

**TOSHIBA**

**TA8667P/F**

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

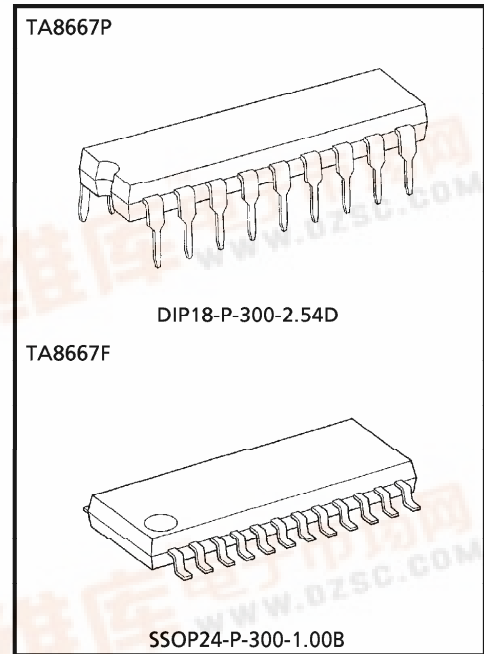
# TA8667P, TA8667F

## HORIZONTAL AFC IC

The TA8667P, TA8667F is generation of high-frequency clock synchronized with horizontal sync signal.  
(The TA8667P/F is H AFC IC for TC9086F (3DYCS), TC9097F (WAC).)

### FEATURES

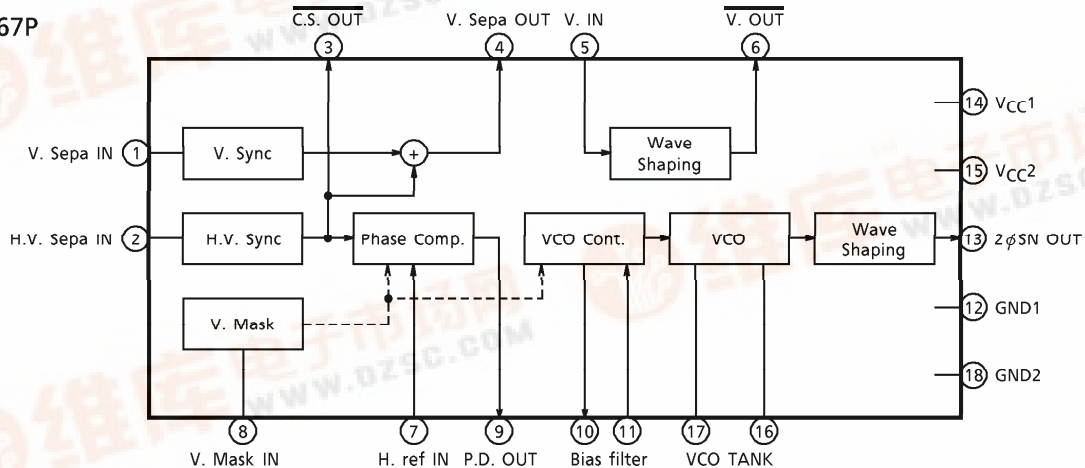
- Generate of Typ. 28MHz (1820fH) clock.
- Generate of vertical sync signal.
- Generate of composite sync signal.



Weight  
 DIP18-P-300-2.54D : 1.47g (Typ.)  
 SSOP24-P-300-1.00B : 0.32g (Typ.)

