



Vincotech

10-FZ12PNA010M7-P849C28

datasheet

flowPIM 0

1200 V / 10 A

Features

- IGBT M7 with low VCEsat and improved EMC behavior
- Open emitter configuration
- Compact and low inductive design
- Built-in NTC

Target applications

- Industrial Drives

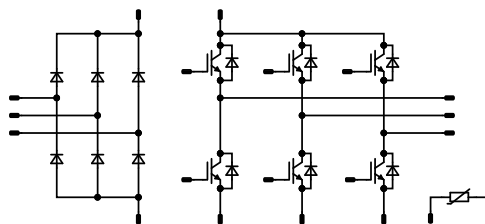
Types

- 10-FZ12PNA010M7-P849C28

flow 0 12 mm housing



Schematic





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Maximum Ratings

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

| Parameter | Symbol | Conditions | Value | Unit |
|-----------|--------|------------|-------|------|
|-----------|--------|------------|-------|------|

Inverter Switch

| | | | | |
|-----------------------------------|------------|---|----------|--------------------|
| Collector-emitter voltage | V_{CES} | | 1200 | V |
| Collector current (DC current) | I_C | $T_j = T_{jmax}$ $T_s = 80\text{ °C}$ | 18 | A |
| Repetitive peak collector current | I_{CRM} | t_p limited by T_{jmax} | 20 | A |
| Total power dissipation | P_{tot} | $T_j = T_{jmax}$ $T_s = 80\text{ °C}$ | 55 | W |
| Gate-emitter voltage | V_{GES} | | ± 20 | V |
| Short circuit ratings | t_{SC} | $V_{GE} = 0\text{ V}$, $V_{CC} = 800\text{ V}$ $T_j = 150\text{ °C}$ | 9,5 | μs |
| Maximum junction temperature | T_{jmax} | | 175 | $^{\circ}\text{C}$ |

Inverter Diode

| | | | | |
|---------------------------------|------------|---------------------------------------|------|--------------------|
| Peak repetitive reverse voltage | V_{RRM} | | 1200 | V |
| Forward current (DC current) | I_F | $T_j = T_{jmax}$ $T_s = 80\text{ °C}$ | 19 | A |
| Total power dissipation | P_{tot} | $T_j = T_{jmax}$ $T_s = 80\text{ °C}$ | 44 | W |
| Maximum junction temperature | T_{jmax} | | 175 | $^{\circ}\text{C}$ |

Rectifier Diode

| | | | | |
|--|------------|--|------|----------------------|
| Peak repetitive reverse voltage | V_{RRM} | | 1600 | V |
| Forward current (DC current) | I_F | $T_j = T_{jmax}$ $T_s = 80\text{ °C}$ | 33 | A |
| Surge (non-repetitive) forward current | I_{FSM} | Single Half Sine Wave, $t_p = 10\text{ ms}$ $T_j = 150\text{ °C}$ | 200 | A |
| Surge current capability | I^2t | | 200 | A^2s |
| Total power dissipation | P_{tot} | $T_j = T_{jmax}$ $T_s = 80\text{ °C}$ | 44 | W |
| Maximum junction temperature | T_{jmax} | | 150 | $^{\circ}\text{C}$ |



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datasheet

Maximum Ratings

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

| Parameter | Symbol | Conditions | Value | Unit |
|-----------|--------|------------|-------|------|
|-----------|--------|------------|-------|------|

Module Properties

Thermal Properties

| | | | | |
|---|------------------|--|----------------------------------|----|
| Storage temperature | T_{stg} | | -40...+125 | °C |
| Operation temperature under switching condition | T_{jop} | | -40...+(T_{jmax} - 25) | °C |

Isolation Properties

| | | | | |
|----------------------------|-------------------|--|-------|----|
| Isolation voltage | V_{isol} | DC Test Voltage* $t_p = 2\text{ s}$ | 6000 | V |
| Isolation voltage | V_{isol} | AC Voltage $t_p = 1\text{ min}$ | 2500 | V |
| Creepage distance | | | >12,7 | mm |
| Clearance | | | 9,29 | mm |
| Comparative Tracking Index | CTI | | ≥ 200 | |

*100 % tested in production



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Characteristic Values

| Parameter | Symbol | Conditions | | | | | Values | | | Unit |
|-----------|--------|------------|------------------------------|---|-------------------------------------|------------|--------|-----|-----|------|
| | | | V_{GE} [V] V_{GS} [V] | V_{CE} [V] V_{DS} [V] V_F [V] | I_C [A] I_D [A] I_F [A] | T_j [°C] | Min | Typ | Max | |

Inverter Switch

Static

| | | | | | | | | | | |
|--------------------------------------|---------------|------------------|----|------|-------|------------------|-----|---------------------|---------------------|----|
| Gate-emitter threshold voltage | $V_{GE(th)}$ | | | 10 | 0,001 | 25 | 5,4 | 6 | 6,6 | V |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | | 15 | | 10 | 25 125 150 | | 1,66 1,9 1,96 | 2,15 ⁽¹⁾ | V |
| Collector-emitter cut-off current | I_{CES} | | 0 | 1200 | | 25 | | | 35 | µA |
| Gate-emitter leakage current | I_{GES} | | 0 | 0 | | 25 | | | 500 | nA |
| Internal gate resistance | r_g | | | | | | | None | | Ω |
| Input capacitance | C_{ies} | 0 | 10 | 10 | 25 | | | 2000 | | pF |
| Output capacitance | C_{oes} | | | | | | | 86 | | pF |
| Reverse transfer capacitance | C_{res} | | | | | | | 23 | | pF |
| Gate charge | Q_g | $V_{CC} = 600$ V | 15 | | 10 | 25 | | 80 | | nC |

Thermal

| | | | | | | | | | | |
|--|---------------|---------------------------------------|--|--|--|--|--|------|--|-----|
| Thermal resistance junction to sink ⁽²⁾ | $R_{th(j-s)}$ | $\lambda_{paste} = 3,4$ W/mK (PSX) | | | | | | 1,72 | | K/W |
|--|---------------|---------------------------------------|--|--|--|--|--|------|--|-----|

