

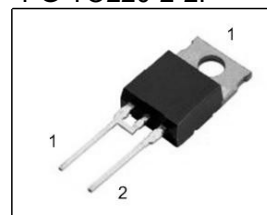
**Silicon Carbide Schottky Diode**

- Worlds first 600V Schottky diode
- Revolutionary semiconductor material - Silicon Carbide
- Switching behavior benchmark
- No reverse recovery
- No temperature influence on the switching behavior
- No forward recovery
- Pb-free lead plating; RoHS compliant
- Qualified according to JEDEC<sup>0)</sup> for target applications

**thinQ!<sup>TM</sup> SiC Schottky Diode**
**Product Summary**

|           |     |    |
|-----------|-----|----|
| $V_{RRM}$ | 600 | V  |
| $Q_C$     | 30  | nC |
| $I_F$     | 12  | A  |

PG-TO220-2-2.



| Type     | Package       | Ordering Code | Marking | Pin 1 | Pin 2 |
|----------|---------------|---------------|---------|-------|-------|
| SDT12S60 | PG-TO220-2-2. | Q67040-S4470  | D12S60  | C     | A     |

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

| Parameter                                                                                         | Symbol         | Value       | Unit             |
|---------------------------------------------------------------------------------------------------|----------------|-------------|------------------|
| Continuous forward current, $T_C=100^\circ\text{C}$                                               | $I_F$          | 12          | A                |
| RMS forward current, $f=50\text{Hz}$                                                              | $I_{FRMS}$     | 17          |                  |
| Surge non repetitive forward current, sine halfwave<br>$T_C=25^\circ\text{C}$ , $t_p=10\text{ms}$ | $I_{FSM}$      | 36          |                  |
| Repetitive peak forward current<br>$T_j=150^\circ\text{C}$ , $T_C=100^\circ\text{C}$ , $D=0.1$    | $I_{FRM}$      | 49          |                  |
| Non repetitive peak forward current<br>$t_p=10\mu\text{s}$ , $T_C=25^\circ\text{C}$               | $I_{FMAX}$     | 120         |                  |
| $i^2t$ value, $T_C=25^\circ\text{C}$ , $t_p=10\text{ms}$                                          | $\int i^2 dt$  | 6.48        | A <sup>2</sup> s |
| Repetitive peak reverse voltage                                                                   | $V_{RRM}$      | 600         | V                |
| Surge peak reverse voltage                                                                        | $V_{RSM}$      | 600         |                  |
| Power dissipation, $T_C=25^\circ\text{C}$                                                         | $P_{tot}$      | 88.2        | W                |
| Operating and storage temperature                                                                 | $T_j, T_{stg}$ | -55... +175 | $^\circ\text{C}$ |

<sup>0)</sup> J-STD20 and JESD22

**Thermal Characteristics**

| Parameter                                      | Symbol     | Values |      |      | Unit |
|------------------------------------------------|------------|--------|------|------|------|
|                                                |            | min.   | typ. | max. |      |
| Characteristics                                |            |        |      |      |      |
| Thermal resistance, junction - case            | $R_{thJC}$ | -      | -    | 1.7  | K/W  |
| Thermal resistance, junction - ambient, leaded | $R_{thJA}$ | -      | -    | 62   |      |

