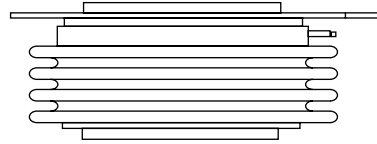


Phase Control Thyristors (Hockey PUK Version), 1000A

FEATURES

- Center amplifying gate
- Metal case with ceramic insulator
- International standard case TO-200AC (B-PUK)
Nell's C-type Capsule
- Compliant to RoHS
- Designed and qualified for industrial level



TO-220AC (B-PUK)
(Nell's C-type Capsule)

TYPICAL APPLICATIONS

- DC motor controls
- Controlled DC power supplies
- AC controllers

PRODUCT SUMMARY

$I_{T(AV)}$	1000A
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MAJOR RATINGS AND CHARACTERISTICS

PARAMETER	TEST CONDITIONS	VALUES	UNIT
$I_{T(AV)}$	Double side cooled, single phase, 50Hz, 180° half-sine wave	1000	A
	T_{hs}	55	°C
$I_{T(RMS)}$		2020	A
	T_{hs}	25	°C
I_{TSM}	50 HZ	18000	A
	60 HZ	18850	
I^2t	50 HZ	1620	kA^2s
	60 HZ	1475	
V_{DRM}/V_{RRM}		800 to 2000	V
t_q	Typical	150	μs
T_J		-40 to 125	°C

ELECTRICAL SPECIFICATIONS

VOLTAGE RATINGS

TYPE NUMBER	VOLTAGE CODE	V_{DRM}/V_{RRM} , MAXIMUM REPETITIVE PEAK AND OFF-STATE VOLTAGE V	V_{RSM} , MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V	I_{DRM}/I_{RRM} , MAXIMUM AT $T_J = T_J$ MAXIMUM mA
1000PTxxC0	08	800	900	80
	12	1200	1300	
	14	1400	1500	
	16	1600	1700	
	18	1800	1900	
	20	2000	2100	

FORWARD CONDUCTION					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNIT
Maximum average current at heatsink temperature	$I_{T(AV)}$	180° conduction, half sine wave double side (single side) cooled		1000(380)	A
				55(85)	°C
Maximum RMS on-state current	$I_{T(RMS)}$	DC at 25°C heatsink temperature double side cooled		2020	A
Maximum peak, one cycle non-repetitive surge current	I_{TSM}	t = 10ms	No voltage reapplied	Sinusoidal half wave, initial $T_J = T_J$ maximum	A
		t = 8.3ms			
		t = 10ms	100% V_{RRM} reapplied		
		t = 8.3ms			
Maximum I^2t for fusing	I^2t	t = 10ms	No voltage reapplied	Sinusoidal half wave, initial $T_J = T_J$ maximum	kA ² s
		t = 8.3ms			
		t = 10ms	100% V_{RRM} reapplied		
		t = 8.3ms			
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	t = 0.1 to 10 ms, no voltage reapplied		16200	kA ² √s
Low level value of threshold voltage	$V_{T(TO)1}$	$(16.7\% \times \pi \times I_{T(AV)} < I < \pi \times I_{T(AV)})$, $T_J = T_J$ maximum		0.99	V
High level value of threshold voltage	$V_{T(TO)2}$	$(I > \pi \times I_{T(AV)})$, $T_J = T_J$ maximum		1.15	
Low level value on-state slope resistance	r_{t1}	$(16.7\% \times \pi \times I_{T(AV)} < I < \pi \times I_{T(AV)})$, $T_J = T_J$ maximum		0.32	mΩ
High level value on-state slope resistance	r_{t2}	$(I > \pi \times I_{T(AV)})$, $T_J = T_J$ maximum		0.26	
Maximum on-state voltage	V_{TM}	$I_{pk} = 2000A$, $T_J = T_J$ maximum, $t_p = 10$ ms sine pulse		1.60	V
Maximum holding current	I_H	$T_J = 25^\circ C$, anode supply 12V resistive load		300	mA
Typical latching current	I_L			500	

