

## PHASE CONTROL THYRISTORS

## Hockey Puk Version

### Features

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

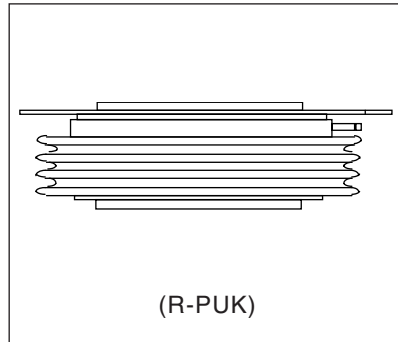
### Typical Applications

- 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 $\mu$ s
$T_J$	max.	125 °C

3360A



## ST3230C..R Series

Bulletin I25200 rev. B 04/00

International  
 Rectifier

### 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	$T_J = T_J \text{ max.}$
$r_t$ Max. value of on-state slope resistance	0.09	mΩ	$T_J = T_J \text{ max.}$
$V_{TM}$ Max. on-state voltage	1.3	V	$I_{pk} = 2900\text{A}$ , $T_C = 25^\circ\text{C}$
$I_L$ Typical latching current	300	mA	$T_J = 25^\circ\text{C}$ , $V_D = 5\text{V}$

#### 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, $T_J = T_J \text{ max.}$
$t_d$ 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		$I_T = 1000\text{A}$ , $t_p = 1\text{ms}$ , $T_J = T_J \text{ max.}$ , $V_{RM} = 50\text{V}$ , $di_{FR}/dt = 2\text{A}/\mu\text{s}$ , $V_{DR} = 67\% V_{DRM}$ , $dv_{DR}/dt = 8\text{V}/\mu\text{s}$ linear

**Blocking**

Parameter	ST3230C..R	Units	Conditions
dv/dt Maximum linear rate of rise of off-state voltage	500	V/μs	T <sub>J</sub> = T <sub>J</sub> max. to 67% rated V <sub>DRM</sub>
I <sub>RRM</sub> I <sub>DRM</sub> Max. peak reverse and off-state leakage current	250	mA	T <sub>J</sub> = 125°C rated V <sub>DRM</sub> /V <sub>RRM</sub> applied

**Triggering**

Parameter	ST3230C..R	Units	Conditions
P <sub>GM</sub> Maximum peak gate power	150	W	t <sub>p</sub> = 100μs
P <sub>G(AV)</sub> Maximum average gate power	10		
I <sub>GM</sub> Max. peak positive gate current	30	A	Anode positive with respect to cathode
V <sub>GM</sub> Max. peak positive gate voltage	30	V	Anode positive with respect to cathode
-V <sub>GM</sub> Max. peak negative gate voltage	0.25	V	Anode negative with respect to cathode
I <sub>GT</sub> Maximum DC gate current required to trigger	400	mA	T <sub>C</sub> = 25°C, V <sub>DRM</sub> = 5V
V <sub>GT</sub> Maximum gate voltage required to trigger	4	V	T <sub>C</sub> = 25°C, V <sub>DRM</sub> = 5V
V <sub>GD</sub> DC gate voltage not to trigger	0.25	V	T <sub>C</sub> = 125°C Max. gate current/voltage not to trigger is the max. value which will not trigger any unit with rated V <sub>DRM</sub> anode-to-cathode applied

**Thermal and Mechanical Specification**

Parameter	ST3230C..R	Units	Conditions	
T <sub>J</sub> max. Max. operating temperature	125	°C	On-state (conducting)	
T <sub>stg</sub> Max. storage temperature range	-55 to 125			
R <sub>thJ-C</sub> Thermal resistance, junction to case	0.019 0.0095	K/W	DC operation single side cooled DC operation double side cooled	
R <sub>th(C-h)</sub> 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 ± 10%	43000 (4400)	N (Kg)		
wt Approximate weight	1600	g		
Case style	(R-PUK)		See Outline Table	

**ΔR<sub>thJ-C</sub> Conduction**

(The following table shows the increment of thermal resistance R<sub>thJ-C</sub> when devices operate at different conduction angles than DC)

