

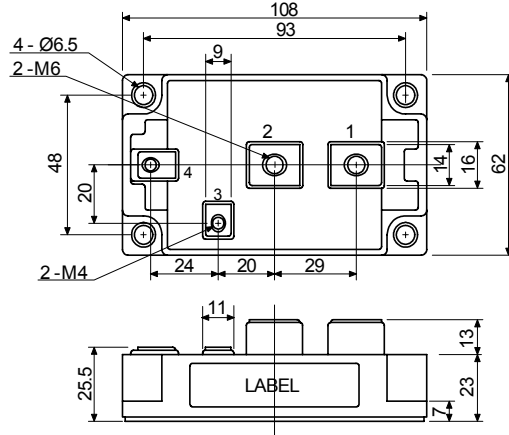
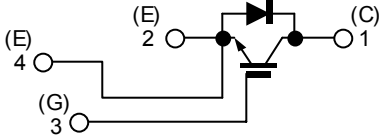
IGBT Module-Single

400 A, 1200V

PHMB400BS12

□ 回路図 : CIRCUIT

□ 外形寸法図 : OUTLINE DRAWING



Dimension: [mm]

□ 最大定格 : MAXIMUM RATINGS (T<sub>c</sub> = 25°C)

| Item   | Symbol           | Rated Value     | Unit               |
|--|------------------|-----------------|--------------------|
| コレクタ・エミッタ間電圧<br>Collector-Emmitter Voltage               | V <sub>CEs</sub> | 1,200           | V                  |
| ゲート・エミッタ間電圧<br>Gate-Emmitter Voltage                     | V <sub>GES</sub> | ±20             | V                  |
| コレクタ電流<br>Collector Current                              | DC               | I <sub>C</sub>  | A                  |
|  | 1ms              | I <sub>CP</sub> |                    |
| コレクタ損失<br>Collector Power Dissipation                    | P <sub>C</sub>   | 2,400           | W                  |
| 接合温度<br>Junction Temperature Range                       | T <sub>j</sub>   | -40~+150        | °C                 |
| 保存温度<br>Storage Temperature Range                        | T <sub>stg</sub> | -40~+125        | °C                 |
| 絶縁耐圧(Terminal to Base AC, 1 minute)<br>Isolation Voltage | V <sub>ISO</sub> | 2,500           | V <sub>(RMS)</sub> |
| 締め付けトルク<br>Mounting Torque                               | F <sub>tor</sub> | 3 (30.6)        | N·m<br>(kgf·cm)    |

□ 電気的特性 : ELECTRICAL CHARACTERISTICS (T<sub>c</sub> = 25°C)

| Characteristic  | Symbol                | Test Condition   | Min. | Typ.   | Max. | Unit |
|---|-----------------------|--|------|--------|------|------|
| コレクタ遮断電流<br>Collector-Emmitter Cut-Off Current          | I <sub>CEs</sub>      | V <sub>CE</sub> = 1200V, V <sub>GE</sub> = 0V  | -    | -      | 4.0  | mA   |
| ゲート漏れ電流<br>Gate-Emmitter Leakage Current                | I <sub>GES</sub>      | V <sub>GE</sub> = ±20V, V <sub>CE</sub> = 0V   | -    | -      | 1.0  | μA   |
| コレクタ・エミッタ間飽和電圧<br>Collector-Emmitter Saturation Voltage | V <sub>CE(sat)</sub>  | I <sub>C</sub> = 400A, V <sub>GE</sub> = 15V   | -    | 2.3    | 2.7  | V    |
| ゲートしきい値電圧<br>Gate-Emmitter Threshold Voltage            | V <sub>GE(th)</sub>   | V <sub>CE</sub> = 5V, I <sub>C</sub> = 400mA   | 4.0  | -      | 8.0  | V    |
| 入力容量<br>Input Capacitance                               | C <sub>ies</sub>      | V <sub>CE</sub> = 10V, V <sub>GE</sub> = 0V, f = 1MHz  | -    | 25,200 | -    | pF   |
| スイッチング時間<br>Switching Time                              | 上昇時間 Rise Time        | V <sub>CC</sub> = 600V<br>R <sub>L</sub> = 1.5Ω<br>R <sub>G</sub> = 3.9Ω<br>V <sub>GE</sub> = ±15V | -    | 0.25   | 0.45 | μs   |
|   | ターンオン時間 Turn-on Time  |  | -    | 0.40   | 0.70 |      |
|   | 下降時間 Fall Time        |  | -    | 0.25   | 0.35 |      |
|   | ターンオフ時間 Turn-off Time |  | -    | 0.80   | 1.10 |      |