SWITCHING					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNIT
Maximum non-repetitive rate of rise of turned-on current	di/dt	Gate drive 20V, 20Ω, $t_r \leq 1\mu s$ $T_J = T_J$ maximum, anode voltage $\leq 80\% V_{DRM}$		1000	A/μs
Typical delay time	t_d	Gate current 1A, $di_g/dt = 1$ A/μs $V_d = 0.67 V_{DRM}$, $T_J = 25^\circ C$		1.0	μs
Typical turn-off time	t_q	$I_{TM} = 750A$, $T_J = T_J$ maximum, $di/dt = 40A/\mu s$. $V_R = 50V$, $dV/dt = 20$ V/μs, gate 0 V 100Ω, $t_p = 500\mu s$		150	

BLOCKING					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNIT
Maximum critical rate of rise of off-state voltage	dV/dt	$T_J = T_J$ maximum linear to 80% rated V_{DRM}		500	V/μs
Maximum peak reverse and off-state leakage current	I_{RRM} , I_{DRM}	$T_J = T_J$ maximum, rated V_{DRM}/V_{RRM} applied		80	mA

TRIGGERING						
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES		UNIT	
			TYP.	MAX.		
Maximum peak gate power	P_{GM}	$T_J = T_J$ maximum, $t_p \leq 5$ ms	10		W	
Maximum average gate power	$P_{G(AV)}$	$T_J = T_J$ maximum, $f = 50$ Hz, $d\% = 50$	2			
Maximum peak positive gate current	I_{GM}	$T_J = T_J$ maximum, $t_p \leq 5$ ms	3		A	
Maximum peak positive gate voltage	$+V_{GM}$	$T_J = T_J$ maximum, $t_p \leq 5$ ms	20		V	
Maximum peak negative gate voltage	$-V_{GM}$		5			
DC gate current required to trigger	I_{GT}	$T_J = -40^\circ\text{C}$	200	-	mA	
		$T_J = 25^\circ\text{C}$	100	200		
		$T_J = 125^\circ\text{C}$	50	-		
DC gate voltage required to trigger	V_{GT}	$T_J = -40^\circ\text{C}$	2.5	-	V	
		$T_J = 25^\circ\text{C}$	1.5	3		
		$T_J = 125^\circ\text{C}$	1.1	-		
DC gate current not to trigger	I_{GD}	$T_J = T_J$ maximum	Maximum gate current/voltage not to trigger is the maximum value which will not trigger any unit with rated V_{DRM} anode to cathode applied		10	mA
DC gate voltage not to trigger	V_{GD}		0.25	V		

THERMAL AND MECHANICAL SPECIFICATIONS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNIT
Maximum operating junction temperature range	T_J		-40 to 125	°C
Maximum storage temperature range	T_{stg}		-40 to 150	
Maximum thermal resistance, junction to heatsink	R_{thJ-hs}	DC operation single side cooled	0.072	K/W
		DC operation double side cooled	0.036	
Maximum thermal resistance, case to heatsink	R_{thC-hs}	DC operation single side cooled	0.011	
		DC operation double side cooled	0.006	
Mounting force, $\pm 10\%$			14700 (1500)	N (kg)
Approximate weight			255	g
Case style		TO-200AC (B-PUK), Nell's C-type Capsule		

ΔR_{thJC} CONDUCTION						
CONDUCTION ANGEL	SINUSOIDAL CONDUCTION		RECTANGULAR CONDUCTION		TEST CONDUCTIONS	UNITS
	SINGLE SIDE	DOUBLE SIDE	SINGLE SIDE	DOUBLE SIDE		
180°	0.009	0.009	0.006	0.006	$T_J = T_J$ maximum	K/W
120°	0.011	0.011	0.010	0.011		
90°	0.014	0.014	0.015	0.015		
60°	0.020	0.020	0.021	0.021		
30°	0.036	0.036	0.036	0.036		

Note

- The table above shows the increment of thermal resistance R_{thJ-hs} when devices operate at different conduction angles than DC

