Ruttonsha International Rectifier Ltd.

INVERTER GRADE THYRISTORS

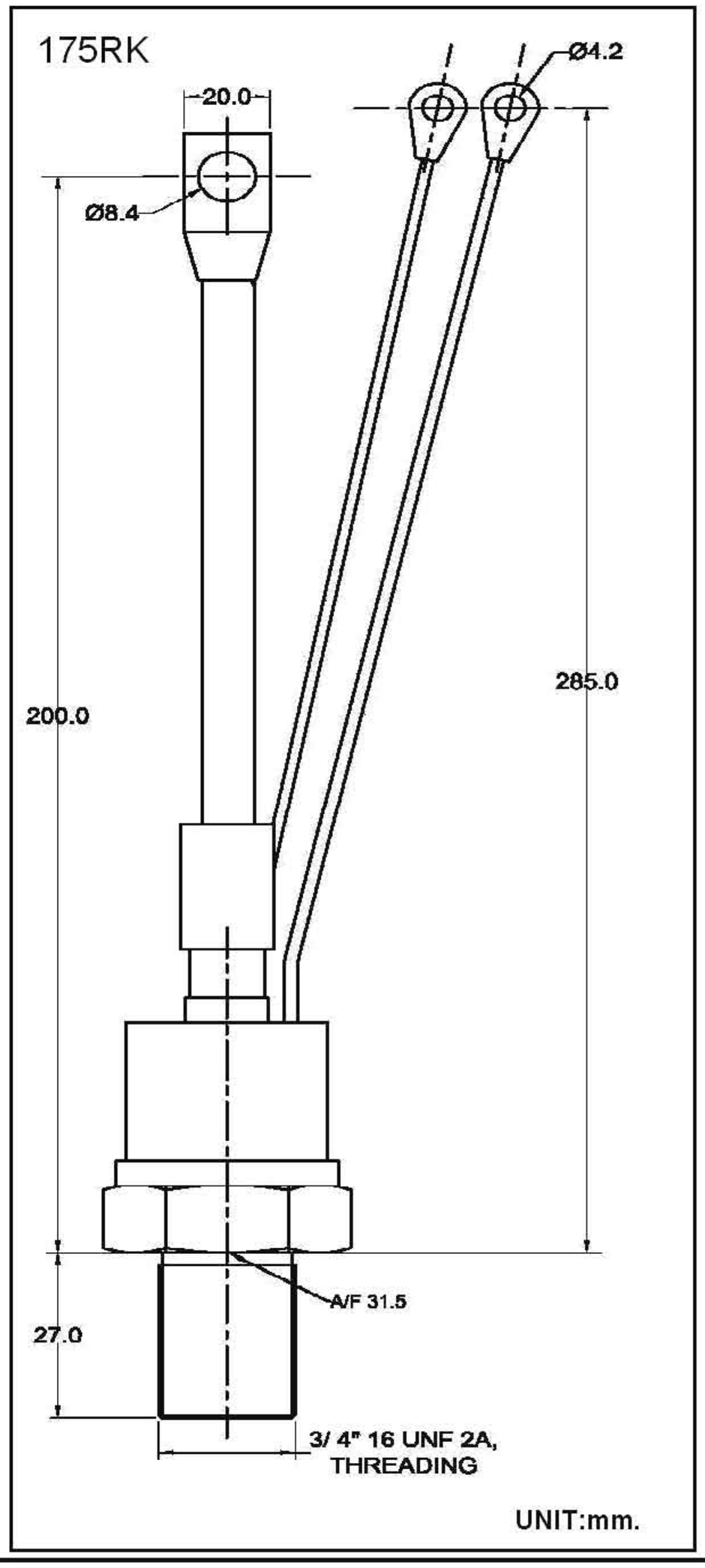
Type : 175 RK 40F To 120F

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

Typical Applications

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



Major Ratings and Characteristics :-

PARAMETERS		175 RK.. F	UNITS
$I_{T(AV)}$		175	A
	@T_C	85	°C
$I_{T(RMS)}$		275	A
I_{TSM}	@50Hz	4680	A
I^2t	@50Hz	110	KA^2s
V_{DRM}	V_{RRM}	400 to 1200	V
T_q	range	15 to 25	µs
T_J		- 40 to 125	°C

