

INTERNATIONAL RECTIFIER



40HFL, 70HFL, 85HFL SERIES

40A, 70A, 85A Fast Recovery Rectifiers

Major Ratings and Characteristics

| | 40HFL... | 70HFL... | 85HFL... | Units | |
|-----------------|-------------|----------|----------|---------------------------|------------------|
| $I_F(AV)$ | 40 | 70 | 85 | A | |
| @ Max T_C | 75 | 75 | 75 | °C | |
| I_{FSM} | 50Hz | 400 | 700 | 1100 | A |
| | 60Hz | 420 | 730 | 1151 | A |
| I^2t | 50Hz | 800 | 2450 | 6050 | A ² s |
| | 60Hz | 730 | 2240 | 5523 | A ² s |
| $I^2\sqrt{t}$ | 11 300 | 34 650 | 85 560 | A ² \sqrt{s} | |
| t_{rr} range | see table | | | | |
| V_{RRM} range | 100 to 1000 | | | V | |
| T_J range | -40 to 125 | | | °C | |

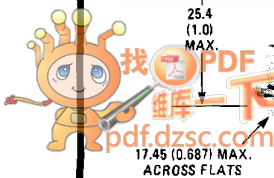
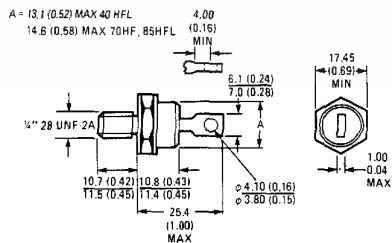
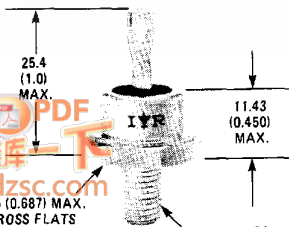
Description

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

Features

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

CASE STYLE AND DIMENSIONS



ELECTRICAL SPECIFICATIONS

Reverse voltage ratings

| Part number ① | V _{RRM} , Maximum peak repetitive reverse voltage T _J = -40 to 125°C | | V _{RSM} , Maximum peak non-repetitive reverse voltage T _J = 25 to 125°C | | I _{FM} Maximum peak reverse current at rated V _{RRM} , T _J = 25°C | | I _{FM} Maximum peak reverse current at rated V _{RRM} , T _J = 125°C | |
|--|---|---|--|--|---|--|--|--|
| | V | | V | | mA | | mA | |
| 40HFL10S02, 40HFL10S05, 40HFL10S10 40HFL20S02, 40HFL20S05, 40HFL20S10 40HFL40S02, 40HFL40S05, 40HFL40S10 40HFL60S02, 40HFL60S05, 40HFL60S10 40HFL80S02, 40HFL80S05, 40HFL80S10 40HFL100S05, 40HFL100S10 | 100 200 400 600 800 1000 | 150 300 500 700 900 1100 | 150 300 500 700 900 1100 | 0.1 0.1 0.1 0.1 0.1 0.7 | 10 19 10 10 10 10 | | | |
| 70HFL10S02, 70HFL10S05, 70HFL10S10 70HFL20S02, 70HFL20S05, 70HFL20S10 70HFL40S02, 70HFL40S05, 70HFL40S10 70HFL60S02, 70HFL60S05, 70HFL60S10 70HFL80S02, 70HFL80S05, 70HFL80S10 70HFL100S05, 70HFL100S10 | 100 200 400 600 800 1000 | 150 300 500 700 900 1100 | 150 300 500 700 900 1100 | 0.1 0.1 0.1 0.1 0.1 0.7 | 15 15 15 15 15 15 | | | |
| 85HFL10S02, 85HFL10S05, 85HFL10S10 85HFL20S02, 85HFL20S05, 85HFL20S10 85HFL40S02, 85HFL40S05, 85HFL40S10 85HFL60S02, 85HFL60S05, 85HFL60S10 85HFL80S02, 85HFL80S05, 85HFL80S10 85HFL100S05, 85HFL100S10 | 100 200 400 600 800 1000 | 150 300 500 700 900 1100 | 150 300 500 700 900 1100 | 0.1 0.1 0.1 0.1 0.1 0.7 | 20 20 20 20 20 20 | | | |

① Types listed are cathode case, for anode case add "R" to code, i.e. 40HFLR20S02, 85HFLR100S05 etc.