Fig.1 Current ratings characteristics

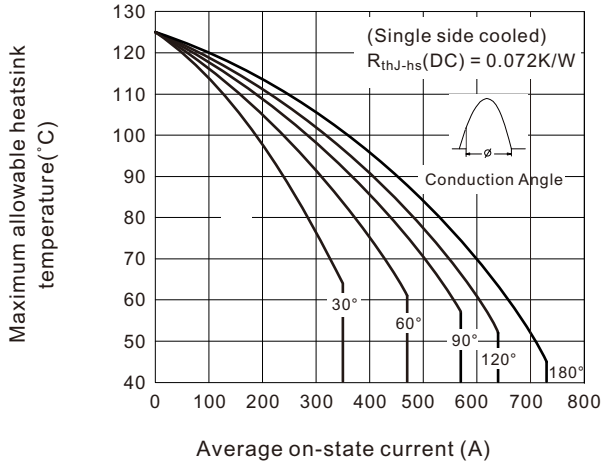


Fig.2 Current ratings characteristics

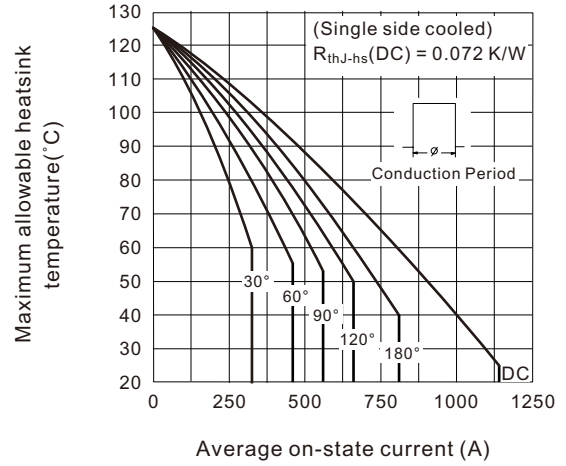


Fig.3 Current ratings characteristics

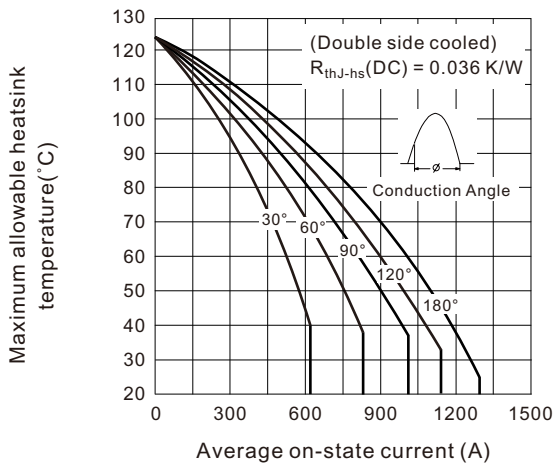


Fig.4 Current ratings characteristics

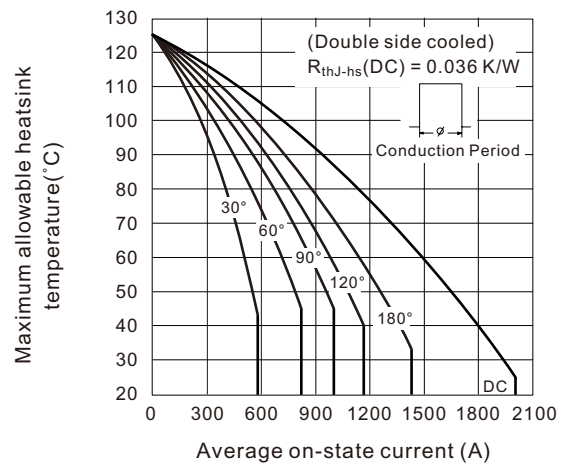


Fig.5 On-state power loss characteristics

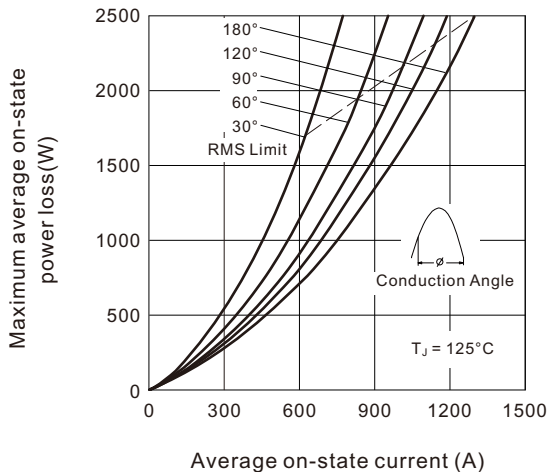


Fig.6 On-state power loss characteristics

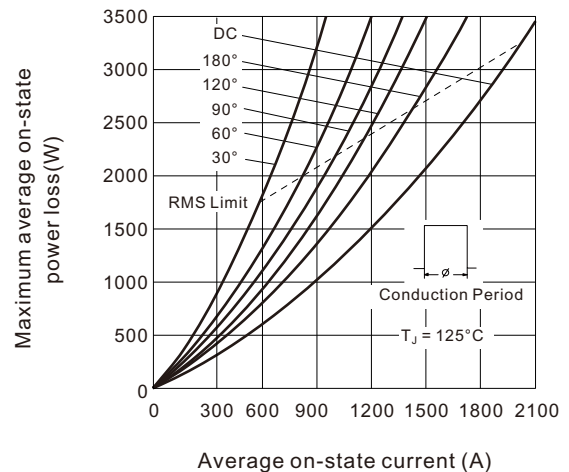


