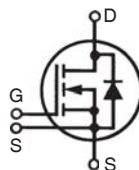


## Polar™ HiperFET™ Power MOSFET

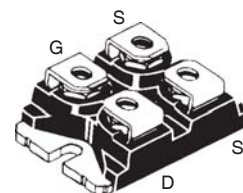
## IXFN60N80P

N-Channel Enhancement Mode  
Fast Intrinsic Rectifier



$$\begin{aligned} V_{DSS} &= 800V \\ I_{D25} &= 53A \\ R_{DS(on)} &\leq 140m\Omega \\ t_{rr} &\leq 250ns \end{aligned}$$

miniBLOC  
E153432



G = Gate      D = Drain  
S = Source

Either Source Terminal S can be used as the Source Terminal or the Kelvin Source (Gate Return) Terminal.

| Symbol     | Test Conditions                                                          | Maximum Ratings |                  |
|------------|--------------------------------------------------------------------------|-----------------|------------------|
| $V_{DSS}$  | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$                          | 800             | V                |
| $V_{DGR}$  | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ , $R_{GS} = 1M\Omega$    | 800             | V                |
| $V_{GSS}$  | Continuous                                                               | $\pm 30$        | V                |
| $V_{GSM}$  | Transient                                                                | $\pm 40$        | V                |
| $I_{D25}$  | $T_C = 25^\circ\text{C}$                                                 | 53              | A                |
| $I_{DM}$   | $T_C = 25^\circ\text{C}$ , Pulse Width Limited by $T_{JM}$               | 150             | A                |
| $I_A$      | $T_C = 25^\circ\text{C}$                                                 | 30              | A                |
| $E_{AS}$   | $T_C = 25^\circ\text{C}$                                                 | 5               | J                |
| $dv/dt$    | $I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ\text{C}$ | 20              | V/ns             |
| $P_D$      | $T_C = 25^\circ\text{C}$                                                 | 1040            | W                |
| $T_J$      |                                                                          | -55 ... +150    | $^\circ\text{C}$ |
| $T_{JM}$   |                                                                          | 150             | $^\circ\text{C}$ |
| $T_{stg}$  |                                                                          | -55 ... +150    | $^\circ\text{C}$ |
| $V_{ISOL}$ | 50/60 Hz, RMS, $t = 1$ minute                                            | 2500            | V~               |
|            | $I_{ISOL} \leq 1\text{mA}$ , $t = 1\text{s}$                             | 3000            | V~               |
| $M_d$      | Mounting Torque for Base Plate                                           | 1.5/13          | Nm/lb.in         |
|            | Terminal Connection Torque                                               | 1.3/11.5        | Nm/lb.in         |
| Weight     |                                                                          | 30              | g                |

### Features

- International Standard Package
- Low Intrinsic Gate Resistance
- miniBLOC with Aluminum Nitride Isolation
- Low Package Inductance
- Fast Intrinsic Rectifier
- Low  $R_{DS(on)}$  and  $Q_G$

### Advantages

- High Power Density
- Easy to Mount
- Space Savings

### Applications

- DC-DC Converters
- Battery Chargers
- Switch-Mode and Resonant-Mode Power Supplies
- AC Motor Control
- High Speed Power Switching Application

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified) | Characteristic Values |      |                          |
|--------------|---------------------------------------------------------------------------|-----------------------|------|--------------------------|
|              |                                                                           | Min.                  | Typ. | Max.                     |
| $BV_{DSS}$   | $V_{GS} = 0V$ , $I_D = 3\text{mA}$                                        | 800                   |      | V                        |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 8\text{mA}$                                    | 3.0                   |      | 5.0 V                    |
| $I_{GSS}$    | $V_{GS} = \pm 30V$ , $V_{DS} = 0V$                                        |                       |      | $\pm 200$ nA             |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$ , $V_{GS} = 0V$<br>$T_J = 125^\circ\text{C}$           |                       |      | 25 $\mu\text{A}$<br>3 mA |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 30A$ , Note 1                                     |                       |      | 140 m $\Omega$           |

