KAD/DEC/103

IRIG-106 PCM decoder/merger - 2ch

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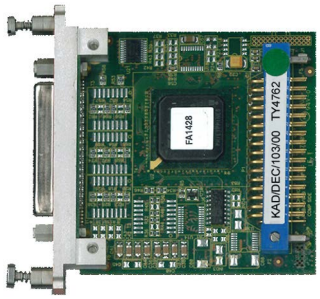


Key Features

- Decommutates up to two IRIG-106 PCM streams in NRZ-L (up to 20Mbps) or BIØ-L codes (up to 8Mbps)
- Up to 4k words per minor frame (16-bit) with programmable word length (4-16 bits), parity (odd/even/none) and word orientation per word
- Operates in synchronous mode with other Acra KAM-500s or in asynchronous mode with third-party PCM encoders

Applications

- Distributed data acquisition systems
- PCM decoders/mergers

Overview

The KAD/DEC/103 is a dual PCM decommutator that can accept two independent PCM streams. Data from each stream is individually parsed into a minor frame buffer from which it can be read coherently over the backplane.

The KAD/DEC/103 is ideally suited to merge two PCM streams in a distributed acquisition system with a star configuration.

In a typical distributed acquisition system where each Acra KAM-500 is operated synchronously, the KAD/DEC/103 runs in synchronous mode. Data is decommutated by the decoder before it is read over the backplane. In this mode there is no need for stale or skipped indication.

When decommutating data from an encoder running asynchronously, data is parsed into a coherent buffer. All parameters read are guaranteed to be from the same minor frame. If data is read slower than it is received, minor frames are skipped occasionally. If data is read faster than it is received, minor frames are repeated (stale) occasionally. In asynchronous mode it is recommended that the stale and skipped indication be read.

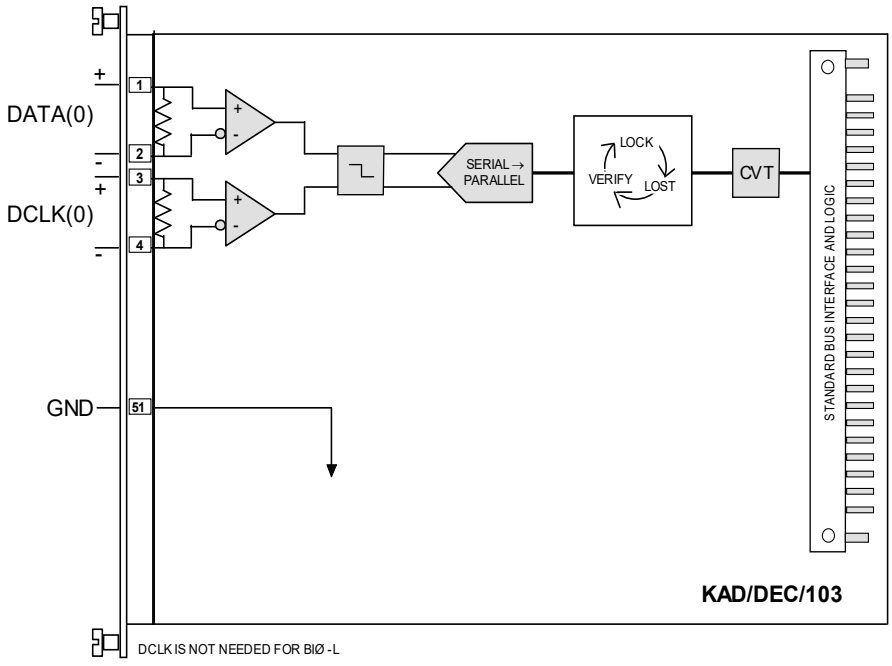


Figure 1: First of two independent PCM decommutators

Specifications

All values provided in the following specification tables are valid within the operating temperature range specified under "Environmental ratings" in the "General specifications" table.

TABLE 1	General specifications				
PARAMETER	MIN.	TYP.	MAX.	UNITS	CONDITION/DETAILS
Slots	–	–	1	–	Can be placed in any user-slot in any combination.
Mass					
	–	66	–	g	
	–	2.23	–	oz	Design metric is grams.
Height above chassis					For recommended clearance requirements see the *CON/KAD/002/CP* data sheet.
bare connector	–	–	11	mm	
bare connector	–	–	0.43	in.	Design metric is millimeters.
Access rate	–	–	2	Msps	Maximum combined access rate for read and write.
Power consumption					
+5V	190	–	260	mA	
±7V	0	–	0	mA	
±12V	0	–	0	mA	
total power	0.95	–	1.3	W	Particular combinations of chassis and Acra KAM-500 modules may have power or current limitations. For details, see *TEC/NOT/016 - Power dissipation, TEC/NOT/049 - Power estimation*, and the relevant chassis data sheet.
Environmental ratings					See *Environmental Qualification Handbook*.
operating temperature	-40	–	85	°C	Chassis base/side plate temperature.
storage temperature	-55	–	105	°C	

