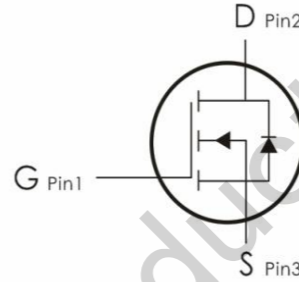
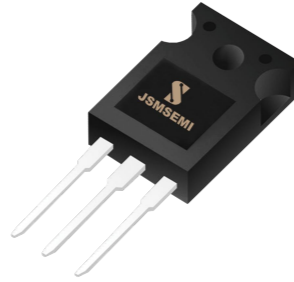


## FEATURES

- 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  |
| SHY1920W                               | TO-247  | SHY1920W |

| Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ , unless otherwise noted |                |          |                  |
|--|----------------|----------|------------------|
| Parameter  | Symbol         | Value    | Unit             |
|  |                | TO-247   |                  |
| Drain-Source Voltage ( $V_{GS} = 0\text{V}$ )                              | $V_{DSS}$      | 200      | V                |
| Continuous Drain Current $V_{GS} = 10\text{V}$ $T_C = 25^\circ\text{C}$    | $I_D$          | 90       | A                |
| Pulsed Drain Current (note1)   | $I_{DM}$       | 360      | A                |
| Gate-Source Voltage  | $V_{GSS}$      | $\pm 20$ | V                |
| Single Pulse Avalanche Energy (note2)                                      | $E_{AS}$       | 1960.2   | mJ               |
| Avalanche Current (note1)  | $I_{AS}$       | 19.8     | A                |
| Repetitive Avalanche Energy (note1)  | $E_{AR}$       | 1176.1   | mJ               |
| Power Dissipation ( $T_C = 25^\circ\text{C}$ )                             | $P_D$          | 550      | W                |
| Peak Diode Recovery dv/dt (note1)  | dv/dt          | 5.0      |                  |
| Operating Junction and Storage Temperature Range                           | $T_J, T_{stg}$ | -55~+150 | $^\circ\text{C}$ |

