The SPIRIT Data Modem algorithm includes ITU-T V.22, V.22bis, V.32, and V32bis modes and is used to transmit data at rates up to 14.4 kbps.

**resource requirements (see Notes 1 and 2)**

<table>
<thead>
<tr>
<th>PEAK MIPS</th>
<th>PROGRAM MEMORY (KWORDS)</th>
<th>CONST MEMORY (KWORDS)</th>
<th>DYNAMIC MEMORY (WORDS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>14.1</td>
<td>2.835</td>
<td>(2244 + Far Echo Delay x 2.4) x Number of channels</td>
</tr>
</tbody>
</table>

NOTES:  
1. Far Echo Delay parameter means the maximum delay (in milliseconds) of for each signal that could be suppressed by the modem. The modem reserves the buffer and saves the transmitted signal to cancel it later. To save one second of the signal, the buffer size needs to be 2400 words.  
2. MIPS requirements are given for 14400 bps rate.

**availability**

The Data Modem is available in five forms:

- eXpressDSP-compliant object code for TMS320C54x
- Fully functional eXpressDSP evaluation object at extremely low price
- Portable C code
- Assembly code

The algorithm is supplied with test environment and integration example code.

Detailed product annotation and user guide documents describing testing procedures, interface and integration of this product, as well as PC-based and DSP-based (TI TMS320VC5406 EVM and TMS320VC5402 DSK) demos are available for evaluation upon request. To get additional information on CST software, go to www.spiritDSP.com/CST.

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performance

Dynamic range 55 dB
Distortion compensation S3002 Line worst case, CONUS Poor Voice etc.
Phase Jitter 40 deg at 50 to 120 Hz
Frequency offset ± 10 Hz
Baud frequency offset ± 0.01 %
Far Echo Frequency offset (V.32/32bis) ± 14 Hz
Far Echo Delay (V.32/32bis) Up to 2 sec
Echo suppression 60 dB

BER = $10^{-5}$ at Flat Channel

<table>
<thead>
<tr>
<th>PROTOCOL</th>
<th>SNR</th>
</tr>
</thead>
<tbody>
<tr>
<td>V.32bis 14400</td>
<td>24 dB</td>
</tr>
<tr>
<td>V.32bis 12000</td>
<td>21 dB</td>
</tr>
<tr>
<td>V.32bis 9600</td>
<td>17 dB</td>
</tr>
<tr>
<td>V.32bis 7200</td>
<td>14 dB</td>
</tr>
<tr>
<td>V.32 9600</td>
<td>19 dB</td>
</tr>
<tr>
<td>V.32 4800</td>
<td>12 dB</td>
</tr>
<tr>
<td>V.22bis 2400</td>
<td>14 dB</td>
</tr>
<tr>
<td>V.22 1200</td>
<td>7 dB</td>
</tr>
</tbody>
</table>
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