

# AN8587SH

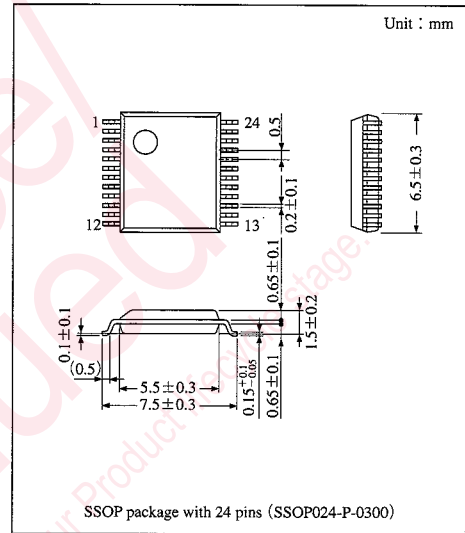
## Cellular Telephone PLL IC Incorporating VCO

### Overview

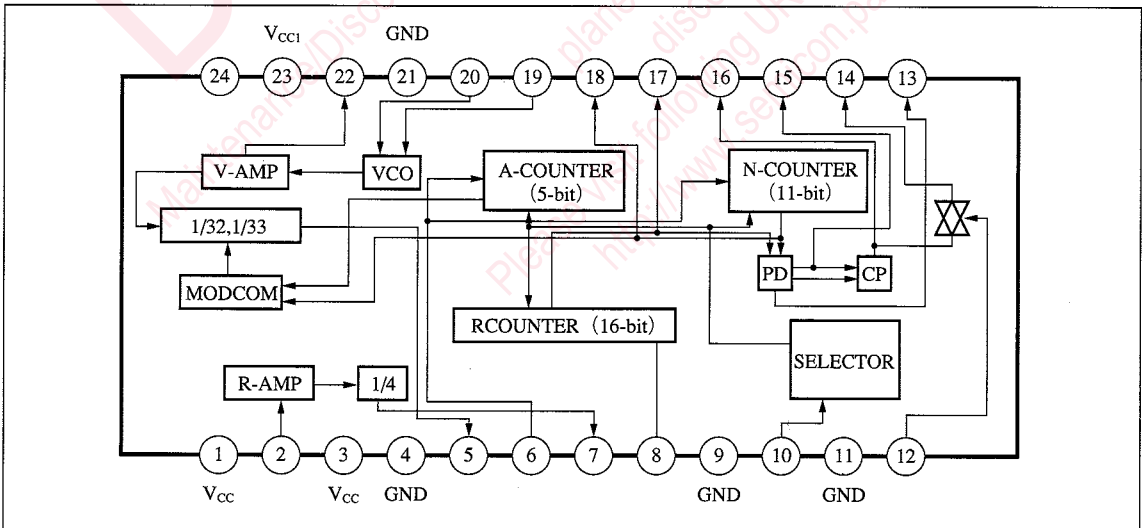
The AN8587SH is a mobile communication PLL IC (Bi-CMOS) incorporating a transmission VCO (TX IF : 90/110 MHz) .

### Features

- LPF switching for high-speed charge up
- VCO components and a PLL are integrated into an IC.
- Small-outline surface-mount package with 0.5 mm pitch
- Provides for a product with fewer components.



### Block Diagram



Mobile  
Communi-  
cation

## Pin Descriptions

Pin No.	Description	Pin No.	Description
1	V <sub>CC</sub>	13	Lock detector output
2	Reference input	14	Phase detector output (2)
3	GND	15	External phase detector output (2)
4	V <sub>CC</sub>	16	Phase detector output (1)
5	Var. prescaler (1/32, 1/33) output	17	Ref. counter output
6	Var. counter input	18	Var. counter output
7	Ref. prescaler (1/4) output	19	RES1
8	Ref. counter input	20	RES2
9	GND	21	GND
10	Frequency division switching control (1)	22	RF output
11	Frequency division switching control (2)	23	V <sub>CC1</sub>
12	Phase detection output (2) control SW	24	Regulator output (2.5V)

