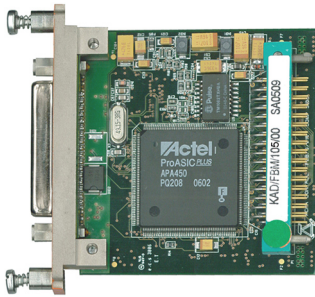


# KAD/FBM/105

Multi-rate FireWire bus monitor parser - 1ch



## Key Features

- Monitors an IEEE 1394b S100b, S200b, S400b bus
- Coherently parses traffic and tags
- Supports 511 (1k), 256 (2k) or 128 (4k) messages (including one catchall slot)
- Parser discards bus configuration, PHY packets and other asynchronous packets (except traffic with transaction code 0xA)
- Provides transaction counters and error detection

## Applications

- FireWire beta mode bus monitoring

## Overview

The KAD/FBM/105 acts as a leaf in the FireWire bus topology. To all other nodes on the bus, the link layer and transaction layer appear deactivated.

The KAD/FBM/105 parses isochronous or asynchronous stream packets; all other traffic (configuration traffic, PHY packets, and asynchronous transactions) is ignored. Selected packets and associated tag information are stored in triple buffered parser slots. The size of the parser buffer, and consequently the number of parser buffers, can be adapted to each application, depending on the rate and the maximum size of the data payload. If the maximum data payload is up to 1,024 bytes, 511 parser slots are available; if it is 2,048 bytes, 256 parser slots are available; and if it is 4,096 bytes, up to 128 parser slots are available.

FireWire packets are parsed in two stages. First, packets are filtered to accept only isochronous and asynchronous stream packets (traffic with transaction code 0xA). Then the isochronous packet header quadlet, and five quadlets of the FireWire packet data payload, are used to classify the packet and determine which of the parser slots the packet is written to. All packets, excluding STOF packets, must be at least 14 quadlets long, otherwise they are dropped. The minimum packet interval is 13  $\mu$ s. Packets including STOF packets with a packet interval smaller than 13  $\mu$ s may be dropped. (An STOF packet is 13 quadlets long and has a 0X00281FA0 header. The packet interval is the time interval between the first bit of each of two consecutive packets.)