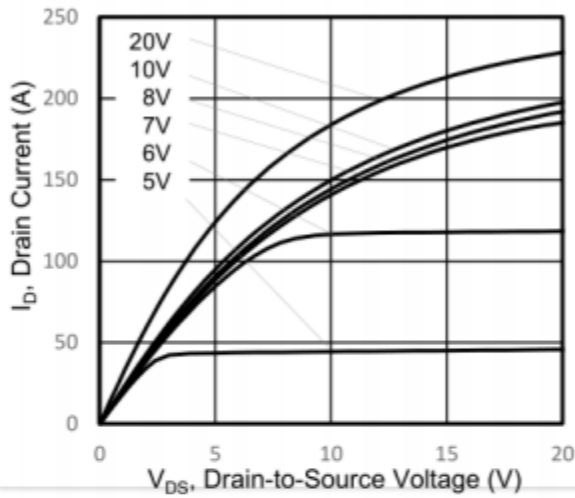
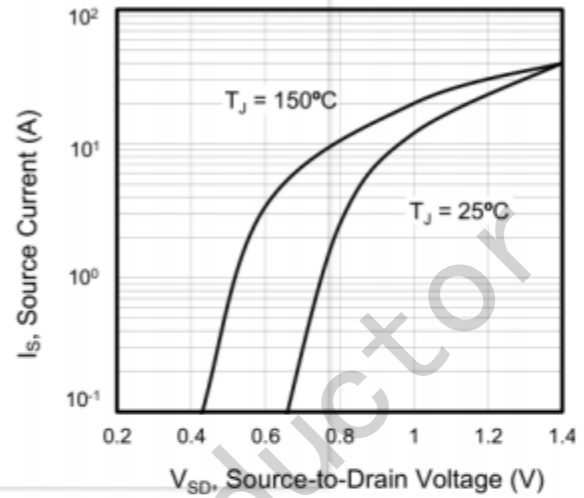
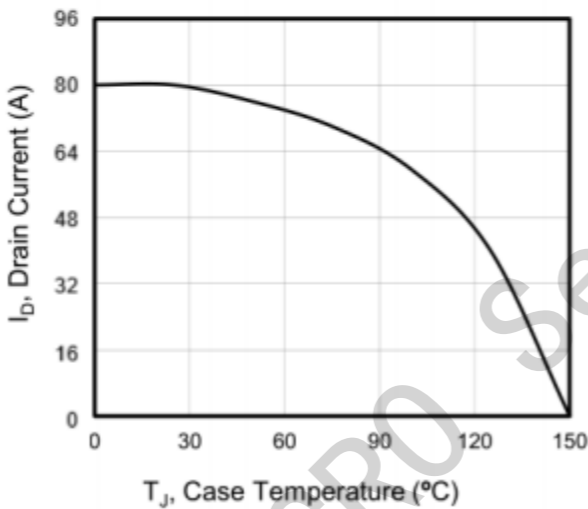
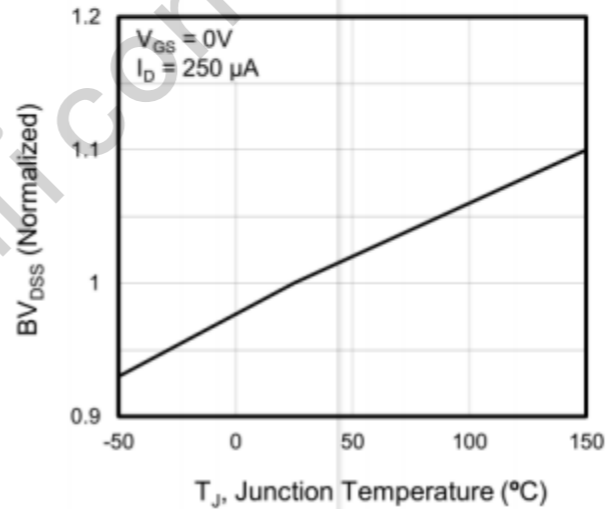
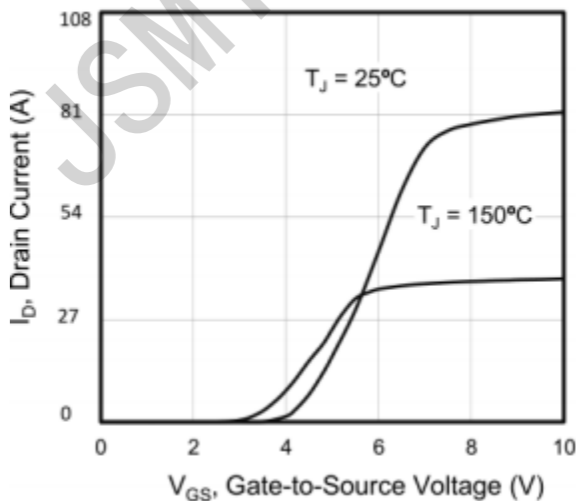
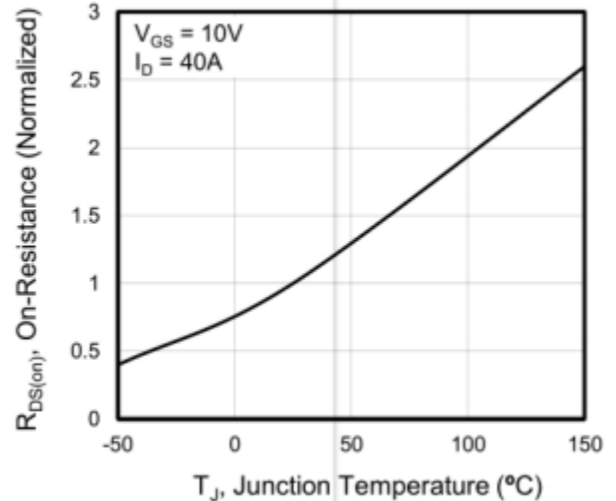
| Thermal Resistance                      |            |       |                    |
|---|------------|-------|--------------------|
| Parameter                               | Symbol     | Value | Unit               |
| Thermal Resistance, Junction-to-Case    | $R_{thJC}$ | 0.89  | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction-to-Ambient | $R_{thJA}$ | 60    |                    |

