### Maximum Ratings

$T_i = 25 \, ^\circ\text{C}$, 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>Buck Switch</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collector-emitter voltage</td>
<td>$V_{CES}$</td>
<td>$T_i = T_{j(max)}$ $T_s = 80 , ^\circ\text{C}$</td>
<td>650</td>
<td>V</td>
</tr>
<tr>
<td>Collector current</td>
<td>$I_c$</td>
<td>$T_i = T_{j(max)}$ $T_s = 80 , ^\circ\text{C}$</td>
<td>94</td>
<td>A</td>
</tr>
<tr>
<td>Repetitive peak collector current</td>
<td>$I_{CRM}$</td>
<td>$T_i$ limited by $T_{j(max)}$</td>
<td>600</td>
<td>A</td>
</tr>
<tr>
<td>Total power dissipation</td>
<td>$P_{tot}$</td>
<td>$T_i = T_{j(max)}$ $T_s = 80 , ^\circ\text{C}$</td>
<td>145</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>$T_{j(max)}$</td>
<td></td>
<td>175</td>
<td>^\circ\text{C}</td>
</tr>
</tbody>
</table>

**Features**

- NPC inverter topology
- Optimized for full rated bi-directional usage (4 quadrant)
- High-speed IGBT in all switch positions
- Integrated NTC
- Low inductive design with integrated DC capacitor
- flow 1 12mm package

**Target applications**

- Industrial Drives
- Solar Inverters
- UPS

**Types**

- 10-FY07NPA200SM02-L366F08
- 10-PY07NPA200SM02-L366F08Y
## Maximum Ratings

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

<table>
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<tr>
<th>Parameter</th>
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<th>Unit</th>
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<tbody>
<tr>
<td><strong>Buck 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_s ) ( T_j = T_{j\max} ) ( T_s = 80 , ^\circ C )</td>
<td>107</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Repetitive peak forward current</td>
<td>( I_{FSM} )</td>
<td></td>
<td>400</td>
<td>A</td>
</tr>
<tr>
<td>Total power dissipation</td>
<td>( P_{tot} ) ( T_j = T_{j\max} ) ( T_s = 80 , ^\circ C )</td>
<td>131</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>Maximum junction temperature</td>
<td>( T_{j\max} )</td>
<td></td>
<td>175</td>
<td>(^\circ C)</td>
</tr>
<tr>
<td><strong>Out. 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 ) ( T_j = T_{j\max} ) ( T_s = 80 , ^\circ C )</td>
<td>94</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Repetitive peak collector current</td>
<td>( I_{FSM} ) ( t_p ) limited by ( T_{j\max} )</td>
<td>600</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Total power dissipation</td>
<td>( P_{tot} ) ( T_j = T_{j\max} ) ( T_s = 80 , ^\circ C )</td>
<td>145</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>Gate-emitter voltage</td>
<td>( V_{GES} )</td>
<td>±20</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Maximum junction temperature</td>
<td>( T_{j\max} )</td>
<td></td>
<td>175</td>
<td>(^\circ C)</td>
</tr>
<tr>
<td><strong>Out. 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_s ) ( T_j = T_{j\max} ) ( T_s = 80 , ^\circ C )</td>
<td>107</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Repetitive peak forward current</td>
<td>( I_{FSM} )</td>
<td></td>
<td>400</td>
<td>A</td>
</tr>
<tr>
<td>Total power dissipation</td>
<td>( P_{tot} ) ( T_j = T_{j\max} ) ( T_s = 80 , ^\circ C )</td>
<td>131</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>Maximum junction temperature</td>
<td>( T_{j\max} )</td>
<td></td>
<td>175</td>
<td>(^\circ C)</td>
</tr>
<tr>
<td><strong>Out. Boost Inverse Diode</strong></td>
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<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_s ) ( T_j = T_{j\max} ) ( T_s = 80 , ^\circ C )</td>
<td>124</td>
<td>A</td>
<td></td>
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<tr>
<td>Repetitive peak forward current</td>
<td>( I_{FSM} )</td>
<td></td>
<td>400</td>
<td>A</td>
</tr>
<tr>
<td>Total power dissipation</td>
<td>( P_{tot} ) ( T_j = T_{j\max} ) ( T_s = 80 , ^\circ C )</td>
<td>164</td>
<td>W</td>
<td></td>
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<tr>
<td>Maximum junction temperature</td>
<td>( T_{j\max} )</td>
<td></td>
<td>175</td>
<td>(^\circ C)</td>
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<tr>
<td><strong>DC Link Capacitor</strong></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Maximum DC voltage</td>
<td>( V_{MAX} )</td>
<td></td>
<td>500</td>
<td>V</td>
</tr>
<tr>
<td>Operation Temperature</td>
<td>( T_{op} )</td>
<td>-55...+125</td>
<td>(^\circ C)</td>
<td></td>
</tr>
</tbody>
</table>
Maximum Ratings

