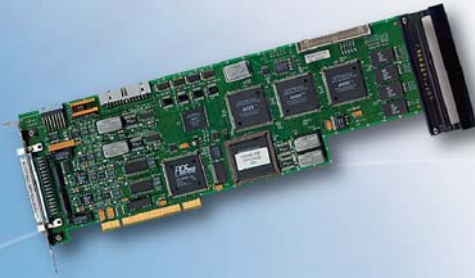


# Telemetry & RF Products

## MULTIFUNCTION PCI TELEMETRY MODULE

### MFT733A-PCI

#### GROUND TELEMETRY



#### KEY FEATURES

- Dual decom design saves PCI slots
- Bus-mastering DMA channels can support both input and output channels
- Extract clock and data from noisy PCM data streams at rates to 15 Mbps
- Supports NRZ-L or randomized NRZ-L PCM inputs to 30 Mbps for a single decom or to 20 Mbps for dual decoms
- Decode, translate, or generate IRIG-A, -B, or -G time
- Time tag PCM input frames with 1 microsecond resolution optionally synchronized to an external source
- Status tag PCM input frames, including sync state, bit slip, CRC error detection
- Extract two asynchronous embedded frames, or fully decommutate a primary and an embedded stream
- Simulate arbitrary telemetry data and formats to 20 Mbps
- Send real-time strip chart data directly to ADP716-PC Analog & Digital Ports with VTS, bypassing host processor

L-3's best-selling Multifunction PCI Telemetry Module (MFT733A-PCI) brings a new level of integration to the system designer. The functions of multiple previous boards are now combined into a single PCI slot, accommodating more telemetry applications in a standard PC workstation or server. It provides a complete PCM telemetry system for 1 or 2 data streams, ideally suited for quick-look applications, flight-line checkout systems, and portable configurations. A rich, robust, and proven set of embedded functions typically offloads the host processor and can be applied to a wide variety of data communications solutions at rates up to 30 Mbps.

The Multifunction PCI Telemetry Module includes the functions of two decommutators, two simulators, two bit synchronizers, and a full-function IRIG time code decoder/generator/translator.

Embedded software configuration options include:

- 2 bit syncs, 2 decom/simulators, internal time clock
- 1 bit sync, 2 decom/simulators, 1 IRIG time code input, internal time clock
- 2 decom/simulators, 1 IRIG time code input and output, internal time clock
- 1 bit sync, 1 decom/simulator, 1 IRIG time code input, internal time clock

Digital synthesizers provide high-resolution frequency programming and low jitter output for two independent PCM outputs at rates up to 20 Mbps for simulation and commanding applications.

Proprietary embedded digital processing optimally acquires and tracks PCM and IRIG time signals and rejects noise. IRIG time functions are closely coupled with decommutation, providing high accuracy time-tagging of input data with 1 microsecond resolution for both real-time or tape playback applications.

In well over 1,000 installations fielded to date, the Multifunction PCI Telemetry Module provides turnkey PC-based single-board telemetry solutions in conjunction with L-3's Visual Test System (VTS) or Vista Software. Alternatively, the robust and powerful API allows integrators to program the board directly for use in a wide range of embedded telemetry applications.



*Excellence You Can Measure*

# Telemetry & RF Products

## MULTIFUNCTION PCI TELEMETRY MODULE

### MFT733A-PCI SPECIFICATIONS

#### Bit Synchronizers

|                   |  |
|-------------------|--|
| Signal Range      | .50 mV to 10 V peak-peak   |
| Codes             | .NRZ-L, NRZ-M, NRZ-S, BiΦ-L, BiΦ-M, BiΦ-S, randomized NRZ-L (11, 15, 17, 20, V35, Intelsat) DM-M, DM-S, RZ |
| Method            | .Second order, phase-locked-loop   |
| Bit rate          | .NRZ codes: 100 bps to 15 Mbps<br>Other codes: 100 bps to 5 Mbps   |
| Tuning resolution | .0.1% (percent of bit rate)  |
| Loop bandwidth    | .0.1%, 0.2%, 0.4%, 0.8%, 1.6% (percent of transition rate)   |
| Outputs           | .Tape, clock/data, phase, polarity, TTL/RS-422, frame search toggle  |

