***flow* BOOST 0** **1200 V / 50 A**

### Features

- High efficiency dual boost
- Ultra fast switching frequency
- Low Inductance Layout
- 1200V IGBT and 1200V SiC diode
- Antiparallel IGBT protection diode with high current

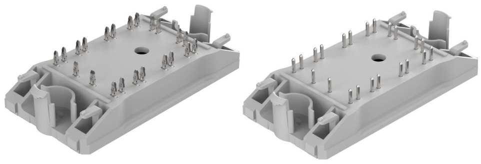
### Target Applications

- solar inverter

### Types

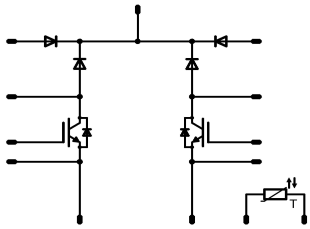
- V23990-P629-L43-PM
- V23990-P629-L43Y-PM

### *flow* 0 12mm housing



Press-fit pins solder pins

### Schematic




# Maximum Ratings

$T_j$=25°C, unless otherwise specified

| Parameter | Symbol | Condition | | Value | Unit |
|---|---|---|---|---|---|
| **Bypass Diode D5, D6 / Boost Sw. Protection Diode D1, D2** | | | | | |
| Repetitive peak reverse voltage | $V_{RRM}$ | | | 1600 | V |
| Mean forward current | $I_{FAV}$ | $T_j=T_{jmax}$ | $T_s$ = 80°C<br>$T_c$=80°C | 38<br>45 | A |
| Surge (non-repetitive) forward current | $I_{FSM}$ | $t_p$=10ms | $T_j$=25°C | 220 | A |
| $I^2$t-value | $I^2t$ | $t_p$=10ms | $T_j$=25°C | 200 | $A^2s$ |
| Power dissipation | $P_{tot}$ | $T_j=T_{jmax}$ | $T_s$ = 80°C<br>$T_c$=80°C | 47<br>71 | W |
| Maximum Junction Temperature | $T_{jmax}$ | | | 150 | °C |
| **Boost Switch (T1,T2)** | | | | | |
| Collector-emitter break down voltage | $V_{CES}$ | | | 1200 | V |
| DC collector current | $I_C$ | $T_j=T_{jmax}$ | $T_s$ = 80°C<br>$T_c$=80°C | 51<br>65 | A |
| Repetitive peak collector current | $I_{CRM}$ | $t_p$ limited by $T_{jmax}$ | | 150 | A |
| Turn off safe operating area | | $T_j$≤150°C<br>$V_{CE}$<=$V_{CES}$ | | 100 | A |
| Power dissipation | $P_{tot}$ | $T_j=T_{jmax}$ | $T_s$ = 80°C<br>$T_c$=80°C | 144<br>210 | W |
| Gate-emitter peak voltage | $V_{GE}$ | | | ±20 | V |
| Short circuit ratings | $t_{SC}$<br>$V_{CC}$ | $T_j$≤150°C<br>$V_{GE}$=15V | | 10<br>800 | μs<br>V |
| Maximum Junction Temperature | $T_{jmax}$ | | | 175 | °C |

# Maximum Ratings

$T_j$=25°C, unless otherwise specified

| Parameter | Symbol | Condition | | Value | Unit |
|---|---|---|---|---|---|
| **Boost Diode (D3,D4)** | | | | | |
| Peak Repetitive Reverse Voltage | $V_{RRM}$ | | | 1200 | V |
| Mean forward current | $I_{FAV}$ | $T_j$=$T_{jmax}$ | $T_s$ = 80°C<br>$T_c$=80°C | 28<br>34 | A |
| Surge (non-repetitive) forward current | $I_{FSM}$ | $t_p$=10ms | $T_j$=25°C | 138 | A |
| $I^2$t-value | $I^2t$ | | | 95 | $A^2s$ |
| Repetitive peak forward current | $I_{FRM}$ | $t_p$ limited by $T_{jmax}$ | | 78 | A |
| Power dissipation | $P_{tot}$ | $T_j$=$T_{jmax}$ | $T_s$ = 80°C<br>$T_c$=80°C | 81<br>123 | W |
| Maximum Junction Temperature | $T_{jmax}$ | | | 175 | °C |
| **Thermal Properties** | | | | | |
| Storage temperature | $T_{stg}$ | | | -40…+125 | °C |
| Operation temperature under switching condition | $T_{op}$ | | | -40…+($T_{jmax}$ - 25) | °C |
| **Insulation Properties** | | | | | |
| Insulation voltage | $V_{isol}$ | DC Test Voltage* | $t_p$ = 2 s | 6000 | V |
| | | AC Voltage | $t_p$ = 1 min | 2500 | V |
| Creepage distance | | | | min 12,7 | mm |
| Clearance | | solder pins / Press-fit pins | | 9,55 / 9,57 | mm |
| Comparative Tracking Index | CTI | | | >200 | |

*100% tested in production

# Characteristic Values

| Parameter | Symbol | Conditions | | | | | Value | | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | $V_{GE}$ [V] or $V_{GS}$ [V] | $V_r$ [V] or $V_{CE}$ [V] or $V_{DS}$ [V] | $I_C$ [A] or $I_F$ [A] or $I_D$ [A] | $T_j$ [°C] | Min | Typ | Max | |
| **Bypass Diode D5, D6 / Boost Sw. Protection Diode D1, D2** | | | | | | | | | | |
| Forward voltage | $V_F$ | | | | 25 | 25<br>125 | 0,8 | 1,14<br>1,10 | 1,9 | V |
| Threshold voltage (for power loss calc. only) | $V_{to}$ | | | | 25 | 25<br>125 | | 0,92<br>0,80 | | V |
| Slope resistance (for power loss calc. only) | $r_t$ | | | | 25 | 25<br>125 | | 0,009<br>0,012 | | Ω |
| Reverse current | $I_r$ | | | 1500 | | 25<br>125 | | | 0,05 | mA |
| Thermal resistance junction to sink | $R_{th(j-s)}$ | phase-change material λ=3,4W/mK | | | | | | 1,49 | | K/W |
| Thermal resistance junction to sink | $R_{th(j-s)}$ | Thermal grease tickness≤ 50um λ= 1 W/K | | | | | | 1,73 | | K/W |
| **Boost Switch (T1,T2)** | | | | | | | | | | |
| Gate emitter threshold voltage | $V_{GE(th)}$ | $V_{GE}=V_{CE}$ | | | 0,0017 | 25<br>125 | 5,2 | 5,8 | 6,4 | V |
| Collector-emitter saturation voltage | $V_{CEsat}$ | | 15 | | 50 | 25<br>125 | 1,5 | 2,13<br>2,58 | 2,5 | V |
| Collector-emitter cut-off | $I_{CES}$ | | 0 | 1200 | | 25<br>125 | | | 0,05 | mA |
| Gate-emitter leakage current | $I_{GES}$ | | 20 | 0 | | 25<br>125 | | | 600 | nA |
| Integrated Gate resistor | $R_{gint}$ | | | | | | | 4 | | Ω |
| Turn-on delay time | $t_{d(on)}$ | $R_{goff}$=4 Ω<br>$R_{gon}$=4 Ω | 15 | 700 | 40 | 25<br>125 | | 27<br>27 | | ns |
| Rise time | $t_r$ | | | | | 25<br>125 | | 14<br>17 | | |
| Turn-off delay time | $t_{d(off)}$ | | | | | 25<br>125 | | 256<br>320 | | |
| Fall time | $t_f$ | | | | | 25<br>125 | | 47<br>57 | | |
| Turn-on energy loss | $E_{on}$ | | | | | 25<br>125 | | 1,051<br>1,224 | | mWs |
| Turn-off energy loss | $E_{off}$ | | | | | 25<br>125 | | 1,540<br>2,430 | | |
| Input capacitance | $C_{ies}$ | f=1MHz | 0 | 25 | | 25 | | 2770 | | pF |
| Output capacitance | $C_{oss}$ | | | | | | | 240 | | |
| Reverse transfer capacitance | $C_{rss}$ | | | | | | | 160 | | |
| Gate charge | $Q_G$ | | 15 | 960 | 50 | 25 | | 230 | | nC |
| Thermal resistance junction to sink | $R_{th(j-s)}$ | phase-change material λ=3,4W/mK | | | | | | 0,66 | | K/W |
| Thermal resistance junction to sink | $R_{th(j-s)}$ | Thermal grease tickness≤ 50um λ= 1 W/K | | | | | | 0,80 | | K/W |
| **Boost Diode (D3, D4)** | | | | | | | | | | |
| Forward voltage | $V_F$ | | | | 15 | 25<br>125 | | 1,43<br>1,69 | 2 | V |
| Reverse leakage current | $I_{rm}$ | | | 1200 | | 25<br>125 | | | 150 | μA |
| Peak recovery current | $I_{RRM}$ | $R_{gon}$=4 Ω | 15 | 700 | 40 | 25<br>125 | | 17<br>15 | | A |
| Reverse recovery time | $t_{rr}$ | | | | | 25<br>125 | | 9<br>9 | | ns |
| Reverse recovery charge | $Q_{rr}$ | | | | | 25<br>125 | | 0,24<br>0,21 | | μC |
| Reverse recovered energy | $E_{rec}$ | | | | | 25<br>125 | | 0,093<br>0,074 | | mWs |
| Peak rate of fall of recovery current | $(di_{rf}/dt)_{max}$ | | | | | 25<br>125 | | 6570<br>5559 | | A/μs |
| Thermal resistance junction to sink | $R_{th(j-s)}$ | phase-change material λ=3,4W/mK | | | | | | 1,17 | | K/W |
| Thermal resistance junction to case | $R_{th(j-s)}$ | Thermal grease tickness≤ 50um λ= 1 W/K | | | | | | 1,36 | | K/W |

