

### 3<sup>rd</sup> Generation thinQ!<sup>TM</sup> SiC Schottky Diode

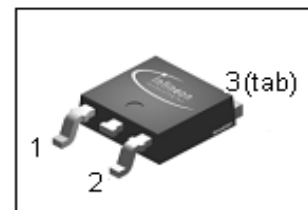
#### Features

- Revolutionary semiconductor material - Silicon Carbide
- Switching behavior benchmark
- No reverse recovery / No forward recovery
- Temperature independent switching behavior
- High surge current capability
- Pb-free lead plating; RoHS compliant
- Qualified according to JEDEC<sup>1)</sup> for target applications
- Breakdown voltage tested at 20mA<sup>2)</sup>
- Optimized for high temperature operation
- Lowest Figure of Merit  $Q_C/I_F$

#### Product Summary

|                            |     |    |
|----------------------------|-----|----|
| $V_{DC}$                   | 600 | V  |
| $Q_C$                      | 12  | nC |
| $I_F; T_C < 130\text{ °C}$ | 8   | A  |

#### PG-TO252-3



#### thinQ! 3G Diode designed for fast switching applications like:

- SMPS e.g.; CCM PFC
- Motor Drives; Solar Applications; UPS



| Type       | Package    | Marking | Pin 1 | Pin 2 | Pin 3 |
|------------|------------|---------|-------|-------|-------|
| IDD08SG60C | PG-TO252-3 | D08G60C | n.c.  | A     | C     |

#### Maximum ratings

| Parameter   | Symbol         | Conditions  | Value       | Unit             |
|---|----------------|---|-------------|------------------|
| Continuous forward current                          | $I_F$          | $T_C < 130\text{ °C}$                             | 8           | A                |
| Surge non-repetitive forward current, sine halfwave | $I_{F,SM}$     | $T_C = 25\text{ °C}, t_p = 10\text{ ms}$          | 42          |                  |
|   |                | $T_C = 150\text{ °C}, t_p = 10\text{ ms}$         | 36          |                  |
| Non-repetitive peak forward current                 | $I_{F,max}$    | $T_C = 25\text{ °C}, t_p = 10\text{ }\mu\text{s}$ | 350         |                  |
| $i^2t$ value  | $\int i^2 dt$  | $T_C = 25\text{ °C}, t_p = 10\text{ ms}$          | 9           | A <sup>2</sup> s |
|   |                | $T_C = 150\text{ °C}, t_p = 10\text{ ms}$         | 6.5         |                  |
| Repetitive peak reverse voltage                     | $V_{RRM}$      | $T_j = 25\text{ °C}$                              | 600         | V                |
| Diode dv/dt ruggedness                              | dv/dt          | $V_R = 0 \dots 480\text{ V}$                      | 50          | V/ns             |
| Power dissipation                                   | $P_{tot}$      | $T_C = 25\text{ °C}$                              | 100         | W                |
| Operating and storage temperature                   | $T_j, T_{stg}$ |   | -55 ... 175 | °C               |
| Soldering temperature, reflow soldering (max)       | $T_{sold}$     | reflow MSL1                                       | 260         |                  |

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

**Thermal characteristics**

|  |            |  |   |    |     |     |
|--|------------|--|---|----|-----|-----|
| Thermal resistance, junction - case    | $R_{thJC}$ |  | - | -  | 1.5 | K/W |
| Thermal resistance, junction - ambient | $R_{thJA}$ | SMD version, device on PCB, minimal footprint                            | - | -  | 75  |     |
|  |            | SMD version, device on PCB, 6 cm <sup>2</sup> cooling area <sup>5)</sup> | - | 50 | -   |     |

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

|                       |          |  |     |     |     |               |
|-----------------------|----------|--|-----|-----|-----|---------------|
| DC blocking voltage   | $V_{DC}$ | $I_R=0.05\text{ mA}, T_j=25\text{ °C}$ | 600 | -   | -   | V             |
| Diode forward voltage | $V_F$    | $I_F=8\text{ A}, T_j=25\text{ °C}$     | -   | 1.8 | 2.1 |               |
|                       |          | $I_F=8\text{ A}, T_j=150\text{ °C}$    | -   | 2.2 | -   |               |
| Reverse current       | $I_R$    | $V_R=600\text{ V}, T_j=25\text{ °C}$   | -   | 0.6 | 70  | $\mu\text{A}$ |
|                       |          | $V_R=600\text{ V}, T_j=150\text{ °C}$  | -   | 2.5 | 700 |               |