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified)                                                                   | Characteristic Values |      |                         |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|-------------------------|
|              |                                                                                                                                             | Min.                  | Typ. | Max.                    |
| $g_{fs}$     | $V_{DS} = 20\text{V}$ , $I_D = 30\text{A}$ , Note 1                                                                                         | 35                    | 67   | S                       |
| $C_{iss}$    | $V_{GS} = 0\text{V}$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$                                                                            |                       | 18   | nF                      |
| $C_{oss}$    |                                                                                                                                             |                       | 1200 | pF                      |
| $C_{rss}$    |                                                                                                                                             |                       | 44   | pF                      |
| $t_{d(on)}$  | <b>Resistive Switching Times</b><br>$V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 30\text{A}$<br>$R_G = 1\Omega$ (External) |                       | 36   | ns                      |
| $t_r$        |                                                                                                                                             |                       | 29   | ns                      |
| $t_{d(off)}$ |                                                                                                                                             |                       | 110  | ns                      |
| $t_f$        |                                                                                                                                             |                       | 26   | ns                      |
| $Q_{g(on)}$  | $V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 30\text{A}$                                                                   |                       | 250  | nC                      |
| $Q_{gs}$     |                                                                                                                                             |                       | 90   | nC                      |
| $Q_{gd}$     |                                                                                                                                             |                       | 78   | nC                      |
| $R_{thJC}$   |                                                                                                                                             |                       |      | 0.12 $^\circ\text{C/W}$ |
| $R_{thCS}$   |                                                                                                                                             |                       | 0.05 | $^\circ\text{C/W}$      |

## Source-Drain Diode

| Symbol   | Test Conditions<br>( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified)                             | Characteristic Values |      |               |
|----------|-------------------------------------------------------------------------------------------------------|-----------------------|------|---------------|
|          |                                                                                                       | Min.                  | Typ. | Max.          |
| $I_S$    | $V_{GS} = 0\text{V}$                                                                                  |                       |      | 60 A          |
| $I_{SM}$ | Repetitive, Pulse Width Limited by $T_{JM}$                                                           |                       |      | 150 A         |
| $V_{SD}$ | $I_F = I_S$ , $V_{GS} = 0\text{V}$ , Note 1                                                           |                       |      | 1.5 V         |
| $t_{rr}$ | $I_F = 25\text{A}$ , $-di/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 100\text{V}$ , $V_{GS} = 0\text{V}$ |                       |      | 250 ns        |
| $Q_{RM}$ |                                                                                                       |                       | 0.6  | $\mu\text{C}$ |
| $I_{RM}$ |                                                                                                       |                       | 6.0  | A             |

Note 1. Pulse test,  $t \leq 300\mu\text{s}$ , duty cycle,  $d \leq 2\%$ .

IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:

|           |           |           |           |              |              |              |              |              |             |
|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|-------------|
| 4,835,592 | 4,931,844 | 5,049,961 | 5,237,481 | 6,162,665    | 6,404,065 B1 | 6,683,344    | 6,727,585    | 7,005,734 B2 | 7,157,338B2 |
| 4,860,072 | 5,017,508 | 5,063,307 | 5,381,025 | 6,259,123 B1 | 6,534,343    | 6,710,405 B2 | 6,759,692    | 7,063,975 B2 |             |
| 4,881,106 | 5,034,796 | 5,187,117 | 5,486,715 | 6,306,728 B1 | 6,583,505    | 6,710,463    | 6,771,478 B2 | 7,071,537    |             |