| Specifications $T_J = 25^\circ\text{C}$ , unless otherwise noted |               |  |       |      |           |            |
|--|---------------|--|-------|------|-----------|------------|
| Parameter  | Symbol        | Test Conditions  | Value |      |           | Unit       |
|  |               |  | Min.  | Typ. | Max.      |            |
| <b>Static</b>  |               |  |       |      |           |            |
| Drain-Source Breakdown Voltage                                   | $V_{(BR)DSS}$ | $V_{GS} = 0V, I_D = 250\mu A$                            | 200   | --   | --        | V          |
| Zero Gate Voltage Drain Current                                  | $I_{DSS}$     | $V_{DS} = 40V, V_{GS} = 0V, T_J = 25^\circ\text{C}$      | --    | --   | 1         | $\mu A$    |
|  |               | $V_{DS} = 32V, V_{GS} = 0V, T_J = 125^\circ\text{C}$     | --    | --   | 100       |            |
| Gate-Source Leakage  | $I_{GSS}$     | $V_{GS} = \pm 20V$                                       | --    | --   | $\pm 100$ | nA         |
| Gate-Source Threshold Voltage                                    | $V_{GS(th)}$  | $V_{DS} = V_{GS}, I_D = 250\mu A$                        | 2.0   | --   | 4.0       | V          |
| Drain-Source On-Resistance (Note3)                               | $R_{DS(on)}$  | $V_{GS} = 10V, I_D = 30A$                                | --    | 23   | 27        | m $\Omega$ |
| <b>Dynamic</b>   |               |  |       |      |           |            |
| Input Capacitance  | $C_{iss}$     | $V_{GS} = 0V, V_{DS} = 25V, f = 1.0MHz$                  | --    | 5784 | --        | pF         |
| Output Capacitance   | $C_{oss}$     |  | --    | 893  | --        |            |
| Reverse Transfer Capacitance                                     | $C_{rss}$     |  | --    | 561  | --        |            |
| Total Gate Charge  | $Q_g$         | $V_{DD} = 20V, I_D = 190A, V_{GS} = 10V$                 | --    | 367  | --        | nC         |
| Gate-Source Charge   | $Q_{gs}$      |  | --    | 33.8 | --        |            |
| Gate-Drain Charge  | $Q_{gd}$      |  | --    | 177  | --        |            |
| Turn-on Delay Time   | $t_{d(on)}$   | $V_{DD} = 20V, I_D = 190A, R_G = 10\Omega, V_{GS} = 10V$ | --    | 55   | --        | ns         |
| Turn-on Rise Time  | $t_r$         |  | --    | 165  | --        |            |
| Turn-off Delay Time  | $t_{d(off)}$  |  | --    | 1050 | --        |            |
| Turn-off Fall Time   | $t_f$         |  | --    | 367  | --        |            |
| <b>Drain-Source Body Diode Characteristics</b>                   |               |  |       |      |           |            |
| Continuous Body Diode Current                                    | $I_S$         | $T_C = 25^\circ\text{C}$                                 | --    | --   | 90        | A          |
| Pulsed Diode Forward Current                                     | $I_{SM}$      |  | --    | --   | 360       |            |
| Body Diode Voltage   | $V_{SD}$      | $T_J = 25^\circ\text{C}, I_{SD} = 95A, V_{GS} = 0V$      | --    | --   | 1.4       | V          |
| Reverse Recovery Time  | $t_{rr}$      | $V_{GS} = 0V, I_S = 190A, di_F/dt = 100A/\mu s$          | --    | 360  | --        | ns         |
| Reverse Recovery Charge  | $Q_{rr}$      |  | --    | 5.61 | --        | $\mu C$    |

