## 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>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Boost Switch</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collector-emitter voltage</td>
<td>$V_{CES}$</td>
<td></td>
<td>650</td>
<td>V</td>
</tr>
<tr>
<td>Collector current</td>
<td>$I_C$</td>
<td>$T_{p&gt;T_{j\text{max}}}$</td>
<td>28</td>
<td>A</td>
</tr>
<tr>
<td>Repetitive peak collector current</td>
<td>$I_{CRM}$</td>
<td>limited by $T_{j\text{max}}$</td>
<td>90</td>
<td>A</td>
</tr>
<tr>
<td>Total power dissipation</td>
<td>$P_{tot}$</td>
<td>$T_{p&gt;T_{j\text{max}}}$</td>
<td>57</td>
<td>W</td>
</tr>
<tr>
<td>Gate-emitter voltage</td>
<td>$V_{GES}$</td>
<td></td>
<td>20</td>
<td>V</td>
</tr>
<tr>
<td>Maximum Junction Temperature</td>
<td>$T_{j\text{max}}$</td>
<td></td>
<td>175</td>
<td>°C</td>
</tr>
</tbody>
</table>

**Features**
- High efficient dual booster
- Included capacitor
- Very high switching frequency
- Very compact design

**Target applications**
- Solar Inverter

**Types**
- 10-FZ07B2A030SM02-M575L48

**Schematic**

---

Copyright Vincotech

24 Jun. 2015 / Revision 2
### Parameter | Symbol | Conditions | Value | Unit |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<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>$V_{RSSR}$</td>
<td></td>
<td>650</td>
<td>V</td>
</tr>
<tr>
<td>Continuous (direct) forward current</td>
<td>$I_F$</td>
<td>$T_j=T_{jmax}$</td>
<td>29</td>
<td>A</td>
</tr>
<tr>
<td>Repetitive peak forward current</td>
<td>$i_{max}$</td>
<td></td>
<td>180</td>
<td>A</td>
</tr>
<tr>
<td>Total power dissipation</td>
<td>$P_{tot}$</td>
<td>$T_j=T_{jmax}$</td>
<td>52</td>
<td>W</td>
</tr>
<tr>
<td>Maximum Junction Temperature</td>
<td>$T_{jmax}$</td>
<td></td>
<td>175</td>
<td>°C</td>
</tr>
<tr>
<td><strong>Boost Inverse Diode</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak Repetitive Reverse Voltage</td>
<td>$V_{RSSR}$</td>
<td></td>
<td>650</td>
<td>V</td>
</tr>
<tr>
<td>Continuous (direct) forward current</td>
<td>$I_F$</td>
<td>$T_j=T_{jmax}$</td>
<td>30</td>
<td>A</td>
</tr>
<tr>
<td>Surge (non-repetitive) forward current</td>
<td>$i_{psR}$</td>
<td>50Hz Single Half Sine Wave</td>
<td>150</td>
<td>A</td>
</tr>
<tr>
<td>Total power dissipation</td>
<td>$P_{tot}$</td>
<td>$T_j=T_{jmax}$</td>
<td>58</td>
<td>W</td>
</tr>
<tr>
<td>Maximum Junction Temperature</td>
<td>$T_{jmax}$</td>
<td></td>
<td>175</td>
<td>°C</td>
</tr>
<tr>
<td><strong>DC Link Capacitor</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum DC voltage</td>
<td>$V_{max}$</td>
<td></td>
<td>1000</td>
<td>V</td>
</tr>
<tr>
<td>Operation Temperature</td>
<td>$T_{op}$</td>
<td></td>
<td>-55…+125</td>
<td>°C</td>
</tr>
<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>°C</td>
</tr>
<tr>
<td>Operation Junction Temperature</td>
<td>$T_{jop}$</td>
<td></td>
<td>-40…+(T$_{jmax}$ - 25)</td>
<td>°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>$V_{isol}$</td>
<td>DC voltage</td>
<td>4000</td>
<td>V</td>
</tr>
<tr>
<td>Creepage distance</td>
<td></td>
<td></td>
<td>m 12,7</td>
<td>mm</td>
</tr>
<tr>
<td>Clearance</td>
<td></td>
<td></td>
<td>9,22</td>
<td>mm</td>
</tr>
<tr>
<td>Comparative Tracking Index</td>
<td>$CTI$</td>
<td></td>
<td>&gt;200</td>
<td></td>
</tr>
</tbody>
</table>

