

PHASE CONTROL THYRISTORS

Hockey Puk Version

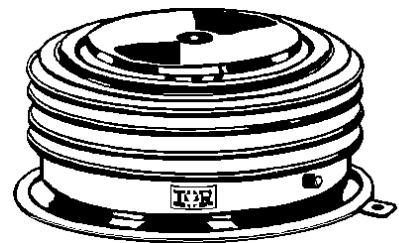
1650A

Features

- Center amplifying gate
- Metal case with ceramic insulator
- International standard case A-24 (K-PUK)
- High profile hockey-puk

Typical Applications

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



case style A-24 (K-PUK)

Major Ratings and Characteristics

Parameters	ST1200C..K	Units
$I_{T(AV)}$	1650	A
@ T_{hs}	55	°C
$I_{T(RMS)}$	3080	A
@ T_{hs}	25	°C
I_{TSM}	@ 50Hz 30500	A
	@ 60Hz 32000	A
I^2t	@ 50Hz 4651	KA ² s
	@ 60Hz 4250	KA ² s
V_{DRM}/V_{RRM}	1200 to 2000	V
t_q typical	200	μs
T_J	- 40 to 125	°C

ST1200C..K 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. @ $T_J = T_J \text{ max}$ mA
ST1200C..K	12	1200	1300	100
	14	1400	1500	
	16	1600	1700	
	18	1800	1900	
	20	2000	2100	

On-state Conduction

Parameter	ST1200C..K	Units	Conditions		
$I_{T(AV)}$ Max. average on-state current @ Heatsink temperature	1650 (700)	A	180° conduction, half sine wave double side (single side) cooled		
	55 (85)	°C			
$I_{T(RMS)}$ Max. RMS on-state current	3080	A	DC @ 25°C heatsink temperature double side cooled		
I_{TSM} Max. peak, one-cycle non-repetitive surge current	30500		t = 10ms	No voltage	
	32000		t = 8.3ms	reapplied	
	25700		t = 10ms	100% V_{RRM}	
	26900		t = 8.3ms	reapplied	
I^2t Maximum I^2t for fusing	4651	KA ² s	t = 10ms	No voltage	Sinusoidal half wave, Initial $T_J = T_J \text{ max.}$
	4250		t = 8.3ms	reapplied	
	3300		t = 10ms	100% V_{RRM}	
	3000		t = 8.3ms	reapplied	
$I^2\sqrt{t}$ Maximum $I^2\sqrt{t}$ for fusing	46510	KA ² √s	t = 0.1 to 10ms, no voltage reapplied		
$V_{T(TO)1}$ Low level value of threshold voltage	0.91	V	(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	1.01		($I > \pi \times I_{T(AV)}$), $T_J = T_J \text{ max.}$		
r_{t1} Low level value of on-state slope resistance	0.21	mΩ	(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 on-state slope resistance	0.19		($I > \pi \times I_{T(AV)}$), $T_J = T_J \text{ max.}$		
V_{TM} Max. on-state voltage	1.73	V	$I_{pk} = 4000A$, $T_J = T_J \text{ max}$, $t_p = 10ms$ 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	ST1200C..K	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	1.9	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	200		$I_{TM} = 550A$, $T_J = T_J$ 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	ST1200C..K	Units	Conditions
dv/dt Maximum critical rate of rise of	500 off-state voltage	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	100	mA	$T_J = T_J$ max, rated V_{DRM}/V_{RRM} applied

Triggering

Parameter	ST1200C..K	Units	Conditions
P_{GM} Maximum peak gate power	16	W	$T_J = T_J$ max, $t_p \leq 5ms$
$P_{G(AV)}$ Maximum average gate power	3		$T_J = T_J$ 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.	$T_J = -40^\circ\text{C}$ $T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$ Max. required gate trigger/ current/ voltage are the lowest value which will trigger all units 12V anode-to-cathode applied
	200	-	
	100	200	
V_{GT} DC gate voltage required to trigger	1.4	-	$T_J = -40^\circ\text{C}$ $T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$
	1.1	3.0	
	0.9	-	
I_{GD} DC gate current not to trigger	10	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	

