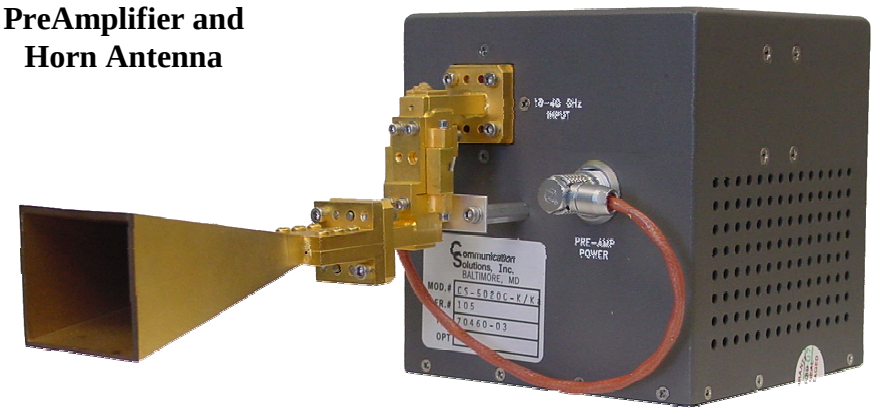
Communication Solutions, Inc.

MILLIMETER-WAVE DOWNCONVERTERS

- *18–110 GHz Coverage*
- *2–18 GHz IF Output*
- *Low Phase Noise*
- *COMINT/ELINT*

CS-5020C-K/Ka Shown with Optional PreAmplifier and Horn Antenna



Communication Solutions (Com-Sol) offers a series of millimeter-wave downconverters to extend the frequency coverage of the company's RF/microwave receivers and tuners. Interchangeable downconverter models are available in 18–40, 40–60, 60–80, 80–100, and 100–110 GHz versions.

A selected tuning frequency is programmed through the parent tuner or receiver by directly commanding the frequency to be received. The built-in algorithm software in the parent unit calculates the correct tuner frequency for the downconverted signal. This approach provides ease of tuning and requires no operator translation using look-up tables or calculation. The parent unit also displays the received millimeter-wave frequency directly. Millimeter-wave tuning resolution is determined by the tuning resolution of the parent tuner or receiver. Both high-side and low-side conversions are subsequently used in the parent to allow for correction of any spectrum inversion, resulting in consistent, non-inverted spectral outputs.

Optional wideband preamplifiers, available for the 18–40 and 40–60 GHz bands only, can be used to lower the system noise figure to approximately 7 dB. These preamplifiers can be attached directly to the millimeter-wave downconverters, and DC power for the preamplifier is supplied via the downconverter, which itself gets power from the parent.

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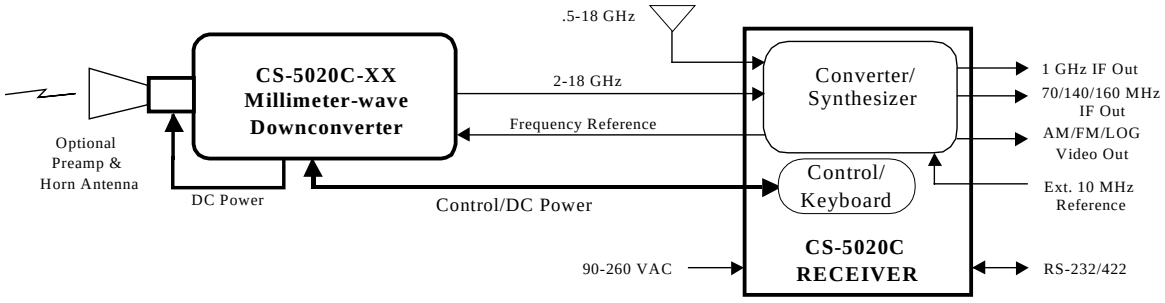

Typical Block Diagram (as used with a CS-5020C Receiver)

The ability to phase-lock the internal LO to the parent tuner or receiver make this series of downconverters well suited for demanding phase-coherent millimeter-wave missions. Internal filtering and regulation is used to ensure a low-noise, clean, and stable LO signal that provides millimeter-wave signal translation with excellent representation of the original received signal.

MECHANICAL

This line of millimeter-wave downconverters are housed in very small, 4.2-inch cubical packages. They are intended for remote operation from the parent receiver or tuner, and are designed for mounting on the rear of an antenna, in a waveguide run, or on a tripod.

INTERFACE

All control signals, reference signals, and DC power for these units is supplied by the parent unit via cables. There are three interconnect cables that route between the millimeter-wave converter and the parent tuner or receiver that are required for operation. The first cable carries all necessary power and control information from the parent unit to the downconverter. A second coaxial cable routes a 240 MHz reference signal from the parent to the downconverter to achieve phase lock. A third coaxial cable routes the downconverted signal at an intermediate frequency of between 2–18 GHz from the downconverter to the parent for further conversion.

A fourth cable is used to provide power to the optional preamplifier and is routed between the millimeter-wave downconverter and the preamplifier. The downconverter, which receives its power from the parent, in turn distributes power to the optional preamplifier that is either remotely located or directly mounted on the front panel of the downconverter.

