Ruttonsha International Rectifier Ltd.

RUTTONSHA

SILICON CONTROLLED RECTIFIERS

175/235RK SERIES
Power Silicon Controlled Rectifiers

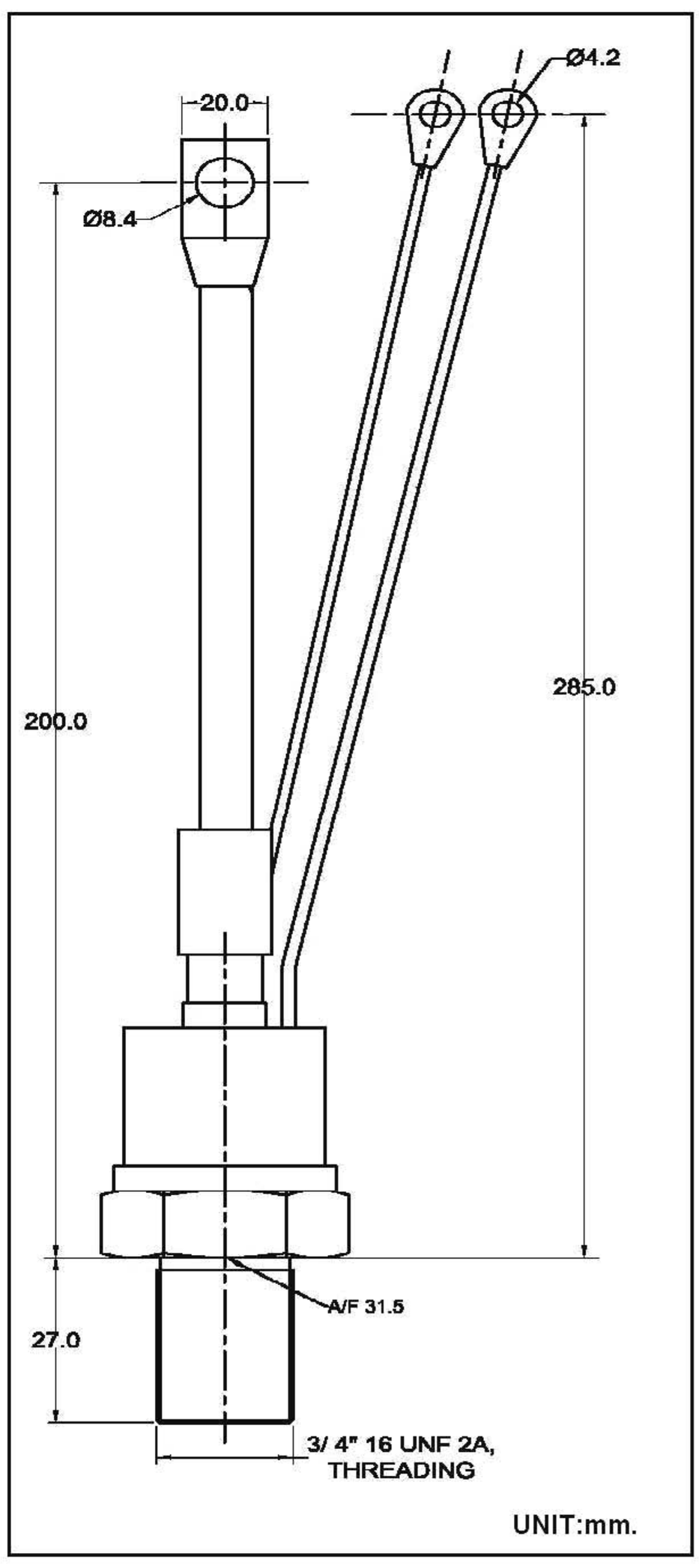
Types : 175RK20 TO 175RK160, 235RK20 TO 235RK160

FEATURES

- *Centre amplifying gate.*
- *International standard case TO-209AB (TO-93).*
- *Threaded studs UNF 3/4 - 16UNF2A.*
- *Compression Bonded Encapsulation for heavy duty operations such as severe thermal cycling.*

TYPICAL APPLICATIONS

- *DC motor control (e.g. for Machine tools).*
- *Controlled rectifiers (e.g. for Battery Charging, Uninterrupted Power Supply).*
- *AC controllers (e.g. Temperature control, Lights control).*