Reverse recovery characteristics

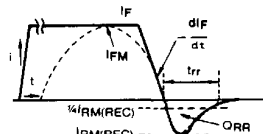
| | 40HFL... | | | 70HFL... | | | 85HFL... | | | Units | Conditions |
|--|----------|------|------|----------|------|------|----------|------|------|-------|---|
| | S02 | S05 | S10 | S02 | S05 | S10 | S02 | S05 | S10 | | |
| t _{rr} Maximum reverse recovery time | 70 | 180 | 350 | 60 | 150 | 290 | 50 | 120 | 270 | ns | T _J = 25°C, I _F = 1A to V _R = 30V -dI _F /dt = 100A/μs |
| | 200 | 500 | 1000 | 200 | 500 | 1000 | 200 | 500 | 1000 | ns | T _J = 25°C, -dI _F /dt = 25A/μs I _{FM} = π x rated I _F (AV) |
| Q _{RR} Maximum reverse recovered charge | 180 | 750 | 3100 | 90 | 500 | 1600 | 70 | 340 | 1350 | nC | T _J = 25°C, I _F = 1A to V _R = 30V -dI _F /dt = 100A/μs |
| | 240 | 1300 | 6000 | 240 | 1300 | 6000 | 240 | 1300 | 6000 | nC | T _J = 25°C, -dI _F /dt = 25A/μs I _{FM} = π x rated I _F (AV) |

Forward conduction

| | 40HFL | 70HFL | 85HFL | Units | Conditions |
|--|--------|--------|--------|-------------------|---|
| I _F (AV) Maximum average forward current | 40 | 70 | 85 | A | 180°C conduction, half sine wave, max. T _c = 75°C |
| I _F (RMS) Maximum RMS forward current | 63 | 110 | 134 | A | |
| I _{FRM} Maximum peak repetitive forward current | 220 | 380 | 470 | A | Sinusoidal half wave, 30° conduction |
| I _{FSM} Maximum peak, one cycle non-repetitive forward current | 400 | 700 | 1100 | A | t = 10ms Sinusoidal half-wave 100% V _{RRM} reapplied, initial T _J = T _J max |
| | 420 | 730 | 1151 | A | t = 8.3ms |
| | 475 | 830 | 1308 | A | t = 10ms Sinusoidal half-wave no voltage reapplied, initial T _J = T _J max |
| | 500 | 870 | 1369 | A | t = 8.3ms |
| I ² t Maximum I ² t for fusing | 800 | 2450 | 6050 | A ² s | t = 10ms 100% V _{RRM} reapplied initial T _J = T _J max |
| | 730 | 2240 | 5523 | A ² s | t = 8.3ms |
| | 1130 | 3460 | 8556 | A ² s | t = 10ms No voltage reapplied initial T _J = T _J max |
| | 1030 | 3160 | 7810 | A ² s | t = 8.3ms |
| I _V ² /t Maximum I _V ² /t for fusing ① | 11 300 | 34 650 | 85 560 | A ² /s | t = 0.1 to 10ms, no voltage reapplied |
| V _F (TO) Maximum value of threshold voltage | 1.081 | 1.085 | 1.128 | V | T _J = 125°C |
| r _F Maximum value of forward slope resistance | 6.33 | 3.40 | 2.11 | mΩ | |

