flow BOOST

1200 V / 40 A

Features
- High efficiency dual boost
- Ultra fast switching frequency
- Low Inductance Layout
- 1200 V IGBT and 1200 V Si diode

Target Applications
- solar inverter

Types
- V23990-P629-F72-PM

Maximum Ratings

\( T_j = 25 \, ^\circ\text{C} \), unless otherwise specified

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Condition</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bypass Diode</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repetitive peak reverse voltage</td>
<td>( V_{BRRM} )</td>
<td></td>
<td>1600</td>
<td>V</td>
</tr>
<tr>
<td>DC forward current</td>
<td>( I_{FAD} )</td>
<td>( T_j = T_{jmax} ), ( T_s = 80 , ^\circ\text{C} )</td>
<td>34</td>
<td>A</td>
</tr>
<tr>
<td>Surge (non-repetitive) forward current</td>
<td>( I_{PDM} )</td>
<td>( I_{p} = 10 , \text{ms} )</td>
<td>220</td>
<td>A</td>
</tr>
<tr>
<td>I2t-value</td>
<td>( I_{2t} )</td>
<td></td>
<td>200</td>
<td>A^2s</td>
</tr>
<tr>
<td>Power dissipation</td>
<td>( P_{on} )</td>
<td>( T_j = T_{jmax} ), ( T_s = 80 , ^\circ\text{C} )</td>
<td>41</td>
<td>W</td>
</tr>
<tr>
<td>Maximum Junction Temperature</td>
<td>( T_{jmax} )</td>
<td></td>
<td>150</td>
<td>^\circ\text{C}</td>
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</tbody>
</table>

Boost IGBT

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Condition</th>
<th>Value</th>
<th>Unit</th>
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</thead>
<tbody>
<tr>
<td>Collector-emitter break down voltage</td>
<td>( V_{CE} )</td>
<td></td>
<td>1200</td>
<td>V</td>
</tr>
<tr>
<td>DC collector current</td>
<td>( I_c )</td>
<td>( T_j = T_{jmax} ), ( T_s = 80 , ^\circ\text{C} )</td>
<td>36</td>
<td>A</td>
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<tr>
<td>Repetitive peak collector current</td>
<td>( I_{2CM} )</td>
<td>( I_{p} ), limited by ( T_{jmax} )</td>
<td>80</td>
<td>A</td>
</tr>
<tr>
<td>Power dissipation</td>
<td>( P_{on} )</td>
<td>( T_j = T_{jmax} ), ( T_s = 80 , ^\circ\text{C} )</td>
<td>108</td>
<td>W</td>
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<tr>
<td>Gate-emitter peak voltage</td>
<td>( V_{GE} )</td>
<td></td>
<td>( \pm 25 )</td>
<td>V</td>
</tr>
<tr>
<td>Short circuit ratings</td>
<td>( t_{SC} )</td>
<td>( T_j \leq 150 , ^\circ\text{C} )</td>
<td>10</td>
<td>( \mu\text{s} )</td>
</tr>
<tr>
<td></td>
<td>( V_{CC} )</td>
<td>( V_{GE} = 15 , \text{V} )</td>
<td>600</td>
<td>V</td>
</tr>
<tr>
<td>Maximum Junction Temperature</td>
<td>( T_{jmax} )</td>
<td></td>
<td>150</td>
<td>^\circ\text{C}</td>
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</table>

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15 Nov. 2016 / Revision 6
Maximum Ratings

