# IXYS

## HiPerFET™ Power MOSFET

Single Die MOSFET

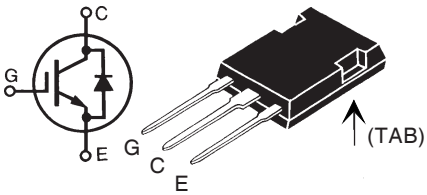
**IXFK 55N50**
**IXFX 55N50**
**IXFN 55N50**

$V_{DSS}$ = 500 V
$I_{D25}$ = 55 A
$R_{DS(on)}$ = 90mΩ
$t_{rr}$ ≤ 250 ns

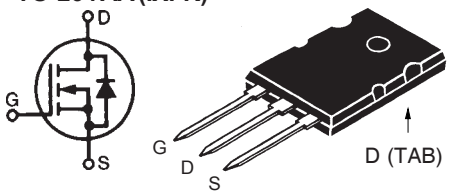
| Symbol | Test Conditions | Maximum Ratings | |
|---|---|---|---|
| $V_{DSS}$ | $T_J$ = 25°C to 150°C | 500 | V |
| $V_{DGR}$ | $T_J$ = 25°C to 150°C | 500 | V |
| $V_{GSS}$ | Continuous | ±20 | V |
| $V_{GSM}$ | Transient | ±30 | V |
| $I_{D25}$ | $T_C$ = 25°C | 55 | A |
| $I_{DM}$ | $T_C$ = 25°C, pulse width limited by $T_{JM}$ | 220 | A |
| $I_{AR}$ | $T_C$ = 25°C | 55 | A |
| $E_{AR}$ | $T_C$ = 25°C | 60 | mJ |
| dv/dt | $I_S \le I_{DM}$, di/dt ≤ 100 A/μs, $V_{DD} \le V_{DSS}$ $T_J \le 150°C$, $R_G$ = 4 Ω | 10 | V/ns |
| $P_D$ | $T_C$ = 25°C | 625 | W |
| $T_J$ | | -55 ... +150 | °C |
| $T_{JM}$ | | 150 | °C |
| $T_{stg}$ | | -55 ... +150 | °C |
| $T_L$ | 1.6 mm (0.062 in.) from case for 10 s (IXFK, IXFX) | 300 | °C |
| $M_d$ | Mounting torque (IXFK, IXFX) | 1.13/10 | Nm/lb.in. |
| | Terminal leads (IXFN) | 1.13/10 | Nm/lb.in. |
| $V_{ISOL}$ | 50/60 Hz, RMS (IXFN) t = 1minute | 2500 | V~ |
| | $I_{ISOL} \le$ 1 mA t = 1 s | 3000 | V~ |
| Weight | PLUS247 | 5 | g |
| | TO-264 | 10 | g |
| | SOT-227B | 30 | g |

| Symbol | Test Conditions ($T_J$ = 25°C, unless otherwise specified) | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $V_{DSS}$ | $V_{GS}$ = 0 V, $I_D$ = 1 mA | 500 | | | V |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D$ = 8 mA | 2.5 | | 4.5 | V |
| $I_{GSS}$ | $V_{GS}$ = ±20 $V_{DC}$, $V_{DS}$ = 0 | | | ±200 | nA |
| $I_{DSS}$ | $V_{DS} = V_{DSS}$ | | | 25 | μA |
| | $V_{GS}$ = 0 V $T_J$ = 125°C | | | 2 | mA |
| $R_{DS(on)}$ | $V_{GS}$ = 10 V, $I_D = 0.5\ I_{D25}$ Pulse test, t ≤ 300 μs, duty cycle d ≤ 2 % | | | 90 | mΩ |

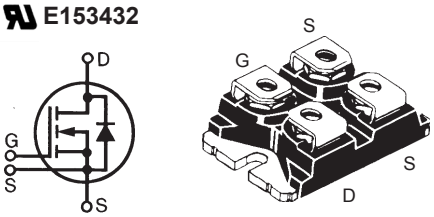
**PLUS247(IXFX)**




**TO-264 AA (IXFK)**




**miniBLOC, SOT-227 B (IXFN)**
E153432




G = Gate D = Drain
S = Source TAB = Drain
Either Source terminal at miniBLOC can be used as Main or Kelvin Source

