

Key Features

The key features of the transceiver module are:

- Carrier frequency of 315 Mega Hertz
- Supports Frequency Shift Keying (FSK)
- Supports 3.3V or 5V input digital data
- Supports two modes of operation: power-down and power-up
- Transmit bit rate up to 66Kbps using NRZ line encoding or 33Kbps using Manchester line encoding
- Selectable Supply voltage range of 3.3V or 5V
- Selectable transmit/receive mode
- Operating temperature range of -40 to 125 degrees
- Antenna matching input of 50 ohms for TX or RX mode
- Low power consumption
- Provides TX/RX data via a 6 pin header with 100 mil spacing between pins and power and ground on separate 6 pin header with same spacing
- Module dimensions are 1.6 inches wide by 1 inch height

Targeted Applications

Some of the targeted applications of the GTR315M_M13 transceiver are:

- Remote controlled garage door openers
- Remote controlled robotics
- Remote keyless entry systems
- Remote controlled toys
- Wireless sensors
- Wireless computer peripherals
- Wireless security systems
- Wireless game consoles
- Wireless pressure monitoring systems

Ordering Info

| Manufacturer/Distributor | Part Number | Online Store | Sales |
|---------------------------------|--------------|---------------|-----------------|
| WyJen Technologies Incorporated | GTR315M-M13A | www.wyjen.com | 1-800- 490-4165 |

Description

A top view of the GTR315M-M13 transceiver module is shown in Figure 1. The GTR315M-M13 transceiver module uses frequency shift keying with data rates up to 33000bps using Manchester encoded data or 66000bps using non return to zero encoded data. The module operates at two popular voltage source levels: 3V or 5V. In particular this module easily targets battery wireless applications using 3.3V. It also operates at the 5 volt supply which is typical for university laboratories. This module can also be used for non-battery applications with low noise sources.

The module integrates a transmitter and receiver section that uses a phase locked loop, low noise amplifier, and power amplifier. The receive section of the GTR315M-M13 module consists of a low noise amplifier with good sensitivity as low as -110dB. The transmit section of the GTR315M-M13 module consists of a power amplifier with a typical output power of 10dBm. Both the transmit and receive sections use a phase locked loop to modulate and demodulate the digital data, respectively. The module also provides a shutdown feature for low power consumption with a typical current of 0.8 μ A.

The GTR315M-M13 module provides a transmit/receive input and bidirectional data which can be easily interfaced to and controlled by a baseband processor or programmable logic device. Other features of the module is that it is robust and rugged and can fit in small areas.



