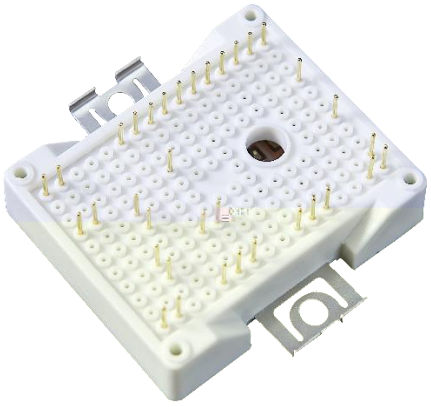
# MG10P12P3

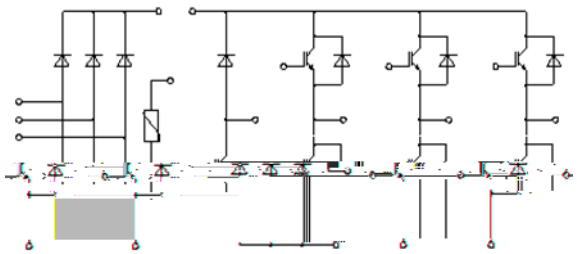
RoHS COMPLIANT



1200V
10A

- Motor Drivers
- AC and DC Servo Drive Amplifier
- UPS (Uninterruptible Power Supplies)

## Circuit



- Low switching losses
- Low $V_{CE(sat)}$ with positive temperature coefficient
- Including fast & soft recovery anti-parallel FWD
- Low inductance case
- High short circuit capability(10us)
- Isolated heatsink using DBC technology
- Maximum junction temperature 175℃

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|---|---|---|---|---|
| Collector-Emitter Voltage | $V_{CES}$ | $V_{GE}$=0V, $I_C$ =1mA, $T_{vj}$=25℃ | 1200 | V |
| Continuous Collector Current | $I_C$ | $T_C$=100℃, $T_{vjmax}$=175℃ | 10 | A |
| Repetitive Peak Collector Current | $I_{CRM}$ | $t_p$=1ms | 20 | A |
| Gate-Emitter Voltage | $V_{GES}$ | $T_{vj}$=25℃ | ±20 | V |
| Total Power Dissipation | $P_{tot}$ | $T_C$=25℃<br>$T_{vjmax}$=175℃ | 140 | W |

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|---|---|---|---|---|---|---|
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| Gate-emitter Threshold Voltage | $V_{GE(th)}$ | $V_{GE}=V_{CE}, I_C$ =0.5mA, $T_{vj}$=25℃ | 5.2 | 5.8 | 6.4 | V |
| Collector-Emitter Cut-off Current | $I_{CES}$ | $V_{CE}$=1200V, $V_{GE}$=0V, $T_{vj}$=25℃ | | | 1.0 | mA |

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|---|---|---|---|---|
| Repetitive Peak Reverse Voltage | $V_{RRM}$ | $T_{vj}$=25℃ | 1200 | V |
| Continuous DC Forward Current | $I_F$ | | 10 | A |
| Repetitive Peak Forward Current | $I_{FRM}$ | $t_p$=1ms | 20 | A |
| $I^2t$-value | $I^2t$ | $V_R$=0V,$t_p$=10ms,$T_{vj}$=125℃ | 16.0 | $A^2s$ |
| | | $V_R$=0V,$t_p$=10ms,$T_{vj}$=150℃ | 14.0 | |

