

Revision 1.0

# SVG1000X Datasheet

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Digital Voice Generator IC



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### 1. Overview

SVG1000X is the voice synthesis IC, which output the PWM signal by decoding the ADPCM encoded voice data on the external memory. SVG1000X can be controlled by MCU with UART interface and also maximum 8 kinds of voice data can be played by the external 8-key matrix without MCU

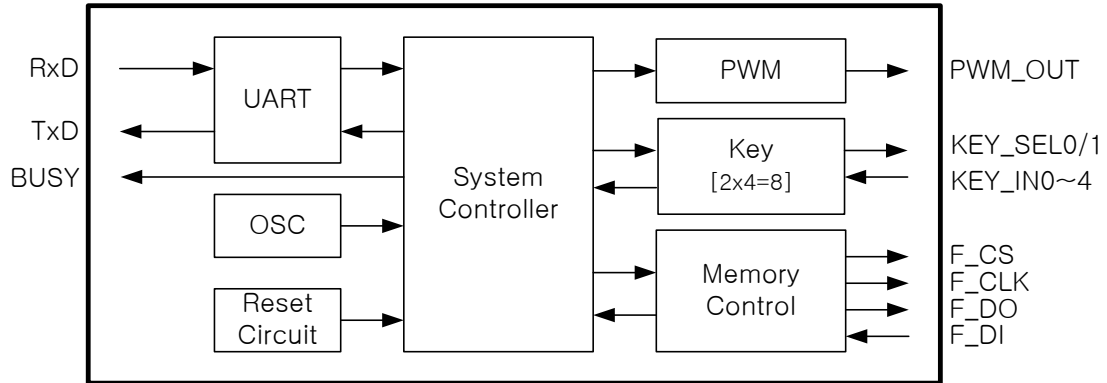
### 2. Features

- Supply Voltage : 3.0V ~ 3.6V
- Built in ADPCM decoder
- Two control mode (MCU with UART interface& External Keys)
- Support maximum 256 Voice files
- Support BUSY signal pin while playing
- Support Serial Flash Memory for Voice data (SPI mode, maximum 16MByte)
- Maximum playing time : 30 Minutes @16Mbyte
- Sampling Frequency : 16KHz
- Built-in internal oscillation & Power-on Reset (Saving external component)
- Two Package support: 20-SOP(1.27mm Pitch), 20-SSOP(0.65mm Pitch)

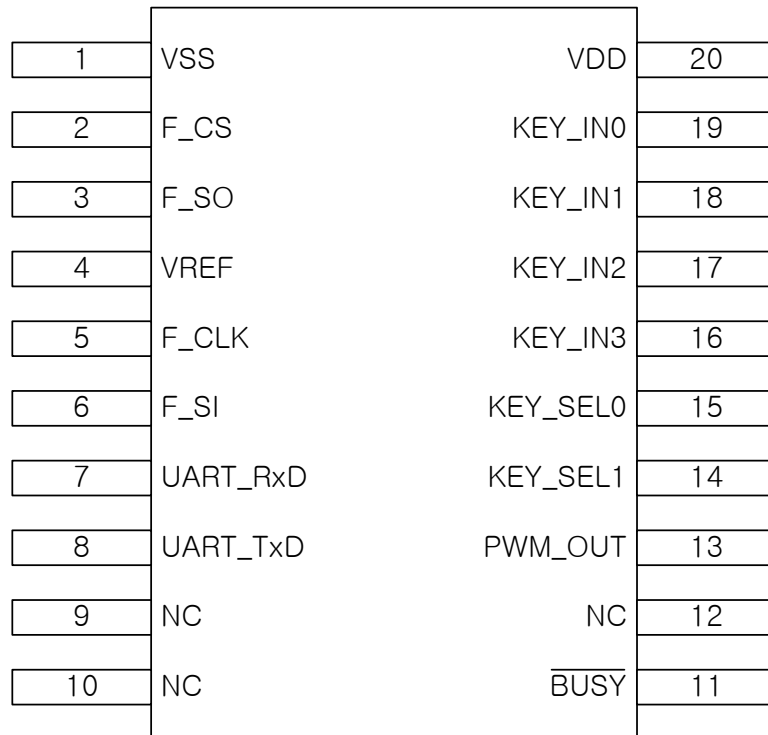
### 3. Application Field

- Toys
- Education & Aids
- Home Appliance (Rice cooker, Refrigerators, Washing machine)

