

Section	Title	Requirement statement	Compliance Directive	Board Vendor		Linaro		
				Board	Comments	Cross-check	Comments	Documented Exceptions
1	96Boards CE Physical Footprint							
1.1	Area							
1.1.1	Dimensions	The board without population of connectors shall fit into a 85 x	Required	Yes		OK		
1.1.2	Area exceptions	Connectors should not protrude from the area footprint except as component design requires (for example USB Type A front shrouds).	Highly Recommended	Yes		OK		
1.1.3	Area - Extended	A compatible extended version is defined that shall fit into a 85 x 100mm footprint with the same conditions.	If, Required	N.A.		OK		
1.2	Height							
1.2.1	PCB	62mil (1.575mm) nominal	Required	Yes		OK		
1.2.2	Below PCB	3.4 mm maximum	Required	Yes		OK		
1.2.3	Above PCB	7.0 mm maximum	Required	Yes		OK		
1.2.4	Total	Total height of the board including on board connectors shall not	Required	Yes		OK		
1.2.5	Component Height	Note that the maximum height for general components on the board top side is 4mm (not including the allowed areas for connectors and larger components)	Required	Yes		OK		
1.2.6	Maximum height in allowed area	The maximum height in the allowed areas is 6.5mm	Required	Yes		OK		
1.2.7	USB Connector height	The two Type A USB connectors which can be up to 7.0mm	Required	Yes		OK		
1.2.8	Option - Extended A	Extended area shall conform to 4mm (except for user links and thermal	If, Required	N.A.		OK		
1.2.9	Option - Extended B	Extended area and extended connector rear connector area shall use	If, Required	N.A.		OK		
1.2.9.1	Below PCB	Exceeds underside height restrictions	Optional	N.A.		OK		
1.2.9.2	Documentation	Board footprint on the underside shall be fully documented and standoffs and/or additional heat management shall be documented or provided	If, Required	Yes		OK		
2	SoC Location Options							
2.1	SoC Top Placement							
2.1.1	Height with a low-profile heatsink/fan	Total maximum height of 6.0mm	Required	Yes		OK		
2.2	SoC Bottom Placement							
2.2.1	Height	The board should meet the "Below PCB" footprint requirement	Highly	Yes		OK		
2.2.2	Heatsink	This then allows additional thermal management in the case or enclosure for the board as required	Highly Recommended	Yes		OK		
3	DRAM							
3.1	Minimum	The board shall be populated with a minimum of 0.5GB of DRAM	Required	Yes		OK		
3.2	Recommended	It is strongly recommended that a minimum of 1GB DRAM is fitted where the board is expected to run Android	Highly Recommended	Yes		OK		
4	eMMC/Flash							
4.1	On-board eMMC/Flash	The board may optionally be populated with eMMC or other format	Optional	Yes	UFS	OK		
4.2	No microSDHC boot?	If the SoC used is not able to boot from microSDHC then a minimum of 8MB of bootable flash memory shall be provided on the board	If, Required	Yes		OK		
4.3	Multiple boot options?	Where multiple boot options are provided the choice of boot location shall be user selectable in hardware (links or switches)	If, Required	Yes				
4.4	Cable insert no boot	Note that the insertion of a cable shall not automatically require boot from that cable (for example the insertion of a microUSB cable into an OTG port to use FastBoot). In this case the boot option must still be user selectable.	Required	-	Check	TBD		
5	microSDHC							
5.1	Location	A microSDHC card socket shall be fitted in the specified location on the board	Required	Yes		OK		
5.2	Bootable?	In the absence of on-board Flash memory, the system shall be capable of booting from the boot software installed on a microSDHC card at power up.	If, Required	No		OK		
6	WiFi/Bluetooth LE							
6.1	Minimum	The board shall support WiFi (minimally 802.11g/n) and Bluetooth	Required	Yes		OK		
6.2	Recommended	It is recommended that WiFi 802.11ac is also supported.	Highly	Yes		OK		
7	Display Interface							
7.1	Display Output Connector	HDMI shall be provided on a full size (Type A) or a micro Type D connector OR MHL shall be provided on a 5 pin microUSB connector OR DisplayPort which shall be provided on a USB Type C Connector	Required	Yes	Type A	OK		
7.2	Audio support	In all cases the display interface shall include audio with support for at least 1 channel	Required	Yes		OK		
