

INTERNATIONAL RECTIFIER

1N3879, 1N3889, 6FL, 12FL, 16FL SERIES

5A, 12A and 16A Fast Recovery Rectifiers

Major Ratings and Characteristics

	1N3879 —1N3883	1N3889 —1N3893	6FL...	12FL...	16FL...	Unit
$I_F(AV)^{\dagger}$	6*	12*	6	12	16	A
I_{FSM}	72	145	110	145	180	A
I_{FSM}	75*	150*	115	150	190	A
I^2t	26	103	60	103	160	A ² s
I^2t	23	94	55	94	150	A ² s
λ_T	363	1452	855	1452	2290	A $\sqrt{s}$
t_{rr} range	see table					ns
V_{RRM} range	50 — 400*		50 — 1000			V
T_J range	—65 to 150					°C

*JEDEC registered values.

 $\dagger$ At max. $T_C = 100^\circ\text{C}$.

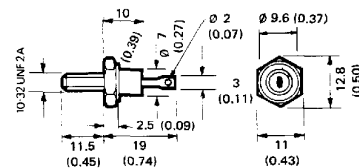
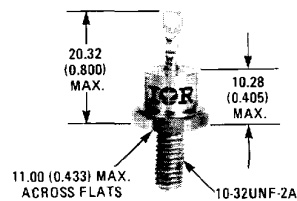
Description

This range of fast recovery diodes is designed for applications in DC power supplies, inverters, converters, choppers, ultrasonic systems and for use as free wheel diodes.

Features

- Short reverse recovery time
- Low stored charge
- Wide current range
- Excellent surge capabilities
- Standard JEDEC types
- Stud cathode and stud anode versions
- Types up to 1000V V_{RRM}
- Fully characterised reverse recovery conditions

CASE STYLE AND DIMENSIONS



Conforms to JEDEC : DO-203AA (DO-4)

IEC 191-2 : A3U

BS 3934 : SO-10A

DIN 41885 : 101 C 2

All dimensions in millimetres (inches)

REVERSE VOLTAGE RATINGS

Part Number ① ②			VRRM — Max. Repetitive Peak Reverse Voltage	VRRM — Max. Non-Repetitive Peak Reverse Voltage $t_p \leq 5$ ms	IR — Max. Reverse Current At Rated V_R		
			V	V	$T_J = 25^\circ\text{C}$	$T_J = 100^\circ\text{C}$	$T_J = 150^\circ\text{C}$
					mA	mA	mA
1N3879			50	75	0.015*	1.0*	3.0*
1N3880			100	150	0.015*	1.0*	3.0*
1N3881			200	250	0.015*	1.0*	3.0*
1N3882			300	350	0.015*	1.0*	3.0*
1N3883			400	450	0.015*	1.0*	3.0*
1N3889			50	75	0.025*	3.0*	5.0*
1N3890			100	150	0.025*	3.0*	5.0*
1N3891			200	250	0.025*	3.0*	5.0*
1N3892			300	350	0.025*	3.0*	5.0*
1N3893			400	450	0.025*	3.0*	5.0*
**6FL5S02	6FL5S05	6FL5S10	50	75	0.050	—	6.0
6FL10S02	6FL10S05	6FL10S10	100	150	0.050	—	6.0
6FL20S02	6FL20S05	6FL20S10	200	275	0.050	—	6.0
6FL40S02	6FL40S05	6FL40S10	400	500	0.050	—	6.0
6FL60S02	6FL60S05	6FL60S10	600	725	0.050	—	6.0
—	6FL80S05	6FL80S10	800	950	0.050	—	6.0
—	6FL100S05	6FL100S10	1000	1250	0.050	—	6.0
**12FL5S02	12FL5S05	12FL5S10	50	75	0.050	—	6.0
12FL10S02	12FL10S05	12FL10S10	100	150	0.050	—	6.0
12FL20S02	12FL20S05	12FL20S10	200	275	0.050	—	6.0
12FL40S02	12FL40S05	12FL40S10	400	500	0.050	—	6.0
12FL60S02	12FL60S05	12FL60S10	600	725	0.050	—	6.0
—	12FL80S05	12FL80S10	800	950	0.050	—	6.0
—	12FL100S05	12FL100S10	1000	1250	0.050	—	6.0
**16FL5S02	16FL5S05	16FL5S10	50	75	0.050	—	6.0
16FL10S02	16FL10S05	16FL10S10	100	150	0.050	—	6.0
16FL20S02	16FL20S05	16FL20S10	200	275	0.050	—	6.0
16FL40S02	16FL40S05	16FL40S10	400	500	0.050	—	6.0
16FL60S02	16FL60S05	16FL60S10	600	725	0.050	—	6.0
—	16FL80S05	16FL80S10	800	950	0.050	—	6.0
—	16FL100S05	16FL100S10	1000	1250	0.050	—	6.0