□ フリーホイールダイオードの特性 : FREE WHEELING DIODE RATINGS & CHARACTERISTICS (T<sub>c</sub> = 25°C)

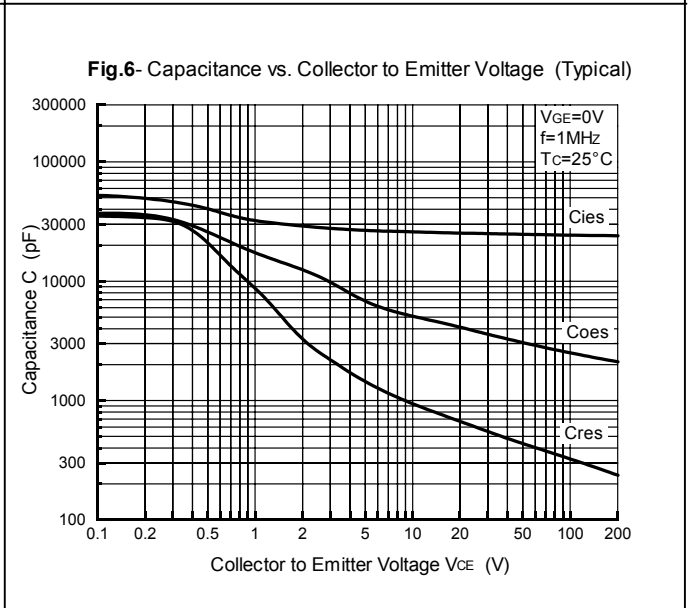
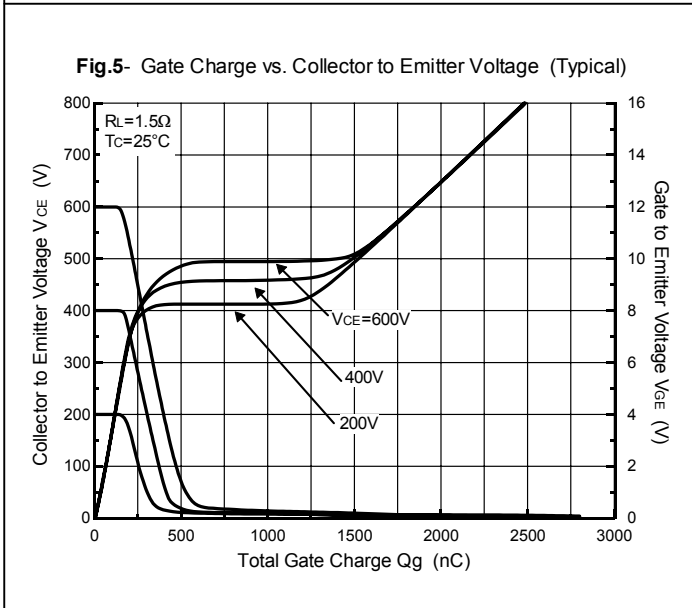
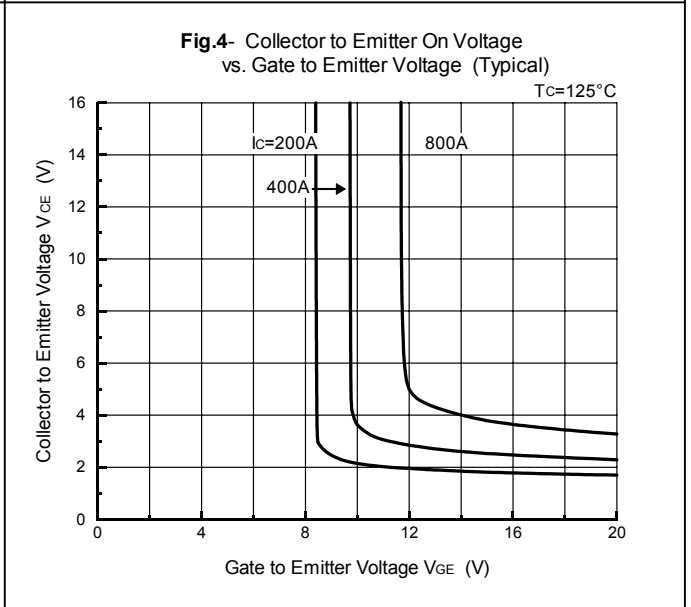
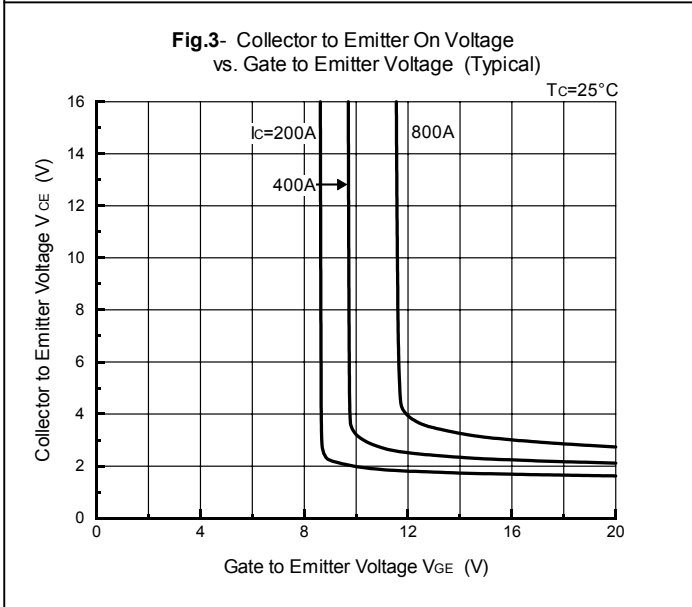
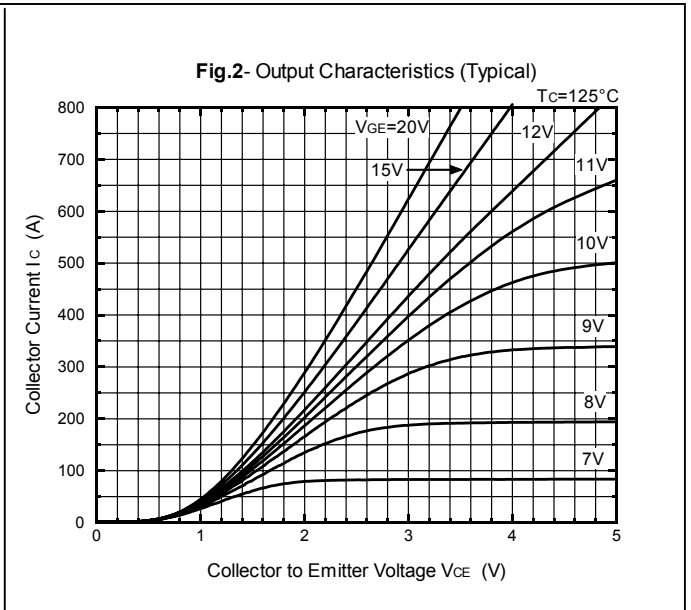
