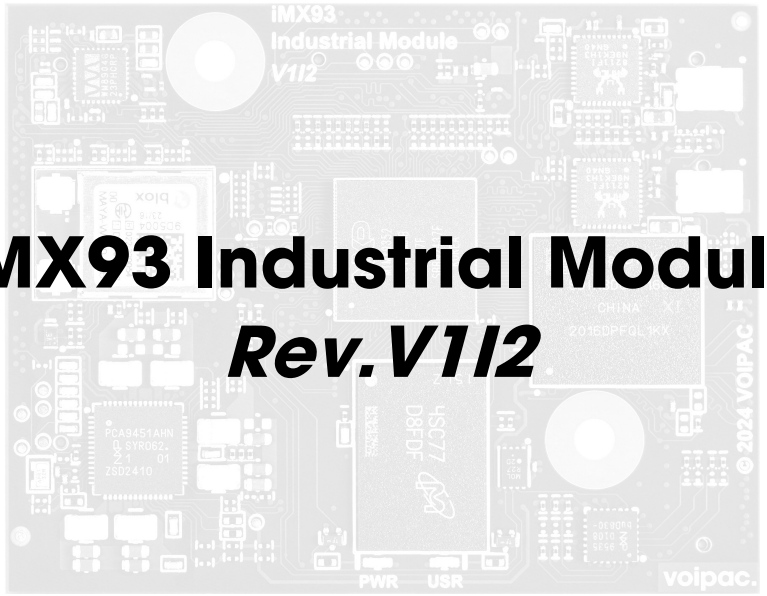

iMX93 Industrial Module

Rev.V1I2

Datasheet

DATE	REVISION	CHANGES
April 9, 2025	1.0	Initial Release
November 21, 2025	1.1	Power Consumption Tables Added

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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 four channel ADC, 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 + Analog 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, mechanically reinforced with epoxy filled and capped vias.

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 integral interfaces. Customized drivers for specific applications can be developed upon request.

OPERATING SYSTEM	DESCRIPTION
Linux	Yocto 5.0 (Scarthgap) / (Linux kernel 6.6) – preinstalled on eMMC Flash
Debian	Debian 12 (Bookworm) – available upon request

1.3. Booting Options

The standard configuration of 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	Supported by VOIPAC Development Kit
Serial NOR/NAND	Available at customized carrier board

The CPU supports following boot mode configurations:

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

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

SINGLE BOOT - Cortex-A55 Boot Core		
BMODE(3:0)	**BOOT DEVICE**	**COMMENT**
x000	Boot from Internal Fuses	
0001	Serial Download	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	Reserved	
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 1.8 V eMMC 5.1	
1011	uSDHC2 4-bit SD 3.0	
1100	Flex SPI Serial NOR	
1101	Flex SPI Serial NAND 2K	
1110	Reserved	
1111	Reserved	

NOTE: *More Information available in i.MX 93 Applications Processor Datasheet Chapter 5: Boot Mode Configuration.*

1.4. Features Summary

FEATURE	DESCRIPTION
CPU	• NXP i.MX 93 Solo / Dual ARM® Cortex®-A55 0.9 / 1.7GHz • Real-time co-processor ARM Cortex-M33 250MHz • Edge AI micro Neural Processing Unit (NPU) Ethos™-U65
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	• MIPI-DSI (up to 1920x1200p60) • LVDS (up to 1280x800p60)
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	4-channel 12-bit ADC, 4x Clock OUT, 2x Tamper, JTAG

1.5. Reference Documents

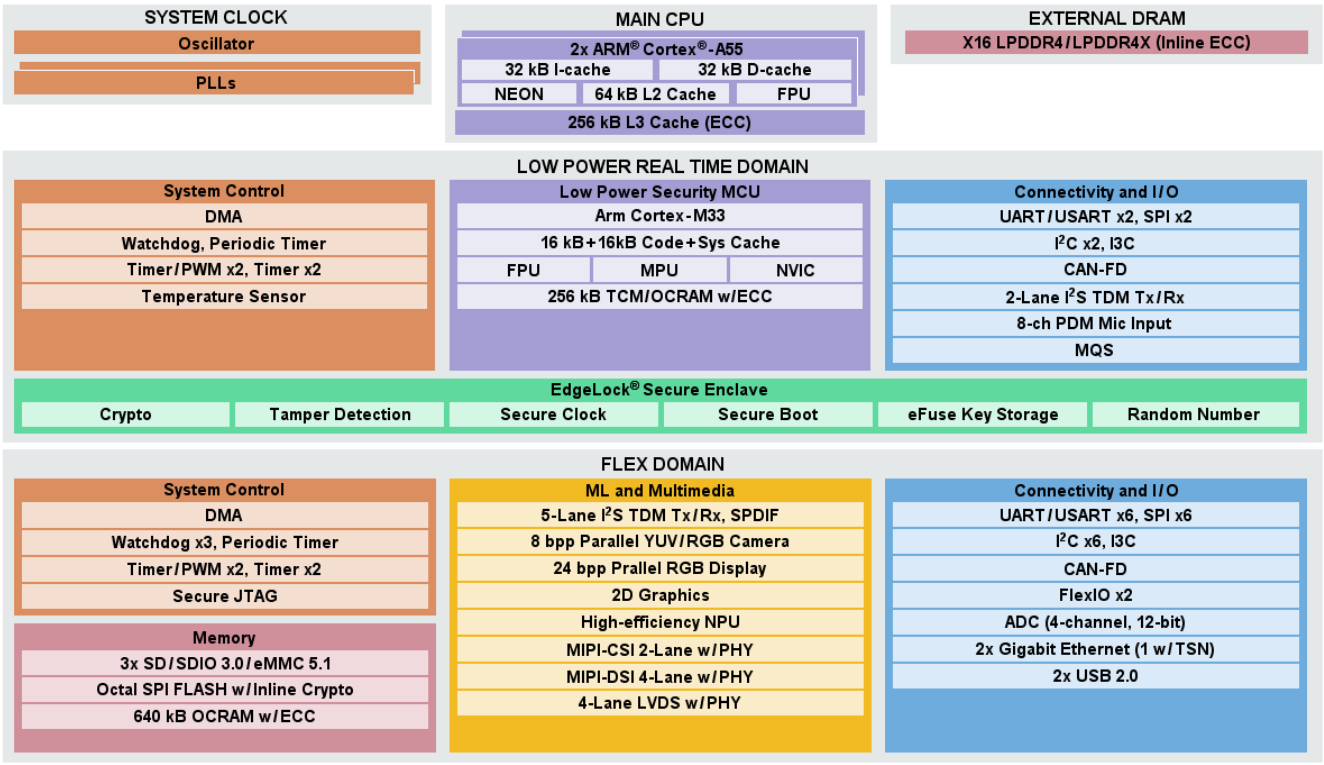
For more detailed technical information about the iMX93 Industrial Module components, please refer to the web resources and documents listed below.