INVERTER GRADE THYRISTORS

175 RK...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
175 RK ... F	40	400	500	40
	60	600	700	
	80	800	900	
	100	1000	1100	
	120	1200	1300	

On - state Conduction

	Parameter	175 RK..F	Units	Conditions	
$I_{T(AV)}$	Max. average on-state current	175	A	180° conduction, half sine wave	
	@ Case temperature	85	°C		
$I_{T(RMS)}$	Max. RMS on-state current	275	A	@85°C case temperature	
I_{TSM}	Max. peak, one half cycle, non-repetitive surge current	4680	A	t = 10 ms	Sinusoidal half wave, Initial $T_J=T_J$ max.
I^2t	Maximum I^2t for fusing	110	KA^2s	t = 10 ms	
$V_{T(TO)}$	Threshold voltage	1.55	V	$T_J=T_J$ max.	
r_t	Forward slope resistance	0.87	mΩ	$T_J=T_J$ max.	
V_{TM}	Max. peak on-state voltage	2.07	V	I_{TM} = 600A, $T_J= T_J$ max, t_P = 10 ms sine wave pulse	
I_H	Maximum holding current	600	mA	T_J = 25°C , I_T > 30A	
I_L	Typical latching current	1000		T_J = 25°C ,V_A =12V, Ra = 6 Ω, I_G = 1A	

Switching

	Parameter	175 RK...F		Units	Conditions
di/dt	Max. non-repetitive rate of rise of turned-on current	100		A/µs	T_J=T_J max., V_{DRM} = rated V_{DRM} T_{TM} = 2 x di/dt
t_d	Typical delay time	1.1		µs	T_J=25°C,V_{DM} =rated V_{DRM}, I_{TM} = 50ADC, t_p=1µs Resistive load, Gate pulse: 10V,5 Ω source
		Min	Max		T_J=T_J max. I_{TM}=300A,commutating di/dt = 20A/µs,
t_q	Maximum turn-off time	15	25	µs	V_R = 50V, t_p=500µs,dv/dt : see table in device code

Blocking

	Parameter	175 RK..F	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} higher value available on request
I_{RRM} I_{DRM}	Max. peak reverse and off-state leakage current	40	mA	T_J = T_J max. rated V_{DRM} /V_{RRM} applied

Triggering

	Parameter	175 RK..F	Units	Conditions
P_{GM}	Maximum peak gate power	60	W	T_J = T_J max., f = 50Hz, d% = 50
$P_{G(AV)}$	Maximum average gate power	10	W	T_J = T_J max., f = 50Hz, d% = 50
I_{GM}	Max. peak positive gate current	10	A	T_J = T_J max., $t_p \leq 5$ ms
$+V_{GM}$	Maximum peak positive gate voltage	20	V	T_J = T_J max., $t_p \leq 5$ ms
$-V_{GM}$	Maximum peak negative gate voltage	5		
I_{GT}	Max. DC gate current required to trigger	200	mA	T_J = 25°C,V_A = 12V, Ra = 6 Ω.
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 max., rated V_{DRM} applied
V_{GD}	Max.DC gate voltage not to trigger	0.25	V	

175 RK...F Series

Thermal and Mechanical Specifications

	Parameter	175 RK ..F	Units	Conditions
T_J	Max.junction 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	K/W	DC operation
R_{thCS}	Max. thermal resistance,case to heatsink	0.04	K/W	Mounting surface,smooth, flat and greased
T	Mounting torque, ± 10%	31 (275)	Nm (lbf-in)	Non lubricated threads
		24.5 (210)	Nm (lbf-in)	lubricated threads
wt	Approximate weight	280	g	
	Case style	TO-209AB(TO-93)		

