32 MCU
FS026x7L

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1

FS026x7L

(FS026x7L)

Cortex-M0 Cortex-M0 ARM (http://infocenter.arm.com)

2

FS026x7L ARM Cortex™-M0 32 RISC
72MHz 128Kbytes Flash 16Kbytes SRAM
2 I2C 1 SPI
I2S 2 SPI 4 UART 1 16 1 32 7 16
1 16 1 12 ADC 2

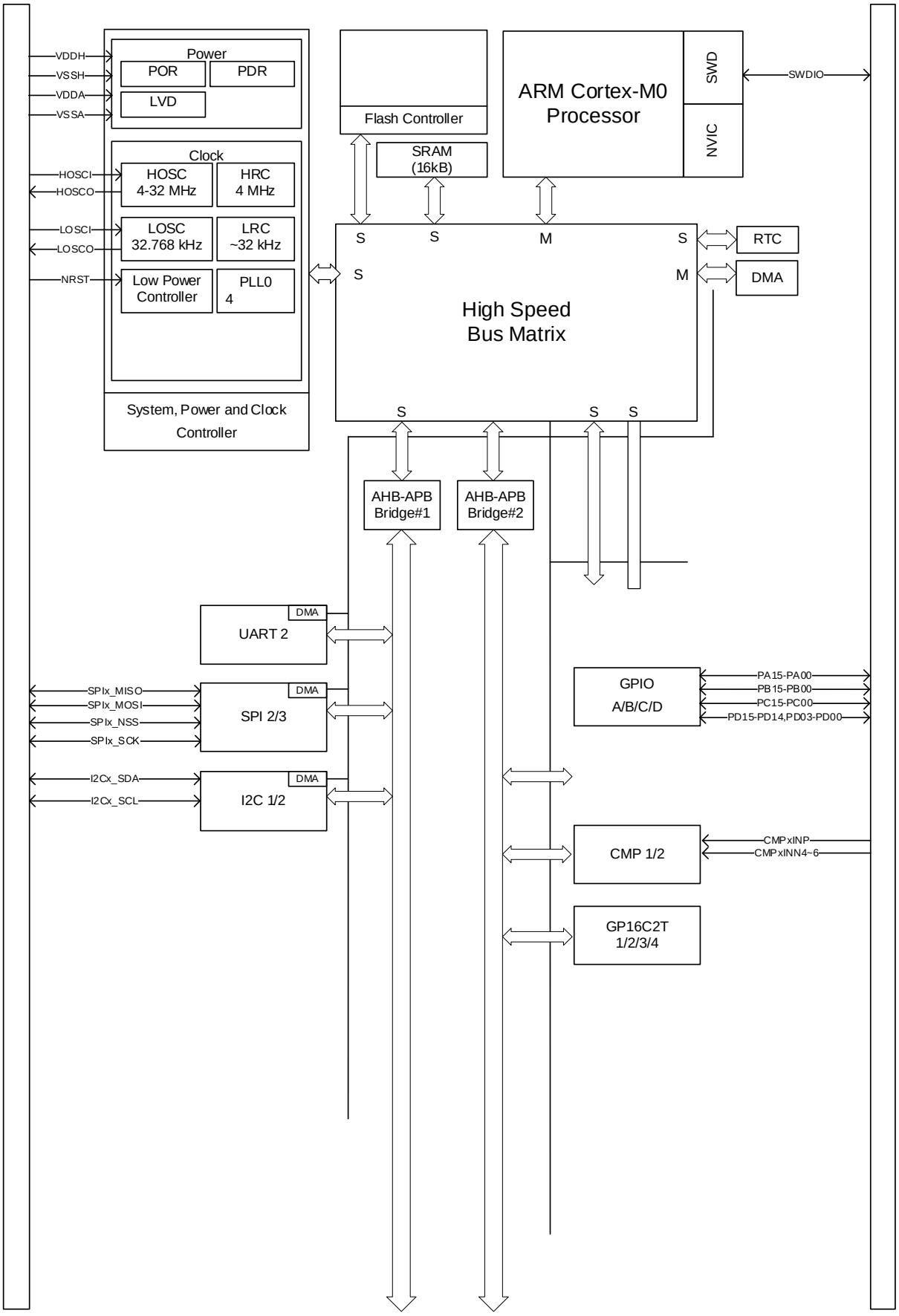
FS026x7L USB 2.0 / USB
USB
USB 4 Mhz 48 Mhz RC
48Mhz USB

FS026x7L 1.8V ~ 5.5V -40°C ~ +85°C

FS026x7L

2．1

	FS026C7L FS026C7N	FS026S7L FS026R7L
Flash (Kbytes)	128	128
SRAM(KBytes)	16	16
GPIO	Max: 38	Max: 54
12-bit ADC	1 (10 channels)	1 (16 channels)
CMP	2	2
DMA	6 channels	
CRC	1	
AES	1 (128 bits)	
CALC		


VDDH
VSSH
VDDA
VSSA
Power
POR
PDR
LVD
Clock
HOSCI
HOSCO
HOSC
4-32 MHz
HRC
4 MHz
LOSCI
LOSCO
LOSC
32.768 kHz
LRC
~32 kHz
NRST
Low Power
Controller
PLL0
4
System, Power and Clock
Controller
Flash Controller
SRAM
(16kB)
ARM Cortex-M0
Processor
SWD
NVIC
SWDIO
S
S
M
S
S
M
RTC
DMA
High Speed
Bus Matrix
S
S
S
AHB-APB
Bridge#1
AHB-APB
Bridge#2
DMA
UART 2
SPIx_MISO
SPIx_MOSI
SPIx_NSS
SPIx_SCK
DMA
SPI 2/3
I2Cx_SDA
I2Cx_SCL
DMA
I2C 1/2
GPIO
A/B/C/D
PA15-PA00
PB15-PB00
PC15-PC00
PD15-PD14,PD03-PD00
CMP 1/2
CMPxINP
CMPxINN4~6
GP16C2T
1/2/3/4