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|---|---|---|---|---|---|---|
| Forward Voltage | $V_F$ | $I_F$=10A,$T_{vj}$=25℃ | | 2.0 | | V |
| | | $I_F$=10A,$T_{vj}$=125℃ | | 2.1 | | |
| | | $I_F$=10A,$T_{vj}$=150℃ | | 2.15 | | |
| Recovered Charge | $Q_{rr}$ | $I_F$ =10A<br>$V_R$=600V<br>-$di_F/dt$ =600A/us<br>$T_{vj}$=25℃ | | 1. 0 | | uC |
| Peak Reverse Recovery Current | $I_{rr}$ | | | 12.5 | | A |
| Reverse Recovery Energy | $E_{rec}$ | | | 0.26 | | mJ |
| Recovered Charge | $Q_{rr}$ | $I_F$ =10 A<br>$V_R$=600V<br>-$di_F/dt$ =600A/us<br>$T_{vj}$=125℃ | | 1.70 | | uC |
| Peak Reverse Recovery Current | $I_{rr}$ | | | 10.6 | | A |
| Reverse Recovery Energy | $E_{rec}$ | | | 0.53 | | mJ |
| Recovered Charge | $Q_{rr}$ | $I_F$ =10 A<br>$V_R$=600V<br>-$di_F/dt$ =600A/us<br>$T_{vj}$=150℃ | | 1.86 | | uC |
| Peak Reverse Recovery Current | $I_{rr}$ | | | 12.0 | | A |
| Reverse Recovery Energy | $E_{rec}$ | | | 0.61 | | mJ |

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|---|---|---|---|---|
| Collector-Emitter Voltage | $V_{CES}$ | $V_{GE}$=0V, $I_C$ =1mA, $T_{vj}$=25℃ | 1200 | V |
| Continuous Collector Current | $I_C$ | $T_C$=100℃, $T_{vjmax}$=175℃ | 10 | A |
| Repetitive Peak Collector Current | $I_{CRM}$ | $t_p$=1ms | 20 | A |
| Gate-Emitter Voltage | $V_{GES}$ | $T_{vj}$=25℃ | ±20 | V |
| Total Power Dissipation | $P_{tot}$ | $T_C$=25℃, $T_{vjmax}$=175℃ | 140 | W |

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|---|---|---|---|---|---|---|
| Gate-emitter Threshold Voltage | $V_{GE(th)}$ | $V_{GE}$=$V_{CE}$, $I_C$ =0.5mA,$T_{vj}$=25℃ | 5.2 | 5.8 | 6.4 | V |
| Collector-Emitter Cut-off Current | $I_{CES}$ | $V_{CE}$=1200V,$V_{GE}$=0V, $T_{vj}$=25℃ | | | 1.0 | mA |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C$=10A,$V_{GE}$=15V, $T_{vj}$=25℃ | | 1.85 | 2.25 | V |
| | | $I_C$=10A,$V_{GE}$=15V, $T_{vj}$=125℃ | | 2.15 | | |
| | | $I_C$=10A,$V_{GE}$=15V, $T_{vj}$=150℃ | | 2.25 | | |
| Gate Charge | $Q_G$ | | | 0.09 | | uC |
| Input Capacitance | $C_{ies}$ | $V_{CE}$=25V, $V_{GE}$=0V, f=1MHz, $T_{vj}$=25℃ | | 1.0 | | nF |
| Reverse Transfer Capacitance | $C_{res}$ | | | 0.03 | | nF |
| Gate-Emitter leakage current | $I_{GES}$ | $V_{CE}$=0V, $V_{GE}$=20V,$T_{vj}$ = 25℃ | | | 400 | nA |
| Turn-on Delay Time | $t_{d(on)}$ | $I_C$=10A $V_{CE}$=600V $V_{GE}$=±15V $R_G$=51Ω $T_{vj}$=25℃ | | 46 | | ns |
| Rise Time | $t_r$ | | | 45 | | ns |
| Turn-off Delay Time | $t_{d(off)}$ | | | 182 | | ns |
| Fall Time | $t_f$ | | | 168 | | ns |
| Energy Dissipation During Turn-on Time | $E_{on}$ | | | 0.92 | | mJ |
| Energy Dissipation During Turn-off Time | $E_{off}$ | | | 0.56 | | mJ |

