



Ruttonsha International Rectifier Ltd.

INVERTER GRADE THYRISTORS

Type : 300RK 40F To 120F

Features

- All diffused Design
- Center Amplifying gate
- Guaranteed high dv/dt
- Guaranteed high dI/dt
- High surge current capability
- Low thermal impedance
- High speed performance

300 A

Typical Applications

- Inverters
- Choppers
- Inductions heating
- All types of force-commutated converters

Major Ratings and Characteristics :-

PARAMETERS	300 RK...F	UNITS
$I_{T(AV)}$	300	A
@ T_C	65	$^{\circ}C$
$I_{T(RMS)}$	471	A
I_{TSM} @50Hz	7950	A
I^2t @50Hz	316	KA^2s
V_{DRM} / V_{RRM}	400 to 1200	V
T_q range(*)	10 to 30	μs
T_J	- 40 to 125	$^{\circ}C$

(*) $T_q = 10$ to $20\mu s$ for 400 to 800V devices

$T_q = 15$ to $30\mu s$ for 1000 to 1200 V devices

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300RK ... F Series

ELECTRICAL SPECIFICATIONS

Voltage Ratings

Type number	Voltage Code	V_{DRM}/V_{RRM} , max repetitive peak voltage V	V_{RSM} , maximum non-repetitive peak voltage V	I_{DRM}/I_{RRM} max. @ $T_J = T_J$ max. mA
300RK..F	04	400	500	50
	08	800	900	
	10	1000	1100	
	12	1200	1300	

On - state Conduction

Parameter	300RK...F	Units	Conditions
$I_{T(AV)}$ Max. average on-state current @ Heatsink temperature	300	A	180° conduction, half sine wave
	65	°C	
$I_{T(RMS)}$ Max RMS on-state current	471		@ 65°C heatsink temperature
I_{TSM} Max. peak, one half cycle non-repetitive surge current	7950	A	t = 10 ms
			Sinusoidal half wave, Initial $T_J = T_J$ max.
I^2t Maximum I^2t for fusing	316	KA ² s	t = 10 ms
$I^2\sqrt{t}$ Maximum $I^2\sqrt{t}$ for fusing	3160	KA ² √s	t = 0.1 to 10 ms, no voltage reapplied

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On - state Conduction

Parameter	300 RK...F	Units	Conditions
$V_{T(RO)}$ Threshold voltage	1.44	V	$T_J = T_J \text{ max.}$
r_t Forward slope resistance	0.57	m Ω	$T_J = T_J \text{ max.}$
V_{TM} Max. peak on state voltage	2.16	V	$I_{TM} = 1225A, T_J = T_J \text{ max, } t_p = 10 \text{ ms sine pulse}$
I_H Maximum holding current	600	mA	$T_J = 25^\circ\text{C. } I_T > 30A$
I_L Typical latching current	1000		$T_J = 25^\circ\text{C., } V_A = 12V. R_a = 6\Omega, I_G = 1A$

Switching

Parameter	300 RK...F	Units	Conditions
di/dt Max. non-repetitive rate of rise of turned-on current	100	A/ μs	$T_J = T_J \text{ max. } V_{DRM} = \text{rated } V_{DRM}$ $I_{TM} = 2 \times \text{di/dt}$
t_d Typical delay time	0.80	μs	$T_J = 25^\circ\text{C. } V_{DM} = \text{rated } V_{DRM}, I_{TM} = 50A \text{ DC, } t_p = 1\mu\text{s}$ Resistive load, Gate pulse: 10V, 5 Ω source
t_q Max. turn-off time (*)	Min. 10 Max. 30		$I_{TM} = 550A, T_J = T_J \text{ max. commutating di/dt} = 40A/\mu\text{s}$ $V_R = 50V, t_p = 500\mu\text{s, dv/dt: see table in device code}$

(*) $t_q = 10 \text{ to } 20 \mu\text{s}$ for 400 to 800v devices; $t_q = 15 \text{ to } 30 \mu\text{s}$ for 1000 to 1200 V devices.