$T_i = 25 \degree C$, 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>°C</td>
</tr>
<tr>
<td>Operation temperature under switching condition</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 Test Voltage* $t_p = 2$ s</td>
<td>6000</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AC Voltage $t_p = 1$ min</td>
<td>2500</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>solder pin \ press-fit pin</td>
<td>8.07 \ 7.86</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>

*100 % tested in production
### Characteristic Values

<table>
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<tr>
<th>Parameter</th>
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<th>Conditions</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gate-emitter threshold voltage</td>
<td>$V_{GE(th)}$</td>
<td>$V_{GE} = V_{CE}$</td>
<td>0.002</td>
<td>25</td>
</tr>
<tr>
<td>Collector-emitter saturation voltage</td>
<td>$V_{CE}$</td>
<td>15</td>
<td>200</td>
<td>25</td>
</tr>
<tr>
<td>Collector-emitter cut-off current</td>
<td>$I_{CS}$</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>none</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input capacitance</td>
<td>$C_{in}$</td>
<td>$f = 1$ Mhz</td>
<td>0</td>
<td>25</td>
</tr>
<tr>
<td>Output capacitance</td>
<td>$C_{out}$</td>
<td>$f = 1$ Mhz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reverse transfer capacitance</td>
<td>$C_{res}$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gate charge</td>
<td>$Q_g$</td>
<td>15</td>
<td>520</td>
<td>200</td>
</tr>
<tr>
<td>Thermal resistance junction to sink</td>
<td>$R_{th(j-s)}$</td>
<td>$\lambda = 3.4$ W/mK (PSX)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turn-on delay time</td>
<td>$t_{d(on)}$</td>
<td>$R_{on} = 4$ Ω</td>
<td>25</td>
<td>125</td>
</tr>
<tr>
<td>Rise time</td>
<td>$t_r$</td>
<td>$R_{off} = 4$ Ω</td>
<td>25</td>
<td>125</td>
</tr>
<tr>
<td>Turn-off delay time</td>
<td>$t_{d(off)}$</td>
<td>25</td>
<td>125</td>
<td>158</td>
</tr>
<tr>
<td>Fall time</td>
<td>$t_f$</td>
<td>25</td>
<td>125</td>
<td>7</td>
</tr>
<tr>
<td>Turn-on energy (per pulse)</td>
<td>$E_{on}$</td>
<td>$Q_{on} = 4.6$ μC</td>
<td>25</td>
<td>125</td>
</tr>
<tr>
<td>Turn-off energy (per pulse)</td>
<td>$E_{off}$</td>
<td>$Q_{off} = 9.1$ μC</td>
<td>25</td>
<td>125</td>
</tr>
</tbody>
</table>

**Buck Switch**

**Static**

- **Gate-emitter threshold voltage**
  \[ V_{GE(th)} = V_{GE} = V_{CE} \]
  - Min: 0.002 V
  - Typ: 3.2 V
  - Max: 4 V
  - Units: V

- **Collector-emitter saturation voltage**
  \[ V_{CE} \]
  - Min: 15 V
  - Typ: 200 V
  - Max: 150 V
  - Units: V

- **Collector-emitter cut-off current**
  \[ I_{CS} \]
  - Min: 0 μA
  - Typ: 650 μA
  - Max: 250 μA
  - Units: μA

- **Gate-emitter leakage current**
  \[ I_{GES} \]
  - Min: 20 nA
  - Typ: 0 nA
  - Max: 250 nA
  - Units: nA

- **Internal gate resistance**
  \[ r_g \]
  - Min: none
  - Typ: |Val
  - Max: |Val
  - Units: Ω

- **Input capacitance**
  \[ C_{in} \]
  - Min: 0 pF
  - Typ: 25 pF
  - Max: 13120 pF
  - Units: pF

- **Output capacitance**
  \[ C_{out} \]
  - Min: 0 pF
  - Typ: 25 pF
  - Max: 194 pF
  - Units: pF

- **Reverse transfer capacitance**
  \[ C_{res} \]
  - Min: 0 pF
  - Typ: 25 pF
  - Max: 42 pF
  - Units: pF

- **Gate charge**
  \[ Q_g \]
  - Min: 15 pC
  - Typ: 520 pC
  - Max: 200 pC
  - Units: pC

**Thermal**

- **Thermal resistance junction to sink**
  \[ R_{th(j-s)} = 3.4 \text{ W/mK (PSX)} \]
  - Min: 0.65 K/W
  - Typ: |Val
  - Max: |Val
  - Units: K/W

**Dynamic**

- **Turn-on delay time**
  \[ t_{d(on)} \]
  - Min: 25 ns
  - Typ: 125 ns
  - Max: 67 ns

- **Rise time**
  \[ t_r \]
  - Min: 25 ns
  - Typ: 125 ns
  - Max: 11 ns

- **Turn-off delay time**
  \[ t_{d(off)} \]
  - Min: 25 ns
  - Typ: 125 ns
  - Max: 158 ns

