



## G1 Series IPM Modules

The new Mitsubishi Electric G1 series was developed in order to achieve higher efficiency, easy system design and superior reliability. The Intelligent Power Modules have been developed in the 650V and 1200V categories in the 6 in 1 and the 7 in 1 configurations.

### Product Advantages

- ❑ Low-loss 7<sup>th</sup> generation Full Gate IGBT
- ❑ Advanced internal drive circuit with integrated protection functions
- ❑ High reliability using a new package technology
- ❑ Line-up with multiple packages, voltage levels and current levels

### Unique Benefits

- Advanced low loss chip technology
- Best EMI vs Loss trade-off
- Integrated driver with multiple functionalities

### Solutions Employed

- A new 7th generation Full Gate IGBT is employed with an integrated sense-emitter
- An innovative switching speed control is established using the integrated sense-emitter component.
- Protection functions are already integrated into the module (short circuit protection using sense-emitter, control supply under voltage detection and on-chip over-temperature sensor at IGBT).
- A failure output signal with identification of fault type is available.

### Small-Pkg. (A-Pkg.)

### Middle-Pkg. (B-Pkg.)

### Large-Pkg. (C-Pkg.)

### X-Large-Pkg. (D-Pkg.)



Vces

Topology\*

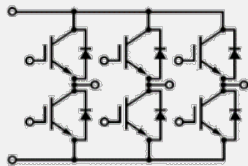
50A, 75A, 100A

50A, 75A, 100A,  
150A, 200A

200A, 300A, **450A<sup>NEW</sup>**

**200A, 300A,  
450A<sup>NEW</sup>**

1200V



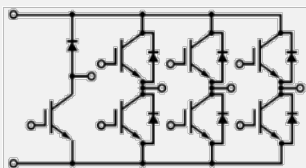
25A, 50A

25A, 50A, 75A,  
100A

100A, 150A, **200A<sup>NEW</sup>**

**100A, 150A,  
200A<sup>NEW</sup>, 300A<sup>NEW</sup>**

650V



50A, 75A

50A, 75A, 100A,  
150A, 200A

200A, 300A,  
**450A<sup>NEW</sup>**

**200A, 300A,  
450A<sup>NEW</sup>**

1200V

25A

25A, 50A, 75A,  
100A

100A, 150A,  
**200A<sup>NEW</sup>**

**100A, 150A,  
200A<sup>NEW</sup>, 300A<sup>NEW</sup>**

\* The topologies presented here represent only the power electronic components. The driver IC is not represented here.

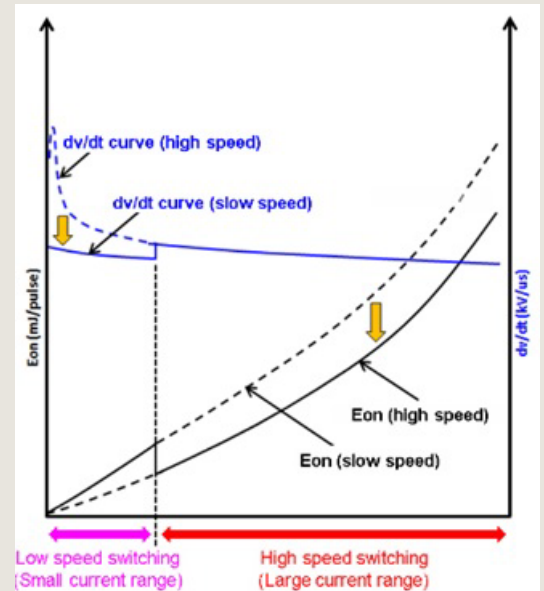
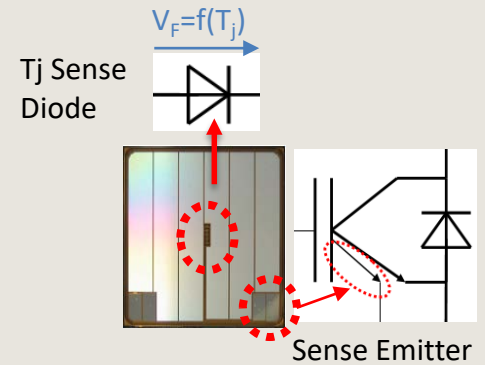
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Industrial

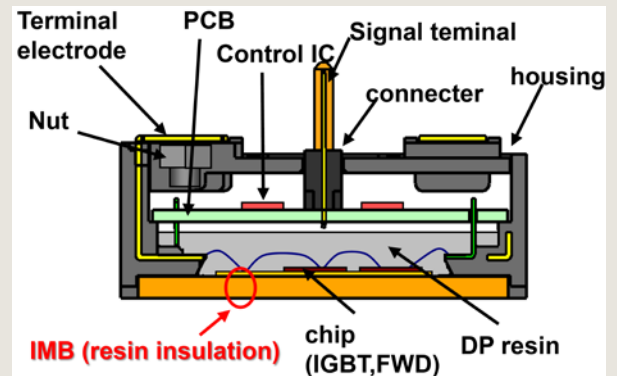
**G1 series IPMs – Chip Technology and benefits**

- Full Gate IGBT with an integrated current sense mirror emitter : The G1 IPM utilizes a 7th generation Full Gate IGBT which consists of a monolithically integrated sense-emitter component. The Full Gate chip structure is utilized to reduce losses. SC (Short Circuit) protection is established using the sense-emitter which aids in detecting the collector current (accordingly an appropriate trip level is assigned). An on-chip  $T_j$  sense diode is integrated to detect an over-temperature event on each IGBT chip.
- Switching speed control using the sense-emitter : An innovative switching speed control can be established depending on the actual value of the collector current  $I_c$ . This means - a reduced speed (for Low EMI) turn-on at low  $I_c$  values and a high speed turn-on (low turn-on loss) at high  $I_c$  values can be achieved. This approach delivers a higher inverter efficiency while simultaneously ensuring good EMI performance during operation.



**Innovative Module Concept :**

- Built-in failure detection and Fo output signal.
- Robust packaging using IMB (Insulated Metal Baseplate) structure and thermal cycle failure free SLC (Solid Cover) package technology to ensure superior thermal cycling behavior while providing low thermal resistance.
- Flexibility in busbar design in the small pkg (A Pkg) : The straight terminal and L shape terminal layout are possible.



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