Fig.7 Maximum non-repetitive surge current single and double side cooled

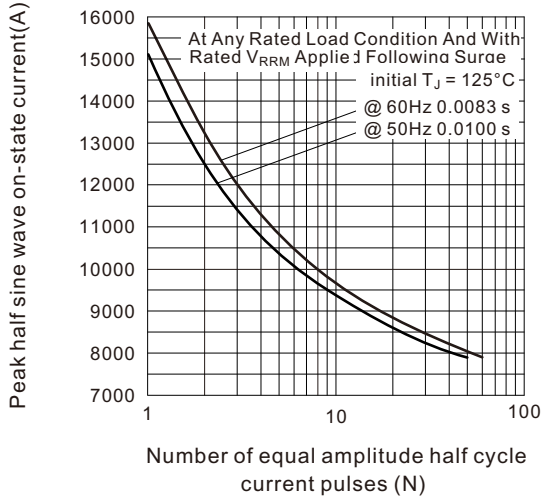


Fig.8 Maximum non-repetitive surge current single and double side cooled

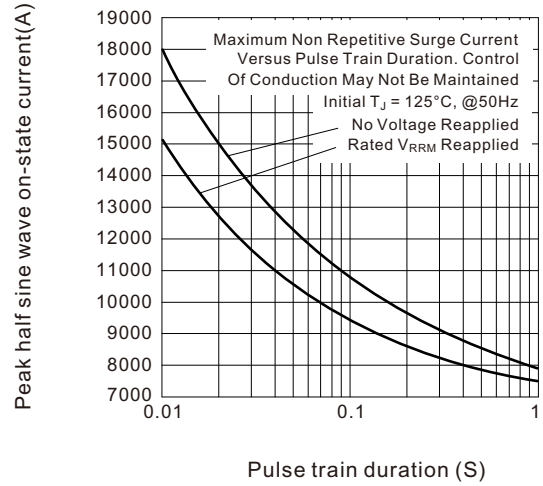


Fig.9 On-state voltage drop characteristics

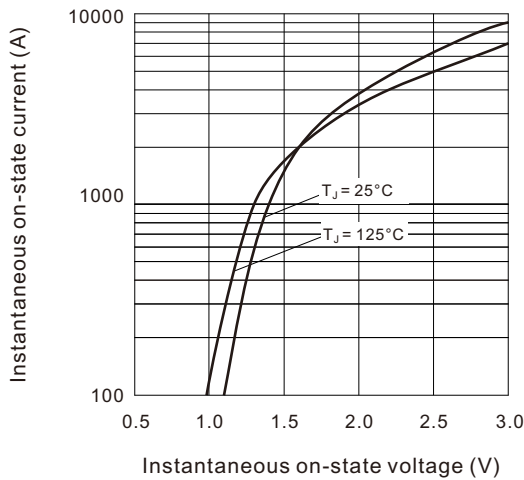


Fig.10 Thermal Impedance Z_{thJ-hs} characteristics

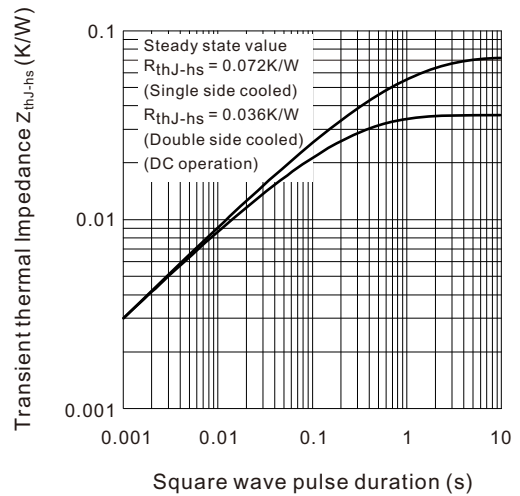
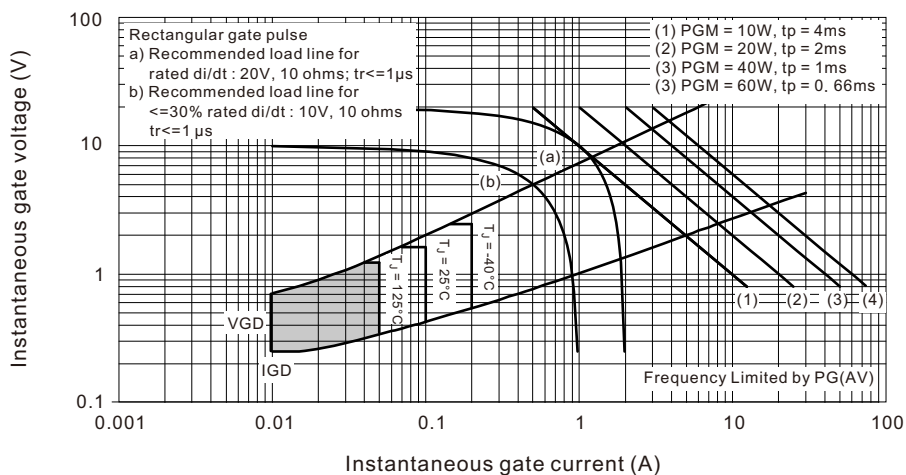


Fig.11 Gate characteristics



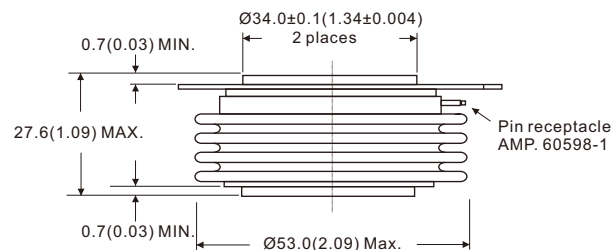
