

Phase Control Thyristors (Hockey PUK Version), 700A

FEATURES

- Center amplifying gate
- Metal case with ceramic insulator
- International standard case TO-220AB (E-PUK),
Nell's B-type Capsule
- Lead (Pb)-free
- Designed and qualified for industrial level



TO-220AB(E-PUK)
(Nell's B-type Capsule)

TYPICAL APPLICATIONS

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

PRODUCT SUMMARY	
$I_{T(AV)}$	700A

MAJOR RATINGS AND CHARACTERISTICS				
PARAMETER	TEST CONDITIONS	VALUES		UNIT
		12 -20	22 -30	
$I_{T(AV)}$	Double side cooled, single phase, 50Hz, 180° half-sine wave	700		A
	T_{hs}	55		°C
$I_{T(RMS)}$		1540		A
	T_{hs}	25		°C
I_{TSM}	50 HZ	9000	8000	A
	60 HZ	9420	8380	
I^2t	50 HZ	405	320	kA ² s
	60 HZ	368	291	
V_{DRM}/V_{RRM}		1200 to 2000	2200 to 3000	V
t_q	Typical	100		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
700PTxxB0	12	1200	1300	30
	16	1600	1700	
	18	1800	1900	
	20	2000	2100	
	22	2200	2300	
	25	2500	2600	
	28	2800	2900	
	30	3000	3100	

FORWARD CONDUCTION							
PARAMETER	SYMBOL	TEST CONDITIONS			VALUES		UNIT
					12~20	22~30	
Maximum average current at heatsink temperature	I _{T(AV)}	180° conduction, half sine wave double side (single side) cooled			700(360)		A
					55(85)		°C
Maximum RMS on-state current	I _{T(RMS)}	DC at 25°C heatsink temperature double side cooled			1540		A
Maximum peak, one cycle non-reptitive surge current	I _{TSM}	t = 10ms	No voltage reapplied	Sinusoidal half wave, initial T _J = T _J maximum	9000	8000	A
		t = 8.3ms			9420	8380	
		t = 10ms	100%V _{RRM} reapplied		7560	6720	
		t = 8.3ms			7915	7035	
Maximum I ² t for fusing	I ² t	t = 10ms	No voltage reapplied		405	320	kA ² s
		t = 8.3ms			368	291	
		t = 10ms	100%V _{RRM} reapplied		285	225	
		t = 8.3ms			260	205	
Maximum I ² √t for fusing	I ² √t	t = 0.1 to 10 ms, no voltage reapplied			4050	3200	kA ² √s
Low level value of threshold voltage	V _{T(TO)1}	(16.7% × π × I _{T(AV)} < I < π × I _{T(AV)}), T _J = T _J maximum			0.91	1.0	V
High level value of threshold voltage	V _{T(TO)2}	(I > π × I _{T(AV)}), T _J = T _J maximum			0.98	1.16	
Low level value on-state slope resistance	r _{t1}	(16.7% × π × I _{T(AV)} < I < π × I _{T(AV)}), T _J = T _J maximum			0.42	0.81	mΩ
High level value on-state slope resistance	r _{t2}	(I > π × I _{T(AV)}), T _J = T _J maximum			0.35	0.70	
Maximum on-state voltage	V _{TM}	I _{pk} = 2100A, T _J = T _J maximum, t _p = 10 ms sine pulse			2.20	2.80	V
Maximum holding current	I _H	T _J = 25°C, anode supply 12V resistive load			600		mA
Typical latching current	I _L				1000		

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 ≤ 1μs T _J =T _J maximum, anode voltage ≤ 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°C	1.0	μs
Typical turn-off time	t _q	I _{TM} = 550A, T _J =T _J maximum, di/dt = 40A/μs. V _R = 50V, dV/dt = 20 V/μs, gate 0 V 100Ω, tp = 500μs	100	

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}	1000	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	30	mA

