### Features
- Neutral-point-Clamped inverter
- Clip-In PCB mounting
- Low Inductance Layout

### Target Applications
- UPS and Solar

### Types
- 10-FZ06NIA050SA-P925L33

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### Maximum Ratings

**Tj=25°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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</thead>
<tbody>
<tr>
<td>Collector-emitter break down voltage</td>
<td>$V_{CES}$</td>
<td>$T_j=T_{\text{max}}$</td>
<td>600</td>
<td>V</td>
</tr>
<tr>
<td>DC collector current</td>
<td>$I_C$</td>
<td>$T_{j}=80°C$</td>
<td>49</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$T_{j}=80°C$</td>
<td>50</td>
<td>A</td>
</tr>
<tr>
<td>Pulsed collector current</td>
<td>$I_{\text{pulse}}$</td>
<td>$I_{j}$ limited by $T_{\text{max}}$</td>
<td>150</td>
<td>A</td>
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<tr>
<td>Power dissipation per IGBT</td>
<td>$P_{\text{tot}}$</td>
<td>$T_{j}=T_{\text{max}}$</td>
<td>77</td>
<td>W</td>
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<tr>
<td></td>
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<td>$T_{j}=80°C$</td>
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<td>W</td>
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<td>Gate-emitter peak voltage</td>
<td>$V_{GE}$</td>
<td>$T_{j}=T_{\text{max}}$</td>
<td>±20</td>
<td>V</td>
</tr>
<tr>
<td>Short circuit ratings</td>
<td>$I_{SC}$</td>
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<td>µs</td>
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<td></td>
<td>$V_{CC}$</td>
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<td>°C</td>
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<tr>
<td>Turn off safe operating area</td>
<td></td>
<td>$V_{CE}&lt;V_{CES}$</td>
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### Buck FWD

<table>
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<th>Symbol</th>
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<tr>
<td>Peak Repetitive Reverse Voltage</td>
<td>$V_{\text{VRRM}}$</td>
<td>$T_{j}=25°C$</td>
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<td>V</td>
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<tr>
<td>DC forward current</td>
<td>$I_{F}$</td>
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<td></td>
<td></td>
<td>$T_{j}=80°C$</td>
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<td>A</td>
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<tr>
<td>Repetitive peak forward current</td>
<td>$I_{\text{VRRM}}$</td>
<td>$I_{j}$ limited by $T_{\text{max}}$</td>
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<td>A</td>
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<tr>
<td></td>
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<td>$T_{j}=100°C$</td>
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<tr>
<td>Power dissipation per Diode</td>
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<td></td>
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<td>$T_{j}=80°C$</td>
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<tr>
<td>Maximum Junction Temperature</td>
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<td>$T_{j}=T_{\text{max}}$</td>
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<td>°C</td>
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# Maximum Ratings

**Tj=25°C, unless otherwise specified**

<table>
<thead>
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<th>Parameter</th>
<th>Symbol</th>
<th>Value</th>
<th>Unit</th>
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<tbody>
<tr>
<td>Collector-emitter break down voltage</td>
<td>$V_{CES}$</td>
<td>600</td>
<td>V</td>
</tr>
<tr>
<td>DC collector current</td>
<td>$I_C$</td>
<td>49</td>
<td>A</td>
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<tr>
<td>Pulsed collector current</td>
<td>$I_{Cpuls}$</td>
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<td>A</td>
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<tr>
<td>Power dissipation per IGBT</td>
<td>$P_{tot}$</td>
<td>77</td>
<td>W</td>
</tr>
<tr>
<td>Gate-emitter peak voltage</td>
<td>$V_{GE}$</td>
<td>±20</td>
<td>V</td>
</tr>
<tr>
<td>Short circuit ratings</td>
<td>$I_{SC}$</td>
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<td>μs</td>
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<tr>
<td>Maximum Junction Temperature</td>
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**Buck and Boost Inverse FWD**

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<th>Unit</th>
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<tr>
<td>Peak Repetitive Reverse Voltage</td>
<td>$V_{IRM}$</td>
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<tr>
<td>DC forward current</td>
<td>$I_F$</td>
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<td>Repetitive peak forward current</td>
<td>$I_{pRM}$</td>
<td>100</td>
<td>A</td>
</tr>
<tr>
<td>Power dissipation per Diode</td>
<td>$P_{tot}$</td>
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<td>W</td>
</tr>
<tr>
<td>Maximum Junction Temperature</td>
<td>$T_{Jmax}$</td>
<td>175</td>
<td>°C</td>
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**Thermal Properties**

