

# SP8906

## 500MHz 4-MODULUS DIVIDER

The SP8906 is a 4-modulus ( $\pm 256/255/240/239$ ) divider for use in frequency synthesisers operating to 500MHz. Designed to interface directly to the NJ8811 synthesiser control circuit, the SP8906 simplifies synthesiser designs at UHF.

### FEATURES

- AC Coupled Input (Internal Bias)
- TTL/MOS Compatible Inputs and Outputs
- Wide Frequency Range: 20 to 500MHz

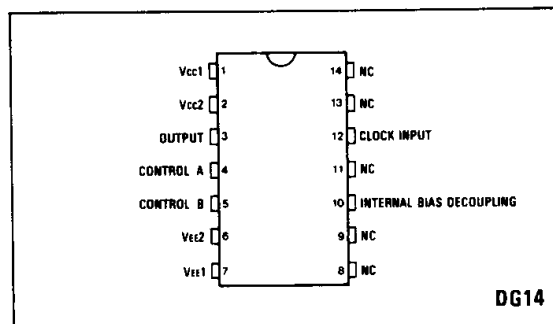


Fig. 1 Pin connections - top view

### QUICK REFERENCE DATA

- Supply Voltage: 5.0V
- Power Consumption: 500mW
- Temperature Range:  $-30^{\circ}\text{C}$  to  $-70^{\circ}\text{C}$

### ABSOLUTE MAXIMUM RATINGS

- Supply Voltage: 8V
- Storage Temperature Range:  $-55^{\circ}\text{C}$  to  $+150^{\circ}\text{C}$
- Max. Junction Temperature:  $+150^{\circ}\text{C}$
- Max. Clock Input Voltage: 2.5V p-p

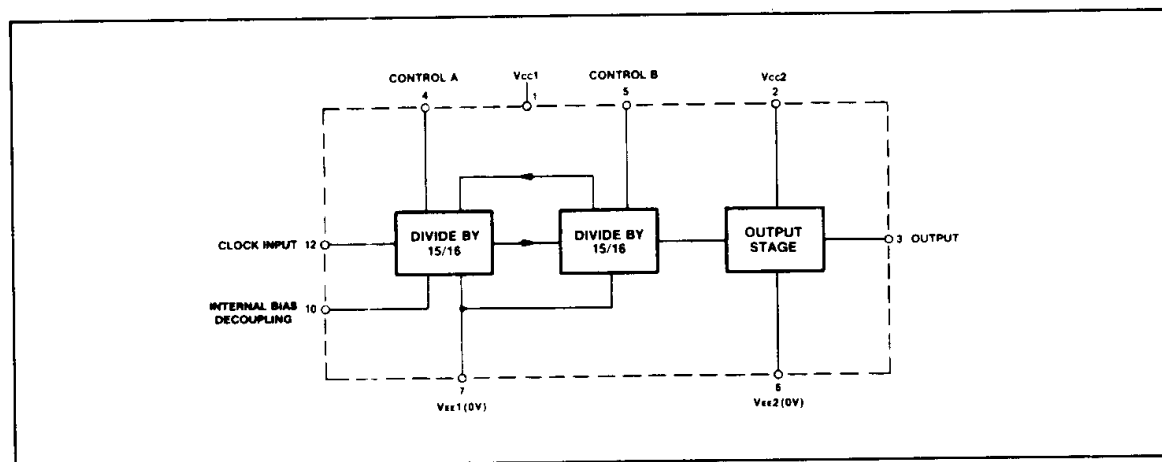


Fig. 2 Functional diagram

### ELECTRICAL CHARACTERISTICS

Supply Voltage:  $V_{cc1}, V_{cc2} = 5.0V \pm 0.25V$   
 Temperature:  $T_{amb} = -30^{\circ}C$  to  $+70^{\circ}C$

