



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

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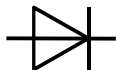
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### Key Parameters

|                  |                                             |
|------------------|---------------------------------------------|
| $V_{RRM}$        | 4500 V                                      |
| $I_{FAVM}$       | 1830 A ( $T_C=85\text{ }^{\circ}\text{C}$ ) |
| $I_{FSM}$        | 40000 A                                     |
| $V_{T0}$         | 1,25 V                                      |
| $r_T$            | 0,5 m $\Omega$                              |
| $R_{thJC}$       | 7,5 K/kW                                    |
| Clamping Force   | 36 ... 52 kN                                |
| Max. Diameter    | 121 mm                                      |
| Contact Diameter | 86 mm                                       |
| Height           | 26 mm                                       |



For type designation please refer to actual  
short form catalog

<http://www.ifbip.com/catalog>

### Merkmale

- Volle Sperrfähigkeit 50/60Hz über einen weiten Temperaturbereich
- Hohe DC Sperrstabilität
- Hohe Stoßstrombelastbarkeit
- Hoher Gehäusebruchstrom
- Sanftes Ausschaltverhalten bei hohen Stromsteilheiten

### Features

- Full blocking capability 50/60Hz over a wide temperature range
- High DC blocking stability
- High surge current capability
- High case non-rupture current
- Soft turn-off behavior at high turn-off di/dt

### Typische Anwendungen

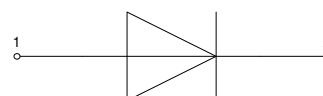
- Mittelspannungsumrichter
- Freilaufdiode für IGCT - Applikationen
- Freilaufdiode für IGBT - Applikationen
- Pulsed Power - Applikationen

### Typical Applications

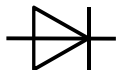
- Medium voltage converters
- Freewheeling Diode for IGCT - applications
- Freewheeling Diode for IGBT - applications
- Pulsed power applications



| content of customer DMX code | DMX code digit | DMX code digit quantity |
|------------------------------|----------------|-------------------------|
| serial number                | 1..7           | 7                       |
| SP material number           | 8..16          | 9                       |
| datecode (production day)    | 17..18         | 2                       |
| datecode (production year)   | 19..20         | 2                       |
| datecode (production month)  | 21..22         | 2                       |
| vT class (optional)          | 23..26         | 4                       |
| QR class (optional)          | 27..30         | 4                       |



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# Technische Information / technical information



**Schnelle beschaltungslose Diode**  
**Fast Hard Drive Diode**

## D1961SH

Infineon Technologies Bipolar  
GmbH & Co. KG

### Elektrische Eigenschaften / Electrical properties

Höchstzulässige Werte / Maximum rated values

|                                                                               |                                                                                                                                                                                                       |             |                      |                           |
|-------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------|---------------------------|
| Periodische Rückwärts-Spitzensperrspannung<br>repetitive peak reverse voltage | $T_{vj} = 0^{\circ}\text{C} \dots T_{vj\text{ max}}$                                                                                                                                                  | $V_{RRM}$   | 4500                 | V                         |
| Durchlaßstrom-Grenzeffektivwert<br>maximum RMS on-state current               | $T_c = 85^{\circ}\text{C}$                                                                                                                                                                            | $I_{FRMSM}$ | 2880                 | A                         |
| Dauergrenzstrom<br>average on-state current                                   | $T_c = 85^{\circ}\text{C}, f=50\text{Hz}$<br>$T_c = 70^{\circ}\text{C}, f=50\text{Hz}$<br>$T_c = 55^{\circ}\text{C}, f=50\text{Hz}$                                                                   | $I_{FAVM}$  | 1830<br>2120<br>2380 | A<br>A<br>A               |
| Stoßstrom-Grenzwert<br>surge current                                          | $T_{vj} = 25^{\circ}\text{C}, t_p = 10\text{ ms}$<br>$T_{vj} = T_{vj\text{ max}}, t_p = 10\text{ ms}$                                                                                                 | $I_{FSM}$   | 40000                | A                         |
| Grenzlastintegral<br>$I^2t$ -value                                            | $T_{vj} = 25^{\circ}\text{C}, t_p = 10\text{ ms}$<br>$T_{vj} = T_{vj\text{ max}}, t_p = 10\text{ ms}$                                                                                                 | $I^2t$      | 8000                 | $10^3\text{ A}^2\text{s}$ |
| Max. Ausschaltverluste<br>max. turn-off losses                                | $T_{vj} = T_{vj\text{ max}}$<br>$I_{FM} = 2500\text{A}, V_{CL} = 2800\text{V}$<br>clamp circuit $L_S \leq 0,25\mu\text{H}$<br>$R_{CL} = 68\Omega, C_{CL} = 3\mu\text{F}$<br>$D_{CL} = 34\text{DSH65}$ | $P_{RQ}$    | 5                    | MW                        |