\( T_j = 25 \, ^\circ C, \) unless otherwise specified

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Condition</th>
<th>Value</th>
<th>Unit</th>
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<tr>
<td><strong>Boost IGBT Protection Diode</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak Repetitive Reverse Voltage</td>
<td>( V_{RSM} )</td>
<td></td>
<td>1600</td>
<td>V</td>
</tr>
<tr>
<td>DC forward current</td>
<td>( I_F ) ( T_j = T_{jmax} ) ( T_s = 80 , ^\circ C )</td>
<td></td>
<td>34</td>
<td>A</td>
</tr>
<tr>
<td>Repetitive peak forward current</td>
<td>( I_{FRM} ) ( \tau_f ) limited by ( T_{jmax} )</td>
<td></td>
<td>220</td>
<td>A</td>
</tr>
<tr>
<td>Power dissipation</td>
<td>( P_{tot} ) ( T_j = T_{jmax} ) ( T_s = 80 , ^\circ C )</td>
<td></td>
<td>41</td>
<td>W</td>
</tr>
<tr>
<td>Maximum Junction Temperature</td>
<td></td>
<td></td>
<td>150</td>
<td>°C</td>
</tr>
<tr>
<td><strong>Boost FWD</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak Repetitive Reverse Voltage</td>
<td>( V_{RSM} )</td>
<td></td>
<td>1200</td>
<td>V</td>
</tr>
<tr>
<td>DC forward current</td>
<td>( I_F ) ( T_j = 150 , ^\circ C ) ( T_s = 80 , ^\circ C )</td>
<td></td>
<td>27</td>
<td>A</td>
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<tr>
<td>Repetitive peak forward current</td>
<td>( I_{FRM} ) ( \tau_f ) limited by ( T_{jmax} )</td>
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<td>70</td>
<td>A</td>
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<tr>
<td>Power dissipation</td>
<td>( P_{tot} ) ( T_j = 150 , ^\circ C ) ( T_s = 80 , ^\circ C )</td>
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<td>47</td>
<td>W</td>
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<tr>
<td>Maximum Junction Temperature</td>
<td>( T_{jmax} )</td>
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<td>175</td>
<td>°C</td>
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**Thermal Properties**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Condition</th>
<th>Value</th>
<th>Unit</th>
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</thead>
<tbody>
<tr>
<td>Storage temperature</td>
<td>( T_{stg} )</td>
<td></td>
<td>-40...+125</td>
<td>°C</td>
</tr>
<tr>
<td>Operation temperature under switching condition</td>
<td>( T_{op} )</td>
<td></td>
<td>-40...+(( T_{jmax} - 25 ))</td>
<td>°C</td>
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**Isolation Properties**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>( t = 2 , s )</th>
<th>DC Test Voltage</th>
<th>Value</th>
<th>Unit</th>
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<tbody>
<tr>
<td>Isolation voltage</td>
<td>( V_{u} )</td>
<td></td>
<td>4000</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Creepage distance</td>
<td></td>
<td></td>
<td>min 12,7</td>
<td>mm</td>
<td></td>
</tr>
<tr>
<td>Clearance</td>
<td></td>
<td></td>
<td>min 9,55</td>
<td>mm</td>
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</tr>
</tbody>
</table>
**Characteristic Values**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Conditions</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boost IGBT</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gate emitter threshold voltage</td>
<td>( V_{\text{gs}} )</td>
<td>( V_{\text{gs}} = V_{\text{ds}} )</td>
<td>0,0025</td>
<td>3,5</td>
</tr>
<tr>
<td>Collector-emitter saturation voltage</td>
<td>( V_{\text{ces}} )</td>
<td>( V_{\text{ces}} = 4 \ \Omega )</td>
<td>25</td>
<td>600</td>
</tr>
<tr>
<td>Collector-emitter cut-off</td>
<td>( I_{\text{fss}} )</td>
<td>( I_{\text{fss}} = 4 \ \Omega )</td>
<td>25</td>
<td>125</td>
</tr>
<tr>
<td>Gate-emitter leakage current</td>
<td>( f_{\text{fss}} )</td>
<td>( f_{\text{fss}} = 0 )</td>
