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| **基于XC7Z100+ADRV9009的双收双发无线电射频板卡** |
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|    一、板卡概述    基于XC7Z100+ADRV9009的双收双发无线电射频板卡是基于Xilinx ZYNQ FPGA和ADI的无线收发芯片ADRV9009开发的专用功能板卡，用于5G小基站，无线图传，数据收发等领域。   二、板卡原理及功能    板卡使用XC7Z100 作为主处理器，包含Dual ARM Cortex-A9核处理器的嵌入式处理。PS端32bit 1GB容量DDR3存储、1路RS232接口、1路USB接口、1路10-100-1000网络接口，PS端32M QSPI flash存储、SD卡接口、8G eMMC存储；PL端64bit 2GB容量DDR3存储，PL端扩展HDMI 输出实现视频显示应用，PL端扩展9路I/O，2路SPI\_LVDS接口、2路RS232接口、4个LED指示灯。    PL端外扩ADRV9009芯片，ADRV9009是一款高集成度射频(RF)、捷变收发器，提供双通道发射器和接收器、集成式频率合成器以及数字信号处理功能。这款IC具备多样化的高性能和低功耗组合，具有2路输入，2路输出，两路观测输入配合FPGA工作满足3G、4G和5G宏蜂窝时分双工(TDD)基站应用要求。  板卡数字接口：* PS 端32bit 1GB 容量 DDR3 存储
* PS端RS232接口
* PS端USB接口
* PS端1路 10-100-1000 Mbps Ethernet (RGMII​) 网络接口
* PS端QSPI flash 存储
* PS端 SD卡，Emmc存储
* PL端64bit 2GB 容量DDR3 存储
* PL端扩展HDMI 输出实现视频显示应用
* PL端扩展9路 I/O、2路SPI\_LVDS、2路RS232、4路LED指示灯
* PL端扩展1路10G SFP+光纤接口

  板卡模拟接口：* 双接收：RX1、RX2
* 双发送：TX1、TX2
* 双观测接收：ORX1、ORX2
* 外部本振接口：EXT\_LO
* 外部时钟参考：REF\_CLK\_IN

  板卡性能指标：

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|   | No | Items | Specifications | Remark |
| Tx | 1  | Frequency | 75~6000 MHz | Frequency > Bandwidth/2 |
| 2  | Bandwidth | Large Signal Bandwidth:5~100MHzSynthesis Bandwidth: 10~200MHz | Software Support Range |
| 3  | Transmission Power | 7dBm | 100~6000MHz, CW0 dB TX attenuation |
| 4  | EVM  |   |   |
| 5 | Attenuation Control Range | 32dB |   |
| 6 | Attenuation Step | 0.05 dB  |   |
| 7 | ACLR |   |   |
| 8 | Spurious  |   |   |
| 9 | SSB Suppression |   |   |
| 10 | LO Suppression |   |   |
| 11 | DAC Sample Rate (max) | 61.44MHz/122.88MHz/245.76MHz | Default VCXO Support |
|   |
| Rx  | 1  | Frequency | 75~6000 MHz | Frequency > Bandwidth/2 |
| 2 | Bandwidth | 16 to 100 MHz | Software Support Range |
| 3 | Sensitivity | -93dBm@20MHz | Noise Figure <3dB |
| 4 | EVM  | <1.5%  | @ -30dBm input |
| 5 | Gain Control | AGC |   |
| MGC:    | Range: 0~30dB |   |
| Step:  0.5dB |   |
| 6 | Gain Step | 0.5dB  |   |
| 7 | Rx Alias Band Rejection | 80dB | Due to digital filters |
| 8 | Noise Figure | <3dB | Maximum RX gain  |
| 9 | IIP3 (@ typ NF) | -25dBm |   |
| 10 | ADC Sample Rate (max) | 61.44MHz/122.88MHz | Default VCXO Support |
| 11 | ADC Wideband SFDR | 78dBc |   |
|   |
|   | 1 | Voltage | 3.3V& 12V |   |
| 2 | ON/OFF TIME  | <6us  | TDD model |
| other | 3 | Duplexing Model | TDD |   |
|   | 4 | Power Consumptions | <10W |   |

   物理特性* 尺寸：100x162.4mm；
* 工作温度：工业级 -40℃～ +85℃。
* 工作电压+12V  ±1V；整板功耗20W。

**三、软件系统** 参考ADI的整体软件架构：  AD9009设备树及驱动 SPI访问，AD，DA访问驱动文件<https://wiki.analog.com/resources/tools-software/linux-drivers/iio-transceiver/adrv9009>      AD采集1.2G波形：  DA  输出设置1.2G及波形：    |

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