2．2

2．2．1 MCU

2．2．1．1 ARM Cortex-M0

◇ (NVIC) 32

◇

◇ - SysTick

◇

◇

◇ (SWD)

◇ CPU (SysTick)

◇ CPU (NVIC)

◇ CPU

2．2．1．2 NVIC

◇ 32

◇

◇

◇

◇

NVIC

2．2．1．3

- SysTick 24

(RTOS)

2．2．3．6 (DMA)

DMA(Direct Memory Access)

6 DMA DMA DMA

DMA

2．2．3．7 (PIS)

PIS(Peripheral Interaction System) PIS

CPU

2．2．3．8

(IWDT)

IWDT(Independent Watchdog)

IWDT

LRC

(WWDT)

WWDT(Window Watchdog) PCLK

WWDT

2．2．6

FS026x7L 10 28 PWM



2．2．6．2 32 4 (GP32C4T1)

◇ 32 /

◇ 16 1 65536

◇

–

–

– PWM ( )

–

◇

◇ DMA

◇ ( )

◇

◇

2．2．6．3 16 4 (GP16C4Tn n=1~3)

◇ 16 /

◇ 16 1 65536

◇

–

–

– PWM ( )

–

◇

◇ DMA

◇ ( )

◇

◇

2．2．6．4 16 2 (GP16C2Tn n=1~4)

◇ 16

◇ 16 1 65536

◇

–

–

– PWM

–

◇ 1

◇

◇

◇

◇ DMA

◇

2．2．6．5 (BS16T1)

◇ 16

◇ 16 1 65536

◇

◇

2．2．6．6 (RTC)

Real Time Clock (RTC) BCD

RTC RTC

2 32.768 KHz 32 KHz

RC RTC

RTC

2．2．7 (KBCU)

RGB PWM

PWM RGB LED

24

15 32

2.2.8

2.2.8.1 (UART)