TRIGGERING						
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES		UNIT
				TYP.	MAX.	
Maximum peak gate power	P _{GM}	T _J = T _J maximum, t _p ≤ 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 ≤ 5 ms		3		A
Maximum peak positive gate voltage	+V _{GM}	T _J = T _J maximum, t _p ≤ 5 ms		20		V
Maximum peak negative gate voltage	-V _{GM}			5		
DC gate current required to trigger	I _{GT}	T _J = -40°C	Maximum required gate current/voltage are the lowest value which will trigger all units 12V anode to cathode applied	200	-	mA
		T _J = 25°C		100	200	
		T _J = 125°C		50	-	
DC gate voltage required to trigger	V _{GT}	T _J = -40°C		2.5	-	V
		T _J = 25°C		1.8	3	
		T _J = 125°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	0.08	K/W
		DC operation double side cooled	0.04	
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, ±10%			9800 (1000)	N (kg)
Approximate weight			83	g
Case style		TO-200AB(E-PUK), Nell's B-typeCapsule		

△ RthJC CONDUCTION						
CONDUCTION ANGEL	SINUSOIDAL CONDUCTION		RECTANGULAR CONDUCTION		TEST CONDUCTIONS	UNITS
	SINGLE SIDE	DOUBLE SIDE	SINGLE SIDE	DOUBLE SIDE		
180°	0.007	0.007	0.005	0.005	Tj = Tj maximum	K/W
120°	0.008	0.008	0.008	0.008		
90°	0.010	0.010	0.011	0.011		
60°	0.015	0.015	0.016	0.016		
30°	0.026	0.026	0.026	0.026		

