NSP2.0

Data Sheet

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1. General Description

NSP2 series is an advanced 2-ch Voice IC with embedded Flash and equips new algorithm to implement Voice Prompt applications with high level of sound quality. In addition to upgrade the operating temperature and flash program/erase cycling endurance, NSP2 also provide SOP8 with 2 I/Os protocol、I2C or UART to communicate with host MCU.

The NSP2 family contains following chips built-in different size of embedded Flash, shown as below:

Part No.	Duration (S)			Package	V_{DD} (V)	LVR (V)	Audio	ISP	Interface			
	8KHz	12KHz	16KHz				PWM		I2C	UART	Two-Wire	One-Wire
NSP2080A	144	96	72	SOP8	2.0 ~ 5.5	1.9	13-bit	V	V	V	V	V
NSP2170A	265	177	133									
NSP2340A	630	420	315									

2. Features

- Operating voltage: 2.0~5.5V
- Operating temperature：-40˚C ~ 85˚C
- Interface with MCU：UART、I2C (Slave)、Two-Wire、One-Wire
- Audio output: 13-bit PWM (0.5W @ 5.5V)
- Provide ISP (In System Program) to update content from Host MCU
- Voice channel: 2-ch Voice
- Low Voltage Reset (LVR)
- Low Standby current (<= 1uA)
- Flash Data Retention：10-Year
- Flash Program/Erase Cycling Endurance：100K
- Package form: SOP8

3. PIN Description

Pin Name	I/O	Function
BP00 BP01	I/O	● General input / output pins ● BP00, BP01 share with ICPCLK and ICPDATA ● Each pin can be set as I2C、UART、Two-Wire、One-Wire interface
VDD	Power	Positive power supply
REG	Power	Internal regulator, 0.1uF capacitor is needed
VSS	Power	Negative power supply
PWM+	O	PWM driver positive output to drive speaker directly
PWM-	O	PWM driver negative output to drive speaker directly
/RESET	I	IC reset input, low active

4. Electrical Characteristics

4.1 Absolute Maximum Ratings

Parameter	Symbol	Conditions	Rated Value	Unit
Input Voltage	VIN	All Inputs	VSS -0.3 to VDD +0.3	V
Storage Temp.	TSTG	-	-55 to +150	°C
Operating Temp.	TOPR	-	-40 to +85	°C

Noted: Exposure to conditions beyond those listed under the absolute Maximum ratings table may adversely affect the life and reliability of the device.

4.2 D.C. Characteristics

(VDD – VSS = 4.5V, TA = 25° C, No Load unless otherwise specified)

Parameter	Sym	Conditions	Min	Typ	Max	Unit
Operating Voltage	V_{DD}		2.0	-	5.5	V
Operating Current	I_{OP1}	No load	-	5	-	mA
Standby Current (STOP)	I_{DD1}	No load	-	-	1	μA
Input Low Voltage	V_{IL}	All input pins	V_{SS}	-	0.3 V_{DD}	V
Input High Voltage	V_{IH}	All input pins	0.7 V_{DD}	-	V_{DD}	V
Pull High resistor BP00, BP01	RPH	VDD = 4.5V	105K	150K	195K	Ω
Output Current BP00, BP01	I_{OL}	V_{DD} = 3V, V_{OUT} = 0.4V	8	-	-	mA
	I_{OH}	V_{DD} = 3V, V_{OUT} = 2.6V	-4	-	-	mA

