

# SP8000 SERIES

## HIGH SPEED DIVIDERS

**SP8602 A, B&M** 500MHz÷2  
**SP8603 A, B&M** 400MHz÷2  
**SP8604 A, B&M** 300MHz÷2

The SP8602, SP8603 and SP8604 are fixed ratio ECL – 2 counters with maximum specified I/P frequencies of 500, 400 and 300 MHz respectively. The operating temperature range is specified by the final coding letter: 'A' denotes –55°C to +125°C, 'B' denotes 0°C to +70°C and 'M' denotes –40°C to +85°C.

The devices can be operated with single input drive or with double, complementary, input drive; in both cases the input is normally capacitively coupled to the signal source. Two complementary emitter follower outputs are provided.

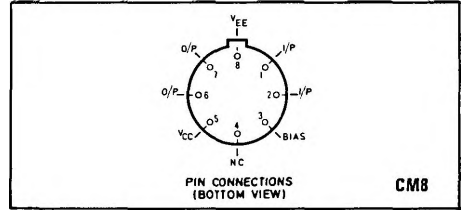


Fig. 1 Pin connections

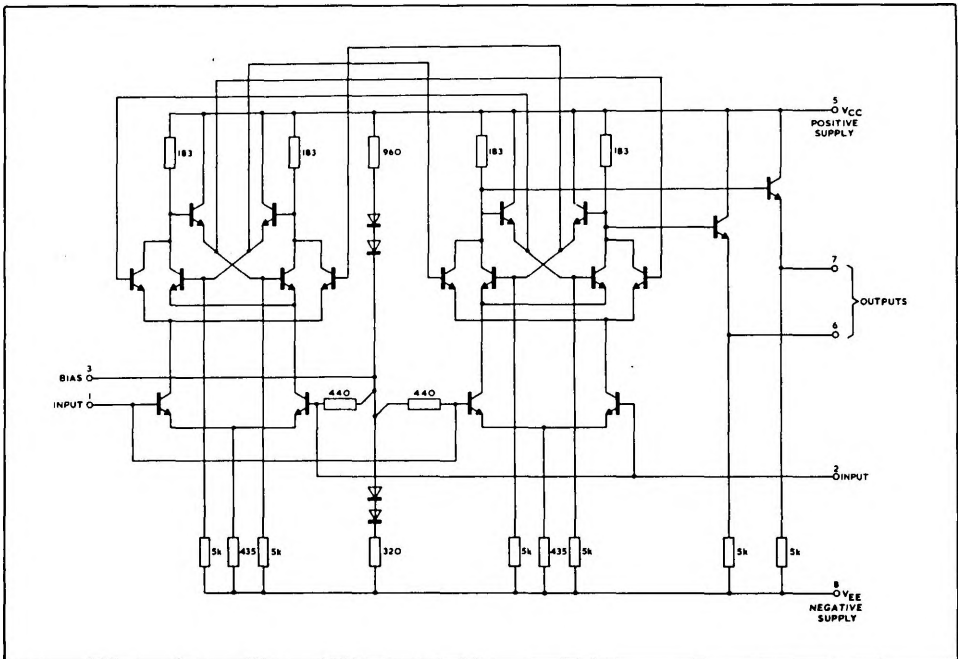


Fig. 2 Circuit diagram (all resistor values are nominal)

ELECTRICAL CHARACTERISTICS

Test conditions (unless otherwise stated)

T<sub>amb</sub> 'A' Grade  
 'B' Grade  
 'M' Grade

-55°C to +125°C  
 0°C to +70°C  
 -40°C to +85°C  
 OV

Operating supply voltage: V<sub>CC</sub>  
 V<sub>EE</sub>

-5.2V ± 0.25V

Input voltage (single drive- other input and bias decoupled to ground plane)

400 to 800 mV p-p

Input voltage (double drive- bias decoupled to ground plane)

