

ROM-2820

ROM-DK2820

NXP i.MX 93 1.7GHz
Cortex®- A55 Dual-core
OSM 1.1 Computer-on-Module

Copyright

The documentation and the software included with this product are copyrighted 2024 by Advantech Co., Ltd. All rights are reserved. Advantech Co., Ltd. reserves the right to make improvements in the products described in this manual at any time without notice. No part of this manual may be reproduced, copied, translated, or transmitted in any form or by any means without the prior written permission of Advantech Co., Ltd. The information provided in this manual is intended to be accurate and reliable. However, Advantech Co., Ltd. assumes no responsibility for its use, nor for any infringements of the rights of third parties that may result from its use.

Acknowledgements

Arm is trademarks of Arm Corporation.

NXP is trademarks of NXP Corporation.

All other product names or trademarks are properties of their respective owners.

Product Warranty (2 years)

Advantech warrants the original purchaser that each of its products will be free from defects in materials and workmanship for two years from the date of purchase.

This warranty does not apply to any products that have been repaired or altered by persons other than repair personnel authorized by Advantech, or products that have been subject to misuse, abuse, accident, or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

Because of Advantech's high quality-control standards and rigorous testing, most customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced free of charge during the warranty period. For out-of-warranty repairs, customers will be billed according to the cost of replacement materials, service time, and freight. Please consult your dealer for more details.

If you believe your product is defective, follow the steps outlined below.

1. Collect all the information about the problem encountered. (For example, CPU speed, Advantech products used, other hardware and software used, etc.) Note anything abnormal and list any onscreen messages displayed when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
3. If your product is diagnosed as defective, obtain a return merchandise authorization (RMA) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a completed Repair and Replacement Order Card, and a proof of purchase date (such as a photocopy of your sales receipt) into a shippable container. Products returned without a proof of purchase date are not eligible for warranty service.
5. Write the RMA number clearly on the outside of the package and ship the package prepaid to your dealer.

Declaration of Conformity

FCC Class B

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for assistance.

Ordering Information

Part No.	Description
ROM-2820CD-REA1E	ROM-2820 A101 i.MX93 Dual 16GB RAM 2GB 0~60°C
ROM-2820WD-REA1E	ROM-2820 A101 i.MX93 Dual 16GB RAM 2GB -40~85°C

Packing List

Before installation, please ensure the following items have been shipped.

- 1 x ROM-2820

Optional Accessories

Part No.	Description
9696ED93000	ROM-ED93 OSM Carrier Board
9696MEG510E ROM-EG51	A101 ASS'Y CODEC Board
ROM-2820WD-REA1E	ROM-2820 OSM V1.1 module
96PSA-A36W12W7-5	ADAPTER 100-240V 36W 12V 3A
1700026878-01	M cable PH JACK D3.5/1x2P-1.25 15cm
1700031429-01	M Cable PH JACK D3.5/1x3P-1.25 15cm
1700021565-01	Debug cable 1x4P-1.25/D-SUB 9P(F) 60cm
1700019474	M Cable D-SUB 9P(F)/D-SUB 9P(F) RS232/RS485 100cm
SQF-MSDM1-16G-21E	SQF MICRO SD C10 MLC 16G (-40~85°C)
1700023619-01	M cable USB-A 4P(M)/micro USB-B 5P(M) 100cm
1700021882-01	BKL cable 1x4P-1.25/1x5P-2.0 50cm
1700021883-01	LVDS cable 1x20P-1.0/2x20P-1.25 50cm

*Please contact us for a suitable cellular module for your region.

Safety Instructions

1. Read these safety instructions carefully.
2. Retain this user manual for future reference.
3. Disconnect the equipment from all power outlets before cleaning. Use only a damp cloth for cleaning. Do not use liquid or spray detergents.
4. For pluggable equipment, the power outlet socket must be located near the equipment and easily accessible.
5. Protect the equipment from humidity.
6. Place the equipment on a reliable surface during installation. Dropping or letting the equipment fall may cause damage.
7. The openings on the enclosure are for air convection. Protect the equipment from overheating. Do not cover the openings.
8. Ensure that the voltage of the power source is correct before connecting the equipment to a power outlet.
9. Position the power cord away from high-traffic areas. Do not place anything over the power cord.
10. All cautions and warnings on the equipment should be noted.
11. If the equipment is not used for a long time, disconnect it from the power source to avoid damage from transient overvoltage.
12. Never pour liquid into an opening. This may cause fire or electrical shock.
13. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
14. If any of the following occurs, have the equipment checked by service personnel:
 - The power cord or plug is damaged.
 - Liquid has penetrated the equipment.
 - The equipment has been exposed to moisture.
 - The equipment is malfunctioning, or does not operate according to the user manual.
 - The equipment has been dropped and damaged.
 - The equipment shows obvious signs of breakage.

DISCLAIMER: These instructions are provided according to IEC 704-1 standards. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

Safety Precaution – Static Electricity

Follow these simple precautions to protect yourself from harm and the products from damage.

- To avoid electrical shock, always disconnect the power from your PC chassis before you work on it. Don't touch any components on the CPU card or other cards while the PC is on.
- Disconnect power before making any configuration changes. The sudden rush of power as you connect a jumper or install a card may damage sensitive electronic components.

Contents

Chapter 1 General Introduction 1

1.1	Introduction	2
1.2	Product Features.....	2
	Table 1.1: Product Features	2
1.3	Mechanical Specifications.....	3
1.3.1	Electrical Specifications	3
1.3.2	Environmental Specifications.....	3

Chapter 2 H/W Installation.....5

2.1	ROM-2820 Board Dimensions	6
2.2	Block Diagram.....	7
2.2.1	ROM-2820	7
2.2.2	ROM-DK2820	7
2.3	Pin Define.....	8
	Table 2.1: Pin Define	8
2.4	Quick Start Guide.....	13
2.4.1	I/O Description of ROM-DK2820.....	13
2.4.2	Switch Setting for ROM-DK2820	13
2.4.3	Debug Port Connection and Setting	13
	Table 2.2: A Cable 2x5P-2.0/D-SUB 9P(M)x2 20cm.....	14
	Table 2.3: Display Options	15
2.5	Connector, Jumper Settings, Switch and LED	18
2.5.1	I/O Overview	18
	Table 2.4: I/O Connector Overview	19
	Table 2.5: Audio1	20
	Table 2.6: BAT601.....	20
	Table 2.7: CN1301	20
	Table 2.8: CANA.....	21
	Table 2.9: CANB.....	21
	Table 2.10: COMA (RS232/RS422/RS485)	22
	Table 2.11: COMB (RS232/RS422/RS485)	22
	Table 2.12: COMC.....	22
	Table 2.13: COMD.....	23
	Table 2.14: COME_DEBUG	23
	Table 2.15: CN1601 (RJ45 1x2).....	23
	Table 2.16: DCIN701 (DC-Jack, +12v Power Input).....	24
	Table 2.17: DSI.....	24
	Table 2.18: DSI_BKLT_PWR	24
	Table 2.19: GPIO.....	25
	Table 2.20: I2S_CN (Audio Codec).....	25
	Table 2.21: LVDS	26
	Table 2.22: M2B_CN	27
	Table 2.23: M2E_CN	29
	Table 2.24: MIC	30
	Table 2.25: SD_CARD	30
	Table 2.26: SPI.....	31
	Table 2.27: USB1201	31
	Table 2.28: USB0_OTG1201	32
	Table 2.29: SIM	32
	Table 2.30: LVDS_BKLT_PWR.....	33
2.5.2	I/O Overview	33
	Table 2.31: Jumper Overview.....	33
	Table 2.32: AT801 (Default: 1-2).....	33

Table 2.33: CN1801 (Default: NA)	33
Table 2.34: CN1802 (Default: NA)	34
Table 2.35: DSI_BKLT_SLT (Default: 1-2)	34
Table 2.36: DSI_VDD_SLT (Default: 1-2)	34
Table 2.37: LVDS_BKLT_SLT (Default: 1-2)	34
Table 2.38: LVDS_VDD_SLT (Default: 1-2)	34
Table 2.39: SD2001 (Default: 1-2)	34
Table 2.40: SD2002 (Default: 1-2)	35
Table 2.41: SD2003 (Default: 1-2)	35
Table 2.42: SD2004 (Default: 1-2)	35
Table 2.43: SD2005 (Default: 1-2)	35
Table 2.44: SD2006 (Default: 1-2)	35
2.5.3 Switch Overview	36
Table 2.45: Switch Overview	36
Table 2.46: SW1001 (Boot Select Switch)	36
Table 2.47: SW1002 (Reset Button)	36
Table 2.48: SW1003 (Power Button)	36
Table 2.49: SW1103 (COMB Switch)	37
Table 2.50: SW1104 (COMA Switch)	37

Chapter 3 Software Functionality 39

3.1 Display	40
3.1.1 LVDS	40
3.1.2 MIPI HDMI	40
3.1.3 MIPI DSI	41
3.2 Audio	42
3.3 M.2	42
3.3.1 Test Wi-Fi with NXP IW-612 Module (SDIO Interface)	42
3.3.2 Test Bluetooth with NXP IW-612 Module (UART Interface)	43
3.3.3 Test 4G with EWM-C401CQE01 Module (UART Interface)	43
3.4 Serial Port (COM A/C)	43
3.4.1 RS-232 Loopback Test (eg. ttyLP0)	43
3.4.2 RS-485 Test	43
3.5 RS-422	45
3.6 I2C	46
3.7 USB	46
3.8 RTC	46
3.9 eMMC/SD	47
3.9.1 Device Routes	47
3.9.2 Test (eg. emmc)	47
3.10 Ethernet	48
3.11 GPIO	49
3.11.1 GPIO Pins	49
Table 3.1: GPIO1101 (Pin Header)	49
3.11.2 GPIO Loopback Test (Using GPIO1 and GPIO2 as examples) ..	49
3.12 Camera	49
3.12.1 MIPI-CSI0 (Tested with OV5640 + mini-SAS to MIPI-CSI Cable) ..	49
3.13 CAN Bus	50
3.14 SPI	50
3.15 Watch Dog	50
3.15.1 Timeout 10S:	50
3.15.2 Timeout 20S:	50
3.15.3 Timeout 50S:	51
3.15.4 Timeout 100S:	51

Chapter 4 Embedded O.S 53

4.1	Introduction	54
4.1.1	Device Tree Source File Select for ROM-2820	54

Chapter 5 System Recovery 55

5.1	System Recovery	56
5.1.1	Recovery by UUU Tool	56
5.1.2	Recovery by EMMC Tool	56

Chapter 6 Advantech Services 57

6.1	RISC Design-in Services.....	58
6.2	Contact Information.....	61
	Table 6.1: Contact Information	61
6.3	Technical Support and Assistance.....	61
6.3.1	Warranty Policy.....	61
6.3.2	Repair Process	62

Chapter 1

General Introduction

This chapter details background information on the ROM-2820.

Sections include:

- Introduction
- Specification

1.1 Introduction

Advantech's ROM-2820 is powered by NXP i.MX 93 processor, featuring 2 Arm Cortex-A55 cores. Additionally, it incorporates 2 Arm Cortex-M33 cores for real-time responsiveness. The Cortex-M33 can reduce static power consumption, making it suitable for applications that require extended battery life. The Cortex-A55, 38% better performance than Cortex-A35 in floating points computing, equip with 64-bit architecture.

The NXP i.MX 93 device also features a Ethos-U65 microNPU design for entry-level ML applications (0.5 TOPS), which provides ~10X better performance than Cortex-A55. As a foundation of the efficient ML inferencing, ROM-2820 offers a rich set of peripherals with device-wide security intelligence for IoT applications. It offers dual GbE for real-time data transmission applications such as parking meters. Also, it has a 2-lane MIPI-CSI with 1080p60 for video capture, a 4-lane MIPI DSI with 1080P60, and a 1-lane LVDS with 480P for diversified HMI applications.

1.2 Product Features

Table 1.1: Product Features

Model Name		ROM-2820
Form Factor		OSM1.1
Processor System	CPU	NXP i.MX 93 Cortex-A55 Dual-core (up to 1.7GHz)
	MCU	1 x Arm Cortex-M33 core
Memory	Technology	LPDDR4X up to 3733MT/s
	Capacity	On-board 2GB
	Flash	16 GB eMMC NAND Flash for O.S.
Graphics	MIPI DSI	1 x 4 lane MIPI-DSI
	LVDS (Display Output, either one)	1 x single channel LVDS
	Graphics Engine	NXP integrated 2D Graphic Acceleration
Ethernet	Chipset	2 x NXP i.MX 93 integrated RMI
RTC	RTC	External RTC
Security		NXP i.MX 93 integrated Trust Zone
I/O	USB	2 x USB2.0
	Audio	1 x I2S
	Serial Port	2 x 4-wire UART, 2 x 2-wire UART, 1 x 2-wire UART for debug console
	SPI	1
	CAN-FD	2
	GPIO	16
	SDIO	1
	I2C	2 + 2 (LVDS/MIPI-CSI)
	PWM	2
	Camera Input	1 x 2-lane MIPI CSI
	ADC	2
	Power Supply Voltage	5V
	Power Consumption	4.82W

Table 1.1: Product Features		
Environment	Operational Temperature	0 ~ 60/-40 ~ 85 °C (0 ~ 140/-40 ~ 185 °F)
	Operating Humidity	95% @ 40° C (non-condensing)
Mechanical	Dimensions (W x D x H)	45 x 45 mm
Operating System		Yocto Linux
Certifications		CE/FCC Class B

1.3 Mechanical Specifications

- **Dimensions:** 45 x 45 mm
- **Height:** 2.1mm

1.3.1 Electrical Specifications

- **Power Supply:** 5V

1.3.2 Environmental Specifications

- **Operating Temperature:** 0 ~ 60 °C/32 ~ 140 °F; -40 ~ 85 °C/-40 ~ 185 °F
- **Operating Humidity:** 95% @ 40° C (non-condensing)
- **Storage Temperature:** -40 ~ 85 °C/-40~185 °F
- **Storage Humidity:** 60 °C/140 °F @ 95% RH non-condensing

Chapter 2

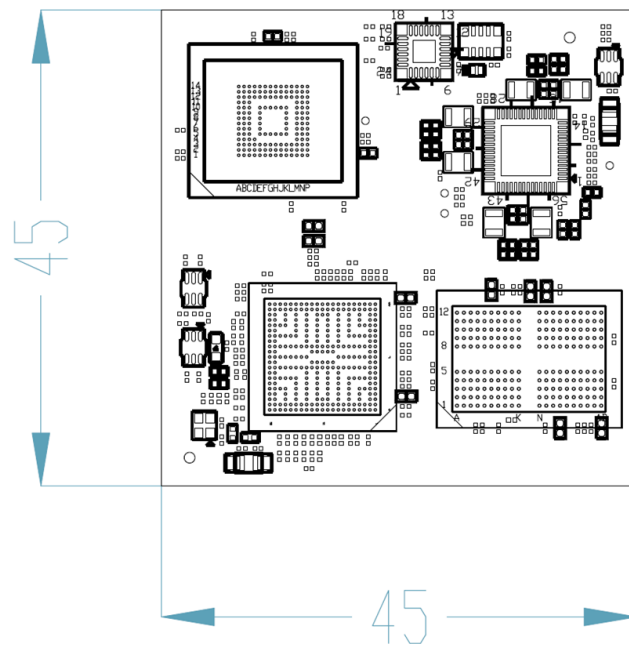
H/W Installation

This chapter details mechanical and connector information.

