

Competence in radio solutions

CIRCUIT DESIGN, INC.

PRODUCT DATA SHEETS

Circuit Design specializes in design and manufacturing of low power radio transmitter, receiver and transceiver modules and modems in the category of SRD.

UHF Narrow Band Telecommand Module

CDT-TX-02M-R, CDT-RX-02M-R

CDT-TX-02M-R and CDT-RX-02M-R are telecommand transmitter and receiver which are specially designed for switching signal transmission. The RF channel is fixed but selectable from 4 preprogrammed channels. In addition to the RF part, the module includes MSK modem and Photo MOS relays (RX) in its robust metal housing.

A handy transmitter can be easily made only by connecting a switching board to the CDT-TX-02M-R.

Features

- 6 switch inputs and outputs
- Standby mode in TX
- 4 operation modes in RX
- Low voltage and consumption current
- MSK modem equipped
- Long range control
- CDT-01-compatible communication format
- RoHS / R&TTE compliance

Applications

- Remote control for motor operated shutter blinds, garage doors, gates etc.
- Industrial remote control
- Security / Alarms
- Paging system



General

Parameter	Specification	Condition
Applicable standard	EN 300 220	
Communication form	One way	MSK 1200 bps
Communication range	500 - 1000 m	Line-of-sight
Number of RF channels	4, adjust using DIP switch	
Frequency*	434.075/433.920/434.600/434.700 MHz	
Operating temp. range	-20 to +60 degree C	No dew condensation

CDT-TX-02M-R (Transmitter)

Parameter	Specification	Condition
Transmitter type	PLL controlled VCO	
RF Output	10 mW	
Supply voltage	2.2 - 12 V (Max. rating 14.5 V)	
Supply current	TX:27 mA, Stand-by:1 uA	
Inputs	6 Switch inputs	Negative logic
Antenna	1/4 lambda whip antenna	
Dimensions	36 mm x 26 mm x 8 mm	Excluding protrusion

CDT-RX-02M-R (Receiver)

Parameter	Specification	Condition
Sensitivity	-120 dBm (BER:10 ⁻²)	
Supply voltage	3.0 - 12 V (Max. rating 14.5 V)	
Supply current	6-outputs Off: 16 mA, On: 50 mA	
Operation mode	One-shot, Toggle, Keying, Continuous	Set by 3 input ports
Outputs	6-photo MOS relay outputs	
Output relay	Max switching voltage and current, 48V 100mA	
Antenna	1/4 lambda whip antenna	
Dimensions	53 mm x 35 mm x 12 mm	Excluding protrusion

Specifications are subject to change without prior notice

*Other frequency: Please contact Circuit Design, Inc.

UHF Narrow Band Transmitter / Receiver

CDP-TX-05M-R, CDP-RX-05M-R

CDP-TX-05M-R and CDP-RX-05M-R are low power narrow band FSK transmitter and receiver modules, designed for industrial applications operating in sub-1 GHz. The modules contain most of the components necessary for radio transmission in compact housing. The RF channel is fixed but selectable from 4 preprogrammed channels. The receiver is double-superheterodyne and equipped with a SAW filter, ensuring high sensitivity and very good selectivity for stable and long range communication.

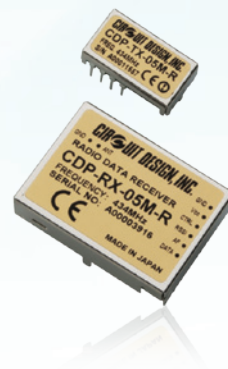
The frequency table can be customized according to the customer's requirement. Please contact Circuit Design.

