SNIPC01

USER'S MANUAL

Preliminary Version 0.5

SNIPC01
SNIPC011
SNIPC012
SNIPC013

SONiX IR Remote Controller

AMENDENT HISTORY

Version	Date	Description
VER 0.1	Oct. 2012	Preliminary Version first issue.
VER 0.2	Nov. 2012	Modify package information and features selection table.
VER 0.3	Nov. 2012	Add application circuit and modify electrical characteristic table.
VER 0.4	Dec. 2012	Modify Internal RC Oscillator Freq.
VER 0.5	Jan. 2013	Add chip type format.

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1 PRODUCT OVERVIEW

SNIPC01 is a IR Remote Controller using special structure design to implement low power, high IR current and flexible IR development platform. SNIPC01 supports up to 49 keys, 250mA IR current, compatible with most IR formats and provide customers with the possibility of creating customized IR format. Sonix provides a SNIPC01 IRCP (IR Configure Processor) software to develop IR format easily. Powerful functionality, low power consumption and cost effective can apply to IR remote control transmitter device easily.

1.1 FEATURES

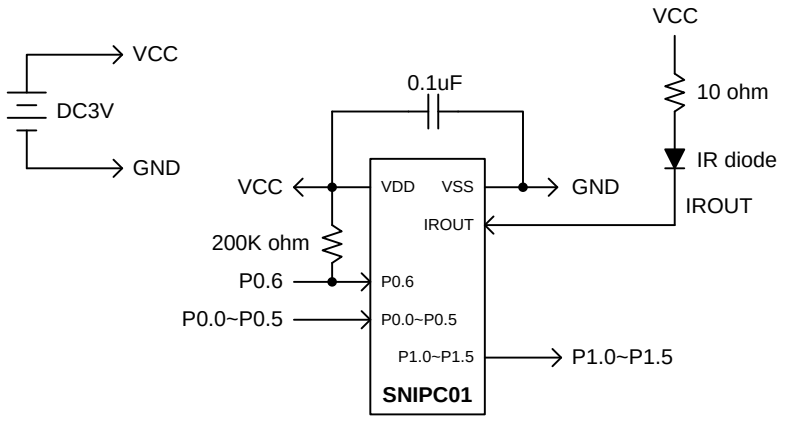
- **Up to 49 Matrix-Key with wake-up function.**
- **Definable IR Protocol.**
- **Definable IR Carry Signal.**
  Frequency range: 28.44kHz~227.5kHz
- **Definable IR Bit Data Format.**
  3-type bit data format.
- **I/O pin configuration**
  Matrix-key input pin: P0.0~P0.6.
  Matrix-key output pin: P1.0~P1.5.
  IR Output Pin: IROUT with 250mA sink current.
  (Idle high).
- **1-Level LVD: 1.8V.**
- **Internal IRC Oscillator.**
- **Two operating modes.**
  Normal mode: Key scan and IR transmission.
  Sleep mode: 0.5uA current.
- **Package (Chip form support)**
  PDIP 16 pin
  SOP 16 pin
  SSOP 16 pin
  PDIP 14 pin
  SOP 14 pin
  PDIP 8 pin
  SOP 8 pin
  SOT23 6 pin

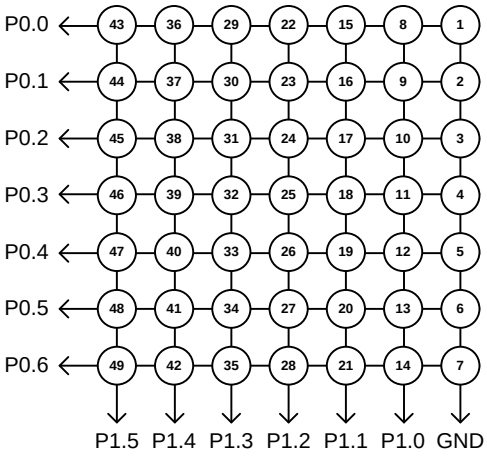
☞ **Features Selection Table**

CHIP	ROM	Scan Input Pin	Scan Output Pin	Oscillator	IR Output	Maximum Key No.	Package
				Int. 455K			
SNIPC01	0.25K*16	7	6	V	Duty/cycle programmable, 250mA sink current	49	PDIP16/SOP16/SSOP16
SNIPC011	0.25K*16	3	2	V	Duty/cycle programmable, 250mA sink current	9	PDIP8/SOP8
SNIPC012	0.25K*16	2	1	V	Duty/cycle programmable, 250mA sink current	4	SOT23-6
SNIPC013	0.25K*16	6	5	V	Duty/cycle programmable, 250mA sink current	36	PDIP14/SOP14

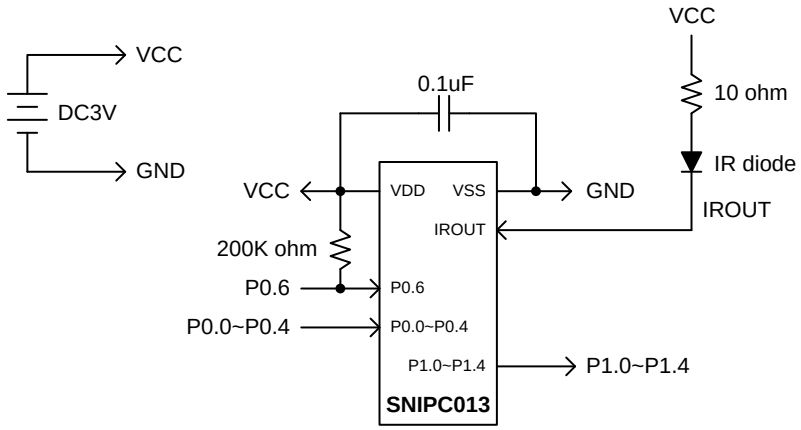
1.2 APPLICATION CIRCUIT

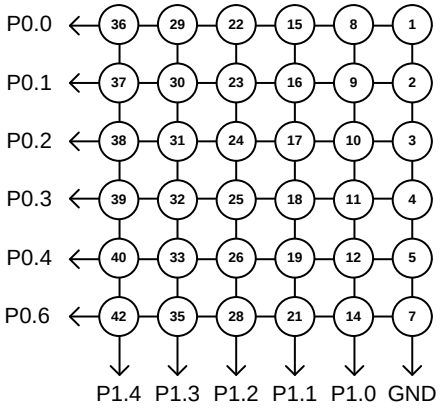
SNIPC01 (PDIP16/ SOP16/ SSOP16)



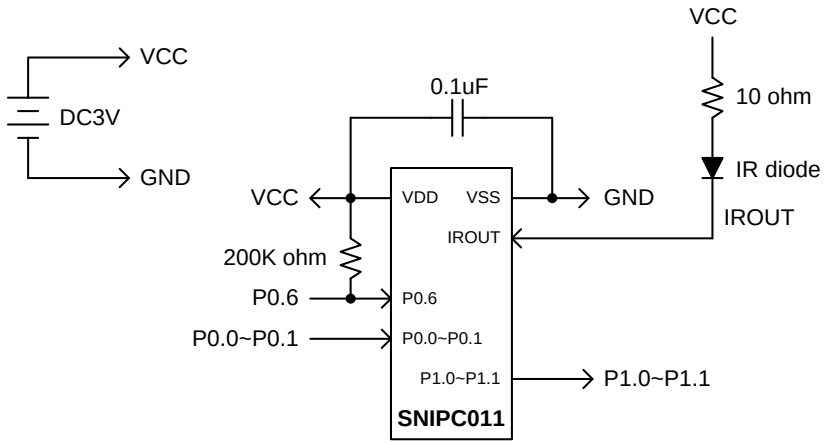


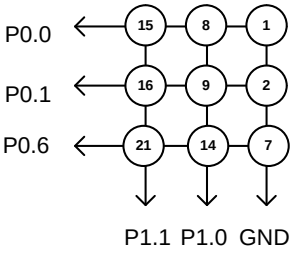
SNIPC013 (PDIP14/ SOP14)



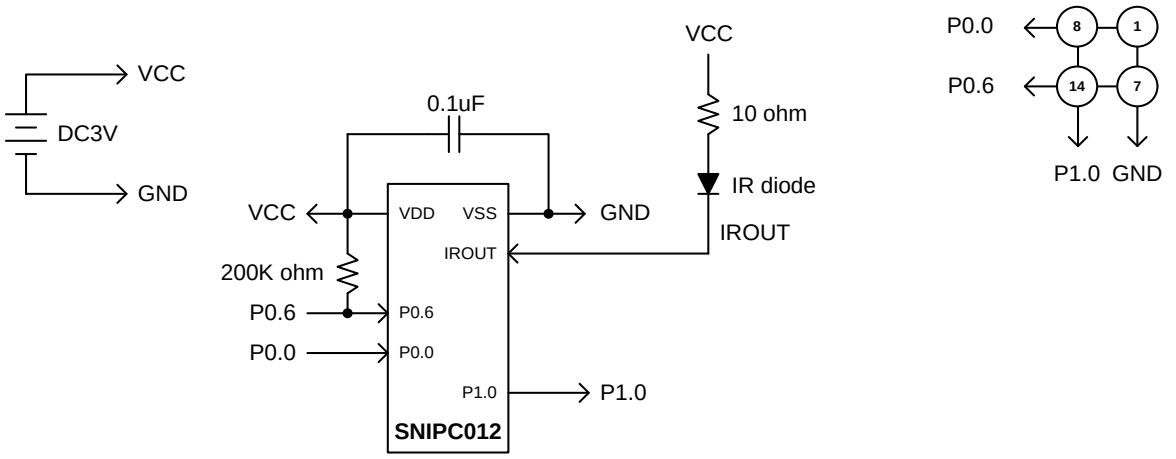


SNIPC011 (PDIP8 /SOP8)





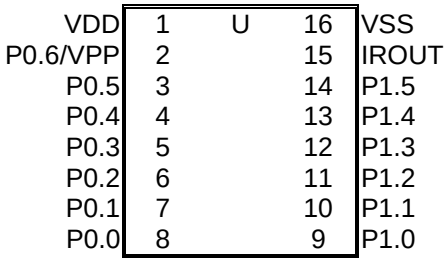
SNIPC012 (SOT23-6)



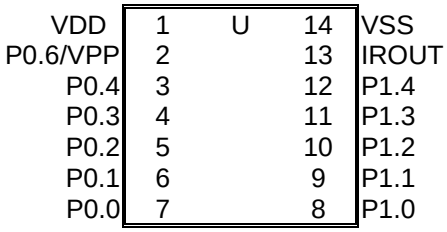
- P0.6 is Matrix input pin shared with VPP pin and not built in pull-up resistor. The external 200K ohm pull-up resistor is necessary.
- There is only one 0.1uF bypass capacitor between VDD and VSS pin.
- The IR driving resistance is 10 ohm.

1.3 PIN ASSIGNMENT

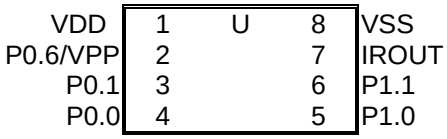
SNIPC01P (PDIP 16 pins)
SNIPC01S (SOP 16 pins)
SNIPC01X (SSOP 16 pins)



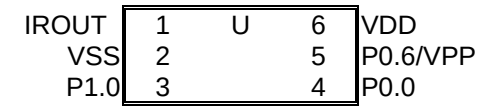
SNIPC013P (PDIP 14 pins)
SNIPC013S (SOP 14 pins)



SNIPC011P (PDIP 8 pins)
SNIPC011S (SOP 8 pins)



SNIPC012D (SOT23 6 pins)



✷ ***Note:*** **SNIPC012D only support QTP type.**

1.3.1 Pin Descriptions

PIN NAME	TYPE	DESCRIPTION
VDD, VSS	P	Power supply input pins for digital and analog circuit.
IROUT	O	IROUT: IR signal output pin.
P0.0~P0.5	I	Matrix key input pins. Schmitt trigger structure. Built-in pull-up resisters and wake-up function.
P0.6/VPP	I,P	Matrix key input pin. Schmitt trigger structure. Built-in wake-up function. VPP: OTP 12.3V power input pin in programming mode.
P1.0~P1.5	I/O	Matrix key output pins.

2 IR REMOTE CONTROL SYSTEM

2.1 KEY ARRANGEMENT

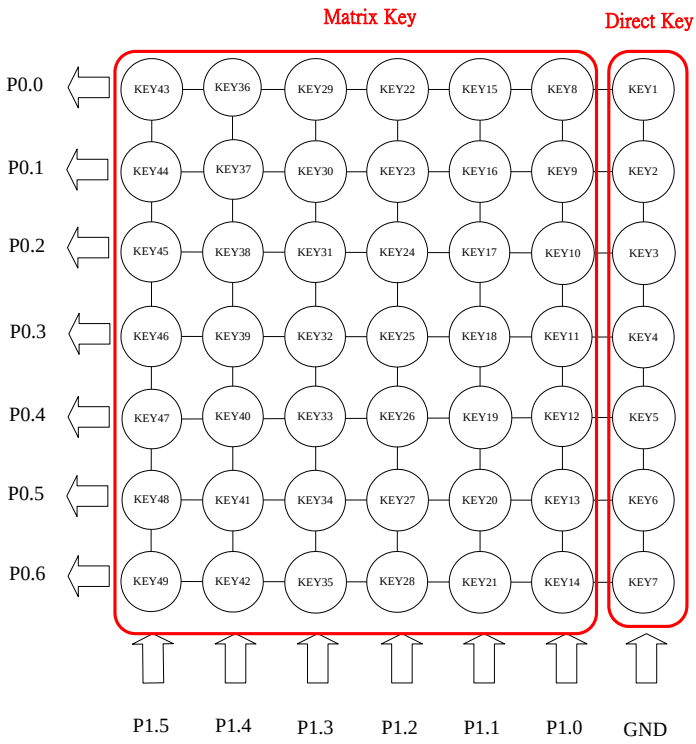


Figure 2-1 Key map

SNIPC01 supports up to 49 keys based on 6 output pins (P1.0~P1.5), 1 GND line and 7 input pins (P0.0~P0.6). The scan procedure starts from GND line, P1.0 to P1.5. According to the scan output source type, 49-Key classify into 7 direct keys (Key1~Key7) and 6*7 matrix keys (Key8~Key 49). Direct keys always have higher priority than matrix keys. It means matrix key will be ignored when any direct key is pressed. At the key arrangement, suggest user can use matrix keys first.

