Fast Recovery Diodes (Stud Version), 6 A, 12 A, 16 A



DO-203AA (DO-4)

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
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT

TYPICAL APPLICATIONS

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

PRODUCT SUMMARY	
$I_{F(AV)}$	6 A, 12 A, 16 A
Package	DO-203AA (DO-4)
Circuit configuration	Single diode

MAJOR RATINGS AND CHARACTERISTICS					
PARAMETER	TEST CONDITIONS	6FL..	12FL..	16FL..	UNITS
$I_{F(AV)}$		6	12	16	A
	T_C	100	100	100	°C
$I_{F(RMS)}$		9.5	19	25	A
I_{FSM}	50 Hz	110	145	180	A
	60 Hz	115	150	190	
I^2t	50 Hz	60	103	160	A^2s
	60 Hz	55	94	150	
$I^2\sqrt{t}$		1452	1452	2290	$I^2\sqrt{s}$
V_{RRM}	Range	50 to 1000	50 to 1000	50 to 1000	V
t_{rr}		See Recovery Characteristics table	See Recovery Characteristics table	See Recovery Characteristics table	ns
T_J	Range	-65 to 150	-65 to 150	-65 to 150	°C

ELECTRICAL SPECIFICATIONS

VOLTAGE RATINGS						
TYPE NUMBER	VOLTAGE CODE	V_{RRM}, MAXIMUM REPETITIVE PEAK 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 = 100 °C mA	I_{RRM} MAXIMUM AT T_J = 150 °C mA
VS-6FL.., VS-12FL.., VS-16FL..	5	50	75	50	-	6.0
	10	100	150			
	20	200	275			
	40	400	500			
	60	600	725			
	80	800	950			
	100	1000	1250			

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FORWARD CONDUCTION

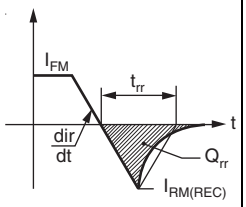
PARAMETER	SYMBOL	TEST CONDITIONS			6FL..	12FL..	16FL..	UNITS
Maximum average forward current at case temperature	$I_{F(AV)}$	180° conduction, half sine wave			6	12 (1)	16	A
		DC			100	100	100	°C
Maximum RMS current	$I_{F(RMS)}$				9.5	19	25	A
Maximum peak, one-cycle non-repetitive forward current	I_{FSM}	t = 10 ms	No voltage reapplied	Sinusoidal half wave, initial T_J = 150 °C	130	170	215	
		t = 8.3 ms			135	180	225	
		t = 10 ms	100 % V_{RRM} reapplied		110	145	180	
		t = 8.3 ms			115	150 (1)	190	
Maximum I^2t for fusing	I^2t	t = 10 ms	No voltage reapplied		86	145	230	A^2s
		t = 8.3 ms			78	130	210	
		t = 10 ms	100 % V_{RRM} reapplied		60	103	160	
		t = 8.3 ms			55	94	150	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	t = 0.1 ms to 10 ms, no voltage reapplied			856	1452	2290	$A^2\sqrt{s}$
Maximum forward voltage drop	V_{FM}	T_J = 25 °C; I_F = Rated $I_{F(AV)}$ (DC)			1.4	1.4 (1)	1.4	V
		T_C = 100 °C; I_{FM} = π x rated $I_{F(AV)}$			1.5	1.5 (1)	1.5	

Note

(1) JEDEC registered values

RECOVERY CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	6FL.., 12FL.., 16FL..		UNITS
			S02	S05	
Maximum reverse recovery time	t_{rr}	T_J = 25 °C, I_F = 1 A to V_R = 30 V, dI_F/dt = 100 A/µs	-	-	ns
		T_J = 25 °C, dI_F/dt = 25 A/µs, I_{FM} = π x rated $I_{F(AV)}$	200	500	
Maximum peak recovery current	$I_{RM(REC)}$	I_{FM} = π x rated $I_{F(AV)}$	-		-
Maximum reverse recovery charge	Q_{rr}	T_J = 25 °C, I_F = 1 A to V_R = 30 V, dI_F/dt = 100 A/µs	-	-	nC
		T_J = 25 °C, dI_F/dt = 25 A/µs, I_{FM} = π x rated $I_{F(AV)}$	-	-	



Note

(1) JEDEC registered values

THERMAL AND MECHANICAL SPECIFICATIONS

PARAMETER	SYMBOL	TEST CONDITIONS	6FL..	12FL..	16FL..	UNITS
Maximum junction operating temperature range	T_J		- 65 to 150			°C
Maximum storage temperature range	T_{Stg}		- 65 to 175			
Maximum thermal resistance, junction to case	R_{thJC}	DC operation	2.5	2.0	1.6	°C/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)			
Approximate weight			7			g
			0.25			oz.
Case style		JEDEC	DO-203AA (DO-4)			