Features

- Low power narrow band FSK with 25kHz channel spacing
- 4 preprogrammed RF channels
- Low voltage operation
- High receiver sensitivity for long range applications with 600m or more at line of sight
- High reliability for industrial applications
- Robust metal housing, high selectivity and shock resistance
- Compact Size
- RSSI (Received Signal Strength) output terminal
- RoHS / R&TTE compliance

Applications

- Industrial remote control
- Security / Alarms
- Telemetry / Monitoring systems
- Tracking systems



General

Parameter	Specification		
	434 MHz	869 MHz A	869 MHz B
Applicable standard	EN 300 220	< -	< -
Communication form	One way	< -	< -
Modulation / Demodulation	FM narrow / FSK	< -	< -
Number of RF channels	4	< -	< -
Frequency (Ch 3) *1	434.0750	869.7500	868.6625
(Ch 2)	433.9200	868.3000	869.2125
(Ch 1)	434.6000	869.8000	869.2750
(Ch 0)	434.7000	869.9250	869.3625
Data rate	100 ~ 4,800 bps	< -	< -
Frequency stability	+/- 2.5 kHz	< -	< -
Operating temp. range (degree C)	-20 to +65	< -	< -

*1 Factory default frequency channel setting

CDP-TX-05M-R (Transmitter)

Parameter	Specification		
RF output power	10 mW	5 mW	< -
Transmitter start up	< 20 ms	< -	< -
Deviation	+/- 3 kHz	< -	< -
Supply voltage	2.2 to 5.5 V	< -	< -
Supply current at 3.0 V	20 mA	16.5 mA	< -
Dimension	22 x 12 x 6 mm	< -	< -
Weight	3 g	< -	< -
Data in	H=Vcc L=0V	< -	< -

CDP-RX-05M-R (Receiver)

Parameter	Specification		
Receiver type	Double superheterodyne	< -	< -
IF frequency	21.7 MHz / 450 kHz	< -	< -
Sensitivity (12dB/SINAD) (BER<0.1%)	-120 dBm	-116 dBm	< -
Supply voltage	3 to 14 V	< -	< -
Supply current at 3V	28 mA	< -	< -
Dimension	36 x 26 x 8 mm	< -	< -
Weight	13 g	< -	< -

915 MHz version for US, 426 MHz version for Japan
and 447 MHz version for Korea are available

Specifications are subject to change without prior notice

32ch

UHF Narrow Band Multi Channel Transmitter/Receiver CDP-TX-02E-R, CDP-RX-02E-R 434MHz

The unique and compact CDP-TX/RX-02E-R is a frequency selectable radio data module for the 434MHz UHF band. Both CDP-TX-02E-R (transmitter) and CDP-RX-02E-R (receiver) are equipped with a frequency synthesizer system including microprocessor. 32 RF channels are selectable using an onboard 4-bit DIP switch.

The CDP-TX-02EP-R and CDP-RX-02EP-R versions are channel selectable using 8 pin terminal allowing you to perform channel selection remotely. Its small size, low voltage operation, and frequency selectability of CDP-02E-R make it ideal for various applications in sites where many radio transmitters are operated.

Features

- 32 frequency synthesized RF channels
- 1 mW / 10 mW selectable
- Low voltage operation
- High sensitivity receiver
- FM narrow band modulation
- R&TTE (EN 300 220) / RoHS compliance

Applications

- Industrial remote control
- Factory automation (Machine to machine)
- Security systems
- Alarms
- Telemetry systems



General

Parameter	Specification (All ratings at 25 degree C unless otherwise noted)
Communication form	One way
Oscillation system	PLL controlled VCO
Modulation / Demodulation	FSK
Frequency range	433.875 MHz to 434.650 MHz
Number of RF channels	32 ch
Channel step	25 kHz
Channel selection method	4 bit switch (CDP-XX-02E-R), 8 pin (CDP-XX-02EP-R)
Frequency stability	+/- 4.0 ppm or less (-20 to + 60 degree C)
Data rate	300 to 4800 bps (Min. pulse width 208 us, Max. pulse width 20 ms)
Operating temp. range	-20 to +60 degree C (No dew condensation)

CDP-TX-02E-R/ CDP-TX-02EP-R (Transmitter)

