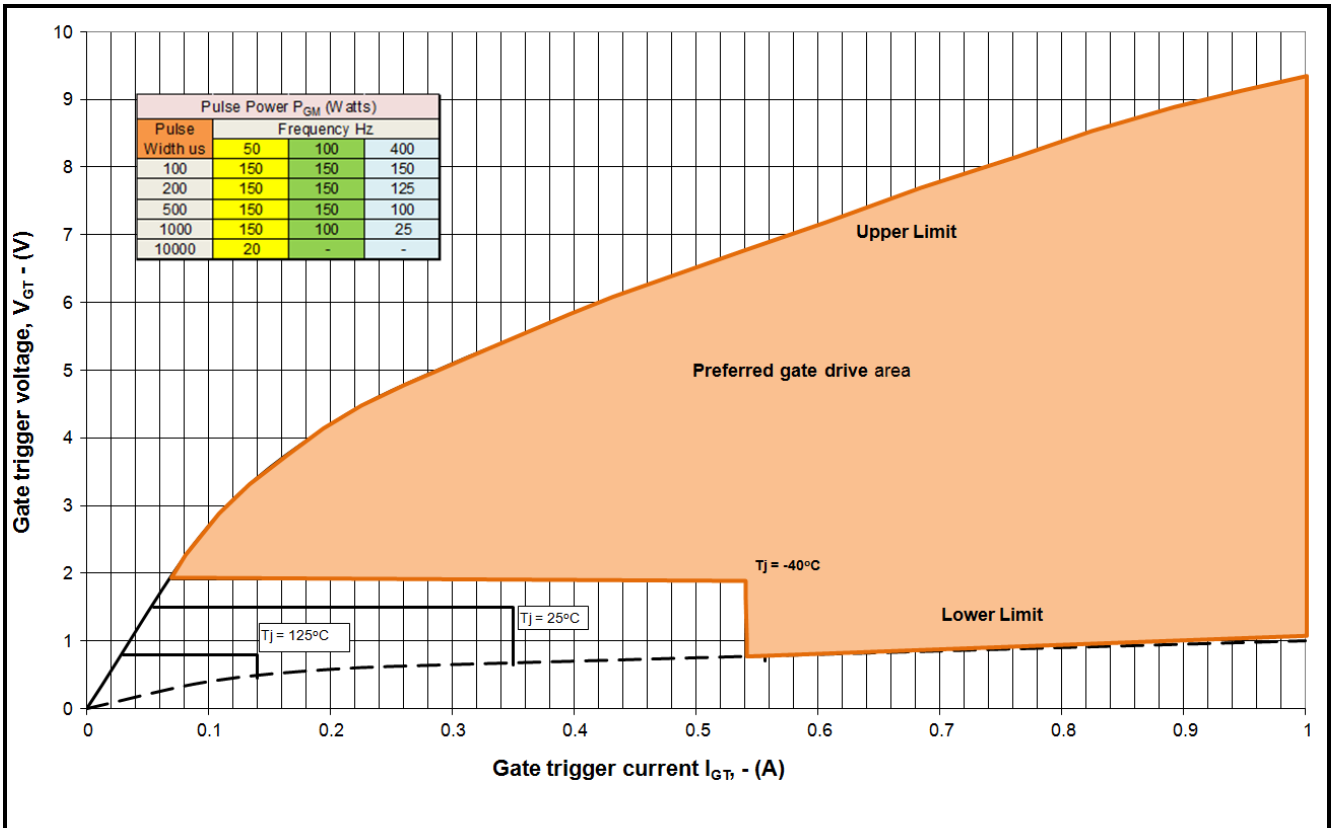


Fig5 Gate Characteristics

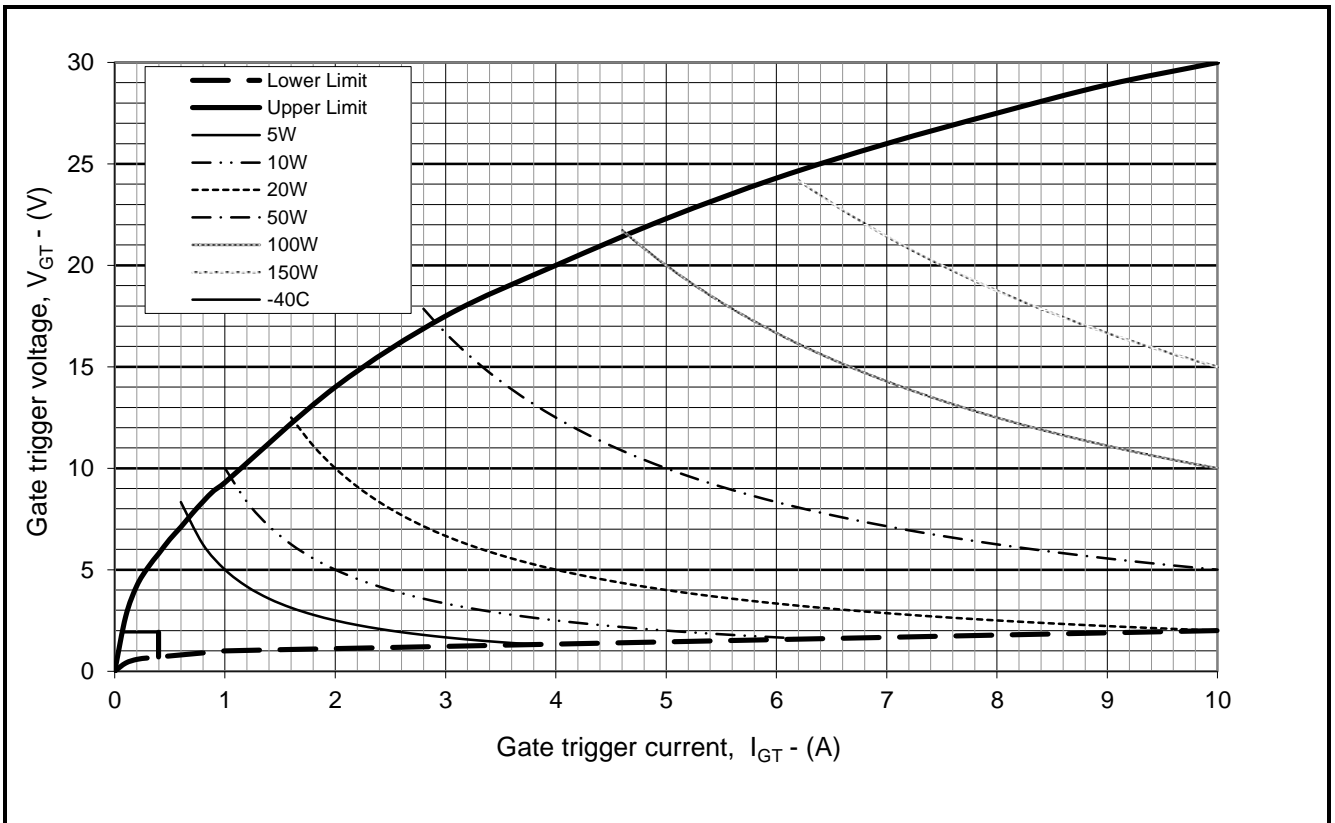
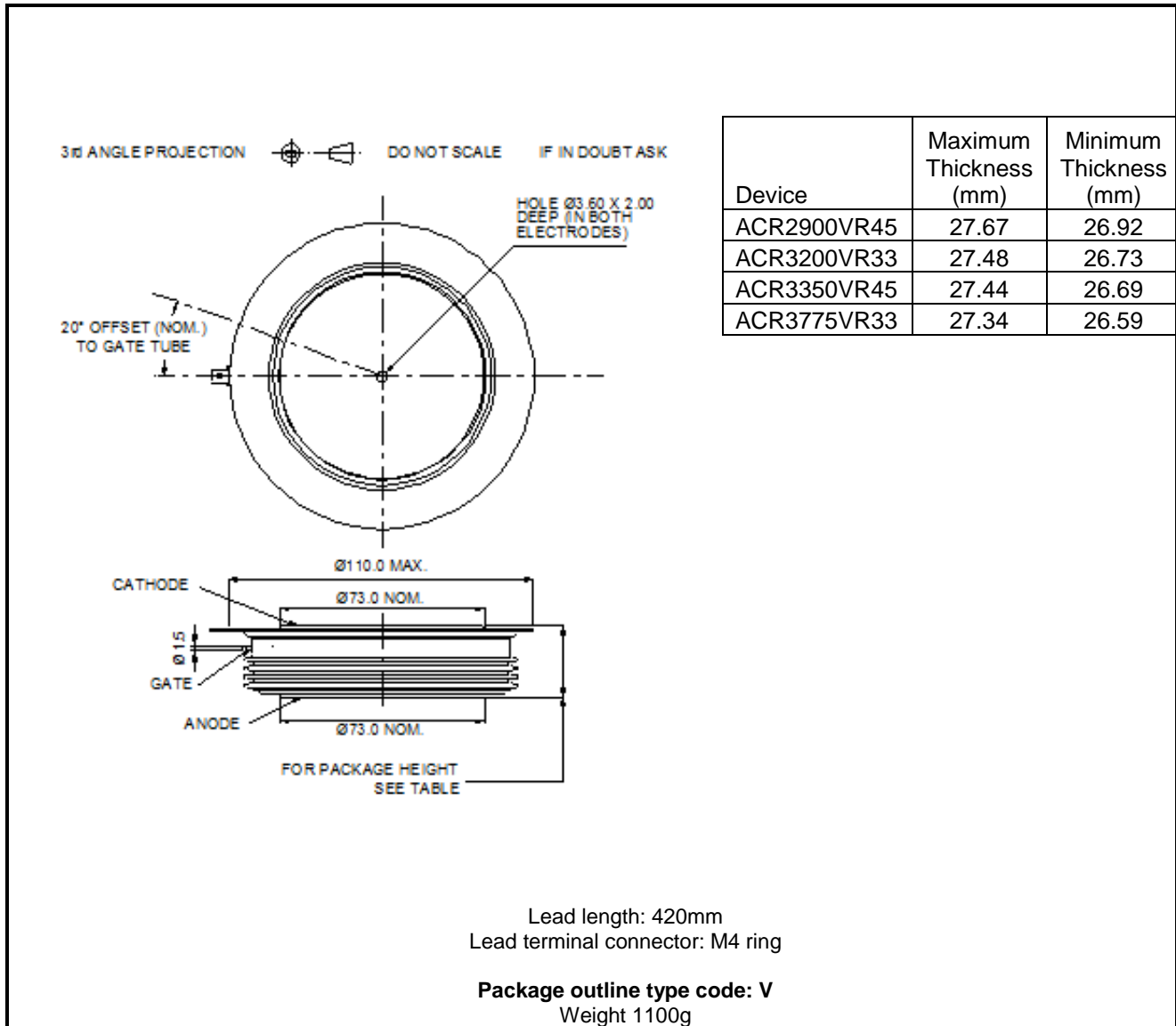


Fig. 6 Gate characteristics

PACKAGE DETAILS

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


Fig.7 Package outline

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