



CST20N03 N-Ch 30V Fast Switching MOSFETs

- ★ Super Low Gate Charge
- ★ 100% EAS Guaranteed
- ★ Green Device Available
- ★ Excellent CdV/dt effect decline
- ★ Advanced high cell density Trench technology

CST20N03 Product Summary

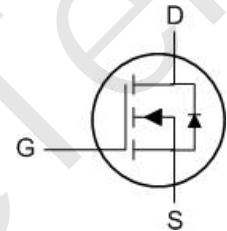
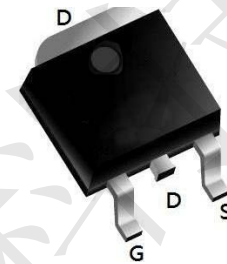


| BVDSS | RDSON | ID |
|-------|-------|-----|
| 30V | 15mΩ | 20A |

CST20N03 Description

The CST20N03 is the high cell density trenched N-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications. The CST20N03 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

CST20N03 TO252 Pin Configuration



CST20N03 Absolute Maximum Ratings

| Symbol | Parameter | Rating | | Units |
|-----------------------|--|------------|--------------|------------|
| | | 10s | Steady State | |
| V_{DS} | Drain-Source Voltage | 30 | | V |
| V_{GS} | Gate-Source Voltage | ± 20 | | V |
| $I_D@T_C=25^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 20 | | A |
| $I_D@T_C=100^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 8 | | A |
| I_{DM} | Pulsed Drain Current ² | 38 | | A |
| EAS | Single Pulse Avalanche Energy ³ | 28 | | mJ |
| I_{AS} | Avalanche Current | 13.8 | | A |
| $P_D@T_C=25^\circ C$ | Total Power Dissipation ⁴ | 5.5 | | W |
| T_{STG} | Storage Temperature Range | -55 to 175 | | $^\circ C$ |
| T_J | Operating Junction Temperature Range | -55 to 175 | | $^\circ C$ |

CST20N03 Thermal Data

| Symbol | Parameter | Typ. | Max. | Unit |
|-----------------|---|------|------|--------------|
| $R_{\theta JC}$ | Thermal Resistance Junction-Case ¹ | --- | 36 | $^\circ C/W$ |



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CST20N03 Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise specified)

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Units |
|---|---|--|------|------|-----------|------------|
| Off Characteristic | | | | | | |
| $V_{(BR)DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_D=250\mu A$ | 30 | - | - | V |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS}=30V, V_{GS}=0V,$ | - | - | 1.0 | μA |
| I_{GSS} | Gate to Body Leakage Current | $V_{DS}=0V, V_{GS}=\pm 20V$ | - | - | ± 100 | nA |
| On Characteristics | | | | | | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}=V_{GS}, I_D=250\mu A$ | 1.0 | 1.5 | 2.5 | V |
| $R_{DS(on)}$ | Static Drain-Source on-Resistance <small>note3</small> | $V_{GS}=10V, I_D=5A$ | - | 15 | 20 | m Ω |
| | | $V_{GS}=4.5V, I_D=3A$ | - | 21 | 29 | |
| Dynamic Characteristics | | | | | | |
| C_{iss} | Input Capacitance | $V_{DS}=15V, V_{GS}=0V,$ $f=1.0MHz$ | - | 490 | - | pF |
| C_{oss} | Output Capacitance | | - | 79 | - | pF |
| C_{rss} | Reverse Transfer Capacitance | | - | 61 | - | pF |
| Q_g | Total Gate Charge | $V_{DS}=15V, I_D=5.8A,$ $V_{GS}=10V$ | - | 10 | - | nC |
| Q_{gs} | Gate-Source Charge | | - | 1.7 | - | nC |
| Q_{gd} | Gate-Drain("Miller") Charge | | - | 2.5 | - | nC |
| Switching Characteristics | | | | | | |
| $t_{d(on)}$ | Turn-on Delay Time | $V_{DS}=15V, I_D=3A,$ $V_{GS}=10V, R_{REN}=3\Omega$ | - | 6 | - | ns |
| t_r | Turn-on Rise Time | | - | 15 | - | ns |
| $t_{d(off)}$ | Turn-off Delay Time | | - | 17 | - | ns |
| t_f | Turn-off Fall Time | | - | 17 | - | ns |
| Drain-Source Diode Characteristics and Maximum Ratings | | | | | | |
| I_S | Maximum Continuous Drain to Source Diode Forward Current | | - | - | 9 | A |
| I_{SM} | Maximum Pulsed Drain to Source Diode Forward Current | | - | - | 36 | A |
| V_{SD} | Drain to Source Diode Forward Voltage | $V_{GS}=0V, I_S=9A$ | - | - | 1.2 | V |
| t_{rr} | Body Diode Reverse Recovery Time | $I_F=5A, di/dt=100A/\mu s$ | - | 7 | - | ns |
| Q_{rr} | Body Diode Reverse Recovery Charge | | - | 2 | - | nC |