## 4. Block Diagram



## 5. Pin Assignments



## 6. Pin Descriptions

Pin No.	Name	In/Out	Descriptions
1	VSS	GND	POWER (GND)
2	F_CS	Output	External memory Selection (Should be Connected to "CS" of memory)
3	F_SO	Input	External memory Data Input. (Should be Connected to "SO" of memory)
4	VREF	Input	Internal Voltage Reference (0.1uF Capacitor should be connected between GND)
5	F_CLK	Output	External memory Data Clock (Should be Connected to "CLK" of memory)
6	F_SI	Output	External memory Data Out (Should be Connected to "SI" of memory)
7	UART_RxD	Input	UART Interface Input
8	UART_TxD	Output	UART Interface Output
9	NC	-	Not Used. Should be "Open" State
10	NC	-	Not Used. Should be "Open" State
11	$\overline{\text{BUSY}}$	Output	Busy status (L: Play mode, H:Standby mode) Open-Drain Output
12	NC	-	Not Used. Should be "Open" State
13	PWM_OUT	Output	Decoded Voice Output
14	KEY_SEL1	Output	Key Selection signal Output
15	KEY_SELO	Output	Key Selection signal Output
16	KEY_IN3	Input	Key Input (Built-in Pull-up resistor)
17	KEY_IN2	Input	Key Input (Built-in Pull-up resistor)
18	KEY_IN1	Input	Key Input (Built-in Pull-up resistor)
19	KEY_IN0	Input	Key Input (Built-in Pull-up resistor)
20	VDD	Power	Power (3.3V)

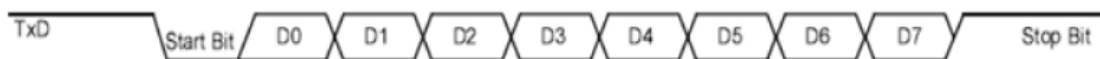
## 7. External MCU controlled operation

### 7.1 Communication protocol

The UART interface is used in communication between MCU and SVG1000X. The protocol specifications of UART are as follows:

- Baud Rate : 38,400bps
- Start bit : 1bit
- 8bit Data (LSB First)
- Stop bit : 1bit

< Timing Diagram >



### 7.2 Control Registers

NAME	Address	Data	Initial value
FIR	50H	Voice file Index Value(0~255)	0
VCR	56H	Volume Value(0~9)	0
PSR	53H	Stop Playing(35H)	0

#### 1) Voice File Index Register: FIR (050H)

FIR register is used to indicate the index address of the voice file to be played.

Maximum 256 of the voice files are supported because of FIR is 8-bit register (00H~0FFH)

#### 2) Volume Control Register : VCR (056H)

VCR register can be used to control the volume of the paying voice file.

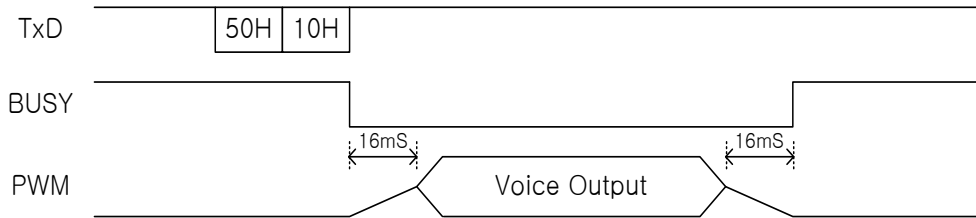
The value "0" is maximum volume and "9" is minimum volume. The other values (Except "0"~"9") are treated as the minimum volume size, "9". Also it is available to control the volume during the playing time.

