
**Netz-Thyristor-Modul**  
**Phase Control Thyristor Module**
**TT106N**
**TT106N**  
**TD106N..K..-A**
**TD106N**  
**TD106N..K..-K**
**DT106N**
**Elektrische Eigenschaften / Electrical properties**

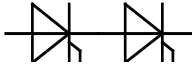
Höchstzulässige Werte / Maximum rated values

|  |   |                                  |              |                |  |
|--|---|----------------------------------|--------------|----------------|--|
| Periodische Vorwärts- und Rückwärts-Spitzensperrspannung<br>repetitive peak forward off-state and reverse voltages | $T_{vj} = -40^{\circ}\text{C} \dots T_{vj \max}$  | $V_{\text{DRM}}, V_{\text{RRM}}$ | 1200<br>1600 | 1400<br>1800   | V<br>V                                       |
| Vorwärts-Stoßspitzensperrspannung<br>non-repetitive peak forward off-state voltage                                 | $T_{vj} = -40^{\circ}\text{C} \dots T_{vj \max}$  | $V_{\text{DSM}}$                 | 1200<br>1600 | 1400<br>1800   | V<br>V                                       |
| Rückwärts-Stoßspitzensperrspannung<br>non-repetitive peak reverse voltage  | $T_{vj} = +25^{\circ}\text{C} \dots T_{vj \max}$  | $V_{\text{RSM}}$                 | 1300<br>1700 | 1500<br>1900   | V<br>V                                       |
| Durchlaßstrom-Grenzeffektivwert<br>maximum RMS on-state current  |   | $I_{\text{TRMSM}}$               |              | 180            | A  |
| Dauergrenzstrom<br>average on-state current  | $T_{\text{C}} = 85^{\circ}\text{C}$<br>$T_{\text{C}} = 78^{\circ}\text{C}$  | $I_{\text{TAVM}}$                |              | 106<br>115     | A<br>A                                       |
| Stoßstrom-Grenzwert<br>surge current   | $T_{vj} = 25^{\circ}\text{C}, t_p = 10 \text{ ms}$<br>$T_{vj} = T_{vj \max}, t_p = 10 \text{ ms}$                   | $I_{\text{TSM}}$                 |              | 2250<br>2000   | A<br>A                                       |
| Grenzlastintegral<br>$I^2t$ -value   | $T_{vj} = 25^{\circ}\text{C}, t_p = 10 \text{ ms}$<br>$T_{vj} = T_{vj \max}, t_p = 10 \text{ ms}$                   | $I^2t$                           |              | 25300<br>20000 | $\text{A}^2\text{s}$<br>$\text{A}^2\text{s}$ |
| Kritische Stromsteilheit<br>critical rate of rise of on-state current  | DIN IEC 747-6 $f = 50 \text{ Hz}$ ,<br>$i_{\text{GM}} = 0,6\text{A}$ , $di_{\text{G}}/dt = 0,6\text{A}/\mu\text{s}$ | $(di_{\text{T}}/dt)_{\text{cr}}$ |              | 150            | $\text{A}/\mu\text{s}$                       |
| Kritische Spannungssteilheit<br>critical rate of rise of off-state voltage   | $T_{vj} = T_{vj \max}, V_{\text{D}} = 0,67 V_{\text{DRM}}$<br>6.Kennbuchstabe / 6 <sup>th</sup> letter F            | $(dv_{\text{D}}/dt)_{\text{cr}}$ |              | 1000           | $\text{V}/\mu\text{s}$                       |

