Ruttonsha International Rectifier Ltd.

SILICON CONTROLLED RECTIFIERS

380RK SERIES
Power Silicon Controlled Rectifiers
595 Amp RMS SCRs

Types : 380RK20 TO 380RK60

FEATURES

- *Centre amplifying gate.*
- *International standard case TO-209AE (TO-118).*
- *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, UPS).*
- *AC controllers (e.g. temperature control, lights control).*

MAJOR RATINGS & CHARACTERISTICS

Parameters		380RK	Units
$I_{T(AV)}$		380	A
	@ T_C	75	^0C
$I_{T(RMS)}$		595	A
I_{TSM}	@ 50 Hz	10500	A
I^2t	@ 50 Hz	551	KA^2s
V_{DRM} / V_{RRM}		200 to 600	V
t_q	typical	100	µs
T_J		-40 to 125	^0C

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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
380RK	20	200	300	50
	40	400	500	
	60	600	700	

ON-STATE CONDUCTION

	Parameter	380RK	Units	Conditions	
$I_{T(AV)}$	Max. average on-state current	380	A	180° conduction, half sine wave	
	@ case temperature	75	°C		
$I_{T(RMS)}$	Max. RMS on-state current	595			
I_{TSM}	Max. peak one cycle non-repetitive surge current	10500	A	t = 10ms	Sinusoidal half wave, Initial $T_J = T_J$ max.
I^2t	Maximum I^2t for fusing	551	kA^2s	t = 10ms	
$V_{T(TO)}$	Threshold voltage	0.91	V	$T_J = T_J$ max.	
r_t	On state slope resistance	0.58	mΩ	$T_J = T_J$ max.	
V_{TM}	Max. on state voltage	1.40	V	I_{pk} = 1193A, T_J = 125°C, t_p = 10ms sine pulse	
I_H	Maximum holding current	600	mA	T_J = 25°C, anode supply 12V resistive load	
I_L	Latching current	1000			

SWITCHING

	Parameter	380RK	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} = 550A, T_J = 125°C, di/dt = 40A/µs, V_R = 50V dv/dt = 20V/µs, Gate 0V 100Ω, t_p = 500µs

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BLOCKING

	Parameter	380RK	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	50	mA	T_J = 125°C, rated V_{DRM} /V_{RRM} applied

TRIGGERING

	Parameter	380RK		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	100	200	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 trigger	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	380RK	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	0.08	K/W	DC operation
R_{thCS}	Max. thermal resistance, case to heat sink	0.03		Mounting surface, smooth, flat and greased
T	Mounting torque, ±10%	48.5	Nm	Non lubricated threads
wt	Approximate weight	535	gm	
	Case style	To - 209AE (TO-118)		See outline

