

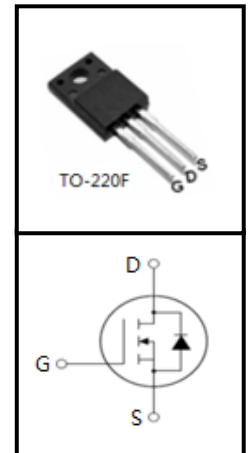
500V N-Channel MOSFET

FEATURES

- Fast switching
- 100% avalanche tested
- Improved dv/dt capability

APPLICATIONS

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)



Device Marking and Package Information

| Device | Package | Marking |
|---------|---------|---------|
| HF18N50 | TO-220F | HF18N50 |

Absolute Maximum Ratings $T_C = 25^\circ\text{C}$, unless otherwise noted

| Parameter | Symbol | Value | Unit |
|--|----------------|----------|------------------|
| Drain-Source Voltage ($V_{GS} = 0V$) | V_{DSS} | 500 | V |
| Continuous Drain Current | I_D | 18 | A |
| Pulsed Drain Current (note1) | I_{DM} | 72 | A |
| Gate-Source Voltage | V_{GSS} | ± 30 | V |
| Single Pulse Avalanche Energy (note2) | E_{AS} | 980 | mJ |
| Avalanche Current (note1) | I_{AS} | 14 | A |
| Repetitive Avalanche Energy (note1) | E_{AR} | 3.92 | mJ |
| Power Dissipation ($T_C = 25^\circ\text{C}$) | P_D | 98 | W |
| Operating Junction and Storage Temperature Range | T_J, T_{stg} | -55~+150 | $^\circ\text{C}$ |

Thermal Resistance

| Parameter | Symbol | Value | Unit |
|---|------------|-------|--------------------|
| Thermal Resistance, Junction-to-Case | R_{thJC} | 1.27 | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction-to-Ambient | R_{thJA} | 62.5 | |

| Specifications $T_J = 25^\circ\text{C}$, unless otherwise noted | | | | | | |
|---|---------------|---|-------|------|-----------|---------------|
| Parameter | Symbol | Test Conditions | Value | | | Unit |
| | | | Min. | Typ. | Max. | |
| Static | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS} = 0V, I_D = 250\mu\text{A}$ | 500 | -- | -- | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = 500V, V_{GS} = 0V, T_J = 25^\circ\text{C}$ | -- | -- | 1 | μA |
| Gate-Source Leakage | I_{GSS} | $V_{GS} = \pm 30V$ | -- | -- | ± 100 | nA |
| Gate-Source Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250\mu\text{A}$ | 3.0 | -- | 4.0 | V |
| Drain-Source On-Resistance (Note3) | $R_{DS(on)}$ | $V_{GS} = 10V, I_D = 9A$ | -- | 0.26 | 0.32 | Ω |
| Dynamic | | | | | | |
| Input Capacitance | C_{iss} | $V_{GS} = 0V,$ $V_{DS} = 25V,$ $f = 1.0\text{MHz}$ | -- | 2367 | -- | pF |
| Output Capacitance | C_{oss} | | -- | 228 | -- | |
| Reverse Transfer Capacitance | C_{rss} | | -- | 15 | -- | |
| Total Gate Charge | Q_g | $V_{DD} = 400V, I_D = 18A,$ $V_{GS} = 10V$ | -- | 53.4 | -- | nC |
| Gate-Source Charge | Q_{gs} | | -- | 10 | -- | |
| Gate-Drain Charge | Q_{gd} | | -- | 20 | -- | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD} = 250V, I_D = 18A,$ $R_G = 25\Omega$ | -- | 51.3 | -- | ns |
| Turn-on Rise Time | t_r | | -- | 36.5 | -- | |
| Turn-off Delay Time | $t_{d(off)}$ | | -- | 232 | -- | |
| Turn-off Fall Time | t_f | | -- | 61 | -- | |
| Drain-Source Body Diode Characteristics | | | | | | |
| Continuous Body Diode Current | I_S | $T_C = 25^\circ\text{C}$ | -- | -- | 18 | A |
| Pulsed Diode Forward Current | I_{SM} | | -- | -- | 72 | |
| Body Diode Voltage | V_{SD} | $T_J = 25^\circ\text{C}, I_{SD} = 9A, V_{GS} = 0V$ | -- | -- | 1.4 | V |
| Reverse Recovery Time | t_{rr} | $V_{GS} = 0V, I_S = 18A,$ $di_F/dt = 100A/\mu\text{s}$ | -- | 497 | -- | ns |
| Reverse Recovery Charge | Q_{rr} | | -- | 4 | -- | μC |

Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $L=10\text{mH}, V_{DD} = 50V, R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$
3. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty Cycle $\leq 1\%$

Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 1. Output Characteristics ($T_J = 25^\circ\text{C}$)

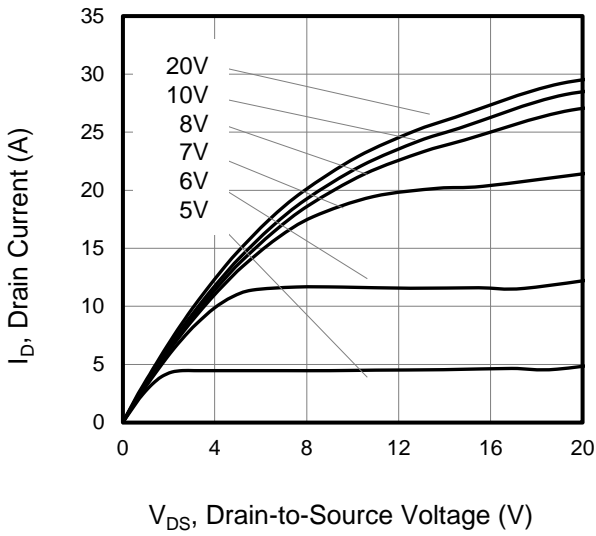