Blocking

Parameter	300 RK...F	Units	Conditions
dv/dt Maximum critical rate of rise of off-state voltage	500	V/ μs	$T_J = T_J \text{ max. linear to } 80\%V_{DRM}, \text{ higher value available on request}$
I_{RRM} Max. peak reverse and off-state leakage current	50	mA	$T_J = T_J \text{ max. rated } V_{DRM} / V_{RRM} \text{ applied}$

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Triggering

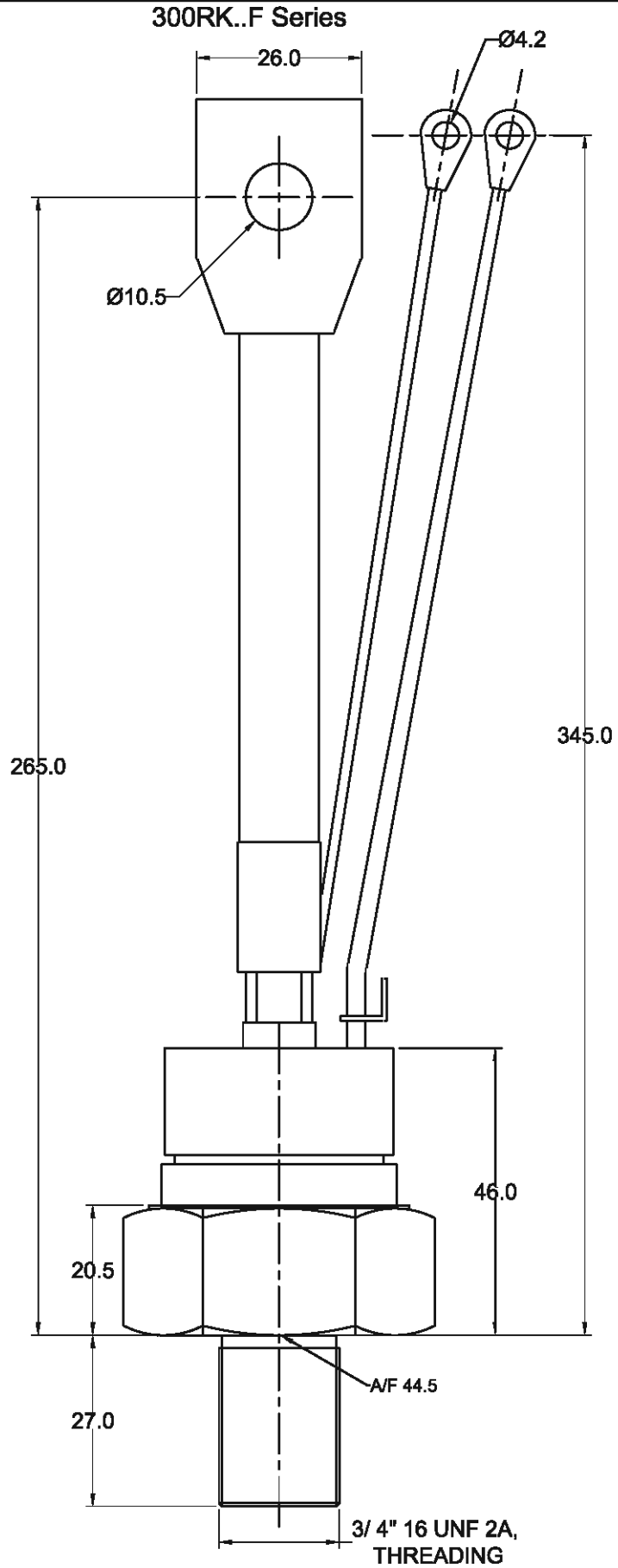
Parameter	300 RK...F	Units	Conditions
P_{GM} Maximum peak gate power	60	W	$T_J = T_J \text{ max.}, f = 50\text{Hz}, d\% = 50$
$P_{G(AV)}$ Maximum average gate power	10	W	$T_J = T_J \text{ max.}, f = 50\text{Hz}, d\% = 50$
I_{GM} Max. peak positive gate current	10	A	$T_J = T_J \text{ max.}, t_p \leq 5 \text{ ms}$
$+V_{GM}$ Maximum peak positive gate voltage	20	V	$T_J = T_J \text{ max.}, t_p \leq 5 \text{ ms}$
$-V_{GM}$ Maximum peak negative gate voltage	5		
I_{GT} Max. DC gate current required to trigger	200	mA	$T_J = 25^\circ\text{C}, V_A = 12\text{V}, R_a = 6 \Omega.$
V_{GT} Max. DC gate voltage required to trigger	3	V	
I_{GD} Max. DC gate current not to trigger	20	mA	$T_J = T_J \text{ max.}, \text{rated } V_{\text{DRM}} \text{ applied}$
V_{GD} Max. DC gate voltage not to trigger	0.25	V	