175 RK...F Series

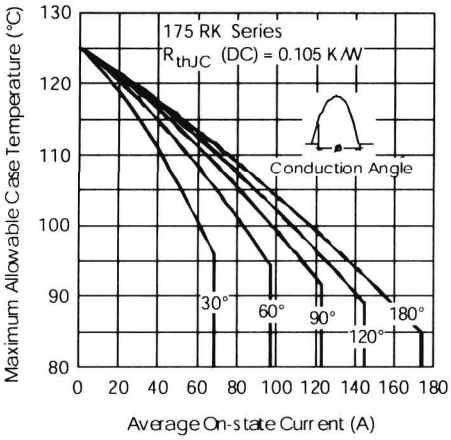


Fig. 1 - Current Ratings Characteristics

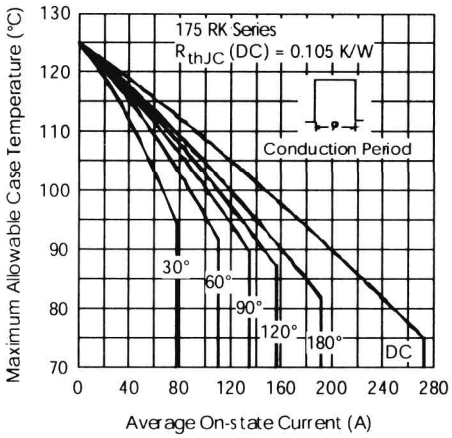


Fig. 2 - Current Ratings Characteristics

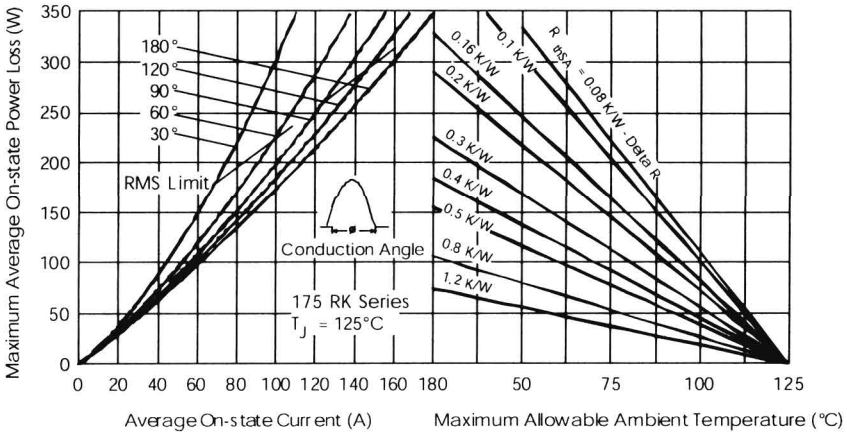


Fig. 3 - On-state Power Loss Characteristics

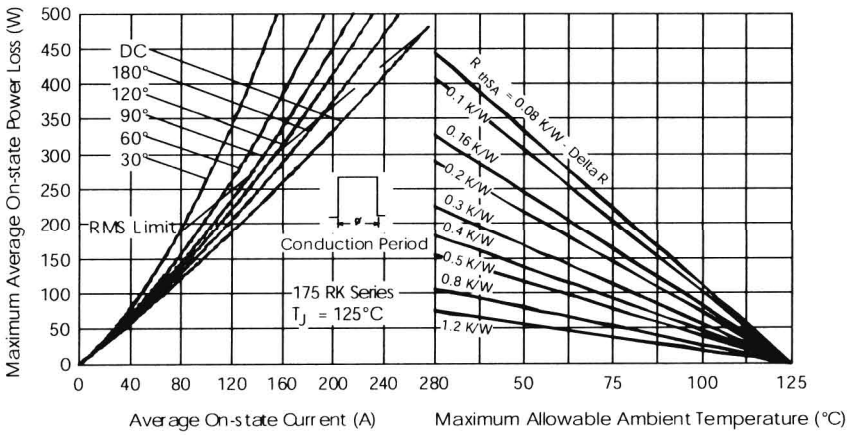