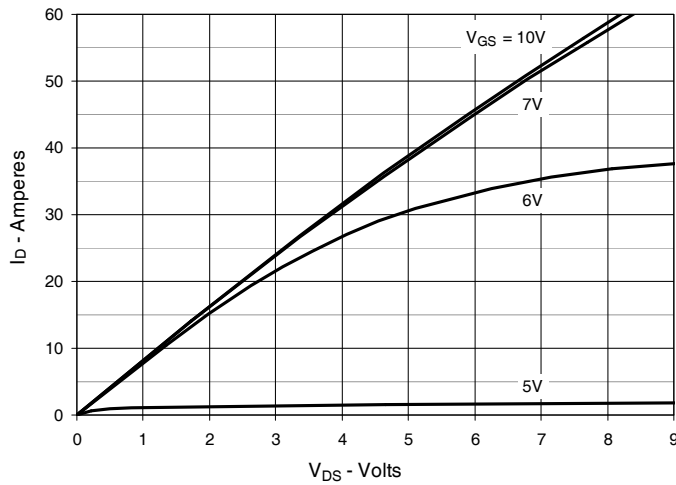
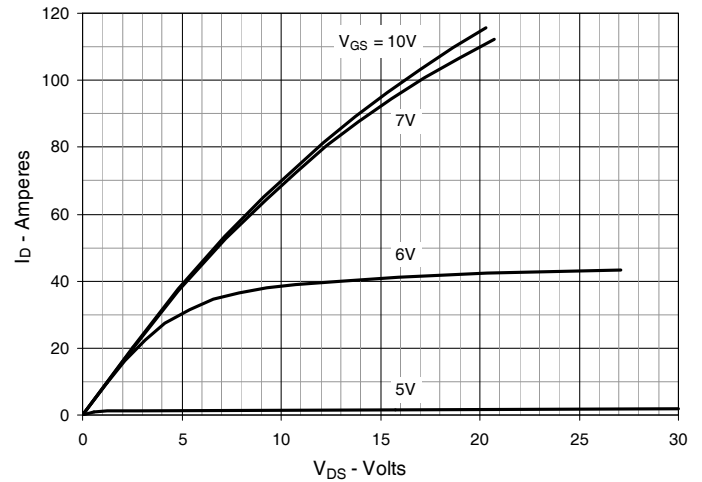
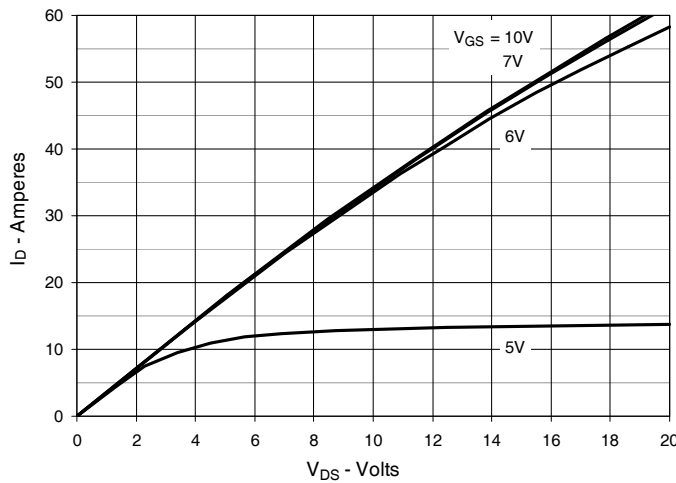
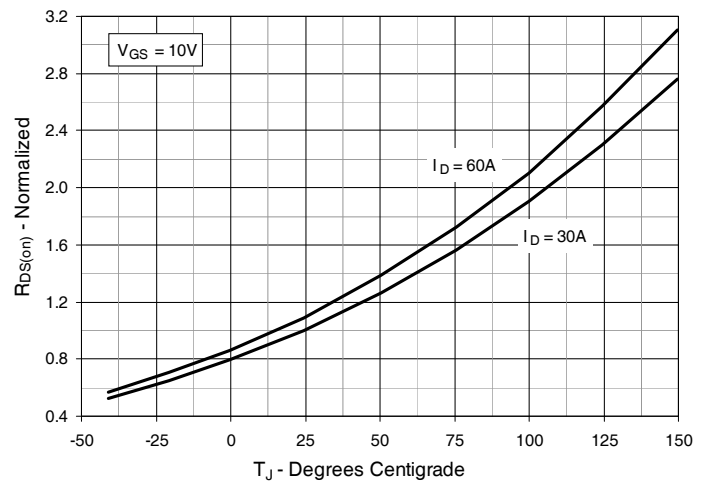
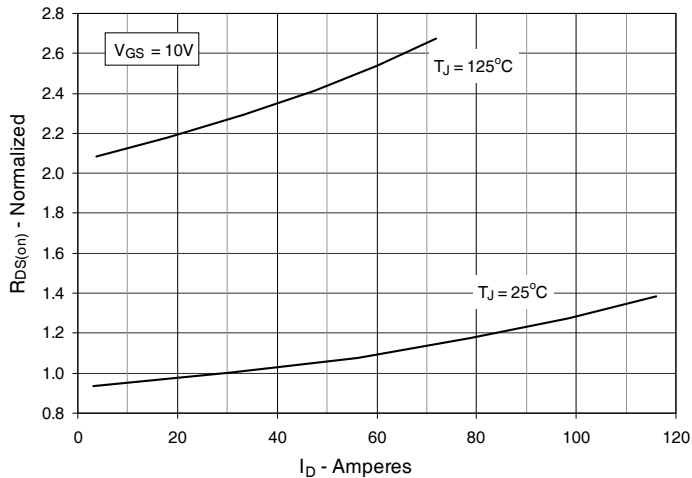
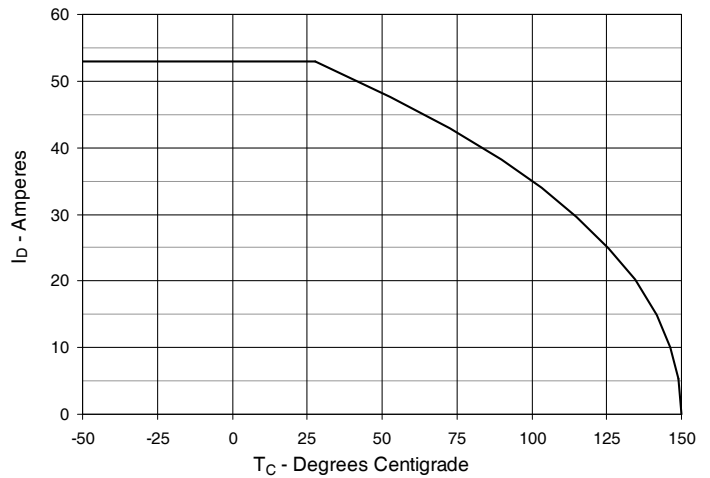
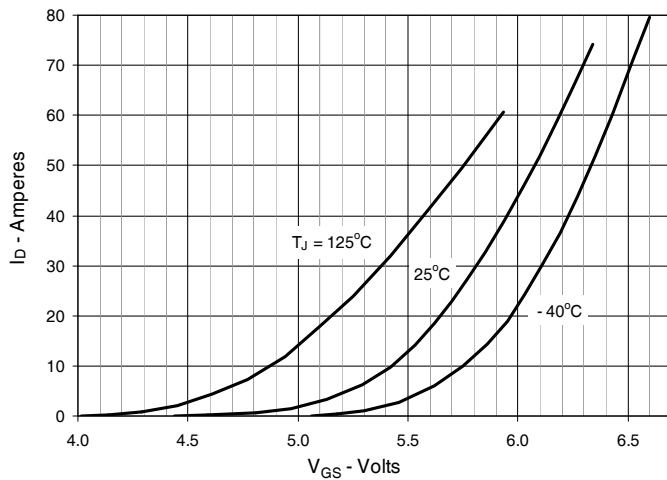
