



MR2000 Series

Standby Compatible Partial Resonance Power Supply IC Module with High-speed IGBT

Shigeru Hisada - Electronic Device Div.Group Advanced Power Products Div. Device Design Dept.
(Joined the company in 1991)

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Introduction

Development of the MR2000 Series

Energy conservation guidelines from the Ministry of Economy, Trade and Industry require a reduction in the standby power consumption of various types of electrical products as a means of reducing environmental CO₂ levels. There are strong demands for reduced power consumption in common devices such as TVs and set top boxes (STB) which remain on standby for long periods of time, and efficient operation under micro-loads is required. Furthermore, demands for integration of the various protective functions, higher functionality, and lower price are increasing to the extent that it is now difficult to satisfy such demands with existing products.

In response, a Multi Chip Module (MCM) structure, incorporating only a main switch and control IC, has been adopted in the development of the MR2000 Series of highly functional and low-cost IC modules.

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Outline

The MR2000 Series includes the 100V input and 200V/worldwide input IC modules, with a function for burst mode switching under micro-load. The 100V input MR2500 Series employs a 500V resistant MOSFET, while the 200V/worldwide input MR2900 Series employs a newly developed 900V resistant high-speed IGBT and a switching device optimized for the various input ranges. Both devices are partial resonance power supply IC modules comprising a low power consumption control IC as the control circuit.

MR2000 Series modules are contained in a fully molded MA Series package as used for previous power supply hybrid ICs with an added screw hole.

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Primary Features

- 1 Current consumption is reduced with use of the burst mode, promoting standby compatibility with a single converter.
- 2 The optimized switching device provides ideal partial resonance operation for high efficiency and low noise.
- 3 The 900V resistant switching device (high-speed IGBT) simplifies design of power supplies for worldwide input.
- 4 Power consumption under micro-load is extremely low (burst mode).
- 5 Use of a drain kick circuit eliminates the need for a start-up resistor.
- 6 The use of a soft drive circuit reduces noise.
- 7 Incorporates an over-current protection function (primary current detect, Ton limit).
- 8 Incorporates over-voltage protection and thermal shutdown functions.
- 9 A power supply circuit may be configured with the minimum of external components.
- 10 The use of the fully molded package is beneficial for insulation design.

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Product Lineup

Model	Main switch	Peak input voltage	Peak input current	Output capacity Po [W] (reference values)		
				Input voltage range AC90~132V	Input voltage range AC90~276V	Input voltage range AC180~276V
MR2520	MOSFET	500	8	100	-	-
MR2540			13	150	-	-
MR2920	High-speed IGBT	900	7	-	100	150
MR2940			10	-	150	225

Table 1 MR2000 Series Product Lineup

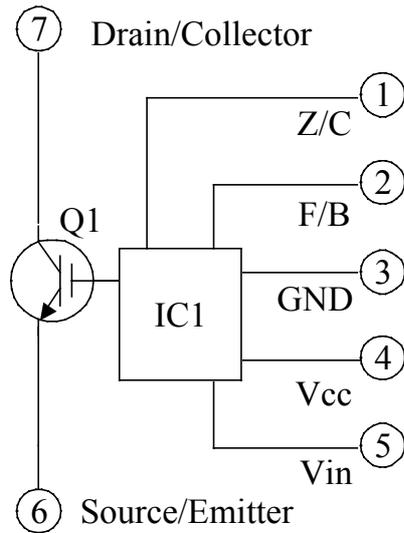


Fig.1 Equivalent Circuit



Fig.2 Appearance

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Features

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Main Switching Device - High-speed IGBT (MR2900 Series)

The unique (patented) structure of the Shindengen high-speed IGBT provides both high-speed switching and low saturation voltage in a single device, thus also permitting its use in switching power supplies. This newly developed high-speed IGBT is positioned between the MOSFET and the bipolar transistor (Fig.3).

Fig.4 shows a comparison of losses in the 900V resistant switching device in the worldwide partial resonance power supply. The loss curve is comparatively flat in relation to the wide range of input voltage, and as such the device is optimized for use with a variety of international input voltages.

Device	Symbol	Drive	ON loss	Switching loss
MOSFET		Voltage	Large	Small
High-speed IGBT		Voltage	↑	↓
IGBT		Voltage		
BJT		Current	Small	Large

Fig.3 Comparison of Switching Devices