7.3	Location	In all cases the connector shall be located in the specified location	Required	Yes		OK		
7.4	MIP/DSI							
7.4.1	Expansion bus	A MIPI DSI port shall be provided on the expansion bus interface.	Required	Yes		OK		
7.4.2	Number of lanes	1-4 lanes are supported. An implementation may use less than 4	Optional	2		OK		
7.4.3	MIP/DSI/HDMI priority	Note that if a single DSI interface on the SoC is used to provide both (1) the high speed expansion bus interface DSI port and (2) the on board HDMI/MHL/DisplayPort interface (via suitable transmitter), then the expansion port interface shall be operational if a mezzanine board that uses DSI is fitted	If, Required	Yes		OK		
7.4.4	MIP/DSI/HDMI simultaneous	It is then optional as to whether the on-board interface is usable at the same time	Optional	Yes	one 4 lane DSI dedicated for HDMI, second 4 lane DSI switchable between HDMI 4k output and high speed expansion interface	OK		
8	Camera Interfaces							
8.1	Expansion bus	1 or 2 MIPI CSI/2 ports may be provided on the expansion bus	Optional	-	3 x 4lane+1 x 2lane	OK		
8.2	CSI0							
8.2.1	Interface	If 1 port is provided it shall be located on the CSI0 port interface	If, Required	Yes		OK		
8.2.2	Number of lanes	From 1-4 lanes may be implemented on the CSI0 port interface	Optional	4	labelled CSI0 in pinout	OK		
8.3	CSI1							
8.3.1	Number of lanes	From 1-2 lanes may be implemented on the CSI1 port interface	Optional	2	labelled CSI1 in pinout (two additional 4 lane CSI interfaces are also provided on new HS2 connector - labelled CSI1 and CSI2)	OK		

8.4	Stereo Cameras	An implementation may support dual (stereo) cameras through the CSI0 interface if the SoC provides the necessary functionality.	Optional	Yes		OK		
8.5	Camera/Sensor Control Signals	The specified GPIO and CLK signals on the expansion connectors shall be used for these functions if implemented.	Required	Yes		OK		
8.6	No camera	If the cameras/sensors are not available/used then these signals shall be available as GPIO and CLK signals	If, Required	Yes		OK		
9	USB Ports							
9.1	Number of ports	A total of 4 USB ports shall be provided for a board.	Required	Yes	2x USB 3.0 Type A and 1 USB Type C onboard. High speed connectors have additional Type 2.0 and Type 3.0 USB capability	OK		
9.2	Ports 1 & 2							
9.2.1	Type	Two Type A or 1 Type C USB host ports (USB 2.x or 3.x) shall be	Required	Yes	Type A USB 3.0	OK		
9.2.2	Location	The connectors shall be in the specified locations.	Required	Yes		OK		
9.3	Port 3	There are two options for Port 3:						
9.3.1	Location	The connector shall be placed in the specified location.	Required	Yes		OK		
9.3.2	Slave	The third port shall be available as a slave port.	Required	Yes		OK		
9.3.3	OTG	The third port may be an OTG port.	Optional	Yes		OK		
9.3.4	Option 1							
9.3.4.1	Type	A 5 pin microUSB USB 2.0 slave port shall be provided.	Required, OR	N.A.		OK		
9.3.4.2	Connector type	The connector type shall be micro-AB for an OTG port or micro-B for	If, Required	N.A.		OK		
9.3.4.3	Power	This port shall not provide power to the board, due to insufficient	If, Required	N.A.		OK		
9.3.5	Option 2							
9.3.5.1	Type	A Type C USB port shall be provided (USB 2.x or 3.x).	Required, OR	Yes		OK		
9.3.5.2	Power	This port may also be used to provide 5V external power to the board.	Optional	No		OK		
9.4	Port 4							
9.4.1	Type	A fourth USB host port shall be provided on the high speed expansion bus.	Required	Yes	USB 2.0 and USB 3.0	OK		
9.5	Restrictions							
9.5.1	Simultaneous use	There may be some restrictions on simultaneous USB port usage.	Optional	No		OK		
9.5.2	Documented	Any such restrictions shall be clearly documented.	If, Required	N.A.		OK		
10	Audio							
10.1	Port 1							
10.1.1	Type	I/O via Bluetooth 4.0	Required	Yes		OK		
10.2	Port 2							
10.2.1	Type	Output through the HDMI/MHL/DisplayPort interface	Required	Yes		OK		
10.3	Port 3							
10.3.1	Type	An I2S/PCM audio channel shall be provided on the low speed expansion interface.	Required	Yes	Additional PCM/I2S also provided on LS2	OK		
11	DC Power							
11.1	Source	Power shall be provided to the board by one (and only one) of the						