Copyright Vincotech
# Characteristic Values

## Boost Switch

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Conditions</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Static</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gate-emitter threshold voltage</td>
<td>$V_{GE,(D)}$</td>
<td>$V_{CE}$</td>
<td>$V_{CE}$</td>
<td>$0,0003$</td>
</tr>
<tr>
<td>Collector-emitter saturation voltage</td>
<td>$V_{CE,(sat)}$</td>
<td>$15$</td>
<td>$30$</td>
<td>$25$</td>
</tr>
<tr>
<td>Collector-emitter cut-off current</td>
<td>$I_{CES}$</td>
<td>$0$</td>
<td>$650$</td>
<td>$25$</td>
</tr>
<tr>
<td>Gate-emitter leakage current</td>
<td>$I_{GES}$</td>
<td>$20$</td>
<td>$0$</td>
<td>$25$</td>
</tr>
<tr>
<td>Internal gate resistance</td>
<td>$r_g$</td>
<td></td>
<td>none</td>
<td>$\Omega$</td>
</tr>
<tr>
<td>Input capacitance</td>
<td>$C_{ies}$</td>
<td>$f=1,MHz$</td>
<td>$0$</td>
<td>$25$</td>
</tr>
<tr>
<td>Reverse transfer capacitance</td>
<td>$C_{res}$</td>
<td></td>
<td>$7,7$</td>
<td></td>
</tr>
<tr>
<td><strong>Thermal</strong></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></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phase-Change Material</td>
<td></td>
<td>$K=3,4W/mK$</td>
<td>$1,67$</td>
<td>$K/W$</td>
</tr>
<tr>
<td><strong>IGBT Switching</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turn-on delay time</td>
<td>$t_{on}$</td>
<td>$t_{on}$</td>
<td>$R_{on} = 16 \Omega$</td>
<td>$15/0$</td>
</tr>
<tr>
<td>Rise time</td>
<td>$t_r$</td>
<td></td>
<td>$6$</td>
<td>$8$</td>
</tr>
<tr>
<td>Turn-off delay time</td>
<td>$t_{off}$</td>
<td>$t_{off}$</td>
<td>$R_{off} = 16 \Omega$</td>
<td>$25$</td>
</tr>
<tr>
<td>Fall time</td>
<td>$t_f$</td>
<td></td>
<td>$3$</td>
<td>$5$</td>
</tr>
<tr>
<td>Turn-on energy (per pulse)</td>
<td>$E_{on}$</td>
<td>$Q_{on} = 0,4 \mu C$</td>
<td>$25$</td>
<td>$125$</td>
</tr>
<tr>
<td>Turn-off energy (per pulse)</td>
<td>$E_{off}$</td>
<td>$Q_{off} = 1,1 \mu C$</td>
<td>$25$</td>
<td>$125$</td>
</tr>
</tbody>
</table>
### Boost Diode