COMPONENT	MANUFACTURER	DESCRIPTION	CLI*
i.MX 93 Processor	NXP Semiconductors	Commercial, Industrial, Extended Industrial	U1
DDR4 SDRAM Memory	Micron Technology, Inc.	MT53E1G16D1FW-046, MT53E256M16D1DS-046	U2
I2C EEPROM	ON Semiconductor	CAT24M01HU51-GT3	U3
iNAND eMMC Flash	SanDisk Corporation	SDINBDG4-16G, SDINBDG4-8G	U4
iNAND eMMC Flash	Alliance Memory, Inc.	ASFC4G31M-51BIN	U4
Ethernet Controller	Realtek Semiconductor Corp.	RTL8211F-CG (RTL8211FD-CG) U5	U14
AUDIO	Cirrus Logic, Inc.	WM8904CGEFL/RV	U6
WiFi and Bluetooth	u-blox	MAYA-W260-00B, MAYA-W160-00B	U10
Power Management IC	NXP Semiconductors	PCA9451AHNY	U13
I2C GPIO Expander	NXP Semiconductors	PCA9535BS,118	U15

*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	Industrial HMI
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
Home Entertainment	Audio / Video (AV) Receivers
Sorround Sound and Sound Bars	Wirelless or Networked Speakers

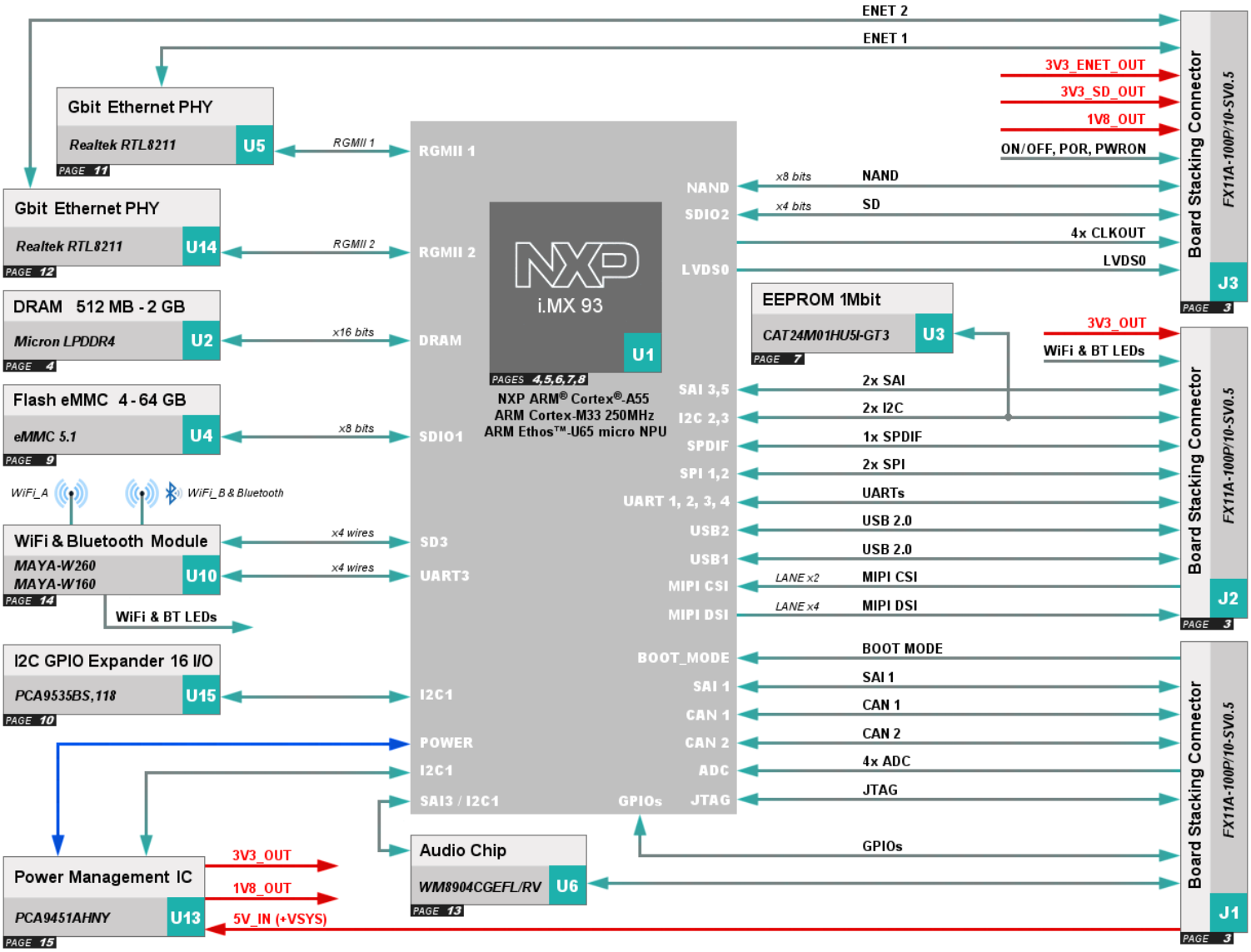
2.3. CPU Features Comparison

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 1200p60 MIPI DSI, 4-lane 800p60 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.

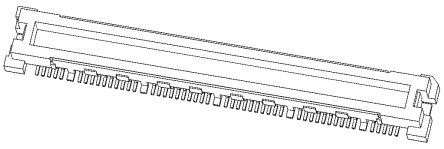
3.2. IO Types Notation

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	AUDIO	1	2	AUDIO	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	SAI1	11	12		DMIC_CLK	O	Digital Microphone Clock
	O	SAI1_TXC		13	14	BOOT	GND	G	Ground
	O	*SAI1_TXD0		15	16		BOOT_MODE0	I	
	I	SAI1_RXD0		17	18		BOOT_MODE1	I	
	O	CAN1_TX	CAN	19	20		GND	G	Ground
Ground	G	GND		21	22	ADC	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	JTAG	71	72	JTAG	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	POWER	79	80	POWER	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

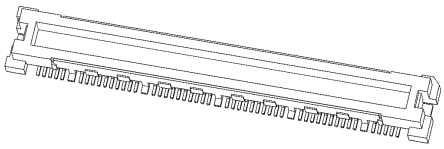
DESCRIPTION	TYPE	PIN NAME		PIN	PIN		PIN NAME	TYPE	DESCRIPTION
Input Voltage (from +3.4V to +5.5V)	PWR	+VSYS	POWER	91	92	POWER	+VSYS	PWR	Input Voltage (from +3.4V to +5.5V)
	PWR	+VSYS		93	94		+VSYS	PWR	
	PWR	+VSYS		95	96		+VSYS	PWR	
	PWR	+VSYS		97	98		+VSYS	PWR	
	PWR	+VSYS		99	100		+VSYS	PWR	
Connector 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.*

