

Fast Recovery Diodes (Stud Version), 40A



FEATURES

- Short reverse recovery time
- Low stored charge
- Wide current range
- Excellent surge capabilities
- Stud cathode and stud anode versions
- Voltage up to 1200 V_{RRM}
- Compliant to RoHS



DO-203AB(DO-5)

TYPICAL APPLICATIONS

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

PRODUCT SUMMARY

| | |
|--------------------|-----|
| I _{F(AV)} | 40A |
|--------------------|-----|

MAJOR RATINGS AND CHARACTERISTICS

| SYMBOL | CHARACTERISTICS | 40FD(R) | UNIT |
|--------------------|------------------------|------------------------------------|-------------------|
| I _{F(AV)} | | 40 | A |
| | Maximum T _C | 85 | °C |
| I _{FSM} | 50 HZ | 475 | A |
| | 60 HZ | 500 | |
| I ² t | 50 HZ | 1128 | A ² s |
| | 60 HZ | 1038 | |
| I ² √t | | 11281 | I ² √s |
| V _{RRM} | Range | 200 to 1200 | V |
| t _{rr} | | See Recovery Characteristics table | ns |
| T _J | Range | -40 to 125 | °C |

ELECTRICAL SPECIFICATIONS

VOLTAGE RATINGS

| TYPE NUMBER | VOLTAGE CODE | V _{RRM} , MAXIMUM PEAK REPETITIVE REVERSE VOLTAGE T _J = -40°C TO 125°C V | V _{RSM} , MAXIMUM PEAK NON-REPETITIVE REVERSE VOLTAGE T _J = 25°C TO 125°C V | I _{FM} , MAXIMUM PEAK REVERSE CURRENT AT RATED V _{RRM} mA | |
|-------------|--------------|--|---|--|------------------------|
| | | | | T _J = 25°C | T _J = 125°C |
| 40FD(R) | 02 | 200 | 300 | 0.1 | 10 |
| | 04 | 400 | 500 | | |
| | 06 | 600 | 700 | | |
| | 08 | 800 | 900 | | |
| | 10 | 1000 | 1100 | | |
| | 12 | 1200 | 1300 | | |

| FORWARD CONDUCTION | | | | | |
|---|---------------------|---|---|---------|-------------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | | 40FD(R) | UNIT |
| Maximum average forward current at maximum case temperature | I _{F(AV)} | 180° conduction, half sine wave | | 40 | A |
| | | | | 85 | °C |
| Maximum RMS forward current | I _{F(RMS)} | | | 63 | A |
| Maximum peak repetitive forward current | I _{FRM} | Sinusoidal half wave, 30° conduction | | 220 | A |
| Maximum peak, one-cycle non-reptitive surge current | I _{FSM} | t = 10ms | Sinusoidal half wave, 100% V _{RRM} reapplied, initial T _J =T _J maximum | 400 | A |
| | | t = 8.3ms | | 420 | |
| | | t = 10ms | Sinusoidal half wave, no voltage reapplied, initial T _J =T _J maximum | 475 | |
| | | t = 8.3ms | | 500 | |
| Maximum I ² t for fusing | I ² t | t = 10ms | 100% V _{RRM} reapplied, initial T _J =T _J maximum | 800 | A ² s |
| | | t = 8.3ms | | 732 | |
| | | t = 10ms | no voltage reapplied, initial T _J =T _J maximum | 1128 | |
| | | t = 8.3ms | | 1038 | |
| Maximum I ² √t for fusing ⁽¹⁾ | I ² √t | t = 0.1 ms to 10 ms, no voltage reapplied | | 11281 | A ² √s |
| Maximum value of threshold voltage | V _{F(TO)} | T _J = 125°C | | 1.081 | V |
| Maximum value of forward slope resistance | r _F | | | 6.33 | mΩ |
| Maximum forward voltage drop | V _{FM} | T _J = 25°C; I _{FM} = 125A | | 1.95 | V |

