

ST300C..C SERIES

PHASE CONTROL THYRISTORS

Hockey Puk Version

Features

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

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

650A



case style TO-200AB (E-PUK)

ST300C..C Series

Bulletin I25157 rev. C 04/00

International
IR 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. @ $T_J = T_J \text{ max}$ 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) 55 (75)	A °C	180° conduction, half sine wave double side (single side) cooled
$I_{T(RMS)}$ 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 $I_{T(AV)}$), $T_J = T_J \text{ max}$.
$V_{T(TO)2}$ High level value of threshold voltage	0.98		($I > \pi$ x $I_{T(AV)}$), $T_J = T_J \text{ max}$.
r_{t1} Low level value of on-state slope resistance	0.74	mΩ	(16.7% x π x $I_{T(AV)} < I < \pi$ x $I_{T(AV)}$), $T_J = T_J \text{ max}$.
r_{t2} High level value of on-state slope resistance	0.73		($I > \pi$ x $I_{T(AV)}$), $T_J = T_J \text{ max}$.
V_{TM} Max. on-state voltage	2.18	V	$I_{pk} = 1635A$, $T_J = T_J \text{ max}$, $t_p = 10ms$ 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		

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 $V_d = 0.67\% V_{DRM}$, $T_J = 25^\circ\text{C}$
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			$T_J = T_J$ max, $f = 50Hz$, $d\% = 50$
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	$T_J = -40^\circ\text{C}$ $T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$ Max. required gate trigger/ current/ voltage are the lowest value which will trigger all units 12V anode-to-cathode applied
	200	-		
	100	200		
	50	-		
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	10.0		mA	$T_J = T_J$ 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	

ST300C..C Series

Bulletin I25157 rev. C 04/00

International
IR Rectifier

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	DC operation single side cooled DC operation double side cooled
F Mounting force, $\pm 10\%$	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	$T_J = T_J \text{ max.}$
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							
ST300C20C1 12345678							
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/ μ sec (Standard value) L = 1000V/ μ sec (Special selection)					

Outline Table

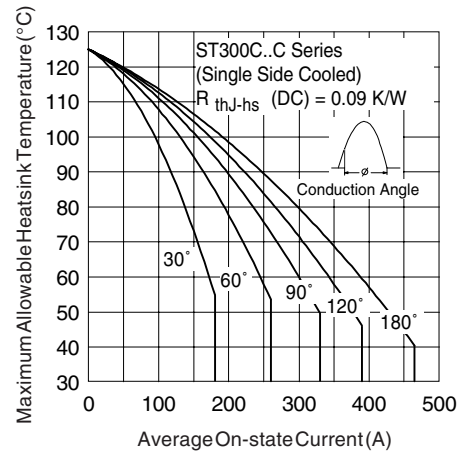
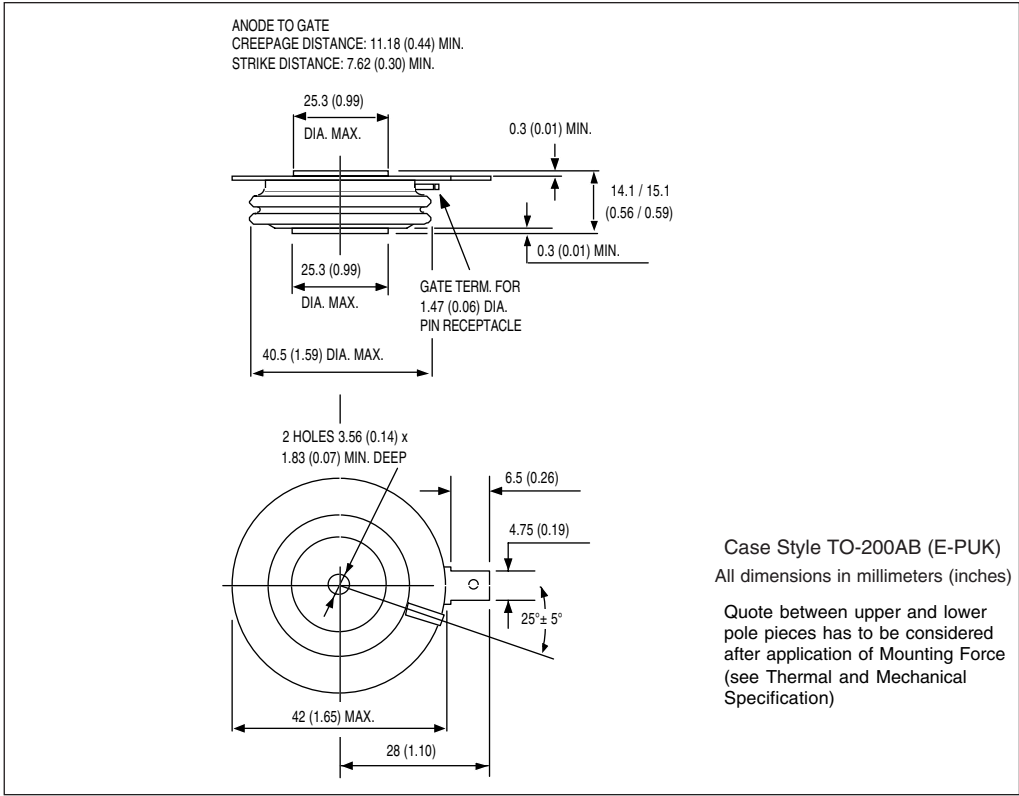