Fig. 4 - On-state Power Loss Characteristics

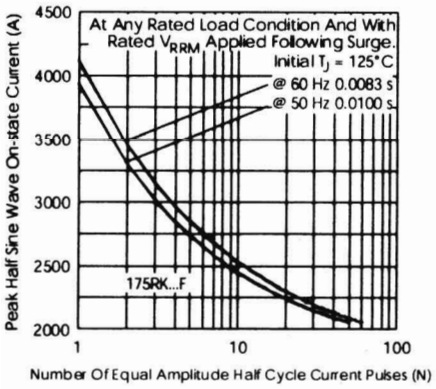


Fig. 5 - Maximum Non-repetitive Surge Current

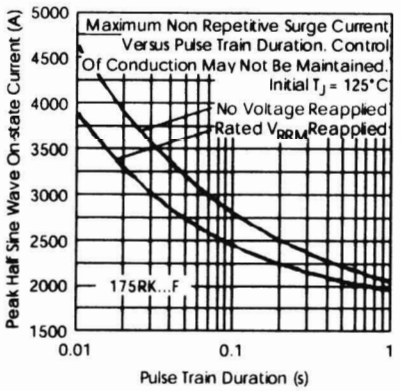


Fig. 6 - Maximum Non-repetitive Surge Current

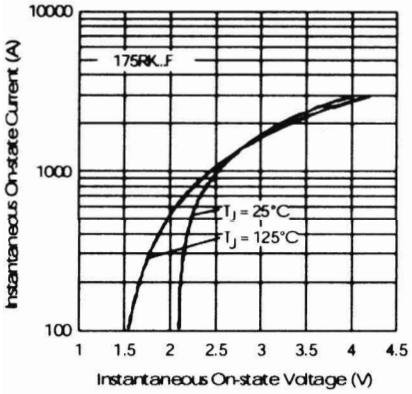


Fig. 7 - On-state Voltage Drop Characteristics

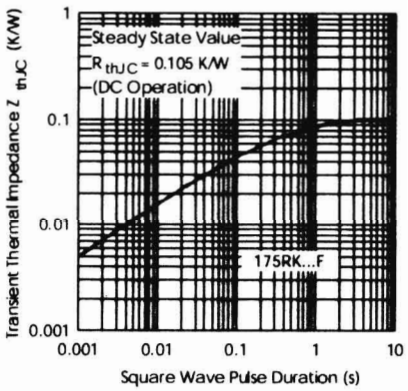


