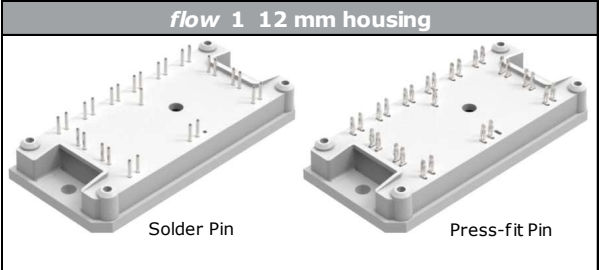
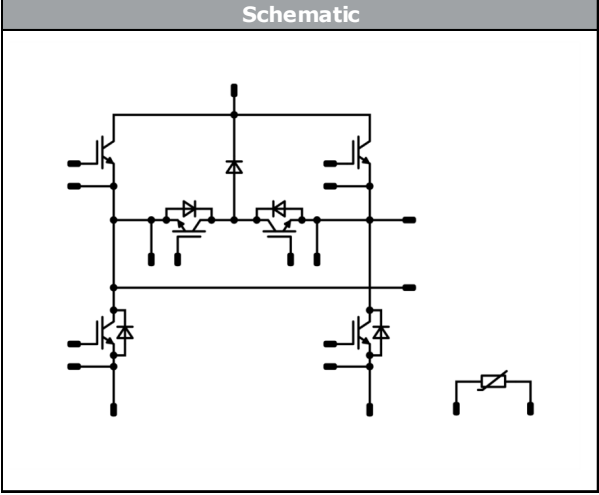




Vincotech

| <i>flow</i> PACK 1 H6.5 | 650 V / 100 A |
|---|---|
| <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p style="text-align: center; margin: 0;">Features</p> <ul style="list-style-type: none"> For one-phase solar applications Innovative H6.5 topology LVRT (Low voltage ride through) capability Fast IGBT S5 Chipset optimized for switching frequencies up to 25kHz NTC </div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p style="text-align: center; margin: 0;">Target applications</p> <ul style="list-style-type: none"> Solar Inverters Special Application </div> <div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center; margin: 0;">Types</p> <ul style="list-style-type: none"> 10-FY07HVA100S5-L986F08 10-PY07HVA100S5-L986F08Y </div> | <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p style="text-align: center; margin: 0;"><i>flow</i> 1 12 mm housing</p>  <p style="text-align: center; margin: 0;">Solder Pin Press-fit Pin</p> </div> <div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center; margin: 0;">Schematic</p>  </div> |

Maximum Ratings

$T_j = 25\text{ °C}$, unless otherwise specified

| Parameter | Symbol | Condition | Value | Unit |
|---|------------|---------------------------------------|-------|------|
| Low Buck Switch / High Buck Switch | | | | |
| Collector-emitter voltage | V_{CES} | | 650 | V |
| Collector current | I_C | $T_j = T_{jmax}$ $T_s = 80\text{ °C}$ | 82 | A |
| Repetitive peak collector current | I_{CRM} | t_p limited by T_{jmax} | 300 | A |
| Total power dissipation | P_{tot} | $T_j = T_{jmax}$ $T_s = 80\text{ °C}$ | 117 | W |
| Gate-emitter voltage | V_{GES} | | ±20 | V |
| Maximum junction temperature | T_{jmax} | | 175 | °C |



Maximum Ratings

$T_j = 25\text{ °C}$, unless otherwise specified

| Parameter | Symbol | Condition | Value | Unit |
|---|------------|---------------------------------------|-------|------|
| Buck Diode | | | | |
| Peak Repetitive Reverse Voltage | V_{RRM} | | 650 | V |
| Continuous (direct) forward current | I_F | $T_j = T_{jmax}$ $T_s = 80\text{ °C}$ | 55 | A |
| Repetitive peak forward current | I_{FRM} | T_j limited by T_{jmax} | 150 | A |
| Total power dissipation | P_{tot} | $T_j = T_{jmax}$ $T_s = 80\text{ °C}$ | 71 | W |
| Maximum Junction Temperature | T_{jmax} | | 175 | °C |
| Boost Switch | | | | |
| Collector-emitter voltage | V_{CES} | | 650 | V |
| Collector current | I_C | $T_j = T_{jmax}$ $T_s = 80\text{ °C}$ | 85 | A |
| Repetitive peak collector current | I_{CRM} | t_p limited by T_{jmax} | 225 | A |
| Total power dissipation | P_{tot} | $T_j = T_{jmax}$ $T_s = 80\text{ °C}$ | 95 | W |
| Gate-emitter voltage | V_{GES} | | ±20 | V |
| Maximum junction temperature | T_{jmax} | | 175 | °C |
| Low Boost Diode / High Boost Diode | | | | |
| Peak Repetitive Reverse Voltage | V_{RRM} | | 650 | V |
| Continuous (direct) forward current | I_F | $T_j = T_{jmax}$ $T_s = 80\text{ °C}$ | 55 | A |
| Repetitive peak forward current | I_{FRM} | T_j limited by T_{jmax} | 150 | A |
| Total power dissipation | P_{tot} | $T_j = T_{jmax}$ $T_s = 80\text{ °C}$ | 71 | W |
| Maximum Junction Temperature | T_{jmax} | | 175 | °C |



Maximum Ratings

$T_j = 25\text{ °C}$, unless otherwise specified

| Parameter | Symbol | Condition | Value | Unit |
|-----------|--------|-----------|-------|------|
|-----------|--------|-----------|-------|------|

Module Properties

Thermal Properties

| | | | | |
|---|-----------|--|-------------------------------|----|
| Storage temperature | T_{stg} | | -40...+125 | °C |
| Operation temperature under switching condition | T_{top} | | -40...(T _{max} - 25) | °C |

Isolation Properties

| | | | | |
|----------------------------|------------|-------------------------------------|-----------|----|
| Isolation voltage | V_{isol} | DC Test Voltage* $t_p = 2\text{ s}$ | 6000 | V |
| | | AC Voltage $t_p = 1\text{ min}$ | 2500 | V |
| Creepage distance | | | min. 12,7 | mm |
| Clearance | | Solder pin | 7,99 | mm |
| Clearance | | Press-fit pin | 8,3 | mm |
| Comparative Tracking Index | CTI | | > 200 | |

*100 % tested in production



Characteristic Values

| Parameter | Symbol | Conditions | | | | | Value | | | Unit |
|-----------|--------|--------------|--------------|--------------|-----------|------------|-------|-----|-----|------|
| | | V_{GS} [V] | V_{GE} [V] | V_{DS} [V] | I_D [A] | T_j [°C] | Min | Typ | Max | |

Low Buck Switch / High Buck Switch

Static

| Parameter | Symbol | $V_{GE} = V_{CE}$ | V_{GS} [V] | V_{CE} [V] | I_C [A] | T_j [°C] | Min | Typ | Max | Unit |
|--------------------------------------|--------------|-------------------|--------------|--------------|-----------|------------------|-----|----------------------|------|------|
| Gate-emitter threshold voltage | $V_{GE(th)}$ | | | | 0,001 | 25 | 3,2 | 4 | 4,8 | V |
| Collector-emitter saturation voltage | V_{CEsat} | | 15 | | 100 | 25 125 150 | | 1,39 1,48 1,51 | 1,75 | V |
| Collector-emitter cut-off current | I_{CES} | | 0 | 650 | | 25 | | | 100 | μA |
| Gate-emitter leakage current | I_{GES} | | 20 | 0 | | 25 | | | 200 | nA |
| Internal gate resistance | r_g | | | | | | | none | | Ω |
| Input capacitance | C_{ies} | | | | | | | 6200 | | pF |
| Output capacitance | C_{oes} | $f = 1$ MHz | 0 | 25 | | 25 | | 176 | | |
| Reverse transfer capacitance | C_{res} | | | | | | | 24 | | |
| Gate charge | Q_g | | 15 | 520 | 100 | 25 | | 240 | | nC |

Thermal

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|-------------------------------------|---------------|---|-----|-----|-----|----------|
| Thermal resistance junction to sink | $R_{th(j-s)}$ | phase-change material $\lambda = 3,4$ W/mK | | | | 0,81 K/W |

Dynamic

| Parameter | Symbol | $R_{goff} = 4$ Ω $R_{gon} = 4$ Ω | V_{GS} [V] | V_{CE} [V] | I_D [A] | T_j [°C] | Min | Typ | Max | Unit |
|-----------------------------|--------------|---|--------------|--------------|-----------|------------------|-----|-------------------------|-----|------|
| Turn-on delay time | $t_{d(on)}$ | | | | | 25 125 150 | | 45 42 44 | | ns |
| Rise time | t_r | | | | | 25 125 150 | | 12 11 13 | | |
| Turn-off delay time | $t_{d(off)}$ | | | | | 25 125 150 | | 117 131 133 | | |
| Fall time | t_f | | | | | 25 125 150 | | 14 21 27 | | |
| Turn-on energy (per pulse) | E_{on} | $Q_{tFWD} = 3,1$ μC $Q_{tFWD} = 5,6$ μC $Q_{tFWD} = 6,3$ μC | | | | 25 125 150 | | 1,058 1,741 1,487 | | mWs |
| Turn-off energy (per pulse) | E_{off} | | | | | 25 125 150 | | 0,655 1,119 1,544 | | |



Vincotech

10-FY07HVA100S5-L986F08
10-PY07HVA100S5-L986F08Y
 datasheet

Characteristic Values

| Parameter | Symbol | Conditions | | | | | Value | | | Unit |
|-----------|--------|--------------|--------------|-----------|------------|-----|-------|-----|--|------|
| | | V_{GE} [V] | V_{CE} [V] | I_C [A] | T_j [°C] | Min | Typ | Max | | |

Buck Diode

Static

| Parameter | Symbol | V_{GE} [V] | V_{CE} [V] | I_C [A] | T_j [°C] | Min | Typ | Max | Unit |
|-------------------------|--------|--------------|--------------|-----------|------------------|-----|----------------------|------|------|
| Forward voltage | V_F | | | 75 | 25 125 150 | | 1,53 1,49 1,47 | 1,92 | V |
| Reverse leakage current | I_r | | | 650 | 25 | | | 3,8 | μA |

Thermal

| Parameter | Symbol | Conditions | Value | Unit |
|-------------------------------------|---------------|---|-------|------|
| Thermal resistance junction to sink | $R_{th(j-s)}$ | phase-change material $\lambda = 3,4$ W/mK | 1,34 | K/W |

Dynamic

| Parameter | Symbol | V_{GE} [V] | V_{CE} [V] | I_C [A] | T_j [°C] | Value | Unit | |
|---------------------------------------|----------------------|---|--------------|-----------|------------------|-------------------------|-------------------------|----|
| Peak recovery current | I_{RRM} | | | | 25 125 150 | 93 141 142 | A | |
| Reverse recovery time | t_{rr} | | | | 25 125 150 | 56 93 98 | ns | |
| Recovered charge | Q_r | $di/dt = 6500$ A/μs $di/dt = 8158$ A/μs $di/dt = 8119$ A/μs | -5/15 | 350 | 106 | 25 125 150 | 3,115 5,594 6,286 | μC |
| Reverse recovered energy | E_{rec} | | | | 25 125 150 | 0,779 1,278 1,630 | mWs | |
| Peak rate of fall of recovery current | $(di_{rr}/dt)_{max}$ | | | | 25 125 150 | 1463 2593 2821 | A/μs | |



Characteristic Values

| Parameter | Symbol | Conditions | | | | | Value | | | Unit |
|-----------|--------|--------------|--------------|--------------|-----------|------------|-------|-----|-----|------|
| | | V_{GS} [V] | V_{GE} [V] | V_{DS} [V] | I_D [A] | T_j [°C] | Min | Typ | Max | |

Boost Switch

Static

| Parameter | Symbol | Conditions | V_{GS} [V] | V_{GE} [V] | V_{DS} [V] | I_D [A] | T_j [°C] | Min | Typ | Max | Unit |
|--------------------------------------|--------------|---------------------|--------------|--------------|--------------|-----------|------------------|-----|----------------------|------|------|
| Gate-emitter threshold voltage | $V_{GE(th)}$ | $V_{GE} = V_{CE}$ | | | | 0,001 | 25 | 4,2 | 5 | 5,8 | V |
| Collector-emitter saturation voltage | V_{CEsat} | | 15 | | | 75 | 25 125 150 | | 1,10 1,08 1,09 | 1,45 | V |
| Collector-emitter cut-off current | I_{CES} | | 0 | 650 | | | 25 | | | 40 | μA |
| Gate-emitter leakage current | I_{GES} | | 20 | 0 | | | 25 | | | 100 | nA |
| Internal gate resistance | r_g | | | | | | | | none | | Ω |
| Input capacitance | C_{ies} | $f = 1 \text{ MHz}$ | 0 | 25 | | | 25 | | 11625 | | pF |
| Reverse transfer capacitance | C_{res} | | | | | | | | 30 | | |

Thermal

| Parameter | Symbol | Conditions | V_{GS} [V] | V_{GE} [V] | V_{DS} [V] | I_D [A] | T_j [°C] | Min | Typ | Max | Unit |
|-------------------------------------|---------------|---|--------------|--------------|--------------|-----------|------------|-----|------|-----|------|
| Thermal resistance junction to sink | $R_{th(j-s)}$ | phase-change material $\lambda = 3,4 \text{ W/mK}$ | | | | | | | 1,00 | | K/W |

