



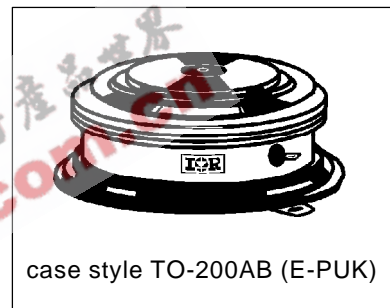
DISCRETE POWER DIODES and THYRISTORS
DATA BOOK

PHASE CONTROL THYRISTORS
Hockey Puk Version
Features

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

650A
Typical Applications

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


Major Ratings and Characteristics

Parameters	ST300C..C	Units
$I_{T(AV)}$	650	A
@ T_{hs}	55	°C
$I_{T(RMS)}$	1290	A
@ T_{hs}	25	°C
I_{TSM}	@ 50Hz 8000	A
	@ 60Hz 8380	A
I^2t	@ 50Hz 320	KA ² s
	@ 60Hz 292	KA ² s
V_{DRM}/V_{RRM}	400 to 2000	V
t_q typical	100	μs
T_J	- 40 to 125	°C

ST300C..C 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..C	04	400	500	50
	08	800	900	
	12	1200	1300	
	16	1600	1700	
	18	1800	1900	
	20	2000	2100	

On-state Conduction

Parameter	ST300C..C	Units	Conditions
$I_{T(AV)}$ Max. average on-state current @ Heatsink temperature	650 (320)	A	180° conduction, half sine wave double side (single side) cooled
	55 (75)	°C	
$I_{T(RMS)}$ Max. RMS on-state current	1290		DC @ 25°C heatsink temperature double side cooled
I_{TSM} Max. peak, one-cycle non-repetitive surge current	8000	A	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% x π x $I_{T(AV)} < I < \pi$ x $I_{T(AV)}$), $T_J = T_J$ max.
$V_{T(TO)2}$ High level value of threshold voltage	0.98		($I > \pi$ x $I_{T(AV)}$), $T_J = T_J$ max.
r_{t1} Low level value of on-state slope resistance	0.74	mΩ	(16.7% x π x $I_{T(AV)} < I < \pi$ x $I_{T(AV)}$), $T_J = T_J$ max.
r_{t2} High level value of on-state slope resistance	0.73		($I > \pi$ x $I_{T(AV)}$), $T_J = T_J$ 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		