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

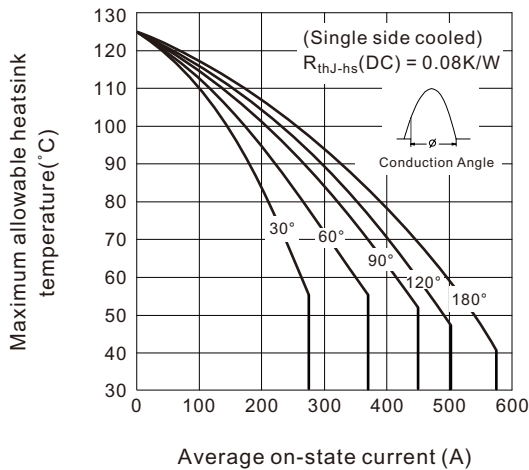


Fig.2 Current ratings characteristics

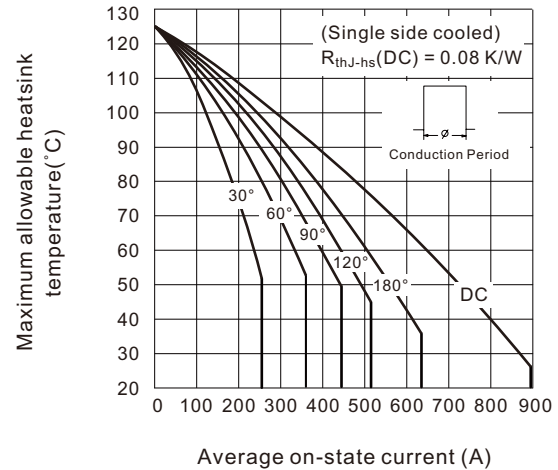


Fig.3 Current ratings characteristics

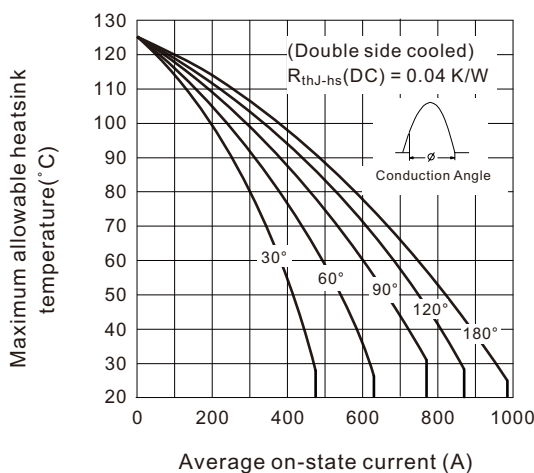


Fig.4 Current ratings characteristics

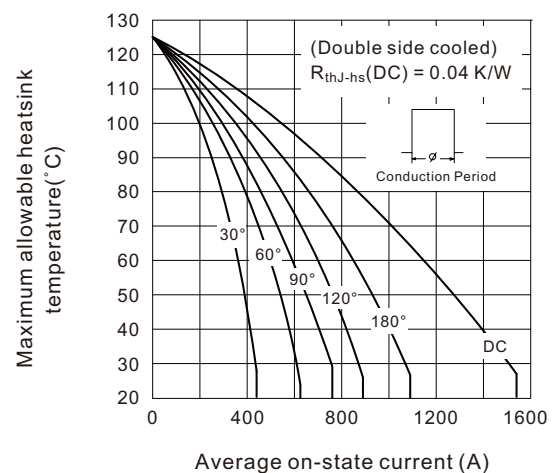


Fig.5 On-state power loss characteristics

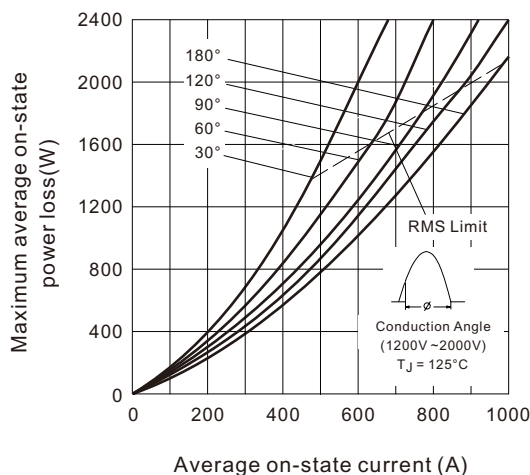


Fig.6 On-state power loss characteristics

