

KAD/EBM/104

GE Aviation ARINC-664P7 bus monitor parser



Overview

The KAD/EBM/104 receives ARINC-664P7 traffic on a dual redundant interface; redundant messages are removed before the stream is sent to a classifier, which it then splits into two groups: parametric messages containing known placed data, which are parsed and made available across the Acra KAM-500 backplane, and non parametric messages containing ARINC-429 words where their content and placement is unknown, requiring further parsing before they are made available.

Key Features

- Monitors a dual redundant ARINC-664P7 compatible interface with redundancy removal
- Supports 512 virtual links
- Coherently parsers 256 different flows for parametric ARINC-664P7
- Coherently parsers 8192 different flows for ARINC 429 over ARINC-664P7
- Two 100BaseTX Ethernet interfaces streaming non redundant traffic to network recorders

All parser slots are triple buffered; there are 256 parser slots for parametric messages and 8192 slots for ARINC 429 words/messages.

The KAD/EBM/104 has two additional 100BaseT (relay) ports that forward a mirror copy of all frames received after redundancy removal for transmission to packet recorders.

Fragmentation of ARINC-664P7 messages is not fully supported by the parser; the parser captures the first fragment only, while discarding the remaining fragments. The relay output forwards all fragmented messages.

Applications

- Monitoring of messages transmitted over GE Aviation ARINC-664P7 bus and streaming to networked recorder

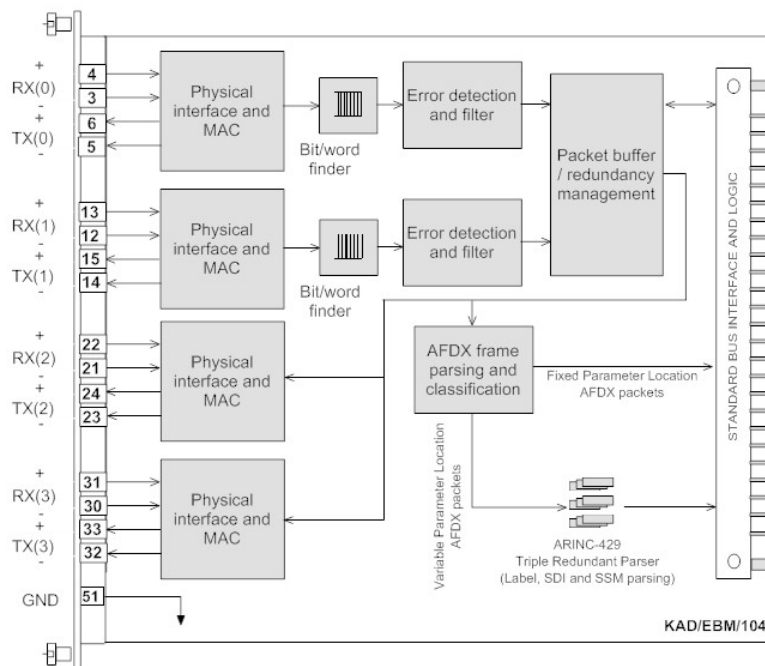


Figure 1: Inputs and outputs of the KAD/EBM/104 parser module

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						
	–	90	–	g		
	–	3.17	–	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	–	–	2	Msp/s	Maximum combined access rate for read and write.	
Power consumption						
+5V	360	–	440	mA		
±7V	0	–	0	mA		
±12V	0	–	0	mA		
total power	1800	–	2200	mW	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		ARINC-664P7				
PARAMETER	MIN.	TYP.	MAX.	UNITS	CONDITION/DETAILS	
Inputs/outputs	–	–	2	–	IEEE 802.3 compatible.	

TABLE 3		Ethernet interface				
PARAMETER	MIN.	TYP.	MAX.	UNITS	CONDITION/DETAILS	
Inputs/outputs	–	–	4	–	IEEE 802.3 compatible.	

