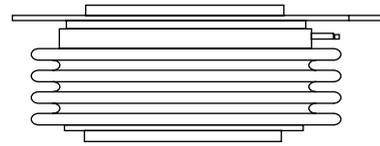


Distributed Gate Thyristors (Hockey PUK Version), 3000A

FEATURES

- Distributed center amplifying gate
- Metal case with ceramic insulator
- International standard case R-PUK
Nell's E-type Capsule
- Compliant to RoHS
- Low on-state and switching losses
- Fast turn-on time, $t_{gt} \leq 3\mu s$
- $di/dt > 1000 A/\mu s$, single shot



R-PUK
(Nell's E-type Capsule)

TYPICAL APPLICATIONS

- DC and AC motor controls
- Controlled DC power supplies
- AC controllers
- Ideal for Impulse Magnetizer

PRODUCT SUMMARY

$I_{T(AV)}$	3000A
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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	3000	A
	T_{hs}	55	°C
$I_{T(RMS)}$		5700	A
	T_{hs}	25	°C
I_{TSM}	50 HZ	50	kA
	60 HZ	52.4	
I^2t	50 HZ	12500	kA ² s
	60 HZ	11395	
V_{DRM}/V_{RRM}		4000 to 5000	V
t_{gt}	Typical	2.0	μs
T_q	Maximum	350	
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
3000PTGxxE0	40	4000	4100	200
	45	4500	4600	
	50	5000	5100	

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		3000(1250)	A
				55/(85)	°C
Maximum RMS on-state current	$I_{T(RMS)}$	DC at 25°C heatsink temperature double side cooled		5700	A
Maximum peak, one cycle non-repetitive surge current	I_{TSM}	t = 10ms	No voltage reapplied	50	KA
		t = 8.3ms		52.4	
		t = 10ms	100% V_{RRM} reapplied	42	
		t = 8.3ms		44	
Maximum I^2t for fusing	I^2t	t = 10ms	No voltage reapplied	12500	kA^2s
		t = 8.3ms		11395	
		t = 10ms	100% V_{RRM} reapplied	8820	
		t = 8.3ms		8035	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	t = 0.1 to 10 ms, no voltage reapplied		125000	$kA^2\sqrt{s}$
Maximum value of threshold voltage	$V_{T(TO)}$	$I_{TM} = 4000A, T_J = T_J$ maximum		1.45	V
Maximum value of on-state slope resistance	r_t			0.15	mΩ
Maximum on-state voltage	V_{TM}	$I_{TM} = 4000A, T_J = T_J$ maximum, $t_p = 10$ ms sine pulse		2.10	V
Maximum holding current	I_H	$T_J = 25^\circ C$, anode supply 12V resistive load		500	mA
Typical latching current	I_L			1000	

SWITCHING					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNIT
Minimum non-repetitive rate of rise of turned-on current	dI/dt	$V_D = 67\% V_{DRM}, I_{FG} = 2A, t_r < 0.5\mu s, T_{case} = 125^\circ C$		1000	A/μs
Typical turn-off time	t_q	$I_{TM} = 4000A, T_J = T_J$ maximum, dI/dt = 60A/μs. $V_R = 100V, dV/dt = 20 V/\mu s, V_D = 67\% V_{DRM}, t_p = 2000\mu s$		350	μs
Maximum gate controlled turn-on delay time	t_d	$V_D = 67\%, V_{DRM}, I_{TM} = 4000A, dI/dt = 60A/\mu s. I_{FG} = 2A, t_r = 0.5\mu s, T_J = 25^\circ C$		2.0	
Maximum turn-on time	t_{gt}			3.0	
Typical reverse recovery time	t_{rr}	$I_{TM} = 4000A, t_p = 2000\mu s, dI/dt = 60A/\mu s, V_R = 100V$		35	
Typical recovered charge	Q_{rr}			3000	μC
Typical reverse recovery current	I_{rm}			400	A

