

AOD380A60-VB Datasheet

N-Channel 600V (D-S) Super Junction Power MOSFET

| PRODUCT SUMMARY | | |
|---|-----------------|-------|
| V_{DS} (V) at T_J max. | 600 | |
| $R_{DS(on)}$ typ. (Ω) at 25 °C | $V_{GS} = 10$ V | 0.340 |

FEATURES

- Low figure-of-merit (FOM) $R_{on} \times Q_g$
- Low input capacitance (C_{iss})
- Reduced switching and conduction losses
- Ultra low gate charge (Q_g)
- Avalanche energy rated (UIS)

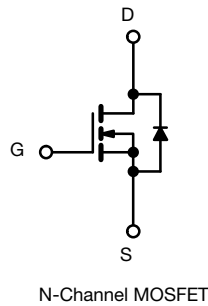


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FREE

TO-252



Top View



APPLICATIONS

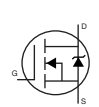
- Server and telecom power supplies
- Switch mode power supplies (SMPS)
- Power factor correction power supplies (PFC)
- Lighting
 - High-intensity discharge (HID)
 - Fluorescent ballast lighting
- Industrial
 - Welding
 - Induction heating
 - Motor drives
 - Battery chargers
 - Renewable energy
 - Solar (PV inverters)

| ABSOLUTE MAXIMUM RATINGS ($T_C = 25$ °C, unless otherwise noted) | | | | |
|---|------------------|----------------|------|------|
| PARAMETER | SYMBOL | LIMIT | UNIT | |
| Drain-source voltage | V_{DS} | 600 | V | |
| Gate-source voltage | V_{GS} | ± 30 | | |
| Continuous drain current ($T_J = 150$ °C) | V_{GS} at 10 V | $T_C = 25$ °C | 12 | A |
| | | $T_C = 100$ °C | 7 | |
| Pulsed drain current ^a | I_{DM} | 36 | | |
| Linear derating factor | | 1.7 | W/°C | |
| Single pulse avalanche energy ^b | E_{AS} | 310 | mJ | |
| Maximum power dissipation | P_D | 180 | W | |
| Operating junction and storage temperature range | T_J, T_{stg} | -55 to +150 | °C | |
| Drain-source voltage slope | dV/dt | $T_J = 125$ °C | 50 | V/ns |
| Reverse diode dV/dt ^d | | 5.1 | | |
| Soldering recommendations (peak temperature) ^c | For 10 s | 260 | °C | |

Notes

- Repetitive rating; pulse width limited by maximum junction temperature
- $V_{DD} = 100$ V, starting $T_J = 25$ °C, $L = 30$ mH, $R_g = 25$ Ω , $I_{AS} = 6$ A
- 1.6 mm from case
- $I_{SD} \leq I_D$, $dI/dt = 100$ A/ μ s, starting $T_J = 25$ °C

