

# INTERNATIONAL RECTIFIER

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

### 6A, 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	
$I_{FSM}$	50Hz	72	145	110	145	180	A
	60Hz	75*	150*	115	150	190	A
$I^2t$	50Hz	26	103	60	103	160	A <sup>2</sup> s
	60Hz	23	94	55	94	150	A <sup>2</sup> s
$I_{RMS}$	363	1452	895	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.

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

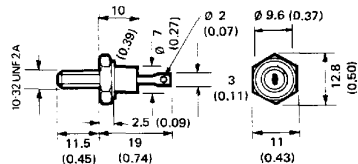
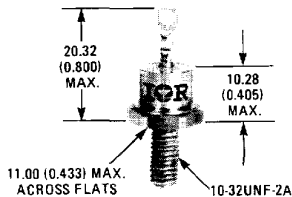
#### Description

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	VRRM - Max. Repetitive Peak Reverse Voltage		VRRM - Max. Non-Repetitive Peak Reverse Voltage		IR - Max. Reverse Current At Rated VR			
	V		V		TJ = 25°C	TJ = 100°C	TJ = 150°C	
	mA		mA		mA			
1N3879	50	75	0.015*	1.0*	3.0*		①	
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*		①	
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*			
**6FL6S02	6FL6S05	6FL6S10	50	75	0.050	—	6.0	①
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	
**12FL6S02	12FL6S05	12FL6S10	50	75	0.050	—	6.0	①
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	
**16FL6S02	16FL6S05	16FL6S10	50	75	0.050	—	6.0	①
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		6FL...			12FL...			16FL...			Unit	Conditions
		S02	S05	S10	S02	S05	S10	S02	S05	S10				
trr	Max. reverse recovery time	150	150	110	285	490	100	250	430	90	225	390	ns	TJ = 25°C, IF = 1A to VR = 30V dIF/dt = 100 A/μs
		300*	300*	200	500	1000	200	500	1000	200	500	1000	ns	TJ = 25°C, dIF/dt = 25 A/μs
IRM(REC)	Max. peak reverse recovery current	4*	5*	—	—	—	—	—	—	—	—	—	nA	IFM = π × rated IF(AV)
QRR	Max. reverse recovered charge	400	350	230	1700	5000	200	1300	3800	150	1100	3000	nC	TJ = 25°C, dIF/dt = 25 A/μs IFM = π × rated IF(AV)
		400	400	200	1200	5000	200	1200	5000	200	1200	5000	nC	

ELECTRICAL SPECIFICATIONS

	1N3879-1N3883	6FL...	1N3889-1N3893	12FL...	16FL...	Unit	Conditions						
FORWARD CONDUCTION													
IF(AV)	Max. average forward current							6*	9	12*	16	A	180° conduction, half sine wave, TC = 100°C
IF(RMS)	Max. r.m.s. forward current							9.5	9.5	19	25	A	
IFSM	Max. peak one-cycle non-repetitive forward current							72	110	145	180	A	t = 10 ms τ = 8.3 ms With rated VRRM Sinusoidal half wave, initial TJ = 150°C
								85	130	170	215		
								90	135	180	225		
i2t	Max. i2t for fusing							26	80	103	160	A2s	Initial TJ = 150°C
	Max. i2t for individual device fusing							36	86	145	230		
								33	76	130	210		
i2√t	Max. i2√t for individual device fusing							363	856	1452	2290	i2√s	t = 0.1 to 10 ms
VFM	Max. peak forward voltage							1.4*	1.4	1.4*	1.4	V	TJ = 25°C, IF = rated IF(AV) (D.C.)
								1.5*	1.5	1.5*	1.5		TC = 100°C, IFM = π × rated IF(AV)

\* JEDEC registered value  
 \*\* Suffix "S02" may be omitted, i.e., 12FL10 to imply 12FL10S02, 12FLR60 implies 12FLR60S02.

① IR(AV) @ rated IF(AV) and VRRM, and TC = 100°C.

② IRM @ rated VRRM and TJ = 150°C.

③ i2t for time tx = i2√t \* √x

④ When these devices are ordered without a suffix, e.g., 40HFL, the order will be filled with devices that meet the S02 specification.

