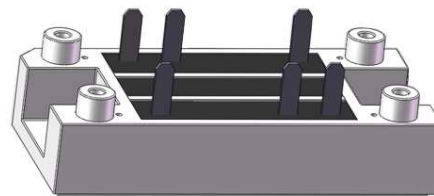


# JS121KQ

## Description

- 1) A package consists of two inverse parallel SCR chips, which non-repetitive peak off-state voltage is up to 2300V
- 2) Welding by vacuum welding technology, which provide high reliability
- 3) Insulated by silicone gel, provide a insulation voltage of 3000V~



V1-A-Pack

## Typical Application

Soft start, solid state relay, AC/DC switch, temperature control.

## Absolute Maximum Ratings (Packaged into V1-A-Pack, unless otherwise specified, $T_{CASE}=25^{\circ}C$ )

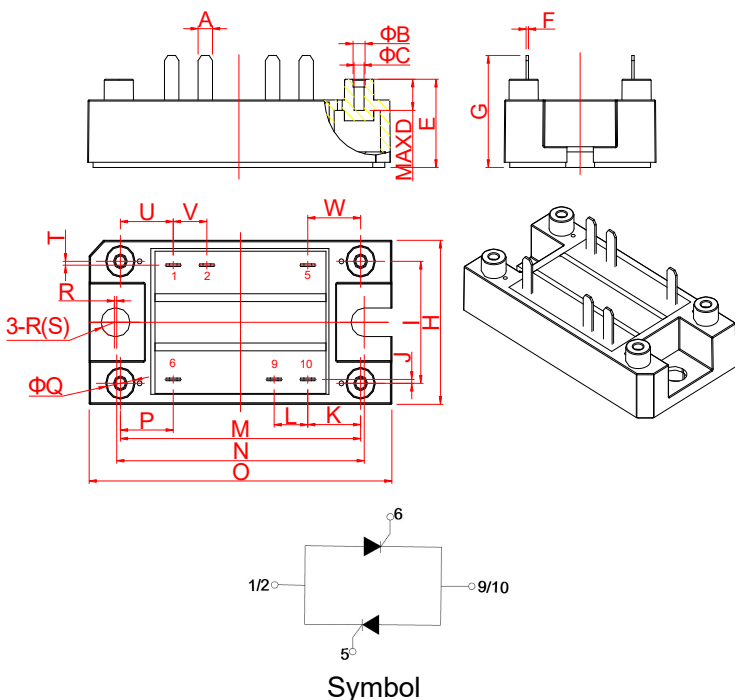
| Parameter                                 | Test Conditions             | Symbol       | Values    |      |      | Unit        |
|-------------------------------------------|-----------------------------|--------------|-----------|------|------|-------------|
|                                           |                             |              | 18        | 20   | 22   |             |
| Operating junction temperature range      |                             | $T_j$        | -40-125   |      |      | $^{\circ}C$ |
| Storage temperature range                 |                             | $T_{stg}$    | -40-125   |      |      | $^{\circ}C$ |
| Repetitive peak off-state voltage         | $T_j=25^{\circ}C$           | $V_{DRM}$    | 1800      | 2000 | 2200 | V           |
| Repetitive peak reverse voltage           | $T_j=25^{\circ}C$           | $V_{RRM}$    | 1800      | 2000 | 2200 | V           |
| Non-repetitive peak off-state voltage     | $T_j=25^{\circ}C$           | $V_{DSM}$    | 1900      | 2100 | 2300 | V           |
| Non-repetitive peak reverse voltage       | $T_j=25^{\circ}C$           | $V_{RSM}$    | 1900      | 2100 | 2300 | V           |
| RMS on-state current                      | $T_C=85^{\circ}C$           | $I_{T(RMS)}$ | 120       |      |      | A           |
| Peak on-state surge current               | $t_p=10ms$ $V_R=0.6V_{RRM}$ | $I_{TSM}$    | 1200      |      |      | A           |
| $I^2t$ value for fusing                   | $t_p=10ms$ $V_R=0.6V_{RRM}$ | $I^2t$       | 7200      |      |      | $A^2s$      |
| Critical rate of rise of on-state current | $I_G=2 \times I_{GT}$       | $di/dt$      | 150       |      |      | $A/\mu s$   |
| Insulation voltage                        | A.C 50Hz(1s/1min)           | $V_{ISO}$    | 3600/3000 |      |      | V           |