BLOCKING					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNIT
Minimum critical rate of rise of off-state voltage	dV/dt	$T_J = T_J$ maximum, linear to 80% rated V_{DRM}		200	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		200	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	50		W	
Maximum average gate power	$P_{G(AV)}$	$T_J = T_J$ maximum, $f = 50$ Hz, $d\% = 50$	4			
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}	$T_J = -40^\circ\text{C}$	100	-	mA	
		$T_J = 25^\circ\text{C}$	50	300		
		$T_J = 125^\circ\text{C}$	25	-		
DC gate voltage required to trigger	V_{GT}	$T_J = -40^\circ\text{C}$	1.3	-	V	
		$T_J = 25^\circ\text{C}$	1.0	3.0		
		$T_J = 125^\circ\text{C}$	0.8	-		
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	$^\circ\text{C}$
Maximum storage temperature range	T_{stg}		-40 to 150	
Maximum thermal resistance, junction to heatsink	$R_{th(J-hs)}$	DC operation single side cooled	0.013	$^\circ\text{C/W}$
		DC operation double side cooled	0.0065	
Maximum thermal resistance, case to heatsink	$R_{th(C-hs)}$	DC operation single side cooled	0.003	
		DC operation double side cooled	0.0015	
Mounting force, $\pm 10\%$			40000 (4045)	N (kg)
Approximate weight			1500	g
Case style		R-PUK, Nell's E-type Capsule		

ΔR_{thJC} CONDUCTION						
CONDUCTION ANGEL	SINUSOIDAL CONDUCTION		RECTANGULAR CONDUCTION		TEST CONDUCTIONS	UNITS
	SINGLE SIDE	DOUBLE SIDE	SINGLE SIDE	DOUBLE SIDE		
180°	0.0004	0.0005	0.0003	0.0003	$T_J = T_J$ maximum	K/W
120°	0.0005	0.0006	0.0005	0.0005		
90°	0.0006	0.0007	0.0007	0.0007		
60°	0.0009	0.0009	0.0010	0.0010		
30°	0.0016	0.0016	0.0017	0.0017		