THERMAL AND MECHANICAL SPECIFICATIONS

| | | 40HFL... | 70HFL... | 85HFL... | Units | Conditions |
|------------|---|-----------------|-----------|-------------|--------|--|
| T_J | Junction operating temperature range | -40 to 125 | | | °C | |
| T_{stg} | Storage temperature range | -40 to 150 | | | °C | |
| R_{thJC} | Maximum internal thermal resistance, junction to case | 0.60 | 0.36 | 0.30 | K/W | DC operation |
| R_{thCS} | Maximum thermal resistance, case to heatsink | 0.25 | | | K/W | Mounting surface, smooth, flat and greased |
| T | Mounting torque 10% | to nut | | 20 (27) | lbf·in | Lubricated threads (non-lubricated threads) |
| | | | | 0.23 (0.29) | kgf·m | |
| | to device | | 2.2 (2.7) | | N·m | |
| | | | 22 | | lbf·in | |
| | | | 0.25 | | kgf·m | |
| | | 2.5 | | N·m | | |
| wt | Approximate weight | 25 (0.88) | | | g (oz) | |
| | Outline | DO-203AB (DO-5) | | | | JEDEC |



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

Fig. 1 — Reverse Recovery Time Test Waveform

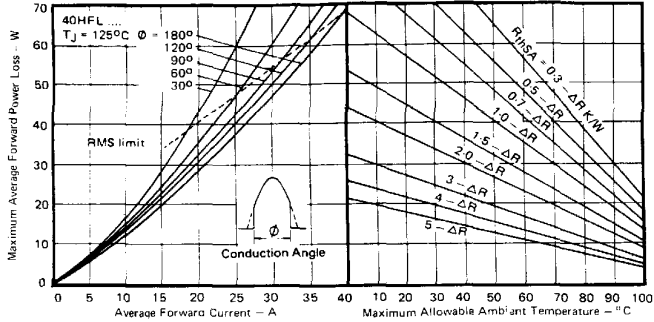


Fig. 2 – Current Rating Nomogram (Sinusoidal Waveforms), 40HFL Series

| Conduction angle - Φ | ΔR | K/W |
|---------------------------|------------|-----|
| 180° | 0.14 | |
| 120° | 0.15 | |
| 90° | 0.20 | |
| 60° | 0.31 | |
| 30° | 0.53 | |

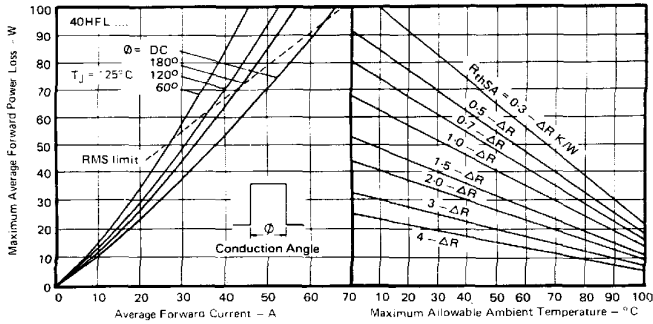
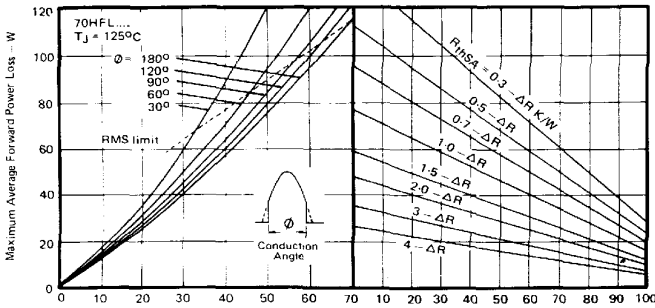


Fig. 3 – Current Rating Nomogram (Rectangular Waveforms), 40HFL Series

| Conduction angle - Φ | ΔR | K/W |
|---------------------------|------------|-----|
| DC | 0 | |
| 180° | 0.08 | |
| 120° | 0.14 | |
| 60° | 0.30 | |



| Conduction angle - Φ | ΔR | K/W |
|---------------------------|------------|-----|
| 180° | 0.08 | |
| 120° | 0.09 | |
| 90° | 0.12 | |
| 60° | 0.18 | |
| 30° | 0.32 | |