3.4. 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		111					
WiFi/BT Module Audio Interface	I	SAI5_RXD0	SAI5	1	2		NC		
	I	SAI5_RXC		3	4		NC		
	I	SAI5_RXFS		5	6		NC		
Ground	G	GND		7	8		GND	G	Ground
WiFi/BT Module Audio Interface	O	SAI5_MCLK		9	10		NC		
Ground	G	GND		101	102		GND	G	Ground
	O	LED_BT	LED	11	12		TAMPER0	I	
	O	LED_WLAN		13	14		TAMPER1	I	
Signals pulled to +VDD_1V8 by 4k7 resistor	O	I2C2_SCL_1V8		15	16		SAI3_RXD_CON	I	WiFi/BT Module Audio Interface
	I/O	I2C2_SDA_1V8		17	18		GND	G	Ground
		NC		19	20	I2C	I2C2_SCL	O	Signals pulled to +VDD_3V3 by 4k7 resistor
		NC		21	22		I2C2_SDA	I/O	
		NC		23	24		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	UART	UART1_RXD	I	
Button 5	I/O	GPIO_BUT5		29	30	UART	UART1_TXD*	O	
Ground	G	GND		103	104		GND	G	Ground
	O	SPI3_SCLK	SPI3	31	32		+VDD_3V3	PWR	+3.3V Power Supply Output (max. current 400mA)
Ground	G	GND	SPI3	33	34		+VDD_3V3	PWR	
	O	SPI3_SS0	SPI3	35	36	SPI6	SPI6_SCLK	O	
	O	SPI3_MOSI	SPI3	37	38	SPI6	GND	G	Ground
	I	SPI3_MISO	SPI3	39	40	SPI6	SPI6_MOSI	O	
Ground	G	GND	UART	41	42	SPI6	SPI6_MISO	I	
	I	UART6_RXD	UART	43	44	SPI6	SPI6_SS0	O	
	O	UART6_TXD	UART	45	46		+NVCC_SNVS_3V3	PWR	
	O	*UART2_TXD	UART	47	48	UART	UART6_RTS	O	
	I	UART2_RXD	UART	49	50	UART	UART6_CTS	I	
Ground	G	GND		105	106		GND	G	Ground
USB2 PHY Power Supply Input	PWR	USB2_VBUS	USB2	51	52	USB1	USB1_VBUS	PWR	USB1 PHY Power Supply Input
Ground	G	GND	USB2	53	54	USB1	GND	G	Ground
		NC	USB2	55	56	USB1	USB1_RX_N	I	
		NC	USB2	57	58	USB1	USB1_RX_P	I	
Ground	G	GND	USB2	59	60	USB1	GND	G	Ground
		NC	USB2	61	62	USB1	USB1_TX_N	O	
		NC	USB2	63	64	USB1	USB1_TX_P	O	
Ground	G	GND	USB2	65	66	USB1	GND	G	Ground
	I/O	USB2_D_N	USB2	67	68	USB1	USB1_D_N	I/O	
	I/O	USB2_D_P	USB2	69	70	USB1	USB1_D_P	I/O	
Ground	G	GND		107	108		GND	G	Ground
	I	USB2_ID	USB2	71	72	USB1	USB1_ID	I	
Ground	G	GND		73	74		GND	G	Ground
		NC	CSI	75	76	CSI	NC		
		NC	CSI	77	78	CSI	NC		
Ground	G	GND	CSI	79	80	CSI	GND	G	Ground
	I	CSI_D0_N	CSI	81	82	CSI	CSI_D1_N	I	
	I	CSI_D0_P	CSI	83	84	CSI	CSI_D1_P	I	
Ground	G	GND	CSI	85	86	DSI	GND	G	Ground
	I	CSI_CLK_N	CSI	87	88	DSI	DSI_CLK_N	O	

