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038 '0$& 038

+&) .%)ODVK .% 65$0

)ODVK &38)ODVK

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+&) ELW 0636 $'&

3*$ &03 ELW3:0 7LPHU7LPHU

3:0 3:0 7LPHU7LPHU 3:0 ELW

7LPHU7LPHU$ 'XW\ 3:0

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	63,	FK								
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7LPHU

7LPHU

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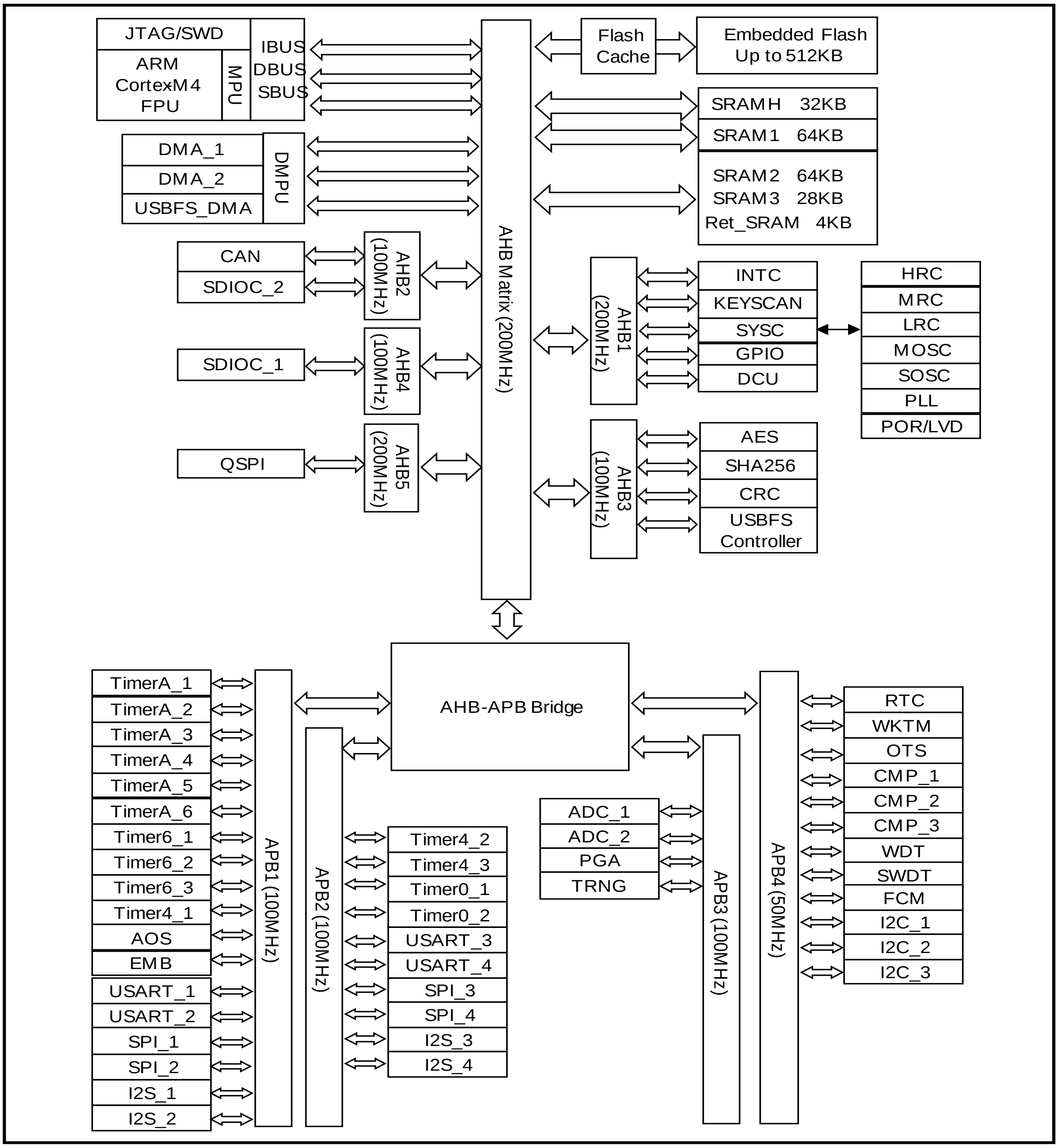
JTAG/SWD
ARM
CortexM4
FPU
MPU
IBUS
DBUS
SBUS
DMA_1
DMA_2
USBFS_DMA
DMPU
CAN
SDIOC_2
AHB2 (100MHz)
SDIOC_1
AHB4 (100MHz)
QSPI
AHB5 (200MHz)
AHB Matrix (200MHz)
Flash Cache
Embedded Flash Up to 512KB
SRAMH 32KB
SRAM1 64KB
SRAM2 64KB
SRAM3 28KB
Ret_SRAM 4KB
AHB1 (200MHz)
INTC
KEYSCAN
SYSC
GPIO
DCU
HRC
MRC
LRC
MOSC
SOSC
PLL
POR/LVD
AHB3 (100MHz)
AES
SHA256
CRC
USBFS Controller
AHB-APB Bridge
TimerA_1
TimerA_2
TimerA_3
TimerA_4
TimerA_5
TimerA_6
Timer6_1
Timer6_2
Timer6_3
Timer4_1
AOS
EMB
USART_1
USART_2
SPI_1
SPI_2
I2S_1
I2S_2
APB1 (100MHz)
APB2 (100MHz)
Timer4_2
Timer4_3
Timer0_1
Timer0_2
USART_3
USART_4
SPI_3
SPI_4
I2S_3
I2S_4
ADC_1
ADC_2
PGA
TRNG
APB3 (100MHz)
APB4 (50MHz)
RTC
WKTM
OTS
CMP_1
CMP_2
CMP_3
WDT
SWDT
FCM
I2C_1
I2C_2
I2C_3

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1.4.10 ,17&

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1) 19,& &RUWH[0)

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1.4.11 $26

$XWRPDWLF 2SHUDWLRQ 6\VWHP &38

$26 $26 6RXUFH

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$26 $26 7DUJHW

1.4.12 .(<6&$1

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1.4.13 038

038

038 ,3 038

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038

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1.4.14 '0$ '0$

'0$ &38

'0$ &38 $0%$ $+%/LWH

'0$B '0$ B '0$

ELW ELW ELW

1.4.15 &03

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1.4.16 $'&

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2 7 6

2 7 6

1.4.18 7 L P H U

7L P H U

1.4.21 7 L P 时 U

$ 7L P 时 U 3 : 0

3 : 0

7L P 时 U 3 : 0

1.4.22 7 L P H U

7L P H U

7L P H U

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1.4.24 : ' 7

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6 : ' 7 3 & / . : ' 7

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8 6 $ 5 7

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	, 6&/. 83//5 83//4 83//3 03//5 03//4 03//3 , 6B(;&.

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&$1 &$1 &$1 %\WH5$0

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77&$1

1.4.31 86% 86%)6

86% 86%)6 3+< 86%)6

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62)

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&30 $(6 +$6+ 751*

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+$6+ 6+$ 6+$ 6HFXUH +DVK $OJRULWKP

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751* ELW

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'DWD &RPSXWLQJ 8QLW&38

'&8

'&8

1.4.34

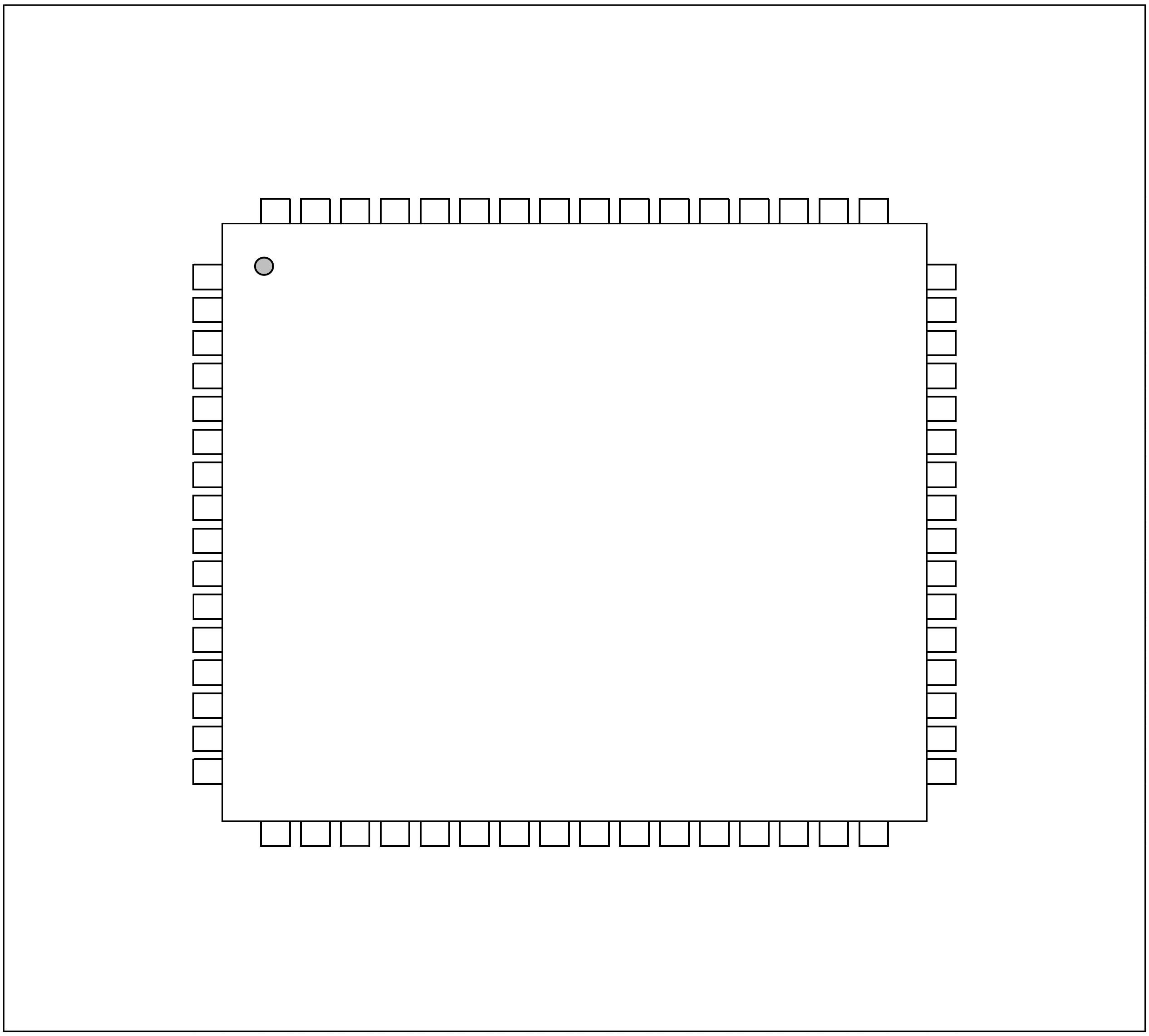
+&) 3(+9%*$

7RS 9LHZ

	1	2	3	4	5	6	7	8	9	10	11	12
A	PE3	PE1	PB8	PB11/MD	PD7	PD5	PB4	PB3	PA15	PA14	PA13	PA12
B	PE4	PE2	PB9	PB7	PB6	PD6	PD4	PD3	PD1	PC12	PC10	PA11
C	PC13	PE5	PE0	VCC	PB5			PD2	PD0	PC11	VCAP_2	PA10
D	PC14/XTAL32_OUT	PE6	VSS							PA9	PA8	PC9
E	PC15/XTAL32_IN	PH2	NC							PC8	PC7	PC6
F	PH0/XTAL_IN	VSS									VSS	VSS
G	PH1/XTAL_OUT	VCC									VCC	VCC
H	PC0	NRST	NC							PD15	PD14	PD13
J	AVSS	PC1	PC2							PD12	PD11	PD10
K	VREFL	PC3	PA2	PA5	PC4			PD9	PD8	PB15	PB14	PB13
L	VREFH	PA0	PA3	PA6	PC5	PB2	PE8	PE10	PE12	PB10	VCAP_1	PB12
M	AVCC	PA1	PA4	PA7	PB0	PB1	PE7	PE9	PE11	PE13	PE14	PE15

$ 3LQ

+&   )   .(7$4)3   +&   )   .&/7$4)3



+&) .(8$4)1 75

2.2

LQFP100	VFBGA100	LQFP64	QFN60	LQFP/QFN48	Pin Name	Analog	EIRQ/WKUP	TRACE/JTAG/SWD	[redacted]	Func1	Func2	Func3	Func4	Func5	Func6	Func7	Func8	Func9	Func10	Func11	[redacted]

LQFP 100	VFBGA100	LQFP 64	QFN60	LQFP/QFN48	Pin Name	Analog	EIRQ/WKUP	TRACE/JTAG/SWD	Func0	Func1	Func2	Func3	Func4	Func5	Func6	Func7	Func8	Func9	Func10	Func11	Func12	Func13	Func14	Func15	Func16~31	Func32~63
									GPO	other	TIM4	TIM6	TIMA	TIMA	EMB,TIMA	USART/SPI/QSPI	KEY	SDIO	USBFS/I2S	-	-	-	EVNTPT	EVENTOUT	-	Communication Funcs
	0				PA1	ADC1_IN1/CMP1_INP2	EIRQ1		GPO		TIM4_2_OUL		7,0$B B3 7,0$B B .%	7,0$B B7		SPI1_SS2		SDIO2_D5					EVNTP101	EVENTOUT		Func_Grp1
	.				PA2	ADC1_IN2/CMP1_INP3	EIRQ2		GPO		TIM4_2_OVH		7,0$B B3	7,0$B B3 7,0$B B .$		SPI1_SS3		SDIO2_D6					EVNTP102	EVENTOUT		Func_Grp1
	/				PA3	ADC1_IN3/PGAVSS/CMP1_INP4	EIRQ3		GPO		TIM4_2_OVL		7,0$B B3	7,0$B B3 7,0$B B .%				SDIO2_D7					EVNTP103	EVENTOUT		Func_Grp1
					AVSS																					
	(				NC																					
					AVCC																					
	0				PA4	ADC12_IN4/CMP2_INP1/CMP3_INP4	EIRQ4		GPO		TIM4_2_OWH			7,0$B B3		USART2_CK	KEYOUT0		I2S1_EXCK				EVNTP104	EVENTOUT		Func_Grp1
	.				PA5	ADC12_IN5/CMP2_INP2	EIRQ5		GPO		TIM4_2_OWL		7,0$B B3 7,0$B B .$	7,0$B B3	TIMA_2_TRIG		KEYOUT1		I2S1_MCK				EVNTP105	EVENTOUT		Func_Grp1

LQFP100	VFBGA100	LQFP64	QFN60	LQFP/QFN48	Pin Name	Analog	EIRQ/WKUP	TRACE/JTAG/SWD	Func0	Func1	Func2	Func3	Func4	Func5	Func6	Func7	Func8	Func9	Func10	Func11	Func12	Func13	Func14	Func15	Func16~31	Func32~63
									GPO	other	TIM4	TIM6	TIMA	TIMA	EMB,TIMA	USART/SPI/QSPI	KEY	SDIO	USBFS/I2S	-	-	-	EVNTPT	EVENTOUT	-	Communication Funcs
	0				PE11		EIRQ11		GPO		TIM4_1_OVH	TIM6_2_PWMA	7,0$B B3 7,0$B B .%											EVENTOUT		
	/				PE12		EIRQ12		GPO		TIM4_1_OWL	TIM6_3_PWMB	7,0$B B3			SPI1_SS1								EVENTOUT		Func_Grp2
	0				PE13		EIRQ13		GPO		TIM4_1_OWH	TIM6_3_PWMA	7,0$B B3			SPI1_SS2								EVENTOUT		Func_Grp2
	0				PE14		EIRQ14		GPO		TIM4_1_CLK		7,0$B B3			SPI1_SS3		SDIO1_CD						EVENTOUT		Func_Grp2
	0				PE15		EIRQ15		GPO				7,0$B B3	7,0$B B7	EMB_IN2	USART4_CK		SDIO1_WP						EVENTOUT		Func_Grp2
	/				PB10		EIRQ10		GPO	ADTRG2	TIM4_2_OVH		7,0$B B3	7,0$B B3		QSPI_QSIO2		SDIO1_D7	I2S3_EXCK				EVNTP210	EVENTOUT		Func_Grp2
	/				VCAP_1																					
	)				VSS																					
	*				VCC																					
	/				PB12		EIRQ12		GPO	VCOUT1	TIM4_2_OVL	TIM6_TRIGB	7,0$B B3		EMB_IN2	QSPI_QSIO1		SDIO2_D1	I2S3_MCK				EVNTP212	EVENTOUT		Func_Grp2
	.				PB13		EIRQ13		GPO	VCOUT2	TIM4_1_OUL	TIM6_1_PWMB	7,0$B B3			QSPI_QSIO0		SDIO2_D0					EVNTP213	EVENTOUT		Func_Grp2