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ORDER INFORMATION TABLE

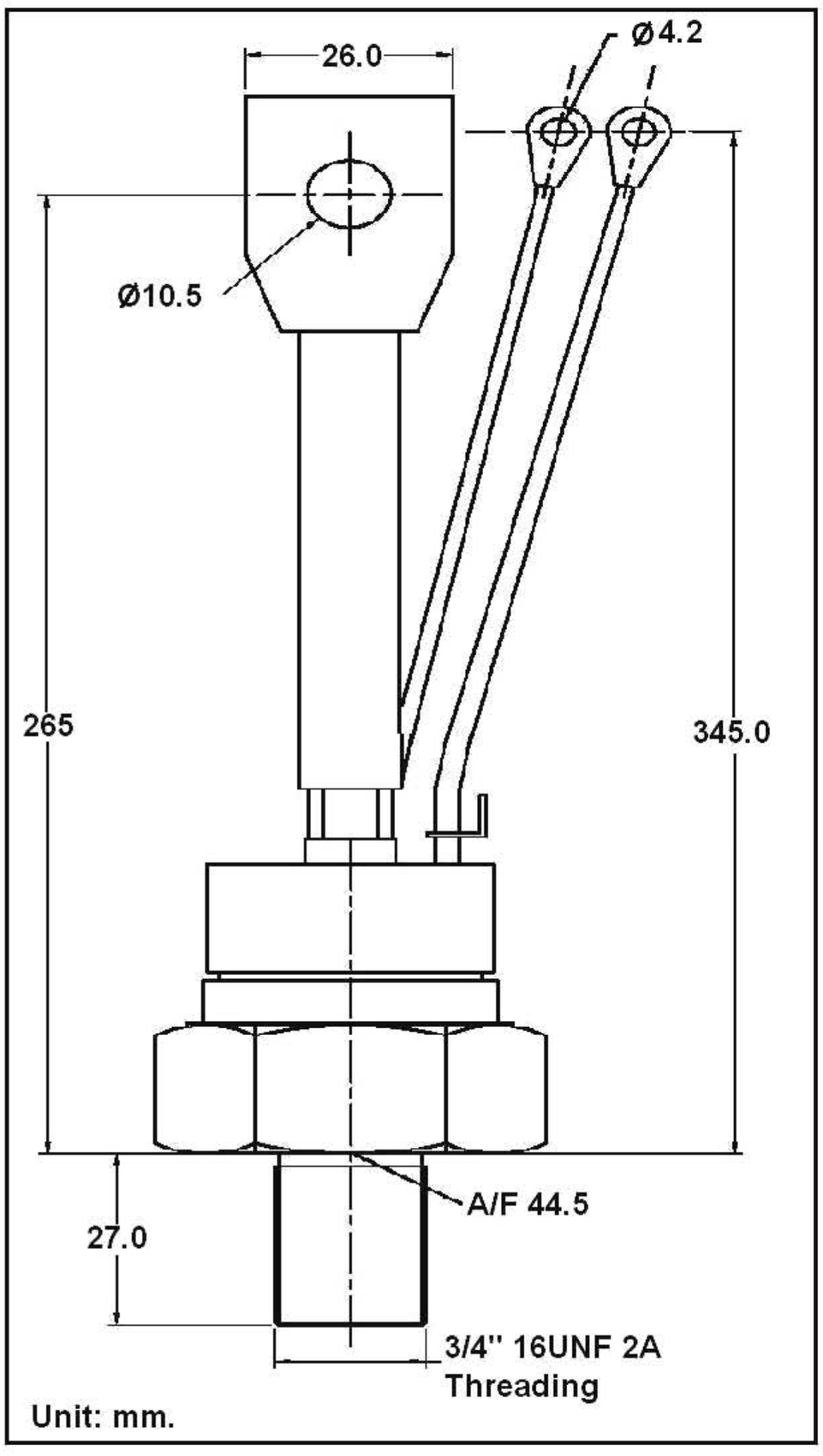
380	RK	40	M
①	②	③	④

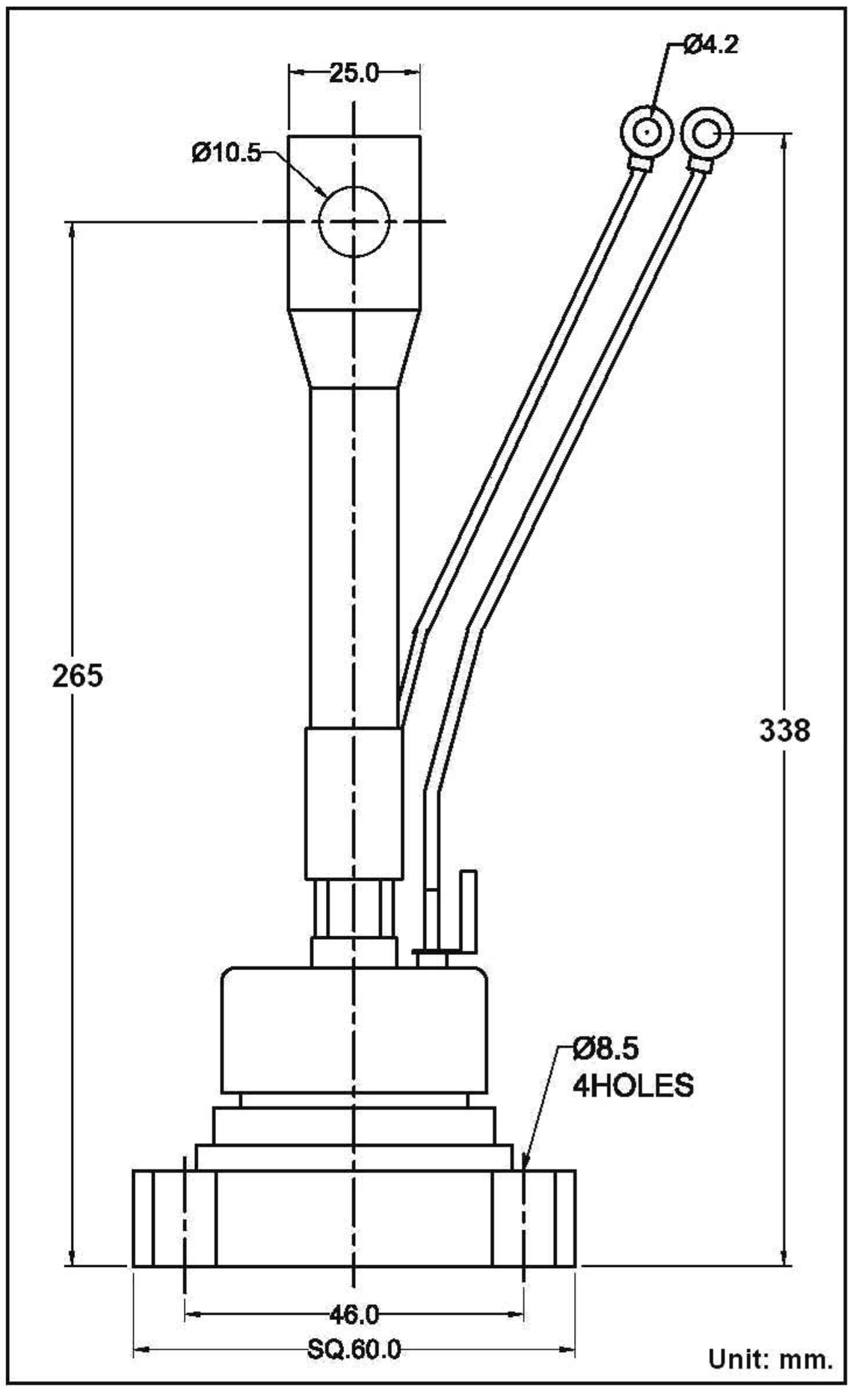
