

PHASE CONTROL THYRISTORS

Stud Version

Features

- Hermetic glass-metal seal
- $dv/dt = 1000V/\mu s$ option
- International standard case TO-209AB (TO-93)
- Threaded studs UNF 3/4 - 16UNF2A

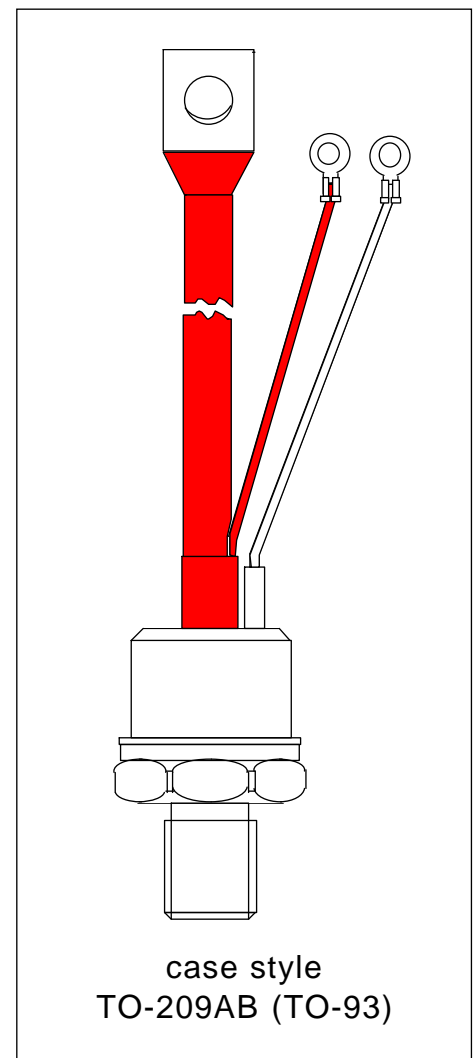
180A

Typical Applications

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

Major Ratings and Characteristics

Parameters	181RKI	Units
$I_{T(AV)}$	180	A
@ T_C	80	$^{\circ}C$
$I_{T(RMS)}$	285	A
I_{TSM} @ 50Hz	3800	A
@ 60Hz	4000	A
I^2t @ 50Hz	72	KA^2s
@ 60Hz	66	KA^2s
V_{DRM}/V_{RRM}	400 to 1000	V
t_q typical	100	μs
T_J	- 40 to 125	$^{\circ}C$



181RKI 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
181RKI	40	400	500	30
	80	800	900	
	100	1000	1100	

On-state Conduction

Parameter	181RKI	Units	Conditions		
$I_{T(AV)}$ Max. average on-state current @ Case temperature	180	A	180° conduction, half sine wave		
	80	°C			
$I_{T(RMS)}$ Max. RMS on-state current	285	A	DC @ 79°C case temperature		
I_{TSM} Max. peak, one-cycle non-repetitive surge current	3800		t = 10ms	No voltage	
	4000		t = 8.3ms	reapplied	
	3500		t = 10ms	100% V_{RRM}	
	3660	t = 8.3ms	reapplied		
I^2t Maximum I^2t for fusing	72	KA ² s	t = 10ms	No voltage	Sinusoidal half wave, Initial $T_J = T_J$ max.
	66		t = 8.3ms	reapplied	
	61		t = 10ms	100% V_{RRM}	
	56		t = 8.3ms	reapplied	
$I^2\sqrt{t}$ Maximum $I^2\sqrt{t}$ for fusing	720	KA ² √s	t = 0.1 to 10ms, no voltage reapplied		
$V_{T(TO)1}$ Low level value of threshold voltage	0.83	V	(16.7% × π × $I_{T(AV)} < I < π × I_{T(AV)}$), $T_J = T_J$ max.		
$V_{T(TO)2}$ High level value of threshold voltage	0.89		($I > π × I_{T(AV)}$), $T_J = T_J$ max.		
r_{t1} Low level value of on-state slope resistance	0.92	mΩ	(16.7% × π × $I_{T(AV)} < I < π × I_{T(AV)}$), $T_J = T_J$ max.		
r_{t2} High level value of on-state slope resistance	0.81		($I > π × I_{T(AV)}$), $T_J = T_J$ max.		
V_{TM} Max. on-state voltage	1.35	V	$I_{pk} = 570A$, $T_J = T_J$ max, $t_p = 10ms$ sine pulse		
I_H Maximum holding current	600	mA	$T_J = 25°C$, anode supply 12V resistive load		
I_L Typical latching current	1000				