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ΔR_{thJC} CONDUCTION								
CONDUCTION ANGLE	6FL..	12FL..	16FL..	6FL..	12FL..	16FL..	TEST CONDITIONS	UNITS
	SINUSOIDAL CONDUCTION			RECTANGULAR CONDUCTION				
180°	0.58	0.46	0.37	0.33	0.26	0.21	T_J = 150 °C	K/W
120°	0.60	0.48	0.39	0.58	0.46	0.37		
60°	1.28	1.02	0.82	1.28	1.02	0.82		
30°	2.20	1.76	1.41	2.20	1.76	1.41		

Note

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

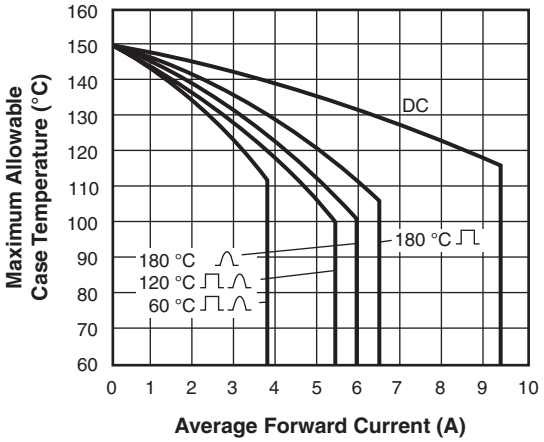


Fig. 1 - Average Forward Current vs. Maximum Allowable Case Temperature, 6FL Series

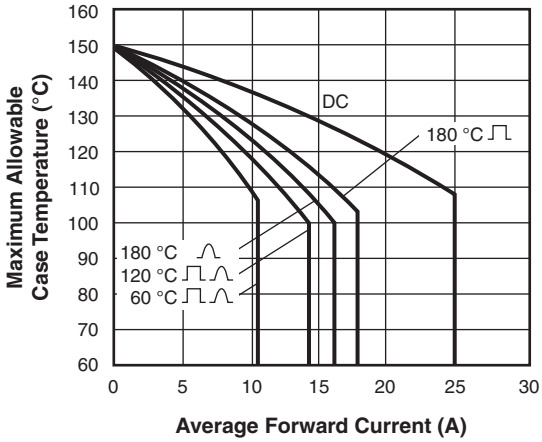


Fig. 3 - Average Forward Current vs. Maximum Allowable Case Temperature, 16FL Series

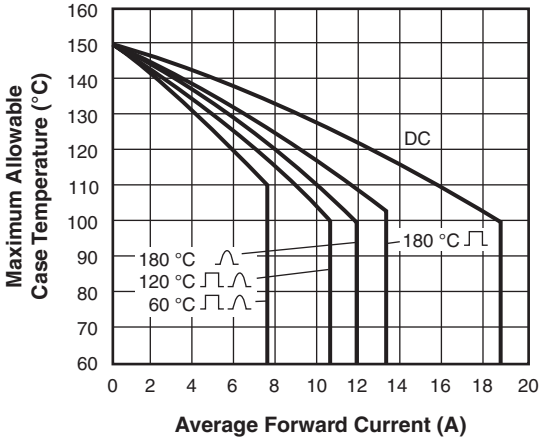
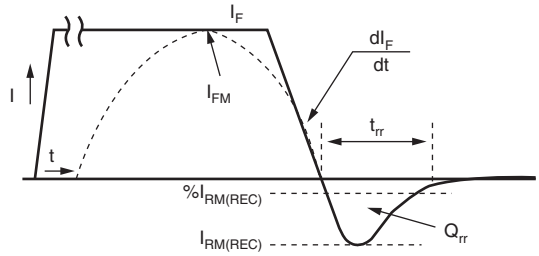


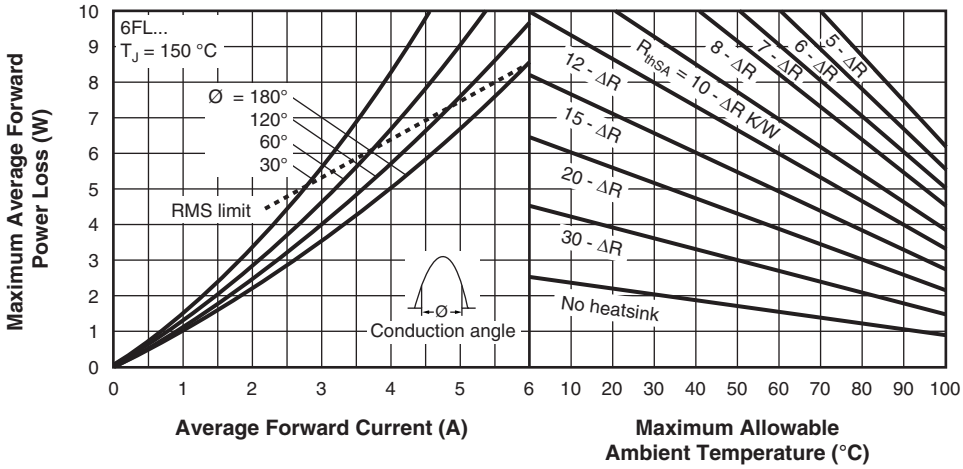
Fig. 2 - Average Forward Current vs. Maximum Allowable Case Temperature, 12FL Series



