

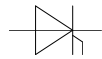
# Technische Information / Technical Information

**eupec**

Netz Thyristor  
Phase Control Thyristor

**T 821N 60...70TOH**

**N**



**Vorläufige Daten  
Preliminary Data**

## Features:

Volle Sperrfähigkeit bei 125° mit 50 Hz

Full blocking capability at 125°C with 50 Hz

Hohe Stoßströme und niedriger Wärme-  
widerstände durch NTV-Verbindung  
zwischen Silizium und Mo-Trägerscheibe.

High surge currents and low thermal resistance  
by using low temperature-connection NTV between  
silicon wafer and molybdenum.

Elektroaktive Passivierung durch a - C:H

Electroactive passivation by a - C:H

## Elektrische Eigenschaften / Electrical properties

Höchstzulässige Werte / Maximum rated values

|  |  |                                  |  |  |
|--|--|----------------------------------|--|--|
| Periodische Vorwärts - und Rückwärts - Spitzensperrspannung<br>repetitive peak forward off-state and reverse voltage | $t_{vj} = -40^{\circ}\text{C} \dots t_{vj\text{ max}}$<br>$f = 50\text{ Hz}$   | $V_{\text{DRM}}, V_{\text{RRM}}$ | 6000<br>6500<br>7000                   | V<br>V<br>V                                  |
| Durchlaßstrom-Grenzeffektivwert<br>RMS forward current   |  | $I_{\text{TRMSM}}$               | 2000                                   | A  |
| Dauergrenzstrom<br>mean forward current  | $t_{\text{C}} = 85^{\circ}\text{C}, f = 50\text{Hz}$<br>$t_{\text{C}} = 60^{\circ}\text{C}, f = 50\text{Hz}$                           | $I_{\text{TAVM}}$                | 965<br>1515                            | A<br>A                                       |
| Stoßstrom-Grenzwert<br>surge forward current   | $t_{vj} = 25^{\circ}\text{C}, t_p = 10\text{ms}, V_R = 0$<br>$t_{vj} = t_{vj\text{ max}}, t_p = 10\text{ms}, V_R = 0$                  | $I_{\text{FSM}}$                 | 23<br>22                               | kA<br>kA                                     |
| Grenzlastintegral<br>$I^2t$ -value   | $t_{vj} = 25^{\circ}\text{C}, t_p = 10\text{ms}$<br>$t_{vj} = t_{vj\text{ max}}, t_p = 10\text{ms}$                                    | $I^2t$                           | $2,65 \cdot 10^6$<br>$2,42 \cdot 10^6$ | $\text{A}^2\text{s}$<br>$\text{A}^2\text{s}$ |
| Kritische Stromsteilheit<br>critical rate of rise of on-state current  | DIN IEC 747-6<br>$f = 50\text{Hz}, v_D = 0,67 V_{\text{DRM}}$<br>$i_{\text{GM}} = 3\text{A}, di_{\text{G}}/dt = 6\text{A}/\mu\text{s}$ | $(di/dt)_{\text{cr}}$            | 150                                    | A/ $\mu\text{s}$                             |
| Kritische Spannungssteilheit<br>critical rate of rise of off-state current   | $t_{vj} = t_{vj\text{ max}}, v_D = 0,67 V_{\text{DRM}}$<br>5. Kennbuchstabe / 5 th letter H  | $(dv/dt)_{\text{cr}}$            | 2000                                   | V/ $\mu\text{s}$                             |