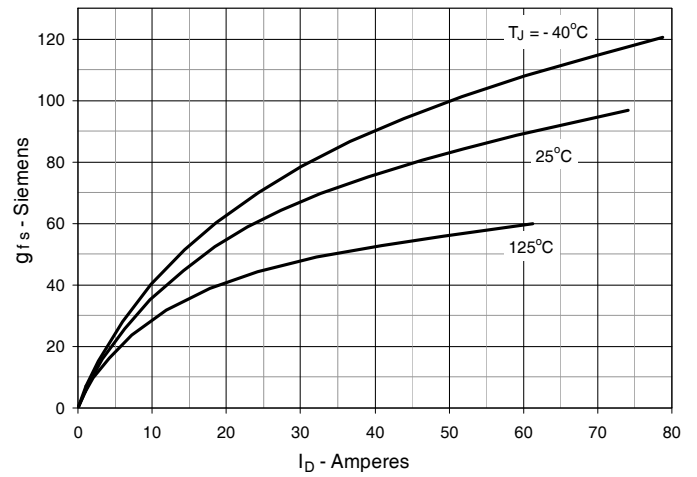
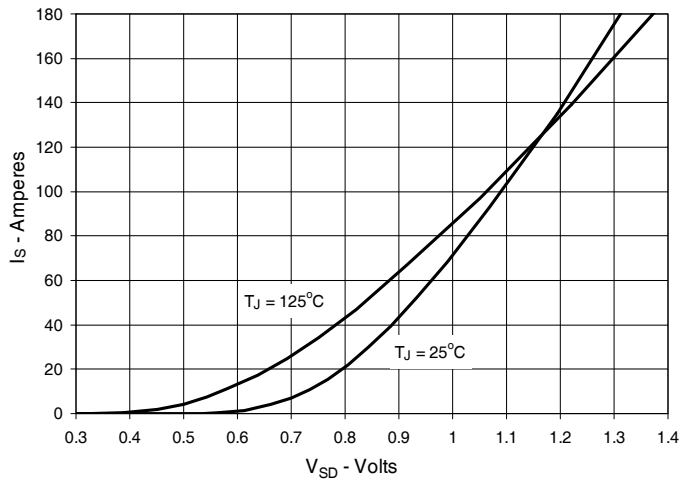
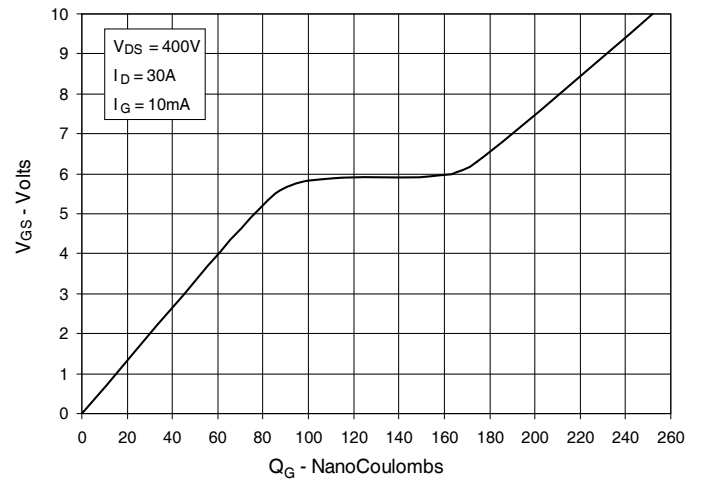
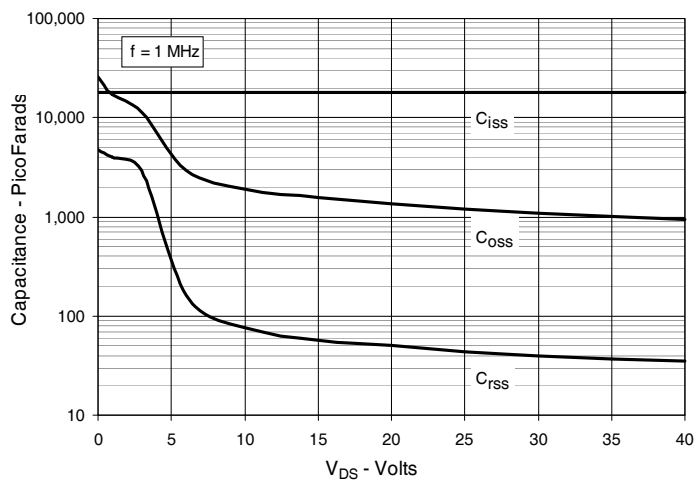
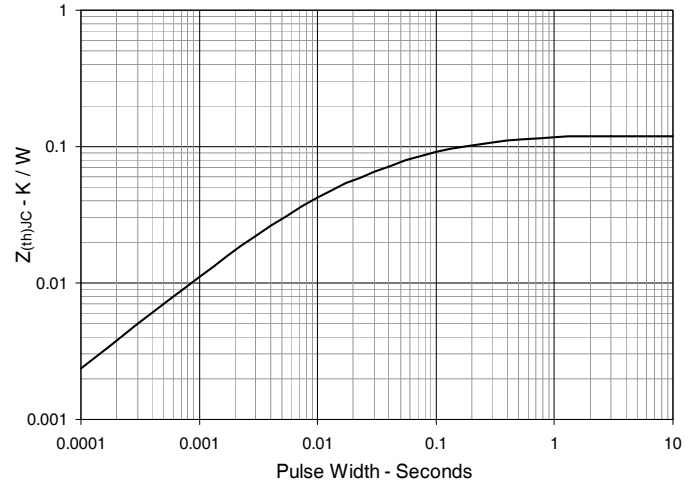
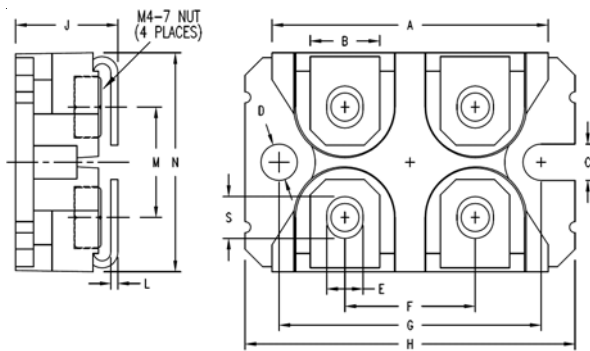
Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$ Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$ Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$ Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 30\text{A}$  Value vs. Junction TemperatureFig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 30\text{A}$  Value vs. Drain Current