Figure 2. Body Diode Forward Voltage

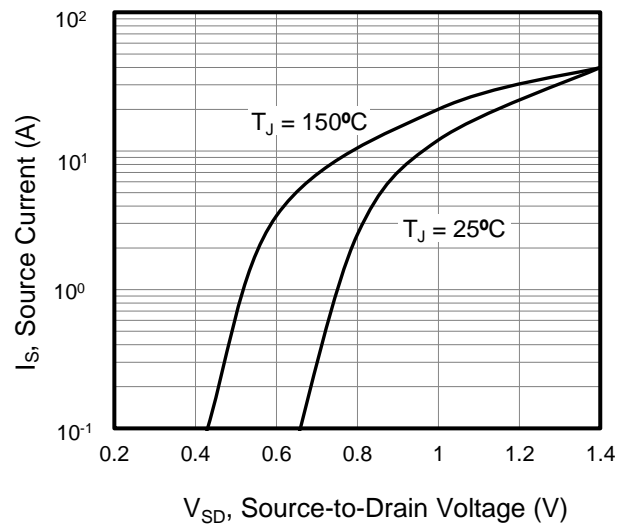


Figure 3. Drain Current vs. Temperature

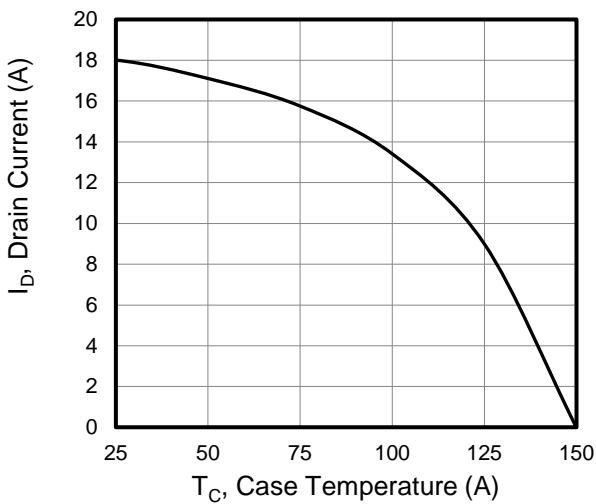


Figure 4. BV_{DSS} Variation vs. Temperature

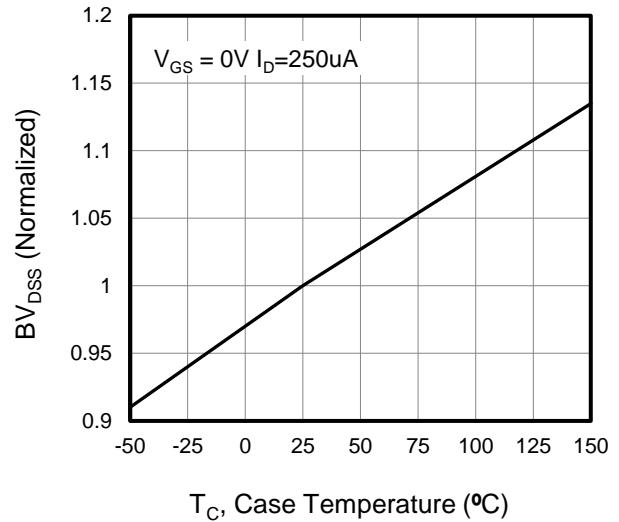


Figure 5. Transfer Characteristics

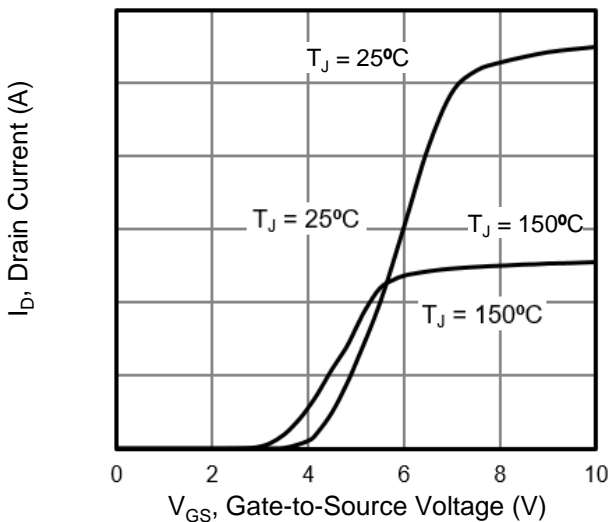
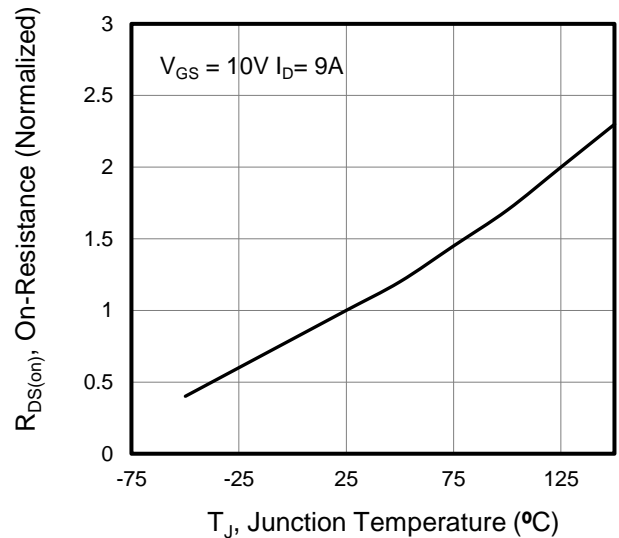