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. EAS condition : $T_J=25^\circ\text{C}, V_{DD}=15V, V_G=10V, L=0.5mH, R_g=25\Omega, I_{AS}=6A$

3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$



CST20N03 Typical Performance Characteristics

Figure 1: Output Characteristics

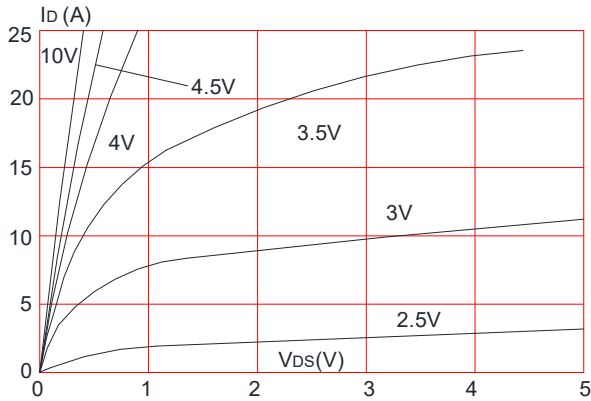


Figure 2: Typical Transfer Characteristics

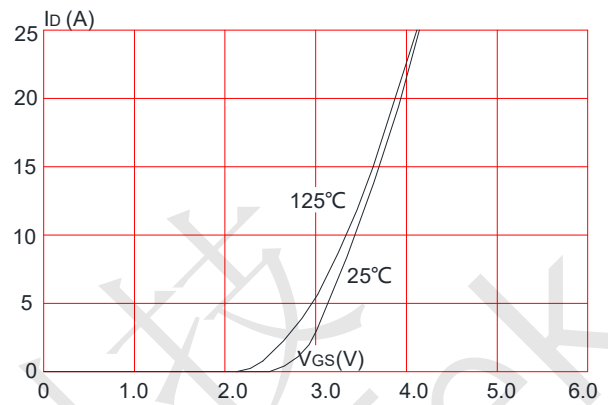


Figure 3: On-resistance vs. Drain Current

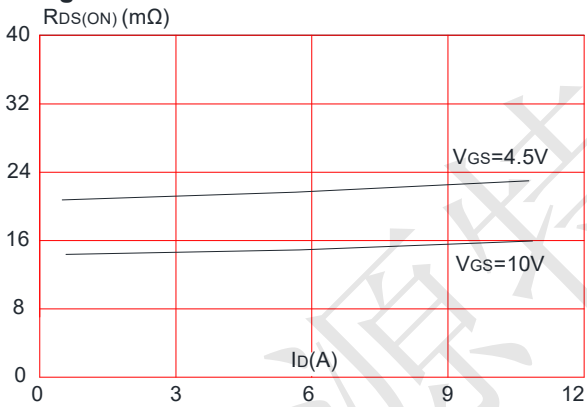


Figure 4: Body Diode Characteristics

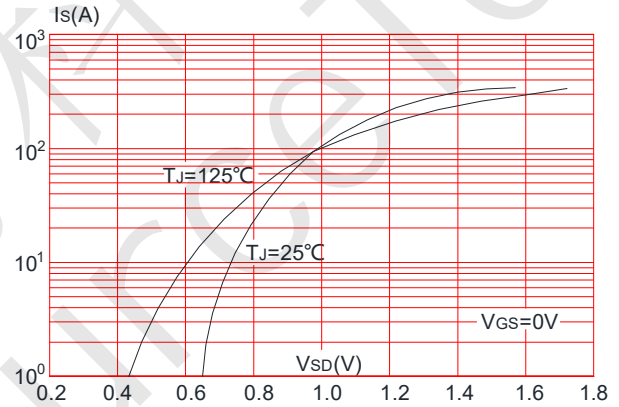


Figure 5: Gate Charge Characteristics

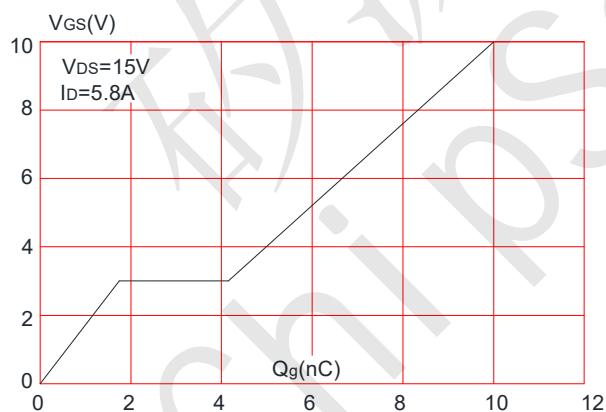
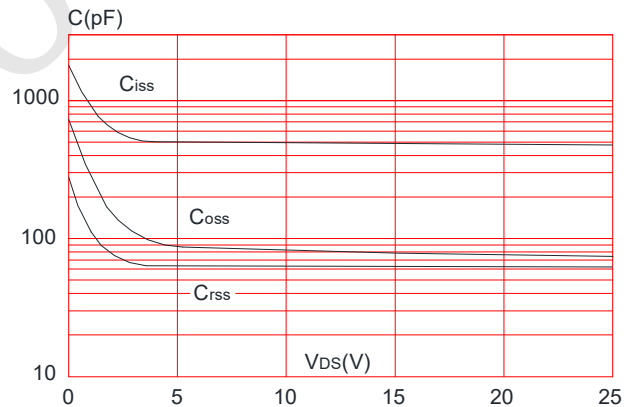


Figure 6: Capacitance Characteristics





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Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

