

**PHASE CONTROL THYRISTORS**
**Hockey Puk Version**
**Features**

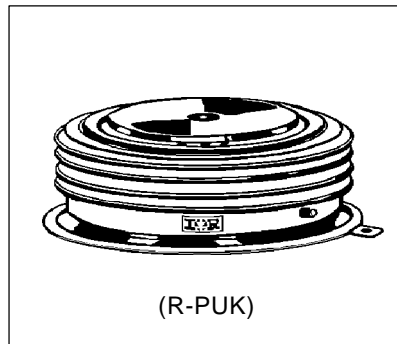
- Double side cooling
- High surge capability
- High mean current
- Fatigue free

**Typical Applications**

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

**Major Ratings and Characteristics**

Parameters	ST3230C..R	Units
$I_{T(AV)}$	2785	A
	@ $T_C$	80 °C
$I_{T(AV)}$	3360	A
	@ $T_{hs}$	55 °C
$I_{T(RMS)}$	5970	A
	@ $T_{hs}$	25 °C
$I_{TSM}$	@ 50Hz	61200 A
	@ 60Hz	64000 A
$I^2t$	@ 50Hz	18730 KA <sup>2</sup> s
	@ 60Hz	17000 KA <sup>2</sup> s
$V_{DRM}/V_{RRM}$	1000 to 1800	V
$t_q$	typical	500 μs
$T_J$	max.	125 °C

**3360A**


## ST3230C..R 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. @ $T_C = 125^\circ\text{C}$ mA
ST3230C..R	10	1000	1100	250
	12	1200	1300	
	14	1400	1500	
	16	1600	1700	
	18	1800	1900	

#### On-state Conduction

Parameter	ST3230C..R	Units	Conditions
$I_{T(AV)}$ Max. average on-state current @ Case temperature	2785 (1720)	A	180° conduction, half sine wave double side (single side [anode side]) cooled
	80	°C	
$I_{T(AV)}$ Max. average on-state current @ Heatsink temperature	3360 (1360)	A	
	55 (85)	°C	
$I_{T(RMS)}$ Max. RMS on-state current	5970	A	DC @ 25°C heatsink temperature double side cooled
$I_{TSM}$ Max. peak, one-cycle non-repetitive surge current	61200	A	t = 10ms No voltage reappplied
	64000		t = 8.3ms
	49000		t = 10ms 50% $V_{RRM}$ reappplied
	51300		t = 8.3ms
$I^2t$ Maximum $I^2t$ for fusing	18730	KA <sup>2</sup> s	t = 10ms No voltage reappplied
	17000		t = 8.3ms
	12000		t = 10ms 50% $V_{RRM}$ reappplied
	10920		t = 8.3ms
$V_{T(TO)}$ Max. value of threshold voltage	0.92	V	$T_J = T_J$ max.
$r_t$ Max. value of on-state slope resistance	0.09	mΩ	$T_J = T_J$ max.
$V_{TM}$ Max. on-state voltage	1.3	V	$I_{pk} = 2900A$ , $T_C = 25^\circ\text{C}$
$I_L$ Typical latching current	300	mA	$T_J = 25^\circ\text{C}$ , $V_D = 5V$

#### Switching

Parameter	ST3230C..R	Units	Conditions
$di/dt$ Max. repetitive 50Hz (no repetitive) rate of rise of turned-on current	150 (300)	A/μs	From 67% $V_{DRM}$ to 1000A gate drive 10V, 5Ω, $t_r = 0.5\mu\text{s}$ to 1A, $T_J = T_J$ max.
$t_d$ Maximum delay time	4.5	μs	Gate drive 30V, 15Ω, $V_d = 67\% V_{DRM}$ , $T_J = 25^\circ\text{C}$ Rise time 0.5μs
$t_q$ Typical turn-off time	500		$I_T = 1000A$ , $t_p = 1\text{ms}$ , $T_J = T_J$ max, $V_{RM} = 50V$ , $di_{RR}/dt = 2A/\mu\text{s}$ , $V_{DR} = 67\% V_{DRM}$ , $dv_{DR}/dt = 8V/\mu\text{s}$ linear

