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***DISCRETE POWER DIODES and THYRISTORS***  
***DATA BOOK***

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**INVERTER GRADE THYRISTORS**
**Hockey Puk Version**
**Features**

- Metal case with ceramic insulator
- International standard case TO-200AB (A-PUK)
- All diffused design
- Center amplifying gate
- Guaranteed high  $dV/dt$
- Guaranteed high  $dI/dt$
- High surge current capability
- Low thermal impedance
- High speed performance

**Typical Applications**

- Inverters
- Choppers
- Induction heating
- All types of force-commutated converters

**370A**


case style TO-200AB (A-PUK)

**Major Ratings and Characteristics**

Parameters	ST183C..C	Units
$I_{T(AV)}$	370	A
@ $T_{hs}$	55	°C
$I_{T(RMS)}$	690	A
@ $T_{hs}$	25	°C
$I_{TSM}$	@ 50Hz 4900	A
	@ 60Hz 5130	A
$I^2t$	@ 50Hz 120	KA <sup>2</sup> s
	@ 60Hz 110	KA <sup>2</sup> s
$V_{DRM}/V_{RRM}$	400 to 800	V
$t_q$ range	10 to 20	μs
$T_J$	- 40 to 125	°C


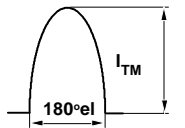
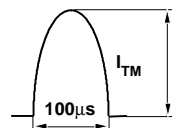
## ST183C..C Series

### ELECTRICAL SPECIFICATIONS

#### Voltage Ratings

Type number	Voltage Code	$V_{DRM}/V_{RRM}$ , maximum repetitive peak voltage V	$V_{RSM}$ , maximum non-repetitive peak voltage V	$I_{DRM}/I_{RRM}$ max. @ $T_J = T_J$ max. mA
ST183C..C	04	400	500	40
	08	800	900	

#### Current Carrying Capability

Frequency							Units
50Hz	770	660	1220	1160	5450	4960	A
400Hz	730	600	1270	1090	2760	2420	
1000Hz	600	490	1210	1040	1600	1370	
2500Hz	350	270	860	730	800	680	
Recovery voltage Vr	50	50	50	50	50	50	V
Voltage before turn-on Vd	$V_{DRM}$		$V_{DRM}$		$V_{DRM}$		
Rise of on-state current di/dt	50	50	-	-	-	-	A/µs
Heatsink temperature	40	55	40	55	40	55	°C
Equivalent values for RC circuit	47Ω / 0.22µF		47Ω / 0.22µF		47Ω / 0.22µF		

#### On-state Conduction

Parameter	ST183C..C	Units	Conditions	
$I_{T(AV)}$ Max. average on-state current @ Heatsink temperature	370 (130)	A	180° conduction, half sine wave double side (single side) cooled	
	55 (85)	°C		
$I_{T(RMS)}$ Max. RMS on-state current	690	A	DC @ 25°C heatsink temperature double side cooled	
$I_{TSM}$ Max. peak, one half cycle, non-repetitive surge current	4900		t = 10ms	No voltage reappplied
	5130		t = 8.3ms	reappplied
	4120		t = 10ms	100% $V_{RRM}$
4310	t = 8.3ms	reappplied	Sinusoidal half wave, Initial $T_J = T_J$ max	
$I^2t$ Maximum $I^2t$ for fusing	120	KA <sup>2</sup> s	t = 10ms	No voltage reappplied
	110		t = 8.3ms	reappplied
	85		t = 10ms	100% $V_{RRM}$
	78		t = 8.3ms	reappplied
$I^2\sqrt{t}$ Maximum $I^2\sqrt{t}$ for fusing	1200	KA <sup>2</sup> √s	t = 0.1 to 10ms, no voltage reappplied	

