



Open Flash Module Electrical - Mechanical Specification

**Revision: 1.01
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Summary

This document describes the electrical and mechanical specification DIMM style solid state modules.

Form Factor Attributes

Signaling Interface	SATA: SATA-II 3Gb/sec SAS: SAS 1.1
Command Protocol	SATA : SATA-IO 2.6 SAS: SCSI Block Protocol
Voltage	3.3v \pm 10%
Power Consumption	3.5W Maximum
Backup Power Requirement	SATA: 2W / 2 Seconds SAS: 3.5W / 5 seconds
Out of Band Management	Serial GPIO Bus
Operating Temperature	0°C - 70°C

Pin Definition

Pin Name	I/O	Description
Vss	I	Ground to device
Vcc	I	Power Supply for Module
SATA_RX+	I	SATA Receive / SAS Receive Primary
SATA_RX-	I	SATA Receive / SAS Receive Primary
SATA_TX+	O	SATA Transmit / SAS Transmit Primary
SATA_TX-	O	SATA Transmit / SAS Transmit Primary
RS+	I	SAS Receive Secondary
RS-	I	SAS Receive Secondary
TS-	O	SAS Transmit Secondary
TS+	O	SAS Transmit Secondary
SClock	I	SGPIO Clock Signal
SLoad	I	SGPIO Last clock of bit stream
SDataOut	I	SGPIO Serial data output bit stream
SDataIn	O	SGPIO Serial data input bit stream
Coherent	O	Coherency Pin
Backup	I	Backup Power Supply Pin
Ready	O	Device Ready
LED-Cathode	I	External DIMM Fault LED Cathode
LED-Anode	I	External DIMM Fault LED Anode
Detect	I/O	DIMM Detect
RSVD	-	Reserved for Future Use
VI - DNC	-	Vendor Unique / Manufacturing - Do Not Connect These pins are used for Module manufacturing and test pins and shall not be connected on production hosts
DNC	-	Do Not Connect

Pin Descriptions

SATA/SAS

The module form factors support both SATA and SAS host interconnect. SATA devices shall conform to the SATA 2.6 signaling specification with both Gen2i and Gen2m signaling modes. SAS device shall conform to the SAS 1.1 signaling specification.

SGPIO

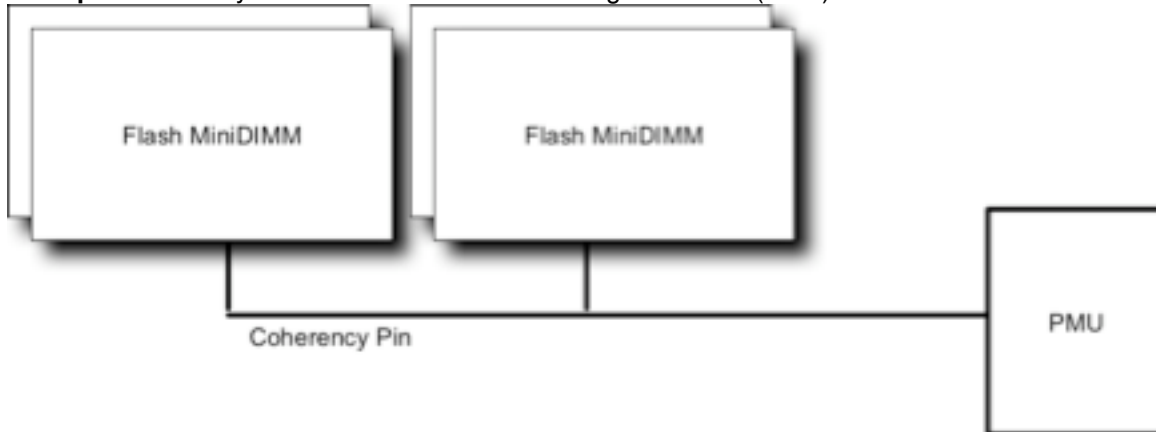
Serial GPIO (SGPIO) is a common interface used for simple device management in SAS backplanes. The basic functions include LED controller, device detection and fault reporting. This interface conforms to the SFF-8485 specification and is optional.

