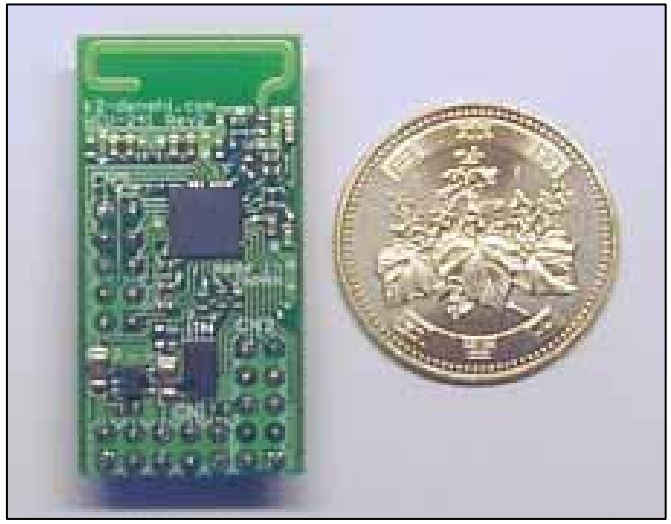
RF & technology
Keitsu Electronic Co., Ltd.

～ Realizing your own communication method
where existing method such as Zigbee・Bluetooth・Wi-Fi ～

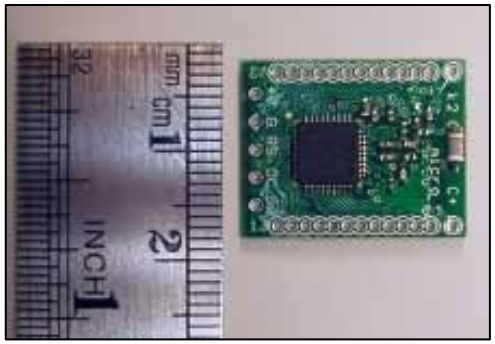
WCU – series
Mini wireless module with embedded MCU

WCU-241 series



WCU-241

WCU-C series



WCU-C micro

www.k2-denshi.com

Two RF comms MCU platforms

● WCU-241 series

simple & high speed

- Nordic nRF24E1 based platform
- 16MHz 8051-based MCU
- EEPROM4k / RAM4k (note)

  note：changes the program size
- Transfer rate 250kbps・1Mbps
- Dual receive func (every 8M)
- ADC 8ch 10bit
- UARTx1
- Free development tool

● WCU-C series

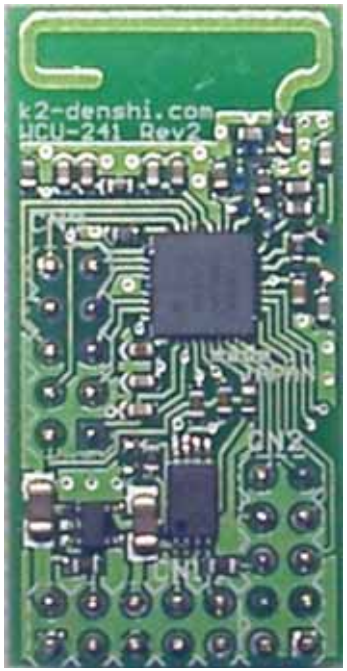
multi function & Flash ROM

- TI CC2510/1110 based platform
- 26MHz 8051-based MCU
- Flash32k / RAM4k
- Transfer rate 1.2～500kbps
- ADC 8+2ch (temp sensor) 12bit
- USARTx2 I2S AES co-pro
- On-board antenna
- Free development tool

WCU—241 series

Simple & high speed

WCU－241

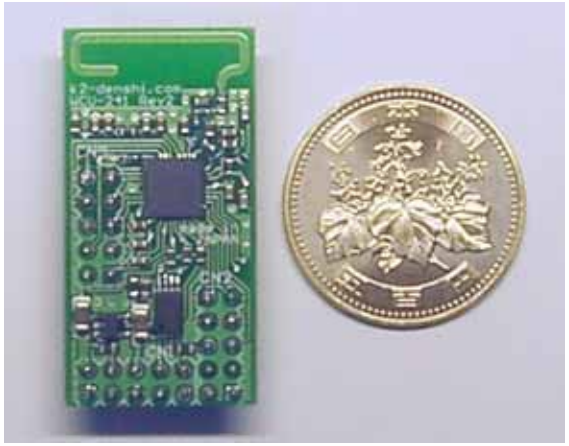


¥ 7875

- 2.4GHz Wireless Transceiver Module
- 8051-based MCU
- ADC 8ch 10bit
- On-board antenna
- Battery operation
- 1Mbps on shock burst mode
- Dual receive function (8M spacing)
- Communication range 20〜30m
  (May vary by setting and environment)
- On-board voltage regulator

Ready to Go Boards

(Pre-programmed)



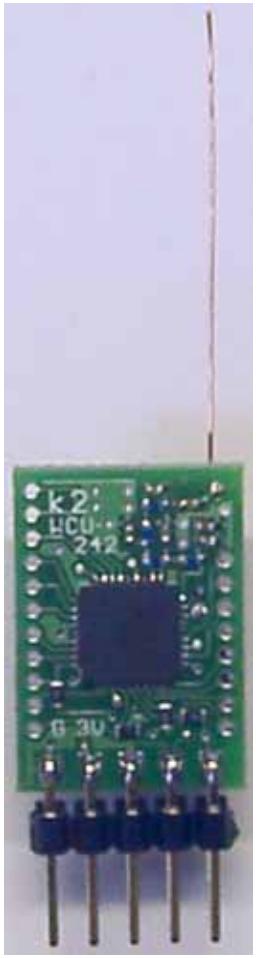
- **WCU-241D** ¥ 8925

  8ch digital remote control TRX
- **WCU-241SD** ¥ 9975

  comms with WCU-241D by PC
- **WCU-241AT/AR**

  8ch analog TRX

WCU－242

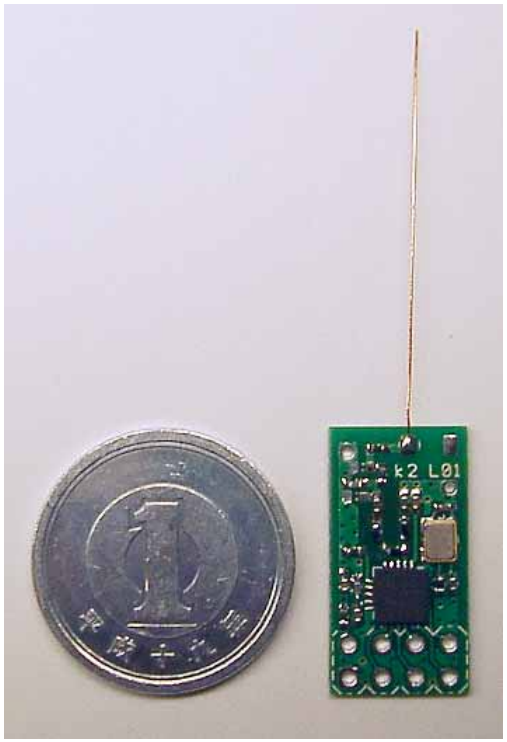


- 2.4GHz Wireless Transceiver Module
- Ultra small size 14x20mm
- 8051-based MCU
- ADC 8ch 10bit
- 1Mbps on shock burst mode
- Dual receive function (8M spacing)
- Battery operation
- Communication range 20～30m

(May vary by setting and environment)

¥ 9135

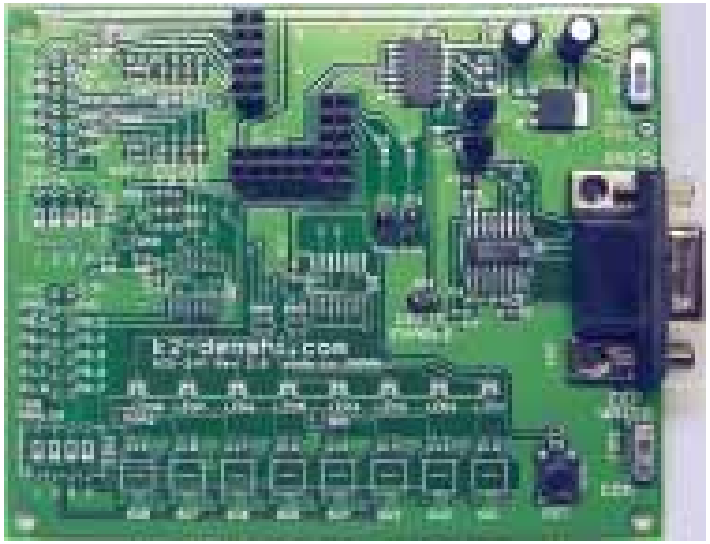
WCU－24L01＋(Plus)



¥ 4725

- 2.4GHz Wireless Transceiver module
- Micro size 10x20mm
- Control by SPI (w/o MCU)
- High speed 2Mbps (enhanced shock burst, auto ACK)
- Low power 11.3mA at 1mW(RF pow)
- Communication range 20～30m (May vary by setting and environment)
- Connectivity with WCU-24 series

WCU－24M



¥ 7875

- Dedicated motherboard
- Programming with RS232C is possible
- Programming and serial link can be switched
- Space for parts to experiment with the unit
- Debugging software included “Sherpa”
- Freeware C Compiler and assembler can be combined

