



DISCRETE POWER DIODES and THYRISTORS
DATA BOOK

PHASE CONTROL THYRISTORS
Hockey Puk Version
Features

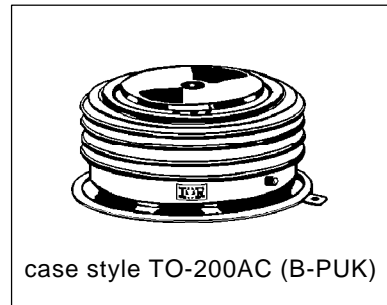
- Center amplifying gate
- Metal case with ceramic insulator
- International standard case TO-200AC (B-PUK)

Typical Applications

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

Major Ratings and Characteristics

Parameters	ST300C..L	Units
$I_{T(AV)}$	560	A
	@ T_{hs}	55 °C
$I_{T(RMS)}$	1115	A
	@ T_{hs}	25 °C
I_{TSM}	@ 50Hz	8000 A
	@ 60Hz	8380 A
I^2t	@ 50Hz	320 KA^2s
	@ 60Hz	292 KA^2s
V_{DRM}/V_{RRM}	400 to 2000	V
t_q typical	100	μs
T_J	- 40 to 125	°C

560A


ST300C..L Series

ELECTRICAL SPECIFICATIONS

Voltage Ratings

Type number	Voltage Code	V_{DRM}/V_{RRM} , max. repetitive peak and off-state voltage V	V_{RSM} , maximum non-repetitive peak voltage V	I_{DRM}/I_{RRM} max. @ $T_J = T_J$ max mA
ST300C..L	04	400	500	50
	08	800	900	
	12	1200	1300	
	16	1600	1700	
	18	1800	1900	
	20	2000	2100	

On-state Conduction

Parameter	ST300C..L	Units	Conditions		
$I_{T(AV)}$ Max. average on-state current @ Heatsink temperature	560 (275)	A	180° conduction, half sine wave double side (single side) cooled		
	55 (75)	°C			
$I_{T(RMS)}$ Max. RMS on-state current	1115	A	DC @ 25°C heatsink temperature double side cooled		
I_{TSM} Max. peak, one-cycle non-repetitive surge current	8000		t = 10ms	No voltage	
	8380		t = 8.3ms	reapplied	
	6730		t = 10ms	100% V_{RRM}	
	7040		t = 8.3ms	reapplied	
I^2t Maximum I^2t for fusing	320		KA ² s	t = 10ms	No voltage
	292			t = 8.3ms	reapplied
	226			t = 10ms	100% V_{RRM}
	207	t = 8.3ms		reapplied	
$I^2\sqrt{t}$ Maximum $I^2\sqrt{t}$ for fusing	3200	KA ² /s	t = 0.1 to 10ms, no voltage reapplied		
$V_{T(TO)1}$ Low level value of threshold voltage	0.97	V	$(16.7\% \times \pi \times I_{T(AV)} < I < \pi \times I_{T(AV)})$, $T_J = T_J$ max.		
$V_{T(TO)2}$ High level value of threshold voltage	0.98		$(I > \pi \times I_{T(AV)})$, $T_J = T_J$ max.		
r_{t1} Low level value of on-state slope resistance	0.74	mΩ	$(16.7\% \times \pi \times I_{T(AV)} < I < \pi \times I_{T(AV)})$, $T_J = T_J$ max.		
r_{t2} High level value of on-state slope resistance	0.73		$(I > \pi \times I_{T(AV)})$, $T_J = T_J$ max.		
V_{TM} Max. on-state voltage	2.18	V	$I_{pk} = 1635A$, $T_J = T_J$ max, $t_p = 10ms$ sine pulse		
I_H Maximum holding current	600	mA	$T_J = 25^\circ C$, anode supply 12V resistive load		
I_L Typical latching current	1000				

