



# **iMX93 Industrial Module**

## ***Rev. V112***

## Datasheet

DATE	REVISION	CHANGES
November 4, 2024	1.0	Initial Release

## Table of Contents

<b>1. Introduction</b>	3
1.1. <a href="#">Hardware</a>	3
1.2. <a href="#">Software</a>	4
1.3. <a href="#">Bootling Options</a>	4
1.4. <a href="#">Features Summary</a>	5
1.5. <a href="#">Reference Documents</a>	5
<b>2. Functional Processor Description</b>	6
2.1. <a href="#">i.MX 93 Series Applications Processors Block Diagram</a>	6
2.2. <a href="#">Target Applications</a>	6
2.3. <a href="#">CPU Features Comparison</a>	7
<b>3. iMX93 Industrial Module Signal Description</b>	8
3.1. <a href="#">iMX93 Industrial Module Block Diagram</a>	8
3.2. <a href="#">IO Types Notation</a>	9
3.3. <a href="#">J1 - 100 Contacts Board Stacking Connector</a>	9
3.4. <a href="#">J2 - 100 Contacts Board Stacking Connector</a>	11
3.5. <a href="#">J3 - 100 Contacts Board Stacking Connector</a>	13
3.6. <a href="#">Mating Connectors</a>	15
<b>4. Technical Specification</b>	17
4.1. <a href="#">Electrical - Power Distribution Tree</a>	17
4.2. <a href="#">Electrical - Powering Options</a>	17
4.3. <a href="#">Electrical - Typical Power Consumption</a>	18
iMX93 Industrial Development Kit LITE	18
iMX93 Industrial Development Kit BASIC	18
iMX93 Industrial Development Kit PRO	18
iMX93 Industrial Development Kit MAX	18
4.4. <a href="#">Product Image</a>	19
4.5. <a href="#">Assembly Drawing</a>	20
4.6. <a href="#">Mechanical</a>	21
4.7. <a href="#">Temperature Range</a>	22
4.8. <a href="#">ISO Certification of Voipac Production</a>	22
4.9. <a href="#">CE Compliance of Voipac Products</a>	22
4.10. <a href="#">RoHS, REACH, UL94, Conflict Minerals, WEEE and Waste Recycling Declarations Compliance</a>	23
<b>Warranty</b>	24
<b>Disclaimer</b>	24
<b>Trademark Acknowledgment</b>	24

## 1. Introduction

### 1.1. Hardware

This highly-integrated system on module, based on the industry-tailored NXP i.MX 93 processor, combines energy-efficiency and cost-effectivity with excellent performance and AI on-device processing. The module features robust connectors, wide diameter standardized-pitch mounting holes and ready-to-use industrial peripherals including double CAN, double 1Gbps Ethernet or ADCs, making it an ideal choice for stable-performance embedded system operating in harsh environments.

The iMX93 Industrial Module provides all of the must-have peripherals of a standard embedded system and moreover includes multiple development demanding parts soldered right on the COM, such as: dual 1Gb Ethernet PHY + Audio chip + EEPROM memory + WiFi 6 and Bluetooth 5.3 module, thus significantly reduces new product time-to-market.

The module also features the industry's first dedicated neural processing unit (NPU) delivering low-power machine learning performance and system-level AI in-device capabilities. This combination empowers building powerful applications that drive the future of artificial intelligence such as IoT devices, human-machine interface (HMI) or [voice recognition solutions](#).

This is a passive-cooled solution, delivering an exceptional thermal performance without efficiency sacrifice, ideal for battery-powered applications where heatsink usage is not possible.

Three robust, 100-pin, shielded connectors with wide mating length and operating temperature range provide perfect board-to-board connection for demanding applications. These connectors with 3mm default stacking height feature shielding metal fittings along the connector signal pins, both on the module and the baseboard, ideal for a stable-performance embedded system as well as for conformal coating.

Furthermore, to ensure this i.MX 93 COM / SOM fits into your final device, its design was compressed into less than 2/3 of a credit card surface area, 1.6mm thin, HDI micro-via Level III, 10-layer PCB.

The [confidential schematic](#) of the iMX93 Industrial Module in PDF, providing answers to further engineering questions, is also included in complete development kit, and becomes available right after the development kit purchase.

## 1.2. Software

Voipac fully supports Linux operating system with drivers for all basic interfaces. Customized drivers for specific applications can be developed upon request.

OPERATING SYSTEM	DESCRIPTION
Linux	Yocto 5.0 (Scarthgap) (Linux version 6.6) preinstalled on eMMC Flash
Debian	Debian 12 (Bookworm) – porting in progress

## 1.3. Booting Options

The standard configuration iMX93 Industrial Module comes with virgin e-Fuses for booting. Standard development kits are set for direct boot from eMMC Flash located on the module. Normal Boot options are:

BOOT DEVICE OPTIONS	DESCRIPTION
MMC/eMMC	Supported by VOIPAC Development Kit
SD/eSD	Supported by VOIPAC Development Kit
Serial NOR/NAND	Available at customized carrier board

The CPU supports following boot mode configurations:

- Boot From e-Fuses: Standard mode
- Serial Downloader: USB mode
- Normal Boot: Depending on values of GPIO pins, booting device is selected (without the need of changing e-Fuses settings)

**NOTE:** All associated pins used for boot configuration are available on 3x 100pin connectors. To ease the prototyping, all the signals are also connected to DIP switches placed on the baseboard.

SINGLE BOOT - Cortex-A55 Boot Core		
BMODE(3:0)	BOOT DEVICE	COMMENT
0000	Boot from Internal Fuses	
0001	Serial Downloader	USB1
0010	USDHC1 8-bit eMMC 5.1	Webshop default
0011	USDHC2 4-bit SD 3.0	
0100	Flex SPI Serial NOR	
0101	Flex SPI Serial NAND 2K	
0110	Infinite Loop	
0111	Reserved	

LOW POWER BOOT - Cortex-M33 Boot Core		
BMODE(3:0)	BOOT DEVICE	COMMENT
1000	Boot from Internal Fuses	
1001	Serial Downloader	USB1
1010	USDHC1 8-bit eMMC 5.1	
1011	USDHC2 4-bit SD 3.0	
1100	Flex SPI Serial NOR	
1101	Flex SPI Serial NAND 2K	
1110	Infinite Loop	
1111	Reserved	

**NOTE:** More Information available in i.MX 93 Applications Processor Reference Manual Chapter 9: System Boot.

## 1.4. Features Summary

FEATURE	DESCRIPTION
CPU	<ul style="list-style-type: none"> <li>• NXP i.MX 93 Solo / Dual ARM® Cortex®-A55 0.9 / 1.7GHz</li> <li>• Real-time co-processor ARM Cortex-M33 250MHz</li> <li>• Edge AI micro Neural Processing Unit (NPU) Ethos™-U65</li> </ul>
DDR4 SDRAM	LPDDR4(X)-3733 (1.866GHz) SDRAM 512 / 1024 / 2048 MB
eMMC	1x eMMC Flash 4 / 8 / 16 / 32 / 64 GB
SD Card	1x SD (4bit)
I2C EEPROM	1 MBit
VIDEO OUT	<ul style="list-style-type: none"> <li>• MIPI-DSI (up to 1920x1200p60)</li> <li>• LVDS (up to 1280x800p60)</li> </ul>
VIDEO IN	MIPI-CSI2 (up to 1080p30)
AUDIO	Digital Audio (SAI), Analog Audio codec (Analog / Digital Microphone, Line In/Out, Headphones Out)
ETHERNET	2x 10/100/1000 Mbps
WiFi	WiFi 6 (802.11 a/b/g/n/ac/ax 2.4 and 5GHz) / WiFi 4 (802.11 a/b/g/n 2.4 and 5GHz) on module
Bluetooth	Bluetooth 5.3 / Bluetooth 5.2 on module
CAN	2x CAN-FD (Flexible Data-Rate)
USB	2x USB 2.0
OTHER IO	8x UART / GPIOs / 4x PWM / 8x I2C / 2x I3C / 7x I2S / 1x Octal SPI / 8x SPI / 1x NAND (8bit)
SYSTEM SIGNALS	Reset IN/OUT, ON/OFF, 4x Boot mode, Power OK, User button
OTHER SIGNALS	4x 12-bit ADC, 4x Clock OUT, 2x Tamper, JTAG