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LQFP100	VFBGA100	LQFP64	QFN60	LQFP/QFN48	Pin Name	Analog	EIRQ/WKUP	TRACE/JTAG/SWD	Func0	Func1	Func2	Func3	Func4	Func5	Func6	Func7	Func8	Func9	Func10	Func11	Func12	Func13	Func14	Func15	Func16~31	Func32~63
									GPO	other	TIM4	TIM6	TIMA	TIMA	EMB,TIMA	USART/SPI/QSPI	KEY	SDIO	USBFS/I2S	-	-	-	EVNTPT	EVENTOUT	-	Communication Funcs
	(				PC8		EIRQ8		GPO		TIM4_2_OWH		7,0$B B3	7,0$B B3		USART3_CK	KEYOUT1	SDIO1_D0	I2S2_MCK				EVNTP308	EVENTOUT		Func_Grp2
	'				PC9		EIRQ9		GPO	MCO_2	TIM4_2_OWL		7,0$B B3	7,0$B B3			KEYOUT0	SDIO1_D1					EVNTP309	EVENTOUT		Func_Grp1
	'				PA8		EIRQ8/WKUP2_0		GPO	MCO_1	TIM4_1_OUH	TIM6_1_PWMA	7,0$B B3 7,0$B B .$			USART1_CK		SDIO1_D1	USBFS_SOF				EVNTP108	EVENTOUT		Func_Grp1
	'				PA9		EIRQ9/WKUP2_1		GPO		TIM4_1_OVH	TIM6_2_PWMA	7,0$B B3 7,0$B B .%					SDIO1_D2	USBFS_VBUS				EVNTP109	EVENTOUT		Func_Grp1
	&				PA10		EIRQ10/WKUP2_2		GPO		TIM4_1_OWH	TIM6_3_PWMA	7,0$B B3	7,0$B B7				SDIO1_CD	USBFS_ID				EVNTP110	EVENTOUT		Func_Grp1
	%				PA11		EIRQ11/WKUP2_3		GPO		TIM4_1_CLK		7,0$B B3		EMB_IN1			SDIO2_CD	USBFS_DM				EVNTP111	EVENTOUT		Func_Grp1
	$				PA12		EIRQ12/WKUP3_0		GPO		TIM4_3_OWL	TIM6_TRIGA	7,0$B B7!	7,0$B B3 7,0$B B .$				SDIO2_WP	USBFS_DP				EVNTP112	EVENTOUT		Func_Grp1
													$B B3	7,0$B B3 7,0$B B .%		SPI2_SS1		SDIO2_D3					EVNTP11			Func_Grp1
					VSS																					
					VCC																					
					PA14		EIRQ14/WKUP3_2	JTCK_SWCLK	GPO					7,0$B B3	TIMA_4_TRIG	SPI2_SS2		SDIO2_D2	I2S				EVNTP114			
					PA15		EIRQ15/WKUP3_3	JTDI	GPO					0$B B3	TIMA_2_TRIG	SPI2_SS3		SDIO2_D1					EVNTP115			
					PC10		EIRQ10		GPO		TIM4_3_OUH		7	$B B3 $B B				SDIO1_D					EVNTP31			Func_
					PC11		EIRQ11		GPO		TIM4_3_OVH		7,0$	3 B				SDIO					EVNTP31			Func_Grp1
											TIM4_3_OWH		7,0$B B					S					EVNTP31			Func_Grp1
																							EVNTP40			Func_Grp1

LQFP 100	VFBG A100	LQFP 64	QFN6 0	LQFP/ QFN4 8	Pin Name	Analog	EIRQ/WK UP	TRACE/JTAG /SWD	Func0	Func1	Func2	Func3	Func4	Func5	Func6	Func7	Func8	Func9	Func10	Func11	Func12	Func13	Func14	Func15	Func16 ~31	Func32~63
									GPO	other	TIM4	TIM6	TIMA	TIMA	EMB,TIMA	USART/SPI/Q SPI	KEY	SDIO	USBFS/I2S	-	-	-	EVNTPT	EVENTOUT	-	Communic ation Funcs
	$				PB3		EIRQ3/WK UP0_3	JTDO_TRACE SWO	GPO	FCMREF	TIM4_3_CLK		7,0$B B3 7,0$B B .%	7,0$B B3				SDIO2_D0					EVNTP203	EVENTOUT		Func_Grp2
	$				PB4		EIRQ4/WK UP1_0	NJTRST	GPO		TIM4_3_OWL		7,0$B B3: 7,0$B B .$	7,0$B B3				SDIO1_D0					EVNTP204	EVENTOUT		Func_Grp2
	&				PB5		EIRQ5/WK UP1_1		GPO		TIM4_3_OWH		7,0$B B3 7,0$B B .%	7,0$B B3				SDIO1_D3	I2S4_EXCK				EVNTP205	EVENTOUT		Func_Grp2
	%				PB6		EIRQ6/WK UP1_2		GPO	ADTRG2	TIM4_3_OVL		7,0$B B3 7,0$B B .$	7,0$B B3				SDIO2_CK	I2S4_MCK				EVNTP206	EVENTOUT		Func_Grp2
	%				PB7		EIRQ7/WK UP1_3		GPO	ADTRG1	TIM4_3_OVH		7,0$B B3 7,0$B B .%					SDIO1_D0					EVNTP207	EVENTOUT		Func_Grp2
	$				PB11/MD		NMI																EVNTP211			
	$				PB8		EIRQ8		GPO		TIM4_3_OUL		7,0$B B3				KEYOUT7	SDIO1_D4	USBFS_DRVV BUS				EVNTP208	EVENTOUT		Func_Grp2
	%				PB9		EIRQ9		GPO		TIM4_3_OUH		7,0$B B3	7,0$B B7		SPI2_SS1	KEYOUT6	SDIO1_D5					EVNTP209	EVENTOUT		Func_Grp2
	&				PE0		EIRQ0		GPO	MCO_1			7,0$B B7			SPI2_SS2								EVENTOUT		Func_Grp2
	$				PE1		EIRQ1		GPO	MCO_2	TIM4_3_CLK					SPI2_SS3								EVENTOUT		Func_Grp2
	D3				VSS																					
	C4				VCC																					
	+				NC																					

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)XQFB*US)XQFB*US

	Func32	Func33	Func34	Func35	Func36	Func37	Func38	Func39	Func40	Func41	Func42	Func43	Func44	Func45	Func46	Func47
Func_Grp1	USART1_TX	USART1_RX	USART1_RTS	USART1_CTS	USART2_TX	USART2_RX	USART2_RTS	USART2_CTS	SPI1_MOSI	SPI1_MISO	SPI1_SS0	SPI1_SCK	SPI2_MOSI	SPI2_MISO	SPI2_SS0	SPI2_SCK
Func_Grp2	USART3_TX	USART3_RX	USART3_RTS	USART3_CTS	USART4_TX	USART4_RX	USART4_RTS	USART4_CTS	SPI3_MOSI	SPI3_MISO	SPI3_SS0	SPI3_SCK	SPI4_MOSI	SPI4_MISO	SPI4_SS0	SPI4_SCK

	Func48	Func49	Func50	Func51	Func52	Func53	Func54	Func55	Func56	Func57	Func58	Func59	Func60	Func61	Func62	Func63
Func_Grp1	I2C1_SDA	I2C1_SCL	I2C2_SDA	I2C2_SCL	I2S1_SD	I2S1_SDIN	I2S1_WS	I2S1_CK	I2S2_SD	I2S2_SDIN	I2S2_WS	I2S2_CK				
Func_Grp2	I2C3_SDA	I2C3_SCL	CAN_TxD	CAN_RxD	I2S3_SD	I2S3_SDIN	I2S3_WS	I2S3_CK	I2S4_SD	I2S4_SDIN	I2S4_WS	I2S4_CK				

)XQF a

Package	Port Group	Bits																Pin Count	
		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		Total
LQFP100	PortA	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	16	83
VFBGA100	PortB	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	16	
	PortC	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	16	
	PortD	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	16	
	PortE	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	16	
	PortH	-	-	-	-	-	-	-	-	-	-	-	-	-	o	o	o	3	
LQFP64	PortA	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	16	52
	PortB	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	16	
	PortC	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	16	
	PortD	-	-	-	-	-	-	-	-	-	-	-	-	-	o	-	-	1	
	PortH	-	-	-	-	-	-	-	-	-	-	-	-	-	o	o	o	3	
QFN60	PortA	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	16	50
	PortB	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	16	
	PortC	o	o	o	o	o	o	o	o	o	-	o	o	-	o	o	o	14	
	PortE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	o	1	
	PortH	-	-	-	-	-	-	-	-	-	-	-	-	-	o	o	o	3	
LQFP48	PortA	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	16	38
QFN48	PortB	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	16	
	PortC	o	o	o	-	-	-	-	-	-	-	-	-	-	-	-	-	3	
	PortH	-	-	-	-	-	-	-	-	-	-	-	-	-	o	o	o	3	
		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		

	Port				5V	
PortA	PA0~PA10 PA13~PA15			, ,	*	
	PA11 PA12			, ,		
PortB	PB0~PB10, PB12~PB15			, ,	*	
	PB11		-	-		
PortC	PC0~PC15			, ,	*	
PortD	PD0~PD15			, ,		

2.3

		I/O	
Power	VCC	I	
	VSS	I	
	VCAP_1~2	IO	
	AVCC	I	
	AVSS	I	
	VREFH		

		I/O	
	I2Sx_EXCK	I	
	I2Sx_MCK	O	
CAN	CAN_TxD	O	
	CAN_RxD	I	
SDIOx	SDIOx_Dy (y=0~7)	IO	SD
	SDIOx_CK	O	SD
	SDIOx_CMD	IO	SD
	SDIOx_CD	I	

2.4

VCC	1.8V~3.6V VSS
VSS	0V
VCAP_1~2	VSS
AVCC	VCC VCC
AVSS/VREFL	/ AVSS VSS
VREFH	ADC1 ADC2 AVCC ADC AVCC
PB11/MD	NRST . VCC
NRST	VCC
Pxy, x=A~E,H, y=0~15	, 5V VREFH/AVCC VCC /VSS