**Notes**

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

**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

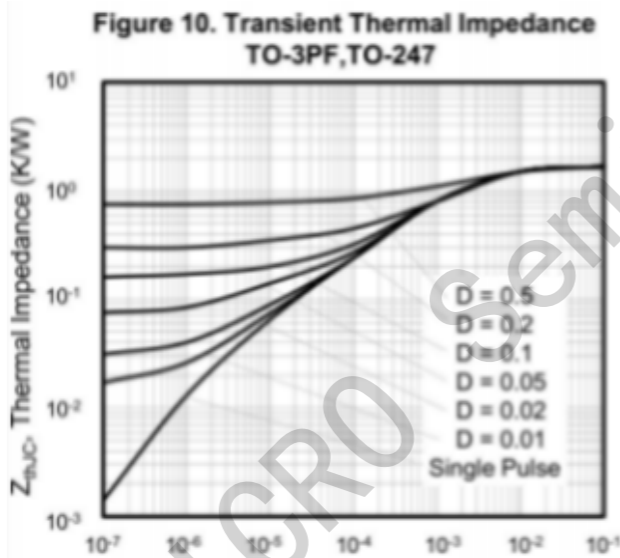
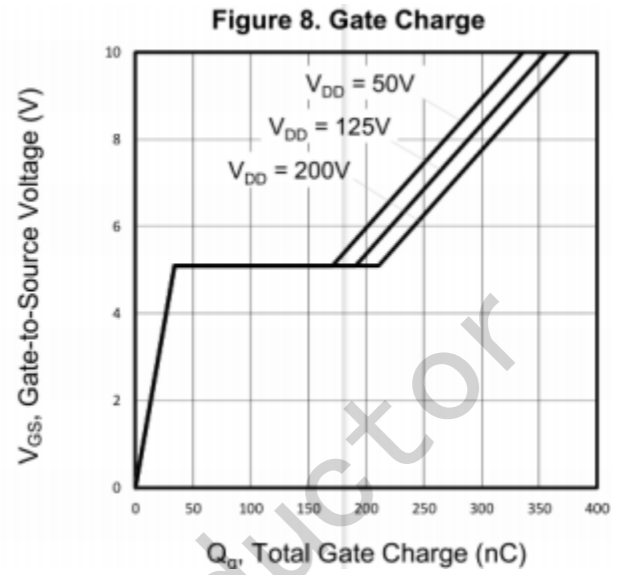
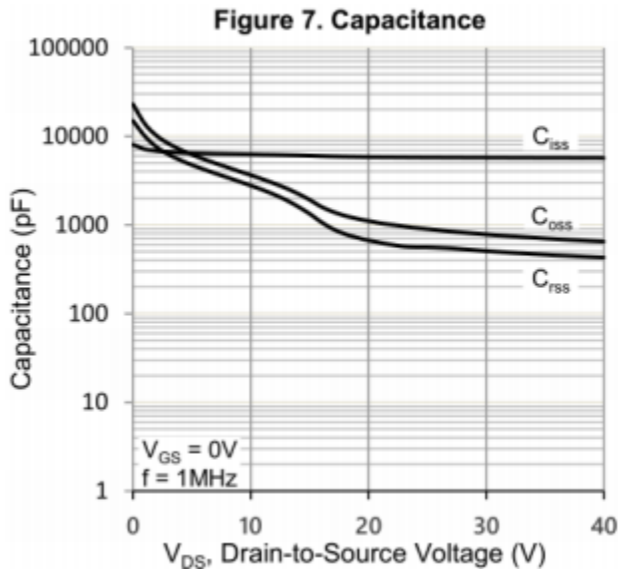


