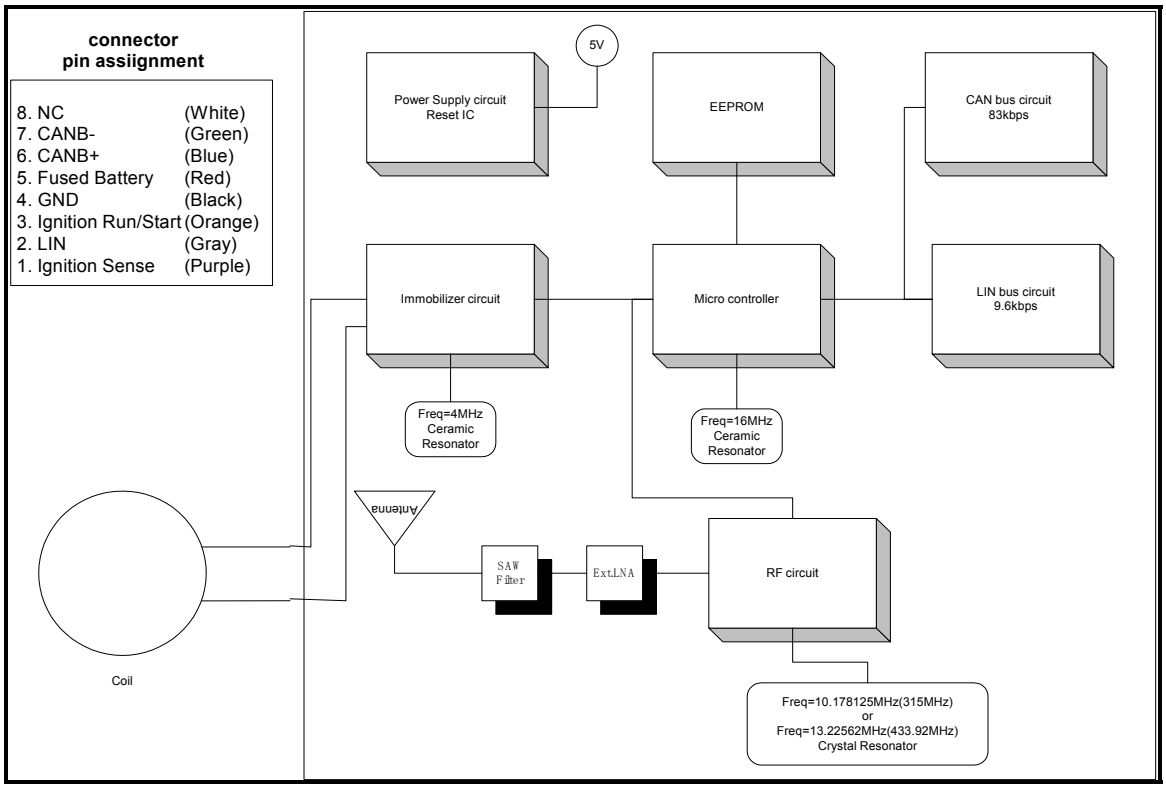
EXHIBITS CHECKLIST INFORMATION

FCC# OUCD6000008X (Numbers are molded/etched onto the transceiver case)

Reference Drawing # 6000008X (where X=0, 1, 2, 3 represents versions that support different functionalities)



WCM block diagram

Theory of Operation:

There are four variations of WCM Printed Circuit Board (PCB) assembly identified with the numbers 6000008X (where X=0, 1, 2, 3) that support different functions. The same PCB assembly is used to provide the same functions in two applications the Small Car (SC) and the small Truck (TK). The WCM is mounted on the lock cylinder housing of the vehicle. The difference between the SC and TK applications is the plastic housing of the PCB which is designed to accommodate the variations of the lock cylinders between a small car and a truck.

The functions supported by the four versions of the WCM PCB are:

1. Remote Keyless Entry (RKE), using 315 MHz wireless communication between the Key and WCM, where WCM is only a Receiver (Rx)
2. Tire Pressure Monitor (TPM) without tire identification, by using a 315 MHz wireless communication between WCM and the pressure sensor, WCM is a receiver only (Rx)
3. TPM with tire identification option, by using wireless communication at 315 MHz, WCM is a receiver only (Rx)
4. Immobilizer using 125 kHz wireless communication between the Key and WCM, where WCM is a transmitter and a receiver at 125 kHz (Tx)

The PCB assembly identified with the number 60000080 supports all functions listed above. The PCB of the remaining versions is populated only with the components that are required to support the desired functionality.

- The PCB assembly 60000080 supports all functions 1, 2, 3, and 4 (WCM is Rx and Tx)
- The PCB assembly 60000081 supports functions 1, 2, and 4 (WCM is Rx and Tx)
- The PCB assembly 60000082 supports functions 1, 2 (WCM is Rx)
- The PCB assembly 60000083 supports functions 4 (WCM is Tx)

WCM has an eight pin (8) connector mounted on PCB. Pins 5 and 4 are fused Battery B+ and Ground, pin 3 is Ignition/Start, pins 6, and 7 are CAN bus CAN+ and CAN-respectively, pin 2 is LIN bus, and pin 1 is ignition sense. The CAN bus is a low speed 2 wire bus interface to transfer and receive messages to the vehicle control module related to, the immobilizer, RKE and TPM functions. The LIN bus is a low speed single wire interface to the vehicle control module for information related to TPM function. The WCM is power continuously to implement the RKE functions, the Ignition/Start activates the TPM and Immobilizer functions

The 315 MHz RF function is implemented using the TDA5211 Infineon integrated circuits and an onboard wire antenna to receive the transmitted signals from the key in the case of RKE functions, or from the tire pressure sensor in the case of the TPM function, decode the message and convey it to the vehicle control module for processing. The modulation method used for the RKE function is ASK 2.4 kbps, and FSK 9.6 kbps for the TPM function.

The immobilizer function is implemented using the PCF7991AT/Philips integrated circuit with an onboard coil antenna to transmit and receive 125 kHz modulated signal. In the transmit mode WCM transmits for 0.5 second modulated 125 kHz signal. This charges a small capacitor in the key that provides the power to read signal and respond back with its identity code. The modulation method used to implement the immobilizer function is Manchester encoded ASK modulation transmitted at the rate of 4 kbps. Authentication is performed once

during an initial start attempt. After successful authentication the transceiver enters a sleep mode until the next occurrence of a start attempt.

Signal Description	Voltage/ Current Level	Frequency	% Duty Cycle (range)	Other
Fused Battery	9V – 16V	DC		
Ground	0V	DC		
Ignition Run/Start	-	-		
CANB+,CANB-	-	-		83.3kbps
LIN	-	-		9.6kbps
Ignition sense	-	-		

Signal Source Description	Voltage/ Current Level	Frequency	% Duty Cycle (range)	Other
Ceramic Resonator (for immobilizer)	0V – 5V	4MHz	50%	Sinusoidal
Ceramic Resonator (for microprocessor)	0V – 5V	16MHz	50%	Sinusoidal
Crystal Resonator (for RF IC 315MHz)	0V – 5V	10.178125 MHz	50%	Sinusoidal
Crystal Resonator (for RF IC 433.92MHz)	0V – 5V	13.22562 MHz	50%	Sinusoidal