Parameter	Specification
Transmitter type	PLL synthesizer
RF output power	10 mW / 1 mW selectable
Transmitter start up time	50 ms (from power on)
Data input	Digital (L = GND H = 3.0 V to Vcc)
Deviation	+/- 2.1 kHz (PN9 4800 bps LPF 20 kHz)
Spurious emission	<-54 dBm (47M - 74M, 87.5M - 118M, 174M - 230M, 470M - 862M) <-36 dBm (Other frequencies below 1000MHz) <-30 dBm (Frequencies above 1000MHz)
Adjacent channel power	<-37 dBm (200 nW)
Supply voltage	3.0 to 12 V DC
Supply current	43 mA typ. at 3V/10 mW 33 mA typ. at 3V/1 mW
Dimensions	36 X 26 X 10 mm (excluding protrusion)
Weight	14 g (without antenna)

CDP-RX-02E-R/ CDP-RX-02EP-R (Receiver)

Parameter	Specification
Receiver type	Double Superheterodyne PLL synthesizer
Sensitivity	- 120 dBm typ. (at AF / 12 dB/SINAD at CCITT filter fm=1 kHz) - 120 dBm typ. (at DO / BER 1% at 4800 bps PN9) - 116 dBm typ. (at DO / BER 0 error / 2556 bits at 4800 bps PN9)
Adjacent CH selectivity	60 dB (+/- 25 kHz)
Blocking	84 dB (All)
Spurious radiation	-60 dBm (below 1 GHz) -50 dBm (above 1GHz)
Data output	Digital (L = GND H = Vcc)
Supply Voltage	3.0 to 12 V DC
Supply current	30 mA typ. at 3 V 33 mA typ. at 12 V
Dimensions	50 X 30 X 9 mm (excluding protrusion)
Weight	20 g

Specifications are subject to change without prior notice

CIRCUIT DESIGN, INC.

www.circuitdesign.jp
CDP-TX/RX-02E-R ver1.2 Oct. 2012

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128ch

UHF Narrow Band Multi Channel Transmitter/Receiver CDP-TX-02F-R, CDP-RX-02F-R 434MHz

The unique and compact CDP-TX/RX-02F-R is a frequency selectable radio data module for the 434MHz UHF band.

Both CDP-TX-02F-R (transmitter) and CDP-RX-02F-R (receiver) are equipped with a frequency synthesizer system including a microprocessor. 128 RF channels are selectable using an onboard 7-bit DIP switch.

The CDP-TX-02FP-R and CDP-RX-02FP-R versions are channel selectable using 14 pin terminal allowing you to perform channel selection remotely.

Its small size, low voltage operation, and frequency selectability of CDP-02F-R make it ideal for various applications in sites where many radio transmitters are operated.

Features

- 128 frequency synthesized RF channels
- 1 mW / 10 mW selectable
- Low voltage operation
- High sensitivity receiver
- FM narrow band modulation
- R&TTE (EN 300 220) / RoHS compliance

Applications

- Industrial remote control
- Factory automation (Machine to machine)
- Security systems
- Alarms
- Telemetry systems



General

Parameter	Specification (All ratings at 25 degree C unless otherwise noted)
Communication form	One way
Oscillation system	PLL controlled VCO
Modulation / Demodulation	FSK
Frequency range	433.1875 MHz to 434.7750 MHz
Number of RF channels	128 ch (12.5 kHz step)
Channel spacing	25 kHz
Channel selection method	7 bit switch (CDP-XX-02F-R), 14 pin (CDP-XX-02FP-R)
Frequency stability	+/- 4.0 ppm or less (-20 to + 60 degree C)
Data rate	300 to 4800 bps (Min. pulse width 208 us, Max. pulse width 20 ms)
Operating temp. range	-20 to +60 degree C (No dew condensation)

CDP-TX-02F-R/ CDP-TX-02FP-R (Transmitter)

Parameter	Specification
Transmitter type	PLL synthesizer
RF output power	10 mW / 1 mW selectable
Transmitter start up time	50 ms (from power on)
Data input	Digital (L = GND H = 3.0 V to Vcc)
Deviation	+/- 2.1 kHz (PN9 4800 bps LPF 20 kHz)
Spurious emission	<-54 dBm (47M - 74M, 87.5M - 118M, 174M - 230M, 470M - 862M) <-36 dBm (Other frequencies below 1000MHz) <-30 dBm (Frequencies above 1000MHz)
Adjacent channel power	<-37 dBm (200 nW)
Supply voltage	3.0 to 12 V DC
Supply current	43 mA typ. at 3V/10 mW 33 mA typ. at 3V/1 mW
Dimensions	36 X 26 X 10 mm (excluding protrusion)
Weight	14 g (without antenna)