(UART) MCU NRZ

I2S I2S

(MCLK) I2S Philips MSB LSB

PCM

SPI

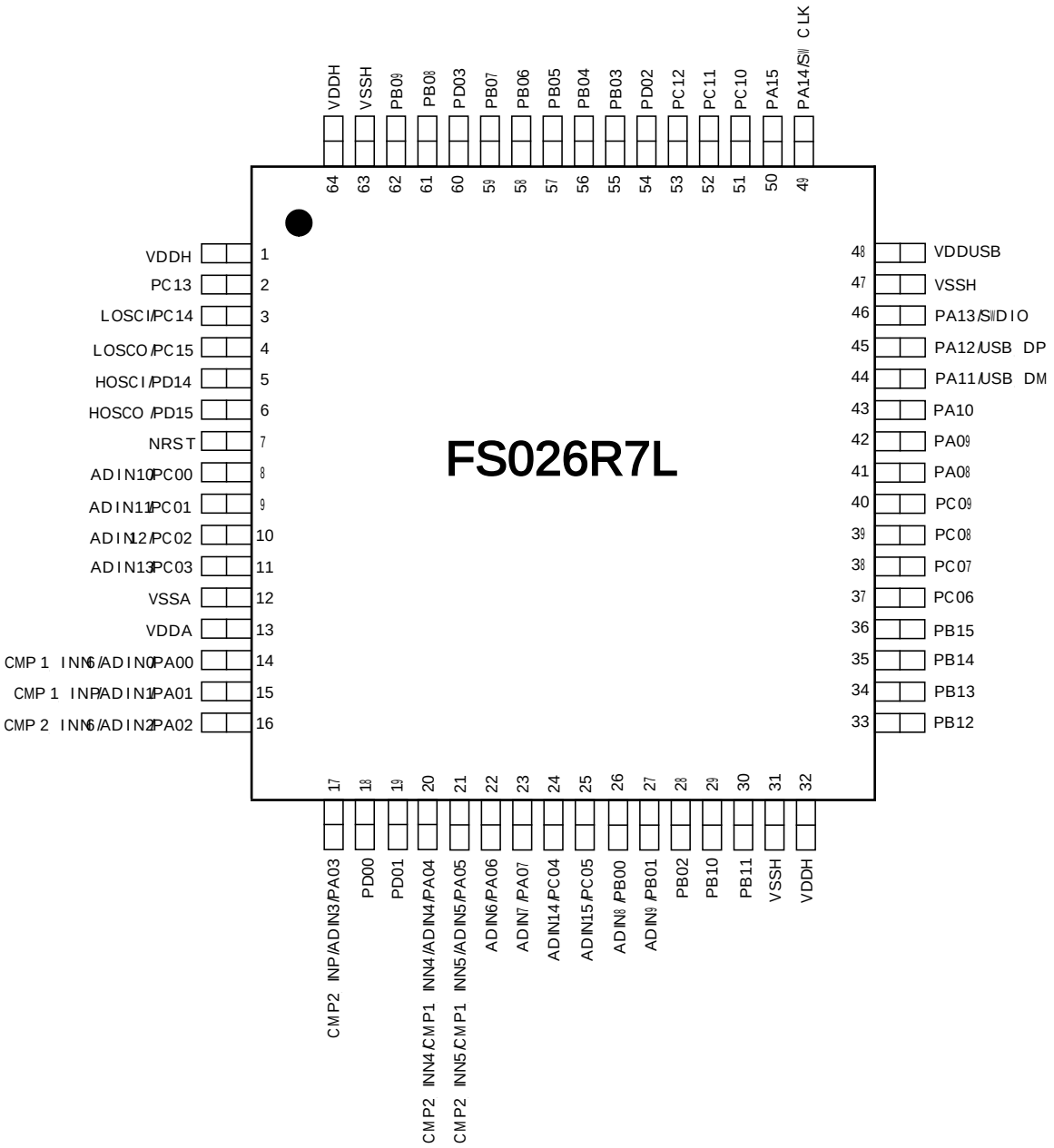
SPI1 SPI2 SPI3

SPI /	SPI1	SPI2	SPI3
Rx TxFIFO (N)[x 8]	16	4	4
I2S			

2-4 SPI

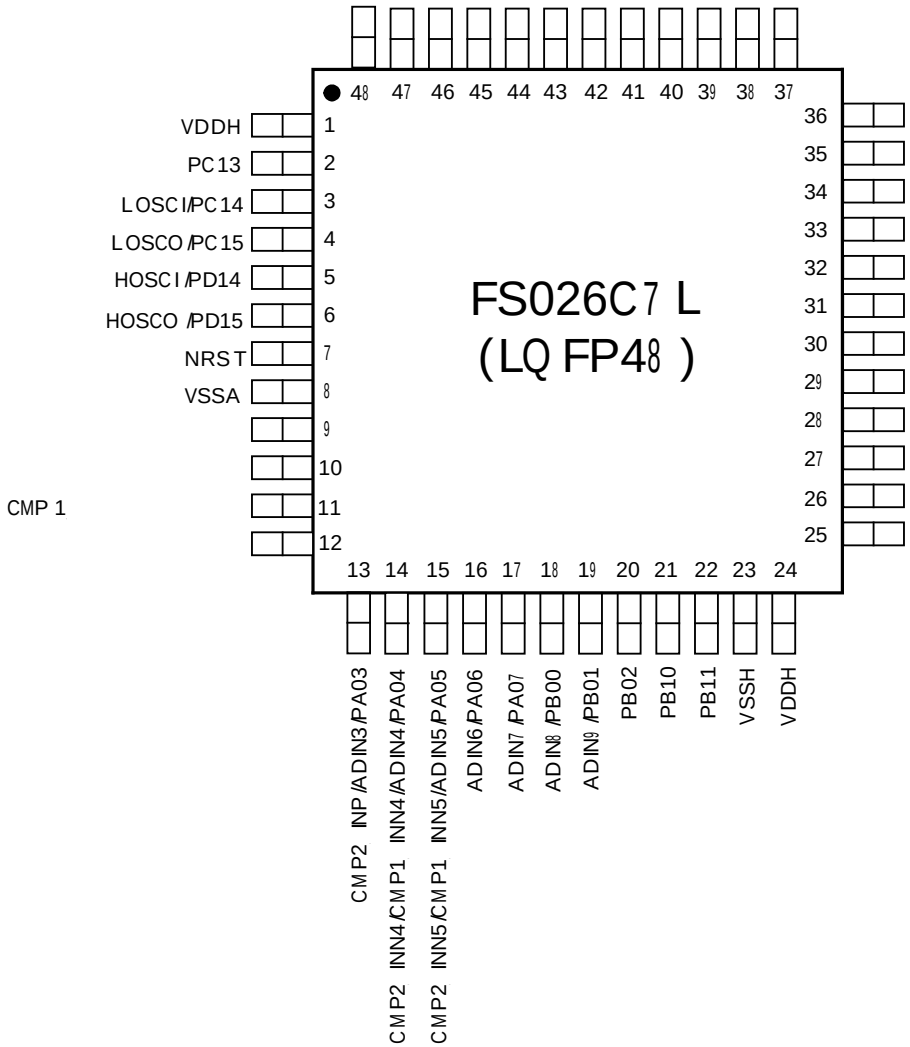
2．2．8．4 (CSU)

3.1.2 LQFP64 (10x10mm)

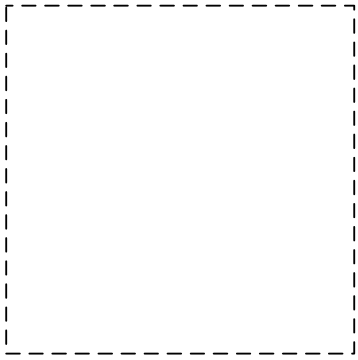


3-2 FS026R7L 64-Pin (10x10mm) LQFP

3.1.3 LQFP48 (7x7mm)



3．1．4 QFN48(5x 5mm)



3．2

LQFP64	LQFP48 /QFN48				
1	1	VDDH	P	POWER	
2	2	PC13	I/O	KBCU_COL13	—
3	3	PC14_LOSCI	I/O	KBCU_COL14	LOSCI
4	4	PC15_LOSCO	I/O	KBCU_COL15	LOSCO
5	5	PD14_HOSCI	I/O	KBCU_COL21 KBCU_COL23	HOSCI
6	6	PD15_HOSCO	I/O	KBCU_COL20 KBCU_COL22	HOSCO
7	7	NRST	A	—	NRST
8	—	PC00	I/O	SPI2_SCK UART4_TX	—

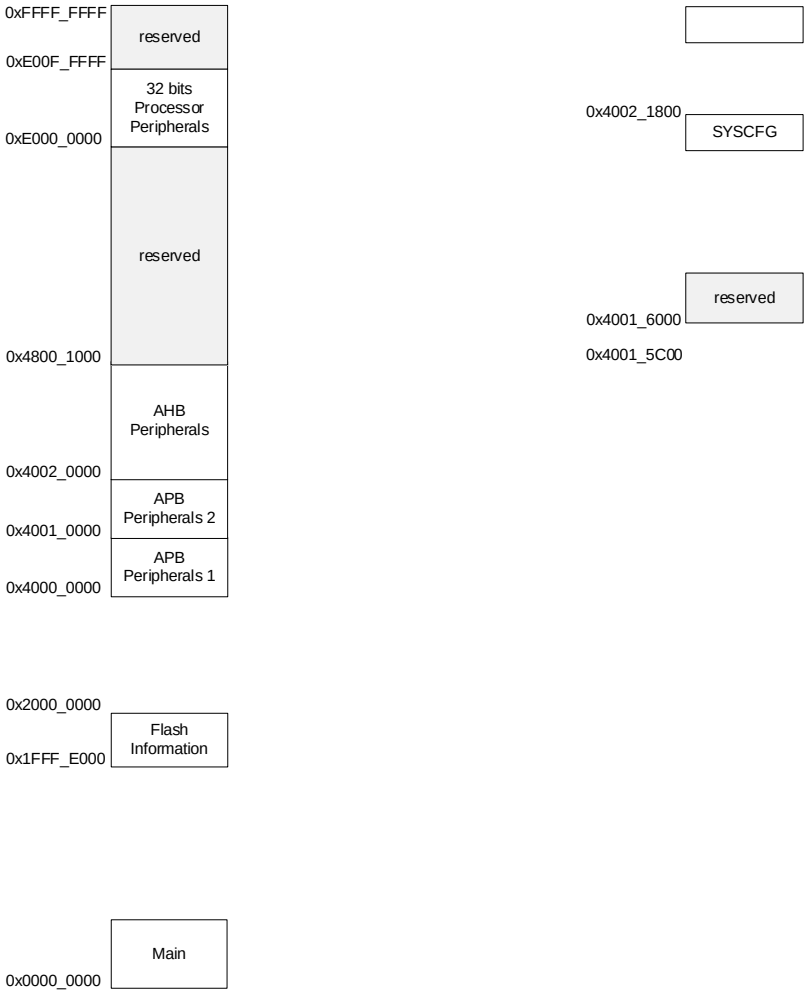
LQFP64	LQFP48 / QFN48				
				KBCU_ROW0_B	
17	13	PA03	I/O	SPI2_MISO I2C2_SDA UART2_RX1_ 0 0H0 021.134 Td [(UA)-Tc 0 Tw 5.5	

