

Dust Networks

SmartMesh®

LTP5903PC Integration Guide



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About This Guide

This product integration guide provides application circuit information for the SmartMesh® LTP5903PC wireless embedded network manager. This guide is a companion to the 020-0039 SmartMesh LTP5903PC Datasheet, which describes overall product behavior, including detailed information about normal operating conditions, electrical and mechanical specifications, hardware and software interfaces, and connector pinouts.

Related Documents

The following documents are available for the SmartMesh-enabled network:

020-0072 SmartMesh LTP5903PC Integration Guide (this guide)

020-0039 SmartMesh LTP5903PC Datasheet

040-0069 SmartMesh IA-510 Manager XML API Guide

040-0067 SmartMesh IA-510 Mote Serial API Guide

040-0073 SmartMesh IA-510 Admin Toolset Guide

040-0074 SmartMesh IA-510 CLI Commands Guide

Conventions and Terminology

This guide uses the following text conventions:

- Computer type indicates information that you enter, such as a URL.
- **Bold type** indicates, buttons, fields, and menu commands.
- *Italic type* is used to introduce a new term.
- **Note:** Notes provide more detailed information about concepts.
- **Caution:** Cautions advise about actions that might result in loss of data.
- **Warning:** Warnings advise about actions that might cause physical harm to the hardware or your person.

Revision History

Revision	Date	Description
1	8/13/09	Final (product release)
2	10/21/09	
3	11/9/09	
4	8/6/2010	
5	12/1/2010	
6	4/20/2012	Updated to Linear Product Numbering

1 Introduction

This chapter provides a brief overview of the features of the SmartMesh LTP5903PC wireless embedded network manager. For detailed product specifications, refer to the *020-0039 SmartMesh LTP5903PC Datasheet*.

Product Overview

The LTP5903PC embedded network manager combines Dust Networks' robust intelligent networking and industry-leading low-power radio technology in an easy-to-integrate embedded subsystem. A central part of the SmartMesh system, the LTP5903PC provides customers with a complete embedded wireless sensor networking solution.

The LTP5903PC is designed for use in line-powered gateways and controllers, and enables customers to develop wireless sensor networks that deliver high performance and scalability. Sophisticated network management algorithms deliver dynamic network optimization and intelligent routing to achieve high reliability, low latency, and deterministic power management. Additionally, the embedded network manager offers a comprehensive set of APIs for easy software development.

The network-ready embedded manager enables customers to integrate advanced wireless sensor networking intelligence into monitoring and control solutions with low risk and rapid time-to-market.

2 Application Circuits

This chapter provides detailed application circuit information and diagrams for the LTP5903PC. Refer to the *020-0039 SmartMesh LTP5903PC Datasheet* for specifications on these interfaces.

Unused Interfaces

When incorporating the LTP5903PC, any unused inputs should be weakly pulled to their inactive state via a 100-kOhm resistor. Unused outputs should remain unconnected.

10/100Base-T Ethernet Interface

The RX_P and RX_N signals are the receive-side differential pair. The levels should conform to 10/100Base-T Ethernet. The receive signals are a 100-Ohm differential pair and should be routed accordingly on the user's PCB.

The TX_P and TX_N signals are the transmit-side differential pair. The levels should conform to 10/100Base-T Ethernet. The TX_P and TX_N signals are a 100-Ohm differential pair and should be routed accordingly on the user's PCB.

The six 10/100Base-T signals should be connected directly to the transformer, as shown in Figure 1. The transformer should be a Pulse Engr. HX1188NL or equivalent. All 10/100Base-T wiring between the LTP5903PC and the RJ-45 connector should be short and direct. Each differential signal pair should be the same length and the lines should be coupled tightly together.

There are four components labeled as "NoStuff." These components may be needed to meet RF emission and susceptibility requirements.