Dynamic

| | | | | | | | | | | |
|-----------------------------|--------------|--|-----|-----|----|------------------|--|--------------------------|--|-----|
| Turn-on delay time | $t_{d(on)}$ | $R_{gon} = 32$ Ω $R_{goff} = 32$ Ω | ±15 | 600 | 10 | 25 125 150 | | 127,8 125,6 123,4 | | ns |
| Rise time | t_r | | | | | 25 125 150 | | 29 32,2 33,8 | | ns |
| Turn-off delay time | $t_{d(off)}$ | | | | | 25 125 150 | | 145,2 179,2 182 | | ns |
| Fall time | t_f | | | | | 25 125 150 | | 98,1 107,57 116,71 | | ns |
| Turn-on energy (per pulse) | E_{on} | $Q_{tFWD} = 1,09$ µC $Q_{tFWD} = 1,66$ µC $Q_{tFWD} = 1,81$ µC | | | | 25 125 150 | | 0,883 1,12 1,19 | | mWs |
| Turn-off energy (per pulse) | E_{off} | | | | | 25 125 150 | | 0,656 0,86 0,908 | | mWs |



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datasheet

Characteristic Values

| Parameter | Symbol | Conditions | | | | | Values | | | Unit |
|-----------|--------|------------|------------------------------|---|-------------------------------------|------------|--------|-----|-----|------|
| | | | V_{GE} [V] V_{GS} [V] | V_{CE} [V] V_{DS} [V] V_F [V] | I_C [A] I_D [A] I_F [A] | T_j [°C] | Min | Typ | Max | |

Inverter Diode

Static

| | | | | | | | | | | |
|-------------------------|-------|----------------|--|--|----|------------------|--|---------------------|--------------------|----|
| Forward voltage | V_F | | | | 10 | 25 125 150 | | 1,61 1,69 1,7 | 2,1 ⁽¹⁾ | V |
| Reverse leakage current | I_R | $V_i = 1200$ V | | | | 25 | | | 25 | µA |

Thermal

| | | | | | | | | | | |
|--|---------------|---------------------------------------|--|--|--|--|--|------|--|-----|
| Thermal resistance junction to sink ⁽²⁾ | $R_{th(j-s)}$ | $\lambda_{paste} = 3,4$ W/mK (PSX) | | | | | | 2,16 | | K/W |
|--|---------------|---------------------------------------|--|--|--|--|--|------|--|-----|

Dynamic

| | | | | | | | | | | |
|---------------------------------------|----------------------|--|----------|-----|----|------------------|--|-------------------------|--|------|
| Peak recovery current | I_{RRM} | $di/dt=278$ A/µs $di/dt=270$ A/µs $di/dt=272$ A/µs | ± 15 | 600 | 10 | 25 125 150 | | 8,67 9,25 9,34 | | A |
| Reverse recovery time | t_{rr} | | | | | 25 125 150 | | 254,4 372,9 409 | | ns |
| Recovered charge | Q_r | | | | | 25 125 150 | | 1,09 1,66 1,81 | | µC |
| Reverse recovered energy | E_{rec} | | | | | 25 125 150 | | 0,374 0,62 0,68 | | mWs |
| Peak rate of fall of recovery current | $(di_{rr}/dt)_{max}$ | | | | | 25 125 150 | | 84,75 53,58 49,28 | | A/µs |



Characteristic Values

| Parameter | Symbol | Conditions | | | | | Values | | | Unit |
|-----------|--------|------------|------------------------------|---|-------------------------------------|------------|--------|-----|-----|------|
| | | | V_{GE} [V] V_{GS} [V] | V_{CE} [V] V_{DS} [V] V_F [V] | I_C [A] I_D [A] I_F [A] | T_j [°C] | Min | Typ | Max | |

Rectifier Diode

Static

| | | | | | | | | | | |
|-------------------------|-------|----------------|--|--|---|-----------|--|----------------|---|----|
| Forward voltage | V_F | | | | 8 | 25 125 | | 0,996 0,907 | 1,21 ⁽¹⁾ 1,1 ⁽¹⁾ | V |
| Reverse leakage current | I_R | $V_r = 1600$ V | | | | 25 | | | 50 | μA |

Thermal

| | | | | | | | | | | |
|--|---------------|---------------------------------------|--|--|--|--|--|------|--|-----|
| Thermal resistance junction to sink ⁽²⁾ | $R_{th(j-s)}$ | $\lambda_{paste} = 3,4$ W/mK (PSX) | | | | | | 1,59 | | K/W |
|--|---------------|---------------------------------------|--|--|--|--|--|------|--|-----|

Thermistor

Static

| | | | | | | | | | | |
|--------------------------------|----------------|--------------------|--|--|--|-----|----|------|---|------|
| Rated resistance | R | | | | | 25 | | 22 | | kΩ |
| Deviation of R_{100} | $\Delta_{R/R}$ | $R_{100} = 1484$ Ω | | | | 100 | -5 | | 5 | % |
| Power dissipation | P | | | | | | | 5 | | mW |
| Power dissipation constant | d | | | | | 25 | | 1,5 | | mW/K |
| B-value | $B_{(25/50)}$ | Tol. ± 1 % | | | | | | 3962 | | K |
| B-value | $B_{(25/100)}$ | Tol. ± 1 % | | | | | | 4000 | | K |
| Vincotech Thermistor Reference | | | | | | | | | I | |

⁽¹⁾ Value at chip level

⁽²⁾ Only valid with pre-applied Vincotech thermal interface material.



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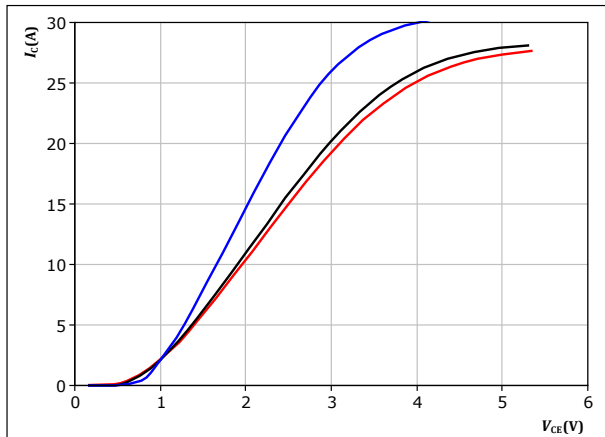
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Inverter Switch Characteristics

