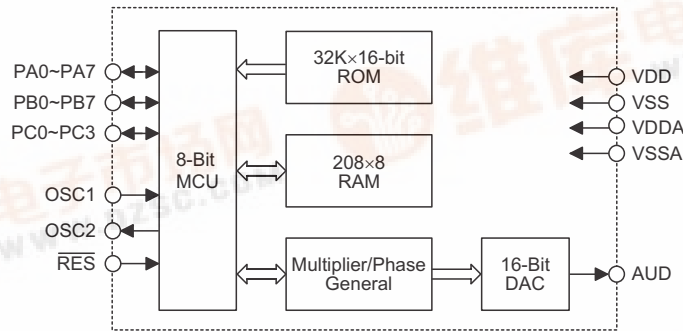# HT36A3
8-Bit Music Synthesizer MCU

Features

- Operating voltage: 2.4V~5.0V
- Operating frequency: 3.58MHz~12MHz (typ. 8MHz)
- 20 bidirectional I/O lines
- Two 8-bit programmable timer with 8 stage prescaler
- Watchdog Timer
- Built-in 8-bit MCU with 208×8 bits RAM
- Built-in 32K×16-bit ROM for program/data shared
- Mono output
- High D/A converter resolution: 16 bits
- Polyphonic up to 8 notes
- Independent pan and volume mix can be assigned to each sound component

- Sampling rate of 25kHz as 6.4MHz for system frequency
- Eight-level subroutine nesting
- HALT function and wake-up feature to reduce power consumption
- Bit manipulation instructions
- 16-bit table read instructions
- 63 powerful instructions
- All instructions in 1 or 2 machine cycles
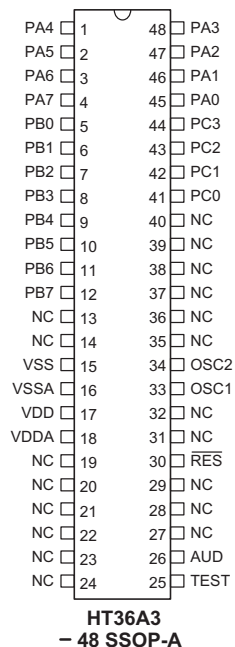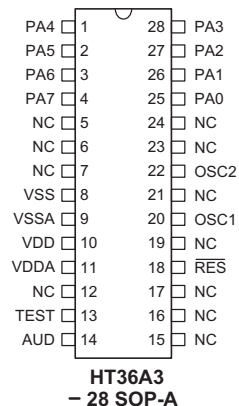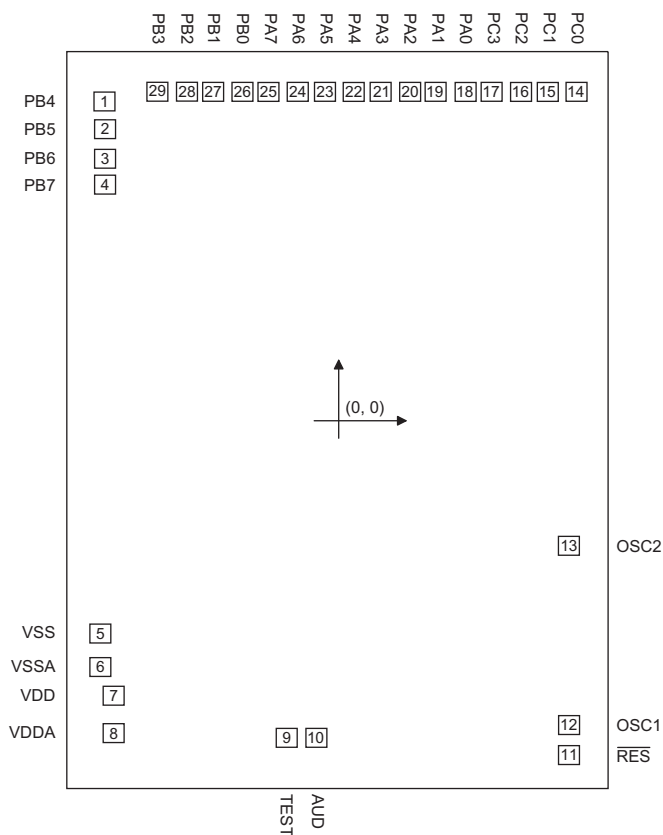- 28-pin SOP, 48-pin SSOP package

General Description

The HT36A3 is an 8-bit high performance RISC-like microcontroller specifically designed for music applications. It provides an 8-bit MCU and a 8 channel wavetable synthesizer. The program ROM is composed of both program control codes and wavetable voice codes, and can be easily programmed.

