



Vincotech

## 30-PT12B2A200H702-PK49L03Y

datasheet

flowBOOST 2 dual

1200 V / 200 A

### Topology features

- Auxiliary diodes for FC pre-charge (patent pending)
- Dual Flying Cap Booster
- Kelvin Emitter for improved switching performance
- Temperature sensor

### Component features

- High speed switching
- Low collector emitter saturation voltage
- Low turn-off losses
- Optimized for hard switching topologies
- Positive temperature coefficient

### Housing features

- Base isolation:  $\text{Al}_2\text{O}_3$
- Convex shaped baseplate for superior thermal contact
- Cu baseplate
- Thermo-mechanical push-and-pull force relief
- Press-fit pin
- Reliable cold welding connection

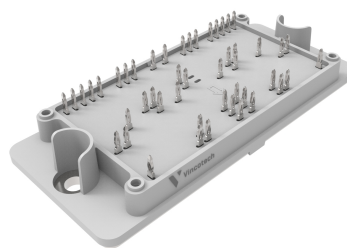
### Target applications

- Solar Inverters

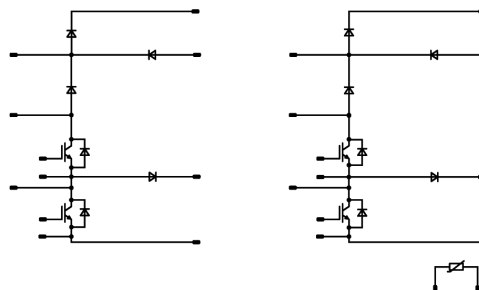
### Types

- 30-PT12B2A200H702-PK49L03Y

### flow 2 13 mm housing



### Schematic





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## Maximum Ratings

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

| Parameter                         | Symbol     | Conditions                                       | Value    | Unit |
|-----------------------------------|------------|--------------------------------------------------|----------|------|
| <b>Inner Boost Switch</b>         |            |                                                  |          |      |
| Collector-emitter voltage         | $V_{CES}$  |                                                  | 1200     | V    |
| Collector current (DC current)    | $I_C$      | $T_j = T_{jmax}$ $T_a = 80\text{ °C}$            | 156      | A    |
| Repetitive peak collector current | $I_{CRM}$  | $t_p$ limited by $T_{jmax}$                      | 600      | A    |
| Turn off safe operating area      |            | $T_j = 150\text{ °C}$ , $V_{CE} = 1200\text{ V}$ | 600      | A    |
| Total power dissipation           | $P_{tot}$  | $T_j = T_{jmax}$ $T_a = 80\text{ °C}$            | 287      | W    |
| Gate-emitter voltage              | $V_{GES}$  |                                                  | $\pm 20$ | V    |
| Maximum junction temperature      | $T_{jmax}$ |                                                  | 175      | °C   |

## Inner Boost Diode

|                                        |            |                                                                     |      |    |
|----------------------------------------|------------|---------------------------------------------------------------------|------|----|
| Peak repetitive reverse voltage        | $V_{RRM}$  |                                                                     | 1200 | V  |
| Forward current (DC current)           | $I_F$      | $T_j = T_{jmax}$ $T_a = 80\text{ °C}$                               | 114  | A  |
| Repetitive peak forward current        | $I_{FRM}$  | $t_p$ limited by $T_{jmax}$                                         | 200  | A  |
| Surge (non-repetitive) forward current | $I_{FSM}$  | Single Half Sine Wave,<br>$t_p = 10\text{ ms}$ $T_j = 25\text{ °C}$ | 800  | A  |
| Total power dissipation                | $P_{tot}$  | $T_j = T_{jmax}$ $T_a = 80\text{ °C}$                               | 234  | W  |
| Maximum junction temperature           | $T_{jmax}$ |                                                                     | 175  | °C |

## Inner Boost Sw. Protection Diode

|                                        |            |                                                                      |      |                  |
|----------------------------------------|------------|----------------------------------------------------------------------|------|------------------|
| Peak repetitive reverse voltage        | $V_{RRM}$  |                                                                      | 1600 | V                |
| Forward current (DC current)           | $I_F$      | $T_j = T_{jmax}$ $T_a = 80\text{ °C}$                                | 98   | A                |
| Surge (non-repetitive) forward current | $I_{FSM}$  | Single Half Sine Wave,<br>$t_p = 10\text{ ms}$ $T_j = 150\text{ °C}$ | 480  | A                |
| Surge current capability               | $I^2t$     |                                                                      | 1152 | A <sup>2</sup> s |
| Total power dissipation                | $P_{tot}$  | $T_j = T_{jmax}$ $T_a = 80\text{ °C}$                                | 124  | W                |
| Maximum junction temperature           | $T_{jmax}$ |                                                                      | 175  | °C               |



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## Maximum Ratings

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

| Parameter                         | Symbol     | Conditions                                       | Value    | Unit |
|-----------------------------------|------------|--------------------------------------------------|----------|------|
| <b>Outer Boost Switch</b>         |            |                                                  |          |      |
| Collector-emitter voltage         | $V_{CES}$  |                                                  | 1200     | V    |
| Collector current (DC current)    | $I_C$      | $T_j = T_{jmax}$ $T_a = 80\text{ °C}$            | 156      | A    |
| Repetitive peak collector current | $I_{CRM}$  | $t_p$ limited by $T_{jmax}$                      | 600      | A    |
| Turn off safe operating area      |            | $T_j = 150\text{ °C}$ , $V_{CE} = 1200\text{ V}$ | 600      | A    |
| Total power dissipation           | $P_{tot}$  | $T_j = T_{jmax}$ $T_a = 80\text{ °C}$            | 287      | W    |
| Gate-emitter voltage              | $V_{GES}$  |                                                  | $\pm 20$ | V    |
| Maximum junction temperature      | $T_{jmax}$ |                                                  | 175      | °C   |

## Outer Boost Diode

|                                        |            |                                                                     |      |    |
|----------------------------------------|------------|---------------------------------------------------------------------|------|----|
| Peak repetitive reverse voltage        | $V_{RRM}$  |                                                                     | 1200 | V  |
| Forward current (DC current)           | $I_F$      | $T_j = T_{jmax}$ $T_a = 80\text{ °C}$                               | 114  | A  |
| Repetitive peak forward current        | $I_{FRM}$  | $t_p$ limited by $T_{jmax}$                                         | 200  | A  |
| Surge (non-repetitive) forward current | $I_{FSM}$  | Single Half Sine Wave,<br>$t_p = 10\text{ ms}$ $T_j = 25\text{ °C}$ | 800  | A  |
| Total power dissipation                | $P_{tot}$  | $T_j = T_{jmax}$ $T_a = 80\text{ °C}$                               | 234  | W  |
| Maximum junction temperature           | $T_{jmax}$ |                                                                     | 175  | °C |

## Outer Boost Sw. Protection Diode

|                                        |            |                                                                      |      |                  |
|----------------------------------------|------------|----------------------------------------------------------------------|------|------------------|
| Peak repetitive reverse voltage        | $V_{RRM}$  |                                                                      | 1600 | V                |
| Forward current (DC current)           | $I_F$      | $T_j = T_{jmax}$ $T_a = 80\text{ °C}$                                | 98   | A                |
| Surge (non-repetitive) forward current | $I_{FSM}$  | Single Half Sine Wave,<br>$t_p = 10\text{ ms}$ $T_j = 150\text{ °C}$ | 480  | A                |
| Surge current capability               | $I^2t$     |                                                                      | 1152 | A <sup>2</sup> s |
| Total power dissipation                | $P_{tot}$  | $T_j = T_{jmax}$ $T_a = 80\text{ °C}$                                | 124  | W                |
| Maximum junction temperature           | $T_{jmax}$ |                                                                      | 175  | °C               |



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## Maximum Ratings

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

| Parameter                              | Symbol     | Conditions                                                          | Value | Unit |
|----------------------------------------|------------|---------------------------------------------------------------------|-------|------|
| <b>Aux Diode H</b>                     |            |                                                                     |       |      |
| Peak repetitive reverse voltage        | $V_{RRM}$  |                                                                     | 1200  | V    |
| Forward current (DC current)           | $I_F$      | $T_j = T_{jmax}$ $T_a = 80\text{ °C}$                               | 74    | A    |
| Repetitive peak forward current        | $I_{FRM}$  | $t_p$ limited by $T_{jmax}$                                         | 150   | A    |
| Surge (non-repetitive) forward current | $I_{FSM}$  | Single Half Sine Wave,<br>$t_p = 10\text{ ms}$ $T_j = 25\text{ °C}$ | 600   | A    |
| Total power dissipation                | $P_{tot}$  | $T_j = T_{jmax}$ $T_a = 80\text{ °C}$                               | 145   | W    |
| Maximum junction temperature           | $T_{jmax}$ |                                                                     | 175   | °C   |

## Aux Diode L

|                                        |            |                                                                     |      |    |
|----------------------------------------|------------|---------------------------------------------------------------------|------|----|
| Peak repetitive reverse voltage        | $V_{RRM}$  |                                                                     | 1200 | V  |
| Forward current (DC current)           | $I_F$      | $T_j = T_{jmax}$ $T_a = 80\text{ °C}$                               | 51   | A  |
| Repetitive peak forward current        | $I_{FRM}$  | $t_p$ limited by $T_{jmax}$                                         | 80   | A  |
| Surge (non-repetitive) forward current | $I_{FSM}$  | Single Half Sine Wave,<br>$t_p = 10\text{ ms}$ $T_j = 25\text{ °C}$ | 320  | A  |
| Total power dissipation                | $P_{tot}$  | $T_j = T_{jmax}$ $T_a = 80\text{ °C}$                               | 123  | W  |
| Maximum junction temperature           | $T_{jmax}$ |                                                                     | 175  | °C |

## 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* $t_p = 2\text{ s}$ | 6800  | V  |
| Creepage distance          |            |                                     | 17,01 | mm |
| Clearance                  |            |                                     | 14,09 | mm |
| Comparative Tracking Index | CTI        |                                     | ≥ 600 |    |

\*100 % tested in production



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## Characteristic Values

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

### Inner Boost Switch

#### Static

|                                      |               |                          |      |      |        |                  |     |                      |                     |    |
|--------------------------------------|---------------|--------------------------|------|------|--------|------------------|-----|----------------------|---------------------|----|
| Gate-emitter threshold voltage       | $V_{GE(th)}$  | $V_{CE} = V_{GE}$        |      |      | 0,0032 | 25               | 4,7 | 5,5                  | 6,2                 | V  |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ |                          | 15   |      | 200    | 25<br>125<br>150 |     | 1,78<br>1,94<br>1,98 | 2,15 <sup>(1)</sup> | V  |
| Collector-emitter cut-off current    | $I_{CES}$     |                          | 0    | 1200 |        | 25               |     |                      | 8                   | µA |
| Gate-emitter leakage current         | $I_{GES}$     |                          | 20   | 0    |        | 25               |     |                      | 200                 | nA |
| Internal gate resistance             | $r_g$         |                          |      |      |        |                  |     | None                 |                     | Ω  |
| Input capacitance                    | $C_{ies}$     | $f = 100 \text{ kHz}$    | 0    | 25   |        | 25               |     | 26000                |                     | pF |
| Output capacitance                   | $C_{oes}$     |                          |      |      |        |                  |     | 480                  |                     | pF |
| Reverse transfer capacitance         | $C_{res}$     |                          |      |      |        |                  |     | 144                  |                     | pF |
| Gate charge                          | $Q_g$         | $V_{CC} = 960 \text{ V}$ | 0/15 |      | 200    | 25               |     | 1428                 |                     | nC |

#### Thermal

|                                                    |               |                                               |  |  |  |  |  |      |  |     |
|----------------------------------------------------|---------------|-----------------------------------------------|--|--|--|--|--|------|--|-----|
| Thermal resistance junction to sink <sup>(2)</sup> | $R_{th(j-s)}$ | $\lambda_{paste} = 3,4 \text{ W/mK}$<br>(PSX) |  |  |  |  |  | 0,33 |  | K/W |
|----------------------------------------------------|---------------|-----------------------------------------------|--|--|--|--|--|------|--|-----|

#### Dynamic

|                             |              |                                                                                                                         |          |     |     |                  |  |                              |  |     |
|-----------------------------|--------------|-------------------------------------------------------------------------------------------------------------------------|----------|-----|-----|------------------|--|------------------------------|--|-----|
| Turn-on delay time          | $t_{d(on)}$  | $R_{gon} = 16 \text{ } \Omega$<br>$R_{goff} = 16 \text{ } \Omega$                                                       | $\pm 15$ | 700 | 200 | 25<br>125<br>150 |  | 1140,88<br>1126,71<br>1123,3 |  | ns  |
| Rise time                   | $t_r$        |                                                                                                                         |          |     |     | 25<br>125<br>150 |  | 73,55<br>68,72<br>68,04      |  | ns  |
| Turn-off delay time         | $t_{d(off)}$ |                                                                                                                         |          |     |     | 25<br>125<br>150 |  | 864,57<br>912,32<br>925,27   |  | ns  |
| Fall time                   | $t_f$        |                                                                                                                         |          |     |     | 25<br>125<br>150 |  | 19,32<br>53,25<br>63,69      |  | ns  |
| Turn-on energy (per pulse)  | $E_{on}$     | $Q_{tFWD}=0,268 \text{ } \mu\text{C}$<br>$Q_{tFWD}=0,301 \text{ } \mu\text{C}$<br>$Q_{tFWD}=0,276 \text{ } \mu\text{C}$ |          |     |     | 25<br>125<br>150 |  | 17,67<br>14,88<br>14,05      |  | mWs |
| Turn-off energy (per pulse) | $E_{off}$    |                                                                                                                         |          |     |     | 25<br>125<br>150 |  | 6,03<br>9,8<br>10,79         |  | mWs |