REVERSE RECOVERY CHARACTERISTICS

		1N3879– 1N3883	1N3889– 1N3893	6FL...			12FL...			16FL...			Unit	Conditions
t_{rr}	Max. reverse recovery time	150	150	110	285	490	100	250	430	90	225	390	ns	$T_J = 25^\circ\text{C}$, $I_F = 1$ A to $V_R = 30$ V $dI_F/dt = 100$ A/ μ s
		300*	300*	200	500	1000	200	500	1000	200	500	1000	ns	$T_J = 25^\circ\text{C}$, $dI_F/dt = 25$ A/ μ s.
$I_{RM}(REC)$	Max. peak reverse recovery current	4*	5*	—	—	—	—	—	—	—	—	—	—	$I_{FM} = \pi \times \text{rated } I_F(AV)$
Q_{RR}	Max. reverse recovered charge	400	350	230	1700	5000	200	1300	3800	150	1100	3000	nC	$T_J = 25^\circ\text{C}$, $I_F = 1$ A to $V_R = 30$ V $dI_F/dt = 100$ A/ μ s
		400	400	200	1200	5000	200	1200	5000	200	1200	5000	nC	$T_J = 25^\circ\text{C}$, $dI_F/dt = 25$ A/ μ s $I_{FM} = \pi \times \text{rated } I_F(AV)$

ELECTRICAL SPECIFICATIONS

		1N3879– 1N3883	6FL...	1N3889– 1N3893	12FL...	16FL...	Unit	Conditions
FORWARD CONDUCTION								
$I_F(AV)$	Max. average forward current	6*	6	12*	16	A	A	180° conduction, half sine wave, $T_C = 100^\circ\text{C}$
$I_F(RMS)$	Max. r.m.s. forward current	9.5	9.5	19	25	A	A	
I_{FSM}	Max. peak one-cycle non-repetitive forward current	72	110	145	180	A	A	$t = 10$ ms — With rated V_{RRM} $t = 8.3$ ms — $V_{RRM} = 0$ Sinusoidal half wave, initial $T_J = 150^\circ\text{C}$
		75*	115	150*	190			
		85	130	170	215			
		90	135	180	225			
I^2t	Max. I^2t for fusing	26	60	103	160	A ² s	A ² s	$t = 10$ ms — With rated V_{RRM} $t = 8.3$ ms — $V_{RRM} = 0$ Initial $T_J = 150^\circ\text{C}$
	Max. I^2t for individual device fusing	36	86	145	230			
		33	78	130	210			
$I^2\sqrt{t}$	Max. $I^2\sqrt{t}$ for individual device fusing ①	363	856	1452	2290	$I^2\sqrt{s}$	$I^2\sqrt{s}$	$t = 0.1$ to 10 ms
V_{FM}	Max. peak forward voltage	1.4*	1.4	1.4*	1.4	V	V	$T_J = 25^\circ\text{C}$, $I_F = \text{rated } I_F(AV)$ (D.C.) $T_C = 100^\circ\text{C}$, $I_{FM} = \pi \times \text{rated } I_F(AV)$
		1.5*	1.5	1.5*	1.5			

* JEDEC registered value

** Suffix "S02" may be omitted, i.e., 12FL10 implies 12FL10S02, 12FLR60 implies 12FLR60S02.

① Types listed are cathode to case; for anode-to-case include "R" in code, i.e., 1N3879R, 6FLR20S10, 16FLR40S02.

② $I_R(AV)$ @ rated $I_F(AV)$ and V_{RRM} , and $T_C = 100^\circ\text{C}$.③ I_{RM} @ rated V_{RRM} and $T_J = 150^\circ\text{C}$.④ I^2t for time $t_x = I^2\sqrt{t} \cdot \sqrt{x}$

⑤ When these devices are ordered without a suffix, e.g., 40HFL, the order will be filled with devices that meet the S02 specification.