# Characteristic Values

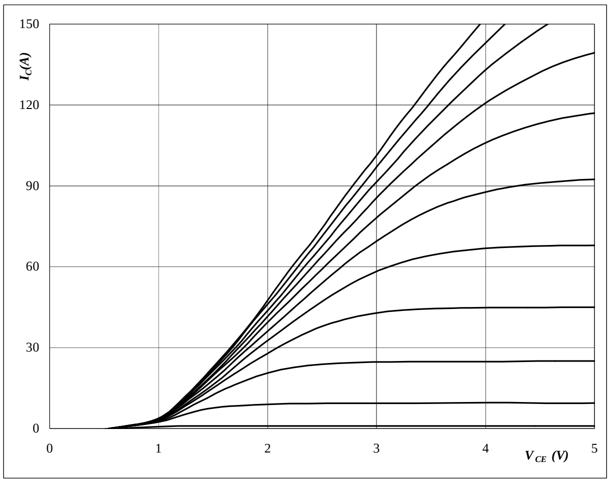
| Parameter | Symbol | Conditions | | | | | Value | | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | $V_{GE}$ [V] or $V_{GS}$ [V] | $V_r$ [V] or $V_{CE}$ [V] or $V_{DS}$ [V] | $I_C$ [A] or $I_F$ [A] or $I_D$ [A] | $T_j$ [°C] | Min | Typ | Max | |
| **Thermistor** | | | | | | | | | | |
| Rated resistance | $R$ | | | | | 25 | | 22 | | kΩ |
| Deviation of R100 | $\Delta_{R/R}$ | $R_{100}$=1486 Ω | | | | 100 | -12 | | 12 | % |
| Power dissipation | $P$ | | | | | 25 | | 200 | | mW |
| Power dissipation constant | | | | | | 25 | | 2 | | mW/K |
| B-value | $B_{(25/50)}$ | Tol.±3% | | | | 25 | | 3950 | | K |
| B-value | $B_{(25/100)}$ | Tol.±3% | | | | 25 | | 3998 | | K |
| Vincotech NTC Reference | | | | | | | | | B | |

# Boost Switch T1,T2 / Boost Diode D3,D4

**Figure 1** T1, T2

**Typical output characteristics**

$I_C = f(V_{CE})$




**At**

$t_p$ = 250 µs

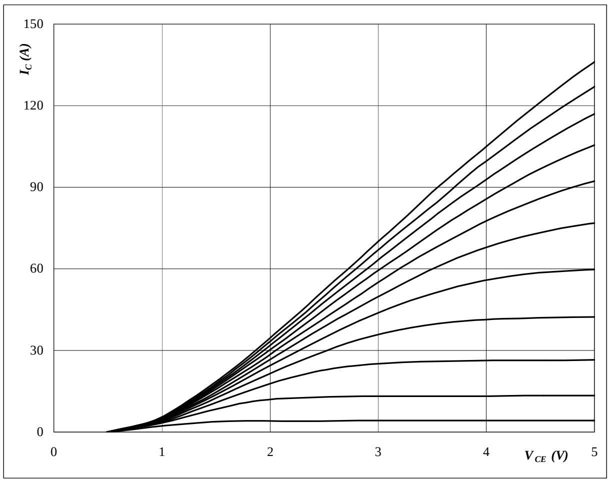
$T_j$ = 25 °C

$V_{GE}$ from 7 V to 17 V in steps of 1 V

**Figure 2** T1, T2

**Typical output characteristics**

$I_C = f(V_{CE})$




**At**

$t_p$ = 250 µs

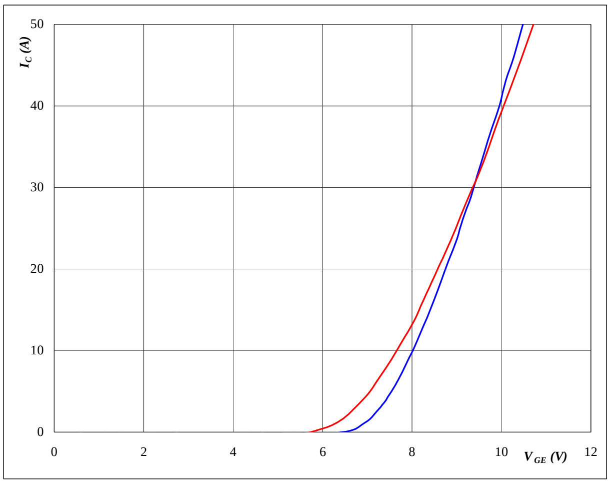
$T_j$ = 125 °C

$V_{GE}$ from 7 V to 17 V in steps of 1 V

**Figure 3** T1, T2

**Typical transfer characteristics**

$I_C = f(V_{GE})$




**At**

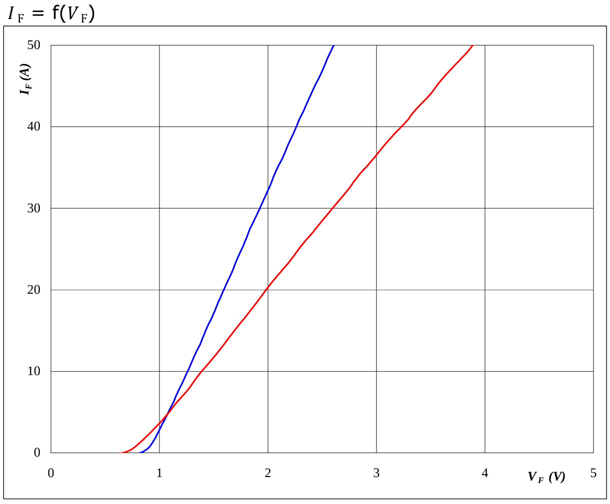
$t_p$ = 100 µs $T_j$ = 25/125 °C

$V_{CE}$ = 10 V

**Figure 4** D3,D4

**Typical diode forward current as a function of forward voltage**

$I_F = f(V_F)$




**At**

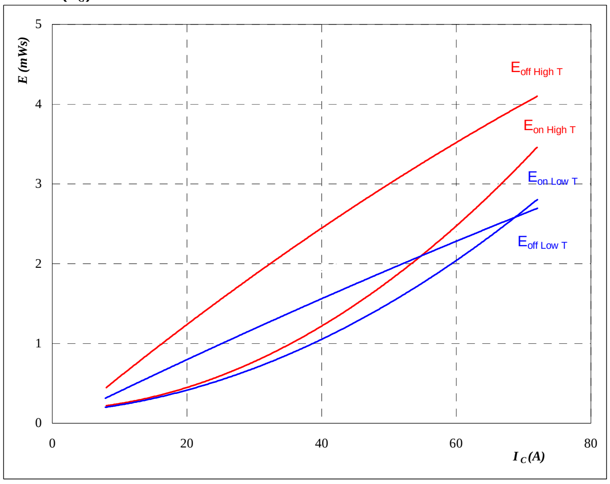
$t_p$ = 250 µs $T_j$ = 25/125 °C

# Boost Switch T1,T2 / Boost Diode D3,D4

**Figure 5** T1, T2

**Typical switching energy losses as a function of collector current**

$E = f(I_C)$



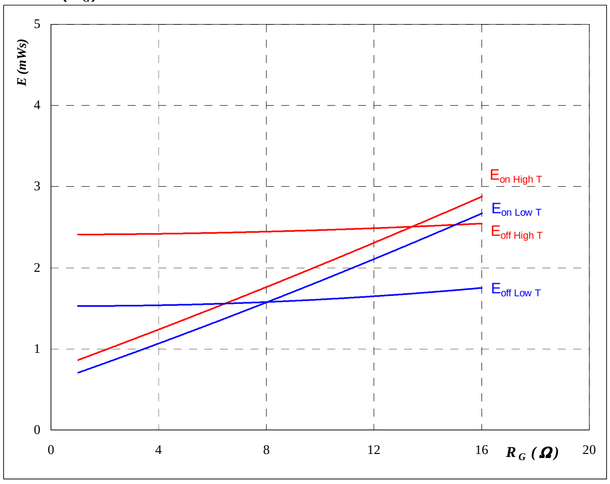

With an inductive load at

| | | |
|---|---|---|
| $T_j$ = | 25/125 | °C |
| $V_{CE}$ = | 700 | V |
| $V_{GE}$ = | 15 | V |
| $R_{gon}$ = | 4 | Ω |
| $R_{goff}$ = | 4 | Ω |