### BLOCK DIAGRAM

TA8667P



961001EBA2

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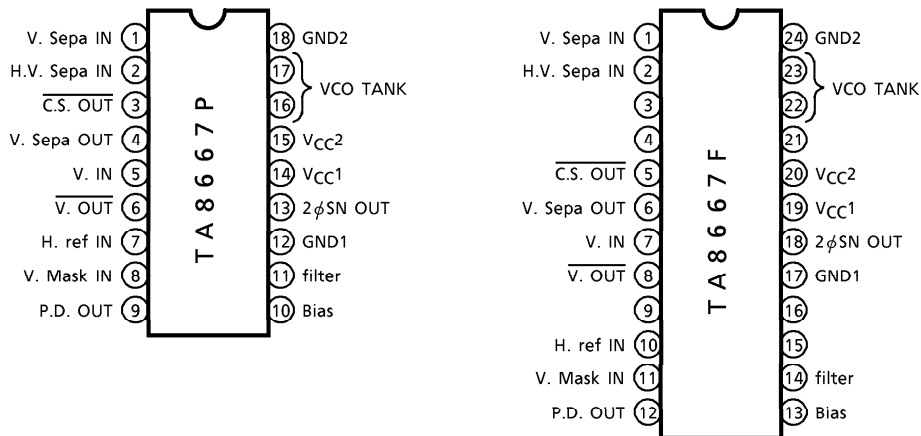
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TERMINAL CONNECTION DIAGRAM



TERMINAL FUNCTION

TA8667P PIN No.	TA8667F PIN No.	PIN NAME	TYP. DC VOLTAGE	I/O CIRCUIT	FUNCTION
1 2	1 2	V. Sepa IN H.V. Sepa IN	(6.0V)		<ul style="list-style-type: none"> <li>• V. Sepa IN : Inputs vertical sync signal separated from video signal.</li> <li>• H.V. Sepa IN : Inputs horizontal and vertical sync signals separated from video signal.</li> </ul>
3	5	C.S. OUT	—		<ul style="list-style-type: none"> <li>• Outputs horizontal and vertical sync signals after wave shaping.</li> </ul>
4	6	V. Sepa OUT	—		<ul style="list-style-type: none"> <li>• Outputs vertical sync signal. Horizontal sync signal remains in V. Sepa OUT.</li> </ul>

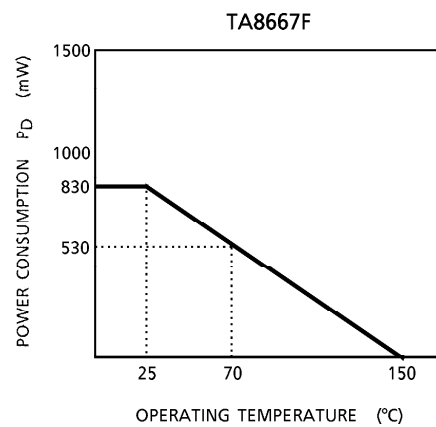
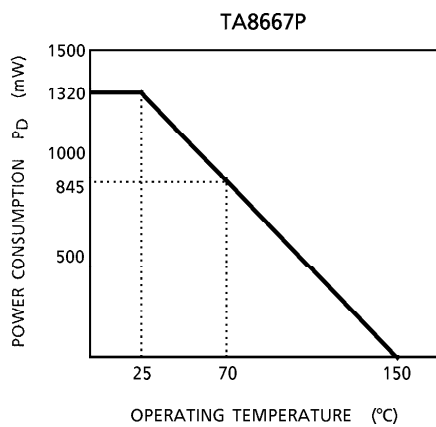
TA8667P PIN No.	TA8667F PIN No.	PIN NAME	TYP. DC VOLTAGE	I/O CIRCUIT	FUNCTION
5	7	V. IN	—		<ul style="list-style-type: none"> <li>Inputs the signal outputted from V. Sepa OUT after horizontal sync signal was removed.</li> </ul>
6	8	$\overline{\text{V. OUT}}$	—		<ul style="list-style-type: none"> <li>Outputs wave-shaped vertical sync signal.</li> </ul>
7	10	H. ref IN	—		<ul style="list-style-type: none"> <li>Phase Comp Input. The reference input is the 15.7kHz signal derived through dividing the 2φSN OUT signal by N (1820~2426) with an external frequency divider (duty : 50%).</li> </ul>
8	11	V. Mask IN	(L : 0V) (H : 5V)		<ul style="list-style-type: none"> <li>Driving the V. Mask IN signal to high turns off the phase-comparison operation. Inputs the signal which masks serrated and equalizing pulses of video signal.</li> </ul>
9	12	P.D. OUT	—		<ul style="list-style-type: none"> <li>Connect an external filter.</li> </ul>
10	13	Bias	6V		