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

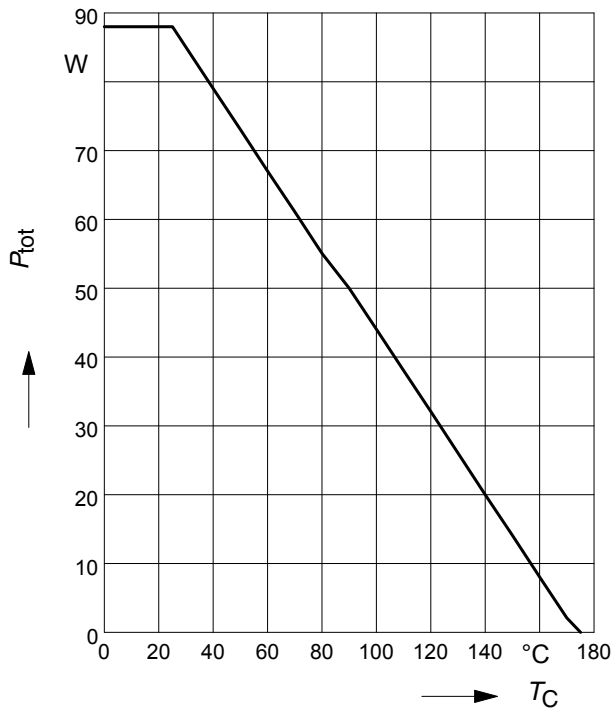
| Parameter                                                                          | Symbol | Values |            |             | Unit    |
|------------------------------------------------------------------------------------|--------|--------|------------|-------------|---------|
|                                                                                    |        | min.   | typ.       | max.        |         |
| Static Characteristics                                                             |        |        |            |             |         |
| Diode forward voltage<br>$I_F=12A, T_j=25^{\circ}C$<br>$I_F=12A, T_j=150^{\circ}C$ | $V_F$  | -<br>- | 1.5<br>1.7 | 1.7<br>2.1  | V       |
| Reverse current<br>$V_R=600V, T_j=25^{\circ}C$<br>$V_R=600V, T_j=150^{\circ}C$     | $I_R$  | -<br>- | 40<br>100  | 400<br>2000 | $\mu A$ |

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

| Parameter                                                                                                                                              | Symbol   | Values      |                 |             | Unit |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------------|-----------------|-------------|------|
|                                                                                                                                                        |          | min.        | typ.            | max.        |      |
| AC Characteristics                                                                                                                                     |          |             |                 |             |      |
| Total capacitive charge<br>$V_R=400V$ , $I_F=12A$ , $di_F/dt=200A/\mu s$ , $T_j=150^{\circ}C$                                                          | $Q_C$    | -           | 30              | -           | nC   |
| Switching time<br>$V_R=400V$ , $I_F=12A$ , $di_F/dt=200A/\mu s$ , $T_j=150^{\circ}C$                                                                   | $t_{rr}$ | -           | n.a.            | -           | ns   |
| Total capacitance<br>$V_R=1V$ , $T_C=25^{\circ}C$ , $f=1MHz$<br>$V_R=300V$ , $T_C=25^{\circ}C$ , $f=1MHz$<br>$V_R=600V$ , $T_C=25^{\circ}C$ , $f=1MHz$ | $C$      | -<br>-<br>- | 450<br>45<br>43 | -<br>-<br>- | pF   |

