Polyphase Microwave, Inc. is a wholly-owned subsidiary of Technology Service Corporation

Technology Service Corporation (TSC) is an employee-owned, high-technology company primarily engaged in providing engineering services to the US Government. These services involve support of systems throughout their life cycles from advanced concept development through operational support. TSC has supported Federal Government, commercial, and international customers for over 40 years. Our Government customers include the US Military Services, Defense Agencies, and the Federal Aviation Administration.

Polyphase Microwave, Inc.
Polyphase Microwave designs and manufactures high-performance specialty mixer components, electronic assemblies, custom circuit boards, and instrumentation for demanding RF/microwave applications. Our products are critical elements in wireless communications systems, radar/EW systems, test instrumentation, and scientific R&D.

In-Stock and Custom Products
We stock a complete line of specialty mixer components including image-reject mixers, quadrature (I/Q) modulators, quadrature (I/Q) demodulators, and single-sideband modulators. Our standard products are often just the starting point for a customized solution. Our experienced engineering staff is ready to discuss your application requirements and find the best solution for your system.

Facility
We design, build and test all of our products at our manufacturing facility located in Bloomington, Indiana, USA.

Quality Assurance
Polyphase Microwave is committed to customer satisfaction through our Quality Management System (QMS). All of our employees are trained in the QMS requirements and are responsible for its application to the manufacturing process. Our QA manager regularly reviews the QMS while ensuring compliance and continuous improvements.
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The protoT x is a 0.3GHz to 5.0 GHz user-programmable RF upconverter and IF to RF upconverter with internal LO synthesizer.

**Models:**
- PTX-0350 (IF: 10MHz – 50MHz)
- PTX-002 (IF: 100MHz – 200MHz)

**4 Programmable Operating Modes:**
- I/Q upconverter
- RF = LO + IF upconverter
- RF = LO - IF upconverter
- Synthesizer

**Features:**
- USB 2.0 interface
- Internal LO synthesizer or external LO input
- 1 Hz step size
- LO nulling control
- 5-way switched RF filter bank
- RF attenuator, 0 to 31.75 dB in 0.25 dB steps
- ±22 dBm RF output power
- API available for custom software integration
- Non-volatile memory for setting recall
- Compact size: 3”x3”x0.6”

**.protoT x UPconverter**

**QUADRATURE MODULATORS**

Quadraphase modulators generate any bandpass RF modulation including QPSK, QAM, OFDM, FM, PM, AM, and pulsed Doppler. I and Q baseband inputs directly modulate the LO input to generate a modulated RF output. AM series modulators use active designs with superior linearity and have integrated LO amplifiers.

QM series modulators are passive for the lowest output noise.