TA8667P PIN No.	TA8667F PIN No.	PIN NAME	TYP. DC VOLTAGE	I/O CIRCUIT	FUNCTION
11	14	filter	6V		<ul style="list-style-type: none"> <li>Connects an external filter.</li> </ul>
12 18 14 15	17 24 19 20	GND1 GND2 VCC1 VCC2			<ul style="list-style-type: none"> <li>Power-supply voltage and GND.</li> </ul>
13	18	2 $\phi$ SN OUT	—		<ul style="list-style-type: none"> <li>Outputs the stable sin wave of N times the fH frequency.</li> </ul>
16 17	22 23	VCO TANC	5.2V 5.2V		<ul style="list-style-type: none"> <li>Sets the oscillating frequency by adjusting the value of external variable coil.</li> </ul>
	3 4 9 15 16 21	NC			

**MAXIMUM RATINGS (Ta = 25°C)**

CHARACTERISTIC	SYMBOL	RATINGS	UNIT
Power Supply Voltage	V <sub>CC</sub> max	12	V
Input Signal Voltage	e <sub>in</sub> max	6	V <sub>p-p</sub>
Power Consumption	TA8667P	P <sub>D</sub>	mW
	TA8667F		
Operating Temperature	T <sub>opr</sub>	- 20~70	°C
Storage Temperature	T <sub>stg</sub>	- 55~150	°C

**Ta-P<sub>D</sub>**



**RECOMMENDED OPERATING CONDITION**

PIN No.	PIN NAME	MIN.	TYP.	MAX.	UNIT
14	V <sub>CC1</sub>	8.5	9.0	9.5	V
15	V <sub>CC2</sub>				

**ELECTRICAL CHARACTERISTICS** ( $V_{CC} = 9.0V$ ,  $T_a = 25^\circ C$ )

All the pin numbers in the below description are those of the TA8667P.

CHARACTERISTIC		SYMBOL	TEST PIN	TEST CONDITION (SEE "TEST CIRCUIT")	MIN.	TYP.	MAX.	UNIT
Operating Power Supply Voltage		$V_{CC}$			8.1	9.0	9.9	V
Operating Power Supply Current		$I_{CC}$			15	27	40	mA
Output Voltage	High Level	$V_{OH(1)}$	3, 6	1) Measure Voltages V3 and V6 of Pin 3 and Pin 6, respectively. 2) Connect variable voltage source to Pin 2 and Pin 5. 3) Change variable voltage source and measure voltages V3 and V6 when high.	2.5	4.0	5.5	V
		$V_{OH(2)}$	4	1) Measure Voltage V4 of Pin 4. 2) Connect variable voltage source to Pin 1. 3) Change variable voltage source and measure voltage V4 when high.	7.0	—	8.3	
	Low Level	$V_{OL(1)}$	3, 6	1) Measure Voltages V3 and V6 of Pin 3 and Pin 6, respectively. 2) Connect variable voltage source to Pin 2 and Pin 5. 3) Change variable voltage source and measure voltages V3 and V6 when low.	—	0.3	0.5	
		$V_{OL(2)}$	4	1) Measure Voltage V4 of Pin 4. 2) Connect variable voltage source to Pin 1. 3) Change variable voltage source and measure voltage V4 when low.	—	0.3	0.5	
Input Voltage	High Level	$V_{IH}$	7, 8		2.5	4.0	—	
	Low Level	$V_{IL}$	7, 8		—	0.3	0.8	
Input Current	High Level	$I_{IH}$	7, 8	Connect an ammeter to Pin 7 and Pin 8. $V_{IH} = 4.0V$ .	—	—	20	$\mu A$
	Low Level	$I_{IL}$	7, 8	Connect an ammeter to Pin 7 and Pin 8. $V_{IL} = 0.3V$ .	—	0	—	$\mu A$