I_F, I_{FM} - Peak forward current prior to commutation
$-dI_F/dt$ - Rate of fall of forward current
$I_{RM(REC)}$ - Peak reverse recovery current
t_{rr} - Reverse recovery time
Q_{rr} - Reverse recovered charge

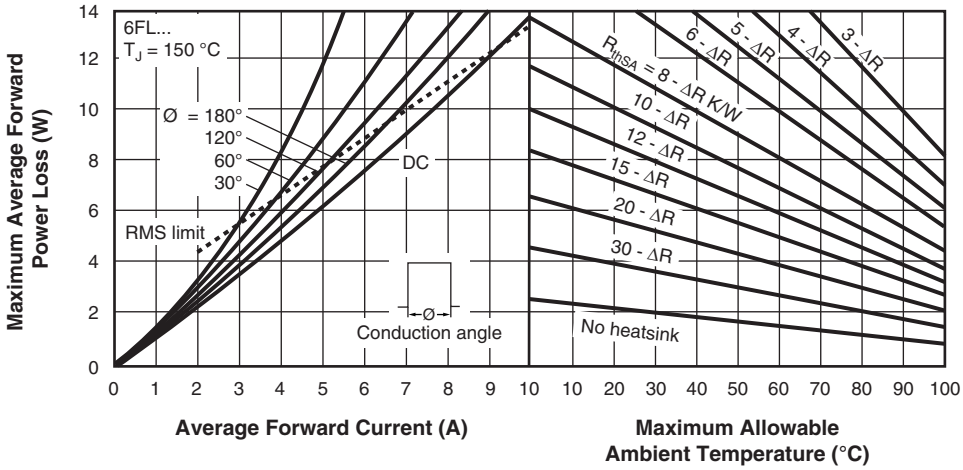
Fig. 4 - Reverse Recovery Time Test Waveform

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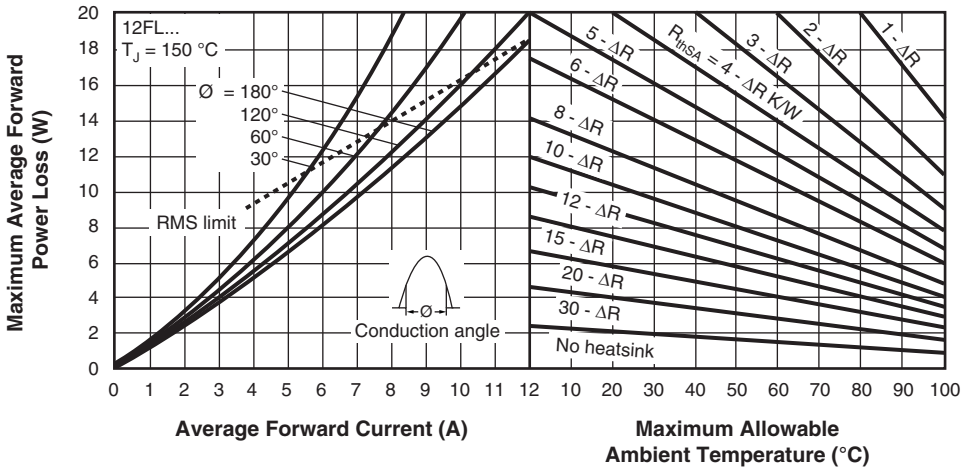
Conduction angle - Ø	ΔR - K/W
180°	0.58
120°	0.60
60°	1.28
30°	2.20

Fig. 5 - Current Rating Nomogram (Sinusoidal Waveforms), 6FL Series



Conduction angle - Ø	ΔR - K/W
DC	0
180°	0.33
120°	0.58
60°	1.28
30°	2.20

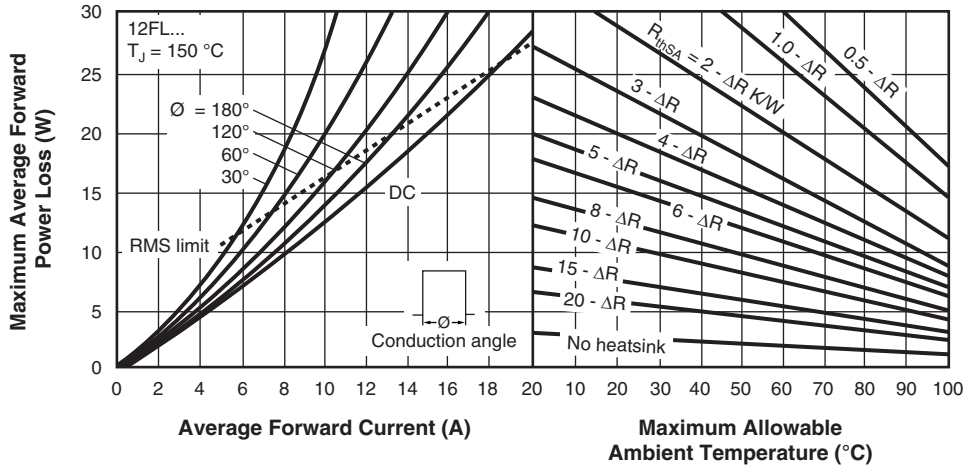
Fig. 6 - Current Rating Nomogram (Rectangular Waveforms), 6FL Series