Setting up the KAD/EBM/104

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/EBM/104	KAD/EBM/104	The instrument part reference.
SerialNumber	FA1234	FA1234	Unique name for each module.
Settings	-	-	-
Fill Value	0000 to FFFF	AAAA	Specifies the value that should be stored when the bus monitor is not receiving data.
Settings Importer Settings	-	-	-
ICD CSV File	UTF-8 String		Location and filename of a CSV file containing ICD (Interface Control Document) description of bus.
Receiving LRU	HF_FTI_AFT HF_FTI_FWD HF_FTI_L HF_FTI_R None	None	
Channels	-	-	-
ARINC_664_Part_7 ARINC 664 Part 7 Input	-	-	-
Processes	-	-	-
Parser(254:0)	-	-	ARINC-664P7 parser slots for parametric messages.
Catchall-Parser	-	-	All ARINC-664P7 parametric data not classified for parsing is captured in this parser slot.
Embedded_ARINC_429 ARINC 429 over ARINC 664 Part 7 Input	-	-	-
Processes	-	-	-
Parser(8190:0)	-	-	ARINC 429 over ARINC-664P7 parser slots.
Catchall-Parser	-	-	All ARINC 429 not classified for parsing is captured in this parser slot.
Ethernet-Out(1:0) Ethernet Output	-	-	Outputs a copy of all packets received on ARINC-664P7 In link.

Parameter definitions

NAME/DESCRIPTION	BASE UNIT	DATA FORMAT	BITS	REGISTER DEFINITION
Global Parameters				
Report Reports the status of the module; the MSB indicates that a new error has occurred since last read. All other bits are persistent and once set to 1 remain set until the module is reset by cycling the power or a new error occurs.	BitVector	BitVector	16	<p>R[15:0]</p> <p>R(15) ErrorSinceLastRead - 1 indicates error occurred since last read.</p> <p>R(14) Reserved</p> <p>R(13) Non-Parametric Message size too big - 1 indicates that a non-parametric message containing ARINC 429 traffic was received with a size greater than 128. This may be due to misconfigured MIW/EDE setting. This bit is persistent and will cause Report(15) to be set to 1.</p> <p>R(12) Non-Parametric Message size zero - 1 indicates that a non-parametric message containing ARINC 429 traffic was received with a size of zero messages. This may be due to misconfigured MIW/EDE setting, or it could be normal behaviour where the end system is sending a frame with no ARINC 429 messages but making use of allocated bandwidth. Treat this as a warning; it will not cause Report(15) to be set to 1.</p> <p>R(11) Network B Sequence Number Error - The ARINC-664P7 Sequence number was different from the expected value; this bit is persistent and will cause Report(15) to be set to 1.</p> <p>R(10) Network B Ethernet Frame Bad CRC - 1 indicates that the CRC on network B failed, this bit is persistent and will cause Report(15) to be set to 1</p> <p>R(9) Network B Bad Bit - 1 indicates that a bad bit occurred on network B, this bit is persistent and will cause Report(15) to be set to 1</p> <p>R(8) Network B Link Inactive - 1 indicates that the link on network B is not active, this bit is driven by the phys activity bit and will not cause Report(15) to be set to 1</p> <p>R[7:4] Reserved</p> <p>R(3) Network A Sequence Number Error - The ARINC-664P7 Sequence number was different from expected value, this bit is persistent and will cause Report(15) to be set to 1</p> <p>R(2) Network A Ethernet Frame Bad CRC - 1 indicates that the CRC on network A failed; this bit is persistent and will cause Report(15) to be set to 1.</p> <p>R(1) Network A Bad Bit - 1 indicates that a bad bit occurred on network A; this bit is persistent and will cause Report(15) to be set to 1.</p> <p>R(0) Network A Link Inactive - 1 indicates that the link on network A is not active.</p>

NAME/DESCRIPTION	BASE UNIT	DATA FORMAT	BITS	REGISTER DEFINITION
RxValidCount(1:0) Number of packets received before redundancy removal block.	BitVector	BitVector	16	R[15:0]
RxErrorCount(1:0) Count of errors on ARINC-664P7 channel before redundancy removal block.	BitVector	BitVector	16	R[15:0]
RxDiscardCount(1:0) Number of packets removed by redundancy removal block.	BitVector	BitVector	16	R[15:0]
RxIcFailCount(1:0) Number of packets which failed integrity check and were dropped.	BitVector	BitVector	16	R[15:0]
TxRelayCount Number of ARINC-664P7 packets transmitted on the relay ports.	BitVector	BitVector	16	R[15:0]
Parser(254:0) Parameters				
A664P7MessageCount Received frame count in the parser slot.	Count	OffsetBinary	16	R[15:0]
A664P7MessageSize Received frame size in bytes.	Unitless	OffsetBinary	16	R[15:0]
A664P7MessageIrigTime48 48-bit wide IRIG time word.	BitVector	BitVector	48	R[47:0]
A664P7MessageTimeHi Hours and minutes at the start of first received 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
A664P7MessageTimeLo Seconds and centiseconds at the start of first received bit.	Second	BCD	16	R[31:16] R(15) Reserved - Reserved for future use R[14:8] Seconds - Seconds 0 to 59 R[7:0] Centiseconds - Centiseconds 0 to 99
A664P7MessageTimeMicro Microseconds at the start of first received bit.	Second	BCD	16	R[15:0] R[15:0] Microseconds - Microseconds 0 to 9999
A664P7MessageInfo Information about parsed message.	BitVector	BitVector	16	R[15:0] R(15) Empty 1: This parser slot has not been written to yet. R(14) Stale 1: The message in this parser slot has been read before. R(13) Skipped 1: The message in this parser slot overwrote another message that had not been read. R[12:0] Reserved
Catchall-Parser Parameters				
A664P7MessageCount Received frame count in the parser slot.	Count	OffsetBinary	16	R[15:0]

