



HY17P55

Datasheet

8-Bit RISC-like Mixed Signal Microcontroller

Embedded 4x14 LCD Driver

18-Bit $\Sigma\Delta$ ADC

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- 8、本規格書中內容，未經本公司許可，嚴禁用於其他目的之轉載或複製。

1. 特點

- 8 位元加強型精簡指令集，共有 71 個指令包含硬體乘法指令及查表指令 H08D
- 2.2V to 5.5V 工作電壓範圍，-40°C~85°C 工作溫度範圍。
- 支援外部石英震盪器 1MHz~16MHz /32768Hz 及內部高精度 RC 震盪器 1.843MHz/3.686MHz/7.834MHz Mode 多種 CPU 工作時脈切換選擇，可讓使用者達到最佳省電規劃
 - 運行模式
 - 待機模式
 - 休眠模式
- 4KWord OTP Type 程式記憶體，256Byte 資料記憶體
- Brownout detector 及 Watch dog Timer，可防止 CPU 進入死機模式。
- 4x14 LCD 液晶驅動器
 - 1/4 Duty、1/3 Bias
 - 內建 Charge Pump 穩壓線路，可提供多種 LCD 偏壓
 - 18 個 LCD 埠可設定數位輸入輸出埠
- LVD 低電壓檢測功能具 14 段檢測電壓設置與外部輸入電壓檢測功能
- 類比電壓源 VDDA 具 10mA 穩壓電壓源輸出，快速啟動功能，可提供傳感器驅動電壓
- 24-Bit $\Sigma\Delta$ ADC 類比數位轉換器
 - 梳狀濾波器採二階/三階設計，轉換頻率達 7.2Ksps
 - 取樣頻率 460KHz
 - 超取樣頻率設置 64 ~ 16384
 - 全差動輸入信號、測量範圍零點調整
 - 內置 PGA(Programmable Gain Amplifier)有 1/4 ~ 128 倍輸入信號放大倍率選擇
 - 內置絕對溫度感測器
- 8-bit Timer A1
- 16-bit Timer B 模組具 Compare/PWM 功能
- 串列通訊 EUART，I²C 模組
- Built-In EPROM (BIE)，內建 2.75V 低壓燒錄控制電路
- Support 8 stack Level.

2.2. I/O 定義與說明

LQFP48 引腳編號	引腳名稱	引腳特性		功能說明
		格式	緩衝	
1	SDRV2/AI15			
	SDRV2	O	P	傳感器驅動
	AI15	A	A	類比輸入通道
3	VSS	P	P	晶片工作電壓源接地端
4	RST/VPP			
	RST	I	S	復位晶片
	VPP	P	P	OTP 讀/寫時的電壓源
5	PT1.0/INT1.0/PSCK/SCL			
	PT1.0	I/O	S/C	數位輸入/輸出
	INT1.0	I	S	中斷源 E0IF
	PSCK	I	S	OTP 讀/寫介面接口
	SCL	I/O	S	I2C 通訊介面引腳
6	PT1.1/INT1.1/PSDI/TBI0			
	PT1.1	I/O	S/C	數位輸入/輸出
	INT1.1	I	S	中斷源 E1IF
	PSDI	I	S	OTP 讀/寫介面接口
	TBI0	I	S	TimerB 置能引腳
7	PT1.2/INT1.2/LVDIN			
	PT1.2	I/O	S/C	數位輸入/輸出
	INT1.2	I	S	中斷源 E2IF
	LVDIN	A	A	LVD 外部信號輸入接口
8	PT1.3/INT1.3/RC			
	PT1.3	I/O	S/C	數位輸入/輸出
	INT1.3	I	S	中斷源 E3IF
	RC	I	S	EUART1 通訊介面接口
9	PT1.4/INT1.4/TX			
	PT1.4	I/O	S/C	數位輸入/輸出
	INT1.4	I	S	中斷源 INTF1.4
	TX	O	C	EUART1 通訊介面接口
10	PT1.5/INT1.5/PSDO/TBI1			
	PT1.5	I/O	S/C	數位輸入/輸出
	INT1.5	I	S	中斷源 INTF1.5
	PSDO	O	C	OTP 讀/寫介面接口
	TBI1	I	S	TimerB 置能引腳

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LQFP48 引腳編號	引腳名稱	引腳特性		功能說明
		格式	緩衝	
11	PT1.6/INT1.6/SCK			
	PT1.6	I/O	S/C	數位輸入/輸出
	INT1.6	I	S	中斷源 INTF1.6
	SCK	I/O	S	SPI 通訊介面接口
12	PT1.7/INT1.7/BZ/SDA			
	PT1.7	I/O	S/C	數位輸入/輸出
	INT1.7	I	S	中斷源 INTF1.5
	BZ	O	C	蜂鳴器輸出端
SDA	I/O	S	I2C 通訊介面引腳	
19	PT8.1/SEG15			
	PT8.1	I/O	S/C	數位輸入/輸出
20	SEG15	O	A	LCD Segment 輸出
	PT8.0/SEG14			
21	PT8.0	I/O	S/C	數位輸入/輸出
	SEG14	O	A	LCD Segment 輸出
22	PT7.7/SEG13			
	PT7.7	I/O	S/C	數位輸入/輸出
23	SEG13	O	A	LCD Segment 輸出
	PT7.6/SEG12			
24	PT7.6	I/O	S/C	數位輸入/輸出
	SEG12	O	A	LCD Segment 輸出
25	PT7.5/SEG11			
	PT7.5	I/O	S/C	數位輸入/輸出
26	SEG11	O	A	LCD Segment 輸出
	PT7.4/SEG10			
27	PT7.4	I/O	S/C	數位輸入/輸出
	SEG10	O	A	LCD Segment 輸出
28	PT7.3/SEG9			
	PT7.3	I/O	S/C	數位輸入/輸出
29	SEG9	O	A	LCD Segment 輸出
	PT7.2/SEG8			
30	PT7.2	I/O	S/C	數位輸入/輸出
	SEG8	O	A	LCD Segment 輸出
31	PT7.1/SEG7			
	PT7.1	I/O	S/C	數位輸入/輸出
32	SEG7	O	A	LCD Segment 輸出

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LQFP48 引腳編號	引腳名稱	引腳特性		功能說明
		格式	緩衝	
28	PT7.0/SEG6	I/O	S/C	數位輸入/輸出
	PT7.0	O	A	LCD Segment 輸出
	SEG6			
29	PT6.7/SEG5	I/O	S/C	數位輸入/輸出
	PT6.7	O	A	LCD Segment 輸出
	SEG5			
30	PT6.6/SEG4	I/O	S/C	數位輸入/輸出
	PT6.6	O	A	LCD Segment 輸出
	SEG4			
31	PT6.5/SEG3	I/O	S/C	數位輸入/輸出
	PT6.5	O	A	LCD Segment 輸出
	SEG3			
32	PT6.4/SEG2	I/O	S/C	數位輸入/輸出
	PT6.4	O	A	LCD Segment 輸出
	SEG2			
33	PT6.3/COM3	I/O	S/C	數位輸入/輸出
	PT6.3	O	A	LCD COM 輸出
	COM3			
34	PT6.2/COM2	I/O	S/C	數位輸入/輸出
	PT6.2	O	A	LCD COM 輸出
	COM2			
35	PT6.1/COM1	I/O	S/C	數位輸入/輸出
	PT6.1	O	A	LCD COM 輸出
	COM1			
36	PT6.0/COM0	I/O	S/C	數位輸入/輸出
	PT6.0	O	A	LCD COM 輸出
	COM0			
37	VLCD	P	P	LCD 的電壓源
38	VDD	P	P	晶片工作電壓源
39	PT2.0/INT2.0/XTO	I/O	S/C	數位輸入/輸出
	PT2.0	I	S	中斷源 INTF2.0
	INT2.0			
	XTO	A	A	外接振盪器輸出端
40	PT2.1/INT2.1/XTI	I/O	S/C	數位輸入/輸出
	PT2.1	I	S	中斷源 INTF2.1
	INT2.1			

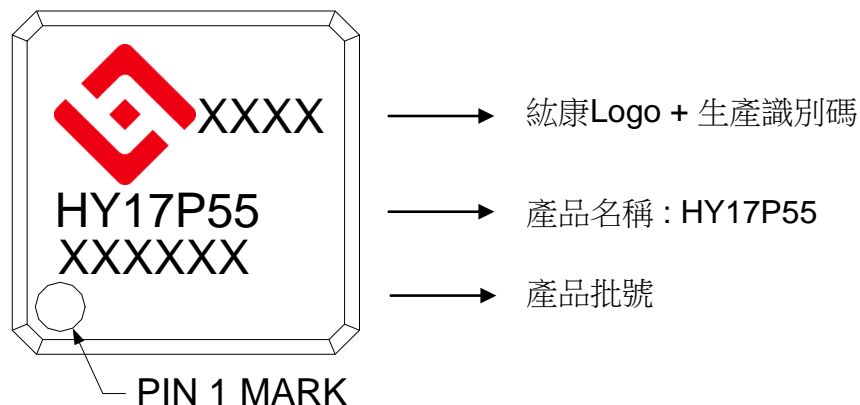
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LQFP48 引腳編號	引腳名稱	引腳特性		功能說明
		格式	緩衝	
	XTI	A	A	外接振盪器輸入端
41	PT2.2/INT2.2/PWM0 PT2.2 INT2.2 PWM0	I/O I O	S/C S C	數位輸入/輸出 中斷源 INTF2.2 PWM0 輸出接口
42	PT2.3/INT2.3/PWM1/TBI2 PT2.3 INT2.3 PWM1 TBI2	I/O I O I	S/C S C S	數位輸入/輸出 中斷源 INTF2.3 PWM1 輸出接口 TimerB 置能引腳
43	VDDA	P	P	穩壓器輸出・類比電路電壓源
44	AI0	A	A	類比輸入通道
45	AI1	A	A	類比輸入通道
46	SDRV1/AI14 SDRV1 AI14	O A	P A	傳感器驅動 類比輸入通道
47	AI2	A	A	類比輸入通道
48	AI3	A	A	類比輸入通道
Others	NC	-	-	未使用(不可連接)

2.3. 封裝片標記信息

2.3.1. LQFP 封裝片標記信息



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3. 應用電路

3.1. 橋式感測器 LCD 顯示

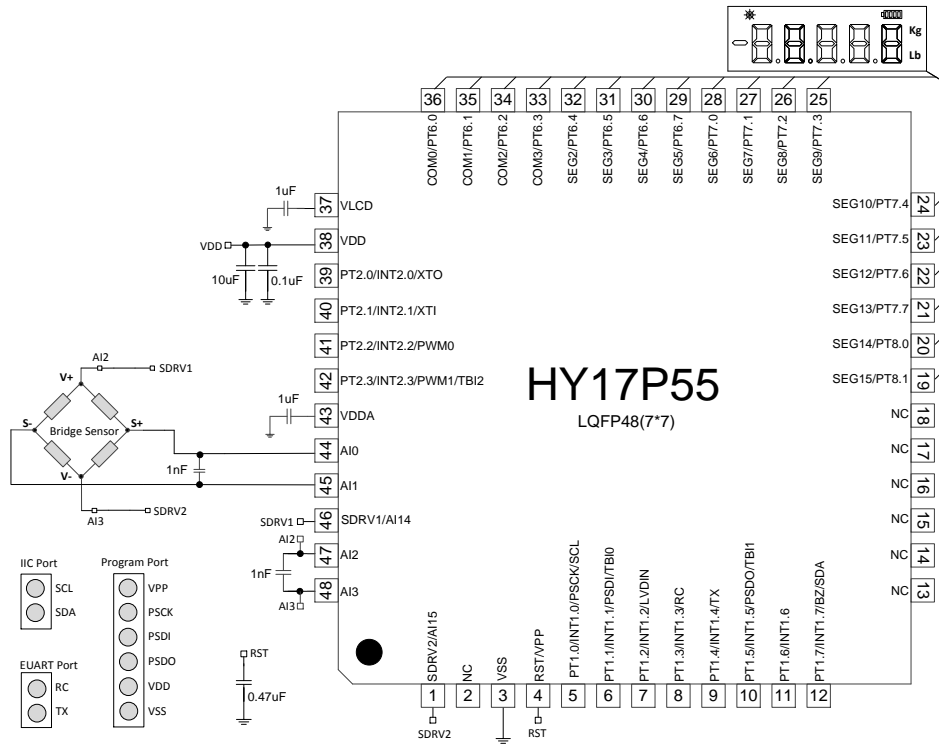


圖 3-1 橋式感測器 LCD 顯示應用電路

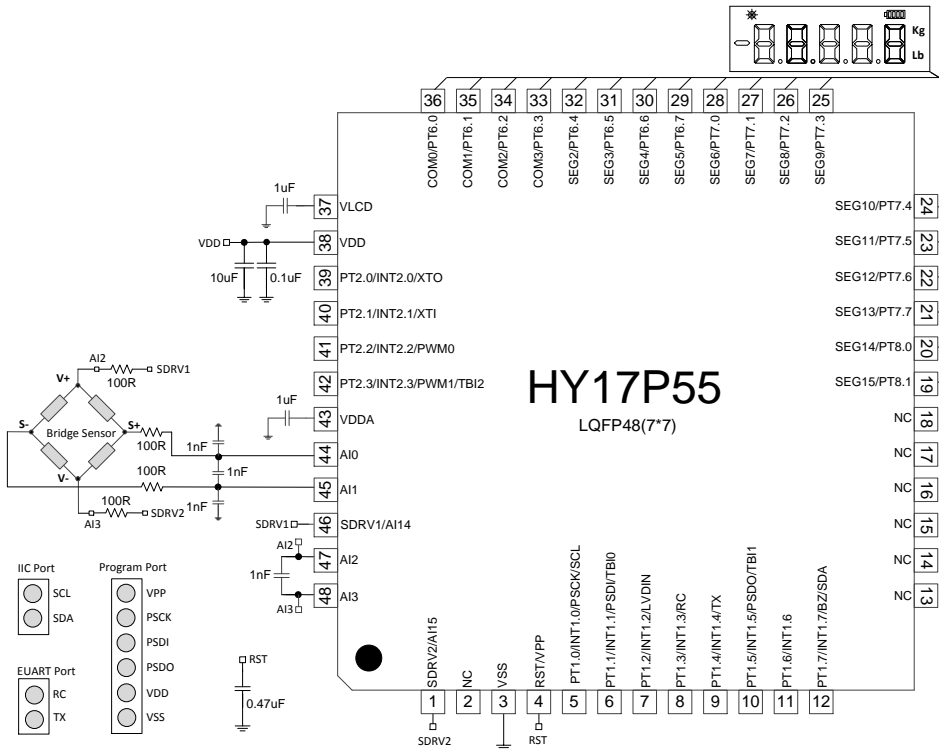


圖 3-2 橋式感測器 LCD 顯示應用電路-增強 RS 抗干擾能力

4. 功能概述

4.1. 內部方塊圖

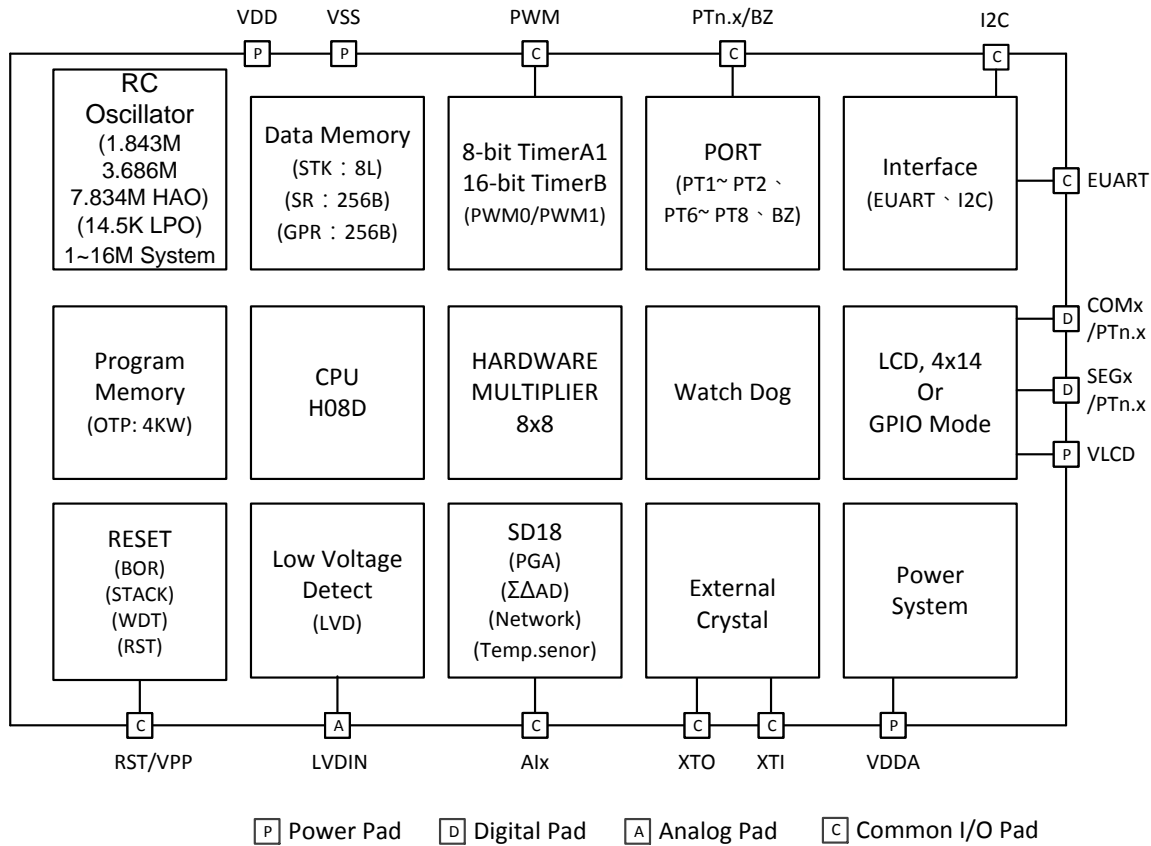


圖 4-1 HY17P55 內部方塊圖

4.2. 相關說明與支援文件

晶片功能相關使用說明書

DS-HY17P55

HY17P55 說明書

UG-HY17S58

HY17S58 使用說明書

APD-CORE005

H08D 指令集說明書

開發工具相關使用說明書

APD-HY17PIDE001

HY17P 系列開發工具軟體使用說明書

APD-HY17PIDE002

HY17P 系列開發工具硬體使用說明書

APD-OTP005

OTP 燒錄引腳資訊

產品生產相關使用說明書

APD-HY17PIDE004

HY17P 系列生產線專用燒錄器說明書

4.3. Clock System

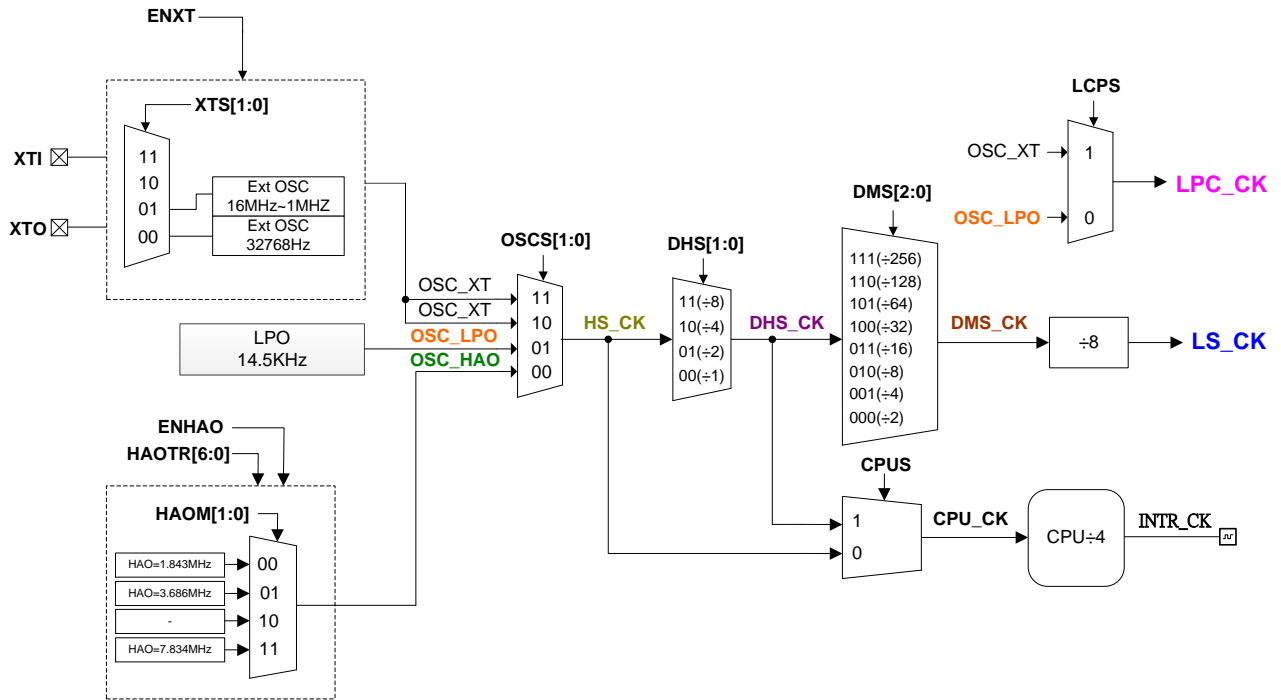


圖 4-2 Clock System 方塊圖(一)

