Maximum Ratings

\( T = 25 \, ^\circ C, \) 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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<tbody>
<tr>
<td>Boost Switch</td>
<td></td>
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<tr>
<td>Collector-emitter voltage</td>
<td>( V_{CES} )</td>
<td>( T = T_{j max} ), ( T_s = 80 , ^\circ C )</td>
<td>650</td>
<td>V</td>
</tr>
<tr>
<td>Collector current</td>
<td>( I_C )</td>
<td>( T = T_{j max} ), ( T_s = 80 , ^\circ C )</td>
<td>62</td>
<td>A</td>
</tr>
<tr>
<td>Repetitive peak collector current</td>
<td>( I_{CRM} )</td>
<td>( T = T_{j max} ), ( T_s = 80 , ^\circ C )</td>
<td>400</td>
<td>A</td>
</tr>
<tr>
<td>Total power dissipation</td>
<td>( P_{tot} )</td>
<td>( T = T_{j max} ), ( T_s = 80 , ^\circ C )</td>
<td>100</td>
<td>W</td>
</tr>
<tr>
<td>Gate-emitter voltage</td>
<td>( V_{GES} )</td>
<td>( T_s = 80 , ^\circ C )</td>
<td>±20</td>
<td>V</td>
</tr>
<tr>
<td>Maximum junction temperature</td>
<td>( T_{j max} )</td>
<td>( T_s = 80 , ^\circ C )</td>
<td>175</td>
<td>(^\circ C)</td>
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</tbody>
</table>
## Maximum Ratings

$T_i = 25 \degree \text{C}$, 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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<tbody>
<tr>
<td><strong>Boost Diode</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak Repetitive Reverse Voltage</td>
<td>$V_{RRM}$</td>
<td></td>
<td>650</td>
<td>V</td>
</tr>
<tr>
<td>Continuous (direct) forward current</td>
<td>$I_F$</td>
<td>$T_i = T_{j\text{max}}$</td>
<td>82</td>
<td>A</td>
</tr>
<tr>
<td>Repetitive peak forward current</td>
<td>$I_{FRM}$</td>
<td></td>
<td>200</td>
<td>A</td>
</tr>
<tr>
<td>Total power dissipation</td>
<td>$P_{tot}$</td>
<td>$T_i = T_{j\text{max}}$</td>
<td>106</td>
<td>W</td>
</tr>
<tr>
<td>Maximum Junction Temperature</td>
<td>$T_{j\text{max}}$</td>
<td></td>
<td>175</td>
<td>°C</td>
</tr>
<tr>
<td><strong>Boost Sw. Protection Diode</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak Repetitive Reverse Voltage</td>
<td>$V_{RRM}$</td>
<td></td>
<td>650</td>
<td>V</td>
</tr>
<tr>
<td>Continuous (direct) forward current</td>
<td>$I_F$</td>
<td>$T_i = T_{j\text{max}}$</td>
<td>14</td>
<td>A</td>
</tr>
<tr>
<td>Repetitive peak forward current</td>
<td>$I_{FRM}$</td>
<td></td>
<td>20</td>
<td>A</td>
</tr>
<tr>
<td>Total power dissipation</td>
<td>$P_{tot}$</td>
<td>$T_i = T_{j\text{max}}$</td>
<td>33</td>
<td>W</td>
</tr>
<tr>
<td>Maximum Junction Temperature</td>
<td>$T_{j\text{max}}$</td>
<td></td>
<td>175</td>
<td>°C</td>
</tr>
<tr>
<td><strong>Rectifier Diode</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak Repetitive Reverse Voltage</td>
<td>$V_{RRM}$</td>
<td></td>
<td>1600</td>
<td>V</td>
</tr>
<tr>
<td>Continuous (direct) forward current</td>
<td>$I_F$</td>
<td>$T_i = T_{j\text{max}}$</td>
<td>87</td>
<td>A</td>
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<tr>
<td>Surge (non-repetitive) forward current</td>
<td>$I_{FSM}$</td>
<td>0.1.ms, sin 180°</td>
<td>890</td>
<td>A</td>
</tr>
<tr>
<td>Surge current capability</td>
<td>$P_{2t}$</td>
<td></td>
<td>3960</td>
<td>A²s</td>
</tr>
<tr>
<td>Total power dissipation</td>
<td>$P_{tot}$</td>
<td>$T_i = T_{j\text{max}}$</td>
<td>95</td>
<td>W</td>
</tr>
<tr>
<td>Maximum Junction Temperature</td>
<td>$T_{j\text{max}}$</td>
<td></td>
<td>150</td>
<td>°C</td>
</tr>
<tr>
<td><strong>DC Link Capacitance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum DC voltage</td>
<td>$V_{MAX}$</td>
<td></td>
<td>630</td>
<td>V</td>
</tr>
<tr>
<td>Operation Temperature</td>
<td>$T_{op}$</td>
<td></td>
<td>-55...+125</td>
<td>°C</td>
</tr>
</tbody>
</table>
Maximum Ratings