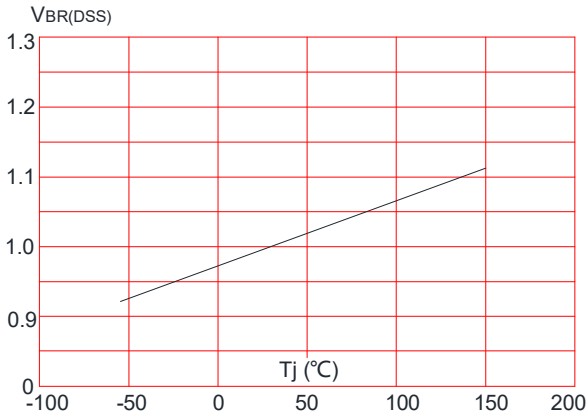


Figure 8: Normalized on Resistance vs. Junction Temperature

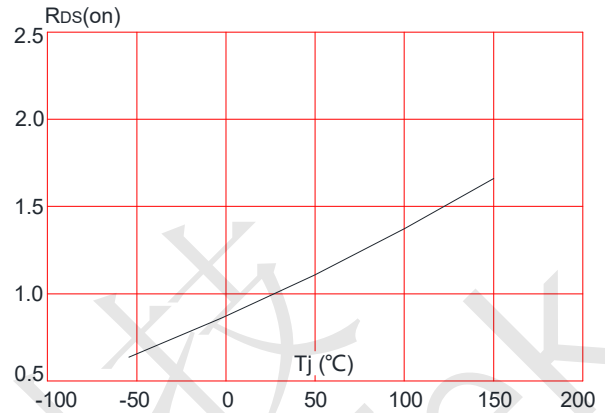


Figure 9: Maximum Safe Operating Area

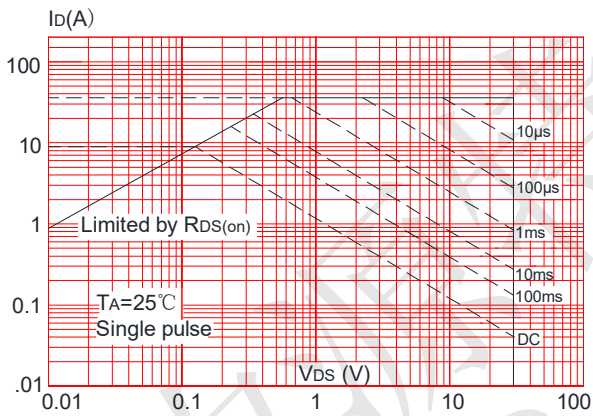


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

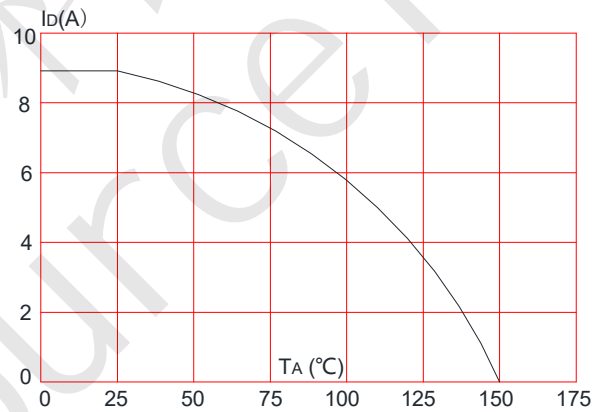
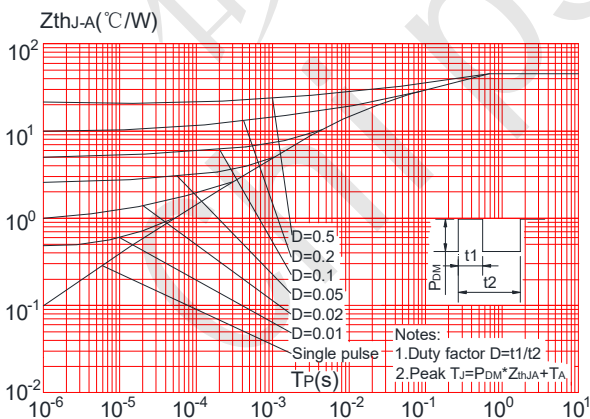