Thermal and Mechanical Specifications

Parameter	300 RK...F	Units	Conditions
T_J Max. operating temperature range	- 40 to 125	°C	
T_{stg} Max. storage temperature range	- 40 to 150		
R_{thJ-C} Max. thermal resistance, junction to case	0.10	K/W	DC operation
R_{thCS} Max. thermal resistance, case to heatsink	0.03	K/W	Mounting surface, smooth, flat and greased
T Mounting force, $\pm 10\%$	48.5 (425)	N (lbf-in)	Non lubricated threads
wt Approximate weight	535	g	
Case style	TO-209AE(TO-118)		

INVERTER GRADE THYRISTOR

OUT-LINE DIAGRAM



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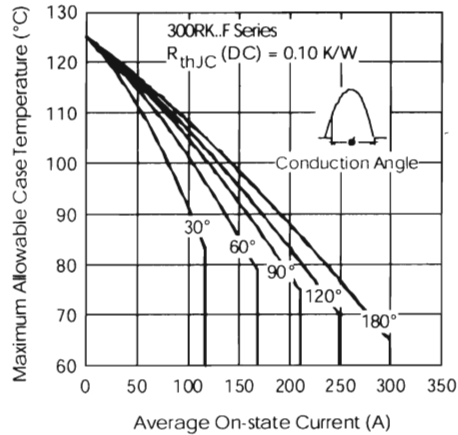