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|---|---|---|---|---|---|---|
| Turn-on Delay Time | $t_{d(on)}$ | $I_C$=10A<br>$V_{CE}$=600 V<br>$V_{GE}$ =±15V<br>$R_G$=51Ω<br>$T_{vj}$=125℃ | | 46 | | ns |
| Rise Time | $t_r$ | | | 63 | | ns |
| Turn-off Delay Time | $t_{d(off)}$ | | | 248 | | ns |
| Fall Time | $t_f$ | | | 220 | | ns |
| Energy Dissipation During Turn-on Time | $E_{on}$ | | | 1.37 | | mJ |
| Energy Dissipation During Turn-off Time | $E_{off}$ | | | 0.81 | | mJ |
| Turn-on Delay Time | $t_{d(on)}$ | $I_C$=10A<br>$V_{CE}$=600 V<br>$V_{GE}$=±15V<br>$R_G$=51Ω<br>$T_{vj}$=150℃ | | 48 | | ns |
| Rise Time | $t_r$ | | | 68 | | ns |
| Turn-off Delay Time | $t_{d(off)}$ | | | 252 | | ns |
| Fall Time | $t_f$ | | | 223 | | ns |
| Energy Dissipation During Turn-on Time | $E_{on}$ | | | 1.60 | | mJ |
| Energy Dissipation During Turn-off Time | $E_{off}$ | | | 0.89 | | mJ |
| SC Data | $I_{SC}$ | $t_p$≤10us,$V_{GE}$=15V,$T_{vj}$=150℃,<br>$V_{CC}$=900V,$V_{CEM}$≤1200V | | 70 | | A |

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|---|---|---|---|---|
| Repetitive Peak Reverse Voltage | $V_{RRM}$ | $T_{vj}$=25℃ | 1200 | V |
| Continuous DC Forward Current | $I_F$ | | 10 | A |
| Repetitive Peak Forward Current | $I_{FRM}$ | $t_p$=1ms | 20 | A |
| $I^2t$-value | $I^2t$ | $V_R$=0V,$t_p$=10ms,$T_{vj}$=125℃ | 16.0 | $A^2s$ |
| | | $V_R$=0V,$t_p$=10ms,$T_{vj}$=150℃ | 14.0 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Forward Voltage | $V_F$ | $I_F$=10A,$T_{vj}$=25℃ | | 2.0 | 2.5 | V |
| | | $I_F$=10A,$T_{vj}$=125℃ | | 2.1 | | |
| | | $I_F$=10A,$T_{vj}$=150℃ | | 2.15 | | |
| Recovered Charge | $Q_{rr}$ | $I_F$ =10 A<br>$V_R$=600V<br>-di$_F$/dt =500A/us<br>$T_{vj}$=25℃ | | 0.88 | | uC |
| Peak Reverse Recovery Current | $I_{rr}$ | | | 12.5 | | A |
| Reverse Recovery Energy | $E_{rec}$ | | | 0.25 | | mJ |
| Recovered Charge | $Q_{rr}$ | $I_F$ =10 A<br>$V_R$=600V<br>-di$_F$/dt =500A/us<br>$T_{vj}$=125℃ | | 1.71 | | uC |
| Peak Reverse Recovery Current | $I_{rr}$ | | | 10.4 | | A |
| Reverse Recovery Energy | $E_{rec}$ | | | 0.50 | | mJ |
| Recovered Charge | $Q_{rr}$ | $I_F$ =10 A<br>$V_R$=600V<br>-di$_F$/dt =500A/us<br>$T_{vj}$=150℃ | | 1.92 | | uC |
| Peak Reverse Recovery Current | $I_{rr}$ | | | 10.4 | | A |
| Reverse Recovery Energy | $E_{rec}$ | | | 0.58 | | mJ |

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|---|---|---|---|---|
| Repetitive Peak Reverse Voltage | $V_{RRM}$ | $T_{vj}$=25℃ | 1600 | V |
| Average output Current 50/60Hz, sine wave | $I_{F(AV)}$ | $T_C$=100℃ | 10 | A |
| Maximum RMS Current at Rectifier Output | $I_{RMSM}$ | $T_C$=100℃ | 20 | A |
| Surge Forward Current | $I_{FSM}$ | $V_R$=0V,$t_p$=10ms,$T_{vj}$=45℃ | 150 | A |