figure 1. IGBT

Typical output characteristics

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

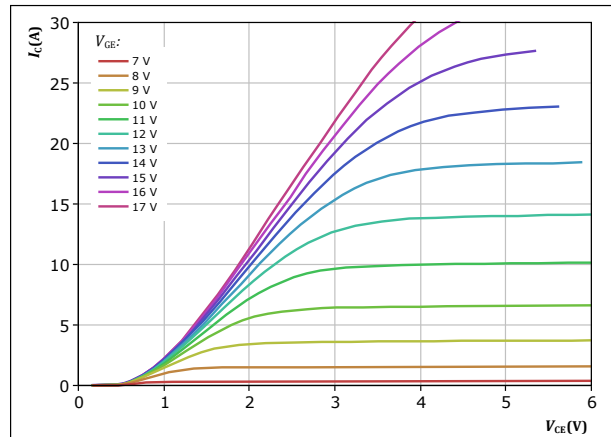


$t_p = 250 \mu s$
 $V_{GE} = 15 V$
 $T_j: 25 ^\circ C, 125 ^\circ C, 150 ^\circ C$

figure 2. IGBT

Typical output characteristics

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

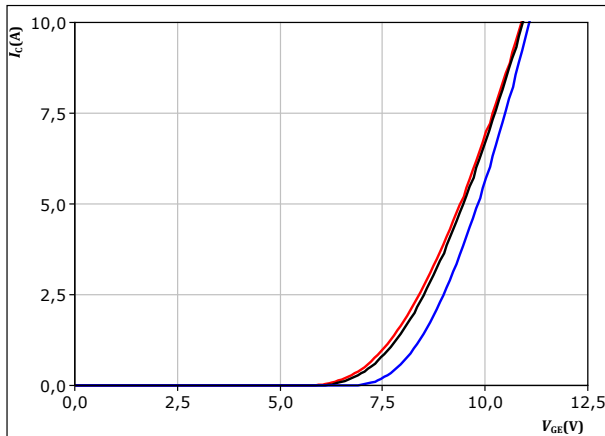


$t_p = 250 \mu s$
 $T_j = 150 ^\circ C$
 V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. IGBT

Typical transfer characteristics

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

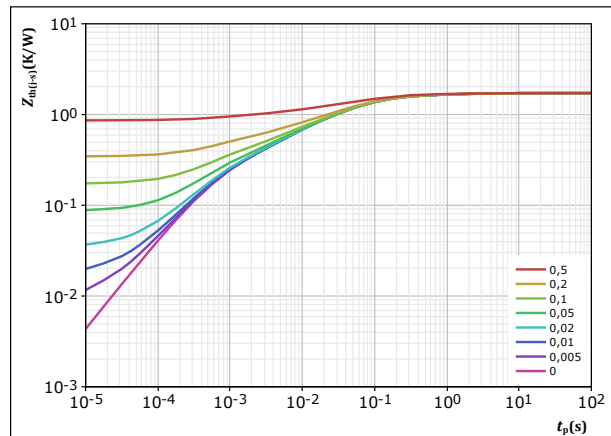


$t_p = 250 \mu s$
 $V_{CE} = 10 V$
 $T_j: 25 ^\circ C, 125 ^\circ C, 150 ^\circ C$

figure 4. IGBT

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 1,722 K/W$
IGBT thermal model values

| $R (K/W)$ | $\tau (s)$ |
|-----------|------------|
| 8,08E-02 | 2,32E+00 |
| 2,21E-01 | 2,45E-01 |
| 6,51E-01 | 6,03E-02 |
| 3,93E-01 | 1,33E-02 |
| 1,95E-01 | 3,15E-03 |
| 1,82E-01 | 5,45E-04 |



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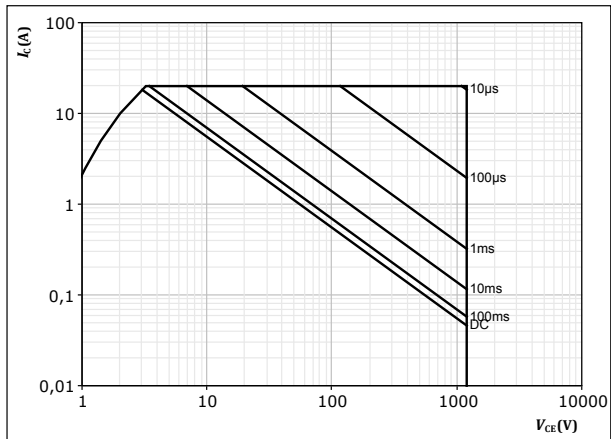
Inverter Switch Characteristics

figure 5.

IGBT

Safe operating area

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



$D =$ single pulse

$T_s = 80$ °C

$V_{GE} = 15$ V

$T_j = T_{jmax}$



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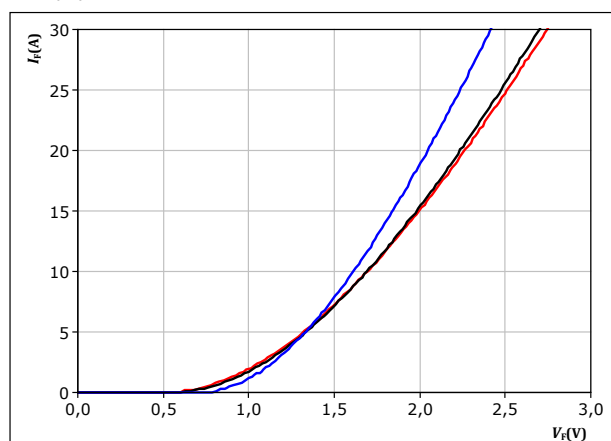
datasheet

Inverter Diode Characteristics

figure 6. FWD

Typical forward characteristics

$$I_F = f(V_F)$$



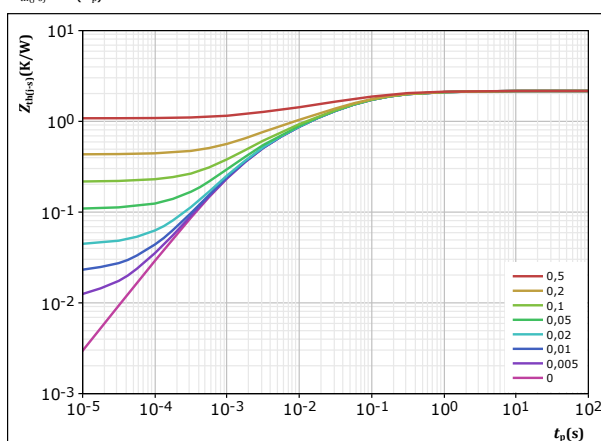
$t_p = 250 \mu s$

T_j : 25 °C, 125 °C, 150 °C

figure 7. FWD

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)} = 2,162 \text{ K/W}$

FWD thermal model values

| R (K/W) | τ (s) |
|-----------|------------|
| 9,29E-02 | 2,25E+00 |
| 3,88E-01 | 2,05E-01 |
| 7,75E-01 | 5,06E-02 |
| 5,89E-01 | 8,88E-03 |
| 3,17E-01 | 1,48E-03 |



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Rectifier Diode Characteristics

figure 8.

