

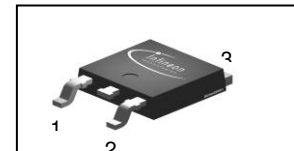
2nd Generation thinQ!TM SiC Schottky Diode

Features

- Revolutionary semiconductor material - Silicon Carbide
- Switching behavior benchmark
- No reverse recovery/ No forward recovery
- No temperature influence on the switching behavior
- High surge current capability
- Pb-free lead plating; RoHS compliant
- Qualified according to JEDEC¹⁾ for target applications
- Breakdown voltage tested at 20mA²⁾
- Optimized for high temperature operation

Product Summary

| | | |
|----------|-----|----|
| V_{DC} | 600 | V |
| Q_c | 8 | nC |
| I_F | 4 | A |

PG-TO252


thinQ! 2G Diode specially designed for fast switching applications like:

- SMPS e.g.; CCM PFC; typ P_{out} = 400 - 800W
- Motor Drives; Solar applications; UPS

| Type | Package | Marking | Pin 1 | Pin 2 | Pin 3 |
|-----------|----------|---------|-------|-------|-------|
| IDD04S60C | PG-TO252 | D04S60C | n.c. | A | C |

Maximum ratings

| Parameter | Symbol | Conditions | Value | Unit |
|---|----------------|---|-------------|------------------|
| Continuous forward current | I_F | $T_C < 130\text{ °C}$ | 4 | A |
| | | $T_C < 100\text{ °C}$ | 6 | |
| RMS forward current | $I_{F,RMS}$ | $f = 50\text{ Hz}$ | 5.6 | |
| Surge non-repetitive forward current, sine halfwave | $I_{F,SM}$ | $T_C = 25\text{ °C}, t_p = 10\text{ ms}$ | 32.6 | |
| Repetitive peak forward current | $I_{F,RM}$ | $T_j = 150\text{ °C}, T_C = 100\text{ °C}, D = 0.1$ | 19.6 | |
| Non-repetitive peak forward current | $I_{F,max}$ | $T_C = 25\text{ °C}, t_p = 10\text{ }\mu\text{s}$ | 200 | |
| i^2t value | $\int i^2 dt$ | $T_C = 25\text{ °C}, t_p = 10\text{ ms}$ | 5.3 | A ² s |
| Repetitive peak reverse voltage | V_{RRM} | | 600 | V |
| Diode dv/dt ruggedness | dv/dt | $V_R = 0 \dots 480\text{ V}$ | 50 | V/ns |
| Power dissipation | P_{tot} | $T_C = 25\text{ °C}$ | 42 | W |
| Operating and storage temperature | T_j, T_{stg} | | -55 ... 175 | °C |

| Parameter | Symbol | Conditions | Values | | | Unit |
|-----------|--------|------------|--------|------|------|------|
| | | | min. | typ. | max. | |

Thermal characteristics

| | | | | | | |
|--|------------|---|---|---|-----|-----|
| Thermal resistance, junction - case | R_{thJC} | | - | - | 3.6 | K/W |
| Thermal resistance, junction - ambient | R_{thJA} | SMD version, device on PCB, minimal footprint | - | - | 75 | |
| | | SMD Version, device on PCB, 6 cm ² cooling ³⁾ | - | - | 50 | |
| Soldering temperature reflowsoldering | T_{sold} | reflow MSL 3 | - | - | 260 | °C |

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

| | | | | | | |
|-----------------------|----------|---------------------------------------|-----|-----|-----|----|
| DC blocking voltage | V_{DC} | $I_R=0.05\text{ mA}$ | 600 | - | - | V |
| Diode forward voltage | V_F | $I_F=4\text{ A}, T_j=25\text{ °C}$ | - | 1.7 | 1.9 | |
| | | $I_F=4\text{ A}, T_j=150\text{ °C}$ | - | 2 | 2.4 | |
| | | $I_F=_\text{A}, T_j=25\text{ °C}$ | | 1.9 | 2.1 | |
| | | $I_F=_\text{A}, T_j=150\text{ °C}$ | | 2.3 | 2.9 | |
| Reverse current | I_R | $V_R=600\text{ V}, T_j=25\text{ °C}$ | - | 0.5 | 50 | μA |
| | | $V_R=600\text{ V}, T_j=150\text{ °C}$ | - | 2 | 500 | |