CDP-RX-02F-R/ CDP-RX-02FP-R (Receiver)

Parameter	Specification
Receiver type	Double Superhetrodyne PLL synthesizer
Sensitivity	- 120 dBm typ. (at AF / 12 dB/SINAD at CCITT filter fm=1 kHz) - 120 dBm typ. (at DO / BER 1% at 4800 bps PN9) - 116 dBm typ. (at DO / BER 0 error / 2556 bits at 4800 bps PN9)
Adjacent CH selectivity	60 dB (+/- 25 kHz)
Blocking	84 dB (All)
Spurious radiation	-60 dBm (below 1 GHz) -50 dBm (above 1GHz)
Data output	Digital (L = GND H = Vcc)
Supply Voltage	3.0 to 12 V DC
Supply current	30 mA typ. at 3 V 33 mA typ. at 12 V
Dimensions	50 X 30 X 9 mm (excluding protrusion)
Weight	20 g

Specifications are subject to change without prior notice

CIRCUIT DESIGN, INC.

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CDP-TX/RX-02F-R ver1.1 Oct. 2012

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UHF Narrow Band Multi Channel Transceiver

STD-302N-R 434MHz

The UHF FM narrow band semi-duplex radio module STD-302 434MHz is suitable for industrial remote control application and telemetry application operated in 434MHz ISM band. SAW filter and narrow band technique provides reliable data communication in industrial applications interference rejection and practical distance range is required. Switching time and channel selecting time become remarkably faster than a conventional transceiver. Suitable for feedback systems.

Features

- 10mW RF power, 3.0V
- Programmable RF channel
- Receiver sensitivity -119dBm
- Excellent vibration & shock resistance / Mechanical durability
- R&TTE (EN 300 220) / RoHS compliance
- FM narrow band
- 869, 458, 429, 419, 447, 335 MHz also available

Applications

- Industrial remote control system
- Telemetry system
- Data transmission



General

Parameter	Specification (All ratings at 25 degree C unless otherwise noted)
Communication form	Half-duplex
Frequency	433.050 to 434.775 MHz
Channel step	25kHz Channel programmable (PLL IC: Fujitsu MB15E03)
Frequency stability	+/- 4 ppm (-20 to +60 degree C)
Data rate	9600 bps max. (Pulse width min.100 us, max. 15 ms)
PLL reference frequency	21.25 MHz (TCXO)
PLL response	30 ms typ. (from PLL setting to LD out)
Modulation	FSK
Supply voltage	3.0 to 5.5 V
Supply current	44 mA (TX) 26 mA (RX)
Operating temp. range	-20 to +60 C (Storage -30 to +75 C)
TX/RX switching time	15 ms typ. (DI vs valid DO at the same frequency)
Dimension	30 X 50 X 9 mm
Weight	25 g

Transmitter part

Parameter	Specification
Transmitter type	PLL synthesizer
RF output power	10 mW at 50 ohm
Deviation	2.75 kHz (PN9, 9600 bps)
DI input level	L = GND, H = 3 V to Vcc
Residual FM noise	0.17 kHz
Spurious emission	< -54 dBm (47M - 74M, 87.5M - 118M, 174M - 230M, 470M - 862MHz)
	< -36 dBm (Other frequencies below 1000 MHz)
	< -30 dBm (Frequencies above 1000 MHz)
Adjacent CH power	-37 dBm (CH 25 kHz, BW = 16kHz, PN9, 9600bps)

Receiver part

Parameter	Specification
Receiver type	Double superheterodyne
IF	21.7 MHz (1st), 450 kHz (2nd)
Maximum input level	10 dBm
Receiver sensitivity	-119 dBm (12dB SINAD)
	-116 dBm (BER 1%)
	-110 dBm (0 error / 2556 bits)
Spurious response rejection	80 dB (1st Mix), 60 dB (2nd Mix)
Adjacent CH selectivity	50 dB (+/- 25kHz)
Intermodulation	50 dB (f-200 kHz + f-100 kHz)
Spurious radiation	-57 dBm (below 1000MHz), -47dBm (above 1000MHz)
DO output level	L = GND, H = 2.8V