11.1.1	DC Jack	An 8V to 18V power supply from a dedicated DC jack power connector. A 1.65mm center pin positive DC jack connector, CUI Inc PJ-041H or equivalent, shall be placed in the specified location.	Required, OR	Yes		OK		
11.1.2	Expansion bus	An 8V to 18V power supply from the SYS_DCIN pins on the low speed expansion connector.	Required, OR	Yes		OK		
11.1.3	USB Type C	A USB Type C port at 5V (if fitted) according to the USB 3.1 specifications.	Required, OR	Yes		OK		
11.2	Multiple supplies							
11.2.1	Safety	If multiple in-specification supplies are connected there shall not be a safety issue	Required	Yes		OK		
11.2.2	Damage	There shall be no damage to the board.	Required	Yes		OK		
11.3	Common for all supplies	The board shall be able to provide the following power to external devices when powered from (a) a sufficiently rated power supply is connected to the DC Jack (b) the Expansion connector or from (c) a Type C USB port (when power does not have to be provided on the SYS_DCIN line)						
11.3.1	Mezzanine +5V	A minimum of 5W to a mezzanine module via the regulated +5V line	Required	Yes		OK		
11.3.2	USB Hosts	A minimum of 5W to external USB devices connected to the 2 host USB ports	Required	Yes		OK		
11.3.3	Mezzanine 1.8V	A minimum of 0.18W to a mezzanine module via the regulated +1.8V line	Required	Yes		OK		
11.4	Only DC Jack supply	The board shall be able to provide the following power to external devices when a sufficiently rated power supply is connected to the DC Jack:						
11.4.1	Mezzanine SYS_DCIN	A minimum of 7W to a mezzanine module via the SYS_DCIN line	If, Required	Yes		OK		
12	Battery Power							
12.1	Battery	A board could be powered either by a low cost power supply that is only capable of providing power for the board and for low power mezzanine boards, or by an external battery (for example from the SYS_DCIN line or a separate battery connection)	Optional	Yes	no charging	OK		
12.2	Limitations	Limitations on available power covering the use of smaller and/or battery power supplies shall be clearly documented.	Required	Yes		OK		
13	Measurement, Instrumentation and Testing							
13.1	Power Measurement							

13.1.1	Minimum	A minimum of 1 current sense resistor shall be placed to permit basic power measurement functions.	Required	Yes		OK		
13.1.2	Power	The total power consumption of the board shall be measurable through a suitable 1% current sense resistor.	Required	Yes		OK		
13.1.3	Installed	This may be a developer install option (i.e. the sense resistor may be shipped as a zero ohm resistor for production boards that a developer can replace for power measurement)	Optional	Yes		OK		
13.1.4	Location	The sense resistor shall be placed on the main board power supply to measure the total base board power.	Required	Yes		OK		
13.1.5	Mezzanine power	It is optional as to whether this will measure any mezzanine board power usage.	Optional	Yes		OK		
13.2	Other resistors	Additional current sense resistors may be placed at the discretion of the board designer.	Optional	Yes		OK		
13.3	Recommended resistors	It is recommended that additional sense resistors are provided for the main PMIC downstream supplies to the SoC core, memory etc.	Highly Recommended	No		OK		
13.4	External	Current sense resistors shall be made available externally to measurement equipment.	Required	Yes		OK		
13.5	Headers	The PCB design shall provide for low profile male 0.1" header pins to enable the connection of.	Required	Yes		OK		
13.5.1	Sense Resistor	A single ground pin (for voltage measurement). The Low speed expansion connector may be documented as being usable for the ground pin requirement.	Required	Yes		OK		
13.5.2	Ground		Required	Yes		OK		
13.5.3	Populated	This header (or headers) may be unpopulated on a retail 96Boards CE board (enabling users to add the headers themselves).	Optional	Yes	Low speed connector may be used as allowed by spec	OK		
14 Power Button and Reset Button								
14.1	Minimum	The user shall be able to manually power up/down and reset the board.	Required	Yes		OK		
14.2	External	It shall be possible to connect external switches for power on/off and for hard reset.	Required	Yes		OK		
14.3	Mezzanine	This shall be implemented using the specified pins on the low speed bus connector (adjacent pins allowing direct connect of a 3 pin connector for both switches).	Required	Yes		OK		