MAJOR RATINGS & CHARACTERISTICS

Parameters		175RK	235RK	Units
$I_{T(AV)}$		170	230	A
	@ T_C	85		^0C
$I_{T(RMS)}$		270	361	A
I_{TSM}	@ 50 Hz	3900	4800	A
I^2t	@ 50 Hz	105	163	KA^2s
V_{DRM} / V_{RRM}		200 to 1600		V
t_q	typical	100		µs
T_J		-40 to 125		^0C

SILICON CONTROLLED RECTIFIERS

175/235RK SERIES

ELECTRICAL SPECIFICATION

VOLTAGE RATINGS

Type Number	Voltage Code	V_{RRM} / V_{DRM}, max. repetitive peak and off-state vltage V	V_{RSM}, max. non-repetitive peak voltage V	I_{DRM} / I_{RRM} max. @ 125°C mA
175RK/235RK	20	200	300	30
	40	400	500	
	60	600	700	
	80	800	900	
	100	1000	1100	
	120	1200	1300	
	140	1400	1500	
	160	1600	1700	

ON-STATE CONDUCTION

	Parameter	175RK	235RK	Units	Conditions	
$I_{T(AV)}$	Max. average on-state current	170	230	A	180°C conduction, half sine wave	
	@ case temperature	85		°C		
$I_{T(RMS)}$	Max. RMS on-state current	270	361			
I_{TSM}	Max. peak one cycle non-repetitive surge current	3900	4800	A	t = 10ms	Sinusodial half wave, Initial T_J = T_J max.
I^2t	Maximum I^2t for fusing	76	115	kA^2s	t = 10ms	
$V_{T(TO)}$	Threshold voltage	1.08	0.92	V	T_J = T_J max.	
r_t	On state slope resistance	1.8	0.81	mΩ	T_J = T_J max.	
V_{TM}	Max. on state voltage	1.75	1.55	V	I_{pk} = π x $I_{T(AV)}$, T_J = 125°C, t_p = 10ms sine pulse	
I_H	Maximum holding current	300		mA	T_J = 25°C, anode supply 12V resistive load	
I_L	Latching current	600				

SWITCHING

	Parameter	175RK/235RK	Units	Conditions
di/dt	Max. non-repetitive rate of rise of turned-on current	100	A/µs	Gate drive 20V, 20Ω, tr ≤ 1 µs T_J = 125°C, anode voltage ≤ 80% V_{DRM}
t_d	Typical delay time	1.0	µs	Gate current 1A, di_g/dt = 1A/µs V_d = 0.67% V_{DRM}, T_J = 25°C
t_q	Typical turn-off time	100		I_{TM} = 300A, T_J = 125°C, di/dt = 20A/µs, V_R = 50V dv/dt = 20V/µs, Gate 0V 100Ω, t_p = 500µs

SILICON CONTROLLED RECTIFIERS

175/235RK SERIES

BLOCKING

	Parameter	175RK/235RK	Units	Conditions
dv/dt	Maximum critical rate of rise of off-state voltage	500	V/µs	T_J = 125°C, linear to 80% rated V_{DRM}
I_{RRM} I_{DRM}	Max. peak reverse and off-state leakage current	30	mA	T_J = 125°C, rated V_{DRM} /V_{DRM} applied

