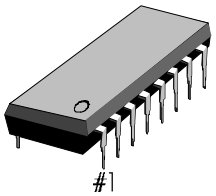
INTRODUCTION

The KS9801/KS9803 are CMOS integrated circuit for the infrared ray remote receiver using with the KS9802 for transmitter, which can be used for TC, VCR, VDP, CDP and AV controller.
The KS9801 is 16DIP type and is able to control 10 functions.
The KS9803 is 24DIP type and is able to control 18 functions.

16-DIP-300A



FEATURES

- **Output for continuous pulse, toggle pulse and single pulse are provided. (Toggle pulse is available only for KS9803)**
- **A single terminal type osillator by means of RC is provided.**
- **Containing custom code detection circuit for code check with the transmitter. (This is to prevent interferences with other models)**
- **Able to output parallely multiple keying signals sent from transmitter. The KS9801 can output parallely up to 5 functions. The KS9803 can output parallely up to 6 functions.**

ORDERING INFORMATION

Device	Package	Operating Temperature
KS9801	16-DIP-300A	- 20 ~ + 75°C
KS9803	22-DIP-400	

BLOCK DIAGRAM

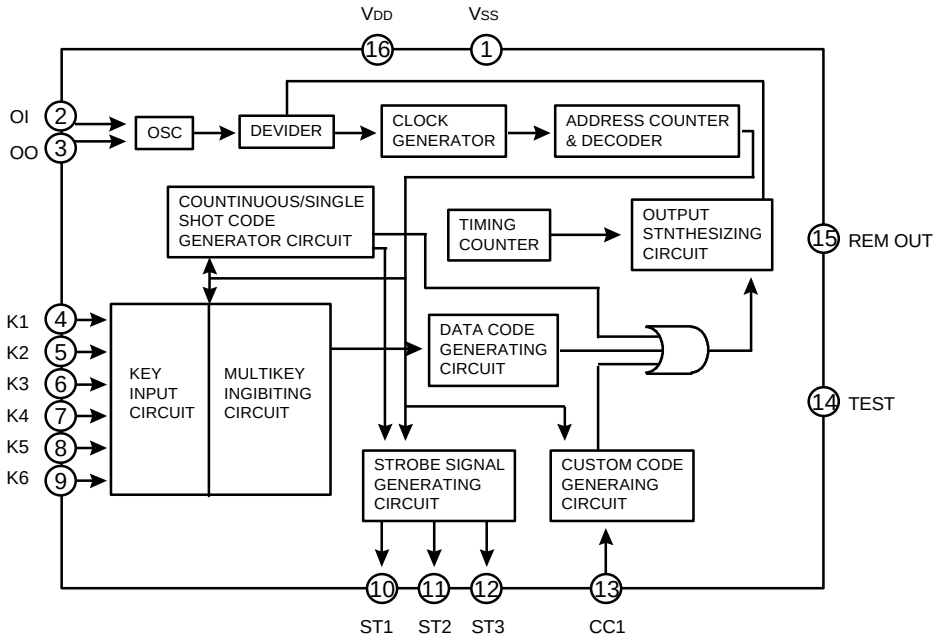
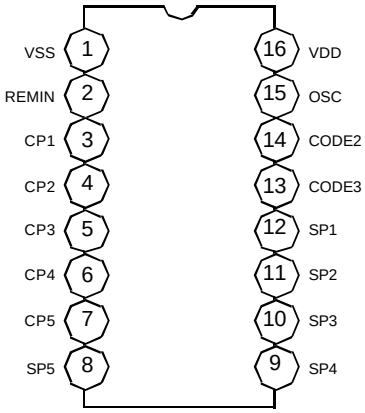