Thermal and mechanical specifications

		1N3879 -1N3883 6FL....	1N3889 -1N3893 12FL....	16FL....	Units	Conditions
T _J	Junction operating temperature range	-65 to 150			°C	
T _{stg}	Storage temperature range	-65 to 175			°C	
R _{thJC}	Maximum internal thermal resistance, junction to case	2.5	2.0	1.6	deg C/W	DC operation
R _{thCS}	Maximum thermal resistance, case to heatsink	0.5			deg C/W	Mounting surface flat, smooth and greased.
T	Mounting torque to nut ±.10%	10.5		lbf.in	Lubricated threads (Non-lubricated threads)	
		0.12		kgf.m		
		1.2		Nm		
	to device	11.5 (13.5)		lbf.in		
		0.13 (0.156)		kgf.m		
		1.3 (1.35)		Nm		
wt	Approximate weight	7		g		
		0.25		oz		
Case style		DO-203AA (DO-4)				JEDEC

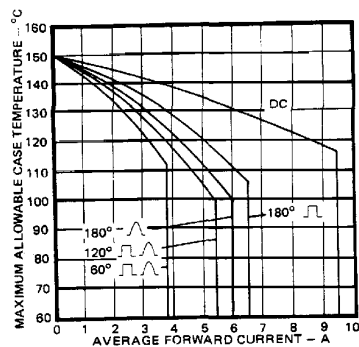


Fig. 1 - Average Forward Current Vs. Maximum Allowable Case Temperature, 1N3879 and 6FL Series

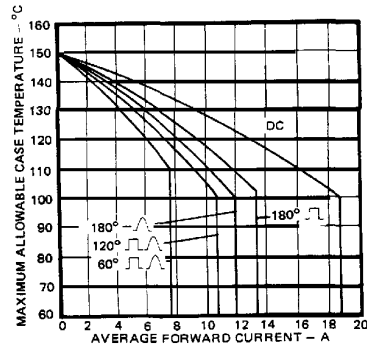


Fig. 2 - Average Forward Current Vs. Maximum Allowable Case Temperature, 1N3889 and 12FL Series

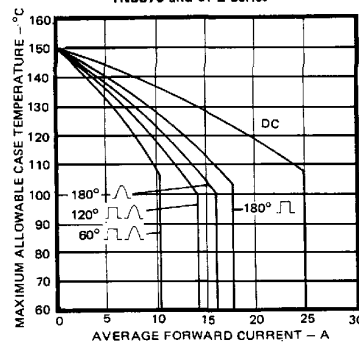
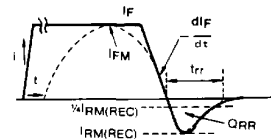


Fig. 3 - Average Forward Current Vs. Maximum Allowable Case Temperature, 16FL Series



