
# MG075PB120K0

# 1200V75A EconoPIM3 IGBT Module



NIETZ | MG075PB120K0

## IGBT, Inverter

### Maximum Rated Values

| | | | | | |
|---|---|---|---|---|---|
| Collector-emitter voltage | $T_{vj}$ = 25°C | $V_{CES}$ | 1200 | | V |
| Continuous DC collector current | $T_C$ = 100°C, $T_{vj}$ max = 150°C | $I_{C\ nom}$ | 75 | | A |
| Repetitive peak collector current | $t_P$ = 1 ms | $I_{CRM}$ | 150 | | A |
| Total power dissipation | $T_C$ = 25°C, $T_{vj}$ max = 150 | $P_{tot}$ | 258 | | W |
| Gate-emitter peak voltage | | $V_{GES}$ | +/- 20 | | V |

### Characteristic value

| | | | min. | typ. | max. | |
|---|---|---|---|---|---|---|
| Collector-emitter saturation voltage | $I_C$ = 75 A, $V_{GE}$ = 15 V | $T_{vj}$ = 25°C | $V_{CE,sat}$ | | 1.85 | | V |
| | $I_C$ = 75 A, $V_{GE}$ = 15 V | $T_{vj}$ = 125°C | | | 2.15 | | V |
| | $I_C$ = 75 A, $V_{GE}$ = 15 V | $T_{vj}$ = 150°C | | | 2.26 | | V |
| Gate threshold voltage | $I_C$ = 2.8mA, $V_{CE}$ = $V_{GE}$, $T_{vj}$ = 25°C | | $V_{GE,th}$ | 5.0 | 6.0 | 6.5 | V |
| Gate charge | $V_{GE}$ = -15 V ... +15 V | | $Q_G$ | | 0.81 | | µC |
| Internal gate resistor | $T_{vj}$ = 25°C | | $R_{Gint}$ | | 2.7 | | Ω |
| Input capacitance | f=1MHz, $T_{vj}$=25°C, $V_{CE}$=25V, $V_{GE}$=0V | | $C_{ies}$ | | 9.80 | | nF |
| Reverse transfer capacitance | f=1MHz, $T_{vj}$=25°C, $V_{CE}$=25V, $V_{GE}$=0V | | $C_{res}$ | | 0.12 | | nF |
| Collector-emitter cut-off current | $V_{CE}$ = 1200 V, $V_{GE}$ = 0 V, $T_{vj}$ = 25°C | | $I_{CES}$ | | | 1 | mA |
| Gate-emitter leakage current | $V_{CE}$ = 0 V, $V_{GE}$ = 20 V, $T_{vj}$ = 25°C | | $I_{GES}$ | | | 100 | nA |
| Turn-on delay time, inductive load | $I_C$ = 75A, $V_{CE}$ = 600V | $T_{vj}$ = 25°C | $T_{d,on}$ | | 0.17 | | us |
| | $V_{GE}$ = +15/-15V | $T_{vj}$ = 125°C | | | 0.18 | | us |
| | $R_{G,on}$ = 10Ω | $T_{vj}$ = 150°C | | | 0.18 | | us |
| Rise time, inductive load | $I_C$ = 75A, $V_{CE}$ = 600V | $T_{vj}$ = 25°C | $T_r$ | | 0.05 | | us |
| | $V_{GE}$ = +15/-15V | $T_{vj}$ = 125°C | | | 0.06 | | us |
| | $R_{G,on}$ = 10Ω | $T_{vj}$ = 150°C | | | 0.07 | | us |
| Turn-off delay time, inductive load | $I_C$ = 75A, $V_{CE}$ = 600V | $T_{vj}$ = 25°C | $T_{d,off}$ | | 0.34 | | us |
| | $V_{GE}$ = +15/-15V | $T_{vj}$ = 125°C | | | 0.39 | | us |
| | $R_{Goff}$ = 10Ω | $T_{vj}$ = 150°C | | | 0.40 | | us |
| Fall time, inductive load | $I_C$ = 75A, $V_{CE}$ = 600V | $T_{vj}$ = 25°C | $T_f$ | | 0.15 | | us |
| | $V_{GE}$ = +15/-15V | $T_{vj}$ = 125°C | | | 0.19 | | us |
| | $R_{Goff}$ = 10Ω | $T_{vj}$ = 150°C | | | 0.38 | | us |
| Turn-on energy loss per pulse | $I_C$ =75A, $V_{CE}$ = 600V, $L_S$ =35 nH | $T_{vj}$ = 25°C | $E_{on}$ | | 7.06 | | mJ |
| | $V_{GE}$ = +15/-15V, di/dt =1100A/µs | $T_{vj}$ = 125°C | | | 9.82 | | mJ |
| | $R_{Gon}$ = 10Ω | $T_{vj}$ = 150°C | | | 10.6 | | mJ |
| Turn-off energy loss per pulse | $I_C$ = 75A, $V_{CE}$ = 600V, $L_S$ = 35nH | $T_{vj}$ = 25°C | $E_{off}$ | | 7.19 | | mJ |
| | $V_{GE}$ =+15/-15V, dv/dt =4040V/µs | $T_{vj}$ = 125°C | | | 9.35 | | mJ |

