

FEATURES

- Single-chip CMOS construction
- 512x10 bit ROM melodies
- Internal envelope circuit
- Low stand-by current
- Single 1.5V operation
- Piezo direct drive
- Easy to connect with standard watch and clock LST's

FUNCTIONS

- Tempo: 16 kinds
- Sound Range: 3 octaves (G4-G7)
- Serial select mode - total 7 melodies
- Play one melody, auto stop
- 32768 KHz external clock

DESCRIPTION

The IZ8018 is a CMOS multi melody IC. The circuit is composed of a 512-word ROM, address counter, tempo and tone generator, address control circuit, envelope signal generator, switch control circuit and tone generator. The IZ8018 has complementary outputs MO, \overline{MO} for direct piezo drive. Since the IZ8018 includes an envelope circuit on the output MO, it can generate good melody sound without any external component for envelope circuit. The IZ8018 can easily be connected to Integral's standard watch chips and designed especially for this target.

BLOCK DIAGRAM

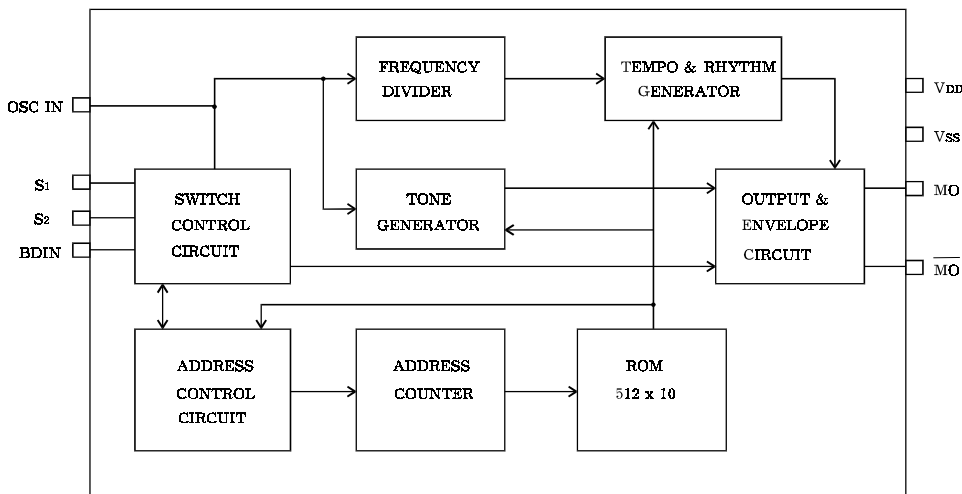


Figure 1.

ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

Characteristic	Symbol	Value	Unit
Supply Voltage	$V_{DD} - V_{SS}$	-0.3 ~ 4.0	V
Input Voltage	V_{IN}	$V_{SS} - 0.3 \sim V_{DD} + 0.3$	V
Output Voltage	V_{OUT}	$V_{SS} - 0.3 \sim V_{DD} + 0.3$	V
Operating Temperature	T_a	- 20 ~ + 75	°C
Storage Temperature	T_{stg}	- 55 ~ + 125	°C

ELECTRICAL CHARACTERISTICS(T_a = 25°C, V_{DD} = 1.55V, V_{SS} = 0V, unless otherwise specified)

Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
Operating Voltage	V _{DD}		1.25	1.55	3.3	V
Supply Current (Stand-by)	I _{DD}	Without Load		0.1	0.5	μA
Input High Voltage	V _{IH}		1.25			V
Input Low Voltage	V _{IL}				0.3	V
Input Current	I _{IH}	V _{IN} = 1.55V	0.2	1	10	μA
	I _{IL}	V _{IN} = 0V	0.2		0.05	μA
Output Current	I _{OH}	V _{OH} = 1.0V	MO	100		μA
			$\overline{\text{MO}}$	200		
	I _{OL}	V _{OL} = 0.5V	MO	100		μA
			$\overline{\text{MO}}$	200		
Output Resistor of MO	RD ₁	V _{OH} = 0.7V t ₁		17		KΩ
	RD ₂	V _{OH} = 0.7V t ₂		30		
	RD ₃	V _{OH} = 0.7V t ₃		50		
	RD ₄	V _{OH} = 0.7V t ₄		75		
	RD ₅	V _{OH} = 0.7V t ₅		110		
	RD ₆	V _{OH} = 0.7V t ₆		170		
	RD ₇	V _{OH} = 0.7V t ₇		260		
	RD ₈	V _{OH} = 0.7V t ₈		450		
Switch Chattering Time	I _{CH}	F = 32768 Hz			62.5	mS

MELODY OPERATION

The BT8018 can repeat one of any 7 melodies consequently.