Specifications are subject to change without prior notice

UHF Narrow Band Multi Channel Transceiver

LMD-400-R 458 - 462.5 MHz

LMD-400-R 458-462.5MHz is a synthesized multi channel transceiver module designed to meet FCC Part 90.267 for US market. This small, highly integrated and fully shielded module is designed for embedding in user equipment. The module is suitable for various low power industrial telecontrol and telemetry applications.

Features

- FCC Part 90.267 compliant
- 458 - 462.5 MHz band
- Programmable RF channel with 12.5 kHz channel space
- 10 mW, GFSK, 4800 bps
- Low power operation 3 - 5.5 V, 52 mA / TX, 42 mA / RX
- Small size 50 x 30 x 9 mm
- Excellent vibration & shock resistance / Mechanical durability
- Wide operation range -20 to + 60 degree C

Applications

- Industrial remote control
- Remote monitoring / SCADA / Security
- Telemetry
- Data acquisition



General

Parameter	Specification (All ratings at 25 degree C unless otherwise noted)
Applicable standard	FCC Part 90.267
Communication form	Half-duplex
Emission class	F1D
Modulation	GFSK
Frequency	458 to 462.5 MHz
Channel spacing	12.5 kHz / Channel programmable
Frequency stability	+/- 2.5 ppm (-20 to +60 degree C)
Aging rate	+/-1 ppm / year
Data rate	4800 bps max. (Pulse width min.200 us, max. 15 ms)
Operating temp. range	-20 to +60 C (Storage -30 to + 75 C)
TX/RX switching time	15 ms typ. (DI vs DO)
Supply voltage	3.0 to 5.5 V
Supply current	52 mA (TX), 42 mA (RX)
Dimension	50 X 30 X 9 mm
Weight	25 g

Transmitter part

Parameter	Specification
RF output power	10 mW at 50 ohm (25 degree C)
Deviation	2.4 kHz (PN9, 4800 bps)
DI input level	L = GND, H = 3 V to Vcc

Receiver part

Parameter	Specification
Receiver type	Double superheterodyne
IF	21.7 MHz (1st), 450 kHz (2nd)
Maximum input level	10 dBm
Receiver sensitivity	-116 dBm typ.(12dB SINAD) -116 dBm typ.(BER 1%)
Co-channel rejection	- 7 dB (D/U ratio)
Spurious response rejection	70 dB
Adjacent CH selectivity	65 dB (25 kHz ch) / 55 dB (12.5 kHz ch)
Blocking	84 dB
DO output level	L = GND, H = 2.8 V
RSSI rising time	30 ms (25kHz shift), 50 ms (at power on)
Time until valid Data-out	50 ms (25kHz shift), 70 ms (at power on)
RSSI out	310 mV at -100 dBm, 240 mV at -110 dBm

Specifications are subject to change without prior notice

UHF Narrow Band Multi Channel Transceiver

LMD-400-R 438-442 MHz / 458-462 MHz

LMD-400 is a synthesized multi channel transceiver module designed to meet European standard EN300113. This small, highly integrated and fully shielded module is designed for embedding in user equipment. The module is suitable for various low power industrial telecontrol and telemetry applications.

Features

- EN300113 compliant
- 438 - 442 MHz for Swedish / Norwegian national frequencies
- 458 - 462 MHz version available
- (Specific frequency model with 4 MHz switching band is possible)
- Programmable RF channel with 12.5 kHz channel space
- 10 mW, GFSK, 4800 bps
- Low power operation 3 ~ 5.5 V, 52 mA / TX, 42 mA / RX
- Small size 50 x 30 x 9 mm
- Excellent vibration & shock resistance / Mechanical durability
- Wide operation range -20 to + 60 degree C

Applications

- Industrial remote control
- Remote monitoring / SCADA / Security
- Telemetry
- Data acquisition