Switching

Parameter	181RKI	Units	Conditions
di/dt Max. non-repetitive rate of rise of turned-on current	300	A/μs	Gate drive 20V, 20Ω, $t_r \leq 1\mu s$ $T_J = T_J$ max, anode voltage $\leq 80\% V_{DRM}$
t_d Typical delay time	1.0	μs	Gate current 1A, $di_g/dt = 1A/\mu s$ $V_d = 0.67\% V_{DRM}$, $T_J = 25°C$
t_q Typical turn-off time	100		$I_{TM} = 50A$, $T_J = T_J$ max, $di/dt = 10A/\mu s$, $V_R = 100V$ $dv/dt = 20V/\mu s$

Blocking

Parameter	181RKI	Units	Conditions
dv/dt Maximum critical rate of rise of off-state voltage	500	V/μs	T _J = T _J max. linear to 80% rated V _{DRM}
I _{RRM} I _{DRM} Max. peak reverse and off-state leakage current	30	mA	T _J = T _J max, rated V _{DRM} /V _{RRM} applied

Triggering

Parameter	181RKI	Units	Conditions
P _{GM} Maximum peak gate power	10	W	T _J = T _J max, t _p ≤ 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 ≤ 5ms
+V _{GM} Maximum peak positive gate voltage	20	V	T _J = T _J max., t _p ≤ 5ms
-V _{GM} Maximum peak negative gate voltage	5.0		
I _{GT} DC gate current required to trigger	TYP.	MAX.	T _J = - 40°C T _J = 25°C T _J = 125°C Max. required gate trigger/ current/ voltage are the lowest value which will trigger all units 12V anode-to-cathode applied
	130	-	
	65	150	
V _{GT} DC gate voltage required to trigger	2.0	-	T _J = - 40°C T _J = 25°C T _J = 125°C
	1.2	2.5	
	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	

Thermal and Mechanical Specification

Parameter	181RKI	Units	Conditions
T _J Max. operating temperature range	-40 to 125	°C	
T _{stg} Max. storage temperature range	-40 to 150		
R _{thJC} Max. thermal resistance, junction to case	0.15	K/W	DC operation
R _{thCS} Max. thermal resistance, case to heatsink	0.04		Mounting surface, smooth, flat and greased
T Mounting torque, ± 10%	31	Nm (lbf-in)	Non lubricated threads
	(275)		
	24.5		Lubricated threads
	(210)		
wt Approximate weight	280	g	
Case style	TO - 209AB (TO-93)		See Outline Table

181RKI Series

ΔR_{thJC} Conduction

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

Conduction angle	Sinusoidal conduction	Rectangular conduction	Units	Conditions
180°	0.050	0.032	K/W	$T_J = T_J \text{ max.}$
120°	0.063	0.059		
90°	0.080	0.082		
60°	0.118	0.124		
30°	0.225	0.228		

Ordering Information Table

Device Code

18	1	RKI	100		
-----------	----------	------------	------------	--	--

1	2	3	4	5	6
---	---	---	---	---	---

- 1** - $I_{T(AV)}$ rated average output current (rounded/10)
- 2** - 0 = Eyelet terminals (Gate and Auxiliary Cathode Leads)
1 = Fast - on terminals (Gate and Auxiliary Cathode Leads)
2 = Flag terminals (For Cathode and Gate Terminals)
- 3** - Thyristor
- 4** - Voltage code: Code x 10 = V_{RRM} (See Voltage Rating Table)
- 5** - None = Stud base UNF 3/4 - 16UNF threads
- 6** - Critical dv/dt: None = 500V/ μ sec
S90 = 1000V/ μ sec