ST1200C..K Series

Thermal and Mechanical Specification

Parameter	ST1200C..K	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	0.042 0.021	K/W	DC operation single side cooled DC operation double side cooled
R _{thC-hs} Max. thermal resistance, case to heatsink	0.006 0.003	K/W	DC operation single side cooled DC operation double side cooled
F Mounting force, ± 10%	24500 (2500)	N (Kg)	
wt Approximate weight	425	g	
Case style	A-24 (K-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°	0.003	0.003	0.002	0.002	K/W	T _J = T _J max.
120°	0.004	0.004	0.004	0.004		
90°	0.005	0.005	0.005	0.005		
60°	0.007	0.007	0.007	0.007		
30°	0.012	0.012	0.012	0.012		

Ordering Information Table

Device Code

ST	120	0	C	20	K	1	
①	②	③	④	⑤	⑥	⑦	⑧

- 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** - K = Puk Case A-24 (K-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 selection)
 L = 1000V/μsec (Special selection)

Outline Table

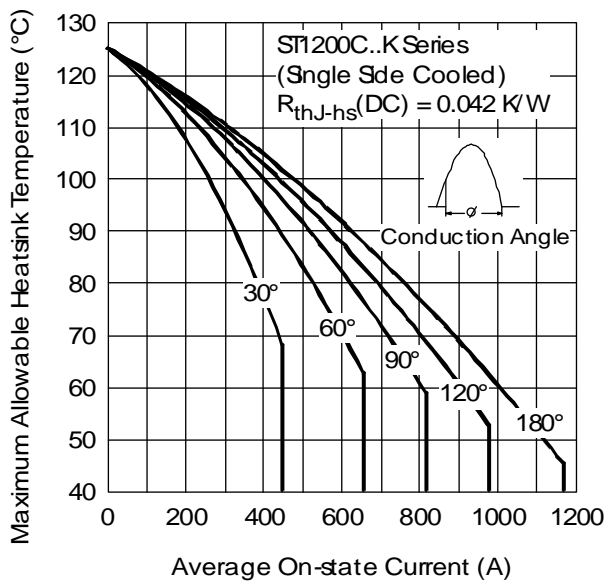
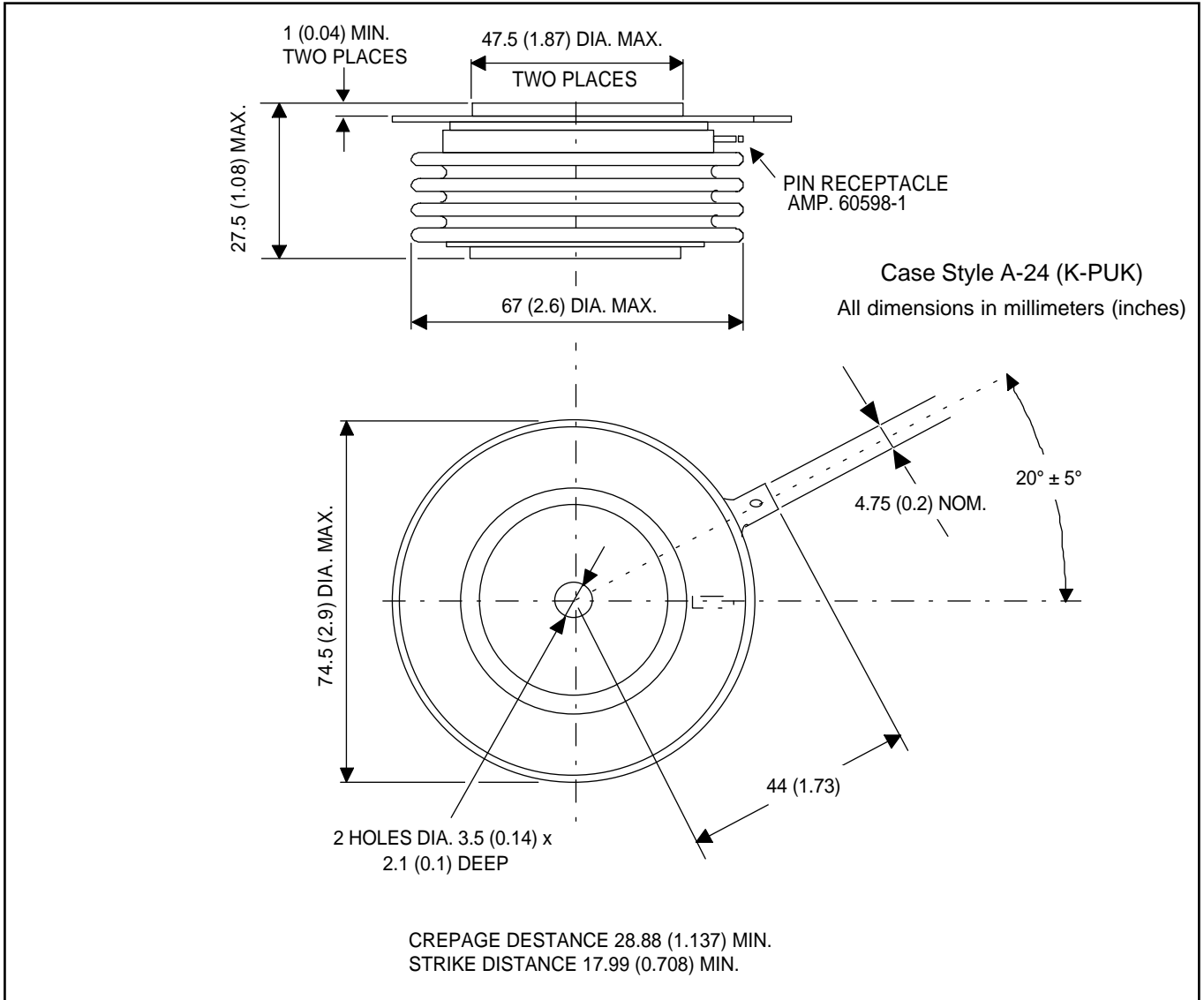