\( T_1 = 25 \, ^\circ\text{C}, \) 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><strong>Module Properties</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Thermal Properties</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage temperature</td>
<td>( T_{stg} )</td>
<td></td>
<td>-40...+125</td>
<td>( ^\circ\text{C} )</td>
</tr>
<tr>
<td>Operation temperature under switching condition</td>
<td>( T_{jop} )</td>
<td></td>
<td>-40..(( T_{jmax} - 25 ))</td>
<td>( ^\circ\text{C} )</td>
</tr>
<tr>
<td><strong>Isolation Properties</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Isolation voltage</td>
<td>( V_{ins} )</td>
<td>DC Test Voltage ( t_x = 2 , \text{s} )</td>
<td>4000</td>
<td>V</td>
</tr>
<tr>
<td>Creepage distance</td>
<td></td>
<td></td>
<td>min. 12,7</td>
<td>mm</td>
</tr>
<tr>
<td>Clearance</td>
<td></td>
<td></td>
<td>9,75</td>
<td>mm</td>
</tr>
<tr>
<td>Comparative Tracking Index</td>
<td>CTI</td>
<td></td>
<td>&gt; 200</td>
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</tr>
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</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>VGE</td>
<td>V_GE</td>
<td></td>
<td>0,001</td>
<td></td>
</tr>
<tr>
<td>VGS</td>
<td>V_GS</td>
<td></td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>VCE</td>
<td>V_CE</td>
<td></td>
<td>3,2</td>
<td></td>
</tr>
<tr>
<td>ID</td>
<td>I_D</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>IC</td>
<td>I_C</td>
<td>Min Typ Max</td>
<td>4,8</td>
<td>V</td>
</tr>
<tr>
<td>Tj</td>
<td>Tj</td>
<td></td>
<td>2,1</td>
<td></td>
</tr>
</tbody>
</table>

### Boost Switch

#### Static

- **Gate-emitter threshold voltage** \(V_{GEmi} = V_{CE}\)
  - Value: 0,001
  - Conditions: Min: 25, Typ: 3,2, Max: 4
  - Unit: V

- **Collector-emitter saturation voltage** \(V_{CEsat}\)
  - Conditions: Min: 15, Typ: 25, Max: 100
  - Value: 1,77
  - Conditions: Min: 125, Typ: 1,86, Max: 1,91
  - Unit: V

- **Collector-emitter cut-off current** \(I_{CES}\)
  - Conditions: Min: 0, Typ: 650, Max: 25
  - Value: 100
  - Unit: µA

- **Gate-emitter leakage current** \(I_{GES}\)
  - Conditions: Min: 20, Typ: 0, Max: 25
  - Value: 100
  - Unit: nA

- **Internal gate resistance** \(R_g\)
  - Value: none
  - Unit: Ω

- **Input capacitance** \(C_{i}\)
  - Conditions: Min: 0, Typ: 25, Max: 25
  - Value: 6560
  - Unit: pF