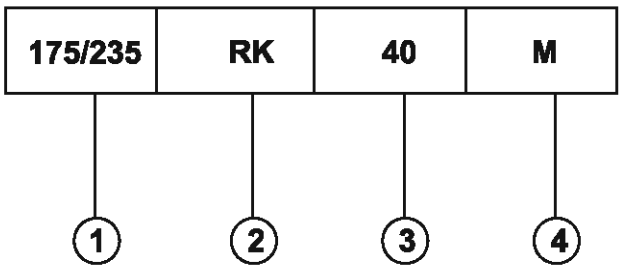
TRIGGERING

	Parameter	175RK/235RK		Units	Conditions	
P_{GM}	Maximum peak gate power	10.0		W	T_J = 125°C, $t_p \leq$ 5ms	
$P_{G(AV)}$	Maximum average gate power	2.0			T_J = 125°C, f= 50Hz, d% = 50	
I_{GM}	Max. peak positive gate current	3.0		A	T_J = 125°C, $t_p \leq$ 5ms	
$+V_{GM}$	Max. peak positive gate voltage	20		V	T_J = 125°C, $t_p \leq$ 5ms	
$-V_{GM}$	Max. peak negative gate voltage	5.0				
		TYP.	MAX.			
I_{GT}	DC gate current required to trigger	90	150	mA	T_J = 25°C	Max. required gate trigger / current / voltage are the lowest value which will trigger all units 12V anode-to-cathode applied.
V_{GT}	DC gate voltage required to grigger	1.8	3.0	V	T_J = 25°C	
I_{GD}	DC gate current not to trigger	10		mA	T_J = 125°C	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	175RK/235RK		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	0.105	0.10	K/W	DC operation
R_{thCS}	Max. thermal resistance, case to heat sink	0.04			Mounting surface, smooth, flat and greased
F	Mounting force, ±10%	31		Nm	Non lubricated threads
wt	Approximate weight	280		gm	
	Case style	To - 209AE (TO-118)			See outline

ORDER INFORMATION TABLE



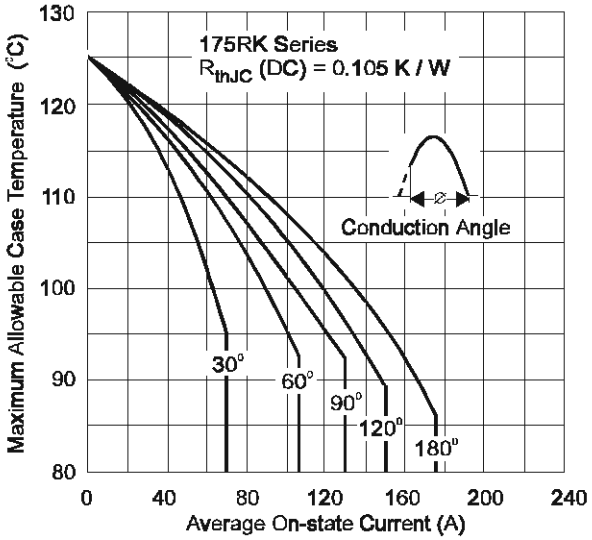
① - Current Code

② - RK - Essential part number

③ - Voltage Rating (See table)

④ - None - Stud 3/4" 16UNF 2A Threading
M - Stud M20 x 1.5P Metric Threading

175/235RK SERIES



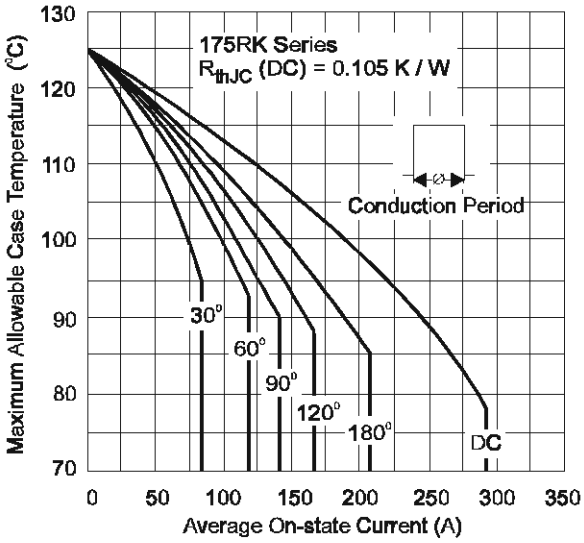
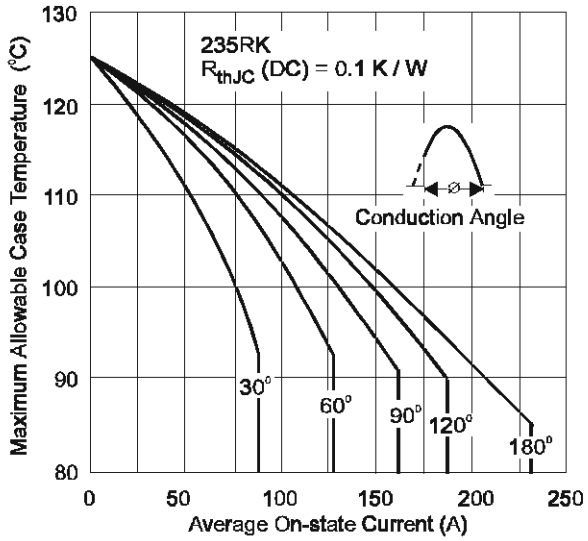


