



Ruttonsha International Rectifier Ltd.

SILICON CONTROLLED RECTIFIERS

305/355RK SERIES

Power Silicon Controlled Rectifiers

Types : 305RK20 TO 305RK160, 355RK20 TO 355RK160

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	305RK	355RK	Units
$I_{T(AV)}$	300	350	A
$@ T_c$	75		$^{\circ}\text{C}$
$I_{T(RMS)}$	470	550	A
I_{TSM} @ 50 Hz	6730	7550	A
I^2t @ 50 Hz	226	285	KA^2s
V_{DRM} / V_{RRM}	200 to 1600		V
t_q typical	100		μs
T_J	-40 to 125		$^{\circ}\text{C}$

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ELECTRICAL SPECIFICATION VOLTAGE RATINGS

Type Number	Voltage Code	V_{RRM} / V_{DRM} max. repetitive peak and off-state voltage V	V_{RSM} max. non-repetitive peak voltage V	I_{DRM} / I_{RRM} max. @ 125°C mA
305RK/355RK	20	200	300	50
	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	305RK	355RK	Units	Conditions	
$I_{T(AV)}$	Max. average on-state current @ case temperature	300	350	A	180° conduction, half sine wave	
		75		°C		
$I_{T(RMS)}$	Max. RMS on-state current	470	550	A	@ 75 Deg.C Case Temp	
I_{TSM}	Max. peak one cycle non-repetitive surge current	6730	7550		t = 10ms	Sinusoidal half wave, Initial $T_J = T_J$ max.
I^2t	Maximum I^2t for fusing	226	285		kA ² s	
I^{2t}	Maximum I^2t for fusing	3200	4050	k A ² s	t = 0.1 to 10ms. No voltage reapplied.	
$V_{T(VO)}$	Threshold voltage	0.97	0.91	V	$T_J = T_J$ max.	
r_t	On state slope resistance	0.74	0.80	mΩ	$T_J = T_J$ max.	
V_{TM}	Max. on state voltage	1.66	1.55	V	$I_{pk} = \pi \times I_{T(AV)}$, $T_J = 125^{\circ}C$, $t_p = 10ms$ sine pulse	
I_H	Maximum holding current	600		mA	$T_J = 25^{\circ}C$, anode supply 12V resistive load	
I_L	Latching current	1000				

SWITCHING

	Parameter	305RK/355RK	Units	Conditions
di/dt	Max. non-repetitive rate of rise of turned-on current	100	A/μs	Gate drive 20V, 20Ω, $t_r \leq 1\mu\text{s}$ $T_J = 125^\circ\text{C}$, anode voltage $\leq 80\% V_{DRM}$
t_d	Typical delay time	1.0	μs	Gate current 1A, $di_g/dt = 1\text{A}/\mu\text{s}$ $V_d = 0.67\% V_{DRM}$, $T_J = 25^\circ\text{C}$
t_q	Typical turn-off time	100		$I_{TM} = 500\text{A}$, $T_J = 125^\circ\text{C}$, $di/dt = 20\text{A}/\mu\text{s}$, $V_R = 50\text{V}$ $dv/dt = 20\text{V}/\mu\text{s}$, Gate 0V 100Ω, $t_p = 500\mu\text{s}$

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BLOCKING

	Parameter	305RK/355RK	Units	Conditions
dv/dt	Maximum critical rate of rise of off-state voltage	500	V/ μ s	$T_J = 125^\circ\text{C}$, linear to 80% rated V_{DRM}
I_{RRM} I_{DRM}	Max. peak reverse and off-state leakage current	50	mA	$T_J = 125^\circ\text{C}$, rated $V_{\text{DRM}}/V_{\text{RRM}}$ applied

TRIGGERING

	Parameter	305RK/355RK		Units	Conditions
P_{GM}	Maximum peak gate power	10.0		W	$T_J = 125^{\circ}\text{C}$, $t_p \leq 5\text{ms}$
$P_{G(AV)}$	Maximum average gate power	2.0			$T_J = 125^{\circ}\text{C}$, $f = 50\text{Hz}$, $d\% = 50$
I_{GM}	Max. peak positive gate current	3.0		A	$T_J = 125^{\circ}\text{C}$, $t_p \leq 5\text{ms}$
$+V_{GM}$	Max. peak positive gate voltage	20		V	$T_J = 125^{\circ}\text{C}$, $t_p \leq 5\text{ms}$
$-V_{GM}$	Max. peak negative gate voltage	5.0			
I_{GT}	DC gate current required to trigger	90	200	mA	$T_J = 25^{\circ}\text{C}$ 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	
I_{GD}	DC gate current not to trigger	10		mA	$T_J = 125^{\circ}\text{C}$ 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	305RK	355RK	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	0.10	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%	24.5/48.5		Nm	lubricated / Non lubricated threads
wt	Approximate weight	535		gm	
	Case style	To - 209AE (TO-118)			See outline

