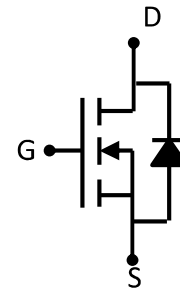


APG078N07K

N-Channel Shielding-Gate Mosfet

Feature

- 70V,80A
 $R_{DS(ON)} < 7.8m\Omega @ V_{GS}=10V$ TYP:6.7 m Ω
- Advanced Trench Power MOSFET
- Provide Excellent $R_{DS(ON)}$ And Low Gate Charge



Schematic diagram

Application

- DC/DC Converter
- Load Switch for Portable Devices
- Battery Switch
- Rectifier



Marking and pin assignment

Package Marking and Ordering Information

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity (PCS) |
|----------------|------------|----------------|-----------|------------|----------------|
| G078N07K | APG078N07K | TO-252 | | - | 2500 |

ABSOLUTE MAXIMUM RATINGS ($T_a=25^{\circ}C$ unless otherwise noted)

| Parameter | Symbol | Value | Unit |
|---|-----------------|-----------|---------------|
| Drain-Source Voltage | V_{DS} | 70 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | V |
| Continuous Drain Current ($T_a=25^{\circ}C$) | I_D | 80 | A |
| Continuous Drain Current ($T_a=100^{\circ}C$) | I_D | 56 | A |
| Pulsed Drain Current ⁽¹⁾ | I_{DM} | 280 | A |
| Singel Pulsed Avalanche Energy ⁽²⁾ | E_{AS} | 160 | mJ |
| Power Dissipation | P_D | 45 | W |
| Thermal Resistance from Junction to Case | $R_{\theta JC}$ | 2.05 | $^{\circ}C/W$ |
| Junction Temperature | T_J | 150 | $^{\circ}C$ |
| Storage Temperature | T_{STG} | -55~ +150 | $^{\circ}C$ |

MOSFET ELECTRICAL CHARACTERISTICS($T_a=25^{\circ}\text{C}$ unless otherwise noted)

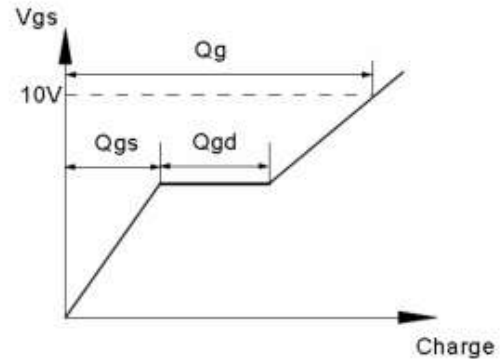
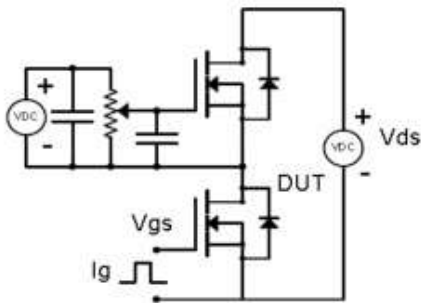
| Parameter | Symbol | Test Condition | Min | Type | Max | Unit |
|---|---------------|--|-----|------|-----------|------------|
| Static Characteristics | | | | | | |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | $V_{GS} = 0V, I_D = 250\mu A$ | 70 | - | - | V |
| Zero gate voltage drain current | I_{DSS} | $V_{DS} = 70V, V_{GS} = 0V$ | - | - | 1 | μA |
| Gate-body leakage current | I_{GSS} | $V_{GS} = \pm 20V, V_{DS} = 0V$ | - | - | ± 100 | nA |
| Gate threshold voltage ⁽³⁾ | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250\mu A$ | 2 | 3 | 4 | V |
| Drain-source on-resistance ⁽³⁾ | $R_{DS(on)}$ | $V_{GS} = 10V, I_D = 30A$ | - | 6.7 | 7.8 | m Ω |
| Forward tranconductance ⁽³⁾ | g_{FS} | $V_{DS} = 10V, I_D = 30A$ | - | 60 | - | S |
| Dynamic characteristics | | | | | | |
| Input Capacitance | C_{iss} | $V_{DS} = 30V, V_{GS} = 0V, f = 1MHz$ | - | 1466 | - | pF |
| Output Capacitance | C_{oss} | | - | 770 | - | |
| Reverse Transfer Capacitance | C_{rss} | | - | 55 | - | |
| Switching characteristics | | | | | | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DS} = 15V, I_D = 3A,$ $V_{GS} = 10V, R_G = 6\Omega$ | - | 8.4 | - | ns |
| Turn-on rise time | t_r | | - | 9.0 | - | |
| Turn-off delay time | $t_{d(off)}$ | | - | 23.6 | - | |
| Turn-off fall time | t_f | | - | 18 | - | |
| Total Gate Charge | Q_g | $V_{DS} = 50V, I_D = 12A,$ $V_{GS} = 10V$ | - | 28 | - | nC |
| Gate-Source Charge | Q_{gs} | | - | 5.2 | - | |
| Gate-Drain Charge | Q_{gd} | | - | 6 | - | |
| Source-Drain Diode characteristics | | | | | | |
| Diode Forward voltage ⁽³⁾ | V_{DS} | $V_{GS} = 0V, I_S = 30A$ | - | - | 1.2 | V |
| Diode Forward current ⁽⁴⁾ | I_S | | - | - | 80 | A |