Fig. 1 - Current Ratings Characteristics

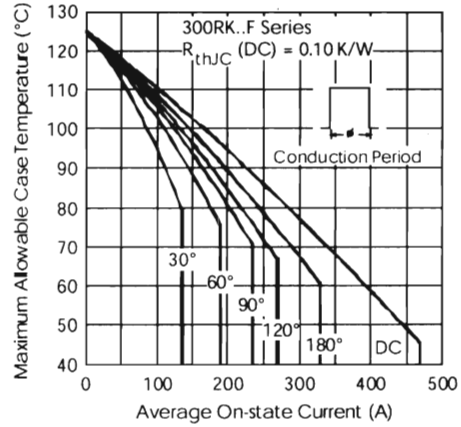


Fig. 2 - Current Ratings Characteristics

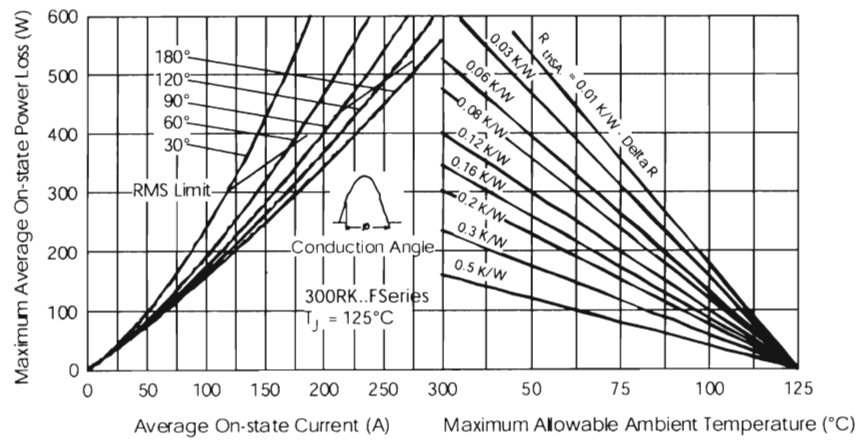


Fig. 3 - On-state Power Loss Characteristics

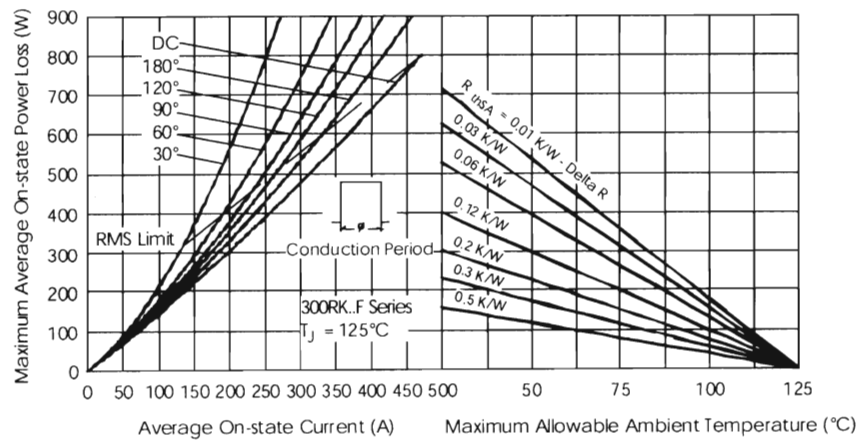


Fig. 4 - On-state Power Loss Characteristics

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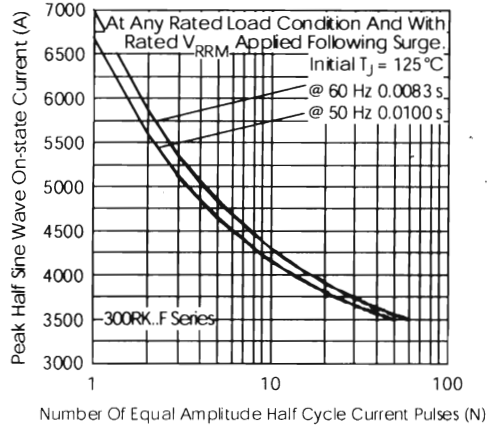