<td>25</td>
<td>125</td>
</tr>
<tr>
<td>Integrated Gate resistor</td>
<td>( R_{\text{geo}} )</td>
<td></td>
<td></td>
<td>tbd.</td>
</tr>
<tr>
<td>Turn-on delay time</td>
<td>( t_{\text{on}} )</td>
<td>( t_{\text{on}} = 1 )</td>
<td>25</td>
<td>125</td>
</tr>
<tr>
<td>Rise time</td>
<td>( t_{\text{r}} )</td>
<td>( t_{\text{r}} = 0 )</td>
<td>25</td>
<td>125</td>
</tr>
<tr>
<td>Turn-off delay time</td>
<td>( t_{\text{off}} )</td>
<td>( t_{\text{off}} = 1 )</td>
<td>25</td>
<td>125</td>
</tr>
<tr>
<td>Fall time</td>
<td>( t_{\text{f}} )</td>
<td>( t_{\text{f}} = 0 )</td>
<td>25</td>
<td>125</td>
</tr>
<tr>
<td>Turn-on energy loss</td>
<td>( E_{\text{on}} )</td>
<td>( E_{\text{on}} = 1 )</td>
<td>25</td>
<td>125</td>
</tr>
<tr>
<td>Turn-off energy loss</td>
<td>( E_{\text{off}} )</td>
<td>( E_{\text{off}} = 1 )</td>
<td>25</td>
<td>125</td>
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<tr>
<td>Input capacitance</td>
<td>( C_{\text{in}} )</td>
<td>( f = 1 ) MHz</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Output capacitance</td>
<td>( C_{\text{out}} )</td>
<td>( f = 1 ) MHz</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Reverse transfer capacitance</td>
<td>( C_{\text{r}} )</td>
<td>( C_{\text{r}} = 1 )</td>
<td>25</td>
<td>125</td>
</tr>
<tr>
<td>Gate charge</td>
<td>( Q_{\text{g}} )</td>
<td>( Q_{\text{g}} = 1 )</td>
<td>15</td>
<td>600</td>
</tr>
<tr>
<td>Thermal resistance junction to sink</td>
<td>( R_{\text{th(j-c)}} )</td>
<td>Thermal grease thickness 50um ( k = 1 ) W/mK</td>
<td>25</td>
<td>125</td>
</tr>
<tr>
<td>Thermal resistance junction to case</td>
<td>( R_{\text{th(j-s)}} )</td>
<td>Thermal grease thickness 50um ( k = 1 ) W/mK</td>
<td>25</td>
<td>125</td>
</tr>
<tr>
<td>Boost IGBT Protection Diode</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diode forward voltage</td>
<td>( V_{\text{ds}} )</td>
<td>( V_{\text{ds}} = V_{\text{ds}} )</td>
<td>25</td>
<td>125</td>
</tr>
<tr>
<td>Thermal resistance junction to sink</td>
<td>( R_{\text{th(j-c)}} )</td>
<td>Thermal grease thickness 50um ( k = 1 ) W/mK</td>
<td>25</td>
<td>125</td>
</tr>
<tr>
<td>Thermal resistance junction to case</td>
<td>( R_{\text{th(j-s)}} )</td>
<td>Thermal grease thickness 50um ( k = 1 ) W/mK</td>
<td>25</td>
<td>125</td>
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<tr>
<td>Boost FWD</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forward voltage</td>
<td>( V_{\text{ds}} )</td>
<td>( V_{\text{ds}} = V_{\text{ds}} )</td>
<td>30</td>
<td>25</td>
</tr>
<tr>
<td>Reverse leakage current</td>
<td>( I_{\text{r}} )</td>
<td>( I_{\text{r}} = 1 )</td>
<td>25</td>
<td>125</td>
</tr>
<tr>
<td>Peak recovery current</td>
<td>( I_{\text{r}} )</td>
<td>( I_{\text{r}} = 2 )</td>
<td>25</td>
<td>150</td>
</tr>
<tr>
<td>Reverse recovery time</td>
<td>( t_{\text{r}} )</td>
<td>( t_{\text{r}} = 0 )</td>
<td>25</td>
<td>150</td>
</tr>
<tr>
<td>Reverse recovery charge</td>
<td>( Q_{\text{r}} )</td>
<td>( Q_{\text{r}} = 1 )</td>
<td>25</td>
<td>150</td>
</tr>
<tr>
<td>Reverse recovered energy</td>
<td>( E_{\text{r}} )</td>
<td>( E_{\text{r}} = 1 )</td>
<td>25</td>
<td>150</td>
</tr>
<tr>
<td>Peak rate of fall of recovery current</td>
<td>( (I_{\text{r}})_{\text{a}} )</td>
<td>( (I_{\text{r}})_{\text{a}} = 1 )</td>
<td>25</td>
<td>150</td>
</tr>
<tr>
<td>Thermal resistance junction to sink</td>
<td>( R_{\text{th(j-c)}} )</td>
<td>Thermal grease thickness 50um ( k = 1 ) W/mK</td>
<td>25</td>
<td>150</td>
</tr>
<tr>
<td>Thermal resistance junction to case</td>
<td>( R_{\text{th(j-s)}} )</td>
<td>Thermal grease thickness 50um ( k = 1 ) W/mK</td>
<td>25</td>
<td>150</td>
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</table>
### Characteristic Values