Sections include:

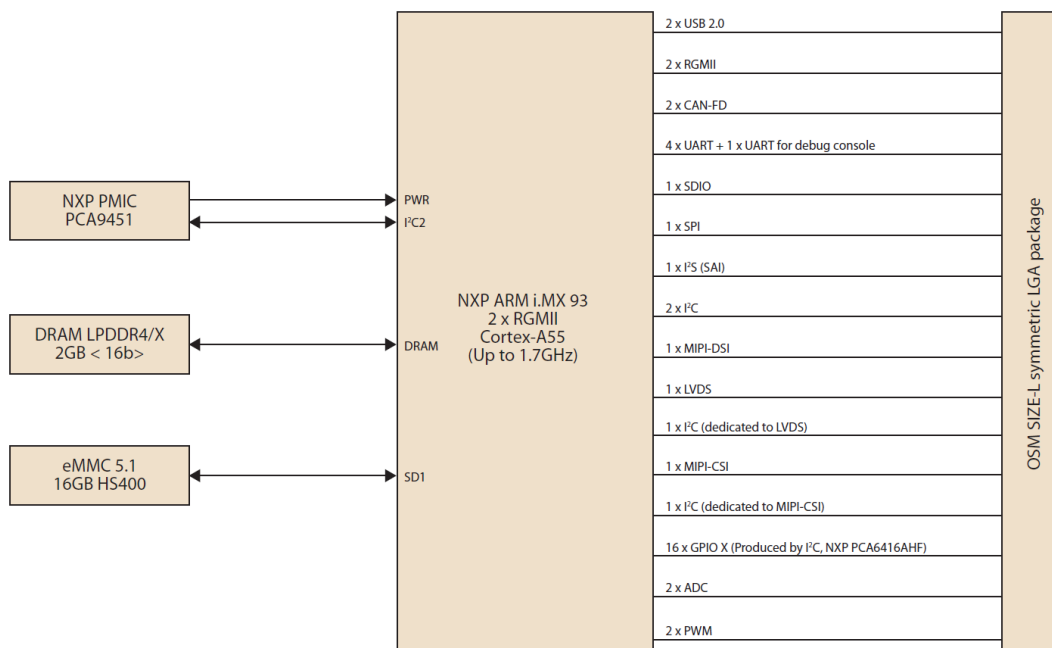
- Mechanical Drawing
- Pin Define
- Quick Start Guide

2.1 ROM-2820 Board Dimensions

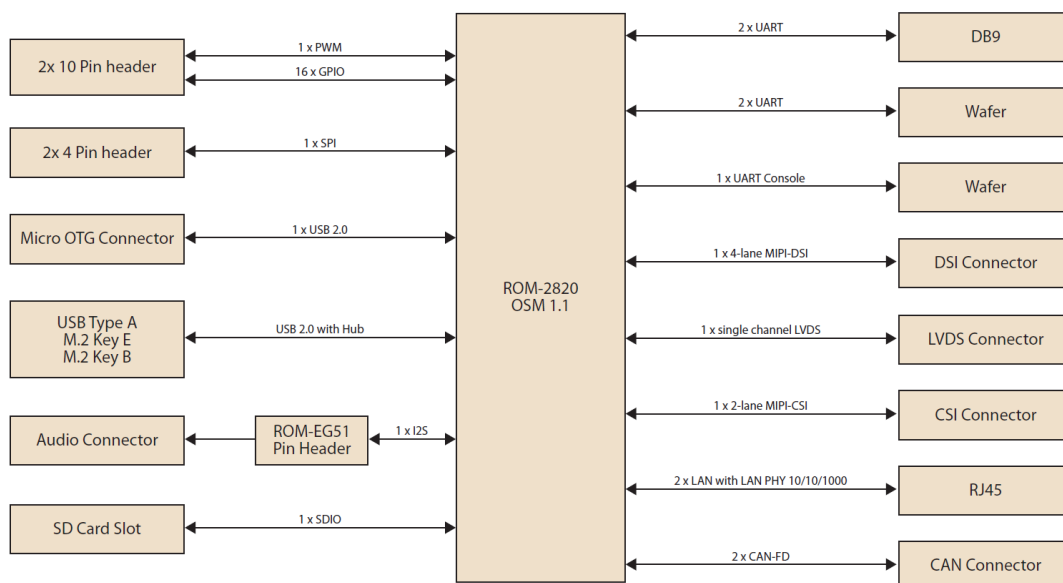


2.2 Block Diagram

2.2.1 ROM-2820



2.2.2 ROM-DK2820



2.3 Pin Define

Table 2.1: Pin Define

Power-GND and Control	Contact Name	Contact Acronym	ROM-2820
	VCC_IN_5V	Y17, Y8, Y9, Y10, Y11, Y25, Y26, Y27, Y28, AE4, AF4, AG4, AH3, AH4, AJ3, AJ4, AK4	+VCC_IN_5V
	GND	D18, E15, E21, F16, F20, J16, J20, L18, M16, M20, P18, R16, R20, V16, V20, Y18, AA14, AA17, AA19, AA22, AB15, AB21, A4, A7, A10, B2, B5, B8, B9, C11, D1, D5, D8, E2, H2, H4, L2, L4, P2, P4, R1, U2, U4, V1, W3, Y2, AA1, A4, AA7, AA8, AA10, AA11, AB3, AB6, AB9, AC4, AC7, AC10, A26, A29, A32, B27, B28, B30, B33, C25, C32, C35, D28, D34, F33, F35, G34, H32, J33, J35, K34, M35, N34, T34, W34, AA25, AA26, AA27, AA28, AA32, AB28, AB31, AB34, AC27, AC30, AC33, AE2, E34, AF35, AG3, AH2, AH34, AJ35, AK3, AL2, AL34, AM13, AM16, AM19, AM22, AM35, N3, AN6, AN9, AN11, AN15, AN18, AN21, AN33, AP2, AP5, AP8, AP13, AP16, AP19, AP22, AP25, AP28, AP31, AP34, AR14, AR17, AR20, AR26, AR29, AR32	GND
	SYS_RST#	U17	SYS_RST#
	CARRIER_PWR_EN	V17	CARRIER_P-WR_EN
	RTC_PWR	W17	+RTC
	BOOT_SEL0#	U19	BOOT_SEL0#
	BOOT_SEL1#	R18	BOOT_SEL1#
	PWR_BTN#	AA9	ONOFF
JTAG	Contact Name	Contact Acronym	ROM-2820
	JTAG_TCK(SWCLK)	N17	JTAG_TCK
	JTAG_TMS(SWDIO)	N19	JTAG_TMS
	JTAG_TDI	P17	JTAG_TDI
	JTAG_TDO(SWO)	R17	JTAG_TDO
	JTAG_nTRST	R19	POR_B

Table 2.1: Pin Define			
UART	Contact Name	Contact Acronym	ROM-2820
	UART_A_RX	A14	UART5_RXD
	UART_A_TX	B13	UART5_TXD
	UART_A_RTS	C13	UART5_RTS
	UART_A_CTS	C14	UART5_CTS
	UART_B_RX	D14	UART6_RXD
	UART_B_TX	D13	UART6_TXD
	UART_B_RTS	D15	UART6_RTS
	UART_B_CTS	D16	UART6_CTS
	UART_C_RX	A22	UART3_RXD
	UART_C_TX	B23	UART3_TXD
	UART_D_RX	C22	UART2_RXD
	UART_D_TX	C23	UART2_TXD
	UART_CON_RX	D22	UART1_RXD
	UART_CON_TX	D23	UART1_TXD
Ethernet / LAN	Contact Name	Contact Acronym	ROM-2820
	ETH_A_(R)(G)MII_CRS	E16	NA
	ETH_A_(R)(G)MII_COL	F15	NA
	ETH_A_(S)(R)(G)MII_TXD0	H15	ENET2_TXD0
	ETH_A_(S)(R)(G)MII_TXD1	G15	ENET2_TXD1
	ETH_A_(S)(R)(G)MII_TXD2	H16	ENET2_TXD2
	ETH_A_(S)(R)(G)MII_TXD3	G16	ENET2_TXD3
	ETH_A_(R)(G)MII_TX- _EN(_ER)	K16	ENET2_TX_CTL
	ETH_A_(R)(G)MII_TX_CLK	J15	ENET2_TXC
	ETH_A_(S)(R)(G)MII_RXD0	K15	ENET2_RXD0
	ETH_A_(S)(R)(G)MII_RXD1	L15	ENET2_RXD1
	ETH_A_(R)(G)MII_RXD2	N15	ENET2_RXD2
	ETH_A_(R)(G)MII_RXD3	P15	ENET2_RXD3
	ETH_A_(R)(G)MII_RX_ER	L16	ENET2_RXER
	ETH_A_(R)(G)MII_RX- _DV(_ER)	M15	ENET2_RX_CTL
	ETH_A_(R)(G)MII_RX_CLK	R15	ENET2_RXC
	ETH_A_SDP	N16	NA
	ETH_MDIO	T15	ENET2_MDIO
	ETH_MDC	T16	ENET2_MDC
	ETH_IOPWR	M17	NA
	ETH_B_(R)(G)MII_CRS	E16	NA
	ETH_B_(R)(G)MII_COL	F15	NA
	ETH_B_(S)(R)(G)MII_TXD0	H15	ENET1_TXD0
	ETH_B_(S)(R)(G)MII_TXD1	G15	ENET1_TXD1
	ETH_B_(S)(R)(G)MII_TXD2	H16	ENET1_TXD2
	ETH_B_(S)(R)(G)MII_TXD3	G16	ENET1_TXD3
	ETH_B_(R)(G)MII_TX- _EN(_ER)	K16	ENET1_TX_CTL
	ETH_B_(R)(G)MII_TX_CLK	J15	ENET1_TXC

Table 2.1: Pin Define

	ETH_B_(S)(R)(G)MII_RXD0	K15	ENET1_RXD0
	ETH_B_(S)(R)(G)MII_RXD1	L15	ENET1_RXD1
	ETH_B_(R)(G)MII_RXD2	N15	ENET1_RXD2
	ETH_B_(R)(G)MII_RXD3	P15	ENET1_RXD3
	ETH_B_(R)(G)MII_RX_ER	L16	ENET1_RXER
	ETH_B_(R)(G)MII_RX- _DV(_ER)	M15	ENET1_RX_CTL
	ETH_B_(R)(G)MII_RX_CLK	R15	ENET1_RXC
	ETH_B_SDP	N16	NA
	ETHB_MDIO	C7	ENET1_MDIO
	ETHB_MDC	C6	ENET1_MDC
GPIO	Contact Name	Contact Acronym	ROM-2820
	GPIO_A_0	D17	GPIO_A_0
	GPIO_A_1	E17	GPIO_A_1
	GPIO_A_2	F17	GPIO_A_2
	GPIO_A_3	G17	GPIO_A_3
	GPIO_A_4	H17	GPIO_A_4
	GPIO_A_5	J17	GPIO_A_5
	GPIO_A_6/SPI_A_CS1#	K17	GPIO_A_6
	GPIO_A_7/SPI_B_CS1#	L17	GPIO_A_7
	GPIO_B_0	D19	GPIO_B_0
	GPIO_B_1	E19	GPIO_B_1
	GPIO_B_2	F19	GPIO_B_2
	GPIO_B_3	G19	GPIO_B_3
	GPIO_B_4	H19	GPIO_B_4
	GPIO_B_5	J19	GPIO_B_5
	GPIO_B_6	K19	GPIO_B_6
	GPIO_B_7	L19	GPIO_B_7
	GPIO_C_0	D3	NA
	GPIO_C_1	D4	NA
	GPIO_C_2	E3	NA
	GPIO_C_3	E4	NA
	GPIO_C_4/DISP_VDD_EN	F3	DISP_VDD_EN
	GPIO_C_5/DISP_BL_EN	F4	DISP_BL_EN
	GPIO_C_6/CAM_PWR	G3	CAM_PWR
	GPIO_C_7/CAM_RST#	G4	CAM_RST#
SDIO	Contact Name	Contact Acronym	ROM-2820
	SDIO_A_CMD	E20	SD2_CMD
	SDIO_A_CLK	F21	SD2_CLK
	SDIO_A_D0	G20	SD2_D0
	SDIO_A_D1	G21	SD2_D1
	SDIO_A_D2	H20	SD2_D2
	SDIO_A_D3	H21	SD2_D3
	SDIO_A_CD#	J21	SD2_CD#
	SDIO_A_WP	D20	NA

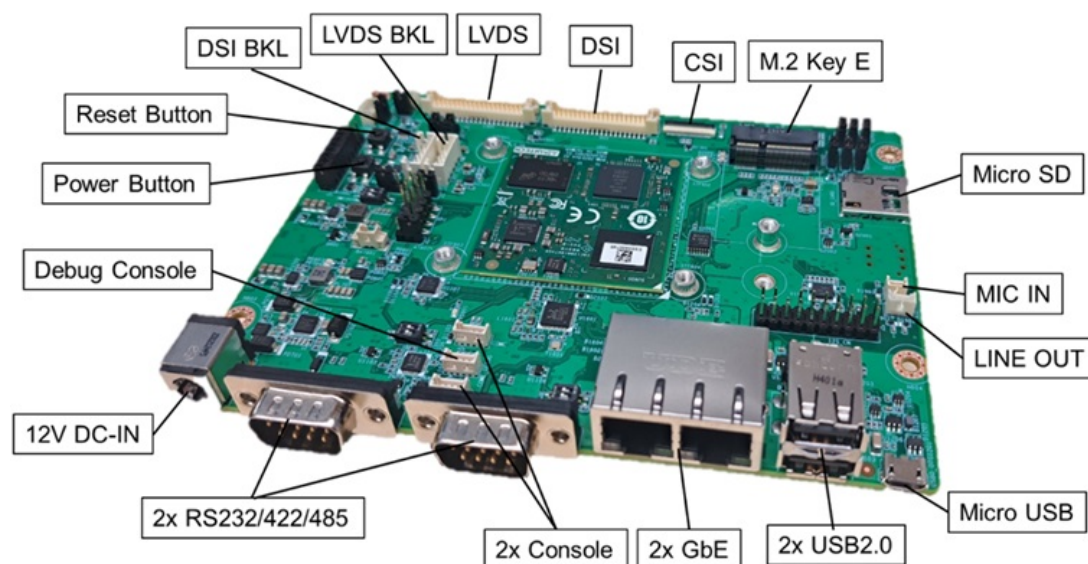
Table 2.1: Pin Define			
	SDIO_A_PWR_EN	D21	SD2_RESET#
	SDIO_A_IOPWR	C20	+NVCC_SD
PWM	Contact Name	Contact Acronym	ROM-2820
	PWM_0	E18	DISP_BL_PWM
	PWM_1	F18	PWM_1
	PWM_2	G18	NA
	PWM_3	H18	NA
	PWM_4	J18	NA
	PWM_5	K18	NA
SPI	Contact Name	Contact Acronym	ROM-2820
	SPI_A_SDI_(IO0)	U15	LPSPi3_SIN
	SPI_A_SDO_(IO1)	V15	LPSPi3_SOUT
	SPI_A_WP_(IO2)	W16	NA
	SPI_A_HOLD_(IO3)	W15	NA
	SPI_A_CS0#	Y15	LPSPi3_PCS0#
	SPI_A_CS1# / GPIO_A_6	K17	NA
	SPI_A_SCK	U16	LPSPi3_SCK
I2S	Contact Name	Contact Acronym	ROM-2820
	I2S_A_DATA_IN	V21	SAI3_RXD0
	I2S_A_DATA_OUT	W21	SAI3_TXD0
	I2S_MCLK	V18	SAI3_MCLK
	I2S_LRCLK	W18	SAI3_TXFS
	I2S_BITCLK	W20	SAI3_BCLK
CAN	Contact Name	Contact Acronym	ROM-2820
	CAN_A_TX	AC17	CAN1_TXD
	CAN_A_RX	AB17	CAN1_RXD
	CAN_B_TX	AC19	CAN2_TXD
	CAN_B_RX	AB19	CAN2_RXD
USB	Contact Name	Contact Acronym	ROM-2820
	USB_A_D_N	AB13	USB1_D-
	USB_A_D_P	AC14	USB1_D+
	USB_A_ID	AB14	NA
	USB_A_OC#	AC15	USB1_OC#
	USB_A_VBUS	AB16	USB1_VBUS
	USB_A_EN	AC16	USB1_PWR_EN
	USB_B_D_N	AB23	USB2_D-
	USB_B_D_P	AC22	USB2_D+
	USB_B_ID	AB22	NA
	USB_B_OC#	AC21	USB2_OC#
	USB_B_VBUS	AB20	USB2_VBUS
	USB_B_EN	AC20	USB2_PWR_EN