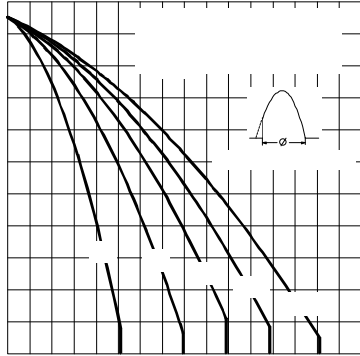


Fig. 3 - Current Ratings Characteristics

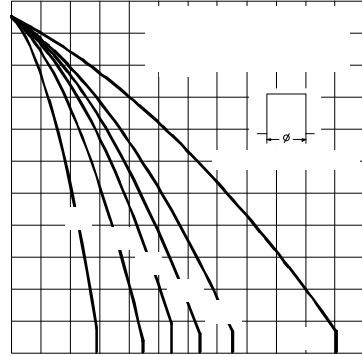


Fig. 4 - Current Ratings Characteristics

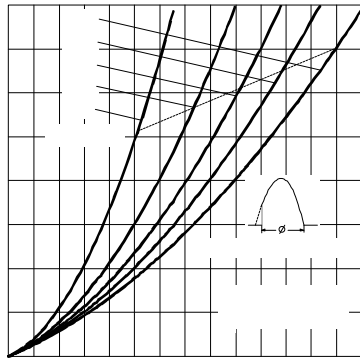


Fig. 5 - On-state Power Loss Characteristics

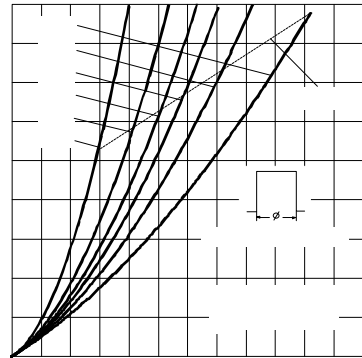


Fig. 6 - On-state Power Loss Characteristics

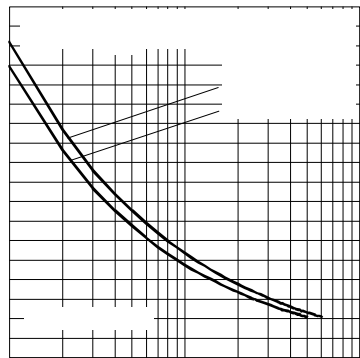


Fig. 7 - Maximum Non-Repetitive Surge Current
Single and Double Side Cooled

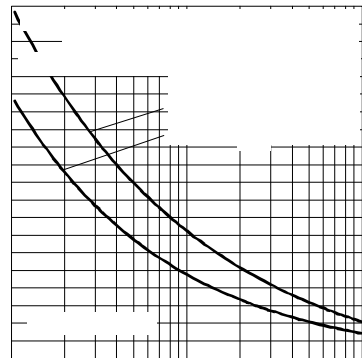


Fig. 8 - Maximum Non-Repetitive Surge Current
Single and Double Side Cooled

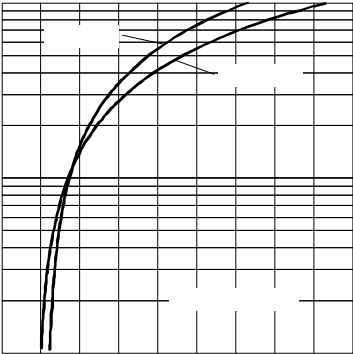


Fig. 9 - On-state Voltage Drop Characteristics

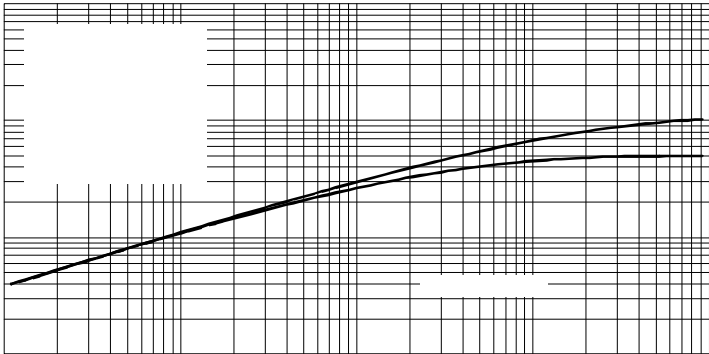


Fig. 10 - Thermal Impedance Z_{thJ-hs} Characteristics

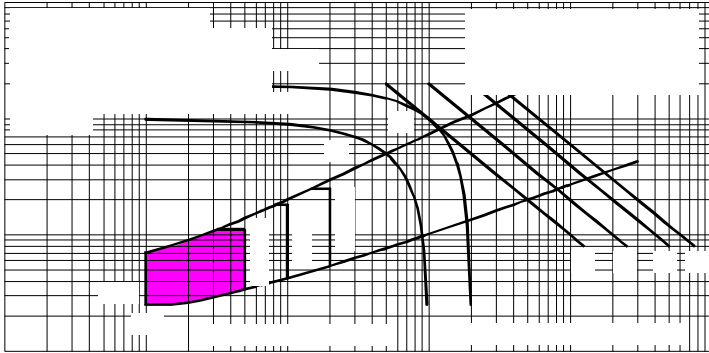


Fig. 11 - Gate Characteristics

Switching

Parameter	ST300C..L	Units	Conditions
di/dt Max. non-repetitive rate of rise of turned-on current	1000	A/μs	Gate drive 20V, 20Ω, $t_r \leq 1\mu s$ $T_J = T_J \text{ max, anode voltage} \leq 80\% V_{DRM}$
t_d Typical delay time	1.0	μs	Gate current 1A, $di_g/dt = 1A/\mu s$ $V_d = 0.67\% V_{DRM}, T_J = 25^\circ C$
t_q Typical turn-off time	100		$I_{TM} = 550A, T_J = T_J \text{ max, } di/dt = 40A/\mu s, V_R = 50V$ $dv/dt = 20V/\mu s, \text{ Gate } 0V \text{ } 100\Omega, t_p = 500\mu s$

Blocking

Parameter	ST300C..L	Units	Conditions
dv/dt Maximum critical rate of rise of off-state voltage	500	V/μs	$T_J = T_J \text{ max, linear to } 80\% \text{ rated } V_{DRM}$
I_{RRM} I_{DRM} Max. peak reverse and off-state leakage current	50	mA	$T_J = T_J \text{ max, rated } V_{DRM}/V_{RRM} \text{ applied}$

Triggering

Parameter	ST300C..L		Units	Conditions
P_{GM} Maximum peak gate power	10.0		W	$T_J = T_J \text{ max, } t_p \leq 5ms$
$P_{G(AV)}$ Maximum average gate power	2.0			$T_J = T_J \text{ max, } f = 50Hz, d\% = 50$