250 to 800 mV p-p

Output load

500Ω and 3pF

Characteristic	Type	Value				Conditions
		Min.	Typ.	Max.	Units	
Max. input freq.	SP8602A,B,M SP8603A,B,M SP8604A,B,M	500 400 300			MHz MHz MHz	V <sub>EE</sub> = -5.2V V <sub>EE</sub> = -5.2V V <sub>EE</sub> = -5.2V
Min. input freq. with sinusoidal input	All		20	40	MHz	
Min. slew rate of square wave input for correct operation	All		30	100	V/μS	single input drive
Output voltage swing	All	400			mV	V <sub>EE</sub> = -5.2V T <sub>amb</sub> = -55°C to +70°C
Output voltage swing	SP602A	350			mV	V <sub>EE</sub> = -5.2V T <sub>amb</sub> = +125°C I/P freq. = 500 MHz
Power supply drain current	All		12	20	mA	V <sub>EE</sub> = -5.2V See note 1

NOTES

- In practice, the 3.5kΩ resistors specified in the test circuit (Fig.3) are not essential: omission of these resistors will reduce the maximum supply current to 18mA.

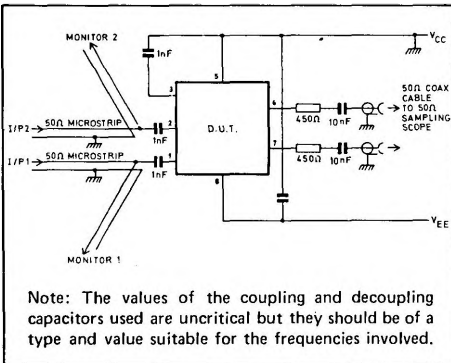


Fig. 3 Test circuit

**ABSOLUTE MAXIMUM RATINGS**

Power supply voltage $V_{CC} - V_{EE}$	8V
Input voltage $V_{in}$	Not greater than the supply voltage in use
Output current $I_{out}$	10 mA
Operating junction temperature	+150°C
Storage temperature range	-55°C to +150°C

**OPERATING NOTES**

It is recommended that a positive earth plane be used for the circuit layout, thus preventing damage if the output emitter followers are inadvertently shorted to ground. All components used in the circuit layout should be suitable for the frequencies involved, and outside a controlled impedance environment, leads and connections should be kept short to minimise stray inductance.

The signal source is normally capacitively coupled to the input. A 1000pF capacitor is usually sufficient. If the input signal is likely to be interrupted a 15KΩ resistor should be connected between the input and the negative rail. In the single drive case it is preferable to connect the resistor to the input not in use - in the double drive case either input can be used. The addition of the input pulldown resistor causes a slight loss of input sensitivity,

but it prevents circuit oscillation under no-signal conditions.

The input waveform may be sinusoidal, but below about 40 MHz the operation of the circuit becomes dependent on the slew rate of the input rather than the amplitude. A square wave input with a slew rate of more than 100 V/μS will permit correct operation down to DC.

The output voltage swing can be increased by the addition of a DC load to the output emitter followers. Pulldown resistors of 1.5 K to the negative rail provide an increase of typically 25% in the output voltage swing.

**APPLICATION NOTES**

**SP8602B and SP8604B interfacing to ECL 10 000 and ECL III**

By increasing the output voltage swing using external pulldown resistors (see operating notes), the SP8604B can be coupled directly into an ECL III or ECL 10 000 gate, but there is a reduction of the noise immunity. Where noise immunity is important the device can be connected to an ECL 10 000 or ECL III line receiver.

**Divide-by-16 frequency scaler.**

The SP8602B and SP8604B interfacing with the SP8601B and high-speed TTL to give a divide-by-16 frequency scaler is shown in Fig. 4.

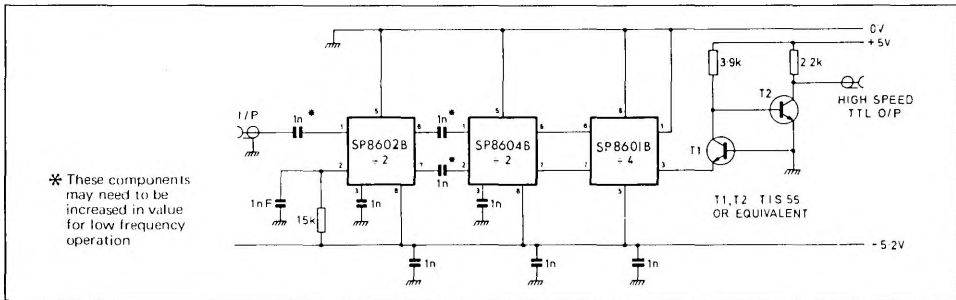


Fig. 4 Divide-by-16 frequency scaler