Charakteristische Werte / Characteristic values

|   |  |                            |   |  |                 |
|---|--|----------------------------|---|--|-----------------|
| Durchlaßspannung<br>on-state voltage  | $t_{vj} = t_{vj\text{ max}}, i_T = 1500\text{A}$ | $v_T$                      | typ<br>2,3  | max<br>2,4   | V               |
| Schleusenspannung / threshold voltage<br>Ersatzwiderstand / slope resistance  | $t_{vj} = t_{vj\text{ max}}$                     | $V_{\text{(TO)}}$<br>$r_T$ | typ<br>0,98<br>0,88                               | max<br>1,02<br>0,92                                | V<br>m $\Omega$ |
| Durchlaßrechenkennlinien<br>On - state characteristics for calculation<br>$V_T = A + B \cdot i_T + C \cdot \ln(i_T+1) + D \cdot \sqrt{i_T}$<br>300 A $\leq i_T \leq$ 4000 A | $t_{vj} = t_{vj\text{ max}}$                     | A<br>B<br>C<br>D           | typ<br>- 0,0945<br>0,000486<br>0,1679<br>0,011106 | max<br>- 0,0937<br>0,000526<br>0,17147<br>0,011367 |                 |

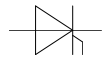
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Charakteristische Werte / Characteristic values

|  |   |            |     |          |               |
|--|---|------------|-----|----------|---------------|
| Zündstrom<br>gate trigger current  | $t_{vj} = 25^{\circ}\text{C}, V_D = 6\text{V}$  | $I_{GT}$   | max | 350      | mA            |
| Zündspannung<br>gate trigger voltage   | $t_{vj} = 25^{\circ}\text{C}, V_D = 6\text{V}$  | $V_{GT}$   | max | 2,5      | V             |
| Nicht zündender Steuerstrom<br>gate non-trigger current                      | $t_{vj} = t_{vj\text{ max}}, V_D = 6\text{V}$<br>$t_{vj} = t_{vj\text{ max}}, V_D = 0,5 V_{DRM}$  | $I_{GD}$   |     | 20<br>10 | mA<br>mA      |
| nicht zündende Steuerspannung<br>gate non-trigger voltage                    | $t_{vj} = 25^{\circ}\text{C}, V_D = 0,5 V_{DRM}$  | $V_{GD}$   |     | 0,4      | V             |
| Haltestrom<br>holding current  | $t_{vj} = 25^{\circ}\text{C}, V_D = 12\text{V}, R_A = 4,7\Omega$  | $I_H$      |     | 350      | mA            |
| Einraststrom<br>latching current   | $t_{vj} = 25^{\circ}\text{C}, V_D = 12\text{V}, R_{GK} \geq 10\Omega$<br>$i_{GM} = 3\text{A}, di_G/dt = 6\text{ A}/\mu\text{s}, t_g = 20\mu\text{s}$  | $I_L$      |     | 3        | A             |
| Vorwärts- und Rückwärts-Sperrstrom<br>forward off-state and reverse currents | $t_{vj} = t_{vj\text{ max}}$<br>$V_D = V_{DRM}, V_R = V_{RRM}$  | $i_D, i_R$ |     | 200      | mA            |
| Zündverzug<br>gate controlled delay time                                     | DIN IEC 747-6<br>$t_{vj} = 25^{\circ}\text{C},$<br>$i_{GM} = 3\text{A}, di_G/dt = 6\text{A}/\mu\text{s}$  | $t_{gd}$   |     | 2        | $\mu\text{s}$ |
| Freiwerdezeit<br>circuit commutated turn-off time                            | $t_{vj} = t_{vj\text{ max}}, I_{TM} = I_{TAVM}$<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>4. Kennbuchstabe / 4 th letter O | $t_q$      | typ | 700      | $\mu\text{s}$ |
| Sperrverzögerungsladung<br>recovered charge                                  | $t_{vj} = t_{vj\text{ max}}$<br>$I_{TM} = 2\text{ kA}, di/dt = 10\text{ A}/\mu\text{s}$<br>$V_R = 0,5 V_{RRM}, V_R = 0,8 V_{RRM}$   | $Q_r$      |     | 10       | mAs           |
| Rückstromspitze<br>peak reverse recovery current                             | $t_{vj} = t_{vj\text{ max}}$<br>$I_{TM} = 1,5\text{ kA}, di/dt = 10\text{ A}/\mu\text{s}$<br>$V_R = 0,5 V_{RRM}, V_R = 0,8 V_{RRM}$   | $I_{RM}$   |     | 250      | A             |