3 ECs

3.1

9 6 6

3.1.1

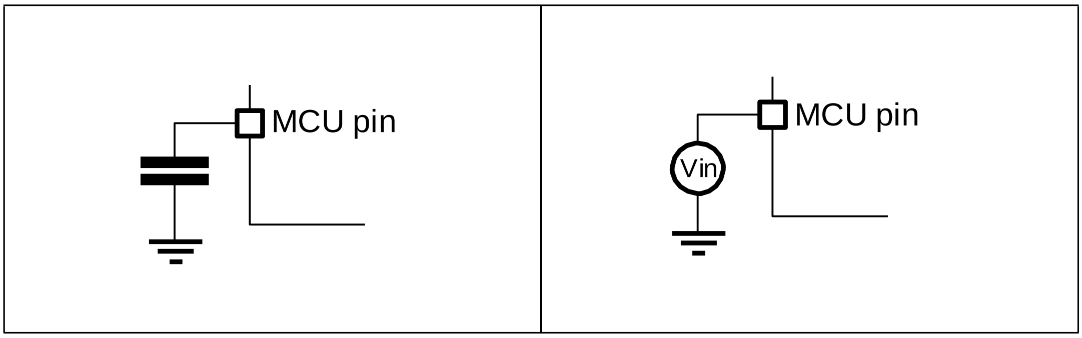
3.1.2

7$ ƒ &9 & & 9

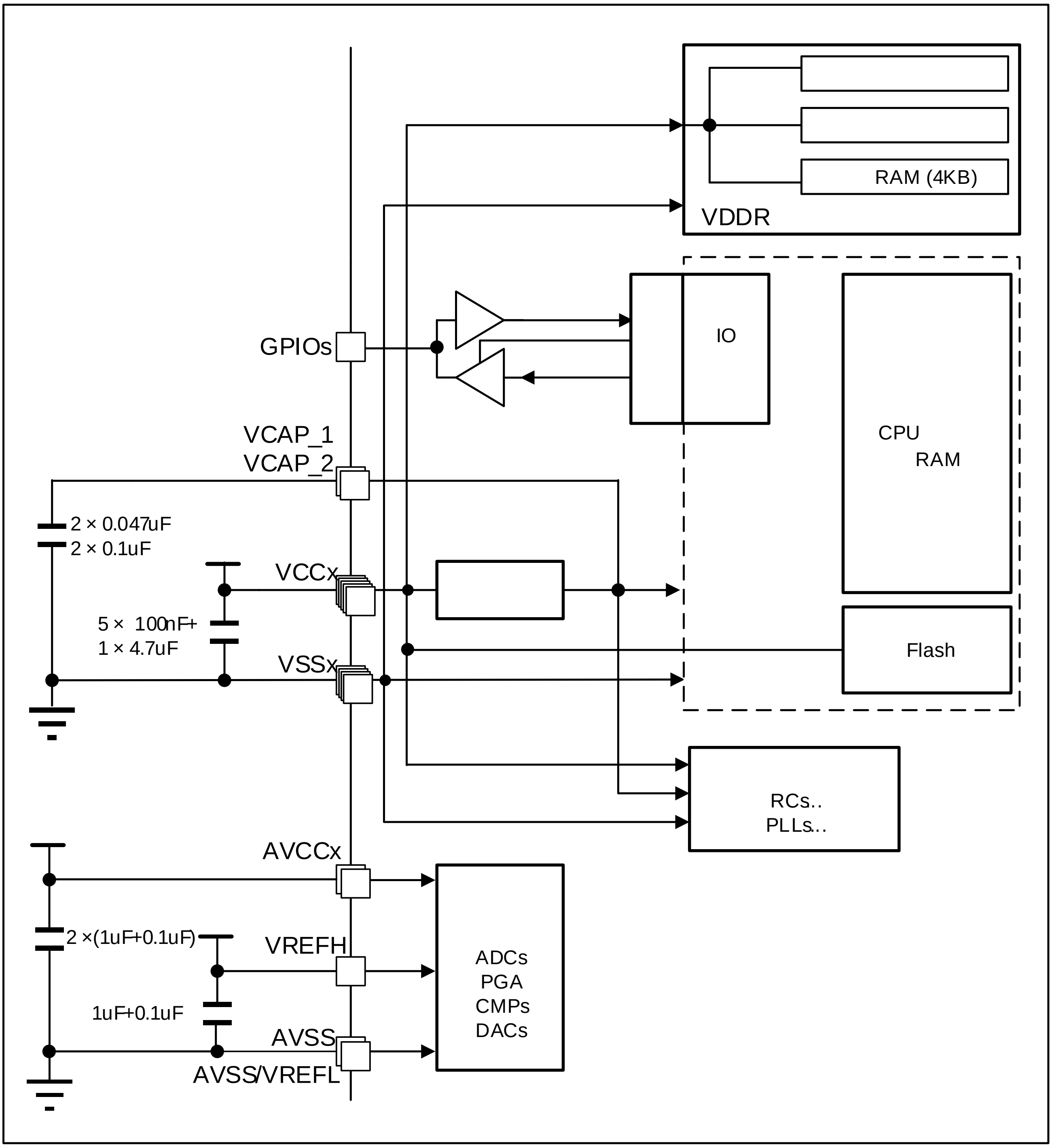
3.1.3

3.1.4

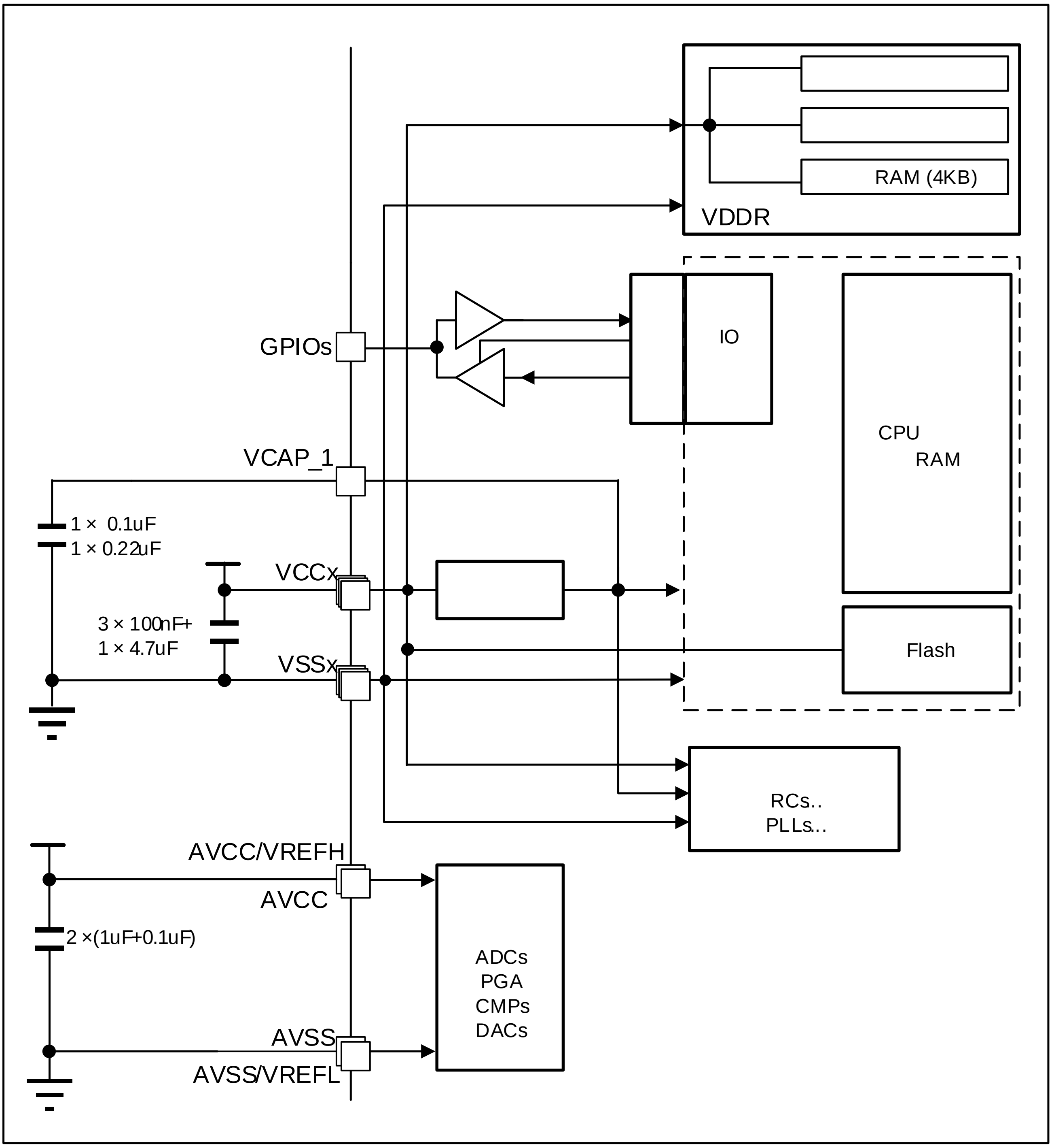
3.1.5



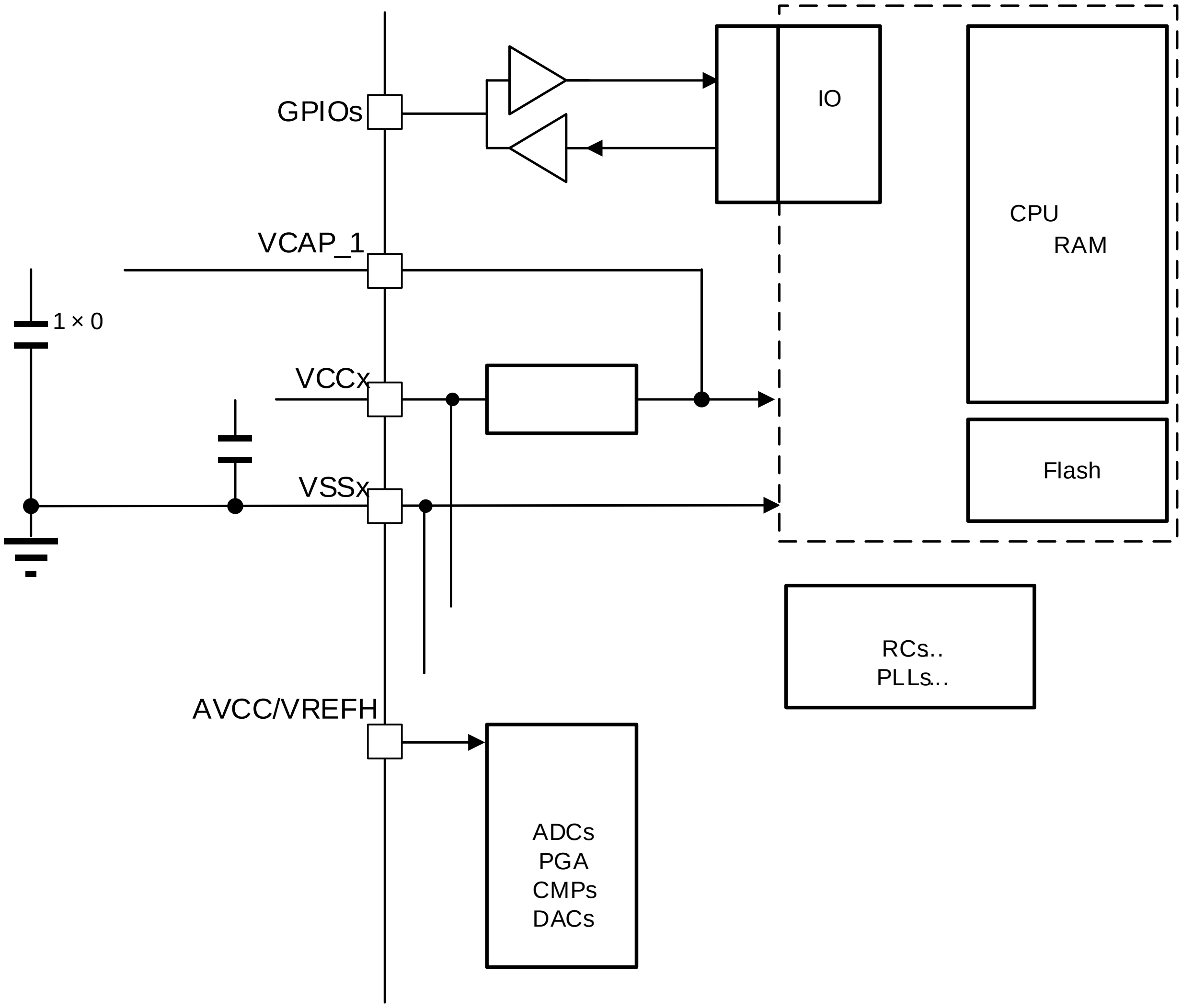
3.1.6


RAM (4KB)
VDDR
IO
CPU
RAM
GPIOs
VCAP_1
VCAP_2
2 × 0.047uF
2 × 0.1uF
VCCx
5 × 100nF+
1 × 4.7uF
VSSx
Flash
RCs..
PLLs..
AVCCx
2 ×(1uF+0.1uF)
VREFH
1uF+0.1uF
AVSS
AVSS/VREFL
ADCs
PGA
CMPs
DACs

+ &) 3 (7/%4) 3 , + &) 3 (+ 9) % * $


RAM (4KB)
VDDR
IO
GPIOs
CPU
RAM
VCAP_1
1 × 0.1uF
1 × 0.22uF
VCCx
3 × 100nF+
1 × 4.7uF
VSSx
Flash
RCs..
PLLs..
AVCC/VREFH
AVCC
2 ×(1uF+0.1uF)
ADCs
PGA
CMPs
DACs
AVSS
AVSS/VREFL

+ &) . (7 $ 4) 3



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3 & %

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X) X) X) X)

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9&$3B 9&$3B 9&$3B 9&$3B

9&$3B 9&$3B

(0&

9&$3B 9&$3B 3:&B3:5& 3'76

9&$3B 9&$3B X) X)

3:&B3:5& 3'76 9&$3B 9&$3B X) X)

3:&B3:5& 3'76

5. 9&$3B 9&$3B 9&$3B

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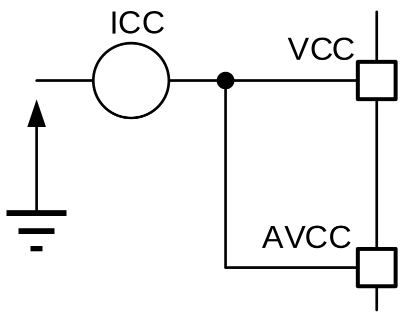
&(;7		—) —) X)
(65	(65	Ÿ

9&$3B 9&$3B

3.1.7



3.2

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9, 1	9	96 6±	9& & 9	
	3$ 86%)6B'3 0$ 86%)6B'3	96 6±		
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Σ ,96 6	96 6		
,9& &	9& &		
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1. 9& & $9& & 96 6 $96 6

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7$_{-}$			ƒ &

3.3

3.3.1

3.3.2

7 $

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	9 & &			

3.3.3

9%25	%25		,&*　%25B/(9>				9
			,&*　%25B/(9　>				9

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			39' /9/> @				9
			39' /9/> @				9
			39' /9/> @				9
			39' /9/> @				9
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			39' /9/> @				9
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			39' /9/> @				9
			39' /9/> @				9
			39' /9/> @				9

7567%2	%25					V
756732						V

1.

2. 39' /9'/> @ PVD2EXINP

3. 39' 9&& 39' /9/> @ 39'

39'(;,13 39' /9'> @ 39' 9&&

4. 39' 9&& 9&&

9&& 39' 9SYG 9SYGK\VW

9&& 39' 9SYG 9SYGK\VW

3.3.4

, 2

, 2

) / $ 6 +

1) , 2 9 & & 9 6 6
2) l+ & / . 0 +]
   l+ & / . 0 +] 0 +] 0 +] l+ & / . 0 +] 0 +]
3) , & & B 5 8 1 , & & B 6 / ((3 , & & B 6 7 3
   , & & B 3 ' ' K U \ V W R Q H , & & B ' + 5 < 6 7 2 1 (
4) 2 1 2))
5) l+ & / . 0 +] l+ & / . 0 +] 0 +] 3 / /

	3DUDPH	6\PERO		7D ƒ&	0LQ	7\S	0D[	8QL
	l+&/. 0+]	,&&B581	ZKLOH 2))					P$
			ZKLOH 21					P$
		,&&B'+5<672	&$&+(2))					P$
			&$&+(21					P$
		,&&B6/((3	2))					P$
			21					P$
		,&&B581	ZKLOH 2))					P$
			ZKLOH 21					P$
		,&&B'+5<672	&$&+(2))					P$
			&$&+(21					P$
		,&&B6/((3	2))					P$
			21					P$
		,&&B581	ZKLOH 2))					P$
			ZKLOH 21					P$
		,&&B'+5<672	&$&+(2))					P$
			&$&+(21					P$
		,&&B6/((3	2))					P$
			21					P$
		,&&B581	ZKLOH 2))					P$
			ZKLOH 21					P$
		,&&B'+5<672	&$&+(2))					P$
			&$&+(21					P$
		,&&B6/((3	2))					P$
			21					P$

1. 7\S 9&& 9
2. 0D[9&& a 9

	3DUPDHW	6\PERO		7D ƒ&	0LQ	7\S	0D[	8QL
	I+&/. 0+]	,&&B581	ZKLOH 2))					P$
			ZKLOH 21					P$
		,&&B'+5<672	&$&+(2))					P$
			&$&+(21					P$
		,&&B6/((3	2))					P$
			21					P$
		,&&B581	ZKLOH 2))					P$
			ZKLOH 21					P$
		,&&B'+5<672	&$&+(2))					P$
			&$&+(21					P$
		,&&B6/((3	2))					P$
			21					P$
		,&&B581	ZKOLH 2))					P$
			ZKLOH 21					P$
		,&&B'+5<672	&$&+(2))					P$
			&$&+(21					P$
		,&&B6/((3	2))					P$
			21					P$
		,&&B581	ZKLOH 2))					P$
			ZKLOH 21					P$
		,&&B'+5<672	&$&+(2))					P$
			&$&+(21					P$
		,&&B6/((3	2))					P$
			21					P$

1. 7\S 9&& 9
2. 0D[9&& a 9

	3DUDPH	6\PERO		7D ƒ&	0LQ	7\S	0D[	8QL
	I+&/. 0+]	,&&B581	ZKLOH 2))					P$
			ZKLOH 21					P$
		,&&B'+5<672	&$&+(2))					P$
			&$&+(21					P$
		,&&B6/((3	2))					P$
			21					P$
		,&&B581	ZKLOH 2))					P$
			ZKLOH 21					P$
		,&&B'+5<672	&$&+(2))					P$
			&$&+(21					P$
		,&&B6/((3	2))					P$
			21					P$
		,&&B581	ZKLOH 2))					P$
			ZKLOH 21					P$
		,&&B'+5<672	&$&+(2))					P$
			&$&+(21					P$
		,&&B6/((3	2))					P$
			21					P$
		,&&B581	ZKLOH 2))					P$
			ZKLOH 21					P$
		,&&B'+5<672	&$&+(2))					P$
			&$&+(21					P$
		,&&B6/((3	2))					P$
			21					P$

1. 7\S 9&& 9
2. 0D[9&& a 9

	3DUDPH	6\PERO		7D ƒ&	0LQ	7\S	0D[	8QL
	I+&/. 0+]	,&&B581	ZKLOH 2))					P$
			ZKLOH 21					P$
		,&&B'+5<672	&$&+(2))					P$
		,&&B6/((3	2))					P$
			21					P$
		,&&B581	ZKLOH 2))					P$
			ZKLOH 21					P$
		,&&B'+5<672	&$&+(2))					P$
		,&&B6/((3	2))					P$
			21					P$
		,&&B581	ZKLOH 2))					P$
			ZKLOH 21					P$
		,&&B'+5<672	&$&+(2))					P$
		,&&B6/((3	2))					P$
			21					P$
		,&&B581	ZKLOH 2))					P$
			ZKLOH 21					P$
		,&&B'+5<672	&$&+(2))					P$
		,&&B6/((3	2))					P$
			21					P$

1. 7\S 9&& 9
2. 0D[9&& a 9

	3DUDPH	6\PERO		7D ƒ&	0LQ	7\S	0D[	8QL
	I+&/. 0+]	,&&B581	ZKLOH 2))					P$
			ZKLOH 21					P$
		,&&B'+5<6721	&$&+(2))					P$
		,&&B6/((3	2))					P$
			21					P$
		,&&B581	ZKLOH 2))					P$
			ZKLOH 21					P$
		,&&B'+5<6721	&$&+(2))					P$
		,&&B6/((3	2))					P$
			21					P$
		,&&B581	ZKLOH 2))					P$
			ZKLOH 21					P$
		,&&B'+5<6721	&$&+(2))					P$
		,&&B6/((3	2))					P$
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		,&&B581	ZKLOH 2))					P$
			ZKLOH 21					P$
		,&&B'+5<6721	&$&+(2))					P$
		,&&B6/((3	2))					P$
			21					P$

1. 7\S 9&& 9
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	3DUDPH	6\PER	9&& 9	7D ƒ&				8QL
					0LQ	7\S	0D[	

,&&B67 3:&B3:5& 673'$6

	3DUDPH	6\PER	9&& 9	7D ƒ&	0LQ	7\S	0D[	8QL
								X$
			> @					X$
			;7$/ 57&					X$
			/5& 57&					X$

1. 7\S 9&& 9
2. 0D[9&& a 9
3.