- **Output capacitance** \(C_{o}\)
  - Conditions: Min: 97
  - Unit: pF

- **Reverse transfer capacitance** \(C_{res}\)
  - Value: 21
  - Unit: nC

### Thermal

- **Thermal resistance junction to sink** \(R_{th(j-s)}\)
  - Conditions: Min: 0,95
  - Unit: K/W

### Dynamic

- **Turn-on delay time** \(t_{d(on)}\)
  - Conditions: Min: 0, Typ: 125, Max: 150
  - Value: 49
  - Unit: ns

- **Rise time** \(t_r\)
  - Value: 10
  - Conditions: Min: 125, Typ: 15, Max: 15
  - Unit: ns

- **Turn-off delay time** \(t_{d(off)}\)
  - Conditions: Min: 25
  - Conditions: Min: 125, Typ: 115, Max: 130
  - Conditions: Min: 150, Typ: 133
  - Unit: ns

- **Fall time** \(t_f\)
  - Conditions: Min: 25
  - Conditions: Min: 125, Typ: 13, Max: 15
  - Unit: ns

- **Turn-on energy (per pulse)** \(E_{on}\)
  - Conditions: Min: 25
  - Conditions: Min: 125, Typ: 1,631, Max: 1,995
  - Unit: mWs

- **Turn-off energy (per pulse)** \(E_{off}\)
  - Conditions: Min: 25
  - Conditions: Min: 125, Typ: 0,618, Max: 1,182
  - Unit: mWs
### Characteristic Values

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Conditions</th>
<th>Value</th>
<th>Unit</th>
</tr>
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<tbody>
<tr>
<td>Boost Diode</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Static</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forward voltage</td>
<td>$V_t$</td>
<td>100</td>
<td>1,50</td>
<td>1,77</td>
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<tr>
<td>Reverse leakage current</td>
<td>$i_r$</td>
<td>550</td>
<td>5,3</td>
<td>μA</td>
</tr>
<tr>
<td>Thermal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thermal resistance junction to sink</td>
<td>$R_{th(j-s)}$</td>
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<td></td>
<td>0,90</td>
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<tr>
<td>Dynamic</td>
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<tr>
<td>Peak recovery current</td>
<td>$I_{on}$</td>
<td>57</td>
<td>25</td>
<td>125</td>
</tr>
<tr>
<td>Reverse recovery time</td>
<td>$t_{rr}$</td>
<td>105</td>
<td>25</td>
<td>125</td>
</tr>
<tr>
<td>Recovered charge</td>
<td>$Q_{rdi/dt}$</td>
<td>3,659</td>
<td>25</td>
<td>125</td>
</tr>
<tr>
<td>Reverse recovered energy</td>
<td>$E_{rec}$</td>
<td>0,797</td>
<td>25</td>
<td>125</td>
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<tr>
<td>Peak rate of fall of recovery current</td>
<td>$(di/dt)_{max}$</td>
<td>5326</td>
<td>25</td>
<td>125</td>
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<td>Boost Sw. Protection Diode</td>
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<tr>
<td>Static</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forward voltage</td>
<td>$V_t$</td>
<td>1,67</td>
<td>10</td>
<td>25</td>
</tr>
<tr>
<td>Reverse leakage current</td>
<td>$i_r$</td>
<td>5,3</td>
<td>10</td>
<td>25</td>
</tr>
<tr>
<td>Thermal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thermal resistance junction to sink</td>
<td>$R_{th(j-s)}$</td>
<td>2,87</td>
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## Characteristic Values