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

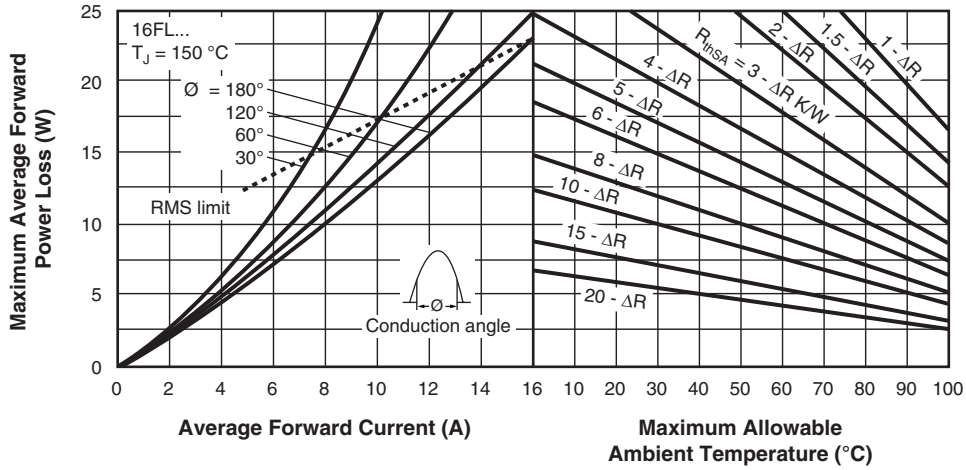
Fig. 7 - Current Rating Nomogram (Sinusoidal Waveforms), 12FL Series

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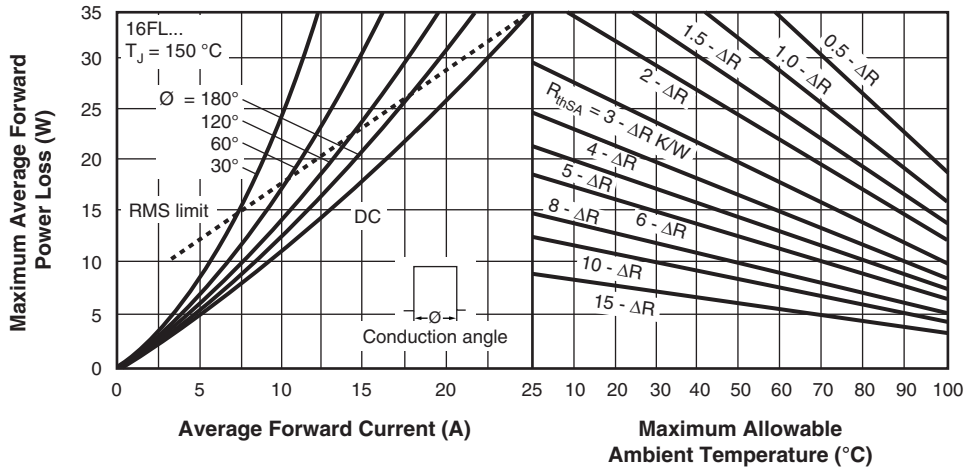
Conduction angle - Ø	ΔR - K/W
DC	0
180°	0.26
120°	0.46
60°	1.02
30°	1.76

Fig. 8 - Current Rating Nomogram (Rectangular Waveforms), 12FL Series



Conduction angle - Ø	ΔR - K/W
180°	0.37
120°	0.39
60°	0.82
30°	1.41

Fig. 9 - Current Rating Nomogram (Sinusoidal Waveforms), 16FL Series



Conduction angle - Ø	ΔR - K/W
DC	0
180°	0.21
120°	0.37
60°	0.82
30°	1.41

Fig. 10 - Current Rating Nomogram (Rectangular Waveforms), 16FL Series

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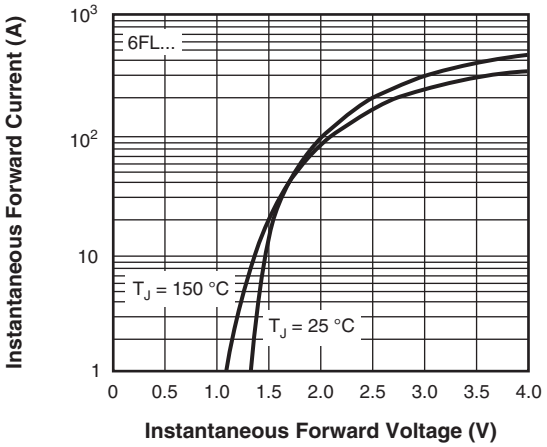