① - Current Code

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





380RK SERIES

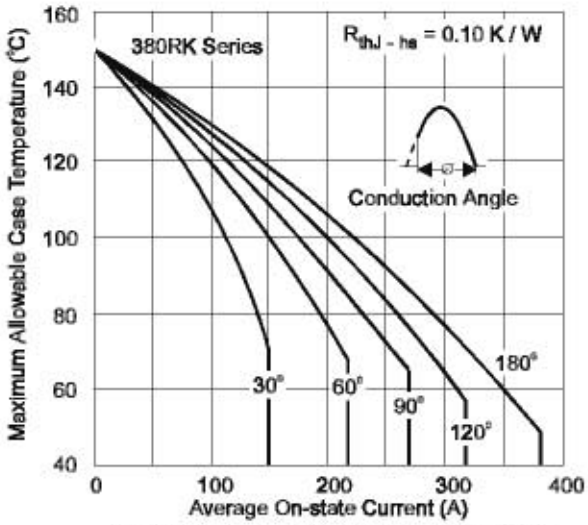


Fig. 1 - Current Ratings Characteristics

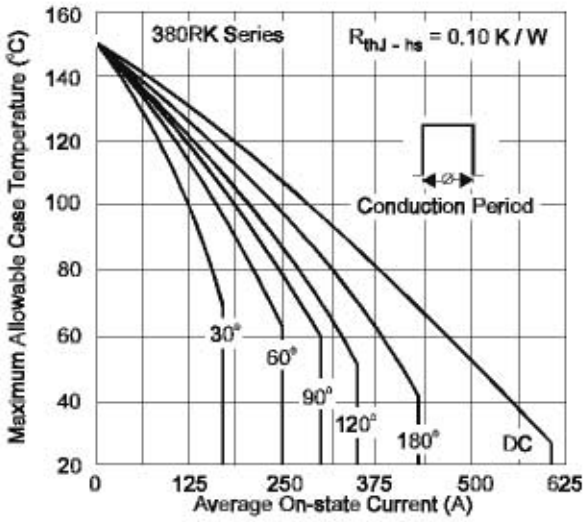


Fig. 2 - Current Ratings Characteristics

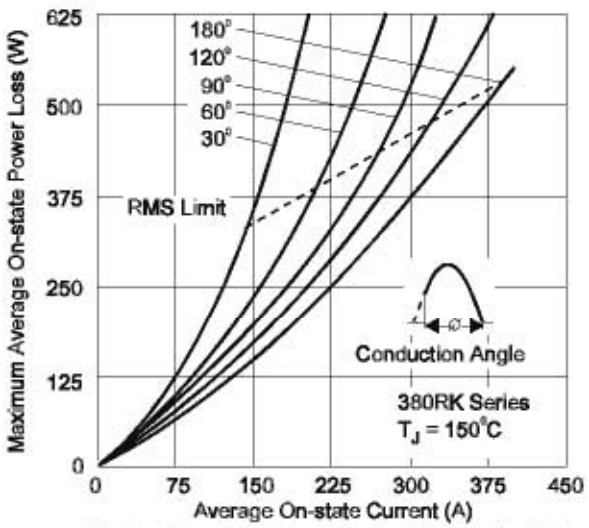


Fig. 3 - On-state Power Loss Characteristics

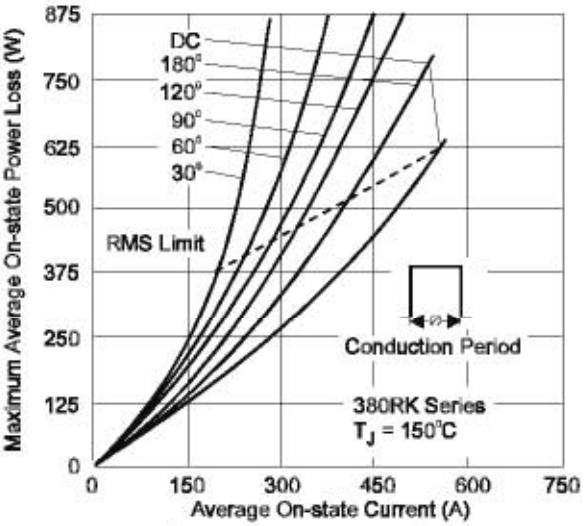