CHARACTERISTIC	SYMBOL	TEST PIN	TEST CONDITION (SEE "TEST CIRCUIT")	MIN.	TYP.	MAX.	UNIT
Sync Separator Input Sensitivity Current	I <sub>INS</sub>	1, 2	1) Measure Voltage V4 (V3) of Pin 4 (Pin 3). 2) Connect variable voltage source to Pin 1 (Pin 2) through an ammeter. 3) Change variable voltage source and measure the current outflowed from Pin 1 (Pin 2) on the high to low transition of V4 (V3).	—	23	—	μA
Oscillating Frequency	f <sub>o</sub>	13	1) SW1 : Off, SW2 : On 2) Measure the level of TP1 with counter. 3) Adjust the value of the variable coil until it reaches 15.73kHz × N.	—	28.6 (Note 1)	—	MHz
				—	32.0 (Note 2)	—	
Output Level	V <sub>o</sub>	13	Measure the level of TP1 at the time when f <sub>o</sub> is measured.	2.0	3.2	4.0	V <sub>p-p</sub>
Output Jitter	T <sub>G</sub>	13	1) Switch on SW1 in the same condition that f <sub>o</sub> is measured. 2) Input the sync signal of 15.73kHz to Pin 2. 3) Measure the output waveform of the frequency divider.	—	14	—	ns

(Note 1) VCO TANC : TRF3518D used

(Note 2) VCO TANC : TRF3503K used

CHARACTERISTIC	SYMBOL	TEST PIN	TEST CONDITION (SEE "TEST CIRCUIT")	MIN.	TYP.	MAX.	UNIT
Horizontal Frequency Phase Comparison Range2	$f_c$		1) SW1 : Off, SW2 : On. Pin 2 : Open. 2) Measure the frequency of TP1. 3) Adjust the value of the variable coil until it reaches 15.73kHz × N ( $f_0 = 32.2\text{MHz}$ ). 4) SW1 : On 5) Connect S.G* to Pin 2. 6) Measure the power supply of TP2. 7) Raise the S.G* frequency starting from around 13.6kHz and measure the frequency when PLL is locked.	± 700	—	—	Hz
Horizontal Frequency Hold Range	$f_H$		8) Raise the S.G* frequency further and measure it when PLL is unlocked. 9) Lower the frequency and measure it when PLL is locked again. 10) Lower the frequency further and measure it when PLL is unlocked again (See Figure 1).				
$\overline{\text{C.S. OUT}}$ Delay Time (See Figure 2)	$t_{csd}$	3		—	—	350	
H. ref IN - $\overline{\text{C.S. OUT}}$ Steady-State Phase Difference (See Figure 3)	$t_{afce}$	7	1) Switch on SW1 in the same condition that $f_0$ is measured. 2) Adjust the value of the variable coil until it reaches 15.73kHz × N ( $f_0 = 32.2\text{MHz}$ ). 3) Input the sync signal of 15.73kHz to Pin 2. 4) Measure the signal waveforms of Pin 3 and Pin 7 simultaneously.	—	—	± 350	ns