Dynamic

| Parameter | Symbol | Conditions | V_{GS} [V] | V_{GE} [V] | V_{DS} [V] | I_D [A] | T_j [°C] | Min | Typ | Max | Unit |
|-----------------------------|--------------|---|--------------|--------------|--------------|-----------|------------|-----|-----|-----|------|
| Turn-on delay time | $t_{d(on)}$ | $R_{gon} = 8 \Omega$ $R_{goff} = 8 \Omega$ | ±15 | 350 | 76 | | | 25 | 203 | | ns |
| Rise time | t_r | | | | | | | 125 | 206 | | |
| Turn-off delay time | $t_{d(off)}$ | | | | | | | 150 | 201 | | |
| Fall time | t_f | | | | | | | 25 | 12 | | |
| Turn-on energy (per pulse) | E_{on} | | | | | | | 125 | 13 | | |
| Turn-off energy (per pulse) | E_{off} | | | | | | | 150 | 13 | | |
| | | 25 | 240 | | | | | | | | |
| | | 125 | 270 | | | | | | | | |
| | | 150 | 262 | | | | | | | | |
| | | 25 | 79 | | | | | | | | |
| | | 125 | 221 | | | | | | | | |
| | | 150 | 282 | | | | | | | | |
| | | 25 | 1,017 | | | | | | | | |
| | | 125 | 0,973 | | | | | | | | |
| | | 150 | 0,498 | | | | | | | | |
| | | 25 | 3,000 | | | | | | | | |
| | | 125 | 4,345 | | | | | | | | |
| | | 150 | 5,018 | | | | | | | | |



Characteristic Values

| Parameter | Symbol | Conditions | | | | | Value | | | Unit |
|-----------|--------|--------------|--------------|-----------|------------|-----|-------|-----|--|------|
| | | V_{GE} [V] | V_{CE} [V] | I_C [A] | T_j [°C] | Min | Typ | Max | | |

Low Boost Diode / High Boost Diode

Static

| Parameter | Symbol | V_{GS} [V] | V_{DS} [V] | I_D [A] | I_F [A] | T_j [°C] | Min | Typ | Max | Unit |
|-------------------------|--------|--------------|--------------|-----------|-----------|------------------|-----|----------------------|------|------|
| Forward voltage | V_F | | | 75 | | 25 125 150 | | 1,53 1,49 1,47 | 1,92 | V |
| Reverse leakage current | I_r | | 650 | | | 25 | | | 3,8 | μA |

Thermal

| Parameter | Symbol | Conditions | Value | Unit |
|-------------------------------------|---------------|---|-------|------|
| Thermal resistance junction to sink | $R_{th(j-s)}$ | phase-change material $\lambda = 3,4$ W/mK | 1,34 | K/W |

Dynamic

| Parameter | Symbol | V_{GS} [V] | V_{DS} [V] | I_D [A] | I_F [A] | T_j [°C] | Min | Typ | Max | Unit |
|---------------------------------------|----------------------|--------------|--------------|-----------|-----------|------------------|------------------|-------------------------|-----|------|
| Peak recovery current | I_{RRM} | | | | | 25 125 150 | | 87 106 112 | | A |
| Reverse recovery time | t_{rr} | | | | | 25 125 150 | | 52 82 94 | | ns |
| Recovered charge | Q_r | | | ±15 | 350 | 76 | 25 125 150 | 2,413 4,386 5,234 | | μC |
| Reverse recovered energy | E_{rec} | | | | | | 25 125 150 | 0,449 1,038 1,265 | | mWs |
| Peak rate of fall of recovery current | $(di_{rr}/dt)_{max}$ | | | | | | 25 125 150 | 4168 1586 2135 | | A/μs |

Thermistor

| Parameter | Symbol | Value | Unit |
|----------------------------|----------------|-------|------|
| Rated resistance | R | 22 | kΩ |
| Deviation of R_{100} | $\Delta_{R/R}$ | -5 | % |
| Power dissipation | P | 5 | mW |
| Power dissipation constant | | 1,5 | mW/K |
| B-value | $B_{(25/50)}$ | 3962 | K |
| B-value | $B_{(25/100)}$ | 4000 | K |
| Vincotech NTC Reference | | I | |

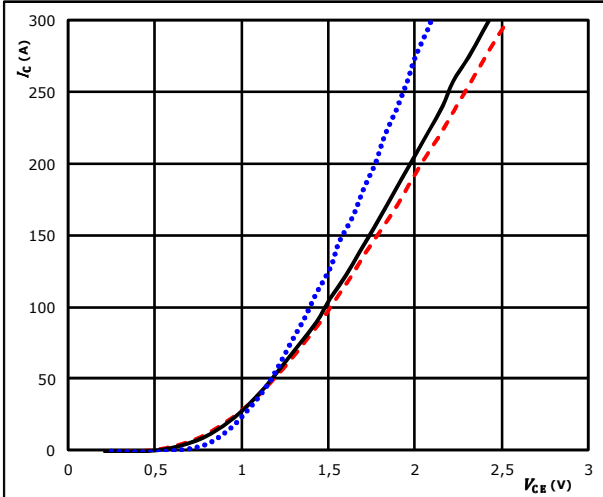


Low Buck Switch / High Buck Switch Characteristics

figure 1. IGBT

Typical output characteristics

$$I_C = f(V_{CE})$$

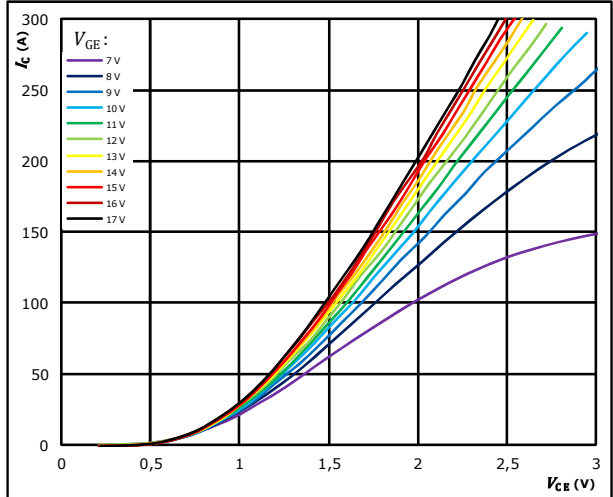


$t_p = 250 \mu s$ $T_j: 25 \text{ }^\circ C$
 $V_{GE} = 15 \text{ V}$ $T_j: 125 \text{ }^\circ C$ ———
 $T_j: 150 \text{ }^\circ C$ - - - - -

figure 2. IGBT

Typical output characteristics

$$I_C = f(V_{CE})$$

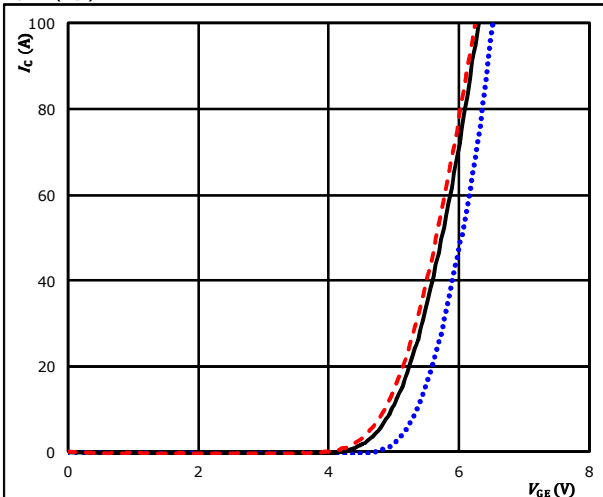


$t_p = 250 \mu s$
 $T_j = 150 \text{ }^\circ C$
 V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. IGBT

Typical transfer characteristics

$$I_C = f(V_{GE})$$

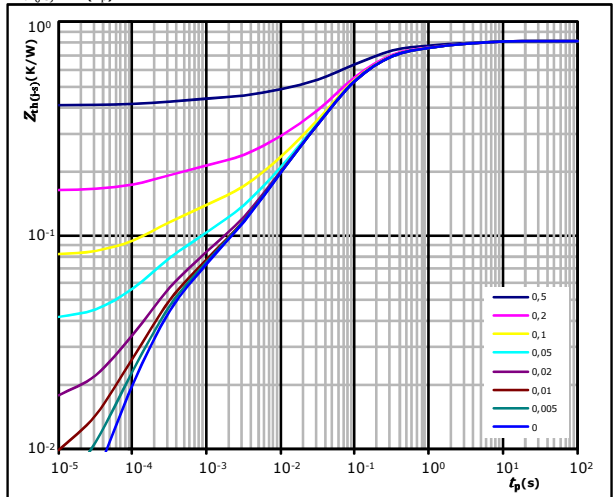


$t_p = 100 \mu s$ $T_j: 25 \text{ }^\circ C$
 $V_{CE} = 10 \text{ V}$ $T_j: 125 \text{ }^\circ C$ ———
 $T_j: 150 \text{ }^\circ C$ - - - - -

figure 4. IGBT

Transient thermal impedance as function of pulse duration

$$Z_{th(\theta-s)} = f(t_p)$$



$D = t_p / T$
 $R_{th(\theta-s)} = 0,81 \text{ K/W}$

IGBT thermal model values

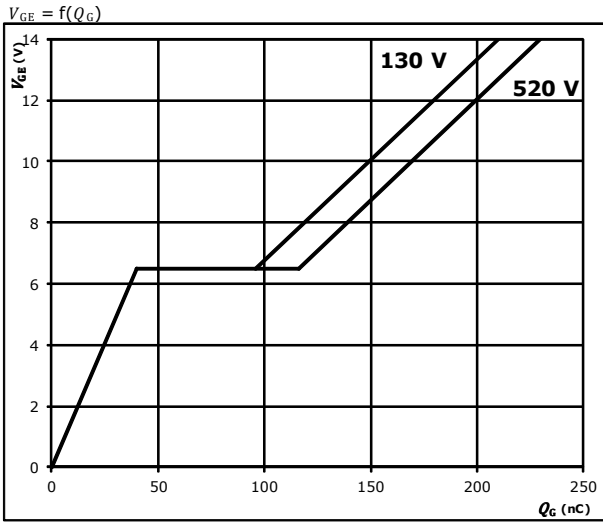
| R (K/W) | τ (s) |
|-----------|------------|
| 4,67E-02 | 3,86E+00 |
| 8,18E-02 | 7,09E-01 |
| 3,18E-01 | 1,25E-01 |
| 2,26E-01 | 4,22E-02 |
| 8,12E-02 | 5,84E-03 |
| 2,54E-02 | 5,78E-04 |
| 3,27E-02 | 1,79E-04 |



Low Buck Switch / High Buck Switch Characteristics

figure 5. IGBT

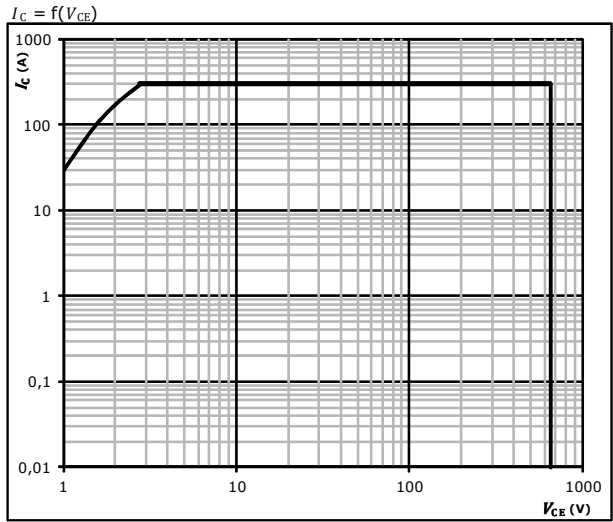
Gate voltage vs gate charge



$I_C = 100$ A

figure 6. IGBT

Safe operating area



$D =$ single pulse
 $T_s = 80$ °C
 $V_{GE} = \pm 15$ V
 $T_j = T_{jmax}$

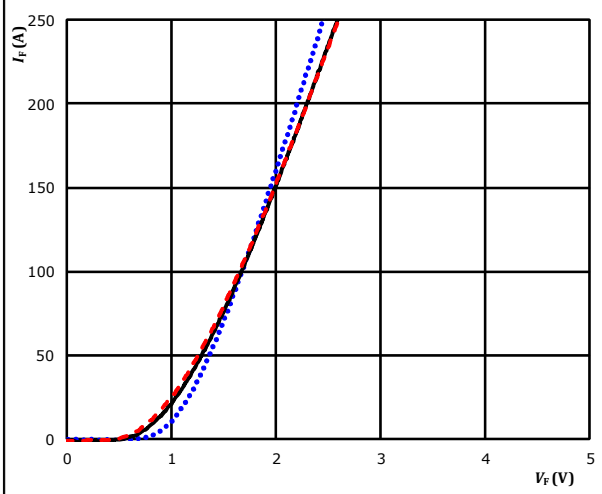


Buck Diode Characteristics

figure 1. FWD

Typical forward characteristics

$I_F = f(V_F)$



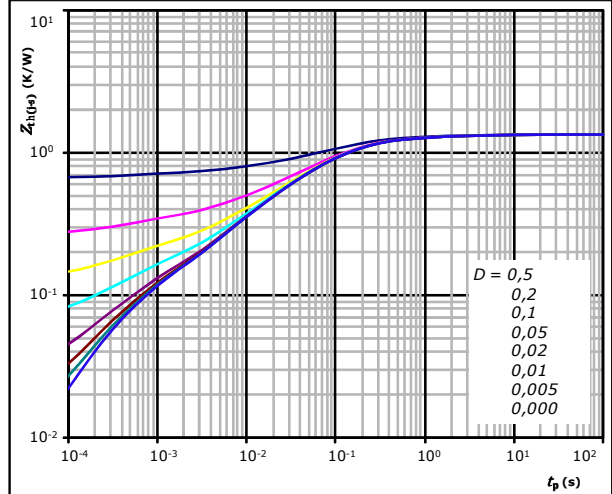
$t_p = 250 \mu s$

$T_j:$ 25 °C (blue dotted line)
 125 °C (black solid line)
 150 °C (red dashed line)

figure 2. FWD

Transient thermal impedance as a function of pulse width

$Z_{th(j-s)} = f(t_p)$



$D = t_p / T$

$R_{th(j-s)} = 1,34 \text{ K/W}$

FWD thermal model values

| R (K/W) | τ (s) |
|-----------|------------|
| 5,84E-02 | 3,64E+00 |
| 1,57E-01 | 5,25E-01 |
| 5,86E-01 | 1,06E-01 |
| 3,27E-01 | 2,57E-02 |
| 1,27E-01 | 4,84E-03 |
| 8,12E-02 | 4,11E-04 |

