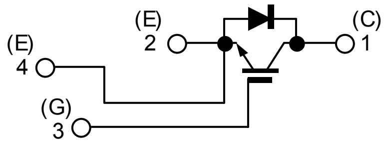
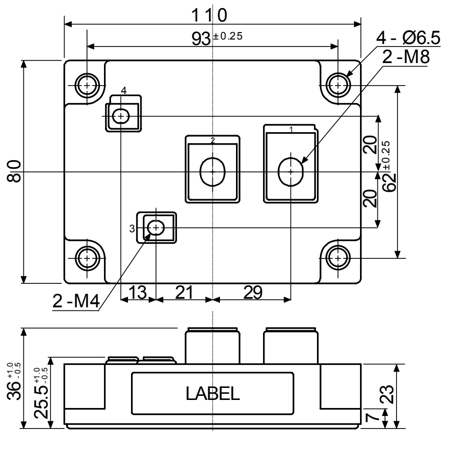
IGBT Module-Single 600A, 600V

PHMB600E6
PHMB600E6C

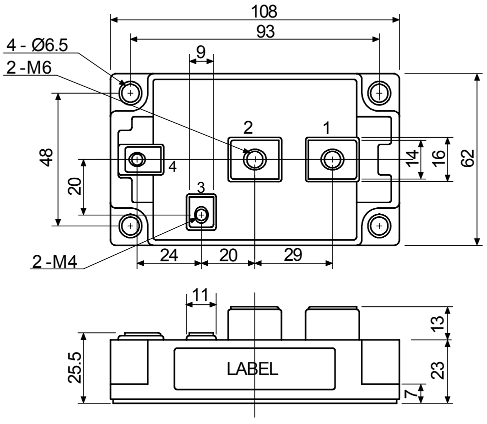
□ 回路図 : *CIRCUIT*



□ 外形寸法図 : *OUTLINE DRAWING*



PHMB600E6



PHMB600E6C

□ 最大定格 : *MAXIMUM RATINGS* （T_C＝２５℃）

<table>
<tr><th colspan="2">Item</th><th>Symbol</th><th colspan="4">Rated Value</th><th>Unit</th></tr>
<tr><td colspan="2">コレクタ・エミッタ間電圧
Collector-Emitter Voltage</td><td>V_{CES}</td><td colspan="4">６００</td><td>V</td></tr>
<tr><td colspan="2">ゲート・エミッタ間電圧
Gate-Emitter Voltage</td><td>V_{GES}</td><td colspan="4">±２０</td><td>V</td></tr>
<tr><td rowspan="2">コレクタ電流
Collector Current</td><td>DC</td><td>６００</td><td colspan="4">６００</td><td rowspan="2">A</td></tr>
<tr><td>1ms</td><td>1,２００</td><td colspan="4">１，２００</td></tr>
<tr><td colspan="2">コレクタ損失
Collector Power Dissipation</td><td>P_C</td><td colspan="4">2,０８０</td><td>W</td></tr>
<tr><td colspan="2">接合温度
Junction Temperature Range</td><td>T_j</td><td colspan="4">−４０〜＋１５０</td><td>℃</td></tr>
<tr><td colspan="2">保存温度
Storage Temperature Range</td><td>T_{stg}</td><td colspan="4">−４０〜＋１２５</td><td>℃</td></tr>
<tr><td colspan="2">絶縁耐圧(Terminal to Base AC, 1 minute)
Isolation Voltage</td><td>V_{ISO}</td><td colspan="4">2,５００</td><td>$V_{(RMS)}$</td></tr>
<tr><td rowspan="3">締め付けトルク
Mounting Torque</td><td>Module Base to Heatsink</td><td rowspan="3">F_{tor}</td><td rowspan="3">PHMB600E6</td><td>3 (30.6)</td><td rowspan="3">PHMB600E6C</td><td>3 (30.6)</td><td rowspan="3">N・m
(kgf・cm)</td></tr>
<tr><td rowspan="2">Busbar to Terminals</td><td>M4 | 14 (143)</td><td>M4 | 14 (143)</td></tr>
<tr><td>M8 | 10.5(107)</td><td>M6 | 3(30.6)</td></tr>
</table>

