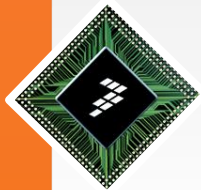


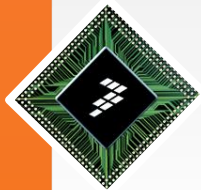
Apply MKW01 as TPMS receiver to kit with TPMS Transmitter MPXY8600/8700 as Total Solution

Prepare by Jason Chiang, 06/24/2014



Agenda

- 1. History**
- 2. MKW01 packet format**
- 3. MPXY8600 RF data configuration**
- 4. H/W Requirement**
- 5. H/W Environment setup**
- 6. MKW01 related register configuration**
- 7. MKW01 receive data output to terminal**
- 8. Reference Document**

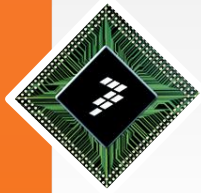


History

The MKW01Z device is highly-integrated, cost-effective, smart radio, sub-1 GHz wireless node solution composed of a transceiver supporting FSK, GFSK, MSK, or OOK modulations with a low-power ARM® Cortex M0+ CPU. The highly integrated RF transceiver operates over a wide frequency range including 315 MHz, 433 MHz, 470 MHz, 868 MHz, 915MHz, 928 MHz, and 955 MHz in the license-free Industrial, Scientific and Medical (ISM) frequency bands. This configuration allows users to minimize the use of external components.

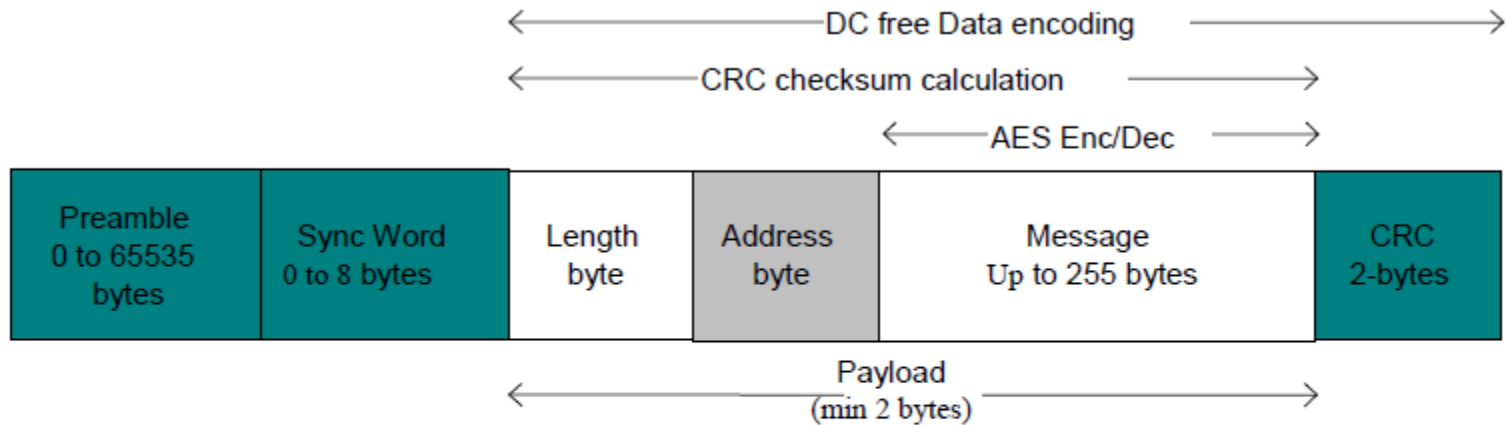
The MPXY8600 is a sensor for use in applications that monitor tire pressure and temperature. It contains the pressure and temperature sensors, an X-axis and a Z-axis accelerometer, a microcontroller, an LF receiver and an RF transmitter all within a single package.