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<tr>
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<th>Symbol</th>
<th>Conditions</th>
<th>Value</th>
<th>Unit</th>
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<tr>
<td>BVincotech NTC Reference</td>
<td></td>
<td></td>
<td>3998 K</td>
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<tr>
<td>B-value</td>
<td>B</td>
<td>(25/100)</td>
<td>25</td>
<td>K</td>
</tr>
<tr>
<td>Power dissipation constant</td>
<td>P</td>
<td></td>
<td>25</td>
<td>mW/K</td>
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<td>Deviation of $R_{100}$</td>
<td>$\Delta R_{100}$</td>
<td>$R_{100} = 1486 , \Omega$</td>
<td>100</td>
<td>-12</td>
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<td>Rated resistance</td>
<td>$R$</td>
<td></td>
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<td>22000</td>
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<tr>
<td>Power dissipation</td>
<td>$P$</td>
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<td>200</td>
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<td>Thermistor</td>
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<td>25</td>
<td>25</td>
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<tr>
<td>B-value</td>
<td>$B_{(25/100)}$</td>
<td>Tol. ±3%</td>
<td>25</td>
<td>3950</td>
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<tr>
<td>B-value</td>
<td>$B_{(25/100)}$</td>
<td>Tol. ±3%</td>
<td>25</td>
<td>3998</td>
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<tr>
<td>Vincotech NTC Reference</td>
<td></td>
<td></td>
<td>B</td>
<td></td>
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</tbody>
</table>
Boost IGBT Protection Diode

**Figure 1.** Boost IGBT Protection Diode
Typical FWD forward current as a function of forward voltage
\[ I_F = f(V_F) \]

![Graph of \( I_F = f(V_F) \)](image)

At
\[ t_p = 250 \ \mu s \]

**Figure 2.** Boost IGBT Protection Diode
Diode transient thermal impedance as a function of pulse width
\[ Z_{th(j-s)} = f(t_p) \]

![Graph of \( Z_{th(j-s)} = f(t_p) \)](image)

At
\[ D = \frac{t_p}{T_{th}} \]
\[ R_{(j-s)} = 1.71 \ \text{K/W} \]

**Figure 3.** Boost IGBT Protection Diode
Power dissipation as a function of heatsink temperature
\[ P_{tot} = f(T_s) \]

![Graph of \( P_{tot} = f(T_s) \)](image)

At
\[ T_j = 150 \ ^\circ C \]

**Figure 4.** Boost IGBT Protection Diode
Forward current as a function of heatsink temperature
\[ I_F = f(T_s) \]

![Graph of \( I_F = f(T_s) \)](image)

At
\[ T_j = 150 \ ^\circ C \]
**INPUT BOOST**

**figure 3.** BOOST IGBT

Typical output characteristics

\[ I_C = f(V_{CE}) \]

At

- \( t_p = 250 \mu s \)
- \( T_j = 25^\circ C \)
- \( V_{CE} \) from 7 V to 17 V in steps of 1 V

