Phase B

Electrical ICD

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Space Center

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RECORD OF REVISIONS

ISS/REV	Date	Modifications	Created/modified by
1/0	22/08/07	Initial Issue	Fabien Jordan
1/1	18/01/08	Pinout updates	Fabien Jordan
1/2	15/02/08	Pinout updates	Fabien Jordan
1/3	21/03/08	Pinout updates	Fabien Jordan

1 REFERENCES

1.1 Normative references

[N1]

1.2 Informative references

[R1] S3-C-20-0-Electrical Block Diagram

[R2] S3-C-1-5-Mechanical&Thermal ICD

2 TERMS, DEFINITIONS AND ABBREVIATED TERMS

2.1 Abbreviated terms

ABF	Add Before Flight
ADCS	Attitude Determination and Control System
ADS	Antenna Deployment System
AWG	American Wire Gauge
BB	Battery Board
BEAC	Beacon
CB	Connection Board
CDMS	Command and Data Monitoring System
COM	Communication System
EPS	Electrical Power System
ICD	Interface Control Document
MB	Mother Board
PL	Payload
TBC	To be confirmed
TBD	To be defined

2.2 Definitions

3 INTRODUCTION

The present ICD aims to describe the electrical interfaces between each electrical assemblies of SwissCube. Before reading this document it is recommended to have a look at the Electrical block Diagram [R1] in order to understand the overall electrical design and also at the Mechanical ICD [R2] in order to understand where the boards are located inside the satellite.

4 WIRES

There are only 3 types of wires in the satellite:

- Power and data wires when no connector is needed,
- Power and data wires when a connector is needed,
- RF coaxial wires.

All these wires must withstand the environmental constraints described in the requirements (vacuum, temperatures range, etc.).

4.1 Power and data interfaces (without connector)

The first type is used to connect the boards when no connector is needed. In order to simplify the design and integration, it has been decided to use the same AWG for all the power and data interfaces (without connector). The selected wire must withstand the maximal current and voltage of each power interfaces.

The maximal current of the most critical power interfaces is 1 Amp.

The resistance of the selected wire (AWG 28) is sufficiently low to withstand this current.

4.1.1 Redundancy

In order to increase the redundancy on the critical interfaces, it has been decided to use one wire more than what is necessary.

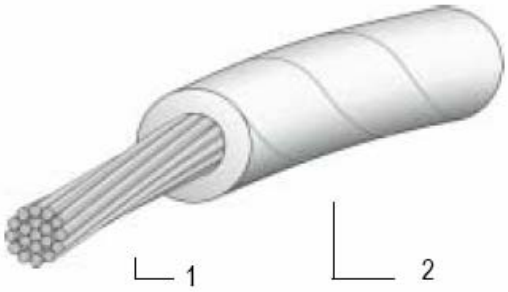
The selected wire is described below. It is Kapton insulated.

axon' CABLE & INTERCONNECTIQUE

Fils simples

TYPE FHT xxxx TF Ag ou Cu Ag

-50°C / +200°C
POLYIMIDE RUBANE
CABLES SANS HALOGENE / FDN
250 Volts AC.



COMPOSITION

Fil primaire

1 - Ame : cuivre électrolytique argenté recuit ou alliage de cuivre argenté.
2 - Isolant : polyimide rubané et soudé.

CARACTERISTIQUES PRINCIPALES

- Gamme de température : - 50°C à + 200°C.
- Tension de service : 250 V AC / 350 V DC.
- Couleur naturelle de la matière. Autres couleurs sur demande.

REFERENCE AXON'	AWG	COMPOSITION	∅ NOMINAL AME (mm)	SECTION NOMINALE AME (mm²)	RESISTANCE NOMINALE FIL ISOLE (Ω / 100m)	∅ NOMINAL FIL ISOLE (mm)	MASSE APPROX. (g/m)
FHT 3007TF	30	7 x 0,102	0,304	0,057	37	0,53	0,76
FHT 3001TF	30	1 x 0,254	0,254	0,051	39	0,48	0,69
FHT 2807TF	28	7 x 0,127	0,381	0,089	23	0,61	1,11
FHT 2801TF	28	1 x 0,320	0,320	0,080	26	0,55	1,00
FHT 2619	26	19 x 0,102	0,504	0,16	12	0,74	1,79
FHT 2601	26	1 x 0,404	0,404	0,13	13	0,63	1,49
FHT 2419	24	19 x 0,127	0,634	0,24	7,6	0,86	2,65
FHT 2401	24	1 x 0,511	0,511	0,20	8,4	0,74	2,26
FHT 2219	22	19 x 0,160	0,800	0,38	4,7	1,03	4,73
FHT 2201	22	1 x 0,643	0,643	0,32	5,3	0,87	3,41
FHT 2019	20	19 x 0,203	1,009	0,616	3,2	1,24	6,26
FHT 2001	20	1 x 0,812	0,812	0,52	3,3	1,04	5,30
FHT 1819	18	19 x 0,254	1,269	0,96	2,1	1,50	9,63
FHT 1619	16	19 x 0,300	1,500	1,34	1,4	1,73	12,30

This AXON wire is not ESA qualified because it has 1.7 um of silver instead of 2 um. However it has been already used in space applications. Given the fact that it is not ESA qualified the price is not too much expensive, so it is a good opportunity for cubesats.

4.2 Power and data interfaces (with connector)

The second type of wire is used when the interfaces need a connector. In fact this cable is already welded to the connector by the manufacturer.

The chosen connector (with its wires) is space qualified.

Each connector has 26 **PTFE wires (AWG 34)**, with a color code.

The current specification is: 1 Amp max.

This wire is able to withstand the maximal current of the power interfaces, but without margin. So it has been decided to use one wire more in order to distribute the power.

4.2.1 Redundancy

In order to increase the redundancy on the critical interfaces, it has been decided to use one wire more than what is necessary.

4.3 RF interfaces

The RF interfaces need a coaxial cable 50 Ohm. The selected cable is ultra-fine and PTFE insulated.

