



Application Note

Astra™ Machina SL1620 Hardware Platform GPIO Pin Multiplexing

Abstract: This application note provides an overview of the GPIO pin multiplexing (pinmux) system for the Astra™ Machina SL1620 hardware platform. It details the pin assignments, configuration options, and usage guidelines to optimize peripheral integration and system performance.

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1. Introduction

The Astra™ Machina SL1620 hardware platform offers a versatile General Purpose Input/Output (GPIO) pin multiplexing (pinmux) system, allowing users to configure pins for various peripheral functions and optimize system performance. This document provides a detailed overview of the SL1620's GPIO pinmux functionality, including pin assignments, configuration options, and practical use cases. Whether for initial setup or advanced configurations, this guide serves as a comprehensive resource for utilizing the full potential of the GPIO pinmux system on the SL1620 platform.

[Table 1](#) lists the SL1620 GPIO pin multiplexing.

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Table 1. SL1620 GPIO Mapping

Function	PIN	GPIO Mapping	Internal PU/PD	Pad/Pin Name	Mode-0	Mode-1	Mode-2	Mode-3	Mode-4	Strap	Notes
JTAG	C12	IO:GPIO[0]	PU	TMS	I:TMS	IO:GPIO[0]	O:URTOB_TXD	IO:KEY_COL2	–	–	O:GPIO Expander triggers interrupt (Core Module)
	B13	IO:GPIO[1]	PU	TDI	I:TDI	O:GPIO[1]	I:URTOB_RXD	IO:KEY_COL3	I:GPIO_TRIG[0]	–	O: Wake up triggered by WiFi
	B14	IO:GPIO[2]	PU	TDO	O:TDO	O:GPIO[2]	IO:PDMB_CLKIO	IO:I2S2B_MCLK	–	–	To 40-Pin header
SPI1	A15	IO:GPIO[3]	–	SPI1_SS0n	O:SPI1_SS0n	IO:GPIO[3]	–	–	–	–	SPI-Flash CS
	D14	IO:GPIO[4]	–	SPI1_SS1n	O:CORE_POR_N	O:SPI1_SS1n	IO:GPIO[4]	I:DSI_TE	I:GPIO_TRIG[1]	–	O: GPIO Expander triggers interrupt (I/O Board)