## 1.5. Reference Documents

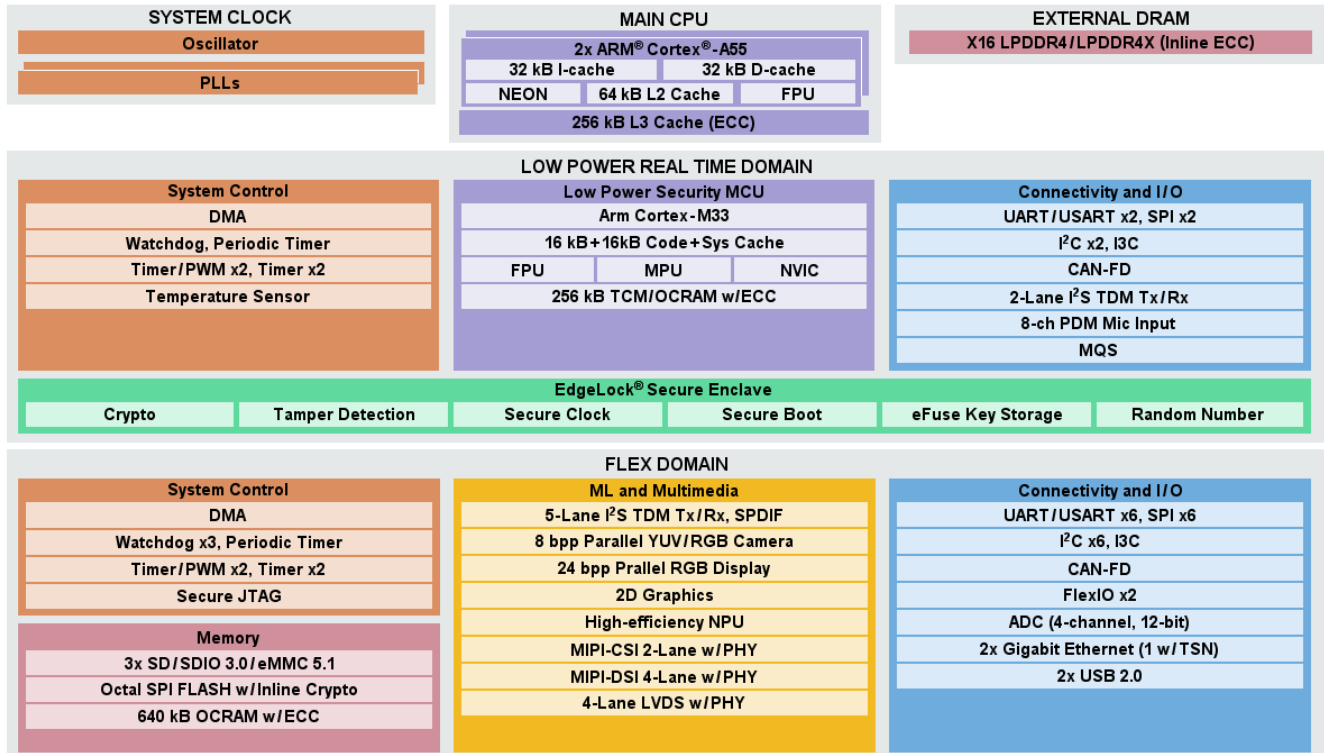
For more detailed technical information about the iMX93 Industrial Module components, please refer to the web resources and documents listed below.

COMPONENT	MANUFACTURER	DESCRIPTION	CLI*
i.MX 93 Processor	NXP Semiconductors	<a href="#">Commercial</a> , <a href="#">Extended</a> / <a href="#">Industrial</a>	<b>U1</b>
DDR4 SDRAM Memory	Micron Technology, Inc.	<a href="#">MT53E1G16D1FW-046</a> , <a href="#">MT53E256M16D1DS-046</a>	<b>U2</b>
I2C EEPROM	ON Semiconductor	<a href="#">CAT24M01HU51-GT3</a>	<b>U3</b>
iNAND eMMC Flash	SanDisk Corporation	<a href="#">SDINBDG4-16G-I1</a> , <a href="#">SDINBDG4-8G</a>	<b>U4</b>
iNAND eMMC Flash	Alliance Memory, Inc.	<a href="#">ASFC4G31M-51BIN</a>	<b>U4</b>
Ethernet Controller	Realtek Semiconductor Corp.	<a href="#">RTL8211FI-CG</a>	<b>U5</b> <b>U14</b>
AUDIO	Cirrus Logic, Inc.	<a href="#">WM8904CGEFL/RV</a>	<b>U6</b>
WiFi and Bluetooth	u-blox	<a href="#">MAYA-W260-00B</a> , <a href="#">MAYA-W160-00B</a>	<b>U10</b>
Power Management IC	NXP Semiconductors	<a href="#">PCA9451AHNY</a>	<b>U13</b>
I2C GPIO Expander	NXP Semiconductors	<a href="#">PCA9535BS,118</a>	<b>U15</b>

\*CLI - iMX93 Industrial Module Component Location Indication.

## 2. Functional Processor Description

### 2.1. i.MX 93 Series Applications Processors Block Diagram



### 2.2. Target Applications

The i.MX 93 processor features NXP advanced and power-efficient implementation of the ARM® Cortex®-A55 core, with a 250MHz Arm Cortex-M33 processor which performs time-critical real-time compute and control. The i.MX 93 family marks the industry's first implementation of the Arm Ethos™-U65 microNPU (NPU - Neural Processing Unit). Ethos-U65 enables developers to create high-performance, cost-effective and energy-efficient Machine Learning (ML) applications. Besides countless other potential uses, the i.MX 93 CPU is also suitable for the following applications:

AUTOMOTIVE	
Audio and Speech Recognition	Low-cost Gateway
Domain Controller Compute Off-load Engine	Driver Monitoring System
INDUSTRIAL AUTOMATION	
Gateways	Remote I/O Controllers
Industrial Scanners	<a href="#">Industrial HMI</a>
Machine Vision	Public Address Systems
BUILDING CONTROL AND ENERGY	
Energy Meters	EV Charging
SMART CITY	
Smart Lighting	Safety and Security
Traffic Control	
SMART HOME	
Home Security Hub	Smart Doorbell
Smart Lock	Smart Thermostat
<a href="#">Set Top Boxes</a>	Audio / Video (AV) Receivers
Surround Sound and Sound Bars	Wireless or Networked Speakers