Fig. 4 - On-state Power Loss Characteristics

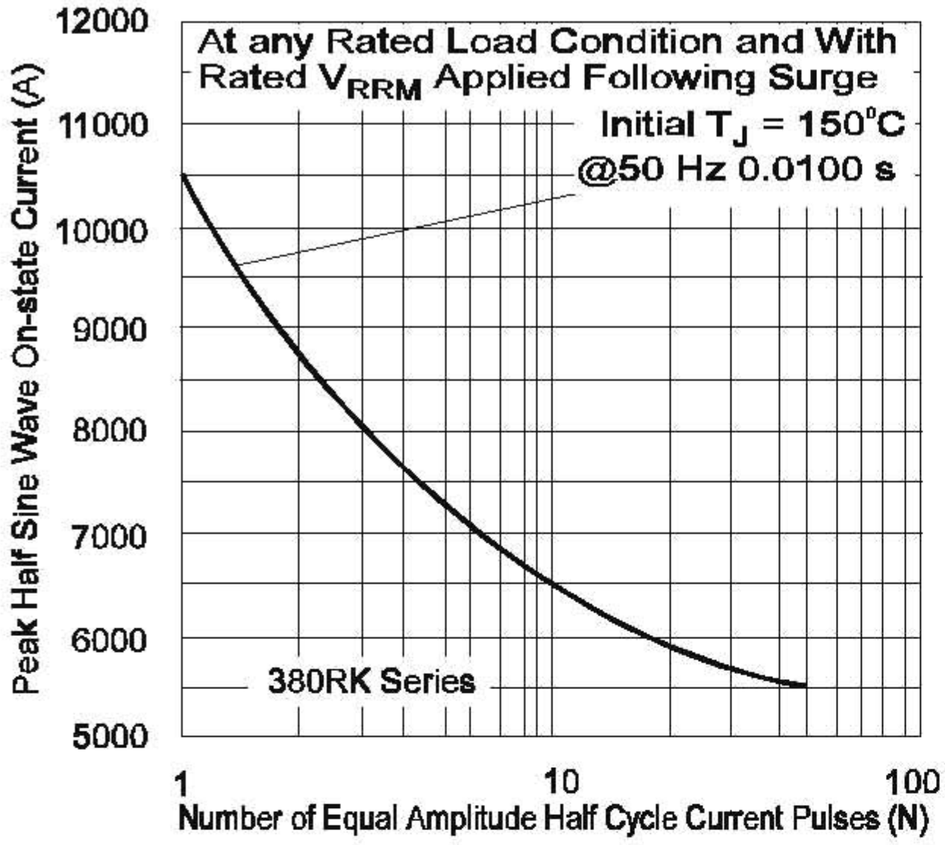


Fig. 5 - Maximum Non-Repetitive Surge Current

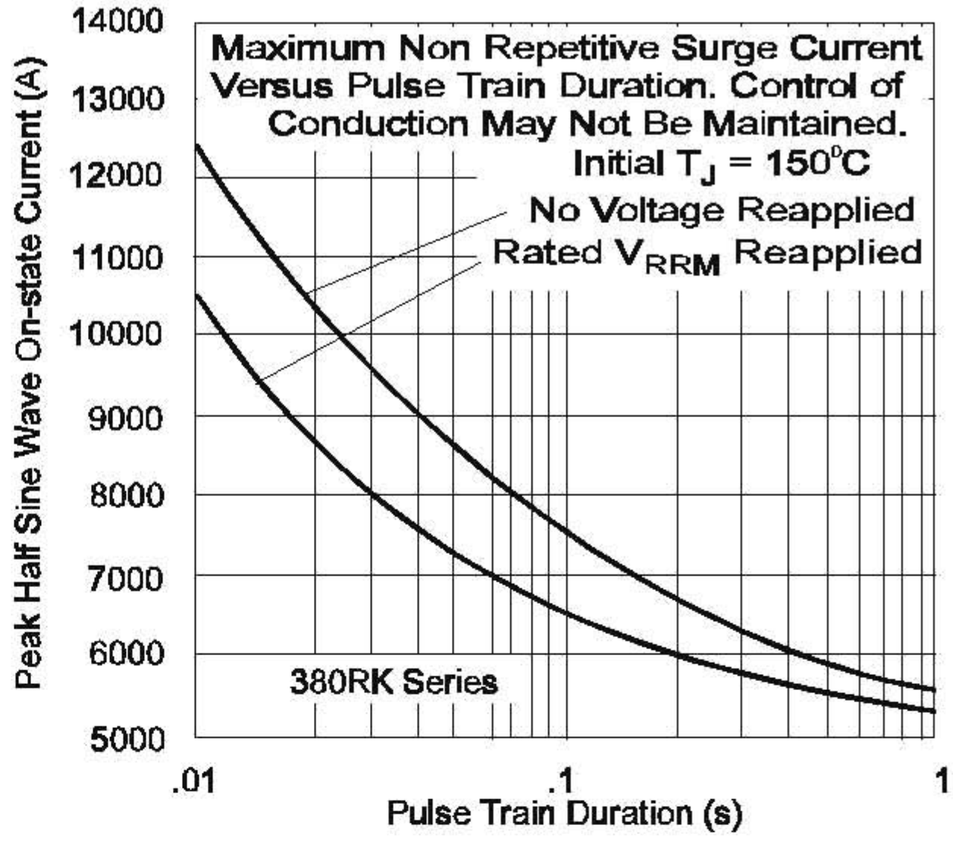