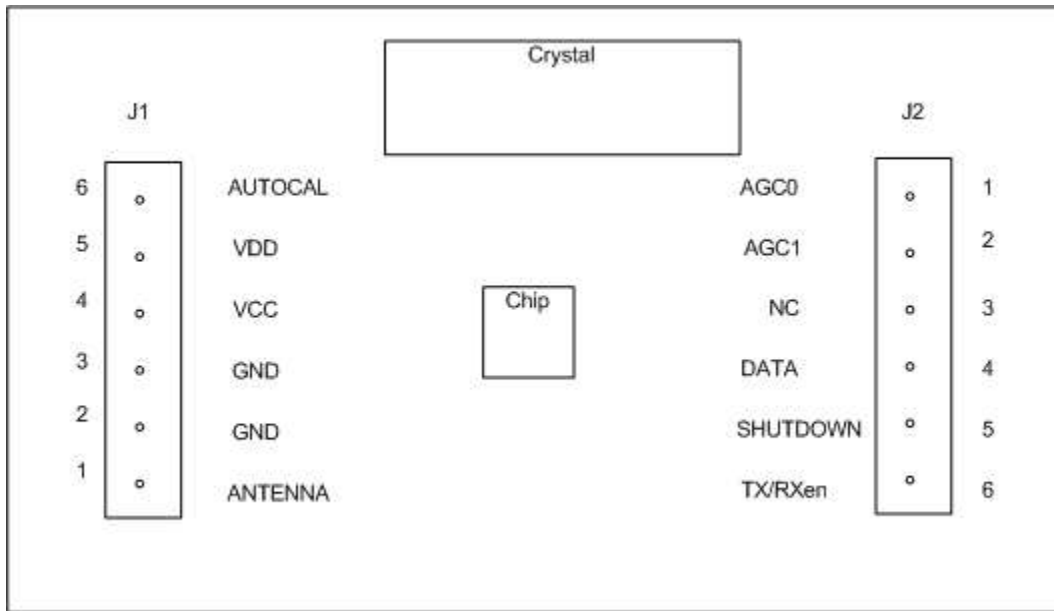


Figure 1. Illustration of **GTR315M-M13** transceiver module showing pins. Note: Top view is from component side.



Input/Output Pin Description

The function of each pin for the GTR315M_M13 transceiver module is described in Table 1.

| Name | J1 Pin Number | Input/Output | Description |
|---------|---------------|---------------|--|
| ANTENNA | 1 | Bidirectional | 50 ohm antenna input/output. When TX/RXen is HIGH this pin acts as a 315MHz RF output and when TX/RXen is HIGH this pin acts as an input to an incoming 315MHz RF signal. |
| GND | 2 | Input | GROUND. |
| GND | 3 | Input | GROUND. |
| VCC | 4 | Input | 5V power supply. See Table 2 for configuration. |
| VDD | 5 | Input | See Table 2 for 3.3V power supply configuration. |
| AUTOCAL | 6 | Input | Set to HIGH to auto-calibrate the internal FSK demodulator Phase Locked Loop to adjust to variations in temperature and voltage every minute, otherwise set to zero to calibrate only on power up. |

| Name | J2 Pin Number | Input/Output | Description |
|----------|---------------|---------------|---|
| AGC0 | 1 | Input | Automatic gain control 0 (see Table 3) |
| AGC1 | 2 | Input | Automatic Gain control 1(see Table 3) |
| NC | 3 | NC | No Connection |
| DATA | 4 | Bidirectional | When in receive mode DATA is an output (receive data), when in transmit mode DATA is an input (transmit data). See pin 6 of J2. |
| SHUTDOWN | 5 | Input | Shutdown input. When HIGH the module is in normal operation, when LOW the module is in shutdown mode. |
| TX/RXen | 6 | Input | Transmit/receive enable. To put the module in transmit mode set TX/RXen HIGH, to put it in receive mode set TXRXen LOW. |

Table 1. Pin description table for the GTR315M-M13 transceiver module.



GTR315M_M13 5V or 3.3V Power Supply Configuration Table

The Table below describes shows to put the module in 5V or 3.3 power supply operation.

| VCC Voltage | VDD Voltage | Power Supply Operation |
|-------------|-------------|------------------------|
| NC | 5V | 5V operation |
| 3.3V | NC | 3.3V operation |

Table 2. GTR315M_M13 power supply configuration.

GTR315M_M13 Auto-Calibration of Automatic Gain Control Table

Table 3 shows how to set the automatic gain control operation of the GTR315M_M13 module. The AGC is disabled when AGC0=0 and AGC1=0. The dwell time is used after the AGC has been enabled. The dwell time is the time that that the module waits before adjusting the gain. When the AGC is enabled using any of the three on states in Table 3 the strength of the incoming RF signal is monitored. When the strength is -55dB (strong RF signal) the module waits for a certain amount of time (dwell time) before reducing the gain of low noise amplifier (LNA). When the RF signal strength is -59dB the module waits a certain amount of time (dwell time) before increasing the LNA gain. If after the dwell time the RF signal changes back to the original RF level the LNA gain will remain unchanged.

| AGC1 | AGC0 | Automatic Gain Control Operation |
|------|------|----------------------------------|
| 0 | 0 | AGC disabled, High Gain |
| 0 | 1 | Dwell time is 162us |
| 1 | 0 | Dwell time is 1.3ms |
| 1 | 1 | Dwell time is 83ms |

Table 3. GTR315M_M13 AGC configuration.



