

Power Amplifier MMIC Models for 14 GHz-band VSAT

FMM5522GJ(3W)/FMM5048GJ(4W)

FUJITSU QUANTUM DEVICES LIMITED has developed a pair of power amplifiers (3W and 4W) for 14 GHz-band VSAT.

The higher output, reduced size, and lower prices of these new models make them ideal as power or driver amplifiers for VSAT systems.

Product Description

With the rapid growth of the Internet, much attention has been focused on the 14GHz-band VSAT system. VSAT stands for "Very Small Aperture Terminal"—a very small satellite-based communications ground station. As the VSAT system is equipped with antennae with much smaller apertures, it is much better suited for consumer use. As the manufacturers are targeting a consumer market in the development of the VSAT system, they require an ODU (Out Door Unit) with a compacter design, higher output, reduced distortion characteristics, and a lower cost. To construct such a system, a compact, inexpensive amplifying unit with high power output will be required. FUJITSU has already responded to this demand by developing the compact 3W and 4W MMIC (Microwave Monolithic Integrated Circuit) modules featuring combined MMIC and hybrid circuits.

Product Features

■ Higher output, Higher gain, and Higher efficiency

Thanks to the hybrid design of the combined MMIC configuration in the driver stage, FET in the power stage, and optimal circuits, these products perform better than ever (increased output, gain and efficiency) and come in even smaller packages.

FMM5522GJ (3W)

Performance characteristics at frequency $f=14.0$ to 14.5GHz :

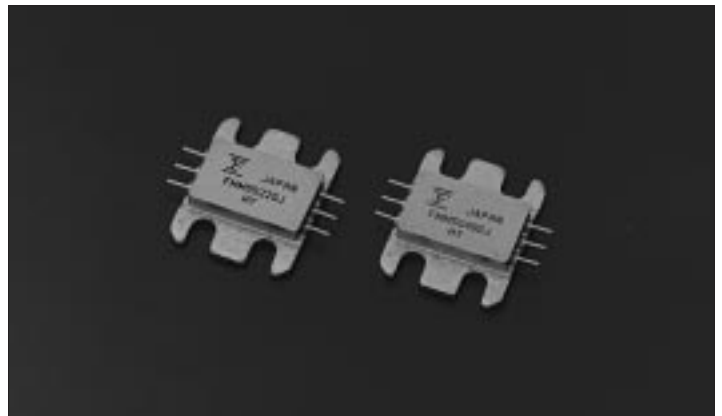
- Small-signal gain $G_L=23.0\text{dB}$
- 1dB gain compression power $P_{1\text{dB}}=33.5\text{dBm}$ or more
- Saturation power $P_{\text{sat}}=35.5\text{dBm}$

FMM5048GJ (4W)

Performance characteristics at frequency $f=13.75$ to 14.5GHz :

- Small-signal gain $G_L=23.0\text{dB}$
- 1dB gain compression power $P_{1\text{dB}}=35.0\text{dBm}$ or more
- Saturation power $P_{\text{sat}}=36.5\text{dBm}$
- power added efficiency $\eta_{\text{add}}=20\%$ or more

Photo 1 External View



These device frequency characteristics are compatible with the satellite communications system (SATCOM). The drain voltage and gate voltage are the same for both models: drain voltage $V_{DD}=10V$ and gate voltage $V_{GG}=-5V$ (Class A operation).

Higher reliability

The adoption of hermetic package and Au gate array chip assures higher reliability.