AC characteristics

| | | | | | | |
|------------------------------|-------|---|---|-----|-----|----|
| Total capacitive charge | Q_c | $V_R=400\text{ V}, I_F \leq I_{F,max}, di_F/dt=200\text{ A}/\mu\text{s}, T_j=150\text{ °C}$ | - | 8 | - | nC |
| Switching time ⁴⁾ | t_c | | - | - | <10 | ns |
| Total capacitance | C | $V_R=1\text{ V}, f=1\text{ MHz}$ | - | 130 | - | pF |
| | | $V_R=300\text{ V}, f=1\text{ MHz}$ | - | 20 | - | |
| | | $V_R=600\text{ V}, f=1\text{ MHz}$ | - | 20 | - | |

¹⁾ J-STD20 and JESD22

²⁾ All devices tested under avalanche conditions, for a time periode of 5ms at 20 mA.

³⁾ Device on 40mm*40mm*1.5mm epox PCB FR4 with 6cm² (one layer, 70μm thick) copper area for drain connection. PCB is vertikal with out blown air.

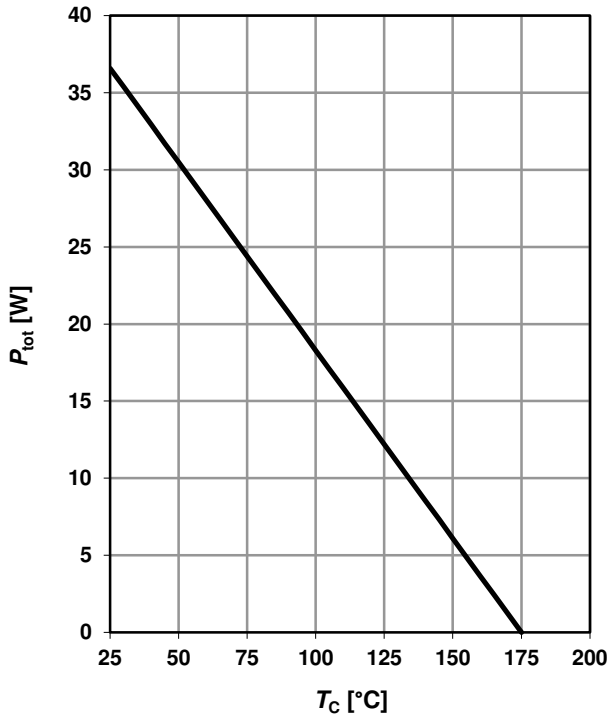
⁴⁾ t_c is the time constant for the capacitive displacement current waveform (independent from T_j, I_{LOAD} and di/dt), different from t_{rr} , which is dependent on $T_j, I_{LOAD}, di/dt$. No reverse recovery time constant t_{rr} due to absence of minority carrier injection.

⁵⁾ Only capacitive charge occuring, guaranteed by design.