#### Input Channels (Decommutators)

|  |  |
|--|--|
| Inputs   |  |
| Data rates   | .0 to 30 Mbps for single stream; 0 to 20 Mbps for dual stream; 0 to 40 Mbps max aggregate at 8 bits per word   |
| Input code   | .NRZ-L or randomized NRZ-L   |
| Data polarity  | .Normal/Inverted/Auto  |
| Data alignment   | .MSB/LSB first per stream  |
| Input levels   | .TTL (data/clock) or RS-422 (data/clock)   |
| Clock input phase  | .0° or 180°  |
| Clock duty cycle   | .50 ± 5%   |
| Data Buffer  |  |
| PCI data pass qualifier                                      | .Frame and subframe not-search and per-word programmable in sorted or tag/data modes   |
| Data buffers   | .Two independent 32- or 64-kword double buffers  |
| Format   | .Telemetry, status, and time words sorted per application setup, tag-data, or pass-through   |
| Buffer access method   | .Bus-mastering DMA controllers or slave reads and interrupts   |
| Other Outputs  |  |
| Data pass qualifier  | .Frame and subframe not-search and per word  |
| Embedded data streams  | .2 max.  |
| Status to host   | .Frame sync state, subframe sync state, frame search detector, subframe search detector, bit slip detector, CRC error detector, interrupt state, interrupt overrun, active buffer size, bit rate |
| I/O connector  | .Real-time, parallel address; data compatible with L-3's Analog & Digital Ports board (ADP716-PC)  |
| Frame and Subframe Characteristics (Sorted Mode or Tag-Data) |  |
| Sync pattern   | .64 bits max.  |
| Subframe sync method   | .SFID, unique sync code, URC, FCC, or none   |
| Search-to-lock   | .1 to 4 valid sync words   |
| Lock-to-search   | .1 to 4 valid sync words   |
| Error threshold  | .0 to 3 bits   |
| Sync aperture  | .±0 or ±1 bit  |
| Frame size   | .2 to 32,768 telemetry words with simulator; 65,536 without simulator  |
| CRC error checking   | .Programmable polynomial and word location to 16th order   |
| Time-Tagging (Sorted Mode)                                   |  |
| Time source  | .Internal time clock optionally synchronized to external IRIG  |
| Format   | .BCD — microseconds to hundreds of days  |
| Trigger source   | .End of minor frames   |
| Resolution   | .One microsecond   |
| Status Tagging (Sorted Mode)                                 |  |
| Trigger source   | .End of minor frames   |

#### Output Channels (Simulators)

|                      |   |
|----------------------|---|
| Modes of Operation   |   |
| Repetitive           | .On-board current value buffer for simulation data  |
| Command              | .Send one command sequence at a time, including sync, data, and fill bits under host control                    |
| Streaming encoder    | .Alternate between double buffers using DMA or slave writes and interrupts; continuous or burst modes supported |
| Data Buffer          |   |
| Current value buffer | .1 to 65,532 telemetry words  |

#### Outputs

|                      |   |
|----------------------|---|
| Data rates           | .PCM NRZ codes: 0 to 20 Mbps aggregate max. in combination with decoms @ 8 bpw<br>Other PCM codes: 0 to 10 Mbps |
| Data rate resolution | .1 bps  |
| Data rate accuracy   | .Stratum 3 (±4.6 ppm) with internal reference   |
| PCM data codes       | .NRZ-L, NRZ-M, NRZ-S, BiΦ-L, BiΦ-M, BiΦ-S, randomized NRZ-L (11, 15, 17, 20, V35, Intelsat) DM-M, DM-S, RZ      |
| Output levels        | .TTL (data/clock) or RS-422 (data/clock)  |
| Output drive         | .TTL high-level: -32 mA max.; RS-422: -20 mA max.<br>TTL low-level: 64 mA max.; RS-422: 20 mA max.              |
| Clock output phase   | .0° or 180°   |
| Clock source         | .Internal/external  |