\* : S.G = Sync Generator



Figure 1

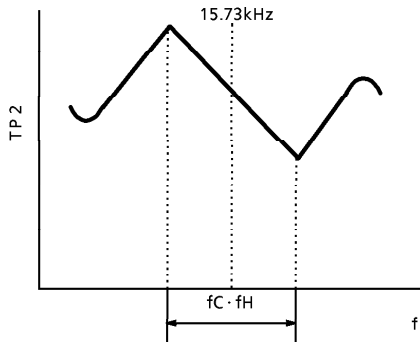


Figure 2

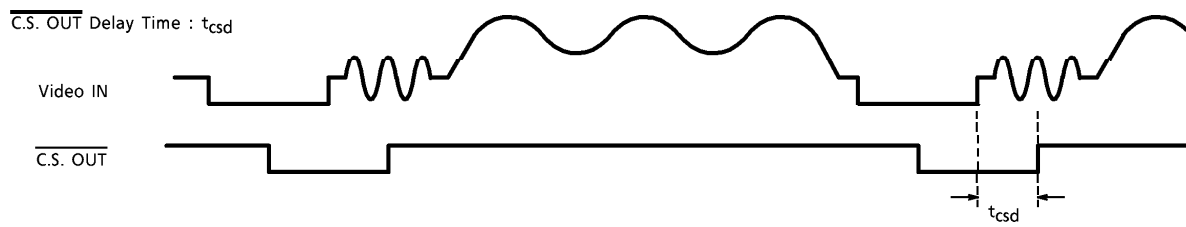
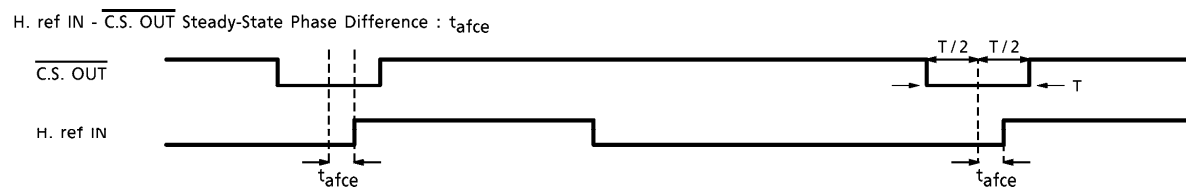
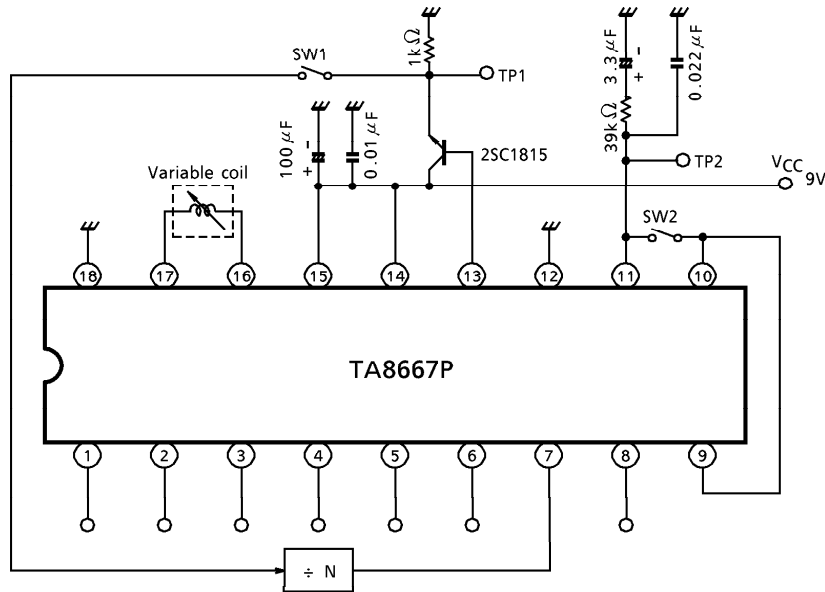


Figure 3



**TEST CIRCUIT (Pin assignment for TA8667P)**



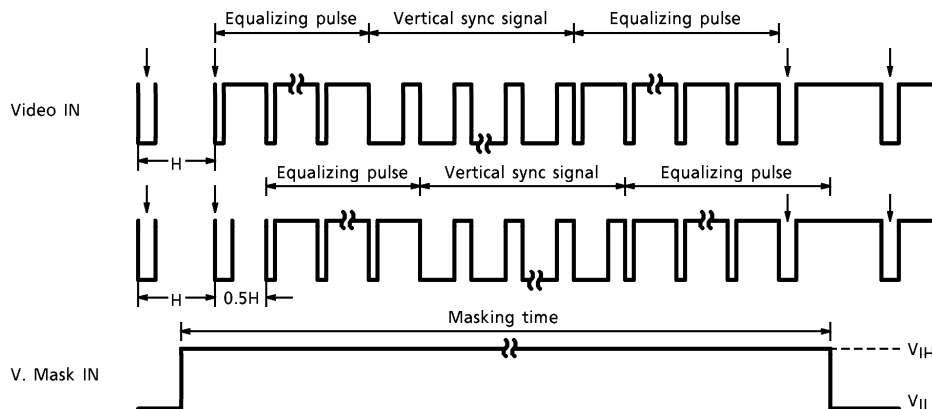
Variable coil (VCO TANK) : Select an inductance suited for the oscillating frequency.