⁶⁾ Repetitive condition defined by $T_j \leq 175\text{ °C}$

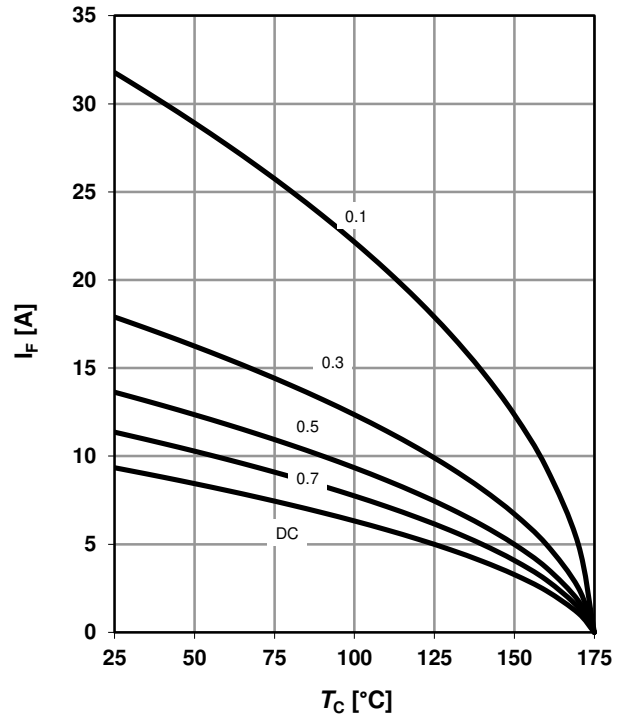
1 Power dissipation

$P_{tot}=f(T_C)$



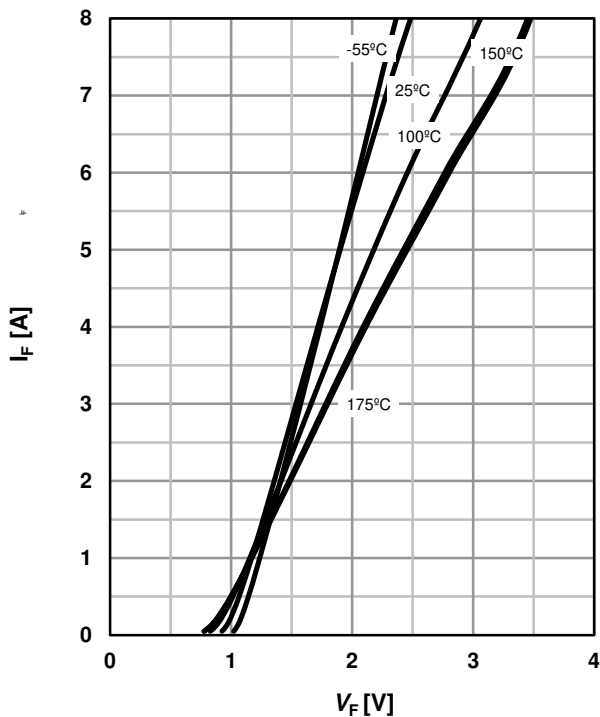
2 Diode forward current

$I_F=f(T_C)^4$; $T_j \leq 175\text{ °C}$; parameter: $D= t_p/T$



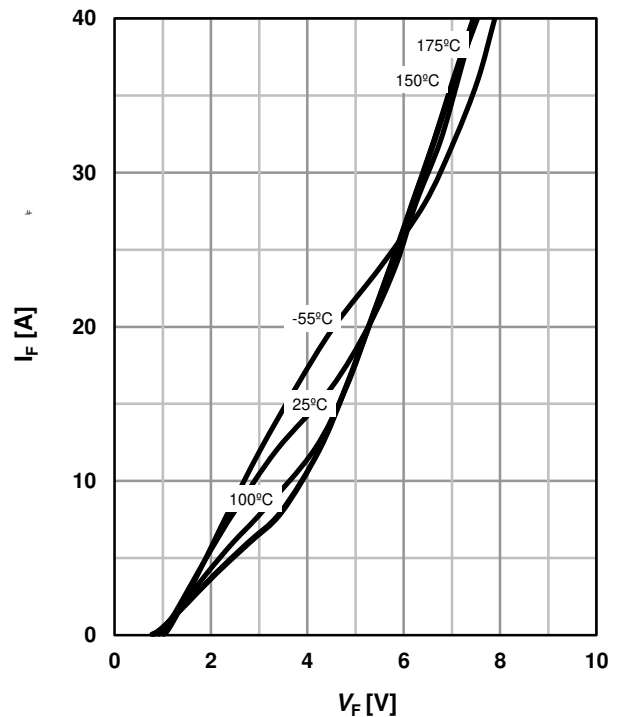
3 Typ. forward characteristic

$I_F=f(V_F)$; $t_p=400\text{ }\mu\text{s}$; parameter: T_j



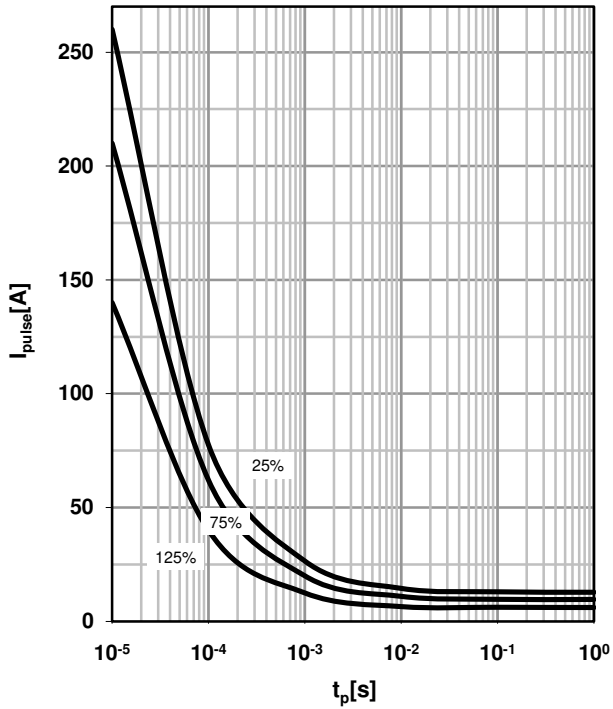
4 Typ. forward characteristic in surge current mode

