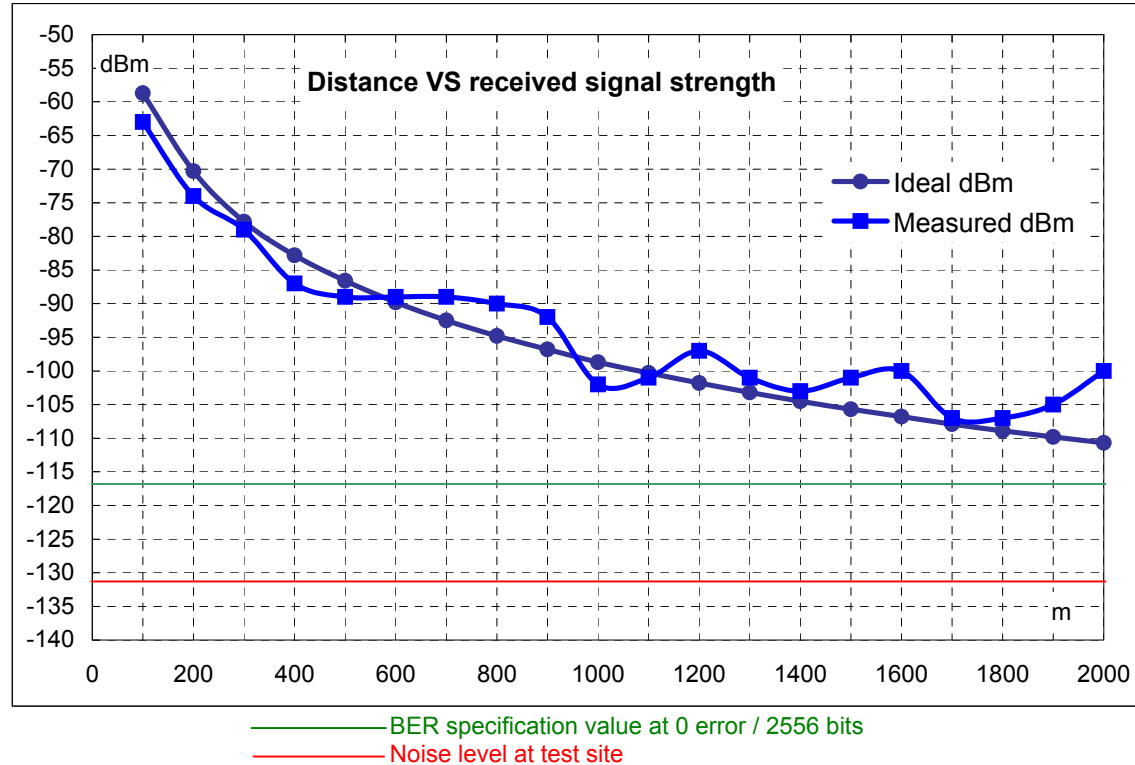


CDP-02E-R range test result

Circuit Design, Inc. Engineering Div.
 Test site: Matuskawa / Weather: Clear
 Test date: June 20, 2006 PM 4:00 -

Distance m	Ideal dBm	Measured dBm	Judgment	Read @RSHEX
0				
100	-58.7	-63	good	33
200	-70.3	-74	good	2C
300	-77.8	-79	good	29
400	-82.8	-87	good	24
500	-86.6	-89	good	23
600	-89.8	-89	good	23
700	-92.5	-89	good	23
800	-94.8	-90	good	22
900	-96.8	-92	good	21
1000	-98.7	-102	good	1B
1100	-100.3	-101	good	1C
1200	-101.8	-97	good	1E
1300	-103.2	-101	good	1C
1400	-104.5	-103	good	1A
1500	-105.7	-101	good	1C
1600	-106.8	-100	good	1D
1700	-107.9	-107	good	17
1800	-108.9	-107	good	17
1900	-109.8	-105	good	19
2000	-110.7	-100	good	1D



* Ideal values are from calculation of received signal strength over flat terrain

The heights of transmitter and receiver antenna: 1.5m, Antenna gain: 2.14 dBi, Test frequency: 433.9 MHz, Transmission power: 10mW

* Measured value and judgment

CCR boards were used for test (CCR board is equipped with communication protocol). Data rate: 4800 bps Modulation: FSK
 Antennas used were ANT-RIG-01. The antennas were positioned vertical at transmitter and receiver. (Refer to antenna radiation pattern below)
 Received field strength was measured using CCR command @ RS and then convert the value into dBm unit.

Judgment for received data was performed by checking received data on the monitor of HyperTerminal

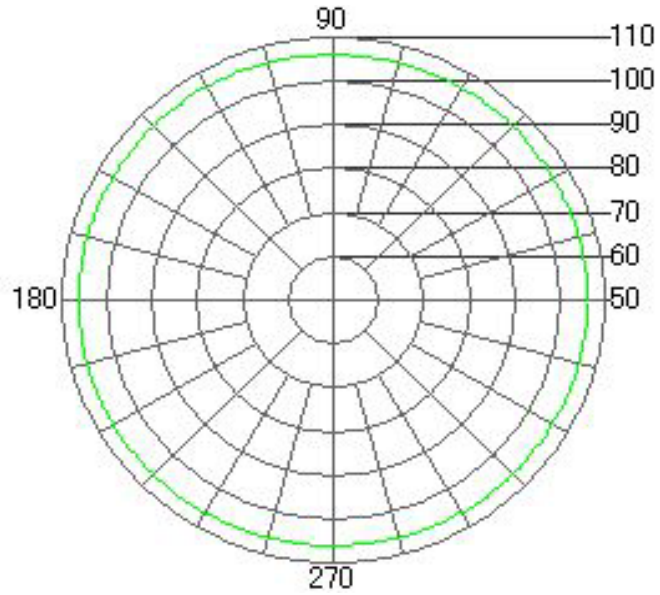
The receiver position was fixed on one position with 1.5m height. The transmitter connected with PC was mounted on the wooden table and moved by 100m after each measurement.

* Test site and environment

Free line of site from 100m to 1700 m (* The measurement points between 100 to 300m were not on the straight line. The measurement points between 300 to 1700 m were located on approximately the straight line)

At 1700 m point, there were trees and houses. The road between 100 to 1900 m was pavement with asphalt, and at 2000 m was grass over ground

Antenna radiation pattern



Measuring antenna
Antenna used with radio module

Position: Vertical Height 1.5m
Position: Vertical Height 1.5m

RSSI data at 433.9 MHz

Serial No. GZ000490

dBm	RSSI mV	@RSHEX
-130	100	9
-125	125	B
-120	165	F
-115	205	13
-110	235	16
-105	278	19
-100	310	1D
-95	338	1F
-90	378	22
-85	418	25
-80	448	28
-75	486	2C
-70	518	2F
-65	550	32
-60	595	36
-55	626	39
-50	640	3A
-45	646	3B
-40	646	3B