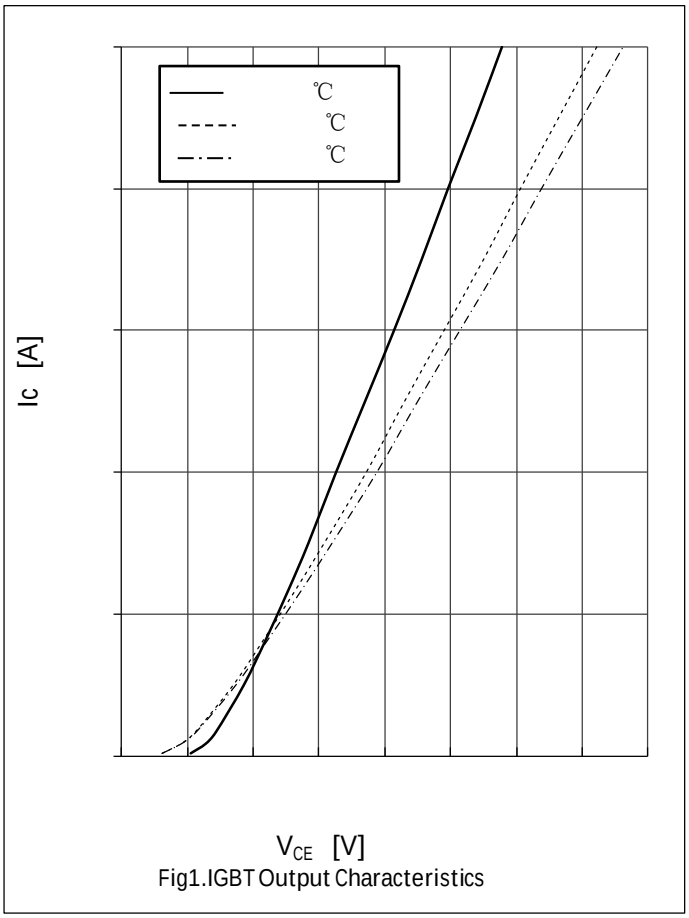
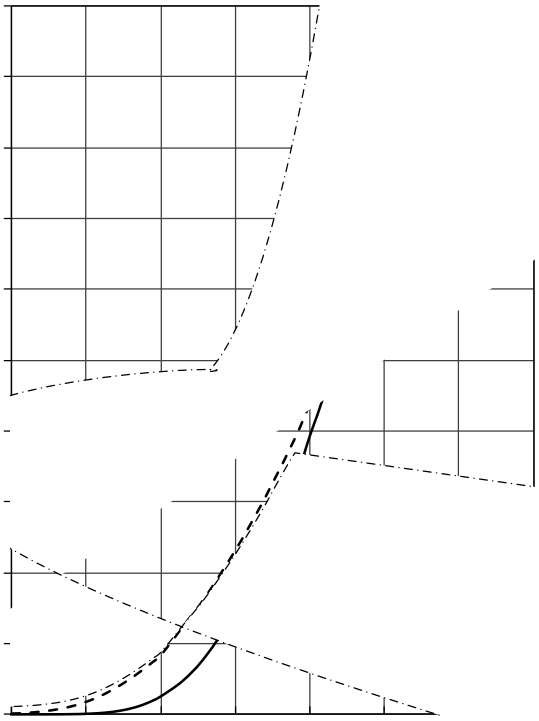