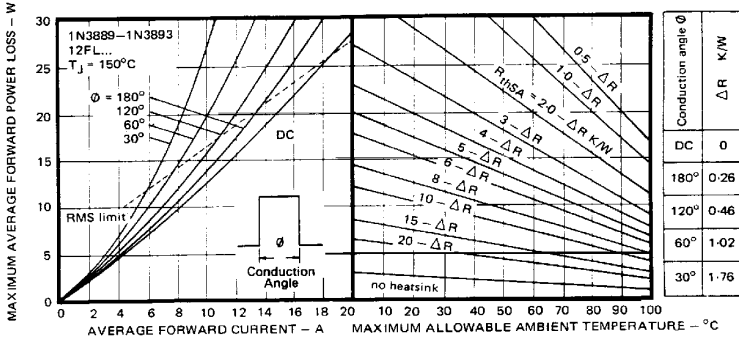


Fig. 8 - Current Rating Nomogram (Rectangular Waveforms), 1N3889 and 12FL Series

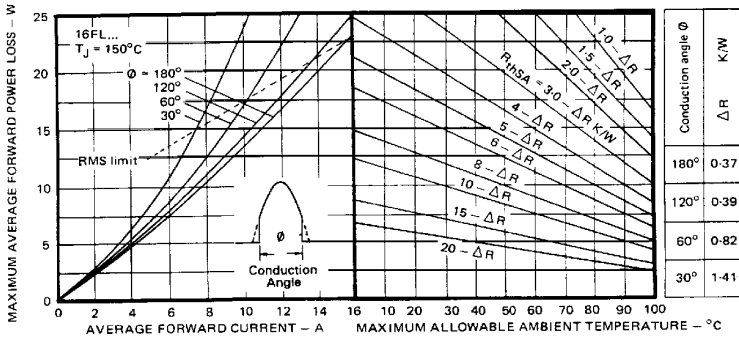
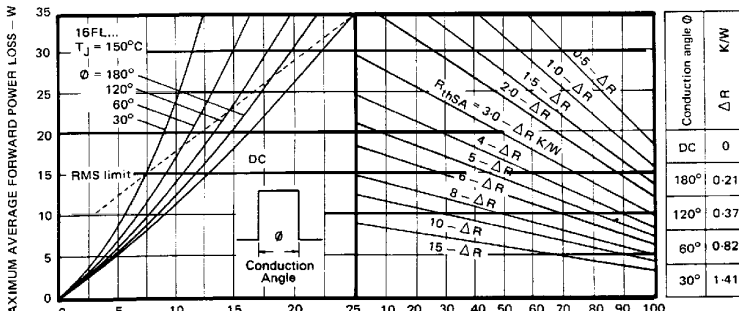


Fig. 9 - Current Rating Nomogram (Sinusoidal Waveforms), 16FL Series



40HFL, 70HFL, 85HFL Series

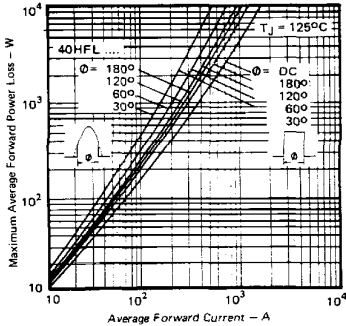


Fig. 8 — Maximum High Level Forward Power Loss Vs. Average Forward Current, 40HFL Series

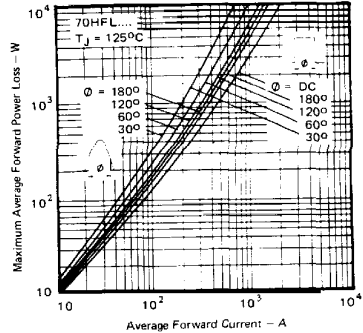


Fig. 9 — Maximum High Level Forward Power Loss Vs. Average Forward Current, 70HFL Series

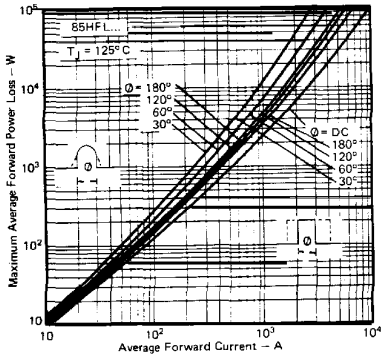


Fig. 10 — Maximum High Level Forward Power Loss Vs. Average Forward Current, 85HFL Series