<table>
<thead>
<tr>
<th>Device</th>
<th>LO/RF Frequency (GHz)</th>
<th>LO Bandwidth (MHz)</th>
<th>Conversion Loss (dB)</th>
<th>LO/RF Leakage (dBm)</th>
<th>Sideband Suppression (dBc)</th>
<th>Supply Voltage (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD155180B</td>
<td>15.5 - 18.0</td>
<td>DC - 275</td>
<td>11.0 ±0.3 ±1.0 ±5</td>
<td>5.0 ±1.5 ±3.0 ±5</td>
<td>Passive</td>
<td></td>
</tr>
<tr>
<td>AD110140B</td>
<td>11.0 - 14.0</td>
<td>DC - 275</td>
<td>9.0 ±0.2 ±2.0 ±5</td>
<td>5.0 ±1.5 ±3.0 ±5</td>
<td>Passive</td>
<td></td>
</tr>
<tr>
<td>AD90120B</td>
<td>9.0 - 12.0</td>
<td>DC - 275</td>
<td>8.0 ±0.1 ±1.0 ±5</td>
<td>5.0 ±1.5 ±3.0 ±5</td>
<td>Passive</td>
<td></td>
</tr>
<tr>
<td>AD60100B</td>
<td>6.0 - 10.0</td>
<td>DC - 275</td>
<td>7.0 ±0.1 ±1.0 ±5</td>
<td>5.0 ±1.5 ±3.0 ±5</td>
<td>Passive</td>
<td></td>
</tr>
<tr>
<td>AD4080B</td>
<td>4.0 - 8.0</td>
<td>DC - 275</td>
<td>8.0 ±0.1 ±1.0 ±5</td>
<td>5.0 ±1.5 ±3.0 ±5</td>
<td>Passive</td>
<td></td>
</tr>
<tr>
<td>QD4070B</td>
<td>4.0 - 7.0</td>
<td>DC - 275</td>
<td>7.0 ±0.2 ±2.0 ±5</td>
<td>5.0 ±1.5 ±3.0 ±5</td>
<td>Passive</td>
<td></td>
</tr>
<tr>
<td>QD3040B</td>
<td>3.0 - 4.0</td>
<td>DC - 275</td>
<td>7.0 ±0.1 ±1.6 Passive</td>
<td>5.0 ±1.5 ±3.0 ±5</td>
<td>Passive</td>
<td></td>
</tr>
<tr>
<td>QD2326B</td>
<td>2.3 - 2.6</td>
<td>DC - 275</td>
<td>8.0 ±0.1 ±1.5 Passive</td>
<td>5.0 ±1.5 ±3.0 ±5</td>
<td>Passive</td>
<td></td>
</tr>
<tr>
<td>QD1422B</td>
<td>1.4 - 2.2</td>
<td>DC - 275</td>
<td>7.0 ±0.1 ±1.2 Passive</td>
<td>5.0 ±1.5 ±3.0 ±5</td>
<td>Passive</td>
<td></td>
</tr>
<tr>
<td>QD1220B</td>
<td>1.2 - 2.0</td>
<td>DC - 275</td>
<td>7.0 ±0.1 ±1.1 Passive</td>
<td>5.0 ±1.5 ±3.0 ±5</td>
<td>Passive</td>
<td></td>
</tr>
</tbody>
</table>

**IMAGE REJECT MIXERS**

The desired RF sideband is downconverted to an IF output while the unwanted RF image is rejected. The IRM series features enhanced image rejection, linearity, and LO-RF isolation making them ideal for high-performance microwave downconverters and receivers.

<table>
<thead>
<tr>
<th>Device</th>
<th>LO/RF Frequency (GHz)</th>
<th>LO Power (dBm)</th>
<th>Conversion Loss (dB)</th>
<th>Noise Figure (dB)</th>
<th>Image Rejection (dB)</th>
<th>Supply Voltage (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IRM0511B</td>
<td>0.5 - 5.5</td>
<td>14</td>
<td>8.5</td>
<td>9</td>
<td>37</td>
<td>Passive</td>
</tr>
<tr>
<td>IRM0622B</td>
<td>0.6 - 2.2</td>
<td>14</td>
<td>8.5</td>
<td>9</td>
<td>35</td>
<td>Passive</td>
</tr>
<tr>
<td>IRM1214B</td>
<td>1.2 - 1.4</td>
<td>14</td>
<td>8.0</td>
<td>5</td>
<td>40</td>
<td>Passive</td>
</tr>
<tr>
<td>IRM2040B</td>
<td>2.0 - 4.0</td>
<td>15</td>
<td>9.5</td>
<td>10</td>
<td>35</td>
<td>Passive</td>
</tr>
<tr>
<td>IRM0510B</td>
<td>0.5 - 1.0</td>
<td>15</td>
<td>7.5</td>
<td>8</td>
<td>37</td>
<td>Passive</td>
</tr>
<tr>
<td>IRM0530B</td>
<td>0.5 - 3.0</td>
<td>15</td>
<td>8.0</td>
<td>5</td>
<td>30</td>
<td>Passive</td>
</tr>
</tbody>
</table>

Values listed are typical. See datasheet for full performance specifications.
protoTx UPCONVERTER

The protoTx is a 0.3GHz to 5.0GHz user-programmable RF upconverter and IF to RF upconverter with internal LO synthesizer.