Fig. 1 - Current Ratings Characteristics

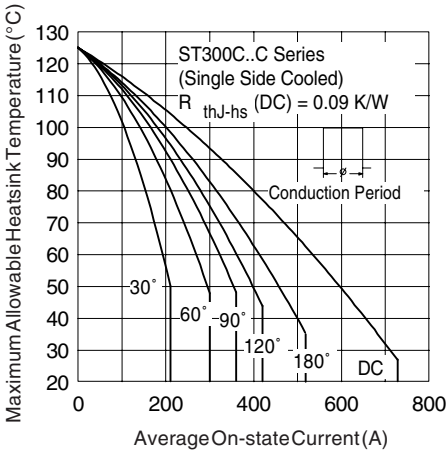


Fig. 2 - Current Ratings Characteristics

ST300C..C Series

Bulletin I25157 rev. C 04/00

International
IOR Rectifier

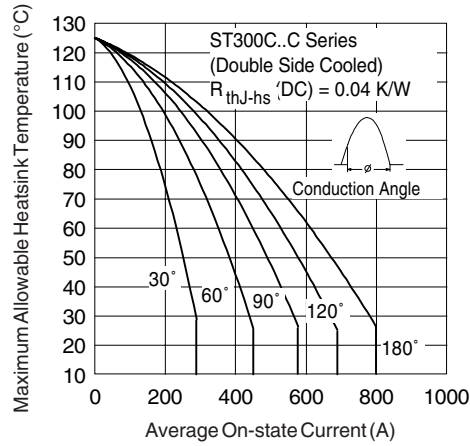


Fig. 3 - Current Ratings Characteristics

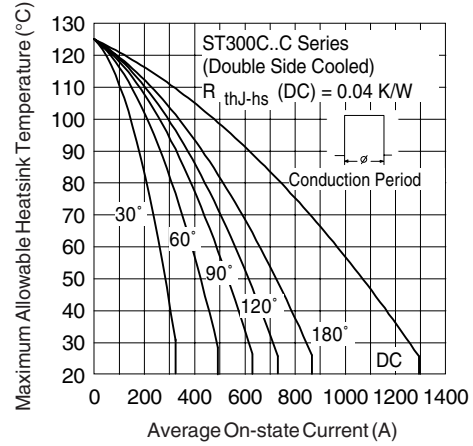


Fig. 4 - Current Ratings Characteristics

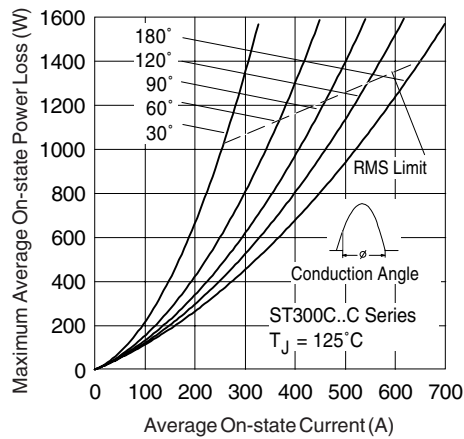


Fig. 5 - On-state Power Loss Characteristics

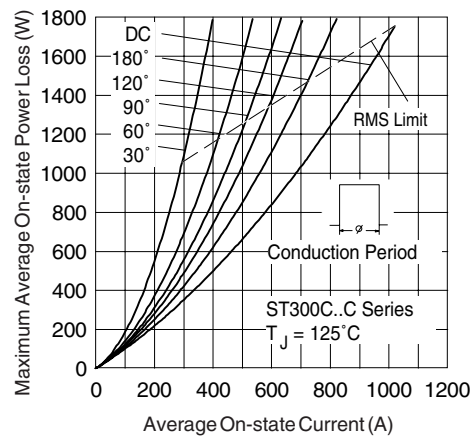


