**Features**

- Neutral point clamped inverter
- Reactive power capability
- Low inductance layout

**Target Applications**

- Solar inverter
- UPS

**Types**

- 10-FZ06NRA075FU-P969F08
- 10-PZ06NRA075FU-P969F08Y

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**Maximum Ratings**

\( T_j = 25 \degree C, \) unless otherwise specified

<table>
<thead>
<tr>
<th>Parameter</th>
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<th>Unit</th>
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<tr>
<td><strong>Buck IGBT</strong></td>
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<tr>
<td>Collector-emitter break down voltage</td>
<td>( V_{CE} )</td>
<td></td>
<td>600</td>
<td>V</td>
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<tr>
<td>DC collector current</td>
<td>( I_C )</td>
<td>( T_j = T_{jmax} ) ( T_j = 80 \degree C )</td>
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<td>A</td>
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<tr>
<td>Repetitive peak collector current</td>
<td>( I_{CRM} )</td>
<td>( T_j ) limited by ( T_{jmax} )</td>
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<td>Power dissipation</td>
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<td>( T_j = T_{jmax} ) ( T_j = 80 \degree C )</td>
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<td>Gate-emitter peak voltage</td>
<td>( V_{GE} )</td>
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<td>±20</td>
<td>V</td>
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<tr>
<td>Short circuit ratings</td>
<td>( t_{sc} )</td>
<td>( T_j \leq 150 \degree C )</td>
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<td>( \mu s )</td>
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<td>Turn off safe operating area (RBSOA)</td>
<td>( I_{off} )</td>
<td>( V_{CE \ max} = 600V ) ( T_{j \ max} = 150\degree C )</td>
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<td>Maximum Junction Temperature</td>
<td>( T_{j \ max} )</td>
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<td><strong>Buck FWD</strong></td>
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<td>Peak Repetitive Reverse Voltage</td>
<td>( V_{REMM} )</td>
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<td>DC forward current</td>
<td>( I_o )</td>
<td>( T_j = T_{jmax} ) ( T_j = 80 \degree C )</td>
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<td>( T_{j \ max} )</td>
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### Maximum Ratings

*Note: *$T_j = 25 \, ^\circ\text{C}$, unless otherwise specified*

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<th>Symbol</th>
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<td><strong>Boost IGBT</strong></td>
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<td>Collector-emitter break down voltage</td>
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<td>A</td>
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<td><strong>Boost Inverse Diode</strong></td>
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<td>Peak Repetitive Reverse Voltage</td>
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<td>V</td>
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<td>Maximum Junction Temperature</td>
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<td><strong>Boost FWD</strong></td>
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<td>$V_{ASM}$</td>
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<td>Maximum Junction Temperature</td>
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$T_j = 25\, ^\circ C$, unless otherwise specified

### Maximum Ratings

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<tr>
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<td>Storage temperature</td>
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<tr>
<td>Operation temperature under switching condition</td>
<td>$T_{op}$</td>
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<td>-40...+$T_{jmax} - 25$</td>
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<td>Insulation Properties</td>
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<td>Insulation voltage</td>
<td>$V_{isol}$</td>
<td>DC Test Voltage* $t_p = 2, s$</td>
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<td>V</td>
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<td>AC Voltage $t_p = 1, min$</td>
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<td>Creepage distance</td>
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<td>min 12,7</td>
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<td>Clearance</td>
<td>Solder pin / Press-fit pin</td>
<td>9,15 / 9,01</td>
<td>mm</td>
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<td>Comparative Tracking Index</td>
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<td>&gt;200</td>
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*100% tested in production
## Characteristic Values