Table 2.1: Pin Define			
I2C	Contact Name	Contact Acronym	ROM-2820
	I2C_A_SCL	AA15	I2C8_SCL
	I2C_A_SDA	AA16	I2C8_SDA
	I2C_B_SCL	AA20	I2C5_SCL
	I2C_B_SDA	AA21	I2C5_SDA
MIPI DSI	Contact Name	Contact Acronym	ROM-2820
	DSI_DATA0_N	AB11	DSI_D0-
	DSI_DATA0_P	AB10	DSI_D0+
	DSI_DATA1_N	AC9	DSI_D1-
	DSI_DATA1_P	AC8	DSI_D1+
	DSI_DATA2_N	AC6	DSI_D2-
	DSI_DATA2_P	AC5	DSI_D2+
	DSI_DATA3_N	AB5	DSI_D3-
	DSI_DATA3_P	AB4	DSI_D3+
	DSI_CLOCK_N	AB8	DSI_CLK-
	DSI_CLOCK_P	AB7	DSI_CLK+
	DISP_VDD_EN /GPIO_C_4	F3	DISP_VDD_EN
	DISP_BL_EN /GPIO_C_5	F4	DISP_BL_EN
	DISP_BL_PWM /PWM_0	E18	DISP_BL_PWM
MIPI CSI	Contact Name	Contact Acronym	ROM-2820
	CSI_DATA0_N	C1	CSI_D0-
	CSI_DATA0_P	B1	CSI_D0+
	CSI_DATA1_N	A2	CSI_D1-
	CSI_DATA1_P	A3	CSI_D1+
	CSI_DATA2_N	A5	NA
	CSI_DATA2_P	A6	NA
	CSI_DATA3_N	B6	NA
	CSI_DATA3_P	B7	NA
	CSI_CLOCK_N	B3	CSI_CLK-
	CSI_CLOCK_P	B4	CSI_CLK+
	CAM_MCK	C2	CSI_MCLK
	I2C_CAM_SDA / CSI_TX_N	C3	I2C3_SDA
	I2C_CAM_SCL / CSI_TX_P	C4	I2C3_SCL
	CAM_PWR / GPIO_C_6	G3	CAM_PWR
	CAM_RST# / GPIO_C_7	G4	CAM_RST#

2.4 Quick Start Guide

2.4.1 I/O Description of ROM-DK2820

ROM-DK2820 is an evaluation board for ROM-2820. Please see the I/O description of ROM-DK2820 below.



2.4.2 Switch Setting for ROM-DK2820



SW1001: 1 OFF, 2 ON

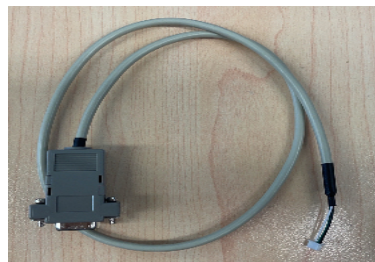
2.4.3 Debug Port Connection and Setting

ROM-2820 debug port is shared with A-core Console. Please connect the debug console cable 1700021565-01 & 1700019474. Then connect the USB-to-RS232 Cable to your PC terminal. Connect the cable to COM1 pin header to the nearby the HDMI connector.

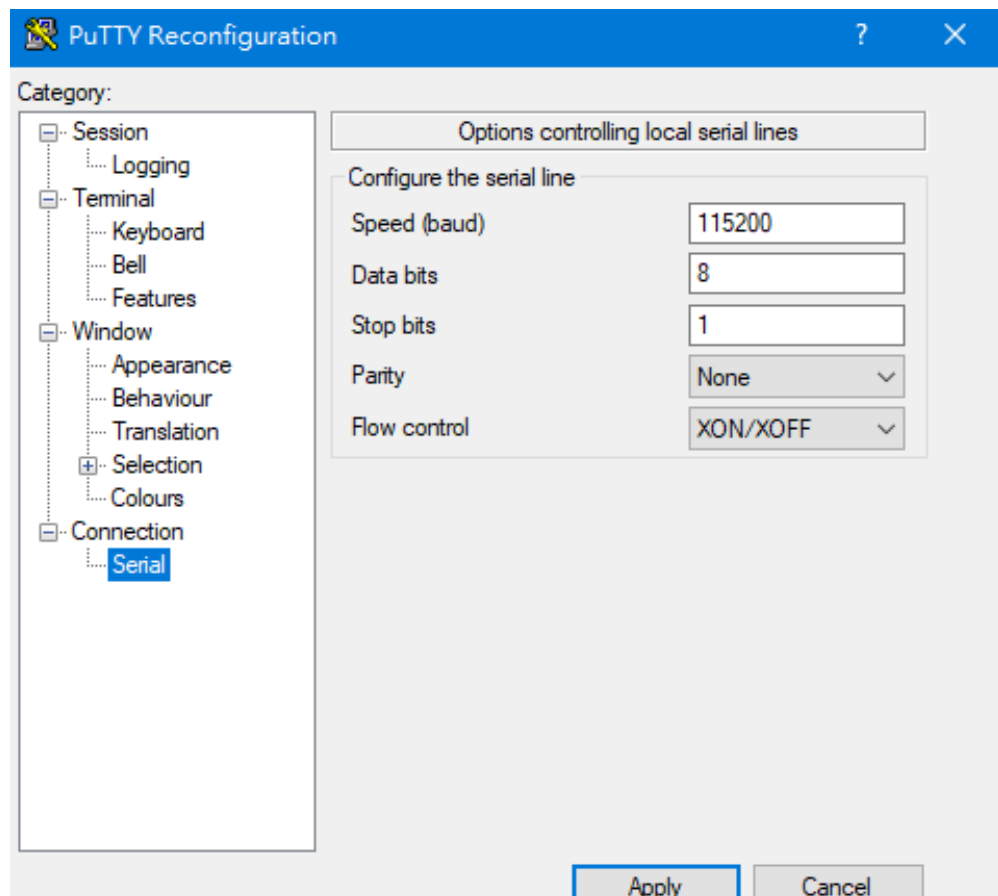
Note! The debug cable needs to be purchased separately.



Table 2.2: A Cable 2x5P-2.0/D-SUB 9P(M)x2 20cm

Part Number	Description	Picture
1700034345-01	A Cable 2x5P-2.0/D-SUB 9P(M)x2 20cm	

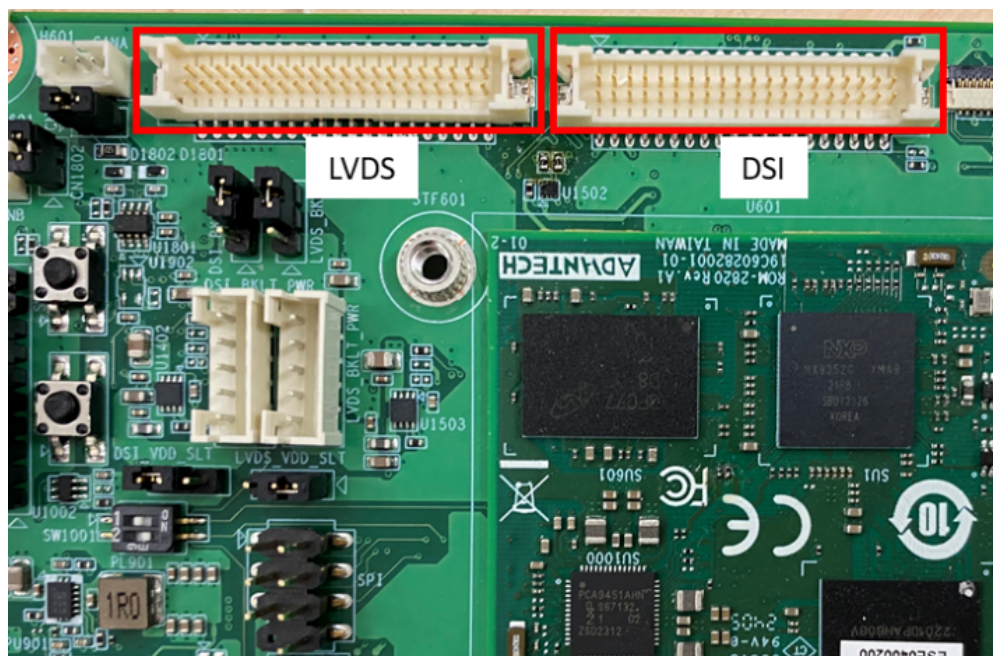
1. ROM-2820 can communicate with a host server using serial cables. Common serial communication programs such as HyperTerminal, Tera Term or PuTTY can be used in such applications. The example demonstrated below describes the serial terminal setup using Tera Term on a Windows host: Open Tera Term on your Windows PC, and select the settings as shown in figure.



2. Connect a Display:

ROM-2820 has two display options: one is MIPI-DSI, and the other is single-channel LVDS. The default display is MIPI DSI converted to HDMI.

When you need to use a DSI to HDMI converter for display, an additional HDMI dongle ROM-EG56 needs to be connected to the DSI connector as show in Figure 2.24.



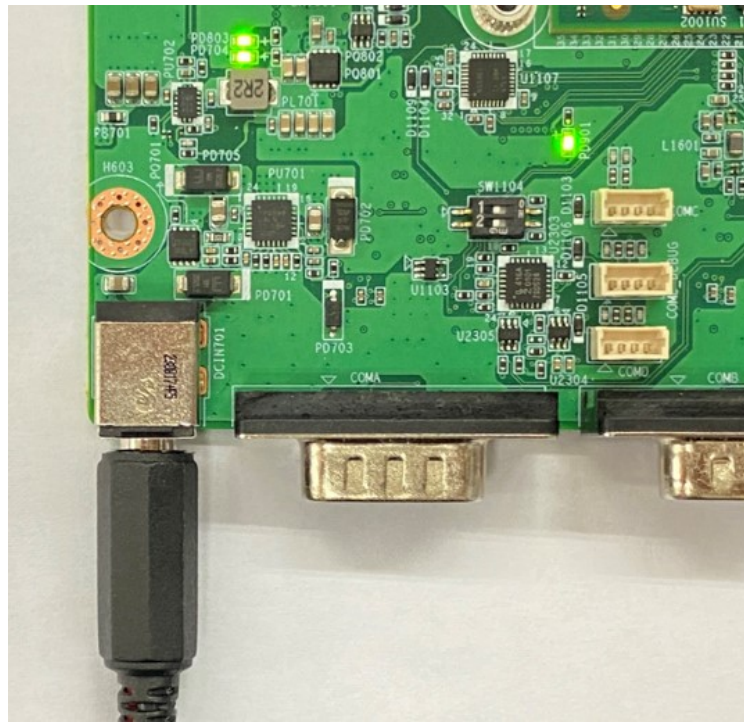
Note: The debug cable needs to be purchased separately.

Table 2.3: Display Options

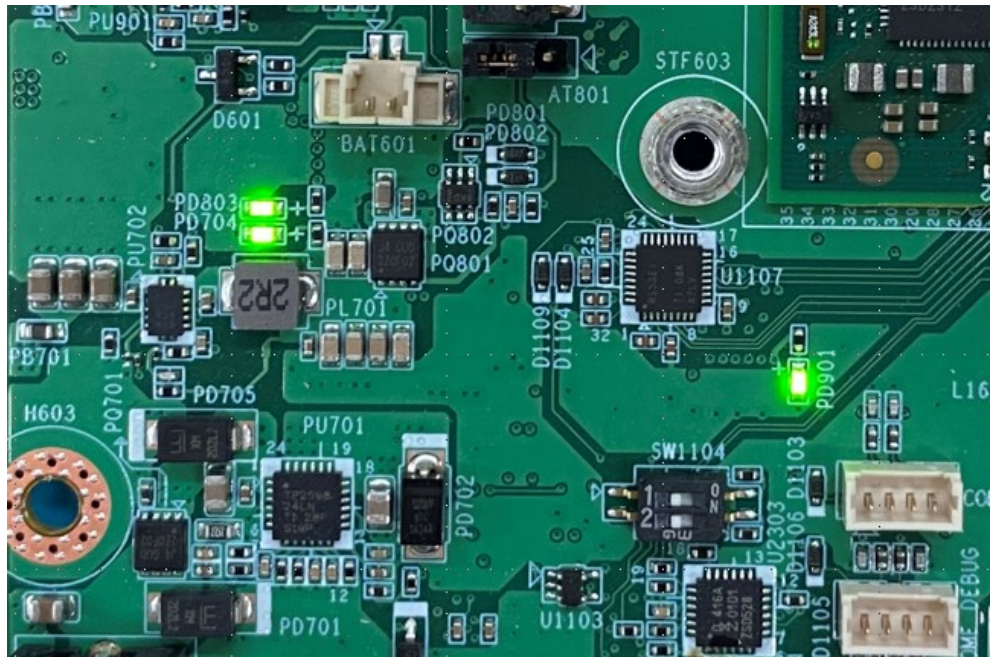
Part Number	Description	Picture
1700034345-01	ROM-EG56-A101-2 ASS'Y DSI to HDMI board	
1700030769-01	M Cable Mini SAS 36P/1x5P- 2.0+2x20P-1.25+1x1P-2	

3. Connect the Power Source:

ROM-2820's power input is 12VDC. The power interface's location is DCIN1. Please choose a suitable adapter and power cord to connect the board (please refer to P/Ns on datasheet and Optional Accessories of this manual) as shown in Figure 2.25.