Note : ⁽¹⁾ I^2t for time $t_x = I^2\sqrt{t} \cdot \sqrt{t_x}$

| SWITCHING | | | | | |
|----------------------------------|-----------------|--|----------|----------|------|
| PARAMETER | SYMBOL | TEST CONDITIONS | 40FD(R) | | UNIT |
| | | | 02 to 06 | 08 to 12 | |
| Typical reverse recovery time | t _{rr} | T _J = 25°C, I _F = 0.5A, I _R = 1.0A, I _{RR} = 250mA (RG#1 CKT) | 200 | 500 | ns |
| | | T _J = 25°C, I _F = 1A to V _R = 30V, -dI _F /dt = 100 A/μs | 70 | 180 | |
| | | T _J = 25°C, -dI _F /dt = 25 A/μs, I _{FM} = π x rated I _{F(AV)} | 200 | 500 | |
| Typical reverse recovered charge | Q _{rr} | T _J = 25°C, I _F = 1A to V _R = 30V, -dI _F /dt = 100 A/μs | 160 | 750 | nC |
| | | T _J = 25°C, -dI _F /dt = 25 A/μs, I _{FM} = π x rated I _{F(AV)} | 240 | 1300 | |

THERMAL AND MECHANICAL SPECIFICATIONS

| PARAMETER | SYMBOL | TEST CONDITIONS | 40FD(R) | UNITS |
|---|------------|--|-----------------|---------------------|
| Maximum junction operating temperature range | T_J | | -40 to 125 | °C |
| Maximum storage temperature range | T_{stg} | | - 40 to 150 | |
| Maximum thermal resistance, junction to case | R_{thJC} | DC operation | 0.60 | K/W |
| Maximum thermal resistance, case to heatsink | R_{thCS} | Mounting surface, smooth, flat and greased | 0.25 | |
| Maximum allowable mounting torque (+0%, -10%) | | Not lubricated threads, tightening on nut ⁽¹⁾ | 3.4(30) | N · m (lbf · in) |
| | | Lubricated thread, tightening on nut ⁽¹⁾ | 2.3(20) | |
| | | Not lubricated threads, tightening on hexagon ⁽²⁾ | 4.2(37) | |
| | | Lubricated thread, tightening on hexagon ⁽²⁾ | 3.2(28) | |
| Approximate weight | | | 25 | g |
| | | | 0.88 | oz. |
| Case style | | JEDEC | DO-203AB (DO-5) | |

Note : (1) Recommended for pass-through holes

(2) Recommended for holed threaded heatsinks

Δ R_{thJC} CONDUCTION

| CONDUCTION ANGEL | 40FD(R) | | TEST CONDUCTIONS | UNITS |
|------------------|-----------------------|------------------------|-----------------------------|-------|
| | SINUSOIDAL CONDUCTION | RECTANGULAR CONDUCTION | | |
| 180° | 0.14 | 0.03 | $T_J = 150^{\circ}\text{C}$ | K/W |
| 120° | 0.15 | 0.14 | | |
| 60° | 0.31 | 0.30 | | |
| 30° | 0.52 | 0.50 | | |

Note

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

ORDERING INFORMATION SCHEME

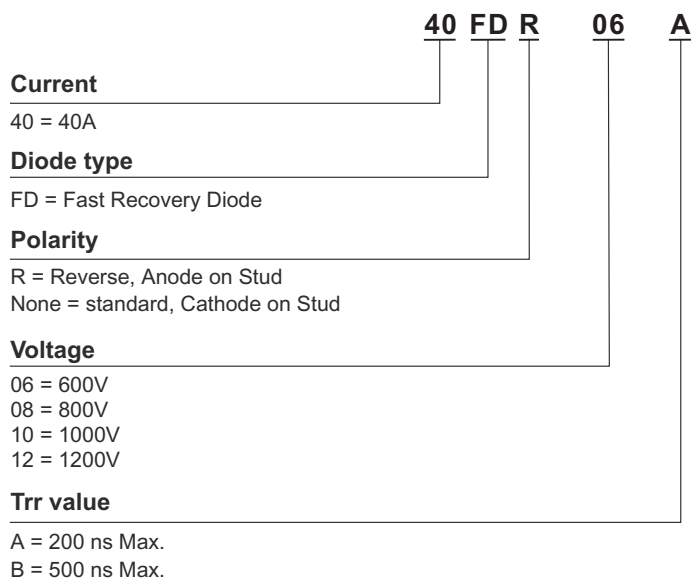
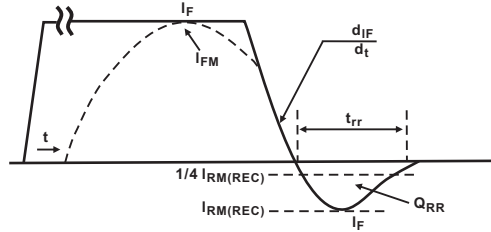