Fig. 1 - Current Ratings Characteristics

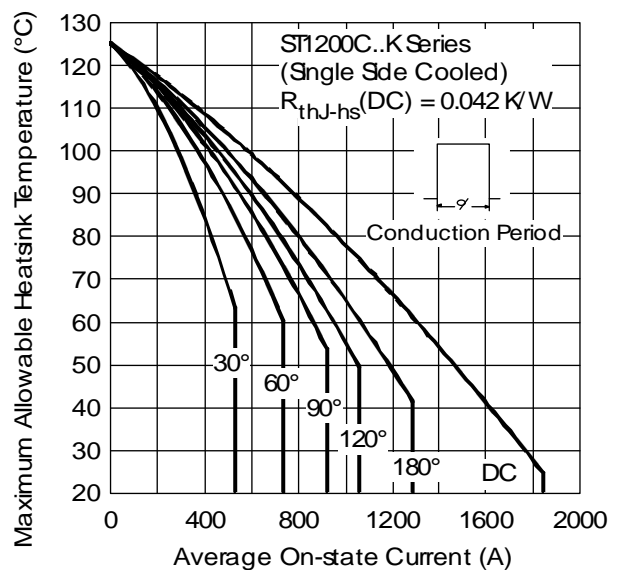


Fig. 2 - Current Ratings Characteristics

ST1200C..K Series

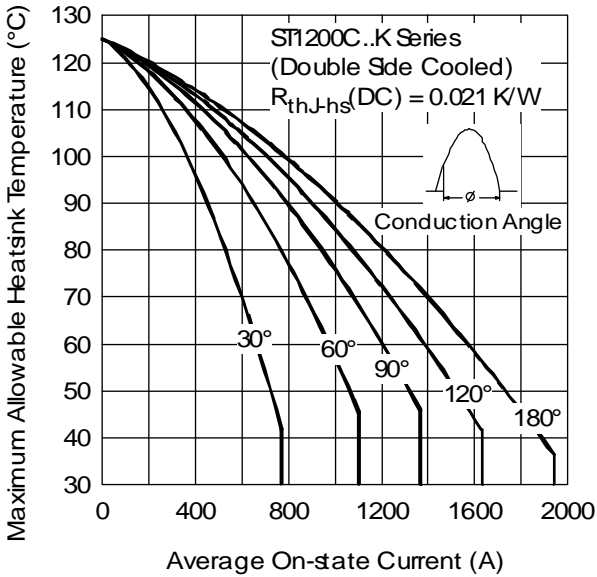


Fig. 3 - Current Ratings Characteristics