- **Fall time**
  \[ t_f \]
  - Min: 25 ns
  - Typ: 125 ns
  - Max: 7 ns

- **Turn-on energy (per pulse)**
  \[ E_{on} \]
  - Min: 25 mWs
  - Typ: 125 mWs
  - Max: 1,101 mWs

- **Turn-off energy (per pulse)**
  \[ E_{off} \]
  - Min: 25 mWs
  - Typ: 125 mWs
  - Max: 0.576 mWs
# 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>Forward voltage</td>
<td>$V_F$</td>
<td>$200$</td>
<td>1,65</td>
<td>V</td>
</tr>
<tr>
<td>Reverse leakage current</td>
<td>$I_R$</td>
<td>$650$</td>
<td>10,6</td>
<td>μA</td>
</tr>
<tr>
<td>Thermal resistance junction to sink</td>
<td>$R_{th(j-s)}$</td>
<td></td>
<td>$0,73$</td>
<td>K/W</td>
</tr>
<tr>
<td>Peak recovery current</td>
<td>$I_{rr}$</td>
<td>$-5 / 15$</td>
<td>$114$</td>
<td>A</td>
</tr>
<tr>
<td>Reverse recovery time</td>
<td>$t_r$</td>
<td>$350$</td>
<td>$91$</td>
<td>ns</td>
</tr>
<tr>
<td>Recovered charge</td>
<td>$Q_{rd}$</td>
<td>$di/dt = 9293 A/μs$</td>
<td>$4,639$</td>
<td>μC</td>
</tr>
<tr>
<td>Reverse recovered energy</td>
<td>$E_{rec}$</td>
<td></td>
<td>$0,966$</td>
<td>mWs</td>
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<tr>
<td>Peak rate of fall of recovery current</td>
<td>$(di/dt)_{max}$</td>
<td>$25$</td>
<td>$3621$</td>
<td>A/μs</td>
</tr>
</tbody>
</table>

**Buck Diode**

**Static**

- Forward voltage $V_F$
- Reverse leakage current $I_R$

**Thermal**

- Thermal resistance junction to sink $R_{th(j-s)}$
- Thermal paste $λ_{paste} = 3,4 W/mK$

**Dynamic**

- Peak recovery current $I_{rr}$
- Reverse recovery time $t_r$
- Recovered charge $Q_{rd}$
- Reverse recovered energy $E_{rec}$
- Peak rate of fall of recovery current $(di/dt)_{max}$
## Characteristic Values

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<tbody>
<tr>
<td></td>
<td></td>
<td>$V_{GE}$ [V]</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{GS}$ [V]</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_{D}$ [A]</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_{F}$ [A]</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{CE}$ [V]</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$T_{j}$ [°C]</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Min</td>
<td>Typ</td>
<td>Max</td>
</tr>
<tr>
<td>Out. Boost Switch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Static</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Gate-emitter threshold voltage</td>
<td>$V_{GE(th)}$</td>
<td>$V_{CE} = 0$, 0,002</td>
<td>25</td>
<td>3,2</td>
</tr>
<tr>
<td>Collector-emitter saturation voltage</td>
<td>$V_{CEsat}$</td>
<td>15</td>
<td>200</td>
<td>25</td>
</tr>
<tr>
<td>Collector-emitter cut-off current</td>
<td>$I_{BS}$</td>
<td>0</td>
<td>650</td>
<td>25</td>
</tr>
<tr>
<td>Gate-emitter leakage current</td>
<td>$I_{GE}$</td>
<td>20</td>
<td>0</td>
<td>25</td>
</tr>
<tr>
<td>Internal gate resistance</td>
<td>$r_{g}$</td>
<td>none</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input capacitance</td>
<td>$C_{in}$</td>
<td>$f = 1$ MHz</td>
<td>25</td>
<td>13120</td>
</tr>
<tr>
<td>Output capacitance</td>
<td>$C_{os}$</td>
<td>0</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Reverse transfer capacitance</td>
<td>$C_{res}$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gate charge</td>
<td>$Q_{g}$</td>
<td>15</td>
<td>520</td>
<td>200</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>$h_{muc} = 3,4$ W/mK (PSX)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dynamic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turn-on delay time</td>
<td>$t_{on}$</td>
<td>$R_{son} = 4$ Ω</td>
<td>-5 / 15</td>
<td>350</td>
</tr>
<tr>
<td>Rise time</td>
<td>$t_{r}$</td>
<td>$R_{sa} = 4$ Ω</td>
<td>25</td>
<td>125</td>
</tr>
<tr>
<td>Turn-off delay time</td>
<td>$t_{off}$</td>
<td>$R_{sof} = 4$ Ω</td>
<td>25</td>
<td>125</td>
</tr>
<tr>
<td>Fall time</td>
<td>$t_{f}$</td>
<td>25</td>
<td>125</td>
<td>7</td>
</tr>
<tr>
<td>Turn-on energy (per pulse)</td>
<td>$E_{on}$</td>
<td>$Q_{on} = 4,5$ μC</td>
<td>25</td>
<td>125</td>
</tr>
<tr>
<td>Turn-off energy (per pulse)</td>
<td>$E_{off}$</td>
<td>$Q_{off} = 9,2$ μC</td>
<td>25</td>
<td>125</td>
</tr>
</tbody>
</table>
## Characteristic Values