	F14	IO:GPIO[5]	–	SPI1_SS2n	I:URTOA_RXD	O:SPI1_SS2n	IO:GPIO[5]	–	I:GPIO_TRIG[2]	–	To 40-Pin header
	B15	IO:GPIO[6]	–	SPI1_SS3n	O:URTOA_TXD	O:SPI1_SS3n	IO:GPIO[6]	–	–	–	SPI-Flash
	B16	O:GPIO[7], SW_strap[2]	PD	SPI1_SDO	O:SPI1_SDO	O:GPIO[7]	–	–	–	software_strap[2]	
	C16	O:GPIO[8], SW_strap[3]	PD	SPI1_SCLK	O:SPI1_SCLK	O:GPIO[8]	–	–	–	software_strap[3]	
	D17	IO:GPIO[9]	–	SPI1_SDI	I:SPI1_SDI	IO:GPIO[9]	–	–	–	–	
I2CO	A8	IO:GPIO[10]	PD	TWO_SCL	IO:TWOA_SCL	IO:GPIO[10]	I:URTOA_CTSn	IO:I2S4_LRCK	–	–	To 40-Pin Header/ 24-bit LCD/ GPIO_EXP_CM
	B8	IO:GPIO[11]	PD	TWO_SDA	IO:TWOA_SDA	IO:GPIO[11]	O:URTOA_RTSn	O:I2S4_BCLK	–	–	
I2C1	C8	IO:GPIO[12]	PD	TW1_SCL	IO:TW1_SCL	IO:GPIO[12]	–	O:I2S4_DO	–	–	To 40-Pin Header/ MIPI to HDMI Converter IC / GPIO_EXP_CM
	F8	IO:GPIO[13]	PD	TW1_SDA	IO:TW1_SDA	IO:GPIO[13]	O:CLK_25M	I:I2S4_DI	–	–	
I2S1	L31	IO:GPIO[14]	–	I2S1_LRCK	IO:GPIO[14]	IO:I2S1_LRCK	–	I:DAIF_IF_CLK_PLL	–	–	To 40-Pin Header
	M31	IO:GPIO[15]	–	I2S1_BCLK	IO:GPIO[15]	IO:I2S1_BCLK	–	I:DAIF_IF_CDC_DAT_AD	–	–	
	M26	O:GPIO[16], boot_src[0]	PU	I2S1_DO	O:GPIO[16]	O:I2S1_DO	–	O:DAIF_IF_CDC_DAT_DA	–	boot_src[0]	
	M32	IO:GPIO[17]	–	I2S1_MCLK	IO:GPIO[17]	IO:I2S1_MCLK	–	O:DAIF_IF_CLK_IF	–	–	
	M27	IO:GPIO[18]	–	I2S1_DI	IO:GPIO[18]	I:I2S1_DI	–	O:DAIF_IF_DAT_DA	–	–	
I2S2	N31	IO:GPIO[19]	–	I2S2_LRCK	IO:GPIO[19]	IO:I2S2_LRCK	–	O:DAIF_IF_CLK_IF	–	–	Audio DAC
	P27	IO:GPIO[20]	–	I2S2_BCLK	IO:GPIO[20]	O:I2S2_BCLK	O:URTOB_RTSn	I:DAIF_IF_EN_AD	–	–	
	P30	O:GPIO[21], boot_src[1]	PD	I2S2_DO	O:GPIO[21]	O:I2S2_DO	–	O:DAIF_IF_EN_DA	–	boot_src[1]	
	R30	IO:GPIO[22]	–	I2S2_DI	IO:GPIO[22]	I:I2S2_DI	–	I:DAIF_IF_INT_ANA	–	–	
PDM	R29	IO:GPIO[23]	–	PDM_DI[1]	IO:GPIO[23]	I:PDM_DI[1]	–	–	–	–	To 40-Pin Header
	T27	IO:GPIO[24]	–	PDM_DI[0]	IO:GPIO[24]	I:PDM_DI[0]	–	–	–	–	Core Module 2x Digital MIC
	T26	IO:GPIO[25]	–	PDM_CLKIO	IO:GPIO[25]	IO:PDM_CLKIO	IO:I2S2A_MCLK	–	–	–	To 40-Pin Header/ DMIC on Board