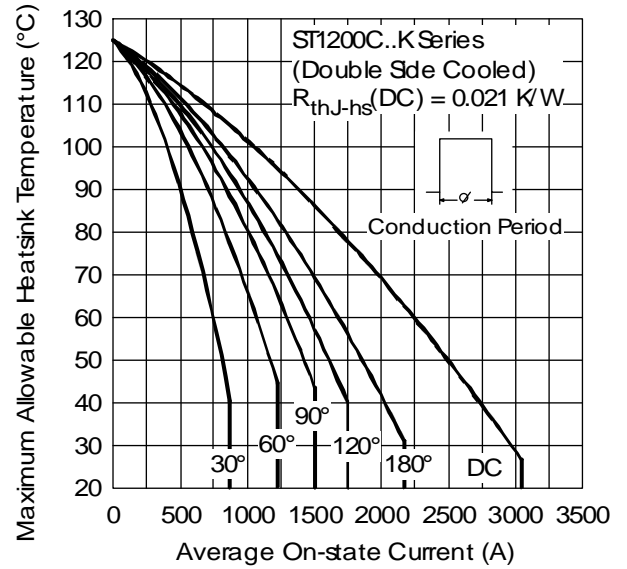


Fig. 4 - Current Ratings Characteristics

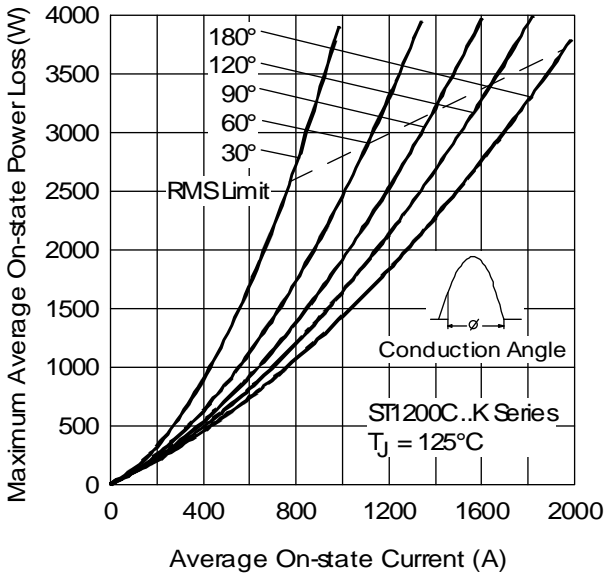


Fig. 5 - On-state Power Loss Characteristics

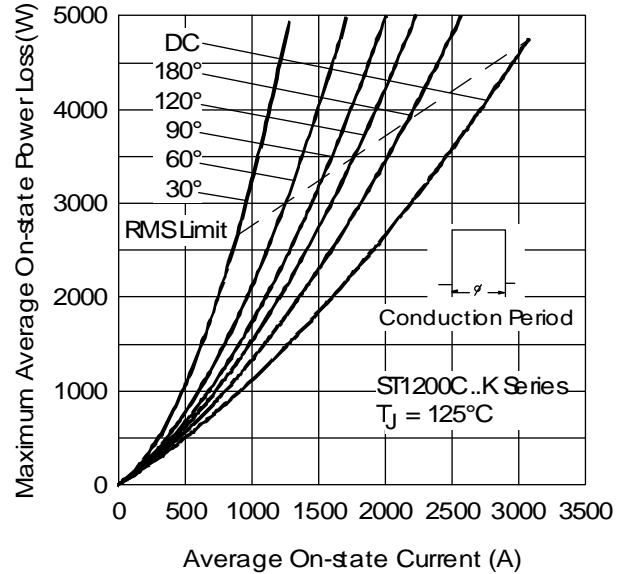


Fig. 6 - On-state Power Loss Characteristics

