TCB

GRANT OF EQUIPMENT AUTHORIZATION

TCB

Certification
Issued Under the Authority of the
Federal Communications Commission
By:

Timco Engineering, Inc.
849 NW State Road 45
P.O. Box 370,
Newberry, FL 32669

Date of Grant: 05/16/2007

Application Dated: 05/15/2007

Moxa Technologies Co.,Ltd.
4F, No.135, Lane 235, Pao-Chiao Rd.
Shing Tien City,
Taiwan

Attention: Jackie Shi , Manager

NOT TRANSFERABLE

EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and is VALID ONLY for the equipment identified hereon for use under the Commission's Rules and Regulations listed below.

FCC IDENTIFIER: SLEW341
Name of Grantee: Moxa Technologies Co.,Ltd.
Equipment Class: Digital Transmission System
Notes: RISC-BASED READY-TO-RUN WIRELESS EMBEDDED COMPUTER

Grant Notes	FCC Rule Parts	Frequency Range (MHZ)	Output Watts	Frequency Tolerance	Emission Designator
CC	15C	2412.0 - 2462.0	0.076		

Power listed is conducted. The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. Users must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.

CC: This device is certified pursuant to two different Part 15 rules sections.

Timco Engineering, Inc.

TCB Application Form 731

Rev 22 June 2004

For Timco Use Only	
Job Number	
Scope	
Date Filed	
Conf. #	
Grant Note	

Shaded areas are REQUIRED

Item 1. Applicant's complete, legal business name:

Moxa Technologies Co., Ltd.

Applicant's FCC Registration Number (FRN): 0011-6507-85

Item 2. Applicant's mailing address: *fill in fields, as appropriate*

Line 1:4F, No. 135, Lane 235, Pao-Chiao Rd., Shing Tien City,

Line 2:Taiwan, R.O.C.

P.O. Box:

City: Shing Tien City

State:	**Country (if foreign address):** Taiwan	**Zip/Postal Code:** 231

Item 3. Applicant Contact Person:

First Name: Jackie	**Last Name:**Shi
Title: Manager	**Telephone:**886-2-8919-1230
E-mail: Jack_Shi@moxa.com.tw	**Fax No.:**886-2-8919-1231

Item 4. FCC ID consisting of:	**Grantee Code:** SLE	**Equipment Product Code (14 characters maximum):** W341 *include "dashes" (-) where appropriate*

Item 5. Application Contact: **All questions regarding the application will be directed to this contact. The Original Grant and Invoice will be sent to this contact.**

Firm Name: Training Research Co., Ltd.	**Telephone:** 886-2-26935155	**Ext:** 32	**Fax: No.:** 886-2-26934440
First Name: Jack	**Middle Initial:**	**Last Name:**Tsai	
Address Line 1:1F, No. 255, Nan-yang Street,	**P.O. Box**:		
Address Line 2: Shijr City, Taipei Hsien	**City:**	**State:**	
Country (if foreign address): Taiwan	**Zip/Postal Code:**221		
E-mail:	**Telephone:**	**Fax:**	

Item 6. Test Firm Used to Take Measurements:

Firm Name: Training Research Co., Ltd.	**Telephone:** 886-2-26935155	**Ext.:** 32	**Fax No.:** 886-2-26934440
First Name: Jack	**Middle Initial:**	**Last Name:**Tsai	
Address Line 1:1F, No. 255, Nan-yang Street,		**P.O. Box:**	
Address Line 2: Shijr City, Taipei Hsien	**City:**	**State:**	
Country (if foreign address): Taiwan	**Zip/Postal Code:**221		
E-mail:			
FCC Registered Test Site Number. *Required for Part 15 and 18 applications.*			93906

Item 7.
* Does this application include a request for **SHORT-TERM** confidentiality for any portion(s) of the data contained in this application pursuant to FCC DA 04-1705 dated 6/15/2004?
* Does this application include a request for confidentiality for any portion(s) of the data contained in this application pursuant to 47 CFR 0.459 of the Commission Rules?

SHORT-TERM request: ☒ Yes ☐ No
PERMANENT request: ☒ Yes ☐ No

Item 8. *Is this application for modular approval? ☐ Yes ☒ No
If yes, please submit a cover letter addressing the modular approval requirements of DA 00-1407.

Item 9. *Is this application for software defined radio authorization? ☐ Yes ☒ No

Item 10. Equipment Class: *3-digits required* DTS	Description of Product as it is marketed: RISC-based Ready-to-Run Wirele

Item 11. *Application is for:

☒ Original Equipment

☐ Change in identification of presently authorized equipment:

Original FCC ID Grant Date (MM/DD/YYYY)

☐ Class II permissive change or modification of presently authorized equipment

☐ Class III permissive change to software defined radio

Note: this may only be filed for applications pertaining to Software Defined Radio

Item 12. Is the equipment in this application:	
* **(a)** a composite device subject to an additional equipment authorization?	☒ Yes ☐ No
* **(b)** part of a system that operates with, or is marketed with, another device that requires an equipment authorization?	☐ Yes ☒ No
If either of the above questions is answered "Yes" complete section 12 (c).	
(c) The related application: ☐ has been granted under the FCC ID listed to the right ☐ is in the process of being filed under the FCC ID listed to the right ☐ is pending with the FCC under the FCC ID listed to the right	**FCC ID**

Item 13. * Equipment will be operated under FCC Rule Part(s):

15(C)

Item 14. EQUIPMENT SPECIFICATIONS: *Where applicable*

Frequency range in MHz		Rated RF power output **IN WATTS**	Frequency tolerance		Emission Designator (See 47 CFR 2.201 and 2.202)	Microprocessor model number
Low Freq	**High Freq**		%, Hz, ppm			
2412	2462	0.07568				

Read each certification carefully before answering and signing this application

WILLFUL FALSE STATEMENTS MADE ON THIS FORM ARE PUNISHABLE BY FINE AND/OR IMPRISONMENT (U.S. CODE, TITLE 18, SECTION 1001), AND/OR REVOCATION OF ANY STATION LICENSE OR CONSTRUCTION PERMIT (U.S. CODE, TITLE 47, SECTION 312 (a) (1)), AND/OR FORFEITURE (U.S. TITLE 47, SECTION 503).

(Continued on Next Page)

Item 15. APPLICANT/AGENT CERTIFICATION:

I certify that I am authorized to sign this application. All of the statements herein and the exhibits attached hereto are true and correct to the best of my knowledge and belief. In accepting a Grant of Equipment Authorization issued by the TCB, under the authority of the FCC, as a result of the representations made in this application, the applicant is responsible for (1) labeling the equipment with the exact FCC ID specified in this application, (2) compliance statement labeling pursuant to the applicable rules, and (3) compliance of the equipment with the applicable technical rules. If the applicant is not the actual manufacturer of the equipment, appropriate arrangements have been made with the manufacturer to ensure that production units of this equipment will continue to comply with the FCC's technical requirements.

Authorizing an agent to sign this application is done solely at the applicant's discretion; however, the applicant remains responsible for all statements in this application.

If an agent has signed this application on behalf of the applicant, a written letter of authorization which includes information to enable the agent to respond to the above Section 5301 (Anti-Drug Abuse) Certification statement has been provided by the applicant. It is understood that the letter of authorization must be submitted to the FCC upon request, and that the FCC reserves the right to contact the applicant directly at any time.

***Signature of Authorized Applicant:** Jackie Shi

Title of Authorized Signature: Manager

NOTE: An asterisk '*' preceding a field indicates it must be completed.

List of Exhibit

EXHIBIT A	***Cover Letter***
EXHIBIT B	***Sample Label***
EXHIBIT C	***Test Report***
EXHIBIT D	***Test Setup Photos***
EXHIBIT E	***User Manual***
EXHIBIT F	***Schematics***
EXHIBIT G	***Part List***
EXHIBIT H	***Block Diagram***
EXHIBIT I	***Operational Description***
EXHIBIT J	***Photographs of EUT***
EXHIBIT K	***RF Exposure Calculations***

EXHIBIT A

Cover Letter

Moxa Technologies Co., Ltd.
Fl. 4, No. 135, Lane 235, Pao-Chiao Rd.,
Shing Tien City, Taipei, Taiwan, R.O.C.
TEL : +886-2-8919-1230
FAX : +886-2-8919-1231

Request for Confidentiality

Federal Communications Commission
Authorization and Evaluation Division

Subject: Confidentiality Request regarding application for certification of

FCC ID: SLEW341

Dear Madam or Sir :
Pursuant to Sections 0.457 and 0.459 of the Commission's Rules, we hereby request confidential treatment of information accompanying this application as outlined below:

- Schematics -ThinkCore W341 Schem.pdf
- Part List -ThinkCore W341 ParLst.pdf
- Block diagram -ThinkCore W341 BlkDia.pdf
- Operational description -ThinkCore W341 OpDes.pdf

The above materials contain trade secrets and proprietary information not customarily released to the public. The public disclosure of these materials may be harmful to the applicant and provide unjustified benefits to its competitors. The applicant understands that pursuant to Section 0.457 of the Rules, disclosure of this application and all accompanying documentation will not be made before the date of the Grant for this application.

Pursuant to DA 04-1705 June 15, 2004 of the Commission's Public notice, we also request temporary confidential treatment of information accompanying this application as outlined below:

- External Photos -ThinkCore W341 ExtPho.pdf
- Internal Photos -ThinkCore W341 IntPho.pdf
- Test Setup Photos -ThinkCore W341 TSup.pdf
- User's Manual -ThinkCore W341 UserMan.pdf

Sincerely,

Johnny Lee

Johnny Lee, Supervisor / Moxa Technologies Co., Ltd.

EXHIBIT B

Sample Label

LABEL Position:

FCC ID: SLEW341
Brand Name
Model Name: ThinkCore W341,
ThinkCore W341-LX

This device complies with Part 15 of the FCC Rules
Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) This device must accept any interference received,
including interference that may cause undesired operation

LABEL Size: 70 x 50 mm

EXHIBIT C

Test Report

MEASUREMENT REPORT
of
RISC-based Ready-to-Run Wireless Embedded Computer

Applicant	**:**	Moxa Technologies Co., Ltd.
EUT	**:**	RISC-based Ready-to-Run Wireless Embedded Computer
Model	**:**	ThinkCore W341, ThinkCore W341-LX
FCC ID	**:**	SLEW341

Tested by :

Training Research Co., Ltd.

TEL : 886-2-26935155 FAX : 886-2-26934440

No. 255, Nanyang Street, Shijr, Taipei Hsien 221, Taiwan, R.O.C.

CERTIFICATION

We here by verify that:

The test data, data evaluation, test procedures and equipment configurations shown in this report were made mainly in accordance with the procedures given in ANSI C63.4 (2003) as a reference. All test were conducted by ***Training Research Co., Ltd.***, 255 Nanyang Street, Shijr, Taipei Hsien 221, Taiwan, R.O.C. Also, we attest to the accuracy of each.

We further submit that the energy emitted by the sample EUT tested as described in the report is **in compliance with** the technical requirements set forth in the FCC Rules Part 15 Subpart C Section 15.247.

Applicant	**:**	Moxa Technologies Co., Ltd.
Applicant address	**:**	Fl. 4, No. 135, Lane 235, Pao-Chiao Rd., Shing Tien City, Taipei, Taiwan, R.O.C.
FCC ID	**:**	SLEW341
Report No.	**:**	M4715060806
Test Date	**:**	April 10, 2007

Prepared by: Jack Tsai *Jack Tsai*

Approved by: Frank Tsai *Frank Tsai*

Conditions of issue :

(1) ***This test report shall not be reproduced except in full, without written approval of TRC. And the test result contained within this report only relate to the sample submitted for testing.***

(2) ***This report must not be used by the client to claim product endorsement by NVLAP or any agency of U.S. Government.***

(3) ***This test report, measurements made by TRC are traceable to the NIST only Conducted and Radiated Method.***

NVLAP LAB CODE 200174-0

Tables of Contents

Ⅰ. GENERAL

1.1 Introduction

The following measurement report is submitted on behalf of applicant in support that the certification in accordance with Part 2 Subpart J and Part 15 Subpart A, and C of the Commission's Rules and Regulations.

1.2 Description of EUT

Product Name	**:**	RISC-based Ready-to-Run Wireless Embedded Computer
Model Name	**:**	ThinkCore W341, ThinkCore W341-LX
FCC ID	**:**	SLEW341
Frequency Range	**:**	2.412 GHz ~ 2.462GHz
Operating Frequency	**:**	2.412GHz ~ 2.462GHz
Support Channel	**:**	11 Channels
Channel Spacing	**:**	5MHz
Modulation Skill	**:**	DBPSK, DQPSK, CCK, OFDM
Power Type	**:**	Powered by the switching adapter, Manufacture: BALANCE ELECTRONICS CO., LTD. Model: GPSA-1200125 I/P: 100 ~ 240VAC ~ 50/60Hz 0.5A O/P: 12VDC 1.2A. Primary: 182cm length, non-shielded, without ferrite core Secondary: 186cm length, non-shielded, without ferrite core
Data Cable	**:**	Eithernet Cable x 1, 10m length, non-shielded, without ferrite core

1.3 Test method

1. The DC-In connected to AC mains supply by switching adapter.
2. The two USB ports connected with USB flash drive.
3. The Relay Output port connected with terminator.
4. The LAN port of EUT connected to far LAN card.
5. The four RS-232/422/485 ports connected with terminators.
6. The notebook PC and test fixture is connected by USB transfer to RS-232 cable, and then test fixture connected with EUT setting test mode.
7. The Notebook PC and test fixture is moving when test mode set finish. The software provided by the manufacturer, the test is performed under the specific conditions.
8. Set different channel and data rate being tested and repeat the procedures above.
   (a) Conducted test and Radiated:
   making EUT to the mode of continuous transmission

1.4 Description of Support Equipment

In order to construct the minimum testing, following equipment were used as the support units.

PC	**:**	**HP**
Model No.	:	Pavilion t1000
Serial No.	:	TWL3320051
FCC ID	:	N/A, DoC (Declaration of Confirmation) Approved
BSMI	:	R33001
Power type	:	100 ~ 127VAC/200 ~ 240VAC, 6A/3A, 50 ~ 60Hz, Switching
Power cord	:	Non-shielded, 1.80m length, Plastic hood, No ferrite core

Monitor	**:**	**HP Flat Panel Monitor**
Model No.	:	PE1234
Serial No.	:	CNN4120K7T
FCC ID	:	DoC Approved
BSMI	:	T3A002
Power type	:	100 ~ 240 VAC / 50 ~ 60 Hz, Switching
Power cord	:	Shielded, 1.83m length, No ferrite core
Data cable	:	Shielded, 1.80m length, with two ferrite cores

Mouse	**:**	**HP**
Model No.	:	M-UR89
Serial No.	:	LZS21750238
FCC ID	:	DoC Approved
BSMI	:	3892D767
Power type	:	By PC
Power cord	:	Non-shielded, 1.88m length, No ferrite core

Keyboard	**:**	**HP**
Model No.	:	5187-0343
Serial No.	:	BE21700404
FCC ID	:	DoC Approved
BSMI	:	3892C981
Power type	:	By PC
Data cable	:	Shielded, 1.73m length, Plastic hood, No ferrite core

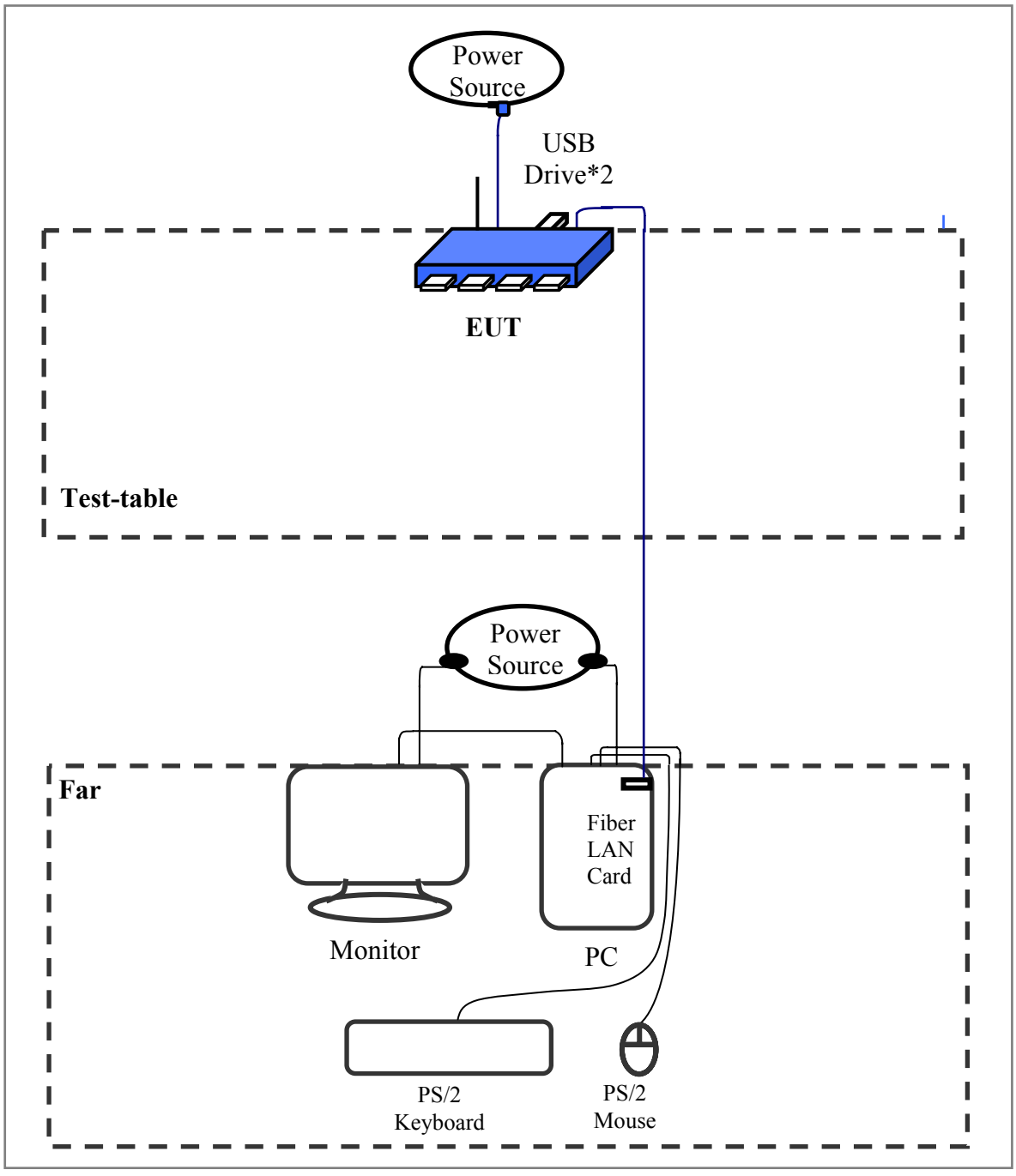
LAN Card	**:**	**D-Link**
Model No.	:	DFE-530TX
Serial No.	:	0050BAE32FF3, 0050BAE3158B
FCC ID	:	N/A, DoC Approved
Power type	:	Powered by PC

USB 2.0

Flash Disk	**:**	**Transcend Information, Inc.**
Model No.	:	TS128MJF2A
Serial No.	:	85047; 85133
BSMI	:	D33193
Power type	:	By EUT

1.5 Configuration of System Under Test

1.5.1 Conducted and Radiated



The tests below are carried with the EUT transmitter set at high power in TDD mode. The EUT is forced to select of output power level and channel number by notebook computer.

The setting up procedure was recorded in 1.3 test method.

Connections of equipment

PC:

* VGA Port …..... a monitor

* PS/2-key Port ……. a PS/2 keyboard

* PS/2-mouse Port …… a PS/2 mouse

* Fiber Port ……... **EUT**

1.6 Verify the Frequency and Channel

Channel	Frequency (GHz)
1	2.412
2	2.417
3	2.422
4	2.427
5	2.432
6	2.437
7	2.442
8	2.447
9	2.452
10	2.457
11	2.462

Note:

1. This is for confirming that all frequencies are in 2.412GHz to 2.462GHz.
2. Section 15.31(m): Measurements on intentional radiators or receivers shall be performed at three frequencies for operating frequency range over 10 MHz.
   (The locations of these frequencies one near the top, one near the middle and one near the bottom.)
3. After test, the EUT operating frequencies are in 2.412GHz to 2.462GHz.(IEEE 802.11b/g)
   So all the items as followed in testing report are need to test these three frequencies:
   Lowest: Channel – 1; Middle: Channel – 6; Highest: Channel – 11.

1.7 Test Procedure

All measurements contained in this report were performed mainly according to the techniques described in ANSI C63.4 (2003) and the pre-setup was written on 1.3 test method, the detail setup was written on each test item.

1.8 Location of the Test Site

The radiated emissions measurements required by the rules were performed on the **three-meter**, **Anechoic Chamber (FCC Registration Number: 93906)** maintained by *Training Research Co., Ltd.* 1F, No. 255 Nanyang Street, Shijr, Taipei Hsien 221, Taiwan, R.O.C. Complete description and measurement data have been placed on file with the commission. The conducted power line emissions tests and other test items were performed in a anechoic chamber also located at Training Research Co., Ltd.

No. 255 Nanyang Street, Shijr, Taipei Hsien 221, Taiwan, R.O.C. *Training Research Co., Ltd.* is listed by the FCC as a facility available to do measurement work for others on a contract basis.

1.9 General Test Condition

The conditions under which the EUT operates were varied to determine their effect on the equipment's emission characteristics. The final configuration of the test system and the mode of operation used during these tests were chosen as that which produced the highest emission levels. However, only those conditions, which the EUT was considered likely to encounter in normal use were investigated.

In test, they were set in high power and continuously transmitting mode that controlled by computer. The lowest channel, middle channel and highest channel of EUT were all tested. The setting up procedure is recorded on 1.3 test method.

II. Section 15.203: Antenna requirement

The EUT can be equipped with detachable antenna. The external antenna is affixed to the EUT using a unique connector, which allows for replacement of a broken antenna, but does not use a standard antenna jack or electrical connector. The antenna requirement stated in Section15.203 is inapplicable to this EUT.

The custom antenna specification of list as below:

Manufacturer	:	SmartAnt Telecom Co., Ltd.
Part No	:	SAA05-220420
Connector	:	RP SMA Plug
Antenna Gain	:	2.0dBi (MAX.)

III. Section 15.207: Power Line Conducted Emissions for AC Powered Units

3.1 Test Condition & Setup

The power line conducted emission measurements were performed in an anechoic chamber. The EUT was assembled on a wooden table, which is 80 centimeters high, was placed 40 centimeters from the backwall and at least 1 meter from the sidewall.

Power was fed to the EUT from the public utility power grid through a line filter and Line Impedance Stabilization Networks (LISNs). The LISN housing, measuring instrumentation case, ground plane, etc., were electrically bonded together at the same RF potential. The Spectrum analyzer (or EMI receiver) was connected to the AC line through an isolation transformer. The 50-ohm output of the LISN was connected to the spectrum analyzer directly. Conducted emission levels were in the CISPR quasi-peak and average detection mode. The analyzer's 6 dB bandwidth was set to 9KHz. No post-detector video filter was used.

The spectrum was scanned from 150KHz to 30MHz. The physical arrangement of the test system and associated cabling was varied (within the scope of arrangements likely to be encountered in actual use) to determine the effect on the unit's emanations in amplitude and frequency. All spurious emission frequencies were observed. The highest emission amplitudes relative to the appropriate limit were measured and have been recorded in paragraph 4.3.

There is a test condition apply in this test item, the test procedure description as <1.3>. Three channels were tested, one in the lowest (CH01), one in the middle (CH06) and the other in highest (CH11) for IEEE 802.11b/g. The setting up procedure is recorded on <1.3>

3.2 List of Test Instruments

Calibration Date

Instrument Name	Model	Brand	Serial No.	Next time
EMI Receiver	8546A	HP	3520A00242	09/06/07
RF Filter Section	85460A	HP	3448A00217	09/06/07
LISN (EUT)	LISN-01	TRC	99-05	06/10/07
LISN (Support E.)	LISN-01	TRC	9912-03, 04	05/26/07
Pre-amplifier	15542 ZFL-500	Mini – Circuits	0 0117	05/20/07
6dB Attenuator	MCL BW-S6W2	Mini – Circuits	9915 – Conducted	05/20/07
10dB Attenuator	A5542 VAT010	Mini – Circuits	0215 – Conducted	05/20/07
Coaxial Cable (2.0 meter)	A30A30-0058-50FS-2M	Jyebao	SMA-08	05/20/07
Coaxial Cable (1.1 meter)	A30A30-0058-50FS-1M	Jyebao	SMA-09	05/20/07
Coaxial Cable (20 meter)	RG-214/U	Jyebao	NP-01	05/20/07
Coaxial Cable (20 meter)	RG-214/U	Jyebao	NP-02	05/20/07
Auto Switch Box (< 30MHz)	ASB-01	TRC	9904-01	05/20/07

3.3 Test Result of Power Line Conducted Emissions

The following table shows a summary of the highest emissions of power line conducted emissions on the LIVE and NETURAL conductors of the EUT power cord. Show as follows.

Test Conditions: Temperature : 25 °C Humidity : 73 % RH

Test mode: IEEE 802.11b Channel 1

Power Connected Emissions					*Class B*		
Conductor	***Frequency (KHz)***	***Peak (dBμV)***	***QP (dBμV)***	***Average (dBμV)***	***QP-limit (dBμV)***	***AVG-limit (dBμV)***	***Margin (dB)***
Line 1	195.000	50.59	---	---	64.71	54.71	-4.12
	199.000	51.75	---	---	64.60	54.60	-2.85
	657.000	42.43	---	---	56.00	46.00	-3.57
	1437.000	41.33	---	---	56.00	46.00	-4.67
	2029.000	43.70	---	---	56.00	46.00	-2.30
	2610.000	43.48	---	---	56.00	46.00	-2.52
Line 2	196.350	53.32	52.01	47.09	64.71	54.71	-7.62
	294.000	45.59	---	---	59.03	49.03	-3.44
	528.265	46.60	45.44	43.80	56.00	46.00	-2.20
	589.295	47.16	43.14	41.15	56.00	46.00	-4.85
	1176.000	40.52	---	---	56.00	46.00	-5.48
	2558.000	42.92	---	---	56.00	46.00	-3.08

NOTE:

(1)Margin = Peak Amplitude – Limit, *The reading amplitudes are all under limit.*

(2)A "+" sign in the margin column means the emission is OVER the Class B Limit, and "–" sign of means UNDER the Class B limit

Test mode: IEEE 802.11b Channel 6

Power Connected Emissions					*Class B*		
Conductor	*Frequency (KHz)*	*Peak (dBμV)*	*QP (dBμV)*	*Average (dBμV)*	*QP-limit (dBμV)*	*AVG-limit (dBμV)*	*Margin (dB)*
Line 1	197.000	51.91	---	---	64.66	54.66	-2.75
	264.000	44.00	---	---	62.74	52.74	-8.74
	657.000	42.24	---	---	56.00	46.00	-3.76
	980.000	40.71	---	---	56.00	46.00	-5.29
	1503.000	41.42	---	---	56.00	46.00	-4.58
	2351.000	43.11	---	---	56.00	46.00	-2.89
Line 2	197.135	53.32	52.44	47.49	64.66	54.66	-7.17
	394.000	45.77	---	---	59.03	49.03	-3.26
	593.395	47.18	46.07	44.83	56.00	46.00	-1.17
	980.000	40.85	---	---	56.00	46.00	-5.15
	2351.000	42.03	---	---	56.00	46.00	-3.97
	19520.000	42.88	---	---	60.00	50.00	-7.12

Test mode: IEEE 802.11b Channel 11

Power Connected Emissions					*Class B*		
Conductor	*Frequency (KHz)*	*Peak (dBμV)*	*QP (dBμV)*	*Average (dBμV)*	*QP-limit (dBμV)*	*AVG-limit (dBμV)*	*Margin (dB)*
Line 1	199.065	54.09	53.59	47.46	64.54	54.54	-7.08
	264.000	47.98	---	---	62.74	52.74	-4.76
	657.000	41.12	---	---	56.00	46.00	-4.88
	1320.000	41.21	---	---	56.00	46.00	-4.79
	1582.000	42.44	---	---	56.00	46.00	-3.56
	2179.000	43.66	---	---	56.00	46.00	-2.34
Line 2	198.640	55.40	54.58	48.03	64.60	54.60	-6.57
	267.000	47.56	---	---	62.66	52.66	-5.10
	398.000	45.46	---	---	58.91	48.91	-3.45
	463.610	47.27	46.64	45.74	57.11	47.11	-1.37
	527.595	46.64	44.29	42.64	56.00	46.00	-3.36
	660.600	48.99	43.97	41.72	56.00	46.00	-4.28

Test mode: IEEE 802.11g Channel 1

Power Connected Emissions					*Class B*		
Conductor	***Frequency (KHz)***	***Peak (dBμV)***	***QP (dBμV)***	***Average (dBμV)***	***QP-limit (dBμV)***	***AVG-limit (dBμV)***	***Margin (dB)***
Line 1	198.890	53.20	52.61	46.90	64.66	54.66	-7.76
	657.000	40.75	---	---	56.00	46.00	-5.25
	1713.000	43.43	---	---	56.00	46.00	-2.57
	1994.000	43.03	---	---	56.00	46.00	-2.97
	2308.000	43.31	---	---	56.00	46.00	-2.69
	3349.000	39.80	---	---	56.00	46.00	-6.20
Line 2	199.250	54.69	53.90	47.77	64.66	54.66	-6.89
	264.000	48.67	---	---	62.74	52.74	-4.07
	463.205	47.20	46.56	45.67	57.11	47.11	-1.44
	529.845	46.94	44.25	42.62	56.00	46.00	-3.38
	657.000	43.29	---	---	56.00	46.00	-2.71
	2558.000	42.77	---	---	56.00	46.00	-3.23

Test mode: IEEE 802.11g Channel 6

Power Connected Emissions					*Class B*		
Conductor	***Frequency (KHz)***	***Peak (dBμV)***	***QP (dBμV)***	***Average (dBμV)***	***QP-limit (dBμV)***	***AVG-limit (dBμV)***	***Margin (Db)***
Line 1	199.000	52.38	---	---	64.60	54.60	-2.22
	657.000	39.90	---	---	56.00	46.00	-6.10
	858.000	39.39	---	---	56.00	46.00	-6.61
	1385.000	41.72	---	---	56.00	46.00	-4.28
	1713.000	43.31	---	---	56.00	46.00	-2.69
	2310.000	44.44	43.16	39.93	56.00	46.00	-6.07
Line 2	198.730	54.44	53.89	47.93	64.60	54.60	-6.67
	394.000	46.24	---	---	59.03	49.03	-2.79
	463.250	47.22	46.55	45.68	57.11	47.11	-1.43
	528.765	47.03	44.58	42.99	56.00	46.00	-3.01
	858.000	41.46	---	---	56.00	46.00	-4.54
	1994.000	42.68	---	---	56.00	46.00	-3.32

Test mode: IEEE 802.11g Channel 11

Power Connected Emissions					*FCC Class B*		
Conductor	***Frequency (KHz)***	***Peak (dBμV)***	***QP (dBμV)***	***Average (dBμV)***	***QP-limit (dBμV)***	***AVG-limit (dBμV)***	***Margin (dB)***
Line 1	197.875	53.15	52.26	46.64	64.60	54.60	-7.96
	657.000	40.10	---	---	56.00	46.00	-5.90
	850.000	39.94	---	---	56.00	46.00	-6.06
	1385.000	41.86	---	---	56.00	46.00	-4.14
	2243.000	42.91	---	---	56.00	46.00	-3.09
	6520.000	43.15	---	---	60.00	50.00	-6.85
Line 2	191.935	62.50	42.00	35.18	64.60	54.60	-19.42
	394.000	44.62	---	---	59.03	49.03	-4.41
	463.070	47.15	46.46	45.57	57.11	47.11	-1.54
	527.640	46.85	44.34	42.80	56.00	46.00	-3.20
	657.000	43.68	---	---	56.00	46.00	-2.32
	1994.000	42.47	---	---	56.00	46.00	-3.53

VI. Section 15.247 (a): Technical description of the EUT

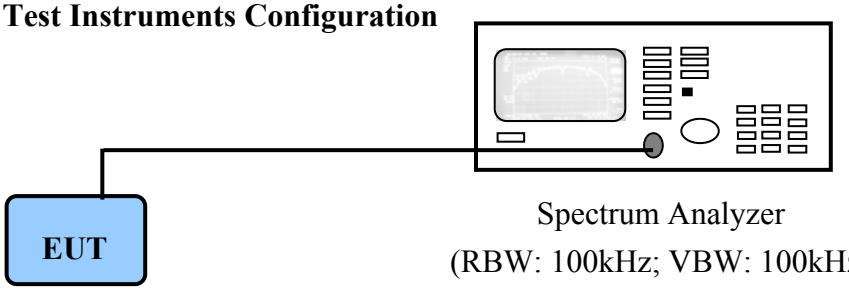
Direct Sequence System is a spread spectrum system in which the carrier has been modulated by a high speed spreading code and an information data stream. The high speed code sequence dominates the "modulating function" and is the direct cause of the wide spreading of the transmitted signal. In the operational description demonstrates the operation principles of the Baseband processor employed by the EUT, shows that which is a complete DSSS baseband processor and meets the definition of the direct sequence spread spectrum system.