Notes:

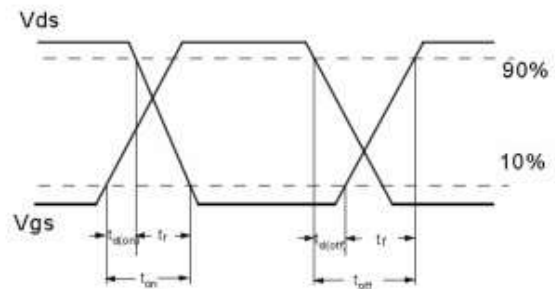
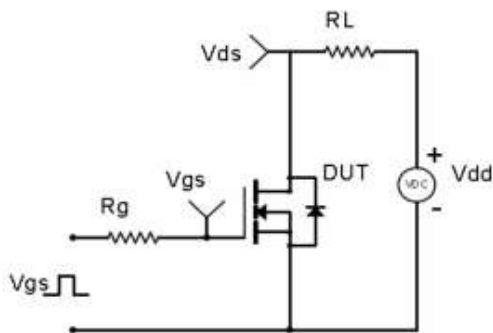
1. Repetitive Rating: pulse width limited by maximum junction temperature
2. EAS Condition: $T_J = 25^{\circ}\text{C}, V_{DD} = 10V, R_G = 20\Omega, L = 0.5mH, I_{AS} = 25A$
3. Pulse Test: pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
4. Surface Mounted on FR4 Board, $t \leq 10$ sec

Test Circuit & Waveform

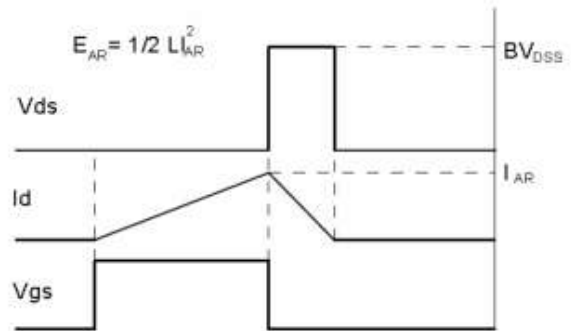
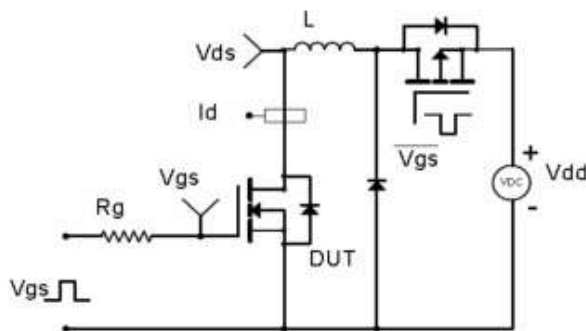
Gate Charge Test Circuit & Waveform