- **Direct Key Pressed:** Direct key is check at first. If any direct key is pressed, ignore other scan source key (P1.0~P1.5).
  Condition 1: Single direct key is pressed and IR transmission starts.
  Condition 2: Multi-key direct keys are pressed and IR transmission will not start.
- **Matrix Key Pressed:** If no any direct key is pressed, check the matrix key state.
  Condition 1: Single key is pressed and IR transmission starts.
  Condition 2: Multi-key matrix keys are pressed and IR transmission starts.
  Condition 3: No key is pressed and IR transmission will not start. System will enter power down mode.

SNIPC01 only supports single key condition. When single key condition is confirmed, IR transmission starts. System will executed key decode to transmit correct waveform. If multi-key condition is conformed, IR transmission will stop until key is released.

✷ ***Note: Key position is fixed.***

2.2 IR TRANSMISSION PROTOCOL

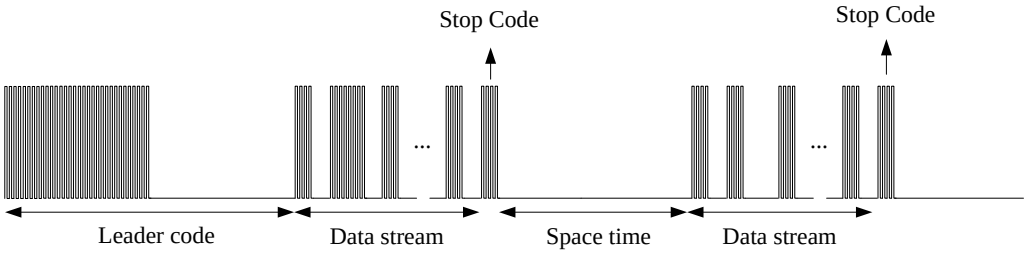


Figure 2-2 IR transmission waveform

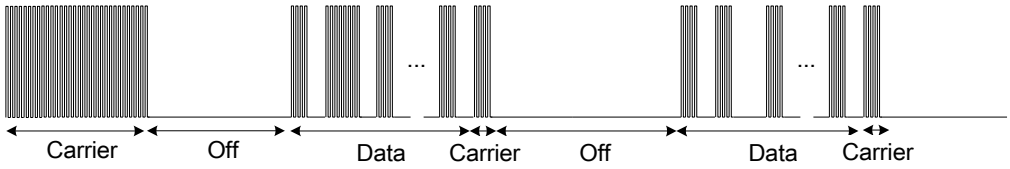


Figure 2-3 IR transmission waveform define in SNIPC01

IR transmission waveform consists of many massages like leader code, data stream, stop code or a period space time as the figure 2.2. SNIPC01 classify those massages into 3 basic waveforms types. Those are carrier waveform type, off waveform type and data type. Most protocols can be built based on different combinations of waveform type. SNIPC01 generator IR transmission by 2 functions as below.

- **IR carrier signal generator.**
- **IR Protocol Programmable Processor.**

2.2.1 IR Carrier Signal Generator

IR carrier signal generator is used to process signal waveform source. SNIPC01 supports 2 signal waveform source mode, carrier mode or non-carrier mode. When carrier mode is set, IR signal output carrier signal with specific frequency and duty.

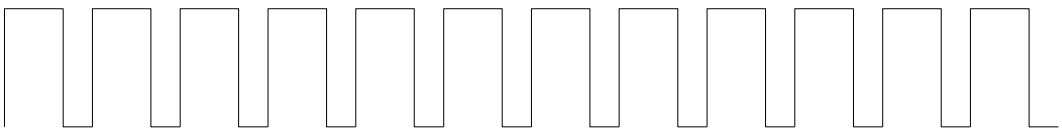


Figure 2-4 Carrier Signal

When non-carrier mode is set, IR signal keep high.

2.2.2 IR Protocol Programmable Processor

IR protocol programmable processor is used to configure IR transmission structure. There are many structures setting as the following.

- **Frame Time**
- **Transmission Structure**
- **Bit Structure**
- **Key Data**

Frame Time:

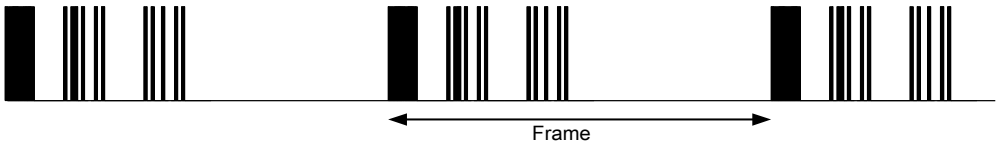


Figure 2-5 IR transmission

IR transmission is a periodic transmission. When single key condition is happen, the IR transmission will start and output waveform from IROUT pin. If single key condition doesn't change, the IR transmission will keep going until the key is released. Frame time is used to set the time length of each transmission start time.

Transmission Structure:

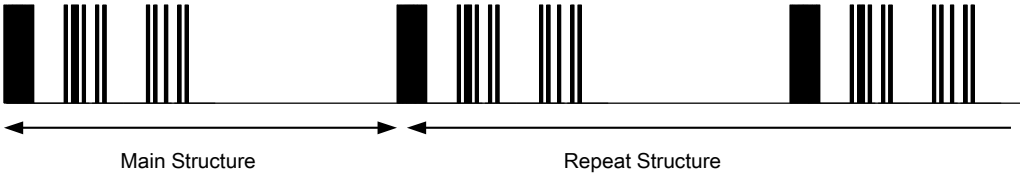


Figure 2-6 IR transmission structure

As IR transmission is a periodic waveform, it is classified into 2 transmission structure. The first one is main structure. Main structure will be transmitted in 1^{ST} cycle. The remainder transmission will transmit repeat structure. Repeat structure has 2 options. It can be repeat main structure or repeat new structure.

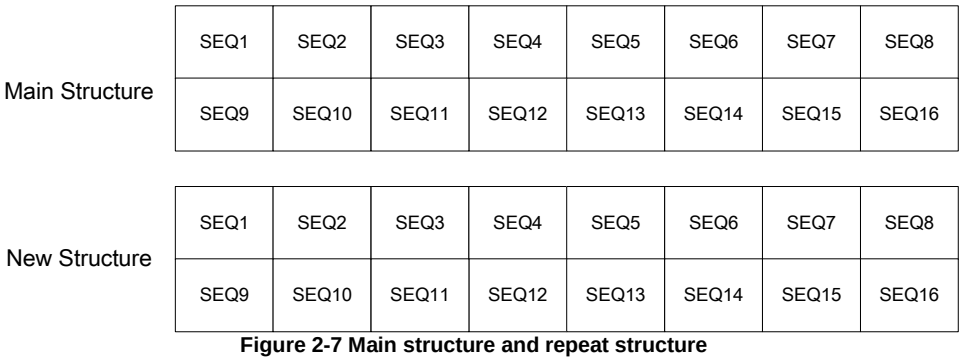


Figure 2-7 Main structure and repeat structure

Each structure supports 16 SEQs to store the control settings of waveform generating. One sequence can represent one kind of waveform mode and generator waveform based on the setting of the sequence(SEQ).

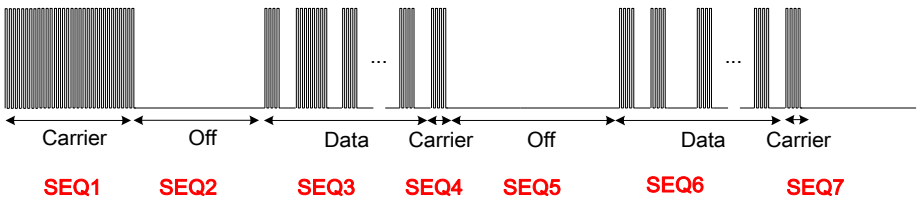


Figure 2-8 SEQ setting

Each SEQ has 3 waveform type options. They are carrier waveform, off waveform and data stream. If set carrier waveform and off waveform, IROUT pin output corresponding waveform. If set data stream, the transmission combines the information key data and bit structure. User can create different protocols by SEQ setting.

Bit Structure:

SNIPC01 supports 3 bit options including Binary (0/1), Binary (Even 0 /Odd 0 /Even 1/ Odd 1) and Quaternary (00/01/10/11). According to option, system enables 2 or 4 bit structure. In binary (0/1), there are bit 0 and bit 1 structures can be set. In binary (Even 0 /Odd 0 /Even 1/ Odd 1), there are bit even 0, bit odd 0, bit event 1 and bit odd 1 structures can be set. When transmits even data (Bit 0, Bit 2, Bit 4,…), system will transmit even 0/ event 1. When transmits odd data (Bit 1, Bit 3, Bit 5,…), system will transmit odd 0/ odd 1. In quaternary (00/01/10/11), there are bit 00, bit 01, bit10 and bit 11 structures can be set.

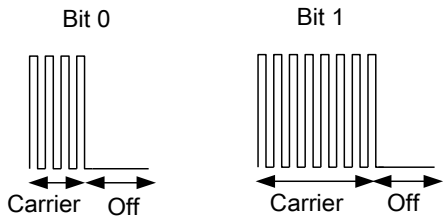


Figure 2-9 Bit structure

Each bit structure has 4 SEQs for bit format setting. Bit structure SEQ function only 2 waveform type options including carrier waveform and off waveform. System transmits the bit structure by key data stream.

Key Data:
49-key data stream setup. SNIPC01 supports 4-words for each key data stored.

3 IRCP (IR Configure Processor)

3.1 OVERVIEW

IRCP (IR configure processor) is an UI interface to build IR transmission protocol for SNIPC01. User can generate properly SN8 file by IRCP. Click IRCP shortcut icon to run the configure operation.

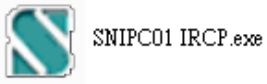


Figure 3-1 IRCP icon

3.2 MAIN FUNCTION CONFIGURE

The main purpose of IRCP is generating SN8 file. The SN8 file includes the information of IR signal, transmission protocol and key map control. Run the IRCP tool and the interface is shown below.

Figure 3-2 SNIPC01 IRCP interface

IRCP main page message illustration:

- **File Option:** Create/load/Save SN8 file.
- **Security Option:** Enable/disable security function.
- **Chip Option:** Choose chip type.
- **Protocol Configure Option:** Set entire protocol detail information including 3 main item (IR Signal/Frame/ Bit Format, Transmission Structure and Key Control).
- **SN8 File Information:** Show the information of SN8 file including create time, file name, file source and checksum.
- **Language Option:** Set English or Chinese .

3.2.1 File Option

File operation is used to build SN8 file. There are 4 file items and shows below.

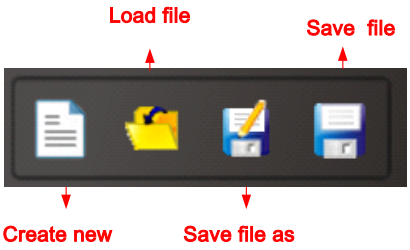


Figure3-3File option

- **Create File:** Create new SN8 file.
- **Load File:** Load old SN8 file.
- **Save File as:** Save SN8 file as new file name.
- **Save File:** Save SN8 file. This item will show after create/load/save as file function.

IRCP configure information will update to SN8 file when “Save File”. User must save file after data configuration.

3.2.2 Security Option

Security option can enable/disable security function.

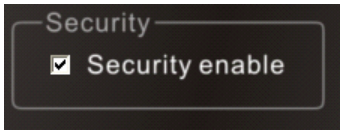


Figure 3-4 Security option

3.2.3 Chip Option

Chip option can choose chip type to generate specific SN8 file. Chip type will switch key map arrangement in Key Control page.

Figure 3-5 Chip option

3.2.4 Protocol Configure Option

Protocol configure include 3 main function as below. Click the item to open each configure page.

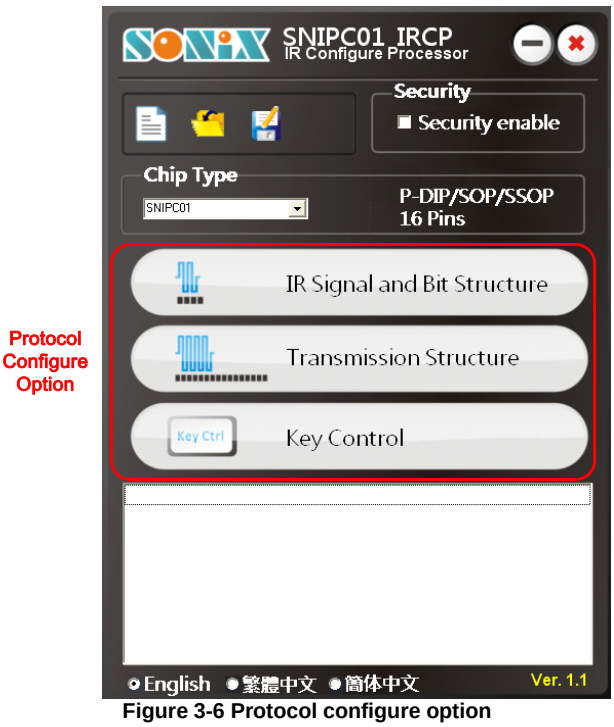


Figure 3-6 Protocol configure option

- **IR Signal and Bit Structure:** Set IR signal(carrier/non-carrier), frame time length and bit format structure.
- **Transmission Structure:** Set transmission structure including main structure and repeat structure.
- **Key Control:** Set 49-key data and debounce option.

Each function will be introduced in the following chapters.

3.2.5 SN8 File Information

SN8 file information shows the create time, file name, file source and checksum.