Outline Table

GLASS-METAL SEAL
FLAG TERMINAL

SW 32
3/4"-16UNF-2A

18 (0.71)
11 (0.43)
DIA. 6.5 (0.26)
13 (0.51)
1.5 (0.06) DIA.
DIA. 28 (1.1) MAX.
70 (2.75) MAX.
28.5 (1.12) MAX.
16 (0.63) MAX.
21 (0.83) MAX.

Case Style TO-209AB (TO-93) Flag
All dimensions in millimeters (inches)

Outline Table

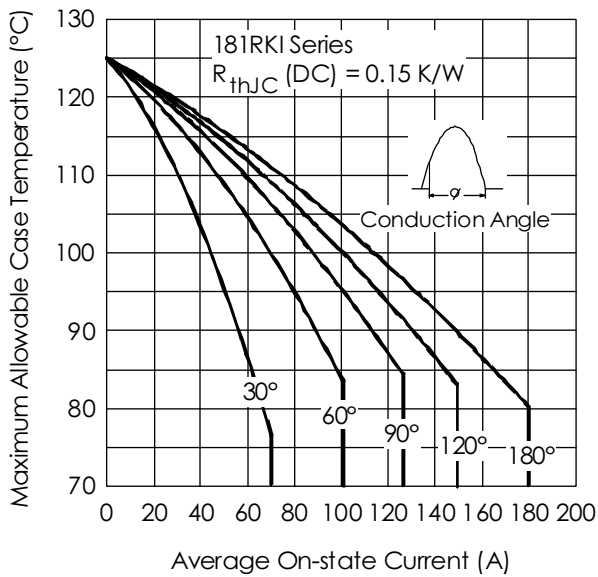
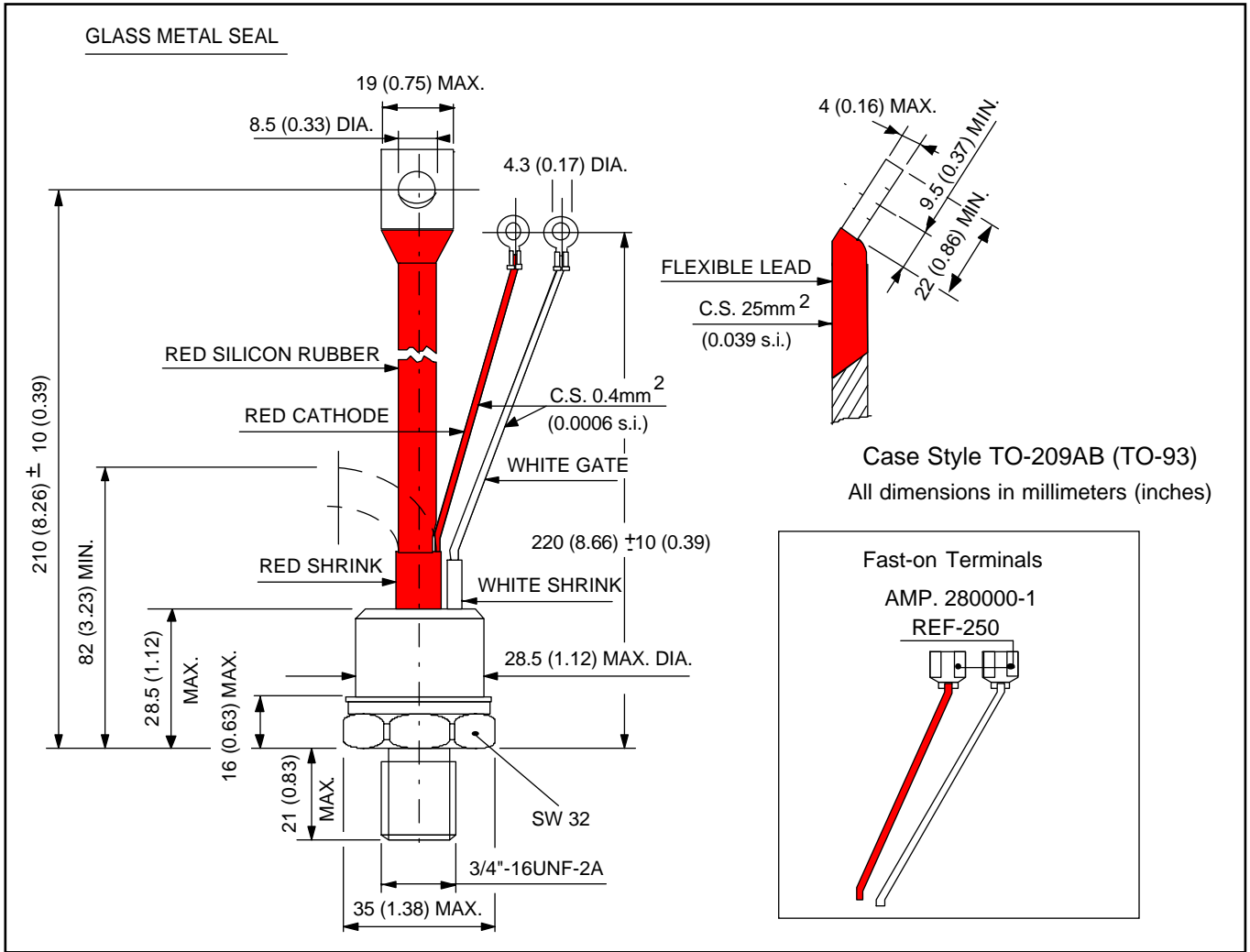