Electrical Characteristics

Some of the electrical characteristics of the module are given below in Table 4.

| Description | Name | Min | Typ | Max | Unit |
|---|------|---------|----------|---------|------|
| 3.3V Supply | VCC | 2.1 | 2.7 | 3.6 | V |
| 5V Supply | VDD | 4.5 | 5.0 | 5.5 | V |
| Supply Current Transmit mode | ICC | | 11.6 | 19.1 | mA |
| Supply Current Receiver mode | ICC | | 6.4 | 8.4 | mA |
| Output Power VCC=2.1V, TA=+125° C | Pout | 3.9 | 6.7 | | dBm |
| Output Power , TA=+25° C | Pout | 4.6 | 10.0 | 15.5 | |
| Output Power VCC=3.6V, TA=-40°C | Pout | | 13.1 | 15.8 | dBm |
| Operating Frequency | | | 315 | | MHz |
| Digital Input High Voltage | VIH | 0.9xVCC | | | V |
| Digital Input Low Voltage | VIL | | | 0.1xVCC | V |
| Digital Output Low Voltage | VOL | | 0.15 | | V |
| Digital Output High Voltage | VOH | | VCC-0.26 | | V |
| Receiver Sensitivity | | | -114 | | dBm |
| Maximum Data Rate (Manchester coded) | | | 33 | | kHz |
| Maximum Data Rate (Non Return to Zero) | | | 66 | | kHz |
| Phase Lock Loop Transmit Bandwidth | | | 200 | | kHz |
| Phase Lock Loop Receive Bandwidth | | | 500 | | kHz |
| Maximum Data Filter Bandwidth | | | 50 | | kHz |
| Antenna Output Impedance | | | 50 | | Ohms |

Table 4. Various electrical characteristics of the GTR315M_M13A module.

Application Circuits

The application of the GTR315M_M13 circuits are based on whether the application requires 3.3V or 5 volts. Examples of these are given next.



5 Volt Application Circuits

Figure 2 and Figure 3 demonstrate how to put the GTR315M_M13A in transmitter and receiver mode respectively system using 5 volt operation. Figure 2 shows the transceiver configured as a 5V FSK transmitter while Figure 3 shows it configured as 5V FSK receiver.