V. Section 15.247(a)(2): Bandwidth for Direct Sequence System

5.1 Test Condition & Setup

The transmitter bandwidth measurements were performed by the contact manner. The EUT was set to transmit continuously, also various channels were investigated to find the maximum occupied bandwidth. The output of the EUT was connected to the spectrum analyzer. The bandwidth of the fundamental frequency is observed by the spectrum analyzer with 100kHz RBW and 100kHz VBW.

5.2 Test Instruments Configuration



PC to control the EUT at maximal power output and channel number and set antenna kit

5.3 List of Test Instruments

Instrument Name	Model No.	Brand	Serial No.	Next time
Spectrum Analyzer	MS2665C	ANRITSU	6200175476	12/11/07

5.4 Test Result of Bandwidth

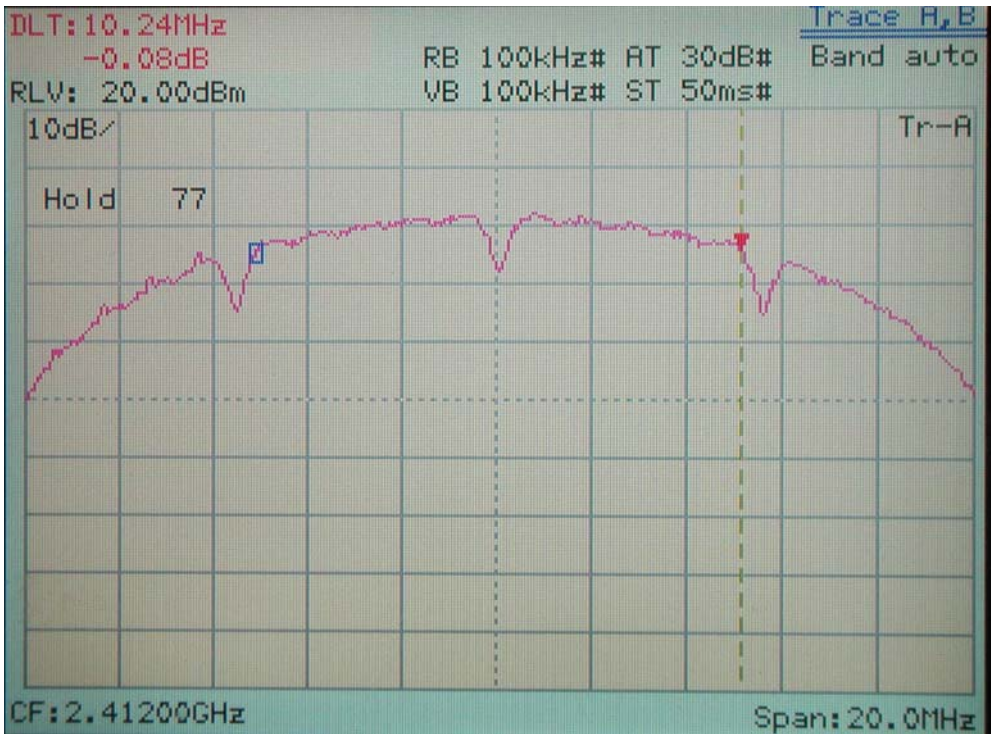
Channel	802.11b	802.11g
01	11.72 MHz	16.80 MHz
06	11.76 MHz	16.80 MHz
11	11.72 MHz	16.80 MHz

Note: 1. The data in the above table are summarizing the following attachment spectrum analyzer hard copy. According to the guidance, we'd made the measurement with the spectrum analyzer's resolution bandwidth *(RBW)=100kHz* and set the *span>>RBW*. The results show the measured 6dB bandwidth comply with the minimum 500kHz requirement.

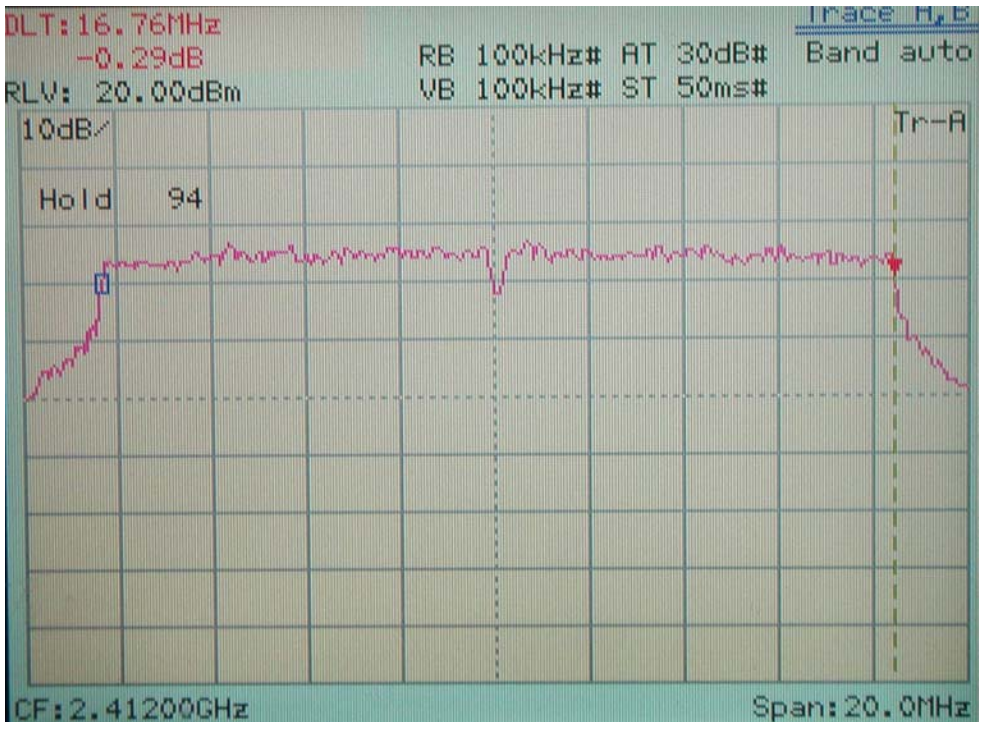
2. The attachments show these on the following pages.

6dB Bandwidth of Channel 1 (The minimum 6dB BW at least 500kHz)

IEEE 802.11b



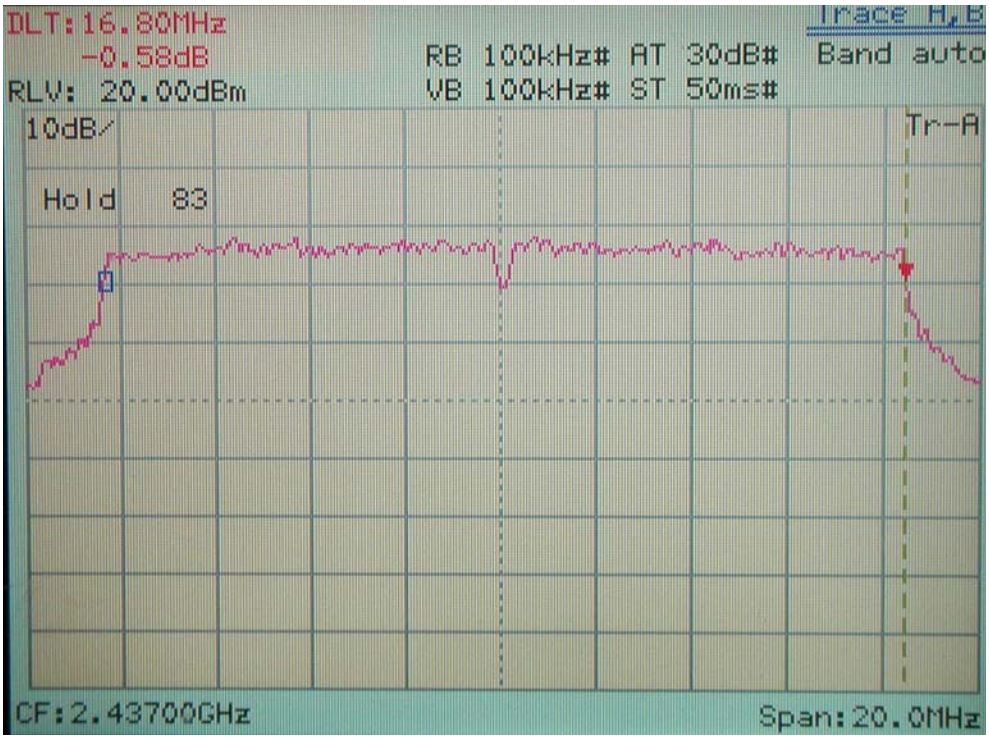
IEEE 802.11g



6dB Bandwidth of Channel 6 (The minimum 6dB BW at least 500kHz)

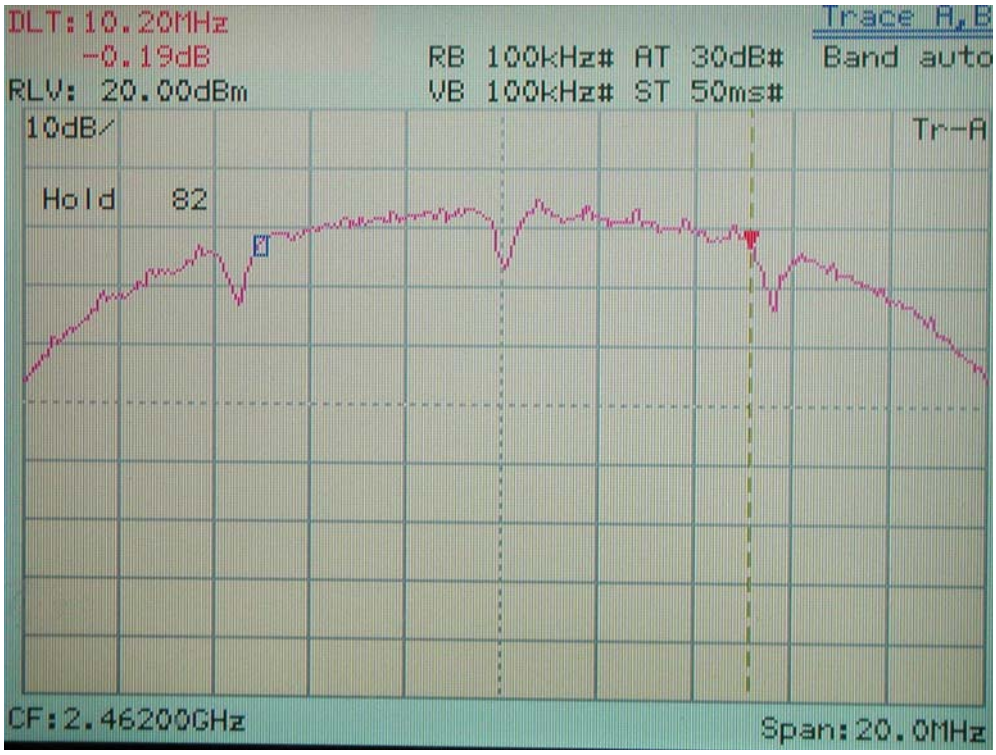
IEEE 802.11b

IEEE 802.11g

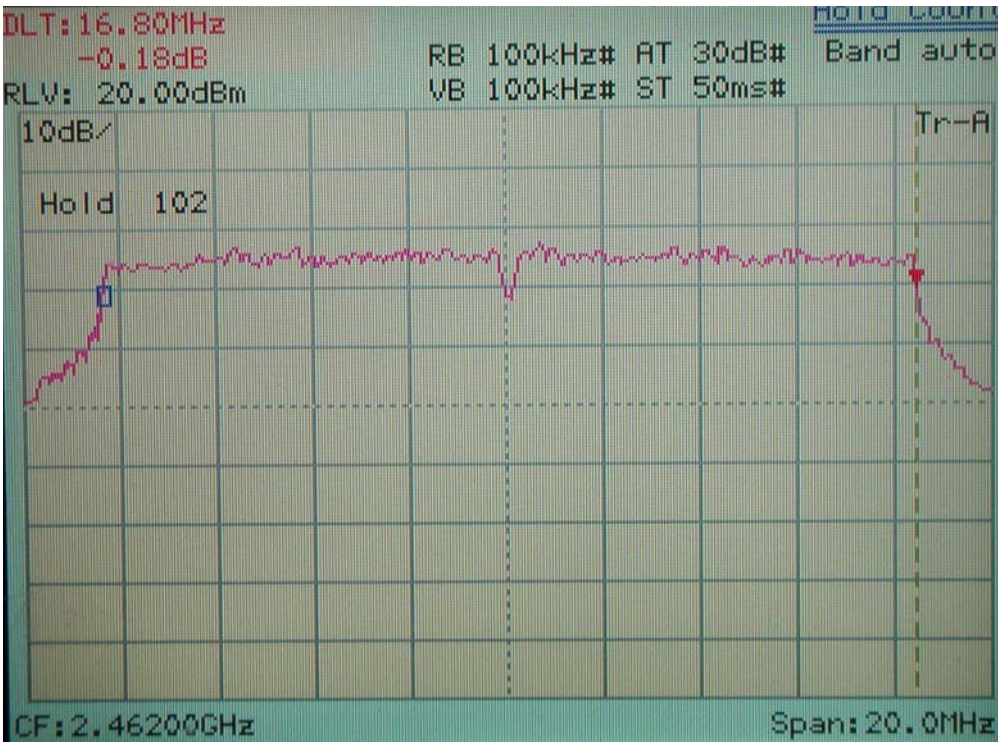


6dB Bandwidth of Channel 11 (The minimum 6dB BW at least 500kHz)

IEEE 802.11b

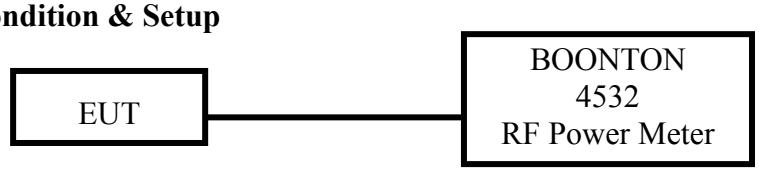


IEEE 802.11g



VI. Section 15.247(b): Power Output

6.1 Test Condition & Setup



1. The output of the transmitter is connected to the BOONTON RF Power Meter.
2. The calibration is performed before every test. The values of the output power of the EUT will shown in the dBm directly are the transmitter output peak power. Recording as follows.

6.2 List of Test Instruments

Instrument Name	Model	Brand	Serial No.	Next time
RF Power Meter	4532	BOONTON	117501	05/18/07
Peak Power Sensor	57340	BOONTON	2696	05/18/07

6.3 Test Result

Formula:
RF Output of EUT + |Cable Loss| = Output Peak Power

Channel	RF Output	Cable Loss	Output Peak Power	
	dBm	dBm	dBm	mW
802.11b CH01	14.37	1.70	16.07	40.46
802.11b CH06	15.43	1.70	17.13	51.64
802.11b CH11	15.91	1.70	17.61	57.68
802.11g CH01	16.42	1.70	18.12	64.86
802.11g CH06	16.88	1.70	18.58	72.11
802.11g CH11	17.09	1.70	18.79	75.68

VII. Section 15.247 (C): Spurious Emissions (Radiated)

7.1 Test Condition & Setup

We'd performed the test by the *radiated emission* skill: The EUT was placed in an anechoic chamber, and set the EUT transmitting continuously and scanned at 3-meter distance to determine its emission characteristics. The physical arrangement of the EUT was varied (within the scope of arrangements likely to be encountered in actual use) to determine the effect on the unit's emanations in amplitude, directivity, and frequency. The exact system configuration, which produced the highest emissions was noted so it could be reproduced later during the final tests. For the measurement above 1GHz, according to the guidance we'd set the spectrum analyzer's 6dB bandwidth RBW to 1MHz.

This was done to ensure that the final measurements would demonstrate the worst-case interference potential of the EUT.

Final radiation measurements were made on a three-meter, anechoic chamber. The EUT system was placed on a nonconductive turntable, which is 0.8 meters height, top surface 1.0 x 1.5 meter.

The spectrum was examined from 30 MHz to 1000 MHz using an Hewlett Packard 85460A EMI Receiver, SCHWARZECK whole range Small Biconical Antenna (Model No.: UBAA9114 & BBVU9135) is used to measure frequency from 30 MHz to 1GHz. The final test is used the HP 85460A spectrum and 8564E spectrum was examined from 1GHz to 25GHz using an Hewlett Packard Spectrum Analyzer, EMCO/HP Horn Antenna (Model 3115 / 84125-80008) for 1G - 25GHz.

At each frequency, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters to find the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarization.

Appropriate preamplifiers were used for improving sensitivity and precautions were taken to avoid overloading or desensitizing the spectrum analyzer. There are two spectrum analyzers use on this testing, HP 85460A for frequency 30MHz to 1000MHz, and 8564E for frequency 1GHz to 25GHz. No post-detector video filters were used in the test. The spectrum analyzer's 6dB bandwidth was set to 120KHz (spectrum was examined from 30 MHz to 1000 MHz), the spectrum analyzer's 6 dB bandwidth was set to 1 MHz (spectrum was examined from 1GHz to 25GHz) and the analyzer was operated in the maximum hold mode. There is a test condition applies in this test item, the test procedure description as the following:

Three channels were tested, one in the lowest (CH01), one in the middle (CH06) and the other in highest (CH11) for IEEE 802.11b/g. The setting up procedure is recorded on <1.3>

With the transmitter operating from a AC source and using the internal of EUT, radiates spurious emissions falling within the restricted bands of 15.209 were measured at operating frequencies corresponding to upper, middle and bottom channels in the 2400 ~ 2483.5 MHz band.

The actual field intensity in decibels referenced to 1 microvolt per meter (dBμV/m) is determined by algebraically adding the measured reading in dBμV, the antenna factor (dB), and cable loss (dB) at the appropriate frequency. Since the EUT was set to transmit continuously, no *duty cycle* is present.

For frequency between 30MHz to 1000MHz

FIa (dBuV/m) = FIr (dBμV) + Correction Factors

FIa : Actual Field Intensity

FIr : Reading of the Field Intensity

Correction Factors = Antenna Factor + (Cable Loss – Amplitude Gain) + Switching Box Loss

For frequency between 1GHz to 25GHz

FIa (dBμV/m) = FIr (dBμV) + Correction Factor

FIa : Actual Field Intensity

FIr : Reading of the Field Intensity

Correction Factors = Antenna Factor + (Cable Loss – Amplitude Gain) + Switching Box Loss

7.2 List of Test Instruments

Calibration Date

Instrument Name	Model	Brand	Serial No.	Next time
EMI Receiver	8546A	HP	3520A00242	09/06/07
RF Filter Section	85460A	HP	3448A00217	09/06/07
Small Biconical Antenna	UBAA9114 & BBVU9135	SCHWARZECK	127	12/07/07
Pre-amplifier	PA1F	TRC	1FAC	05/20/07
Auto Switch Box (>30MHz)	ASB-01	TRC	9904-01	05/20/07
Coaxial Cable (Double shielded, 15 meter)	A30A30-0058-50FS-15M	JYEBAO	SMA-01	05/20/07
Coaxial Cable (1.1 meter)	A30A30-0058-50FS-1M	JYEBAO	SMA-02	05/20/07
Spectrum Analyzer	8564E	HP	3720A00840	12/11/07
Microwave Preamplifier	84125C	HP	US36433002	11/18/07
Horn Antenna	3115	EMCO	9104-3668	02/05/08
Horn Antenna	1196E (3115)	HP (EMCO)	9704-5178	02/12/08
Standard Guide Horn Antenna	84125-80008	HP	18-26.5GHz	12/12/07
Standard Guide Horn Antenna	84125-80001	HP	26.5-40GHz	12/12/07
Pre-amplifier	PA2F	TRC	2F1GZ	06/20/07
Coaxial Cable (3 miter)	A30A30-0058-50FST118	JYEBAO	MSA-05	06/20/07
Coaxial Cable (1 meter)	A30A30-0058-50FST118	JYEBAO	MSA-04	06/20/07

7.3 Test Result of Spurious Radiated Emissions

The highest peak values of radiated emissions form the EUT at various antenna heights, antenna polarizations, EUT orientation, etc. are recorded on the following.

Test Conditions: Temperature : 25 ° C Humidity : 73 % RH

Test mode: IEEE 802.11b CH01 for 30MHz to 1GHz [Horizontal]

Radiated Emission				*Correction Factors*	*Corrected Amplitude*	*Class B (3 m)*	
Frequency (MHz)	*Amplitude (dBμV)*	*Ant. H. (m)*	*Table ( )*	*(dB)*	*(dBμV/m)*	*Limit (dBμV/m)*	*Margin (dB)*
147.61	37.73	1.00	129	-3.45	34.28	43.50	-9.22
227.64	47.65	1.00	99	-4.09	43.56	46.00	-2.44
253.10	47.03	1.00	89	-3.75	43.28	46.00	-2.72
291.90	41.14	1.00	50	-3.70	37.44	46.00	-8.56
387.69	38.85	1.00	102	-1.57	37.28	46.00	-8.72
483.47	39.57	1.00	211	1.81	41.38	46.00	-4.62

Test mode: IEEE 802.11b CH01 for 30MHz to 1GHz [Vertical]

Radiated Emission				*Correction Factors*	*Corrected Amplitude*	*Class B (3 m)*	
Frequency (MHz)	*Amplitude (dBμV)*	*Ant. H. (m)*	*Table ( )*	*(dB)*	*(dBμV/m)*	*Limit (dBμV/m)*	*Margin (dB)*
145.19	40.45	1.00	59	-3.27	37.18	43.50	-6.32
253.10	40.74	1.00	196	-3.75	36.99	46.00	-9.01
290.69	45.93	1.00	49	-3.75	42.18	46.00	-3.82
438.61	36.01	1.00	239	0.38	36.39	46.00	-9.61
483.47	36.32	1.00	141	1.81	38.13	46.00	-7.87
865.41	21.54	1.00	128	13.60	35.14	46.00	-10.86

Note:

1. Margin = Amplitude – limit, *if margin is minus means under limit.*
2. Corrected Amplitude = Reading Amplitude + Correction Factors
3. Correction factor = Antenna factor + (Cable Loss – Amplitude gain) + Switching Box Loss

Test mode: IEEE 802.11b CH01 for 1GHz to 25GHz [Horizontal]

Frequency	*Ant. H.*	*Table*	*Amplitude*		*Correction Factor*	*Corrected Amplitude*		*Limit*		*Margin*
			Peak / Ave.			*Peak / Ave.*		*Peak / Ave.*		
MHz	*m*	*degree*	*dBμV*		*dB/m*	*dBμV/m*		*dBμV/m*		*dB*
3162.50	1.00	231	35.50	---	11.21	46.71	---	73.96	53.96	-7.25
12061.04	1.00	293	37.44	---	9.81	47.25	---	73.96	53.96	-6.71
19296.25	1.00	1	46.64	---	1.60	48.24	---	73.96	53.96	-5.72
21708.12	1.00	99	45.69	---	2.87	48.56	---	73.96	53.96	-5.40
24120.00	1.00	262	45.73	---	3.40	49.13	---	73.96	53.96	-4.83

Test mode: IEEE 802.11b CH01 for 1GHz to 25GHz [Vertical]

Frequency	*Ant. H.*	*Table*	*Amplitude*		*Correction Factor*	*Corrected Amplitude*		*Limit*		*Margin*
			Peak / Ave.			*Peak / Ave.*		*Peak / Ave.*		
MHz	*m*	*degree*	*dBμV*		*dB/m*	*dBμV/m*		*dBμV/m*		*dB*
2291.67	1.00	39	39.00	---	8.91	47.91	---	73.96	53.96	-6.05
12061.04	1.00	287	38.10	---	9.81	47.91	---	73.96	53.96	-6.05
19296.25	1.00	18	47.07	---	1.60	48.67	---	73.96	53.96	-5.29
21708.12	1.00	121	45.66	---	2.87	48.53	---	73.96	53.96	-5.43
24120.00	1.00	268	45.64	---	3.40	49.04	---	73.96	53.96	-4.92

Note:

1. Margin = Corrected - Limit.
2. The EUT utilizes a *permanently attached antenna*. In addition the spurious RF radiated emissions levels do comply with the *20dBc limit* both at its bandedges and other spurious emissions.
3. As stated in Section 15.35(b), for any frequencies above 1000MHz, radiated limits shown are based upon the use of measurement instrumentation employing an average detector function. As the results of our test, the peak amplitudes are already below the FCC limit. Thus the average amplitudes of the rest are omitted.