Compact size

- Size: 15mm×12mm
- Height: 3.5mm

Figure 1 Dimensional Outline

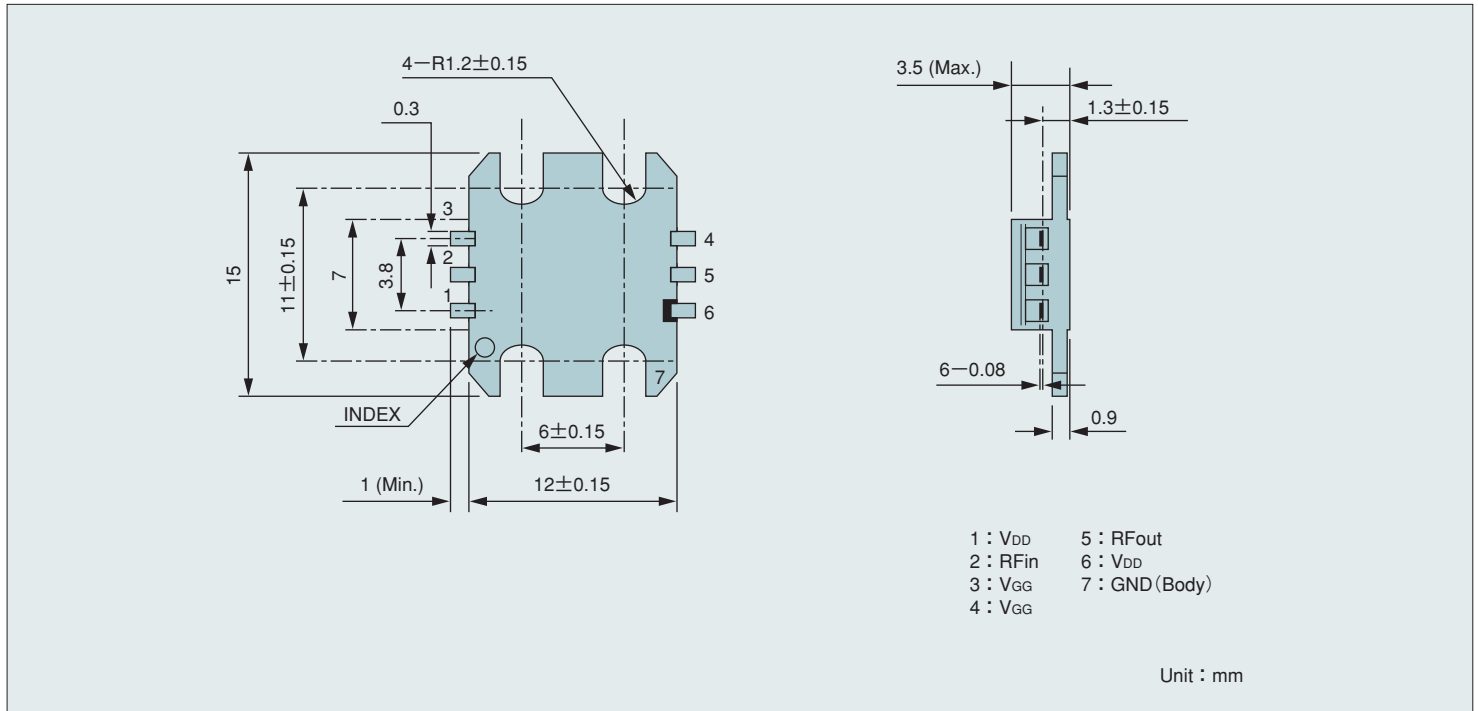


Table 1 Principal Characteristics

Model			FMM5522GJ			FMM5048GJ			Unit		
Parameter	Symbol	Test Condition	Specifications			Specifications					
			Min.	Typ.	Max.	Min.	Typ.	Max.			
Frequency range	f	——	14.0	——	14.5	13.75	——	14.5	GHz		
Power at 1 dB gain compression	P _{1dB}	V _{DD} =10V V _{GG} =−5.0V	33.5	35.0	——	35.0	36.0	——	dBm		
Gain at 1 dB gain compression	G _{1dB}		23.0	26.0		23.0	26.0		dB		
Gain flatness	ΔG		——	——	8.0	——	——	±1.5	dB		
Input VSWR	VSWR _i						6.0	8.0	6.0	8.0	——
Output VSWR	VSWR _o						9.5	11.0	9.5	11.0	
Drain current	I _{DD}						1.75	2.0	2.1	2.5	A
Gate current	I _{GG}						22.0	25.0	6.0	12.0	mA

Fig.1 shows the dimensional outlines. The same package design is used for both the FMM5522GJ and FMM5048GJ.

Characteristics

Table 1 summarizes the principal characteristics of the FMM5522GJ and FMM5048GJ. Fig.2,3 and Fig.4,5

summarize the frequency characteristics and I/O characteristics for the FMM5522GJ and FMM5048GJ, respectively.

