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Fast Switching Diode

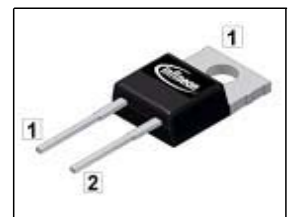
Features

- 1200 V diode technology
- Fast recovery
- Soft switching
- Low reverse recovery charge
- Low forward voltage
- Easy paralleling
- Pb-free lead plating; RoHS compliant
- Halogen-free according to IEC61249-2-21
- Qualified according to JEDEC for target applications

Product Summary

| | | |
|------------|------|----|
| V_{RRM} | 1200 | V |
| I_F | 12 | A |
| V_F | 1.65 | V |
| T_{jmax} | 150 | °C |

PG-TO220-2



| Type | Package | Ordering Code | Marking | Pin 1 | PIN 2 | PIN 3 |
|-----------|------------|---------------|---------|-------|-------|-------|
| IDP12E120 | PG-TO220-2 | - | D12E120 | C | A | - |

Maximum Ratings, at $T_j = 25\text{ °C}$, unless otherwise specified

| Parameter | Symbol | Value | Unit |
|--|----------------|------------|------|
| Repetitive peak reverse voltage | V_{RRM} | 1200 | V |
| Continuous forward current | I_F | 12 | A |
| $T_C=25\text{ °C}$ | | 28 | |
| $T_C=90\text{ °C}$ | | 17 | |
| Surge non repetitive forward current | I_{FSM} | 63 | |
| $T_C=25\text{ °C}$, $t_p=10\text{ ms}$, sine halfwave | | | |
| Maximum repetitive forward current | I_{FRM} | 42.5 | |
| $T_C=25\text{ °C}$, t_p limited by T_{jmax} , $D=0.5$ | | | |
| Power dissipation | P_{tot} | 96 | W |
| $T_C=25\text{ °C}$ | | 96 | |
| $T_C=90\text{ °C}$ | | 46 | |
| Operating and storage temperature | T_j, T_{stg} | -55...+150 | °C |
| Soldering temperature | T_S | 260 | °C |
| wavesoldering, 1.6mm (0.063 in.) from case for 10s | | | |

Thermal Characteristics

| Parameter | Symbol | Values | | | Unit |
|---|------------|--------|------|------|------|
| | | min. | typ. | max. | |
| Characteristics | | | | | |
| Thermal resistance, junction - case | R_{thJC} | - | - | 1.3 | K/W |
| Thermal resistance, junction - ambient, leaded | R_{thJA} | - | - | 62 | |
| SMD version, device on PCB: @ min. footprint @ 6 cm ² cooling area ¹⁾ | R_{thJA} | - | - | 62 | |
| | | - | 35 | - | |

Electrical Characteristics, at $T_j = 25\text{ }^\circ\text{C}$, unless otherwise specified

| Parameter | Symbol | Values | | | Unit |
|--|--------|--------|-------------|-------------|---------------|
| | | min. | typ. | max. | |
| Static Characteristics | | | | | |
| Reverse leakage current $V_R=1200\text{V}$, $T_j=25^\circ\text{C}$ $V_R=1200\text{V}$, $T_j=150^\circ\text{C}$ | I_R | - | - | 100 1000 | μA |
| Forward voltage drop $I_F=12\text{A}$, $T_j=25^\circ\text{C}$ $I_F=12\text{A}$, $T_j=150^\circ\text{C}$ | V_F | - | 1.65 1.7 | 2.15 - | V |

⁰J-STD20 and JESD22

¹Device on 40mm*40mm*1.5mm epoxy PCB FR4 with 6cm² (one layer, 70 μm thick) copper area for drain connection. PCB is vertical without blown air.