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<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Conditions</th>
<th>Value</th>
<th>Unit</th>
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<tr>
<td>DC Link Capacitance</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Capacitance</td>
<td>C</td>
<td></td>
<td></td>
<td>150</td>
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<tr>
<td>Tolerance</td>
<td></td>
<td></td>
<td></td>
<td>-10</td>
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<tr>
<td>Dissipation factor</td>
<td></td>
<td>f = 1 kHz</td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>Climatic category</td>
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<td></td>
<td></td>
<td>55/125/56</td>
</tr>
<tr>
<td>Rectifier Diode</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Static</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forward voltage</td>
<td>V_i</td>
<td></td>
<td></td>
<td>75</td>
</tr>
<tr>
<td>Reverse leakage current</td>
<td>I_r</td>
<td></td>
<td></td>
<td>1600</td>
</tr>
<tr>
<td>Thermal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thermal resistance junction to sink</td>
<td>R_{th(j-s)}</td>
<td>phase-change material λ = 3,4 W/mK</td>
<td></td>
<td>0,74</td>
</tr>
<tr>
<td>Thermistor</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Rated resistance</td>
<td>R</td>
<td></td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>Deviation of R_{tot}</td>
<td></td>
<td>ΔR</td>
<td>R_{tot} = 1484 Ω</td>
<td></td>
</tr>
<tr>
<td>Power dissipation</td>
<td>P</td>
<td></td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>Power dissipation constant</td>
<td></td>
<td></td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>B-value</td>
<td></td>
<td>R_{B(25/100)}</td>
<td>Tol. ±1 %</td>
<td></td>
</tr>
<tr>
<td>Vincotech NTC Reference</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Boost Switch Characteristics

**figure 1.**
Typical output characteristics

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

- \( t_p = 250 \, \mu s \)
- \( V_{CE} = 15 \, V \)
- \( T_j = 25 \, ^\circ C \)
- \( 125 \, ^\circ C \)
- \( 150 \, ^\circ C \)

**figure 2.**
Typical output characteristics

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

- \( V_{GE} = 7 \, V \) to \( 17 \, V \) in steps of \( 1 \, V \)

**figure 3.**
Typical transfer characteristics

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

- \( t_p = 100 \, \mu s \)
- \( V_{CE} = 10 \, V \)
- \( T_j = 25 \, ^\circ C \)
- \( 125 \, ^\circ C \)
- \( 150 \, ^\circ C \)

**figure 4.**
Transient thermal impedance as function of pulse duration

\[ Z_{th(j-s)} = f(t_p) \]

- \( D = \frac{t_p}{T} \)
- \( R_{th(j-s)} = 0.95 \, K/W \)

**IGBT thermal model values**

- \( R \) (K/W)
- \( t \) (s)
- \( 1.57E-01 \)
- \( 1.21E+00 \)
- \( 3.43E-01 \)
- \( 1.58E-01 \)
- \( 3.28E-01 \)
- \( 4.39E-02 \)
- \( 9.05E-02 \)
- \( 7.74E-03 \)
- \( 3.40E-02 \)
- \( 6.69E-04 \)
Boost Switch Characteristics

**Figure 5.** Gate voltage vs gate charge

\[ V_{GE} = f(Q_G) \]

**Figure 6.** Safe operating area

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

- \( D = \) single pulse
- \( T_i = 80 \) °C
- \( V_{CE} = \pm 15 \) V
- \( T_j = T_{jmax} \) °C

\[ I_C = 100 \text{ A} \]

\[ V_{GE} = \pm 15 \text{ V} \]

\[ T_j = T_{jmax} \]
Boost Diode Characteristics

**Typical forward characteristics**

\[ I_F = f(V_F) \]

**Transient thermal impedance as a function of pulse width**

\[ Z_{th(j-s)} = f(t_p) \]

<table>
<thead>
<tr>
<th>Diode thermal model values</th>
</tr>
</thead>
<tbody>
<tr>
<td>( R ) (K/W)</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>7,42E-02</td>
</tr>
<tr>
<td>1,41E-01</td>
</tr>
<tr>
<td>3,41E-01</td>
</tr>
<tr>
<td>1,94E-01</td>
</tr>
<tr>
<td>9,09E-02</td>
</tr>
<tr>
<td>5,85E-02</td>
</tr>
</tbody>
</table>

\[ D = \frac{t_p}{\tau} \]