**figure 4.** BOOST FWD

Typical output characteristics

\[ I_C = f(V_{CE}) \]

At

- \( t_p = 250 \mu s \)
- \( T_j = 125^\circ C \)
- \( V_{CE} \) from 7 V to 17 V in steps of 1 V

**figure 3.** BOOST IGBT

Typical transfer characteristics

\[ I_C = f(V_{CE}) \]

At

- \( t_p = 250 \mu s \)
- \( V_{CE} = 10 \) V

**figure 4.** BOOST FWD

Typical FWD forward current as a function of forward voltage

\[ I_F = f(V_F) \]

At

- \( t_p = 250 \mu s \)
- \( T_j = 25^\circ C \)
- \( T_j = T_{j_{max}} - 25^\circ C \)
figure 5. **BOOST IGBT**

Typical switching energy losses as a function of collector current

\[ E = f(I_C) \]

With an inductive load at

- \( T_j = 25/125 \) °C
- \( V_{CE} = 600 \) V
- \( V_G = 15 \) V
- \( R_{gon} = 4 \) Ω
- \( I_C = 40 \) A

figure 6. **BOOST IGBT**

Typical switching energy losses as a function of gate resistor

\[ E = f(R_G) \]

With an inductive load at

- \( T_j = 25/125 \) °C
- \( V_{CE} = 600 \) V
- \( V_G = 15 \) V
- \( I_C = 40 \) A

figure 7. **BOOST IGBT**

Typical reverse recovery energy loss as a function of collector current

\[ E_{rec} = f(I_C) \]

With an inductive load at

- \( T_j = 25/125 \) °C
- \( V_{CE} = 600 \) V
- \( V_G = 15 \) V
- \( R_{gon} = 4 \) Ω

figure 8. **BOOST IGBT**

Typical reverse recovery energy loss as a function of gate resistor

\[ E_{rec} = f(R_G) \]

With an inductive load at

- \( T_j = 25/125 \) °C
- \( V_{CE} = 600 \) V
- \( V_G = 15 \) V
- \( I_C = 40 \) A
With an inductive load at
\[ T_j = 125 \, ^\circ\text{C} \]
\[ V_{CE} = 600 \, \text{V} \]
\[ V_{GE} = 15 \, \text{V} \]
\[ I_F = 40 \, \text{A} \]
\[ R_{gon} = 4 \, \Omega \]

At
\[ T_j = 25/125 \, ^\circ\text{C} \]
\[ V_{CE} = 600 \, \text{V} \]
\[ V_{GE} = 15 \, \text{V} \]
\[ I_F = 40 \, \text{A} \]
\[ R_{gon} = 4 \, \Omega \]
**INPUT BOOST**

**Figure 13.** Typical reverse recovery charge as a function of collector current

\[ Q_{rr} = f(I_C) \]

At

- \( T_J = 25/125 \degree C \)
- \( V_{CE} = 600 \) V
- \( V_G = 15 \) V
- \( R_{gon} = 4 \) Ω

**Figure 14.** Typical reverse recovery charge as a function of IGBT turn on gate resistor

\[ Q_{rr} = f(R_{gon}) \]

At

- \( T_J = 25/125 \degree C \)
- \( V_R = 600 \) V
- \( I_R = 40 \) A
- \( V_G = 15 \) V

**Figure 15.** Typical reverse recovery current as a function of collector current

\[ I_{RRM} = f(I_C) \]

**Figure 16.** Typical reverse recovery current as a function of IGBT turn on gate resistor

\[ I_{RRM} = f(R_{gon}) \]

At

- \( T_J = 25/125 \degree C \)
- \( V_R = 600 \) V
- \( I_R = 40 \) A
- \( V_G = 15 \) V
**INPUT BOOST**

**figure 17.** BOOST FWD  
Typical rate of fall of forward and reverse recovery current as a function of collector current 
\[ \frac{dI_0}{dt}, \frac{dI_{rec}}{dt} = f(I_c) \]

\[ \frac{dI_0}{dt}, \frac{dI_{rec}}{dt} = f(R_{gon}) \]

