SHARP

DOC NO. EU-01Z03

Bluetooth CF Card

DC2C1BZ001
Technical Documentation

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Description: This specification covers the **Sharp Bluetooth™ CF Card model DC2C1BZ001** intended for design application use with PDAs, Notebook PCs, mobile phones, digital cameras or PC peripherals.
(Source: Bluetooth V.1.1 Radio specification Part A)
Ref no. of QPN : 010-7LI_1 *QPN : Qualification Product Notice

Remark: 1.This CF card is not designed for use in Life Support Application products where malfunction of those products can be reasonably expected to result in personal injury.
SHARP customers using or selling these products for use in such applications do so at their risk and agree to fully indemnify SHARP for any damages resulting from such improper use or sale.
2.Country of origin: Japan or China.

[1] GENERAL SPECIFICATIONS

1-1 Bluetooth Specification	Power Class 3
1-2 Frequency range	2402 MHz to 2480 MHz
1-3 Channel system	TDMA
1-4 Duplex system	Half duplex/TDD
1-5 Total number of channels	79 ch
1-6 Nominal antenna impedance	50 ohm
1-7 Intermediate frequency	Zero IF
1-8 Modulation system	GFSK/ BbT= 0.5
(Air Interface)	Data rate: 1Mbps
Process gain	Frequency hopping 1600hops/sec
1-9 Operating voltage	Vcc: 3.3 V+/-5%
1-10 Absolute maximum supply voltage (Ta=25 deg.)	Vcc: 4.0 V
1-11 Weight	13 g/ typ.
1-12 Block diagram	Figure 1

[2] MECHANICAL SPECIFICATIONS

2-1 Dimension and mounting details	Figure 2
2-2 Terminal details	Table 2

[3] ENVIRONMENT SPECIFICATIONS

3-1 Operating temperature	15 to 35 deg. ....Normal condition/ Radio spec Part A 0 to 35 deg. .....Extreme condition/ Radio spec Part A 0 to 50 deg. .....Application guaranteed condition
3-2 Storage temperature	-20 to 70 deg..
3-3 Efficient humidity	Less than 85 %
3-4 Storage humidity	Less than 90 %

[4] TESTING CONDITIONS

4-1 Supply voltage	Vcc: 3.3+/-0.1 V
4-2 Ambient temperature	25 +/- 3 deg..
4-3 Ambient humidity	65 +/- 10 %

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[5] ELECTRICAL SPECIFICATIONS

*** The following items should be measured under the "[4] TESTING CONDITIONS" if there are no comments in the condition table.

*** Extreme condition: 0 to 35 degree. Normal condition: 15 to 35 degree.

NO.	Item	Specification				Condition
		Min	Typ	Max	Unit	
	<< TX BLOCK >>					
5-1	Output power/ Average	-6.0		0.0	dBm	Extreme condition, DH5, PRBS9 mod.
5-2	Power density			20	dBm	Extreme condition, DH5, PRBS9 mod.
5-3	Frequency Range	2400		2483.5	MHz	Extreme condition, DH1, PRBS9 mod.
5-4	20dB Bandwidth			1.0	MHz	Extreme condition, DH1, PRBS9 mod.
5-5	Adjacent channel power				dBm	Extreme condition, DH1, PRBS9 mod.
	M+/-2 ch			-20		
	M >+/-3 ch			-40		
5-6	Modulation characteristics	+/-140		+/-175	kHz	Extreme condition, DH1, 11110000 mod.
		+/-115			kHz	Extreme condition, DH1, 1010 mod.
5-7	Initial carrier frequency tolerance			+/-75	kHz	Extreme condition, DH1, PRBS9 mod.
5-8	Carrier frequency drift				kHz	Extreme condition, DH1, 1010 mod.
	1 slot packet/ DH1			+/-25		
	3 slot packet/ DH3			+/-40		
	5 slot packet/ DH5			+/-40		
5-9	Out-of band Spurious emissions / Conductive mode				dBm	Extreme condition, DH1, PRBS9 mod.
	30 to 1000MHz			-36		
	1 to 12.75GHz			-30		
	1.8 to 1.9GHz			-47		
	5.15 to 5.3GHz			-47		
	<< RX BLOCK >>					
5-10	Receiver sensitivity DH1 & DH5			-70	dBm	Extreme condition at B.E.R=1e-3, PRBS9 mod.
5-11	C/I performance (X dB=D-UD *1) *2				dB	Normal condition D level : -60 dBm, DH1, PRBS9 mod. UD level : at B.E.R=1e-3, PRBS9 mod.
	Y=M(Co-channel)			+14		
	Y=M+/-1			+4		
	Y=M+/-2			-30		
	Y=M>+/-3			-40	dB	Normal condition D level : -67 dBm, DH1, PRBS9 mod. UD level : at B.E.R=1e-3, PRBS9 mod.