Figure A: Gate Charge Test Circuit and Waveform

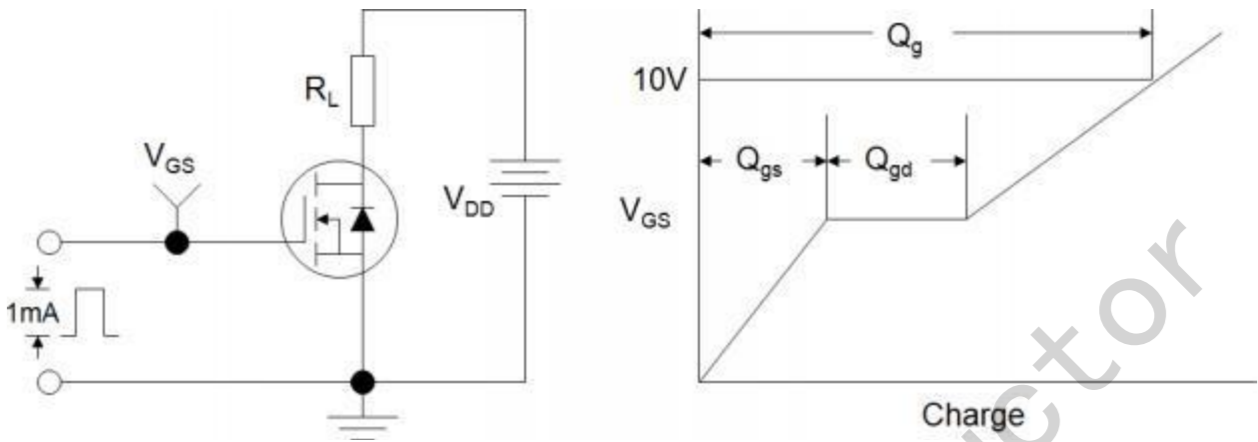


Figure B : Resistive Switching Test Circuit and Waveform

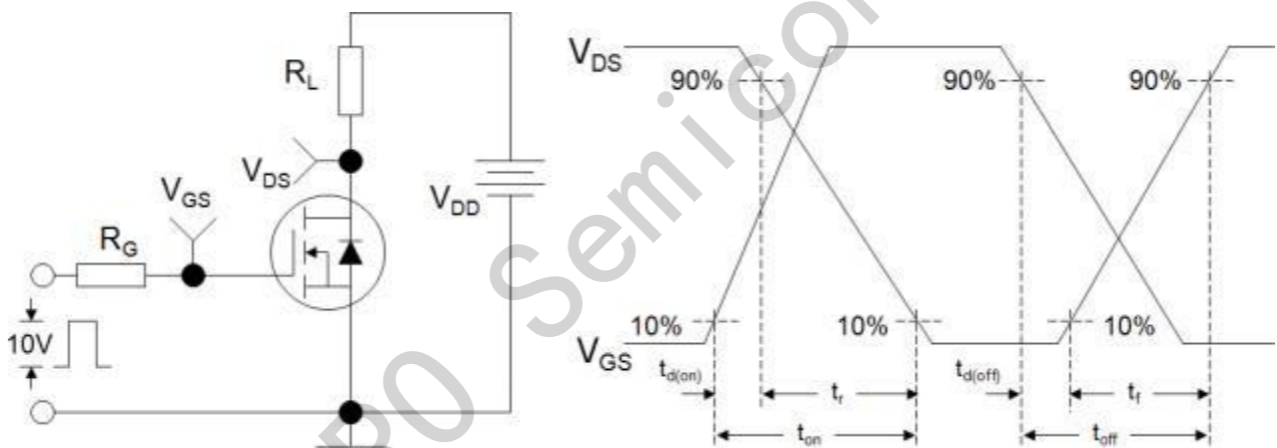
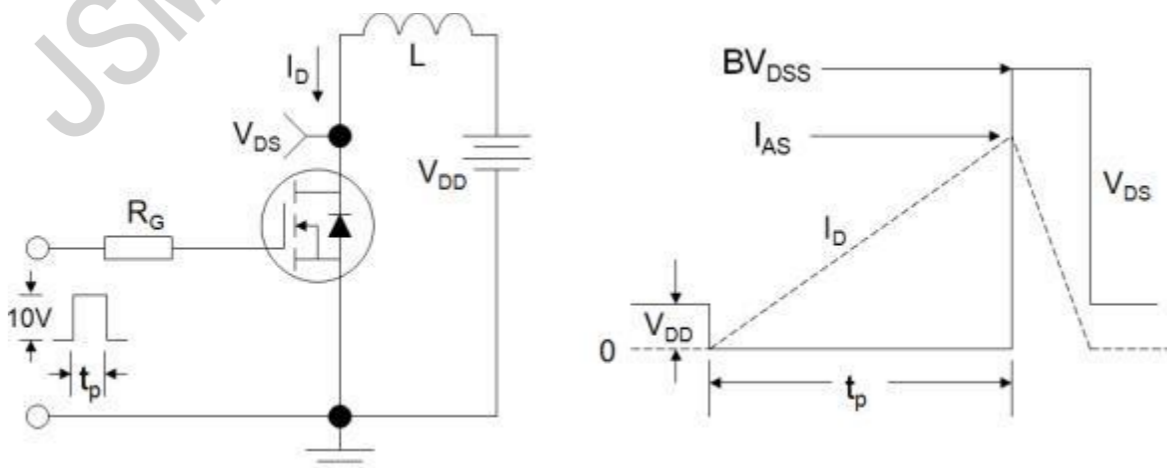
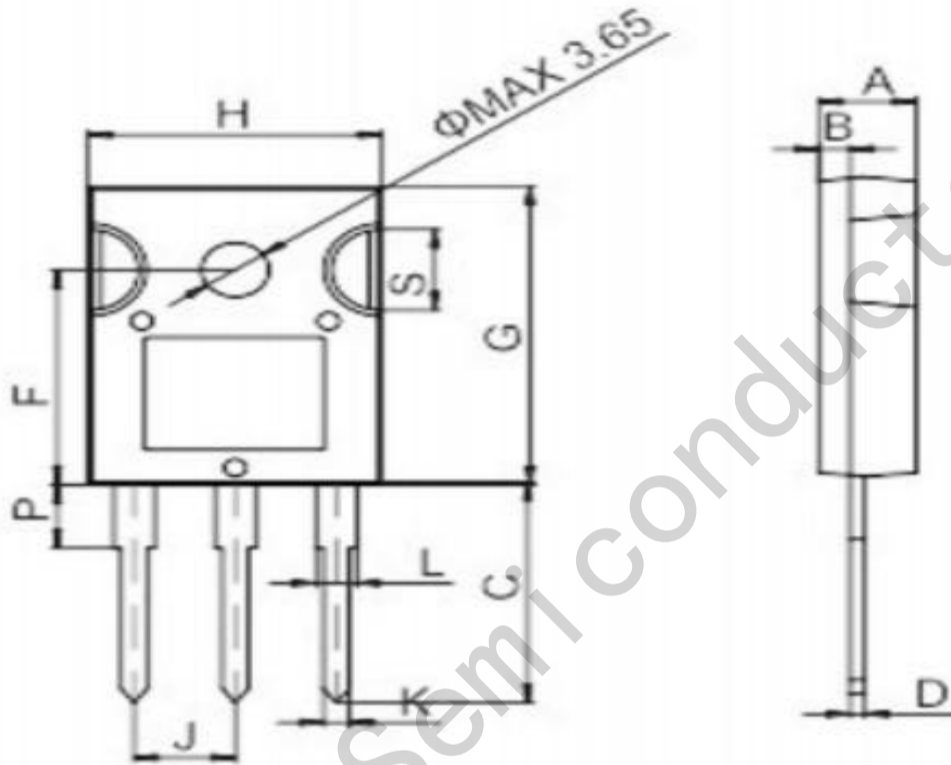


