Fast Recovery Diodes
(Stud Version), 12A

Available
RoHS*
COMPLIANT

FEATURES

- Short reverse recovery time
- Low stored charge
- Wide current range
- Excellent surge capabilities
- Standard JEDEC types
- Stud cathode and stud anode versions
- Fully characterized reverse recovery conditions
- RoHS compliant

DO-203AA(DO-4)

TYPICAL APPLICATIONS

- DC power supplies
- Inverters
- Converters
- Choppers
- Ultrasonic systems
- Freewheeling diodes

PRODUCT SUMMARY	
$I_{F(AV)}$	12A

MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	**CHARACTERISTICS**	**12FD..**	**UNIT**
$I_{F(AV)}$	T_C = 100°C	12	A
$I_{F(RMS)}$		19	A
I_{FSM}	50 HZ	170	A
	60 HZ	180	
I^2t	50 HZ	145	A^2s
	60 HZ	134	
$I^2\sqrt{t}$		1452	$I^2\sqrt{s}$
V_{RRM}	Range	200 to 1200	V
t_{rr}		See Recovery Characteristics table	ns
T_J	Range	-65 to 150	°C

ELECTRICAL SPECIFICATIONS

VOLTAGE RATINGS					
TYPE NUMBER	**VOLTAGE CODE**	**V_{RRM}, MAXIMUM REPETITIVE PEAK AND AND OFF-STATE VOLTAGE V**	**V_{RSM}, MAXIMUM NON-REPETITIVE PEAK VOLTAGE V**	**I_{RRM}, MAXIMUM AT T_J = 25°C μA**	**I_{RRM}, MAXIMUM AT T_J = 150°C mA**
12FD(R)	02	200	275	10	6.0
	04	400	500		
	06	600	725		
	08	800	950		
	10	1000	1200		
	12	1200	1400		

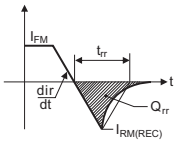
Note (1) JEDEC registered values

FORWARD CONDUCTION

PARAMETER	SYMBOL	TEST CONDITIONS			12FD(R)	UNIT
Maximum average forward current at case temperature	$I_{F(AV)}$	180° conduction, half sine wave DC			12(1)	A
		T_C			100	°C
Maximum RMS forward current	$I_{F(RMS)}$				19	A
Maximum peak, one-cycle non-reptitive surge current	I_{FSM}	t = 10ms	No voltage reapplied	Sinusoidal half wave, initial T_J = 150°C	170	A
		t = 8.3ms			180	
		t = 10ms	100%V_{RRM} reapplied		145	
		t = 8.3ms			150(1)	
Maximum I^2t for fusing	I^2t	t = 10ms	No voltage reapplied		145	A^2s
		t = 8.3ms			134	
		t = 10ms	100%V_{RRM} reapplied		105	
		t = 8.3ms			93	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	t = 0.1 to 10 ms, no voltage reapplied			1452	$A^2\sqrt{s}$
Maximum on-state voltage	V_{FM}	T_J = 25°C; I_F = 12 A			1.4(1)	V
		T_C = 100°C; I_{FM} = 38 A			1.5(1)	

Note (1) JEDEC registered values

RECOVERY CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	12FD(R)		UNIT	
			02 to 06	08 to 12		
Maximum reverse recovery time	t_{rr}	I_F =1A, I_R = 0.5A, I_{RR} = 0.25A (RG#1 CKT)	200	500	ns	
		T_J = 25°C,dI_F/dt = 25 A/µs, I_{FM} = π x rated $I_{F(AV)}$	200	500		

THERMAL AND MECHANICAL SPECIFCATIONS

PARAMETER	SYMBOL	TEST CONDITIONS	12FD(R)	UNITS
Maximum junction operating temperature range	T_J		- 65 to150	°C
Maximum storage temperature range	T_{stg}		- 65 to175	
Maximum thermal resistance, junction to case	R_{thJC}	DC operation	2.0	K/W
Maximum thermal resistance case to heatsink	R_{thCS}	Mounting surface, smooth, flat and greased	0.5	
Allowable mounting torque		Not-lubricated threads	$1.5^{+0}_{-10\%}$ (13)	N · m (lbf · in)
		Lubricated threads	$1.2^{+0}_{-10\%}$ (10)	N · m (lbf · in)
Approximate weight			7	g
			0.25	oz.
Case style		JEDEC	DO-203AA (DO-4)	

△R_{thJC} CONDUCTION				
CONDUCTION ANGEL	12FD(R)		TEST CONDUCTIONS	UNITS
	SINUSOIDAL CONDUCTION	RECTANGULAR CONDUCTION		
180˚	0.46	0.26	T_J = 150°C	K/W
120˚	0.48	0.46		
60˚	1.02	1.02		
30˚	1.76	1.76		

Note

• The table above shows the increment of thermal resistance R_{thJC} when devices operate at different conduction angles than DC

ORDERING INFORMATION SCHEME

12 FD R 06 A

Current

12 = 12A

Diode type

FD = Fast Recovery Diode

Polarity

R = Reverse
None = standard

Voltage

06 = 600V
08 = 800V
10 = 1000V
12 = 1200V

Trr value

A = 200 ns Max.
B = 500 ns Max.

