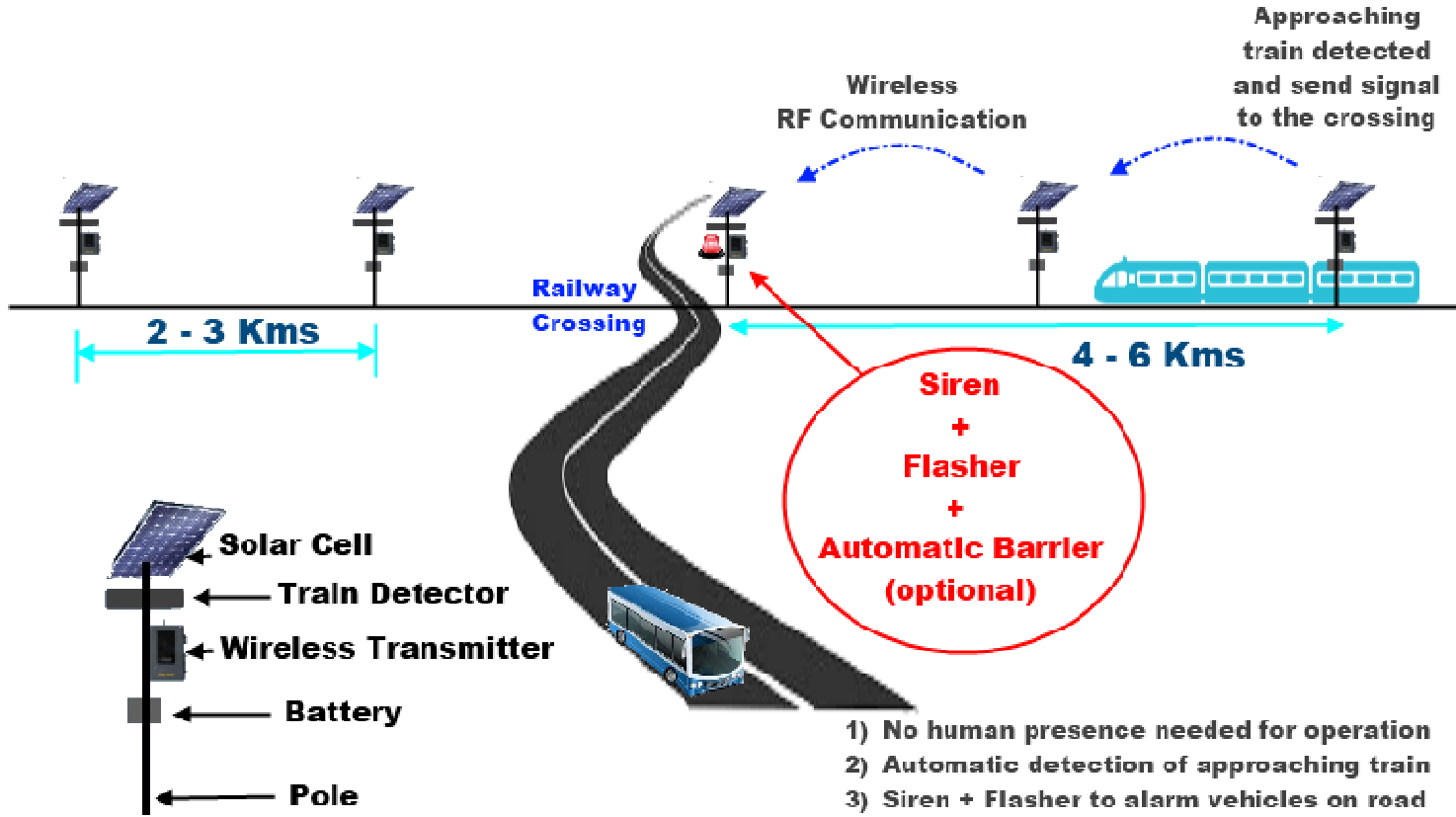