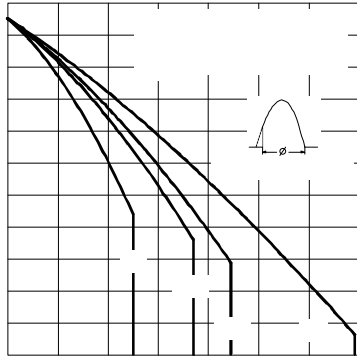


Fig. 1 - Current Ratings Characteristics

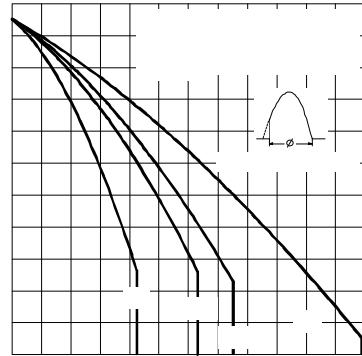


Fig. 2 - Current Ratings Characteristics

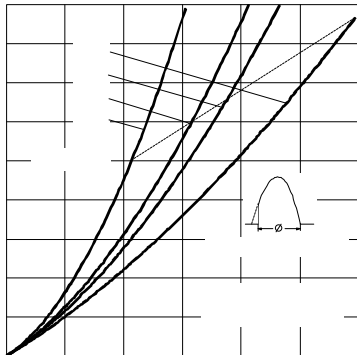


Fig. 3 - On-state Power Loss Characteristics

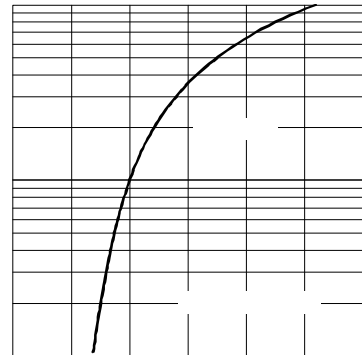


Fig. 4 - On-state Voltage Drop Characteristics

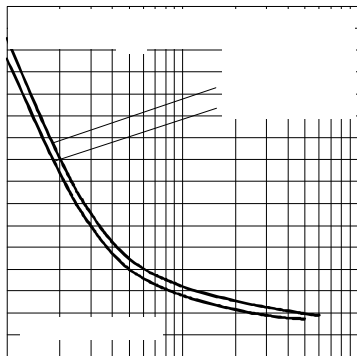


Fig. 5 - Maximum Non-Repulsive Surge Current

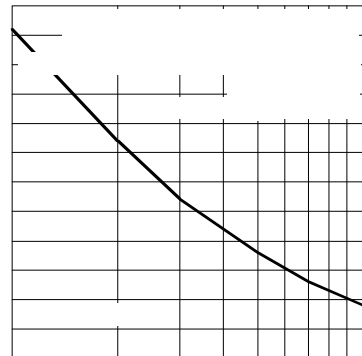


Fig. 6 - Maximum Non-Repulsive Surge Current

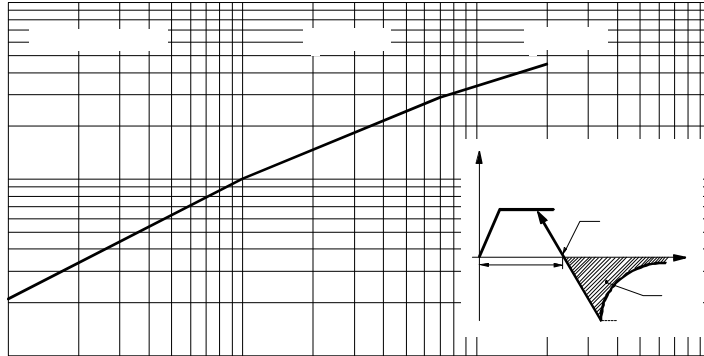


Fig. 7 - Stored Charged

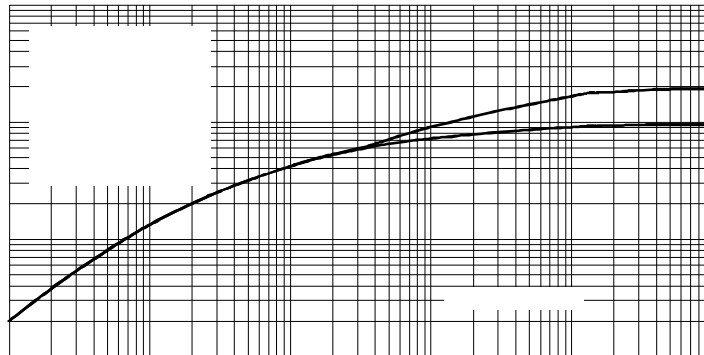


Fig. 8 - Thermal Impedance  $Z_{thJ-C}$  Characteristics

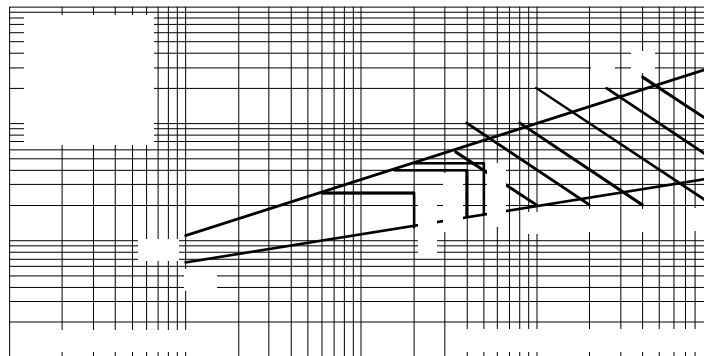


Fig. 9 - Gate Characteristics

Blocking

Parameter	ST3230C..R	Units	Conditions
dv/dt Maximum linear rate of rise of off-state voltage	500	V/ $\mu$ s	$T_J = T_J$ max. to 67% rated $V_{DRM}$
$I_{RRM}$ $I_{DRM}$ Max. peak reverse and off-state leakage current	250	mA	$T_J = 125^\circ\text{C}$ rated $V_{DRM}/V_{RRM}$ applied

Triggering

Parameter	ST3230C..R	Units	Conditions
$P_{GM}$ Maximum peak gate power	150	W	$t_p = 100\mu\text{s}$
$P_{G(AV)}$ Maximum average gate power	10		
$I_{GM}$ Max. peak positive gate current	30	A	Anode positive with respect to cathode
$V_{GM}$ Max. peak positive gate voltage	30	V	Anode positive with respect to cathode
$-V_{GM}$ Max. peak negative gate voltage	0.25	V	Anode negative with respect to cathode
$I_{GT}$ Maximum DC gate current required to trigger	400	mA	$T_C = 25^\circ\text{C}$ , $V_{DRM} = 5\text{V}$
$V_{GT}$ Maximum gate voltage required to trigger	4	V	$T_C = 25^\circ\text{C}$ , $V_{DRM} = 5\text{V}$