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

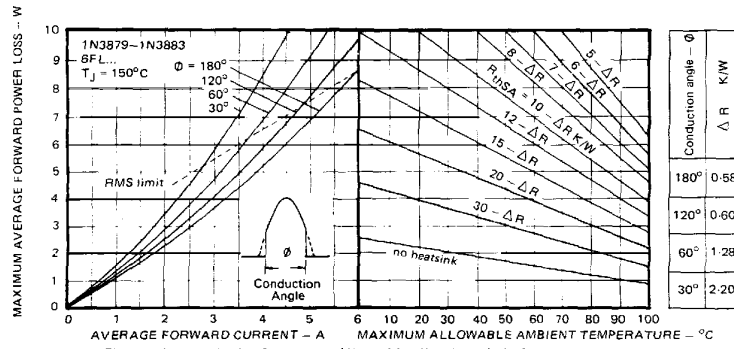


Fig. 5 - Current Rating Nomogram (Sinusoidal Waveforms), 1N3879 and 6FL Series

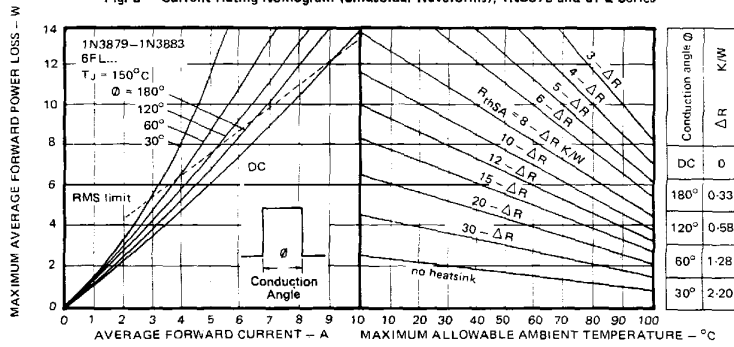


Fig. 6 - Current Rating Nomogram (Rectangular Waveforms), 1N3879 and 6FL Series

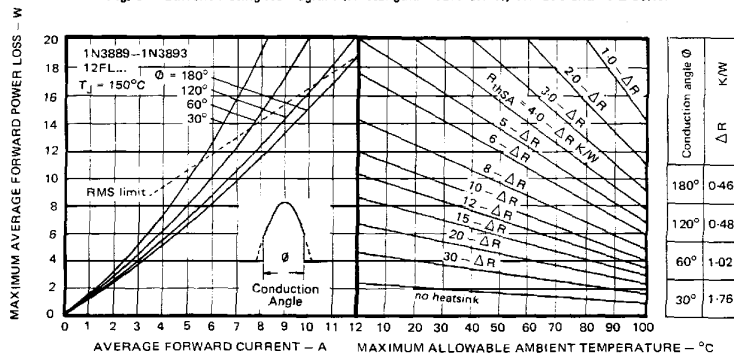


Fig. 7 - Current Rating Nomogram (Sinusoidal Waveforms), 1N3889 and 12FL Series

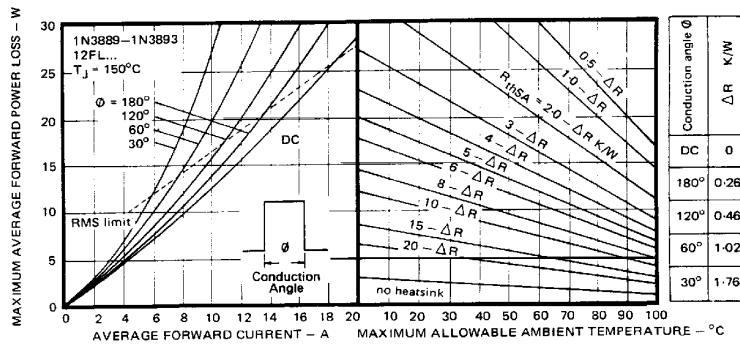


Fig. 8 - Current Rating Nomogram (Rectangular Waveforms), 1N3889 and 12FL Series

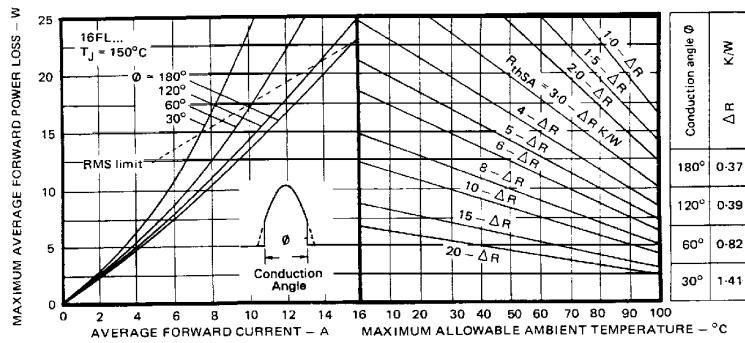


Fig. 9 - Current Rating Nomogram (Sinusoidal Waveforms), 16FL Series

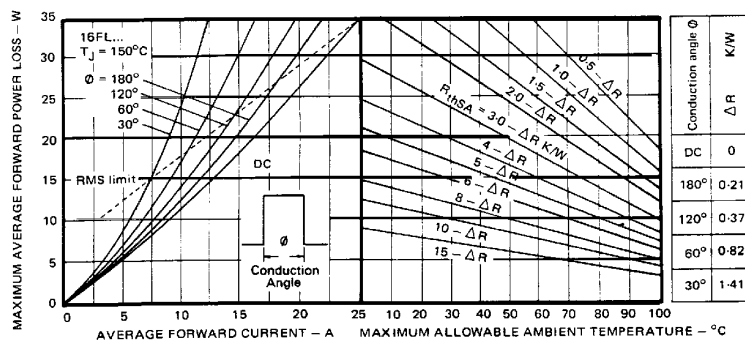


Fig. 10 - Current Rating Nomogram (Rectangular Waveforms), 16FL Series

1N3879, 1N3889, 6FL, 12FL, 16FL Series

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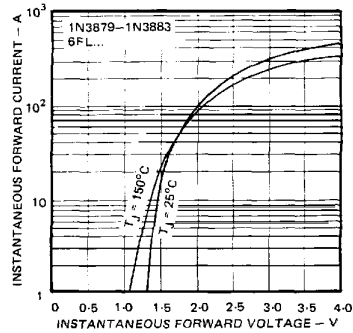