### 1 Power dissipation

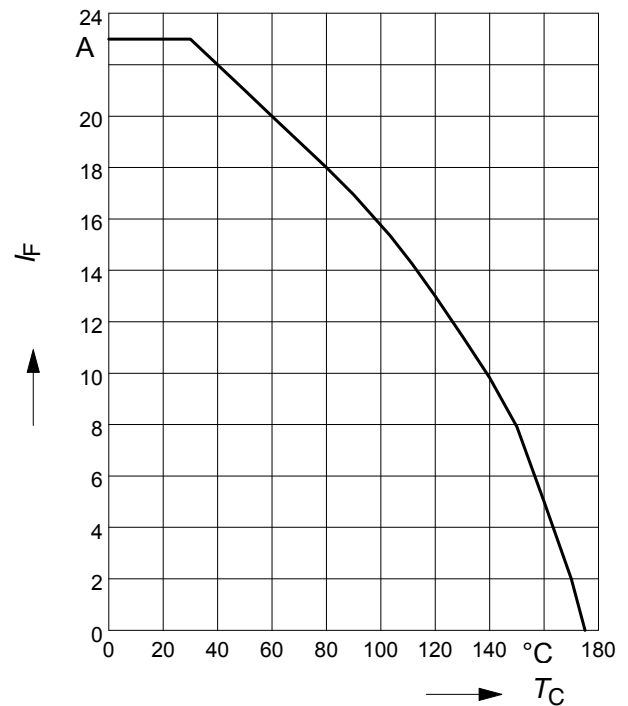
$$P_{\text{tot}} = f(T_C)$$



### 2 Diode forward current

$$I_F = f(T_C)$$

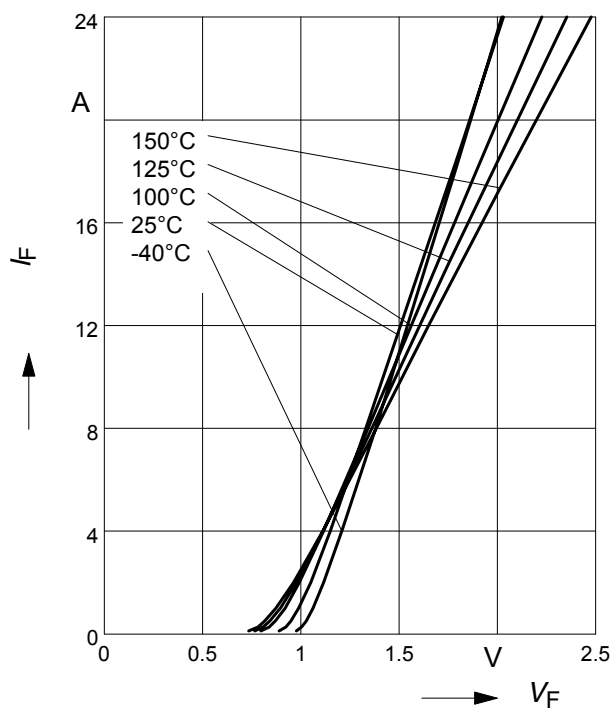
parameter:  $T_j \leq 175^\circ\text{C}$



### 3 Typ. forward characteristic

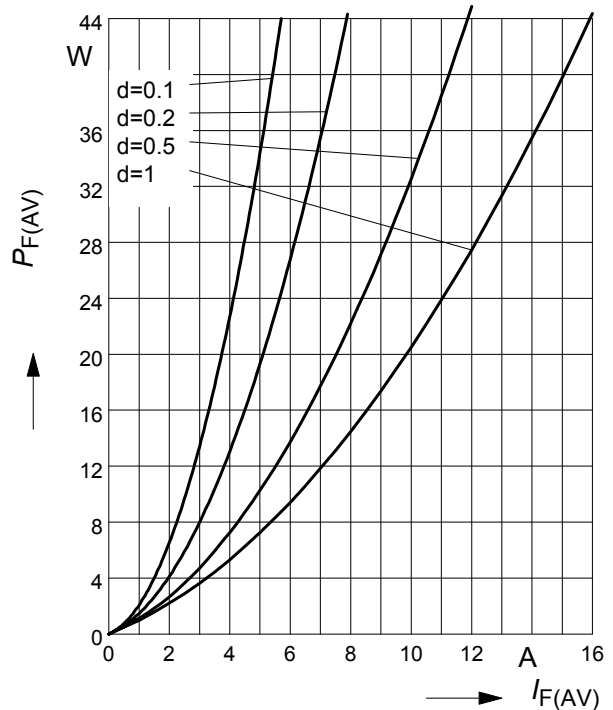
$$I_F = f(V_F)$$

parameter:  $T_j$ ,  $t_p = 350 \mu\text{s}$



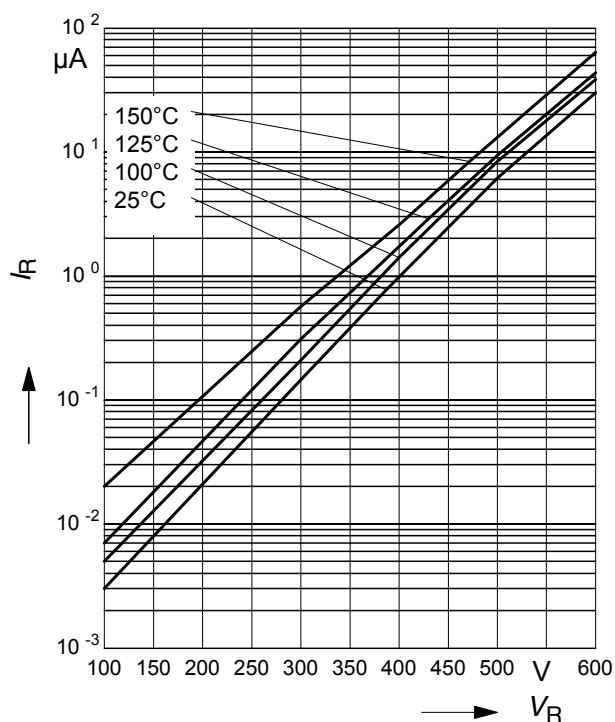
### 4 Typ. forward power dissipation vs. average forward current