**Figure 6** T1, T2

**Typical switching energy losses as a function of gate resistor**

$E = f(R_G)$



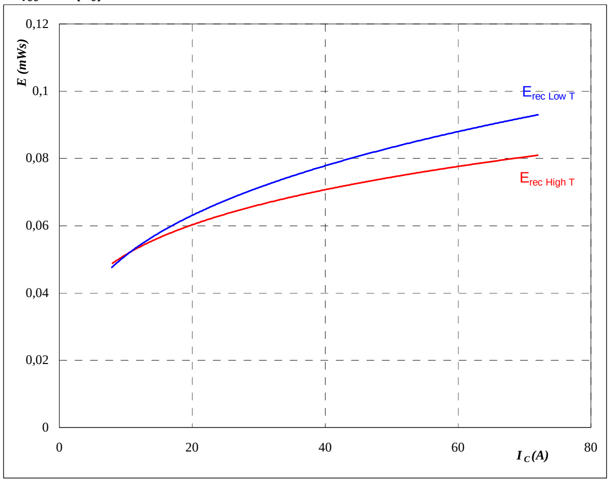

With an inductive load at

| | | |
|---|---|---|
| $T_j$ = | 25/125 | °C |
| $V_{CE}$ = | 700 | V |
| $V_{GE}$ = | 15 | V |
| $I_C$ = | 40 | A |

**Figure 7** D3,D4

**Typical reverse recovery energy loss as a function of collector current**

$E_{rec} = f(I_c)$



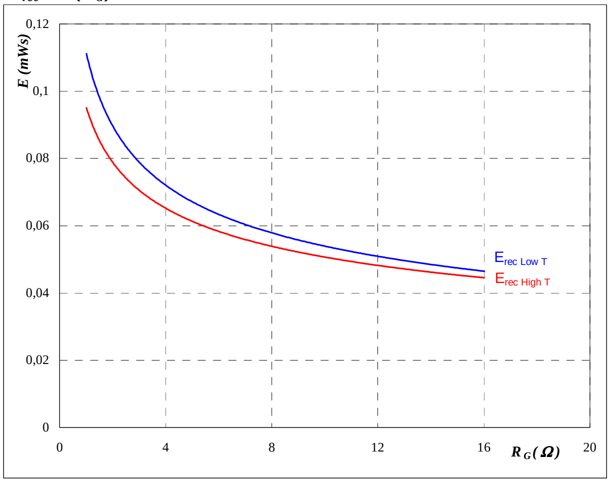

With an inductive load at

| | | |
|---|---|---|
| $T_j$ = | 25/125 | °C |
| $V_{CE}$ = | 700 | V |
| $V_{GE}$ = | 15 | V |
| $R_{gon}$ = | 4 | Ω |
| $R_{goff}$ = | 4 | Ω |

**Figure 8** D3,D4

**Typical reverse recovery energy loss as a function of gate resistor**

$E_{rec} = f(R_G)$




With an inductive load at

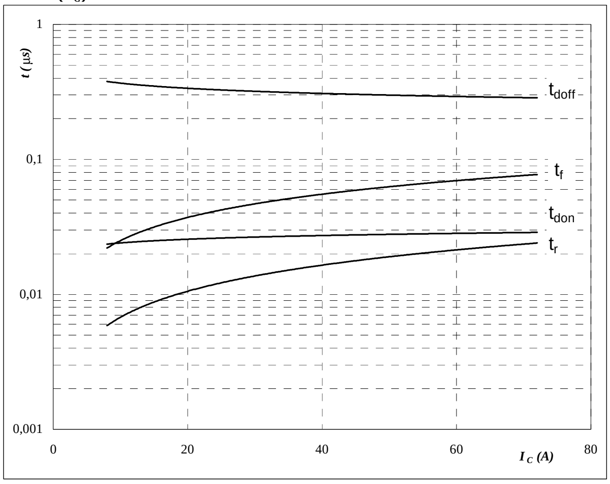
| | | |
|---|---|---|
| $T_j$ = | 25/125 | °C |
| $V_{CE}$ = | 700 | V |
| $V_{GE}$ = | 15 | V |
| $I_C$ = | 40 | A |

# Boost Switch T1,T2 / Boost Diode D3,D4

**Figure 9** T1, T2

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

$t = f(I_C)$



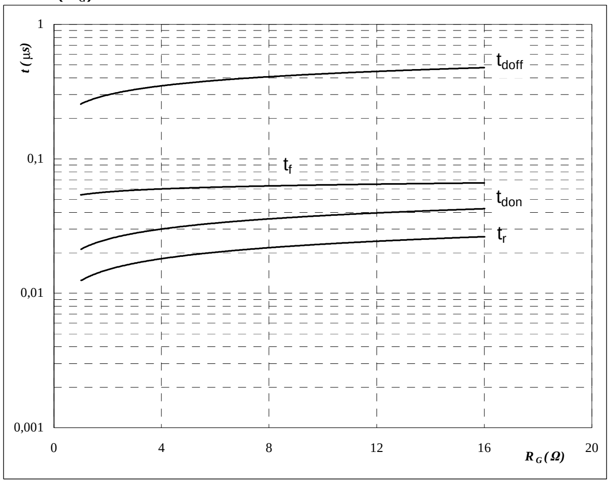

With an inductive load at

| | | |
|---|---|---|
| $T_j$ = | 126 | °C |
| $V_{CE}$ = | 700 | V |
| $V_{GE}$ = | 15 | V |
| $R_{gon}$ = | 4 | Ω |
| $R_{goff}$ = | 4 | Ω |

**Figure 10** T1, T2

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

$t = f(R_G)$



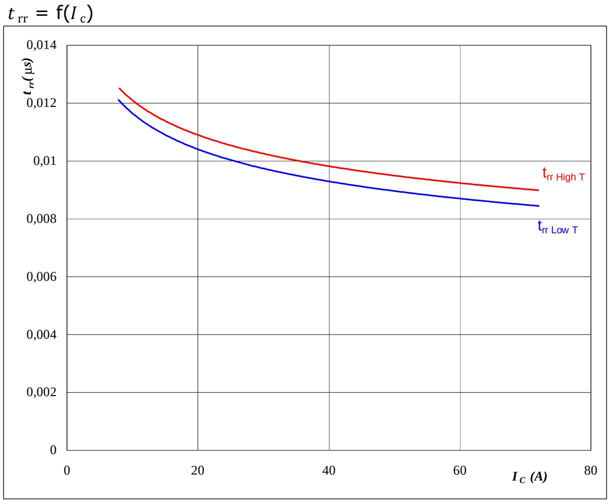

With an inductive load at

| | | |
|---|---|---|
| $T_j$ = | 126 | °C |
| $V_{CE}$ = | 700 | V |
| $V_{GE}$ = | 15 | V |
| $I_C$ = | 40 | A |

**Figure 11** D3,D4

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

$t_{rr} = f(I_c)$



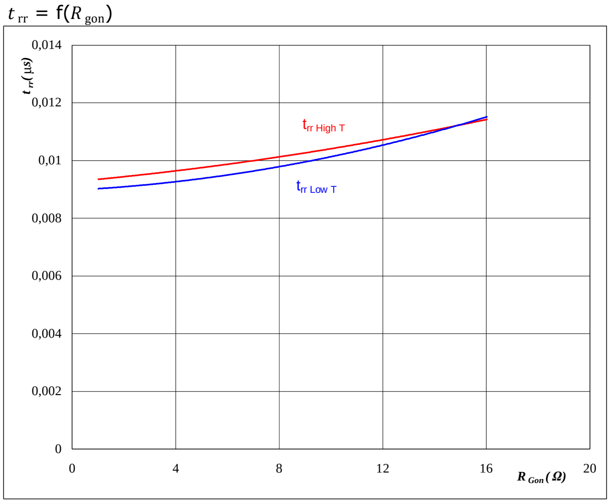

**At**

| | | |
|---|---|---|
| $T_j$ = | 25/125 | °C |
| $V_{CE}$ = | 700 | V |
| $V_{GE}$ = | 15 | V |
| $R_{gon}$ = | 4 | Ω |

**Figure 12** D3,D4

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

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




**At**

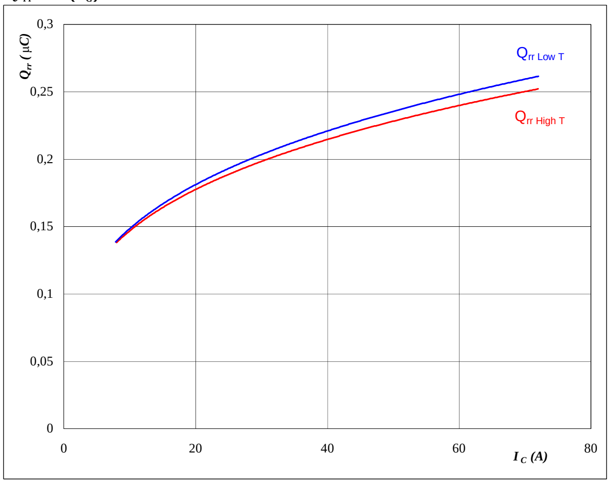
| | | |
|---|---|---|
| $T_j$ = | 25/125 | °C |
| $V_R$ = | 700 | V |
| $I_F$ = | 40 | A |
| $V_{GE}$ = | 15 | V |

