

PARK ITD-1020

Integrated Telemetry IF Demodulator

Overview

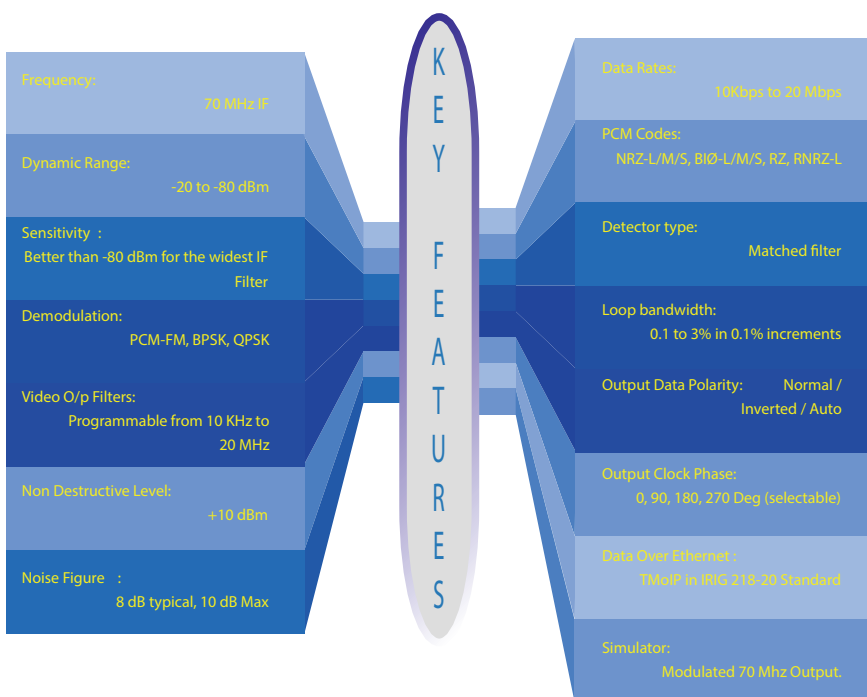
PARK ITD-1020 is a revolutionary concept in Telemetry integrating RF down Converter, Demodulator, Bitsynchronizer, Decommulator, PCM simulator and Modulator into a single low cost portable 1U rack mount enclosure. The unit performs end to end processing of telemetry signal by receiving IF input signal and providing demodulated Telemetry data on Ethernet.

The unit has a built-in IRIG-B time code reader and Time stamps the Decommuted telemetry Frames with a resolution of one micro second. The unit can also synchronize with NTP server to sync the system with UTC Time.

The unit is fully configurable over Ethernet. The ITD-1020 supports a variety of modulation schemes like FM, BPSK, QPSK and optional FEC schemes like Viterbi decoder.

PCC's PC based telemetry data processing software available as an Independent product namely X-DAAS, can configure, Acquire and process telemetry data from ITD-1020.

The ITD-1020 eliminates the need to open PCs and plug-in add-on boards. The ITD-1020 is rugged, portable and eliminates the need to carry multiple bulky units (IF Receiver, Decommulation system, Modulator, Simulator) to field.



Applications

- Telemetry Range Application for Aircrafts, Missiles, UAVs, Launch Vehicles etc
- Mobile Application, such as Mobile Telemetry Station or Ship based Telemetry
- Payload Acquisition from Geo-Synchronous Satellite