Fig. 6 - On-state Power Loss Characteristics

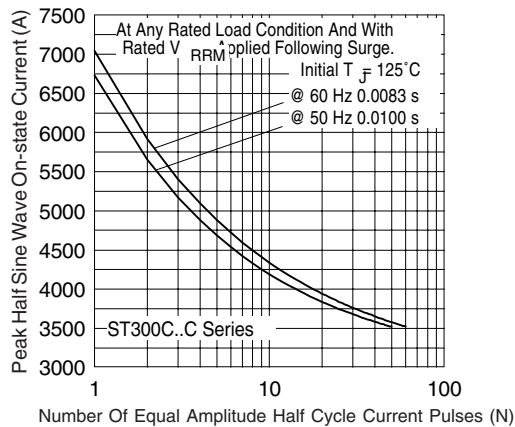


Fig. 7 - Maximum Non-Repetitive Surge Current
Single and Double Side Cooled

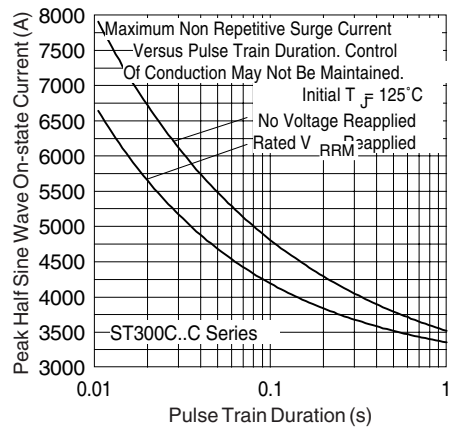


Fig. 8 - Maximum Non-Repetitive Surge Current
Single and Double Side Cooled

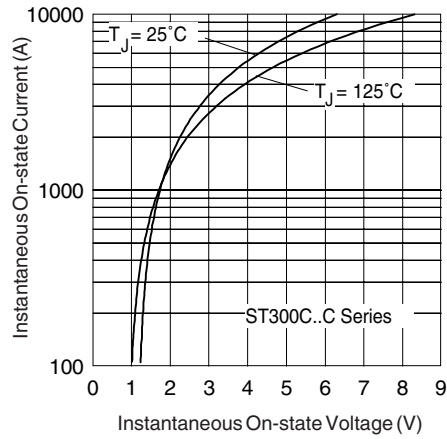


Fig. 9 - On-state Voltage Drop Characteristics

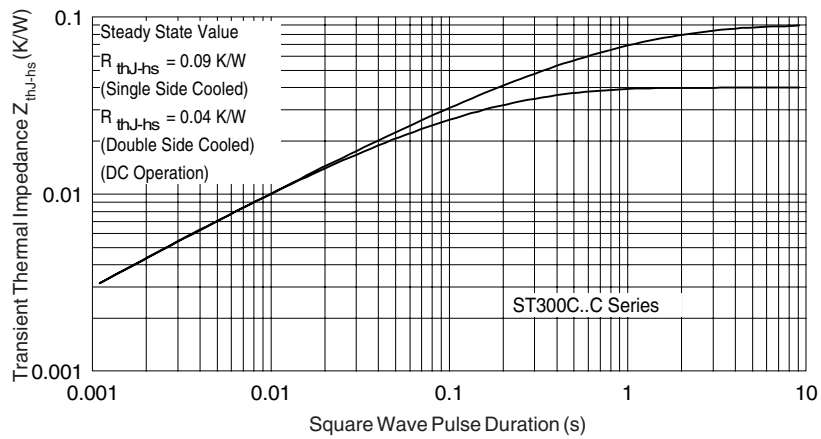


Fig. 10 - Thermal Impedance Z_{thJ-hs} Characteristics

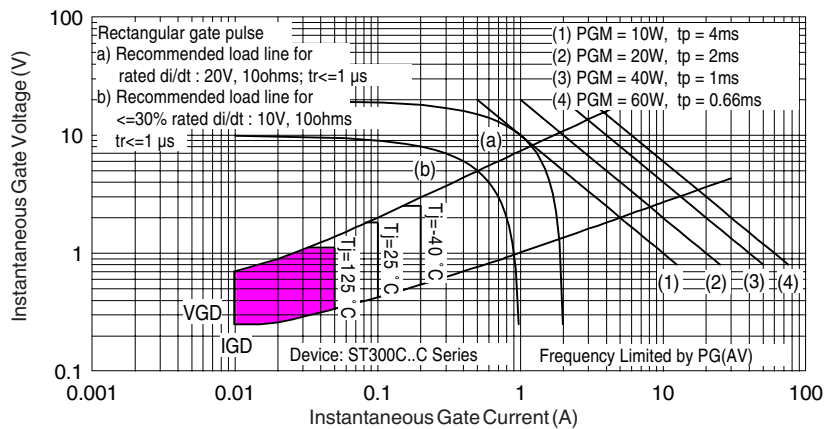


Fig. 11 - Gate Characteristics