Fig. 5 - Maximum Non-repetitive Surge Current

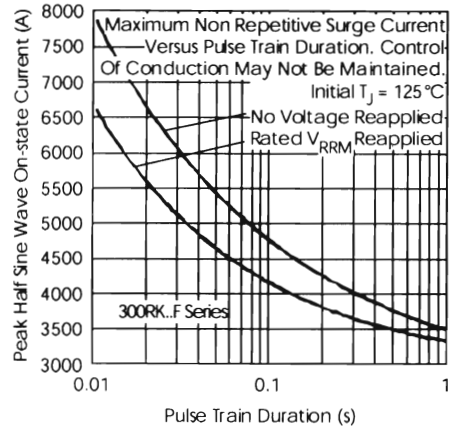


Fig. 6 - Maximum Non-repetitive Surge Current

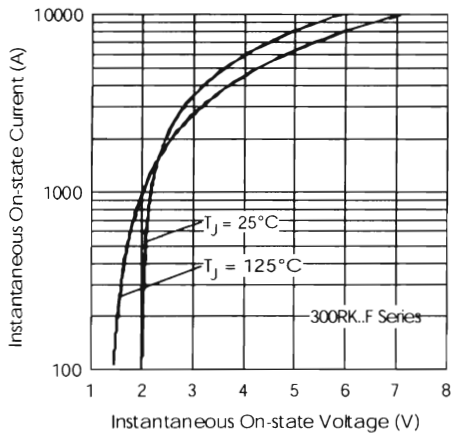


Fig. 7 - On-state Voltage Drop Characteristics

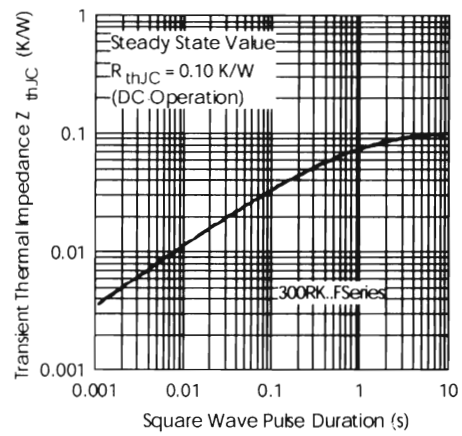


Fig. 8 - Thermal Impedance Z_{thJC} Characteristic

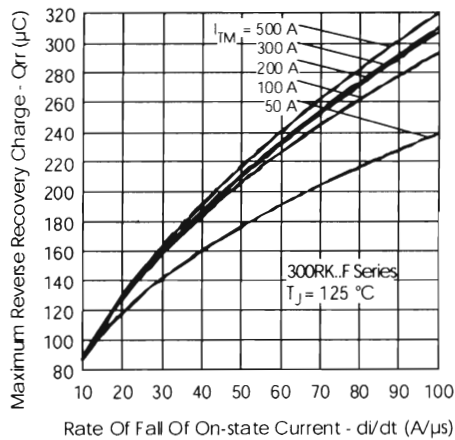


Fig. 9 - Reverse Recovered Charge Characteristics

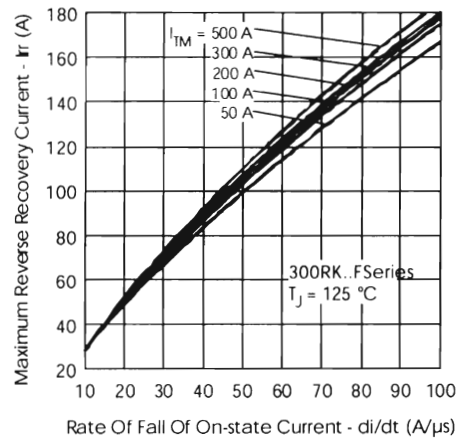


Fig. 10 - Reverse Recovery Current Characteristics

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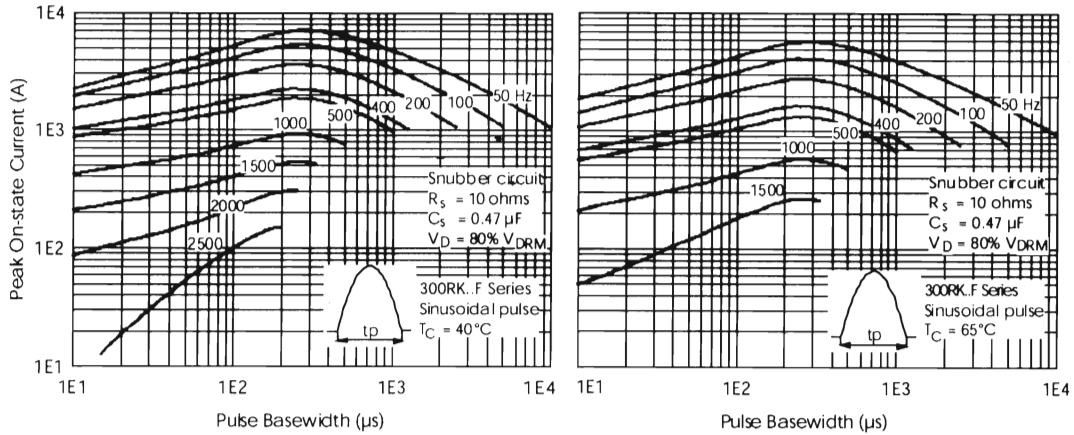