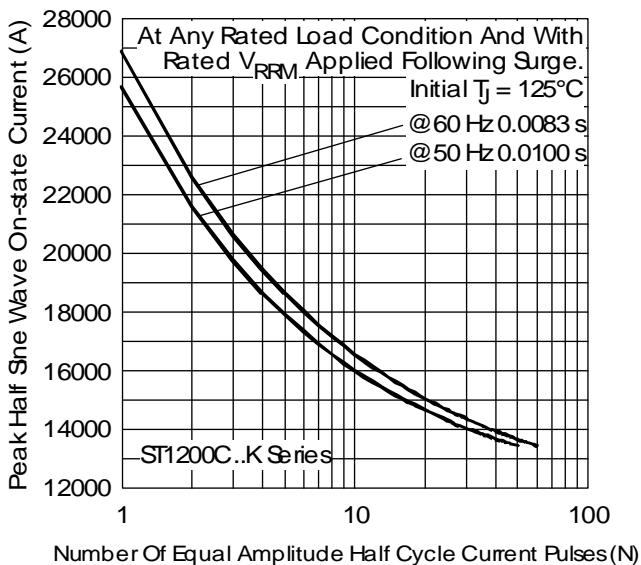


Fig. 7 - Maximum Non-Repetitive Surge Current Single and Double Side Cooled

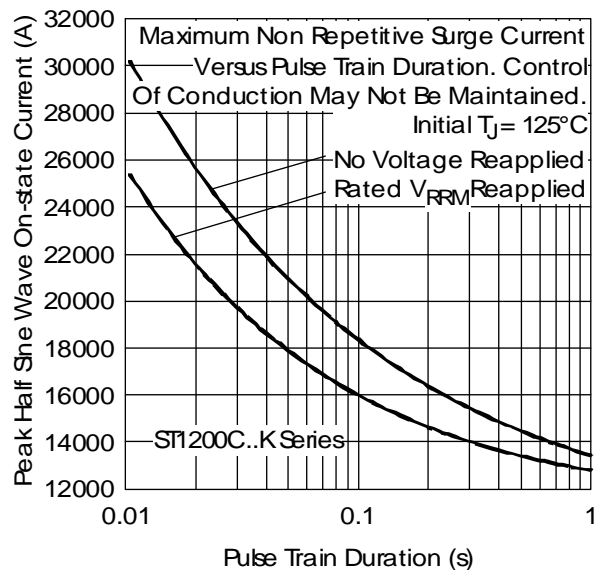


Fig. 8 - Maximum Non-Repetitive Surge Current Single and Double Side Cooled