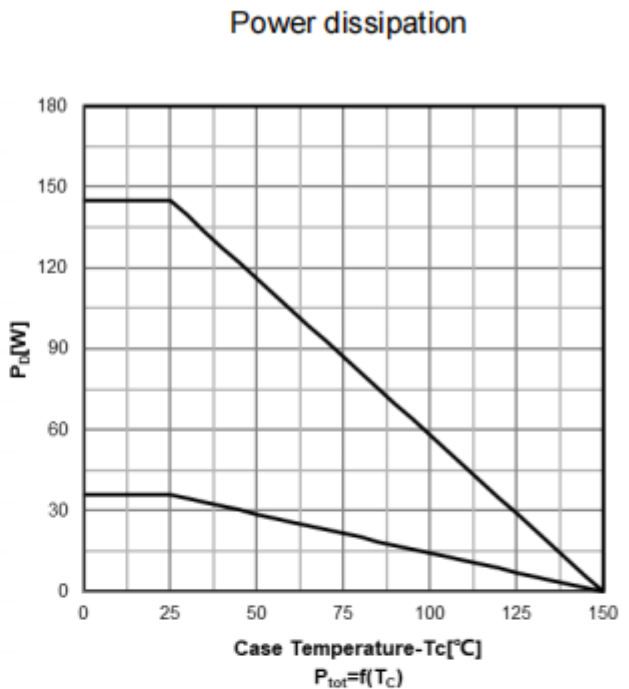
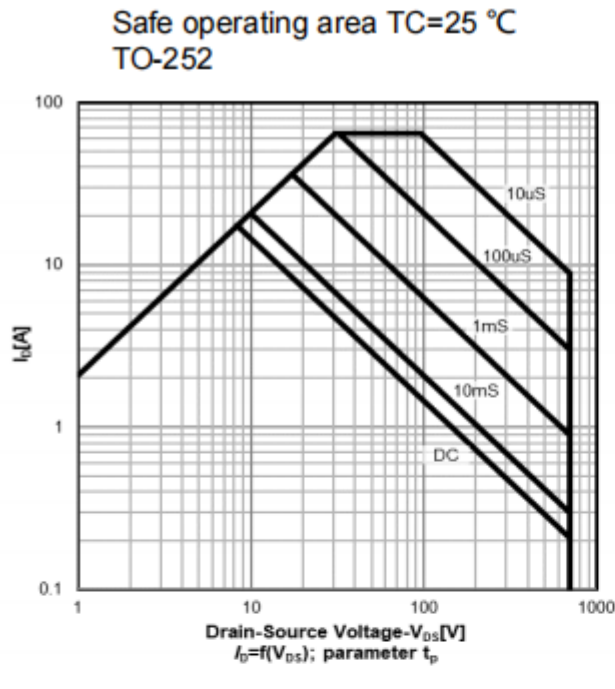
| THERMAL RESISTANCE RATINGS | | | | |
|----------------------------------|------------|------|------|------|
| PARAMETER | SYMBOL | TYP. | MAX. | UNIT |
| Maximum junction-to-ambient | R_{thJA} | - | 62 | °C/W |
| Maximum junction-to-case (drain) | R_{thJC} | - | 0.85 | |

| SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted) | | | | | | | |
|---|---------------------|---|--|---------------------------------------|-------|-----------|---------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | | MIN. | TYP. | MAX. | UNIT |
| Static | | | | | | | |
| Drain-source breakdown voltage | V_{DS} | $V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$ | | 600 | - | - | V |
| V_{DS} temperature coefficient | $\Delta V_{DS}/T_J$ | Reference to $25\text{ }^\circ\text{C}, I_D = 1\text{ mA}$ | | - | 1.08 | - | V/°C |
| Gate-source threshold Voltage (N) | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$ | | 2.0 | - | 4.0 | V |
| Gate-source leakage | I_{GSS} | $V_{GS} = \pm 20\text{ V}$ | | - | - | ± 100 | nA |
| | | $V_{GS} = \pm 30\text{ V}$ | | - | - | ± 1 | μA |
| Zero gate voltage drain current | I_{DSS} | $V_{DS} = 600\text{ V}, V_{GS} = 0\text{ V}$ | | - | - | 1 | μA |
| | | $V_{DS} = 480\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$ | | - | - | 10 | |
| Drain-source on-state resistance | $R_{DS(on)}$ | $V_{GS} = 10\text{ V}$ | $I_D = 4\text{ A}$ | - | 0.340 | - | Ω |
| Forward transconductance | g_{fs} | $V_{DS} = 30\text{ V}, I_D = 12\text{ A}$ | | - | 8.7 | - | S |
| Dynamic | | | | | | | |
| Input capacitance | C_{iss} | $V_{GS} = 0\text{ V}, V_{DS} = 100\text{ V}, f = 1\text{ MHz}$ | | - | 1500 | - | pF |
| Output capacitance | C_{oss} | | | - | 51 | - | |
| Reverse transfer capacitance | C_{rss} | | | - | 12 | - | |
| Effective output capacitance, energy related ^a | $C_{o(er)}$ | | | - | 50 | - | |
| Effective output capacitance, time related ^b | $C_{o(tr)}$ | $V_{DS} = 0\text{ V to } 480\text{ V}, V_{GS} = 0\text{ V}$ | | - | 205 | - | |
| Total gate charge | Q_g | $V_{GS} = 10\text{ V}$ | $I_D = 12\text{ A}, V_{DS} = 480\text{ V}$ | - | 25 | - | nC |
| Gate-source charge | Q_{gs} | | | - | 8 | - | |
| Gate-drain charge | Q_{gd} | | | - | 10 | - | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD} = 480\text{ V}, I_D = 12\text{ A}, V_{GS} = 10\text{ V}, R_g = 9.1\text{ }\Omega$ | | - | 12 | 24 | ns |
| Rise time | t_r | | | - | 14 | 23 | |
| Turn-off delay time | $t_{d(off)}$ | | | - | 61 | 110 | |
| Fall time | t_f | | | - | 16 | - | |
| Gate input resistance | R_g | | | $f = 1\text{ MHz}, \text{open drain}$ | | 0.3 | |
| Drain-Source Body Diode Characteristics | | | | | | | |
| Continuous source-drain diode current | I_S | MOSFET symbol showing the integral reverse p - n junction diode  | | - | - | 12 | A |
| Pulsed diode forward current | I_{SM} | | | - | - | 36 | |
| Diode forward voltage | V_{SD} | $T_J = 25\text{ }^\circ\text{C}, I_S = 12\text{ A}, V_{GS} = 0\text{ V}$ | | - | - | 1.2 | V |
| Reverse recovery time | t_{rr} | $T_J = 25\text{ }^\circ\text{C}, I_F = I_S = 12\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, V_R = 25\text{ V}$ | | - | 416 | 832 | ns |
| Reverse recovery charge | Q_{rr} | | | - | 6.4 | 12.8 | μC |
| Reverse recovery current | I_{RRM} | | | - | 27 | - | A |