### Charakteristische Werte / Characteristic values

|                                                                                                                                                                 |                                                                                                                                                           |            |              |              |          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|------------|--------------|--------------|----------|
| Gleichsperrspannung<br>continuous direct reverse voltage                                                                                                        | failure rate $\lambda < 100$                                                                                                                              | $V_{R(D)}$ | estimate     | 2800         | V        |
| Durchlaßspannung<br>on-state voltage                                                                                                                            | $T_{vj} = T_{vj\text{ max}}, I_F = 2500\text{A}$                                                                                                          | $V_F$      | typ.<br>max. | 2,16<br>2,50 | V<br>V   |
| Schleusenspannung<br>threshold voltage                                                                                                                          | $T_{vj} = T_{vj\text{ max}}$                                                                                                                              | $V_{(TO)}$ | typ.<br>max. | 1,11<br>1,25 | V<br>V   |
| Ersatzwiderstand<br>slope resistance                                                                                                                            | $T_{vj} = T_{vj\text{ max}}$                                                                                                                              | $r_T$      | typ.<br>max. | 0,42<br>0,5  | mΩ<br>mΩ |
| Durchlaßkennlinie<br>on-state characteristic<br>$200\text{A} \leq I_F \leq 3000\text{A}$<br>$V_F = A + B \cdot I_F + C \cdot \ln(I_F + 1) + D \cdot \sqrt{I_F}$ | $T_{vj} = T_{vj\text{ max}}$                                                                                                                              | typ.       | A            | 0,72096      |          |
|                                                                                                                                                                 |                                                                                                                                                           |            | B            | -0,000113    |          |
|                                                                                                                                                                 |                                                                                                                                                           |            | C            | -0,0806      |          |
|                                                                                                                                                                 |                                                                                                                                                           |            | D            | 0,0469       |          |
|                                                                                                                                                                 |                                                                                                                                                           | max.       | A            | 0,6986       |          |
|                                                                                                                                                                 |                                                                                                                                                           |            | B            | -0,0000753   |          |
|                                                                                                                                                                 |                                                                                                                                                           |            | C            | -0,07067     |          |
|                                                                                                                                                                 |                                                                                                                                                           |            | D            | 0,0506       |          |
| Spitzenwert der Durchlassverzögerungsspannung<br>peak value of forward recovery voltage                                                                         | $T_{vj} = T_{vj\text{ max}}, di_F/dt = 5000\text{A}/\mu\text{s}$<br>$I_{FM} = 4000\text{A}$                                                               | $V_{FRM}$  | typ.         | 280          | V        |
| Sperrstrom<br>reverse current                                                                                                                                   | $T_{vj} = T_{vj\text{ max}}, V_R = V_{RRM}$                                                                                                               | $I_R$      | max.         | 150          | mA       |
| Sperrverzögerungsladung<br>recovered charge                                                                                                                     | $T_{vj} = T_{vj\text{ max}}$<br>$I_{FM} = 2500\text{A}, V_{CL} = 2800\text{V},$                                                                           | $Q_r$      | max.         | 12           | mAs      |
| Rückstromspitze<br>peak reverse recovery current                                                                                                                | $-di/dt = 1000\text{A}/\mu\text{s}$<br>clamp circuit $L_S \leq 0,25\mu\text{H},$                                                                          | $I_{RM}$   | max.         | 2250         | A        |
| Ausschaltverlust Energie<br>turn-off energy                                                                                                                     | $R_{CL} = 68\Omega, C_{CL} = 3\mu\text{F},$<br>$D_{CL} = 34\text{DSH65},$                                                                                 | $W_{RQ}$   | max.         | 21           | Ws       |
| Abklingsanftheit<br>reverse recovery softness factor                                                                                                            | $T_{vj} = T_{vj\text{ max}}$<br>$I_{FM} = 2500\text{A}, V_R = 2800\text{ V},$<br>$-di_r/dt(i=0) = 1000\text{A}/\mu\text{s}, \Delta t_{rf} = 200\text{ns}$ | $F_{RRS}$  | typ.         | 1,6          |          |

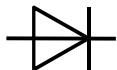
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approved by: JP

revision: 3.2





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# D1961SH

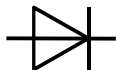
Infineon Technologies Bipolar  
GmbH & Co. KG