□ 電気的特性 : *ELECTRICAL CHARACTERISTICS* （T_C＝２５℃）

<table>
<tr><th colspan="2">Characteristic</th><th>Symbol</th><th>Test Condition</th><th>Min.</th><th>Typ.</th><th>Max.</th><th>Unit</th></tr>
<tr><td colspan="2">コレクタ遮断電流
Collector-Emitter Cut-Off Current</td><td>I_{CES}</td><td>V_{CE}= 600V, V_{GE}= 0V</td><td>−</td><td>−</td><td>1.0</td><td>mA</td></tr>
<tr><td colspan="2">ゲート漏れ電流
Gate-Emitter Leakage Current</td><td>I_{GES}</td><td>V_{GE}= ±20V, V_{CE}= 0V</td><td>−</td><td>−</td><td>1.0</td><td>μA</td></tr>
<tr><td colspan="2">コレクタ・エミッタ間飽和電圧
Collector-Emitter Saturation Voltage</td><td>$V_{CE(sat)}$</td><td>I_C= 600A, V_{GE}= 15V</td><td>−</td><td>2.1</td><td>2.6</td><td>V</td></tr>
<tr><td colspan="2">ゲートしきい値電圧
Gate-Emitter Threshold Voltage</td><td>$V_{GE(th)}$</td><td>V_{CE}= 5V, I_C= 600mA</td><td>4.0</td><td>−</td><td>8.0</td><td>V</td></tr>
<tr><td colspan="2">入力容量
Input Capacitance</td><td>C_{ies}</td><td>V_{CE}= 10V, V_{GE}= 0V, f = 1MH$_Z$</td><td>−</td><td>30,000</td><td>−</td><td>pF</td></tr>
<tr><td rowspan="4">スイッチング時間
Switching Time</td><td>上昇時間 Rise Time</td><td>t_r</td><td rowspan="4">V_{CC}= 300V
R_L= 0.5Ω
R_G= 2.0Ω
V_{GE}= ±15V</td><td>−</td><td>0.15</td><td>0.35</td><td rowspan="4">μs</td></tr>
<tr><td>ターンオン時間 Turn-on Time</td><td>t_{on}</td><td>−</td><td>0.30</td><td>0.85</td></tr>
<tr><td>下降時間 Fall Time</td><td>t_f</td><td>−</td><td>0.10</td><td>0.25</td></tr>
<tr><td>ターンオフ時間 Turn-off Time</td><td>t_{off}</td><td>−</td><td>0.40</td><td>0.80</td></tr>
</table>

□フリーホイーリングダイオードの特性: *FREE WHEELING DIODE RATINGS & CHARACTERISTICS* （T_C＝２５℃）

<table>
<tr><th colspan="2">Item</th><th>Symbol</th><th>Rated Value</th><th>Unit</th></tr>
<tr><td rowspan="2">順電流
Forward Current</td><td>DC</td><td>I_F</td><td>６００</td><td rowspan="2">A</td></tr>
<tr><td>1ms</td><td>I_{FM}</td><td>1,２００</td></tr>
</table>

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
順電圧 Peak Forward Voltage	V_F	I_F= 600A, V_{GE}= 0V	−	1.9	2.4	V
逆回復時間 Reverse Recovery Time	t_{rr}	I_F= 600A, V_{GE}= -10V di/dt= 1200A/μs	−	0.15	0.25	μs

□ 熱的特性 : *THERMAL CHARACTERISTICS*

<table>
<tr><th colspan="2">Characteristic</th><th>Symbol</th><th>Test Condition</th><th>Min.</th><th>Typ.</th><th>Max.</th><th>Unit</th></tr>
<tr><td rowspan="2">熱抵抗
Thermal Impedance</td><td>IGBT</td><td rowspan="2">Rth(j-c)</td><td rowspan="2">Junction to Case
(Tc測定点チップ直下)</td><td>−</td><td>−</td><td>0.06</td><td rowspan="2">℃/W</td></tr>
<tr><td>Diode</td><td>−</td><td>−</td><td>0.14</td></tr>
</table>