WCU－241D･SD sample usage

8ch remote control test

Monitoring port by PC

Port setting by PC

8 port

digital output

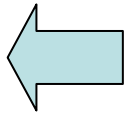
WCU-241D receiver mode

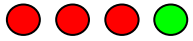
RS232C

WCU-241SD
Transceiver

8 port

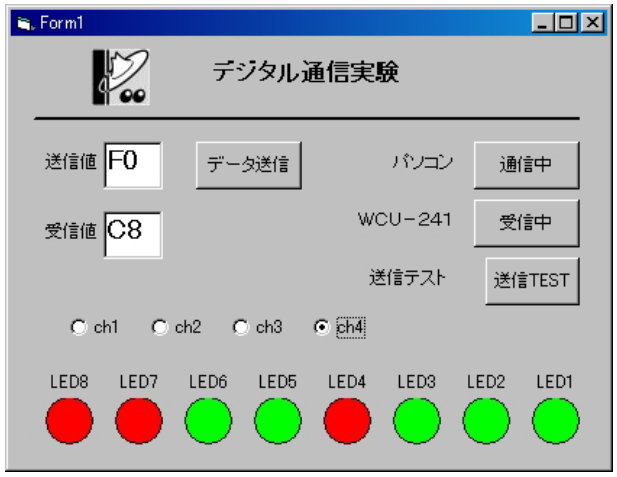
digital input





WCU-241D transmitter mode

Data I/O remotely controlled by host PC



Ch 1

Port output

Ch 2

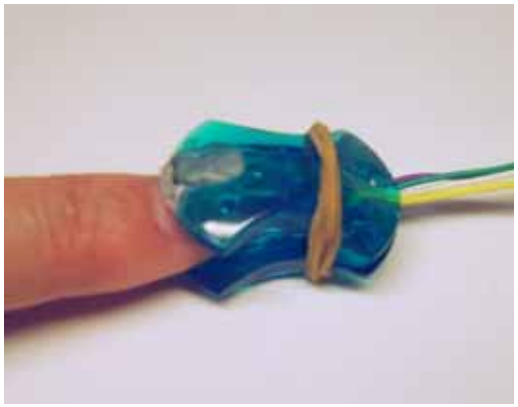
Port input

Data I/O can be controlled by setting T/RX and channels

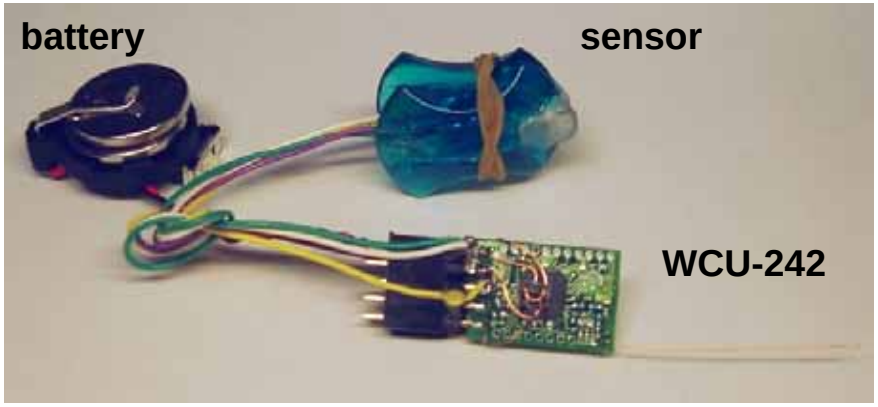
demonstration of WCU-241 series

Wireless photoplethysmogram demo

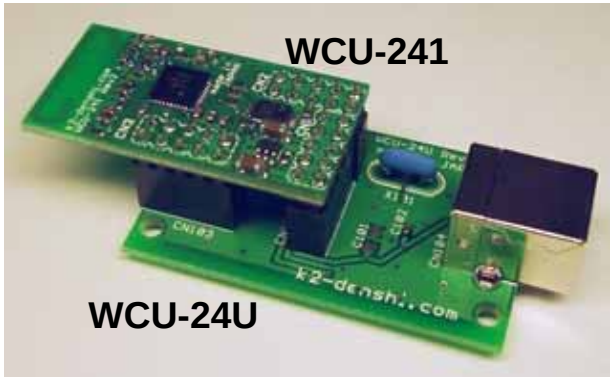
Photoplethysmogram detector



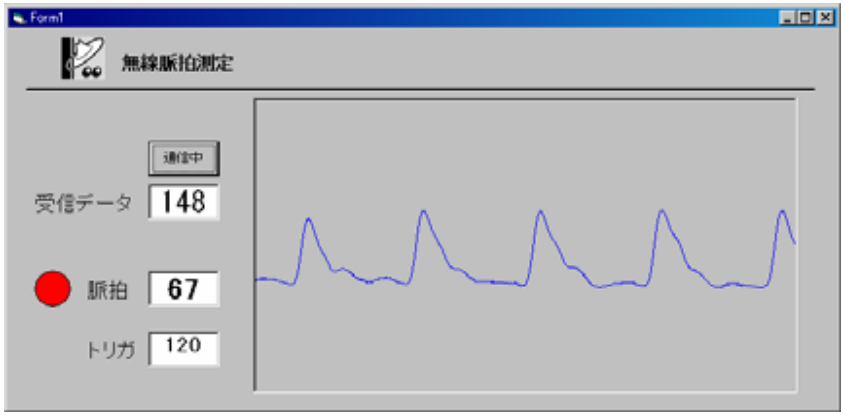
Detector output is digitized then transmitted as RF



Received RF is demodulated then transferred to the PC



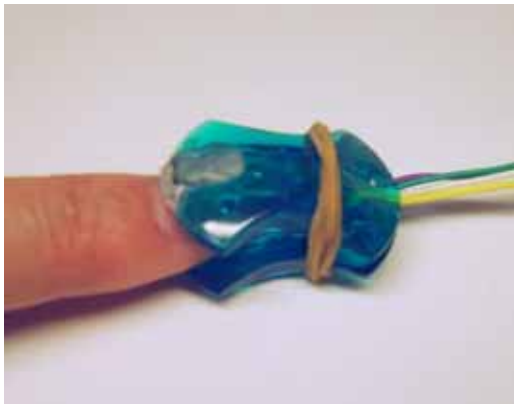
The photoplethysmogram waveform is now remotely displayed on the PC display



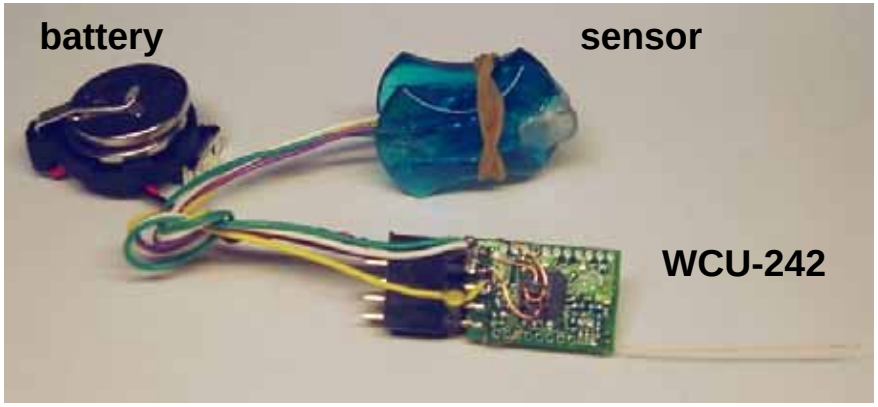
demonstration of WCU-241 series

Wireless level meter demo

Photoplethysmogram detector



Detector output is digitized then transmitted as RF



Received RF is demedulated and converted back to original analogue waveform, driving a level meter

The movement of the level meter represents the remotely sensed Photoplethysmogram

demonstration of WCU-241 series

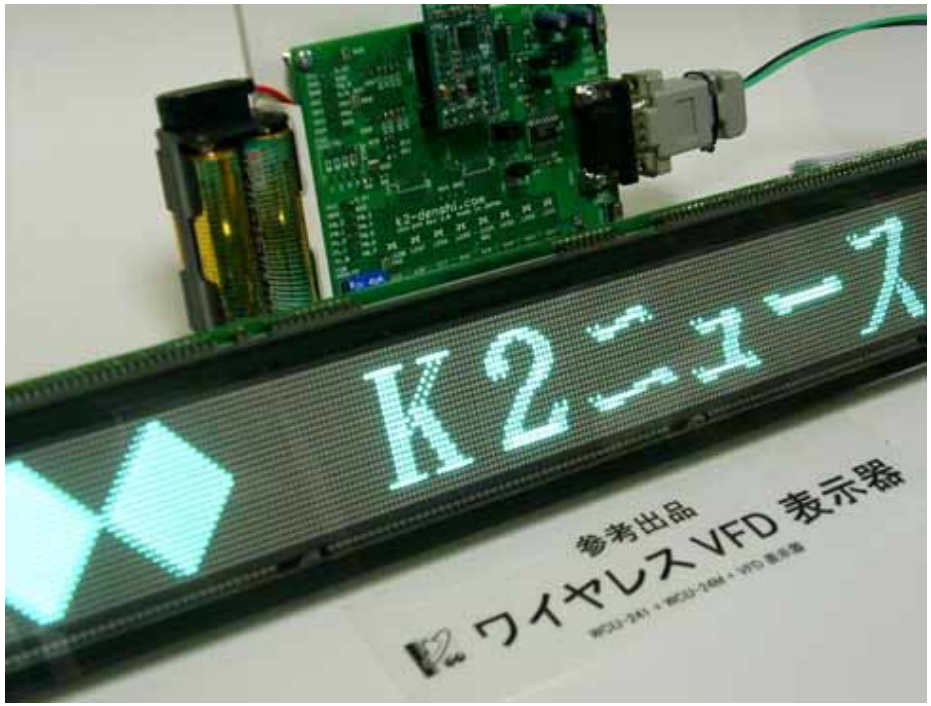
Wireless display demo

WCU-241＋WCU-24M

One of locally stored messages, which is selected by the switches on the bottom, is horizontally scrolling displayed

The messages are wirelessly transferred by a host PC

WCU-241＋WCU-24M＋VFD



WCU—C series

multi function & Flash ROM

WCU-C series

WCU－C251

¥ 7875

- 2.4GHz wireless transceiver module
- 8051-based MCU Flash32k
- ADC 8+2ch 12bit
- MCU embedded temperature sensor
- USARTx2 I2S AES co-pro
- On-board antenna
- Battery operation
- 1.2～500kbps
- Multi channel operation
- Communication range 100m
  (May vary by setting and environment)

WCU－C251D ★ pre-programmed

¥ 8925

- Pre-programmed version of WCU-C251
- 16 digital I/O port (ON/OFF)
- Transmission rate approx 10ms
- Switchable function transmitter or receiver
- RF power -30dBm～1dBm
- Switchable Frequency 4ch(2403～2478MHz)
- Output invert function (On RX mode)
- Output toggle function (On RX mode)

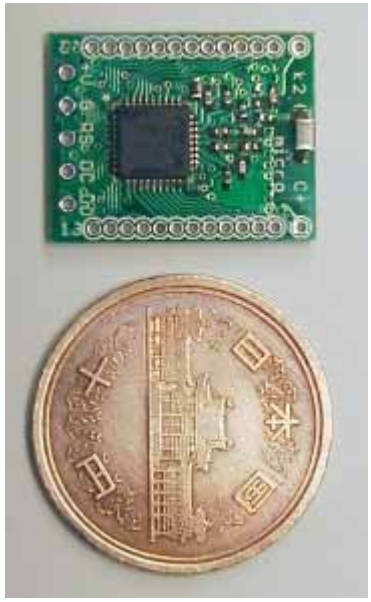
＜the program can be customized＞

WCU－C251A ★ pre-programmed

- Pre-programmed version of WCU-C251
- 8ch 12bit resolution ADC transfer
- 8-bit digital Input or Output
- Switchable function transmitter or receiver
- Transmit (sample) rate 5ms〜1s
- Switchable Frequency 4ch(2403〜2478MHz)
- LCD output on RX mode (need level convert)
- Serial output on RX mode