SILICON CONTROLLED RECTIFIERS

ORDER INFORMATION TABLE

305/355	RK	40	M
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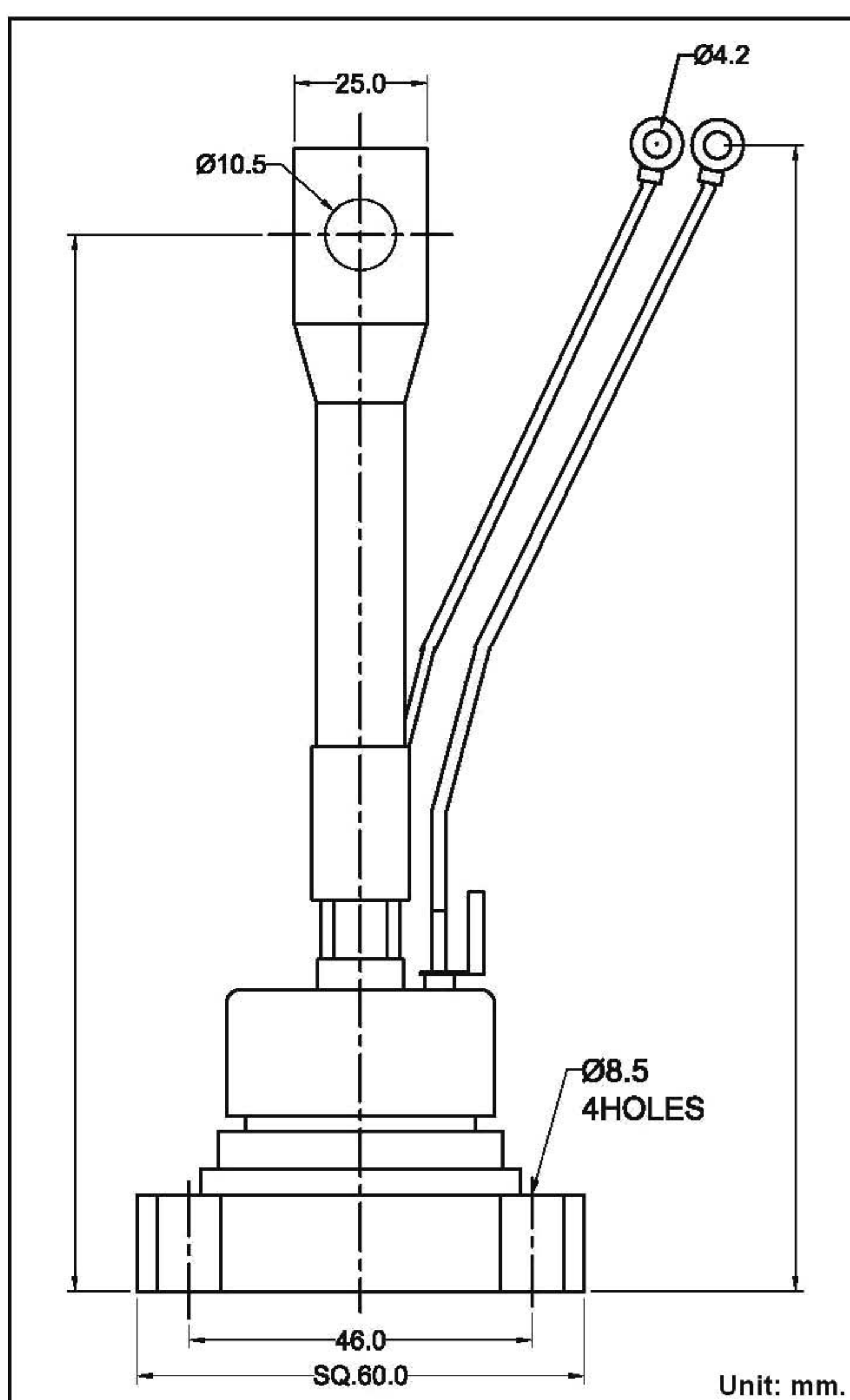
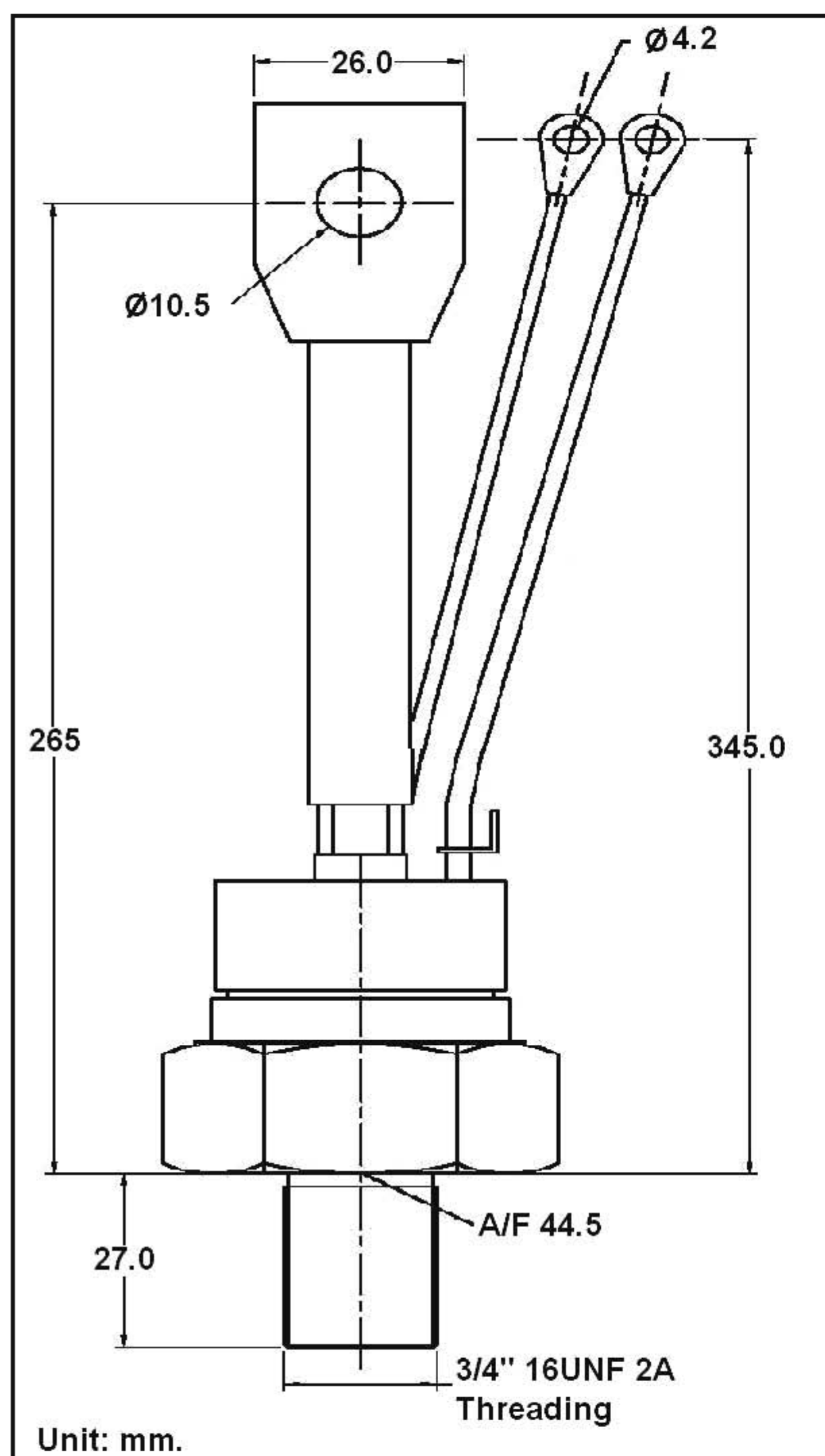
①

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



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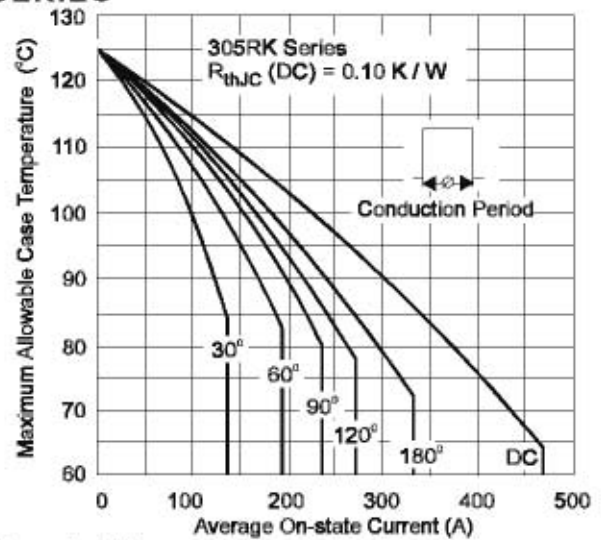
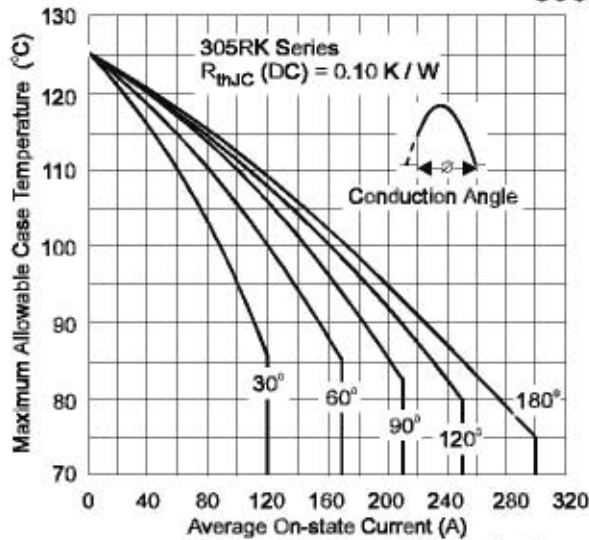