### Thermische Eigenschaften / Thermal properties

|                                                                        |                                                                                                                                                                           |                     |                                                                     |
|------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------------------------------------------------------|
| Innerer Wärmewiderstand<br>thermal resistance, junction to case        | <u>Kühlfläche / cooling surface</u><br>beidseitig / two-sided, $\theta = 180^\circ\text{sin}$<br>beidseitig / two-sided, DC<br>Anode / anode, DC<br>Kathode / cathode, DC | $R_{\text{thJC}}$   | max. 8,55 K/kW<br>max. 7,5 K/kW<br>max. 13,3 K/kW<br>max. 17,2 K/kW |
| Übergangs-Wärmewiderstand<br>thermal resistance, case to heatsink      | <u>Kühlfläche / cooling surface</u><br>beidseitig / two-sided<br>einseitig / single-sided                                                                                 | $R_{\text{thCH}}$   | max. 2,5 K/kW<br>max. 5 K/kW                                        |
| Höchstzulässige Sperrschichttemperatur<br>maximum junction temperature |                                                                                                                                                                           | $T_{\text{vj max}}$ | 140 °C                                                              |
| Betriebstemperatur<br>operating temperature                            |                                                                                                                                                                           | $T_{\text{c op}}$   | 0...+140 °C                                                         |
| Lagertemperatur<br>storage temperature                                 |                                                                                                                                                                           | $T_{\text{stg}}$    | -40...+150 °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 |           |   | 76DSX45             |  |
| Anpresskraft<br>clamping force                                 |           | F | 36...52 kN          |  |
| Gewicht<br>weight                                              |           | G | typ. 1350 g         |  |
| Kriechstrecke<br>creepage distance                             |           |   | 33 mm               |  |
| Luftstrecke<br>air distance                                    |           |   | 17 mm               |  |
| Feuchtklasse<br>humidity classification                        | DIN 40040 |   | C                   |  |
| Schwingfestigkeit<br>vibration resistance                      | f = 50 Hz |   | 50 m/s <sup>2</sup> |  |



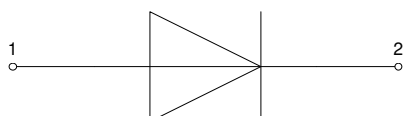
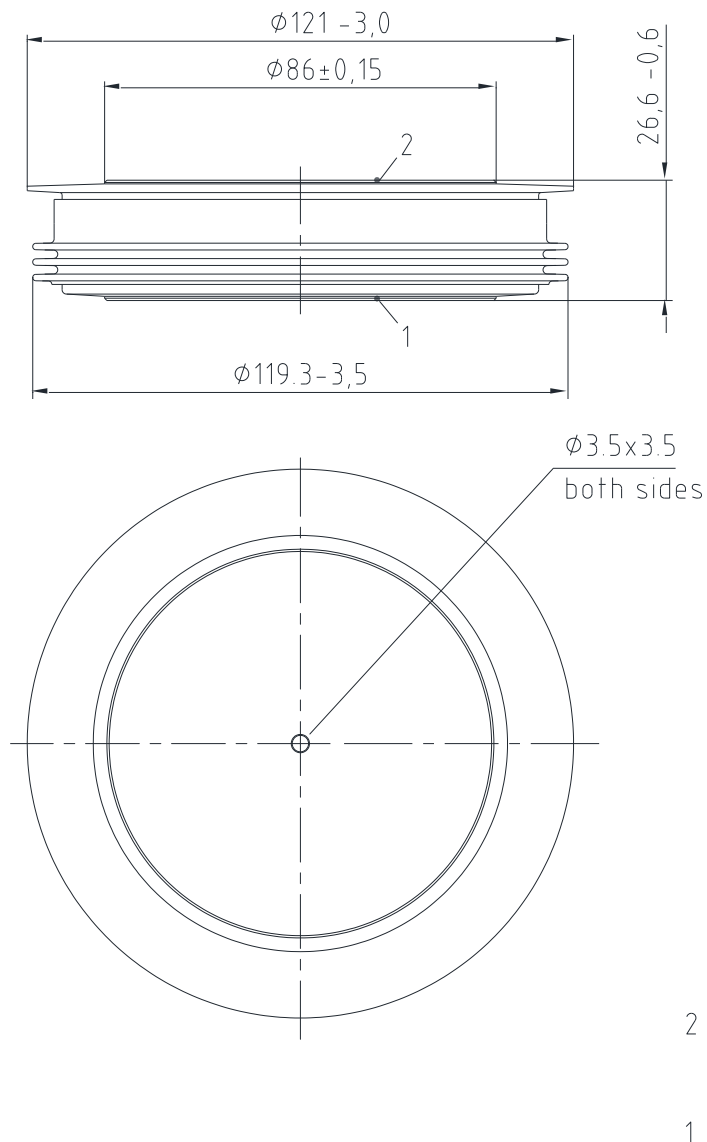
Technische Information /  
technical information



Schnelle beschaltungslose Diode  
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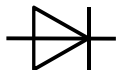
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1: Anode/Anode