Fig. 11 - Maximum Forward Voltage vs. Forward Current, 6FL Series

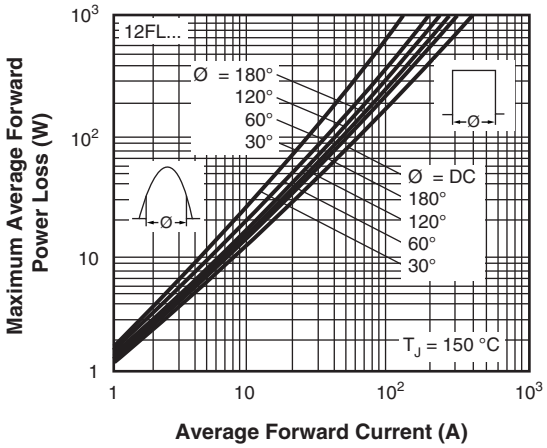


Fig. 14 - Maximum High Level Forward Power Loss vs. Average Forward Current, 12FL Series

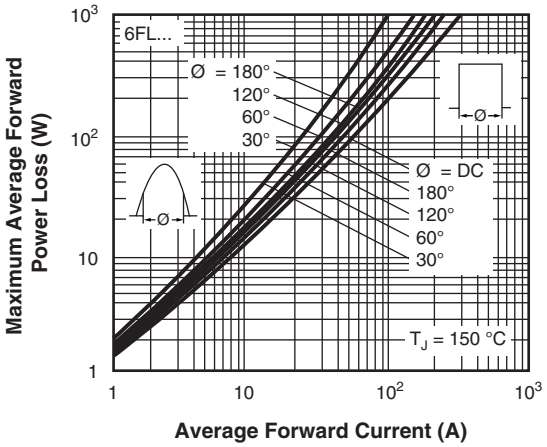


Fig. 12 - Maximum High Level Forward Power Loss vs. Average Forward Current, 6FL Series

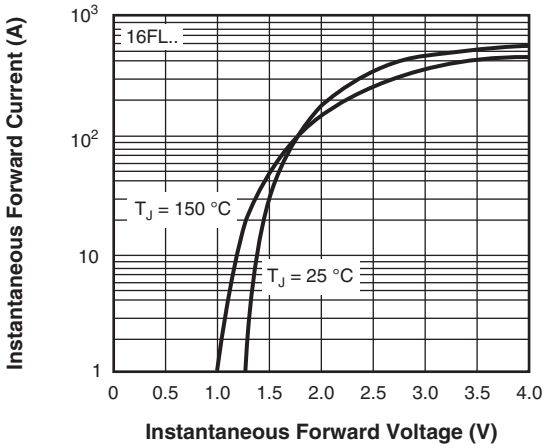


Fig. 15 - Maximum Forward Voltage vs. Forward Current, 16FL Series

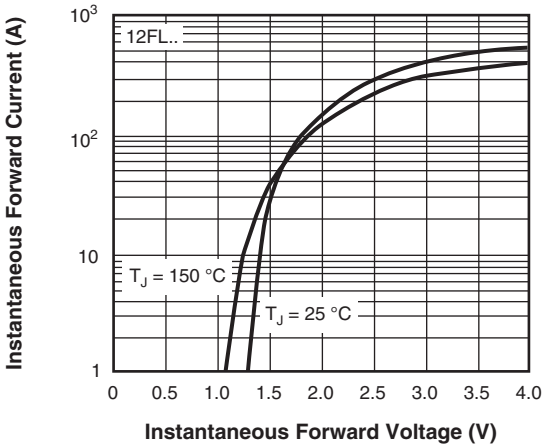


Fig. 13 - Maximum Forward Voltage vs. Forward Current, 12FL Series

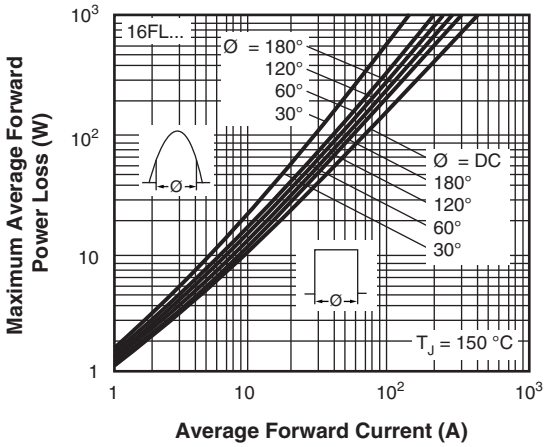


Fig. 16 - Maximum High Level Forward Power Loss vs. Average Forward Current, 16FL Series