Fig. 11 - Maximum Forward Voltage Vs. Forward Current, 1N3879 and 6FL Series

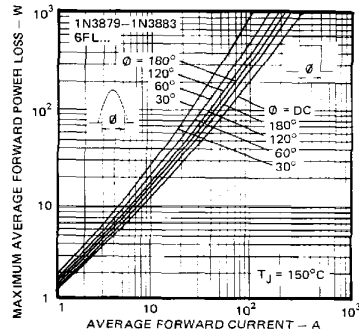


Fig. 12 - Maximum High Level Forward Power Loss Vs. Average Forward Current, 1N3879 and 6FL Series

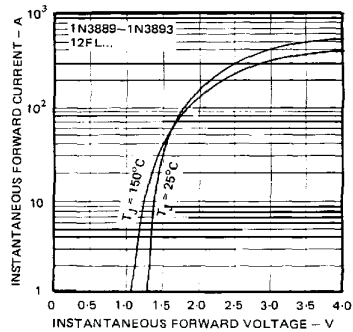


Fig. 13 - Maximum Forward Voltage Vs. Forward Current, 1N3889 and 12FL Series

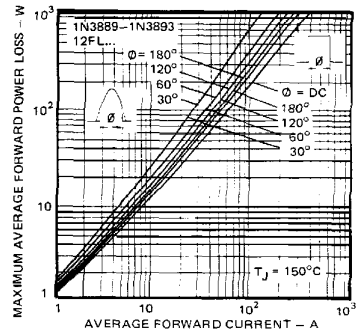


Fig. 14 - Maximum High Level Forward Power Loss Vs. Average Forward Current, 1N3889 and 12FL Series

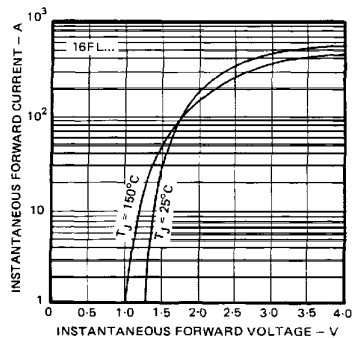


Fig. 15 - Maximum Forward Voltage Vs. Forward Current, 16FL Series

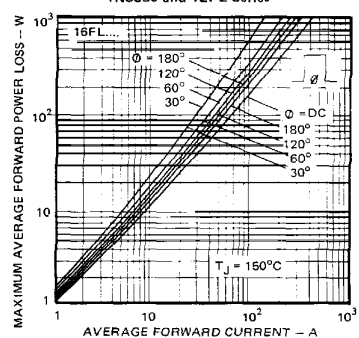


Fig. 16 - Maximum High Level Forward Power Loss Vs. Average Forward Current, 16FL Series

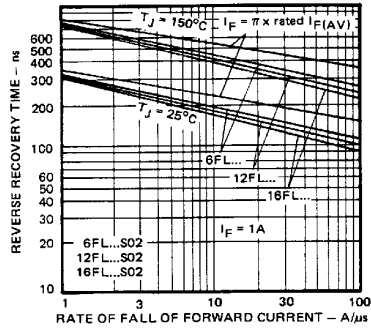


Fig. 17A - Maximum Reverse Recovery Time Vs. Rate of Fall of Forward Current, All Series __S02

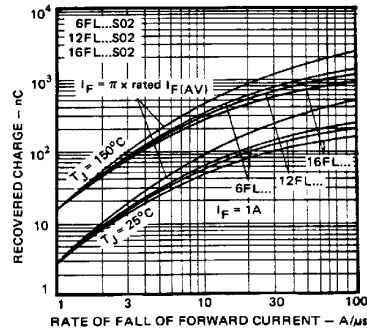


Fig. 17B - Maximum Recovered Charge Vs. Rate of Fall of Forward Current, All Series __S02

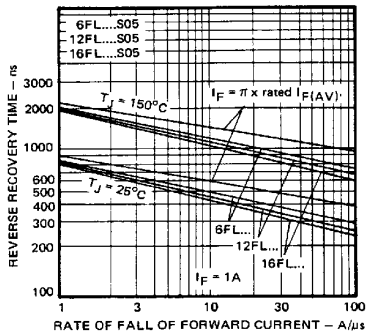


Fig. 18A - Maximum Reverse Recovery Time Vs. Rate of Fall of Forward Current, All Series __S05