Figure 6. On-Resistance vs. Temperature



Typical Characteristics $T_j = 25^\circ\text{C}$, unless otherwise noted

Figure 7. Capacitance

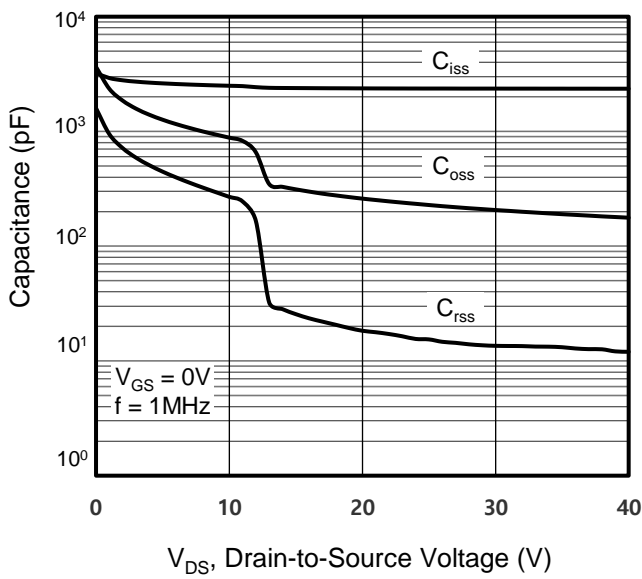


Figure 8. Gate Charge

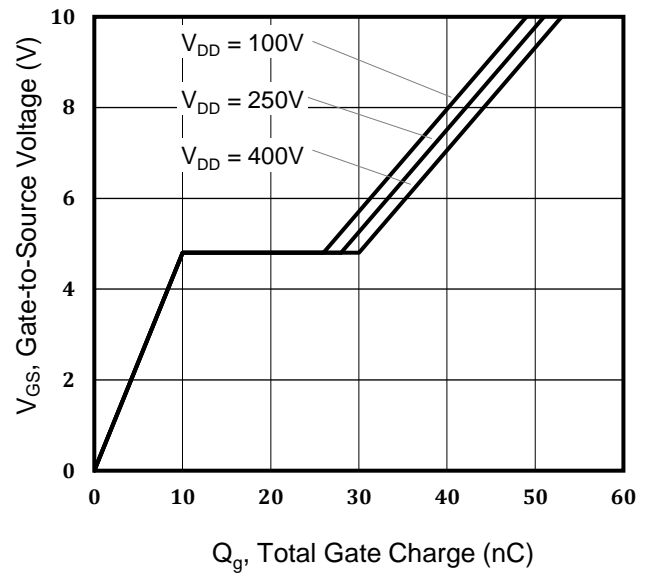


Figure 9. Transient Thermal Impedance

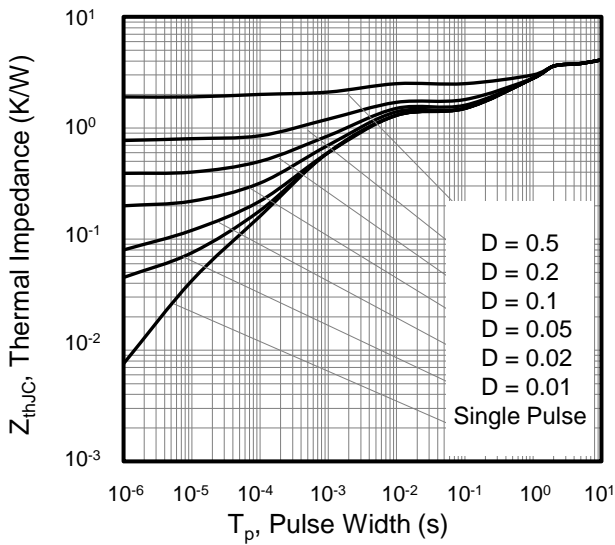


Figure A: Gate Charge Test Circuit and Waveform