Fig.1 Reverse recovery time test waveform



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.2 Current rating nomogram (Sinusoidal Waveforms)

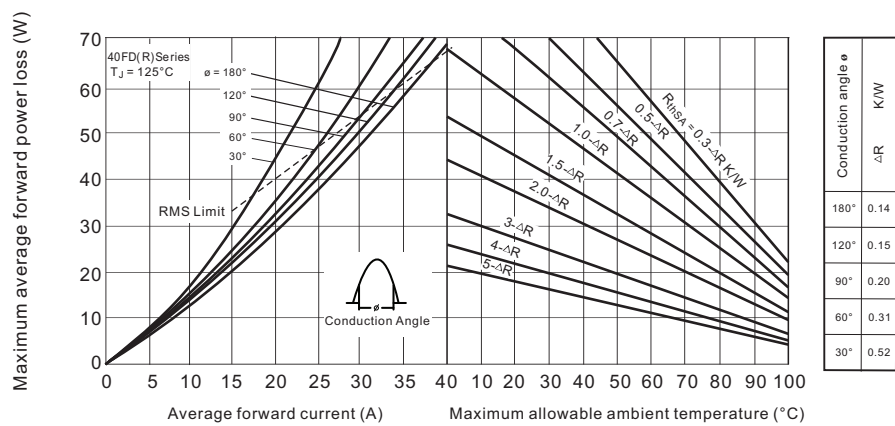
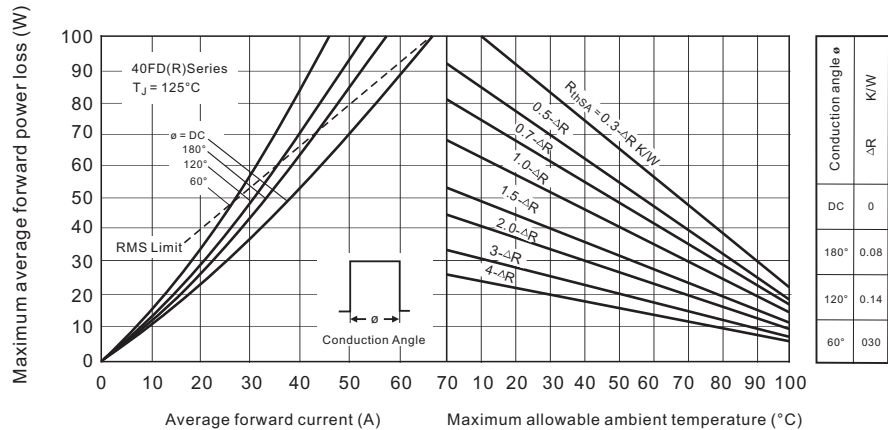


Fig. 3 Current rating nomogram (Rectangular waveforms)



Nell High Power Products

Fig.4 Maximum high level forward power loss vs. average forward current

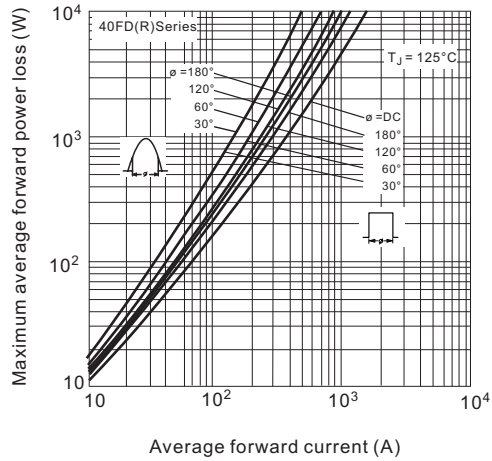


Fig.5 Maximum forward voltage vs. forward current.