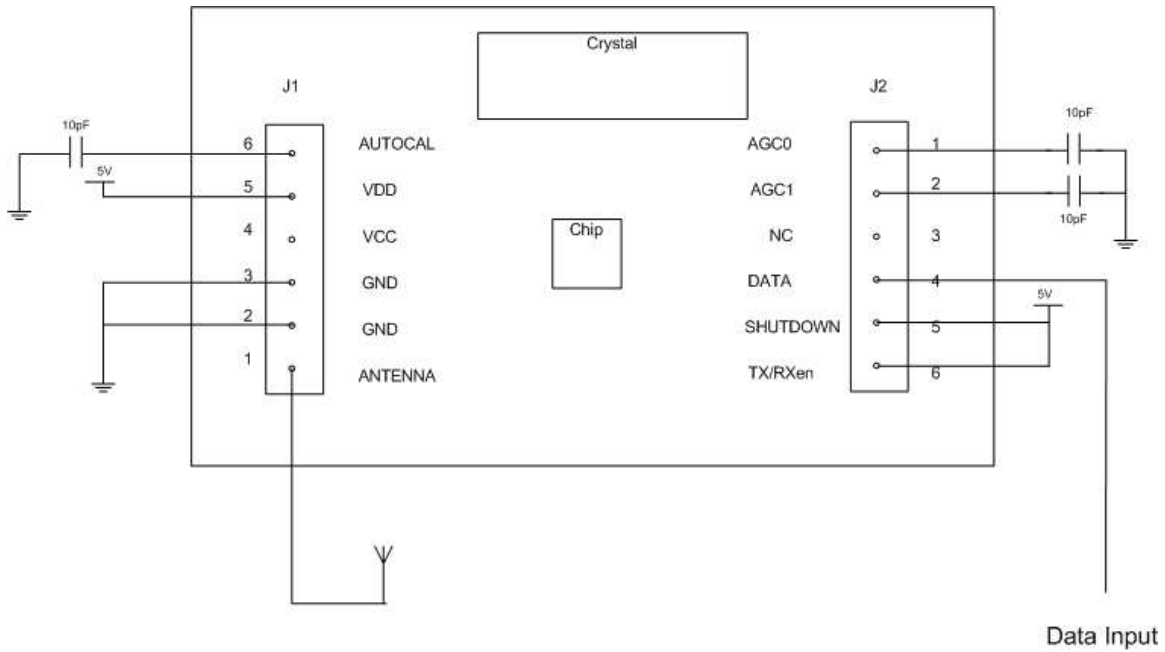


Figure 2. . Detailed circuit illustrating how the GTR315M_M13 transceiver module can be configured as a 5V FSK transmitter. As a test circuit connect the data input to a square wave generator with a 1000KHz square wave. Offset the square wave by 2.5V for the best bit rate. Use the corresponding receiver configuration in **Figure 3** to verify that the data is received correctly. Note: Top view as shown is from component side of transceiver.



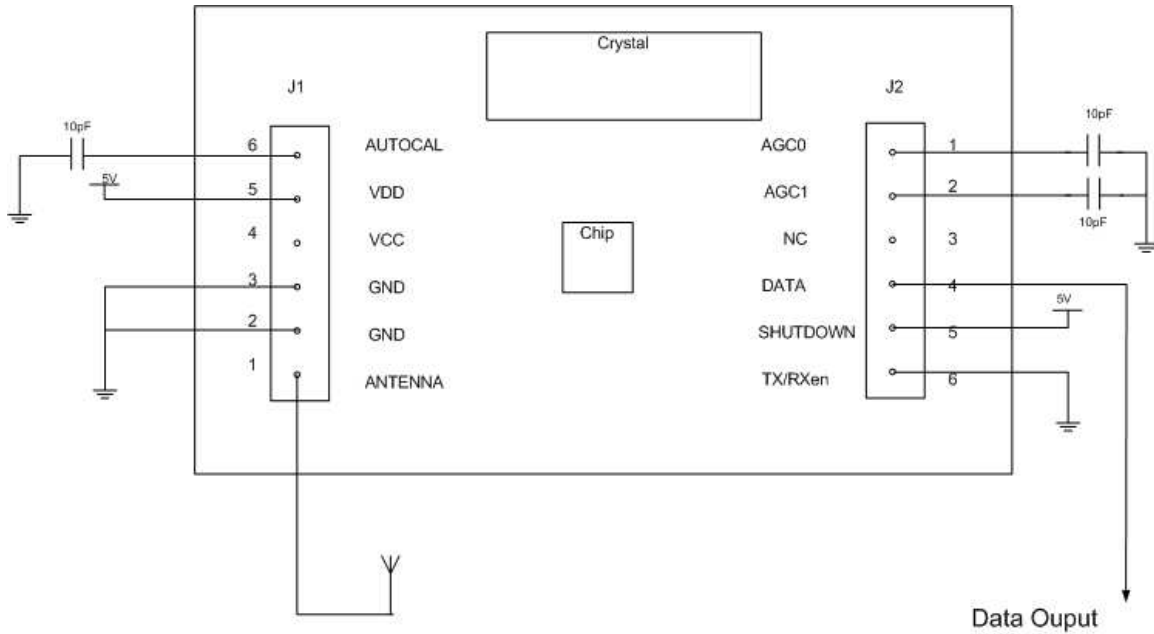


Figure 3. . Detailed circuit illustrating how the GTR315M_M13 transceiver module can be configured as a 5V FSK receiver. Note: Top view as shown is from component side of transceiver.