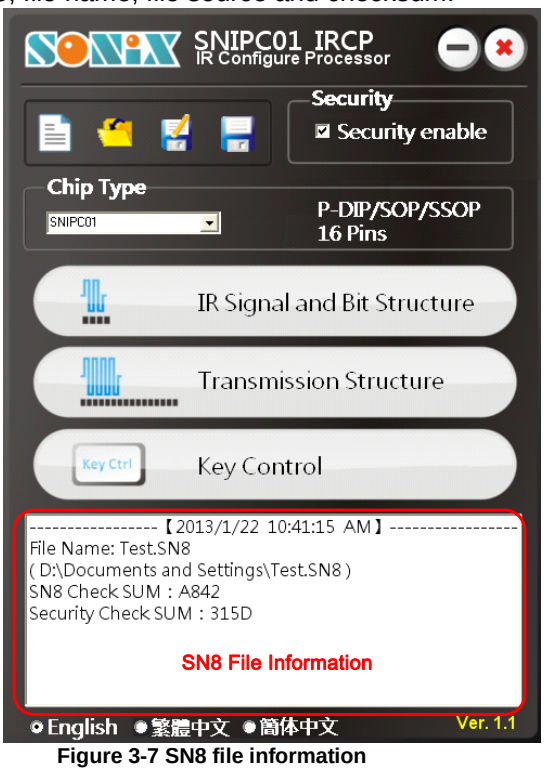


Figure 3-7 SN8 file information

- **Create Time:** Time information updates SN8 file changes.
- **File Name:** SN8 file name and file source.
- **Checksum:** SN8 checksum and security checksum. Security checksum will show when security enable.

3.3 IR SIGNAL AND BIT STRUCTURE

The first item has 3 main functions including IR signal, frame time and bit structure. The control page shows below.

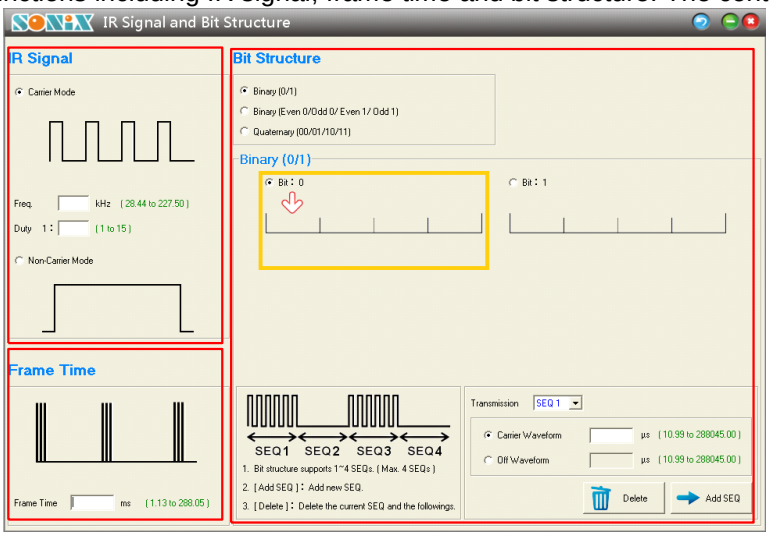


Figure 3-8 IR signal and bit structure configure page

- **IR Signal:** IR signal option.
- **Frame Time:** IR transmission cycle length.
- **Bit Structure:** Build each data bit transmission structure.

3.3.1 IR Signal

IR signal option determines the output signal waveform source. SNIPC01 supports 2 kinds of IR signal and controlled by signal option. There are carrier mode and non-carrier mode. In carrier mode, the signal can set carrier frequency and duty. In non-carrier mode, the main signal keep high status. Both modes can't exist in the same time. Choose the proper type and finish the setting in need. The control block shows below.

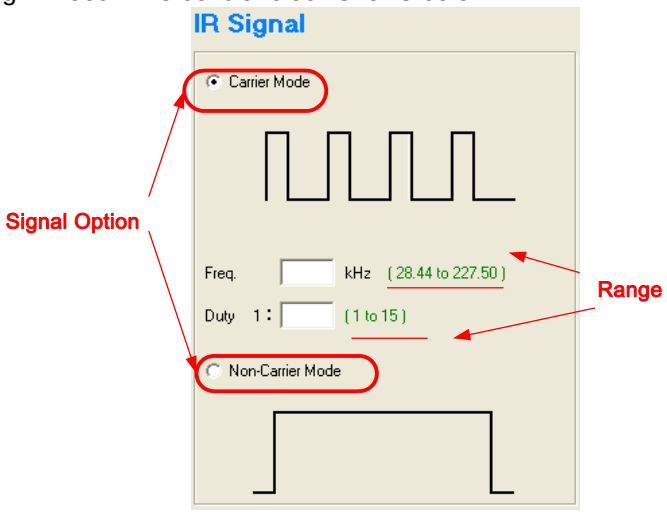


Figure 3-9 IR signal control block

- **Carrier Mode:** In carrier mode, there are two signal option must be set, the Frequency and Duty. Frequency determines carrier frequency and the unit is KHz. Duty determines the time ratio of high level and low level. Range will show behind the item and the range of Duty will vary with user frequency setting automatically.
- **Non-Carrier Mode:** The signal will keep high level signal.

➢ **Example: Set frequency=38kHz and Duty=1:2. Real frequency and duty will show in the figure.**

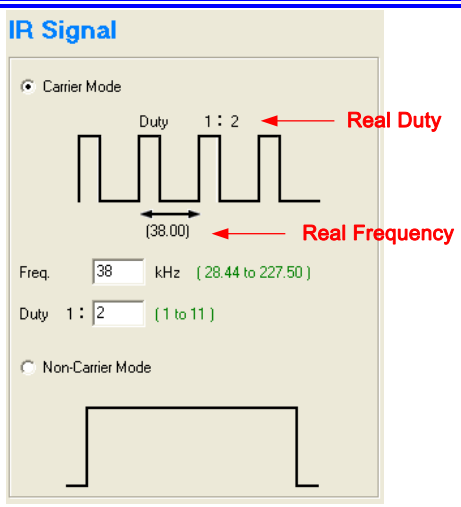


Figure 3-10 IR signal example

➢ **Example: Set frequency=40kHz and Duty=1:4. Real duty only supports Duty=1:5.**

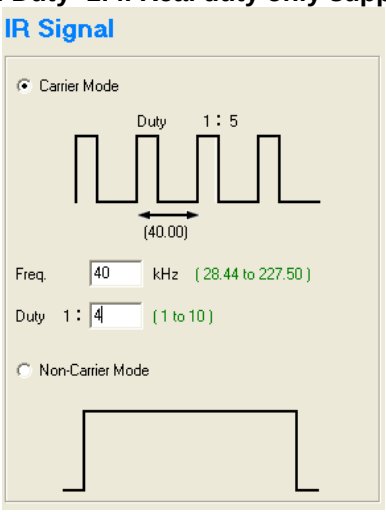


Figure 3-11 IR signal example

✸ ***Note: According to hardware limitation, real value may be a similar value. The real value shows the configuration that the system can support.***

3.3.2 Frame Time

Frame time is a periodic cycle for IR transmission and always keep the same period during IR transmission exist. The option determines the fix time between each IR transmission start time. The unit is ms and the time range will show behind the item.

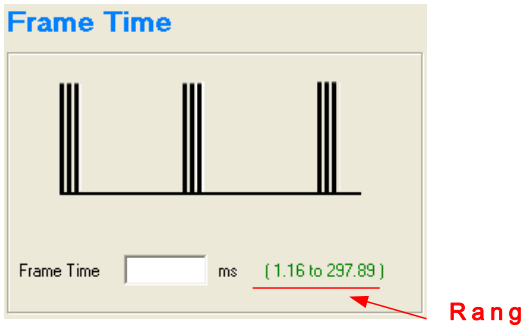


Figure 3-12 Frame time block

- **Example: Set Frame Time=108ms. Real frame time is 108.22ms and shows in the figure.**

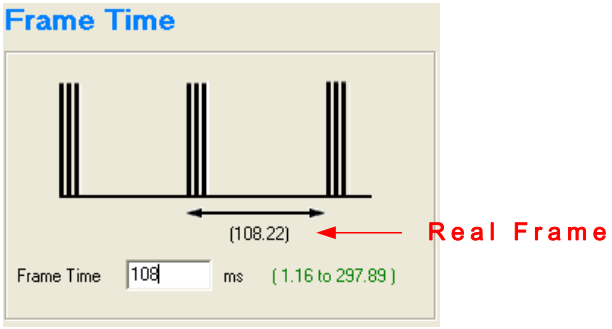


Figure 3-13 Frame time block

3.3.3 Bit Structure

Bit structure builds the data bit waveform structure. Data transmission will be executed according to bit structure and key data. Bit structure control block includes bit type, bit option and waveform setting, as shown in below.

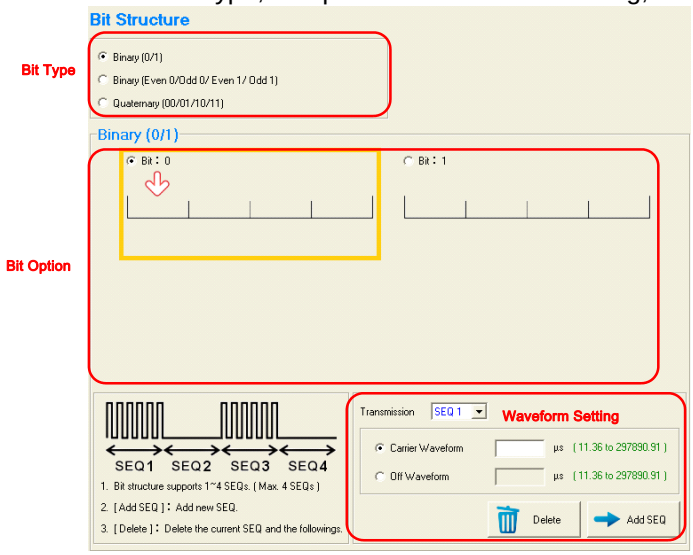


Figure 3-14 Bit structure control block

- **Bit Type:** IRCP supports 3 bit types including Binary (0/1), Binary (Even 0 /Odd 0 /Even 1/ Odd 1) and Quaternary (00/01/10/11). Only one bit type is chosen in one time. User must choose the proper one.
- **Bit Option:** According to bit type, control block enables 2 or 4 kinds of bit items for setting. Choose bit item to set the bit transmission waveform structure.

- **Waveform Setting:** According to bit option, set the waveform structure. Control block maximum supports 4 SEQs for each bit.

For bit structure setting, user chooses bit type first and bit option will show automatically. Bit option is used to execute each bit waveform and the yellow square shows the current bit item. Waveform setting set up the detail waveform shape. The configure procedure steps shows in the following.

Configure Procedure Flow:
Step1: Choose one bit type to enable bit option.

Figure 3-15 Bit type control block

Step2: Choose one bit item to set the detail waveform. The yellow square will show in the current bit choice. Click the item to configure other bit waveform.

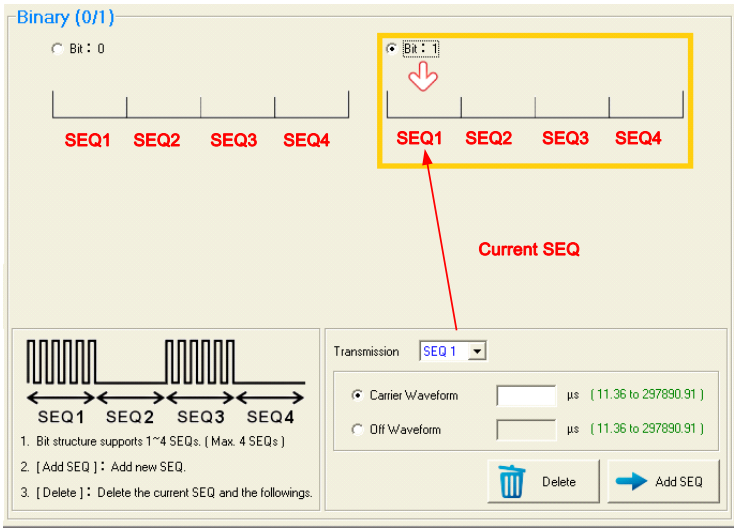


Figure 3-16 Bit option control block

Each bit option has 4 SEQs for waveform configuration. User can set 1~4 SEQs according different protocols. Current SEQ is mark with red arrowhead and the detail information is shown in the waveform setting.

Step3: Build waveform structure with waveform options and time length. There are two waveform options that is carrier waveform and off waveform. After waveform option is determined, set the waveform time length. The time unit is µs. The real time and waveform structure will show in figure as shown below.

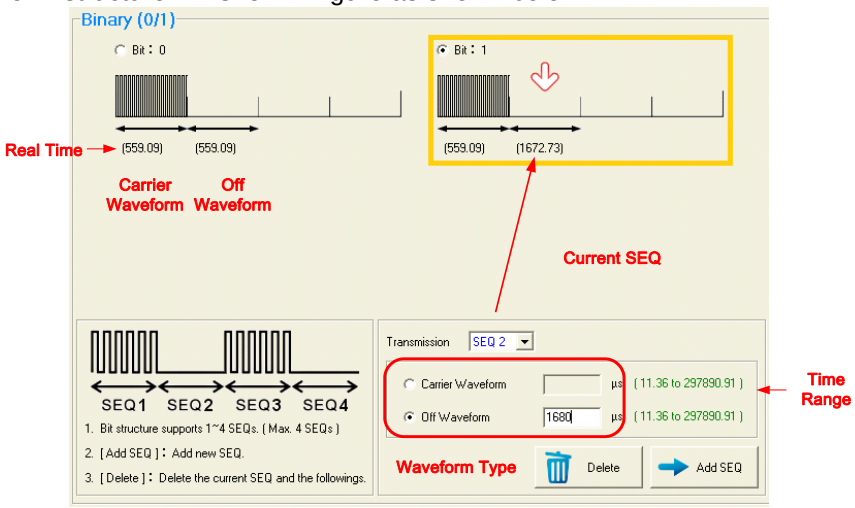


Figure 3-17 Waveform Type control block

- **Carrier Waveform:** IROUT outputs IR carrier signal. Set the time length of the carrier waveform. The time range shows behind the item.

- **Off Waveform:** IROUT pin output low status. Set the time length of the off waveform. The time range shows behind the item.

User can add one SEQ by “Add SEQ” and delete SEQ by “Delete SEQ”. It is noted that SEQ must continuous. “Delete SEQ” will delete current SEQ and the following.

➢ **Example:**
Binary (0/1) has 2 bit option, Bit0 and Bit1. Choose the target and set the waveform type. The range will show behind the item. Each bit has 1SEQ~4SEQs for setting.

