

The SP5070 is a single modulus frequency synthesiser for use in Satellite TV receivers and together with an appropriate voltage controlled oscillator (VCO), forms a complete phase locked loop (PLL) synthesiser. The circuit consists of a prescaler with preamplifier and a fixed modulus divider. The phase comparator is fed with a reference frequency derived from an external oscillator or crystal. The comparator has a charge pump output amplifier stage around which feedback may be applied. Only an external transistor is required for varicap line driving.

FEATURES

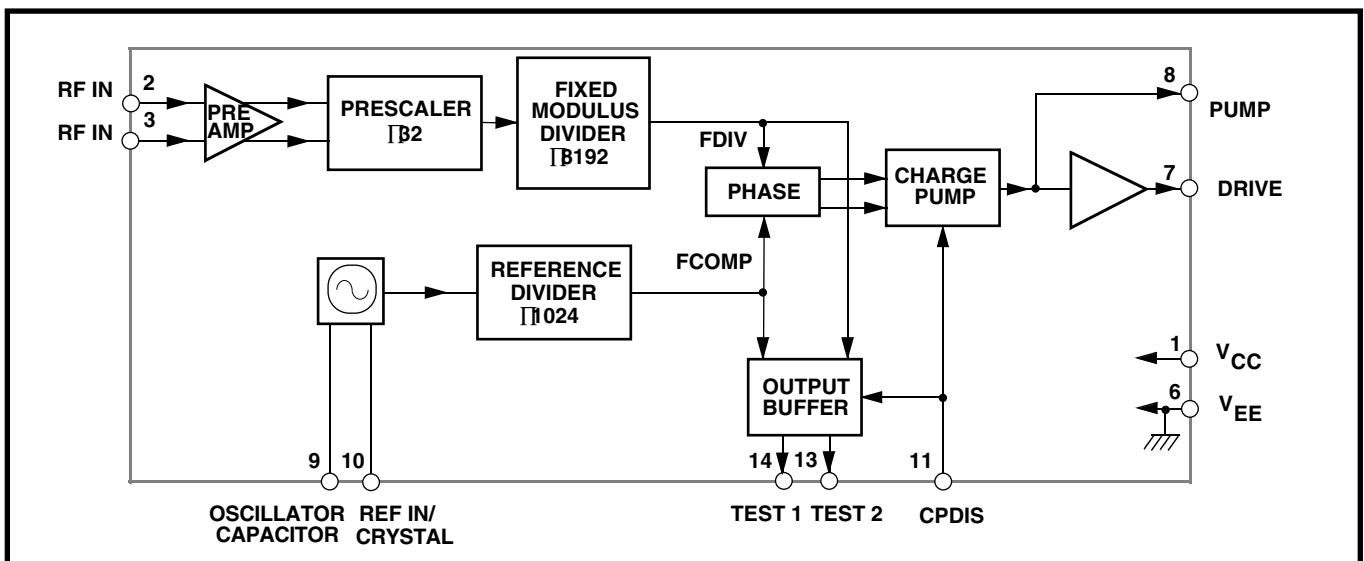
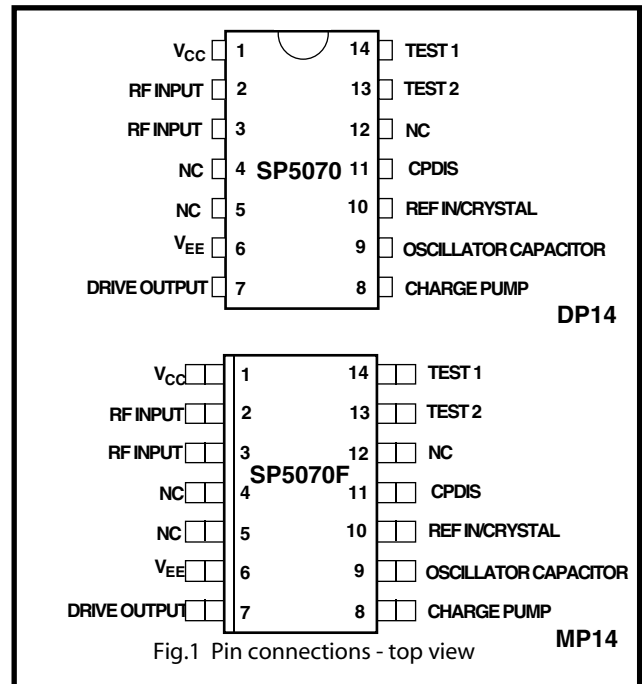
- Low Power Consumption (5V, 47mA typ.)
 - Prescaler and Preamplifier Included
 - Charge Pump Amplifier with Feedback Point
 - Charge Pump Disable Facility
 - Synthesises Frequencies up to 2.4GHz
 - Pin and Function Compatible with SP5060 and SP5062
 - Full ESD Protection*
- * Normal ESD handling procedures should be observed.