ST300C..C Series

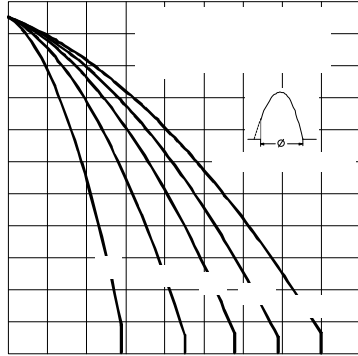


Fig. 3 - Current Ratings Characteristics

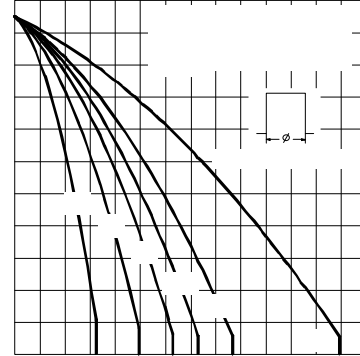


Fig. 4 - Current Ratings Characteristics

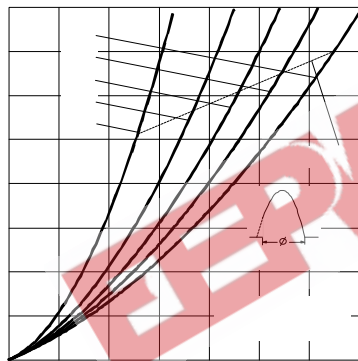


Fig. 5 - On-state Power Loss Characteristics

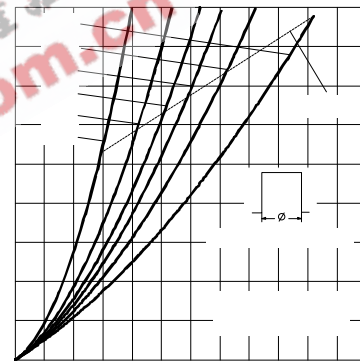


Fig. 6 - On-state Power Loss Characteristics

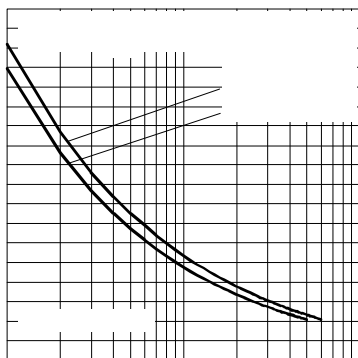


Fig. 7 - Maximum Non-Repetitive Surge Current
Single and Double Side Cooled

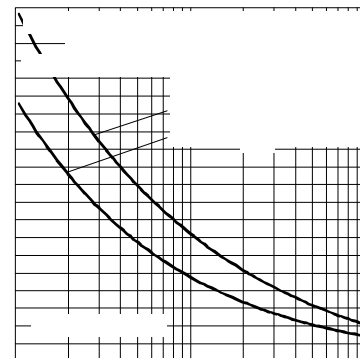


Fig. 8 - Maximum Non-Repetitive Surge Current
Single and Double Side Cooled

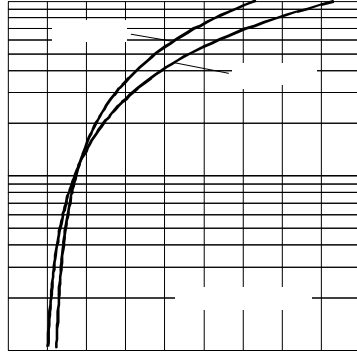


Fig. 9 - On-state Voltage Drop Characteristics



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

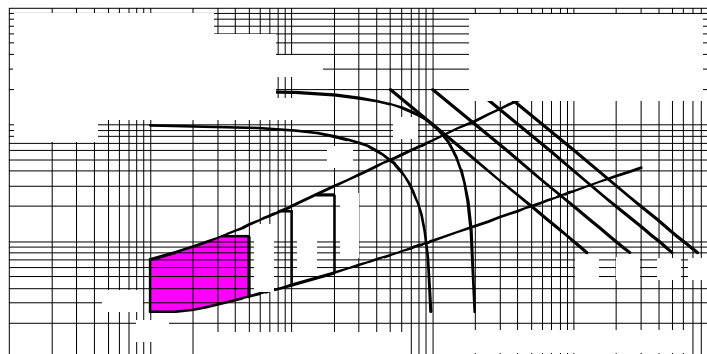


Fig. 11 - Gate Characteristics

Switching

Parameter	ST300C..C	Units	Conditions
di/dt Max. non-repetitive rate of rise of turned-on current	1000	A/ μ s	Gate drive 20V, 20 Ω , $t_r \leq 1\mu$ s $T_J = T_J$ max, anode voltage $\leq 80\% V_{DRM}$
t_d Typical delay time	1.0	μ s	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		$I_{TM} = 300A$, $T_J = T_J$ max, $di/dt = 40A/\mu$ s, $V_R = 50V$ $dv/dt = 20V/\mu$ s, Gate 0V 100 Ω , $t_p = 500\mu$ s

Blocking

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

Triggering

Parameter	ST300C..C		Units	Conditions
P_{GM} Maximum peak gate power	10.0		W	$T_J = T_J$ max, $t_p \leq 5ms$
$P_{G(AV)}$ Maximum average gate power	2.0			
I_{GM} Max. peak positive gate current	3.0		A	$T_J = T_J$ max, $t_p \leq 5ms$
$+V_{GM}$ Maximum peak positive gate voltage	20		V	$T_J = T_J$ 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	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..C Series

Thermal and Mechanical Specification

Parameter	ST300C..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	0.09 0.04	K/W	DC operation single side cooled DC operation double side cooled
R _{thC-hs} Max. thermal resistance, case to heatsink	0.02 0.01		K/W
F Mounting force, ± 10%	9800 (1000)	N (Kg)	
wt Approximate weight	83	g	
Case style	TO - 200AB (E-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°	0.010	0.011	0.007	0.007	K/W	T _J = T _J max.
120°	0.012	0.012	0.012	0.013		
90°	0.015	0.015	0.016	0.017		
60°	0.022	0.022	0.023	0.023		
30°	0.036	0.036	0.036	0.037		