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<th>Unit</th>
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<tr>
<td>Storage temperature</td>
<td>$T_{stg}$</td>
<td>-40...+125</td>
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<tr>
<td>Operation temperature under switching condition</td>
<td>$T_{op}$</td>
<td>-40...+(Tjmax - 25)</td>
<td>°C</td>
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**Insulation Properties**

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<tr>
<td>Clearance</td>
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<td>min 12.7</td>
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### Characteristic Values

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Conditions</th>
<th>Value</th>
<th>Unit</th>
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<tbody>
<tr>
<td><strong>Buck IGBT</strong></td>
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<td>Gate emitter threshold voltage</td>
<td>VGE or VGS</td>
<td>VCE=VGE</td>
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<td>Collector-emitter saturation voltage</td>
<td>VCE</td>
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<td>1.62</td>
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<td>Collector-emitter cut-off current incl. Diode</td>
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<td>30</td>
<td>μA</td>
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<tr>
<td>Gate-emitter leakage current</td>
<td>ICSS</td>
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<td>nA</td>
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<td>Integrated Gate resistor</td>
<td>Rgoff</td>
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<td>none</td>
<td>Ω</td>
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<tr>
<td>Turn-on delay time</td>
<td>tON</td>
<td>Rgoff=8 Ω</td>
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<tr>
<td>Rise time</td>
<td>τr</td>
<td>Rgon=8 Ω</td>
<td>12</td>
<td></td>
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<td>Turn-off delay time</td>
<td>tOFF</td>
<td></td>
<td>206</td>
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<tr>
<td>Fall time</td>
<td>τf</td>
<td></td>
<td>200</td>
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<td>Turn-on energy loss per pulse</td>
<td>Eon</td>
<td></td>
<td>1.00</td>
<td>mWs</td>
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<tr>
<td>Turn-off energy loss per pulse</td>
<td>Eoff</td>
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<td>mWs</td>
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<td>f=1MHz</td>
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<td>pF</td>
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<td>Output capacitance</td>
<td>Cov</td>
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<td>200</td>
<td>pF</td>
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<td>Reverse transfer capacitance</td>
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<tr>
<td>Gate charge</td>
<td>QGate</td>
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<td>nC</td>
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<td>Thermal resistance chip to heatsink per chip</td>
<td>RthJH</td>
<td>Thermal grease thickness=550um</td>
<td>1.23</td>
<td>K/W</td>
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### Diode FWD

<table>
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<th>Symbol</th>
<th>Conditions</th>
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<th>Unit</th>
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<tr>
<td>Diode forward voltage</td>
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<td>Peak reverse recovery current</td>
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<td>66</td>
<td>A</td>
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<tr>
<td>Reverse recovery time</td>
<td>τR</td>
<td>Rgon=8 Ω</td>
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<td>Reverse recovered charge</td>
<td>Qrec</td>
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<td>Peak rate of fall of recovery current</td>
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<td>Reverse recovered energy</td>
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<td>Thermal resistance chip to heatsink per chip</td>
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<td>K/W</td>
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### Characteristic Values

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<tr>
<td>Boost IGBT</td>
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<tr>
<td>Gate-emitter threshold voltage</td>
<td>VGE(VGE)</td>
<td>VCE(VCE)</td>
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<td>Collector-emitter saturation voltage</td>
<td>VCE(VCE)</td>
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<td>Collector-emitter cut-off incl. diode</td>
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<td>600</td>
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<td>Gate-emitter leakage current</td>
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<td>650</td>
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<td>Integrated Gate resistor</td>
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<td>100</td>
<td>100</td>
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<tr>
<td>Turn-on delay time</td>
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<td>±15</td>
<td>350</td>
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<tr>
<td>Rise time</td>
<td>tR</td>
<td>±25°C</td>
<td>173</td>
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<td>Turn-off delay time</td>
<td>tOFF</td>
<td>±25°C</td>
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<td>Fall time</td>
<td>tF</td>
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<td>Turn-on energy loss per pulse</td>
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<td>0.83</td>
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<tr>
<td>Output capacitance</td>
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<td>Reverse transfer capacitance</td>
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<td>Gate charge</td>
<td>Qg</td>
<td>±15</td>
<td>480</td>
<td>50</td>
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<td>Thermal resistance chip to heatsink per chip</td>
<td>RthJH</td>
<td>Thermal grease thickness 50um k=1 W/mK</td>
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<td>Buck and Boost Inverse FWD</td>
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<td>Diode forward voltage</td>
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<td>Thermal resistance chip to heatsink per chip</td>
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<td>T=25°C</td>
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<td>mW</td>
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<td>Power dissipation constant</td>
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<td>B-value</td>
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<td>T=25°C</td>
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<td>B-value</td>
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<td>Tol. ±3%</td>
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<td>Vincotech NTC Reference</td>
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<td>T=25°C</td>
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Buck