2: Kathode/Cathode

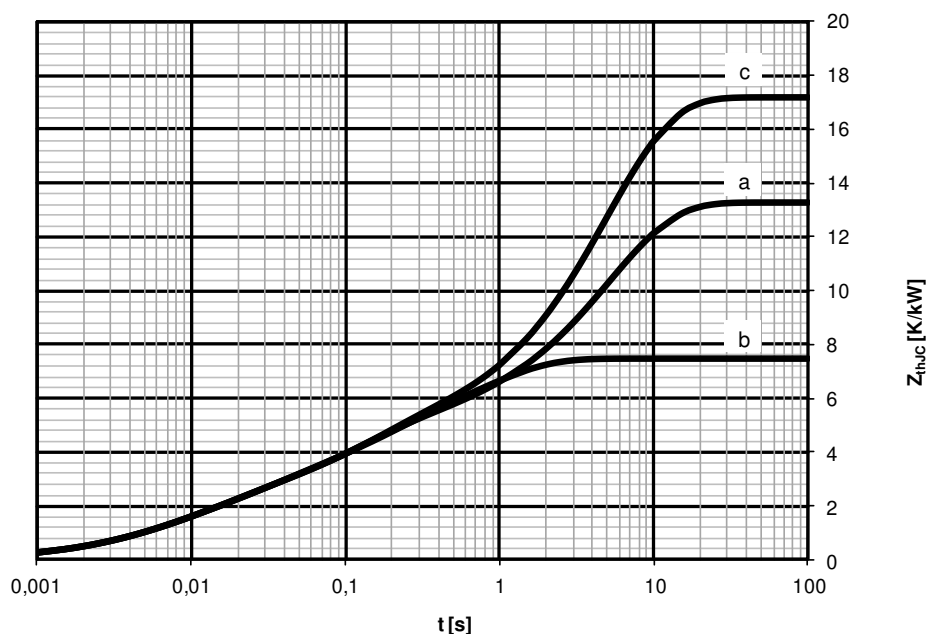


**Analytische Elemente des transienten Wärmewiderstandes  $Z_{thJC}$**   
**Analytical elements of transient thermal impedance  $Z_{thJC}$**

|                                 | Pos. n                  | 1    | 2     | 3      | 4       | 5       | 6 | 7 |
|---------------------------------|-------------------------|------|-------|--------|---------|---------|---|---|
| beidseitig<br>two-sided         | $R_{thn} [^{\circ}C/W]$ | 2,95 | 2     | 1,54   | 0,98    | 0,03    |   |   |
|                                 | $\tau_n [s]$            | 0,78 | 0,131 | 0,0217 | 0,00514 | 0,00104 |   |   |
| anodenseitig<br>anode-sided     | $R_{thn} [^{\circ}C/W]$ | 8,04 | 0,81  | 2,39   | 1,6     | 0,46    |   |   |
|                                 | $\tau_n [s]$            | 5,11 | 0,359 | 0,0962 | 0,012   | 0,00332 |   |   |
| kathodenseitig<br>cathode-sided | $R_{thn} [^{\circ}C/W]$ | 12,1 | 0,4   | 2,44   | 1,55    | 0,71    |   |   |
|                                 | $\tau_n [s]$            | 4,97 | 0,489 | 0,121  | 0,0153  | 0,00427 |   |   |

Analytische Funktion / Analytical function:

