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1 Overview

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3:0 3:0 7LPH7ULPHU 3:0 ELW
7LPH7ULPHU$ 'XW\ 3:0
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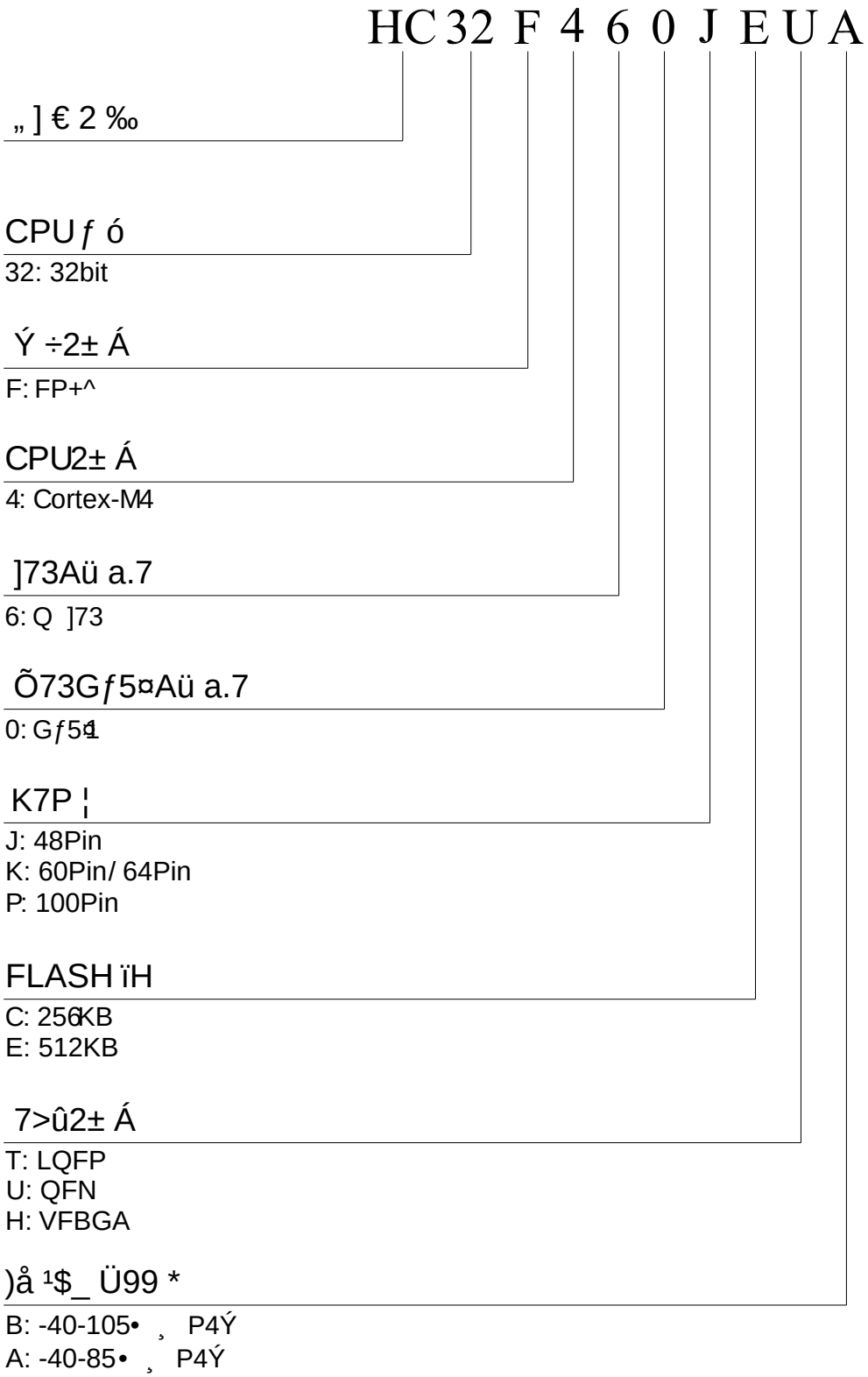
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CPU ƒ ó
32: 32bit
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F: FP+^
CPU2± Á
4: Cortex-M4
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6: Q]73
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0: Gƒ5¤
K7P ¦
J: 48Pin
K: 60Pin/ 64Pin
P: 100Pin
FLASH ïH
C: 256KB
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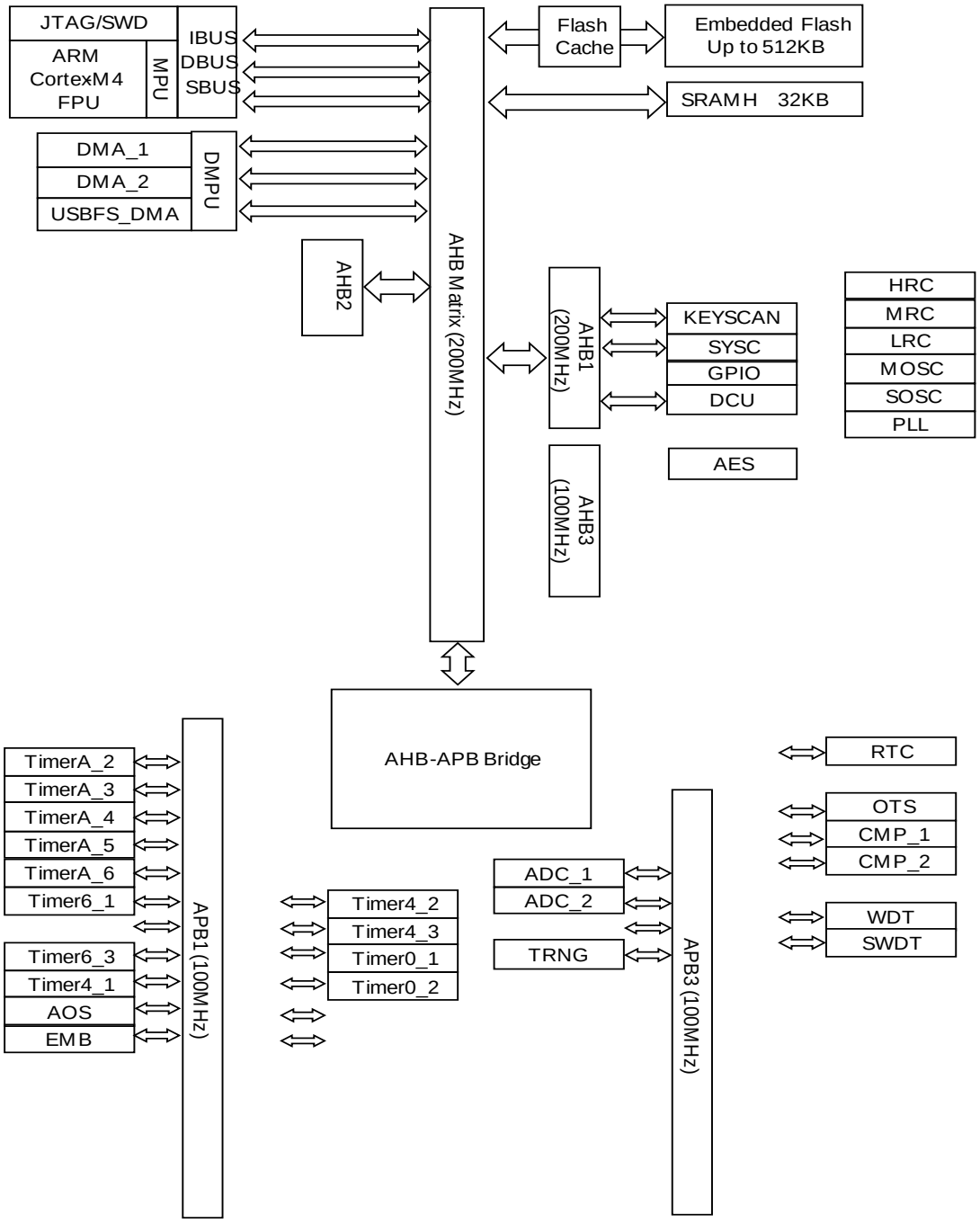
JTAG/SWD
ARM Cortex-M4 FPU
MPU
IBUS
DBUS
SBUS
Flash Cache
Embedded Flash Up to 512KB
SRAMH 32KB
DMA_1
DMA_2
USBFS_DMA
DMPU
AHB2
AHB Matrix (200MHz)
AHB1 (200MHz)
KEYSCAN
SYSC
GPIO
DCU
HRC
MRC
LRC
MOSC
SOSC
PLL
AES
AHB3 (100MHz)
AHB-APB Bridge
TimerA_2
TimerA_3
TimerA_4
TimerA_5
TimerA_6
Timer6_1
Timer6_3
Timer4_1
AOS
EMB
APB1 (100MHz)
Timer4_2
Timer4_3
Timer0_1
Timer0_2
ADC_1
ADC_2
TRNG
APB3 (100MHz)
RTC
OTS
CMP_1
CMP_2
WDT
SWDT

1.4

1.4.1 &38

+&) $50Š &RUWH[Ž0LWK)38 ELW &38

$50Š &RUWH[Ž0LWK)38 &38 '63)38)ORDWLQJ3RLQW 8QLW

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&RUWH[Ž0[&38, &38' &386 '0$B '0$B 86%6B0$

)ODVK ,&2'( )ODVK '&2'( )ODVK 0&2'(&38)ODVK 65$0+ 65$0+ N% 65$0$ 65$0 .% 65$0% 65$0 .%65$0 .%5HWHQWLRQ65$0 .% $3% $26(0% 7PHU6WV, 86$57 , 6 $3% 7LPHU6WV, 86$57 , 6 $3% $'&3*$751* $3%)&0 :'7 &03 276 5.7&0 , & $+% .(<6&$1 ,17& '&8 *3,2 6<6& $+% &$1 6',2& $+% $(6 +$6+ &5&)6 86%

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7LPHU

1.4.21 7LPHU

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3:0

7LPHU 3:0

1.4.22 7LPHU

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2 Pinouts

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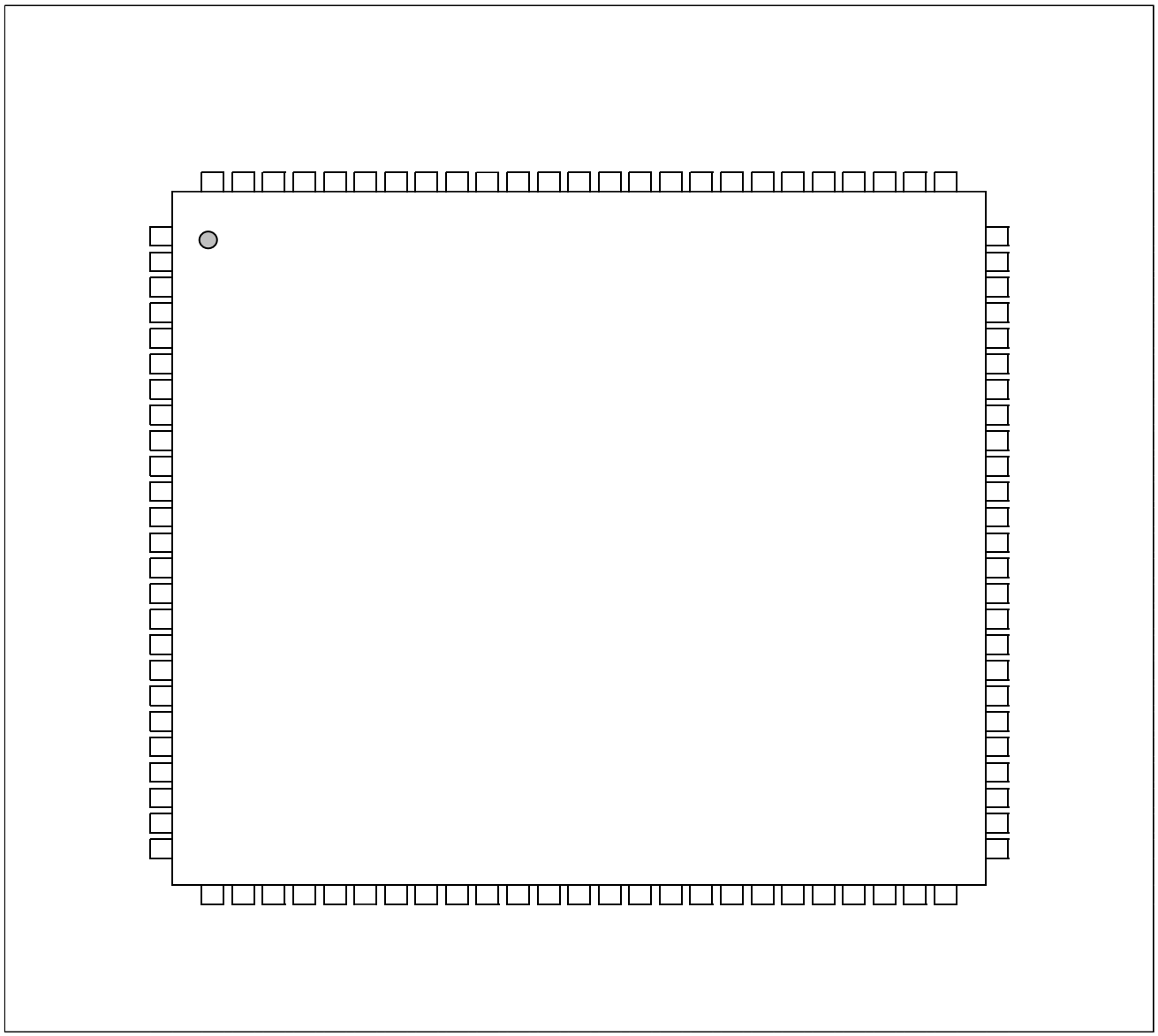

