# MPBL50N120B

## 1200V-50A Trench and Field Stop IGBT

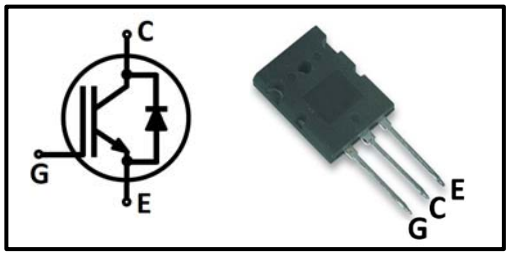
## Features

- Easy parallel switching capability due to positive temperature coefficient in $V_{CEsat}$
- Low $V_{CEsat}$, fast switching
- High ruggedness, good thermal stability
- Very tight parameter distribution

## Applications

- Welding Machine
- UPS

| Type | Marking | Package Code |
|---|---|---|
| MPBL50N120B | MP50N120B | TO-264 |




## Maximum Rated Values

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Collector-emitter voltage | $V_{CE}$ | 1200 | V |
| DC collector current, limited by $T_{jmax}$<br>$T_C$=25℃<br>$T_C$=100℃ | $I_C$ | <br>100<br>50 | A |
| Pulsed collector current, $t_p$ limited by $T_{jmax}$ [1)] | $I_{Cpuls}$ | 200 | |
| Diode forward current, limited by $T_{jmax}$<br>$T_C$=25℃<br>$T_C$=100℃ | $I_F$ | <br>50<br>25 | |
| Diode pulsed current, $t_p$ limited by $T_{jmax}$ [1)] | $I_{Fpuls}$ | 100 | |
| Gate-emitter voltage | $V_{GE}$ | ±20 | V |
| Transient Gate-emitter voltage（$t_p$≤10us,D<0.01) | | ±30 | |
| Power dissipation $T_C$=25℃ | $P_{tot}$ | 535 | W |
| Power dissipation $T_C$=100℃ | | 267 | |
| Operating junction temperature | $T_j$ | -40~175 | ℃ |
| Storage temperature | $T_{stg}$ | -55~150 | |
| Soldering temperature,<br>wave soldering 1.6mm (0.063in.) from case for 10s | | 260 | |
| Mounting torque, M3 screw<br>Maximum of mounting processes: 3 | M | 0.6 | Nm |

[1)] Defined by design. Not subject to production test.

## Thermal Characteristics

| Parameter | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| IGBT thermal resistance, junction-case | $R_{thJC}$ | - | - | 0.28 | K/W |
| Diode thermal resistance, junction-case | $R_{thJCD}$ | - | - | 0.80 | |
| Thermal Resistance, junction-ambient | $R_{thJA}$ | - | - | 30 | |

## Electrical Characteristics（at $T_j$=25℃, unless otherwise specified）

## Static Characteristics

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Collector-emitter breakdown voltage | $V_{(BR)CES}$ | $V_{GE}$=0V, $I_C$=0.25mA | 1200 | - | - | V |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | $V_{GE}$=15V, $I_C$=50A $T_j$=25℃ | - | 1.90 | 2.30 | |
| | | $T_j$=150℃ | - | 2.50 | - | |
| | | $T_j$=175℃ | - | 2.65 | - | |
| Diode forward voltage | $V_F$ | $V_{GE}$=0V, $I_F$=25A $T_j$=25℃ | - | 2.0 | - | |
| | | $T_j$=150℃ | - | 1.7 | - | |
| | | $T_j$=175℃ | - | 1.6 | - | |
| G-E threshold voltage | $V_{GE(th)}$ | $I_C$=1.7mA, $V_{CE}$=$V_{GE}$ | 5.0 | 5.8 | 6.5 | |
| C-E leakage current | $I_{CES}$ | $V_{CE}$=1200V, $V_{GE}$=0V $T_j$=25℃ | - | - | 0.1 | mA |
| | | $T_j$=175℃ | - | - | 4.0 | |
| G-E leakage current | $I_{GES}$ | $V_{CE}$=0V, $V_{GE}$=20V | - | - | 250 | nA |

## Dynamic Characteristics

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Input capacitance | $C_{ies}$ | $V_{CE}$=25V, $V_{GE}$=0V, f=1MHz | - | 6050 | - | pF |
| Output capacitance | $C_{oes}$ | | - | 145 | - | |
| Reverse transfer capacitance | $C_{res}$ | | - | 135 | - | |
| Gate charge | $Q_G$ | $V_{CC}$=600V, $I_C$=50A, $V_{GE}$=15V | - | 480 | - | nC |