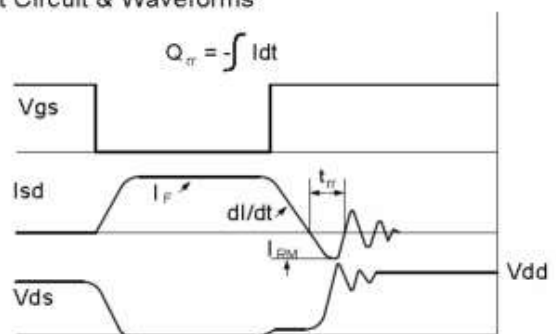
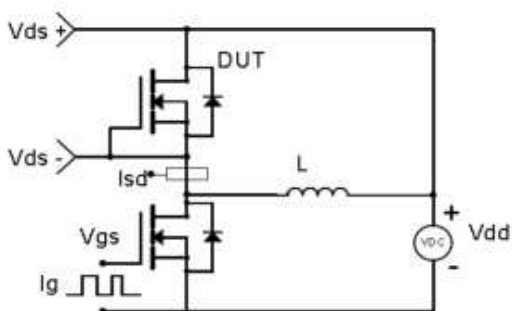
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Typical Electronic and Thermal Characteristics

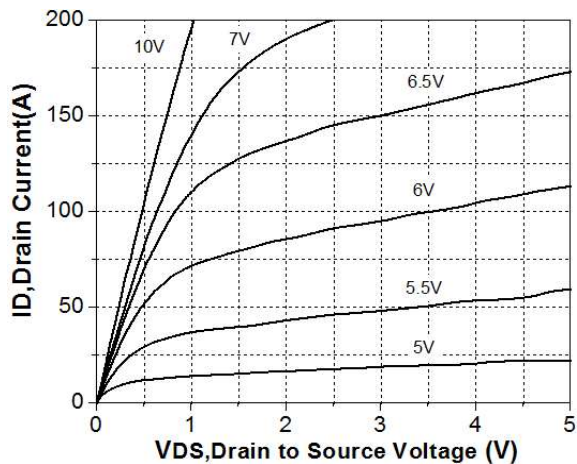


Figure 1. On-Region Characteristics

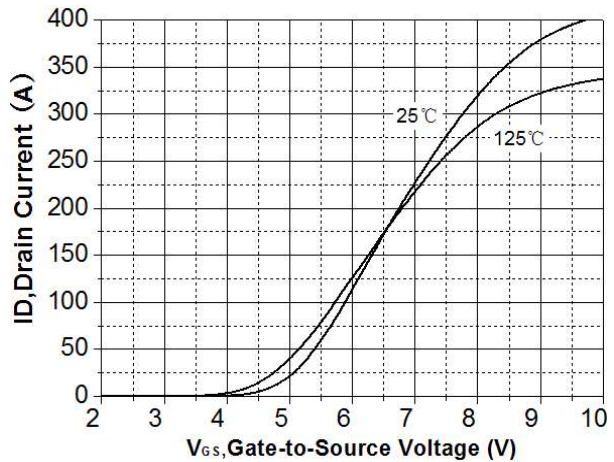


Figure 2. Transfer Characteristics

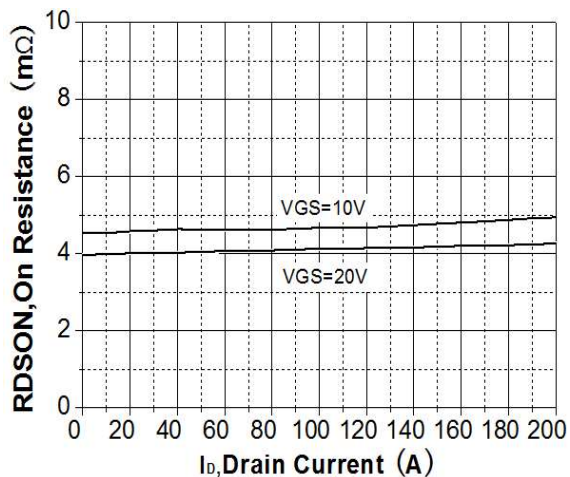