Fig.1 Average forward current vs. maximum allowable case temperature.

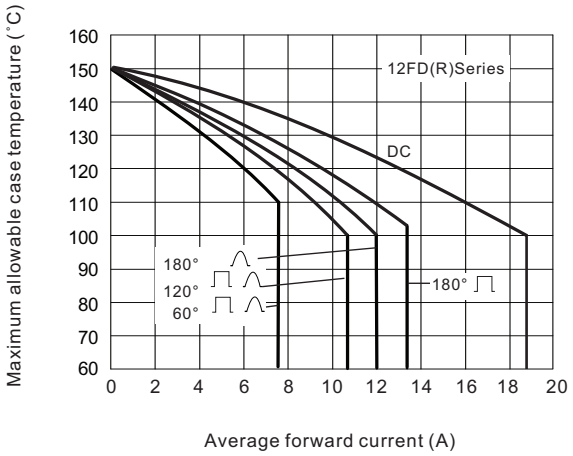
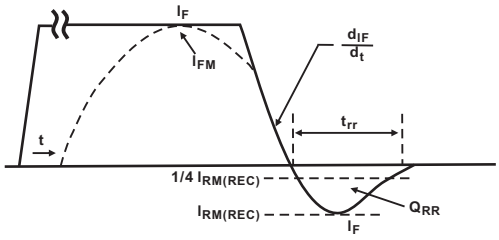


Fig.2 Reverse recovery time test waveform



I_F,I_{FM} = Peak forward current prior to commutation

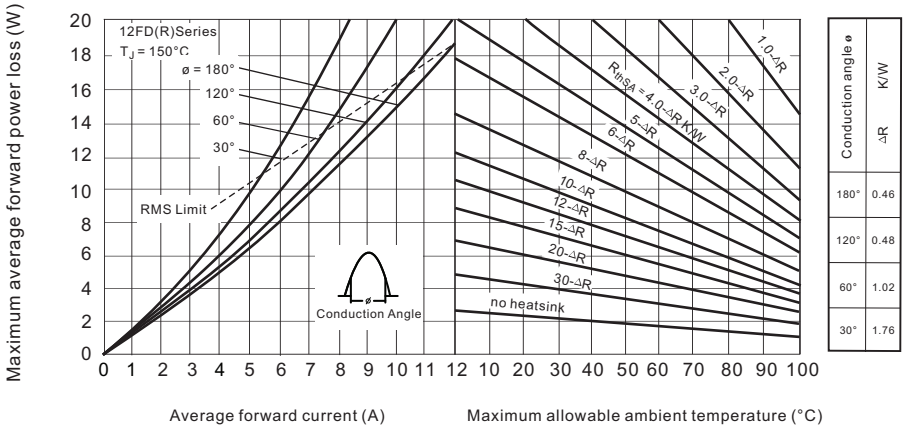
– d_{IF}/d_t = Rate of fall of forward current

$I_{RM(REC)}$ = Peak reverse recovery current

t_{rr} = Reverse recovery time

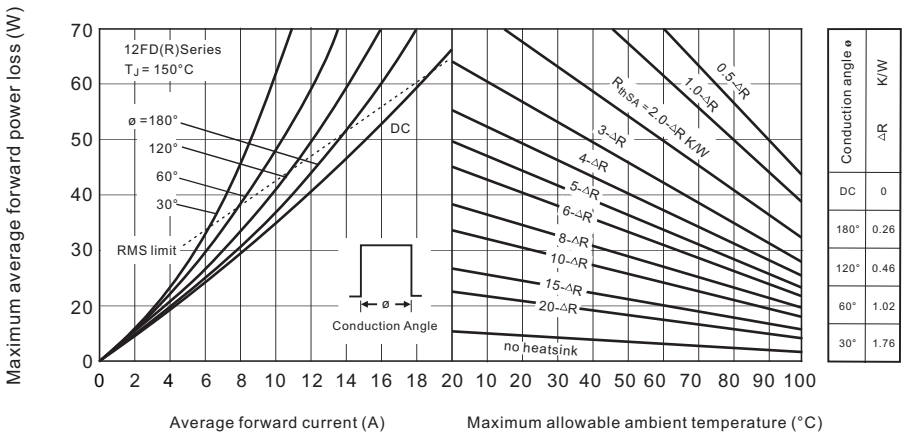
Q_{RR} = Reverse recovered charge

Fig. 3 Current rating nomogram (sinusoidal waveforms)



Conduction angle ø	K/W ΔR
180°	0.46
120°	0.48
60°	1.02
30°	1.76

Fig.4 Current rating nomogram (Rectangular Waveforms).