<table>
<thead>
<tr>
<th>Parameter</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Min</td>
<td>Typ</td>
</tr>
</tbody>
</table>

### Out. Boost Diode

#### Static

**Forward voltage**

- $V_c$
  - 200
  - 25
  - 125
  - 150
  - 1,65
  - 1,60
  - 1,58
  - 2,65
  - V

**Reverse leakage current**

- $I_r$
  - 650
  - 25
  - 10,6
  - µA

#### Thermal

**Thermal resistance junction to sink**

- $R_{th}$
  - $\lambda_{paste} = 3,4 \text{ W/mK}$
  - (PSX)
  - 0,73
  - K/W

#### Dynamic

**Peak recovery current**

- $I_{rrm}$
  - $-5 / 15$
  - 350
  - 120
  - 25
  - 125
  - 91
  - 129
  - A

**Reverse recovery time**

- $t_{rr}$
  - $di/dt = 6472 \text{ A/µs}$
  - $di/dt = 5169 \text{ A/µs}$
  - 25
  - 125
  - 70
  - 103
  - ns

**Recovered charge**

- $Q_r$
  - $di/dt = 6472 \text{ A/µs}$
  - $di/dt = 5169 \text{ A/µs}$
  - 25
  - 125
  - 4,495
  - 9,160
  - µC

**Reverse recovered energy**

- $E_{rec}$
  - $di/dt = 6472 \text{ A/µs}$
  - $di/dt = 5169 \text{ A/µs}$
  - 25
  - 125
  - 0,800
  - 1,676
  - mWs

**Peak rate of fall of recovery current**

- $(di/dt)_{max}$
  - $-5 / 15$
  - 350
  - 120
  - 25
  - 125
  - 2015
  - 1571
  - A/µs

### Out. Boost Inverse Diode

#### Static

**Forward voltage**

- $V_c$
  - 200
  - 25
  - 125
  - 150
  - 1,77
  - 1,69
  - 1,66
  - 1,95
  - V

**Reverse leakage current**

- $I_r$
  - 650
  - 25
  - 2,4
  - µA

#### Thermal

**Thermal resistance junction to sink**

- $R_{th}$
  - $\lambda_{paste} = 3,4 \text{ W/mK}$
  - (PSX)
  - 0,58
  - K/W

### DC Link Capacitor

**Capacitance**

- $C$
  - 300
  - nF

**Tolerance**

- $f = 1 \text{ kHz}$
  - -10
  - +10
  - %

**Dissipation factor**

- $f = 1 \text{ kHz}$
  - 25
  - 2,5
  - %
### 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>$V_{GE}$</td>
<td>[V]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$V_{GS}$</td>
<td>[V]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$V_{CE}$</td>
<td>[V]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$V_{DS}$</td>
<td>[V]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$V_{F}$</td>
<td>[V]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$I_{C}$</td>
<td>[A]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$I_{D}$</td>
<td>[A]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$I_{F}$</td>
<td>[A]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$T_{j}$</td>
<td>[$^\circ$C]</td>
<td></td>
<td>Min</td>
<td>Typ</td>
</tr>
</tbody>
</table>

#### Thermistor
- **Rated resistance**
  - $R_{25} = 22\, \text{k}\Omega$
- **Deviation of $R_{100}$**
  - $\Delta R/R_{100} = 1484\, \Omega$  
    - $R_{100} = 100\, \Omega$  
    - Min: -5%  
    - Typ: 5%  
- **Power dissipation**
  - $P_{25} = 5\, \text{mW}$  
- **Power dissipation constant**
  - $P_{25} = 1.5\, \text{mW/K}$  
- **B-value**
  - $B(25/50) = 3962\, \text{K}$  
  - $B(25/100) = 4000\, \text{K}$  
- **Vincotech NTC Reference**

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Buck Switch Characteristics

**figure 1.**
Typical output characteristics

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

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

**figure 2.**
Typical output characteristics

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

- \( t_p = 250 \ \mu s \)
- \( V_{GE} \) from \( 7 \ \text{V} \) to \( 17 \ \text{V} \) in steps of \( 1 \ \text{V} \)
- \( T_j = 150^\circ \text{C} \)

**figure 3.**
Typical transfer characteristics

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

- \( t_p = 100 \ \mu s \)
- \( V_{CE} = 0 \ \text{V} \)
- \( T_j: \ 25^\circ \text{C} \)
- \( 125^\circ \text{C} \)
- \( 150^\circ \text{C} \)

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

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

- \( D = t_p / T \)
- \( R_{00(i)} = 0.65 \ \text{K/W} \)

