



1. General Description 綜述:

DL3332 series voice recorder is developed on a high performance voice recording controller. The chip operates over a wide voltage range of 2.4V~5.5V and 8MIPS high speed instruction rate. The chip integrates program ROM, data ROM, SRAM, PWM audio output and 16 programmable I/O pins. Interfacing with fast speed SPI (serial) flash can achieve variable duration for voice recording.

DL3332 是在高效的單片機平台上構建起來一系列錄音產品。主控芯片具有高時效（8MIPS），寬電壓（2.4V~5.5V），低周邊成本的優勢。內部資源豐富包括 SRAM，program ROM，Data ROM，16 根 I/O 口，PWM 直推喇叭。錄音資料存儲在外接的 SPI flash，語音長度可以任意擴展（需要軟件配合）。資料不用電池，仍然可以保存。

FEATURES

- **Low BOM cost and high performance(10KHz playback sampling rate for voice recording)**
高效的處理器，電路成本低，音質好（10KHz 採樣頻率）
- **Wide operating voltage 2.4V~5.5V**
寬廣的工作電壓
- **Low voltage reset**
低電復位
- **PWM type direct drive speaker output, and external audio amplifier(1309) supported**
直推喇叭，並可以外接功放 IC 提高音量(1309)
- **Standby mode for power saving, typical 5uA.(with flash)**
待機狀態 5uA(連 flash)
- **Internal Oscillator@+ - 5% tolerance and external Ring Oscillator for fine-tune**
內置震蕩電阻，兼有外部震蕩電阻接口做微調之用
- **Single message**
一段錄音
- **Beep tone alert**
Beep 聲錄音提示
- **Zero Power Data Retention**
斷電資料保存
- **Production test mode to speed up production efficiency**
帶有生產測試模式，提高生產效率，降低損耗

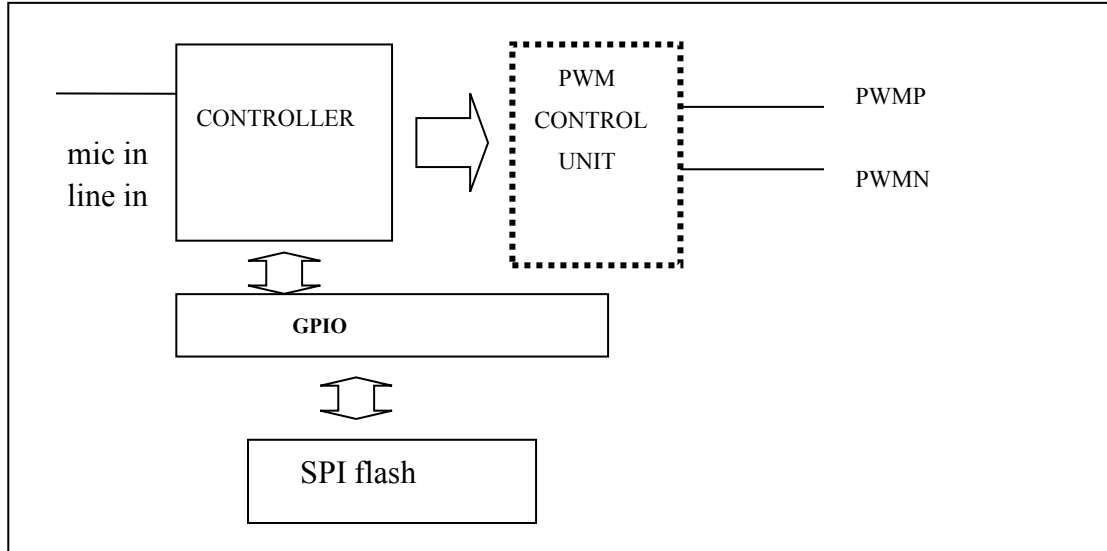
可重复录一万次



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2. System Block Diagram 系統架構



3. Pin Definition 腳位注解:

VPS	1	24	CEB
PWMP	2	23	SCLK
VPD	3	22	SDI
PWMN	4	21	SDO
OSC_ADJ	5	20	REC_L
VSS	6	19	REC_R
VDD	7	18	PLAY_R
NC	8	17	PLAY_L
NC	9	16	TEST
NC	10	15	CTR3
CTR1	11	14	REC_LED
CTR2	12	13	MIC_CTR