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Conditions</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$V_r$ [V]</td>
<td>$I_r$ [A]</td>
<td>$T_j$ [°C]</td>
</tr>
<tr>
<td>Static</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forward voltage</td>
<td>$V_f$</td>
<td>30</td>
<td>25</td>
<td>125</td>
</tr>
<tr>
<td>Reverse leakage current</td>
<td>$I_r$</td>
<td></td>
<td>665</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></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FWD Switching</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak recovery current</td>
<td>$I_{imu}$</td>
<td>15/0</td>
<td>25</td>
<td>125</td>
</tr>
<tr>
<td>Reverse recovery time</td>
<td>$t_{ur}$</td>
<td></td>
<td>25</td>
<td>125</td>
</tr>
<tr>
<td>Recovered charge</td>
<td>$Q_r$</td>
<td>$d/dt = 4188\ A/µs$</td>
<td>25</td>
<td>125</td>
</tr>
<tr>
<td>Reverse recovered energy</td>
<td>$E_{rec}$</td>
<td>$d/dt = 3749\ A/µs$</td>
<td>25</td>
<td>125</td>
</tr>
<tr>
<td>Peak rate of fall of recovery current</td>
<td>$(d/dt)_f$</td>
<td></td>
<td>25</td>
<td>125</td>
</tr>
</tbody>
</table>

### Boost Inverse Diode

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Conditions</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$V_r$ [V]</td>
<td>$I_r$ [A]</td>
<td>$T_j$ [°C]</td>
</tr>
<tr>
<td>Static</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forward voltage</td>
<td>$V_f$</td>
<td>15</td>
<td>25</td>
<td>125</td>
</tr>
<tr>
<td>Reverse leakage current</td>
<td>$I_r$</td>
<td></td>
<td>650</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></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Boost Diode**

**Parameter**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Conditions</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$V_r$ [V]</td>
<td>$I_r$ [A]</td>
<td>$T_j$ [°C]</td>
</tr>
</tbody>
</table>

**Static**

| Forward voltage | $V_f$ | 15 | 25 | 125 | 150 | 2,48 | 1,73 | 2,93 | V   |
| Reverse leakage current | $I_r$ | 650 | 25 | 150 |     | 10   | -    | µA  |

**Thermal**

| Thermal resistance junction to sink | $R_{th(j-s)}$ | | | | | 1,65 | K/W |

---

**Boost Inverse Diode**

**Parameter**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Conditions</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$V_r$ [V]</td>
<td>$I_r$ [A]</td>
<td>$T_j$ [°C]</td>
</tr>
</tbody>
</table>

**Static**

| Forward voltage | $V_f$ | 15 | 25 | 125 | 150 | 2,48 | 1,73 | 2,93 | V   |
| Reverse leakage current | $I_r$ | 650 | 25 | 150 |     | 10   | -    | µA  |

**Thermal**

| Thermal resistance junction to sink | $R_{th(j-s)}$ | | | | | 1,65 | K/W |
## DC Link Capacitor

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Conditions</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>$T_J [^\circ C]$</td>
<td>Min Typ Max</td>
</tr>
<tr>
<td>Static</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capacitance per leg</td>
<td>$C$</td>
<td></td>
<td>47</td>
<td>nF</td>
</tr>
<tr>
<td>Tolerance</td>
<td></td>
<td></td>
<td>-10</td>
<td>+10  %</td>
</tr>
</tbody>
</table>

## Thermistor

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Conditions</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated resistance</td>
<td>$R$</td>
<td></td>
<td>25</td>
<td>22   kΩ</td>
</tr>
<tr>
<td>Deviation of R100</td>
<td>$A_{\Delta R/R}$</td>
<td>R100=1486 Ω</td>
<td>100</td>
<td>-12</td>
</tr>
<tr>
<td>Power dissipation</td>
<td>$P$</td>
<td></td>
<td>25</td>
<td>200  mW</td>
</tr>
<tr>
<td>Power dissipation constant</td>
<td></td>
<td></td>
<td>25</td>
<td>2    mW/K</td>
</tr>
<tr>
<td>B-value</td>
<td>$B_{25}$</td>
<td>Tol. ±3%</td>
<td>25</td>
<td>3950 K</td>
</tr>
<tr>
<td>B-value</td>
<td>$B_{25}$</td>
<td>Tol. ±3%</td>
<td>25</td>
<td>3998 K</td>
</tr>
</tbody>
</table>

Vincotech NTC Reference
Boost Switch Characteristics

### Typical output characteristics

![Graph showing typical output characteristics of IGBTs with Ic as a function of Vce.]