\[ Z_{th(j-s)} = 0.90 \text{ K/W} \]
Boost Sw. Protection Diode Characteristics

**figure 1.** FWD
Typical forward characteristics

$I_F = f(V_F)$

**figure 2.** FWD
Transient thermal impedance as a function of pulse width

$Z_{th}(t) = f(t_D)$

$t_D = \frac{t_p}{T}$

$R_{th(j-s)} = 2.87 \text{ K/W}$

FWD thermal model values

<table>
<thead>
<tr>
<th>$R$ (K/W)</th>
<th>$\tau$ (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.5090E-02</td>
<td>3.9390E+00</td>
</tr>
<tr>
<td>1.4760E-01</td>
<td>4.4830E-01</td>
</tr>
<tr>
<td>1.3130E+00</td>
<td>5.9640E-02</td>
</tr>
<tr>
<td>7.3180E-01</td>
<td>1.3610E-02</td>
</tr>
<tr>
<td>4.0440E-01</td>
<td>2.7940E-03</td>
</tr>
<tr>
<td>2.1060E-01</td>
<td>5.3720E-04</td>
</tr>
</tbody>
</table>

$t_p = 250 \mu s$

$T_{j}$: 125 °C

$D = 0.5$

$0.2$

$0.1$

$0.05$

$0.02$

$0.01$

$0.005$

$0.000$
Rectifier Diode Characteristics

**Typical forward characteristics**

\[ I_F = f(V_F) \]

![Graph showing typical forward characteristics of a rectifier diode.](image)

\[ t_p = 250 \, \mu s \quad T_J: \begin{align*} 25 \, ^\circ C \\ 125 \, ^\circ C \end{align*} \]

\[ Z_{th(j-s)} = f(t_p) \]

\[ R_{th(j-s)} = 0.74 \, \text{K/W} \]

**Diode thermal model values**

<table>
<thead>
<tr>
<th>( R ) (K/W)</th>
<th>( \tau ) (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.95E-02</td>
<td>7.08E-00</td>
</tr>
<tr>
<td>1.21E-01</td>
<td>1.15E-00</td>
</tr>
<tr>
<td>2.75E-01</td>
<td>1.52E-01</td>
</tr>
<tr>
<td>2.24E-01</td>
<td>5.48E-02</td>
</tr>
<tr>
<td>3.60E-02</td>
<td>4.07E-03</td>
</tr>
<tr>
<td>1.01E-02</td>
<td>1.33E-03</td>
</tr>
</tbody>
</table>

**Thermistor Characteristics**

**Thermistor typical temperature characteristic**

**Typical NTC characteristic as a function of temperature**

\[ R_s = f(T) \]

![Graph showing thermistor temperature characteristic.](image)
Boost Switching Characteristics

**Figure 1.** IGBT
Typical switching energy losses as a function of collector current

\[ E = f(I_C) \]

With an inductive load at 25 °C
- \( V_{CE} = 350 \) V
- \( T_J = 125 \) °C
- \( V_{GE} = -5/15 \) V
- \( R_{gon} = 4 \) Ω
- \( I_C = 99 \) A

**Figure 2.** IGBT
Typical switching energy losses as a function of gate resistor

\[ E = f(R_g) \]

With an inductive load at 25 °C
- \( V_{CE} = 350 \) V
- \( T_J = 125 \) °C
- \( V_{GE} = -5/15 \) V
- \( I_C = 99 \) A

**Figure 3.** FWD
Typical reverse recovered energy loss as a function of collector current

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

With an inductive load at 25 °C
- \( V_{CE} = 350 \) V
- \( T_J = 125 \) °C
- \( V_{GE} = -5/15 \) V
- \( I_C = 99 \) A

**Figure 4.** FWD
Typical reverse recovered energy loss as a function of gate resistor

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

With an inductive load at 25 °C
- \( V_{CE} = 350 \) V
- \( T_J = 125 \) °C
- \( V_{GE} = -5/15 \) V
- \( I_C = 99 \) A
Boost Switching Characteristics

**Figure 5.** Typical switching times as a function of collector current

$t = f(I_C)$

With an inductive load at

- $T_j = 150 \degree C$
- $V_{CE} = 350 V$
- $V_{GE} = -5/15 V$
- $R_{gon} = 4 \Omega$
- $R_{goff} = 4 \Omega$

**Figure 7.** Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$

At

- $V_{CE} = 350 V$
- $V_{GE} = -5/15 V$
- $R_{g} = 4 \Omega$
- $T_j = 25 \degree C$
- $T_j = 25 \degree C$
- $T_j = 125 \degree C$
- $T_j = 150 \degree C$