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Pin Name	Pin No.	I/O	Description
VPS,VSS	1, 6	I	POWER SUPPLY 電源 -
VPD,VDD	3, 7	I	POWER SUPPLY 電源 +
PWMP	2	O	PWM +
PWMN	4	O	PWM -
OSC_ADJ	5	I	Fine Tune Oscillation Freq. If no external Rose connected, the chip will have max +/- 5% oscillation freq. tolerance 震蕩頻率微調 , 不接微調電阻, 會有最多 +/- 5% 的頻飄
NC	8,9,10	I	NC 無特殊功能
CTR1,2,3	11,12,15	I	CONTROL pin . 控制信號腳
MIC_CTR	13	O	Microphone control pin. Disable power supply of microphone in stand by mode to save the power consumption. 麥克風控制腳 , 在待機狀態下, 把麥克風電源關掉, 降低靜態功耗
REC_LED	14	O	LED indicator. The pin will send a HIGH signal during the voice recording and LOW signal when it stop recording or end of message is reached. The pin will also send a pulse@3Hz while the voice is playing back. LED 指示燈 , 錄音時候輸出高電平, 聲音錄滿或停止錄音會輸出低電平. 播放的時候, 輸出 3Hz 的脈衝信號。



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TEST	16	I	<p>Production Test Mode. Connected to VDD then power on, it will enter the production test mode. Trigger the input keys , the REC_LED will be lit on respectively. Afterwards, the REC_LED will keep on for a short while and a BEEP tone@1KHz will be played. If no flash connected or bad contact with the controller, the REC_LED will keep flash. Trigger any key will turn off the REC_LED. REMARK: the pin should be disconnected with VDD after the production test mode</p> <p>生產測試模式。跟 VDD 連接，然後上電會自動進入測試模式。順次觸發按鍵(PLAY_L,PLAY_R,REC_R,REC_L) 會打開 REC_LED, 放手 REC_LED 會熄滅，當所有按鍵都測試完成，REC_LED 會保持常亮，當聽到 BEEP 聲，表示 flash 測試完成。如果 flash 沒有跟主芯片接好，REC_LED 會長閃。任意按一個鍵會把 LED 關掉。注意，在正常使用下，要確保 TEST pin 不會跟 VDD 連接，否則功能可能出現異常。</p>
PLAY_L	17	I	<p>PLAY LEVEL HOLD. Level hold the key to play back the voice. Release the key will stop the voice play back.</p> <p>播放鍵，按著鍵播放聲音，放手聲音停止</p>
PLAY_R	18	I	<p>PLAY(RETRIGGER). Trigger the key once will play the entire message. Retriggering the key will play the voice again from begin during the voice playback .</p> <p>播放鍵。按一下把整段錄音播放出來，聲音放完之前重新觸發一次，語音會從頭播放。Remark: If PLAY_R,PLAY_L is triggered at the same time, the voice is played at Odd trigger and stopped playing at Even trigger, that is PLAY-STOP-PLAY 如果 PLAY_R,PLAY_L 被同時觸發，播放的模式將變為單數次觸發是播放，雙數次觸發是停止。就是說：播放—停止播放-停止。</p>