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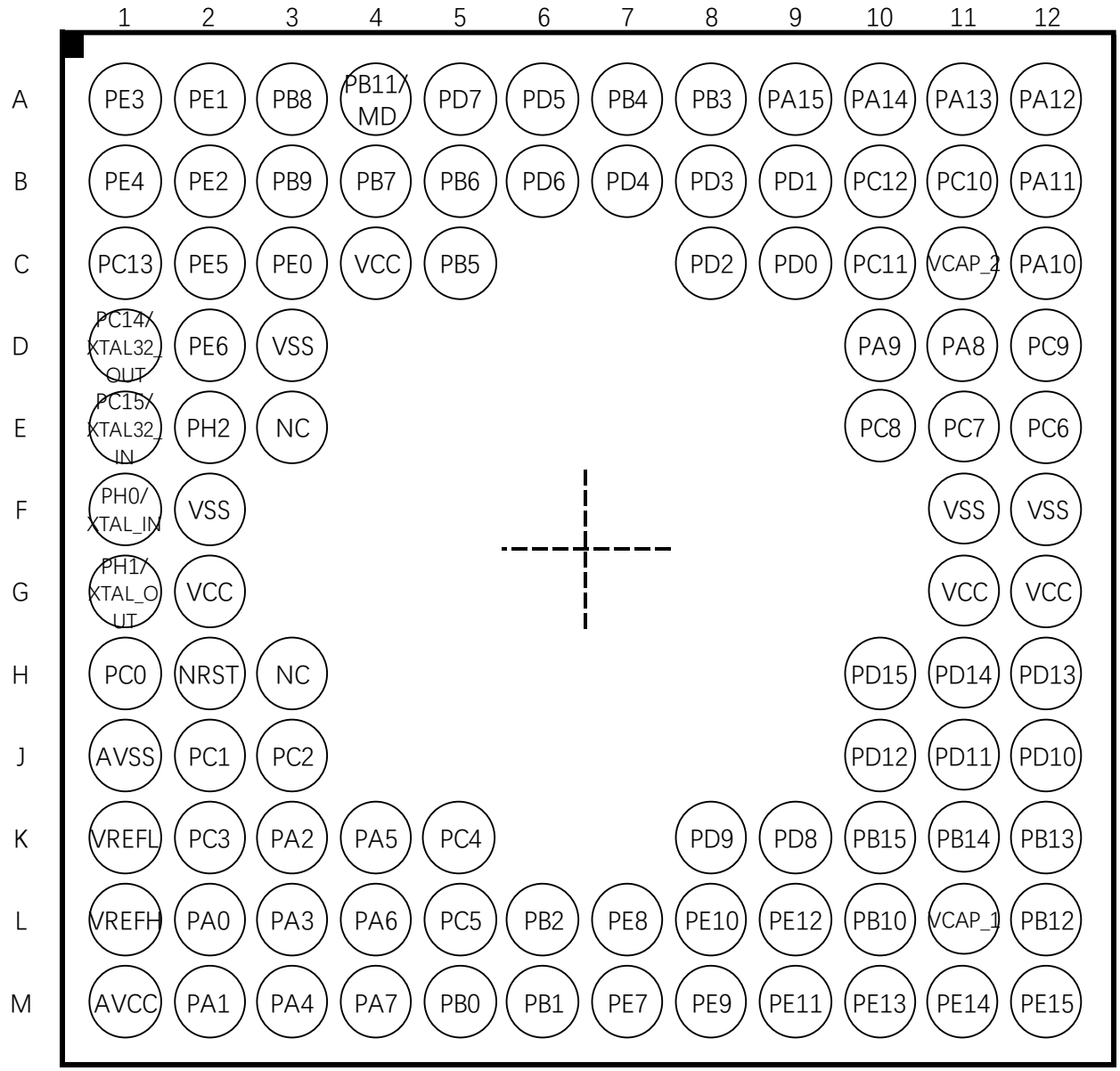
1 2 3 4 5 6 7 8 9 10 11 12
A PE3 PE1 PB8 PB11/MD PD7 PD5 PB4 PB3 PA15 PA14 PA13 PA12
B PE4 PE2 PB9 PB7 PB6 PD6 PD4 PD3 PD1 PC12 PC10 PA11
C PC13 PE5 PE0 VCC PB5 PD2 PD0 PC11 VCAP_2 PA10
D PC14/XTAL32_OUT PE6 VSS PA9 PA8 PC9
E PC15/XTAL32_IN PH2 NC PC8 PC7 PC6
F PH0/XTAL_IN VSS VSS VSS
G PH1/XTAL_OUT 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

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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				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

.

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
	(				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
	$				PA13		EIRQ13/WKUP3_1	JTMS_SWDIO	GPO				7,0$B B3	7,0$B B3 7,0$B B .%		SPI2_SS1		SDIO2_D3					EVNTP113	EVENTOUT		Func_Grp1
	&				VCAP_2																					
	)				VSS																					
	*				VCC																					
	$				PA14		EIRQ14/WKUP3_2	JTCK_SWCLK	GPO				7,0$B B3	7,0$B B3	TIMA_4_TRIG	SPI2_SS2		SDIO2_D2	I2S1_EXCK				EVNTP114	EVENTOUT		Func_Grp1
	$				PA15		EIRQ15/WKUP3_3	JTDI	GPO				7,0$B B3 7,0$B B .$	7,0$B B3	TIMA_2_TRIG	SPI2_SS3		SDIO2_D1	I2S1_MCK				EVNTP115	EVENTOUT		Func_Grp1
	%				PC10		EIRQ10		GPO		TIM4_3_OUH		7,0$B B3	7,0$B B3 7,0$B B .$				SDIO1_D2					EVNTP310	EVENTOUT		Func_Grp1
	&				PC11		EIRQ11		GPO		TIM4_3_OVH		7,0$B B3	7,0$B B3 7,0$B B .%				SDIO1_D3					EVNTP311	EVENTOUT		Func_Grp1
	%				PC12		EIRQ12		GPO		TIM4_3_OWH		7,0$B B7	7,0$B B3				SDIO1_CK					EVNTP312	EVENTOUT		Func_Grp1
	&				PD0		EIRQ0		GPO	VCOUT123				7,0$B B3									EVNTP400	EVENTOUT		Func_Grp1

	Func32	Func33	Func34	Func35	Func36	Func37	Func38	Func39	Func40	Func41	Func42	Func43	Func44	Func45	Func46	Func47
Func_Grp 1	USART1_ TX	USART1_ RX	USART1_R TS	USART1_C TS	USART2_ TX	USART2_ RX	USART2_R TS	USART2_C TS	SPI1_MO SI	SPI1_MS O	SPI1_SS0	SPI1_SC K	SPI2_MO SI	SPI2_MIS O	SPI2_SS0	SPI2_SC K
Func_Grp 2	USART3_ TX	USART3_ RX	USART3_R TS	USART3_C TS	USART4_ TX	USART4_ RX	USART4_R TS	USART4_C TS	SPI3_MO SI	SPI3_MIS O	SPI3_SS0	SPI3_SC K	SPI4_MO SI	SPI4_MIS O	SPI4_SS0	SPI4_SC K

	Func48	Func49	Func50	Func51	Func52	Func53	Func54	Func55	Func56	Func57	Func58	Func59	Func60	Func61	Func62	Func63
Func_Grp 1	I2C1_SDA	I2C1_SCL	I2C2_SDA	I2C2_SCL	I2S1_SD	I2S1_SDIN	I2S1_WS	I2S1_CK	I2S2_SD	I2S2_SDI N	I2S2_WS	I2S2_CK				
Func_Grp 2	I2C3_SDA	I2C3_SCL	CAN_TxD	CAN_RxD	I2S3_SD	I2S3_SDIN	I2S3_WS	I2S3_CK	I2S4_SD	I2S4_SDI N	I2S4_WS	I2S4_CK				

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	
	VREFL	I	
System	NRST	I	
	MD	I	
PVD	PVD2EXINP	I	PVD2
Clock	XTAL_IN	I	
	XTAL_OUT	O	
	XTAL32_IN	I	(32K)
	XTAL32_OUT	O	
	MCO_1~2	O	
GPIO	GPIOxy (x=A~E,H, y=0~15)	IO	
EVENTOUT	EVENTOUT	O	Cortex-M4 CPU
EIRQ	EIRQx (x=0~15)	I	
	WKUPx_y (x,y=0~3)	I	PowerDown
	NMI	I	
Event Port	EVNTPxy (x=1~4, y=0~15)	IO	
Key	KEYOUTx(x=0~7)	O	KEYSCAN
JTAG/SWD	JTCK_SWCLK	I	
	JTMS_SWDIO	IO	
	JTDO_TRACESWO	O	
	JTDI	I	
	NJTRST	I	
TRACE	TRACECK	O	
	TRACED0~3	O	
FCM	FCMREF	I	
RTC	RTCOUT	O	1Hz
Timer4	TIM4_x_CLK	I	

		I/O	
(x=1~3)	TIM4_x_OUH	IO	PWM U
	TIM4_x_OUL	IO	PWM U
	TIM4_x_OVH	IO	PWM V
	TIM4_x_OVL	IO	PWM V
	TIM4_x_OWH	IO	PWM W
	TIM4_x_OWL	IO	PWM W
Timer6	TIM6_TRIGA	I	A
(x=1~3)	TIM6_TRIGB	I	B
	TIM6_x_PWMA		