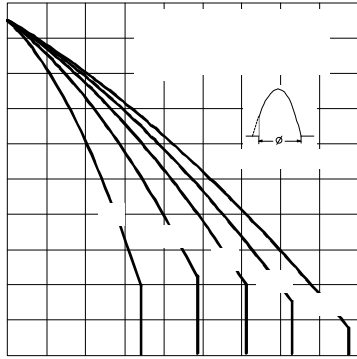


Fig. 3 - Current Ratings Characteristics

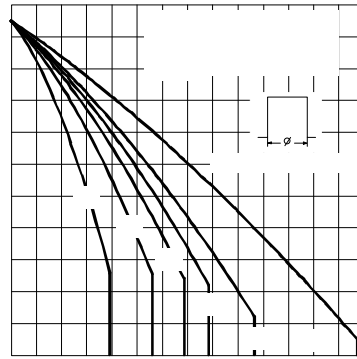


Fig. 4 - Current Ratings Characteristics

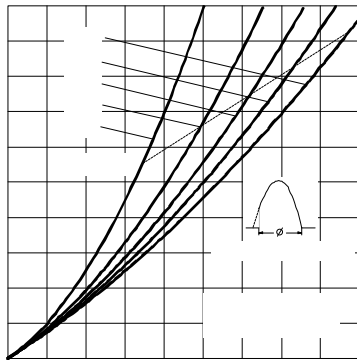


Fig. 5 - On-state Power Loss Characteristics

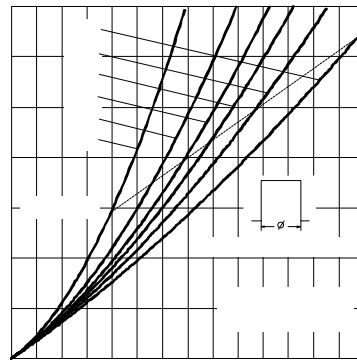


Fig. 6 - On-state Power Loss Characteristics

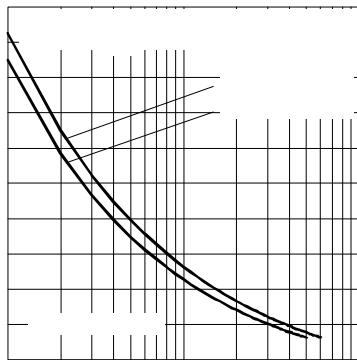


Fig. 7 - Maximum Non-repetitive Surge Current  
Single and Double Side Cooled

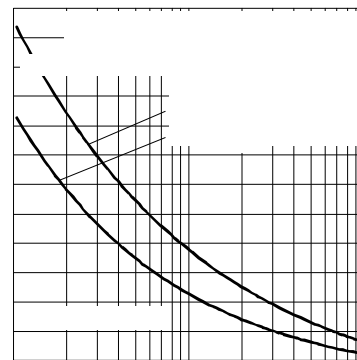


Fig. 8 - Maximum Non-repetitive Surge Current  
Single and Double Side Cooled

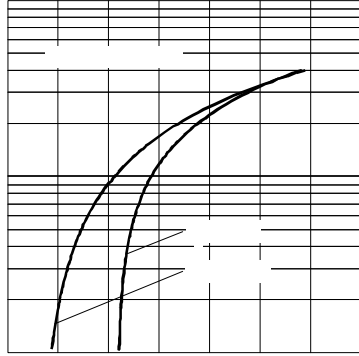


Fig. 9 - On-state Voltage Drop Characteristics

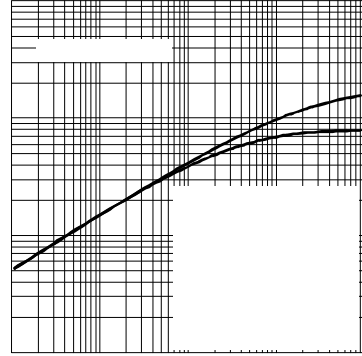


Fig. 10 - Thermal Impedance  $Z_{thJ-hs}$  Characteristics

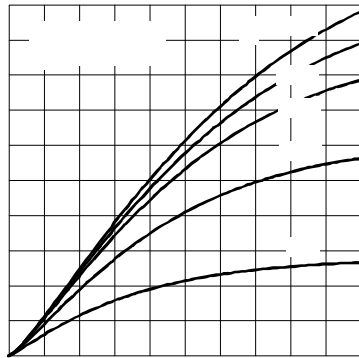


Fig. 11 - Reverse Recovered Charge Characteristics

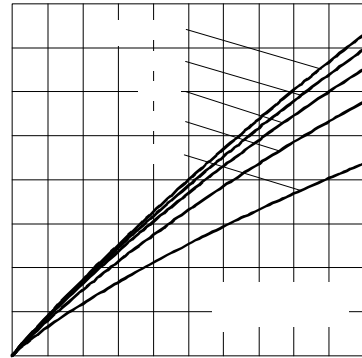


Fig. 12 - Reverse Recovery Current Characteristics