<table>
<thead>
<tr>
<th>Parameter</th>
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<tr>
<td><strong>Buck IGBT</strong></td>
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<tr>
<td>Gate-emitter threshold voltage</td>
<td>$V_{GE(th)}$</td>
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<td>0,0025</td>
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<tr>
<td>Collector-emitter saturation voltage</td>
<td>$V_{CEsat}$</td>
<td>$V_{CE}$</td>
<td>0.0025</td>
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<tr>
<td>Collector-emitter cut-off current incl. Diode</td>
<td>$I_{CES}$</td>
<td>$I_{DS}$</td>
<td>25</td>
<td>mA</td>
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<tr>
<td>Gate-emitter leakage current</td>
<td>$I_{LED}$</td>
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<td>25</td>
<td>mA</td>
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<tr>
<td>Integrated Gate resistor</td>
<td>$R_{gint}$</td>
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<td>Ω</td>
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<tr>
<td>Turn-on delay time</td>
<td>$t_{d(on)}$</td>
<td>350</td>
<td>15</td>
<td>ns</td>
</tr>
<tr>
<td>Turn-off delay time</td>
<td>$t_{d(off)}$</td>
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<td>15</td>
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<td>Fall time</td>
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<td>6</td>
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<td>Turn-on energy loss</td>
<td>$E_{on}$</td>
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<td>0.30</td>
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<tr>
<td>Turn-off energy loss</td>
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<td>Input capacitance</td>
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<td>Output capacitance</td>
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<td>Reverse transfer capacitance</td>
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<td>Gate charge</td>
<td>$Q_s$</td>
<td>25</td>
<td>24</td>
<td>nC</td>
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<tr>
<td>Thermal resistance junction to sink</td>
<td>$R_{th(j-s)}$</td>
<td>$R_{th(j-s)}$</td>
<td>0.84</td>
<td>K/W</td>
</tr>
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</table>

| **Buck FWD**                                  |        |            |       |        |
| Diode forward voltage                         | $V_F$  | 25         | 25    | V      |
| Reverse leakage current                       | $I_r$  | 25         | 25    | µA     |
| Peak reverse recovery current                 | $I_{RMS}$ | 25         | 25    | A      |
| Reverse recovery time                         | $t_r$  | 25         | 25    | ns     |
| Reverse recovered charge                      | $Q_r$  | 25         | 25    | µC     |
| Peak rate of fall of recovery current         | $\frac{dI_{RMS}}{dt}$ | 25         | 25    | A/µs   |
| Reverse recovered energy                      | $E_{off}$ | 25         | 0.13  | mWs    |
| Thermal resistance junction to sink           | $R_{th(j-s)}$ | $R_{th(j-s)}$ | 1.73  | K/W    |
### Characteristic Values

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<td>Gate-emitter threshold voltage</td>
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<td>$V_{th} = V_{EE}$</td>
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<td>Collector-emitter saturation voltage</td>
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<td>Collector-emitter cut-off diode</td>
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<td>Gate-emitter leakage current</td>
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<td>Turn-on delay time</td>
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<td>Turn-on energy loss</td>
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<td>Turn-off energy loss</td>
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<td>Input capacitance</td>
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<td>Output capacitance</td>
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<td>Reverse transfer capacitance</td>
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<td>Gate charge</td>
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<td>Thermal resistance junction to sink</td>
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<td>Thermal resistance junction to sink</td>
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<td><strong>Boost FWD</strong></td>
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<td>Diode forward voltage</td>
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10-FZ06NRA075FU-P969F08
10-PZ06NRA075FU-P969F08Y
datasheet

copyright Vincotech
**Buck**

**figure 1.** IGBT  Typical output characteristics

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

At
\[ t_p = 250 \ \mu s \]
\[ T_j = 25 \ ^\circ C \]
\[ V_{CE} \text{ from } 7 \text{ V to } 17 \text{ V in steps of } 1 \text{ V} \]

**figure 2.** IGBT  Typical output characteristics

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

At
\[ t_p = 250 \ \mu s \]
\[ T_j = 125 \ ^\circ C \]
\[ V_{CE} \text{ from } 7 \text{ V to } 17 \text{ V in steps of } 1 \text{ V} \]

**figure 3.** IGBT  Typical transfer characteristics

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

At
\[ t_p = 250 \ \mu s \]
\[ V_{CE} = 10 \text{ V} \]

**figure 4.** FWD  Typical diode forward current as a function of forward voltage

\[ I_F = f(V_F) \]

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

**Figure 5.** IGBT

Typical switching energy losses as a function of collector current

\[ E = f(I_c) \]

With an inductive load at:

\[ T_j = 25/125 \, ^\circ C \]

\[ V_{CE} = 350 \, V \]

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

\[ R_{gon} = 8 \, \Omega \]

\[ I_C = 40 \, A \]

**Figure 6.** IGBT

Typical switching energy losses as a function of gate resistor

\[ E = f(R_G) \]

With an inductive load at:

\[ T_j = 25/125 \, ^\circ C \]

\[ V_{CE} = 350 \, V \]