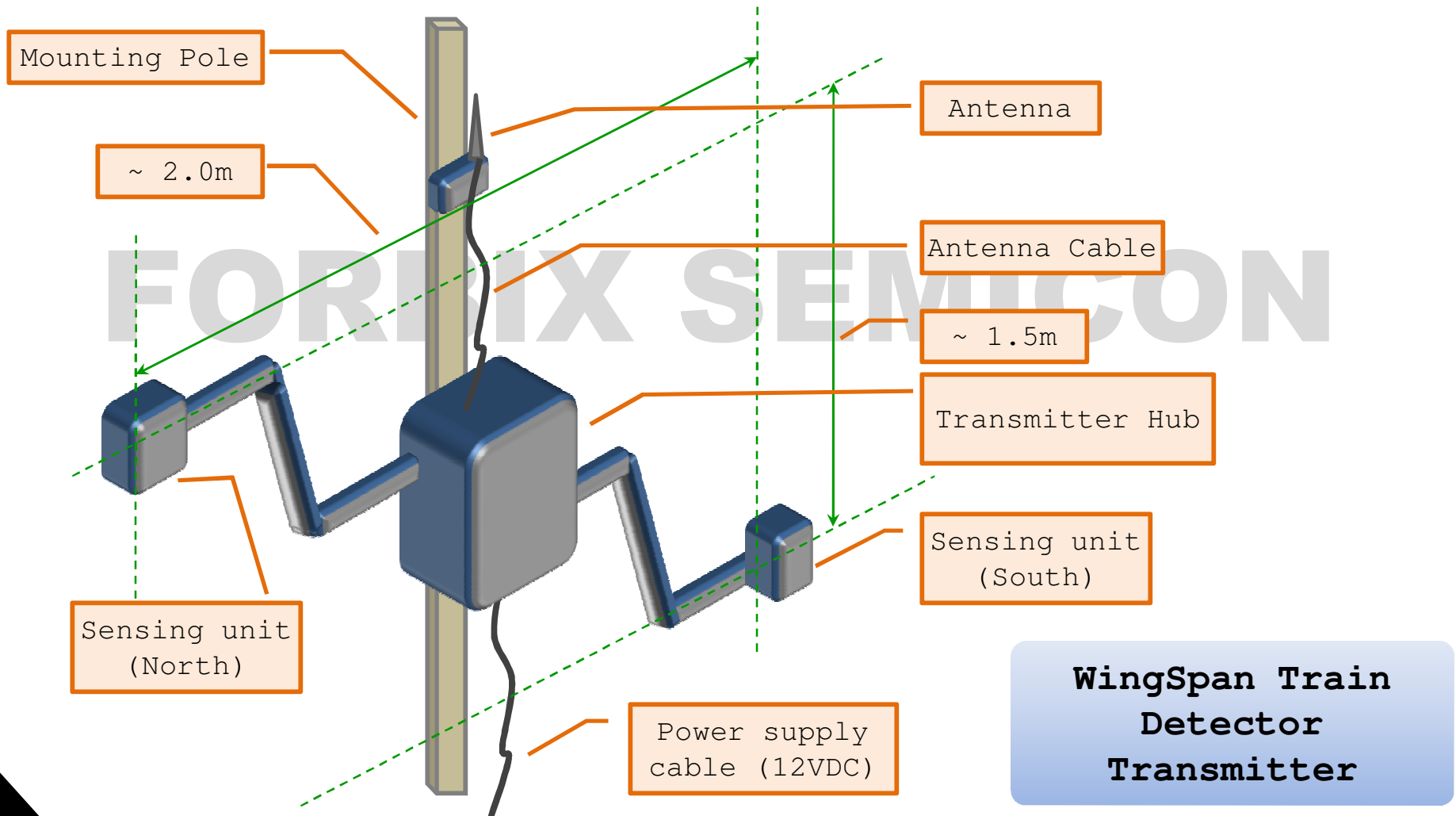