LQFP64	LQFP48 / QFN48				
				UART3_RX GP16C4T2_CH2 KBCU_COL7	
39	—	PC08	I/O	SPI3_MISO UART3_CTS GP16C4T2_ETR GP16C4T2_CH3 KBCU_COL8	—
40	—	PC09	I/O	SPI3_MOSI UART3_RTS GP16C4T1_ETR GP16C4T2_CH4 GP16C2T3_CH2 KBCU_COL9	—
41	29	PA08	I/O	I2S1_MCK CSU_SYNC UART1_CK GP16C2T3_CH1 AD16C4T1_CH1 MCO KBCU_ROW2_B	—
42	30	PA09	I/O	UART1_TX GP16C2T1_BKIN GP16C2T3_CH1N AD16C4T1_CH2 MCO KBCU_ROW3_R	—
43	31	PA10	I/O	USB_CID UART1_RX GP16C2T3_BKIN AD16C4T1_CH3 KBCU_ROW3_G	—
44	32	PA11	I/O	SPI1_MISO I2S1_SDI UART1_CTS AD16C4T1_CH4 CMP1_OUT	USB_DM
45	33	PA12	I/O	SPI1_MOSI I2S1_SDO UART1_RTS AD16C4T1_ETR CMP2_OUT	USB_DP
46	34	PA13	I/O	SWDIO USB_CID IR_OUT GP16C2T3_CH2 AD16C4T1_CH1 KBCU_COL22 KBCU_COL20	—
47	35	VSSH	G	GROUND	
48	36	VDDUSB	P	USB POWER	
49	37	PA14	I/O	SWCLK UART2_TX GP16C4T2_CH4 AD16C4T1_BKIN CMP1_OUT KBCU_COL23 KBCU_COL21	—
50	38	PA15	I/O	SPI1_NSS I2S1_WS	—

USB	USB_CID	USB ID
	USB_DP	USB D+
	USB_DM	USB D-
	CSU_SYNC	CSU
KEY/LED	KBCU_KEYy	KBCU KEYy , (y=0~6)
	KBCU_ROWy_R	KBCU ROWy LED PWM , (y=0~6)
	KBCU_ROWy_G	KBCU ROWy LED PWM , (y=0~6)
	KBCU_ROWy_B	KBCU ROWy LED PWM , (y=0~6)
	KBCU_COLy	KBCU COLy , (y=0~23)
	ADINy	ADC y , (y=0~15)
	CMPx_INP	CMPx , (x=1,2)
	CMPx_INNy	CMPx y, (x=1,2; y=n/a,4,5,6)
	CMPx_OUT	CMPx , (x=1,2)

3-2

4


0xFFFF_FFFF
reserved
0xE00F_FFFF
32 bits Processor Peripherals
0xE000_0000
reserved
0x4800_1000
AHB Peripherals
0x4002_0000
APB Peripherals 2
0x4001_0000
APB Peripherals 1
0x4000_0000
0x2000_0000
Flash Information
0x1FFF_E000
Main
0x0000_0000
0x4002_1800
SYSCFG
reserved
0x4001_6000
0x4001_5C00