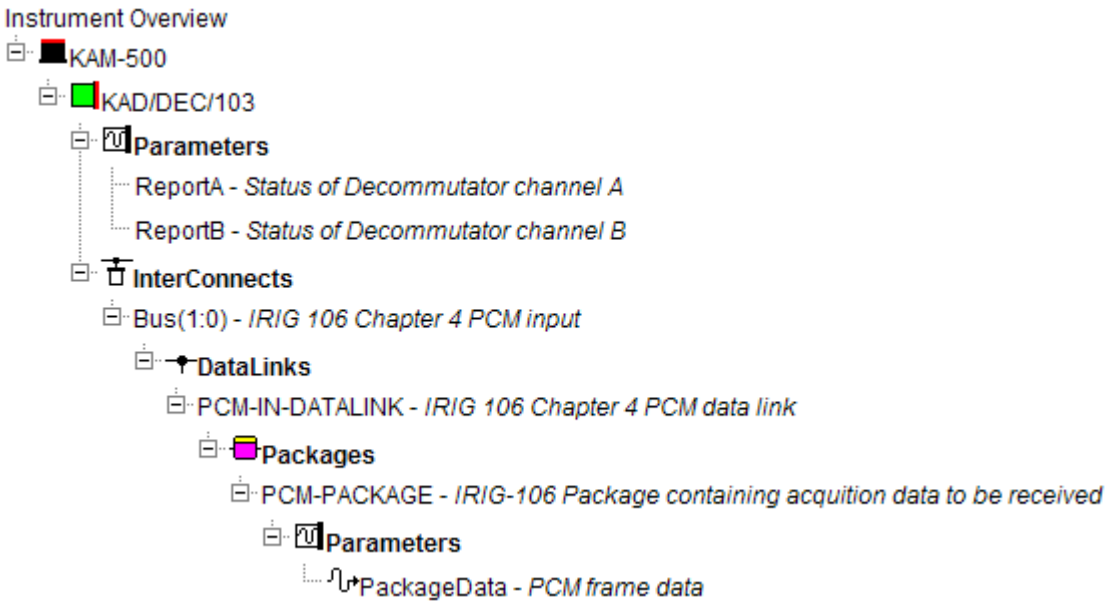
TABLE 2	RS-422 inputs				
PARAMETER	MIN.	TYP.	MAX.	UNITS	CONDITION/DETAILS
Inputs	–	–	4	–	
Signalling rate					
Data	–	–	20	Mbps	NRZ-L (8Mbps for BIØ-L).
Input voltage					
operating range	-25	–	25	V	Do not exceed operating range.
logic 0	–	–	0.2	V	(130mV hysteresis) V_{IN+} - V_{IN-}.
logic 1	0.2	–	–	V	(130mV hysteresis) V_{IN+} - V_{IN-}.
common mode voltage	-20	–	25	V	
overvoltage protection	-27	–	27	V	Voltage in excess of these values can damage input.
ESD protection	–	16	–	kV	Human Body Model.
Input resistance					
between inputs	24	–	–	kΩ	Module powered on.
between inputs	24	–	–	kΩ	Module powered off.
between inputs	–	120	–	Ω	Module powered on and inputs terminated.
between inputs	–	120	–	Ω	Module powered off and inputs terminated.
each input to GND	12	–	–	kΩ	Module powered on.
each input to GND	12	–	–	kΩ	Module powered off.

Setting up the KAD/DEC/103

All module setup can be defined in XML using XidML® schemas (see http://www.xidml.org).

The following treeview provides an overview of setup configurations available for this module:

Treeview icons legend	
DAU: Data Acquisition Unit	Indicator: Indicates the firing of an event based on specific conditions
PC: Personal Computer	Parser slot: Area of memory reserved for storing parsed data
Instrument: Any component or module used in a data acquisition system	Snarfer: Captures all data transmitted on a bus and selectively stores it
DataLink: Connection for transmitting or receiving (defines both the data link and the physical layer)	Bridge: Electrical circuit usually used for measuring purposes
Package: Used to describe how data is transmitted or stored	PCMCIA card: Peripheral interface device usually for use in laptop computers
Parameter: Any register that can be read from an instrument	Multiplexer: Selects one of many input signals and outputs that signal on a signal line
Algorithm: Defines processing to be performed on data	Channels: Defines settings for input or output channels on an instrument
InterConnect: Represents a physical connection on an instrument	
PCI card: Circuit board that plugs into the PCI bus on a PC	



Setting up the module

The following table lists the setup configurations available for the KAD/DEC/103.

