Frequency Control Products and Bluetooth

Introduction

The demand for Bluetooth wireless technology enabled products continues to expand at a rapid rate. The number of connected devices in the home, office and car are numerous and the desire to eliminate the clutter of cables makes Bluetooth a viable solution. The capabilities in today's mobile communication products are also driving Bluetooth applications that link these devices into Personal Area Networks.

The products utilizing Bluetooth are diverse. PDA's, printers, computer keyboard & mouse, headsets, gaming devices, routers, barcode scanners, cameras, mobile phones, hands-free car kits only scratch the surface of products implementing Bluetooth wireless technology. Everyday new uses for this technology are developed resulting in more products becoming Bluetooth enabled.

What is Bluetooth?

In simple terms, Bluetooth was conceived to replace cables connecting electronic devices. Specifically, it is a short-range radio module operating in the ISM frequency band at 2.4 GHz. Designed to operate in noisy frequency environments and over short distances (10 meters) the Bluetooth protocol employs a frequency-hopping scheme to make the link robust. To avoid interference with other signals the radio link quickly hops to a new frequency after transmitting or receiving a data stream (or packet) between devices.

How does CTS support Bluetooth products?

As the demands for wireless applications grow, many companies are producing chipsets that provide for Bluetooth technology solutions. Most of these chipsets require an external timing device, in the form of a quartz crystal that can be multiplied up to the 2.4 GHz frequency band. The quartz crystal needs to be small in size, high in reliability and provide adequate frequency stability.

CTS Models 403, 405, 406 and 407 are a series of crystals suitable for Bluetooth applications. The ceramic-based package with a seam welded metal lid, in a variety of sizes, offers the performance required to function in a Bluetooth environment. Typical Bluetooth frequencies are 12, 13, 15.36, 16, 24, 26 and 32 MHz that operate in a fundamental resonance mode. The user defines the operating temperature range, frequency tolerance @ 25°C, stability over temperature range and load capacitance. The following web link offers access to CTS data sheets for each model, http://www.ctscorp.com/components/xtal.asp.

Model Name	Frequency Range	Calibration Tolerance	Temperature Stability	Aging	Temperature Ranges	E.S.R.	Package Size
Model 403	13 - 50 MHz	± 30 ppm standard (tighter tolerances available)	± 50 ppm standard (tighter stabilities available)	≤ ± 5 ppm (first year)	-20 to 70°C -40°C to 85°C	Max. 90 Ohm	3.2 x 2.5 x 0.80 mm 0.126 x 0.098 x 0.31 inch
Model 405	12 - 50 MHz	± 30 ppm standard (tighter tolerances available)	± 50 ppm standard (tighter stabilities available)	≤ ± 5 ppm (first year)	-20 to 70°C -40°C to 85°C	Max. 50 Ohm	3.2 x 5.0 x 0.9 mm 0.126 x 0.197 x 0.035 inch
Model 406	10 - 50 MHz	± 30 ppm standard (tighter tolerances available)	± 50 ppm standard (tighter stabilities available)	≤ ± 5 ppm (first year)	-20 to 70°C -40°C to 85°C	Max. 80 Ohm	3.5 x 6 x 1.20 mm 0.138 x 0.236 x 0.047 inch
Model 407	8 - 50 MHz	± 30 ppm standard (tighter tolerances available)	± 50 ppm standard (tighter stabilities available)	≤ ± 5 ppm (first year)	-20 to 70°C -40°C to 85°C	Max. 80 Ohm	5.0 x 7.0 x 1.20 mm 0.197 x 0.276 x 0.047 inch

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