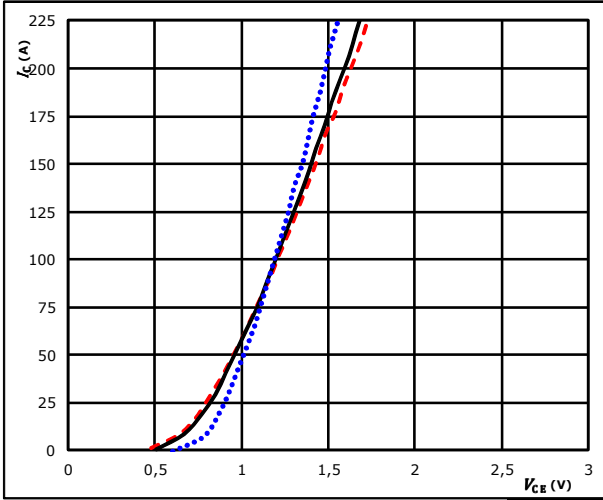


Boost Switch Characteristics

figure 1. IGBT

Typical output characteristics

$$I_C = f(V_{CE})$$

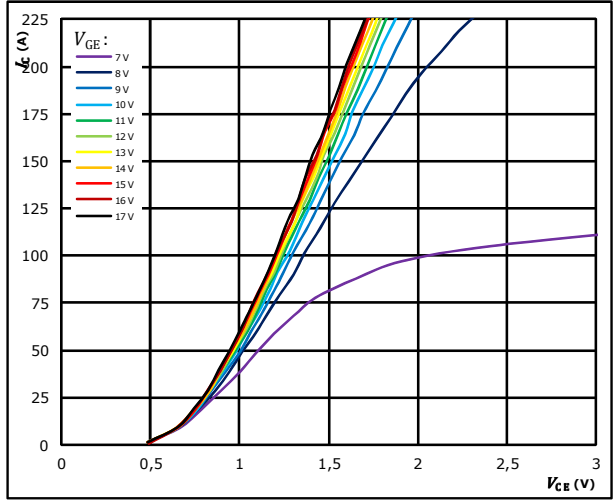


$t_p = 250 \mu s$ $T_j: 25 \text{ }^\circ C$
 $V_{GE} = 15 \text{ V}$ $T_j: 125 \text{ }^\circ C$ ———
 $T_j: 150 \text{ }^\circ C$ - - - - -

figure 2. IGBT

Typical output characteristics

$$I_C = f(V_{CE})$$

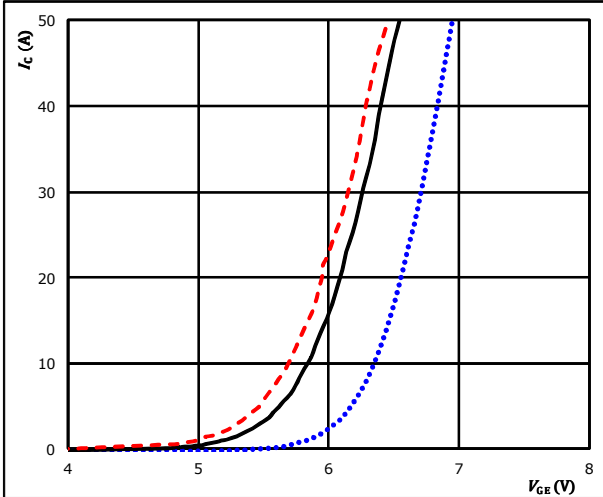


$t_p = 250 \mu s$
 $T_j = 150 \text{ }^\circ C$
 V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. IGBT

Typical transfer characteristics

$$I_C = f(V_{GE})$$

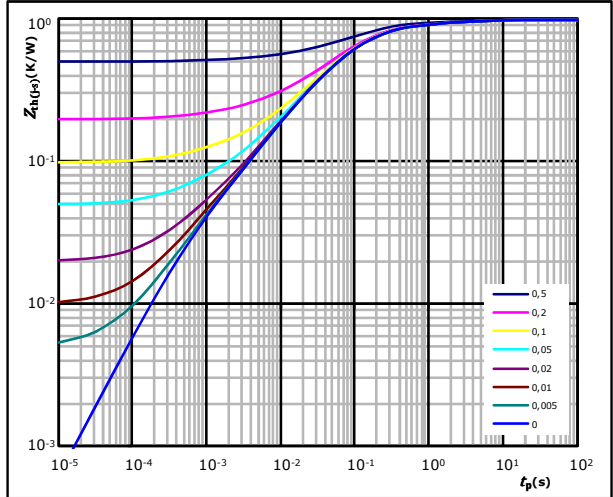


$t_p = 100 \mu s$ $T_j: 25 \text{ }^\circ C$
 $V_{CE} = 10 \text{ V}$ $T_j: 125 \text{ }^\circ C$ ———
 $T_j: 150 \text{ }^\circ C$ - - - - -

figure 4. IGBT

Transient thermal impedance as function of pulse duration

$$Z_{th(j-s)} = f(t_p)$$



$D = t_p / T$
 $R_{th(j-s)} = 1,00 \text{ K/W}$
 IGBT thermal model values

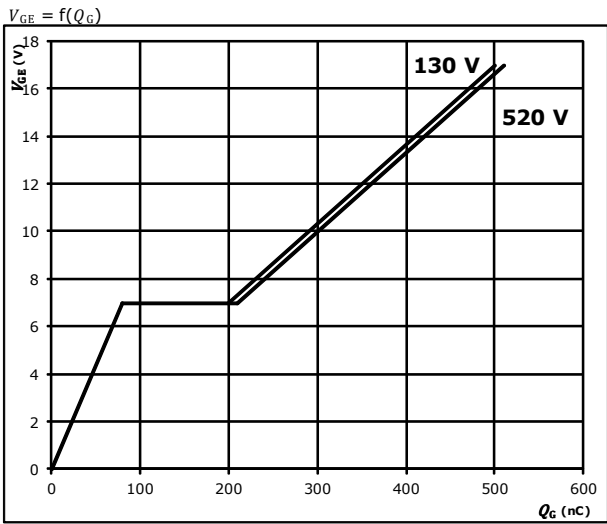
| R (K/W) | τ (s) |
|-----------|------------|
| 8,80E-02 | 2,68E+00 |
| 1,67E-01 | 3,70E-01 |
| 5,38E-01 | 8,09E-02 |
| 1,47E-01 | 1,56E-02 |
| 3,80E-02 | 3,42E-03 |
| 1,88E-02 | 5,45E-04 |



Boost Switch Characteristics

figure 5. IGBT

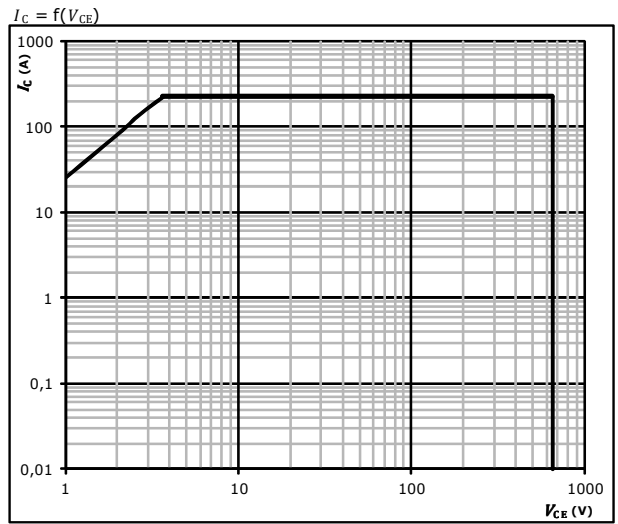
Gate voltage vs gate charge



$I_C = 75$ A

figure 6. IGBT

Safe operating area



$D =$ single pulse
 $T_s = 80$ °C
 $V_{GE} = \pm 15$ V
 $T_j = T_{jmax}$

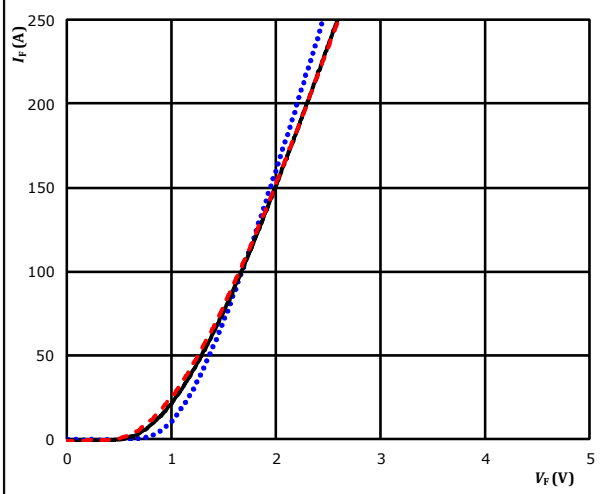


Low Boost Diode / High Boost Diode Characteristics

figure 1. FWD

Typical forward characteristics

$I_F = f(V_F)$

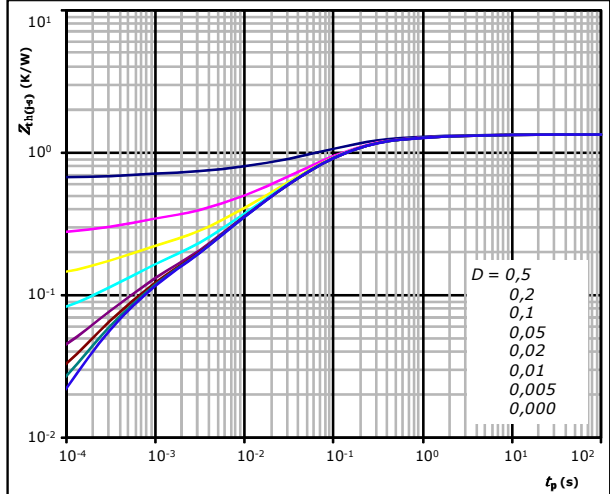


$t_p = 250 \mu s$
 T_j : 25 °C (blue dotted line)
 125 °C (black solid line)
 150 °C (red dashed line)

figure 2. FWD

Transient thermal impedance as a function of pulse width

$Z_{th(j-s)} = f(t_p)$



$D = t_p / T$
 $R_{th(j-s)} = 1,34 \text{ K/W}$

FWD thermal model values

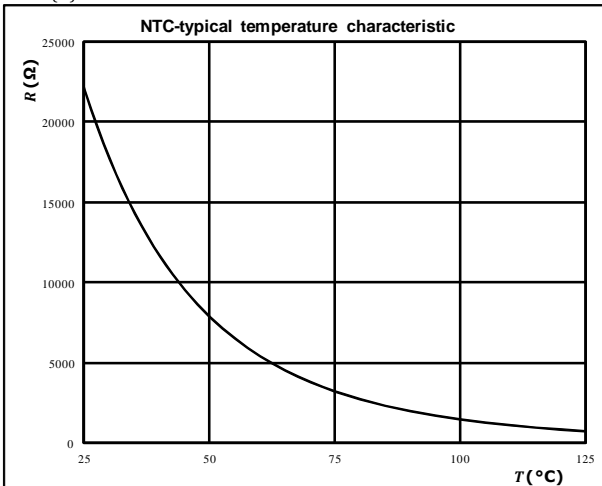
| R (K/W) | τ (s) |
|-----------|------------|
| 5,84E-02 | 3,64E+00 |
| 1,57E-01 | 5,25E-01 |
| 5,86E-01 | 1,06E-01 |
| 3,27E-01 | 2,57E-02 |
| 1,27E-01 | 4,84E-03 |
| 8,12E-02 | 4,11E-04 |