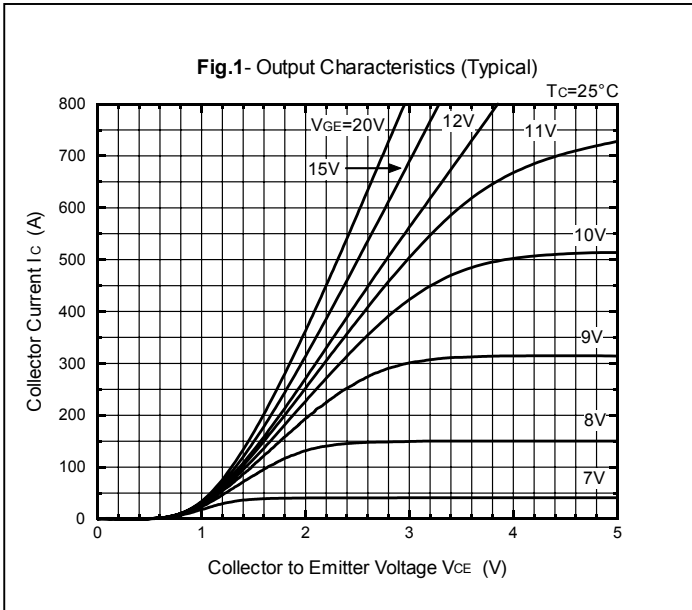
| Item                   | Symbol | Rated Value     | Unit |
|------------------------|--------|-----------------|------|
| 順電流<br>Forward Current | DC     | I <sub>F</sub>  | A    |
|                        | 1ms    | I <sub>FM</sub> |      |