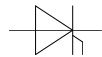
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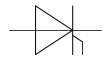
## Thermische Eigenschaften / Thermal properties

|   |  |                     |                 |  |
|---|--|---------------------|-----------------|--|
| Innerer Wärmewiderstand<br>thermal resistance, junction to case     | beidseitig / two-sided, $\Theta = 180^\circ\text{sin}$<br>beidseitig / two-sided, DC | $R_{\text{thJC}}$   | 0,0129<br>0,012 | $^\circ\text{C/W}$<br>$^\circ\text{C/W}$ |
| Übergangs-Wärmewiderstand<br>thermal resistance, case to heatsink   | beidseitig / two-sided   | $R_{\text{thCK}}$   | 0,004           | $^\circ\text{C/W}$                       |
| Höchstzulässige Sperrschichttemperatur<br>max. junction temperature |  | $t_{\text{vj max}}$ | 125             | $^\circ\text{C}$                         |
| Betriebstemperatur<br>operating temperature                         |  | $t_{\text{c op}}$   | -40...+125      | $^\circ\text{C}$                         |
| Lagertemperatur<br>storage temperature                              |  | $t_{\text{stg}}$    | -40...+150      | $^\circ\text{C}$                         |

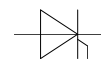
## Mechanische Eigenschaften / Mechanical properties

|  |           |   |         |                |
|--|-----------|---|---------|----------------|
| Gehäuse, siehe Anlage<br>case, see appendix  |           |   | Seite 4 |                |
| Si-Element mit Druckkontakt, Amplifying-Gate<br>Si-pellet with pressure contact, amplifying gate |           |   | 65TN70  |                |
| Anpreßkraft<br>clampig force   |           | F | 27...40 | kN             |
| Gewicht<br>weight  |           | G | typ 850 | g              |
| Kriechstrecke<br>creepage distance   |           |   | 27      | mm             |
| Feuchtklasse<br>humidity classification  | DIN 40040 |   | C       |                |
| Schwingfestigkeit<br>vibration resistance  | f = 50Hz  |   | 50      | $\text{m/s}^2$ |

Mit dieser technischen Information werden Halbleiterbauelemente spezifiziert, jedoch keine Eigenschaften zugesichert. Sie gilt in Verbindung mit den zugehörigen technischen Erläuterungen.  
This technical information specifies semiconductor devices but promises no characteristics. It is valid in combination with the belonging technical notes.

