

SP8000 SERIES

HIGH SPEED DIVIDERS

SP8616 B&M 1 GHz ÷ 4 **SP8615 B&M** 900MHz ÷ 4
SP8614 B&M 800MHz ÷ 4 **SP8613 B&M** 700MHz ÷ 4

The SP8616 series of UHF counters are fixed ratio ÷ 4 asynchronous emitter coupled logic counters with, in the case of the SP8616B, a maximum operating frequency in excess of 1GHz, over a temperature range of 0°C to +70°C. The input is normally capacitively coupled to the signal source but can be DC coupled if it is required. The two complementary emitter follower outputs are capable of driving 100Ω lines and interfacing to ECL with the same positive supply. The SP8616 series require supplies of 0V and -7.4V (± 0.4V).

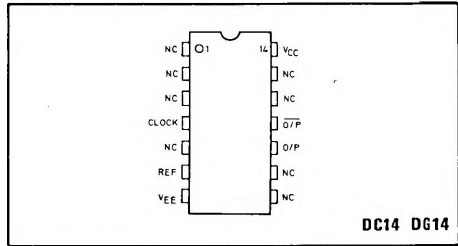


Fig. 1 Pin connections

FEATURES

- DC to 1GHz operation.
- 0°C to 70°C operation guaranteed at maximum specified frequency and over a wide dynamic input range.
- Complementary emitter follower O/Ps, ECL compatible.

APPLICATIONS

- UHF Instrumentation, Including Counters and Timers
- Prescaling for UHF Synthesisers.

ABSOLUTE MAXIMUM RATINGS

Power supply voltage	$V_{CC} - V_{EE}$	10 volts
Input voltage	V_{INac}	2.5 volts p-p
Output current		15mA
Storage temperature range		-55°C to +150°C
Maximum operating function temperature		+150°C

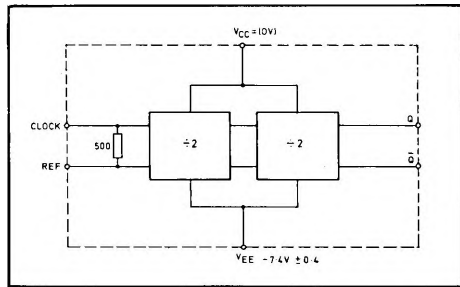


Fig. 2 Functional diagram

QUICK REFERENCE DATA

- $V_{CC} = 0V$
- $V_{EE} = -7.4V \pm 0.4V$
- Input Voltage Range 400mV to 1.2V (see Fig. 3)
- Output Voltage Swing 700mV Typ.
- Temp. Range: 'B' Grade 0°C to +75°C
'M' Grade -40°C to +85°C

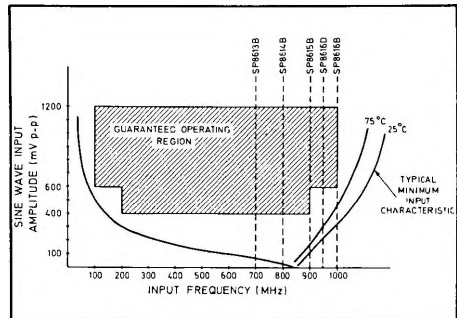


Fig. 3 Specified range of operation

ELECTRICAL CHARACTERISTICS

Test conditions (unless otherwise stated).

T_{amb} = 'B' grade: 0°C to +70°C; 'M' grade: -40°C to +85°C
 Supply voltage
 $V_{CC} = 0V$
 $V_{EE} = -7.4V \pm 0.4V$

Characteristic	Type	Value			Units	Conditions
		Min.	Typ.	Max.		
Max.toggle frequency	SP8616	1000			MHz	$V_{IN} = 600mV$ to 1.2Vp-p (see Fig. 3)
	SP8615	900			MHz	$V_{IN} = 400MHz$ to 1.2V p-p
	SP8614	800			MHz	$V_{IN} = 400MHz$ to 1.2V p-p
	SP8613	700			MHz	$V_{IN} = 400MHz$ to 1.2V p-p
Min.toggle frequency for correct operation with sine wave input	ALL			200	MHz	$V_{IN} = 400mV$ to 1.2V p-p
Min.toggle frequency for correct operation with sine wave input	ALL			100	MHz	$V_{IN} = 600mV$ to 1.2V p-p
Min slew rate for square wave input to guarantee operation to 0Hz	ALL			200	V/ μs	
Output voltage swing	ALL	500	700		mV	
Power supply drain current	ALL		45	60	mA	$V_{EE} = -7.4V$

Toggle Frequency Test Board Layout

1. All connections to the device are kept short.
2. The capacitors are leadless ceramic types.
3. In practice, the device is tested in an Augat .14 lead DIL socket which degrades the performance slightly. If the device is mounted in a low profile socket or soldered into a printed circuit board, the specified performance will be exceeded.

OPERATING AND APPLICATION NOTE

The SP8616 series of dividers are very simple to use but normal high frequency rules should be followed for optimum performance, for example, all connections should be kept short, the capacitors and resistors should be types suitable for the frequencies involved, etc.

The input is normally capacitively coupled to the signal source. There is an internal 500Ω resistor connecting the input to a reference voltage; this biases the input in the middle of the transfer characteristic. The reference voltage is brought out onto pin 6, which should be decoupled to the earth plane.

The sensitivity of the device can be increased by DC coupling the input signal about earth (see Fig. 5).

$V_{CC} - V_{EE}$ should be kept inside the specified 7.4 volts ± 0.4 volts but the actual value of V_{CC} relative to earth is not very critical and can be varied between 4.0V and 6.0V with only a small effect on performance. A V_{CC} of about 5.2V is the optimum for full temperature range operation.

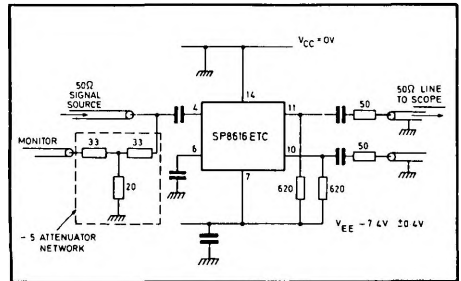


Fig. 4 Toggle frequency test circuit

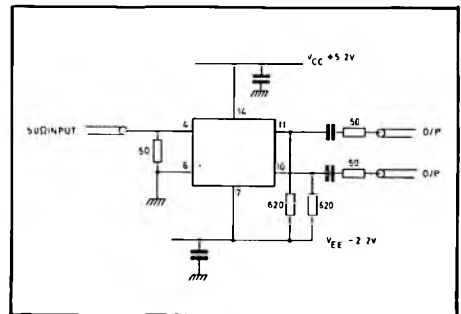


Fig. 5 Circuit for using the input signal about earth potential