		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

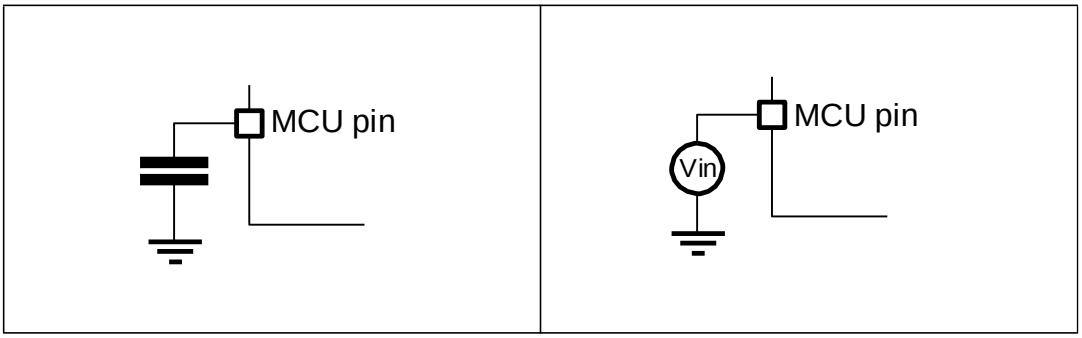
3.1.2

7$ ƒ &9 & & 9

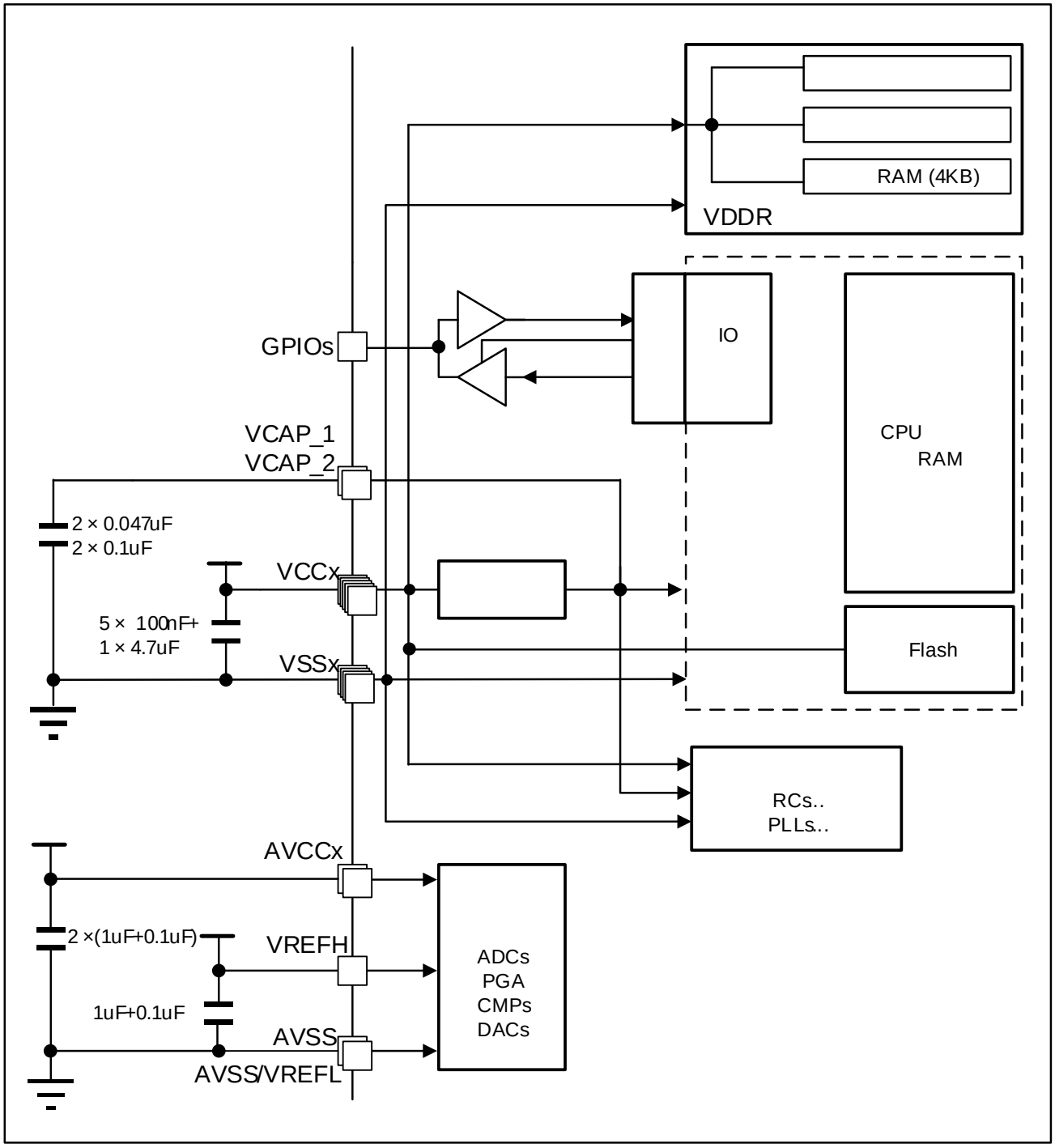
3.1.3

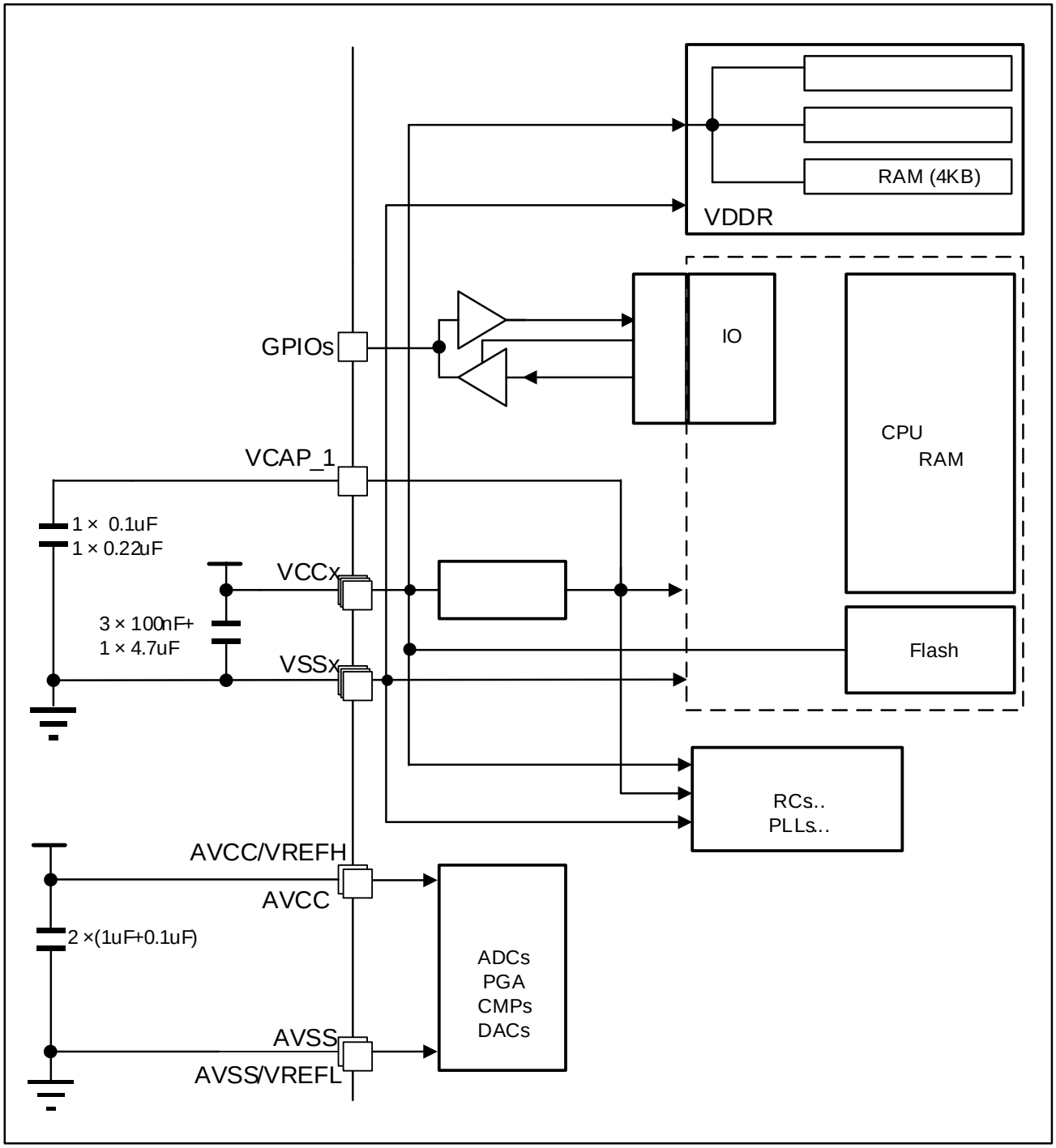
3.1.4

3.1.5

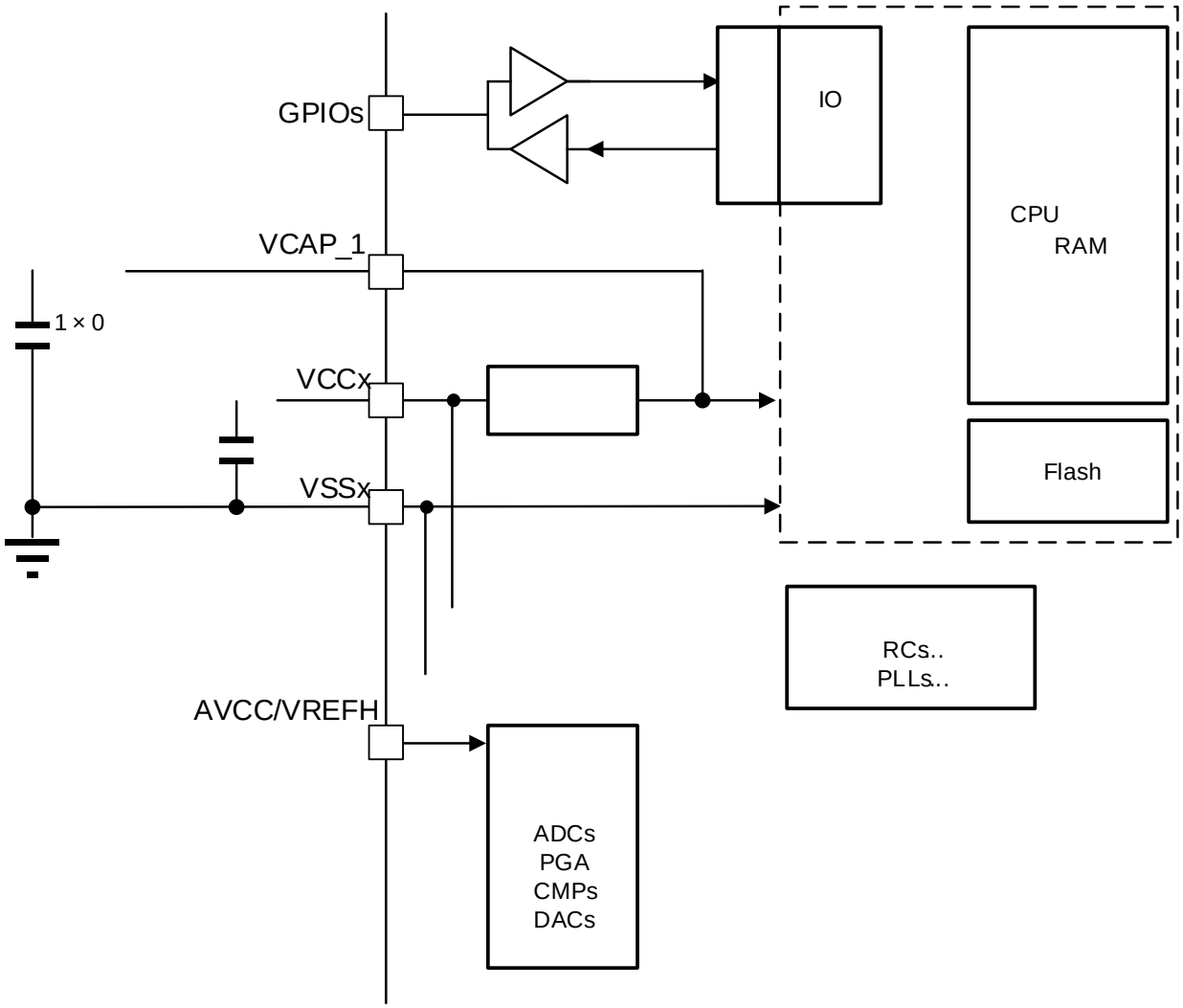


3.1.6


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


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

+ &) . (7 $ 4) 3



+ &) . (8 $ 4) 1 7 5 + &) - (7 $ 4) 3 + &) - (8 $ 1 7 5

1. —) 9 & &
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3. 9 & & 9 6 6 $ 9 & & $ 9 6 6

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3 & %

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

9&$3B 9&$3B

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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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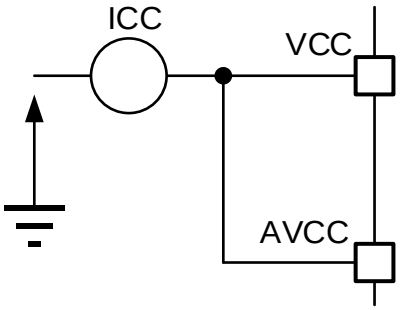
&(;7		—) —) X)
(65	(65	Ÿ

9&$3B 9&$3B

3.1.7



3.2

9&&9₆₆	$9&& 9&&			9
9,1	9	9₆₆±	9&& 9	
	3$ 86%)6B'30$ 86%)6B'3	9₆₆±		
9(6'+%0				

1. 9&& $9&& 966 $966

2. 9,1

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Σ,966	966		
,9&&	9&&		
,966	966		
,,2	, 2		
	, 2		
Σ,,2	, 2		
	, 2		

1. 9&& $9&& 966 $966

3.3

3.3.1

3.3.2

7 $

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	9 & &			

3.3.3

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			,&* %25B/(9 >				9

9%25 %25

3.3.4

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, 2

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1) , 2 9 & & 9 6 6

2) I+ & / . 0 +]

I+ & / . 0 +] 0 +] 0 +] I+ & / . 0 +] 0 +]

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, & & B 3 ' ' K U \ V W R Q H , & & B ' + 5 < 6 7 2 1 (

4) 2 1 2))

5) I+ & / . 0 +] I+ & / . 0 +] 0 +] 3 / /

	3DUDPH	6\PERO		7D ƒ&				8QL
					0LQ	7\S	0D[	
	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	&$&+(2))					P$
			&$&+(21					P$
		,&&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&				8QL
					0LQ	7\S	0D[	
	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	&$&+ℓ))					P$
		,&&B6/((3	2))					P$
			21					P$

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

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

1. 7\S $9_{\&\&}$ 9
2. 0D[$9_{\&\&}$ a 9

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

,&&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

(6 ' / 8

3.3.5.1 (6 '

- (6 '

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9(6 ' + % 0		7$ ƒ & - (6 ' $		9
9(6 ' & ' 0		7$ ƒ & - (6 ' &		

(6 '

3.3.5.2 / D W ƒ K S

/ D W ƒ K S / D W ƒ K S

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/ 8	/ D W ƒ K S	7$ ƒ & - (6 ' $		P$

/ D W ƒ K S

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$
538		86%)6B'3 86%)6B'0				.
		86%)6B'3 86%)6B'0	9,1 96			.
&,2	, 2	3$ 86%)6B'0 3$ 86%)6B'3				S)
		3$ 86%)6B'0 3$ 86%)6B'3				S)

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1.