**AC characteristics**

|                              |       |   |   |     |     |               |
|------------------------------|-------|---|---|-----|-----|---------------|
| Total capacitive charge      | $Q_C$ | $V_R=400\text{ V}, I_F \leq I_{F,max}, di_F/dt=200\text{ A}/\mu\text{s}, T_j=150\text{ °C}$ | - | 12  | -   | nC            |
| Switching time <sup>3)</sup> | $t_c$ |   | - | -   | <10 | ns            |
| Total capacitance            | $C$   | $V_R=1\text{ V}, f=1\text{ MHz}$  | - | 240 | -   | $\mu\text{F}$ |
|                              |       | $V_R=300\text{ V}, f=1\text{ MHz}$  | - | 30  | -   |               |
|                              |       | $V_R=600\text{ V}, f=1\text{ MHz}$  | - | 30  | -   |               |

<sup>1)</sup> J-STD20 and JESD22

<sup>2)</sup> All devices tested under avalanche conditions, for a time periode of 10ms, at 20mA.

<sup>3)</sup>  $t_c$  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  $T_j$ ,  $I_{LOAD}$  and  $di/dt$ . No reverse recovery time constant  $t_{rr}$  due to absence of minority carrier injection.

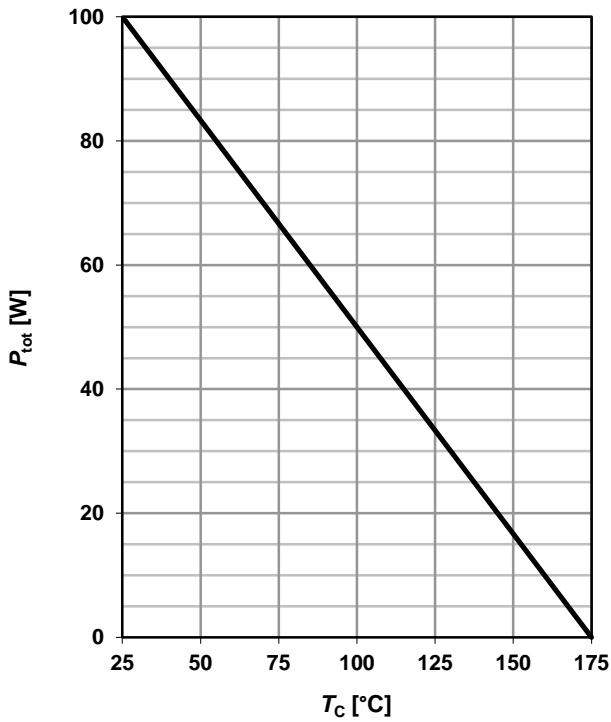
<sup>4)</sup> Under worst case  $Z_{th}$  conditions.

<sup>5)</sup> Device on 40mm\*40mm\*1.5 epoxy PCB FR4 with 6cm<sup>2</sup> (one layer, 70 $\mu\text{m}$  thick) copper area for drain connection. PCB is vertical without blown air

<sup>6)</sup> Only capacitive charge occuring, guaranteed by design.