Fig. 6 - Maximum Non-Repetitive Surge Current

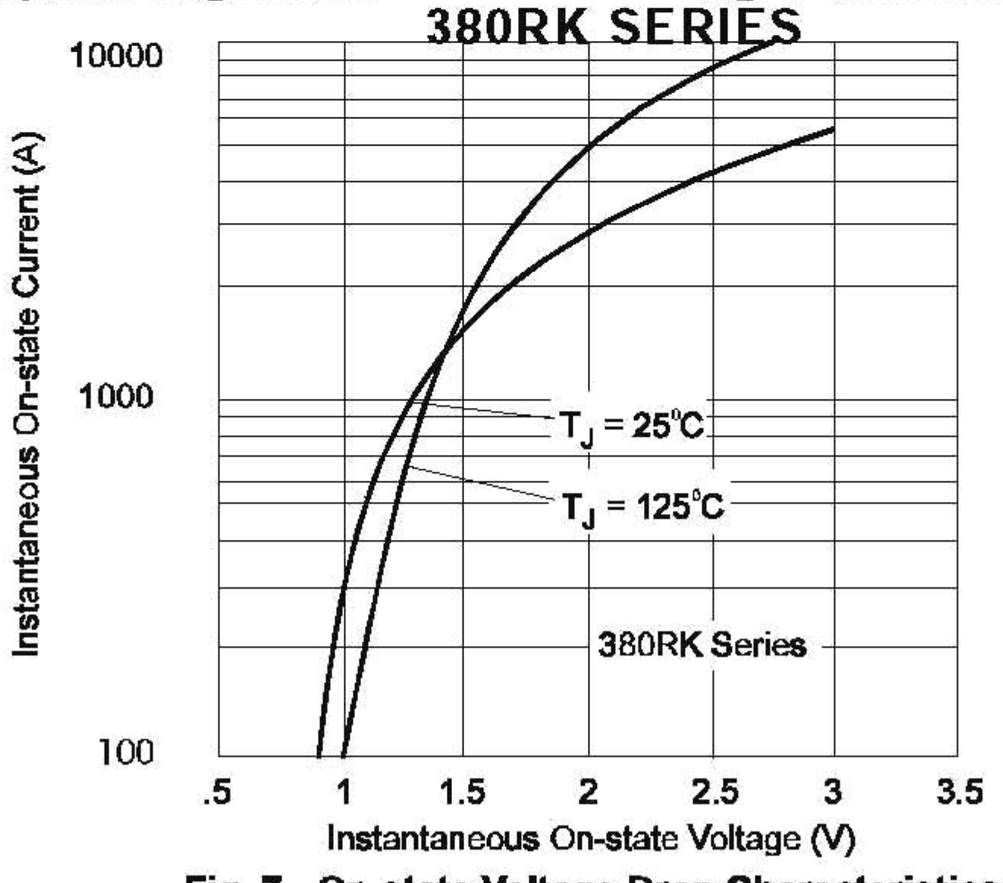


Fig. 7 - On-state Voltage Drop Characteristics

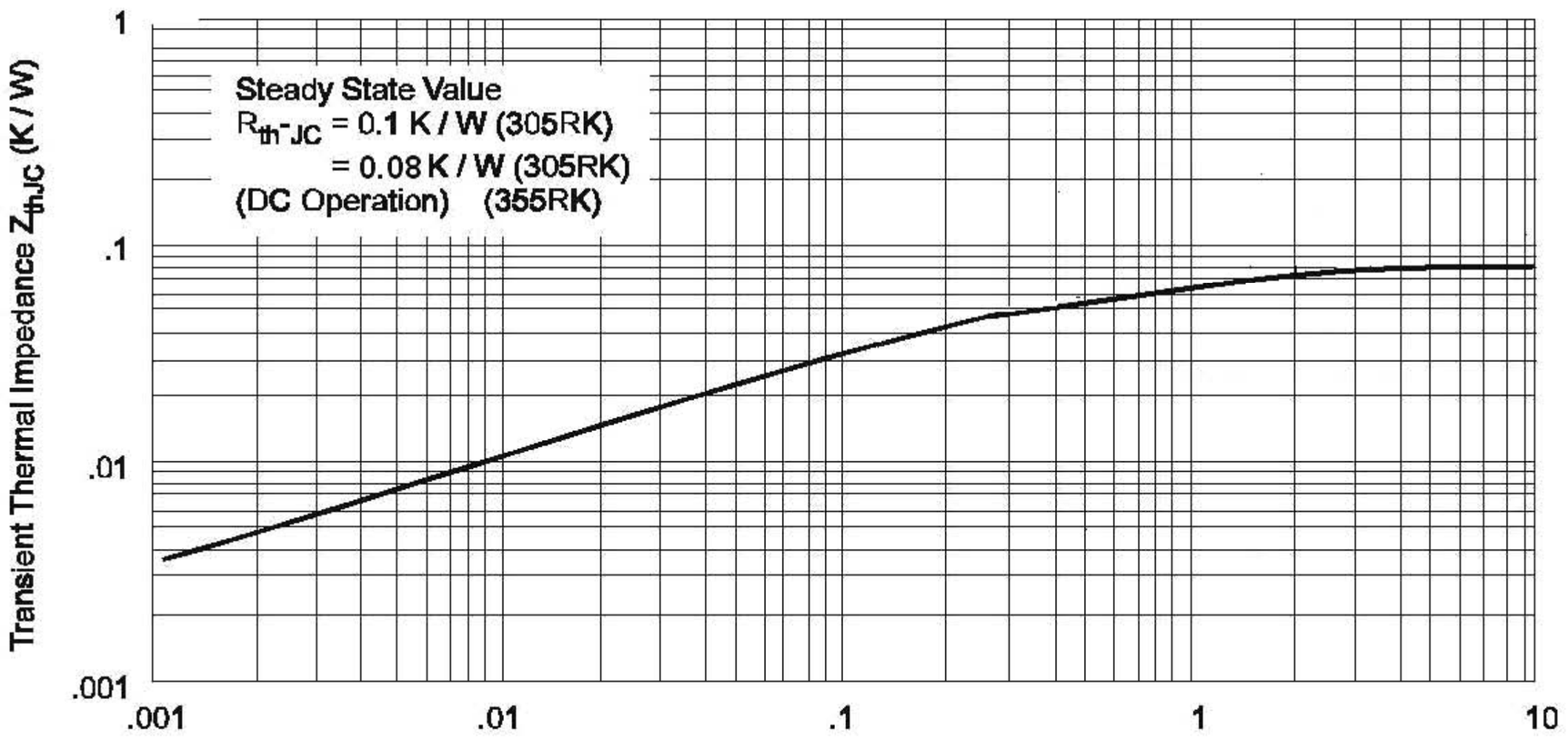