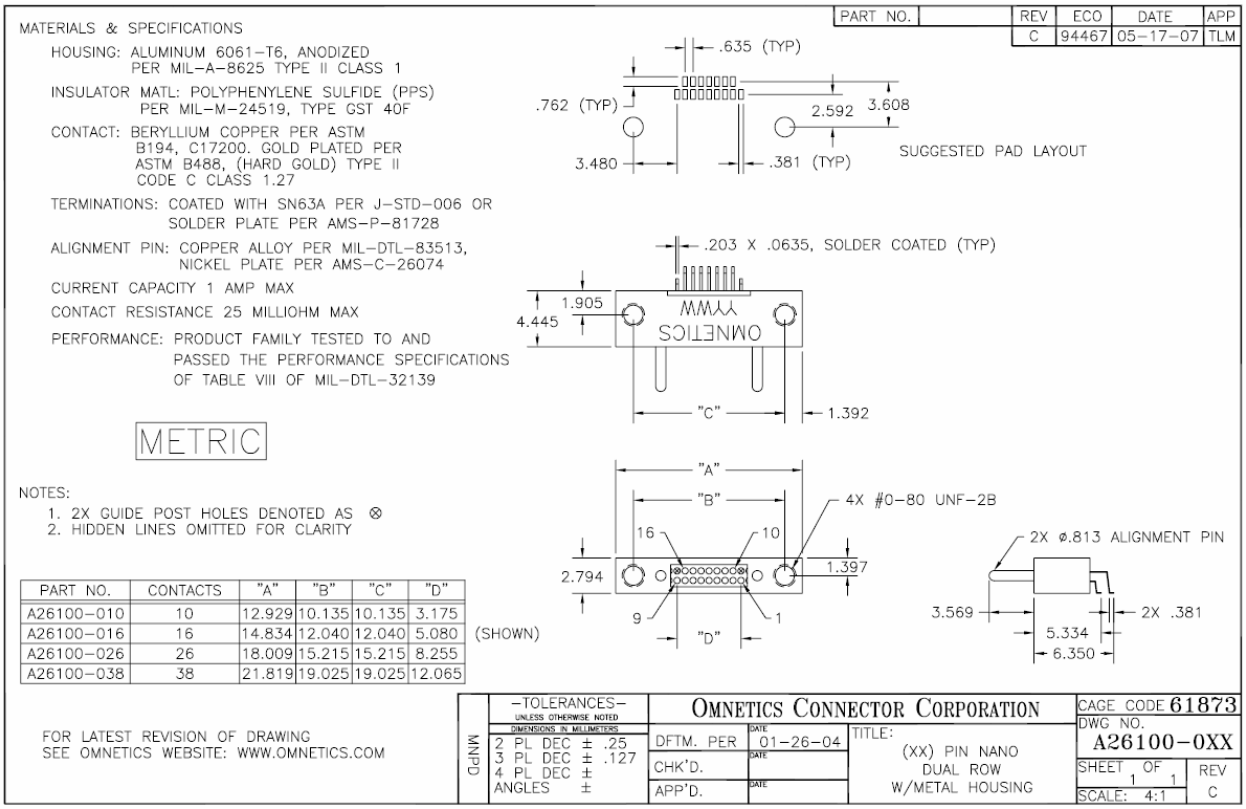
More details about this cable (and connector) are given in Appendix A.

5 CONNECTORS

Only one type of connector is used in the satellite.

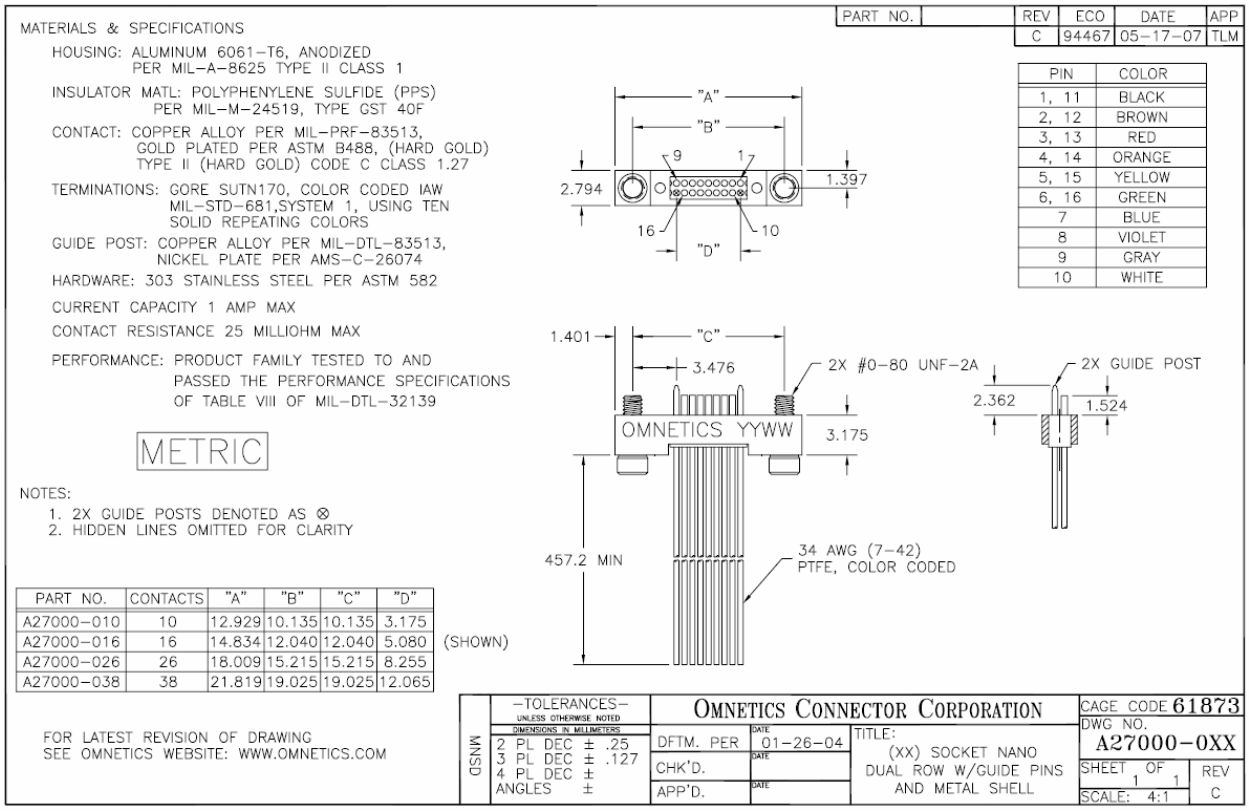
This connector has 26 pins and it is used to connect each face of the satellite and also the battery box. It is also used for the service connector and the "add before flight".

5.1 Male Connector (Horizontal SMD)



The number **A26100-026** (26 contacts) has been selected.

5.2 Female Connector



The number **A27000-026** (26 contacts) has been selected.

6 ELECTRICAL INTERFACES LIST

According to the Electrical Block Diagram, here is the electrical interfaces list.

6.1 Power and data interfaces (without connector)

These wires are soldered on the both side.

Connection	Interface	Pin N°	Pin Name	Signal	Frequency	I rising time	Vmax [V]	Imax [mA]	Type of Wire
J1 to J1	CB to EPS	1	+2.5V_TS	Analog			2.5	< 1	AXON AWG 28
		2	GND_TS	Analog			0.0	< 1	AXON AWG 28
		3	BT1_TP	Analog			2.5	< 1	AXON AWG 28
		4	BT2_TP	Analog			2.5	< 1	AXON AWG 28
		5	FRAME_TP	Analog			2.5	< 1	AXON AWG 28
		6	EXT_TP	Analog			2.5	< 1	AXON AWG 28
		7	-X_TP	Analog			2.5	< 1	AXON AWG 28
		8	+X_TP	Analog			2.5	< 1	AXON AWG 28
		9	-Y_TP	Analog			2.5	< 1	AXON AWG 28
		10	+Y_TP	Analog			2.5	< 1	AXON AWG 28
		11	-Z_TP	Analog			2.5	< 1	AXON AWG 28
		12	+Z_TP	Analog			2.5	< 1	AXON AWG 28
		13	GND_TS	Analog			0.0	< 1	AXON AWG 28
		14	BT1(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	4.2	< 1	AXON AWG 28
		15	BT1(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	4.2	< 1	AXON AWG 28
		16	BT12(-)	Analog	noise at 0.5 to 1MHz	> 0.5 us	0.0	< 1	AXON AWG 28
		17	BT12(-)	Analog	noise at 0.5 to 1MHz	> 0.5 us	0.0	< 1	AXON AWG 28
		18	BT2(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	4.2	< 1	AXON AWG 28
		19	BT2(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	4.2	< 1	AXON AWG 28
		20	BT12(-)	Analog	noise at 0.5 to 1MHz	> 0.5 us	0.0	< 1	AXON AWG 28
		21	BT12(-)	Analog	noise at 0.5 to 1MHz	> 0.5 us	0.0	< 1	AXON AWG 28
		22	SC+Z(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	250	AXON AWG 28
		23	SC+Z(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	250	AXON AWG 28
		24	SC-Z(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	0.0	250	AXON AWG 28
		25	SC-Z(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	0.0	250	AXON AWG 28
		26	SC+X(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	250	AXON AWG 28
		27	SC+X(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	250	AXON AWG 28
		28	SC-X(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	0.0	250	AXON AWG 28
		29	SC-X(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	0.0	250	AXON AWG 28
		30	SC+Y(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	250	AXON AWG 28
		31	SC+Y(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	250	AXON AWG 28
		32	SC-Y(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	0.0	250	AXON AWG 28
		33	SC-Y(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	0.0	250	AXON AWG 28
		34	KS3(-)	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	500	AXON AWG 28
		35	KS4(-)	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	500	AXON AWG 28
		36	NC						

