

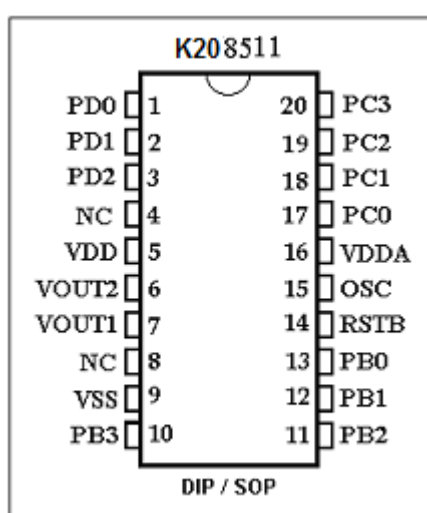


Eight Input Key Trigger with BUSY and /BUSY Outputs

FEATURES

- Key triggers mode with up to 8 input triggers
- BUSY and /BUSY outputs
- Up to 57 voice groups
- Any combination of the trigger options:
Level/Edge; Hold/Un-hold; Retrigger/Non-retrigger
- DAC through VOUT2_COUT pin
- PWM through VOUT1 and VOUT2
- Two levels PWM output volume
- Support 8-bit PCM, 5-bit uLaw and 4-bit ADPCM compressions

PIN CONFIGURATIONS



PIN DESCRIPTIONS

Pin Names	Description
VOUT1	PWM output to drive speaker directly
VOUT2_COUT	PWM output or COUT DAC output select by programmable option
VSS	Power Ground
OSC	Oscillator input
VDDA	Program power pin, connect to VDD during playback
VDD	Positive Power Supply
PBn	Input trigger pins with 1M Ohm internal pull-down
PCn	Input trigger pins with 1M Ohm internal pull-down
PD0	Unused I/O pin, leave open
PD1	BUSY output, active HIGH during voice playback
PD2	/BUSY output, active LOW during voice playback
RSTB	Reset pin, LOW active

Note: where n is from 0 to 3.

Note: Pins for memory programming are: VDD, VDDA, VSS, PB0, PB1, OSC, VOUT2 and RSTB.



Key Trigger Table

Up to 57 Voice Groups can be triggered by PB0 to PB3 and PC0 to PC3.