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

\[ I_C = 40 \, A \]

**Figure 7.** FWD

Typical reverse recovery energy loss as a function of collector current

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

With an inductive load at:

\[ T_j = 25/125 \, ^\circ C \]

\[ V_{CE} = 350 \, V \]

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

\[ R_{gon} = 8 \, \Omega \]

**Figure 8.** FWD

Typical reverse recovery energy loss as a function of gate resistor

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

With an inductive load at:

\[ T_j = 25/125 \, ^\circ C \]

\[ V_{CE} = 350 \, V \]

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

\[ I_C = 40 \, A \]
Typical switching times as a function of collector current
\[ t = f(I_C) \]

With an inductive load at
- \( T_j = 125 \) °C
- \( V_{CE} = 350 \) V
- \( V_{GE} = \pm 15 \) V
- \( R_{gon} = 8 \) Ω
- \( I_C = 40 \) A

Typical reverse recovery time as a function of collector current
\[ t_{rr} = f(I_C) \]

At
- \( T_j = 25/125 \) °C
- \( V_{CE} = 350 \) V
- \( V_{GE} = \pm 15 \) V
- \( R_{gon} = 8 \) Ω
**Buck**

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

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

At

- \( T_j = 25/125 \, ^\circ\text{C} \)
- \( V_{CE} = 350 \, \text{V} \)
- \( V_{GE} = \pm 15 \, \text{V} \)
- \( R_{gon} = 8 \, \Omega \)

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

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

At

- \( T_j = 25/125 \, ^\circ\text{C} \)
- \( V_{CE} = 350 \, \text{V} \)
- \( I_f = 40 \, \text{A} \)
- \( V_{GE} = \pm 15 \, \text{V} \)

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

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

At

- \( T_j = 25/125 \, ^\circ\text{C} \)
- \( V_{CE} = 350 \, \text{V} \)
- \( V_{GE} = \pm 15 \, \text{V} \)
- \( I_f = 40 \, \text{A} \)
- \( V_{GE} = \pm 15 \, \text{V} \)

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

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

At

- \( T_j = 25/125 \, ^\circ\text{C} \)
- \( V_{CE} = 350 \, \text{V} \)
- \( I_f = 40 \, \text{A} \)
- \( V_{GE} = \pm 15 \, \text{V} \)
Typical rate of fall of forward and reverse recovery current

\[
dI_0/dt, dI_{rec}/dt = f(I_C)
\]

At
\[
T_j = 25/125 \degree C
\]
\[
V_{CE} = 350 \text{ V}
\]
\[
V_{GE} = \pm 15 \text{ V}
\]
\[
R_{gon} = 8 \text{ } \Omega
\]

IGBT transient thermal impedance

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

At
\[
D = t_p / T
\]
\[
R_{th(j-s)} = 0.84 \text{ K/W}
\]

IGBT thermal model values
\[
R (K/W) \text{  } \text{Tau (s)}
\]
\[
1.34E-01 1.78E+00
2.04E-01 2.71E-01
3.94E-01 9.06E-02
9.26E-02 1.42E-02
1.92E-02 2.31E-03
\]

FWD transient thermal impedance

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

At
\[
D = t_p / T
\]
\[
R_{th(j-s)} = 1.73 \text{ K/W}
\]

FWD thermal model values
\[
R (K/W) \text{  } \text{Tau (s)}
\]
\[
8.04E-02 4.54E+00
1.74E-01 9.63E-01
6.34E-01 1.62E-01
5.25E-01 5.62E-02
2.03E-01 1.25E-02
1.15E-01 2.31E-03
\]
figure 21. IGBT
Safe operating area as a function of collector-emitter voltage

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

At
\[ D = \text{single pulse} \]
\[ T_s = 80 \, ^\circ \text{C} \]
\[ V_{GE} = \pm 15 \, \text{V} \]
\[ T_J = T_{J\text{max}} \]
**Boost**

**figure 1. IGBT**

Typical output characteristics

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

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

**figure 2. IGBT**

Typical output characteristics

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

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

**figure 3. IGBT**

Typical transfer characteristics

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

**figure 4. FWD**

Typical diode forward current as a function of forward voltage

\[ I_F = f(V_F) \]

---

\( T_j = T_{jmax} - 25 \ ^\circ C \)