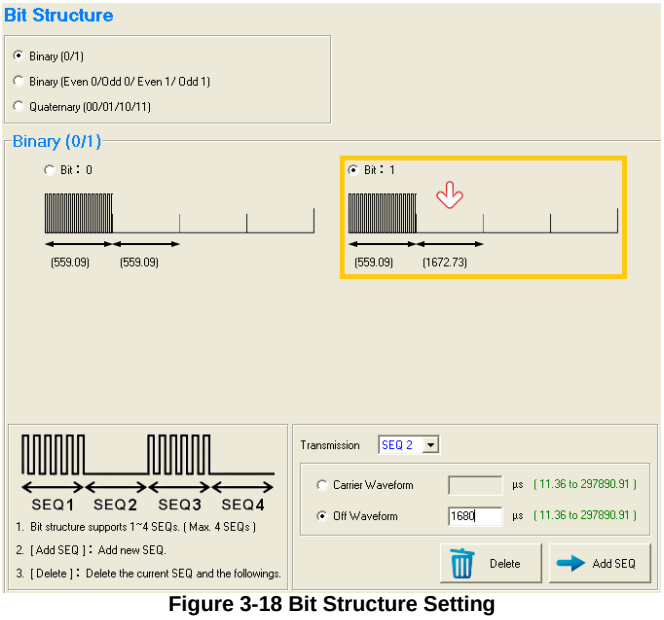


Figure 3-18 Bit Structure Setting

Binary(Even 0/ Odd0 / Even 1 /Odd1): There are 4 bit option, Even 0, Odd0, Even 1 and Odd1 .Choose the target and set the waveform type. The range will show behind the item. Each bit has 1SEQ~4SEQs for setting.

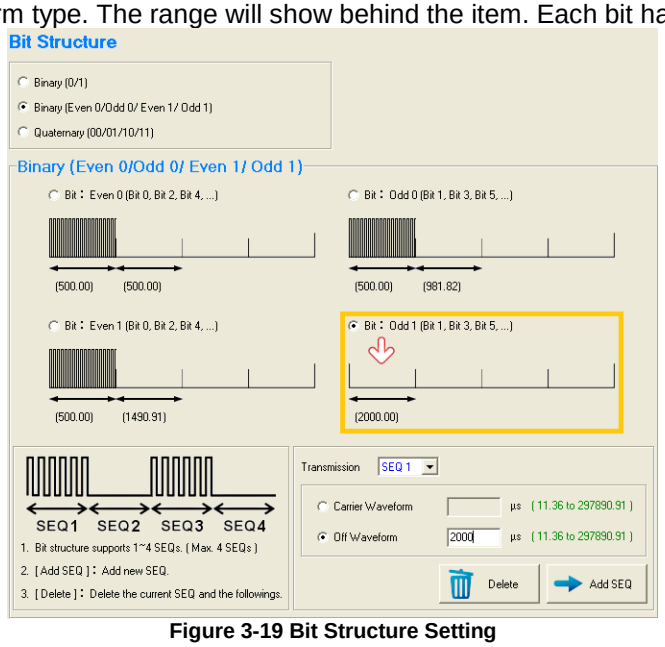


Figure 3-19 Bit Structure Setting

Quaternary (00/01/ 10/11): There are 4 bit option, Bit00, Bit01, Bit10 and Bit11. Choose the target and set the waveform type. The range will show behind the item. Each bit has 1SEQ~4SEQs for setting.

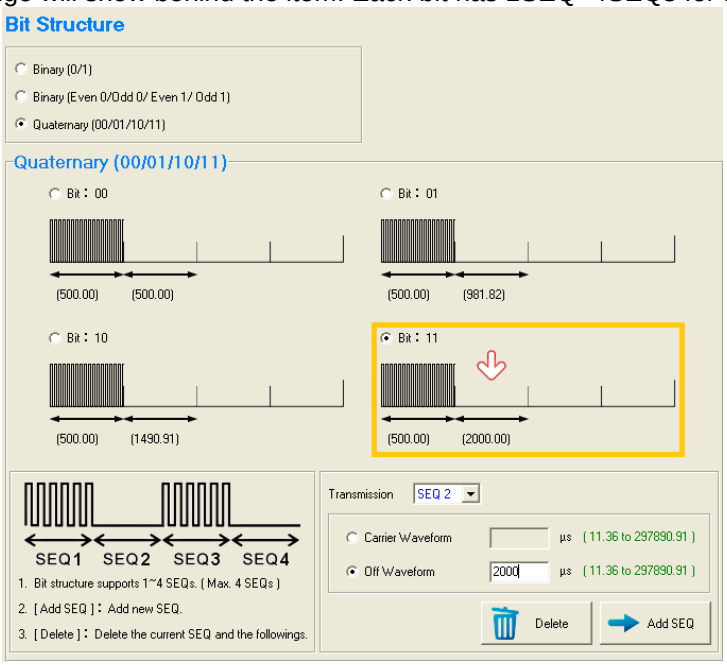


Figure 3-20 Bit Structure Setting

➢ **Example: If the signal is non-carrier mode, the waveform option will different.**

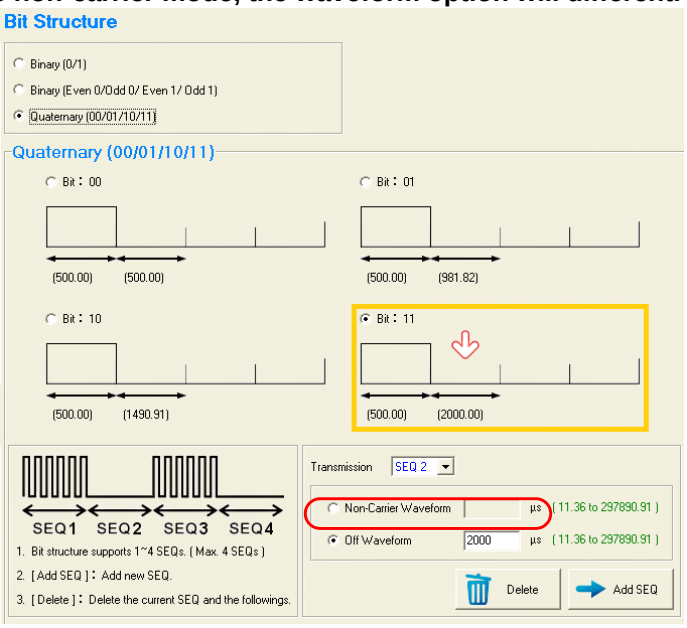


Figure 3-21 Bit Structure Setting

3.4 TRANSMISSION STRUCTURE

Transmission structure control transmission shape. There are two structure setting including main structure and repeat structure, as shown in below.

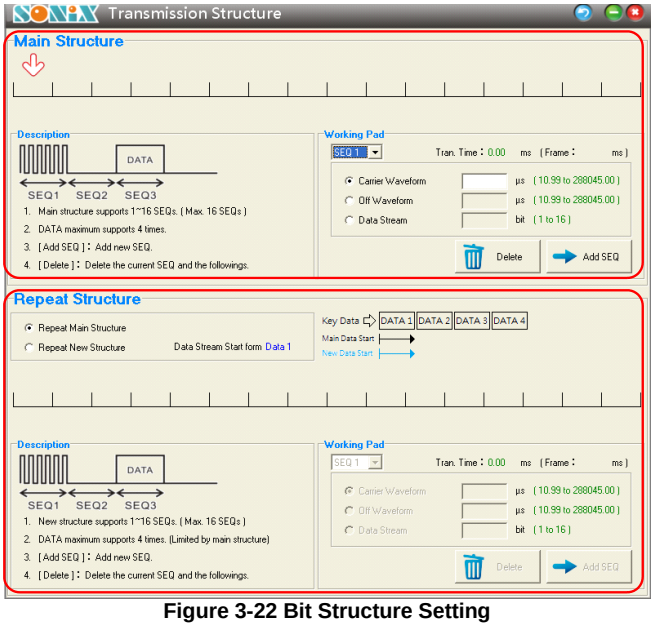


Figure 3-22 Bit Structure Setting

- **Main Structure:** The main transmission structure and must be transmitted in 1st transmission.
- **Repeat Structure:** Repeat structure defines the IR transmission waveform except 1st transmission.

3.4.1 Main Structure

Main structure supports 1~16SEQs to build the proper transmission waveform. Each SEQ supports 3 waveform types to choose IR transmission waveform. Those are carrier waveform, off waveform and data stream.

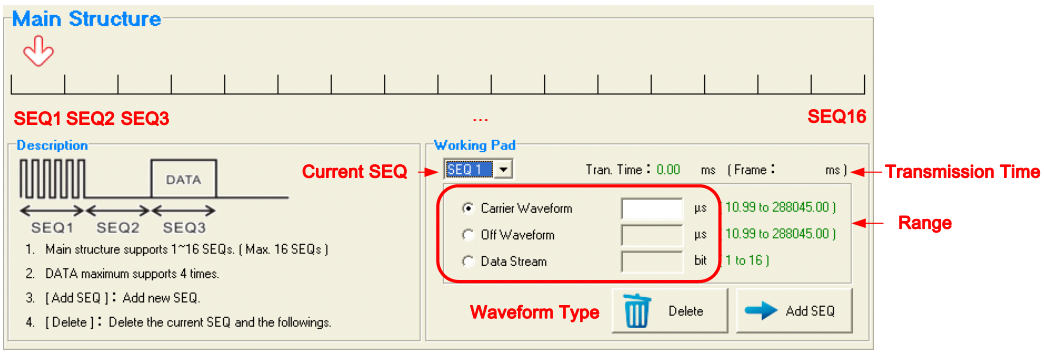


Figure 3-23 Main structure setting

- **Carrier Waveform:** IROUT outputs IR carrier signal. Set the time length of the carrier waveform. The time range shows behind the item.
- **Off Waveform:** IROUT pin output low status. Set the time length of the off waveform. The time range shows behind the item.
- **Data Stream:** Set the length of data. Main structure and repeat structure maximum supports 4 SEQs for data stream setting. One SEQ maximum supports 16 bits data.
- **Transmission Time:** Show the main structure transmission time (approximately value) and frame time.

Setting procedure can refer to Configure Procedure Flow in 3.3.3.

➢ **Example:**

Set IR transmission procedure is

1. **9000us carrier**
2. **4500us off**
3. **16-bit data**
4. **16-bit data**
5. **560 us carrier.**

The real time will show in the figure and main structure transmission time is about 85.82ms.

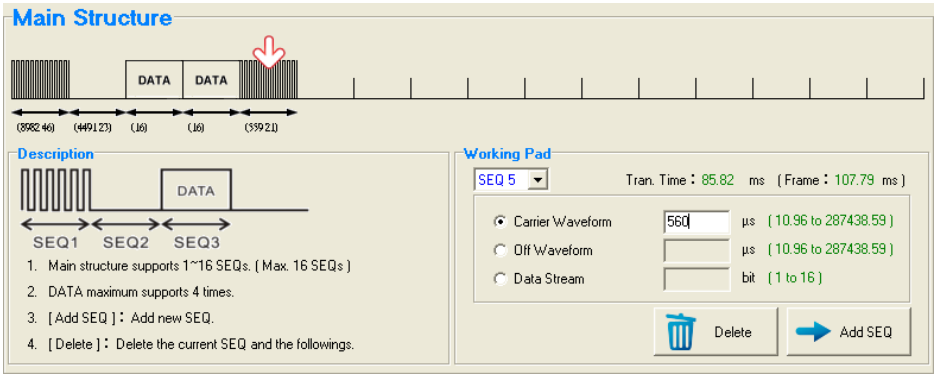


Figure 3-24 Main structure setting

3.4.2 Repeat Structure

Repeat structure can repeat main structure or create a new structure. If choose repeat main structure, system will executed main structure automatically. If new structure is chosen, user can build a new transmission structure. New structure supports 1~16SEQs for transmission waveform setting. Each SEQ supports 3 waveform types to choose IR transmission waveform. Those are carrier waveform, off waveform and data stream.

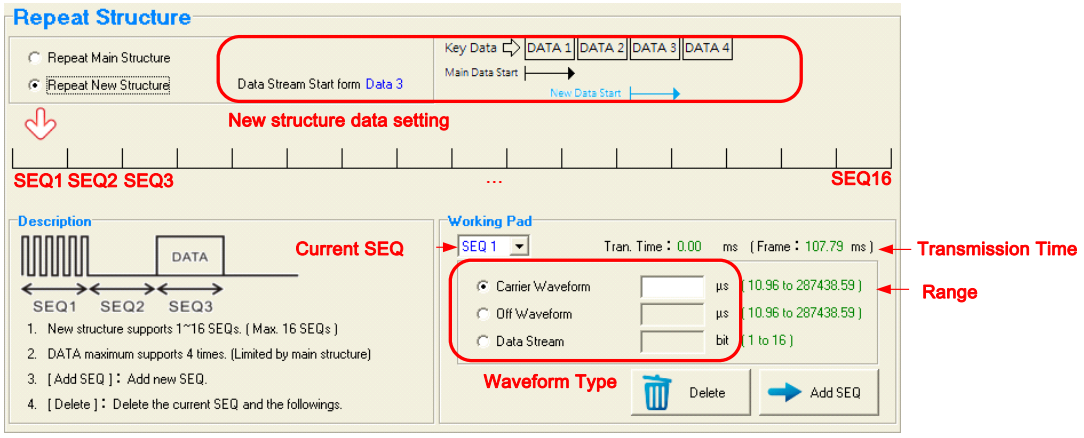


Figure 3-25 Repeat structure setting

- **Carrier Waveform:** IROUT outputs IR carrier signal. Set the time length of the carrier waveform. The time range shows behind the item.
- **Off Waveform:** IROUT pin output low status. Set the time length of the off waveform. The time range shows behind the item.
- **Data Stream:** Set the length of data. Main structure and repeat structure maximum supports 4 SEQs for data stream setting. One SEQ maximum supports 16 bits data.
- **Transmission Time:** Show the new structure transmission time (approximately value) and frame time.

In new structure, the data stream setting is limited by main structure. SNIPC01 total supports 4SEQs for data stream setting. In the data stream control, new structure uses the remaining space of main structure. Setting procedure can refer to Configure Procedure Flow in 3.3.3.