Fig. 1 - Current Ratings Characteristics

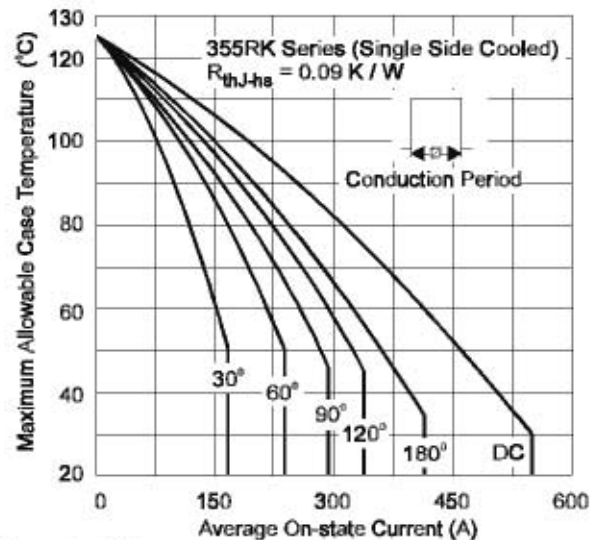
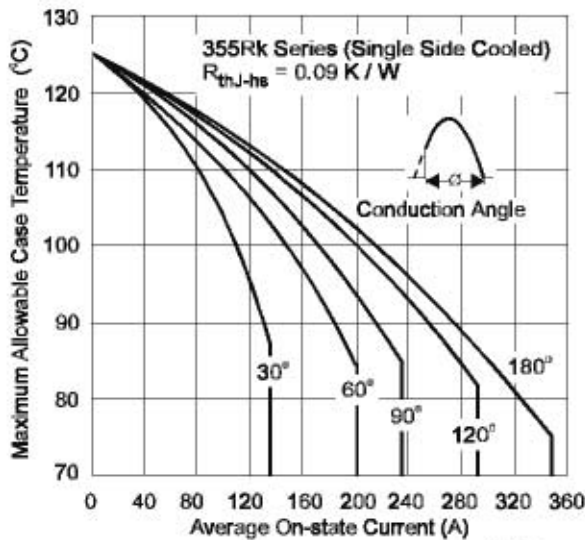