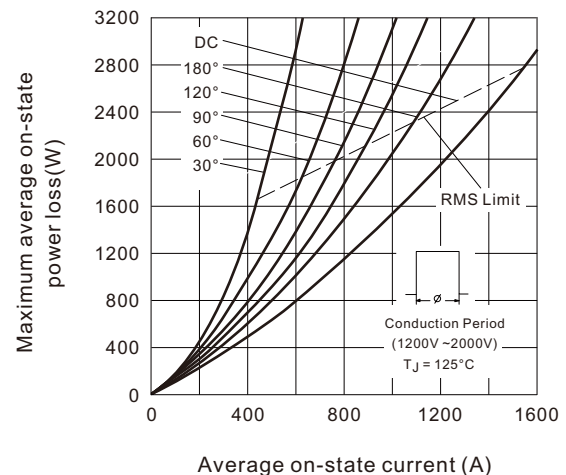


Fig.7 On-state power loss characteristics

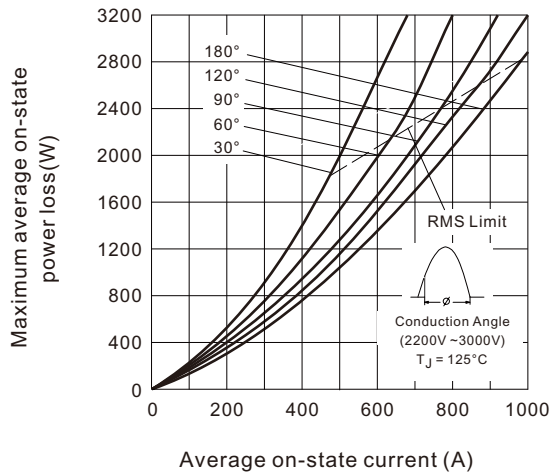


Fig.8 On-state power loss characteristics

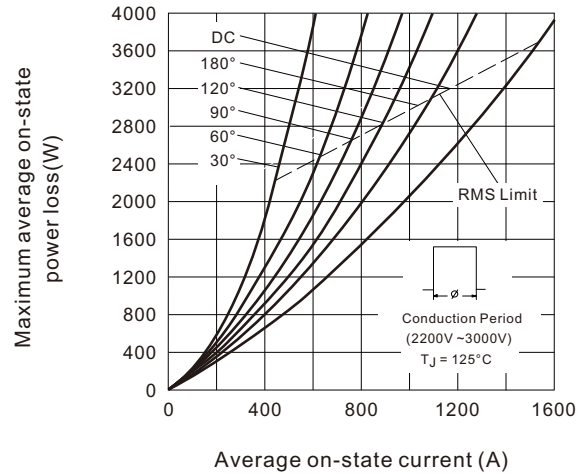


Fig.9 Maximum non-repetitive surge current single and double side cooled

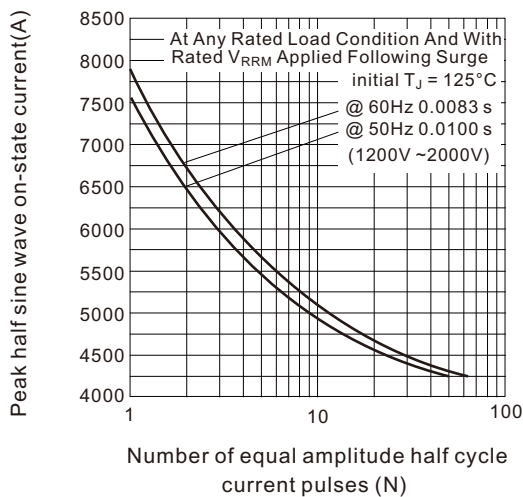


Fig.10 Maximum non-repetitive surge current single and double side cooled

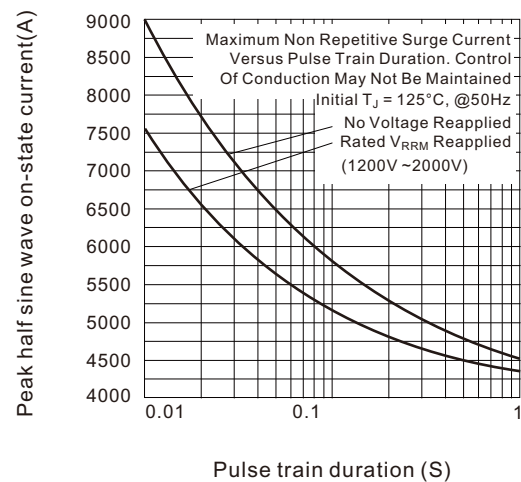


Fig.11 Maximum non-repetitive surge current single and double side cooled