## Electrical Characteristics (Packaged into V1-A-Pack, unless otherwise specified, $T_{CASE}=25^{\circ}C$ )

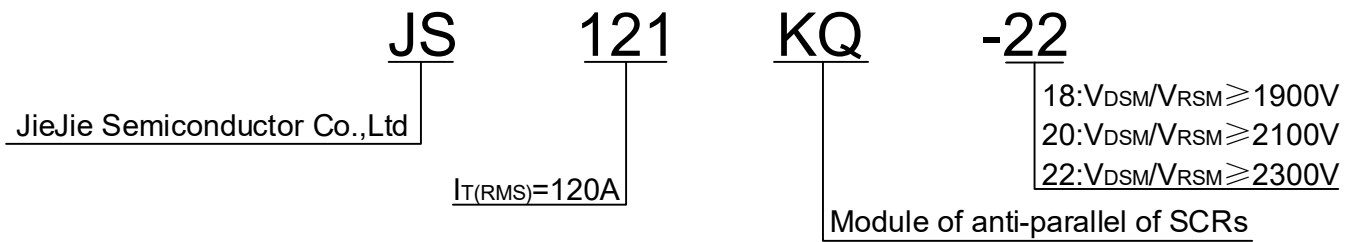
| Parameter             | Test Conditions           | Symbol   | Values      | Unit      |
|-----------------------|---------------------------|----------|-------------|-----------|
| Peak on-state voltage | $I_T=240A$ $t_p=380\mu s$ | $V_{TM}$ | $\leq 1.8$  | V         |
| Threshold voltage     | $T_j=125^{\circ}C$        | $V_{TO}$ | $\leq 0.95$ | V         |
| Dynamic resistance    | $T_j=125^{\circ}C$        | $R_d$    | $\leq 2.1$  | $m\Omega$ |

|                                   |                                                            |               |             |                           |
|-----------------------------------|------------------------------------------------------------|---------------|-------------|---------------------------|
| Repetitive peak off-state current | $V_D = V_{RRM}$<br>$T_C = 25^\circ\text{C}$                | $I_{DRM1}$    | $\leq 100$  | $\mu\text{A}$             |
|                                   | $T_C = 125^\circ\text{C}$                                  | $I_{DRM2}$    | $\leq 30$   | $\text{mA}$               |
| Repetitive peak reverse current   | $V_R = V_{RRM}$<br>$T_C = 25^\circ\text{C}$                | $I_{RRM1}$    | $\leq 100$  | $\mu\text{A}$             |
|                                   | $T_C = 125^\circ\text{C}$                                  | $I_{RRM2}$    | $\leq 30$   | $\text{mA}$               |
| Triggering gate current           | $V_D = 12\text{V}$ $R_L = 30\Omega$                        | $I_{GT}$      | 20-120      | $\text{mA}$               |
| Holding current                   | $I_T = 1\text{A}$                                          | $I_H$         | $\leq 250$  | $\text{mA}$               |
| Latching current                  | $I_G = 1.2 I_{GT}$                                         | $I_L$         | $\leq 300$  | $\text{mA}$               |
| Triggering gate voltage           | $V_D = 12\text{V}$ $R_L = 30\Omega$                        | $V_{GT}$      | $\leq 1.8$  | $\text{V}$                |
| Non triggering gate voltage       | $V_D = V_{DRM}$ $T_J = 125^\circ\text{C}$                  | $V_{GD}$      | $\geq 0.25$ | $\text{V}$                |
| Critical rate of rise of voltage  | $V_D = 2/3 V_{DRM}$ $T_J = 125^\circ\text{C}$<br>Gate Open | $dv/dt$       | $\geq 1000$ | $\text{V}/\mu\text{s}$    |
| Thermal resistance                | Junction to case                                           | $R_{th(j-c)}$ | 0.37        | $^\circ\text{C}/\text{W}$ |