Integrated Telemetry Demodulator

Helical Antenna



Integrated Telemetry Demodulator

Ruggedized laptop with X-DAAS Software



PARK ITD-1020

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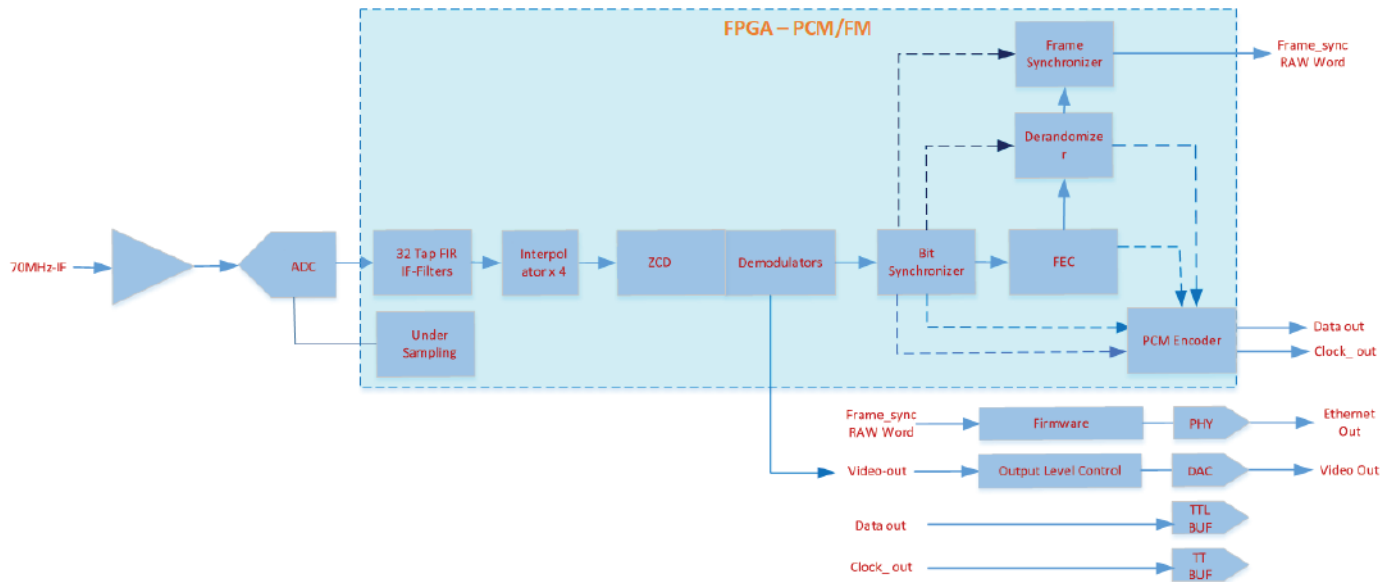


Figure 1 : Functional Block Diagram for PCM/FM

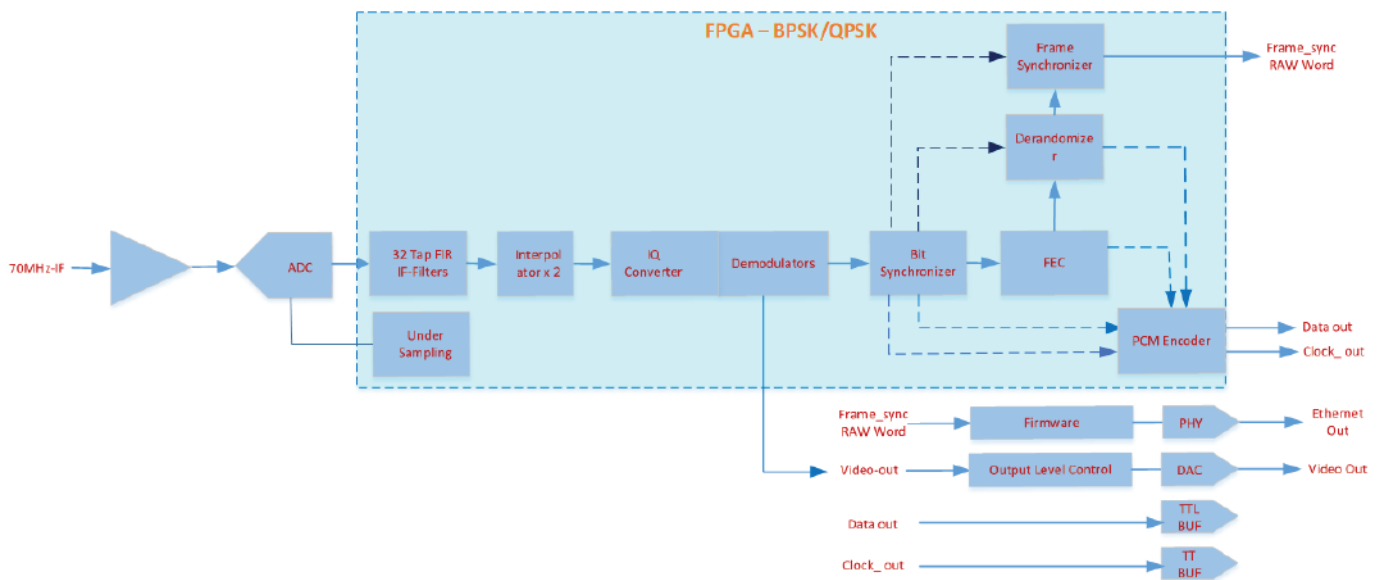


Figure 2 : Functional Block Diagram for BPSK/QPSK

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Integrated Telemetry IF Demodulator