Function	PIN	GPIO Mapping	Internal PU/PD	Pad/Pin Name	Mode-0	Mode-1	Mode-2	Mode-3	Mode-4	Strap	Notes	
I2S3	R31	IO:GPIO[26]	–	I2S3_LRCK	IO:GPIO[26]	IO:I2S3_LRCK	–	–	–	–	M.2 Key Connector for BT	
	T31	IO:GPIO[27]	–	I2S3_BCLK	IO:GPIO[27]	IO:I2S3_BCLK	–	–	–	–		
	R32	O:GPIO[28], legacy_boot	–	I2S3_DO	O:GPIO[28]	O:I2S3_DO	–	–	–	legacy_boot		
	U32	IO:GPIO[29]	–	I2S3_DI	IO:GPIO[29]	I:I2S3_DI	–	–	–	–		
SPI2	F19	O:GPIO[30], SW_strap[1]	PD	SPI2_SS0n	O:GPIO[30]	O:SPI2_SS0n	–	–	–	software_strap[1]	To 40-Pin Header	
	B18	IO:GPIO[31]	–	SPI2_SS1n	IO:GPIO[31]	O:SPI2_SS1n	–	O:DAIF_IF_CDC_DIR	–	–	–	
	D19	IO:GPIO[32]	–	SPI2_SS2n	O:IO_POR_N	IO:GPIO[32]	O:SPI2_SS2n	I:DAIF_IF_PWR_OK	I:PDM_DI[2]	–	–	24-bit RGB LCD SPI-CS
	F21	IO:GPIO[33]	–	SPI2_SS3n	I:PWR_OK	IO:GPIO[33]	O:SPI2_SS3n	O:DAIF_IF_NARES	I:PDM_DI[3]	–	–	To 40-Pin Header
	B19	O:GPIO[34], SW_strap[0]	PU	SPI2_SDO	O:GPIO[34]	O:SPI2_SDO	–	–	–	software_strap[0]	–	
	B20	O:GPIO[35], pllPwrDown	PD	SPI2_SCLK	O:GPIO[35]	O:SPI2_SCLK	–	–	–	pllPwrDown	–	To 40-Pin Header/ 24-bit RGB LCD
I2C2	A20	IO:GPIO[36]	–	SPI2_SDI	IO:GPIO[36]	I:SPI2_SDI	–	–	–	–	–	
	C17	IO:GPIO[37]	PD	TW2_SCL	IO:GPIO[37]	IO:TW2_SCL	I:KEY_ROW0	O:RGMIB_MDC	–	–	–	SoC Core PMIC
UATR1	A18	IO:GPIO[38]	PD	TW2_SDA	IO:GPIO[38]	IO:TW2_SDA	I:KEY_ROW1	IO:RGMIB_MDIO	–	–	–	–
	C22	IO:GPIO[39]	–	URT1_RXD	IO:GPIO[39]	–	I:URT1A_RXD	I:KEY_ROW2	I:GPIO_TRIG[3]	–	–	M.2 Key Connector for BT
I2C3	C23	IO:GPIO[40]	–	URT1_TXD	IO:GPIO[40]	–	O:URT1A_TXD	I:KEY_ROW3	–	–	–	–
	B21	IO:GPIO[41]	PD	TW3_SCL	IO:GPIO[41]	IO:TW3A_SCL	O:URT1A_RTSn	O:IF_DCLS	–	–	–	M.2 Key Connector for BT
	C21	IO:GPIO[42]	PD	TW3_SDA	IO:GPIO[42]	IO:TW3A_SDA	I:URT1A_CTSn	O:IF_DCLS_N	–	–	–	–
PDM	A25	IO:GPIO[43]	–	PWM[3]	IO:GPIO[43]	O:PWM[3]	–	IO:IF_DCLS_SCLK	–	–	–	24-bit RGB LCD
	B24	IO:GPIO[44]	–	PWM[2]	IO:GPIO[44]	O:PWM[2]	IO:KEY_COL1	–	–	–	–	To 40-Pin Header
	B23	IO:GPIO[45]	–	PWM[1]	IO:GPIO[45]	O:PWM[1]	–	–	–	–	–	–
	A23	O:GPIO[46], cpuRstByps	PD	PWM[0]	O:GPIO[46]	O:PWM[0]	O:RGMIL_PTP_PPS_O	–	–	–	cpuRstByps	Optional Heatsink-Fan
GPIO_A	B26	IO:GPIO[47]	–	GPIO_A[3]	IO:GPIO[47]	–	I:KEY_ROW4	I:URT1B_RXD	–	–	–	To 40-Pin Header
	B25	IO:GPIO[48]	–	GPIO_A[2]	IO:GPIO[48]	–	I:KEY_ROW5	O:URT1B_TXD	–	–	–	–
	D25	IO:GPIO[49]	–	GPIO_A[1]	IO:GPIO[49]	O:RGMIA_MDC	O:PWM[2]	–	–	–	–	Gigabit Ethernet PHY
	F23	IO:GPIO[50]	–	GPIO_A[0]	IO:GPIO[50]	IO:RGMIA_MDIO	O:PWM[1]	–	–	–	–	–
USB	F25	O:GPIO[51], pllByps	–	USB2_DRV_VBUS	O:USB2_DRV_VBUS	O:GPIO[51]	–	–	–	pllByps	O:Audio DAC Mute	
NAND	B28	IO:GPIO[52]	–	NAND_ALE	IO:GPIO[52]	O:NAND_ALE	–	–	–	–	–	Optional NAND Flash
	B30	IO:GPIO[53]	–	NAND_CEN	IO:GPIO[53]	O:NAND_CEn	–	–	–	–	–	–
SDIO	C26	IO:GPIO[54]	–	SDIO_CDn	IO:GPIO[54]	I:SDIOA_CDn	IO:KEY_COLO	O:URT1B_RTSn	–	–	–	Micro-SD connector