Figure C : Unclamped Inductive Switching Test Circuit and Waveform



**TO-247**



| Ref. | Dimensions  |      |      |        |      |       |
|------|-------------|------|------|--------|------|-------|
|      | Millimeters |      |      | Inches |      |       |
|      | Min.        | Typ. | Max. | Min.   | Typ. | Max.  |
| A    | 4.9         |      | 5.4  | 0.193  |      | 0.213 |
| B    | 1.6         |      | 2.0  | 0.063  |      | 0.079 |
| C    | 14.35       |      | 15.4 | 0.565  |      | 0.606 |
| D    | 0.5         |      | 0.8  | 0.020  |      | 0.031 |
| F    | 14.4        |      | 15.1 | 0.567  |      | 0.594 |
| G    | 19.7        |      | 20.6 | 0.775  |      | 0.811 |
| H    | 15.4        |      | 16.2 | 0.606  |      | 0.638 |
| J    | 5.3         |      | 5.6  | 0.209  |      | 0.220 |
| K    | 1.3         |      | 1.5  | 0.051  |      | 0.059 |
| L    | 2.8         |      | 3.3  | 0.110  |      | 0.130 |
| P    | 3.7         |      | 4.2  | 0.146  |      | 0.165 |
| S    | 5.35        |      | 5.65 | 0.211  |      | 0.222 |