**Features**
- International standard packages
- Encapsulating epoxy meets UL 94 V-0, flammability classification
- miniBLOC with Aluminium nitride isolation
- Low $R_{DS\ (on)}$ HDMOS™ process
- Rugged polysilicon gate cell structure
- Unclamped Inductive Switching (UIS) rated
- Low package inductance
- Fast intrinsic Rectifier

**Advantages**
- PLUS247 package for clip or spring bar mounting
- Easy to mount
- Space savings
- High power density

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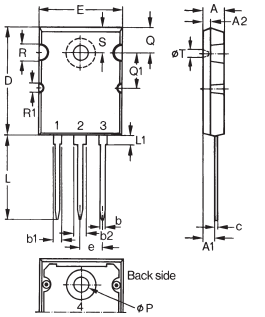
| Symbol | Test Conditions ($T_J$ = 25°C, unless otherwise specified) | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $g_{fs}$ | $V_{DS}$ = 10 V; $I_D$ = 0.5 • $I_{D25}$ Note 1 | | 45 | | S |
| $C_{iss}$ | | | 9400 | | pF |
| $C_{oss}$ | $V_{GS}$ = 0 V, $V_{DS}$ = 25 V, f = 1 MHz | | 1280 | | pF |
| $C_{rss}$ | | | 460 | | pF |
| $t_{d(on)}$ | | | 45 | | ns |
| $t_r$ | $V_{GS}$ = 10 V, $V_{DS}$ = 0.5 • $V_{DSS}$, $I_D$ = 0.5 • $I_{D25}$ | | 60 | | ns |
| $t_{d(off)}$ | $R_G$ = 1 Ω (External), | | 120 | | ns |
| $t_f$ | | | 45 | | ns |
| $Q_{g(on)}$ | | | 330 | | nC |
| $Q_{gs}$ | $V_{GS}$ = 10 V, $V_{DS}$ = 0.5 • $V_{DSS}$, $I_D$ = 0.5 • $I_{D25}$ | | 55 | | nC |
| $Q_{gd}$ | | | 155 | | nC |
| $R_{thJC}$ | | | | 0.20 | K/W |
| $R_{thCK}$ | IXFK, IXFX | | 0.15 | | K/W |
| $R_{thCK}$ | | | 0.05 | | K/W |

**Source-Drain Diode**

| Symbol | Test Conditions ($T_J$ = 25°C, unless otherwise specified) | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $I_S$ | $V_{GS}$ = 0 | | | 55 | A |
| $I_{SM}$ | Repetitive; pulse width limited by $T_{JM}$ | | | 220 | A |
| $V_{SD}$ | $I_F$ = 100 A, $V_{GS}$ = 0 V Note 1 | | | 1.5 | V |
| $t_{rr}$ | | | | 250 | ns |
| $Q_{RM}$ | $I_F$ = 25 A, -di/dt = 100 A/µs, $V_R$ = 100 V | | 1.0 | | µC |
| $I_{RM}$ | | | 10 | | A |

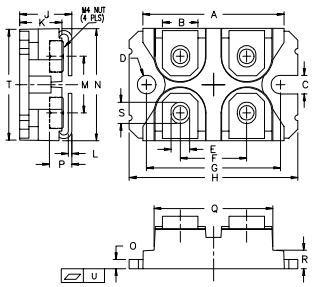
Notes: 1. Pulse test, t ≤ 300 µs, duty cycle d ≤ 2 %