SETUP DATA	CHOICE	DEFAULT	NOTES
Manufacturer	-	-	-
Name	ACRA CONTROL	ACRA CONTROL	Name of manufacturer.
PartReference	KAD/DEC/103	KAD/DEC/103	ACRA CONTROL part number.
SerialNumber	-	-	Unique name for each module.
InterConnects Bus(1:0)	No character limit	Not Specified	IRIG 106 Chapter 4 PCM input.
Settings	-	-	-
Module-PCM-In-1.2	-	-	-
Bus Bus(1:0)	-	-	-
SyncWordMask	FFFFFFFF:00000000	Not Specified	-

Setting up parameters

Parameter definitions

The following table lists all parameters that are available for the KAD/DEC/103.

NAME/DESCRIPTION	BASE UNIT	DATA FORMAT	BITS	REGISTER DEFINITION
ReportA Status of decommutator channel A	Unitless	BitVector	16	R(15) Error received on the bus since last read. R(14) Sync word since last read. R(13)The bus is in lock. R[12:10] Reserved for future use. R[9:8] Error code. R(7) Stale, this frame has been read before. R(6) Skipped, one or more frames has been skipped. R(5) Empty, no frames have been received. R[4:0] Reserved for future use.
ReportB Status of decommutator channel B	Unitless	BitVector	16	R(15) Error received on the bus since last read. R(14) Sync word since last read. R(13)The bus is in lock. R[12:10] Reserved for future use. R[9:8] Error code. R(7) Stale, this frame has been read before. R(6) Skipped, one or more frames has been skipped. R(5) Empty, no frames have been received. R[4:0] Reserved for future use.
PackageData PCM frame data	-	-	16	R[15:0].

Setting up data links

A data link is a connection for transmitting and receiving data. It defines both the data link and physical layers of the link. The following are data links supported by the KAD/DEC/103.

Non-programmable data links

NAME	DESCRIPTION
Bus(1:0)	IRIG 106 Chapter 4 PCM data link

Setting up packages

A package is a logical description of how data is transmitted or stored.

PCM-PACKAGE

IRIG-106 Package containing acquisition data to be received.

SETUP DATA	CHOICE	DEFAULT	NOTES
ReferencedToAbsoluteTime	Yes No	Yes	-
PackageRate	-	-	-
DataLinkReference	No character limit	Not Specified	-
Properties	-	-	-
MajorFrameProperties	-	-	-
BitsPerMinorFrame	16384:48	48	16-bit words must be used when setting the maximum BitsPerMinorFrame to ensure buffer does not exceed 4096 words.
MinorFramesPerMajorFrame	1	1	-
DefaultDataBitsPerWord	16:4	16	-
DefaultMostSignificantBit	First Last	First	-
FillPattern	-		-
DefaultParity	None Odd Even	None	-
SynchronizationStrategy	-	-	-
SubframeSynchronizationStrategy	-	-	-
SFID	-	-	-
MinorFrameOffset_Bits	-	-	-
MinorFrameOffset_Words	-	-	-
StartValue	-	-	-
Increment	-	-	-
MostSignificantBit	-	-	-
Justification	-	-	-
SyncWord	-	-	-
Modulation	-	-	-
PCMCode	NRZ-L Bi-Phase-L	NRZ-L	-
DclkPhase	0 180	0	-
PCMPolarity	False True	True	-
Content	-	-	-
Parameter	-	-	-
NumberOfDataBits	-	-	-
MostSignificantBit	-	-	-

SETUP DATA	CHOICE	DEFAULT	NOTES
Location	-	-	-
MinorFrameNumber	1:1	Not Specified	-
Offset_Words	4095:3	3	-
Offset_Bits	-	-	-
Occurrences	-	-	-

NOTE: It is recommended that names are less than 20 characters, have no white space or contain any of the following five characters "/><\.

Getting the most from the KAD/DEC/103

Frame lock and loss

The number of necessary synchronization words to consider frame lock, and errors to cause a frame loss, is fixed, and therefore cannot be reprogrammed.

The KAD/DEC/103 is considered to be locked when two consecutive synchronization words are received correctly at the expected location and no other bit errors have been detected.

The KAD/DEC/103 immediately misses a frame after detecting a bit error (illegal bit), a parity error or a syncword error.