Ordering Information Table

Device Code	1	2	3	4	5	6	7	8
	ST	30	0	C	20	C	1	
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	- C = Puk Case TO-200AB (E-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/μsec (Standard value) L = 1000V/μsec (Special selection)							

Outline Table

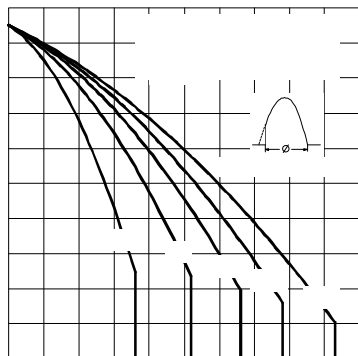
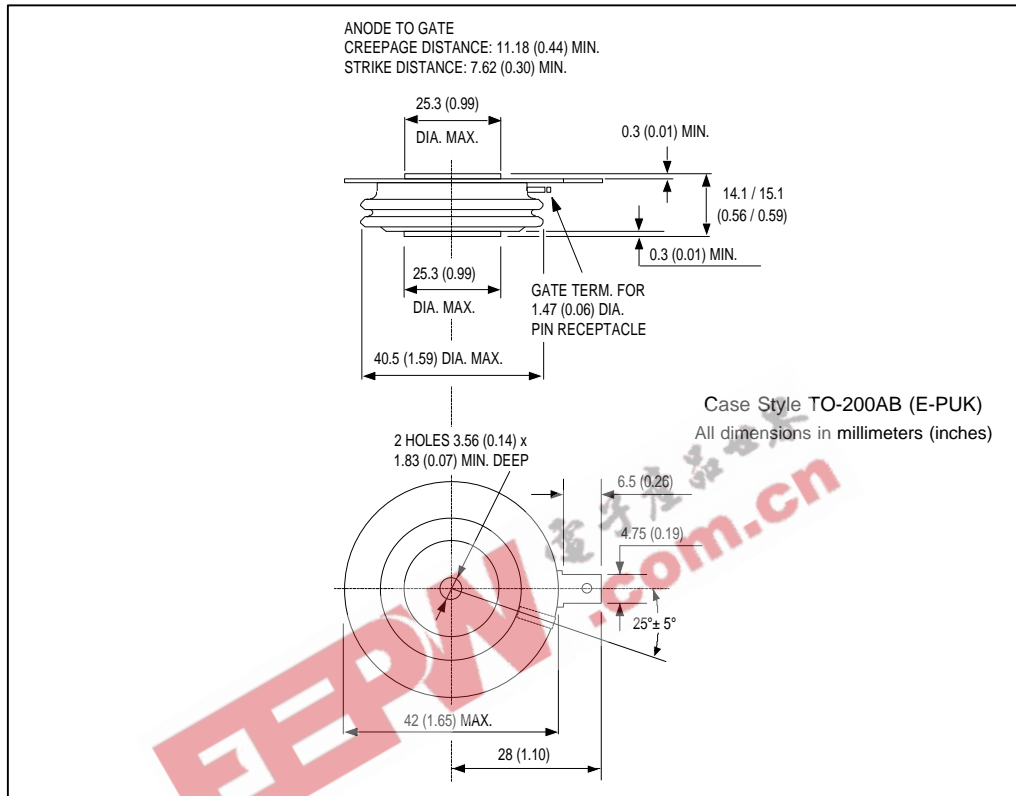


Fig. 1 - Current Ratings Characteristics

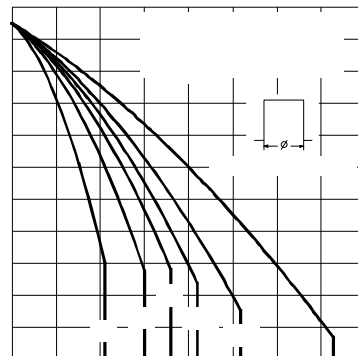


Fig. 2 - Current Ratings Characteristics