Fig. 1

SAMSUNG ELECTRONICS

PIN CONFIGURATION



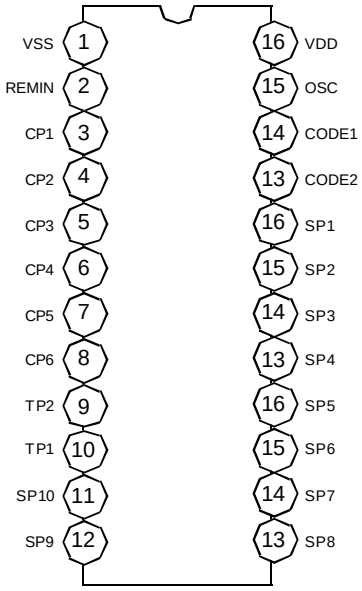


Fig. 2

PIN DISCRIPTION

Pin No		Symbol	Input Output	Description
KS9801	KS9803			
1	1	GND	Ground	
2	2	REMIN	Reveiving Signal Input	Instruction signal with carrier signal eliminated is input
3 ~ 7	—	CP1 ~ SP5	Continuous Signal output	As long as receiving is input, this output is held at 'H' level. After release a key, output is held at'H' level during about 160msec.
—	3 ~ 8	CP1 ~ CP6		
—	9 ~10	TP1, TP2	Toggle Signal Output	When receiving signal is input, output is toggled.
8 ~ 12	¡ª	SP1 ~ SP5	Single Signal Output	When receiving signal is input, output is held at "H" level only for about 107msec.
—	11 ~ 20	SP1 ~ SP10		
13, 14	21, 22	CODE	Code Input	A code set at this terminal is compared with transmitter code and if they agree each other, input is accepted. (built-in pull-up resistor)
15	33	OSC	Timing Oscillation	A capacitor and a resistor are parallely connected between this terminal and VSS.
16	24	V_{DD}	Power Supply	

ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

Characteristic	Symbol	Value	Unit
Supply Voltage	V_{DD}	0 ~ 6	V
Input/Output Voltage	V_{IN} V_{OUT}	V_{SS} -0.3 ~ V_{DD} + 0.3	V
Power Dissipation	P_D	200	mW
Operating Temperature	T_{OPR}	-20 ~ 75	°C
Storage Temperature	T_{STG}	-55 ~ 125	°C

ELECTRICAL CHARACTERISTICS

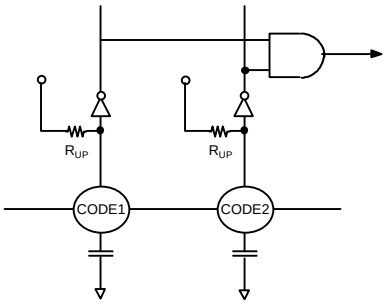
(Ta = 25°C, V_{DD} = 5V, Unless Otherwise specified)

Characteristic		Symbol	Test Conditions	Min	Typ	Max	Unit
Operating Voltage		V_{DD}	Ta = -25°C ~ 75°C	4.5		5.5	V
Operating Current		I_{DD}	Output Without Load			1.0	mA
Frequency Deviation		f_{OSC}	Ta = -25°C ~ 75°C V_{DD} = 4.5V ~ 5.5V	27	38	57	KHz
Frequency Stability		ΔV_{FOXC}	Ta = -25°C V_{DD} = 4.5V ~ 5.5V	-5		5	%
		ΔT_{FOSC}	Ta = -30°C ~ 75°C	-5		5	%
Output Current	"H" Level	I_{OH}	All Output, V_{OH} = 4V		-2.0	-1.0	mA
	"L" Level	I_{OL}	All Output, V_{OL} = 1V	1.0	2.5		mA
Input Current	"H" Level	I_{IH}	Code Terminal V_{IH} = 5.0V	-1.0		1.0	uA
Pull-up Resistor		R_{UP}	REMAIN Terminal	10	20	40	Kohm
Input Circuit Threshold Voltage		V_{IH}	REMAIN Terminal	3.5			V
		V_{IL}	REMAIN Terminal			1.5	V
Hysteresis Width		VH_{2S}			1.0		V
Standard osc Frequency		S_{FOSC}			38		KHz

OPERATING PRINCIPLES

1. POR (Power On Reset) CIRCUIT

To initialize the internal state at time of power ON, it is necessary to perform the initialization.
The initialization is carried out when a capacitor is connected to the code bit terminal.



