

# MBN1200E33D

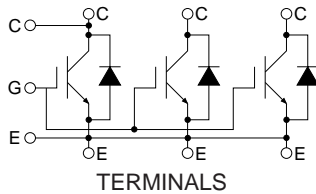
TENTATIVE SPECIFICATION

Silicon N-channel IGBT

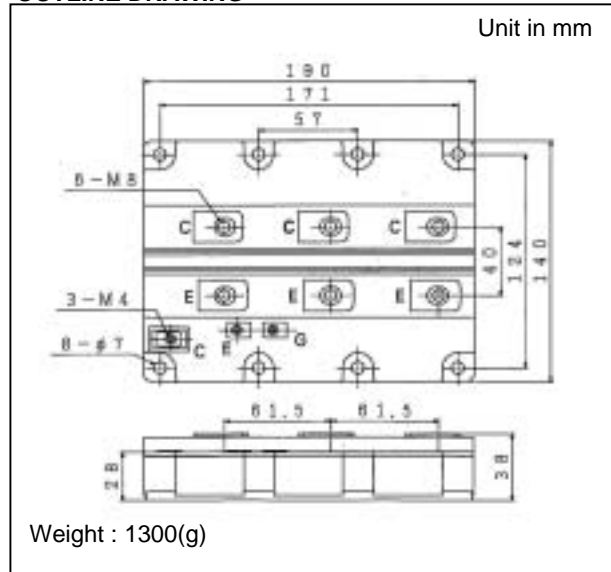
## FEATURES

- \* High speed, low loss IGBT module.
- \* Low driving power due to low input capacitance MOS gate.
- \* Low noise due to ultra soft fast recovery diode.
- \* High reliability, high durability module.
- \* High thermal fatigue durability.  
( $\Delta T_c=70^\circ\text{C}$ ,  $N>30,000$ cycles)
- \* Isolated head sink (terminal to base).

## CIRCUIT DIAGRAM



## OUTLINE DRAWING



## ABSOLUTE MAXIMUM RATINGS ( $T_c=25^\circ\text{C}$ )

| Item                      | Symbol            | Unit             | MBN1200E33D        |
|---------------------------|-------------------|------------------|--------------------|
| Collector Emitter Voltage | $V_{CES}$         | V                | 3,300              |
| Gate Emitter Voltage      | $V_{GES}$         | V                | $\pm 20$           |
| Collector Current         | DC                | $I_C$            | 1,200              |
|                           | 1ms               | $I_{CP}$         | 2,400              |
| Forward Current           | DC                | $I_F$            | 1,200              |
|                           | 1ms               | $I_{FM}$         | 2,400              |
| Junction Temperature      | $T_j$             | $^\circ\text{C}$ | -40 ~ +125         |
| Storage Temperature       | $T_{stg}$         | $^\circ\text{C}$ | -40 ~ +125         |
| Isolation Voltage         | $V_{ISO}$         | $V_{RMS}$        | 6,000(AC 1 minute) |
| Screw Torque              | Terminals (M4/M8) | -                | 2/10 (1)           |
|                           | Mounting (M6)     | -                | 6 (2)              |

Notes: (1) Recommended Value  $1.8\pm 0.2/9\pm 1\text{N}\cdot\text{m}$ (2) Recommended Value  $5.5\pm 0.5\text{N}\cdot\text{m}$ 