## Mechanical Characteristics

| Module size                                                                                       | 63x31.6mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |      |            |        |       |       |  |  |             |  |  |        |  |  |     |     |     |     |     |     |   |      |   |      |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |  |  |   |  |  |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |       |      |       |       |       |       |   |       |      |       |       |       |       |   |    |      |    |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |   |    |      |    |       |       |       |   |       |    |       |       |       |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |      |      |      |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |
|---------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------------|--------|-------|-------|--|--|-------------|--|--|--------|--|--|-----|-----|-----|-----|-----|-----|---|------|---|------|-------|-------|-------|---|-----|-----|-----|-------|-------|-------|---|-----|-----|-----|-------|-------|-------|---|--|--|---|--|--|-------|---|-------|----|-------|-------|-------|-------|---|-----|-----|-----|-------|-------|-------|---|-------|------|-------|-------|-------|-------|---|-------|------|-------|-------|-------|-------|---|----|------|----|-------|-------|-------|---|------|------|------|-------|-------|-------|---|------|----|------|-------|-------|-------|---|-----|---|-----|-------|-------|-------|---|------|----|------|-------|-------|-------|---|----|------|----|-------|-------|-------|---|-------|----|-------|-------|-------|-------|---|-------|----|-------|-------|-------|-------|---|-----|-----|-----|-------|-------|-------|---|-----|-----|-----|-------|-------|-------|---|------|------|------|-------|-------|-------|---|------|------|------|-------|-------|-------|---|------|----|------|-------|-------|-------|---|-----|---|-----|-------|-------|-------|---|------|----|------|-------|-------|-------|
| Module height                                                                                     | 21.6mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |      |            |        |       |       |  |  |             |  |  |        |  |  |     |     |     |     |     |     |   |      |   |      |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |  |  |   |  |  |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |       |      |       |       |       |       |   |       |      |       |       |       |       |   |    |      |    |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |   |    |      |    |       |       |       |   |       |    |       |       |       |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |      |      |      |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |
|  <p>Symbol</p> | <table><tr><th rowspan="3">Ref</th><th colspan="6">Dimensions</th></tr><tr><th colspan="3">Millimeters</th><th colspan="3">Inches</th></tr><tr><th>Min</th><th>Typ</th><th>Max</th><th>Min</th><th>Typ</th><th>Max</th></tr><tr><td>A</td><td>2.85</td><td>3</td><td>3.15</td><td>0.112</td><td>0.118</td><td>0.124</td></tr><tr><td>B</td><td>2.3</td><td>2.5</td><td>2.7</td><td>0.091</td><td>0.098</td><td>0.106</td></tr><tr><td>C</td><td>1.9</td><td>2.1</td><td>2.3</td><td>0.075</td><td>0.083</td><td>0.091</td></tr><tr><td>D</td><td></td><td></td><td>6</td><td></td><td></td><td>0.236</td></tr><tr><td>E</td><td>16.25</td><td>17</td><td>17.75</td><td>0.640</td><td>0.669</td><td>0.699</td></tr><tr><td>F</td><td>0.4</td><td>0.5</td><td>0.6</td><td>0.016</td><td>0.020</td><td>0.024</td></tr><tr><td>G</td><td>20.85</td><td>21.6</td><td>22.35</td><td>0.821</td><td>0.850</td><td>0.880</td></tr><tr><td>H</td><td>30.85</td><td>31.6</td><td>32.35</td><td>1.215</td><td>1.244</td><td>1.274</td></tr><tr><td>I</td><td>23</td><td>23.5</td><td>24</td><td>0.906</td><td>0.925</td><td>0.945</td></tr><tr><td>J</td><td>0.25</td><td>0.75</td><td>1.25</td><td>0.010</td><td>0.030</td><td>0.049</td></tr><tr><td>K</td><td>10.5</td><td>11</td><td>11.5</td><td>0.413</td><td>0.433</td><td>0.453</td></tr><tr><td>L</td><td>6.5</td><td>7</td><td>7.5</td><td>0.256</td><td>0.276</td><td>0.295</td></tr><tr><td>M</td><td>49.5</td><td>50</td><td>50.5</td><td>1.949</td><td>1.989</td><td>1.988</td></tr><tr><td>N</td><td>51</td><td>51.5</td><td>52</td><td>2.008</td><td>2.028</td><td>2.047</td></tr><tr><td>O</td><td>62.25</td><td>63</td><td>63.75</td><td>2.451</td><td>2.480</td><td>2.510</td></tr><tr><td>P</td><td>10.25</td><td>11</td><td>11.75</td><td>0.404</td><td>0.433</td><td>0.463</td></tr><tr><td>Q</td><td>5.6</td><td>6.1</td><td>6.6</td><td>0.220</td><td>0.240</td><td>0.260</td></tr><tr><td>R</td><td>0.3</td><td>0.5</td><td>0.7</td><td>0.012</td><td>0.020</td><td>0.028</td></tr><tr><td>S</td><td>2.55</td><td>2.75</td><td>2.95</td><td>0.100</td><td>0.108</td><td>0.116</td></tr><tr><td>T</td><td>0.25</td><td>0.75</td><td>1.25</td><td>0.010</td><td>0.030</td><td>0.049</td></tr><tr><td>U</td><td>10.5</td><td>11</td><td>11.5</td><td>0.413</td><td>0.433</td><td>0.453</td></tr><tr><td>V</td><td>6.5</td><td>7</td><td>7.5</td><td>0.256</td><td>0.276</td><td>0.295</td></tr><tr><td>W</td><td>10.5</td><td>11</td><td>11.5</td><td>0.413</td><td>0.433</td><td>0.453</td></tr></table> | Ref  | Dimensions |        |       |       |  |  | Millimeters |  |  | Inches |  |  | Min | Typ | Max | Min | Typ | Max | A | 2.85 | 3 | 3.15 | 0.112 | 0.118 | 0.124 | B | 2.3 | 2.5 | 2.7 | 0.091 | 0.098 | 0.106 | C | 1.9 | 2.1 | 2.3 | 0.075 | 