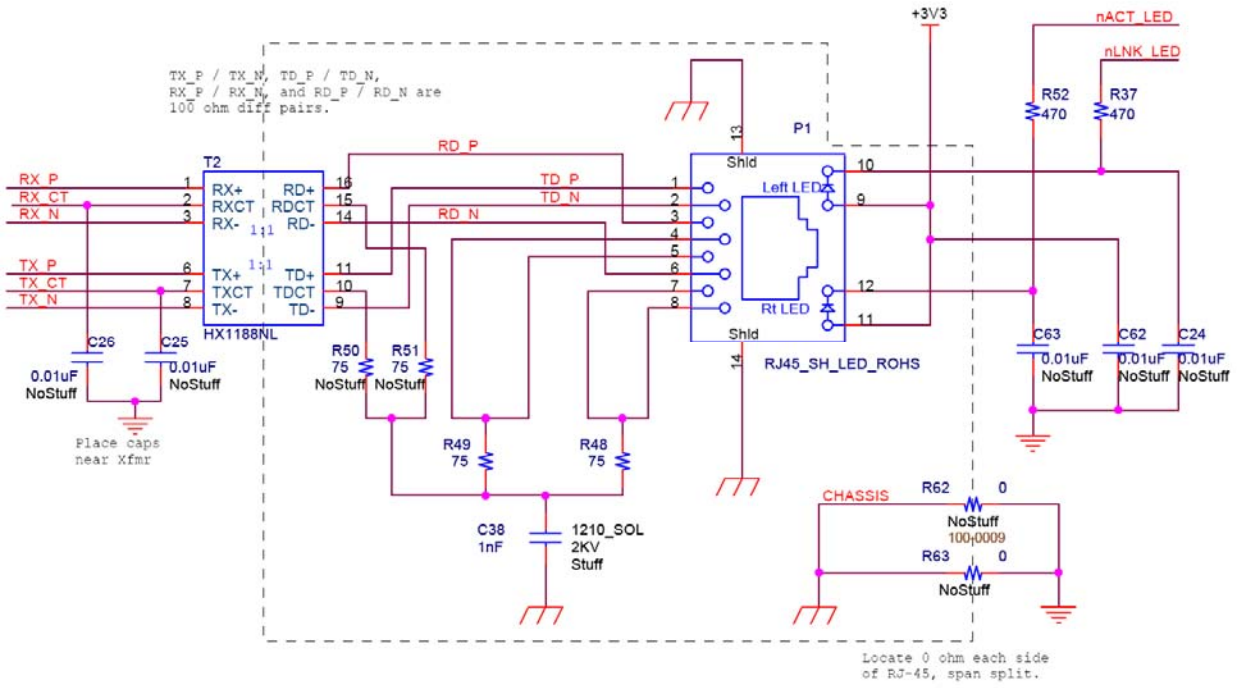
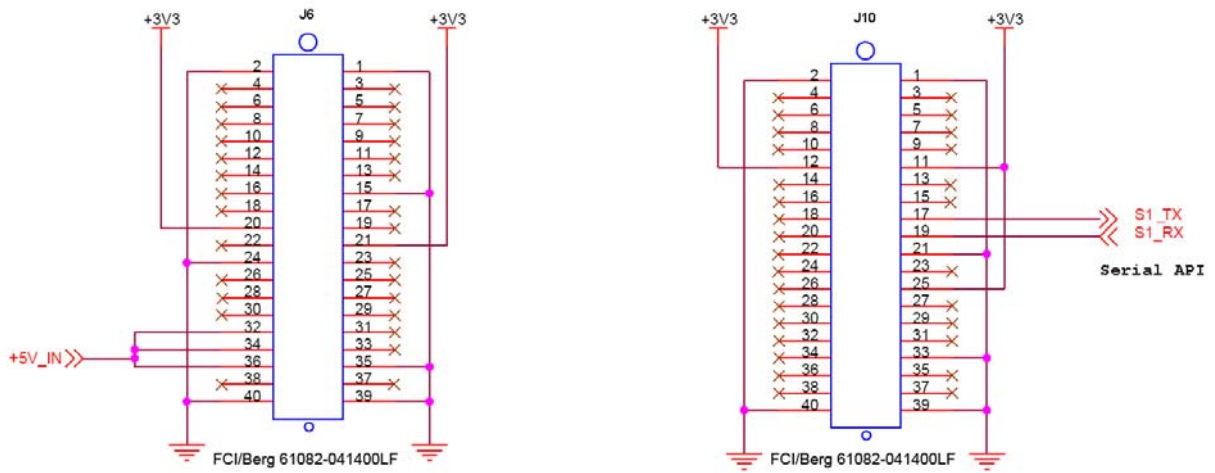


Figure 1 10/100Base-T Ethernet Application Circuit

Serial 1 Interface

The following application circuit illustrates how to convert the Serial 1 signals to EIA-232 voltage levels.