2. 9&& 9

	92/		,2 ± P$ '9&&				
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	92+			9&&			
	92/		,2 ± P$ '9&&"				
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	92+			9&&			
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	92+			9&&			
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	92+			9&&			
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	92+			9&&			
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	92+			9&&			

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	I P D [, 2 R X		& S) & & 9 9				0 +]
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			& S) & & 9 9				
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	I P D [, 2 R X		& S) & & 9 9				0 +]
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	W , 2 R X W W , 2 R X W		& S) & & 9 9				Q V
			& S) & & 9 9				
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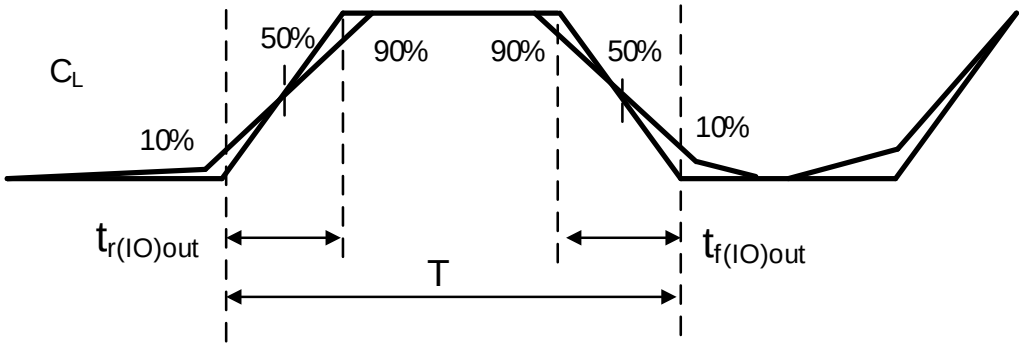

$(t_r + t_f)$ (2/3)T Duty cycle= 50%±5% C_L

/

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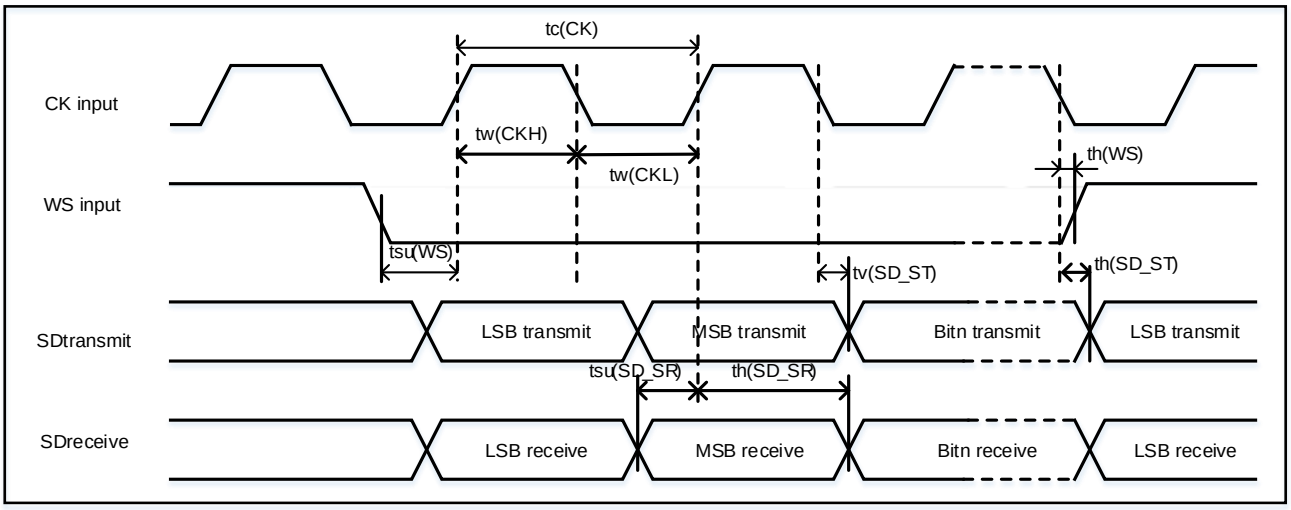

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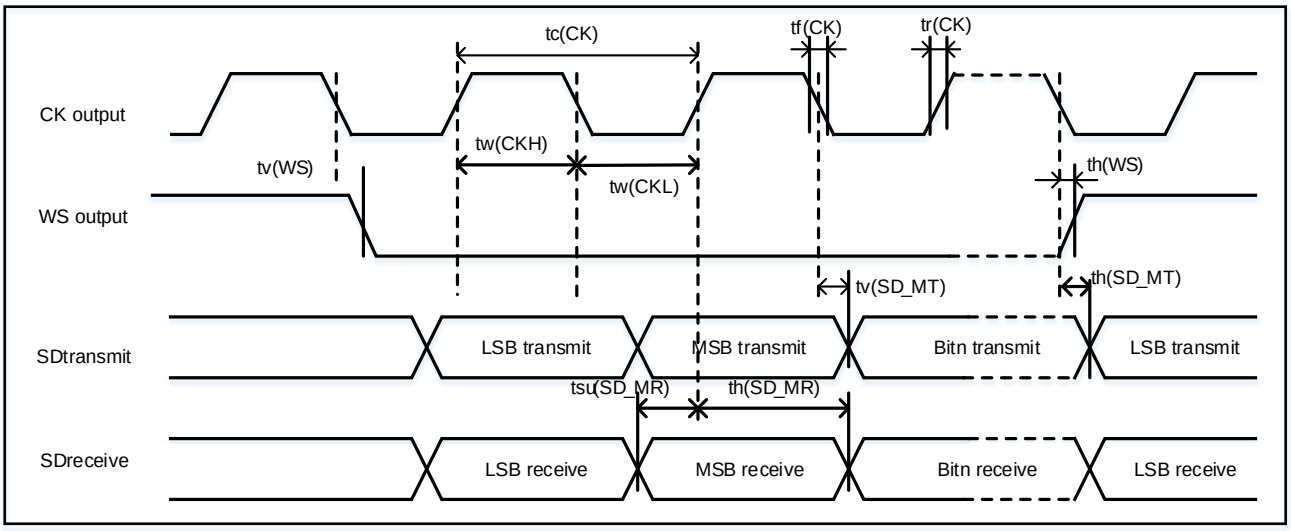

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3.3.10 ， &

		60		)0		
		0LQ	0D[	0LQ	0D[	
I6&/	6&/					.+]
W 67$	+RO					XV
W:	6&/					XV
W,*+	6&/					XV
W 67$	6HWXS					XV
W '$7	+ROG					XV
W '$7	6HWXS	W&		W&		QV
W	6&/ 6'$					QV
W	6&/ 6'$					QV
W 672	6HWXS					XV
W 8)	%86					XV
&E						S)

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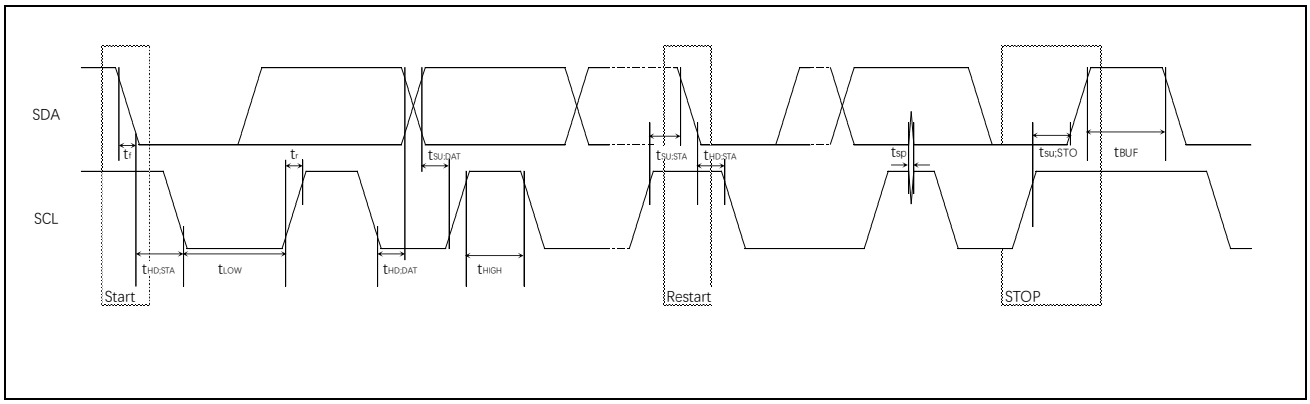

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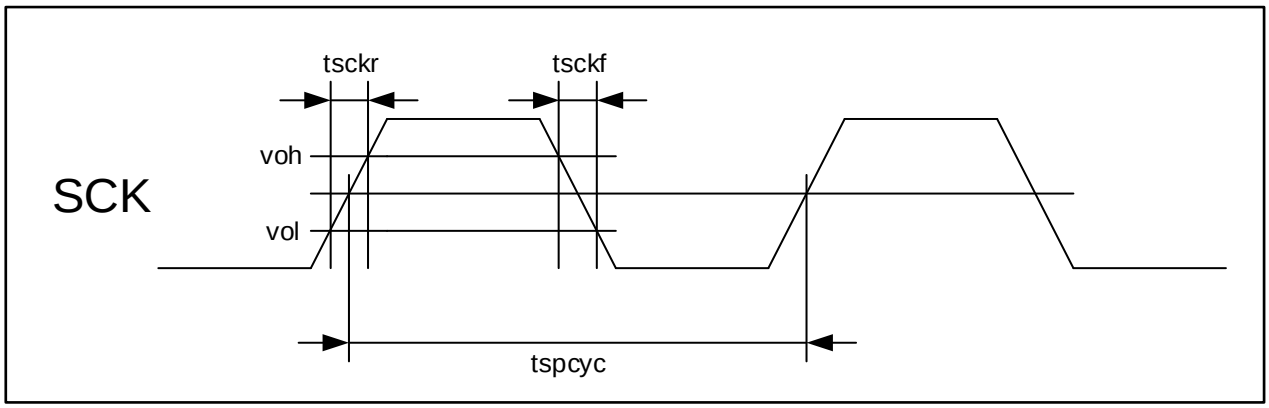
3.3.11 6 3 ,

,WHP			6\PER	0LQ	0D[	8QL\	7HVW FRQ
	6&. FORFN F\F	0DVWH	WVSF\	SFO'ON0+]		WSF	
				SFO'ON0+]			& S)
		6ODYH					
	6&. FORFN UQ0\	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	