#### 3) Voice Play STOP Register : PSR (053H)

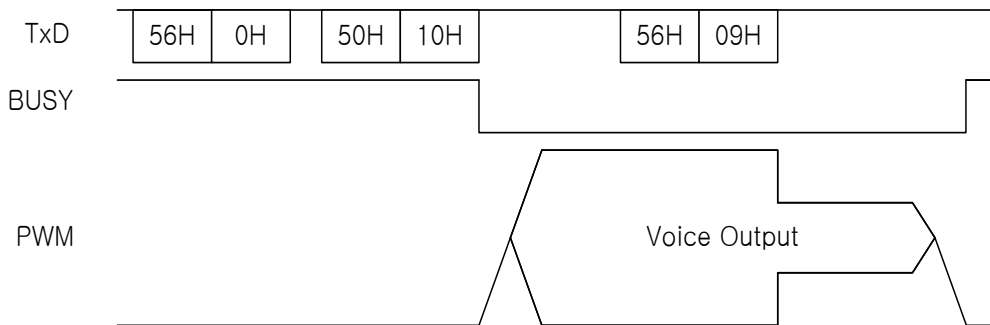
The voice play is stop immediately when the PSR is written with the value"35H", and the other value of PSR can't affect the play operation.

### 7.3 Control Timing

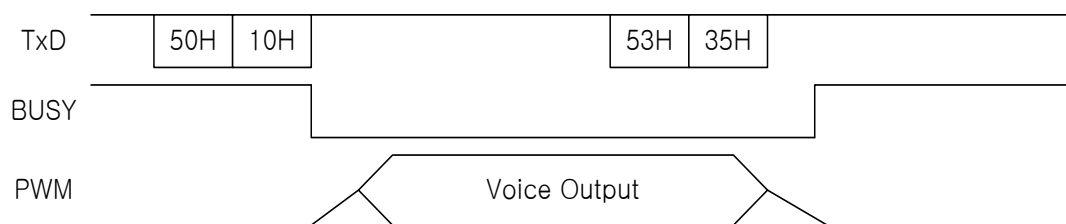
**1) Play voice file** ( Play the voice file at "10H" Indexed address )