General

Parameter	Specification (All ratings at 25 degree C unless otherwise noted)
Applicable standard	EN300113
Communication form	Half-duplex
Emission class	F1D
Modulation	GFSK
Frequency	438 to 442 MHz or 458 to 462 MHz Ask for other specific frequency in 400 MHz with 4MHz coverage
Channel spacing	12.5 kHz / Channel programmable
Frequency stability	+/- 2.5 ppm (-20 to +60 degree C)
Aging rate	+/-1 ppm / year
Data rate	4800 bps max. (Pulse width min.200 us, max. 15 ms)
Operating temp. range	-20 to +60 C (Storage -30 to + 75 C)
TX/RX switching time	15 ms typ. (DI vs DO)
Supply voltage	3.0 to 5.5 V
Supply current	52 mA (TX), 42 mA (RX)
Dimension	50 X 30 X 9 mm
Weight	25 g

Transmitter part

Parameter	Specification
RF output power	10 mW at 50 ohm (25 degree C)
Deviation	2.4 kHz (PN9, 4800 bps)
DI input level	L = GND, H = 3 V to Vcc

Receiver part

Parameter	Specification
Receiver type	Double superheterodyne
IF	21.7 MHz (1st), 450 kHz (2nd)
Maximum input level	10 dBm
Receiver sensitivity	-110 dBm typ.(12dB SINAD) -110 dBm typ.(BER 1%)
Co-channel rejection	-7 dB (D/U ratio)
Spurious response rejection	70 dB
Adjacent CH selectivity	60 dB (12.5 kHz ch)
Blocking	84 dB
DO output level	L = GND, H = 2.8 V
RSSI rising time	30 ms (25kHz shift), 50 ms (at power on)
Time until valid Data-out	50 ms (25kHz shift), 70 ms (at power on)
RSSI out	270 mV at -100 dBm, 200 mV at -110 dBm

Specifications are subject to change without prior notice

DSSS low power radio transceiver STD-502-R 2.4GHz

The STD-502-R 2.4 GHz transceiver uses direct sequence spread spectrum (DSSS) modulation and a true diversity circuit, enabling reliable communications even in the congested 2.4 GHz band.

The STD-502-R complies with the European ETSI EN300440, U.S. FCC Part 15.247 standards and Japanese ARIB STD-T66 standard, making it ready for the global market.

Low power consumption and battery operation give the STD-502-R the performance demanded for applications where long range and reliability are required.

The transceiver uses a transparent data interface to enable users to communicate using their own protocols.

The modules can be set easily via the UART interface using dedicated commands.

*Circuit Design developed an onboard ASIC containing SS correlator (a key part of spread spectrum communication).
This ensures long term supply for industrial applications.

Features

- CE and FCC conformity certification
- ARIB STD-T66 compliant
- Uses direct sequence spread spectrum (DSSS) modulation
- A true diversity receiver with two built-in receiver circuits
- Module settings using dedicated commands
- Data communication uses a transparent interface
- Low power operation
- 77 channels
- Range 300m LOS

Applications

- Industrial telecontrol
- Telemetry systems



Specification

Parameter	Specification	Remark
Frequency range	2402.5 ~ 2478.5 MHz	
Number of RF channels	77	
Channel spacing	1 MHz	
RF chip rate	144 k , 288 kcps	
Modulation system	FSK	
Supply voltage	3.3 ~ 5.5 V	
Supply current	TX: 65 mA RX: 65 mA	
RF output power	6 mW (contact)	
Receiver sensitivity	-93 dBm	
Operating temp. range	-20 ~ + 65 °C (storage -30 ~ +80 °C)	No dew condensation
Dimension	50 x 30 x 9 mm	Not including connectors
Weight	24 g	
RF connectors	RP-SMA x 2	

Interface

Parameter	Specification	Remark
Data interface (DI / DO)	9.6 k / 19.2 kbps	Sync: CLK terminal
Command interface (TXD / RXD)	UART communication (RS232C format)	
- Communication method	Asynchronous	
- UART bit rate	19200, 38400, 57600 bps	
- Flow control	None	
- Other parameters	Data length: 8 bits, Parity (None), Stop bits 2	