Features:
- IF to RF upconverter with internal LO synthesizer.
- The protoTx is a 0.3GHz to 5.0GHz user-programmable RF upconverter.
- QM series modulators use passive designs for the lowest possible output noise.
- Internal LO synthesizer
- USB 2.0 interface
- 5-way switched RF filter bank
- LO mulling control
- 5-way switched RF filter bank
- LO attenuator, 0 to 31.75 dB in 0.25 dB steps
- +22 dBm RF output power
- API available for custom software integration
- Non-volatile memory for setting recall
- Compact size: 3”x3”x0.6”

Models:
- PTX-03
- PTX-0350 (IF: 10MHz – 50MHz)
- PTX-0300 (IF: 100MHz – 200MHz)
- PTX-0301 (IF: 30MHz – 100MHz)

4 Programmable Operating Modes:
- I/O upconverter
- RF = LO + IF upconverter
- RF = LO - IF upconverter
- Synthesizer

Values listed are typical. See datasheet for full performance specifications.

QUADRATURE MODULATORS

Quadrature modulators generate any bandpass RF modulation including GSK, QAM, OFDM, FM, PM, AM, and pulsed Doppler. I and Q baseband inputs directly modulate the LO input to generate a modulated RF output. AM series modulators use passive designs with superior linearity and have integrated LO amplifiers. QM series modulators are passive for the lowest output noise.

Features:
- 90° phase shift
- 10 MHz TCXO
- LSB/USB SWITCH
- INTEGER-N SYNTH

Values listed are typical. See datasheet for full performance specifications.

SINGLE SIDEBAND MIXER

Upconvert an IF signal to the desired RF sideband while the unwanted RF sideband and RF leakage. The SSB series features enhanced sideband suppression, linearity, and ultra-low RF leakage.

Features:
- 5-way switched RF filter bank
- LO attenuation control
- 5-way switched RF filter bank
- LO attenuator, 0 to 31.75 dB in 0.25 dB steps
- +22 dBm RF output power
- API available for custom software integration
- Non-volatile memory for setting recall

Values listed are typical. See datasheet for full performance specifications.

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Features:
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- LO attenuation control
- 5-way switched RF filter bank
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- RF = LO - IF upconverter
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Features:
- USB 2.0 interface
- Internal LO synthesizer or external LO input
- 1 Hz step size
- LO nulling control
- 5-way switched RF filter bank
- RF attenuator, 0 to 31.75 dBm in 0.25 dB steps
- ±22 dBm RF output power
- API available for custom software integration
- Non-volatile memory for setting recall
- Compact size: 3”x3”x0.6”

Images and circles are not fully visible/legible, but figures are correct in their shape.

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Quadrature modulators generate any bandpass RF modulation including GPSK, QAM, OFDM, FM, PM, AM, and pulsed Doppler. I and Q baseband inputs directly modulate the LO input to generate a modulated RF output. AM series modulators use active designs with superior linearity and have integrated LO amplifiers. QM series modulators are passive for the lowest output noise.

SINGLE SIDEBAND MIXER

Upconvert an IF signal to the desired RF sideband while suppressing the unwanted RF sideband. The SSB series features enhanced sideband suppression, linearity, and ultra-low LO leakage.

QUADRATURE DEMODULATORS

Quadrature demodulators directly convert RF signals to I and Q baseband outputs. Internally matched lowpass filters provide anti-aliasing for easy interfacing with digitizers or ADCs. AD series demodulators are active designs with the best overall performance. QD series demodulators use passive mixers for the lowest possible output noise.

IMAGE REJECT MIXERS

The desired RF sideband is downconverted to an IF output while the unwanted RF image is rejected. The IRM series features enhanced image rejection, linearity, and LO-RF isolation making them ideal for high-performance microwave downconverters and receivers.