This setup offer customers to utilize Freescale MPXY8600/8700 as transmitter and MKW01 as receiver to form 315MHz, 433.92MHz TPMS transmitter and receiver total solution.

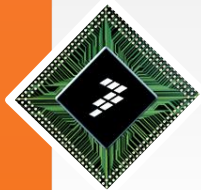


MKW01 packet format

Variable Length Packet Format



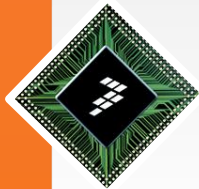
-  Fields added by the packet handler in Tx and processed and removed in Rx
-  Optional User provided fields which are part of the payload
-  Message part of the payload



MKW01 packet format(continued)

Tips :

- 1. User may follow above packet formats sending from transmitter and MKW01 decode Preamble and Sync Word, then decode payload data.**
- 2. Preamble value can't be changed, Sync Word length can be configurable. Sync word length must be matched.**
- 3. Payload can be encoded to other format, like Manchester encoding or DC-whitening. Preamble and Sync word can't be encoded to other format. The format of Preamble and Sync Word can't be changed.**
- 4. Currently we use 1 byte Preamble + 4 bytes Sync Words to communicate between MKW01 and MPXY8600/8700.**



MPXY8600 RF data buffer configuration

```
/******  
function :Fill_RFBUFFER(void)  
parameters :void  
returns :void  
type :low level c  
description: RF Buffer filling  
******/
```

```
void Fill_RFBUFFER(void)  
{  
    // Two init byte for ECHO- DO NOT CHANGE IT!  
    #if 1
```

```
RFD0= Rotate_data(0x55);
```

→ Insert "Preamble" data here

```
RFD1 = Rotate_data(0x01);  
// Supllier ID - FSL byte - this byte can be change
```

```
RFD2 = Rotate_data(0x01);
```

→ Insert "Sync Word" data here

```
RFD3 = Rotate_data(0x01);
```

```
RFD4 = Rotate_data(0x01);
```

```
RFD5 = Rotate_data(0x0A);
```

```
RFD6 = Rotate_data(0xFF);
```

```
RFD7 = Rotate_data(0x06);
```

```
RFD8 = Rotate_data(PPRESSURE);
```

```
RFD9 = Rotate_data(PTEMPERATURE);
```

```
RFD10 = Rotate_data(PVOLTAGE);
```

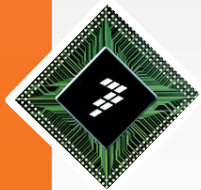
```
RFD11 = Rotate_data(PACCCZ);
```

```
RFD12 = Rotate_data(0x10);
```

```
RFD13 = Rotate_data(0xC3);
```

