

High-Power Compact Sources in the 200 - 300 GHz Frequency Range

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Abstract— We present a set of three high-power compact sources based on ACST high-power multiplier technology providing about 18dBm typical output power covering frequency ranges from 200 - 235 GHz, 230 – 260 GHz and 270-300 GHz. In this work we present the experimental results of this series (1213) of THz sources (1213).

Keywords—Source, compact, high-power, Schottky, tripler

I. INTRODUCTION

The market for mm-wave sources has highly evolved up to W-band, where 1 W output power can be achieved with MMIC technology [1]. However, in the submm-wave range there still exists a limitation in terms of output power with this technology. Several emerging applications such as THz imaging [2], THz quality management control [3] and wireless THz telecommunication technologies aiming for 6G techniques [4] require new solutions. Therefore, the use of discrete diode structures for frequency multipliers above 100GHz is in comparison of significant advantage.

With our Schottky Diodes-based technology, we have developed a series of three frequency multipliers (213 series [5]) able to efficiently triple the frequency of commercially available E and W-band amplifiers to cover the 200 GHz to 300 GHz frequency range. The 213 series of multipliers have been combined with MMIC technology up to W-Band to produce submm-wave high-power compact sources, fulfilling the requirements of the market in terms of miniaturization and cost reduction.

II. RESULTS

With our Schottky Diode-based technology combined with commercial MMIC technology at ACST GmbH, we have developed a series of compact sources: 1213A, 1213B and 1213C [6] covering the frequency ranges of 200 - 235 GHz, 230 – 260 GHz and 270-300 GHz, respectively. ACST's compact 1213B is shown in Fig. 1 in order to illustrate the level of miniaturization. The 213 series are single chip Schottky based triplers able to efficiently handle 0.5 W output power from commercial sources [1] to achieve the performance depicted in Fig. 1. It is possible to easily increase in 3 dB the available output power of our compact sources implementing power combining of two tripler chips in a single module. This power combining approach allows us to efficiently handle 1 W from the commercially available sources in E-Band and W-Band to deliver up to 160 mW without dramatically increasing the size of the compact source. The development of these multipliers is still on- going.

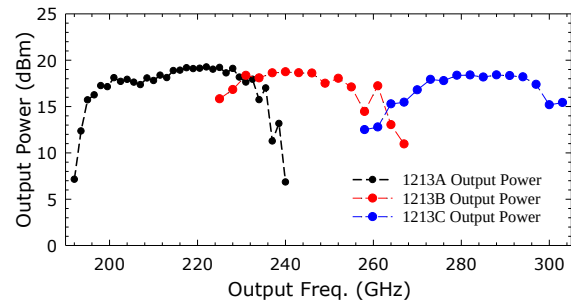
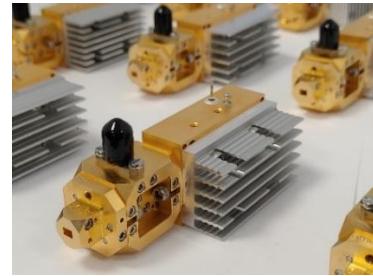


Fig. 1. Image of a set of commercial 1213B sources (Up) and the performance of the 1213 series in the 200-300 GHz range (Bottom).

The 1213 series set the basis of high-power sources required to overcome the THz range, being used in combination with our 229 series of high-power triplers to cover the range of 600-900GHz [7].

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