



DISCRETE POWER DIODES and THYRISTORS
DATA BOOK

PHASE CONTROL THYRISTORS
Hockey Puk Version
Features

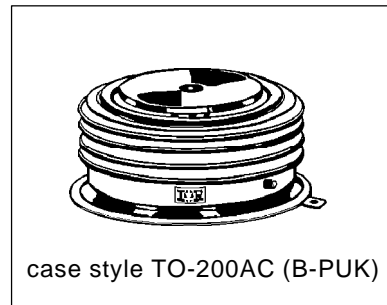
- Center amplifying gate
- Metal case with ceramic insulator
- International standard case TO-200AC (B-PUK)

Typical Applications

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

Major Ratings and Characteristics

Parameters	ST700C..L	Units
$I_{T(AV)}$	910	A
	@ T_{hs}	55 °C
$I_{T(RMS)}$	1857	A
	@ T_{hs}	25 °C
I_{TSM}	@ 50Hz	15700 A
	@ 60Hz	16400 A
I^2t	@ 50Hz	1232 KA ² s
	@ 60Hz	1125 KA ² s
V_{DRM}/V_{RRM}	1200 to 2200	V
t_q typical	150	μs
T_J	- 40 to 125	°C

910A


ST700C..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
ST700C..L	12	1200	1300	80
	16	1600	1700	
	18	1800	1900	
	20	2000	2100	
	22	2200	2300	

On-state Conduction

Parameter	ST700C..L	Units	Conditions	
$I_{T(AV)}$ Max. average on-state current @ Heatsink temperature	910 (355)	A	180° conduction, half sine wave double side (single side) cooled	
	55 (85)	°C		
$I_{T(RMS)}$ Max. RMS on-state current	1857	A	DC @ 25°C heatsink temperature double side cooled	
I_{TSM} Max. peak, one-cycle non-repetitive surge current	15700		t = 10ms	No voltage reappplied
	16400		t = 8.3ms	reappplied
	13200		t = 10ms	100% V_{RRM}
	13800		t = 8.3ms	reappplied
I^2t Maximum I^2t for fusing	1232	KA ² s	t = 10ms	No voltage reappplied
	1125		t = 8.3ms	reappplied
	871		t = 10ms	100% V_{RRM}
	795		t = 8.3ms	reappplied
$I^2\sqrt{t}$ Maximum $I^2\sqrt{t}$ for fusing	12321	KA ² √s	t = 0.1 to 10ms, no voltage reappplied	
$V_{T(TO)1}$ Low level value of threshold voltage	1.00	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	1.13		$(I > \pi \times I_{T(AV)}), T_J = T_J$ max.	
r_{t1} Low level value of on-state slope resistance	0.40	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	0.35		$(I > \pi \times I_{T(AV)}), T_J = T_J$ max.	
V_{TM} Max. on-state voltage	1.80	V	$I_{pk} = 2000A, T_J = T_J$ 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			

ST700C..L Series

Switching

Parameter	ST700C..L	Units	Conditions
di/dt Max. non-repetitive rate of rise of turned-on current	1000	A/μs	Gate drive 20V, 20Ω, $t_r \leq 1\mu\text{s}$ $T_J = T_J \text{ max}$, anode voltage $\leq 80\% V_{\text{DRM}}$
t_d Typical delay time	1.0	μs	Gate current 1A, $di_g/dt = 1\text{A}/\mu\text{s}$ $V_d = 0.67\% V_{\text{DRM}}$, $T_J = 25^\circ\text{C}$
t_q Typical turn-off time	150		$I_{\text{TM}} = 750\text{A}$, $T_J = T_J \text{ max}$, $di/dt = 60\text{A}/\mu\text{s}$, $V_R = 50\text{V}$ $dv/dt = 20\text{V}/\mu\text{s}$, Gate 0V 100Ω, $t_p = 500\mu\text{s}$

Blocking

Parameter	ST700C..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% rated V_{DRM}
I_{DRM} I_{RRM} Max. peak reverse and off-state leakage current	80	mA	$T_J = T_J \text{ max}$, rated $V_{\text{DRM}}/V_{\text{RRM}}$ applied

Triggering

Parameter	ST700C..L		Units	Conditions
P_{GM} Maximum peak gate power	10.0		W	$T_J = T_J \text{ max}$, $t_p \leq 5\text{ms}$
$P_{\text{G(AV)}}$ Maximum average gate power	2.0			$T_J = T_J \text{ max}$, $f = 50\text{Hz}$, $d\% = 50$
I_{GM} Max. peak positive gate current	3.0		A	$T_J = T_J \text{ max}$, $t_p \leq 5\text{ms}$
$+V_{\text{GM}}$ Maximum peak positive gate voltage	20		V	$T_J = T_J \text{ max}$, $t_p \leq 5\text{ms}$
$-V_{\text{GM}}$ Maximum peak negative gate voltage	5.0			
I_{GT} DC gate current required to trigger	TYP.	MAX.	mA	$T_J = -40^\circ\text{C}$ $T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$ 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	$T_J = -40^\circ\text{C}$ $T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$
	1.8	3.0		
	1.1	-		
I_{GD} DC gate current not to trigger	10		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	

