Dual Channel, Shared Oscillator Downconverter
Indoor / Outdoor

S-, C-, X-, Ku-, K (DBS)-, Ka-, and Q-band
Triple-channel converters also available

All of WORK Microwave’s satellite down converters meet the demanding requirements of modern satellite transmission applications. Customers worldwide appreciate their reliability and high level of quality. The dual-channel, shared oscillator converters can be used in systems where an accurate phase relationship is required between two converter channels, as is the case for monopulse tracking system down conversion.

Operating and control
The converters can be operated via the push buttons on the front panel using self-explanatory display menus or via remote control (RS232, RS422/485, TCP/IP over Ethernet).

Detailed monitoring of the system status and a summary alarm output (dual change over switch contacts) are provided. For the remote control ASCII string-based commands as well as addressable, packet-based commands are provided.

Housing options
The converters normally are delivered without fans and can be operated in environments, where at minimum one RU space for natural ventilation is available above each unit. This eliminates the fan as a potential point of failure. For rack installations without any space in between the units, a fan within the converter unit is recommended. This forces airflow from the right side to left side of the units. Outdoor versions with IP 67 degree of protection are also available.

Key features
- Shared oscillator to guarantee excellent phase tracking in between channels
- 70 MHz or 140 MHz IF bands available
- Low power consumption
- Extreme low phase noise (< -60 dBc/Hz @ 10 Hz)
- Long-term stability $10^{-7}$ / year
- Output power +10 dBm (1 dB compression point)
- Automatic reference recognition (5 and 10 MHz)
- 0 °C to 50 °C (32 °F to 122 °F) (VSCD units)
- -30 °C to 60 °C (-22 °F to 140 °F) (VHCD units)
- -40 °C to 60 °C (-40 °F to 140 °F) (VECD units)
- Remote control through RS232, RS422/485 (2-wire or 4-wire) interfaces. Packet command syntax supports RS485 bus systems and allows addressed operation.
- Remote control through Ethernet supporting a TCP/IP command interface (Indoor Version only)
- IF test outputs (standard on indoor units, on outdoor units with Option IFT)
- Summary alarm output with dual change over switch contacts
- Internal Fan as option for indoor units (Option FAN)
- CE compliant

3 years warranty

Visit us at www.work-microwave.com
## Dual Channel, Shared Oscillator Downconverter

- **S-, C-, X-, Ku-, K (DBS)-, and Ka-band**
- **Q-band on request (contact factory)**

### Downconverter Type:
- **VHCD-S1S1T / VSCD-S1S1T**
- **VHCD-S4S4T / VSCD-S4S4T**
- **VHCD-GCT / VSCD-GCT**
- **VHCD-XXT / VSCD-XXT**

### RF-Input Frequency:
- **S-Band**
  - 2.2 ... 2.3 GHz
- **C-Band**
  - 3.4 ... 4.2 GHz
- **X-Band**
  - 7.25 ... 7.75 GHz

### Intermediate Frequency:
- **2450 MHz**
  - for 70 MHz IF Output
  - for 140 MHz IF Output
- **3060 MHz**
  - for 70 MHz IF Output
  - for 140 MHz IF Output
- **2150 MHz**
  - for 70 MHz IF Output
  - for 140 MHz IF Output

### Phase Noise:
- **10 Hz**
  - -70 / -67
  - -84 / -81
  - -98 / -95
  - -104 / -101
  - -112 / -109
- **100 Hz**
  - -70 / -67
  - -84 / -81
  - -98 / -95
  - -104 / -101
  - -112 / -109
- **1 kHz**
  - -98 / -95
  - -104 / -101
  - -107 / -104
  - -112 / -109
  - -110 / -107
- **10 kHz**
  - -107 / -104
  - -112 / -109
  - -110 / -107
  - -110 / -107
  - -110 / -107
- **100 kHz**
  - -110 / -107
  - -110 / -107
  - -110 / -107
  - -110 / -107
  - -110 / -107

### Fixed Oscillator with Test Output (indoor only, optional for outdoor):
- **2520 MHz (140 MHz IF)**
- **2860 MHz (140 MHz IF)**
- **3120 MHz (70 MHz IF)**
- **3200 MHz (140 MHz IF)**

### Microwave Oscillator with Test Output (indoor only, optional for outdoor):
- **2150 MHz**
- **2450 MHz**
- **2280 MHz (140 MHz IF)**
- **2220 MHz (70 MHz IF)**