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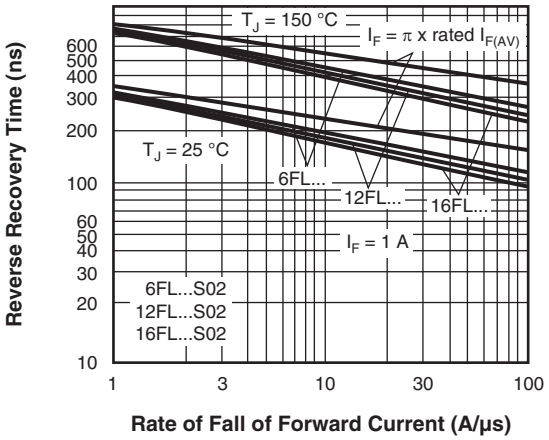


Fig.17a - Typical Reverse Recovery Time vs.
Rate of Fall of Forward Current, All Series ...S02

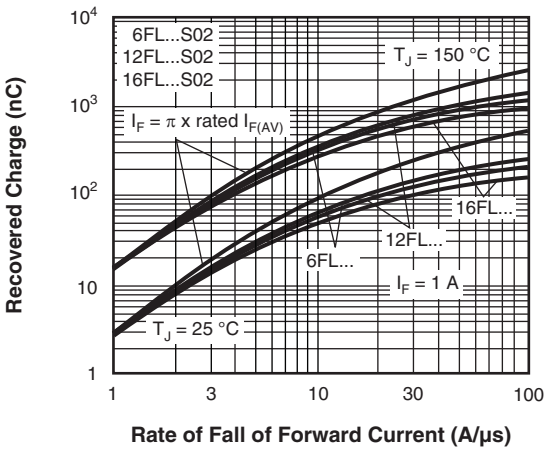


Fig. 17b - Typical Recovered Charge vs.
Rate of Fall of Forward Current, All Series ...S02

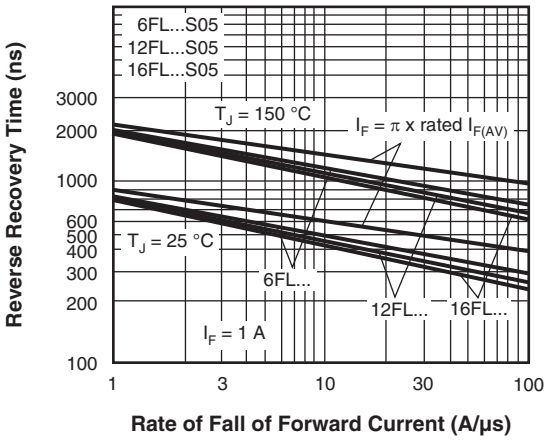


Fig. 18a - Typical Reverse Recovery Time vs.
Rate of Fall of Forward Current, All Series ...S05

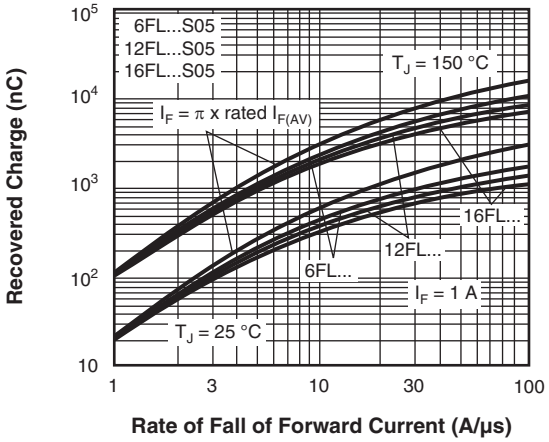


Fig. 18b - Typical Recovered Charge vs.
Rate of Fall of Forward Current, All Series ...S05

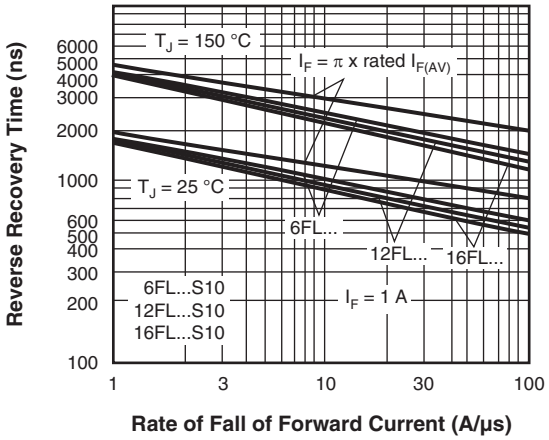


Fig. 19a - Typical Reverse Recovery Time vs.
Rate of Fall of Forward Current, All Series ...S10