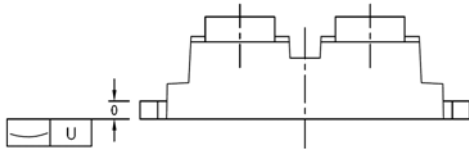
Fig. 6. Maximum Drain Current vs. Case Temperature



**Fig. 7. Input Admittance**

**Fig. 8. Transconductance**

**Fig. 9. Forward Voltage Drop of Intrinsic Diode**

**Fig. 10. Gate Charge**

**Fig. 11. Capacitance**

**Fig. 12. Maximum Transient Thermal Impedance**


**SOT-227B (IXFN) Outline**


(M4 screws (4x) supplied)



| SYM | INCHES |       | MILLIMETERS |       |
|-----|--------|-------|-------------|-------|
|     | MIN    | MAX   | MIN         | MAX   |
| A   | 1.224  | 1.260 | 31.10       | 32.00 |
| B   | .303   | .327  | 7.70        | 8.30  |
| C   | .161   | .173  | 4.10        | 4.40  |
| D   | .161   | .173  | 4.10        | 4.40  |
| E   | .161   | .173  | 4.10        | 4.40  |
| F   | .587   | .598  | 14.90       | 15.20 |
| G   | 1.181  | 1.201 | 30.00       | 30.50 |
| H   | 1.488  | 1.508 | 37.80       | 38.30 |
| J   | .461   | .484  | 11.70       | 12.30 |
| L   | .030   | .033  | 0.75        | 0.85  |
| M   | .492   | .512  | 12.50       | 13.00 |
| N   | .984   | 1.004 | 25.00       | 25.50 |
| O   | .075   | .087  | 1.90        | 2.20  |
| S   | .181   | .193  | 4.60        | 4.90  |
| U   | .000   | .005  | 0.00        | 0.13  |



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