# Boost Switch T1,T2 / Boost Diode D3,D4

**Figure 13** D3,D4

**Typical reverse recovery charge as a function of collector current**

$Q_{rr} = f(I_C)$



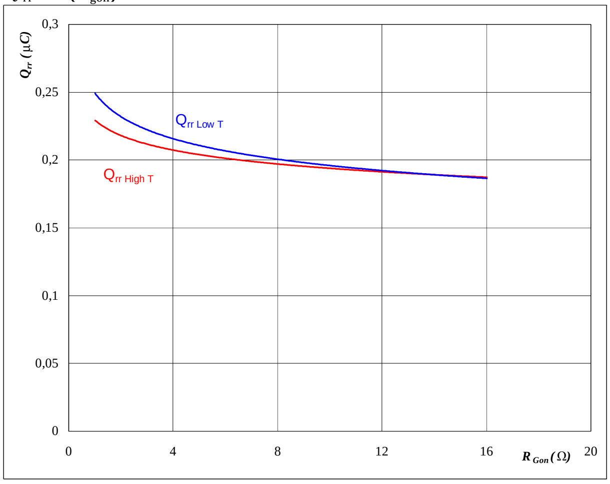

**At**

| | | |
|---|---|---|
| $T_j$ = | 25/125 | °C |
| $V_{CE}$ = | 700 | V |
| $V_{GE}$ = | 15 | V |
| $R_{gon}$ = | 4 | Ω |

**Figure 14** D3,D4

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

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



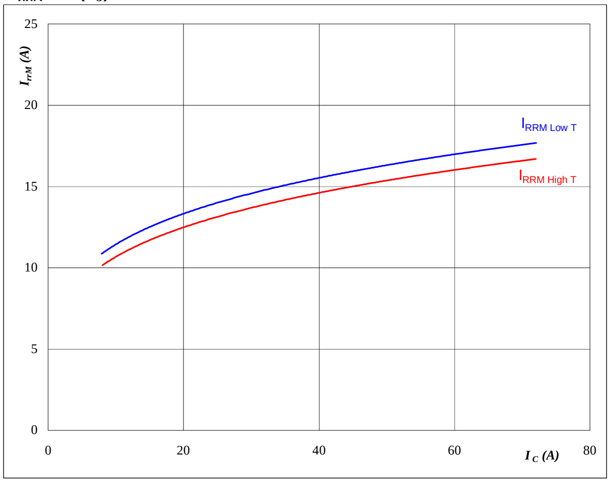

**At**

| | | |
|---|---|---|
| $T_j$ = | 25/125 | °C |
| $V_R$ = | 700 | V |
| $I_F$ = | 40 | A |
| $V_{GS}$ = | 15 | V |

**Figure 15** D3,D4

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

$I_{RRM} = f(I_C)$



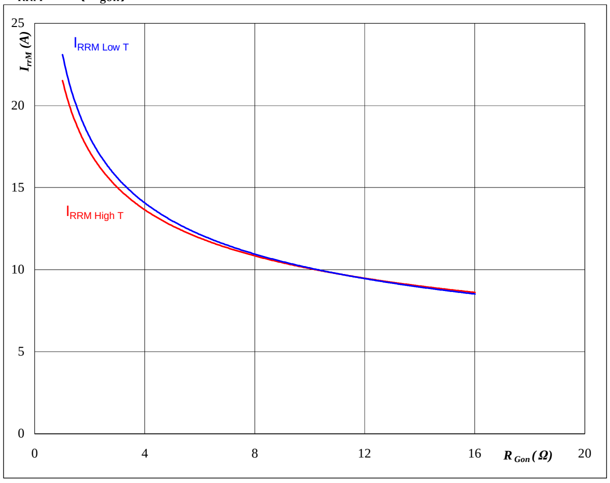

**At**

| | | |
|---|---|---|
| $T_j$ = | 25/125 | °C |
| $V_{CE}$ = | 700 | V |
| $V_{GE}$ = | 15 | V |
| $R_{gon}$ = | 4 | Ω |

**Figure 16** D3,D4

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

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




**At**

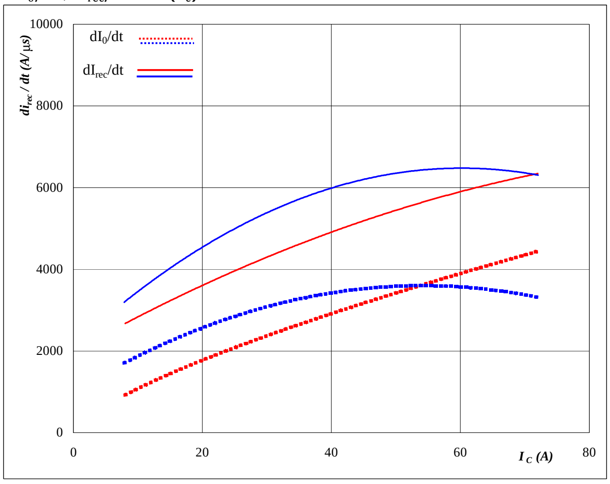
| | | |
|---|---|---|
| $T_j$ = | 25/125 | °C |
| $V_R$ = | 700 | V |
| $I_F$ = | 40 | A |
| $V_{GE}$ = | 15 | V |

# Boost Switch T1,T2 / Boost Diode D3,D4

**Figure 17** D3,D4

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

$dI_0/dt, dI_{rec}/dt = f(I_c)$



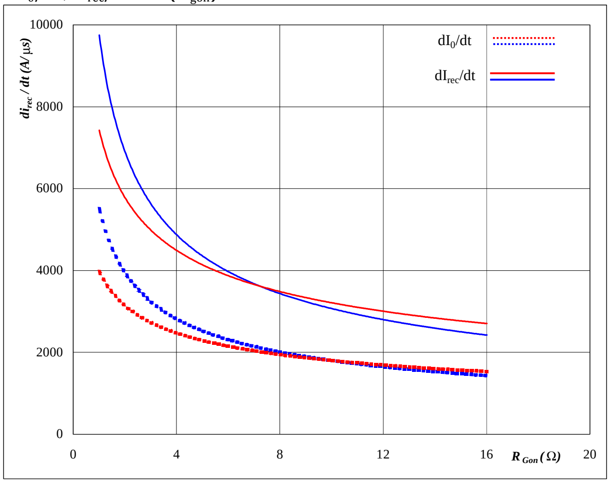

**At**

| | | |
|---|---|---|
| $T_j$ = | 25/125 | °C |
| $V_{CE}$ = | 700 | V |
| $V_{GE}$ = | 15 | V |
| $R_{gon}$ = | 4 | Ω |

**Figure 18** D3,D4

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

$dI_0/dt, dI_{rec}/dt = f(R_{gon})$



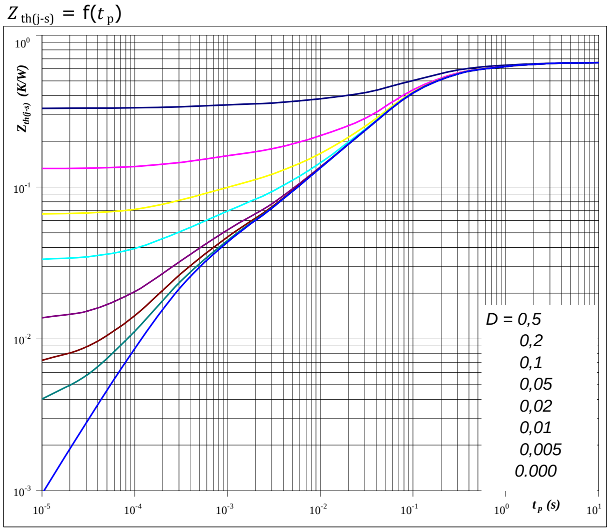

**At**

| | | |
|---|---|---|
| $T_j$ = | 25/125 | °C |
| $V_R$ = | 700 | V |
| $I_F$ = | 40 | A |
| $V_{GE}$ = | 15 | V |

**Figure 19** T1, T2

**IGBT transient thermal impedance as a function of pulse width**

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




**At**

$D = t_p / T$

| | phase-change material | | | Thermal grease | |
|---|---|---|---|---|---|
| $R_{th(j-s)}$ = | 0,66 | K/W | $R_{th(j-s)}$ = | 0,80 | K/W |

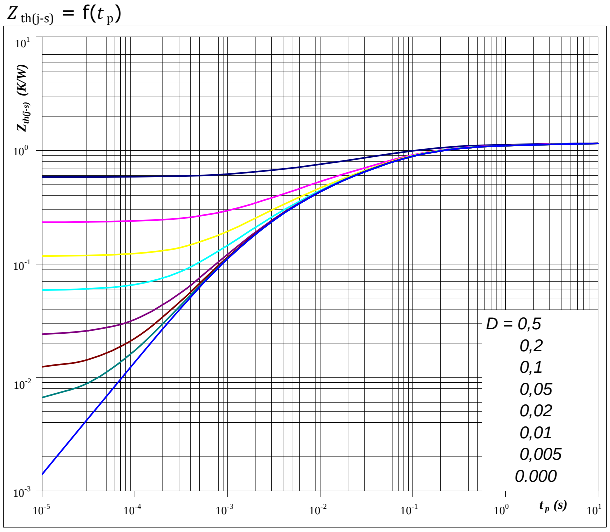
IGBT thermal model values

| phase-change material | | Thermal grease | |
|---|---|---|---|
| R (K/W) | Tau (s) | R (K/W) | Tau (s) |
| 0,085 | 1,272 | 0,103 | 1,272 |
| 0,179 | 0,186 | 0,216 | 0,186 |
| 0,314 | 0,060 | 0,378 | 0,060 |
| 0,053 | 0,005 | 0,064 | 0,005 |
| 0,029 | 0,000 | 0,035 | 0,000 |