Coherency Pin

The purpose of the coherency pin is to provide notification to the host of when the module may be powered down without data-loss. The Coherency Pin will be an open-drain output and will be de-asserted when the module is performing write operations to the non-volatile media or when there is data stored in volatile cache memory that needs to be flushed to the media. The pin shall only be asserted during a power shutdown or emergency power event. Systems with multiple modules should connect all the coherency pins together and be connected to either host or Power Management Unit(PMU) to insure all devices are coherent before turning off power to the module.

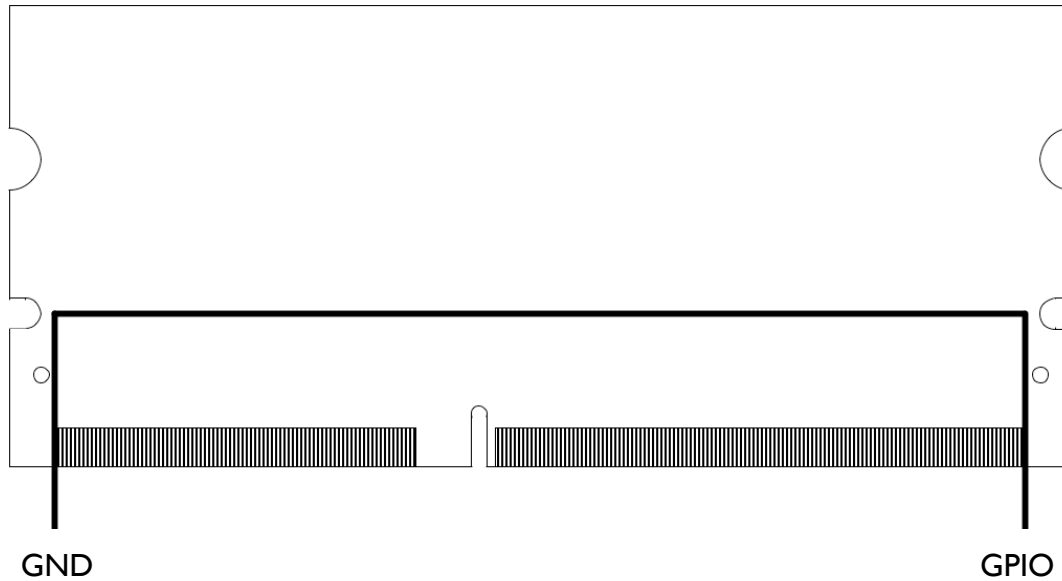
Value	Description
0	Device contains data in volatile memory or is in the process of writing data to non-volatile media. Power should not be disconnected
1	Device has completed writing all data to Non-volatile media

Example Coherency Pin connected to Power Management Unit (PMU)



Module Detection Pin

The Module Detection pins are used to notify the host when a device has been inserted into the system at power on. The pin uses continuity between Vcc or GND and a GPIO on a system management unit.



Back-up Power Pin

The Back-up Power pin enables the module to better understand the power system of the host. In systems where a fault tolerant back up power system is deployed, the Module will control it's own internal caching policy and shall ignore host in-band commands for controlling cache policy for better performance. This pin is an input on the module. For those systems that do not support a backup power system, this pin shall be connect to ground. Backup Power system must meet the backup power requirements outlined in this specification in order claim backup system is present.

For systems that support a backup power system, the pin shall also be used to notify the status of the backup power system. This shall cover two notifications to the module. The first case is when the backup power system is no longer functioning due to failure or some other reason. The second is when the main system power has failed and the module is functioning off the backup power system. In either case, the DIMM shall immediately flush all volatile data to the non-volatile media and use the caching policy sent to the device by the host.