Connection	Interface	Pin N°	Pin Name	Signal	Frequency	I rising time	Vmax [V]	Imax [mA]	Type of Wire
J2 to J2	MB to EPS	1	I2C_SDA	Digital	100 kHz		3.3	< 1	AXON AWG 28
		2	I2C_SCL	Digital	100 kHz		3.3	< 1	AXON AWG 28
		3	GND_EPS	Analog			0.0	5	AXON AWG 28
		4	GND_EPS	Analog			0.0	5	AXON AWG 28
		5	+3.3V_EPS	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	16	AXON AWG 28
		6	+3.3V_EPS	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	16	AXON AWG 28
		7	SC(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	500	AXON AWG 28
		8	SC(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	500	AXON AWG 28
		9	SC(-)	Analog	noise at 0.5 to 1MHz	> 0.5 us	0.0	500	AXON AWG 28
		10	SC(-)	Analog	noise at 0.5 to 1MHz	> 0.5 us	0.0	500	AXON AWG 28
		11	BEAC_S_EN	Digital			3.3	< 1	AXON AWG 28
		12	NC						
		13	CDMS_EN	Digital			3.3	< 1	AXON AWG 28
		14	PL_EN	Digital			3.3	< 1	AXON AWG 28
		15	ADCS_EN	Digital			3.3	< 1	AXON AWG 28
		16	ADS1_EN	Digital			3.3	< 1	AXON AWG 28
		17	BEAC_ST	Digital			3.3	< 1	AXON AWG 28
		18	COM_ST	Digital			3.3	< 1	AXON AWG 28
		19	CDMS_ST	Digital			3.3	< 1	AXON AWG 28
		20	PL_ST	Digital			3.3	< 1	AXON AWG 28
		21	ADCS_ST	Digital			3.3	< 1	AXON AWG 28
		22	ADS1/2_ST	Digital			3.3	< 1	AXON AWG 28
		23	BEAC_SIG	Digital	morse code 10bit/s		3.3	< 1	AXON AWG 28
		24	BEAC_SIG	Digital	morse code 10bit/s		3.3	< 1	AXON AWG 28
		25	BEAC_H_EN	Digital			3.3	< 1	AXON AWG 28
		26	BEAC_H_EN	Digital			3.3	< 1	AXON AWG 28
		27	ADS2_EN	Digital			3.3	< 1	AXON AWG 28
		28	ADS2_EN	Digital			3.3	< 1	AXON AWG 28
		29	SAFE_MODE	Digital			3.3	< 1	AXON AWG 28
		30	GND_EPS	Analog			0.0	5	AXON AWG 28
		31	GND_EPS	Analog			0.0	5	AXON AWG 28
		32	GND_EPS	Analog			0.0	5	AXON AWG 28
		33	GND_EPS	Analog			0.0	5	AXON AWG 28
		34	MB_TP	Analog			2.5	< 1	AXON AWG 28
		35	NC						

Connection	Interface	Pin N°	Pin Name	Signal	Frequency	I rising time	Vmax [V]	Imax [mA]	Type of Wire
J3 to J3	MB to CDMS	1	+3.3V_CDMS	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	25	AXON AWG 28
		2	+3.3V_CDMS	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	25	AXON AWG 28
		3	GND_CDMS	Analog			0.0	25	AXON AWG 28
		4	I2C_SDA	Digital	100 Khz		3.3	< 1	AXON AWG 28
		5	I2C_SCL	Digital	100 Khz		3.3	< 1	AXON AWG 28
		6	GND_CDMS	Analog			0.0	25	AXON AWG 28
		7	NC						

Connection	Interface	Pin N°	Pin Name	Signal	Frequency	I rising time	Vmax [V]	Imax [mA]	Type of Wire
J4 to J4	MB to PL	1	+3.3V_PL	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	70	AXON AWG 28
		2	+3.3V_PL	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	70	AXON AWG 28
		3	GND_PL	Analog			0.0	70	AXON AWG 28
		4	GND_PL	Analog			0.0	70	AXON AWG 28
		5	I2C_SDA	Digital	100 Khz		3.3	< 1	AXON AWG 28
		6	I2C_SCL	Digital	100 Khz		3.3	< 1	AXON AWG 28
		7	NC						

Connection	Interface	Pin N°	Pin Name	Signal	Frequency	I rising time	Vmax [V]	Imax [mA]	Type of Wire
J5 to J5	CB to ADCS	1	MT-X(+)	Analog	low noise at 10 kHz		3.0	15	AXON AWG 28
		2	MT-X(-)	Analog	low noise at 10 kHz		3.0	15	AXON AWG 28
		3	MT+Y(+)	Analog	low noise at 10 kHz		3.0	15	AXON AWG 28
		4	MT+Y(-)	Analog	low noise at 10 kHz		3.0	15	AXON AWG 28
		5	MT-Z(+)	Analog	low noise at 10 kHz		3.0	15	AXON AWG 28
		6	MT-Z(-)	Analog	low noise at 10 kHz		3.0	15	AXON AWG 28
		7	GND_SS	Analog			0.0	< 1	AXON AWG 28
		8	GND_SS	Analog			0.0	< 1	AXON AWG 28
		9	+3.0V_SS	Analog			3.0	< 1	AXON AWG 28
		10	SS-X_S1	Analog			2.5	< 1	AXON AWG 28
		11	SS-X_R1	Analog			2.5	< 1	AXON AWG 28
		12	SS-X_S2	Analog			2.5	< 1	AXON AWG 28
		13	SS-X_R2	Analog			2.5	< 1	AXON AWG 28
		14	SS+X_S1	Analog			2.5	< 1	AXON AWG 28
		15	SS+X_R1	Analog			2.5	< 1	AXON AWG 28
		16	SS+X_S2	Analog			2.5	< 1	AXON AWG 28
		17	SS+X_R2	Analog			2.5	< 1	AXON AWG 28
		18	SS-Y_S1	Analog			2.5	< 1	AXON AWG 28
		19	SS-Y_R1	Analog			2.5	< 1	AXON AWG 28
		20	SS-Y_S2	Analog			2.5	< 1	AXON AWG 28
		21	SS-Y_R2	Analog			2.5	< 1	AXON AWG 28
		22	SS+Y_S1	Analog			2.5	< 1	AXON AWG 28
		23	SS+Y_R1	Analog			2.5	< 1	AXON AWG 28
		24	SS+Y_S2	Analog			2.5	< 1	AXON AWG 28
		25	SS+Y_R2	Analog			2.5	< 1	AXON AWG 28
		26	SS-Z_S1	Analog			2.5	< 1	AXON AWG 28
		27	SS-Z_R1	Analog			2.5	< 1	AXON AWG 28
		28	SS-Z_S2	Analog			2.5	< 1	AXON AWG 28
		29	SS-Z_R2	Analog			2.5	< 1	AXON AWG 28
		30	SS+Z_S1	Analog			2.5	< 1	AXON AWG 28
		31	SS+Z_R1	Analog			2.5	< 1	AXON AWG 28
		32	SS+Z_S2	Analog			2.5	< 1	AXON AWG 28
		33	SS+Z_R2	Analog			2.5	< 1	AXON AWG 28
		34	NC						