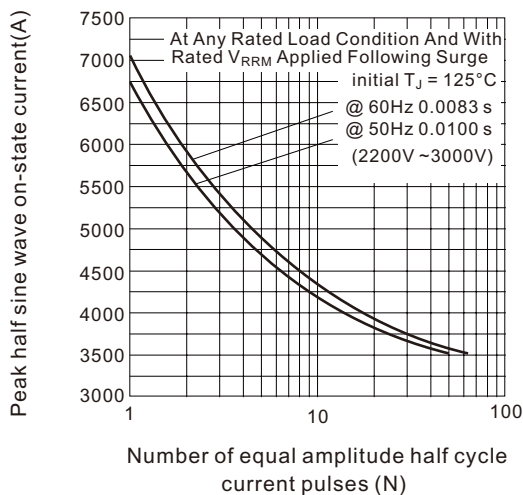


Fig.12 Maximum non-repetitive surge current single and double side cooled

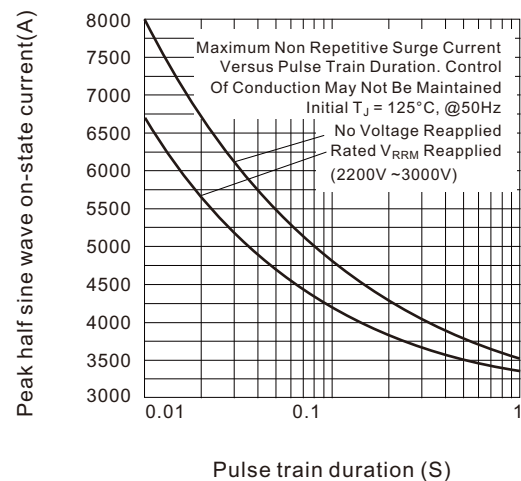


Fig.13 On-state voltage drop characteristics

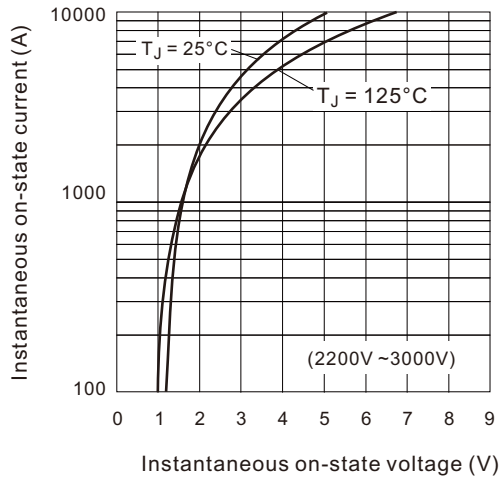


Fig.14 On-state voltage drop characteristics

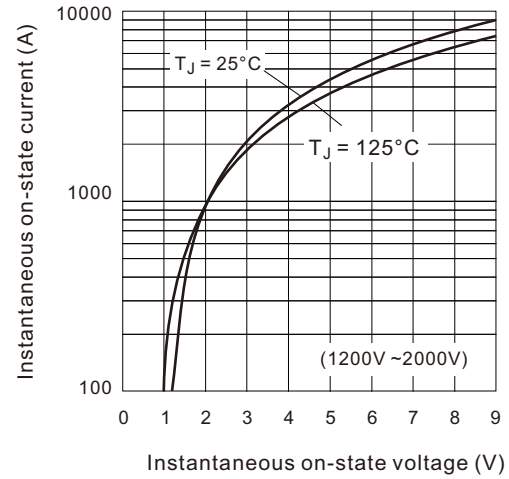


Fig.15 Gate characteristics

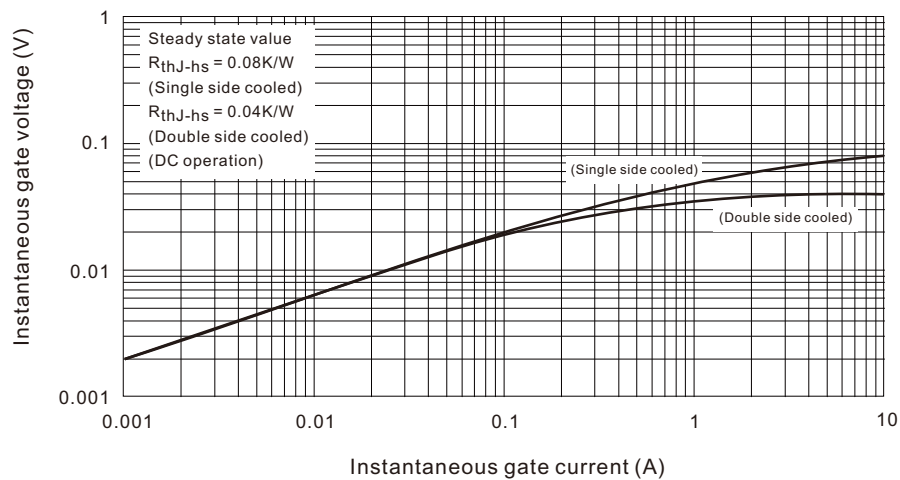
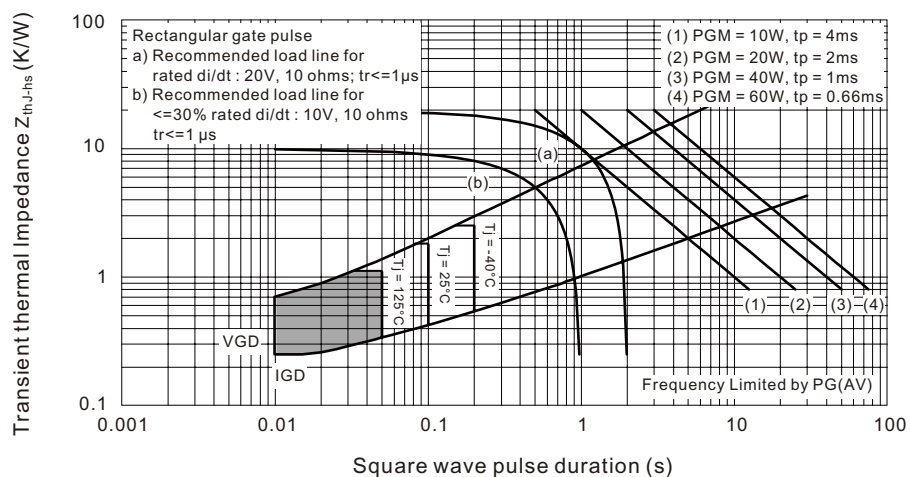