Board-to-Board connector that mates with J6 on the embedded Manager.

Board-to-Board connector that mates with J10 on the embedded Manager.

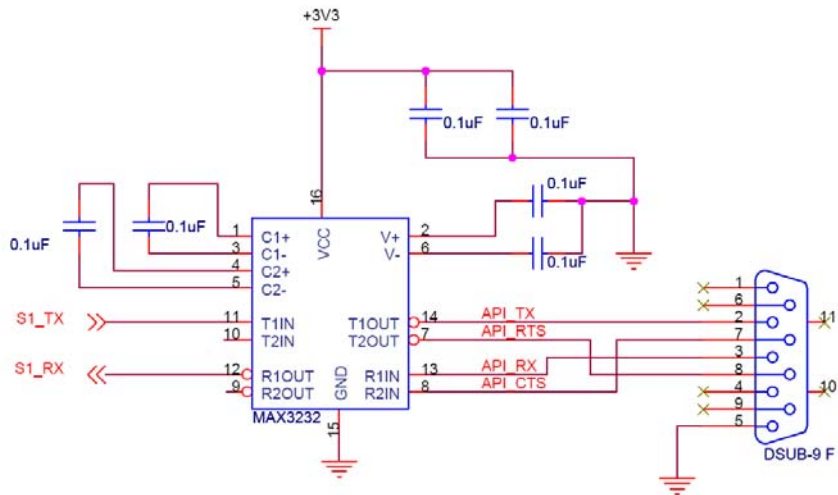
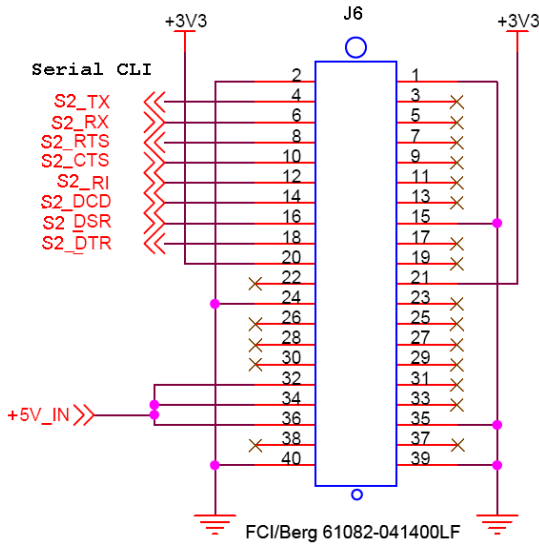


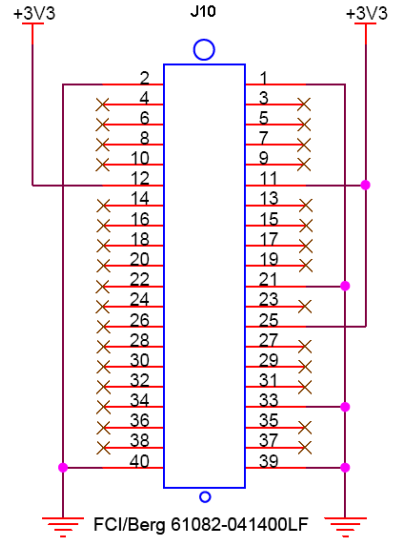
Figure 2 Serial 1 Application Circuit

Serial 2 Interface

The following application circuit shows how to convert the Serial 2 interface to EIA-232 voltage levels.



Board-to-Board connector that mates with J6 on the embedded Manager.



Board-to-Board connector that mates with J10 on the embedded Manager.