＜the program can be customized＞

WCU－C micro



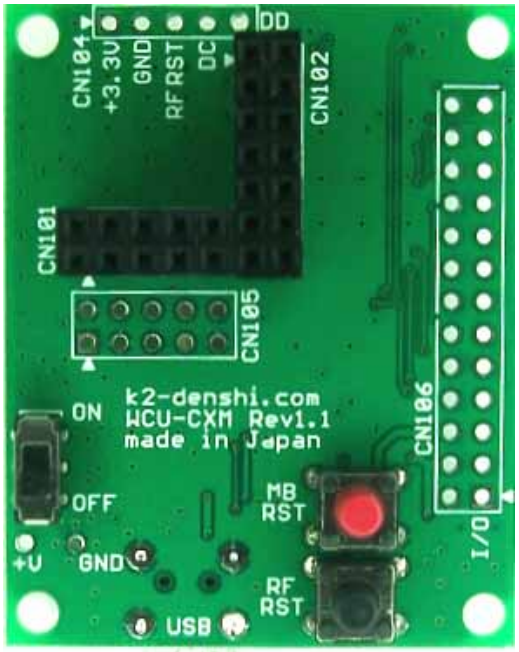
- 2.4GHz wireless transceiver module
- 8051-based MCU Flash32k
- ADC 8+2ch 12bit
- MCU embedded temperature sensor
- USARTx2　I2S　AES co-pro
- Ultra small chip antenna
- Battery operating
- 1.2～500kbps
- Multi channel operation
- Ultra small 16x20mm

WCU－C111

- 315MHz wireless transceiver module
- 8051-based MCU Flash32k
- ADC 8+2ch 12bit
- MCU embedded temperature sensor
- USARTx2 I2S AES co-pro
- Small on-board antenna
- Battery operation
- 1.2～250kbps
- Can use low level radio law (in Japan)
- Communication range 10m (in Japan)

(May vary by setting and environment)

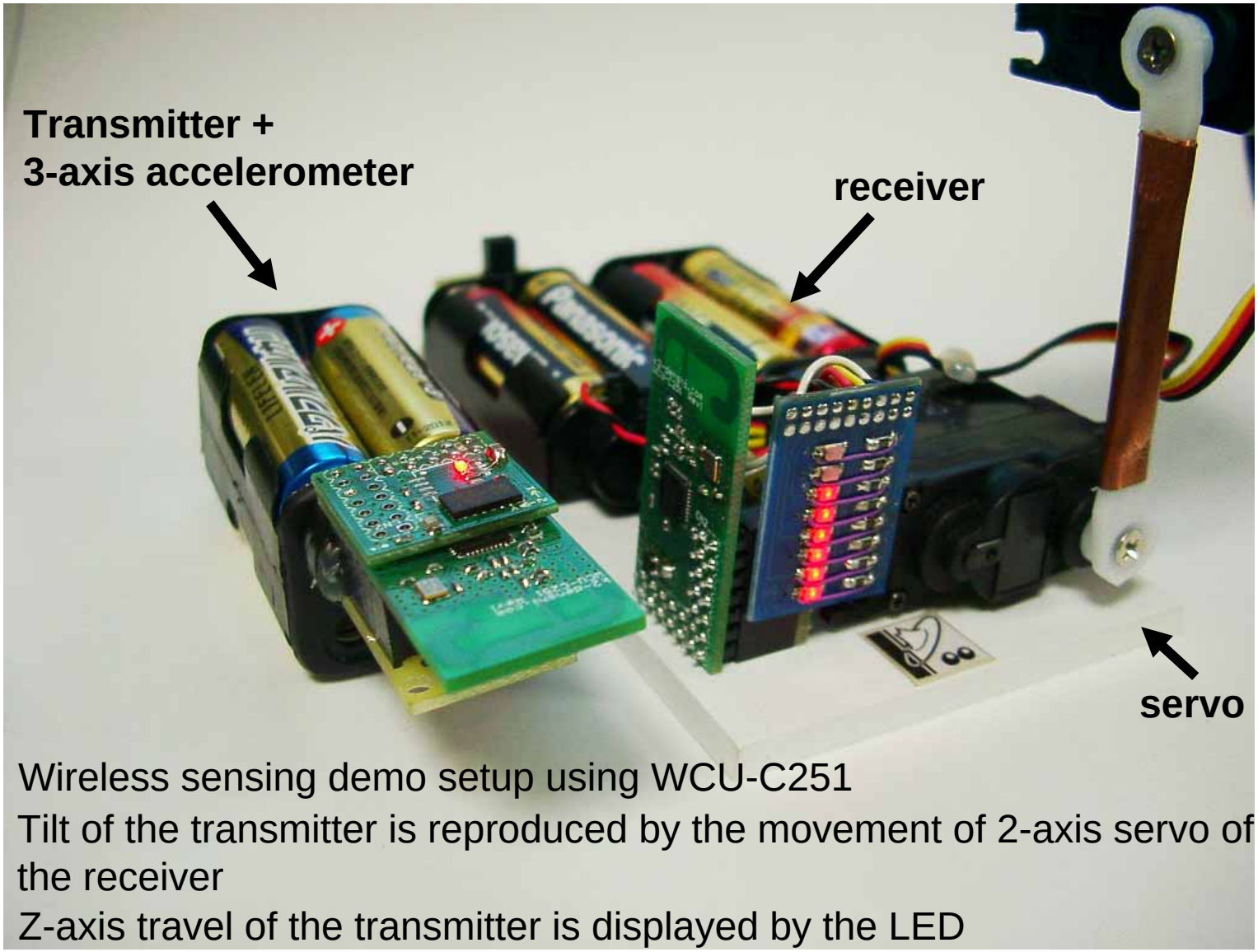
WCU－CXM



- Development board for WCU-C series
- Can program radio MCU of TI
- Program download and remote debugging by a host PC through USB connection
- Free writing software of TI is available
- Usable the utility software of TI to test communication quality
- Free compilers and Assemblers available IAR C and SDCC

¥ 7875

Wireless Sensing 1



Wireless sensing demo setup using WCU-C251

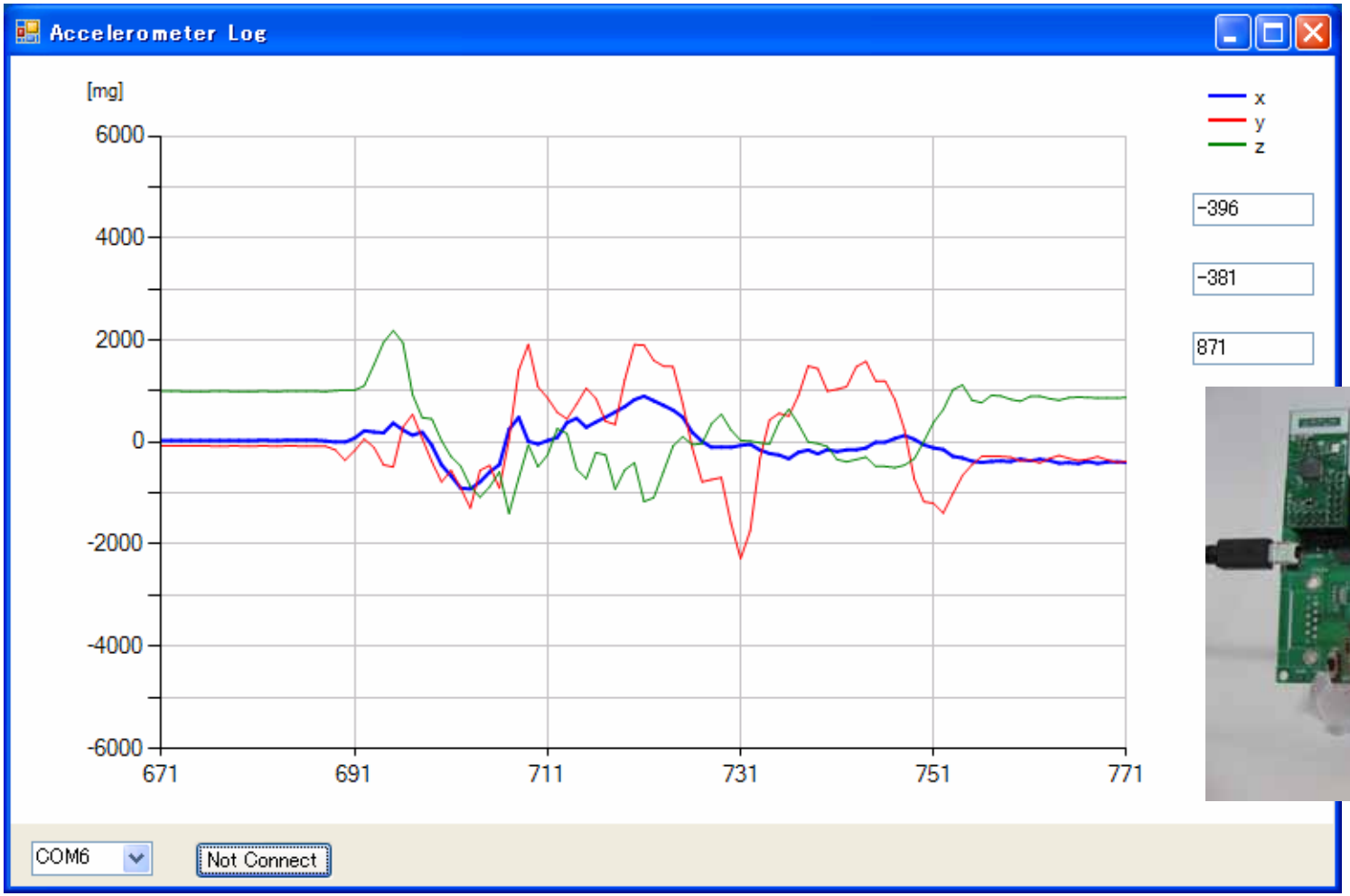
Tilt of the transmitter is reproduced by the movement of 2-axis servo of the receiver