Test mode: IEEE 802.11b CH06 for 30MHz to 1GHz [Horizontal]

Radiated Emission				Correction Factors	Corrected Amplitude	Class B (3 m)	
Frequency (MHz)	Amplitude (dBμV)	Ant. H. (m)	Table ( )	(dB)	(dBμV/m)	Limit (dBμV/m)	Margin (dB)
145.19	38.46	1.00	142	-3.27	35.19	43.50	-8.31
227.64	45.19	1.00	92	-4.09	41.10	46.00	-4.90
253.10	45.83	1.00	102	-3.75	42.08	46.00	-3.92
290.69	40.37	1.00	251	-3.75	36.62	46.00	-9.38
387.69	38.83	1.00	96	-1.57	37.26	46.00	-8.74
483.47	41.64	1.00	106	1.81	43.45	46.00	-2.55

Test mode: IEEE 802.11b CH06 for 30MHz to 1GHz [Vertical]

Radiated Emission				Correction Factors	Corrected Amplitude	Class B (3 m)	
Frequency (MHz)	Amplitude (dBμV)	Ant. H. (m)	Table ( )	(dB)	(dBμV/m)	Limit (dBμV/m)	Margin (dB)
111.24	38.74	1.00	211	-1.91	36.83	43.50	-6.67
146.40	40.77	1.00	63	-3.36	37.41	43.50	-6.09
251.89	40.33	1.00	132	-3.66	36.67	46.00	-9.33
290.69	45.88	1.00	53	-3.75	42.13	46.00	-3.87
483.47	36.61	1.00	145	1.81	38.42	46.00	-7.58
768.41	24.43	1.00	175	10.85	35.28	46.00	-10.72

Test mode: IEEE 802.11b CH06 for 1GHz to 25GHz [Horizontal]

Frequency	*Ant. H.*	*Table*	*Amplitude*		*Correction Factor*	*Corrected Amplitude*		*Limit*		*Margin*
			Peak / Ave.			*Peak / Ave.*		*Peak / Ave.*		
MHz	*m*	*degree*	*dBμV*		*dB/m*	*dBμV/m*		*dBμV/m*		*dB*
2235.42	1.00	285	35.33	---	8.75	44.08	---	73.96	53.96	-9.88
12187.92	1.00	91	39.44	---	9.74	49.18	---	73.96	53.96	-4.78
19498.12	1.00	105	46.93	---	1.70	48.63	---	73.96	53.96	-5.33
21934.79	1.00	181	47.11	---	3.09	50.20	---	73.96	53.96	-3.76
24371.46	1.00	168	46.19	---	3.26	49.45	---	73.96	53.96	-4.51

Test mode: IEEE 802.11b CH06 for 1GHz to 25GHz, Antenna#1 [Vertical]

Frequency	*Ant. H.*	*Table*	*Amplitude*		*Correction Factor*	*Corrected Amplitude*		*Limit*		*Margin*
			Peak / Ave.			*Peak / Ave.*		*Peak / Ave.*		
MHz	*m*	*degree*	*dBμV*		*dB/m*	*dBμV/m*		*dBμV/m*		*dB*
2312.50	1.00	36	39.34	---	8.96	48.30	---	73.96	53.96	-5.66
12187.92	1.00	40	40.60	---	9.74	50.34	---	73.96	53.96	-3.62
19498.12	1.00	115	47.12	---	1.70	48.82	---	73.96	53.96	-5.14
21934.79	1.00	177	47.03	---	3.09	50.12	---	73.96	53.96	-3.84
24371.46	1.00	159	46.06	---	3.26	49.32	---	73.96	53.96	-4.64

Test mode: IEEE 802.11b CH11 for 30MHz to 1GHz [Horizontal]

Radiated Emission				Correction Factors	Corrected Amplitude	Class B (3 m)	
Frequency (MHz)	Amplitude (dBμV)	Ant. H. (m)	Table ( )	(dB)	(dBμV/m)	Limit (dBμV/m)	Margin (dB)
193.69	38.64	1.00	123	-3.61	35.03	43.50	-8.47
227.64	45.24	1.00	93	-4.09	41.15	46.00	-4.85
253.10	48.51	1.00	93	-3.75	44.76	46.00	-1.24
386.47	38.97	1.00	107	-1.61	37.36	46.00	-8.64
483.47	40.50	1.00	207	1.81	42.31	46.00	-3.69
865.41	24.22	1.00	96	13.60	37.82	46.00	-8.18

Test mode: IEEE 802.11b CH11 for 30MHz to 1GHz [Vertical]

Radiated Emission				Correction Factors	Corrected Amplitude	Class B (3 m)	
Frequency (MHz)	Amplitude (dBμV)	Ant. H. (m)	Table ( )	(dB)	(dBμV/m)	Limit (dBμV/m)	Margin (dB)
108.81	40.37	1.00	201	-1.75	38.62	43.50	-4.88
145.19	39.57	1.00	43	-3.27	36.30	43.50	-7.20
254.31	44.52	1.00	192	-3.84	40.68	46.00	-5.32
291.90	45.70	1.00	53	-3.70	42.00	46.00	-4.00
483.47	36.46	1.00	185	1.81	38.27	46.00	-7.73
768.41	24.26	1.00	171	10.85	35.11	46.00	-10.89

Test mode: IEEE 802.11b CH11 for 1GHz to 25GHz [Horizontal]

Frequency	*Ant. H.*	*Table*	*Amplitude Peak / Ave.*		*Correction Factor*	*Corrected Amplitude Peak / Ave.*		*Limit Peak / Ave.*		*Margin*
MHz	*m*	*degree*	*dBμV*		*dB/m*	*dBμV/m*		*dBμV/m*		*dB*
2683.33	1.00	341	34.84	---	9.83	44.67	---	73.96	53.96	-9.29
12308.75	1.00	0	38.27	---	9.56	47.83	---	73.96	53.96	-6.13
19696.46	1.00	317	46.51	---	1.81	48.32	---	73.96	53.96	-5.64
22157.92	1.00	208	45.74	---	3.25	48.99	---	73.96	53.96	-4.97
24619.37	1.00	201	45.89	---	3.01	48.90	---	73.96	53.96	-5.06

Test mode: IEEE 802.11b CH11 for 1GHz to 25GHz [Vertical]

Frequency	*Ant. H.*	*Table*	*Amplitude Peak / Ave.*		*Correction Factor*	*Corrected Amplitude Peak / Ave.*		*Limit Peak / Ave.*		*Margin*
MHz	*m*	*degree*	*dBμV*		*dB/m*	*dBμV/m*		*dBμV/m*		*dB*
2343.75	1.00	17	39.67	---	9.05	48.72	---	73.96	53.96	-5.24
9849.79	1.00	275	35.44	---	11.93	47.37	---	73.96	53.96	-6.59
19696.46	1.00	312	46.51	---	1.81	48.32	---	73.96	53.96	-5.64
22157.92	1.00	226	45.99	---	3.25	49.24	---	73.96	53.96	-4.72
24619.37	1.00	200	45.56	---	3.01	48.57	---	73.96	53.96	-5.39

Test mode: IEEE 802.11g CH01 for 30MHz to 1GHz [Horizontal]

Radiated Emission				Correction Factors	Corrected Amplitude	Class B (3 m)	
Frequency (MHz)	Amplitude (dBμV)	Ant. H. (m)	Table ( )	(dB)	(dBμV/m)	Limit (dBμV/m)	Margin (dB)
194.90	41.88	1.00	253	-3.58	38.30	43.50	-5.20
227.64	45.72	1.00	83	-4.09	41.63	46.00	-4.37
253.10	46.98	1.00	73	-3.75	43.23	46.00	-2.77
290.69	42.07	1.00	43	-3.75	38.32	46.00	-7.68
483.47	40.74	1.00	207	1.81	42.55	46.00	-3.45
865.41	23.18	1.00	107	13.60	36.78	46.00	-9.22

Test mode: IEEE 802.11g CH01 for 30MHz to 1GHz [Vertical]

Radiated Emission				Correction Factors	Corrected Amplitude	Class B (3 m)	
Frequency (MHz)	Amplitude (dBμV)	Ant. H. (m)	Table ( )	(dB)	(dBμV/m)	Limit (dBμV/m)	Margin (dB)
108.81	42.16	1.00	218	-1.75	40.41	43.50	-3.09
152.46	39.92	1.00	40	-3.60	36.32	43.50	-7.18
193.69	41.35	1.00	89	-3.61	37.74	43.50	-5.76
253.10	41.95	1.00	178	-3.75	38.20	46.00	-7.80
290.69	43.77	1.00	59	-3.75	40.02	46.00	-5.98
483.47	38.22	1.00	152	1.81	40.03	46.00	-5.97

Test mode: IEEE 802.11g CH01 for 1GHz to 25GHz [Horizontal]

Frequency	*Ant. H.*	*Table*	*Amplitude Peak / Ave.*		*Correction Factor*	*Corrected Amplitude Peak / Ave.*		*Limit Peak / Ave.*		*Margin*
MHz	*m*	*degree*	*dBμV*		*dB/m*	*dBμV/m*		*dBμV/m*		*dB*
2147.92	1.00	252	35.84	---	8.50	44.34	---	73.96	53.96	-9.62
12061.04	1.00	264	36.94	---	9.81	46.75	---	73.96	53.96	-7.21
19296.25	1.00	17	47.11	---	1.60	48.71	---	73.96	53.96	-5.25
21708.12	1.00	120	45.83	---	2.87	48.70	---	73.96	53.96	-5.26
24120.00	1.00	253	45.93	---	3.40	49.33	---	73.96	53.96	-4.63

Test mode: IEEE 802.11g CH01 for 1GHz to 25GHz [Vertical]

Frequency	*Ant. H.*	*Table*	*Amplitude Peak / Ave.*		*Correction Factor*	*Corrected Amplitude Peak / Ave.*		*Limit Peak / Ave.*		*Margin*
MHz	*m*	*degree*	*dBμV*		*dB/m*	*dBμV/m*		*dBμV/m*		*dB*
2531.25	1.00	57	38.50	---	9.55	48.05	---	73.96	53.96	-5.91
12061.04	1.00	175	37.77	---	9.81	47.58	---	73.96	53.96	-6.38
19296.25	1.00	14	46.60	---	1.60	48.20	---	73.96	53.96	-5.76
21708.12	1.00	118	45.48	---	2.87	48.35	---	73.96	53.96	-5.61
24120.00	1.00	251	45.50	---	3.40	48.90	---	73.96	53.96	-5.06

Test mode: IEEE 802.11g CH06 for 30MHz to 1GHz [Horizontal]

Radiated Emission				Correction Factors	Corrected Amplitude	Class B (3 m)	
Frequency (MHz)	Amplitude (dBμV)	Ant. H. (m)	Table ( )	(dB)	(dBμV/m)	Limit (dBμV/m)	Margin (dB)
148.82	38.72	1.00	112	-3.54	35.18	43.50	-8.32
193.69	40.05	1.00	92	-3.61	36.44	43.50	-7.06
227.64	47.17	1.00	102	-4.09	43.08	46.00	-2.92
251.89	45.82	1.00	83	-3.66	42.16	46.00	-3.84
290.69	44.41	1.00	53	-3.75	40.66	46.00	-5.34
505.30	35.56	1.00	129	2.57	38.13	46.00	-7.87

Test mode: IEEE 802.11g CH06 for 30MHz to 1GHz [Vertical]

Radiated Emission				Correction Factors	Corrected Amplitude	Class B (3 m)	
Frequency (MHz)	Amplitude (dBμV)	Ant. H. (m)	Table ( )	(dB)	(dBμV/m)	Limit (dBμV/m)	Margin (dB)
148.82	40.94	1.00	59	-3.54	37.40	43.50	-6.10
253.10	41.41	1.00	129	-3.75	37.66	46.00	-8.34
291.90	45.45	1.00	59	-3.70	41.75	46.00	-4.25
373.14	36.40	1.00	73	-2.01	34.39	46.00	-11.61
504.09	32.56	1.00	155	2.47	35.03	46.00	-10.97
865.41	21.78	1.00	66	13.60	35.38	46.00	-10.62

Test mode: IEEE 802.11g CH06 for 1GHz to 25GHz [Horizontal]

Frequency	*Ant. H.*	*Table*	*Amplitude Peak / Ave.*		*Correction Factor*	*Corrected Amplitude Peak / Ave.*		*Limit Peak / Ave.*		*Margin*
MHz	*m*	*degree*	*dBμV*		*dB/m*	*dBμV/m*		*dBμV/m*		*dB*
2727.08	1.00	11	35.33	---	9.92	45.25	---	73.96	53.96	-8.71
12187.92	1.00	73	39.60	---	9.74	49.34	---	73.96	53.96	-4.62
19498.12	1.00	102	46.95	---	1.70	48.65	---	73.96	53.96	-5.31
21934.79	1.00	177	46.68	---	3.09	49.77	---	73.96	53.96	-4.19
24371.46	1.00	158	46.37	---	3.26	49.63	---	73.96	53.96	-4.33

Test mode: IEEE 802.11g CH06 for 1GHz to 25GHz [Vertical]

Frequency	*Ant. H.*	*Table*	*Amplitude Peak / Ave.*		*Correction Factor*	*Corrected Amplitude Peak / Ave.*		*Limit Peak / Ave.*		*Margin*
MHz	*m*	*degree*	*dBμV*		*dB/m*	*dBμV/m*		*dBμV/m*		*dB*
2316.67	1.00	42	41.66	---	8.98	50.64	---	73.96	53.96	-3.32
12187.92	1.00	77	39.44	---	9.74	49.18	---	73.96	53.96	-4.78
19498.12	1.00	112	47.08	---	1.70	48.78	---	73.96	53.96	-5.18
21934.79	1.00	159	46.99	---	3.09	50.08	---	73.96	53.96	-3.88
24371.46	1.00	145	45.90	---	3.26	49.16	---	73.96	53.96	-4.80

Test mode: IEEE 802.11g CH11 for 30MHz to 1GHz [Horizontal]

Radiated Emission				Correction Factors	Corrected Amplitude	Class B (3 m)	
Frequency (MHz)	Amplitude (dBμV)	Ant. H. (m)	Table ( )	(dB)	(dBμV/m)	Limit (dBμV/m)	Margin (dB)
194.90	39.62	1.00	102	-3.58	36.04	43.50	-7.46
228.85	46.54	1.00	102	-4.10	42.44	46.00	-3.56
253.10	45.74	1.00	83	-3.75	41.99	46.00	-4.01
290.69	41.86	1.00	63	-3.75	38.11	46.00	-7.89
387.69	39.54	1.00	106	-1.57	37.97	46.00	-8.03
482.26	38.58	1.00	205	1.77	40.35	46.00	-5.65

Test mode: IEEE 802.11g CH11 for 30MHz to 1GHz [Vertical]

Radiated Emission				Correction Factors	Corrected Amplitude	Class B (3 m)	
Frequency (MHz)	Amplitude (dBμV)	Ant. H. (m)	Table ( )	(dB)	(dBμV/m)	Limit (dBμV/m)	Margin (dB)
108.81	39.95	1.00	0	-1.75	38.20	43.50	-5.30
146.40	40.14	1.00	343	-3.36	36.78	43.50	-6.72
251.89	41.33	1.00	193	-3.66	37.67	46.00	-8.33
290.69	44.85	1.00	43	-3.75	41.10	46.00	-4.90
504.09	32.79	1.00	160	2.47	35.26	46.00	-10.74
768.41	24.52	1.00	171	10.85	35.37	46.00	-10.63

Test mode: IEEE 802.11g CH11 for 1GHz to 25GHz [Horizontal]

Frequency	*Ant. H.*	*Table*	*Amplitude Peak / Ave.*		*Correction Factor*	*Corrected Amplitude Peak / Ave.*		*Limit Peak / Ave.*		*Margin*
MHz	*m*	*degree*	*dBμV*		*dB/m*	*dBμV/m*		*dBμV/m*		*dB*
2177.08	1.00	267	36.50	---	8.59	45.09	---	73.96	53.96	-8.87
9849.79	1.00	78	35.28	---	11.93	47.21	---	73.96	53.96	-6.75
19696.46	1.00	313	46.57	---	1.81	48.38	---	73.96	53.96	-5.58
22157.92	1.00	213	45.58	---	3.25	48.83	---	73.96	53.96	-5.13
24619.37	1.00	204	45.85	---	3.01	48.86	---	73.96	53.96	-5.10

Test mode: IEEE 802.11g CH11 for 1GHz to 25GHz [Vertical]

Frequency	*Ant. H.*	*Table*	*Amplitude Peak / Ave.*		*Correction Factor*	*Corrected Amplitude Peak / Ave.*		*Limit Peak / Ave.*		*Margin*
MHz	*m*	*degree*	*dBμV*		*dB/m*	*dBμV/m*		*dBμV/m*		*dB*
2339.58	1.00	103	38.67	---	9.04	47.71	---	73.96	53.96	-6.25
9849.79	1.00	21	35.61	---	11.93	47.54	---	73.96	53.96	-6.42
19696.46	1.00	301	46.33	---	1.81	48.14	---	73.96	53.96	-5.82
22157.92	1.00	231	45.83	---	3.25	49.08	---	73.96	53.96	-4.88
24619.37	1.00	194	45.89	---	3.01	48.90	---	73.96	53.96	-5.06

7.4 Test Result of the Bandedge

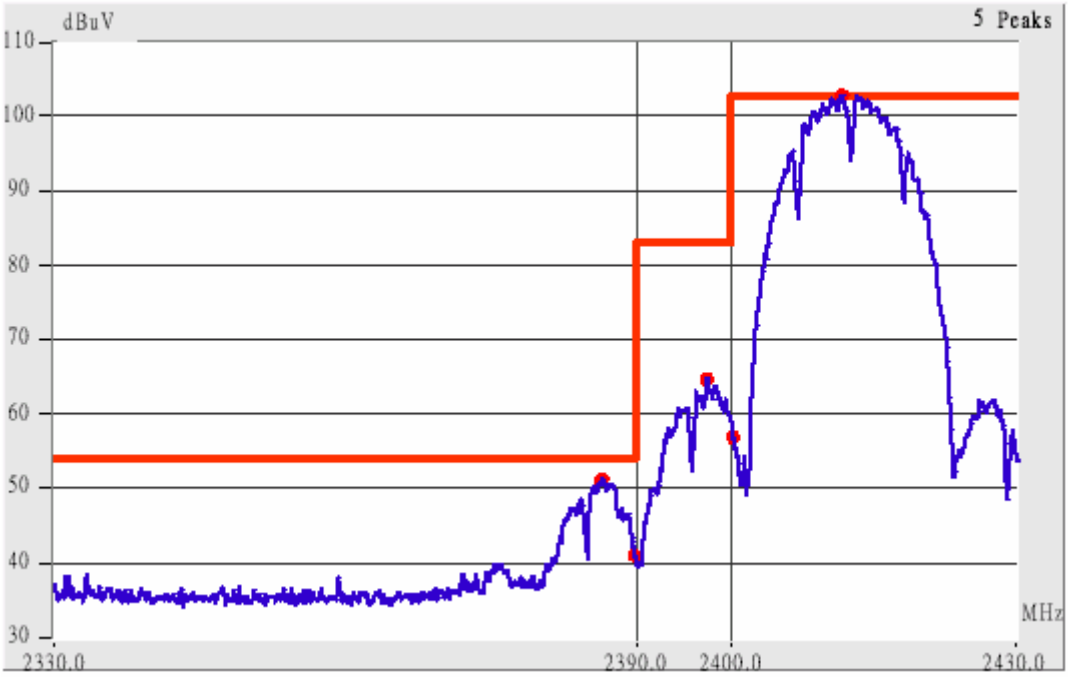
If any 100 kHz bandwidth outside these frequency bands, the radio frequency power that is produced by the modulation products of the spreading sequence, the information sequence and the carrier frequency shall be either *at least 20 dB below that in any 100 kHz bandwidth within the band that contains the highest level of the desired power or shall not exceed the general levels specified id §15.209(a)*,

We perform this section by the *radiated manner*, the RBW is set to 100kHz and VBW>RBW. We'd made the observation *up to 10th harmonics and the criterion is all the harmonic/spurious emissions must be 20dB below the highest emission level measured.* If the emissions fall in the restricted bands stated in the Part 15.205(a) must also *comply with the radiated emission limits specified in Part 15.209(a). (Peak mode: RBW=VBW=1MHz, Average mode: RBW=1MHz; VBW=10Hz)*

The following pages show our observations referring to the channel lowest and highest respectively.

Test Condition & Setup: same as < 8.1 >

IEEE 802.11b Ch01



This is the hard copy of our bandedge measurement generated by our bandedge testing program. The plot shown above is the bandedge of channel 1.

1. The lobe left by the fundamental side is already 20dB below the highest emission level.
2. The emissions recorded in the restricted band is do comply with the Part 15.209(a) – as below.

Radiated Emission					*Corrected Amplitude (dBμV/m)*		*Class B (3m)*		
Frequency (MHz)	*Ant. P.*	*Ant. H. (m)*	*Angle ( )*	*Factors (dB)*	*Peak*	*Average*	*Limit (dBμV/m) Peak*	*Ave.*	*Margin (dB)*
2386.60	Hor	1.00	85	9.17	51.84	---	73.96	53.96	-2.12
2390.02	Hor	1.00	271	9.18	45.85	---	73.96	53.96	-8.11
2385.91	Ver	1.00	43	9.17	58.17	51.84	73.96	53.96	-2.12
2390.02	Ver	1.00	38	9.18	51.52	---	73.96	53.96	-2.44

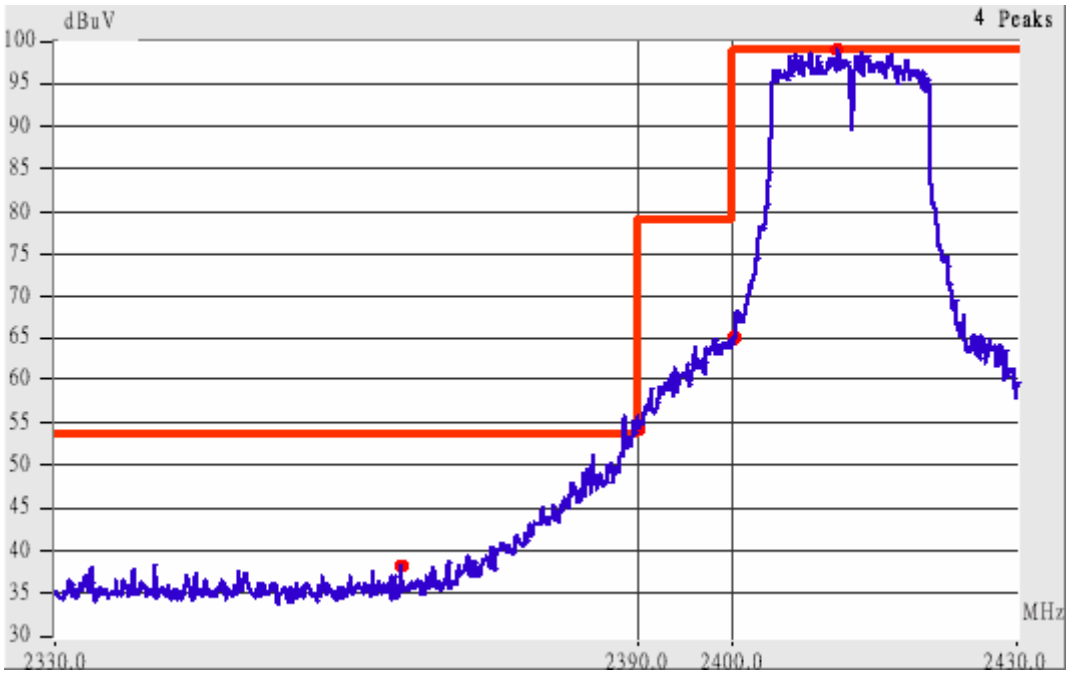
IEEE 802.11b Ch11

This is the hard copy of our bandedge measurement generated by our bandedge testing program. The plot shown above is the bandedge of channel 11.

3. The lobe right by the fundamental side is already 20dB below the highest emission level.
4. The emissions recorded in the restricted band is do comply with the Part 15.209(a) – as below

Radiated Emission					*Corrected Amplitude (dBμV/m)*		*Class B (3m)*		
Frequency (MHz)	*Ant. P.*	*Ant. H. (m)*	*Angle ( )*	*Factors (dB)*	*Peak*	*Average*	*Limit (dBμV/m) Peak*	*Ave.*	*Margin (dB)*
2483.50	Hor	1.00	169	9.44	48.44	---	73.96	53.96	-5.52
2487.82	Hor	1.00	170	9.46	51.29	---	73.96	53.96	-2.67
2500.01	Hor	1.00	338	9.49	44.99	---	73.96	53.96	-8.97
2509.22	Hor	1.00	251	9.51	45.67	---	73.96	53.96	-8.29
2483.25	Ver	1.00	128	9.44	56.61	49.61	73.96	53.96	-4.35
2487.46	Ver	1.00	131	9.45	57.96	51.28	73.96	53.96	-2.68
2500.01	Ver	1.00	131	9.49	50.49	---	73.96	53.96	-3.47
2509.87	Ver	1.00	131	9.51	50.01	---	73.96	53.96	-3.95

IEEE 802.11g Ch01

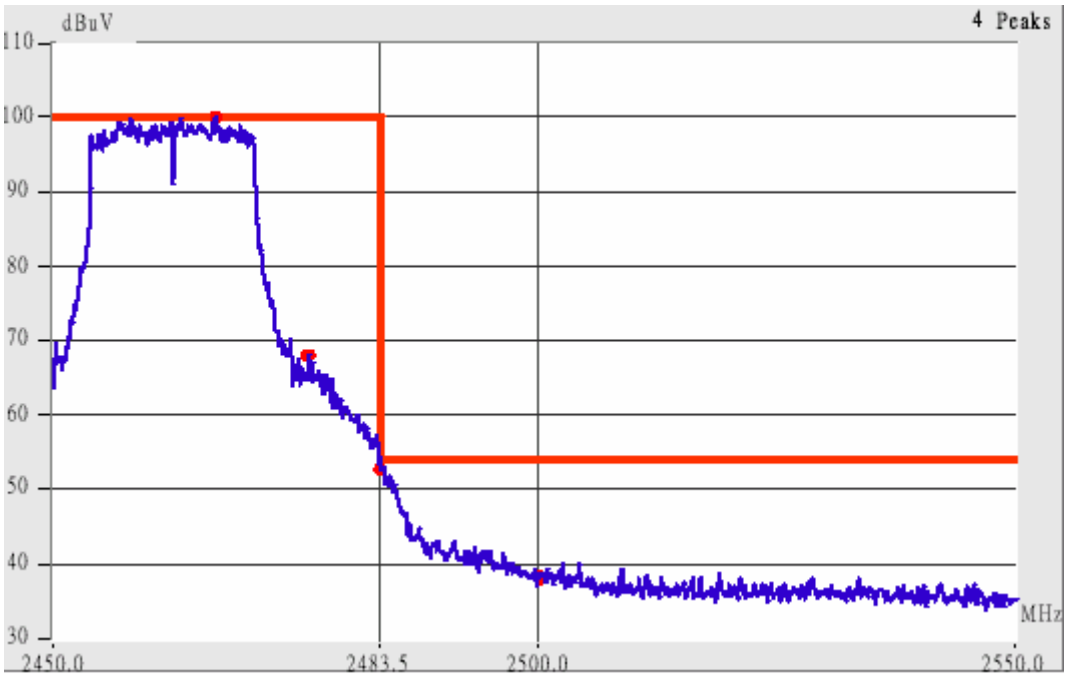


This is the hard copy of our bandedge measurement generated by our bandedge testing program. The plot shown above is the bandedge of channel 1.

5. The lobe left by the fundamental side is already 20dB below the highest emission level.
6. The emissions recorded in the restricted band is do comply with the Part 15.209(a) – as below.

Radiated Emission					*Corrected Amplitude (dBμV/m)*		*Class B (3m)*		
Frequency (MHz)	*Ant. P.*	*Ant. H. (m)*	*Angle (°)*	*Factors (dB)*	*Peak*	*Average*	*Limit (dBμV/m) Peak*	*Ave.*	*Margin (dB)*
2382.62	Hor	1.00	108	9.16	57.16	38.33	73.96	53.96	-15.63
2389.47	Hor	1.00	108	9.18	61.68	45.35	73.96	53.96	-8.61
2382.93	Ver	1.00	48	9.16	64.00	44.49	73.96	53.96	-9.47
2389.48	Ver	1.00	45	9.18	69.18	52.35	73.96	53.96	-1.61

IEEE 802.11g Ch11



This is the hard copy of our bandedge measurement generated by our bandedge testing program. The plot shown above is the bandedge of channel 11.

7. The lobe right by the fundamental side is already 20dB below the highest emission level.
8. The emissions recorded in the restricted band is do comply with the Part 15.209(a) – as below

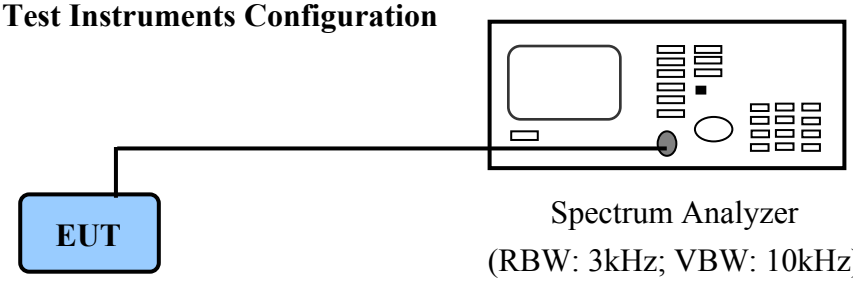
Radiated Emission					*Corrected Amplitude (dBμV/m)*		*Class B (3m)*		
Frequency (MHz)	*Ant. P.*	*Ant. H. (m)*	*Angle ( )*	*Factors (dB)*	*Peak*	*Average*	*Limit (dBμV/m) Peak*	*Ave.*	*Margin (dB)*
2482.91	Hor	1.00	220	9.44	59.28	44.27	73.96	53.96	-9.69
2488.11	Hor	1.00	221	9.46	49.96	---	73.96	53.96	-4.00
2500.01	Hor	1.00	203	9.49	44.32	---	73.96	53.96	-9.64
2517.16	Hor	1.00	120	9.52	45.02	---	73.96	53.96	-8.94
2482.93	Ver	1.00	220	9.44	65.78	52.61	73.96	53.96	-1.35
2486.85	Ver	1.00	112	9.45	58.79	42.62	73.96	53.96	-11.34
2500.01	Ver	1.00	66	9.49	48.32	---	73.96	53.96	-5.64
2510.92	Ver	1.00	113	9.51	48.34	---	73.96	53.96	-5.62

VIII. Section 15.247(d): Power Spectral Density

8.1 Test Condition & Setup

The tests below are running with the EUT transmitter set at high power in TDD mode. The EUT is needed to force selection of output power level and channel number. While testing, the EUT was set to transmit continuously and to be tested by the contact manner with the spectrum analyzer.

8.2 Test Instruments Configuration



PC to control the EUT at maximal power output and channel number and set antenna kit

8.3 List of Test Instruments

Instrument Name	Model No.	Brand	Serial No.	Next time
Spectrum Analyzer	MS2665C	ANRITSU	6200175476	12/11/07

8.4 Test Result of Power spectral density

The following table shows a summary of the test results of the Power Spectral Density.