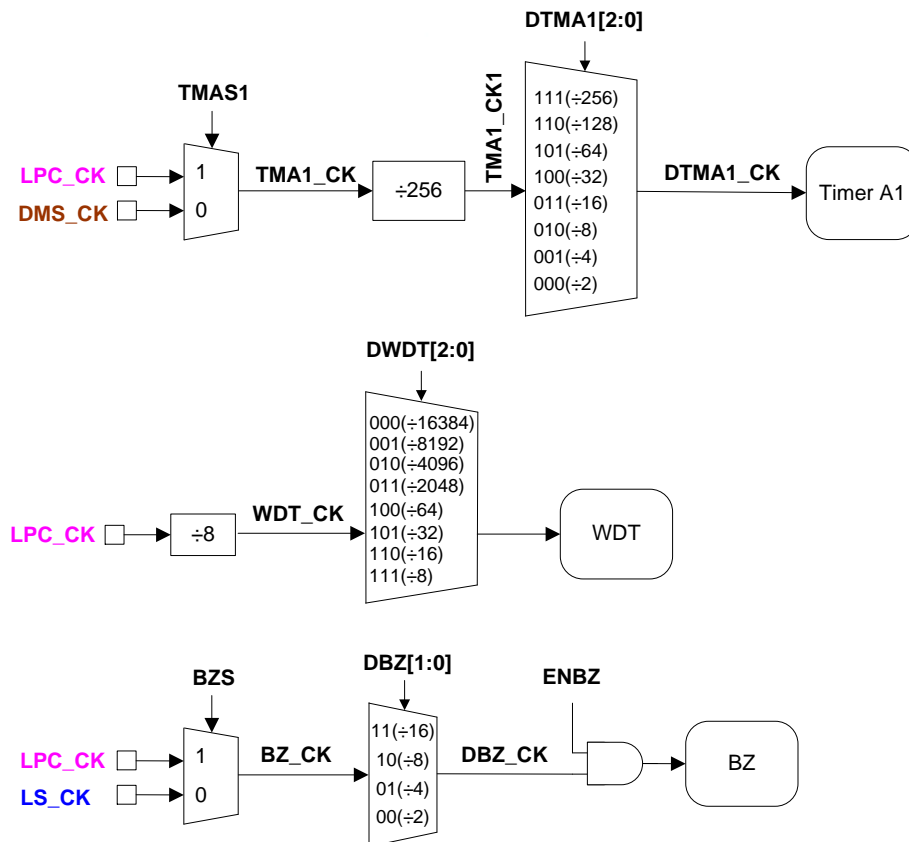


圖 4-3 Clock System 方塊圖(二)

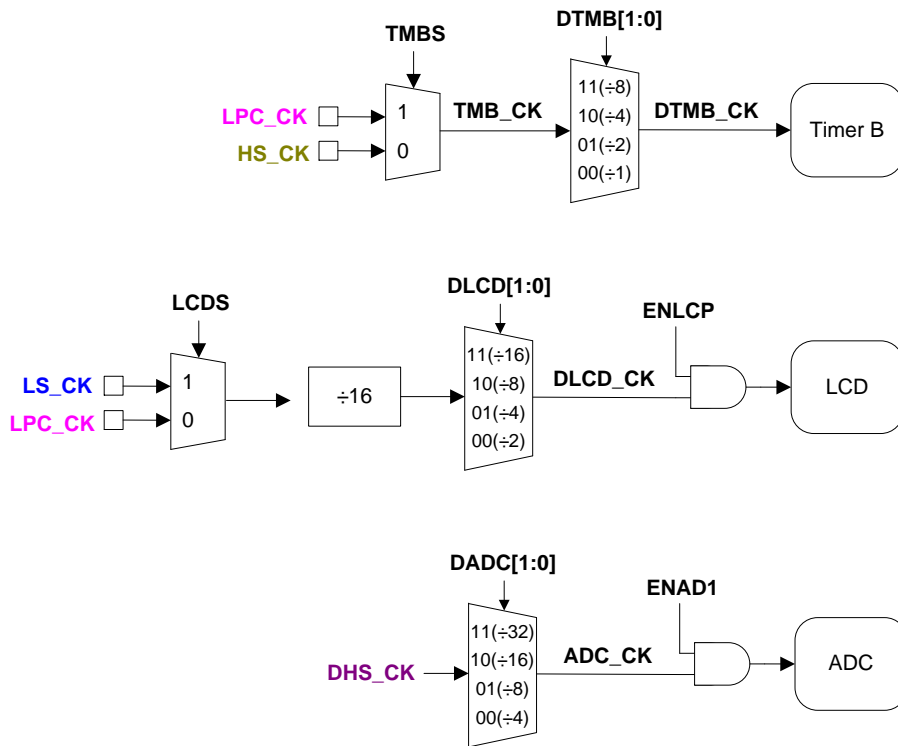


圖 4-4 Clock System 方塊圖(三)

