MaxStream Specifications/Features Review

Contents

Application Note

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Abstract

This document is to highlight the reasons that thousands of companies are choosing MaxStream modules over our competitor's products. Many engineers try to make a decision based only on datasheet shopping. We all know that datasheets can be deceiving.

Take a close look at the specifications and what they mean to your application before making any decisions. Those engineers who take time (~15 minutes) to range test our modules choose them for their designs 9 out of 10 times.

Specifications and Features

MaxStream's patent pending technology is changing the way OEMs implement RF capability. Instead of the OEM having to alter their system designs to accommodate an RF solution, MaxStream provides solutions that can be configured to work with existing designs.

The table below articulates the competitive advantages embedded into each MaxStream module. When compared to competing modules, MaxStream modules stand out in terms of money and time saved during project development. No module is easier to integrate or to work with. No module provides more performance at a lower price. The following features from the table below will be of particular interest:

- Receiver Sensitivity (Measured at $1x10^{-4}$ BER)
- Blocking (Interference Rejection)
- Output Power
- Data Throughput Rate

MaxStream backs up world leading technology with world class support. MaxStream's regular business hours are 8am to 5pm MST, and customers are immediately connected with either Sales Representatives or Applications Engineers for immediate responses to their needs. To experience MaxStream quality and service firsthand, contact MaxStream toll-free at 1-866-765-9885, through live chat at www.MaxStream.net or by email at info@maxstream.net.

MaxStream Specifications/Features Review

Features	XStream 900 MHz	XStream 2.4 GHz	Comments
Agency Approvals	FCC, IC, ACA, MOC	FCC, ETSI (CE), IC, ACA, MOC, EEC	MaxStream modules have been approved for US, Canadian, Australian and Israeli deployment. Additionally, the 2.4 GHz XStream module has been approved for European Union use in 14 countries with additional countries being added regularly and upon request.
Approved Uses	Portable/ Handheld (w/ SAR testing)/ Mobile/ Fixed Base-station	Portable/ Handheld (w/ SAR testing)/ Mobile/ Fixed Base-station	**All** MaxStream products have been approved for modular use without any additional testing in Mobile and Fixed base-station applications. The modules may also be used in portable/handheld applications when tested as integrated with the final OEM product for safety (SAR).
Number of Approved Antennas	12 (8.5 dBi max)	29 (16.5 dBi max)	Modular approval is contingent upon integrating the product with approved antennas. MaxStream has numerous approved antennas for use with each module to provide additional design options for customers. Additional antennas may be tested and added to the approval list upon request and as needed for specific applications.

