

iDC-7901 3U VPX Full Range, Wideband RF Down-Converter



Key Features

- RF Coverage of full 2.0 to 18.0GHz Band
- Full Input frequency range divided into eight overlapping bands
- Eight RF bands are frequency translated and made available on eight, individual IF outputs
- Additional IF Output provides selection from the eight converter RF bands or low-frequency bypass path
- Low-frequency “Bypass” mode (100MHz to 2.25GHz)
- IF Outputs centered at 4.0GHz
- Integrated Anti-alias filtering provides “Digitizer-ready” IF outputs
- IDC-7901 includes 5:1 RF Input Switch
- 3U VPX format, SOSA-aligned

Description

The iDC-7901 is a member of the IDC-7900 family of next-generation full band RF down-converter products offered by Intelligent RF Solutions. Building on the iDC-6800 family of 2 to 18GHz down-converters, the iDC-7900 series offers compact size (3U VPX), improved spurious performance, high dynamic range and “digitizer-ready” IF outputs placed in the second Nyquist ready for integration with a suitable digitizer card. Combined with a suitable digitizer, the iDC-7901 converter facilitates monitoring, detection and processing of the full 2 to 18GHz spectrum simultaneously. Low SWaP allows iDC-7901 down-converter to support a broad range of applications including wideband stare, High probability of intercept (HPOI), wideband digitization and RFSoc processing solutions on even the smallest platforms.

The iDC-7901 separates the full 2 to 18GHz spectrum into eight overlapping bands, and provides simultaneous frequency-conversion to eight, 2.5GHz-wide IF signals each centered at 4.0GHz. Overlap of 500MHz provides the ability to process signals of 500MHz BW centered anywhere in the 2 to 18GHz band. Dual-stage frequency conversion is employed on the lowest two bands to achieve excellent spurious performance. Integrated low phase noise PLL synthesizers generate all necessary LO signals which are locked to an external reference of 10 or 100MHz which can be provided as a sinewave signal or differential clock signal. Feeding multiple down-converters with a common reference provides coherency between multiple channels of iDC-7900 units.

IF Signals are centered at 4.0 GHz and are suitably filtered to allow second-Nyquist sampling at a rate of 5.333GSPS. Integrated anti-alias filters on each IF output provide 60dB alias-free dynamic range over a minimum 2.2GHz BW, allowing direct interface to a multi-channel digitizer. High single tone spur-free dynamic range is achieved by use of state-of-the-art MMIC mixers permitting better than 60dB of SFDR with input signals of 0dBm.

All RF connections (5 RF Input, 9 IF Output and 1 Frequency Reference) are available via the black-plane VITA-67.3 RF nano connector. A compact 3U VPX, SOSA-aligned package supports deployment of extended EW/SIGINT capabilities on low SWaP platforms.

Detailed Specifications

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| Frequency Coverage | 2.0 to 18.0GHz; 1.75 to 18.25GHz total; 100MHz to 2.25GHz low frequency ‘bypass’ |
| Number of RF Inputs | Five user-selectable inputs covering the full RF band |
| RF Input/Input Isolation | 60dB, min. |
| Dedicated IF Outputs | Eight, each representing a 2.5 GHz section of the input spectrum |
| User-Selectable IF Output | Provides the ability to select from any of the eight dedicated IF outputs, or the low-frequency bypass mode |

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| IF Output Frequency Range | 2.75 to 5.25 GHz, nom. |
| IF 3dB Bandwidth | 2.90 to 5.10 GHz, min. |
| 60dB alias-free IF BW | 2.90 to 5.10 GHz, min. |
| RF to IF Gain | 0dB, at 0dB RF Attenuation |
| RF Attenuators | 0 to 15.5dB user-controlled digital attenuators on each of eight converted bands; located ahead of first amplifier stage |
| Gain Flatness | +/- 1 dB, max. |
| Gain Temperature Stability | +/-1dB, max. |
| Noise Figure | 21dB, max. |
| Output IP3 | +9dBm, min. |
| Output P1dB | +4dBm, min. |
| Single Tone SFDR | 60dB, min. at 0dBm output signal level |
| Image Rejection | 70dB, min. |
| Internally Generated Spurious | -90dBm, typ. input equivalent |
| Low-Freq Bypass Gain | -14dB, nom. (pass-thru contains no amplifiers) |
| Low-Freq Bypass Freq | 100MHz to 2.25GHz; +/-2dB, typ.; >60dB alias rejection for 5.333GSPS digitizer operating in 1 st Nyquist |
| Input Return Loss | 2.0:1, max. |
| Output Return Loss | 1.5:1, max. |
| Output Harmonic and non-harmonic spurious | -60dBc at 0dBm output signal level |
| LO Leakage at RF Input | -90dBm, max. |
| LO Leakage at IF Output | -80dBm, max. |
| External Reference | Sinewave 10/100MHz -5dBm to +10dBm, or differential clock signal |
| Indicator LEDs | Three green LEDs: Power, Phase-lock Status, Network Connection |
| Size | 3U VPX |
| RF Connectors | 20 NanoRF contacts |
| OpenVPX Payload Profile | SLT3-PAY-1F1U1S1S1U1U2F1H-14.6.11-12 |
| Platform Management | VITA-46.11/SOSA IPMC Support |
| Power | <50 watts |
| Weight | 1.5 lbs. |
| Operating temperature | -40 to +85°C |
| Storage temperature | -54 to +90°C |

RF Band Frequencies

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| Band 0 | 100MHz to 2.25 GHz (no frequency conversion) |
| Band 1 | 1.75 to 4.25 GHz (inverted spectrum) |
| Band 2 | 3.75 to 6.25 GHz (upright spectrum) |
| Band 3 | 5.75 to 8.25 GHz (inverted spectrum) |
| Band 4 | 7.75 to 10.25 GHz (inverted spectrum) |
| Band 5 | 9.75 to 12.25 GHz (inverted spectrum) |
| Band 6 | 11.75 to 14.25 GHz (inverted spectrum) |
| Band 7 | 13.75 to 16.25 GHz (inverted spectrum) |
| Band 8 | 15.75 to 18.25 GHz (upright spectrum) |

Optional Configurations

The iDC-7900 product family is designed for systems requiring high fidelity, full RF band down-conversion in a small package. The iDC-7901 is ideally suited to interface with digitizer cards based on the Xilinx RFSoc. Other applications may require different RF gain, a multiple RF input switch, or multiple RF inputs (e.g., separate L-, S-, C-, X-, and Ku-bands). The flexible design approach makes it possible to accommodate different performance requirements to suit the particular system needs. Please contact iRF for more details on available configurations or tailoring the design meet your specific system requirements.

iDC-7901 RF-to-IF Signal Path Block Diagram