**TO-264 AA Outline**




| Dim. | Millimeter Min. | Max. | Inches Min. | Max. |
|---|---|---|---|---|
| A | 4.82 | 5.13 | .190 | .202 |
| A1 | 2.54 | 2.89 | .100 | .114 |
| A2 | 2.00 | 2.10 | .079 | .083 |
| b | 1.12 | 1.42 | .044 | .056 |
| b1 | 2.39 | 2.69 | .094 | .106 |
| b2 | 2.90 | 3.09 | .114 | .122 |
| c | 0.53 | 0.83 | .021 | .033 |
| D | 25.91 | 26.16 | 1.020 | 1.030 |
| E | 19.81 | 19.96 | .780 | .786 |
| e | 5.46 BSC | | .215 BSC | |
| J | 0.00 | 0.25 | .000 | .010 |
| K | 0.00 | 0.25 | .000 | .010 |
| L | 20.32 | 20.83 | .800 | .820 |
| L1 | 2.29 | 2.59 | .090 | .102 |
| P | 3.17 | 3.66 | .125 | .144 |
| Q | 6.07 | 6.27 | .239 | .247 |
| Q1 | 8.38 | 8.69 | .330 | .342 |
| R | 3.81 | 4.32 | .150 | .170 |
| R1 | 1.78 | 2.29 | .070 | .090 |
| S | 6.04 | 6.30 | .238 | .248 |
| T | 1.57 | 1.83 | .062 | .072 |

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

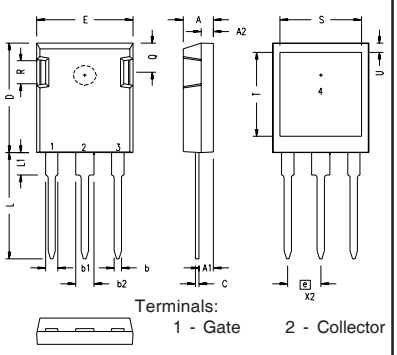



M4 screws (4x) supplied

| Dim. | Millimeter Min. | Max. | Inches Min. | Max. |
|---|---|---|---|---|
| A | 31.50 | 31.88 | 1.240 | 1.255 |
| B | 7.80 | 8.20 | 0.307 | 0.323 |
| C | 4.09 | 4.29 | 0.161 | 0.169 |
| D | 4.09 | 4.29 | 0.161 | 0.169 |
| E | 4.09 | 4.29 | 0.161 | 0.169 |
| F | 14.91 | 15.11 | 0.587 | 0.595 |
| G | 30.12 | 30.30 | 1.186 | 1.193 |
| H | 38.00 | 38.23 | 1.496 | 1.505 |
| J | 11.68 | 12.22 | 0.460 | 0.481 |
| K | 8.92 | 9.60 | 0.351 | 0.378 |
| L | 0.76 | 0.84 | 0.030 | 0.033 |
| M | 12.60 | 12.85 | 0.496 | 0.506 |
| N | 25.15 | 25.42 | 0.990 | 1.001 |
| O | 1.98 | 2.13 | 0.078 | 0.084 |
| P | 4.95 | 5.97 | 0.195 | 0.235 |
| Q | 26.54 | 26.90 | 1.045 | 1.059 |
| R | 3.94 | 4.42 | 0.155 | 0.174 |
| S | 4.72 | 4.85 | 0.186 | 0.191 |
| T | 24.59 | 25.07 | 0.968 | 0.987 |
| U | -0.05 | 0.1 | -0.002 | 0.004 |

**PLUS247 Outline**

| SYM | INCHES MIN | MAX | MILLIMETERS MIN | MAX |
|---|---|---|---|---|
| A | .190 | .205 | 4.83 | 5.21 |
| A1 | .090 | .100 | 2.29 | 2.54 |
| A2 | .075 | .085 | 1.91 | 2.16 |
| b | .045 | .055 | 1.14 | 1.40 |
| b1 | .075 | .084 | 1.91 | 2.13 |
| b2 | .115 | .123 | 2.92 | 3.12 |
| C | .024 | .031 | 0.61 | 0.80 |
| D | .819 | .840 | 20.80 | 21.34 |
| E | .620 | .635 | 15.75 | 16.13 |
| e | .215 BSC | | 5.45 BSC | |
| L | .780 | .800 | 19.81 | 20.32 |
| L1 | .150 | .170 | 3.81 | 4.32 |
| Q | .220 | .244 | 5.59 | 6.20 |
| R | .170 | .190 | 4.32 | 4.83 |
| S | .520 | .540 | 13.21 | 13.72 |
| T | .620 | .640 | 15.75 | 16.26 |
| U | .065 | .080 | 1.65 | 2.03 |