0.083 | 0.091 | D |  |  | 6 |  |  | 0.236 | E | 16.25 | 17 | 17.75 | 0.640 | 0.669 | 0.699 | F | 0.4 | 0.5 | 0.6 | 0.016 | 0.020 | 0.024 | G | 20.85 | 21.6 | 22.35 | 0.821 | 0.850 | 0.880 | H | 30.85 | 31.6 | 32.35 | 1.215 | 1.244 | 1.274 | I | 23 | 23.5 | 24 | 0.906 | 0.925 | 0.945 | J | 0.25 | 0.75 | 1.25 | 0.010 | 0.030 | 0.049 | K | 10.5 | 11 | 11.5 | 0.413 | 0.433 | 0.453 | L | 6.5 | 7 | 7.5 | 0.256 | 0.276 | 0.295 | M | 49.5 | 50 | 50.5 | 1.949 | 1.989 | 1.988 | N | 51 | 51.5 | 52 | 2.008 | 2.028 | 2.047 | O | 62.25 | 63 | 63.75 | 2.451 | 2.480 | 2.510 | P | 10.25 | 11 | 11.75 | 0.404 | 0.433 | 0.463 | Q | 5.6 | 6.1 | 6.6 | 0.220 | 0.240 | 0.260 | R | 0.3 | 0.5 | 0.7 | 0.012 | 0.020 | 0.028 | S | 2.55 | 2.75 | 2.95 | 0.100 | 0.108 | 0.116 | T | 0.25 | 0.75 | 1.25 | 0.010 | 0.030 | 0.049 | U | 10.5 | 11 | 11.5 | 0.413 | 0.433 | 0.453 | V | 6.5 | 7 | 7.5 | 0.256 | 0.276 | 0.295 | W | 10.5 | 11 | 11.5 | 0.413 | 0.433 | 0.453 |
| Ref                                                                                               | Dimensions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |            |        |       |       |  |  |             |  |  |        |  |  |     |     |     |     |     |     |   |      |   |      |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |  |  |   |  |  |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |       |      |       |       |       |       |   |       |      |       |       |       |       |   |    |      |    |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |   |    |      |    |       |       |       |   |       |    |       |       |       |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |      |      |      |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |
|                                                                                                   | Millimeters                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |      |            | Inches |       |       |  |  |             |  |  |        |  |  |     |     |     |     |     |     |   |      |   |      |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |  |  |   |  |  |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |       |      |       |       |       |       |   |       |      |       |       |       |       |   |    |      |    |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |   |    |      |    |       |       |       |   |       |    |       |       |       |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |      |      |      |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |
|                                                                                                   | Min                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Typ  | Max        | Min    | Typ   | Max   |  |  |             |  |  |        |  |  |     |     |     |     |     |     |   |      |   |      |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |  |  |   |  |  |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |       |      |       |       |       |       |   |       |      |       |       |       |       |   |    |      |    |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |   |    |      |    |       |       |       |   |       |    |       |       |       |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |      |      |      |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |
| A                                                                                                 | 2.85                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 3    | 3.15       | 0.112  | 0.118 | 0.124 |  |  |             |  |  |        |  |  |     |     |     |     |     |     |   |      |   |      |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |  |  |   |  |  |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |       |      |       |       |       |       |   |       |      |       |       |       |       |   |    |      |    |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |   |    |      |    |       |       |       |   |       |    |       |       |       |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |      |      |      |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |
| B                                                                                                 | 2.3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 2.5  | 2.7        | 0.091  | 0.098 | 0.106 |  |  |             |  |  |        |  |  |     |     |     |     |     |     |   |      |   |      |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |  |  |   |  |  |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |       |      |       |       |       |       |   |       |      |       |       |       |       |   |    |      |    |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |   |    |      |    |       |       |       |   |       |    |       |       |       |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |      |      |      |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |
| C                                                                                                 | 1.9                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 2.1  | 2.3        | 0.075  | 0.083 | 0.091 |  |  |             |  |  |        |  |  |     |     |     |     |     |     |   |      |   |      |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |  |  |   |  |  |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |       |      |       |       |       |       |   |       |      |       |       |       |       |   |    |      |    |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |   |    |      |    |       |       |       |   |       |    |       |       |       |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |      |      |      |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |
| D                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |      | 6          |        |       | 0.236 |  |  |             |  |  |        |  |  |     |     |     |     |     |     |   |      |   |      |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |  |  |   |  |  |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |       |      |       |       |       |       |   |       |      |       |       |       |       |   |    |      |    |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |   |    |      |    |       |       |       |   |       |    |       |       |       |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |      |      |      |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |
| E                                                                                                 | 16.25                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 17   | 17.75      | 0.640  | 0.669 | 0.699 |  |  |             |  |  |        |  |  |     |     |     |     |     |     |   |      |   |      |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |  |  |   |  |  |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |       |      |       |       |       |       |   |       |      |       |       |       |       |   |    |      |    |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |   |    |      |    |       |       |       |   |       |    |       |       |       |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |      |      |      |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |
| F                                                                                                 | 0.4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0.5  | 0.6        | 0.016  | 0.020 | 0.024 |  |  |             |  |  |        |  |  |     |     |     |     |     |     |   |      |   |      |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |  |  |   |  |  |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |       |      |       |       |       |       |   |       |      |       |       |       |       |   |    |      |    |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |   |    |      |    |       |       |       |   |       |    |       |       |       |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |      |      |      |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |
| G                                                                                                 | 20.85                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 21.6 | 22.35      | 0.821  | 0.850 | 0.880 |  |  |             |  |  |        |  |  |     |     |     |     |     |     |   |      |   |      |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |  |  |   |  |  |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |       |      |       |       |       |       |   |       |      |       |       |       |       |   |    |      |    |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |   |    |      |    |       |       |       |   |       |    |       |       |       |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |      |      |      |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |
| H                                                                                                 | 30.85                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 31.6 | 32.35      | 1.215  | 1.244 | 1.274 |  |  |             |  |  |        |  |  |     |     |     |     |     |     |   |      |   |      |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |  |  |   |  |  |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |       |      |       |       |       |       |   |       |      |       |       |       |       |   |    |      |    |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |   |    |      |    |       |       |       |   |       |    |       |       |       |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |      |      |      |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |
| I                                                                                                 | 23                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 23.5 | 24         | 0.906  | 0.925 | 0.945 |  |  |             |  |  |        |  |  |     |     |     |     |     |     |   |      |   |      |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |  |  |   |  |  |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |       |      |       |       |       |       |   |       |      |       |       |       |       |   |    |      |    |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |   |    |      |    |       |       |       |   |       |    |       |       |       |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |      |      |      |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |
| J                                                                                                 | 0.25                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0.75 | 1.25       | 0.010  | 0.030 | 0.049 |  |  |             |  |  |        |  |  |     |     |     |     |     |     |   |      |   |      |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |  |  |   |  |  |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |       |      |       |       |       |       |   |       |      |       |       |       |       |   |    |      |    |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |   |    |      |    |       |       |       |   |       |    |       |       |       |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |      |      |      |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |
| K                                                                                                 | 10.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 11   | 11.5       | 0.413  | 0.433 | 0.453 |  |  |             |  |  |        |  |  |     |     |     |     |     |     |   |      |   |      |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |  |  |   |  |  |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |       |      |       |       |       |       |   |       |      |       |       |       |       |   |    |      |    |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |   |    |      |    |       |       |       |   |       |    |       |       |       |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |      |      |      |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |
| L                                                                                                 | 6.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 7    | 7.5        | 0.256  | 0.276 | 0.295 |  |  |             |  |  |        |  |  |     |     |     |     |     |     |   |      |   |      |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |  |  |   |  |  |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |       |      |       |       |       |       |   |       |      |       |       |       |       |   |    |      |    |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |   |    |      |    |       |       |       |   |       |    |       |       |       |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |      |      |      |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |
| M                                                                                                 | 49.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 50   | 50.5       | 1.949  | 1.989 | 1.988 |  |  |             |  |  |        |  |  |     |     |     |     |     |     |   |      |   |      |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |  |  |   |  |  |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |       |      |       |       |       |       |   |       |      |       |       |       |       |   |    |      |    |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |   |    |      |    |       |       |       |   |       |    |       |       |       |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |      |      |      |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |
| N                                                                                                 | 51                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 51.5 | 52         | 2.008  | 2.028 | 2.047 |  |  |             |  |  |        |  |  |     |     |     |     |     |     |   |      |   |      |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |  |  |   |  |  |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |       |      |       |       |       |       |   |       |      |       |       |       |       |   |    |      |    |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |   |    |      |    |       |       |       |   |       |    |       |       |       |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |      |      |      |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |
| O                                                                                                 | 62.25                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 63   | 63.75      | 2.451  | 2.480 | 2.510 |  |  |             |  |  |        |  |  |     |     |     |     |     |     |   |      |   |      |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |  |  |   |  |  |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |       |      |       |       |       |       |   |       |      |       |       |       |       |   |    |      |    |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |   |    |      |    |       |       |       |   |       |    |       |       |       |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |      |      |      |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |
| P                                                                                                 | 10.25                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 11   | 11.75      | 0.404  | 0.433 | 0.463 |  |  |             |  |  |        |  |  |     |     |     |     |     |     |   |      |   |      |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |  |  |   |  |  |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |       |      |       |       |       |       |   |       |      |       |       |       |       |   |    |      |    |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |   |    |      |    |       |       |       |   |       |    |       |       |       |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |      |      |      |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |
| Q                                                                                                 | 5.6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 6.1  | 6.6        | 0.220  | 0.240 | 0.260 |  |  |             |  |  |        |  |  |     |     |     |     |     |     |   |      |   |      |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |  |  |   |  |  |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |       |      |       |       |       |       |   |       |      |       |       |       |       |   |    |      |    |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |   |    |      |    |       |       |       |   |       |    |       |       |       |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |      |      |      |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |
| R                                                                                                 | 0.3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0.5  | 0.7        | 0.012  | 0.020 | 0.028 |  |  |             |  |  |        |  |  |     |     |     |     |     |     |   |      |   |      |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |  |  |   |  |  |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |       |      |       |       |       |       |   |       |      |       |       |       |       |   |    |      |    |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |   |    |      |    |       |       |       |   |       |    |       |       |       |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |      |      |      |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |
| S                                                                                                 | 2.55                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 2.75 | 2.95       | 0.100  | 0.108 | 0.116 |  |  |             |  |  |        |  |  |     |     |     |     |     |     |   |      |   |      |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |  |  |   |  |  |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |       |      |       |       |       |       |   |       |      |       |       |       |       |   |    |      |    |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |   |    |      |    |       |       |       |   |       |    |       |       |       |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |      |      |      |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |
| T                                                                                                 | 0.25                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0.75 | 1.25       | 0.010  | 0.030 | 0.049 |  |  |             |  |  |        |  |  |     |     |     |     |     |     |   |      |   |      |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |  |  |   |  |  |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |       |      |       |       |       |       |   |       |      |       |       |       |       |   |    |      |    |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |   |    |      |    |       |       |       |   |       |    |       |       |       |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |      |      |      |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |
| U                                                                                                 | 10.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 11   | 11.5       | 0.413  | 0.433 | 0.453 |  |  |             |  |  |        |  |  |     |     |     |     |     |     |   |      |   |      |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |  |  |   |  |  |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |       |      |       |       |       |       |   |       |      |       |       |       |       |   |    |      |    |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |   |    |      |    |       |       |       |   |       |    |       |       |       |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |      |      |      |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |
| V                                                                                                 | 6.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 7    | 7.5        | 0.256  | 0.276 | 0.295 |  |  |             |  |  |        |  |  |     |     |     |     |     |     |   |      |   |      |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |  |  |   |  |  |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |       |      |       |       |       |       |   |       |      |       |       |       |       |   |    |      |    |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |   |    |      |    |       |       |       |   |       |    |       |       |       |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |      |      |      |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |
| W                                                                                                 | 10.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 11   | 11.5       | 0.413  | 0.433 | 0.453 |  |  |             |  |  |        |  |  |     |     |     |     |     |     |   |      |   |      |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |  |  |   |  |  |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |       |      |       |       |       |       |   |       |      |       |       |       |       |   |    |      |    |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |   |    |      |    |       |       |       |   |       |    |       |       |       |       |   |       |    |       |       |       |       |   |     |     |     |       |       |       |   |     |     |     |       |       |       |   |      |      |      |       |       |       |   |      |      |      |       |       |       |   |      |    |      |       |       |       |   |     |   |     |       |       |       |   |      |    |      |       |       |       |

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