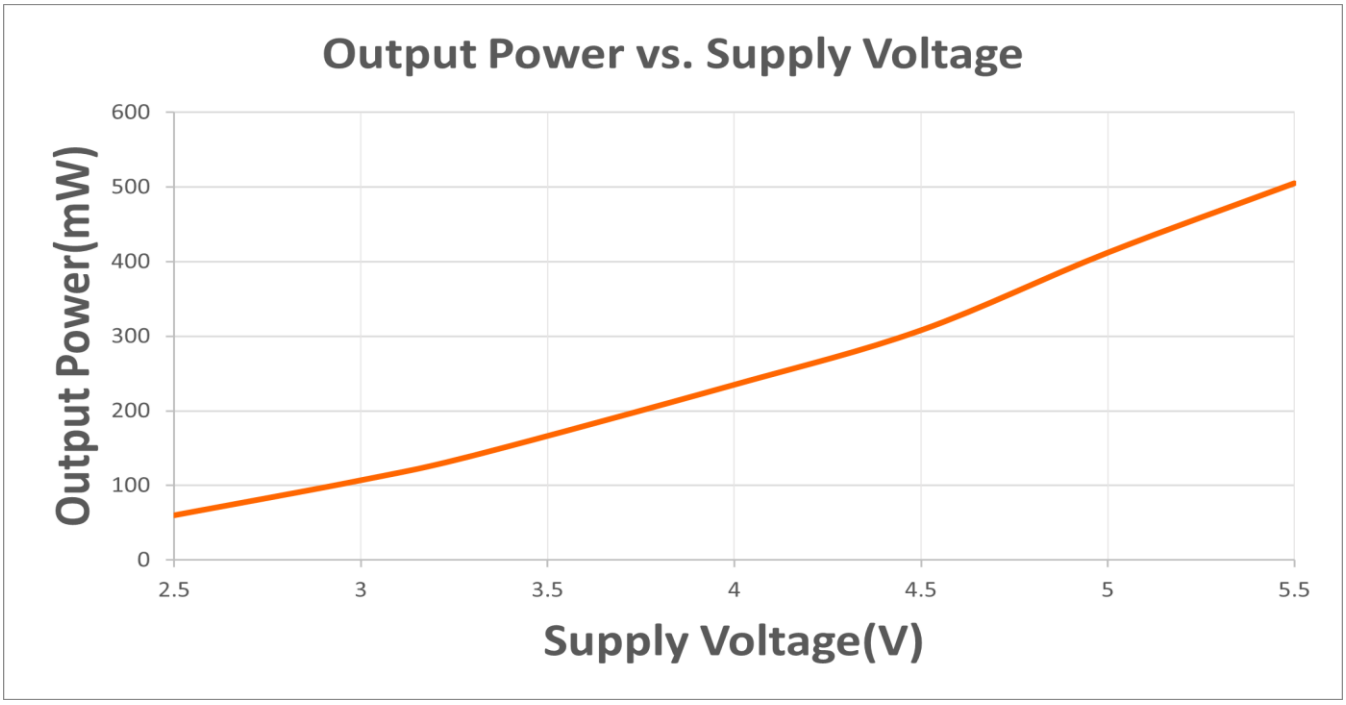
4.3 A.C. Characteristics

(VDD = 4.5V, TA = 25°C, No Load unless otherwise specified)

Parameter	Sym	Conditions	Min	Typ	Max	Unit
Frequency Deviation by Voltage Drop	ΔF/F	(Fmax – Fmin)/Fmin @VDD: 2.0 ~ 5.5V	-3	-	3	%

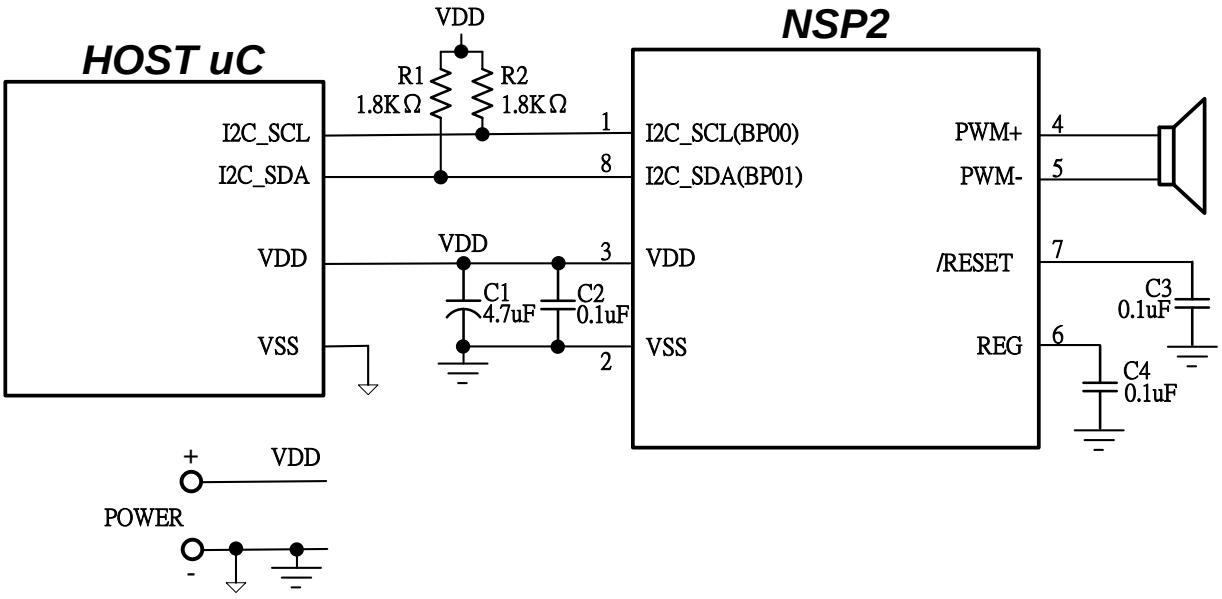
4.4 Output Power

(Frequency Input = 1KHz Sine Wave, RL=8Ω, THD+N≦1%)