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

### Typical transfer characteristics

![Graph showing typical transfer characteristics of IGBTs with Ic as a function of Vge.]

- $Z_{th(j-s)} = f(t_p)$
- $t_p = 100 \, \mu s$
- $V_{CE} = 10 \, V$
- $T_f = 25 \, ^\circ C$
- $125 \, ^\circ C$
- $150 \, ^\circ C$

### Transient Thermal Impedance as function of Pulse duration

![Graph showing transient thermal impedance as a function of pulse duration.]

- $D = t_p / T$
- $R_{th(j-s)} = 1,67 \, K/W$
- IGBT thermal model values:
  - $R_{th} (K/W) \times t (s)$
  - 1,80E-01, 1,06E-00
  - 3,72E-01, 1,72E-01
  - 6,39E-01, 5,52E-02
  - 3,20E-01, 1,27E-02
  - 1,54E-01, 3,03E-03
Boost Switch Characteristics

Gate voltage vs Gate charge IGBT

$V_{GE} = f(Q_G)$

At
$I_C = 30 \text{ A}$

Boost Diode Characteristics

Typical forward characteristics FWD

$R_{FD}$ = $f(V_F)$

$V_F$ (V)

0 10 20 30 40 50 60 70 80

0 2,5 5 7,5 10 12,5

0 10 20 30 40 50 60 70 80

$R_{TFD}$ (K/W)

0 1 2 3 4 5

$I_F$ (A)

$V_F$ (V)

Typical forward characteristics FWD

$R_{FD}$ = $f(V_F)$

$V_F$ (V)

0 10 20 30 40 50 60 70 80

0 2,5 5 7,5 10 12,5

0 10 20 30 40 50 60 70 80

$R_{TFD}$ (K/W)

0 1 2 3 4 5

$I_F$ (A)

$V_F$ (V)

Transient thermal impedance as a function of pulse width FWD

$Z_{A(t)} = f(t_p)$

$Z_{A(t)}$ (K/W)

$D = 0.5$, 0.2, 0.1, 0.05, 0.02, 0.01, 0.005, 0.000

10

10

10

10

$D = 0.5$, 0.2, 0.1, 0.05, 0.02, 0.01, 0.005, 0.000

$R_{TFD}$ (K/W)

$T_F$ (°C)

0 1 2 3 4 5

0 10 20 30 40 50 60 70 80

0 2,5 5 7,5 10 12,5

$R_{TFD}$ (K/W)

0 10 20 30 40 50 60 70 80

0 2,5 5 7,5 10 12,5

$R_{TFD}$ (K/W)

0 1 2 3 4 5

$I_F$ (A)

$V_F$ (V)

$R_{TFD}$ (K/W)

0 10 20 30 40 50 60 70 80

0 2,5 5 7,5 10 12,5

$R_{TFD}$ (K/W)

0 10 20 30 40 50 60 70 80

0 2,5 5 7,5 10 12,5

$R_{TFD}$ (K/W)

0 1 2 3 4 5

$I_F$ (A)

$V_F$ (V)

$R_{TFD}$ (K/W)

0 10 20 30 40 50 60 70 80

0 2,5 5 7,5 10 12,5

$R_{TFD}$ (K/W)

0 10 20 30 40 50 60 70 80

0 2,5 5 7,5 10 12,5

$R_{TFD}$ (K/W)

0 1 2 3 4 5

$I_F$ (A)

$V_F$ (V)

FWD thermal model values

$R$ (K/W), $	au$ (s)

6.05E-02 3.63E+00

1.50E-01 6.48E-01

8.27E-01 7.70E-02

4.06E-01 1.51E-02

2.16E-01 3.45E-03

1.73E-01 7.96E-04

Copyright Vincotech 7 24 Jun. 2015 / Revision 2
Boost Inverse Diode Characteristics

Typical forward characteristics

\[ I_F = f(V_F) \]

![Graph showing typical forward characteristics](image)

\[ t_p \approx 250 \mu s \]