Function	PIN	GPIO Mapping	Internal PU/PD	Pad/Pin Name	Mode-0	Mode-1	Mode-2	Mode-3	Mode-4	Strap	Notes
	C27	IO:GPIO[55]	–	SDIO_WP	IO:GPIO[55]	I:SDIOA_WP	–	I:URTIB_CTSn	–	–	To 40-Pin Header
24-bit RGB	V30	IO:GPIO[56]	–	LCD_D[2]	IO:GPIO[56]	IO:LCD_D[2]	–	–	–	–	24-bit RGB LCD
	W29	IO:GPIO[57]	–	LCD_D[3]	IO:GPIO[57]	IO:LCD_D[3]	–	–	–	–	
	W30	IO:GPIO[58]	–	LCD_D[4]	IO:GPIO[58]	IO:LCD_D[4]	–	–	–	–	
	Y32	IO:GPIO[59]	–	LCD_D[5]	IO:GPIO[59]	IO:LCD_D[5]	–	–	–	–	
	Y31	IO:GPIO[60]	–	LCD_D[6]	IO:GPIO[60]	IO:LCD_D[6]	–	–	–	–	
	AA31	IO:GPIO[61]	–	LCD_D[7]	IO:GPIO[61]	IO:LCD_D[7]	–	–	–	–	
	AB32	IO:GPIO[62]	–	LCD_D[10]	IO:GPIO[62]	IO:LCD_D[10]	–	–	–	–	
	AB31	IO:GPIO[63]	–	LCD_D[11]	IO:GPIO[63]	IO:LCD_D[11]	–	–	–	–	
	AC30	IO:GPIO[64]	–	LCD_D[12]	IO:GPIO[64]	IO:LCD_D[12]	–	–	–	–	
	AC27	IO:GPIO[65]	–	LCD_D[13]	IO:GPIO[65]	IO:LCD_D[13]	–	–	–	–	
	AC26	IO:GPIO[66]	–	LCD_D[14]	IO:GPIO[66]	IO:LCD_D[14]	–	–	–	–	
	AD30	IO:GPIO[67]	–	LCD_D[15]	IO:GPIO[67]	IO:LCD_D[15]	–	–	–	–	
	AE31	IO:GPIO[68]	–	LCD_D[18]	IO:GPIO[68]	IO:LCD_D[18]	–	–	–	–	
	AE27	IO:GPIO[69]	–	LCD_D[19]	IO:GPIO[69]	IO:LCD_D[19]	–	–	–	–	
	AE26	IO:GPIO[70]	–	LCD_D[20]	IO:GPIO[70]	IO:LCD_D[20]	–	–	–	–	
	AF31	IO:GPIO[71]	–	LCD_D[21]	IO:GPIO[71]	IO:LCD_D[21]	–	–	–	–	
	AA30	IO:GPIO_X[0]	–	LCD_D[8]	IO:GPIO_X[0]	IO:LCD_D[8]	IO:KEY_COL6	O:I2S5_DO	–	–	
	AA29	IO:GPIO_X[1]	–	LCD_D[9]	IO:GPIO_X[1]	IO:LCD_D[9]	IO:KEY_COL7	I:I2S5_DI	–	–	
	AD31	IO:GPIO_X[2]	–	LCD_D[16]	IO:GPIO_X[2]	IO:LCD_D[16]	I:KEY_ROW8	IO:I2S5_LRCK	–	–	
	AE32	IO:GPIO_X[39]	–	LCD_D[17]	IO:GPIO_X[39]	IO:LCD_D[17]	I:KEY_ROW9	IO:I2S5_BCLK	–	–	
AK31	IO:GPIO_X[10]	–	LCD_GPIO[3]	IO:GPIO_X[10]	O:LCD_GPIO[3]	IO:KEY_COL4	I:SDIOB_CDn	–	–		
AK32	IO:GPIO_X[11]	–	LCD_GPIO[4]	IO:GPIO_X[11]	O:LCD_GPIO[4]	IO:KEY_COL5	I:SDIOB_WP	–	–	O: Interrupt is triggered by GePHY	
U31	IO:GPIO_X[12]	–	LCD_D[0]	IO:GPIO_X[12]	IO:LCD_D[0]	I:KEY_ROW6	IO:TW3B_SCL	–	–	24-bit RGB LCD	
V31	IO:GPIO_X[13]	–	LCD_D[1]	IO:GPIO_X[13]	IO:LCD_D[1]	I:KEY_ROW7	IO:TW3B_SDA	–	–		
Ag31	IO:GPIO_X[40]	–	LCD_D[22]	IO:GPIO_X[40]	IO:LCD_D[22]	–	–	–	–		
AG29	IO:GPIO_X[14]	–	LCD_D[23]	IO:GPIO_X[14]	IO:LCD_D[23]	–	–	–	–		
AG32	IO:GPIO_X[15]	–	LCD_CLK	IO:GPIO_X[15]	O: LCD_CLK	–	–	–	–		
AG30	IO:GPIO_X[16]	–	LCD_GPIO[0]	IO:GPIO_X[16]	O:LCD_GPIO[0]	–	–	–	–		
AJ30	IO:GPIO_X[17]	–	LCD_GPIO[1]	IO:GPIO_X[17]	O:LCD_GPIO[1]	–	–	–	–		