ＰＨＭＢ６００Ｅ６
ＰＨＭＢ６００Ｅ６Ｃ

Fig.1- Output Characteristics (Typical)

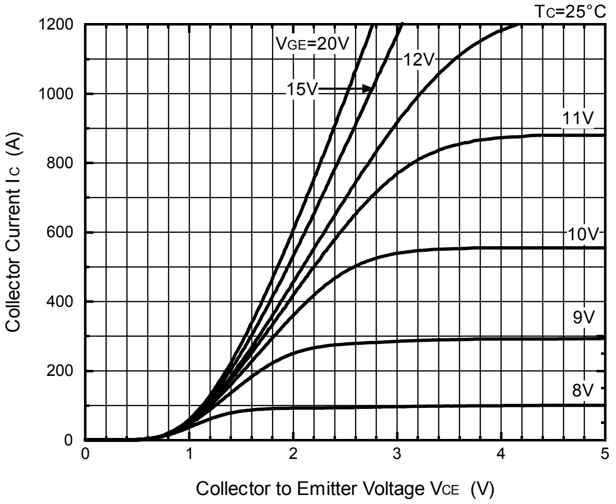


Fig.2- Output Characteristics (Typical)

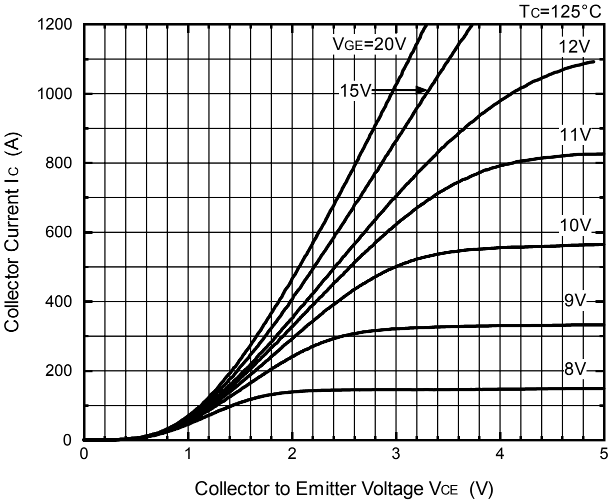


Fig.3- Collector to Emitter On Voltage vs. Gate to Emitter Voltage (Typical)

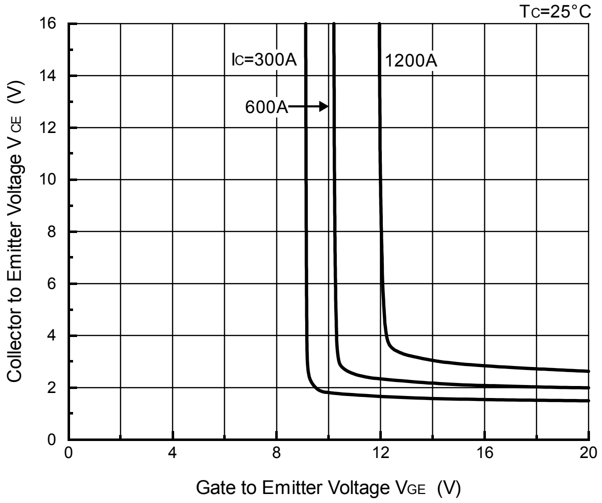


Fig.4- Collector to Emitter On Voltage vs. Gate to Emitter Voltage (Typical)

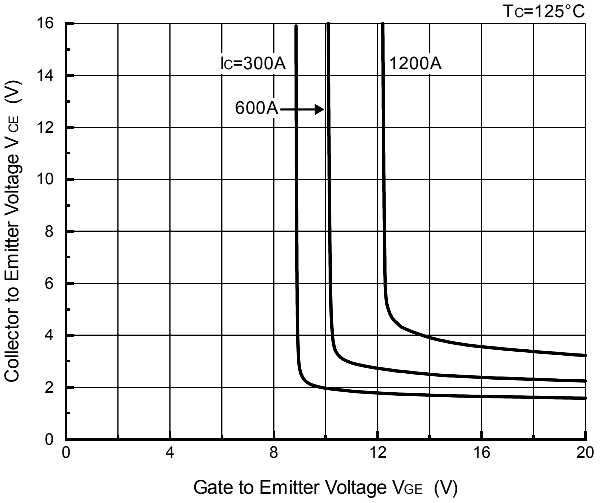


Fig.5- Gate Charge vs. Collector to Emitter Voltage (Typical)