Voice Group	PB0	PB1	PB2	PB3	PC0	PC1	PC2	PC3
1	HIGH	NC	NC	NC	NC	NC	NC	NC
2	NC	HIGH	NC	NC	NC	NC	NC	NC
3	NC	NC	HIGH	NC	NC	NC	NC	NC
4	NC	NC	NC	HIGH	NC	NC	NC	NC
5	NC	NC	NC	NC	HIGH	NC	NC	NC
6	NC	NC	NC	NC	NC	HIGH	NC	NC
7	NC	NC	NC	NC	NC	NC	HIGH	NC
8	NC	NC	NC	NC	NC	NC	NC	HIGH
9	HIGH	HIGH	NC	NC	NC	NC	NC	NC
10	NC	HIGH	HIGH	NC	NC	NC	NC	NC
11	NC	NC	HIGH	HIGH	NC	NC	NC	NC
12	NC	NC	NC	HIGH	HIGH	NC	NC	NC
13	NC	NC	NC	NC	HIGH	HIGH	NC	NC
14	NC	NC	NC	NC	NC	HIGH	HIGH	NC
15	NC	NC	NC	NC	NC	NC	HIGH	HIGH
16	HIGH	NC	NC	NC	NC	NC	NC	HIGH
17	HIGH	HIGH	HIGH	NC	NC	NC	NC	NC
18	NC	HIGH	HIGH	HIGH	NC	NC	NC	NC
19	NC	NC	HIGH	HIGH	HIGH	NC	NC	NC
20	NC	NC	NC	HIGH	HIGH	HIGH	NC	NC
21	NC	NC	NC	NC	HIGH	HIGH	HIGH	NC
22	NC	NC	NC	NC	NC	HIGH	HIGH	HIGH
23	HIGH	NC	NC	NC	NC	NC	HIGH	HIGH
24	HIGH	HIGH	NC	NC	NC	NC	NC	HIGH
25	HIGH	HIGH	HIGH	HIGH	NC	NC	NC	NC
26	NC	HIGH	HIGH	HIGH	HIGH	NC	NC	NC
27	NC	NC	HIGH	HIGH	HIGH	HIGH	NC	NC
28	NC	NC	NC	HIGH	HIGH	HIGH	HIGH	NC
29	NC	NC	NC	NC	HIGH	HIGH	HIGH	HIGH
30	HIGH	NC	NC	NC	NC	HIGH	HIGH	HIGH
31	HIGH	HIGH	NC	NC	NC	NC	HIGH	HIGH
32	HIGH	HIGH	HIGH	NC	NC	NC	NC	HIGH
33	HIGH	HIGH	HIGH	HIGH	HIGH	NC	NC	NC
34	NC	HIGH	HIGH	HIGH	HIGH	HIGH	NC	NC
35	NC	NC	HIGH	HIGH	HIGH	HIGH	HIGH	NC
36	NC	NC	NC	HIGH	HIGH	HIGH	HIGH	HIGH
37	HIGH	NC	NC	NC	HIGH	HIGH	HIGH	HIGH
38	HIGH	HIGH	NC	NC	NC	HIGH	HIGH	HIGH
39	HIGH	HIGH	HIGH	NC	NC	NC	HIGH	HIGH
40	HIGH	HIGH	HIGH	HIGH	NC	NC	NC	HIGH
41	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	NC	NC
42	NC	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	NC
43	NC	NC	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH
44	HIGH	NC	NC	HIGH	HIGH	HIGH	HIGH	HIGH
45	HIGH	HIGH	NC	NC	HIGH	HIGH	HIGH	HIGH
46	HIGH	HIGH	HIGH	NC	NC	HIGH	HIGH	HIGH
47	HIGH	HIGH	HIGH	HIGH	NC	NC	HIGH	HIGH
48	HIGH	HIGH	HIGH	HIGH	HIGH	NC	NC	HIGH
49	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	NC
50	NC	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH
51	HIGH	NC	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH
52	HIGH	HIGH	NC	HIGH	HIGH	HIGH	HIGH	HIGH
53	HIGH	HIGH	HIGH	NC	HIGH	HIGH	HIGH	HIGH
54	HIGH	HIGH	HIGH	HIGH	NC	HIGH	HIGH	HIGH
55	HIGH	HIGH	HIGH	HIGH	HIGH	NC	HIGH	HIGH
56	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	NC	HIGH
57	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH



Ramp-up-down enable or disable

When COUT is used for playback, Ramp-up-down would be enabled. This function eliminates the 'POP' noise at the beginning and end of voice playback.

When VOUT1 and VOUT2 are used to drive speaker directly, the Ramp-up-down operation are disabled.

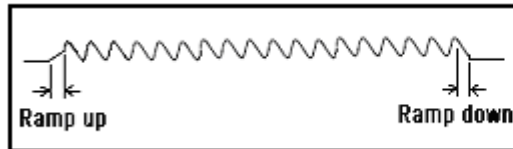


Fig. 1 Ramp-up-down Enable

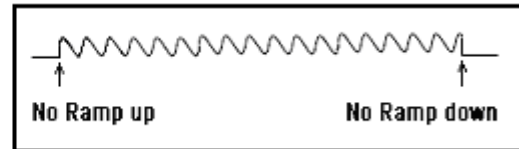


Fig. 2 Ramp-up-down Disable

Trigger Options

User selectable options that affect each individual group are called Group Options. They are:

- Edge or Level trigger
- Unholdable or Holdable trigger
- Re-triggerable or non-retriggerable

Fig. 3 to Fig. 6 show the voice playback with different combination of triggering mode and the relationship between outputs and voice playback.