Thermistor Characteristics

figure 1. Thermistor

Typical NTC characteristic as a function of temperature

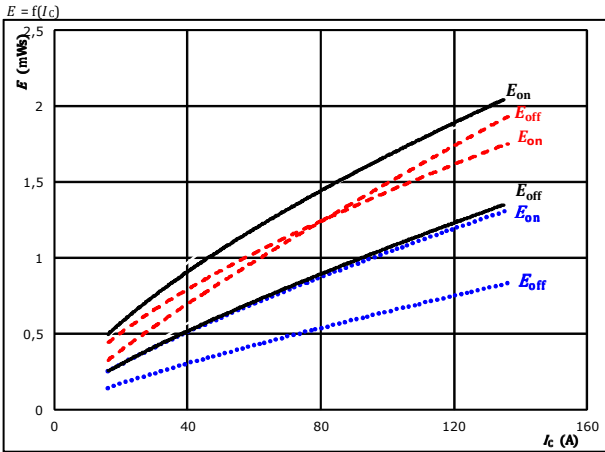
$R = f(T)$





Buck Switching Characteristics

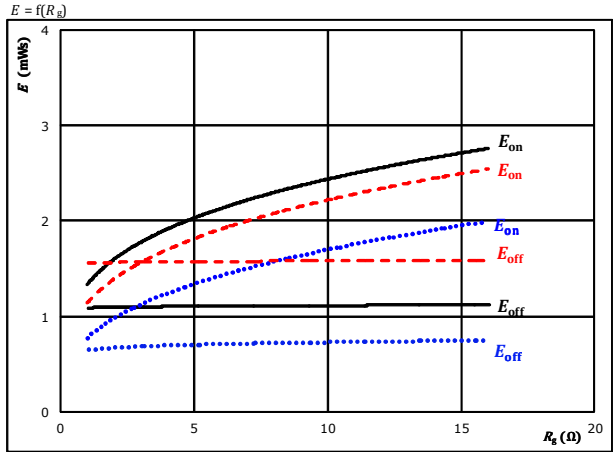
figure 1. IGBT
 Typical switching energy losses as a function of collector current



With an inductive load at
 $V_{CE} = 350$ V
 $V_{GE} = -5/15$ V
 $R_{gon} = 4$ Ω
 $R_{goff} = 4$ Ω

T_j : 25 °C (dotted), 125 °C (solid), 150 °C (dashed)

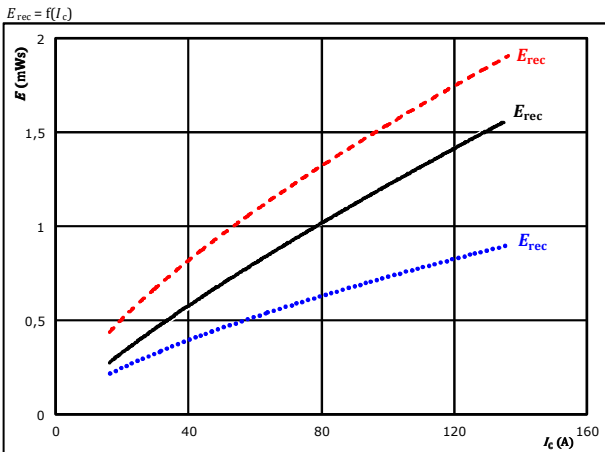
figure 2. IGBT
 Typical switching energy losses as a function of gate resistor



With an inductive load at
 $V_{CE} = 350$ V
 $V_{GE} = -5/15$ V
 $I_C = 106$ A

T_j : 25 °C (dotted), 125 °C (solid), 150 °C (dashed)

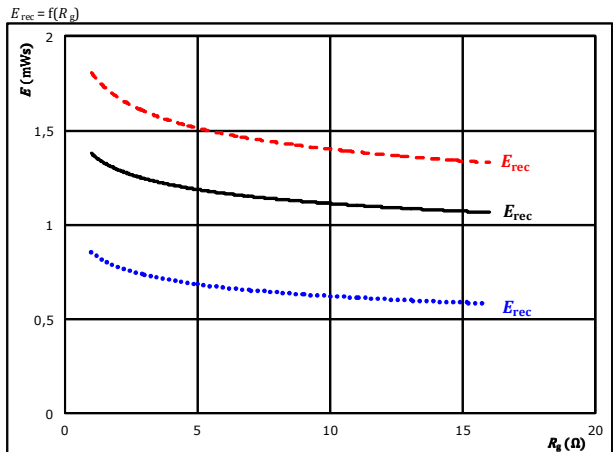
figure 3. FWD
 Typical reverse recovered energy loss as a function of collector current



With an inductive load at
 $V_{CE} = 350$ V
 $V_{GE} = -5/15$ V
 $R_{gon} = 4$ Ω

T_j : 25 °C (dotted), 125 °C (solid), 150 °C (dashed)

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



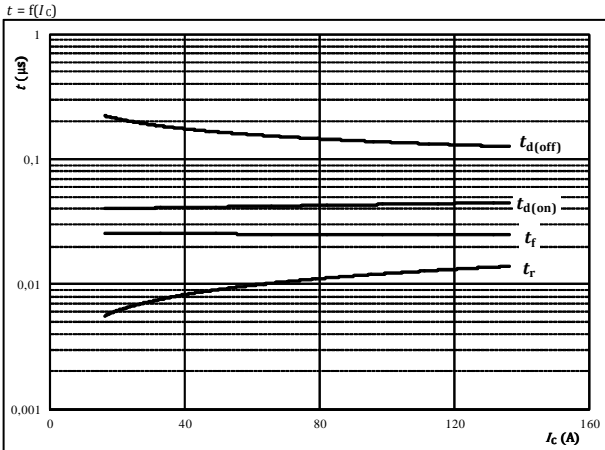
With an inductive load at
 $V_{CE} = 350$ V
 $V_{GE} = -5/15$ V
 $I_C = 106$ A

T_j : 25 °C (dotted), 125 °C (solid), 150 °C (dashed)



Buck Switching Characteristics

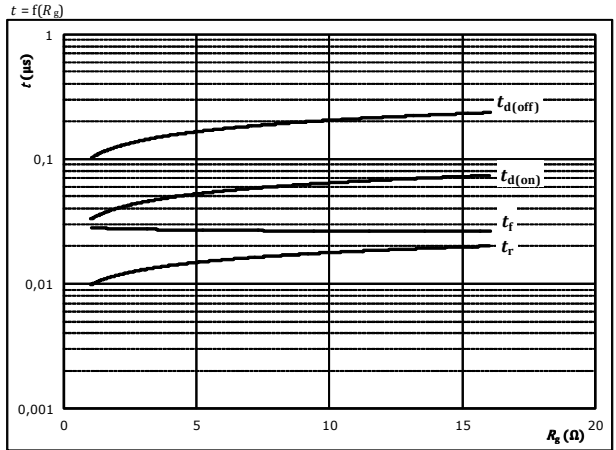
figure 5. IGBT
 Typical switching times as a function of collector current



With an inductive load at

$T_j = 150$ °C
 $V_{CE} = 350$ V
 $V_{GE} = -5/15$ V
 $R_{g(on)} = 4$ Ω
 $R_{g(off)} = 4$ Ω

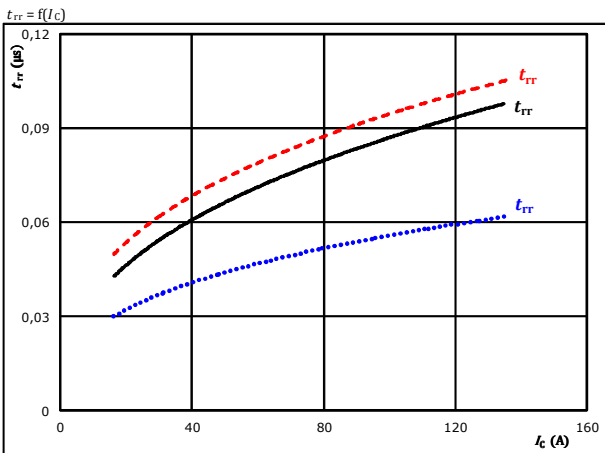
figure 6. IGBT
 Typical switching times as a function of gate resistor



With an inductive load at

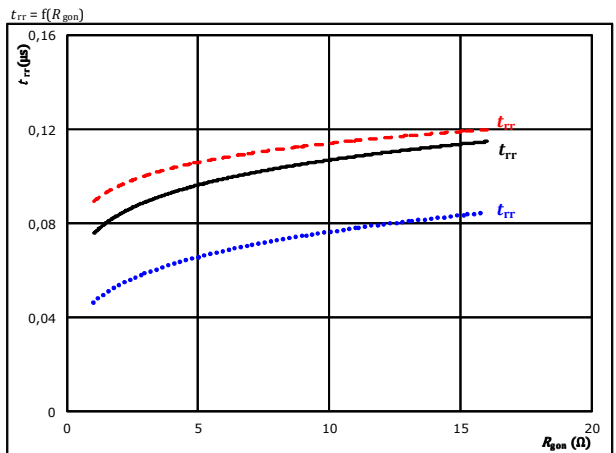
$T_j = 150$ °C
 $V_{CE} = 350$ V
 $V_{GE} = -5/15$ V
 $I_C = 106$ A

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



At $V_{CE} = 350$ V
 $V_{GE} = -5/15$ V
 $R_{g(on)} = 4$ Ω
 $T_j = 25$ °C (dotted blue line)
 $T_j = 125$ °C (solid black line)
 $T_j = 150$ °C (dashed red line)

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



At $V_{CE} = 350$ V
 $V_{GE} = -5/15$ V
 $I_C = 106$ A
 $T_j = 25$ °C (dotted blue line)
 $T_j = 125$ °C (solid black line)
 $T_j = 150$ °C (dashed red line)

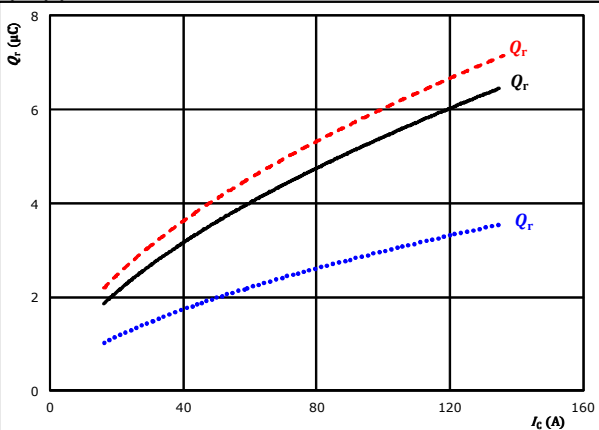


Buck Switching Characteristics

figure 9. FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_C)$$

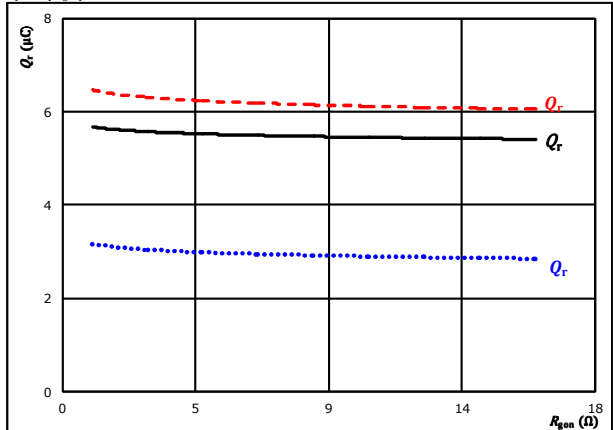


At $V_{CE} = 350$ V $T_j = 25$ °C
 $V_{GE} = -5/15$ V $T_j = 125$ °C ———
 $R_{gpn} = 4$ Ω $T_j = 150$ °C - - - - -

figure 10. FWD

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

$$Q_r = f(R_{gpn})$$

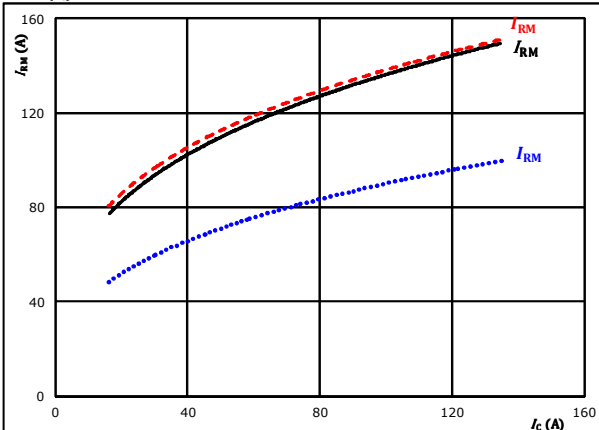


At $V_{CE} = 350$ V $T_j = 25$ °C
 $V_{GE} = -5/15$ V $T_j = 125$ °C ———
 $I_C = 106$ A $T_j = 150$ °C - - - - -

figure 11. FWD

Typical peak reverse recovery current as a function of collector current

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

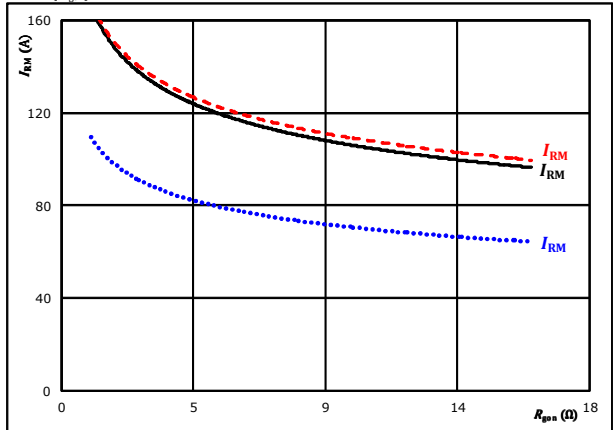


At $V_{CE} = 350$ V $T_j = 25$ °C
 $V_{GE} = -5/15$ V $T_j = 125$ °C ———
 $R_{gpn} = 4$ Ω $T_j = 150$ °C - - - - -