Fig. 1 - Current Ratings Characteristics



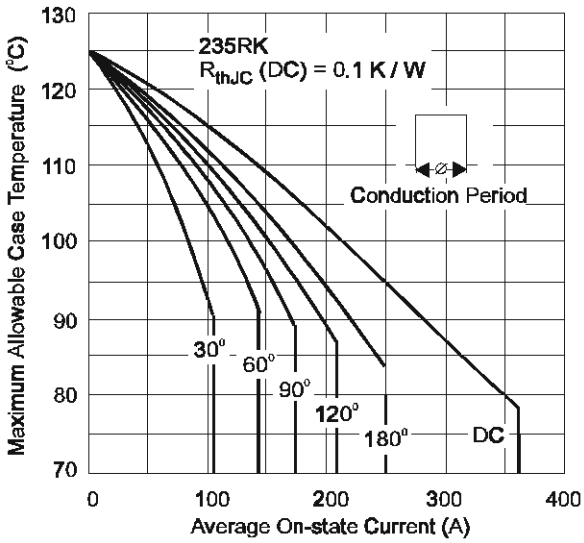


Fig. 2 - Current Ratings Characteristics

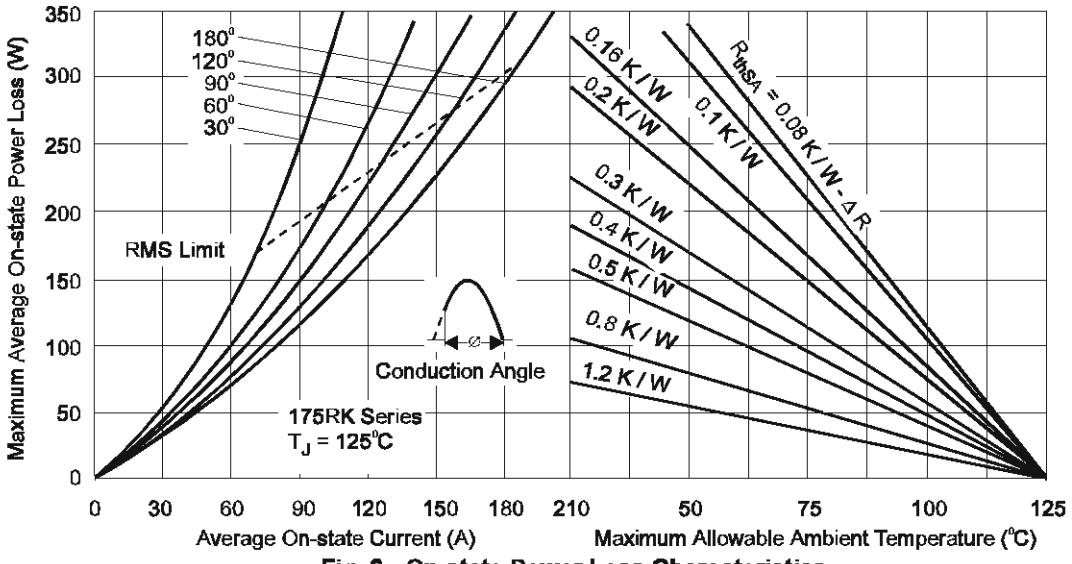


Fig. 3 - On-state Power Loss Characteristics

175 / 235RK SERIES