| Characteristic                 | Symbol          | Test Condition   | Min. | Typ. | Max. | Unit |
|--------------------------------|-----------------|--|------|------|------|------|
| 順電圧<br>Peak Forward Voltage    | V <sub>F</sub>  | I <sub>F</sub> = 400A, V <sub>GE</sub> = 0V                      | -    | 2.2  | 2.6  | V    |
| 逆回復時間<br>Reverse Recovery Time | t <sub>rr</sub> | I <sub>F</sub> = 400A, V <sub>GE</sub> = -10V<br>di/dt = 800A/μs | -    | 0.2  | 0.3  | μs   |

□ 熱的特性 : THERMAL CHARACTERISTICS

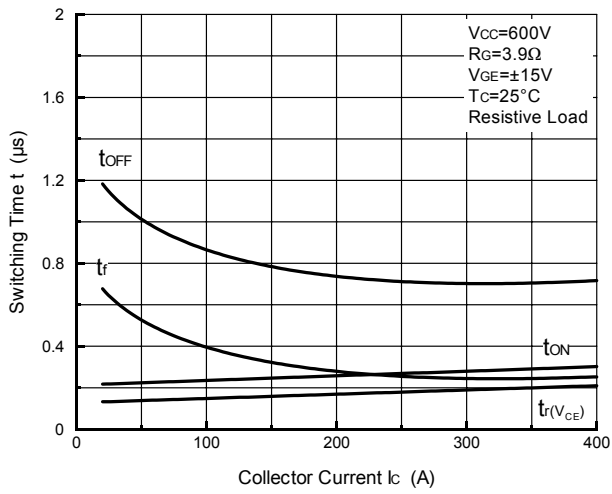
| Characteristic           | Symbol | Test Condition   | Min. | Typ. | Max.  | Unit |
|--------------------------|--------|------------------|------|------|-------|------|
| 熱抵抗<br>Thermal Impedance | IGBT   | Junction to Case | -    | -    | 0.052 | °C/W |
|                          | Diode  |                  | -    | -    | 0.107 |      |