4.4. Low Voltage Detect(LVD)

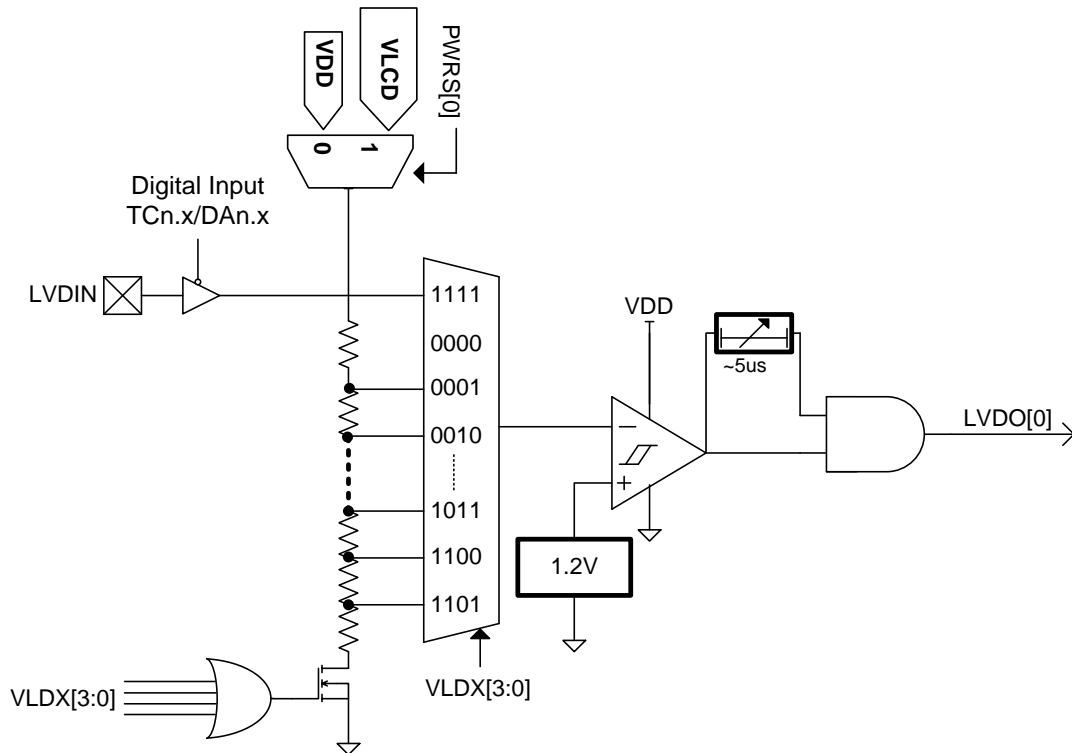


圖 4-5 Low Voltage Detect 方塊圖

4.5. Reset

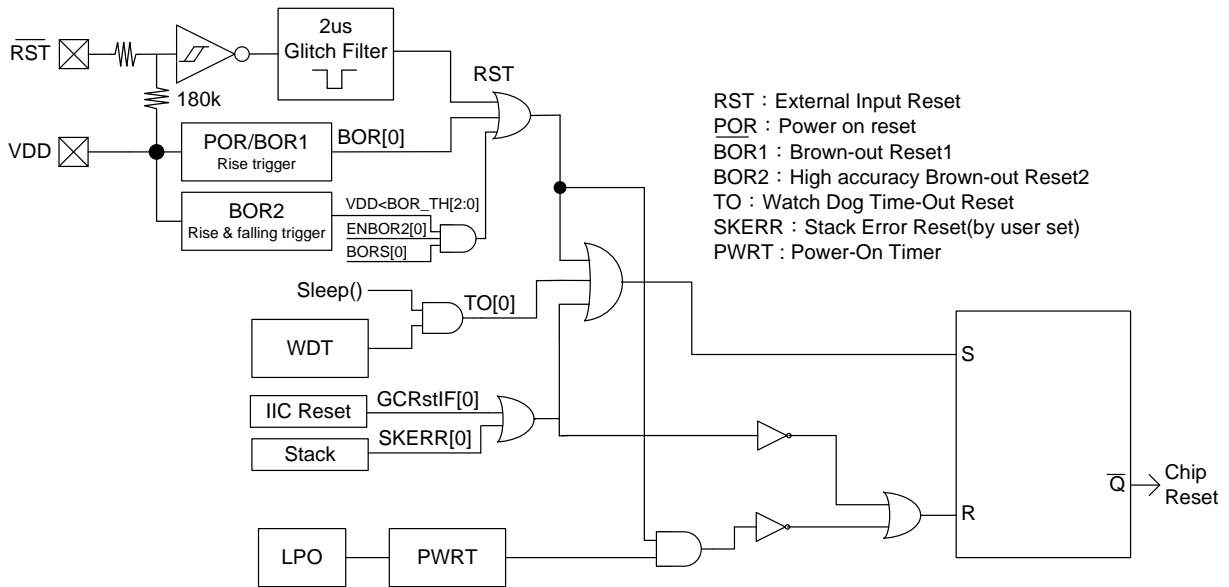


圖 4-6 Reset 方塊圖

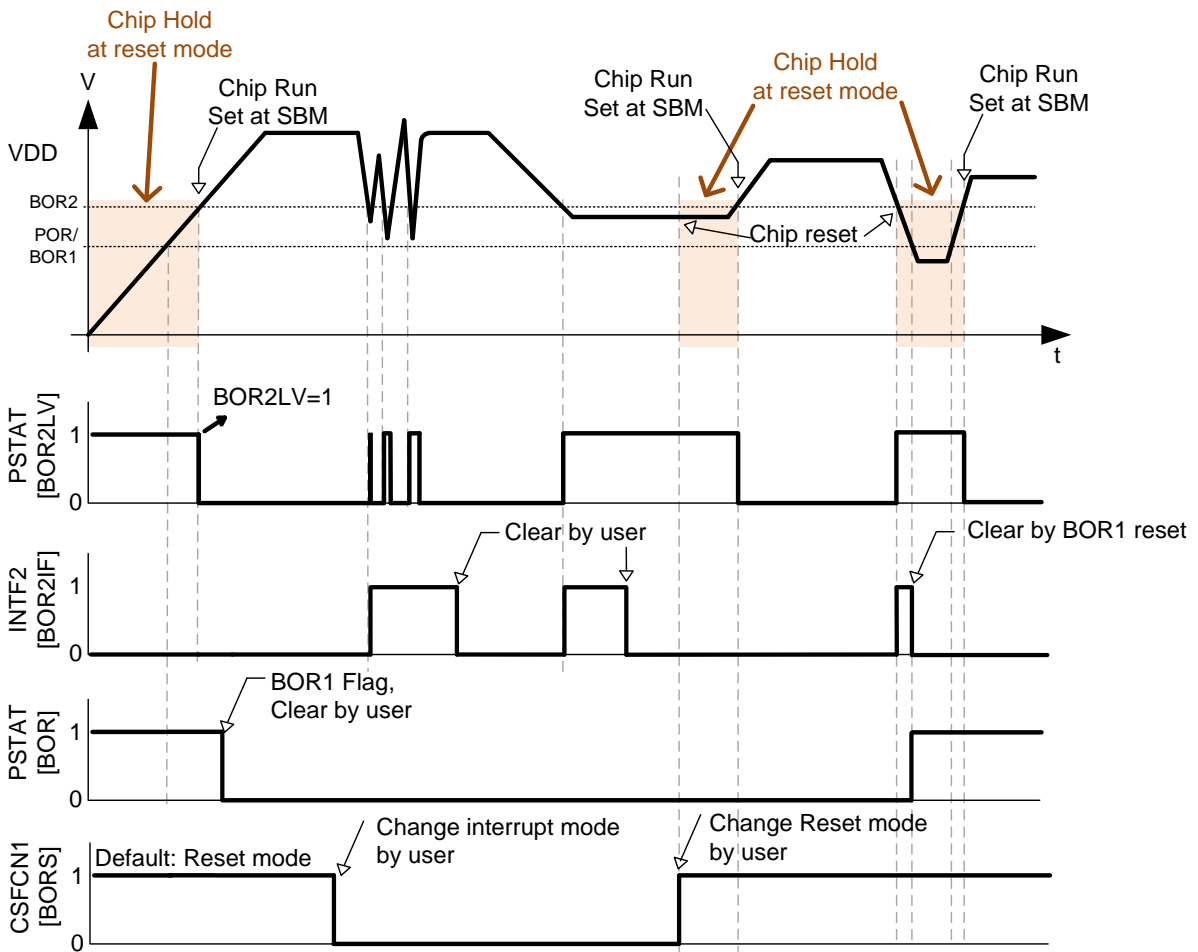


圖 4-7 BOR1 and BOR2 Chart

4.6. Power System

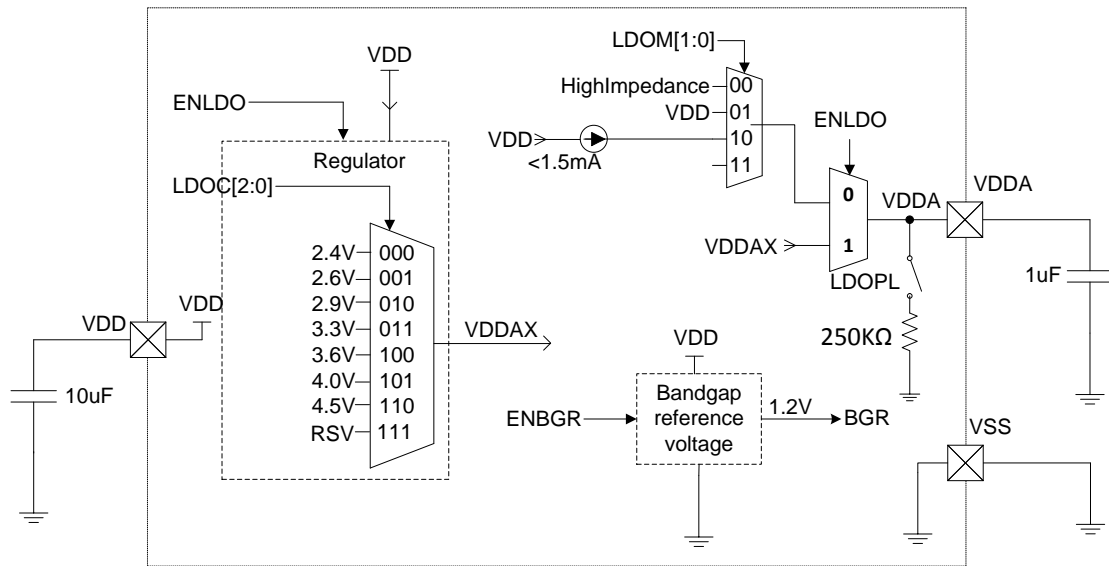


圖 4-8 Power System 方塊圖

4.7. SD18 Network

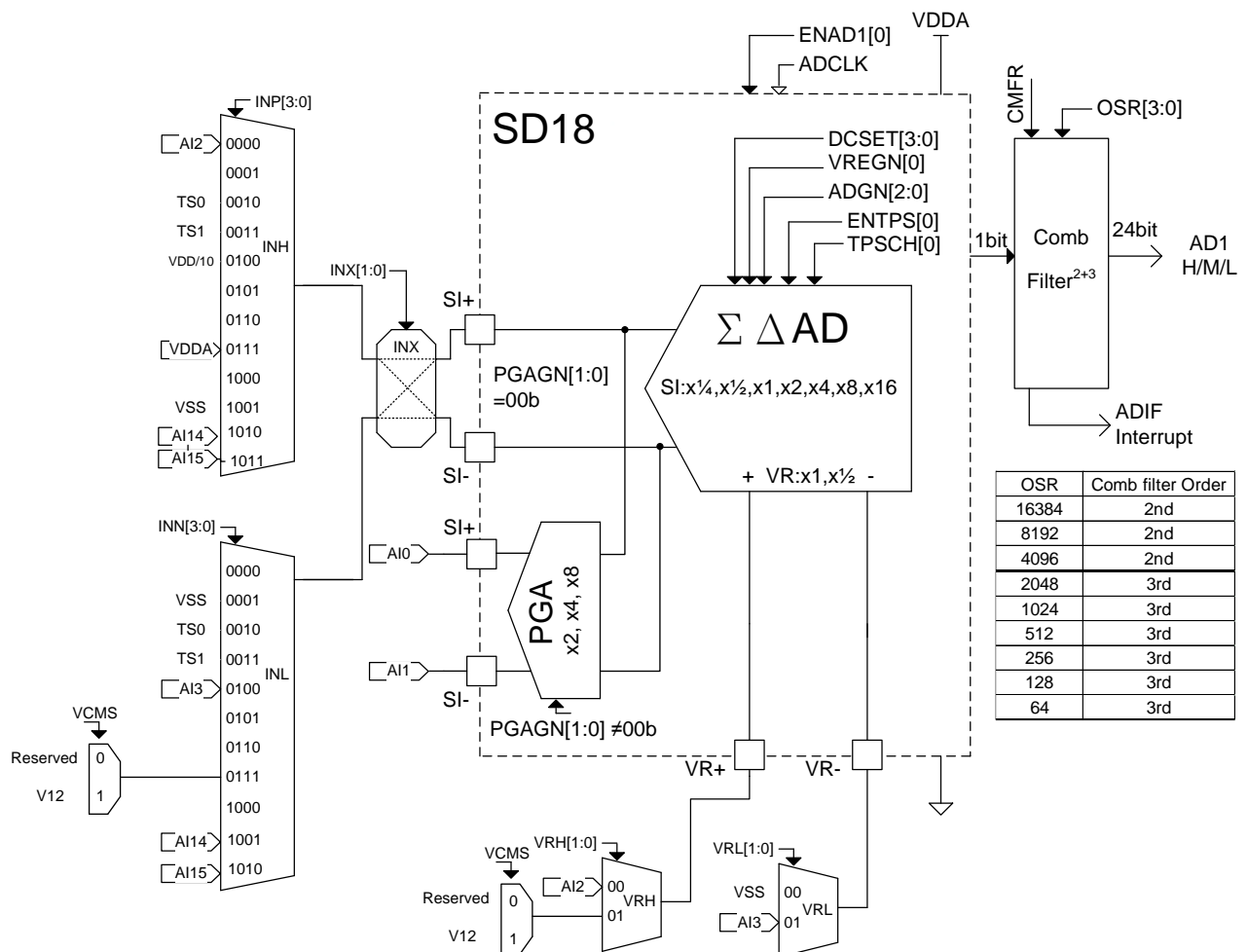


圖 4-9 SD18 Network 方塊圖

4.8. GPIO PT1 and PT2

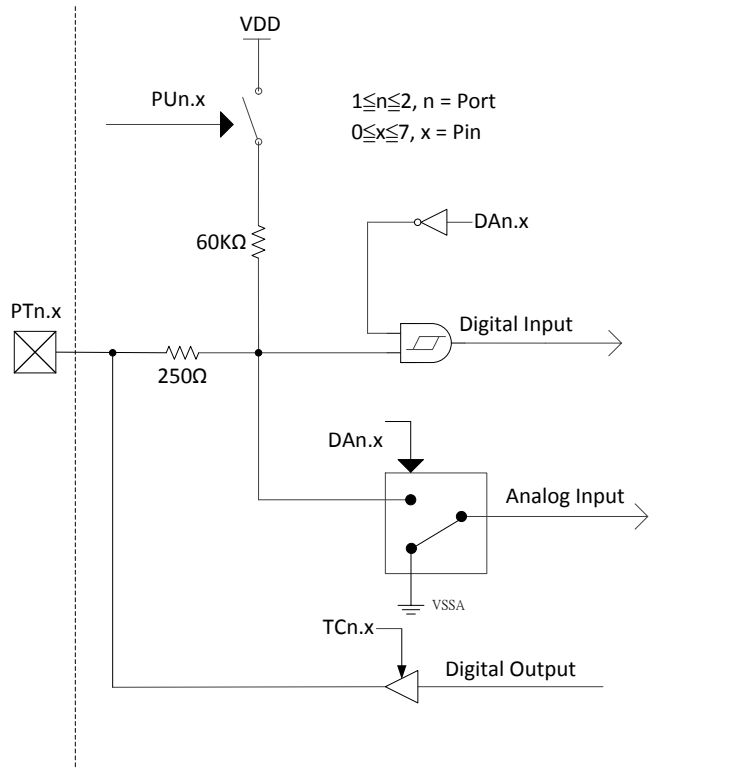


圖 4-10 GPIO PT1 and PT2 方塊圖

4.9. GPIO PT6/COM0~COM3

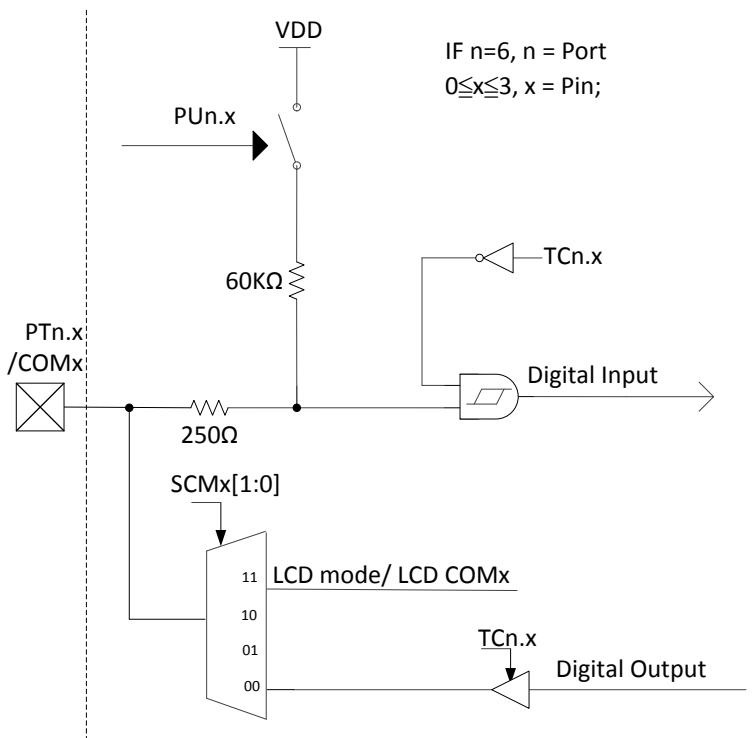


圖 4-11 GPIO PT6/COM0~COM3 方塊圖

4.10. GPIO PT6~PT7/SEG2~SEG13

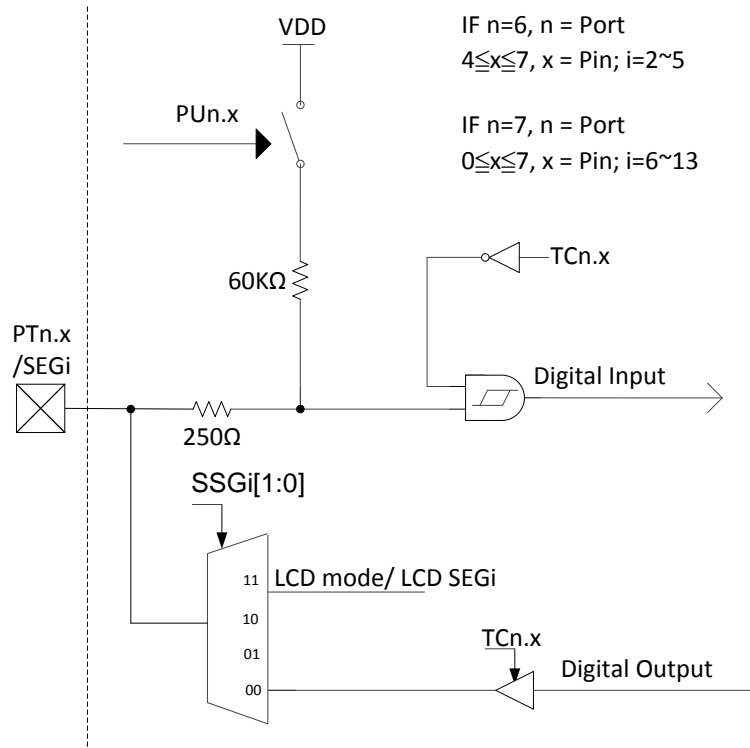


圖 4-12 GPIO PT6~PT7/SEG2~SEG13 方塊圖

4.11. GPIO PT8/SEG14~SEG15

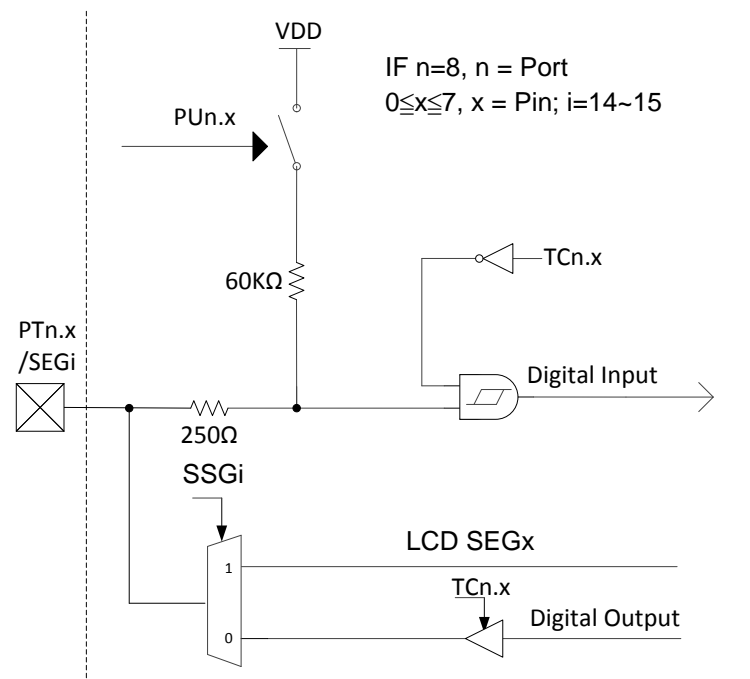


圖 4-13 GPIO PT8/SEG14~SEG15 方塊圖

4.12. Watch Dog

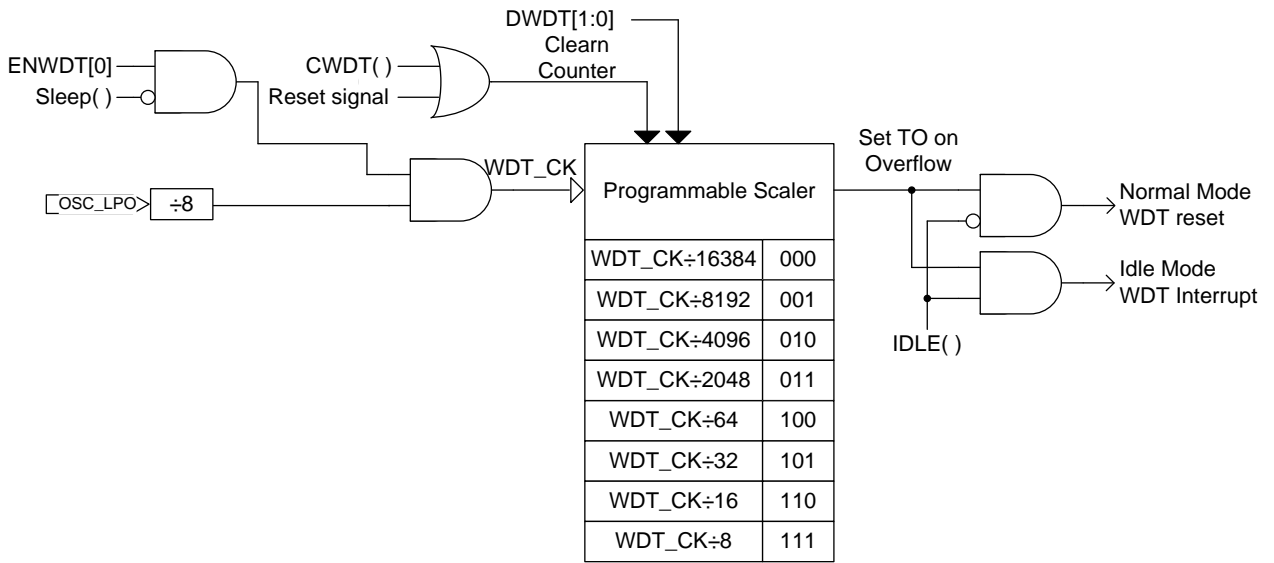


圖 4-14 Watch Dog 方塊圖

4.13. 8-bit Timer A1

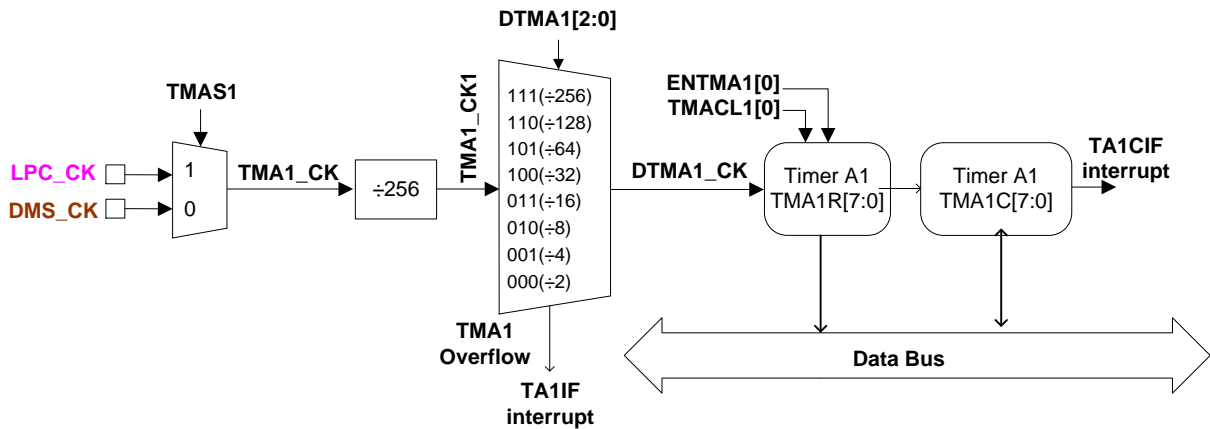


圖 4-15 8-bit Timer A1 方塊圖

4.14. 16-bit Timer B

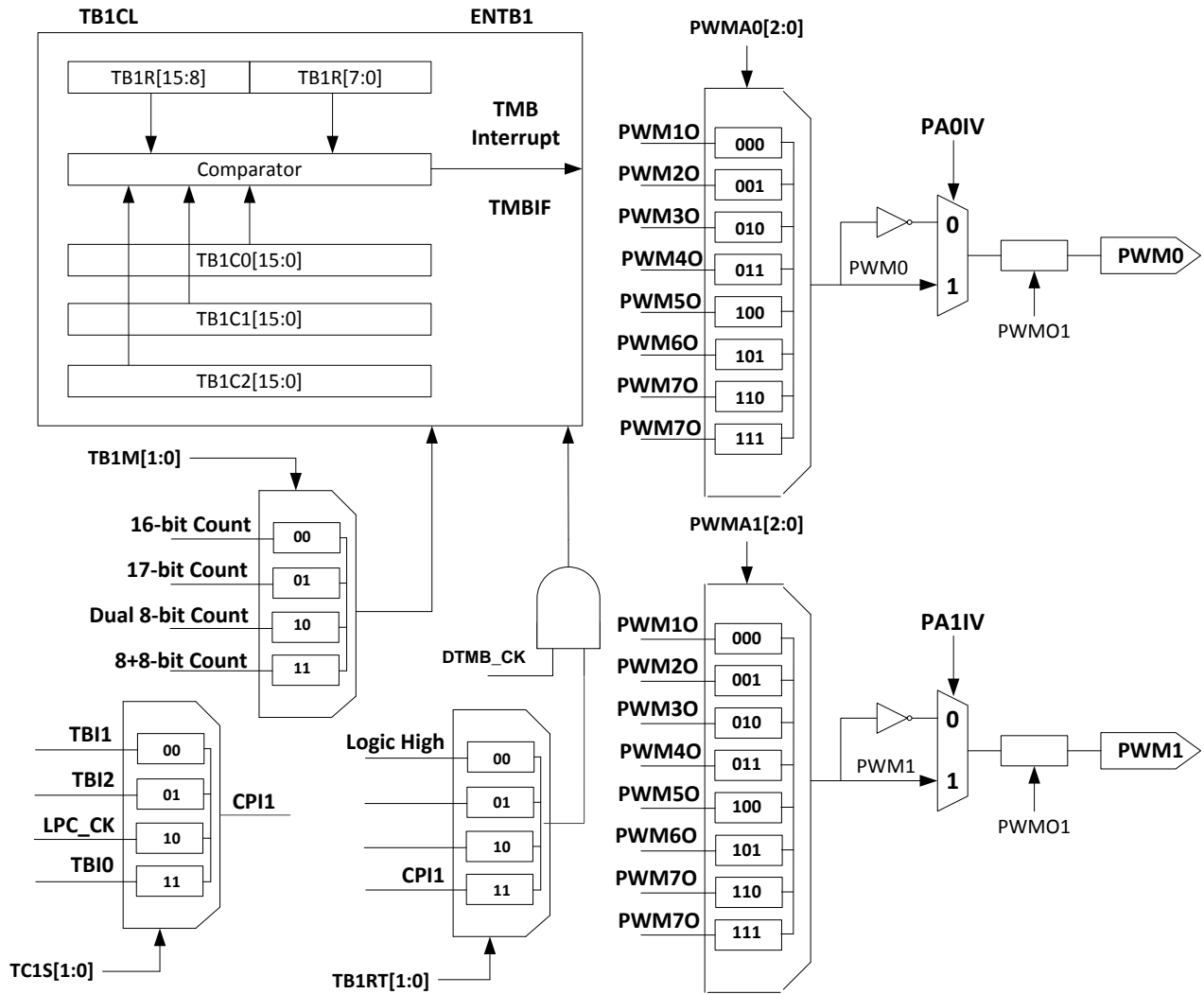


圖 4-16 16-bit Timer B 方塊圖

4.15. LCD

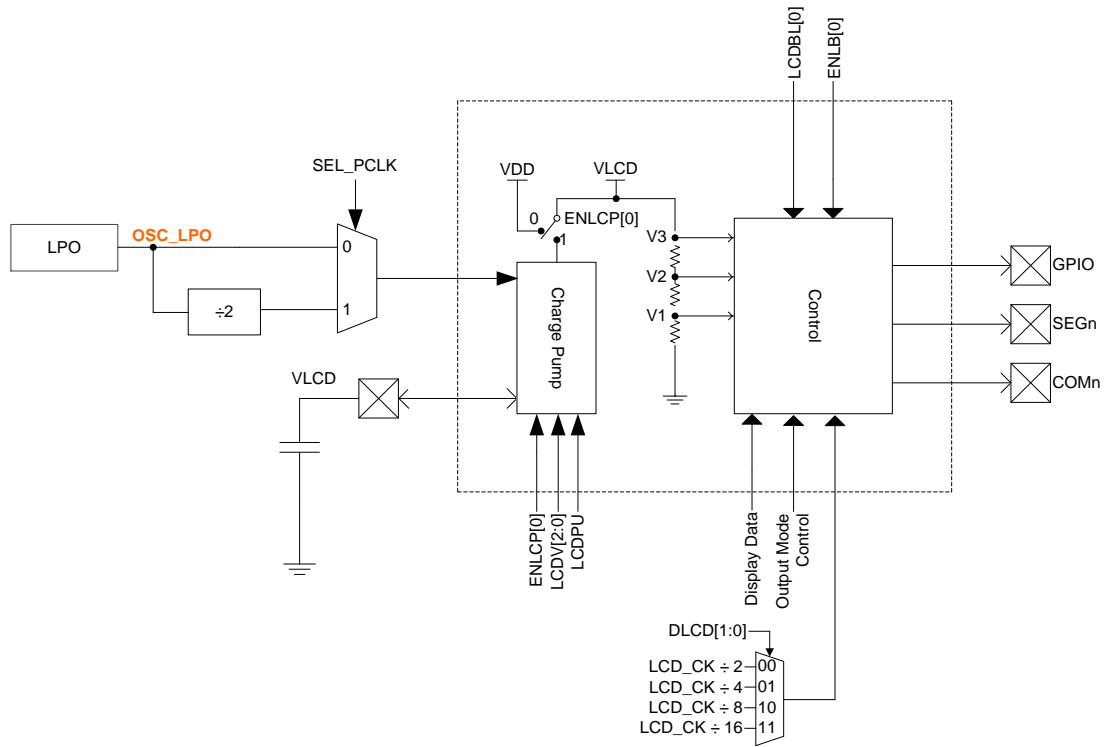


圖 4-17 LCD 方塊圖

4.16. EUART

EUART TRANSMIT BLOCK DIAGRAM

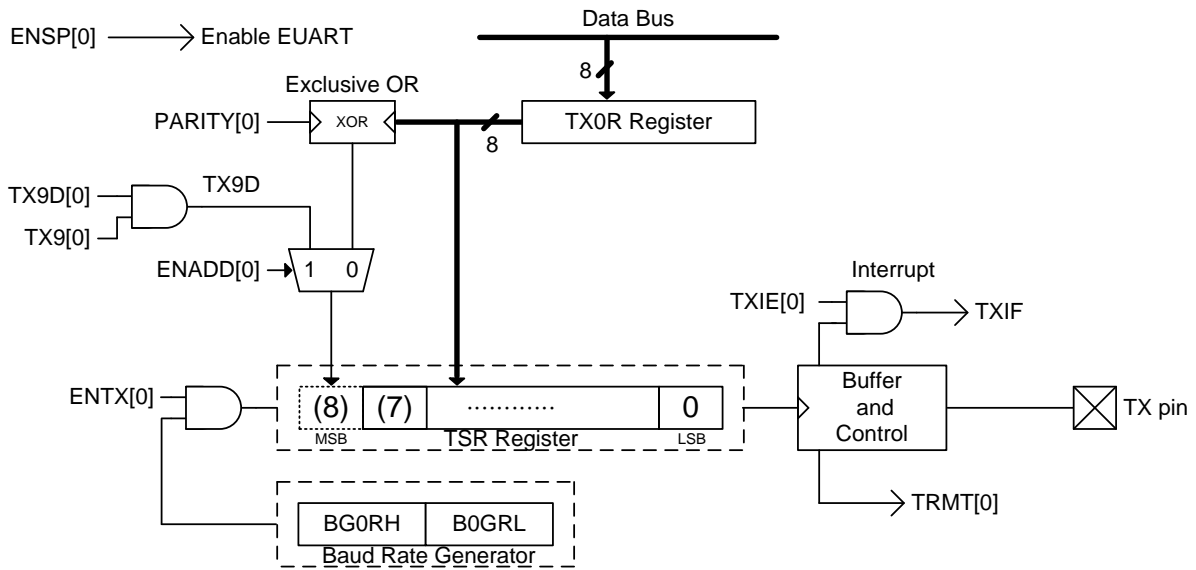
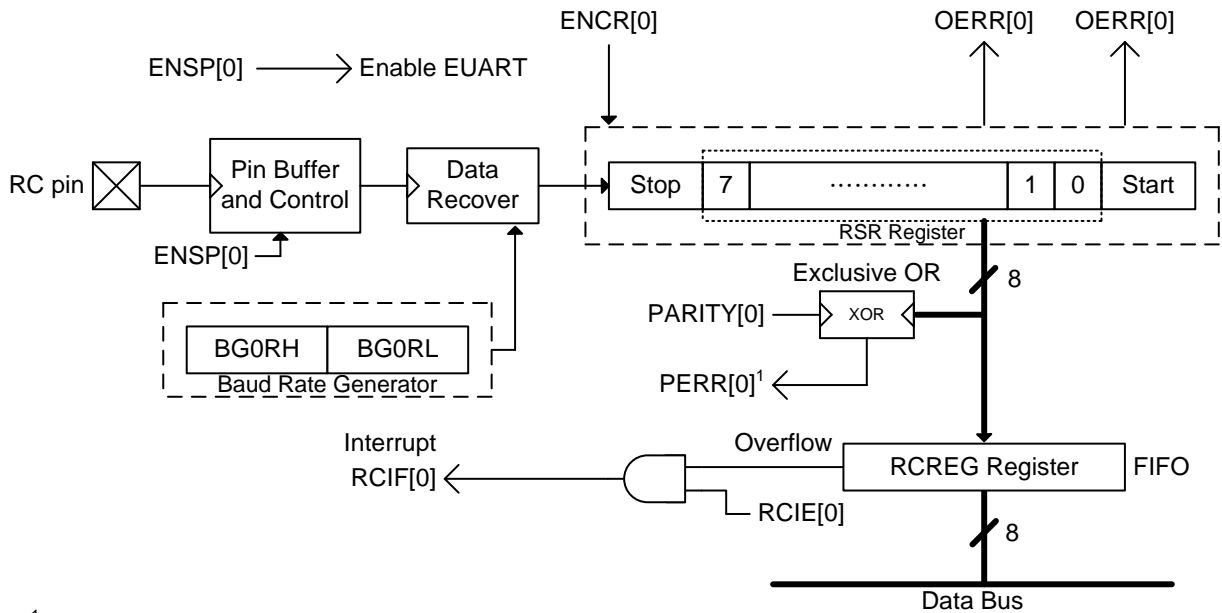