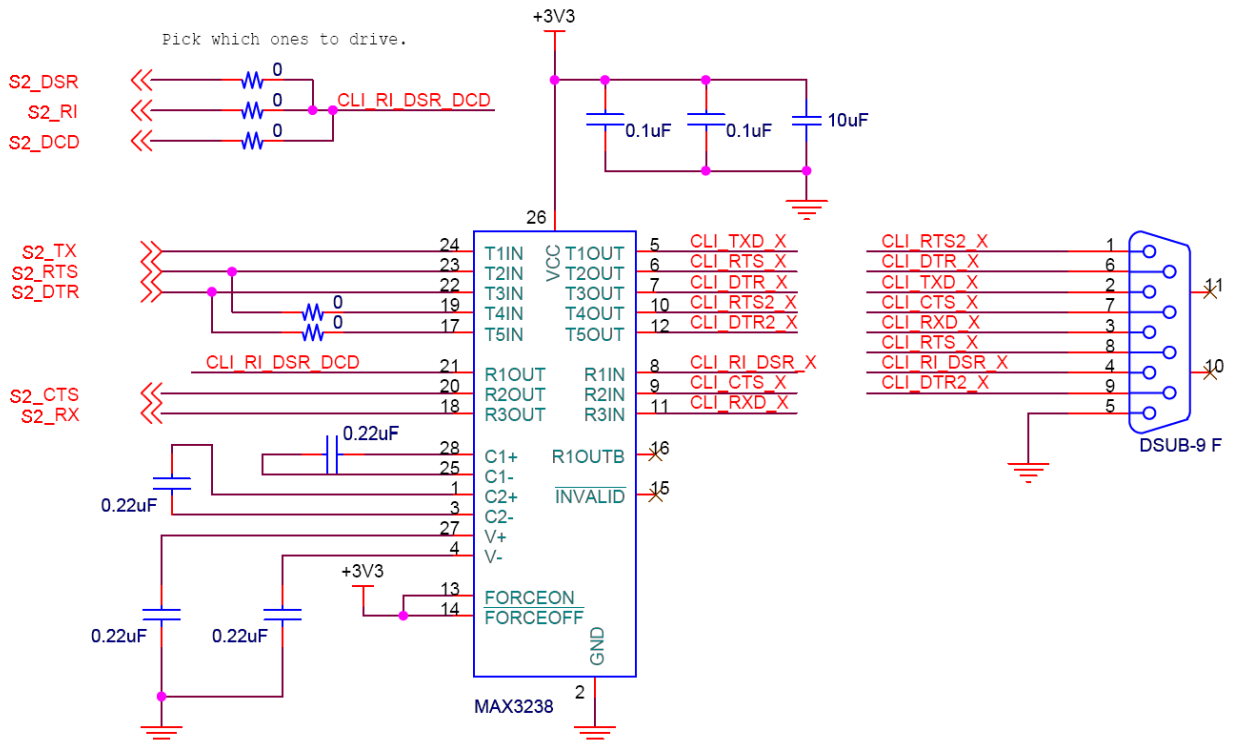


Figure 3 Serial 2 Application Circuit

LED Status Indicators

The following application circuit shows how to wire the LED and reset switch signals. Note that nLED_RADIO is an LED low signal level (refer to the product datasheet for specifications). Because its current sourcing capability is limited, a buffer is recommended.