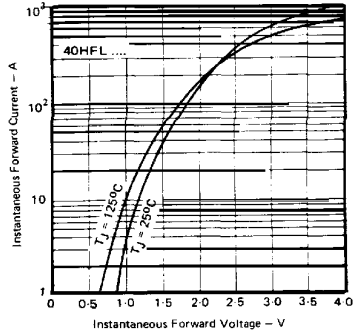
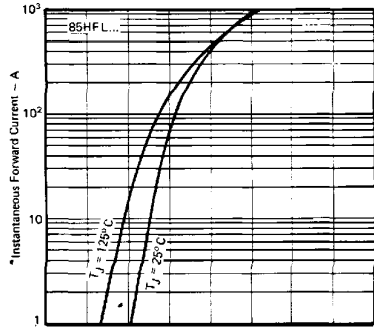
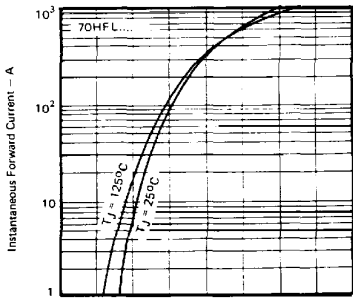


Fig. 11 — Maximum Forward Voltage Vs. Forward Current, 40HFL Series



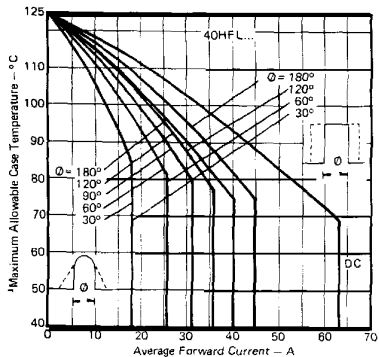


Fig. 14 — Average Forward Current Vs. Maximum Allowable Case Temperature, 40HFL Series

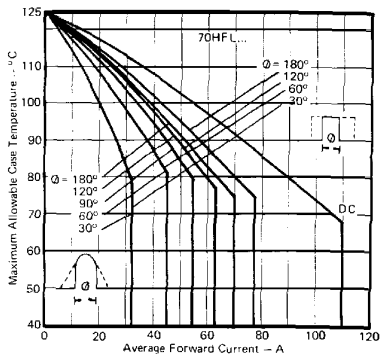


Fig. 15 — Average Forward Current Vs. Maximum Allowable Case Temperature, 70HFL Series

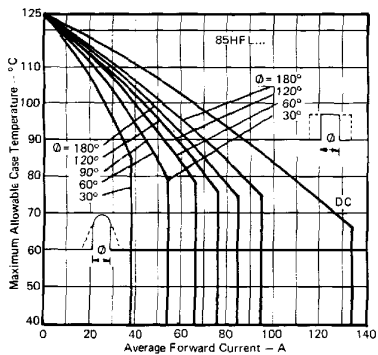


Fig. 16 — Average Forward Current Vs. Maximum Allowable Case Temperature, 85HFL Series

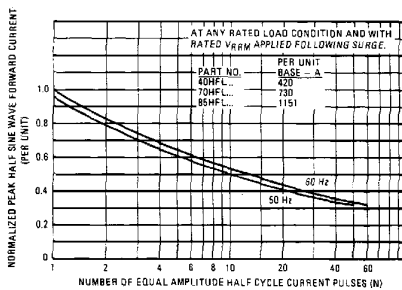
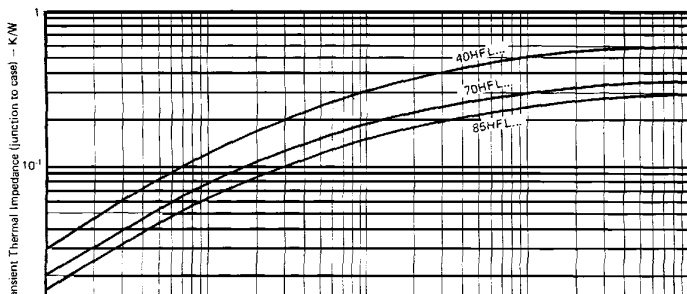