➢ **Example: Set repeat structure is Repeat Main structure. In this case, the waveform setting will be disabled.**

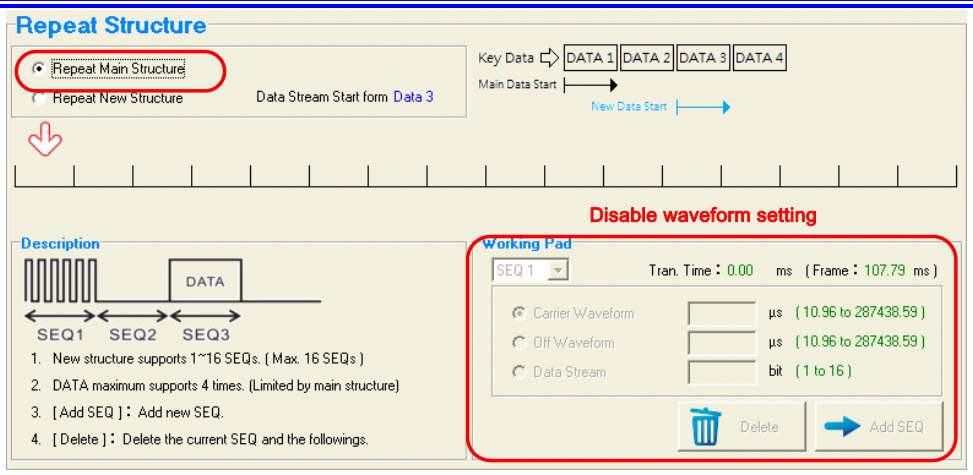


Figure 3-26 Repeat structure setting

➢ **Example:**

Set repeat structure is Repeat New structure. Set new structure transmission procedure is

1. **9000us carrier**
2. **2250 us off**
3. **8-bit data**
4. **560 us carrier.**

The real time shows in the figure.

Main structure uses 2 data stream space (DATA1 and DATA2) and new structure can store data from DATA3. New structure transmission time is about 107.79ms.

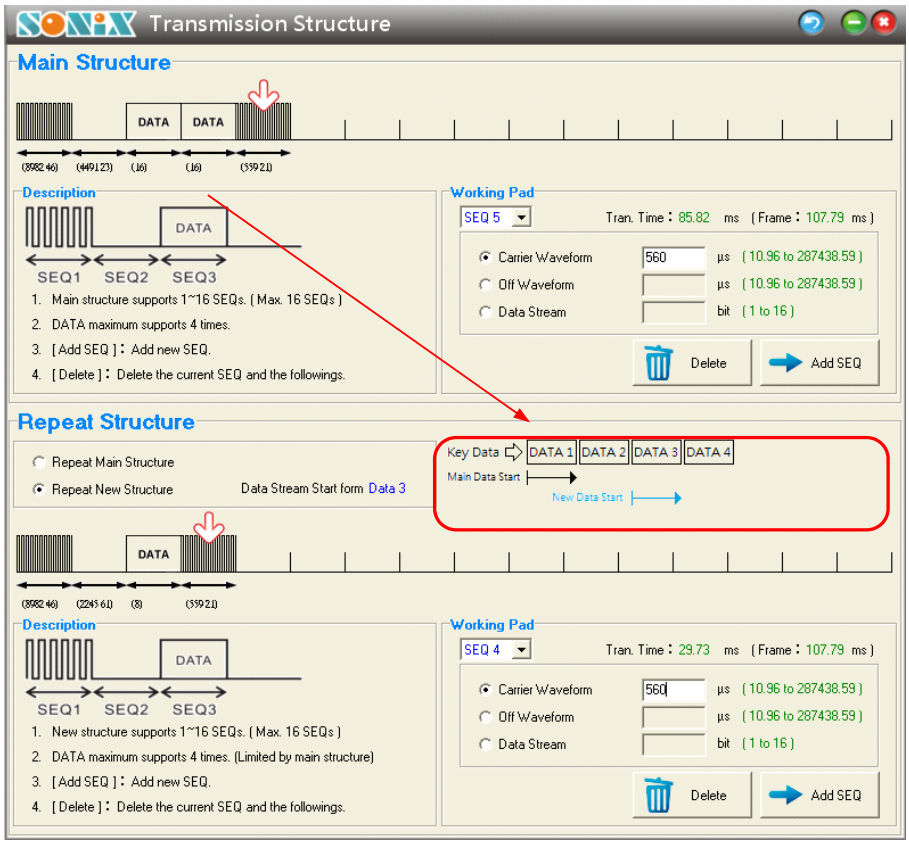


Figure 3-27 Transmission structure setting

3.5 KEY CONTROL

Key control is used to set key debounce and 49-key data setting, as shown in below.

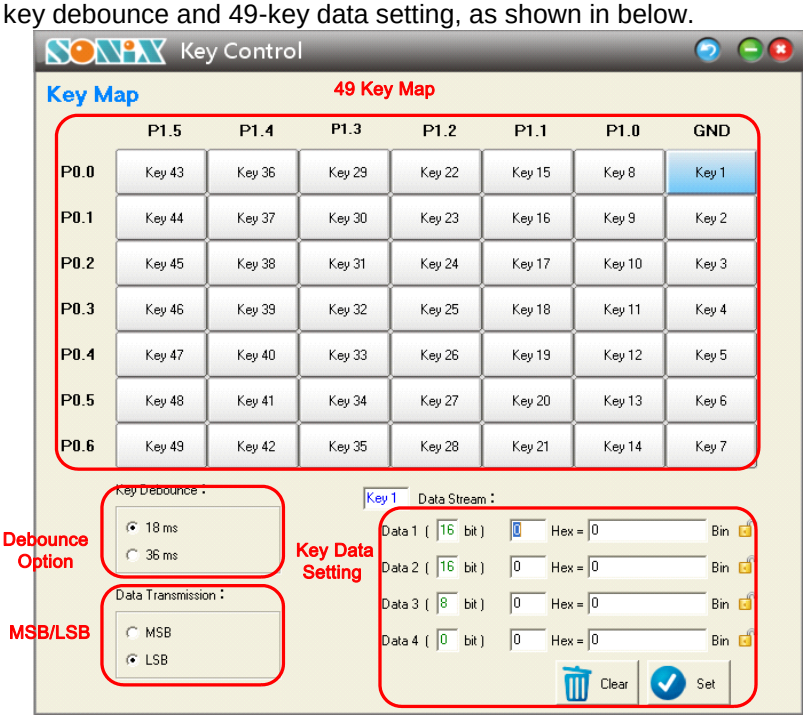


Figure 3-28 Key control

- **Key Map**: Set 49-key control. Click key map to set each key configuration.
- **Key Debounce:** Key debounce time option.
- **MSB/LSB:** Set the data transmission is MSB or LSB.
- **Key Data Setting:** Set the data of each key.

3.5.1 Key Debounce

SNIPC01 supports 2 debounce times and the debounce time will vary with IR carrier frequency.

3.5.2 Data Transmission

Set data transmission procedure is MSB/LSB.

3.5.3 Key Map and Key Data Setting

Choose the key by click key map and set data stream. Each key maximum support 4 data item(Data1~Data 4) can used.

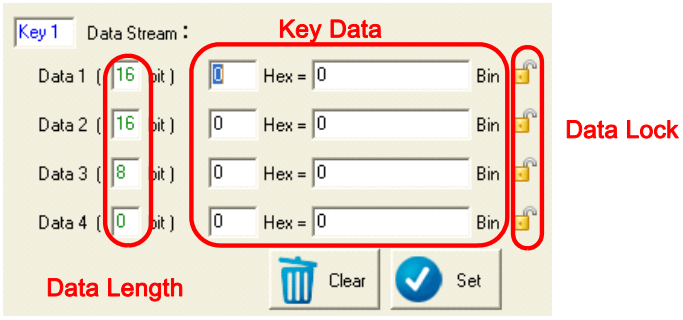
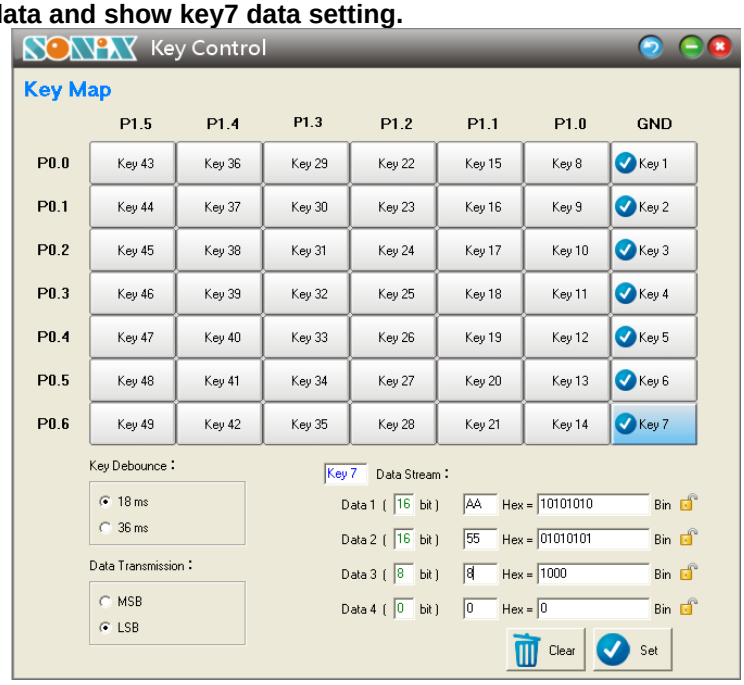


Figure 3-29 Key control

- **Key Name**: Choose key1~key49 by key map.
- **Data Length:** The length will limit the number of data bits. Data length is defined in transmission structure.
- **Key Data:** Set the key data stream.
- **Data Lock:** It is used to lock specific data information.

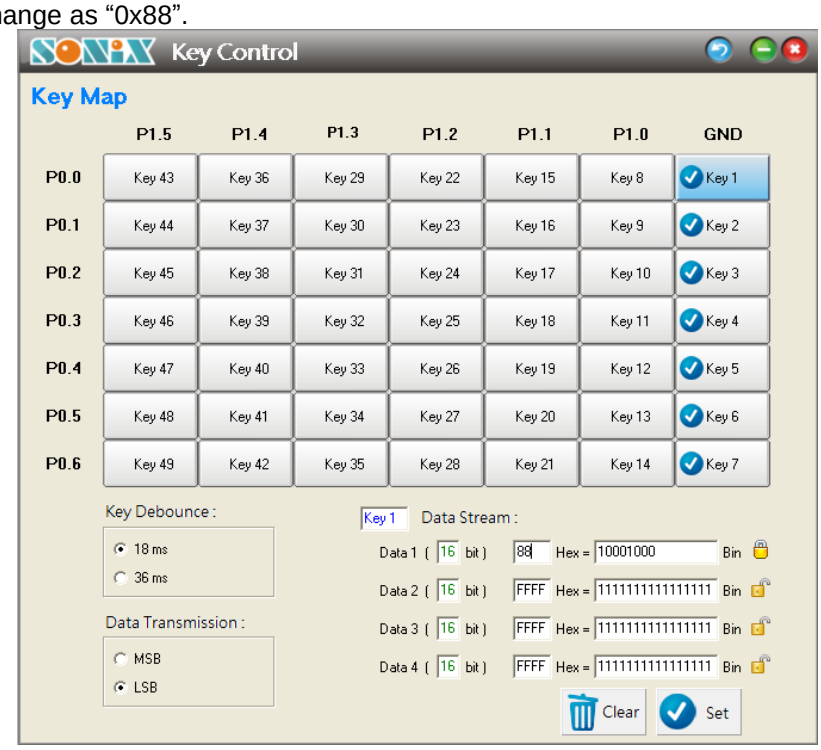
Choose key by click key map and set each key data. After 1-key setting is finished, user must click the ”Set” item to save key data and that key will be mark in the key map. Data lock is used to set specific data repeatedly. When one specific data is locked, the data information will be locked until unlocked or exit key control page.

➢ **Example: Set 7-key data and show key7 data setting.**



➢ **Example: Data lock function.**

Data lock function is not only keep status but also change the value of “Set Key”. In the case below, key1~key7 are already set and data1 is locked. If change Data1 value of key1 as “0x88” and set. The Data1 value of Key2~key7 also change as “0x88”.



✷ ***Note:***

Key data is stored when ”Set” item is clicked . Please click the ”Set” item after any key data changed.

4 ELECTRICAL CHARACTERISTIC

4.1 ABSOLUTE MAXIMUM RATING

Supply voltage (Vdd)…… - 0.3V ~ 6.0V
Input in voltage (Vin)…… Vss – 0.2V ~ Vdd + 0.2V
Operating ambient temperature (Topr)
SNIPC01P, SNIPC01S, SNIPC01X…… -20°C ~ + 70°C
Storage ambient temperature (Tstor) …… –40°C ~ + 125°C

4.2 ELECTRICAL CHARACTERISTIC

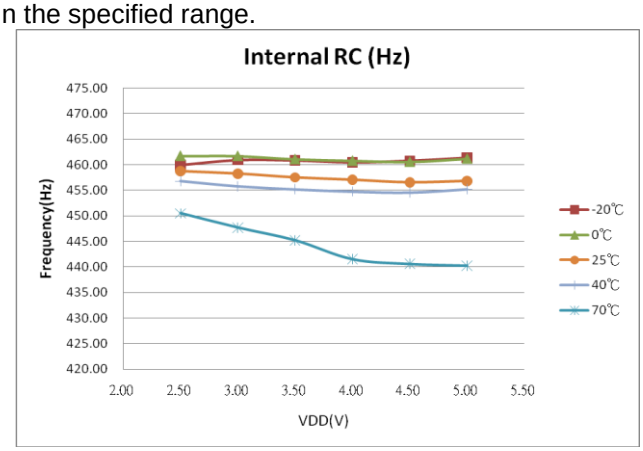
(All of voltages refer to Vss, Vdd = 5.0V, ambient temperature is 25℃ unless otherwise note.)