Connection	Interface	Pin N°	Pin Name	Signal	Frequency	I rising time	Vmax [V]	Imax [mA]	Type of Wire
J6 to J6	MB to ADCS	1	+3.3V_ADCS	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	35	AXON AWG 28
		2	+3.3V_ADCS	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	35	AXON AWG 28
		3	GND_ADCS	Analog			0.0	35	AXON AWG 28
		4	GND_ADCS	Analog			0.0	35	AXON AWG 28
		5	I2C_SDA	Digital	100 kHz		3.3	< 1	AXON AWG 28
		6	I2C_SCL	Digital	100 kHz		3.3	< 1	AXON AWG 28
		7	NC						

Connection	Interface	Pin N°	Pin Name	Signal	Frequency	I rising time	Vmax [V]	Imax [mA]	Type of Wire
J7 to J7	MB to COM	1	+3.3V_COM	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	500	AXON AWG 28
		2	+3.3V_COM	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	500	AXON AWG 28
		3	+3.3V_BEAC	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	500	AXON AWG 28
		4	+3.3V_BEAC	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	500	AXON AWG 28
		5	I2C_SDA	Digital	100 kHz		3.3	< 1	AXON AWG 28
		6	I2C_SCL	Digital	100 kHz		3.3	< 1	AXON AWG 28
		7	GND_COM	Analog			0.0	500	AXON AWG 28
		8	UPLINK	Digital			?	< 1	AXON AWG 28
		9	DOWNLINK	Digital			?	< 1	AXON AWG 28
		10	GND_COM	Analog			0.0	500	AXON AWG 28
		11	SAFE_MODE	Digital			3.3	< 1	AXON AWG 28
		12	BEAC_TP	Analog			2.5	< 1	AXON AWG 28
		13	COM_EN_FR_ABF	Digital			3.3	< 1	AXON AWG 28
		14	COM_EN_TO_ABF	Digital			3.3	< 1	AXON AWG 28

Connection	Interface	Pin N°	Pin Name	Signal	Frequency	I rising time	Vmax [V]	Imax [mA]	Type of Wire
J8 to J8	MB to BEAC	1	+3.3V_BEAC	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	50	AXON AWG 28
		2	+3.3V_BEAC	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	50	AXON AWG 28
		3	GND_BEAC	Analog			0.0	50	AXON AWG 28
		4	BEAC_SIG	Digital	morse code 10bit/s		3.3	< 1	AXON AWG 28
		5	BEAC_SIG	Digital	morse code 10bit/s		3.3	< 1	AXON AWG 28
		6	GND_BEAC	Analog			0.0	50	AXON AWG 28
		7	BEAC_TP	Analog			2.5	< 1	AXON AWG 28
		8	NC						
		9	NC						
		10	NC						

Connection	Interface	Pin N°	Pin Name	Signal	Frequency	I rising time	Vmax [V]	Imax [mA]	Type of Wire
J9 to J9	MB to CB	1	BT_UNLOCK1	Analog			0.0	< 1	AXON AWG 28
		2	BT_UNLOCK2	Analog			0.0	< 1	AXON AWG 28
		3	GND_MB	Analog			0.0	250	AXON AWG 28
		4	GND_MB	Analog			0.0	250	AXON AWG 28
		5	GND_MB	Analog			0.0	250	AXON AWG 28
		6	GND_MB	Analog			0.0	250	AXON AWG 28
		7	BT2(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	4.2	250	AXON AWG 28
		8	BT2(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	4.2	250	AXON AWG 28
		9	BT1(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	4.2	250	AXON AWG 28
		10	BT1(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	4.2	250	AXON AWG 28
		11	BT12(-)	Analog	noise at 0.5 to 1MHz	> 0.5 us	0.0	500	AXON AWG 28
		12	BT12(-)	Analog	noise at 0.5 to 1MHz	> 0.5 us	0.0	500	AXON AWG 28

Connection	Interface	Pin N°	Pin Name	Signal	Frequency	I rising time	Vmax [V]	Imax [mA]	Type of Wire
J10	BB to Batteries	1	BT1(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	4.2	500	AXON AWG 28
		2	BT1(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	4.2	500	AXON AWG 28
		3	BT2(-)	Analog	noise at 0.5 to 1MHz	> 0.5 us	0.0	500	AXON AWG 28
		4	BT2(-)	Analog	noise at 0.5 to 1MHz	> 0.5 us	0.0	500	AXON AWG 28
		5	Rch(+)	Analog			4.0	150	AXON AWG 28
		6	Rch(-)	Analog			0.0	150	AXON AWG 28
		7	BT1(-)	Analog	noise at 0.5 to 1MHz	> 0.5 us	0.0	500	AXON AWG 28
		8	BT1(-)	Analog	noise at 0.5 to 1MHz	> 0.5 us	0.0	500	AXON AWG 28
		9	BT2(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	4.2	500	AXON AWG 28
		10	BT2(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	4.2	500	AXON AWG 28

Connection	Interface	Pin N°	Pin Name	Signal	Frequency	I rising time	Vmax [V]	Imax [mA]	Type of Wire
J11	+Y to KS1/2	1	KS1(+)	Analog			4.2	20	AXON AWG 28
		2	KS1(-)	Analog			0.0	20	AXON AWG 28
		3	KS2(+)	Analog			4.2	20	AXON AWG 28
		4	KS2(-)	Analog			0.0	20	AXON AWG 28

Connection	Interface	Pin N°	Pin Name	Signal	Frequency	I rising time	Vmax [V]	Imax [mA]	Type of Wire
J12	+Y to KS3/4	1	KS3(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	500	AXON AWG 28
		2	KS3(-)	Analog	noise at 0.5 to 1MHz	> 0.5 us	0.0	500	AXON AWG 28
		3	KS4(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	500	AXON AWG 28
		4	KS4(-)	Analog	noise at 0.5 to 1MHz	> 0.5 us	0.0	500	AXON AWG 28