*1 UD…Undesired signal level(dBm) D…Desired signal level(dBm)

Y : undesired-channel
M : desired-channel
M +/- 1 : adjacent channel
M +/- 2 : next adjacent channel

*2 Frequencies where the requirements are not met are called spurious response frequencies.
Five spurious response frequencies are allowed at frequencies with a distance of .2 MHz from the wanted signal.
On these spurious response frequencies a relaxed interference requirement C/I = -17 dB shall be met.

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5-12	Blocking performance					dBm	Normal condition D : 2460MHz only, -67 dBm , DH1, PRBS9 mod. UD level : at B.E.R=1e-3, No-mod.
	*3	30 to 1910 MHz	-10				
		1910 to 2000 MHz	-10				
		2000 to 2399 MHz	-27				
		2500 to 3000 MHz	-27				
		3 to 12.75 GHz	-10				
5-13	Intermodulation performance		-39			dBm	Normal condition D level : -64 dBm, DH1, PRBS9 mod. UD level : at B.E.R=1e-3, PRBS9 mod. UD1:Y=M+/-3, No-mod. UD2:Y=M+/-6, PRBS9 mod.
5-14	Maximum input level		-20			dBm	Normal condition at B.E.R=1e-3, PRBS9 mod.
5-15	Spurious emission when not allocated a TX (TX circuit : turned off)					dBm	Normal condition, DH1, PRBS9 mod.
		30 to 1000 MHz			-57		
		1 to 12.75GHz			-47		
<< TOTAL BLOCK >>							
5-16	Current consumption (TX mode)					mA	
	Peak current: TX (continuous)				100		* current consumption under burst mode is depends on software.
	Peak current: RX(continuous)				100		

*3 24 exceptions are permitted which are dependent upon the given receive channel frequency and are centered at a frequency which is an integer multiple of 1MHz.
At 19 of these spurious response frequencies a relaxed power level -50dBm of the interferer may used to achieve a BER of 0.1%. At the remaining 5spurious response frequencies the power level is arbitrary.

[6] Baseband Specification

Supports frequency band and RF channels for USA, Japan and Europe(except France),79-channel system
Supports of ACL link
Supports of ID,NULL,POLL,FHS,DM1 packet type
Supports of DH1,DM3,DH3,DM5,DH5 packet type
Supports paging 79-channels
Supports page scan 79-channels
Supports paging scheme 0
Supports paging mode R0,R1,R2
Supports Npage>=1,Npage>=128,Npage>=256
Supports inquiry,79-channel
Supports inquiry scan,79-channel
Support the dedicated inquiry access code
Piconet capabilities Only point to point connection

[7] Link Manager Specification

Supports 3-slot packets,5-slot packets
Supports encryption
Supports slot offset
Supports role switch(Master/Slave)
Supports hold mode, sniff mode
Supports power control
Supports authentification
Supports pairing
Supports accept change of link key
Supports clock offset information
Supports slot offset information
Supports LM version information
Supports feature information
Supports name information
Supports test mode