**Figure 1**
Typical output characteristics
$I_C = f(V_{CE})$

![Graph](image1)

**At**
- $t_f = 250 \ \mu s$
- $T_j = 25 \ ^\circ C$
- $V_{CE}$ from 7 V to 17 V in steps of 1 V

**Figure 2**
Typical output characteristics
$I_C = f(V_{CE})$

![Graph](image2)

**At**
- $t_f = 250 \ \mu s$
- $T_j = 125 \ ^\circ C$
- $V_{CE}$ from 7 V to 17 V in steps of 1 V

**Figure 3**
Typical transfer characteristics
$I_C = f(V_{GE})$

![Graph](image3)

**At**
- $t_f = 250 \ \mu s$
- $T_j = 25 \ ^\circ C$
- $T_j = T_{j_{max}} - 25 \ ^\circ C$
- $V_{CE} = 10$ V

**Figure 4**
Typical diode forward current as a function of forward voltage
$I_F = f(V_F)$

![Graph](image4)

**At**
- $t_f = 250 \ \mu s$
Figure 5  
Typical switching energy losses as a function of collector current  
\[ E = f(I_C) \]

With an inductive load at  
\[ T_j = 25/125 \degree C \]  
\[ V_{CE} = 350 \text{ V} \]  
\[ V_{GE} = \pm 15 \text{ V} \]  
\[ R_{g_{on}} = 8 \text{ \Omega} \]  
\[ R_{g_{off}} = 8 \text{ \Omega} \]

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

With an inductive load at  
\[ T_j = 25/125 \degree C \]  
\[ V_{CE} = 350 \text{ V} \]  
\[ V_{GE} = \pm 15 \text{ V} \]  
\[ I_C = 50 \text{ A} \]

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

With an inductive load at  
\[ T_j = 25/125 \degree C \]  
\[ V_{CE} = 350 \text{ V} \]  
\[ V_{GE} = \pm 15 \text{ V} \]  
\[ R_{g_{on}} = 8 \text{ \Omega} \]

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

With an inductive load at  
\[ T_j = 25/125 \degree C \]  
\[ V_{CE} = 350 \text{ V} \]  
\[ V_{GE} = \pm 15 \text{ V} \]  
\[ I_C = 50 \text{ A} \]
Buck

**Figure 9**
Typical switching times as a function of collector current

\[ t = f(I_C) \]

With an inductive load at

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

**Figure 10**
Typical switching times as a function of gate resistor

\[ t = f(R_G) \]

With an inductive load at

- \( T_j = 125 \, ^\circ C \)
- \( V_{CE} = 350 \, V \)
- \( V_{GE} = \pm 15 \, V \)
- \( I_C = 50 \, A \)

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

\[ t_r = f(I_C) \]

At

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

**Figure 12**
Typical reverse recovery time as a function of IGBT turn on gate resistor

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

At

- \( T_j = 25/125 \, ^\circ C \)
- \( V_{CE} = 350 \, V \)
- \( I_C = 50 \, A \)
- \( V_{GE} = \pm 15 \, V \)
Buck

Figure 13 FWD
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.]

At
\[ T_J = 25/125 \, ^\circ C \]
\[ V_{CE} = 350 \, V \]
\[ V_{GE} = \pm 15 \, V \]
\[ R_{gon} = 8 \, \Omega \]

Figure 14 FWD
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 gate resistor.]

At
\[ T_J = 25/125 \, ^\circ C \]
\[ V_{BE} = 350 \, V \]
\[ I_F = 50 \, A \]
\[ V_{GE} = \pm 15 \, V \]

Figure 15 FWD
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.]