Figure 11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient





CST20N03 Test Circuit

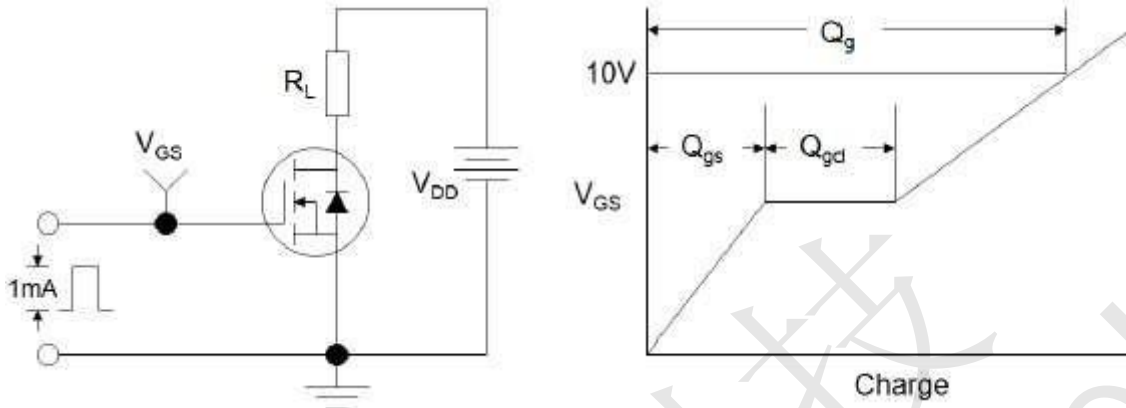


Figure1:Gate Charge Test Circuit & Waveform

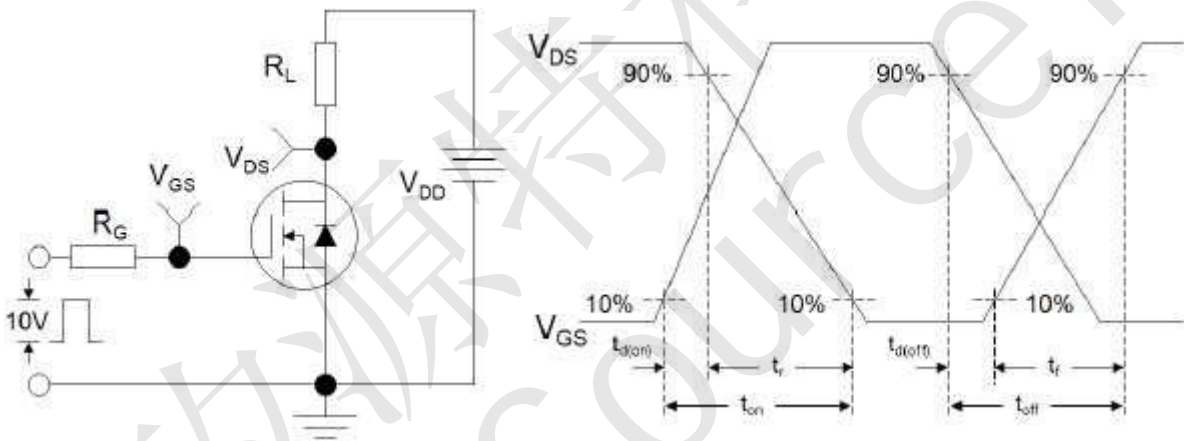


Figure 2: Resistive Switching Test Circuit & Waveforms

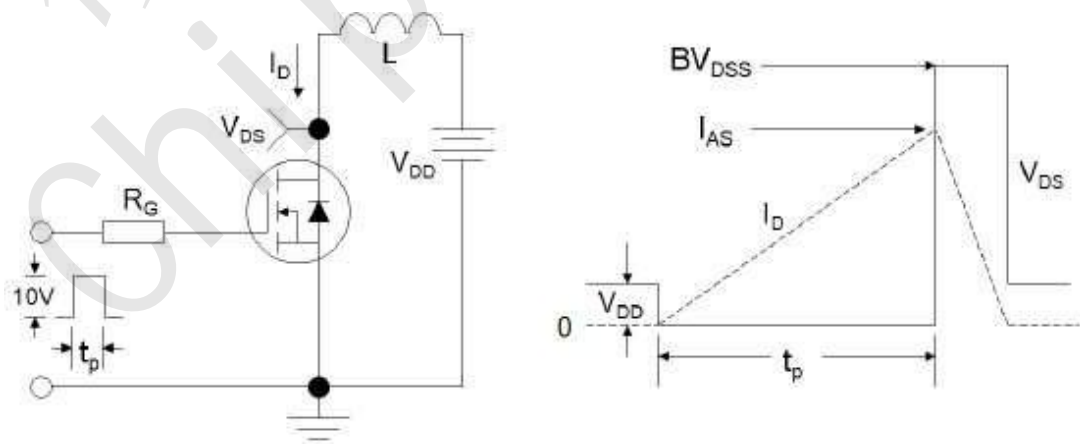
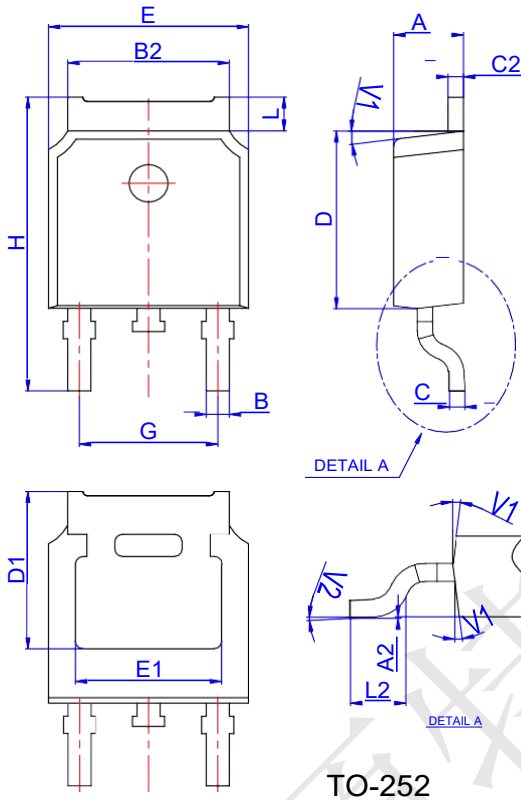