5

5．1

5．1．1

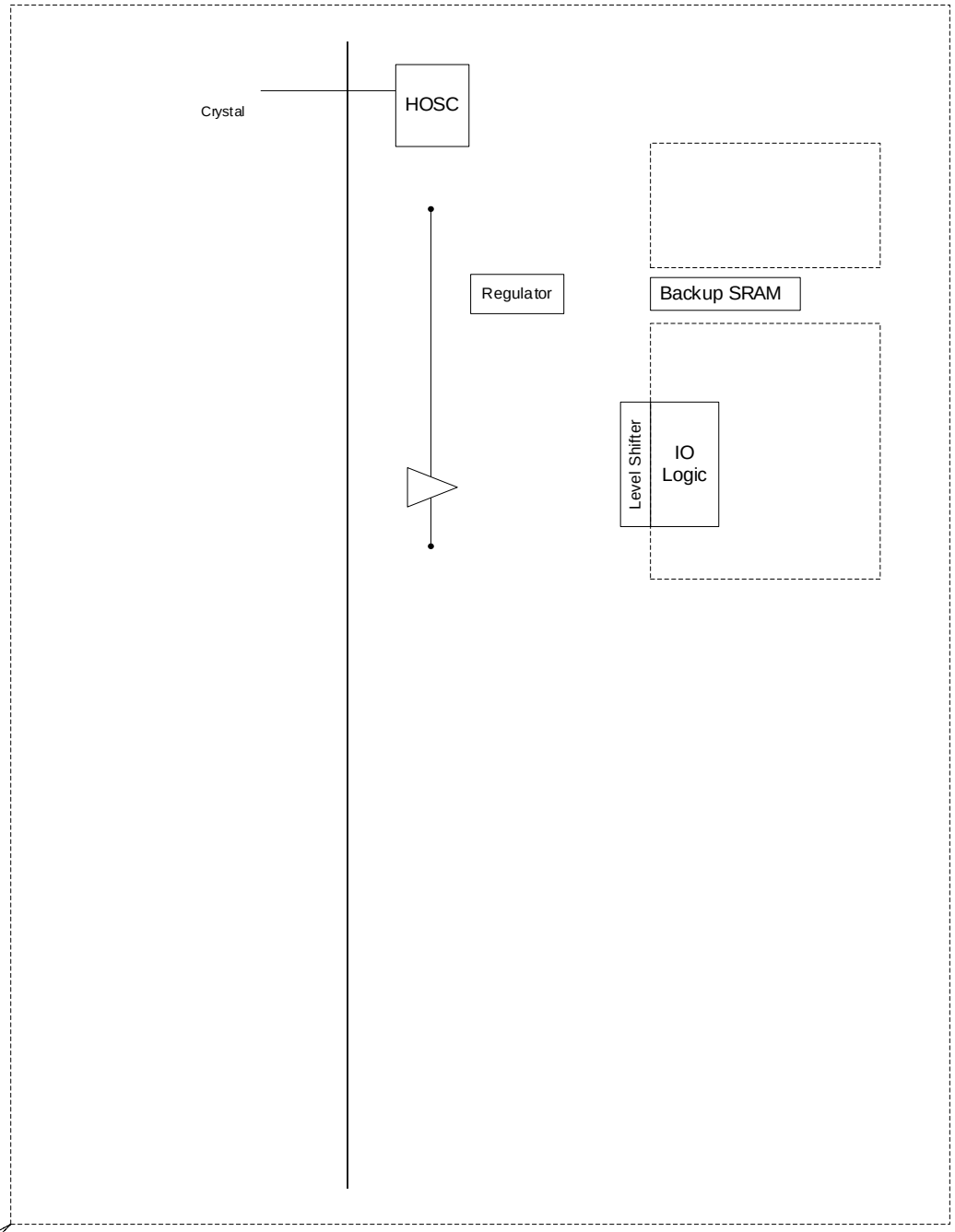
(

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T_A=25°C V_{DDH} =

V_{DDA} = 5V(1.8V ≤ V_{DDH} ≤ 5.5V)

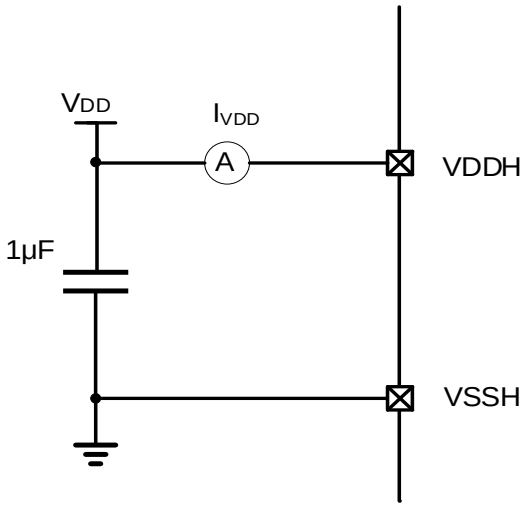
5．1．2



5．1．3

VDDH V_{DD}
GPIO

LED



5-2

5. 2

5. 2. 1

V_{DD}	(V_{DDH}, V_{DDA})	– 0.3	7.5	V

5．3

5．3．1

f_{HCLK}	AHB	–	–	72	MHz
f_{PCLK1}	APB1	–	–	72	MHz
f_{PCLK2}	APB2	–	–	72	MHz
V_{DDH}		–	1.8	5.5	V
V_{DDA}	(ADC)	$V_{DDA} \geq V_{DDH}$	V_{DDH}	5.5	V
	(ADC)		2.4	5.5	
T_A		–	-40	85	°C
T_J		–	–	125	°C

5-4

5．3．2

t_{VDDH}	V_{DDH}	–	0	∞	μs/V
	V_{DDH}	–	20	∞	
t_{VDDA}	V_{DDA}	–	0	∞	
	V_{DDA}	–	20	∞	

5-5

5．3．3

V

SRAM

STANDBY1

			T_A=25			T_A=85	
			1.8V	3.3V	5.0V	5.0V	

5.3.6

f_{HOSC}	HOSCI	–	1	–	32	MHz
V_{HOSC_HIGH}	HOSCI	–	0.7* V_{DDH}	–	V_{DDH}	V
V_{HOSC_LOW}	HOSCI	–	V_{SSH}	–	0.3* V_{DDH}	V

(/)

„ , (LOSC) 32.768 kHz

	_9‘ ˜D ¤ð €.					
f_{LOSC}		–	–	32.768	–	kHz
R_F		–	–	4,000	–	kΩ

g_m

5.3.7

4M RC

f_{HRC}		V_{DDH}=5V, T_A=25°C	3.98	4	4.04	MHz
ACC_{HRC}	HRC	T_A= 25°C	-0.5	–	1.0	%
		T_A= 0 to 70°C	-1.5	–	2.5	%
		T_A= – 40 to 85°C	-4.4	–	2.8	%
$t_{START(HRC)}$	HRC	–	–	8	–	µs
I_{DD}	HRC	–	–	45	–	µA

5-19 4M RC

48M RC

f_{HRC48}		V_{DDH}=5V, T_A=25°C	47.8	48	48.2	MHz
		T_A= 25°C	-2î ö 2î ö 2			

ACC_{HRC48} HRC48

5.3.8 PLL

f_{PLL_IN}	PLL	–	3	4	16	MHz
f_{PLL_OUT}	PLL	–	4	–	72	MHz
f_{VCO_OUT}	PLL VCO	–	256	–	576	MHz
t_{LOCK}(1)	PLL	VCO freq = 576 MHz	15	–	25	µs
$t_{START(PLL)}$(1)	PLL	VCO freq = 256 MHz	40	–	50	µs
		VCO freq = 576 MHz	40	–	60	
Jitter	PLL	RMS	–	341.5	–	ps
		peak to peak	–	1.36	–	ns
I_{DD}	PLL	f_{PLL_OUT} = 72MHz	–	–	1	mA

5-22 PLL

:

1.

