

**SP8670 A, B&M 600MHz ÷ 8**  
**SP8671 A, B&M 500MHz ÷ 8**  
**SP8672 A, B&M 400MHz ÷ 8**

The SP8670, SP8671 and SP8672 are fixed ratio  $-8$  asynchronous ECL counters with a maximum operating frequency of 600, 500 and 400 MHz respectively. The operating temperature is specified by the final coding letter:  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  ('A' grade),  $0^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$  ('B' grade) and  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$  ('M' grade). The input is normally capacitively coupled to the signal source but the circuit can be DC driven if required. The inputs can be either single driven, relative to the on-chip reference voltage, or driven differentially. There are two complementary emitter-follower outputs.

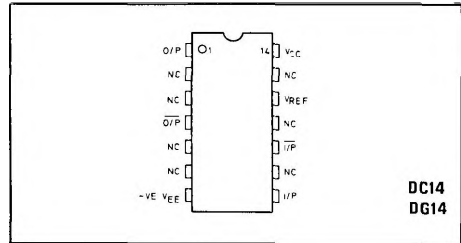


Fig. 1 Pin connections

**FEATURES**

- Low Power – Typically 250mW
- ECL II & ECL III Output Compatibility
- Easy Operation From UHF Signal Source

**APPLICATIONS**

- Prescaling for UHF Synthesisers
- Instrumentation

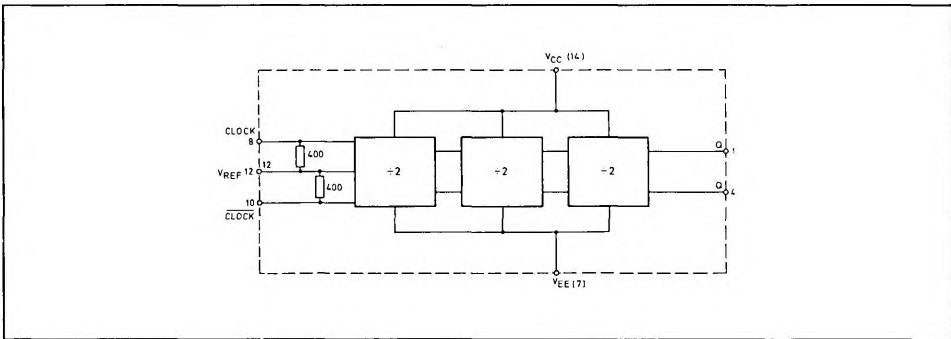


Fig. 2 Functional diagram

**QUICK REFERENCE DATA**

- Power Supplies:  $V_{CC} = 0\text{V}$   
 $V_{EE} = -5.2\text{V} \pm 0.25\text{V}$
- Input Amplitude range: 400mV to 800mV p-p
- Output Voltage Swing: 800mV typ. p-p
- Temp. Ranges:  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  ('A' Grade)  
 $0^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$  ('B' Grade)  
 $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$  ('M' Grade)

# SP8670

## ELECTRICAL CHARACTERISTICS

Test Conditions (unless otherwise stated)

$T_{amb} =$  'A' grade:  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ ;  
 Supply Voltage 'B' grade:  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ ;  
 $V_{CC} = 0\text{V}$  'M' grade:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ ;  
 $V_{EE} = -5.2\text{V} \pm 0.25\text{V}$   
 Output load =  $500\Omega$  line in parallel with approx.  $3\text{pF}$

Characteristic		Value			Units	Condition
		Min.	Typ.	Max.		
Max. Toggle frequency	SP8670 SP8671 SP8672	600 500 400			MHz MHz MHz	Test circuit as in fig. 2 $V_{IN} = 400$ to $800\text{mV p-p}$
Min. Toggle frequency for correct operation with a sine wave input				40	MHz	
Min. slew rate for square wave input to guarantee correct operation to 0Hz				100	V/ $\mu\text{s}$	
Input reference voltage			2.6		V	
Output voltage swing (dynamic)		500	800		mV	p-p
Output voltage (static)						
High state		-8.95		.615	V	
Low state		-1.83		-1.435	V	
Power supply drain current			45	60	mA	

### Toggle Frequency Test Circuit

1. All leads are kept short to minimise stray capacitance and inductance
2. Resistors and capacitors are non-inductive UHF types.
3. Device is tested in a 14 lead Augat socket type No. 314-AGGA-R

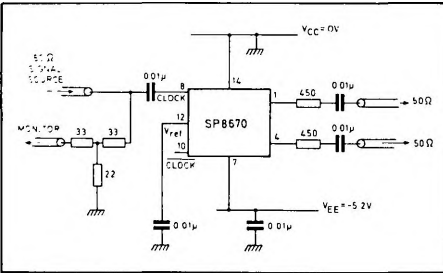


Fig. 3 Toggle frequency test circuit

### OPERATING NOTE

Normal UHF layout techniques should be used to ensure satisfactory operation. If the positive supply is used as the earth connection, noise immunity is improved and the risk of damage due to inadvertently shorting the output emitter followers to the negative rail is reduced.

The circuit is normally capacitively coupled to the signal source. In the absence of an input signal the circuit will self-oscillate. This can be prevented by connecting a  $10\text{K}\Omega$  resistor between one of the inputs and the negative rail.

$V_{ref}$  must be decoupled to RF earth by a capacitor in the range  $30\text{pF}$  to  $1000\text{pF}$ . It is important that this decoupling is adequate, otherwise input sensitivity will be reduced.

The device will also miscut if the input transitions are slow — a slew rate of  $100\text{V}/\mu\text{s}$  or greater is necessary for low frequency operation.

The outputs interface directly to ECL II or to ECL 10K with a potential divider (see Fig. 4).

A typical application of the SL8670 would be in the divider chain of a synthesiser operating in the military frequency range 225 MHz to 512 MHz. A binary division ratio is optimum where power is at a premium and so the SP8670 series would normally be used in low power applications.

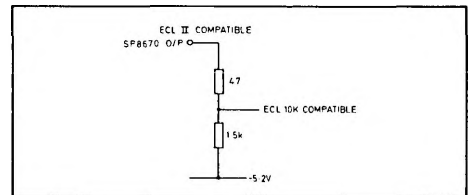


Fig. 4 SP8670 to ECL 10K interface

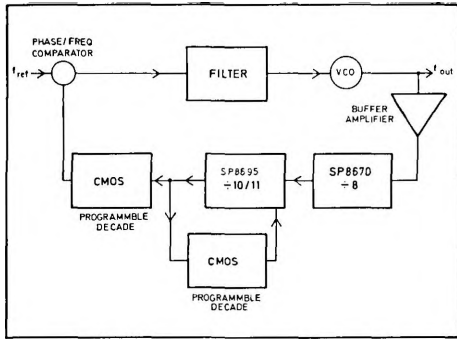


Fig. 5 A low power synthesiser loop

### ABSOLUTE MAXIMUM RATINGS

Power supply voltage $ V_{CC} - V_{EE} $	8 volts
Input voltage $V_{INac}$	2.5V p-p
Output source current $I_{out}$	10mA
Storage temperature range	$-55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$
Operating junction temperature	$150^{\circ}\text{C}$ max.