63,



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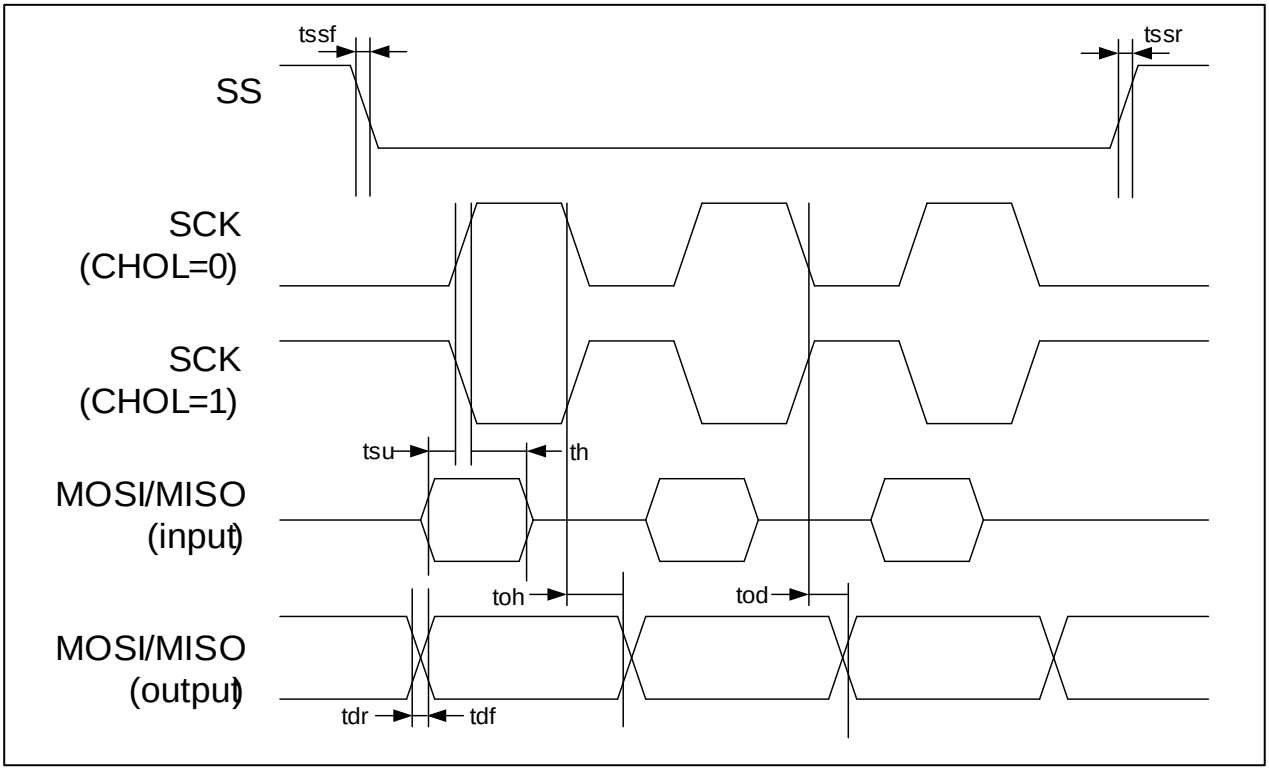

tssf
tssr
SS
SCK
(CHOL=0)
SCK
(CHOL=1)
tsu
th
MOSI/MISO
(input)
toh
tod
MOSI/MISO
(output)
tdr
tdf

6 3 ,

6\PERO		3DUDPHW	&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	&URRVVHU	&/ S)a S)				9
	W6W		&/ S)a S) a RI2+9 2/_				QV
	W)W		&/ S)a S) a RI2+9 2/_				QV
	W6W)0$	W6W)W	&/ S)a S)				
53'			9,1 9&& LQ KRVW P				N

86% /R6ZSHHG

1.

2. 9 86% 86%

9 9&&

3.

4. 5/ 86%

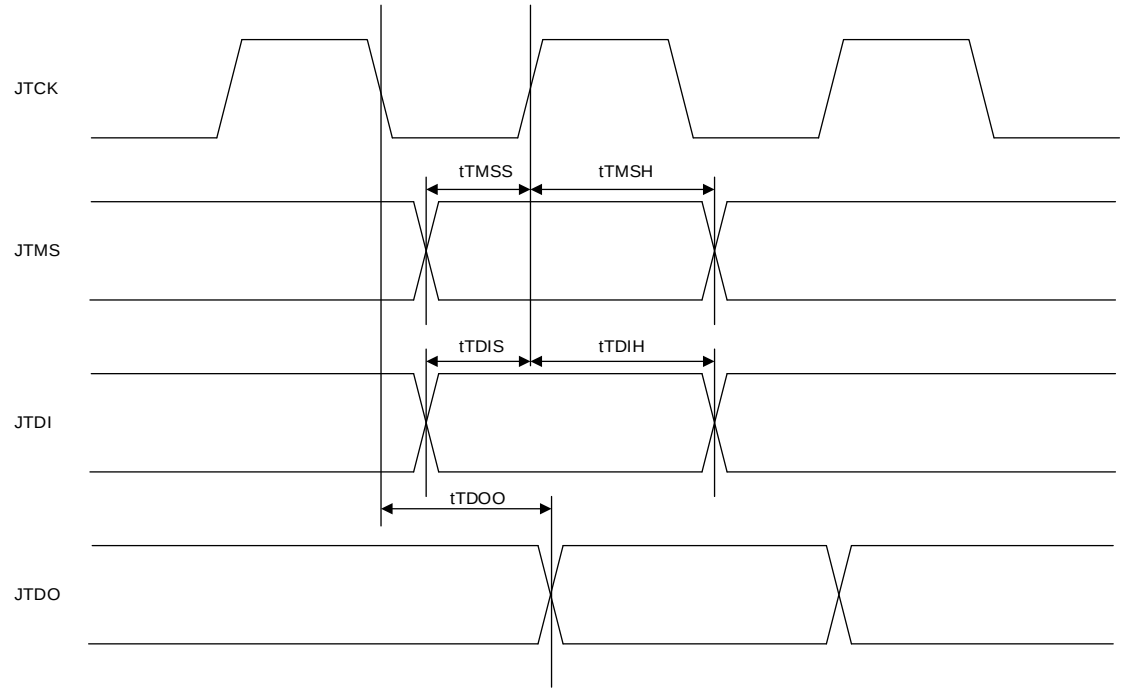
86% &URVV 2YHU

3.3.14 3//

			0LQ	7\S	0D[	8QL
$I_{3//B,1}$	3//3)' 3KDVHH)QU 'HWHFWLQRXW FO					0+]
$I_{3//B287}$	3// PXOWLSOLH FORFN					0+]
$I_{9\&2B287}$	3// 9&2 RXWSXW					0+]
-LWWH	3HULRG -LWWH	3// 3)' LQSXW FORF 6\VWHP FORFN 3HDVKRHDN		±		SV
	&\FOHWR\FOH -LW	3// 3)' LQSXW FORF 6\VWHPFNFOR0+] 3HDVKRHDN		±		
$V_{\&.}$	3// ORFN WLPH					—V

3//

1. -LWWHU



- 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$/B,1		966		9	
W ;7$/ 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 $
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3.3.16.3

N +]

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

; 7 $ /

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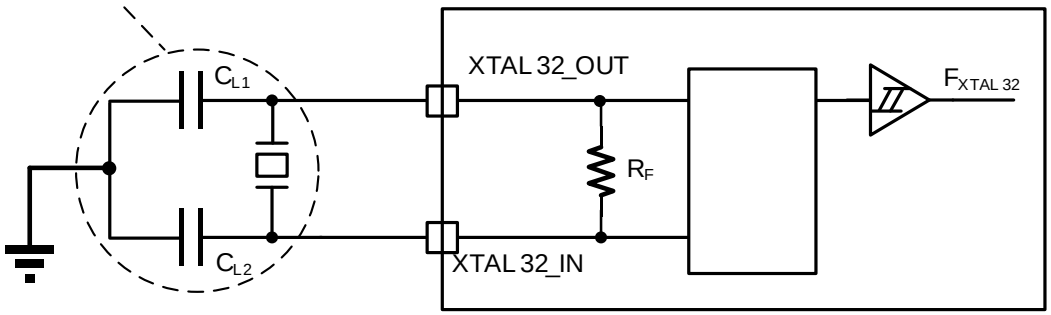
3. 7 6 8 ; 7 $ / ; 7 $ / N +]

& / & / & / & /

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

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

; 7 $ / ' 5 9 > @ X $



N +]

3.3.17

3.3.17.1 + 5 &

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

+ 5 &

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I0 5 &					0 +]
W W 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 &

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W		I$'& 0 +]				— V
						$I&
W219		I$'& 0 +]				— V
		I$'& 0 +]				— V
		I$'& 0 +]				— V
		W 6 Q				$'&
I6	I$'& 0 +]	$'&				0 V S V
		$'&				
W7						— V

$'&

1. 9$9&&95()+ 9

5$,1

$$R_{AIN} = \frac{k-1}{f_{ADC} \times C_{ADC} \times \ln(2^{N+2})} - R_{ADC}$$

/6% 1

N $'&B6675

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

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

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

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

1.

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

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

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

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

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

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

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

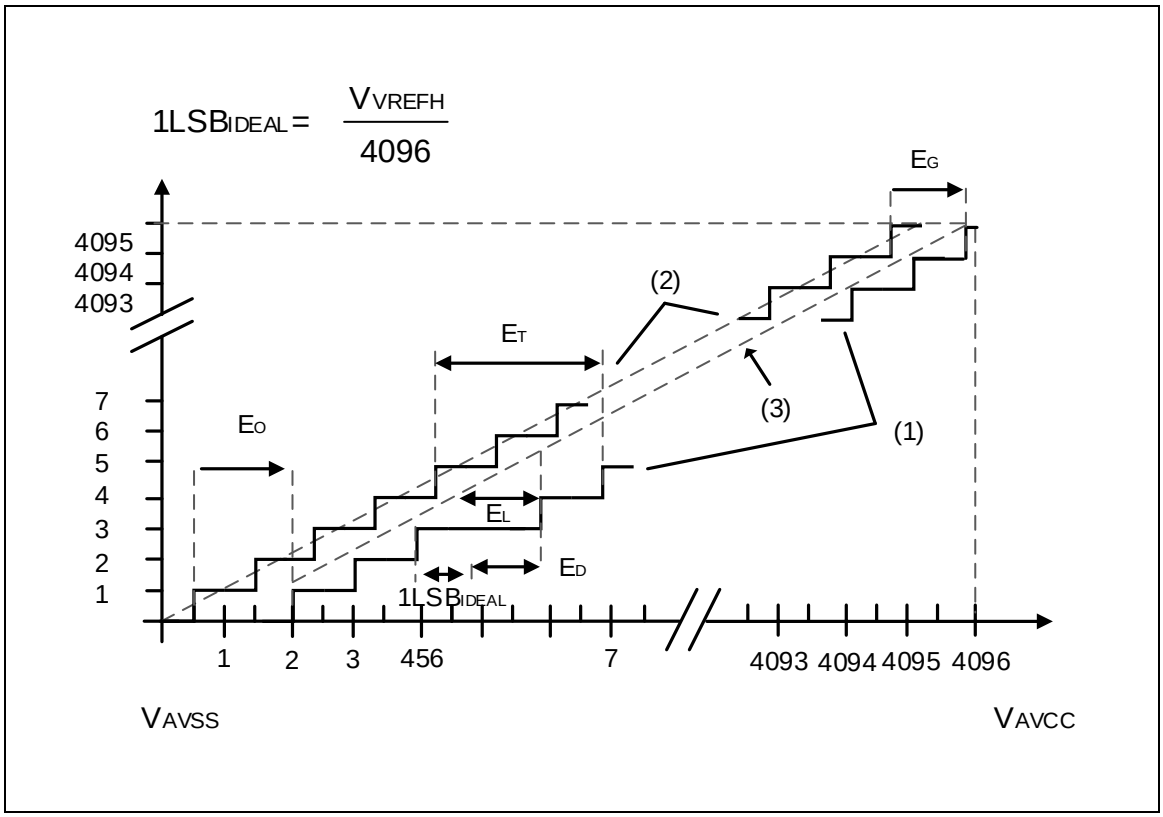
$'& B,1 a $'& B,1 a,1 #I$'& 0+]

(1 2 %					% L V
6 , 1 $ '		I$ ' & 0 +]			G %
6 1 5		N +]			G %
7 + '		N			G %
		9$9 & & a 9			

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

(1 2 %					% L V
6 , 1 $ '		I$ ' & 0 +]			G %
6 1 5		N +]			G %
7 + '		N			G %
		9$9 & & a 9			

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



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1. 5$,1 5$'& &$'&
2. &SDUDVLWLF&% 3&% S)&SDUDVLWLF

