



Breakthrough in Combining/Dividing Radio Frequency/Microwave Power

NASA scientists have discovered a method for combining or dividing harmonically rich waveforms while maintaining both the amplitude and phase of the original waveform.

RESULT

High efficiency amplification at microwave frequencies for cell phone and PCS communications.

TECHNOLOGY

Power Divider/Combiner for Harmonically Rich Waveforms (MFS-31186)

NASA FIELD CENTER

Marshall Space Flight Center (MSFC)

TECHNOLOGY SYNOPSIS

In the past, methods to divide a waveform had inherent design constraints that limited high-efficiency techniques. This invention provides 50 to 60% efficiency compared to the 10% efficiency now achieved in non-pulsed circuits. This MSFC invention, the Power Divider/Combiner for Harmonically Rich Waveforms, has contributed an important approach to solving battery life problems.

- **Longer Battery Life** due to greater efficiency in power use.
- **Increased Reliability** eliminates the need for pulsed systems.

While several different types of circuits are being studied that may address the same issues, this invention is unique by providing high-efficiency power amplification at microwave frequencies (2-18 GHz; 1-5watt power). The key is the ability to design in the microwave applications. Although it is difficult to make a direct comparison because definitions and system specifications vary greatly, this invention can produce an efficiency in the order of 50 to 60% (unpulsed) versus 10% unpulsed (50% pulsed) when compared with existing technologies.



BENEFITS

- 50 to 60% efficiency un-pulsed compared to 10% now
- Smaller handsets
- Less heat dissipation is needed for the same power level

COMMERCIAL APPLICATIONS

- Cellular telephone
- Personal Communication Systems (PCS)
- Replacing Wilson hybrid, radial wave power hybrid, and multi-port divider methodologies



Breakthrough in Combining/Dividing Radio Frequency/Microwave Power *continued*

Although the technology was developed for space shuttles, its strength is full-spectrum combining of square wave signals as used in land based telecommunications.

LICENSING FACTS

Protection: NASA has been granted U.S. patent # 6,320,478 for this technology

Prototype: Available as a laboratory prototype for basic demonstrations.

Licensing: Licenses are available for all fields of use.

Knowledge Transfer: Inventor is available for assistance to licensee.

ABOUT THE INVENTOR

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