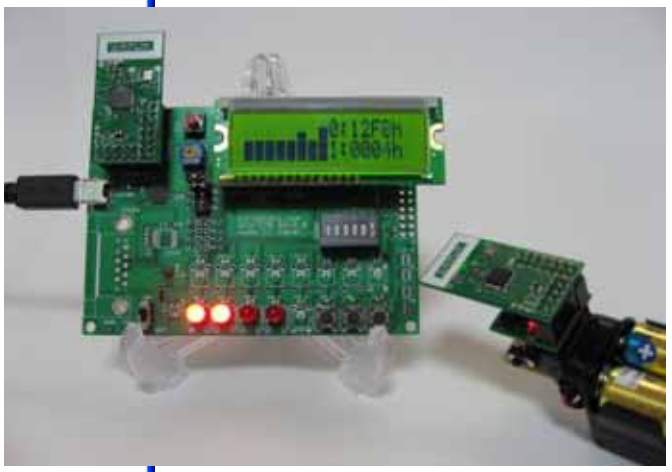
Z-axis travel of the transmitter is displayed by the LED

demonstration of WCU-C series

Wireless sensing + PC

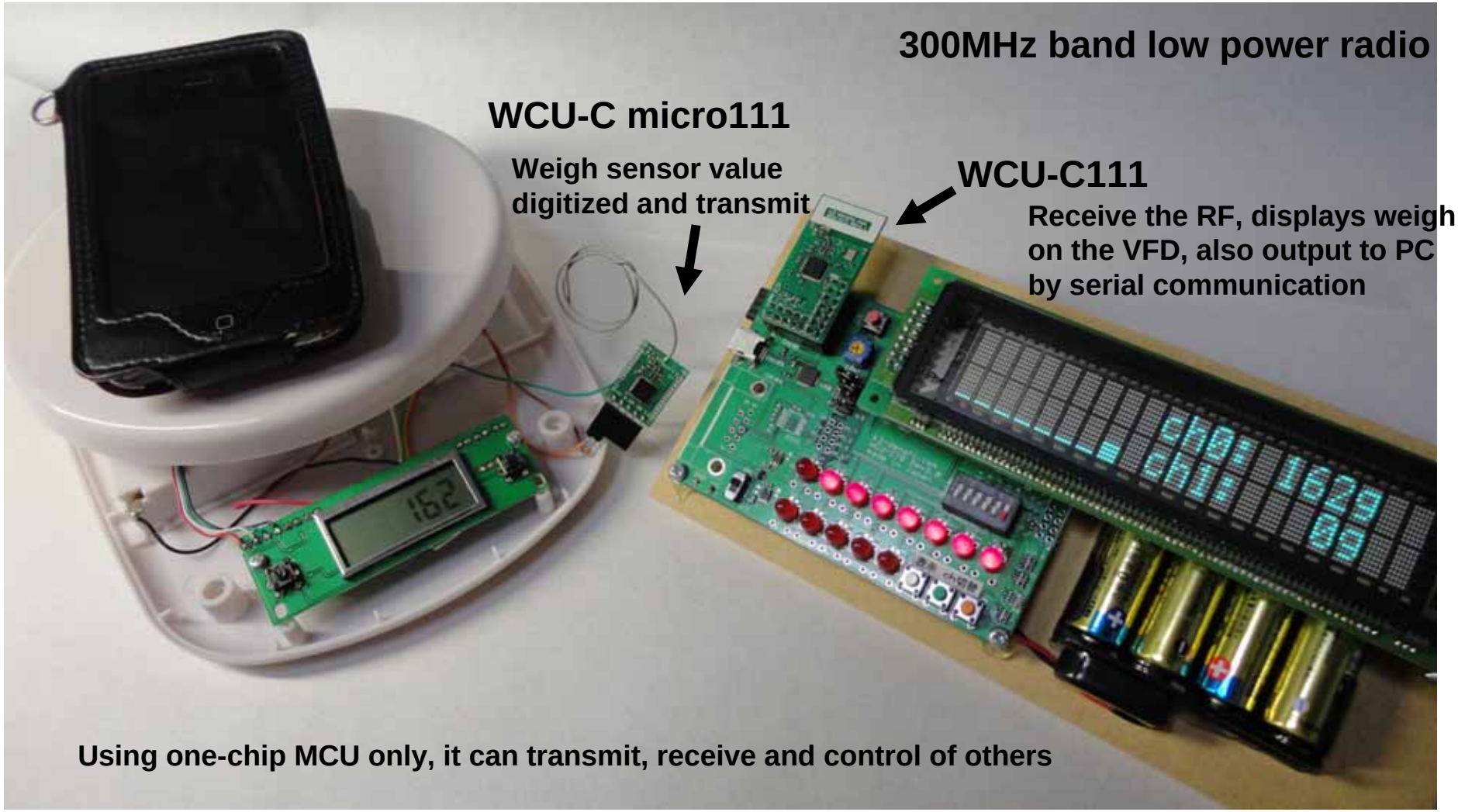
Acceleration data recorded to the PC through the USB





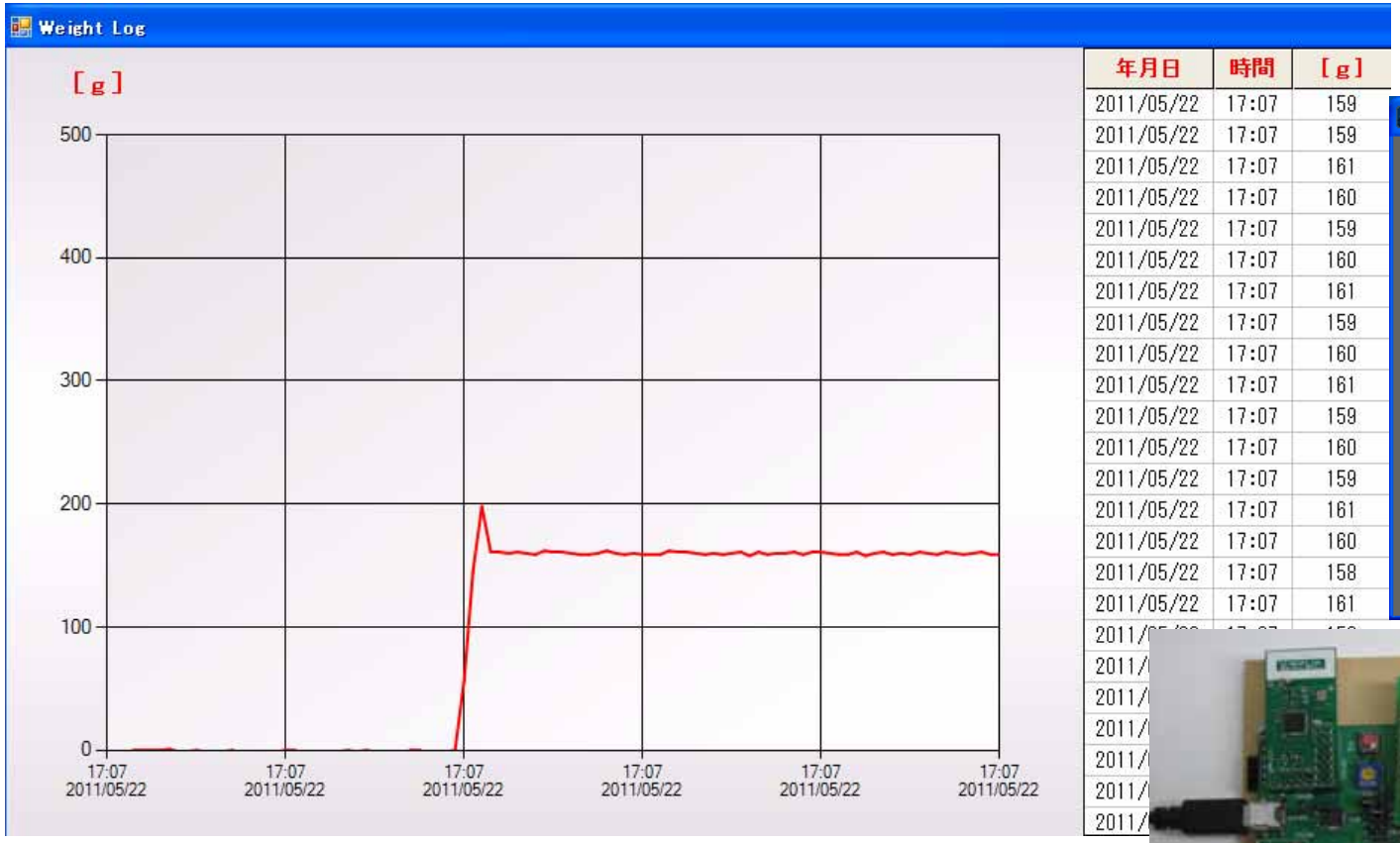
demonstration of WCU-C series

Wireless Scale



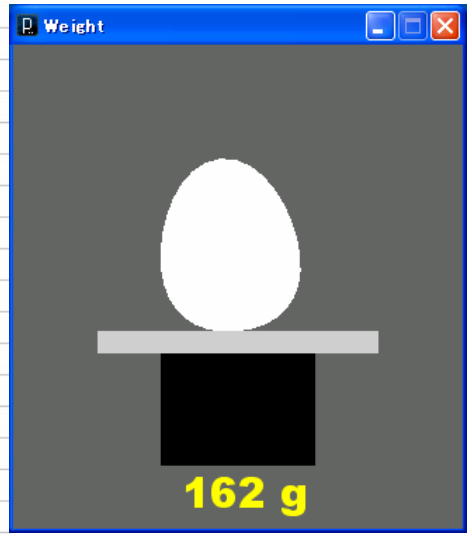
demonstration of WCU-C series

Wireless Scale + PC



年月日	時間	[g]
2011/05/22	17:07	159
2011/05/22	17:07	159
2011/05/22	17:07	161
2011/05/22	17:07	160
2011/05/22	17:07	159
2011/05/22	17:07	160
2011/05/22	17:07	161
2011/05/22	17:07	159
2011/05/22	17:07	160
2011/05/22	17:07	161
2011/05/22	17:07	159
2011/05/22	17:07	160
2011/05/22	17:07	159
2011/05/22	17:07	161
2011/05/22	17:07	160
2011/05/22	17:07	158
2011/05/22	17:07	161