Terminals: 1 - Gate 2 - Collector

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 4,850,072 4,881,106 4,931,844 5,017,508 5,034,796 5,049,961 5,063,307 5,187,117 5,237,481 5,381,025 5,486,715 6,162,665 6,259,123B1 6,306,728 B1 6,404,065B1 6,534,343 6,583,505 6,683,344 6,710,405B2 6,710,463 6,727,585 6,759,692

Figure 1. Output Characteristics at 25°C

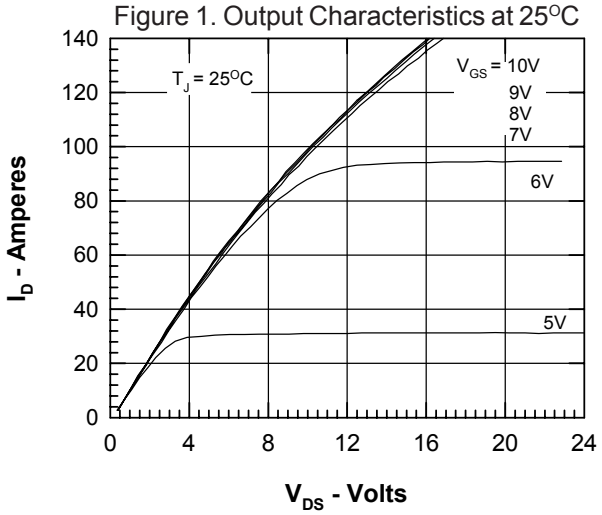