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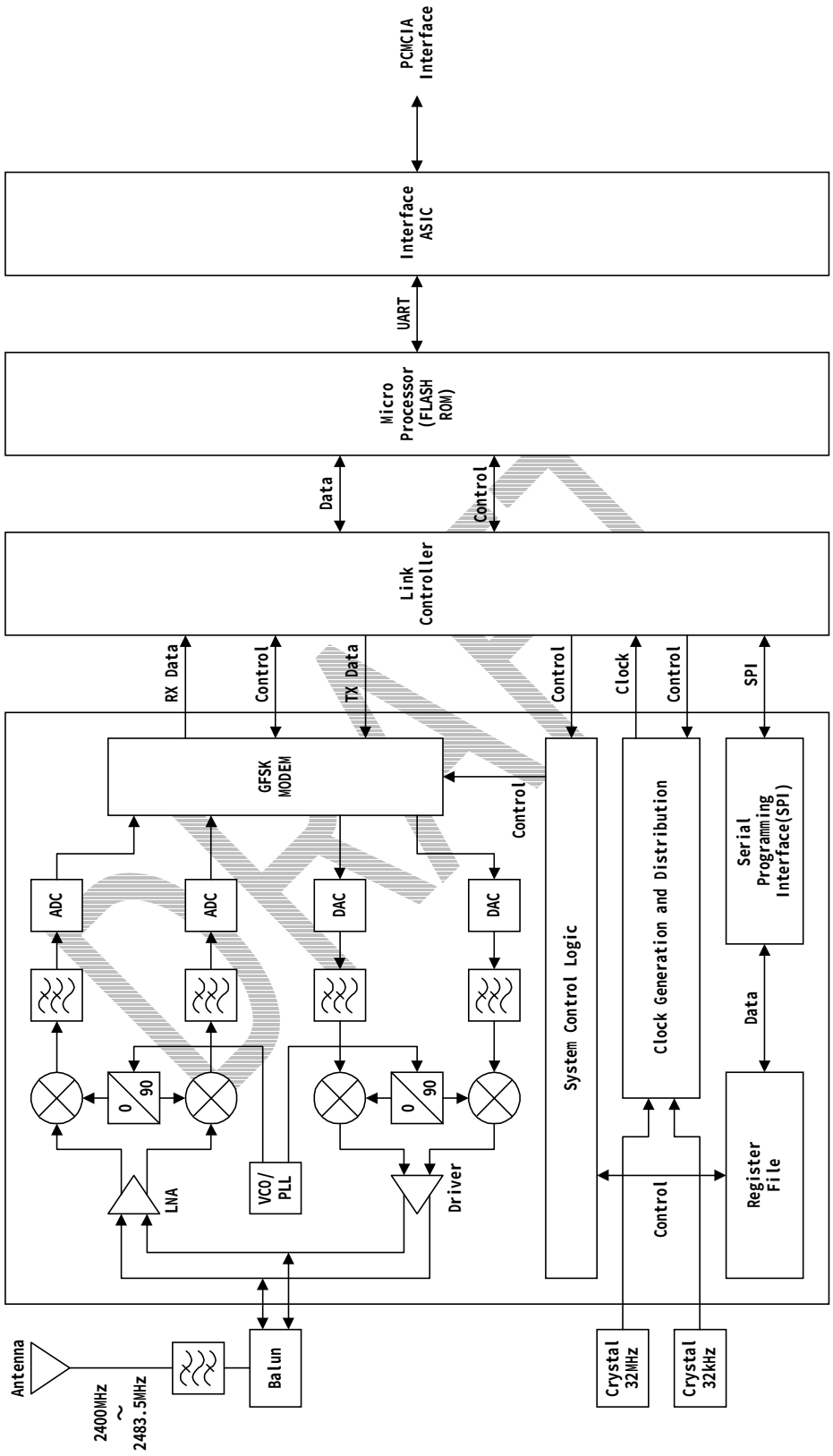


Figure 1 Block diagram

[9] Description of the circuit functions

(see Figure 1: Block diagram)

(1) Operation of the Bluetooth CF Card at Rx mode

The 2.4GHz ISM band burst signal modulated by GFSK through the antenna is filtered to eliminate undesired out-of-band signals at the 2.4GHz Band Pass Filter (BPF).

After the BPF stage, the signal is converted into the balanced signals at the Balun, and come into a pair of balanced RF I/O pins of the Radio Modem IC (name: SiW1502 by SiliconWave).

In the IC, the signals are processed at the Low Noise Amplifier (LNA), the Direct I/Q Down Converter, the Low Pass Filter, and the Analog to Digital Converter (ADC) before sent to the GFSK demodulator. Within the demodulator, data detection and timing recovery circuits convert the data for transfer to the Link Controller.

(2) Operation of the Bluetooth CF card at TX mode

The serial TX Data sent to the Radio Modem IC (name: SiW1502 by SiliconWave) from the Link Controller is modulated by GFSK. After that, the signals are processed at Digital to Analog Converter (DAC), the Low Pass Filter, the Direct I/Q Up Converter and the Drive Amplifier to create the radio signals.