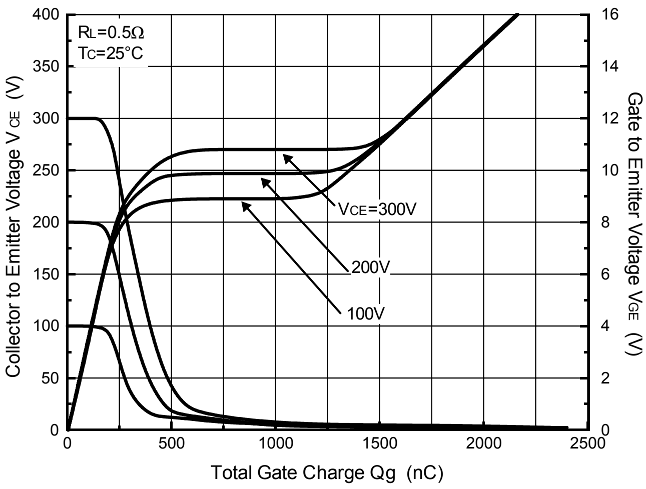


Fig.6- Capacitance vs. Collector to Emitter Voltage (Typical)

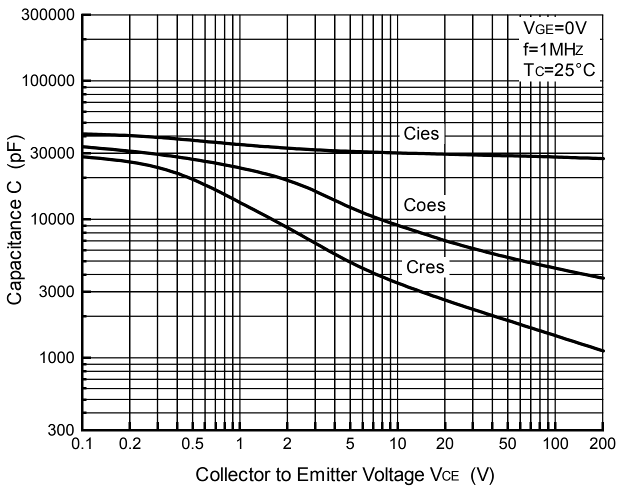


Fig.7- Collector Current vs. Switching Time (Typical)

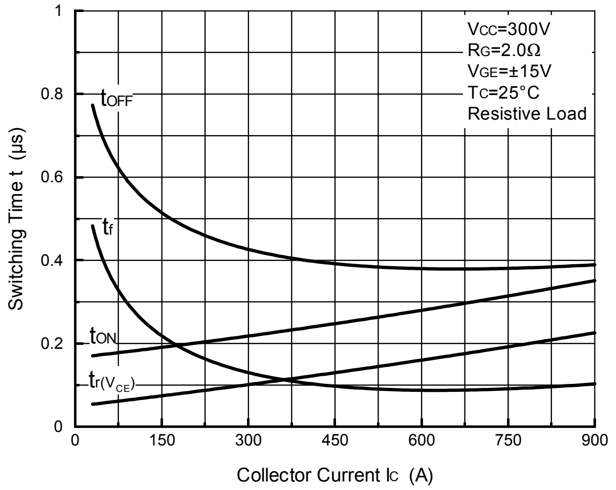


Fig.8- Series Gate Impedance vs. Switching Time (Typical)