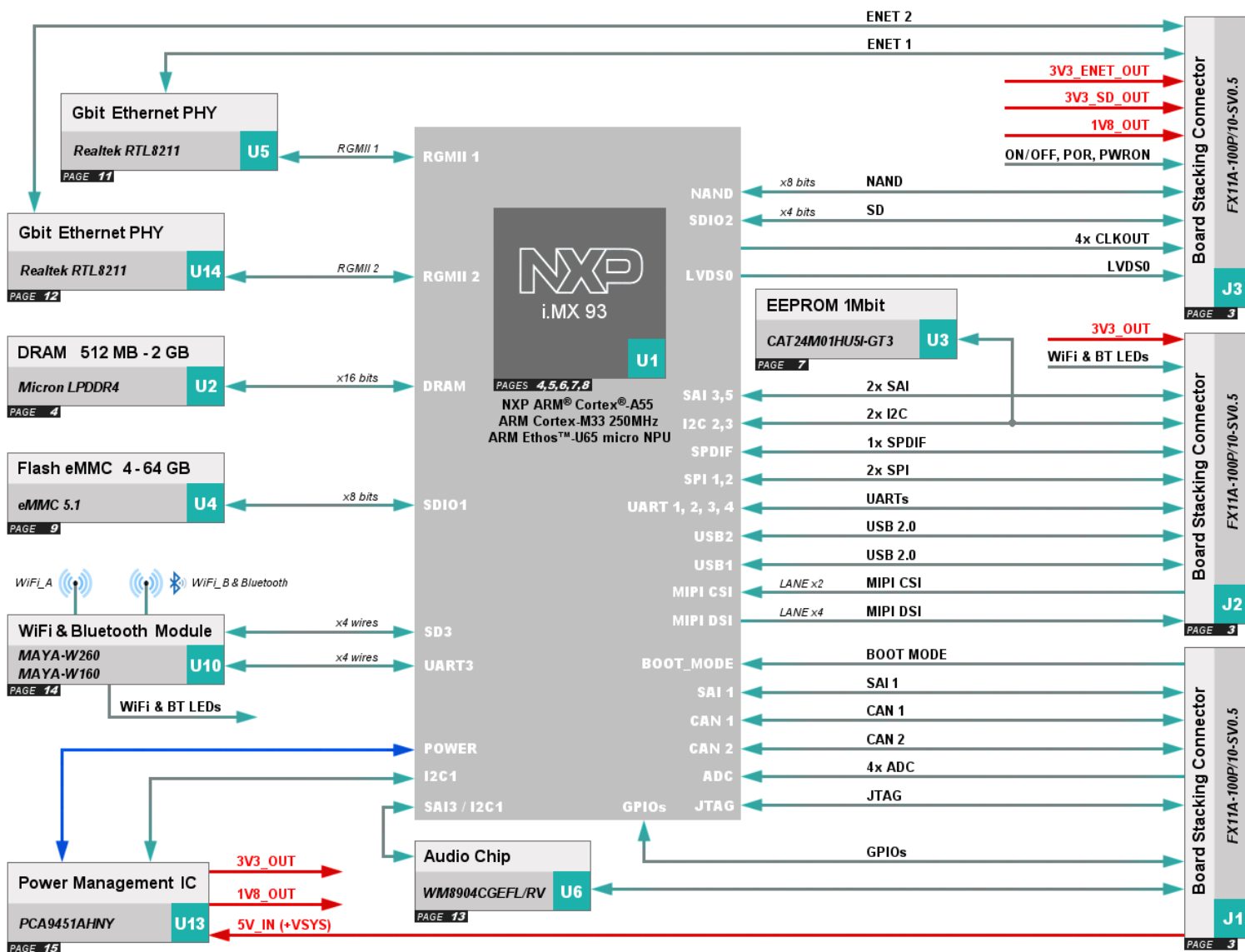
### 2.3. CPU Features Comparison

FEATURE	i.MX 93 DUAL	i.MX 93 SOLO
CPU	2 x ARM® Cortex®-A55 1.7GHz	ARM® Cortex®-A55 900MHz / 1.7GHz
Real-time co-processor	ARM Cortex-M33 250MHz	
Neural Processing Unit	ARM Ethos™-U65 micro NPU	
DDR4 transfer rate	3.7 GT/s	1.866 / 3.7 GT/s
Connectivity	2x GbE, 2x USB 2.0	
Display	4-lane 1080p60 MIPI DSI, 4-lane LVDS	
Camera	2-lane 1080p30 MIPI CSI	

### 3. iMX93 Industrial Module Signal Description

This chapter describes the signals of the iMX93 Industrial Module. Some pins have dedicated functionality, but most of them are highly multiplexed, so that the same pin can serve different roles and the same functionality can be selected on different pins. Each of these multiplexed pins is also usable as a General Purpose Input/Output pin (GPIO). Additionally, each GPIO pin can be set as an interrupt source.

#### 3.1. iMX93 Industrial Module Block Diagram



**NOTE:** The page number in **black field** refers to the iMX93 Industrial Module schematics document page. The confidential schematics is provided to each development kit.



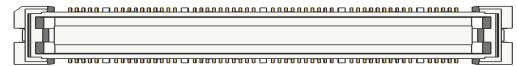
### 3.2. IO Types Notation

TYPE	DESCRIPTION	TYPE	DESCRIPTION
PWR	Power	G	Ground
I	Input	O	Output
I/O	Input / Output		

### 3.3. J1 - 100 Contacts Board Stacking Connector (CONN RCPT 100POS SMD GOLD)

Description: J1 Board-to-board shielded connector connects the module to the baseboard. 100 low-density pins with additional ground strips provide strong and reliable peripheral connection.

Manufacturer: Hirose Electric Co. Ltd.  
 Connector: [FX11A-100P/10-SV0.5\(71\)](#)



**J1**

DESCRIPTION	TYPE	PIN NAME		PIN	PIN		PIN NAME	TYPE	DESCRIPTION
Connector Ground Plate	G	GND		111					
Analog Microphone Left	I	MICIN_L	A U D I O	1	2	A U D I O	DMIC1_IN	I	Digital Microphone 1
Analog Microphone Right	I	MICIN_R		3	4		DMIC2_IN	I	Digital Microphone 2
Headphone Output Ground Loop Noise Rejection Feedback	I	HP_OUT_FB		5	6		LINE_OUT_L	O	
Headphone Output Right	O	HP_OUT_R		7	8		LINE_OUT_R	O	
Headphone Output Left	O	HP_OUT_L		9	10		LINE_OUT_FB	I	
Ground	G	GND		101	102		GND	G	Ground
	O	*SAI1_TXFS	S A I 1	11	12	B O O T	DMIC_CLK	O	Digital Microphone Clock
	O	SAI1_TXC		13	14		GND	G	Ground
	O	*SAI1_TXD0		15	16		BOOT_MODE0	I	
	I	SAI1_RXD0		17	18		BOOT_MODE1	I	
	O	CAN1_TX	C A N	19	20	A D C	GND	G	Ground
Ground	G	GND		21	22		ADC0	I	
	I	CAN1_RX		23	24		ADC1	I	
	O	CAN2_TX		25	26		ADC2	I	

DESCRIPTION	TYPE	PIN NAME	PIN	PIN	PIN NAME	TYPE	DESCRIPTION
	I	CAN2_RX	27	28	GND	G	Ground
	I	BOOT_MODE2	29	30	ADC3	I	
Ground	G	GND	103	104	GND	G	Ground
Available in custom configurations only	I/O	GPIO_IO12_CON	31	32	GPIO_IO14_CON	I/O	Available in custom configurations only
	I/O	GPIO_IO13_CON	33	34	GPIO_IO15_CON	I/O	
Ground	G	GND	35	36	GND	G	Ground
Available in custom configurations only	I/O	GPIO_IO16_CON	37	38	GPIO_IO19_CON	I/O	Available in custom configurations only
	I/O	GPIO_IO17_CON	39	40	GPIO_IO20_CON	I/O	
Ground	G	GND	41	42	GPIO_IO23	I/O	Voice Cmd Demo LED
Available in custom configurations only	I/O	GPIO_IO21_CON	43	44	BOOT_MODE3	I	
	I/O	GPIO_IO22_CON	45	46	GND	G	Ground
Ground	G	GND	47	48	GPIO_IO26_CON	I/O	Available in custom configurations only
Voice Cmd Demo PWM	I/O	GPIO_IO24	49	50	NC		
Ground	G	GND	105	106	GND	G	Ground
		NC	51	52	NC		
		NC	53	54	NC		
Ground	G	GND	55	56	GND	G	Ground
		NC	57	58	NC		
		NC	59	60	NC		
Ground	G	GND	61	62	GND	G	Ground
		NC	63	64	NC		
		NC	65	66	NC		
Ground	G	GND	67	68	GND	G	Ground
		NC	69	70	NC		
Ground	G	GND	107	108	GND	G	Ground
	I	JTAG_TMS	71	72	JTAG_TCK	I	
	O	JTAG_TDO	73	74	GND	G	Ground
	I	JTAG_TDI	75	76	JTAG_nTRST	I	
Ground	G	GND	77	78	GND	G	Ground
Ground	G	GND	79	80	GND	G	Ground
Ground	G	GND	81	82	GND	G	Ground
Input Voltage (from +3.4V to +5.5V)	PWR	+VSYS	83	84	+VSYS	PWR	Input Voltage (from +3.4V to +5.5V)
	PWR	+VSYS	85	86	+VSYS	PWR	
	PWR	+VSYS	87	88	+VSYS	PWR	
	PWR	+VSYS	89	90	+VSYS	PWR	
Ground	G	GND	109	110	GND	G	Ground

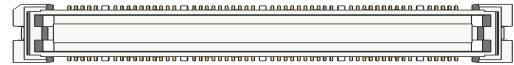
DESCRIPTION	TYPE	PIN NAME		PIN	PIN		PIN NAME	TYPE	DESCRIPTION
Input Voltage (from +3.4V to +5.5V)	PWR	+VSYS	<b>P O W E R</b>	<b>91</b>	<b>92</b>	<b>P O W E R</b>	+VSYS	PWR	Input Voltage (from +3.4V to +5.5V)
	PWR	+VSYS		<b>93</b>	<b>94</b>		+VSYS	PWR	
	PWR	+VSYS		<b>95</b>	<b>96</b>		+VSYS	PWR	
	PWR	+VSYS		<b>97</b>	<b>98</b>		+VSYS	PWR	
	PWR	+VSYS		<b>99</b>	<b>100</b>		+VSYS	PWR	
Connector Ground Plate	G	GND		<b>112</b>					

**\*NOTE:** These signals share the same CPU pad with Boot Mode signals. Extreme care is recommended during power up sequence.