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

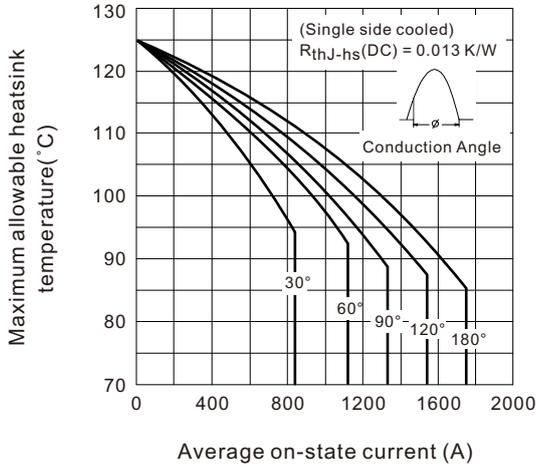


Fig.2 Current ratings characteristics

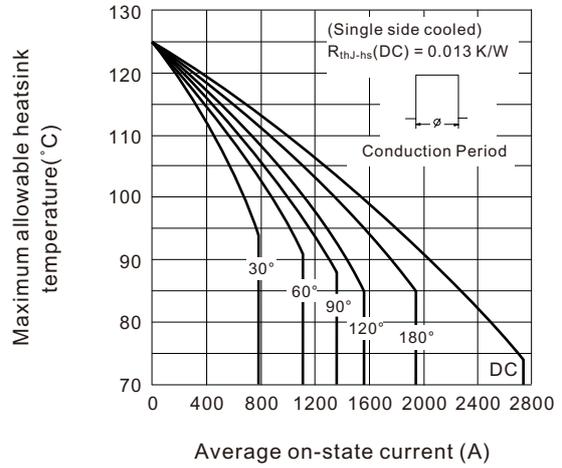


Fig.3 Current ratings characteristics

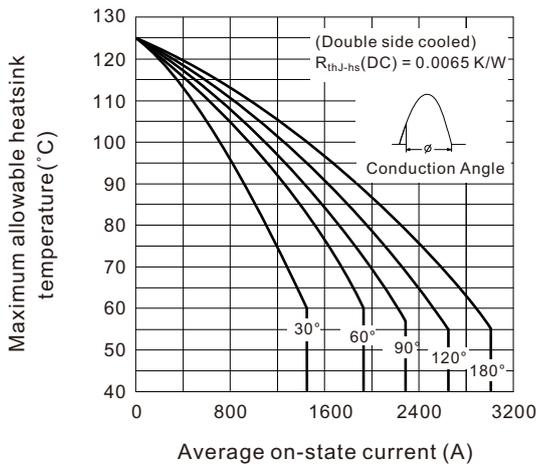


Fig.4 Current ratings characteristics

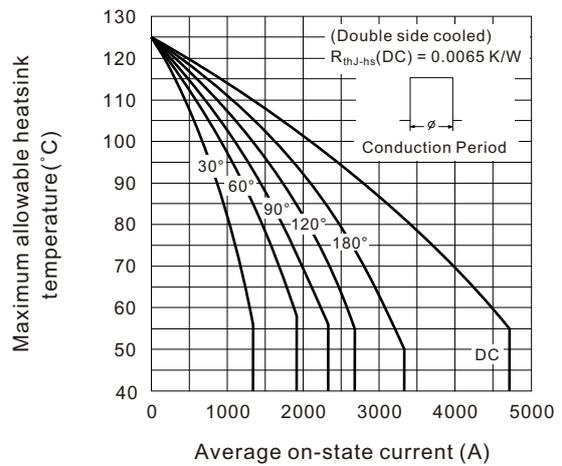


Fig.5 On-state power loss characteristics

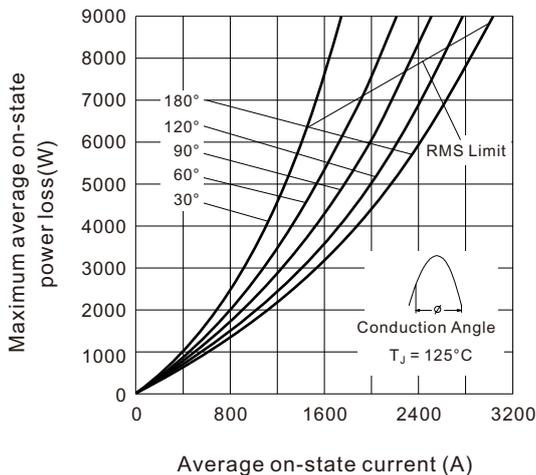


Fig.6 On-state power loss characteristics