At 
- \( T_j = 25/125 \) °C 
- \( V_{CE} = 600 \) V 
- \( V_{GE} = 15 \) V 
- \( I_F = 40 \) A 
- \( R_{gon} = 4 \) Ω 

**figure 18.** BOOST FWD  
Typical rate of fall of forward and reverse recovery current as a function of IGBT turn on gate resistor 

\[ \frac{dI_0}{dt}, \frac{dI_{rec}}{dt} = f(R_{gon}) \]

At 
- \( T_j = 25/125 \) °C 
- \( V_r = 600 \) V 
- \( I_r = 40 \) A 
- \( V_{GE} = 15 \) V 

**figure 19.** BOOST IGBT  
IGBT transient thermal impedance as a function of pulse width 
\[ Z_{th(j-s)} = f(t_p) \]

At 
- \( D = 0,5 \) 
- \( R_{(K/W)} = 0,65 \) K/W 

**figure 20.** BOOST FWD  
FWD transient thermal impedance as a function of pulse width 
\[ Z_{th(j-s)} = f(t_p) \]

At 
- \( D = 0,5 \) 
- \( R_{(K/W)} = 1,48 \) K/W 

IGBT thermal model values

<table>
<thead>
<tr>
<th>( R ) (K/W)</th>
<th>Tau (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,98E-01</td>
<td>4,95E-01</td>
</tr>
<tr>
<td>3,47E-01</td>
<td>1,11E-01</td>
</tr>
<tr>
<td>7,54E-02</td>
<td>1,46E-02</td>
</tr>
<tr>
<td>2,80E-02</td>
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FWD thermal model values

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<th>( R ) (K/W)</th>
<th>Tau (s)</th>
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<td>5,00E-02</td>
<td>5,60E+00</td>
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<td>8,13E-02</td>
<td>6,64E-04</td>
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</table>
**figure 21. BOOST IGBT**

Power dissipation as a function of heatsink temperature

\[ P_{\text{tot}} = f(T_s) \]

At

\[ T_j = 150 \, ^\circ\text{C} \]

**figure 22. BOOST IGBT**

Collector/Drain current as a function of heatsink temperature

\[ I_C = f(T_s) \]

At

\[ T_j = 150 \, ^\circ\text{C}, \quad V_{GE} = 15 \, \text{V} \]

**figure 23. BOOST FWD**

Power dissipation as a function of heatsink temperature

\[ P_{\text{tot}} = f(T_s) \]

At

\[ T_j = 150 \, ^\circ\text{C} \]

**figure 24. BOOST FWD**

Forward current as a function of heatsink temperature

\[ I_F = f(T_s) \]

At

\[ T_j = 150 \, ^\circ\text{C} \]
INPUT BOOST

**figure 25. BOOST IGBT**
Safe operating area as a function of drain-source voltage
\[ I_C = f(V_{CE}) \]

**figure 26. BOOST IGBT**
Gate voltage vs Gate charge
\[ V_{GE} = f(Q_g) \]

\[ \begin{align*}
\text{At} & \\
D &= \text{single pulse} \\
T_s &= 80 \, ^\circ\text{C} \\
V_{GE} &= 15 \, \text{V} \\
T_j &= T_{j\max}
\end{align*} \]

\[ \begin{align*}
\text{At} & \\
I_C &= 40 \, \text{A}
\end{align*} \]
**Bypass Diode**

**figure 1.** Bypass Diode

Typical Diode forward current as a function of forward voltage

\[ I\text{}_F = f(V\text{}_F) \]

![Graph of Diode forward current as a function of forward voltage](image)

**At**

\[ t_p = 250 \ \mu\text{s} \]

**figure 2.** Bypass Diode

Diode transient thermal impedance as a function of pulse width

\[ Z\text{th(j-s)} = f(t\text{p}) \]

![Graph of Diode transient thermal impedance as a function of pulse width](image)