Fig1.IGBT Output Characteristics



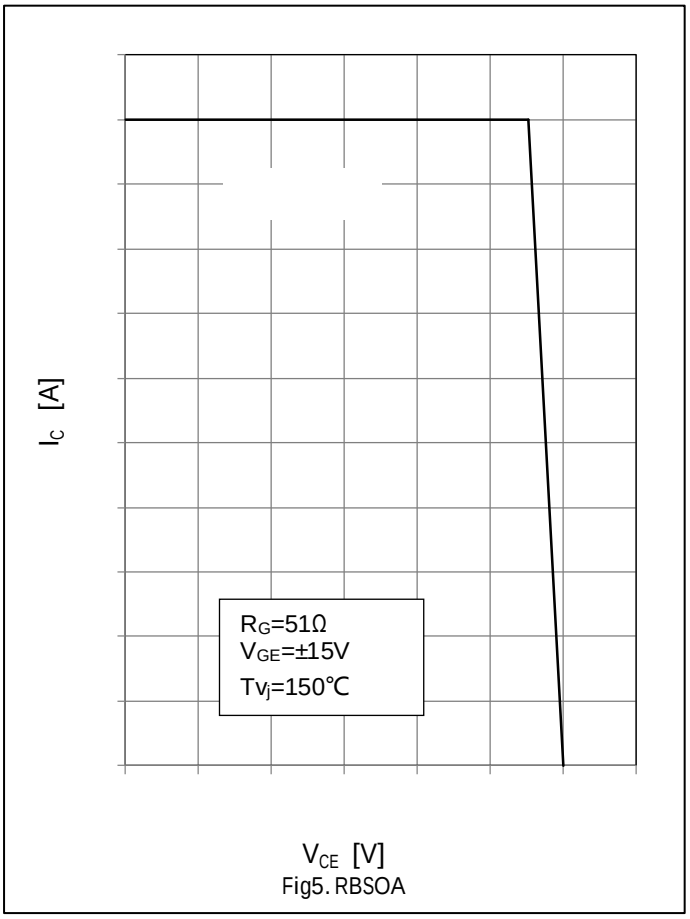


Fig5. RBSOA

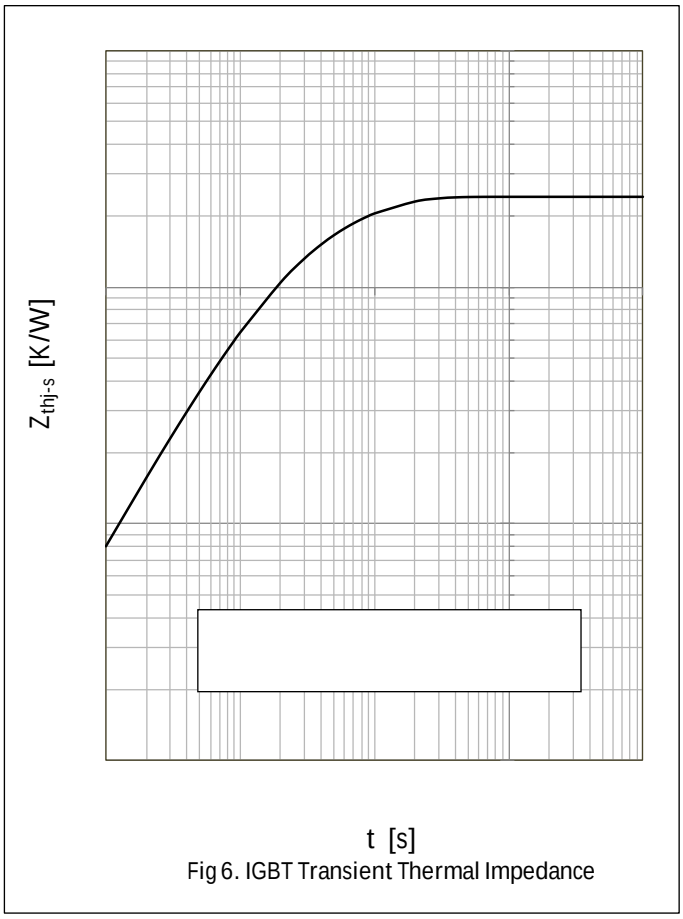