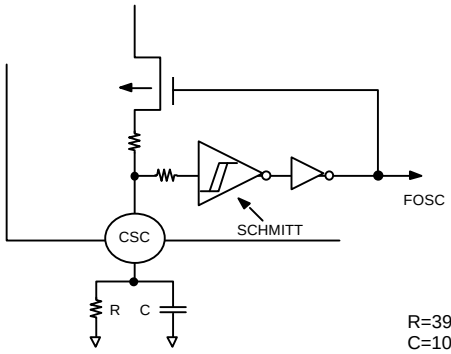
Initalize
RUP = 20KΩ
C =0.001µF ~ 0.022µF

Fig. 3

In case of KS9803, connect a capacitor to CODE2 and CODE3.

2. OSCILLATION CIRCUIT

The RC oscillation circuit is normally operated at 38Khz oscillation frequency.
(The RC is connected between OSC terminal and V_{SS}).



R=39k¥Ø¡¾5%
C=1000pF¡¾5%

Fig. 4

Oscillation frequency is about 38KHz±5KHz at R = 38KΩ and C = 1000pF.

3. RECEIVING SIGNAL INPUT CIRCUIT

Signal received by the light receiving element is sent through the Pre-Amp. To the detector When 38KHz carrier wave is eliminated and the signal enters a REMIN PIN of the receiving signal input circuit. The receiving signal input circuit (REMIN) has a built-in Schmitt trigger for shaping receiving signal waveform to eliminate rounding.

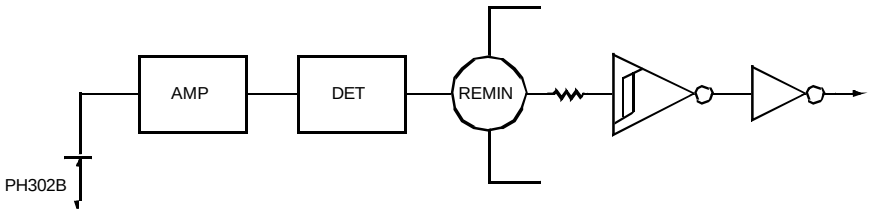


Fig. 5

4. RECEIVING SIGNAL CHECK

The receiving signal check is to check 2 cycle transmitting signal sent from the transmitter to check whether it is normal signal.

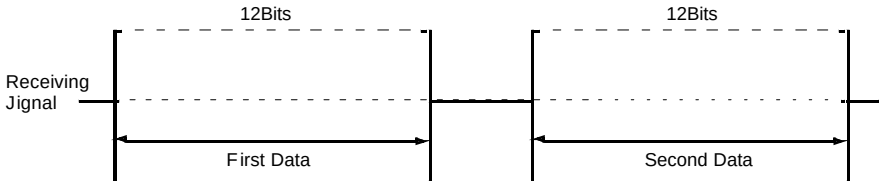


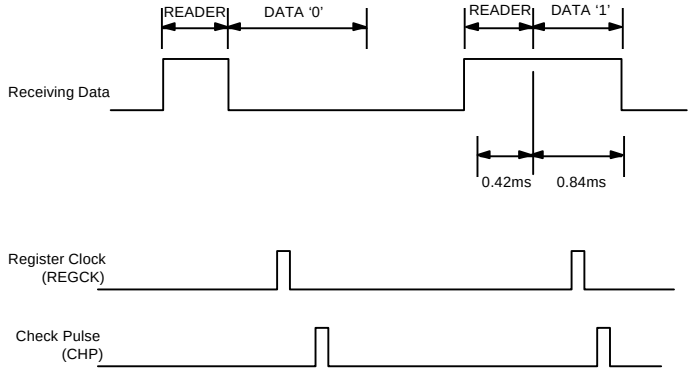
Fig. 6

First, the first data is stored in the 12-bit data register. Then, when the second data is entered, the previous data is pushed out from the data register one by one.

The pushed out data and incoming data are checked to see if they are same.

If any error is caused during 12 bits receiving data check, the system is reset at that time. And when all receiving data are same, output is raised from "L" level to "H" level.

The status of receiving data, register clock and check pulse is shown below.
Register clock is provided in the data center by taking frequency margins of the transmitter and the receiver into consideration.