**Charakteristische Werte / Characteristic values**

|   |  |                              |              |            |                  |
|---|--|------------------------------|--------------|------------|------------------|
| Durchlaßspannung<br>on-state voltage  | $T_{vj} = T_{vj \max}, i_{\text{T}} = 300 \text{ A}$   | $V_{\text{T}}$               | max.         | 1,78       | V                |
| Schleusenspannung<br>threshold voltage                                      | $T_{vj} = T_{vj \max}$   | $V_{(\text{TO})}$            |              | 0,9        | V                |
| Ersatzwiderstand<br>slope resistance  | $T_{vj} = T_{vj \max}$   | $r_{\text{T}}$               |              | 2,6        | $\text{m}\Omega$ |
| Zündstrom<br>gate trigger current   | $T_{vj} = 25^{\circ}\text{C}, V_{\text{D}} = 6 \text{ V}$  | $I_{\text{GT}}$              | max.         | 150        | mA               |
| Zündspannung<br>gate trigger voltage  | $T_{vj} = 25^{\circ}\text{C}, V_{\text{D}} = 6 \text{ V}$  | $V_{\text{GT}}$              | max.         | 1,4        | V                |
| Nicht zündender Steuerstrom<br>gate non-trigger current                     | $T_{vj} = T_{vj \max}, V_{\text{D}} = 6 \text{ V}$<br>$T_{vj} = T_{vj \max}, V_{\text{D}} = 0,5 V_{\text{DRM}}$  | $I_{\text{GD}}$              | max.<br>max. | 5,0<br>2,5 | mA<br>mA         |
| Nicht zündende Steuerspannung<br>gate non-trigger voltage                   | $T_{vj} = T_{vj \max}, V_{\text{D}} = 0,5 V_{\text{DRM}}$  | $V_{\text{GD}}$              | max.         | 0,2        | V                |
| Haltestrom<br>holding current   | $T_{vj} = 25^{\circ}\text{C}, V_{\text{D}} = 6 \text{ V}, R_{\text{A}} = 5 \Omega$   | $I_{\text{H}}$               | max.         | 200        | mA               |
| Einraststrom<br>latching current  | $T_{vj} = 25^{\circ}\text{C}, V_{\text{D}} = 6 \text{ V}, R_{\text{GK}} \geq 10 \Omega$<br>$i_{\text{GM}} = 0,6\text{A}$ , $di_{\text{G}}/dt = 0,6\text{A}/\mu\text{s}$ ,<br>$t_{\text{g}} = 20 \mu\text{s}$ | $I_{\text{L}}$               | max.         | 620        | mA               |
| Vorwärts- und Rückwärts-Sperrstrom<br>forward off-state and reverse current | $T_{vj} = T_{vj \max}$<br>$V_{\text{D}} = V_{\text{DRM}}, V_{\text{R}} = V_{\text{RRM}}$   | $i_{\text{D}}, i_{\text{R}}$ | max.         | 30         | mA               |
| Zündverzug<br>gate controlled delay time                                    | DIN IEC 747-6 $T_{vj} = 25^{\circ}\text{C}$ ,<br>$i_{\text{GM}} = 0,6\text{A}$ , $di_{\text{G}}/dt = 0,6\text{A}/\mu\text{s}$  | $t_{\text{gd}}$              | max.         | 3          | $\mu\text{s}$    |

|              |            |                      |          |
|--------------|------------|----------------------|----------|
| prepared by: | C.Drilling | date of publication: | 16.05.02 |
| approved by: | J. Novotny | Revision:            | 2        |


**Netz-Thyristor-Modul**  
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**TT106N**
**Elektrische Eigenschaften / Electrical properties**


Charakteristische Werte / Characteristic values

|  |  |            |      |            |               |
|--|--|------------|------|------------|---------------|
| Freiwerdezeit<br>circuit commutated turn-off time  | $T_{vj} = T_{vj\max}$ , $i_{TM} = I_{TAVM}$<br>$V_{RM} = 100\text{ V}$ , $V_{DM} = 0,67 V_{DRM}$<br>$dv_D/dt = 20\text{ V}/\mu\text{s}$ , $-di_T/dt = 10\text{ A}/\mu\text{s}$<br>5.Kennbuchstabe / 5 <sup>th</sup> letter O | $t_q$      | typ. | 150        | $\mu\text{s}$ |
| Isolations-Prüfspannung<br>insulation test voltage | RMS, $f = 50\text{ Hz}$ , $t = 1\text{ min}$<br>RMS, $f = 50\text{ Hz}$ , $t = 1\text{ sec}$   | $V_{ISOL}$ |      | 3,0<br>3,6 | kV<br>kV      |