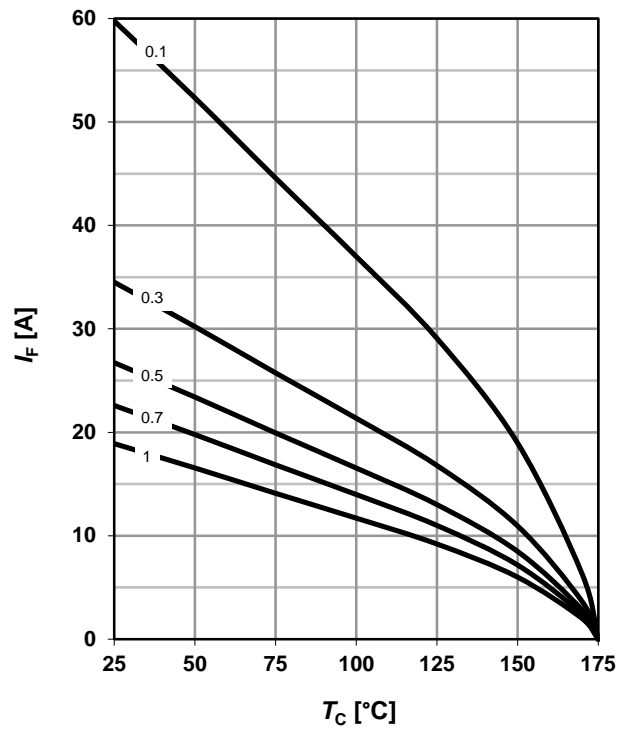
**1 Power dissipation**

$P_{tot}=f(T_C)$ ; parameter:  $R_{thJC(max)}$



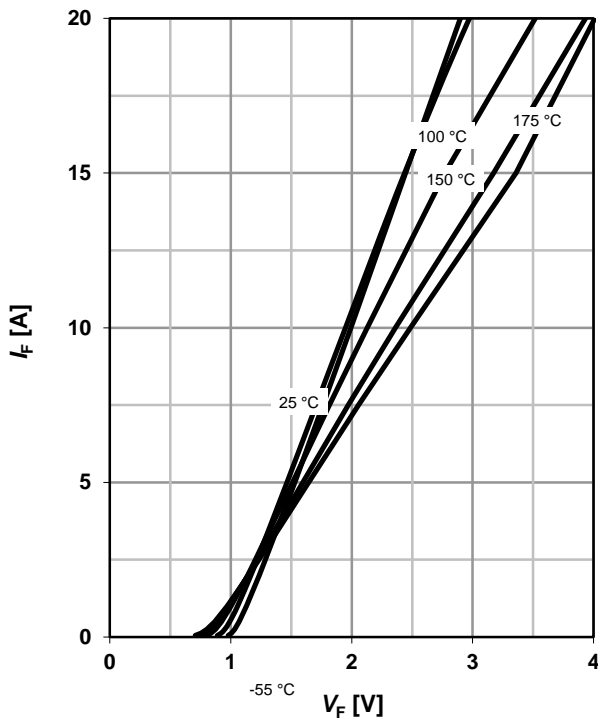
**2 Diode forward current**

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



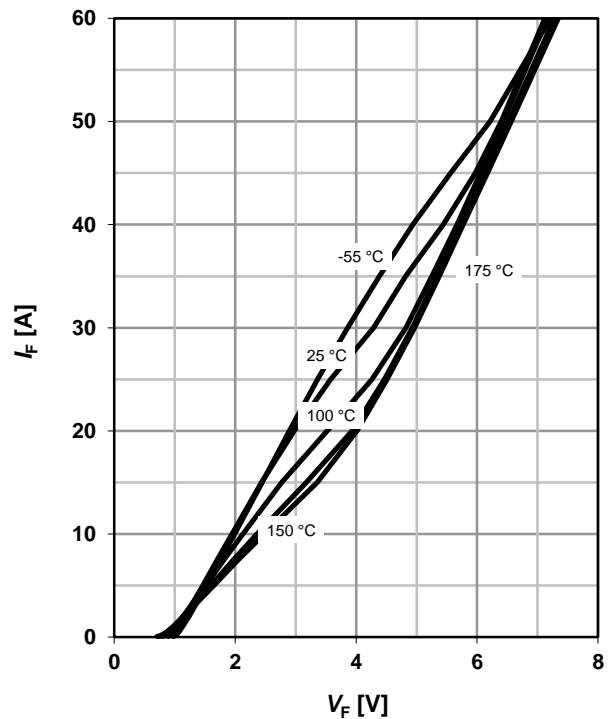
**3 Typ. forward characteristic**

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



