

Technical Specifications
Of
CCSDS TM-TC ACQUISITION & PROCESSING UNIT



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CCSDS TM-TC ACQUISITION & PROCESSING UNIT

1.0 Introduction

CCSDS Telemetry (TM) data is to be acquired and frame synchronized using an external hardware circuit and transferred to a Personal Computer via USB port, which has Microsoft Windows-7/10 operating system. Also same hardware should handle CCSDS format Tele-command (TC) message reception from Personal Computer, frame formatting and distributing to Spacecraft. Driver Software should have library functions, which can be accessed through high level application programs (designed and developed in VB 6.0/VC++/VB.NET/VC++.NET/Lab Windows) for data transfer. Driver Software has to store incoming Telemetry data continuously on computer hard disk. Stored data can be Microsoft Access format with date & time stamp. Signal details are given below.

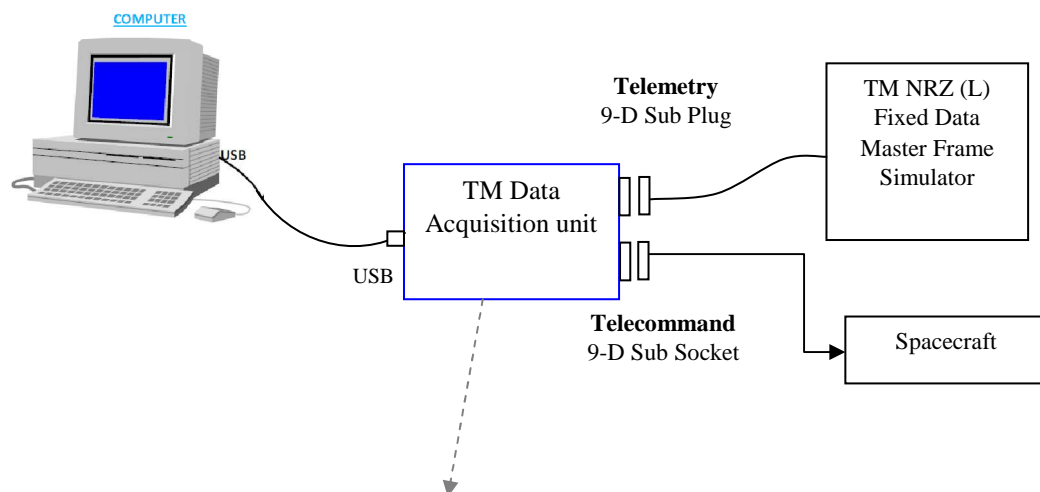


Figure 1 Typical TM-TC Data Acquisition System

2.0 Technical Specifications

| Sl.No | Description | Specification |
|--------------------------------|---|--|
| Signal Specifications | | |
| 1. | Input Signals (Telemetry) | Telemetry Data, Telemetry Clock and GND reference |
| 2. | Input Signal Amplitude | 5V CMOS Buffer O/P via 1k resistor |
| 3. | Clock and Data Relationship | TM channel Clock and Data are synchronous and Data changes during falling edge of the clock |
| 4. | Data Bit Sequence | Most significant Bit first |
| 5. | Frame Length | 256 Bytes (including frame sync 4 bytes) |
| 6. | Number of Frames | 8/16/32/64 |
| 7. | Frame Sync code | 4 byte (1A-CF-FC-1D in hex) first 4 bytes in each frame |
| 8. | TM Data format | Randomised as per CCSDS standard |
| 9. | Output Signals (Tele-command) | Window signal, Burst clock, TC Data and GND reference |
| 10. | Output Signal Amplitude | 5V, Via CMOS Buffer CD4050 |
| 11. | Window, Clock and Data Relationship | <ul style="list-style-type: none"> NRZ- L Data synchronized with Clock signal Data change with rising edge of clock WINDOW rising edge before data start with a duration of 8 data bits WINDOW falling edge after data end with a duration of 8 data bits Burst Clock during data transfer period |
| Hardware Specifications | | |
| 12. | Number of Input Channels (Telemetry) | Two Independent Channels |
| 13. | Input Connector | 9-Pin D-Type Male Connector |
| 14. | Output Port Type | USB |
| 15. | Acquisition Unit Data rate | Up-to 64 kBps (64*1024 Bits per sec) |
| 16. | Input Isolation | Opto-coupler / Data Isolator |
| 17. | Input Current Drawn | < 0.5 mA with opto-coupler |
| 18. | Power Supply (TM section) | USB Power |
| 19. | Number of Output Channels for Telecommand | Two Independent Channels |
| 20. | Output Connector | 9-Pin D-Type Female Connector |

| Sl.No | Description | Specification |
|--------------------------------|-------------------------------------|---|
| 21. | Tele-command data rate | Programmable from 100Hz to 10 kHz with variable resolution 1Hz to 25Hz |
| 22. | Tele-command data size | Programmable from 1 to 1024 bytes |
| 23. | Tele-command output | CD4050 buffer O/P via 1K resistor |
| 24. | Tele-command input output Isolation | via opto-coupler / Data Isolator |
| 25. | Power Supply (TC section) | USB Power for TC input circuitry and External 5V provision for TC Opto-coupler circuitry / not required for Data Isolator |
| 26. | Dimension | Light weight and compact in size with ABS plastic body |
| Software Specifications | | |
| 27. | Driver Software Compatibility | Microsoft Windows-7/10 |
| 28. | Storage | Continuous storage of incoming Telemetry Data |
| 29. | Stored Data Format | Microsoft Access compatible database |
| 30. | Data conversion | De-randomization of acquired TM data as per CCSDS standard |
| General Specifications | | |
| 31. | Demo | If need arises, the Vendor shall arrange a Demo of UNIT at URSC before Purchase order released. |