Fig. 1 - Current Ratings Characteristics

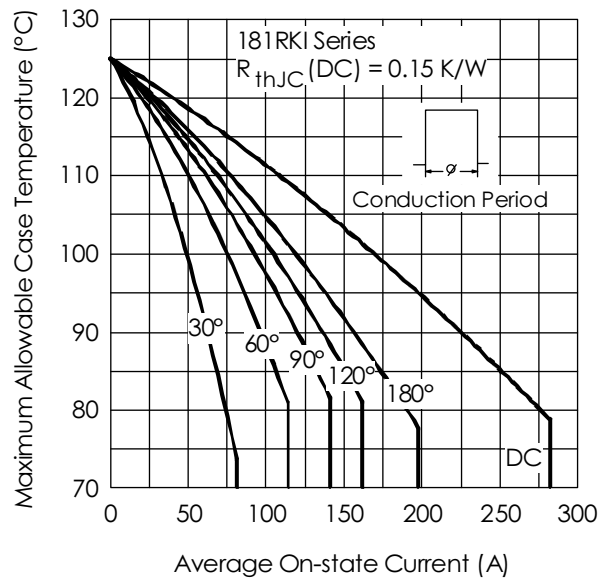


Fig. 2 - Current Ratings Characteristics

181RKI Series

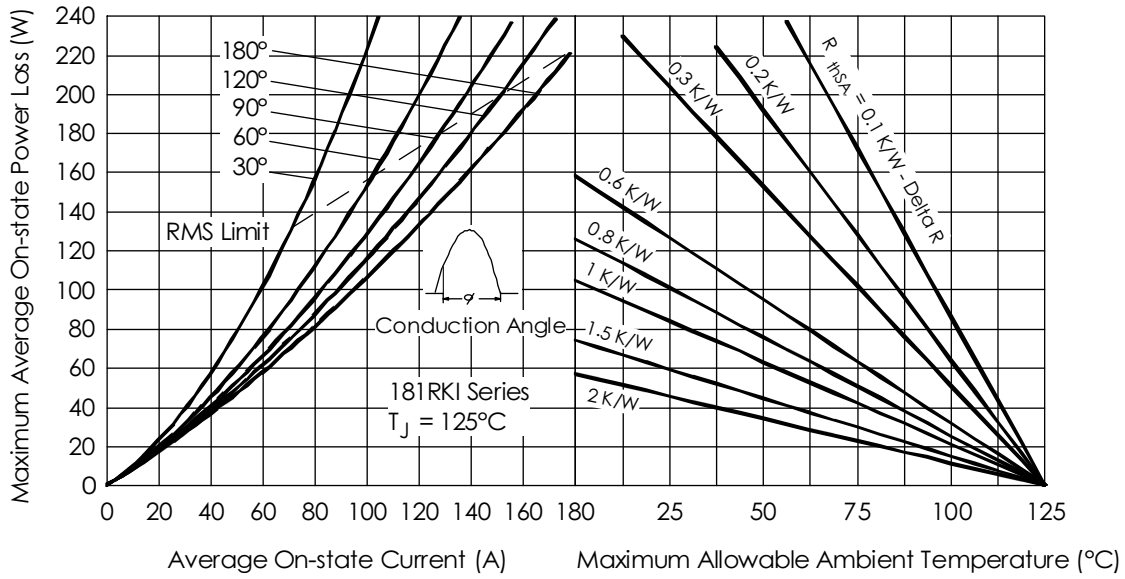


