AN6093NSA

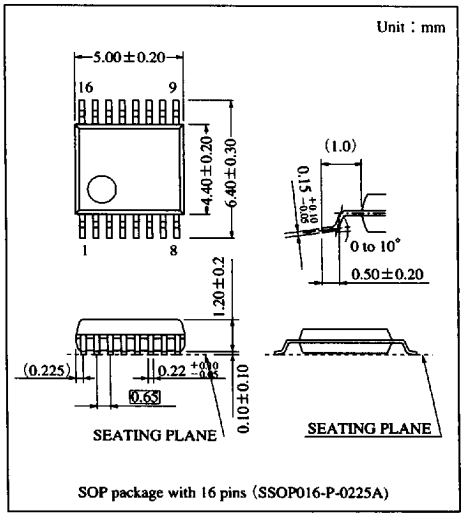
Digital Communication Orthogonal Modulator IC

■ Overview

The AN6093NSA is a orthogonal modulator IC for PHS. It incorporates a phase shifter and an APC circuit for indirect modulation in the 1.9 GHz band. It efficiently prevents power from leaking to adjacent channels. When provided with an LC filter, it can efficiently suppress IF-band local harmonic spurious.

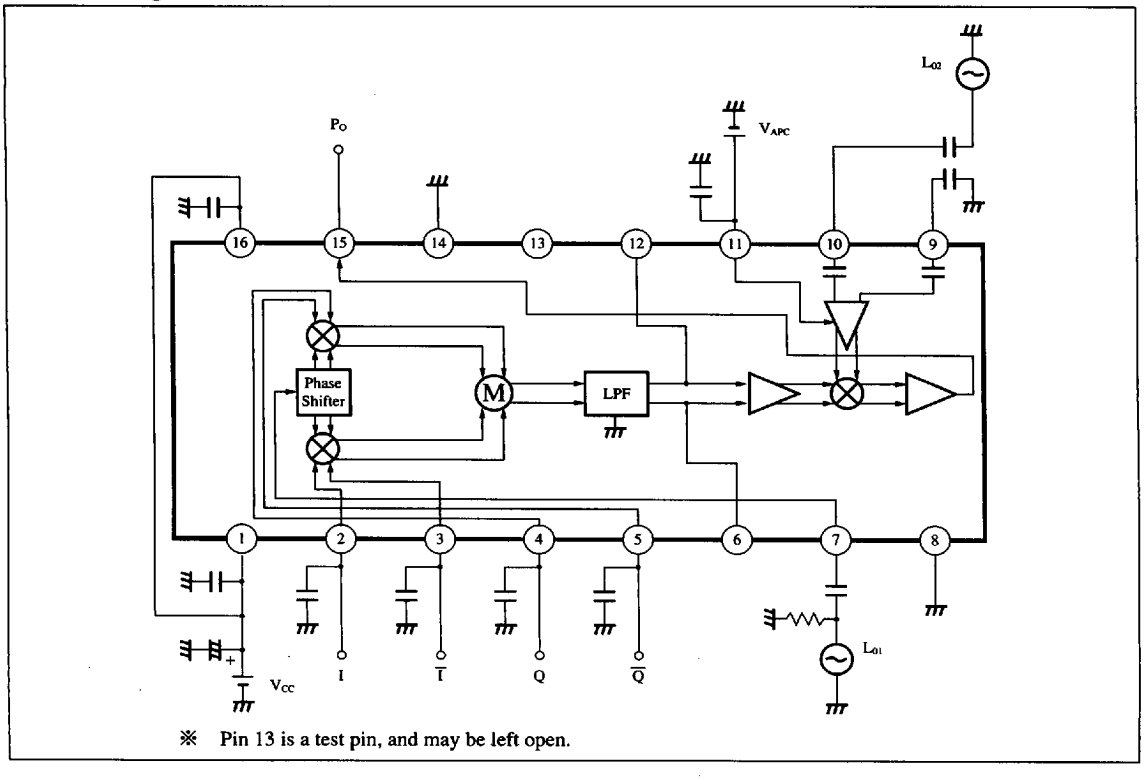
■ Features

- Operating supply voltage range: 2.7 to 4 V
- 1.9 GHz indirect modulation
- LO1's eighth-order harmonic suppression : –58dBc or better
- High-power output : –12 dBm
- Variable range: APC = typ 38 dB (fout = 1.9 GHz)
- Phase shifter frequency : 233 MHz
- Package: SSOP016-P-0225A with 0.65 mm pitch



SOP package with 16 pins (SSOP016-P-0225A)

■ Block Diagram



※ Pin 13 is a test pin, and may be left open.