**2) Volume adjustment** (Control the maximum volume of the voice file at "10H" indexed address into minimum volume)

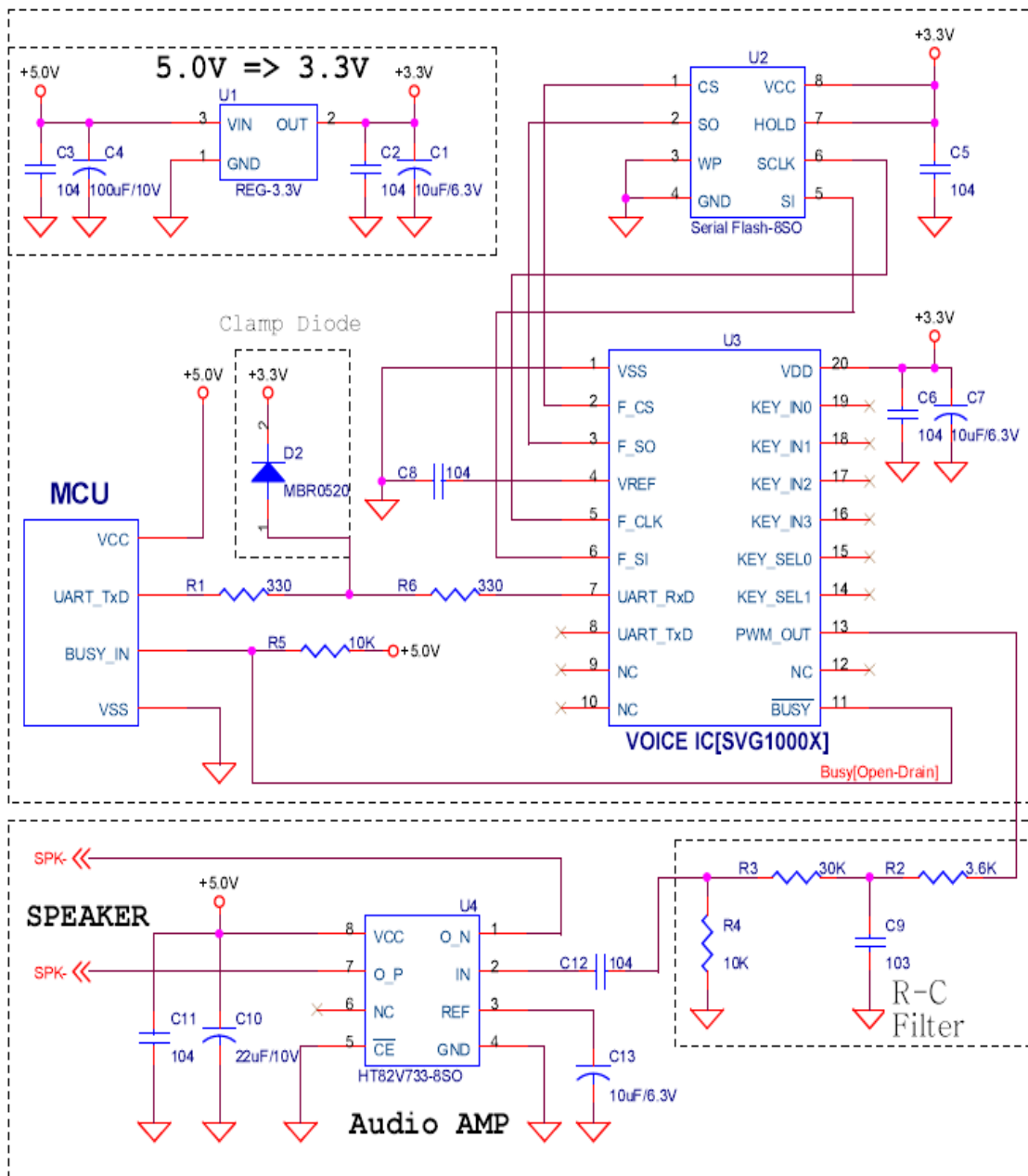


**3) STOP playing** (Stop playing the voice file of "10H" indexed address)



## 8. Applications

### 8.1 Application circuit diagram





## 8.2 Parts List

No	Reference No	Description	Part Number	Specification	Qty	Vendor
1	U1	Regulator	IL1117-3.3	3.3V, SOT223	1	Iksemicon
2	U2	Serial Flash	S25FL127S	16MByte, 8SOIC, SPI Interface	1	SPANSION
3	U3	Voice IC	SVG1000X	20SOP, 3.3V	1	SEMINIX
4	U4	Audio AMP	HT82V733	8SO, 0.24W	1	HOLTEK
5	D1	Schottky Diode	MBR0520L	SOD123, 0.5A	1	Fairchild
6	R1,R6	Chip Resistor	330	2012, 5%	2	
7	R2	Chip Resistor	3.6K	2012, 5%	1	
8	R4,R5	Chip Resistor	10K	2012, 5%	2	
9	R3	Chip Resistor	30K	2012, 5%	1	
10	C9	Chip Capacitor	0.01uF[103]	2012	1	
11	C3,C2, C5,C6, C8,C11, C12	Chip Capacitor	0.1uF[104]	2012	7	
12	C1,C7,C13	Chip Tantal	10uF	3216, 6.3V	3	
13	C10	Chip Tantal	22uF	3216, 10V	1	
14	C4	Chip Tantal	100uF	3528, 10V	1	

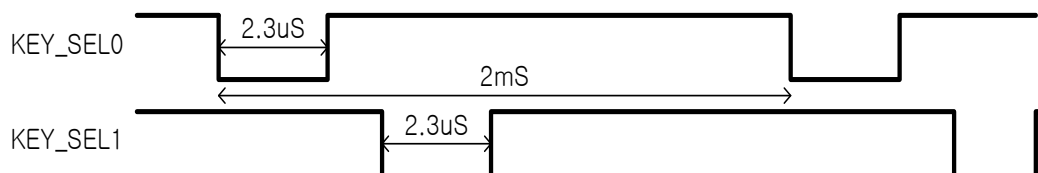
\* Higher accurate value is required for the parts in PWM filter circuit)