Conduction angle	Single side	Double side	Units	Conditions
180°	0.0010	0.0010	K/W	T <sub>J</sub> = T <sub>J</sub> max.
120°	0.0017	0.0017		
60°	0.0044	0.0044		

# ST3230C..R Series

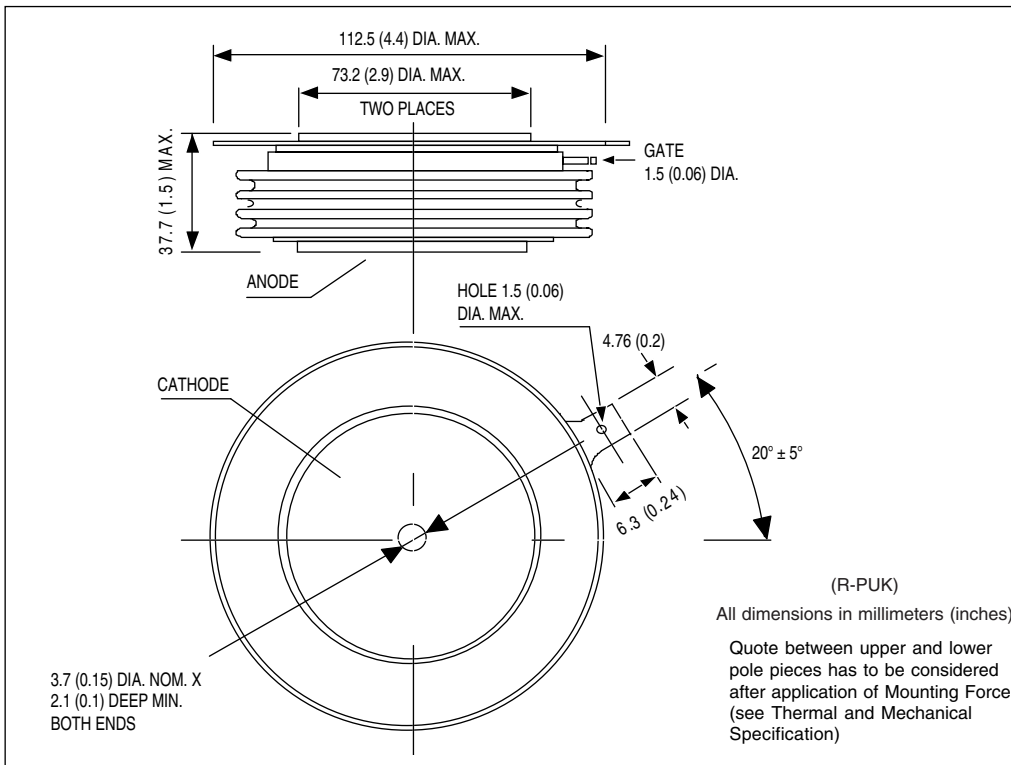
Bulletin I25200 rev. B 04/00

International  
**IRF** Rectifier

## Ordering Information Table

Device Code							
ST	323	0	C	18	R	1	
①	②	③	④	⑤	⑥	⑦	⑧
<b>1</b>	- Thyristor	<b>2</b>	- Essential part number	<b>3</b>	- 0 = Converter grade	<b>4</b>	- C = Ceramic Puk
<b>5</b>	- Voltage code: Code x 100 = $V_{RRM}$ (See Voltage Rating Table)	<b>6</b>	- R = Puk Case	<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)	<b>8</b>	- Critical dv/dt: None = 500V/ $\mu$ sec (Standard selection) L = 1000V/ $\mu$ sec (Special selection)