## ELECTRICAL CHARACTERISTICS

| Item                                 | Symbol          | Unit               | Min.               | Typ.  | Max. | Test Conditions   |                  |
|--------------------------------------|-----------------|--------------------|--------------------|-------|------|---|------------------|
| Collector Emitter Cut-Off Current    | $I_{CES}$       | mA                 | -                  | -     | 12   | $V_{CE}=3,300\text{V}$ , $V_{GE}=0\text{V}$ , $T_j=25^\circ\text{C}$                      |                  |
|                                      |                 |                    | -                  | 20    | 60   | $V_{CE}=3,300\text{V}$ , $V_{GE}=0\text{V}$ , $T_j=125^\circ\text{C}$                     |                  |
| Gate Emitter Leakage Current         | $I_{GES}$       | nA                 | -500               | -     | +500 | $V_{GE}=\pm 20\text{V}$ , $V_{CE}=0\text{V}$ , $T_j=25^\circ\text{C}$                     |                  |
| Collector Emitter Saturation Voltage | $V_{CE(sat)}$   | V                  | -                  | 4.2   | 5.2  | $I_C=1,200\text{A}$ , $V_{GE}=15\text{V}$ , $T_j=125^\circ\text{C}$                       |                  |
| Gate Emitter Threshold Voltage       | $V_{GE(TH)}$    | V                  | 4.5                | 6.0   | 7.0  | $V_{CE}=10\text{V}$ , $I_C=1,200\text{mA}$ , $T_j=25^\circ\text{C}$                       |                  |
| Input Capacitance                    | $C_{ies}$       | nF                 | -                  | 110   | -    | $V_{CE}=10\text{V}$ , $V_{GE}=0\text{V}$ , $f=100\text{kHz}$ , $T_j=25^\circ\text{C}$     |                  |
| Internal Gate Resistance             | $R_{ge}$        | $\Omega$           | -                  | 1.2   | -    | $V_{CE}=10\text{V}$ , $V_{GE}=0\text{V}$ , $f=100\text{kHz}$ , $T_j=25^\circ\text{C}$     |                  |
| Switching Times                      | Rise Time       | $t_r$              | -                  | 1.9   | 3.1  | $V_{CC}=1,650\text{V}$ , $I_C=1,200\text{A}$  |                  |
|                                      | Turn On Time    | $t_{on}$           | -                  | 2.4   | 3.3  | $L=100\text{nH}$  |                  |
|                                      | Fall Time       | $t_f$              | -                  | 1.0   | 2.5  | $R_G=3.3\Omega$ (3)   |                  |
|                                      | Turn Off Time   | $t_{off}$          | -                  | 3.0   | 5.1  | $V_{GE}=\pm 15\text{V}$ , $T_j=125^\circ\text{C}$   |                  |
| Peak Forward Voltage Drop            | $V_{FM}$        | V                  | -                  | 2.5   | 3.0  | $I_C=1,200\text{A}$ , $V_{GE}=0\text{V}$ , $T_j=125^\circ\text{C}$                        |                  |
| Reverse Recovery Time                | $t_{rr}$        | $\mu\text{s}$      | -                  | 0.6   | 1.1  | $V_{CC}=1,650\text{V}$ , $I_C=1,200\text{A}$ , $L=100\text{nH}$ , $T_j=125^\circ\text{C}$ |                  |
| Turn On Loss                         | $E_{on(10\%)}$  | J/P                | -                  | 1.6   | 2.1  | $V_{CC}=1,650\text{V}$ , $I_C=1,200\text{A}$ , $L=100\text{nH}$                           |                  |
| Turn Off Loss                        | $E_{off(10\%)}$ | J/P                | -                  | 1.3   | 1.7  | $R_G=3.3\Omega$ (3)   |                  |
| Reverse Recovery Loss                | $E_{rr(10\%)}$  | J/P                | -                  | 1.2   | 1.9  | $V_{GE}=\pm 15\text{V}$ , $T_j=125^\circ\text{C}$   |                  |
| Stray inductance module              | $L_{SCE}$       | nH                 | -                  | 12    | -    |   |                  |
| Thermal Impedance                    | IGBT            | $R_{th(j-c)}$      | $^\circ\text{C/W}$ | -     | -    | 0.0085  | Junction to case |
|                                      | FWD             | $R_{th(j-c)}$      | $^\circ\text{C/W}$ | -     | -    | 0.017   |                  |
| Contact Thermal Impedance            | $R_{th(c-f)}$   | $^\circ\text{C/W}$ | -                  | 0.006 | -    | Case to fin   |                  |

Notes:(3)  $R_G$  value is the test condition's value for evaluation of the switching times, not recommended value.Please, determine the suitable  $R_G$  value after the measurement of switching waveforms (overshoot voltage, etc.) with appliance mounted.

\* Please contact our representatives at order.

\* For improvement, specifications are subject to change without notice.

\* For actual application, please confirm this spec sheet is the newest revision.

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