Fig. 3 - On-state Power Loss Characteristics

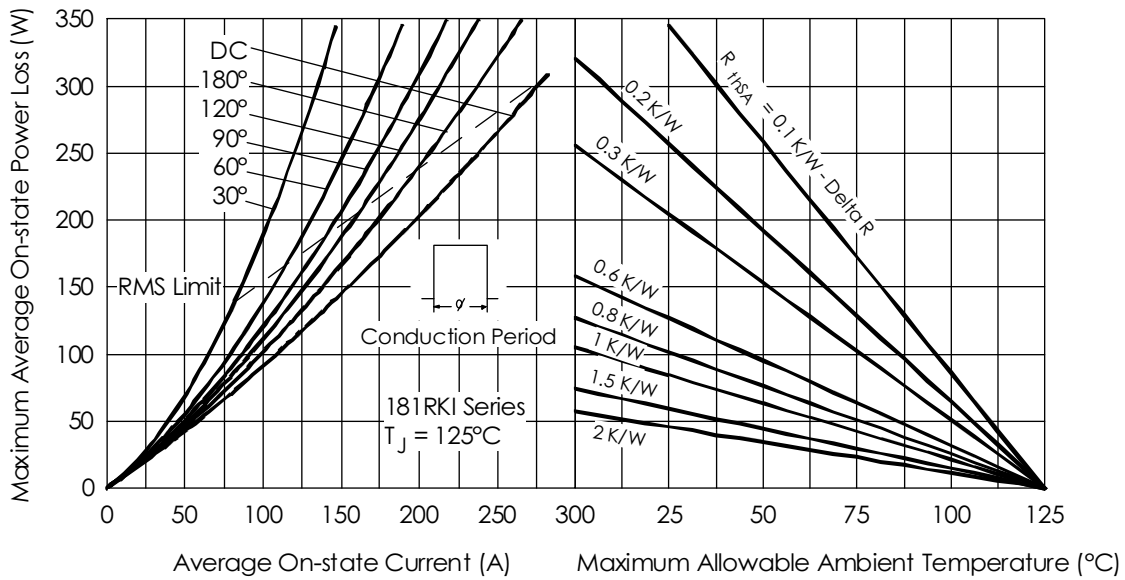


Fig. 4 - On-state Power Loss Characteristics

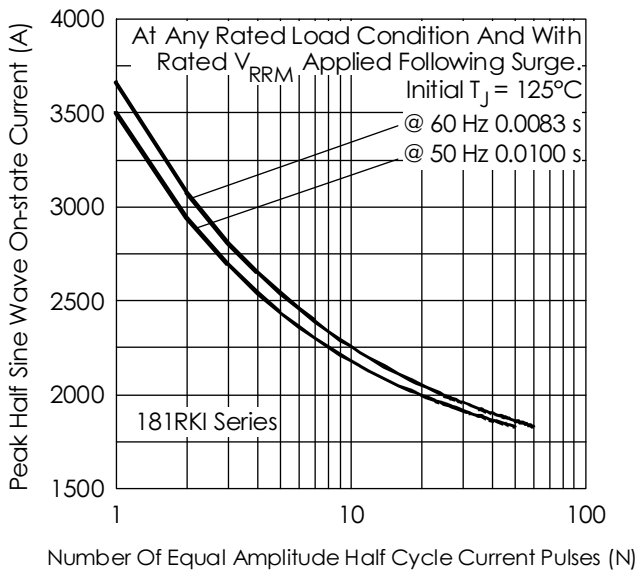