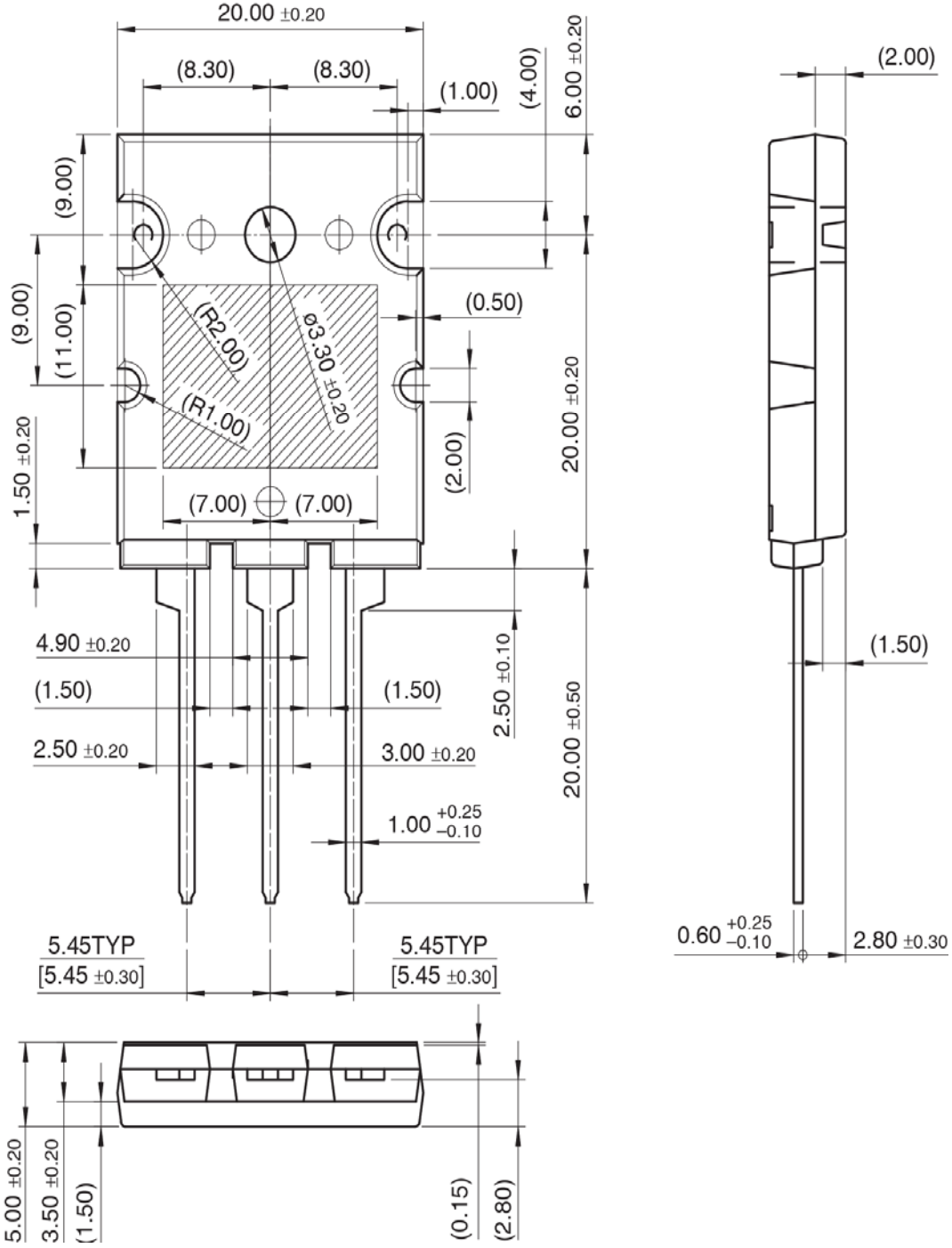
## IGBT Switching Characteristics

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Turn-on delay time | $t_{d(on)}$ | $T_j$=25℃, $V_{CC}$=600V, $I_C$=50A, $V_{GE}$=0/15V, $R_G$=10Ω, Inductive load | - | 92 | - | ns |
| Rise time | $t_r$ | | - | 156 | - | |
| Turn-off delay time | $t_{d(off)}$ | | - | 622 | - | |
| Fall time | $t_f$ | | - | 72 | - | |
| Turn-on energy | $E_{on}$ | | - | 6.68 | - | mJ |
| Turn-off energy | $E_{off}$ | | - | 3.07 | - | |
| Total switching energy | $E_{ts}$ | | - | 9.75 | - | |
| Turn-on delay time | $t_{d(on)}$ | $T_j$=175℃, $V_{CC}$=600V, $I_C$=50A, $V_{GE}$=0/15V, $R_G$=10Ω, Inductive load | - | 81 | - | ns |
| Rise time | $t_r$ | | - | 146 | - | |
| Turn-off delay time | $t_{d(off)}$ | | - | 723 | - | |
| Fall time | $t_f$ | | - | 96 | - | |
| Turn-on energy | $E_{on}$ | | - | 6.84 | - | mJ |
| Turn-off energy | $E_{off}$ | | - | 4.10 | - | |
| Total switching energy | $E_{ts}$ | | - | 10.94 | - | |

## Diode Characteristics

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Diode reverse recovery time | $t_{rr}$ | $T_j$=25℃, $V_R$=600V, $I_F$=25A, $di_F/dt$=300A/μs | - | 230 | - | ns |
| Diode reverse recovery charge | $Q_{rr}$ | | - | 1.72 | - | μC |
| Diode peak reverse recovery current | $I_{rrm}$ | | - | 16.0 | - | A |
| Diode reverse recovery time | $t_{rr}$ | $T_j$=175℃, $V_R$=600V, $I_F$=25A, $di_F/dt$=300A/μs | - | 392 | - | ns |
| Diode reverse recovery charge | $Q_{rr}$ | | - | 4.25 | - | μC |
| Diode peak reverse recovery current | $I_{rrm}$ | | - | 25.6 | - | A |

## TO-264



## Revision History

| Revision | Subjects (major changes since last revision) | Date |
|---|---|---|
| 1.0 | Initial version | 2021.8 |

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