figure 12. FWD

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

$$I_{RM} = f(R_{gpn})$$



At $V_{CE} = 350$ V $T_j = 25$ °C
 $V_{GE} = -5/15$ V $T_j = 125$ °C ———
 $I_C = 106$ A $T_j = 150$ °C - - - - -



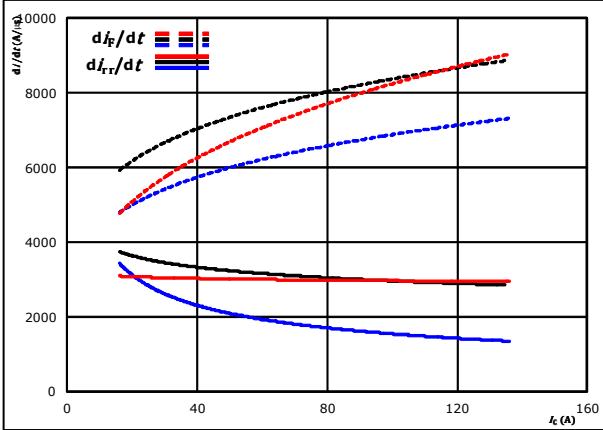
Vincotech

10-FY07HVA100S5-L986F08
10-PY07HVA100S5-L986F08Y
 datasheet

Buck Switching Characteristics

figure 13. FWD

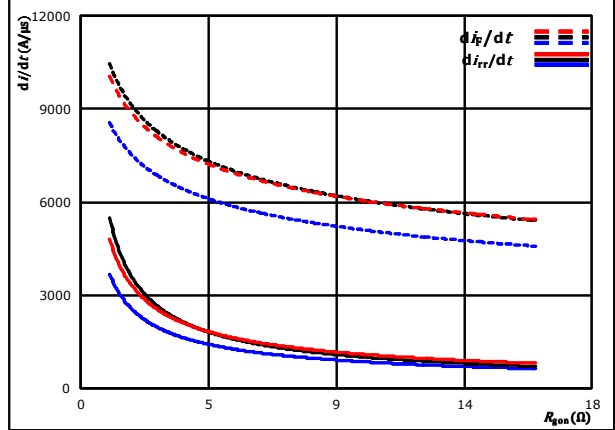
Typical rate of fall of forward and reverse recovery current as a function of collector current
 $di_F/dt, di_{rr}/dt = f(I_C)$



At $V_{CE} = 350$ V $T_j = 25$ °C
 $V_{CE} = -5/15$ V $T_j = 125$ °C ———
 $R_{g0n} = 4$ Ω $T_j = 150$ °C - - - - -

figure 14. FWD

Typical rate of fall of forward and reverse recovery current as a function of IGBT turn on gate resistor
 $di_F/dt, di_{rr}/dt = f(R_{g0n})$

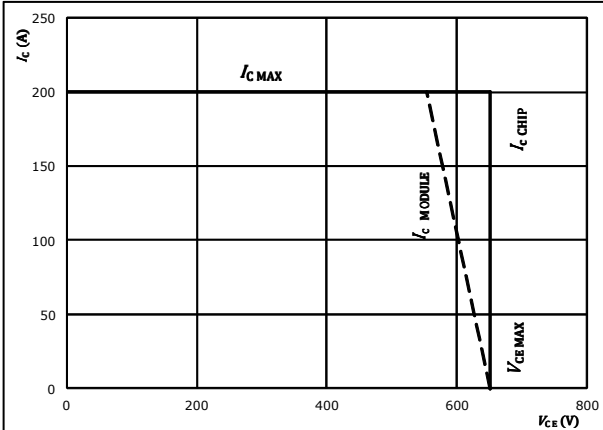


At $V_{CE} = 350$ V $T_j = 25$ °C
 $V_{CE} = -5/15$ V $T_j = 125$ °C ———
 $I_C = 106$ A $T_j = 150$ °C - - - - -

figure 15. IGBT

Reverse bias safe operating area

$I_C = f(V_{CE})$



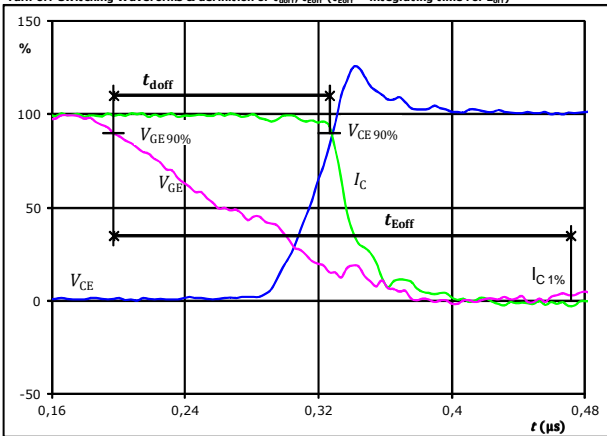
At $T_j = 175$ °C
 $R_{g0n} = 4$ Ω
 $R_{g0ff} = 4$ Ω



Buck Switching Definitions

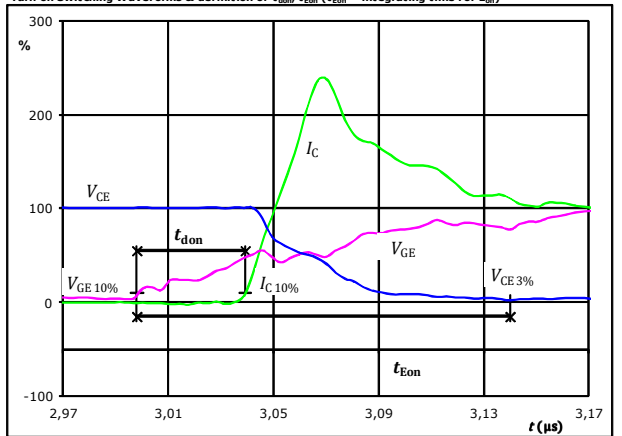
| General conditions | |
|--------------------|--------------|
| T_j | = 125 °C |
| R_{gon} | = 4 Ω |
| R_{goff} | = 4 Ω |

figure 1. IGBT
 Turn-off Switching Waveforms & definition of t_{doff} , t_{Eoff} (t_{Eoff} = integrating time for E_{off})



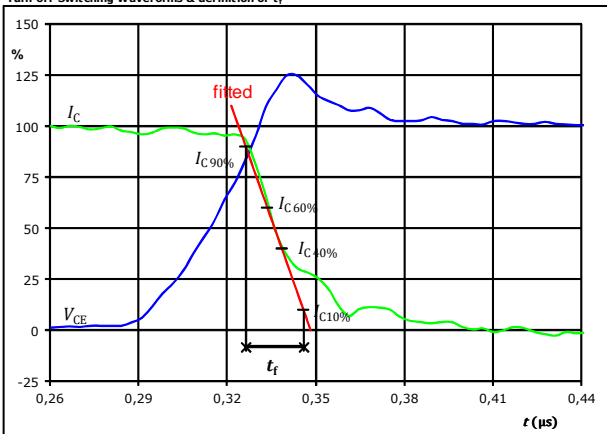
| | | |
|-------------------|--------|---------|
| $V_{GE}(0\%) =$ | -5 | V |
| $V_{GE}(100\%) =$ | 15 | V |
| $V_C(100\%) =$ | 350 | V |
| $I_C(100\%) =$ | 107 | A |
| $t_{doff} =$ | -0,697 | μ s |
| $t_{Eoff} =$ | 0,274 | μ s |

figure 2. IGBT
 Turn-on Switching Waveforms & definition of t_{don} , t_{Eon} (t_{Eon} = integrating time for E_{on})



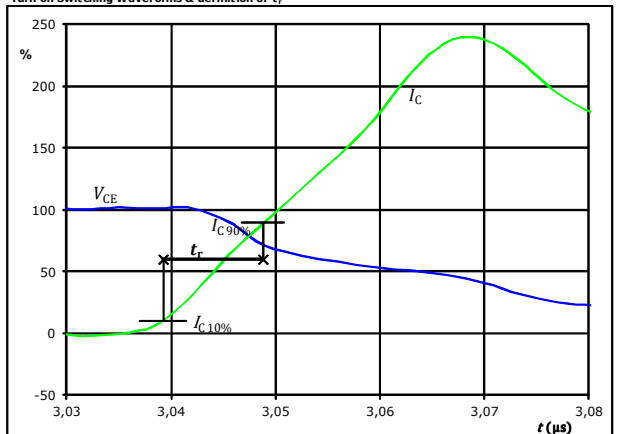
| | | |
|-------------------|-------|---------|
| $V_{GE}(0\%) =$ | -5 | V |
| $V_{GE}(100\%) =$ | 15 | V |
| $V_C(100\%) =$ | 350 | V |
| $I_C(100\%) =$ | 107 | A |
| $t_{don} =$ | 0,042 | μ s |
| $t_{Eon} =$ | 0,142 | μ s |

figure 3. IGBT
 Turn-off Switching Waveforms & definition of t_f



| | | |
|----------------|-------|---------|
| $V_C(100\%) =$ | 350 | V |
| $I_C(100\%) =$ | 107 | A |
| $t_f =$ | 0,021 | μ s |

figure 4. IGBT
 Turn-on Switching Waveforms & definition of t_r



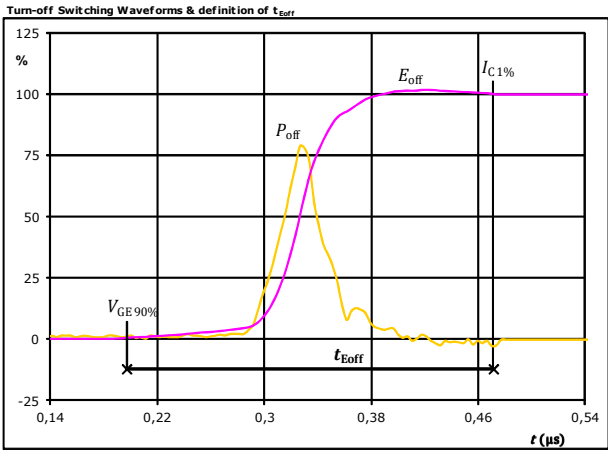
| | | |
|----------------|-------|---------|
| $V_C(100\%) =$ | 350 | V |
| $I_C(100\%) =$ | 107 | A |
| $t_r =$ | 0,011 | μ s |



Vincotech

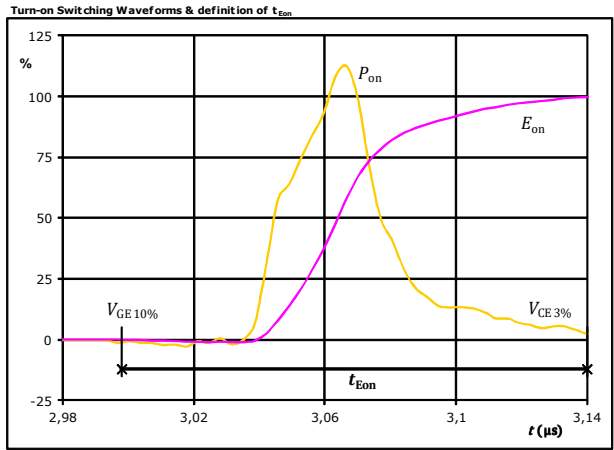
Buck Switching Characteristics

figure 5. IGBT



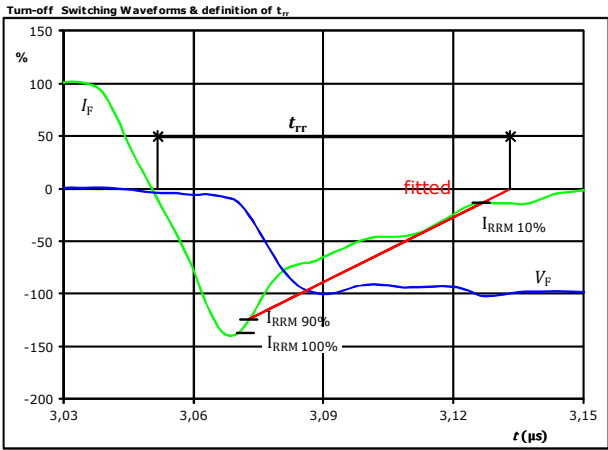
$P_{off}(100\%) = 37,35$ kW
 $E_{off}(100\%) = 1,12$ mJ
 $t_{Eoff} = 0,27$ μs

figure 6. IGBT



$P_{on}(100\%) = 37,35$ kW
 $E_{on}(100\%) = 0,22$ mJ
 $t_{Eon} = 0,14$ μs

figure 7. FWD

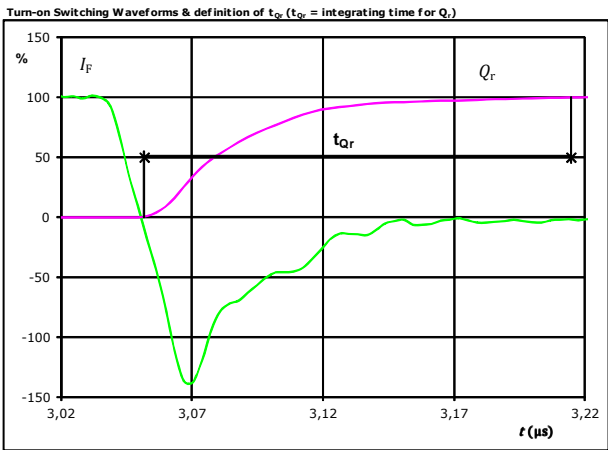


$V_F(100\%) = 350$ V
 $I_F(100\%) = 107$ A
 $I_{RRM}(100\%) = -141$ A
 $t_{rr} = 0,086$ μs