$$P_{F(AV)} = f(I_F) \quad T_C = 100^\circ\text{C}, d = t_p/T$$



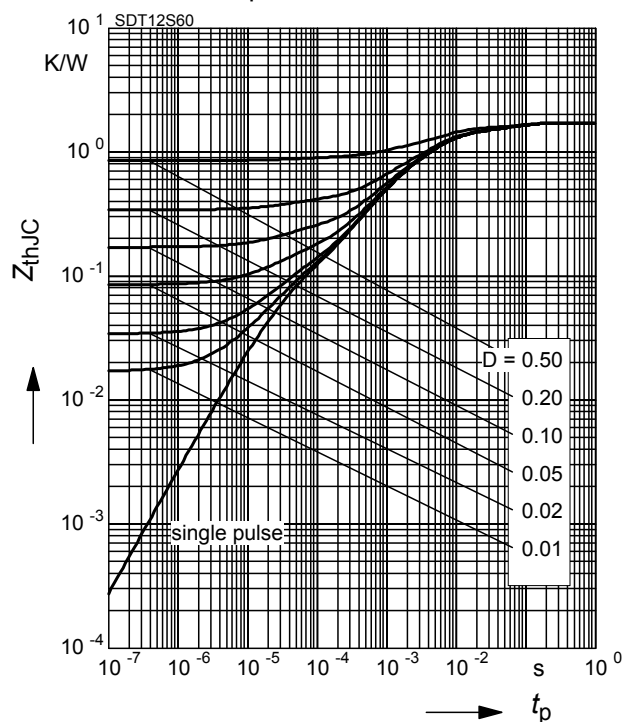
**5 Typ. reverse current vs. reverse voltage**