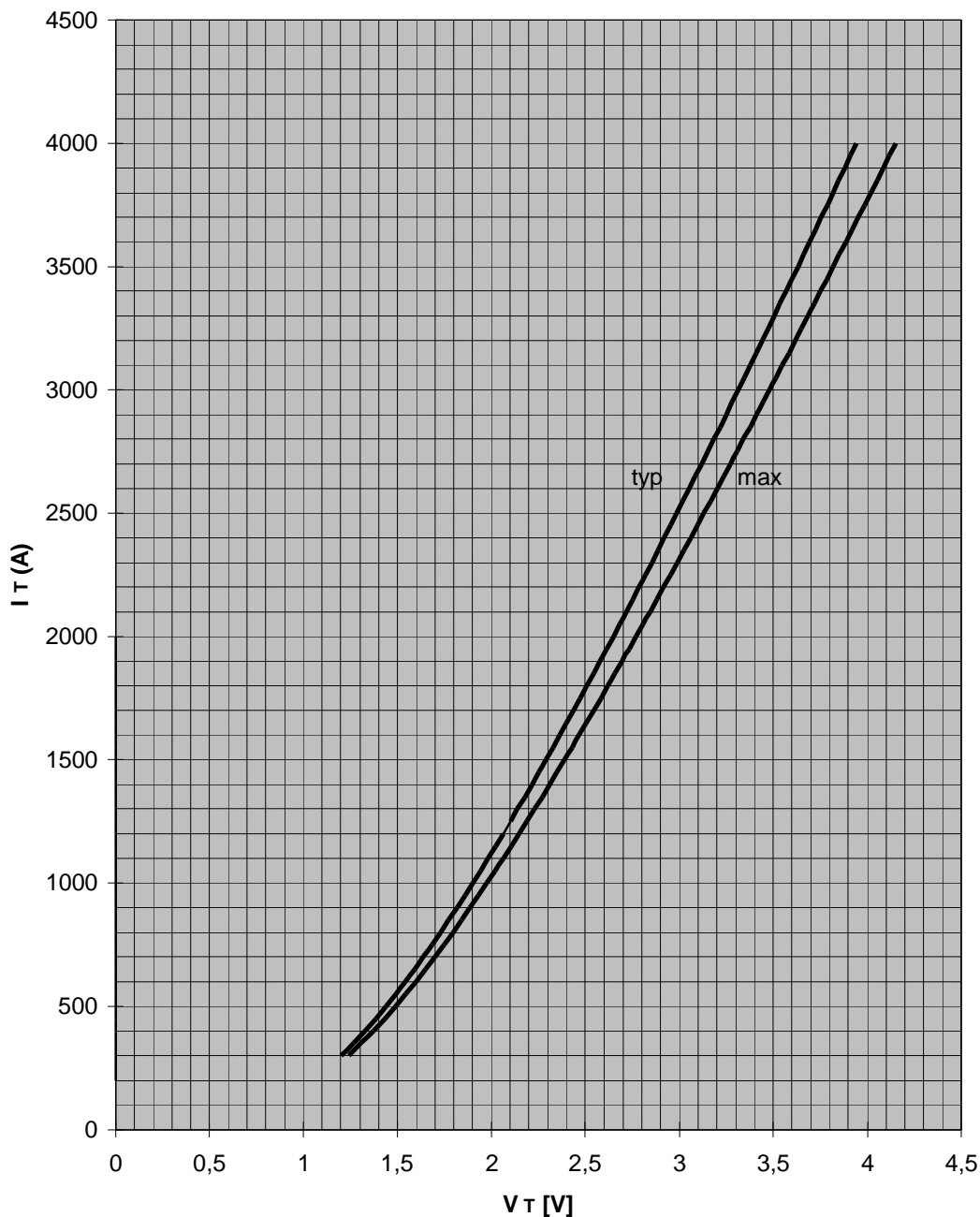


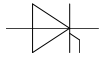
**Maßbild / Outline**



**Durchlaßkennlinie  $i_T = f(v_T)$**   