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**figure 5.**
**Typical switching energy losses**
as a function of collector current
\[ E = f(I_C) \]

![Graph](image)

With an inductive load at
- \( T_J = 25/125 \) °C
- \( V_{CE} = 350 \) V
- \( V_{GE} = \pm 15 \) V
- \( R_{gon} = 4 \) Ω
- \( I_C = 50 \) A

**figure 6.**
**Typical switching energy losses**
as a function of gate resistor
\[ E = f(R_G) \]

![Graph](image)

With an inductive load at
- \( T_J = 25/125 \) °C
- \( V_{CE} = 350 \) V
- \( V_{GE} = \pm 15 \) V
- \( R_{goff} = 4 \) Ω
- \( I_C = 50 \) A

**figure 7.**
**Typical reverse recovery energy loss**
as a function of collector current
\[ E_{rec} = f(I_C) \]

![Graph](image)

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

**figure 8.**
**Typical reverse recovery energy loss**
as a function of gate resistor
\[ E_{rec} = f(R_G) \]

![Graph](image)

With an inductive load at
- \( T_J = 25/125 \) °C
- \( V_{CE} = 350 \) V
- \( V_{GE} = \pm 15 \) V
- \( R_{goff} = 4 \) Ω
- \( I_C = 50 \) A
**Typical switching times as a function of collector current**

\[ t = f(I_{C}) \]

With an inductive load at:
- \( T_j = 25/125 \) °C
- \( V_{CE} = 350 \) V
- \( V_{GE} = \pm 15 \) V
- \( R_{gon} = 4 \) Ω
- \( I_C = 50 \) A

**Typical reverse recovery time as a function of collector current**

\[ t_{rr} = f(I_{C}) \]

At:
- \( T_j = 25/125 \) °C
- \( V_{CE} = 350 \) V
- \( V_{GE} = \pm 15 \) V
- \( R_{gon} = 4 \) Ω
- \( I_C = 50 \) A
**Boost**

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

$$Q_{rr} = f(I_C)$$

![Graph showing typical reverse recovery charge as a function of collector current.](image1)

**At**
- $T_j = 25/125$ °C
- $V_{CE} = 350$ V
- $V_{GE} = \pm 15$ V
- $R_{gon} = 4$ Ω

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

$$Q_{rr} = f(R_{gon})$$

![Graph showing typical reverse recovery charge as a function of IGBT turn on gate resistor.](image2)

**At**
- $T_j = 25/125$ °C
- $V_{CE} = 350$ V
- $I_F = 50$ A
- $V_{GE} = \pm 15$ V

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

$$I_{RRM} = f(I_C)$$

![Graph showing typical reverse recovery current as a function of collector current.](image3)

**At**
- $T_j = 25/125$ °C
- $V_{CE} = 350$ V
- $V_{GE} = \pm 15$ V
- $I_F = 50$ A
- $V_{GE} = \pm 15$ V

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

$$I_{RRM} = f(R_{gon})$$

![Graph showing typical reverse recovery current as a function of IGBT turn on gate resistor.](image4)

**At**
- $T_j = 25/125$ °C
- $V_{CE} = 350$ V
- $I_F = 50$ A
- $V_{GE} = \pm 15$ V
**Boost**

**Figure 17.**
Typical rate of fall of forward and reverse recovery current as a function of collector current

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

**At**
- \(T_j = 25/125^\circ C\)
- \(V_{CE} = 350\) V
- \(V_{GE} = \pm 15\) V
- \(R_{gin} = 4\) Ω

**Figure 18.**
Typical rate of fall of forward and reverse recovery current as a function of reverse recovery current

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

**At**
- \(T_j = 25/125^\circ C\)
- \(V_R = 350\) V
- \(I_F = 50\) A
- \(V_{GE} = \pm 15\) V

**Figure 19.**
IGBT transient thermal impedance as a function of pulse width

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

**At**
- \(D = 0.5\)
- \(0.2\)
- \(0.1\)
- \(0.05\)
- \(0.02\)
- \(0.01\)
- \(0.005\)
- \(0.000\)

\(D = \frac{t_y}{T}\)

**Figure 20.**
FWD transient thermal impedance as a function of pulse width

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

**At**
- \(D = 0.5\)
- \(0.2\)
- \(0.1\)
- \(0.05\)
- \(0.02\)
- \(0.01\)
- \(0.005\)
- \(0.000\)

\(D = \frac{t_y}{T}\)