,WH	3DUDPH	6\PERO	9&& $9&& 9	7D ƒ&	0LQ	7\S	0D[	8QL
		,&&B02'8/	;7$/ 0+]					P$
			0+]					P$
			0+]					P$
			0+]					P$

3.3.5

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3.3.5.1   (6 '

- (6 '

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9(6 ' & ' 0		7$ ƒ & - (6 ' &		

(6 '

3.3.5.2   / D W F K S

/ D W F K S   / D W F K S

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‡   ,   2

(, $ - (6 ' $, &   / X D S W F K

/ 8	/ D W F K S	7$ ƒ & - (6 ' $		P$

/ D W F K S

3.3.6

&38

‡ :)(

‡ :.83 9&& 9

76723		3:&B3:5& 9+5&6' 3:&B3:5& 93//6' 05& 5$0			
76723		05&)ODVK			
73'		9&$3B 9&$3B X) X)			
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		9&$3B 9&$3B X) X)			
73'		9&$3B 9&$3B X) X)			
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1. 9&$3B 9&$3B 3:&B3:5& 3'76
   9&$3B 9&$3B X) X)
   3:&B3:5& 3'76 9&$3B 9&$3B X) X)
   3:&B3:5& 3'76

3.3.7 , 2

9, /			'9&&"			9&&	9
9, +			'9&&"	9&&			9
9+<6			'9&&"				9
,/.*	, 2		966" 9, 1" 9&&			±	X$
			9, 1 9				X$
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		86%)6B'3 86%)6B'0	9, 1 966				.
&, 2	, 2	3$ 86%)6B'0 3$ 86%)6B'3					S)
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	9 2 +			9 & &			
	9 2 /		,, 2 ± P $ '9 & &				
	9 2 +			9 & &			
	9 2 /		,, 2 ± P $ '9 & &"				
	9 2 +			9 & &			9
	9 2 /		,, 2 ± P $ '9 & &"				
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	9 2 /		,, 2 ± P $ '9 & &				
	9 2 +			9 & &			
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	9 2 +			9 & &			

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   ,9 & &

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			&/ S) &&9 9				
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	W,2 RXW W,2 RXW		&/ S) &&9 9				QV
			&/ S) &&9 9				
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			&/ S) &&9 9				
	lPD[,2 RX		&/ S) &&9 9				0+]
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			&/ S) &&9 9				
			&/ S) &&9 9				
	W,2 RXW W,2 RXW		&/ S) &&9 9				QV
			&/ S) &&9 9				
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			&/ S) &&9 9				
	lPD[,2 RX		&/ S) &&9 9				0+]
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2. &/ 3&% 0&8

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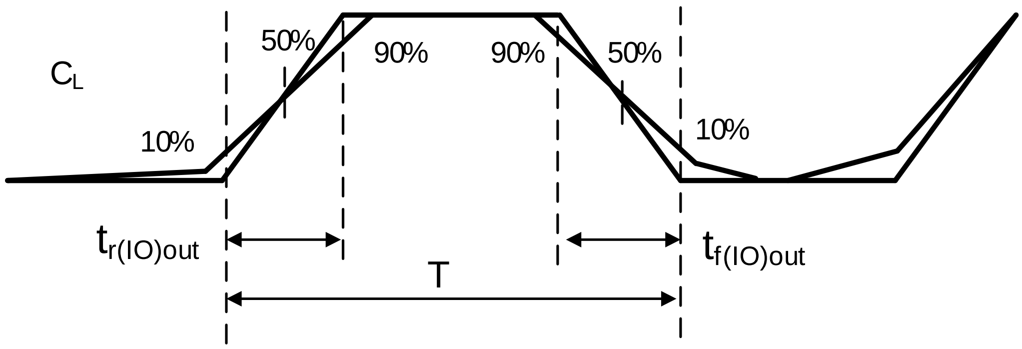
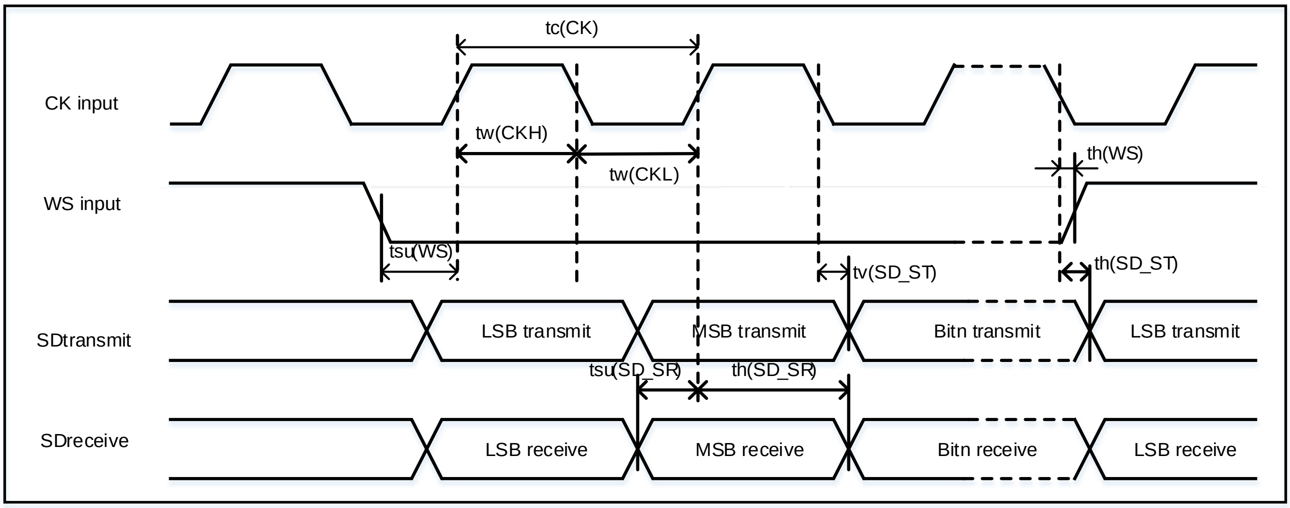


$(t_r + t_f)$ (2/3)T Duty cycle= 50%±5% C_L
/

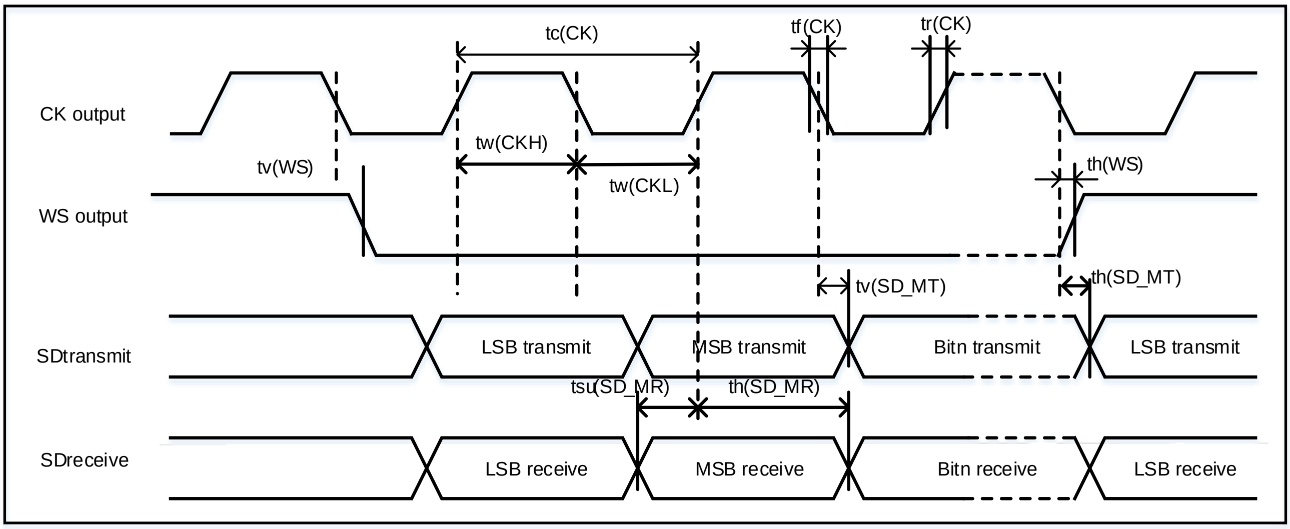
, 2

3.3.8 8 6 $ 5 7

t_{cyc}		UART	4	-	t_{PCLK1}
		CSI	6	-	
t_{CKw}			0.4	0.6	t_{Scyc}
t_{CKr}			-	5	ns
t_{CKf}			-	5	ns
t_{TD}		CSI	-	28	ns
t_{RDS}		CSI	15	-	ns
t_{RDH}		CSI	5	-	ns



, 6 3KLOLSV



, 6 3KLOLSV

3.3.10 , &

		60		)0		
		0LQ	0D[	0LQ	0D[	
l6&/	6&/					.+]
W+'67$	+RO					XV
W/2:	6&/					XV
W,*+	6&/					XV
W68 67$	6HWXS					XV
W+'$7	+ROG					XV
W68 '$7	6HWXS	W&		W&		QV
Wr	6&/ 6'$					QV
Wf	6&/ 6'$					QV
W68 672	6HWXS					XV
W%8)	%86					XV
&E						S)

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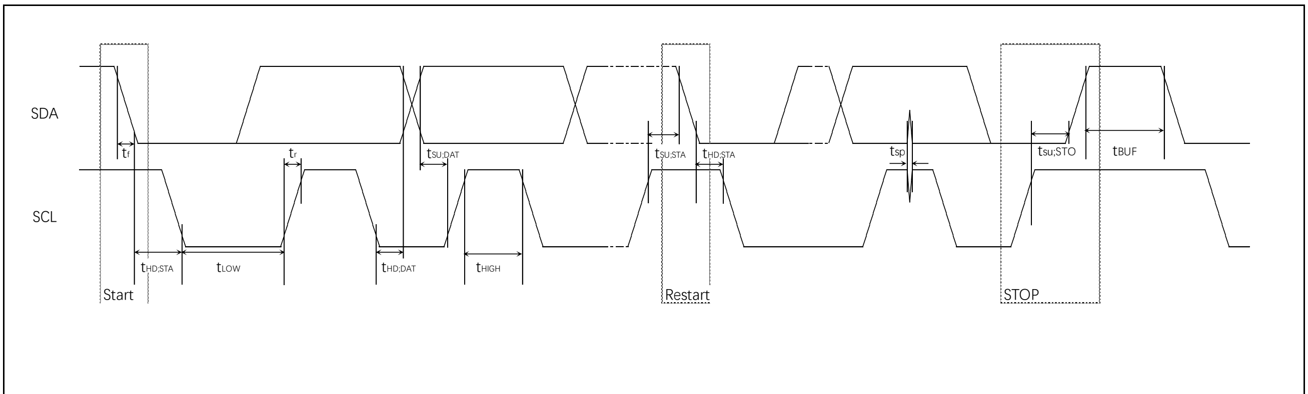

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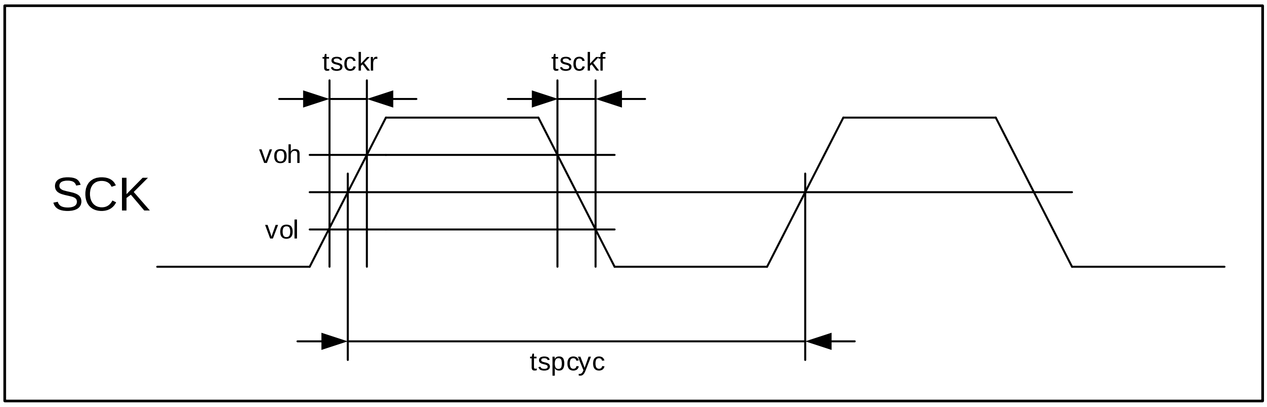
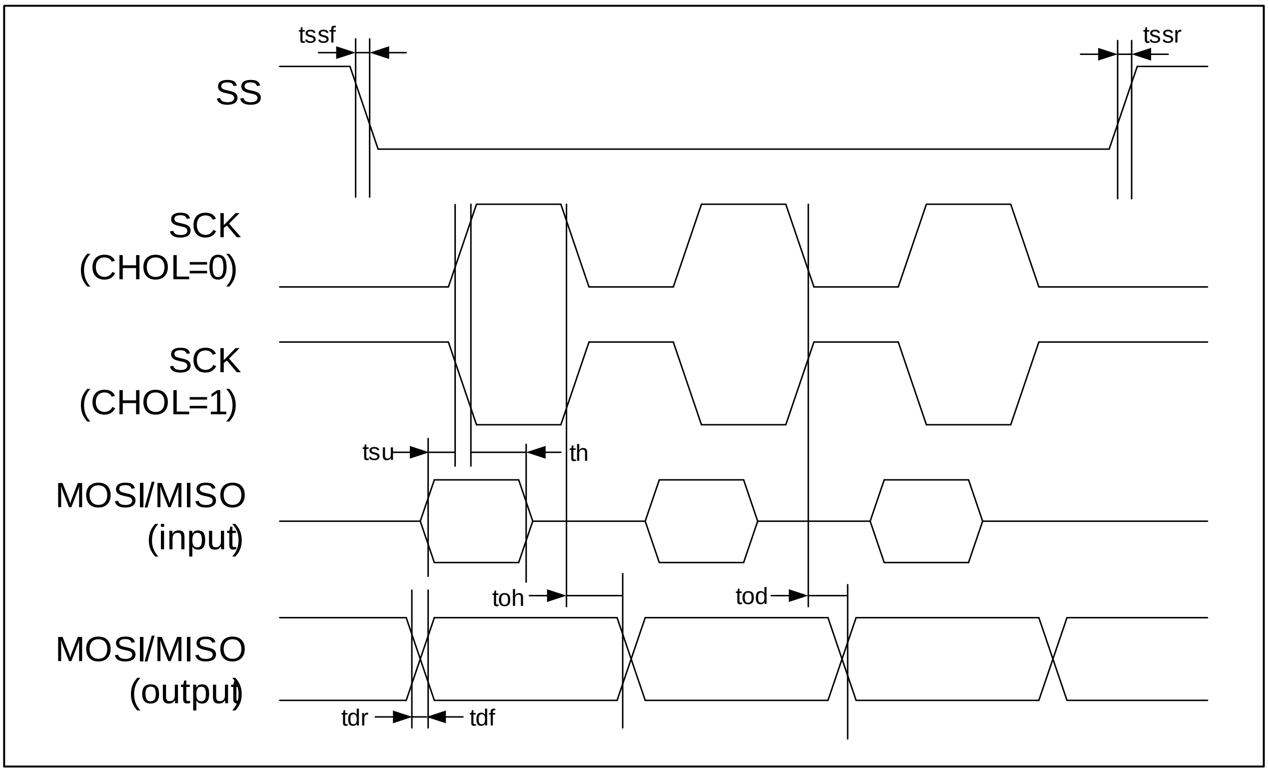
3.3.11 6 3 ,