**Figure 20** D3,D4

**FWD transient thermal impedance as a function of pulse width**

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




**At**

$D = t_p / T$

| | phase-change material | | | Thermal grease | |
|---|---|---|---|---|---|
| $R_{th(j-s)}$ = | 1,17 | K/W | $R_{th(j-s)}$ = | 1,36 | K/W |

FWD thermal model values

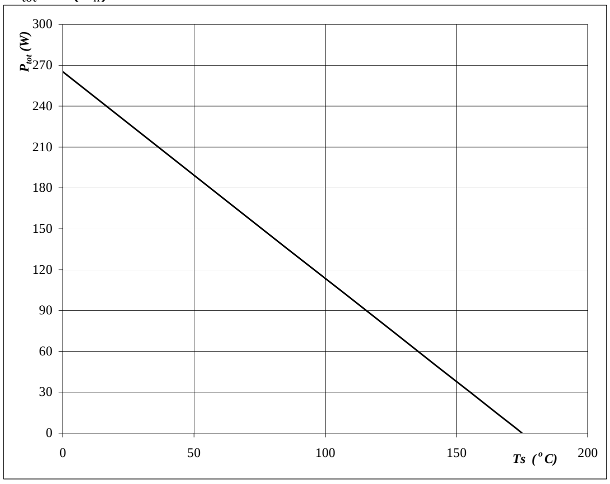
| phase-change material | | Thermal grease | |
|---|---|---|---|
| R (K/W) | Tau (s) | R (K/W) | Tau (s) |
| 0,043 | 9,803 | 0,050 | 9,80 |
| 0,101 | 0,815 | 0,118 | 0,82 |
| 0,383 | 0,098 | 0,445 | 0,10 |
| 0,308 | 0,026 | 0,358 | 0,03 |
| 0,233 | 0,005 | 0,271 | 0,01 |
| 0,098 | 0,001 | 0,114 | 0,00 |