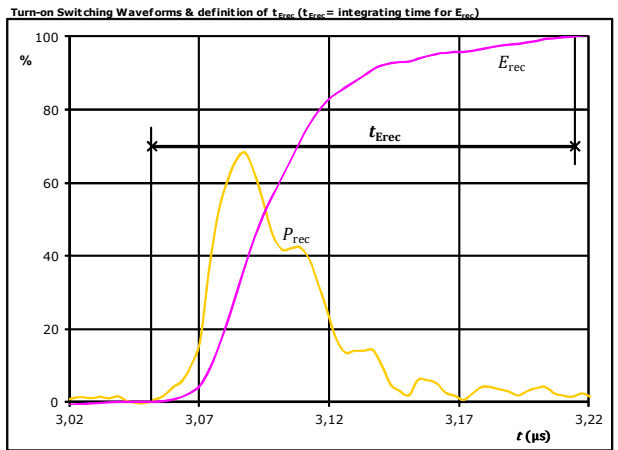
Buck Switching Characteristics

figure 8. FWD



I_F (100%) = 107 A
 Q_r (100%) = 5,56 μC
 t_{Qr} = 0,16 μs

figure 9. FWD

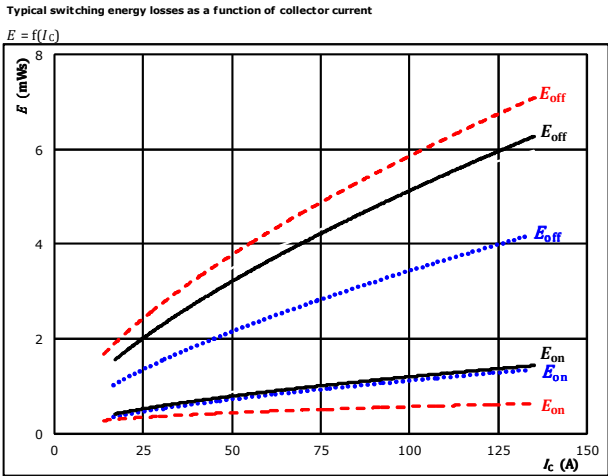


P_{rec} (100%) = 37,35 kW
 E_{rec} (100%) = -1,69 mJ
 t_{Erec} = 0,16 μs



Boost Switching Characteristics

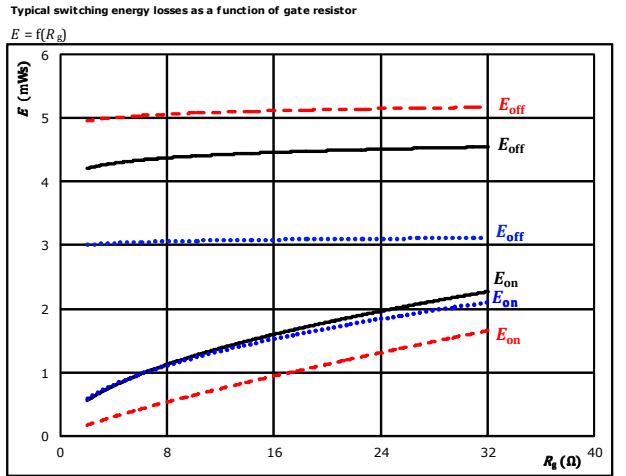
figure 1. IGBT



With an inductive load at

| | | |
|---------------------|--------------|---------|
| $V_{CE} = 350$ V | $T_j: 25$ °C | |
| $V_{GE} = \pm 15$ V | 125 °C | ———— |
| $R_{gon} = 8$ Ω | 150 °C | - - - - |
| $R_{goff} = 8$ Ω | | |

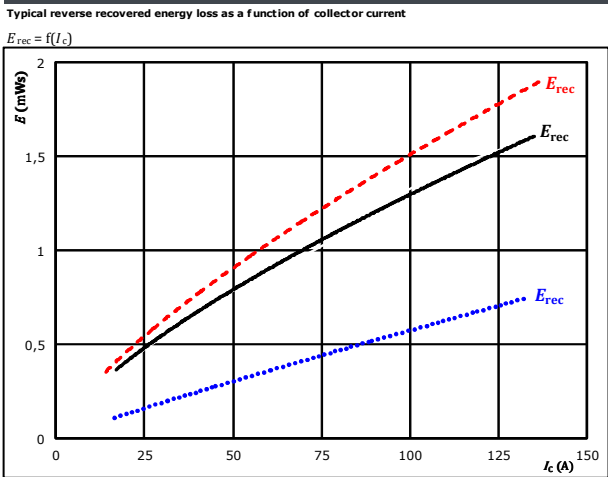
figure 2. IGBT



With an inductive load at

| | | |
|---------------------|--------------|---------|
| $V_{CE} = 350$ V | $T_j: 25$ °C | |
| $V_{GE} = \pm 15$ V | 125 °C | ———— |
| $I_C = 76$ A | 150 °C | - - - - |

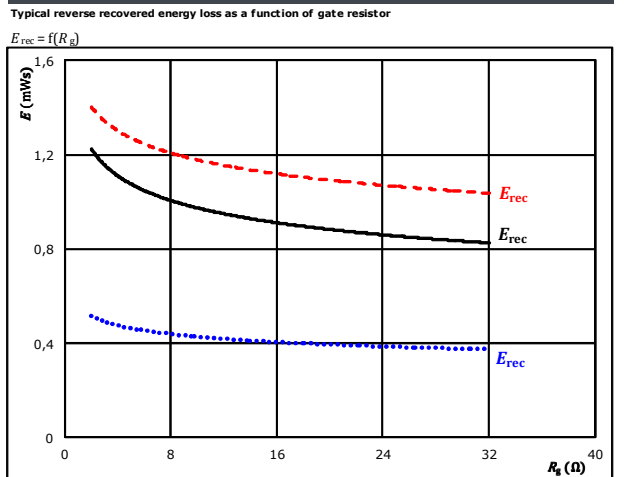
figure 3. FWD



With an inductive load at

| | | |
|---------------------|--------------|---------|
| $V_{CE} = 350$ V | $T_j: 25$ °C | |
| $V_{GE} = \pm 15$ V | 125 °C | ———— |
| $R_{gon} = 8$ Ω | 150 °C | - - - - |

figure 4. FWD



With an inductive load at

| | | |
|---------------------|--------------|---------|
| $V_{CE} = 350$ V | $T_j: 25$ °C | |
| $V_{GE} = \pm 15$ V | 125 °C | ———— |
| $I_C = 76$ A | 150 °C | - - - - |

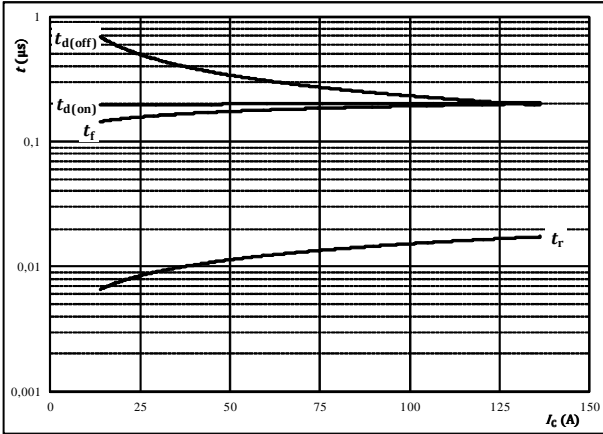


Boost Switching Characteristics

figure 5. IGBT

Typical switching times as a function of collector current

$$t = f(I_c)$$



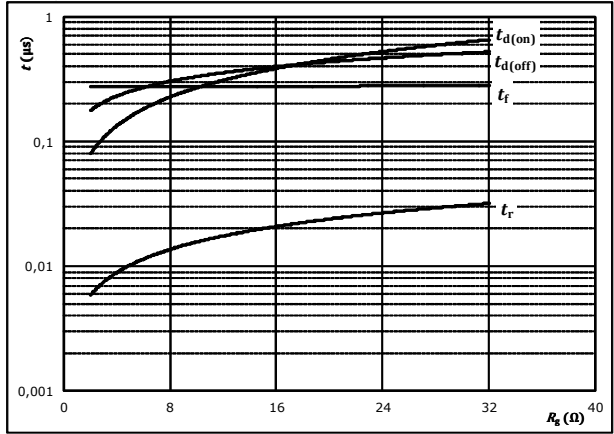
With an inductive load at

| | | |
|--------------|-----|----|
| $T_j =$ | 150 | °C |
| $V_{CE} =$ | 350 | V |
| $V_{GE} =$ | ±15 | V |
| $R_{gon} =$ | 8 | Ω |
| $R_{goff} =$ | 8 | Ω |

figure 6. IGBT

Typical switching times as a function of gate resistor

$$t = f(R_g)$$



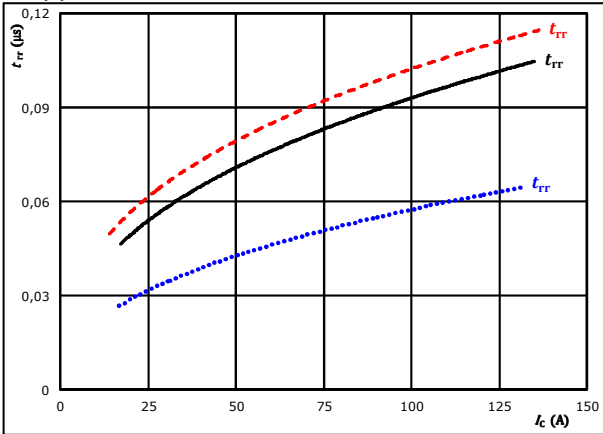
With an inductive load at

| | | |
|------------|-----|----|
| $T_j =$ | 150 | °C |
| $V_{CE} =$ | 350 | V |
| $V_{GE} =$ | ±15 | V |
| $I_c =$ | 76 | A |

figure 7. FWD

Typical reverse recovery time as a function of collector current

$$t_{rr} = f(I_c)$$

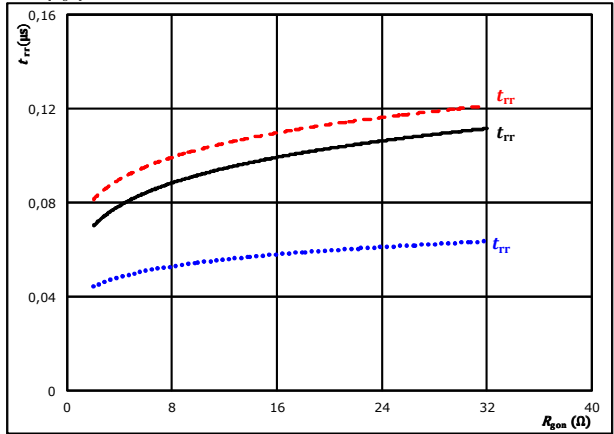


| | | | | | | |
|----|-------------|-----|---|--------|--------|-------|
| At | $V_{CE} =$ | 350 | V | $T_j:$ | 25 °C | |
| | $V_{GE} =$ | ±15 | V | | 125 °C | ———— |
| | $R_{gon} =$ | 8 | Ω | | 150 °C | ----- |

figure 8. FWD

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

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



| | | | | | | |
|----|------------|-----|---|--------|--------|-------|
| At | $V_{CE} =$ | 350 | V | $T_j:$ | 25 °C | |
| | $V_{GE} =$ | ±15 | V | | 125 °C | ———— |
| | $I_c =$ | 76 | A | | 150 °C | ----- |