Fig. 5 - Maximum Non-Repetitive Surge Current

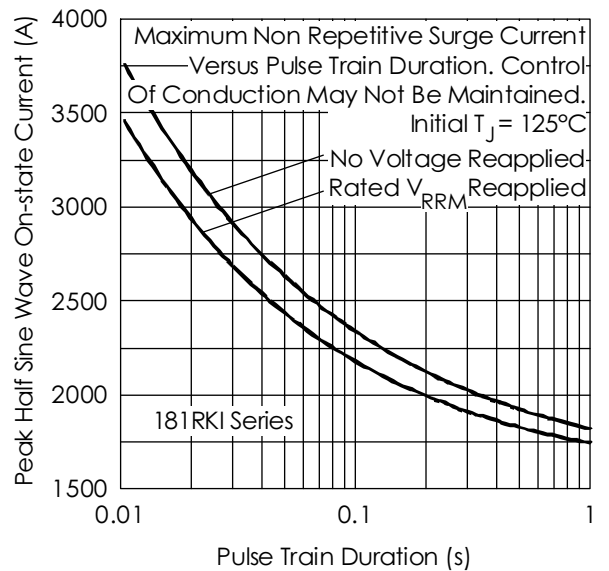


Fig. 6 - Maximum Non-Repetitive Surge Current

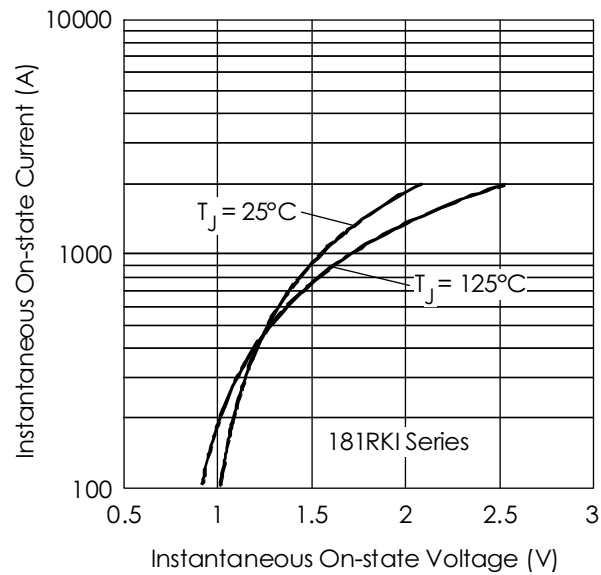


Fig. 7 - On-state Voltage Drop Characteristics