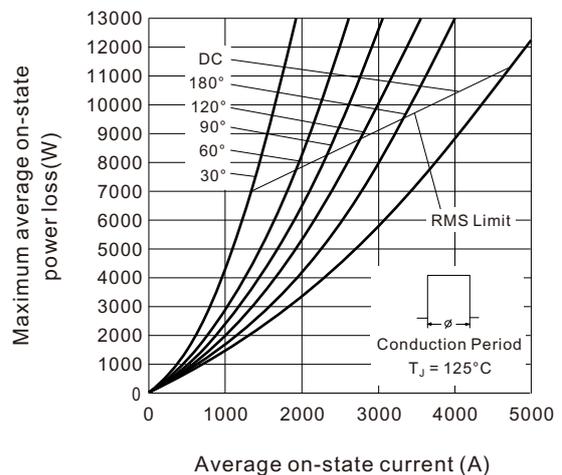


Fig.7 Maximum non-repetitive surge current single and double side cooled

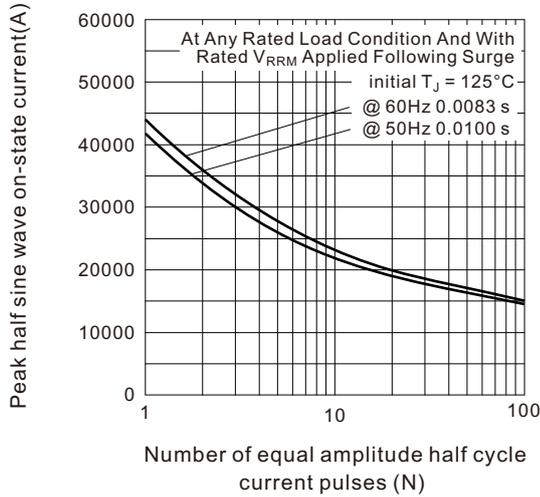


Fig.8 Maximum non-repetitive surge current single and double side cooled

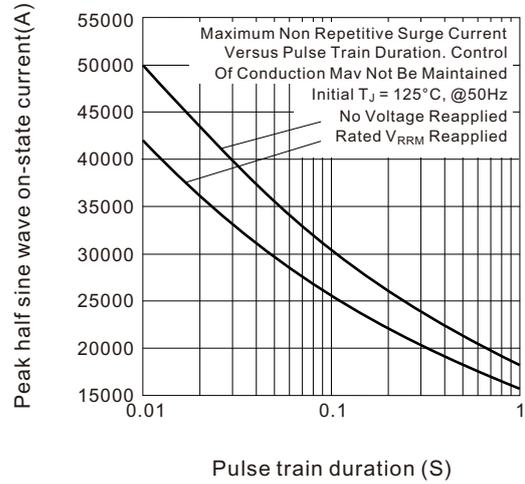


Fig.9 Maximum on-state voltage drop characteristics

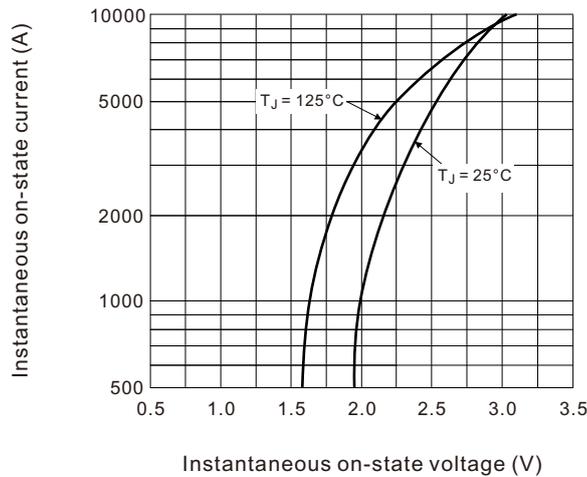


Fig.10 Thermal Impedance $Z_{th(J-hs)}$ characteristics

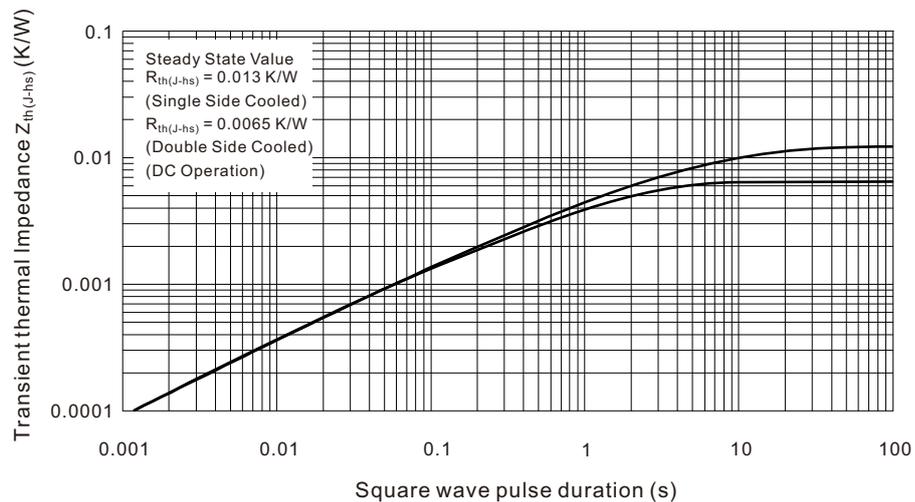