# Boost Switch T1,T2 / Boost Diode D3,D4

**Figure 21** T1, T2

**Power dissipation as a function of heatsink temperature**

$P_{tot} = f(T_h)$



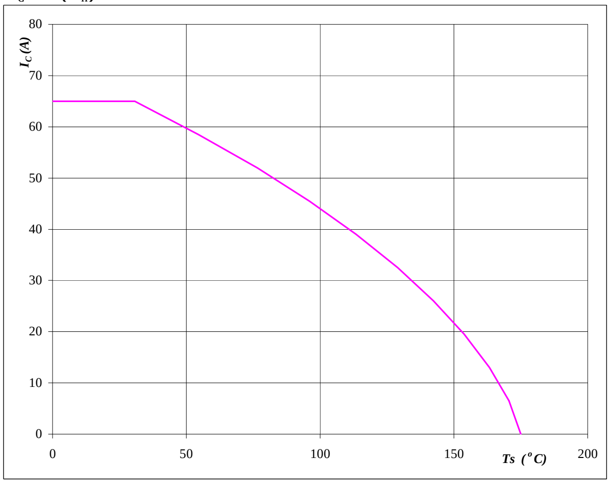

At

$T_j$ = 175 ºC

**Figure 22** T1, T2

**Collector current as a function of heatsink temperature**

$I_C = f(T_h)$




At

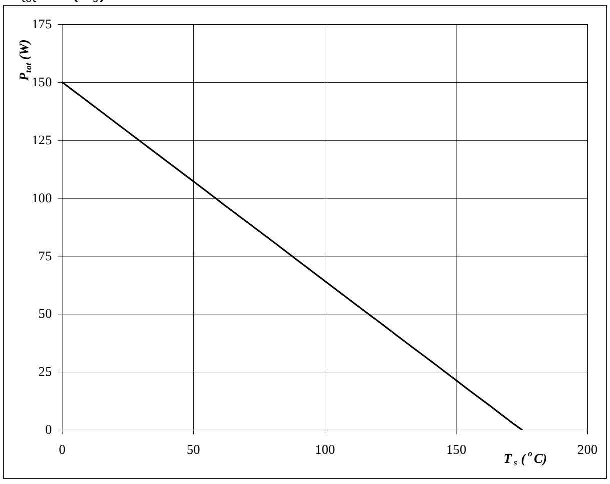
$T_j$ = 175 ºC

$V_{GE}$ = 15 V

**Figure 23** D3,D4

**Power dissipation as a function of heatsink temperature**

$P_{tot} = f(T_s)$



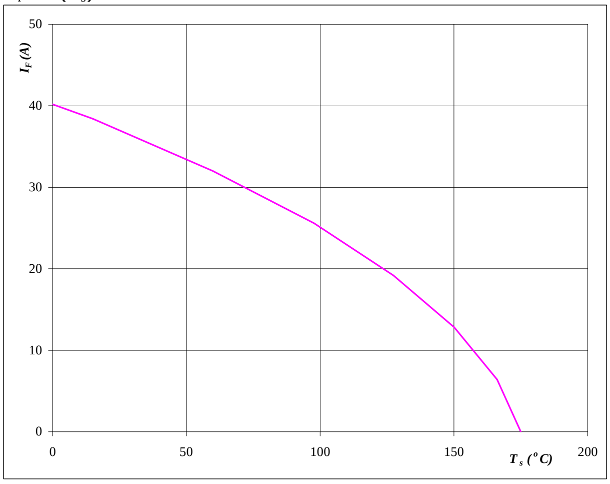

At

$T_j$ = 175 ºC

**Figure 24** D3,D4

**Forward current as a function of heatsink temperature**

$I_F = f(T_s)$




At

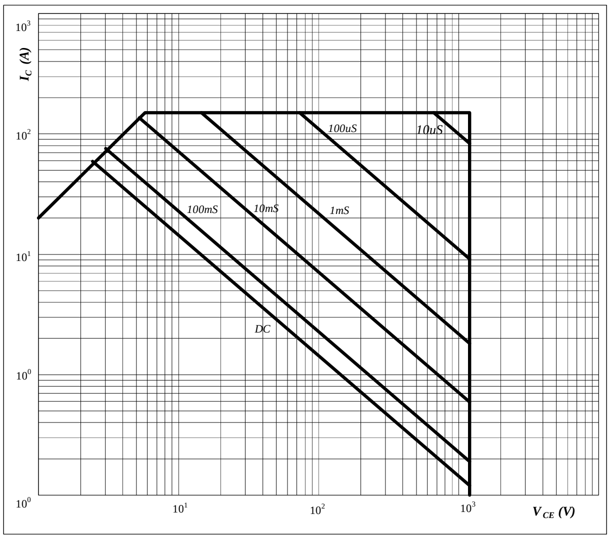
$T_j$ = 175 ºC

# Boost Switch T1,T2 / Boost Diode D3,D4

**Figure 25** T1, T2

**Safe operating area as a function of collector-emitter voltage**

$I_C = f(V_{CE})$




**At**

$D$ = single pulse

$T_s$ = 80 ºC

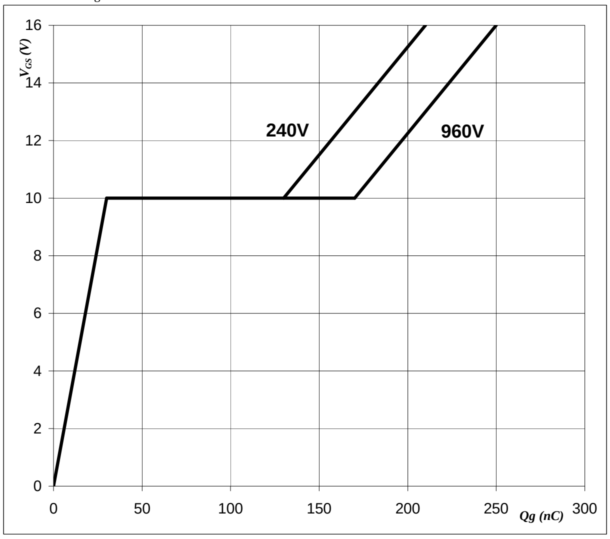
$V_{GE}$ = 15 V

$T_j$ = $T_{jmax}$ ºC

**Figure 26** T1, T2

**Gate voltage vs Gate charge**

$V_{GE} = f(Q_g)$



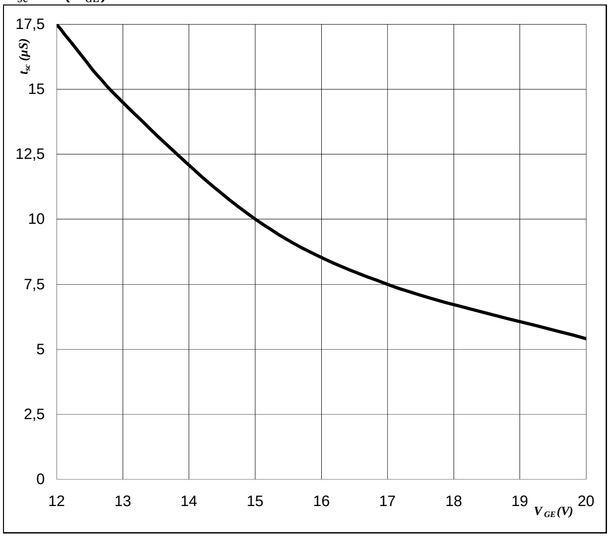

**At**

$I_C$ = 50 A

**Figure 27** T1, T2

**Short circuit withstand time as a function of gate-emitter voltage**

$t_{sc} = f(V_{GE})$




**At**

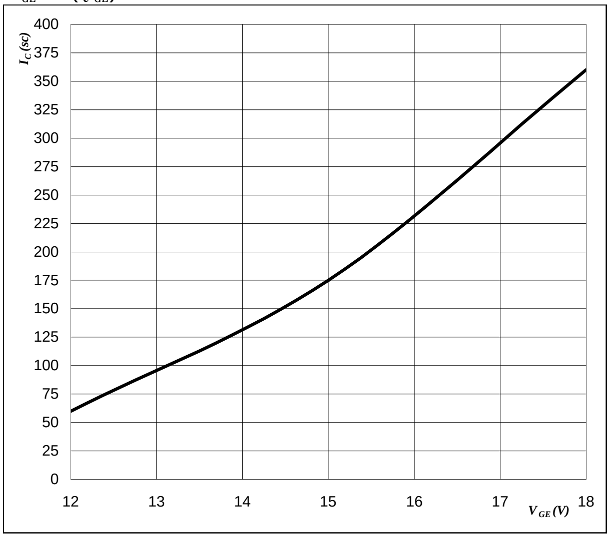
$V_{CE}$ = 600 V

$T_j$ ≤ 150 ºC

**Figure 28** T1, T2

**Typical short circuit collector current as a function of gate-emitter voltage**

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




**At**

$V_{CE}$ ≤ 600 V

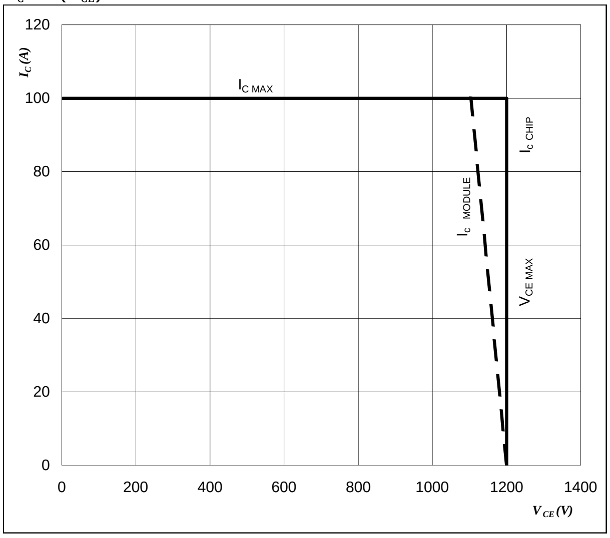
$T_j$ = 25 ºC

# Boost Switch T1,T2 / Boost Diode D3,D4

**Figure 29** T1, T2

**Reverse bias safe operating area**

$I_C = f(V_{CE})$




**At**

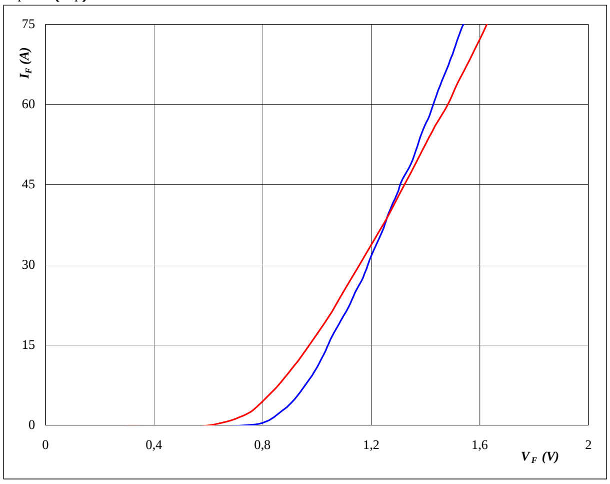
| | | |
|---|---|---|
| $T_{vj}$ ≤ | 150 | ºC |
| $I_{C\,MAX}$= | 100 | A |
| $V_{CE}$ MAX= | 1200 | V |

# Bypass Diode D5,D6 / Boost Sw. Protection Diode D1,D2

**Figure 1** D1,D2,D5,D6

**Typical diode forward current as a function of forward voltage**

$I_F = f(V_F)$




**At**

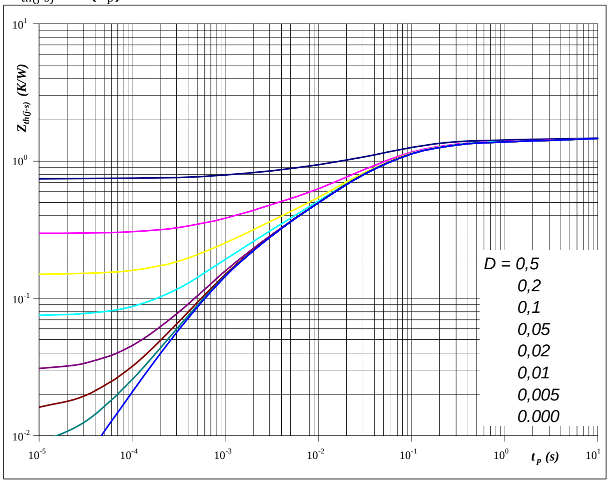
$T_j$ = 25/125 °C

$t_p$ = 250 µs

**Figure 2** D1,D2,D5,D6

**Diode transient thermal impedance as a function of pulse width**

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




**At**

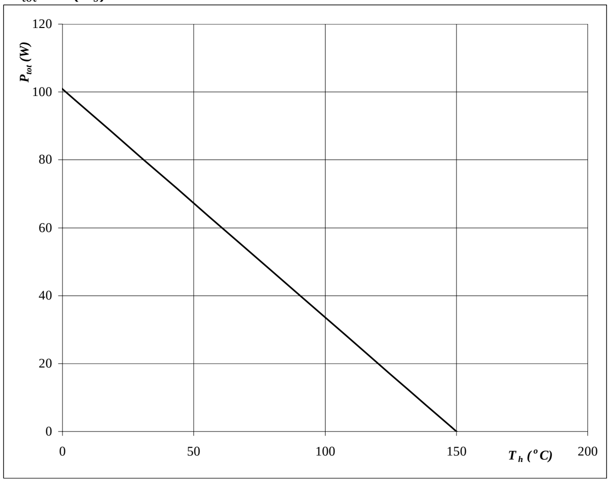
$D = t_p / T$

| | phase-change material | | | Thermal grease | |
|---|---|---|---|---|---|
| $R_{th(j-s)}$ = | 1,49 | K/W | $R_{th(j-s)}$ = | 1,73 | K/W |