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms



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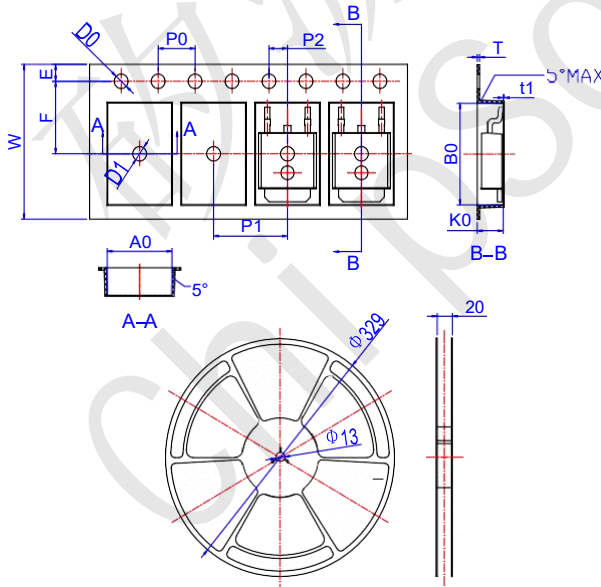
CST20N03 Package Mechanical Data TO 252-4R



TO-252

| 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° |

CST20N03 Reel Specification-TO-252-4R



| 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 |