Initial Power On

Value	Description
0	Device no backup power system. Device will conform to host caching policies.
1	Device has backup power system. Device will manage it's own caching policy and ignore host-level caching control

Transition	Description
1 _ 0	Device backup power system failure has occurred. The Device shall immediately flush volatile cache and then conform to host caching policies.
0 _ 1	Device backup power system is back in operation. The Device will revert to previous caching policy before the failure

Fault LED

The Fault LED is a feature on the module is used for notification of the location of a faulty device in the system. This LED is externally driven by the host system and can be done without power to the module.

Attribute	Value
Part Number	Kingbright APA1606SYCK
LED Type	Right Angle SMT
LED Size	EIA 0603 - 1.6mm x 0.6mm
LED Thickness	1.2mm
LED Wavelength	595nm Amber
Forward Voltage	2V
Reverse Current	10uA

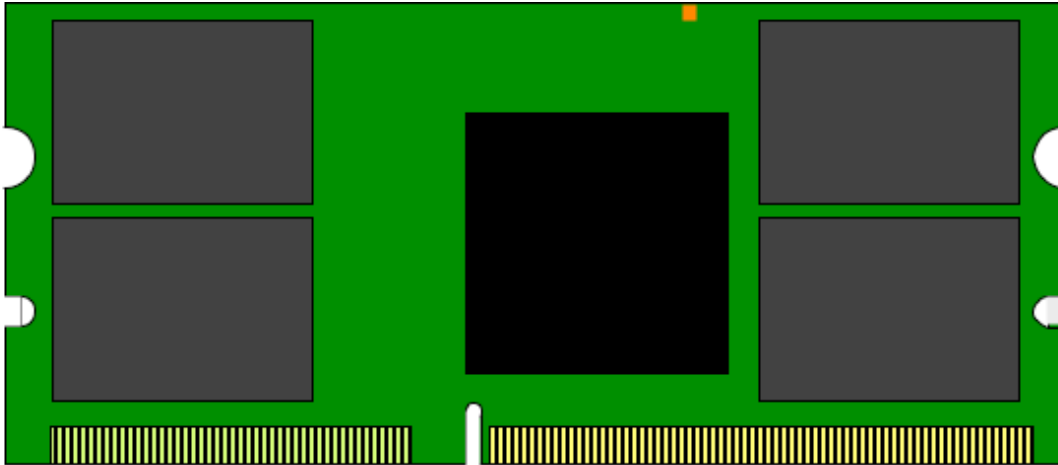
Ready Pin

The Ready Pin designates the activity status from host driven commands one the module. It is uses Vcc GPIO and shall require external logic to drive an LED or other user level notification.

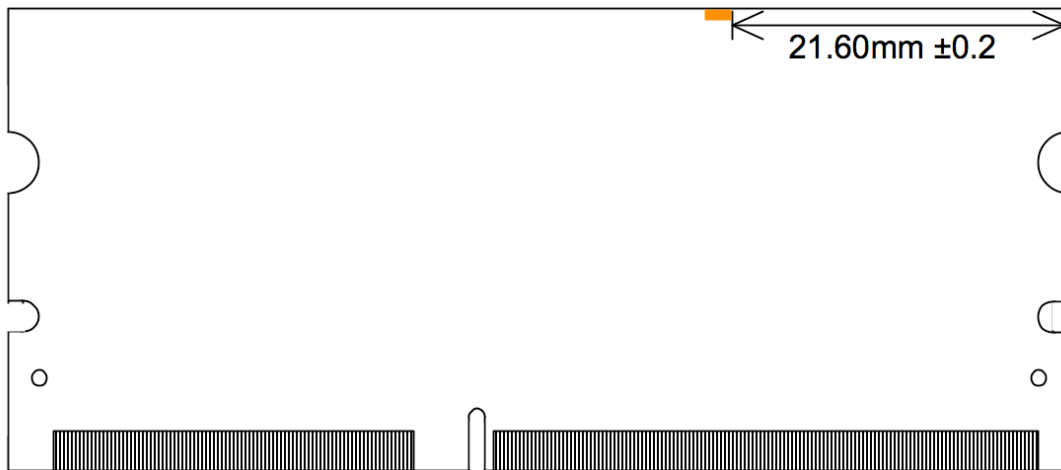
Value	Description
0	Device is active with Host I/O
1	Device is not processing host driven I/O

DIMM Style Form Factor

This device utilizes the JEDEC MO258-A form factor, 200-pin MiniDIMM. The Sun Flash Module will use the 2.5V key position definition.