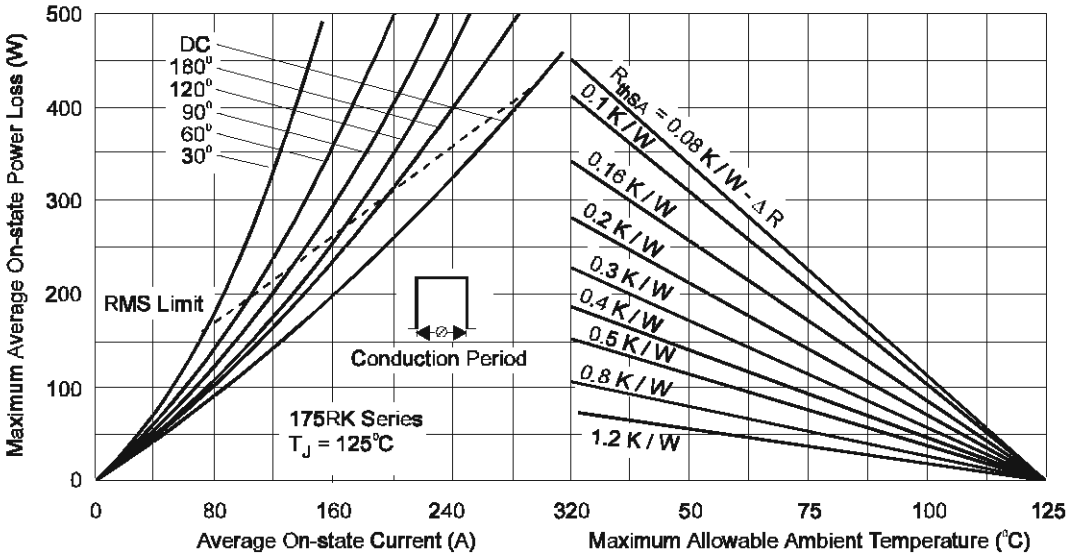


Fig. 4 - On-state Power Loss Characteristics

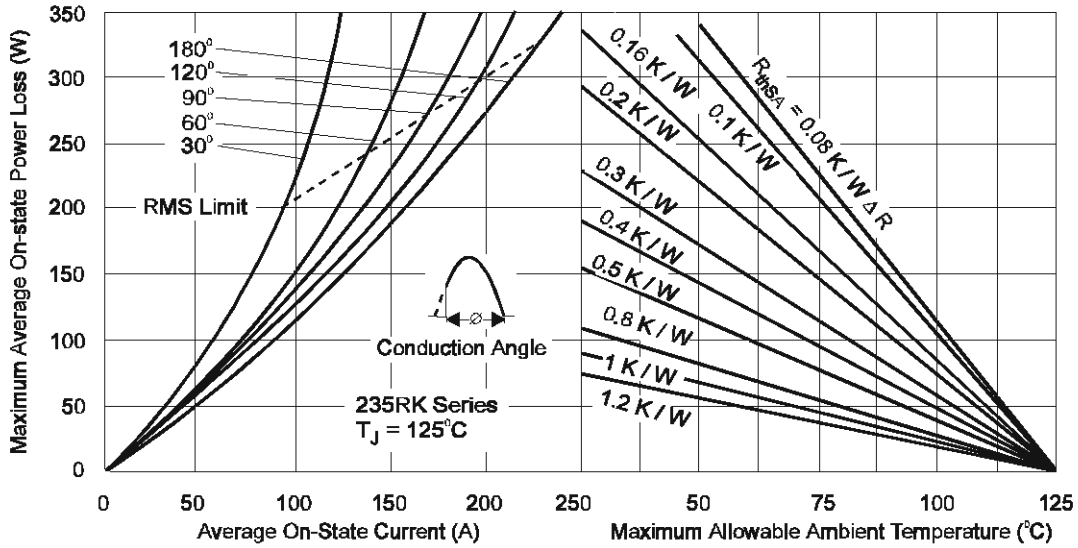


Fig. 5 - On-state Power Loss Characteristics

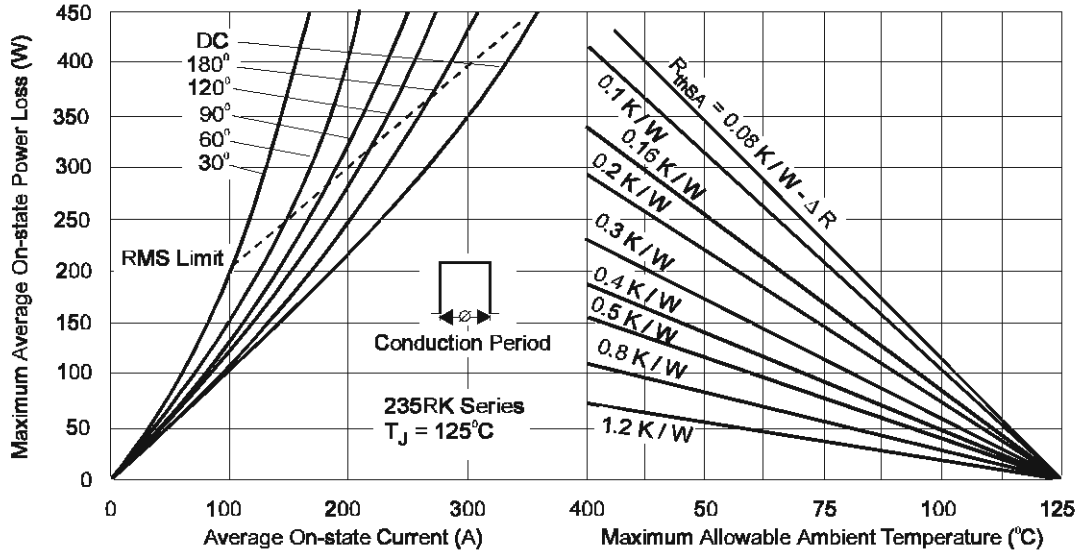


Fig. 6 - On-state Power Loss Characteristics