Figure 2. Output Characteristics at 125°C

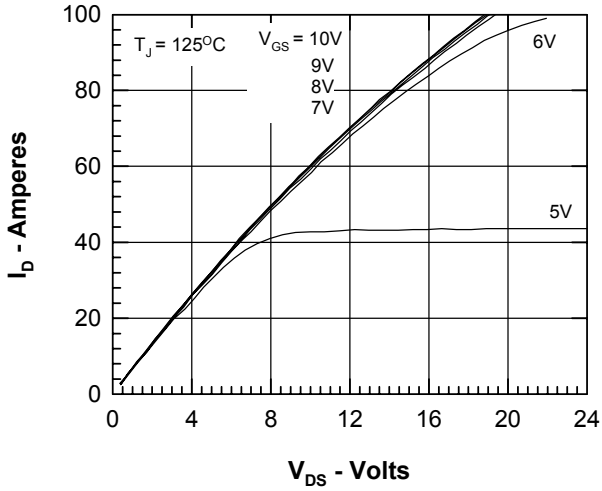



Figure 3. $R_{DS(on)}$ normalized to 0.5 $I_{D25}$ value vs. $I_D$

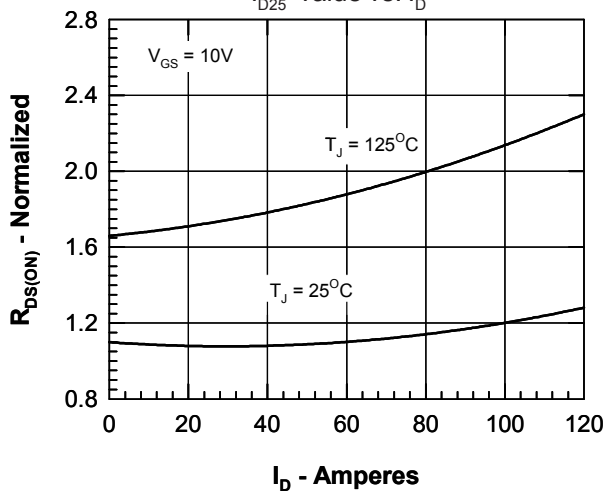



Figure 4. $R_{DS(on)}$ normalized to 0.5 $I_{D25}$ value vs. $T_J$

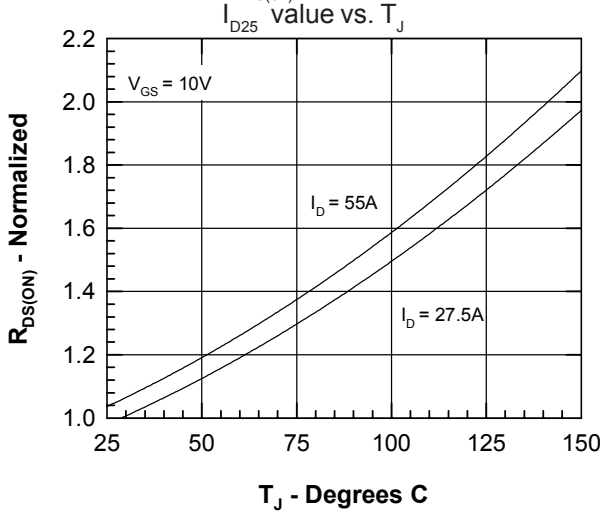



Figure 5. Drain Current vs. Case Temperature

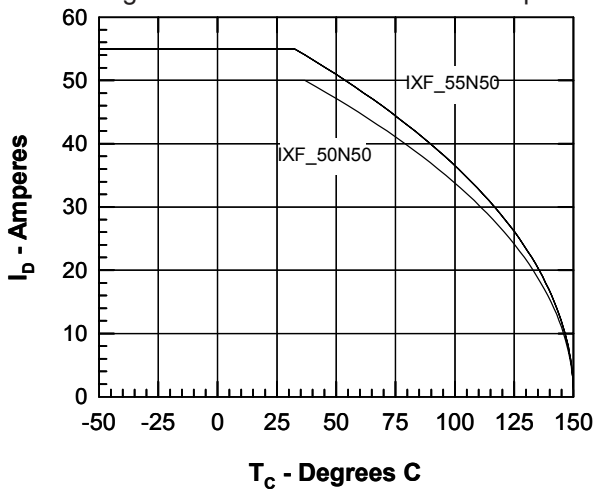
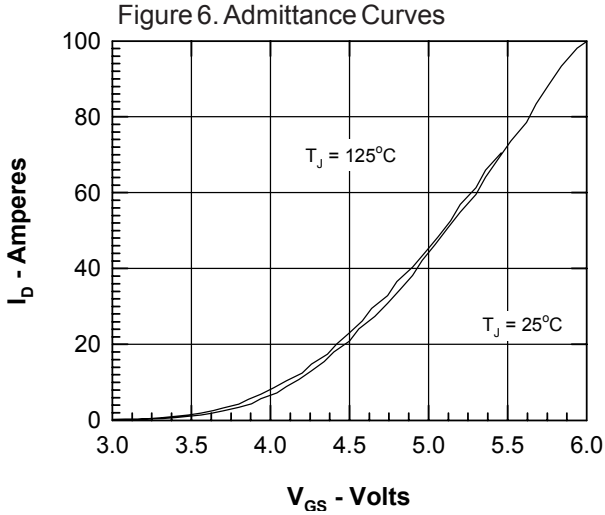