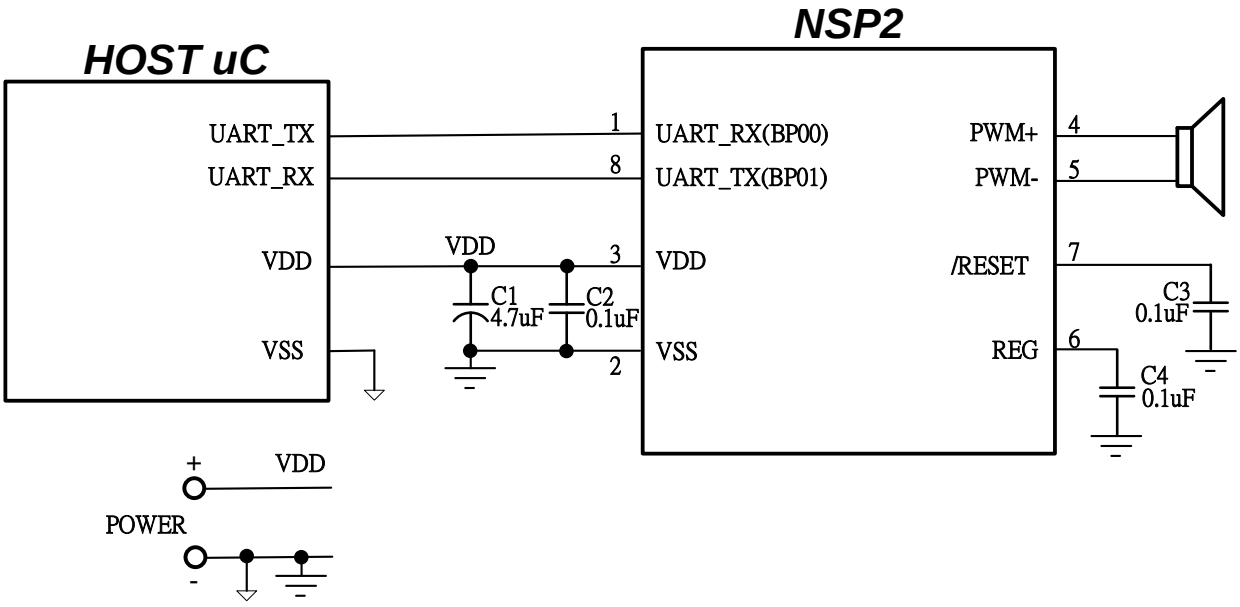


5. Typical Application Circuit

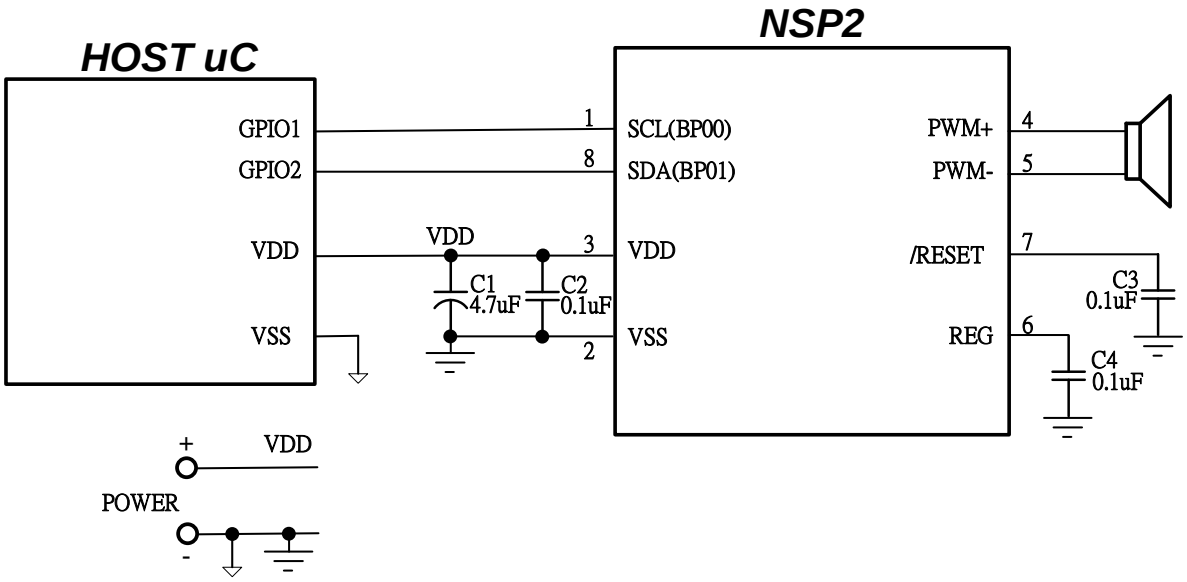
5.1 Connect to Host uC by I2C Interface



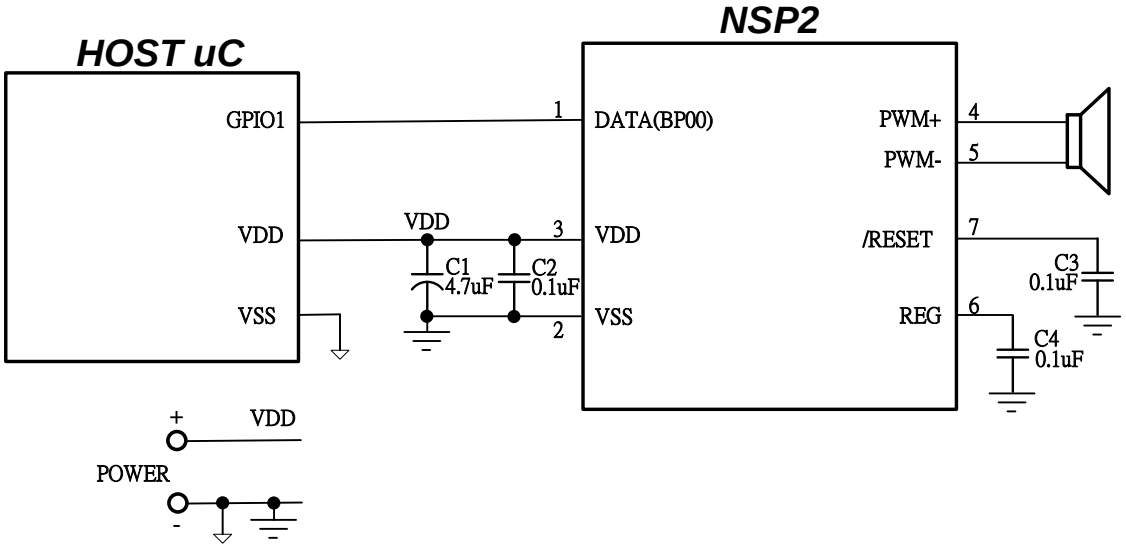
5.2 Connect to Host uC by UART Interface



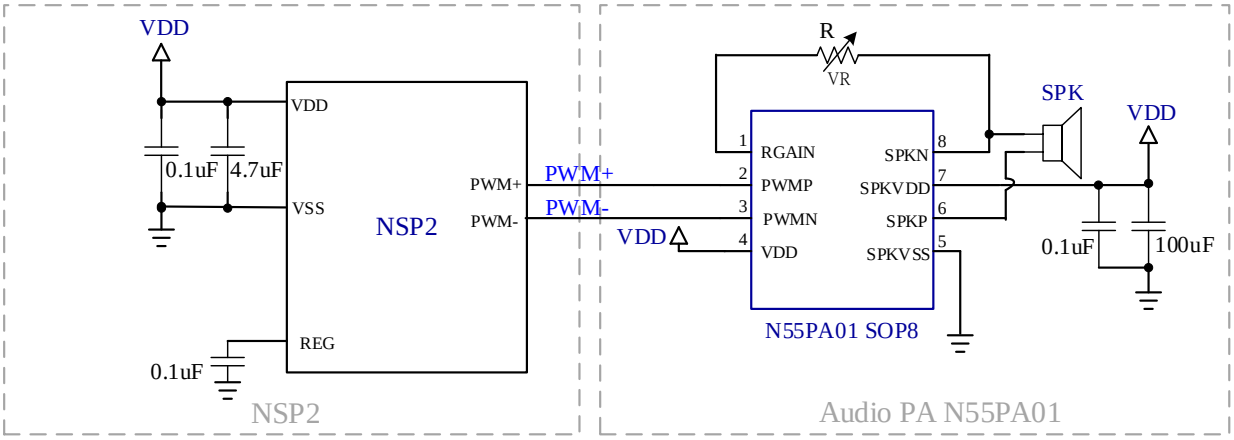
5.3 Connect to HOST uC by Two-Wire Interface



5.4 Connect to HOST uC by One-Wire Interface



5.5 Voice Prompt Application with N55PA01 PA



Noted: Please refer to N55PA01 Data Sheet

5.6 PCB Layout Notice

(1) The C1、C2 and C4 connected to NSP2 chip as near as possible.