## 9. Key controlled Voice Play

### 9.1 Function & Operation

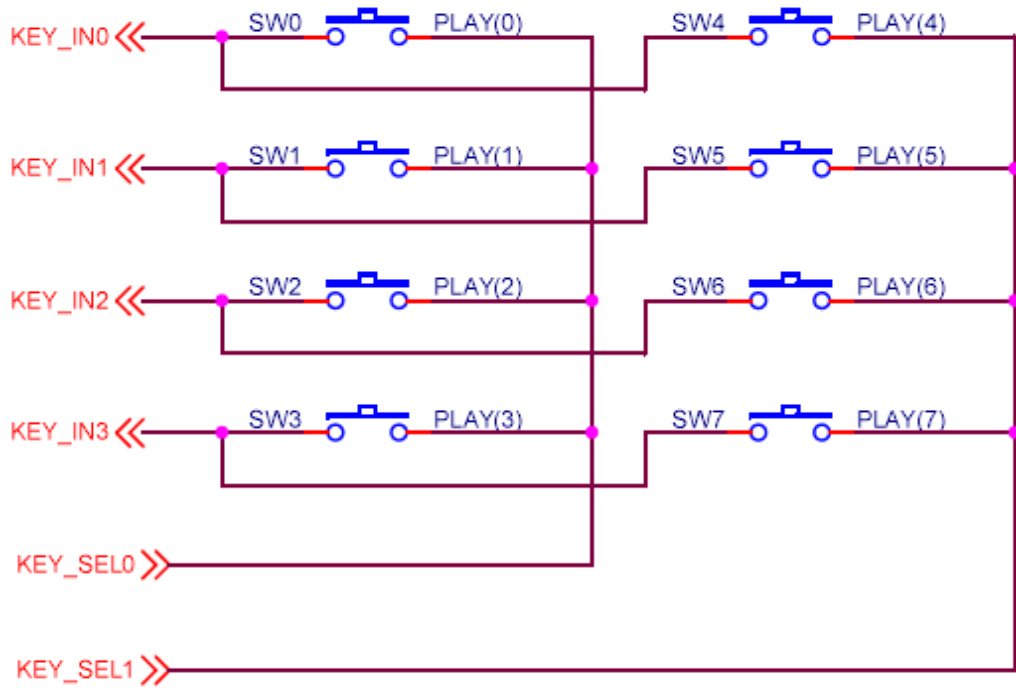
- 8(Eight) voice files in the Serial FLASH memory can be played without MCU by using two key selection pins (KEY\_SEL0, KEY\_SEL1) and 4 (Four) key input pins (KEY\_IN0~KEY\_IN3) matrix composition.
- The extra components as the pull-up resistors are not needed at the key input pins because the internal pull-up resistor is built in the key input pins of Voice IC (SVG1000X).
- If the SW0 (switch 0) is pressed, SVG1000X plays the voice file at the index address "0" of the voice memory (Serial FLASH Memory).  
 "Switch 0" means SW0 which is the switch at the matrix cross of KEY\_SEL0 and KEY\_IN0 pins of SVG1000X.  
 As the same method, SW1 (switch 1) is pressed, index address "1" of the voice memory is played.
- The keys are available when they are pressed more than 100mseconds.  
 If other key is pressed during a voice file is playing, the current voice file is stop and other voice file will be played.

### 9.2 KEY\_SEL0 & KEY\_SEL1 Signal Diagram



### 9.3 KEY Connection

The following key matrix should be connected application circuit.



## 10. Electrical Characteristics

Item	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Supply Voltage	VDD	V <sub>OSC</sub> =8MHz	2.7	-	3.6	V
Input Voltage (Low Level)	V <sub>IL</sub>	VDD = 2.7V~3.6V	0.8*VDD	-	VDD	V
Input Voltage (High Level)	V <sub>IH</sub>		-	-	0.2*VDD	V
Output Voltage (High Level)	V <sub>OH</sub>	I <sub>OH</sub> =-10mA	VDD-1.5	VDD-0.4		V
Output Voltage (Low Level)	V <sub>OL</sub>	I <sub>OL</sub> =25mA	-	-	2	V
Pull-up Resistor	R <sub>P</sub>	T <sub>A</sub> = 25°C	25	50	100	KΩ
Current Consumption	I <sub>DD</sub>	Play time VDD=3.3V	-	-	15	mA
Operating Temperature	T <sub>A</sub>	-	-40	-	85	°C
ESD Immunity	V <sub>ESD</sub>	HBM	2000			V
		MM	200			V
		CDM	500			V