Figure 6. Admittance Curves




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Figure 7. Gate Charge

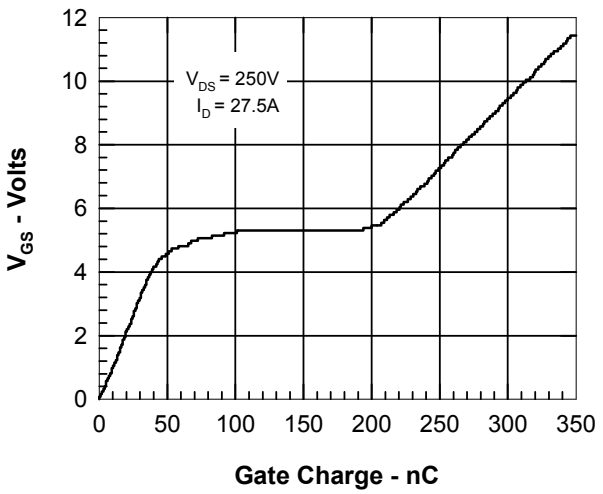



Figure 8. Capacitance Curves

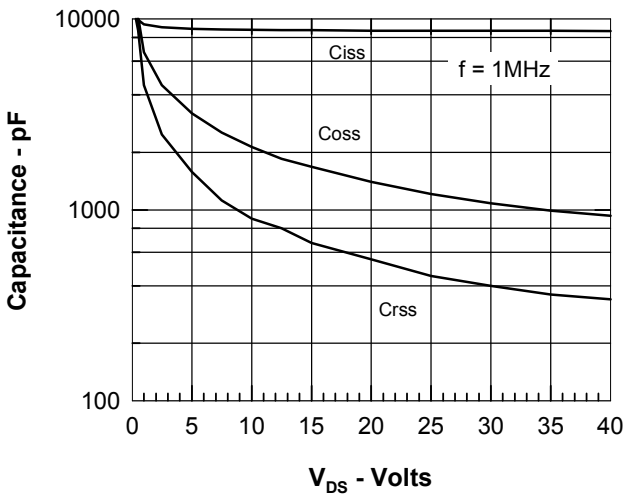



Figure 9. Forward Voltage Drop of the Intrinsic Diode

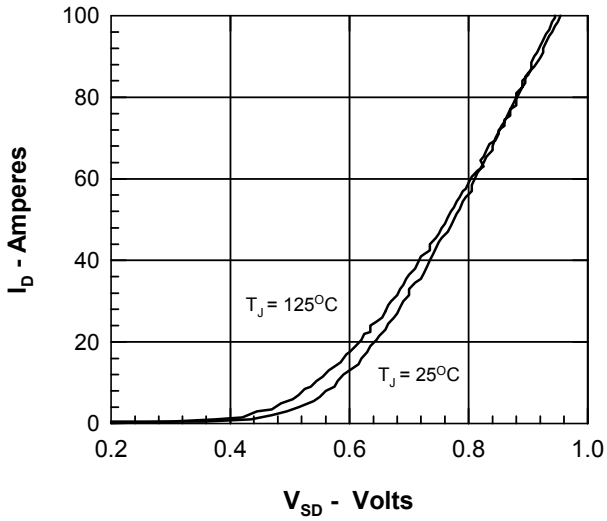
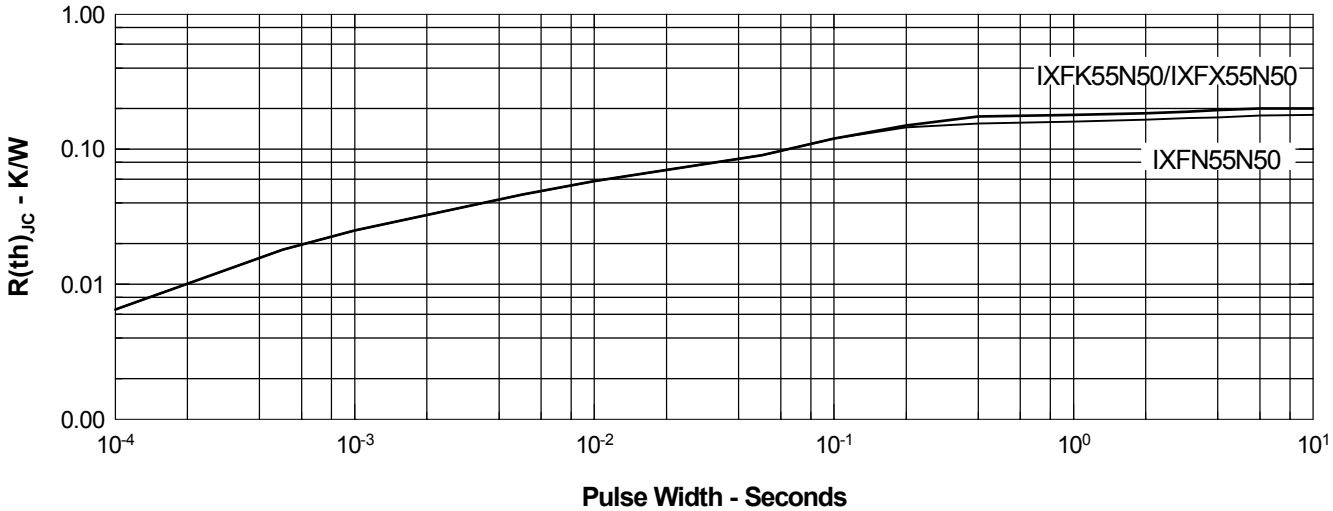



Figure 10. Transient Thermal Resistance






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