At
\[ T_J = 25/125 \, ^\circ C \]
\[ V_{CE} = 350 \, V \]
\[ V_{GE} = \pm 15 \, V \]
\[ R_{gon} = 8 \, \Omega \]

Figure 16 FWD
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 gate resistor.]

At
\[ T_J = 25/125 \, ^\circ C \]
\[ V_{BE} = 350 \, V \]
\[ I_F = 50 \, A \]
\[ V_{GE} = \pm 15 \, V \]
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
- \( T_j = 25/125 \) °C
- \( V_{CE} = 350 \) V
- \( V_{GE} = \pm 15 \) V
- \( R_{gon} = 8 \) Ω

Figure 18
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
- \( V_{GE} = \pm 15 \) V
- \( I_F = 50 \) A

Figure 19
IGBT transient thermal impedance as a function of pulse width
\[ Z_{thJH} = f(t_p) \]

At
- \( D = t_p / T \)
- \( R_{ThJH} = 1.23 \) KW

IGBT thermal model values

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<thead>
<tr>
<th>R (C/W)</th>
<th>Tau (s)</th>
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<td>7.1E-03</td>
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<tr>
<td>0.06</td>
<td>4.1E-04</td>
</tr>
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Figure 20
FWD transient thermal impedance as a function of pulse width
\[ Z_{thJH} = f(t_p) \]

At
- \( D = t_p / T \)
- \( R_{ThJH} = 1.75 \) KW

FWD thermal model values

<table>
<thead>
<tr>
<th>R (C/W)</th>
<th>Tau (s)</th>
</tr>
</thead>
<tbody>
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<td>5.5E+00</td>
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<tr>
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<td>9.4E-01</td>
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<td>0.68</td>
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<td>5.2E-03</td>
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Figure 21
Power dissipation as a function of heatsink temperature
\[ P_{\text{tot}} = f(T_h) \]

At
\[ T_j = 175 ^\circ C \]

Figure 22
Collector current as a function of heatsink temperature
\[ I_C = f(T_h) \]

At
\[ T_j = 175 ^\circ C \]
\[ V_{GE} = 15 \text{ V} \]

Figure 23
Power dissipation as a function of heatsink temperature
\[ P_{\text{tot}} = f(T_h) \]

At
\[ T_j = 175 ^\circ C \]

Figure 24
Forward current as a function of heatsink temperature
\[ I_F = f(T_h) \]

At
\[ T_j = 175 ^\circ C \]

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Buck & Boost

Figure 25 IGBT
Turn on safe operating area as a function of collector-emitter voltage
\[ I_C = f(V_{CE}) \]

Figure 26 IGBT
Gate voltage vs Gate charge
\[ V_{GE} = f(Q_g) \]

At
\[ T_j \leq T_{j_{max}} \]
\[ I_C = 50 \text{ A} \]
Figure 1  
**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 2  
**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  
**Typical transfer characteristics**  
$I_C = f(V_{GE})$

At

- $t_p = 250 \, \mu s$
- $V_{CE} = 10 \, V$
- $T_J = T_{Jmax} - 25 \, ^\circ C$
- $T_J = 25 \, ^\circ C$
Typical switching energy losses as a function of collector current

\[ E = f(I_C) \]

With an inductive load at:
- \( T_J = 25/125 \, ^\circ\text{C} \)
- \( V_{CE} = 350 \, \text{V} \)
- \( V_{GE} = \pm 15 \, \text{V} \)
- \( R_{gon} = 8 \, \Omega \)
- \( R_{goff} = 8 \, \Omega \)

Typical reverse recovery energy loss as a function of collector current

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

With an inductive load at:
- \( T_J = 25/125 \, ^\circ\text{C} \)
- \( V_{CE} = 350 \, \text{V} \)
- \( V_{GE} = \pm 15 \, \text{V} \)
- \( R_{gon} = 8 \, \Omega \)

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Typical switching times as a function of collector current