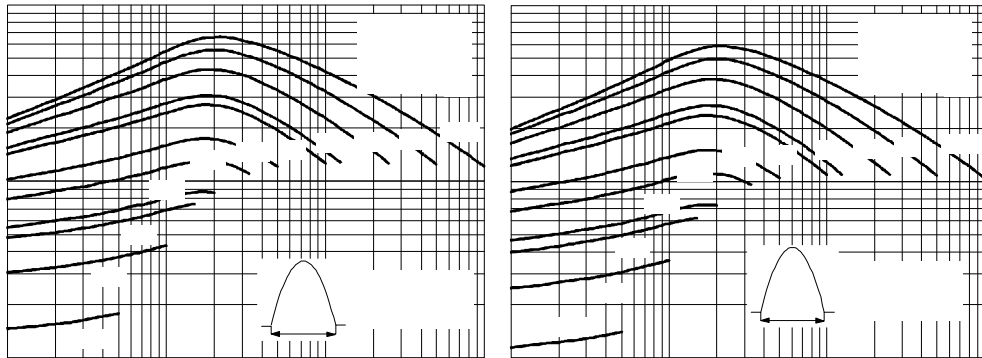


Fig. 13 - Frequency Characteristics

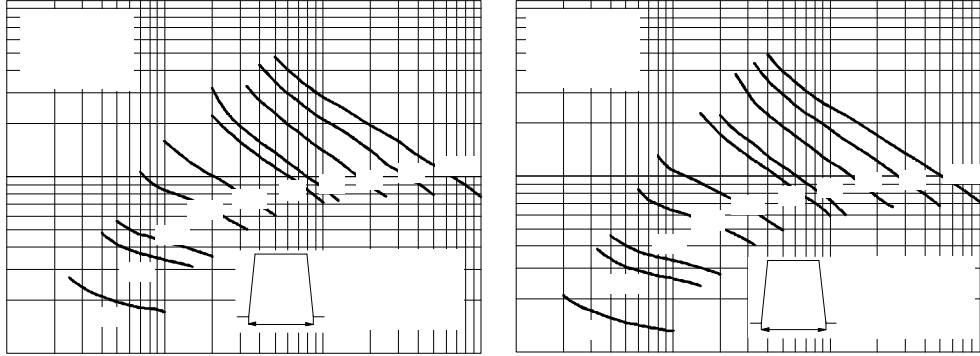


Fig. 14 - Frequency Characteristics

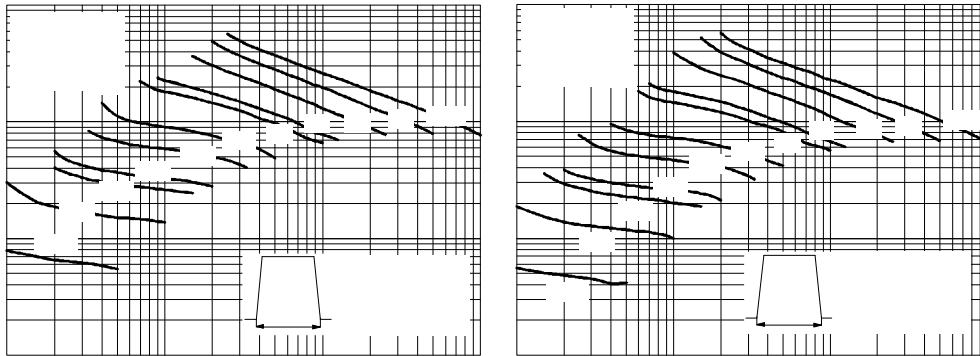


Fig. 15 - Frequency Characteristics

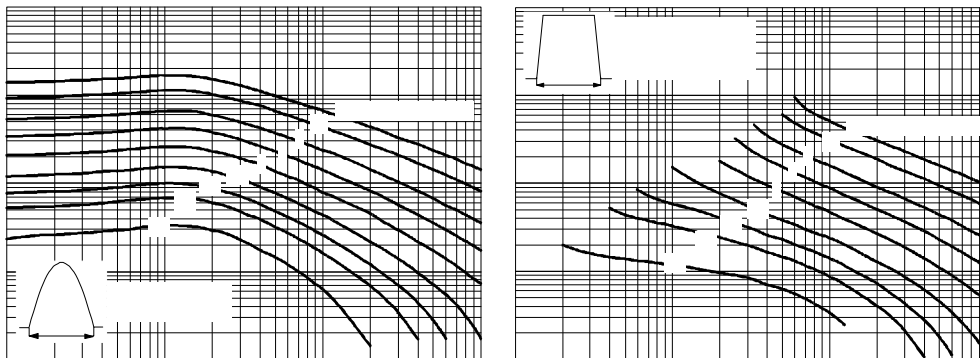


Fig. 16 - Maximum On-state Energy Power Loss Characteristics

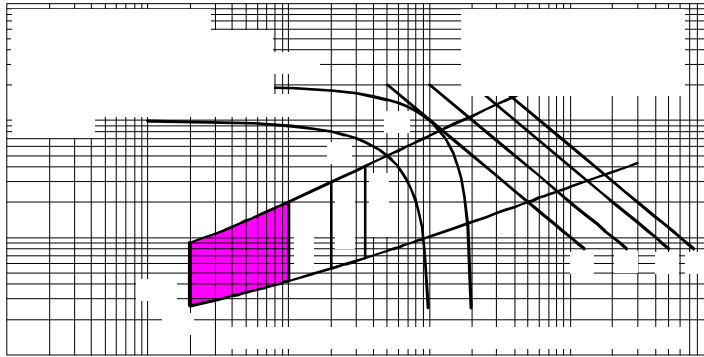


Fig. 17 - Gate Characteristics

## On-state Conduction

Parameter	ST183C..C	Units	Conditions
$V_{TM}$ Max. peak on-state voltage	1.80	V	$I_{TM} = 600A$ , $T_J = T_J \text{ max}$ , $t_p = 10\text{ms}$ sine wave pulse
$V_{T(TO)1}$ Low level value of threshold voltage	1.40		$(16.7\% \times \pi \times I_{T(AV)} < I < \pi \times I_{T(AV)})$ , $T_J = T_J \text{ max}$ .
$V_{T(TO)2}$ High level value of threshold voltage	1.45		$(I > \pi \times I_{T(AV)})$ , $T_J = T_J \text{ max}$ .
$r_{t1}$ Low level value of forward slope resistance	0.67	m $\Omega$	$(16.7\% \times \pi \times I_{T(AV)} < I < \pi \times I_{T(AV)})$ , $T_J = T_J \text{ max}$ .