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## Characteristic Values

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

### Inner Boost Diode

#### Static

|                         |       |                |  |  |     |                  |  |                      |                                               |    |
|-------------------------|-------|----------------|--|--|-----|------------------|--|----------------------|-----------------------------------------------|----|
| Forward voltage         | $V_F$ |                |  |  | 100 | 25<br>125<br>150 |  | 1,42<br>1,73<br>1,84 | 1,65 <sup>(1)</sup><br><br>2,3 <sup>(1)</sup> | V  |
| Reverse leakage current | $I_R$ | $V_i = 1200$ V |  |  |     | 25               |  | 5                    | 500                                           | µA |

#### Thermal

|                                                    |               |                                       |  |  |  |  |  |      |  |     |
|----------------------------------------------------|---------------|---------------------------------------|--|--|--|--|--|------|--|-----|
| Thermal resistance junction to sink <sup>(2)</sup> | $R_{th(j-s)}$ | $\lambda_{paste} = 3,4$ W/mK<br>(PSX) |  |  |  |  |  | 0,41 |  | K/W |
|----------------------------------------------------|---------------|---------------------------------------|--|--|--|--|--|------|--|-----|

#### Dynamic

|                                       |                      |                                                              |          |     |     |                  |  |                               |  |      |
|---------------------------------------|----------------------|--------------------------------------------------------------|----------|-----|-----|------------------|--|-------------------------------|--|------|
| Peak recovery current                 | $I_{RM}$             | $di/dt=4136$ A/µs<br>$di/dt=10770$ A/µs<br>$di/dt=2111$ A/µs | $\pm 15$ | 700 | 200 | 25<br>125<br>150 |  | 25,45<br>27,92<br>28,74       |  | A    |
| Reverse recovery time                 | $t_{rr}$             |                                                              |          |     |     | 25<br>125<br>150 |  | 18,58<br>19,16<br>18,65       |  | ns   |
| Recovered charge                      | $Q_r$                |                                                              |          |     |     | 25<br>125<br>150 |  | 0,268<br>0,301<br>0,276       |  | µC   |
| Reverse recovered energy              | $E_{rec}$            |                                                              |          |     |     | 25<br>125<br>150 |  | 0,014<br>0,017<br>0,016       |  | mWs  |
| Peak rate of fall of recovery current | $(di_{rr}/dt)_{max}$ |                                                              |          |     |     | 25<br>125<br>150 |  | 1548,45<br>2937,25<br>4552,73 |  | A/µs |



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## Characteristic Values

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

### Inner Boost Sw. Protection Diode

#### Static

|                         |       |                |  |  |    |                  |  |                        |                    |    |
|-------------------------|-------|----------------|--|--|----|------------------|--|------------------------|--------------------|----|
| Forward voltage         | $V_F$ |                |  |  | 40 | 25<br>125<br>150 |  | 1,06<br>0,987<br>0,974 | 1,5 <sup>(1)</sup> | V  |
| Reverse leakage current | $I_R$ | $V_i = 1600$ V |  |  |    | 25<br>150        |  |                        | 50<br>1000         | μA |

#### Thermal

|                                                    |               |                                       |  |  |  |  |  |      |  |     |
|----------------------------------------------------|---------------|---------------------------------------|--|--|--|--|--|------|--|-----|
| Thermal resistance junction to sink <sup>(2)</sup> | $R_{th(j-s)}$ | $\lambda_{paste} = 3,4$ W/mK<br>(PSX) |  |  |  |  |  | 0,76 |  | K/W |
|----------------------------------------------------|---------------|---------------------------------------|--|--|--|--|--|------|--|-----|



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

### Outer Boost Switch

#### Static

|                                      |               |                          |      |      |        |                  |     |                      |                     |    |
|--------------------------------------|---------------|--------------------------|------|------|--------|------------------|-----|----------------------|---------------------|----|
| Gate-emitter threshold voltage       | $V_{GE(th)}$  | $V_{CE} = V_{GE}$        |      |      | 0,0032 | 25               | 4,7 | 5,5                  | 6,2                 | V  |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ |                          | 15   |      | 200    | 25<br>125<br>150 |     | 1,78<br>1,94<br>1,98 | 2,15 <sup>(1)</sup> | V  |
| Collector-emitter cut-off current    | $I_{CES}$     |                          | 0    | 1200 |        | 25               |     |                      | 8                   | µA |
| Gate-emitter leakage current         | $I_{GES}$     |                          | 20   | 0    |        | 25               |     |                      | 200                 | nA |
| Internal gate resistance             | $r_g$         |                          |      |      |        |                  |     | None                 |                     | Ω  |
| Input capacitance                    | $C_{ies}$     | $f = 100 \text{ kHz}$    | 0    | 25   |        | 25               |     | 26000                |                     | pF |
| Output capacitance                   | $C_{oes}$     |                          |      |      |        |                  |     | 480                  |                     | pF |
| Reverse transfer capacitance         | $C_{res}$     |                          |      |      |        |                  |     | 144                  |                     | pF |
| Gate charge                          | $Q_g$         | $V_{CC} = 960 \text{ V}$ | 0/15 |      | 200    | 25               |     | 1428                 |                     | nC |

#### Thermal

|                                                    |               |                                               |  |  |  |  |  |      |  |     |
|----------------------------------------------------|---------------|-----------------------------------------------|--|--|--|--|--|------|--|-----|
| Thermal resistance junction to sink <sup>(2)</sup> | $R_{th(j-s)}$ | $\lambda_{paste} = 3,4 \text{ W/mK}$<br>(PSX) |  |  |  |  |  | 0,33 |  | K/W |
|----------------------------------------------------|---------------|-----------------------------------------------|--|--|--|--|--|------|--|-----|

#### Dynamic

|                             |              |                                                                   |          |     |     |                  |  |                              |  |     |
|-----------------------------|--------------|-------------------------------------------------------------------|----------|-----|-----|------------------|--|------------------------------|--|-----|
| Turn-on delay time          | $t_{d(on)}$  | $R_{gon} = 16 \text{ } \Omega$<br>$R_{goff} = 16 \text{ } \Omega$ | $\pm 15$ | 700 | 200 | 25<br>125<br>150 |  | 1131,73<br>1119,22<br>1115,5 |  | ns  |
| Rise time                   | $t_r$        |                                                                   |          |     |     | 25<br>125<br>150 |  | 61,42<br>57,9<br>57,91       |  | ns  |
| Turn-off delay time         | $t_{d(off)}$ |                                                                   |          |     |     | 25<br>125<br>150 |  | 862,07<br>910,63<br>923,92   |  | ns  |
| Fall time                   | $t_f$        |                                                                   |          |     |     | 25<br>125<br>150 |  | 15,96<br>68,37<br>81,24      |  | ns  |
| Turn-on energy (per pulse)  | $E_{on}$     |                                                                   |          |     |     | 25<br>125<br>150 |  | 14,55<br>12,57<br>11,71      |  | mWs |
| Turn-off energy (per pulse) | $E_{off}$    |                                                                   |          |     |     | 25<br>125<br>150 |  | 5,8<br>9,99<br>11,2          |  | mWs |



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## Characteristic Values

| Parameter                                          | Symbol               | Conditions                                                  |                              |                                           |                                     |                  | Values |                               |                                           | Unit |
|----------------------------------------------------|----------------------|-------------------------------------------------------------|------------------------------|-------------------------------------------|-------------------------------------|------------------|--------|-------------------------------|-------------------------------------------|------|
|                                                    |                      |                                                             | $V_{GE}$ [V]<br>$V_{GS}$ [V] | $V_{CE}$ [V]<br>$V_{DS}$ [V]<br>$V_F$ [V] | $I_C$ [A]<br>$I_D$ [A]<br>$I_F$ [A] | $T_j$ [°C]       | Min    | Typ                           | Max                                       |      |
| <b>Outer Boost Diode</b>                           |                      |                                                             |                              |                                           |                                     |                  |        |                               |                                           |      |
| <b>Static</b>                                      |                      |                                                             |                              |                                           |                                     |                  |        |                               |                                           |      |
| Forward voltage                                    | $V_F$                |                                                             |                              |                                           | 100                                 | 25<br>125<br>150 |        | 1,42<br>1,73<br>1,84          | 1,65 <sup>(1)</sup><br>2,3 <sup>(1)</sup> | V    |
| Reverse leakage current                            | $I_R$                | $V_i = 1200$ V                                              |                              |                                           |                                     | 25               |        | 5                             | 500                                       | µA   |
| <b>Thermal</b>                                     |                      |                                                             |                              |                                           |                                     |                  |        |                               |                                           |      |
| Thermal resistance junction to sink <sup>(2)</sup> | $R_{th(j-s)}$        | $\lambda_{paste} = 3,4$ W/mK (PSX)                          |                              |                                           |                                     |                  |        | 0,41                          |                                           | K/W  |
| <b>Dynamic</b>                                     |                      |                                                             |                              |                                           |                                     |                  |        |                               |                                           |      |
| Peak recovery current                              | $I_{RM}$             | $di/dt=3352$ A/µs<br>$di/dt=2745$ A/µs<br>$di/dt=2613$ A/µs | $\pm 15$                     | 700                                       | 200                                 | 25<br>125<br>150 |        | 35,14<br>39,79<br>41,81       |                                           | A    |
| Reverse recovery time                              | $t_{rr}$             |                                                             |                              |                                           |                                     | 25<br>125<br>150 |        | 19,7<br>18,78<br>18,86        |                                           | ns   |
| Recovered charge                                   | $Q_r$                |                                                             |                              |                                           |                                     | 25<br>125<br>150 |        | 0,378<br>0,43<br>0,428        |                                           | µC   |
| Reverse recovered energy                           | $E_{rec}$            |                                                             |                              |                                           |                                     | 25<br>125<br>150 |        | 0,031<br>0,043<br>0,046       |                                           | mWs  |
| Peak rate of fall of recovery current              | $(di_{rr}/dt)_{max}$ |                                                             |                              |                                           |                                     | 25<br>125<br>150 |        | 4614,39<br>6679,58<br>6294,98 |                                           | A/µs |



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## Characteristic Values

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

### Outer Boost Sw. Protection Diode

#### Static

|                         |       |                |  |  |    |                  |  |                        |                    |  |    |
|-------------------------|-------|----------------|--|--|----|------------------|--|------------------------|--------------------|--|----|
| Forward voltage         | $V_F$ |                |  |  | 40 | 25<br>125<br>150 |  | 1,06<br>0,987<br>0,974 | 1,5 <sup>(1)</sup> |  | V  |
| Reverse leakage current | $I_R$ | $V_r = 1600$ V |  |  |    | 25<br>150        |  |                        | 50<br>1000         |  | μA |

#### Thermal

|                                                    |               |                                       |  |  |  |  |  |      |  |  |     |
|----------------------------------------------------|---------------|---------------------------------------|--|--|--|--|--|------|--|--|-----|
| Thermal resistance junction to sink <sup>(2)</sup> | $R_{th(j-s)}$ | $\lambda_{paste} = 3,4$ W/mK<br>(PSX) |  |  |  |  |  | 0,76 |  |  | K/W |
|----------------------------------------------------|---------------|---------------------------------------|--|--|--|--|--|------|--|--|-----|

### Aux Diode H

#### Static

|                         |       |                |  |  |    |                  |  |                      |                    |  |    |
|-------------------------|-------|----------------|--|--|----|------------------|--|----------------------|--------------------|--|----|
| Forward voltage         | $V_F$ |                |  |  | 75 | 25<br>125<br>150 |  | 2,59<br>2,16<br>2,07 | 3,3 <sup>(1)</sup> |  | V  |
| Reverse leakage current | $I_R$ | $V_r = 1200$ V |  |  |    | 25<br>150        |  |                      | 250<br>2000        |  | μA |

#### Thermal

|                                                    |               |                                       |  |  |  |  |  |      |  |  |     |
|----------------------------------------------------|---------------|---------------------------------------|--|--|--|--|--|------|--|--|-----|
| Thermal resistance junction to sink <sup>(2)</sup> | $R_{th(j-s)}$ | $\lambda_{paste} = 3,4$ W/mK<br>(PSX) |  |  |  |  |  | 0,66 |  |  | K/W |
|----------------------------------------------------|---------------|---------------------------------------|--|--|--|--|--|------|--|--|-----|



Vincotech

## Characteristic Values

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

### Aux Diode L

#### Static

|                         |       |                |  |  |    |                  |  |                      |                                           |    |
|-------------------------|-------|----------------|--|--|----|------------------|--|----------------------|-------------------------------------------|----|
| Forward voltage         | $V_F$ |                |  |  | 40 | 25<br>125<br>150 |  | 1,49<br>1,84<br>1,98 | 1,65 <sup>(1)</sup><br>2,3 <sup>(1)</sup> | V  |
| Reverse leakage current | $I_R$ | $V_i = 1200$ V |  |  |    | 25               |  | 2                    | 200                                       | µA |

#### Thermal

|                                                    |               |                                       |  |  |  |  |  |      |  |     |
|----------------------------------------------------|---------------|---------------------------------------|--|--|--|--|--|------|--|-----|
| Thermal resistance junction to sink <sup>(2)</sup> | $R_{th(j-s)}$ | $\lambda_{paste} = 3,4$ W/mK<br>(PSX) |  |  |  |  |  | 0,77 |  | K/W |
|----------------------------------------------------|---------------|---------------------------------------|--|--|--|--|--|------|--|-----|

### Thermistor

#### Static

|                                |                |                    |  |  |  |     |    |      |   |      |
|--------------------------------|----------------|--------------------|--|--|--|-----|----|------|---|------|
| Rated resistance               | $R$            |                    |  |  |  | 25  |    | 22   |   | kΩ   |
| Deviation of R100              | $\Delta_{R/R}$ | $R_{100} = 1484$ Ω |  |  |  | 100 | -5 |      | 5 | %    |
| Power dissipation              | $P$            |                    |  |  |  | 25  |    | 130  |   | mW   |
| Power dissipation constant     | $d$            |                    |  |  |  | 25  |    | 1,5  |   | mW/K |
| B-value                        | $B_{(25/50)}$  | Tol. $\pm 1$ %     |  |  |  |     |    | 3962 |   | K    |
| B-value                        | $B_{(25/100)}$ | Tol. $\pm 1$ %     |  |  |  |     |    | 4000 |   | K    |
| Vincotech Thermistor Reference |                |                    |  |  |  |     |    |      | I |      |

<sup>(1)</sup> Value at chip level

<sup>(2)</sup> Only valid with pre-applied Vincotech thermal interface material.