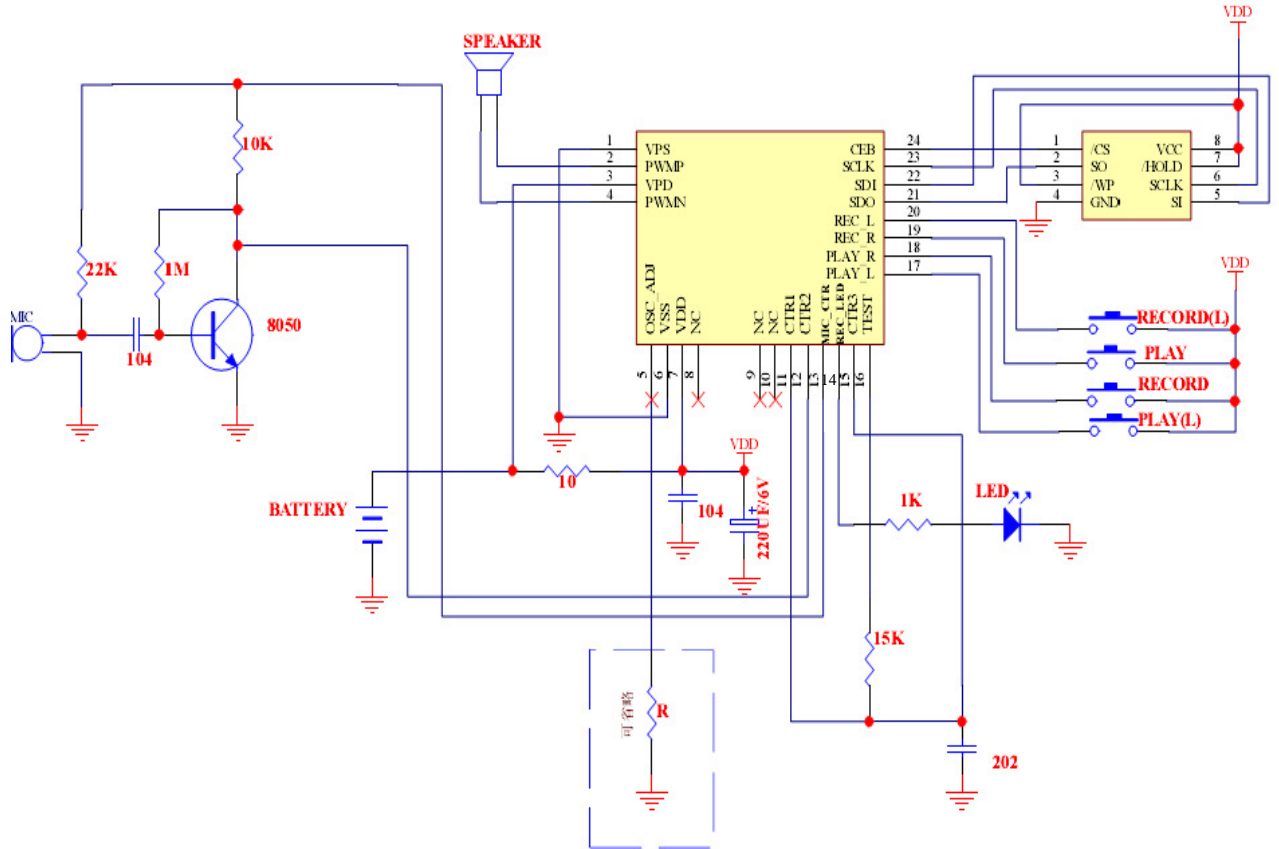
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Pin Name	Pin No.	I/O	Description
REC_R	19	I	RECORD key. Trigger the key once will start the voice recording. Trigger the key again will stop the voice recording. If not in MUTE mode, you will hear a BEEP sound for the first trigger meaning that it's starting to record the message. Trigger again will hear Beep twice to indicate the recording process stop. 錄音鍵. 按一下開始錄音, 再次觸發會停止錄音。按一次會聽到 Beep 聲一次, 再次觸發會聽到 Beep 聲兩次。表示錄音開始和結束。
REC_L	20	I	RECORD key. Level-hold the key to record the message. Release the key to stop the voice recording. You will hear a BEEP sound for the first trigger meaning that it's starting to record the message. Lift the key will hear Beep twice to indicate the recording process stop. 錄音鍵. 長按開始錄音, 放手停止錄音。按一次會聽到 Beep 聲一次, 放手會聽到 Beep 聲兩次。表示錄音開始和結束。
CEB,SCLK, SDI,SDO	21, 22, 23, 24	I/O	SPI flash interface. SPI flash 通訊口



4. Application Circuit 參考電路(VDD=4.5V):



To fine tune the circuitry to fit for different application especially for the microphone sensitivity, operating voltage, background noise, user many change the value of the resistor connected to the Microphone. The typical value is 22K ohm, however you may change the value normal from 10K ohm to 50K ohm. Larger the resistance, lower the sensitivity. 調整連接麥克風的電阻值可以針對不同的靈敏度,電壓,背景雜音等要求。一般我們用 22K 歐姆,但是用戶可以自己調整。範圍建議是 10K 歐姆到 50K 歐姆。阻抗越大,靈敏度越低。