$I_F=f(V_F)$; $t_p=400\text{ }\mu\text{s}$; parameter: T_j



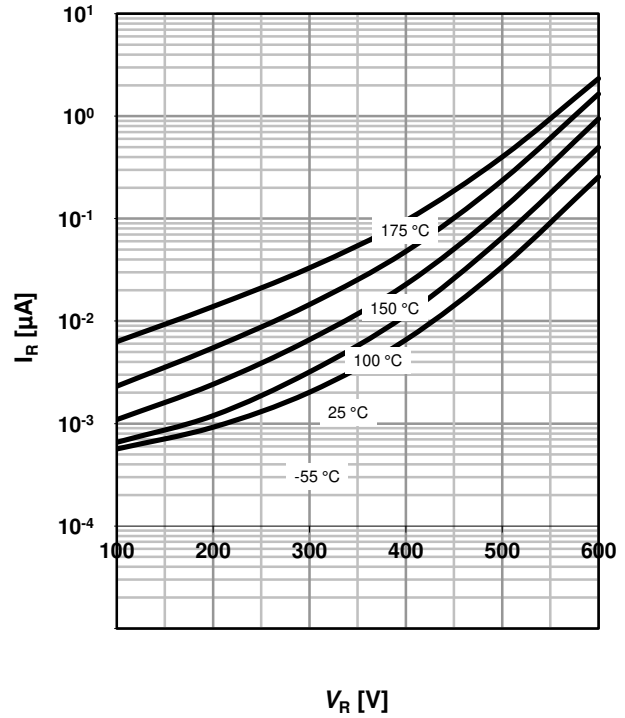
5 Max. repetitive pulse current

$I_{\text{pulse}}=f(t_p)^{4/5}$; parameter T_C



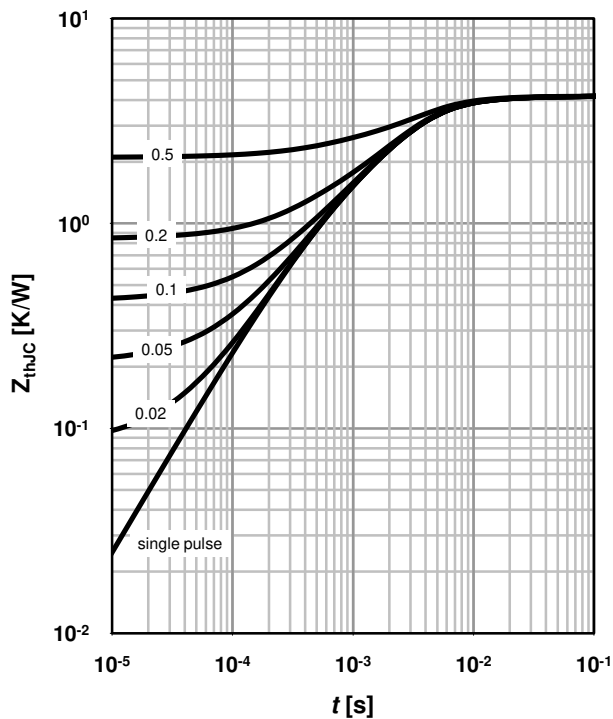
6 Typ. reverse current vs. reverse voltage