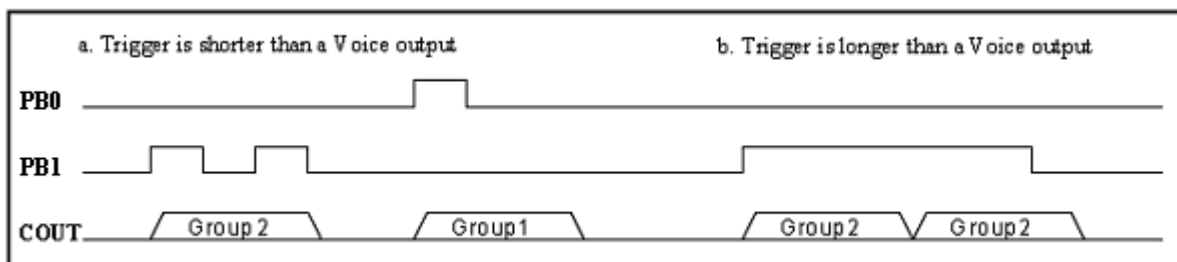


Fig. 3 Level, Unholdable, Non-retriggerable

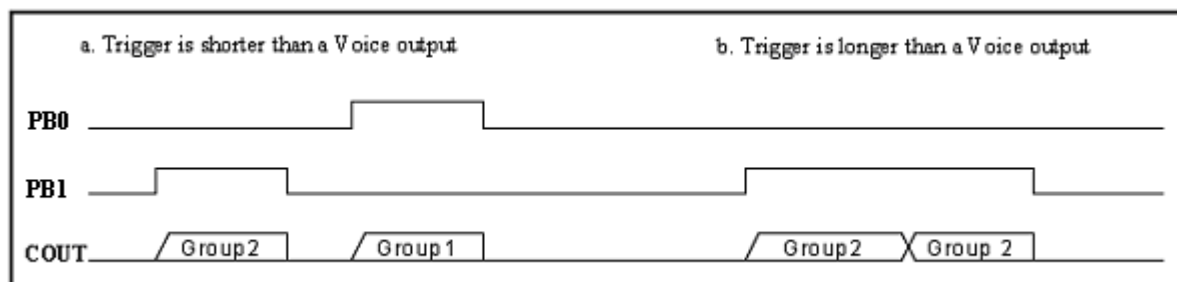


Fig. 4 Level Holdable

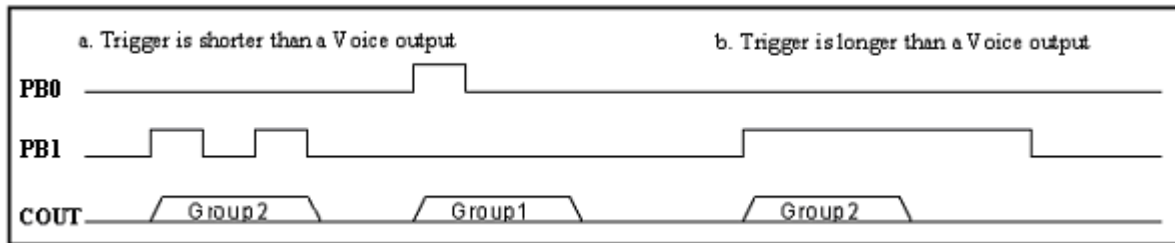


Fig. 5 Edge, Unholdable, Non-retrigger

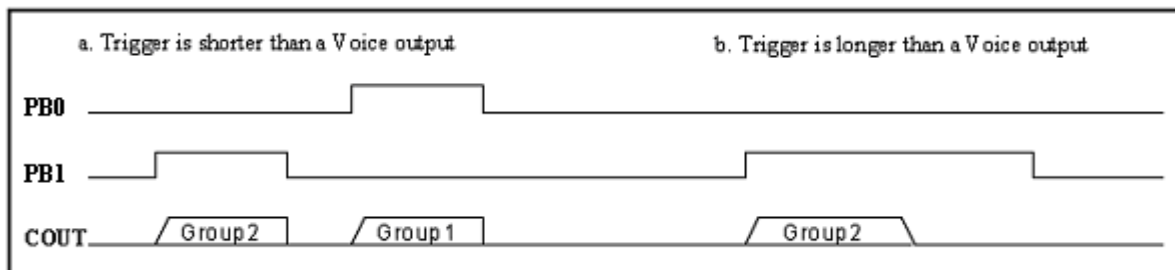
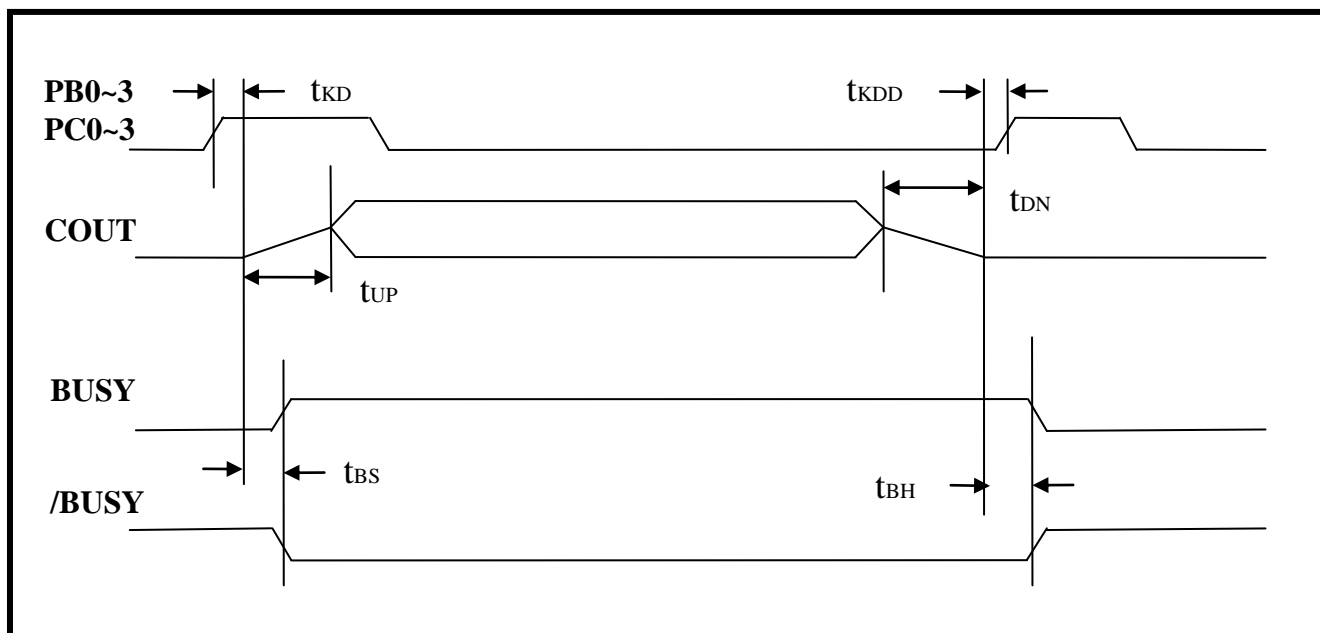


Fig. 6 Edge, Holdable

**TRIGGER TIMING**

Symbol	Parameter	Min.	Typ.	Max.	Unit	Note
t_{KD}	Key trigger debounce time	$64/F_s$	—	—	sec	1
t_{KDD}	Key trigger delay after ramp down	--	0	--	ms	
t_{UP}	Ramp up time	0	$128/F_s$	--	sec	1
t_{DN}	Ramp down time	0	--	$256/F_s$	sec	2
t_{BS}	BUSY output set up time	0	--	$1/F_s$	sec	1
t_{BH}	BUSY output hold time	--	--	$1/F_s$	sec	1

Note:

- 1) Where F_s is sampling rate.
- 2) Ramp down from the value of the last sound sample.