I$'&

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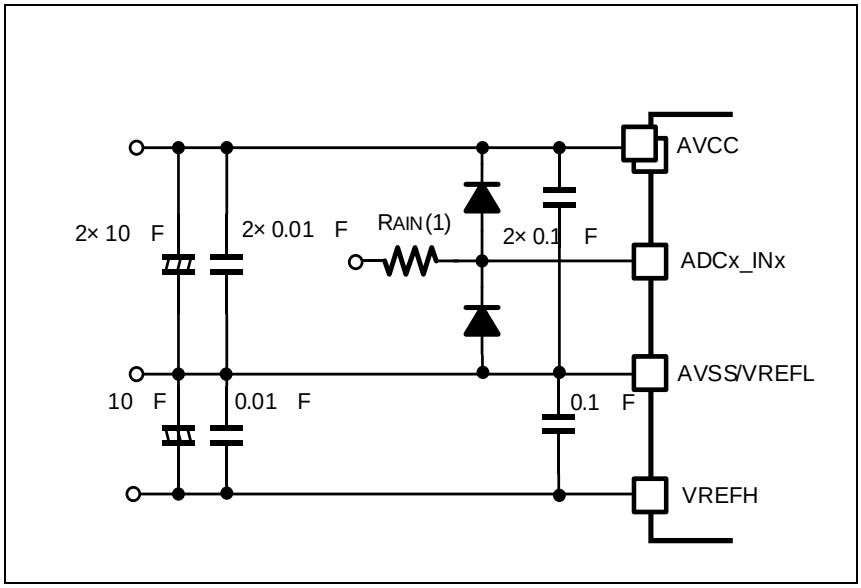
AVCC
2× 10 F
2× 0.01 F
RAIN (1)
2× 0.1 F
ADCx_INx
AVSS/VREFL
10 F
0.01 F
0.1 F
VREFH

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	[9$9&&				“	/6%
76(77/,1*	'$ '$ “ /6%					—V

'$&

3.3.20

9$9&&						9
9,					9$9&&	9
7FPS		P9				QV
7VHW						QV

3.3.21

9$9&&						9
926						P9
9,				9$9&&*DL		9$9&&*DL 9
			*DLQ			
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		3*$966	*DLQ			
		3*$	*DLQ			
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			* D L Q			
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			* D L Q			
			* D L Q			

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3.3.22

3.3.23

3.3.23.1

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		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

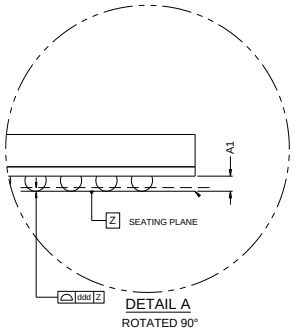
1.

2. 7KFON&38

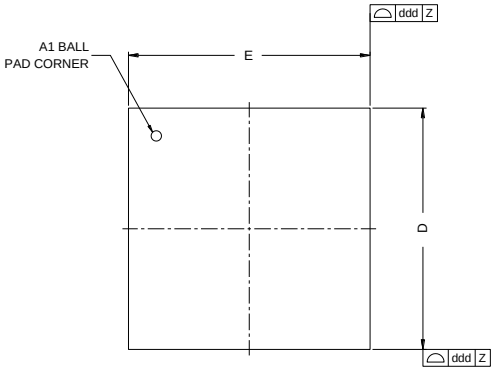
1HQG		7$ •		NF\F
1HQG		7$ •		NF\F
7UHW		7$ • DIWHU NF\FOH		<HD

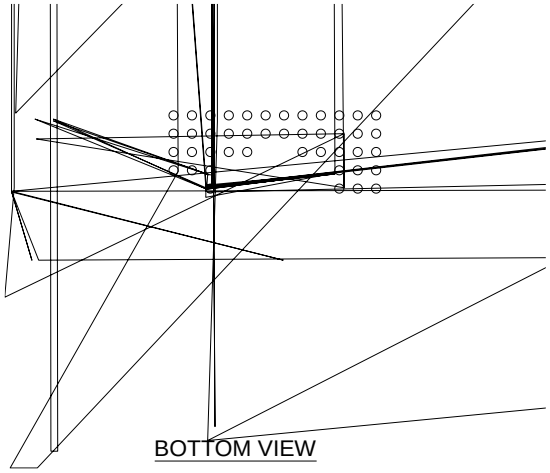
9) % * $

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	--



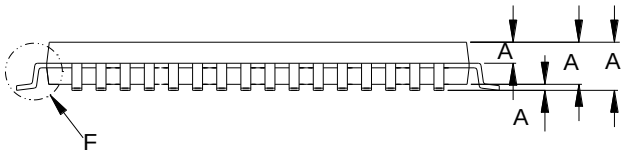
DETAIL A
ROTATED 90°

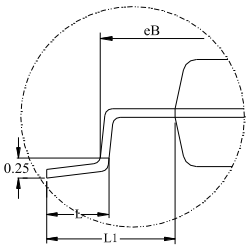




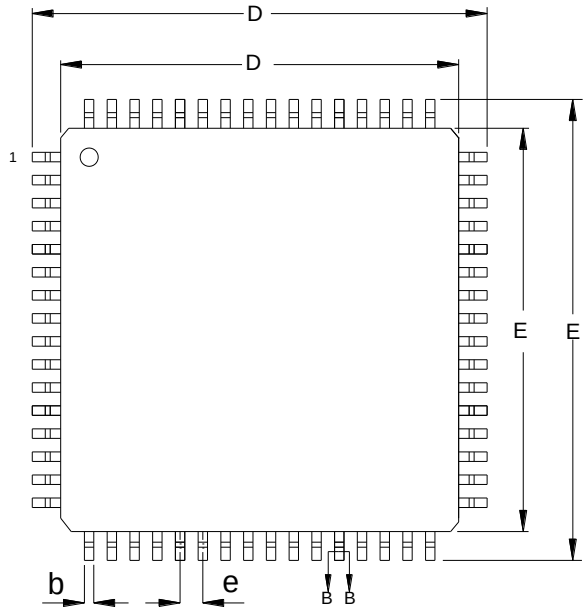
BOTTOM VIEW

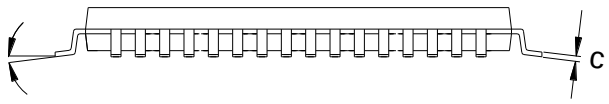
/ 4) 3

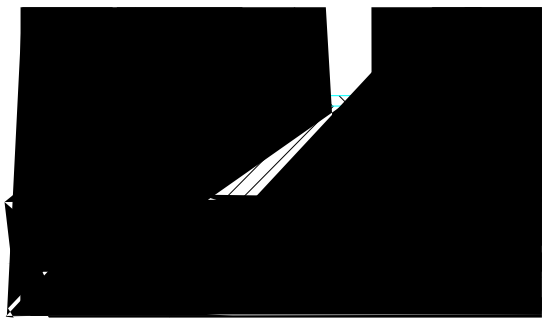




DETAIL: F







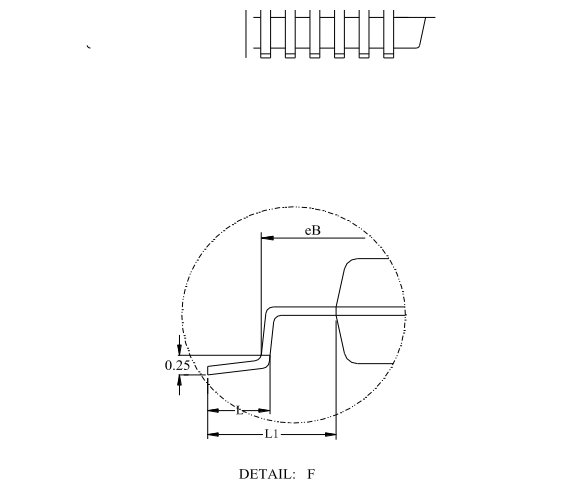
Symbol	10x10 Millimeter		
	Min	Nom	Max
A	--	--	1.60
A1	0.05	--	0.15
A2	1.35	1.40	1.45
A3	0.59	0.64	0.69
b	0.18	--	0.26
b1	0.17	0.20	0.23
c	0.13	--	0.17
c1	0.12	0.13	0.14
D	11.80	12.00	12.20
D1	9.90	10.00	10.10
E	11.80	12.00	12.20
E1	9.90	10.00	10.10
e	0.50BSC		
L	0.45	--	0.75
L1	1.00REF		
	0°	--	7°

1 2 7 (

' L P H Q V L R Q VD Q G(G R Q R W L Q F O X

P R O G I O D V K

/ 4) 3



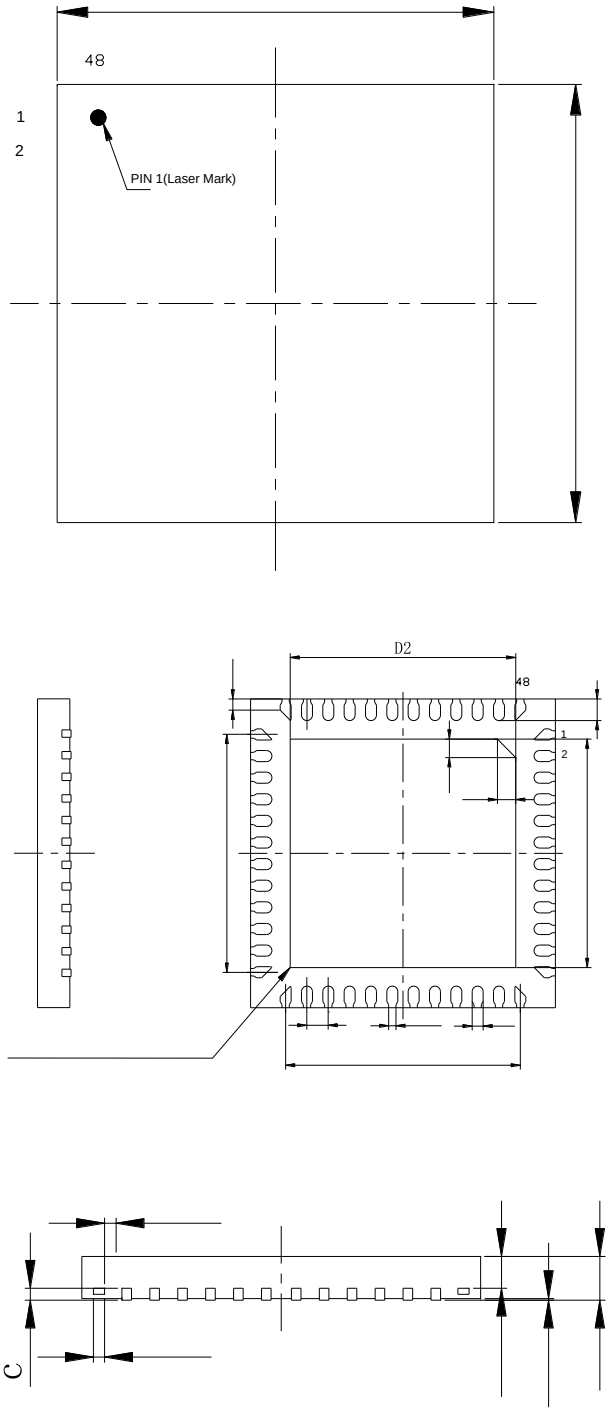
Symbol	7x7 Millimeter		
	Min	Nom	Max
A	--	--	1.60
A1	0.05	--	0.15
A2	1.35	1.40	1.45
A3	0.59	0.64	0.69
b	0.18	--	0.26
b1	0.17	0.20	0.23
c	0.13	--	0.17
c1	0.12	0.13	0.14
D	8.80	9.00	9.20
D1	6.90	7.00	7.10
E	8.80	9.00	9.20
E1	6.90	7.00	7.10
e	0.50BSC		
L	0.40	--	0.65
L1	1.00REF		
	0	--	7°