General Specifications

PARAMETER	REMARKS
IF Input	01
Frequency	70 MHz
IF Bandwidth Selectable	1.5 MHz, 5 MHz, 10 MHz and 20 MHz
Digital IF	Automatic based on Bitrate
Nominal input impedance	50 Ω
Input Dynamic Range	-20 to -80 dBm
Sensitivity	Better than -80dBm for the widest IF Filter
Non Destructive Input Level	+10dBm
Noise Figure	8 dB typical, 10 dB Max
Image & Spurious Rejection	>60 dB
Channel Isolation	>80 dB

Demodulator Specifications

PARAMETER	REMARKS
Demodulation mode	PCM FM/FSK, BPSK, QPSK
Post detection video filters	Automatically based on data rate
Data Rates	10 Kbps to 20 Mbps
AFC Tracking	± 250 KHz, step size 1KHz or better
AFC Time Constants	Automatic Selection based on IF filter selection
AGC Controls	Automatic

Output Specifications

PARAMETER	REMARKS
Video (Data) Output impedance	75 Ω
AGC Polarity	Positive or Negative
AGC Range	>90dB
AGC Time Constants	.1, 1.0, 10, 100 (Selectable)

Bit Synchronizer

PARAMETER	REMARKS
Data rate	10 KBPS to 10 MBPS
Input / Output PCM Codes	NRZ-L/M/S, BI \emptyset -L/M/S, RZ, RNRZ-L
Output Data Polarity	Normal / Inverted
Output Clock Phase	0, 90, 180, 270 Deg (selectable)
TTL per channel (5V TTL)	Coded PCM and Clock
2nd Output per channel	RS422 or coded PCM and Clock
PERFORMANCE	
Bit Rate	10 Kbps to 20 Mbps (NRZ-L)
Input Levels	0.1 Vpp Min, ± 10 V max
Output Level	5V TTL
DC offset	100% of I/P peak-to-peak signal level
AC offset	No degradation up to 100% of I/P signal ampl at 0.1% of the bitrate
Loop Bandwidth	0.01% to 3% of bit rate (selectable)

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PARAMETER	REMARKS
Performance	
Acquisition Range	0.4% to 8% of bit rate (automatic)
Tracking Range	0.1% to 20% of bit rate (automatic)
Sync acquisition Threshold	SNR 0 dB
Sync Maintenance	SNR – 3 dB
Sync acquisition period	<50 bits
Sync retention	256 bits without transition
BER probability	Within 1 dB from theoretical BER curve
Viterbi Decoder (Optional)	
Constraint length	6, 7 or 9
Code rate	$\frac{1}{2}$, $\frac{3}{4}$
Decoding depth	64
Soft decision	6-bit soft decision decoding
Maximum bit rate	10 Mbps
Differential Coding	Enable or Disable, Selectable

Decommutator

PARAMETER	REMARKS
IRIG 106 – Ch4 Class-I and Class-II Compliant	
Data polarity	Normal, Inverted, Auto
Clock Edge	Raising edge or falling edge software selectable
PCM Frame Characteristics	
Word Length	8 to 32 bits (including parity)
Sync Length	8 to 64 bits
Bit ordering	LSB first or MSB first
Byte ordering	Big Endian or Little Endian
Words / frame	12 to 524288 including word containing sync pattern
Bit rate	10 Kbps to 20 Mbps
PCM Sub Frame Characteristics	
Sub frame Sync	None or SFID, Sub frame size: 1 to 1024 frames
SFID method	Up / Down (SFID)
SFID position	Anywhere in the minor frame
Words / sub frame	4 Million (Max)
Bit errors in sync pattern	Programmable, 0 to 16

De-randomizer

The Frame synchronizer provides De-randomization facility where the following can be programmed

- Frame Sync pattern Excluded from De-randomization
- The De-randomization Polynomial is user defined.
- The De-randomization length is user defined.
- 16 bit programmable De-randomizer

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Packet over Ethernet

The unit shall also provide the data transmission facility through Ethernet port. The Frame packet can be transmitted through the Ethernet port in Unicast or Multicast mode. The frame will be time stamped with either IRIG time or UTC time. In case of data loss, the unit provides option to either stop sending data or send dummy data at regular interval.