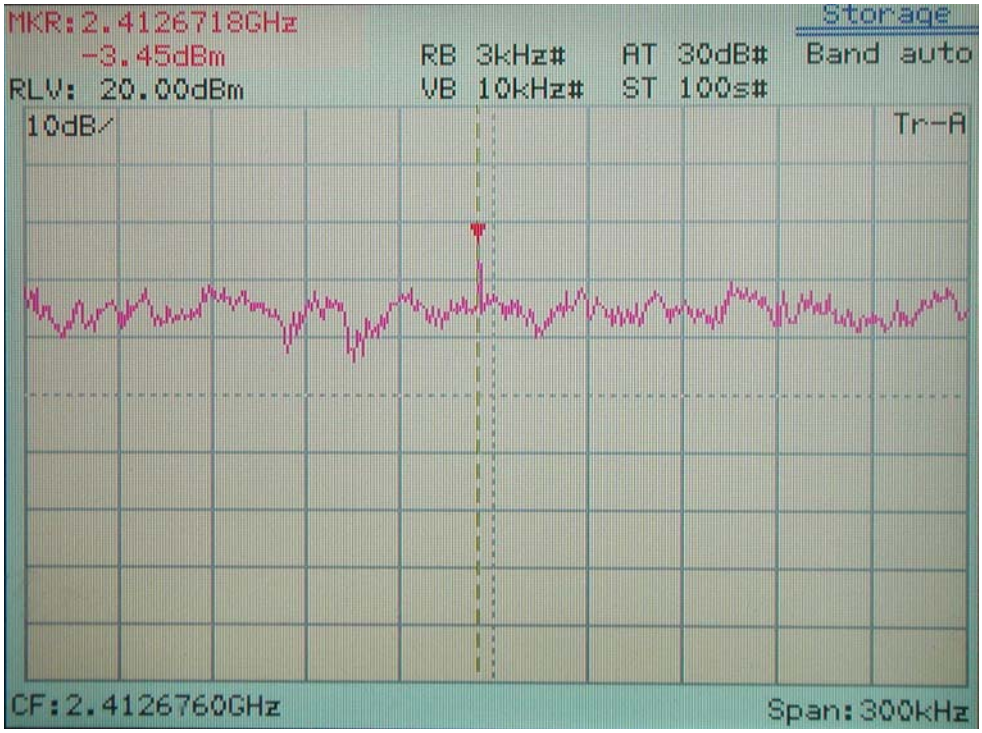
Channel	*Ppr (dBm)*	*Cable Loss (dB)*	*Ppq (dBm)*	*Limit (dB)*	*Margin (dB)*
802.11b CH01	-3.45	1.70	-1.75	8.00	-9.75
802.11b CH06	-3.67	1.70	-1.97	8.00	-9.97
802.11b CH11	-5.32	1.70	-3.62	8.00	-11.62
802.11g CH01	-15.65	1.70	-13.95	8.00	-21.95
802.11g CH06	-14.69	1.70	-12.99	8.00	-20.99
802.11g CH11	-15.76	1.70	-14.06	8.00	-22.06

Note:

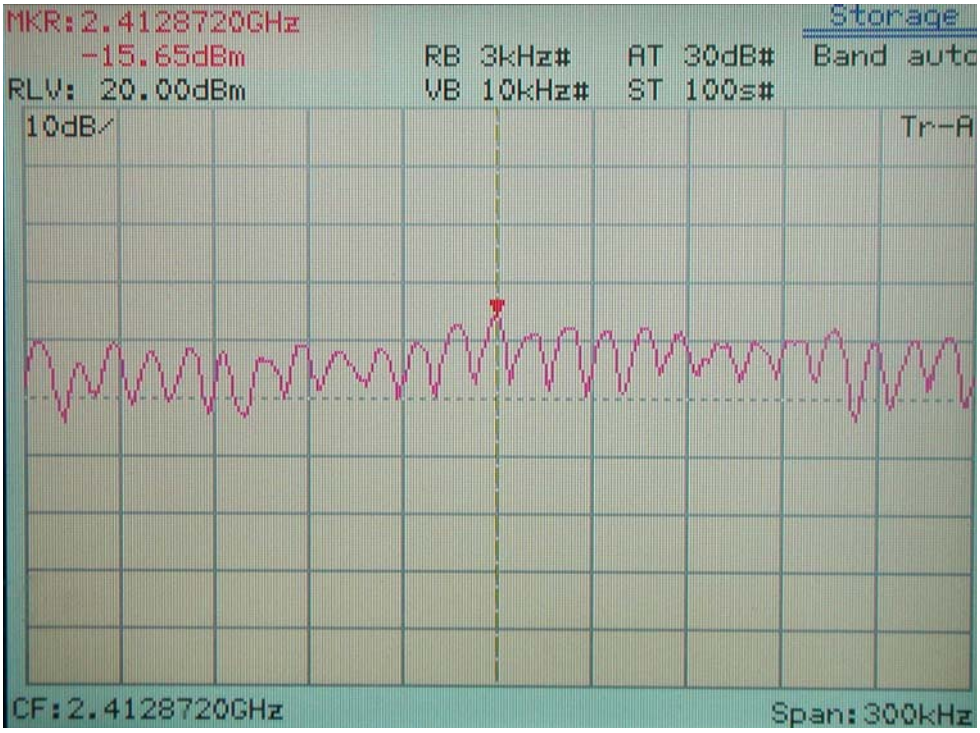
1. The following pages show the results of spectrum reading.
2. Ppr: spectrum read power density (using peak search mode),
   Ppq: actual peak power density in the spread spectrum band.
3. Ppq = Ppr + |Cable Loss|

Power Spectral Density of Channel 01

IEEE 802.11b

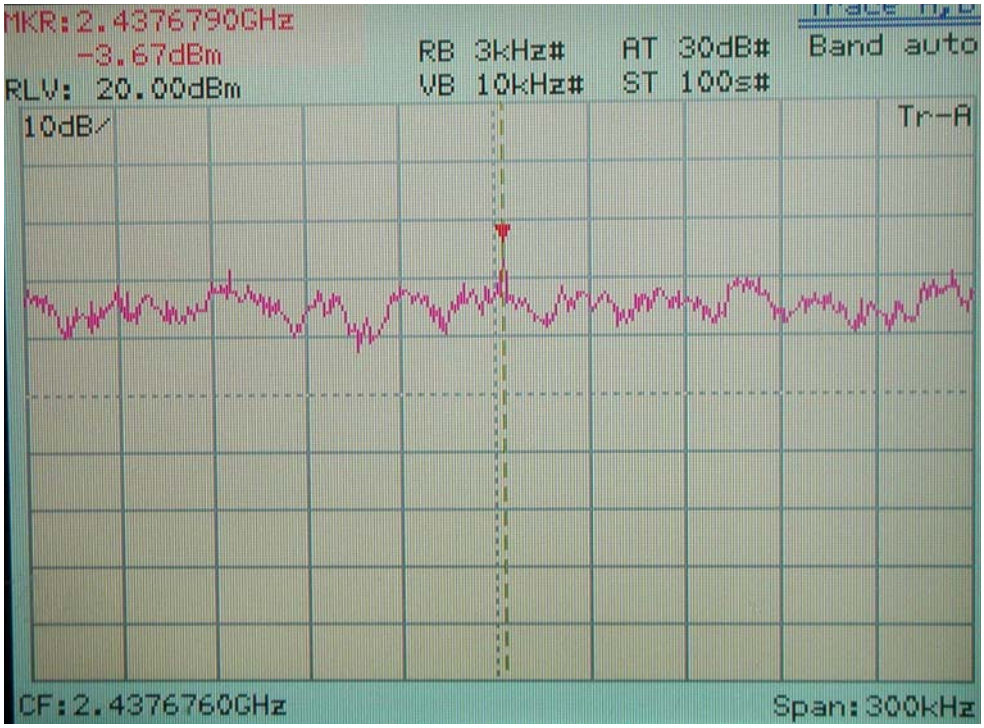


IEEE 802.11g

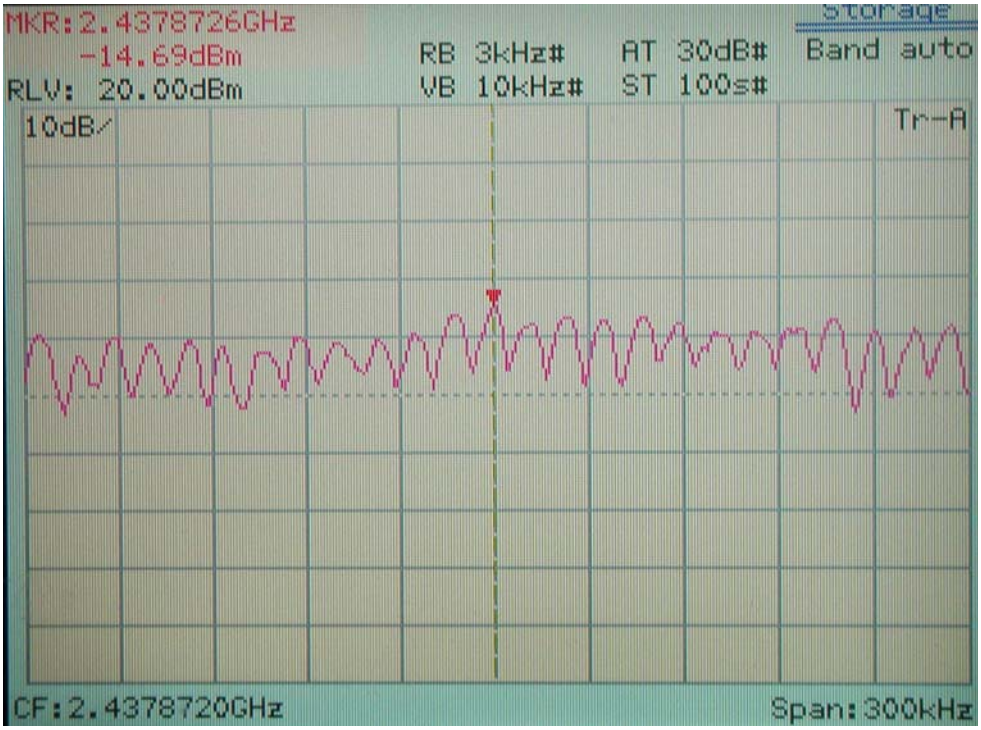


Power Spectral Density of Channel 06

IEEE 802.11b

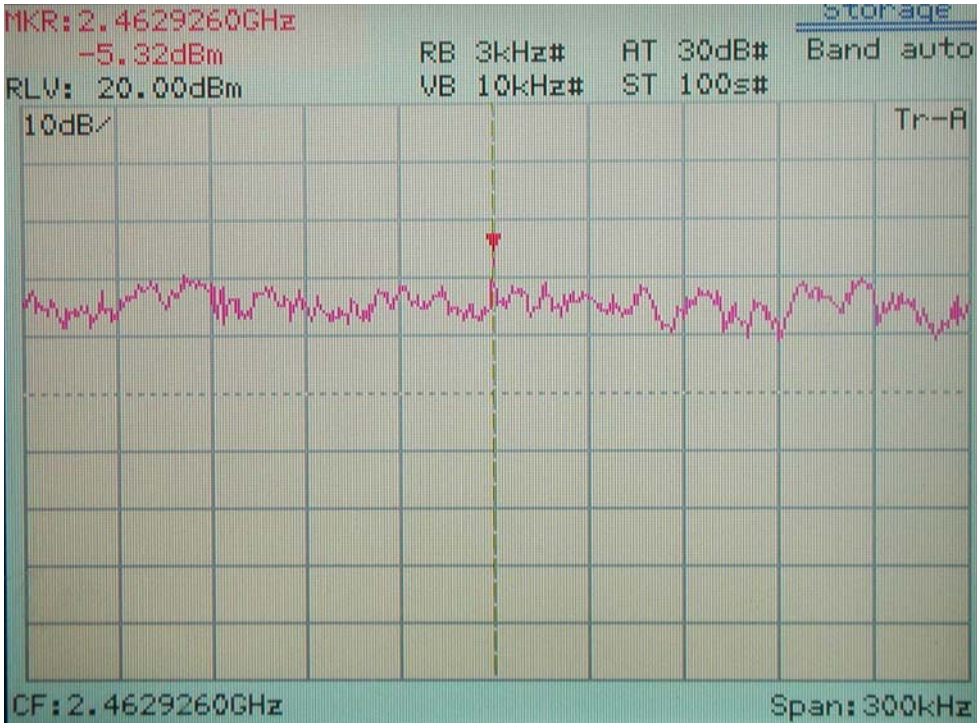


IEEE 802.11g



Power Spectral Density of Channel 11

IEEE 802.11b



IEEE 802.11g

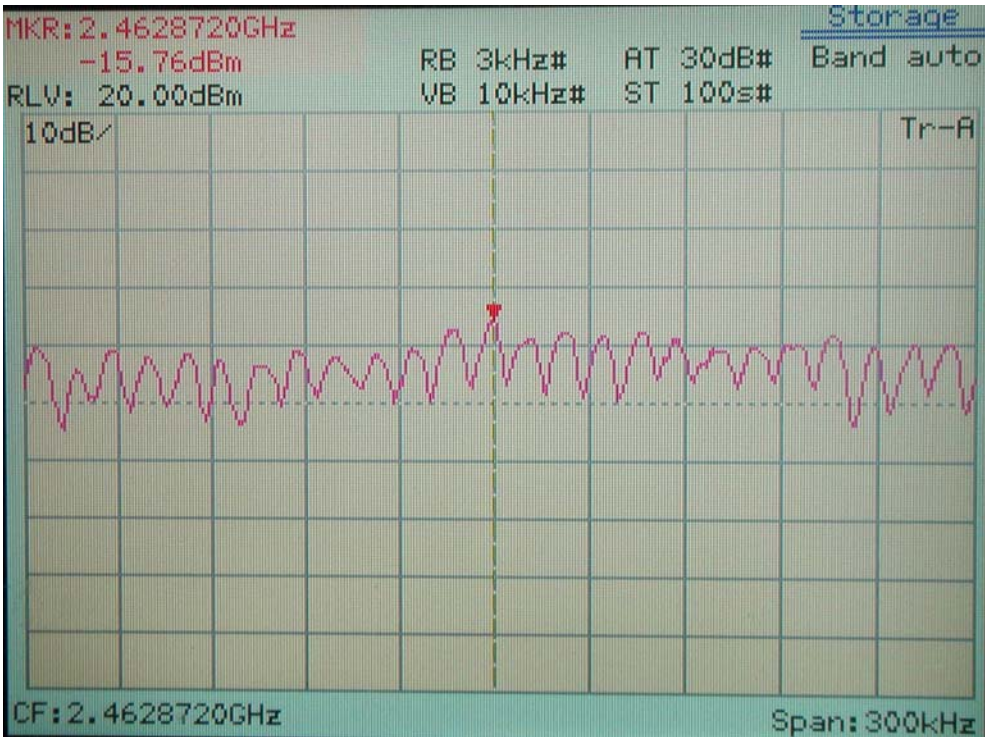
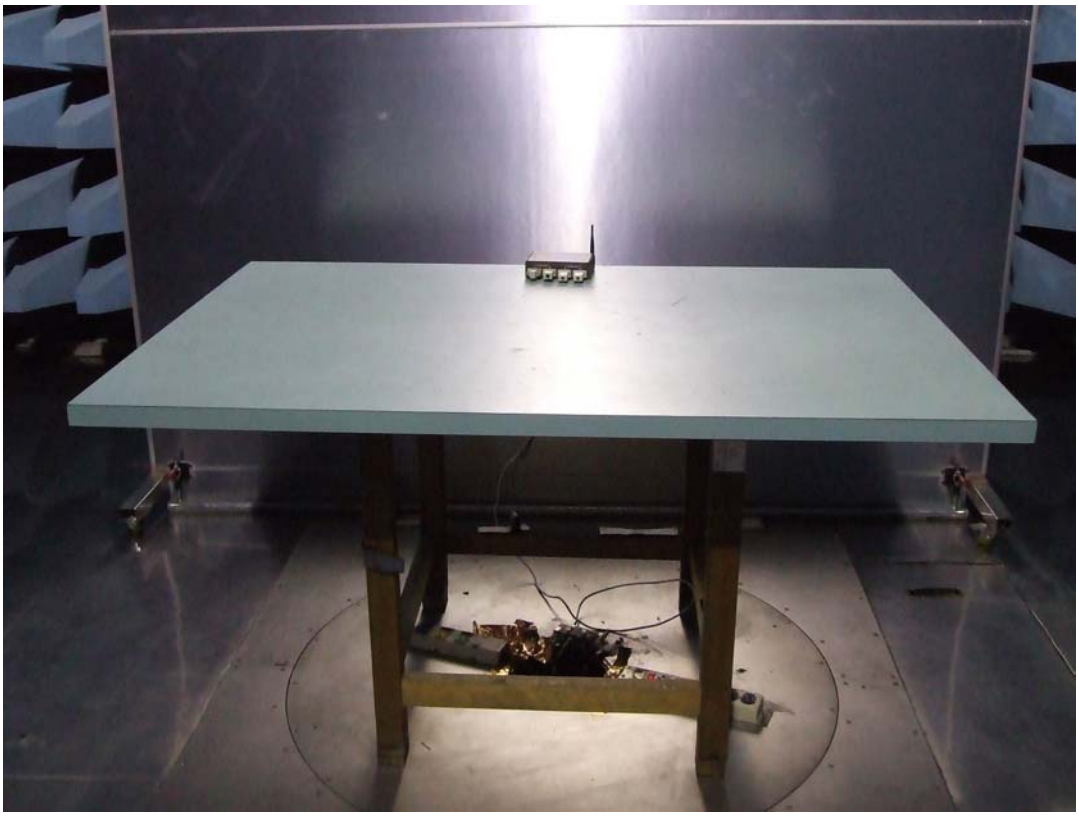


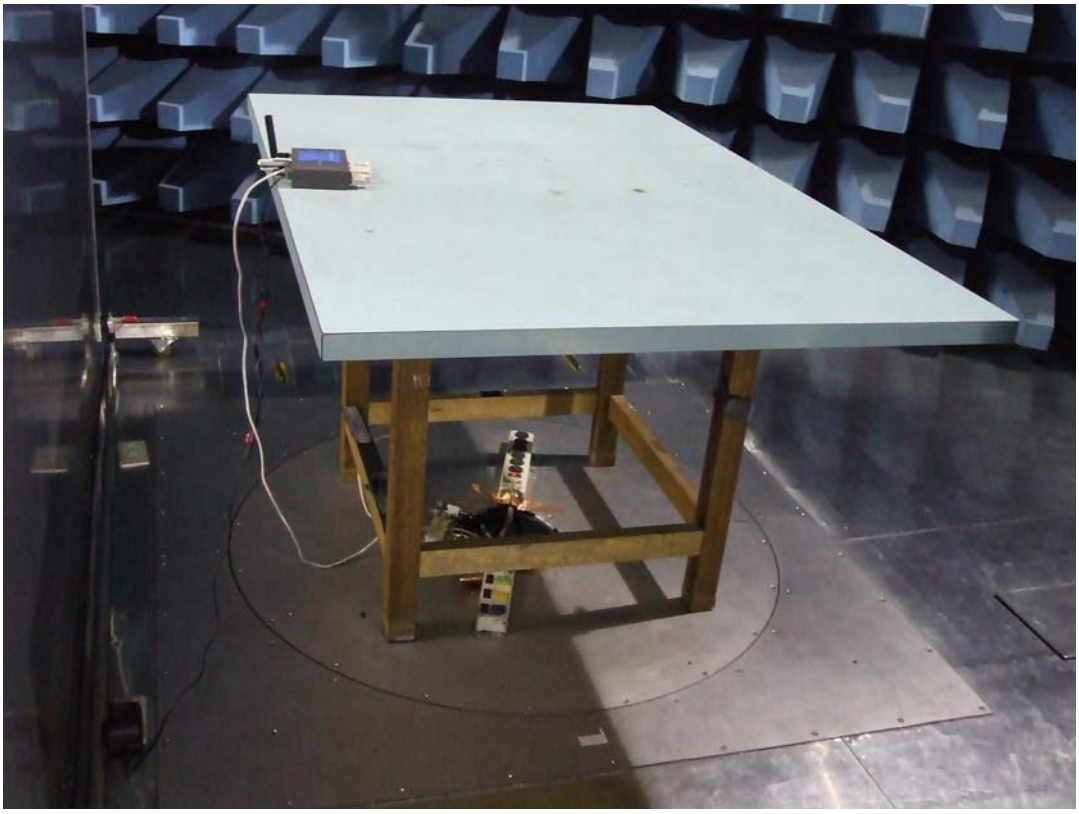
EXHIBIT D

Test Set-up Photos

Conducted Test Setup Placement



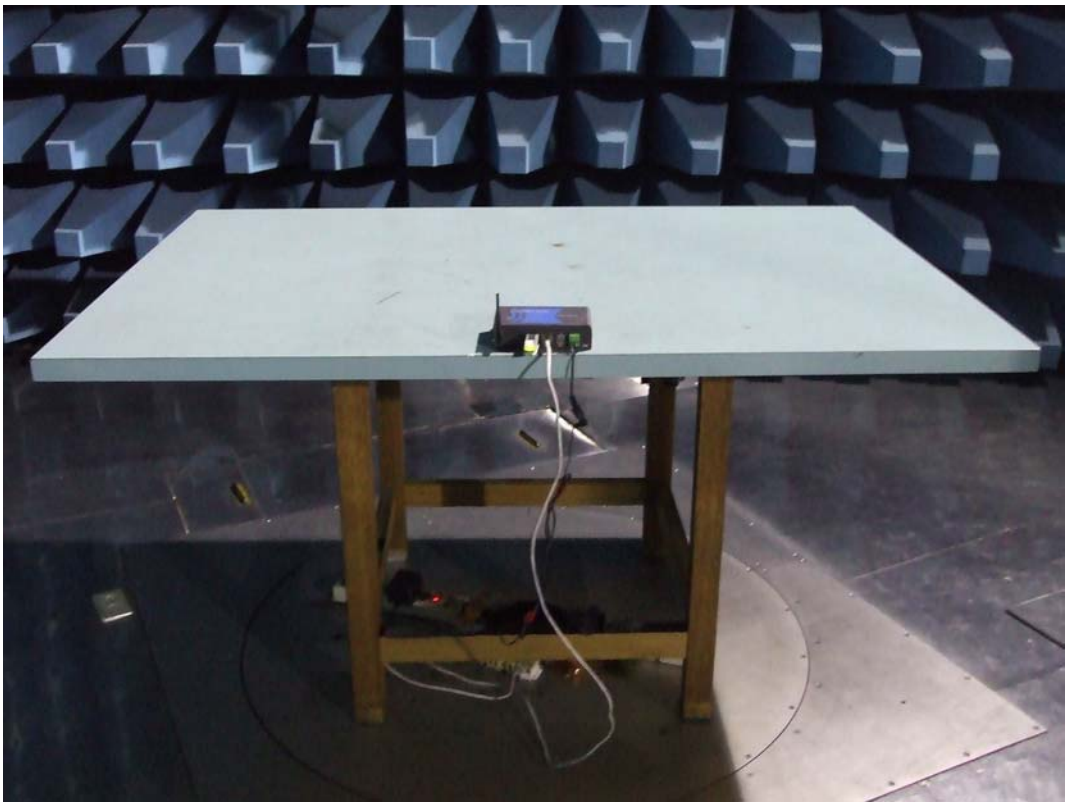
Front View of the Test Configuration



Side View of the Test Configuration

Radiated Test Setup Placement

Front View of the Test Configuration



Rear View of the Test Configuration

EXHIBIT E

User Manual

ThinkCore W311/321/341
Hardware User's Manual

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www.moxa.com/product

Moxa Systems Co., Ltd.
Tel: +886-2-8919-1711
Fax: +886-2-8919-1722
Web: www.moxa.com

MOXA Technical Support
Worldwide: support@moxa.com
The Americas support@usa.moxa.com

ThinkCore W311/321/341
Hardware User's Manual

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Introduction

The ThinkCore W300 Series is a line of wireless RISC-based embedded computers that feature 802.11a/b/g WLAN, RS-232/422/485 serial ports, and an Ethernet port in a small, rugged chassis. In addition, the W321 and W341 models feature an SD slot, and the W341 features two USB 2.0 hosts and one relay output channel.

As part of the W300 Series, your embedded computer is ideal for diverse, machine-to-machine embedded applications. It enables wireless operation of traditionally wired network and serial devices and not only provides transparent data transfer, but also numeric computing, protocol conversion, data processing and even data encryption. You will find it easier to build embedded systems for distributed peer-to-peer communication, turn wired devices into wireless devices, and introduce higher mobility and more intelligence to your system. In this chapter, learn about the capabilities of the embedded computer.

This chapter covers the following topics:

- **Overview**
- **Package Checklist**
- **Product Features**
- **Product Hardware Specifications**
- **Hardware Block Diagram**
  - ThinkCore W311
  - ThinkCore W321
  - ThinkCore W341

Overview

The ThinkCore W300 Series wireless embedded computer is designed around the MOXA ART ARM9 32-bit RISC processor. Unlike the X86 CPU, which uses a CISC design, the MOXA ART ARM9 uses RISC architecture and modern semiconductor technology to provide a powerful computing engine without generating significant heat. The processor also integrates UART and LAN functions to provide exceptional communication performance, but without the bus bandwidth limitations associated with general ARM-based communication products.

On-board NOR Flash ROM and SDRAM provides ample storage capacity, and for select models, the SD slot gives applications extra room to expand. The built-in WLAN function supports the 802.11a/b/g standard, providing transmission security with WEP, WPA and WPA2. The backup LAN port not only provides an alternative solution for networking but also supports Ethernet clients, allowing any network device to plug in and connect to the WLAN. The built-in RS-232/422/485 serial ports support a wide range of serial devices, making this platform suitable for data acquisition and protocol conversion applications.

The Linux-based operating system comes pre-installed and ready to run, providing an open platform for software development. Software written for desktop PCs can easily be ported to W300 Series embedded computers by using a common complier, so little time is spent modifying existing software code. In addition, the operating system, device drivers, and user-developed software can all be stored in the built-in flash memory.

Package Checklist

The ThinkCore W300 Series includes the following models:

ThinkCore W311-LX
A small, RISC-based, ready-to-run, wireless embedded computer with WLAN, one serial ports, Ethernet, and μClinux OS

ThinkCore W321-LX
A small, RISC-based, ready-to-run, wireless embedded computer with WLAN, two serial ports, Ethernet, SD slot, and μClinux OS

ThinkCore W341-LX
A RISC-based, ready-to-run, wireless embedded computer with WLAN, four serial ports, Ethernet, SD slot, USB port, relay output, and Linux OS

Each model is shipped with the following items:

- ThinkCore W300 Series wireless embedded computer
- Quick Installation Guide
- Documentation & Software CD
- 100 cm RJ45-to-RJ45 Ethernet cross-over cable
- 100 cm console port cable (CBL-4PINDB9F-100)
- Universal Power Adaptor
- Product Warranty Statement

Optional Accessories

- 35 mm DIN-rail mounting kit (DK-35A)

NOTE*: Notify your sales representative if any of the above items are missing or damaged.*

Product Features

ThinkCore W300 Series computers have the following features:

- MOXAART 32-bit ARM9 industrial communication processor
- 16 MB on-board RAM (64 MB for W341)
- 8 MB built-in flash memory (16 MB for W341)
- 802.11a/b/g Wireless LAN
- WEP, WPA and WPA2 encryption
- Infrastructure mode and Ad-Hoc mode
- RS-232/422/485 serial ports with software selectable interface
- Baudrates between 50 and 921.6 Kbps, including all nonstandard baudrates
- 10/100M Ethernet for backup networking
- SD card slot for storage expansion (W321 and W341 only)
- Withstands 5G continuous vibration and 50G shock
- LED indicators for status, serial transmission, and wireless signal strength
- Ready-to-run Linux platform
- Installation on DIN-rail or wall
- Fanless design for increased ruggedness

Product Hardware Specifications

System

CPU	MOXA ART ARM9 32-bit RISC CPU, 192 MHz		
DRAM	W311: 16 MB	W321: 16 MB	W341: 64 MB
Flash	W311: 8 MB	W321: 16 MB	W341: 64 MB
Storage Expansion	W311: None	W321: SD slot × 1	W341: SD slot × 1
USB	W341: USB 2.0 host × 2		
Relay Output	Form C, SPDT × 1 Normal switching capacity: Switching power: Switching voltage: Switch current: Operation time: Initial contact resistance:	 2 A @30 VDC 60 W max. 220 VDC max. 2 A max. 4 ms @20°C 100 Mohm max.	
Console port	RS-232 × 1 (TxD, RxD, GND), 4-pin header output, "115200, n, 8, 1"		
Button	Reset button × 1, supports "Reset to Factory Default"		
Others	RTC, buzzer, Watchdog Timer		
OS	W311: μClinux, based on Linux Kernel 2.6 W321: μClinux, based on Linux Kernel 2.6 W341: Built-in Embedded Linux with MMU support		

WLAN Communication

Standard Compliance	802.11a/b/g
Radio Frequency Type	DSSS, CCK, OFDM
Radio Frequency Band	802.11a: 5.15 to 5.25 GHz (Indoor used only) 802.11b/g: U.S., Europe and Japan product covering 2.4 to 2.484 GHz
Media Access Protocol	Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA)
Modulation	802.11a/g: OFDM (64-QAM, 16-QAM, QPSK, BPSK) 802.11b: DSSS (DBPSK, DQPSK, CCK)
Transmission Power (Typical)	5.15 to 5.25 GHz: 15 dBm @6 Mbps; 12 dBm @54 Mbps 2.412 to 2.462 GHz (IEEE802.11g): 17 dBm @6 Mbps; 15 dBm @54Mbps 2.412 to 2.462 GHz (IEEE802.11b): 18 dBm@ 1 to 11 Mbps
Receiver Sensitivity (Typical)	5.15 to 5.25 GHz: 6 Mbps @ -90 dBm; 54 Mbps @ -72 dBm 2.412 to 2.462 G (IEEE802.11g): 6 Mbps @ -90 dBm; 54 Mbps @ -73 dBm 2.412 to 2.462 G (IEEE802.11b): 11 Mbps @ -87 dBm; 1 Mbps @ -94 dBm
Transmission Rate	54 Mbps with auto fallback (54, 48, 36, 24, 18, 12, 11, 9, 6, 5.5, 2, 1 Mbps) 802.11b supported rates: 1, 2, 5.5, 11 Mbps 802.11a/g supported rates: 6, 9, 12, 18, 24, 36, 48, 54 Mbps
Transmission distance	100 meters at 11 Mbps (with no obstructions)
Security	WEP 64-bit/128-bit, WPA, WPA2 data encryption
Antenna Connector	Reverse SMA
Antenna	External 2 dBi dipole antenna
WLAN Mode	Infrastructure, Ad-Hoc

Network Communication

LAN	10/100 Mbps RJ45 × 1, auto-sensing
Protection	1.5 KV built-in magnetic isolation protection

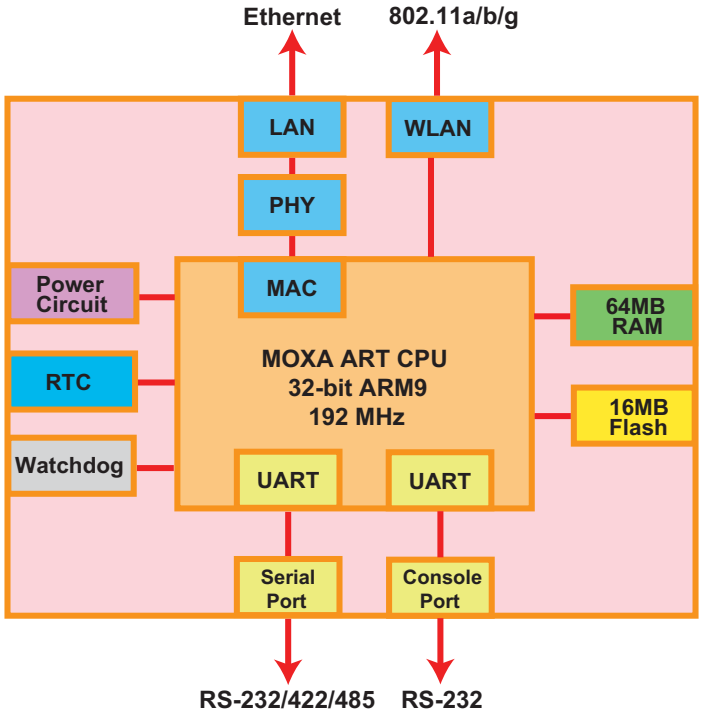
Serial Communication

Serial Port	W311: RS-232/422/485 DB9 male × 1 W321: RS-232/422/485 DB9 male × 2 W341: RS-232/422/485 DB9 male × 4
Protection	15 KV built-in ESD protection for all signals
Data bits	5, 6, 7, 8
Stop bits	1, 1.5, 2
Parity	None, Even, Odd, Space, Mark
Flow Control	RTS/CTS, XON/XOFF, RS-485 ADDC™
Speed	50 bps to 921.6 Kbps, including all nonstandard baudrates