NAME/DESCRIPTION	BASE UNIT	DATA FORMAT	BITS	REGISTER DEFINITION
A664P7MessageSize Received frame size in bytes.	Unitless	OffsetBinary	16	R[15:0]
A664P7MessageIrigTime48 48-bit wide IRIG time word	BitVector	BitVector	48	R[47:0]
A664P7MessageTimeHi Hours and minutes at the start of first received 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
A664P7MessageTimeLo Seconds and centiseconds at the start of first received bit.	Second	BCD	16	R[31:16] R(15) Reserved - Reserved for future use R[14:8] Seconds - Seconds 0 to 59 R[7:0] Centiseconds - Centiseconds 0 to 99
A664P7MessageTimeMicro Microseconds at the start of first received bit.	Second	BCD	16	R[15:0] R[15:0] Microseconds - Microseconds 0 to 9999
A664P7MessageData(757:0) Data captured from Ethernet frames.	BitVector	BitVector	16	R[15:0]
A664P7MessageInfo Information about parsed message.	BitVector	BitVector	16	R[15:0] R(15) Empty 1: This parser slot has not been written to yet. R(14) Stale 1: The message in this parser slot has been read before. R(13) Skipped 1: The message in this parser slot overwrote another message that had not been read. R[12:0] Reserved
Parser(8190:0) Parameters				
A429MessageIrigTime48 48-bit wide IRIG time word.	BitVector	BitVector	48	R[47:0]
A429MessageTimeHi Hours and minutes of the last bit in the message	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
A429MessageTimeLo Seconds and centiseconds of the last bit in the message.	Second	BCD	16	R[31:16] R(15) Reserved - Reserved for future use R[14:8] Seconds - Seconds 0 to 59 R[7:0] Centiseconds - Centiseconds 0 to 99
A429MessageTimeMicro Microseconds of the last bit in the message.	Second	BCD	16	R[15:0] R[15:0] Microseconds - Microseconds 0 to 9999
A429MessageCount A copy of the number of the ARINC 664P7 received frame count which contained the ARINC 429 messages.	Count	OffsetBinary	16	R[15:0]

NAME/DESCRIPTION	BASE UNIT	DATA FORMAT	BITS	REGISTER DEFINITION
A429MessageInfo Information about parsed message.	BitVector	BitVector	16	R[15:0] R(15) Empty 1: This parser slot has not been written to yet. R(14) Stale 1: The message in this parser slot has been read before. R(13) Skipped 1: The message in this parser slot overwrote another message that had not been read. R[12:0] Reserved
Catchall-Parser Parameters				
A429MessageIrigTime48 48-bit wide IRIG time word.	BitVector	BitVector	48	R[47:0]
A429MessageTimeHi 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.
A429MessageTimeLo 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.
A429MessageTimeMicro Microsecond time midway through first transmitted bit.	Second	BCD	16	R[15:0] R[15:0] Microseconds - BCD Microseconds 0 to 9999.
A429MessageCount A copy of number of the ARINC 664P7 received frame count which contained the ARINC 429 messages.	Count	OffsetBinary	16	R[15:0]
A429MessageData The ARINC 429 data as it was received, Parity, SSM, Data, SDI and Label	BitVector	BitVector	32	R[31:0] R(31) Parity - The parity bit received. R[30:29] SSM - SSM(1:0): Sign/Status Matrix. R[28:10] Data - Data(18:0) : ARINC 429 Data field. R[9:8] SDI - SDI(1:0) Source Destination Identifier. R[7:0] Label - Label(0:7) : The ARINC 429 Label in the order it was received.
A429MessageInfo Information about parsed message.	BitVector	BitVector	16	R[15:0] R(15) Empty 1: This parser slot has not been written to yet. R(14) Stale 1: The message in this parser slot has been read before. R(13) Skipped 1: The message in this parser slot overwrote another message that had not been read. R[12:0] Reserved