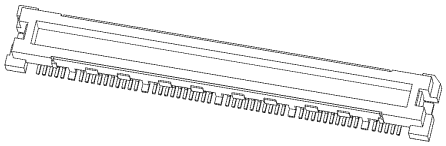
	I	CSI_CLK_P		89	90		DSI_CLK_P	O	
Ground	G	GND		109	110		GND	G	Ground
	O	DSI_D2_N	DSI	91	92	DSI	DSI_D3_N	O	
	O	DSI_D2_P		93	94		DSI_D3_P	O	
Ground	G	GND		95	96		GND	G	Ground
	O	DSI_D0_N		97	98		DSI_D1_N	O	
	O	DSI_D0_P		99	100		DSI_D1_P	O	
Connector Ground Plate	G	GND		112					

*__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)



DESCRIPTION	TYPE	PIN NAME		PIN	PIN		PIN NAME	TYPE	DESCRIPTION
Connector Ground Plate	G	GND		111					
	I/O	ETH1_TRX0_P	ETH1	1	2	ETH1	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	ETH1	11	12		NC		
	O	ETH1_LED_LINK1000		13	14		GND	G	
	O	ETH1_LED_LINK100		15	16		NC		
Ethernet Power Supply Output (max. current 20mA)	PWR	+ENET_VDDIO		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	SYSTEM	35	36		NC		
+1.8V Power Supply Output	PWR	+VDD_1V8		37	38		NC		
(max. current 0.5A)*	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/CFGLDO1	O	
GPIO Expander	I/O	GPIO_6		57	58		TOUCH1_INT#	I	
		NC		59	60		NC		
Ground	G	GND	SD2	61	62	SD2	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	ETH2	73	74	LVDS0	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	

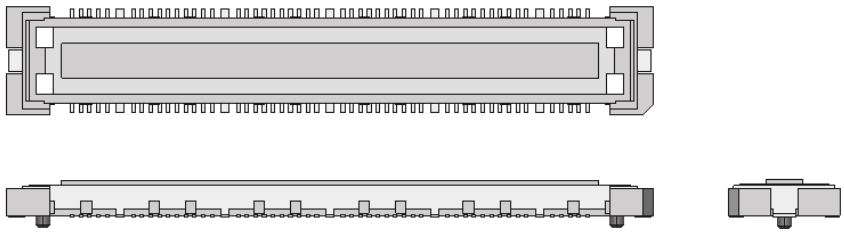
DESCRIPTION	TYPE	PIN NAME		PIN	PIN		PIN NAME	TYPE	DESCRIPTION
Ground	G	GND	ETH2	85	86	LVDS0	GND	G	Ground
	I/O	ETH2_TRX2_P		87	88		LVDS0_TX2_N	O	
	I/O	ETH2_TRX2_N		89	90		LVDS0_TX2_P	O	
Ground	G	GND		109	110		GND	G	Ground
	I/O	ETH2_TRX3_P	ETH2	91	92	LVDS0	LVDS0_TX3_N	O	
	I/O	ETH2_TRX3_N		93	94		LVDS0_TX3_P	O	
Ground	G	GND		95	96		GND	G	Ground
	O	ETH2_LED0/CFG_EXT		97	98		LVDS0_CLK_N	O	
	O	ETH2_LED1/CFGLDO0		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

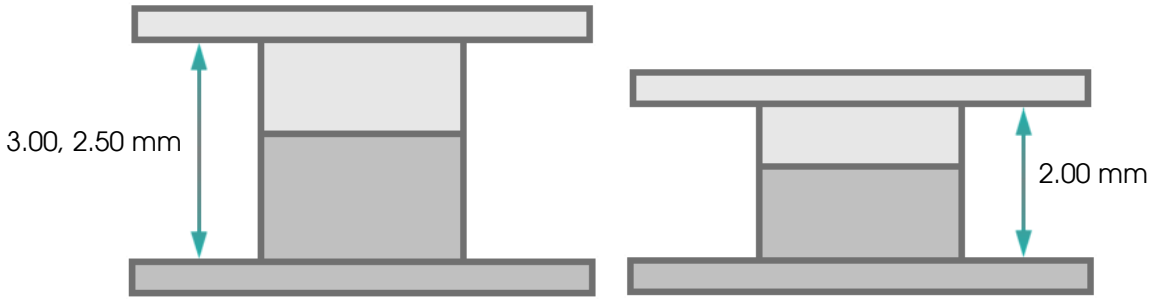
The standard configuration of iMX93 Industrial Module has 3 low profile, shielded, board-to-board connectors soldered on the bottom side. The recommended 3 mating receptacle connectors (3 pcs supplied with each complete development kit, extra pcs available for purchase at VOIPAC website) for the custom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