The radio signals that go out of the IC are converted into unbalanced signal at the Balun before the out-of-band signals are eliminated by the BPF. After that, the signal comes into the Antenna.

(3) Operation of the Baseband (BB) Controller

The Link Controller IC (name: SiW1602 by SiliconWave) and the Microprocessor IC (name: H8S/2214 by Hitachi) provide the Bluetooth link management and control functions.

The ICs perform the logical protocol processing within the unit that enables the host to communicate over a Bluetooth link. Real time functions such as frequency hopping, burst timing, synthesizer programming, and clock synchronization are implemented in this hardware.

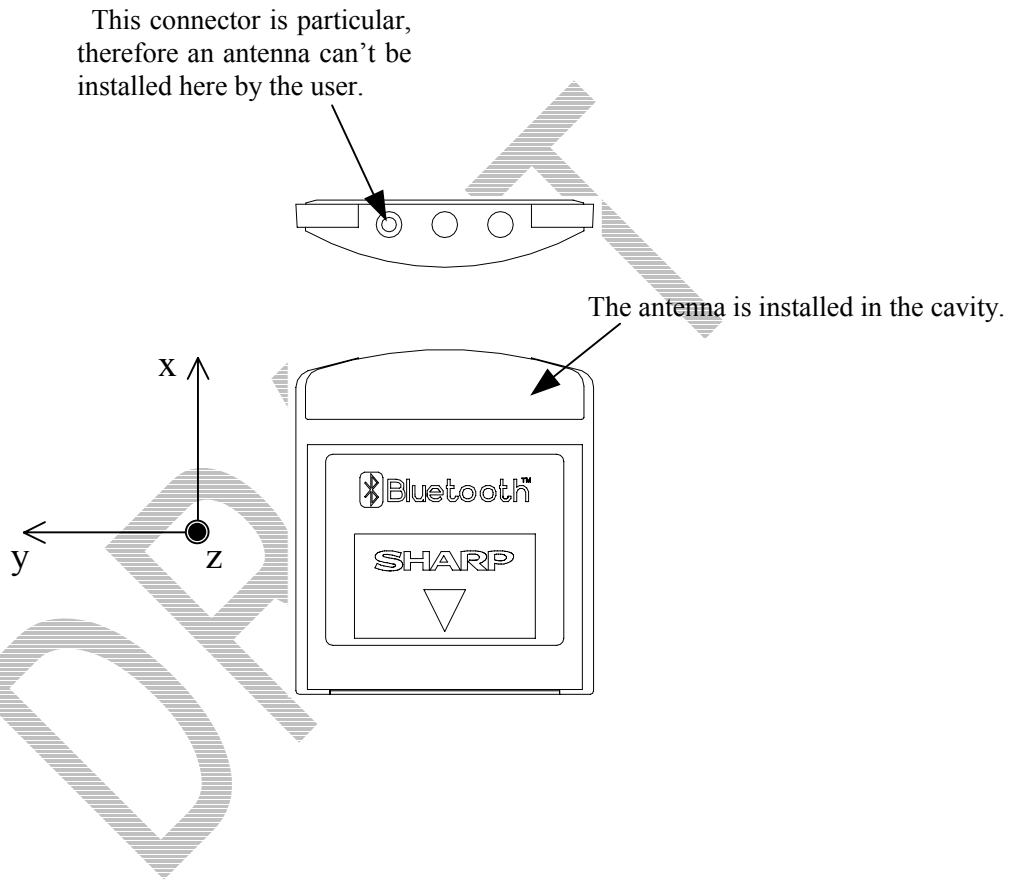
In addition, Bluetooth transmit and receive data is processed. The received data from the Radio Modem IC is processed through the hardware, and is sent to the Interface ASIC. The transmit data is passed in reverse order.

And, the Interface ASIC mediates between the above hardware and the PCMCIA Interface.

(4) Description of the Antenna

Gain for x-polarization: +1.0dBi / Avg.
Gain for y-polarization: -2.5dBi / Avg.

The antenna is installed perfectly in CF Card's cavity that can't be opened, therefore an other antenna can't be replaced by the user.