Fig.16 Thermal Impedance Z_{thJ-hs} characteristics

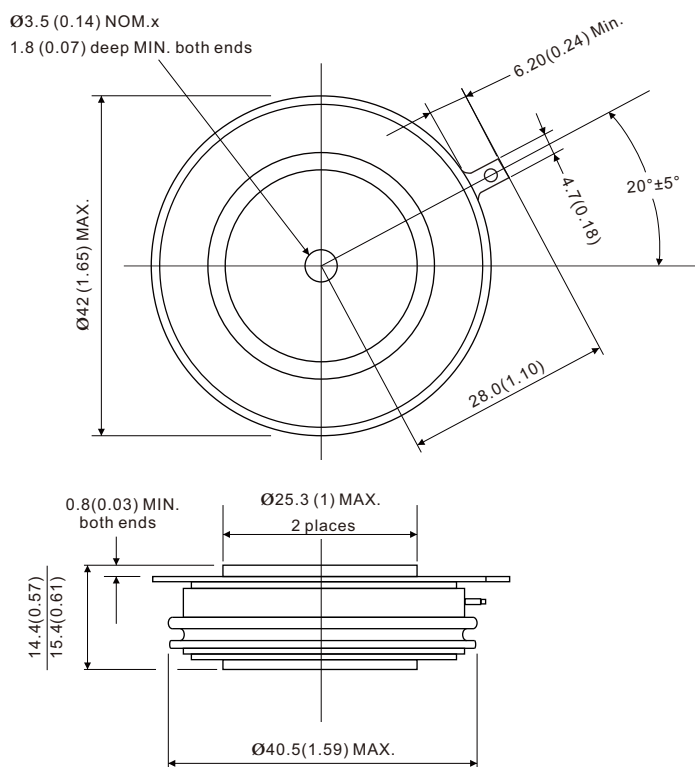


ORDERING INFORMATION TABLE

Device code	700	PT	20	B	0
	①	②	③	④	⑤

- ① - Maximum average on-state current $I_{T(AV)}$, 700 for 700A
- ② - PT = Phase Control Thyristors
- ③ - Voltage code, code $\times 100 = V_{RRM}/V_{RRM}$
- ④ - B = PUK case TO-200AB (E-PUK), Nell's B-type Capsule
- ⑤ - Terminal type, "0" for eyelet

TO-200AB (E-PUK) (Nell's B-type Capsule)



All dimensions in millimeters (inches)