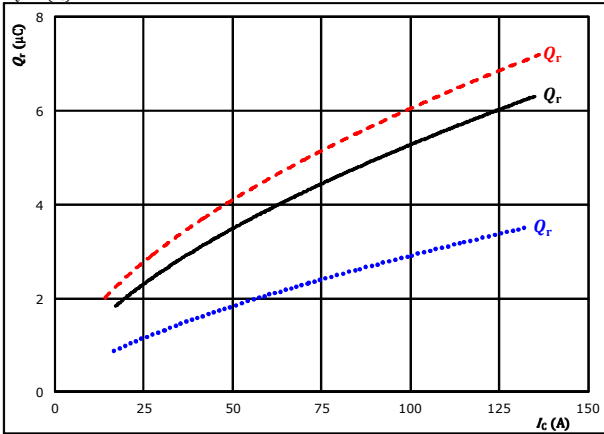


Boost Switching Characteristics

figure 9. FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$

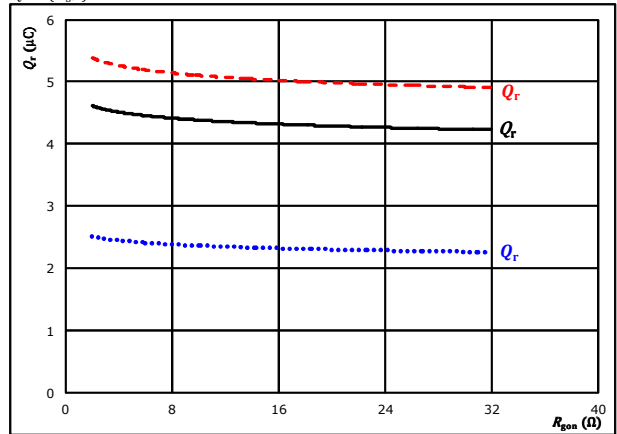


At $V_{CE} = 350$ V $T_j = 25$ °C
 $V_{GE} = \pm 15$ V $T_j = 125$ °C ———
 $R_{gpn} = 8$ Ω $T_j = 150$ °C - - - - -

figure 10. FWD

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

$$Q_r = f(R_{gpn})$$

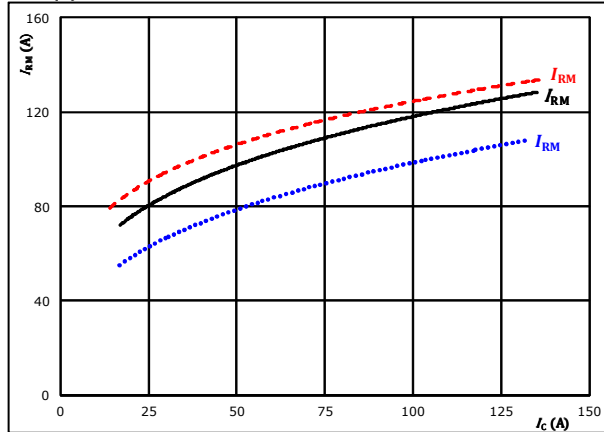


At $V_{CE} = 350$ V $T_j = 25$ °C
 $V_{GE} = \pm 15$ V $T_j = 125$ °C ———
 $I_c = 76$ A $T_j = 150$ °C - - - - -

figure 11. FWD

Typical peak reverse recovery current current as a function of collector current

$$I_{RM} = f(I_c)$$

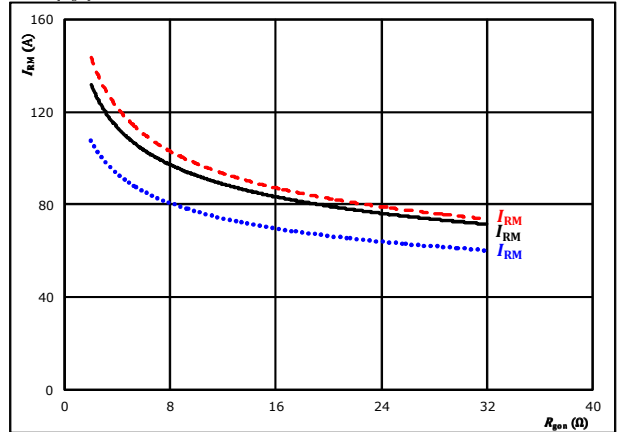


At $V_{CE} = 350$ V $T_j = 25$ °C
 $V_{GE} = \pm 15$ V $T_j = 125$ °C ———
 $R_{gpn} = 8$ Ω $T_j = 150$ °C - - - - -

figure 12. FWD

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

$$I_{RM} = f(R_{gpn})$$



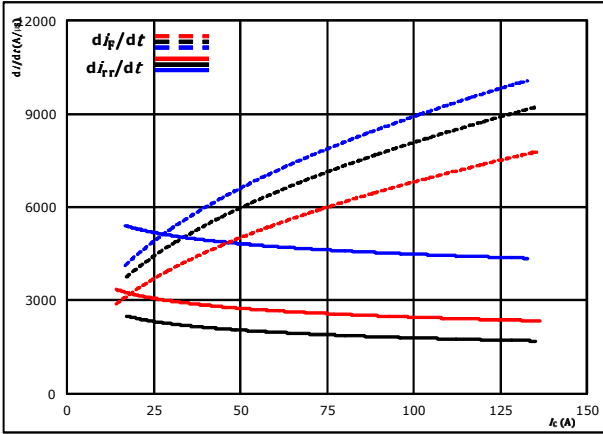
At $V_{CE} = 350$ V $T_j = 25$ °C
 $V_{GE} = \pm 15$ V $T_j = 125$ °C ———
 $I_c = 76$ A $T_j = 150$ °C - - - - -



Boost Switching Characteristics

figure 13. FWD

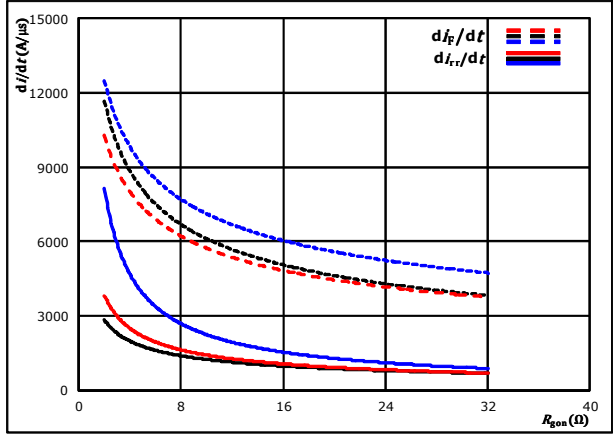
Typical rate of fall of forward and reverse recovery current as a function of collector current
 $di_f/dt, di_{rr}/dt = f(I_c)$



At $V_{CE} = 350$ V $T_j = 25$ °C
 $V_{GE} = \pm 15$ V $T_j = 125$ °C ———
 $R_{gpn} = 8$ Ω $T_j = 150$ °C - - - - -

figure 14. FWD

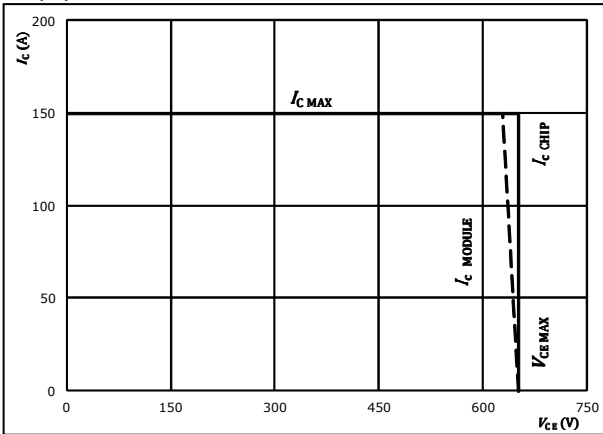
Typical rate of fall of forward and reverse recovery current as a function of IGBT turn on gate resistor
 $di_f/dt, di_{rr}/dt = f(R_{gpn})$



At $V_{CE} = 350$ V $T_j = 25$ °C
 $V_{GE} = \pm 15$ V $T_j = 125$ °C ———
 $I_c = 76$ A $T_j = 150$ °C - - - - -

figure 15. IGBT

Reverse bias safe operating area
 $I_c = f(V_{CB})$



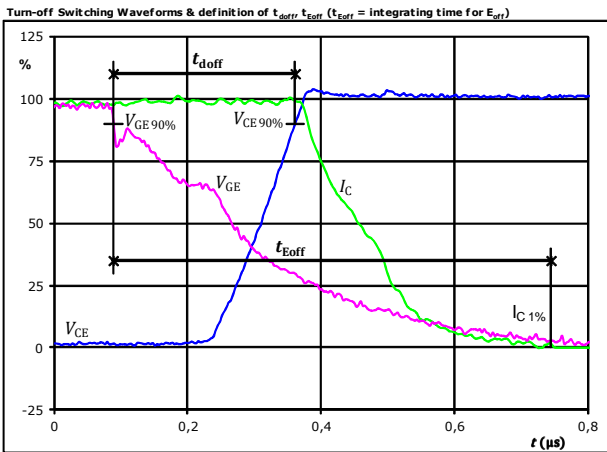
At $T_j = 175$ °C
 $R_{gpn} = 8$ Ω
 $R_{goff} = 8$ Ω



Boost Switching Definitions

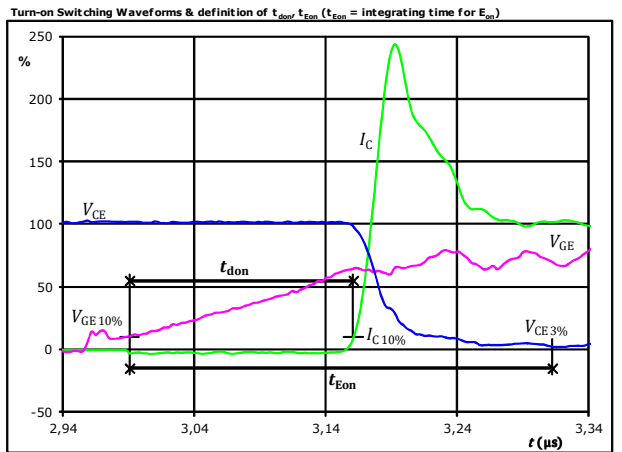
| General conditions | | |
|--------------------|---|--------|
| T_j | = | 125 °C |
| R_{gon} | = | 8 Ω |
| R_{goff} | = | 8 Ω |

figure 1. IGBT



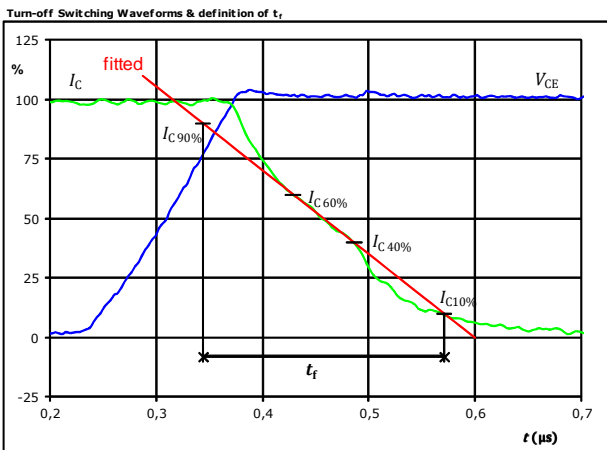
| | | |
|-------------------|-------|----|
| $V_{CE}(0\%) =$ | -15 | V |
| $V_{GE}(100\%) =$ | 15 | V |
| $V_C(100\%) =$ | 350 | V |
| $I_C(100\%) =$ | 76 | A |
| $t_{doff} =$ | 0,270 | µs |
| $t_{Eoff} =$ | 0,657 | µs |

figure 2. IGBT



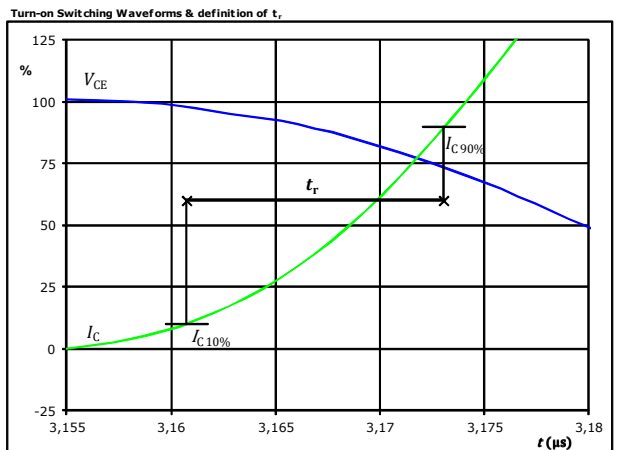
| | | |
|-------------------|-------|----|
| $V_{CE}(0\%) =$ | -15 | V |
| $V_{GE}(100\%) =$ | 15 | V |
| $V_C(100\%) =$ | 350 | V |
| $I_C(100\%) =$ | 76 | A |
| $t_{don} =$ | 0,206 | µs |
| $t_{Eon} =$ | 0,322 | µs |

figure 3. IGBT



| | | |
|----------------|-------|----|
| $V_C(100\%) =$ | 350 | V |
| $I_C(100\%) =$ | 76 | A |
| $t_f =$ | 0,221 | µs |

figure 4. IGBT



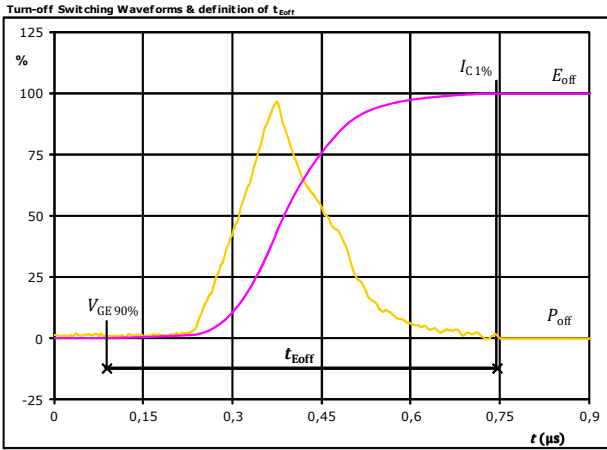
| | | |
|----------------|-------|----|
| $V_C(100\%) =$ | 350 | V |
| $I_C(100\%) =$ | 76 | A |
| $t_r =$ | 0,013 | µs |