APPLICATIONS

- Satellite TV
- High IF Cable Tuning Systems
- C-Band with Frequency Doubling Mixer

ORDERING INFORMATION

- SP5070 DP - (14 Lead Plastic Package)
 SP5070F MP - (14 Lead Miniature Plastic Package)



SP5070

ELECTRICAL CHARACTERISTICS

$T_{amb} = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$, $V_{CC} = +4.5\text{V}$ to $+5.5\text{V}$. These characteristics are guaranteed by either production test or design. They apply within the specified ambient temperature and supply voltage ranges unless otherwise stated.

Characteristics	Symbol	Pin	Value			Units	Conditions
			Min	Typ	Max		
Supply current	I_{CC}	1	-	47	55	mA	$V_{CC} = 5\text{V}$
Prescaler input voltage		2,3	50	-	300	mV_{RMS}	300MHz to 1.8GHz sinewave 2.4GHz, see Fig.5
Prescaler input voltage		2,3	100	-	300	mV_{RMS}	
Prescaler input impedance		2,3	-	50	-	pF	
Input capacitance		2,3	-	2	-		
Charge pump output current		8	-	± 100	-	μA	V pin 8 = 2.0V V pin 8 = 2.0V At collector of External Varicap Drive transistor
Charge pump output leakage		8	-	-	± 5	nA	
Drift due to leakage		-	-	-	5	mV/s	
Charge pump drive output current		7	1	-	-	mA	V pin 7 = 0.7V
Charge pump amplifier gain		-	-	6400	-	-	pin 7 current 100 μA
Oscillator temperature stability		9,10	-	-	2	ppm/ $^{\circ}\text{C}$	
Oscillator stability with supply voltage		9,10	-	-	2	ppm/V	
Reference clock frequency		10	2	-	10	MHz	
External reference amplitude		10	150	-	500	mV_{RMS}	
Charge pump disable/TEST 1 and TEST 2/enable		11	-250	-	-500	μA	$V_{IN} < 0\text{V}$
Charge pump disable leakage		11	-	-	10	μA	V pin 11 = V_{CC}
TEST 1/TEST 2 sink current		13,14	1	-	-	mA	$V_{OUT} = 0.7\text{V}$
TEST 1/TEST 2 leakage current		13,14	-	-	10	μA	$V_{OUT} = V_{CC} + 0.3\text{V}$
TEST 1/TEST 2 voltage		13,14	-	-	$V_{CC} + 0.3$	V	

ABSOLUTE MAXIMUM RATINGS

All voltages are referred to $V_{EE} = 0\text{V}$

Characteristics	Pin	Value		Units
		Min	Max	
Supply voltage	1	-0.3	7	V
RF input voltage	2,3	-	2.5	Vp-p
RF input DC offset	2,3	-0.3	$V_{CC} + 0.3$	V
Charge pump DC offset	8	-0.3	$V_{CC} + 0.3$	V
Charge pump disable	11	-0.7	$V_{CC} + 0.3$	V
Drive DC offset	7	-0.3	$V_{CC} + 0.3$	V
Crystal oscillator DC offset	9,10	-0.3	$V_{CC} + 0.3$	V
TEST outputs	13,14	-0.3	$V_{CC} + 0.3$	V
Storage temperature	-	-55	150	$^{\circ}\text{C}$
Junction temperature	-	-	+150	$^{\circ}\text{C}$
DP14 thermal resistance, chip-to-ambient	-	-	78	$^{\circ}\text{C}/\text{W}$
DP14 thermal resistance, chip-to-case	-	-	30	$^{\circ}\text{C}/\text{W}$
MP14 thermal resistance, chip-to-ambient	-	-	123	$^{\circ}\text{C}/\text{W}$
MP14 thermal resistance, chip-to-case	-	-	45	$^{\circ}\text{C}/\text{W}$
Power consumption at 5.5V	-	-	275	mW