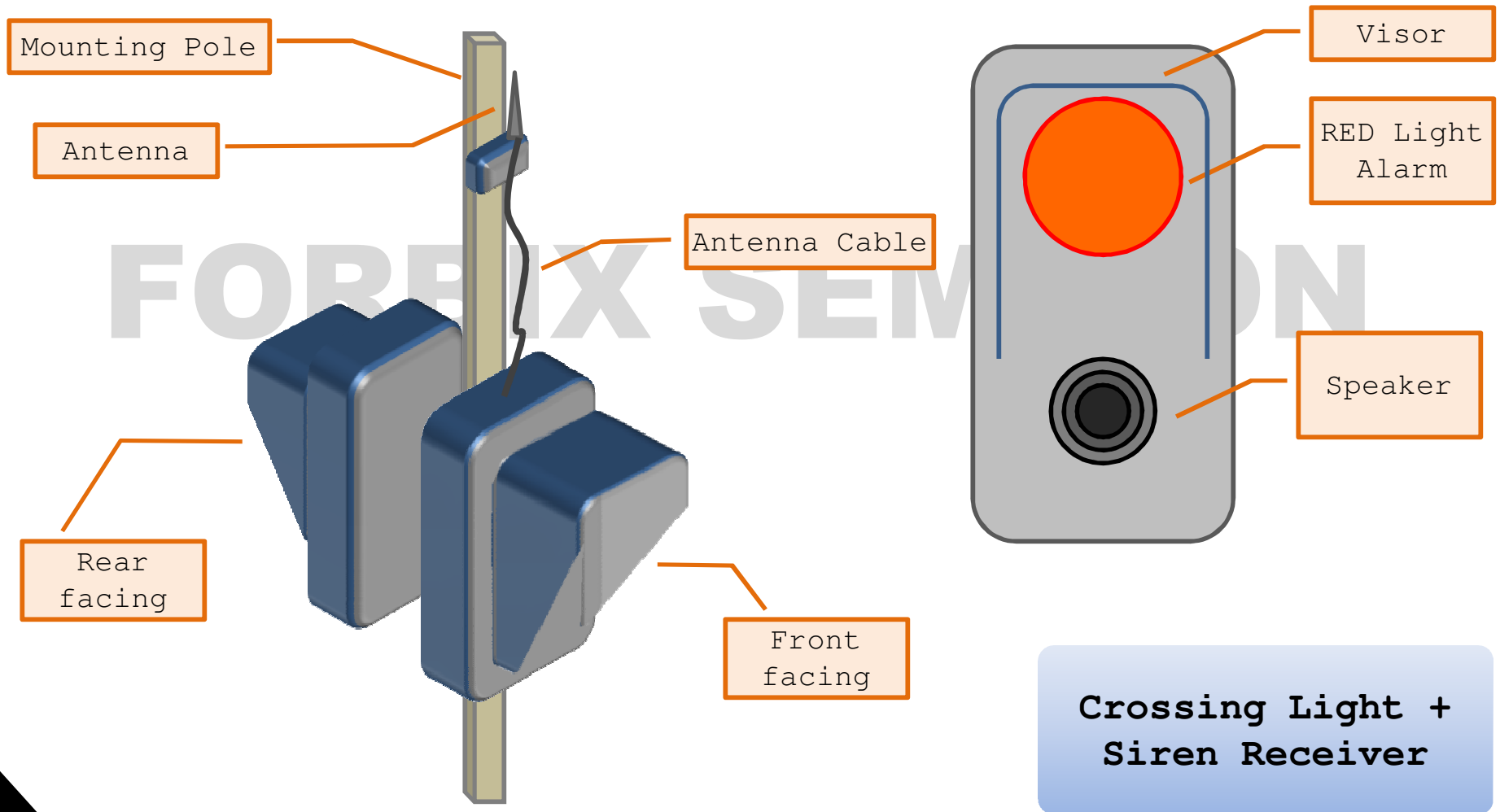
## Unmanned Level Crossing Train Detector Siren