Rectifier

Typical forward characteristics

$$I_F = f(V_F)$$

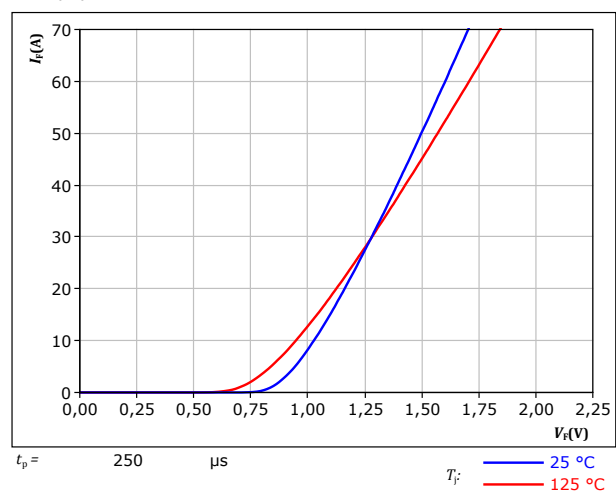
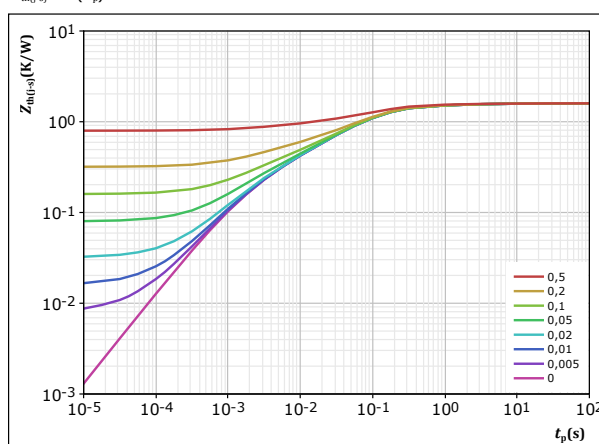


figure 9.

Rectifier

Transient thermal impedance as a function of pulse width

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



| | | |
|--------------------------------|------------|-----|
| $D =$ | t_p / T | |
| $R_{th(j-s)} =$ | 1,594 | K/W |
| Rectifier thermal model values | | |
| R (K/W) | τ (s) | |
| 3,44E-02 | 9,66E+00 | |
| 1,12E-01 | 1,22E+00 | |
| 5,81E-01 | 1,45E-01 | |
| 4,89E-01 | 5,05E-02 | |
| 2,38E-01 | 9,26E-03 | |
| 1,22E-01 | 1,79E-03 | |
| 1,81E-02 | 7,88E-04 | |



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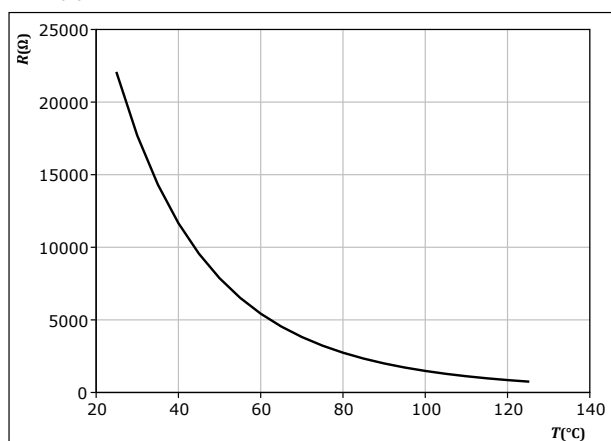
Thermistor Characteristics

figure 10.

Thermistor

Typical NTC characteristic as function of temperature

$$R_T = f(T)$$





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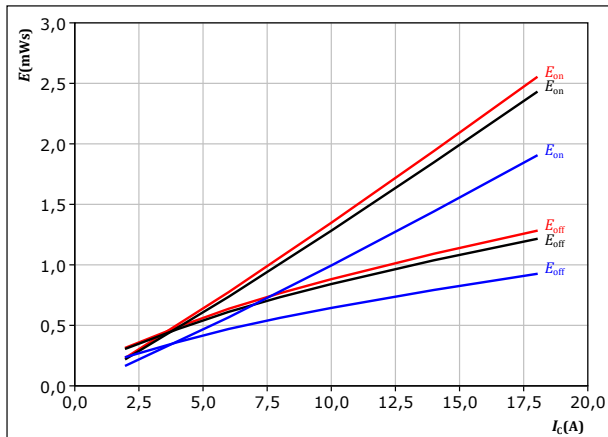
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Inverter Switching Characteristics

figure 11. IGBT

Typical switching energy losses as a function of collector current

$$E = f(I_c)$$



With an inductive load at

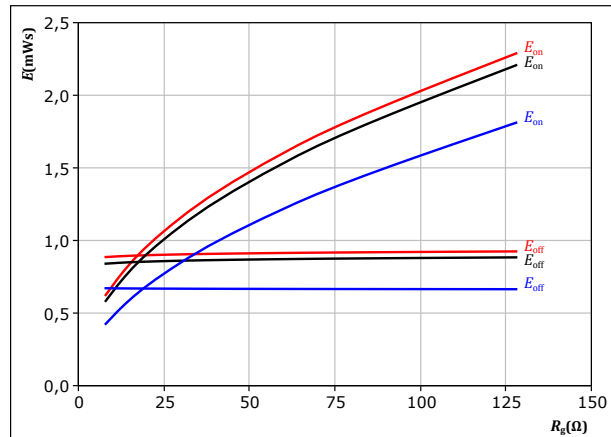
$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $R_{gon} = 32 \text{ } \Omega$
 $R_{goff} = 32 \text{ } \Omega$