- ON-HOUR AND CONFIRMATION CHIME

The IZ8018 has a 0.75 sec timer circuit to prevent the melody starting by chime sounds of the watch chip and by confirmation chime of chronograph or by signal below 0.75 sec.

- MELODY START

The signals to start the melody are AC or DC signals which are over 0.75 sec after the first signal is given to BDIN. The signal under 0.75 sec will put the IZ8018 in standby mode.

- MELODY STOP

The melody does not stop until it plays to the end of the melody even if alarm signal is stopped. Though the alarm signal is longer than the melody signal the melody does not repeat. If the melody is needed to be stopped midway it can be done by pushing either S₁ or S₂.

MELODY SOUND

The musical interval of the melody is 400-1500 Hz with signal of 50% duty. The standard length of one melody is about 20 sec.

ENVELOPE FUNCTION

The IZ8018 has an envelope circuit on the output MO for high tone quality without any external components. The output current will decrease exponentially as show in Fig.2. The transistor for amplification would be NPN type and has proper h_{fe} in order to keep this waveform.

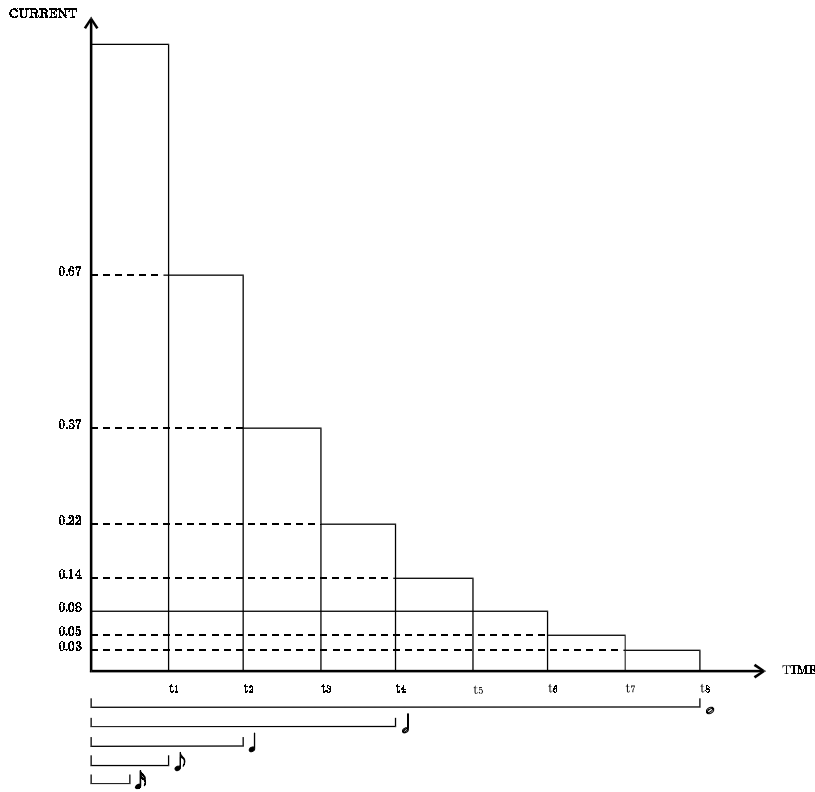


Figure 2.