- 25 °C
- 125 °C
- 150 °C

Transient thermal impedance as a function of pulse width

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

![Graph showing transient thermal impedance](image)

FWD thermal model values

- \( R (\text{K/W}) \)
- \( \tau (\text{s}) \)

<table>
<thead>
<tr>
<th>( R (\text{K/W}) )</th>
<th>( \tau (\text{s}) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.16E-02</td>
<td>4.06E+00</td>
</tr>
<tr>
<td>1.04E-01</td>
<td>5.69E-01</td>
</tr>
<tr>
<td>7.15E-01</td>
<td>7.94E-02</td>
</tr>
<tr>
<td>4.04E-01</td>
<td>1.99E-02</td>
</tr>
<tr>
<td>2.10E-01</td>
<td>4.66E-03</td>
</tr>
<tr>
<td>1.69E-01</td>
<td>9.24E-04</td>
</tr>
</tbody>
</table>

Thermistor Characteristics

Typical NTC characteristic

\[ R_T = f(T) \]

![Graph showing typical NTC characteristic](image)

\[ R_T = f(T) \]

\( R \) as a function of temperature

- 25 50 75 100 125 °C

\( R \) (Ω)

\( T \) (°C)
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
- \( V_{CE} = 400 \, \text{V} \)
- \( T_j: 125 \, ^\circ\text{C} \)
- \( R_{gon} = 16 \, \Omega \)
- \( I_C = 30 \, \text{A} \)

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

\[ E = f(r_g) \]

With an inductive load at
- \( V_{CE} = 400 \, \text{V} \)
- \( T_j: 125 \, ^\circ\text{C} \)
- \( i_g = 15/0 \, \text{V} \)
- \( R_{goff} = 16 \, \Omega \)

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

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

With an inductive load at
- \( V_{CE} = 400 \, \text{V} \)
- \( T_j: 125 \, ^\circ\text{C} \)
- \( R_{gon} = 16 \, \Omega \)

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

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

With an inductive load at
- \( V_{CE} = 400 \, \text{V} \)
- \( T_j: 125 \, ^\circ\text{C} \)
- \( i_g = 15/0 \, \text{V} \)
- \( I_C = 30 \, \text{A} \)
Boost Switching Characteristics

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

\[ t = f(I_C) \]

With an inductive load at
- \( T_j = 125 \, ^\circ\text{C} \)
- \( V_{CE} = 400 \, \text{V} \)
- \( R_{gon} = 16 \, \Omega \)
- \( i_c = 30 \, \text{A} \)

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

\[ t = f(R_g) \]

With an inductive load at
- \( T_j = 125 \, ^\circ\text{C} \)
- \( V_{CE} = 400 \, \text{V} \)
- \( R_{gon} = 16 \, \Omega \)
- \( i_c = 30 \, \text{A} \)

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

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

At
- \( V_{CE} = 400 \, \text{V} \)
- \( T_j = 25 \, ^\circ\text{C} \)
- \( R_{gon} = 16 \, \Omega \)
- \( i_c = 30 \, \text{A} \)

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

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

At
- \( V_{CE} = 400 \, \text{V} \)
- \( T_j = 125 \, ^\circ\text{C} \)
- \( i_c = 30 \, \text{A} \)
- \( T_j = 150 \, ^\circ\text{C} \)
Boost Switching Characteristics

**Figure 9.** FWD

Typical recovered charge as a function of collector current

\[ Q_r = f(I_C) \]

At

- \( V_{CE} = 400 \, \text{V} \)
- \( V_{GE} = 15/0 \, \text{V} \)
- \( R_{gon} = 16 \, \Omega \)

Temperature:

- \( 25 \, ^\circ\text{C} \)
- \( 125 \, ^\circ\text{C} \)
- \( 150 \, ^\circ\text{C} \)

**Figure 10.** FWD

Typical recovered charge as a function of IGBT turn-on gate resistor

\[ Q_r = f(R_{gon}) \]

