

Chapter 1 System Overview

1.1 Address Mapping

RK3568 boot from internal BootRom, which supports remap function by software programming. Remap is controlled by PMU_SGRF_SOC_CON1[12:11]. When remap is set to 2'b01, the BootRom is un-accessible and PMU_SRAM is mapped to address 0xFFFF0000. When remap is set to 2'b10, the BootRom is un-accessible and SYSTEM_SRAM is mapped to address 0xFFFF0000.

Table 1-1 Address Mapping

Module	Start Address	Size	Module	Start Address	Size
PCIe3x2_S	0xF0000000	32MB	Reserved	0xFE290000	64KB
PCIe3x1_S	0xF2000000	32MB	GMAC0	0xFE2A0000	64KB
PCIe2x1_S	0xF4000000	32MB	SDMMC0	0xFE2B0000	64KB
PCIe3x2_DBI	0xF6000000	4MB	SDMMC1	0xFE2C0000	64KB
PCIe3x1_DBI	0xF6400000	4MB	Reserved	0xFE2D0000	192KB
PCIe2x1_DBI	0xF6800000	4MB	FSPI	0xFE300000	64KB
Reserved	0xF6C00000	84MB	EMMC	0xFE310000	64KB
SATA0	0xFC000000	4MB	Reserved	0xFE320000	64KB
SATA1	0xFC400000	4MB	NANDC	0xFE330000	64KB
SATAx2	0xFC800000	4MB	Reserved	0xFE340000	128KB
USB3_0	0xFCC00000	4MB	KEYLADDER_S	0xFE360000	64KB
USB3_1	0xFD000000	4MB	TRNG_S	0xFE370000	64KB
GIC600	0xFD400000	4MB	CRYPTO_NS	0xFE380000	32KB
USB20HOST0	0xFD800000	512KB	TRNG_NS	0xFE388000	16KB
USB20HOST1	0xFD880000	512KB	OTP_NS	0xFE38C000	16KB
DAPLITE	0xFD900000	512KB	Reserved	0xFE390000	64KB
Rreserved	0xFD980000	512KB	OTP_S	0xFE3A0000	32KB
QSGMII_PCS	0xFDA00000	2MB	DCF_S	0xFE3A8000	32KB
PMU_SGRF	0xFDC00000	64KB	Reserved	0xFE3B0000	32KB
Reserved	0xFDC10000	64KB	KEY_READER	0xFE3B8000	32KB
PMU_GRF	0xFDC20000	64KB	WDT_S	0xFE3C0000	64KB
CPU_GRF	0xFDC30000	64KB	SEC_TRNG_CHK	0xFE3D0000	64KB
DDR_GRF	0xFDC40000	64KB	JBG_USR	0xFE3E0000	64KB
PIPE_GRF	0xFDC50000	64KB	JBG_OTP	0xFE3F0000	64KB
SYS_GRF	0xFDC60000	64KB	I2S0_8CH	0xFE400000	64KB
PIPE_PHY_GRF0	0xFDC70000	64KB	I2S1_8CH	0xFE410000	64KB
PIPE_PHY_GRF1	0xFDC80000	64KB	I2S2_2CH	0xFE420000	64KB
PIPE_PHY_GRF2	0xFDC90000	64KB	I2S3_2CH	0xFE430000	64KB
USBPHY_U3_GRF	0xFDCA0000	32KB	PDM	0xFE440000	64KB
USBPHY_U2_GRF	0xFDCA8000	32KB	VAD	0xFE450000	64KB
EDP_PHY_GRF	0xFDCB0000	32KB	SPDIF_8CH	0xFE460000	64KB
PCIE30_PHY_GRF	0xFDCB8000	32KB	AUDPWM	0xFE470000	32KB
SYSTEM_SRAM(64K)	0xFDCC0000	64KB	DIG_ACODEC	0xFE478000	32KB
PMU_MEM	0xFDCD0000	128KB	SDMMC_BUF	0xFE480000	64KB
USB_GRF	0xFDCF0000	64KB	Reserved	0xFE490000	448KB