5. CODE BIT COMPARISON

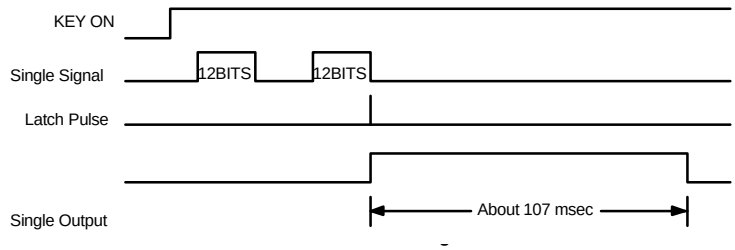
In order to prevent interference with other machines and apparatus, C1, C2 and C3 code bits are provided for checking whether the transmitter codes are agree to the receiver codes.
Only when both codes agree, internal latch pulse is generated to latch receiving data and output is raised from "L" level to "H" level.
If both codes do not agree, latch pulse is not generated and output remains at "L" level.
Code bits used differ depending on receiver as shown below :

CODE BIT	
C1	C2
C3	C2
0	1
1	0
1	1

KS9801·····C2, C3 is used.
KS9803·····C1, C2 is used.
*CODE BIT "0", "0" can not be used.

6. EXPLANATION OF OUTPUT PULSE SP, CP, TP

1) SP1 ~ SP10 (Single Pulse)
When single key is depressed, after checking 12 bits receiving data, if data agree, single pulse is output. Output is raised from "L" level to "H" level and returned again to "L" level after about 107 msec.



2) CP1 ~ CP6 (Continuous Pulse)
Continuous pulse is output by the first latch pulse after key ON. Output is kept at "H" level as long as continuous signal is input.
When the key is released and continuous signal is stoped, about 160 msec later, output is reversed to "L" level by the last latch pulse.
Further, CP1 ~ CP6 are able to parallelly and simultaneously maximum sextet outputs at "H" level by continuous signal sent from the transmitter.
These output are optimum as outputs of REC-PLAY, REC-PAUSE and CUE/REVIEW of a tape deck.

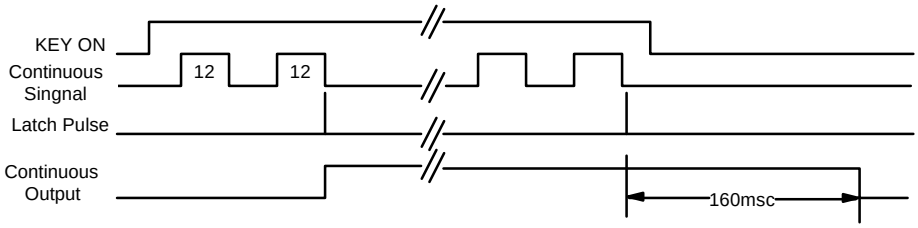
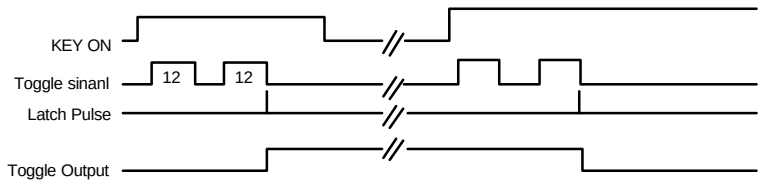


Fig. 9

3) TP1, TP2 (Toggle Pulse)
When toggle signal is received, toggle pulse output is reversed.
This toggle pulse is used for power ON?OFF, MUTE, etc.



ig. 10

F

7. CODE TABLE

C1 ~ C3 code bits are available in addition to the below data bits for optional code selection. KS9803 is able to use all keys, but KS9801 can use KEY (1) ~(5) and KEY (7)~ (a) only for 10 commands.