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Features	XStream 900 MHz	XStream 2.4 GHz	Comments
Receiver Sensitivity **(measured at 1x10^{-4} BER)**	1200 bps -116dBm 9600 bps -110dBm 19200 bps -107dBm	9600 bps -104dBm 19.2kbps -101dBm	MaxStream touts that **sensitivity is a critically important design parameter** for low power wireless modules. Some competitors contend that better receiver sensitivity can be undesirable because it makes a radio more prone to interference. This contention is false because "Blocking" is the specification that measures susceptibility to interference. In an FM system, Blocking is not related to Sensitivity. [see "Blocking" Specification below] MaxStream customers routinely experience more range using the 9600 bps modules in all environments than with the 19.2k bps modules even though the power output is the same. Simply put, when a module has worse receiver sensitivity, transmitter power must be increased to maintain the same range. Increased transmitter power requires additional cost for power supplies and reduces battery life in portable applications.
Output Power	1W effective 140mW actual	250mW effective 47mW actual	**XStream modules set the standard for performance** by outperforming many 1Watt radios – yet MaxStream does this at power levels that are optimized for battery-powered applications. Also note that 250mW performance is available in products that comply with European emissions standards. While many manufacturers focus on boosting output power to increase range, MaxStream optimizes receiver sensitivity for several reasons: lower system cost, lower power requirements and greater international acceptance.
Blocking (Interference Rejection)	60dB	55dB	MaxStream technology has excellent interference rejection. In fact, interference just 1 MHz away can be 1 MILLION times stronger than the MaxStream signal and only degrade the receiver sensitivity by 3dB. This interfering device would have to output more than 100,000 Watts to significantly affect the transmission of the XStream modules. Additionally, the 900 MHz XStream module has over 70 dB of blocking (10 million times attenuation) for pager and cellular networks – systems that commonly interfere with competing 900 MHz modules.
Hopping Frequencies	25	25 standard 75 available	MaxStream's 2.4 GHz XStream uses 25 channels to provide a single, compatible, license free module in the U.S., Canada, Europe, Australia, New Zealand, and many other countries. The frequency band used by the 2.4 GHz XStream allows a concurrent 802.11 network to be configured using non-interfering frequencies.
Data Throughput Rate (streaming) **———————** **RF Baud Rate**	1200bps 1250bps 9600bps 10000bps 19200bps 20000bps	9600bps 10000bps 19200bps 20000bps	MaxStream is recognized for an extremely efficient radio protocol. The XStream-series radio modules can sustain a 9.6kbps (or 19.2kbps) transfer through a 10kbps (or 20kbps) RF channel while offering the most advanced networking and addressing capability available in the RF module industry. Modules that packetize data such as the XStream radio require that there be no bit errors in the packet for the communication to be successful. Transmitting fewer bits per packet reduces the chances of failed communication at a specified BER. Compare MaxStream's 5% overhead to others in the industry transmitting at RF baud rates many times the data throughput rate. MaxStream radio modules are specified for data rates based on their actual streaming throughput rate, not their RF data rate. Range will decrease as the RF data rate is increased.

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Features	XStream 900 MHz	XStream 2.4 GHz	Comments
Dwell Time	50 – 400ms	50 – 400ms	The average dwell time (time spent transmitting on one frequency) in real-world applications of MaxStream frequency hopping modules is 64 milliseconds. MaxStream modules have a "reliable delivery" mode that will hop to a new frequency and retransmit the packet when interference is detected.
Synchronize **Initial** **Streaming**	8 or 50 ms N/A	8 or 50 ms N/A	MaxStream radios are inherently peer-to-peer instead of client / server (master / slave). This means that modules communicate with NO configuration and support very flexible networking topologies. In the default mode of operation, the modules initialize the communication channel (synchronize transmitter and receiver) before each communication. MaxStream modules have no problem streaming data at 9600 or 19200 baud as rated. Re-synchronizing with each transmission allows the system to recover quickly from interference. A module can communicate immediately after power up without waiting for any synchronization. Also, there is no need to stay synchronized during sleep or low power modes allowing MaxStream to have power down modes as low as 40 micro-amps. Configurable low latency operating modes reduce the synchronization time to as little as 8ms. MaxStream is the only manufacturer offering a low cost, transmit only, frequency hopping spread spectrum RF module – made possible by patent pending synchronization techniques.
Testing	100% tested at room temp. Extended temp testing available	100% tested at room temp. Extended temp testing available	MaxStream modules were designed with stringent design parameters to ensure their operation over an extended -40 to 85 degree C temperature range. MaxStream has characterized performance over temperature and tests all radio parameters on 100% of products to a stringent standard designed to ensure operation over temperature. Extreme temperatures affect radio parameters in predictable, consistent ways that are accounted for during testing of MaxStream product.
Manufacturing	ISO 9002	ISO 9002	MaxStream products are **manufactured under ISO-9001/9002 quality standards**. These products are being deployed worldwide under the most extreme conditions with extraordinarily low failure rates.
Warranty	1 year	1 year	MaxStream always stands behind their product and is known for exceptional customer service and support.
Form Factor	Form and function compatible with 2.4 GHz XStream	Form and function compatible with 900 MHz XStream	MaxStream products maintain compatible form and functionality ensuring the simple ability to offer a variety of wireless products globally. This flexibility allows OEM's the ability to design once and deploy worldwide, facilitating expansions into global markets.

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