

## Proposal To Specify Leakage Current On INTRQ Line

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Present ATA standards require a host computer to supply a 10K pull-up or pull-down resistor on the INTRQ line of the ATA bus. The device side controls this line with a tri-state buffer and the purpose of the resistor is to hold the line at a known level during times the drives are not actively driving the line.

Many hosts employ a pull-up resistor and sense the interrupt as an edge-trigger. Such configurations are not affected by this proposal, as they are not susceptible to leakage current during tri-state.

Some hosts use the pull-down resistor and prefer to treat the interrupt request line as a lever-triggered input. In this case, the leakage current during tri-state may become a source of spurious interrupts if the voltage across the pull-down exceeds the logic-low threshold. Given a  $V_{IL}$  of 0.8 volts and the specified 10K-Ohm pull-down, this implies that the maximum leakage current is 80  $\mu$ a (micro-amps). Further, this current is the combined total of two possible drives on a bus, each device must contribute less than 40  $\mu$ a (micro-amps).

This figure has been implicit in the standard based on the component values and threshold voltages specified in Section 4.

Proposal A:

Add to Section 4, Table 3 – DC characteristics, a note reading:

**4. A device shall have less than 40  $\mu$ a (micro-amps) of leakage current into a 10K Ohm pull-down resistor while the INTRQ line is in a tri-state mode.**

Alternative:

However, in reality, there have been a significant number of drives in the past that have far greater leakage current when the INTRQ line is in tri-state. For this reason, many hosts have been built with a pull-down resistor significantly less than 10K ohms. Implicitly in the electrical specifications, the INTRQ buffer on the drive side should be able to adequately drive logic high into as low as 6K ohms in the pull-down configuration. This is based on  $V_{OH}$  of 2.4 volts and driver source current of 400  $\mu$ a as defined in Section 4, Table 3 of ATA/ATAPI 6.

As an alternative, I would propose that the pull-down resistor be specified as 6.2K or greater ohms and the leakage current limit may be correspondingly increased 129  $\mu$ a (micro-amps) or less than 64  $\mu$ a (micro-amps) for each drive.

Alternative Proposal:

Change Section 4, Table 5 – Driver types and required termination, note 5 to read:

**5. A 10K-Ohm pull-up or 6.2K-Ohm pull-down resistor, depending on the level sensed, should be implemented at the host.**

Add to Section 4, Table 3 – DC characteristics, a note reading:

**4. A device shall have less than 64  $\mu$ a (micro-amps) of leakage current into a 6.2K-Ohm pull-down resistor when the INTRQ line is in the tri-state mode.**