The HT36A3 has a built-in 8-bit microprocessor which programs the synthesizer to generate the melody by setting the special register from 20H~2AH. A HALT feature is provided to reduce power consumption.

Block Diagram

Pin Assignment

HT36A3
− 28 SOP-A

HT36A3
− 48 SSOP-A

Pad Assignment

Chip size: 83×111 (mil)^2

* The IC substrate should be connected to VSS in the PCB layout artwork.

Pad Coordinates

Pad No.	X	Y	Pad No.	X	Y
1	−879.100	1202.400	16	693.900	1240.150
2	−879.100	1097.100	17	583.300	1240.150
3	−879.100	986.500	18	483.300	1240.150
4	−879.100	886.500	19	372.700	1240.150
5	−898.600	−805.050	20	272.700	1240.150
6	−898.600	−931.910	21	162.100	1240.150
7	−847.650	−1041.910	22	62.100	1240.150
8	−847.650	−1180.350	23	−48.500	1240.150
9	−193.090	−1200.600	24	−148.500	1240.150
10	−81.290	−1200.600	25	−259.100	1240.150
11	875.950	−1262.274	26	−359.100	1240.150
12	875.950	−1149.626	27	−469.700	1240.150
13	875.950	−471.774	28	−569.700	1240.150
14	901.500	1240.150	29	−680.300	1240.150
15	793.900	1240.150			

Pad Description

| Pad Name	I/O	Internal Connection	Function
PA0~PA7	I/O	Pull-High or None	Bidirectional 8-bit Input/Output port
PB0~PB7	I/O	Pull-High or None	Bidirectional 8-bit Input/Output port
PC0~PC3	I/O	Pull-High or None	Bidirectional 8-bit Input/Output port
VSS	—	—	Negative power supply, ground
VSSA	—	—	Negative power supply of DAC, ground
VDD	—	—	Digital power supply
VDDA	—	—	DAC power supply
AUD	O	—	Audio output
TEST	—	—	No connection (open)
$\overline{RES}$	I	—	Reset input, active low (no pull-high)
OSC1 OSC2	I O	—	OSC1 and OSC2 are connected to an RC network or a crystal (by mask option) for the internal system clock. In the case of RC operation, OSC2 is the output terminal for 1/8 system clock. The system clock may come from the crystal, the two pins cannot be floating.

Absolute Maximum Ratings

Supply Voltage ....$V_{SS}-0.3V$ to $V_{SS}+6V$

Input Voltage ....$V_{SS}-0.3V$ to $V_{DD}+0.3V$

Storage Temperature ....$-50°C$ to $125°C$

Operating Temperature ....$-25°C$ to $70°C$

Note: These are stress ratings only. Stresses exceeding the range specified under ″Absolute Maximum Ratings″ may cause substantial damage to the device. Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability.

D.C. Characteristics

Ta=25°C

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{DD}	Conditions				
V_{DD}	Operating Voltage	—	—	2.2	4.5	5.5	V
I_{DD}	Operating Current	4.5V	No load, f_{OSC}=8MHz	—	8	16	mA
I_{STB}	Standby Current (WDT Disabled)	4.5V	No load, System HALT	—	1	3	μA
I_{OH}	I/O Ports Source Current	4.5V	V_{OH}=4.5V	2	3	—	mA
I_{OL}	I/O Ports Sink Current	4.5V	V_{OL}=0.5V	2	3	—	mA
V_{IH}	Input High Voltage for I/O Ports	4.5V	—	$0.8V_{DD}$	—	V_{DD}	V
V_{IL}	Input Low Voltage for I/O Ports	4.5V	—	0	—	$0.2V_{DD}$	V