I_{GM} Max. peak positive gate current	3.0		A	$T_J = T_J \text{ max, } t_p \leq 5ms$
$+V_{GM}$ Maximum peak positive gate voltage	20		V	$T_J = T_J \text{ max, } t_p \leq 5ms$
$-V_{GM}$ Maximum peak negative gate voltage	5.0			
I_{GT} DC gate current required to trigger	TYP.	MAX.	mA	$T_J = -40^\circ C$ $T_J = 25^\circ C$ $T_J = 125^\circ C$ Max. required gate trigger/ current/ voltage are the lowest value which will trigger all units 12V anode-to-cathode applied
	200	-		
	100	200		
V_{GT} DC gate voltage required to trigger	2.5	-	V	$T_J = -40^\circ C$ $T_J = 25^\circ C$ $T_J = 125^\circ C$
	1.8	3.0		
	1.1	-		
I_{GD} DC gate current not to trigger	10.0		mA	$T_J = T_J \text{ max}$ Max. gate current/voltage not to trigger is the max. value which will not trigger any unit with rated V_{DRM} anode-to-cathode applied
V_{GD} DC gate voltage not to trigger	0.25		V	

ST300C..L Series

Thermal and Mechanical Specification

Parameter	ST300C..L	Units	Conditions
T_J Max. operating temperature range	-40 to 125	°C	
T_{stg} Max. storage temperature range	-40 to 150		
R_{thJ-hs} Max. thermal resistance, junction to heatsink	0.11	K/W	DC operation single side cooled
	0.05		DC operation double side cooled
R_{thC-hs} Max. thermal resistance, case to heatsink	0.011	K/W	DC operation single side cooled
	0.006		DC operation double side cooled
F Mounting force, $\pm 10\%$	9800 (1000)	N (Kg)	
wt Approximate weight	250	g	
Case style	TO - 200AC (B-PUK)		See Outline Table

ΔR_{thJ-hs} Conduction

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

Conduction angle	Sinusoidal conduction		Rectangular conduction		Units	Conditions
	Single Side	Double Side	Single Side	Double Side		
180°	0.012	0.010	0.008	0.008	K/W	$T_J = T_J \text{ max.}$
120°	0.014	0.015	0.014	0.014		
90°	0.018	0.018	0.019	0.019		
60°	0.026	0.027	0.027	0.028		
30°	0.045	0.046	0.046	0.046		