Fig 6. IGBT Transient Thermal Impedance

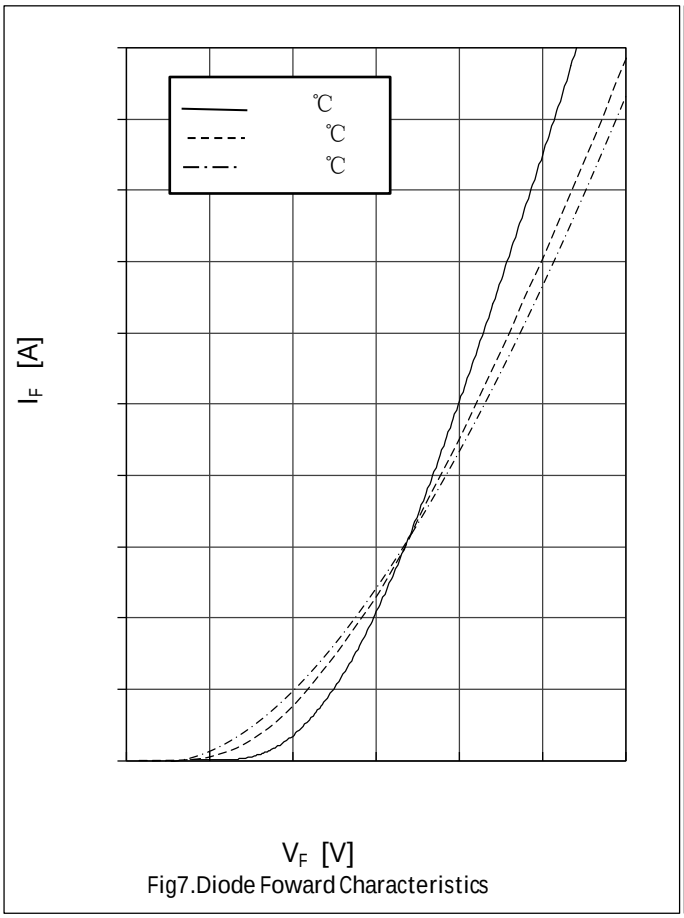


Fig7.Diode Foward Characteristics

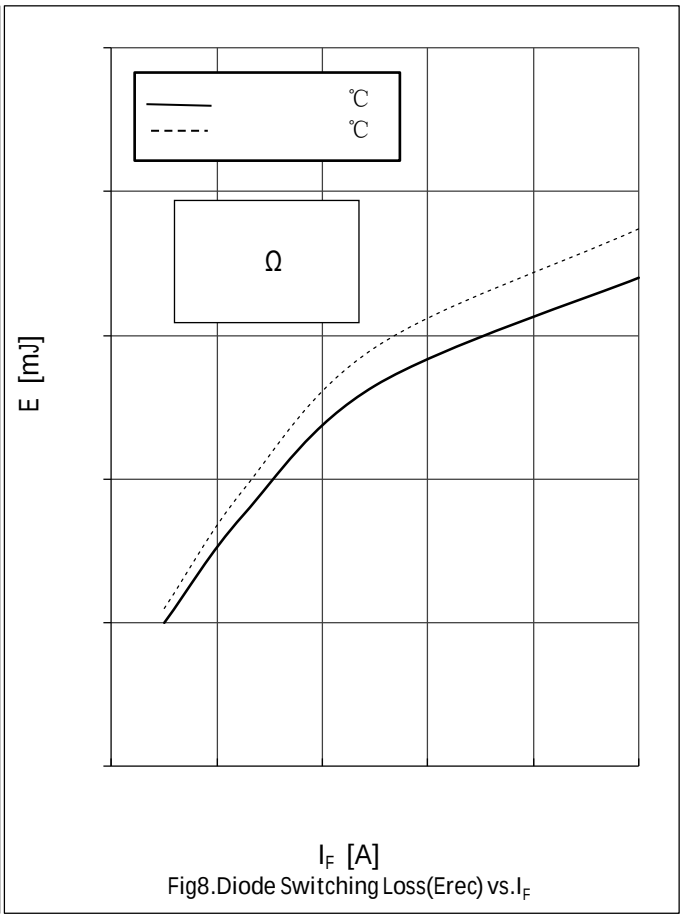