3.3 Volt Application Circuits

Figure 2 and Figure 3 demonstrate how to put the GTR315M_M13A in transmitter and receiver mode respectively system using 3.3V volt operation. Figure 2 shows the transceiver configured as a 3.3V FSK transmitter while Figure 3 shows it configured as 3.3V FSK receiver.

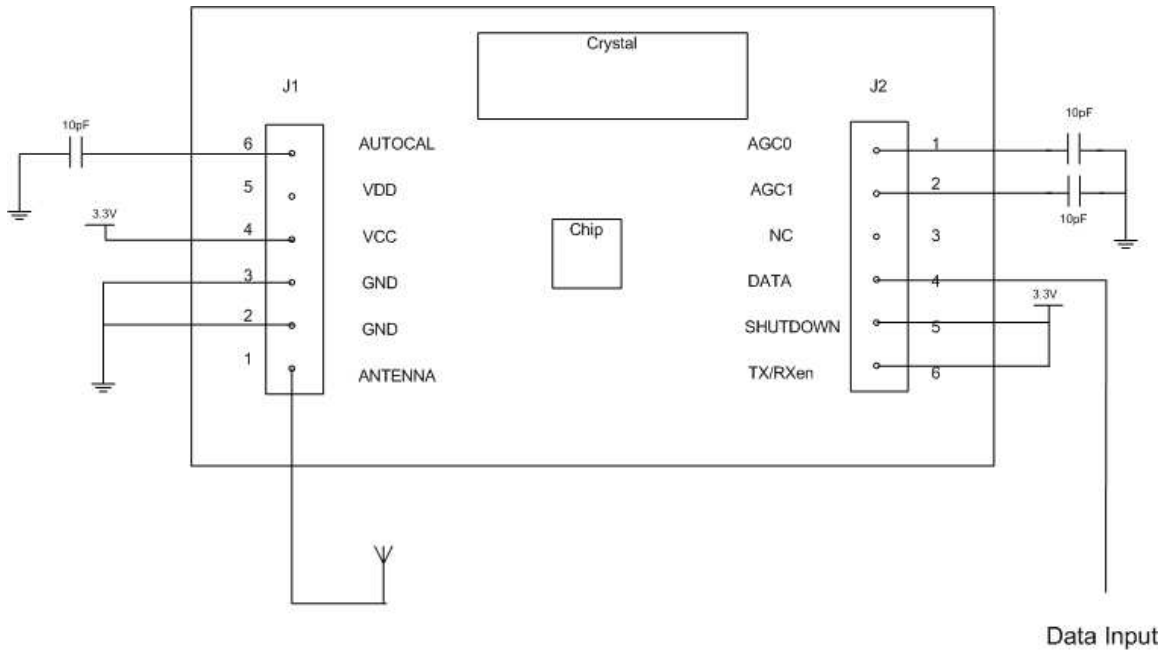


Figure 4. Detailed circuit illustrating how the GTR315M_M13 transceiver module can be configured as a 3.3V FSK transmitter. Offset the square wave by 1.65V for the best bit rate. As a test circuit connect the data input to a square wave generator with a 1000KHz square wave. Use the corresponding receiver configuration in **Figure 5** to verify that the data is received correctly. Note: Top view as shown is from component side of transceiver.