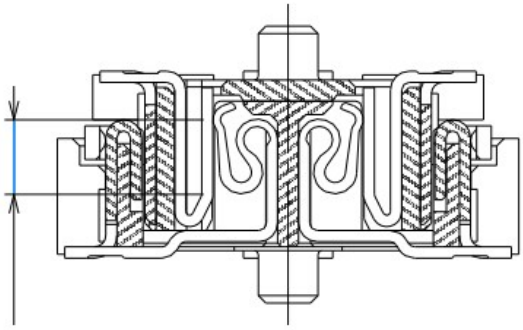


NOTE: *2.0 mm stacking height type cannot be used or interchanged with the 2.5 mm or 3.0 mm types.*

Cross section of mating

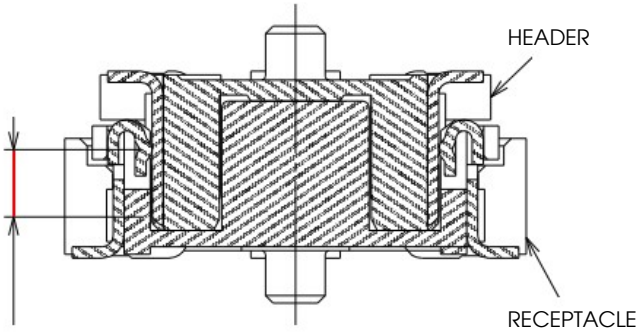
Stacking height: 3.00 mm, 2.50 mm

SIGNAL PORTION



1.00 (Effective wipe length)

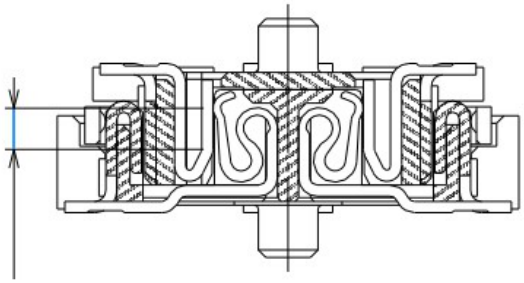
GROUND PORTION



0.90 (Effective wipe length)

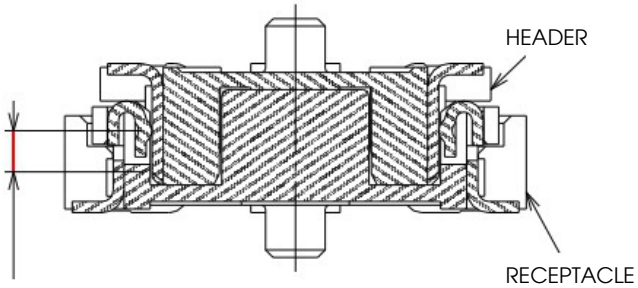
Stacking height: 2.00 mm

SIGNAL PORTION



0.55 (Effective wipe length)

