MCP251863 Schematic Hints

MCP251863 Board Design Hints

Introduction

This application note covers hints on how to design a PCB for the MCP251863.

Included are recommendations to achieve a low level of emissions and best practices for other parts of the PCB.

A good EMC design requires more knowledge than what can be put into a short application note. Unlike many other design issues, EMC is not an area where it is possible to list a set of rules. EMC compliance cannot be guaranteed by design; it has to be tested.

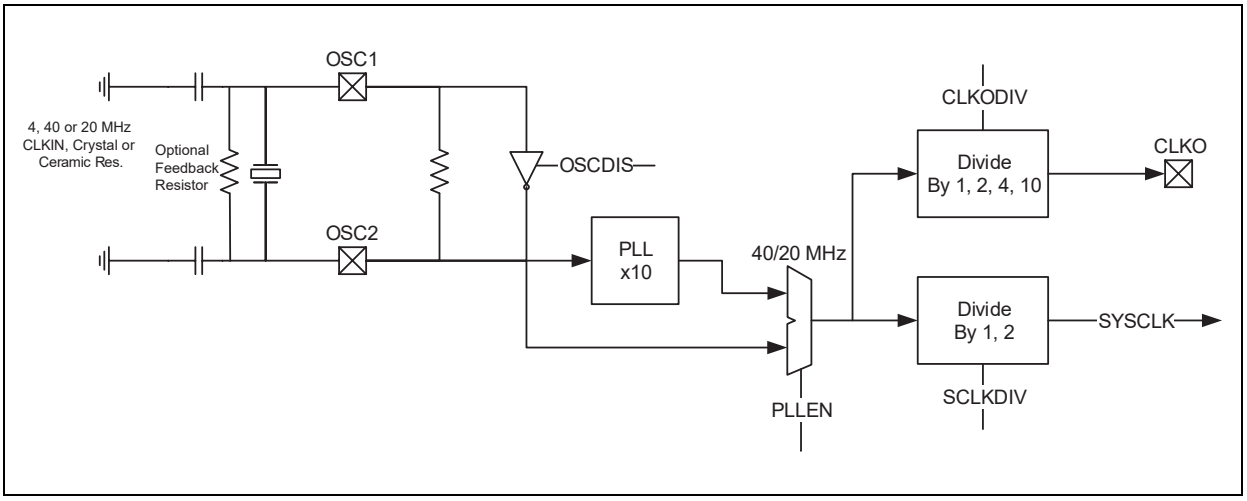
Table of Contents

1. Getting Started

Selecting the correct crystal oscillator or ceramic resonator components depends on multiple factors that are application-dependent. Please review Section 6.7 “Clocking Guidelines” of the “PIC32 Family Reference Manual” (DS61112) and refer to the application notes listed in Section Related Documents.

The following crystals, together with 18 pF load capacitors, were successfully used in two of our evaluation boards: ABM8G-40.000MHZ-18-D2Y-T and ABM8G-20.000MHZ-18-D2Y-T. The following crystals, together with 6 pF load capacitors, were successfully used in our evaluation boards: XRCGE20M000F3A1AR0 and XRCGB40M000F5A00R0. The CSTNR4M00GH5C000R0 ceramic resonator has been successfully tested with 39 pF load capacitors and a feedback resistor of 1 MΩ in one of our evaluation boards. The CSTNE20M0VH3C000R0 has been successfully tested with 15 pF load capacitors and a feedback resistor of 1 MΩ in one of our evaluation boards.

Figure 1-1. CRYSTAL/CERAMIC RESONATOR OPERATION

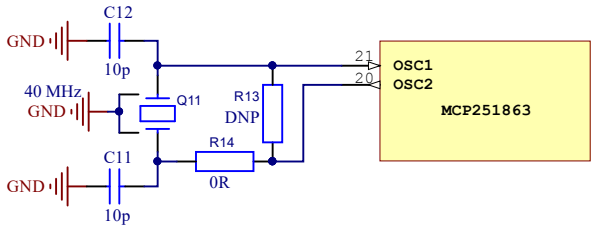


2. Examples - Schematic Excerpts MCP251863

There are several sections of the layout that are crucial for a good EMC performance. This chapter gives examples of how to properly implement these.

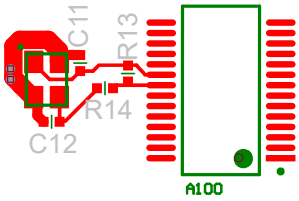
The first section is the external crystal-oscillator. The suggested schematic in the datasheet includes R13 and R14 that may or may not be necessary for stability, depending on the crystal-oscillator being used. If the specific design does not need them, the crystal can be moved closer to the MCP251863.

Figure 2-1. MCP251863 Oscillator schematic



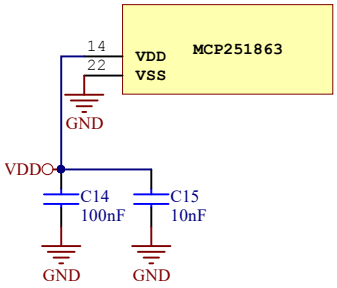
It is important to place the crystal-oscillator as close as possible to the MCP251863. It is recommended to keep the traces on the same side of the PCB as the crystal-oscillator and the MCP251863.

Figure 2-2. MCP251863 Oscillator layout



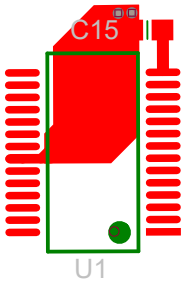
The most crucial section to achieve a low level of emissions is the power supply. The VDD input is blocked with one or two capacitors depending on the requirements of the board. If two capacitors are used, the one with the smaller value should be placed closer to the MCP251863.

Figure 2-3. MCP251863 power schematic



It is highly recommended that a direct and low-impedance connection from the Ground pin 22 to the blocking capacitor is implemented and that the ground vias are placed close to the blocking capacitor. Simply connecting pin 22 to a large Ground plane and placing a via close-by significantly increases unwanted emissions.

Figure 2-4. MCP251863 power layout



3. Related Documents

MCP251863 webpage

PIC32 Family Reference Manual "Section 6. "Oscillators"

Basic PICmicro Oscillator Design

Practical PICmicro® Oscillator Analysis and Design

CISPR standards: 16, 22 and 25

4. Revision History

Rev A – 05/2022

Initial Release

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