FUNCTIONAL DESCRIPTION

The SP5070, when used with a voltage controlled oscillator, forms a complete phase locked loop frequency synthesiser.

The phase comparator comparison frequency is obtained by dividing the reference frequency. This may be generated on-chip by means of an external crystal, or from an external reference oscillator.

The output of the prescaler is divided by the fixed modulus divider, producing an output frequency which is phased locked to the comparison frequency.

The divider stages are arranged to give a fixed ratio between the synthesised frequency and the reference of 256:1. Any frequency within the range of 300MHz to 2.4GHz may be achieved by using the appropriate reference or crystal frequency.

A single external transistor, driven from the charge pump output, provides the output drive necessary for the oscillator varicap line.

A test facility which disables the charge pump is also provided. This is activated when a negative voltage is applied to pin 11, see electrical characteristics above. When the device is in this mode, F_{COMP} and F_{DIV} are also available at outputs TEST1 and TEST2 respectively. These are open collector outputs and are each capable of sinking a minimum of 1mA. In normal mode of operation these outputs are high impedance.

For compatibility with SP5060/SP5062, pin 11 may be connected to V_{CC}

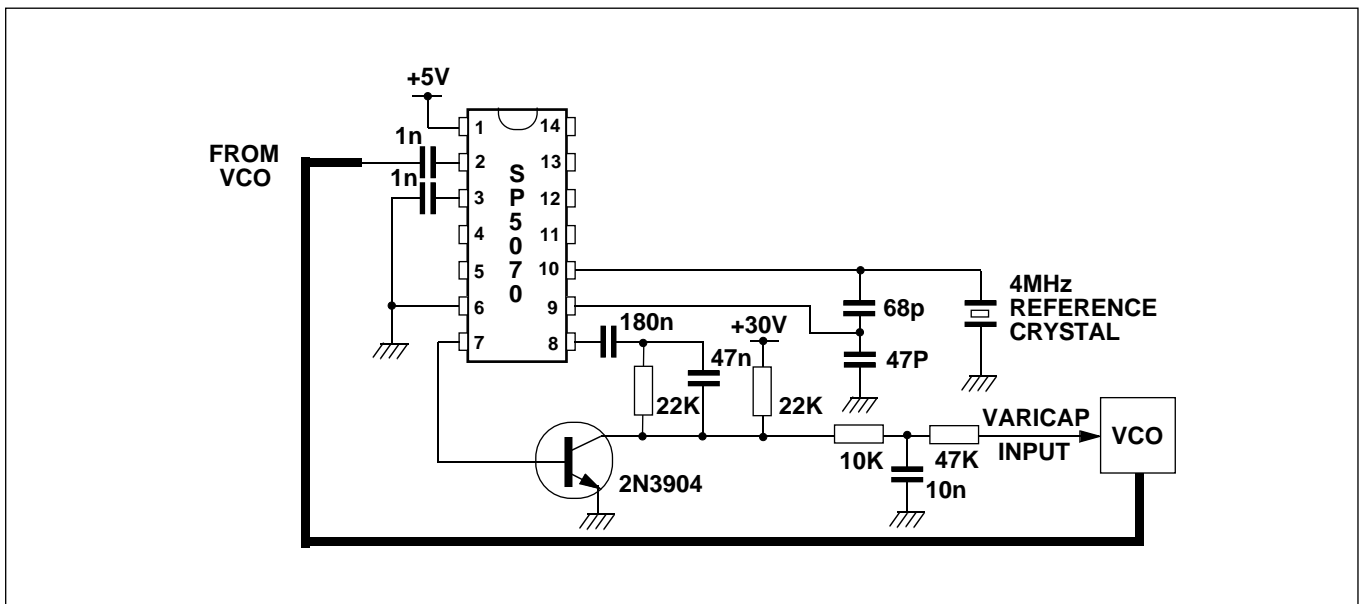


Fig.3 Typical application and test circuit (1024MHz with 4MHz reference crystal)