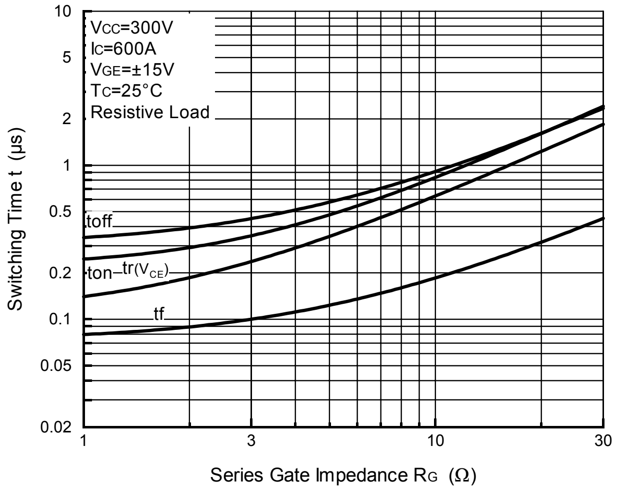


Fig.9- Collector Current vs. Switching Time

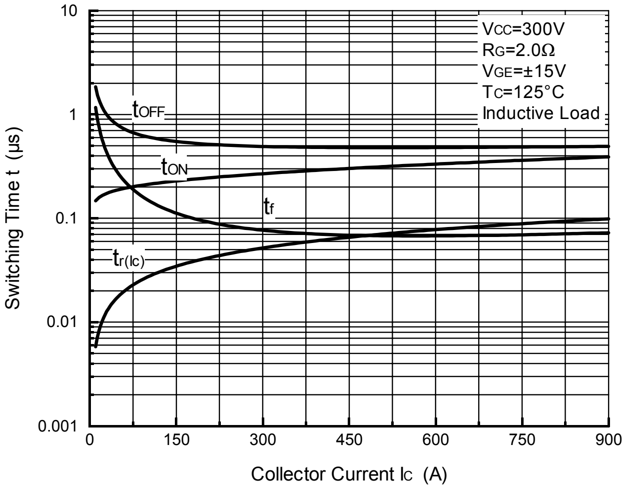


Fig.10- Series Gate Impedance vs. Switching Time

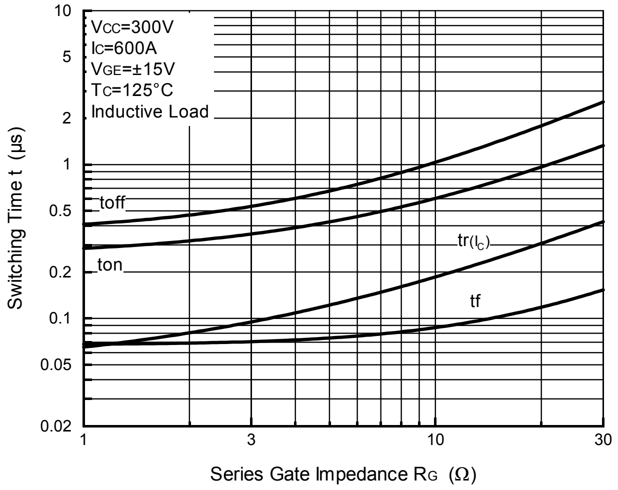


Fig.11- Collector Current vs. Switching Loss

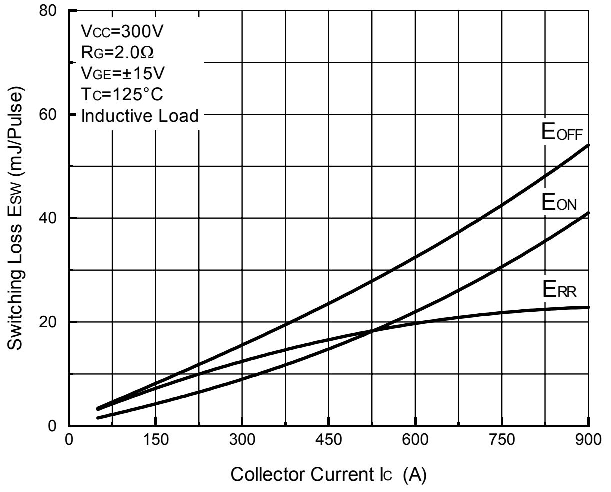


Fig.12- Series Gate Impedance vs. Switching Loss

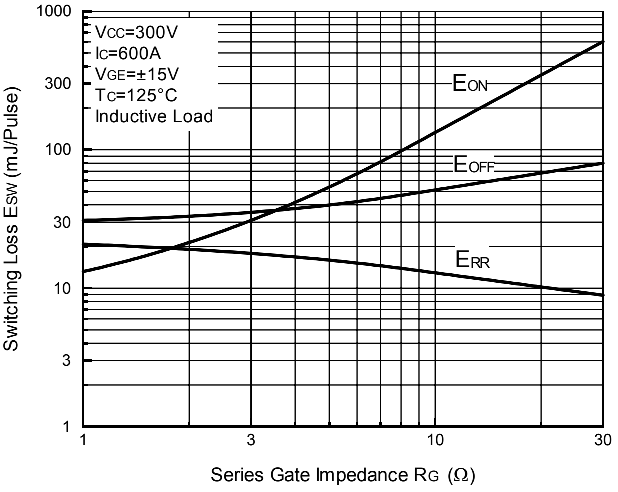