Fig.11 Gate characteristics - Trigger limits

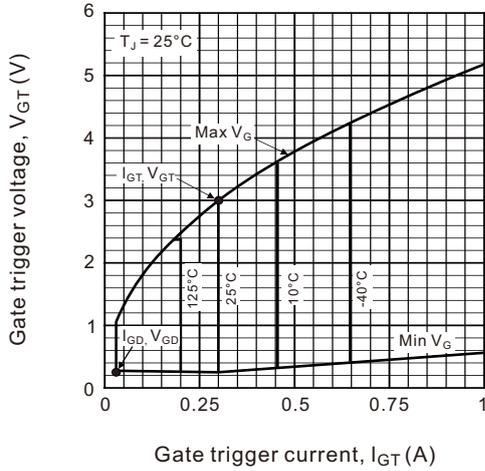


Fig.12 Gate characteristics - Power curves

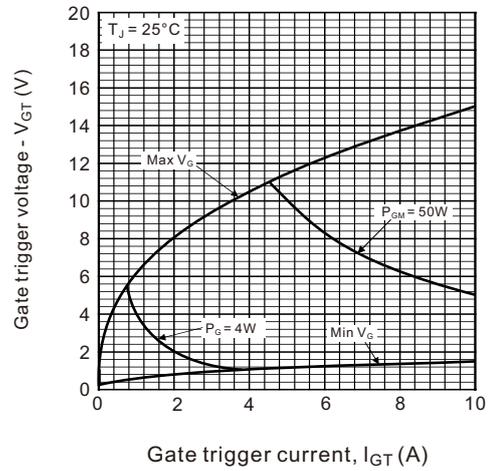


Fig.13 Total recovered charge, Q_{rr}

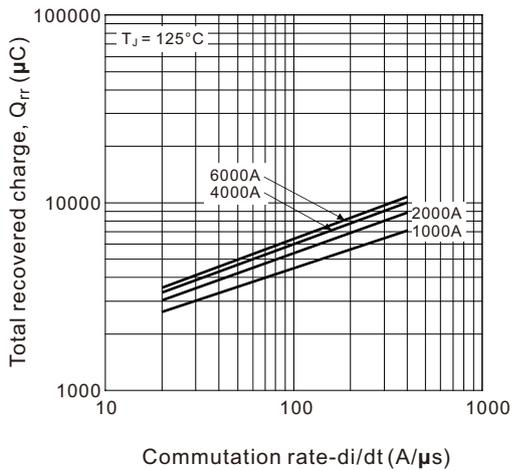


Fig.14 Recovered charge, Q_{ra} (50% chord)

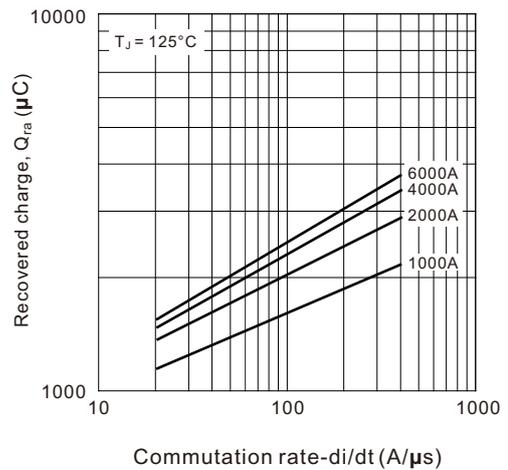


Fig.15 Peak reverse recovery current, I_{rm}

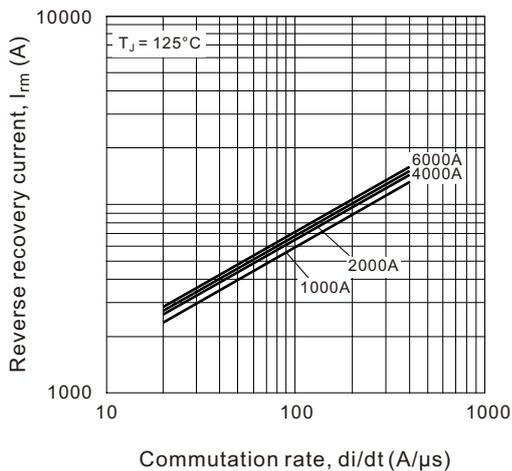


Fig.16 Maximum recovery time, t_{rr} (50% chord)