**IGBT thermal model values**

\[
\begin{array}{ccc}
R & T & A \\
\text{K/W} & \text{s} & \text{K/W} \\
7,51E-02 & 3,22E+00 & 1,27E-01 & 5,1E+00 \\
3,27E-01 & 1,11E-01 & 7,19E-02 & 2,69E-02 \\
3,44E-02 & 6,17E-03 & 1,81E-02 & 5,82E-04 \\
\end{array}
\]
Buck Switch Characteristics

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

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

- \( V_{GE} \): Gate voltage
- \( Q_G \): Gate charge

**figure 6.**
Safe operating area

- \( I_C \): Collector current
- \( V_{CE} \): Collector-emitter voltage

Conditions:
- \( I_C = 200 \) A
- \( D = \) single pulse
- \( T_j = 80 \) °C
- \( V_{GE} = \pm 15 \) V
- \( T_j = T_{jmax} \)
Buck Diode Characteristics

Typical forward characteristics

$\text{I}_F = f(\text{V}_F)$

Transient thermal impedance as a function of pulse width

$\text{Z}_\text{th}(\text{t}_\text{p}) = f(\text{t}_\text{p})$

$t_p = 250 \mu s$

$\text{D} = \frac{t_p}{\text{T}}$

$R_{\text{th(j-s)}} = 0.73 \text{ K/W}$

$R_{\text{th}} \text{(K/W)}$

$\tau \text{(s)}$

8.64E-02 3.05E+00
1.38E-01 6.75E-01
3.34E-01 1.25E-01
1.06E-01 3.99E-02
4.34E-02 6.89E-03
1.90E-02 7.34E-04

$\text{V}_j$: 0 100 200 300 400 500

$\text{I}_F$ (A)

$\text{V}_F$ (V)
Out. Boost Switch Characteristics

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

<table>
<thead>
<tr>
<th>$V_{CE}$ (V)</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>$I_C$ (A)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$t_p = 250 \, \mu s$  
$V_{CE} = 15 \, V$  
$T_j: 25 \degree C$  
$125 \degree C$  
$150 \degree C$

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

<table>
<thead>
<tr>
<th>$V_{CE}$ (V)</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>$I_C$ (A)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$t_p = 250 \, \mu s$  
$V_{CE}$ from 7 V to 17 V in steps of 1 V  
$T_j: 150 \degree C$

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

<table>
<thead>
<tr>
<th>$V_{GE}$ (V)</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>$I_C$ (A)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$t_p = 100 \, \mu s$  
$V_{CE} = 0 \, V$  
$T_j: 25 \degree C$  
$125 \degree C$  
$150 \degree C$

**Figure 4.** IGBT  
Transient thermal impedance as function of pulse duration  
$Z_{th}(j-s) = f(t_p)$

<table>
<thead>
<tr>
<th>$t_p$ (s)</th>
<th>10^{-3}</th>
<th>10^{-2}</th>
<th>10^{-1}</th>
<th>10^{0}</th>
<th>10^{1}</th>
<th>10^{2}</th>
</tr>
</thead>
<tbody>
<tr>
<td>$Z_{th}(K/W)$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

datasheet

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Out. Boost Switch Characteristics

**figure 5.** IGBT Gate voltage vs gate charge

\[ V_G = f(Q_G) \]

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

- \( I_C = 200 \, \text{A} \)
- \( D = \) single pulse
- \( T_s = 80 \, ^\circ\text{C} \)
- \( V_{GE} = \pm 15 \, \text{V} \)
- \( T_j = T_{jmax} \)

**figure 6.** IGBT Safe operating area

\[ I_C = f(V_{CE}) \]
Out. Boost Diode Characteristics

**Figure 1.** Typical forward characteristics

\[ I_F = f(V_F) \]

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

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

- \( t_p = 250 \mu s \)
- \( 25 \, ^\circ C \)
- \( 125 \, ^\circ C \)
- \( 150 \, ^\circ C \)

<table>
<thead>
<tr>
<th>D = ( t_p / T )</th>
<th>( R_{th}(K/W) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.005</td>
<td>8.64E-02</td>
</tr>
<tr>
<td>0.01</td>
<td>1.38E-01</td>
</tr>
<tr>
<td>0.02</td>
<td>3.34E-01</td>
</tr>
<tr>
<td>0.05</td>
<td>1.06E-01</td>
</tr>
<tr>
<td>0.1</td>
<td>4.34E-02</td>
</tr>
<tr>
<td>0.2</td>
<td>1.90E-02</td>
</tr>
<tr>
<td>0.5</td>
<td>3.05E+00</td>
</tr>
<tr>
<td>1.0</td>
<td>6.75E-01</td>
</tr>
<tr>
<td>2.0</td>
<td>1.25E-01</td>
</tr>
<tr>
<td>5.0</td>
<td>3.99E-02</td>
</tr>
</tbody>
</table>