4. When switching on the power, the green LED indicator on BOT side of the board will light up to indicate that the board has booted up normally.



- After booting, the display boot screen and debug window are shown as pictures below. Login username: root without password.



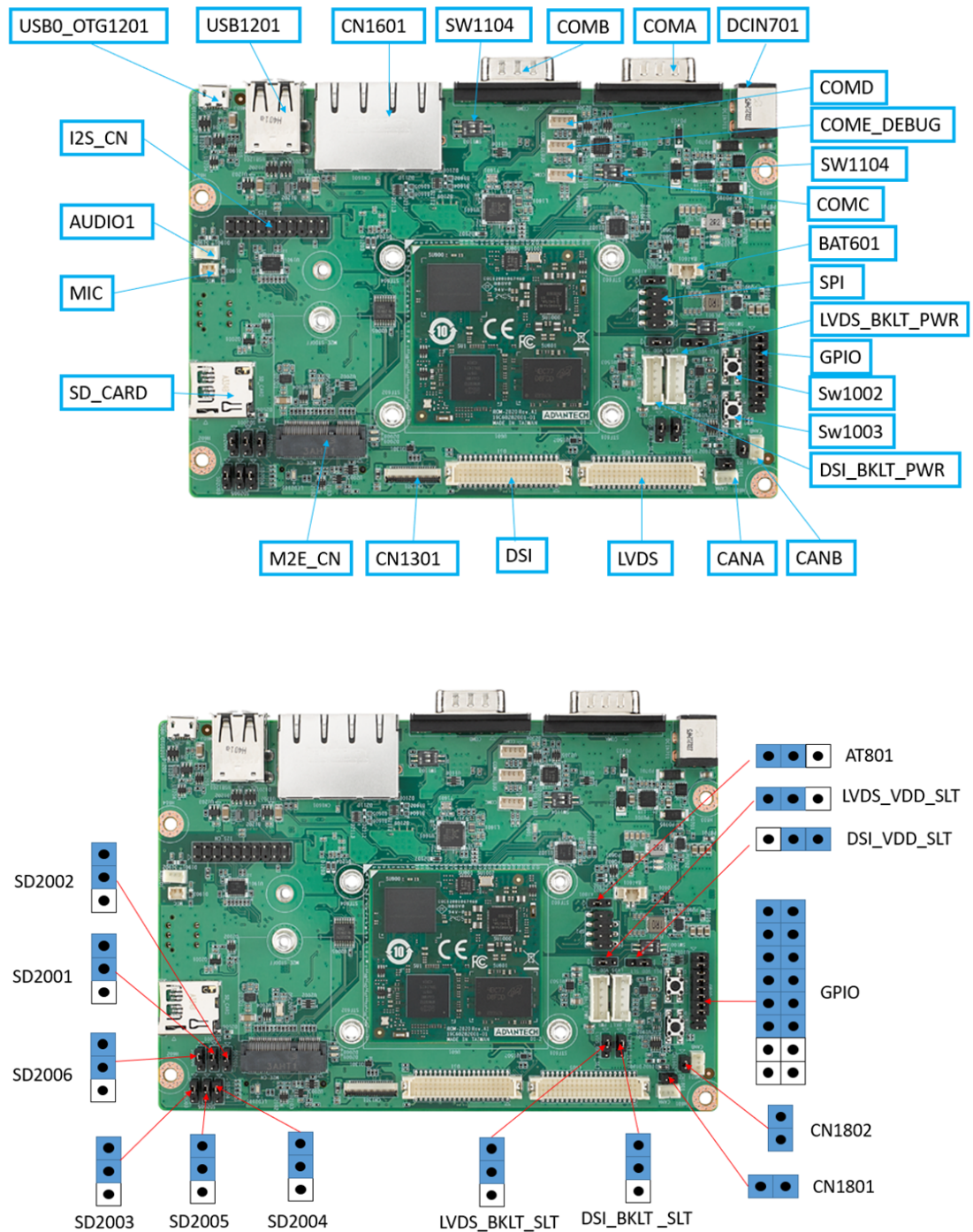
```

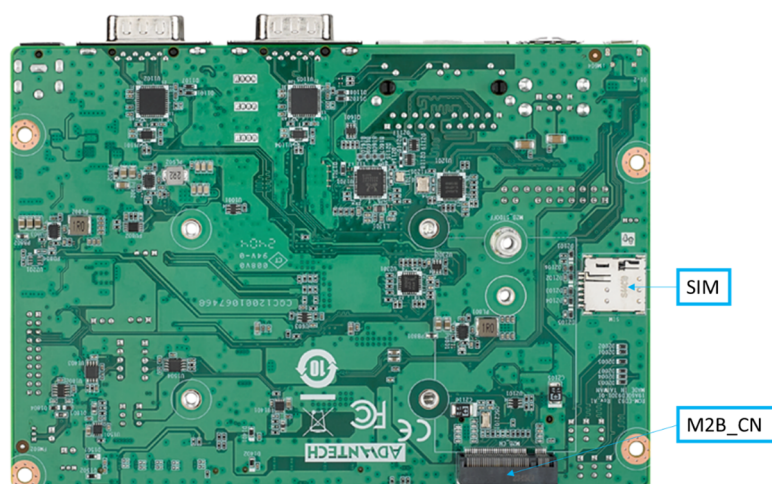
See 'systemctl status poplask-quit.service' for details.
[ OK ] Started /etc/rc.local Compatibility.
[ OK ] Finished Permit User Sessions.
[ OK ] Started Target Communication Framework agent.
[ OK ] Started Avahi mDNS/DNS-SD Stack.
[ OK ] Started Getty on tty1.
[ OK ] Started Serial Getty on ttyLPO.
[ OK ] Reached target Login Prompts.
Starting Weston, a Wayland compositor, as a system service...
0.105002] audit: type=1334 audit(1713865327.752:8): prog-id=9 op=LOAD
0.207240] audit: type=1334 audit(1713865327.764:7): prog-id=10 op=LOAD
Starting User Database Manager...
0.224172] imx-dmcc 428a0000.ethernet eth1: RPL221F Gigabit Ethernet (irq=POLL)
0.245202] imx-dmcc 428a0000.ethernet eth1: No Safety Features support found
0.252265] imx-dmcc 428a0000.ethernet eth1: IEEE 1588-2008 Advanced Timestamp supported
0.257490] imx-dmcc 428a0000.ethernet eth1: registered PTP clock
0.287764] imx-dmcc 428a0000.ethernet eth1: FPE workqueue start
0.294474] imx-dmcc 428a0000.ethernet eth1: configuring for phy/rgmii-id link mode
0.312802] br21: adding VxLAN 0 to HW filter on device eth1
[ OK ] Started Network Time Service.
[ OK ] Started User Database Manager.
Starting WPA supplicant...
0.437962] audit: type=1334 audit(1713865328.106:8): prog-id=11 op=LOAD
0.646125] audit: type=1334 audit(1713865328.204:9): prog-id=12 op=LOAD
Starting Hostname Service...
[ OK ] Created slice User Slice of UID 0.
Starting User Runtime Directory /run/user/0...
[ OK ] Started WPA supplicant.
[ OK ] Finished User Runtime Directory /run/user/0.
Starting User Manager for UID 0...
10.050591] audit: type=1006 audit(1713865328.608:10): pid=564 uid=0 old-auid=4294967295 auid=0 tty=(none) old-ses=4294967295 ses=1 res=1
10.070891] audit: type=1300 audit(1713865328.608:10): arch=c00000b7 syscall=64 success=yes exit=1 a0=0 a1=ffff7183d60 a2=1 a3=1 items=0 ppid=1 pid=564 auid=0 uid=0 gid=0 euid=0 suid=0 fsuid=0 egid=0 sg
id=0 fsuid=0 tty=(none) seccomp=0 comm="(systemd)" exe="/lib/systemd/systemd" key=(null)
[ OK ] Started Hostname Service.
[ OK ] Started User Manager for UID 0.
[ OK ] Started Session c1 of User root.
[ OK ] Created slice /system/systemd-fsck.
[ OK ] Started containerd container runtime.
[ OK ] Found device /dev/mmcblk0p2.
[ OK ] Found device /dev/mmcblk0p1.
Starting File System Check on /dev/mmcblk0p1...
Starting File System Check on /dev/mmcblk0p2...
[ OK ] Finished File System Check on /dev/mmcblk0p1.
Mounting /run/media/boot-mmcblk0p1...
[ OK ] Found device /dev/mmcblk0p1.
[ OK ] Mounted /run/media/boot-mmcblk0p1.
chdir /
[ OK ] Mounted /run/media/boot-mmcblk0p1.
Starting File System Check on /dev/mmcblk0p1...
[ 11.202382] mx8-img-udm Registered mx8-isi.0.capture as /dev/video0
[ 11.209357] unregister ISI channel: mx8-isi.0
[FAILED] failed to start Weston, a compositor, as a system service.
See 'systemctl status weston.service' for details.
[ OK ] Finished File System Check on /dev/mmcblk0p1.
Mounting /run/media/boot-mmcblk0p1...
[ OK ] Mounted /run/media/boot-mmcblk0p1.
[ 11.319422] fs: _err_prober: No ECC D16ns discovered
root: fsck 90.6% complete...
NXP i.MX Release Distro 6.1-mickledore tmo93rom2020a1 ttyLPO

```

2.5 Connector, Jumper Settings, Switch and LED

2.5.1 I/O Overview



**Table 2.4: I/O Connector Overview**

No	Position	Description
2.5	AUDIO1	Line Out Connector
2.6	BAT601	Battery Connector
2.7	CN1301	Camera FPC connector
2.8	CANA	CAN Bus Connector
2.9	CANB	CAN Bus Connector
2.10	COMA	RS232/422/485
2.11	COMB	RS232/422/485
2.12	COMC	COM A port wafer
2.13	COMD	COM D port wafer
2.14	COME_DEBUG	Debug console wafer
2.15	CN1601	RJ45 1x2
2.16	DCIN701	12V DCIN connector
2.17	DSI	DSI connector
2.18	DSI_BKLT_PWR	DSI backlight wafer
2.19	GPIO	GPIO header
2.20	I2S_CN	Audio expander pin header
2.21	LVDS	LVDS connector
2.22	M2B_CN	M2 Key B connector
2.23	M2E_CN	M2 Key E connector
2.24	MIC	MIC Connector
2.25	SD_CARD	Micro SD slot
2.26	SPI	SPI pin header
2.27	USB1201	USB2.0 2x1 Connector
2.28	USB0_OTG1201	Micro USB Connector
2.29	SIM	SIM card slot
2.30	LVDS_BKLT_PWR	LVDS backlight wafer

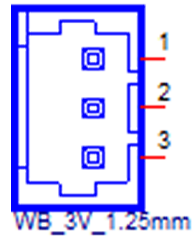


Table 2.5: Audio1

Pin	Signal	Pin	Signal
1	HP_L	2	HP_R
3	GND_AUD		

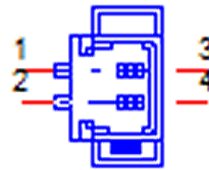


Table 2.6: BAT601

Pin	Signal	Pin	Signal
1	+RTC_PWR	2	GND
3	GND	4	GND

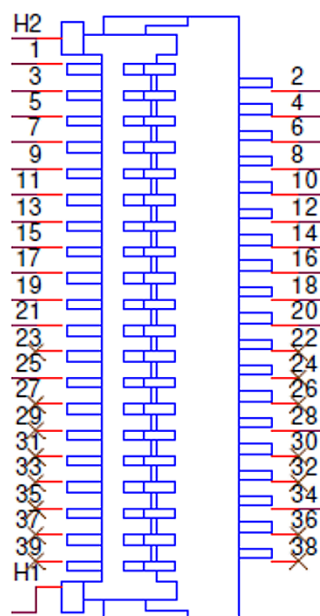
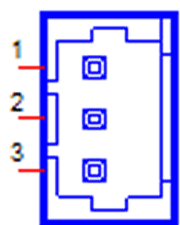


Table 2.7: CN1301

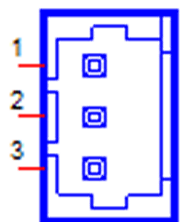
Pin	Signal	Pin	Signal
1	+V3_CAMAF_A	2	+V3_CAMAF_A
3	-	4	-
5	GND	6	-
7	-	8	GND
9	-	10	-
11	-	12	-
13	-	14	GND

Table 2.7: CN1301

15	-	16	-
17	GND	18	-
19	-	20	GND
21	CAM_MCLK_X	22	CAM_PWR#_R
23	I2C_CSI0_CK	24	I2C_CSI0_DAT
25	GND	26	CSI_CLOCK_P
27	CSI_CLOCK_N	28	GND
29	CSI_DATA0_P	30	CSI_DATA0_N
31	CAM0_RST#_R	32	CSI_DATA1_P
33	CSI_DATA1_N	34	GND
35	-	36	-
37	-	38	-
39	-	-	-

**Table 2.8: CANA**

Pin	Signal	Pin	Signal
1	CANA_L	2	CANA_H
3	GND		

**Table 2.9: CANB**

Pin	Signal	Pin	Signal
1	CANB_L	2	CANB_H
3	GND		

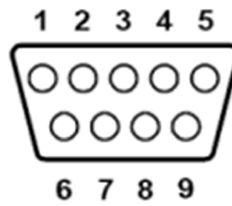


Table 2.10: COMA (RS232/RS422/RS485)

Pin	Signal	Pin	Signal
1	+12V	2	GND
3	RS232 TXD or 422/ 485RX+	4	RS232 RXD or 422/ 485TX+
5	GND	6	-
7	RTS#	8	CTS#
9	-		

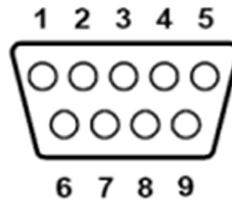


Table 2.11: COMB (RS232/RS422/RS485)

Pin	Signal	Pin	Signal
1	+12V	2	GND
3	RS232 TXD or 422/ 485RX+	4	RS232 RXD or 422/485TX+
5	GND	6	-
7	RTS#	8	CTS#
9	-		



Table 2.12: COMC

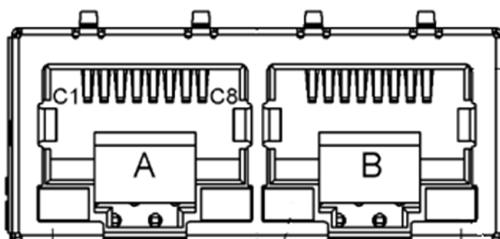
Pin	Signal	Pin	Signal
1	+V3.3	2	COMC_TX_R
3	COMC_RX_R	4	GND