Characteristics	Symbol	Value		Units	Conditions
		Min.	Max.		
Maximum frequency(sinewave input)	$f_{max}$	500		MHz	Input 400-1000mV p-p
Minimum frequency(sinewave input)	$f_{min}$		20	MHz	Input 600-1000mV p-p
Output high voltage	$V_{OH}$	2.5		V	$I_{OH} = -1mA$
Output low voltage	$V_{OL}$		0.5	V	$I_{OL} = 2mA$
Power supply current	$I_{CC}$		100	mA	Inputs and output O/C
Input low level	$V_{IL}$		1.3	V	
Input high level	$V_{IH}$	2.3		V	
Input current	$I_{IL}$		-1.2	mA	$V_{IN} = 0.5V$
Clock to output delay	$t_p$		60	ns	
Set-up and release time	$t_s, t_r$	5		ns	Control A I/P
Set-up and release time	$t_s, t_r$	8		ns	Control B I/P

#### NOTES

- Unless otherwise stated the electrical characteristics are guaranteed over specified supply, frequency and temperature range.
- The test configuration for dynamic testing is shown in Fig. 6

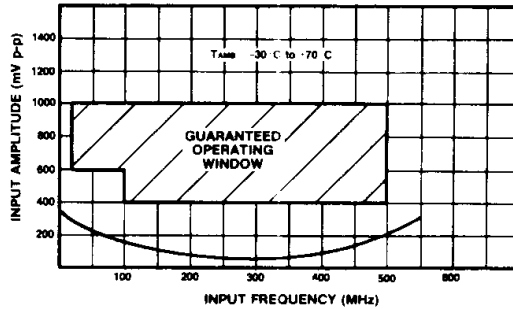


Fig.3 Typical characteristics SP8906

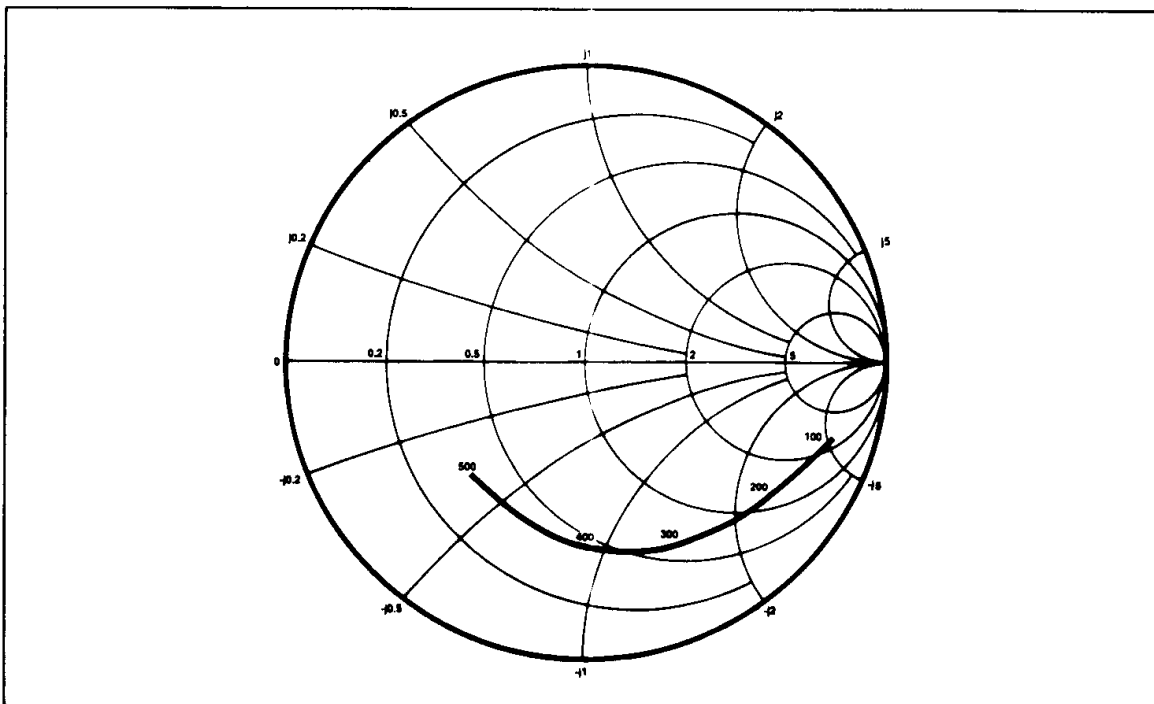


Fig.4 Typical input impedance. Test conditions: supply voltage 5.0V, ambient temperature  $25^{\circ}C$ , frequencies in MHz, impedances normalised to 50 ohms.