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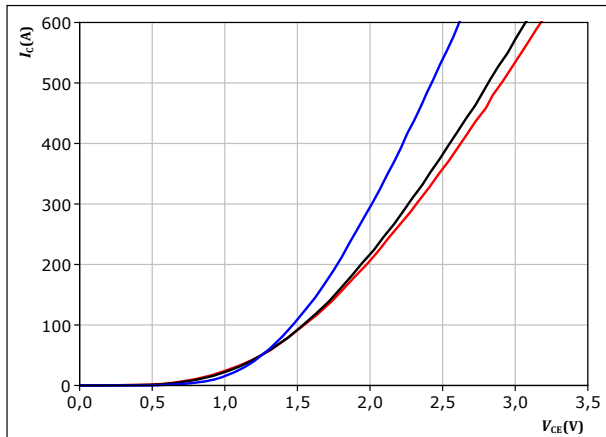
# 30-PT12B2A200H702-PK49L03Y datasheet

## Inner Boost Switch Characteristics

figure 1. IGBT

Typical output characteristics

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

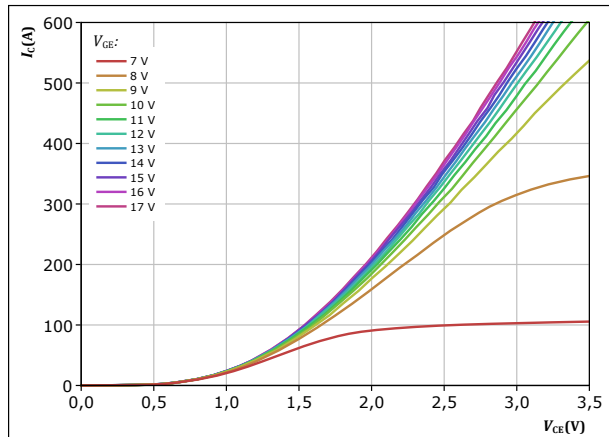


$t_p = 250 \mu s$   
 $V_{GE} = 15 V$   
 $T_j:$  25 °C, 125 °C, 150 °C

figure 2. IGBT

Typical output characteristics

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

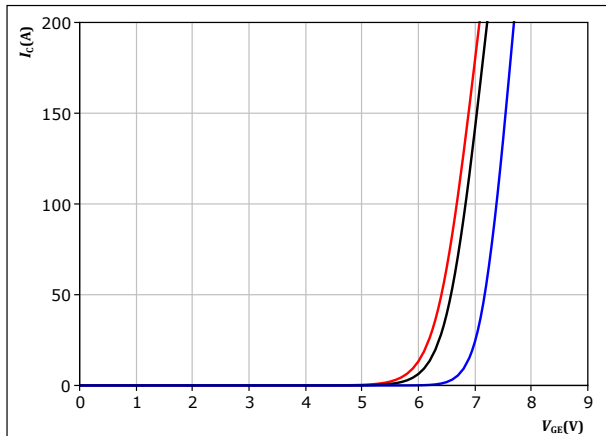


$t_p = 250 \mu s$   
 $T_j = 150 ^\circ C$   
 $V_{GE}$  from 7 V to 17 V in steps of 1 V

figure 3. IGBT

Typical transfer characteristics

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

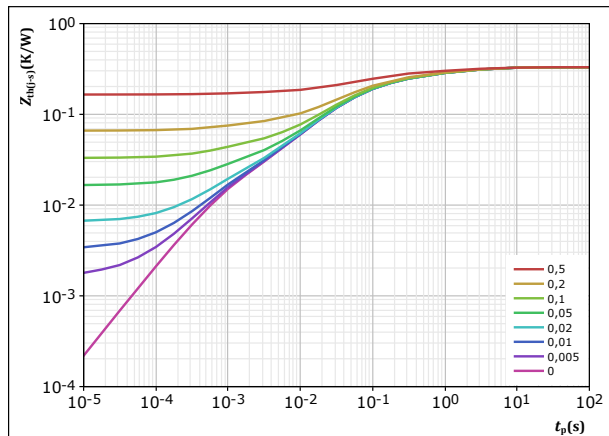


$t_p = 250 \mu s$   
 $V_{CE} = 48 V$   
 $T_j:$  25 °C, 125 °C, 150 °C

figure 4. IGBT

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$   
 $R_{th(j-s)} = 0,331 K/W$   
IGBT thermal model values  

| R (K/W)  | $\tau$ (s) |
|----------|------------|
| 3,72E-02 | 4,28E+00   |
| 7,68E-02 | 6,09E-01   |
| 1,42E-01 | 7,68E-02   |
| 6,11E-02 | 1,66E-02   |
| 1,38E-02 | 8,44E-04   |



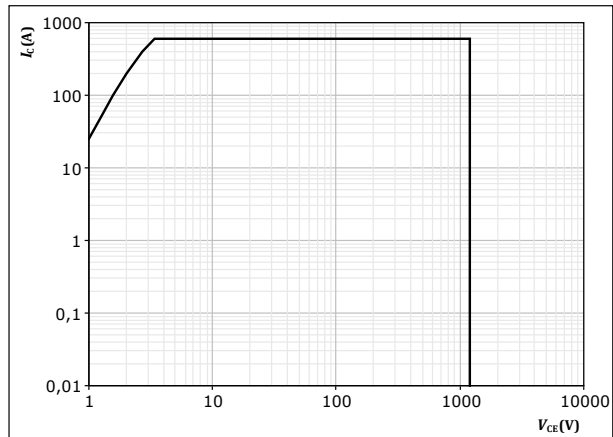
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## Inner Boost Switch Characteristics

figure 5. IGBT

Safe operating area

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

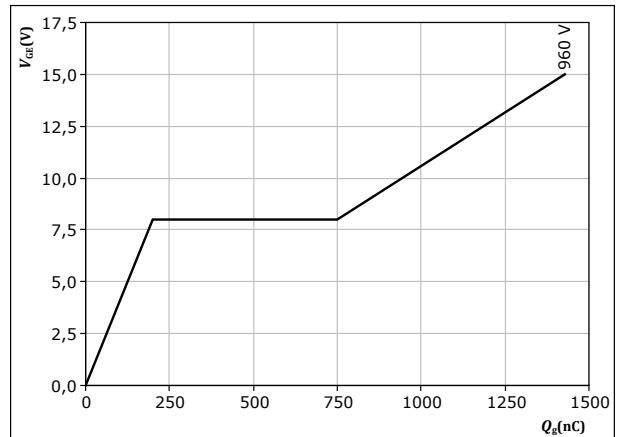


$D = \text{single pulse}$   
 $T_s = 80 \text{ } ^\circ\text{C}$   
 $V_{GE} = 15 \text{ V}$   
 $T_j = T_{jmax}$

figure 6. IGBT

Gate voltage vs gate charge

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



$I_C = 200 \text{ A}$   
 $T_j = 25 \text{ } ^\circ\text{C}$



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## Inner Boost Diode Characteristics

figure 7. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

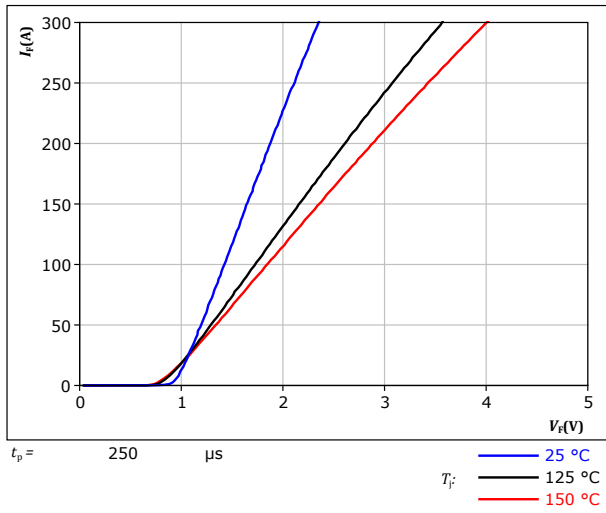
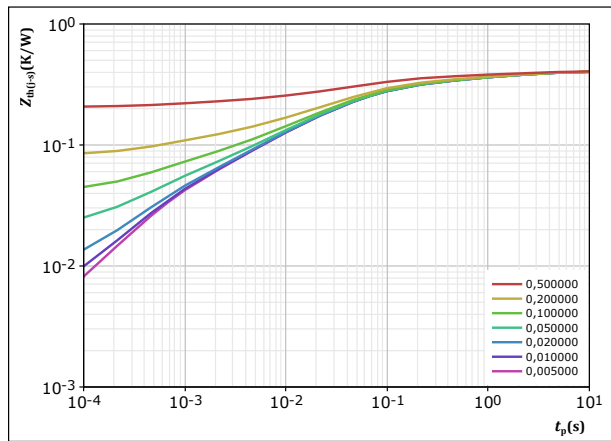


figure 8. FWD

Transient thermal impedance as a function of pulse width

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





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## Inner Boost Sw. Protection Diode Characteristics

figure 9. Rectifier

Typical forward characteristics

$$I_F = f(V_F)$$

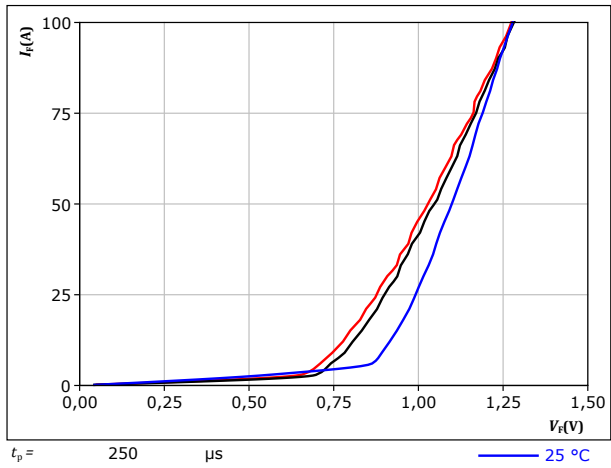
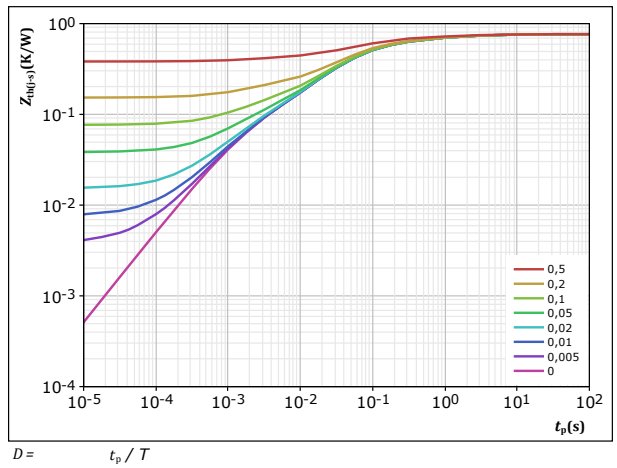


figure 10. Rectifier

Transient thermal impedance as a function of pulse width

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





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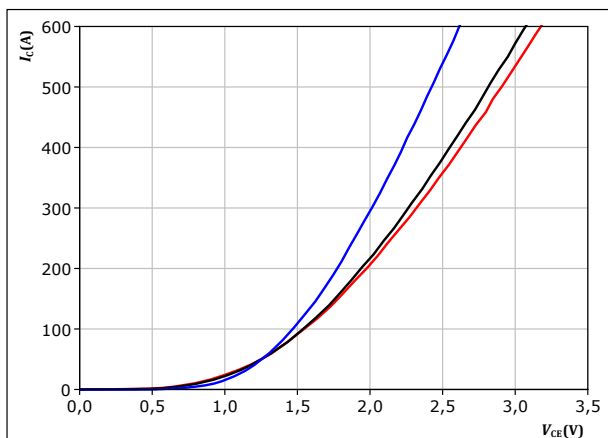
datasheet