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

**Thermal and mechanical specifications**

	1N3879 -1N3863 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
$R_{thJC}$	2.5	2.0	1.6	deg C/W	DC operation
$R_{thCS}$	Maximum thermal resistance, case to heatsink			0.5	deg C/W
T	Mounting torque ± 10%	to nut	10.5	lb.in	Mounting surface flat, smooth and greased.  Lubricated threads (Non-lubricated threads)
			0.12	kgf.m	
		1.2	Nm		
		to device	11.5 (13.5)	lb.in	
			0.13 (0.156)	kgf.m	
wt	Approximate weight	7		g	
		0.25		oz	
Case style		DO-203AA (DO-4)		JEDEC	

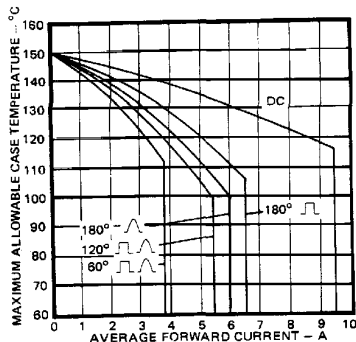


Fig. 1 - Average Forward Current Vs. Maximum Allowable Case Temperature, 1N3879 and 6FL Series

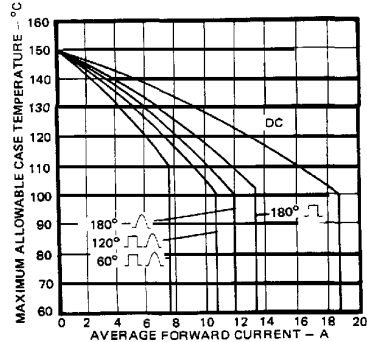


Fig. 2 - Average Forward Current Vs. Maximum Allowable Case Temperature, 1N3889 and 12FL Series

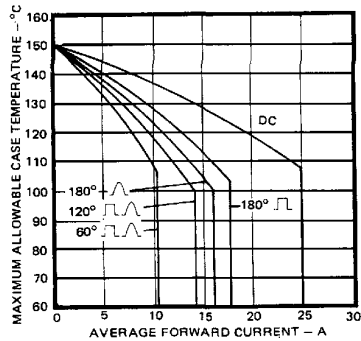
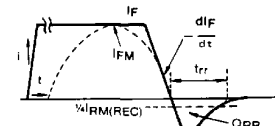
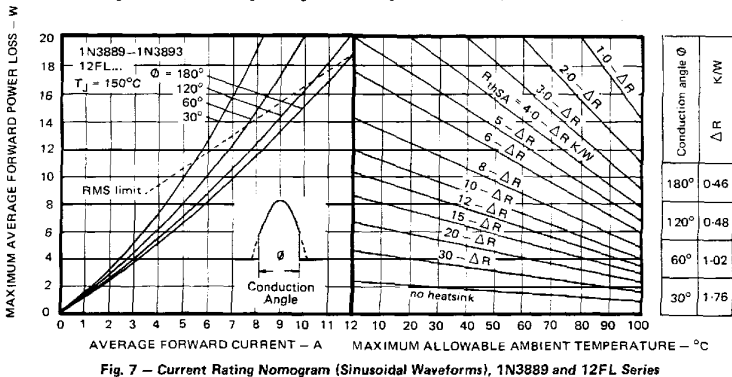
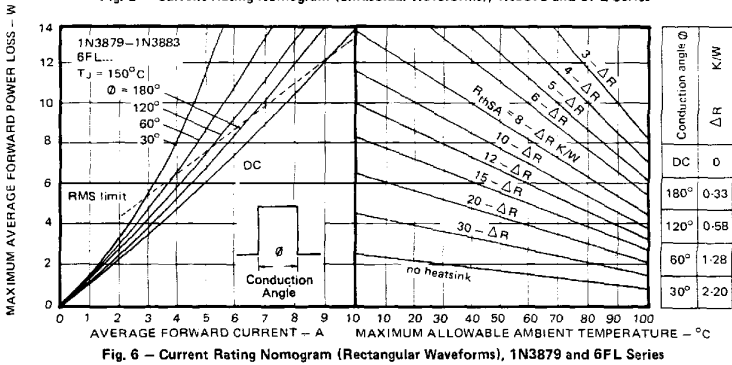
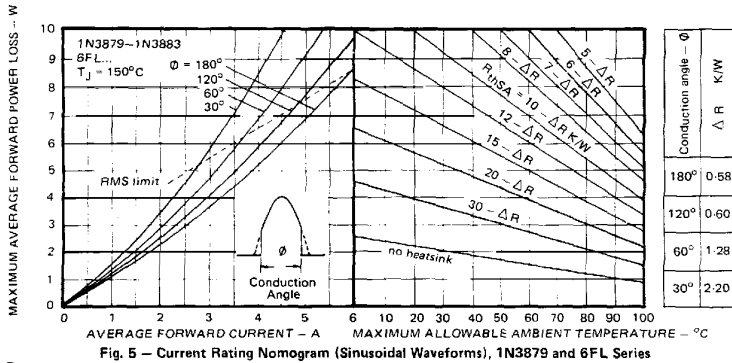