**PRECAUTIONS**

V. Mask IN (See Figure 4, "An example of V. Mask IN timing")

Driving the V. Mask IN signal to high stops phase-comparison operation.  
 Adjust the signal so that equalizing pulse of video signal and vertical sync signal are masked.  
 Masking some parts of horizontal sync signal and video signal do not cause a problem.  
 However, the rise and fall of V. Mask IN must not occur while horizontal sync signal and equalizing pulse are low - the time indicated with "↓" in Figure 4, for example.

Figure 4 "An example of V. Mask IN timing"



- Example of VCO TANK Specification for 32MHz clock (TRF3503K)

When  $f = 7.96\text{MHz}$  :

$$\begin{cases} L = 2.35\mu\text{H} \text{ (Varied within more than } \pm 15\%) \\ Q = 47 \end{cases}$$

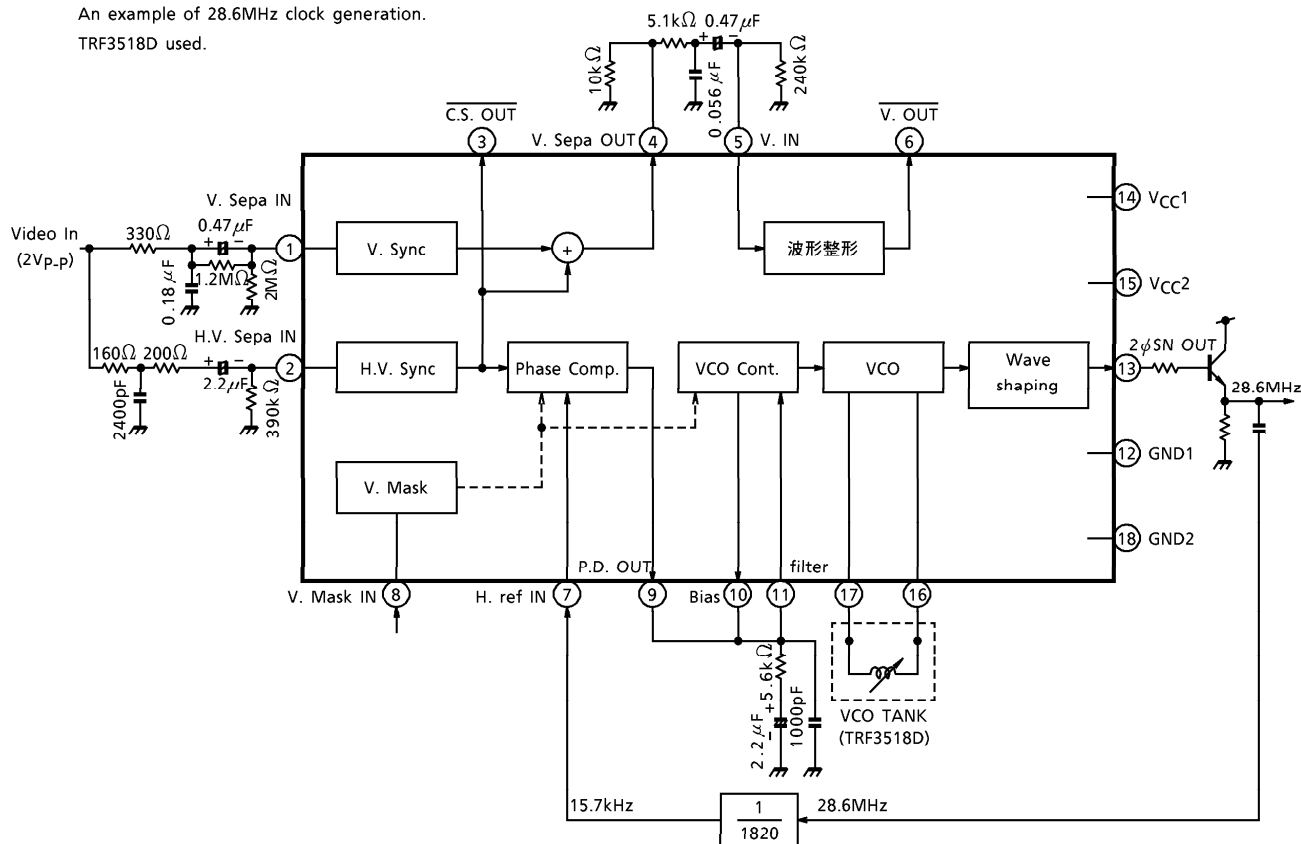
- Example of VCO TANK Specification for 28MHz clock (TRF3518D)