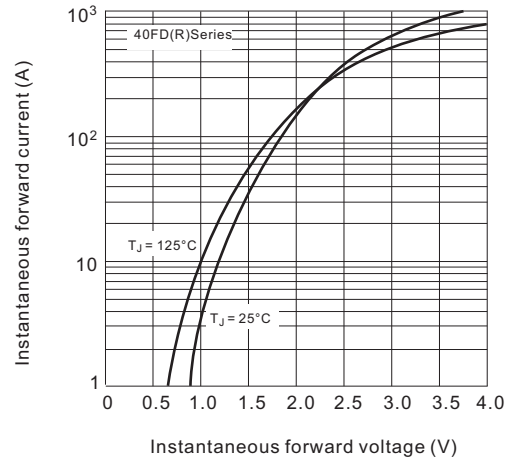


Fig.6 Average forward current vs. maximum allowable case temperature.

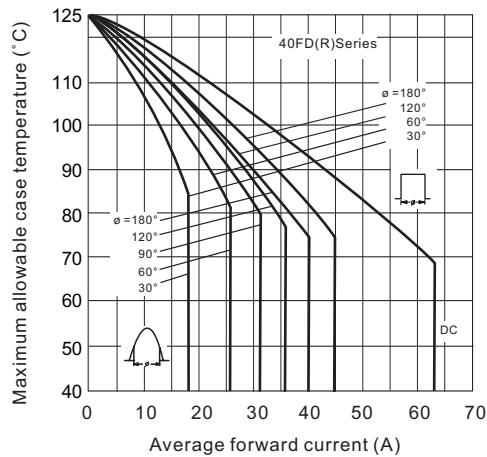


Fig.7 Typical reverse recovery time vs. rate of fall of forward current.

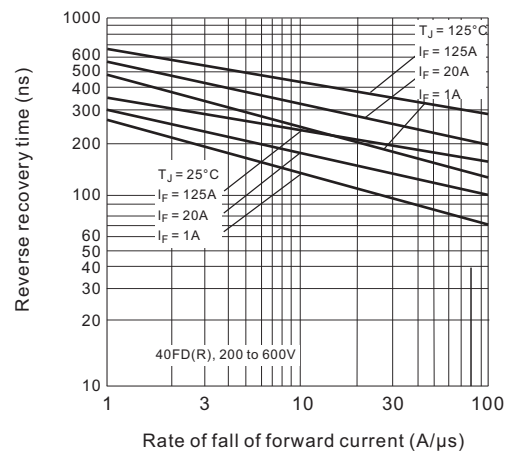


Fig.8 Typical recovered charge vs. rate of fall of forward current.

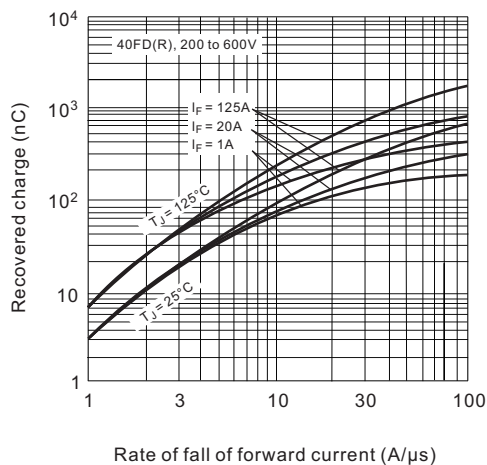


Fig.9 Typical reverse recovery time vs. rate of fall of forward current.