Fig. 3 - Average Forward Current Vs. Maximum Allowable Case Temperature, 16FL Series



- $I_F, I_{FM}$  = 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



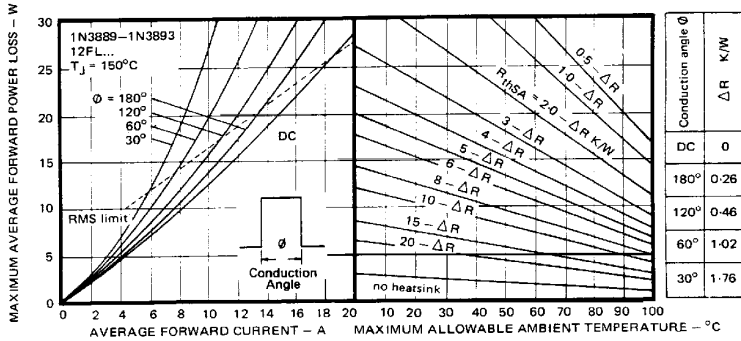


Fig. 8 – Current Rating Nomogram (Rectangular Waveforms), 1N3889 and 12FL Series

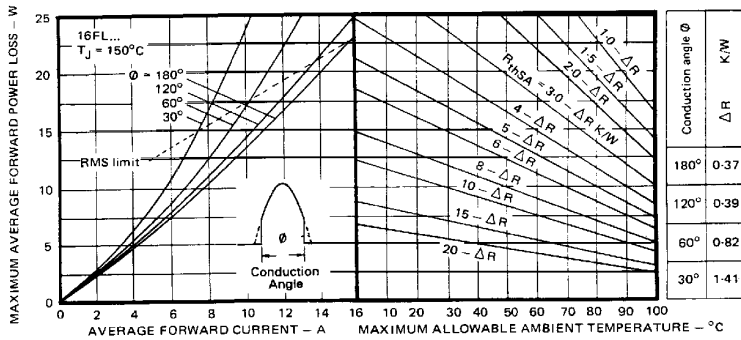


Fig. 9 – Current Rating Nomogram (Sinusoidal Waveforms), 16FL Series

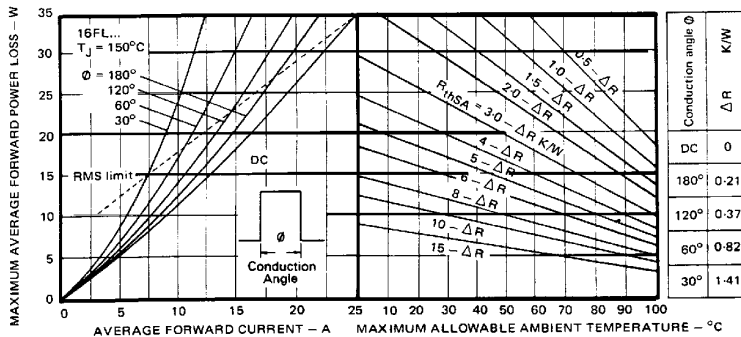


Fig. 10 – Current Rating Nomogram (Rectangular Waveforms), 16FL Series

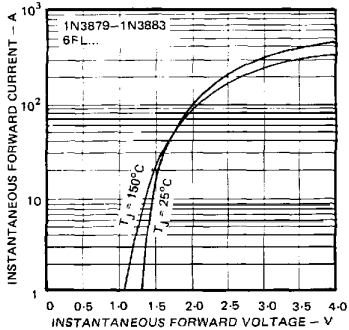


Fig. 11 - Maximum Forward Voltage Vs. Forward Current, 1N3879 and 6FL Series

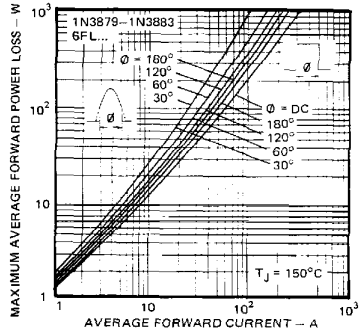


Fig. 12 - Maximum High Level Forward Power Loss Vs. Average Forward Current, 1N3879 and 6FL Series

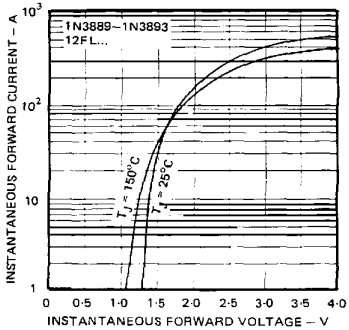


