Arbitrary & Function Generator

Protek 9301/9302

**DDS (Direct Digital Synthesizer) Technology**
- **Function**: Sine, Square, Triangle, Ramp, Noise and Arbitrary Waveform
- **Frequency Range**: 0.00000001 Hz to 31 MHz
- **Frequency Resolution**: 0.00000001 Hz
- **Frequency Accuracy**: ±3 PPM
- **Modulation**: AM, FM, PM, Burst
- **Arbitrary Waveform of 40M Sample/sec, up to 16K Sample Point**
- **RS232 Interface (Standard)**
- **GPIB Interface (Standard)**
- **Arbitrary Waveform Composer (Standard)**

**Main Function BNC(CH1/CH2 output)**
- Sine, Square, Triangle, Ramp, Noise, Arbitrary

**Function Keys**
- Sine, Square, Triangle, Ramp, Noise, Arbitrary

**Step Keys**
- Sine, Square, Triangle, Ramp, Noise, Arbitrary

**Sweep / Modulate Keys**
- Sine, Square, Triangle, Ramp, Noise, Arbitrary
### Protek 9301/9302 Various Waveforms

<table>
<thead>
<tr>
<th>Waveform Specifications</th>
<th>Reception Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standard Function</strong></td>
<td>Sine, Square, Triangle, Ramp, Noise, Arbitrary</td>
</tr>
<tr>
<td><strong>AWC Software</strong></td>
<td>Windows 95, 98, 2000, NT, ME</td>
</tr>
<tr>
<td><strong>AWC Function</strong></td>
<td>Sine, Square, Triangle, Ramp, DC, Noise, Damped Sine, Exponential Rise, Exponential Fail, Free Hand, Line</td>
</tr>
<tr>
<td><strong>Waveform Length</strong></td>
<td>16 to 16,383 Points</td>
</tr>
<tr>
<td><strong>Amplitude Resolution</strong></td>
<td>12 bits</td>
</tr>
<tr>
<td><strong>Sampling Rate</strong></td>
<td>40 M Samples/sec</td>
</tr>
<tr>
<td><strong>Frequency Characteristics Specifications</strong></td>
<td>Sine, Square, Ramp, Triangle</td>
</tr>
<tr>
<td><strong>Sine, Square</strong></td>
<td>0.01 µHz to 1 MHz</td>
</tr>
<tr>
<td><strong>Ramp, Triangle</strong></td>
<td>0.01 µHz to 2 MHz</td>
</tr>
<tr>
<td><strong>Noise</strong></td>
<td>10 MHz (6dBm M Type)</td>
</tr>
<tr>
<td><strong>Output Characteristics Specifications</strong></td>
<td>Output Protek 9301(1Channel), Protek 9302(2Channel)</td>
</tr>
<tr>
<td><strong>Source Impedance</strong></td>
<td>500 Floating</td>
</tr>
<tr>
<td><strong>Output Units</strong></td>
<td>Vpp, Vrms, dBm, %</td>
</tr>
<tr>
<td><strong>Sync Output</strong></td>
<td>Front-Panel TTL Output For Each Channel</td>
</tr>
<tr>
<td><strong>Inter Channel Crosstalk</strong></td>
<td>&lt;0.05% (Protek 9302 Only)</td>
</tr>
<tr>
<td><strong>DC Offset</strong></td>
<td>±5V (Limited Such That</td>
</tr>
<tr>
<td><strong>Span</strong></td>
<td>0.01 µHz to 31 MHz (2MHz For Triangle, Ramp)</td>
</tr>
</tbody>
</table>

### Sine Wave Amplitude Accuracy (0 V DC Offset)

- 0.09% at 0.01 kHz to 10 kHz
- 0.03% at 10 kHz to 20 kHz
- 0.01% at 20 kHz to 20 MHz
- 0.005% at 20 MHz to 25 MHz
- 0.002% at 25 MHz to 30 MHz