Fig8.Diode Switching Loss(Erec) vs.$I_F$

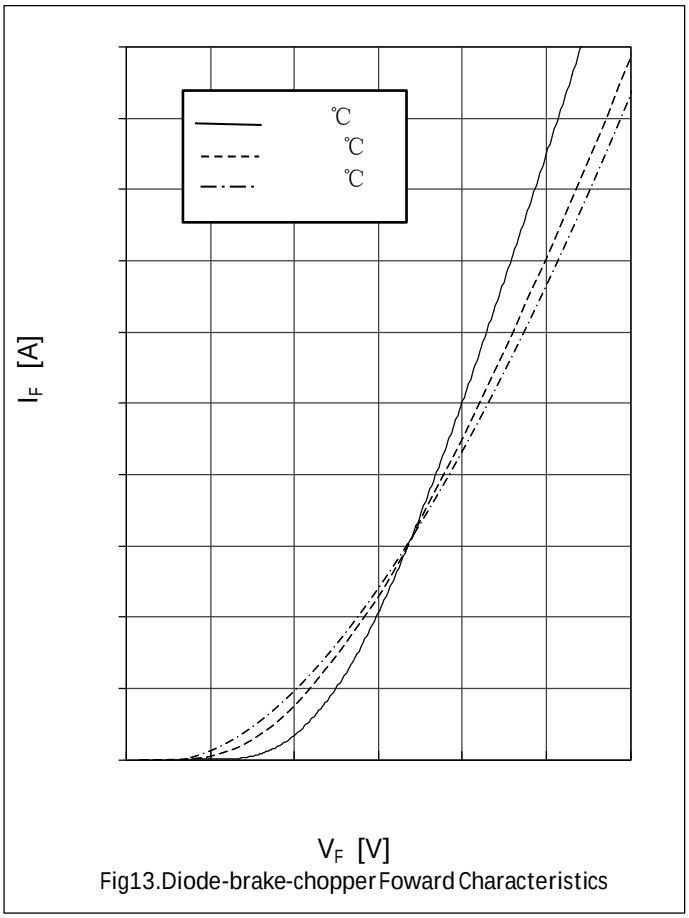
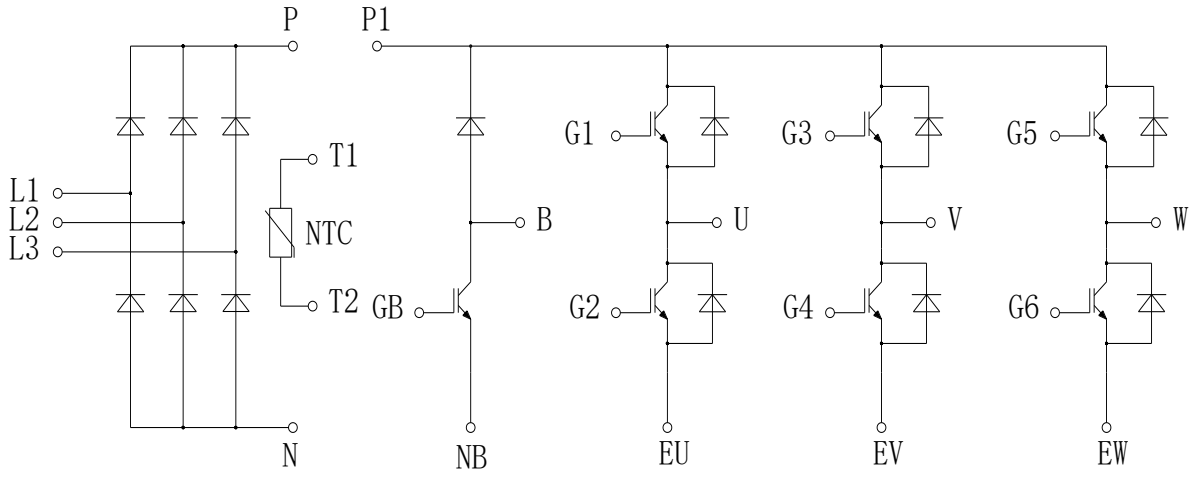