■ Pin Descriptions

Pin No.	Description	Pin No.	Description
1	V_{CC} (mod)	9	LO2R
2	Iinput	10	LO2
3	$\overline{\text{Iinput}}$	11	APC/BS
4	Qinput	12	LC2
5	$\overline{\text{Qinput}}$	13	Test Pin
6	LC1	14	GND
7	LO1	15	RFoutput
8	GND	16	V_{CC} (UP–MIX)

■ Absolute Maximum Ratings (Ta=25℃)

Parameter	Symbol	Rating	Unit
Supply voltage	V_{CC}	4.2	V
Supply current	I_{CC}	60	mA
Power dissipation	P_D	252	mW
Operating ambient temperature	T_{opr}	−20 to +60	℃
Storage temperature	T_{stg}	−55 to +125	℃

Note) Protect from electrostatic discharge.

■ Recommended Operating Range

Parameter	Symbol	Range
Operating supply voltage range	V_{CC}	2.7 to 4V

■ Electrical characteristics (Ta=25±2℃)

Parameter	Symbol	Condition	min	typ	max	Unit
Output level (1)	P_{O1}	Lo1=233MHz, −10dBm Lo2=1660MHz, −15dBm V_{APC}=2.5V	−15	−12	—	dBm
Output level (2)	P_{O2}	Lo1=233MHz, −10dBm Lo2=1685MHz, −15dBm V_{APC}=2.5V	−15	−12	—	dBm
Current consumption	I_{CC}	Lo1=233MHz, −10dBm Lo2=1672.5MHz, −15dBm V_{APC}=2.5V	—	29	38	mA

Notes) V_{CC}=3V
IQ signal : $0.5V_{P-P}$ (two-phase), $\pi/4$ QPSK modulation input DC bias = 1.8 V
P_{O1} output frequency = 1893.024 MHz
P_{O2} output frequency = 1918.024 MHz

■ Electrical Characteristics (design values for reference) (Ta=25±2℃)

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

Parameter	Symbol	Condition	min	typ	max	Unit
Minimum output level*1	Pmin	Lo1=233MHz, −10dBm Lo2=1672.5MHz, −15dBm VAPC=1.0V	—	−50	−45	dBm
1st local leak suppression*1	CL1	Lo1=233MHz, −10dBm Lo2=1672.5MHz, −15dBm VAPC=2.5V	—	−25	—	dBc
2nd local leak suppression*1	CL2	Lo1=233MHz, −10dBm Lo2=1672.5MHz, −15dBm VAPC=2.5V	—	−15	—	dBc
Image leak suppression*1	IL	Lo1=233MHz, −10dBm Lo2=1672.5MHz, −15dBm VAPC=2.5V IQ : Level adj.	—	−35	−30	dBc
Adjacent spurious suppression*2	DU1	Lo1=233MHz, −10dBm Lo2=1672.5MHz, −15dBm VAPC=2.5V	—	−55	−50	dBc
In-band output deviation*3	ΔP	Lo1=233MHz, −10dBm Lo2=1660 to 1685MHz, −15dBm VAPC=2.5V	—	±1.6	—	dB
3rd intermodulation distortion suppression*3 (Pout=−1.5dBm)	IM3	Lo1=233MHz, −10dBm Lo2=1672.5MHz, −15dBm VAPC=2.5V	—	−25	—	dBc
fLO1+fLO2, Local leak suppression*1	CL	Lo1=233MHz, −10dBm Lo2=1672.5MHz, −15dBm VAPC=2.5V IQ : DC offset adj.	—	−35	−30	dBc
Adjacent channel power leak suppression (600 kHz separation)	BL	Lo1=233MHz, −10dBm Lo2=1672.5MHz, −15dBm VAPC=2.5V	—	−65	−60	dBc
Base-band distortion suppression*1	BH	Lo1=233MHz, −10dBm Lo2=1672.5MHz, −15dBm VAPC=2.5V	—	−40	−30	dBc
Adjacent spurious suppression Note.2)	DU2	Using an LC filter between pins 6 and 12, removing 8fLo1, and 2fLo2 to 6fLo1 components	—	−60	—	dBc

Note 1) V_{CC}=3V
IQ signal : $0.5V_{P-P}$, two-phase, input DC bias = 1.8V
*1 : π/4 QPSK modulation
*2 : π/4 QPSK modulation
*3 : PN9-stage modulation
Note 2) The output level decreases if an LC filter is attached.

■ Usage note

Surge breakdown levels

The following are design values for reference only (not guaranteed).
Condition : C = 200 pF, and R = 0 Ω

Pin No.	Positive breakdown level (V)
2	130
3	130
4	130
5	130

Note) Breakdown level is 200 V or more for those pins other than above and for negative surges.

Mobile Communication