\(R_{th(j,s)} = 1.02\) K/W

\(R_{th(j,s)} = 1.87\) K/W
Boost

**figure 21.** Boost Inverse Diode
Typical diode forward current as a function of forward voltage

\[ I_F = f(V_F) \]

**figure 22.** Boost Inverse Diode
Diode transient thermal impedance as a function of pulse width

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

At

\[ t_p = 250 \ \mu s \]

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

\[ R_{on(s)} = 2.17 \ \text{K/W} \]
Thermistor

**figure 1.** Typical NTC characteristic as a function of temperature

\[ R_T = f(T) \]

**figure 2.** Typical NTC resistance values

\[ R(T) = R_{25} \cdot e^{\left(\frac{B_{3010}}{T} \cdot \frac{1}{T_{25}}\right)} \] [Ω]

<table>
<thead>
<tr>
<th>T (°C)</th>
<th>( R_{\text{roll}} ) [Ω]</th>
<th>( R_{\text{min}} ) [Ω]</th>
<th>( R_{\text{max}} ) [Ω]</th>
<th>( \Delta R/R ) [% ±%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>71804.2</td>
<td>56974.4</td>
<td>83884</td>
<td>16.8</td>
</tr>
<tr>
<td>10</td>
<td>43780.4</td>
<td>37094.4</td>
<td>50466.5</td>
<td>15.3</td>
</tr>
<tr>
<td>20</td>
<td>23648.6</td>
<td>23648.6</td>
<td>31284.7</td>
<td>13.6</td>
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<tr>
<td>25</td>
<td>22000</td>
<td>19109.3</td>
<td>24890.7</td>
<td>13.1</td>
</tr>
<tr>
<td>30</td>
<td>17723.3</td>
<td>15512.2</td>
<td>19934.4</td>
<td>12.5</td>
</tr>
<tr>
<td>40</td>
<td>5467.9</td>
<td>4560.6</td>
<td>5695.1</td>
<td>8.9</td>
</tr>
<tr>
<td>50</td>
<td>3848.6</td>
<td>3546</td>
<td>4151.1</td>
<td>7.9</td>
</tr>
<tr>
<td>60</td>
<td>2757.7</td>
<td>2568.2</td>
<td>2947.1</td>
<td>6.9</td>
</tr>
<tr>
<td>70</td>
<td>2006.9</td>
<td>1899.7</td>
<td>2129.2</td>
<td>5.9</td>
</tr>
<tr>
<td>100</td>
<td>1486.1</td>
<td>1411.8</td>
<td>1560.4</td>
<td>5</td>
</tr>
<tr>
<td>150</td>
<td>400.2</td>
<td>364.8</td>
<td>435.7</td>
<td>8.8</td>
</tr>
</tbody>
</table>

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Switching Definitions BUCK IGBT

General conditions

\[
\begin{align*}
T_j & = 125 \, ^\circ C \\
R_{\text{on}} & = 8 \, \Omega \\
R_{\text{off}} & = 8 \, \Omega 
\end{align*}
\]

**figure 1.**
Turn-off Switching Waveforms & definition of \( t_{\text{doff}} \), \( t_{\text{Eoff}} \)

\( t_{\text{Eoff}} \) = integrating time for \( E_{\text{off}} \)

<table>
<thead>
<tr>
<th>Voltage Range</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>( V_{\text{CE}} ) (0%)</td>
<td>-15 V</td>
</tr>
<tr>
<td>( V_{\text{CE}} ) (100%)</td>
<td>700 V</td>
</tr>
<tr>
<td>( I_{\text{C}} ) (100%)</td>
<td>40 A</td>
</tr>
<tr>
<td>( t_{\text{doff}} )</td>
<td>0,17 μs</td>
</tr>
<tr>
<td>( t_{\text{Eoff}} )</td>
<td>0,33 μs</td>
</tr>
</tbody>
</table>

**figure 2.**
Turn-on Switching Waveforms & definition of \( t_{\text{don}} \), \( t_{\text{Eon}} \)

\( t_{\text{Eon}} \) = integrating time for \( E_{\text{on}} \)

