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Technical Note

The OE and ST Functions of Oscillators

Most of Epson's oscillators have either an OE (Output Enable) or a ST (Stand-by) function. These functions affect the output of the oscillator. A description of both functions follows.

Output Enable: OE

The OE function serves to tri-state the output of the oscillator. The OE input terminal is active high. When the terminal is put at a low level, the output of the oscillator will go into a high impedance state. Oscillation is not stopped when the output is disabled. When the OE terminal is cleared, the output is not synchronized (Figure 1).

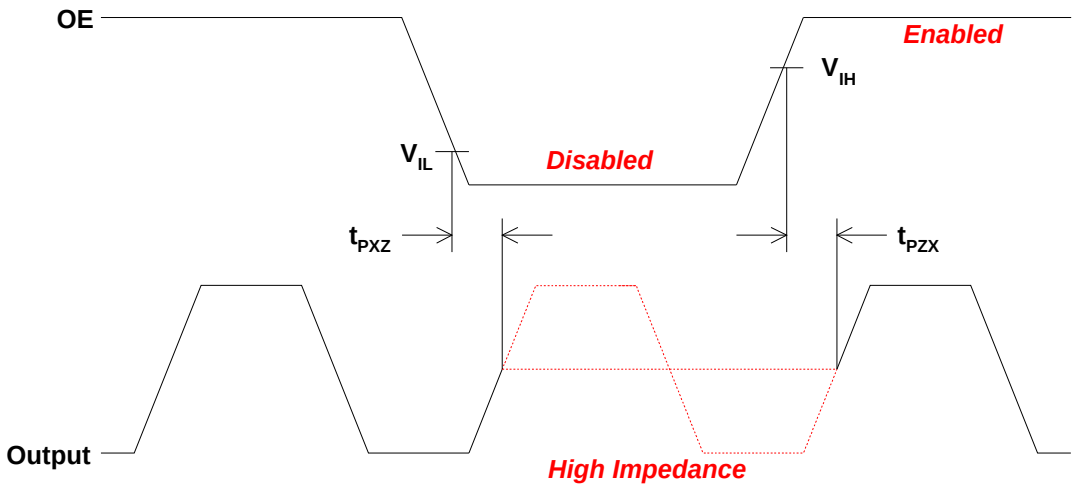

Figure 1 Output Enable

There is an output disable time, t_{PXZ}, which is the time taken from the OE input terminal reaching the low level input voltage (V_{IL}) to the output of the oscillator being disabled (high impedance). The output enable time, t_{PZX}, is the time taken from the OE input terminal reaching the high level input voltage (V_{IH}) to the output of the oscillator being enabled.

Stand-by: ST

The ST function stops oscillation and puts the output at a low level. The ST input terminal is active low. When the terminal is put at a low level, the output of the oscillator goes to a low level. Since the oscillator is stopped when in ST mode, the current consumption is dramatically reduced. When the ST terminal is cleared, the oscillator must go through a startup period (Figure 2).