Fig. 11 - Frequency Characteristics

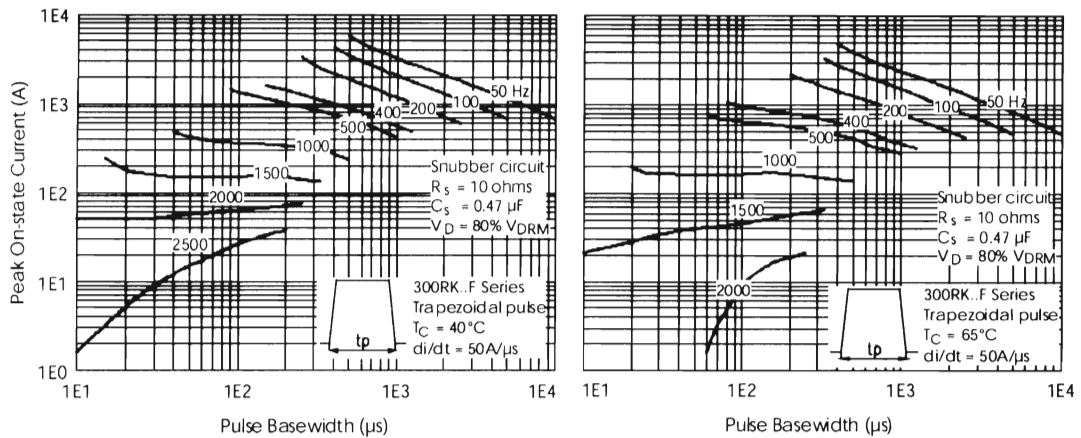


Fig. 12 - Frequency Characteristics

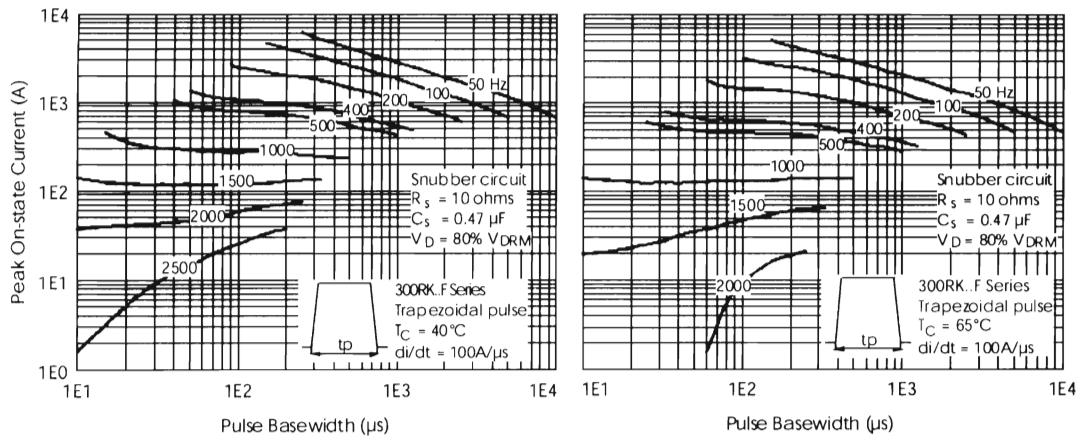


Fig. 13 - Frequency Characteristics

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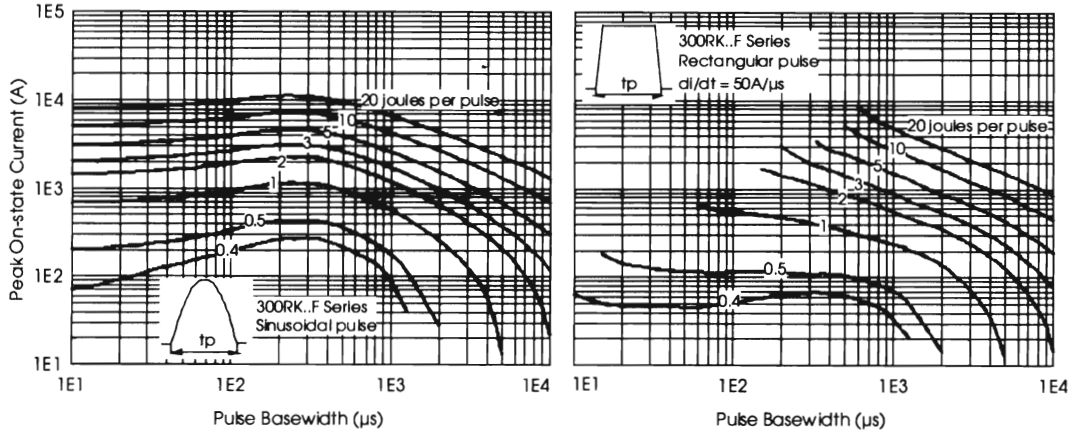


Fig. 14 - Maximum On-state Energy Power Loss Characteristics

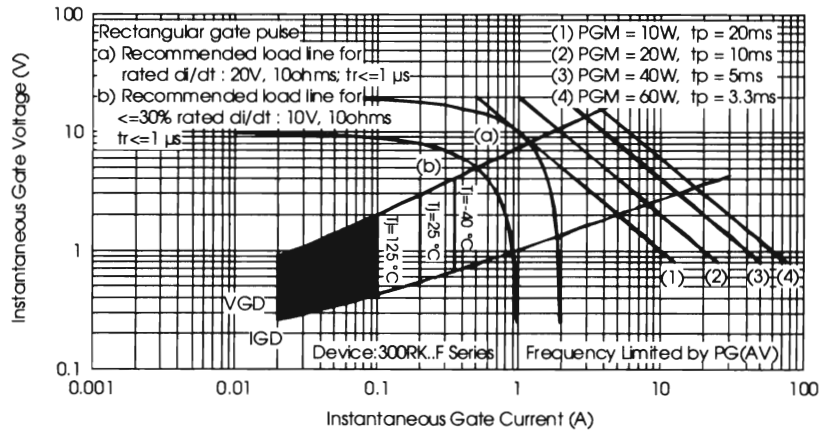


Fig. 15 - Gate Characteristics