$r_{t2}$ High level value of forward slope resistance	0.58		$(I > \pi \times I_{T(AV)})$ , $T_J = T_J \text{ max}$ .
$I_H$ Maximum holding current	600	mA	$T_J = 25^\circ\text{C}$ , $I_T > 30A$
$I_L$ Typical latching current	1000		$T_J = 25^\circ\text{C}$ , $V_A = 12V$ , $R_a = 6\Omega$ , $I_G = 1A$

## Switching

Parameter	ST183C..C	Units	Conditions
$di/dt$ Max. non-repetitive rate of rise of turned-on current	1000	A/ $\mu\text{s}$	$T_J = T_J \text{ max}$ , $V_{DRM} = \text{rated } V_{DRM}$ $I_{TM} = 2 \times di/dt$
$t_d$ Typical delay time	1.1	$\mu\text{s}$	$T_J = 25^\circ\text{C}$ , $V_{DM} = \text{rated } V_{DRM}$ , $I_{TM} = 50A \text{ DC}$ , $t_p = 1\mu\text{s}$ Resistive load, Gate pulse: 10V, 5 $\Omega$ source
$t_q$ Max. turn-off time	Min 10 Max 20		$T_J = T_J \text{ max}$ , $I_{TM} = 300A$ , commutating $di/dt = 20A/\mu\text{s}$ $V_R = 50V$ , $t_p = 500\mu\text{s}$ , $dv/dt$ : see table in device code