Connection	Interface	Pin N°	Pin Name	Signal	Frequency	I rising time	Vmax [V]	Imax [mA]	Type of Wire
J13 to J13	ADS to -Y	1	SS-Y_S1	Analog			2.5	< 1	AXON AWG 28
		2	SS-Y_R1	Analog			2.5	< 1	AXON AWG 28
		3	SS-Y_S2	Analog			2.5	< 1	AXON AWG 28
		4	SS-Y_R2	Analog			2.5	< 1	AXON AWG 28
		5	-Y_TP	Analog			2.5	< 1	AXON AWG 28
		6	GND_SS	Analog			0.0	< 1	AXON AWG 28
		7	+3.0V_SS	Analog			3.0	< 1	AXON AWG 28
		8	GND_TS	Analog			0.0	< 1	AXON AWG 28
		9	+2.5V_TS	Analog			2.5	< 1	AXON AWG 28
		10	SC-Y(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	250	AXON AWG 28
		11	SC-Y(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	250	AXON AWG 28
		12	SC-Y(-)	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	250	AXON AWG 28
		13	SC-Y(-)	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	250	AXON AWG 28

Connection	Interface	Pin N°	Pin Name	Signal	Frequency	I rising time	Vmax [V]	Imax [mA]	Type of Wire
J15	BB to Batteries	1	GND_TS	Analog			0.0	< 1	AXON AWG 28
		2	+2.5V_TS	Analog			2.5	< 1	AXON AWG 28
		3	BT1_TP	Analog			2.5	< 1	AXON AWG 28

Connection	Interface	Pin N°	Pin Name	Signal	Frequency	I rising time	Vmax [V]	Imax [mA]	Type of Wire
J16	BB to Batteries	1	GND_TS	Analog			0.0	< 1	AXON AWG 28
		2	+2.5V_TS	Analog			2.5	< 1	AXON AWG 28
		3	BT2_TP	Analog			2.5	< 1	AXON AWG 28

6.2 Power and data interfaces (with connector)

These wires are soldered on one side and connected on the other side.

Connection	Interface	Pin N°	Pin Name	Signal	Frequency	I rising time	Vmax [V]	Imax [mA]	Type of Wire
JX1 to X1	CB to +Z	1	SS+Z_S1	Analog			2.5	< 1	PTFE AWG 34
		2	SS+Z_R1	Analog			2.5	< 1	PTFE AWG 34
		3	SS+Z_S2	Analog			2.5	< 1	PTFE AWG 34
		4	SS+Z_R2	Analog			2.5	< 1	PTFE AWG 34
		5	EXT_TP	Analog			2.5	< 1	PTFE AWG 34
		6	+Z_TP	Analog			2.5	< 1	PTFE AWG 34
		7	GND_SS	Analog			0.0	< 1	PTFE AWG 34
		8	+3.0V_SS	Analog			3.0	< 1	PTFE AWG 34
		9	GND_TS	Analog			0.0	< 1	PTFE AWG 34
		10	+2.5V_TS	Analog			2.5	< 1	PTFE AWG 34
		11	SC+Z(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	250	PTFE AWG 34
		12	SC+Z(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	250	PTFE AWG 34
		13	SC+Z(-)	Analog	noise at 0.5 to 1MHz	> 0.5 us	0.0	250	PTFE AWG 34
		14	SC+Z(-)	Analog	noise at 0.5 to 1MHz	> 0.5 us	0.0	250	PTFE AWG 34
		15	NC						

Connection	Interface	Pin N°	Pin Name	Signal	Frequency	I rising time	Vmax [V]	Imax [mA]	Type of Wire
JX2 to X2	CB to -Z	1	SS-Z_S1	Analog			2.5	< 1	PTFE AWG 34
		2	SS-Z_R1	Analog			2.5	< 1	PTFE AWG 34
		3	SS-Z_S2	Analog			2.5	< 1	PTFE AWG 34
		4	SS-Z_R2	Analog			2.5	< 1	PTFE AWG 34
		5	-Z_TP	Analog			2.5	< 1	PTFE AWG 34
		6	GND_SS	Analog			0.0	< 1	PTFE AWG 34
		7	+3.0V_SS	Analog			3.0	< 1	PTFE AWG 34
		8	GND_TS	Analog			0.0	< 1	PTFE AWG 34
		9	+2.5V_TS	Analog			2.5	< 1	PTFE AWG 34
		10	MT-Z(+)	Analog	low noise at 10 kHz		3.0	15	PTFE AWG 34
		11	MT-Z(-)	Analog	low noise at 10 kHz		3.0	15	PTFE AWG 34
		12	SC-Z(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	250	PTFE AWG 34
		13	SC-Z(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	250	PTFE AWG 34
		14	SC-Z(-)	Analog	noise at 0.5 to 1MHz	> 0.5 us	0.0	250	PTFE AWG 34
		15	SC-Z(-)	Analog	noise at 0.5 to 1MHz	> 0.5 us	0.0	250	PTFE AWG 34
		16	NC						

Connection	Interface	Pin N°	Pin Name	Signal	Frequency	I rising time	Vmax [V]	Imax [mA]	Type of Wire
JX3 to X3	CB to +X	1	SS+X_S1	Analog			2.5	< 1	PTFE AWG 34
		2	SS+X_R1	Analog			2.5	< 1	PTFE AWG 34
		3	SS+X_S2	Analog			2.5	< 1	PTFE AWG 34
		4	SS+X_R2	Analog			2.5	< 1	PTFE AWG 34
		5	+X_TP	Analog			2.5	< 1	PTFE AWG 34
		6	GND_SS	Analog			0.0	< 1	PTFE AWG 34
		7	+3.0V_SS	Analog			3.0	< 1	PTFE AWG 34
		8	GND_TS	Analog			0.0	< 1	PTFE AWG 34
		9	+2.5V_TS	Analog			2.5	< 1	PTFE AWG 34
		10	SC+X(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	250	PTFE AWG 34
		11	SC+X(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	250	PTFE AWG 34
		12	SC+X(-)	Analog	noise at 0.5 to 1MHz	> 0.5 us	0.0	250	PTFE AWG 34
		13	SC+X(-)	Analog	noise at 0.5 to 1MHz	> 0.5 us	0.0	250	PTFE AWG 34
		14	NC						

Connection	Interface	Pin N°	Pin Name	Signal	Frequency	I rising time	Vmax [V]	Imax [mA]	Type of Wire
JX4 to X4	CB to -X	1	SS-X_S1	Analog			2.5	< 1	PTFE AWG 34
		2	SS-X_R1	Analog			2.5	< 1	PTFE AWG 34
		3	SS-X_S2	Analog			2.5	< 1	PTFE AWG 34
		4	SS-X_R2	Analog			2.5	< 1	PTFE AWG 34
		5	-X_TP	Analog			2.5	< 1	PTFE AWG 34
		6	GND_SS	Analog			0.0	< 1	PTFE AWG 34
		7	+3.0V_SS	Analog			3.0	< 1	PTFE AWG 34
		8	GND_TS	Analog			0.0	< 1	PTFE AWG 34
		9	+2.5V_TS	Analog			2.5	< 1	PTFE AWG 34
		10	MT-X(+)	Analog	low noise at 10 kHz		3.0	15	PTFE AWG 34
		11	MT-X(-)	Analog	low noise at 10 kHz		3.0	15	PTFE AWG 34
		12	SC-X(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	250	PTFE AWG 34
		13	SC-X(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	250	PTFE AWG 34
		14	SC-X(-)	Analog	noise at 0.5 to 1MHz	> 0.5 us	0.0	250	PTFE AWG 34
		15	SC-X(-)	Analog	noise at 0.5 to 1MHz	> 0.5 us	0.0	250	PTFE AWG 34
		16	NC						