**Table 2.13: COMD**

Pin	Signal	Pin	Signal
1	+V3.3	2	COMD_TX_R
3	COMD_RX_R	4	GND

**Table 2.14: COME_DEBUG**

Pin	Signal	Pin	Signal
1	+V3.3	2	COME_TX_R
3	COME_RX_R	4	GND

**Table 2.15: CN1601 (RJ45 1x2)**

Pin	Signal	Pin	Signal
A1	ETH_A_MDI0+_R	A2	ETH_A_MDI0-_R
A3	ETH_A_MDI1+_R	A4	ETH_A_MDI1-_R
A5	ETH_A_MDI2+_R	A6	ETH_A_MDI2-_R
A7	ETH_A_MDI3+_R	A8	ETH_A_MDI3-_R
A9	ETH_A_CTREF	A10	GND
B1	ETH_B_MDI0+_R	B2	ETH_B_MDI0-_R
B3	ETH_B_MDI1+_R	B4	ETH_B_MDI1-_R
B5	ETH_B_MDI2+_R	B6	ETH_B_MDI2-_R
B7	ETH_B_MDI3+_R	B8	ETH_B_MDI3-_R
B9	ETH_B_CTREF	B10	GND
LA1	ETH_A_PHYAD0_ACT#	LA2	+V3.3
LA3	ETH_A_LDO1_1000M#	LA4	ETH_A_LDO0_100M#
LB1	ETH_B_PHYAD0_ACT#	LB2	+V3.3
LB3	ETH_B_LDO1_1000M#	LB4	ETH_B_LDO0_100M#

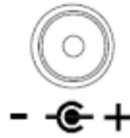


Table 2.16: DCIN701 (DC-Jack, +12v Power Input)

Pin	Signal	Pin	Signal
1	+12V	Shield	GND

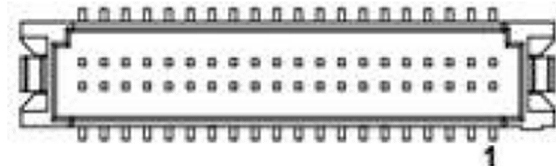


Table 2.17: DSI

Pin	Signal	Pin	Signal
1	+VDD_DSI	2	+VDD_DSI
3	GND	4	GND
5	+VDD_DSI	6	+VDD_DSI
7	DSI_DATA0_N	8	-
9	DSI_DATA0_P	10	-
11	GND	12	GND
13	DSI_DATA1_N	14	-
15	DSI_DATA1_P	16	-
17	GND	18	GND
19	DSI_DATA2_N	20	-
21	DSI_DATA2_P	22	-
23	GND	24	GND
25	DSI_CLK_N	26	-
27	DSI_CLK_P	28	-
29	GND	30	GND
31	I2C_SCL_DSI	32	I2C_SDA_DSI
33	GND	34	GND
35	DSI_DATA3_N	36	-
37	DSI_DATA3_P	38	-
39	PD 4.7K	40	DSI_CTRL

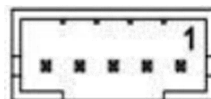
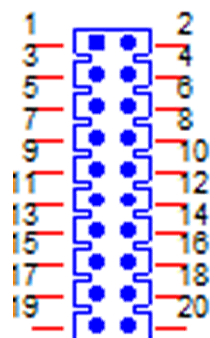
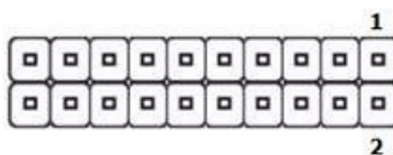


Table 2.18: DSI_BKLT_PWR

Pin	Signal	Pin	Signal
1	+VDD_DSI_BKLT	2	GND
3	DSI_BL_EN_C	4	DSI_BL_PWM_C
5	+V5	-	

**Table 2.19: GPIO**

Pin	Signal	Pin	Signal
1	GPIO_A_0	2	GPIO_A_1
3	GPIO_A_2	4	GPIO_A_3
5	GPIO_A_4	6	GPIO_A_5
7	GPIO_A_6	8	GPIO_A_7
9	GPIO_B_0	10	GPIO_B_1
11	GPIO_B_2	12	GPIO_B_3
13	GPIO_B_4	14	GPIO_B_5
15	GPIO_B_6	16	GPIO_B_7
17	USB_B_EN	18	USB_B_OC#
19	PWM1	20	GND

**Table 2.20: I2S_CN (Audio Codec)**

Pin	Signal	Pin	Signal
1	AUDIO_VDDA	2	GND
3	AUDIO_VDDA	4	2S0_SDIN_3V3
5	I2S0_SDOUT_3V3	6	I2S0_LRCK_3V3
7	I2S0_CK_3V3	8	AUDIO_MCK_3V3
9	-	10	GND
11	AUDIO_I2C_CK	12	+MIC_BIAS
13	AUDIO_I2C_DAT	14	GND_AUD
	key	16	HP_R
17	MIC_IN	18	GND_AUD
19	GND_AUD	20	HP_L

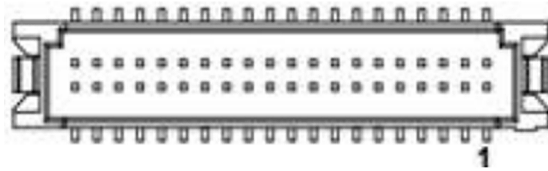


Table 2.21: LVDS

Pin	Signal	Pin	Signal
1	+VDD_LVDS	2	+VDD_LVDS
3	GND	4	GND
5	+VDD_LVDS	6	+VDD_LVDS
7	LVDS_A_LANE0_N	8	-
9	LVDS_A_LANE0_P	10	-
11	GND	12	GND
13	LVDS_A_LANE1_N	14	-
15	LVDS_A_LANE1_P	16	-
17	GND	18	GND
19	LVDS_A_LANE2_N	20	-
21	LVDS_A_LANE2_P	22	-
23	GND	24	GND
25	LVDS_A_CLK_N	26	-
27	LVDS_A_CLK_P	28	-
29	GND	30	GND
31	I2C_SCL_LVDS	32	I2C_SDA_LVDS
33	GND	34	GND
35	LVDS_A_LANE3_N	36	-
37	LVDS_A_LANE3_P	38	-
39	PD 4.7K	40	LVDS_CTRL



Table 2.22: M2B_CN

Pin	Signal	Pin	Signal
1	-	2	+V3.8
3	GND	4	+V3.8
5	GND	6	M2B_POWER_OFF#
7	USB_M2B_DP	8	M2B_W_DISABLE1#
9	USB_M2B_DN	10	LED_M2B#
11	GND		
Key			
		20	-
21	-	22	-
23	-	24	-
25	M2B_DPR	26	M2B_W_DISABLE2#
27	GND	28	-
29	-	30	UIM_a_RESET
31	-	32	UIM_a_CLK
33	GND	34	UIM_a_DATA
35	-	36	+VUIM_PWR

Table 2.22: M2B_CN

37	-	38	-
39	GND	40	-
41	-	42	-
43	-	44	M2B_ALERT#
45	GND	46	-
47	-	48	-
49	-	50	VLTE_PG
51	GND	52	M2B_CLKREQ#
53	-	54	M2B_WAKE#
55	-	56	-
57	GND	58	-
59	M2B_ANTCTL0	60	-
61	-	62	-
63	-	64	-
65	-	66	SIM_DETECT
67	M2B_RST#	68	32.768KHz
69	-	70	+V3.8
71	GND	72	+V3.8
73	GND	74	+V3.8
75	-		

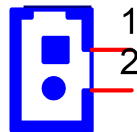


Table 2.23: M2E_CN

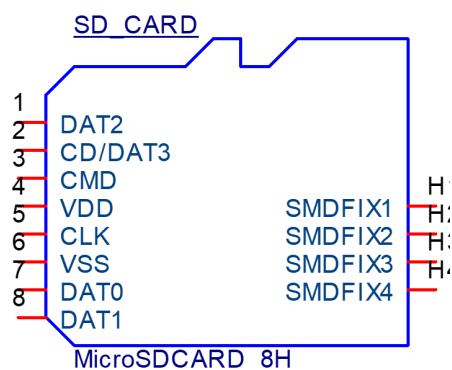
Pin	Signal	Pin	Signal
1	GND	2	+V3.3_M2E
3	USB_M2E_DP	4	+V3.3_M2E
5	USB_M2E_DN	6	LED_OUT_WLAN#
7	GND	8	PCM_CLK
9	M2_CK	10	PCM_SYNC
11	M2_CMD	12	PCM_OUT
13	M2_D0	14	PCM_IN
15	M2_D1	16	LED_OUT_BT#
17	M2_D2	18	GND
19	M2_D3	20	M2E_UR_WAKE#
21	M2_SDIO_WAKE#	22	M2_RXD
23	M2_SDIO_RST#		
Key			
		32	M2_TXD
33	GND	34	M2_CTS
35	-	36	M2_RTS

Table 2.23: M2E_CN

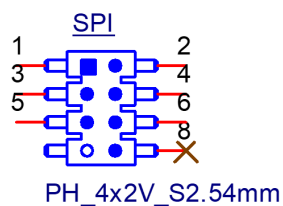
37	-	38	VEN_SPI_TXD
39	GND	40	VEN_SPI_RXD
41	-	42	VEN_SPI_CLK
43	-	44	-
45	GND	46	-
47	-	48	-
49	-	50	M2_SYSCLK
51	GND	52	M2E_RST#
53	-	54	M2E_W_DISABLE2#
55	-	56	M2E_W_DISABLE1#
57	GND	58	I2C_A_SDA
59	-	60	I2C_A_SCL
61	-	62	M2E_nALERT_C
63	GND	64	SPI_A_CS0#
65	-	66	-
67	-	68	-
69	GND	70	-
71	-	72	+V3.3_M2E
73	-	74	+V3.3_M2E
75	GND		

**Table 2.24: MIC**

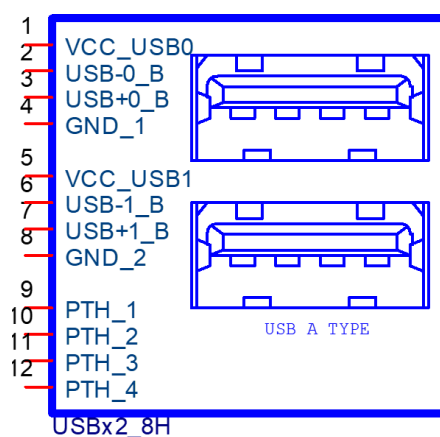
Pin	Signal	Pin	Signal
1	MIC_IN	2	GND_AUD

**Table 2.25: SD_CARD**

Pin	Signal	Pin	Signal
1	SD_D2	2	SD_D3
3	SD_CMD	4	+V3.3_SDIO
5	SD_CK	6	GND
7	SD_D0	8	SD_D1
H1	GND	H2	SDIO_A_CD#
H3	GND	H4	GND

**Table 2.26: SPI**

Pin	Signal	Pin	Signal
1	+V1.8	2	GND
3	SPI_A_CS0#	4	SPI_A_SCK
5	SPI_A_SDO	6	SPI_A_SDI
		8	-

**Table 2.27: USB1201**

Pin	Signal	Pin	Signal
1	+V5_USB2	2	USB2_DN_C
3	USB2_DP_C	4	GND
5	+V5_USB1	6	USB1_DN_C
7	USB1_DP_C	8	GND
9	GND	10	GND
11	GND	12	GND

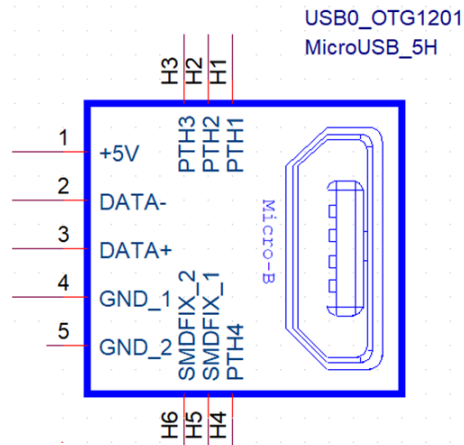


Table 2.28: USB0_OTG1201

Pin	Signal	Pin	Signal
1	+V5_USBOTG	2	USBA_DN_C
3	USBA_DP_C	4	USB_A_ID_C
5	GND	6	
H1		H2	
H3	GND	H4	GND
H5	GND	H6	GND

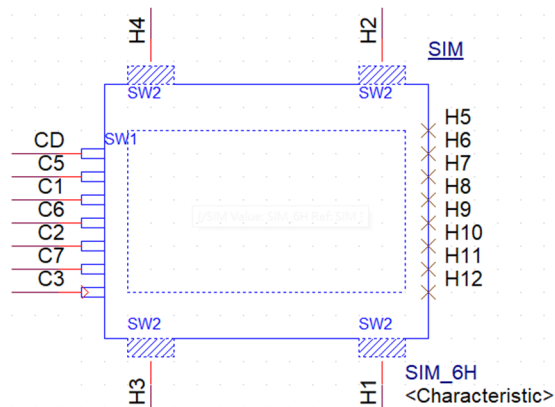
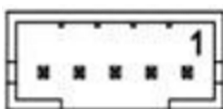


Table 2.29: SIM

Pin	Signal	Pin	Signal
C1	+VUIM_PWR	C2	UIM_RESET
C3	UIM_CLK		
C5	GND	C6	+VUIM_VPP
C7	UIM_DATA	CD	SIM_DETECT
H1	GND	H2	GND
H3	GND	H4	GND
H5	-	H6	-
H7	-	H8	-
H9	-	H10	-
H11	-	H12	-

**Table 2.30: LVDS_BKLT_PWR**

Pin	Signal	Pin	Signal
1	+VDD_BKLT	2	GND
3	DISP_BL_EN_C	4	DISP_BL_PWM_C
5	+V5	-	

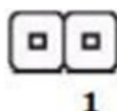
2.5.2 I/O Overview

Table 2.31: Jumper Overview

No	Position	Description
2.32	AT801	AT/ATX select header
2.33	CN1801	CANA terminal resistor enable jumper
2.34	CN1802	CANB terminal resistor enable jumper
2.35	DSI_BKLT_SLT	DSI backlight power select
2.36	DSI_VDD_SLT	DSI VDD power select
2.37	LVDS_BKLT_SLT	LVDS backlight power select
2.38	LVDS_VDD_SLT	LVDS VDD power select
2.39	SD2001	SDIO device select jumper
2.40	SD2002	SDIO device select jumper
2.41	SD2003	SDIO device select jumper
2.42	SD2004	SDIO device select jumper
2.43	SD2005	SDIO device select jumper
2.44	SD2006	SDIO device select jumper

**Table 2.32: AT801 (Default: 1-2)**

1-2	AT mode
2-3	ATX mode

**Table 2.33: CN1801 (Default: NA)**

1-2	With terminal resistor
NA	Without terminal resistor

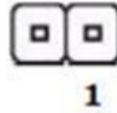


Table 2.34: CN1802 (Default: NA)

1-2	With terminal resistor
NA	Without terminal resistor



Table 2.35: DSI_BKLT_SLT (Default: 1-2)

1-2	5V
2-3	12V



Table 2.36: DSI_VDD_SLT (Default: 1-2)