T_j :
— 25 °C
— 125 °C
— 150 °C

figure 12. IGBT

Typical switching energy losses as a function of gate resistor

$$E = f(R_g)$$



With an inductive load at

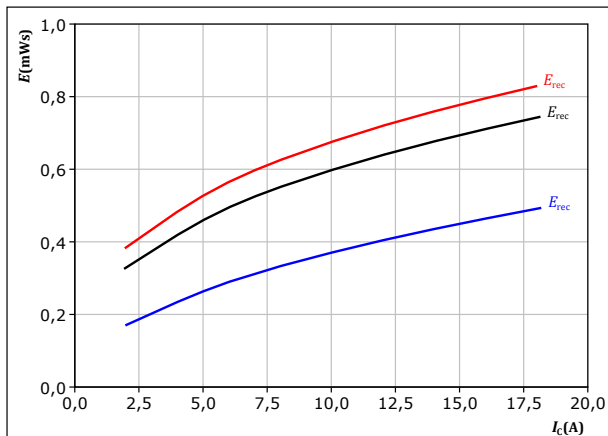
$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $I_c = 10 \text{ A}$

T_j :
— 25 °C
— 125 °C
— 150 °C

figure 13. FWD

Typical reverse recovered energy loss as a function of collector current

$$E_{rec} = f(I_c)$$



With an inductive load at

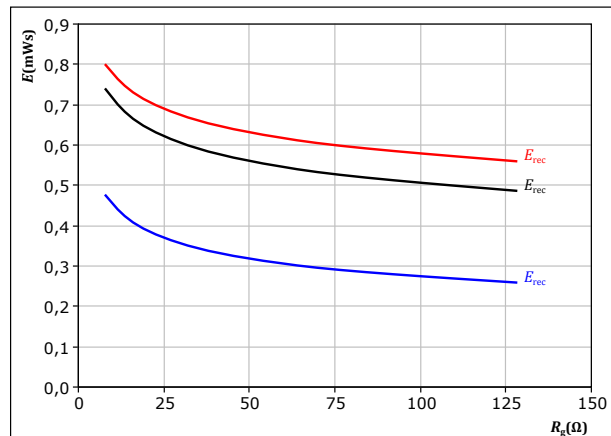
$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $R_{gon} = 32 \text{ } \Omega$

T_j :
— 25 °C
— 125 °C
— 150 °C

figure 14. FWD

Typical reverse recovered energy loss as a function of gate resistor

$$E_{rec} = f(R_g)$$



With an inductive load at

$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $I_c = 10 \text{ A}$

T_j :
— 25 °C
— 125 °C
— 150 °C



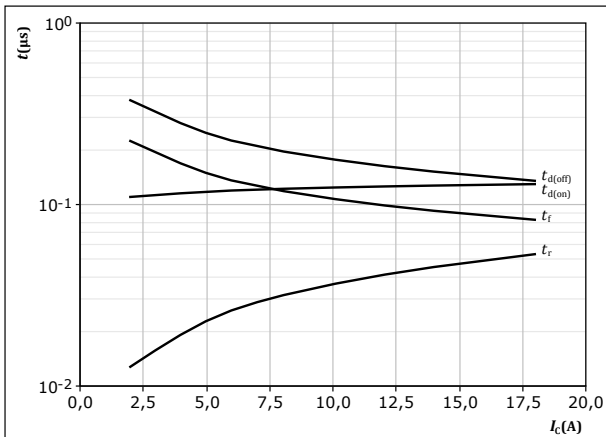
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Inverter Switching Characteristics

figure 15. IGBT

Typical switching times as a function of collector current
 $t = f(I_c)$

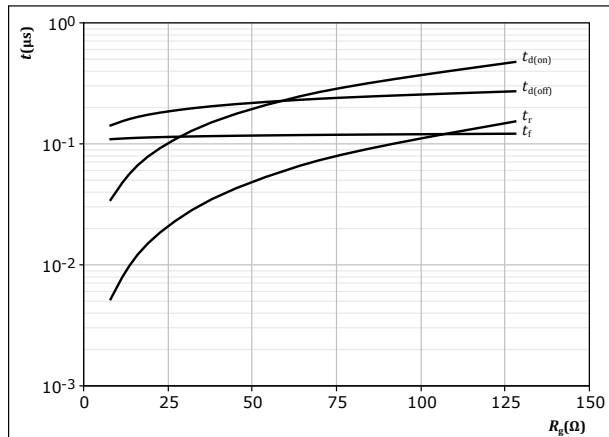


With an inductive load at

$T_j = 150$ °C
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 32$ Ω
 $R_{goff} = 32$ Ω

figure 16. IGBT

Typical switching times as a function of gate resistor
 $t = f(R_g)$

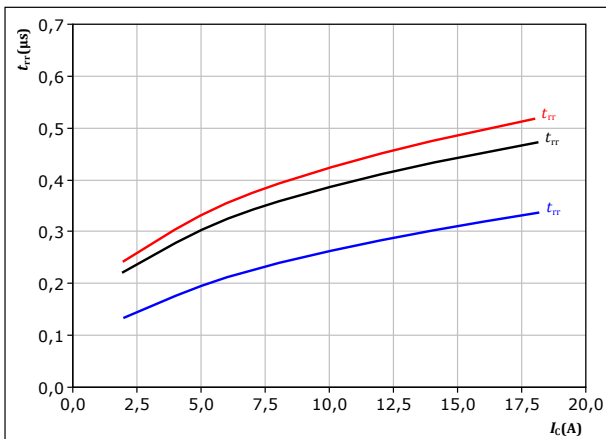


With an inductive load at

$T_j = 150$ °C
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_c = 10$ A

figure 17. FWD

Typical reverse recovery time as a function of collector current
 $t_{rr} = f(I_c)$



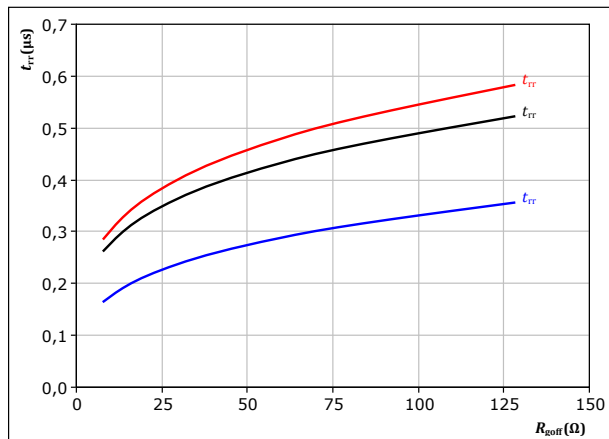
With an inductive load at

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 32$ Ω

T_j : 25 °C
125 °C
150 °C

figure 18. FWD

Typical reverse recovery time as a function of IGBT turn off gate resistor
 $t_{rr} = f(R_{goff})$