$t = f(I_C)$

With an inductive load at

$T_j = 125 ^\circ \text{C}$

$V_{CE} = 350 \text{ V}$

$V_{CE} = \pm 15 \text{ V}$

$R_{gon} = 8 \ \Omega$

$R_{goff} = 8 \ \Omega$

Typical reverse recovery time as a function of collector current

$t_r = f(I_C)$

At

$T_j = 25/125 \ ^\circ \text{C}$

$V_{CE} = 350 \text{ V}$

$V_{CE} = \pm 15 \text{ V}$

$R_{gon} = 8 \ \Omega$
**Boost**

**Figure 12** FWD

Typical reverse recovery charge as a function of collector current

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

At

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

**Figure 13** FWD

Typical reverse recovery charge as a function of IGBT turn on gate resistor

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

At

\[ T_J = 25/125 \degree C \]
\[ V_{CE} = 350 \text{ V} \]
\[ I_F = 50 \text{ A} \]
\[ V_{GE} = \pm 15 \text{ V} \]

**Figure 14** FWD

Typical reverse recovery current as a function of collector current

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

**Figure 15** FWD

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

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

At

\[ T_J = 25/125 \degree C \]
\[ V_{CE} = 350 \text{ V} \]
\[ I_F = 50 \text{ A} \]
\[ V_{GE} = \pm 15 \text{ V} \]
Figure 16
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
- \( T_j = 25/125 \, ^\circ C \)
- \( V_{CE} = 350 \, V \)
- \( V_{GE} = \pm 15 \, V \)
- \( I_F = 50 \, A \)
- \( R_{gon} = 8 \, \Omega \)

Figure 17
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
- \( T_j = 25/125 \, ^\circ C \)
- \( V_{CE} = 350 \, V \)
- \( I_F = 50 \, A \)
- \( V_{GE} = \pm 15 \, V \)

Figure 18
IGBT transient thermal impedance as a function of pulse width
\[ Z_{thJH} = f(t_p) \]

At
- \( D = t_p / T \)
- \( R_{noth} = 1.23 \, \text{K/W} \)

R (C/W)  \( \text{Tau (s)} \)
- 0.04  7.4E+00
- 0.19  1.2E+00
- 0.46  1.7E-01
- 0.35  4.2E-02
- 0.12  7.1E-03
- 0.06  4.1E-04

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Boost

Figure 19  
Power dissipation as a function of heatsink temperature

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

At
\[ T_j = 175 \, ^{\circ}C \]

Figure 20  
Collector current as a function of heatsink temperature

\[ I_C = f(T_h) \]

At
\[ T_j = 175 \, ^{\circ}C \]
\[ V_{GE} = 15 \, V \]
Buck and Boost Inverse Diode

**Figure 1**
Typical diode forward current as a function of forward voltage
\[ I_F = f(V_F) \]

\[ T_j = T_{jmax} - 25 \, ^\circ C \]
\[ T_j = 25 \, ^\circ C \]

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

**Figure 2**
Diode transient thermal impedance as a function of pulse width
\[ Z_{thJH} = f(t_p) \]

\[ D = \frac{t_p}{T} \]
\[ R_{thJH} = 1.75 \, K/W \]

**Figure 3**
Power dissipation as a function of heatsink temperature
\[ P_{tot} = f(T_{th}) \]

**Figure 4**
Forward current as a function of heatsink temperature
\[ I_F = f(T_{th}) \]

At
\[ T_j = 175 \, ^\circ C \]

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Thermistor

Figure 1
Typical NTC characteristic as a function of temperature

\[ R_T = f(T) \]

Figure 2
Typical NTC resistance values

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

<table>
<thead>
<tr>
<th>T (°C)</th>
<th>R (Ω)</th>
<th>T (°C)</th>
<th>R (Ω)</th>
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Switching Definitions BUCK IGBT

General conditions

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<td>$R_{DS(on)}$</td>
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</tr>
<tr>
<td>$R_{Goff}$</td>
<td>8 Ω</td>
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Figure 1
Turn-off Switching Waveforms & definition of $t_{off}$, $t_{Eoff}$

$t_{off} = \text{integrating time for } E_{off}$

$V_{GE} (0\%) = -15$ V
$V_{GE} (100\%) = 15$ V
$V_{CE} (100\%) = 350$ V
$I_C (100\%) = 50$ A
$t_{off} = 0.21$ μs
$t_{Eoff} = 0.47$ μs