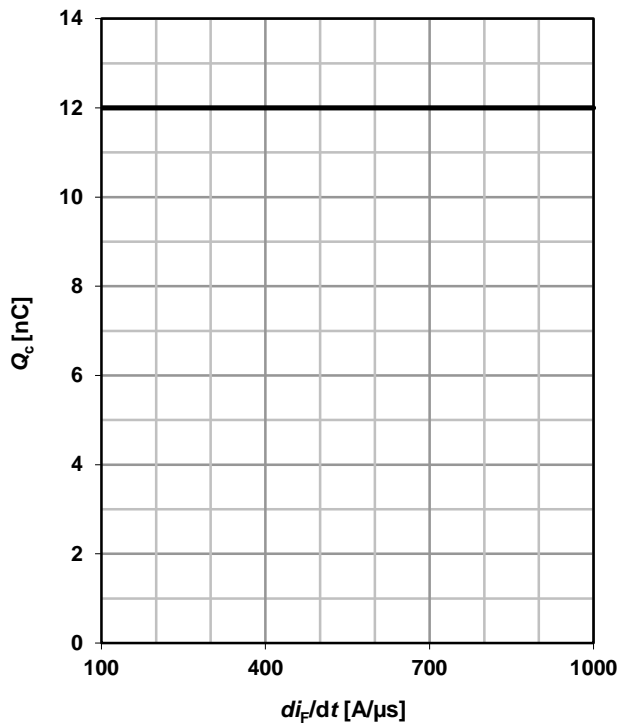
**4 Typ. forward characteristic in surge current mode**

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



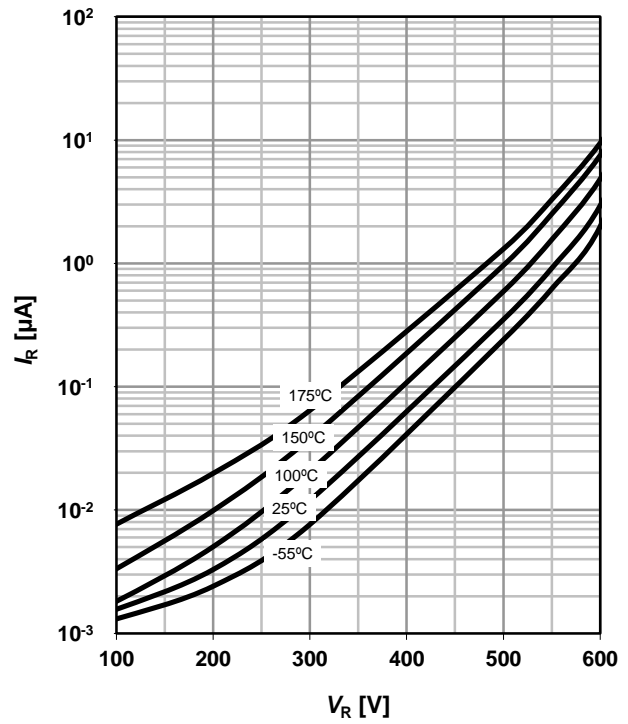
**5 Typ. capacitance charge vs. current slope**

$$Q_C = f(di_F/dt)^6; I_F \leq I_{F,max}$$



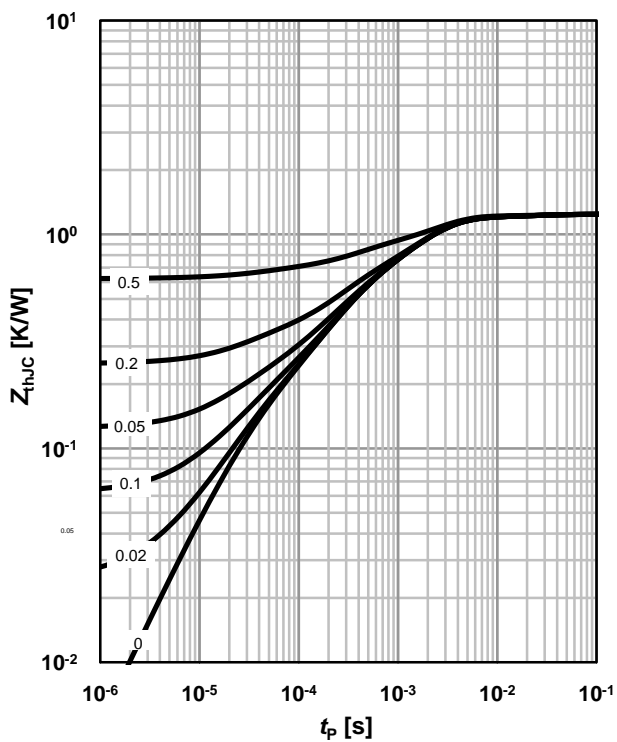
**6 Typ. reverse current vs. reverse voltage**