## Outline Table



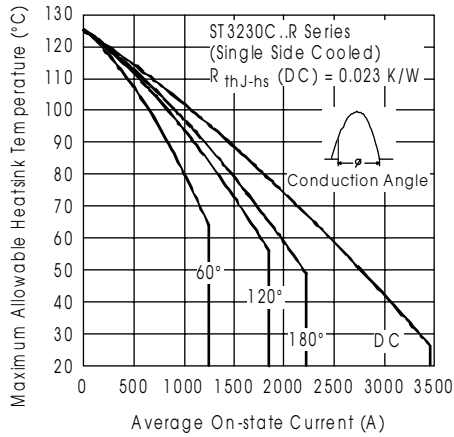


Fig. 1 - Current Ratings Characteristics

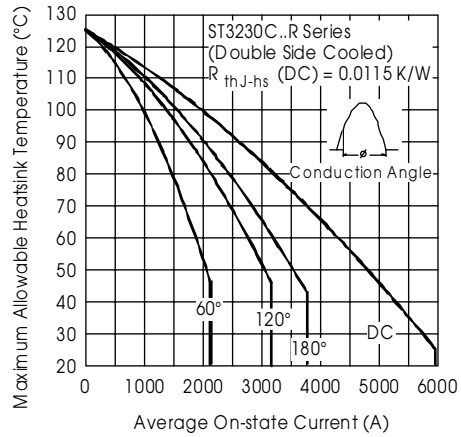


Fig. 2 - Current Ratings Characteristics

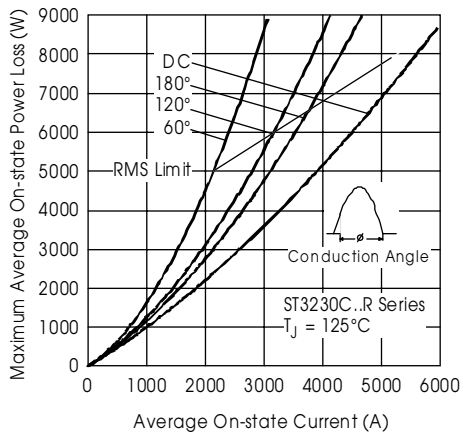


Fig. 3 - On-state Power Loss Characteristics

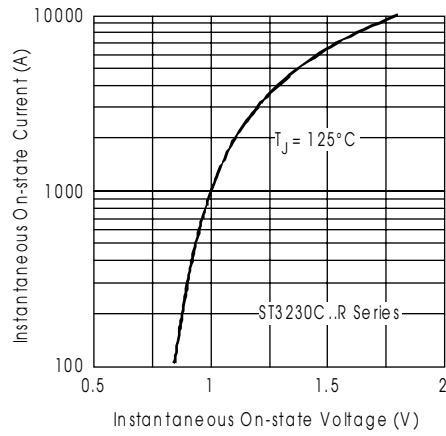


Fig. 4 - On-state Voltage Drop Characteristics

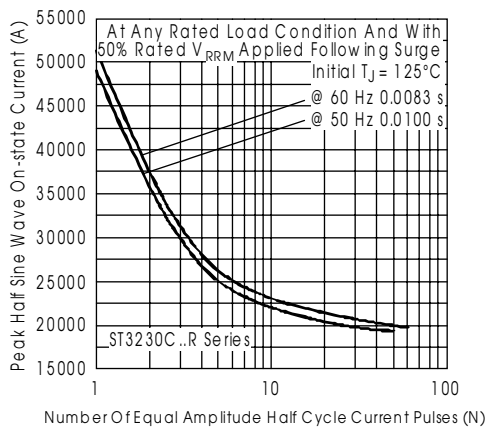


Fig. 5 - Maximum Non-Repetitive Surge Current

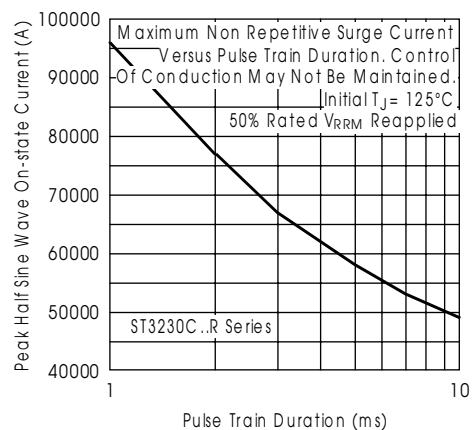


Fig. 6 - Maximum Non-Repetitive Surge Current