KEY NO.	DATA BIT									FUNCTION OF INST-RUCTION	KEY NO.	DATA BIT									FUNCTION OF INST-RUCTION
	CT	S1	S2	D1	D2	D3	D4	D5	D6			CT	S1	S2	D1	D2	D3	D4	D5	D6	
(1)	1	0	0	1	0	0	0	0	0	CONT, CP1	(10)	0	1	0	0	0	0	1	0	0	SING, SP4
(2)	1	0	0	0	1	0	0	0	0	CONT, CP2	(a)	0	1	0	0	0	0	0	1	0	SING, SP5
(3)	1	0	0	0	0	1	0	0	0	CONT, CP3	(b)	0	1	0	0	0	0	0	0	1	SING, SP6
(4)	1	0	0	0	0	0	1	0	0	CONT, CP4	(c)	0	0	1	1	0	0	0	0	0	SING, SP7
(5)	1	0	0	0	0	0	0	1	0	CONT, CP5	(d)	0	0	1	0	1	0	0	0	0	SING, SP8
(6)	1	0	0	0	0	0	0	0	1	CONT, CP6	(e)	0	0	1	0	0	1	0	0	0	SING, SP9
(7)	0	1	0	1	0	0	0	0	0	SING, SP1	(f)	0	0	1	0	0	0	1	0	0	SING, SP10
(8)	0	1	0	0	1	0	0	0	0	SING, SP2	(g)	0	0	1	0	0	0	0	1	0	TOGG, TP1
(9)	0	1	0	0	0	1	0	0	0	SING, SP3	(h)	0	0	1	0	0	0	0	0	1	TOGG, TP2

CONT : Continuous, SING : Single, TOGG : Toggle

£¤KS9802 has 18 function keys, and total 75 commands can be transmitted : 63 commands by the continuous keys of multiple keying is possible and 12 commands by the single-shot keys.

EXAMPLE OF APPLICATION CIRCUIT

1. COMBINATION OF KS9802/KS9801 CODE BITS

(TABLE 1)

KS9802			KS9801	
C1	C2	C3	C2	C3
1	0	1	0	1
1	1	0	1	0
1	1	1	1	1

(EXAMPLE 1) In Case CODE C2 = 0 and C3 = 1

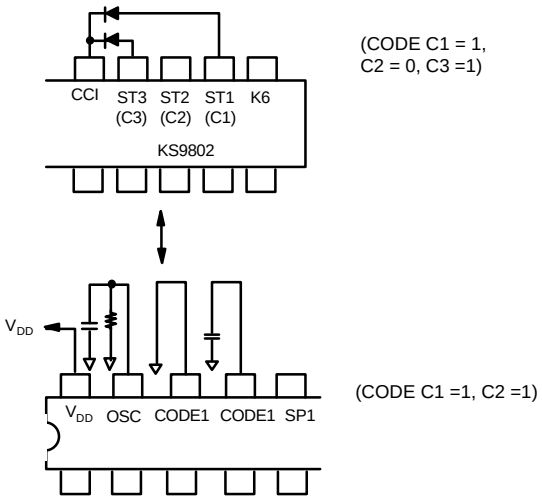


Fig. 11

The combination of code bits of KS9802 and KS9801 is shown in Table 1.

To make code bit to "1" on KS9802, connect diodes to CCI terminal from ST1 ~ ST3 terminals. To set Code Bit at "0" open the circuit.

KS9801 has Code2 and CODE3 code terminals. Code bit of C1 has been pulled up in IC and C1 is always kept at "1" status.

Therfore, on transmitter KS9802 it is necessary to keep C1 code bit at "1".

2. COMBINATION OF KS9802/KS9803 CODE BITS

(TABLE 2)

KS9802			KS9803	
C1	**C2**	**C3**	**C2**	**C3**
0	1	1	0	1
1	0	1	1	0
1	1	1	1	1

(EXAMPLE 2) In case CODE C1 = 1 and C2 = 1

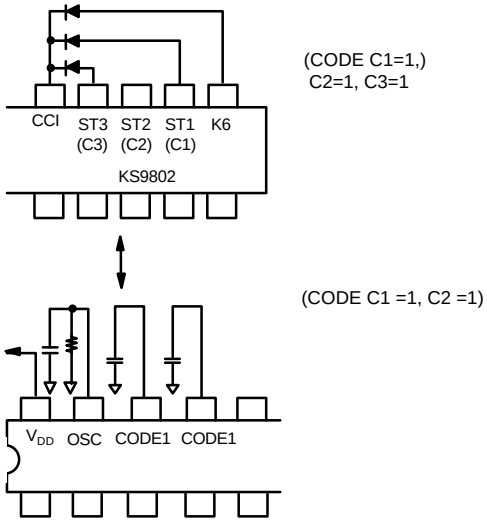


Fig. 12

Fig. 12

The combination of code bits of KS9802 and KS9803 is shown in Table 2.
KS9803 has CODE1 and CODE2 code terminals. Code bit of C3 has been pulled up in IC and C3 is always kept at "1" status.
Therefore, on transmitter KS9802 it is necessary to keep code bit C3 at "1".
To keep code bit C3 at "1", connect a diode to Cci terminal from ST3 terminal.