With an inductive load at

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_c = 10$ A

T_j : 25 °C
125 °C
150 °C



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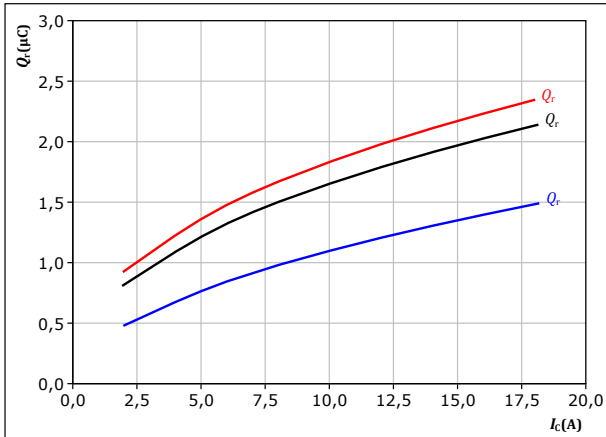
Inverter Switching Characteristics

figure 19.

FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$



With an inductive load at

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 32$ Ω

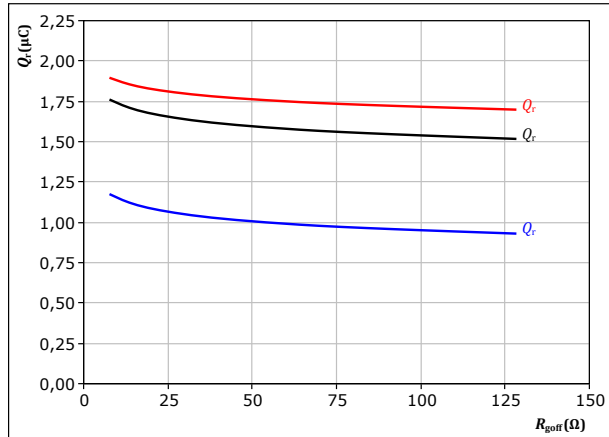
T_j :
— 25 °C
— 125 °C
— 150 °C

figure 20.

FWD

Typical recovered charge as a function of turn off gate resistor

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



With an inductive load at

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_c = 10$ A

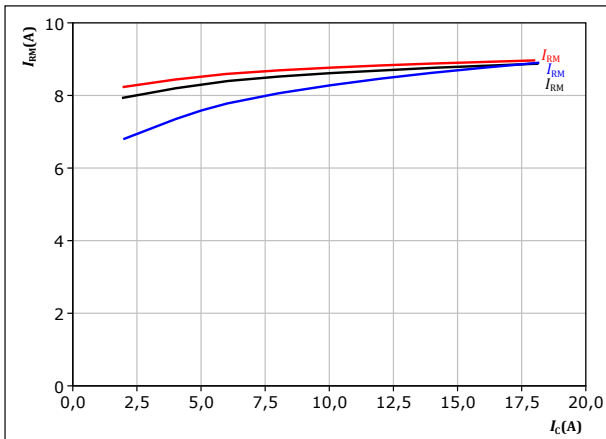
T_j :
— 25 °C
— 125 °C
— 150 °C

figure 21.

FWD

Typical peak reverse recovery current as a function of collector current

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



With an inductive load at

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 32$ Ω

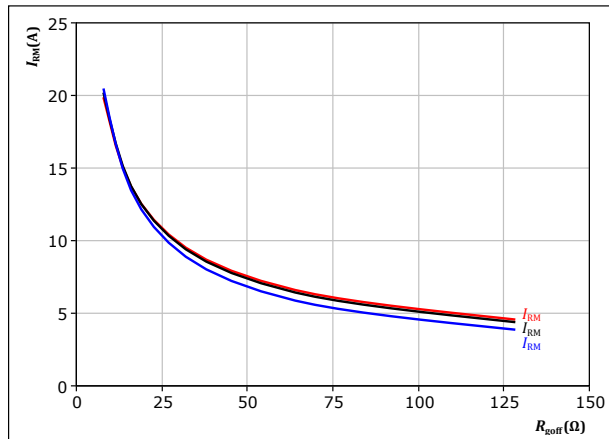
T_j :
— 25 °C
— 125 °C
— 150 °C

figure 22.

FWD

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

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



With an inductive load at

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_c = 10$ A

T_j :
— 25 °C
— 125 °C
— 150 °C



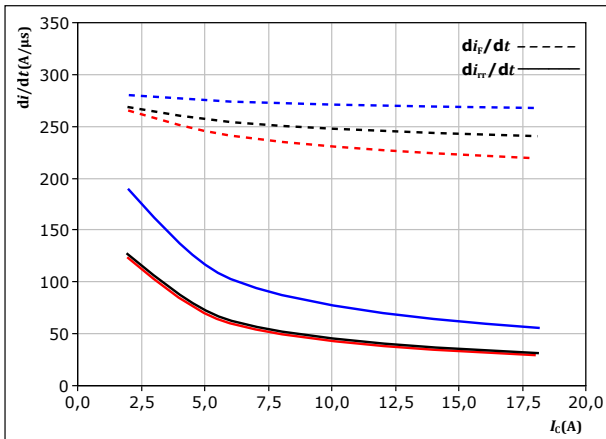
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datasheet

Inverter Switching Characteristics

figure 23. FWD

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



With an inductive load at

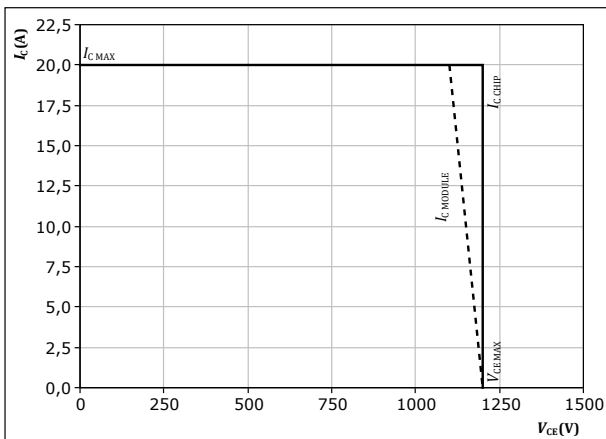
$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $R_{gon} = 32 \text{ } \Omega$