Connection	Interface	Pin N°	Pin Name	Signal	Frequency	I rising time	Vmax [V]	Imax [mA]	Type of Wire
JX5 to X5	CB to +Y	1	SS+Y_S1	Analog			2.5	< 1	PTFE AWG 34
		2	SS+Y_R1	Analog			2.5	< 1	PTFE AWG 34
		3	SS+Y_S2	Analog			2.5	< 1	PTFE AWG 34
		4	SS+Y_R2	Analog			2.5	< 1	PTFE AWG 34
		5	+Y_TP	Analog			2.5	< 1	PTFE AWG 34
		6	FRAME_TP	Analog			2.5	< 1	PTFE AWG 34
		7	GND_SS	Analog			0.0	< 1	PTFE AWG 34
		8	+3.0V_SS	Analog			3.0	< 1	PTFE AWG 34
		9	GND_TS	Analog			0.0	< 1	PTFE AWG 34
		10	+2.5V_TS	Analog			2.5	< 1	PTFE AWG 34
		11	MT+Y(+)	Analog	low noise at 10 kHz		3.0	15	PTFE AWG 34
		12	MT+Y(-)	Analog	low noise at 10 kHz		3.0	15	PTFE AWG 34
		13	KS1(+)	Analog			4.2	20	PTFE AWG 34
		14	KS1(-)	Analog			4.2	20	PTFE AWG 34
		15	KS2(+)	Analog			4.2	20	PTFE AWG 34
		16	KS2(-)	Analog			4.2	20	PTFE AWG 34
		17	KS3(+)	Analog			3.3	500	PTFE AWG 34
		18	KS3(-)	Analog			3.3	500	PTFE AWG 34
		19	KS4(+)	Analog			3.3	500	PTFE AWG 34
		20	KS4(-)	Analog			3.3	500	PTFE AWG 34
		21	SC+Y(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	250	PTFE AWG 34
		22	SC+Y(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	250	PTFE AWG 34
		23	SC+Y(-)	Analog	noise at 0.5 to 1MHz	> 0.5 us	0.0	250	PTFE AWG 34
		24	SC+Y(-)	Analog	noise at 0.5 to 1MHz	> 0.5 us	0.0	250	PTFE AWG 34
		25	NC						

Connection	Interface	Pin N°	Pin Name	Signal	Frequency	I rising time	Vmax [V]	Imax [mA]	Type of Wire
JX6a to X6	CB to -Y	1	SS-Y_S1	Analog			2.5	< 1	PTFE AWG 34
		2	SS-Y_R1	Analog			2.5	< 1	PTFE AWG 34
		3	SS-Y_S2	Analog			2.5	< 1	PTFE AWG 34
		4	SS-Y_R2	Analog			2.5	< 1	PTFE AWG 34
		5	-Y_TP	Analog			2.5	< 1	PTFE AWG 34
		6	GND_SS	Analog			0.0	< 1	PTFE AWG 34
		7	+3.0V_SS	Analog			3.0	< 1	PTFE AWG 34
		8	GND_TS	Analog			0.0	< 1	PTFE AWG 34
		9	+2.5V_TS	Analog			2.5	< 1	PTFE AWG 34
		10	SC-Y(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	250	PTFE AWG 34
		11	SC-Y(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	250	PTFE AWG 34
		12	SC-Y(-)	Analog	noise at 0.5 to 1MHz	> 0.5 us	0.0	250	PTFE AWG 34
		13	SC-Y(-)	Analog	noise at 0.5 to 1MHz	> 0.5 us	0.0	250	PTFE AWG 34
		14	NC						

Connection	Interface	Pin N°	Pin Name	Signal	Frequency	I rising time	Vmax [V]	Imax [mA]	Type of Wire
JX6b to X6	MB to ADS	1	HT1(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	500	PTFE AWG 34
		2	HT1(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	500	PTFE AWG 34
		3	HT1(-)	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	500	PTFE AWG 34
		4	HT1(-)	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	500	PTFE AWG 34
		5	HT2(-)	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	500	PTFE AWG 34
		6	HT2(-)	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	500	PTFE AWG 34
		7	HT2(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	500	PTFE AWG 34
		8	HT2(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	500	PTFE AWG 34
		9	NC						

Connection	Interface	Pin N°	Pin Name	Signal	Frequency	I rising time	Vmax [V]	Imax [mA]	Type of Wire
JX7 to X7	CB to BB	1	GND_TS	Analog			0.0	< 1	PTFE AWG 34
		2	+2.5V_TS	Analog			2.5	< 1	PTFE AWG 34
		3	BT1_TP	Analog			2.5	< 1	PTFE AWG 34
		4	BT_UNLOCK1	Analog			0.0	< 1	PTFE AWG 34
		5	KS1(+)	Analog			4.2	20	PTFE AWG 34
		6	KS1(-)	Analog			4.2	20	PTFE AWG 34
		7	KS2(+)	Analog			4.2	20	PTFE AWG 34
		8	KS2(-)	Analog			4.2	20	PTFE AWG 34
		9	GND_MB	Analog			0.0	250	PTFE AWG 34
		10	GND_MB	Analog			0.0	250	PTFE AWG 34
		11	BT1(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	4.2	170	PTFE AWG 34
		12	BT1(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	4.2	170	PTFE AWG 34
		13	BT1(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	4.2	170	PTFE AWG 34
		14	BT12(-)	Analog	noise at 0.5 to 1MHz	> 0.5 us	4.2	330	PTFE AWG 34
		15	BT12(-)	Analog	noise at 0.5 to 1MHz	> 0.5 us	4.2	330	PTFE AWG 34
		16	BT12(-)	Analog	noise at 0.5 to 1MHz	> 0.5 us	4.2	330	PTFE AWG 34
		17	BT2(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	4.2	170	PTFE AWG 34
		18	BT2(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	4.2	170	PTFE AWG 34
		19	BT2(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	4.2	170	PTFE AWG 34
		20	GND_MB	Analog			0.0	250	PTFE AWG 34
		21	GND_MB	Analog			0.0	250	PTFE AWG 34
		22	BT_UNLOCK2	Analog			0.0	< 1	PTFE AWG 34
		23	GND_TS	Analog			0.0	< 1	PTFE AWG 34
		24	+2.5V_TS	Analog			2.5	< 1	PTFE AWG 34
		25	BT2_TP	Analog			2.5	< 1	PTFE AWG 34
		26	NC						

Connection	Interface	Pin N°	Pin Name	Signal	Frequency	I rising time	Vmax [V]	Imax [mA]	Type of Wire
X8	MB to Service	1	BT12(-)	Analog	noise at 0.5 to 1MHz	> 0.5 us	0.0	250	PTFE AWG 34
		2	BT12(-)	Analog	noise at 0.5 to 1MHz	> 0.5 us	0.0	250	PTFE AWG 34
		3	BT1(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	4.2	250	PTFE AWG 34
		4	BT1(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	4.2	250	PTFE AWG 34
		5	BT2(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	4.2	250	PTFE AWG 34
		6	BT2(+)	Analog	noise at 0.5 to 1MHz	> 0.5 us	4.2	250	PTFE AWG 34
		7	BT_UNLOCK_2	Digital			0.0	< 1	PTFE AWG 34
		8	BT_UNLOCK_1	Digital			0.0	< 1	PTFE AWG 34
		9	CHARGE_1	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	500	PTFE AWG 34
		10	CHARGE_2	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	500	PTFE AWG 34
		11	SUPPLY_1	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	500	PTFE AWG 34
		12	SUPPLY_2	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	500	PTFE AWG 34
		13	GND_MB	Analog			0.0	330	PTFE AWG 34
		14	I2C_SDA	Digital	100 kHz		3.3	< 1	PTFE AWG 34
		15	I2C_SCL	Digital	100 kHz		3.3	< 1	PTFE AWG 34
		16	GND_MB	Analog			0.0	330	PTFE AWG 34
		17	UPLINK	Digital	TBD		3.3	< 1	PTFE AWG 34
		18	DOWNLINK	Digital	TBD		3.3	< 1	PTFE AWG 34
		19	GND_MB	Analog			0.0	330	PTFE AWG 34
		20	BEAC_SIG	Digital	morse code 10bit/s				PTFE AWG 34
		21	NC						
		22	NC						
		23	NC						
		24	NC						
		25	NC						
		26	NC						