### Fixed Oscillator with Test Output (indoor only, optional for outdoor):
- **2520 MHz (140 MHz IF)**
- **2860 MHz (140 MHz IF)**
- **3120 MHz (70 MHz IF)**
- **3200 MHz (140 MHz IF)**

### Microwave Oscillator with Test Output (indoor only, optional for outdoor):
- **2150 MHz**
- **2450 MHz**
- **2280 MHz (140 MHz IF)**
- **2220 MHz (70 MHz IF)**

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<table>
<thead>
<tr>
<th>Downconverter Type:</th>
<th>VHCD-X3X3T / VSCD-X3X3T</th>
<th>VHCD-KuKuT / VSCD-KuKuT</th>
<th>VHCD-KaKaT / VSCD-KaKaT</th>
<th>VHCD-Ka1Ka1T / VSCD-Ka1Ka1T</th>
</tr>
</thead>
<tbody>
<tr>
<td>RF-Input Frequency:</td>
<td>X-Band</td>
<td>X-Band</td>
<td>X-Band</td>
<td>X-Band</td>
</tr>
<tr>
<td></td>
<td>7.0 ... 9.0 GHz</td>
<td>10.70 ... 12.75 GHz</td>
<td>18.10 ... 21.20 GHz</td>
<td>19.70 ... 20.10 GHz</td>
</tr>
<tr>
<td>Intermediate Frequency:</td>
<td>2150 MHz</td>
<td>2150 MHz</td>
<td>2450 MHz</td>
<td>2150 MHz</td>
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<tr>
<td></td>
<td>for 70 MHz IF Output</td>
<td>for 70 MHz IF Output</td>
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<td>for 70 MHz IF Output</td>
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<tr>
<td></td>
<td>for 140 MHz IF Output</td>
<td>for 140 MHz IF Output</td>
<td>for 140 MHz IF Output</td>
<td>for 140 MHz IF Output</td>
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<tr>
<td>Phase Noise:</td>
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<td>10 Hz</td>
<td>10 Hz</td>
<td>10 Hz</td>
</tr>
<tr>
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<td>-63 / -60</td>
<td>-63 / -60</td>
<td>-63 / -60</td>
<td>-63 / -60</td>
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<td>-83 / -80</td>
<td>-83 / -80</td>
<td>-83 / -80</td>
<td>-83 / -80</td>
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<td>-93 / -95</td>
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<td>-98 / -95</td>
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<td>-107 / -104</td>
<td>-110 / -107</td>
<td>-108 / -105</td>
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</tbody>
</table>

### Fixed Oscillator with Test Output (indoor only, optional for outdoor):
- **2220 MHz (70 MHz IF)**
- **2280 MHz (140 MHz IF)**
- **2380 MHz (140 MHz IF)**
- **2330 MHz (70 MHz IF)**
- **2380 MHz (70 MHz IF)**
- **2380 MHz (140 MHz IF)**

### Microwave Oscillator with Test Output (indoor only, optional for outdoor):
- **2150 MHz**
- **2450 MHz**
- **2220 MHz (70 MHz IF)**
- **2220 MHz (140 MHz IF)**

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*0 °C ... 50 °C, outside this temperature range degraded by max. 5 dB.*
Dual Channel, Shared Oscillator Downconverter
S-, C-, X-, Ku-, K (DBS)-, and Ka-band
Q-band on request (contact factory)

Common Parameters

Conversion Scheme: Dual down conversion, no frequency inversion.
All channels with shared oscillator.
Same conversion frequency for all channels.
Gain setting individual for each channel.

Phase Tracking between channels: < 10 deg rms after 1 hour warm up, constant gain setting, constant frequency setting, signal frequency constant within 10 kHz. Initial phase difference to be compensated externally.

Frequency Resolution: 100 Hz

RF-input Characteristics:
- Impedance: 50 Ω
- Return loss: > 20 dB
- Operational input level: -45 dBm
- Maximum aggregate input level: +5 dBm (damage level)
- LO leakage: < -80 dBm
- RF-connector: SMA female (standard)
- K female (-Ka standard)
- WR28 waveguide (-Ka with option WR28)

IF-Output Characteristics:
- Frequency: 70 ±20 MHz or 140 ±40 MHz (optional: both ➔ [IF-Band] = 70/140)
- Impedance: 50 or 75 Ω
- Return Loss: > 20 dB
- 1 dB compression point: > 10 dBm, 13 dBm typical
- Output muting: > 60 dB (by command or sense input or by alarm condition)
- IF-signal monitor: -20 dB of IF-output (approx.)
- IF-Connectors: BNC female