5.3.9 FLASH

t_{PROG}	32	–	–	25	–	µs
t_{ERASE}		(page) = 512B	–	2	–	ms
		(sector)= 2KB(4 page)	–	2	–	ms
t_{ME}		RP=level 0, WP/UCRP	–	8	–	ms
		RP=level 0, WP/UCRP	2	–	126	ms
I_{DD}			–	1	–	mA
			–	1	–	mA
		Flash STANDBY	–	30	–	µA
		Flash STOP	–	10	–	µA
V_{PROG}		–	–	–	10	V
N_{END}	/	T_A = -40 to +85 °C	100000	–	–	Cycles

5．3．10 EMC

5．3．10．1 EMS

V_{FESD}	IO	V_{DDH}=5V LQFP64 TA=25 ° C f_{HCLK}=24MHz V_{DDH} 100nF/0603 IWDT IEC 61000-4-2	A
V_{EFT}		V_{DDH}=5V LQFP64 TA=25 ° C f_{HCLK}=24MHz V_{DDH} 100nF/0603 IWDT IEC 61000-4-4	A

5-24 EMS

5．3．11

5．3．11．1 (ESD)

$V_{ESD(HBM)}$	( )	T_A =25°C JEDEC EIA/JESD22-A114-B	Class 3A	4000	V
$V_{ESD(CDM)}$	( )	T_A =25°C JEDEC EIA/JESD22- C101-F	Class C3	2000	V

5-25

5．3．11．2 (LtchU)

LU		T_A=25°C JEDEC STANDARD JESD78E	Class I, Level A

5-26

5．3．12I O

IO DC

V_{IL}	I/O (CMOS)	T_A = -40 to +85 °C V_{DDH}=5V	–	–	0.3* V_{DDH}	V
	I/O (TTL)		–	–	0.8	V
V_{IH}	I/O (CMOS)		0.7* V_{DDH}	–	–	V
	I/O (TTL)		2	–	–	V
I_{IOLEAK}	I/O	$V_{SSH} \le V_{IN} \le V_{DDH}$	–	–	400	pA
R_{PU}	GPIO (USB)	$V_{IN} = V_{SSH}$	–	50	–	kΩ
R_{PD}	GPIO (USB)	$V_{IN} = V_{DDH}$	–	50	–	kΩ
$t_{IOGLITCH}$	I/O (FIR=1)	–	–	20	–	ns

I/O 4( )Ti
I/O ns253 Td (I/

IO AC

f_{IOOUT_MAX}		C_L= 50 pF,V_{DDH} > 2 V, (DS=0)	–	–	56	MHz
		C_L= 50 pF,V_{DDH} > 2 V, (DS=1)	–	–	72	MHz
t_{IOFALL}		C_L= 50 pF,V_{DDH} > 2 V, (DS=0)	–	–	4	ns
		C_L= 50 pF,V_{DDH} > 2 V, (DS=1)	–	–	3.7	ns
t_{IORISE}		C_L= 50 pF,V_{DDH} > 2 V, (DS=0)	–	–	7	ns
		C_L= 50 pF,V_{DDH} > 2 V, DS=1	–	–	4.2	ns
$t_{IOPULSE}$	EXTI					

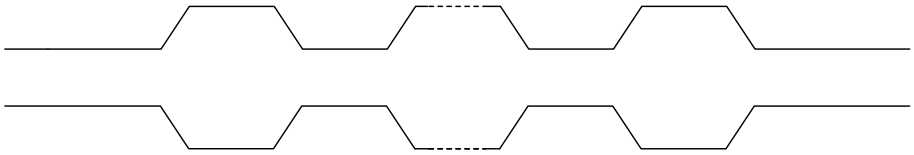
5.3.12.1I/O

5. 3. 12. 2I/O (DS=1)

5-7 I_{OL}, V_{OL}

5.3.13 NRST





5．3．15．3USB FS

5．3．16 ADC

V_{DDA}		–	2.4	–	5.5	V
V_{REFP}	ADC	$V_{DDA} = V_{REFP}$	2.4	–	5.5	V
I_{ADC}	ADC	V_{DDA}=5V	–	1.5	–	mA
f_{ADC}	ADC	–	0.6	–	12	MHz
f_S		12	–	–	0.8571	MHz
		10	–	–	1	
		8	–	–	1.2	
		6	–	–	1.5	
f_{TRIG}		f_{ADC} = 12 MHz	–	–	823	kHz
		–	–	–	17	$1/f_{ADC}$
V_{AIN}		–	37	–	V_{REFP}-50	mV
R_{AIN}		–	–	–	277.67	kΩ
R_{ADC}		–	–	1.18	–	kΩ
C_{ADC}		–	–	8.5	–	pF
t_{CAL}		f_{ADC} = 12MHz	–	3.42	–	μs
t_S		f_{ADC} = 12MHz	0.125	–	21.375	μs
		–	1.5	–	256.5	$1/f_{ADC}$
t_{START}		f_{ADC} = 12MHz	–	1.75	–	μs
t_{CONV}	( )	f_{ADC} = 12 MHz 12	1.1667	–	22.417	μs
		12	14 269 (t_S + 12.5 12.5)			$1/f_{ADC}$
ERR_{DNL}		f_{ADC}=12MHz	–	±3	–	LSB
ERR_{INL}		f_{ADC}=12MHz	–	±10	–	LSB