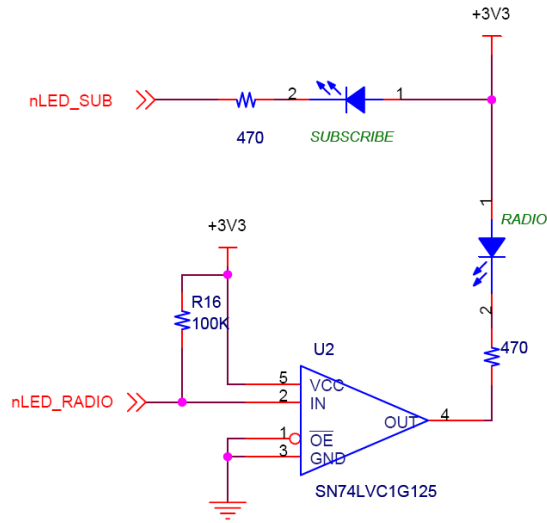
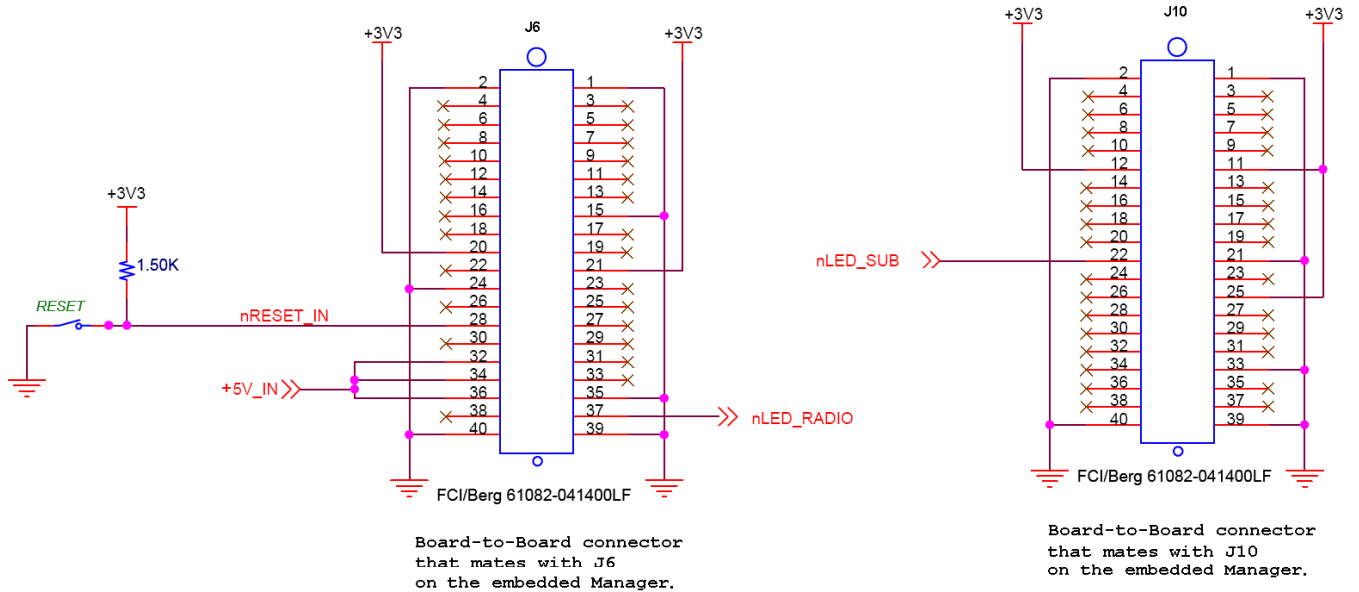


Figure 4 LED and Switch Application Circuit

Antenna ESD Considerations

The antenna pin is a particularly sensitive node for electro-static discharge (ESD) since it must detect small, high-frequency signals. ESD damage to the LTP5903PC may result in decreased receive or transmit performance, or other system failure. Many applications of the LTP5903PC have an exposed antenna that provides an entry point for ESD events. Proper consideration of antenna design as well as antenna protection can substantially improve ESD robustness in harsh environments.

A radome (protective covering) made of highly resistive material may be used to prevent direct contact with the antenna and/or dissipate charge. To avoid ESD events caused by triboelectric charging generated by wind passing over the antenna in dry climates, the radome design should consider bulk and surface resistivity as well as the size of the gap between the antenna metal and the interior of the radome.

In general, DC-grounded antennas (the antenna and ground have a dc short) provide superior protection to ESD events. DC-grounded antennas are highly recommended in harsh environments. Additionally, a DC path to earth ground should be provided whenever possible to help bleed off accumulated charge from the antenna as well as leak charge from the radome.

While these general guidelines should improve robustness to ESD events, individual implementations may have unique factors that complicate ESD protection. Upon request, Dust Networks can provide contact information for an external consultant able to perform a review for ESD and other system considerations.

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Document Status	Product Status	Definition
Advanced Information	Planned or under development	This document contains the design specifications for product development. Dust Networks reserves the right to change specifications in any manner without notice.
Preliminary	Engineering samples and pre-production prototypes	This document contains preliminary data; supplementary data will be published at a future date. Dust Networks reserves the right to make changes at any time without notice in order to improve design and supply the best possible product. The product is not fully qualified at this point.
No identification noted	Full Production	This document contains the final specifications. Dust Networks reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.
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