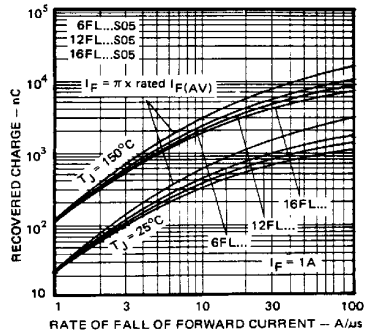


Fig. 18B - Maximum Recovered Charge Vs. Rate of Fall of Forward Current, All Series __S05

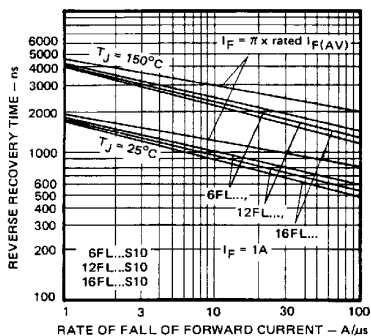


Fig. 19A - Maximum Reverse Recovery Time Vs. Rate of Fall of Forward Current, All Series __S10

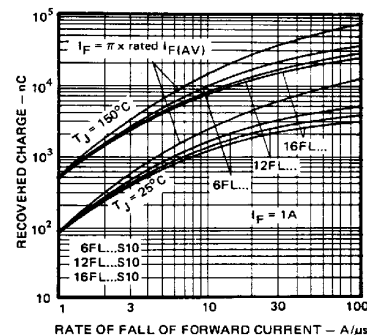


Fig. 19B - Maximum Recovered Charge Vs. Rate of Fall of Forward Current, All Series __S10

1N3879, 1N3889, 6FL, 12FL, 16FL Series

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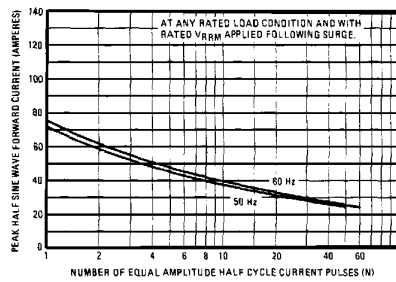


Fig. 20 - Maximum Non-Repetitive Surge Current Vs. Number of Current Pulses, 1N3879 Series

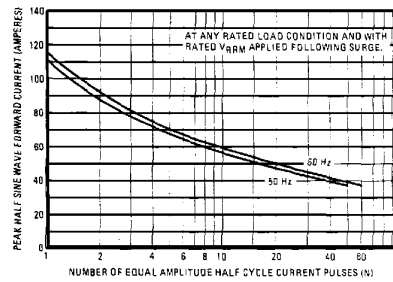


Fig. 21 - Maximum Non-Repetitive Surge Current Vs. Number of Current Pulses, 6FL Series

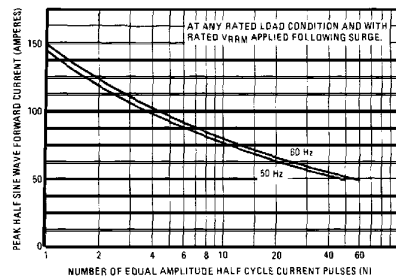


Fig. 22 - Maximum Non-Repetitive Surge Current Vs. Number of Current Pulses, 1N3889 and 12FL Series

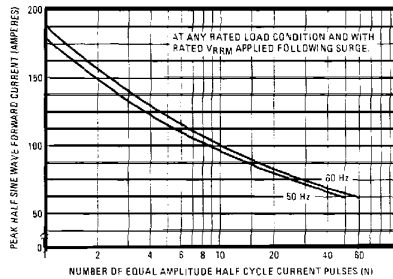


Fig. 23 - Maximum Non-Repetitive Surge Current Vs. Number of Current Pulses, 16FL Series

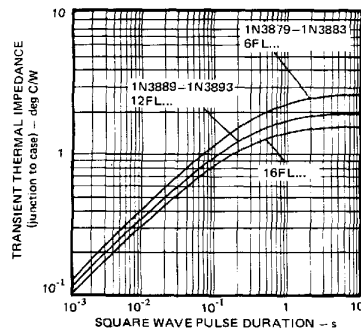


Fig. 24 - Maximum Transient Thermal Impedance, Junction-to-Case Vs. Pulse Duration, All Series.