$V_{GD}$ DC gate voltage not to trigger	0.25	V	$T_C = 125^\circ\text{C}$ 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

Thermal and Mechanical Specification

Parameter	ST3230C..R	Units	Conditions	
$T_J$ max. Max. operating temperature	125	$^\circ\text{C}$	On-state (conducting)	
$T_{stg}$ Max. storage temperature range	-55 to 125			
$R_{thJ-C}$ Thermal resistance, junction to case	0.019 0.0095	K/W	DC operation single side cooled DC operation double side cooled	
$R_{th(C-h)}$ Thermal resistance, case to heatsink	0.004 0.002	K/W	Single side cooled Double side cooled	Clamping force 43KN with mounting compound
F Mounting force $\pm 10\%$	43000 (4400)	N (Kg)		
wt Approximate weight	1600	g		
Case style	(R-PUK)		See Outline Table	

$\Delta R_{thJ-C}$  Conduction

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

Conduction angle	Single side	Double side	Units	Conditions
180 $^\circ$	0.0010	0.0010	K/W	$T_J = T_J$ max.
120 $^\circ$	0.0017	0.0017		
60 $^\circ$	0.0044	0.0044		

## ST3230C..R Series

### Ordering Information Table

Device Code							
1	2	3	4	5	6	7	8
<b>ST</b>	<b>323</b>	<b>0</b>	<b>C</b>	<b>18</b>	<b>R</b>	<b>1</b>	<b> </b>

<p><b>1</b> - Thyristor</p> <p><b>2</b> - Essential part number</p> <p><b>3</b> - 0 = Converter grade</p> <p><b>4</b> - C = Ceramic Puk</p> <p><b>5</b> - Voltage code: Code x 100 = <math>V_{RRM}</math> (See Voltage Rating Table)</p> <p><b>6</b> - R = Puk Case</p> <p><b>7</b> - 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><b>8</b> - Critical dv/dt: None = 500V/<math>\mu</math>sec (Standard selection)            L = 1000V/<math>\mu</math>sec (Special selection)</p>	
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### Outline Table