14.4	Auto power on	It shall be possible to configure the board to power up automatically if external power is removed and then re-applied.	Required	Yes		OK		
14.5	Auto power on default	This may either be default operation or through a configuration option (e.g. link or switch).	Optional	Yes		OK		
15 External Fan Connection								
15.1	Connection	An external fan (for example for a case) connection is available on the low speed expansion connector by using a 2 pin male header for +5V or +12V fans.	Required	Yes		OK		
16 UART								
16.1	UART 1	One standard UART from the SoC shall be made available for general purpose use on the low speed expansion connector.	Required	Yes		OK		
16.2	additional UARTs	A second UART (TXD/RXD only) may be made available on the low speed expansion connector.	Optional	Yes		OK		
17 JTAG								
17.1	JTAG	JTAG facilities may be provided on a board.	Optional	Yes		OK		
17.2	Connector	If implemented the JTAG interface shall use the 10 pin JTAG	If Required	No		OK		
18 System and User LEDs								
18.1	Required	The following LEDs shall be present on the board.	Required	Yes		OK		
18.1.1	WiFi activity LED	Yellow Type: 0603 SMD	Required	Yes		OK		
18.1.2	Bluetooth activity LED	Blue Type: 0603 SMD	Required	Yes		OK		
18.1.3	User LEDs x4	Green Type: 0603 SMD	Required	Yes		OK		
18.2	Size, Color, Location	The LEDs shall be of the specified size, color and location.	Required	Yes		OK		
18.3	User LEDs	The User LEDs shall be directly programmable from the SoC.	Required	Yes		OK		
19 Front Panel and DC Jack Connectors								
19.1	Through hole	The front panel connectors (Display, USB Type A and microUSB/USB Type C) and the DC Jack connector shall include through-PCB mechanical support.	Required	Yes		OK		
19.2	SMT	While surface mount electrical connections are acceptable, a fully surface mount connector without any in/through board mechanical support shall not be used.	Required	Yes		OK		
20 Expansion Connectors								
20.1	Number	Two expansion connectors shall be provided.	Required	Yes	5 provided (3 low speed, 2 high speed)	OK		
20.2	Low Speed Expansion Connector							
20.2.1	Type	A 40 pin low profile female 2mm receptacle (20x2) 4.5mm height is specified.	Required	Yes		OK		
20.2.2	Part Numbers	Molex 87381-4063 OR FCI 55510-140LF OR Samtec TLE-120-01-G-DV OR TE 4-1470209-3 OR TE 4-1734506-3 OR FCI 63453-140LF	Optional	Yes		OK		
20.2.3	Logic Levels	Unless otherwise indicated the low speed expansion connector signals are at 1.8V logic levels.	Required	Yes		OK		
20.2.4	Keep out	Since a shrouded part can be used the connector footprint should be 43.0x6.5mm with no other components on the board top side in this area.	Required	Yes		OK		

20.2.5	Interfaces							
20.2.5.1	UART0	One UART shall be provided on the low speed expansion bus	Required	Yes		OK		
20.2.5.2	UART1	A second UART may be provided	Optional	Yes		OK		
20.2.5.3	SPI	One SPI bus master shall be provided on the low speed expansion	Required	Yes		OK		
20.2.5.4	I2C x 2	Two I2C interfaces shall be provided on the low speed expansion	Required	Yes		OK		
20.2.5.4.1	Pullups	It is recommended that a 2K2R pullup is provided on each I2C signal, dependent on any relevant drive/pullup specifications of the SoC.	Highly Recommended	Yes		OK		
20.2.5.5	I2S	One PCM/Inter IC Sound (I2S) PCM audio data bus shall be provided on the low speed expansion bus.	Required	Yes		OK		
20.2.5.6	GPIO x 12	12 GPIO lines shall be provided on the low speed expansion bus.	Required	Yes		OK		
20.2.5.7	Reset and Power button	Reset and Power external request signals shall be provided	Required	Yes		OK		
20.2.5.7.1	Logic Levels	These signals shall be active low.	Required	Yes		OK		
20.2.5.8	1.8V, 5V and DC, IN power supplies	Power supplies	Required	Yes		OK		
20.3	High Speed Expansion Connector							
20.3.1	Type	A 60 pin 0.8mm high speed Board to Board low profile receptacle connector is specified.	Required	Yes		OK		
20.3.2	Part Numbers	FCI 61082-061409LF OR TE5177983-2	Optional	Yes		OK		
20.3.3	Logic Levels	unless otherwise indicated the high speed expansion connector signals are at 1.8V logic levels.	Required	Yes		OK		
20.3.4	Interfaces							