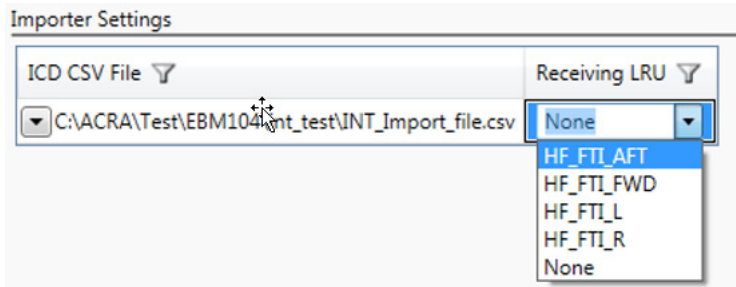
NOTE: It is recommended that names are less than 20 characters, have no white space or contain any of the following five characters "><\.

Getting the most from the KAD/EBM/104

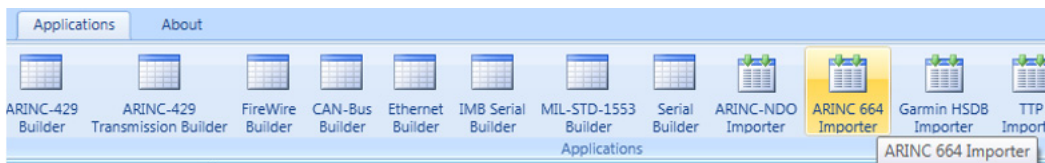
Importing ARINC-664P7 message definitions into DAS Studio 3

For this example, four KAD/EBM/104 modules are used. Each KAD/EBM/104 is configured to parse ARINC-664P7 traffic from one of four ARINC-664P7 busses. The message definitions for each bus are contained in a CSV file provided by the user.

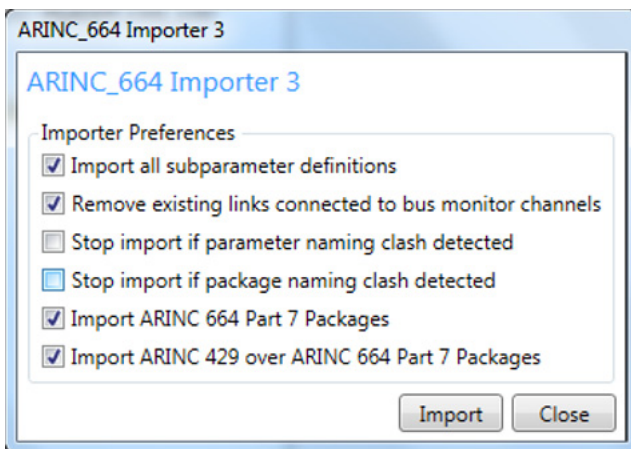
1. On the KAD/EBM/104 **Settings** tab, go to **Importer Settings**.
2. Click the **ICD CSV File** drop-down arrow and then browse to the CSV file to import.



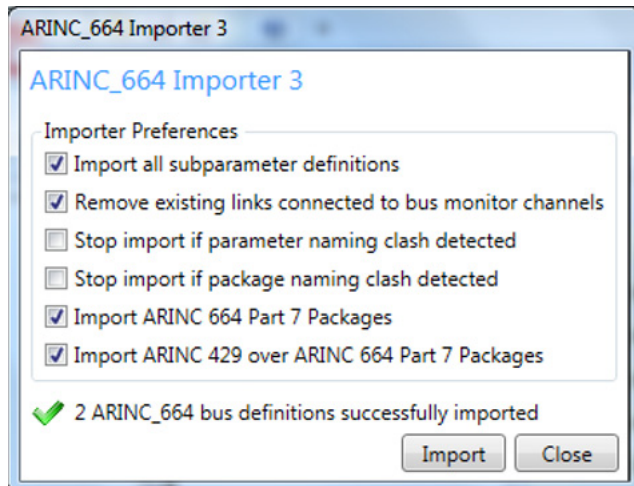
3. In the **Receiving LRU** field, select which bus from the ICD file this module must parse.
4. Repeat the above steps to set up each KAD/EBM/104 module in the task file.
5. On the **Applications** menu click **ARINC 664 Importer**.