Terminal details

PC Card I/O Mode			
PinNum	SignalName	PinType	In, OutType
1	GND		Ground
2	D03	I/O	I1Z,OZ3
3	D04	I/O	I1Z,OZ3
4	D05	I/O	I1Z,OZ3
5	D06	I/O	I1Z,OZ3
6	D07	I/O	I1Z,OZ3
7	-CE1	I	I3U
8	A10	I	I1Z
9	-OE	I	I3U
10	A09	I	I1Z
11	A08	I	I1Z
12	A07	I	I1Z
13	VCC		Power
14	A06	I	I1Z
15	A05	I	I1Z
16	A04	I	I1Z
17	A03	I	I1Z
18	A02	I	I1Z
19	A01	I	I1Z
20	A00	I	I1Z
21	D00	I/O	I1Z,OZ3
22	D01	I/O	I1Z,OZ3
23	D02	I/O	I1Z,OZ3
24	-IOIS16	O	OT3
25	-CD2	O	Ground

PC Card I/O Mode			
PinNum	SignalName	PinType	In, OutType
26	-CD1	O	Ground
27	D011	I/O	I1Z,OZ3
28	D012	I/O	I1Z,OZ3
29	D013	I/O	I1Z,OZ3
30	D014	I/O	I1Z,OZ3
31	D015	I/O	I1Z,OZ3
32	-CE2	I	I3U
33	-VS1	O	Ground
34	-IORD	I	I3U
35	-IOWR	I	I3U
36	-WE	I	I3U
37	IREQ	O	OT1
38	VCC		Power
39	-CSEL	I	I2Z
40	-VS2	O	OPEN
41	RESET	I	I2Z
42	-WAIT	O	OT1
43	-INPACK	O	OT1
44	-REG	I	I3U
45	-SPKR	I/O	I1U,OT1
46	-STSCHG	I/O	I1U,OT1
47	D08	I/O	I1Z,OZ3
48	D09	I/O	I1Z,OZ3
49	D10	I/O	I1Z,OZ3
50	GND		Ground

Table 2 Terminal details

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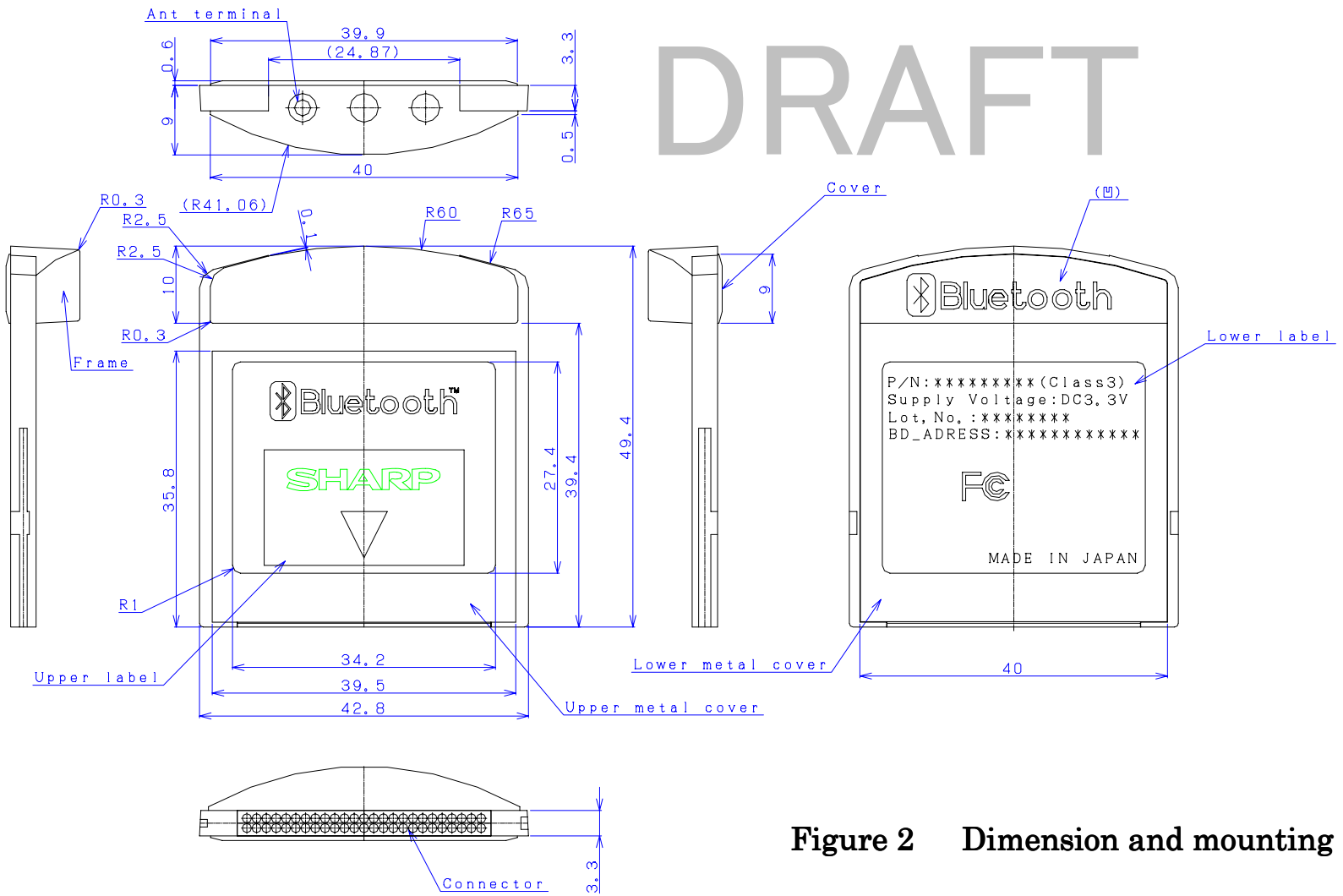