Figure 3. On-Resistance Variation vs Drain Current

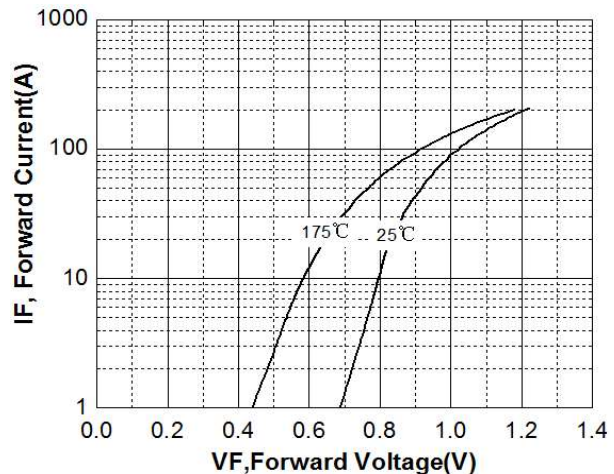


Figure 4. Body Diode Forward Voltage Vs Reverse Drain Current

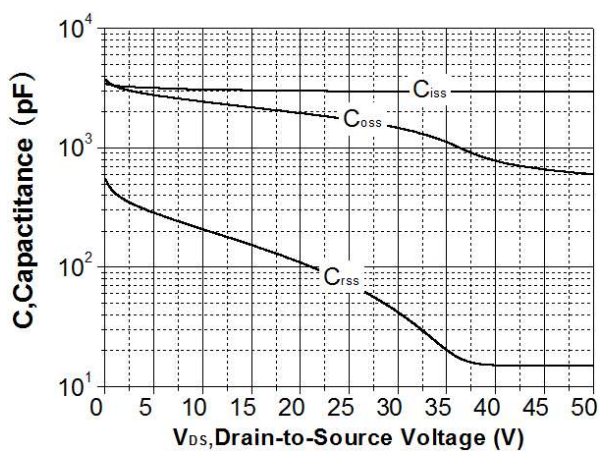


Figure 5. Capacitance Characteristics

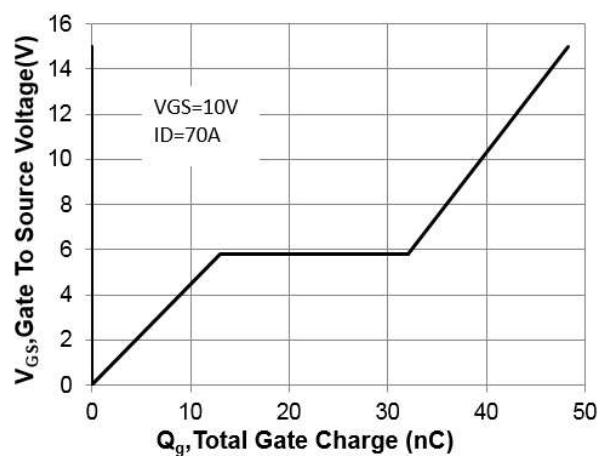


Figure 6. Gate Charge Characteristics

Typical Electronic and Thermal Characteristics

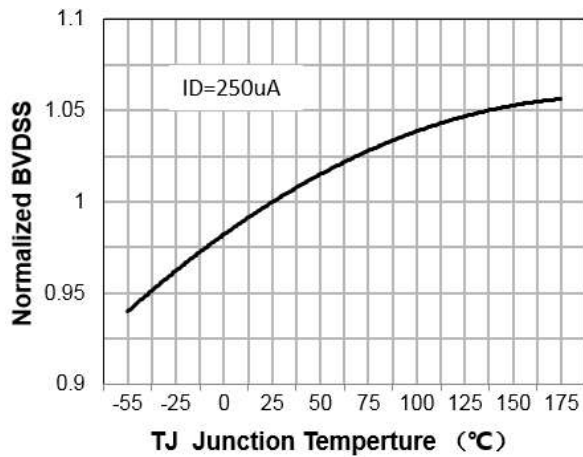