# PHMB 400BS12

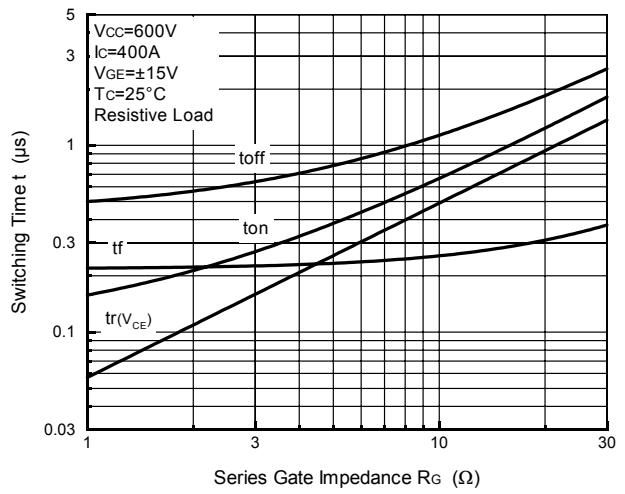


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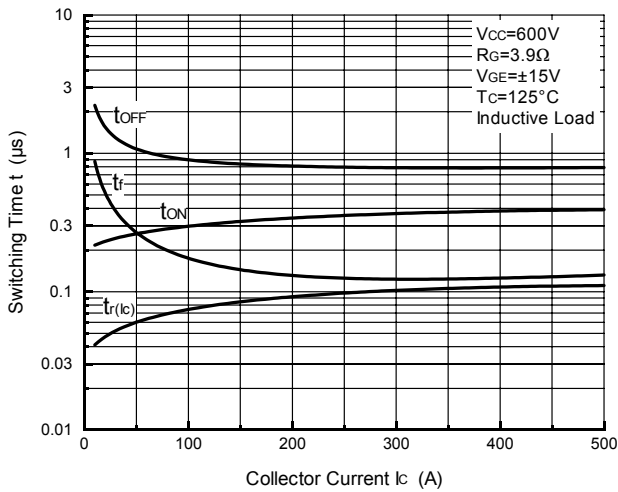
**Fig.7- Collector Current vs. Switching Time (Typical)**



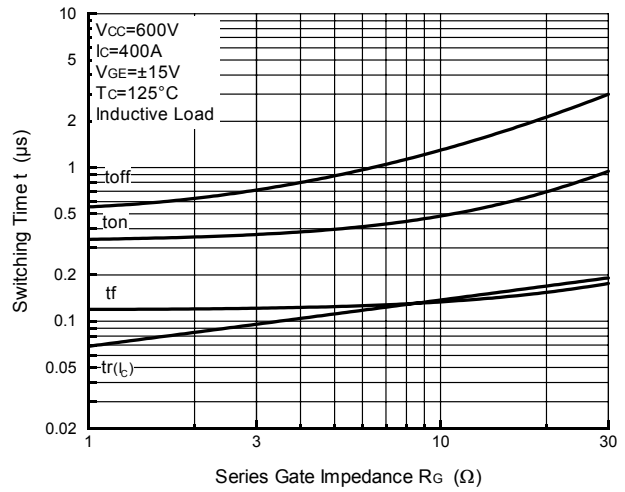
**Fig.8- Series Gate Impedance vs. Switching Time (Typical)**



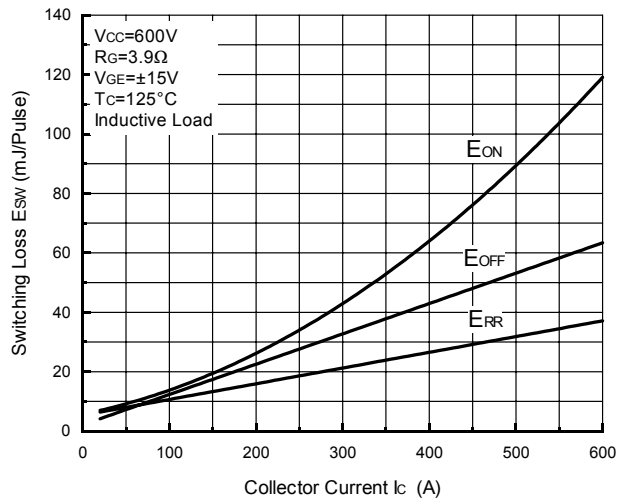
**Fig.9- Collector Current vs. Switching Time**



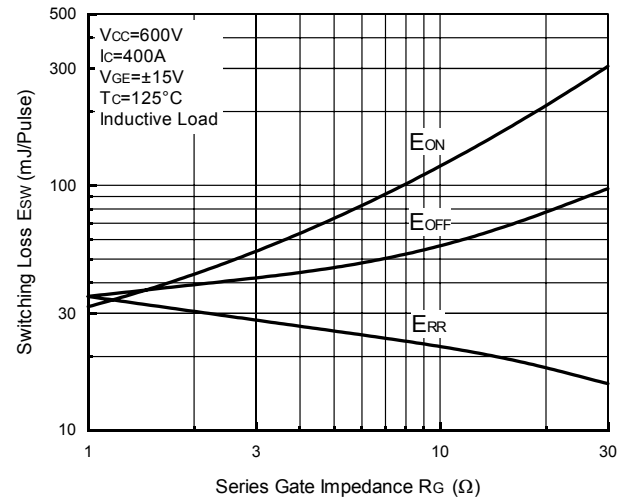
**Fig.10- Series Gate Impedance vs. Switching Time (Inductive Load)**