## Outer Boost Switch Characteristics

figure 11. IGBT

Typical output characteristics

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

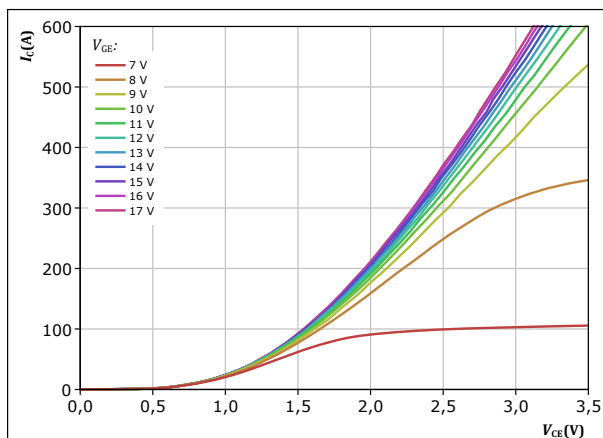


$t_p = 250 \mu s$   
 $V_{GE} = 15 V$   
 $T_j:$  25 °C, 125 °C, 150 °C

figure 12. IGBT

Typical output characteristics

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

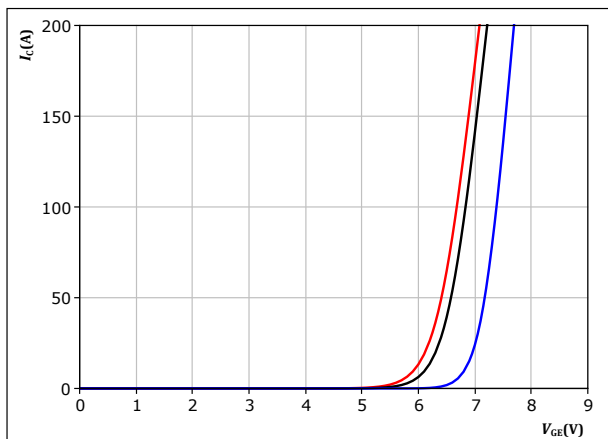


$t_p = 250 \mu s$   
 $T_j = 150 ^\circ C$   
 $V_{GE}$  from 7 V to 17 V in steps of 1 V

figure 13. IGBT

Typical transfer characteristics

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

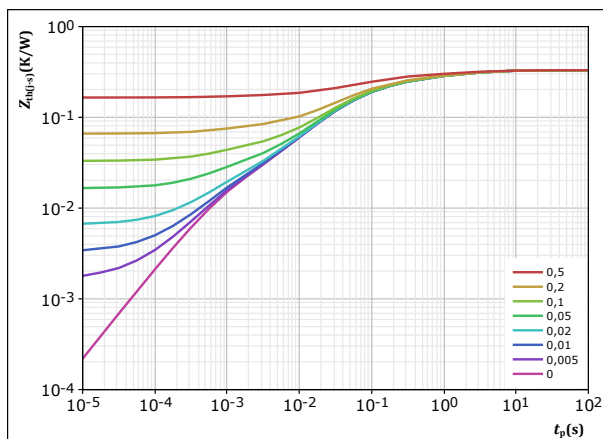


$t_p = 250 \mu s$   
 $V_{CE} = 48 V$   
 $T_j:$  25 °C, 125 °C, 150 °C

figure 14. IGBT

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$   
 $R_{th(j-s)} = 0,331 K/W$   
IGBT thermal model values  

| R (K/W)  | $\tau$ (s) |
|----------|------------|
| 3,72E-02 | 4,28E+00   |
| 7,68E-02 | 6,09E-01   |
| 1,42E-01 | 7,68E-02   |
| 6,11E-02 | 1,66E-02   |
| 1,38E-02 | 8,44E-04   |



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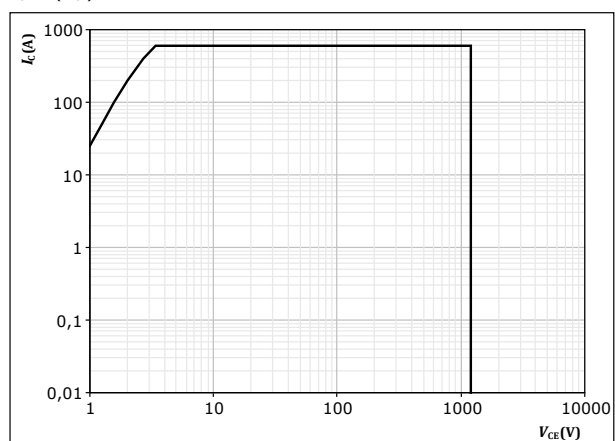
datasheet

## Outer Boost Switch Characteristics

figure 15. IGBT

Safe operating area

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

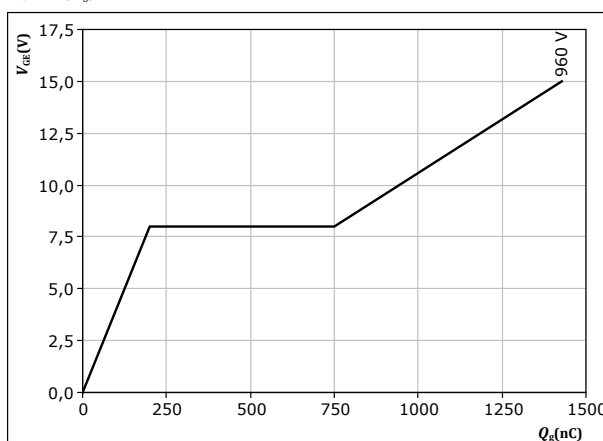


$D =$  single pulse  
 $T_s = 80$  °C  
 $V_{GE} = 15$  V  
 $T_j = T_{jmax}$

figure 16. IGBT

Gate voltage vs gate charge

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



$I_C = 200$  A  
 $T_j = 25$  °C



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## Outer Boost Diode Characteristics

figure 17.

FWD

Typical forward characteristics

$$I_F = f(V_F)$$

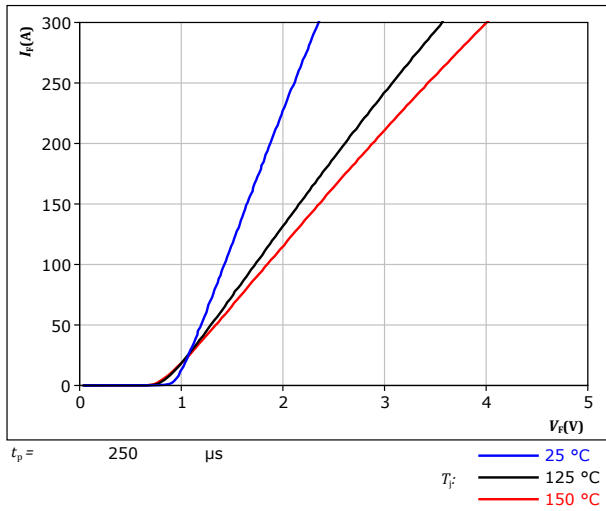
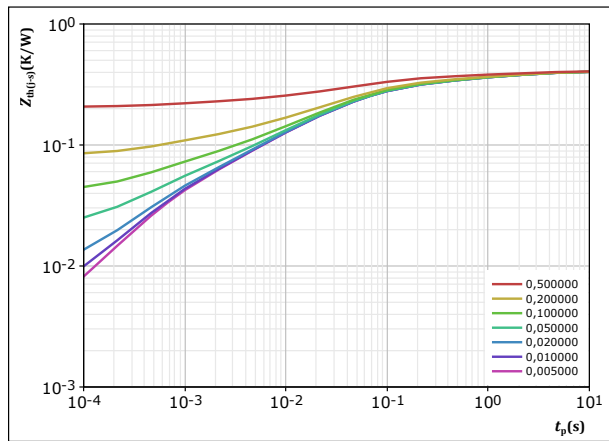


figure 18.

FWD

Transient thermal impedance as a function of pulse width

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





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## Outer Boost Sw. Protection Diode Characteristics

figure 19. Rectifier

Typical forward characteristics

$$I_F = f(V_F)$$

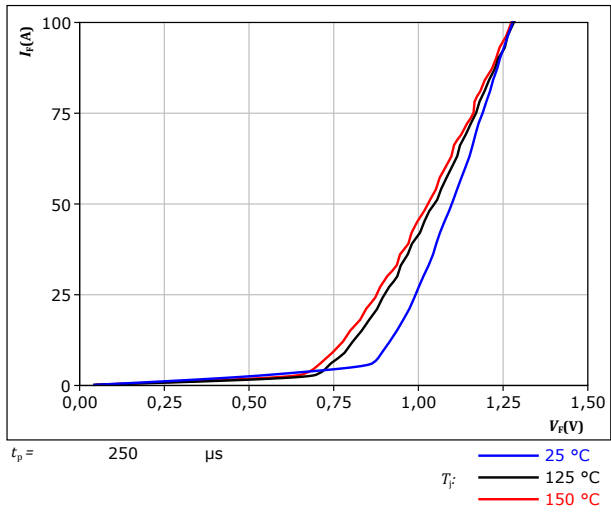
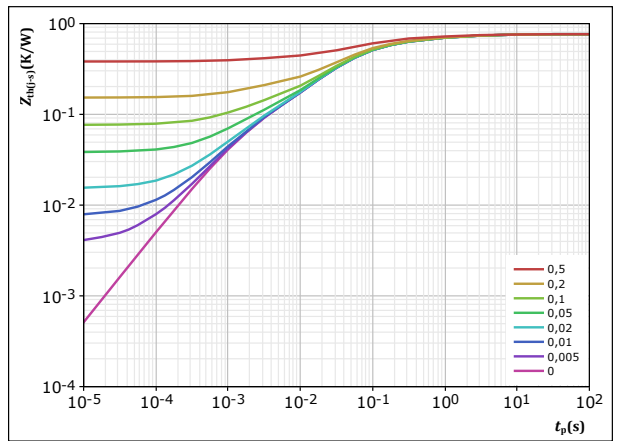


figure 20. Rectifier

Transient thermal impedance as a function of pulse width

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



|                                |            |
|--------------------------------|------------|
| $D =$                          | $t_p / T$  |
| $R_{th(j-s)} =$                | 0,765 K/W  |
| Rectifier thermal model values |            |
| $R$ (K/W)                      | $\tau$ (s) |
| 4,68E-02                       | 5,24E+00   |
| 1,43E-01                       | 5,88E-01   |
| 3,57E-01                       | 7,04E-02   |
| 1,61E-01                       | 1,86E-02   |
| 5,74E-02                       | 1,54E-03   |



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## Aux Diode H Characteristics

figure 21.

FWD

Typical forward characteristics

$$I_F = f(V_F)$$

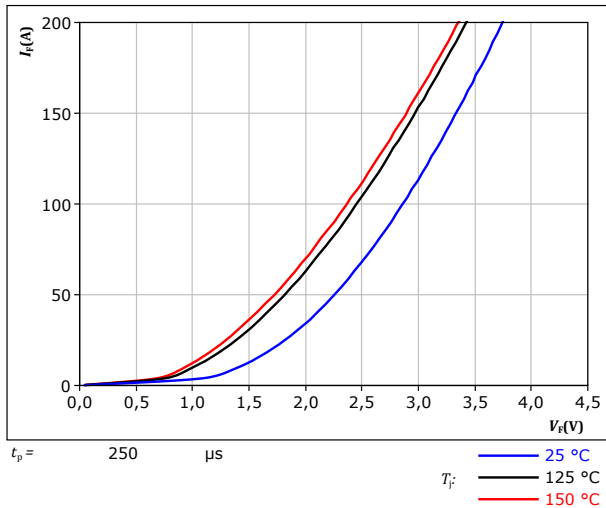
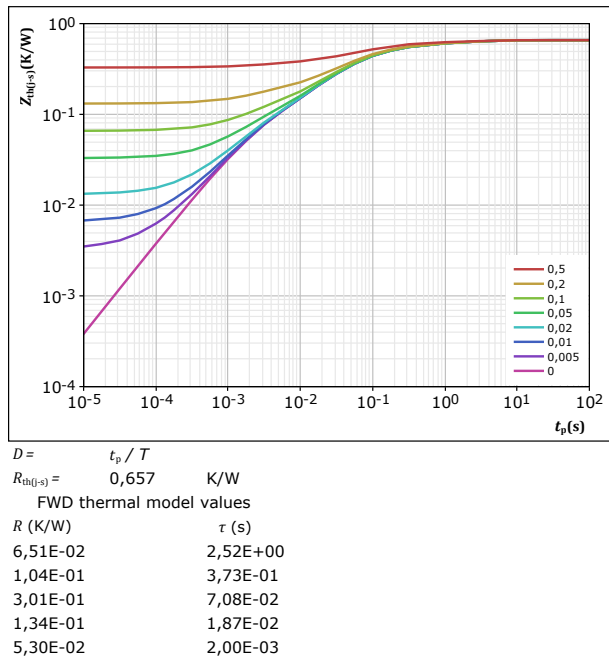


figure 22.