Figure 2
Turn-on Switching Waveforms & definition of $t_{on}$, $t_{Eon}$

$t_{on} = \text{integrating time for } E_{on}$

$V_{GE} (0\%) = -15$ V
$V_{GE} (100\%) = 15$ V
$V_{CE} (100\%) = 350$ V
$I_C (100\%) = 50$ A
$t_{on} = 0.10$ μs
$t_{Eon} = 0.26$ μs

Figure 3
Turn-off Switching Waveforms & definition of $t_f$

$V_C (100\%) = 350$ V
$I_C (100\%) = 50$ A
$t_f = 0.13$ μs

Figure 4
Turn-on Switching Waveforms & definition of $t_r$

$V_C (100\%) = 350$ V
$I_C (100\%) = 50$ A
$t_r = 0.02$ μs
Switching Definitions BUCK IGBT

### Figure 5
Output inverter IGBT

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

- $P_{off}(100\%) = 17.53$ kW
- $E_{off}(100\%) = 1.95$ mJ
- $t_{Eoff} = 0.47$ $\mu$s

### Figure 6
Output inverter IGBT

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

- $P_{on}(100\%) = 17.53$ kW
- $E_{on}(100\%) = 1.00$ mJ
- $t_{Eon} = 0.26$ $\mu$s

### Figure 7
Output inverter FWD

Gate voltage vs Gate charge (measured)

- $V_{GEoff} = -15$ V
- $V_{GEon} = 15$ V
- $V_C(100\%) = 350$ V
- $I_C(100\%) = 50$ A
- $Q_g = 572.22$ nC

### Figure 8
Output inverter IGBT

Turn-off Switching Waveforms & definition of $t_r$

- $V_d(100\%) = 350$ V
- $I_d(100\%) = 50$ A
- $I_{IRM}(100\%) = -72$ A
- $t_r = 0.21$ $\mu$s
Switching Definitions BUCK IGBT

Figure 9
Output inverter FWD
Turn-on Switching Waveforms & definition of $t_{Qr}$
($t_{Qr}$ = integrating time for $Q_r$)

<table>
<thead>
<tr>
<th>$I_d$ (100%)</th>
<th>50 A</th>
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</thead>
<tbody>
<tr>
<td>$Q_r$ (100%)</td>
<td>4.40 $\mu$C</td>
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<tr>
<td>$t_{Qr}$</td>
<td>0.65 $\mu$s</td>
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Figure 10
Output inverter FWD
Turn-on Switching Waveforms & definition of $t_{Erec}$
($t_{Erec}$ = integrating time for $E_{rec}$)

<table>
<thead>
<tr>
<th>$P_{Erec}$ (100%)</th>
<th>17.53 kW</th>
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<tr>
<td>$E_{rec}$ (100%)</td>
<td>1.07 mJ</td>
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<tr>
<td>$t_{Erec}$</td>
<td>0.65 $\mu$s</td>
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Measurement circuits

Figure 11
BUCK stage switching measurement circuit

Figure 12
BOOST stage switching measurement circuit
10-FZ06NIA050SA-P925F33
preliminary datasheet

Ordering Code and Marking - Outline - Pinout

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<th>in packaging barcode as</th>
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Outline

Pinout

Pin Index

Pin | X   | Y   |
--- | --- | --- |
1   | 38.6 | 0   |
2   | 30.8 | 0   |
3   | 77   | 0   |
4   | 9.2  | 0   |
5   | 0    | 0   |
6   | 2.8  | 0   |
7   | 0    | 0   |
8   | 0    | 7.1 |
9   | 0    | 9.4 |
10  | 0    | 12.1|
11  | 0    | 15.5|
12  | 0    | 22.8|
13  | 2.8  | 22.8|
14  | 9.2  | 22.8|
15  | 9.2  | 22.8|
16  | 2    | 22.8|
17  | 0    | 22.8|
18  | 23.6 | 14.9|
19  | 35   | 22.8|
20  | 35   | 0.2 |

-pin 1 needs change

DC+ 15, 16
16 G1
17 S1
12 G2
13 S3
8, 9, 10, 11 Line
7 G4
6 S4
1 GZ
2 SZ
1 NTC1
19 NTC2
20
DC- 3, 4
NTC1
19 NTC2
20
PRODUCT STATUS DEFINITIONS

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<td>This datasheet contains final specifications. Vincotech reserves the right to make changes at any time without notice in order to improve design. The data contained is exclusively intended for technically trained staff.</td>
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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.