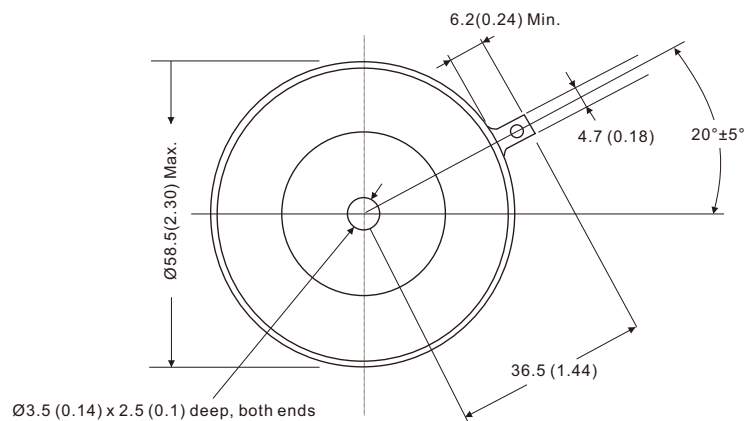
ORDERING INFORMATION TABLE

Device code	1000	PT	16	C	0
	①	②	③	④	⑤

- ① - Maximum average on-state current $I_{T(AV)}$, 1800 for 1800A
- ② - PT = Phase Control Thyristors
- ③ - Voltage code, code $\times 100 = V_{RRM}/V_{RRM}$
- ④ - C = PUK case TO-200AC (B-PUK), Nell's C-type Capsule
- ⑤ - Terminal type, "0" for eyelet

TO-200AC (B-PUK) (Nell's C-type Capsule)

Creepage distance: 28.88(1.137) minimum
Strike distance: 18.0(0.708) minimum



All dimensions in millimeters (inches)