Fig. 8 - Thermal Impedance $Z_{thJ\text{-}hs}$ Characteristics

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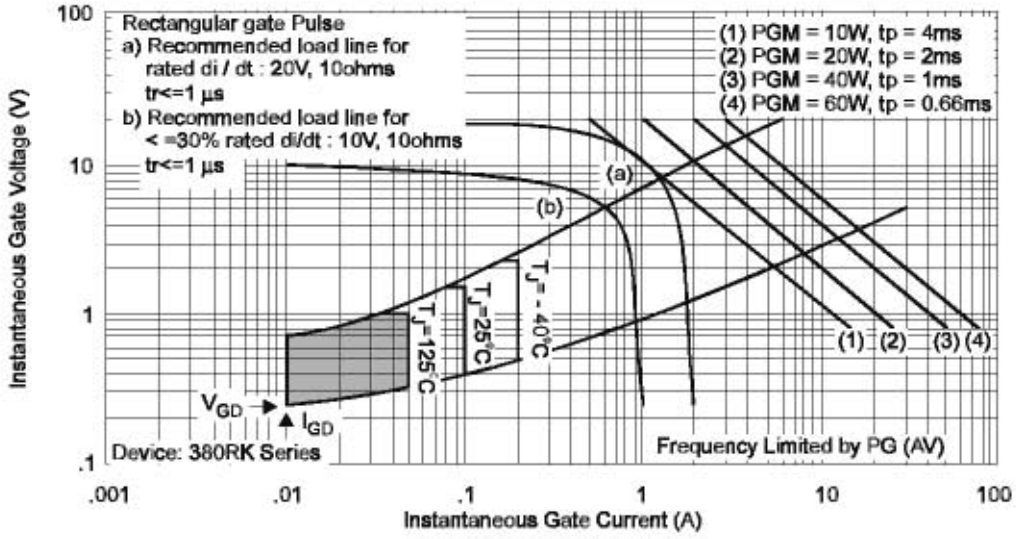

Fig.9 - Gate Characteristics