| | | | | | | |
|---|---|---|---|---|---|---|
| | $R_{Goff}$ = 10Ω $T_{vj}$ = 150°C | | | 10.3 | | mJ |
| SC data | $V_{GE}$ ≤15V, $V_{CC}$ =600 V, $t_P$ ≤ 8 µs, $T_{vj}$ = 150°C , $R_G$ =10Ω , $C_{GE}$ = 0.0uF , $V_{CEmax}$ = $V_{CES}$ -$L_{sCE}$ ·di/dt | $I_{SC}$ | | 450 | | A |
| Thermal resistance, junction to case | Per IGBT | $R_{th,JC}$ | | | 0.48 | K/W |

## Diode, Inverter

### Maximum Rated Values

| | | | | | |
|---|---|---|---|---|---|
| Repetitive peak reverse voltage | $T_{vj}$ = 25°C | $V_{RRM}$ | 1200 | | V |
| Continuous DC forward current | | $I_F$ | 75 | | A |
| Repetitive peak forward current | $t_P$ = 1 ms | $I_{FRM}$ | 150 | | A |

### Characteristic value

| | | | | min. | typ. | max. | |
|---|---|---|---|---|---|---|---|
| Forward voltage | $I_F$ = 75 A, $V_{GE}$ = 0 V | $T_{vj}$ = 25°C | $V_F$ | | 1.99 | | V |
| | $I_F$ = 75 A, $V_{GE}$ = 0 V | $T_{vj}$ = 125°C | | | 2.10 | | V |
| | $I_F$ = 75 A, $V_{GE}$ = 0 V | $T_{vj}$ = 150°C | | | 2.05 | | V |
| Peak reverse recovery current | $I_F$ = 75A, $V_R$ = 600V | $T_{vj}$ = 25°C | $I_{RM}$ | | 50.2 | | A |
| | $V_{GE}$ = -15V | $T_{vj}$ = 125°C | | | 53.5 | | |
| | | $T_{vj}$ = 150°C | | | 56.1 | | |
| Recovered charge | $I_F$ = 75A, $V_R$ = 600V | $T_{vj}$ = 25°C | $Q_r$ | | 3.01 | | µC |
| | $V_{GE}$ = -15V | $T_{vj}$ = 125°C | | | 6.96 | | |
| | | $T_{vj}$ = 150°C | | | 8.50 | | |
| Reverse recovery energy | $I_F$ = 75A, $V_R$ = 600V | $T_{vj}$ = 25°C | $E_{rec}$ | | 0.14 | | mJ |
| | $V_{GE}$ = -15V | $T_{vj}$ = 125°C | | | 1.28 | | |
| | | $T_{vj}$ = 150°C | | | 1.71 | | |
| Thermal resistance, junction to case | Per diode | | $R_{th,JC}$ | | | 0.53 | K/W |