Figure 2 Dimension and mounting details

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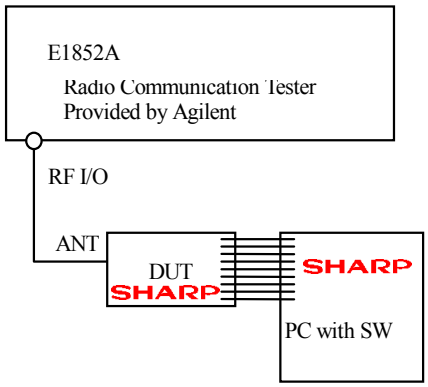
<SHEET 1: Measurement block diagram>

Measurement System 1: Burst Mode Measurement



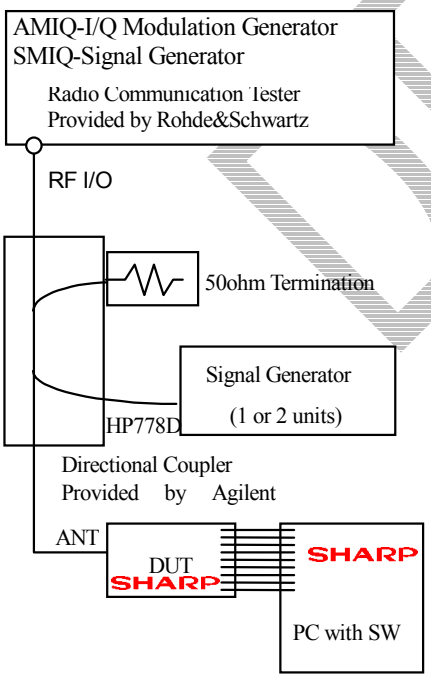
Test Item (TX Burst Mode)

- Output Power
- Power Control
- Initial carrier frequency tolerance
- Modulation characteristics
- Carrier frequency drift

Test Item (RX Burst Mode)

- Receiver Sensitivity

Measurement System 2: Burst Mode Measurement



Test Item (RX Burst Mode)

- C/I performance
- Blocking performance
- Intermodulation performance
- Maximum input level

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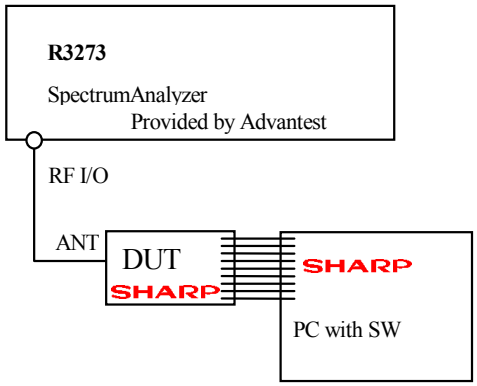
Measurement System 3: Burst Mode Measurement



Test Item (TX Burst Mode)

- Power Density
- Spurious emission
- Frequency range
- 20dB BW Adjacent CH power
- Current consumption at TX mode

Test Item (RX Burst Mode)

- Spurious emission when not allocated a TX
- Current consumption at RX mode