## Blocking

Parameter	ST183C..C	Units	Conditions
$dv/dt$ Maximum critical rate of rise of off-state voltage	500	V/ $\mu\text{s}$	$T_J = T_J \text{ max}$ . linear to 80% $V_{DRM}$ , higher value available on request
$I_{RRM}$ $I_{DRM}$ Max. peak reverse and off-state leakage current	40	mA	$T_J = T_J \text{ max}$ , rated $V_{DRM}/V_{RRM}$ applied

## Triggering

Parameter	ST183C..C	Units	Conditions
$P_{GM}$ Maximum peak gate power	60	W	$T_J = T_J \text{ max}$ , $f = 50\text{Hz}$ , $d\% = 50$
$P_{G(AV)}$ Maximum average gate power	10		
$I_{GM}$ Max. peak positive gate current	10	A	$T_J = T_J \text{ max}$ , $t_p \leq 5\text{ms}$
$+V_{GM}$ Maximum peak positive gate voltage	20	V	$T_J = T_J \text{ max}$ , $t_p \leq 5\text{ms}$
$-V_{GM}$ Maximum peak negative gate voltage	5		
$I_{GT}$ Max. DC gate current required to trigger	200	mA	$T_J = 25^\circ\text{C}$ , $V_A = 12V$ , $R_a = 6\Omega$
$V_{GT}$ Max. DC gate voltage required to trigger	3	V	
$I_{GD}$ Max. DC gate current not to trigger	20	mA	$T_J = T_J \text{ max}$ , rated $V_{DRM}$ applied
$V_{GD}$ Max. DC gate voltage not to trigger	0.25	V	



## ST183C..C Series

### Thermal and Mechanical Specification

Parameter	ST183C..C	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	0.17	K/W	DC operation single side cooled
	0.08		DC operation double side cooled
$R_{thC-hs}$ Max. thermal resistance, case to heatsink	0.033	K/W	DC operation single side cooled
	0.017		DC operation double side cooled
F Mounting force, ± 10%	4900 (500)	N (Kg)	
wt Approximate weight	50	g	
Case style	TO - 200AB (A-PUK)		See Outline Table

### $\Delta R_{thJ-hs}$ 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°	0.015	0.016	0.011	0.011	K/W	$T_J = T_J \text{ max.}$
120°	0.018	0.019	0.019	0.019		
90°	0.024	0.024	0.026	0.026		
60°	0.035	0.035	0.036	0.037		
30°	0.060	0.060	0.060	0.061		

### Ordering Information Table

Device Code									
1	2	3	4	5	6	7	8	9	10
ST	18	3	C	08	C	H	K	1	
<b>1</b>	- Thyristor								
<b>2</b>	- Essential part number								
<b>3</b>	- 3 = Fast turn off								
<b>4</b>	- C = Ceramic Puk								
<b>5</b>	- Voltage code: Code x 100 = $V_{RRM}$ (See Voltage Rating Table)								
<b>6</b>	- C = Puk Case TO-200AB (A-PUK)								
<b>7</b>	- Reapplied dv/dt code (for $t_q$ test condition)								
<b>8</b>	- $t_q$ code								
<b>9</b>	- 0 = Eyelet term. (Gate and Aux. Cathode Unsoldered Leads)								
	1 = Fast-on term. (Gate and Aux. Cathode Unsoldered Leads)								
	2 = Eyelet term. (Gate and Aux. Cathode Soldered Leads)								
	3 = Fast-on term. (Gate and Aux. Cathode Soldered Leads)								
<b>10</b>	- Critical dv/dt:								
	None = 500V/ $\mu$ sec (Standard value)								
	L = 1000V/ $\mu$ sec (Special selection)								

dv/dt - $t_q$ combinations available						
dv/dt (V/ $\mu$ s)	20	50	100	200	400	
$t_q$ ( $\mu$ s)	10	CN	DN	EN	FN*	HN
	12	CM	DM	EM	FM	HM
	15	CL	DL	EL	FL*	HL
	18	CP	DP	EP	FP	HP
	20	CK	DK	EK	FK	HK

\*Standard part number.  
All other types available only on request.