### 3.4. J2 - 100 Contacts Board Stacking Connector (CONN RCPT 100POS SMD GOLD)

Description: J2 Board-to-board shielded connector connects the module to the baseboard. 100 low-density pins with additional ground strips provide strong and reliable peripheral connection.

Manufacturer: Hirose Electric Co. Ltd.  
Connector: [FX11A-100P/10-SV0.5\(71\)](#)



**J2**

DESCRIPTION	TYPE	PIN NAME		PIN	PIN		PIN NAME	TYPE	DESCRIPTION
Connector Ground Plate	G	GND		<b>111</b>					
WiFi/BT Module Audio Interface	I	SAI5_RXD0	<b>S A I 5</b>	<b>1</b>	<b>2</b>		NC		
	I	SAI5_RXC		<b>3</b>	<b>4</b>		NC		
	I	SAI5_RXFS		<b>5</b>	<b>6</b>		NC		
Ground	G	GND		<b>7</b>	<b>8</b>		GND	G	Ground
WiFi/BT Module Audio Interface	O	SAI5_MCLK			<b>9</b>	<b>10</b>		NC	
Ground	G	GND		<b>101</b>	<b>102</b>		GND	G	Ground
	O	LED_BT	<b>L E D</b>	<b>11</b>	<b>12</b>		TAMPER0	I	
	O	LED_WLAN		<b>13</b>	<b>14</b>		TAMPER1	I	
Signals pulled to +VDD_1V8 by 4k7 resistor	O	I2C_SCL_1V8		<b>15</b>	<b>16</b>		SAI3_RXD_CON	I	WiFi/BT Module Audio Interface
	I/O	I2C_SDA_1V8		<b>17</b>	<b>18</b>		GND	G	Ground
		NC		<b>19</b>	<b>20</b>	<b>I 2 C</b>	I2C2_SCL	O	Signals pulled to +VDD_3V3 by 4k7 resistor
		NC		<b>21</b>	<b>22</b>		I2C2_SDA	I/O	
		NC		<b>23</b>	<b>24</b>		I2C3_SDA	I/O	

DESCRIPTION	TYPE	PIN NAME		PIN	PIN		PIN NAME	TYPE	DESCRIPTION
	O	LVDS0_PWM		25	26		I2C3_SCL	O	
Ground	G	GND		27	28	U A R T	UART1_RXD	I	
Button 5	I/O	GPIO_BUT5		29	30		UART1_TXD*	O	
Ground	G	GND		103	104		GND	G	Ground
	O	SPI3_SCLK		31	32		+VSD_3V3	PWR	+3.3V Power Supply Output (max. current 400mA)
Ground	G	GND	S P I 3	33	34		+VSD_3V3	PWR	
	O	SPI3_SS0		35	36		SPI6_SCLK	O	
	O	SPI3_MOSI		37	38	S P I 6	GND	G	Ground
	I	SPI3_MISO		39	40		SPI6_MOSI	O	
Ground	G	GND		41	42		SPI6_MISO	I	
	I	UART6_RXD	U A R T	43	44		SPI6_SS0	O	
	O	UART6_TXD		45	46		+NVCC_SNV3_3V3	PWR	
	O	*UART2_TXD		47	48		UART6_RTS	O	
	I	UART2_RXD		49	50		UART6_CTS	I	
Ground	G	GND		105	106		GND	G	Ground
USB2 PHY Power Supply Input	PWR	USB2_VBUS		51	52		USB1_VBUS	PWR	USB1 PHY Power Supply Input
Ground	G	GND		53	54		GND	G	Ground
		NC		55	56		USB1_RX_N	I	
		NC		57	58		USB1_RX_P	I	
Ground	G	GND	U S B 2	59	60	U S B 1	GND	G	Ground
		NC		61	62		USB1_TX_N	O	
		NC		63	64		USB1_TX_P	O	
Ground	G	GND		65	66		GND	G	Ground
	I/O	USB2_D_N		67	68		USB1_D_N	I/O	
	I/O	USB2_D_P		69	70		USB1_D_P	I/O	
Ground	G	GND		107	108		GND	G	Ground
	I	USB2_ID		71	72		USB1_ID	I	
Ground	G	GND		73	74		GND	G	Ground
		NC		75	76		NC		
		NC		77	78		NC		
Ground	G	GND	C S I	79	80	C S I	GND	G	Ground
	I	CSI_D0_N		81	82		CSI_D1_N	I	
	I	CSI_D0_P		83	84		CSI_D1_P	I	
Ground	G	GND		85	86	D S I	GND	G	Ground
	I	CSI_CLK_N		87	88		DSI_CLK_N	O	

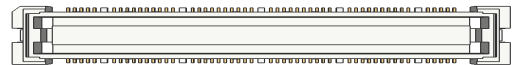
	I	CSI_CLK_P		89	90		DSI_CLK_P	O	
Ground	G	GND		109	110		GND	G	Ground
	O	DSI_D2_N	D S I	91	92	D S I	DSI_D3_N	O	
	O	DSI_D2_P		93	94		DSI_D3_P	O	
Ground	G	GND		95	96		GND	G	Ground
	O	DSI_D0_N		97	98		DSI_D1_N	O	
	O	DSI_D0_P		99	100		DSI_D1_P	O	
Connector Ground Plate	G	GND		112					

**\* NOTE:** These signals share the same CPU pad with Boot Mode signals.  
Extreme care is recommended during power up sequence.

### 3.5. J3 - 100 Contacts Board Stacking Connector (CONN RCPT 100POS SMD GOLD)

Description: J3 Board-to-board shielded connector connects the module to the baseboard. 100 low-density pins with additional ground strips provide strong and reliable peripheral connection.

Manufacturer: Hirose Electric Co. Ltd.  
Connector: [FX11A-100P/10-SV0.5\(71\)](#)



**J3**

DESCRIPTION	TYPE	PIN NAME		PIN	PIN		PIN NAME	TYPE	DESCRIPTION
Connector Ground Plate	G	GND		111					
	I/O	ETH1_TRX0_P	E T H 1	1	2	E T H 1	ETH1_TRX1_P	I/O	
	I/O	ETH1_TRX0_N		3	4		ETH1_TRX1_N	I/O	
Ground	G	GND		5	6		GND	G	Ground
	I/O	ETH1_TRX2_P		7	8		ETH1_TRX3_P	I/O	
	I/O	ETH1_TRX2_N		9	10		ETH1_TRX3_N	I/O	
Ground	G	GND		101	102		GND	G	Ground
	O	ETH1_LED_ACT		11	12		NC		
	O	ETH1_LED_LINK1000		13	14		GND	G	
	O	ETH1_LED_LINK100	E T H 1	15	16		NC		
Ethernet Power Supply Output (max. current 20mA)	PWR	+ENET_VDDIO_3V3		17	18		NC		
Ground	G	GND		19	20		GND	G	Ground