The FMM5048GJ provides broader frequency characteristics of $f=13.75$ to 14.5GHz with $P_{1\text{dB}}=35.0\text{dBm}$ or more. ★

Figure 2 Frequency Characteristics (FMM5522GJ)

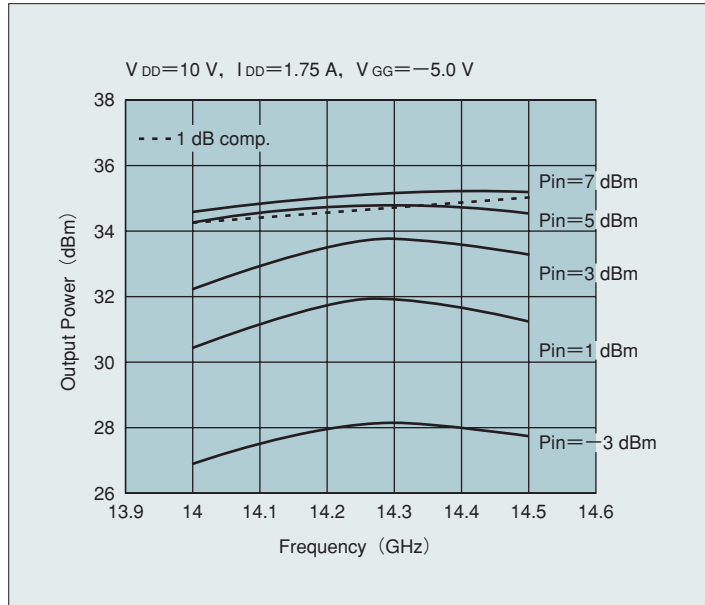


Figure 4 Frequency Characteristics (FMM5048GJ)

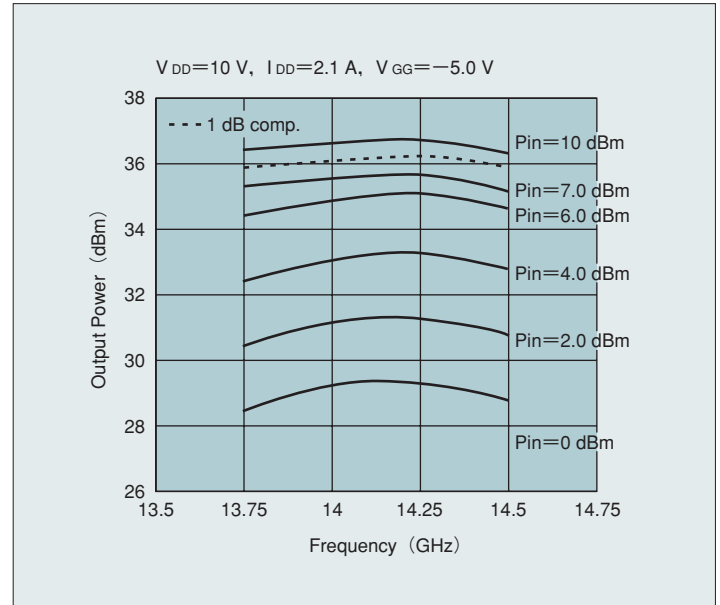


Figure 3 I/O Characteristics (FMM5522GJ)

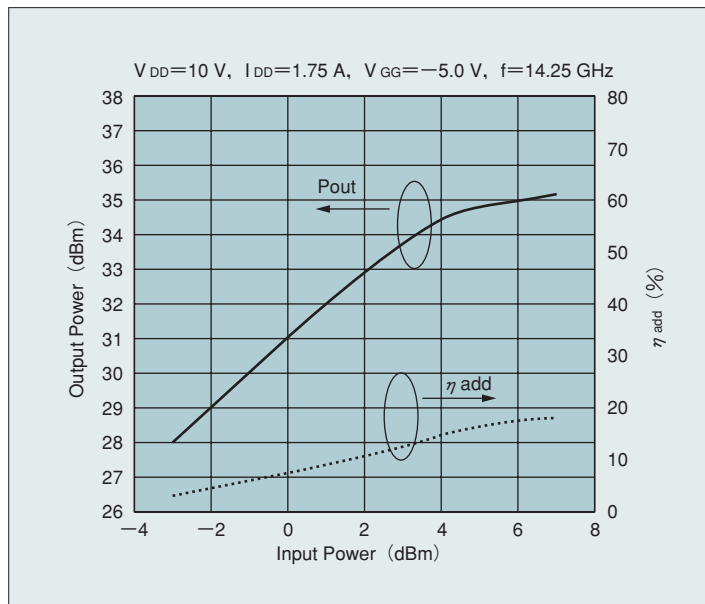


Figure 5 I/O Characteristics (FMM5048GJ)

