Designing a High Performance, Single-SAW SDARS Solution

AN010

This App Note outlines the design considerations surrounding Guerrilla RF's new Satellite Digital Audio Radio Service (SDARS) solution for non-collocated cellular transmit applications. In this operating environment, the difficult out-of-band blocker (OOB) specification is reduced significantly from +10 dBm to −10 dBm. This relaxation of the OOB blocker spec makes it possible to have a spec-compliant LNA solution which uses only a single surface acoustic wave (SAW) filter. The primary driver behind this architecture is the cost savings that can be realized from omitting the SAW filter prior to the stage 1 LNA.
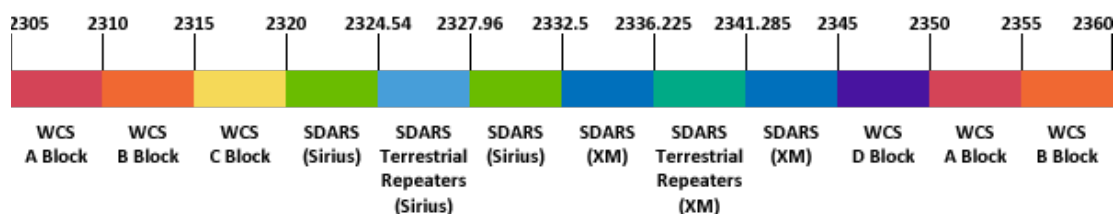

Figure 1. SDARS Spectrum

Due to the Wireless Communication Service (WCS) requirements in the SXM specification, a high-rejection, high-insertion loss WCS SAW filter is required to be spec-compliant. As shown below in our reference design board, our solution uses a B3447 SAW device from RF360 with GRF2071 chosen as the stage 1 LNA and GRF2073 as the stage 2 LNA.
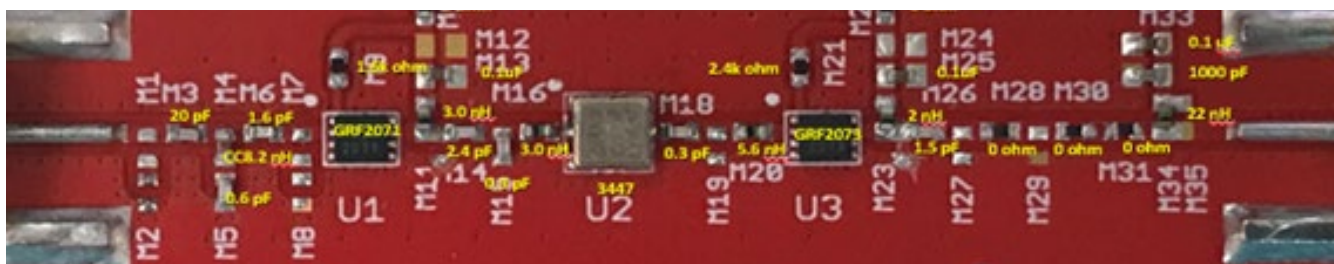

Figure 2. Guerrilla RF's Single SAW SDARS Reference Design

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LNA Selection Considerations:

The stage 2 LNA must have modest linearity and the gain necessary to achieve the desired cascaded performance. In this case, GRF2073 provides the high gain and linearity characteristics we are looking for.

The GRF2071 stage 1 LNA is the heart of the architecture as it must:

1.   Pass the IMRR2, IMRR3 and OOB linearity requirements without an input SAW filter protecting it.
2.   Have enough gain and a low-enough NF to still meet the very difficult sub-1.0 dB cascaded NF requirement.

The results of this architecture are:

- Incredibly low cascaded NF for the reference design of 0.73 to 0.84 dB - well under the 1.0 dB limit
- Passes the IMRR2, IMRR3 and OOB linearity requirements with a few dB of margin at the worst-case frequencies

The full reference design data report as well as a reference design evaluation board are available from Guerrilla RF. We also have outstanding SDARS reference design solutions for applications with a co-located cellular transmitter which are based on a dual-SAW design, and those are available for sampling as well.

Regardless of your technical requirements, Guerrilla RF is committed to providing the high performance RF solutions and applications support necessary to make your product a success.

Contact us at applications@guerrilla-rf.com or sales@guerrilla-rf.com !

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Revision History

Revision	Date | Reason for Revision
Initial Release	September 1, 2020

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