Conduction angle ø	K/W ΔR
DC	0
180°	0.26
120°	0.46
60°	1.02
30°	1.76

Fig. 5 Maximum forward voltage vs. forward current.

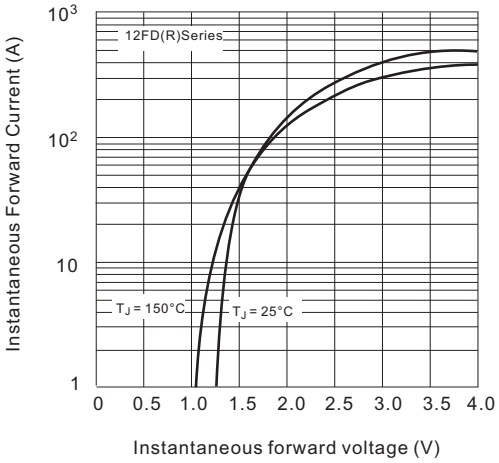


Fig .6 Maximum high level forward power loss vs. average forward current

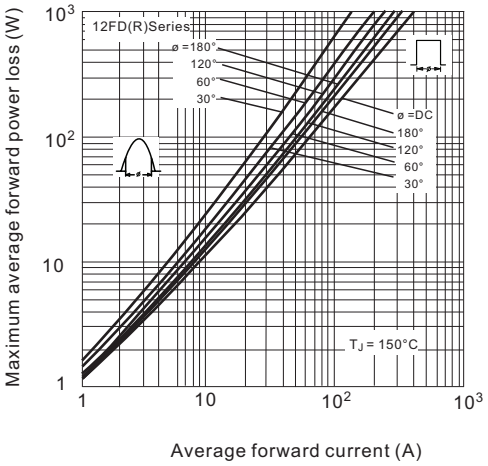


Fig .7 Typical reverse recovery time vs. rate of fall of forward current.

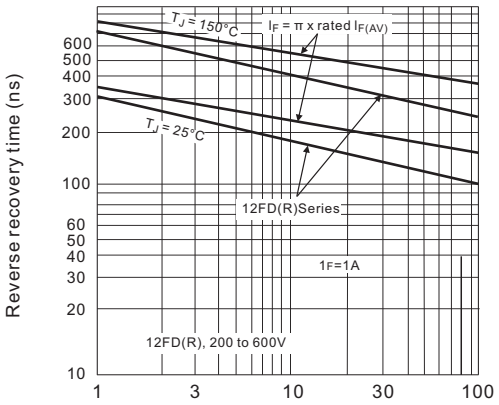


Fig .8 Typical recovered charge vs. rate of fall of forward current.

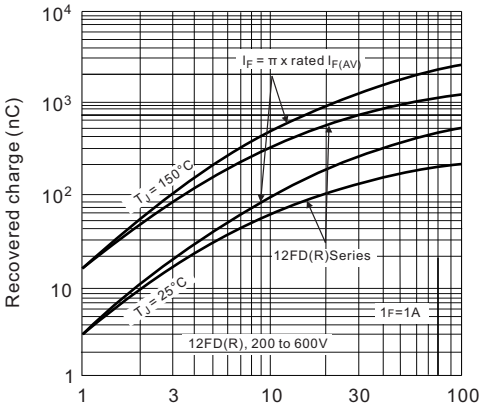


Fig .9 Typical reverse recovery time vs. rate of fall of forward current.

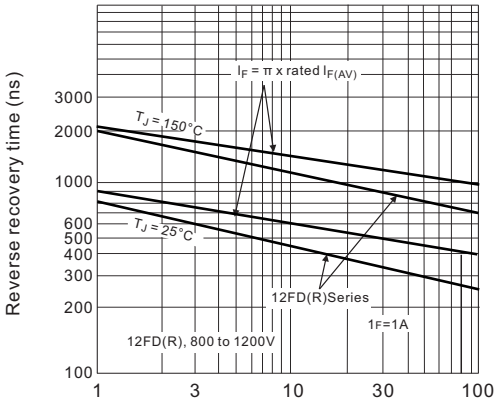


Fig .10 Typical recovered charge vs. rate of fall of forward current.