175/235RK SERIES

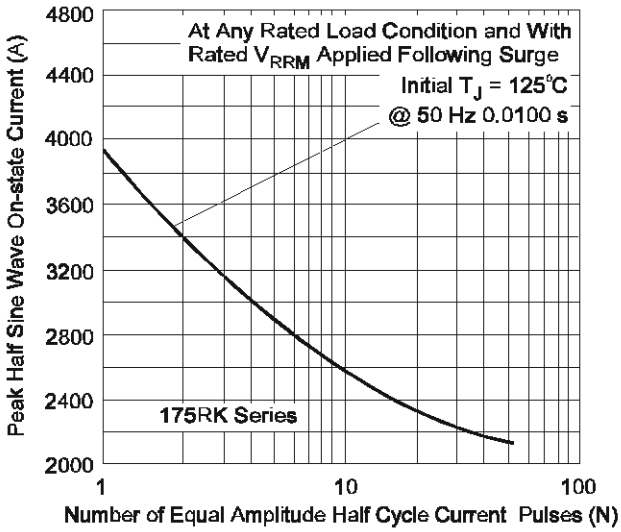


Fig. 7 - Maximum Non-Repetitive Surge Current

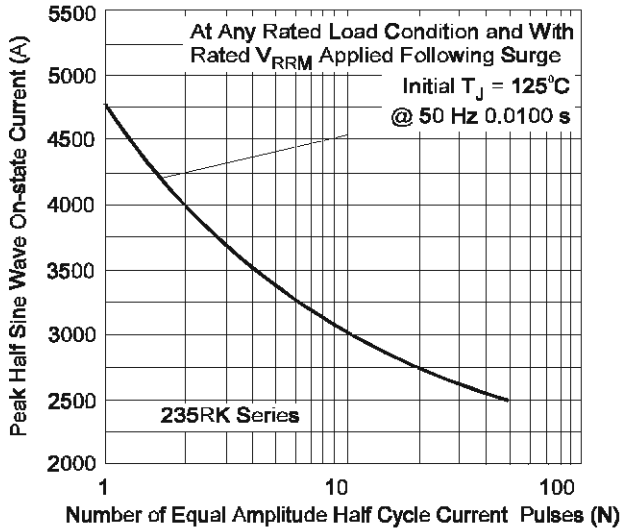


Fig. 8 - Maximum Non-Repetitive Surge Current

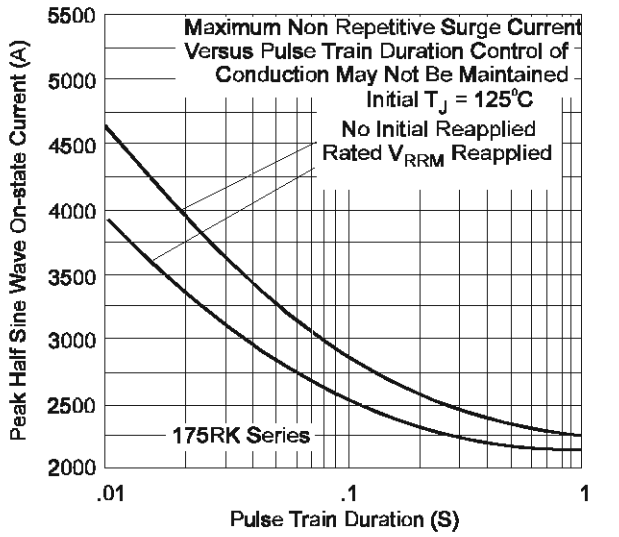