Limiting and typical on-state characteristic

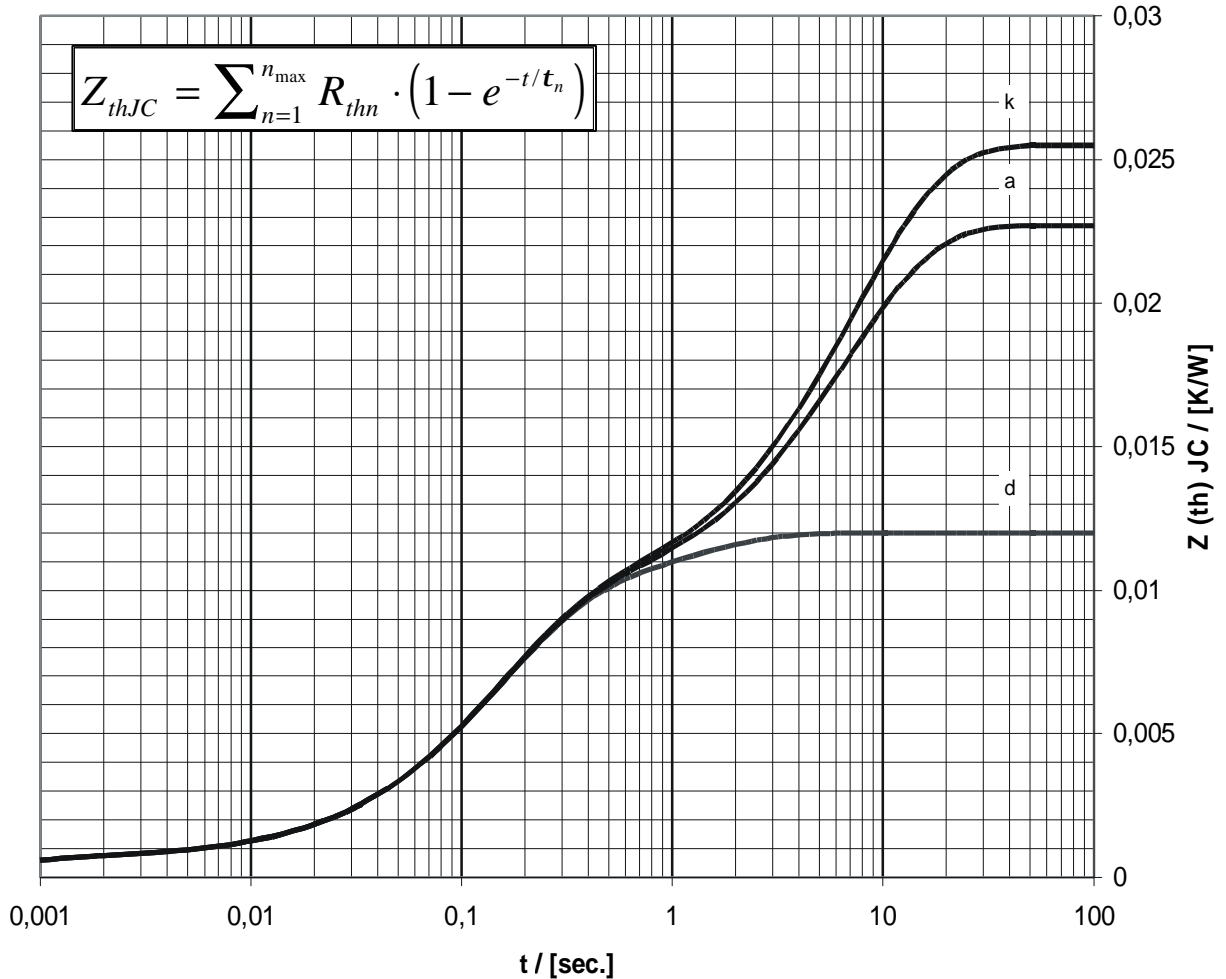
$\frac{3}{4}$   $t_{vj} = 125^\circ \text{C}$