$I_R=f(V_R)$; parameter: T_j



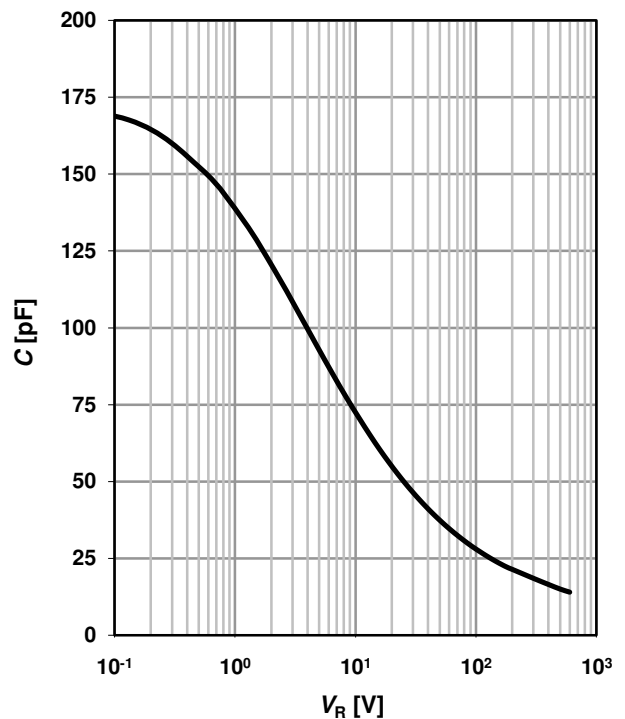
7 Transient thermal impedance

$Z_{\text{thJC}}=f(t_p)$; parameter: $D = t_p/T$



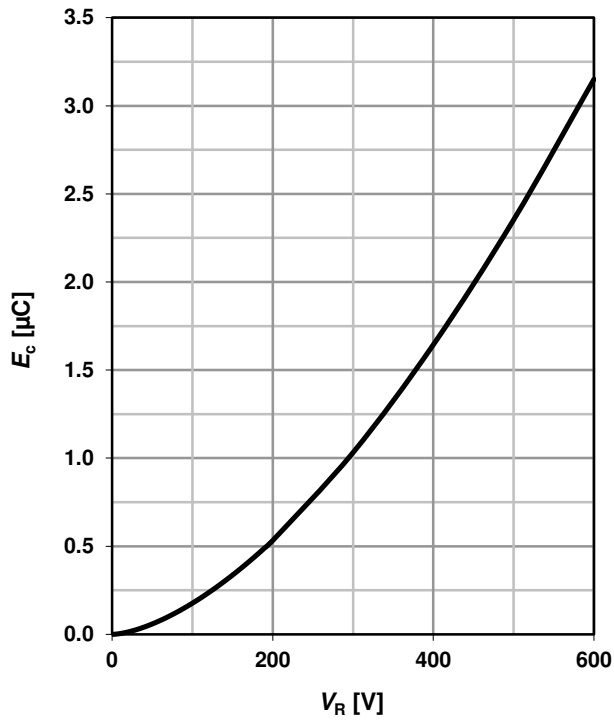
8 Typ. capacitance vs. reverse voltage

$C=f(V_R)$; $T_C=25\text{ °C}$, $f=1\text{ MHz}$



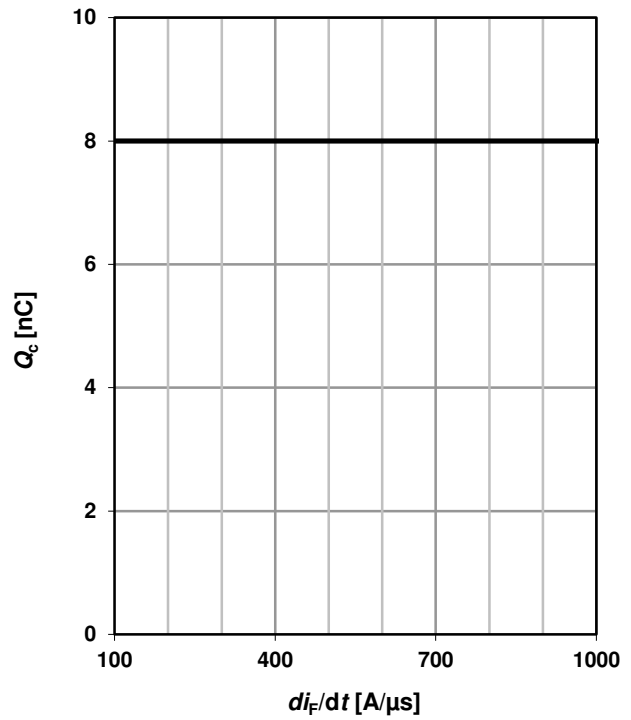
9 Typ. C stored energy

$$E_C = f(V_R)$$

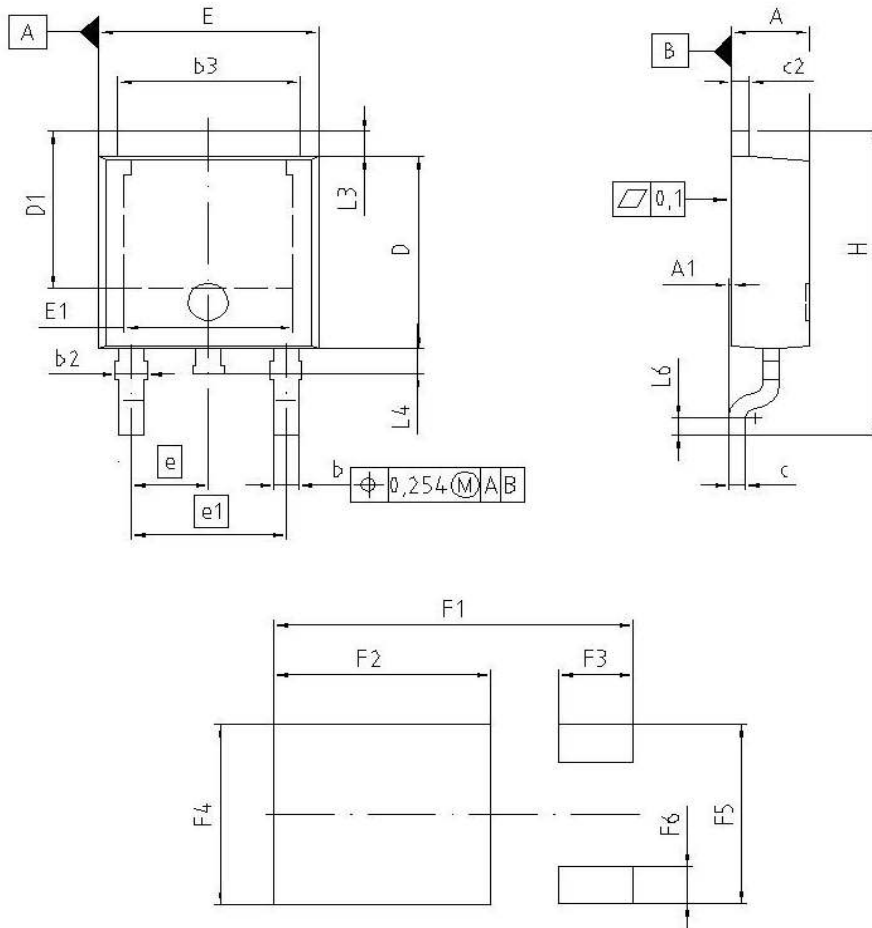


10 Typ. capacitance charge vs. current slope

$$Q_C = f(di_F/dt)^5; T_j = 150 \text{ }^\circ\text{C}; I_F \leq I_{F,max}$$



Package Outline:PG-TO252-3-1/TO252-3-11/TO252-3-21



| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|--------|--------|-------|
| | MIN | MAX | MIN | MAX |
| A | 2.159 | 2.413 | 0.085 | 0.095 |
| A1 | 0.000 | 0.150 | 0.000 | 0.006 |
| b | 0.635 | 0.889 | 0.025 | 0.035 |
| b2 | 0.650 | 1.150 | 0.026 | 0.045 |