Fig. 2 - Current Ratings Characteristics

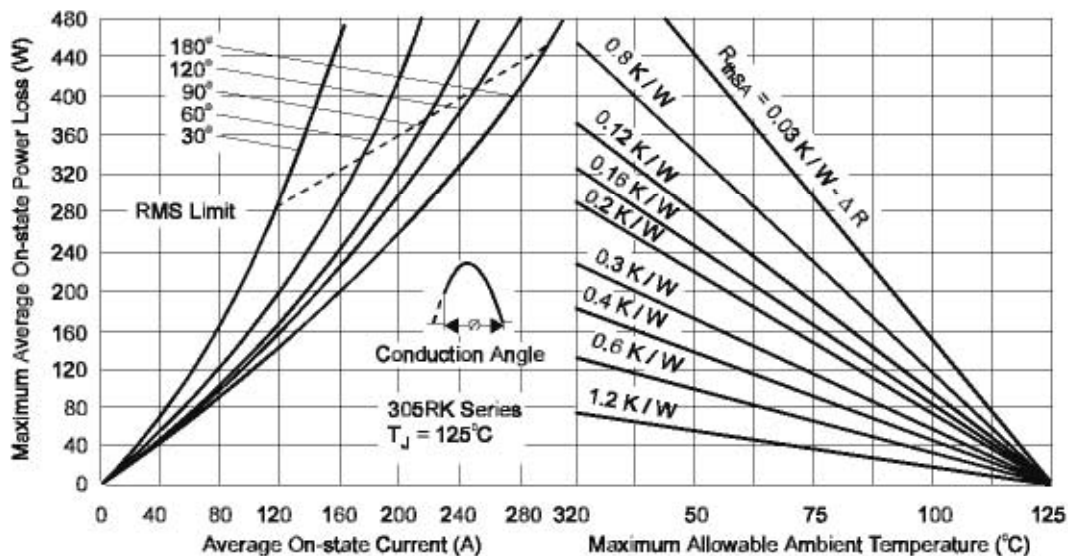


Fig. 3 - On-state Power Loss Characteristics

SILICON CONTROLLED RECTIFIERS

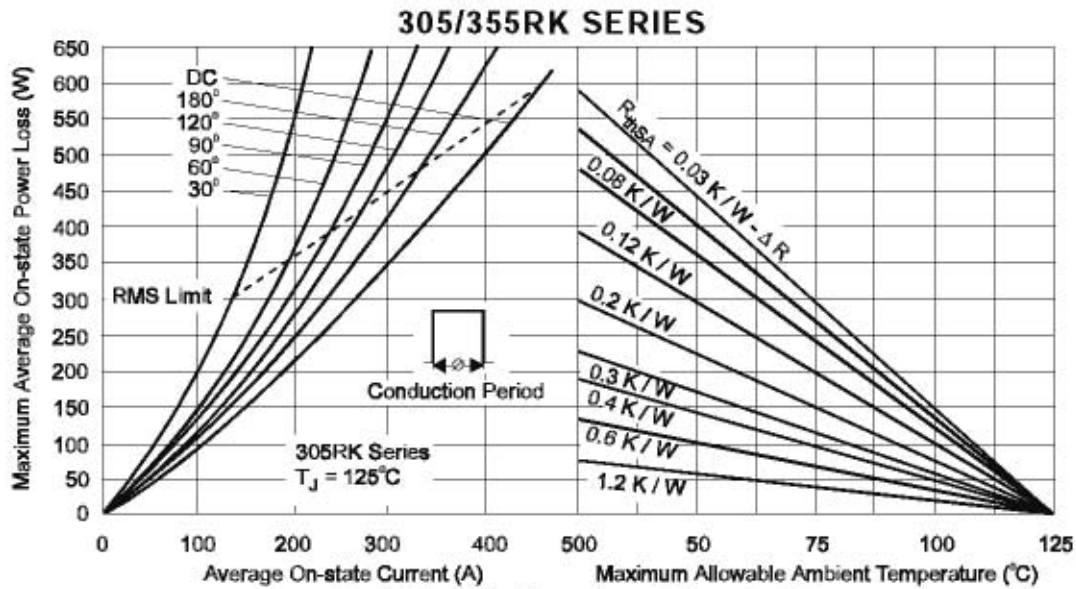


Fig. 4 - On-state Power Loss Characteristics

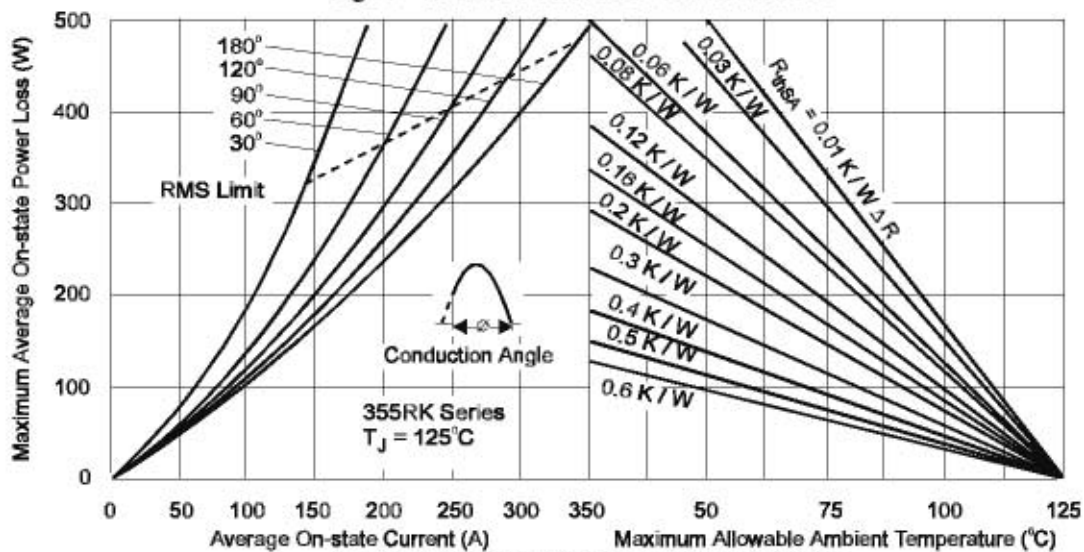


Fig. 5 - On-state Power Loss Characteristics

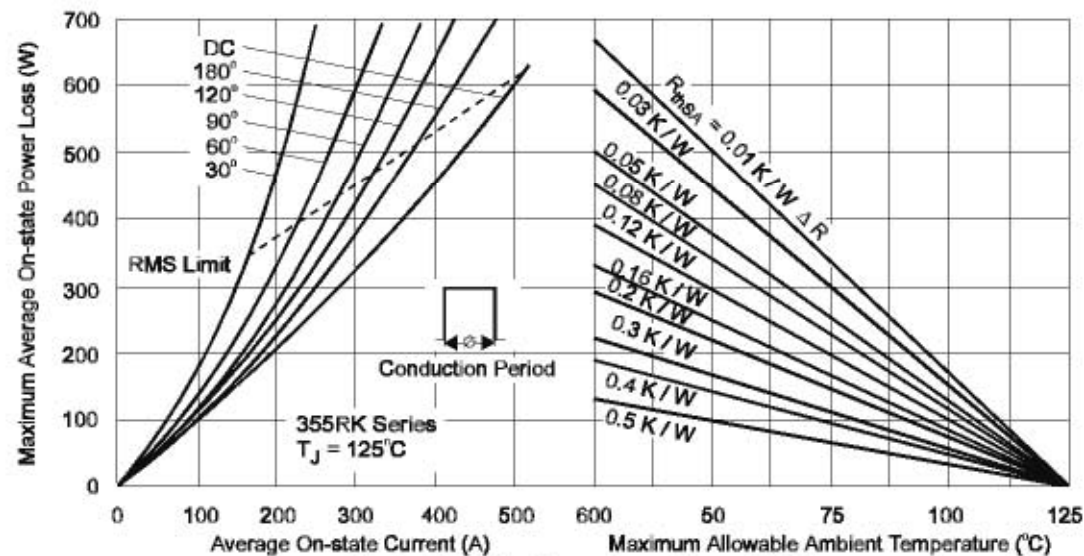


Fig. 6 - On-state Power Loss Characteristics

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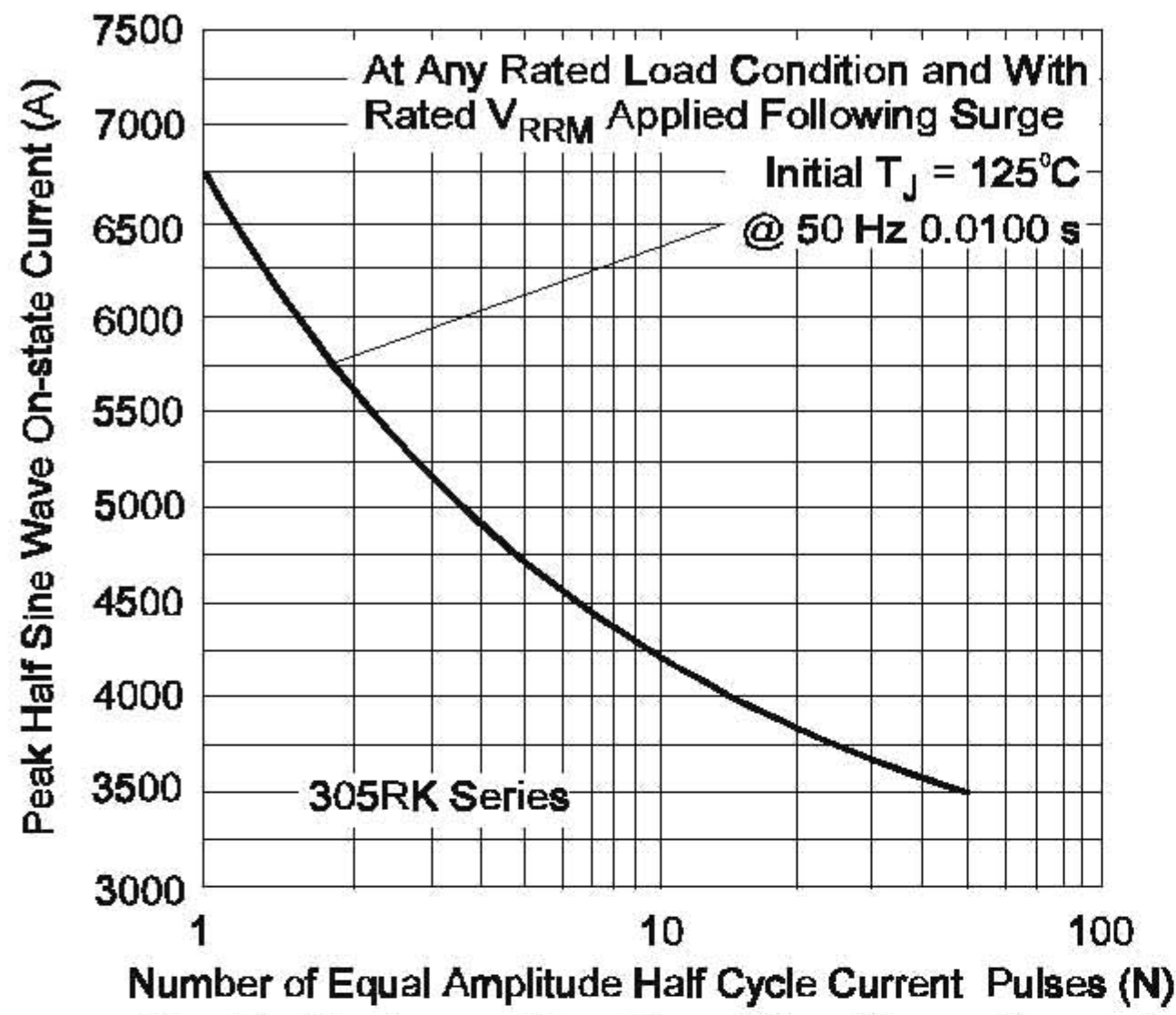