Fig13.Diode-brake-chopper Foward Characteristics


P
P1
L1
L2
L3
T1
NTC
T2
GB
B
G1
U
G2
G3
V
G4
G5
W
G6
N
NB
EU
EV
EW

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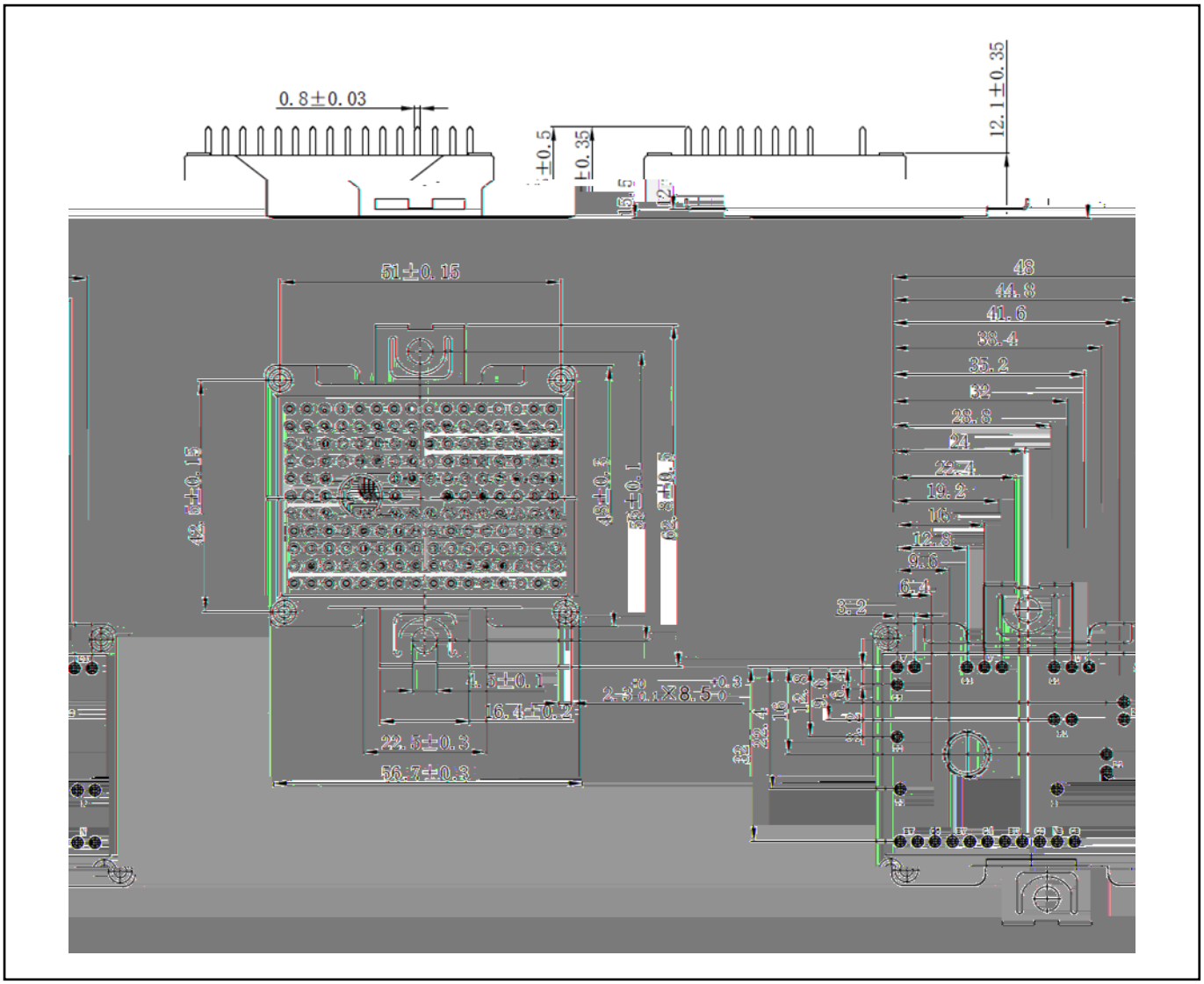
0.8±0.03
12.1±0.35
51±0.15
48
44.8
41.6
38.4
35.2
32
28.8
24
22.4
19.2
16
12.8
9.6
6.4
3.2
4.5±0.1
16.4±0.2
22.5±0.3
56.7±0.3

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