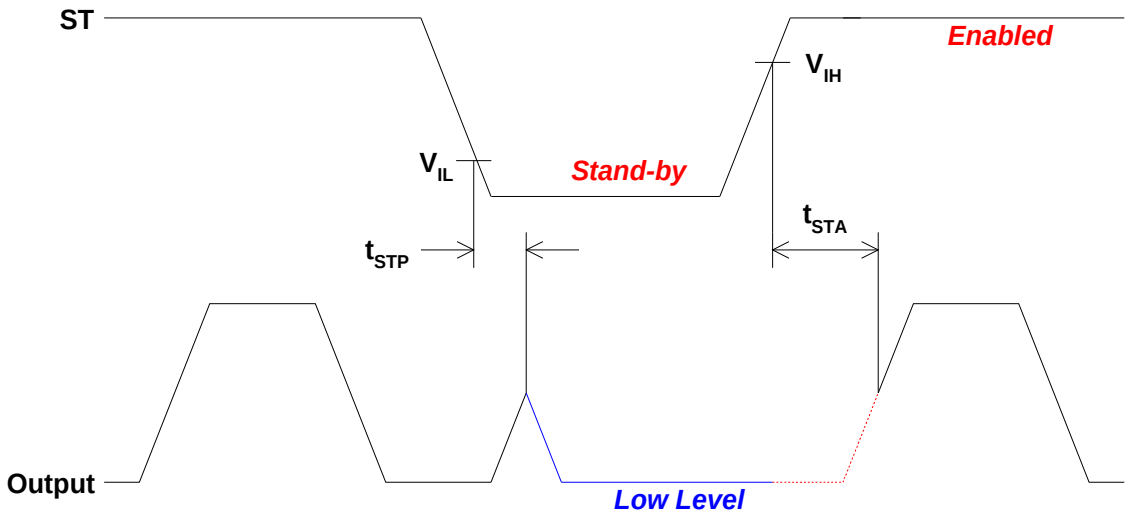

Figure 2 Stand-by

There is an output disable delay, t_{STP}, which is the time taken from the ST input terminal reaching the low level input voltage (V_{IL}) to the output of the oscillator going to a low level. The output enable delay, t_{STA}, is the time taken from the ST input terminal reaching the high level input voltage (V_{IH}) to the output of the oscillator starting.

If the OE/ST terminal is left open, the logic level will be fixed high. Therefore in most cases it is acceptable to leave the terminal Open.[1]

[1] In the case of high external noise, it may be necessary to tie the terminal high.

SG-8002 Oscillators and the OE/ST Terminal

The SG-8002 series oscillators have either an OE (Output Enable) or a ST (Stand-by) function. These two functions are controlled by a terminal input on the oscillator (Please refer to the technical note: *The OE and ST Functions of Oscillators* on the usage of these functions). The OE/ST input terminal has a built-in resistor described as follows.

The built-in resistor switches from a low to high value depending on the voltage level presented at the input of the OE/ST terminal. When the input voltage level is high or open, then the resistor value will be low, approximately 30kΩ (Figure 1). When the input level is low, then the pull-up resistor will be high, several MΩ (Figure 2).

If the OE/ST terminal is left open, the logic level will be fixed high. Therefore in most cases it is acceptable to leave the terminal Open.[2] When the input level is low the pull-up resistor is switched into high impedance. This means that the current through pull-up resistor will be reduced and lower the current consumption of the oscillator.[3]

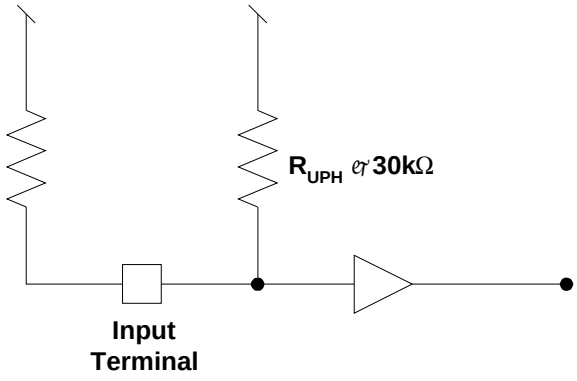

Figure 3 Input level is high or open

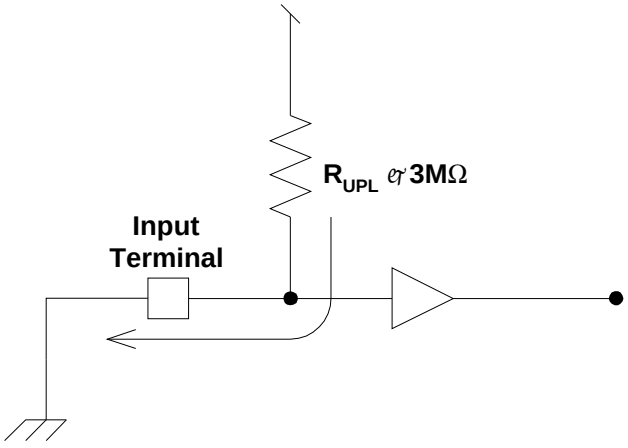

Figure 4 When the input level is low

[2] In the case of high external noise, it may be necessary to tie the terminal high.
[3] The current consumption depends on the function, OE or ST.

Table 1 Pull-Up Resistor Values

Symbol	Resistor Definition	Min	Typ	Max	Unit	Condition
R_{UPH}	High level or open	15	30	100	kΩ	Vin=0.7Vdd
R_{UPL}	Low level	1.1	3.0	8.0	MΩ	Vin=0V