Fig. 7 - Maximum Non-Repetitive Surge Current

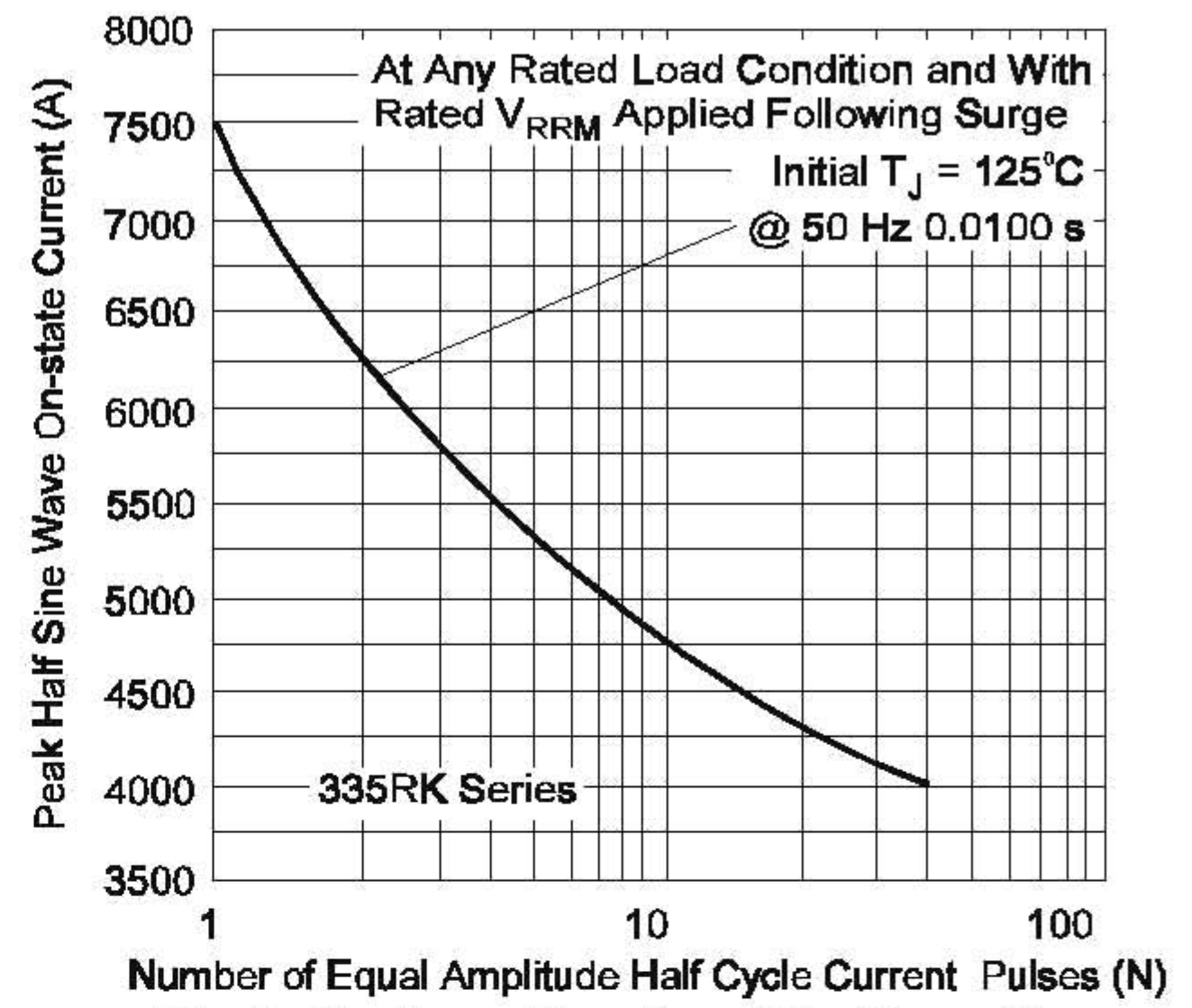


Fig. 8 - Maximum Non-Repetitive Surge Current

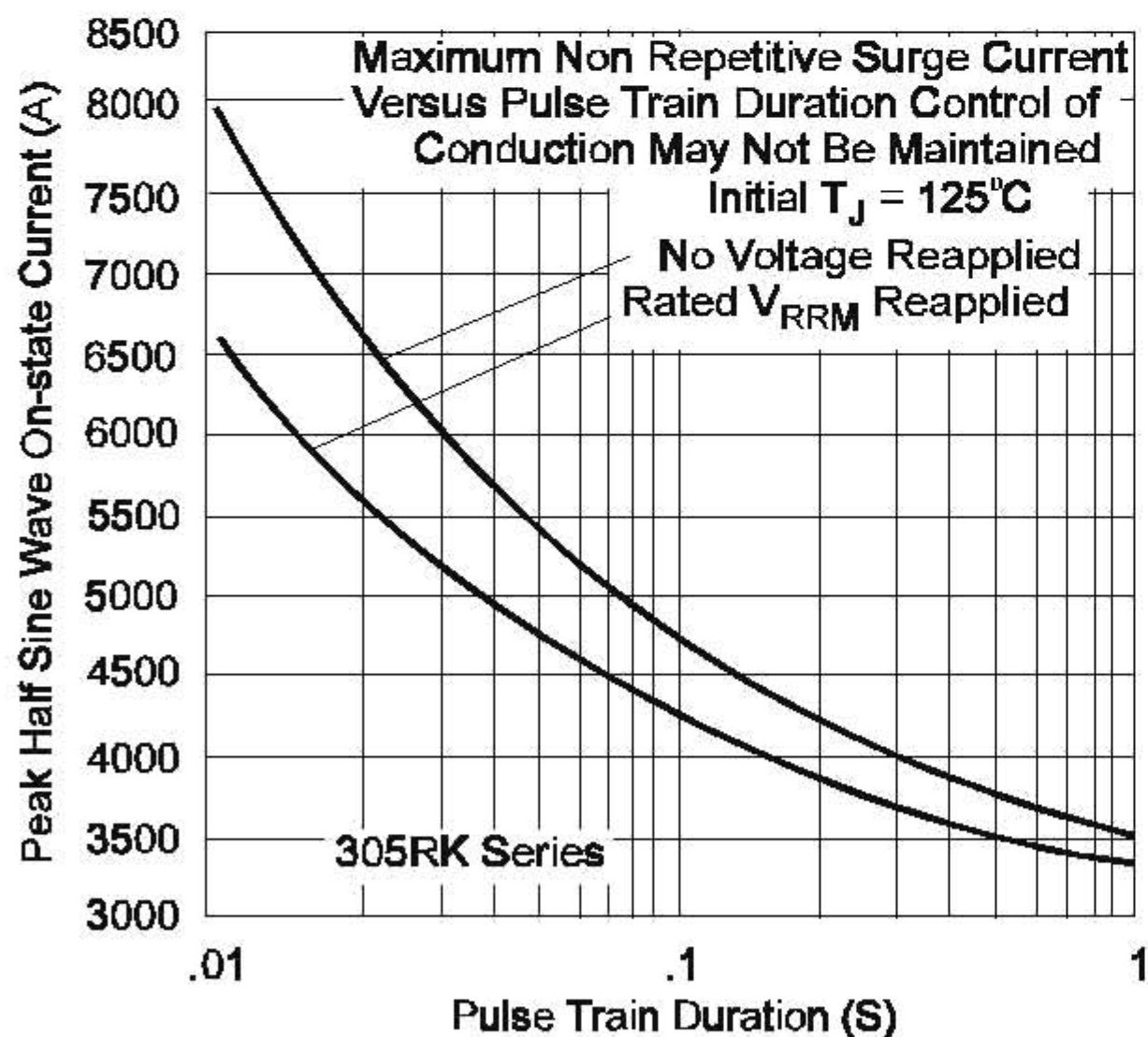