圖 4-18 EUART 傳送方塊圖

EUART 8-BITS RECEIVE BLOCK DIAGRAM



¹Don't care PERR[0] state of 8-bits receive mode

圖 4-19 EUART 8-bits 接收方塊圖

4.17. I2C

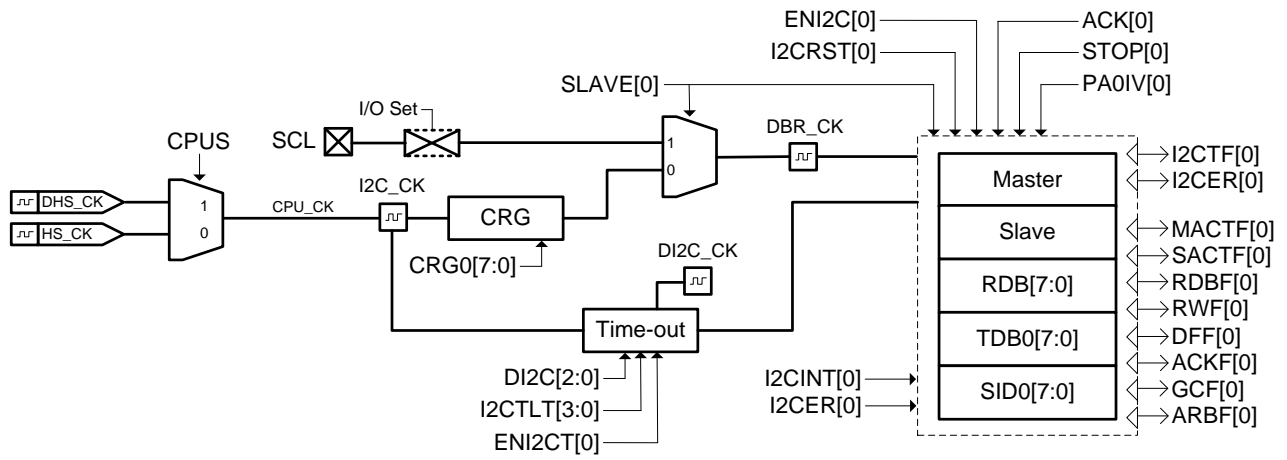


圖 4-20 I2C 方塊圖

5. 暫存器列表

“.”no use,“r”read/write,“w”write,“r”read,“r0”only read 0,“r1”only read 1,“w0”only write 0,“w1”only write 1
“\$”for event status,“.”unimplemented bit,“x”unknown,“u”unchanged,“d”depends on condition

Address	Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	ARST	IRST	R/W
000h	INDF0	Contents of FSR0 to address data memoryvalue of FSR0 not changed								xxxx xxxx	uuuu uuuu	*****
001h	POINC0	Contents of FSR0 to address data memoryvalue of FSR0 post-incremente								xxxx xxxx	uuuu uuuu	*****
002h	PODEC0	Contents of FSR0 to address data memoryvalue of FSR0 post-decremente								xxxx xxxx	uuuu uuuu	*****
003h	PRINC0	Contents of FSR0 to address data memoryvalue of FSR0 pre-incremente								xxxx xxxx	uuuu uuuu	*****
004h	PLUSW0	Contents of FSR0 to address data memoryvalue of FSR0 offset by W								xxxx xxxx	uuuu uuuu	*****
005h	INDF1	Contents of FSR1 to address data memoryvalue of FSR1 not changed								xxxx xxxx	uuuu uuuu	*****
006h	POINC1	Contents of FSR1 to address data memoryvalue of FSR1 post-incremente								xxxx xxxx	uuuu uuuu	*****
007h	PODEC1	Contents of FSR1 to address data memoryvalue of FSR1 post-decremente								xxxx xxxx	uuuu uuuu	*****
008h	PRINC1	Contents of FSR1 to address data memoryvalue of FSR1 pre-incremente								xxxx xxxx	uuuu uuuu	*****
009h	PLUSW1	Contents of FSR1 to address data memoryvalue of FSR1 offset by W								xxxx xxxx	uuuu uuuu	*****
00Ah	INDF2	Contents of FSR2 to address data memoryvalue of FSR2 not changed								xxxx xxxx	uuuu uuuu	*****
00Bh	POINC2	Contents of FSR2 to address data memoryvalue of FSR2 post-incremente								xxxx xxxx	uuuu uuuu	*****
00Ch	PODEC2	Contents of FSR2 to address data memoryvalue of FSR2 post-decremente								xxxx xxxx	uuuu uuuu	*****
00Dh	PRINC2	Contents of FSR2 to address data memoryvalue of FSR2 pre-incremente								xxxx xxxx	uuuu uuuu	*****
00Eh	PLUSW2	Contents of FSR2 to address data memoryvalue of FSR2 offset by W								xxxx xxxx	uuuu uuuu	*****
00Fh	FSR0H	-	-	-	-	-	-	-	FSR0[9:8]	.... .xx	.... .uu*
010h	FSR0L	Indirect Data Memory Address Pointer 0 Low Byte,FSR0[7:0]								xxxx xxxx	uuuu uuuu	*****
011h	FSR1H	-	-	-	-	-	-	-	FSR1[9:8]	.... .xx	.... .uu*
012h	FSR1L	Indirect Data Memory Address Pointer 0 Low Byte,FSR1[7:0]								xxxx xxxx	uuuu uuuu	*****
013h	FSR2H	-	-	-	-	-	-	-	FSR2[9:8]	.... .xx	.... .uu*
014h	FSR2L	Indirect Data Memory Address Pointer 0 Low Byte,FSR2[7:0]								xxxx xxxx	uuuu uuuu	*****
016h	TOSH	-	-	-	TOS[12:8]			-	-	...x xxxx	...u uuuu*
017h	TOSL	Top-of-Stack Low Byte (TOS<7:0>)								xxxx xxxx	uuuu uuuu	*****
018h	SKCN	SKFL	SKUN	SKOV	-	SKPRT[3:0]			-	000. 0000	u\$. \$\$\$	rw0,rw0,rw0,-,***,
01Ah	PCLATH	-	-	-	PC[12:8]			-	-	...0 0000	...0 0000	*****
01Bh	PCLATL	PC Low Byte for PC<7:0>								0000 0000	0000 0000	*****
01Dh	TBLPTRH	-	-	-	TBLPTR[12:8]			-	-	...x xxxx	...u uuuu*
01Eh	TBLPTRL	Program Memory Table Pointer Low Byte (TBLPTR<7:0>)								xxxx xxxx	uuuu uuuu	*****
01Fh	TBLDH	Program Memory Table Latch High Byte								xxxx xxxx	uuuu uuuu	*****
020h	TBLDL	Program Memory Table Latch Low Byte								xxxx xxxx	uuuu uuuu	*****
021h	PRODH	Product Register of Multiply High Byte								xxxx xxxx	uuuu uuuu	*****
022h	PRODL	Product Register of Multiply Low Byte								xxxx xxxx	uuuu uuuu	*****
023h	INTE0	GIE	TA1CIE	ADIE	WDTIE	TB1IE	-	E1IE	E0IE	0000 0000	00uu uuuu	*****
024h	INTE1	TA1IE	SPIIE	TXIE	RCIE	I2CERIE	I2CIE	E3IE	E2IE	0000 0000	uuuu uuuu	*****
025h	INTE2	-	-	-	-	TX2IE	RC2IE	-	BOR2IE	0000 0000	uuuu uuuu	*****
026h	INTF0	-	TA1CIF	ADIF	WDTIF	TB1IF	-	E1IF	E0IF	.000 0000	.uuu uuuu	*****
027h	INTF1	TA1IF	SPIIF	TXIF	RCIF	I2CERIF	I2CIF	E3IF	E2IF	0000 0000	uuuu uuuu	***,r,r,***
028h	INTF2	-	-	-	-	TX2IF	RC2IF	-	BOR2IF	0000 0000	uuuu uuuu	*****
029h	WREG	Working Register								xxxx xxxx	uuuu uuuu	*****
02Ah	BSRCN	-	-	-	-	-	-	-	BSR[1:0]	.... .xx	.... .uu*
02Bh	MSTAT	-	-	-	C	DC	N	OV	Z	...x xxxx	...u uuuu*
02Ch	PSTAT	BOR	PD	TO	IDL	RST	SKERR	BOR2LV	GCRstIF	\$000 \$000	uu\$u u\$uu	rw0,rw0,rw0,rw0,rw0,rw0,rw0
02Eh	BIECN	1	-	-	ENBVD	VPPHV	ENBCP	BIEWR	BIERD	1.00 \$000	1.00 \$uuu	r1,-,***,r,***
02Fh	BIEARH	ENBIE	-	1	1	1	1	1	1	0.xx xxxx	u.uu uuuu	*****
030h	BIEARL	BIE Address Register as BIEAL[5:0]								xxxx xxxx	uuuu uuuu	*****
031h	BIEDRH	BIE High Byte Data Register								xxxx xxxx	uuuu uuuu	*****
032h	BIEDRL	BIE Low Byte Data Register								xxxx xxxx	uuuu uuuu	*****
033h	PWRCN	ENBGR	LDOC[2:0]		LDOM[1:0]		ENLDO	CSFON		0000 0000	uuuu u00u	*****,wr0,wr0,*
034h	OSCCN0	OSCS[1:0]		DHS[1:0]		DMS[2:0]		CUPS		0000 0000	uuuu uuuu	*****
035h	OSCCN1	CCOPT	LCPS	DADC[1:0]		DTMB[1:0]		TMBS	LCDS	0000 0000	uuuu uu.	*****
036h	OSCCN2	DLCD[1:0]		ENXT	XTS[1:0]		HAOM[1:0]		ENHAO	0000 0001	uuuu uu1	*****
037h	CSFCN0	SKRST		HAOTR[6:0]						1. ....	....	.....*
038h	CSFCN1	ENSDRV	-	-	BOR_TH[2:0]		BORS	ENBOR2		...0 0011	uuuu uuuu*
039h	WDTCN	ENBZ	BZS	DBZ[1:0]		ENWDT		DWDWT[2:0]		0000 0000	uuuu \$000	-,***,rw1,***

表 5-1 資料記憶體列表

HY17P55

Embedded 18-Bit Σ ADC 8-Bit RISC-like Mixed Signal Microcontroller



“.”no use,“*”read/write,“w”write,“r”read,“r0”only read 0,“r1”only read 1,“w0”only write 0,“w1”only write 1

“\$”for event status,“.”unimplemented bit,“x”unknown,“u”unchanged,“d”depends on condition

Address	Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	ARST	IRST	R/W
03Ah	AD1H	ADC1 conversion high byte data register								..00 0000	..uu uuuu	..***** 1 1 1 1 1 1 1 1
03Bh	AD1M	ADC1 conversion middle byte data register								0000 0000	uuuu uuuu	***** 1 1 1 1 1 1 1 1
03Ch	AD1L	ADC1 conversion low byte data register								0000 0000	uuuu uuuu	***** 1 1 1 1 1 1 1 1
03Dh	AD1CN0	ENAD1	-	-	OSR[3:0]			CMFR		0..0 0000	uuu. uuuu	***** 1 1 1 1 1 1 1 1
03Eh	AD1CN1	-	-	VREGN	PGAGN[1:0]		ADGN[2:0]			xxxx xxxx	uuuu uuuu	***** 1 1 1 1 1 1 1 1
03Fh	AD1CN2	INIS1	-	-	DCSET[3:0]					xxxx xxxx	uuuu uuuu	***** 1 1 1 1 1 1 1 1
040h	AD1CN3	INP[3:0]			INN[3:0]					xxxx xxxx	uuuu uuuu	***** 1 1 1 1 1 1 1 1
041h	AD1CN4	VRH[1:0]		VRL[1:0]		INX[1:0]		VRIS	INIS	0000 0000	uuuu uuuu	***** 1 1 1 1 1 1 1 1
042h	AD1CN5	ENACM	-	VCMS	LDOP1	-	-	ENTPS	TPSCH	0000 0000	uuuu uuuu	***** 1 1 1 1 1 1 1 1
043h	LVDCN	-	-	PWRS	LVDS[3:0]			LVDO		0000 0000	uuuu uuuu	***** 1 1 1 1 1 1 1 1
044h	TMA1CN	ENTMA1	TMACL1	TMAS1	DTMA1[2:0]		-	-		0000 00.0	u0uu uu.u	*.rw1***** 1 1 1 1 1 1 1 1
045h	TMA1R	TMA1 counter Register								0000 0000	uuuu uuuu	rw0,rw0,rw0,rw0 rw0,rw0,rw0,rw0
046h	TMA1C	TMA1C counter Register								0000 0000	uuuu uuuu	rw0,rw0,rw0,rw0 rw0,rw0,rw0,rw0
047h	TB1Flag		PWM7A	PWM6A	PWM5A	PWM4A	PWM3A	PWM2A	PWM1A	.000 0000	.uuu uuuu	-.r,r,r,r,r,r,r,r
048h	TB1CN0	ENTB1	TB1M[1:0]		TB1RT[1:0]		TB1CL	PWMO0	PWMO1	0000 0000	uuuu u0uu	*****.rw1,* 1 1 1 1 1 1 1 1
049h	TB1CN1	PA1IV	PWMA1[2:0]			PA0IV	PWMA0[2:0]			0000 0000	uuuu uuuu	***** 1 1 1 1 1 1 1 1
04Ah	TB1RH	TimerB1 counter Register [15:8]								xxxx xxxx	uuuu uuuu	r,r,r,r,r,r,r,r
04Bh	TB1RL	TimerB1 counter Register [7:0]								xxxx xxxx	uuuu uuuu	r,r,r,r,r,r,r,r
04Ch	TB1C0H	TimerB1 counter Condition Register [15:8]								xxxx xxxx	uuuu uuuu	***** 1 1 1 1 1 1 1 1
04Dh	TB1C0L	TimerB1 counter Condition Register [7:0]								xxxx xxxx	uuuu uuuu	***** 1 1 1 1 1 1 1 1
04Eh	TB1C1H	TimerB1 counter Condition Register [15:8]								xxxx xxxx	uuuu uuuu	***** 1 1 1 1 1 1 1 1
04Fh	TB1C1L	TimerB1 counter Condition Register [7:0]								xxxx xxxx	uuuu uuuu	***** 1 1 1 1 1 1 1 1
050h	TB1C2H	TimerB1 counter Condition Register [15:8]								xxxx xxxx	uuuu uuuu	***** 1 1 1 1 1 1 1 1
051h	TB1C2L	TimerB1 counter Condition Register [7:0]								xxxx xxxx	uuuu uuuu	***** 1 1 1 1 1 1 1 1
052h	TC1CN0	-	TC1S[1:0]		-	-	-	-	-	0000 0000	uuuu uuuu	uuuu uuuu
053h	PT1	PT1.7	PT1.6	PT1.5	PT1.4	PT1.3	PT1.2	PT1.1	PT1.0	xxxx xxxx	uuuu uuuu	***** 1 1 1 1 1 1 1 1
054h	TRISC1	TC1.7	TC1.6	TC1.5	TC1.4	TC1.3	TC1.2	TC1.1	TC1.0	0000 0000	uuuu uuuu	***** 1 1 1 1 1 1 1 1
055h	PT1DA	DA1.7	DA1.6	DA1.5	DA1.4	DA1.3	DA1.2	DA1.1	DA1.0	0000 0000	uuuu uuuu	***** 1 1 1 1 1 1 1 1
056h	PT1PU	PU1.7	PU1.6	PU1.5	PU1.4	PU1.3	PU1.2	PU1.1	PU1.0	0000 0000	uuuu uuuu	***** 1 1 1 1 1 1 1 1
057h	PT1M1	-	-	-	-	INTEG1[1:0]		INTEG0[1:0]		0000 0000	uuuu uuuu	***** 1 1 1 1 1 1 1 1
058h	PT1INT	INTEG7	INTEG6	INTEG5	INTEG4	INTEG3	INTEG2	-	-	0000 0000	uuuu uuuu	***** 1 1 1 1 1 1 1 1
059h	PT1INTE	INTE1.7	INTE1.6	INTE1.5	INTE1.4	-	-	-	-	0000 0000	uuuu uuuu	***** 1 1 1 1 1 1 1 1
05Ah	PT1INTF	INTF1.7	INTF1.6	INTF1.5	INTF1.4	-	-	-	-	0000 0000	uuuu uuuu	***** 1 1 1 1 1 1 1 1
05Bh	PT2	-	-	-	-	PT2.3	PT2.2	PT2.1	PT2.0	xxxx xxxx	uuuu uuuu	***** 1 1 1 1 1 1 1 1
05Ch	TRISC2	-	-	-	-	TC2.3	TC2.2	TC2.1	TC2.0	0000 0000	uuuu uuuu	***** 1 1 1 1 1 1 1 1
05Dh	PT2DA	-	-	-	-	DA2.3	DA2.2	DA2.1	DA2.0	0000 0000	uuuu uuuu	***** 1 1 1 1 1 1 1 1
05Eh	PT2PU	-	-	-	-	PU2.3	PU2.2	PU2.1	PU2.0	0000 0000	uuuu uuuu	***** 1 1 1 1 1 1 1 1
05Fh	PT2INT	-	-	-	-	INTG2.3	INTG2.2	INTG2.1	INTG2.0	0000 0000	uuuu uuuu	***** 1 1 1 1 1 1 1 1
060h	PT2INTE	-	-	-	-	INTE2.3	INTE2.2	INTE2.1	INTE2.0	0000 0000	uuuu uuuu	***** 1 1 1 1 1 1 1 1
061h	PT2INTF	-	-	-	-	INTF2.3	INTF2.2	INTF2.1	INTF2.0	0000 0000	uuuu uuuu	***** 1 1 1 1 1 1 1 1
062h	PT6	PT6.7	PT6.6	PT6.5	PT6.4	PT6.3	PT6.2	PT6.1	PT6.0	xxxx xxxx	uuuu uuuu	***** 1 1 1 1 1 1 1 1
063h	TRISC6	TC6.7	TC6.6	TC6.5	TC6.4	TC6.3	TC6.2	TC6.1	TC6.0	0000 0000	uuuu uuuu	***** 1 1 1 1 1 1 1 1
064h	PT6DA	DA6.7	DA6.6	DA6.5	DA6.4	DA6.3	DA6.2	DA6.1	DA6.0	0000 0000	uuuu uuuu	***** 1 1 1 1 1 1 1 1
065h	PT6PU	PU6.7	PU6.6	PU6.5	PU6.4	PU6.3	PU6.2	PU6.1	PU6.0	0000 0000	uuuu uuuu	***** 1 1 1 1 1 1 1 1
066h	PT7	PT7.7	PT7.6	PT7.5	PT7.4	PT7.3	PT7.2	PT7.1	PT7.0	xxxx xxxx	uuuu uuuu	***** 1 1 1 1 1 1 1 1
067h	TRISC7	TC7.7	TC7.6	TC7.5	TC7.4	TC7.3	TC7.2	TC7.1	TC7.0	0000 0000	uuuu uuuu	***** 1 1 1 1 1 1 1 1
068h	PT7DA	DA7.7	DA7.6	DA7.5	DA7.4	DA7.3	DA7.2	DA7.1	DA7.0	0000 0000	uuuu uuuu	***** 1 1 1 1 1 1 1 1
069h	PT7PU	PU7.7	PU7.6	PU7.5	PU7.4	PU7.3	PU7.2	PU7.1	PU7.0	0000 0000	uuuu uuuu	***** 1 1 1 1 1 1 1 1
06Ah	PT8	-	-	-	-	-	-	PT8.1	PT8.0	xxxx xxxx	uuuu uuuu	***** 1 1 1 1 1 1 1 1
06Bh	TRISC8	-	-	-	-	-	-	TC8.1	TC8.0	0000 0000	uuuu uuuu	***** 1 1 1 1 1 1 1 1
06Ch	PT8DA	-	-	-	-	-	-	DA8.1	DA8.0	0000 0000	uuuu uuuu	***** 1 1 1 1 1 1 1 1
06Dh	PT8PU	-	-	-	-	-	-	PU8.1	PU8.0	0000 0000	uuuu uuuu	***** 1 1 1 1 1 1 1 1

表 5-2 資料記憶體列表(續)

HY17P55

Embedded 18-Bit Σ ADC 8-Bit RISC-like Mixed Signal Microcontroller



“-”no use,“r”read/write,“w”write,“r”read,“r0”only read 0,“r1”only read 1,“w0”only write 0,“w1”only write 1

“\$”for event status,“.”unimplemented bit,“x”unknown,“u”unchanged,“d”depends on condition