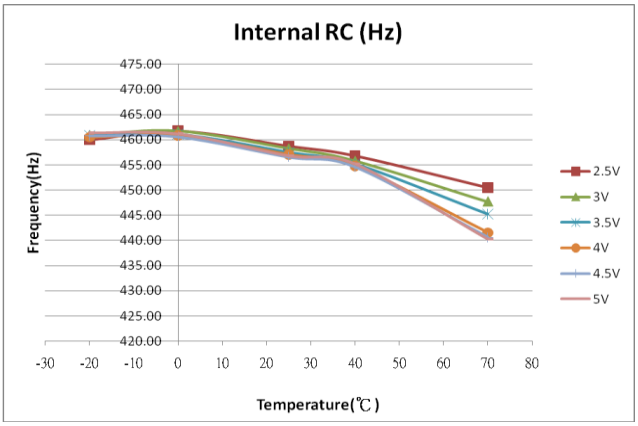
PARAMETER	SYM.	DESCRIPTION		MIN.	TYP.	MAX.	UNIT
Operating voltage	Vdd	Normal mode.		2.0	-	5.5	V
Vdd rise rate	Vpor	Vdd rise rate to ensure internal power-on reset		0.05	-	-	V/ms
Input Low Voltage	ViL	All input ports		Vss	-	0.3Vdd	V
Input High Voltage	ViH	All input ports		0.7Vdd	-	Vdd	V
Reset pin leakage current	Ilekg	Vin = Vdd		-	-	2	uA
I/O port pull-up resistor	Rup	Vin = Vss , Vdd = 3V		100	200	300	KΩ
		Vin = Vss , Vdd = 5V		50	100	150	
I/O port input leakage current	Ilekg	Pull-up resistor disable, Vin = Vdd		-	-	2	uA
sink current	IoL1	Vop = Vss + 0.5V, Vdd = 3V			4*		mA
		Vop = Vss + 0.5V, Vdd = 5V		-	5*	-	
IROUT sink current	IoL2	Vop = Vss + 0.5V, Vdd = 3V		-	250	-	mA
Supply Current	Idd1	Run Mode	Vdd= 5V, *25℃*	-	200	400	uA
			Vdd= 3V, *25℃*	-	150	300	uA
	Idd3	Sleep Mode	Vdd= 5V, *25℃*	-	0.5	2	uA
			Vdd= 3V, *25℃*	-	0.5	2	uA
Internal RC Oscillator Freq.	Firc	Internal RC (IRC)	25°C, Vdd= 2.0~5.0V, 455KHz	-1%	455	+1%	Khz
			0°C~40°C, Vdd= 3.0V, 455KHz	-1%	455	+1%	Khz
			0°C~40°C, Vdd= 5.0V, 455KHz	-1%	455	+1%	Khz
			-20°C~70°C, Vdd=2.0~5.0V, 455KHz	-3%	455	+3%	Khz
LVD Voltage	Vdet	Low voltage reset level.		1.6	1.8	2.0	V

*** These parameters are for design reference, not tested.**

4.3 CHARACTERISTIC GRAPHS

The Graphs in this section are for design guidance, not tested or guaranteed. In some graphs, the data presented are outside specified operating range. This is for information only and devices are guaranteed to operate properly only within the specified range.





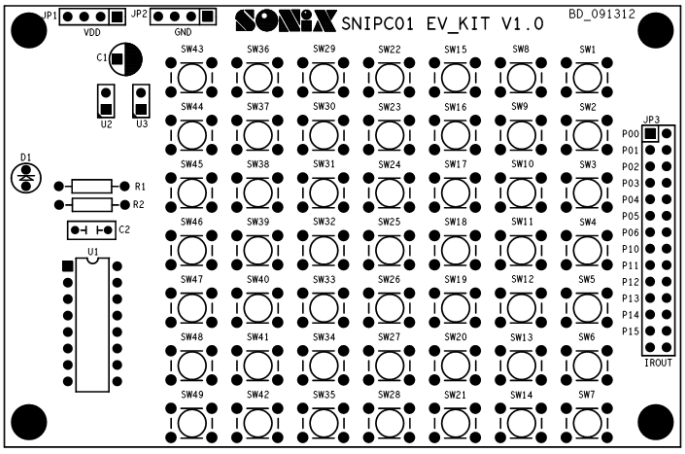
5 DEVELOPMENT TOOL

SONIX provides UI interface and EV-kit for SNIPC01 development. These development tools' version is as following.

- **EV-kit: SNIPC01 EV-kit V1.0.**
- **UI tool: SNIPC01_IRCP V1.0.**
- **Writer: MPIII WRITER.**

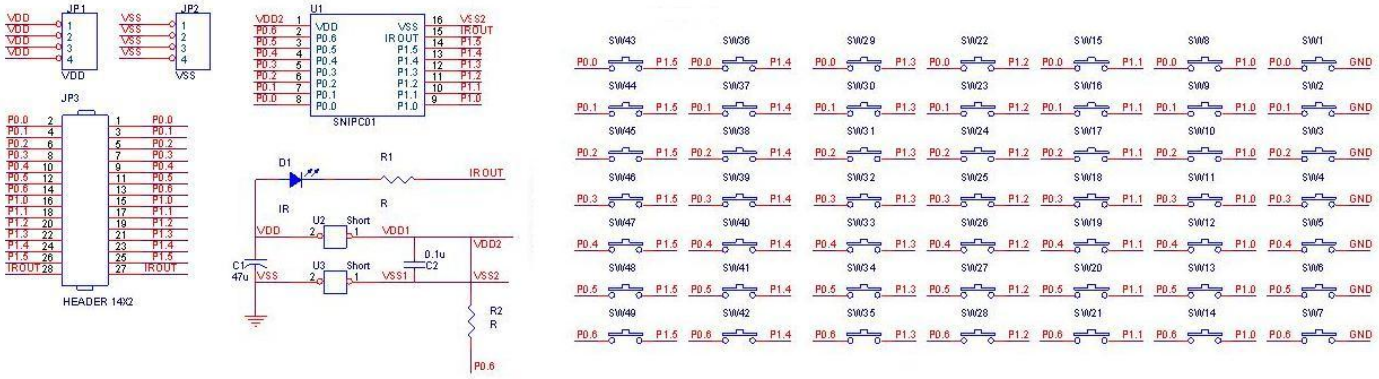
5.1 SNIPC01 EV-kit

SNIPC01 EV-kit includes GPIO interface and IR driver module. The schematic of SNIPC01 EV-kit is as following.



- JP3: GPIO connector for test.
- U1: SIPC01DIP, SOP and SSOP type connector for connecting to user's target board.
- U2/U3: Short connector.
- SW1~SW49: Remote key map.
- D1/R1: IR driving circuit for SNIPC01 real chip test.

SNIPC01 EV-kit schematic:



5.2 EV-KIT APPLICATION NOTIC

SNIPC01 EV-kit includes direct type key map, matrix type key map and IR driving circuit module.

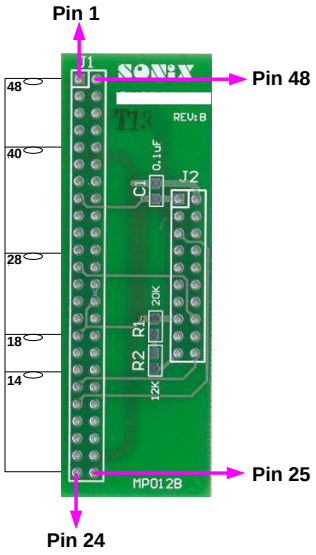
- The IR driving circuit module is for SNIPC01 real chip test. The EV-kit is like a real remote controller. The R2 resistance is about 200kΩ and R1 resistance is about 10Ω for 250mA sink current @Vdd=3V.

6 OTP PROGRAMMING PIN

SNIPC01 OTP ROM program/verify supports MP-Pro writer and MP-III writer.

- MP-Pro writer: Plug on SNIPC01 IC directly.
- MP-III writer: For SNIPC01 version.
- SNIPC012D only support QTP type

6.1 WRITER TRANSITION BOARD SOCKET PIN ASSIGNMENT



JP3 (Mapping to 48-pin text tool)

DIP 1	1	48	DIP48
DIP 2	2	47	DIP47
DIP 3	3	46	DIP46
DIP 4	4	45	DIP45
DIP 5	5	44	DIP44
DIP 6	6	43	DIP43
DIP 7	7	42	DIP42
DIP 8	8	41	DIP41
DIP 9	9	40	DIP40
DIP10	10	39	DIP39
DIP11	11	38	DIP38
DIP12	12	37	DIP37
DIP13	13	36	DIP36
DIP14	14	35	DIP35
DIP15	15	34	DIP34
DIP16	16	33	DIP33
DIP17	17	32	DIP32
DIP18	18	31	DIP31
DIP19	19	30	DIP30
DIP20	20	29	DIP29
DIP21	21	28	DIP28
DIP22	22	27	DIP27
DIP23	23	26	DIP26
DIP24	24	25	DIP25

Writer JP1/JP2

VDD	1	2	VSS
CLK/PGCLK	3	4	CE
PGM/OTPCLK	5	6	OE/ShiftDat
D1	7	8	D0
D3	9	10	D2
D5	11	12	D4
D7	13	14	D6
VDD	15	16	VPP
HLS	17	18	RST
-	19	20	ALSB/PDB

JP1 for Writer transition board
JP2 for dice and >48 pin package

6.2 PROGRAMMING PIN MAPPING:

Programming Pin Information of SNIPC01							
Chip Name		SNIPC01P/S/X			SNIPC011P/S		
Writer Connector		IC and JP3 48-pin text tool Pin Assignment					
JP1/JP2 Pin Number	JP1/JP2 Pin Name	IC Pin Number	IC Pin Name	JP3 Pin Number	IC Pin Number	IC Pin Name	JP3 Pin Number
1	VDD	1	VDD	17	1	VDD	21
2	GND	16	VSS	32	8	VSS	28
3	CLK	8	P0.0	24	4	P0.0	24
4	CE	-	-	-	-	-	-
5	PGM	9	P1.0	25	5	P1.0	25
6	OE	7	P0.1	23	3	P0.1	23
7	D1	-	-	-	-	-	-
8	D0	-	-	-	-	-	-
9	D3	-	-	-	-	-	-
10	D2	-	-	-	-	-	-
11	D5	-	-	-	-	-	-
12	D4	-	-	-	-	-	-
13	D7	-	-	-	-	-	-
14	D6	-	-	-	-	-	-
15	VDD	-	-	-	-	-	-
16	VPP	2	P0.6/VPP	18	2	P0.6/VPP	22
17	HLS	-	-	-	-	-	-
18	RST	-	-	-	-	-	-
19	-	-	-	-	-	-	-
20	ALSB/PDB	10	P1.1	26	6	P1.1	26

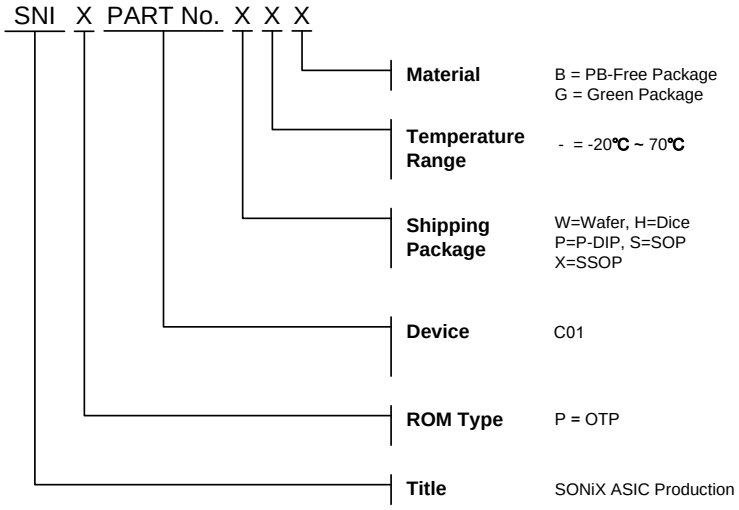
Programming Pin Information of SNIPC01							
Chip Name		SNIPC013P/S					
Writer Connector		IC and JP3 48-pin text tool Pin Assignment					
JP1/JP2 Pin Number	JP1/JP2 Pin Name	IC Pin Number	IC Pin Name	JP3 Pin Number	IC Pin Number	IC Pin Name	JP3 Pin Number
1	VDD	1	VDD	18			
2	GND	14	VSS	31			
3	CLK	7	P0.0	24			
4	CE	-	-	-			
5	PGM	8	P1.0	25			
6	OE	6	P0.1	23			
7	D1	-	-	-			
8	D0	-	-	-			
9	D3	-	-	-			
10	D2	-	-	-			
11	D5	-	-	-			
12	D4	-	-	-			
13	D7	-	-	-			
14	D6	-	-	-			
15	VDD	-	-	-			
16	VPP	2	P0.6/VPP	19			
17	HLS	-	-	-			
18	RST	-	-	-			
19	-	-	-	-			
20	ALSB/PDB	9	P1.1	26			

7 Marking Definition

7.1 INTRODUCTION

There are many different types in Sonix 8-bit MCU production line. This note lists the production definition of all 8-bit MCU for order or obtains information. This definition is only for Blank OTP MCU.