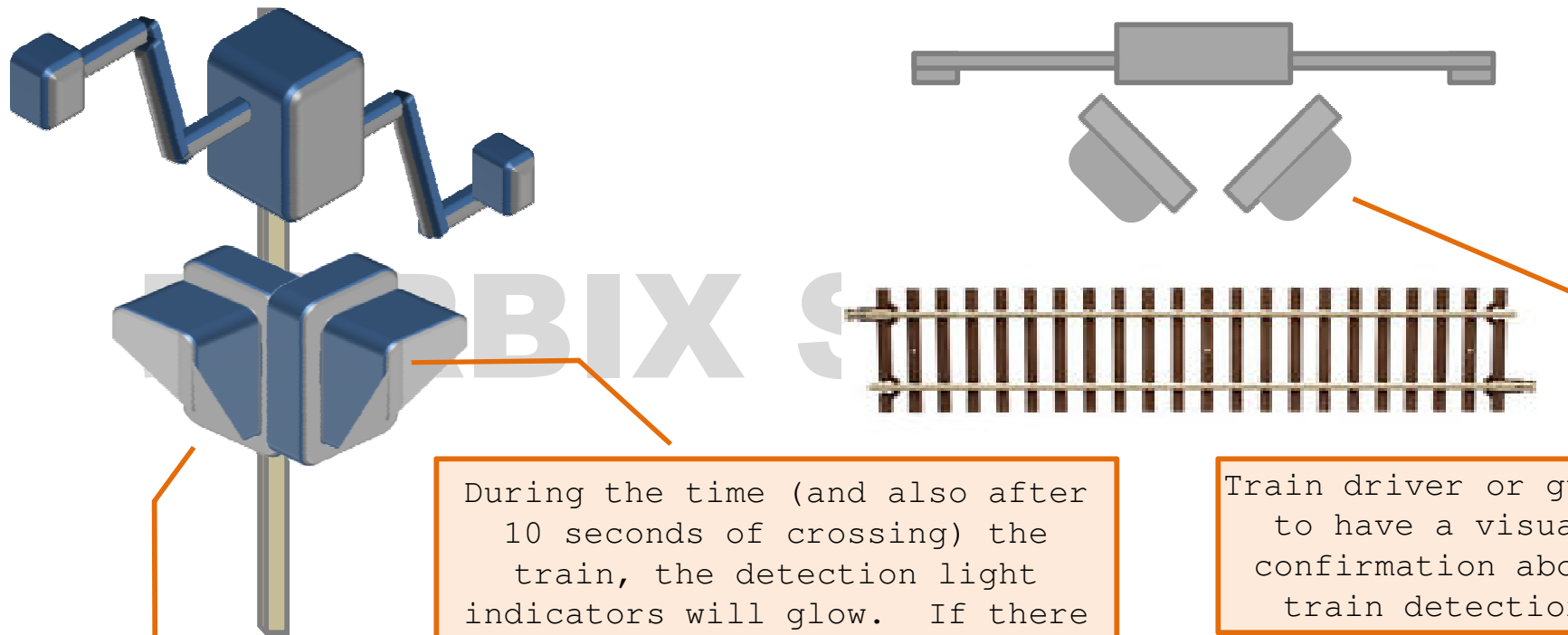


MADE IN INDIA







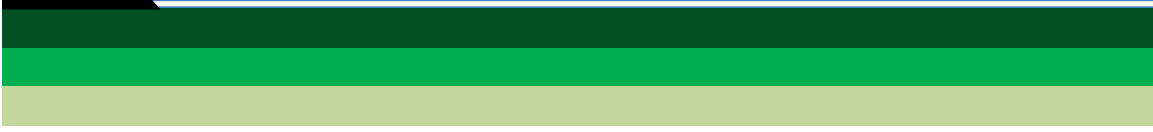


Indicator lights to confirming the train detection

During the time (and also after 10 seconds of crossing) the train, the detection light indicators will glow. If there is any system malfunction, the lights will not turn ON. In such an event the driver can lower the speed of the train, before approaching the junction