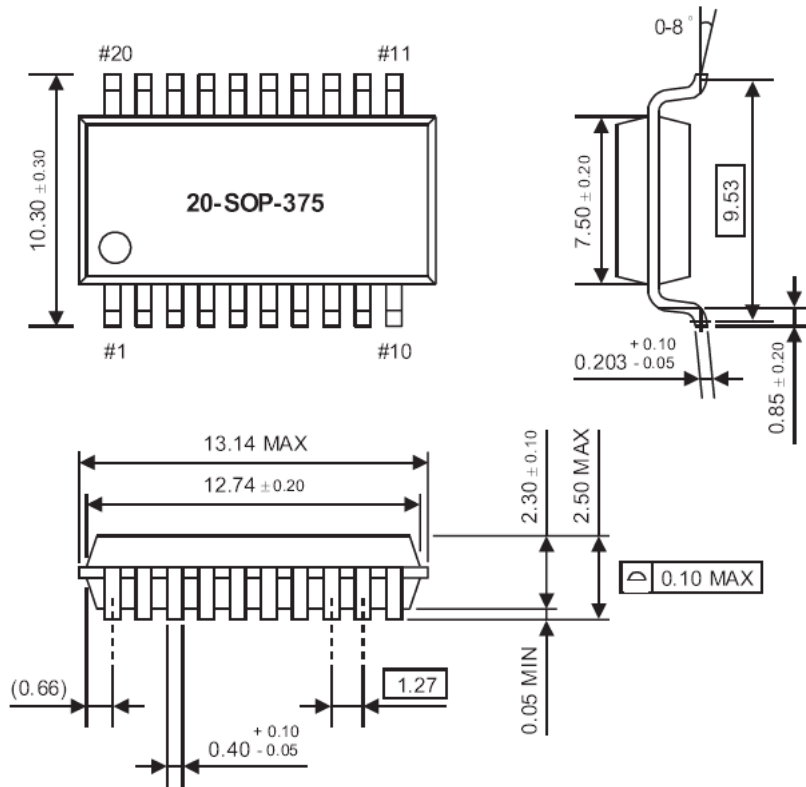
\* HBM (Human Body Model)

\* MM (Machine Model)

\* CDM (Charged Device Model)

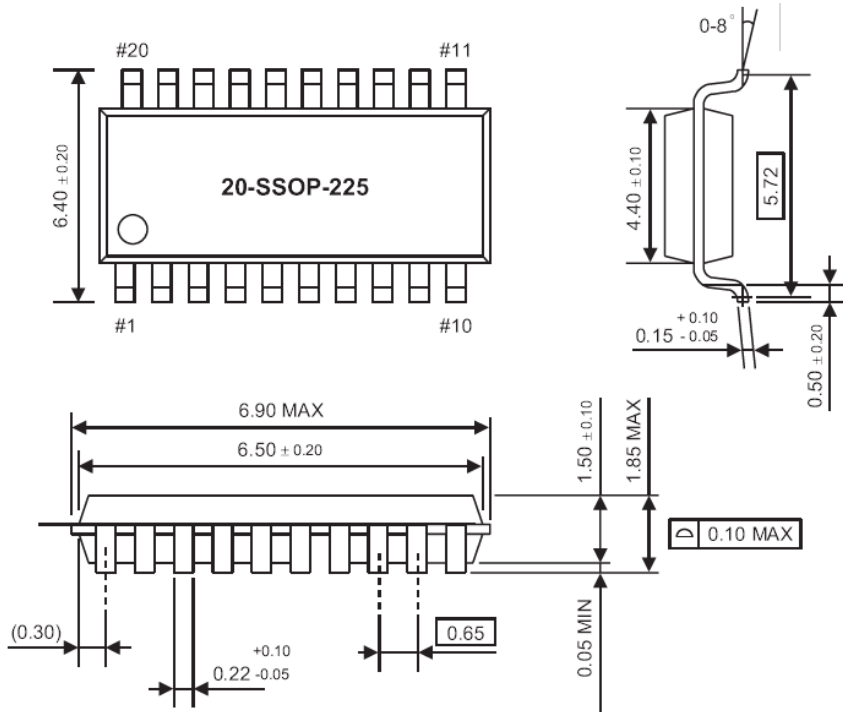
## 11. Package Information

### 11.1 20-SOP Package dimension



**NOTE:** The unit of dimension is mm.

### 11.2 20-SSOP Package Dimension



NOTE: The unit of dimension is mm.