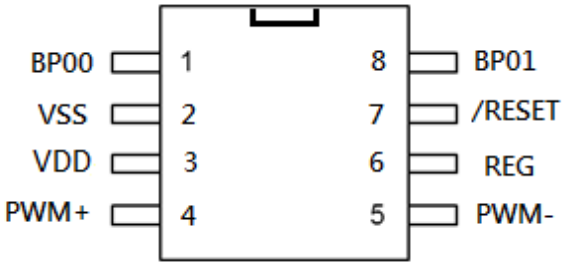
(2) Host uC ⏚ and NSP2 chip ⏚ should have its own path to power supply.

6. Package Information

6.1 Pin Assignment

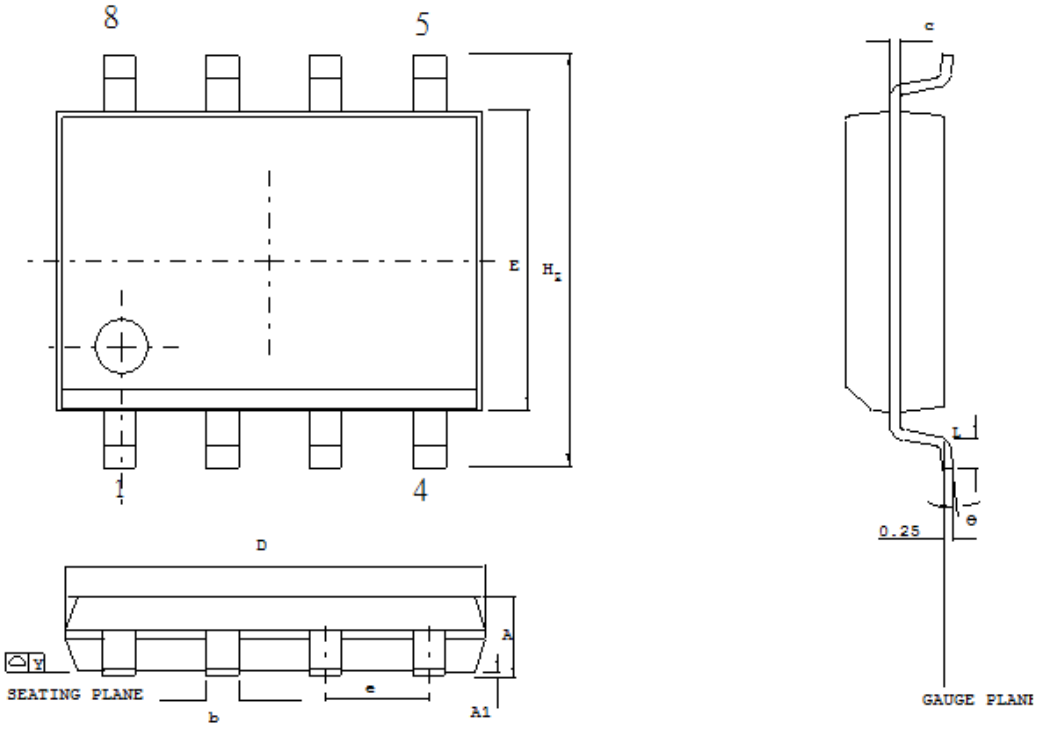
NSP2080A/2170A/2340A

SOP8 (150 mil)



6.2 Package Dimension

SOP8, 150 mil



Control dimensions are in mile meters

Symbol	Dimension (mm)		Dimension (inch)	
	Min.	Max.	Min.	Max.
A	1.35	1.75	0.053	0.069
A1	0.10	0.25	0.004	0.010
B	0.33	0.51	0.013	0.020
C	0.19	0.25	0.008	0.010
E	3.80	4.00	0.150	0.157
D	4.80	5.00	0.188	0.196
e	1.27 BSC		0.050 BSC	
H_E	5.80	6.20	0.228	0.244
Y	-	0.10	-	0.004
L	0.40	1.27	0.016	0.050
θ	0	10	0	10

7. Ordering Information

Part No.	Shape	Type	Remark
NSP2080A NSP2170A NSP2340A	E: Tube T: Tape & Reel	Package: SOP8 (150mil)	Blank

8. Revision History

Version	Date	Substantial Changes	Page
1.0	May 2022	Initial Release	All

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