<table>
<thead>
<tr>
<th>Voltage Range</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>( V_{\text{CE}} ) (0%)</td>
<td>-15 V</td>
</tr>
<tr>
<td>( V_{\text{CE}} ) (100%)</td>
<td>700 V</td>
</tr>
<tr>
<td>( I_{\text{C}} ) (100%)</td>
<td>40 A</td>
</tr>
<tr>
<td>( t_{\text{don}} )</td>
<td>0,09 μs</td>
</tr>
<tr>
<td>( t_{\text{Eon}} )</td>
<td>0,15 μs</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Voltage Range</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>( V_{\text{C}} ) (100%)</td>
<td>700 V</td>
</tr>
<tr>
<td>( I_{\text{C}} ) (100%)</td>
<td>40 A</td>
</tr>
<tr>
<td>( t_f )</td>
<td>0,006 μs</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Voltage Range</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>( V_{\text{C}} ) (100%)</td>
<td>700 V</td>
</tr>
<tr>
<td>( I_{\text{C}} ) (100%)</td>
<td>40 A</td>
</tr>
<tr>
<td>( t_r )</td>
<td>0,01 μs</td>
</tr>
</tbody>
</table>
Switching Definitions BUCK IGBT

**figure 5.**
**IGBT**
Turn-off Switching Waveforms & definition of \( t_{Eoff} \)

\[
P_{off}(100\%) = 27.78 \text{ kW}
E_{off}(100\%) = 0.51 \text{ mJ}
\]
\( t_{Eoff} = 0.33 \mu s \)

**figure 6.**
**IGBT**
Turn-on Switching Waveforms & definition of \( t_{Eon} \)

\[
P_{on}(100\%) = 27.78 \text{ kW}
E_{on}(100\%) = 0.51 \text{ mJ}
\]
\( t_{Eon} = 0.15 \mu s \)

**figure 7.**
**IGBT**
Turn-off Switching Waveforms & definition of \( t_{rr} \)

\[
V_d (100\%) = 700 \text{ V}
I_d (100\%) = 40 \text{ A}
I_{swr} (100\%) = -57 \text{ A}
\]
\( t_{rr} = 0.03 \mu s \)

**figure 8.**
**FWD**
Turn-on Switching Waveforms & definition of \( t_{Qrr} \)
\( (t_{Qrr} = \text{integrating time for } Q_{rr}) \)

\[
I_d (100\%) = 40 \text{ A}
Q_{rr} (100\%) = 1.04 \mu C
\]
\( t_{Qrr} = 0.09 \mu s \)
Switching Definitions BUCK IGBT

**figure 9.**
Turn-on Switching Waveforms & definition of $t_{Erec}$
($t_{Erec}$ = integrating time for $E_{rec}$)

- $P_{rec}$ (100%) = 27.78 kW
- $E_{rec}$ (100%) = 0.13 mJ
- $t_{Erec}$ = 0.09 μs

**figure 10.** BUCK stage switching measurement circuit

**figure 11.** BOOST stage switching measurement circuit

Measurement circuits
**Ordering Code & Marking**

<table>
<thead>
<tr>
<th>Text</th>
<th>Name</th>
<th>Date code</th>
<th>UL &amp; VIN</th>
<th>Lot</th>
<th>Serial</th>
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<tr>
<td>WWYY UL VIN LLLLL SSSS</td>
<td>10-FZ06NRA075FU-P969F08</td>
<td>WWYY UL VIN LLLLL SSSS</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Pin table [mm]**