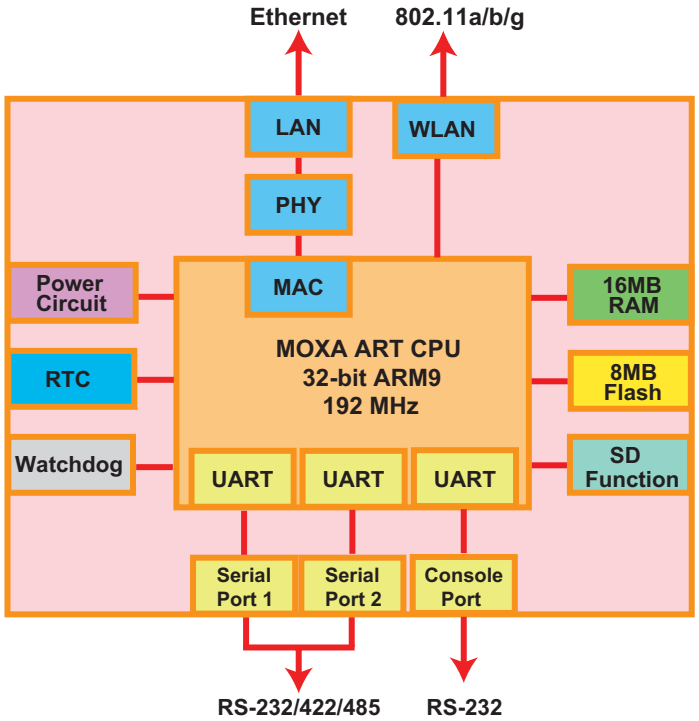
LEDs	
System	Ready, SD activity (for W321 and W341 only)
WLAN	Enable, signal strength
LAN	10 M/Link, 100 M/Link
Serial	TxD, RxD
Power Requirements	
Power Input	12 to 48 V
Power Consumption	W311: 250 mA @12 VDC, 3 W W321: 300 mA @12 VDC, 3.6 W W341: 540 mA @12 VDC, 6.5 W
Mechanical	
Dimension (W × D × H)	(without wall mount ear or antenna) W311: 67 × 100.4 × 22 mm W321: 77 × 111 × 26 mm W341: 150 × 100 × 38 mm
Antenna	110 mm
Construction Material	W311: aluminum, 1 mm W321: aluminum, 1 mm W341: aluminum, 1 mm / SECC, 1 mm for rear panel
Mounting	DIN-rail, wall
Environmental	
Operating Temperature	-10 to 60°C (14 to 140°F), 5 to 95% RH
Storage Temperature	-20 to 80°C (-4 to 176°F), 5 to 95% RH
Regulatory Approvals	
EMC	FCC, CE
Safety	TÜV, UL, cUL
Others	RoHS, CRoHS, WEEE
Warranty	5 years

Hardware Block Diagram

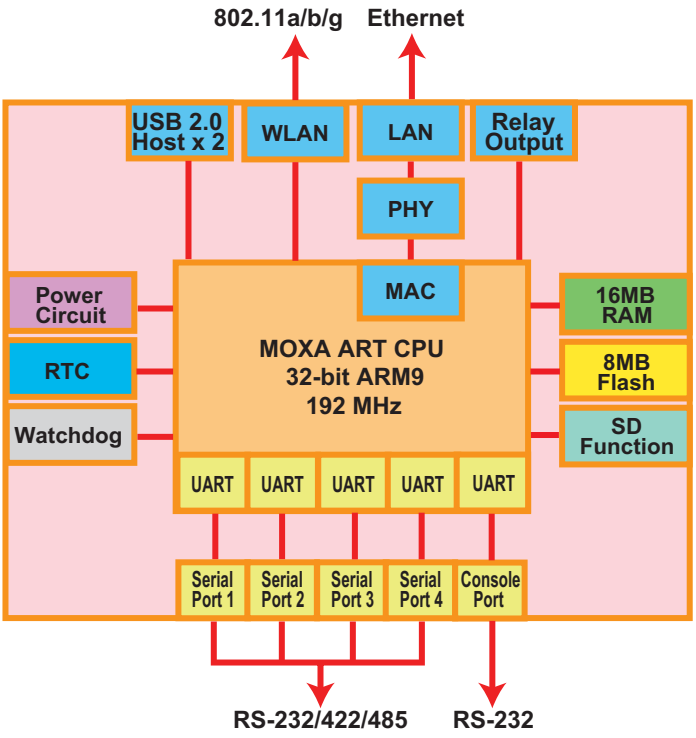
ThinkCore W311



ThinkCore W321



ThinkCore W341



2

Hardware Introduction

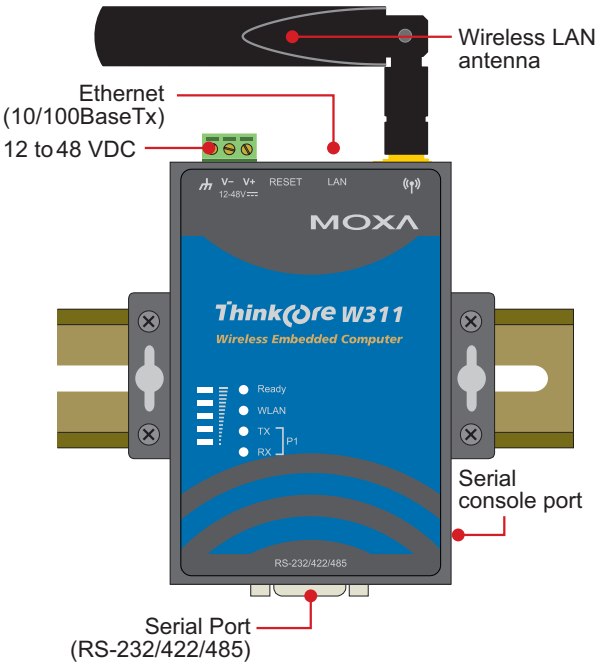
ThinkCore W300 Series hardware is compact, well-designed, and built rugged for industrial applications. LED indicators help you monitor the performance and identify trouble spots. Multiple ports allow the connection of different devices for wireless operation. With the reliable and stable hardware platform that is provided, you may devote your attention to the development of your application. In this chapter, learn the basics about the embedded computer hardware and its different parts.

This chapter covers the following topics:

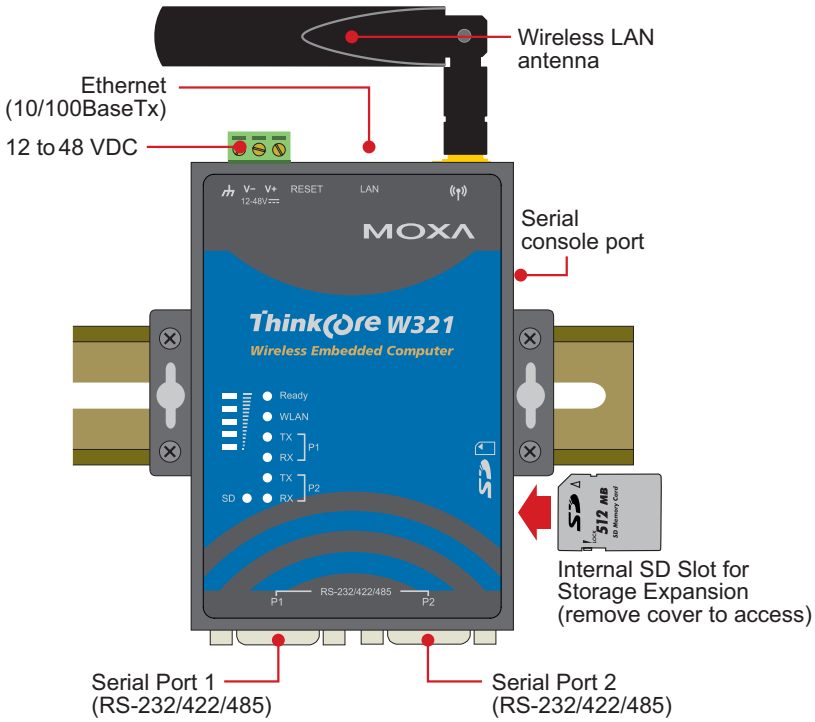
- **Appearance**
  - ThinkCore W311
  - ThinkCore W321
  - ThinkCore W341
- **Dimensions**
  - ThinkCore W311
  - ThinkCore W321
  - ThinkCore W341
- **LED Indicators**
- **Reset Button**
- **Real Time Clock**

Appearance

ThinkCore W311

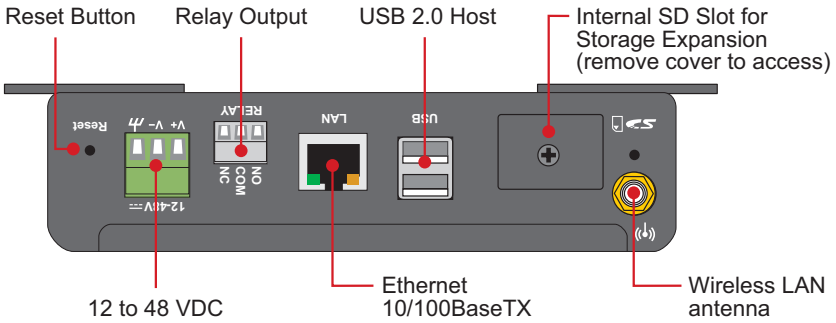


ThinkCore W321

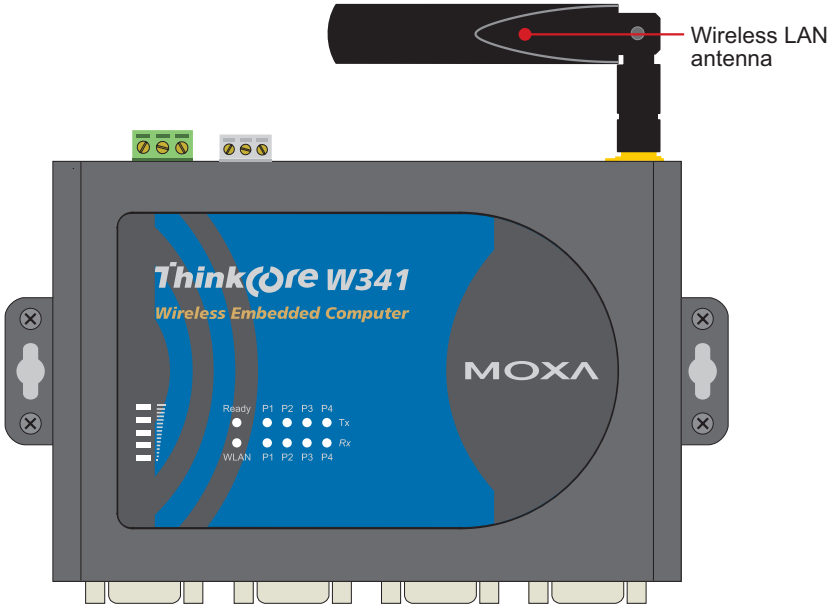


ThinkCore W341

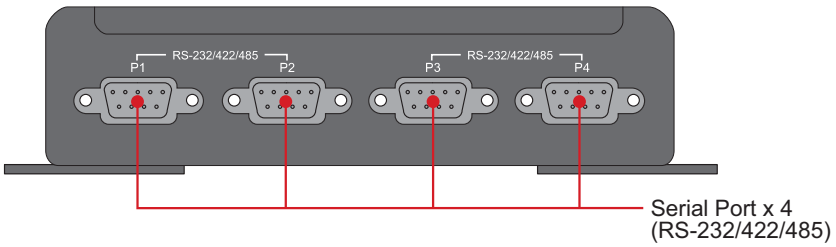
Top View



Front View

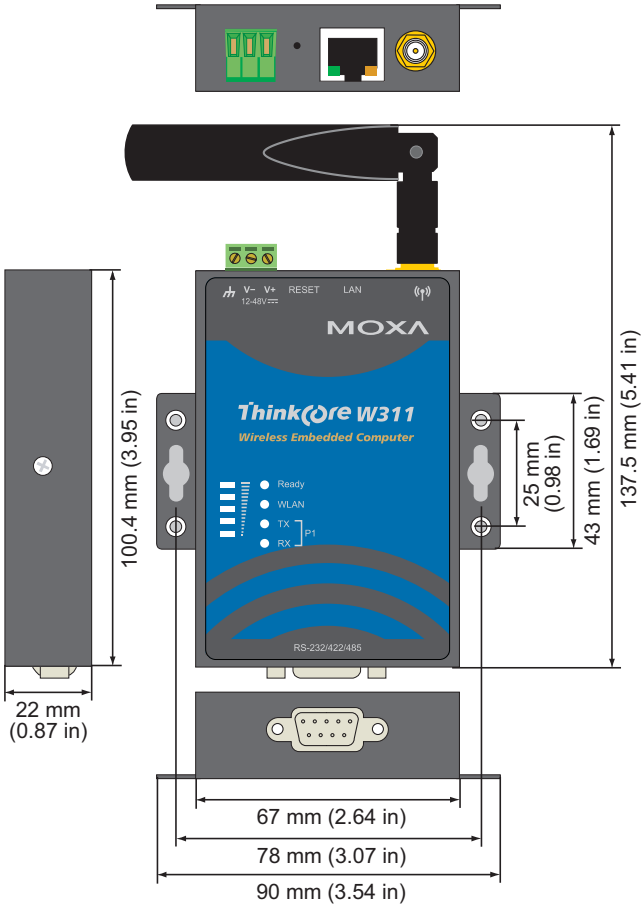


Bottom View

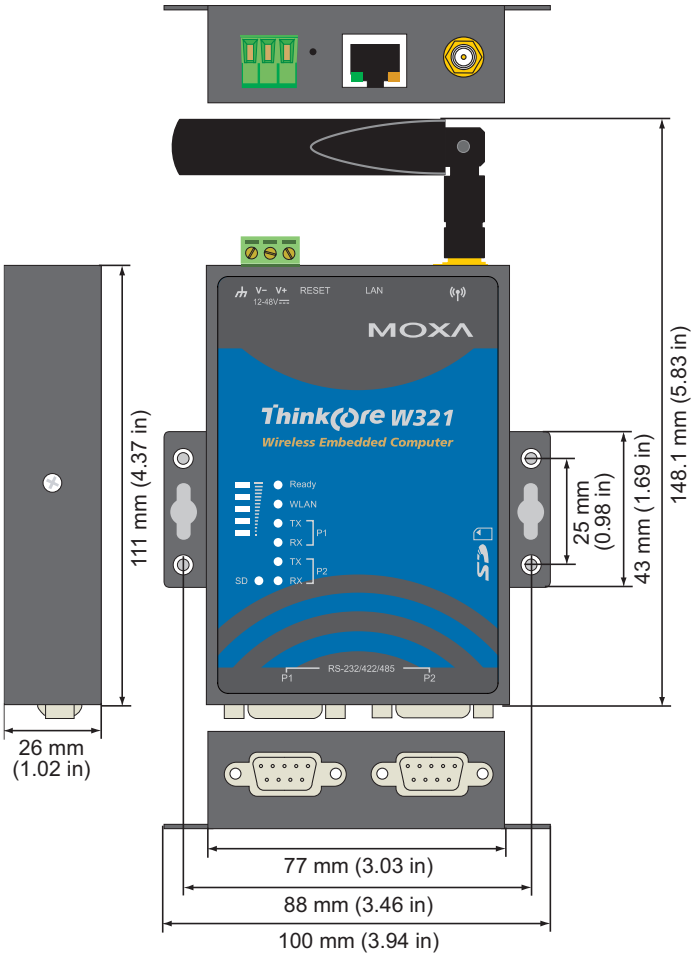


Dimensions

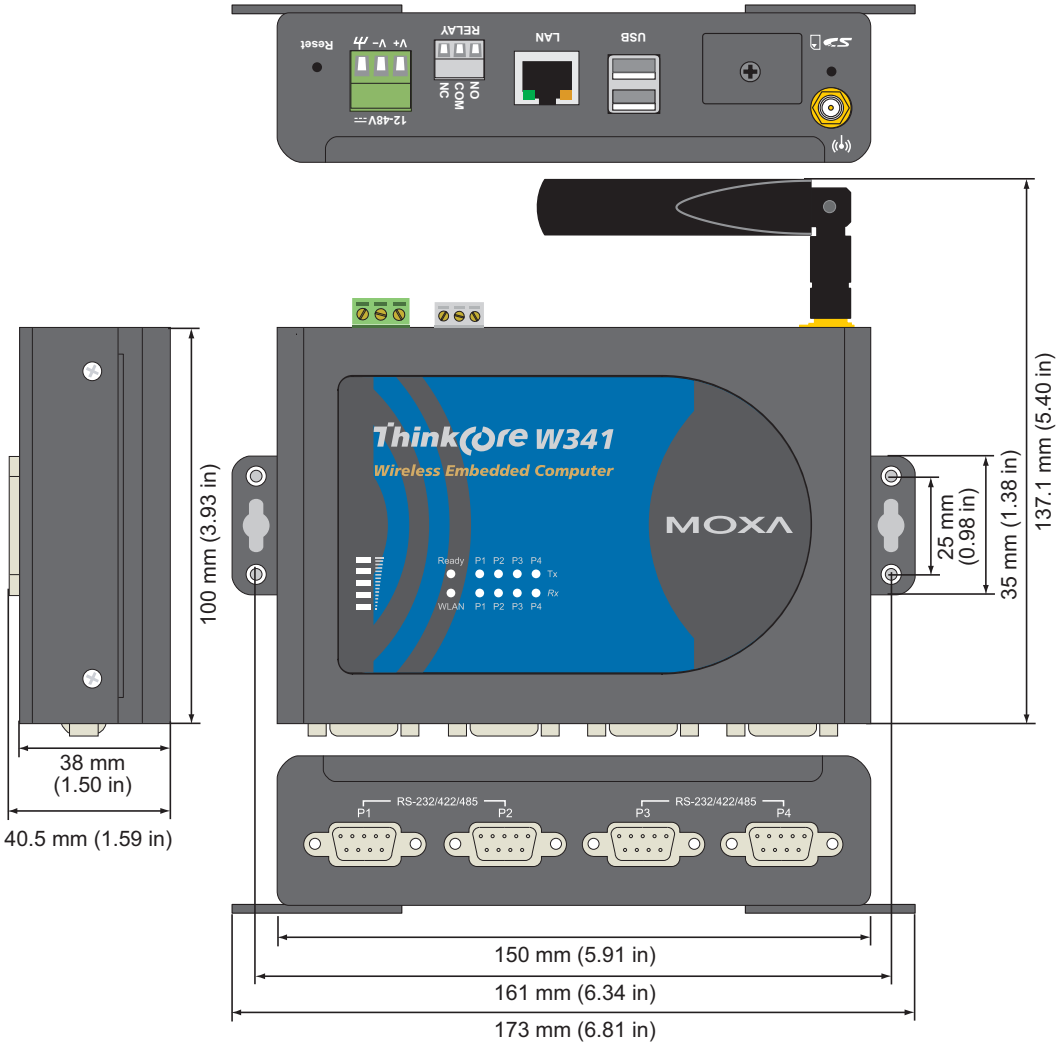
ThinkCore W311



ThinkCore W321



ThinkCore W341



LED Indicators

Please note that the W311 does not include an SD slot, so it will not have an SD LED.

LED Name	LED Color	LED Function
Ready	Green	Power is on and functioning normally
	Off	Power is off or there is another power error
SD	Green	SD card is detected
	Off	No SD card is detected
WLAN	Green	ON: WLAN is ready
		Blinking: Conflict with WLAN IP or no response from DHCP server
	Off	WLAN is not ready or function error
Signal Strength	Green	Number of glowing LEDs indicates signal strength 5: Excellent 4: Very good 3: Good 2: Fair 1: Bad
	Off	No signal or WLAN connection failed
LAN	Orange	10 Mbps Ethernet link
	Green	100 Mbps Ethernet link
	Off	Disconnected or short circuit
TxD P1-P4	Green	Serial ports P1-P4 transmitting data
	Off	Serial ports P1-P4 not transmitting data
RxD P1-P4	Yellow	Serial ports P1-P4 receiving data
	Off	Serial ports P1-P4 not receiving data

Reset Button

Hold the reset button down for 5 seconds to load the factory default configuration. After loading the factory defaults, the system will reboot automatically. We recommend that you use this function only if the software is not working properly. To reset the Linux system software, always use the software reboot command ("reboot") to protect the integrity of data.

The reset button is NOT designed as a hard reboot for the embedded computer.

ATTENTION

Restoring default settings preserves your data

Resetting the embedded computer to factory defaults will NOT format the user directory and will NOT erase the user's data. The reset button only loads a configuration file. All files in the **/etc** directory will revert to their factory defaults, but all other user data will remain intact in the Flash ROM.

Please note that if there is a problem with the **/etc** directory, the embedded computer may be unable to restore the factory default settings.

Real Time Clock

The embedded computer's real-time clock is powered by a lithium battery. We strongly recommend that you NOT replace the lithium battery on your own. If the battery needs to be changed, please contact the MOXA RMA service team.

ATTENTION

There is a risk of explosion if the wrong type of battery is used. To avoid this potential danger, always be sure to use the correct type of battery. Contact the MOXA RMA service team for battery replacement.

3

Hardware Connection Description

ThinkCore W300 Series wireless embedded computers are equipped for multiple types of connections. WLAN, Ethernet, and multiple serial interfaces are built into every model, including a serial console port for monitoring of bootup messages. Select models also include an SD slot for storage expansion, USB ports for additional device and storage options, and relay output connections. With the open-source Linux kernel, you are free to develop custom applications for remote, wireless operation of your device. In this chapter, learn how to connect the embedded computer to the network and to various devices.

This chapter covers the following topics:

- **Wiring Requirements**
  - Connecting the Power
  - Grounding the Unit
- **Connecting Data Transmission Cables**
  - Connecting to the Network
  - Connecting to the WLAN
  - Connecting to a Serial Device
  - Serial Console Port
- **SD Slot (W321 and W341 only)**
- **USB (W341 only)**
- **Relay Output (W341 only)**

Wiring Requirements

This section describes how to connect serial devices to the embedded computer.

You should heed the following common safety precautions before proceeding with the installation of any electronic device:

- Use separate paths to route wiring for power and devices. If power wiring and device wiring paths must cross, make sure the wires are perpendicular at the intersection point.

  NOTE: Do not run signal or communication wiring and power wiring in the same wire conduit. To avoid interference, wires with different signal characteristics should be routed separately.

- Use the type of signal transmitted through a wire to determine which wires should be kept separate. The rule of thumb is that wiring that shares similar electrical characteristics can be bundled together.
- Keep input wiring and output wiring separate.
- It is advisable to label the wiring to all devices in the system.

ATTENTION

Safety First!

Be sure to disconnect the power cord before installation and/or wiring.

Watch Electrical Current!

Calculate the maximum possible current in each power wire and common wire. Observe all electrical codes dictating the maximum current allowable for each wire size.

If the current goes above the maximum ratings, the wiring could overheat, causing serious damage to your equipment.

Watch Temperature!

Be careful when handling the unit. When the unit is plugged in, the internal components generate heat, and consequently the outer casing may feel hot to the touch.

Connecting the Power

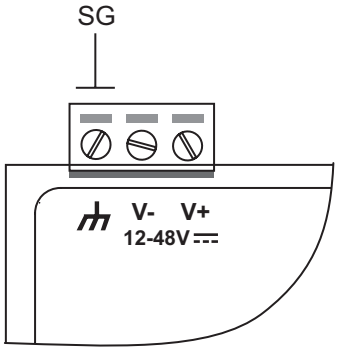
Connect the "live-wire" end of the 12-48 VDC power adapter to the embedded computer's terminal block. When power is properly supplied, the "Ready" LED will glow a solid green after a 25 to 30 second delay.

Grounding the Unit

Grounding and wire routing help limit the effects of noise due to electromagnetic interference (EMI). Before connecting any devices, run a ground wire from the ground screw to the grounding surface.

ATTENTION

This product should be mounted to a well-grounded mounting surface such as a metal panel.



SG: The ***Shielded Ground*** (sometimes called Protected Ground) contact is the left most contact of the 3-pin power terminal block connector, as viewed from the angle shown here. Connect the SG wire to an appropriate grounded metal surface.

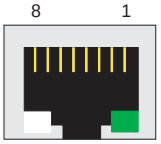
Connecting Data Transmission Cables

This section describes how to connect cables for the network, serial devices, and serial COM terminal.

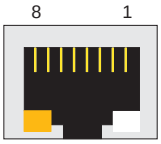
Connecting to the Network

Plug your network cable into the embedded computer's Ethernet port. The other end of the cable should be plugged into your Ethernet network. When the cable is properly connected, the LEDs on the embedded computer's Ethernet port will glow to indicate a valid connection.

The 10/100 Mbps Ethernet LAN port uses 8-pin RJ45 connectors. The following diagram shows the pinouts for these ports.



The LED indicator in the lower right corner glows a solid green color when the cable is properly connected to a 100 Mbps Ethernet network. The LED will flash on and off when Ethernet packets are being transmitted or received.



The LED indicator in the lower left corner glows a solid orange color when the cable is properly connected to a 10 Mbps Ethernet network. The LED will flash on and off when Ethernet packets are being transmitted or received.

Pin	Signal
1	ETx+
2	ETx-
3	ERx+
4	---
5	---
6	ERx-
7	---
8	---

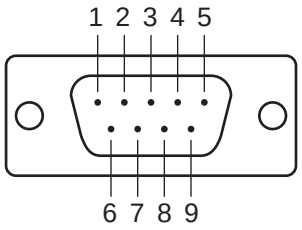
Connecting to the WLAN

The wireless embedded computer is WLAN ready and includes an 802.11 a/b/g WLAN module. It supports WEP, WPA and WPA2 data encryption. To verify WLAN operation, first configure your WLAN settings on the embedded computer using the serial console or a wired network connection. Please refer to the operating system user's manual for further detail.

Connecting to a Serial Device

Your serial device can plug into the embedded computer's serial port using a serial cable. Serial ports P1 to P4 have male DB9 connectors and can be configured for RS-232, RS-422, or RS-485 communication through software. The pin assignments are shown in the following table:

DB9 Male Port



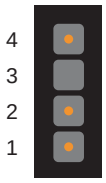
RS-232/422/485 Pinouts

Pin	RS-232	RS-422	RS-485 (4-wire)	RS-485 (2-wire)
1	DCD	TxDA(-)	TxDA(-)	---
2	RxD	TxDB(+)	TxDB(+)	---
3	TxD	RxDB(+)	RxDB(+)	DataB(+)
4	DTR	RxDA(-)	RxDA(-)	DataA(-)
5	GND	GND	GND	GND
6	DSR	---	---	---
7	RTS	---	---	---
8	CTS	---	---	---

Serial Console Port

The serial console port is a 4-pin pin-header RS-232 port. It is designed for serial console terminals, which are useful for viewing boot-up messages.

Serial Console Port & Pinouts



Pin	Signal
1	TxD
2	RxD
3	NC
4	GND

Serial Console Cable

SD Slot (W321 and W341 only)

Both the ThinkCore W321 and W341 include an SD slot for storage expansion. The SD slot allows users to add up to 1 GB of additional memory by inserting a Secure Digital (SD) memory card compliant with the SD 1.0 standard.

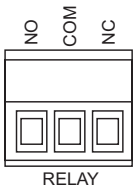
To install an SD card, remove the cover in order to access the slot. Insert the SD card into the slot and push it in until it clicks. To remove the card, push the card in until it clicks to release, then pull the card out.

USB (W341 only)

The ThinkCore W341 includes two USB 2.0 hosts. These hosts can be used for an external flash disk or hard drive in order to store large amounts of data.

Relay Output (W341 only)

The ThinkCore W341 includes a relay output channel. There is a 3-pin terminal block for the relay output connection, with pinouts as shown in the figure.



A

FCC Warning Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. this device may not cause harmful interference, and
2. this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

CAUTION:

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Prohibition of co-location

This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

Safety Information

To maintain compliance with FCC's RF exposure guidelines, when installing and/or operating this equipment, you should maintain a minimum distance of 20 cm between the transmitter and your body. Use only the supplied antenna. Unauthorized antennae, modifications, or attachments could damage the transmitter and may violate FCC regulations.

B

Service Information

This appendix shows you how to contact MOXA for information about this and other products, and how to report problems.

The following topics are covered in this appendix:

- **MOXA Internet Services**
- **Problem Report Form**
- **Product Return Procedure**

MOXA Internet Services

Customer satisfaction is our number one concern, and to ensure that customers receive the full benefit of our products, MOXA Internet Services has been set up to provide technical support, driver updates, product information, and user's manual updates.

The following services are provided

E-mail for technical support.....support@moxa.com

World Wide Web (WWW) Site for product information:

.....http://www.moxa.com

Problem Report Form

MOXA ThinkCore W311/321/341 Series

Customer name:	
Company:	
Tel:	**Fax:**
Email:	**Date:**

1. **MOXA Product:** ☐ ThinkCore W311 ☐ ThinkCore W321 ☐ ThinkCore W341
2. **Serial Number:** _____

Problem Description: Please describe the problem clearly. Include as many details as you can. This will help us reproduce the problem, and expedite the repair of your product.

Product Return Procedure

For product repair, exchange, or refund, the customer must:

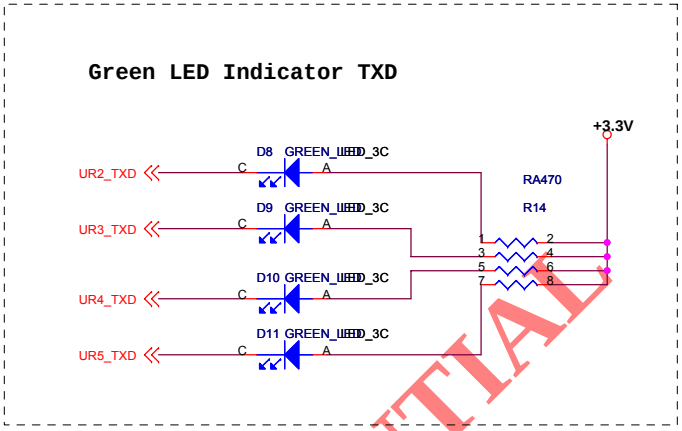
- Provide evidence of original purchase.
- Obtain a Product Return Agreement (PRA) from the sales representative or dealer.
- Fill out the Problem Report Form (PRF). Include as much detail as possible for a shorter product repair time.
- Carefully pack the product in an anti-static package, and send it, pre-paid, to the dealer. The PRA should be visible on the outside of the package, and include a description of the problem, along with the return address and telephone number of a technical contact.