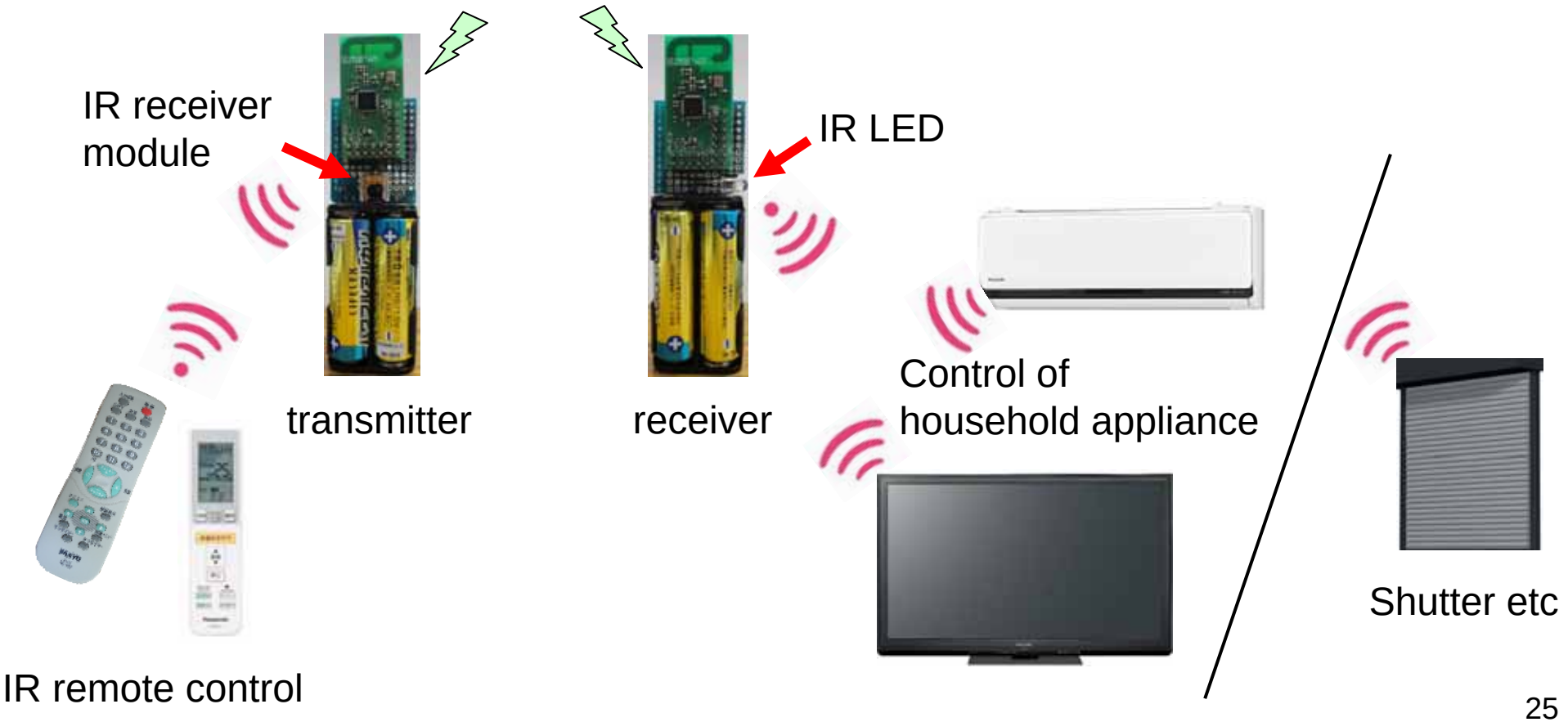
Egg size varies depending on weight



The weigh measured by wireless scale recorded to the PC through the USB

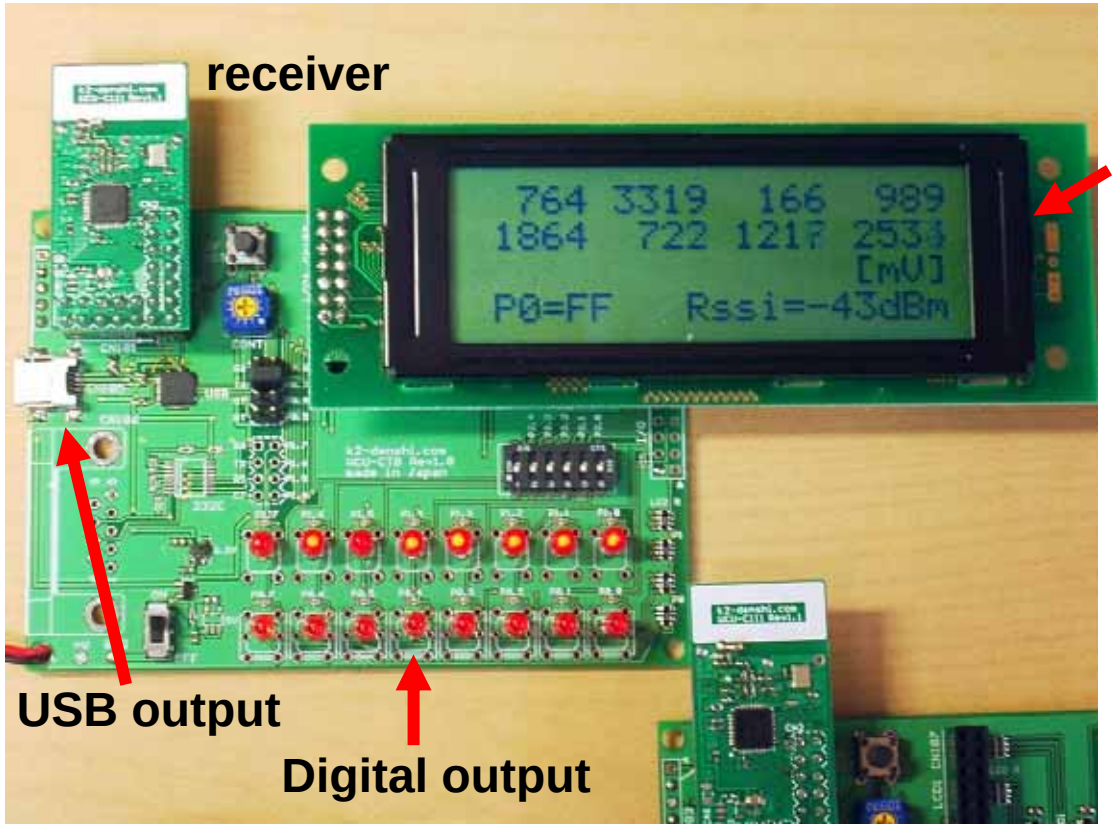
Infrared (IR) remote control radio link

The transmitter relays the IR remote via RF to the receiver, that reproduces the optical output. No format dependency by its nature provided IR clock is 38kHz.



demonstration of WCU-C series

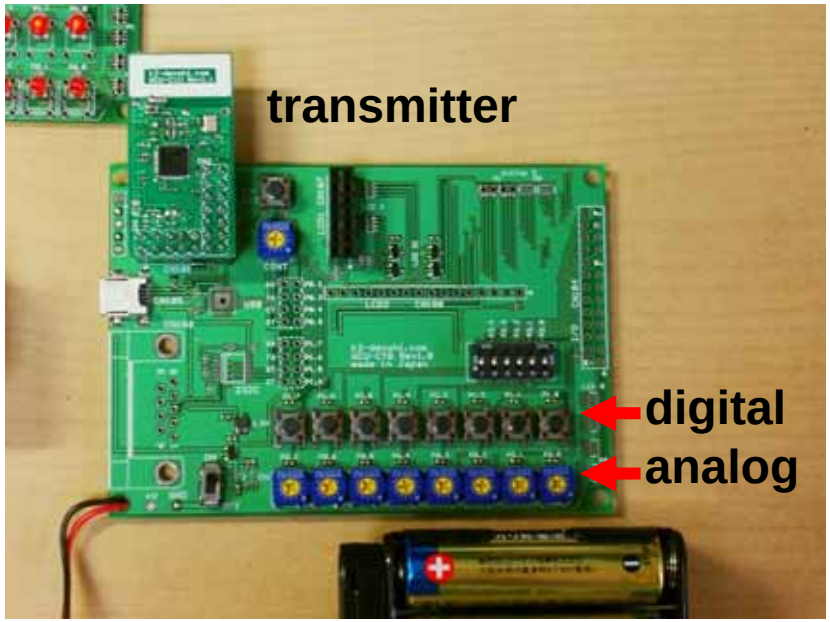
8ch Analog & 8ch Digital data transfer



300MHz band (also 2.4GHz band)

LCD output
8ch analog values [mV]
Port value + receive signal level

Transmit every 20ms (or faster)



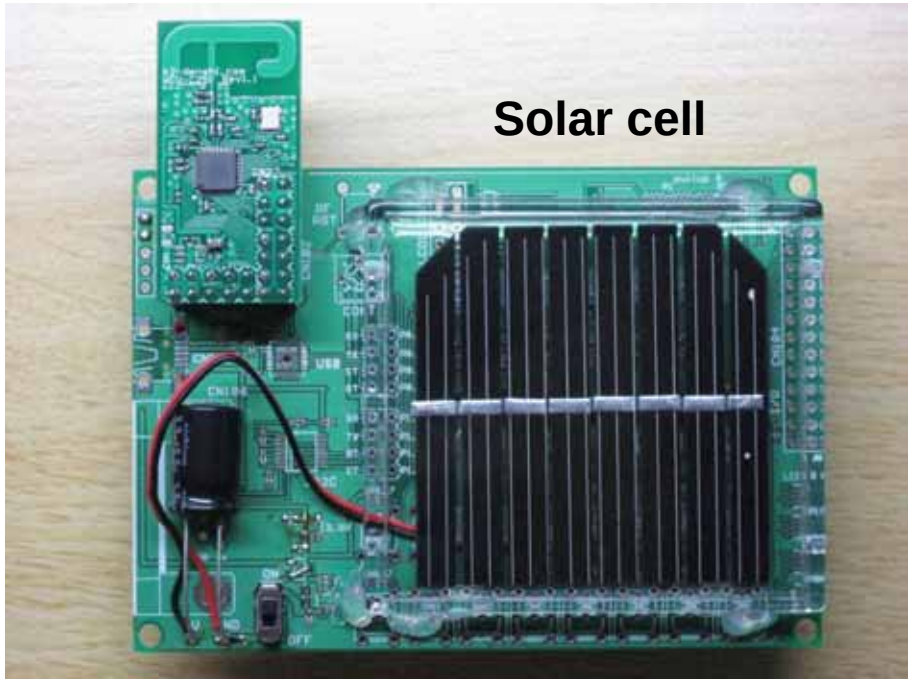
Data transfer using WCU-C111

8ch analog and digital data are transferred real-time
(ADC 12bit)