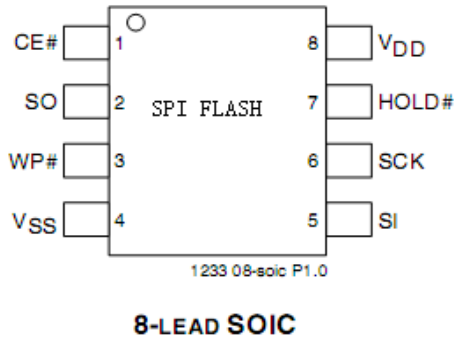
按一下播放接 18 脚, IC 的 13 脚加一个 22UF 电容到地, 可以减少一些噪音, C3 电容标错, 应为 1NF 电容



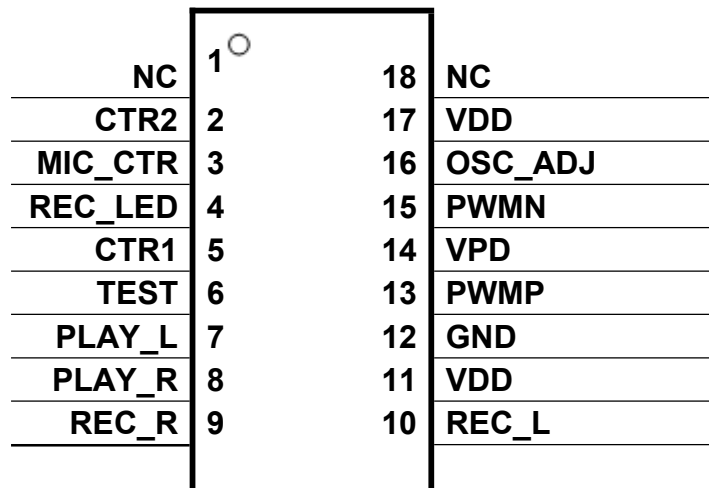
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5. Packaging information