Fig. 9 - Maximum Non-Repetitive Surge Current

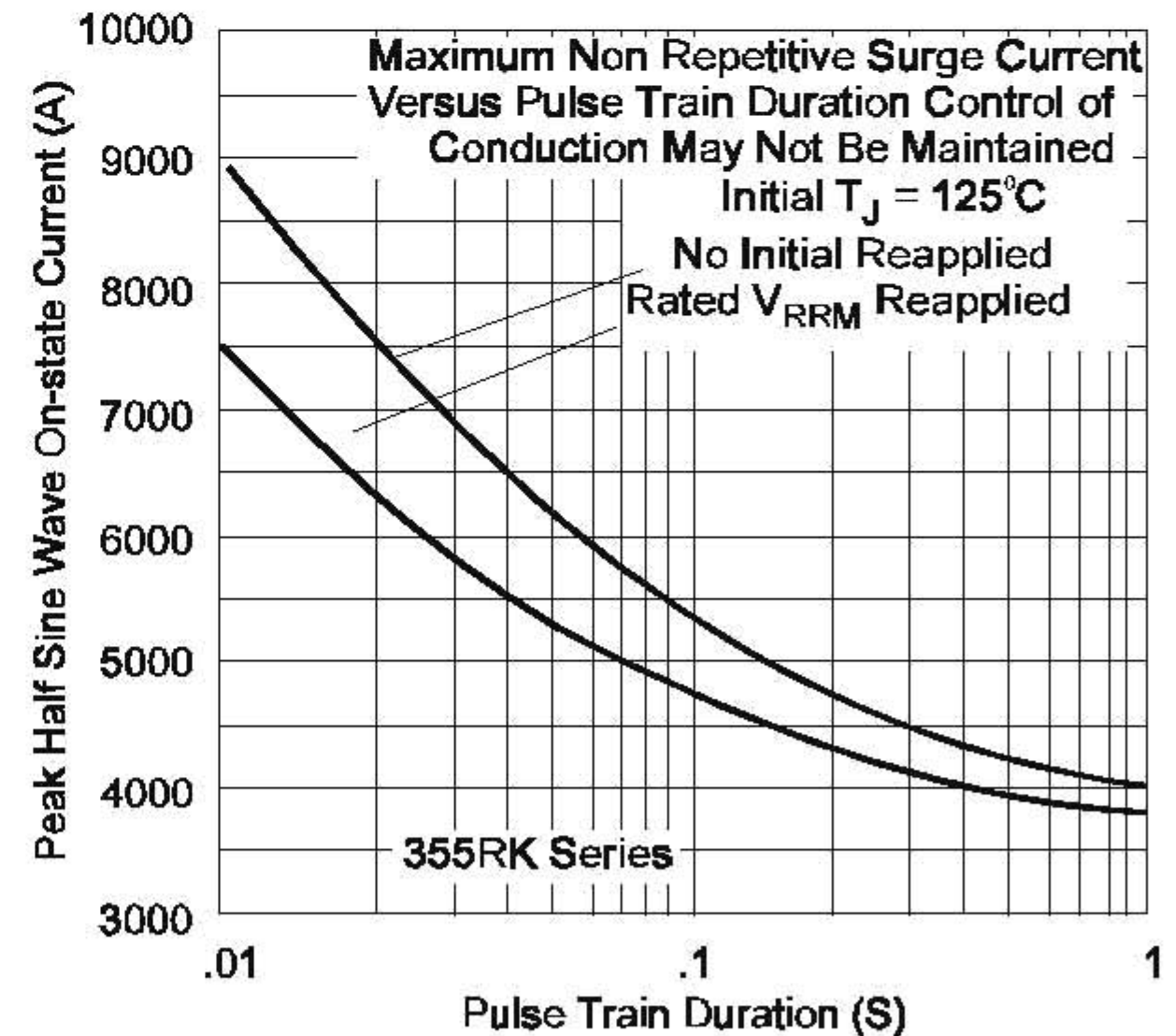


Fig. 10 - Maximum Non-Repetitive Surge Current

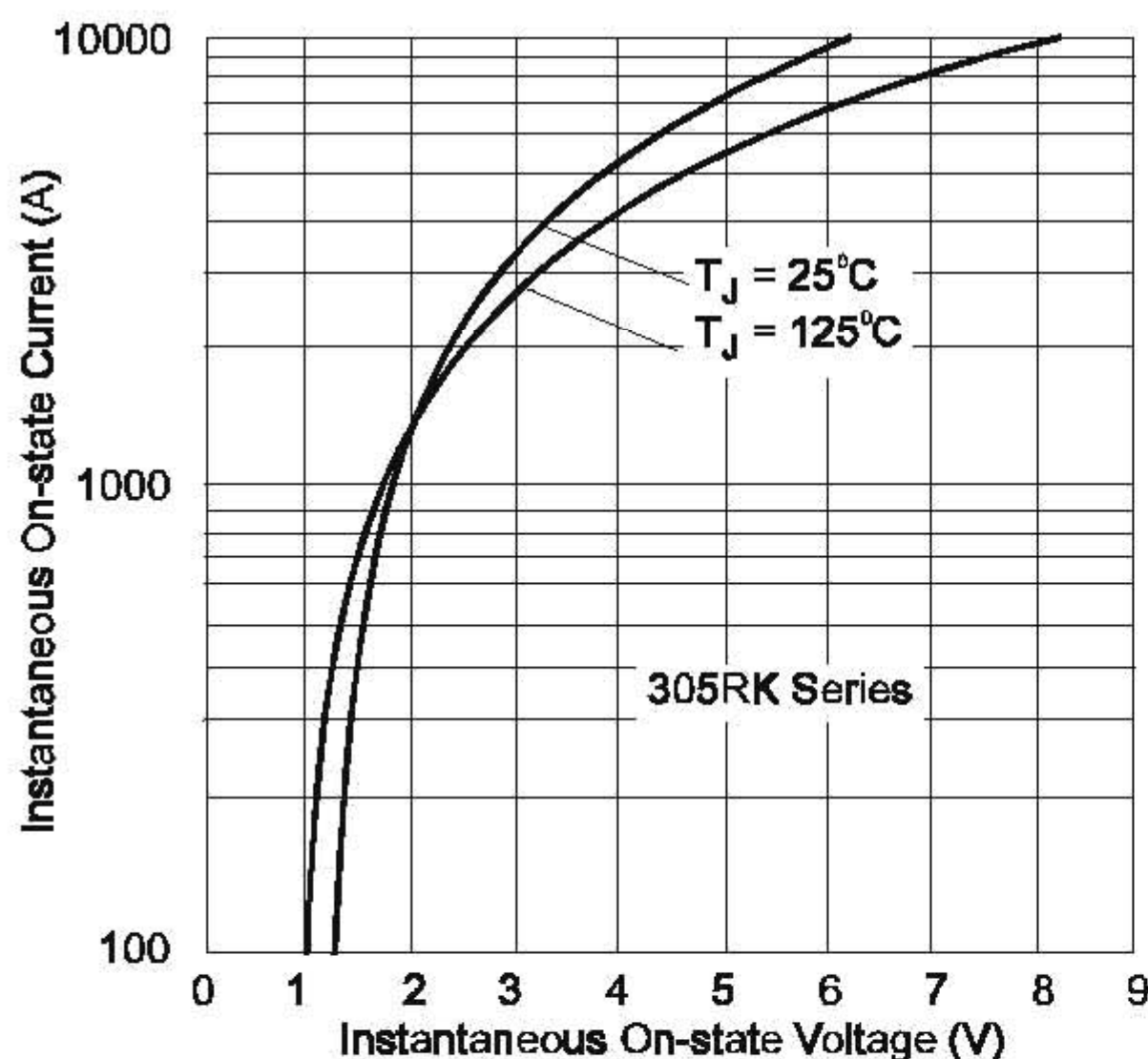