1 2 7 (

'L P H Q V L R Q VD Q G(G R Q R W L Q F O X

P R O G I O D V K

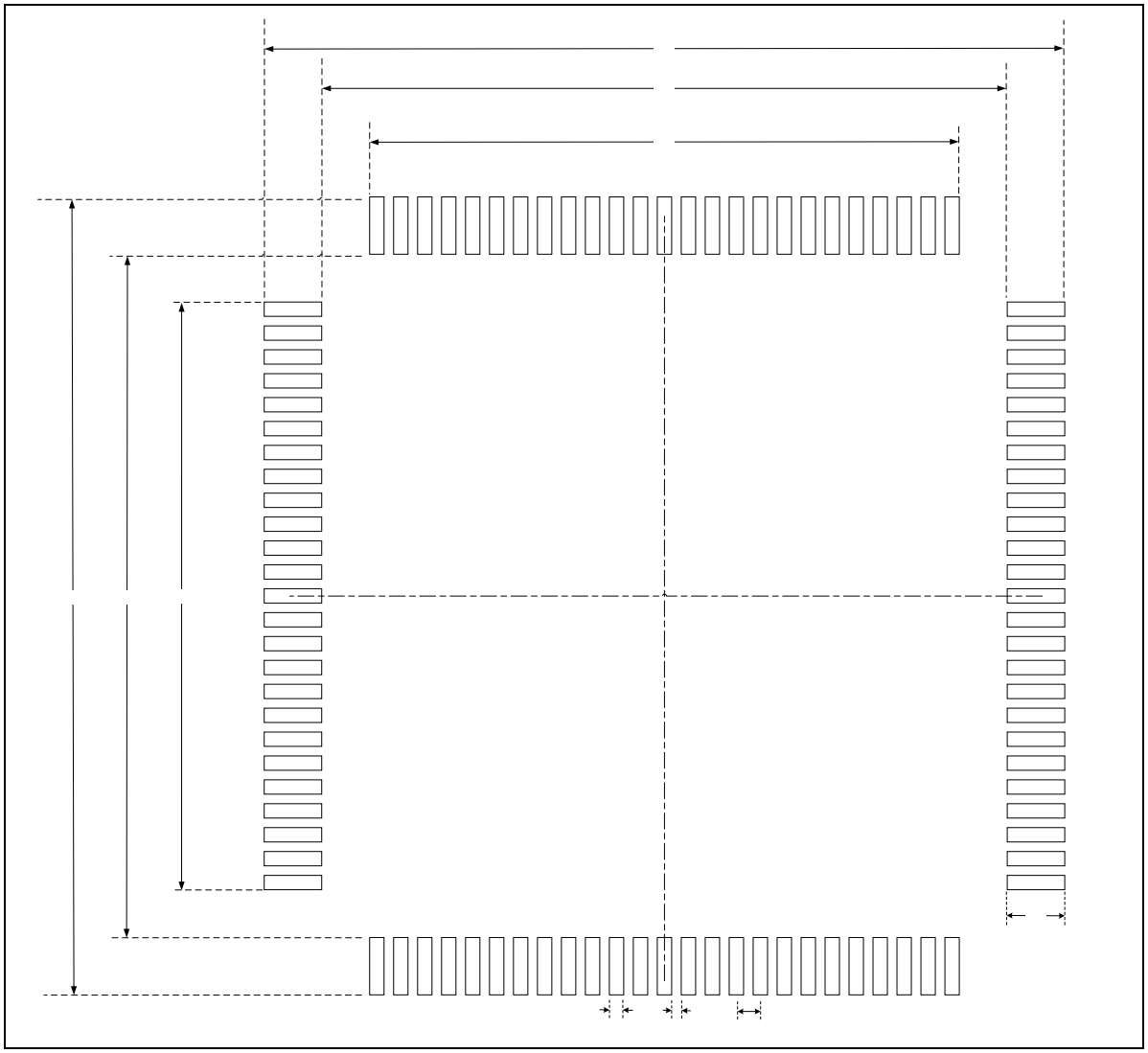
4) 1



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

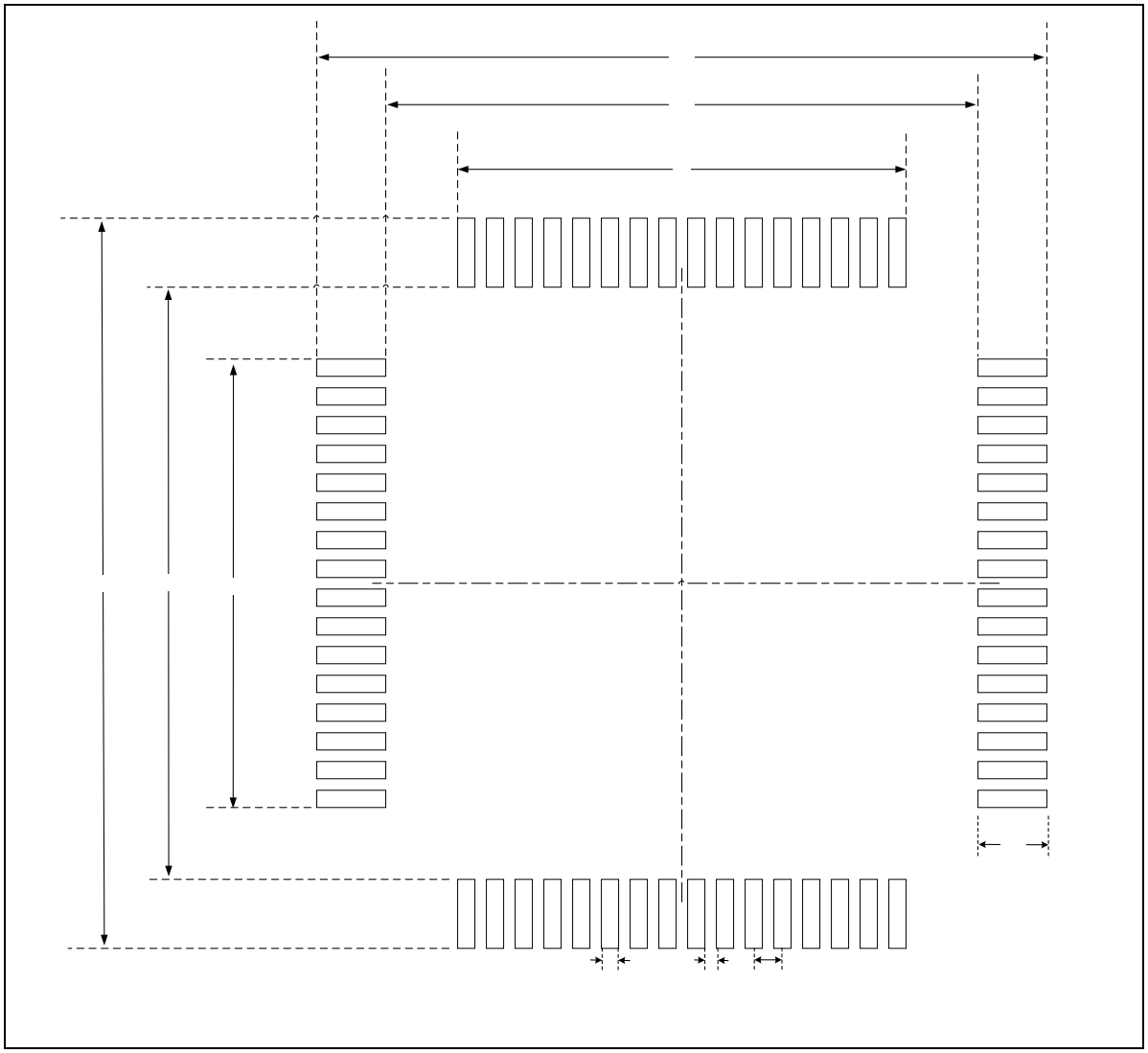
/4)3 PP PP



NOTE:

Dimensions are expressed in millimeters.

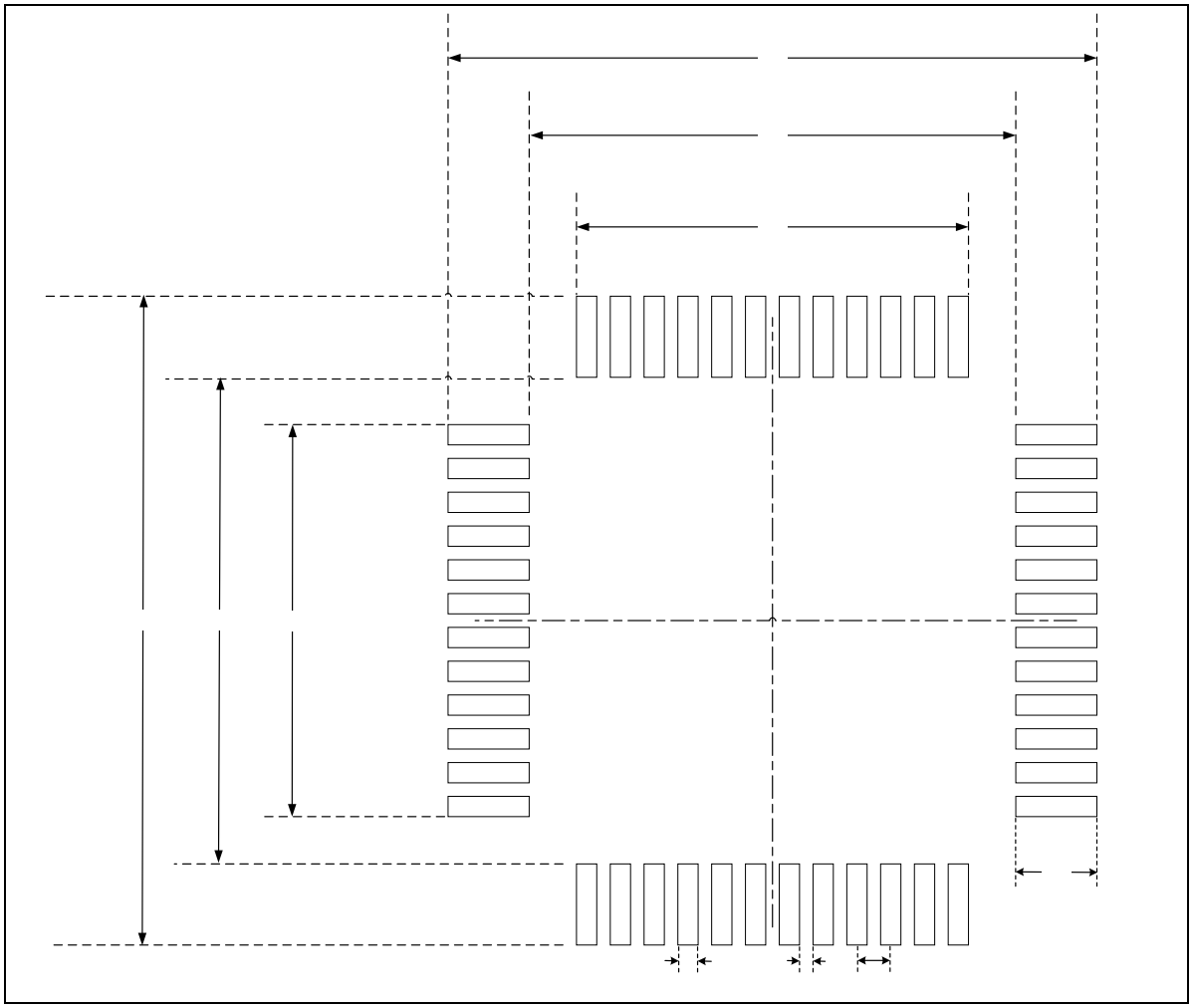
/4)3 P P P P



NOTE:

Dimensions are expressed in millimeters.