Fig. 13 - Maximum Forward Voltage Vs. Forward Current, 1N3889 and 12FL Series

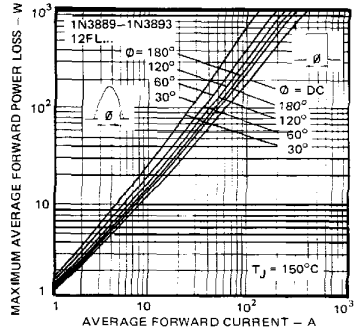


Fig. 14 - Maximum High Level Forward Power Loss Vs. Average Forward Current, 1N3889 and 12FL Series

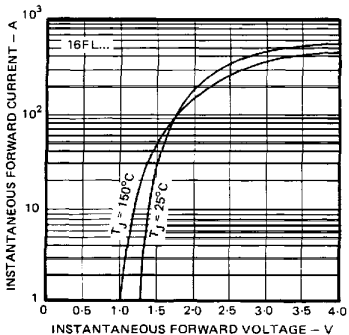


Fig. 15 - Maximum Forward Voltage Vs. Forward Current, 16FL Series

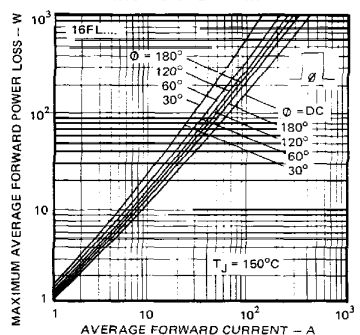


Fig. 16 - Maximum High Level Forward Power Loss Vs. Average Forward Current, 16FL Series

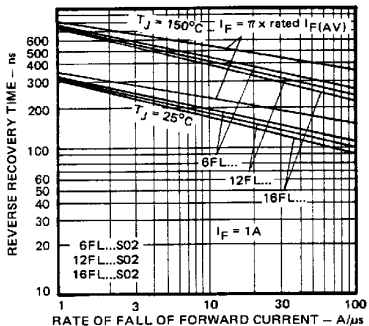


Fig. 17A — Maximum Reverse Recovery Time Vs. Rate of Fall of Forward Current, All Series \_\_S02

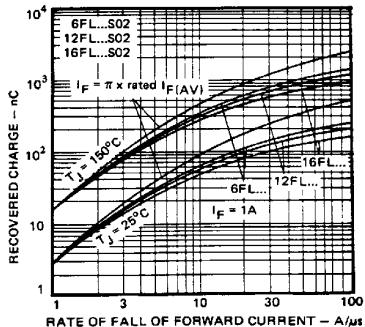


Fig. 17B — Maximum Recovered Charge Vs. Rate of Fall of Forward Current, All Series \_\_S02

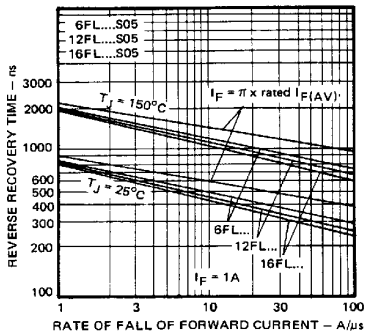


Fig. 18A — Maximum Reverse Recovery Time Vs. Rate of Fall of Forward Current, All Series \_\_S05