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MODEL NUMBER CONFIGURATION

Model Number Format: CS-**xxxxx-XX**

where **xxxxx** is the parent receiver/tuner series number

(**5020C** for use with the CS-5020C Receiver)
(**5040** for use with the CS-5040 VXI Tuner)
(**5950** for use with the CS-5950 Receiver)
(**7000** for use with the CS-7000 VXI Tuner)

where **XX** is the millimeter-wave frequency band:

K/Ka for 18–40 GHz
U for 40–60 GHz
E for 60–80 GHz
W for 80–100 GHz
F for 100–110 GHz

18-110 GHz Down Converters
(shown above in a 6 ½ inch high attaché case)

OPTIONS

A number of options are available, as listed below. Consult with Com-Sol for option compatibility.

Option 1 – Preamplifier (K/Ka and U bands only)
Option 1a – Low noise figure with medium gain
Option 1b – Ultra-low noise figure with high gain

Option 2 – Antenna
Option 2a – Horn antenna
Option 2b – Omni-directional antenna

Option 3 – Special Mounting Configuration – Contact Com-Sol for details.

Option 4 – Connector, RF input – Contact Com-Sol for details.

Option 5 – Daisy-Chain Multiple-Band Coverage – Contact Com-Sol for details.

Option 6 – Extended Warranty – Contact Com-Sol for details.

RELATED EQUIPMENT

CS-5020C Microwave Receiver
CS-5040 VXI Microwave Tuner
CS-5950 Microwave Receiver
CS-7000 VXI Microwave Tuner

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SPECIFICATIONS - 18–40 GHz DOWNCONVERTER

Performance according to specifications is guaranteed over the stated operating temperature range unless otherwise noted.

Input
- frequency ..... 18–40 GHz
- VSWR..... 2.5:1 max
- connector ..... WRD-180 with UG-1587/U flange
  "K" connector (Option 4)

Performance to Parent Tuner 1GHz IF Output at 25°C (with 9-ft cable length)

	Standard Version	Option 1a Version	Option 1b Version
Noise Figure (max)	17 dB	6 dB	3.5 dB
Gain (typical)	17 dB	33 dB	39 dB
Input Third-Order Intercept (min)	+5 dBm	-20 dBm	-25 dBm

Integrated Phase Noise (100 Hz–25 MHz) ..... 1.5° RMS max

Image Rejection ..... 40 dB min

Output
- frequency ..... 2–17 GHz
- connector ..... SMA female

Reference Input
- frequency ..... 240 MHz
- level ..... 0 ± 3 dBm
- connector ..... SMA female

Control/Power Connector ..... 10-pin “Lemo”

Preamp Connector (Option 1) ..... 2-pin “Lemo” (+15 VDC)

Input Power
- +15 VDC ..... 8 W max (standard)
  13.5 W max w/preamp (Option 1)
- -15 VDC ..... 0.75 W max

Temperature
- operating..... 0 to +50° C
- non-operating..... -40 to +85° C

Size..... 4.2 x 4.2 x 4.2 in (10.7 x 10.7 x 10.7 cm)

Weight..... 4 lb (1.8 kg)

EMI Shielding..... Designed to meet MIL-STD-461, RE-02, CS-03

International Emissions Standards..... Designed for CE compliance

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SPECIFICATIONS - 40–60 GHz DOWNCONVERTER

Performance according to specifications is guaranteed over the stated operating temperature range unless otherwise noted.

Input
- frequency ..... 40–60 GHz
- VSWR..... 2.5:1 max
- connector ..... WR-19 with UG-383(M) flange

Performance to Parent Tuner 1GHz IF Output at 25°C (with 9-ft cable length)

	Standard Version	Option 1a Version	Option 1b Version
Noise Figure (max)	18 dB	7 dB	4.5 dB
Gain (typical)	17 dB	33 dB	39 dB
Input Third-Order Intercept (min)	+5 dBm	-20 dBm	-25 dBm

Integrated Phase Noise (100 Hz–25 MHz) ..... 1.5° RMS max

Image Rejection ..... 40 dB min

Output
- frequency ..... 2–17 GHz
- connector ..... SMA female

Reference Input
- frequency ..... 240 MHz
- level ..... 0 ± 3 dBm
- connector ..... SMA female

Control/Power Connector ..... 10-pin “Lemo”

Preamp Connector (Option 1) ..... 2-pin “Lemo” (+15 VDC)

Input Power
- +15 VDC ..... 8 W max (standard)
  18 W max w/preamp (Option 1)
- -15 VDC ..... 0.75 W max

Temperature
- operating..... 0 to +50° C
- non-operating..... -40 to +85° C

Size..... 4.2 x 4.2 x 4.2 in (10.7 x 10.7 x 10.7 cm)

Weight..... 4 lb (1.8 kg)

EMI Shielding..... Designed to meet MIL-STD-461, RE-02, CS-03

International Emissions Standards..... Designed for CE compliance

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SPECIFICATIONS - 60–80 GHz DOWNCONVERTER

Performance according to specifications is guaranteed over the stated operating temperature range unless otherwise noted.