7.2 MARKING INDETIFICATION SYSTEM



7.3 MARKING EXAMPLE

- **Wafer, Dice:**

Name	ROM Type	Device	Package	Temperature	Material
SIPC01W	OTP	C01	Wafer	-20℃~70℃	-
SNIPC01H	OTP	C01	Dice	-20℃~70℃	-

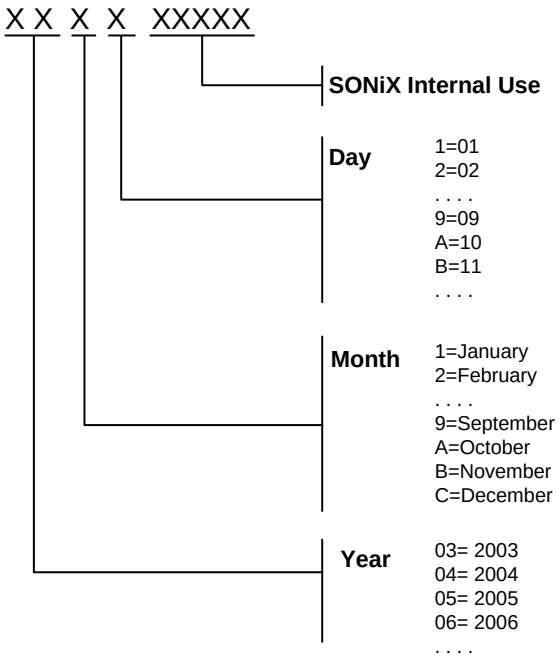
- **Green Package:**

Name	ROM Type	Device	Package	Temperature	Material
SNIPC01PG	OTP	C01	DIP	-20℃~70℃	Green Package
SNIPC01SG	OTP	C01	SOP	-20℃~70℃	Green Package
SNIPC01XG	OTP	C01	SSOP	-20℃~70℃	Green Package
SNIPC011PG	OTP	C01	DIP	-20℃~70℃	Green Package
SNIPC011SG	OTP	C01	SOP	-20℃~70℃	Green Package
SNIPC012DG	OTP	C01	SOT23	-20℃~70℃	Green Package
SNIPC013PG	OTP	C01	DIP	-20℃~70℃	Green Package
SNIPC013SG	OTP	C01	SOP	-20℃~70℃	Green Package

- **PB-Free Package:**

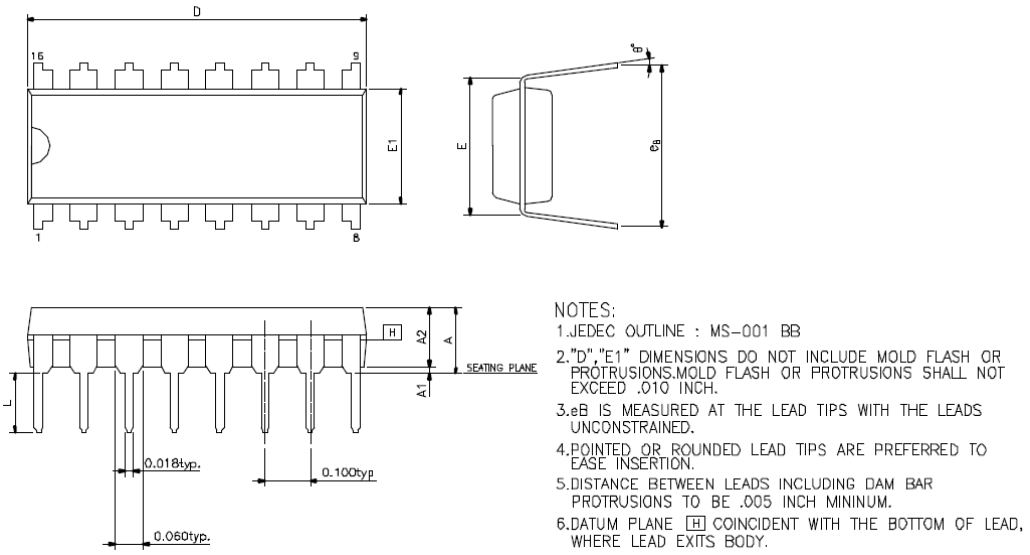
Name	ROM Type	Device	Package	Temperature	Material
SNIPC01PB	OTP	C01	DIP	-20℃~70℃	PB-Free Package
SNIPC01SB	OTP	C01	SOP	-20℃~70℃	PB-Free Package
SNIPC01XB	OTP	C01	SSOP	-20℃~70℃	PB-Free Package
SNIPC011PB	OTP	C01	DIP	-20℃~70℃	PB-Free Package
SNIPC011SB	OTP	C01	SOP	-20℃~70℃	PB-Free Package
SNIPC012DB	OTP	C01	SOT23	-20℃~70℃	PB-Free Package
SNIPC013PB	OTP	C01	DIP	-20℃~70℃	PB-Free Package
SNIPC013SB	OTP	C01	SOP	-20℃~70℃	PB-Free Package

7.4 DATECODE SYSTEM



8 PACKAGE INFORMATION

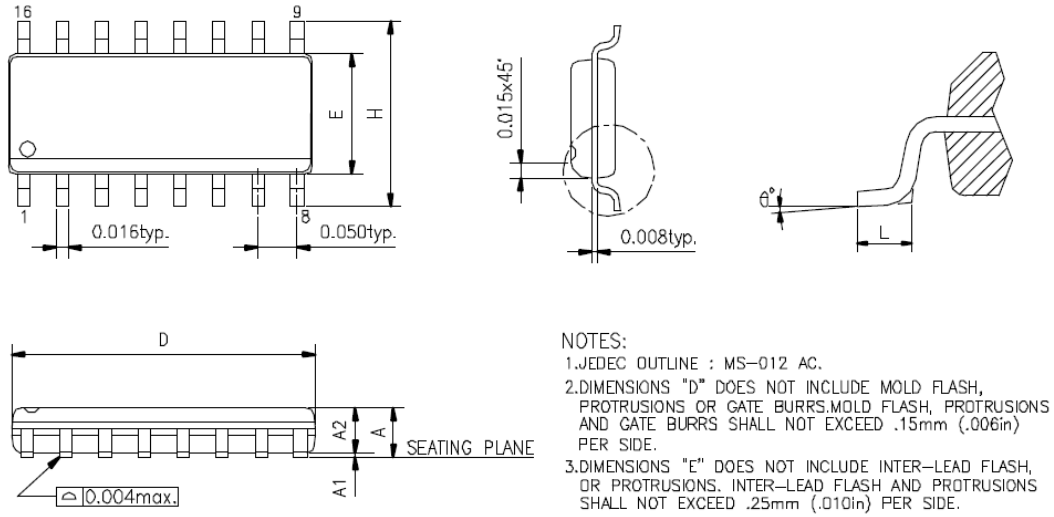
8.1 DIP16 PIN



NOTES:
1. JEDEC OUTLINE : MS-001 BB
2. "D","E1" DIMENSIONS DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS.MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED .010 INCH.
3. eB IS MEASURED AT THE LEAD TIPS WITH THE LEADS UNCONSTRAINED.
4. POINTED OR ROUNDED LEAD TIPS ARE PREFERRED TO EASE INSERTION.
5. DISTANCE BETWEEN LEADS INCLUDING DAM BAR PROTRUSIONS TO BE .005 INCH MININUM.
6. DATUM PLANE H COINCIDENT WITH THE BOTTOM OF LEAD, WHERE LEAD EXITS BODY.

SYMBOLS	MIN	NOR	MAX	MIN	NOR	MAX
	(inch)			(mm)		
A	-	-	0.210	-	-	5.334
A1	0.015	-		0.381	-	-
A2	0.125	0.130	0.135	3.175	3.302	3.429
D	0.735	0.755	0.775	18.669	19.177	19.685
E	0.30 BSC			7.620 BSC		
E1	0.245	0.250	0.255	6.223	6.350	6.477
L	0.115	0.130	0.150	2.921	3.302	3.810
eB	0.335	0.355	0.375	8.509	9.017	9.525
θ°	0°	7°	15°	0°	7°	15°

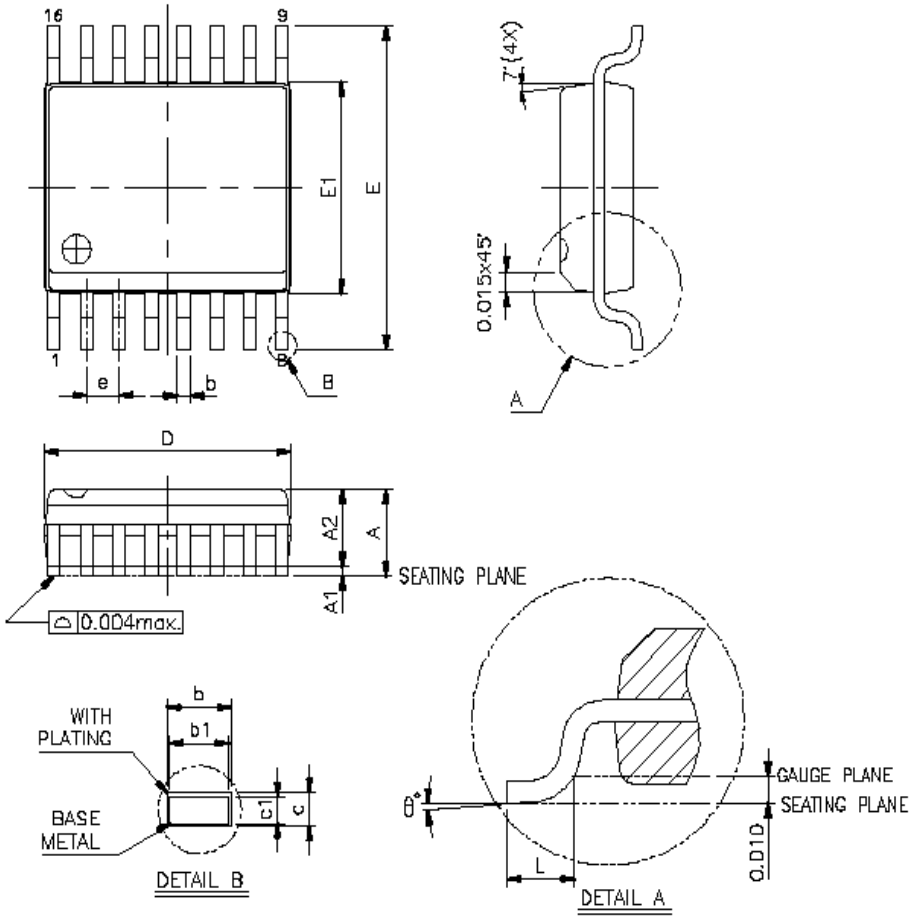
8.2 SOP 16 PIN



NOTES:
1. JEDEC OUTLINE : MS-012 AC.
2. DIMENSIONS "D" DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS AND GATE BURRS SHALL NOT EXCEED .15mm (.006in) PER SIDE.
3. DIMENSIONS "E" DOES NOT INCLUDE INTER-LEAD FLASH, OR PROTRUSIONS. INTER-LEAD FLASH AND PROTRUSIONS SHALL NOT EXCEED .25mm (.010in) PER SIDE.

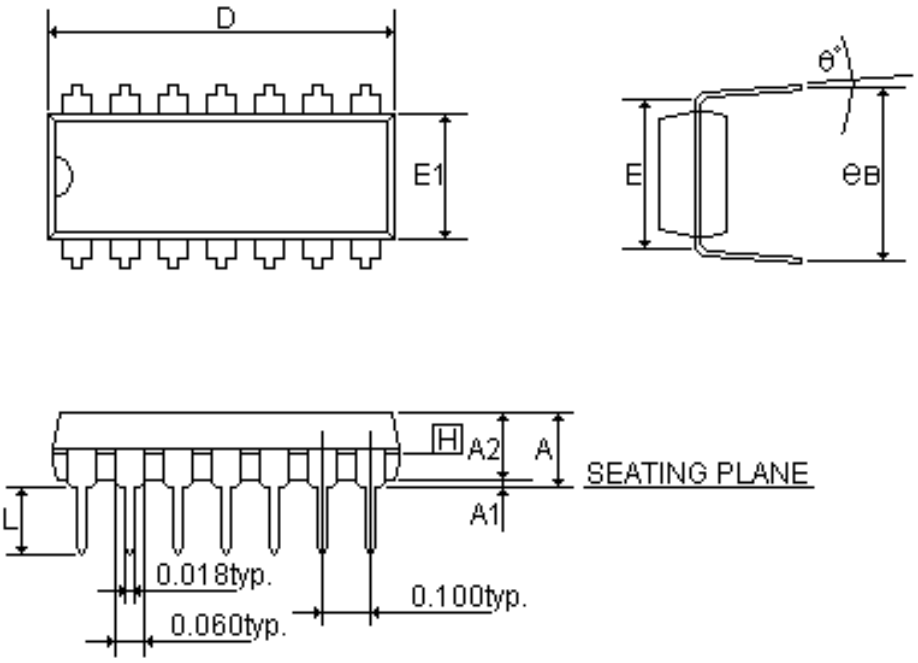
SYMBOLS	MIN	NOR	MAX	MIN	NOR	MAX
	(inch)			(mm)		
A	0.053	-	0.069	1.346	-	1.753
A1	0.004	-	0.010	0.102	-	0.254
D	0.386	-	0.394	9.804	-	10.008
E	0.150	-	0.157	3.810	-	3.988
H	0.228	-	0.244	5.791	-	6.198
L	0.016	-	0.050	0.406	-	1.270
θ°	0°	-	8°	0°	-	8°

8.3 SSOP 16 PIN



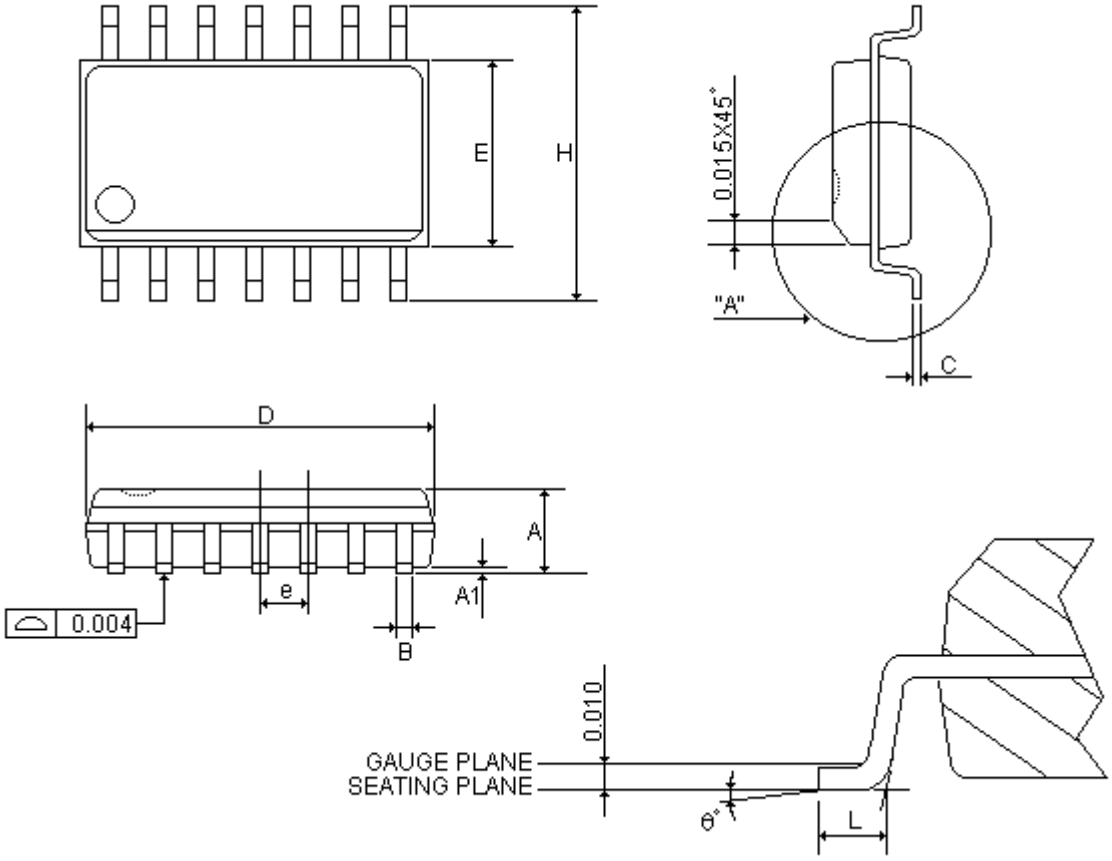
SYMBOLS	MIN	NOR	MAX	MIN	NOR	MAX
	(inch)			(mm)		
A	0.053	-	0.069	1.3462	-	1.7526
A1	0.004	-	0.010	0.1016	-	0.254
A2	-	-	0.059	-	-	1.4986
b	0.008	-	0.012	0.2032	-	0.3048
b1	0.008	-	0.011	0.2032	-	0.2794
c	0.007	-	0.010	0.1778	-	0.254
c1	0.007	-	0.009	0.1778	-	0.2286
D	0.189	-	0.197	4.8006	-	5.0038
E1	0.150	-	0.157	3.81	-	3.9878
E	0.228	-	0.244	5.7912	-	6.1976
L	0.016	-	0.050	0.4064	-	1.27
e	0.025 BASIC			0.635 BASIC		
θ°	0°	-	8°	0°	-	8°