FWD

Transient thermal impedance as a function of pulse width

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





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## Aux Diode L Characteristics

figure 23.

FWD

Typical forward characteristics

$$I_F = f(V_F)$$

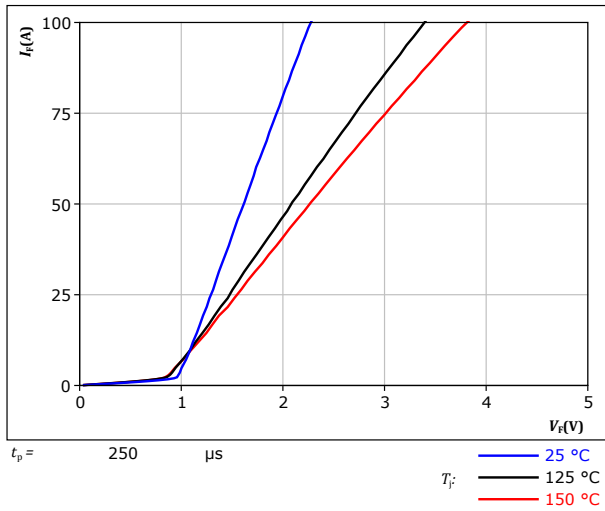
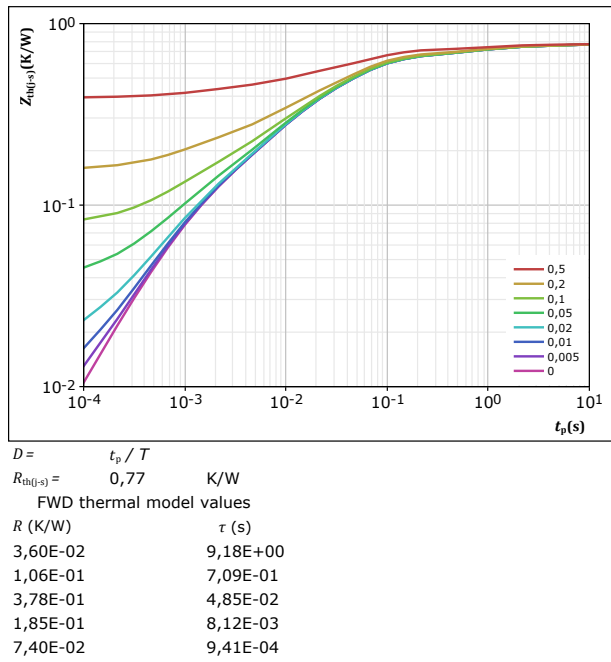


figure 24.

FWD

Transient thermal impedance as a function of pulse width

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





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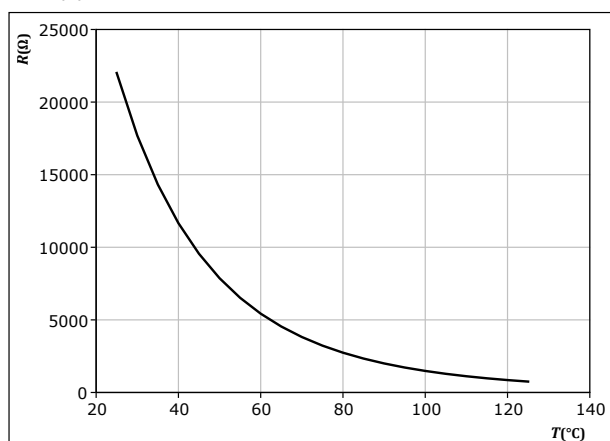
## Thermistor Characteristics

figure 25.

Thermistor

Typical NTC characteristic as function of temperature

$$R_T = f(T)$$





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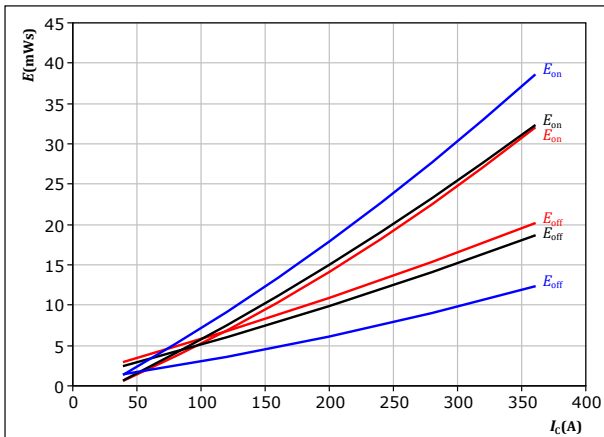
## Inner Boost Switching Characteristics

figure 26.

IGBT

Typical switching energy losses as a function of collector current

$$E = f(I_c)$$



With an inductive load at

$V_{CE} = 700 \text{ V}$   
 $V_{GE} = \pm 15 \text{ V}$   
 $R_{gon} = 16 \text{ } \Omega$   
 $R_{goff} = 16 \text{ } \Omega$

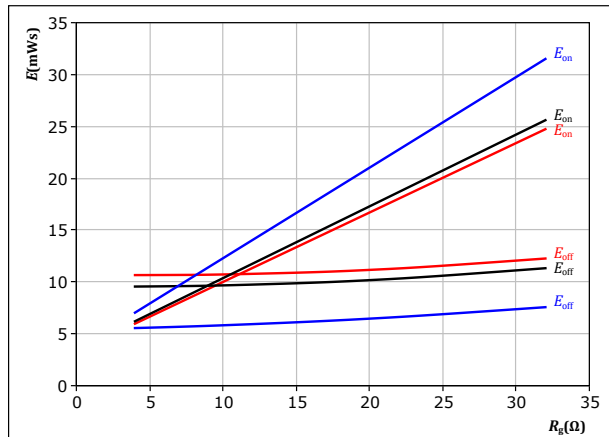
$T_j$ :  
— 25 °C  
— 125 °C  
— 150 °C

figure 27.

IGBT

Typical switching energy losses as a function of IGBT turn on gate resistor

$$E = f(R_g)$$



With an inductive load at

$V_{CE} = 700 \text{ V}$   
 $V_{GE} = \pm 15 \text{ V}$   
 $I_c = 200 \text{ A}$

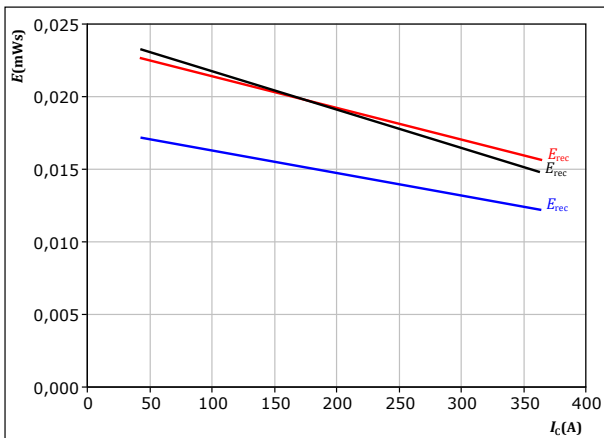
$T_j$ :  
— 25 °C  
— 125 °C  
— 150 °C

figure 28.

FWD

Typical reverse recovered energy loss as a function of collector current

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



With an inductive load at

$V_{CE} = 700 \text{ V}$   
 $V_{GE} = \pm 15 \text{ V}$   
 $R_{gon} = 16 \text{ } \Omega$

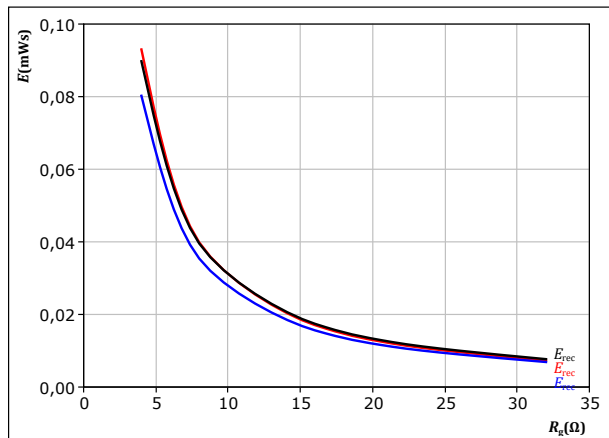
$T_j$ :  
— 25 °C  
— 125 °C  
— 150 °C

figure 29.

FWD

Typical reverse recovered energy loss as a function of IGBT turn on gate resistor

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



With an inductive load at

$V_{CE} = 700 \text{ V}$   
 $V_{GE} = \pm 15 \text{ V}$   
 $I_c = 200 \text{ A}$

$T_j$ :  
— 25 °C  
— 125 °C  
— 150 °C



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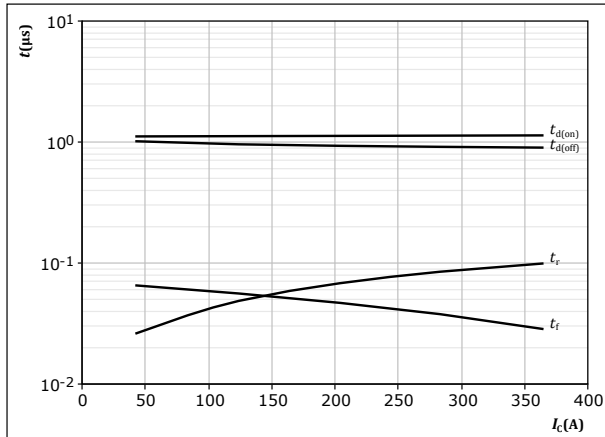
# 30-PT12B2A200H702-PK49L03Y datasheet

## Inner Boost Switching Characteristics

figure 30.

IGBT

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



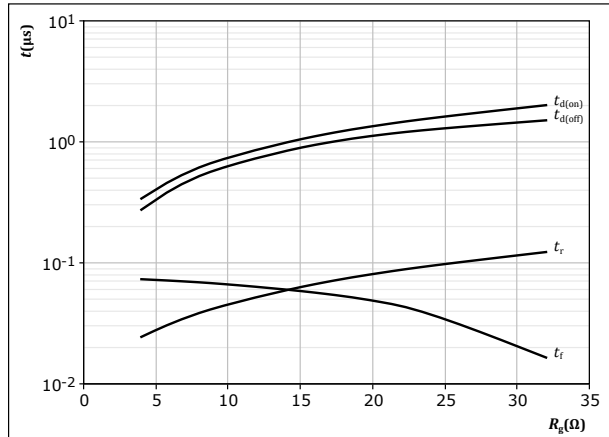
With an inductive load at

$T_j = 150$  °C  
 $V_{CE} = 700$  V  
 $V_{GE} = \pm 15$  V  
 $R_{gon} = 16$  Ω  
 $R_{goff} = 16$  Ω

figure 31.

IGBT

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



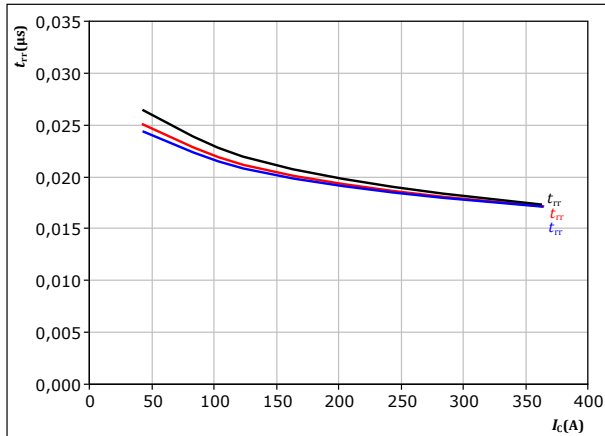
With an inductive load at

$T_j = 150$  °C  
 $V_{CE} = 700$  V  
 $V_{GE} = \pm 15$  V  
 $I_c = 200$  A

figure 32.

FWD

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



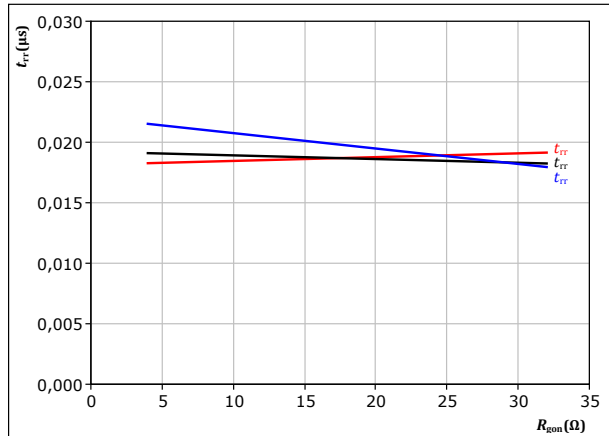
With an inductive load at

$V_{CE} = 700$  V  
 $V_{GE} = \pm 15$  V  
 $R_{gon} = 16$  Ω  
 $T_j: 25$  °C (blue),  $125$  °C (black),  $150$  °C (red)

figure 33.