APPLICATION CIRCUIT

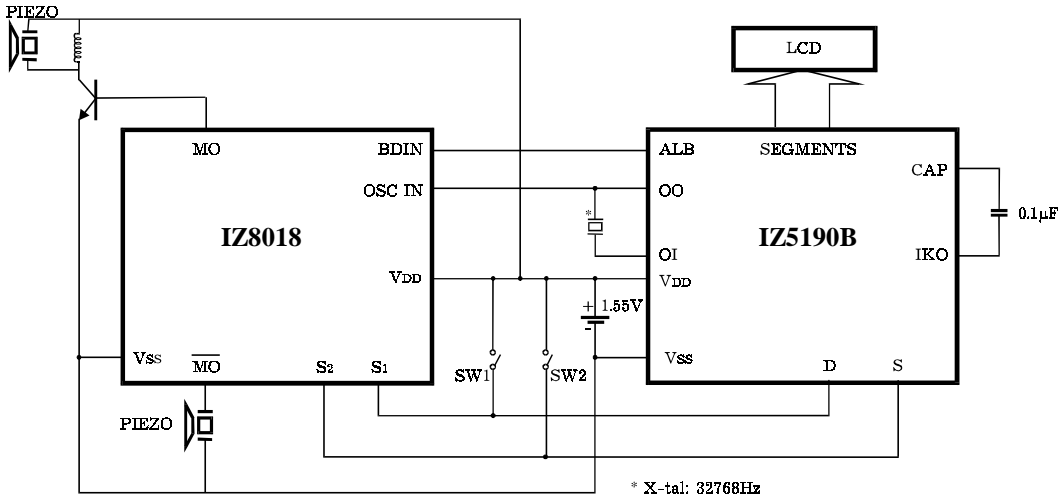
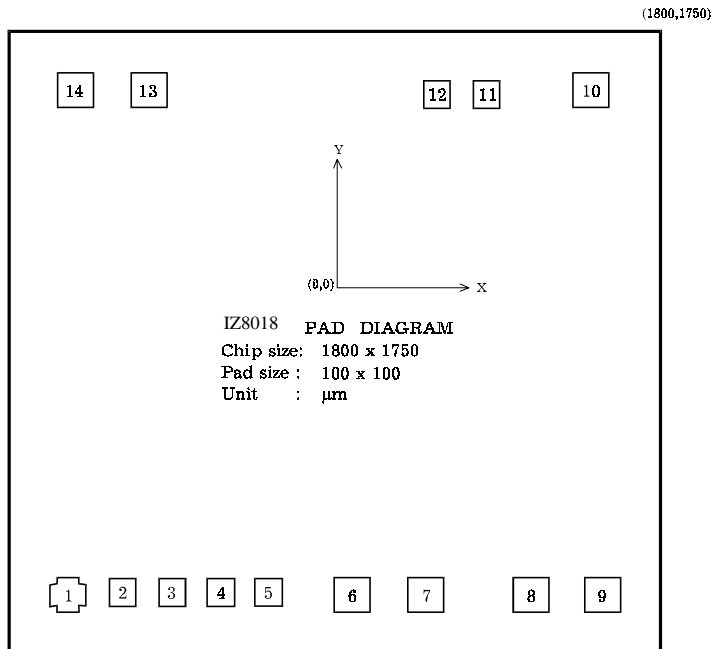


Figure 3.

PAD LAYOUT



NOTE: Pads 2, 3, 4, 5, 11, 12 are 80 x 80 µm and provided for wafer's testing only. In normal operation they should be kept open.

Figure 4.

PAD LOCATION

(Unit: µm)

Pad No.	Pad Name	x	Y	Description	Pad No.	Pad Name	X	Y	Description
1	GND	-735	-710	0V Power Supply	8	S1	560	-710	Start & Stop Input
2		-572	-710	Test	9	VCC	745	-710	Power Supply
3		-438	-710	Test	10	OSC IN	715	715	Oscillator Input
4		-302	-710	Test	11		440	715	Test
5		-170	-710	Test	12		300	715	Test
6	BDIN	50	-710	Trigger Signal Input	13	MO	-515	715	Direct Piezo Driver

7	S2	255	-710	Start & Stop Input	14	MO	-715	715	ENV Melody Output/ Direct Pieso Driver
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* Pins S1, S2 pulled down to V_{SS} by internal resistors.

SONG LIST

No.	IZ8018
1	Home sweet Home
2	Oh! Susanna
3	Whispering Hope
4	Dreaming of Home and Mother
5	Oh! My Darling Clementine
6	Beautiful Dreamer
7	Red River Valley