When  $f = 7.96\text{MHz}$  :

$$\begin{cases} L = 3.5\mu\text{H} \text{ (Varied within more than } \pm 15\%) \\ Q = 42 \end{cases}$$

**SAMPLE APPLICATION 1 (Pin Assignment for TA8667P)**

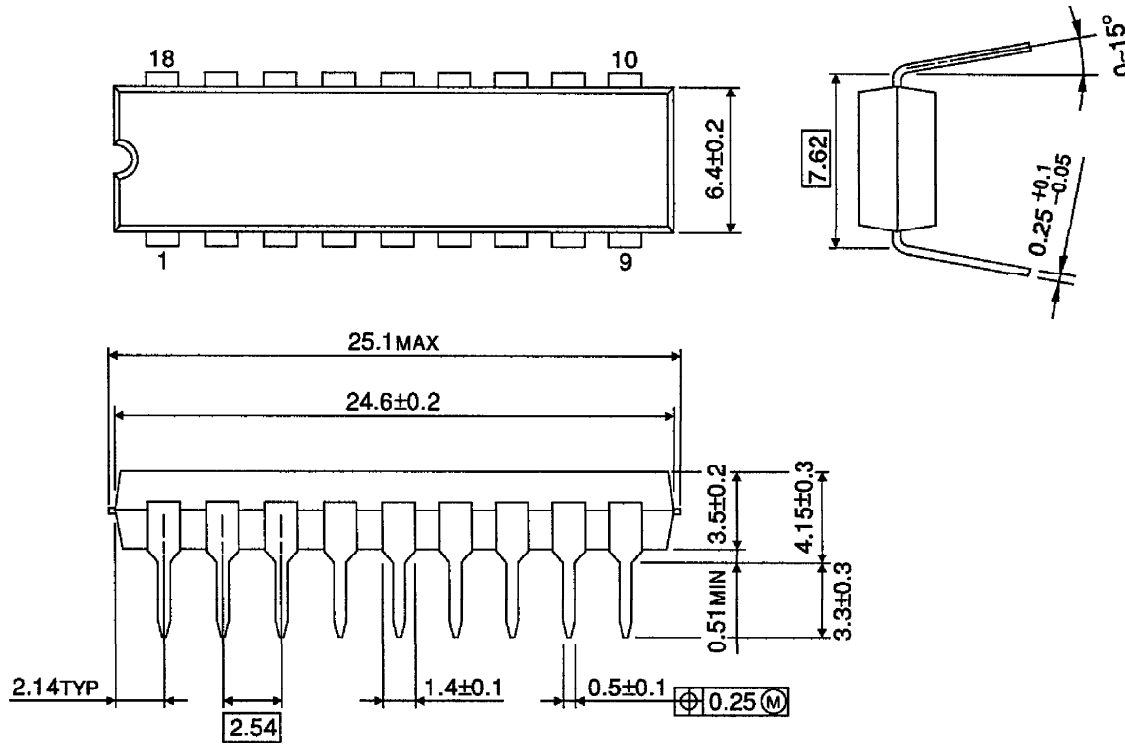
An example of 28.6MHz clock generation.  
TRF3518D used.