DESCRIPTION	TYPE	PIN NAME	PIN	PIN	PIN NAME	TYPE	DESCRIPTION
		NC	21	22	NC		
		NC	23	24	NC		
Ground	G	GND	25	26	GND	G	Ground
		NC	27	28	NC		
		NC	29	30	NC		
Ground	G	GND	103	104	GND	G	Ground
		NC	31	32	NC		
		NC	33	34	GND	G	Ground
Ground	G	GND	35	36	NC		
+1.8V Power Supply Output (max. current 0.5A)*	PWR	+VDD_1V8	37	38	NC		
	PWR	+VDD_1V8	39	40	NC		
Internally powered by +NVCC_BBSM_1P8	I	ONOFF_CPU	41	42	NC		
Reset Output, internally powered by +NVCC_BBSM_1P8	O	POR_B	43	44	CLKO01	I/O	Button 1
Reset Input, internally powered by +NVCC_BBSM_1P8	I	PWRON_B	45	46	CLKO02	I/O	Button 2
Ground	G	GND	47	48	CLKO03	I/O	Button 3
		NC	49	50	CLKO04	I/O	Button 4
Ground	G	GND	105	106	GND	G	Ground
GPIO Expander	I/O	GPIO_7	51	52	NC		
		NC	53	54	NC		
GPIO Expander	I/O	GPIO_5	55	56	ETH2_LED2/GFGLDO1	O	
GPIO Expander	I/O	GPIO_6	57	58	TOUCH1_INT#	I	
		NC	59	60	NC		
Ground	G	GND	61	62	GND	G	Ground
	I/O	SD2_DATA3	63	64	NC		
	I/O	SD2_DATA2	65	66	SD2_CMD	I/O	
	I/O	SD2_DATA1	67	68	+NVCC_SD2	PWR	SD Power Supply Output
	I/O	SD2_DATA0	69	70	SD2_nCD	I	
Ground	G	GND	107	108	GND	G	Ground
	O	SD2_CLK	71	72	SD2_nRST	O	
Ground	G	GND	73	74	GND	G	Ground
	I/O	ETH2_TRX0_P	75	76	LVDS0_TX0_N	O	
	I/O	ETH2_TRX0_N	77	78	LVDS0_TX0_P	O	
Ground	G	GND	79	80	GND	G	Ground
	I/O	ETH2_TRX1_P	81	82	LVDS0_TX1_N	O	
	I/O	ETH2_TRX1_N	83	84	LVDS0_TX1_P	O	

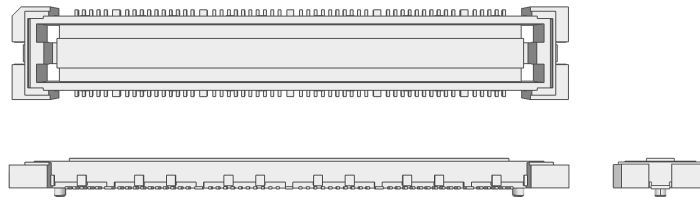
DESCRIPTION	TYPE	PIN NAME		PIN	PIN		PIN NAME	TYPE	DESCRIPTION
Ground	G	GND	ETH2	85	86	LVDS0	GND	G	Ground
	I/O	ETH2_TRX2_P		87	88		LVDS0_TX2_N	O	
	I/O	ETH2_TRX2_N		89	90		LVDS0_TX2_P	O	
Ground	G	GND		109	110		GND	G	Ground
	I/O	ETH2_TRX3_P	ETH2	91	92	LVDS0	LVDS0_TX3_N	O	
	I/O	ETH2_TRX3_N		93	94		LVDS0_TX3_P	O	
Ground	G	GND		95	96		GND	G	Ground
	O	ETH2_LED0/GFGLDO1		97	98		LVDS0_CLK_N	O	
	O	ETH2_LED1/GFGLDO0		99	100		LVDS0_CLK_P	O	
Connector Ground Plate	G	GND		112					

**\* NOTE:** DRAM Memories are supplied by +VDD\_1V8 power rail.  
 Extreme care is recommended while using +VDD\_1V8 on baseboard.

### 3.6. Mating Connectors

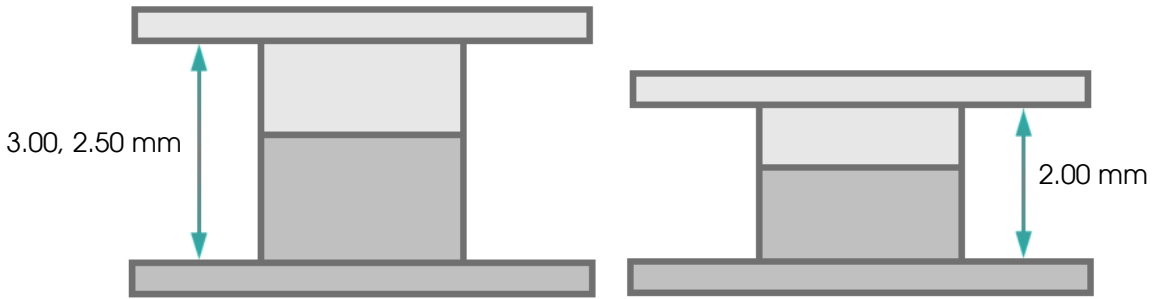
The standard configuration of iMX93 Industrial Module has 3 low profile, shielded, board-to-board connectors soldered on the bottom side. The recommended 3 mating receptacle connectors (3 pcs supplied with each complete development kit, extra pcs available for purchase at VOIPAC website) for the custom baseboard interfacing are:

Manufacturer: Hirose Electric Co. Ltd.  
 Connector: Double Row Receptacle Connector [FX11A-100S/10-SV\(71\)](#)



Besides the 3mm connectors mating height used at the Voipac iMX93 Industrial Development Kit, the board-to-board stacking connectors are available also in mating height of 2.5mm or even 2mm, to fit smaller, thinner case designs.

**Stacking Height Variation**

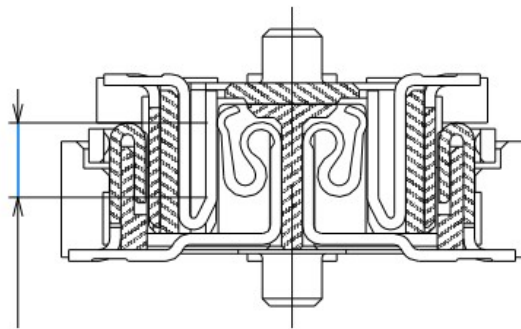


**NOTE:** 2.0 mm stacking height type cannot be used or interchanged with the 2.5 mm or 3.0 mm types.

**Cross section of mating**

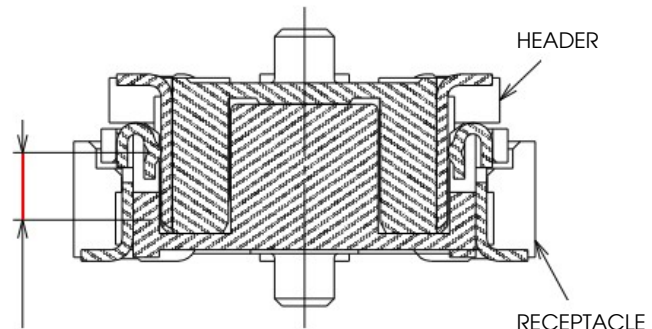
**Stacking height: 3.00 mm, 2.50 mm**

SIGNAL PORTION



1.00 (Effective wipe length)

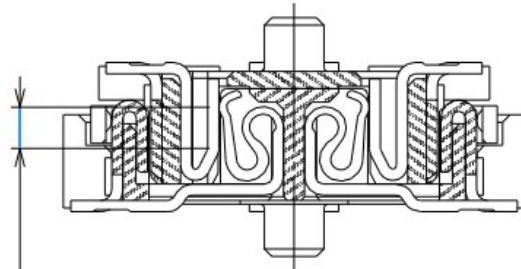
GROUND PORTION



0.90 (Effective wipe length)