ST700C..L Series

Thermal and Mechanical Specification

Parameter	ST700C..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	0.073 0.031	K/W	DC operation single side cooled DC operation double side cooled
R _{thC-hs} Max. thermal resistance, case to heatsink	0.011 0.006	K/W	DC operation single side cooled DC operation double side cooled
F Mounting force, ± 10%	14700 (1500)	N (Kg)	
wt Approximate weight	255	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°	0.009	0.009	0.006	0.006	K/W	T _J = T _J max.
120°	0.011	0.011	0.011	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		

Ordering Information Table

Device Code																	
<table border="1" style="margin: auto;"> <tr> <td style="padding: 5px;">ST</td> <td style="padding: 5px;">70</td> <td style="padding: 5px;">0</td> <td style="padding: 5px;">C</td> <td style="padding: 5px;">22</td> <td style="padding: 5px;">L</td> <td style="padding: 5px;">1</td> <td style="padding: 5px;"> </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	70	0	C	22	L	1		①	②	③	④	⑤	⑥	⑦	⑧	<p>1 - Thyristor</p> <p>2 - Essential part number</p> <p>3 - 0 = Converter grade</p> <p>4 - C = Ceramic Puk</p> <p>5 - Voltage code: Code x 100 = V_{RRM} (See Voltage Rating Table)</p> <p>6 - L = Puk Case TO-200AC (B-PUK)</p> <p>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)</p> <p>8 - Critical dv/dt: None = 500V/μsec (Standard selection) L = 1000V/μsec (Special selection)</p>
ST	70	0	C	22	L	1											
①	②	③	④	⑤	⑥	⑦	⑧										

Outline Table

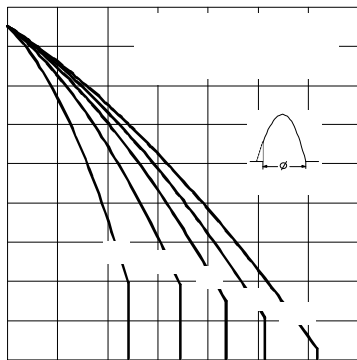
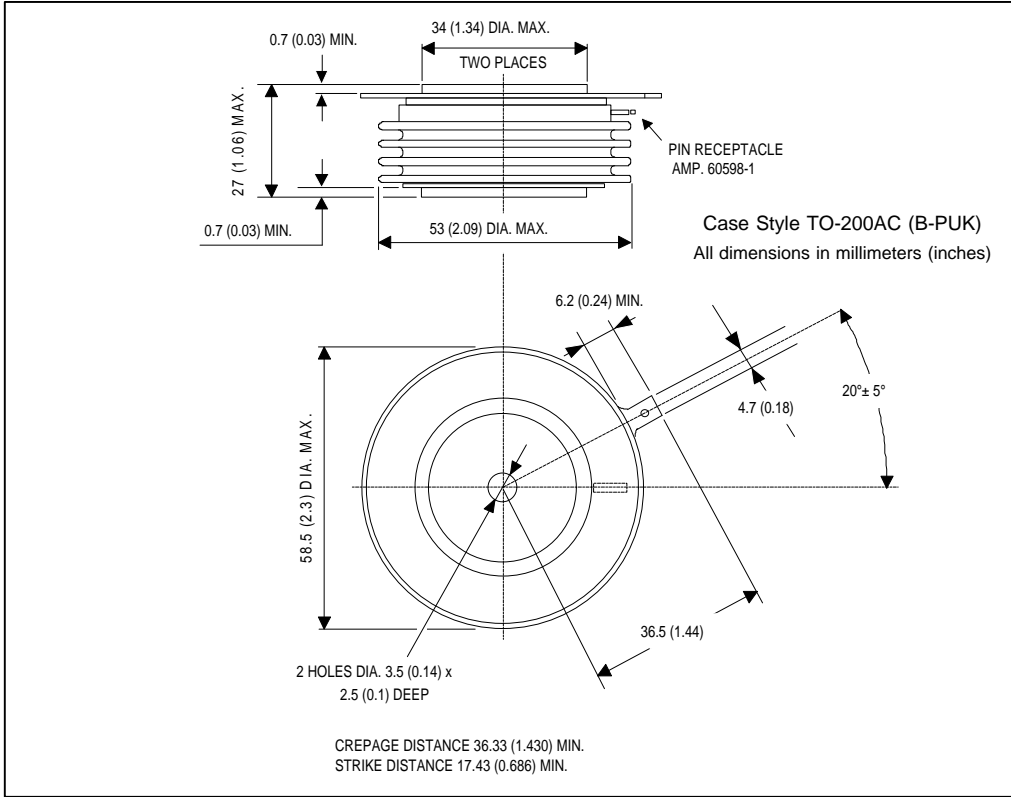


Fig. 1 - Current Ratings Characteristics

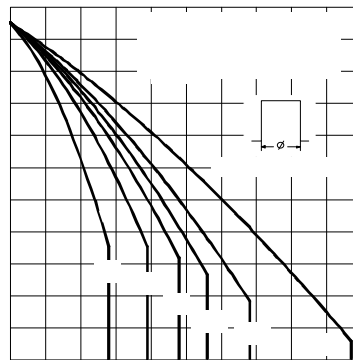


Fig. 2 - Current Ratings Characteristics