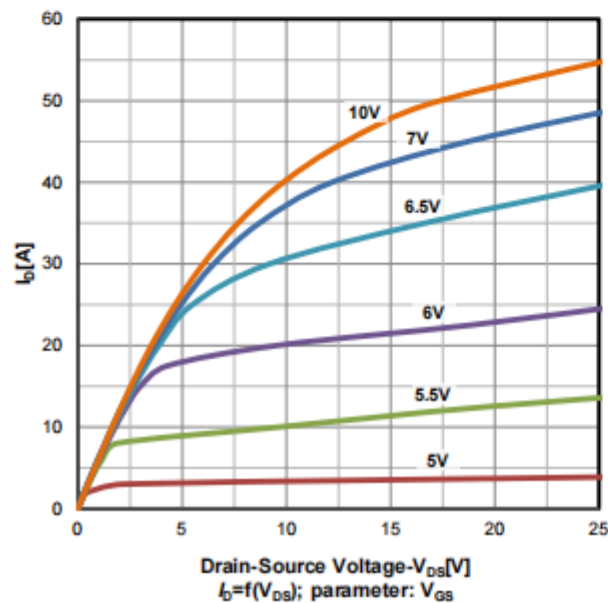
Notes

- a. $C_{oss(er)}$ is a fixed capacitance that gives the same energy as C_{oss} while V_{DS} is rising from 0 % to 80 % V_{DSS}
- b. $C_{oss(tr)}$ is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 % to 80 % V_{DSS}

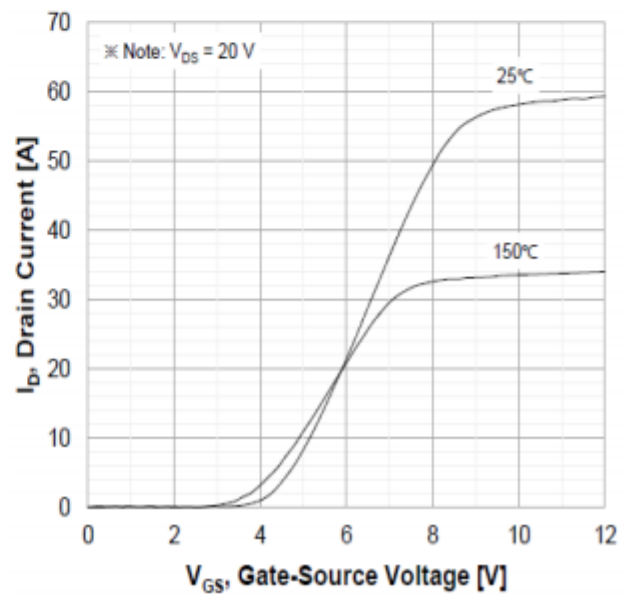
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