#### Time Code Reader/Generator/Translator

|                                      |  |
|--------------------------------------|--|
| Inputs (applies to Reader Mode only) |  |
| Format                               | .Analog: IRIG-A, -B, or -G forward   |
| Playback rates                       | . $\frac{1}{16}$ , $\frac{1}{8}$ , $\frac{1}{4}$ , $\frac{1}{2}$ , 1, 2, 4, 8, or 16 times real time |
| Carrier frequency range              | .±5% of nominal in a wide loop bandwidth mode  |
| Mark amplitude                       | .200 mV to 10V (auto-range)  |
| Impedance                            | .1 MΩ or 75 Ω programmable   |
| Modulation ratio                     | .2:1 to 6:1  |
| Error detection                      | .Error frame bypass option   |
| Phase-locked-loop                    | .Tracks IRIG input time and generates time on signal loss; wide or narrow loop bandwidth (prog)      |
| Internal Time Clock                  |  |
| Modes of operation                   | .Translate or generate forward   |
| Resolution                           | .One microsecond   |
| Stability in Generate Mode           | .±4.6 ppm  |
| Interface                            | .Host can read or set time to 1 μsec   |
| Outputs                              |  |
| Format                               | .Analog: IRIG-A, -B, or -G encode of internal time clock   |
| Carrier frequency range              | .100 KHz maximum   |
| Modulation ratio                     | .3:1 nominal   |

#### Connectors

|   |                                     |
|---|-------------------------------------|
| Rear panel                                  | .DB-50 (female)                     |
| Parallel I/O                                | .40-pin 0.1" center header          |
| Auxiliary                                   | .26-pin 0.1" center header          |
| TTL external cable assembly                 |                                     |
| (order separately)                          | .DB-50 to 12 coax cables            |
| RS-422 differential external cable assembly |                                     |
| (order separately)                          | .DB-50 to 8 triax and 4 coax cables |

#### Power

|             |                                  |
|-------------|----------------------------------|
| +5V supply  | .1.6 A typical ± 5%              |
| +12V supply | .400 mA typical ± 5%             |
| -12V supply | .100 mA typical ± 5%             |
| VIO         | .140 mA max. (either 5V or 3.3V) |

#### Compatibility

|  |  |
|--|--|
| VTS Software (version 6.4.2 for 15/30 Mbps operation; previous versions 10/20)   |  |
| Vista Software (version 4.3.0 for 15/30 Mbps operation; previous versions 10/20) |  |
| L-3 stand-alone Bit Synchronizer Software  |  |
| Direct programming via API command window  |  |

#### Ordering Information

|                   |   |
|-------------------|---|
| MFT733A-PCI       | .PCI Multifunction Telem Module, Dual Stream, BNC/TTL                               |
| MFT733A-PCI-T     | .PCI Multifunction Telem Module, Dual Stream, Triax Connectors (Differential)/RS422 |
| MFT733A-PCI-OEM   | .PCI Multifunction Telem Module, Dual Stream, OEM (Board & Driver Only)             |
| MFT733A-PCI-H     | .PCI Multifunction Telem Module, Dual Stream, Hardened Version                      |
| MFT733A-PCI-S     | .PCI Multifunction Telem Module, Single Stream, BNC/TTL                             |
| MFT733A-PCI-S-OEM | .PCI Multifunction Telem Module, Single Stream, OEM (Board & Driver Only)           |
| MFT-CBL-DIF       | .Cable for MFT733-PCI (All Versions), Triax/ Differential, RS422                    |
| MFT-CBL-TTL       | .Cable for MFT733-PCI (All Versions), BNC/TTL                                       |

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