Train driver or guard to have a visual confirmation about train detection

**WingSpan Train Detector Transmitter with light indicators**



## Transmitter technical details:

- Train detector unit needs to be mounted on the pole (not less than 10-12 feet height from the ground level)
- **Make sure the transmitter unit antenna is visible to the receiver or intermediate transmitting antennas**
- The **detecting** module pole mounting should not be more than **3.5 meters from the train**
- The transmitter has inbuilt logic to avoid false detection from nearby flying objects or vibration on the poles. It is also equipped with redundant detecting units for the train detection
- Maximum train speed to detect is 300 Km/hr.
- Minimum train length needs to be no less than 30 meters (at max speed) [this is the extreme corner scenario for detection logic]
- Intermediate transmitters detect the train as well as retransmit the far end transmitting signals
- Any number of transmitting poles can be installed on either side of the receiver junction (preferably even numbers)
- Number of transmitting units needs to be pre-programmed at the factory
- Antenna stub is with a magnetic base and comes with 1 meter RF connector cable. This cable can be extended to increase the overall height of transmission
- The transmitter unit operates on 12VDC supply. This can be fed either from a battery of 12VDC (with solar / electricity charging)
- FORBIX SEMICON factory do not manufacture solar cells, charging circuits, battery and poles
- Transmitter units have the provision to clamp on pole via semi circular clamping plates (not shown in the picture)

## Receiver technical details:

- Receiver unit needs to be mounted on the pole (not less than 10-12 feet height from the ground level)
- **Make sure the receiver unit antenna is visible to the intermediate transmitting antennas**
- **The receiver glows the red light flashing once the train is detected for the 1<sup>st</sup> time from the farthest transmitting pole**
- **On subsequent detection from next poles the receiver turns ON the alarm siren horn till the train crosses the other side of the transmitting pole** (other side to the receiver)
- After the train has moved out from the other side of the farthest transmitting pole, the receiver will stop glowing the red alarm light
- The receiver has light indication and light for 2 sides of the pole
- The Red color flasher and the siren alarm are covered with Mild Steel (MS) material to avoid from direct heat / sunlight / rain
- Antenna stub is with a magnetic base and comes with 1 meter RF connector cable. This cable can be extended to increase the overall range of communication
- The receiver unit operates on 12VDC supply. This can be fed either from a battery of 12VDC (with solar / electricity charging)
- FORBIX SEMICON factory do not manufacture solar cells or charging circuits
- Receiver unit have the provision to clamp on pole via semi circular clamping plates (not shown in the picture)

## Additional fail safe features:

The failsafe feature is enabled automatically (in an event of a detector pole failure) or manually by the railway technician

- The detector is equipped with redundant sensors, thereby reducing the chances of failure. If and ONLY if ALL the sensors fail the detector is assumed to be malfunctioning
- Additional indicator lights at the detector for the engine driver and guard to get a visual confirmation
- If far end pole detectors fail and near end continues to detect train presence, then automatic corrective action is taken by the receiver at the crossing (by blinking the alert light)
- The radio transmitter unit constantly pings a heartbeat broadcast message the centralized receiver informing, it is alive and all parts are functioning OK. If this heartbeat messages stop coming from the detector poles then the receiver assumes a possible malfunction at the particular detector and thereby halting the whole system (and enabling the flashing light)
- Receiver has indicator LEDs to indicate the detector pole status. This shows, which particular pole is not functioning, so that the railway technicians can take corrective action

At the train detector transmitter:

The transmitter unit has 2 additional indicator lights. Once the train presence is detected, the indicator lights turns ON. It remains ON till the train is present in near the detector. Once the train has crossed the detector pole 15-20 seconds later the indicator light turns OFF.

This is a visual indication of the driver and the guard of the train (informing the correct detection).

In an event of malfunction of the machine the lights will NOT turn ON. Therefore, in such a case, the driver should reduce the speed of the train before it reaches the junction

The possible causes of malfunction probably would be:

- Battery is dead because the charger has stopped working or solar panel is functioning
- Any physical damage or tampering to the overall electronic circuits
- All the 3 detecting sensors have failed at the transmitter unit (this case is very rare), because the sensing units are electrically and mechanically isolated

Corrective action at the receiver:

In the even of a failure the railway staff needs to open the receiver unit and turn on a switch (present inside the unit). After this switch is activated the complete detection system will stall and the receiver unit will continuously flash the indicator light (at the crossing). The flashing of the indicator light, implies that the RED alert indicator would be in a blinking (with a duration of 1-2 second), ON/OFF/ON/OFF ...

