Preliminary Data Sheet
September 1992

AT&T Microelectronics

158-Type Voltage-Controlled SAW Oscillator (VCSO)

The 158-Type Voltage-Controlled SAW Oscillator (VCSO).

Features

- Compatible with SONET at 622.08 MHz
- High-Q SAW-resonator based design
- Sinusoidal output voltage (into a 50 Ω load)
- ECL output, other frequencies available by 1993
- Phase noise better than –95 dBc/Hz at 1 kHz from carrier
- Second and third harmonic distortion less than –20 dBc
- Spurious tones less than –60 dBc
- High reliability

Description

The 158-Type Voltage-Controlled SAW Oscillator (VCSO) is a high-performance oscillator that operates at the fundamental frequency of the internal SAW resonator. The resonator is a high-stability, high-Q quartz device which enables the circuit to achieve low phase noise performance over a wide temperature range. The circuit is hermetically sealed in a 16-pin, double-width, metal DIP. The package is compact, with overall dimensions (excluding leads) of 0.80 in. x 0.97 in. x 0.28 in. (W x L x H).

The first oscillators in this family, the 158A and the 158B, are available at a nominal frequency of 622.08 MHz. They are designed for synchronization of a 622.08 Mbits/s OC-12 signal to a 51.84 Mbits/s clock rate in optical communication systems using the SONET standards. They are also suited for use in clock or data retiming applications.

Pin Information

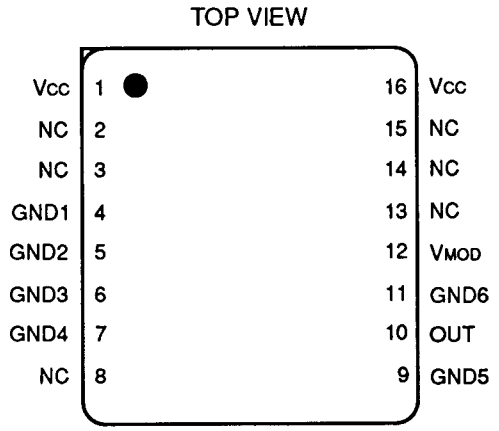


Figure 1. Pin Diagram

Table 1. Pin Descriptions

Pin	Symbol	Description
1	Vcc	Supply voltage (12.0 V ± 5%).
2	NC*	No connect.
3	NC	No connect.
4	GND1	Circuit and package ground.
5	GND2	Circuit and package ground.
6	GND3	Circuit and package ground.
7	GND4	Circuit and package ground.
8	NC	No connect.
9	GND5	Circuit and package ground.
10	OUT	Output waveform.
11	GND6	Circuit and package ground.
12	VMOD	Modulation voltage.
13	NC	No connect.
14	NC	No connect.
15	NC	No connect.
16	Vcc	Supply voltage (12.0 V ± 5%).

* It is recommended that NC pins be grounded.

Electrical Specifications

158A/B

Table 2. Electrical Specifications

Note: All measurements taken with a nominal load impedance of 50 Ω at a return loss of ≥20 dB.

Parameter	Value
Output Frequency	622.08 MHz ± 20 ppm
Operating Temperature Range: 158A 158B	 –40 °C to +85 °C 0 °C to 70 °C
Power Supply Voltage	12 V ± 5% at 65 mA max
Tuning Voltage (VMOD)	1 V to 10 V (0 V to 12 V max)
Tuning Sensitivity	20 kHz/V to 100 kHz/V (VMOD = 1 V to 10 V)
Tuning Voltage Input Impedance	180 pF in parallel with 10 kΩ nominal
Output Power	7.5 dBm to 12 dBm at 622.08 MHz (ac coupled)
Second Harmonic Level	≤–20 dBc
Spurious Tone Level	≤–60 dBc
Phase Noise	≤–95 dBc/Hz at 1 kHz from carrier
Modulation Bandwidth	90 kHz