## Diode, Rectifier

### Maximum Rated Values

| | | | | |
|---|---|---|---|---|
| Repetitive peak reverse voltage | $T_{vj}$ = 25°C | $V_{RRM}$ | 1600 | V |
| Average Rectified Output current | $V_F$ = 1.2, $T_{vj}$ = 150°C | $I_F$ | 75 | A |
| Surge forward current | $t_p$ = 10 ms, Tvj = 150°C | $I_{FSM}$ | 515 | A |
| $I^2t$ - value | $t_p$ = 10 ms, Tvj = 150°C | $I^2t$ | 1330 | $A^2s$ |

### Characteristic value

| | | | min. | typ. | max. | |
|---|---|---|---|---|---|---|
| Forward voltage | $T_{vj}$ = 150°C, $I_F$ = 75 A | $V_F$ | | 1.11 | | V |
| Reverse current | $T_{vj}$ = 150°C, $V_R$ = 1600 V | $I_R$ | | 1 | | mA |
| Thermal resistance, junction to case | per Diode | $R_{thJC}$ | | | 0.55 | K/W |



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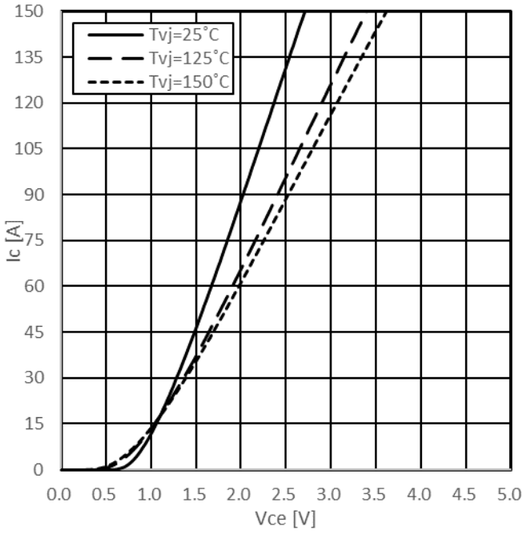
## NTC-Thermistor

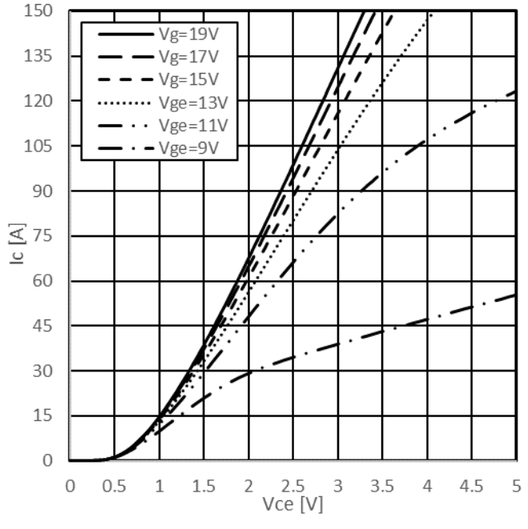
### Characteristic value

| | | | min. | typ. | max. | |
|---|---|---|---|---|---|---|
| Rated resistance | Tc = 25°C | $R_{25}$ | | 5.07 | | KΩ |
| Power dissipation | Tc = 25°C | $P_{25}$ | | | 240 | mW |
| B-value | $R_2=R_{25}exp[B_{25/50}(1/T_2-1/(298, 15K))]$ | $B_{25}/B_{50}$ | | 3412.7 | | K |
| B-value | $R_2=R_{25}exp[B_{25/75}(1/T_2-1/(298, 15K))]$ | $B_{25}/B_{75}$ | | 3454.8 | | K |
| B-value | $R_2=R_{25}exp[B_{25/100}(1/T_2-1/(298, 15K))]$ | $B_{25}/B_{100}$ | | 3442.2 | | K |

