



# **EVM-915-DTS**

## **Data Guide**

**Wireless made simple®**



**Warning:** Linx radio frequency ("RF") products may be used to control machinery or devices remotely, including machinery or devices that can cause death, bodily injuries, and/or property damage if improperly or inadvertently triggered, particularly in industrial settings or other applications implicating life-safety concerns. No Linx Technologies product is intended for use in any application without redundancies where the safety of life or property is at risk.

The customers and users of devices and machinery controlled with RF products must understand and must use all appropriate safety procedures in connection with the devices, including without limitation, using appropriate safety procedures to prevent inadvertent triggering by the user of the device and using appropriate security codes to prevent triggering of the remote controlled machine or device by users of other remote controllers.

**Do not use this or any Linx product to trigger an action directly from the data line or RSSI lines without a protocol or encoder/decoder to validate the data.** Without validation, any signal from another unrelated transmitter in the environment received by the module could inadvertently trigger the action.

**All RF products are susceptible to RF interference that can prevent communication.** RF products without frequency agility or hopping implemented are more subject to interference. This module does not have frequency agility built in.

**Do not use any Linx product over the limits in this data guide.**

Excessive voltage or extended operation at the maximum voltage could cause product failure. Exceeding the reflow temperature profile could cause product failure which is not immediately evident.

**Do not make any physical or electrical modifications to any Linx product.** This will void the warranty and regulatory and UL certifications and may cause product failure which is not immediately evident.



**Warning:** This product incorporates numerous static-sensitive components. Always wear an ESD wrist strap and observe proper ESD handling procedures when working with this device. Failure to observe this precaution may result in module damage or failure.

## Ordering Information

Ordering Information		
Product Part No.	Description	Radiotronix Part No.
EVM-915-DTS-FCS	TRM-915-DTS Evaluation Module, 915MHz, Straight RP-SMA Connector, FCC Approved	Wi.232DTS-FCC-ST-R
EVM-915-DTS-FCR	TRM-915-DTS Evaluation Module, 915MHz, Right Angle RP-SMA Connector, FCC Approved	Wi.232DTS-FCC-RA-R
EVM-915-DTS-BZR	TRM-915-DTS Evaluation Module, 915MHz, Right Angle RP-SMA Connector, Brazil Anatel Approved	Wi.232DTSB-EVM-RA-R
EVM-915-DTS-BZS	TRM-915-DTS-BRZ Evaluation Module, 915MHz, Straight RP-SMA Connector, Brazil Anatel Approved	Wi.232DTSB-EVM-ST-R

Figure 2: Ordering Information

## Electrical Specifications

Electrical Specifications						
Parameter	Designation	Min.	Typ.	Max.	Units	Notes
Power Supply						
Operating Voltage	$V_{CC}$	4		12	VDC	
Supply Current	$I_{CC}$					
Receive				25	mA	
Transmit, $P_o = 0\text{dBm}$				35	mA	
Transmit, $P_o = 13\text{dBm}$				60	mA	
Digital Interface						
Output						
Logic Low	$V_{OL}$	0		0.4	VDC	
Logic High	$V_{OH}$	2.5		$V_{CC}$	VDC	
Input						
Logic Low	$V_{IL}$	0		$0.3 \cdot V_{CC}$	VDC	
Logic High	$V_{IH}$	$0.7 \cdot V_{CC}$		$V_{CC}$	VDC	
Environmental						
Operating Temperature Range		-40		85	°C	

Figure 3: Electrical Specifications

**Note:** Please see the TRM-915-DTS data guide for complete information about the module, detailed specifications and configuration commands.

## PCB Footprint

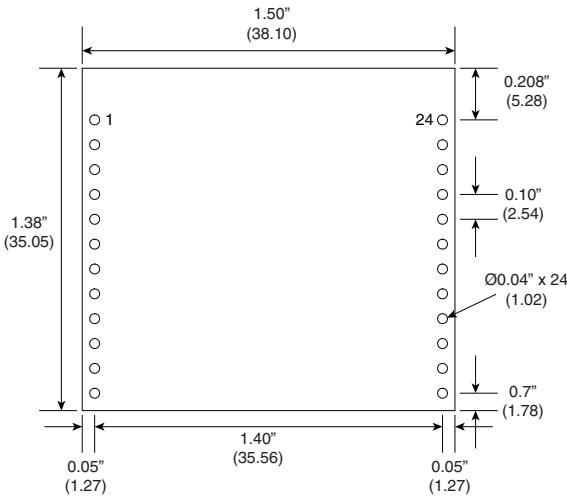


Figure 6: DTS Series EVM Module PCB Footprint

## Board Layout Guidelines

The module's design makes integration straightforward; however, it is still critical to exercise care in PCB layout. Failure to observe good layout techniques can result in a significant degradation of the module's performance. Grounding, filtering, decoupling, routing and PCB stack-up are all important considerations for any RF design. Some basic design guidelines are provided here.