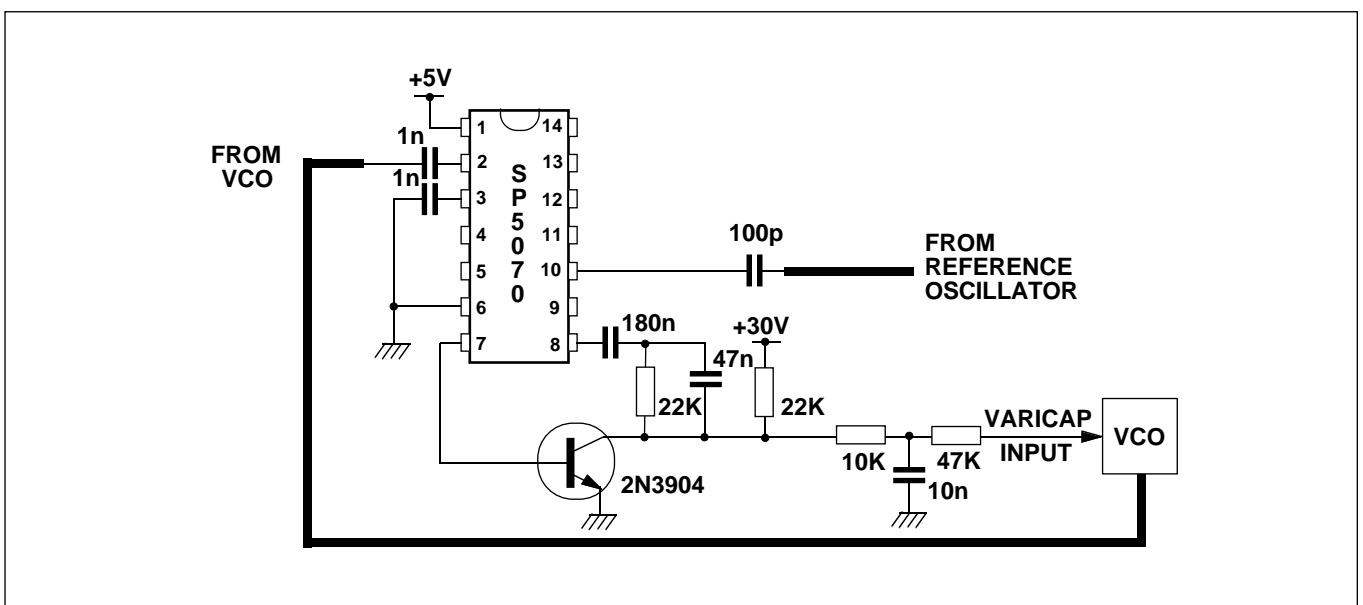


Fig.4 Application using external reference oscillator

SP5070

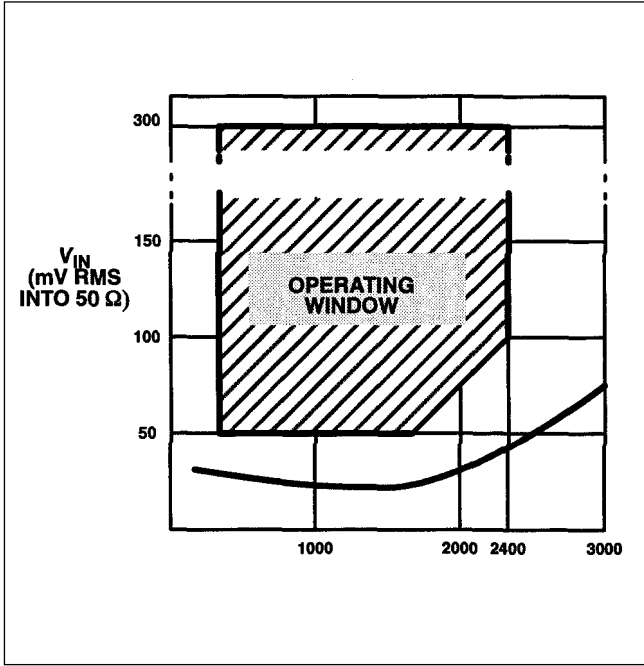


Fig.5 Typical input sensitivity

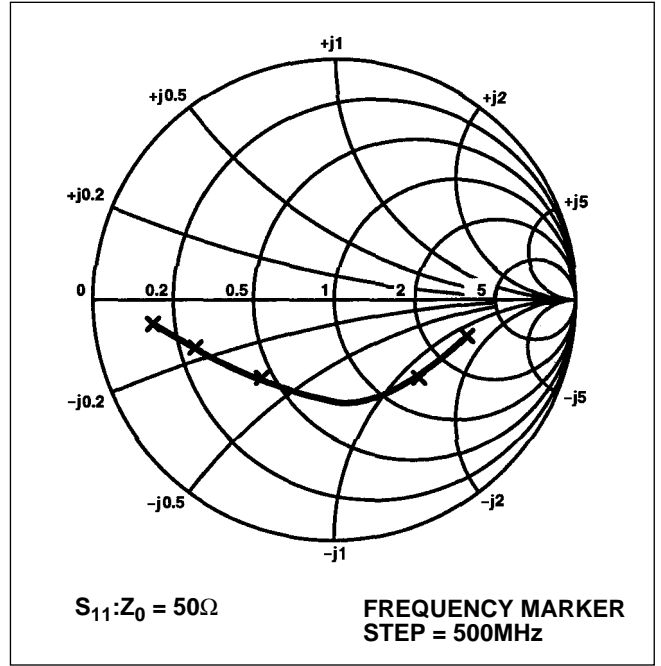


Fig.6 Typical input impedance

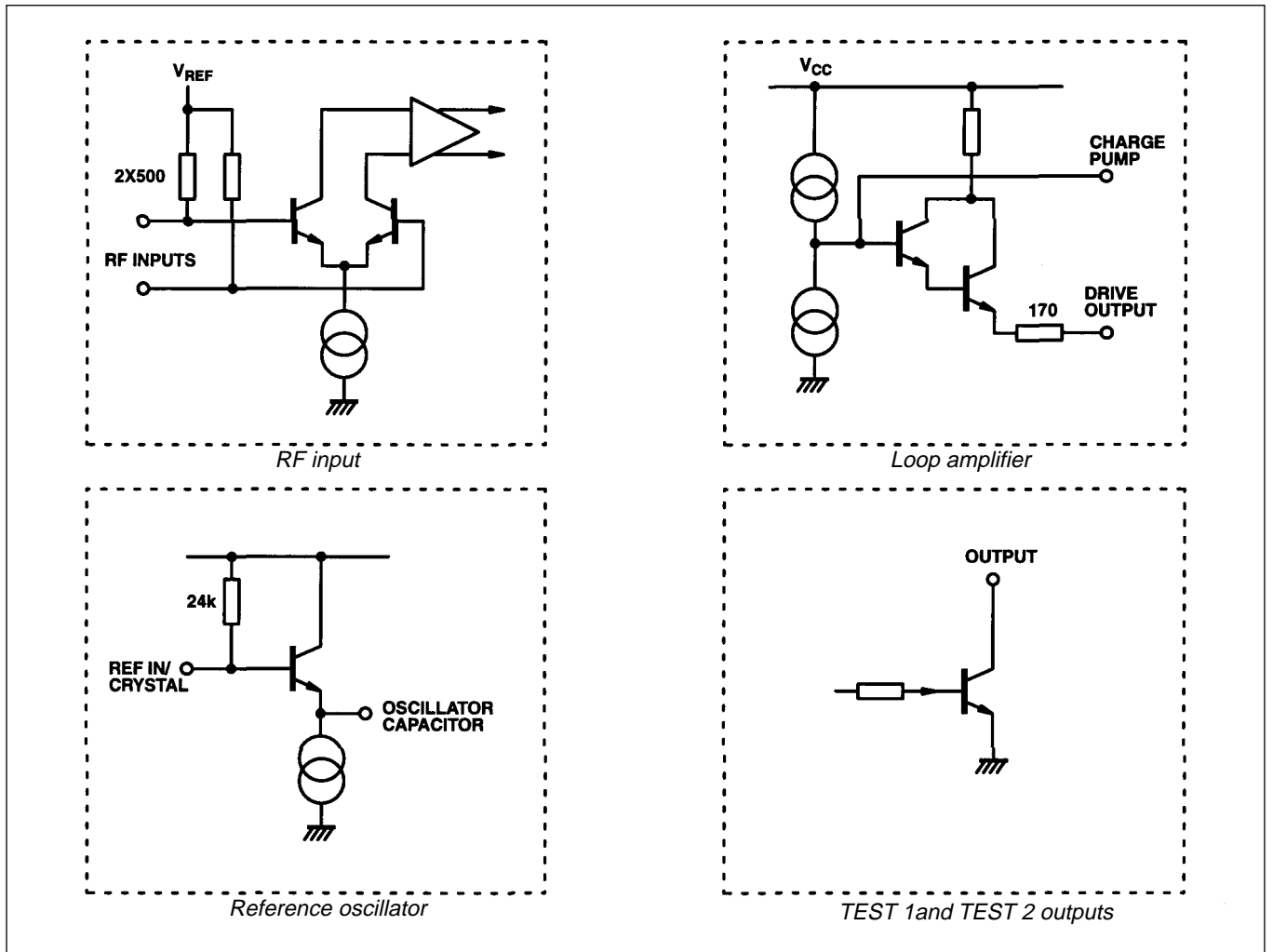


Fig.7 SP5070 input/output interface circuits



**For more information about all Zarlink products
visit our Web Site at
www.zarlink.com**

Information relating to products and services furnished herein by Zarlink Semiconductor Inc. or its subsidiaries (collectively "Zarlink") is believed to be reliable. However, Zarlink assumes no liability for errors that may appear in this publication, or for liability otherwise arising from the application or use of any such information, product or service or for any infringement of patents or other intellectual property rights owned by third parties which may result from such application or use. Neither the supply of such information or purchase of product or service conveys any license, either express or