FWD

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



With an inductive load at

$V_{CE} = 700$  V  
 $V_{GE} = \pm 15$  V  
 $I_c = 200$  A  
 $T_j: 25$  °C (blue),  $125$  °C (black),  $150$  °C (red)



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datasheet

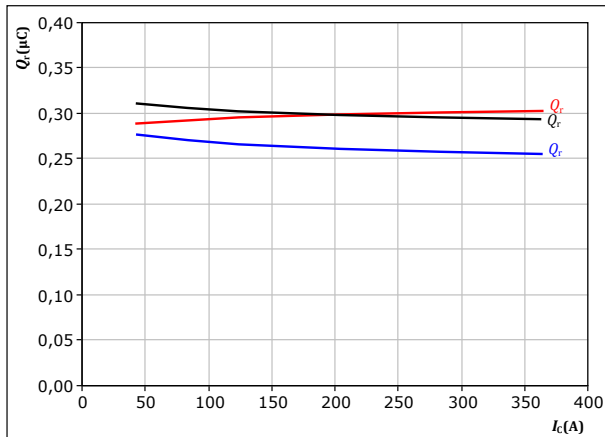
## Inner Boost Switching Characteristics

figure 34.

FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$



With an inductive load at

$V_{CE} = 700$  V  
 $V_{GE} = \pm 15$  V  
 $R_{gon} = 16$  Ω

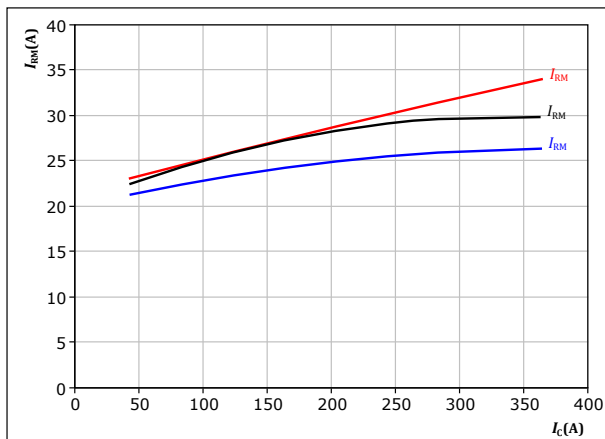
$T_j$ : 25 °C  
125 °C  
150 °C

figure 36.

FWD

Typical peak reverse recovery current as a function of collector current

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



With an inductive load at

$V_{CE} = 700$  V  
 $V_{GE} = \pm 15$  V  
 $R_{gon} = 16$  Ω

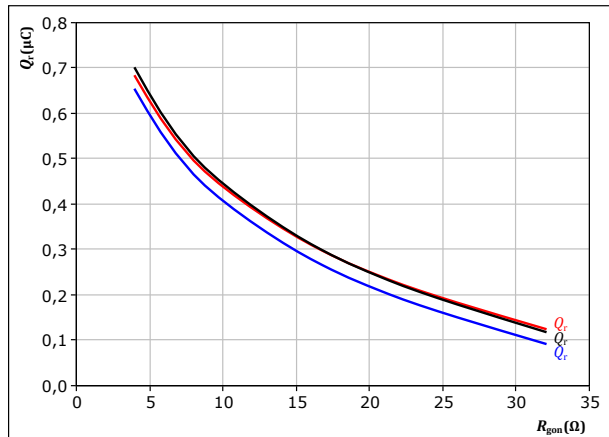
$T_j$ : 25 °C  
125 °C  
150 °C

figure 35.

FWD

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

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



With an inductive load at

$V_{CE} = 700$  V  
 $V_{GE} = \pm 15$  V  
 $I_c = 200$  A

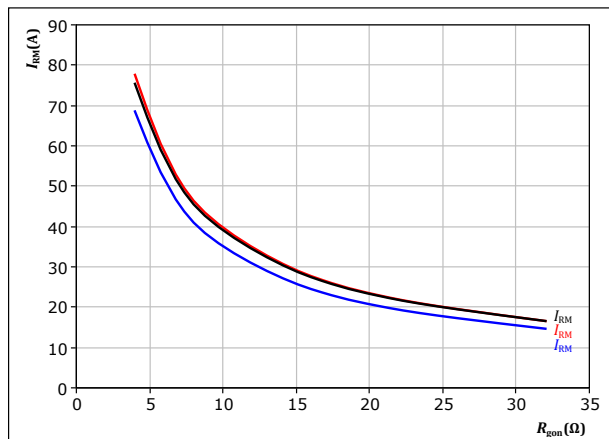
$T_j$ : 25 °C  
125 °C  
150 °C

figure 37.

FWD

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

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



With an inductive load at

$V_{CE} = 700$  V  
 $V_{GE} = \pm 15$  V  
 $I_c = 200$  A

$T_j$ : 25 °C  
125 °C  
150 °C



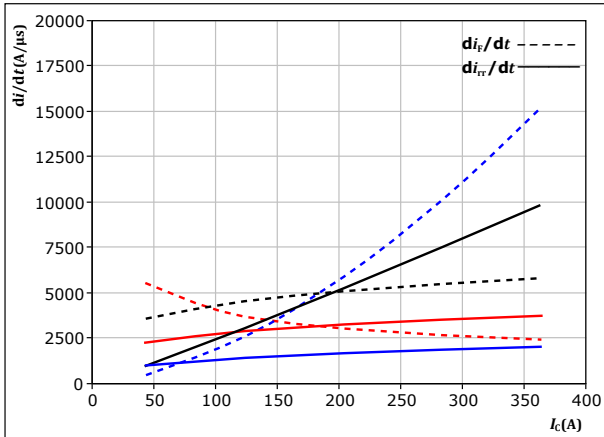
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30-PT12B2A200H702-PK49L03Y  
datasheet

## Inner Boost Switching Characteristics

figure 38. FWD

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



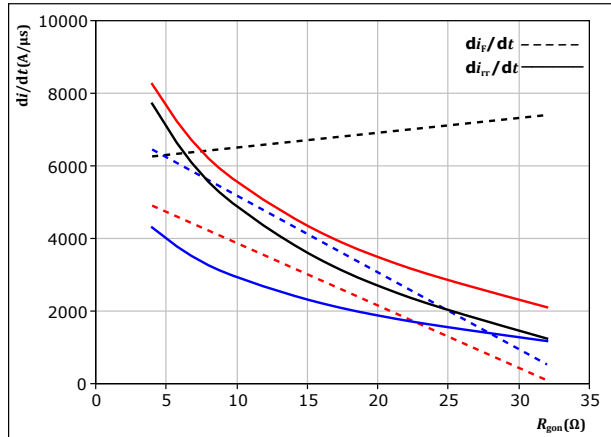
With an inductive load at

$V_{CE} = 700 \text{ V}$   
 $V_{GE} = \pm 15 \text{ V}$   
 $R_{gon} = 16 \text{ } \Omega$

$T_j$ :  
— 25 °C  
— 125 °C  
— 150 °C

figure 39. FWD

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



With an inductive load at

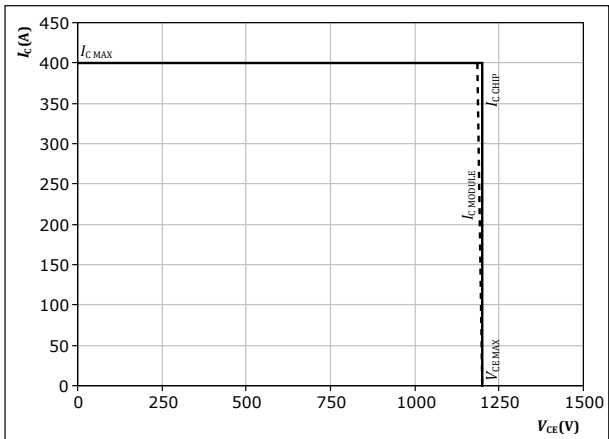
$V_{CE} = 700 \text{ V}$   
 $V_{GE} = \pm 15 \text{ V}$   
 $I_C = 200 \text{ A}$

$T_j$ :  
— 25 °C  
— 125 °C  
— 150 °C

figure 40. IGBT

Reverse bias safe operating area

$I_C = f(V_{CE})$



At  $T_j = 150 \text{ } ^\circ\text{C}$   
 $R_{gon} = 16 \text{ } \Omega$   
 $R_{goff} = 16 \text{ } \Omega$



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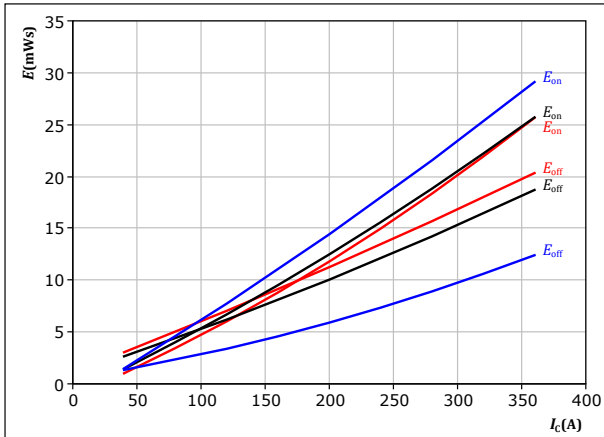
### Outer Boost Switching Characteristics

figure 41.

IGBT

Typical switching energy losses as a function of collector current

$$E = f(I_c)$$



With an inductive load at

$V_{CE} = 700$  V  
 $V_{GE} = \pm 15$  V  
 $R_{gon} = 16$   $\Omega$   
 $R_{goff} = 16$   $\Omega$

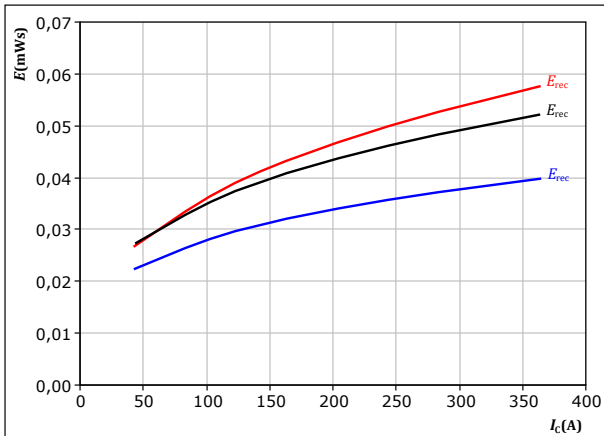
$T_j$ : 25 °C  
125 °C  
150 °C

figure 43.

FWD

Typical reverse recovered energy loss as a function of collector current

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



With an inductive load at

$V_{CE} = 700$  V  
 $V_{GE} = \pm 15$  V  
 $R_{gon} = 16$   $\Omega$

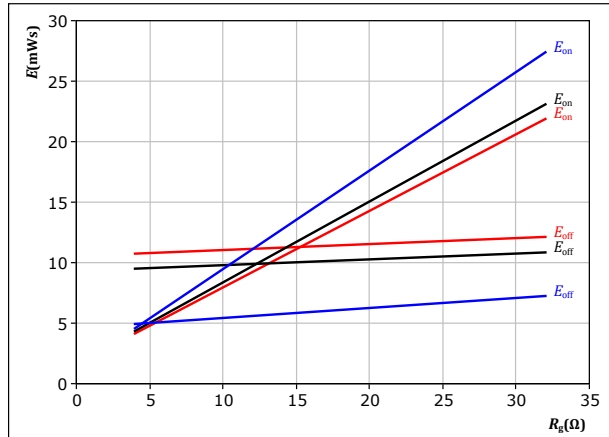
$T_j$ : 25 °C  
125 °C  
150 °C

figure 42.

IGBT

Typical switching energy losses as a function of IGBT turn on gate resistor

$$E = f(R_g)$$



With an inductive load at

$V_{CE} = 700$  V  
 $V_{GE} = \pm 15$  V  
 $I_c = 200$  A

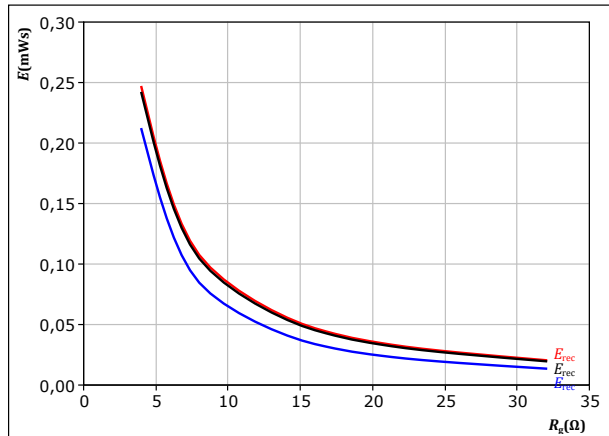
$T_j$ : 25 °C  
125 °C  
150 °C

figure 44.