Specifications are subject to change without prior notice

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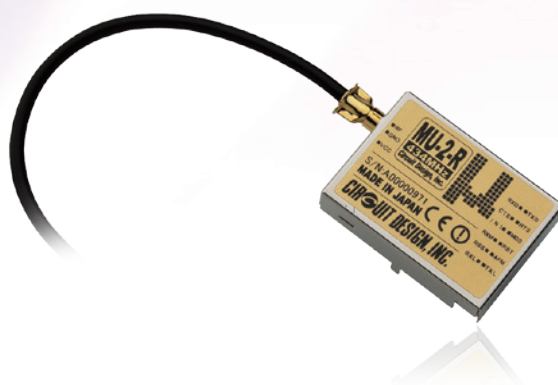
Embedded low power radio modem

MU-2-R 434 MHz

The MU-2-R is an embedded radio modem operated in the 434 MHz ISM band. Dedicated commands, specially designed for wireless application, are provided for building a range of wireless systems, from simple control systems to wide network systems. Using the commands, the user can concentrate on designing the application without needing to be aware of the radio protocol and control aspects. Reed-Solomon code is used for forward error correction (FEC) to maintain data integrity and provide highly reliable wireless communication.

Features

- UART interface with simple command control
- Narrow band FM for reliable long range communication
- 434 MHz ISM band Pre-programmed 127 channels
- 1 mW / 10 mW power selectable
- Error correction with Reed-Solomon code
- Repeater and auto answer back function
- Low power operation 42 mA at 3 V
- Robust metal housing for industrial use
- R&TTE (EN 300 220) / RoHS compliance



Applications

- Telemetry - Environment monitoring, Meter reading, Various measuring applications
- Telecontrol - Remote control for industrial equipment
- Security - Various alarm and monitoring systems



General

Parameter	Specification	Remark
Standard	EN300220	
RF output power	10 mW / 1 mW selectable	Output (50 ohm)
Oscillation system	PLL synthesizer system	
Radio communication speed	4800 bps	
Frequency range	433.2000 to 434.7750 MHz	
Channel spacing	25 kHz	
Number of channels	127	Channel step 12.5 kHz
Receiver sensitivity	-110 dBm	Packet error rate 0.1%*1
	-113 dBm with error correction	Packet error rate 0.1%*1
Operating temperature	-20 to + 65	
Operating voltage	3.0 to 5.0 V	Absolute max. rate 5.5 V
Consumption current	TX: 42 mA RX: 22 mA @ 3V	10 mW RF out
	TX: 26 mA RX: 22 mA @ 3V	1 mW RF out
External dimensions	36 x 26 x 8 mm	Not including antenna
Weight	14.5 g	
Modulation	BFSK	

*1 (255 byte / 1 packet)

Reference data

* Effective radio communication speed: About 3,400 bps (Conditions: One-way communication, no error correction, 25°C)

* Range: About 600 m (Conditions: One-way, no error correction, 25°C, line of sight distance, antenna height of 1.5 m, vertical antenna)

Serial interface

Parameter	Specification
Communication method	Serial communication (RS232C format)
Synchronization	Asynchronous / UART
Data speed	1200 / 2400 / 4800 / 9600 / 38400 / 57600 bps
Flow control	RTS / CTS hardware flow control
Parameter	Data length: 8 bit / Parity: (No, Odd, Even) / Stop bit: 1 or 2

Specifications are subject to change without prior notice

Embedded low power radio modem

MU-D1-R 915 MHz

The MU-D1-R is a Direct Sequence Spread Spectrum transceiver that operates in the 900 MHz ISM band under FCC Part 15. Dedicated commands, specially designed for wireless application, are provided for building a range of wireless systems, from simple control systems to wide network systems. For receiving, a true diversity system is employed to achieve stable and reliable communication.