Fig. 17 — Maximum Non-Repetitive Surge Current Vs. Number of Current Pulses, All Series



40HFL, 70HFL, 85HFL Series

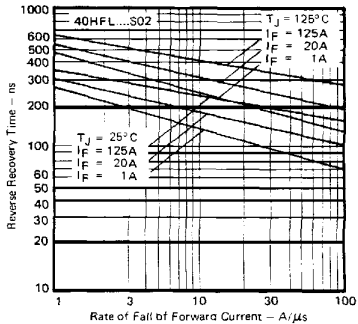


Fig. 19 – Maximum Reverse Recovery Time Vs. Rate of Fall of Forward Current, 40HFL...S02 Series

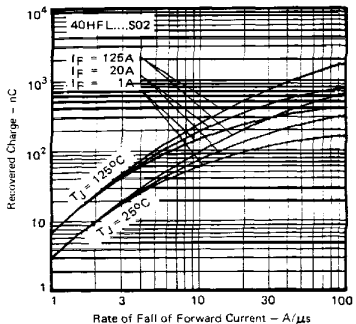


Fig. 20 – Maximum Recovered Charge Vs. Rate of Fall of Forward Current, 40HFL...S02 Series

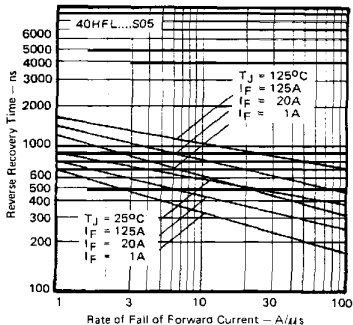


Fig. 21 – Maximum Reverse Recovery Time Vs. Rate of Fall of Forward Current, 40HFL...S05 Series

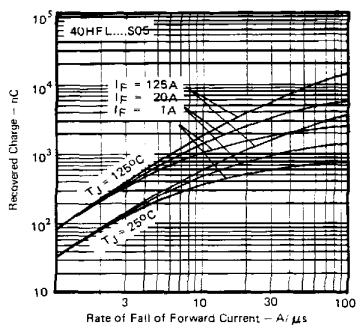
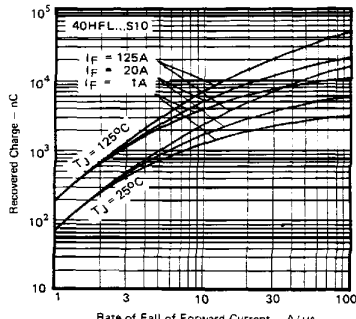
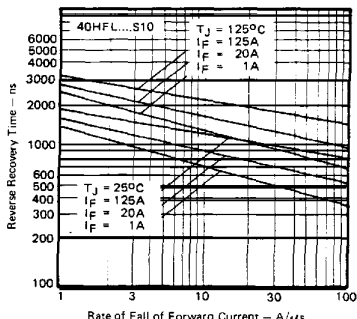


Fig. 22 – Maximum Recovered Charge Vs. Rate of Fall of Forward Current, 40HFL...S05 Series



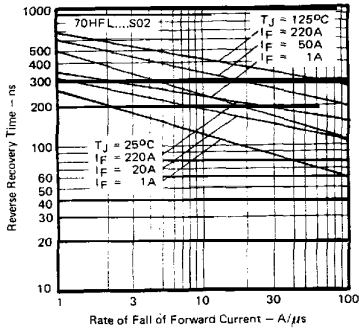


Fig. 25 — Maximum Reverse Recovery Time Vs. Rate of Fall of Forward Current, 70HFL...S02 Series

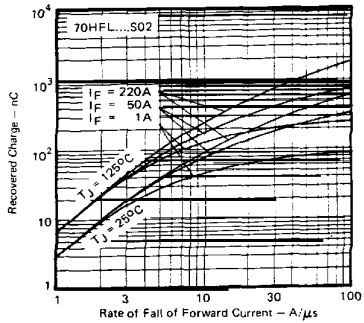


Fig. 26 — Maximum Recovered Charge Vs. Rate of Fall of Forward Current, 70HFL...S02 Series