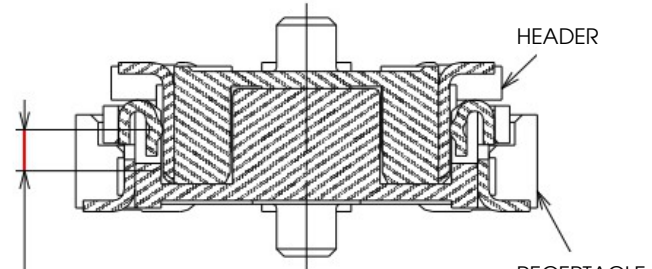
**Stacking height: 2.00 mm**

SIGNAL PORTION



0.55 (Effective wipe length)

GROUND PORTION

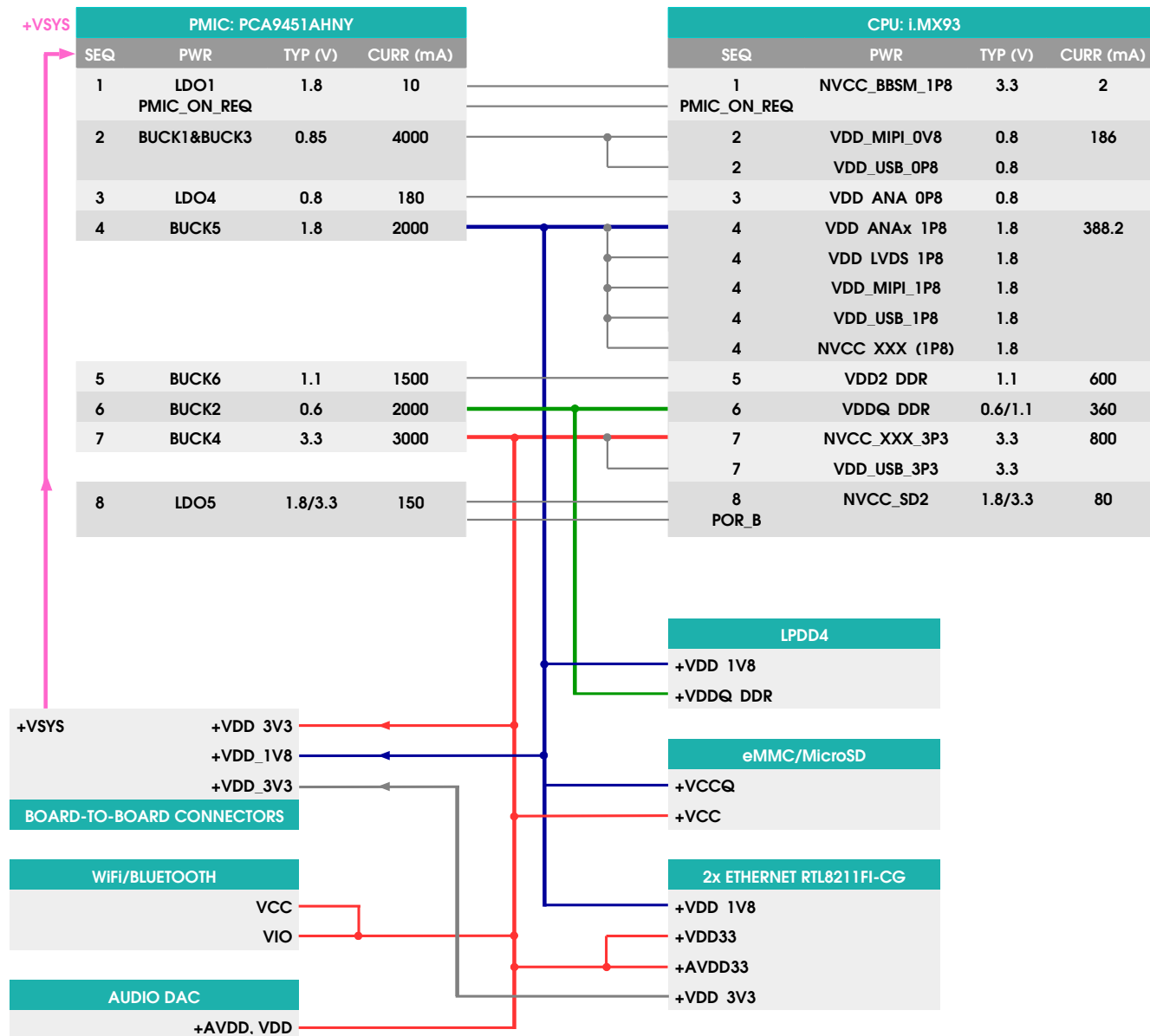


0.55 (Effective wipe length)



## 4. Technical Specification

### 4.1. Electrical - Power Distribution Tree



### 4.2. Electrical - Powering Options

The iMX93 Industrial Module is powered via +VSYS pins, in range from +3.4 to +5.5V. To ensure the full performance of all the peripherals, the entire development kit with accessories might require up to 20W of power.

### 4.3. Electrical – Typical Power Consumption

iMX93 Industrial Development Kit LITE			
TEST CONDITION	INPUT VOLTAGE	MEASURED CURRENT	POWER USAGE
	V <sub>in</sub> [V]	I [A]	P [W]
Uboot only	TBA	TBA	TBA
Bootling-up process (maximum)	TBA	TBA	TBA
Linux at idle	TBA	TBA	TBA
Linux + LVDS	TBA	TBA	TBA
Linux + LVDS + Stresstest	TBA	TBA	TBA

iMX93 Industrial Development Kit BASIC			
TEST CONDITION	INPUT VOLTAGE	MEASURED CURRENT	POWER USAGE
	V <sub>in</sub> [V]	I [A]	P [W]
Uboot only	TBA	TBA	TBA
Bootling-up process (maximum)	TBA	TBA	TBA
Linux at idle	TBA	TBA	TBA
Linux + ETH	TBA	TBA	TBA
Linux + ETH + LVDS	TBA	TBA	TBA
Linux + ETH + LVDS + Stresstest	TBA	TBA	TBA

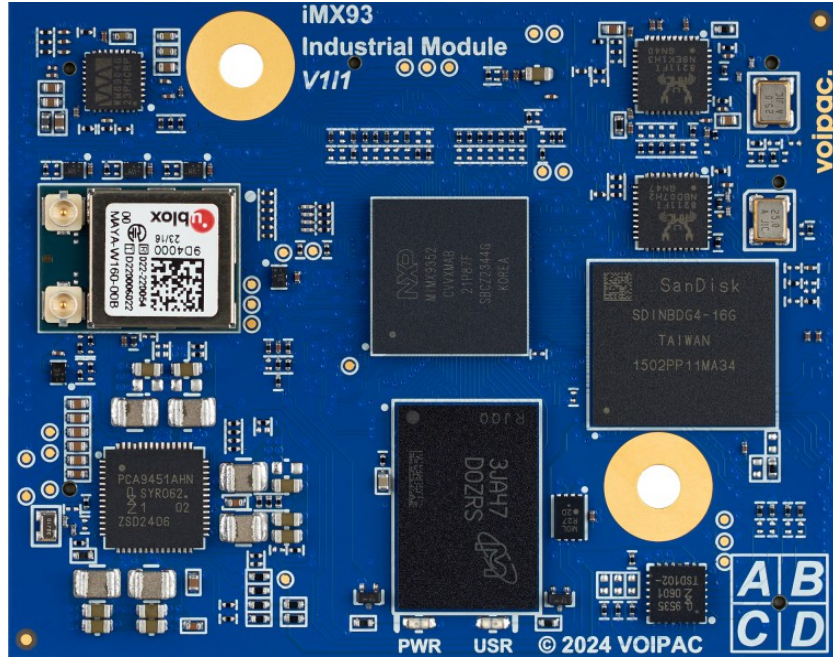
iMX93 Industrial Development Kit PRO			
TEST CONDITION	INPUT VOLTAGE	MEASURED CURRENT	POWER USAGE
	V <sub>in</sub> [V]	I [A]	P [W]
Uboot only	TBA	TBA	TBA
Bootling-up process (maximum)	TBA	TBA	TBA
Linux at idle	TBA	TBA	TBA
Linux + ETH	TBA	TBA	TBA
Linux + ETH + LVDS	TBA	TBA	TBA
Linux + ETH + LVDS + Stresstest	TBA	TBA	TBA

iMX93 Industrial Development Kit MAX			
TEST CONDITION	INPUT VOLTAGE	MEASURED CURRENT	POWER USAGE
	V <sub>in</sub> [V]	I [A]	P [W]
Uboot only	TBA	TBA	TBA
Bootling-up process (maximum)	TBA	TBA	TBA
Linux at idle	TBA	TBA	TBA
Linux + ETH	TBA	TBA	TBA
Linux + ETH + LVDS	TBA	TBA	TBA
Linux + ETH + LVDS + Stresstest	TBA	TBA	TBA