The above illustration shows an example for application and may require modification in constant and circuit for practical design.

OUTLINE DRAWING  
DIP18-P-300-2.54D

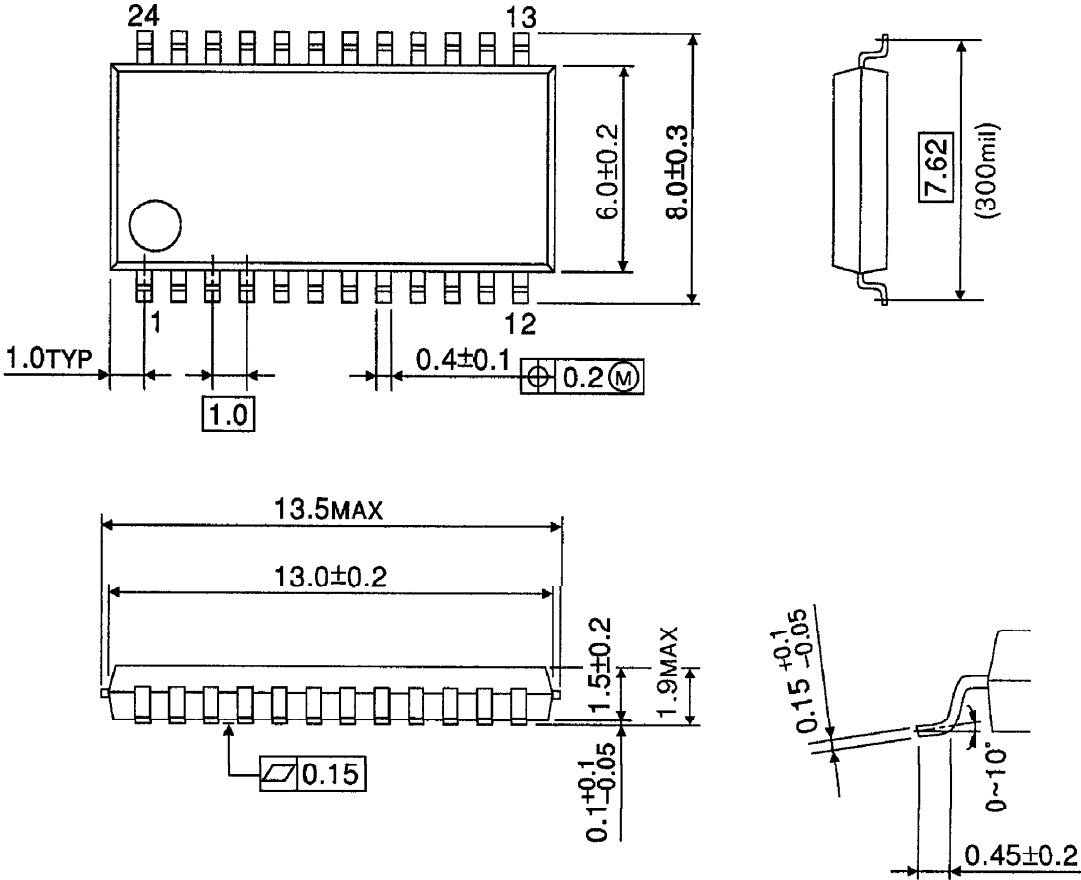
Unit : mm



Weight : 1.47g (Typ.)

OUTLINE DRAWING  
SSOP24-P-300-1.00B

Unit : mm



Weight : 0.32g (Typ.)