Connection	Interface	Pin N°	Pin Name	Signal	Frequency	I rising time	Vmax [V]	Imax [mA]	Type of Wire
X9	MB to ABF	1	POWER_TO_ABF	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	250	PTFE AWG 34
		2	POWER_TO_ABF	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	250	PTFE AWG 34
		3	POWER_TO_ABF	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	250	PTFE AWG 34
		4	POWER_TO_ABF	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	250	PTFE AWG 34
		5	POWER_FR_ABF	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	250	PTFE AWG 34
		6	POWER_FR_ABF	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	250	PTFE AWG 34
		7	POWER_FR_ABF	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	250	PTFE AWG 34
		8	POWER_FR_ABF	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	250	PTFE AWG 34
		9	NC						
		10	BEAC_TO_ABF	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	50	PTFE AWG 34
		11	BEAC_TO_ABF	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	50	PTFE AWG 34
		12	BEAC_FR_ABF	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	50	PTFE AWG 34
		13	BEAC_FR_ABF	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	50	PTFE AWG 34
		14	ADS1_TO_ABF	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	250	PTFE AWG 34
		15	ADS1_TO_ABF	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	250	PTFE AWG 34
		16	ADS1_FR_ABF	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	250	PTFE AWG 34
		17	ADS1_FR_ABF	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	250	PTFE AWG 34
		18	NC						
		19	COM_EN_TO_ABF	Digital			3.3	< 1	PTFE AWG 34
		20	COM_EN_TO_ABF	Digital			3.3	< 1	PTFE AWG 34
		21	COM_EN_FR_ABF	Digital			3.3	< 1	PTFE AWG 34
		22	COM_EN_FR_ABF	Digital			3.3	< 1	PTFE AWG 34
		23	ADS2_TO_ABF	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	250	PTFE AWG 34
		24	ADS2_TO_ABF	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	250	PTFE AWG 34
		25	ADS2_FR_ABF	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	250	PTFE AWG 34
		26	ADS2_FR_ABF	Analog	noise at 0.5 to 1MHz	> 0.5 us	3.3	250	PTFE AWG 34

6.3 RF Interfaces

Connection	Interface	Pin N°	Pin Name	Signal	Frequency	Rising time	Vmax [V]	Imax [mA]	Type of Wire
	COM to VHF			RF	148 MHz				PTFE H.FL
	COM to UHF			RF	437.5 MHz				PTFE H.FL
	BEAC to COM			RF	437.5 MHz				PTFE H.FL

Appendix A RF coaxial wire and connector

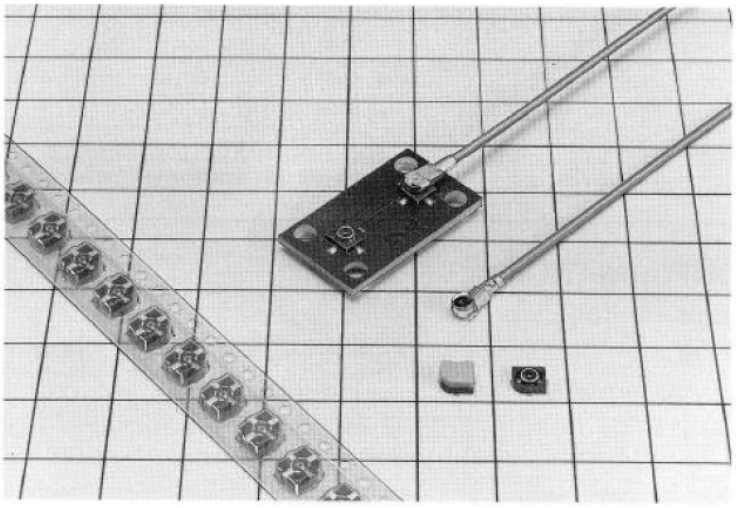
HRS H.FL Series

The world's smallest low-profile coaxial connectors
H.FL Coaxial Connectors

■ OUTLINE

The H.FL series of coaxial connectors consists of the world's smallest surface-mount low profile coaxial connectors.

The H.FL connectors have a lower profile, with a mounted height of approximately 30% that of our S.FL2 connectors. They occupy 20% less board space, allowing higher density internal wiring.



■ FEATURES

(1) Height off printed circuit board of 3mm when connected (lowest in the world).
(2) High frequency response of V.S.W.R 1.3 or less from D.C. to 3000 MHz.
(3) Compressed wire system used on the cable side connector for both the center and exterior, providing stable connection quality. For the external conductor compression part, the shielded wire is compressed between metal, providing stability with respect to fluctuations in heat.
(4) The ultra-fine Teflon cable can be used for wiring connections and this enables high-density wiring inside of the unit.
1.48 mm diameter (single shield) cable :
CO-6F/FH-SB manufactured by Hitachi Cable Ltd. DFS111-UL1979 manufactured by Junkosha Co., Ltd. and 0.8DS-PBE manufactured by Sumitomo Electric Industry Co., Ltd.
1.32 mm diameter (double shield) cable :
A12B0733 manufactured by Junkosha Co., Ltd.
1.47 mm diameter (single shield) cable :
CXN2571 manufactured by W.L. Gore+Associates, Inc.
(5) The connector can be easily removed with an extraction jig.
(6) Emboss taping makes automatic mounting possible.
In addition, connectors with caps are available for use with all types of mounters.
(7) Connection can be easily verified.
Despite the ultra small size, a locking feeling is provided making it possible to check that the connector is securely connected.
(8) The connectors are designed to protect against mis-insertion.
(9) A cut is provided on the circuit board side connector, making it simple to check the direction after mounting.
(10) A plug connector (H.FL-LP 1.25C) for use with 75Ω cable has been added to the Series.
The board-side connector is used jointly with H.FL-R-SMT.
The high frequency characteristics show a V.S.W.R. of 1.2 or less from DC to 500 MHz.
Suitable cable is 1.25C-6FFH manufactured by Hitachi Cable Ltd.

■ APPLICATIONS

Portable telephones, cellular telephones, wireless communications devices, electronic measuring equipment, GPS, etc.