The packets can be transmitted as

1. TMoIP packet.
 - a. This transmission shall be over the UDP connection.
 - b. The full packet will be transmitted in IRIG 218-20 format
2. Customized UDP Packet.
 - a. The transmission shall be done either on a unicast mode or Broadcast mode.
 - b. Each Frame packet shall be divided into multiple UDP packet, each packet not exceeding 1400 bytes.
 - c. The word boundary shall be maintained.
 - d. Each UDP packet shall be prefixed with a 12 bytes header in the following format
 <"BEG">
 <TotalSize(4Bytes)><SizeInCurrentPacket(2Bytes)>
 <SequenceNo(2Bytes)>

Simulator (Optional)

PARAMETER	REMARKS
Output codes	NRZ-L, NRZ-M, NRZ-S, BiÖ-L, BiÖ-M, BiÖ-S, and RNRZ-L
Randomizer	11/15 bit forward or Reverse programmable
Minimum bit rate	10 Kbits/sec
Bit rate accuracy	± 0.01% of nominal data rate
Frame Characteristics	
Word Length	8 to 32 bits (including parity) Sync Length: 8 to 64 bits
Bit ordering	LSB first or MSB first
Parity type	None, Odd, Even
Parity bit position	LSB or MSB
Byte ordering	Big Endian or Little Endian
Words / frame	12 to 524288 including word containing sync pattern
Bit rate	10 bps to 20 Mbps
Modulator	
Frequency	70 MHz
Band width	±15 MHz
Modulation	PCM/FM, PSK, QPSK
Data rate	1 KBPS to 20 MBPS
Output level	0 dBm
FEC	Viterbi, Rate 1/2, 3/4

Setting up the PARK ITD-1020

This unit is configured using PARK X-DAAS GUI software

Unit Information

SETUP DATA	CHOICE	DEFAULT	NOTES
Manufacture	PCC	PCC	Name of manufacturer
Part Reference	PARK ITD-1020	PARK ITD-1020	Module variant part number
Serial Number	ITD/1020-xxx/yy	--	Unique serial number for individual module xxx-Serial Number yy-Manufacturing Year

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Interface Details

The following tables gives the details of the Input and output of the unit,

SL NO	INTERFACE NAME	COUNT	DESCRIPTION
1	70 MHz In	1	70 MHz Input for demodulation. Connection Type : SMA, Female, 50 Ohms
2	Video Out	1	Baseband demodulated video output. Connection Type : BNC, Female, 75 Ohms
3	Bitsync In	1	Baseband Input for Bit synchronizer. Connection Type : BNC, Female, 75 Ohms
4	TTL PCM Data	1	TTL Level PCM Frame Synchronized Data NRZ-L PCM code Connector Type : BNC, Female
5	TTL PCM Clock	1	TTL Level PCM Frame Synchronized Clock for NRZ-L PCM Data Connector Type : BNC, Female
6	RS422 Data+ RS422 Data- RS422 Clock+ RS422 Clock-	1	Differential Level PCM data and clock output Type : D-Type 15 Male
7	IRIG-B	1	IRIG-B AM signal for Time stamping Connector Type: BNC, Female
8	Eth MGMT	1	RJ45 port, used for configuration and monitoring.
9	Eth PCM	1	RJ45 port. The PCM Packet with time stamping is transmitted on this port on Unicast or Multicast address.
10	70 MHz Out	1	This is the simulator 70 MHz output. Connector : SMA, Female, 50 Ohms

Ordering Information

Module Part Number	Module Description
PARK ITD-00-1020	The Module come with all the standard feature
PARK ITD-01-1020	The Module comes with additional feature of FEC – Viterbi decoder
PARK ITD-10-1020	The Module comes with additional feature of Simulator with IF Modulated 70 MHz output
PARK ITD-11-1020	The Module comes with additional feature of FEC – Viterbi and Simulator with IF Modulated 70 MHz output

Note: While ordering please suffix the Module Part Number with 'R' for Rugged Unit and "NR" for Non Rugged Unit

Supporting software

SOFTWARE	DETAILS
PCC X-CAMP/X-DAAS	GUI based software for Configuring, Acquisition, Monitoring and Processing