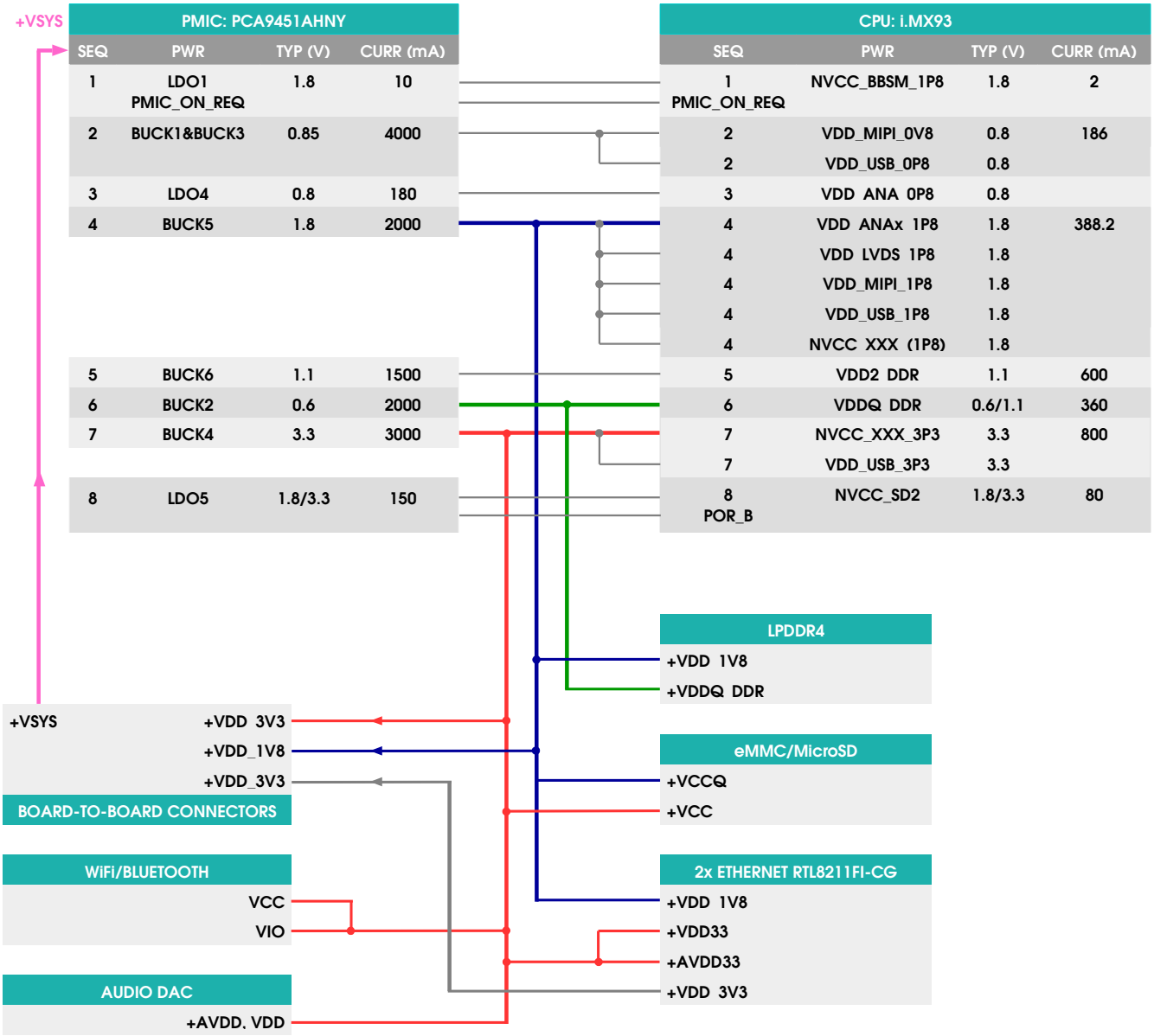
GROUND PORTION



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
	Vin [V]	I [A]	P [W]
Run mode – U-boot in command-prompt ready for input	5.194	0.128	0.666
Run mode – Linux booting process (maximum)	5.194	0.138	0.717
Run mode – Linux in command-prompt ready for input	5.195	0.101	0.525
Idle mode – ARM Core off in sleep state	5.199	0.026	0.138
Run mode – Linux running stress test	5.193	0.152	0.793

iMX93 Industrial Development Kit BASIC			
TEST CONDITION	INPUT VOLTAGE	MEASURED CURRENT	POWER USAGE
	Vin [V]	I [A]	P [W]
Run mode – U-boot in command-prompt ready for input	5.188	0.290	1.506
Run mode – Linux booting process (maximum)	5.190	0.341	1.770
Run mode – Linux in command-prompt ready for input	5.192	0.227	1.179
Idle mode – ARM Core off in sleep state	5.198	0.049	0.257
Run mode – Linux running stress test	5.193	0.367	1.905

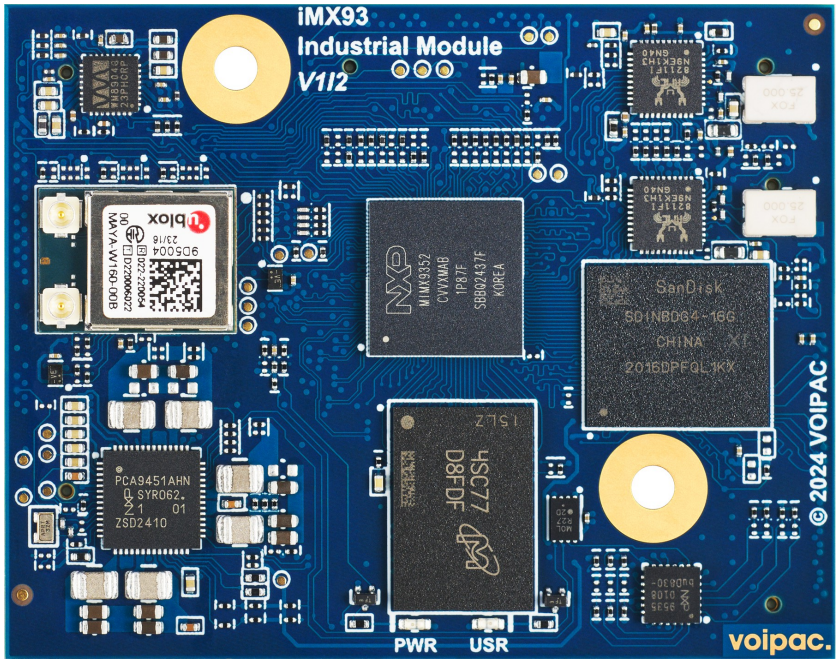
iMX93 Industrial Development Kit PRO			
TEST CONDITION	INPUT VOLTAGE	MEASURED CURRENT	POWER USAGE
	Vin [V]	I [A]	P [W]
Run mode – U-boot in command-prompt ready for input	5.183	0.401	2.081
Run mode – Linux booting process (maximum)	5.182	0.478	2.476
Run mode – Linux in command-prompt ready for input	5.186	0.323	1.675
Idle mode – ARM Core off in sleep state	5.195	0.079	0.414
Run mode – Linux running stress test	5.181	0.482	2.498

iMX93 Industrial Development Kit MAX			
TEST CONDITION	INPUT VOLTAGE	MEASURED CURRENT	POWER USAGE
	Vin [V]	I [A]	P [W]
Run mode – U-boot in command-prompt ready for input	5.183	0.416	2.159
Run mode – Linux booting process (maximum)	5.186	0.460	2.386
Run mode – Linux in command-prompt ready for input	5.186	0.338	1.756
Idle mode – ARM Core off in sleep state	5.196	0.085	0.444
Run mode – Linux running stress test	5.183	0.574	2.977