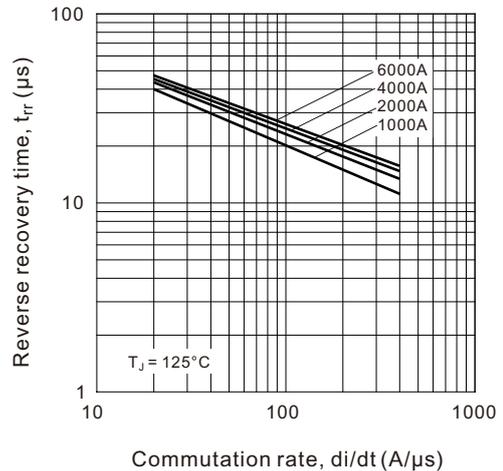


Fig.17 Reverse recovery energy per pulse

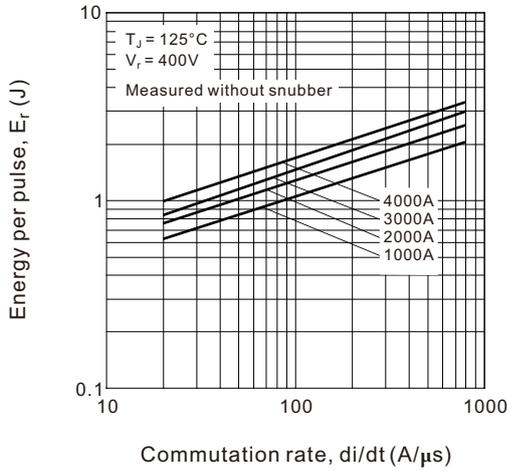
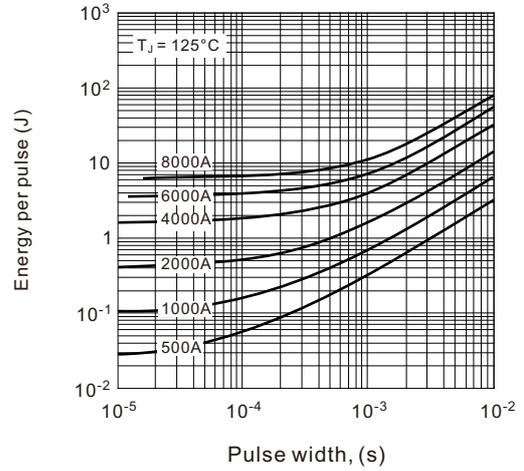


Fig.18 Sine wave energy per pulse

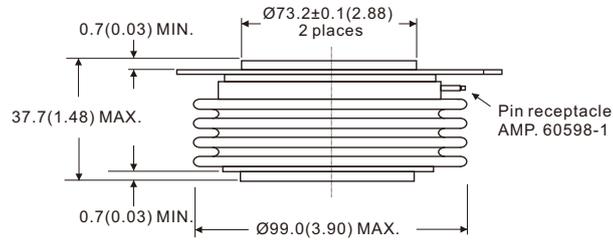
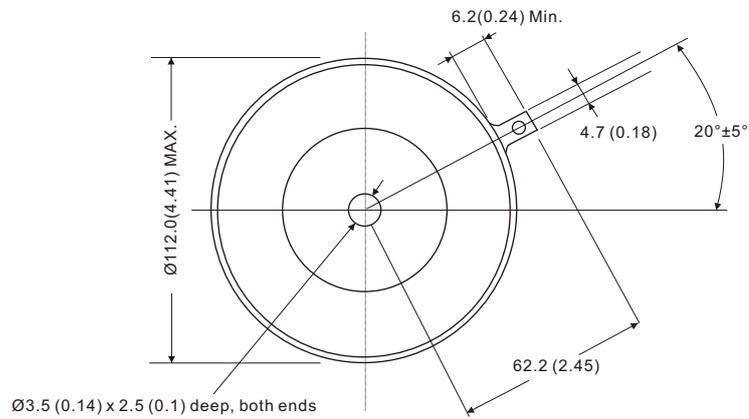


ORDERING INFORMATION TABLE

Device code	3000	PTG	45	E	0
	①	②	③	④	⑤

- 1 - Maximum average on-state current $I_{T(AV)}$, 3000 for 3000A
- 2 - PTG = Distribute gate thyristor
- 3 - Voltage code, cold $\times 100 = V_{RRM}/V_{RRM}$
- 4 - E = PUK case R-PUK, Nell's E-type Capsule
- 5 - Terminal type, "0" for eyelet

R-PUK (Nell's E-type Capsule)



All dimensions in millimeters (inches)

