MITSUBISHI ELECTRIC CORPORATION
PUBLIC RELATIONS DIVISION
7-3, Marunouchi 2-chome, Chiyoda-ku, Tokyo, 100-8310 Japan

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Customer Inquiries

Semiconductor & Device Marketing Div. B
Mitsubishi Electric Corporation

www.MitsubishiElectric.com/semiconductors/

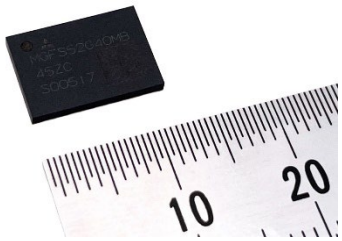
Media Inquiries

Public Relations Division
Mitsubishi Electric Corporation

prd.gnews@nk.MitsubishiElectric.co.jp
www.MitsubishiElectric.com/news/

Mitsubishi Electric to Ship Samples of 3.6-4.0GHz, 16W GaN Power Amplifier Module for 5G Massive MIMO Base Stations

Will reduce production costs and power consumption of base stations in more countries



3.6-4.0GHz, 16W GaN PAM for 5G mMIMO base stations (MGFS52G40MB)

TOKYO, March 18, 2025 – Mitsubishi Electric Corporation (TOKYO: 6503) announced today that it will begin shipping samples of a new 16W-average-power gallium nitride (GaN) power amplifier module (PAM) for 5G massive MIMO[1] (mMIMO) base stations on March 25. This PAM product, which operates in the 3.6-4.0GHz band, can be widely deployed in North America and East and Southeast Asia. As 5G networks expand from urban centers to regional areas, mMIMO base stations, especially 32T32R mMIMO[2] base stations, are expected to be increasingly deployed. Mitsubishi Electric's 16W GaN PAM is particularly well suited for 32T32R mMIMO base stations because it reduces both production costs and power consumption.

Since mMIMO base stations use multi-element antennas and many power amplifiers, there is a growing need for highly efficient power amplifiers to help reduce base station production costs and power consumption. In particular, PAMs strongly contribute to lower production costs because they are easy to mount on a printed circuit board, unlike discrete power amplifiers that need many on-board components. While power amplifiers are required to deliver low-distortion characteristics compliant with 5G signal quality,[3] they must also support different frequency bands in various countries and additionally must achieve increasingly higher output power to support longer communication distances as 5G networks expand from urban areas to surrounding cities.

[1] Wireless technology using multiple antennas in both transmitter and receiver to improve communication speed and quality.
[2] Massive MIMO antenna consisting of 32 transmitters and receivers.
[3] 5G in-band and out-of-band distortion characteristics are regulated by the Third Generation Partnership Project (3GPP).

Mitsubishi Electric's existing 8W and 16W GaN PAMs, which support the 3.3-3.8GHz band, are widely used in Europe and South and West Asia. The newly developed 16W GaN PAM, which supports the 3.6-4.0GHz band widely used in North America and both East and Southeast Asia, is mainly suitable for 32T32R mMIMO base stations, which are expected to be increasingly deployed as 5G networks expand from urban areas into surrounding cities. A 32T32R mMIMO base station equipped with the new 16W PAM can achieve nearly the same communication distances as a 64T64R mMIMO[4] base station equipped with an 8W PAM, and also halve the number of PAMs required in a 32T32R mMIMO base station, thereby reducing the production costs of mMIMO base stations used in many countries. In addition, the PAM uses Mitsubishi Electric's proprietary GaN high-electron-mobility transistor (HEMT) and circuit design technology to achieve low distortion characteristics and high power-added efficiency of 41% in a wide frequency range of 3.6-4.0GHz (400MHz band) to reduce power consumption in 5G mMIMO base stations.

Product Features

1) ***Support for 3.6-4.0GHz band will expand the use of 5G mMIMO base stations in more countries***
   - Mitsubishi Electric's proprietary matching circuit design technology supports the 3.6-4.0 GHz band, which is widely used in North America and East and Southeast Asia, thereby helping to expand the use of 5G mMIMO base stations in more countries.

2) ***16W high output power requires fewer PAMs in 5G mMIMO base stations, reducing production costs***
   - The communication coverage of 64T64R mMIMO base stations with 8W PAMs is almost the same as that of 32T32R mMIMO base stations with 16W PAMs, but the number of PAMs can be halved, significantly reducing production costs.
   - However, when used in a 64T64R mMIMO with 16W PAMs, the power output is double that of a 64T64R mMIMO with 8W PAMs, helping to extend communication distances for 5G mMIMO base stations.

3) ***41% power-added efficiency in 400MHz band reduces 5G mMIMO base station power consumption***
   - GaN HEMTs with an epitaxial growth layer structure[5] achieve high efficiency and low distortion characteristics for 5G.
   - Mitsubishi Electric's proprietary wideband Doherty circuit,[6] which mitigates bandwidth limitations caused by the output parasitic capacitance of GaN HEMTs, achieves 41% power-added efficiency in the 400MHz band to reduce power consumption in 5G mMIMO base stations.

4) ***Modularization simplifies 5G mMIMO base station circuit design and reduces production costs***
   - Mitsubishi Electric's proprietary high-density packaging technology realizes a Doherty-circuit PAM, which is essential for 5G base station power amplifiers.
   - Deployment of the new PAM will reduce the number of components required in 5G mMIMO base stations, thereby reducing circuit design time and effort and also production costs.

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[4] Massive MIMO antenna consisting of 64 transmitters and receivers.
[5] Thin-film crystal growth layer formed by growing a crystalline thin film on a crystalline substrate.
[6] High-efficiency circuit technique for power amplifiers proposed by W.H. Doherty in 1936.

Main Specifications

Model	MGFS52G40MB
Frequency	3.6-4.0GHz
Average output power	16W (42dBm)
Saturated output power	141W (51.5dBm)
Gain	30dB min.
Power-added efficiency	41%
Dimensions	11.5×8.0×1.4mm
Shipment date	March 25, 2025

Environmental Awareness

This product is compliant with the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) directive 2011/65/EU and (EU) 2015/863.

Website

For more about high-frequency devices, visit www.MitsubishiElectric.com/semiconductors/hf/

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About Mitsubishi Electric Corporation

With more than 100 years of experience in providing reliable, high-quality products, Mitsubishi Electric Corporation (TOKYO: 6503) is a recognized world leader in the manufacture, marketing and sales of electrical and electronic equipment used in information processing and communications, space development and satellite communications, consumer electronics, industrial technology, energy, transportation and building equipment. Mitsubishi Electric enriches society with technology in the spirit of its "Changes for the Better." The company recorded a revenue of 5,257.9 billion yen (U.S.$ 34.8 billion*) in the fiscal year ended March 31, 2024. For more information, please visit www.MitsubishiElectric.com

*U.S. dollar amounts are translated from yen at the rate of ¥151=U.S.$1, the approximate rate on the Tokyo Foreign Exchange Market on March 31, 2024