TYPICAL APPLICATIONS

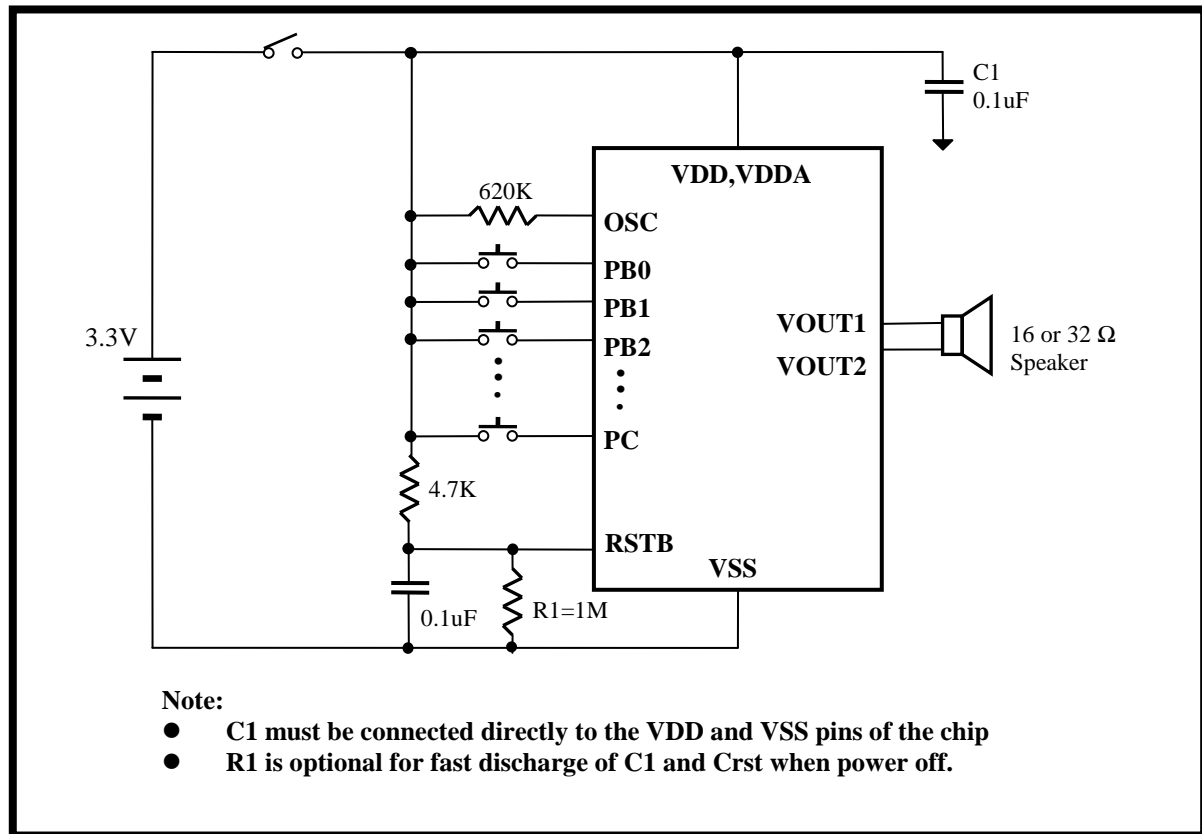


Fig 7a. 3.3V Battery with PWM direct drive for 16 or 32 Ohm Speaker

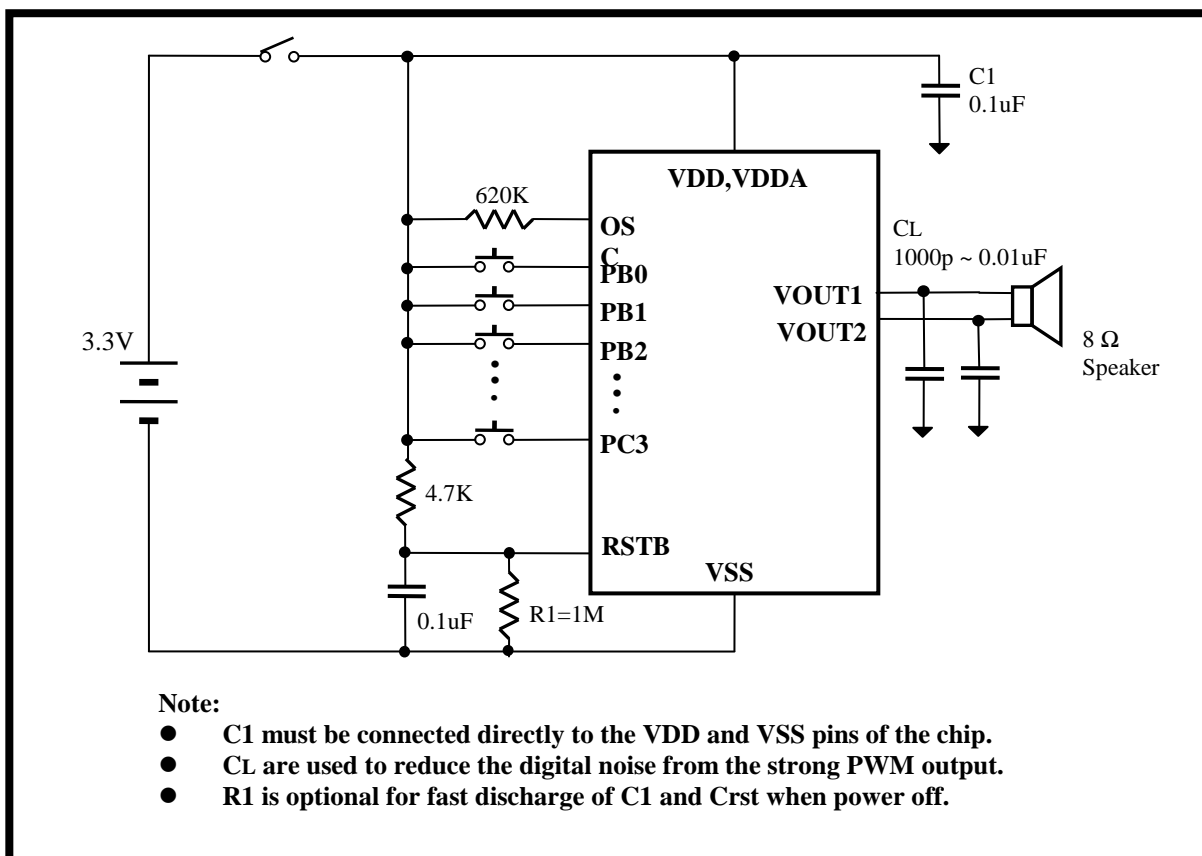