The module should, as much as reasonably possible, be isolated from other components on your PCB, especially high-frequency circuitry such as crystal oscillators, switching power supplies, and high-speed bus lines.

When possible, separate RF and digital circuits into different PCB regions.

Make sure internal wiring is routed away from the module and antenna and is secured to prevent displacement.

Bypass caps should be low ESR ceramic types and located directly adjacent to the pin they are serving.

In some instances, a designer may wish to encapsulate or "pot" the product. Since such compounds can considerably impact RF performance and the ability to rework or service the product, it is the responsibility of the designer to evaluate and qualify the impact and suitability of such materials.

## Usage Guidelines for Regulatory Compliance

The EVM-915-DTS module is provided with a United States FCC and Brazil ANATEL Modular Certification. This certification shows that the module meets the requirements of FCC Part 15 and ANATEL Resolution 506 standards for an intentional radiator. The integrator does not need to conduct any further testing under these rules provided that the following guidelines are met:

- An approved antenna must be directly coupled to the module's RP-SMA connector through an approved coaxial extension cable.
- Alternate antennas can be used, but may require the integrator to perform certification testing.
- The module must not be modified in any way. Coupling of external circuitry must not bypass the provided connectors.
- End product must be externally labeled with "Contains FCC ID: Q7V-3F090003X".
- The end product's user's manual must contain an FCC statement equivalent to that listed on page 7 of this data guide.
- The antenna used for this transceiver must not be co-located or operating in conjunction with any other antenna or transmitter.
- The integrator must not provide any information to the end-user on how to install or remove the module from the end-product.

**Note:** The integrator is required to perform unintentional radiator testing on the final product per FCC sections 15.107 and 15.109.

Any changes or modifications not expressly approved by Linx Technologies could void the user's authority to operate the equipment.

## Additional Testing Requirements

The modules have been tested for compliance as an intentional radiator, but the integrator is required to perform unintentional radiator testing on the final product per FCC sections 15.107 and 15.109. Additional product-specific testing might be required. Please contact the FCC regarding regulatory requirements for the application. Ultimately it is the integrator's responsibility to show that their product complies with the regulations applicable to their product.

## Brazil Anatel Labeling Requirements

The Brazil version, the EVM-915-250-BZx, has been tested and complies with the Anatel regulations for sale in Brazil. The following should be included in the product's documentation.

Este equipamento opera em caráter secundário, isto é, não tem direito à proteção contra interferência prejudicial, mesmo de estações do mesmo tipo, e não pode causar interferência a sistemas operando em caráter primário.



**3069-12-8396**



**(01)07898407650125**

## Product Labeling

The end product must be labeled to meet the FCC product label requirements. It must have the below or similar text:

Contains FCC ID: OJMTRM900TTA

The Brazil version must contain:

Anatel: 3069-12-8396

The label must be permanently affixed to the product and readily visible to the user. “Permanently affixed” means that the label is etched, engraved, stamped, silkscreened, indelibly printed, or otherwise permanently marked on a permanently attached part of the equipment or on a nameplate of metal, plastic, or other material fastened to the equipment by welding, riveting, or a permanent adhesive. The label must be designed to last the expected lifetime of the equipment in the environment in which the equipment may be operated and must not be readily detachable.

## Interference Considerations

The RF spectrum is crowded and the potential for conflict with unwanted sources of RF is very real. While all RF products are at risk from interference, its effects can be minimized by better understanding its characteristics.

Interference may come from internal or external sources. The first step is to eliminate interference from noise sources on the board. This means paying careful attention to layout, grounding, filtering and bypassing in order to eliminate all radiated and conducted interference paths. For many products, this is straightforward; however, products containing components such as switching power supplies, motors, crystals and other potential sources of noise must be approached with care. Comparing your own design with a Linx evaluation board can help to determine if and at what level design-specific interference is present.

External interference can manifest itself in a variety of ways. Low-level interference produces noise and hashing on the output and reduces the link's overall range.

High-level interference is caused by nearby products sharing the same frequency or from near-band high-power devices. It can even come from your own products if more than one transmitter is active in the same area. It is important to remember that only one transmitter at a time can occupy a frequency, regardless of the coding of the transmitted signal. This type of interference is less common than those mentioned previously, but in severe cases it can prevent all useful function of the affected device.

Although technically not interference, multipath is also a factor to be understood. Multipath is a term used to refer to the signal cancellation effects that occur when RF waves arrive at the receiver in different phase relationships. This effect is a particularly significant factor in interior environments where objects provide many different signal reflection paths. Multipath cancellation results in lowered signal levels at the receiver and shorter useful distances for the link.





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