$$I_R = f(V_R); \text{ parameter: } T_j$$



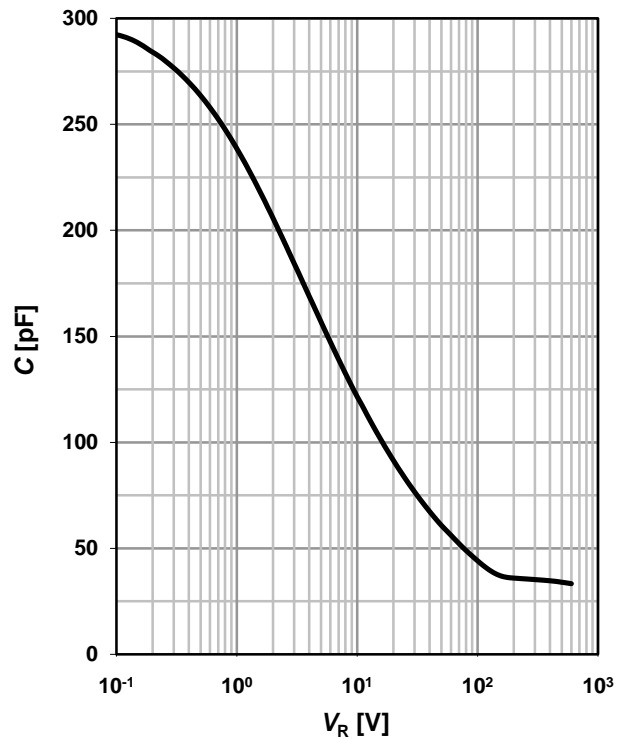
**7 Typ. transient thermal impedance**

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



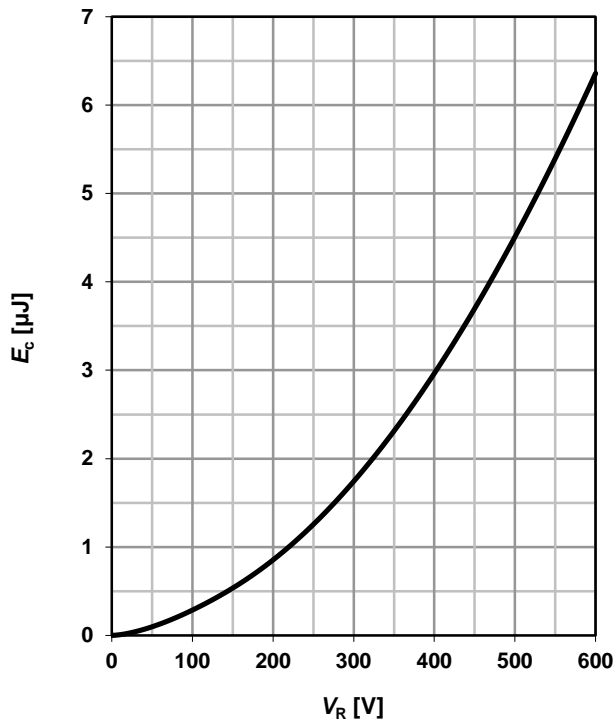
**8 Typ. capacitance vs. reverse voltage**