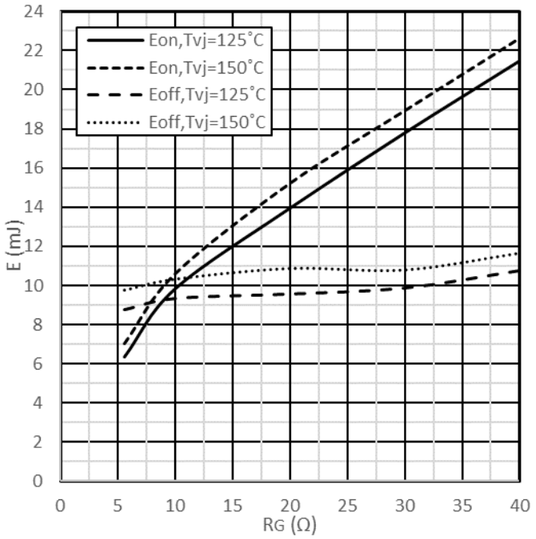
**Output characteristic IGBT, Inverter (typical)**
Ic=f(VCE)
VGE=15V



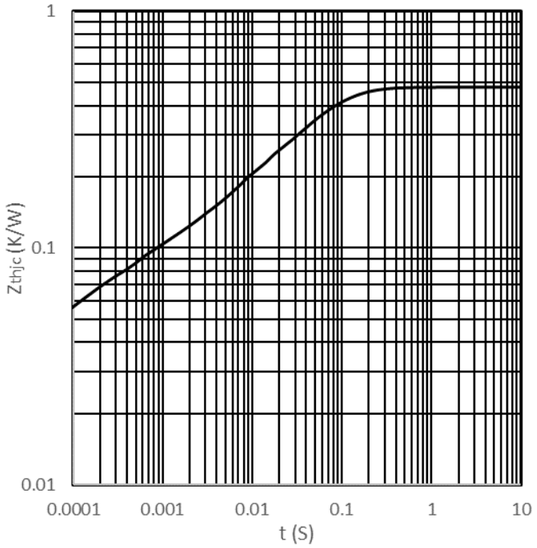

**Output characteristic IGBT, Inverter (typical)**
Ic=f(VCE)
Tvj=150˚C




**Switching losses IGBT,Inverter (typical)**
Eon = f (RG), Eoff = f (RG)
VGE = ±15 V, Ic=75A, VCE = 600 V




**Transient thermal impedance IGBT,Inverter**
**ZthJC = f (t)**



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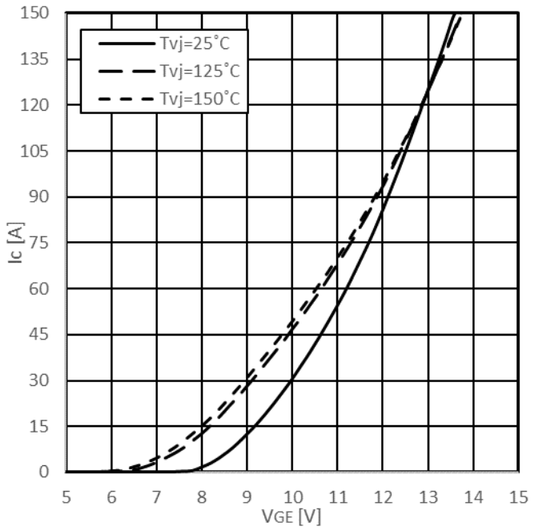
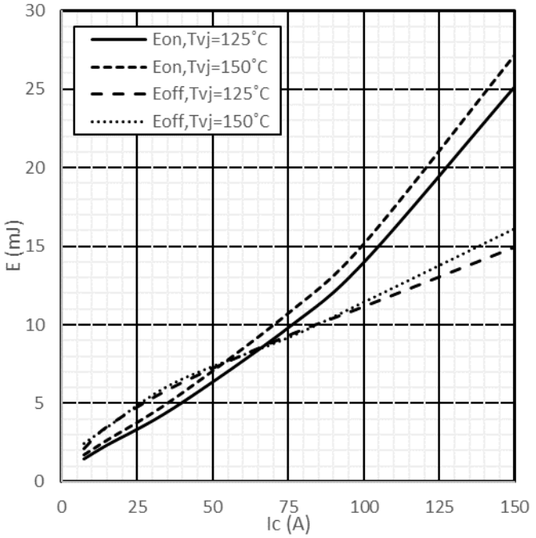
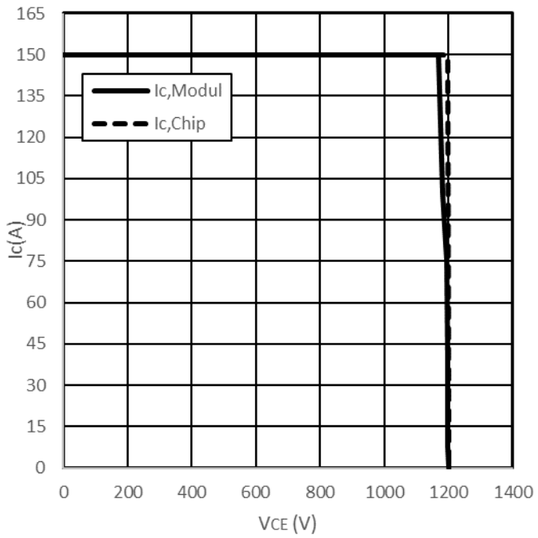
**Transfer characteristic IGBT,Inverter (typical)**
Ic=f(VGE)
VCE=20V