demonstration of WCU-C series

Solar cell operation

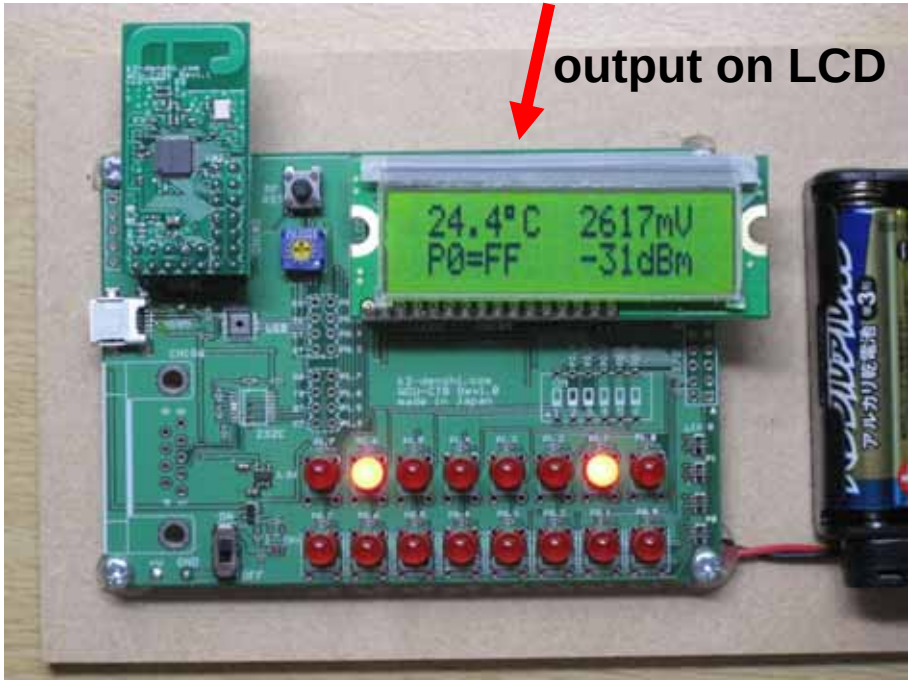
transmitter



2.4GHz band (also 300MHz band)

Temperature + cell voltage

receiver **Port value + receive level**

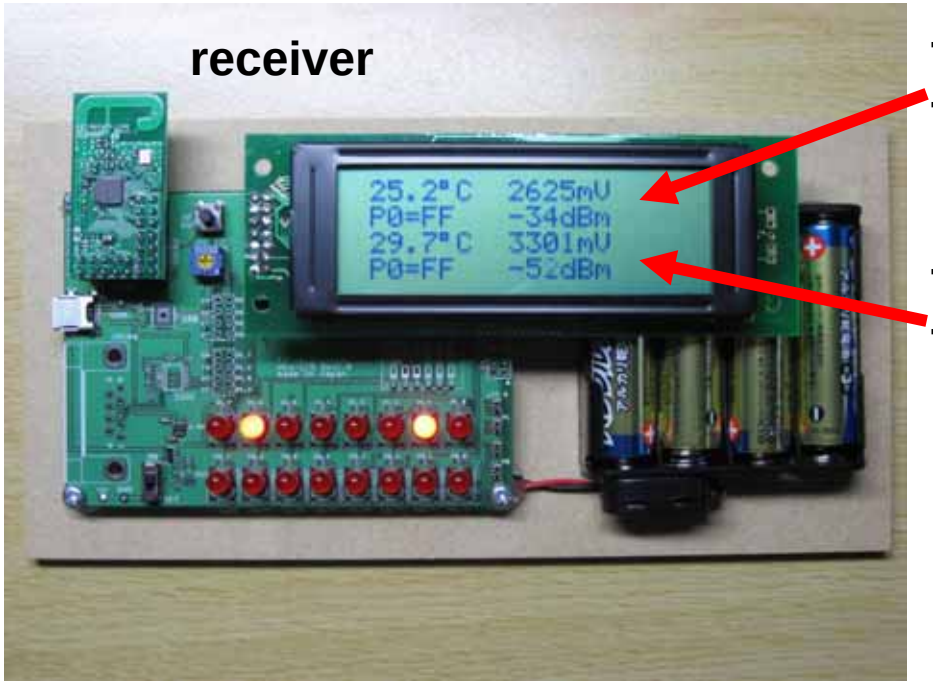


Test of solar cell operation using WCU-C251

Wafer temperature of the MCU, cell voltage and port input value are transmitted

Sleep mode current less than 1uA

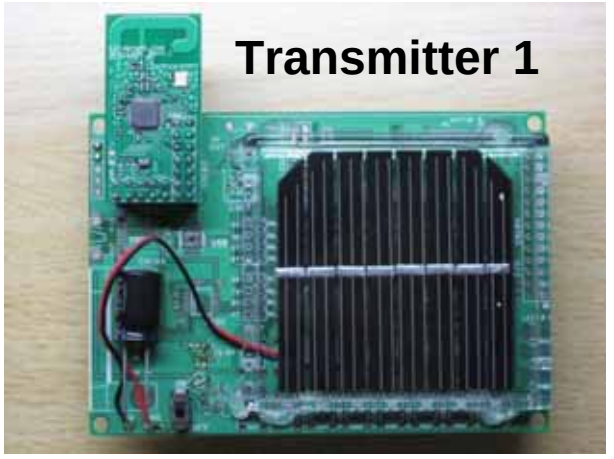
Multiple data transfers



Transmitter 1
Temperature + supply voltage
Port value + receive level

Transmitter 2
Temperature + supply voltage
Port value + receive level

Transmitter 2



Multiple transmitter data transfer using two WCU-C251s

Each WCU-C251 transmits its wafer temperatures, power voltage and input state

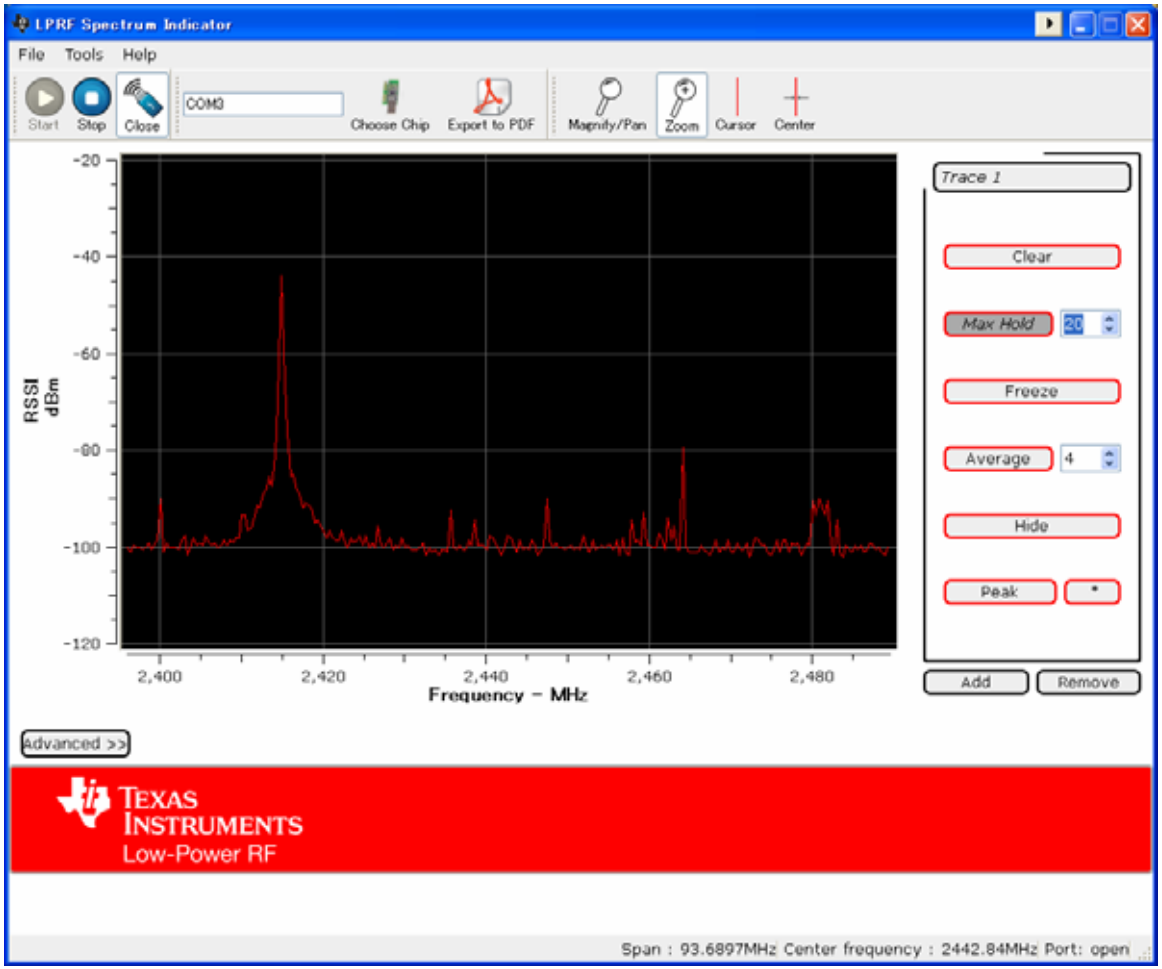
Multiple data transfers are possible by communication control settings

WCU-C251U

Simple spectrum analyzer

A simple 2.4GHz spectrum analyzer using USB-equipped WCU-C251U
Both firmware and PC application can be downloaded from TI forum

TI CC2511 based



Custom Design

Not happy with Zigbee’s slow response ･･･

Channels of Bluetooth not enough ･･･

Wi-Fi is too power hungry ･･･

We offer to develop your own communication system overcoming the limitation of the existing methods.