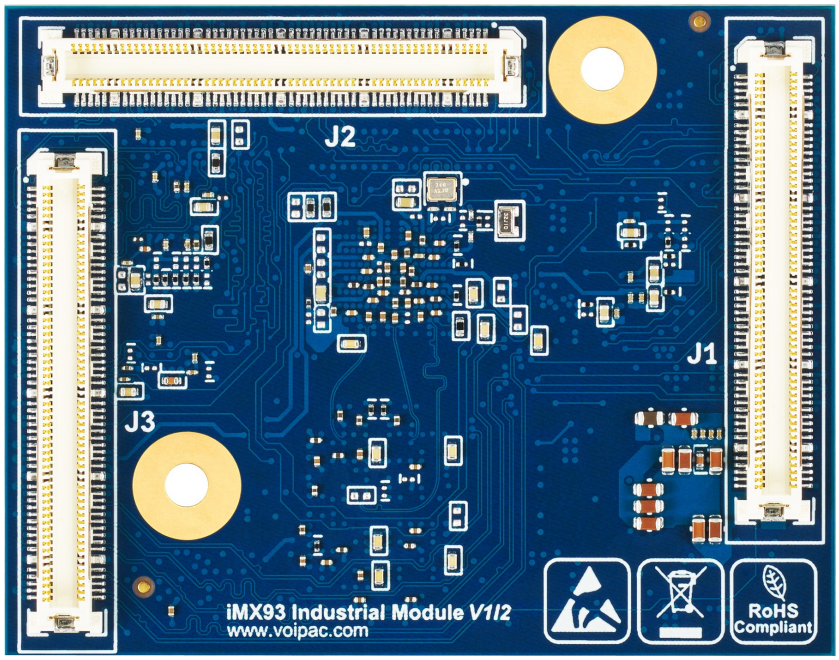
NOTE: *All 4 kits used during the test procedure were running the default Linux distribution and booted up from the eMMC NAND Flash Memory.*
While measured, the development kits were placed under a very heavy load - using stress test application putting CPU, memories and Ethernet/s under challenging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