FWD

Typical reverse recovered energy loss as a function of IGBT turn on gate resistor

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



With an inductive load at

$V_{CE} = 700$  V  
 $V_{GE} = \pm 15$  V  
 $I_c = 200$  A

$T_j$ : 25 °C  
125 °C  
150 °C



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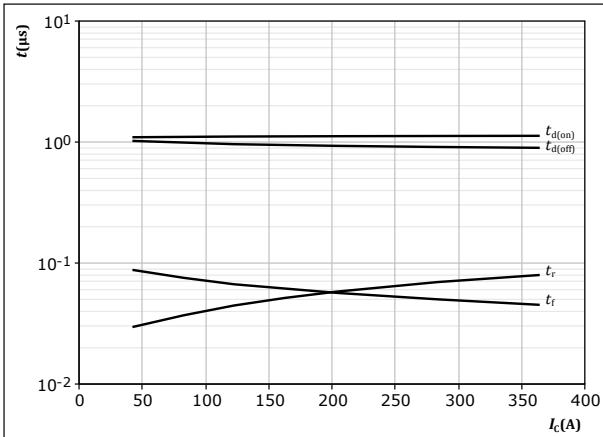
## Outer Boost Switching Characteristics

figure 45.

IGBT

Typical switching times as a function of collector current

$$t = f(I_C)$$



With an inductive load at

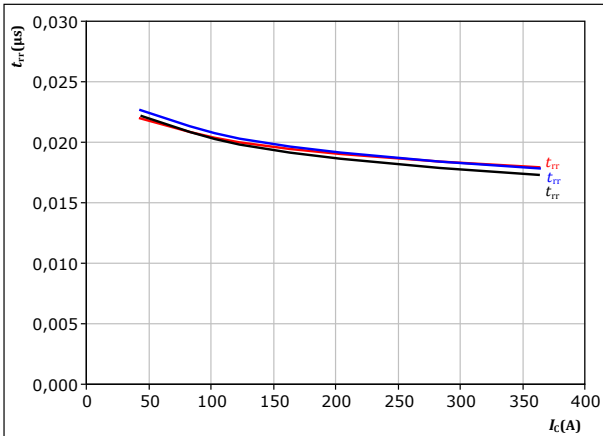
$T_j = 150$  °C  
 $V_{CE} = 700$  V  
 $V_{GE} = \pm 15$  V  
 $R_{gon} = 16$   $\Omega$   
 $R_{goff} = 16$   $\Omega$

figure 47.

FWD

Typical reverse recovery time as a function of collector current

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



With an inductive load at

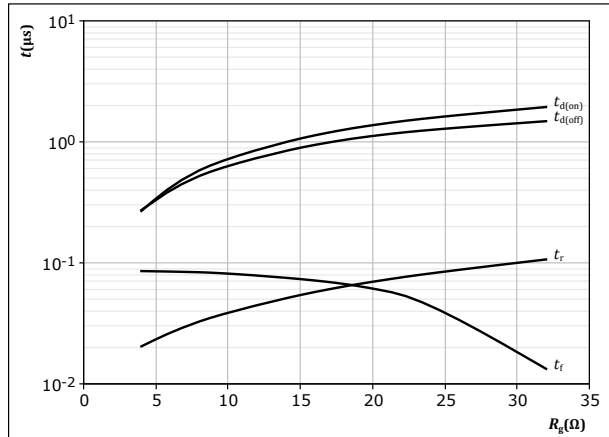
$V_{CE} = 700$  V  
 $V_{GE} = \pm 15$  V  
 $R_{gon} = 16$   $\Omega$   
 $T_j: 25$  °C (blue),  $125$  °C (black),  $150$  °C (red)

figure 46.

IGBT

Typical switching times as a function of IGBT turn on gate resistor

$$t = f(R_g)$$



With an inductive load at

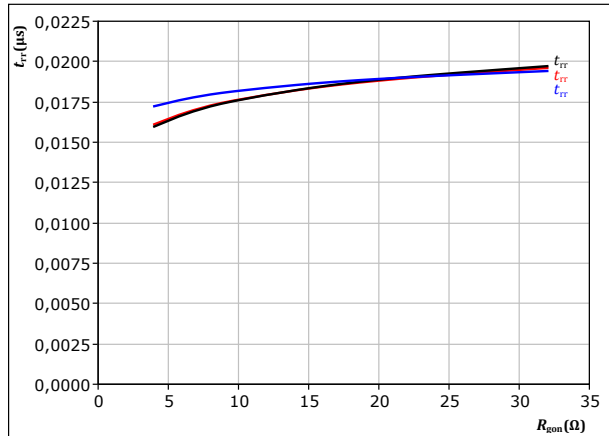
$T_j = 150$  °C  
 $V_{CE} = 700$  V  
 $V_{GE} = \pm 15$  V  
 $I_C = 200$  A

figure 48.

FWD

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

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



With an inductive load at

$V_{CE} = 700$  V  
 $V_{GE} = \pm 15$  V  
 $I_C = 200$  A  
 $T_j: 25$  °C (blue),  $125$  °C (black),  $150$  °C (red)



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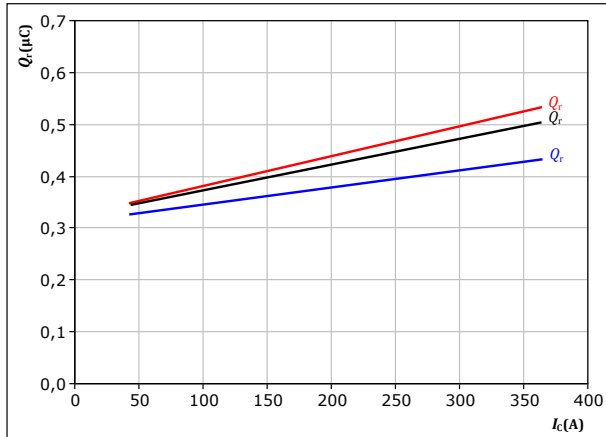
datasheet

## Outer Boost Switching Characteristics

figure 49. FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$



With an inductive load at

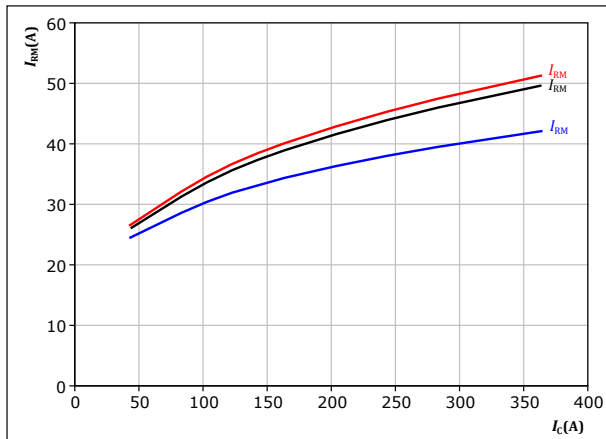
$V_{CE} = 700$  V  
 $V_{GE} = \pm 15$  V  
 $R_{gon} = 16$  Ω

$T_j$ :  
— 25 °C  
— 125 °C  
— 150 °C

figure 51. FWD

Typical peak reverse recovery current as a function of collector current

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



With an inductive load at

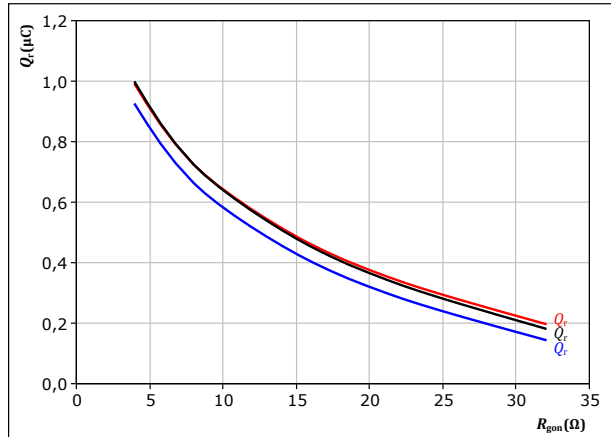
$V_{CE} = 700$  V  
 $V_{GE} = \pm 15$  V  
 $R_{gon} = 16$  Ω

$T_j$ :  
— 25 °C  
— 125 °C  
— 150 °C

figure 50. FWD

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

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



With an inductive load at

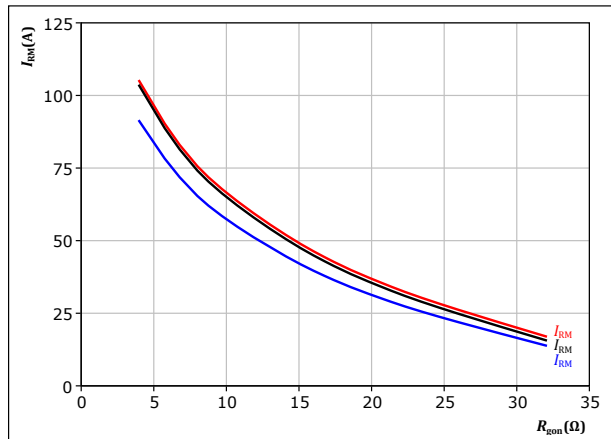
$V_{CE} = 700$  V  
 $V_{GE} = \pm 15$  V  
 $I_c = 200$  A

$T_j$ :  
— 25 °C  
— 125 °C  
— 150 °C

figure 52. FWD

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

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



With an inductive load at

$V_{CE} = 700$  V  
 $V_{GE} = \pm 15$  V  
 $I_c = 200$  A

$T_j$ :  
— 25 °C  
— 125 °C  
— 150 °C



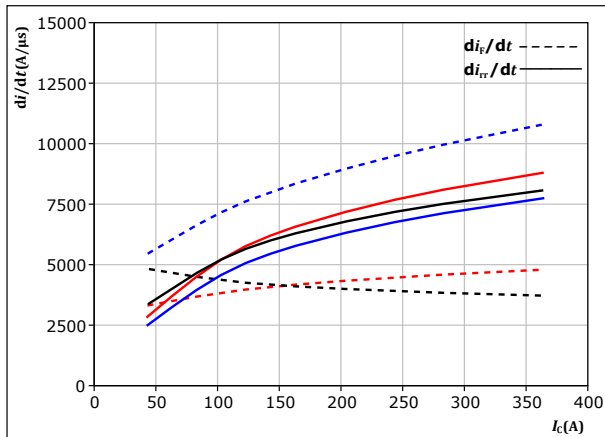
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### Outer Boost Switching Characteristics

figure 53. FWD

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

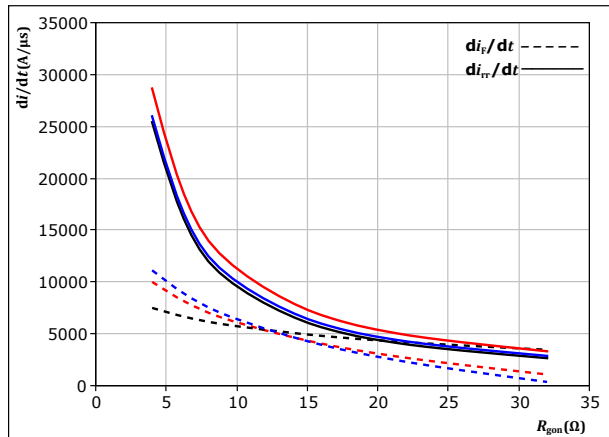


With an inductive load at

$V_{CE} = 700$  V  
 $V_{GE} = \pm 15$  V  
 $R_{gon} = 16$  Ω  
 $T_j:$  25 °C (blue), 125 °C (black), 150 °C (red)

figure 54. FWD

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



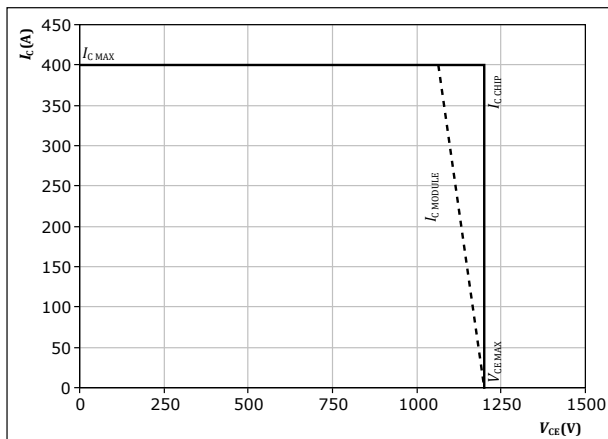
With an inductive load at

$V_{CE} = 700$  V  
 $V_{GE} = \pm 15$  V  
 $I_C = 200$  A  
 $T_j:$  25 °C (blue), 125 °C (black), 150 °C (red)