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

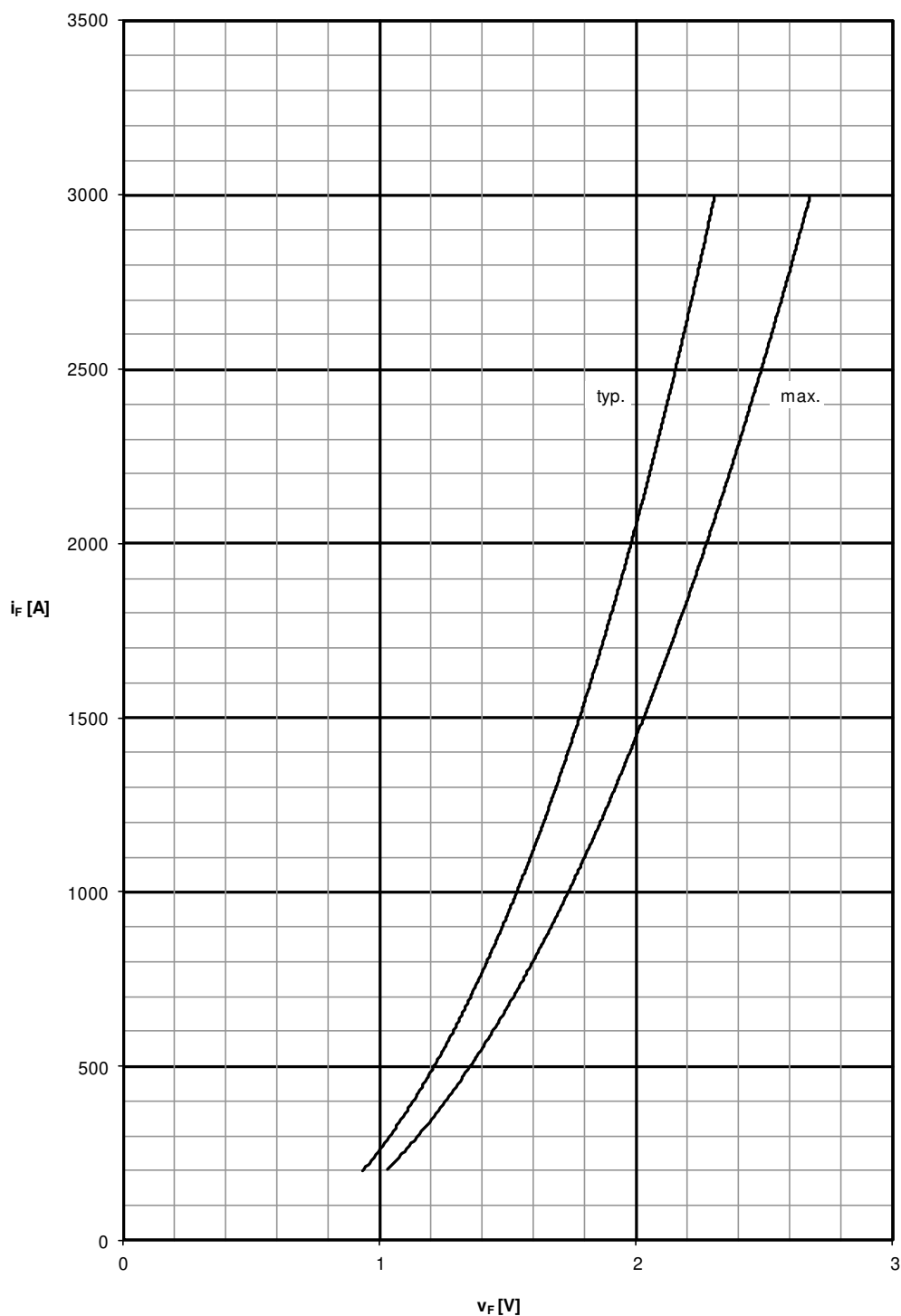
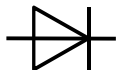


**Transienter innerer Wärmewiderstand für DC / Transient thermal impedance  $Z_{thJC} = f(t)$  for DC**

**a** : Anodenseitige Kühlung / Anode-sided cooling

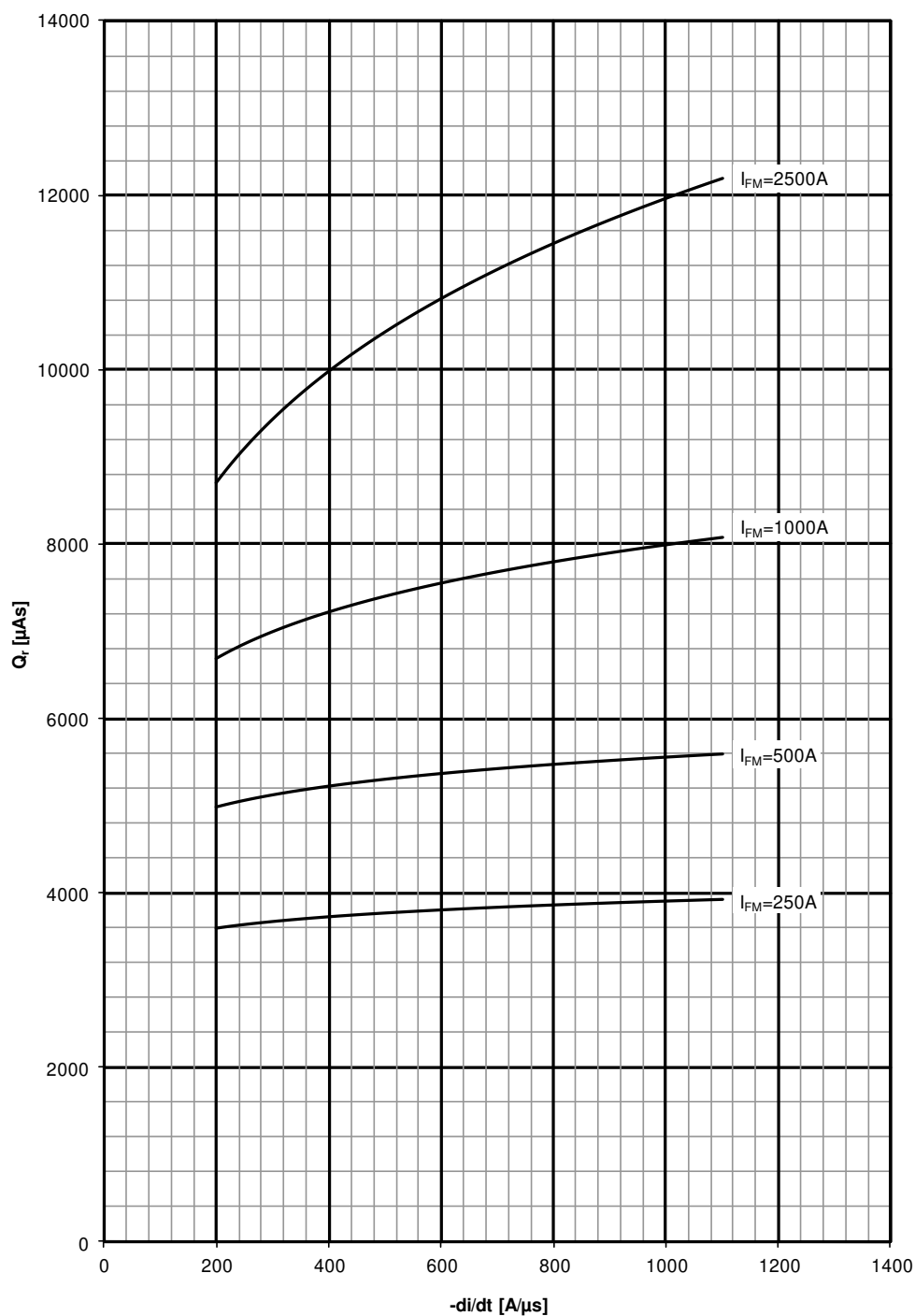
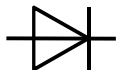
**b** : Beidseitige Kühlung / Two-sided cooling