Function	PIN	GPIO Mapping	Internal PU/PD	Pad/Pin Name	Mode-0	Mode-1	Mode-2	Mode-3	Mode-4	Strap	Notes
	AJ31	IO:GPIO_X[18]	–	LCD_GPIO[2]	IO:GPIO_X[18]	O:LCD_GPIO[2]	–	–	–	–	
RGMII	F30	IO:GPIO_X[19]	–	RGMII_TXD[0]	RMII_TXD0	IO:GPIO_X[19]	O:RGMII_TXD[0]	–	–	–	Gigabit Ethernet PHY
	D27	IO:GPIO_X[20]	–	RGMII_TXD[1]	RMII_TXD1	IO:GPIO_X[20]	O:RGMII_TXD[1]	–	–	–	
	D31	IO:GPIO_X[21]	–	RGMII_TXD[2]	N/A	IO:GPIO_X[21]	O:RGMII_TXD[2]	–	–	–	
	D30	IO:GPIO_X[22]	–	RGMII_TXD[3]	N/A	IO:GPIO_X[22]	O:RGMII_TXD[3]	–	–	–	
	H30	IO:GPIO_X[31]	–	RGMII_RXD[0]	RMII_RXD0	IO:GPIO_X[31]	I:RGMII_RXD[0]	–	–	–	
	F31	IO:GPIO_X[32]	–	RGMII_RXD[1]	RMII_RXD1	IO:GPIO_X[32]	I:RGMII_RXD[1]	–	–	–	
	G31	IO:GPIO_X[33]	–	RGMII_RXD[2]	N/A	IO:GPIO_X[33]	I:RGMII_RXD[2]	–	–	–	
	G32	IO:GPIO_X[41]	–	RGMII_RXD[3]	N/A	IO:GPIO_X[41]	I:RGMII_RXD[3]	–	–	–	
	F28	IO:GPIO_X[42]	–	RGMII_RXC	RMII_RXC	IO:GPIO_X[42]	I:RGMII_RXC	–	–	–	
	C30	IO:GPIO_X[43]	–	RGMII_TXC	RMII_TXC/Refclk	IO:GPIO_X[43]	O:RGMII_TXC	–	–	–	
	E31	IO:GPIO_X[51]	–	RGMII_TXCTL	RMII_TXEN	IO:GPIO_X[51]	O:RGMII_TXCTL	–	–	–	
	H31	IO:GPIO_X[52]	–	RGMII_RXCTL	RMII_CRSDV	IO:GPIO_X[52]	I:RGMII_RXCTL	–	–	–	
	A30	IO:GPIO_X[53]	–	RGMII_CLK_OUT	N/A	IO:GPIO_X[53]	O:REFCLK_25MHz	–	–	–	
–	–	–	–	Core Module GPIO_Expander I2CO @0x43	I:GPIO0	–	–	–	–	–	SoC FAN_TACH_CON
	I:GPIO1				–	–	–	–	AUD_JACK_DET (Lineout Audio Jack)		
	O:GPIO2				–	–	–	–	To 40-Pin Header (12)		
	O:GPIO3				–	–	–	–	NAND_WPn		
	O:GPIO4				–	–	–	–	DMIC_MUTEn		
	O:GPIO5				–	–	–	–	LevelTranslator_ENn		
	I:GPIO6				–	–	–	–	USB2_CONN_OCn		
	IO:GPIO7				–	–	–	–	To 40-Pin Header (33)		
–	–	–	–	Core Module GPIO_Expander I2CO @0x44	GPIO0	–	–	–	–	–	NC
	GPIO1				–	–	–	–	–	NC	
	GPIO2				–	–	–	–	–	–	NC
	GPIO3				–	–	–	–	–	–	NC
	O:GPIO4				–	–	–	–	–	–	MIPI to HDMI Converter IC LT9611-RSTn
	I:GPIO5				–	–	–	–	–	–	MIPI to HDMI Converter IC LT9611.INTO
	O:GPIO6				–	–	–	–	–	–	HDMI_PWR_EN