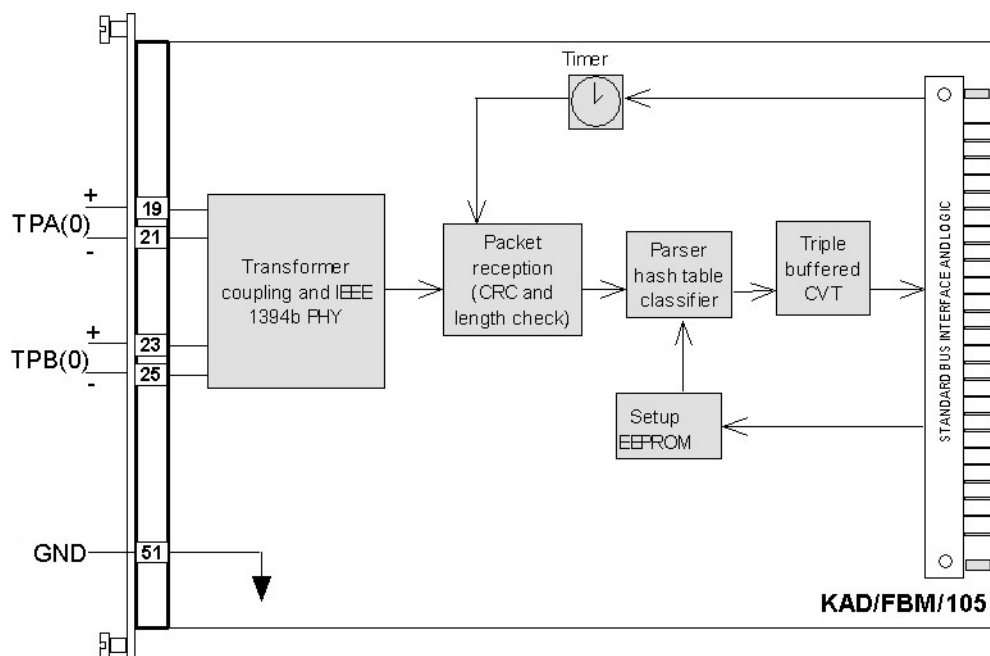


Figure 1: Parsing in the KAD/FBM/105

## 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						
	–	75	–	g		
	–	2.64	–	oz	Design metric is grams.	
Height above chassis					For recommended clearance requirements see the <i>CON/KAD/002/CP</i> data sheet.	
bare connector	–	–	11	mm		
bare connector	–	–	0.43	in.	Design metric is millimeters.	
Access rate	–	–	4	Mbps	Maximum combined access rate for read and write.	
Power consumption						
+5V	200	–	250	mA		
total power	1.00	–	1.25	W	Particular combinations of chassis and Acra KAM-500 modules may have power or current limitations. For details, see <i>TEC/NOT/016 - Power dissipation</i> , <i>TEC/NOT/049 - Power estimation</i> , and the relevant chassis data sheet.	
Environmental ratings					See <i>Environmental Qualification Handbook</i> .	
operating temperature	-40	–	85	°C	Chassis base/side plate temperature.	
storage temperature	-55	–	105	°C		

TABLE 2		FireWire bus interface				
PARAMETER	MIN.	TYP.	MAX.	UNITS	CONDITION/DETAILS	
Inputs	–	–	1	–	IEEE 1394b, S400b compatible.	
Voltage	200	–	800	mV	1394b differential input voltage.	
Data rate	100	–	400	Mbps	Auto-negotiate FireWire 100 Mbps, 200 Mbps and 400 Mbps.	

## Setting up the KAD/FBM/105

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

### Instrument settings

SETUP DATA	CHOICE	DEFAULT	NOTES
Manufacturer	-	-	-
Name	ACRA CONTROL	ACRA CONTROL	Name of manufacturer.
PartReference	KAD/FBM/105/B	KAD/FBM/105/B	The instrument part reference.
SerialNumber	AAA1234	AAA1234	Unique name for each module.
Settings	-	-	-
Parser Slot Number	128 slots (4k size) 256 slots (2k size) 511 slots (1k size)	511 slots (1k size)	Number of parser slots (including one catchall parser slot). 128 slots with 4KB buffer, 256 slots with 2KB buffer, 511 slots with 1KB buffer
Fill Value	0000 to FFFF	AAAA	Value used to fill empty parser slots.
Parser Err Message Enable	True False	False	Parsing of packets with errors enabled (packets with errors not dropped).
Processes	-	-	-
Parser(509:0)	-	-	Parser slots on the module.
Catchall-Parser	-	-	All data not classified for parsing is captured in this parser slot.
Channels	-	-	-
FireWire-In	-	-	-
FireWire-Bus Input	-	-	-

### Parameter definitions

NAME/DESCRIPTION	BASE UNIT	DATA FORMAT	BITS	REGISTER DEFINITION
Global Parameters				
Report Reports the status of the module.	BitVector	BitVector	16	R[15:0] R(15) FreshError - Indicates error occurred since last read. R[14:4] Reserved - Reserved for future use. R[3:0] Error code - Error code.
Status1394B IEEE 1394b port status.	BitVector	BitVector	16	R[15:0] R[15:11] Reserved - Reserved for future use. R(10) ShortPacketDropped - Short packet dropped. (Clears on read.) R[9:8] DataRate - Data Rate of last received package 00: 100Mbps 01: 200Mbps 10: 400Mbps 11: Reserved for future use. R[7:2] PHY_ID - FireWire PHY Identifier. R(1) Reserved - Reserved for future use. R(0) Link - Link connection status.
BusMessageCountOthers Transaction counter, counts all fully parsed packets that do not have STOF header. This counter can overflow.	BitVector	BitVector	16	R[15:0]

NAME/DESCRIPTION	BASE UNIT	DATA FORMAT	BITS	REGISTER DEFINITION
<b>BusMessageCountHdrDef</b> Transaction counter, counts all fully parsed packets with STOF header (0X00281FA0). This counter can overflow.	BitVector	BitVector	16	R[15:0]
<b>Message100ShortCount</b> Count of 100Mbps messages that are dropped as they are smaller than minimum packet size allowed for 100Mbps packages. This counter can overflow.	BitVector	BitVector	16	R[15:0]
<b>Message200ShortCount</b> Count of 200Mbps messages that are dropped as they are smaller than minimum packet size allowed for 200Mbps packages and are not STOF messages. This counter can overflow.	BitVector	BitVector	16	R[15:0]
<b>Message400ShortCount</b> Count of 400Mbps messages that are dropped as they are smaller than minimum packet size allowed for 400Mbps packages and are not STOF messages. This counter can overflow.	BitVector	BitVector	16	R[15:0]
Parser(509:0) Parameters				
<b>MessageCount</b> Received message count.	Count	OffsetBinary	16	R[15:0]
<b>MessageSize</b> The number of bytes in the message.	Count	OffsetBinary	16	R[15:0]
<b>MessageInfoBuffer</b> Information tag for this parsed transaction. This is a non-zero value.	BitVector	BitVector	16	R[15:0] R(15) Empty - 1 indicates that there is no message stored. R(14) Stale - 1 indicates this message was read before. R(13) Skipped - 1 indicates this message overwrote another. R[12:0] Reserved - Reserved for future use.