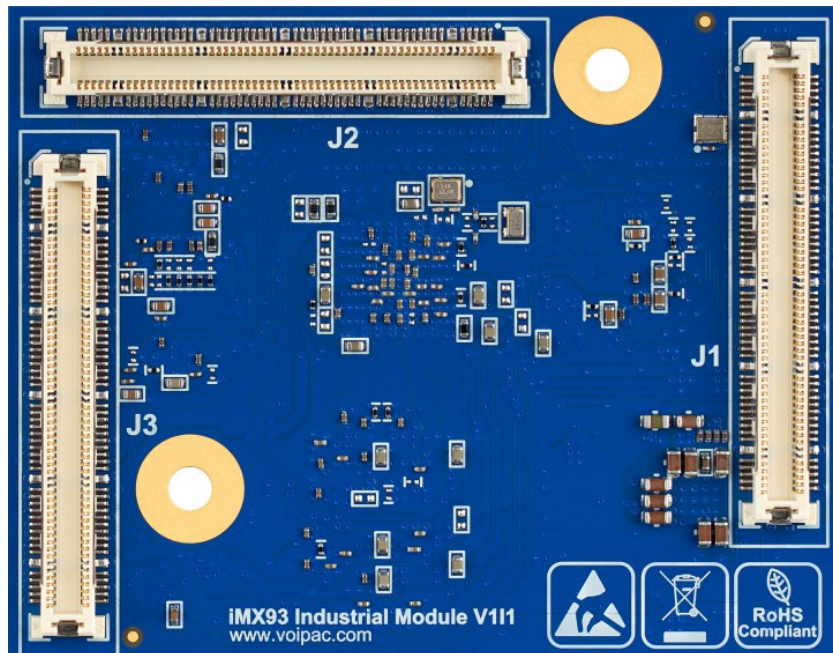
**NOTE:** All 4 kits used during the test procedure were running the default Linux distribution and booted up from the eMMC NAND Flash Memory.  
While measured, the development kits were placed under a very heavy load - using stress test application putting CPU, memories and Ethernet under challenging conditions.