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■ MATERIALS and TREATMENT

Part name	Material	Treatment
Shell	Phosphor bronze	Silver plating
Insulator	PBT plastic (plug side) Liquid crystal polymer (receptacle side)	Black Black
Male center contact	Bronze	Gold plating
Female center contact	Phosphor bronze	Gold plating

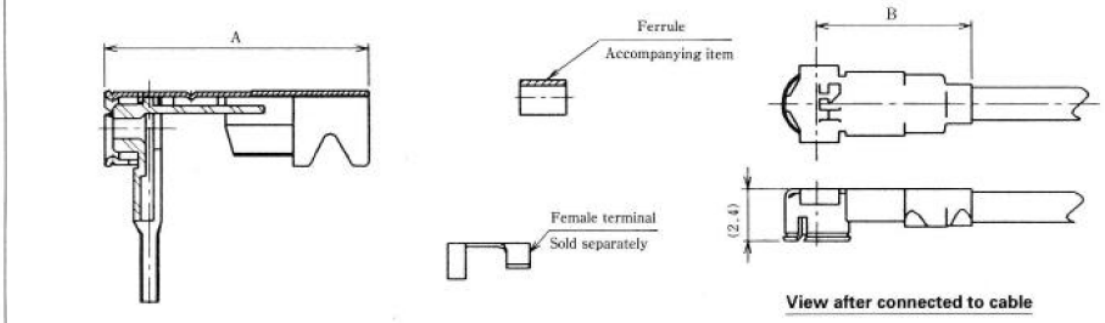
■ PERFORMANCE

Item	Rated value
Characteristic impedance	50Ω
Insulation resistance	500MΩ or greater at DC 250V
Contact resistance	20mΩ (center), 10mΩ (exterior) at DC 10mA
Dielectric strength	AC 300V (r.m.s), 1 minute
Contact service life	50 times
Voltage standing wave ratio	1.3 or less, DC to 3,000MHz (target value)

■ PRODUCT INFORMATION

▲ L-shaped plugs

Item	HRS No.	Model No.	Sales Quantities	Applicable cable	A length	B length
Right-angle plug shell	CL331-0503-4-01	H.FL-LP-DFS111 (01)	Sold by the package (100 pieces per pack)	Hitachi CO-6F and FH-SB Junkosha DFS111-UL1979 Sumitomo 0.8DS-PBE	10.4	(6.95)
	CL331-0504-7-01	H.FL-LP-A32 (01)	Sold by the package (100 pieces per pack)	Junkosha A12B0733	10.8	(7.35)
	CL331-0506	H.FL-LP-1.25C (01)	Sold by the package (100 pieces per pack)	Hitachi 1.25C-6FFH	10.4	(6.95)
Female contacts	CL331-0511-2	H.FL-LP Female contacts	Sold by the reel (10,000 contacts per reel)	The same as above		

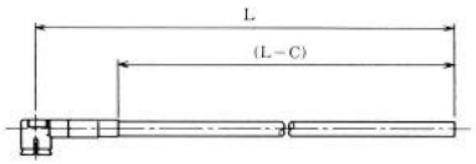


NOTE 1 : Sales quantities of the H.FL-LP-DFS111 (01), H.FL-LP-A32 (01) are in units of 1 package (containing 100 pieces).
Also note that the H.FL-LP female contacts are sold in units of 1 reel (containing 10,000 pieces).
NOTE 2 : The female contacts are sold as separate items.

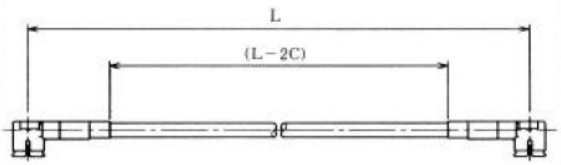
Harness Items

The dimension specifications of the harness items of the H.FL Series should be made as indicated below.

Single-end harness



Double-end harness



Please specify the dimensions from the connector center for both the double-end and single-end types.
The standard tolerances are as follows :

Total length	Tolerance (mm)
35 ~ 200	±4
201 ~ 500	±8
501 ~ 1000	±12
1001 ~	±1.5%

NOTE : The shortest length is 35 mm.

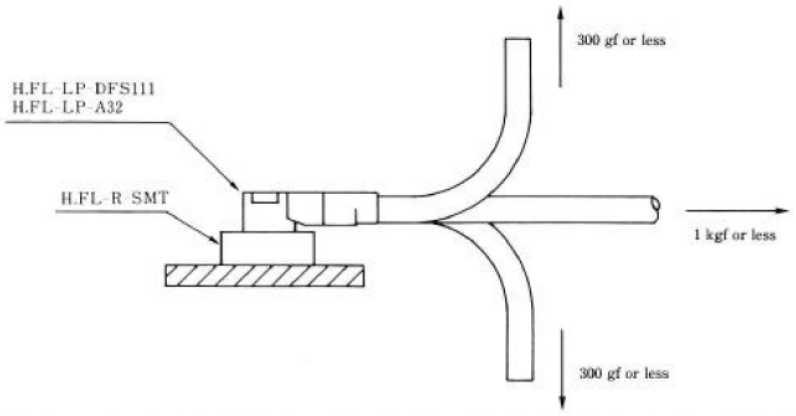
C Dimension

H.FL-LP-DFS111 : 6.95
H.FL-LP-A32 : 7.35

Usage Precautions

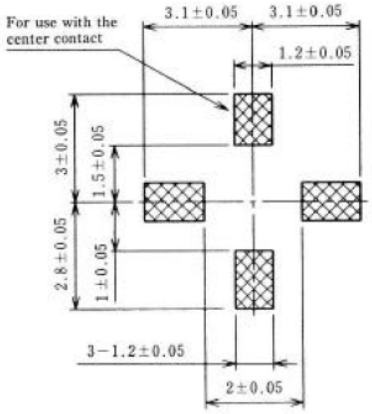
Plugs

- **Disconnection and Connection of Connectors**
  a. The disconnection and connection of the connectors is accomplished by hooking the end portion of the S.FL-LP-N or H.FL-LP-N onto the connector hook portion, aligning with the connector coupling axis, and pulling it off perpendicularly, or, holding the connector body, aligning with the connector coupling axis and pulling it off.
  Holding the cable to pull off the connector should never be attempted since doing so will damage the connector.
  b. To join connectors, the coupling axes of both connectors are aligned and inserted as perpendicular as possible.
  Do not attempt an insertion on an extreme angle.
- **Permissible Load On the Cable After Connector Coupling**
  The permissible load on the cable after connector coupling is indicated in the diagram below.
  A load in excess of this value should not be applied to the cable.



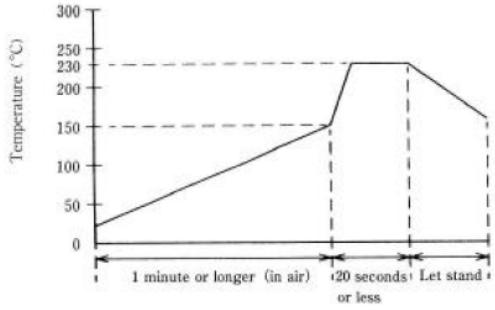
▲ Receptacles

• **Board Pattern Dimensions**



- The pattern dimensions listed to the left should be strictly observed.
  Pattern dimensions other than those specified could lead to short circuits or a drop in the binding force of the board.
- A screen thickness of 0.15 to 0.25 mm is recommended for cream solder printing.

• **Mounting Temperature Profile (Reference)**



NOTE : Reflow soldering should be conducted with a printed circuit board surface peak temperature of 240 ℃ for 5 seconds or less.
The mounting temperature profile will change depending on such factors as the size of the board, solder used, and the solder thickness.

◆ View of mounted connector