Ordering Information Table

Device Code																	
<table border="1" style="margin: auto;"> <tr> <td style="text-align: center;">ST</td> <td style="text-align: center;">30</td> <td style="text-align: center;">0</td> <td style="text-align: center;">C</td> <td style="text-align: center;">20</td> <td style="text-align: center;">L</td> <td style="text-align: center;">1</td> <td style="text-align: center;"> </td> </tr> <tr> <td style="text-align: center;">①</td> <td style="text-align: center;">②</td> <td style="text-align: center;">③</td> <td style="text-align: center;">④</td> <td style="text-align: center;">⑤</td> <td style="text-align: center;">⑥</td> <td style="text-align: center;">⑦</td> <td style="text-align: center;">⑧</td> </tr> </table>	ST	30	0	C	20	L	1		①	②	③	④	⑤	⑥	⑦	⑧	
ST	30	0	C	20	L	1											
①	②	③	④	⑤	⑥	⑦	⑧										
1	- Thyristor																
2	- Essential part number																
3	- 0 = Converter grade																
4	- C = Ceramic Puk																
5	- Voltage code: Code x 100 = V_{RRM} (See Voltage Rating Table)																
6	- L = Puk Case TO-200AC (B-PUK)																
7	- 0 = Eyelet terminals (Gate and Auxiliary Cathode Unsoldered Leads) 1 = Fast-on terminals (Gate and Auxiliary Cathode Unsoldered Leads) 2 = Eyelet terminals (Gate and Auxiliary Cathode Soldered Leads) 3 = Fast-on terminals (Gate and Auxiliary Cathode Soldered Leads)																
8	- Critical dv/dt: None = 500V/ μ sec (Standard value) L = 1000V/ μ sec (Special selection)																

Outline Table

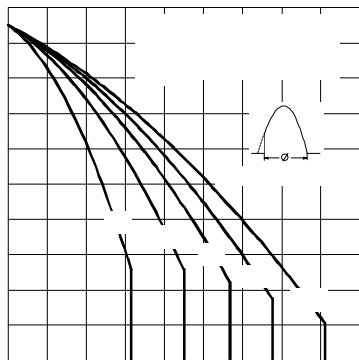
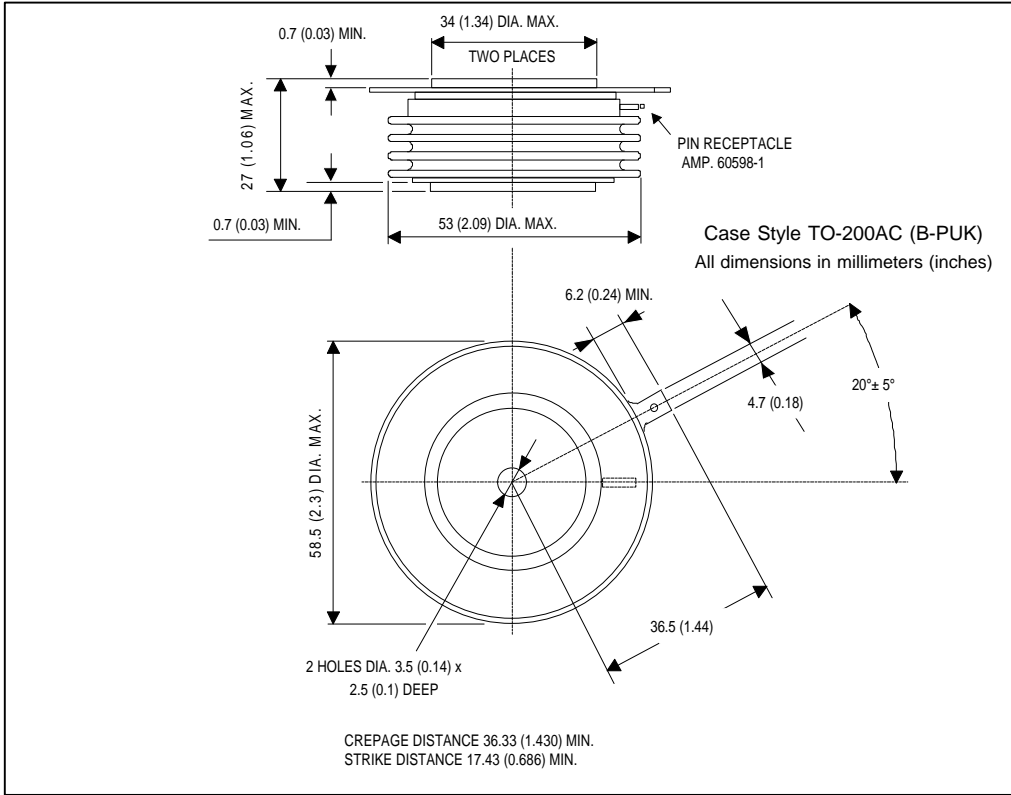


Fig. 1 - Current Ratings Characteristics

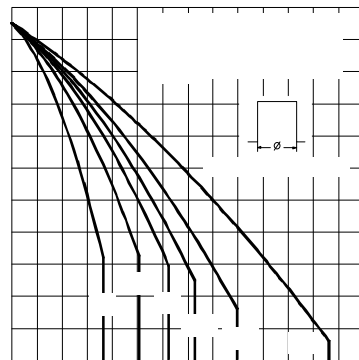


Fig. 2 - Current Ratings Characteristics