T_j :
— 25 °C
— 125 °C
— 150 °C

figure 25. IGBT

Reverse bias safe operating area

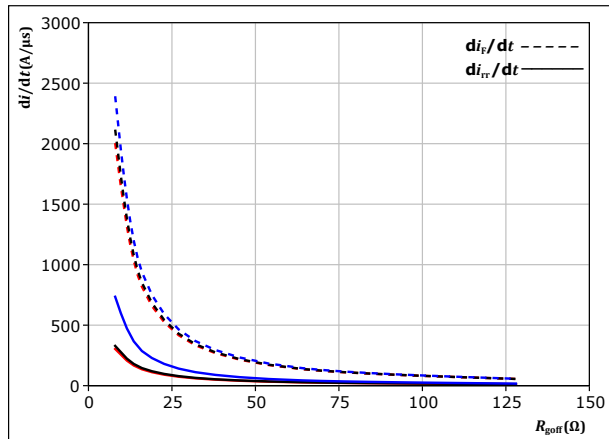
$I_c = f(V_{CE})$



At $T_j = 150 \text{ } ^\circ\text{C}$
 $R_{gon} = 32 \text{ } \Omega$
 $R_{goff} = 32 \text{ } \Omega$

figure 24. FWD

Typical rate of fall of forward and reverse recovery current as a function of turn off gate resistor
 $di_f/dt, di_r/dt = f(R_{goff})$



With an inductive load at

$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $I_c = 10 \text{ A}$

T_j :
— 25 °C
— 125 °C
— 150 °C



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10-FZ12PNA010M7-P849C28 datasheet

Inverter Switching Definitions

figure 26. IGBT

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

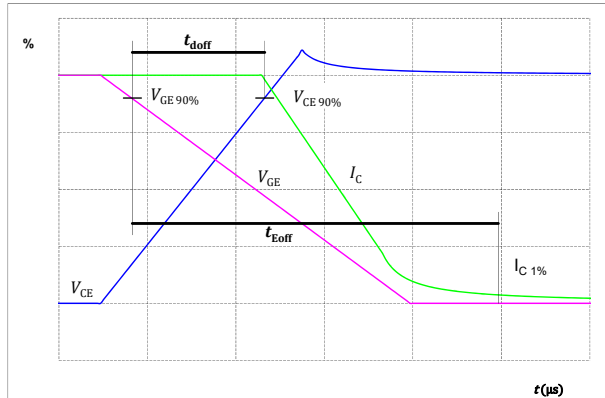


figure 27. IGBT

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

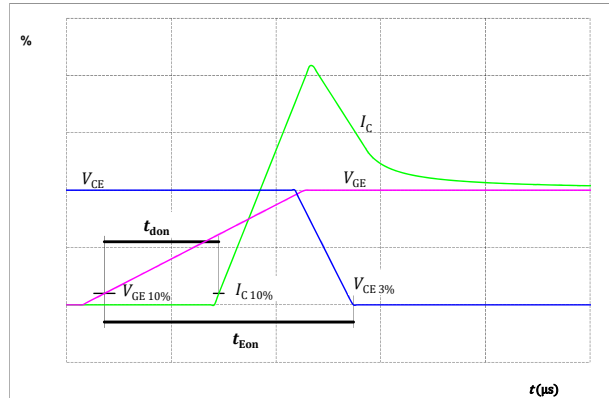


figure 28. IGBT

Turn-off Switching Waveforms & definition of t_f

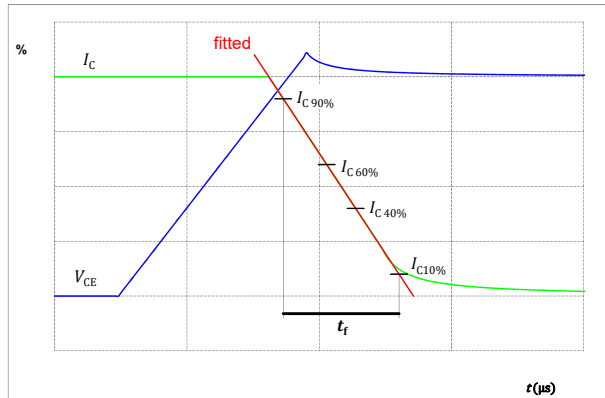
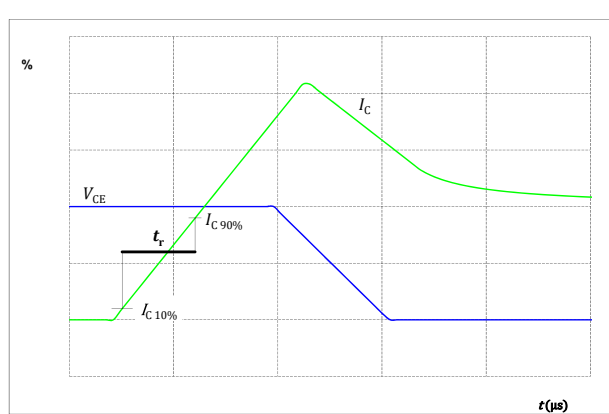


figure 29. IGBT

Turn-on Switching Waveforms & definition of t_r





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Inverter Switching Definitions

figure 30.

FWD

Turn-off Switching Waveforms & definition of t_{rr}

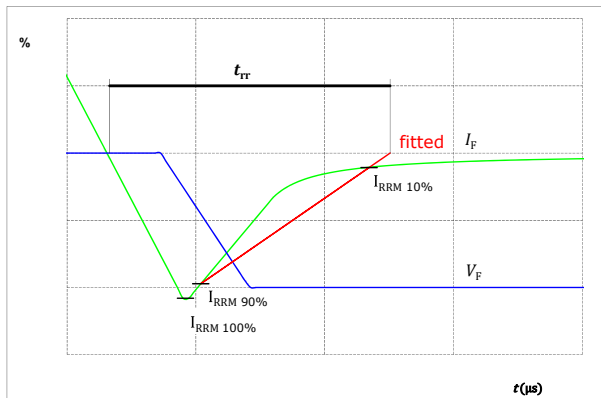
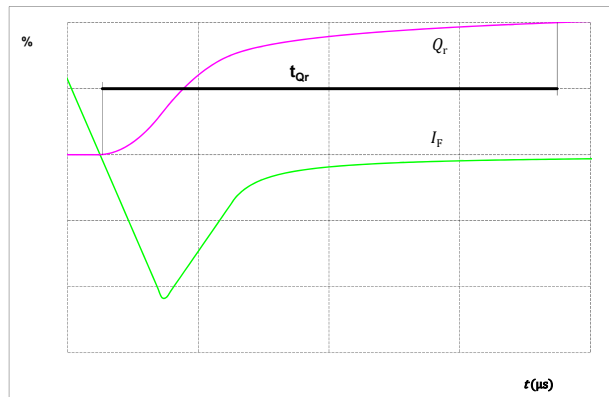


figure 31.