Fig 7b. 3.3V Battery with PWM direct drive for 8 Ohm Speaker

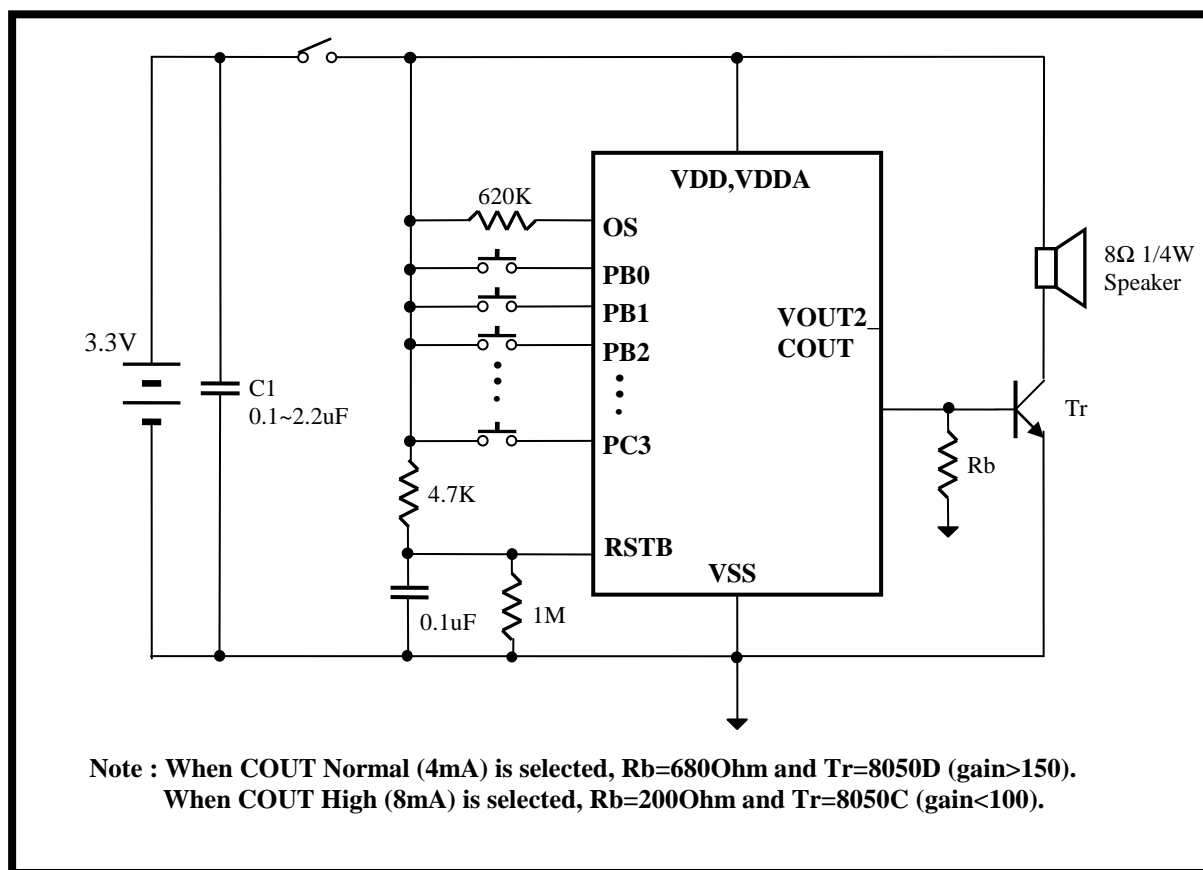
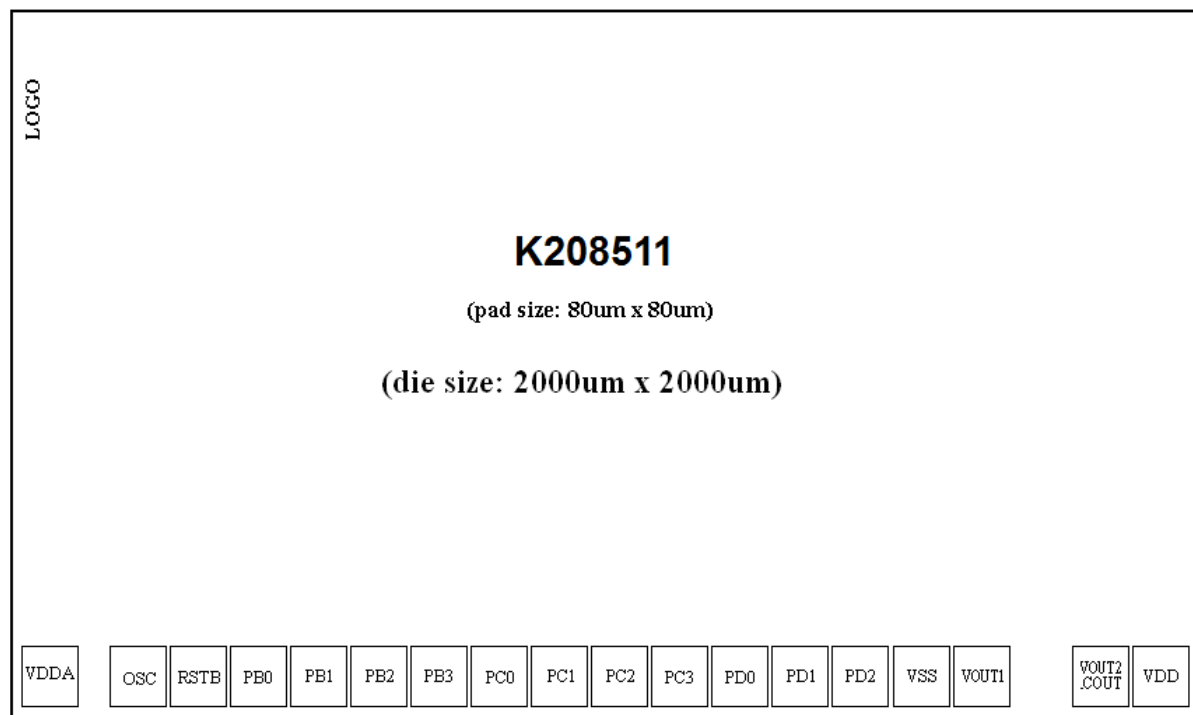


Fig 8. 3.3V Battery with Transistor drive

Bonding Diagrams



Note:

1. Substrate must be connected to VSS
2. Bonding pad size is 80 um x 80 um