,WHP			6\PER	0LQ	0D[	8QL\	7HVW FRQ
	6&. FORFN F\F	0DVWH	WVSF\	SFON0+]		WSF	
				SFON0+]			& S)
		6ODYH					
	6&. FORFN UL	0DVWH	WVFNU			QV	
	WLPH	6ODYH	WVFNI			XV	
	'DWD LQSXW V	0DVWH	WVX			QV	
		6ODYH					& S)
	'DWD LQSXW K	0DVWH	WK	WSF\F		QV	
		6ODYH					
	'DWD RXWSXW	0DVWH	WRG			QV	
		6ODYH					
	'DWD RXWSXW	0DVWH	WRK			QV	
		6ODYH					
	026, 0,62 ULVH	0DVWH	WGU			QV	
	IDOO WLPH	6ODYH	WGI			XV	
	66 ULVH DQG	0DVWH	WVVU			QV	
		6ODYH	WVVI			XV	

6 3 ,



6&. &ORFN


tssf
tssr
SS
SCK
(CHOL=0)
SCK
(CHOL=1)
tsu
th
MOSI/MISO
(input)
toh
tod
MOSI/MISO
(output)
tdr
tdf

6 3 ,

3.3.12 &$1 %

&$1[B7; &$1[B5; , 2

3.3.13 86%

6\PERO		3DUDPHV	&RQGLWLRQ	0LQ	7\S	0D[	8QL
	9&&						9
	9,/						9
	9,+						9
	9',						9
	9&0						9
	92/		5/ NWR 9				9
	92+		5/ N WR 966				9
	9&56	&URVVRYHU	&/ S)				9
	W6		&/ S) a RI 2+ 92/ _				QV
	W)		&/ S) a RI 2+ 92/ _				QV
	W6)0$	W6)W	&/ S)				
53'			9,1 9&& LQ KRVW PI				N
538			9,1 966 LGOH VWDW				N
			9,1 966 LQ GHYLFH PRGH				N

86%)XOO6SHHG

1.

2. 9 86% 86%

9 9&&

3.

4. 5/ 86%

6\PERO		3DUDPHW	&RQGLWLRQ	0LQ	7\S	0D[	8QLW
	9&&						9
	9,/						9
	9,+						9
	9',						9
	9&0						9
	92/		5/ NWR 9				9
	92+		5/ N WR 966				9
	9&56	&URVVRYHU	&/ S)a S)				9
	W6		&/ S)a S) a RI 2+ **9**2/ _				QV
	W)		&/ S)a S) a RI 2+ **9**2/ _				QV
	W60$	W6)W	&/ S)a S)				
53'			9,1 9&& LQ KRVW P				N

86% /RZ6SHHG

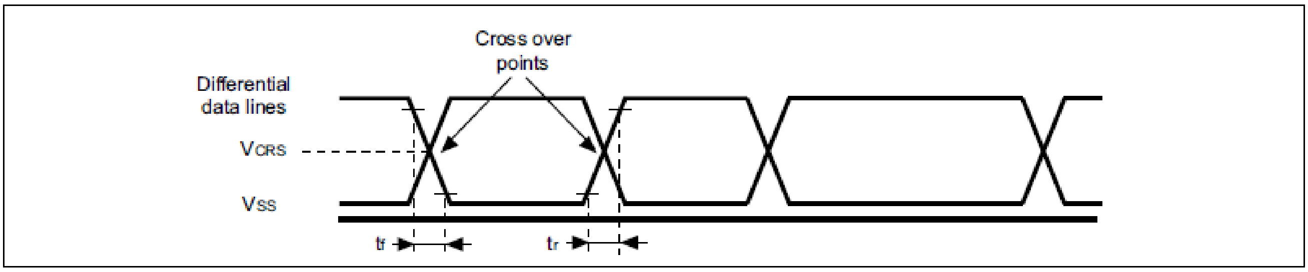
1.

2. 9 86% 86%

9 9&&

3.

4. 5/ 86%



86% &URVV 2YHU

3.3.14 3//

			0LQ	7\S	0D[	8QL
$f_{3//B,1}$	3//3)' 3KDVH)UH 'HWHFWRU LQSXW FO					0+]
$f_{3//B287}$	3// PXOWLSOLH FORFN					0+]
$f_{9\&2B287}$	3// 9&2 RXWSXW					0+]
-LWWHU$_{3//}$	3HULRG -LWWH	3// 3)' LQSXW FORF 6\VWHP FORFN 3HDNWRSHDN		±		SV
	&\FOH WR\FOH -LW	3// 3)' LQSXW FORF 6\VWHP FORFN 0+] 3HDNWRSHDN		±		
$t_{/2\&.}$	3// ORFN WLPH					—V

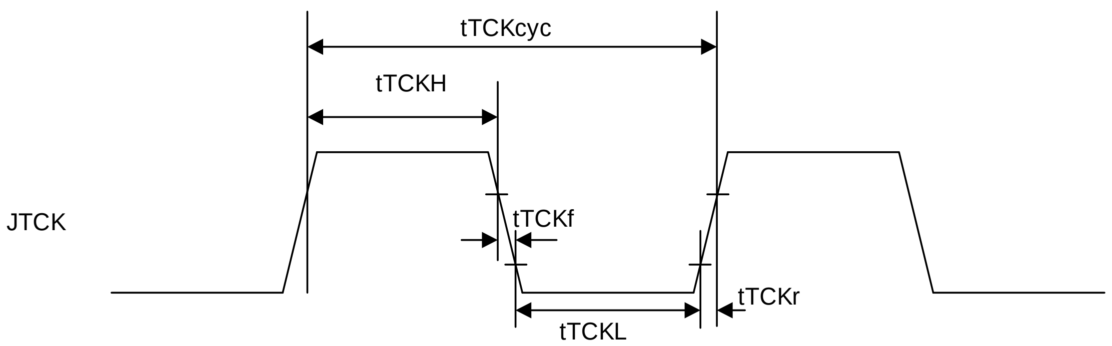
3//

1. -LWWHU

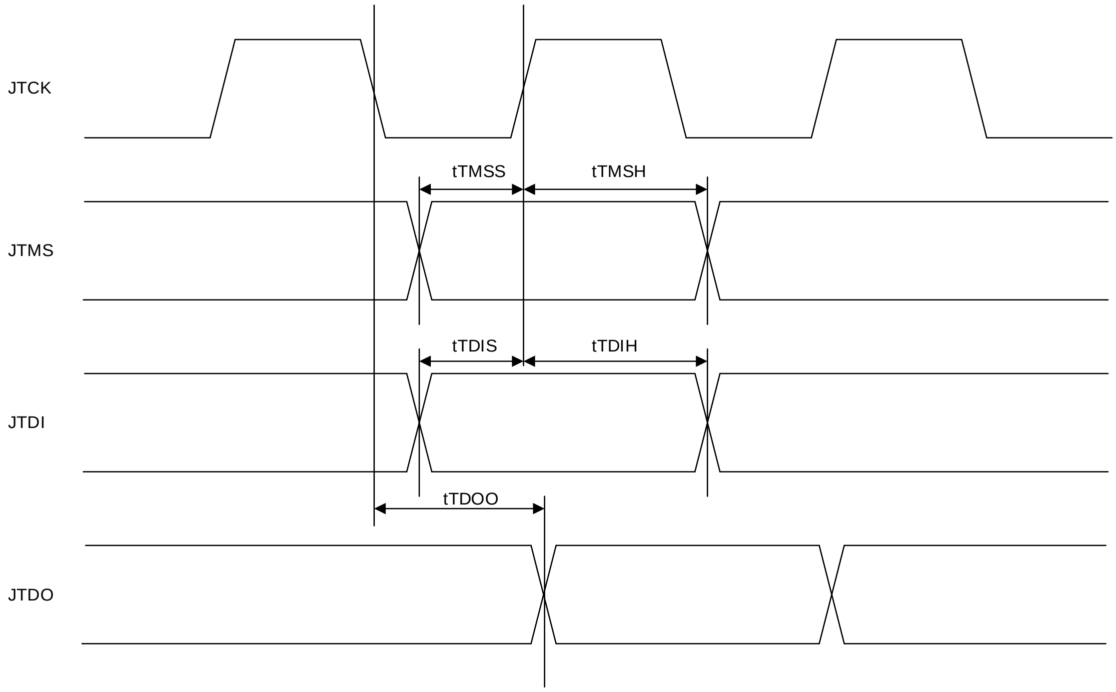
3.3.15 -7$*

6\QERO	,WHP	0LQ	7\S	0D[	8QLW
W7&.F\F	-7&. FORFN F\FOH WLP				QV
W7&.+	-7&. FORFN KLJK SXOVH Z				QV
W7&./	-7&. FORFN ORZ SXOV				QV
W7&.U	-7&. FORFN ULVH WLP				QV
W7&.I	-7&. FORFN IDOO WLP				QV
W706V	-706 VHWXS WLPH				QV
W706K	-706 KROG WLPH				QV
W7',V	-7', VHWXS WLPH				QV
W7',K	-7', KROG WLPH				QV
W7'2G	-7'2 GDWD GHOD\ WLP				QV

-7$*



-7$*-7&.



-7$*

3.3.16

3.3.16.1

;7$/ , 2 , 2

I;7$/B(;7						0+]
9,+B;7$/	;7$/B,1		9&&		9&&	9
9,/B;7$/	;7$/B,1		966		9&&	
W;7$/ W;7$/	;7$/B,1					QV
'XW);7$/						

3.3.16.2

; 7 $ / 0 +]

I; 7 $ / B , 1						0 +]
5)						NŸ
$; 7 $ /	; 7 $ /精度					S S I
* P P D [	振荡器 * P					P $
W6 8 ; 7 $ /		9 & & 0 +]				P V
		9 & & 0 +]				

3.3.16.3

N +]

			0 L Q	7 \ S	0 D [	
) ; 7 $ /						N+]
5)						0
, ' ' B ; 7 $ /		; 7 $ / ' 5 9 > @				— $
$; 7 $ /	; 7 $ /					S S F
* P P D [	* P					X $ 9
7 6 8 ; 7 $ /		9 & &				V

; 7 $ /

1.

2.

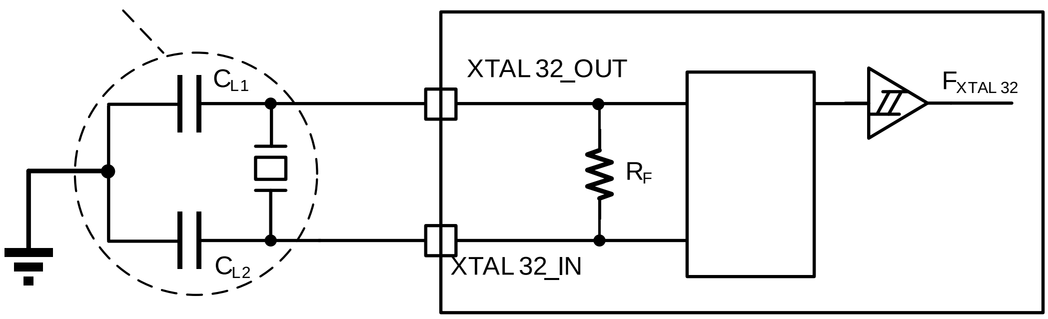
3. 7 6 8 ; 7 $ / ; 7 $ / N +]

&/ &/ &/ &/

&/ &/ & & V & V 3 & % 0 & 8 ; 7 $ / B , 1

; 7 $ / B 2 8 7 V W H D S D F L W D Q F H &/ &/ S)

; 7 $ / ' 5 9 > @ X $



N+]

3.3.17

3.3.17.1 + 5 &

I+ 5 &						0 +]
		7$ •				
		7$ •				
		7$ •				
Ww + 5 &	+ 5 &					— V

+ 5 &

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3.3.17.2 0 5 &

I0 5 &					0 +]
Ww 0 5 &	0 5 &				— V

0 5 &

1.

3.3.17.3 / 5 &

I/ 5 &					N+]
WW / 5 &	/ 5 &				— V

/ 5 &

1.

3.3.17.4 6 : ' 7 6 : ' 7 / 5 &

I6 : ' 7 / 5 &					N+]
W V W 6 : ' 7 / 5 &	6 : ' 7 / 5 &				— V

6 : ' 7 / 5 &

1.

3.3.18 $'&

9$9&&						9
95()+					9$9&&	9
I$'&	$'&	9$9&& a 9				0+]
		9$9&& a 9				
9$,1			9$966		95()+	9
5$,1						NŸ
5$'&						NŸ
&$'&						S)
W		I$'& 0+]				—V

$'&

W6		I$'& 0+]				—V
						$I&
W&219		I$'& 0+]				—V
		I$'& 0+]				—V
		I$'& 0+]				—V
		W6 Q				I$'&
		$'&				

I6 0VS\
I$'& 0+]
$'&

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(2			“	“	/6%
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$'& B,1 a $'& B,1 a,1 # I$'& 0+]

(7		I$'& 0+] N 9$9&& a 9	“	“	/6%
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$'& B,1 a $'& B,1 a # I$'& 0+]

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$'& B,1 a $'& B,1 a # I$'& 0+]

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(7		I$'& 0+] N 9$9&& a 9	“	“	/6%
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('			“	“	/6%
(/			“	“	/6%

$'& B,1 a $'& B,1 a # I$'& 0+]

(7		I$'& 0+] N 9$9&& a 9	“	“	/6%
(2			“	“	/6%
(*			“	“	/6%
('			“	“	/6%
(/			“	“	/6%

$'& B,1 a $'& B,1 a # I$'& 0+]

(12%		I$'& 0+] N+] N 9$9&& a 9			%LV
6,1$'					G%
615					G%
7+'					G%

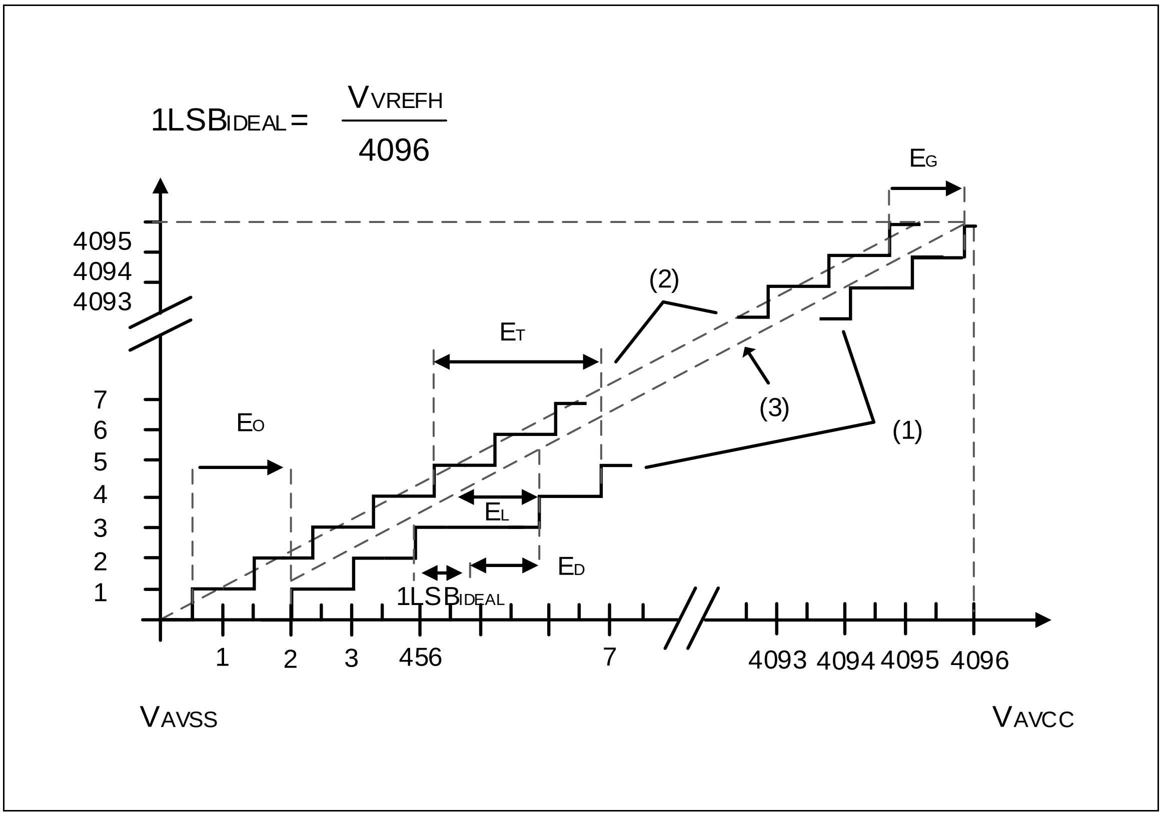
$'& B,1 a $'& B,1 a,1 # I$'& 0+]