implied, under patents or other intellectual property rights owned by Zarlink or licensed from third parties by Zarlink, whatsoever. Purchasers of products are also hereby notified that the use of product in certain ways or in combination with Zarlink, or non-Zarlink furnished goods or services may infringe patents or other intellectual property rights owned by Zarlink.

This publication is issued to provide information only and (unless agreed by Zarlink in writing) may not be used, applied or reproduced for any purpose nor form part of any order or contract nor to be regarded as a representation relating to the products or services concerned. The products, their specifications, services and other information appearing in this publication are subject to change by Zarlink without notice. No warranty or guarantee express or implied is made regarding the capability, performance or suitability of any product or service. Information concerning possible methods of use is provided as a guide only and does not constitute any guarantee that such methods of use will be satisfactory in a specific piece of equipment. It is the user's responsibility to fully determine the performance and suitability of any equipment using such information and to ensure that any publication or data used is up to date and has not been superseded. Manufacturing does not necessarily include testing of all functions or parameters. These products are not suitable for use in any medical products whose failure to perform may result in significant injury or death to the user. All products and materials are sold and services provided subject to Zarlink's conditions of sale which are available on request.

Purchase of Zarlink's I²C components conveys a licence under the Philips I²C Patent rights to use these components in and I²C System, provided that the system conforms to the I²C Standard Specification as defined by Philips.

Zarlink, ZL and the Zarlink Semiconductor logo are trademarks of Zarlink Semiconductor Inc.

Copyright Zarlink Semiconductor Inc. All Rights Reserved.

TECHNICAL DOCUMENTATION - NOT FOR RESALE