In summary, two synchronization words cause a frame lock and more than one bit error causes a frame loss.

Asynchronous mode

In asynchronous mode, if the data is read slightly faster (for example, 1% faster) than it is being received, data is never missed. However, it is sometimes repeated (1 in 100 frames in such cases). In asynchronous mode, to ensure PCM is in lock, check the Report/Status bits corresponding to The bus is in lock (bit 13) and the Sync word since last read (bit 14) making sure that both are set to logic 1. Any of these two bits set to zero implies possible loss of PCM lock. Additionally *stale, skip* and *empty* bits are relevant in asynchronous operation as the KAD/DEC/103 operates as a PCM bus monitor.

Frame structure

The KAD/DEC/103 is a minor-frame decoder only and therefore the default number of minor frames per major frame is one.

Error codes for the KAD/DEC/103

CODE	DESCRIPTION
0	Illegal BIØ-L bit[1]
1	Parity error
10	Sync word error
11	Reserved for future use

1. Available only in BIØ-L operation.

Synchronous operation: maximum inter-chassis bit rate

For synchronous operation in a distributed Acra KAM-500 chassis, the maximum inter-chassis bit-rate for the KAD/DEC/103 is 8Mbps, using NRZ-L PCM code.

Connector pinout of the KAD/DEC/103

PIN	NAME	SEE SPECIFICATIONS TABLE	COMMENT
1	DATA(0)+	RS-422 inputs	PCM data; first bus
2	DATA(0)-	RS-422 inputs	PCM data; first bus
3	DCLK(0)+	RS-422 inputs	PCM data clock; first bus
4	DCLK(0)-	RS-422 inputs	PCM data clock; first bus
5	DATA(1)+	RS-422 inputs	PCM data
6	DATA(1)-	RS-422 inputs	PCM data
7	DCLK(1)+	RS-422 inputs	PCM data clock
8	DCLK(1)-	RS-422 inputs	PCM data clock
9	DNC		Do not connect
10	DNC		Do not connect
11	GND	Internal ground	
12	GND	Internal ground	
13	DNC		Do not connect
14	DNC		Do not connect
15	DNC		Do not connect
16	DNC		Do not connect
17	DNC		Do not connect
18	DNC		Do not connect
19	DNC		Do not connect
20	DNC		Do not connect
21	DNC		Do not connect
22	DNC		Do not connect
23	DNC		Do not connect
24	DNC		Do not connect
25	DNC		Do not connect
26	DNC		Do not connect
27	DNC		Do not connect
28	DNC		Do not connect
29	DNC		Do not connect
30	DNC		Do not connect
31	DNC		Do not connect
32	DNC		Do not connect
33	DNC		Do not connect
34	DNC		Do not connect
35	DNC		Do not connect
36	DNC		Do not connect
37	DNC		Do not connect
38	DNC		Do not connect
39	DNC		Do not connect
40	DNC		Do not connect
41	DNC		Do not connect
42	DNC		Do not connect
43	DNC		Do not connect
44	DNC		Do not connect
45	DNC		Do not connect
46	DNC		Do not connect
47	DNC		Do not connect
48	DNC		Do not connect
49	DNC		Do not connect
50	DNC		Do not connect
51	GND	Internal ground	
52	CHASSIS	Chassis	Double-density connector only

Ordering information

PART NUMBER	DESCRIPTION
KAD/DEC/103	IRIG-106 PCM decoder/merger - 2ch (with 52-way double-density connector)
KAM/DEC/103	IRIG-106 PCM decoder/merger - 2ch (with 51-way micro-miniature connector)

By default, the standard mating connector, CON/KAD/002/CP, is included with each module in the shipment. Its part number will be added to the Confirmation of Order unless an alternative option is specified (see the *Cables* data sheet). In this data sheet, KAD/DEC/103 refers to both the KAD and KAM version of the module.

Revision history

REVISION	DIFFERENCES	STATUS
KAD/DEC/103	First release	Recommended for new programs

Supporting software

SOFTWARE	DETAILS
DAS Studio 3	User interface for setup and management of data acquisition, network switches, recorders and ground stations in an integrated environment
KSM-500	This module is supported by the KSM-500 suite of software tools

Related documentation

DOCUMENT	DETAILS
DOC/DBK/001	Acra KAM-500 Databook
DOC/HBK/002	Environmental Qualification Handbook
DOC/MAN/018	KSM-500 Databook
DOC/MAN/030	DAS Studio 3 User Manual
TEC/NOT/016	Power dissipation
TEC/NOT/049	Power estimation
TEC/NOT/066	Using the KAD/DEC/103