Figure 7. Breakdown Voltage Variation vs Temperature

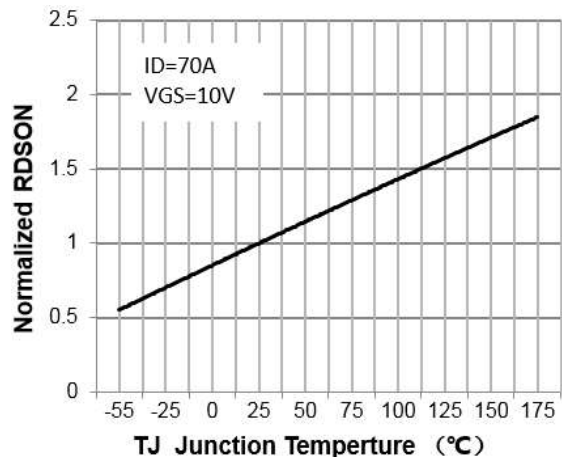


Figure 8. On-Resistance Variation vs Temperature

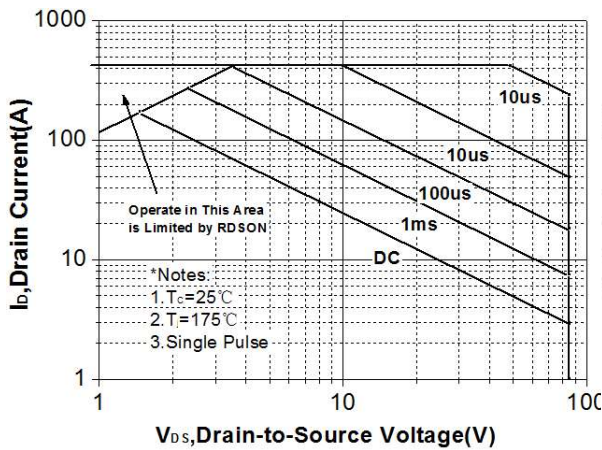


Figure 9. Maximum Safe Operating Area

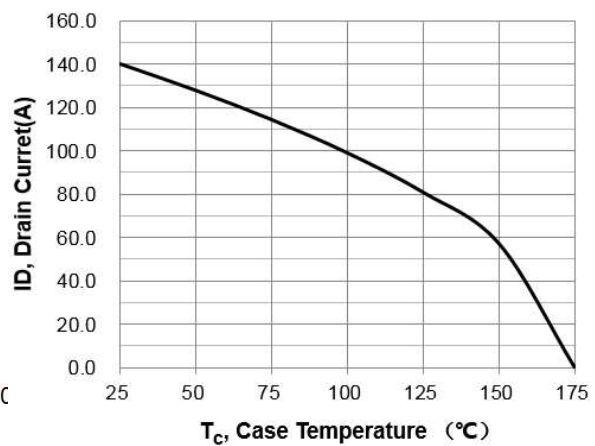


Figure 10. Maximum Drain Current vs Case Temperature

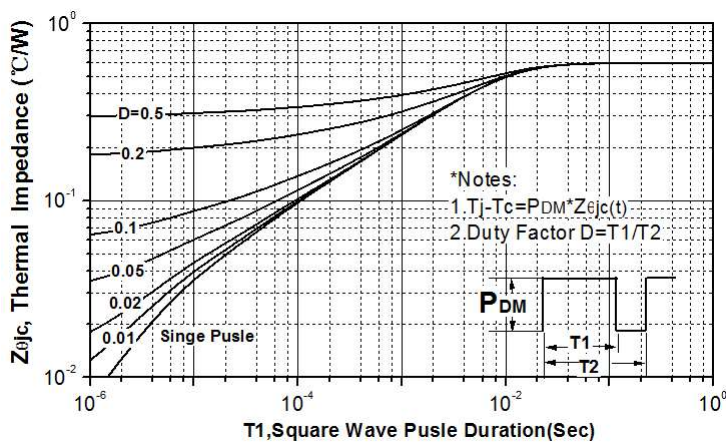
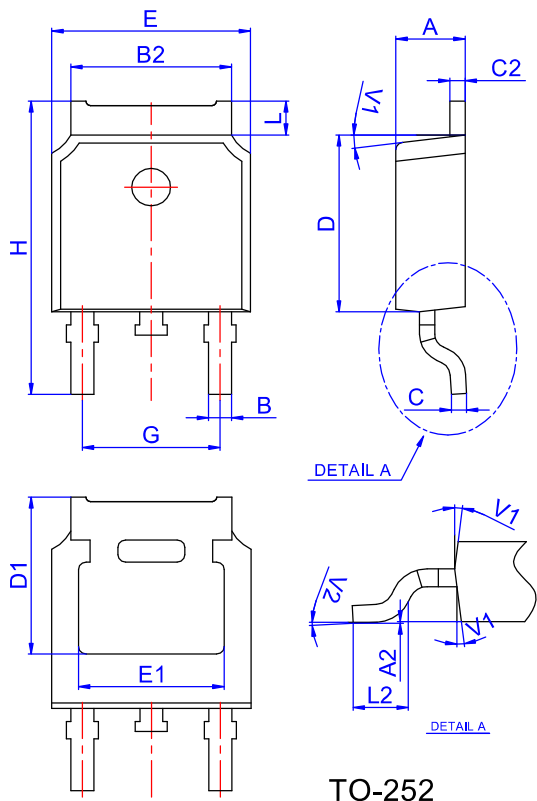