**c** : Kathodenseitige Kühlung / Cathode-sided cooling



Grenzdurchlaßkennlinie / Limiting on-state characteristic  $i_F = f(v_F)$

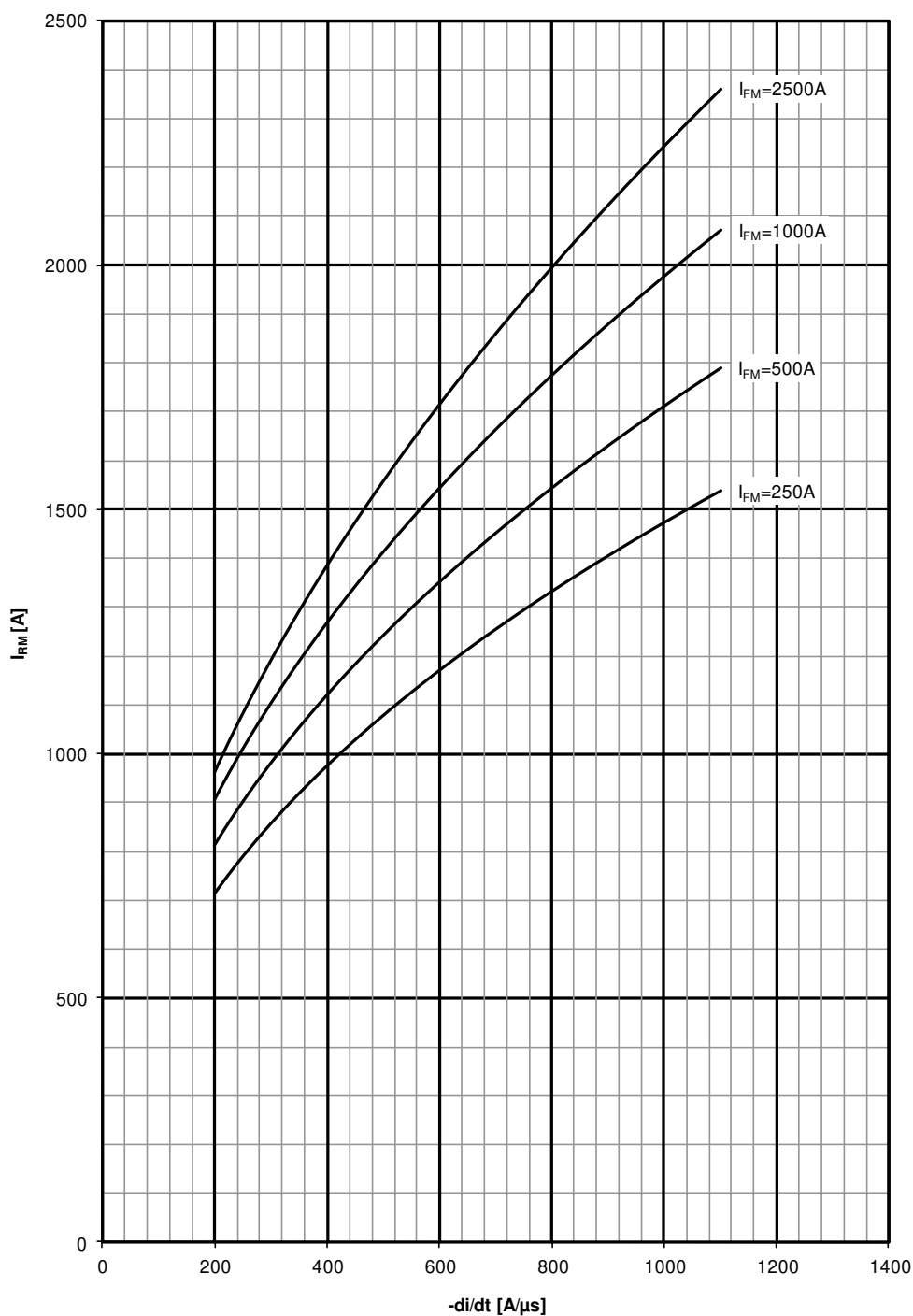
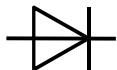
$$T_{vj} = T_{vj \max}$$