(12%					%LV
6,1$'		I$'& 0+] N+]			G%
6 1 5		N			G%
7+'		9$9&& a 9			G%

$'& B,1 a $'& B,1 a,1 # I$'& 0+]

(12%					%LV
6,1$'		I$'& 0+] N+]			G%
6 1 5		N			G%
7+'		9$9&& a 9			G%

$'& B,1a $'& B,1 a,1 # I$'& 0+]



$'&

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5. (7

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2. &SDUDVLWLF3&% 3&% S)&SDUDVLWLF

l$'&

3 & %

9 5 ( ) + $ 9 & & $ 9 & &

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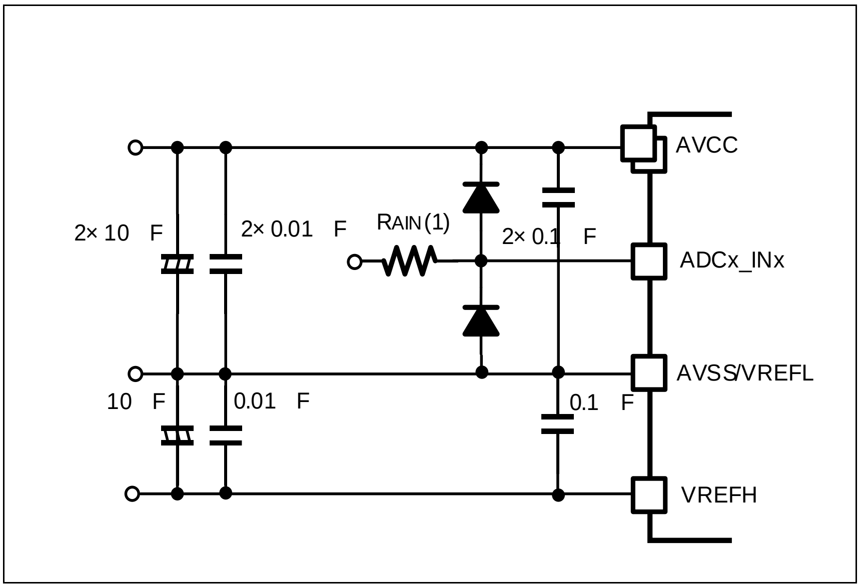

AVCC
2× 10 F
2× 0.01 F
RAIN (1)
2× 0.1 F
ADCx_INx
AVSS/VREFL
10 F
0.01 F
0.1 F
VREFH

3.3.19 ' $ &

9$9 & &						9
' 1 /	/ 6 %				“	/ 6 %
	[9$9 & &				“	/ 6 %
76 (7 7 / , 1 *	' $ ' $ “ / 6 %					— V

' $ &

3.3.20

9$9 & &						9
9,					9$9 & &	9
7F P S		P 9				QV
7V H W						QV

3.3.21

$9_{\$9\&\&}$						9
9_{26}						P9
$9_{,}$			$9_{\$9\&\&}$ *DL		$9_{\$9\&\&}$ *DL	9

*DLQ

3*$966

3*$

*(

WUĐôŽó†xpS H•CC&ï8rfWU9ôŽô' pS H•CC&ï8rfWUvôŽõ 1pS G•CC&ï8rf_Žõ@"pS G•CC"ïSxF3S .iT G 442.õ7.c(5D!sƒc(5D!sƒc #TB 861 5D!sƒc H'##TBq7 1 ‰ 25D' pS G'##TBq7 1 y ÑŠ W ™ ÑŠ W½ÀOqxB7n¿a h #1F) .#yå

			*DLQ				
			*DLQ				
			*DLQ				
			*DLQ				
			*DLQ				
			*DL				
			*				

1

3.3.23

3.3.23.1

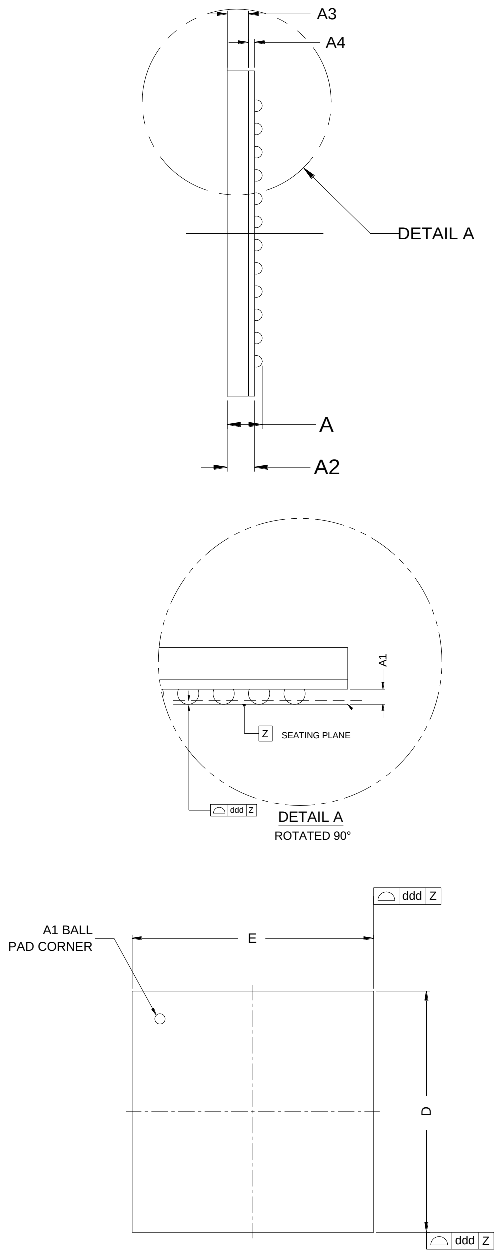
,9&&		9&& 9a 9				P$
		9&& 9a 9				
		9&& 9a 9				
		9&& 9a 9				

7SURJ			7KFON	7KFON	7KFON	—V
			7KFON	7KFON	7KFON	—V
7HUDVH			7KFON	7KFON	7KFON	PV
7PDV			7KFON	7KFON	7KFON	PV

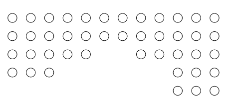
1.
2. 7KFON &38

1HQG		7$ •		NF\F
1HQG		7$ •		NF\F
7UHW		7$ • DIWHU NF\FO		<HD

9) % * $

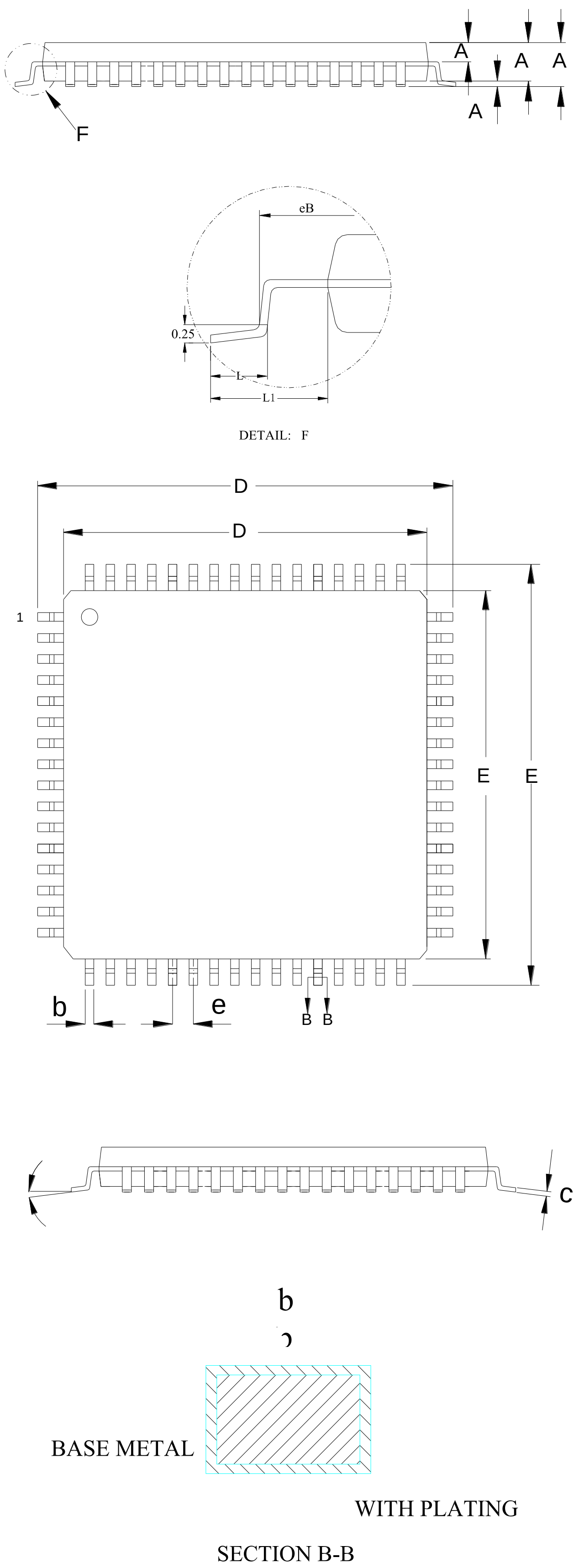


Symbol	7x7 Millimeter		
	Min	Nom	Max
A	0.67	0.74	0.81
A1	0.11	0.16	0.21
A2	0.54	0.58	0.62
A3	0.45REF		
A4	0.13REF		
b	0.20	0.25	0.30
D	6.90	7.00	7.10
D1	--	5.5	--
E	6.90	7.00	7.10
E1	--	5.5	--
e	--	0.5	--
F	0.75REF		
ddd	--	0.10	--
eee	--	0.15	--
fff	--	0.05	--



BOTTOM VIEWA1 BALLPAD CORNEI

/4)3



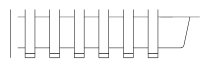
Symbol	10x10 Millimeter		
	Min	Nom	Max
A	--	--	1.60
A1	0.05	--	0.15
A2	1.35	1.40	1.45
A3	0.59	0.64	0.69
b	0.18	--	0.26
b1	0.17	0.20	0.23
c	0.13	--	0.17
c1	0.12	0.13	0.14
D	11.80	12.00	12.20
D1	9.90	10.00	10.10
E	11.80	12.00	12.20
E1	9.90	10.00	10.10
e	0.50BSC		
L	0.45	--	0.75
L1	1.00REF		
	0°	--	7°

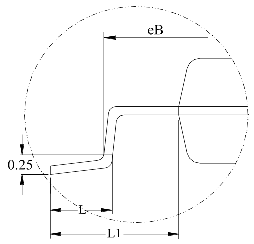
127(

'LPHQVLRQVDQG(GR QRW LQFOX

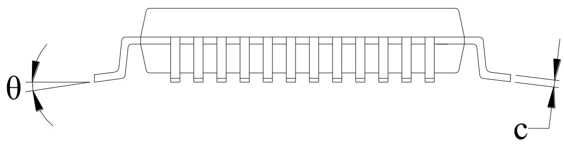
PROG IODVK

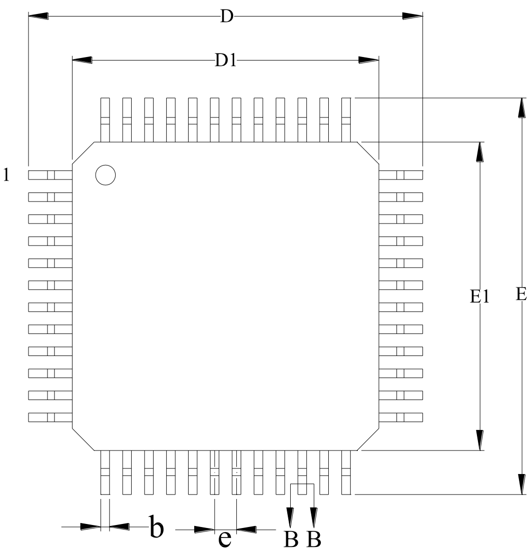
/ 4) 3

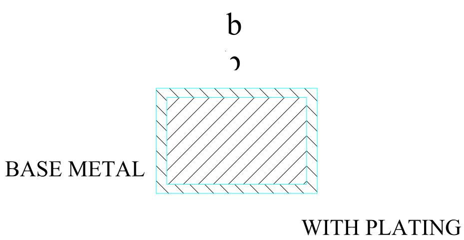




DETAIL: F







SECTION B-B

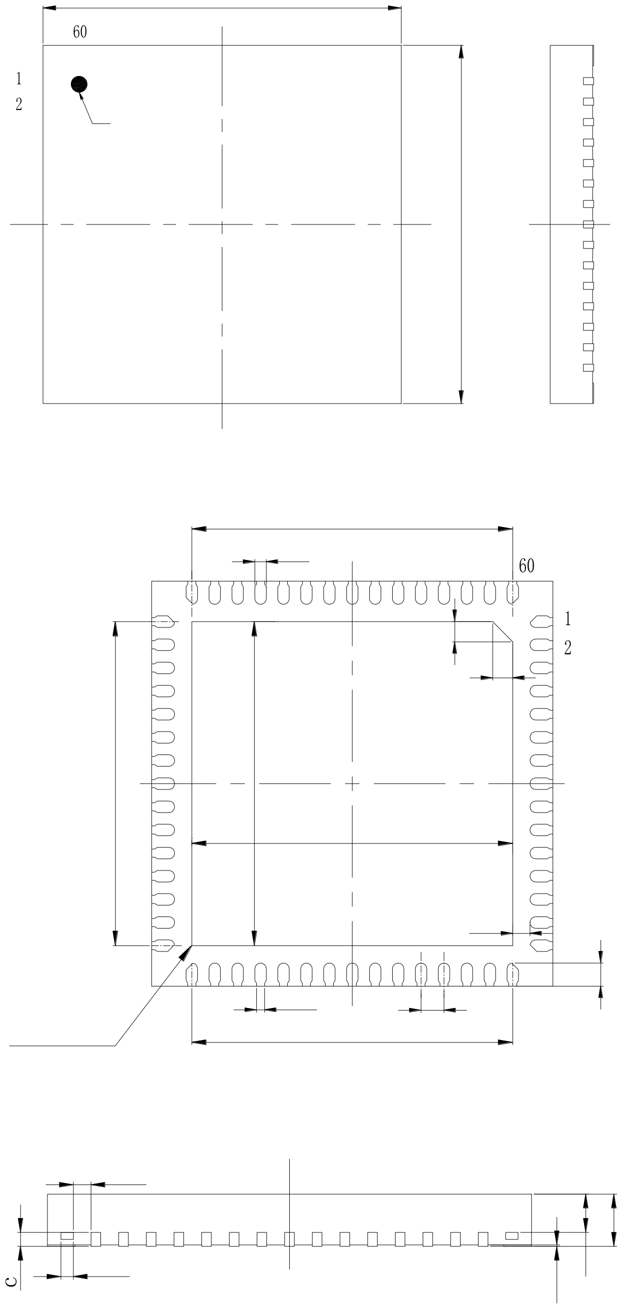
Symbol	7x7 Millimeter		
	Min	Nom	Max
A	--	--	1.60
A1	0.05	--	0.15
A2	1.35	1.40	1.45
A3	0.59	0.64	0.69
b	0.18	--	0.26
b1	0.17	0.20	0.23
c	0.13	--	0.17
c1	0.12	0.13	0.14
D	8.80	9.00	9.20
D1	6.90	7.00	7.10
E	8.80	9.00	9.20
E1	6.90	7.00	7.10
e	0.50BSC		
L	0.40	--	0.65
L1	1.00REF		
	0	--	7°