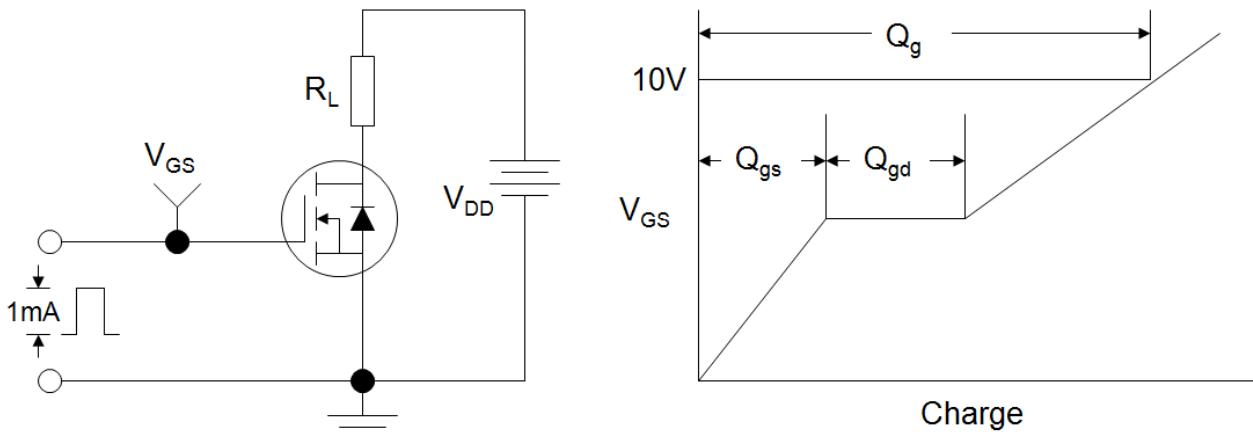


Figure B: Resistive Switching Test Circuit and Waveform

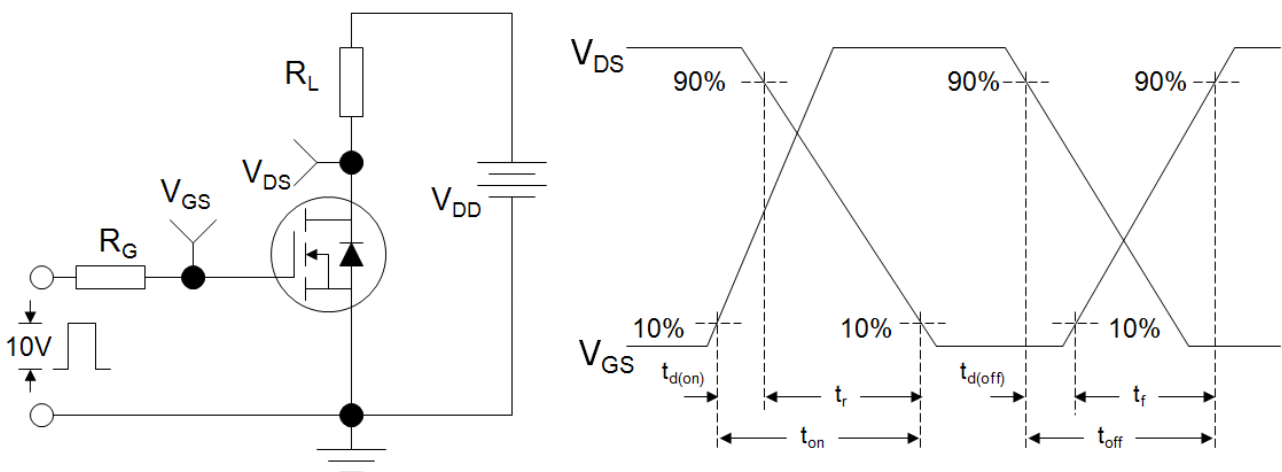
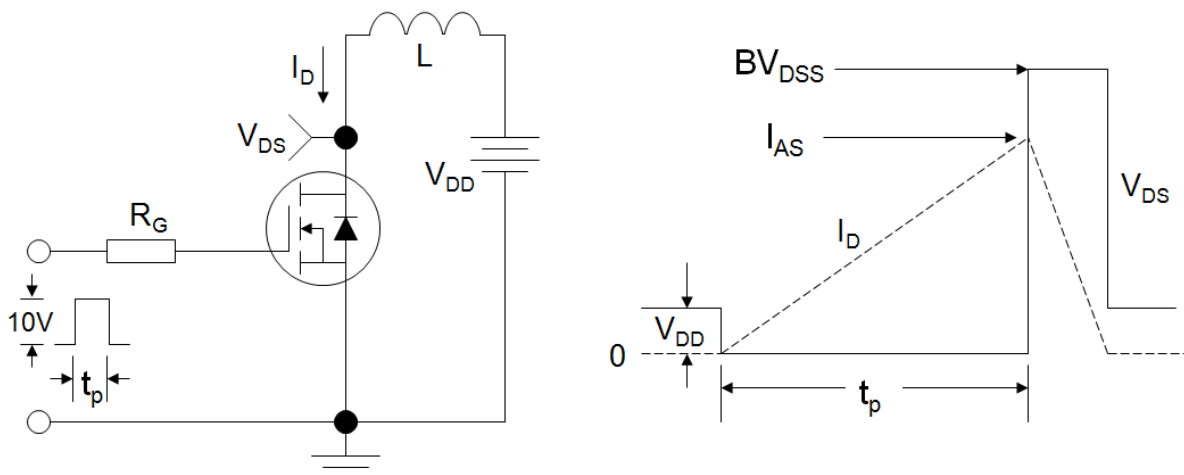
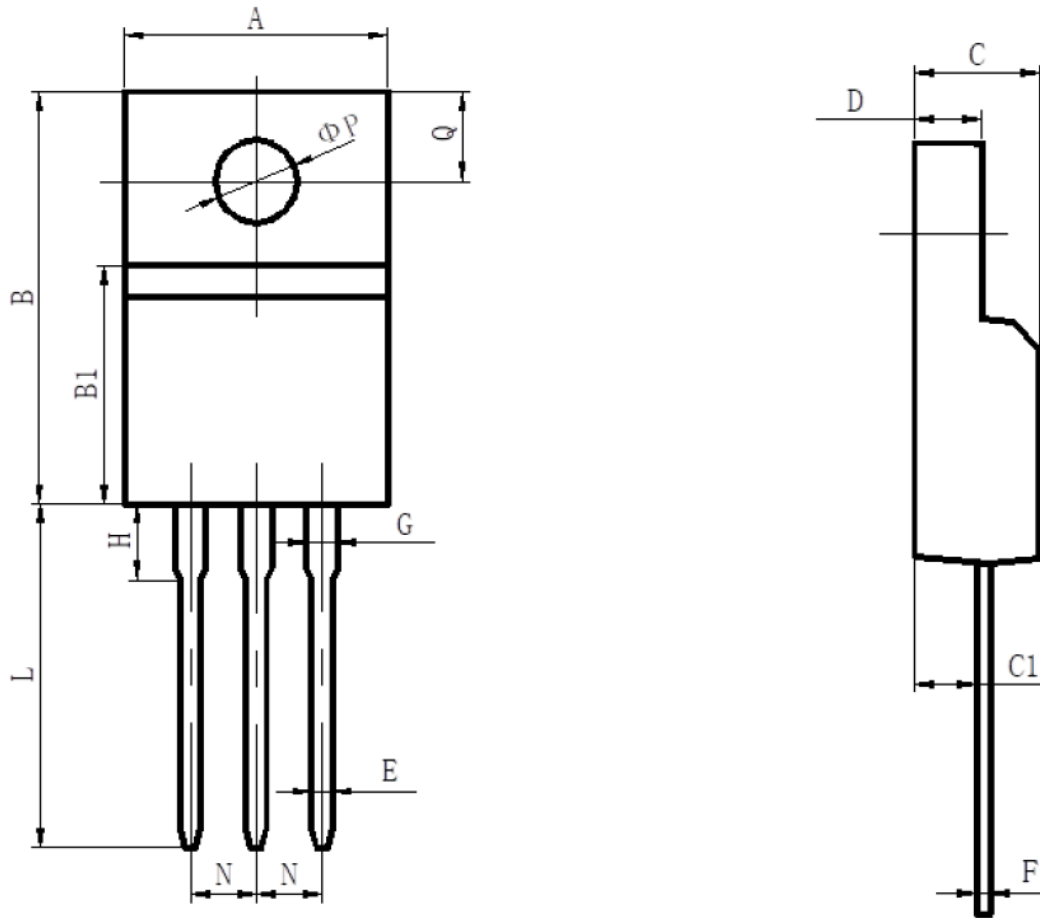


Figure C: Unclamped Inductive Switching Test Circuit and Waveform



TO-220F



| SYMBOLS | MILLIMETERS | |
|----------|-------------|-------|
| | MIN | MAX |
| A | 9.70 | 10.30 |
| B | 15.50 | 16.10 |
| B1 | 8.99 | 9.39 |
| C | 4.40 | 4.80 |
| C1 | 2.15 | 2.55 |
| D | 2.50 | 2.90 |
| E | 0.70 | 0.90 |
| F | 0.40 | 0.60 |
| G | 1.12 | 1.42 |
| H | 3.40 | 3.80 |
| L | 12.60 | 13.60 |
| N | 2.34 | 2.74 |
| Q | 3.15 | 3.55 |
| ΦP | 3.00 | 3.30 |

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