### Square Wave Amplitude Accuracy

- 0.1% at 0.01 kHz to 10 kHz
- 0.05% at 10 kHz to 20 kHz
- 0.02% at 20 kHz to 20 MHz
- 0.01% at 20 MHz to 25 MHz
- 0.005% at 25 MHz to 30 MHz

### Triangular, Ramp, Arbitrary Amplitude Accuracy

- 0.09% at 0.01 kHz to 10 kHz
- 0.05% at 10 kHz to 20 kHz
- 0.03% at 20 kHz to 20 MHz
- 0.01% at 20 MHz to 25 MHz
- 0.005% at 25 MHz to 30 MHz

### Sine Wave Spectral Purity Specifications

- **Spurious Components**
  - DC to 1 MHz: < -65dBc (Non-Harmonic)
  - 1 MHz to 12 MHz: < -95dBc
- **Subharmonic**
  - < -90dBc (Sine, Vpp)
- **Harmonic Distortion**
  - 1 MHz to 12 MHz: < -90dBc (Sine, Vpp)

### Signal Characteristics Specifications

- **Rise/Fall Time**
  - 0.1% (10% to 90%)
- **Asymmetry**
  - ±1% of Period (±4 ns)
- **Overshoot**
  - < 5%
- **Ripple**
  - ±0.4dB (10% to 90%)
- **Sync Output**
  - ±0.2dB (10% to 90%)
- **Phase Shift**
  - ≤100 kHz
- **Span**
  - < ±9999.99°
- **Rate**
  - 0.001 Hz to 10 kHz

### Frequency Characteristics Specifications

- **Sine, Square, Ramp, Triangle**
  - 0.05-5Vpp
- **Noise**
  - ±1.5% of Setting +0.5mV (DC Only)

### Distortion

- **Rate**
  - < -35dB Typical at 1 kHz, 80% Depth
- **Type**
  - Linear or Log
- **Time**
  - 0.001 Hz to 10 kHz
- **Span**
  - ±10% ±5V For 100% Modulation, 100KΩ Impedance
- **Source**
  - Internal (Sine, Square, Ramp, or Arbitrary)
  - 0.001 Hz to 10 kHz
  - 0.09Hz to 3MHz (For Triangle, Ramp)
  - 0.09Hz to 31MHz (2MHz For Triangle, Ramp)
  - 2 MHz to Sine, Square, Triangle, Ramp

### Modulation Characteristics Specifications

- **Source**
  - Internal (Sine, Square, Ramp, or Arbitrary)
  - 0.001 Hz to 10 kHz
- **Span**
  - ±180° (10% to 90%)

### Waveform

- **Sine, Square, Triangle, Ramp, Arbitrary**
  - 0 to 100% Modulation, ±100% DSBSC

### External Input

- **Type**
  - Linear or Log
- **Time**
  - 0.001 Hz to 10 kHz
- **Span**
  - ±180° (10% to 90%)
- **Source**
  - Internal (Sine, Square, Ramp, or Arbitrary)
  - 0.001 Hz to 10 kHz
  - ±5V For 100% Modulation, 100KΩ Impedance
- **Sweep Output**
  - Two Markers May Be Set At Any Sweep Point(TTL Output)
  - 0-10 V Linear Ramp Signal, Synchronized to Sweep

### Specifications

- **Power Consumption**
  - Protek 9301 : 46W, Protek 9302 : 80W
- **Interfaces**
  - RS-232 (2400 to 19,200 bps) and GPIB (Optional)
- **Dimensions**
  - 363mm(W) x 109mm(H) x 386mm(D)
- **Weight**
  - Protek 9301 : 8.2 kg, Protek 9302 : 8.7 kg
- **Operating Humidity**
  - 35% to 80%
- **Operating Temperature**
  - 5°C to 40°C
- **Accuracy**
  - ±3 ppm(20°C to 30°C)
- **Aging**
  - ±3 ppm/Year
- **Distortion**
  - < -35dB at 1 kHz, 80% Depth