3.0 Technical Compliance Statement

- The vendor should fill the Compliance status.

| Sl.No | Description | Specification | Compliance Yes/NO? |
|------------------------------|-----------------------------|---|--------------------|
| Signal Specifications | | | |
| 1. | Input Signals (Telemetry) | Telemetry Data, Telemetry Clock and GND reference | Yes/NO? |
| 2. | Input Signal Amplitude | 5V CMOS Buffer O/P via 1k resistor | Yes/NO? |
| 3. | Clock and Data Relationship | TM channel Clock and Data are synchronous and Data changes during falling edge of the clock | Yes/NO? |
| 4. | Data Bit Sequence | Most significant Bit first | Yes/NO? |
| 5. | Frame Length | 256 Bytes (including frame sync 4 bytes) | Yes/NO? |
| 6. | Number of Frames | 8/16/32/64 | Yes/NO? |

| Sl.No | Description | Specification | Compliance Yes/NO? |
|--------------------------------|---|--|-----------------------|
| 7. | Frame Sync code | 4 byte (1A-CF-FC-1D in hex) first 4 bytes in each frame | Yes/NO? |
| 8. | TM Data format | Randomised as per CCSDS standard | Yes/NO? |
| 9. | Output Signals (Tele-command) | Window signal, Burst clock, TC Data and GND reference | Yes/NO? |
| 10. | Output Signal Amplitude | 5V, Via CMOS Buffer CD4050 | Yes/NO? |
| 11. | Window, Clock and Data Relationship | <ul style="list-style-type: none"> NRZ- L Data synchronized with Clock signal Data change with rising edge of clock WINDOW rising edge before data start with a duration of 8 data bits WINDOW falling edge after data end with a duration of 8 data bits Burst Clock during data transfer period | Yes/NO? |
| Hardware Specifications | | | |
| 12. | Number of Input Channels (Telemetry) | Two Independent Channels | Yes/NO? |
| 13. | Input Connector | 9-Pin D-Type Male Connector | Yes/NO? |
| 14. | Output Port Type | USB | Yes/NO? |
| 15. | Acquisition Unit Data rate | Up-to 64 kbps (64*1024 Bits per sec) | Yes/NO? |
| 16. | Input Isolation | Opto-coupler / Data Isolator | Yes/NO? |
| 17. | Input Current Drawn | < 0.5 mA with opto-coupler | Yes/NO? |
| 18. | Power Supply (TM section) | USB Power | Yes/NO? |
| 19. | Number of Output Channels for Telecommand | Two Independent Channels | Yes/NO? |
| 20. | Output Connector | 9-Pin D-Type Female Connector | Yes/NO? |
| 21. | Tele-command data rate | Programmable from 100Hz to 10 kHz with variable resolution 1Hz to 25Hz | Yes/NO? |
| 22. | Tele-command data size | Programmable from 1 to 1024 bytes | Yes/NO? |
| 23. | Tele-command output | CD4050 buffer O/P via 1K resistor | Yes/NO? |
| 24. | Tele-command input output Isolation | via opto-coupler / Data Isolator | Yes/NO? |
| 25. | Power Supply (TC section) | USB Power for TC input circuitry and External 5V provision for TC Opto-coupler circuitry / | Yes/NO? |

| Sl.No | Description | Specification | Compliance Yes/NO? |
|--------------------------------|-------------------------------|--|--------------------|
| | | not required for Data Isolator | |
| 26. | Dimension | Light weight and compact in size with ABS plastic body | Yes/NO? |
| Software Specifications | | | |
| 27. | Driver Software Compatibility | Microsoft Windows-7/10 | Yes/NO? |
| 28. | Storage | Continuous storage of incoming Telemetry Data | Yes/NO? |
| 29. | Stored Data Format | Microsoft Access compatible database | Yes/NO? |
| 30. | Data conversion | De-randomization of acquired TM data as per CCSDS standard | Yes/NO? |
| General Specifications | | | |
| 31. | Demo | If need arises, the Vendor shall arrange a Demo of UNIT at URSC before PO release. | Yes/NO? |

4.0 Technical Bid Documents

- The vendor should submit the Technical Compliance Statement during Technical Bid.

5.0 Price Bid

The vendor shall consider the price for the following during the Price Bid.

- CCSDS TM-TC Acquisition and Processing Unit-2 Nos.
- User Manual/Operating Manual
- Warranty Period-1 Year

6.0 Deliverables

The vendor shall provide the following after the placement of purchasing order within 4 months.

- CCSDS TM-TC Acquisition and Processing Unit-2 Nos.
- User Manual/Operating Manual.