| b3 | 5.004 | 5.500 | 0.197 | 0.217 |
| c | 0.457 | 0.580 | 0.018 | 0.023 |
| c2 | 0.460 | 0.980 | 0.018 | 0.039 |
| D | 5.969 | 6.223 | 0.235 | 0.245 |
| D1 | 5.020 | 5.842 | 0.198 | 0.230 |
| E | 6.400 | 6.731 | 0.252 | 0.265 |
| E1 | 4.850 | 5.207 | 0.191 | 0.205 |
| e | 2.286 | | 0.090 | |
| e1 | 4.572 | | 0.180 | |
| N | 3 | | 3 | |
| H | 9.400 | 10.480 | 0.370 | 0.413 |
| L3 | 0.900 | 1.143 | 0.035 | 0.045 |
| L4 | 0.584 | 0.950 | 0.023 | 0.037 |
| L6 | 0.510 | 0.686 | 0.020 | 0.027 |
| F1 | 10.500 | 10.700 | 0.413 | 0.421 |
| F2 | 6.300 | 6.500 | 0.248 | 0.256 |
| F3 | 2.100 | 2.300 | 0.083 | 0.091 |
| F4 | 5.700 | 5.900 | 0.224 | 0.232 |
| F5 | 5.660 | 5.860 | 0.222 | 0.231 |
| F6 | 1.100 | 1.300 | 0.043 | 0.051 |

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SCALE

EUROPEAN PROJECTION

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