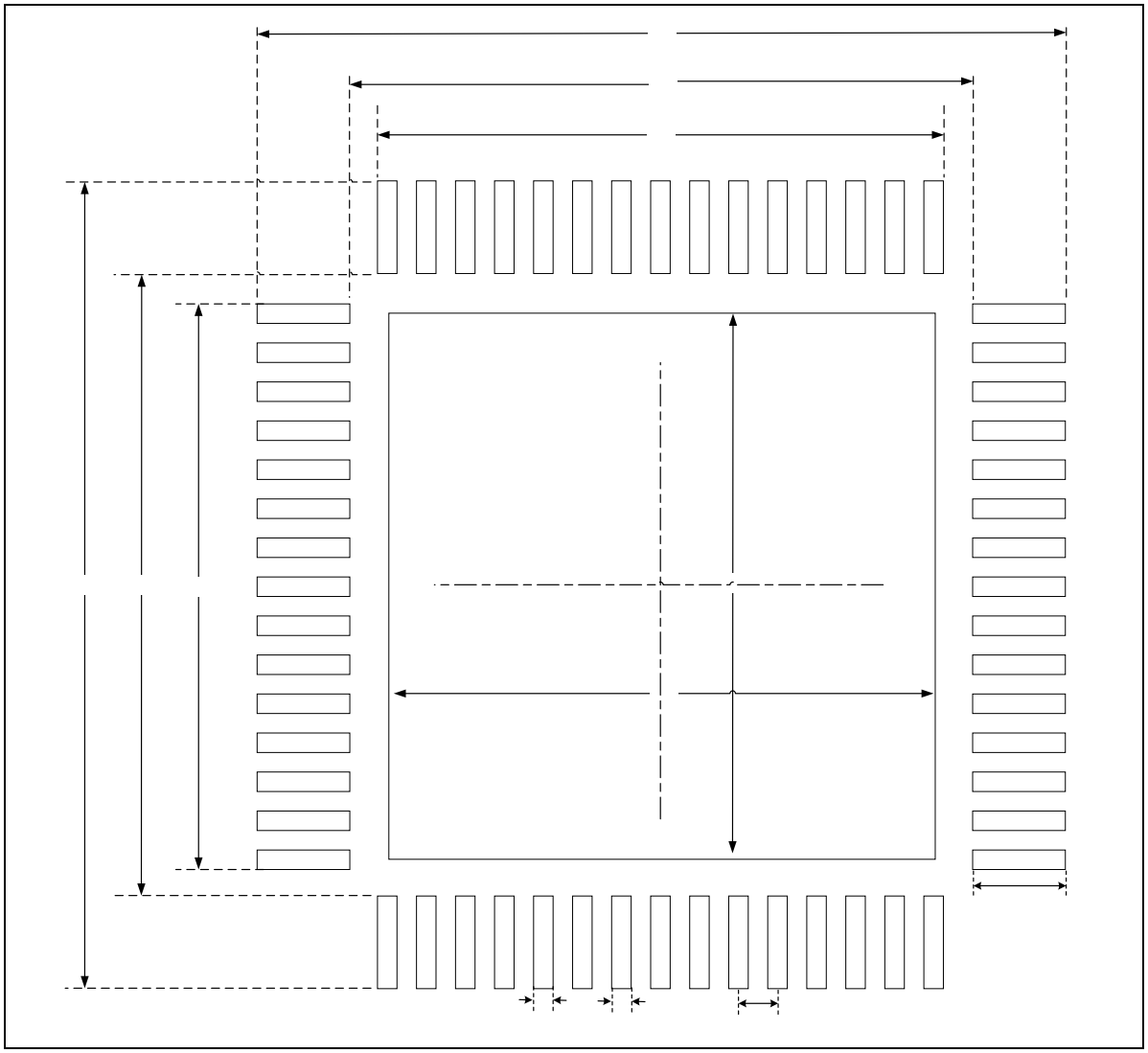
/4)3 P P P P



NOTE:

Dimensions are expressed in millimeters.

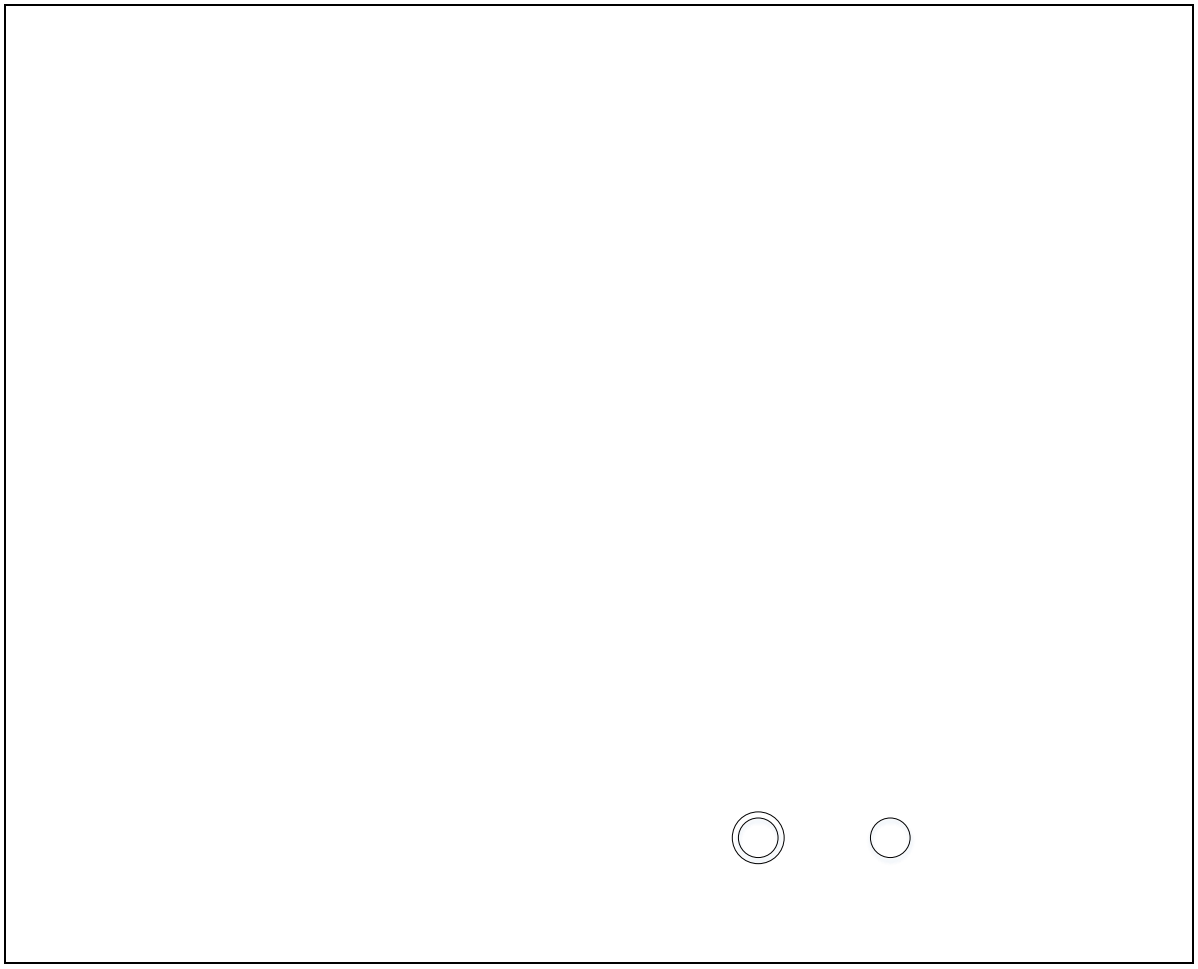
4)1 P P[P P



NOTE:

Dimensions are expressed in millimeters.

9) % * $ P P [P P



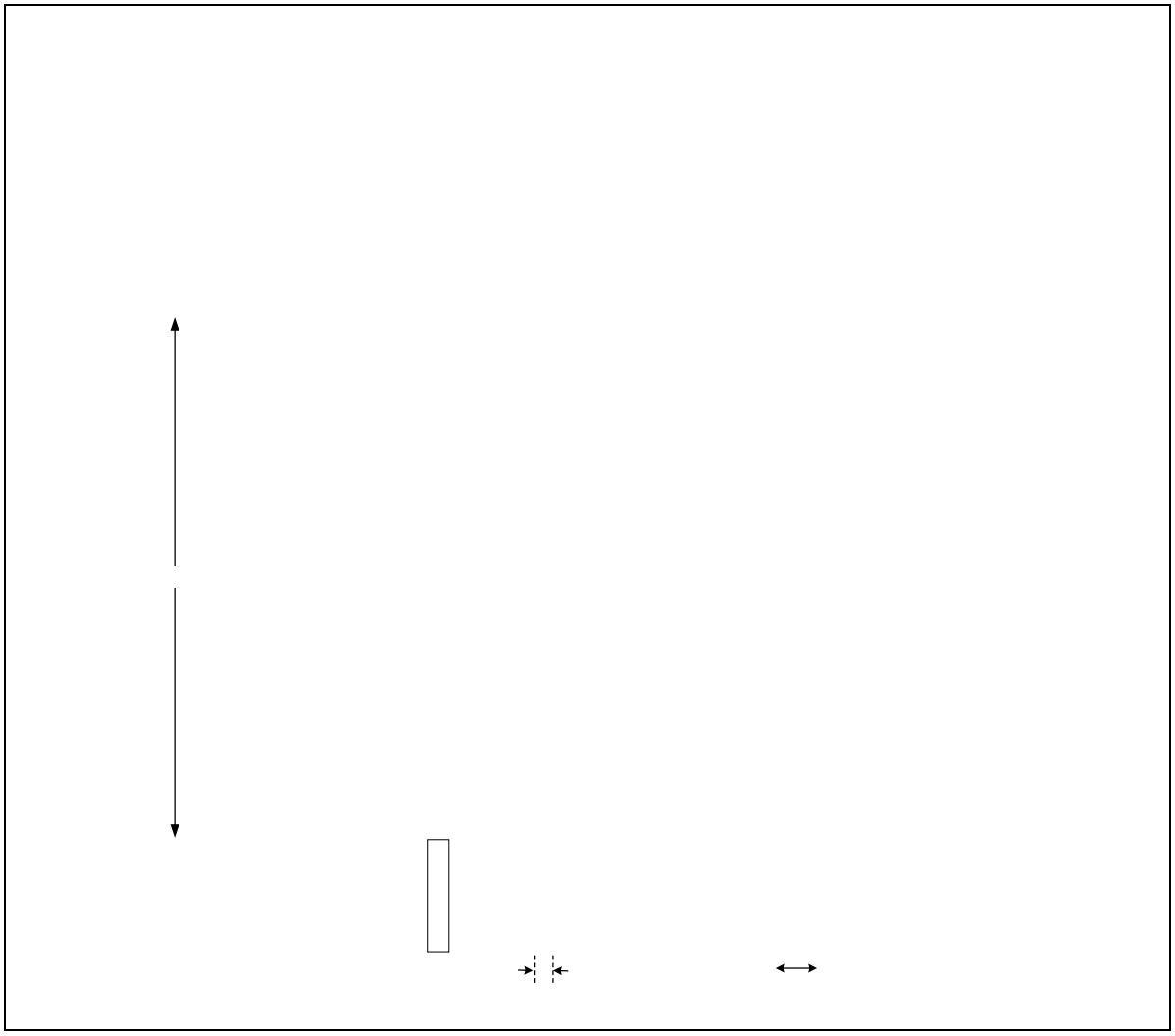
NOTE:

Dimensions are expressed in millimeters.

VBGA100 recommended PCB design rules(0.5mm pitch)

' L P H Q V L R Q	5 H F R P P HYQDGHXGH V
3L W F K	P P
' S D G	P P
' V P	P P W \S H S HRQQG W K H V R O G HRUQ DWRNO UHJ
6W H QRIS LHQ L Q J	P P
6W H QWFKLLOF N Q H V V	%H W Z H H QP PDQ G P P

4)1 P P[P P



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-D P E L H Q WJA 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		

5

Ý ÷ Á -	HC32F460JEUA-QFN48TR	HC32F460JETA-LQFP48	HC32F460KEUA-QFN60TR	HC32F460KETA-LQFP64	HC32F460PETB-LQFP100	HC32F460PEHB-VFBGA100	HC32F460JCTA-LQFP48	HC32F460KCTA-LQFP64	HC32F460PCTB-LQFP100
qNÇ(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				
FLASH(Ÿ*< Ö û	8	8	8	8	8				
0C] ↑ E	- \	- >û	- \	- >û	- >û	- >û	- >û	- >û	- >û

&

5HY		
5HY		.% 9)%*$ ƒ& PD[
5HY		1) &RUH0DUN '0,36 2) .% 3) 4) %2539' 5) -7$* 6:-
5HY		1) 4)1 $ F F 2) 0+] 0+] 3) 86%B'0$ 86%)6B'0$,!6,B6B $26 4) [+a [ )!+ [B a [B) [a [!) [B a [B) 5) $26 .(<6&$1 6) 7) Q) X) X) 8) 7,39' 7,39' 7,1567 75 756777$!27567325 9) &$1 % 10) 3// I3//B,1 0D[0+] 0+] -LWWHU 11) I;7$/B(;7 0+] 12) ;7$/ &/ &/ 13) ;7$/ &/ &/

¸ Ò Þ ^Cc ¦ D µ+^Eý0A c ? 1 ‹ E?÷ L 0Aä ¸B-LÅ , D G "6Š31 >

Email Æmcu@hdsc.com.cn

5‡ v Æhttp://www.hdsc.com.cn/mcu.htm

FP f v Æ @#- 8 #œ R æ p c0 D%867 - A Ý 10 x

Fä5L Æ201203