Application Circuit
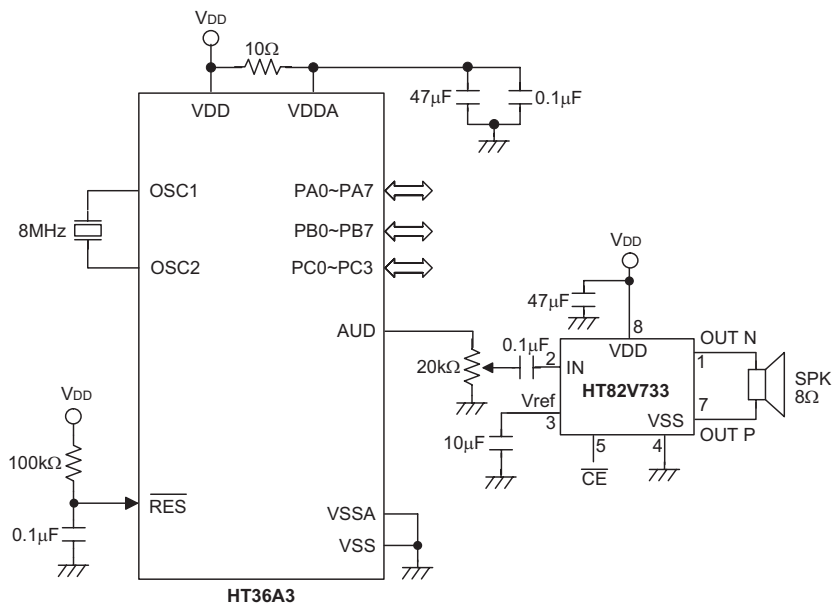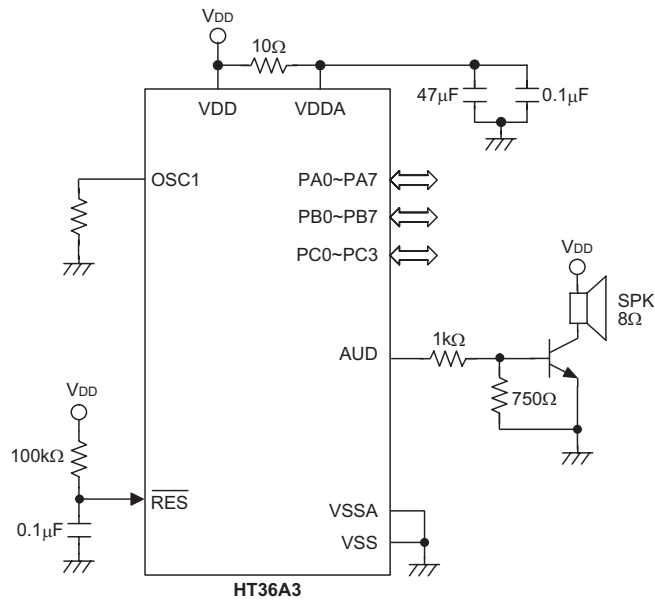
Package Information

28-pin SOP (300mil) Outline Dimensions
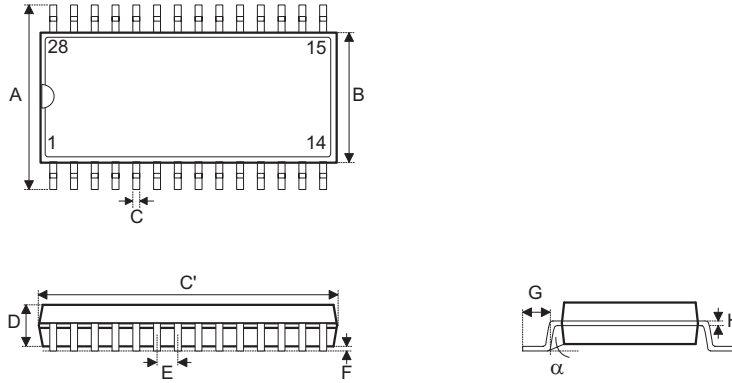
Symbol	Dimensions in mil		
	Min.	**Nom.**	**Max.**
A	394	—	419
B	290	—	300
C	14	—	20
C′	697	—	713
D	92	—	104
E	—	50	—
F	4	—	—
G	32	—	38
H	4	—	12
α	0°	—	10°