**Thermische Eigenschaften / Thermal properties**

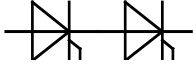
|  |  |                   |      |            |                           |
|--|--|-------------------|------|------------|---------------------------|
| Innerer Wärmewiderstand<br>thermal resistance, junction to case        | pro Modul / per Module, $\Theta = 180^\circ\text{ sin}$<br>pro Zweig / per arm, $\Theta = 180^\circ\text{ sin}$<br>pro Modul / per Module, DC<br>pro Zweig / per arm, DC | $R_{thJC}$        | max. | 0,165      | $^\circ\text{C}/\text{W}$ |
|  |  |                   | max. | 0,330      | $^\circ\text{C}/\text{W}$ |
|  |  |                   | max. | 0,155      | $^\circ\text{C}/\text{W}$ |
|  |  |                   | max. | 0,310      | $^\circ\text{C}/\text{W}$ |
| Übergangs-Wärmewiderstand<br>thermal resistance, case to heatsink      | pro Modul / per Module<br>pro Zweig / per arm  | $R_{thCH}$        | max. | 0,04       | $^\circ\text{C}/\text{W}$ |
|  |  |                   | max. | 0,08       | $^\circ\text{C}/\text{W}$ |
| Höchstzulässige Sperrschichttemperatur<br>maximum junction temperature |  | $T_{vj\max}$      |      | 140        | $^\circ\text{C}$          |
| Betriebstemperatur<br>operating temperature                            |  | $T_{c\text{ op}}$ |      | -40...+140 | $^\circ\text{C}$          |
| Lagertemperatur<br>storage temperature                                 |  | $T_{stg}$         |      | -40...+140 | $^\circ\text{C}$          |

**Mechanische Eigenschaften / Mechanical properties**

|   |                                 |    |      |                   |                       |
|---|---------------------------------|----|------|-------------------|-----------------------|
| Gehäuse, siehe Anlage<br>case, see annex  |                                 |    |      | Seite 3<br>Page 3 |                       |
| Si-Element mit Druckkontakt<br>Si-pellet with pressure contact                      |                                 |    |      |                   |                       |
| Innere Isolation<br>internal insulation   |                                 |    |      | AIN               |                       |
| Anzugsdrehmoment für mechanische Anschlüsse<br>mounting torque                      | Toleranz / Tolerance $\pm 15\%$ | M1 |      | 4                 | Nm                    |
| Anzugsdrehmoment für elektrische Anschlüsse<br>terminal connection torque           | Toleranz / Tolerance $\pm 10\%$ | M2 |      | 4                 | Nm                    |
| Steueranschlüsse<br>control terminals   | DIN 46 244                      |    |      | A 2,8 x 0,8       |                       |
| Gewicht<br>weight   |                                 | G  | typ. | 250               | g                     |
| Kriechstrecke<br>creepage distance  |                                 |    |      | 15                | mm                    |
| Schwingfestigkeit<br>vibration resistance   | $f = 50\text{ Hz}$              |    |      | 50                | $\text{m}/\text{s}^2$ |
|  | file-No.                        |    |      | E 83336           |                       |

Mit diesem Datenblatt werden Halbleiterbauelemente spezifiziert, jedoch keine Eigenschaften zugesichert. Es gilt in Verbindung mit den zugehörigen technischen Erläuterungen.

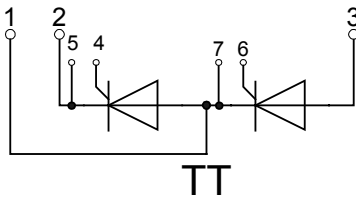
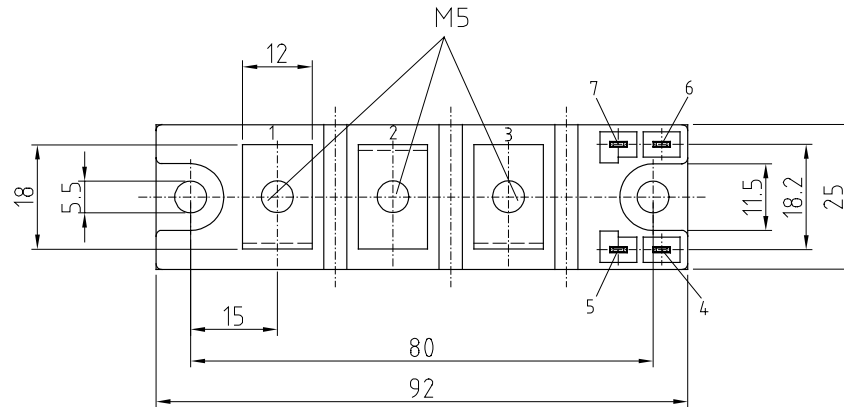
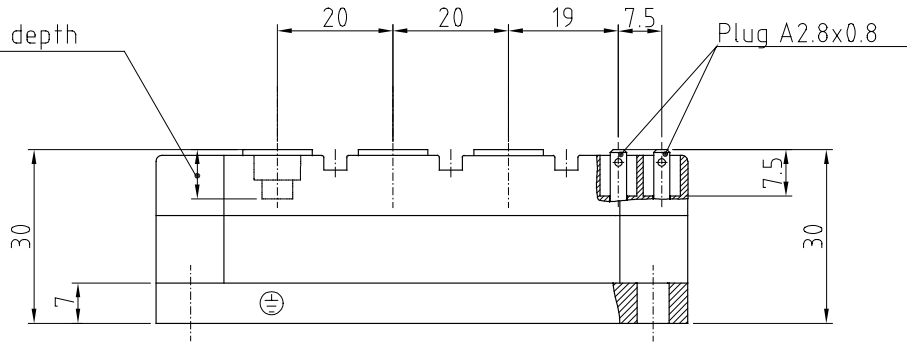
This data sheet specifies semiconductor devices, but promises no characteristics. It is valid in combination with the belonging technical notes.