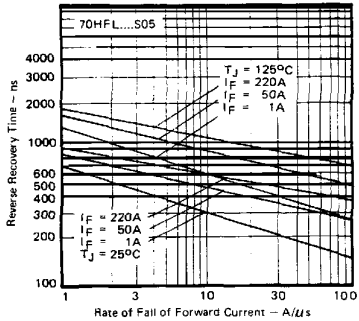


Fig. 27 — Maximum Reverse Recovery Time Vs. Rate of Fall of Forward Current, 70HFL...S05 Series

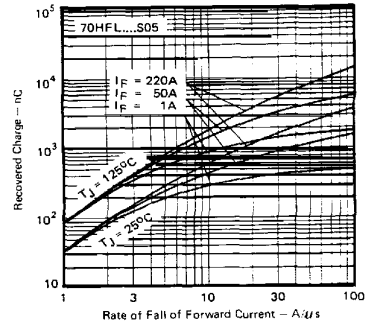
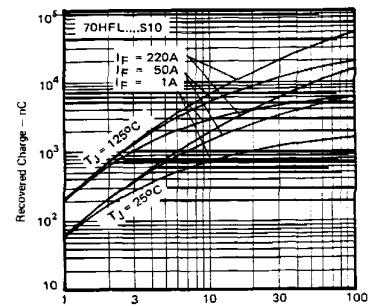
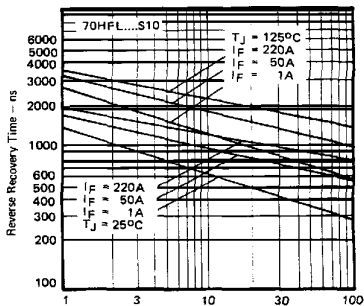


Fig. 28 — Maximum Recovered Charge Vs. Rate of Fall of Forward Current, 70HFL...S05 Series



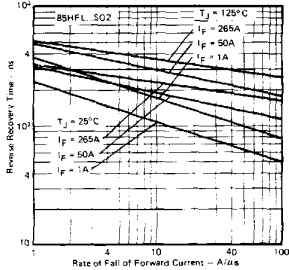


Fig. 31 – Maximum Reverse Recovery Time Vs. Rate of Fall of Forward Current, 85HFL_S02 Series

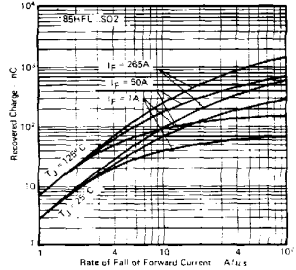


Fig. 32 – Maximum Recovered Charge Vs. Rate of Fall of Forward Current, 85HFL_S02 Series

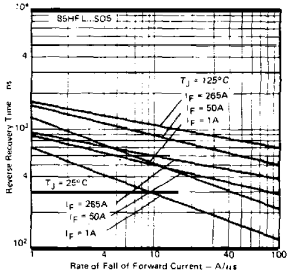


Fig. 33 – Maximum Reverse Recovery Time Vs. Rate of Fall of Forward Current, 85HFL_S05 Series

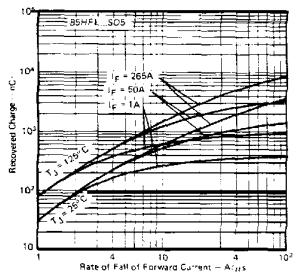


Fig. 34 – Maximum Recovered Charge Vs. Rate of Fall of Forward Current, 85HFL_S05 Series

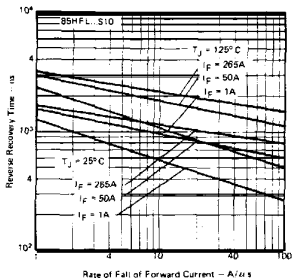


Fig. 35 – Maximum Reverse Recovery Time

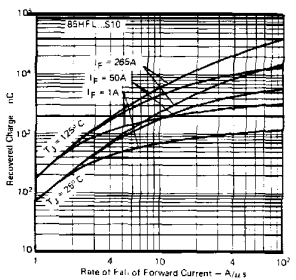


Fig. 36 – Maximum Recovered Charge