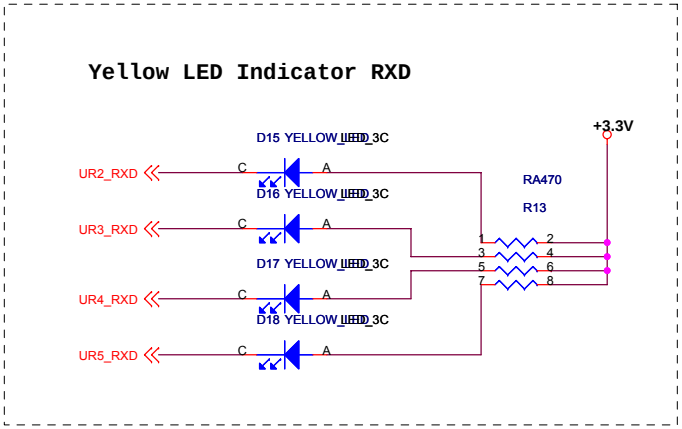
EXHIBIT F

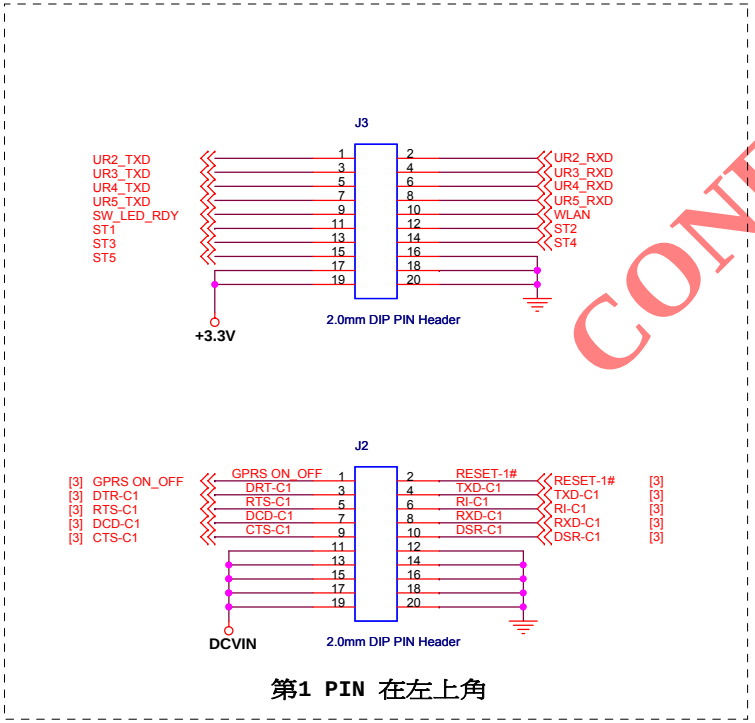
Schematics

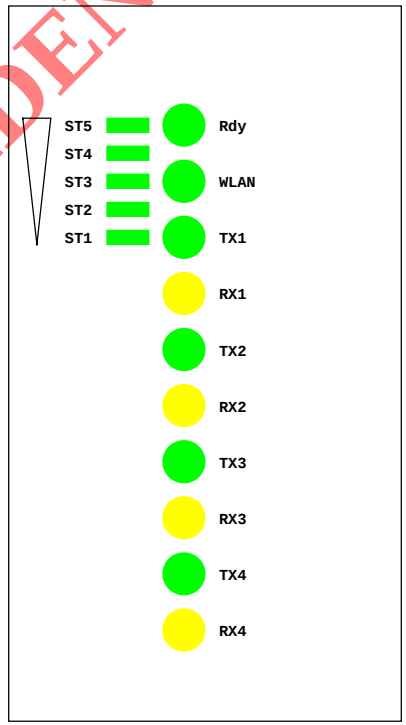
W341 GPRS and LED Board Ver:1.0

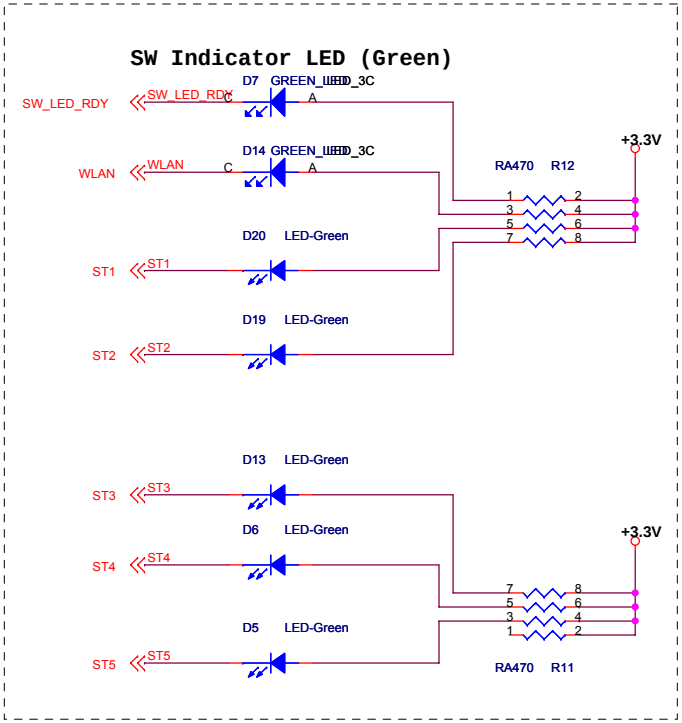
MOXA Moxa Systems Co., Ltd.			
Design Name: W341	Schematic Function Name: Sheet list		
PCB Part No.: <PCB Part No>	品名規格: <Specification>		
Department: System	Auther: Abel	Version: 1.0	Size: Custom
Date: Monday, August 14, 2006	Sheet 1 of 4		



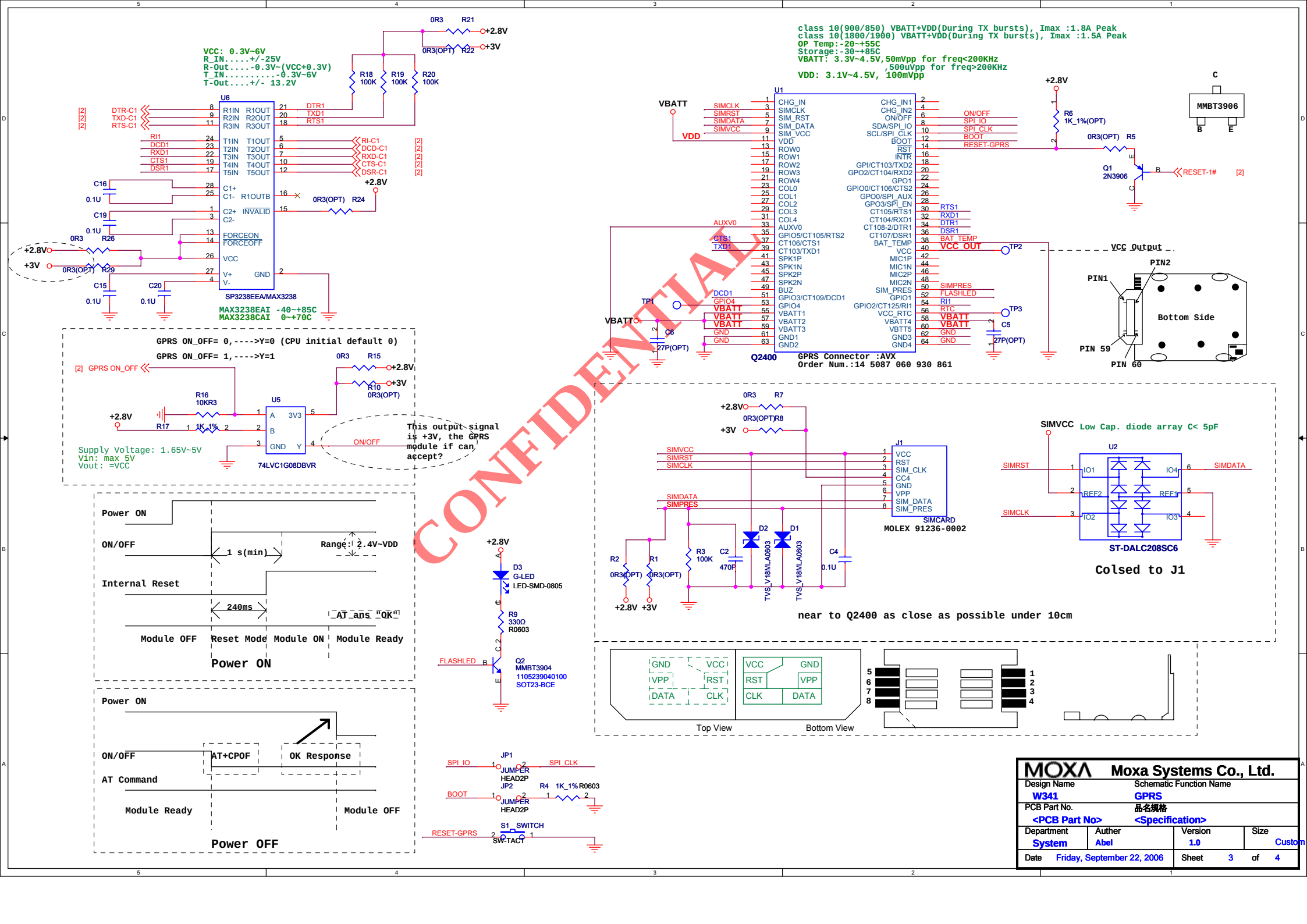




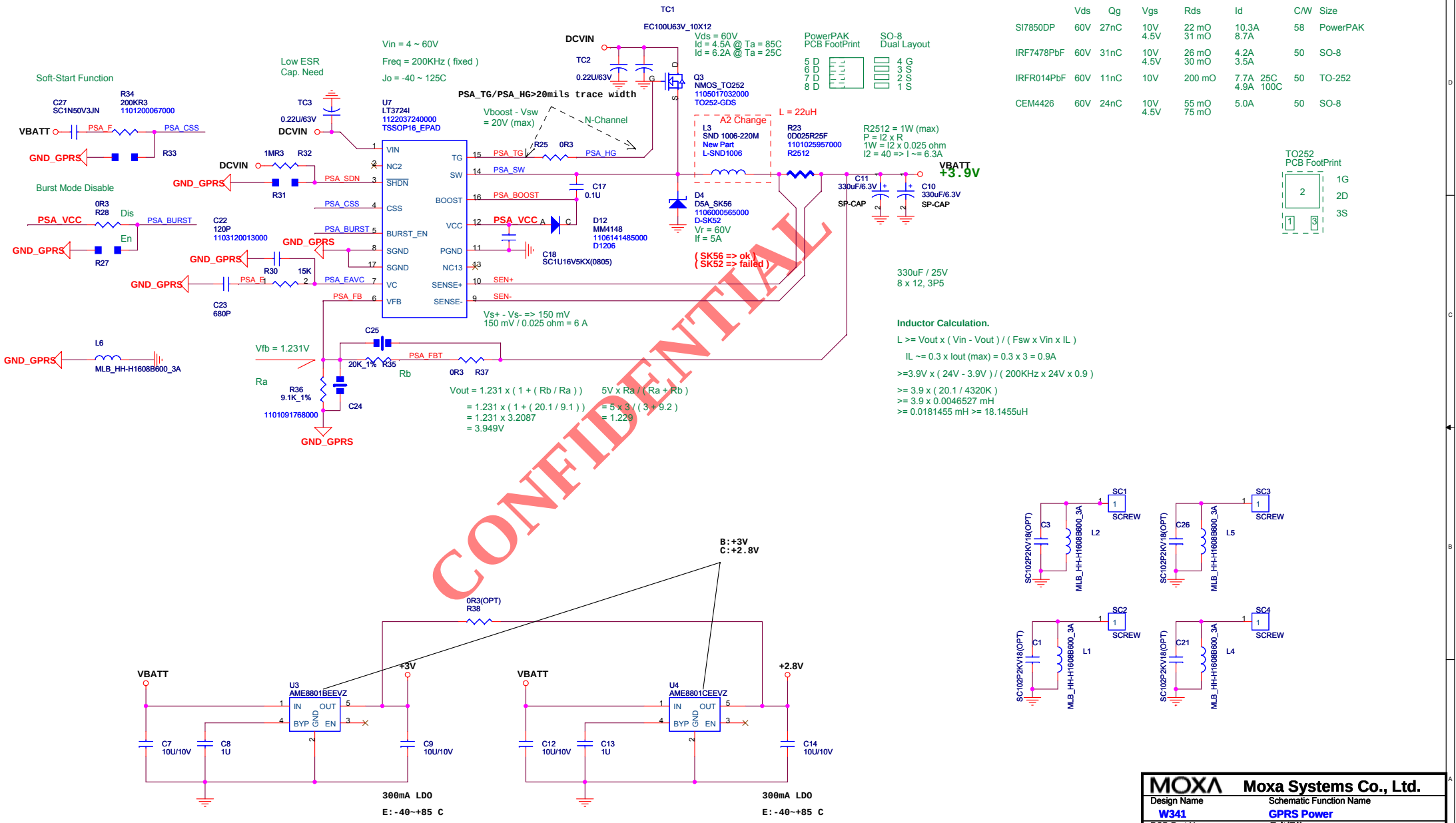




MOXA	Moxa Systems Co., Ltd.		
Design Name: W341	Schematic Function Name: LED Indicator		
PCB Part No.: <PCB Part No>	品名規格: <Specification>		
Department: System	Auther: Abel	Version: 1.0	Size: Custom
Date: Monday, August 14, 2006	Sheet 2 of 4		



MOXA	Moxa Systems Co., Ltd.		
Design Name	W341	Schematic Function Name	GPRS
PCB Part No.	<PCB Part No>	品名規格	<Specification>
Department	System	Auther	Abel
Version	1.0	Size	Custom
Date	Friday, September 22, 2006	Sheet	3 of 4



	Vds	Qg	Vgs	Rds	Id	C/W	Size
SI7850DP	60V	27nC	10V 4.5V	22 mO 31 mO	10.3A 8.7A	58	PowerPAK
IRF7478PbF	60V	31nC	10V 4.5V	26 mO 30 mO	4.2A 3.5A	50	SO-8
IRFR014PbF	60V	11nC	10V	200 mO	7.7A 25C 4.9A 100C	50	TO-252
CEM4426	60V	24nC	10V 4.5V	55 mO 75 mO	5.0A	50	SO-8

MOXA	Moxa Systems Co., Ltd.		
Design Name	W341	Schematic Function Name	GPRS Power
PCB Part No.	<PCB Part No>	品名規格	<Specification>
Department	System	Auther	Abel
Version	1.0	Size	Custom
Date	Monday, August 21, 2006	Sheet	4 of 4

W341 Schematic Ver:1.0

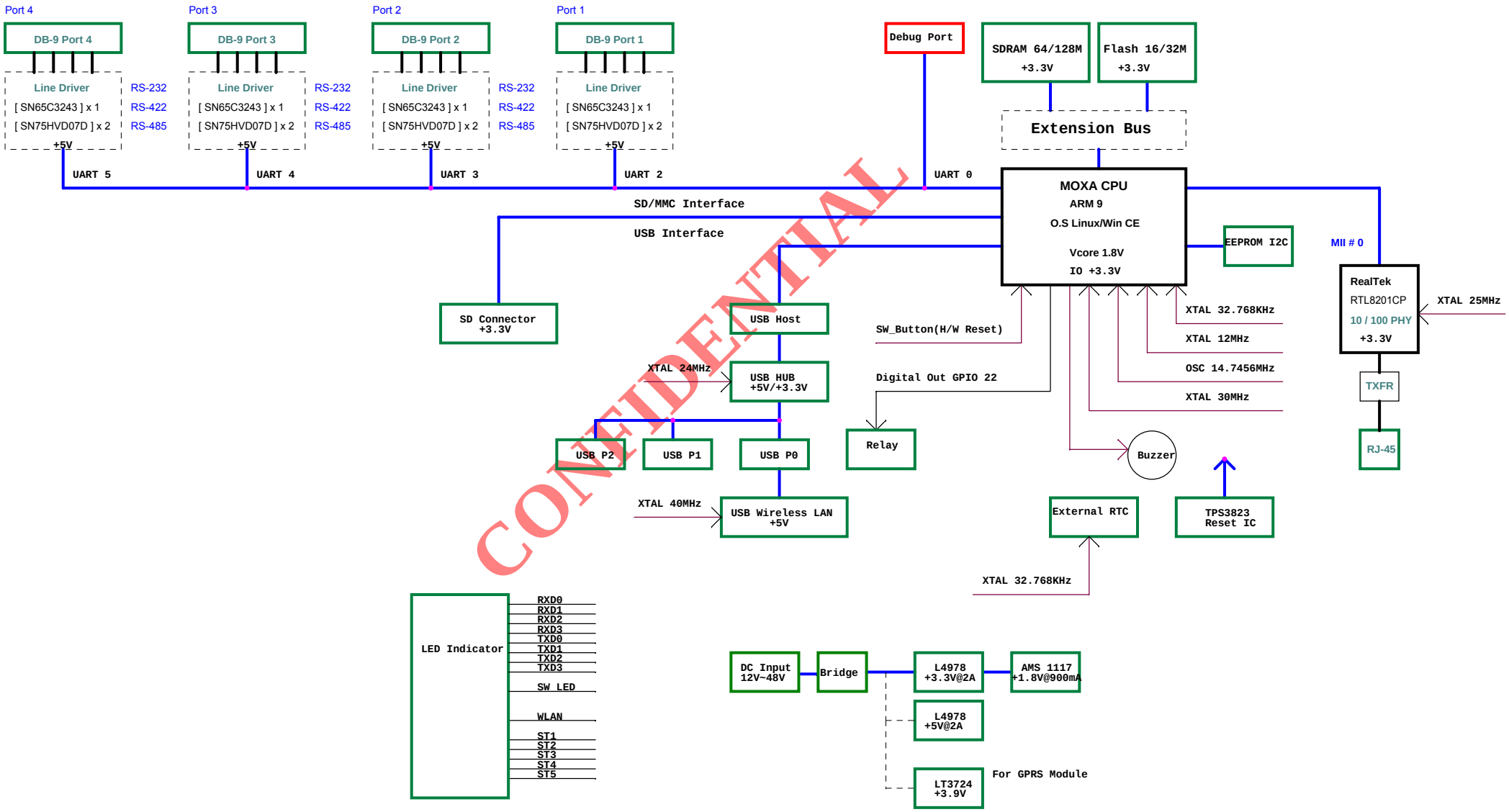
GPIO Table list

GPIO 0	D_LED0
GPIO 1	D_LED1
GPIO 2	D_LED2
GPIO 3	D_LED3
GPIO 4	WLAN
GPIO 5	RTC_SCLK
GPIO 6	RTC_DATA
GPIO 7	RTC_RST
GPIO 8	ST1
GPIO 9	ST2
GPIO 10	SD_WP/GPIO0
GPIO 11	SD_CD/GPIO1
GPIO 12	SD_CMD/GPIO2
GPIO 13	SD_DAT0/GPIO3
GPIO 14	SD_DAT1/GPIO4
GPIO 15	SD_DAT2/GPIO5
GPIO 16	SD_DAT3/GPIO6
GPIO 17	SD_CLK/GPIO7
GPIO 18	WLAN_ON_OFF
GPIO 19	SD_LED
GPIO 20	ST3
GPIO 21	ST4
GPIO 22	D-OUT
GPIO 23	JP1
GPIO 24	BUZZER
GPIO 25	SW_RELOAD
GPIO 26	WDAG
GPIO 27	SW_LED_READY
GPIO 28	ST5
GPIO 29	UR_CLK
GPIO 30	GPRS_ON_OFF
GPIO 31	UR1_RI

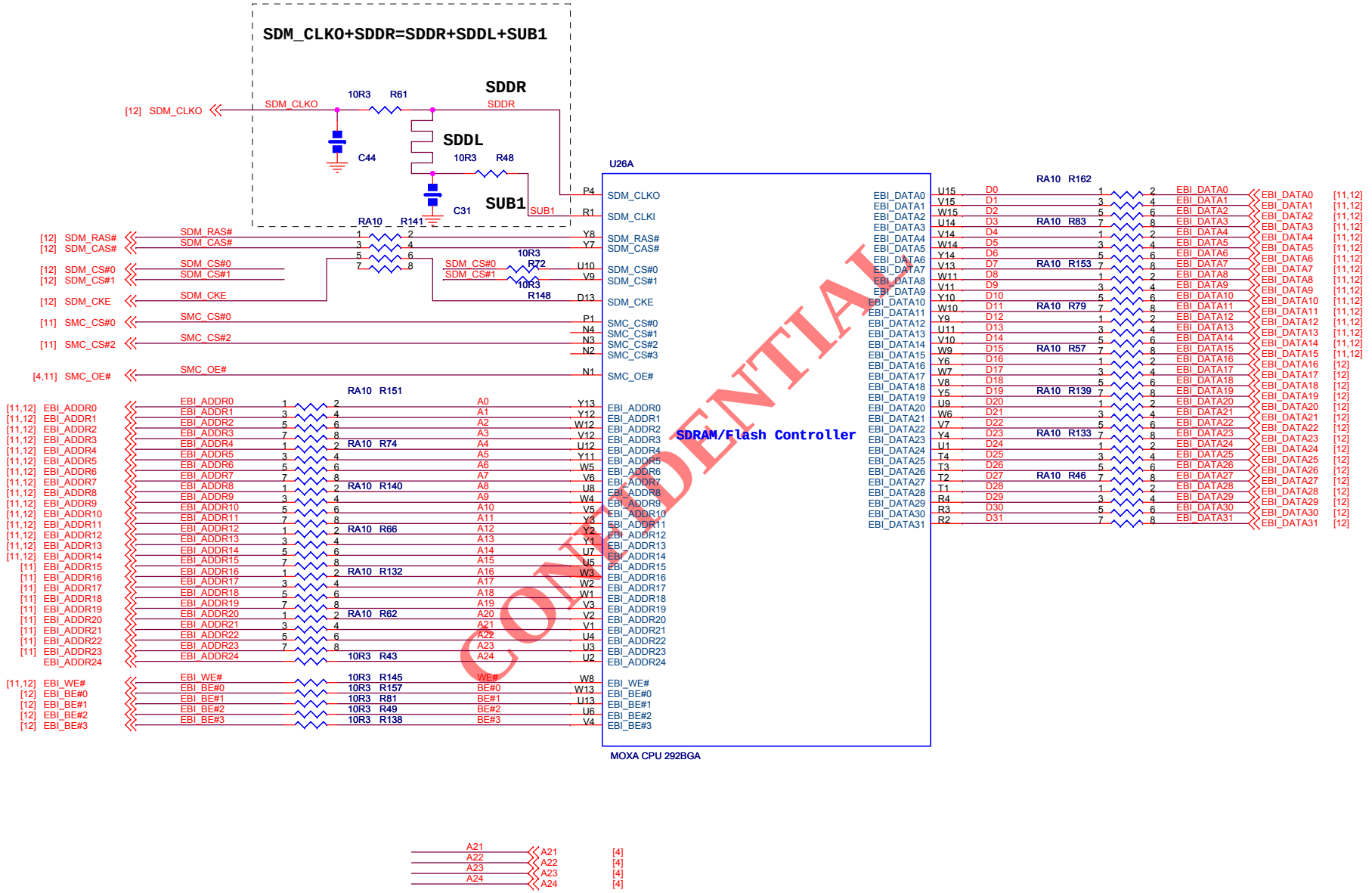
MOXA Moxa Systems Co., Ltd.

Design Name: W341	Schematic Function Name: Sheet List		
PCB Part No.: 1199003410100	品名規格: W341-LX		
Department: System	Auther: Abel	Version: 1.1	Size: Custom
Date: Thursday, December 21, 2006	Sheet 1 of 17		

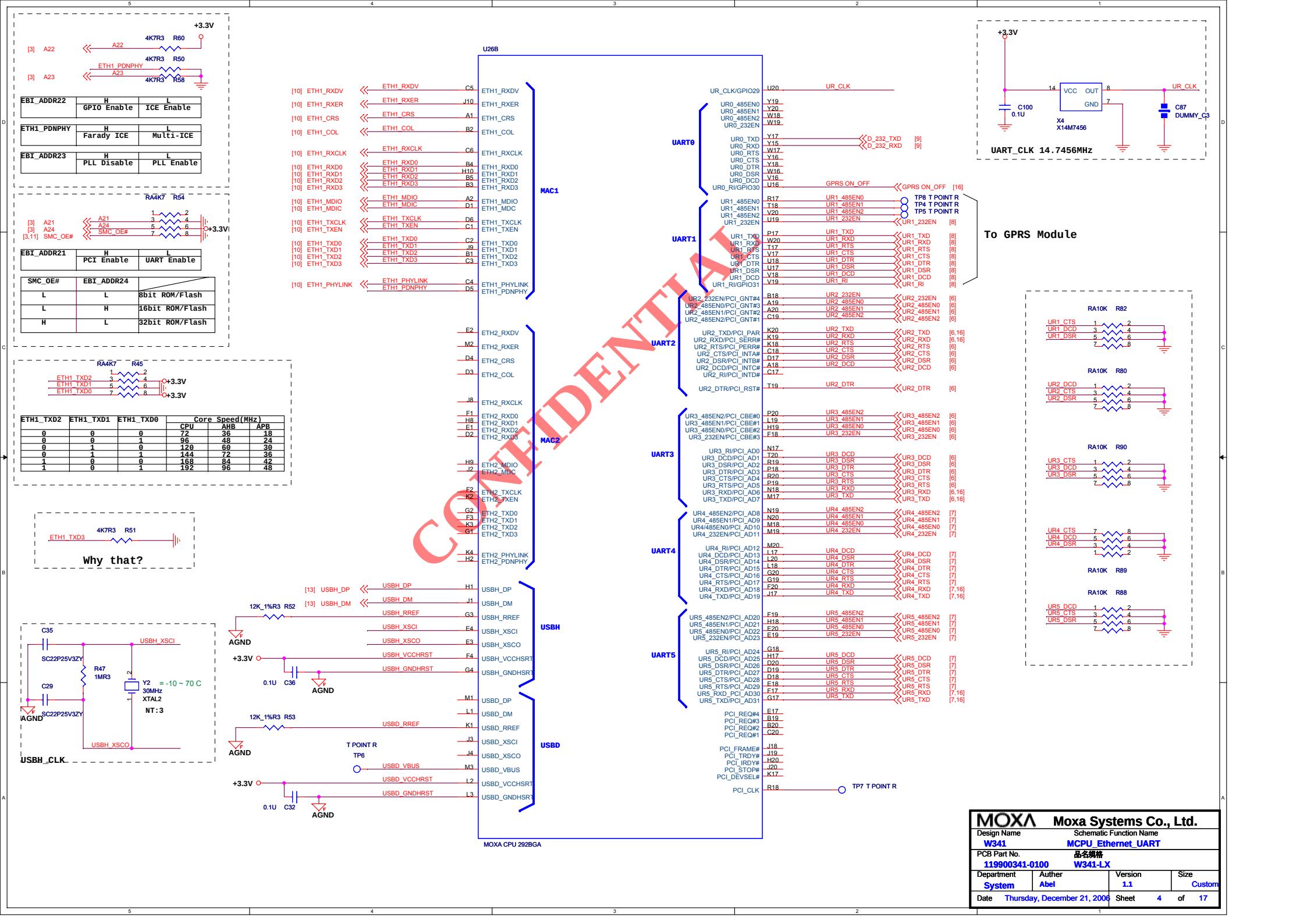
W341 Schematic Ver:1.0



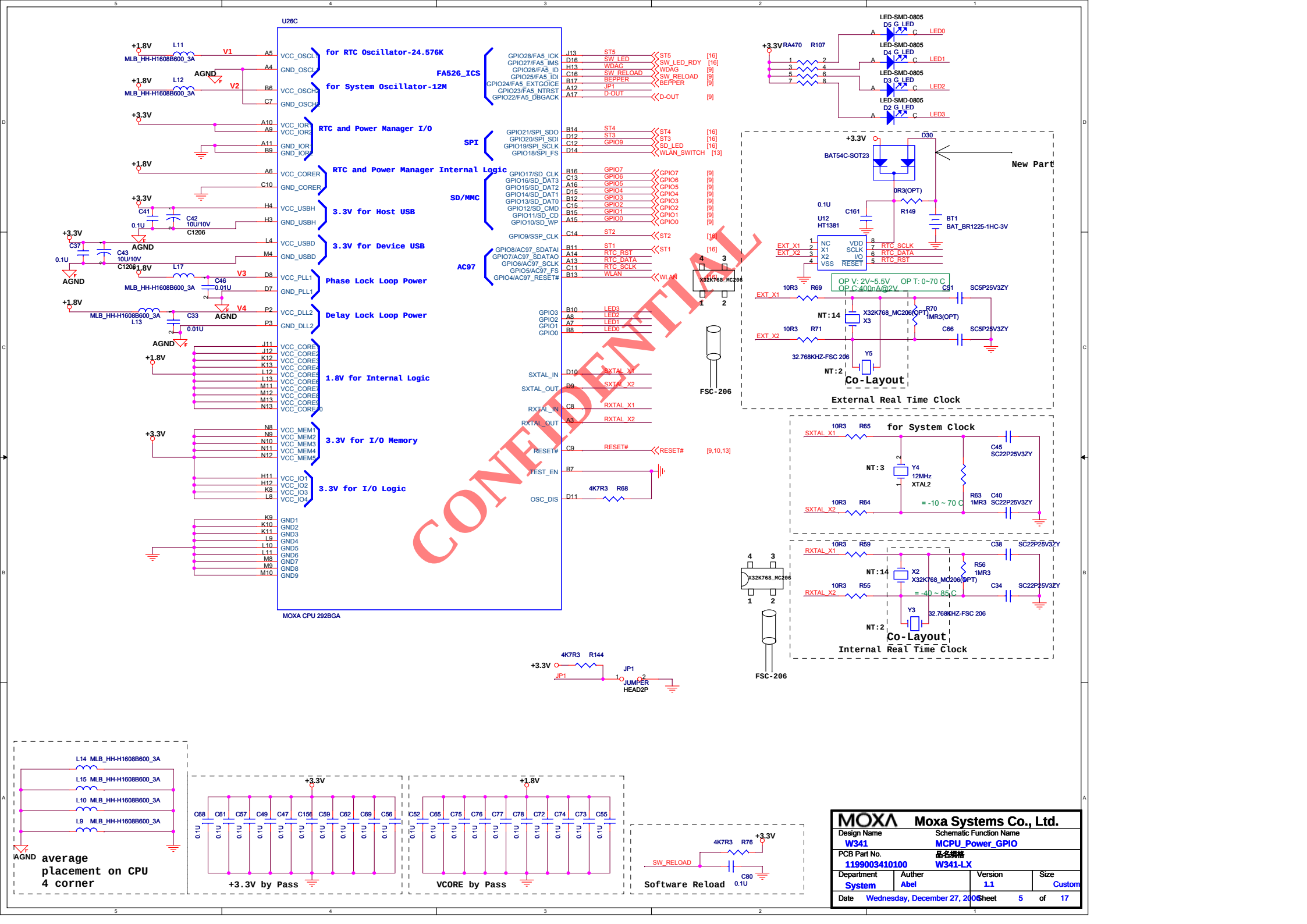
MOXA Moxa Systems Co., Ltd.			
Design Name: W341	Schematic Function Name: Block Diagram		
PCB Part No.: 1199003410100	品名規格: W341-LX		
Department: System	Auther: Abel	Version: 1.1	Size: Custom
Date: Tuesday, April 17, 2007		Sheet: 2 of 17	