**Figure 6.** Typical switching times as a function of gate resistor

$t = f(R_g)$

With an inductive load at

- $T_j = 150 \degree C$
- $V_{CE} = 350 V$
- $V_{GE} = -5/15 V$
- $I_C = 99 A$

**Figure 8.** Typical reverse recovery time as a function of IGBT turn on gate resistor

$t_{rr} = f(R_{g on})$
Boost Switching Characteristics

**Figure 9.** Typical recovered charge as a function of collector current

![Graph showing typical recovered charge as a function of collector current.](image)

- $Q_r = f(I_C)$
- $Q_r = f(R_{gon})$

At $V_{CE} = 350$ V, $25^\circ$C
- $V_{GS} = -5/15$ V
- $R_{on} = 4 \, \Omega$

At $V_{CE} = 350$ V, $25^\circ$C
- $V_{GS} = -5/15$ V
- $I_c = 99$ A

**Figure 10.** Typical recovered charge as a function of IGBT turn-on gate resistor

![Graph showing typical recovered charge as a function of IGBT turn-on gate resistor.](image)

**Figure 11.** Typical peak reverse recovery current as a function of collector current

![Graph showing typical peak reverse recovery current as a function of collector current.](image)

- $I_{RM} = f(I_C)$

At $V_{CE} = 350$ V, $25^\circ$C
- $V_{GS} = -5/15$ V
- $R_{on} = 4 \, \Omega$

At $V_{CE} = 350$ V, $25^\circ$C
- $V_{GS} = -5/15$ V
- $I_c = 99$ A

**Figure 12a.** Typical peak reverse recovery current as a function of IGBT turn-on gate resistor

![Graph showing typical peak reverse recovery current as a function of IGBT turn-on gate resistor.](image)
Boost Switching Characteristics

**Figure 13.** FWD
Typical rate of fall of forward and reverse recovery current as a function of collector current
\[
\frac{di_F}{dt}, \frac{di_{rr}}{dt} = f(I_c)
\]

At
- \( V_{CE} = 350 \) V
- \( V_{GE} = -5/15 \) V
- \( R_{gs} = 4 \) Ω
- \( T_j = 125 \) °C

At
- \( V_{CE} = 350 \) V
- \( V_{GE} = -5/15 \) V
- \( R_{gs} = 4 \) Ω
- \( T_j = 150 \) °C

**Figure 14.** FWD
Typical rate of fall of forward and reverse recovery current as a function of IGBT turn on gate resistor
\[
\frac{di_F}{dt}, \frac{di_{rr}}{dt} = f(R_g)
\]

At
- \( V_{CE} = 350 \) V
- \( V_{GE} = -5/15 \) V
- \( R_{gs} = 4 \) Ω
- \( T_j = 125 \) °C

At
- \( V_{CE} = 350 \) V
- \( V_{GE} = -5/15 \) V
- \( R_{gs} = 4 \) Ω
- \( T_j = 150 \) °C

**Figure 15.** IGBT
Reverse bias safe operating area
\( I_c = f(V_{CE}) \)

At
- \( T_j = 175 \) °C
- \( R_{gs} = 4 \) Ω
- \( R_{goff} = 4 \) Ω
Boost Switching Characteristics

\[ T_j = 125 \, ^\circ C \]
\[ R_{gcon} = 4 \, \Omega \]
\[ R_{goff} = 4 \, \Omega \]

**Figure 1.**
Turn-off Switching Waveforms & definition of \( t_{doff} \), \( t_{Eoff} \) (\( t_{Eoff} \): integrating time for \( E_{off} \))

**Figure 2.**
Turn-on Switching Waveforms & definition of \( t_{don} \), \( t_{Eon} \) (\( t_{Eon} \): integrating time for \( E_{on} \))