Features

- UART interface with simple command control
- True diversity receiver
- Direct Sequence Spread Spectrum
- PN code length of 15
- BPSK modulation/demodulation
- MU-2 interface compatible
- Power selectable 40 mW / 8 mW
- Robust metal housing for industrial use
- FCC Part 15.247 compliant

Applications

- Telemetry - Environment monitoring, Meter reading, Various measuring applications
- Telecontrol - Remote control for industrial equipment
- Security - Various alarm and monitoring systems



General

Parameter	Specification	Remark
Standard	FCC Part 15.247	
RF output power	40 mW / 8 mW	Selectable by the command
Radio communication speed	600 kbps	40 kbps x 15 chips
Frequency range	902.5 to 927.50 MHz	
Number of channels	20	
Operating temperature	-20 to + 65	
Operating voltage	4.0 to 5.5 V	
Consumption current	TX: 130 mA RX: 58 mA @ 5V	40 mW RF out
	TX: 55 mA RX: 58 mA @ 5V	8 mW RF out
External dimensions	36 x 26 x 8 mm	Not including antenna
Weight	13 g	
Modulation	BPSK	

Reference data

* Range: About 300 m (Conditions: One-way, no error correction, 25°C, line of sight distance, antenna height of 1.5 m, vertical antenna)

Serial interface

Parameter	Specification
Communication method	Serial communication (RS232C format)
Synchronization	Asynchronous / UART
Data speed	19200 / 38400 / 57600 bps
Flow control	RTS / CTS hardware flow control
Parameter	Data length: 8 bit / Parity: (No, Odd, Even) / Stop bit: 1 or 2

Specifications are subject to change without prior notice

UHF Multi Channel Wireless Audio Transmitter / Receiver

WA-TX-03-R, WA-RX-03-R 863 MHz

The WA-TX-03-R / WA-RX-03-R are 15ch multichannel audio modules that operate in the European harmonized 863 - 865 MHz band. In addition to offering a frequency response range sufficient for voice transmission, the compander noise reduction system has a wide dynamic range, enabling transmission of clear audio signals. As embedded devices, they include nearly all the parts necessary for audio transmission in a small shielding case, making it possible to develop audio transmission equipment in a short time.

Features

- 863 - 865 MHz European audio band
- 15 channels with 125 kHz
- Built in noise reduction systems
- Built in mute circuit
- Easy installation for user system
- R&TTE (EN 301 357) / RoHS compliance

Applications

- Audio guiding at museum
- Tour guide system
- Wireless conference system
- Wireless microphone system for amateur users
- Various audio transmissions



General

Parameter	Specification
Frequency	863 - 865 MHz
Number of RF channels	15
Frequency Type	F3E
Modulation	FM
Distance	50 m (line of sight)
Dynamic range	70 dB or more (W/IHF-A Filter)
Audio Frequency response	50 Hz to 13 kHz +/- 3.5 dB
T.H.D	2 % or less (@AF 1 kHz, Dev.= 20 kHz)
Emphasis	50 us
Operating temperature	0 to 50 degree C

WA-TX-03-R (Transmitter)

Parameter	Specification
Oscillation type	Crystal based PLL oscillation
RF power output	2 mW (e.r.p)
Frequency stability	+/- 15 kHz
Noise reduction type	Compander
Spurious emission	1 uW Max.
Deviation	20 kHz (1 kHz@-25 dBv)
Audio input level	- 93 to -13 dBv (1kHz)
Audio input impedance	20 kohm or more
Max.DC input to audio input	7 V DC Max.
Supply voltage	4.2 to 6 V
Current consumption	70 mA
Dimensions (WxDxH)	36 x 26 x 8 mm
Weight	13 g

WA-RX-03-R (Receiver)

Parameter	Specification
Receiving method	Single superheterodyne
Local oscillation type	Crystal based PLL oscillation
IF frequency	10.7 MHz
Noise reduction type	Expander
Sensitivity	S/N 55 dB at 21 dBuV (-92 dBm)
Squelch sensitivity	Adjustable
Audio output level	-10 dBv (Dev. 20 kHz),
Audio output impedance	20 kohm or less
Supply voltage	3 to 5 V
Current consumption	45 mA
Dimensions (WxDxH)	36 x 26 x 8 mm
Weight	13 g

*0dBv = 0.775V

*Data of specification is measured at 25C unless otherwise specified.

Specifications are subject to change without prior notice

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