Input
- frequency ..... 60–80 GHz
- VSWR..... 2.5:1 max
- connector ..... WR-12 with UG-387 flange

Performance to Parent Tuner 1GHz IF Output at 25°C (with 9-ft cable length)

	Standard Version
Noise Figure (max)	18.5 dB
Gain (typical)	15.5 dB
Input Third-Order Intercept (min)	-6.5 dBm

Integrated Phase Noise (100 Hz–25 MHz) ..... 2° RMS max

Image Rejection ..... 0 dB

Output
- frequency ..... 2.5–18 GHz
- connector ..... SMA female

Reference Input
- frequency ..... 240 MHz
- level ..... 0 ± 3 dBm
- connector ..... SMA female

Control/Power Connector ..... 10-pin “Lemo”

Input Power
- +15 VDC ..... 8 W max
- -15 VDC ..... 0.75 W max

Temperature
- operating..... 0 to +50° C
- non-operating..... -40 to +85° C

Size..... 4.2 x 4.2 x 4.2 in (10.7 x 10.7 x 10.7 cm)

Weight..... 4 lb (1.8 kg)

EMI Shielding..... Designed to meet MIL-STD-461, RE-02, CS-03

International Emissions Standards..... Designed for CE compliance

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SPECIFICATIONS - 80-100 GHz DOWNCONVERTER

Performance according to specifications is guaranteed over the stated operating temperature range unless otherwise noted.

Input
- frequency ..... 80–100 GHz
- VSWR..... 2.5:1 max
- connector ..... WR-10 with UG-387 flange

Performance to Parent Tuner 1GHz IF Output at 25°C (with 9-ft cable length)

	Standard Version
Noise Figure (max)	18.5 dB
Gain (typical)	15.5 dB
Input Third-Order Intercept (min)	-6.5 dBm

Integrated Phase Noise (100 Hz–25 MHz) ..... 2.5° RMS max

Image Rejection ..... 0 dB

Output
- frequency ..... 2–14 GHz
- connector ..... SMA female

Reference Input
- frequency ..... 240 MHz
- level ..... 0 ± 3 dBm
- connector ..... SMA female

Control/Power Connector ..... 10-pin “Lemo”

Input Power
- +15 VDC ..... 8 W max
- -15 VDC ..... 0.75 W max

Temperature
- operating..... 0 to +50° C
- non-operating..... -40 to +85° C

Size..... 4.2 x 4.2 x 4.2 in (10.7 x 10.7 x 10.7 cm)

Weight..... 4 lb (1.8 kg)

EMI Shielding..... Designed to meet MIL-STD-461, RE-02, CS-03

International Emissions Standards..... Designed for CE compliance

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SPECIFICATIONS - 100-110 GHz DOWNCONVERTER

Performance according to specifications is guaranteed over the stated operating temperature range unless otherwise noted.

Input
- frequency ..... 100–110 GHz
- VSWR..... 2.5:1 max
- connector ..... WR-10 with UG-387 flange

Performance to Parent Tuner 1GHz IF Output at 25°C (with 9-ft cable length)

	Standard Version
Noise Figure (max)	19.5 dB
Gain (typical)	14.5 dB
Input Third-Order Intercept (min)	-5.5 dBm

Integrated Phase Noise (100 Hz–25 MHz) ..... 3° RMS max

Image Rejection ..... 0 dB

RF-IF Gain (to 1 GHz out at parent tuner)..... 20 dB min

Output
- frequency ..... 5–15 GHz
- connector ..... SMA female

Reference Input
- frequency ..... 240 MHz
- level ..... 0 ± 3 dBm
- connector ..... SMA female

Control/Power Connector ..... 10-pin “Lemo”

Input Power
- +15 VDC ..... 8 W max
- -15 VDC ..... 0.75 W max

Temperature
- operating..... 0 to +50° C
- non-operating..... -40 to +85° C

Size..... 4.2 x 4.2 x 4.2 in (10.7 x 10.7 x 10.7 cm)

Weight..... 4 lb (1.8 kg)

EMI Shielding..... Designed to meet MIL-STD-461, RE-02, CS-03

International Emissions Standards..... Designed for CE compliance

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ORDERING INFORMATION

When placing an order, please specify the exact model number and options. Each unit is supplied with a power/control cable, a manual, a certificate of conformance, and acceptance test data. Coaxial interconnect cables must be purchased separately.

All exports of the hardware and/or software referenced in this datasheet require a United States Department of State Export License, or exemption as regulated by the International Traffic in Arms Regulations (ITAR).

WARRANTY

Communication Solutions, Inc. is an ISO-9001 certified Engineering and Manufacturing facility serving the Signal Intelligence Community and the Test & Measurement Industry.

All units are warranted for a period of one year against manufacturing defects in materials or workmanship, provided that the unit is returned to the manufacturer's designated facility. This warranty is specifically limited to the repair or replacement of the unit, and does not include liability for consequential damages or physical damage caused by other parties.

Communication Solutions, Inc. reserves the right to change the features and/or specifications of the equipment described in this document at any time without notice.

Communication Solutions, Inc.

Com-Sol is ISO-9001 certified.

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