At

- \( V_{CE} = 400 \, \text{V} \)
- \( V_{GE} = 15/0 \, \text{V} \)
- \( I_C = 30 \, \text{A} \)
- \( T_j = 125 \, ^\circ\text{C} \)
- \( 150 \, ^\circ\text{C} \)

**Figure 11.** FWD

Typical peak reverse recovery current as a function of collector current

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

At

- \( V_{CE} = 400 \, \text{V} \)
- \( V_{GE} = 15/0 \, \text{V} \)
- \( R_{gon} = 16 \, \Omega \)

Temperature:

- \( 25 \, ^\circ\text{C} \)
- \( 125 \, ^\circ\text{C} \)
- \( 150 \, ^\circ\text{C} \)

**Figure 12.** FWD

Typical peak reverse recovery current as a function of IGBT turn-on gate resistor

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

At

- \( V_{CE} = 400 \, \text{V} \)
- \( V_{GE} = 15/0 \, \text{V} \)
- \( I_C = 30 \, \text{A} \)
- \( T_j = 125 \, ^\circ\text{C} \)
- \( 150 \, ^\circ\text{C} \)
Boost Switching Characteristics

**Figure 13.** FWD
Typical rate of fall of forward and reverse recovery current as a function of collector current

\[
\frac{di_F}{dt}, \frac{di_{rr}}{dt} = f(I_c)
\]

<table>
<thead>
<tr>
<th>Condition</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(V_{CE})</td>
<td>400 V</td>
</tr>
<tr>
<td>(I_C)</td>
<td>30 A</td>
</tr>
<tr>
<td>(T_J)</td>
<td>125 °C</td>
</tr>
</tbody>
</table>

**Figure 14.** FWD
Typical rate of fall of forward and reverse recovery current as a function of IGBT turn on gate resistor

\[
\frac{di_F}{dt}, \frac{di_{rr}}{dt} = f(R_g)
\]

**Figure 15.** IGBT
Reverse bias safe operating area

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

<table>
<thead>
<tr>
<th>Condition</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(V_{CE})</td>
<td>15/0 V</td>
</tr>
<tr>
<td>(I_C)</td>
<td>30 A</td>
</tr>
<tr>
<td>(T_J)</td>
<td>175 °C</td>
</tr>
<tr>
<td>(R_{gon})</td>
<td>16 Ω</td>
</tr>
<tr>
<td>(R_{goff})</td>
<td>16 Ω</td>
</tr>
</tbody>
</table>
Boost Switching Definitions

**General conditions**

* $T_i = 125 \degree C$
* $R_{on} = 16 \Omega$
* $R_{off} = 16 \Omega$

---

**Figure 1.**

**IGBT**

**Turn-off Switching Waveforms & definition of $t_{off}$, $t_{Eoff}$ ($t_{Eoff} =$ integrating time for $E_{off}$)

- $V_{CE}(0\%) = 0 \text{ V}$
- $V_{CE}(100\%) = 15 \text{ V}$
- $I_{C}(100\%) = 400 \text{ V}$
- $t_{off} = 0.175 \mu s$
- $R_{on} = 0.216 \mu s$

**Figure 2.**

**IGBT**

**Turn-on Switching Waveforms & definition of $t_{on}$, $t_{Eon}$ ($t_{Eon} =$ integrating time for $E_{on}$)

- $V_{CE}(0\%) = 0 \text{ V}$
- $V_{CE}(100\%) = 15 \text{ V}$
- $I_{C}(100\%) = 400 \text{ V}$
- $I_{C}(10\%) = 30 \text{ A}$
- $I_{C}(10\%) = 0.021 \mu s$
- $I_{C}(90\%) = 0.118 \mu s$

---

**Figure 3.**

**IGBT**

**Turn-off Switching Waveforms & definition of $tf$

- $V_{CE}(10\%) = 400 \text{ V}$
- $I_{C}(10\%) = 30 \text{ A}$
- $t_f = 0.005 \mu s$