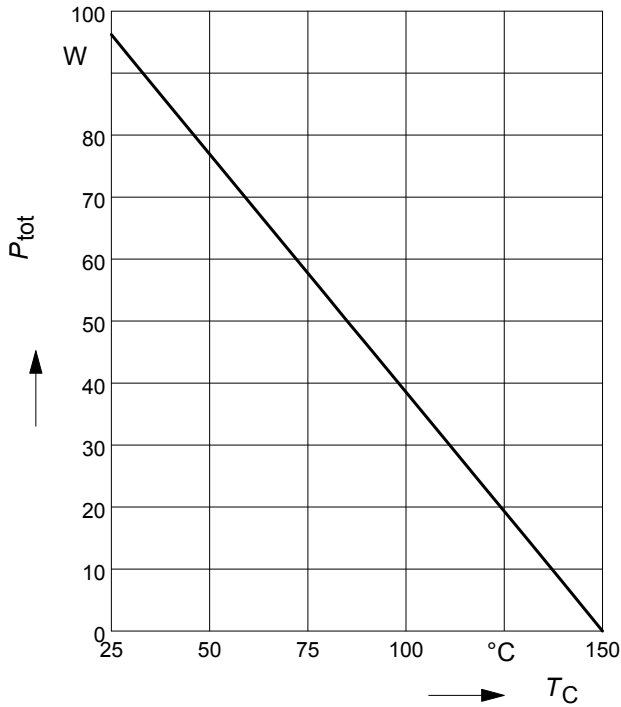
Electrical Characteristics, at $T_j = 25\text{ °C}$, unless otherwise specified

| Parameter | Symbol | Values | | | Unit |
|--|-----------|--------|----------------------|------|------|
| | | min. | typ. | max. | |
| Dynamic Characteristics | | | | | |
| Reverse recovery time $V_R=800\text{V}$, $I_F=12\text{A}$, $di_F/dt=800\text{A}/\mu\text{s}$, $T_j=25\text{°C}$ $V_R=800\text{V}$, $I_F=12\text{A}$, $di_F/dt=800\text{A}/\mu\text{s}$, $T_j=125\text{°C}$ $V_R=800\text{V}$, $I_F=12\text{A}$, $di_F/dt=800\text{A}/\mu\text{s}$, $T_j=150\text{°C}$ | t_{rr} | - | 150 215 225 | - | ns |
| Peak reverse current $V_R=800\text{V}$, $I_F = 12\text{ A}$, $di_F/dt=800\text{A}/\mu\text{s}$, $T_j=25\text{°C}$ $V_R=800\text{V}$, $I_F = 12\text{A}$, $di_F/dt=800\text{A}/\mu\text{s}$, $T_j=125\text{°C}$ $V_R=800\text{V}$, $I_F = 12\text{A}$, $di_F/dt=800\text{A}/\mu\text{s}$, $T_j=150\text{°C}$ | I_{rrm} | - | 17 20.9 21.5 | - | A |
| Reverse recovery charge $V_R=800\text{V}$, $I_F=12\text{A}$, $di_F/dt=800\text{A}/\mu\text{s}$, $T_j=25\text{°C}$ $V_R=800\text{V}$, $I_F = 12\text{A}$, $di_F/dt=800\text{A}/\mu\text{s}$, $T_j=125\text{°C}$ $V_R=800\text{V}$, $I_F = 12\text{A}$, $di_F/dt=800\text{A}/\mu\text{s}$, $T_j=150\text{°C}$ | Q_{rr} | - | 1200 1840 2025 | - | nC |
| Reverse recovery softness factor $V_R=800\text{V}$, $I_F=12\text{A}$, $di_F/dt=800\text{A}/\mu\text{s}$, $T_j=25\text{°C}$ $V_R=800\text{V}$, $I_F=12\text{A}$, $di_F/dt=800\text{A}/\mu\text{s}$, $T_j=125\text{°C}$ $V_R=800\text{V}$, $I_F=12\text{A}$, $di_F/dt=800\text{A}/\mu\text{s}$, $T_j=150\text{°C}$ | S | - | 5 5.8 5.9 | - | |