1 2 7 (

'LPHQVLRQVDQG(GR QRW LQFOX

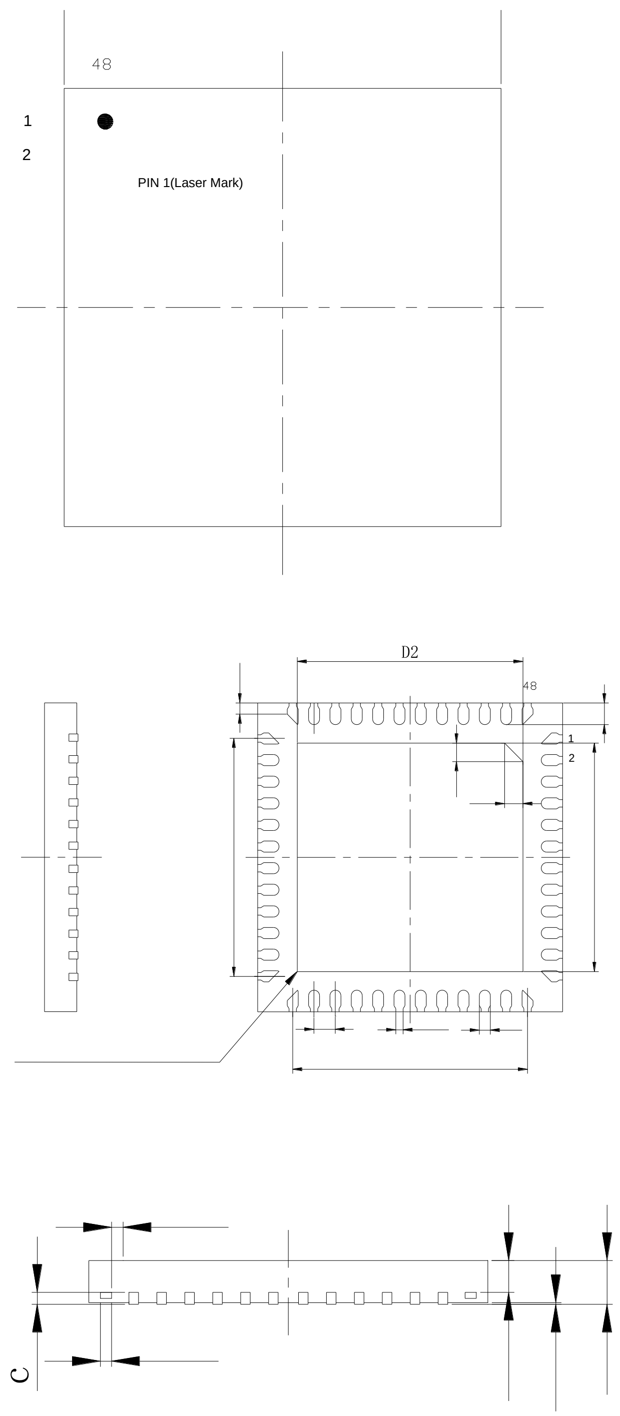
PROG IODVK

4) 1



Symbol	7x7 Millimeter		
	Min	Nom	Max
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
A2	0.547REF		
b	0.15	0.20	0.25
b1	0.14REF		
c	0.20REF		
c1	0.255REF		
c2	0.18REF		
D	6.90	7.00	7.10
D2	5.50	5.60	5.70
Nd	5.60BSC		
e	0.40BSC		
E	6.90	7.00	7.10
E2	5.50	5.60	5.70
Ne	5.60BSC		
L	0.35	0.40	0.45
K	0.25	0.30	0.35
h	0.30	0.35	0.40

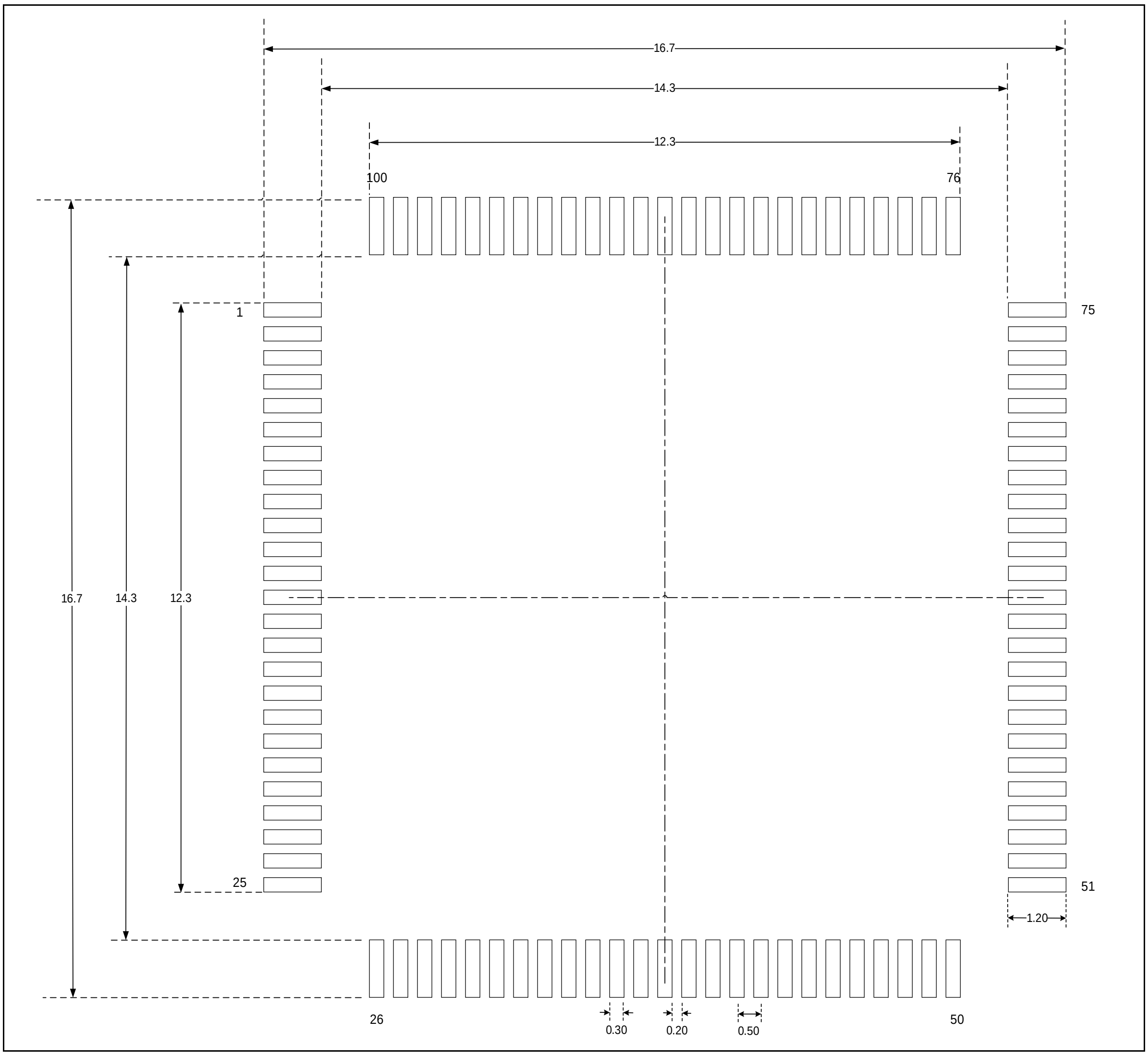
4) 1



Symbol	5x5 Millimeter		
	Min	Nom	Max
A	0.50	0.55	0.60
A1	0.00	0.02	0.05
A2	0.40REF		
b	0.13	0.18	0.23
b1	0.12REF		
c	0.10	0.15	0.20
c1	0.145REF		
c2	0.140REF		
D	4.90	5.00	5.10
D2	3.60	3.70	3.80
e	0.35BSC		
Ne	3.85BSC		
Nd	3.85BSC		
E	4.90	5.00	5.10
E2	3.60	3.70	3.80
L	0.30	0.35	0.40
L1	0.13	0.18	0.23
h	0.25	0.30	0.35
L/F	154 x 154		

4.2

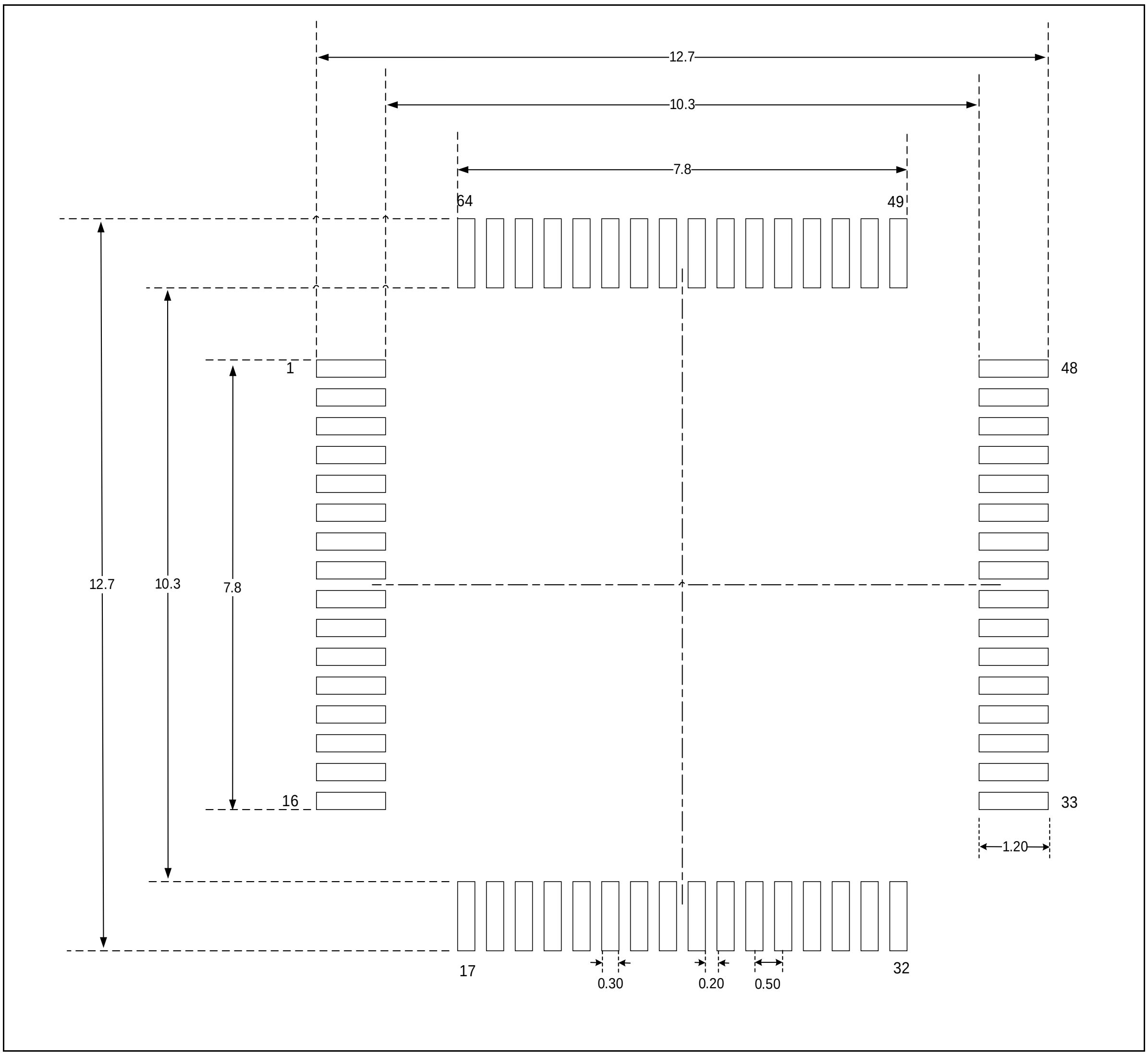
/4)3 PP PP



NOTE:

Dimensions are expressed in millimeters.

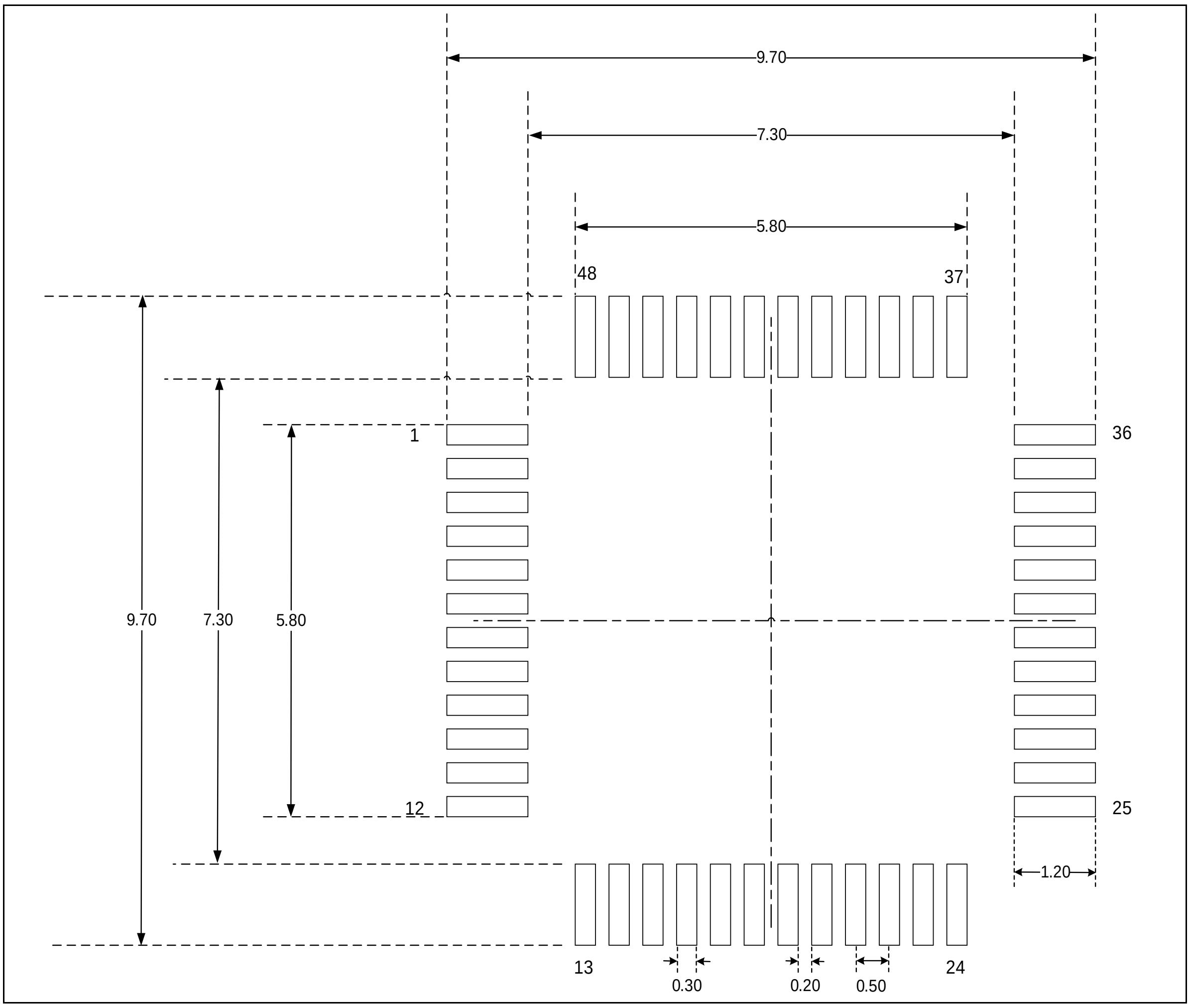
/4)3 PP PP



NOTE:

Dimensions are expressed in millimeters.