Function	PIN	GPIO Mapping	Internal PU/PD	Pad/Pin Name	Mode-0	Mode-1	Mode-2	Mode-3	Mode-4	Strap	Notes
	-		-			I:GPIO7	-	-	-	-	MIPI to HDMI Converter IC SOC_HPD
-	-	-	-	IO Board GPIO_Expander I2C1 @0x43		O:GPIO0	-	-	-	-	SDIO MUX select
	-		O:GPIO1		-	-	-	-	PWR_ON_DSI		
	-		O:GPIO2		-	-	-	-	Gigabit Ethernet PHY reset		
	-		O:GPIO3		-	-	-	-	LCD Display reset		
	-		O:GPIO4		-	-	-	-	LED Indicator for Stand-By Status		
	-		O:GPIO5		-	-	-	-	USB2-CONN_PWR_ON		
	-		GPIO6		-	-	-	-	NC		
	-		O:GPIO7		-	-	-	-	MIPI-DSI GPIO		
	-		O:GPIO0		-	-	-	-	-	USB-C_Logic_INTn_3V3	
-	-	-	-	IO Board GPIO_Expander I2C1 @0x44		GPIO1	-	-	-	-	NC
	-		O:GPIO2		-	-	-	-	M2-SDIO_DISABLE1		
	-		O:GPIO3		-	-	-	-	M2-SDIO_HOST-WAKE		
	-		O:GPIO4		-	-	-	-	SD-CARD_PWR_EN		
	-		O:GPIO5		-	-	-	-	M2-SDIO_DISABLE2		
	-		O:GPIO6		-	-	-	-	SD-CARD_VIO_SEL		
	-		I:GPIO7		-	-	-	-	LCD_TP_IRQ		

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2. References

- *SL1620 Embedded IoT Processor Datasheet* (PN: 505-001428-01)
- *SL1620 Embedded IoT Processor Functional Specification* (PN: 505-001456-01)
- *SL1620 Peripherals Register Specification* (PN: 505-001466-01)

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3. Revision History

Revision	Description
A	Initial release.
B	Minor update to latest template and correct trademark typo.

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