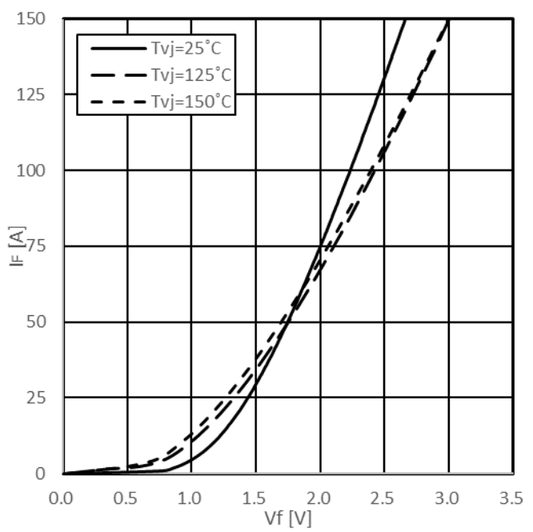

**Switching losses IGBT,Inverter (typical)**
Eon = f (Ic), Eoff = f (Ic)
VGE = ±15 V, RGon = 10Ω, RGoff = 10Ω, VCE = 600 V




**Reverse bias safe operating area IGBT,Inverter (RBSOA)**
IC = f (VCE)
VGE = ±15 V, RGoff =10Ω, Tvj = 150°C




**Forward characteristic of Diode, Inverter (typical)**
IF = f (VF)

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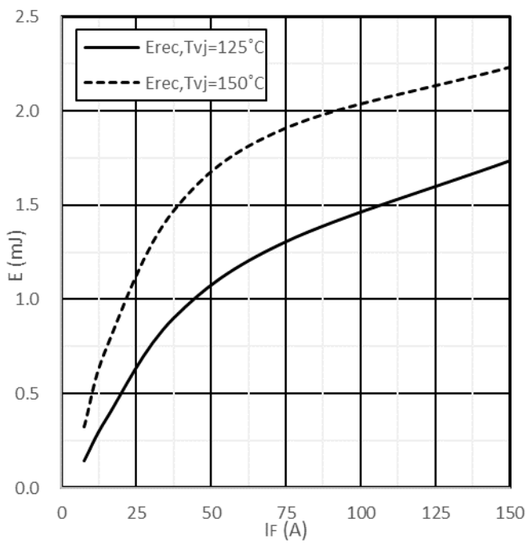
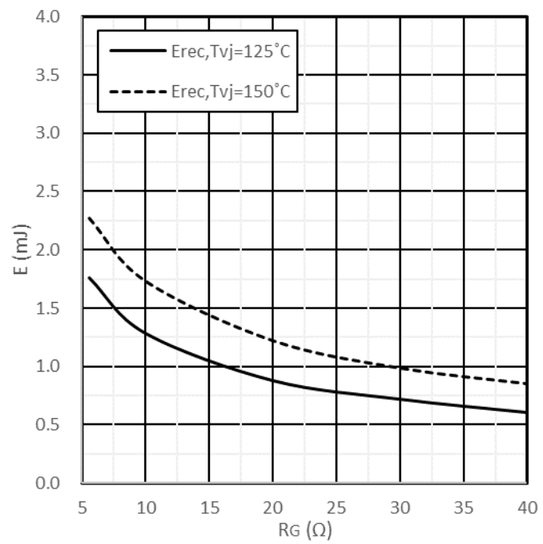
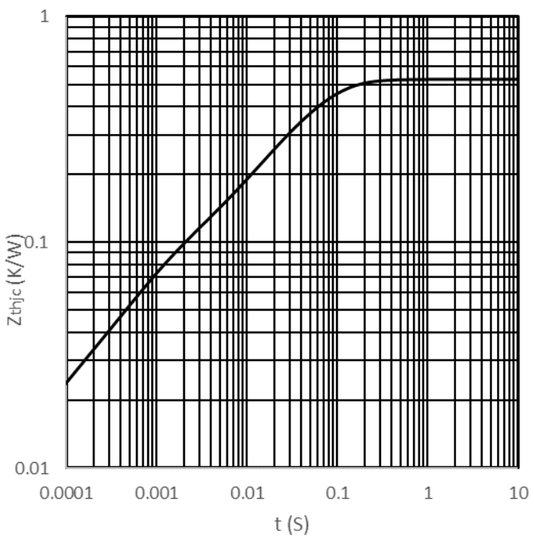
