PLESSEY
SEMICONDUCTORS

SP1600 SERIES
ECL III

SP1658
VOLTAGE-CONTROLLED MULTIVIBRATOR

The SP1658 is a voltage-controlled multivibrator which provides appropriate level shifting to produce an output compatible with PECL III and PECL 10,000 logic levels. Frequency control is accomplished through the use of voltage-variable current sources which control the slew rate of a single external capacitor.

The bias filter may be used to help eliminate ripple on the output voltage levels at high frequencies and the input filter may be used to decouple noise from the analog input signal.

The PECL1658 is useful in phase-locked loops, frequency synthesizer and clock signal generation applications for instrumentation, communication, and computer systems.

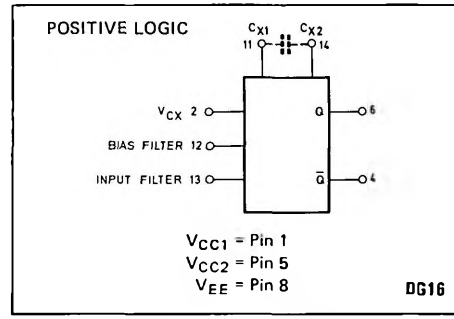

Fig. 1 Block diagram of SP1658

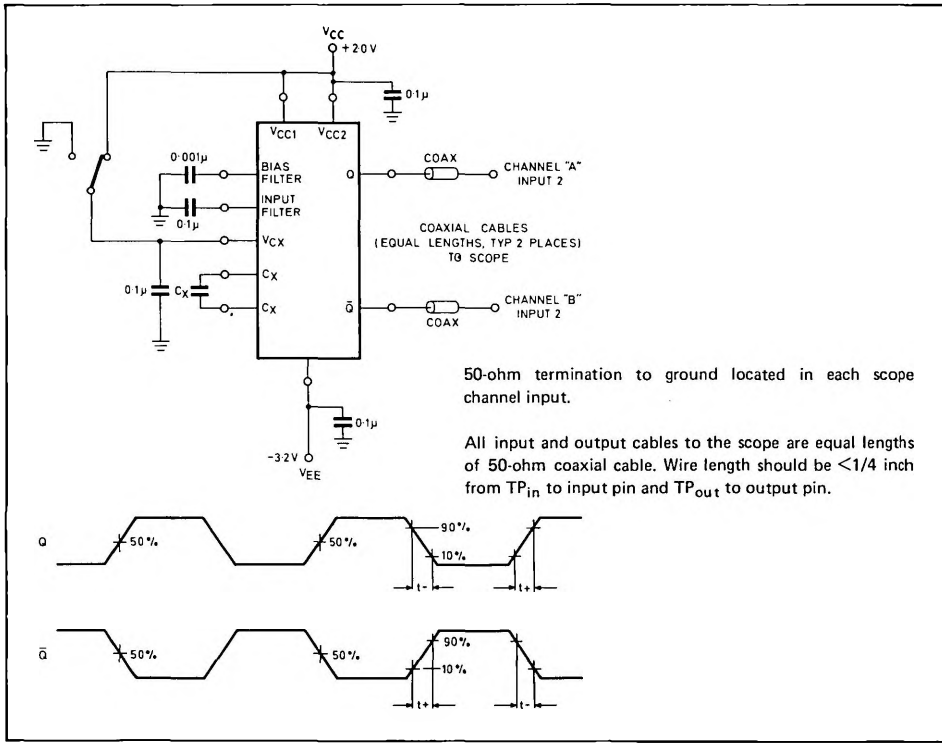

Fig. 2 AC test circuit and waveforms

ELECTRICAL CHARACTERISTICS

This PECL III circuit has been designed to meet the dc specifications shown in the test table, after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse air flow greater than 500 linear fpm is maintained. Outputs are terminated through a 50-ohm resistor to −2.0 volts.

@ Test Temperature	TEST VOLTAGE VALUES (Vdc ±1%) V_{IH}	V_{IL}	V_3	V_{IHA}	V_{EE}
0°C	−0.0	−2.0	−1.0	+2.0	−5.2
+25°C	−0.0	−2.0	−1.0	+2.0	−5.2
+75°C	−0.0	−2.0	−1.0	+2.0	−5.2