4.4. Product Image

Top Side

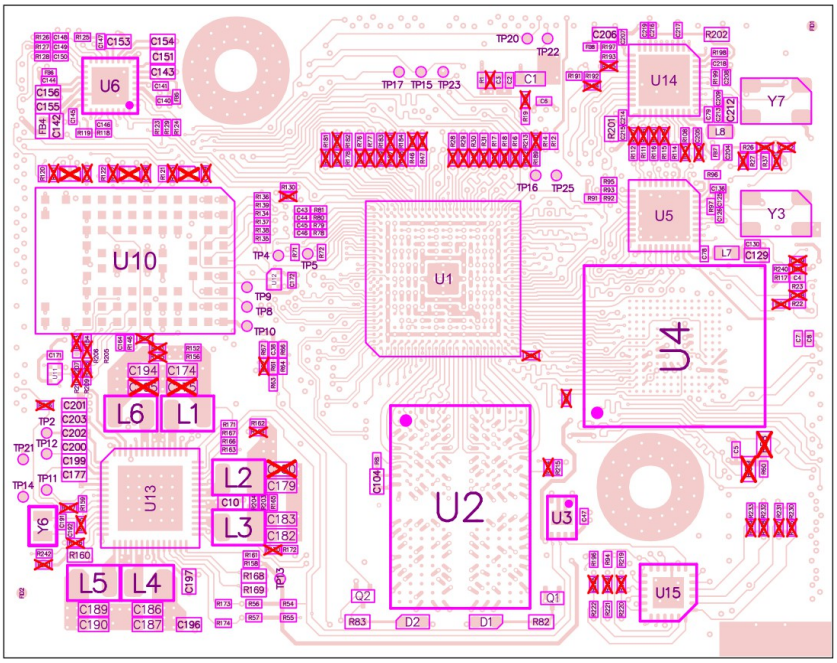


Bottom Side

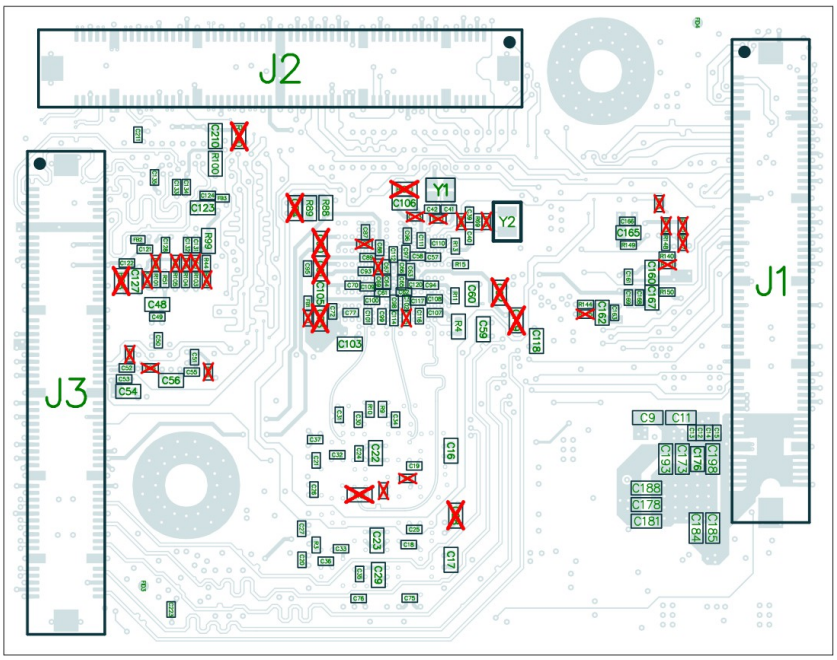


4.5. Assembly Drawing

Top Side

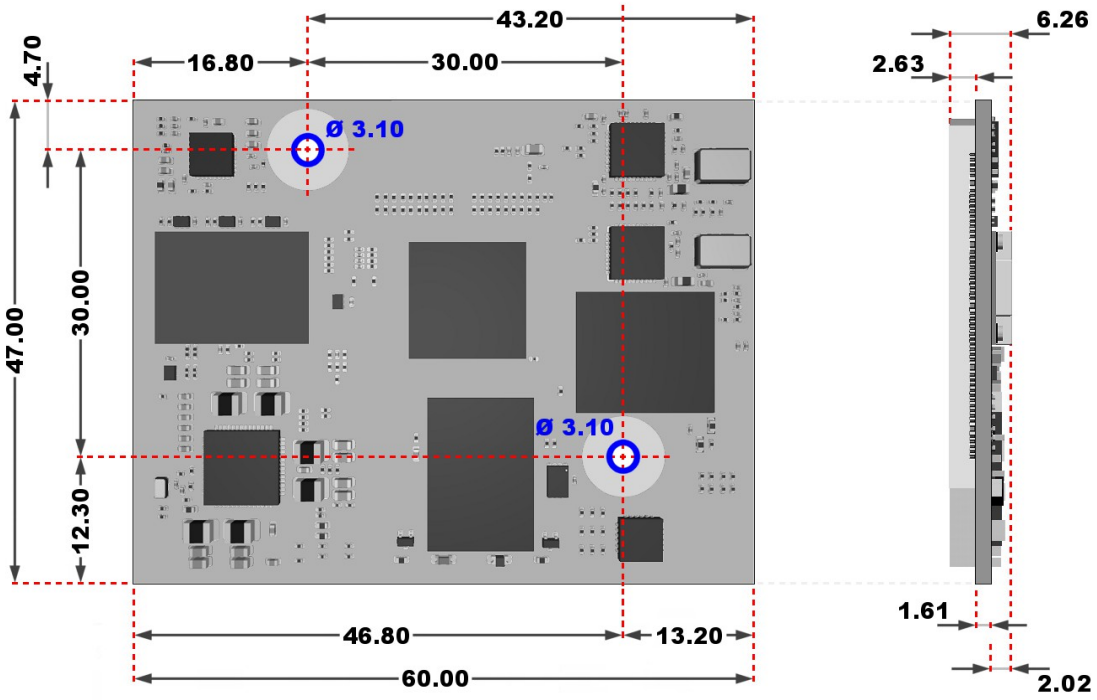


Bottom Side

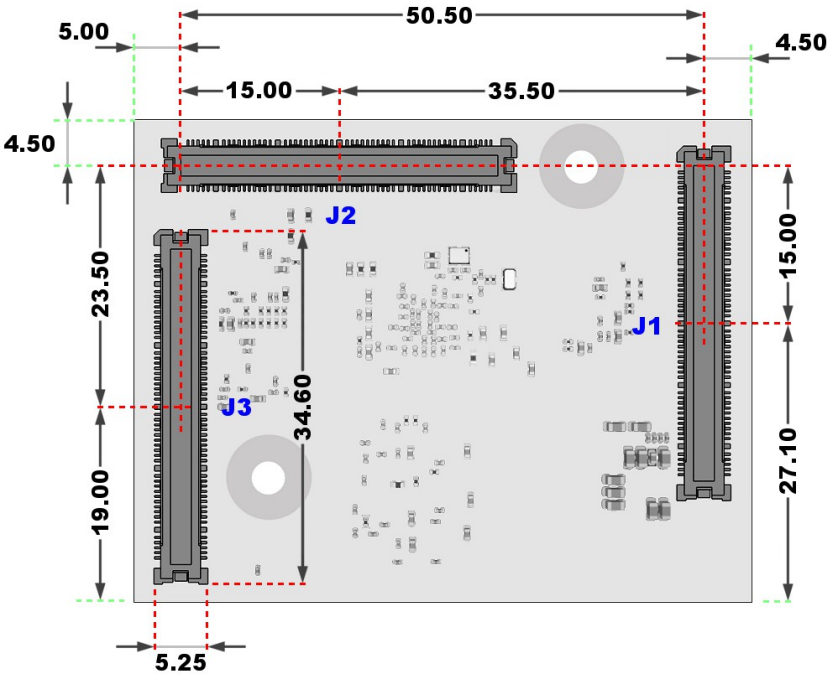


4.6. Mechanical

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.

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