1 Power dissipation

$$P_{\text{tot}} = f(T_C)$$

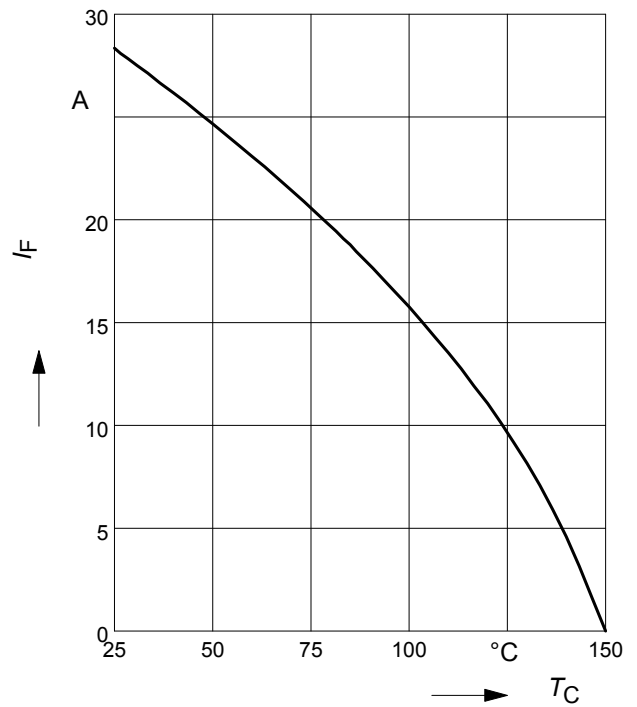
parameter: $T_j \leq 150^\circ\text{C}$



2 Diode forward current

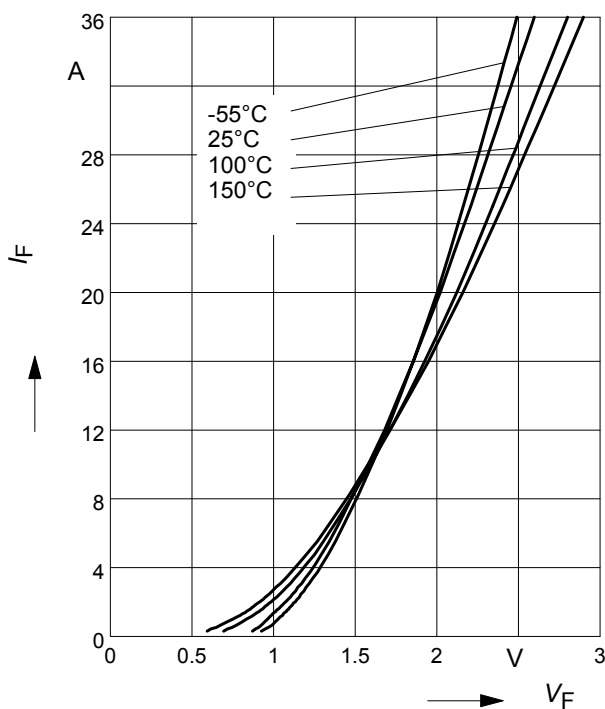
$$I_F = f(T_C)$$

parameter: $T_j \leq 150^\circ\text{C}$



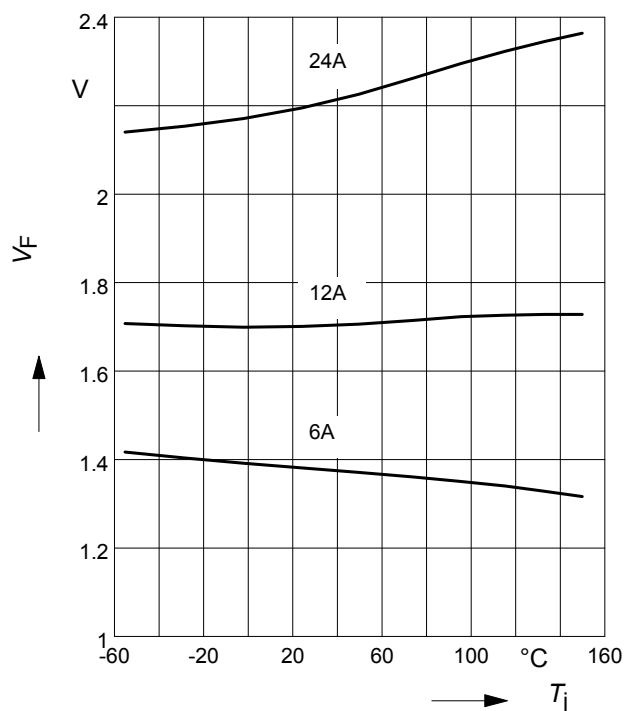
3 Typ. diode forward current

$$I_F = f(V_F)$$