48-pin SSOP (300mil) Outline Dimensions
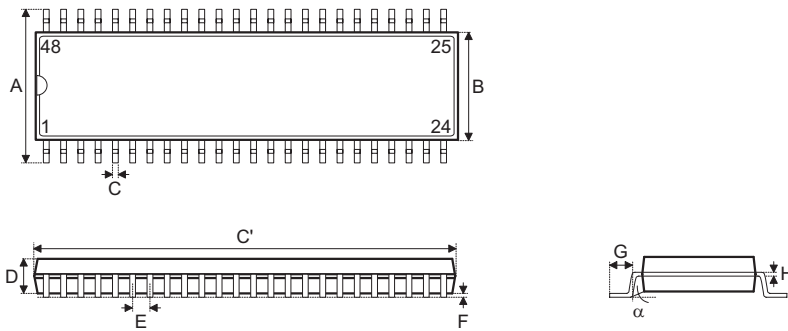
Symbol	Dimensions in mil		
	Min.	**Nom.**	**Max.**
A	395	—	420
B	291	—	299
C	8	—	12
C′	613	—	637
D	85	—	99
E	—	25	—
F	4	—	10
G	25	—	35
H	4	—	12
α	0°	—	8°

Product Tape and Reel Specifications

Reel Dimensions
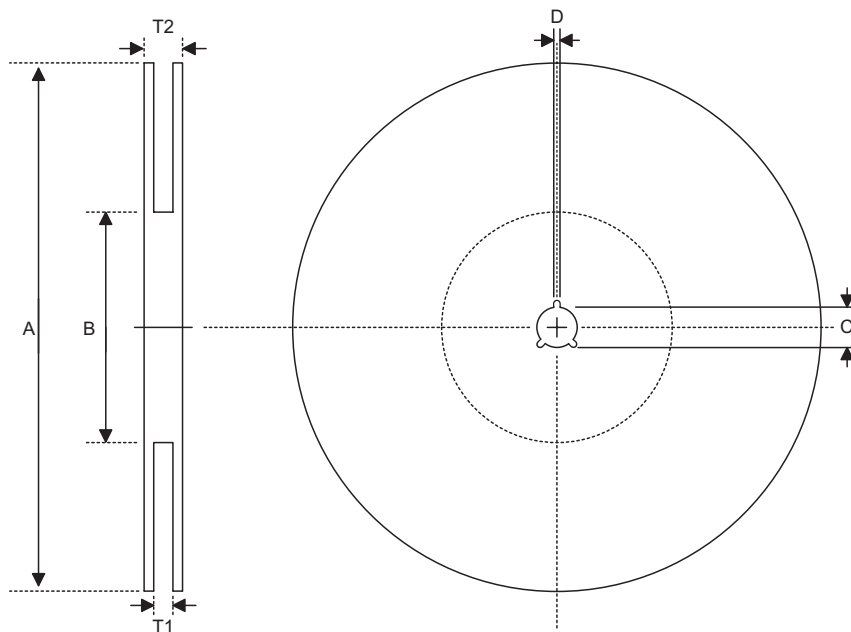
SOP 28W (300mil)

Symbol	Description	Dimensions in mm
A	Reel Outer Diameter	330±1.0
B	Reel Inner Diameter	62±1.5
C	Spindle Hole Diameter	13.0+0.5 −0.2
D	Key Slit Width	2.0±0.5
T1	Space Between Flange	24.8+0.3 −0.2
T2	Reel Thickness	30.2±0.2

SSOP 48W

Symbol	Description	Dimensions in mm
A	Reel Outer Diameter	330±1.0
B	Reel Inner Diameter	100±0.1
C	Spindle Hole Diameter	13.0+0.5 −0.2
D	Key Slit Width	2.0±0.5
T1	Space Between Flange	32.2+0.3 −0.2
T2	Reel Thickness	38.2±0.2