FWD

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





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10-FZ12PNA010M7-P849C28

datasheet

| Ordering Code | |
|--|-----------------------------|
| Version | Ordering Code |
| Without thermal paste | 10-FZ12PNA010M7-P849C28 |
| With thermal paste (5,2 W/mK, PTM6000HV) | 10-FZ12PNA010M7-P849C28-/7/ |
| With thermal paste (3,4 W/mK, PSX-P7) | 10-FZ12PNA010M7-P849C28-/3/ |

| Marking | | | | | | |
|------------|--------------------------------|------------|-----------|-----------|-------|--------|
| Text | Name | | Date code | UL & VIN | Lot | Serial |
| | NN-NNNNNNNNNNNNNN- TTTTTUVV | | WWYY | UL VIN | LLLLL | SSSS |
| Datamatrix | Type&Ver | Lot number | Serial | Date code | | |
| | TTTTTUVV | LLLLL | SSSS | WWYY | | |

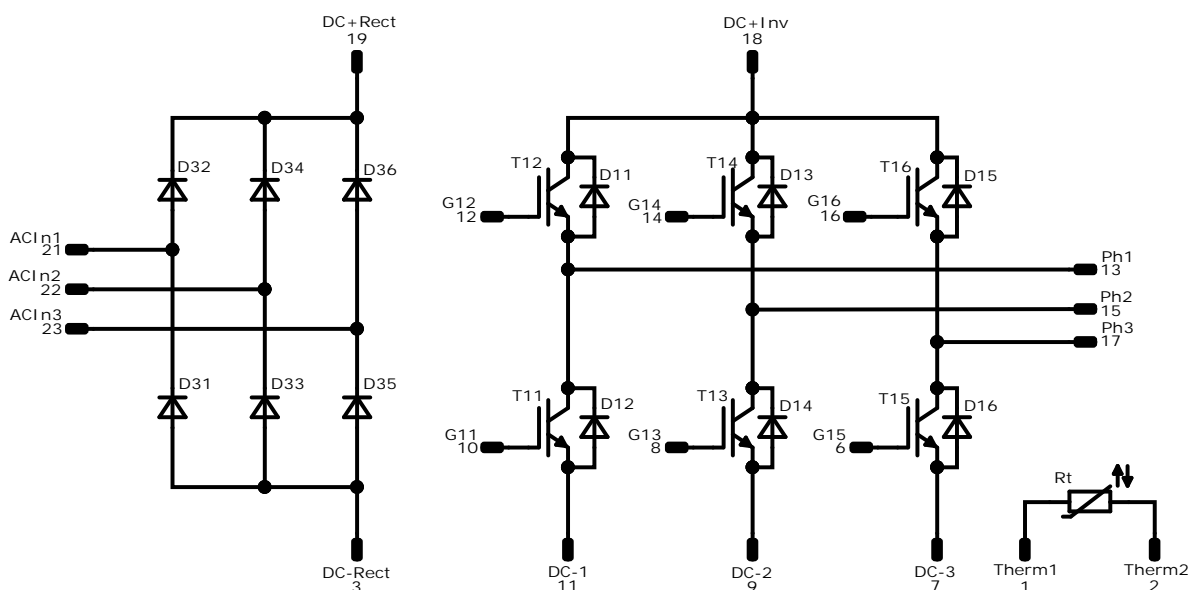
| Outline | | | |
|----------------|---------------|------|----------|
| Pin table [mm] | | | |
| Pin | X | Y | Function |
| 1 | 25,5 | 2,7 | Therm1 |
| 2 | 25,5 | 0 | Therm2 |
| 3 | 22,8 | 0 | DC-Rect |
| 4 | not assembled | | |
| 5 | not assembled | | |
| 6 | 13,5 | 0 | G15 |
| 7 | 10,8 | 0 | DC-3 |
| 8 | 8,1 | 0 | G13 |
| 9 | 5,4 | 0 | DC-2 |
| 10 | 2,7 | 0 | G11 |
| 11 | 0 | 0 | DC-1 |
| 12 | 0 | 19,8 | G12 |
| 13 | 0 | 22,5 | Ph1 |
| 14 | 7,5 | 19,8 | G14 |
| 15 | 7,5 | 22,5 | Ph2 |
| 16 | 15 | 19,8 | G16 |
| 17 | 15 | 22,5 | Ph3 |
| 18 | 22,8 | 22,5 | DC+Inv |
| 19 | 25,5 | 22,5 | DC+Rect |
| 20 | not assembled | | |
| 21 | 33,5 | 15 | ACIn1 |
| 22 | 33,5 | 7,5 | ACIn2 |
| 23 | 33,5 | 0 | ACIn3 |

Tolerance of pinpositions: ±0,5mm at the end of pins.
Dimension of coordinate axis is only offset without tolerance



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Pinout




Identification

| ID | Component | Voltage | Current | Function | Comment |
|------------------------------|-----------|---------|---------|-----------------|---------|
| T11, T12, T13, T14, T15, T16 | IGBT | 1200 V | 10 A | Inverter Switch | |
| D11, D12, D13, D14, D15, D16 | FWD | 1200 V | 10 A | Inverter Diode | |
| D31, D32, D33, D34, D35, D36 | Rectifier | 1600 V | 25 A | Rectifier Diode | |
| Rt | NTC | | | Thermistor | |



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10-FZ12PNA010M7-P849C28
datasheet

| Packaging instruction | | | | |
|---|------|----------|------|---|
| Standard packaging quantity (SPQ) 135 | >SPQ | Standard | <SPQ | Sample |
| Handling instruction | | | | |
| Handling instructions for <i>flow 0</i> packages see vincotech.com website. | | | | |
| Package data | | | | |
| Package data for <i>flow 0</i> packages see vincotech.com website. | | | | |
| Vincotech thermistor reference | | | | |
| See Vincotech thermistor reference table at 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-FZ12PNA010M7-P849C28-D3-14 | 26 Sep. 2021 | New Datasheet format, module is unchanged Correct Thermal values of Inverter Diode | |

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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.