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

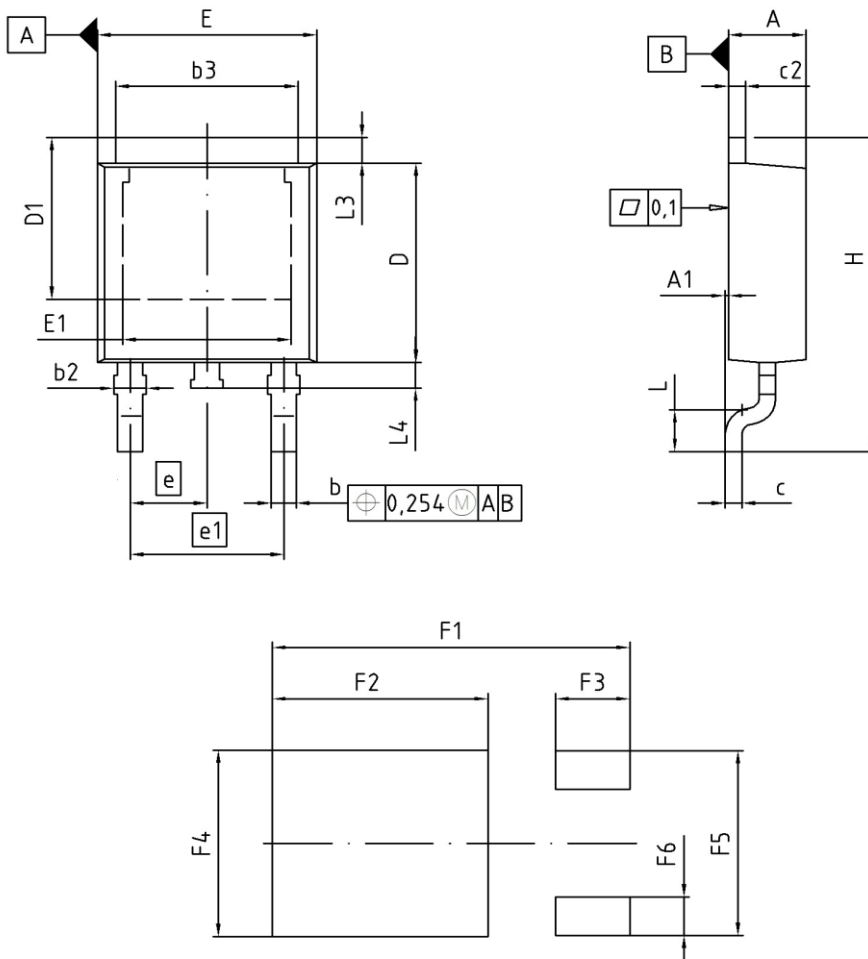


9 Typ. C stored energy

$$E_C = f(V_R)$$



PG-TO252-3: Outline



| DIM | MILLIMETERS |       | INCHES |       |
|-----|-------------|-------|--------|-------|
|     | MIN         | MAX   | MIN    | MAX   |
| A   | 2.16        | 2.41  | 0.085  | 0.095 |
| A1  | 0.00        | 0.15  | 0.000  | 0.006 |
| b   | 0.64        | 0.89  | 0.025  | 0.035 |
| b2  | 0.65        | 1.15  | 0.026  | 0.045 |
| b3  | 5.00        | 5.50  | 0.197  | 0.217 |
| c   | 0.46        | 0.60  | 0.018  | 0.024 |
| c2  | 0.46        | 0.98  | 0.018  | 0.039 |
| D   | 5.97        | 6.22  | 0.235  | 0.245 |
| D1  | 5.02        | 5.84  | 0.198  | 0.230 |
| E   | 6.40        | 6.73  | 0.252  | 0.265 |
| E1  | 4.70        | 5.21  | 0.185  | 0.205 |
| e   | 2.29        |       | 0.090  |       |
| e1  | 4.57        |       | 0.180  |       |
| N   | 3           |       | 3      |       |
| H   | 9.40        | 10.48 | 0.370  | 0.413 |
| L   | 1.18        | 1.70  | 0.046  | 0.067 |
| L3  | 0.90        | 1.25  | 0.035  | 0.049 |
| L4  | 0.51        | 1.00  | 0.020  | 0.039 |
| F1  | 10.50       | 10.70 | 0.413  | 0.421 |
| F2  | 6.30        | 6.50  | 0.248  | 0.256 |
| F3  | 2.10        | 2.30  | 0.083  | 0.091 |
| F4  | 5.70        | 5.90  | 0.224  | 0.232 |
| F5  | 5.66        | 5.86  | 0.223  | 0.231 |
| F6  | 1.10        | 1.30  | 0.043  | 0.051 |

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