Characteristic	Symbol	Pin Under Test	SP1658 Test Limits 0°C Min	0°C Max	+25°C Min	+25°C Typ	+25°C Max	+75°C Min	+75°C Max	Unit	VOLTAGE APPLIED TO PINS LISTED BELOW V_{IH}	V_{IL}	V_3	V_{IHA}	V_{EE}	Gnd
Power Supply Drain Current	I_E	8 *	–	–	–	–	32	–	–	mAdc	2	–	–	–	8	1,5
		8 * *	–	–	–	–	32	–	–	mAdc	2	–	–	–	8	1,5
Input Current	I_{inH}	2 *	–	–	–	–	350	–	–	µAdc	2	–	–	–	8	1,5
Input Leakage Current	I_{inL}	2 *	–	–	−0.5	–	–	–	–	µAdc	–	2	–	–	8	1,5
"Q" High Output Voltage	V_{OH}	4 *	−1.000	−0.840	−0.960	–	−0.810	−0.900	−0.720	Vdc	–	–	2	–	8	1,5
		6 * *	−1.000	−0.840	−0.960	–	−0.810	−0.900	−0.720	Vdc	–	–	2	–	8	1,5
"Q" Low Output Voltage	V_{OL}	4 *	−1.870	−1.620	−1.850	–	−1.620	−1.850	−1.595	Vdc	–	–	2	–	8	1,5
		6 * *	−1.870	−1.620	−1.850	–	−1.620	−1.850	−1.595	Vdc	–	–	2	–	8	1,5
AC Characteristics (Figure 2) (Tests shown for one output, but checked on both)											C_{X1}	C_{X2}	Gnd	V_{ILA} +1.0V	V_{IHA} +2.0V	V_{EE} −3.2V	V_{CC} +2.0V
	t†	6	–	2.5	–	1.6	2.5	–	2.7	ns	–	11,14	–	–	2	8	1,5
	t−	6	–	2.5	–	1.4	2.5	–	2.7		–		–	–	2		
	t+	6	–	4.6	–	3.7	4.6	–	4.8		–		–	2	–		
	t−	6	–	4.2	–	2.4	4.2	–	4.4		–		–	2	–		
Rise Time (10% to 90%)	t+	6	–	8.5	–	5.7	8.5	–	8.7		–		2	–	–		
Fall Time (10% to 90%)	t−	6	–	8.5	–	5.9	8.5	–	8.7		–		2	–	–		
Oscillator Frequency	f_{osc1}	–	130	–	130	155	175	110	–	MHz	–	11,14	–	–	2	8	1,5
	f_{osc2}	–	–	–	78	90	100	–	–	MHz	11,14	–	–	–	2	8	1,5
Tuning Ratio Test †	TR	–	–	–	3.1	4.5	–	–	–	–	11,14	–	–	–	–	8	1,5

* Germanium diode (0.4 drop) forward biased from 11 to 14 (11 ——▷|—— 14).
* * Germanium diode (0.4 drop) forward biased from 14 to 11 (11 ——|◁—— 14).

†TR = $\frac{\text{Output frequency at } V_{CX} = \text{Gnd}}{\text{Output frequency at } V_{CX} = -2.0\text{ V}}$

C1 = 0.01 µF connected from pin 12 to Gnd.
C2 = 0.001 µF connected from pin 13 to Gnd.
C_{X1} = 10 pF connected from pin 11 to pin 14.
C_{X2} = 5 pF connected from pin 11 to pin 14.

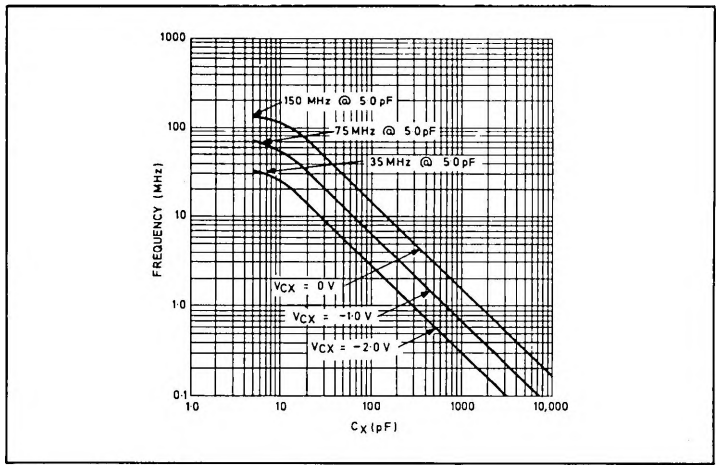

Fig. 3 Output frequency v capacitance for three values of input voltage

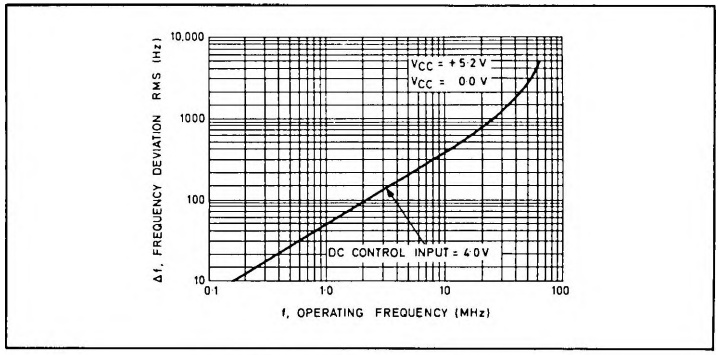

Fig. 4 RMS noise deviation v operating frequency

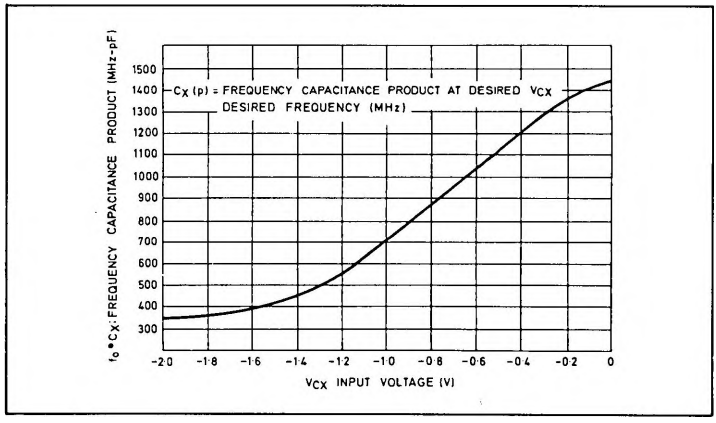

Fig. 5 Frequency-capacitance product v control voltage V_{CX}