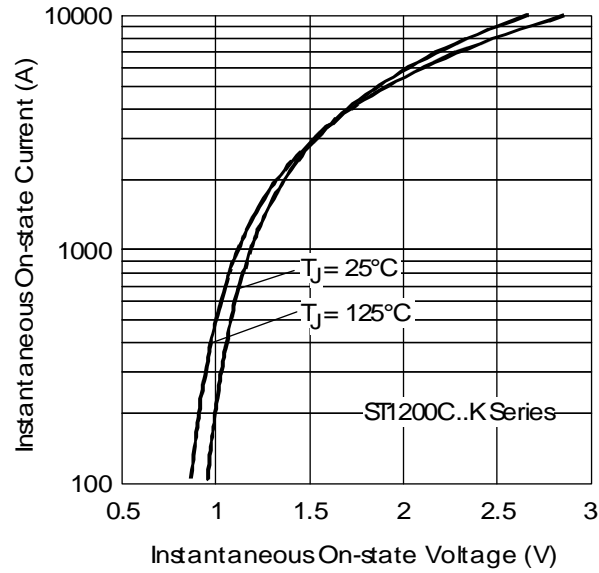


Fig. 9 - On-state Voltage Drop Characteristics

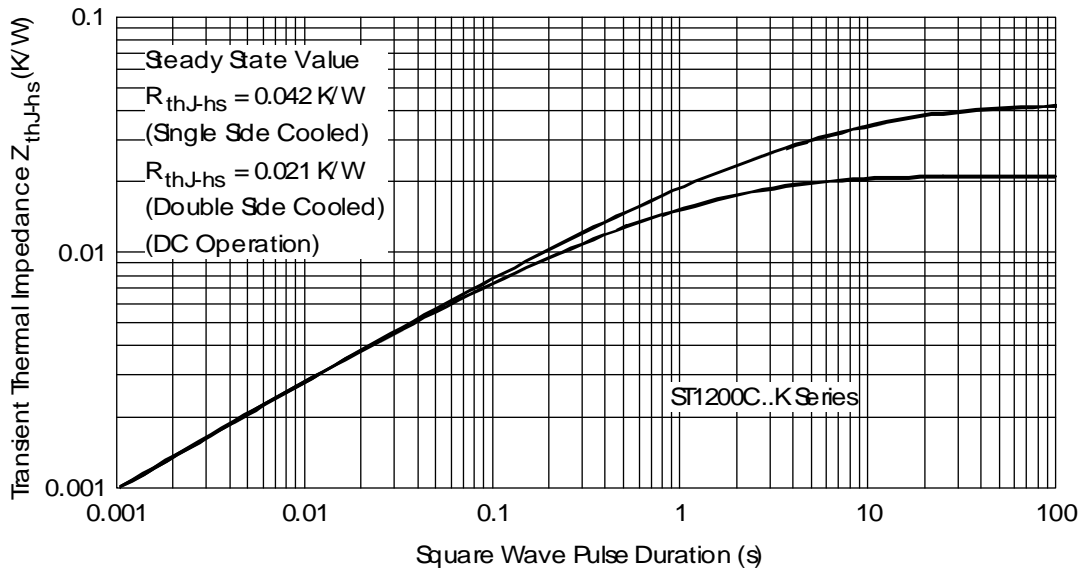


Fig. 10 - Thermal Impedance Z_{thJ-hs} Characteristics

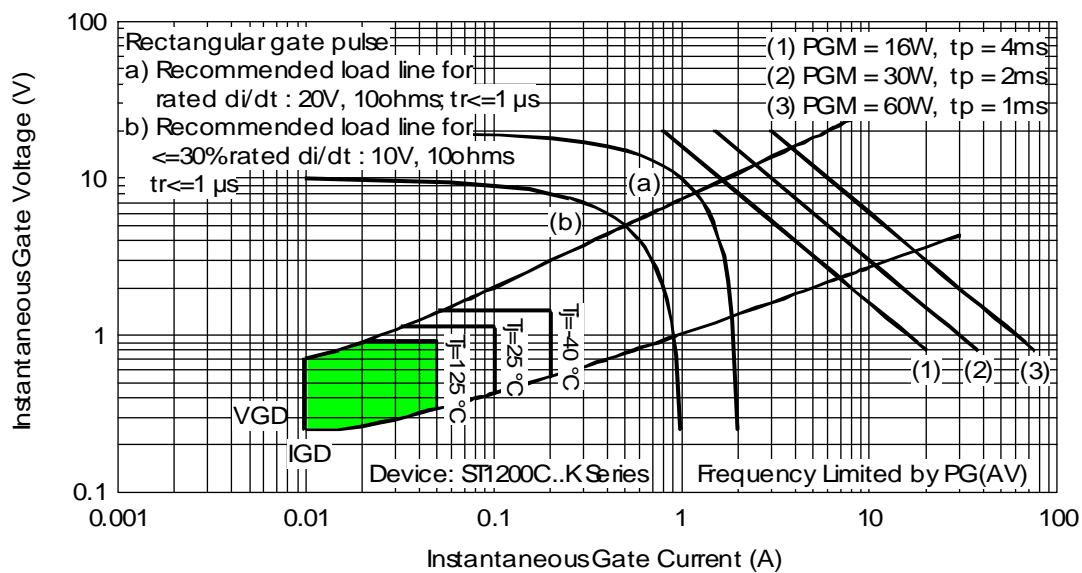


Fig. 11 - Gate Characteristics