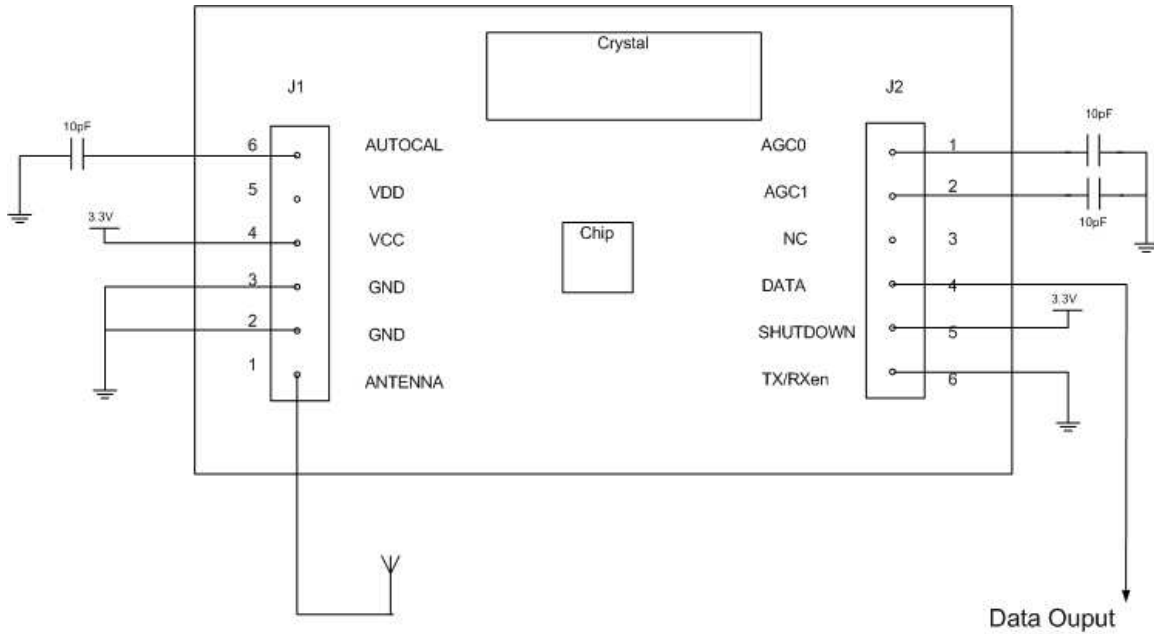


Figure 5. . Detailed circuit illustrating how the GTR315M_M13 transceiver module can be configured as a 3.3V FSK receiver. Note: Top view as shown is from component side of transceiver.



GTR315M_M13 Transceiver Module Dimensions

The actual dimensions of the GTR315M_M13 transceiver module are given Figure 6.

