Low Power SCSI for Laptops

- Laptop computers need to limit the power for longer battery life.
  - Battery power units may not be able to provide TERMPWR for the far end terminators.
  - Battery power units may not be able to power the terminator inside in normal power mode when an external cable is attached.
- High performance and low power must work together.
  - Size TERMPWR fusing for the application, 1 Amp min for 8 bit bus and 1.5 Amp for 16 bit bus.
  - Regulated terminators reduce the TERMPWR current.
  - Low power mode for the terminators on short bus configurations, automatic termination current adjustment when external cables are added.

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- Power Down Modes required when the SCSI devices are not in use, this includes powering down the SCSI bus, Termination, and controllers.
  - No device errors when the bus is powered down or hang conditions.
- 3.3 Volt operation compatible with 5.0 Volt devices.
  - Termpwr 2.8 < 5.25 Volts to the terminators at the far end of the cable.
  - Units may require TERMPWR to be supplied externally for the controller terminator to run in normal power mode versus low power mode when running the internal bus only.

X3T10/94-229R1 SPI-LP
SCSI-3 SPI Low Power

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Abstract:
This standard defines the additional requirements for low power applications over the SCSI-3 Parallel Interface (SPI) standard. This is not a standalone document, but an additional requirements document for low power applications, only the differences with SPI are defined in this document.

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1.0 Foreword:
A requirement has developed by low power applications, energy star/green power applications, Laptop and PCMCIA for a low power version of SCSI-3 SPI. This effects the TERMPWR voltage, termination, Signal when Termination is turned off, and powering down devices, it does not effect the thresholds.

1.1 Scope:
This document specifies items that are different than SCSI-3 SPI, it is not a complete parallel SCSI definition. Items not define in this document, SCSI-3 SPI rules apply.

2.0 Termination Power Considerations
The single-ended SCSI bus is a traditional open collector style bus requires a lot power to the termination and drivers when the bus is driven. The passive termination requires a lot of power even when the bus is inactive. Terminator current requirements must be minimized.

2.1 Idle Bus Termination Current
The original 220/330 ohm passive termination can consume 181 mA on each end of the bus when the bus is free. **Passive termination shall not be used in low power applications**.

Termination that uses a combination of resistors and diode known as “force perfect termination” shall not be used. It violates SCSI-3 SPI and requires high idle current.

Regulated terminators draw very little current 1 < 30 mA at each end of the bus for existing regulated terminators when the bus is free. The newer versions of the terminators can be limited to 5 mA maximum for each end of the bus.

Regulated terminator power can be drastically reduced when the bus is not active by powering down the terminators. Drives should be spin down first then the termination powered down during inactivity periods. Laptops currently spin down drives during inactivity periods, the spin up time is considerably longer

2.2 Termination Operation Current
Battery operated systems are generally small systems that do not have heavy device loads or long cable lengths. Small systems do not need high pull up current.

Short buses do not need the normal pull up current to operate, 24 mA maximum at each end of the bus will allow 3 to 6 meter operation, less than 0,2 meters 1 mA pull up with 3 devices is less than 10 nS rise time, less than 0.3 meters 2 mA pull up is less than 10 nS.

2.3 Low Power Termination Restrictions

a.) SCSI Low Power shall use regulated terminators.
b.) Regulated terminator idle current shall be <5 mA for 18 lines and <7 mA for 27 lines for each end of the bus.
c.) Disconnect terminators shall be <15 μA.

3.0 Drive Spinning Considerations
Spinning down drives to conserve power must consider the life of the drive. Drives must be designed for the application with park and more start/stop life than normal. A basic design rule has been 1 power up cycle per day with a minimum of 3 year life powered on each day. Inactivity spin down can mean 100 drive spin ups a day as an average. The high spin up power compared to the run power must be carefully reviewed. Spinning down a drive may not conserve power if the drive is stopped for too short of a time.