MOXA Moxa Systems Co., Ltd.			
Design Name: W341	Schematic Function Name: MCPU_SDRAM_FLASH_Controller		
PCB Part No.: 1199003410100	品名規格: W341-LX		
Department: System	Auther: Abel	Version: 1.1	Size: Custom
Date: Wednesday, December 27, 2006	Sheet 3 of 17		



MOXA	Moxa Systems Co., Ltd.
Design Name: W341	Schematic Function Name: MCPU_Ethernet_UART
PCB Part No.: 119900341-0100	品名規格: W341-LX
Department: System	Auther: Abel
Version: 1.1	Size: Custom
Date: Thursday, December 21, 2006	Sheet 4 of 17



Moxa Systems Co., Ltd.	
Design Name: W341	Schematic Function Name: MCPU_Power_GPIO
PCB Part No.: 1199003410100	品名規格: W341-LX
Department: System	Auther: Abel
Version: 1.1	Size: Custom
Date: Wednesday, December 27, 2006	Sheet 5 of 17

RS232 PORT 1

SN65C3243 by pass
RA10(OPT) R160
UR2_RXD 1 2 RXD-2
UR2_CTS 3 4 CTS-2
UR2_DSR 5 6 DSR-2
UR2_DCD 7 8 DCD-2
RA10(OPT) R87
UR2_TXD 7 8 TXD-2
UR2_RTS 5 6 RTS-2
UR2_DTR 3 4 DTR-2
1 2

U17 1160032433201
SN65C3243 TSSOP28P
C83 0.1U +5V
C90 SC47N50V3ZY
C98 SCD33U16V3ZY
C82 SCD33U16V3ZY
C89 SCD33U16V3ZY
[4,16] UR2_RXD
[4] UR2_CTS
[4] UR2_DSR
[4] UR2_DCD
[4,16] UR2_TXD
[4] UR2_RTS
[4] UR2_DTR
C1P C1N C2P C2N VCC GND VP VN
ROUT1 ROUT2 ROUT2B ROUT3 ROUT4 ROUT5
RIN1 RIN2 RIN3 RIN4 RIN5
DIN1 DIN2 DIN3 DOUT1 DOUT2 DOUT3
INVALID FORCEON FORCEOFF
RXD-2 CTS-2 DSR-2 DCD-2 TXD-2 RTS-2 DTR-2
UR2_232EN [4]

VCC	C1	C2, C3, C4
3.3 V	0.1 uF	0.1 uF
5 V	0.047 uF	0.33 uF
3.0 ~ 5.5 V	0.1 uF	0.47 uF

SN65C3243 = -40 ~ 85 C
SN75C3243 = 0 ~ 70 C

TTL RS232

UR2_485_DA0-C2 R193 2 UR2_485_DB0-C2
R0603 120Ω(OPT)

10KR3 R156 +5V
UR2_RXD
[4] UR2_485EN2
[4] UR2_485EN1
RS422 Receiver Data
UR2_TXD
[4] UR2_485EN0
RS422 Send Data
SN75HVD07DR U29
U30 SN75HVD07DR 1160004853200 SO8P
R REN TEN T VCC D- D+ GND
150KR3 R172 UR2_485_DA0
150KR3 R171 UR2_485_DB0
150KR3 R173 UR2_422_TDB0
150KR3 R174 UR2_422_TDA0
+5V
C174 0.1U C179 0.1U

Signaling Rate
SN75HVD05 40 Mpbs
SN75HVD06 10 Mpbs
SN75HVD07 1 Mpbs

SN65HVD07 = -40 ~ 85 C
SN75HVD07 = 0 ~ 70 C

bypass near to SN75HVD07DR

RA10 R166
RXD-2 CTS-2 DSR-2 DCD-2 RXD-C2 CTS-C2 DSR-C2 DCD-C2
RA10 R93
TXD-2 RTS-2 DTR-2 TXD-C2 RTS-C2 DTR-C2
RA10 R92
UR2_485_DB0 UR2_485_DA0 UR2_422_TDB0 UR2_422_TDA0
UR2_485_DB0-C2 UR2_485_DA0-C2 UR2_422_TDB0-C2 UR2_422_TDA0-C2

DSR-C2 RTS-C2 SGND-C2 TXD-C2 RXD-C2 DCD-C2 CTS-C2 DTR-C2
D21 TVS_V18MLA0603(OPT)
D22 TVS_V18MLA0603(OPT)
D28 TVS_V18MLA0603(OPT)
D27 TVS_V18MLA0603(OPT)
D24 TVS_V18MLA0603(OPT)
D23 TVS_V18MLA0603(OPT)
D25 TVS_V18MLA0603(OPT)
D26 TVS_V18MLA0603(OPT)
1118000000300
VRD0603
COM_G

DB9M P1
UR2_422_TDA0-C2 UR2_422_TDB0-C2 UR2_485_DB0-C2 UR2_485_DA0-C2
DCD-C2 DSR-C2 RXD-C2 RTS-C2 TXD-C2 CTS-C2 DTR-C2 SGND-C2
33R5 R97
COM_G COM_G [7]

-55 ~ 125 C Pb Free
Vm (dc) = 18 V
Itm (8/20us) = 30 A
[ESD] Transient Voltage Surge Suppressors

Port 1

RS232 PORT 2

SN65C3243 by pass
RA10(OPT) R169
UR3_RXD 1 2 RXD-3
UR3_CTS 3 4 CTS-3
UR3_DSR 5 6 DSR-3
UR3_DCD 7 8 DCD-3
RA10(OPT) R95
UR3_TXD 7 8 TXD-3
UR3_RTS 5 6 RTS-3
UR3_DTR 3 4 DTR-3
1 2

U20 1160032433201
SN65C3243 TSSOP28P
C94 0.1U +5V
C104 SC47N50V3ZY
C111 SCD33U16V3ZY
C93 SCD33U16V3ZY
C112 SCD33U16V3ZY
[4,16] UR3_RXD
[4] UR3_CTS
[4] UR3_DSR
[4] UR3_DCD
[4,16] UR3_TXD
[4] UR3_RTS
[4] UR3_DTR
C1P C1N C2P C2N VCC GND VP VN
ROUT1 ROUT2 ROUT2B ROUT3 ROUT4 ROUT5
RIN1 RIN2 RIN3 RIN4 RIN5
DIN1 DIN2 DIN3 DOUT1 DOUT2 DOUT3
INVALID FORCEON FORCEOFF
RXD-3 CTS-3 DSR-3 DCD-3 TXD-3 RTS-3 DTR-3
UR3_232EN [4]

VCC	C1	C2, C3, C4
3.3 V	0.1 uF	0.1 uF
5 V	0.047 uF	0.33 uF
3.0 ~ 5.5 V	0.1 uF	0.47 uF

SN65C3243 = -40 ~ 85 C
SN75C3243 = 0 ~ 70 C

TTL RS232

UR3_485_DA0-C3 R190 2 UR3_485_DB0-C3
R0603 120Ω(OPT)

10KR3 R84 +5V
UR3_RXD
[4] UR3_485EN2
[4] UR3_485EN1
RS422 Receiver Data
UR3_TXD
[4] UR3_485EN0
RS422 Send Data
SN75HVD07DR U34
U35 SN75HVD07DR 1160004853200 SO8P
R REN TEN T VCC D- D+ GND
150KR3 R189 UR3_485_DA0
150KR3 R188 UR3_485_DB0
150KR3 R191 UR3_422_TDB0
150KR3 R192 UR3_422_TDA0
+5V
C183 0.1U C184 0.1U

Signaling Rate
SN75HVD05 40 Mpbs
SN75HVD06 10 Mpbs
SN75HVD07 1 Mpbs

SN65HVD07 = -40 ~ 85 C
SN75HVD07 = 0 ~ 70 C

bypass near to SN75HVD07DR

RA10 R176
RXD-3 CTS-3 DSR-3 DCD-3 RXD-C3 CTS-C3 DSR-C3 DCD-C3
RA10 R102
TXD-3 RTS-3 DTR-3 TXD-C3 RTS-C3 DTR-C3
RA10 R101
UR3_485_DA0 UR3_485_DB0 UR3_422_TDB0 UR3_422_TDA0
UR3_485_DA0-C3 UR3_485_DB0-C3 UR3_422_TDB0-C3 UR3_422_TDA0-C3

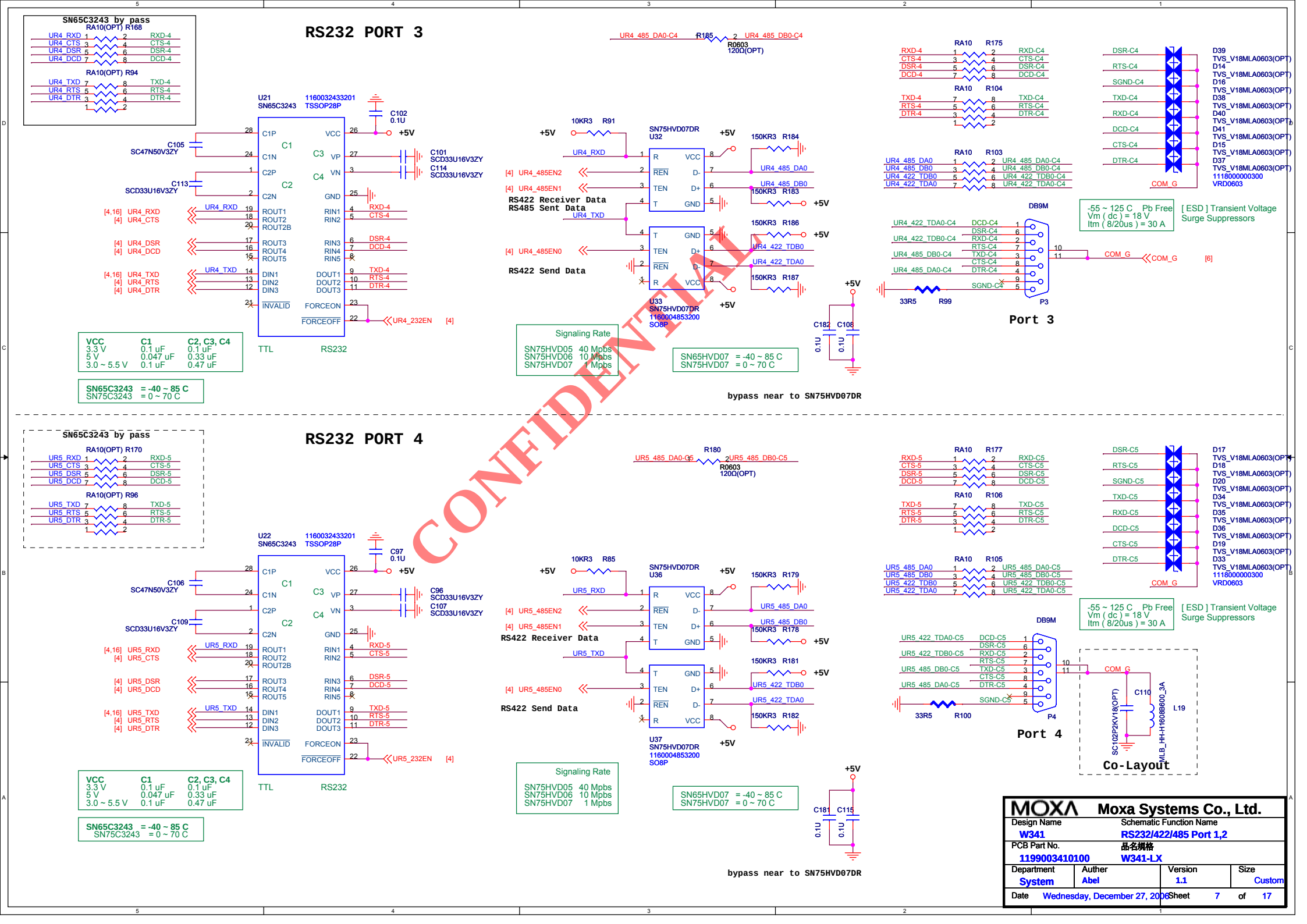
DSR-C3 RTS-C3 SGND-C3 TXD-C3 RXD-C3 DCD-C3 CTS-C3 DTR-C3
D10 TVS_V18MLA0603(OPT)
D11 TVS_V18MLA0603(OPT)
D13 TVS_V18MLA0603(OPT)
D43 TVS_V18MLA0603(OPT)
D44 TVS_V18MLA0603(OPT)
D45 TVS_V18MLA0603(OPT)
D12 TVS_V18MLA0603(OPT)
D42 TVS_V18MLA0603(OPT)
1118000000300
VRD0603
COM_G

DB9M P2
UR3_422_TDA0-C3 UR3_422_TDB0-C3 UR3_485_DB0-C3 UR3_485_DA0-C3
DCD-C3 DSR-C3 RXD-C3 RTS-C3 TXD-C3 CTS-C3 DTR-C3 SGND-C3
33R5 R98
COM_G COM_G [7]

-55 ~ 125 C Pb Free
Vm (dc) = 18 V
Itm (8/20us) = 30 A
[ESD] Transient Voltage Surge Suppressors

Port 2

MOXA Moxa Systems Co., Ltd.			
Design Name: W341	Schematic Function Name: RS232/422/485 Port 1,2		
PCB Part No.: 1199003410100	品名規格: W341-LX		
Department: System	Auther: Abel	Version: 1.1	Size: Custom
Date: Wednesday, December 27, 2006	Sheet 6 of 17		


SN65C3243 by pass
RA10(OPT) R168
UR4_RXD
UR4_CTS
UR4_DSR
UR4_DCD
RXD-4
CTS-4
DSR-4
DCD-4
RA10(OPT) R94
UR4_TXD
UR4_RTS
UR4_DTR
TXD-4
RTS-4
DTR-4
RS232 PORT 3
U21
SN65C3243
1160032433201
TSSOP28P
C1P
C1N
C2P
C2N
VCC
VP
VN
GND
ROUT1
ROUT2
ROUT2B
ROUT3
ROUT4
ROUT5
RIN1
RIN2
RIN3
RIN4
RIN5
DIN1
DIN2
DIN3
DOUT1
DOUT2
DOUT3
INVALID
FORCEON
FORCEOFF
C102 0.1U
C105 SC47N50V3ZY
C101 SCD33U16V3ZY
C114 SCD33U16V3ZY
C113 SCD33U16V3ZY
+5V
UR4_232EN
[4,16] UR4_RXD
[4] UR4_CTS
[4] UR4_DSR
[4] UR4_DCD
[4,16] UR4_TXD
[4] UR4_RTS
[4] UR4_DTR
VCC C1 C2, C3, C4
3.3 V 0.1 uF 0.1 uF
5 V 0.047 uF 0.33 uF
3.0 ~ 5.5 V 0.1 uF 0.47 uF
SN65C3243 = -40 ~ 85 C
SN75C3243 = 0 ~ 70 C
TTL
RS232
UR4_485_DA0-C4
R185
R0603
120Ω(OPT)
UR4_485_DB0-C4
10KR3 R91
SN75HVD07DR
U32
RS422 Receiver Data
RS485 Sent Data
RS422 Send Data
[4] UR4_485EN2
[4] UR4_485EN1
[4] UR4_485EN0
150KR3 R184
150KR3 R183
150KR3 R186
150KR3 R187
U33
1160004853200
SO8P
Signaling Rate
SN75HVD05 40 Mpbs
SN75HVD06 10 Mpbs
SN75HVD07 1 Mpbs
SN65HVD07 = -40 ~ 85 C
SN75HVD07 = 0 ~ 70 C
C182 0.1U
C108 0.1U
bypass near to SN75HVD07DR
RA10 R175
RA10 R104
RA10 R103
DSR-C4
RTS-C4
SGND-C4
TXD-C4
RXD-C4
DCD-C4
CTS-C4
DTR-C4
D39 TVS_V18MLA0603(OPT)
D14 TVS_V18MLA0603(OPT)
D16 TVS_V18MLA0603(OPT)
D38 TVS_V18MLA0603(OPT)
D40 TVS_V18MLA0603(OPT)
D41 TVS_V18MLA0603(OPT)
D15 TVS_V18MLA0603(OPT)
D37 TVS_V18MLA0603(OPT)
1118000000300
VRD0603
COM_G
DB9M
P3
33R5 R99
-55 ~ 125 C Pb Free
Vm (dc) = 18 V
Itm (8/20us) = 30 A
[ESD] Transient Voltage Surge Suppressors
[6]
Port 3
SN65C3243 by pass
RA10(OPT) R170
RA10(OPT) R96
UR5_RXD
UR5_CTS
UR5_DSR
UR5_DCD
UR5_TXD
UR5_RTS
UR5_DTR
RXD-5
CTS-5
DSR-5
DCD-5
TXD-5
RTS-5
DTR-5
RS232 PORT 4
U22
SN65C3243
1160032433201
TSSOP28P
C97 0.1U
C106 SC47N50V3ZY
C96 SCD33U16V3ZY
C107 SCD33U16V3ZY
C109 SCD33U16V3ZY
UR5_232EN
[4,16] UR5_RXD
[4] UR5_CTS
[4] UR5_DSR
[4] UR5_DCD
[4,16] UR5_TXD
[4] UR5_RTS
[4] UR5_DTR
VCC C1 C2, C3, C4
3.3 V 0.1 uF 0.1 uF
5 V 0.047 uF 0.33 uF
3.0 ~ 5.5 V 0.1 uF 0.47 uF
SN65C3243 = -40 ~ 85 C
SN75C3243 = 0 ~ 70 C
TTL
RS232
UR5_485_DA0-C5
R180
R0603
120Ω(OPT)
UR5_485_DB0-C5
10KR3 R85
SN75HVD07DR
U36
RS422 Receiver Data
RS422 Send Data
[4] UR5_485EN2
[4] UR5_485EN1
[4] UR5_485EN0
150KR3 R179
150KR3 R178
150KR3 R181
150KR3 R182
U37
1160004853200
SO8P
Signaling Rate
SN75HVD05 40 Mpbs
SN75HVD06 10 Mpbs
SN75HVD07 1 Mpbs
SN65HVD07 = -40 ~ 85 C
SN75HVD07 = 0 ~ 70 C
C181 0.1U
C115 0.1U
bypass near to SN75HVD07DR
RA10 R177
RA10 R106
RA10 R105
DSR-C5
RTS-C5
SGND-C5
TXD-C5
RXD-C5
DCD-C5
CTS-C5
DTR-C5
D17 TVS_V18MLA0603(OPT)
D18 TVS_V18MLA0603(OPT)
D20 TVS_V18MLA0603(OPT)
D34 TVS_V18MLA0603(OPT)
D35 TVS_V18MLA0603(OPT)
D36 TVS_V18MLA0603(OPT)
D19 TVS_V18MLA0603(OPT)
D33 TVS_V18MLA0603(OPT)
1118000000300
VRD0603
COM_G
DB9M
P4
33R5 R100
-55 ~ 125 C Pb Free
Vm (dc) = 18 V
Itm (8/20us) = 30 A
[ESD] Transient Voltage Surge Suppressors
Port 4
C110
SC102P2KV18(OPT)
L19
WLB_HH-H1608600_3A
Co-Layout
CONFIDENTIAL
MOXA
Moxa Systems Co., Ltd.
Design Name
W341
Schematic Function Name
RS232/422/485 Port 1,2
PCB Part No.
1199003410100
品名規格
W341-LX
Department
System
Auther
Abel
Version
1.1
Size
Custom
Date
Wednesday, December 27, 2006
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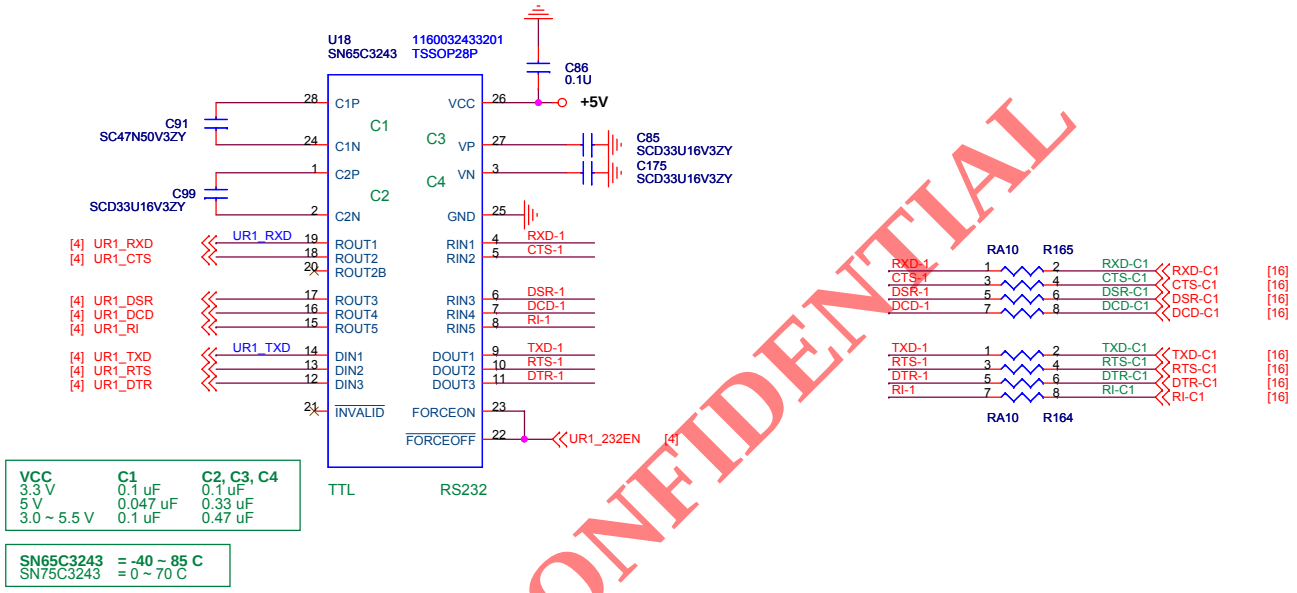
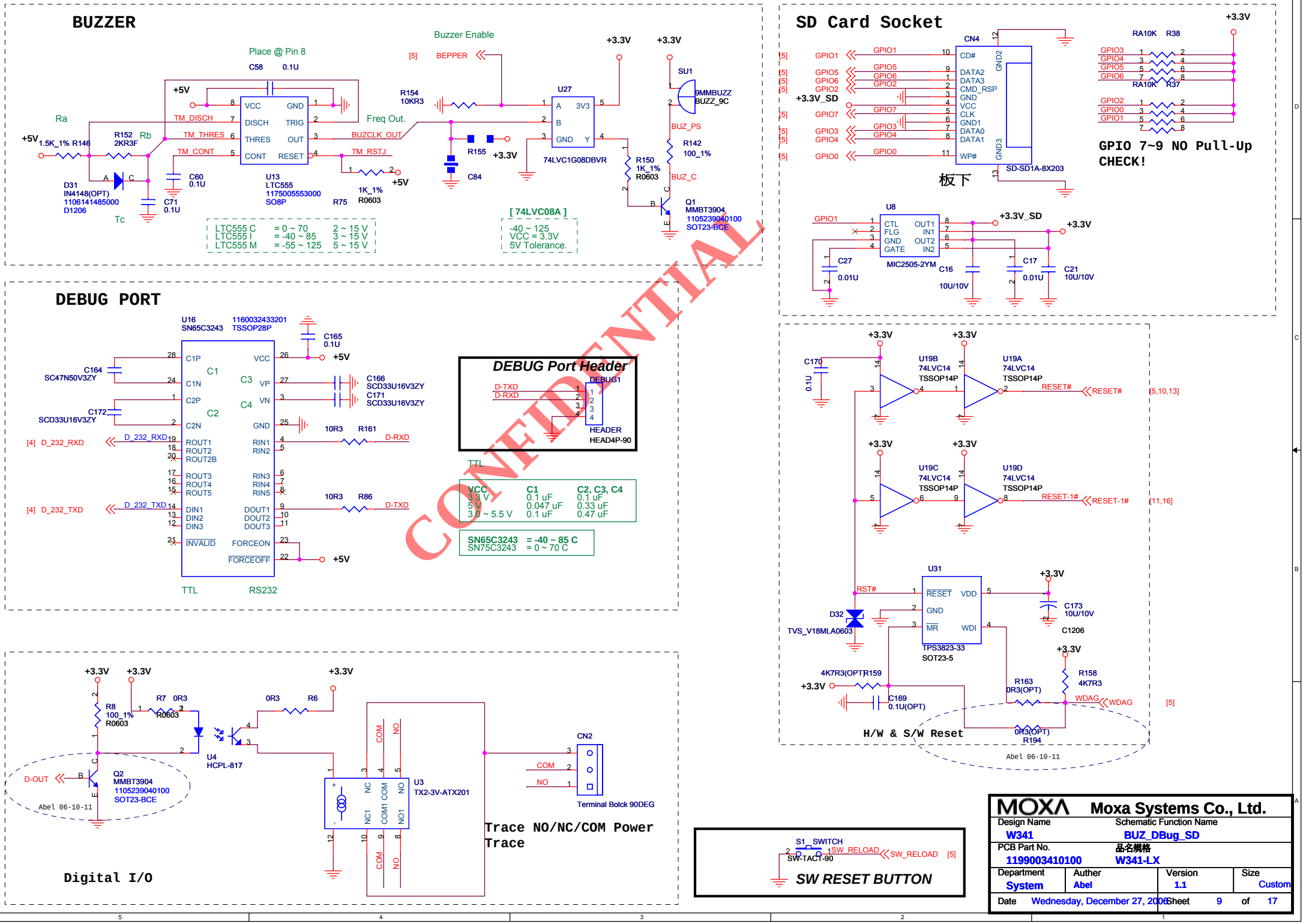
GPRS Port



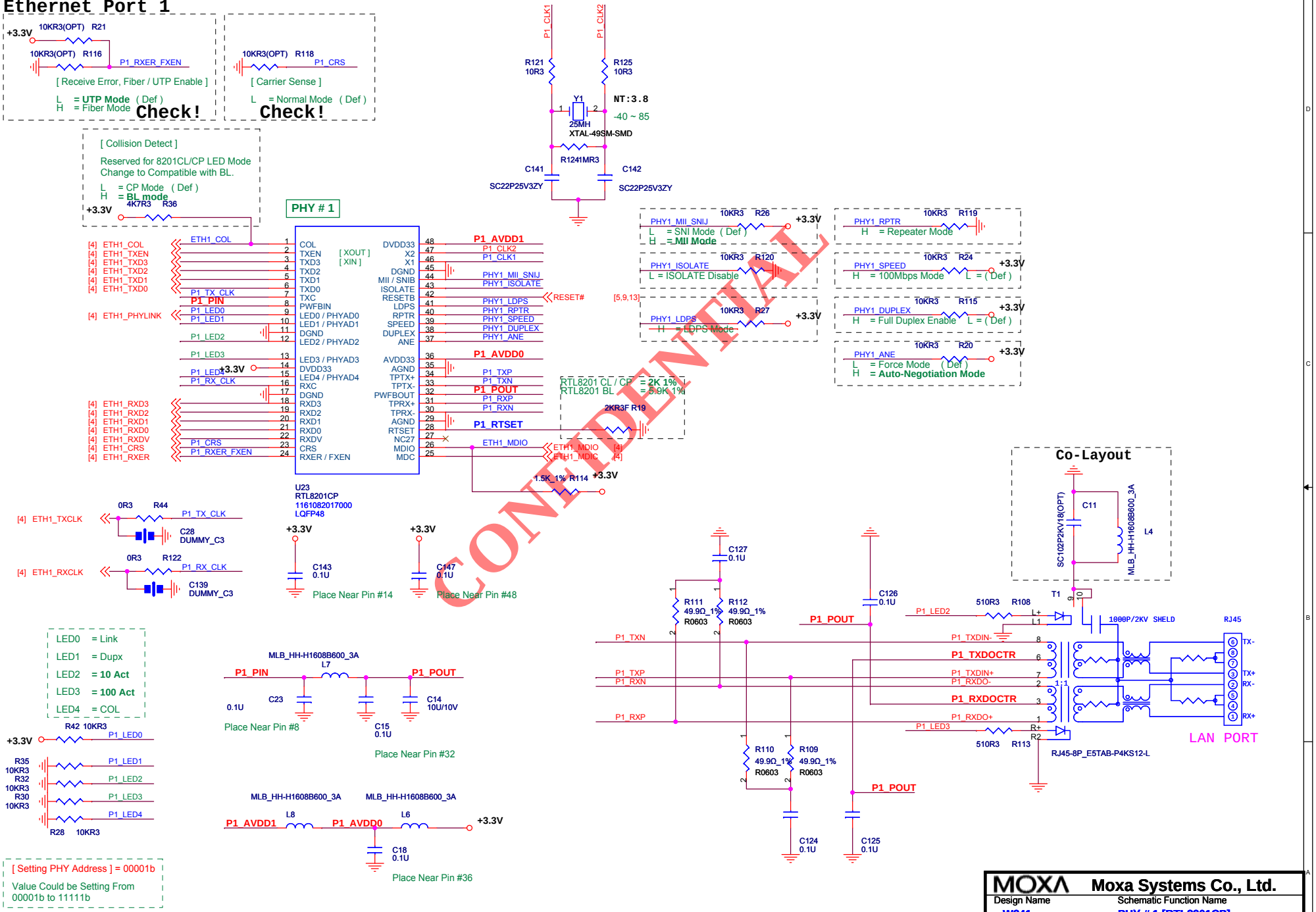
VCC	C1	C2, C3, C4
3.3 V	0.1 uF	0.1 uF
5 V	0.047 uF	0.33 uF
3.0 ~ 5.5 V	0.1 uF	0.47 uF

SN65C3243	= -40 ~ 85 C
SN75C3243	= 0 ~ 70 C

MOXA Moxa Systems Co., Ltd.			
Design Name: W341	Schematic Function Name: Console Port		
PCB Part No.: 1199003410100	品名規格: W341-LX		
Department: System	Auther: Abel	Version: V1.1	Size: Custom
Date: Wednesday, December 27, 2006	Sheet 8 of 17		