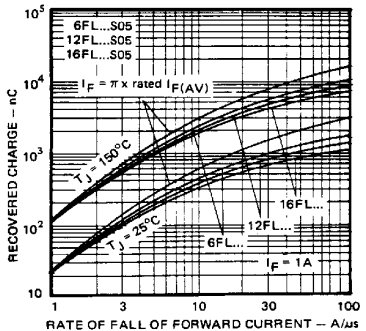


Fig. 18B — Maximum Recovered Charge Vs. Rate of Fall of Forward Current, All Series \_\_S05

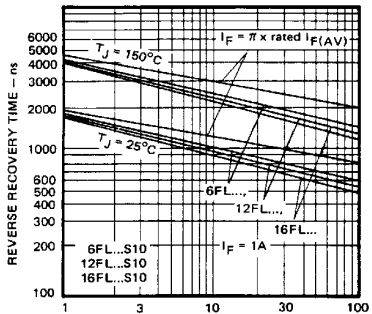


Fig. 19A — Maximum Reverse Recovery Time Vs. Rate of Fall of Forward Current, All Series \_\_S10

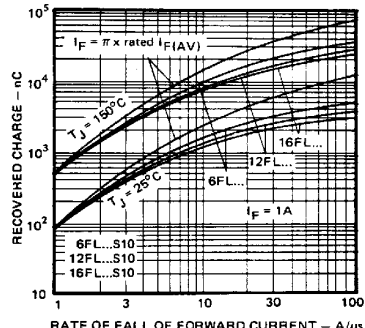


Fig. 19B — Maximum Recovered Charge Vs. Rate of Fall of Forward Current, All Series \_\_S10

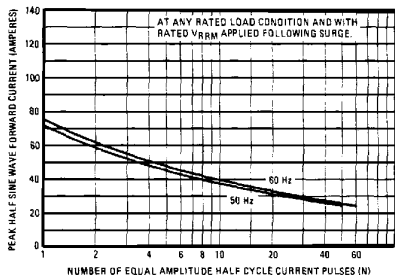


Fig. 20 – Maximum Non-Repetitive Surge Current Vs. Number of Current Pulses, 1N3879 Series

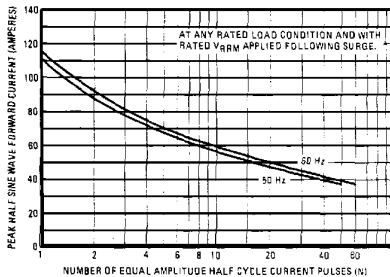


Fig. 21 – Maximum Non-Repetitive Surge Current Vs. Number of Current Pulses, 6FL Series

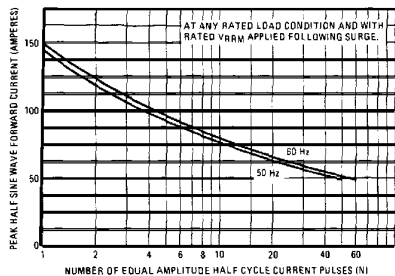


Fig. 22 – Maximum Non-Repetitive Surge Current Vs. Number of Current Pulses, 1N3889 and 12FL Series

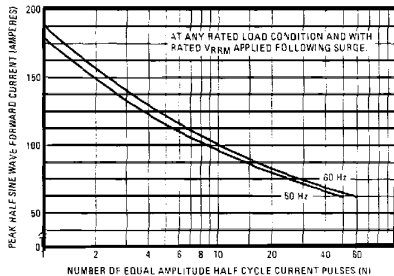


Fig. 23 – Maximum Non-Repetitive Surge Current Vs. Number of Current Pulses, 16FL Series

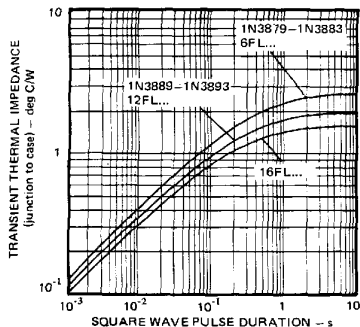


Fig. 24 – Maximum Transient Thermal Impedance, Junction-to-Case Vs. Pulse Duration, All Series.