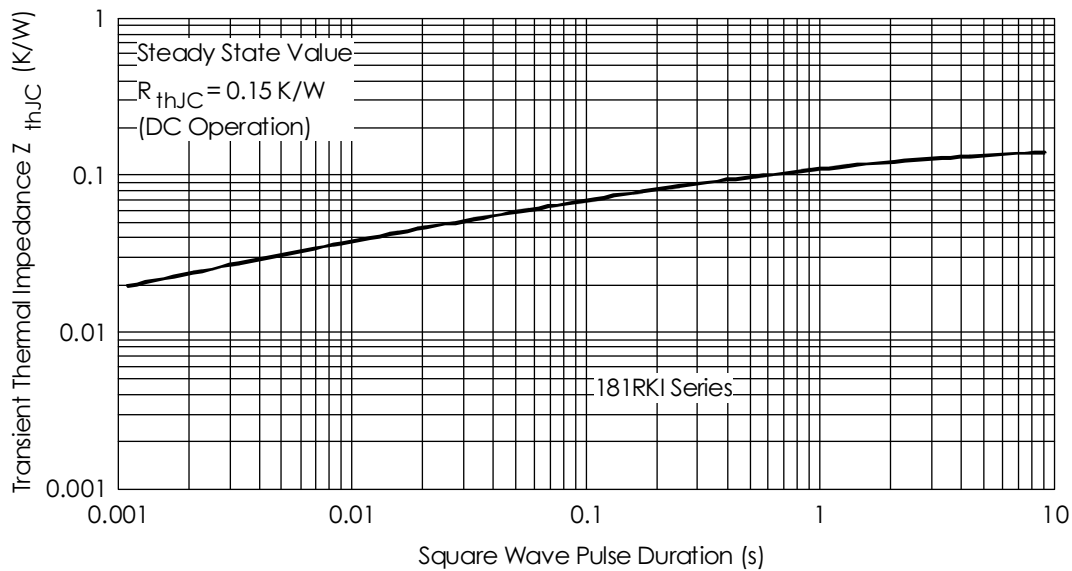


Fig. 8 - Thermal Impedance Z_{thJC} Characteristic

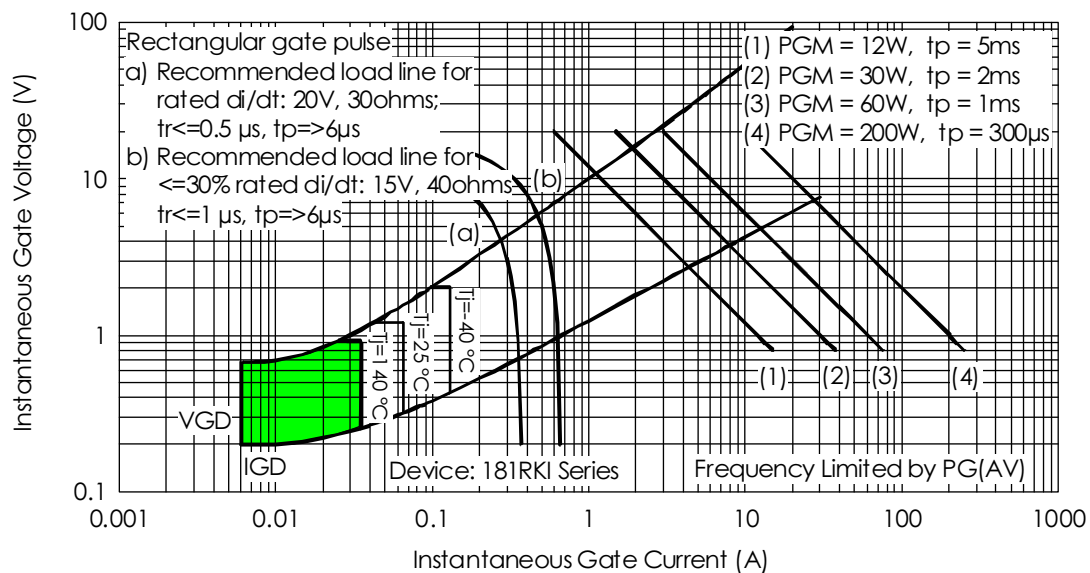


Fig. 9 - Gate Characteristics