4 Typ. diode forward voltage

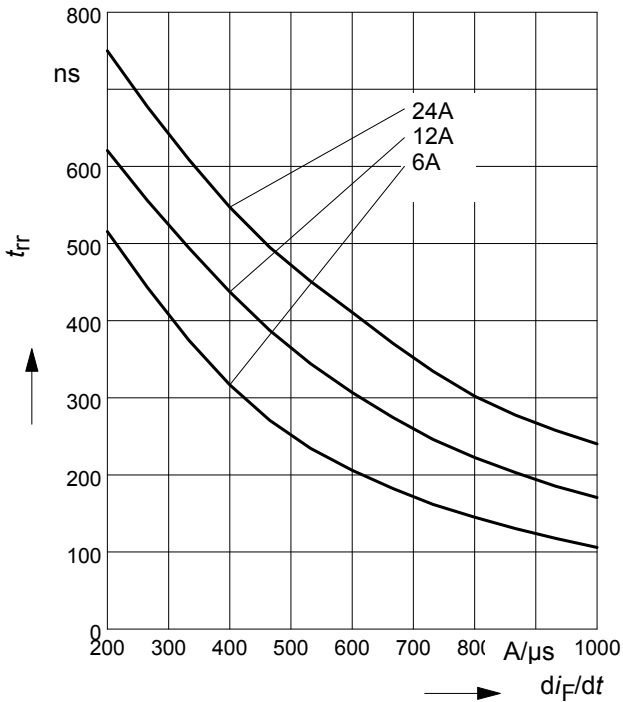
$$V_F = f(T_j)$$



5 Typ. reverse recovery time

$$t_{rr} = f(dI_F/dt)$$

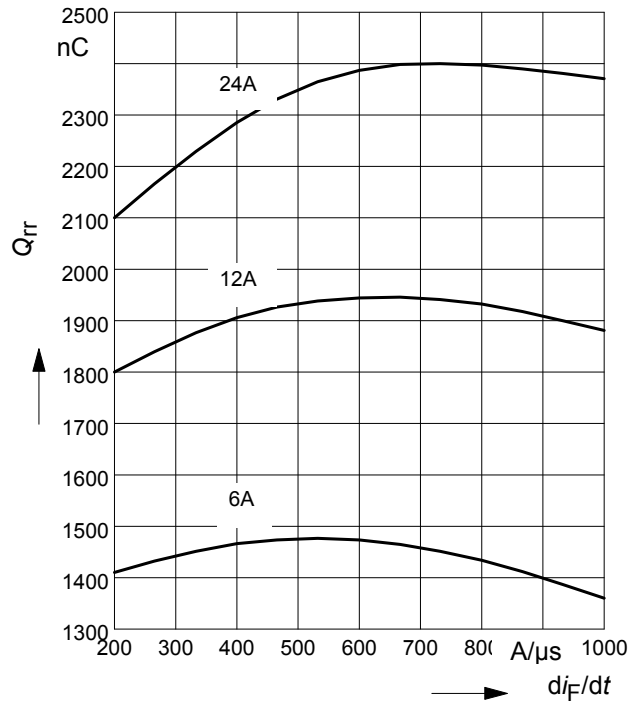
parameter: $V_R = 800V, T_j = 125^\circ C$



6 Typ. reverse recovery charge

$$Q_{rr} = f(dI_F/dt)$$

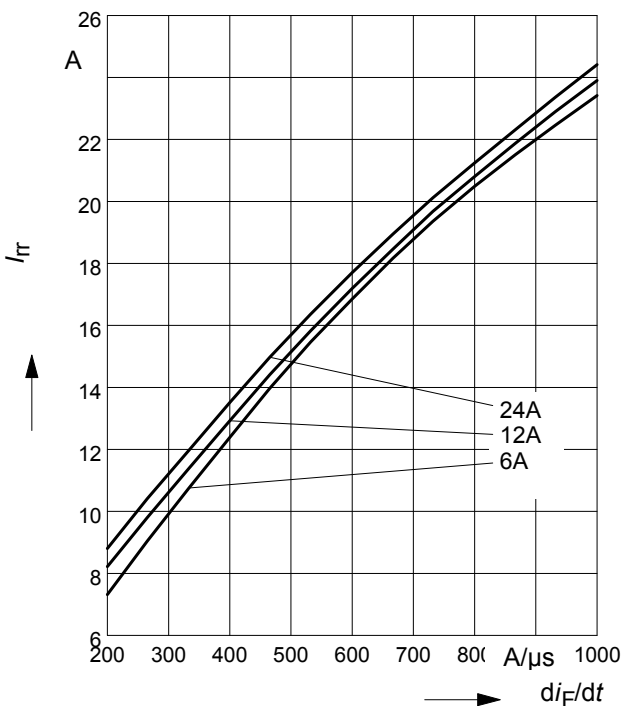
parameter: $V_R = 800V, T_j = 125^\circ C$