Module	Start Address	Size	Module	Start Address	Size
PMU_CRU	0xFDD00000	64KB	Reserved	0xFE500000	64KB
CRU_S	0xFDD10000	32KB	DMAC0_S	0xFE510000	64KB
SYS_SGRF	0xFDD18000	16KB	Reserved	0xFE520000	64KB
Stimer	0xFDD1C000	16KB	DMAC0_NS	0xFE530000	64KB
CRU_NS	0xFDD20000	64KB	DMAC1_S	0xFE540000	64KB
PMU_CRU_S	0xFDD30000	64KB	DMAC1_NS	0xFE550000	64KB
I2C0	0xFDD40000	64KB	SCR	0xFE560000	64KB
UART0	0xFDD50000	64KB	CAN0	0xFE570000	64KB
GPIO0	0xFDD60000	64KB	CAN1	0xFE580000	64KB
PWM0	0xFDD70000	64KB	CAN2	0xFE590000	64KB
PVTM_PMU	0xFDD80000	64KB	I2C1	0xFE5A0000	64KB
PMU_NS	0xFDD90000	64KB	I2C2	0xFE5B0000	64KB
Reserved	0xFDDA0000	128KB	I2C3	0xFE5C0000	64KB
DDR_SCRAMBLE_KEY	0xFDDC0000	32KB	I2C4	0xFE5D0000	64KB
OSC_CHK	0xFDDC8000	32KB	I2C5	0xFE5E0000	64KB
Reserved	0xFDDD0000	192KB	TIMER_NS	0xFE5F0000	64KB
PVTM_CORE	0xFDE00000	64KB	WDT_NS	0xFE600000	64KB
Reserved	0xFDE10000	128KB	SPI0	0xFE610000	64KB
GIC600	0xFDE30000	0KB	SPI1	0xFE620000	64KB
SPINLOCK	0xFDE30000	64KB	SPI2	0xFE630000	64KB
NPU	0xFDE40000	128KB	SPI3	0xFE640000	64KB
MALIG52	0xFDE60000	128KB	UART1	0xFE650000	64KB
PVTM_GPU	0xFDE80000	64KB	UART2	0xFE660000	64KB
PVTM_NPU	0xFDE90000	64KB	UART3	0xFE670000	64KB
VDPU	0xFDEA0000	64KB	UART4	0xFE680000	64KB
RGA	0xFDEB0000	64KB	UART5	0xFE690000	64KB
EBC	0xFDEC0000	64KB	UART6	0xFE6A0000	64KB
JPEG_DEC	0xFDED0000	64KB	UART7	0xFE6B0000	64KB
JPEG_ENC	0xFDEE0000	64KB	UART8	0xFE6C0000	64KB
IEP	0xFDEF0000	64KB	UART9	0xFE6D0000	64KB
Eink	0xFDF00000	128KB	PWM1	0xFE6E0000	64KB
Reserved	0xFDF20000	128KB	PWM2	0xFE6F0000	64KB
RKVENC	0xFDF40000	128KB	PWM3	0xFE700000	64KB
Reserved	0xFDF60000	128KB	TSADC	0xFE710000	64KB
RKVDEC	0xFDF80000	128KB	SARADC	0xFE720000	64KB
CSI_RX_CTRL0	0xFDFA0000	64KB	Reserved	0xFE730000	64KB
CSI_RX_CTRL1	0xFDFB0000	64KB	GPIO1	0xFE740000	64KB
Reserved	0xFDFC0000	64KB	GPIO2	0xFE750000	64KB
VICAP0	0xFDFD0000	64KB	GPIO3	0xFE760000	64KB
VICAP1	0xFDFE0000	64KB	GPIO4	0xFE770000	64KB
ISP	0xFDFE0000	64KB	Mailbox	0xFE780000	64KB
SDMMC2	0xFE000000	64KB	MCU_INTC	0xFE790000	64KB
GMAC1	0xFE010000	64KB	Reserved	0xFE7A0000	384KB
Reserved	0xFE020000	128KB	DDR_PHY	0xFE800000	64KB

Module	Start Address	Size	Module	Start Address	Size
VOP	0xFE040000	64KB	Reserved	0xFE810000	64KB
HDCP_AHB	0xFE050000	64KB	PIPE_PHY0	0xFE820000	64KB
DSITX0	0xFE060000	64KB	PIPE_PHY1	0xFE830000	64KB
DSITX1	0xFE070000	64KB	PIPE_PHY2	0xFE840000	64KB
HDCP_APB	0xFE080000	128KB	DSI_TX_PHY0	0xFE850000	64KB
HDMI	0xFE0A0000	128KB	DSI_TX_PHY1	0xFE860000	64KB
eDP	0xFE0C0000	64KB	CSI_RX_PHY	0xFE870000	64KB
HDCP_KEY	0xFE0D0000	64KB	OTP_PHY	0xFE880000	64KB
Reserved	0xFE0E0000	128KB	CPU_BOOST	0xFE890000	64KB
Reserved	0xFE100000	1024KB	USB2PHY_U3OTG	0xFE8A0000	64KB
FIREWALL_DDR	0xFE200000	64KB	USB2PHY_U2HOST	0xFE8B0000	64KB
Reserved	0xFE210000	64KB	PCIE30_PHY	0xFE8C0000	128KB
DMA2DDR	0xFE220000	64KB	PCIE2x1_S	0x300000000	1024MB
DFIMON	0xFE230000	64KB	PCIE3x1_S	0x340000000	1024MB
DFICTRL	0xFE240000	64KB	PCIE3x2_S	0x380000000	1024MB
UPCTL2	0xFE250000	64KB	PCIE2x1_DBI	0x3C0000000	4MB
PCIE2x1_APB	0xFE260000	64KB	PCIE3x1_DBI	0x3C0400000	4MB
PCIE3x1_APB	0xFE270000	64KB	PCIE3x2_DBI	0x3C0800000	4MB
PCIE3x2_APB	0xFE280000	64KB			

The following table show the boot address when before remap and after remap
Table 1-2Address Remapping

remap[1:0]=2'b00		remap[1:0]=2'b11		remap[1:0]=2'b10	
		not accessible	BootRom(20KB)	not accessible	BootRom(20KB)
0xFFFF0000	BootRom(20KB)	0xFFFF0000	PMU_SRAM(8KB)	0xFF000000	SYSTEM_SRAM (64KB)
0xFD000000	PMU_SRAM(8KB)	0xFD000000	PMU_SRAM(8KB)	0xFD000000	PMU_SRAM(8KB)
0xFD000000	SYSTEM_SRAM (64KB)	0xFD000000	SYSTEM_SRAM (64KB)	0xFD000000	SYSTEM_SRAM (64KB)

1.2 System Boot

RK3568 provides system boot from off-chip devices such as SDMMC card, eMMC memory, serial Nand or Norflash. When boot code is not ready in these devices, also provide system code download into them by USB OTG interface. All of the boot code will be stored in internal BootRom. The following is the whole boot procedure for boot code, which will be stored in BootRom in advance.

The following features are supported.

- Support system boot from the following device:
 - Serial Nor Flash, 1bit or 4bits data width(device layout in FSPI IO)
 - Serial Nand Flash, 1bit data width(device layout in FSPI IO)
 - Asynchronous Flash Interface, 8bits data width
 - eMMC Interface, 8bits data width
 - SDMMC Card, 4bits data width
- Support system code download by USB OTG

Following figure shows RK3568boot procedure flow.