figure 55. IGBT

Reverse bias safe operating area

$I_C = f(V_{CE})$



At  $T_j = 150$  °C  
 $R_{gon} = 16$  Ω  
 $R_{goff} = 16$  Ω



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## Switching Definitions

figure 56. IGBT

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

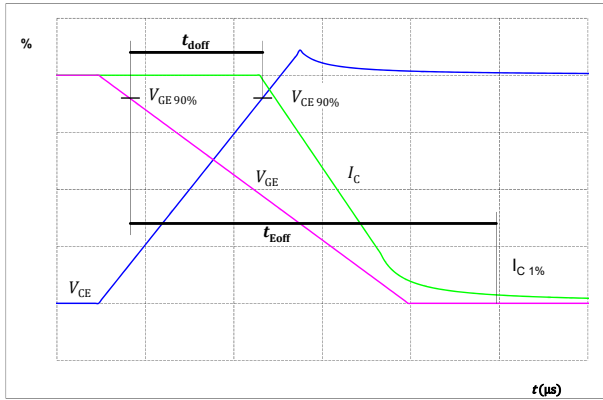


figure 57. IGBT

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

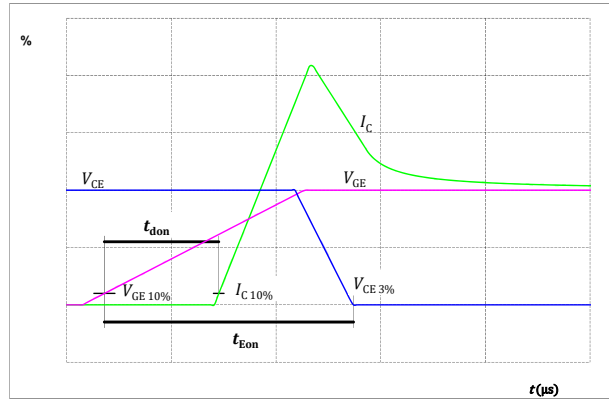


figure 58. IGBT

Turn-off Switching Waveforms & definition of  $t_f$

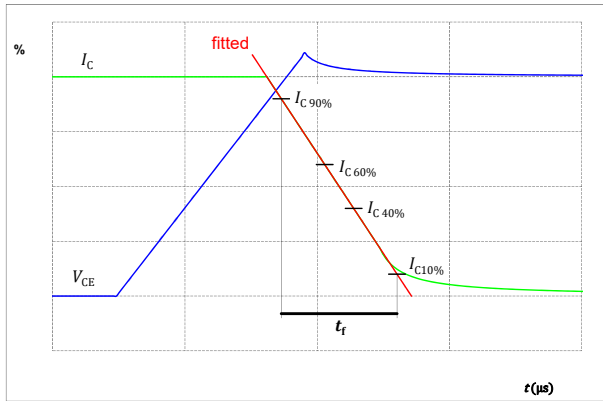
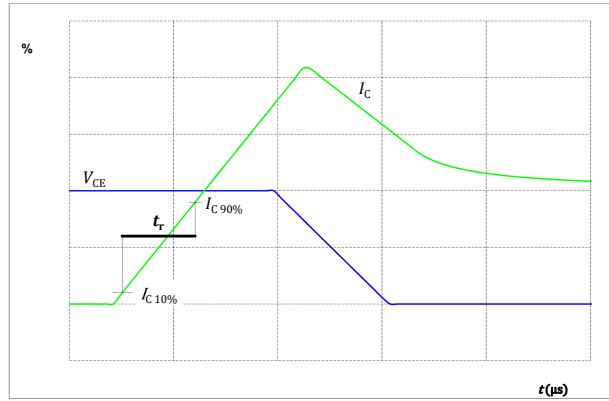


figure 59. IGBT

Turn-on Switching Waveforms & definition of  $t_r$





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## Switching Definitions

figure 60. FWD

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

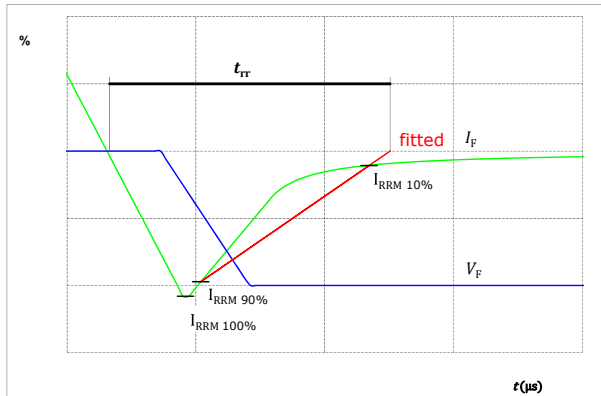
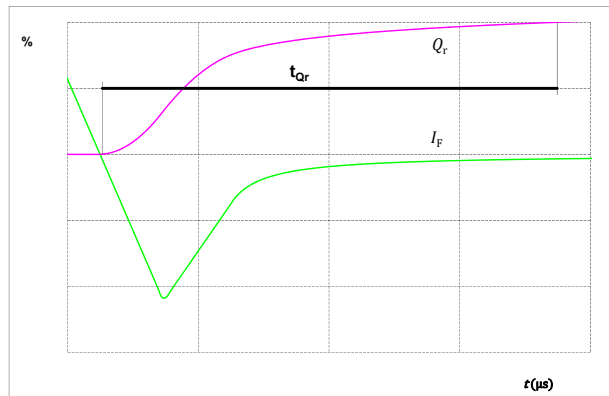


figure 61. FWD

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





**30-PT12B2A200H702-PK49L03Y**  
datasheet

| Ordering Code                         |                                |
|---------------------------------------|--------------------------------|
| Version                               | Ordering Code                  |
| Without thermal paste                 | 30-PT12B2A200H702-PK49L03Y     |
| With thermal paste (3.4 W/mK, PSX-P7) | 30-PT12B2A200H702-PK49L03Y-/3/ |

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

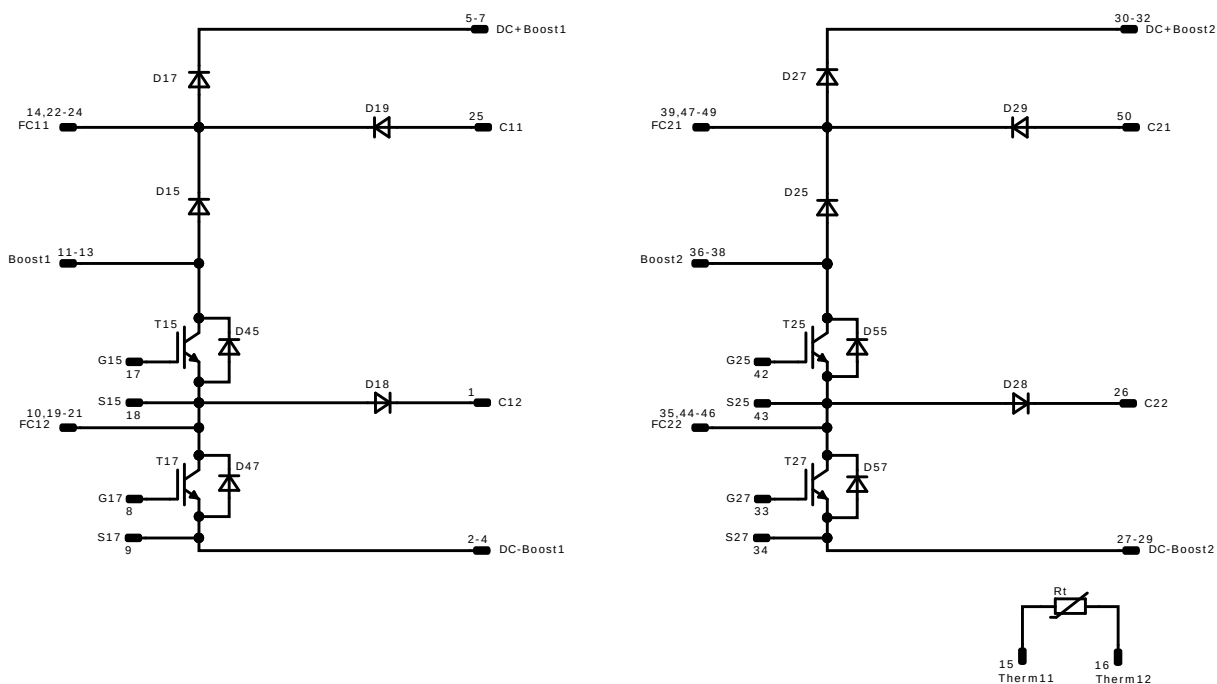
| Outline        |      |      |           |    |               |      |           |
|----------------|------|------|-----------|----|---------------|------|-----------|
| Pin table [mm] |      |      |           |    |               |      |           |
| Pin            | X    | Y    | Function  | 26 | 70,9          | 0    | C22       |
| 1              | 0    | 0    | C12       | 27 | 53,9          | 0    | DC-Boost2 |
| 2              | 17   | 0    | DC-Boost1 | 28 | 50,9          | 0    | DC-Boost2 |
| 3              | 20   | 0    | DC-Boost1 | 29 | 50,9          | 3    | DC-Boost2 |
| 4              | 20   | 3    | DC-Boost1 | 30 | 38            | 0    | DC+Boost2 |
| 5              | 32,9 | 0    | DC+Boost1 | 31 | 38            | 3    | DC+Boost2 |
| 6              | 32,9 | 3    | DC+Boost1 | 32 | 38            | 6    | DC+Boost2 |
| 7              | 32,9 | 6    | DC+Boost1 | 33 | 67,9          | 13   | G27       |
| 8              | 3    | 13   | G17       | 34 | 70,9          | 13   | S27       |
| 9              | 0    | 13   | S17       | 35 | 62,9          | 18,5 | FC22      |
| 10             | 8    | 18,5 | FC12      | 36 | 54,4          | 21,5 | Boost2    |
| 11             | 16,5 | 21,5 | Boost1    | 37 | 51,4          | 18,5 | Boost2    |
| 12             | 19,5 | 18,5 | Boost1    | 38 | 51,4          | 21,5 | Boost2    |
| 13             | 19,5 | 21,5 | Boost1    | 39 | 44,4          | 18,5 | FC21      |
| 14             | 26,5 | 18,5 | FC11      | 40 | not assembled |      |           |
| 15             | 32,9 | 25   | Therm11   | 41 | not assembled |      |           |
| 16             | 32,9 | 22   | Therm12   | 42 | 70,9          | 36,9 | G25       |
| 17             | 0    | 36,9 | G15       | 43 | 67,9          | 36,9 | S25       |
| 18             | 3    | 36,9 | S15       | 44 | 64,9          | 36,9 | FC22      |
| 19             | 6    | 36,9 | FC12      | 45 | 61,9          | 36,9 | FC22      |
| 20             | 9    | 36,9 | FC12      | 46 | 58,9          | 36,9 | FC22      |
| 21             | 12   | 36,9 | FC12      | 47 | 51,9          | 36,9 | FC21      |
| 22             | 19   | 36,9 | FC11      | 48 | 48,9          | 36,9 | FC21      |
| 23             | 22   | 36,9 | FC11      | 49 | 45,9          | 36,9 | FC21      |
| 24             | 25   | 36,9 | FC11      | 50 | 38            | 36,9 | C21       |
| 25             | 32,9 | 36,9 | C11       |    |               |      |           |



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datasheet

**Pinout**



**Identification**

| ID       | Component  | Voltage | Current | Function                         | Comment |
|----------|------------|---------|---------|----------------------------------|---------|
| T15, T25 | IGBT       | 1200 V  | 200 A   | Inner Boost Switch               |         |
| D15, D25 | FWD        | 1200 V  | 100 A   | Inner Boost Diode                |         |
| D45, D55 | Rectifier  | 1600 V  | 40 A    | Inner Boost Sw. Protection Diode |         |
| T17, T27 | IGBT       | 1200 V  | 200 A   | Outer Boost Switch               |         |
| D17, D27 | FWD        | 1200 V  | 100 A   | Outer Boost Diode                |         |
| D47, D57 | Rectifier  | 1600 V  | 40 A    | Outer Boost Sw. Protection Diode |         |
| D19, D29 | FWD        | 1200 V  | 75 A    | Aux Diode H                      |         |
| D18, D28 | FWD        | 1200 V  | 40 A    | Aux Diode L                      |         |
| Rt       | Thermistor |         |         | Thermistor                       |         |



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datasheet

| Packaging instruction                                                                                                                                                                                                           |      |          |      |                                                                                       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------|------|---------------------------------------------------------------------------------------|
| Standard packaging quantity (SPQ) 36                                                                                                                                                                                            | >SPQ | Standard | <SPQ | Sample                                                                                |
| Handling instruction                                                                                                                                                                                                            |      |          |      |                                                                                       |
| Handling instructions for <i>flow 2</i> packages see vincotech.com website.                                                                                                                                                     |      |          |      |                                                                                       |
| Package data                                                                                                                                                                                                                    |      |          |      |                                                                                       |
| Package data for <i>flow 2</i> packages see vincotech.com website.                                                                                                                                                              |      |          |      |                                                                                       |
| Vincotech thermistor reference                                                                                                                                                                                                  |      |          |      |                                                                                       |
| See Vincotech thermistor reference table at vincotech.com website.                                                                                                                                                              |      |          |      |                                                                                       |
| Application Note                                                                                                                                                                                                                |      |          |      |                                                                                       |
| For use of pre-charging auxiliary diodes see application note: "The Advantages and Operation of Flying-Capacitor Boosters" at vincotech.com                                                                                     |      |          |      |                                                                                       |
| UL recognition and file number                                                                                                                                                                                                  |      |          |      |                                                                                       |
| This device is UL 1557 recognized under E192116 up to a junction temperature under switching condition $T_{j,op}=175^{\circ}\text{C}$ and up to 4000VAC/1min isolation voltage. For more information see vincotech.com website. |      |          |      |  |

| Document No.:                    | Date:        | Modification:                                                                                       | Pages |
|----------------------------------|--------------|-----------------------------------------------------------------------------------------------------|-------|
| 30-PT12B2A200H702-PK49L03Y-D2-14 | 28 Sep. 2026 | Update Boost Sw. Protection Diode characteristics<br>Change Aux Diode Low according to PCN-2026-008 |       |

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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.