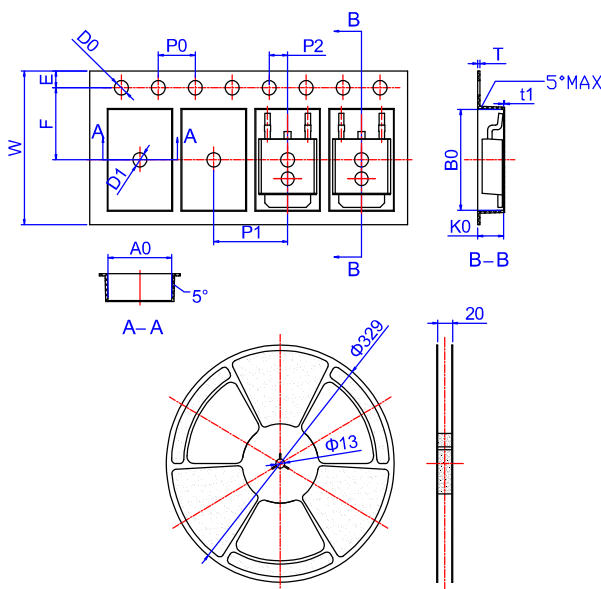
Figure 11. Transient Thermal Response Curve

TO-252 Package Information



| Ref. | Dimensions | | | | | |
|------|-------------|------|-------|----------|------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 2.10 | | 2.50 | 0.083 | | 0.098 |
| A2 | 0 | | 0.10 | 0 | | 0.004 |
| B | 0.66 | | 0.86 | 0.026 | | 0.034 |
| B2 | 5.18 | | 5.48 | 0.202 | | 0.216 |
| C | 0.40 | | 0.60 | 0.016 | | 0.024 |
| C2 | 0.44 | | 0.58 | 0.017 | | 0.023 |
| D | 5.90 | | 6.30 | 0.232 | | 0.248 |
| D1 | 5.30REF | | | 0.209REF | | |
| E | 6.40 | | 6.80 | 0.252 | | 0.268 |
| E1 | 4.63 | | | 0.182 | | |
| G | 4.47 | | 4.67 | 0.176 | | 0.184 |
| H | 9.50 | | 10.70 | 0.374 | | 0.421 |
| L | 1.09 | | 1.21 | 0.043 | | 0.048 |
| L2 | 1.35 | | 1.65 | 0.053 | | 0.065 |
| V1 | | 7° | | | 7° | |
| V2 | 0° | | 6° | 0° | | 6° |

Reel Specification-TO-252



| Ref. | Dimensions | | | | | |
|------|-------------|-------|-------|--------|-------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| W | 15.90 | 16.00 | 16.10 | 0.626 | 0.630 | 0.634 |
| E | 1.65 | 1.75 | 1.85 | 0.065 | 0.069 | 0.073 |
| F | 7.40 | 7.50 | 7.60 | 0.291 | 0.295 | 0.299 |
| D0 | 1.40 | 1.50 | 1.60 | 0.055 | 0.059 | 0.063 |
| D1 | 1.40 | 1.50 | 1.60 | 0.055 | 0.059 | 0.063 |
| P0 | 3.90 | 4.00 | 4.10 | 0.154 | 0.157 | 0.161 |
| P1 | 7.90 | 8.00 | 8.10 | 0.311 | 0.315 | 0.319 |
| P2 | 1.90 | 2.00 | 2.10 | 0.075 | 0.079 | 0.083 |
| A0 | 6.85 | 6.90 | 7.00 | 0.270 | 0.271 | 0.276 |
| B0 | 10.45 | 10.50 | 10.60 | 0.411 | 0.413 | 0.417 |
| K0 | 2.68 | 2.78 | 2.88 | 0.105 | 0.109 | 0.113 |
| T | 0.24 | | 0.27 | 0.009 | | 0.011 |
| t1 | 0.10 | | | 0.004 | | |
| 10P0 | 39.80 | 40.00 | 40.20 | 1.567 | 1.575 | 1.583 |