Carrier Tape Dimensions
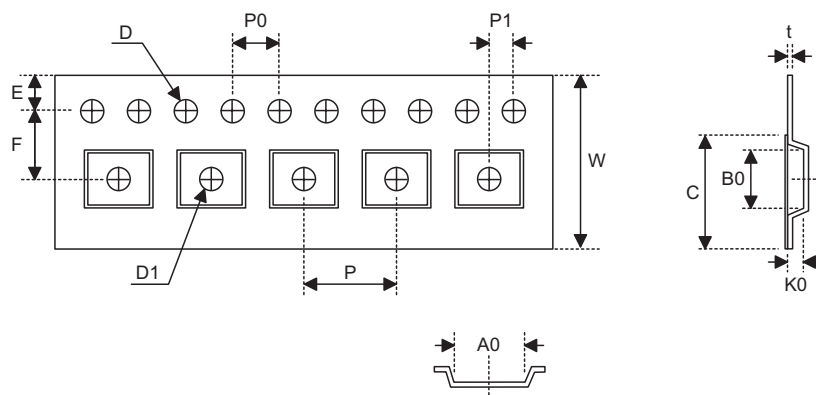
SOP 28W (300mil)

Symbol	Description	Dimensions in mm
W	Carrier Tape Width	24.0±0.3
P	Cavity Pitch	12.0±0.1
E	Perforation Position	1.75±0.1
F	Cavity to Perforation (Width Direction)	11.5±0.1
D	Perforation Diameter	1.5+0.1
D1	Cavity Hole Diameter	1.5+0.25
P0	Perforation Pitch	4.0±0.1
P1	Cavity to Perforation (Length Direction)	2.0±0.1
A0	Cavity Length	10.85±0.1
B0	Cavity Width	18.34±0.1
K0	Cavity Depth	2.97±0.1
t	Carrier Tape Thickness	0.35±0.01
C	Cover Tape Width	21.3
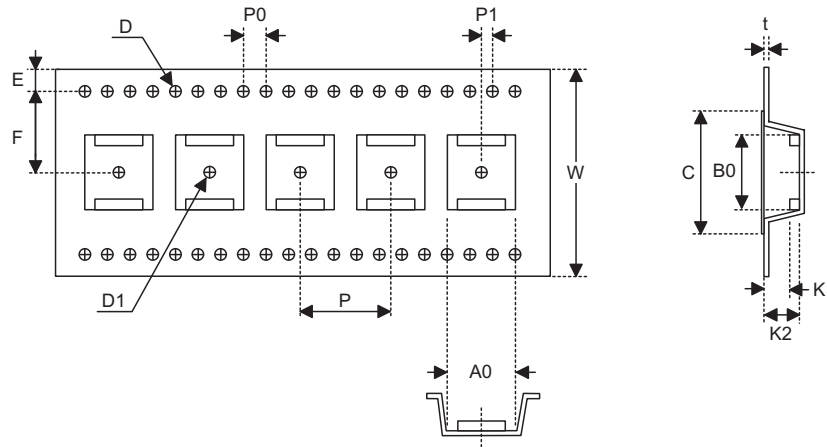
SSOP 48W

Symbol	Description	Dimensions in mm
W	Carrier Tape Width	32.0±0.3
P	Cavity Pitch	16.0±0.1
E	Perforation Position	1.75±0.1
F	Cavity to Perforation (Width Direction)	14.2±0.1
D	Perforation Diameter	2.0 Min.
D1	Cavity Hole Diameter	1.5+0.25
P0	Perforation Pitch	4.0±0.1
P1	Cavity to Perforation (Length Direction)	2.0±0.1
A0	Cavity Length	12.0±0.1
B0	Cavity Width	16.20±0.1
K1	Cavity Depth	2.4±0.1
K2	Cavity Depth	3.2±0.1
t	Carrier Tape Thickness	0.35±0.05
C	Cover Tape Width	25.5

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