**Figure 3** D1,D2,D5,D6

**Power dissipation as a function of heatsink temperature**

$P_{tot} = f(T_s)$



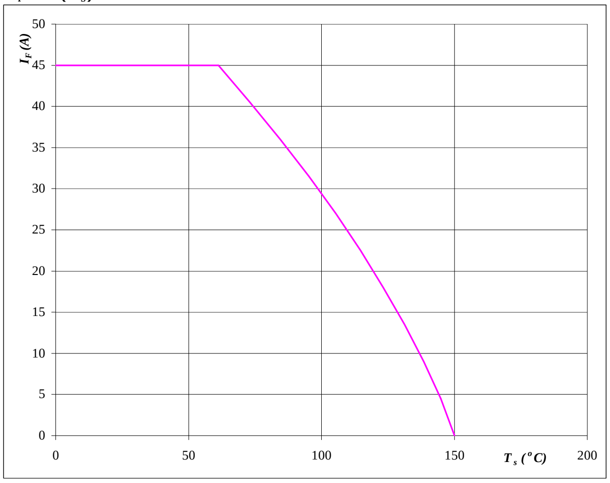

**At**

$T_j$ = 150 ºC

**Figure 4** D1,D2,D5,D6

**Forward current as a function of heatsink temperature**

$I_F = f(T_s)$




**At**

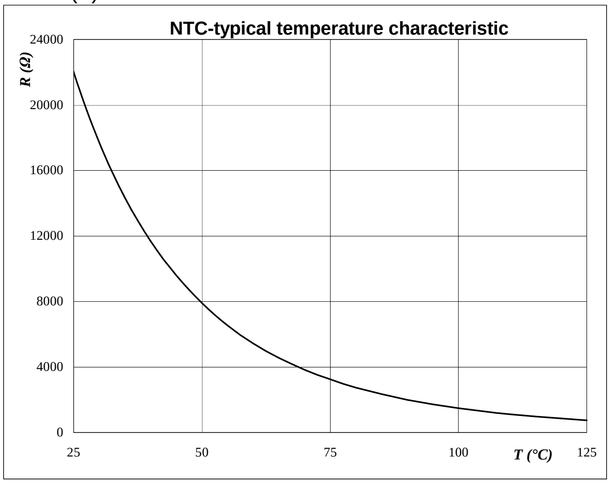
$T_j$ = 150 ºC

# Thermistor

**Figure 1** Thermistor

**Typical NTC characteristic**
**as a function of temperature**

$R_T = f(T)$



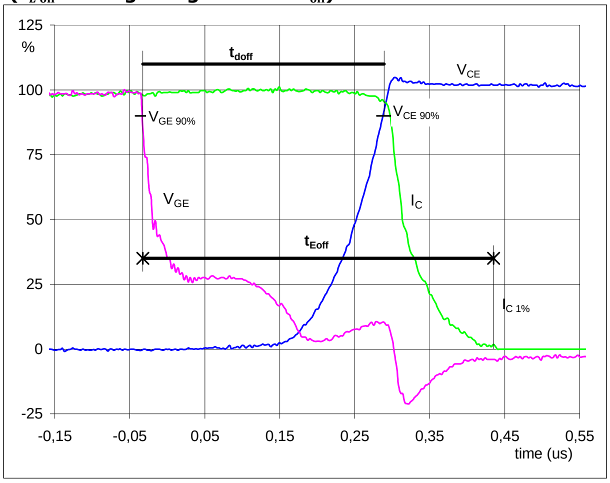
# Switching Definitions Boost

**General conditions**

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

**Figure 1** T1, T2

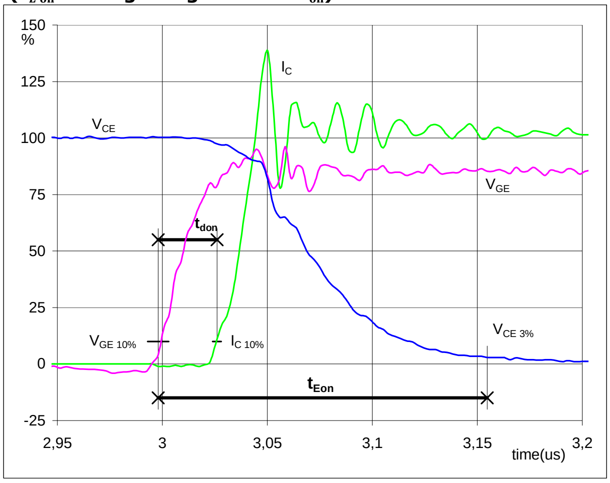
**Turn-off Switching Waveforms & definition of $t_{doff}$, $t_{Eoff}$ ($t_{E\,off}$ = integrating time for $E_{off}$)**




| | | |
|---|---|---|
| $V_{GE}$ (0%) = | 0 | V |
| $V_{GE}$ (100%) = | 15 | V |
| $V_C$ (100%) = | 700 | V |
| $I_C$ (100%) = | 40 | A |
| $t_{doff}$ = | 0,320 | µs |
| $t_{E\,off}$ = | 0,468 | µs |

**Figure 2** T1, T2

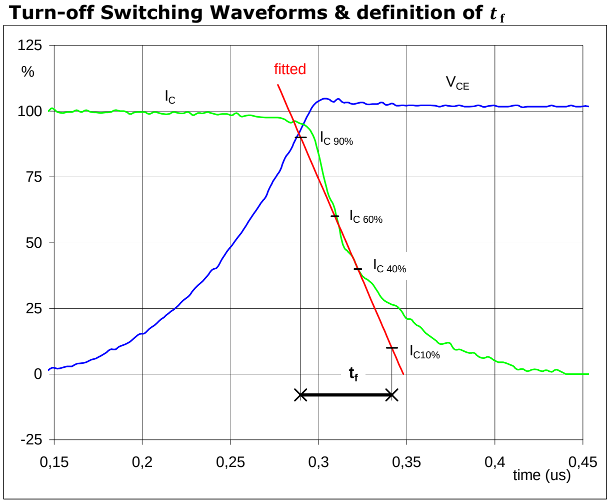
**Turn-on Switching Waveforms & definition of $t_{don}$, $t_{Eon}$ ($t_{E\,on}$ = integrating time for $E_{on}$)**




| | | |
|---|---|---|
| $V_{GE}$ (0%) = | 0 | V |
| $V_{GE}$ (100%) = | 15 | V |
| $V_C$ (100%) = | 700 | V |
| $I_C$ (100%) = | 40 | A |
| $t_{don}$ = | 0,027 | µs |
| $t_{E\,on}$ = | 0,157 | µs |

**Figure 3** T1, T2

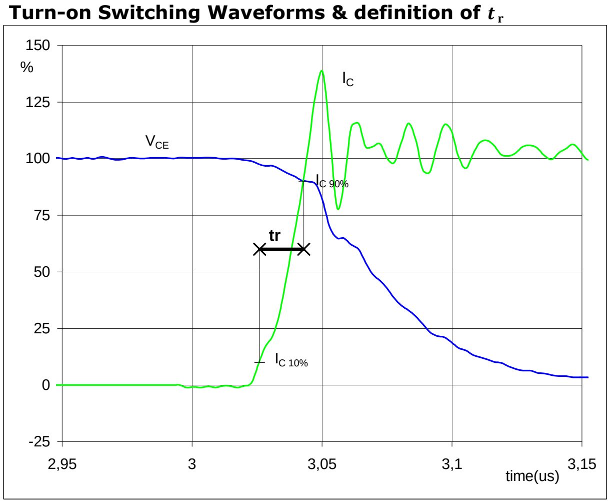
**Turn-off Switching Waveforms & definition of $t_f$**




| | | |
|---|---|---|
| $V_C$ (100%) = | 700 | V |
| $I_C$ (100%) = | 40 | A |
| $t_f$ = | 0,057 | µs |

**Figure 4** T1, T2

**Turn-on Switching Waveforms & definition of $t_r$**

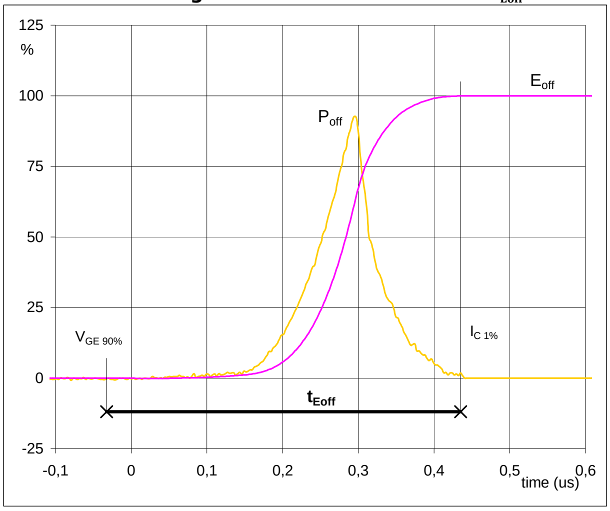



| | | |
|---|---|---|
| $V_C$ (100%) = | 700 | V |
| $I_C$ (100%) = | 40 | A |
| $t_r$ = | 0,017 | µs |

# Switching Definitions Boost

**Figure 5** T1, T2

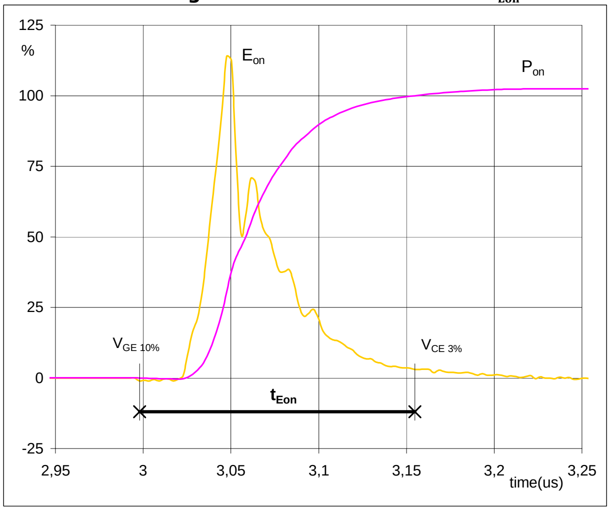
**Turn-off Switching Waveforms & definition of $t_{Eoff}$**




| | | |
|---|---|---|
| $P_{off}$ (100%) = | 28,02 | kW |
| $E_{off}$ (100%) = | 2,43 | mJ |
| $t_{E\,off}$ = | 0,468 | μs |

**Figure 6** T1, T2

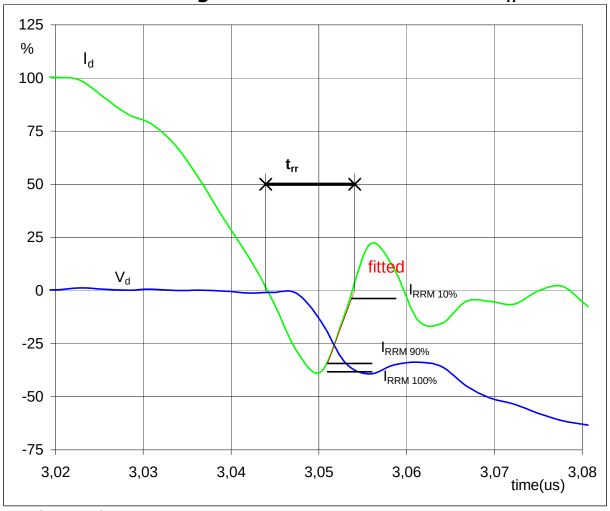
**Turn-on Switching Waveforms & definition of $t_{Eon}$**




| | | |
|---|---|---|
| $P_{on}$ (100%) = | 28,02 | kW |
| $E_{on}$ (100%) = | 1,22 | mJ |
| $t_{E\,on}$ = | 0,1567 | μs |