Fig. 9 - Maximum Non-Repetitive Surge Current

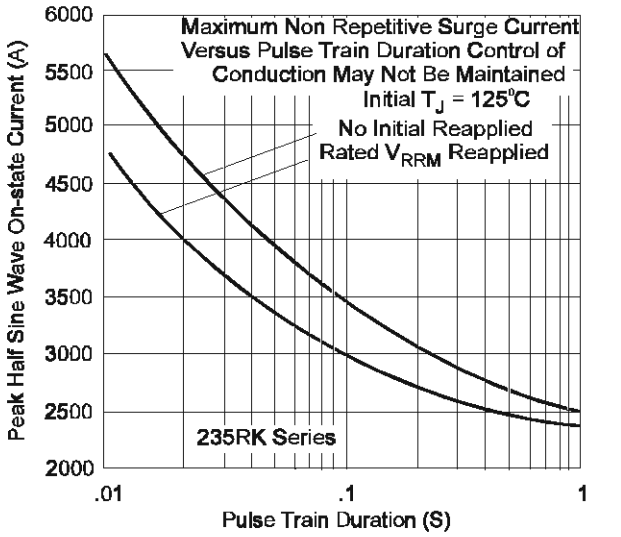


Fig. 10 - Maximum Non-Repetitive Surge Current

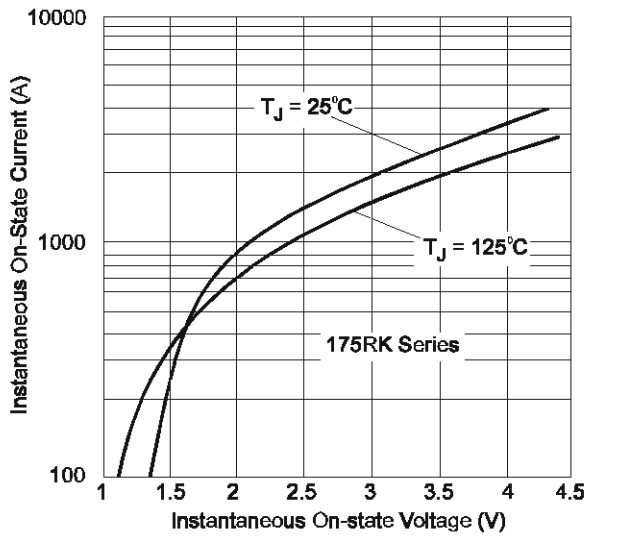


Fig. 11 - On-state Voltage Drop Characteristics

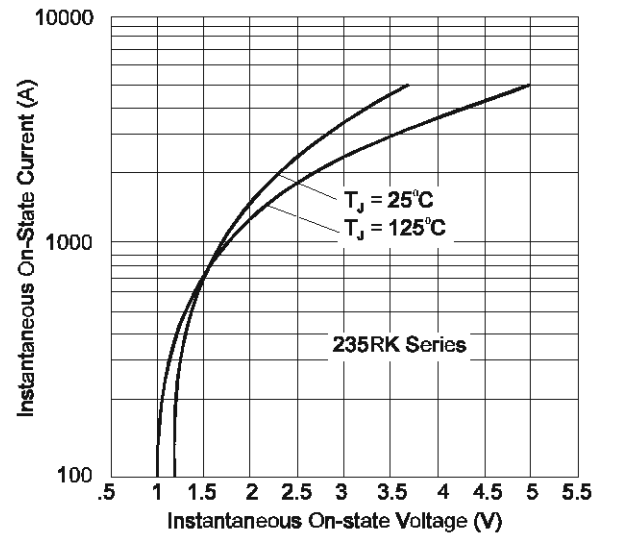