## Radio technical specifications

+20dBm (100mW) constant RF output  
 +14dbm high efficiency PA for the transmitter  
 Receiver sensitivity: - 148 dbm  
 168 dbm is the maximum link budget  
 4 stages of LNA at the receiver unit  
 Operating voltage of the transmitter: 12VDC  
 Operating voltage of the receiver: 12VDC  
 Operating temperature: 25°C (0°C to 55°C)  
 CRC on data payload: Enabled  
 Packet Error Rate: PER (1%)  
 Redundancy packet feature: Enabled  
 fOsc = 32MHz  
 Radio IC used CC1100 (from Texas Instruments) [Sub-GHz frequency]

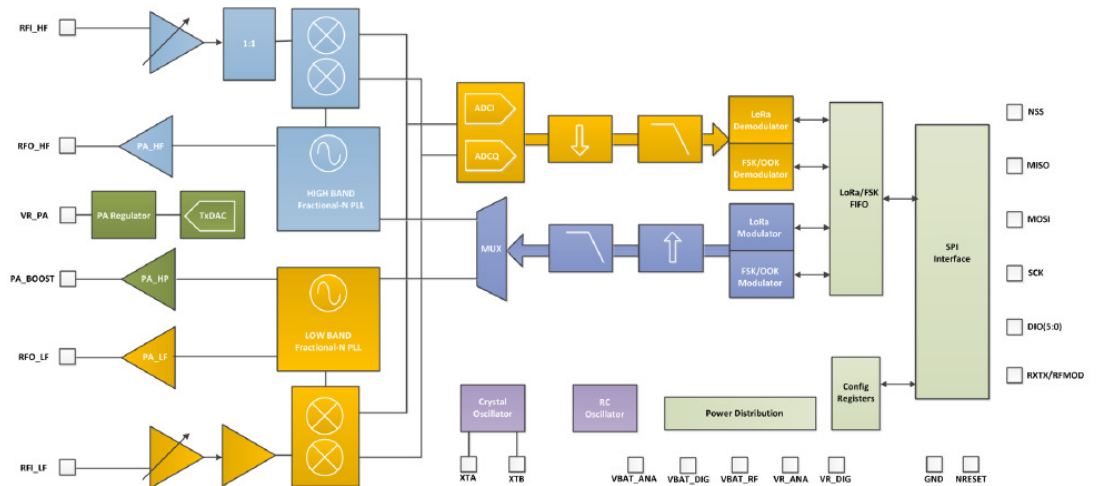
Following are the programmed parameters and vary from customer to customer:

- Operating data packet length and data format
- Internal data encryption logic
- FSK, GFSK, MSK, GMSK, OOK modulation techniques
- **Operating frequency (380 - 480MHz). The transmitter does not operate on 1 specific frequency. It hops multiple predefined frequencies for data transmission. Data packets are transmitted in all of the predefined frequencies one by one. The receiver is tuned to the predetermined hopping frequencies.**
- Communication data rate 146/293/4688/9380 depending on range requirement
- Bandwidth (62.5 or 125KHz as per sensitivity settings)

Range of communication of any RF wireless machine is primarily dependent on environmental conditions, viz. temperature, humidity, interference, cross talk and multipath fading. It achieve best range of communication, it is suggested to mount the machine at a height not less than 10-12 feet and open line of sight to the receiver. In such conditions the range of communication can reach up to 3.5Kms as well. **At various installations the range of communication is achieved within 5-6Kms.**

Sub-GHz antenna provided are of 2 types:

- Fixed cylindrical type
- Long wire extended type (with magnetic base)
- Receiver contactor relay maximum load capacity 5A @ 220VAC/50Hz or 110VAC/60Hz



Radio circuit block diagram

**Document History**

| <b>Revision / Date</b> | <b>Approved</b> | <b>Description / Changes</b> |
|------------------------|-----------------|------------------------------|
| Nov - 2016             | Yes             | Initial Release              |
|                        |                 |                              |
|                        |                 |                              |
|                        |                 |                              |

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