18 PIN COB 主芯片 COB 接線圖

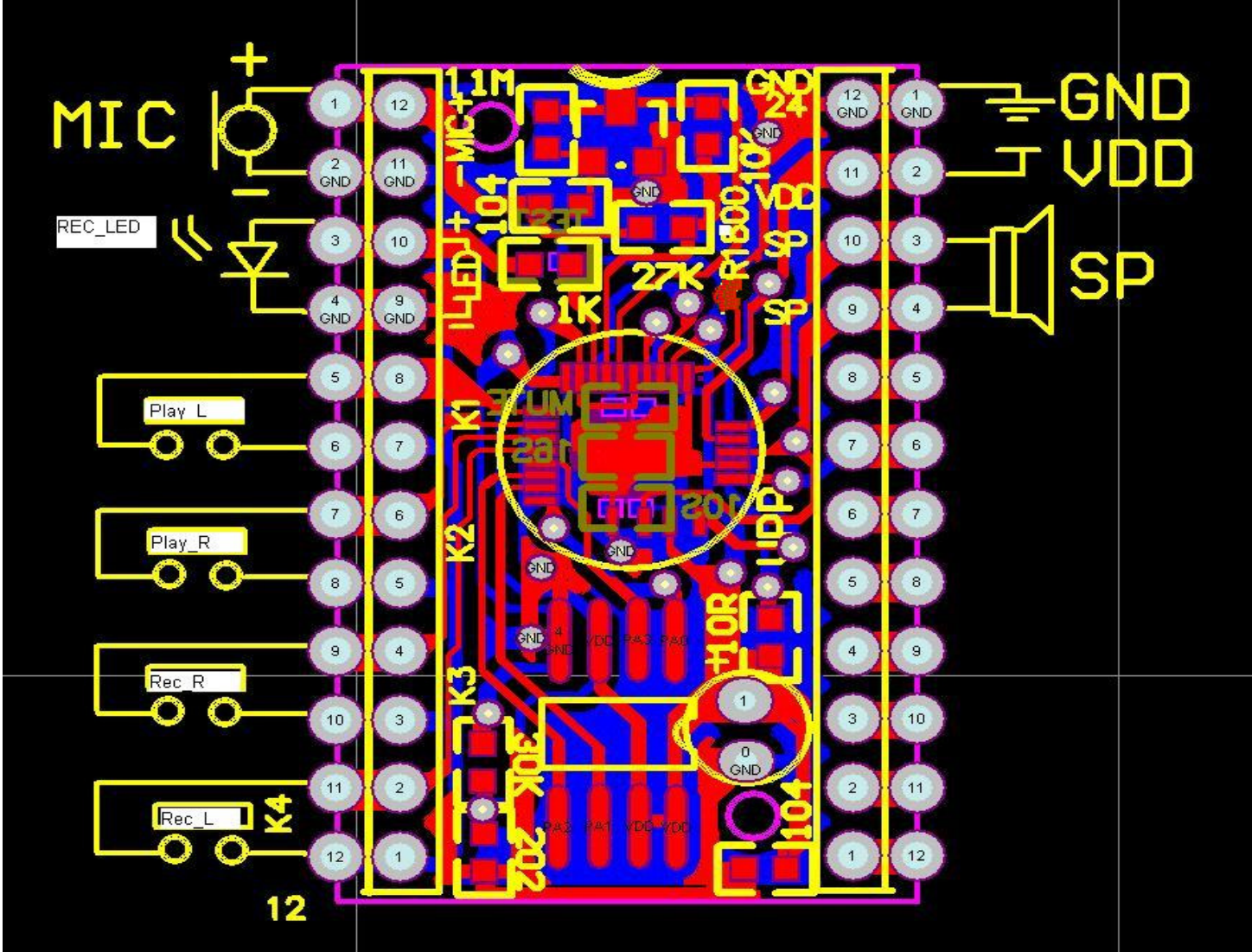




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6. PCBA(Size 31mm*20mm)



Apart from the IC, we will also offer PCBA with components. Customer can easily connect the keys and LED as well as other necessary components to the PCBA. Then they can save the cost and time for production. 我們同時可以提供芯片模塊給客戶。客戶只需要根據上圖簡單的接線就可以完成生產，節省成本。



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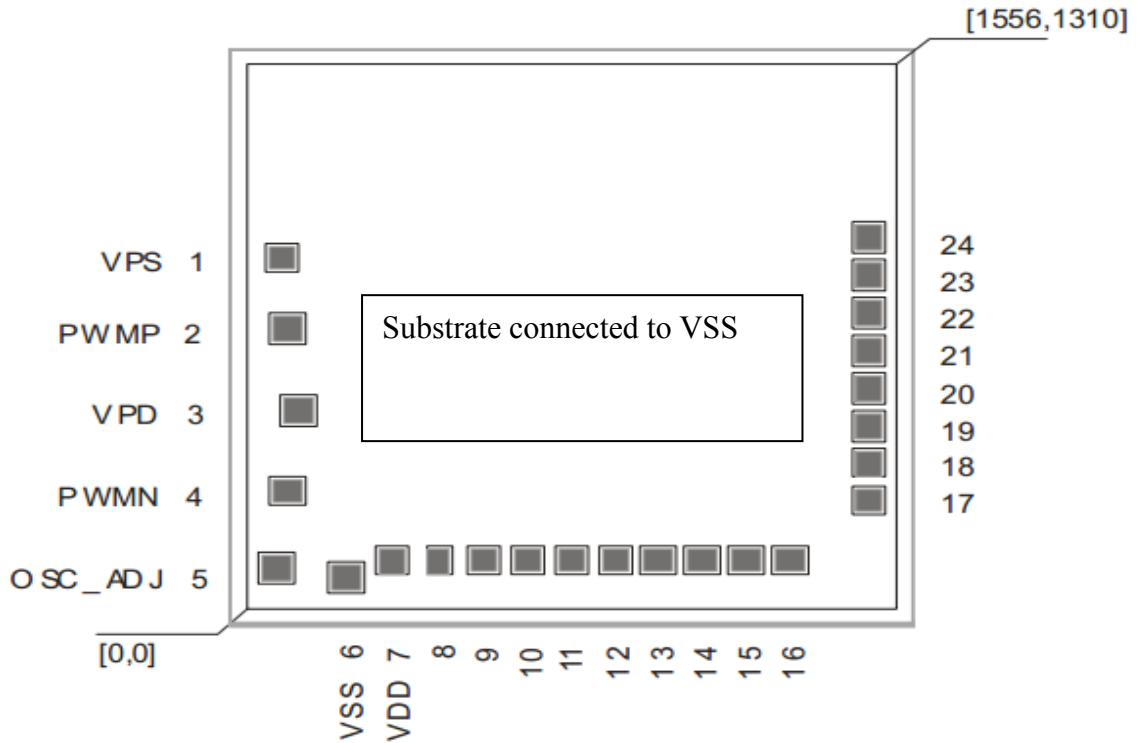
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7. Bonding Diagram (打線圖)