5-34 ADC

R_{AIN}

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

Ts ( ) t_s V #—p

5．3．19

V_{REFINT}(1)	(BandGap)	T_A=-40 to +85 , V_{DDA}=5V	1.20	1.22	1.24	V
V_{RESSRC}(2)		RESEN=1, RESSRC=0	–	V_{REFINT}	–	V
		RESEN=1, RESSRC=1	–	V_{DDA}	–	V
V_{RES}(3)		VRESSEL=000, ADIN18/CMPx_INN	–	1/4	–	V_{RESSRC}
		VRESSEL=001, ADIN18/CMPx_INN	–	1/2	–	
		VRESSEL=010, ADIN18/CMPx_INN	–	3/4	–	
		VRESSEL=011, ADIN18/CMPx_INN	–	1	–	
		VRESSEL=100, ADIN18	–	1/16	–	
		VRESSEL=101, ADIN18	–	15/16	–	

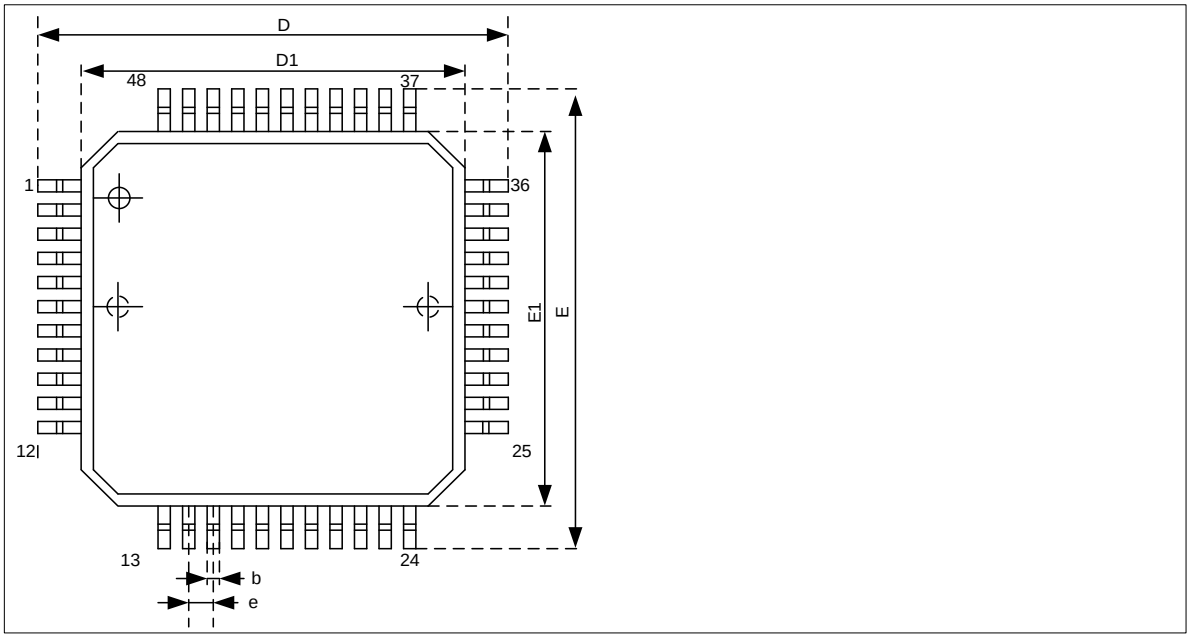
5 38

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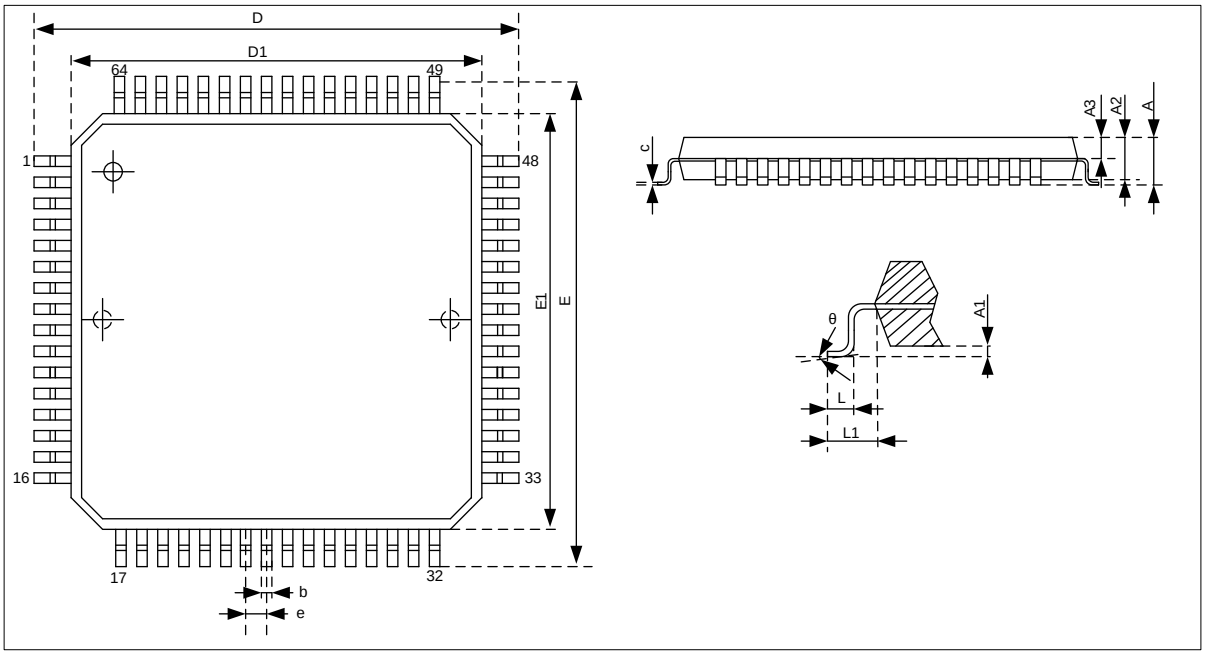
1. V_{REFINT} ADIN17 ADC SYSCFG_ADCVREF VDDA
2. V_{RESSRC} V_{REFINT} V_{DDA} SYSCFG_PWR.RESSRC
3. V_{RES} 6 ADIN18 CMP1_INN CMP2_INN ±0.8%