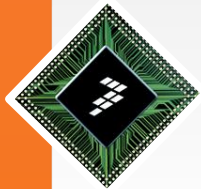
```
RFD14 = Rotate_data(PARAM1);
```

→ Insert " Sensor data "data here

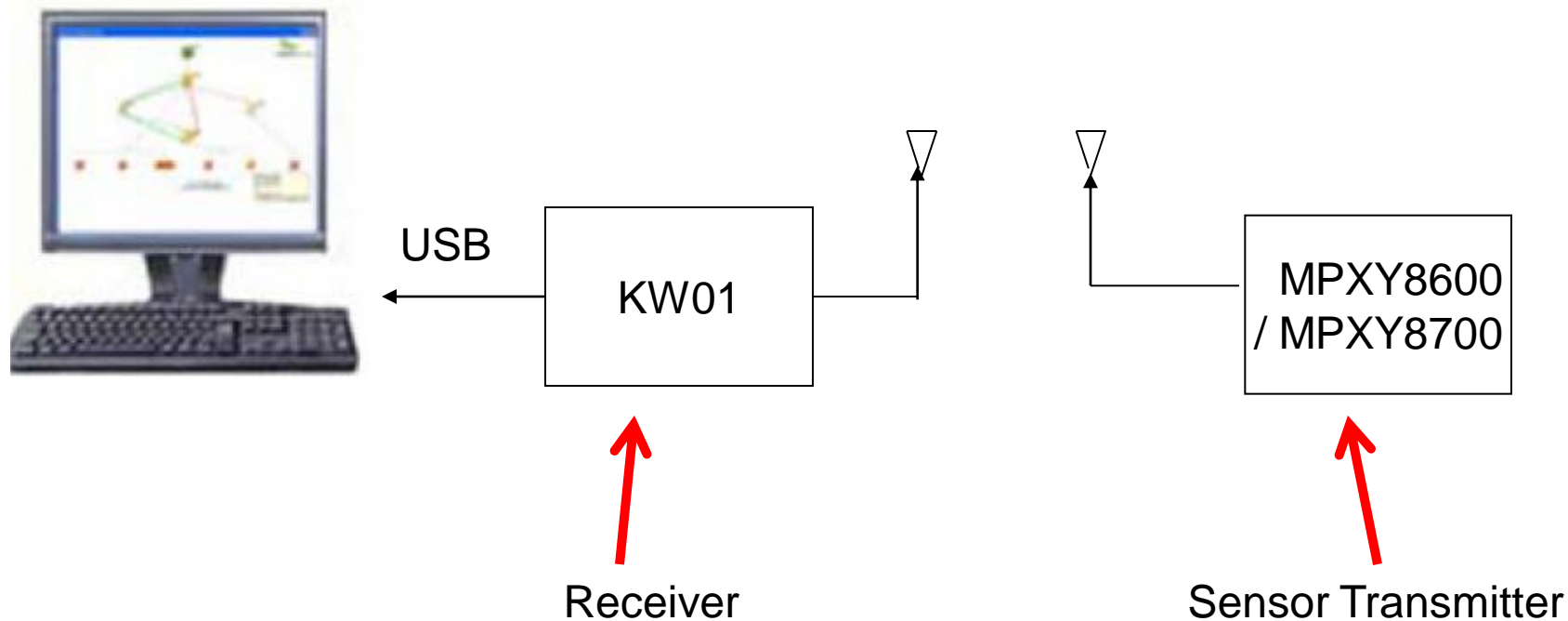


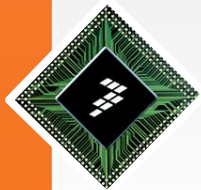
H/W Requirement

- 1. MKW01 EVB (TWR-RF EVB is optional)**
- 2. MPXY8600/8700 EVB**
- 3. Codewarrior 10.x for MPXY8700 development**
- 4. Codewarrior 6.3 for MPXY8600 development**
- 5. IAR Embedded Workbench for ARM7.10 for MKW01 development**
- 6. PC terminal for Data Display**



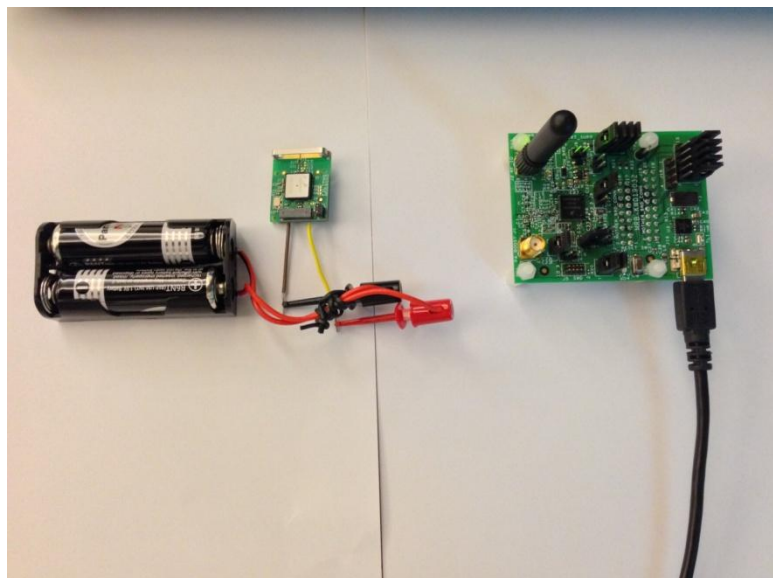
H/W Environment setup





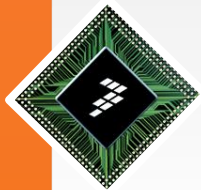
H/W Environment setup(Continued)