Address	Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	ARST	IRST	R/W	
071h	CFG0	-	-	-	-	-	GCRst	ENI2CT	ENI2C	0000 0000	.... uuu	-,-,-,-,-,-,-,-
072h	ACT0	SLAVE	-	-	I2CER	START	STOP	I2CINT	ACK	0000 0000	uuuu uuuu	***** 1 1 1 1 1 1 1 1	
073h	STA0	MACTF	SACTF	RDBF	RWF	DFB	ACKF	GCF	ARBF	0001 0000	uuuu uuuu	***** 1 1 1 1 1 1 1 1	
074h	CRG0	CRG[7:0]								0000 0000	uuuu uuuu	***** 1 1 1 1 1 1 1 1	
075h	TOC0	I2CTF	DI2C[2:0]			I2CTL[3:0]					0000 0000	uuuu uuuu	***** 1 1 1 1 1 1 1 1
076h	RDB0	RDB[7:1]							RDB[0]	xxxx xxxx	uuuu uuuu	***** 1 1 1 1 1 1 1 1	
077h	TDB0	TDB0[7:1]							TDB0[0]	xxxx xxxx	uuuu uuuu	***** 1 1 1 1 1 1 1 1	
078h	SID0	SID0[7:1],The corresponding address of the 7-bit mode							SID0V[0]	0000 0000	uuuu uuuu	***** 1 1 1 1 1 1 1 1	
079h	UR0CN	ENSP	ENTX	TX9	TX9D	PARITY	-	-	WUE	0000 0..0	uuuu u..u	***** 1 1 1 1 1 1 1 1	
07Ah	UR0STA	-	RC9D	PERR	FERR	OERR	RCIDL	TRMT	ABDOVF	.000 0010	.uuu uuuu	-,-,-,-,-,-,-,-	
07Bh	BA0CN	-	-	-	-	ENCR	RC9	ENADD	ENABD	.... 0000	.... uuuu	-,-,-,-,-,-,-,-
07Ch	BGORH	-	-	-	Baud Rate Generator Register High Byte					...x xxxx	...u uuuu	-,-,-,-,-,-,-,-	
07Dh	BGORL	Baud Rate Generator Register Low Byte								xxxx xxxx	uuuu uuuu	***** 1 1 1 1 1 1 1 1	
07Eh	TX0R	UART Transmit Register								xxxx xxxx	uuuu uuuu	***** 1 1 1 1 1 1 1 1	
07Fh	RC0REG	UART Receive Register								xxxx xxxx	uuuu uuuu	r,r,r,r,r,r,r,r	
180h	LCDCN1	ENLCP	LCDV[2:0]			ENLB	SELPLCK	-	LCDFPU	0000 00.0	uuuu uu.u	***** 1 1 1 1 1 1 1 1	
181h	LCDCN2	-	-	-	-	-	-	LCDBL	LCI	0000 00..	uuuu uu..	***** 1 1 1 1 1 1 1 1	
182h	LCDCN3	SCM3[1:0]		SCM2[1:0]		SCM1[1:0]		SCM0[1:0]		1111 1111	uuuu uuuu	***** 1 1 1 1 1 1 1 1	
183h	LCDCN4	-	-	-	-	-	-	SSG15	SSG14	1111 1111	uuuu uuuu	***** 1 1 1 1 1 1 1 1	
185h	LCDCN6	SSG5[1:0]		SSG4[1:0]		SSG3[1:0]		SSG02[1:0]		1111 1111	uuuu uuuu	***** 1 1 1 1 1 1 1 1	
186h	LCDCN7	SSG9[1:0]		SSG8[1:0]		SSG7[1:0]		SSG6[1:0]		1111 1111	uuuu uuuu	***** 1 1 1 1 1 1 1 1	
187h	LCDCN8	SSG13[1:0]		SSG12[1:0]		SSG11[1:0]		SSG10[1:0]		1111 1111	uuuu uuuu	***** 1 1 1 1 1 1 1 1	
188h	LCD0	LCD SEG3[4:7] data				LCD SEG2[3:0] data				xxxx xxxx	uuuu uuuu	***** 1 1 1 1 1 1 1 1	
189h	LCD1	LCD SEG5[4:7] data				LCD SEG4[3:0] data				xxxx xxxx	uuuu uuuu	***** 1 1 1 1 1 1 1 1	
18Ah	LCD2	LCD SEG7[4:7] data				LCD SEG6[3:0] data				xxxx xxxx	uuuu uuuu	***** 1 1 1 1 1 1 1 1	
18Bh	LCD3	LCD SEG9[4:7] data				LCD SEG8[3:0] data				xxxx xxxx	uuuu uuuu	***** 1 1 1 1 1 1 1 1	
18Ch	LCD4	LCD SEG11[4:7] data				LCD SEG10[3:0] data				xxxx xxxx	uuuu uuuu	***** 1 1 1 1 1 1 1 1	
18Dh	LCD5	LCD SEG13[4:7] data				LCD SEG12[3:0] data				xxxx xxxx	uuuu uuuu	***** 1 1 1 1 1 1 1 1	
18Eh	LCD6	LCD SEG15[4:7] data				LCD SEG14[3:0] data				xxxx xxxx	uuuu uuuu	***** 1 1 1 1 1 1 1 1	
080h ~ 0FFh	SRAM as 128Byte									uuuu uuuu	uuuu uuuu	***** 1 1 1 1 1 1 1 1	
100h ~ 17Fh	SRAM as 128Byte									uuuu uuuu	uuuu uuuu	***** 1 1 1 1 1 1 1 1	

表 5-3 資料記憶體列表(續)

HY17P55

Embedded 18-Bit Σ ADC
8-Bit RISC-like Mixed Signal Microcontroller



6. 電氣特性

Absolute Maximum Ratings :

Absolute maximum ratings over operating free-air temperature (unless otherwise noted)

Voltage applied at VDD to VSS	-0.2 V to 6.0 V
Voltage applied to any pin	-0.2 V to VDD + 0.3 V
Voltage applied to RST/VPP pin	-0.2 V to 8.75 V
Diode current at any device terminal	±2 mA
Storage temperature, Tstg: (unprogrammed device)	-55°C to 125°C
(programmed device)	-40°C to 85°C
Total power dissipation.	0.5w
Maximum output current sink by any I/O pin.	.20mA

6.1. Recommended operating conditions

TA = -40°C ~ 85°C, unless otherwise noted

Sym.	Parameter		Test Conditions	Min.	Typ.	Max.	unit
VDD	Supply Voltage		All digital peripherals and CPU VDD = 2.0V~5.5V, Frequency<=9.6Mhz, VDD = 3.6V~5.5V, Frequency<=16Mhz,	2.0		5.5	V
VDDA	Supply Voltage		Analog peripherals	2.4		4.5	
VSS	Supply Voltage			0		0	
XT	External Oscillator Frequency	Watch crystal	VDD = 2.2V~5.5V, ENXT[0]=1	XTS[1:0]=0x	32768		Hz
		Ceramic resonator, Crystal		XTS[1:0]=10	450K	4M	
				XTS[1:0]=11	1M	8M	
		Ceramic resonator, Crystal	VDD = 3.6V~5.5V, ENXT[0]=1	XTS[1:0]=11	450K	16M	

6.2. Internal RC Oscillator

TA = 25°C, VDD = 3.0V, unless otherwise noted

Sym.	Parameter	Test Conditions	Min.	Typ.	Max.	unit
HAO	High Speed Oscillator frequency	ENHAO[0]=1, HAOM[1:0]=00	-20%	1.843	+20%	MHz
		ENHAO[0]=1, HAOM[1:0]=01	-20%	3.686	+20%	MHz
		ENHAO[0]=1, HAOM[1:0]=11	-20%	7.834	+20%	MHz
		After Frequency Trim by Writer	-2%		+2%	MHz
LPO	Low Power Oscillator frequency	VDD supply voltage be enable LPO	-20%	14.5	+20%	KHz

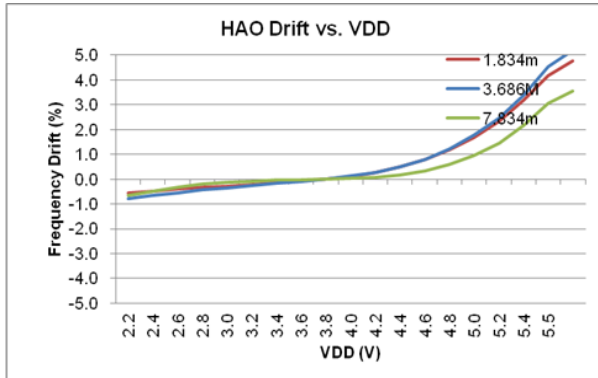


Figure 6.2-1 HAO vs. VDD

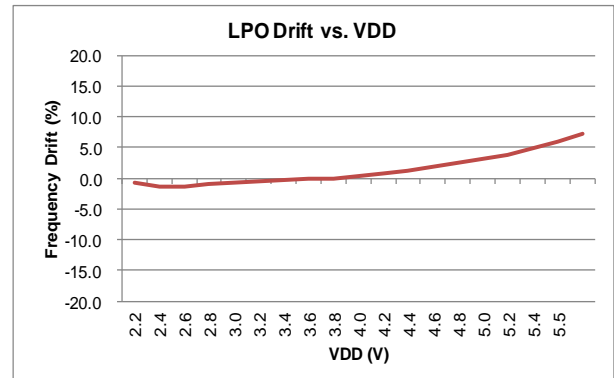


Figure 6.2-2 LPO vs. VDD

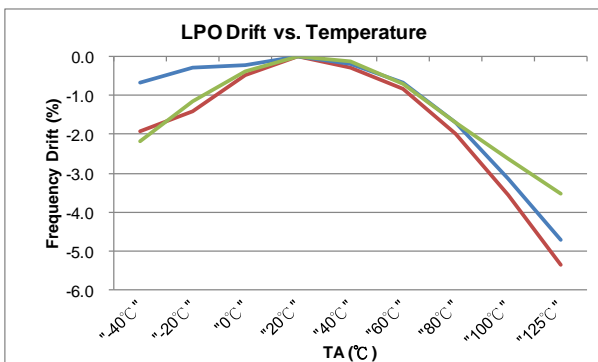


Figure 6.2-3 LPO vs. Temperature

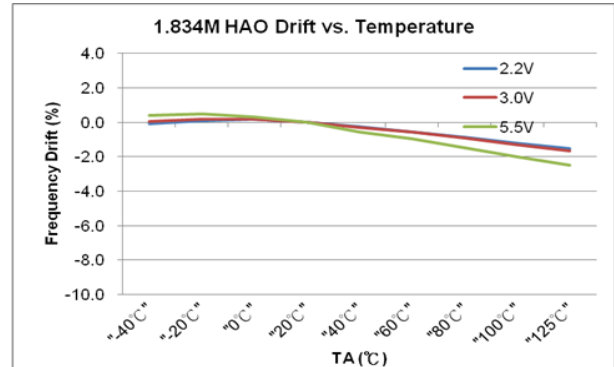


Figure 6.2-4 HAO(1.834MHz) vs. Temperature

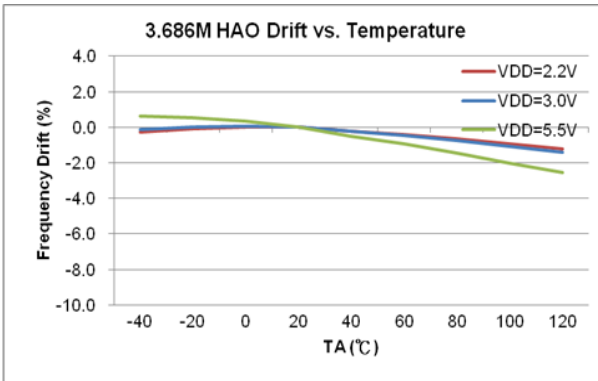


Figure 6.2-5 HAO(3.686MHz) vs. Temperature

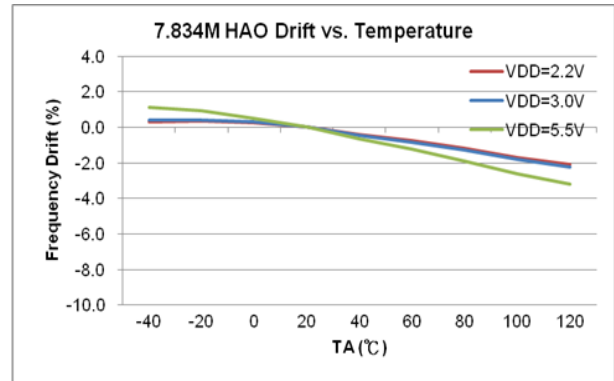


Figure 6.2-6 HAO(7.834MHz) vs. Temperature

6.3. Supply current into VDD excluding peripherals current

TA = 25°C, VDD = 3.0V, OSC_LPO = 14.5KHz, BOR2 OFF, unless otherwise noted

Sym.	Parameter	Test Conditions	Min.	Typ.	Max.	unit
I _{AM1}	Active mode 1	OSC_CY = off, OSC_HAO = 7.834MHz, CPU_CK = 7.834MHz		600	1000	uA
I _{AM2}	Active mode 2	OSC_CY = off, OSC_HAO = 3.686MHz, CPU_CK = 3.686MHz		320	650	uA
I _{AM3}	Active mode 3	OSC_CY = off, OSC_HAO = 1.843MHz, CPU_CK = 1.843MHz		280	500	uA
I _{AM4}	Active mode 4	OSC_CY = off, OSC_HAO = 1.843MHz,		220	350	uA

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		CPU_CK = 1.843MHz/2			
I _{LP1}	Low Power 1	OSC_CY = off, OSC_HAO=off, CPU_CK = LPO	2	5	uA
I _{LP2}	Low Power 2	OSC_CY = off, OSC_HAO=off, CPU_CK = LPO, Idle state	0.5	1.5	uA
I _{LP3}	Low Power 3	OSC_CY = off, OSC_HAO=off, CPU_CK = off, Sleep state	0.2	1.0	uA
I _{LP4}	Low Power 4	OSC_CY = 32768, OSC_HAO = off, CPU_CK = 32768, Idle state	3.59		uA
I _{LP5}	Low Power 5	OSC_CY = 32768, OSC_HAO = off, CPU_CK = off, Sleep state	1.54		uA
<p>OSC_CY : External Oscillator frequency. OSC_HAO : Internal High Accuracy Oscillator frequency. CPU_CK : CPU core work frequency.</p>					

TA = 25°C, VDD = 5.5V, OSC_LPO = 14.5KHz, , BOR2 OFF, unless otherwise noted

Sym.	Parameter	Test Conditions	Min.	Typ.	Max.	unit
I _{AM1}	Active mode 1	OSC_CY = off, OSC_HAO = 7.834MHz, CPU_CK = 7.834MHz		1200	1800	uA
I _{AM2}	Active mode 2	OSC_CY = off, OSC_HAO = 3.686MHz, CPU_CK = 3.686MHz		720	1200	uA
I _{AM3}	Active mode 3	OSC_CY = off, OSC_HAO = 1.843MHz, CPU_CK = 1.843MHz		500	1000	uA
I _{AM4}	Active mode 4	OSC_CY = off, OSC_HAO = 1.843MHz, CPU_CK = 1.843MHz/2		400	800	uA
I _{LP1}	Low Power 1	OSC_CY = off, OSC_HAO = off, CPU_CK = LPO		4	10	uA
I _{LP2}	Low Power 2	OSC_CY = off, OSC_HAO=off, CPU_CK = LPO, Idle state		1	3	uA
I _{LP3}	Low Power 3	OSC_CY = off, OSC_HAO=off, CPU_CK = off, Sleep state		0.3	2	uA
I _{LP4}	Low Power 4	OSC_CY = 32768, OSC_HAO = off, CPU_CK = 32768, Idle state		8.58		uA
I _{LP5}	Low Power 5	OSC_CY = 32768, OSC_HAO = off, CPU_CK = off, Sleep state		4.33		uA

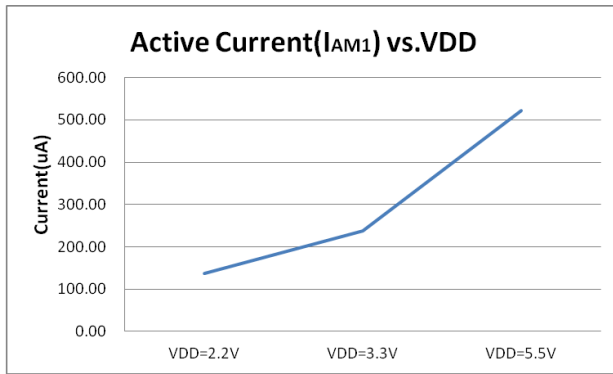


Figure 6.3-1 I_{AM1} vs. VDD

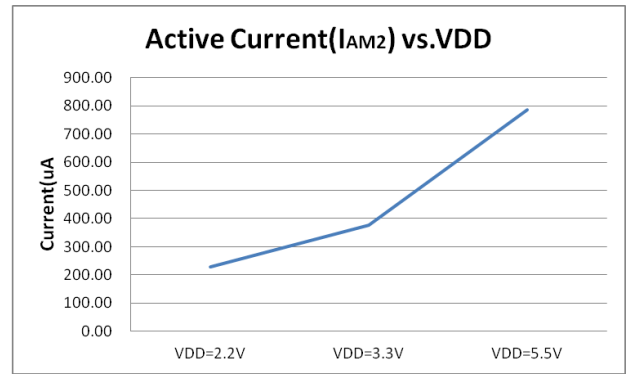


Figure 6.3-2 I_{AM2} vs. VDD

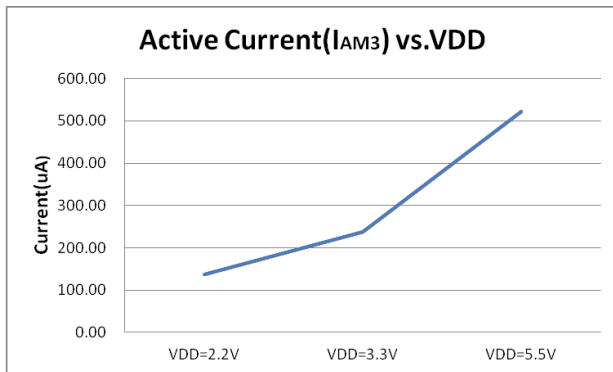


Figure 6.3-3 I_{AM3} vs. VDD

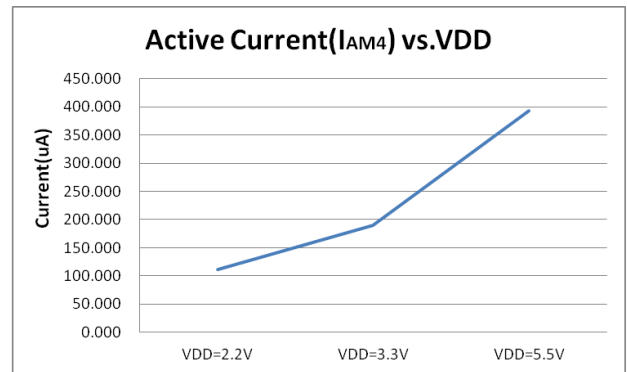


Figure 6.3-4 I_{AM4} vs. VDD

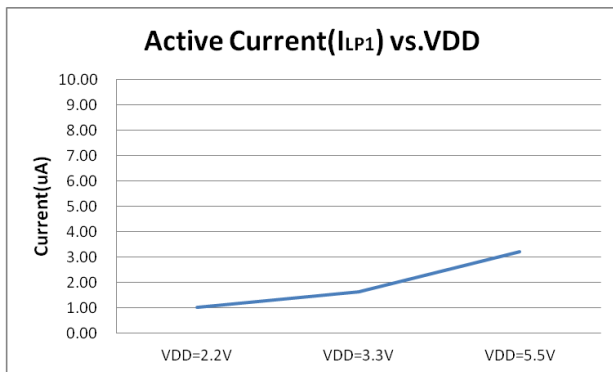


Figure 6.3-5 I_{LP1} vs. VDD

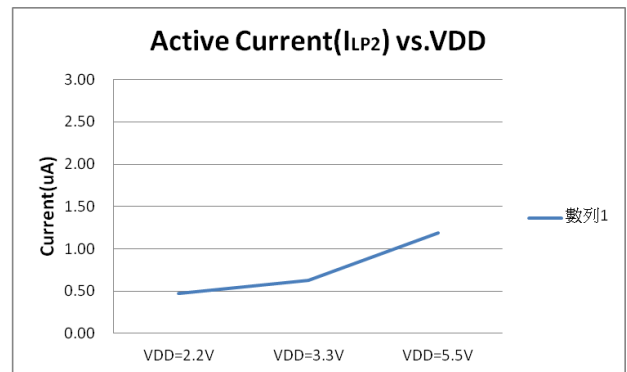


Figure 6.3-6 I_{LP2} vs. VDD

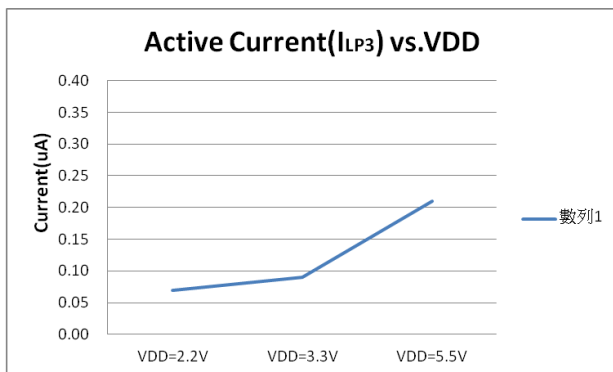


Figure 6.3-7 I_{LP3} vs. VDD

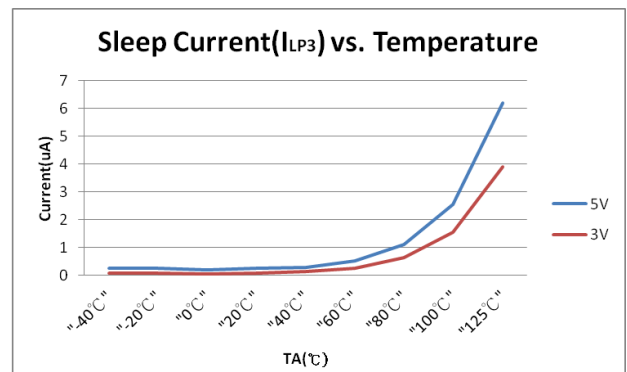


Figure 6.3-8 I_{LP3} vs. Temperature

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6.4. Port 1~2, 6~8

TA = 25°C, VDD = 3.0V, unless otherwise noted

Sym.	Parameter	Test Conditions	Min.	Typ.	Max.	unit
Input voltage and Schmitt trigger and leakage current and timing						
V _{IH}	High-Level input voltage				0.7*VDD	V
V _{IL}	Low-Level input voltage		0.3*VDD			
V _{hys}	Input Voltage hysteresis(V _{IH} - V _{IL})			0.3*VDD		V
I _{LKG}	Leakage Current				0.1	uA
R _{PU}	Port pull high resistance			60		kΩ
Output voltage and current and frequency						
V _{OH}	High-level output voltage	VDD<4V, I _{OH} =10mA,	VDD -0.4			V
		VDD>=4V, I _{OH} =15mA,	VDD -0.4			
V _{OL}	Low-level output voltage	VDD<4V, I _{OL} =-10mA	VSS +0.3			V
		VDD>=4V, I _{OL} =-15mA	VSS +0.3			