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

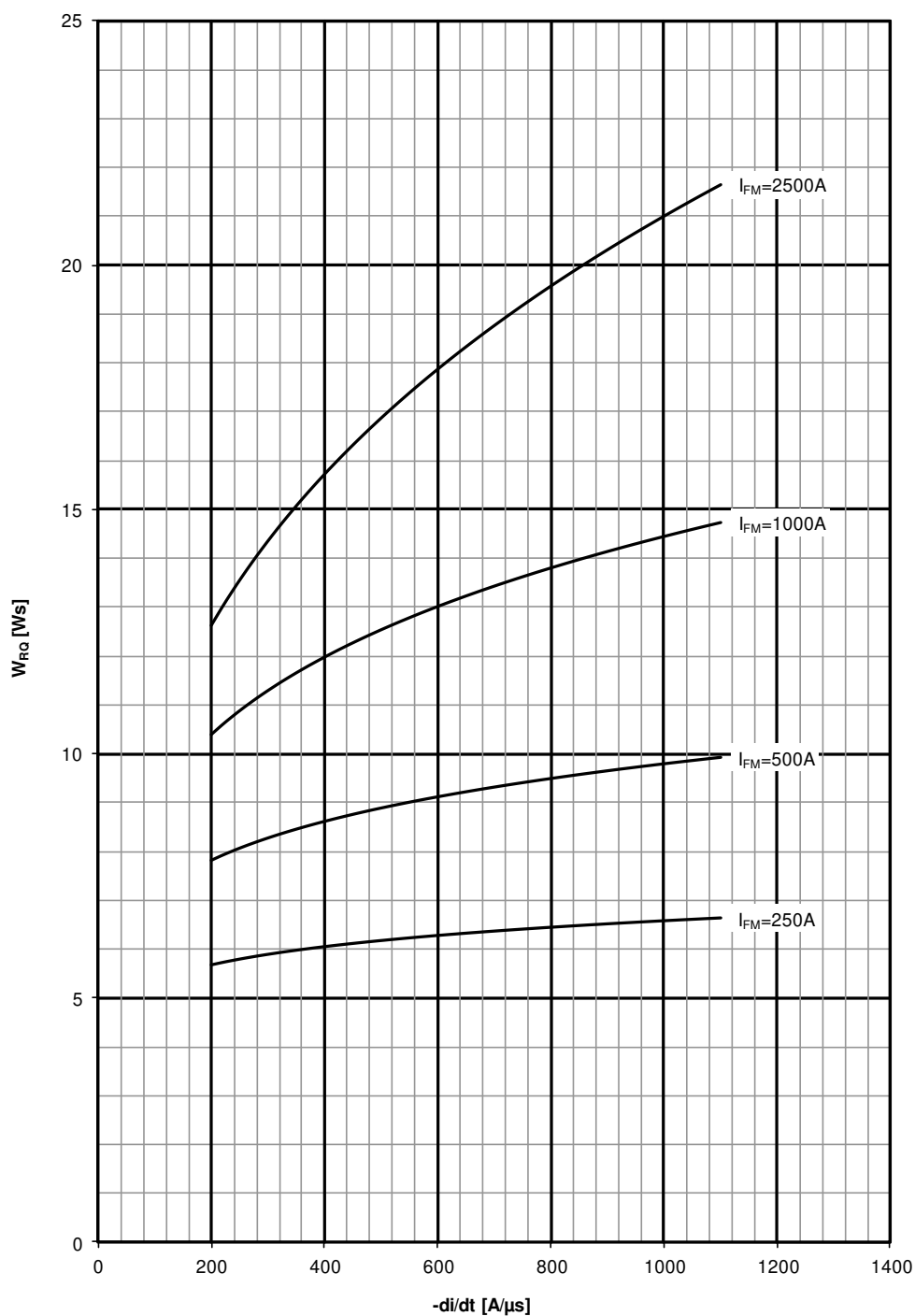
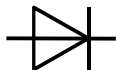
$T_{vj}=T_{vjmax}$ , clamp circuit  $L_S \leq 0,25\mu H$ ,  $R_{CL} = 68\Omega$   
 $C_{CL} = 3\mu F$ ,  $D_{CL} = 34DSH65$