NAME/DESCRIPTION	BASE UNIT	DATA FORMAT	BITS	REGISTER DEFINITION
MessageInfoPacket Information tag for this parsed transaction.	BitVector	BitVector	16	R[15:0] R(15) ErrorInMessage - 1 indicates that there is an error associated with this message, R(14) BusMessageCount - 1 indicates that BusMessageCountHdrDef was used. R[13:4] Reserved - Reserved for future use. R(3) HdrCrcError - 1 indicates CRC error in header of this message was detected. R(2) PayloadCrcError - 1 indicates CRC error in payload of this message was detected. R(1) LengthMismatch - 1 indicates length mismatch. The length defined in the header does not match the actual received amount of data. R(0) Message2Big - 1 indicates that message is too big. A message was received that exceeds the maximum payload defined.
MessageIrigTime48 48-bit wide IRIG time word.	BitVector	BitVector	48	R[47:0]
MessageTimeHi Hours and minutes time midway through first transmitted bit.	BitVector	BitVector	16	R[47:32] R[15:13] Reserved - Reserved for future use. R[12:7] Hours - BCD Hours 0 to 23. R[6:0] Minutes - BCD Minutes 0 to 59.
MessageTimeLo Seconds and centiseconds time midway through first transmitted bit.	BitVector	BitVector	16	R[31:16] R(15) Reserved - Reserved for future use. R[14:8] Seconds - BCD Seconds 0 to 59. R[7:0] Centiseconds - BCD Centiseconds 0 to 99.
MessageTimeMicro Microsecond time midway through first transmitted bit.	Second	BCD	16	R[15:0] R[15:0] Microseconds - BCD Microseconds 0 to 9999.
Catchall-Parser Parameters				
MessageCount Received message count.	Count	OffsetBinary	16	R[15:0]
MessageSize The number of bytes in the message.	Count	OffsetBinary	16	R[15:0]
MessageData(2053:0) Message Data. Buffer size is 1k (511 parser slots), 2k (256 parser slots) or 4k (128 parser slots)	BitVector	BitVector	16	R[15:0]
MessageInfoBuffer Information tag for this parsed transaction. This is a non-zero value.	BitVector	BitVector	16	R[15:0] R(15) Empty - 1 indicates that there is no message stored. R(14) Stale - 1 indicates this message was read before. R(13) Skipped - 1 indicates this message overwrote another. R[12:0] Reserved - Reserved for future use.

NAME/DESCRIPTION	BASE UNIT	DATA FORMAT	BITS	REGISTER DEFINITION
MessageInfoPacket Information tag for this parsed transaction.	BitVector	BitVector	16	R[15:0] R(15) ErrorInMessage - 1 indicates that there is an error associated with this message. R(14) BusMessageCount - 1 indicates that BusMessageCountHdrDef was used. R[13:4] Reserved - Reserved for future use. R(3) HdrCrcError - 1 indicates CRC error in header of this message was detected. R(2) PayloadCrcError - 1 indicates CRC error in payload of this message was detected. R(1) LengthMismatch - 1 indicates length mismatch. The length defined in the header does not match the actual received amount of data. R(0) Message2Big - 1 indicates that message is too big. A message was received that exceeds the maximum payload defined.
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MessageTimeMicro Microsecond time midway through first transmitted bit.	Second	BCD	16	R[15:0] R[15:0] Microseconds - BCD Microseconds 0 to 9999.

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

## Getting the most from the KAD/FBM/105

### Error codes for the KAD/FBM/105

Code <sup>1</sup>	DESCRIPTION
0 <sub>16</sub>	Reserved for future use.
1 <sub>16</sub>	Cyclical Redundancy Checking (CRC) error in header was detected.
2 <sub>16</sub>	Reserved for future use.
3 <sub>16</sub>	CRC error in payload was detected.
4 <sub>16</sub>	Length mismatch. The length defined in the header does not match the actual received amount of data.
5 <sub>16</sub> -7 <sub>16</sub>	Reserved for future use.
8 <sub>16</sub>	Packet too big. Received packet exceeds the maximum payload allowed for its data rate or exceeds selected buffer size. <sup>2</sup>
9 <sub>16</sub> -D <sub>16</sub>	Reserved for future use.
E <sub>16</sub>	Reserved for future use.
F <sub>16</sub>	Default value after power-on.