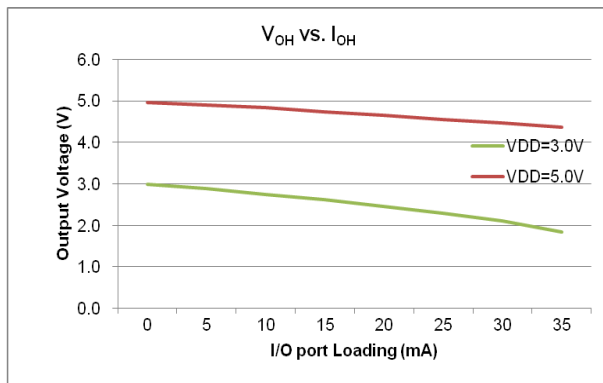


Figure 6.4-1 V_{OH} vs. I_{OH}

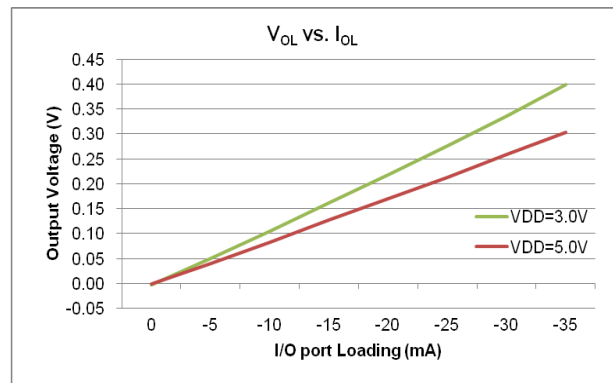


Figure 6.4-2 V_{IL}/V_{IH} vs. VDD

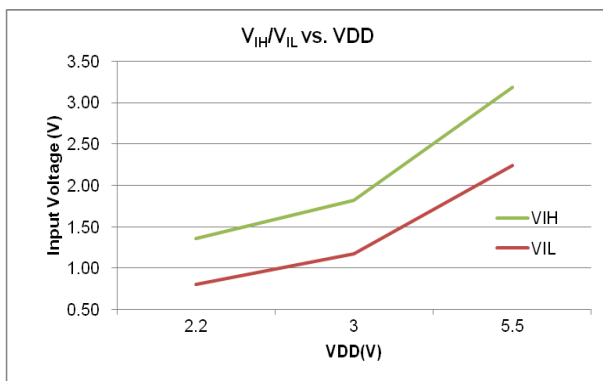


Figure 6.4-3 V_{OL} vs. I_{OL}

6.5. Reset(Brownout, Low Voltage Detect)

TA = 25°C, VDD = 3.0V, unless otherwise noted

Sym.	Parameter	Test Conditions	Min.	Typ.	Max.	unit	
BOR1	Pulse length needed to accepted reset internally, t_{d-LVR1}		2			us	
	VDD Start Voltage to accepted reset internally (L→H), V_{HYS1}		1.15	1.48	1.75	V	
	BOR1 current, I_{BOR1}			0.2	0.5	uA	
	Temperature Drift			30		%	
BOR2	Pulse length needed to accepted reset internally, t_{d-LVR2}		2			us	
	VDD Start Voltage to accepted reset internally (L→H), V_{HYS2} , and BOR_TH[2:0]:	000b		1.56	1.70	1.84	V
		001b		1.82	1.98	2.14	
		010b		2.02	2.20	2.38	
		011b		2.27	2.47	2.67	
		100b		2.48	2.70	2.92	
		101b		2.73	2.97	3.21	
		110b		3.24	3.60	3.96	
		111b		3.56	3.95	4.35	
	VDD Start Voltage to accepted reset internally (H→L), V_{LVR2} , and BOR_TH[2:0]:	000b		1.53	1.66	1.79	V
		001b		1.78	1.93	2.08	
		010b		1.98	2.15	2.32	
		011b		2.23	2.42	2.61	
		100b		2.44	2.65	2.86	
		101b		2.69	2.92	3.15	
		110b		3.19	3.54	3.89	
		111b		3.50	3.89	4.28	
	Hysteresis, $V_{HYS2-LVR2}$		25	60	90	mV	
	BOR2 current, I_{BOR2}			10	15	uA	
Temperature Drift			3	5	%		
RST	Pulse length needed as RST/VPP pin to accepted reset internally, t_{d-RST}		2			us	
	Input Voltage to accepted reset voltage			1.1		V	
	Reset release voltage			2		V	
LVD	Operation current, I_{LVD}			10		uA	
	External input voltage to compare reference voltage		1.15	1.2	1.25	V	
	Compare reference voltage temperature drift	TA = -40°C ~ 85 °C		50		ppm/ °C	
	Detect VDD voltage rang by user option, VSVS VLDS[3:0]=1110b		-0.1V	4.0	+0.1 V	V	
	Detect VDD voltage rang by user option, VSVS VLDS[3:0]=1101b			3.6			
	Detect VDD voltage rang by user option, VSVS VLDS[3:0]=1100b			3.3			
	Detect VDD voltage rang by user option, VSVS VLDS[3:0]=1011b			3.0			
	Detect VDD voltage rang by user option, VSVS VLDS[3:0]=1010b			2.9			
	Detect VDD voltage rang by user option, VSVS VLDS[3:0]=1001b			2.8			
	Detect VDD voltage rang by user option, VSVS VLDS[3:0]=1000b			2.7			
	Detect VDD voltage rang by user option, VSVS VLDS[3:0]=0111b			2.6			
	Detect VDD voltage rang by user option, VSVS VLDS[3:0]=0110b			2.5			
	Detect VDD voltage rang by user option, VSVS VLDS[3:0]=0100b			2.4			

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VLDS[3:0]=0101b			
Detect VDD voltage rang by user option, VSVS VLDS[3:0]=0100b		2.3	
Detect VDD voltage rang by user option, VSVS VLDS[3:0]=0011b		2.2	
Detect VDD voltage rang by user option, VSVS VLDS[3:0]=0010b		2.1	
Detect VDD voltage rang by user option, VSVS VLDS[3:0]=0001b		2.0	

BOR1/BOR2 : Brownout Reset 1/2
LVR : Low Voltage Reset of BOR
LVD : Low Voltage Detect
RST : External Reset pin

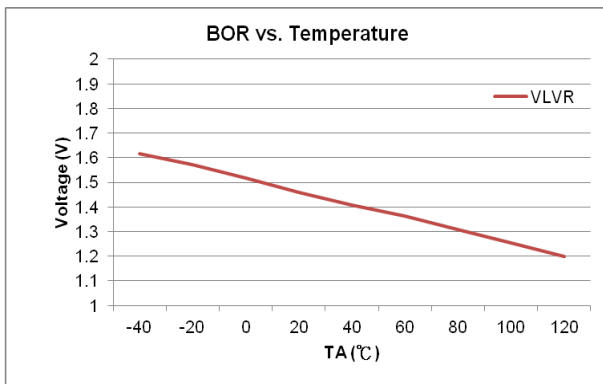


Figure 6.5-1 BOR vs. Temperature

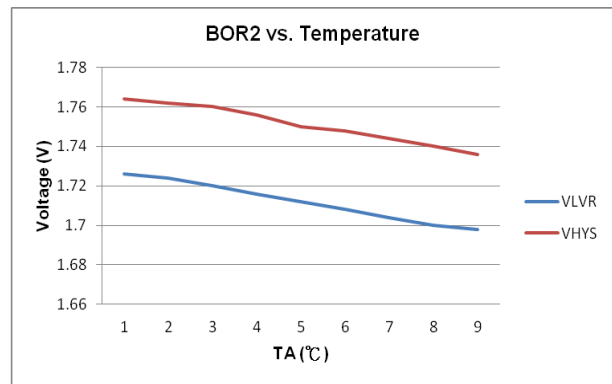


Figure 6.5-2 BOR2 vs. Temperature

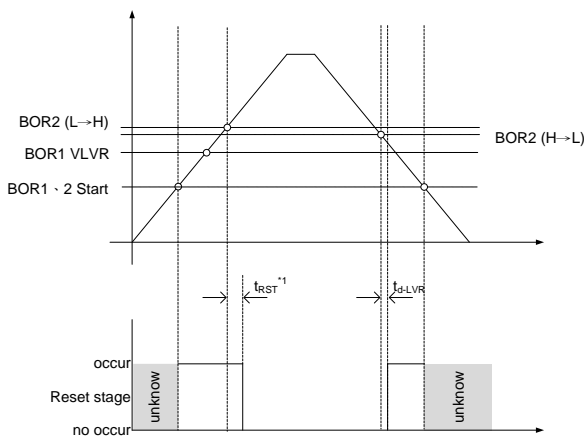


Figure 6.5-2 BOR reset diagram

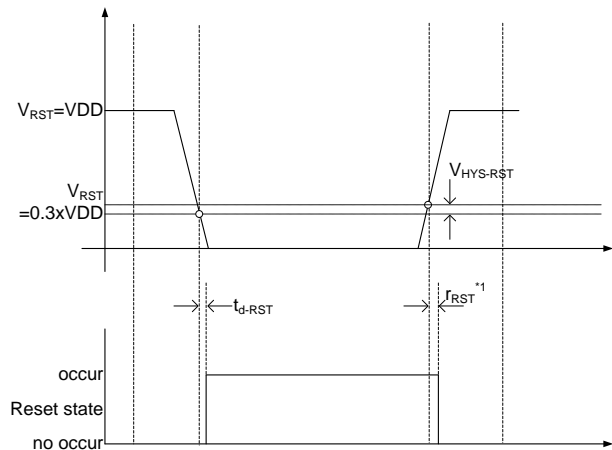


Figure 6.5-3 RST reset diagram

6.6. Power System

TA = 25°C, VDD = 3.0V, unless otherwise noted

Sym.	Parameter	Test Conditions		Min.	Typ.	Max.	unit
VDDA	VDDA operation current, I_{VDDA}	$I_L = 0\text{mA}$	LDOC[2:0]=000b	20			μA
	Select VDDA output voltage	$I_L = 0.1\text{mA}$, $VDD \geq VDDA + 0.25\text{V}$	LDOC [2:0]=000b	-5%	+5%	2.4	V
			LDOC [2:0]=001b			2.6	V
			LDOC [2:0]=010b			2.9	V
			LDOC [2:0]=011b			3.3	V
			LDOC [2:0]=100b			3.6	V
			LDOC [2:0]=101b			4.0	V
			LDOC [2:0]=110b			4.5	V
Dropout voltage	$I_L = 10\text{mA}$	LDOC [2:0]=000b		250		mV	
Temperature drift	LDOC [2:0]=000b $I_L = 0.1\text{mA}$	TA=-40°C~85°C	50			PPM/°C	
VDD Voltage drift	LDOC [2:0]=000b	VDD=2.2V~5.5V	± 0.2			%/V	
V12	operation current, I_{V12}	ENAD1[0]=1b, Internal Analog Common Mode	ENV12 [0]=1b	50			μA
	Voltage, $V_{ACM}=V12$		$I_L = 0\mu\text{A}$	1.1	1.2	1.3	V
	Temperature drift	ENAD1[0]=1b,	TA=-40°C~85°C, ENV12 [0]=1b	50			PPM/°C

VDDA : Adjust Voltage Regulator

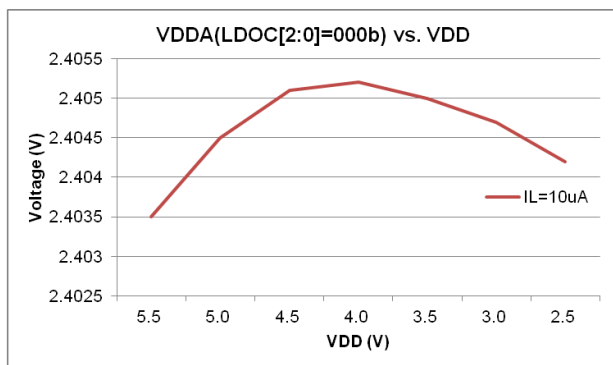


Figure 6.6-1 VDDA(000b) vs. VDD

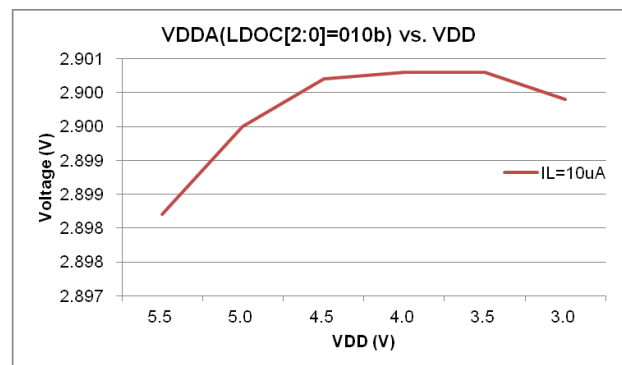


Figure 6.6-2 VDDA(010b) vs. VDD

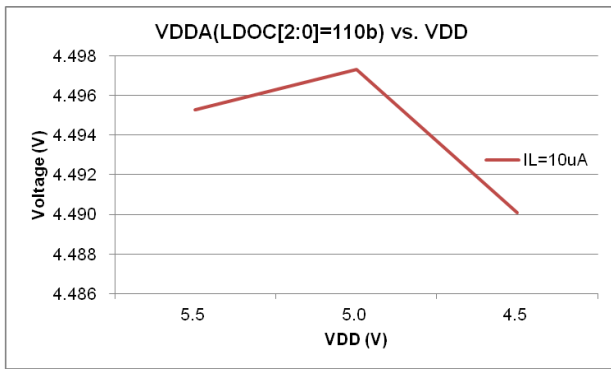


Figure 6.6-3 VDDA(110b) vs. VDD

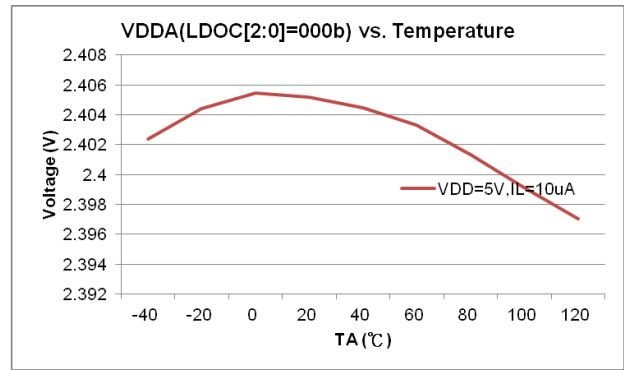


Figure 6.6-4 VDDA(000b) vs. Temperature

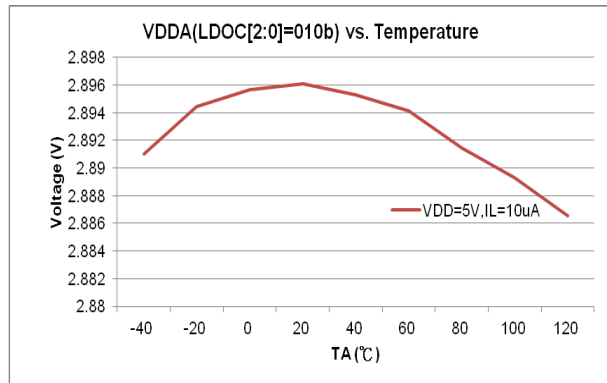


Figure 6.6-5 VDDA(010b) vs. Temperature

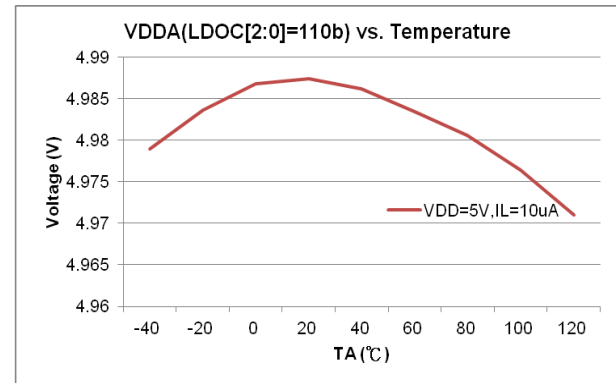


Figure 6.6-6 VDDA(110b) vs. Temperature

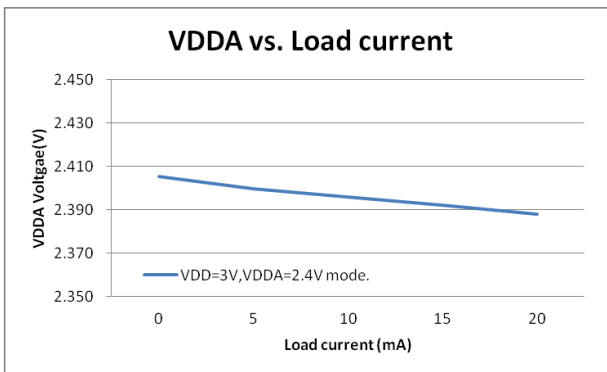


Figure 6.6-7 VDDA vs. Load current

6.7. LCD

TA = 25°C, VDD = 3.3V, CVLCD = 4.7uF, unless otherwise noted.

Sym.	Parameter	Test Conditions		Min.	Typ.	Max.	unit
I _{LCD}	Operation supply current with output buffer.(all segment turn on, No load)	ENLCP[0]=1	VDD = 3.0V	5			uA
VLCD	Supply Voltage at VLCD pin	ENLCP [0]=0		2.4		5	V
	Embedded Charge Pump output voltage at VLCD pin	VDD = 3.3V, ENLCP [0]=1 CVLCD =4.7uF	LCDV[2:0]=111b	-10%	2.45	+10%	V
			LCDV[2:0]=110b	-10%	2.70	+10%	
			LCDV[2:0]=101b	-10%	2.85	+10%	
			LCDV[2:0]=100b	-10%	3.10	+10%	
			LCDV[2:0]=011b	-10%	3.30	+10%	
			LCDV[2:0]=010b	-10%	4.10	+10%	
			LCDV[2:0]=001b (VDD>2.4V mode)	-10%	4.55	+10%	
LCDV[2:0]=000b (VDD>2.75V)	-10%	5.1	+10%				
VDD Voltage drift	ENLCP [0]=1, CVLCD =4.7uF, LCDV[2:0]>010b, VDD=2.2V ~ 5.5V; LCDV[2:0]=001b, VDD>2.4V; LCDV[2:0]=000b, VDD>2.75 V;		4			%/V	
Z _{LCD}	Output impedance with LCD buffer	f _{LCD} =128Hz, VLCD=3.05V		10			kΩ

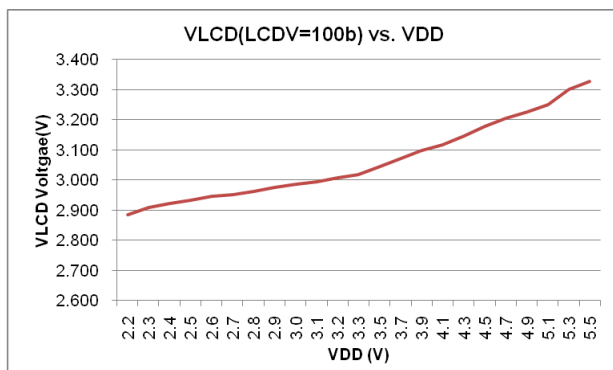


Figure6.7-1 VLCD(LCDV=100b) vs. VDD

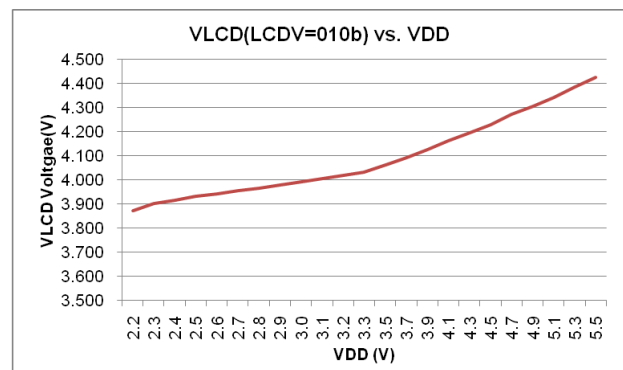


Figure6.7-2 VLCD(LCDV=010b) vs. VDD

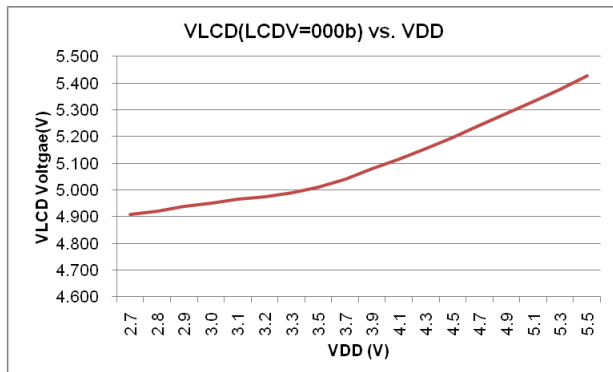


Figure 6.7-3 VLCD(LCDV=000b) vs. VDD

6.8. SD18, Power Supply and recommended operating conditions

TA = 25°C, VDD = 3.0V, VDDA=2.4V, unless otherwise noted

Sym.	Parameter	Test Conditions		Min.	Typ.	Max.	unit
V _{SD18}	Supply Voltage at VDDA	ENLDO[0]=0		2.4		5.5	V
f _{SD18}	Modulator sample frequency, ADC_CK			115	460		KHz
	Over Sample Ratio, OSR			64		16384	
I _{SD18}	Operation supply current without PGA	ENAD1 [0]=1	GAIN =16, ADC_CK=460KHz		260		uA