<table>
<thead>
<tr>
<th>Pin</th>
<th>X</th>
<th>Y</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>33.6</td>
<td>0</td>
<td>G6</td>
</tr>
<tr>
<td>2</td>
<td>30.7</td>
<td>0</td>
<td>S4/6</td>
</tr>
<tr>
<td>3</td>
<td>27.8</td>
<td>0</td>
<td>G4</td>
</tr>
<tr>
<td>4</td>
<td>22</td>
<td>0</td>
<td>-DC</td>
</tr>
<tr>
<td>5</td>
<td>19.2</td>
<td>0</td>
<td>-DC</td>
</tr>
<tr>
<td>6</td>
<td>11.4</td>
<td>0</td>
<td>GND</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>0</td>
<td>S2</td>
</tr>
<tr>
<td>8</td>
<td>0</td>
<td>2.9</td>
<td>G2</td>
</tr>
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<td>9</td>
<td>0</td>
<td>9.9</td>
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</tr>
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<td>10</td>
<td>0</td>
<td>12.7</td>
<td>Line</td>
</tr>
<tr>
<td>11</td>
<td>0</td>
<td>15.5</td>
<td>Line</td>
</tr>
<tr>
<td>12</td>
<td>0</td>
<td>19.7</td>
<td>G1</td>
</tr>
<tr>
<td>13</td>
<td>0</td>
<td>22.6</td>
<td>S1</td>
</tr>
<tr>
<td>14</td>
<td>10.1</td>
<td>22.6</td>
<td>GND</td>
</tr>
<tr>
<td>15</td>
<td>17.9</td>
<td>22.6</td>
<td>+DC</td>
</tr>
<tr>
<td>16</td>
<td>20.8</td>
<td>22.6</td>
<td>+DC</td>
</tr>
<tr>
<td>17</td>
<td>27.8</td>
<td>22.6</td>
<td>G3</td>
</tr>
<tr>
<td>18</td>
<td>30.7</td>
<td>22.6</td>
<td>S3/5</td>
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<tr>
<td>19</td>
<td>33.6</td>
<td>22.6</td>
<td>G5</td>
</tr>
<tr>
<td>20</td>
<td>33.6</td>
<td>14.8</td>
<td>NTC1</td>
</tr>
<tr>
<td>21</td>
<td>33.6</td>
<td>8.2</td>
<td>NTC2</td>
</tr>
</tbody>
</table>

**Outline**

- **Pin X/Y Function**
  - Pin 1: X=33.6, Y=0, Function: G6
  - Pin 2: X=30.7, Y=0, Function: S4/6
  - Pin 3: X=27.8, Y=0, Function: G4
  - Pin 4: X=22, Y=0, Function: -DC
  - Pin 5: X=19.2, Y=0, Function: -DC
  - Pin 6: X=11.4, Y=0, Function: GND
  - Pin 7: X=0, Y=0, Function: S2
  - Pin 8: X=0, Y=2.9, Function: G2
  - Pin 9: X=0, Y=9.9, Function: Line
  - Pin 10: X=0, Y=12.7, Function: Line
  - Pin 11: X=0, Y=15.5, Function: Line
  - Pin 12: X=0, Y=19.7, Function: G1
  - Pin 13: X=0, Y=22.6, Function: S1
  - Pin 14: X=10.1, Y=22.6, Function: GND
  - Pin 15: X=17.9, Y=22.6, Function: +DC
  - Pin 16: X=20.8, Y=22.6, Function: +DC
  - Pin 17: X=27.8, Y=22.6, Function: G3
  - Pin 18: X=30.7, Y=22.6, Function: S3/5
  - Pin 19: X=33.6, Y=22.6, Function: G5
  - Pin 20: X=33.6, Y=14.8, Function: NTC1
  - Pin 21: X=33.6, Y=8.2, Function: NTC2

- **Outline Image**: Diagram showing the pin layout and dimensions.
<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>T5, T6</td>
<td>IGBT</td>
<td>600 V</td>
<td>75 A</td>
<td>Buck IGBT</td>
<td></td>
</tr>
<tr>
<td>D3, D4</td>
<td>FWD</td>
<td>600 V</td>
<td>30 A</td>
<td>Buck FWD</td>
<td></td>
</tr>
<tr>
<td>T1, T2</td>
<td>IGBT</td>
<td>600 V</td>
<td>75 A</td>
<td>Boost IGBT</td>
<td></td>
</tr>
<tr>
<td>D1, D2</td>
<td>FWD</td>
<td>1200 V</td>
<td>30 A</td>
<td>Boost FWD</td>
<td></td>
</tr>
<tr>
<td>D9, D10</td>
<td>FWD</td>
<td>600 V</td>
<td>10 A</td>
<td>Boost Inverse Diode</td>
<td></td>
</tr>
<tr>
<td>D13, D14</td>
<td>FWD</td>
<td>600 V</td>
<td>10 A</td>
<td>Boost Sw. Prot. Diode</td>
<td></td>
</tr>
<tr>
<td>NTC</td>
<td>NTC</td>
<td>600 V</td>
<td></td>
<td>Thermistor</td>
<td></td>
</tr>
</tbody>
</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.

**DISCLAIMER**

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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.

**LIFE SUPPORT POLICY**

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