## Absolute Maximum Ratings (T<sub>a</sub> = 25°C)

Parameter	Symbol	Rating	Unit
Supply voltage	V <sub>CC</sub>	4.5	V
Supply current	I <sub>CC</sub>	28	mA
Power dissipation	P <sub>D</sub>	126	mW
Operating ambient temperature	T <sub>opr</sub>	-20 to +75	°C
Storage temperature	T <sub>stg</sub>	-55 to +125	°C

## Recommended Operating Range

Parameter	Symbol	Range
Operating supply voltage range	V <sub>CC</sub>	3.4V to 4.0V

## Electrical Characteristics (T<sub>a</sub> = 25 ± 2°C)

Parameter	Symbol	Condition	min	typ	max.	Unit
Current consumption	I <sub>CC</sub>	SELECT1 to V <sub>CC</sub> , SELECT2 to GND	—	16.0	19	mA
Reference input level	X <sub>in</sub>	f <sub>in</sub> = 10 to 20MHz f <sub>rout</sub> = f <sub>in</sub> /4	0.5	—	1.0	V <sub>P-P</sub>
Power output (1)	P <sub>out1</sub>	SELECT1 to V <sub>CC</sub> , SELECT2 to GND (P <sub>out</sub> : f <sub>out</sub> = 110.0MHz)	-15	-11.0	—	dBm
Output leak current (1)	I <sub>LCP1</sub>	V <sub>CC1</sub> = 0V V <sub>CP1</sub> = 3.7V, 0V	-1.0	0	1.0	μA
Output leak current (2)	I <sub>LCP2</sub>	V <sub>CC1</sub> = V <sub>CC</sub> SWCONT grounded, V <sub>CP2</sub> = 3.7V, 0V	-1.0	0	1.0	μA
Output voltage (High)	V <sub>HCP</sub>	V <sub>CC1</sub> = 0V I <sub>CP</sub> = -1mA	2.9	3.35	3.8	V
Output voltage (Low)	V <sub>LCP</sub>	V <sub>CC1</sub> = 0V I <sub>CP</sub> = 1mA	-0.10	0.17	0.80	V

Note) Unless otherwise specified, V<sub>CC</sub> = 3.7V

Reference input : When SELECT1 is connected to V<sub>CC</sub> and SELECT2 to GND,  
f<sub>in</sub> = 12.8MHz, and X<sub>in</sub> = 0.7V<sub>P-P</sub>.

**Electrical Characteristics (Design Values for Reference) (Ta=25±2°C)**

The following are design values for reference only (not guaranteed).

Parameter	Symbol	Condition	Typical value	Unit
Power output (2)	Pout2	SELECT1 to GND, SELECT2 to GND (Pout : fout=90.0MHz)	-11.0	dBm
Power output (3)	Pout3	SELECT1 to GND, SELECT2 to Vcc (Pout : fout=90.0MHz)	-11.0	dBm

Note) Unless otherwise specified, Vcc=3.7V

Reference input : When SELECT1 is connected to GND and SELECT2 to GND, fin = 12.80MHz, and Xin=0.7Vp-p.  
When SELECT1 is connected to GND and SELECT2 to Vcc, fin = 15.36MHz, and Xin=0.7Vp-p.

**Usage Note**

**Surge Breakdown Level**

The following are design values for reference only (not guaranteed).

Condition : C=200pF, and R=0Ω

Pin No.	Positive breakdown level (V)
23	200 to 230

**Counter Frequency Dividing Ratio**

Status of SELECT1	L	L	H	H
Status of SELECT2	L	H	L	H
Ref Counter	256	256	256	×
A Counter	0	16	0	×
N Counter	225	187	275	×

◎ VCO's oscillation frequency, fout, is calculated as follows :  
 $f_{out} = [(32 \times N) + A] \times [(f_{in}/4) \div R]$

where R, A, and N are frequency dividing ratios of REF, A, and N counters respectively, and fin is the OSC frequency.  
 If fin is 12.8MHz, then [(fin/4) ÷ R] is 12.5kHz.

◎ Examples of frequency dividing are :  
 fout=90MHz, SELECT1 low, SELECT2 low, and fin=12.80MHz  
 fout=90MHz, SELECT1low, SELECT2 high, and fin=15.36MHz  
 fout=110MHz, SELECT1 high, SELECT2 low, and fin=12.80MHz

Note) The above are design values for reference only (not guaranteed).





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