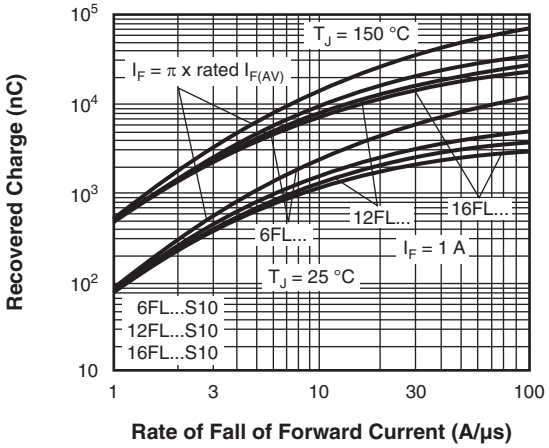


Fig. 19b - Typical Recovered Charge vs.
Rate of Fall of Forward Current, All Series ...S10

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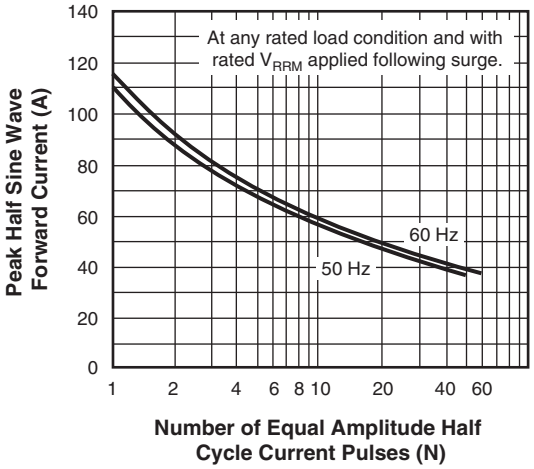


Fig. 20 - Maximum Non-Repetitive Surge Current vs. Number of Current Pulses, 6FL Series

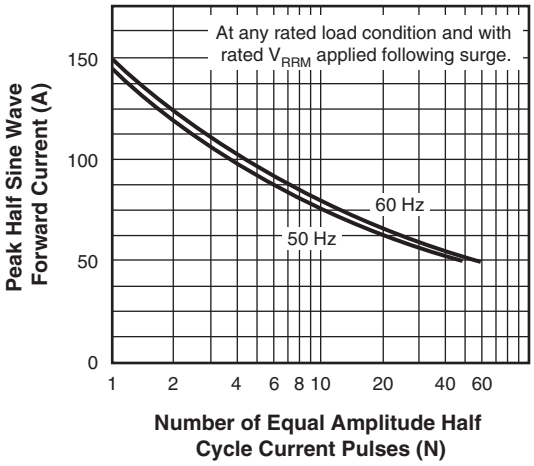


Fig. 21 - Maximum Non-Repetitive Surge Current vs. Number of Current Pulses, 12FL Series

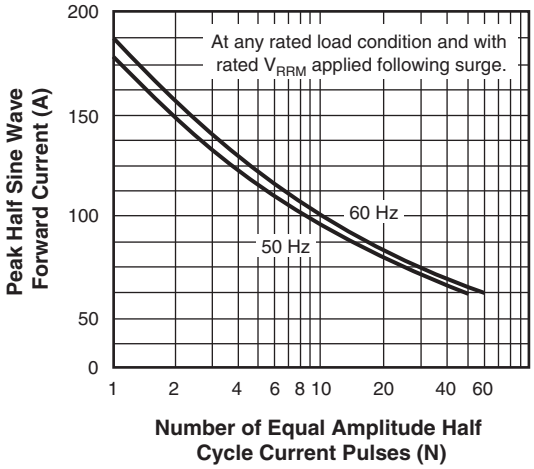


Fig. 22 - Maximum Non-Repetitive Surge Current vs. Number of Current Pulses, 16FL Series

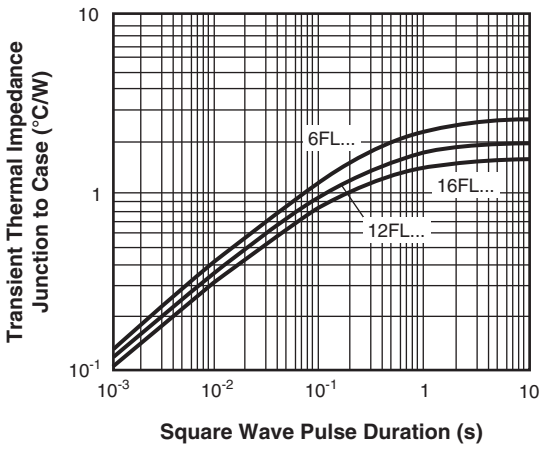
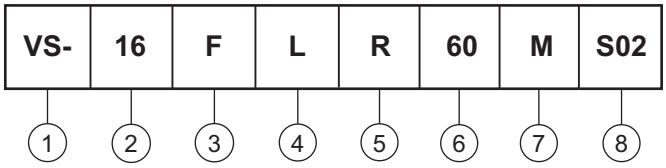