1. Prepare MPXY8600 EVB as Transmitter. MPXY8600's RF data buffer sends data packet every 3 sec.
2. Prepare one MKW01 EVB as receiver. This MKW01 will receive sensor data sending from MPXY8600/8700 and then output to Terminal .



MPXY8600

MKW01 EVB

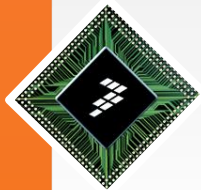


MKW01 related register configuration

1. DC-free encoding/decoding is set to None(off) mode.
(This can be monitored by reading PacketConfig1 register)

Table 6-9. Packet Engine Registers

| | | | | | |
|----------------------------|-----|--------------|----|----|---|
| RegPacketConfig1 (0x37) | 7 | PacketFormat | rw | 0 | Defines the packet format used: 0 → Fixed length 1 → Variable length |
| | 6-5 | DcFree | rw | 00 | Defines DC-free encoding/decoding performed: 00 → None (Off) 01 → Manchester 10 → Whitening 11 → reserved |



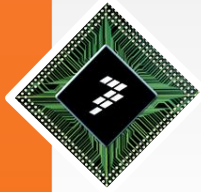
MKW01 related register configuration (Continued)

2. On the Simple Range Demo :

The packet is formed as follows:

Preamble (1bytes, value 0x55) + SyncWord (4 bytes, value 0x01) + sensor data

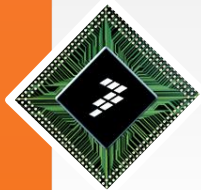
3. CRC calculation needs to be considered (This can be monitored by reading PacketConfig1 register)
4. Variable length packet format needs to be considered (This can be monitored by reading PacketConfig1 register)
5. Center carrier Frequency can be programmed in **(void)PhyPib_SetCarrierFreq(0x4EC000)**, Set it to 315MHz or 433.92MHz



MKW01 Receive Sensor data and output data to Terminal

```
008-255-060055CA8D10C300
008-255-060054CA8C10C301
008-255-060054CA8C10C302
008-255-060055CA8C10C303
008-255-060055CA8C10C300
008-255-060055CA8C10C301
008-255-060054CA8C10C302
008-255-060055CA8C10C303
008-255-060055CA8C10C300
008-255-060055CA8C10C301
008-255-060055CA8D10C302
008-255-060055CA8C10C303
008-255-060055CA8C10C300
008-255-060055CA8C10C301
008-255-060055CA8C10C302
008-255-060055CA8C10C303
008-255-060054CA8C10C301
008-255-060055CA8D10C302
008-255-060055CA8C10C300
008-255-060055CA8C10C301
008-255-060054CA8C10C303
008-255-060054CA8C10C300
008-255-060055CA8C10C301
008-255-060054CA8C10C302
008-255-060055CA8C10C303
```

00 : Pressure data
55/54 : Temperature data
CA : Voltage data
8C/8D : Z-axis accelerometers



Reference Document :

1. MKW01 Datasheet, MKW01Z128.pdf
2. MKW01 Reference Manual, MKW01Z128RM.pdf.
3. KW01 Development Hardware, KW01DHRM.pdf.
4. MKW01 Simple Media Access Controller, MKW01SMACRM.pdf.
5. MKW01 Documentation Application User Guide, MKW01DAUG.pdf.
6. MPXY8600 Datasheet, MPXY8XXD.pdf.
7. MPXY8600 Reference Manual, MPXY8500RM.pdf.

Please contact jason.chiang@freescale.com if any question