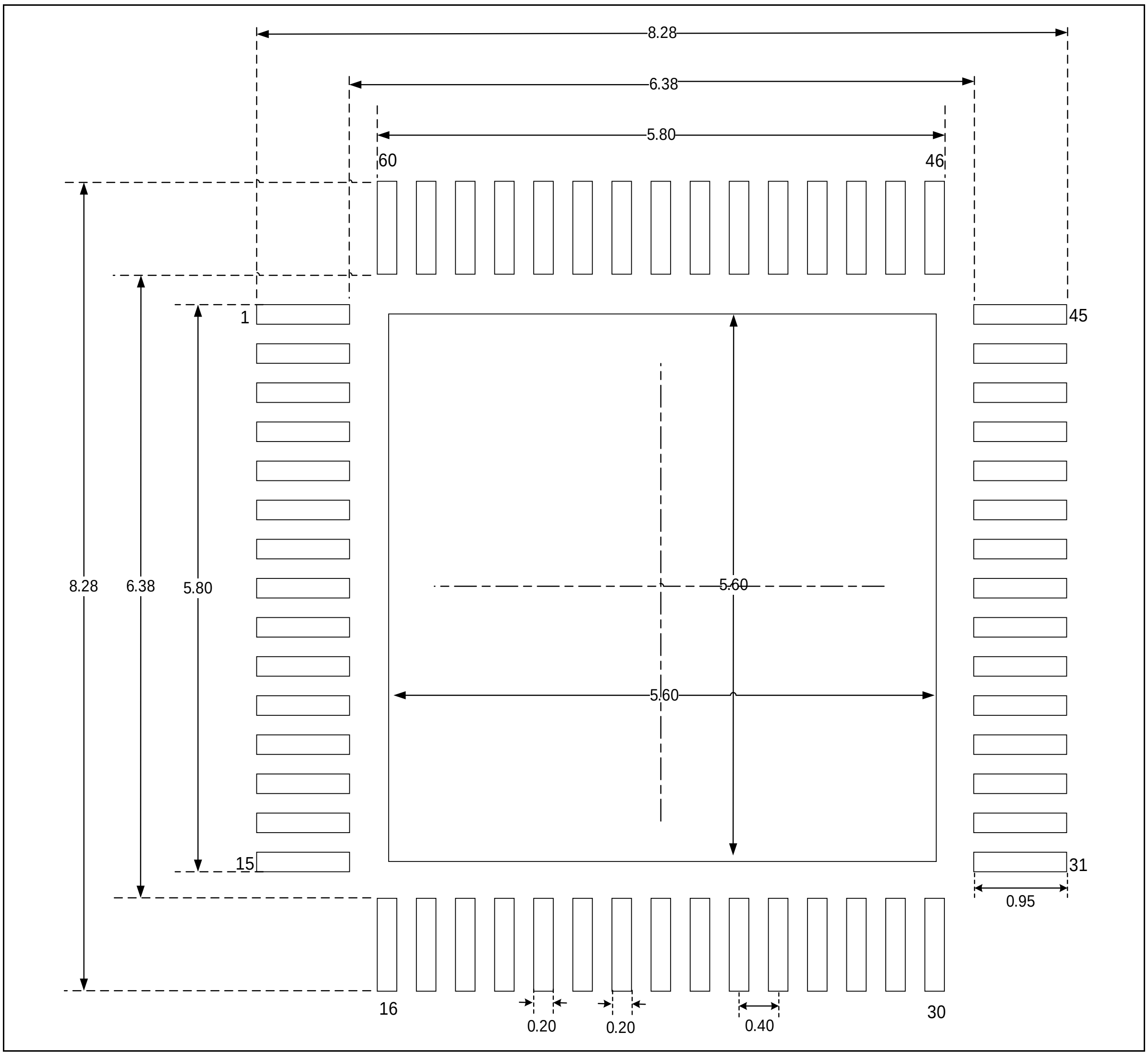
/4)3 PP PP



NOTE:

Dimensions are expressed in millimeters.

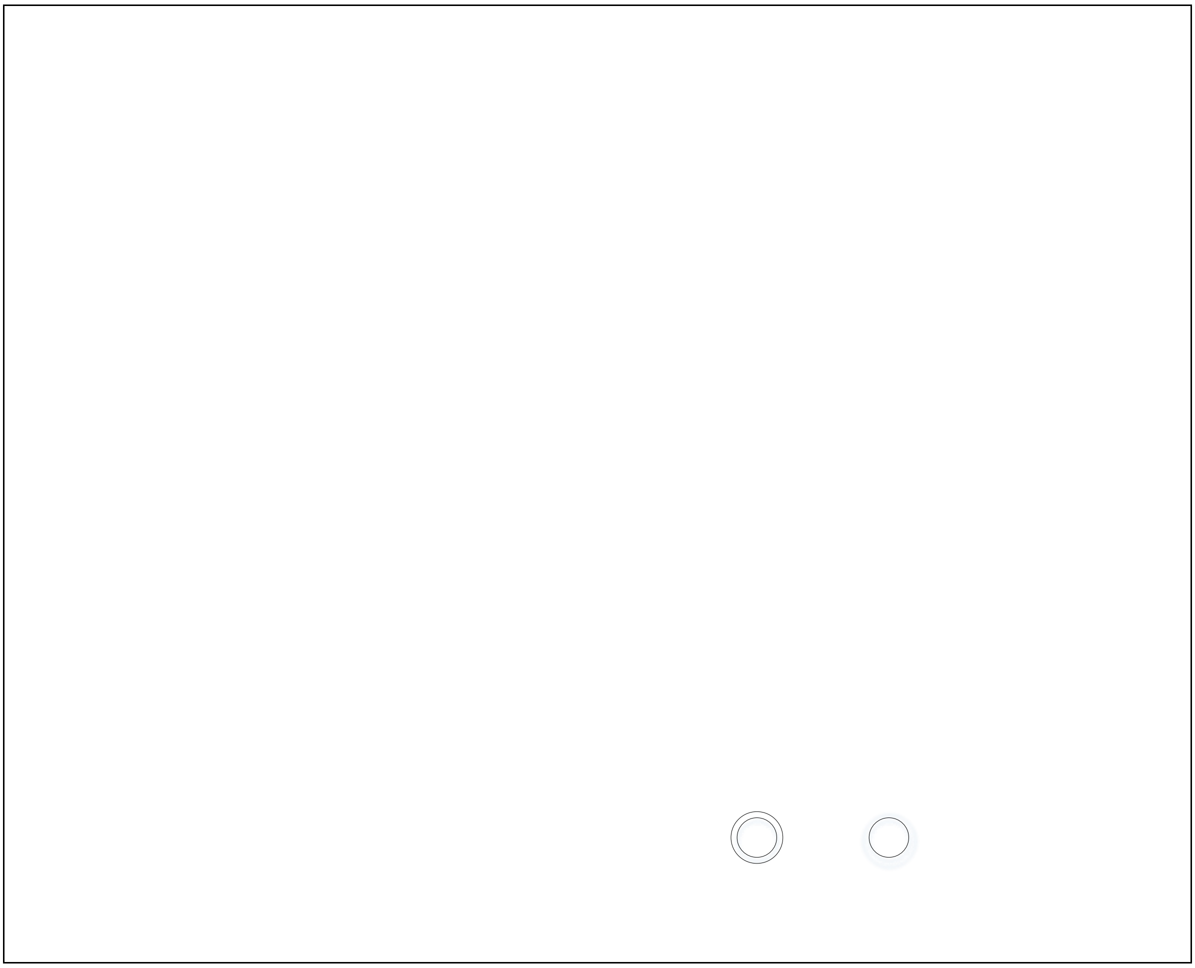
4)1 PP[PP



NOTE:

Dimensions are expressed in millimeters.

9)%*$ PP[PP



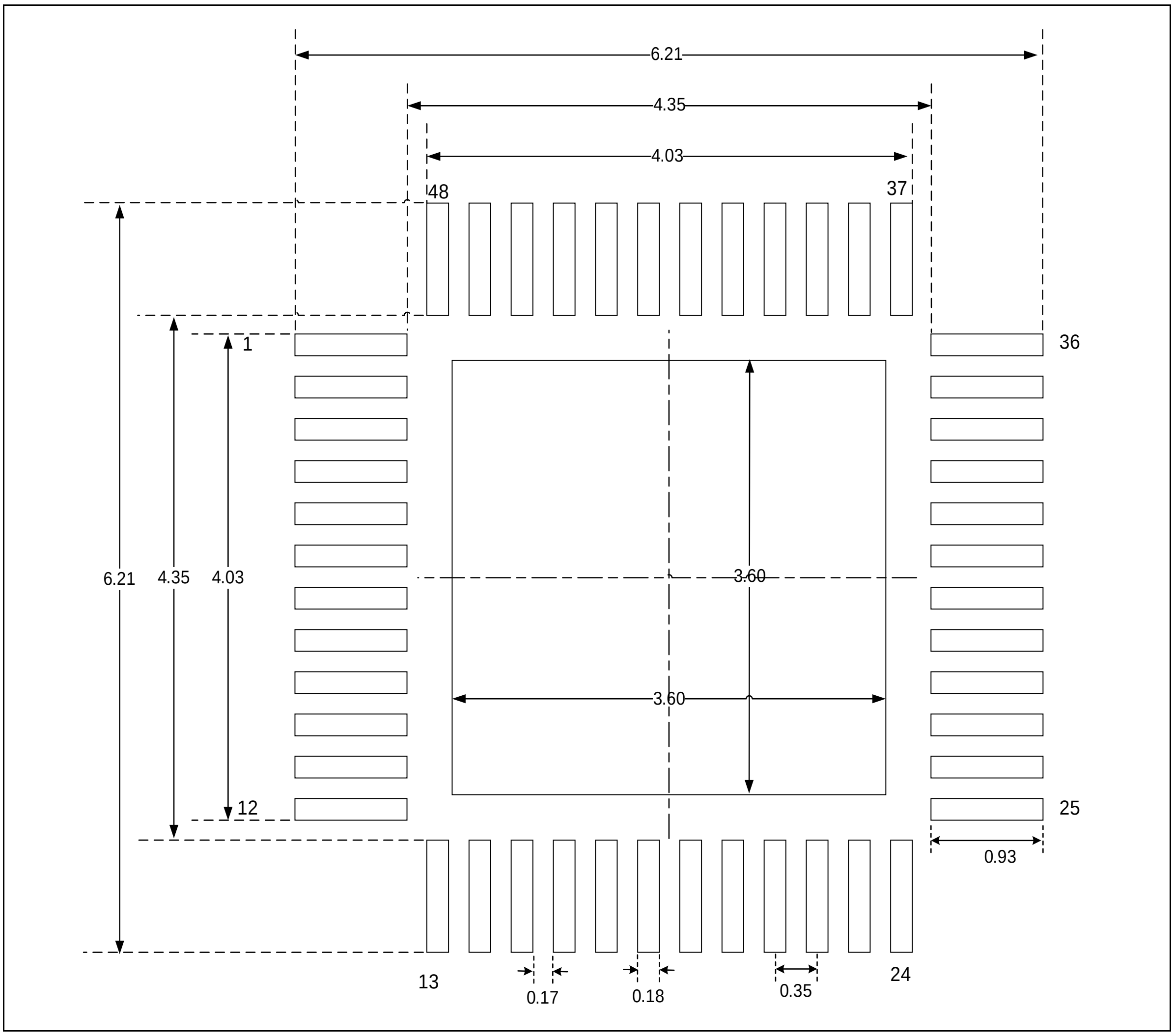
NOTE:

Dimensions are expressed in millimeters.

VBGA100 recommended PCB design rules(0.5mm pitch)

'LPHQVLRQ	5HFRPPHQGHGYDOXHV
3LWFK	PP
'SDG	PP
'VP	PP W\S GHSHQGV RQ WKH VROGHUPDVN UHJ
6WHQFLO RSHQLQJ	PP
6WHQFLO WKLFNQHVV	%HWZHHQ PP DQG PP

4)1 PP[PP



NOTE:

Dimensions are expressed in millimeters.

4.4

7M •

7M 7DPE 3[-$

7DPE •

-$ • :

3 , 2 : ,''

î 9'' , 2 , 2

7M

7-

Package Type and Size	Thermal Resistance Junction-DPELHQW JA 9 D	Unit
LQFP100 14mm x 14mm / 0.5mm pitch	50 +/- 10%	• :
LQFP64 10mm x 10mm / 0.5mm pitch	65 +/- 10%	• :
LQFP48 7mm x 7mm / 0.5mm pitch	75 +/- 10%	• :

5

Ý ÷ Á -	HC32F460JEUA-QFN48TR	HC32F460JETA-LQFP48	HC32F460KEUA-QFN60TR	HC32F460KETA-LQFP64	HC32F460PETB-LQFP100	HC32F460PEHB-VFBGA100	HC32F460JCTA-LQFP48	HC32F460KCTA-LQFP64	HC32F460PCTB-LQFP100
qNǬ(MHz)	200	200	200	200	200	200	200	200	200
» n	ARM Cortex-M4	ARM Cortex-M4	ARM Cortex-M4	ARM Cortex-M4	ARM Cortex-M4	ARM Cortex-M4	ARM Cortex-M4	ARM Cortex-M4	ARM Cortex-M4
Flash (KB)	512	512	512	512	512	512	256	256	256
RAM (KB)	192	192	192	192	192	192	192	192	192
OTP (B)	960	960	960	960	960	960	960	960	960
Package (mm*mm)	QFN48 (5*5) e=0.35	LQFP48 (7*7) e=0.5	QFN60 (7*7) e=0.4	LQFP64 (10*10) e=0.5	LQFP100 (14*14) e=0.5	VFBGA100 (7*7) e=0.5	LQFP48 (7*7) e=0.5	LQFP64 (10*10) e=0.5	LQFP100 (14*14) e=0.5
FP+fO	38	38	50	52	83	83	38	52	83
6 „ '+k Á	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
6Q '+k Á	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
16 ƒ Ð , ž	11	11	11	11	11	11	11	11	11
+k p Ý I Ð , ž	3	3	3	3	3	3	3	3	3
12 ƒ ADCE¢ ˜ ‹ y	2	2	2	2	2	2	2	2	2
12 ƒ ADCFPF‰ ¦	10	10	15	16	16	16	10	16	16
" E¹ ž	3	3	3	3	3	3	3	3	3
t] ž PGA	1	1	1	1	1	1	1	1	1
SPI	4	4	4	4	4	4	4	4	4
QUADSPI	1	1	1	1	1	1	1	1	1
I^2S	4	4	4	4	4	4	4	4	4
I^2C	3	3	3	3	3	3	3	3	3
U(S)ART	4	4	4	4	4	4	4	4	4
CAN	1	1	1	1	1	1	1	1	1
SDIO	2	2	2	2	2	2	2	2	2
žFUSB OTG	1	1	1	1	1	1	1	1	1
DMA	8	8	8	8	8	8	8	8	8
DCU	4	4	4	4	4	4	4	4	4
PVD	8	8	8	8	8				
AES128	8	8	8	8	8				
SHA256	8	8	8	8	8				
TRNG	8	8	8	8	8				
CRC	8	8	8	8	8				
KEYSCAN	8	8	8	8	8				
RTC	8	8	8	8	8				
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Email Æ mcu@hdsc.com.cn

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