$$I_R = f(V_R)$$


**6 Transient thermal impedance**

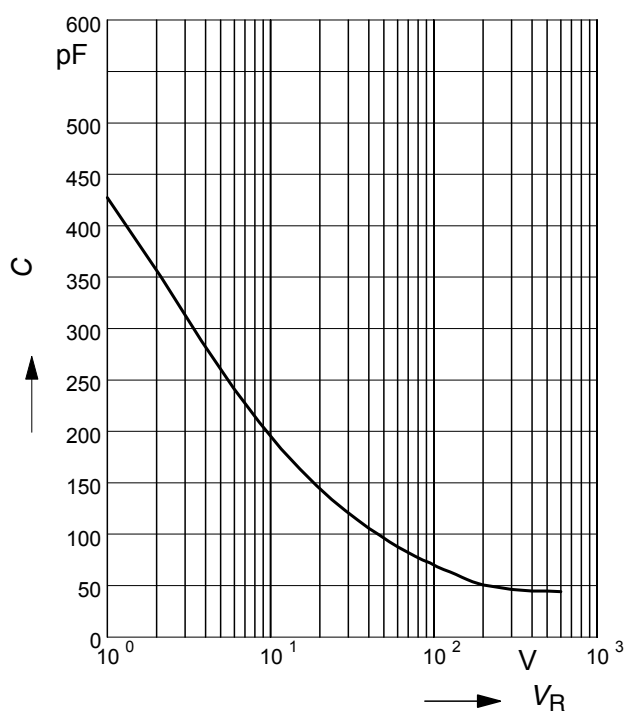
$$Z_{thJC} = f(t_p)$$

$$\text{parameter : } D = t_p/T$$

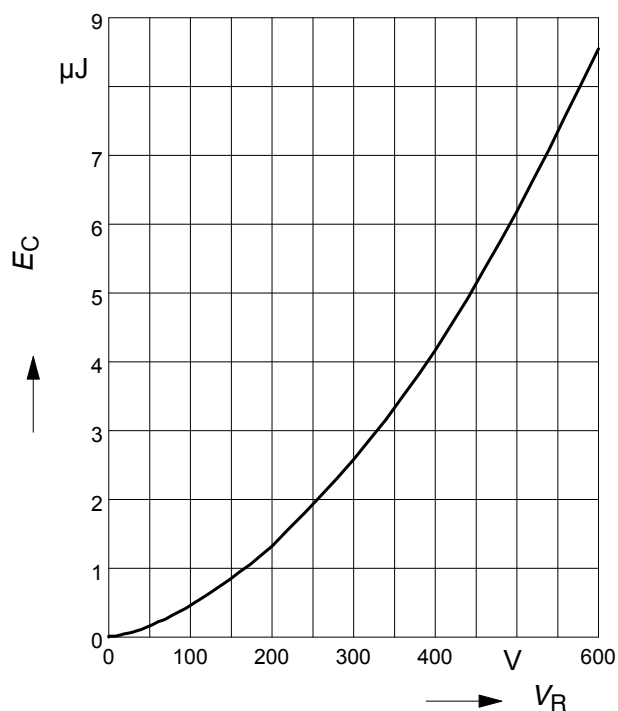

**7 Typ. capacitance vs. reverse voltage**

$$C = f(V_R)$$

parameter:  $T_C = 25^\circ C$ ,  $f = 1$  MHz


**8 Typ. C stored energy**

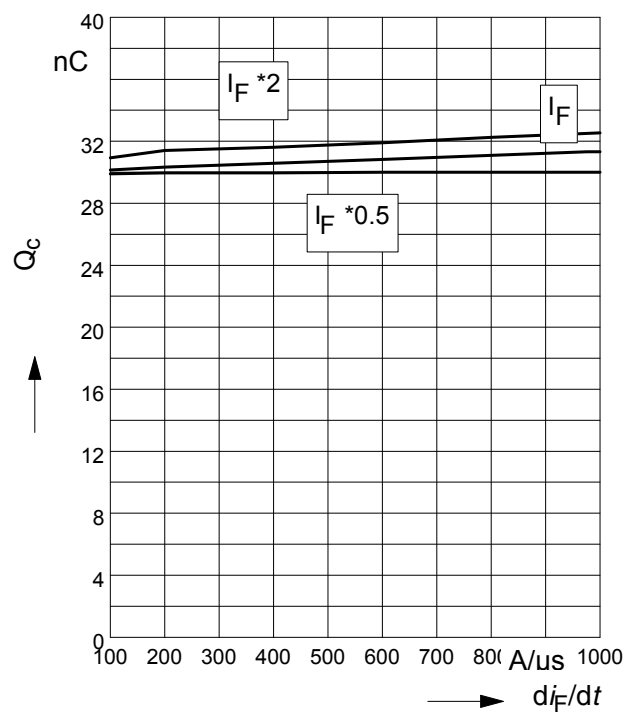
$$E_C = f(V_R)$$



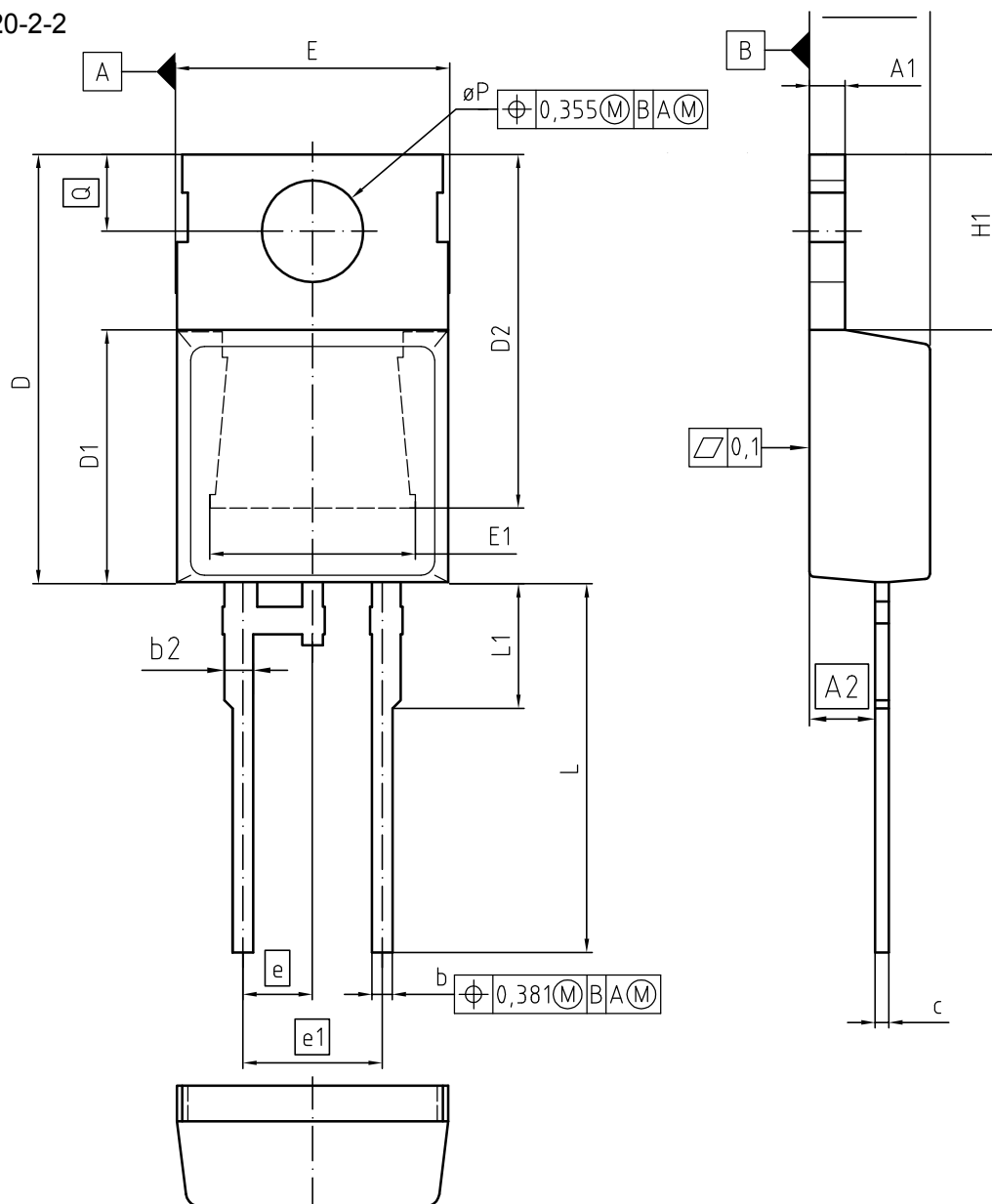
## 9 Typ. capacitive charge vs. current slope

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

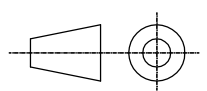
parameter:  $T_j = 150\text{ }^{\circ}\text{C}$



PG-TO-220-2-2



| DIM | MILLIMETERS |        | INCHES |       |
|-----|-------------|--------|--------|-------|
|     | MIN         | MAX    | MIN    | MAX   |
| A   | 4.191       | 4.699  | 0.165  | 0.185 |
| A1  | 1.170       | 1.400  | 0.046  | 0.055 |
| A2  | 2.215       | 2.718  | 0.087  | 0.107 |
| b   | 0.635       | 0.889  | 0.025  | 0.035 |
| b2  | 0.950       | 1.651  | 0.037  | 0.065 |
| c   | 0.330       | 0.635  | 0.013  | 0.025 |
| D   | 14.808      | 15.950 | 0.583  | 0.628 |
| D1  | 8.509       | 9.450  | 0.335  | 0.372 |
| D2  | 12.850      | 14.245 | 0.506  | 0.561 |
| E   | 9.677       | 10.363 | 0.381  | 0.408 |
| E1  | 6.500       | 8.788  | 0.256  | 0.346 |
| e   | 2.540       |        | 0.100  |       |
| e1  | 5.080       |        | 0.200  |       |
| N   | 2           |        | 2      |       |
| H1  | 5.900       | 6.900  | 0.232  | 0.272 |
| L   | 12.700      | 14.000 | 0.500  | 0.551 |
| L1  | 3.048       | 4.800  | 0.120  | 0.189 |
| øP  | 3.550       | 3.886  | 0.140  | 0.153 |
| Q   | 2.540       | 3.048  | 0.100  | 0.120 |

|                                                                                                              |
|--------------------------------------------------------------------------------------------------------------|
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