**Figure 7** T1, T2

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

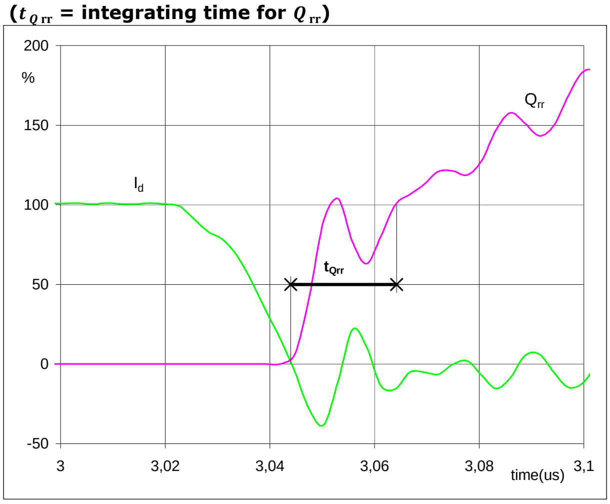



| | | |
|---|---|---|
| $V_d$ (100%) = | 700 | V |
| $I_d$ (100%) = | 40 | A |
| $I_{RRM}$ (100%) = | -15 | A |
| $t_{rr}$ = | 0,009 | μs |

# Switching Definitions Boost

**Figure 8** D3, D4

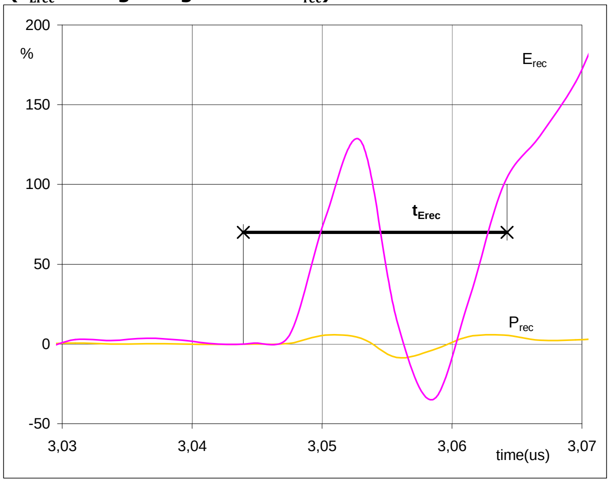
**Turn-on Switching Waveforms & definition of $t_{Qrr}$**
**($t_{Q\,rr}$ = integrating time for $Q_{rr}$)**




| | | |
|---|---|---|
| $I_d$ (100%) = | 40 | A |
| $Q_{rr}$ (100%) = | 0,21 | µC |
| $t_{Q\,rr}$ = | 0,02 | µs |

**Figure 9** D3, D4

**Turn-on Switching Waveforms & definition of $t_{Erec}$**
**($t_{Erec}$= integrating time for $E_{rec}$)**

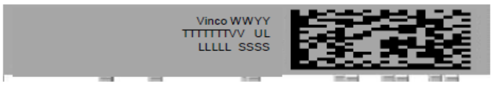



| | | |
|---|---|---|
| $P_{rec}$ (100%) = | 28,02 | kW |
| $E_{rec}$ (100%) = | 0,07 | mJ |
| $t_{E\,rec}$ = | 0,02 | µs |

# Ordering Code and Marking - Outline - Pinout

## Ordering Code & Marking

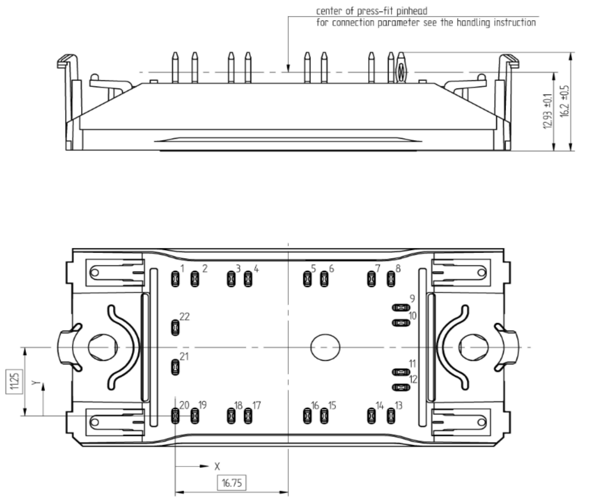
| Version | Ordering Code |
|---|---|
| without thermal paste 12mm housing solder pins | V23990-P629-L43-PM |
| with thermal paste 12mm housing solder pins | V23990-P629-L43-/3/-PM |
| without thermal paste 12mm housing Press-fit pins | V23990-P629-L43Y-PM |
| with thermal paste 12mm housing Press-fit pins | V23990-P629-L43Y-/3/-PM |




| | | | | | | |
|---|---|---|---|---|---|---|
| Text | Vinco | Date code | Name & Ver | UL | Lot | Serial |
| | Vinco | WWYY | TTTTTTTVV | UL | LLLLL | SSSS |
| Datamatrix | Type&Ver | Lot number | Serial | Date code | | |
| | TTTTTTTVV | LLLLL | SSSS | WWYY | | |

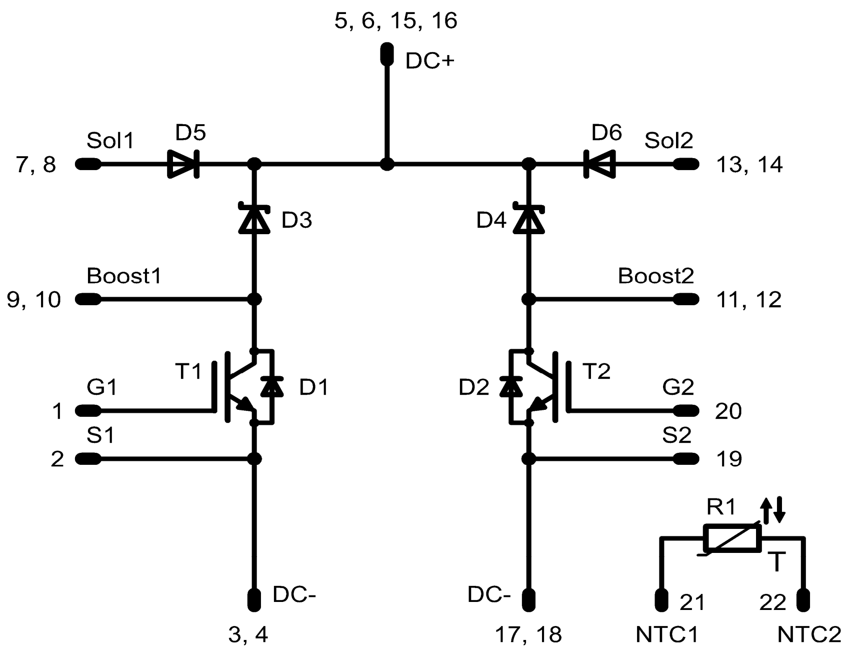
## Outline

| Pin | X | Y | Function | Pin | X | Y | Function |
|---|---|---|---|---|---|---|---|
| 1 | 0 | 22,5 | G1 | 20 | 0 | 0 | G2 |
| 2 | 2,9 | 22,5 | S1 | 21 | 0 | 8 | NTC1 |
| 3 | 8,3 | 22,5 | DC- | 22 | 0 | 14,5 | NTC2 |
| 4 | 10,8 | 22,5 | DC- | | | | |
| 5 | 19,6 | 22,5 | DC+ | | | | |
| 6 | 22,1 | 22,5 | DC+ | | | | |
| 7 | 29,1 | 22,5 | Sol1 | | | | |
| 8 | 32 | 22,5 | Sol1 | | | | |
| 9 | 33,5 | 17,8 | Boost1 | | | | |
| 10 | 33,5 | 15,3 | Boost1 | | | | |
| 11 | 33,5 | 7,2 | Boost2 | | | | |
| 12 | 33,5 | 4,7 | Boost2 | | | | |
| 13 | 32 | 0 | Sol2 | | | | |
| 14 | 29,1 | 0 | Sol2 | | | | |
| 15 | 22,1 | 0 | DC+ | | | | |
| 16 | 19,6 | 0 | DC+ | | | | |
| 17 | 10,8 | 0 | DC- | | | | |
| 18 | 8,3 | 0 | DC- | | | | |
| 19 | 2,9 | 0 | S2 | | | | |




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

## Pinout




## Identification

| ID | Component | Voltage | Current | Function | Comment |
|---|---|---|---|---|---|
| T1,T2 | IGBT | 1200 V | 50 A | Boost Switch | |
| D3,D4 | FWD | 1200 V | 15 A | Boost Diode | |
| D1,D2 | FWD | 1600 V | 25 A | Boost Sw. Protection Diode | |
| D5,D6 | FWD | 1600 V | 25 A | Bypass Diode | |
| R1 | NTC | | | Thermistor | |

| Packaging instruction | | | | | |
|---|---|---|---|---|---|
| Standard packaging quantity (SPQ) | **135** | >SPQ | Standard | <SPQ | Sample |

| Handling instruction |
|---|
| Handling instructions for *flow* 0 packages see vincotech.com website. |

| Package data |
|---|
| Package data for *flow* 0 packages see vincotech.com website. |

| Document No.: | Date: | Modification: | Pages |
|---|---|---|---|
| V23990-P629-L43x-D6-14 | 27 May. 2020 | Update Isolation Voltage | 2 |