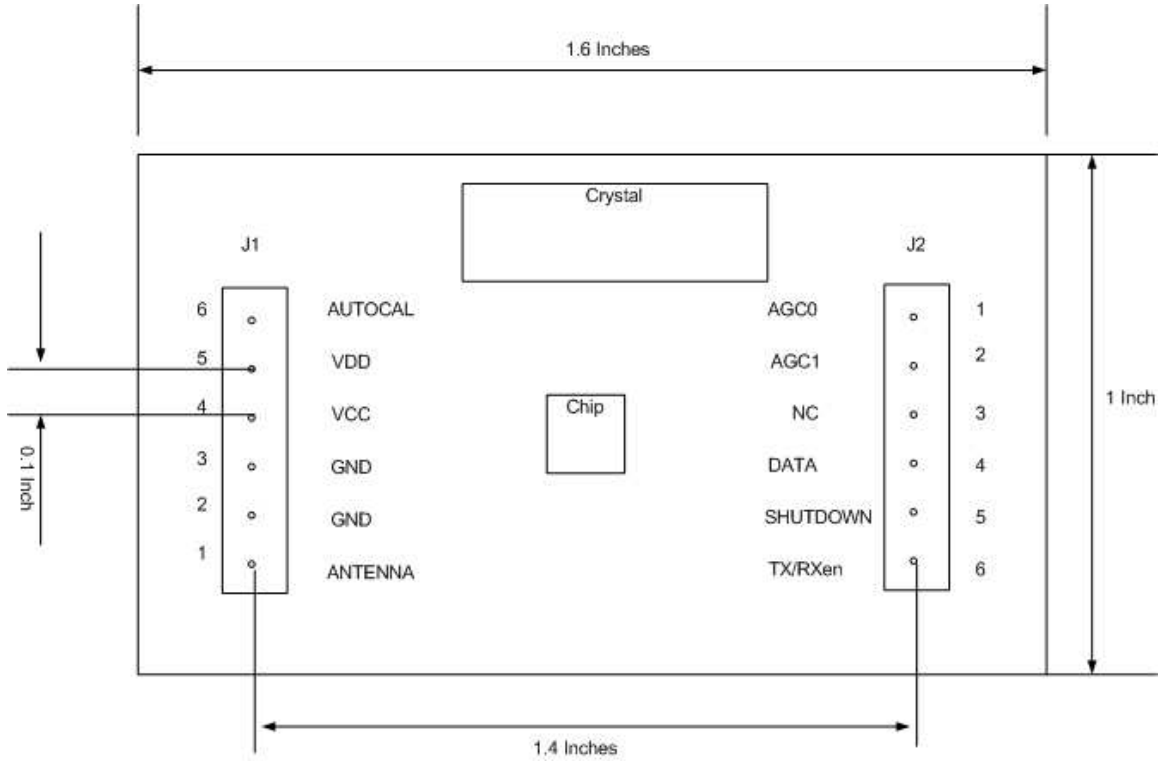


Figure 6. Illustration of GTR315M_M13 transceiver module showing dimensions. Note: Top view as shown is from component side of transceiver.



Part Numbering

Short Name

GAABBBC-VVV-U

| | |
|-----|--|
| G | WyJen Technologies Specifier |
| AA | TX stands for Transmitter RX stands for Receiver TR stands for Transmitter and Receiver |
| BBB | 3 digit number representing carrier frequency 2 digit number representing carrier frequency with decimal point represented by D |
| C | M stands for mega Hertz G stands for Giga Hertz |
| VVV | 3 character series code |
| U | 1 character feature code |

Notes:

BBB and C Fields are used together: Some example values are

315M
433M
868M
915M
2D5G
5D8G



Long Name

The part numbering scheme for the WyJen Technologies wireless modules are explained below.

GAABBBC-XX-YYYZWWT-VVV-U

| | |
|-----|---|
| G | WyJen Technologies Specifier |
| AA | TX stands for Transmitter RX stands for Receiver TR stands for Transmitter and Receiver |
| BBB | 3 digit number representing carrier frequency 2 digit number representing carrier frequency with decimal point represented by D |
| C | M stands for mega Hertz G stands for Giga Hertz |
| XX | 5V stands for 5 volt technology 3V stands for 3.3V technology 35 stands for 3.3 or 5V technology |
| YYY | A00 stands for ASK modulation F00 stands for FSK modulation P00 stands for PSK modulation Q00 stands for QAM modulation AF0 stands for ASK and FSK modulation AFP stands for ASK, FSK, and PSK modulation AM0 stands for amplitude modulation AFM stands for ASK and FM modulation FFM stands for FSK and FM modulation |
| Z | S stands for SIP package D stands for DIP package M stands for surface mount package |
| T | A stands for 1.125 inches width by 0.75 inches height B stands for 2 inches width by 0.75 inches height C stands for 1.6 inches by 1 inch height |
| WW | 2 digit number representing number of input and output pins in the package |
| VVV | 3 character series code |
| U | 1 character feature code |

Notes:

1. T Field: For SIP package width is side with connector
2. BBB and C Fields are used together: Some example values are
 - 315M
 - 433M
 - 868M
 - 915M
 - 2D5G
 - 5D8G



Examples

The part number GTX315M-5V-A00S12B-M27B corresponds to a WyJen Technologies transmitter, 315 mega hertz operating frequency, that requires a 3.3 volt power supply, uses amplitude shift keying modulation with a 6 pin SIP package, series M27 transmitter, with version A features. The dimensions of the package are 1.125 width x 0.75 by height.

The part number GTX2D5G-3V-F00S12B-M07A corresponds to a WyJen Technologies transmitter, 2.5 Giga hertz operating frequency, that requires a 3.3 volt power supply, uses frequency shift keying modulation with a 12 pin SIP package, series M07 receiver, with version A features. The dimensions of the package are 2 width x 0.75 by height.