**Switching losses Diode, Inverter (typical)**
Erec = f (IF)
RGon = 10Ω, VCE = 600 V



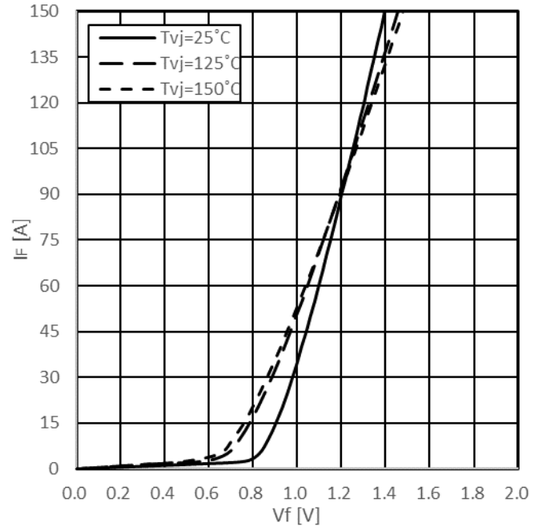

**Switching losses Diode, Inverter (typical)**
Erec = f (RG)
IF = 75 A, VCE = 600 V




**Transient thermal impedance Diode, Inverter**
ZthJC = f (t)




**Forward characteristic of Diode, Rectifier (typical)**
$I_F = f(V_F)$



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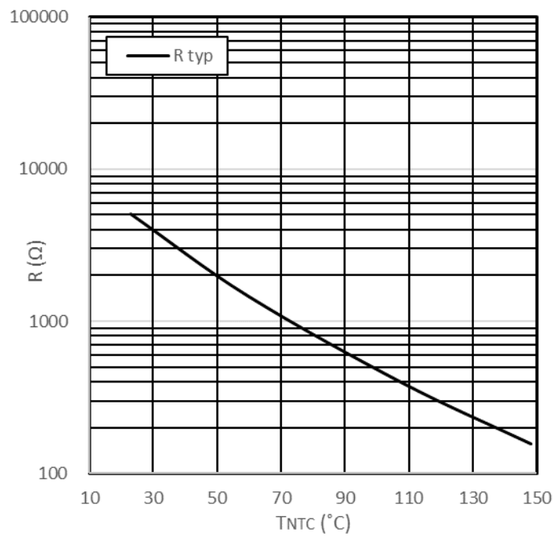
**NTC-Thermistor-temperature characteristic (typical)**
R=f(T)