1-2	3.3V
2-3	5V



Table 2.37: LVDS_BKLT_SLT (Default: 1-2)

1-2	5V
2-3	12V



Table 2.38: LVDS_VDD_SLT (Default: 1-2)

1-2	3.3V
2-3	5V



Table 2.39: SD2001 (Default: 1-2)

1-2	To SD Card
2-3	To M.2

**Table 2.40: SD2002 (Default: 1-2)**

1-2	To SD Card
2-3	To M.2

**Table 2.41: SD2003 (Default: 1-2)**

1-2	To SD Card
2-3	To M.2

**Table 2.42: SD2004 (Default: 1-2)**

1-2	To SD Card
2-3	To M.2

**Table 2.43: SD2005 (Default: 1-2)**

1-2	To SD Card
2-3	To M.2

**Table 2.44: SD2006 (Default: 1-2)**

1-2	To SD Card
2-3	To M.2

2.5.3 Switch Overview

Table 2.45: Switch Overview

No	Position	Description
2.46	SW1001	Boot select switch
2.47	SW1002	Reset button
2.48	SW1003	Power button
2.49	SW1104	COMA UART setting switch
2.50	SW1103	COMB UART setting switch



Table 2.46: SW1001 (Boot Select Switch)

1	2	Feature
ON	ON	-
ON	OFF	Serial Download
OFF	ON	eMMC
OFF	OFF	SD card



Table 2.47: SW1002 (Reset Button)

Pin	Signal	Pin	Signal
1	GND	2	GND
3	RESET_IN#	4	RESET_IN#



Table 2.48: SW1003 (Power Button)

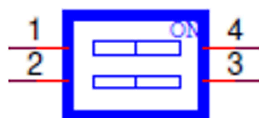
Pin	Signal	Pin	Signal
1	GND	2	GND
3	PWR_BTN#	4	PWR_BTN#



	Mode2	Mode1	Mode0
RS232 loopback	x	Low	Low
RS-232	x	Low	High
RS-485 half duplex	X	High	Low
RS-485 full duplex	Low	High	High
RS-485 loopback	High	High	High

Table 2.49: SW1103 (COMB Switch)

1-ON	RX with terminal resistor
1-OFF	RX without terminal resistor
2-ON	mode2 pin to pull high
2-OFF	mode2 pin to pull down



	Mode2	Mode1	Mode0
RS232 loopback	x	Low	Low
RS-232	x	Low	High
RS-485 half duplex	X	High	Low
RS-485 full duplex	Low	High	High
RS-485 loopback	High	High	High

Table 2.50: SW1104 (COMA Switch)

1-ON	RX with terminal resistor
1-OFF	RX without terminal resistor
2-ON	mode2 pin to pull high
2-OFF	mode2 pin to pull down

Chapter 3

Software Functionality

This chapter details the software functions on the ROM-2820.

3.1 Display

3.1.1 LVDS

3.1.1.1 Single Channel LVDS: G070VW01 (VDD: 3.3V, Backlight Power: 12V)

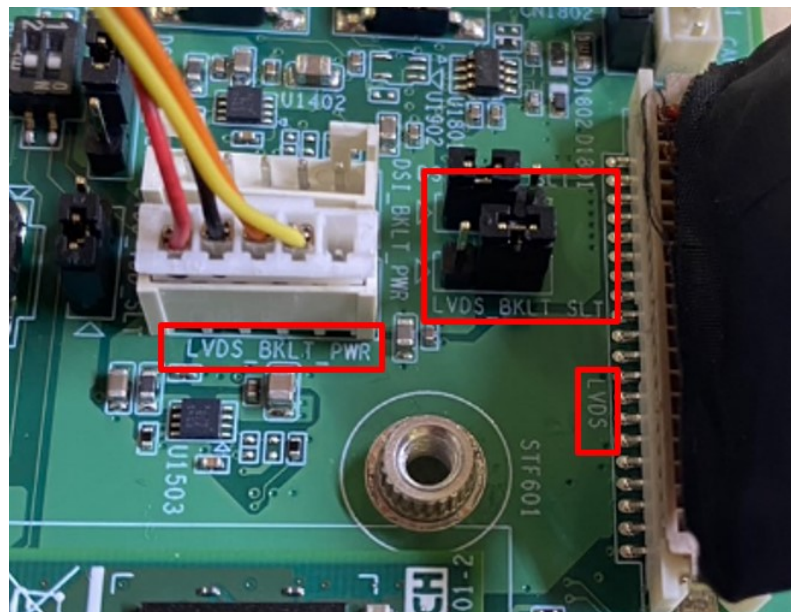
Step 1: Connect G070VW01 LVDS panel with the LVDS cable. Connect this to the LVDS. Connect the Backlight cable to LVDS_BKLT_PWR.

Step 2: Connect another 12V adapter to the DC-Jack on the backlight cable.

Step 3: Power on RSB-2820 and the extra 12V adapter.

Step 4: Press enter after boot. The system will stop at u-boot as demonstrated below, enter the command in red and press enter.

```
Normal Boot
Hit any key to stop autoboot: 0
=> setenv fdtfile imx93-rom2820-a1-lvds.dtb
=> saveenv
=> boot
```



(LVDS_BPLT_SLT: 2&3 jumper short)

3.1.2 MIPI HDMI

3.1.2.1 Single Channel MIPI HDMI: (VDD: 3.3V, Backlight Power: 5V)

Step 1: Connect another 5V adapter to the DC-Jack on the backlight cable.

Step 2: Power on RSB-2820 and the extra 5V adapter.

Step 3: Press enter after boot. The system will stop at u-boot as demonstrated below, enter the command in red and press enter.

```
Normal Boot
Hit any key to stop autoboot: 0
=> setenv fdtfile imx93-rom2820-a1.dtb
=> saveenv
=> boot
```



(DSI_BKLT_SLT: 1&2 jumper short)

3.1.3 MIPI DSI

3.1.3.1 Single Channel LVDS: G101UAN02.0 (VDD: 3.3V, Backlight Power: 12V)

Step 1: Connect G101UAN02.0 LVDS panel with the LVDS cable. Connect this to the LVDS. Connect the Backlight cable to DSI_BKLT_PWR.

Step 2: Connect another 12V adapter to the DC-Jack on the backlight cable.

Step 3: Power on RSB-2820 and the extra 12V adapter.

Step 4: Press enter after boot. The system will stop at u-boot as demonstrated below, enter the command in red and press enter.

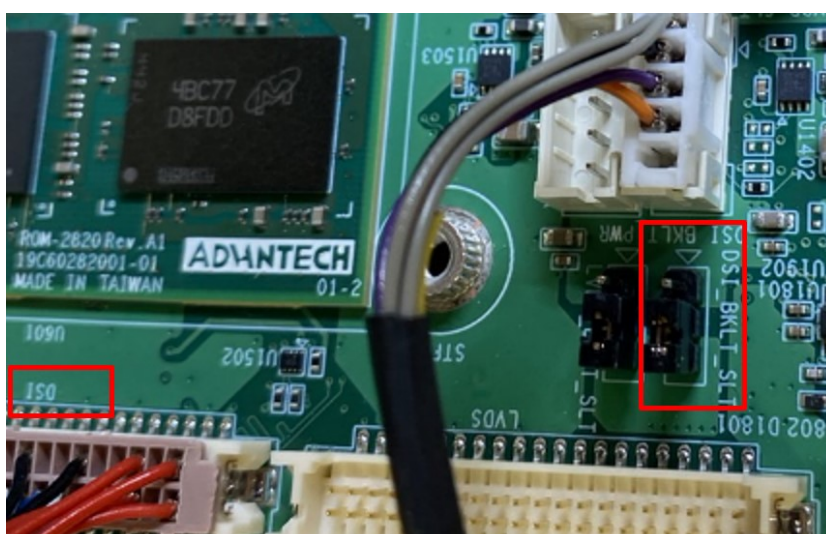
Normal Boot

Hit any key to stop autoboot: 0

=> setenv fdfile imx93-rom2820-a1-auog101uan02.dtb

=> saveenv

=> boot



(DSI_BKLT_SLT: 2&3 jumper short)

3.2 Audio

Step 1: Check audio codec

```
# cat /proc/asound/cards  
0 [sgtl5000]: sgtl5000 - sgtl5000 sgtl5000
```

Step 2: Audio codec (sgtl5000):

1. Set MIC and headphone:

```
# amixer set Mic 100%  
# amixer set Headphone 100%
```

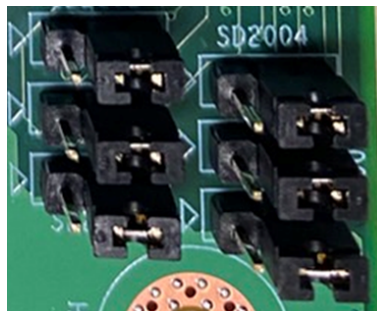
2. Record and playback:

```
Record  
# arecord -D plughw:0,0 -r 16000 -f S16_LE ./f-16000.wav  
Playback  
# aplay -D plughw:0,0 f-16000.wav
```

3.3 M.2

3.3.1 Test Wi-Fi with NXP IW-612 Module (SDIO Interface)

Step 1: Switch jumper SD2001~SD2006(2&3 jumper short)



Step 2: Press enter after boot. The system will stop at u-boot, and change dtb file by below command.

```
# setenv fdtfile imx93-rom2820-a1-m2-sdio.dtb  
# saveenv  
# boot
```

Step 3: Install driver by below command.

```
# modprobe moal mod_para=nxp/wifi_mod_para.conf
```

Step 4: WIFI test command.

```
# ifconfig wlan0 up  
# wpa_passphrase ${SSID} ${PASSWORD} > /tmp/wpa.conf  
# wpa_supplicant -BDwext -imlan0 -c/tmp/wpa.conf  
# udhcpc -b -i wlan0
```

3.3.2 Test Bluetooth with NXP IW-612 Module (UART Interface)

Step 1: Please refer to the 3.3.1 step 1.
 Step 2: Please refer to the 3.3.1 step 2.
 Step 3: Please refer to the 3.3.1 step 3.
 Step 4: Bluetooth test command.

```
# modprobe btnxpuart
# hciconfig hci0 up
# bluetoothctl
# discoverable on
# pairable on
# scan on
[NEW] FC:18:3C:8D:75:F4 myphone
# scan off
# pair FC:18:3C:8D:75:F4
# connect FC:18:3C:8D:75:F4
```

3.3.3 Test 4G with EWM-C401CQE01 Module (UART Interface)

Step1: You need to connect two antennas.
 Step2: 4G test command.

```
# stty -F /dev/ttyUSB1 speed 115200 -echo
# cat /dev/ttyUSB1 &
# echo "AT+CSQ" > /dev/ttyUSB1

Console message:
AT+CSQ

+CSQ: 25,99

OK
# pppd connect 'chat -v -s -t 10 "" "AT" "" "ATDT*99#" "CONNECT" ""' user username password password /dev/ttyUSB2 460800 nodetach crtscts debug usepeerdns defaultroute &
# ping 8.8.8.8
64 bytes from 8.8.8.8: icmp_seq=1 ttl=56 time=222 ms
```

3.4 Serial Port (COM A/C)

3.4.1 RS-232 Loopback Test (eg. ttyLP0)

Step 1: Connect loopback with COMA(ttyLP4)&COMB(ttyLP5)
 Step 2: Run test command.

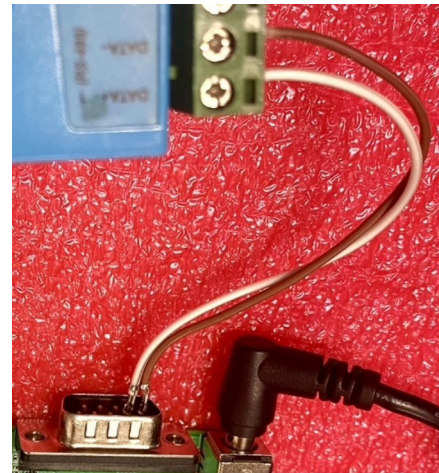
```
# stty -F /dev/ttyLP4 -echo -onlcr 115200
# cat /dev/ttyLP4 &
# echo "Serial Port Test" > /dev/ttyLP4
```

3.4.2 RS-485 Test

Step 1: Test RS-485 with Adam-4520. Connect Adam-4520 with COMA with DB9 as the following(COMA(ttyLP4)&COMB(ttyLP5))

Adam-4520 Data- <-->ROM-2820 COMA DB9 Pin 1,
 Adam-4520 Data+ <-->ROM-2820 COMA DB9 Pin 2
 Adam-4520 Data- <-->ROM-2820 COMB DB9 Pin 1,

Adam-4520 Data+ <-->ROM-2820 COMB DB9 Pin 2



Step 2: Create the following file and save it as rs485.sh.

```
#!/bin/sh

i2cset -y -f 4 0x21 0x00 0x10
i2cset -y -f 4 0x21 0x01 0x01
i2cset -y -f 4 0x21 0x02 0xdf
i2cset -y -f 4 0x21 0x03 0xfd
i2cset -y -f 4 0x21 0x04 0x00
i2cset -y -f 4 0x21 0x05 0x00
i2cset -y -f 4 0x21 0x06 0xcf
i2cset -y -f 4 0x21 0x07 0xfc
```

Step 3: Run below command:

```
# sudo chmod 775 rs485.sh
# ./rs485.sh
# stty -F /dev/ttyLP4 -echo -onlcr 115200
# cat /dev/ttyLP4 &
# echo "Serial Port Test" > /dev/ttyLP4
```

Step 4: You need to open two terminals: one to connect to the debug port of the ROM2820, and the other to connect to the Adam-4520.

Step 5: You can send data from the ROM2820's debug port to the Adam-4520, and you can also input text from the Adam-4520's terminal using the keyboard so that the ROM2820's debug port can receive it.