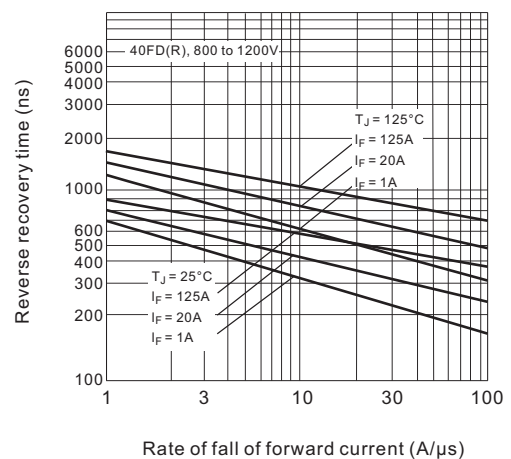
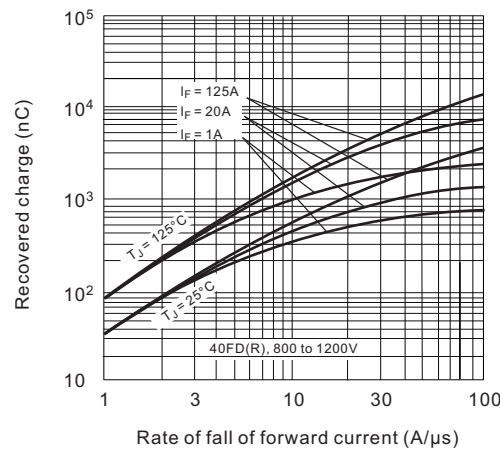
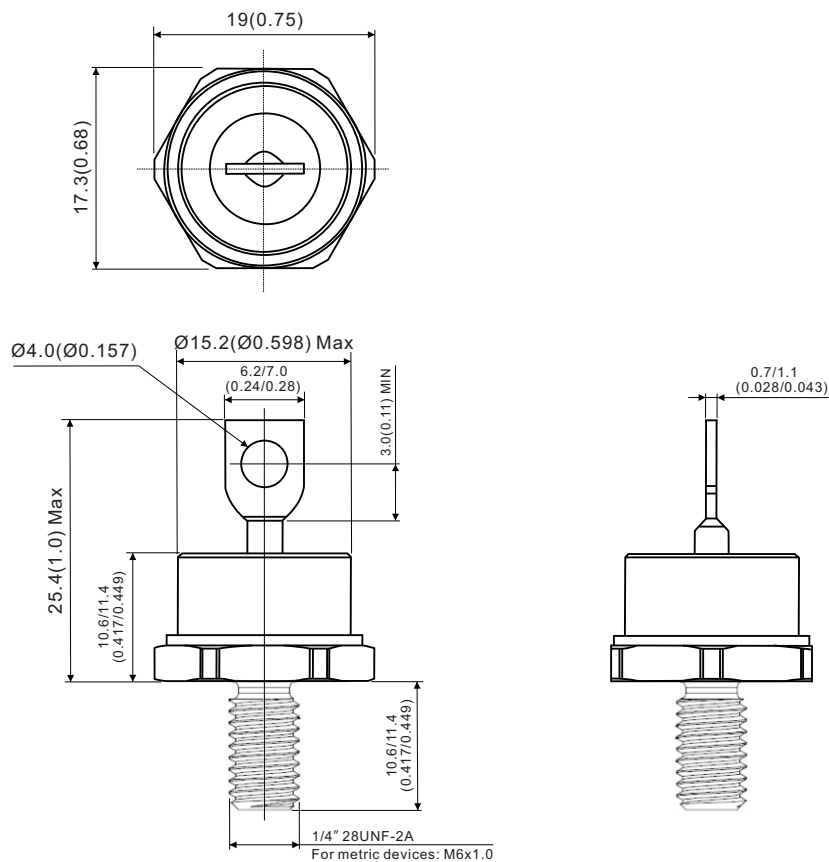


Fig .10 Typical recovered charge vs. rate of fall of forward current.



DO-203AB(DO-5)



All dimensions in millimeters (inches)

