

**1.2 Theory of Operation**

The Radio Transceiver Module integrates the Remote Keyless Entry (RKE), Tire Pressure Monitoring System (TPMS) and Passive Entry/Passive Start (PEPS) Ultra High Frequency (UHF) communication processing into a single module that is a node on the vehicle MS-CAN network and communicates directly with the Body Control Module (BCM) via K-Line.

The following key features are integrated in the RTM module:

- **Remote Keyless Entry UHF Receiver** – Receive vehicle access/control command request UHF transmissions from mated Remote Keyless Entry transmitters (PK and IKT). Vehicle access/control command requests includes door Lock/Unlock, Panic Alarm. Global window Open/Close, lift gate/trunk access, and possibly Remote Start or Step
- **TPM UHF Receiver** – Receive Tire Pressure status UHF transmissions from mated sensors mounted in the vehicle wheels.
- **PEPS "Downlink/Response" Receiver** – Receive Passive Start/Entry (PASE) "Downlink/Response" UHF messages from mated PK transmitters as a result of a Low Frequency "Uplink/challenge" request via a Low Frequency (LF) transmission from the vehicle.
- **MS-CAN Serial Communications** – interface with the vehicle Medium Speed CAN bus to receive data from other vehicle sub-system components as well as communicate diagnostic information and reprogram the module.
- **K-Line Communication** - Dedicated interface between the Radio Transceiver Module (RTM) and the Body Computer Module (BCM) to transfer RF data from the UHF receiver feature to the BCM for processing.
- **Integrated Low Band UHF Antenna** – Single integrated 434 MHz Antenna for reception of RKE or TPM messages.

In the field application the RKE System shall meet:

- For Unidirectional RKE a minimum range of 30 meters, for typical systems, 16 points around the vehicle, Nulls of +/- 1m widths at 30 m are allowed.

Typical systems defines here as 25°C, RTM at mean of production, keys at nominal of spec, RTM at discussed location above passengers head.

**Receiver:**

The design evaluates received signal qualifiers (potentially data rate. modulation type, synchronization word. transmitter ID code. etc.) to minimize the probability of waking up the microprocessor in the RF Module or the MSCAN bus on noise or transmissions from other services.

The receiver is capable of reading the received signal strength (RSSI) and storing the value for further processing as will be defined in the Functional Specification. The design is capable of polling for TPMS and RKE signals simultaneously.

The RF receiver supports all 433MHz channel center frequencies based on its part number. To support the PDL designated remote start applications. the two-way systems are capable of typical 150 meters of range performance around the entire vehicle. The RF Module receives a CAN signal indicating it is configured as a remote start vehicle.

Bandwidth for each receiver of DUT:

Table 1.2-1:

Remote Keyless Entry	
Receiver frequency [MHz]	BW [kHz]
B: 434,251	360

Table 1.2-2:

TPM	
Receiver frequency [MHz]	BW [kHz]
B: 433,92	360

Table 1.2-3:

PEPS	
Receiver frequency [MHz]	BW [kHz]
B: 434,251	360