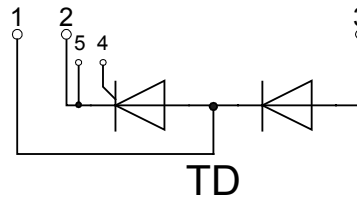
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Phase Control Thyristor Module

**TT106N**

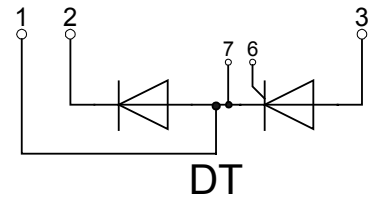
screwing depth  
max. 8.5



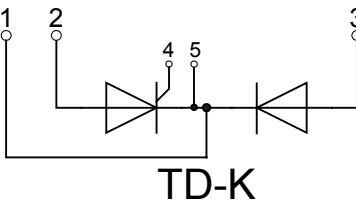
TT



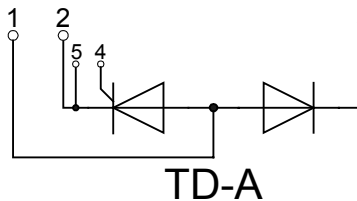
TD



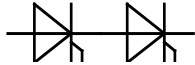
DT



TD-K



TD-A



Netz-Thyristor-Modul  
Phase Control Thyristor Module

**TT106N**

**Analytische Elemente des transienten Wärmewiderstandes  $Z_{thJC}$  für DC**  
**Analytical elements of transient thermal impedance  $Z_{thJC}$  for DC**

| Pos. n           | 1      | 2      | 3     | 4      | 5      | 6 | 7 |
|------------------|--------|--------|-------|--------|--------|---|---|
| $R_{thn}$ [°C/W] | 0,0127 | 0,03   | 0,049 | 0,1682 | 0,0315 |   |   |
| $\tau_n$ [s]     | 0,001  | 0,0092 | 0,074 | 0,57   | 3,51   |   |   |

Analytische Funktion / Analytical function: 
$$Z_{thJC} = \sum_{n=1}^{n_{max}} R_{thn} \left( 1 - e^{-\frac{t}{\tau_n}} \right)$$

Luftselbstkühlung / Natural cooling  
3 Module pro Kühlkörper / 3 modules per heatsink  
Kühlkörper / Heatsink type: KM14 (50W)

**Analytische Elemente des transienten Wärmewiderstandes  $Z_{thCA}$**   
**Analytical elements of transient thermal impedance  $Z_{thCA}$**

| Pos. n           | 1     | 2     | 3    | 4 | 5 | 6 | 7 |
|------------------|-------|-------|------|---|---|---|---|
| $R_{thn}$ [°C/W] | 0,048 | 0,202 | 2,05 |   |   |   |   |
| $\tau_n$ [s]     | 3,71  | 40    | 984  |   |   |   |   |

Verstärkte Kühlung / Forced cooling  
3 Module pro Kühlkörper / 3 modules per heatsink  
Kühlkörper / Heatsink type: KM 14 (Papst 4650N)

**Analytische Elemente des transienten Wärmewiderstandes  $Z_{thCA}$**   
**Analytical elements of transient thermal impedance  $Z_{thCA}$**

| Pos. n           | 1     | 2     | 3    | 4 | 5 | 6 | 7 |
|------------------|-------|-------|------|---|---|---|---|
| $R_{thn}$ [°C/W] | 0,048 | 0,202 | 0,53 |   |   |   |   |
| $\tau_n$ [s]     | 3,71  | 40    | 254  |   |   |   |   |

Analytische Funktion / Analytical function: 
$$Z_{thCA} = \sum_{n=1}^{n_{max}} R_{thn} \left( 1 - e^{-\frac{t}{\tau_n}} \right)$$