### 4.4. Product Image

Top Side

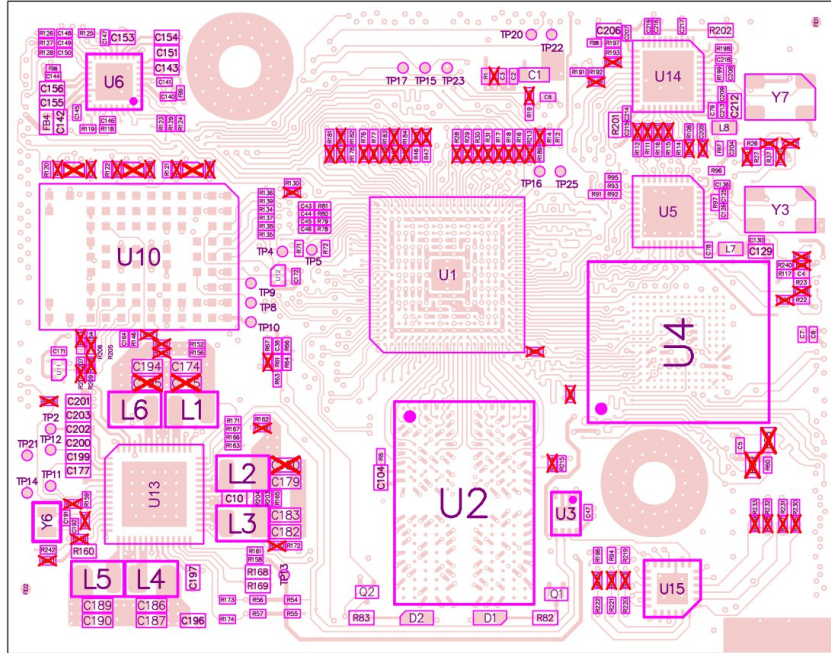


Bottom Side

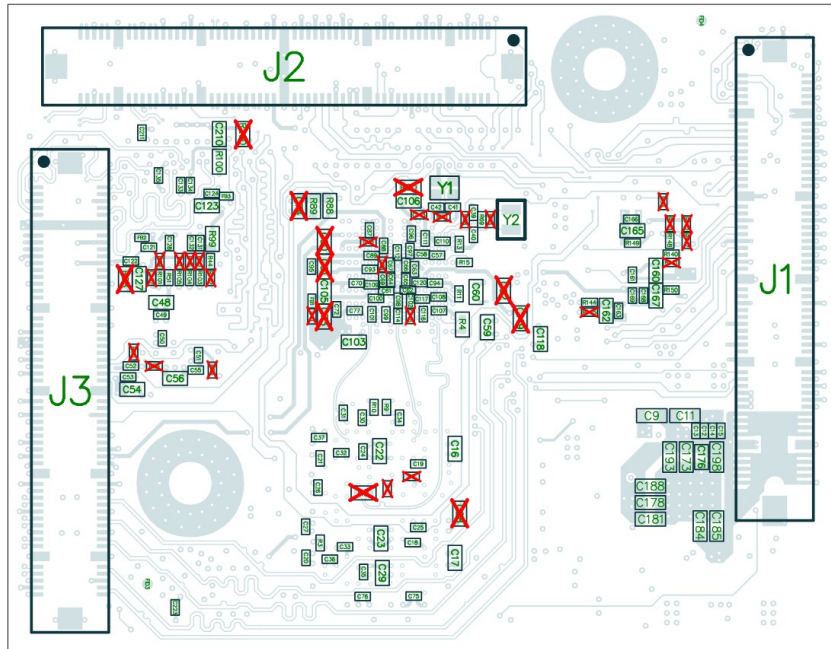


### 4.5. Assembly Drawing

Top Side



Bottom Side

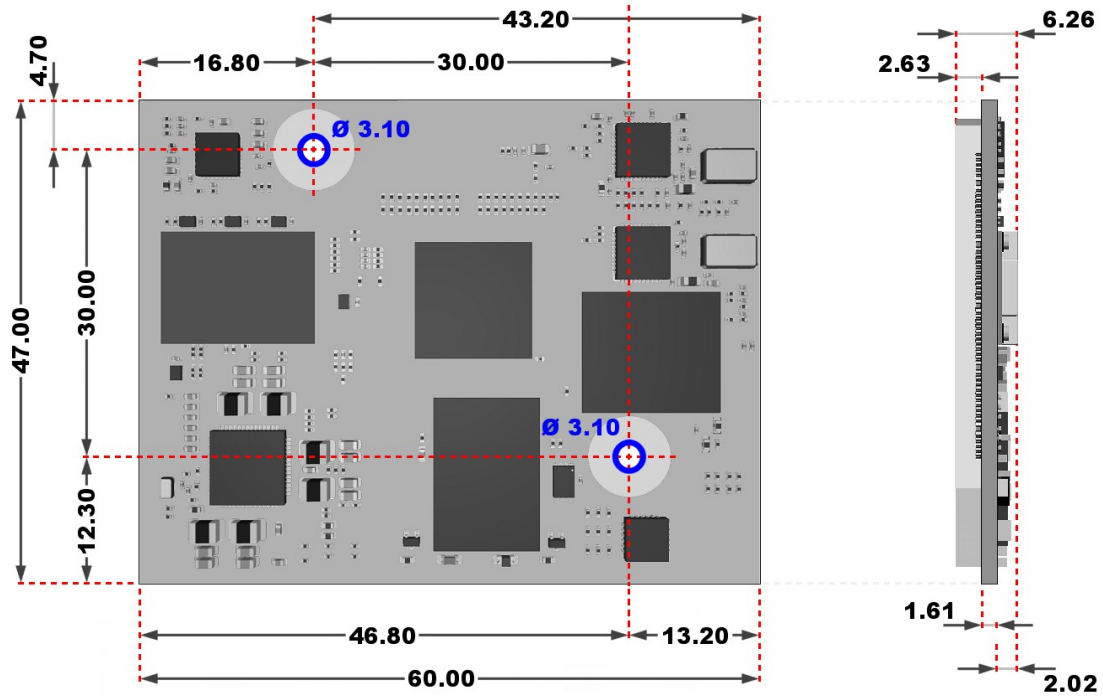




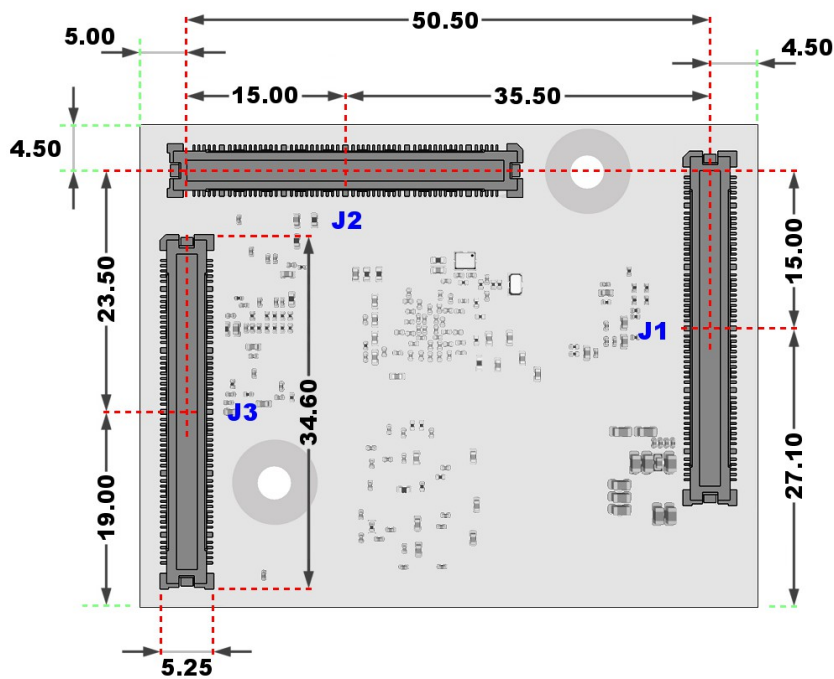
### 4.6. Mechanical

Dimensions (top view, in millimeters)

(side view, in millimeters)



Connectors Placement and Dimensions (bottom view, in millimeters)



#### 4.7. Temperature Range

SYMBOL	DESCRIPTION	MIN	MAX	UNIT	Temperature Range of the Module in Standard Webshop Configuration
T_AMB_C	Operating temperature range - COMMERCIAL	0	+70	°C	x
T_AMB_E	Operating temperature range - EXTENDED	-20	+85	°C	
T_AMB_I	Operating temperature range - INDUSTRIAL	-40	+85	°C	

#### 4.8. ISO Certification of Voipac Production

Production of Voipac hardware is performed at ISO 9001:2016 certified facilities with proprietary Quality Management System, satisfying international customer and regulatory requirements. The company's facilities are equipped with in-house stainless steel laser stencil production, advanced assembly machines, oxygen-free soldering, and 3D Automated Optical Inspection (AIO) that ensure high-quality of assembled products. Every Voipac product has to withstand an extensive post-assembly checkup and visual inspection. Each individual COM is also preloaded with a customizable firmware and follows an in-depth peripheral inspection with zero-tolerance policy to any deviation from the full functionality.

#### 4.9. CE Compliance of Voipac Products

The CE label is a mandatory conformity mark for electronic devices placed on the market in the European Economic Area and every product sold within the EU needs a CE Certificate of Conformance that ensures it complies with the essential requirements of the applicable European Commission (EC) directives.

Voipac COMs are considered components for further processing by the industry, skilled development teams or system integrators, not finished Electrical Electronic Equipment (EEE) used as stand-alone devices by the general public, thus do not need to observe the CE marking requirements and consequently do not need any identification either.

To make sure that Voipac COMs can be used in CE/FFC certified final devices, they are designed and manufactured to obey both the EC and FFC directives. The modules and baseboards in standard webshop configurations, together with accessories, are stress-tested in an environmental chamber for a wide range of operating temperatures. Under a heavy load, their radiated and conducted emissions are also tested and measured to confirm compliance with the Electromagnetic Interference limits. The COMs and baseboards are furthermore subject to broad-band random vibration tests, sweep sinus mechanical vibration tests and shock tests to prove their dynamic load resilience.

See Voipac Wiki for [Environmental Chamber Testing](#), [EMC Testing](#) and [Shock and Vibration Testing](#) results.

## **4.10. RoHS, REACH, UL 94, Conflict Minerals, WEEE and Waste Recycling Declarations Compliance**

### **RoHS I / II / III**

Voipac certifies to the best of its knowledge, that all of its production is made in lead-free facilities using standardized manufacturing quality systems and control parameters, thereby meeting the regulatory compliance of RoHS 1 Directive (2002/95/EC), RoHS 2 Directive (2011/65/EU) and RoHS 3 Directive (2015/863/EU). [Read more.](#)

### **REACH**

REACH is a regulation of the European Union, adopted to improve the protection of human health and the environment from the risks that can be posed by chemicals. Voipac products are "articles" as defined in Article 3(3) of the REACH regulations, and do not release substances under normal use. [Read more.](#)

### **UL 94 V-0**

UL 94 certification is a normalized method of determining the flammability of plastic materials as the standard evaluates ignition, process of burning and flame spread resistance. Voipac products are complying with the most flame-resistance class V-0 of this standard, by using only UL 94 certified components. [Read more.](#)

### **Conflict Minerals**

Voipac will not knowingly procure material supplies and components which contain minerals that directly or indirectly finance or benefit non-governmental military groups in the Democratic Republic of Congo (DRC) or adjoining countries. Voipac declares and commits to refuse usage of metals also from other conflict regions. [Read more.](#)

### **WEEE**

To minimize the amount of non-recycled electrical and electronic equipment waste and its impact on the environment, Voipac also conforms with the Waste Electrical and Electronic Equipment Directive 2018/852/EC, and designs its products and packaging with consideration to future dismantling and recycling. [Read more.](#)

### **Waste Recycling**

Voipac has been participating in responsible selective collection, recovery and recycling of its production activities waste. Over the years, the collective effort of manufacturers has helped to minimize the waste impact on the environment by saving an equivalent of thousands of tons of carbon dioxide. [Read more.](#)

## Warranty:

### VOIPAC TECHNOLOGIES s.r.o. Does Not Bear Responsibility for the Following:

- Failure of a product resulting from misuse, accident, modification, unsuitable operating environment, or improper maintenance by user
- Any technical or other support provided by VOIPAC TECHNOLOGIES s.r.o. such as assistance, set-up and installation is provided WITHOUT WARRANTY OF ANY KIND, [unless agreed otherwise](#)

## Disclaimer:

VOIPAC TECHNOLOGIES s.r.o. reserves the right to make changes, without notice, to any product, including circuits and/or software described or contained in this datasheet. VOIPAC TECHNOLOGIES s.r.o. assumes no responsibility or liability for the use of the described product(s), conveys no license or title under any patent, copyright, or mask work rights to these products, and makes no representations or warranties that these products are free from patent, copyright, or mask work right infringement, unless otherwise specified.

## Trademark Acknowledgment:

Brand and product names are trademarks or registered trademarks of their respective owners.

# voipac.

**VOIPAC TECHNOLOGIES s.r.o.**

Gen. M. R. Stefanika 6670/19

911 01 Trenčín

Slovak Republic (Slovakia)

HW & SW support: [support@voipac.com](mailto:support@voipac.com)