3. If input volage above VDD +0.3V may be applied to REMIN Input Terminal (2 PIN), connect resistors of about 10kΩ in series to REMIN Input Terminal. (This is to preevent latch-up).

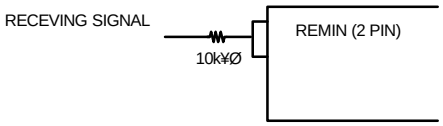


Fig. 13

APPLICATION CIRCUITS

1. RECEIVING PART

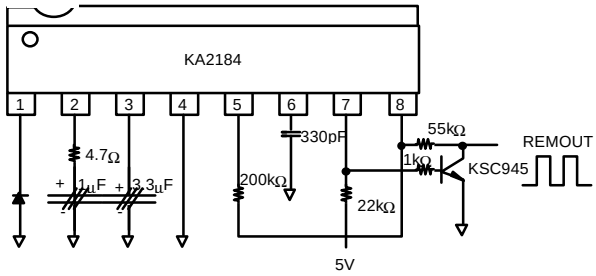


Fig. 14

2. KS9801 CIRCUIT

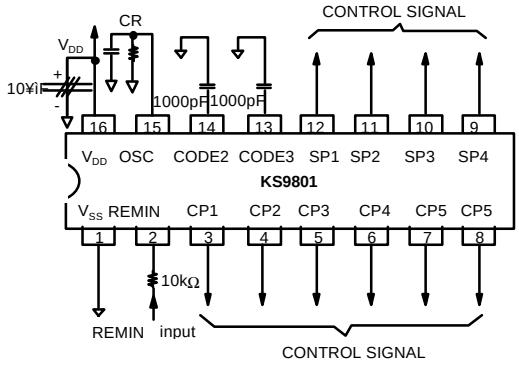


Fig. 15

3. KS9803 CIRCUIT

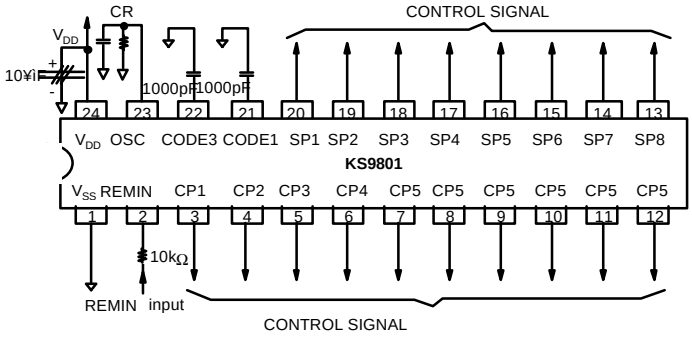
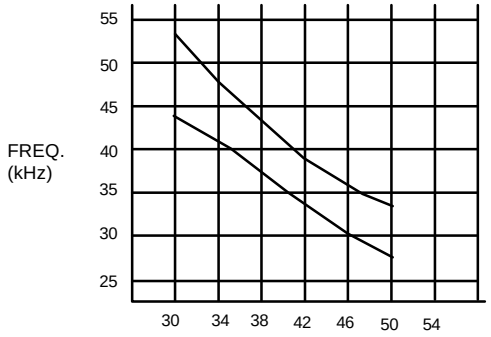


Fig. 16

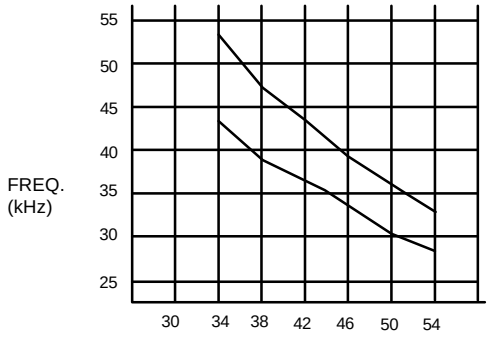
Variance of Oscillation Frequency by R and C