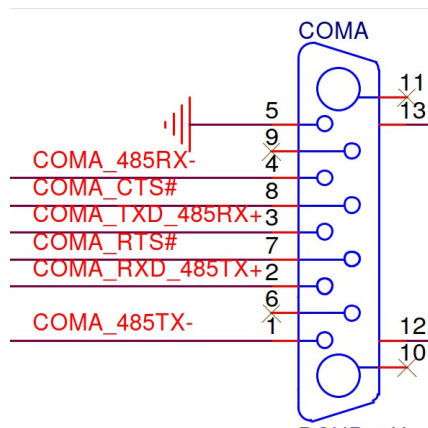
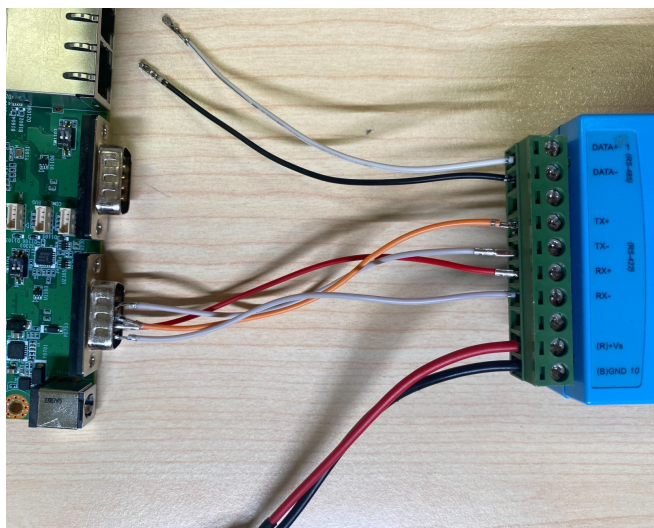
```
root@imx93rom2820a1:~# echo "Serial Port Test" > /dev/ttyLP4
root@imx93rom2820a1:~# zxcv
```

```
VT COM30 - Tera Term VT
File Edit Setup Control Window Help
Serial Port Test
```

3.5 RS-422

Step 1: Test RS-422 with Adam-4520. Connect Adam-4520 with COMA with DB9 as the following (COMA(ttyLP4)&COMB(ttyLP5))

Adam-4520 RX- <--> ROM-2820 COMA DB9 Pin 3,
 Adam-4520 RX+ <--> ROM-2820 COMA DB9 Pin 4
 Adam-4520 TX+ <--> ROM-2820 COMB DB9 Pin 2,
 Adam-4520 TX- <--> ROM-2820 COMB DB9 Pin 1



Step 2: Create the following file and save it as rs422.sh

```
#!/bin/sh

i2cset -y -f 4 0x21 0x00 0x10
i2cset -y -f 4 0x21 0x01 0x01
i2cset -y -f 4 0x21 0x02 0xff
i2cset -y -f 4 0x21 0x03 0xfd
i2cset -y -f 4 0x21 0x04 0x00
i2cset -y -f 4 0x21 0x05 0x00
i2cset -y -f 4 0x21 0x06 0xcf
i2cset -y -f 4 0x21 0x07 0xfc
```

Step 3: Run below command

```
# sudo chmod 775 rs422.sh
# ./rs485.sh
# stty -F /dev/ttyLP4 -echo -onlcr 115200
# cat /dev/ttyLP4 &
# echo "Serial Port Test" > /dev/ttyLP4
```

Step 4: You need to open two terminals: one to connect to the debug port of the ROM2820, and the other to connect to the Adam-4520.

Step 5: You can send data from the ROM2820's debug port to the Adam-4520, and you can also input text from the Adam-4520's terminal using the keyboard so that the ROM2820's debug port can receive it.

```
root@imx93rom2820a1:~# echo "Serial Port Test" > /dev/tty
root@imx93rom2820a1:~# zxcabc
```



3.6 I2C

Step 1: Test command

```
# i2cdetect -l
i2c-0 i2c      44340000.i2c      I2C adapter
i2c-1 i2c      44350000.i2c      I2C adapter
i2c-2 i2c      42530000.i2c      I2C adapter
i2c-4 i2c      426b0000.i2c      I2C adapter
i2c-7 i2c      426e0000.i2c      I2C adapter
```

3.7 USB

USB disk test (USB 2.0)

Step 1: Issue the following command (`lsusb -t`) after inserting a USB disk into the USB 2.0 port to check if the USB device is listed.

Step 2: Test (eg. if usb disk is `/dev/sda`)

```
# dd if=/dev/urandom of=data bs=1 count=1024
# dd if=/dev/sda of=backup bs=1 count=1024 skip=4096 # dd if=data of=/dev/sda bs=1
seek=4096
# dd if=/dev/sda of=data1 bs=1 count=1024 skip=4096 # diff data data1
# dd if=backup of=/dev/sda bs=1 seek=4096
```

3.8 RTC

Step 1: Set system time to current, then write to RTC

```
root@imx93rom2820a1:~# date 010100002025 && hwclock -w && date
```

Step 2: Set one incorrect time, then read time from RTC to verify

```
root@imx93rom2820a1:~# hwclock -r && date
```

Step 3: Restore the RTC time to system time

```
root@imx93rom2820a1:~# date
```

3.9 eMMC/SD

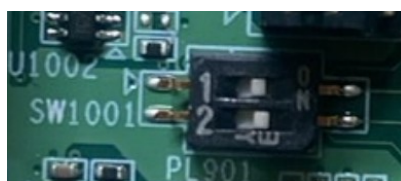
3.9.1 Device Routes

eMMC: /dev/mmcblk0



(SW1001: 1 off & 2 on)

SD: /dev/mmcblk1



(SW1001: 1 on & 2on)

3.9.2 Test (eg. emmc)

Step 1: Test command:

```
# dd if=/dev/urandom of=data bs=1 count=1024
# dd if=/dev/mmcblk0 of=backup bs=1 count=1024 skip=4096
# dd if=data of=/dev/mmcblk0 bs=1 seek=4096
# dd if=/dev/mmcblk0 of=data1 bs=1 count=1024 skip=4096
# diff data data1
# dd if=backup of=/dev/mmcblk0 bs=1 seek=4096
```

3.10 Ethernet

Step 1: Check the Ethernet device

```
root@imx93rom2820a1:~# ifconfig
eth0: flags=-28669<UP,BROADCAST,MULTICAST,DYNAMIC> mtu 1500
      ether 00:04:9f:01:30:e0 txqueuelen 1000 (Ethernet)
      RX packets 0 bytes 0 (0.0 B)
      RX errors 0 dropped 0 overruns 0 frame 0
      TX packets 0 bytes 0 (0.0 B)
      TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth1: flags=-28605<UP,BROADCAST,RUNNING,MULTICAST,DYNAMIC> mtu 1500
      inet 172.22.16.55 netmask 255.255.252.0 broadcast 172.22.19.255
      inet6 fe80::204:9fff:fe01:30e0 prefixlen 64 scopeid 0x20<link>
      ether 00:04:9f:01:30:e0 txqueuelen 1000 (Ethernet)
      RX packets 54 bytes 7121 (6.9 KiB)
      RX errors 0 dropped 6 overruns 0 frame 0
      TX packets 39 bytes 5443 (5.3 KiB)
      TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
      device interrupt 112

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
      inet 127.0.0.1 netmask 255.0.0.0
      inet6 ::1 prefixlen 128 scopeid 0x10<host>
      loop txqueuelen 1000 (Local Loopback)
      RX packets 136 bytes 10738 (10.4 KiB)
      RX errors 0 dropped 0 overruns 0 frame 0
      TX packets 136 bytes 10738 (10.4 KiB)
      TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

Step 2: Connect the cable and ping test (eg. Eth0)

```
root@imx93rom2820a1:~# ping 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=56 time=2.53 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=56 time=2.38 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=56 time=2.28 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=56 time=2.39 ms
64 bytes from 8.8.8.8: icmp_seq=5 ttl=56 time=2.19 ms
^C
--- 8.8.8.8 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4006ms
```

3.11 GPIO

3.11.1 GPIO Pins

Table 3.1: GPIO1101 (Pin Header)

Pin	Numbers
GPIO1	496(shared pin)
GPIO2	497
GPIO3	498
GPIO4	499
GPIO5	500
GPIO6	501
GPIO7	502
GPIO8	503
GPIO9	504
GPIO10	505
GPIO11	506
GPIO12	507

3.11.2 GPIO Loopback Test (Using GPIO1 and GPIO2 as examples)

Step 1: Connect GPIO1 and GPIO2 Step 2: Export GPIO interface

Step 2: Export GPIO interface

```
# echo 498 > /sys/class/gpio/export
# echo 499 > /sys/class/gpio/export
```

Step 3: Set GPIO direction

```
# echo out > /sys/class/gpio/gpio1/direction
# echo in > /sys/class/gpio/gpio2/direction
```

Step 4: Read value and set output value than check

```
# cat /sys/class/gpio/gpio2/value 0
# echo 1 > /sys/class/gpio/gpio1/value
# cat /sys/class/gpio/gpio2/value
1
```

3.12 Camera

3.12.1 MIPI-CSI0 (Tested with OV5640 + mini-SAS to MIPI-CSI Cable)

Step 1: Take pictures

```
# gst-launch-1.0 v4l2src num-buffers=1 device=/dev/video0 ! video/x-raw,width=720,height=480 ! jpegenc ! filesink location=sample.jpeg
```

Step 2: View on panel

```
# gplay-1.0 sample.jpeg
```

3.13 CAN Bus

Step 1: Connect can1 and can2

Step 2 Test command

```
# ip link set can0 up type can bitrate 125000
# ip link set can1 up type can bitrate 125000
# candump can1 &
# cansend can0 12345678#123412341234
The following shows the result
can1 12345678 [6] 12 34 12 34 12 34
```

3.14 SPI

Step 1: Connect to spi and read and write spi data.

```
# echo -n $'\x06\x05\x04\x03\x02\x01' > test
# dd if=test of=/dev/mtdblock0
# hexdump -C /dev/mtd0 -n 64
```



3.15 Watch Dog

3.15.1 Timeout 10S:

Step 1: System will not reboot. Watchdog can be refreshed when feed dog before it timeout.

```
root@imx93rom2820a1:~# /unit_tests/Watchdog/wdt_driver_test.out 10 1 0
```

Step 2: System will reboot after 10 sec. Watchdog does not refresh after it timeout.

```
root@imx93rom2820a1:~# Ctrl + C
```

3.15.2 Timeout 20S:

Step 1: System will not reboot. Watchdog can be refreshed when feed dog before it timeout.

```
root@imx93rom2820a1:~# /unit_tests/Watchdog/wdt_driver_test.out 20 1 0
```

Step 2: System will reboot after 20 sec. Watchdog does not refresh after it timeout.

```
root@imx93rom2820a1:~# Ctrl + C
```

3.15.3 Timeout 50S:

Step 1: System will not reboot. Watchdog can be refreshed when feed dog before it timeout.

```
root@imx93rom2820a1:~# /unit_tests/Watchdog/wdt_driver_test.out 50 1 0
```

Step 2: System will reboot after 50 sec. Watchdog does not refresh after it timeout.

```
root@imx93rom2820a1:~# Ctrl + C
```

3.15.4 Timeout 100S:

Step 1: System will not reboot. Watchdog can be refreshed when feed dog before it timeout.

```
root@imx93rom2820a1:~# /unit_tests/Watchdog/wdt_driver_test.out 100 1 0
```

Step 2: System will reboot after 100 sec. Watchdog does not refresh after it timeout.

```
root@imx93rom2820a1:~# Ctrl + C
```


Chapter 4

Embedded O.S

This chapter details instructions for building Linux systems.

4.1 Introduction

Advantech's ROM-2820 platform comes preloaded with Yocto 4.2 based embedded O.S. (Linux kernel 6.1.36). It contains all the system-required shell commands and drivers needed to operate the platform. We do not offer IDE developing environment on ROM-2820 BSP. Users can evaluate and develop their device using the Ubuntu 20.04 LTS environment.

This chapter introduces the software configuration and development of ROM-2820. It enables users to develop their application(s) efficiently.

For detailed operation, please refer to the Yocto Linux BSP Version A User Guide. The following link directs you to the Imx93 series Wikipedia page: wiki.advantech.com.tw/view/loTGateway/BSP/Linux/iMX93/Yocto_LBVA_User_Guide

4.1.1 Device Tree Source File Select for ROM-2820

4.1.1.1 Display

- A. MIPI HDMI (Default)
 - 1. imx93-rom2820-a1.dtb

- B. LVDS
 - 1. G070VW01
imx93-rom2820-a1-lvds.dtb

- C. MIPI LVDS
 - 1. G101UAN02.0
imx93-rom2820-a1-auog101uan02.dtb

4.1.1.2 Module

- 1. NXP IW-612
imx93-rom2820-a1-m2-sdio.dtb
- 2. EWM-C401CQE01
imx93-rom2820-a1.dtb

Chapter 5

System Recovery

This chapter details system recovery procedures for a damaged Linux OS.

5.1 System Recovery

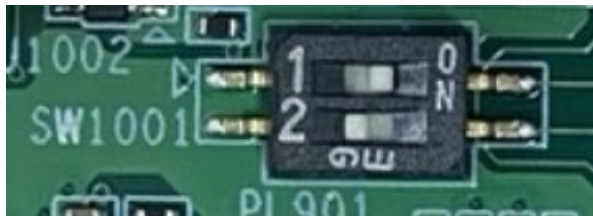
This section provides detailed procedures for restoring the eMMC image. If you destroy the onboard flash image by accident, you can recover the system by following these steps.

5.1.1 Recovery by UUU Tool

1. Copy 2820A1AIM36LIVD0042_iMX93_2G_flash_tool.tgz
2. Need to connect one end of the Micro USB cable to the device and the other end to the computer.



3. Enter ROM-2820 download mode by change SW1001



4. Connect OTG to desk-top.
5. UUU command to flash eMMC.

6. Enter ROM-2820 eMMC Boot mode by change SW1001



6. Reboot the sy

5.1.2 Recovery by EMMC Tool

1. Copy 2820A1AIM36LIVD0042_iMX93_2G_flash_tool.tgz
2. Download mksd-lisnx.sh (https://github.com/ADVANTECH-Corp/RISC_tools_scripts/blob/master/imx93/mksd-linux.sh)