Fig. 23 - Maximum Transient Thermal Impedance, Junction to Case vs. Pulse Duration, All Series

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ORDERING INFORMATION TABLE

Device code



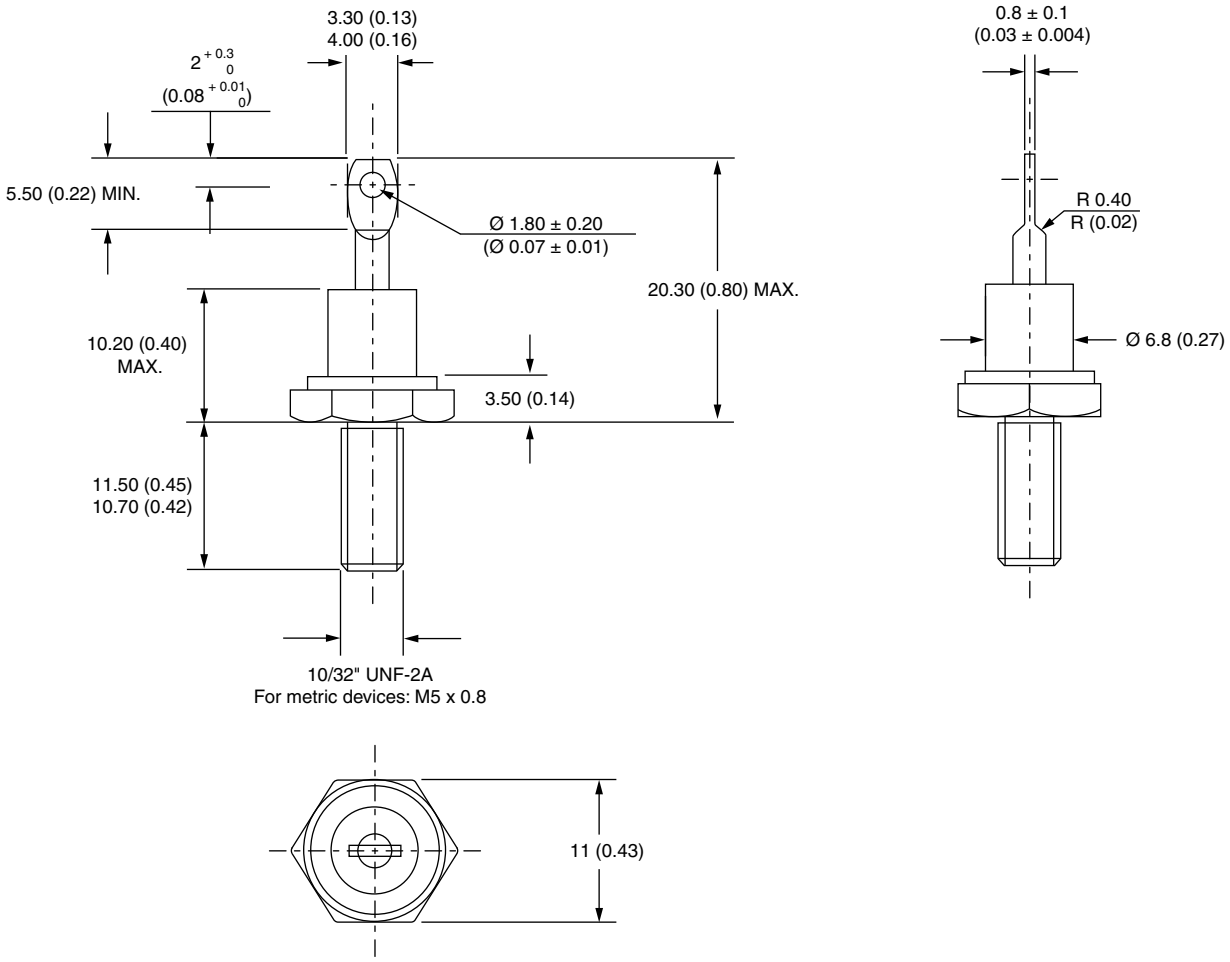
1 - Vishay Semiconductors product
2 - Current code $I_{(AVG)}$ = Exact current rating
3 - F = Diode
4 - Omit = Standard recovery diode
L = Only for fast diode
5 - Omit = Stud forward polarity
R = Stud reverse polarity
6 - Voltage code x 10 = V_{RRM} (see Voltage Ratings table)
7 - Outlines:
Omit = Stud base UNF thread
M = Stud base metric thread
8 - t_{rr} code only for fast diode (see Recovery Characteristics table)

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95311

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DO-203AA (DO-4)

DIMENSIONS in millimeters (inches)



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Шишлаков Евгений

8 (495)668-30-28 доб 169

manager28@tradeelectronics.ru

http://www.tradeelectronics.ru/