Chip size: 1659x1174

Pad size: 80 x 80



No.	Name	X	Y	No.	Name	X	Y
1	VPS	71.15	900.50	13	MIC_CTR	954.41	87.93
2	PWMP	108.81	707.40	14	REC-LED	1054.04	87.93
3	VPD	137.52	511.97	15	CTR3	1153.67	87.93
4	PWMN	108.81	316.53	16	TEST	1253.30	87.93
5	OSC_ADJ (NC)	87.93	74.75	17	Play_L	1395.95	154.94
6	VSS	230.85	74.75	18	Play_R	1395.95	254.57
7	VDD	373.82	107.37	19	REC_R	1395.95	354.20
8	NC	464.85	87.93	20	REC_L	1395.95	453.83
9	NC	555.89	87.93	21	SDO	1395.95	553.46
10	NC	655.52	87.93	22	SDI	1395.95	653.09
11	CTR1	755.15	87.93	23	SCLK	1395.95	752.72
12	CTR2	854.78	87.93	24	CEB	1395.95	852.35



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8. Electronic Characteristics(電氣特性):

DC CHARACTERISTICS (TA = 25°C, VDD = 3V)

CONDITIONS	SYMBOL	CONDITIONS	LIMIT			UNIT
			Min	Typ	Max	
Operating Voltage	V _{DD}	-	2.4	-	5.5	V
Operating Current	I _{OP}	3V, 8.1MHz	-	2.5	-	mA
Standby Current	I _{STBY}	2.4V ~ 5.5V	-	-	1	uA
Input High Level	V _{IH}		0.8*V _{DD}	-	-	V
Input Low Level	V _{IL}		-	-	0.2*V _{DD}	V
Output High I	I _{OH}	VDD=3V, V _{OH} =2V	-	-3.5	-	mA
Output Sink I	I _{OL}	VDD=3V, V _{OL} =1V	-	5	-	mA
Input Resistor	R _{IN}	Pull down 50K ohm Selected	-	50	-	Kohm
		Pull down 1M ohm Selected	-	1000	-	Kohm

AC CHARACTERISTICS (TA = 25°C, VDD = 3V)

NO.	PARAMETER	Test Condition	SYMBOL	LIMIT			UNIT
				Min	Typ.	Max	
1.	OSC Frequency	-	F _{CPU}	-	8.1	-	MHz
				-	8.1	-	MHz



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9. Ordering Information(銷售指引)

Package:

- 1) Controller 主芯片
 - a) Die (裸片)
 - b) COB
- 2) SPI flash (儲存芯片)
 - a) 8 pin SOP
- 3) PCBA 機芯模塊

Product Series 產品系列	Sampling Rate (采樣頻率)	Duration	Availability (供貨狀況)
1606	10KHz	6" single message (6 秒,一段錄放音)	Now (現貨)
1610	10KHz	10" single message (10 秒,一段錄放音)	Now (現貨)
1620	10KHz	20" single message (20 秒, 一段錄放音)	Now (現貨)
1630	10KHz	30" single message (30 秒, 一段錄放音)	Now (現貨)
1660	10KHz	60" single message (60 秒, 一段錄放音)	Now (現貨)
16120	10KHz	128" single message (128 秒, 一段錄放音)	Now(現貨)