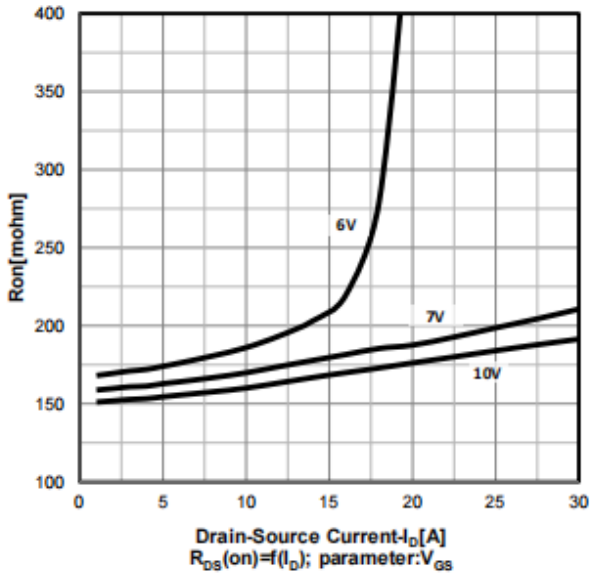
Typ. output characteristics $T_J=25\text{ }^\circ\text{C}$



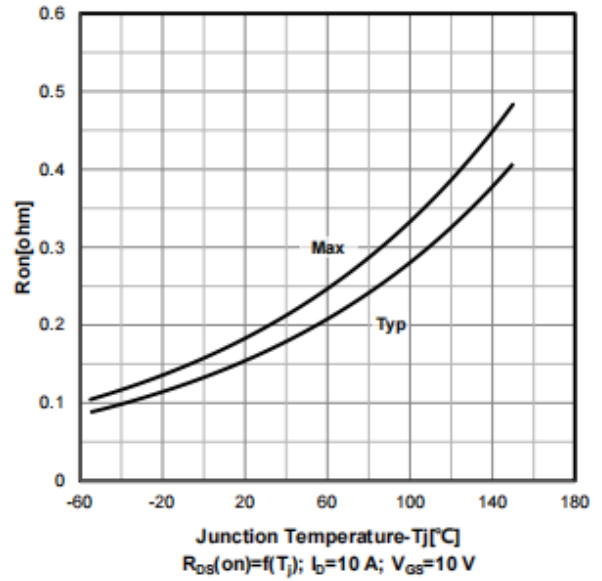
Transfer characteristics



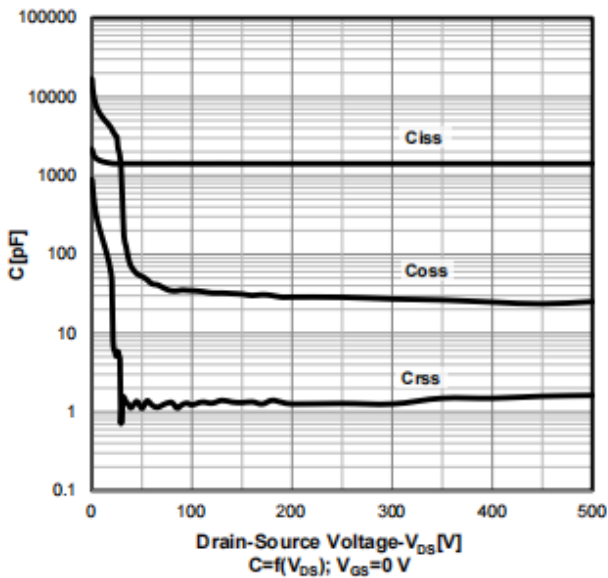
Typ. drain-source on-state resistance



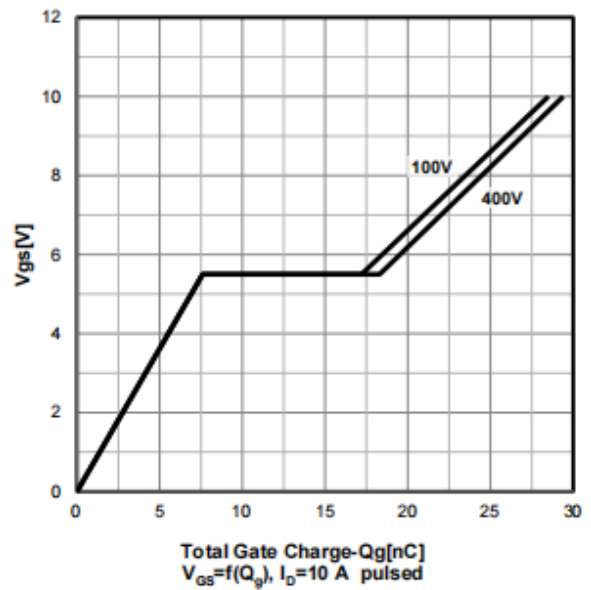
On-resistance vs temperature



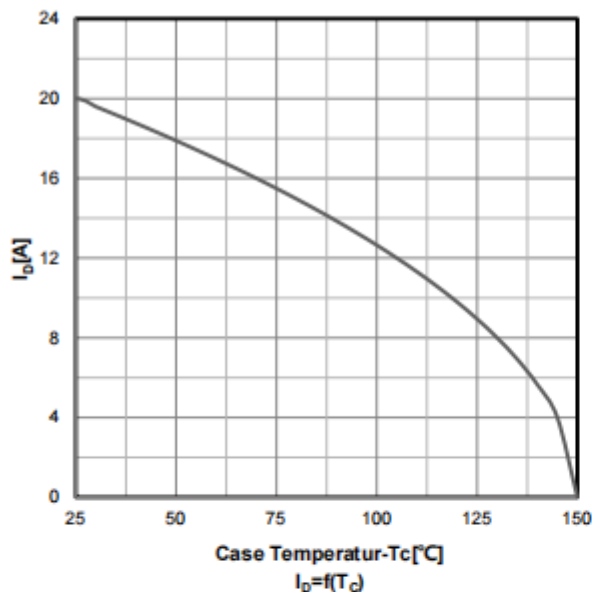
Typ. capacitances



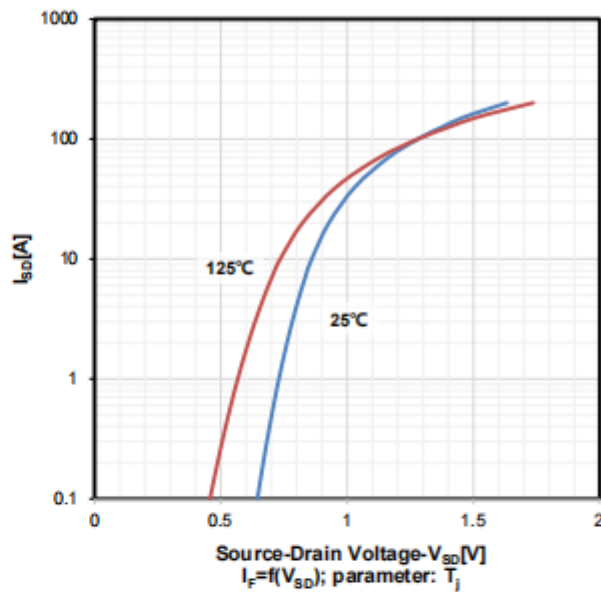