**At**

\[ D = \frac{t_p}{T\text{Rth(j-s)}} = 1,71 \ \text{K/W} \]

**figure 3.** Bypass Diode

Power dissipation as a function of heatsink temperature

\[ P\text{tot} = f(T\text{s}) \]

![Graph of Power dissipation as a function of heatsink temperature](image)

**At**

\[ T\text{j} = 150 \ ^\circ\text{C} \]

**figure 4.** Bypass Diode

Forward current as a function of heatsink temperature

\[ I\text{F} = f(T\text{s}) \]

![Graph of Forward current as a function of heatsink temperature](image)

**At**

\[ T\text{j} = 150 \ ^\circ\text{C} \]
Thermistor

Typical NTC characteristic as a function of temperature

\[ R_T = f(T) \]
Switching Definitions BOOST IGBT

General conditions

\[
\begin{align*}
T_j &= 125 \, ^\circ C \\
R_{gs} &= 4 \, \Omega \\
R_{goff} &= 4 \, \Omega
\end{align*}
\]

**figure 1.** Boost IGBT

Turn-off Switching Waveforms & definition of \( t_{doff}, t_{Eoff} \)

\( t_{doff} = 0.19 \, \mu s \)

\( t_{Eoff} = 0.56 \, \mu s \)

**figure 2.** Boost IGBT

Turn-on Switching Waveforms & definition of \( t_{don}, t_{Eon} \)

\( t_{don} = 0.03 \, \mu s \)

\( t_{Eon} = 0.15 \, \mu s \)

**figure 3.** Boost IGBT

Turn-off Switching Waveforms & definition of \( t_f \)

\( V_C (100\%) = 600 \, V \)

\( I_C (100\%) = 40 \, A \)

\( t_f = 0.04 \, \mu s \)

**figure 4.** Boost IGBT

Turn-on Switching Waveforms & definition of \( t_r \)

\( V_C (100\%) = 600 \, V \)

\( I_C (100\%) = 40 \, A \)

\( t_r = 0.01 \, \mu s \)
Switching Definitions BOOST IGBT

**Figure 5.** Boost IGBT
Turn-off Switching Waveforms & definition of $t_{E_{\text{off}}}$

- $P_{\text{off}}$ (100%) = 24.23 kW
- $E_{\text{off}}$ (100%) = 1.53 mJ
- $t_{E_{\text{off}}}$ = 0.56 μs

**Figure 6.** Boost IGBT
Turn-on Switching Waveforms & definition of $t_{E_{\text{on}}}$

- $P_{\text{on}}$ (100%) = 24.23 kW
- $E_{\text{on}}$ (100%) = 1.65 mJ
- $t_{E_{\text{on}}}$ = 0.15 μs

**Figure 7.** Boost FWD
Turn-off Switching Waveforms & definition of $t_{rr}$

- $V_d$ (100%) = 600 V
- $I_d$ (100%) = 40 A
- $I_{\text{RRM}}$ (100%) = -91 A
- $t_{rr}$ = 0.27 μs
Switching Definitions BOOST FWD

**figure 9.** Boost FWD
Turn-on Switching Waveforms & definition of $t_{Qrr}$
($t_{Qrr} = $ integrating time for $Q_{rr}$)

- $I_d$ (100%) = 40 A
- $Q_{rr}$ (100%) = 6.92 μC
- $t_{Qrr} =$ 1.00 μs

**figure 10.** Boost FWD
Turn-on Switching Waveforms & definition of $t_{Erec}$
($t_{Erec} = $ integrating time for $E_{rec}$)

- $P_{rec}$ (100%) = 24.23 kW
- $E_{rec}$ (100%) = 3.36 mJ
- $t_{Erec} =$ 1.00 μs
Ordering Code and Marking - Outline - Pinout

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Outline

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**Pinout**

[Diagram showing pinout and connections for different components like Sol1, Sol2, Boost1, Boost2, G1, S1, S2, G2, NTC1, NTC2, etc.]
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