- \( \tau = 3.05E+00 \) s
- \( 1.38E-01 \) s
- \( 3.34E-01 \) s
- \( 1.06E-01 \) s
- \( 4.34E-02 \) s
Out. Boost Inverse Diode Characteristics

**figure 1.**
**FWD**
Typical forward characteristics

\[ I_F = f(V_F) \]

\[ T_i: \begin{align*}
25 \, ^\circ C & \quad \text{dotted} \\
125 \, ^\circ C & \quad \text{solid} \\
150 \, ^\circ C & \quad \text{dashed}
\end{align*} \]

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

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

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

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

**Thermistor Characteristics**

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

\[ R = f(T) \]

\[ R \, (\Omega): \begin{align*}
25,000 & \quad \text{at} \ 25 \, ^\circ C \\
20,000 & \quad \text{at} \ 50 \, ^\circ C \\
15,000 & \quad \text{at} \ 75 \, ^\circ C \\
10,000 & \quad \text{at} \ 100 \, ^\circ C \\
5,000 & \quad \text{at} \ 125 \, ^\circ C
\end{align*} \]
Buck Switching Characteristics

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

\[ E = f(I_C) \]

With an inductive load at

- \( V_{in} = 350 \text{ V} \)
- \( T_J = 25 \text{ °C} \)
- \( T_J = 125 \text{ °C} \)
- \( R_{rson} = 4 \text{ Ω} \)
- \( I_C = 120 \text{ A} \)

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

\[ E = f(R_g) \]

With an inductive load at

- \( V_{in} = 350 \text{ V} \)
- \( V_{in} = -5 / 15 \text{ V} \)
- \( R_{goff} = 4 \text{ Ω} \)
- \( I_C = 120 \text{ A} \)

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

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

With an inductive load at

- \( V_{in} = 350 \text{ V} \)
- \( T_J = 25 \text{ °C} \)
- \( T_J = 125 \text{ °C} \)
- \( R_{rson} = 4 \text{ Ω} \)
- \( I_C = 120 \text{ A} \)

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

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

With an inductive load at

- \( V_{in} = 350 \text{ V} \)
- \( V_{in} = -5 / 15 \text{ V} \)
- \( R_{goff} = 4 \text{ Ω} \)
- \( I_C = 120 \text{ A} \)
Buck Switching Characteristics

**Figure 5.** IGBT

Typical switching times as a function of collector current

\[ t = f(I_C) \]

With an inductive load at

- \( T_J = 125 \, ^\circ\text{C} \)
- \( V_C = 350 \, \text{V} \)
- \( V_{GE} = -5 / 15 \, \text{V} \)
- \( R_{ON} = 4 \, \Omega \)
- \( R_{OFF} = 4 \, \Omega \)

**Figure 6.** IGBT

Typical switching times as a function of gate resistor

\[ t = f(R_g) \]

With an inductive load at

- \( T_J = 125 \, ^\circ\text{C} \)
- \( V_C = 350 \, \text{V} \)
- \( V_{GE} = -5 / 15 \, \text{V} \)
- \( I_C = 120 \, \text{A} \)

**Figure 7.** FWD

Typical reverse recovery time as a function of collector current

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

With an inductive load at

- \( T_J = 25 \, ^\circ\text{C} \)
- \( V_C = 350 \, \text{V} \)
- \( V_{GE} = -5 / 15 \, \text{V} \)
- \( R_{ON} = 4 \, \Omega \)

**Figure 8.** FWD

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

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

With an inductive load at

- \( T_J = 25 \, ^\circ\text{C} \)
- \( V_C = 350 \, \text{V} \)
- \( V_{GE} = -5 / 15 \, \text{V} \)
- \( I_C = 120 \, \text{A} \)
Buck Switching Characteristics

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

\[ Q_r = f(I_C) \]

With an inductive load at
- \( V_{CC} = 350 \text{ V} \)
- \( V_{IN} = -5 / 15 \text{ V} \)
- \( R_{gon} = 4 \Omega \)

Temperature ranges:
- \( T_j = 25 \text{ °C} \)
- \( T_j = 125 \text{ °C} \)

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

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

With an inductive load at
- \( V_{CC} = 350 \text{ V} \)
- \( V_{IN} = -5 / 15 \text{ V} \)
- \( I_C = 120 \text{ A} \)

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

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

With an inductive load at
- \( V_{CC} = 350 \text{ V} \)
- \( V_{IN} = -5 / 15 \text{ V} \)
- \( R_{gon} = 4 \Omega \)

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

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

With an inductive load at
- \( V_{CC} = 350 \text{ V} \)
- \( V_{IN} = -5 / 15 \text{ V} \)
- \( I_C = 120 \text{ A} \)
Buck Switching Characteristics

Figure 13. FWD
Typical rate of fall of forward and reverse recovery current as a function of collector current
\[ \frac{dV}{dt}, \frac{dV_t}{dt} = f(I_C) \]