Fig. 11 - On-state Voltage Drop Characteristics

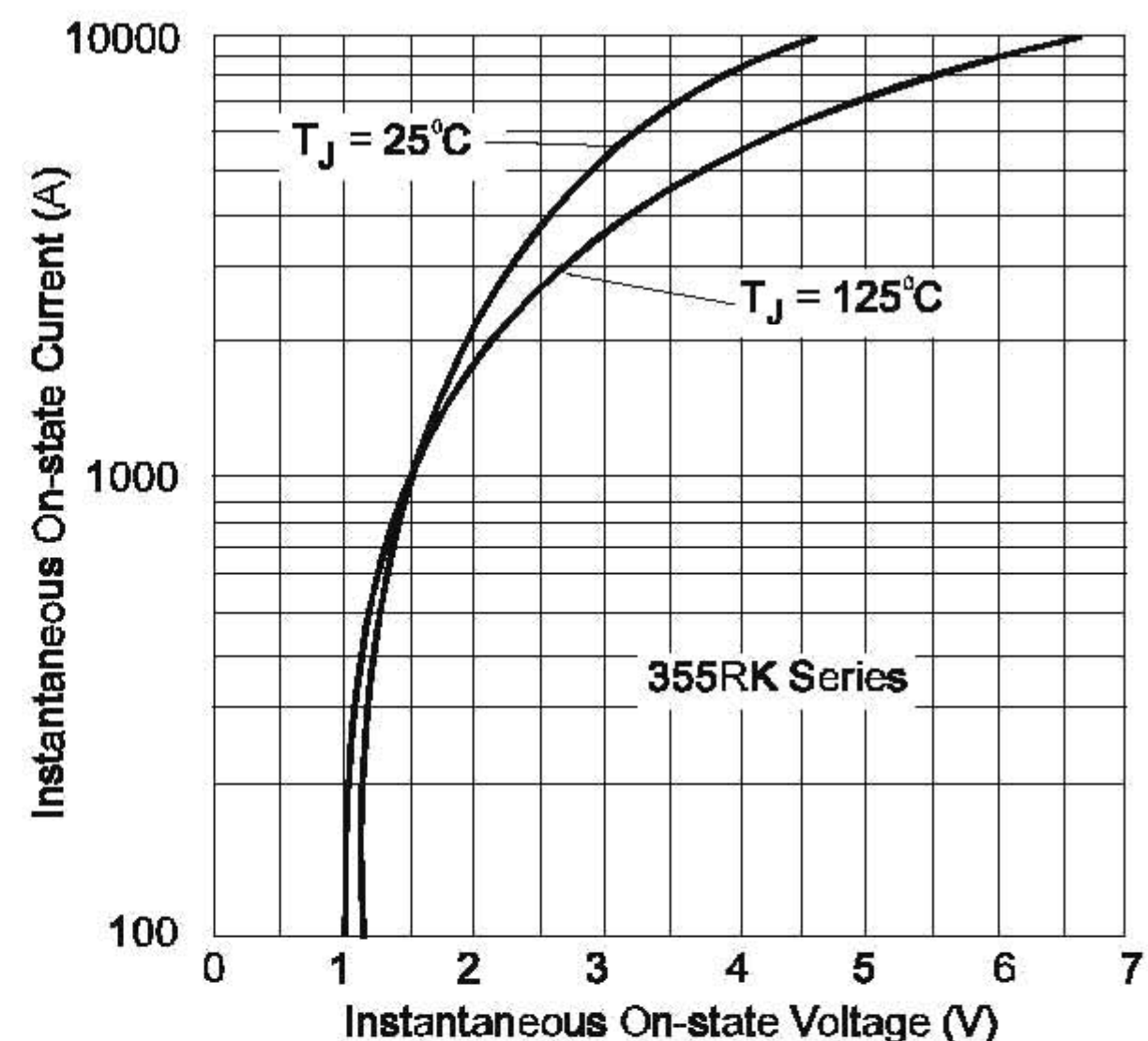


Fig. 12 - On-state Voltage Drop Characteristics

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