6.8.1. PGA, Power Supply and recommended operating conditions

TA = 25°C, VDD = 3.0V, VDDA=2.4V, unless otherwise noted

Sym.	Parameter	Test Conditions		Min	Typ.	Max.	unit
V _{PGA}	Supply Voltage at VDDA	ENLDO [0]=0		2.4		5.5	V
I _{PGA}	Operation supply current	PGAGN[1:0]=<11>			400		uA
G _{PGA}	Gain temperature drift	TA = -40°C~ 85°C	GAIN=128		15		ppm/°C

6.8.2. SD18,performance

TA = 25°C, VDD = 3.6V, VDDA=2.4V, VVR= AI2(short to VDDA)/2

GAIN=16 with PGA=8, fSD18=460KHz, unless otherwise noted

Sym.	Parameter	Test Conditions		Min.	Typ.	Max.	unit
INL	Integral Nonlinearity(INL)	VDDA=2.4V, VVR= AI2/2, $\Delta SI = \pm 450mV$			± 0.003	± 0.01	%FSR
	No Missing Codes ³	ADC_CK=460KHz, OSR[3:0]=0000b		23			Bits
G _{SD18}	Temperature drift Gain x16	TA = -40°C~ 85°C			10		ppm/ °C
E _{OS}	Offset error of Full Scale Rang input voltage range with Chopper without PGA	$\Delta AI=0V$ $\Delta VR=1.2V$ DCSET[3:0]=<0000> * ΔAI is external short	Gain=2			1	%FSR
	Offset temperature drift with chopper without PGA		GAIN=1		2		uV/°C
			GAIN=2		1		
			GAIN=4		0.5		
Offset temperature drift with chopper	GAIN=16		0.15				
CM _{SD18}	Common-mode rejection	V _{CM} =0.7V to 1.7V, V _{VR} = 1.0V, without PGA	V _{SI} =0V, GAIN=1		90		dB
			V _{SI} =0V, GAIN=16		75		dB
PSRR	DC power supply rejection	VDDA=3.0V $\Delta V_{DDA} = \pm 100mV$, V _{VR} =1.0V, V _{SI} =1.2V, V _{SI'} =1.2V,	GAIN=1 PGA=off		75		dB
			GAIN=16 PGA=8				dB

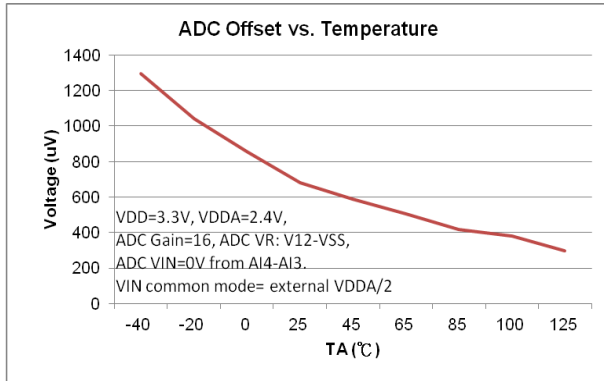


Figure 6.8-1 ADC Offset drift with Temperature

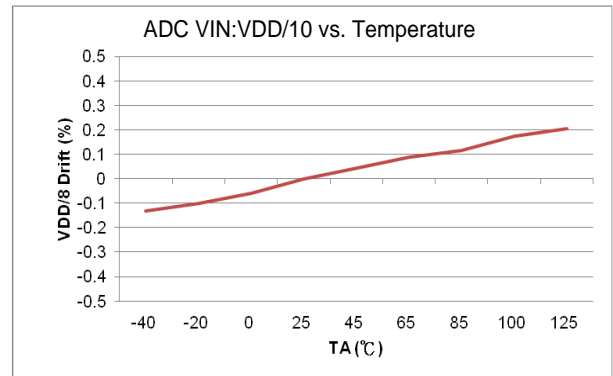


Figure 6.8-2 VDD/10 drift with Temperature

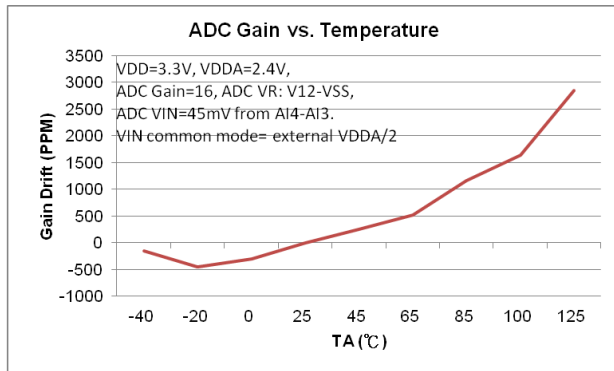


Figure 6.8-3 ADC Gain drift with Temperature

6.8.3. SD18 Noise Performance

HY17P55 針對 SD18 提供了重要的輸入雜訊規格。下表列出典型的雜訊規格表與 Gain, Output rate, 及差動最大輸入電壓等關係。取樣 1024 筆資料。

ENOB(RMS) with OSR/GAIN at A/D Clock=460KHz, VDD=3.6V, VDDA=2.4V, VREF=SDR/2=1.2V														
Max Vin(mV) =0.9*VREF ⁽¹⁾	OSR				64	128	256	512	1024	2048	4096	8192	16384	
	Output rate(Hz)				7188	3594	1797	898	449	225	112	56	28	
	Gain	=	PGAGN	x	ADGN									
±2160	0.25	=	off	x	0.25	14.57	15.06	15.56	16.03	16.56	16.94	17.38	17.84	18.36
±2160	0.5	=	off	x	0.5	14.62	15.03	15.54	16.04	16.47	16.84	17.34	17.87	18.32
±1080	1	=	off	x	1	14.62	15.07	15.63	16.11	16.61	16.93	17.53	17.92	18.4
±540	2	=	off	x	2	14.5	14.99	15.47	15.9	16.47	16.82	17.32	17.87	18.3
±270	4	=	off	x	4	14.49	15.05	15.52	16.06	16.56	16.8	17.35	17.85	18.31
±135	8	=	off	x	8	14.49	14.98	15.44	16.01	16.5	16.86	17.3	17.81	18.18
±68	16	=	off	x	16	14.37	14.95	15.38	15.91	16.39	16.79	17.17	17.72	18.16
±34	32	=	2	x	16	13.39	13.9	14.37	14.88	15.41	15.79	16.31	16.75	17.28
±17	64	=	4	x	16	13.15	13.59	14.12	14.6	15.07	15.43	15.83	16.47	16.94
±8.5	128	=	8	x	16	12.65	13.22	13.76	14.11	14.55	14.94	15.32	15.96	16.42

RMS(uV) with OSR/GAIN at A/D Clock=460KHz, VDD=3.6V, VDDA=2.4V, VREF=SDR/2=1.2V														
Max Vin(mV) =0.9*VREF ⁽¹⁾	OSR				64	128	256	512	1024	2048	4096	8192	16384	
	Output rate(Hz)				7188	3594	1797	898	449	225	112	56	28	
	Gain	=	PGAGN	x	ADGN									
±2160	0.25	=	off	x	0.25	386.39	275.54	194.62	140.62	97.02	74.67	54.99	40.14	27.99
±2160	0.5	=	off	x	0.5	186.42	140.20	98.54	69.72	51.69	39.98	28.25	19.55	14.39
±1080	1	=	off	x	1	93.40	68.04	46.27	33.27	23.46	18.76	12.42	9.48	6.81
±540	2	=	off	x	2	50.55	36.05	25.91	19.20	12.93	10.18	7.18	4.90	3.64
±270	4	=	off	x	4	25.42	17.31	12.48	8.60	6.09	5.13	3.51	2.49	1.81
±135	8	=	off	x	8	12.74	9.07	6.60	4.44	3.18	2.47	1.81	1.28	0.99
±68	16	=	off	x	16	6.91	4.64	3.44	2.39	1.71	1.29	0.99	0.68	0.50
±34	32	=	2	x	16	6.82	4.81	3.47	2.43	1.69	1.30	0.90	0.66	0.46
±17	64	=	4	x	16	4.03	2.97	2.06	1.48	1.07	0.83	0.63	0.40	0.29
±8.5	128	=	8	x	16	2.86	1.92	1.33	1.04	0.77	0.58	0.45	0.29	0.21

(1) Max.Vin (mV) is the max. input voltage of single end to ground(VSS)

Table6.8-3(a) SD18 ENOB and RMS Noise Table at VDDA=2.4V

ENOB(RMS) with OSR/GAIN at A/D Clock=460KHz, VDD=5.5V, VDDA=5V, VREF=SDR/2=2.5V														
Max Vin(mV) =0.9*VREF ⁽¹⁾	OSR				64	128	256	512	1024	2048	4096	8192	16384	
	Output rate(Hz)				7188	3594	1797	898	449	225	112	56	28	
	Gain	=	PGAGN	x	ADGN									
±4500	0.25	=	off	x	0.25	14.69	15.33	15.64	16.18	16.66	16.97	17.6	18.06	18.63
±4500	0.5	=	off	x	0.5	14.69	15.29	15.81	16.34	16.81	17.17	17.66	18.13	18.66
±2250	1	=	off	x	1	14.64	15.16	15.65	16.19	16.64	17	17.47	17.96	18.5
±1125	2	=	off	x	2	14.75	15.25	15.74	16.29	16.83	17.09	17.59	18.16	18.64
±562	4	=	off	x	4	14.66	15.12	15.63	16.17	16.67	16.99	17.39	17.98	18.51
±281	8	=	off	x	8	14.67	15.19	15.76	16.13	16.75	17.12	17.51	18.02	18.58
±140	16	=	off	x	16	14.66	15.15	15.68	16.15	16.63	17	17.53	18.01	18.5
±70	32	=	2	x	16	14.11	14.59	15.13	15.61	16.01	16.3	16.88	17.36	17.97
±35	64	=	4	x	16	13.87	14.39	14.82	15.25	15.63	15.9	16.56	16.96	17.66
±17	128	=	8	x	16	13.47	13.92	14.45	14.85	15.35	15.55	15.99	16.55	16.99

RMS(uV) with OSR/GAIN at A/D Clock=460KHz, VDD=5.5V, VDDA=5V, VREF=SDR/2=2.5V														
Max Vin(mV) =0.9*VREF ⁽¹⁾	OSR				64	128	256	512	1024	2048	4096	8192	16384	
	Output rate(Hz)				7188	3594	1797	898	449	225	112	56	28	
	Gain	=	PGAGN	x	ADGN									
±4500	0.25	=	off	x	0.25	758.72	485.33	392.27	269.49	193.61	156.14	100.97	73.09	49.28
±4500	0.5	=	off	x	0.5	379.65	249.80	174.20	120.50	87.05	67.98	48.27	34.97	24.18
±2250	1	=	off	x	1	196.47	136.56	97.65	67.22	48.90	38.19	27.54	19.71	13.54
±1125	2	=	off	x	2	91.00	64.24	45.84	31.18	21.53	18.01	12.67	8.55	6.14
±562	4	=	off	x	4	48.34	35.26	24.75	17.04	11.99	9.64	7.30	4.83	3.36
±281	8	=	off	x	8	24.06	16.71	11.31	8.70	5.67	4.39	3.35	2.36	1.60
±140	16	=	off	x	16	12.08	8.64	5.96	4.32	3.09	2.39	1.66	1.18	0.84
±70	32	=	2	x	16	8.84	6.35	4.37	3.13	2.38	1.95	1.30	0.93	0.61
±35	64	=	4	x	16	5.23	3.65	2.70	2.01	1.55	1.28	0.81	0.61	0.38
±17	128	=	8	x	16	3.45	2.53	1.75	1.33	0.94	0.81	0.60	0.41	0.30

(1) Max.Vin (mV) is the max. input voltage of single end to ground(VSS)

Table6.8-3(b) SD18 ENOB and RMS Noise Table at VDDA=5V

<i>ENOB(RMS) with OSR/GAIN at A/D Clock=460KHz, VDD=3.6V, VDDA=2.4V, VREF=SDR/2=1.2V at High Accuracy Mode</i>									
Max Vin(mV) =0.9*VREF ⁽¹⁾	OSR				2048	4096	8192	16384	
	Output rate(Hz)				112	56	28	14	
	Gain	=	PGAGN	x	ADGN				
±2160	0.25	=	off	x	0.25	17.37	17.78	18.36	18.81
±2160	0.5	=	off	x	0.5	17.38	17.84	18.33	18.79
±1080	1	=	off	x	1	17.41	17.99	18.46	18.93
±540	2	=	off	x	2	17.32	17.83	18.32	18.8
±270	4	=	off	x	4	17.39	17.9	18.41	18.92
±135	8	=	off	x	8	17.35	17.8	18.41	18.83
±68	16	=	off	x	16	17.34	17.76	18.2	18.77
±34	32	=	2	x	16	16.23	16.76	17.3	17.82
±17	64	=	4	x	16	15.9	16.41	17.01	17.46
±8.5	128	=	8	x	16	15.38	15.99	16.54	16.87
<i>RMS(μV) with OSR/GAIN at A/D Clock=460Hz, VDD=3.6V, VDDA=2.4V, VREF=SDR/2=1.2V at High Accuracy Mode</i>									
Max Vin(mV) =0.9*VREF ⁽¹⁾	OSR				2048	4096	8192	16384	
	Output rate(Hz)				112	56	28	14	
	Gain	=	PGAGN	x	ADGN				
±2160	0.25	=	off	x	0.25	55.47	41.59	27.99	20.38
±2160	0.5	=	off	x	0.5	27.50	19.98	14.28	10.39
±1080	1	=	off	x	1	13.47	8.99	6.51	4.71
±540	2	=	off	x	2	7.18	5.03	3.58	2.57
±270	4	=	off	x	4	3.41	2.41	1.68	1.18
±135	8	=	off	x	8	1.76	1.29	0.84	0.63
±68	16	=	off	x	16	0.88	0.66	0.49	0.33
±34	32	=	2	x	16	0.96	0.66	0.45	0.32
±17	64	=	4	x	16	0.60	0.42	0.28	0.20
±8.5	128	=	8	x	16	0.43	0.28	0.19	0.15

(1) Max.Vin (mV) is the max. input voltage of single end to ground(VSS)

Table6.8-3(c) High Accuracy Mode, SD18 ENOB and RMS Noise Table at VDDA=2.4V

<i>ENOB(RMS) with OSR/GAIN at A/D Clock=460KHz, VDD=5.5V, VDDA=5V, VREF=SDR/2=2.5V at High Accuracy Mode</i>									
Max Vin(mV) =0.9*VREF ⁽¹⁾	OSR				2048	4096	8192	16384	
	Output rate(Hz)				112	56	28	14	
	Gain	=	PGAGN	x	ADGN				
±4500	0.25	=	off	x	0.25	17.43	18.06	18.54	19.07
±4500	0.5	=	off	x	0.5	17.59	18.16	18.67	19.15
±2250	1	=	off	x	1	17.44	17.93	18.58	19.01
±1125	2	=	off	x	2	17.61	18.13	18.65	19.12
±562	4	=	off	x	4	17.43	17.96	18.5	19.05
±281	8	=	off	x	8	17.55	18.15	18.63	19.07
±140	16	=	off	x	16	17.51	17.97	18.54	19.06
±70	32	=	2	x	16	16.92	17.31	17.93	18.48
±35	64	=	4	x	16	16.5	17.06	17.52	18.03
±17	128	=	8	x	16	16.03	16.44	16.96	17.48
<i>RMS(μV) with OSR/GAIN at A/D Clock=460Hz, VDD=5.5V, VDDA=5V, VREF=SDR/2=2.5V at High Accuracy Mode</i>									
Max Vin(mV) =0.9*VREF ⁽¹⁾	OSR				2048	4096	8192	16384	
	Output rate(Hz)				112	56	28	14	
	Gain	=	PGAGN	x	ADGN				
±4500	0.25	=	off	x	0.25	113.63	73.10	52.63	36.50
±4500	0.5	=	off	x	0.5	50.78	34.25	24.08	17.25
±2250	1	=	off	x	1	28.12	20.00	12.81	9.52
±1125	2	=	off	x	2	12.56	8.73	6.09	4.39
±562	4	=	off	x	4	7.10	4.92	3.38	2.30
±281	8	=	off	x	8	3.25	2.15	1.54	1.14
±140	16	=	off	x	16	1.67	1.22	0.82	0.57
±70	32	=	2	x	16	1.26	0.96	0.63	0.43
±35	64	=	4	x	16	0.84	0.57	0.42	0.29
±17	128	=	8	x	16	0.59	0.44	0.31	0.21

(1) Max.Vin (mV) is the max. input voltage of single end to ground(VSS)

Table6.8-3(d) High Accuracy Mode, SD18 ENOB and RMS Noise Table at VDDA=5V

The RMS Noise are referred to the input. The Effective Number of Bits (ENOB(RMS Bit)) is defined as:

$$\text{ENOB(RMS)} = \frac{\ln\left(\frac{\text{FSR}}{\text{RMS Noise}}\right)}{\ln(2)}$$

$$\text{RMS Noise} = \frac{\left(2 \times \text{VREF} \times \sqrt{\sum_{k=1}^{1024} (\text{ADO}[k] - \text{Average})^2}\right)}{2^{23}}$$

Where FSR (Full - Scale Range) = $2 \times \text{VREF}/\text{Gain}$.