With an inductive load at
- \( V_{CE} = 350 \text{ V} \)
- \( T_J = 25 \text{ °C} \)
- \( V_{IN} = -5 / 15 \text{ V} \)
- \( R_{gon} = 4 \text{ Ω} \)

Figure 14. FWD
Typical rate of fall of forward and reverse recovery current as a function of IGBT turn on gate resistor
\[ \frac{dV}{dt}, \frac{dV_t}{dt} = f(R_{gon}) \]

With an inductive load at
- \( V_{CE} = 350 \text{ V} \)
- \( T_J = 25 \text{ °C} \)
- \( V_{IN} = -5 / 15 \text{ V} \)
- \( I_C = 120 \text{ A} \)

Figure 15. IGBT
Reverse bias safe operating area

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

At
- \( T_J = 125 \text{ °C} \)
- \( R_{pm} = 4 \text{ Ω} \)
- \( R_{goff} = 4 \text{ Ω} \)
## Buck Switching Definitions

### General conditions

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$T_1$</td>
<td>125 °C</td>
</tr>
<tr>
<td>$R_{son}$</td>
<td>4 Ω</td>
</tr>
<tr>
<td>$R_{goff}$</td>
<td>4 Ω</td>
</tr>
</tbody>
</table>

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

- **$V_{CE}$** (0%) = -5 V
- **$V_{CE}$** (100%) = 15 V
- **$I_C$** (100%) = 120 A
- $t_{Eoff}$ = 174 ns

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

- **$V_{CE}$** (100%) = 350 V
- **$V_{CE}$** (90%) = 350 V
- **$I_C$** (100%) = 120 A
- $t_{Eon}$ = 66 ns

### Switching characteristics

<table>
<thead>
<tr>
<th>Condition</th>
<th>$V_{CE}$ (%)</th>
<th>$I_C$ (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1%</td>
<td>350 V</td>
<td>10%</td>
</tr>
<tr>
<td>90%</td>
<td>350 V</td>
<td>90%</td>
</tr>
<tr>
<td>60%</td>
<td>350 V</td>
<td>60%</td>
</tr>
<tr>
<td>40%</td>
<td>350 V</td>
<td>40%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Condition</th>
<th>$V_{CE}$ (%)</th>
<th>$I_C$ (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10%</td>
<td>350 V</td>
<td>10%</td>
</tr>
<tr>
<td>90%</td>
<td>350 V</td>
<td>90%</td>
</tr>
<tr>
<td>60%</td>
<td>350 V</td>
<td>60%</td>
</tr>
<tr>
<td>40%</td>
<td>350 V</td>
<td>40%</td>
</tr>
</tbody>
</table>

### Figures

- **Figure 1:** IGBT
- **Figure 2:** IGBT
- **Figure 3:** IGBT
- **Figure 4:** IGBT
Buck Switching Characteristics

Figure 5. Turn-off Switching Waveforms & definition of \( t_{Qr} \)

<table>
<thead>
<tr>
<th>%</th>
<th>( t_{tr} )</th>
<th>( t_{rr} )</th>
<th>( t_{t} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>33%</td>
<td>( V_F )</td>
<td>( I_F )</td>
<td>( I_r )</td>
</tr>
<tr>
<td>( V_F ) (100%)</td>
<td>350 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( I_F ) (100%)</td>
<td>120 A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( I_r ) (100%)</td>
<td>160 A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( t_{rr} )</td>
<td>91 ns</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 6. Turn-on Switching Waveforms & definition of \( t_{Qr} \) (integrating time for \( Q_r \))

<table>
<thead>
<tr>
<th>%</th>
<th>( t_{tr} )</th>
<th>( t_{rr} )</th>
<th>( t_{Qr} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>10%</td>
<td>( I_F )</td>
<td>( Q_r )</td>
<td>( t_{Qr} )</td>
</tr>
<tr>
<td>( I_F ) (100%)</td>
<td>120 A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( Q_r ) (100%)</td>
<td>9.11 ( \mu )C</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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

- \( V_{CC} = 350 \text{ V} \)
- \( V_{CC} = -5 / 15 \text{ V} \)
- \( R_{gon} = 4 \text{ } \Omega \)
- \( I_C = 120 \text{ A} \)

**Figure 2.** IGBT

Typical switching energy losses as a function of gate resistor

\[ E = f(R_g) \]

With an inductive load at

- \( V_{CC} = 350 \text{ V} \)
- \( V_{CC} = -5 / 15 \text{ V} \)
- \( I_C = 120 \text{ A} \)

**Figure 3.** FWD

Typical reverse recovered energy loss as a function of collector current

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

With an inductive load at

- \( V_{CC} = 350 \text{ V} \)
- \( V_{CC} = -5 / 15 \text{ V} \)
- \( R_{gon} = 4 \text{ } \Omega \)

**Figure 4.** FWD

Typical reverse recovered energy loss as a function of gate resistor

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

With an inductive load at

- \( V_{CC} = 350 \text{ V} \)
- \( V_{CC} = -5 / 15 \text{ V} \)
- \( I_C = 120 \text{ A} \)
Boost Switching Characteristics