```
# tar -xvzf 2820A1AIM36LIVD0042_iMX93_2G_flash_tool.tgz
# cp -a ~/mksd-linux.sh ~/2820A1AIM36LIVD0038_iMX93_2G_flash_tool/mk_inand
```

3. Put 2820A1AIM36LIVD0038_iMX93_2G_flash_tool onto a USB flash drive, and then insert it into the ROM2820 USB drive.

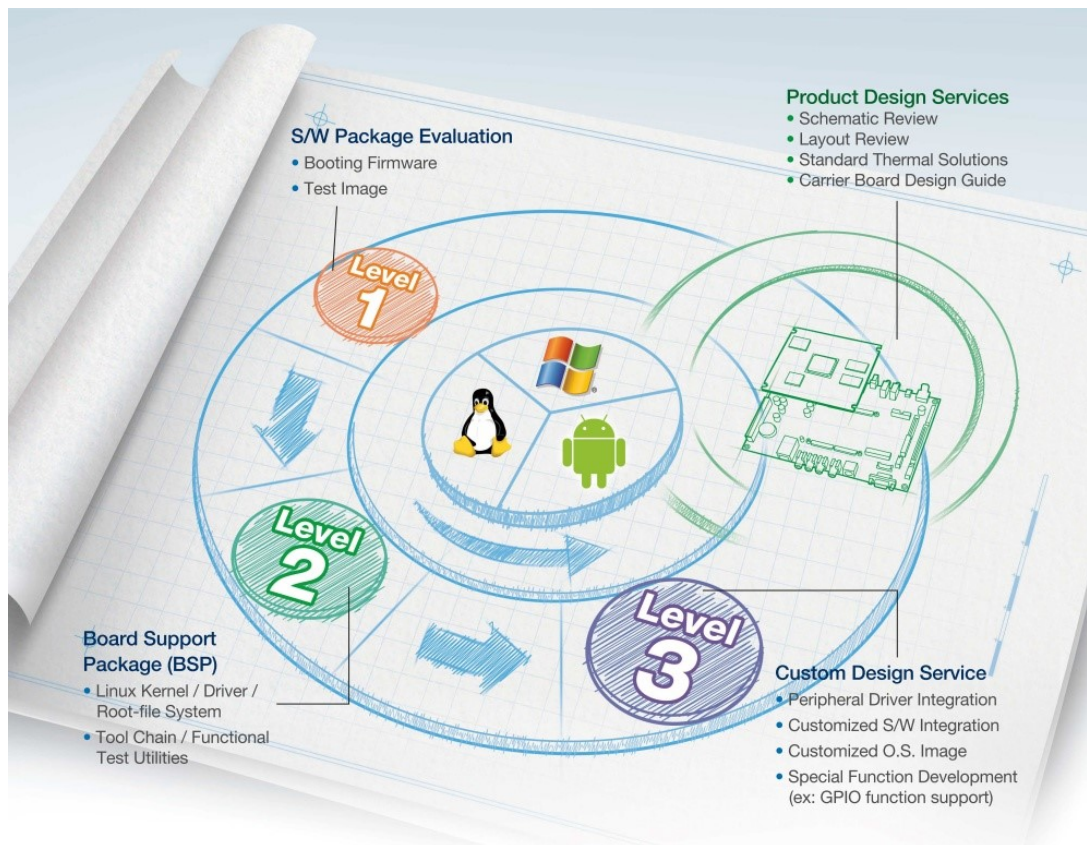
```
# cd /run/media/sda/2820A1AIM36LIVD0038_iMX93_2G_flash_tool/mk_inand/
# cp -a ~/mksd-linux.sh ~/2820A1AIM36LIVD0038_iMX93_2G_flash_tool/mk_inand
# ./mksd-linux.sh /dev/mmcblk0
```

Chapter 6

Advantech Services

This chapter outlines Advantech's Design-In services, technical support, and warranty policy for ROM-2820.

6.1 RISC Design-in Services



Advantech RISC Design-in Services help customers reduce the time and work involved with designing new carrier boards. We handle the complexities of technical research and greatly minimize the development risks associated with carrier boards.

Easy Development

Advantech has support firmware, root file-system, BSP, and other development tools for customers. These help customers develop their carrier board and differentiate their embedded products and applications.

- Full range of RISC products
- Comprehensive document support

Design Assistance Service

Advantech provides a checklist for engineers to check their schematics and review services based on customer carrier board schematics. These services prevent design errors before they occur. This saves time and reduces costs associated with developing carrier boards.

- Schematic review
- Placement and layout review
- Debugging assistance services
- General/Special reference design database

Thermal Solution Services

In order to provide quicker flexible solutions for customer's thermal designs, Advantech provides services including both modularized thermal solutions and customized thermal solutions

- Standard thermal solutions
- Customized thermal solutions

Embedded Software Services

This service provides support drivers, software integration and customized firmware, root file-system, and Linux image. Users can save time and focus on their core development.

- Embedded Linux/ Android OS
- Advantech boot loader customization

With the spread of industrial computing, a whole range of new applications has been developed, resulting in a fundamental change in the IPC industry. Due to diverse market demands and intense competition, cooperation on vertical integration is an effective way to create competitive advantages. As a result, ARM-based CPU modules have grown in popularity. Concentrating all necessary components on CPU modules and placing other parts on the carrier board provides greater flexibility while retaining low power consumption credentials.

Advantech has identified the following common questions concerning the implementation of modular designs.

Data Acquisition

Despite obtaining sufficient information for making decisions concerning specialized vertical applications, some customers encounter difficulties dealing with platform design, and communicating with the CPU/chipset manufacturers. These challenges in carrier board design can negatively impact time-to-market at the expense of market opportunities.

Software Development and Modification

Compared to x86 architectures, RISC architectures use simpler instruction sets. Software support for x86 platforms cannot be used on RISC platforms. System integrators (SI) need to develop software for their system and integrate it with hardware themselves. Unlike x86 platforms, RISC platforms are not well supported by Board Support Packages (BSP) and drivers. While driver support is provided, system integration still requires a lot of effort. The BSP provided by CPU manufacturers is usually tailored for carrier board design, making system integration for software difficult.

Addressing this, Advantech introduced Streamlined Design-in Support Services for RISC-based Computer on Modules (COM). With a dedicated professional design-in services team, Advantech actively participates in carrier board design and problem solving. Advantech's services not only enable customers to effectively distribute their resources, but also reduce R&D costs and hardware investment.

By virtue of a cooperative relationship with leading original manufacturers of CPUs and chipsets - such as ARM, TI, and NXP - Advantech helps solve communication and technical support difficulties. This can reduce the uncertainties in product development. Advantech's professional software team focuses on providing complete Board Support Packages. They also help customers create a software development environment for their RISC platforms.

Advantech RISC design-in services helps customers reduce time to market by overcoming their problems through streamlined services.

Along with our multi-stage development process which includes: planning, design, integration, and validation, Advantech's RISC design-in service provides comprehensive support during the following different phases:

Planning Stage

Before deciding to adopt Advantech RISC COM, customers must go through a complete survey process, detailing product features, specifications, and compatibility testing with software. Advantech offers a RISC Customer Solution Board (CSB) as an evaluation tool for carrier boards which are simultaneously designed when developing RISC COMs. In the planning stage, customers can use this evaluation board to assess RISC modules and test peripheral hardware. Advantech provides standard software Board Support Packages (BSP) for RISC COM, so that customers can define their product's specifications while simultaneously verifying I/O and performance. Advantech also offers software evaluation and peripheral module recommendations (such as WiFi, 3G, BT). At this stage, Advantech seeks to resolve customer concerns. Product evaluation with a focus on performance and specification is vital during the planning period. Therefore, Advantech helps their customers conduct all the necessary tests for their RISC COM.

Design Stage

Advantech will supply a reference carrier board design guide when a product moves into the design stage. The carrier board design guide provides pin definitions for the COM connectors with limitations and recommendations for carrier board design. This design guide gives customers clear guidelines during their carrier board development. Advantech offers a complete pin-out check list for different form factors such as Q7, ULP and RTX2.0, enabling carrier board signals and layout design examination. Advantech's team helps customers review the placement/layout and schematics. This helps carrier board designs fulfill customers' requirements. Advantech's RISC software team assists in establishing an environment for software development while evaluating the time and resources needed. Advantech can also cooperate with a third party to provide proficient consulting services in software development. With Advantech's professional support, the design process is eased and product quality is improved; thus meeting customer targets.

Integration Stage

This phase comprises HW/SW integration, application development, and peripheral module implementation. Due to the lack of knowledge and experience using platforms, customers need to spend a certain amount of time on analyzing integration problems. In addition, peripheral module implementation is relevant to driver designs on carrier boards. RISC platforms usually have less support for ready-made drivers on carrier boards, therefore users need to learn by trial and error to get the best solution with the least effort. Advantech's team has years of experience in customer support and HW/SW development. Advantech supports customers with professional advice and information shortening development time and enabling effective product integration.

Validation stage

After the completion of a customer's ES sample there is a series of verification steps. In addition to verifying a product's functionality, testing a product's efficiency is an important stage for RISC platforms. Through an efficient verification process, backed by Advantech's technical support, customers optimize their applications with ease. Advantech's team can provide professional consulting services regarding further testing and equipment usage. This helps customers find the right tools to efficiently identify and solve problems to enhance product quality and performance.

6.2 Contact Information

The contact information for Advantech customer service is below:

Table 6.1: Contact Information

Region/Country	Contact Information
United States of America	1-888-576-9688
Brazil	0800-770-5355
Mexico	01-800-467-2415
Europe (Toll Free)	00800-2426-8080
Singapore & SAP	65-64421000
Malaysia	1800-88-1809
Australia (Toll Free)	1300-308-531
China (Toll Free)	800-810-0345 800-810-8389 Sales@advantech.com.cn
India (Toll Free)	1-800-425-5071
Japan (Toll Free)	0800-500-1055
Korea (Toll Free)	080-363-9494 080-363-9495
Taiwan (Toll Free)	0800-777-111
Russia (Toll Free)	8-800-555-01-50

Alternatively, you can contact the Advantech service team via our website.

http://www.advantech.com.tw/contact/default.aspx?page=contact_form2&subject=Technical+Support

Our technical support engineers will provide a quick response to your queries

6.3 Technical Support and Assistance

6.3.1 Warranty Policy

The warranty policy for Advantech products is provided below.

6.3.1.1 Warranty Period

Advantech branded off-the-shelf products and third-party off-the-shelf products used to assemble Advantech's Configure-to-Order products are entitled to a two-year global warranty. Products defect in design, materials, or workmanship are covered from the date of shipment.

All customized products will have a 15-month regional warranty by default. The actual product warranty terms and conditions may vary based on the sales contract.

All third-party products purchased separately will be covered by the original manufacturer's warranty and time period, and shall not exceed one year of coverage through Advantech.

6.3.1.2 Repairs under Warranty

It is possible to obtain a replacement product (cross-shipment) within the first 30 days after purchase. Contact your original Advantech supplier to arrange a replacement if the product was purchased directly from Advantech and was DOA (dead-on-arrival). The DOA cross-shipment excludes any shipping damage, customized and/or build-to-order products.

For products that are not DOA, the return fee to an authorized Advantech repair facility will be at the customer's expense. The shipping fee for reconstructed products from Advantech back to the customer will be at Advantech's expense.

6.3.1.3 Exclusions from Warranty

The product is excluded from warranty if:

- The product has been found to be defective after expiry of the warranty period.
- Warranty has been voided by removal or alternation of the product or part identification labels.
- The product has been misused, abused, or subjected to unauthorized disassembly/modification; placed in an unsuitable physical or operating environment; improperly maintained by the customer; or failure from which Advantech is not responsible whether by accident or other cause. Such conditions will be determined by Advantech at its sole discretion.
- The product is damaged beyond repair due to a natural disaster, such as a lightning strike, flood, earthquake, etc.
- The product is sent for updates, upgrades, or tests at the request of the customer who is without warranty.

6.3.2 Repair Process

6.3.2.1 Obtaining an RMA Number

All returns from customers must be authorized with an Advantech RMA (return merchandise authorization) number. Any returns of defective units or parts without valid RMA numbers will not be accepted; they will be returned to the customer at the customer's cost without prior notice.

An RMA number is only an authorization for returning a product; it is not an approval for repair or replacement. To request an RMA number, visit Advantech's RMA website: <http://erma.advantech.com.tw> and use an authorized user ID and password.

You must fill out basic product and customer information and describe the problems encountered in detail in "Problem Description". Vague entries such as "does not work" and "failure" are not acceptable.

If you are uncertain about the cause of the problem, please contact Advantech's application engineers. They may be able to find a solution that does not require sending the product in for repair.

The serial number of the entire product is required even if only a component is returned for repair. Otherwise, the case will be regarded as out-of-warranty.

6.3.2.2 Returning Products for Repair

Customers may be able to save time and meet end-user requirements by returning defective products to any authorized Advantech repair facility without an extra cross-region charge. Customers are required to contact their local repair center before global repair service will be offered.

We recommend sending cards without accessories (manuals, cables, etc.). Remove any unnecessary components from the card, such as the CPU, DRAM, and CF card. If you send all these parts back (because you believe they may be part of the problem), please clearly state that they are included. Otherwise, Advantech will not be responsible for any items not listed. Ensure that the Problem Description is enclosed. European customers who are located outside the European community are requested to use UPS as the shipping company. We strongly recommend adding a packing list to all shipments. Please prepare a shipment invoice according to the following guidelines to minimize goods clearance time:

1. Give a low value to the product on the invoice, or additional charges will be levied by customs that will be borne by the sender.
2. Add information "Invoice for customs purposes only with no commercial value" to the shipment invoice.
3. Show RMA numbers, product serial numbers, and warranty status on the shipment invoices.
4. Add information about the goods Country of origin.

In addition, attach an invoice with the RMA number to the carton, write the RMA number on the outside of the carton, and attach the packing slip to save handling time. Please also address the parts directly to the Service Department and mark the package "Attn. RMA Service Department".

All products must be returned in properly packed ESD material or anti-static bags. Advantech reserves the right to return unrepaired items at the customer's cost if inappropriately packed.

Door-to-Door transportation, such as speed post, is recommended for delivery. Otherwise, the sender should bear additional charges such as clearance fees if air cargo shipment methods are used.

Should DOA cases fail, Advantech will take full responsibility for the product and transportation charges. If the items are not DOA, but fail within warranty, the sender will bear the freight charges. For out-of-warranty cases, customers must cover the cost and take care of both outward and inward transportation.

6.3.2.3 Service Charges

The product is excluded from warranty if:

- The product is sent for repair after the warranty period is expired.
- The product is tested or calibrated after the warranty period is expired, and a NPF (no problem found) result is obtained.
- The product, though repaired within the warranty period, has been misused, abused, or subjected to unauthorized disassembly/modification; placed in an unsuitable environment; improperly maintained by the customer; or failure for which Advantech is not responsible whether by accident or other cause. Such conditions will be determined by Advantech at its sole discretion.
- The product is damaged beyond repair due to a natural disaster, such as a lightning strike, flood, earthquake, etc.
- The product is sent for updates, upgrades, or tests at the request of the customer who is without warranty.

If a product has been repaired by Advantech, and within three months after such a repair the product requires another repair for the same problem, Advantech will conduct the repair free of charge. However, free repairs do not apply to products that have been misused, abused, or subjected to unauthorized disassembly/modification; placed in an unsuitable environment; improperly maintained by the customer; or fail-

ure for which Advantech is not responsible whether by accident or other cause. Please contact your nearest regional service center for detailed service quotations.

Before beginning out-of-warranty repairs, we will send you a pro forma invoice (P/I) with the repair charges stated. When you remit the funds, reference the P/I number listed under "Our Ref". Advantech reserves the right to deny repair services to customers who do not return the DOA unit or sign the P/I. Additionally, Advantech will scrap defective products without prior notice if customers do not return the signed P/I within three months.

6.3.2.4 Repair Report

Advantech returns each product with a repair report that shows the result of the repair. A repair analysis report can also be provided upon request. If the defect is not caused by Advantech's design or manufacturing, customers will be charged US\$60 or US\$120 for in-warranty or out-of-warranty repair analysis reports, respectively.

6.3.2.5 Custody of Products Submitted for Repair

Advantech will retain custody of a product submitted for repair for one month while waiting for the return of a signed P/I or payment (A/R). If the customer fails to respond within this period, Advantech will close the case automatically. Advantech will take reasonable measures to contact the customer during this one month period.

6.3.2.6 Shipping Back to Customer

The forwarding company for RMA returns from Advantech to customers is selected by Advantech. Other express services, such as UPS or FedEx, can be used upon request. However, the customer must bear the extra costs of alternative shipment methods. If you require any special arrangements, please specify this when shipping the product to us.



Enabling an Intelligent Planet

www.advantech.com

Please verify specifications before quoting. This guide is intended for reference purposes only.

All product specifications are subject to change without notice.

No part of this publication may be reproduced in any form or by any means, such as electronically, by photocopying, recording, or otherwise, without prior written permission from the publisher.

All brand and product names are trademarks or registered trademarks of their respective companies.

© Advantech Co., Ltd. 2024