1) Variance of Oscillation Frequency by R



V_{DD} = 5V
C= 1000pF

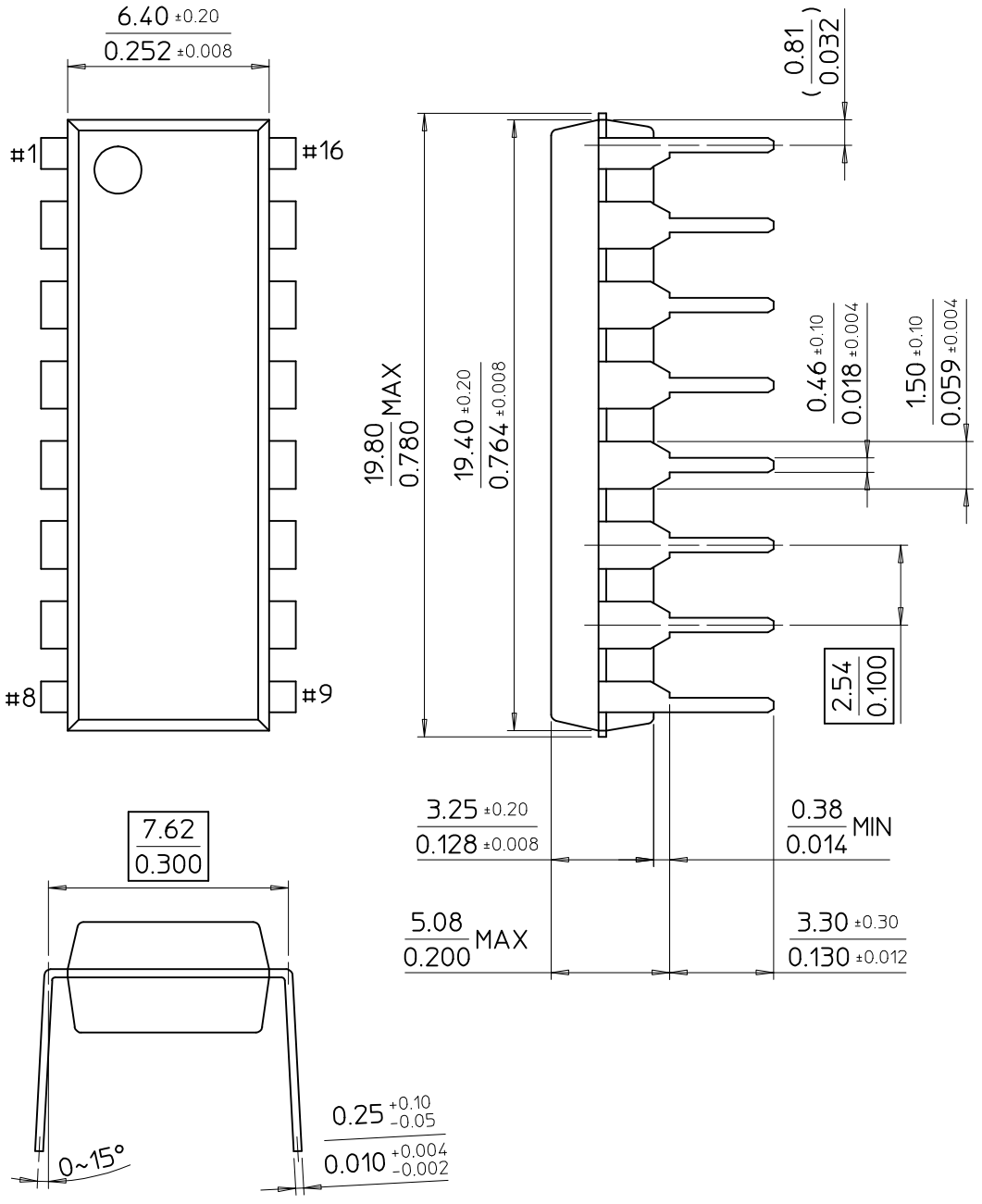
2) Variance of Oscillation Frequency by C