Fig. 8 - Thermal Impedance Z_{thJC} Characteristic

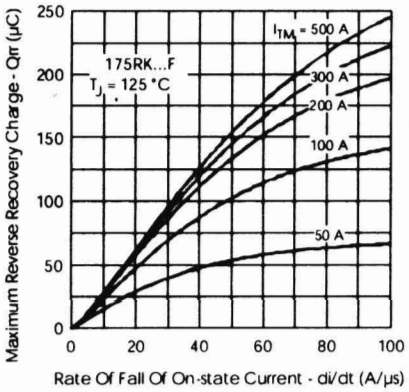


Fig. 9 - Reverse Recovered Charge Characteristics

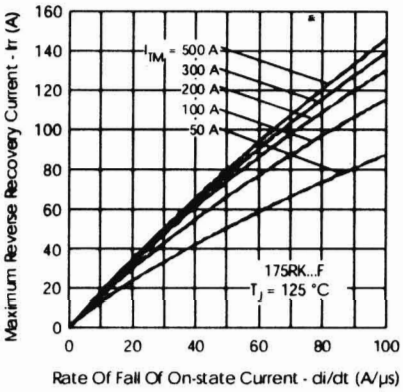


Fig. 10 - Reverse Recovery Current Characteristics

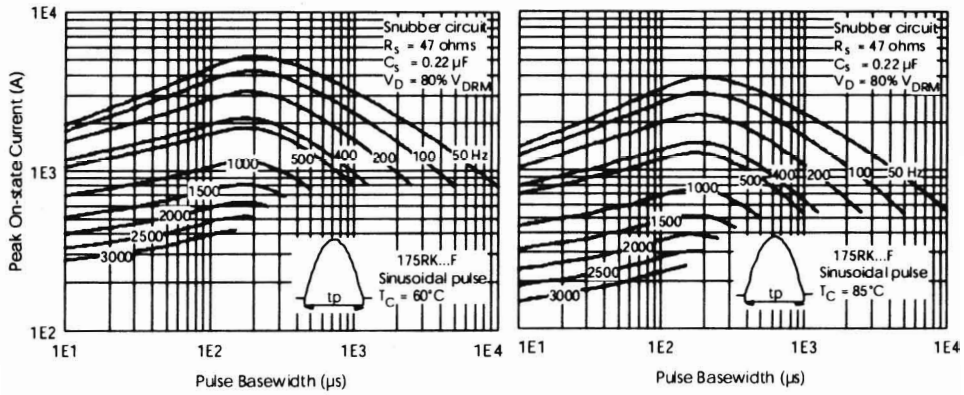


Fig. 11 - Frequency Characteristics