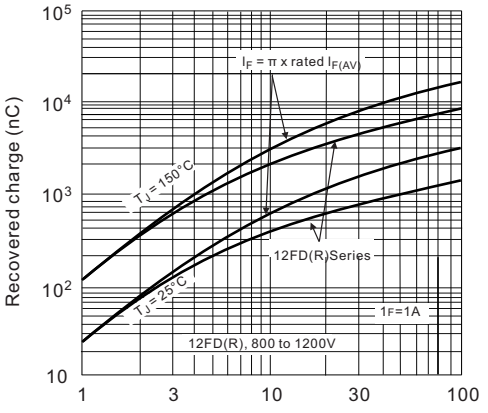


Fig .11 Maximum transient thermal impedance, junction-to-case vs. pulse duration.

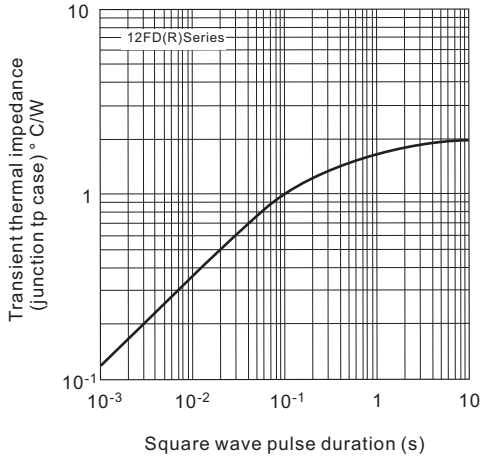
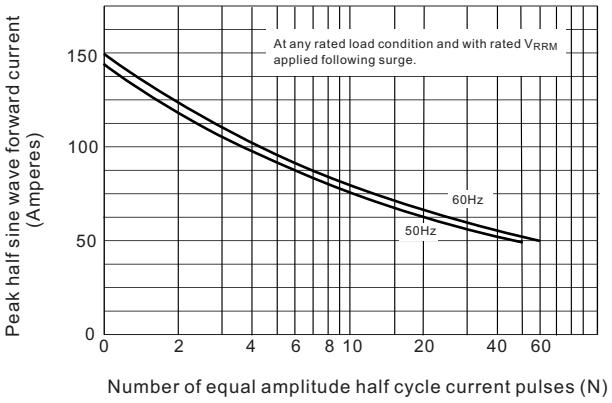
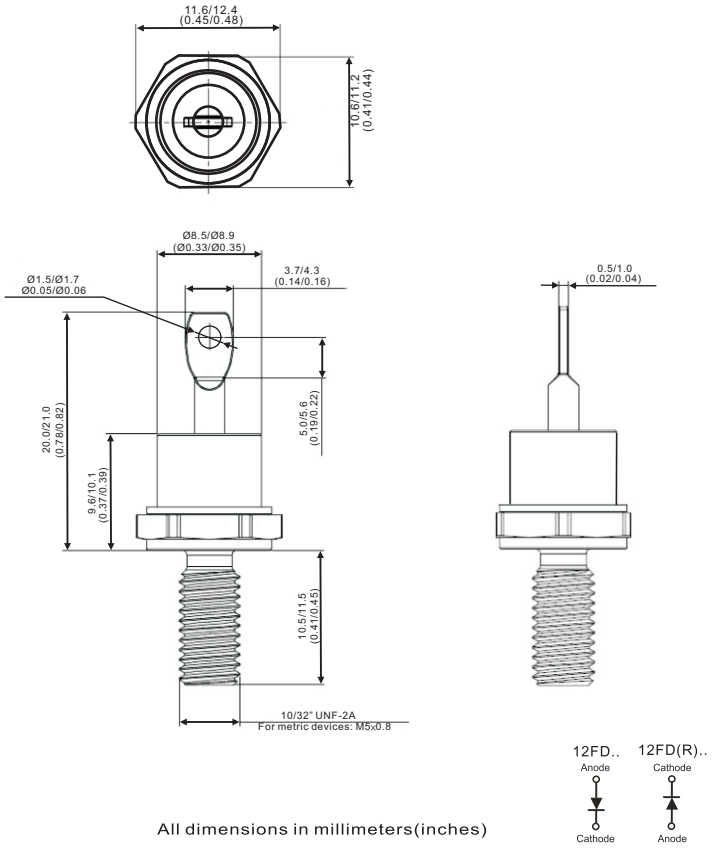


Fig .12 Maximum non-repetitive surge current vs. number of current pulses .



DO-203AA (DO-4)



All dimensions in millimeters(inches)