7 Typ. reverse recovery current

$$I_{rr} = f(dI_F/dt)$$

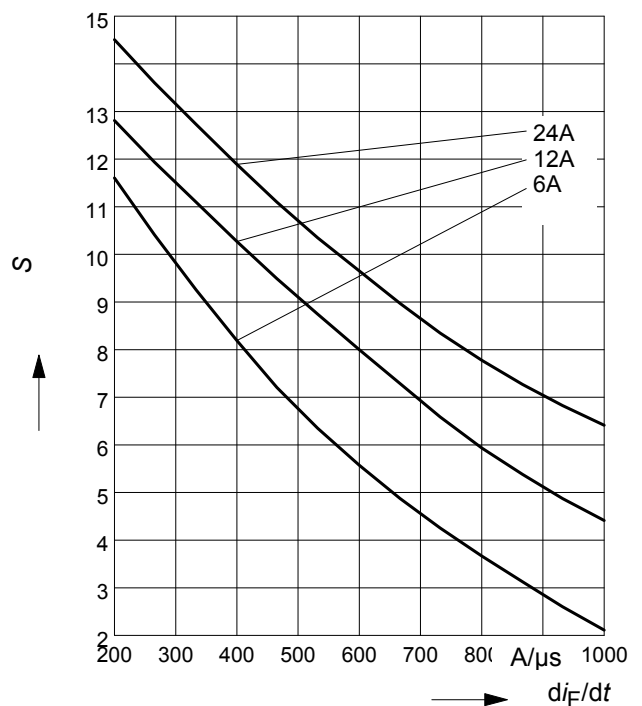
parameter: $V_R = 800V, T_j = 125^\circ C$



8 Typ. reverse recovery softness factor

$$S = f(dI_F/dt)$$

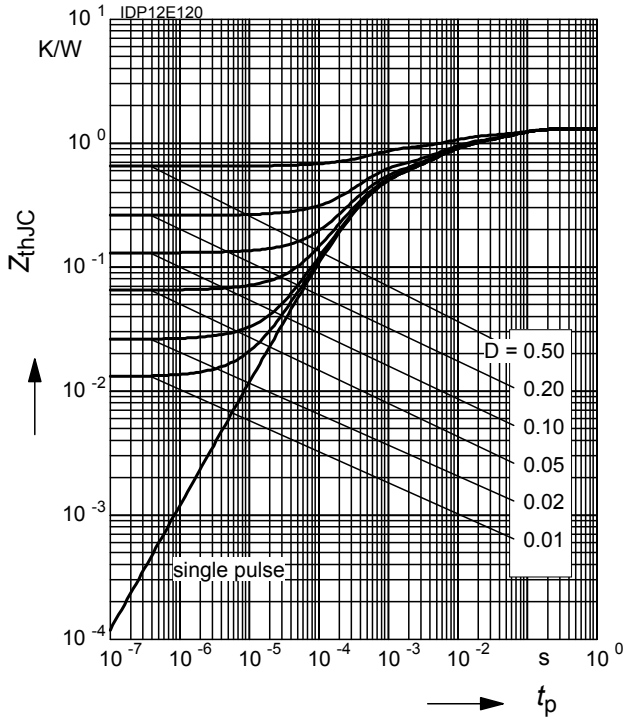
parameter: $V_R = 800V, T_j = 125^\circ C$

