

OPTOELECTRONICS, INC.
UTC151 OPERATOR'S MANUAL

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INTRODUCTION

This document describes the operation of the Optoelectronics, Inc. Model UTC151 Frequency Counter Module. The UTC151 counts frequencies up to 175 MHz, and provides two inputs and four gate times.

EXTERNAL CONNECTIONS

All connections to the UTC151 Frequency Counter Module are made through a 14-pin male double-row header, located on the rear panel. The signals available on the connector are summarized in Table 1 below. Following the table is a description of each of the signals.

Table 1. Connector Pinout.

PIN	SIGNAL	TYPE
1	GND	Power
2	GND	Power
3	OSC-EN*	Output
4	OE30-PWRDWN*	Output
5	INPUT*	Input
6	GATE*	Input
7	GATE-SEL0*	Input
8	GATE-SEL1*	Input
9	N.C.	N/A
10	INPUT-B	Input
11	INPUT-A	Input
12	GND	Power
* 13	+5VDC	Power
14	GND	Power

GND

These four connector pins provide the ground reference for the power supply, as well as all input and output signals.

OSC-EN*

This TTL output signal allows the UTC151 to control an external oscillator. When input A is selected, the UTC151 enables the external oscillator by asserting this signal (TTL low). When input B is selected, or when the UTC151 is in SLEEP mode, the UTC151 disables the external oscillator by negating this signal (TTL high). The electrical specifications for this signal are as follows:

TTL low: 0.4 V max., 1.6 mA max. sink current

TTL high: 3.8 V min., 0.4 mA max. source current

CTR

OE30-PWRDWN*

This TTL output signal, when asserted (TTL low), indicates that the OE30 counter chip is in power down mode. This occurs when the UTC151 is in SLEEP mode. When the UTC151 is in normal operation, this signal is negated (TTL high). The electrical specifications for this signal are as follows:

- TTL low: 0.4 V max., 1.6 mA max. sink current
- TTL high: 3.8 V min., 0.4 mA max. source current

INPUT*

This TTL input signal selects between counter inputs A and B. This signal is fully debounced, and a weak pull-up is provided internally. Therefore, a normally-open, momentary push-button switch can be connected between this signal and ground. Each time the push-button switch is pressed and released, the opposite input is selected. The currently selected input is indicated by the corresponding annunciator on the display. This signal can also be driven by TTL logic. However, due to the debounce logic, the minimum duration of any input state is 60 milliseconds. The electrical specifications for this signal are as follows:

- TTL low: 0.8 V max., 250 μ A max. load current
- TTL high: 3.9 V min., 2 μ A max. load current

GATE*

This TTL input signal selects the gate time, and hence the measurement resolution, of the counter. This signal is fully debounced, and a weak pull-up is provided internally. Therefore, a normally-open, momentary push-button switch can be connected between this signal and ground. The UTC151 has four gate settings. Each time the push-button switch is pressed and released, the next gate setting is selected. The currently selected gate setting is indicated by the position of the decimal point on the frequency display. The four gate settings supported are summarized in Table 2 below. This signal also has an alternate function. When the UTC151 is turned on while pressing and holding the GATE push-button switch, the five-minute SLEEP mode timeout function is disabled. This signal can also be driven by TTL logic. However, due to the debounce logic, the minimum duration of any input state is 60 milliseconds. The electrical specifications for this signal are as follows:

- TTL low: 0.8 V max., 250 μ A max. load current
- TTL high: 3.9 V min., 2 μ A max. load current

Table 2. UTC151 Gate Settings.

GATE SETTING	GATE TIME	MEASUREMENT TIME	MEASUREMENT RESOLUTION	EXAMPLE (MHz)
1	10 mS	25 mS	100 Hz	162.5500
2	100 mS	130 mS	10 Hz	162.55000
3	1 S	1 S	1 Hz	162.550000
4	10 S	10 S	0.1 Hz	162.5500000

GATE-SEL0*

GATE-SEL1*

These TTL input signals select the power-up default gate setting of the counter. These signals are read once at power-up, and are ignored at all other times. A weak pull-up is provided internally. Therefore, leaving the signals open is interpreted as a TTL high, and grounding the signals is interpreted as a TTL low. The four power-up-default gate settings supported are summarized in Table 3 below. These signals can also be driven by TTL logic. The electrical specifications for these signals are as follows:

TTL low: 0.5 V max., 250 μ A max. load current

TTL high: 3.9 V min., 2 μ A max. load current

Table 3. UTC151 Power-up Default Gate Settings.

GATE SETTING	GATE-SEL0*	GATE-SEL1*
1	TTL high	TTL high
2	TTL low	TTL high
3	TTL high	TTL low
4	TTL low	TTL low

INPUT-A

This input is the direct AC coupled input to the frequency counter. Signals up to 175 MHz can be counted through this input. The amplitude of signals presented to this input should not exceed 2.5 volts peak-to-peak.

INPUT-B

This input is the 50 Ω AC coupled input to the frequency counter. This input provides a 50 Ω amplifier stage. When counter input A is selected, the amplifier is disabled. Signals up to 175 MHz can be counted through this input. The amplitude of signals presented to this input should not exceed 2.5 volts peak-to-peak.

+5VDC

DC power is supplied to the UTC151 through this connector pin. The supply voltage range is 4.75 - 5.25 VDC, 100 mA max.

FRONT PANEL DISPLAY

The UTC151 front panel display consists of a ten-digit Liquid Crystal Display (LCD) module. The results of all frequency measurements are displayed here, as well as various annunciators.

FRONT PANEL INDICATOR

The UTC151 has one Light-Emitting Diode (LED) front panel indicator. This indicator LED flashes each time a measurement is successfully completed. The amount of time between flashes of the indicator LED is equal to the currently selected measurement time (see Table 2). At the shortest measurement time, the indicator LED will flash so fast that, to the human eye, it will appear to be on continuously.

POWER-UP

When the UTC151 is turned on by applying DC power to the +5VDC pin, a display self-test is performed by illuminating all front panel display segments for approximately two seconds. "MFJ" is then displayed for an additional two seconds. The UTC151 then begins normal operation with the currently selected power-up default gate setting, and the five-minute SLEEP mode timeout function enabled. To disable the five-minute SLEEP mode timeout function, press and hold the GATE push-button switch before turning on the UTC151. Once the display self-test begins, release the GATE switch.

SLEEP MODE

The UTC151 has an internal five-minute SLEEP mode timer. Each time the INPUT or GATE push-button switch is pressed, the timer is reset to five minutes. If five minutes have elapsed since the last time either push-button switch was pressed, the UTC151 automatically enters SLEEP mode, and "SLEEP----" is displayed on the front panel display. In "SLEEP" mode, the OE30 counter chip, the 50 Ω amplifier, and the external oscillator are disabled to conserve battery power. Once in SLEEP mode, pressing either the INPUT or GATE push-button switch causes the UTC151 to resume normal operation. The SLEEP mode timeout function can be disabled as described above.