**Figure 3.**
Turn-off Switching Waveforms & definition of \( t_f \)

**Figure 4.**
Turn-on Switching Waveforms & definition of \( t_r \)

V\(_{GE}(0\%)\) = -5 V
V\(_{GE}(100\%)\) = 15 V
V\(_{CE}(100\%)\) = 350 V
I\(_C(100\%)\) = 101 A
\( t_{doff} \) = 0.130 \( \mu \)s
\( t_{Eoff} \) = 0.181 \( \mu \)s

V\(_{GS}(0\%)\) = -5 V
V\(_{GS}(100\%)\) = 15 V
V\(_{CE}(100\%)\) = 350 V
I\(_C(100\%)\) = 101 A
\( t_{on} \) = 0.049 \( \mu \)s
\( t_{Eon} \) = 0.190 \( \mu \)s

V\(_{GE}(10\%)\) = -25 V
V\(_{GE}(90\%)\) = 0 V
V\(_{GE}(90\%)\) = 15 V
I\(_C(10\%)\) = 101 A
I\(_C(90\%)\) = 101 A
I\(_C(60\%)\) = 101 A
I\(_C(40\%)\) = 101 A
I\(_C(10\%)\) = 101 A

-50 0 50 100 150 200
0 0.05 0.1 0.15 0.2 0.25 0.3 0.35

-50 0 50 100 150 200
0 0.05 0.1 0.15 0.2 0.25 0.3 0.35

-50 0 50 100 150 200
0 0.05 0.1 0.15 0.2 0.25 0.3 0.35

-50 0 50 100 150 200
0 0.05 0.1 0.15 0.2 0.25 0.3 0.35

-50 0 50 100 150 200
0 0.05 0.1 0.15 0.2 0.25 0.3 0.35
Boost Switching Characteristics

**Figure 5. IGBT**

Turn-off Switching Waveforms & definition of $t_{E_{off}}$

- $P_{off}(100\%) = 35.26 \text{ kW}$
- $E_{off}(100\%) = 1.08 \text{ mJ}$
- $t_{E_{off}} = 0.18 \mu s$

**Figure 6. IGBT**

Turn-on Switching Waveforms & definition of $t_{E_{on}}$

- $P_{on}(100\%) = 35.26 \text{ kW}$
- $E_{on}(100\%) = 1.94 \text{ mJ}$
- $t_{E_{on}} = 0.19 \mu s$

**Figure 7. FWD**

Turn-off Switching Waveforms & definition of $t_{rr}$

- $V_F(100\%) = 350 \text{ V}$
- $I_F(100\%) = 101 \text{ A}$
- $I_{RRM}(10\%) = -93 \text{ A}$
- $I_{RRM}(90\%) = 3 \text{ A}$
- $I_{RRM}(100\%) = 3,03 \text{ A}$
- $t_{rr} = 0.114 \mu s$
Boost Switching Characteristics

**Figure 8.** FWD
Turn-on Switching Waveforms & definition of \( t_Q \) \( (t_Q = \text{integrating time for } Q_r) \)

\[
\begin{align*}
I_F(100\%) &= 101 \text{ A} \\
Q_r(100\%) &= 6,48 \mu\text{C} \\
I_Q &= 0,23 \mu\text{s}
\end{align*}
\]

**Figure 9.** FWD
Turn-on Switching Waveforms & definition of \( t_E \) \( (t_E = \text{integrating time for } E_{rec}) \)

\[
\begin{align*}
P_{rec}(100\%) &= 35,26 \text{ kW} \\
E_{rec}(100\%) &= 1,52 \text{ mJ} \\
t_{Erec} &= 0,23 \mu\text{s}
\end{align*}
\]
## Pinout

### Identification

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<th>ID</th>
<th>Component</th>
<th>Voltage</th>
<th>Current</th>
<th>Function</th>
<th>Comment</th>
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<td>100 A</td>
<td>Boost Switch</td>
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<td>100 A</td>
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### Packaging instruction

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</table>

### Handling instruction

Handling instructions for flow 0 packages see vincotech.com website.

### Package data

Package data for flow 0 packages see vincotech.com website.

### UL recognition and file number

This device is certified according to UL 1557 standard, UL file number E192116. For more information see vincotech.com website.