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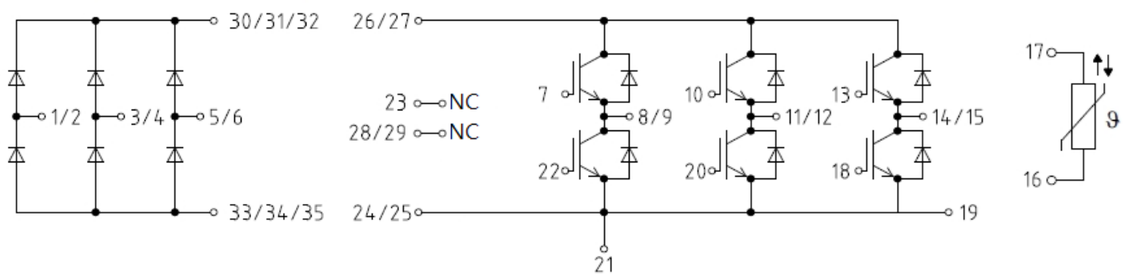
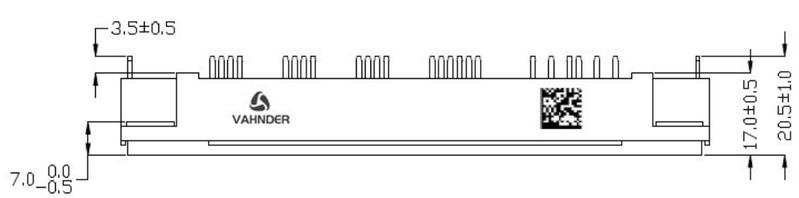
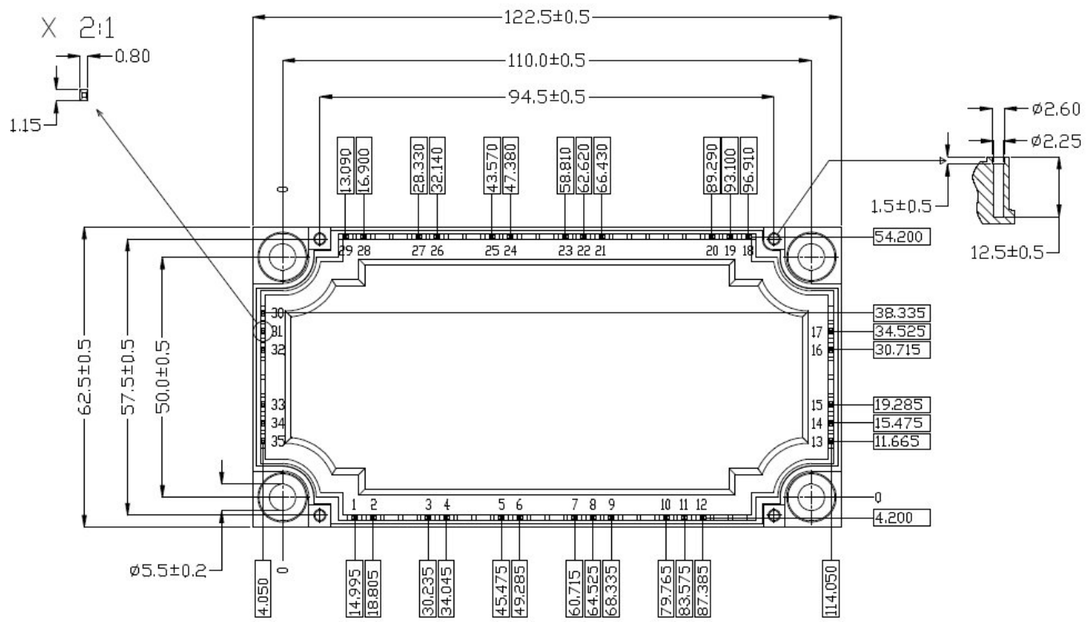
**Circuit Diagram**




**Package outlines**





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