Make a full-custom design

(radio system, sensor devices, etc)

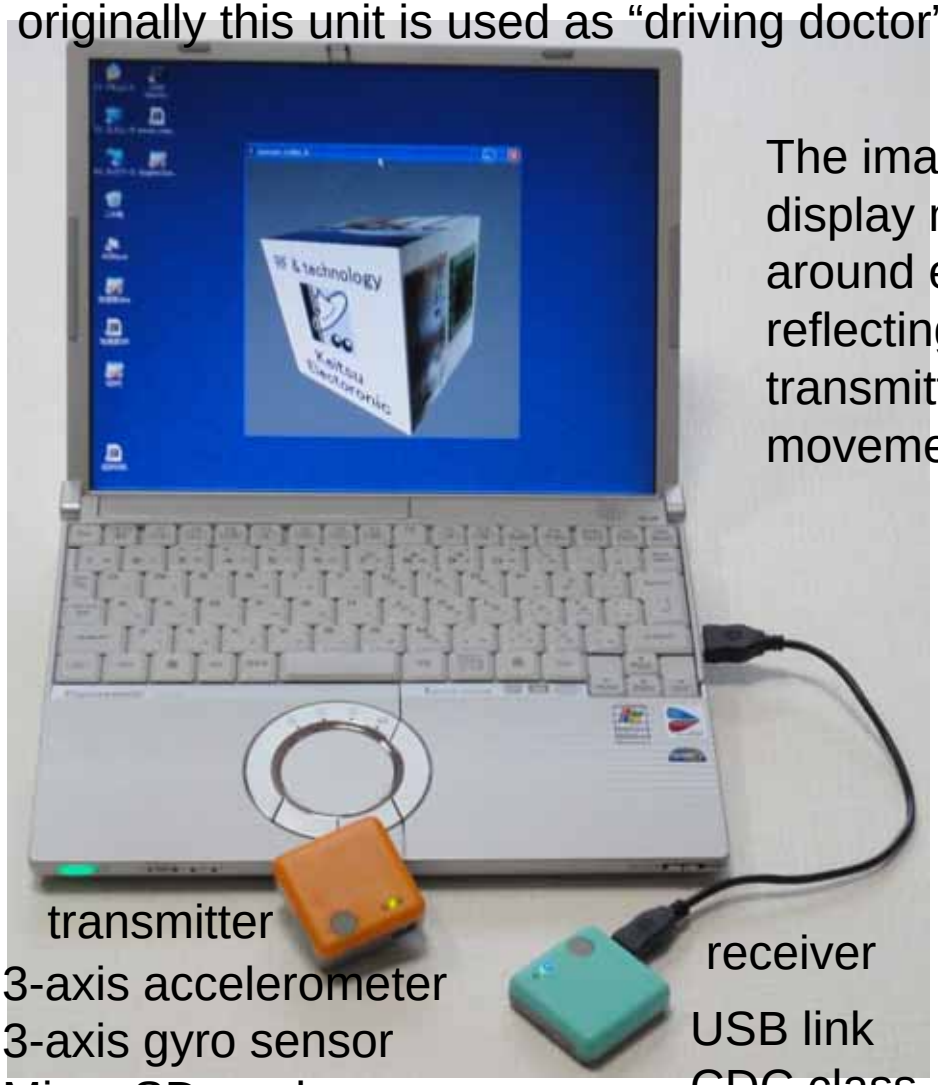
Radio system application

- Wireless remote control (high security)
- Temperature monitor (solar cell，energy saving)
- Hart beat，vital warmth monitor
- Location identification
- Wireless nurse call
- Security sensor
- Voice communication (high security，transceiver)

Custom product

Wireless data logger

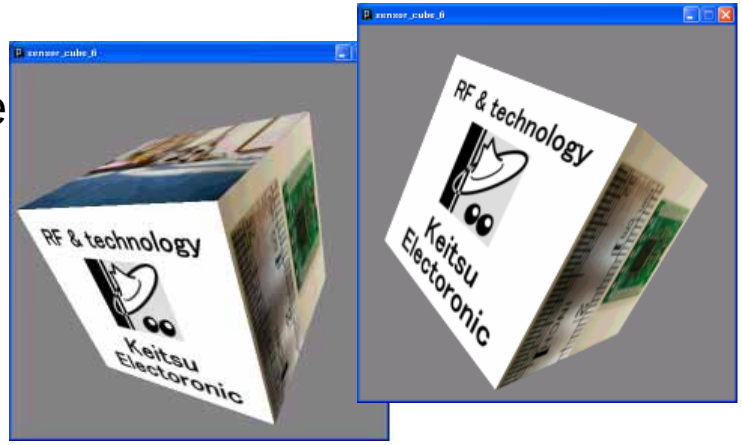
originally this unit is used as “driving doctor” (automobile operation assessment system)

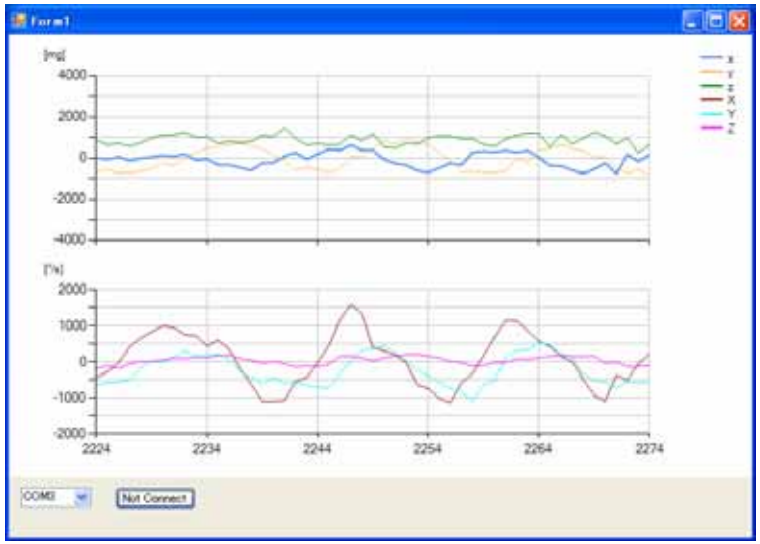


transmitter
3-axis accelerometer
3-axis gyro sensor
Micro SD card
External GPS connection

receiver
USB link
CDC class

The image on the display moves around exactly reflecting the transmitter’s movement





Real-time current display and logging at host PC (6-axis)

Custom product

Multi-function radio remote control

(Rewritable firmware by tow-way communication)

PTP INC. Co. ltd
(case design Fumie Shibata)

“SPIDER PRO” can record all DTB ch automatically during the week and search exposure. This is multi-function radio remote control for “SPIDER PRO”.

Custom product

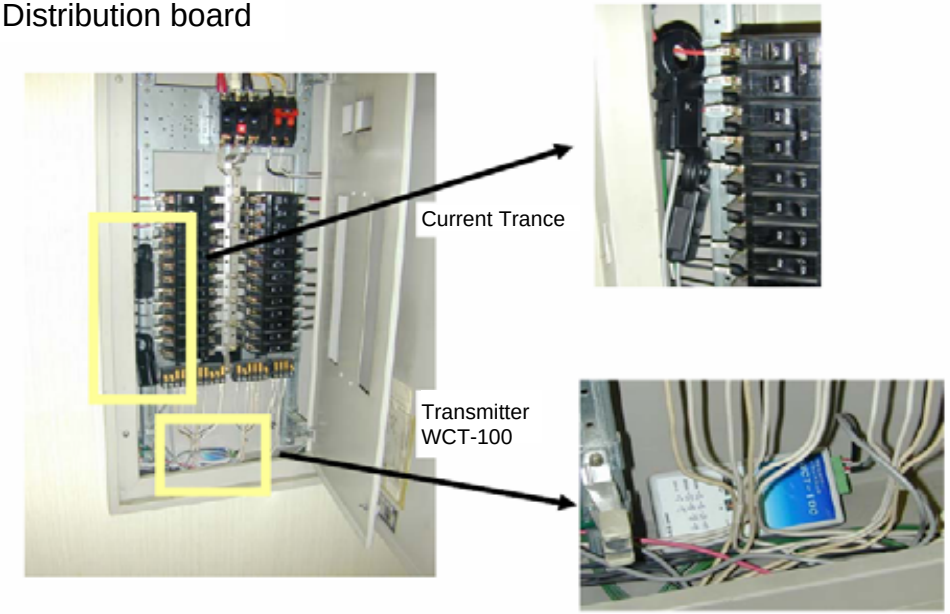
Wireless current logger

Contribute to energy saving by monitoring current value

Receiver
WCT-110

Transmitter WCT-100

Distribution board



Real-time current display and logging at host PC

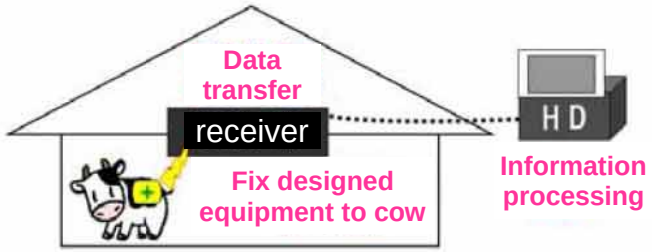
Custom product

Temperature monitor for cow

joint research with Osaka environmental agriculture, forestry and fisheries institute and industrial technique research institute

Develop wireless monitoring instrument of temperature for cow

Small wireless transmitter with wearable temperature logger



Knowing the temperature
- support delivery of cow
- support period of heat
- prevention of illness
- etc

Useful for warm management

Transmitter

Diameter 55mm thickness 13mm
Material epoxy resin
Power Li-Po battery
Interval 10 second

Receiver

USB link

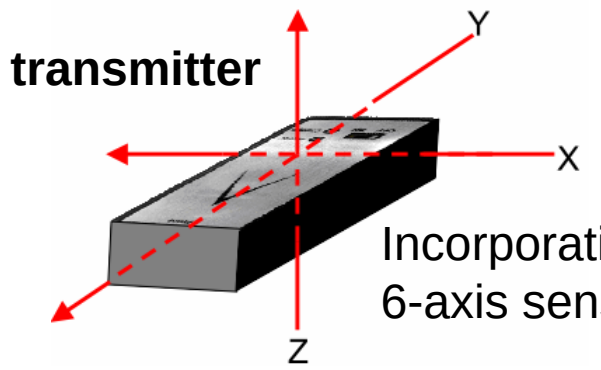
PC software

Display date, temperature, transmitter ID, battery residual quantity and transfer EXEL

Custom product

Wireless CG controller

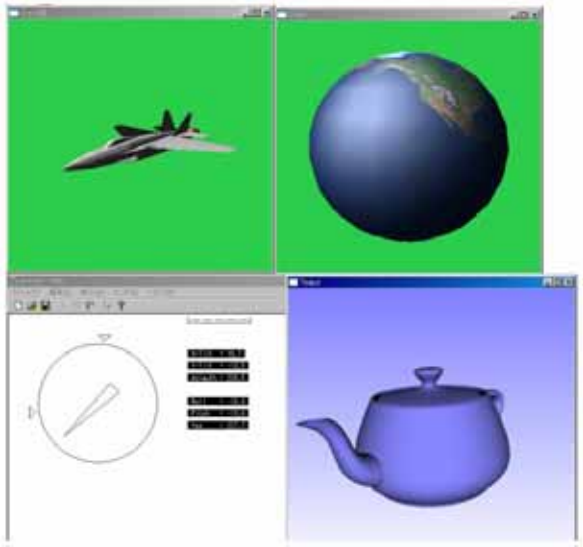
Transmit 3-axis magnetic field and 3-axis acceleration data



Incorporating micro
6-axis sensor

article	Specific
frequency	2.4GHz
Sampling interval	25ms
Communication range	5m
Battery life	12hours
Battery type	Li-ion / 3.8V 600mA
Consumption current	38mA

The device and evaluation kit available at
Aich micro intelligent corporation



The view point of the 3-D graphics on the PC, to which receiver is attached, alignes to the direction of the transmitter.