Application

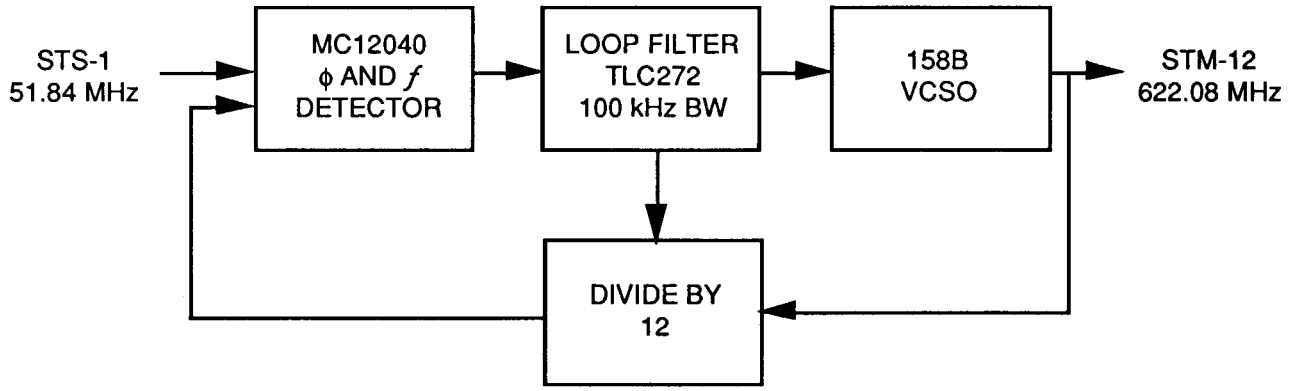


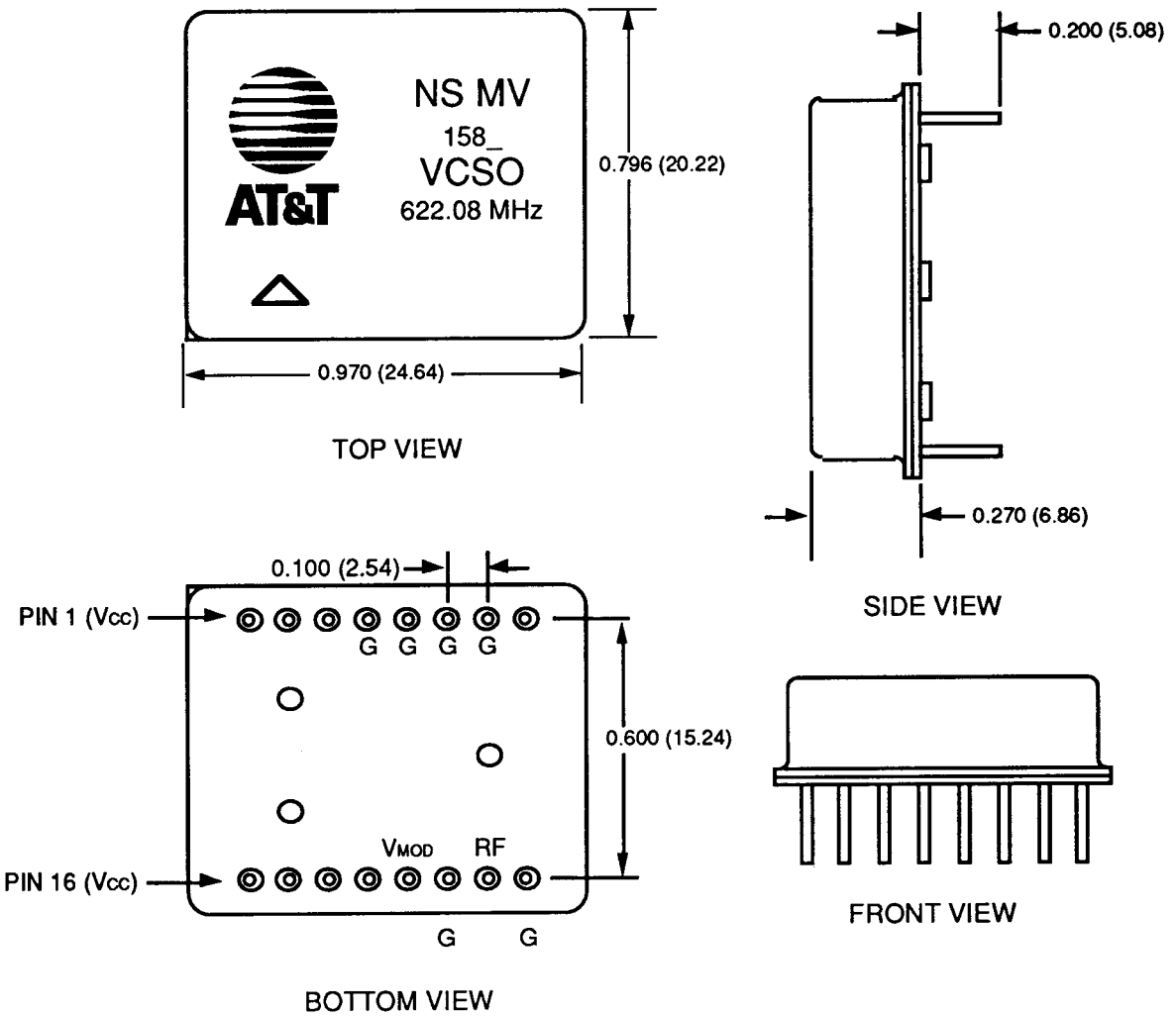
Figure 2. SONET STS-1 to STS-12 Frequency Synthesizer

A typical application for the 158-type SAW oscillator is frequency synthesis of a base frequency to a higher frequency. In Figure 2, the STS/OC-12 rate of 622.08 MHz is being phase-locked to an STS/OC-1 SONET rate of 51.84 MHz. The phase-locked loop contains a phase frequency detector, a loop filter based upon an operational amplifier, a divider set to divide by 12, and the 158 VCSO. The noise level and the acquisition time of the phase-locked loop will be determined by the loop filter bandwidth, which for this example has been set at 100 kHz. The SONET STS/OC-12 rate can be phase-locked to any submultiple frequency by selecting the appropriate divider. A similar application based upon this type of layout might involve clock and data recovery of a SONET STS/OC-12 rate or some submultiple of that frequency.

Outline Diagram

16-Pin Double-Width Metal Can DIP

Dimensions are in inches and (millimeters).



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September 1992
DS92-123PIZ

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