6

6.1 LQFP48 (7x7mm)

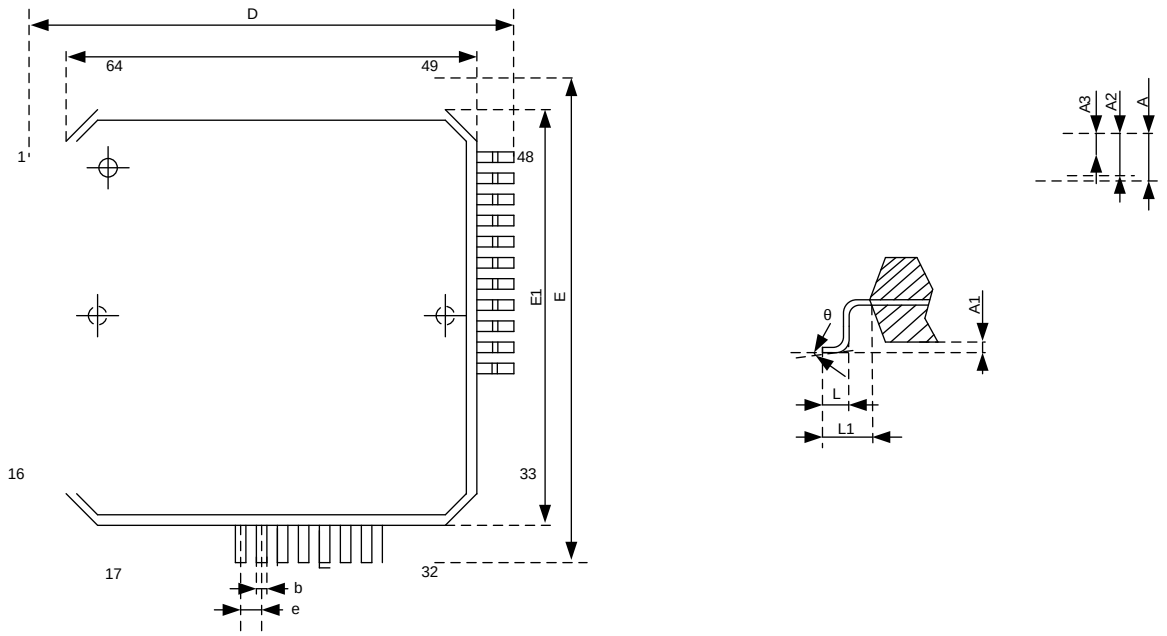


6．2 LQFP64（7x7mm）

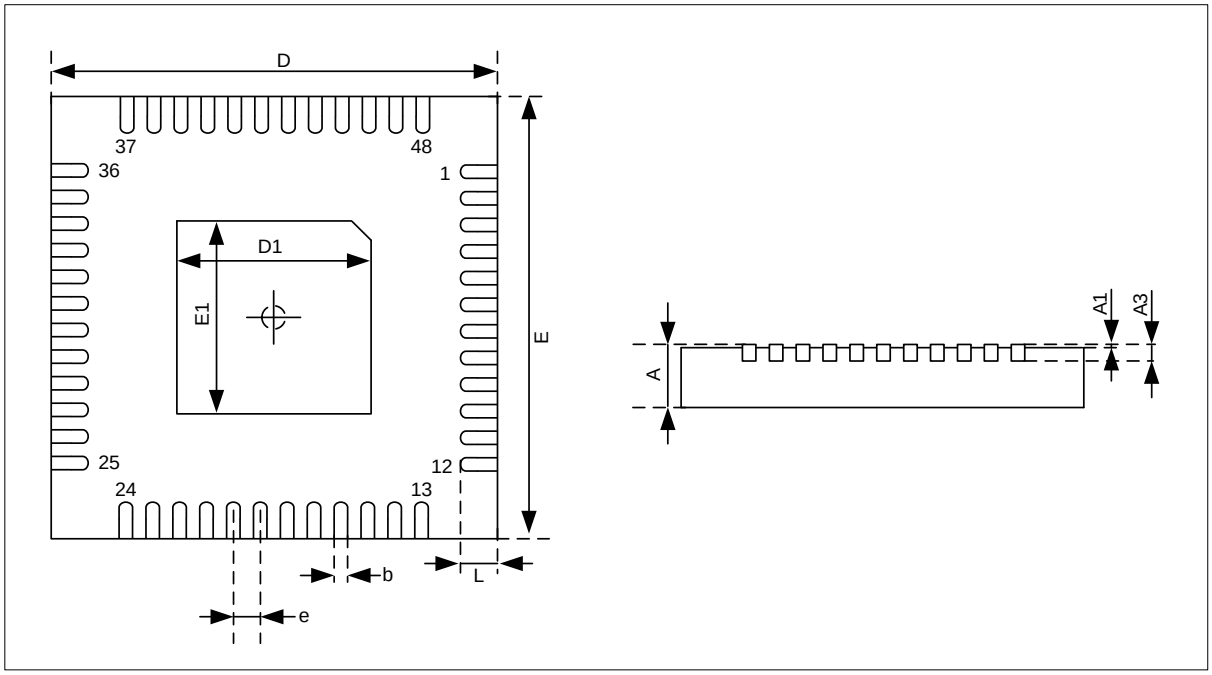


6-2 LQFP64(7x7mm)

6．3 LQFP64（10x 10mm）



6．4 QFN48（5x5mm）



6-4 QFN 48(5x5mm)

	mm		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
A3	0.203 REF		
D	5.00 BSC		
D1	3.60	3.70	3.80
E	5.00 BSC		
E1	3.60	3.70	3.80

3.60 5

V1.0	2022-12-02	
V1.1	2023-04-17	5.3.16
	2023-05-05	Bootloader Bootrom
	2023-05-23	1. ADC V_{AIN} 2.
V1.2	2023-06-30	HRC V_{REFINT}
	2023-07-04	SPI
V1.3	2024-07-16	“ 2-1 ” SPI
V1.4	2024-11-08	1. FS026C7N 2. 3.