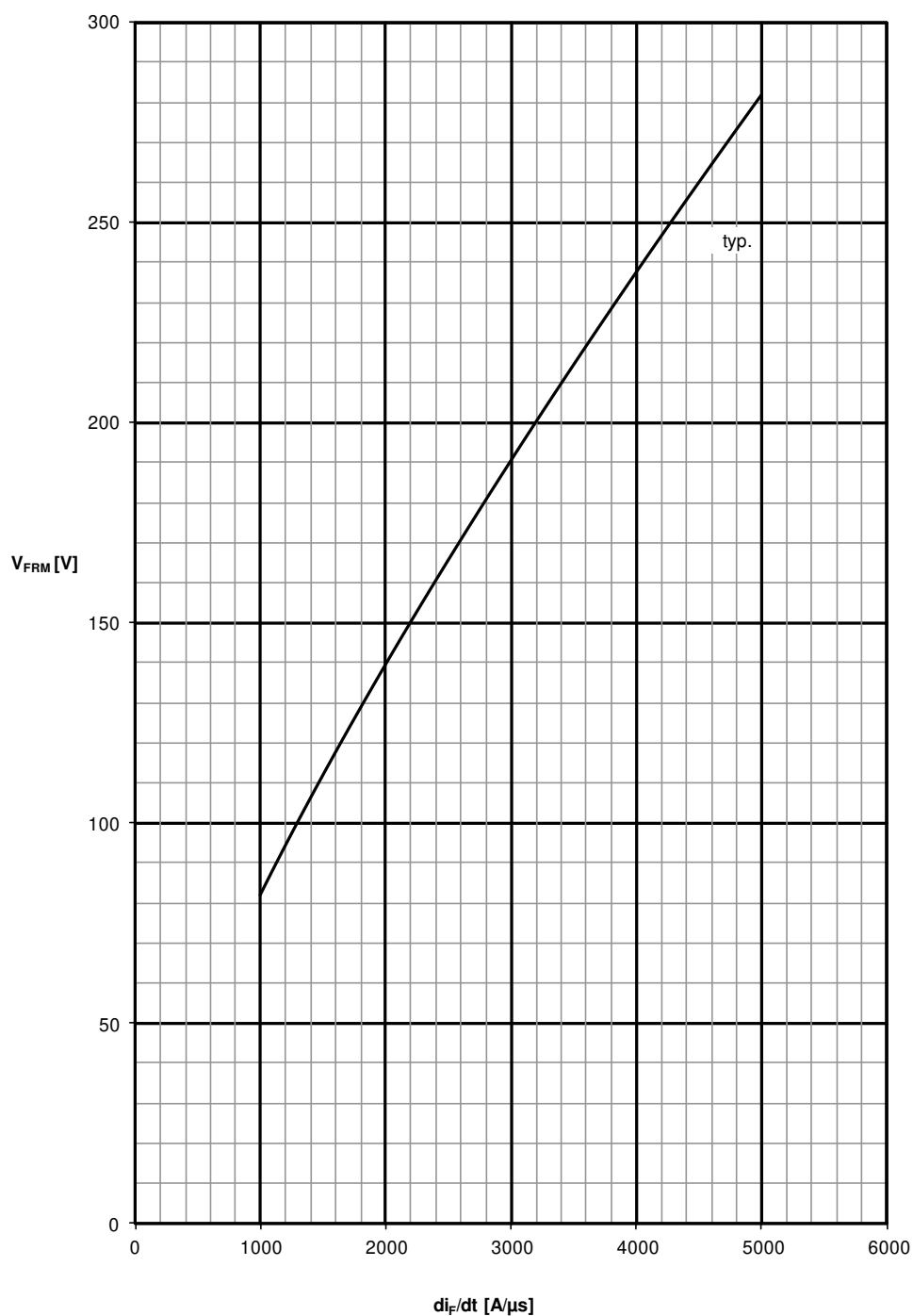
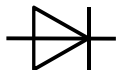
Rückstromspitze / peak reverse recovery current  $I_{RM} = f(-di/dt)$

$T_{vj} = T_{vjmax}$ , clamp circuit  $L_S \leq 0,25\mu H$ ,  $R_{CL} = 68\Omega$   
 $C_{CL} = 3\mu F$ ,  $D_{CL} = 34DSH65$



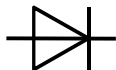
**Ausschaltverlust Energie / turn-off energy  $E_{off} = f(-di/dt)$**

$T_{vj}=T_{vjmax}$ , clamp circuit  $L_S \leq 0,25\mu H$ ,  $R_{CL} = 68\Omega$   
 $C_{CL} = 3\mu F$ ,  $D_{CL} = 34DSH65$



Spitzenwert-Durchlassverzögerungsspannung / peak value forward recovery voltage  $V_{FRM} = f(di_F/dt)$

$T_{vj} = T_{vjmax}$ ,  $I_{FM} = 4000A$



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