**Figure 4.**

**IGBT**

**Turn-on Switching Waveforms & definition of $tr$

- $V_{CE}(10\%) = 400 \text{ V}$
- $I_{C}(10\%) = 30 \text{ A}$
- $t_r = 0.008 \mu s$
Boost Switching Definitions

**Figure 5.** IGBT Turn-off Switching Waveforms & definition of tEoff

- $P_{off}(100\%) = 11.95$ kW
- $E_{off}(100\%) = 0.25$ mJ
- $t_{Eoff} = 0.216$ $\mu$s

**Figure 6.** IGBT Turn-on Switching Waveforms & definition of tEon

- $P_{on}(100\%) = 11.95$ kW
- $E_{on}(100\%) = 0.51$ mJ
- $t_{Eon} = 0.118$ $\mu$s

**Figure 7.** FWD Turn-off Switching Waveforms & definition of trr

- $V_{d}(100\%) = 400$ V
- $I_{d}(100\%) = 30$ A
- $I_{max}(100\%) = -36$ A
- $t_{rr} = 0.077$ $\mu$s
Boost Switching Definitions

**Figure 8.** FWD

Turn-on Switching Waveforms & definition of $t_{Qrr}$ (integarting time for $Q_{rr}$)

- $I_d(100\%) = 30$ A
- $Q_{rr}(100\%) = 1.09$ μC
- $t_{Qrr} = 0.152$ μs

- $E_{rec}(100\%) = 0.25$ mJ
- $t_{Erec} = 0.152$ μs

**Figure 9.** FWD

Turn-on Switching Waveforms & definition of $t_{Erec}$ (integarting time for $E_{rec}$)

- $P_{rec}(100\%) = 11.95$ kW
- $t_{P_{rec}} = 0.152$ μs
## Pinout

![Pinout Diagram](image)

## Identification

<table>
<thead>
<tr>
<th>ID</th>
<th>Component</th>
<th>Voltage</th>
<th>Current</th>
<th>Function</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>T2,T3</td>
<td>IGBT</td>
<td>650V</td>
<td>30A</td>
<td>Boost Switch</td>
<td>IGC10T65U8Q</td>
</tr>
<tr>
<td>D20,D30</td>
<td>FWD</td>
<td>650V</td>
<td>30A</td>
<td>Boost Diode</td>
<td>PCFF30S65W</td>
</tr>
<tr>
<td>D2,D3</td>
<td>FWD</td>
<td>650V</td>
<td>15A</td>
<td>Boost Inverse Diode</td>
<td>PCFF15S65W</td>
</tr>
<tr>
<td>C1,C2</td>
<td>Capacitor</td>
<td>1000V</td>
<td></td>
<td>DC Link Capacitor</td>
<td></td>
</tr>
<tr>
<td>NTC</td>
<td>NTC</td>
<td></td>
<td></td>
<td>Thermistor</td>
<td></td>
</tr>
</tbody>
</table>
### Packaging instruction

<table>
<thead>
<tr>
<th>Standard packaging quantity (SPQ)</th>
<th>&gt;SPQ</th>
<th>Standard</th>
<th>&lt;SPQ</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>135</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Handling instruction

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

---

**DISCLAIMER**

The information, specifications, procedures, methods and recommendations herein (together "information") are presented by Vincotech to reader in good faith, are believed to be accurate and reliable, but may well be incomplete and/or not applicable to all conditions or situations that may exist or occur. Vincotech reserves the right to make any changes without further notice to any products to improve reliability, function or design. No representation, guarantee or warranty is made to reader as to the accuracy, reliability or completeness of said information or that the application or use of any of the same will avoid hazards, accidents, losses, damages or injury of any kind to persons or property or that the same will not infringe third parties rights or give desired results. It is reader's sole responsibility to test and determine the suitability of the information and the product for reader's intended use.

**LIFE SUPPORT POLICY**

Vincotech products are not authorised for use as critical components in life support devices or systems without the express written approval of Vincotech.

As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instructions for use provided in labelling can be reasonably expected to result in significant injury to the user.

2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.