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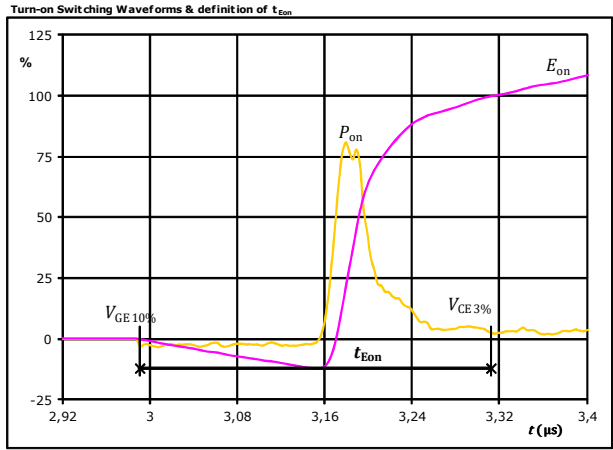
Boost Switching Characteristics

figure 5. IGBT



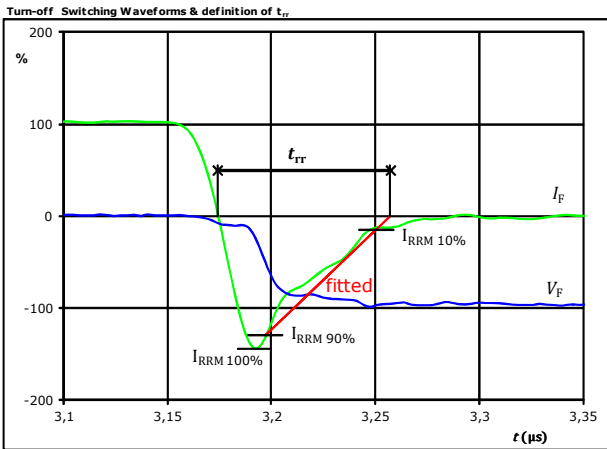
$P_{off}(100\%) = 26,62$ kW
 $E_{off}(100\%) = 4,35$ mJ
 $t_{Eoff} = 0,66$ µs

figure 6. IGBT



$P_{on}(100\%) = 26,62$ kW
 $E_{on}(100\%) = 0,97$ mJ
 $t_{Eon} = 0,32$ µs

figure 7. FWD



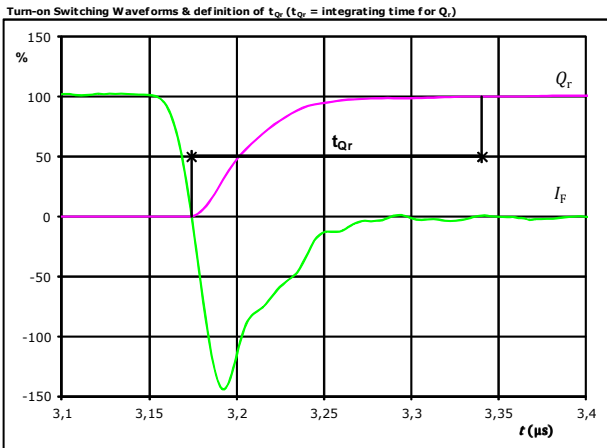
$V_F(100\%) = 350$ V
 $I_F(100\%) = 76$ A
 $I_{RRM}(100\%) = -106$ A
 $t_{rr} = 0,082$ µs



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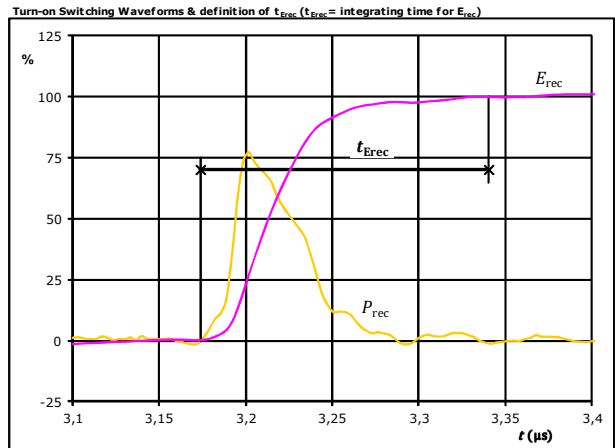
Boost Switching Characteristics

figure 8. FWD



| | | |
|----------------|------|---------------|
| I_F (100%) = | 76 | A |
| Q_r (100%) = | 4,39 | μC |
| t_{Qr} = | 0,17 | μs |

figure 9. FWD



| | | |
|--------------------|-------|---------------|
| P_{rec} (100%) = | 26,62 | kW |
| E_{rec} (100%) = | 1,04 | mJ |
| t_{Erec} = | 0,17 | μs |



10-FY07HVA100S5-L986F08
10-PY07HVA100S5-L986F08Y
 datasheet

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| Ordering Code & Marking | | | | | | |
|---|-------------------------|------------|--------------------------|-----------|------|--------|
| Version | | | Ordering Code | | | |
| without thermal paste 12 mm housing with solder pins | | | 10-FY07HVA100S5-L986F08 | | | |
| without thermal paste 12 mm housing with press-fit pins | | | 10-PY07HVA100S5-L986F08Y | | | |
| NN-NNNNNNNNNNNN TTTTIVV WYYY UL VIN LLLL SSSS | | | | | | |
| Text | Name | | Date code | UL & VIN | Lot | Serial |
| | NN-NNNNNNNNNNNN-TTTTIVV | | WYYY | UL VIN | LLLL | SSSS |
| Datamatrix | Type&Ver | Lot number | Serial | Date code | | |
| | TTTTTIVV | LLLL | SSSS | WYYY | | |

| Pin table | | | |
|-----------|---------------|------|----------|
| Pin | X | Y | Function |
| 1 | 52,2 | 0 | G14 |
| 2 | 49,2 | 0 | S14 |
| 3 | Not assembled | | |
| 4 | 26,1 | 0 | Therm2 |
| 5 | 23,1 | 0 | Therm1 |
| 6 | 3 | 0 | S12 |
| 7 | 0 | 0 | G12 |
| 8 | 0 | 8 | DC+ |
| 9 | 0 | 10,5 | DC+ |
| 10 | 0 | 17,7 | DC-1 |
| 11 | 0 | 20,2 | DC-1 |
| 12 | 0 | 28,2 | G11 |
| 13 | 3 | 28,2 | S11 |
| 14 | 10 | 28,2 | G21 |
| 15 | 13 | 28,2 | S21 |
| 16 | 20,35 | 28,2 | Ph2 |
| 17 | 22,85 | 28,2 | Ph2 |
| 18 | 29,35 | 28,2 | Ph1 |
| 19 | 31,85 | 28,2 | Ph1 |
| 20 | 39,2 | 28,2 | S22 |
| 21 | 42,2 | 28,2 | G22 |
| 22 | 49,2 | 28,2 | S13 |
| 23 | 52,2 | 28,2 | G13 |
| 24 | 52,2 | 20,2 | DC-2 |
| 25 | 52,2 | 17,7 | DC-2 |
| 26 | 52,2 | 10,5 | DC+ |
| 27 | 52,2 | 8 | DC+ |
| 28 | 26,1 | 22,1 | A20 |

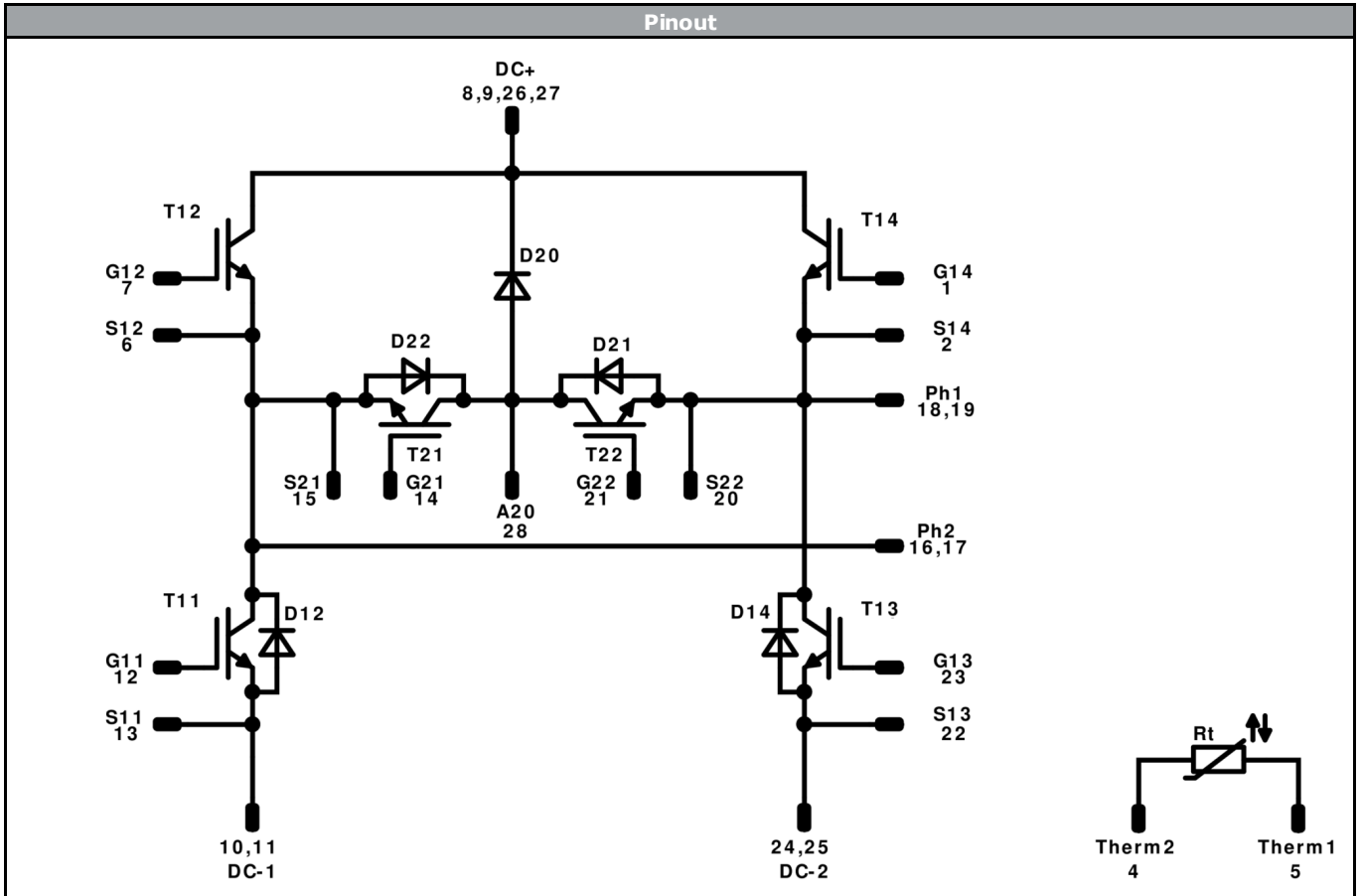
Outline

center of press-fit pinhead
for connection parameter see the handling instruction

Tolerance of pinpositions: ±0.5mm at the end of pins
Dimension of coordinate axis is only offset without tolerance



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| Identification | | | | | |
|-----------------------|------------------|----------------|----------------|------------------|----------------|
| ID | Component | Voltage | Current | Function | Comment |
| T11, T13 | IGBT | 650 V | 100 A | Low Buck Switch | |
| T12, T14 | IGBT | 650 V | 100 A | High Buck Switch | |
| D21, D22 | FWD | 650 V | 75 A | Buck Diode | |
| T21, T22 | IGBT | 650 V | 75 A | Boost Switch | |
| D12, D14 | FWD | 650 V | 75 A | Low Boost Diode | |
| D20 | FWD | 650 V | 75 A | High Boost Diode | |
| Rt | NTC | | | Thermistor | |




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| Packaging instruction | | | |
|---------------------------------------|------|----------|-------------|
| Standard packaging quantity (SPQ) 100 | >SPQ | Standard | <SPQ Sample |

| Handling instruction |
|---|
| Handling instructions for <i>flow 1</i> packages see vincotech.com website. |

| Package data |
|--|
| Package data for <i>flow 1</i> 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.  |

| Document No.: | Date: | Modification: | Pages |
|--------------------------------|--------------|---------------|-------|
| 10-xY07HVA100S5-L986F08x-D1-14 | 11 Aug. 2017 | | |

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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.