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Fig.13- Forward Characteristics of Free Wheeling Diode (Typical)

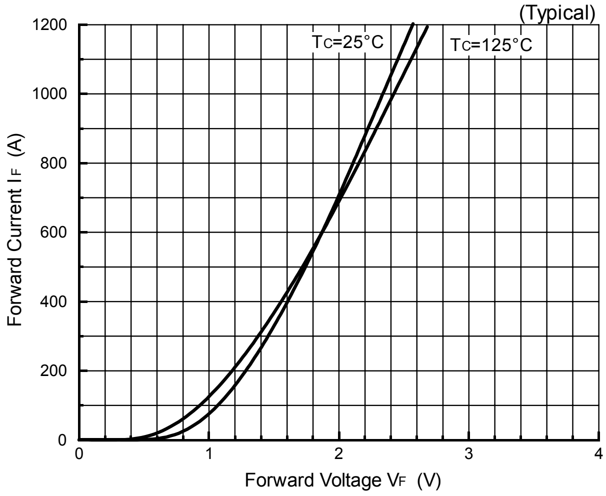

Fig.14- Reverse Recovery Characteristics (Typical)

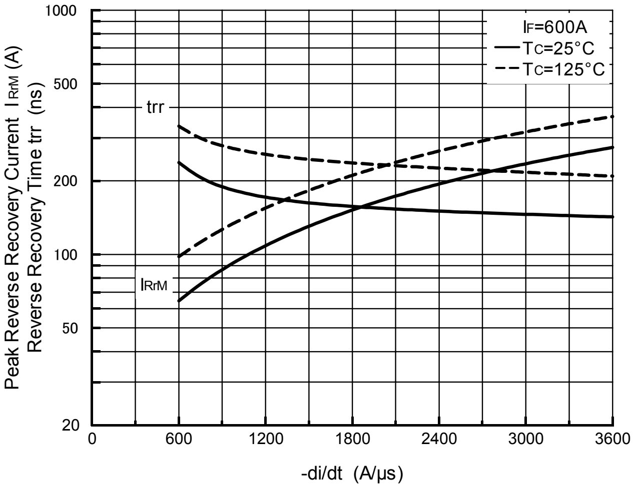

Fig.15- Reverse Bias Safe Operating Area

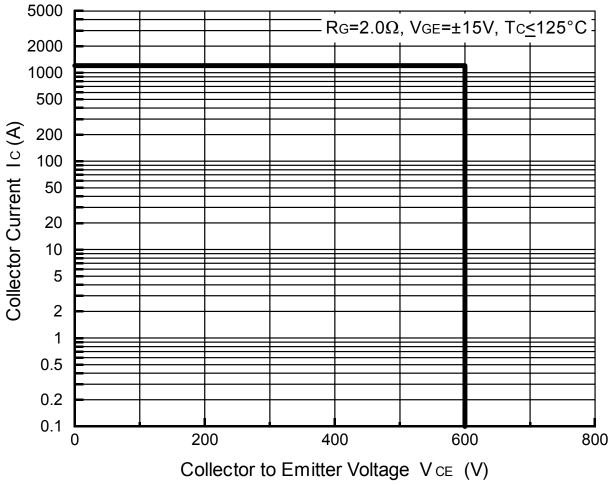

Fig.16- Transient Thermal Impedance