$$\text{Average} = \frac{\sum_{k=1}^{1024} (\text{ADO}[k])}{1024}$$

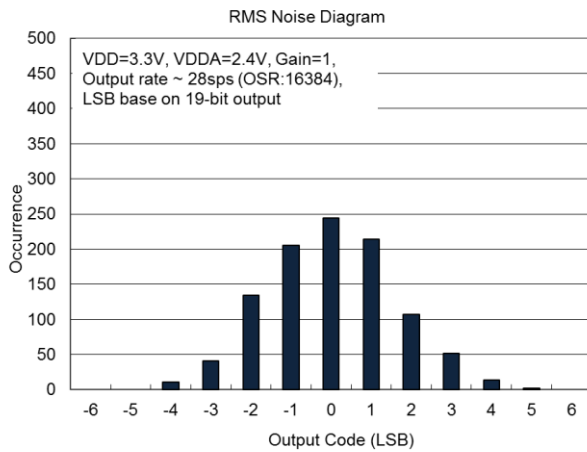


Figure 6.8-4 RMS Noise Diagram

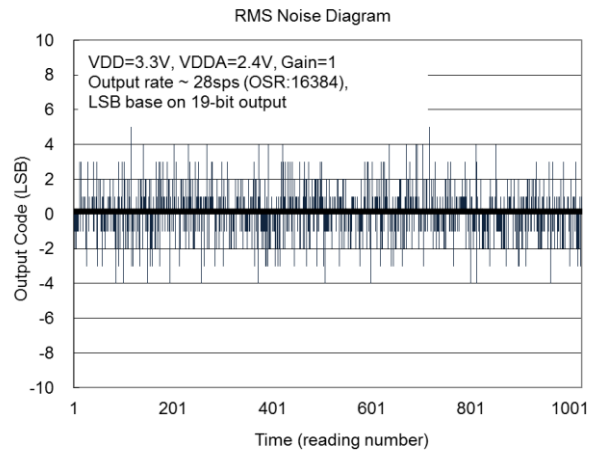


Figure 6.8-5 Output Code Diagram

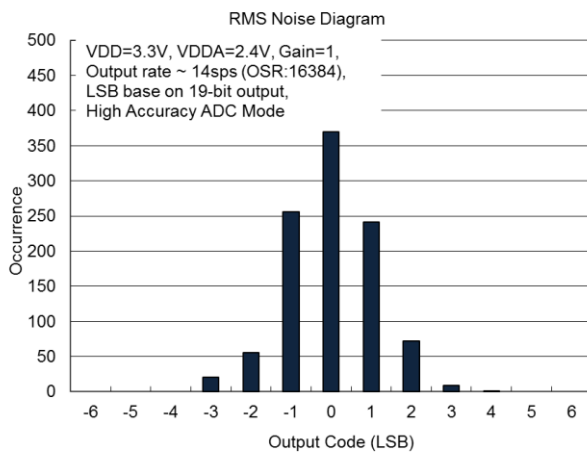


Figure 6.8-6 RMS Noise Diagram

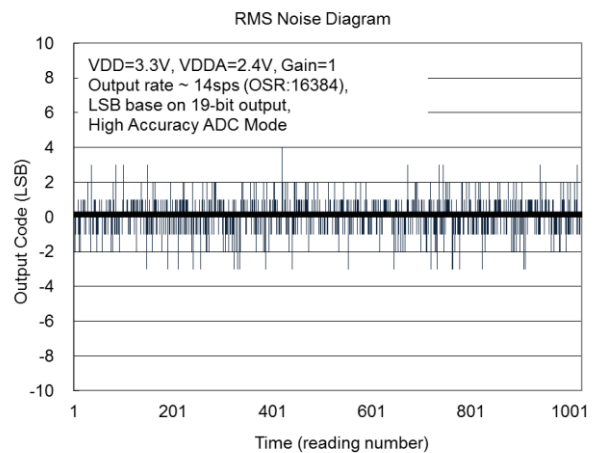


Figure 6.8-7 Output Code Diagram

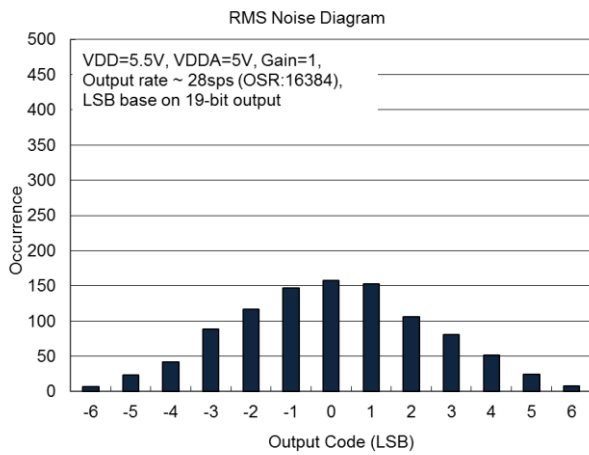


Figure 6.8-8 RMS Noise Diagram

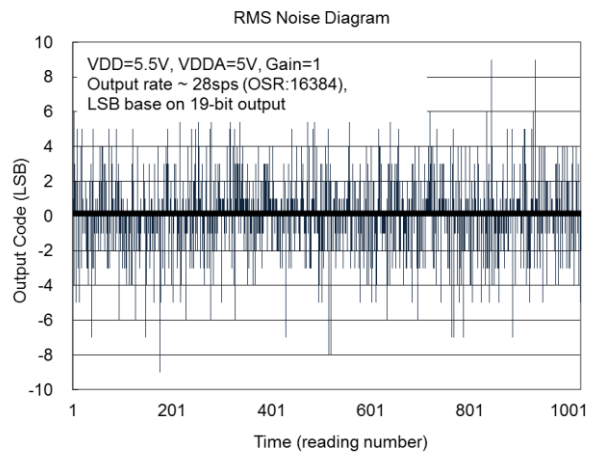


Figure 6.8-9 Output Code Diagram

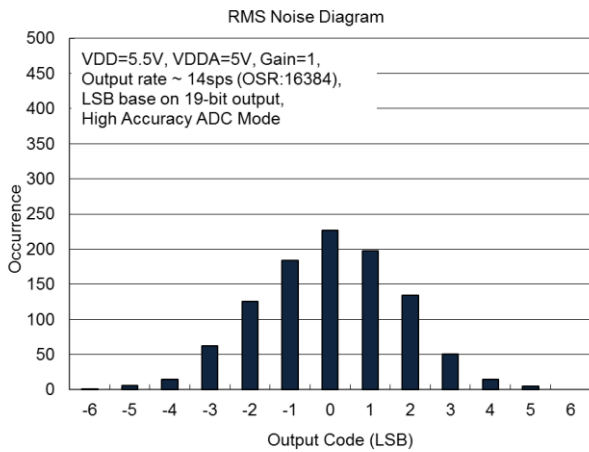


Figure 6.8-10 RMS Noise Diagram

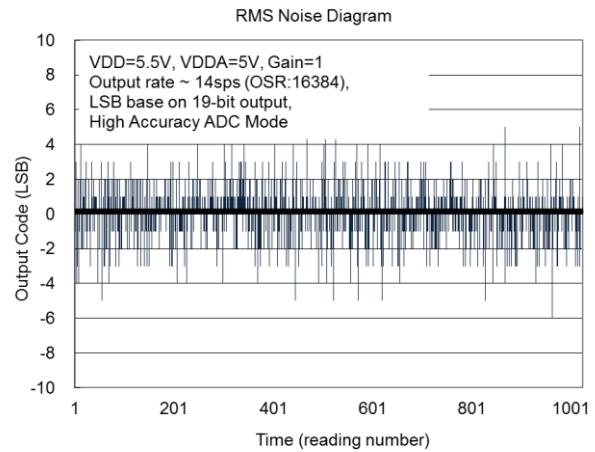


Figure 6.8-11 Output Code Diagram

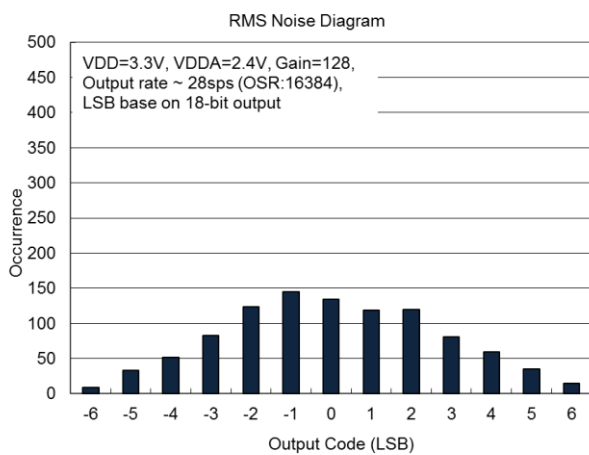


Figure 6.8-12 RMS Noise Diagram

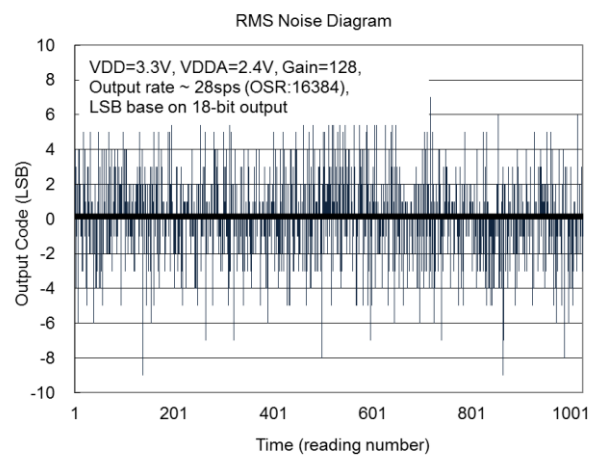


Figure 6.8-13 Output Code Diagram

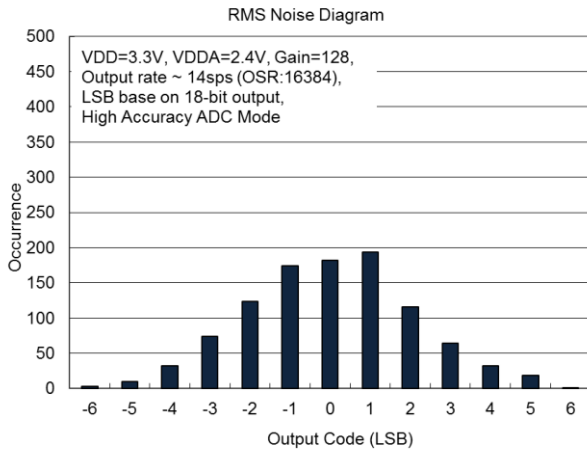


Figure 6.8-14 RMS Noise Diagram

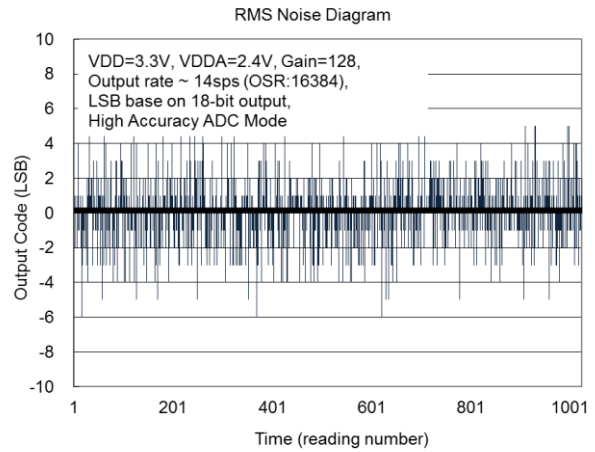


Figure 6.8-15 Output Code Diagram

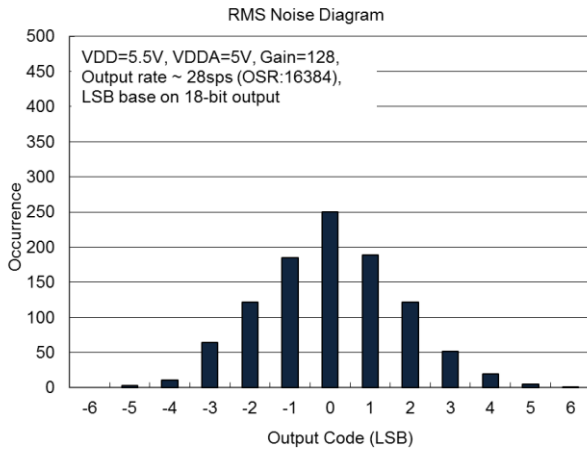


Figure 6.8-16 RMS Noise Diagram

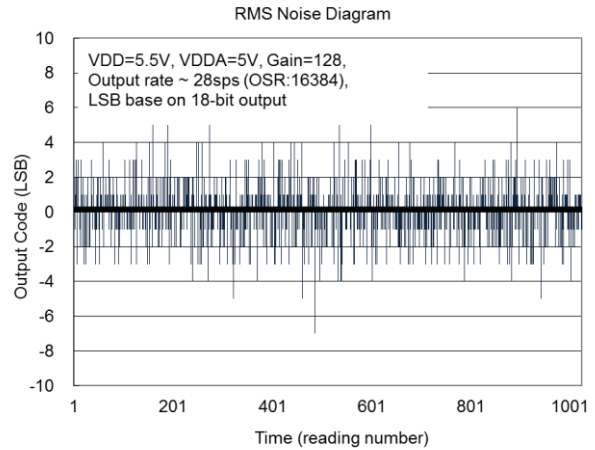


Figure 6.8-17 Output Code Diagram

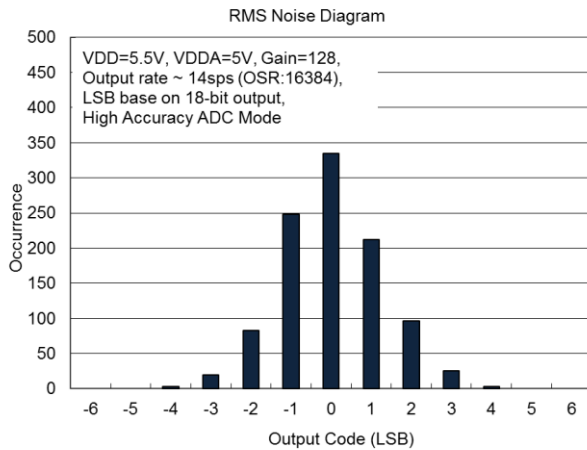


Figure 6.8-18 RMS Noise Diagram

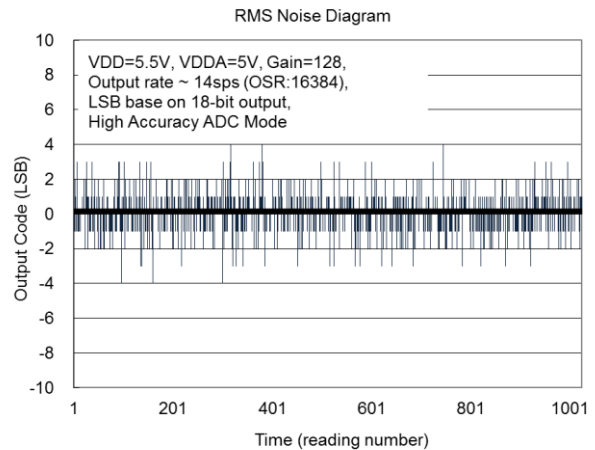


Figure 6.8-19 Output Code Diagram

6.8.4. SD18 ,Temperature Sensor

TA = 25°C, VDD = 3.0V, VDDA=2.4V, unless otherwise noted

Sym.	Parameter	Test Conditions	Min.	Typ.	Max.	unit
TC _s	Sensor temperature drift			173		uV/°C
KT	Absolute Temperature Scale 0°K			-284		°C
TC _{ERR}	One point calibrate error temperature	Calibration at 25°C of -40°C~85°C		±2		°C

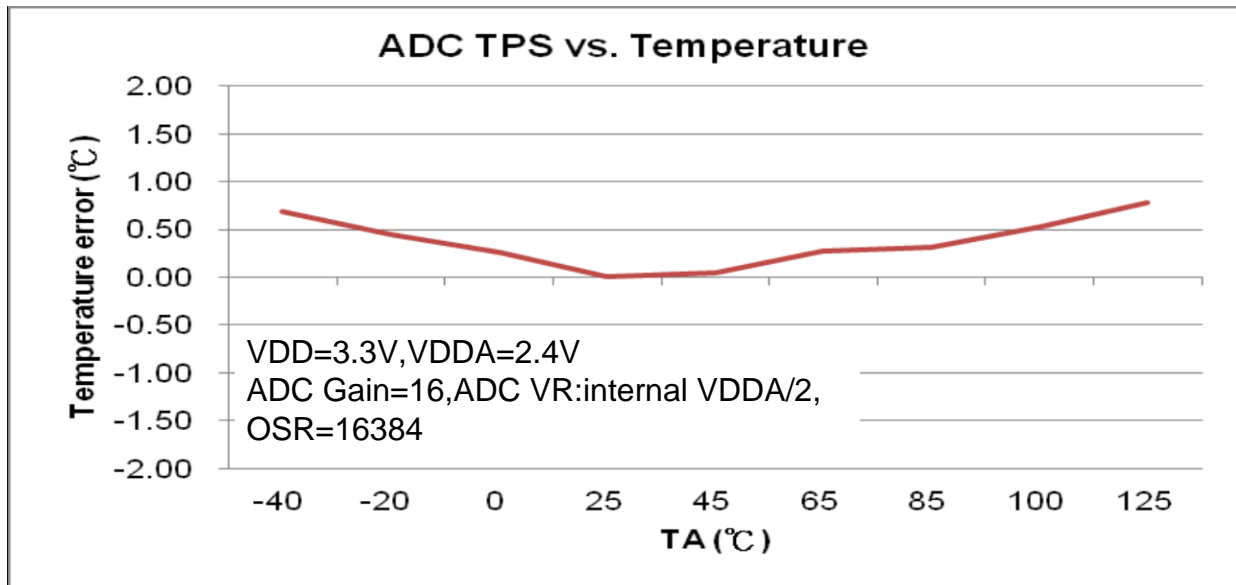


Figure 6.8-20 ADC Temperature Error

6.9. Build-In EPROM(BIE)

TA = 25°C, VDD = 3.0V, unless otherwise noted

Sym.	Parameter	Test Conditions	Min.	Typ.	Max.	unit
V _{BIE}	Supply Voltage at VPP PIN		8.5		8.75	V
I _{BIE}	Operation supply current			3		mA
V _{SS}	Supply Voltage			0		V

When connecting to the external VBIE power source to program the BIE block, users can use the instruction to program the words one by one into the BIE block.

6.10. Build-In EPROM(BIE) Low voltage control circuit

TA = 25°C, VDD = 3.05V, unless otherwise noted

Sym.	Parameter	Test Conditions	Min.	Typ.	Max.	unit
T _O	Operation temperature range		0	25	40	°C
V _{DD}	Operation supply Voltage		2.75		5.5	V
V _{SS}	Supply Voltage			0		V

When the 2.75V low voltage programming control circuit is activated, users can program the BIE block without connecting to the external VBIE power source.

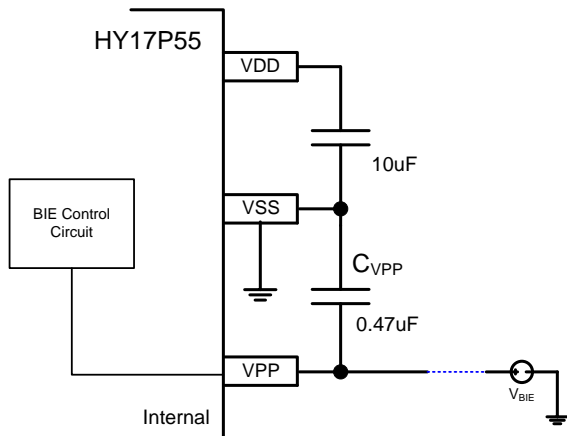


Figure 6.10-1 BIE typical application circuit

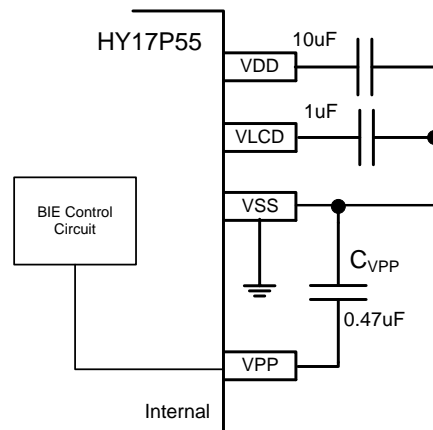


Figure 6.10-2 Use low voltage control circuit

7. 訂貨資訊

下單品名 1	封裝型式	引腳數	封裝型式		程式碼	出貨包裝 形式	個裝 數量	材料 組成	MSL3
			描述方式	編號 2					
HY17P55-D000	Die	-	D	000	000	-	250	Green4	-
HY17P55-L048	LQFP	48	L	048	000	Tray	250	Green4	MSL-3

¹ 產品名稱 – 封裝型式描述方式 – 程式碼編號 (空白片 / 標準品 / 代客燒錄碼)

例如：您的 HY17P55 代客燒錄服務申請的程式碼編號為 008，且需要的產品是裸片出貨。則下單品名為 HY17P55-D000-008

例如：您的需求是 HY17P55 不帶程式碼的空白片且需要的產品是裸片出貨。則下單品名為 HY17P55-D000

例如：您的需求是 HY17P55 不帶程式碼的空白片且需要的產品是封裝片 LQFP48 出貨，則下單品名為 HY17P55-L048，且需以 Tray 出貨，則除下單品名外，請特別註明出貨包裝形式為 Tray

例如：您的 HY17P55 代客燒錄服務申請的程式碼編號為 009，而需求的產品是封裝片 LQFP48 出貨，則下單品名為 HY17P55-L048-009，且需以 Tray 出貨，則除下單品名外，請特別註明出貨包裝形式為 Tray

² 程式碼編號

“001”~“999” 為標準品或代客燒錄申請的程式碼編號，而空白晶片不帶此碼。

³ MSL:

濕度敏感性等級係依據 IPC/JEDEC J-STD-020 的規範加以試驗分級，並參考 IPC/JEDEC J-STD-033 的標準處理、包裝、運輸與使用。

⁴ Green (RoHS & no Cl/Br):

HYCON 產品皆為 Green Product，符合 RoHS 指令，REACH 高關注物質(SVHC)以及無鹵素相關規定。

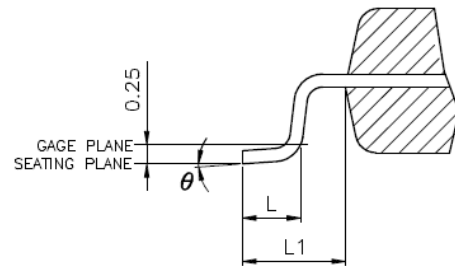
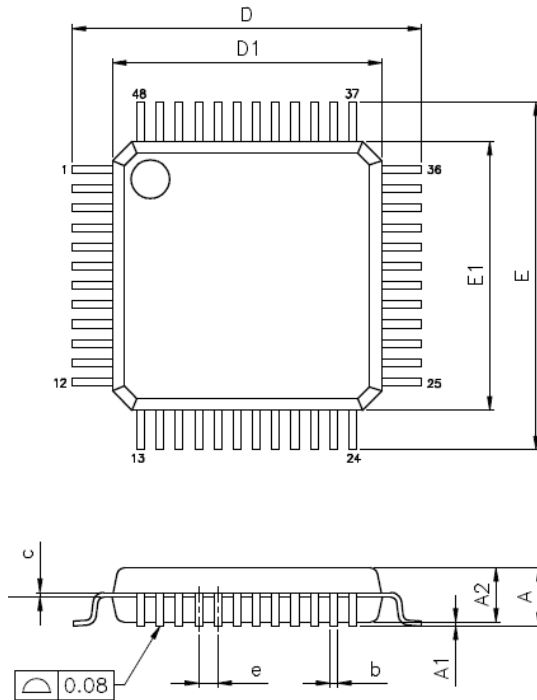
HY17P55

Embedded 18-Bit $\Sigma\Delta$ ADC
8-Bit RISC-like Mixed Signal Microcontroller

8. 封裝型式資訊

8.1. LQFP48(L048)

8.1.1. Package Dimensions



SYMBOLS	MIN.	NOM.	MAX.
A	--	--	1.60
A1	0.05	--	0.15
A2	1.35	1.40	1.45
b	0.17	0.22	0.27
c	0.09	--	0.20
D	9.00 BSC		
D1	7.00 BSC		
E	9.00 BSC		
E1	7.00 BSC		
e	0.50 BSC		
L	0.45	0.60	0.75
L1	1.00 REF		
θ	0°	3.5°	7°

Note:

1. All dimensions refer to JEDEC OUTLINE MS-012.
2. Do not include Mold Flash or Protrusions.
3. Unit: mm.

9. 修訂記錄

以下描述本文件差異較大的地方，而標點符號與字形的改變不在此描述範圍。

文件版次	頁次	日期	摘要
V01	All	2018/07/12	初版發行
V02	6~10	2018/08/8	腳位說明
	11		應用電路修改
	13~15		系統頻率修正
	24~26		暫存器列表
	39~43		ADC 操作頻率、ENOB 表
V03	21、26	2020/5/29	修改 LCD 暫存器
	30		新增外振 32768 功耗
V04	25	2021/1/5	修改暫存器列表，增加 INIS1、VRIS、INIS
	34		增加 BOR、Reset 時序圖
V05	15	2021/9/11	修改 BOR、Reset 時序圖