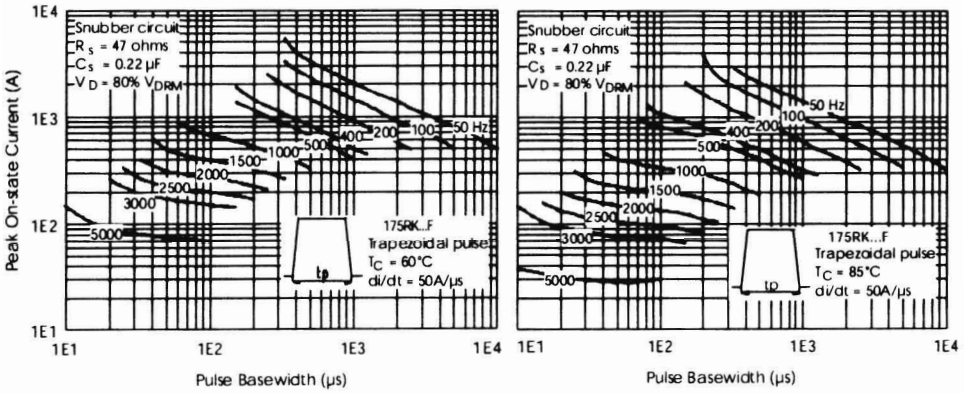


Fig. 12 - Frequency Characteristics

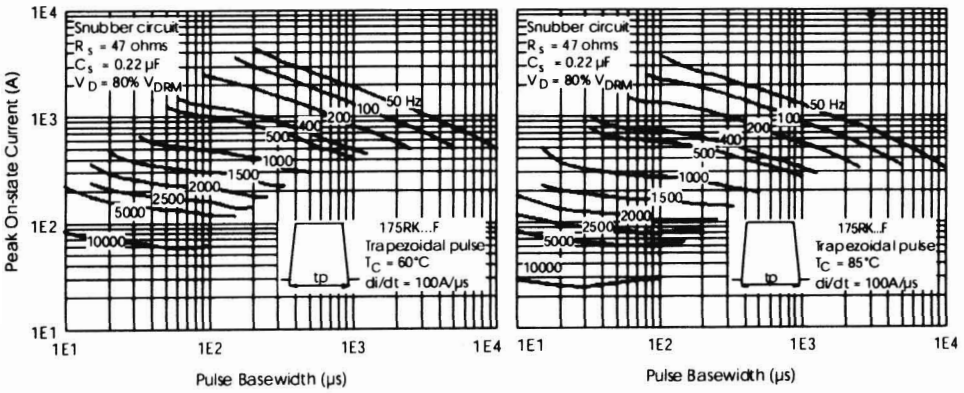


Fig. 13 - Frequency Characteristics

175 RK...F Series

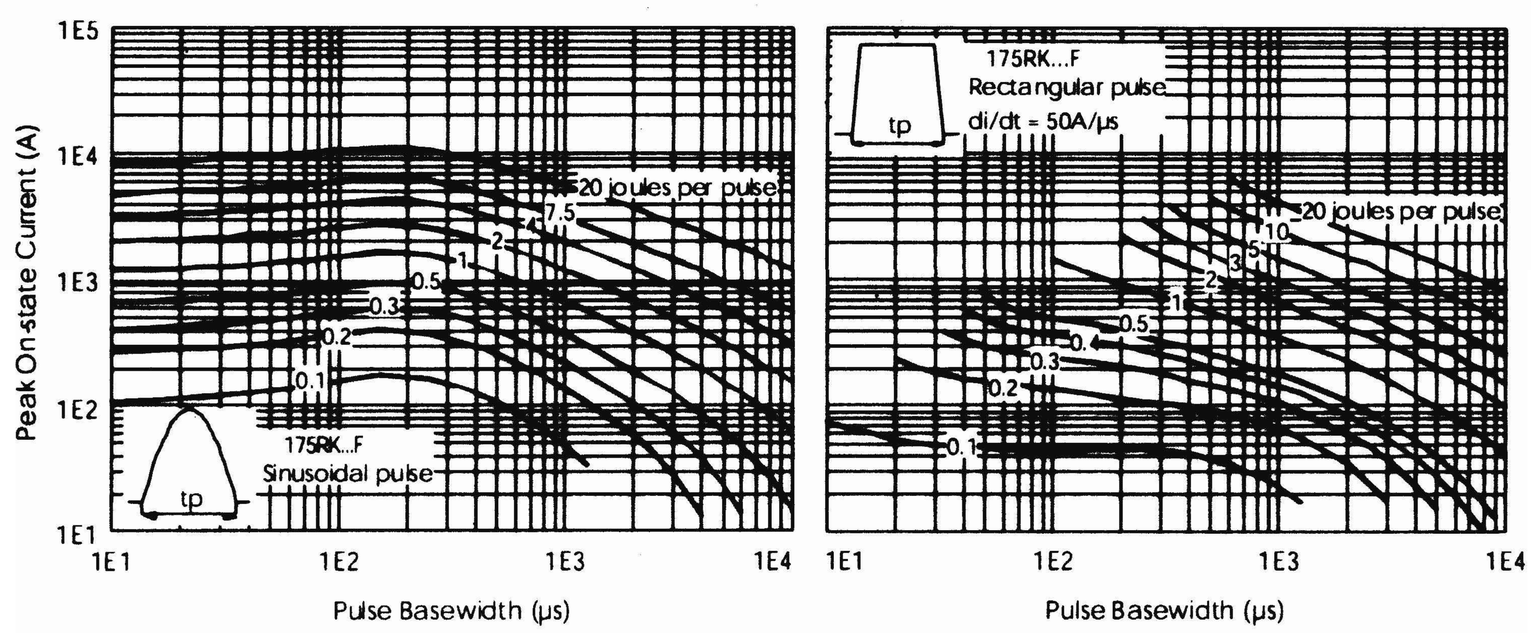


Fig. 14 - Maximum On-state Energy Power Loss Characteristics

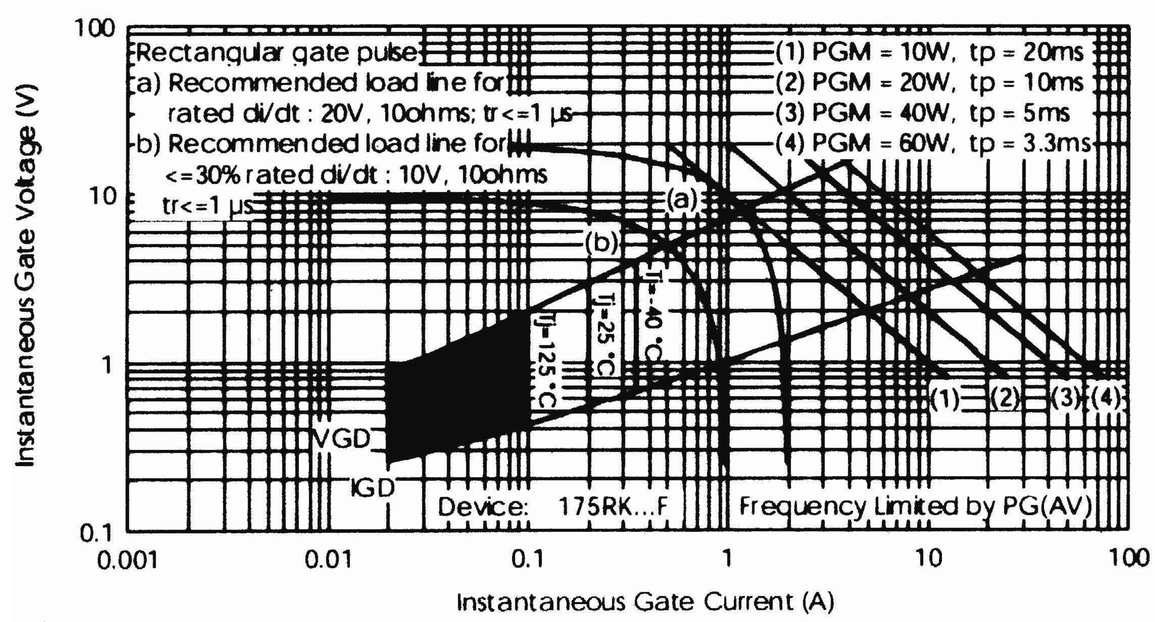


Fig. 15 - Gate Characteristics