V_{DD} = 5V
R= 39kΩ

16-DIP-300A

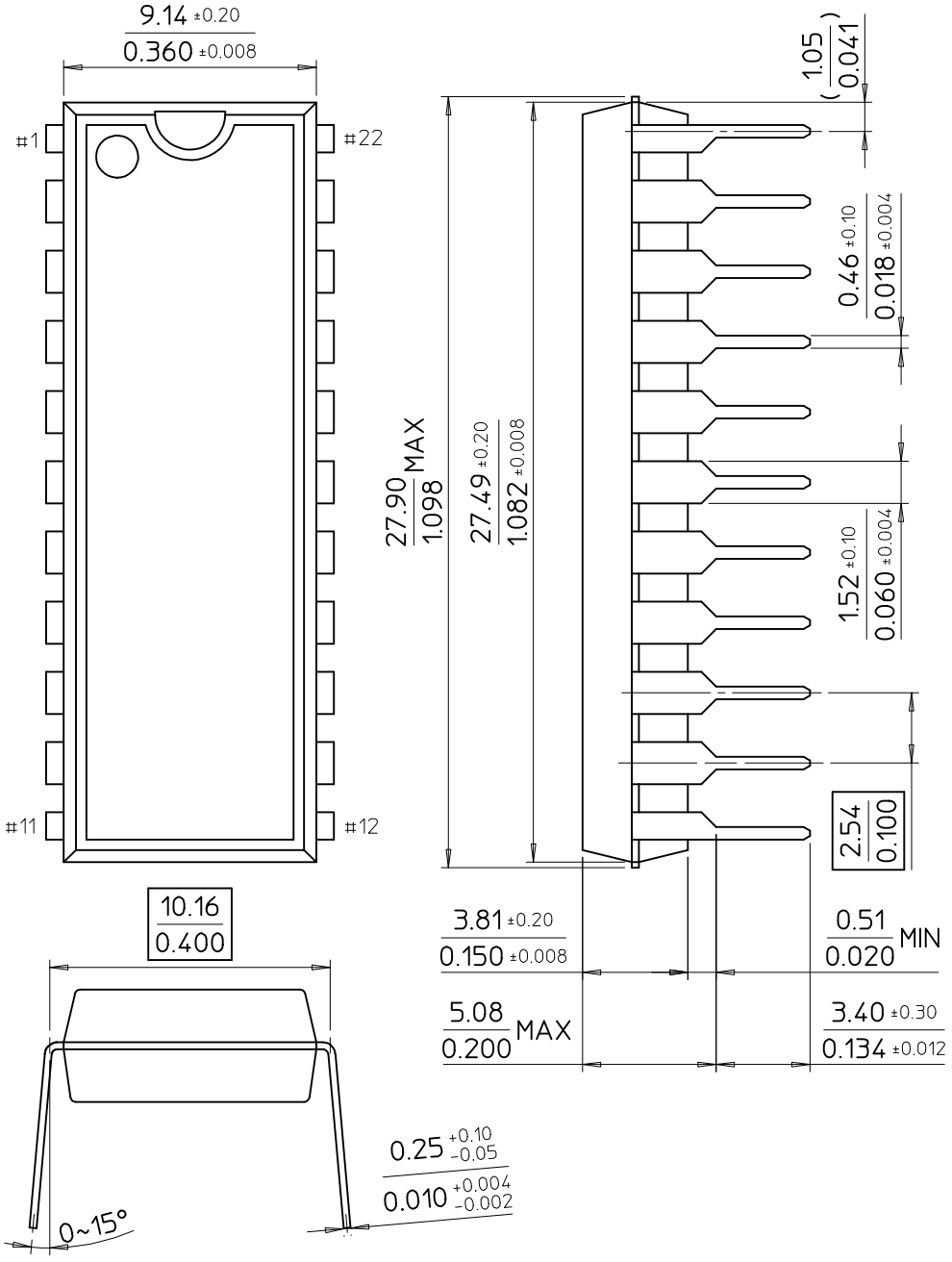
Dimensions in Milimeters/inches



SAMSUNG ELECTRONICS CO.,LTD.

22-DIP-400

Dimensions in Milimeters/inches



SAMSUNG ELECTRONICS CO.,LTD.