Transfer Characteristics:
- Max. conversion gain: 45 dB ±1.0 dB
- Attenuation range: 0 ... 30 dB, Step 0.1 dB
- Level stability: ±0.25 dB/day at constant temperature
- ±0.5 dB max., ±0.2 dB typ. over temperature range
- Gain flatness: ±0.25 dB over ±20 MHz (IF 70 MHz), ±0.40 dB over ±40 MHz (IF 140 MHz)
- Image rejection: > 80 dB
- Noise figure: < 12 dB
- Isolation between channels: > 60 dB

Equalizer (Gain slope):
- Max. ±0.0625 dB / MHz (IF 70 MHz), ±0.05 dB / MHz (IF 140 MHz) (programmable)

Group Delay (± 18 MHz):
- Linear: 0.03 ns / MHz max.
- Parabolic: 0.01 ns / MHz² max.
- Ripple: 1 ns peak to peak max.

Group Delay (± 36 MHz):
- Linear: 0.015 ns / MHz max.
- Parabolic: 0.005 ns / MHz² max.
- Ripple: 2 ns peak to peak max.

Intermodulation (3° Order):
- OIP3: > 20 dBm

AM / PM conversion:
- 0.1° / dB

Spurious Outputs:
- Signal related: < -60 dBc (|Δ| < 2 MHz), < -70 dBc (|Δ| ≥ 2 MHz)
- Output harmonics: < -40 dBc
- Signal independent: < -75 dBm

Frequency Stability:
- ±1 x 10⁻⁷, -30 °C ... 60 °C
- ±1 x 10⁻⁶, -30 °C ... 60 °C (after 30 min warm up)
- ±1 x 10⁻⁶ per day (fixed temperature after 24 h warm up)

Specifications are subject to change

These converter types are only a small selection of what is available. Please contact us for further frequency bands and features.
Dual Channel, Shared Oscillator Downconverter
S-, C-, Ku-band
K- and Q-band on request (contact factory)

Indoor Housing:

<table>
<thead>
<tr>
<th>Reference Input:</th>
<th>Frequency:</th>
<th>5 or 10 MHz sine wave</th>
</tr>
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<tbody>
<tr>
<td>Level:</td>
<td>5 dBm ±5 dB</td>
<td></td>
</tr>
<tr>
<td>Modes:</td>
<td>auto/extern/intern</td>
<td></td>
</tr>
<tr>
<td>Connector:</td>
<td>BNC female</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Reference Output:</th>
<th>Frequency:</th>
<th>10 MHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level:</td>
<td>0 dBm ±3 dB</td>
<td></td>
</tr>
<tr>
<td>Connector:</td>
<td>BNC female</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Monitoring and Control Interface:</th>
<th>Protocol:</th>
<th>SNMP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection:</td>
<td>UDP over Ethernet (10 or 100 Mbps, auto sensing), connector RJ-45</td>
<td></td>
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</table>

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<tr>
<th>Reference Input (Option):</th>
<th>Frequency:</th>
<th>5 or 10 MHz sine wave</th>
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<tr>
<td>Level:</td>
<td>5 dBm ±5 dB</td>
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<tr>
<td>Modes:</td>
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<td></td>
</tr>
<tr>
<td>Connector:</td>
<td>SMA female</td>
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<td>Connector:</td>
<td>SMA female</td>
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<table>
<thead>
<tr>
<th>Combined Monitoring and Control Interface and Alarm Interface:</th>
<th>Protocol:</th>
<th>Multipoint packet format commands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection:</td>
<td>RS232 or RS422/RS485 (configurable), connector DSUB09 female or TCP/IP over Ethernet (10 or 100 Mbps, auto sensing), connector RJ-45</td>
<td></td>
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<tr>
<td>Alarm output:</td>
<td>Two potential free contacts (DPDT)</td>
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</tr>
<tr>
<td>Connection type:</td>
<td>24 V DC output: max. 0.3 A</td>
<td></td>
</tr>
<tr>
<td>Mute Input:</td>
<td>6.5 V DC output: max. 0.2 A</td>
<td></td>
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</table>

- Temperature Range: -30 °C ... 60 °C operating (10 minutes warm up at -30 °C)
- Relative Humidity: < 100 %
- Mains Power Input: Max.: 45 VA / 35 W
- Mains Power Input Connector: Amphenol C16-1 (3+PE) male
- Mains Fuse: 2 x 2 A, time-lag fuse
- Dimensions: 402 x 111 x 391 mm³ (WxHxD) (standard)
- Degree of Protection: IP 67 (acc. IEC 529)

Outdoor Housing:

Specifications are subject to change