Cypress CYWUSB6953

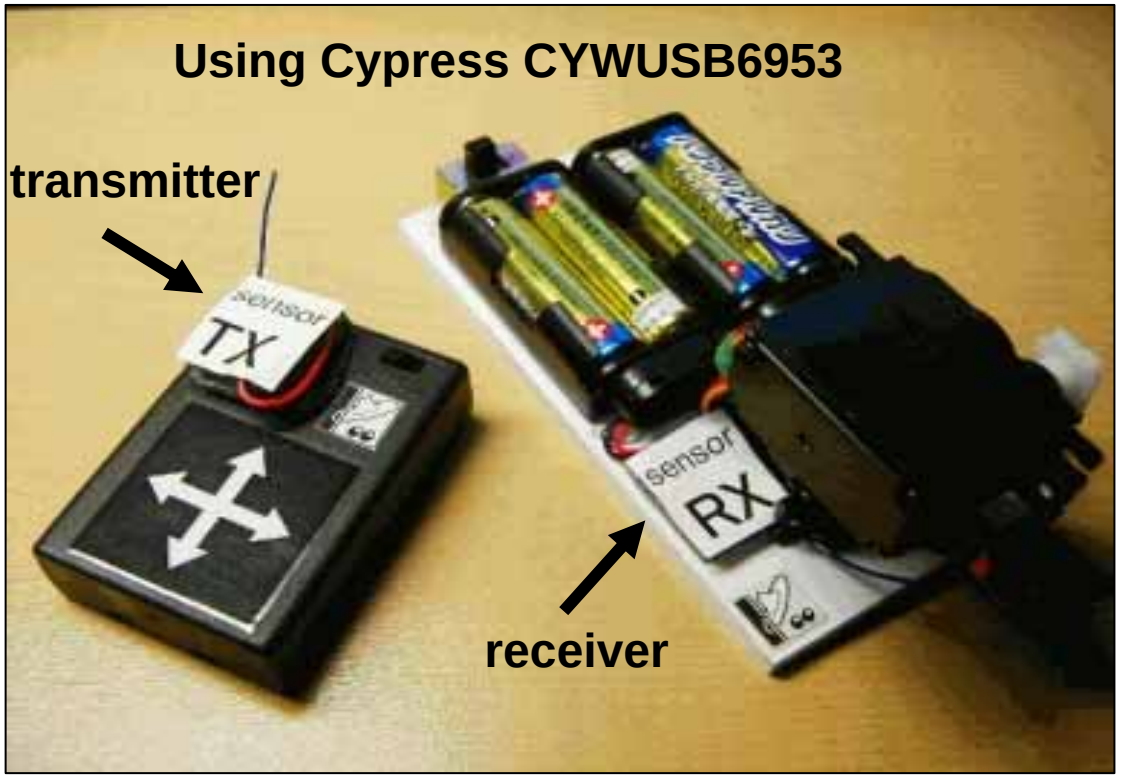
WCU－6953

- 2.4GHz wireless transceiver module
- Incorporating Cypress CYWUSB6953
- Built-in MCU **PSoC**
- Comparator, ADC, counter, communication, etc programmable analog circuit
- Free pin assignment
- Extensive tools and libraries available
- DSSS (direct spread spectrum system)
- Communication range 20～30m (change by setting and environment)

demonstration of Cypress CYWUSB6953

Wireless sensing 2

Usable variety of radio devices



The transmitter transmits its attached accelerometers' data real time

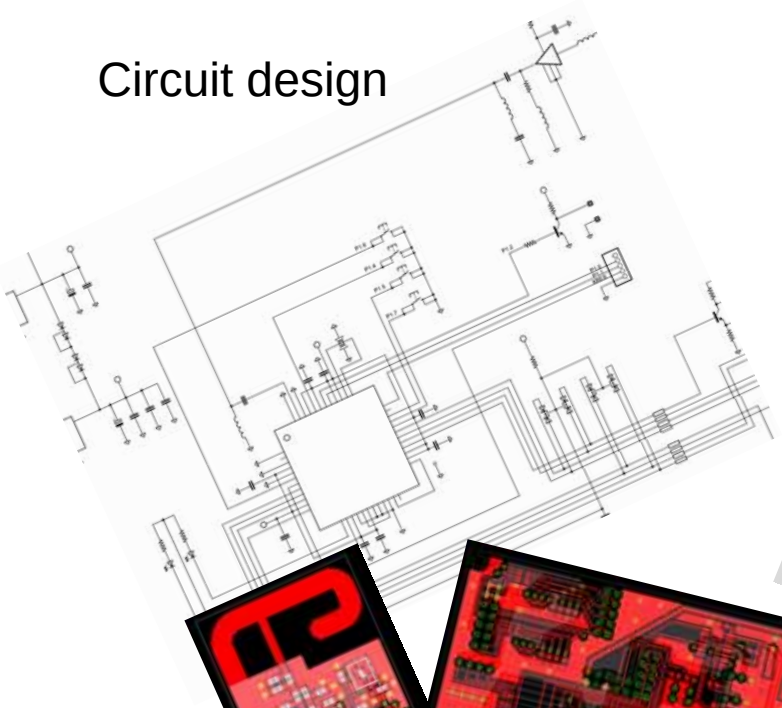
The receiver is reproduced transmitter's tilt by controlling the servo

hardware/software design & development

Include RF & system design

Usable various RF measuring instruments

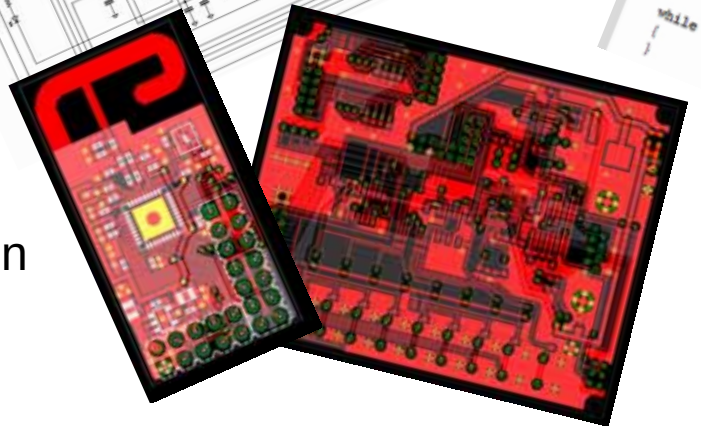
Circuit design

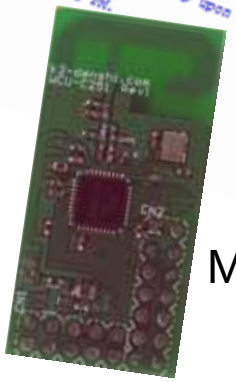


Software design

```
{
    while(CNT--);
}
void main( void )
{
//  CLKCON = 0x7d;
//  while ((SLEEP & 0x40) == 0); // Wait until XOSC/USB clock has stabalised
//  P0DIR = 0xff;
//  P0SEL = 0x00;
//  P1DIR = 0xff;
//  P1SEL = 0x00;
    // Set SLEEP.MODE according to desired PM, e.g. PM1.
    SLEEP = (SLEEP & 0xFC) | 0x02;
    asm("NOP");
    asm("NOP");
    asm("NOP");
    if (SLEEP & 0x03)
    {
    // Set PCON.IDLE to enter the selected PM, e.g. PM1.
    PCON |= 0x01;
    // The SoC is now in PM and will only wake up upon Sleep Timer interrupt
    // or external Port interrupt.
    // First instruction upon exiting PM.
    asm("NOP");
    }
    while (1)
    {
    }
```

PCB design





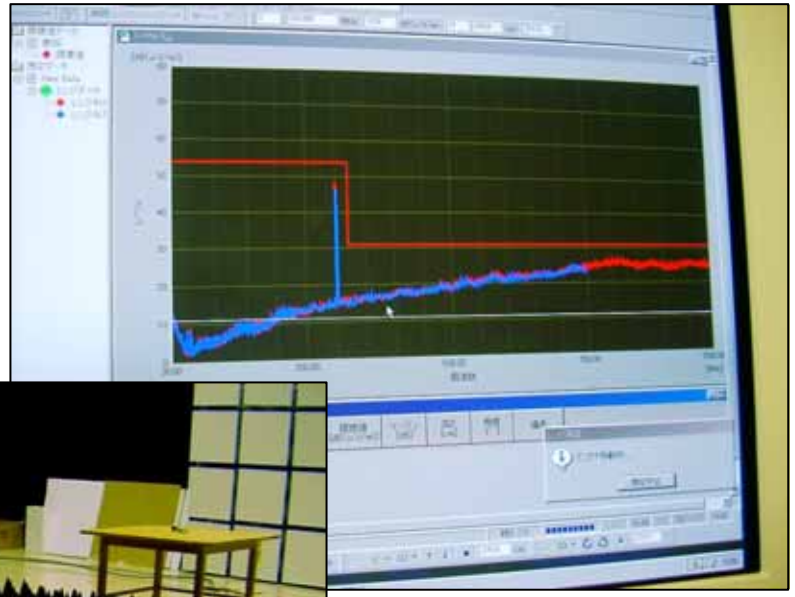
Mass production

Test for various RF certifications

Also offer support on behalf of the certification test

Small power certification test
(japan)

FCC・ETSI
(US EU)



Micro power certification test
(japan)

RF & technology

Keitsu Electronic Co., Ltd.

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- Control technology
- RF certification support
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