20.3.4.1	MIPI DSI	A MIPI DSI interface shall be provided on the high speed expansion bus.	Required	Yes		OK		
20.3.4.2	USB	One USB host port shall be provided on the high speed expansion bus.	Required	Yes		OK		
20.3.4.2.1	Logic Levels	In many designs the USB port is expected to come from a USB hub solution ready for direct connect to a USB interface, therefore these signals are specified at USB PHY signal levels.	Required	Yes		OK		
20.3.4.3	SD or SPI interface	The expansion port shall be configured with either an SD port or a second SPI Port SD Configuration	Required	SD		OK		
20.3.4.4	MIPI CSI-2 (x2 optional)	Two MIPI CSI-2 interfaces may be provided on the high speed expansion bus.	Optional	-	4 provided	OK		
20.3.4.5	I2C	Two I2C interfaces may be provided on the high speed expansion bus.	Optional	2		OK		
20.3.4.5.1	with CSI	If one or two CSI2 interfaces are implemented then at least the same number of I2C interfaces shall be provided on the high speed expansion bus.	Required	Yes		OK		
20.3.4.5.2	Pullups	It is recommended that a 2K2R pullup is provided on each I2C signal, dependent on any relevant drive/pullup specifications of the SoC.	Highly Recommended	Yes		OK		
20.3.4.6	HSIC	One MIPI-HSIC interface may be provided on the high speed expansion bus.	Optional	No		OK		
20.3.4.7	Reserved	One pin shall be reserved for future use. It shall be pulled up via 100K to 1.8V.	Required	Yes		OK		
20.3.4.8	Clocks	One or two programmable clock interfaces may be provided on the high speed expansion bus.	Optional	2		OK		
20.3.4.8.1	with CSI	If CSI camera(s) are supported on mezzanine boards these clocks shall be available as the CSI reference clocks (in case they are needed)	Required	Yes		OK		
20.4	GPIO-A	GPIO-A shall be capable of waking up the SoC from sleep/standby mode	Required	Yes		OK		
20.5	GPIO Default	By default all GPIO pins should be configured at boot as inputs to the SoC.	Required	Yes		OK		
21	Standalone Functionality							
21.1	Minimum	The standalone board requires only a power supply and display connected to be used as an advanced single board computer (using wireless keyboard/mouse/WiFi & Bluetooth).	Required	Yes		OK		
22	Software							
22.1	License compliance	All the sources required to rebuild the image are downloadable via public git repositories where the license (e.g. GPL) requires it.	Required	Yes		OK		
22.2	User changes							
22.2.4	Software replacement	It shall be possible to replace or update the bootloader, kernel and roots	Required	Yes		OK		
22.2.5	Unbricking a board	It shall be possible to recover from a "bricked" board (for example as a result of use of a user built bootloader) without specialized additional hardware	Required	Yes	using fastboot	OK		
22.3	Core Functionality	The bundled software enables all mandatory HW specified in the 96Boards specification e.g. USB, Display, Connectivity, Serial, on-board switches and LEDs, various mandatory interfaces on the LS and HS connectors	Required	Yes		OK		
23	Licensing							
23.1	Binary software							
	License to Linaro	Binary distribution license to Linaro/96Boards to allow any binaries to be redistributed on the 96Boards website	Required	Yes		OK		
	License to Board Manufacturer	Binary distributions license to allow board manufacturer to ship all necessary binaries	Required	Yes		OK		
24	Documentation							
24.1	Board schematics	Board schematics shall be available under CC BY 4.0 licence on the 96Boards.org site	Required	Yes		OK		
24.2	Board BOM	BOM for the board	Optional	Yes		OK		
		Includes information on hardware and software interfaces to enable the maker community and developers of bootloaders, kernels and OS distributions. This information will be contributed in specified markup language to be hosted on 96Boards.org		Yes		OK		
24.3	Board User Manual		Required	Yes		OK		
24.4	SoC Programmers Technical Reference Manual	The manual shall include sufficient information for developers to be able to create board drivers and software interfaces for the supported SoC features	Required	Yes		OK		
25	Misc							
25.1	96Boards team board sample delivery	The 96Boards team is to be sent no less than 7 (seven) sample boards for support, testing, documentation, website, engineering, projects, etc...	Required	Yes		OK		