Typ. gate charge characteristics



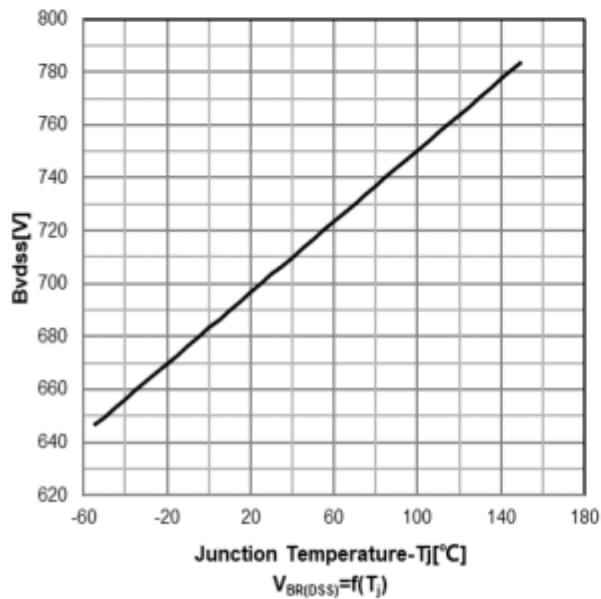
Drain current vs temperature



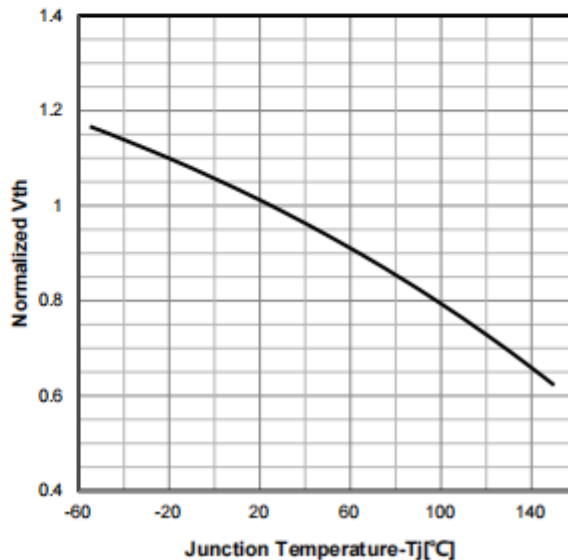
Forward characteristics of reverse diode



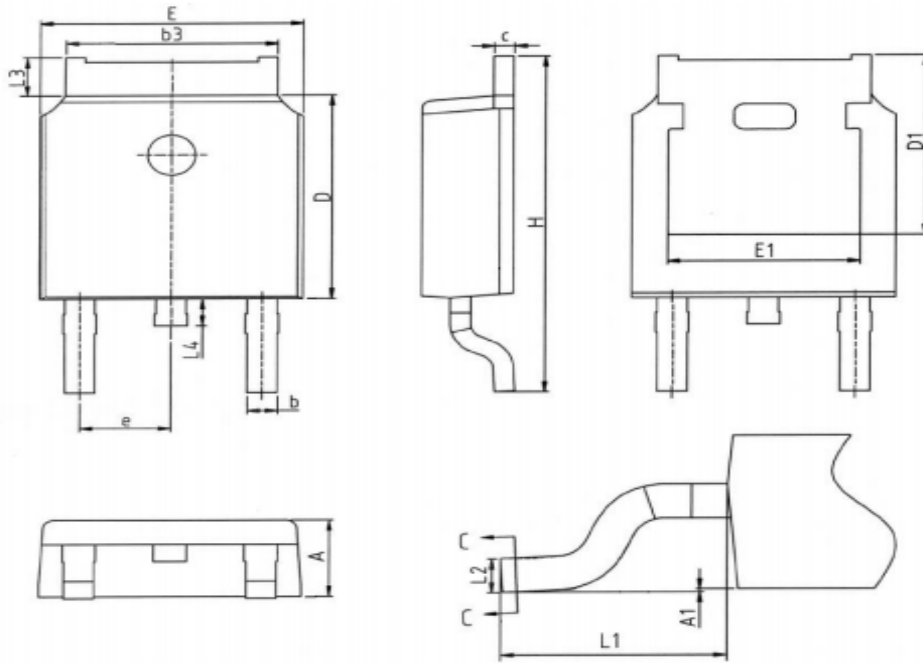
Drain-source breakdown voltage



Normalized Vth characteristics



Package Outline : TO 252



COMMON DIMENSIONS

| SYMBOL | UNIT(mm) | | |
|--------|----------|-------|-------|
| | MIN | NOM | MAX |
| A | 2.20 | 2.30 | 2.40 |
| A1 | 0.00 | - | 0.127 |
| b | 0.66 | 0.78 | 0.90 |
| b3 | 5.16 | 5.31 | 5.46 |
| c | 0.43 | 0.53 | 0.63 |
| D | 5.98 | 6.10 | 6.22 |
| D1 | 5.30REF | | |
| E | 6.40 | 6.60 | 6.75 |
| E1 | 4.63 | - | - |
| e | 2.286BSC | | |
| H | 9.40 | 10.10 | 10.50 |
| L1 | 2.90REF | | |
| L2 | 0.51BSC | | |
| L3 | 0.88 | 1.08 | 1.28 |
| L4 | 0.50 | 0.80 | 1.00 |

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