**Fig.11- Collector Current vs. Switching Loss**

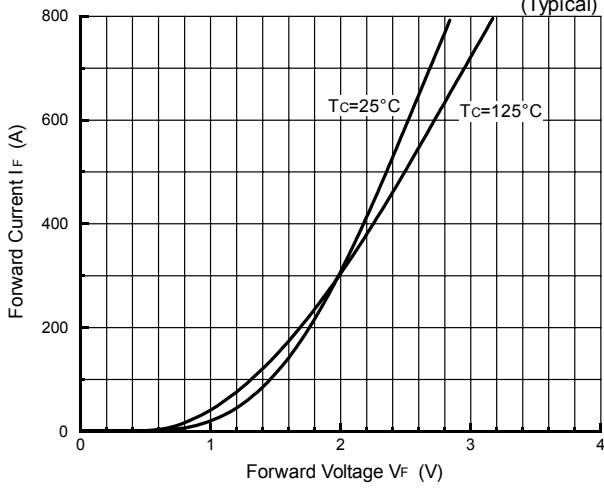


**Fig.12- Series Gate Impedance vs. Switching Loss (Inductive Load)**

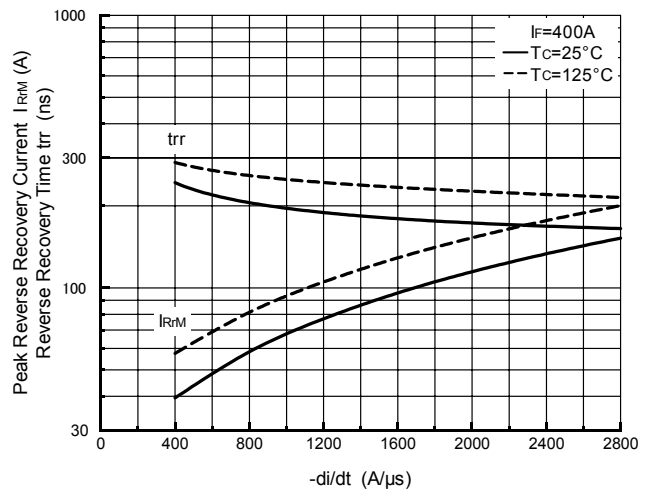


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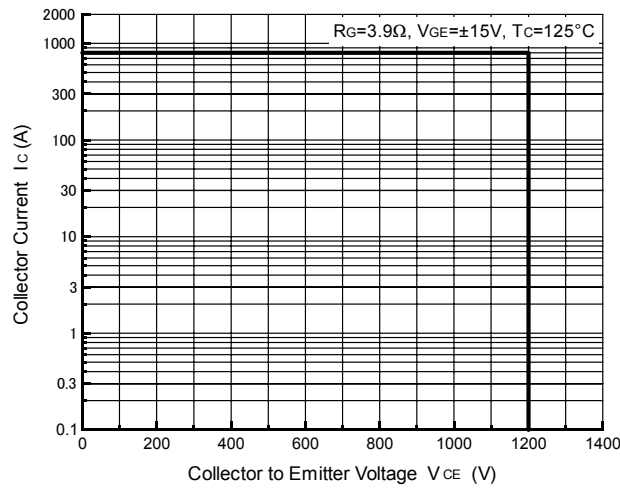
**Fig.13- Forward Characteristics of Free Wheeling Diode (Typical)**



**Fig.14- Reverse Recovery Characteristics (Typical)**



**Fig.15- Reverse Bias Safe Operating Area**



**Fig.16- Transient Thermal Impedance**