Outline Table

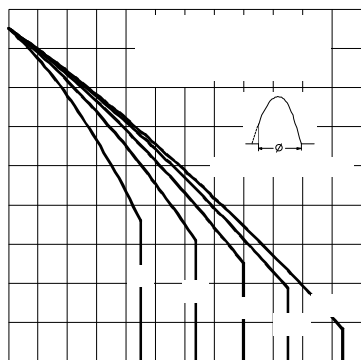
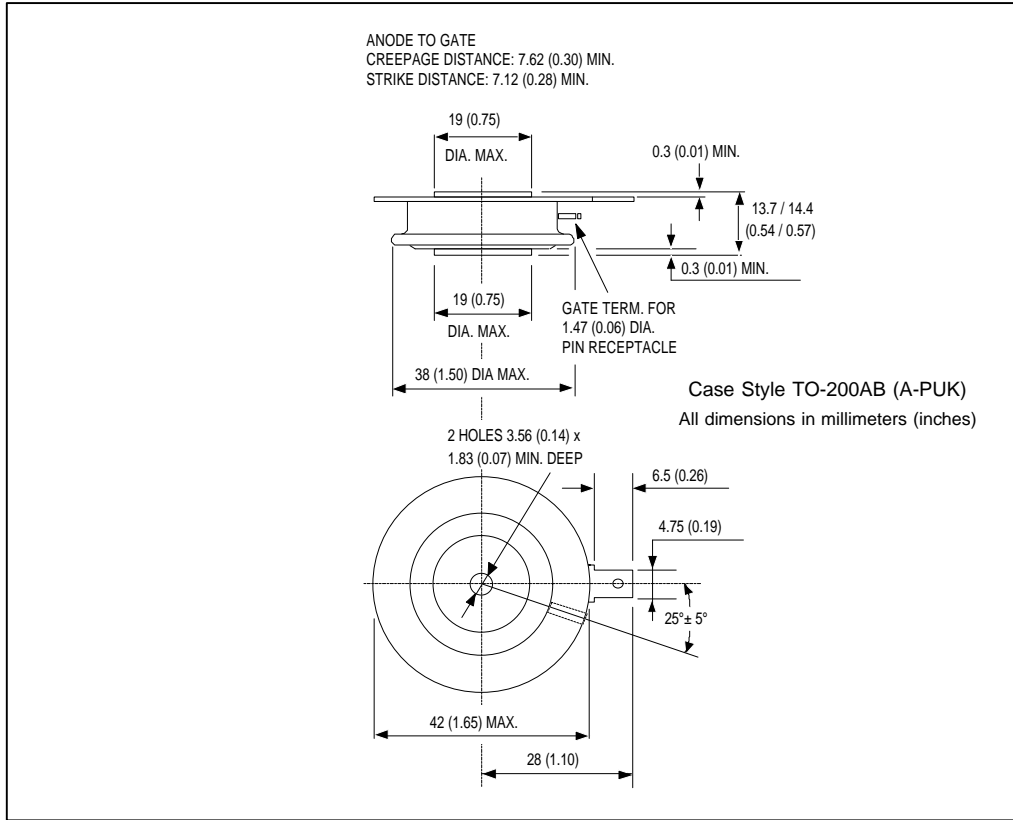


Fig. 1 - Current Ratings Characteristics

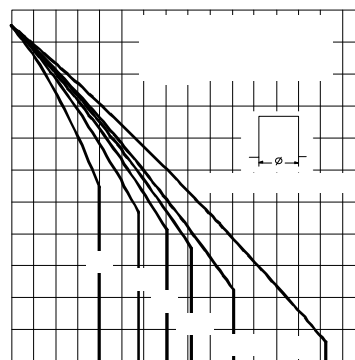


Fig. 2 - Current Ratings Characteristics