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

\[ t = f(I_C) \]

- With an inductive load at
  - \( T_J = 125 \, ^\circ C \)
  - \( V_{CE} = 350 \, V \)
  - \( V_{GSS} = -5 / 15 \, V \)
  - \( R_{gon} = 4 \, \Omega \)
  - \( I_C = 120 \, A \)

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

\[ t = f(R_g) \]

- With an inductive load at
  - \( T_J = 125 \, ^\circ C \)
  - \( V_{CE} = 350 \, V \)
  - \( V_{GSS} = -5 / 15 \, V \)
  - \( I_C = 120 \, A \)

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

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

- With an inductive load at
  - \( T_J = 25 \, ^\circ C \)
  - \( V_{CE} = 350 \, V \)
  - \( V_{GSS} = -5 / 15 \, V \)
  - \( R_{gon} = 4 \, \Omega \)

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

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

- With an inductive load at
  - \( T_J = 25 \, ^\circ C \)
  - \( V_{CE} = 350 \, V \)
  - \( V_{GSS} = -5 / 15 \, V \)
  - \( I_C = 120 \, A \)
Boostr Switching Characteristics

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

![Graph showing Qr as a function of IC with IC values on the x-axis and Qr values on the y-axis.]

With an inductive load at
- Vcc = 350 V
- VCE = -5/15 V
- Rgon = 4 Ω

At 25 °C

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

![Graph showing Qr as a function of Rgon with Rgon values on the x-axis and Qr values on the y-axis.]

With an inductive load at
- Vcc = 350 V
- VCE = -5/15 V
- Ic = 120 A

At 25 °C

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

![Graph showing IrM as a function of IC with IC values on the x-axis and IrM values on the y-axis.]

With an inductive load at
- Vcc = 350 V
- VCE = -5/15 V
- Rgon = 4 Ω

At 25 °C

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

![Graph showing IrM as a function of Rgon with Rgon values on the x-axis and IrM values on the y-axis.]

With an inductive load at
- Vcc = 350 V
- VCE = -5/15 V
- Ic = 120 A

At 25 °C
Boost Switching Characteristics

**Figure 13.** FWD

Typical rate of fall of forward and reverse recovery current as a function of collector current

$$\frac{d}{dt}I_F, \frac{d}{dt}I_{Rr} = f(I_C)$$

With an inductive load at $V_{CE}=350\,V$, $T_j=25\,C$

$V_{Gm}=\pm 5 / 15\,V$

$R_{gon}=4\,\Omega$

**Figure 14.** FWD

Typical rate of fall of forward and reverse recovery current as a function of IGBT turn on gate resistor

$$\frac{d}{dt}I_F, \frac{d}{dt}I_{Rr} = f(R_{gon})$$

With an inductive load at $V_{CE}=350\,V$, $T_j=125\,C$

$V_{Gm}=\pm 5 / 15\,V$

$I_C=120\,A$

**Figure 15.** IGBT

Reverse bias safe operating area

$I_c=f(V_{CE})$

$T_j=125\,C$

$R_{gm}=4\,\Omega$

$R_{goff}=4\,\Omega$
Boost Switching Definitions

General conditions

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<td>$R_{off}$</td>
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**Figure 1:**
Turn-off Switching Waveforms & definition of $t_{doff}$, $t_{Eoff}$ ($t_{Eoff}$ is integrating time for $E_{off}$).

- $V_{GE}(0\%) = -5$ V
- $V_{CE}(0\%) = 15$ V
- $I_C(100\%) = 120$ A
- $t_{doff} = 171$ ns

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

- $V_{GE}(100\%) = 15$ V
- $V_{CE}(100\%) = 350$ V
- $I_C(10\%) = 120$ A
- $t_{don} = 62$ ns

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

- $V_{CE}(1\%) = 350$ V
- $I_C(10\%) = 120$ A
- $t_f = 12$ ns

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

- $V_{CE}(1\%) = 350$ V
- $I_C(10\%) = 120$ A
- $t_r = 14$ ns
Boost Switching Characteristics

Figure 5. Turn-off Switching Waveforms & definition of $t_{rr}$

- $V_F(100\%) = 350\ V$
- $I_F(100\%) = 120\ A$
- $I_{Fmax}(100\%) = 129\ A$
- $t_{rr} = 103\ \text{ns}$

Figure 6. Turn-on Switching Waveforms & definition of $Q_r$ ($t_{Qr}$ = integrating time for $Q_r$)

- $I_r(100\%) = 120\ A$
- $Q_r(100\%) = 9,16\ \mu\text{C}$
10-FY07NPA200SM02-L366F08 / 10-PY07NPA200SM02-L366F08Y datasheet

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Handling instruction

Handling instructions for if no series packaging available packages see vincotech.com website.

Package data

Package data for if no series packaging available 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.

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