8.4 PDIP 14 PIN



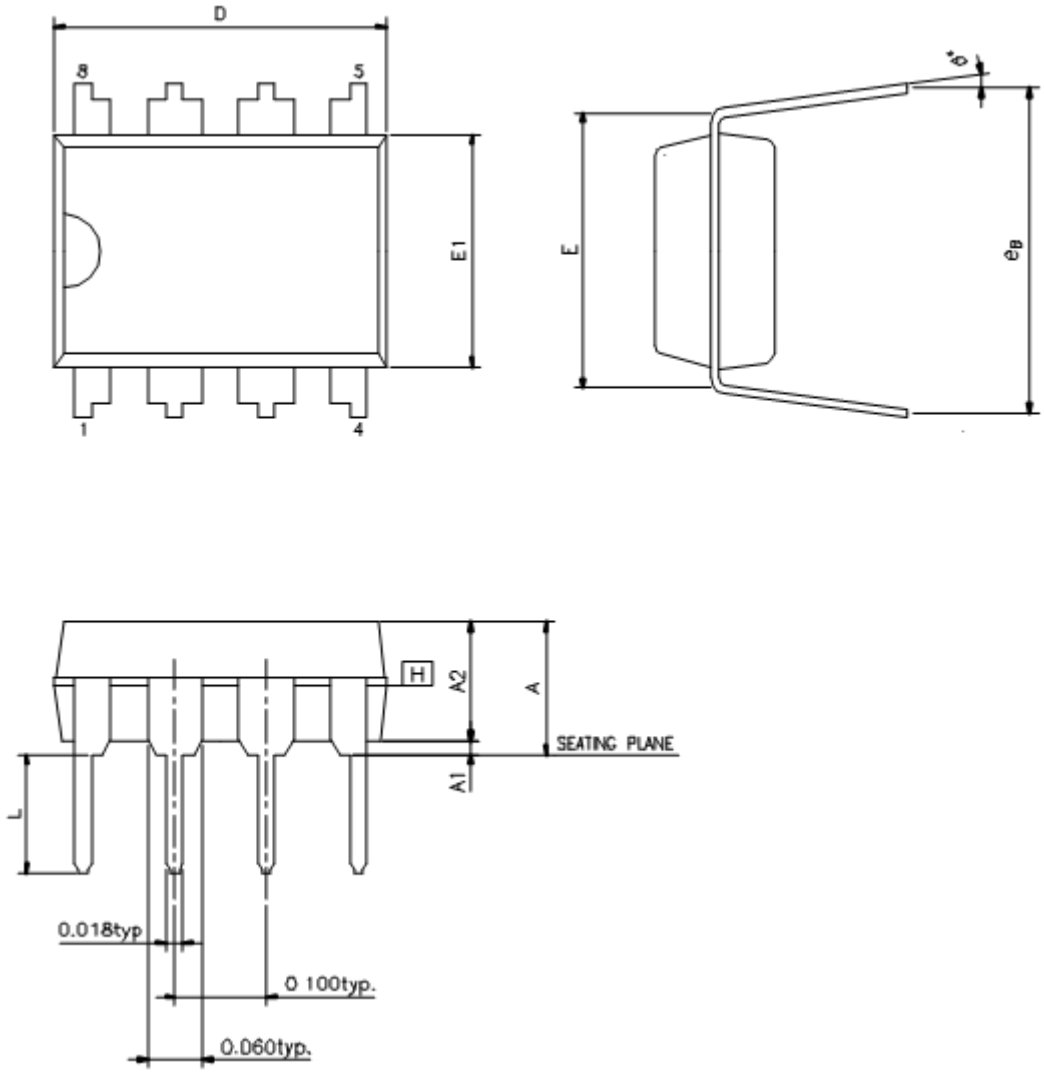
SYMBOLS	MIN	NOR	MAX	MIN	NOR	MAX
	(inch)			(mm)		
A	-	-	0.210	-	-	5.334
A1	0.015	-	-	0.381	-	-
A2	0.125	0.130	0.135	3.175	3.302	3.429
D	0.735	0.075	0.775	18.669	1.905	19.685
E	0.300			7.62		
E1	0.245	0.250	0.255	6.223	6.35	6.477
L	0.115	0.130	0.150	2.921	3.302	3.810
eB	0.335	0.355	0.375	8.509	9.017	9.525
θ°	0°	7°	15°	0°	7°	15°

8.5 SOP 14 PIN



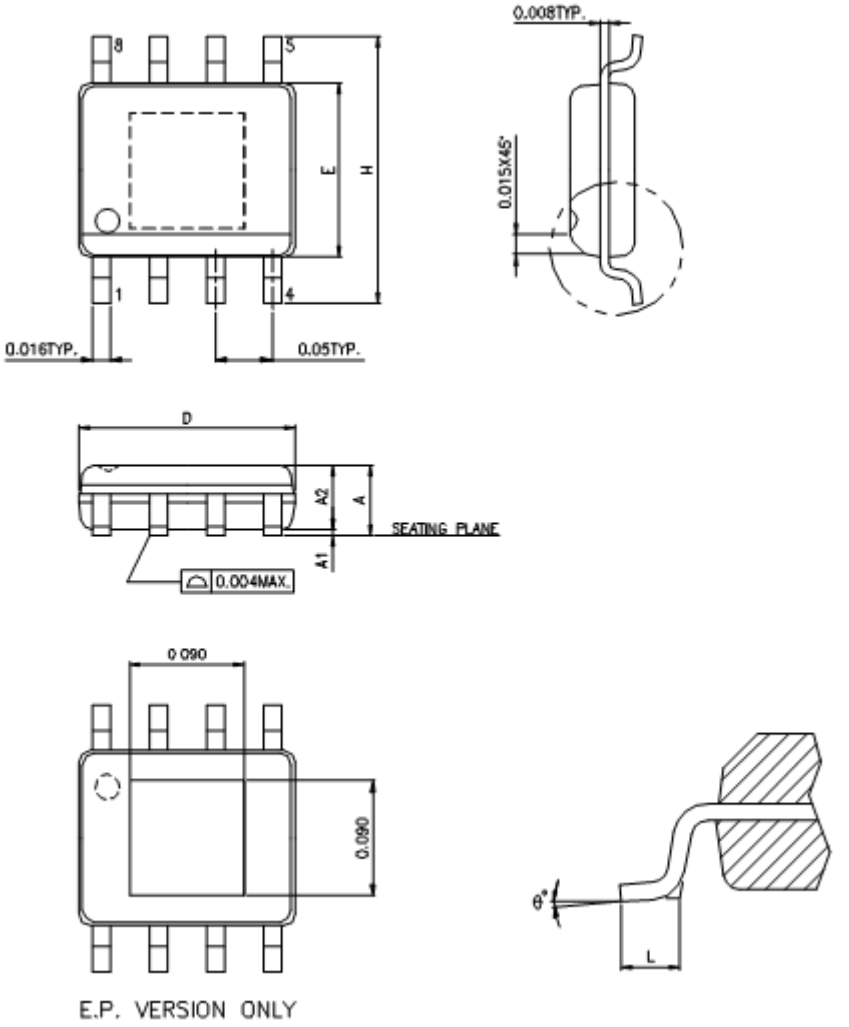
SYMBOLS	MIN	NOR	MAX	MIN	NOR	MAX
	(inch)			(mm)		
A	0.058	0.064	0.068	1.4732	1.6256	1.7272
A1	0.004	-	0.010	0.1016	-	0.254
B	0.013	0.016	0.020	0.3302	0.4064	0.508
C	0.0075	0.008	0.0098	0.1905	0.2032	0.2490
D	0.336	0.341	0.344	8.5344	8.6614	8.7376
E	0.150	0.154	0.157	3.81	3.9116	3.9878
e	-	0.050	-	-	1.27	-
H	0.228	0.236	0.244	5.7912	5.9944	6.1976
L	0.015	0.025	0.050	0.381	0.635	1.27
θ°	0°	-	8°	0°	-	8°

8.6 PDIP 8 PIN



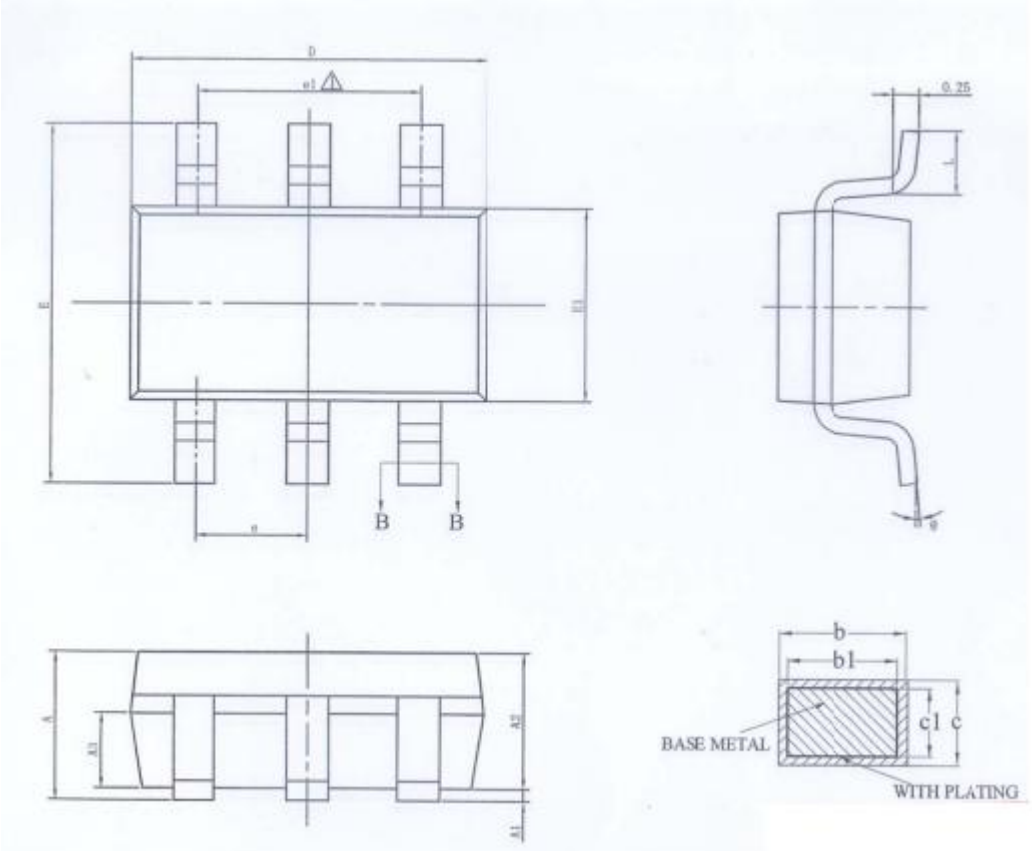
SYMBOLS	MIN	NOR	MAX	MIN	NOR	MAX
	(inch)			(mm)		
A	-	-	0.210	-	-	5.334
A1	0.015	-	-	0.381	-	-
A2	0.125	0.130	0.135	3.175	3.302	3.429
D	0.355	0.365	0.400	9.017	9.271	10.16
E		0.300			7.62	
E1	0.245	0.250	0.255	6.223	6.35	6.477
L	0.115	0.130	0.150	2.921	3.302	3.810
eB	0.335	0.355	0.375	8.509	9.017	9.525
θ°	0°	7°	15°	0°	7°	15°

8.7 SOP 8 PIN



SYMBOLS	MIN	NOR	MAX	MIN	NOR	MAX
	(inch)			(mm)		
A	0.053	-	0.069	1.346	-	1.753
A1	0.004	-	0.010	0.102	-	0.254
A2	-	-	0.059	-	-	1.498
D	0.189	-	0.196	4.800	-	4.978
E	0.150	-	0.157	3.810	-	3.988
H	0.228	-	0.244	5.791	-	6.198
L	0.016	-	0.050	0.406	-	1.270
θ°	0°	-	8°	0°	-	8°

8.8 SOT23 6 PIN



SYMBOLS	MIN	NOR	MAX	MIN	NOR	MAX
	(inch)			(mm)		
A	-	-	0.053	-	-	1.35
A1	0.002	-	0.006	0.04	-	0.15
A2	0.039	0.043	0.047	1.00	1.10	1.20
A3	0.022	0.026	0.030	0.55	0.65	0.75
b	0.012	-	0.020	0.30	-	0.50
b1	0.012	0.016	0.018	0.30	0.40	0.45
c	0.003	-	0.009	0.08	-	0.22
c1	0.003	0.005	0.008	0.08	0.13	0.20
D	0.107	0.115	0.123	2.72	2.92	3.12
E	0.102	0.110	0.118	2.60	2.80	3.00
E1	0.055	0.063	0.071	1.40	1.60	1.80
e	0.037			0.95		
e1	0.075			1.90		
L	0.012	-	0.024	0.30	-	0.60
θ°	0°	-	8°	0°	-	8°

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