**Transienter innerer Wärmewiderstand**  
**Transient thermal impedance  $Z_{(th)JC} = f(t)$**

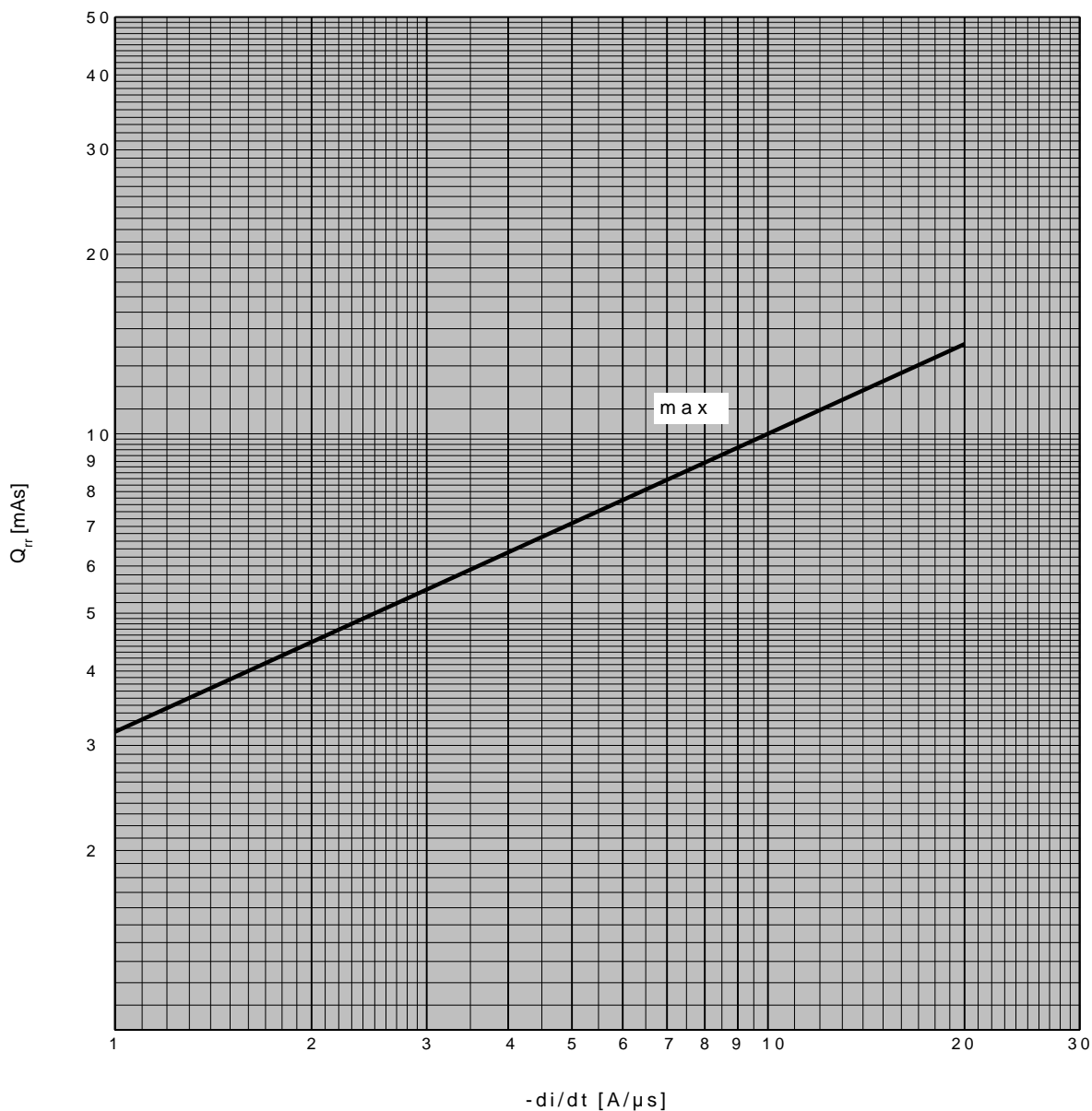
|   | doppelseitige Kühlung |        | anodenseitige Kühlung |        | kathodenseitige Kühlung |        |
|---|-----------------------|--------|-----------------------|--------|-------------------------|--------|
|   | r [K/W]               | [s]    | r [K/W]               | [s]    | r [K/W]                 | [s]    |
| 1 | 0,00235               | 1,15   | 0,01305               | 6,6    | 0,01585                 | 7,3    |
| 2 | 0,002                 | 0,232  | 0,002                 | 0,232  | 0,002                   | 0,232  |
| 3 | 0,0015                | 0,14   | 0,0015                | 0,14   | 0,0015                  | 0,14   |
| 4 | 0,0055                | 0,13   | 0,0055                | 0,13   | 0,0055                  | 0,13   |
| 5 | 0,00065               | 0,0006 | 0,00065               | 0,0006 | 0,00065                 | 0,0006 |
|   | 0,012                 | -      | 0,0227                | -      | 0,0255                  | -      |

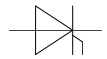




**Sperrverzögerungsladung  $Q_r = f(-di/dt)$   
recovered charge**

$t_{vj} = 125^\circ\text{C}, I_{TM} = 1500\text{A}, V_R = 0,5 V_{RRM}, V_{RM} = 0,8 V_{RRM}$





Rückstromspitze / reverse recovery current

$$I_{RM} = f (di/dt)$$

$t_{vj} = 125^{\circ}C, I_{TM} = 1500A, V_R = 0,5 V_{RRM}, V_{RM} = 0,8 V_{RRM}$