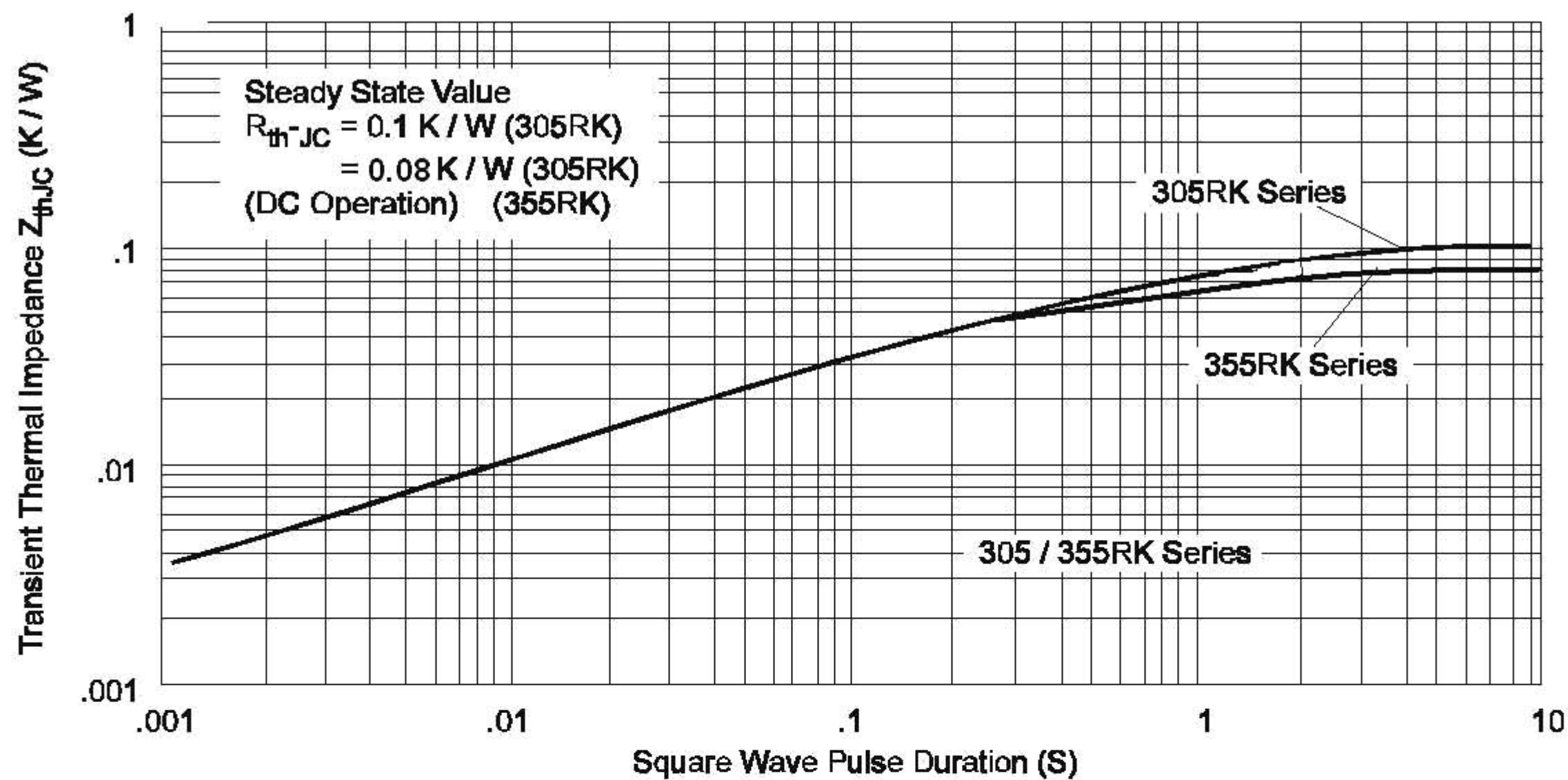


Fig. 13 - Thermal Impedance Z_{thJC} Characteristics

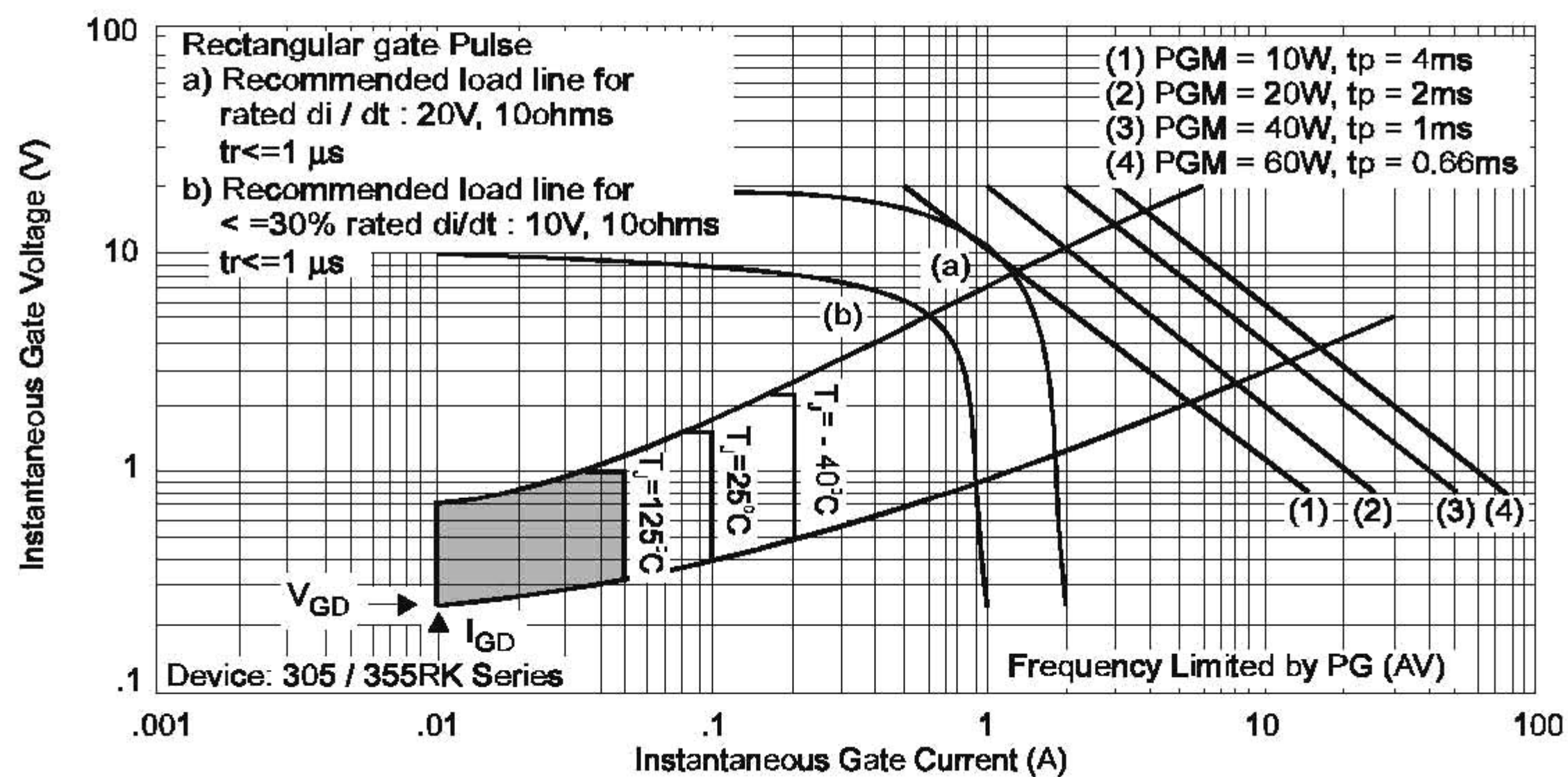


Fig. 14 - Gate Characteristics