Fig. 12 - On-state Voltage Drop Characteristics

175 / 235RK SERIES

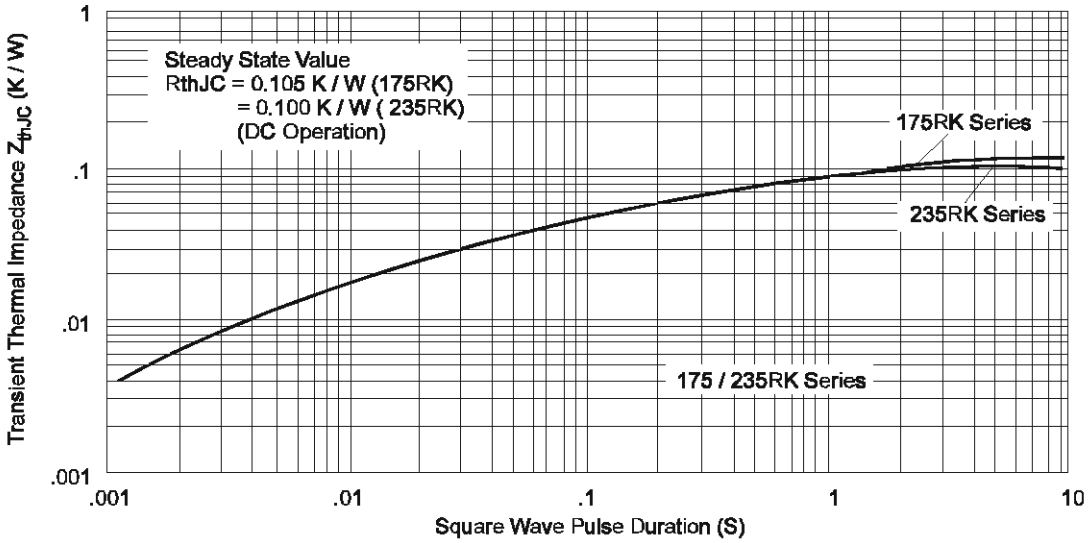


Fig. 13 - Thermal Impedance Z_{thJC} Characteristics

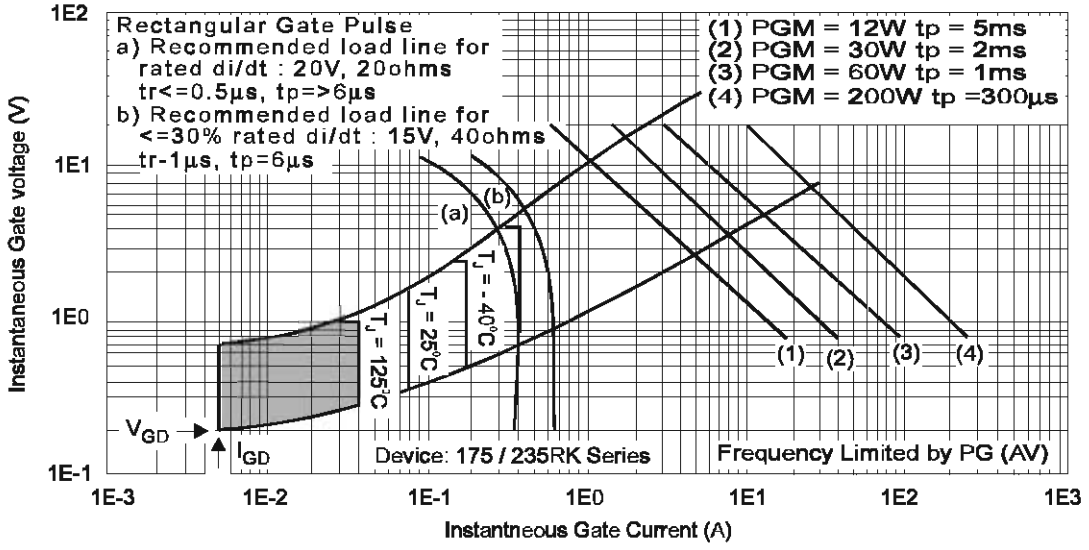


Fig. 9 - Gate Characteristics

Last Update : Feb. 2006