The **ARINC 664 Importer 3** dialog box opens. It is recommended to use the default settings as shown.



6. Clicks **Import**.
After import, the following dialog box opens.



The message definitions imported for both **A664 Parametric** and **A664 A429** block message can be seen on the **Packages** tab in DAS Studio 3.

Instrument Name	Channel Name	Bit Rate	Connection Name	Connected Instrument	Connected Channel	Package Count
MyKAD_EBM_104	ARINC_664_Part_7(0)	n/a	Link_ARINC_664			91
MyKAD_EBM_104	Embedded_ARINC_429(1)	n/a	Link_ARINC_429			22

Name	Virtual Link	UDP Destination Port	EDE Enable	Transmission Interval Minimum
32802_63351_A664_04_ATA21AMS_Msg	32802	63351	True	40
32804_61601_po429_01_Msg_320_S_4	32804	61601	True	80

The parameters from these message definitions can now be placed in PCM or Ethernet as required.

Fragmentation

When a UDP message is fragmented over several IP packets, the UDP port numbers are contained in the first fragment only. As the destination port number is used to assign a parser ID, only the first fragment can be parsed, and only parameters within that fragment are available over the backplane. You must ensure that the way in which packets are fragmented does not change if data from a first fragment is to be captured, otherwise you may get unexpected results.

Closed network

ARINC-664P7 is intended for operation in a closed network; the KAD/EBM/104 is not intended to be used on an open network such as a Windows or a Linux domain. If a KAD/EBM/104 is used on an open network for commissioning or test purposes, then network management traffic will be sent. Some of this traffic will pass the ARINC-664P7 integrity check and redundancy management rules and then be transmitted by the relay ports. However, not all network management traffic will pass these rules and will instead be dropped from the system.

Power-on error report

The error output bits from the Ethernet PHY IC are brought into the modules report word. Occasionally, at power-on the PHY indicates an error before the interface is live. By monitoring the fresh error bit in the report word these errors can be filtered out.

Connector pinout of the KAD/EBM/104

PIN	NAME	SEE SPECIFICATIONS TABLE	COMMENT
1	DNC		Do not connect
2	DNC		Do not connect
3	RX(0)-	ARINC-664P7	Connect to ARINC 664 network A
4	RX(0)+	ARINC-664P7	Connect to ARINC 664 network A
5	TX(0)-	ARINC-664P7	Connect to ARINC 664 network A
6	TX(0)+	ARINC-664P7	Connect to ARINC 664 network A
7	DNC		Do not connect
8	DNC		Do not connect
9	CHASSIS	Chassis	
10	DNC		Do not connect
11	DNC		Do not connect
12	RX(1)-	ARINC-664P7	Connect to ARINC 664 network B
13	RX(1)+	ARINC-664P7	Connect to ARINC 664 network B
14	TX(1)-	ARINC-664P7	Connect to ARINC 664 network B
15	TX(1)+	ARINC-664P7	Connect to ARINC 664 network B
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	RX(2)-	Ethernet interface	Mirror output Ethernet connection
22	RX(2)+	Ethernet interface	Mirror output Ethernet connection
23	TX(2)-	Ethernet interface	Mirror output Ethernet connection
24	TX(2)+	Ethernet interface	Mirror output Ethernet connection
25	DNC		Do not connect
26	DNC		Do not connect
27	CHASSIS	Chassis	
28	DNC		Do not connect
29	DNC		Do not connect
30	RX(3)-	Ethernet interface	Mirror output Ethernet connection
31	RX(3)+	Ethernet interface	Mirror output Ethernet connection
32	TX(3)-	Ethernet interface	Mirror output Ethernet connection
33	TX(3)+	Ethernet interface	Mirror output Ethernet connection
34	DNC		Do not connect
35	DNC		Do not connect
36	CHASSIS	Chassis	
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	CHASSIS	Chassis	
51	GND	Internal ground	
52	CHASSIS	Chassis	

Ordering information

PART NUMBER	DESCRIPTION
KAD/EBM/104	GE Aviation ARINC-664P7 bus monitor parser

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).

Revision history

REVISION	DIFFERENCES	STATUS
KAD/EBM/104	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

Related documentation

DOCUMENT	DETAILS
DOC/DBK/001	Acra KAM-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

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