## OPERATING NOTES

1. The clock input should be capacitively coupled to the signal source. The input signal path is completed by connecting a decoupling capacitor from the internal bias decoupling, pin 10, to ground.
2. If no signal is present the device will self-oscillate. If this is undesirable it may be prevented by connecting a 33k or greater between pin 10 and ground (pin 7), see Fig. 5.
3. The input can be operated at very low frequencies but slew rate must be better than 200V/ $\mu$ s.
4. The output is TTL/CMOS compatible and is current limited to 3mA sink in the low state and 5mA source in the high state.
5. The control inputs have internal 5k pull-up resistors which can be directly coupled to open collector outputs.
6. There are separate supply lines for the output stage ( $V_{cc2}$ ,  $V_{EE2}$ ) to reduce input to output and output to input coupling.
7. The minimum input sinewave frequency can be improved by adding hysteresis (See Fig. 5) to reference inputs. Care must be taken not to apply too much hysteresis as

this will reduce input sensitivity. A maximum value of 50mV ( $R_1 = 33k$ ) should not be exceeded.

8. Under certain conditions, when the device is dynamically locked, an oscillation occurs which can be prevented by insertion of a 1 $\mu$ H RF choke in series with  $V_{cc1}$  and  $V_{cc2}$ . Under these conditions  $V_{cc1}$  and  $V_{cc2}$  pins should not be decoupled. See Fig. 5.
9. The input impedance of SP8906 is a function of frequency. See Fig. 4.
10. See Table II for different ratios obtained.

Control A	Control B	Division Ratio
1	1	256
0	1	255
1	0	240
0	0	239

Table 2

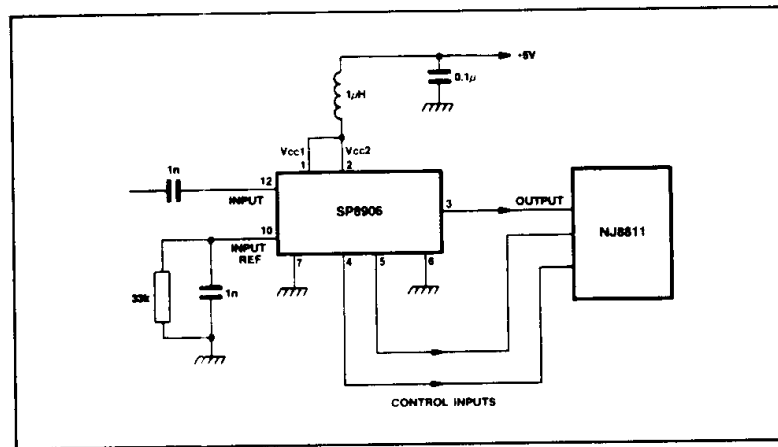


Fig.5 Typical application showing interfacing to NJ8811

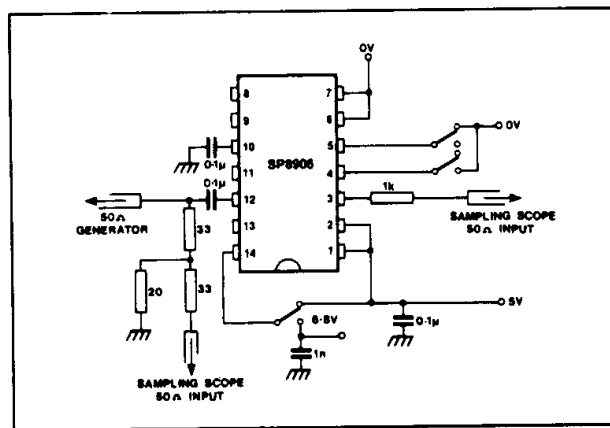


Fig.6 Test circuit