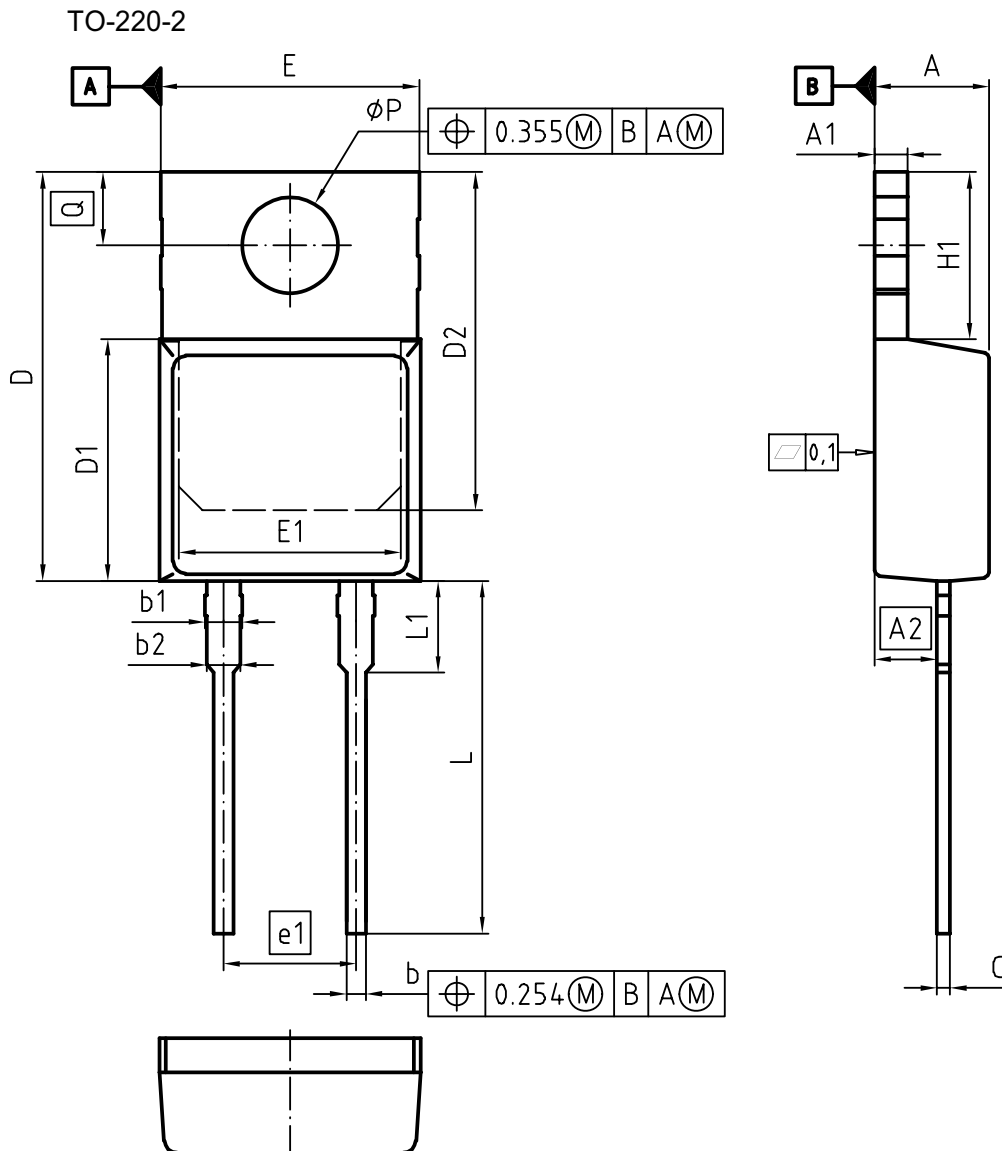


9 Max. transient thermal impedance

$$Z_{thJC} = f(t_p)$$

parameter : $D = t_p/T$





| DIM | MILLIMETERS | | INCHES | |
|----------|-------------|-------|--------|-------|
| | MIN | MAX | MIN | MAX |
| A | 4.30 | 4.50 | 0.169 | 0.177 |
| A1 | 1.17 | 1.37 | 0.046 | 0.054 |
| A2 | 2.30 | 2.50 | 0.091 | 0.098 |
| b | 0.65 | 0.85 | 0.026 | 0.033 |
| b1 | 1.19 | 1.69 | 0.047 | 0.066 |
| b2 | 1.19 | 1.39 | 0.047 | 0.055 |
| c | 0.40 | 0.60 | 0.016 | 0.024 |
| D | 15.35 | 15.95 | 0.604 | 0.628 |
| D1 | 9.05 | 9.45 | 0.356 | 0.372 |
| D2 | 12.30 | 13.05 | 0.484 | 0.514 |
| E | 9.80 | 10.20 | 0.386 | 0.402 |
| E1 | 7.25 | 8.60 | 0.285 | 0.339 |
| e1 | 5.08 | | 0.200 | |
| N | 2 | | 2 | |
| H1 | 5.90 | 6.90 | 0.232 | 0.272 |
| L | 13.00 | 14.00 | 0.512 | 0.551 |
| L1 | 3.30 | 3.70 | 0.130 | 0.146 |
| ϕP | 3.55 | 3.70 | 0.140 | 0.146 |
| Q | 2.60 | 3.00 | 0.102 | 0.118 |

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