1. Error codes are in hexadecimal.
2. Buffer size is determined by the Parser Slot Number setting (see “Instrument settings” on page 3).

### Shielded Twisted Pair (STP) cable length

The maximum length of the STP cable is 15 meters for S100b, S200b, and S400b.

### Triple buffering

Triple buffering supports concurrent access to the packet being read, the packet being received, and an interim packet. The transaction information word (MessageInfo) associated with each packet is used to indicate whether the packet is stale (buffer has been read before) or skipped (buffer has been overwritten).

### Packet classification

Isochronous and asynchronous stream packets can be stored in one of the parser slots or dropped (not stored). The decision on which parser slot to store the packet or the decision to drop a packet is based on information from each packet, that is, information in the isochronous packet header quadlet (quadlet 0, which includes, for example, the channel ID) and five quadlets of the FireWire packet data payload (Quadlets 2, 4, 10, 11, and 13 of the Firewire package). DAS Studio 3 names Quadlet 0 as Quadlet A, Quadlet 2 as Quadlet B, Quadlet 4 as Quadlet C, Quadlet 10 as Quadlet D, Quadlet 11 as Quadlet E, and Quadlet 13 as Quadlet F. An explicit data value or a special wildcard value can be specified for each of these fields.

Up to 510 rules can be specified. A rule is defined by a combination of the packet header quadlet, the five quadlets of the FireWire packet data payload and the wildcard mask. Rules can allow for multiple packets to be stored in a single parser slot. Rules may overlap. The compiler sorts and processes rules in a deterministic order.

Data length	Tag	Channel	TCode:0xA	SY	<b>Header Quadlet</b>
Header CRC					Header CRC Quadlet
					<b>Quadlet 2</b>
					Quadlet 3
					<b>Quadlet 4</b>
					Quadlet 5
					Quadlet 6
					Quadlet 7
					Quadlet 8
					Quadlet 9
Payload					<b>Quadlet 10</b>
					<b>Quadlet 11</b>
					Quadlet 12
					<b>Quadlet 13</b>
					Quadlet 14
					Quadlet 15
					....
					....
					....
Zero pad bytes if necessary					....
Data CRC					Data CRC

Figure 2: Six quadlets of the FireWire packet which the module parses



## Connector pinout of the KAD/FBM/105

PIN	NAME	SEE SPECIFICATIONS TABLE	COMMENT
1	DNC		Do not connect
2	DNC		Do not connect
3	DNC		Do not connect
4	DNC		Do not connect
5	DNC		Do not connect
6	DNC		Do not connect
7	DNC		Do not connect
8	DNC		Do not connect
9	DNC		Do not connect
10	DNC		Do not connect
11	DNC		Do not connect
12	DNC		Do not connect
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	TPA+	FireWire bus interface	Receive Data+ (IEEE convention uses TPA)
20	DNC		Do not connect
21	TPA-	FireWire bus interface	Receive Data- (IEEE convention uses TPA*)
22	DNC		Do not connect
23	TPB+	FireWire bus interface	Transmit Data+ (IEEE convention uses TPB)
24	DNC		Do not connect
25	TPB-	FireWire bus interface	Transmit Data- (IEEE convention uses TPB*)
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	

## Ordering information

PART NUMBER	DESCRIPTION
KAD/FBM/105/B	Multi-rate FireWire bus monitor parser - 1ch (with 52-way double-density connector)
KAM/FBM/105/B	Multi-rate FireWire bus monitor parser - 1ch (with 51-way micro-miniature connector)

By default, the standard mating connector, (CON/KAD/002/CP for KAD modules; or ACC/CON/008/04 for KAM modules), 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/FBM/105 refers to both the KAD and KAM version of the module.

## Revision history

REVISION	DIFFERENCES	STATUS
KAD/FBM/105/B	Added support for IEEE 1394b S200b, S400b bus; supports 511 (1k), 256 (2k) or 128 (4k) messages	Recommended for new programs
KAD/FBM/105	First release	Not 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/MAN/018	KSM-500 Databook
DOC/HBK/002	Environmental Qualification Handbook
DOC/MAN/030	DAS Studio 3 User Manual
TEC/NOT/016	Power dissipation
TEC/NOT/049	Power estimation