Example: DIMM placement



Fault LED Location

DIMM Style Pinout

Pin	Front Description	Pin	Back - Description
1	Detect 0	101	DNC
2	DNC	102	DNC
3	DNC	103	DNC
4	DNC	104	DNC
5	DNC	105	DNC
6	DNC	106	DNC
7	DNC	107	DNC
8	DNC	108	DNC
9	DNC	109	DNC
10	DNC	110	DNC
11	DNC	111	DNC
12	DNC	112	DNC
13	DNC	113	DNC
14	DNC	114	DNC
15	DNC	115	DNC
16	DNC	116	DNC
17	DNC	117	DNC
18	DNC	118	DNC
19	DNC	119	DNC
20	DNC	120	DNC
21	DNC	121	DNC
22	DNC	122	DNC
23	DNC	123	DNC
24	DNC	124	DNC
25	DNC	125	DNC
26	DNC	126	DNC
27	DNC	127	DNC
28	DNC	128	DNC
29	DNC	129	DNC
30	DNC	130	DNC
31	VI - DNC	131	VI - DNC
32	VI - DNC	132	VI - DNC
33	VI - DNC	133	VI - DNC
34	VI - DNC	134	VI - DNC
35	VI - DNC	135	VI - DNC
36	VI - DNC	136	VI - DNC
37	VI - DNC	137	VI - DNC
38	VI - DNC	138	VI - DNC
39	VI - DNC	139	VI - DNC
40	VI - DNC	140	VI - DNC
KEY			

Pin	Front Description	Pin	Back - Description
41	Vcc	141	Vcc
42	Vcc	142	Vcc
43	Vcc	143	Ready
44	Backup	144	Vss
45	Vss	145	Coherent
46	SClock	146	Vss
47	Vss	147	SDataOut
48	SLoad	148	SDataIn
49	Vss	149	Vss
50	TP+ / SATA_TX+	150	Vss
51	TP- / SATA_TX-	151	Vss
52	Vss	152	Rsvd
53	Vss	153	Rsvd
54	RP- / SATA_RX-	154	Vss
55	RP+ / SATA_RX+	155	Vss
56	Vss	156	Rsvd
57	Vss	157	Rsvd
58	TS+	158	Vss
59	TS-	159	Vss
60	Vss	160	Rsvd
61	Vss	161	Rsvd
62	RS-	162	Vss
63	RS+	163	Vss
64	Vss	164	LED-Cathode
65	Vss	165	LED-Anode
66	Vss	166	Vss
67	Rsvd	167	Rsvd
68	Rsvd	168	Vcc
69	Vcc	169	Vcc
70	Vcc	170	Vcc
71	DNC	171	DNC
72	DNC	172	DNC
73	DNC	173	DNC
74	DNC	174	DNC
75	DNC	175	DNC
76	DNC	176	DNC
77	DNC	177	DNC
78	DNC	178	DNC
79	DNC	179	DNC
80	DNC	180	DNC
81	DNC	181	DNC
82	DNC	182	DNC
83	DNC	183	DNC
84	DNC	184	DNC

Pin	Front Description	Pin	Back - Description
85	DNC	185	DNC
86	DNC	186	DNC
87	DNC	187	DNC
88	DNC	188	DNC
89	DNC	189	DNC
90	DNC	190	DNC
91	DNC	191	DNC
92	DNC	192	DNC
93	DNC	193	DNC
94	DNC	194	DNC
95	DNC	195	DNC
96	DNC	196	DNC
97	DNC	197	DNC
98	DNC	198	DNC
99	DNC	199	DNC
100	DNC	200	Detect 1