BUZZER
Place @ Pin 8
C58 0.1U
+5V
Ra
Rb
R152 2KR3F
1.5K_1% R146
TM_DISCH
TM_THRES
TM_CONT
VCC GND
DISCH TRIG
THRES OUT
CONT RESET
Freq Out.
BUZCLK_OUT
TM_RSTJ
1K_1%
R0603
R75
C60 0.1U
C71 0.1U
D31
IN4148(OPT)
1106141485000
D1206
Tc
U13
LTC555
1175005553000
SO8P
Buzzer Enable
[5] BEPPER
R154 10KR3
R155
C84
U27
74LVC1G08DBVR
A 3V3
B
GND Y
+3.3V
SU1
9MMBUZZ
BUZZ_9C
BUZ_PS
R142 100_1%
BUZ_C
R150 1K_1% R0603
Q1
MMBT3904
1105239040100
SOT23-BCE
LTC555 C = 0 ~ 70 2 ~ 15 V
LTC555 I = -40 ~ 85 3 ~ 15 V
LTC555 M = -55 ~ 125 5 ~ 15 V
[74LVC08A]
-40 ~ 125
VCC = 3.3V
5V Tolerance.
SD Card Socket
CN4
GPIO1
GPIO5
GPIO6
GPIO2
+3.3V_SD
GPIO7
GPIO3
GPIO4
GPIO0
CD#
DATA2
DATA3
CMD_RSP
GND
VCC
CLK
GND1
DATA0
DATA1
WP#
GND2
GND3
SD-SD1A-8X203
板下
RA10K R38
RA10K R37
GPIO3
GPIO4
GPIO5
GPIO6
GPIO2
GPIO0
GPIO1
GPIO 7~9 NO Pull-Up
CHECK!
U8
CTL OUT1
FLG IN1
GND OUT2
GATE IN2
MIC2505-2YM
C27 0.01U
C16 10U/10V
C17 0.01U
C21 10U/10V
DEBUG PORT
U16
SN65C3243
1160032433201
TSSOP28P
C1P C1 VCC
C1N C3 VP
C2P C4 VN
C2N GND
ROUT1 RIN1
ROUT2 RIN2
ROUT2B
ROUT3 RIN3
ROUT4 RIN4
ROUT5 RIN5
DIN1 DOUT1
DIN2 DOUT2
DIN3 DOUT3
INVALID FORCEON
FORCEOFF
C165 0.1U
C164 SC47N50V3ZY
C172 SCD33U16V3ZY
C166 SCD33U16V3ZY
C171 SCD33U16V3ZY
[4] D_232_RXD
[4] D_232_TXD
10R3 R161
10R3 R86
D-RXD
D-TXD
TTL
RS232
DEBUG Port Header
DEBUG1
HEADER
HEAD4P-90
VCC C1 C2, C3, C4
3.3 V 0.1 uF 0.1 uF
5 V 0.047 uF 0.33 uF
3.0 ~ 5.5 V 0.1 uF 0.47 uF
SN65C3243 = -40 ~ 85 C
SN75C3243 = 0 ~ 70 C
CONFIDENTIAL
C170 0.1U
U19B 74LVC14 TSSOP14P
U19A 74LVC14 TSSOP14P
U19C 74LVC14 TSSOP14P
U19D 74LVC14 TSSOP14P
RESET#
RESET-1#
[5,10,13]
[11,16]
U31
TPS3823-33
SOT23-5
RST#
RESET VDD
GND
MR WDI
D32
TVS_V18MLA0603
C173 10U/10V
C1206
4K7R3(OPT)R159
C169 0.1U(OPT)
R163 0R3(OPT)
R158 4K7R3
WDAG
0R3(OPT) R194
H/W & S/W Reset
Abel 06-10-11
Digital I/O
R8 100_1% R0603
R7 0R3
0R3 R6
U4
HCPL-817
Q2
MMBT3904
1105239040100
SOT23-BCE
D-OUT
U3
TX2-3V-ATX201
NC NC1 COM COM1 NO NO1
CN2
COM
NO
Terminal Bolck 90DEG
Trace NO/NC/COM Power Trace
S1_SWITCH
SW-TACT-90
SW_RELOAD
SW RESET BUTTON
MOXA
Moxa Systems Co., Ltd.
Design Name W341
Schematic Function Name BUZ_DBug_SD
PCB Part No. 1199003410100
品名規格 W341-LX
Department System
Auther Abel
Version 1.1
Size Custom
Date Wednesday, December 27, 2006
Sheet 9 of 17

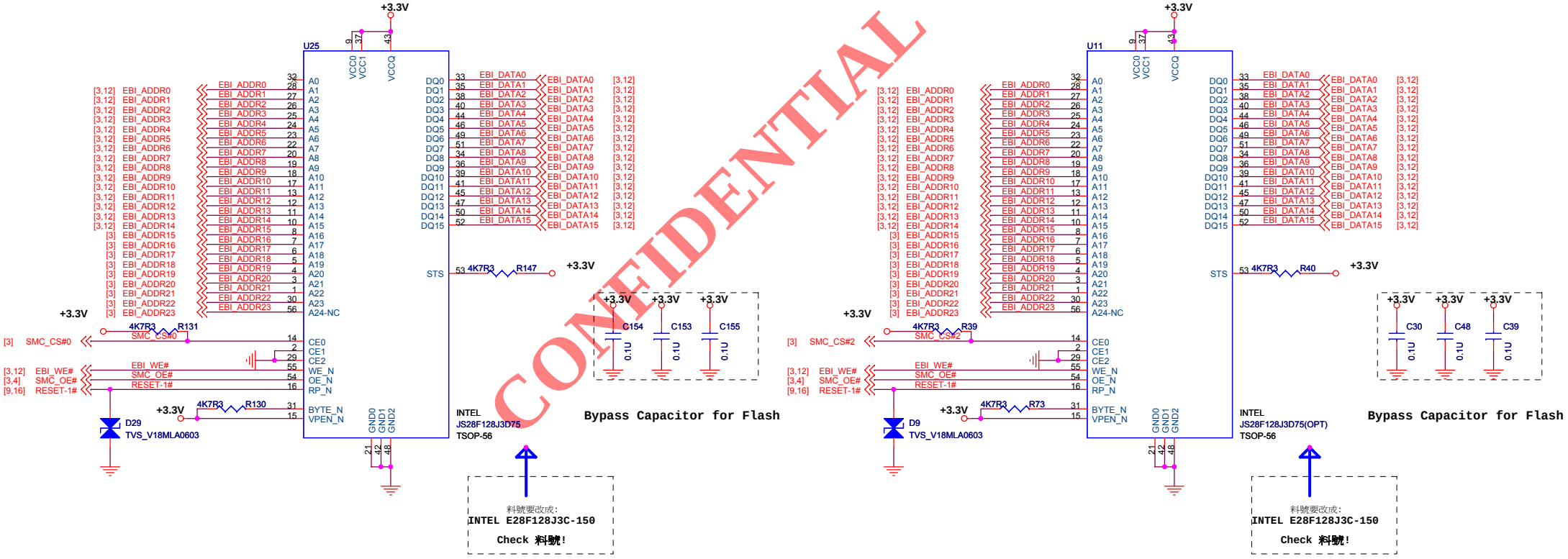
Ethernet Port 1



MOXA	Moxa Systems Co., Ltd.		
Design Name	Schematic Function Name		
W341	PHY # 1 [RTL8201CP]		
PCB Part No.	品名規格		
1199003410100	W341-LX		
Department	Auther	Version	Size
System	Abel	1.1	Custom
Date Wednesday, December 27, 2006	Sheet 10	of 17	

32MB Flash

Flash = 16MB, Mount INTEL JS28F128J3D75 ,16MB Addrs----A0~A22	1157000236001
Flash = 8MB , Mount INTEL E28F640J3D75 , 8MB Addrs----A0~A21	1157000256000/01
Flash = 4MB , Mount INTEL E28F320J3D75 , 4MB Addrs----A0~A20	1157000276001



MOXA Moxa Systems Co., Ltd.			
Design Name: W341	Schematic Function Name: FLASH 16M/32M(Option) Bytes		
PCB Part No.: 1199003410100	品名規格: W341-LX		
Department: System	Auther: Abel	Version: 1.1	Size: Custom
Date: Thursday, December 21, 2006	Sheet 11 of 17		

SDRAM 4B X 1M X 16------X1 PCS 115100020600 8MBytes

HY57V641620E(L/S)T(P)-5 200MHZ
HY57V641620E(L/S)T(P)-6 166MHZ
HY57V641620E(L/S)T(P)-7 143MHZ
HY57V641620E(L/S)T(P)-H 133MHZ

SDRAM 4B X 2M X 16------X1 PCS

64MB Mount U1,U2,U3,U4
32MB Mount U1,U2
16MB Mount U1

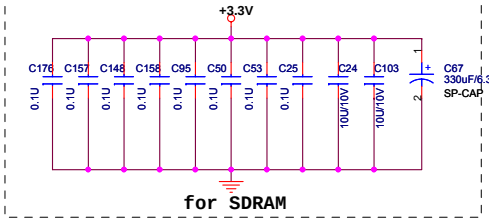
1151000226100 16MBytes

SDRAM 4B X 4M X 16------X4 PCS

HY57V561620CTP-H

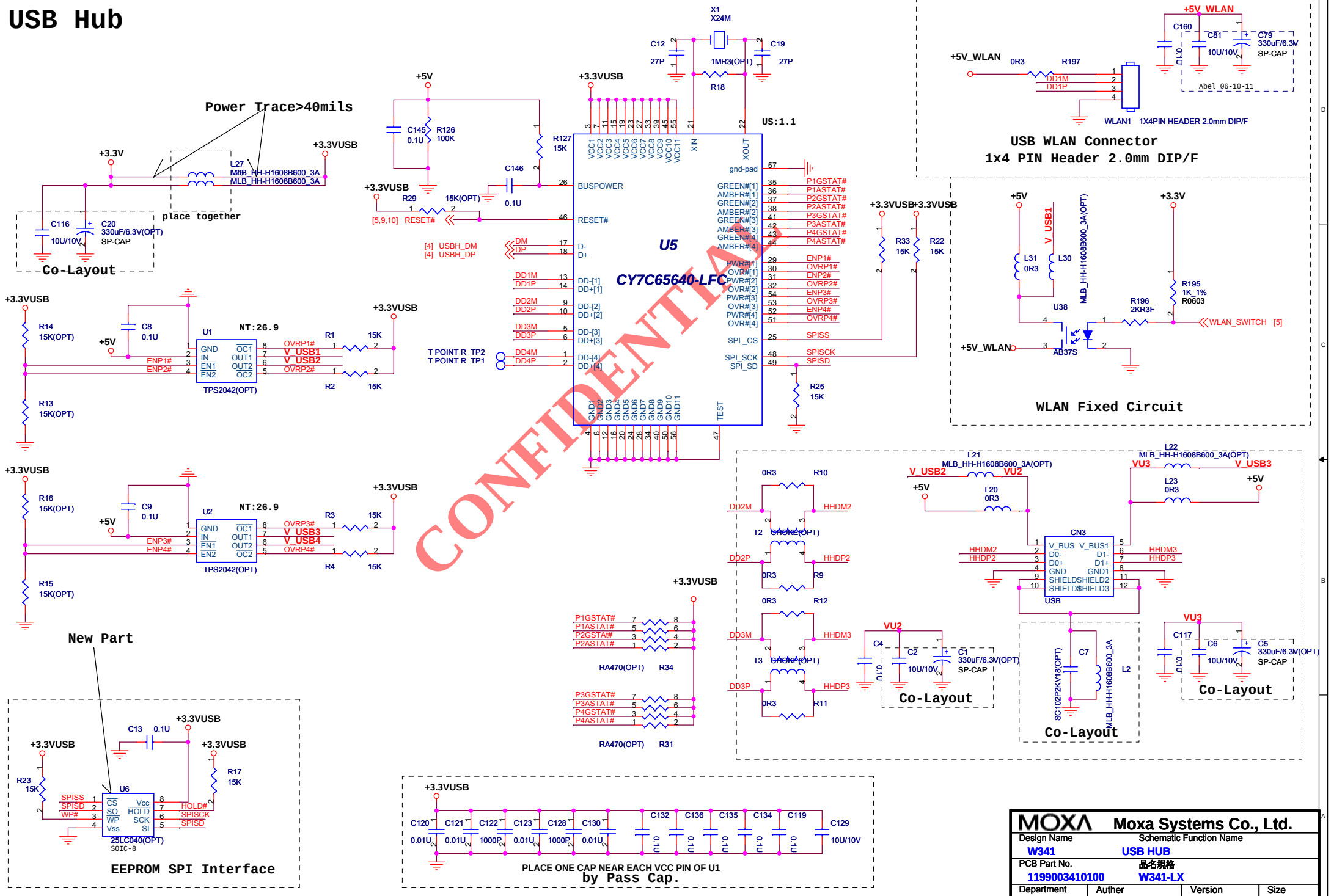
128MB Mount U1,U2,U3,U4

1151000216000 32MBytes



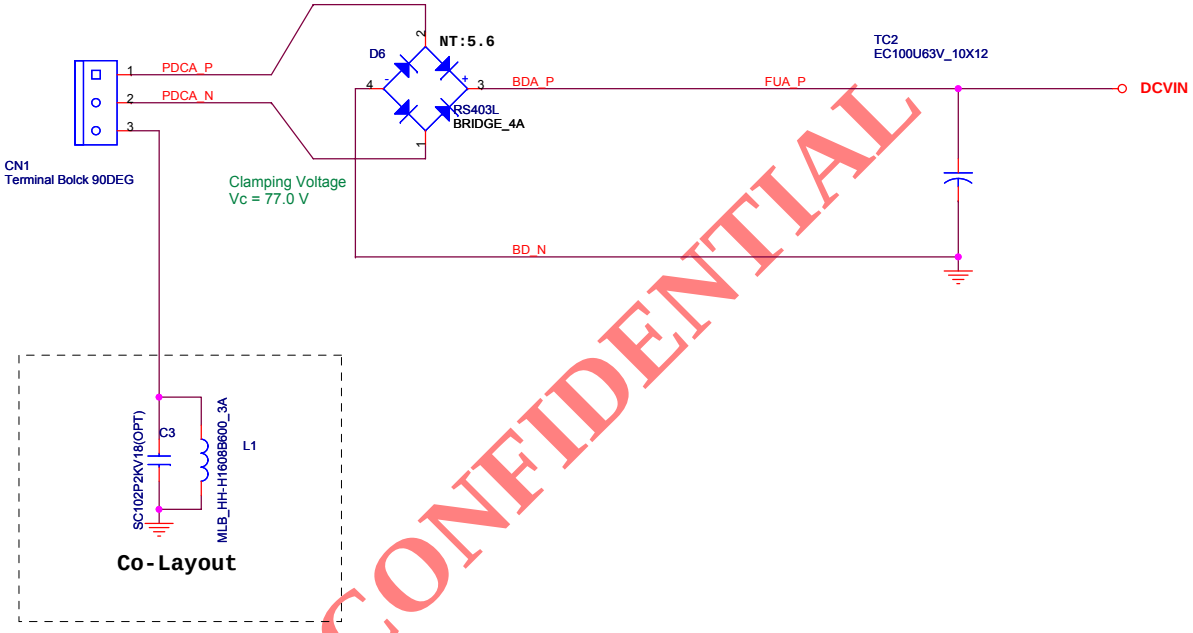
MOXA Moxa Systems Co., Ltd.			
Design Name: W341	Schematic Function Name: SDRAM 64M/128M(Option) Bytes		
PCB Part No.: 1199003410100	品名規格: W341-LX		
Department: System	Auther: Abel	Version: 1.1	Size: Custom
Date: Wednesday, December 27, 2006	Sheet 12 of 17		

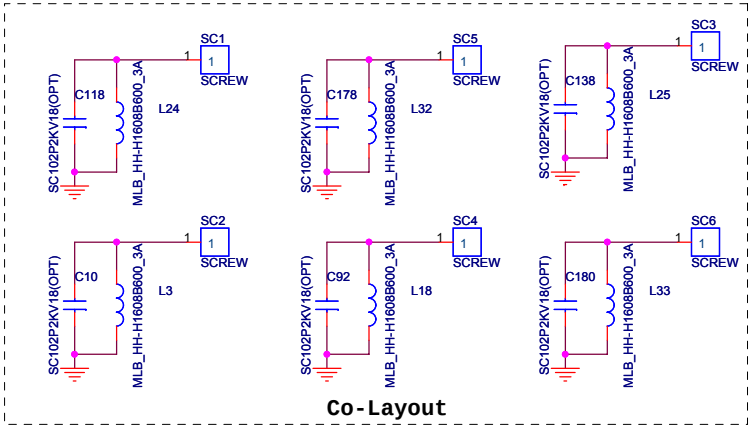
USB Hub



MOXA	Moxa Systems Co., Ltd.		
Design Name	Schematic Function Name		
W341	USB HUB		
PCB Part No.	品名規格		
1199003410100	W341-LX		
Department	Auther	Version	Size
System	Abel	1.1	Custom
Date Wednesday, December 27, 2006	Sheet 13 of 17		

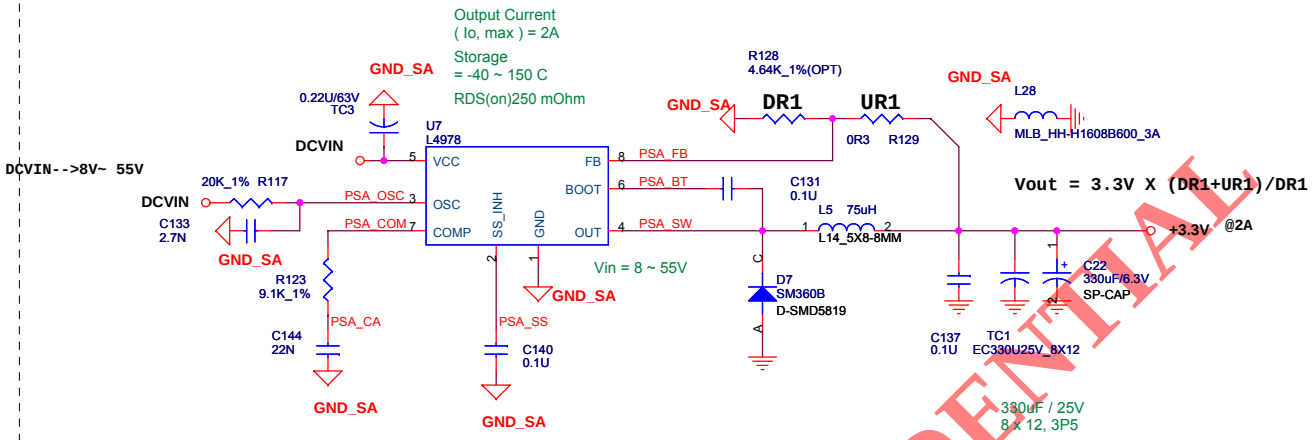
12V~48V DCIN



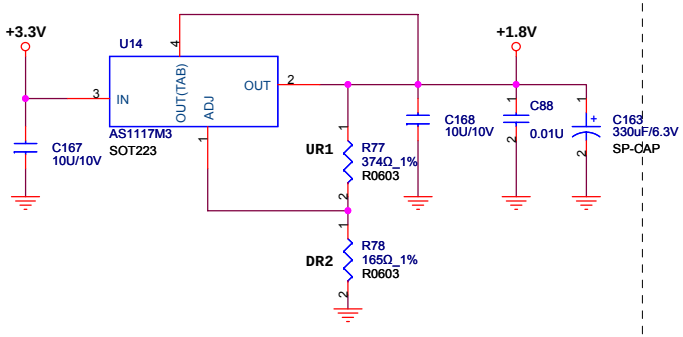


MOXA **Moxa Systems Co., Ltd.**			
Design Name: W341	Schematic Function Name: DC12V~48V Input		
PCB Part No.: 1199003410100	品名規格: W341-LX		
Department: System	Auther: Abel	Version: 1.1	Size: Custom
Date: Thursday, December 21, 2006	Sheet 14 of 17		

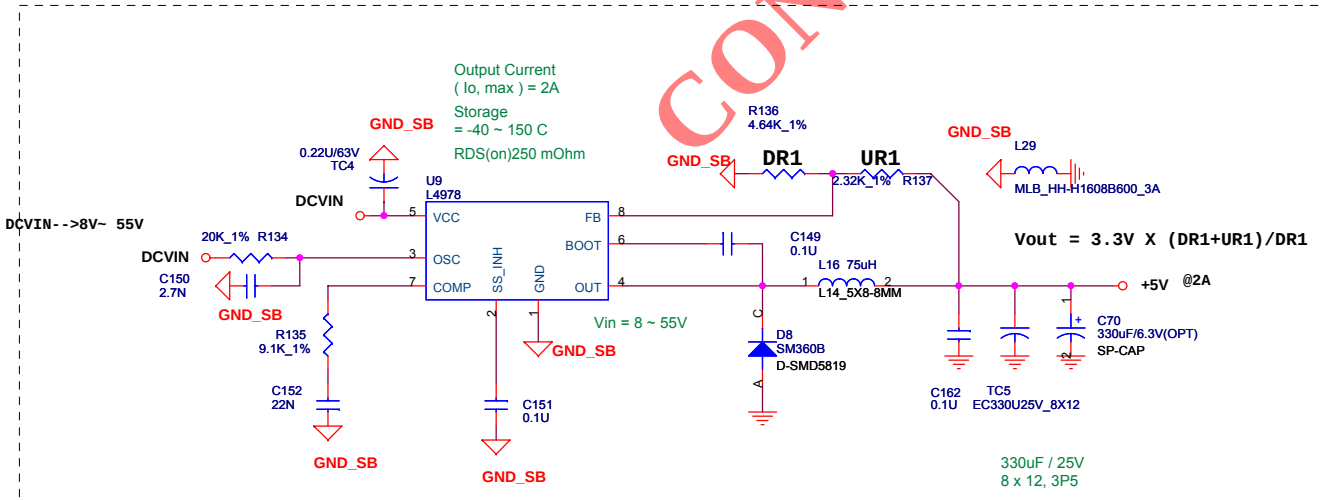
DC-DC OUTPUT



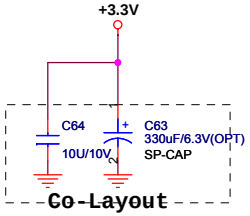
+3.3V OUTPUT @2A Max



+1.8V OUTPUT @900mA

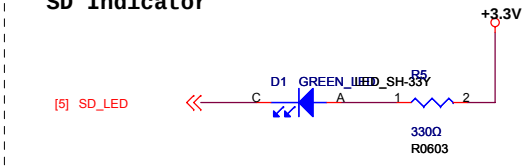


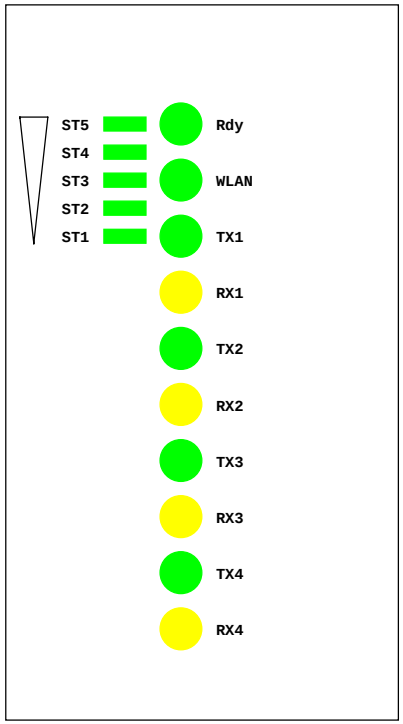
+5V OUTPUT @2A Max (Wireless LAN,USBX2,Line Driver)

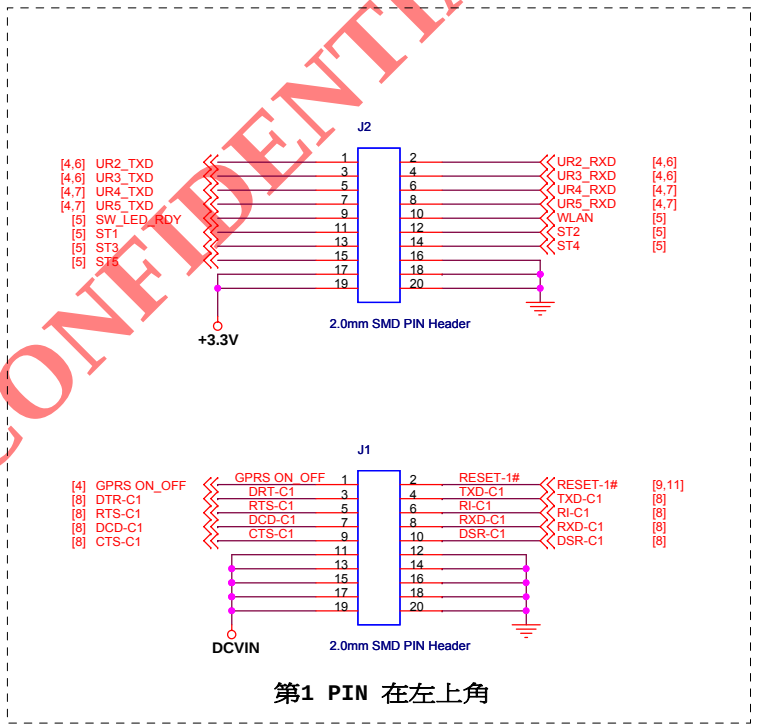


MOXA Moxa Systems Co., Ltd.			
Design Name: W341	Schematic Function Name: DC-DC 5V/3.3V/1.8V Output		
PCB Part No.: 1199003410100	品名規格: W341-LX		
Department: System	Auther: Abel	Version: 1.1	Size: Custom
Date: Wednesday, December 27, 2006	Sheet: 15 of 17		

SD Indicator







第1 PIN 在左上角

MOXA Moxa Systems Co., Ltd.			
Design Name: W341	Schematic Function Name: PIN Header to Top		
PCB Part No.: 1199003410100	品名規格: W341-LX		
Department: System	Auther: Abel	Version: 1.1	Size: Custom
Date: Thursday, December 21, 2006	Sheet: 16 of 17		

06-10-11

1. Relay Circuit Change R8 as 100 ohm, Add Q2(2N3904), Change R7 as 0 ohm
2. USB Port removed L30,L21,L22,U1,U2
   Mount L31,L20,L23 as 0 ohm
3. Reset Circuit , Add R194
4. Relay connector revise spec. to 1111002002400
5. USB common chock dimension changed to 1104100070000

'06-12-20

1. WLAN Power Cycleing Fixed

MOXA Moxa Systems Co., Ltd.			
Design Name: W341	Schematic Function Name: History		
PCB Part No.: 1199003410100	品名規格: w341-lx		
Department: System	Auther: <Auther>	Version: 1.1	Size: Custom
Date: Thursday, December 21, 2006	Sheet 17 of 17		

EXHIBIT G

Part List

MOXA SYSTEMS Co. Ltd

03-21-2007 #BO W341 LED V1.0

Part Number	Part	Q'ty	Ref.
1102470057000	RA 470Ω 1/10W 5% 8P4R	4	R11 R12 R13 R14
1104000002101	Bead 60ohm@100MHz 3A	4	L1 L2 L4 L5 L6
1106999990800	LED 3mm with HOLDER 3mm	6	D7 D8 D9 D10 D11 D14
1106999990900	LED 3mm with HOLDER 3mm	4	D15 D16 D17 D18
110699999A000	LED Green Square with HOLDER 2.0mm	5	D5 D6 D13 D19 D20
1126001210C00	HEADER 2*10PIN/M/180DEG	2	J2 J3
1199003411100	*W341 PCB V1.0	1	
1201000000000	Label	1	
1204000001200	LED Holder	1	

MOXA SYSTEMS Co. Ltd

03-21-2007 #BO W341 CPU V1.1

Part Number	Part	Q'ty	Ref.
1101000057100	R 0Ω 1/10W 5%	13	R6 R7 R9 R10 R11 R12 R44 R122 R129 L20 L23 L31 R197
1101001068100	R 1KΩ 1/10W 1%	3	R75 R150 R195
1101001077200	R 1MΩ 1/10W 5%	4	R47 R56 R63 R124
1101002068000	R 2KΩ 1/10W 1%	3	R19 R152 R196
1101010057200	R 10Ω 1/10W 5%	20	R43 R48 R49 R55 R59 R61 R64 R65 R69 R71 R72 R81 R86 R121 R125 R138 R145 R148 R15
1101010067100	R 10KΩ 1/10W 5%	17	R20 R24 R26 R27 R28 R30 R32 R35 R42 R84 R85 R91 R115 R119 R120 R154 R156
1101012068100	R 12KΩ 1/10W 1%	2	R52 R53
1101015067100	R 15KΩ 1/10W 5%	10	R1 R2 R3 R4 R17 R22 R23 R25 R33 R127
1101015768000	R 1.5KΩ 1/10W 1%	2	R114 R146
1101020068000	R 20KΩ 1/10W 1%	2	R117 R134
1101033057000	R 33Ω 1/8W 5%	4	R97 R98 R99 R100
1101047767100	R 4.7KΩ 1/10W 5%	15	R36 R39 R40 R50 R51 R58 R60 R68 R73 R76 R130 R131 R144 R147 R158
1101091768000	R 9.1KΩ 1/10W 1%	2	R123 R135
1101100058000	R 100Ω 1/10W 1%	2	R142 R8
1101100067000	R 100KΩ 1/10W 5%	1	R126
1101150067100	R 150KΩ 1/10W 5%	16	R171 R172 R173 R174 R178 R179 R181 R182 R183 R184 R186 R187 R188 R189 R191 R192
1101165058000	R 165Ω 1/10W 1%	1	R78
1101232868000	R 2.32KΩ 1/10W 1%	1	R137
1101330057100	R 330Ω 1/10W 5%	1	R5
1101375058000	R374 SMD 0603	1	R77
1101464868000	R 4.64KΩ 1/10W 1%	1	R136
1101499758000	R 49.9Ω 1/10W 1%	4	R109 R110 R111 R112
1101510057200	R 510Ω 1/10W 5%	2	R108 R113
1102010057000	RA 10Ω 1/10W 5% 8P4R	29	R153 R162 R164 R165 R166 R175 R176 R177 R46 R57 R62 R66 R74 R79 R83 R92 R93 R10 R102 R103 R104 R105 R106 R132 R133 R139 R140 R141 R151
1102010067000	RA 10KΩ 1/10W 5% 8P4R	7	R37 R38 R80 R82 R88 R89 R90
1102047767000	RA 4.7KΩ 1/10W 5% 8P4R	2	R45 R54
1102470057000	RA 470Ω 1/10W 5% 8P4R	1	R107
1103001733300	C/M 0.1uF/25V X7R ±10%	87	C4 C8 C9 C13 C15 C18 C23 C25 C30 C32 C36 C37 C39 C41 C47-C50 C52 C53 C55-C62 C65 C68 C69 C71-C78 C80 C83 C86 C94 C95 C97 C100 C102 C108 C115 C117 C119 C124-C127 C131 C132 C134-C137 C140 C143 C145-C149 C151 C153 -C158 C160-C162 C165 C170 C17 4 C176 C179 C181-C184
1103001833000	*C/M 0.01uF/50V X7R 80~-20%	9	C17 C27 C33 C46 C88 C120 C121 C123 C130
1103001933000	C/M 1nF/50V X7R ±10%	2	C122 C128
1103002014400	C/M 27pF/50V NPO ±5%	2	C12 C19
1103005013000	C/M 5pF/50V NPO ±0.25pF	2	C51 C66
1103010033000	C/M 10uF/10V Y5V 80~-20%	16	C2 C6 C14 C16 C21 C24 C42 C43 C64 C81 C103 C116 C129 C167 C168 C173

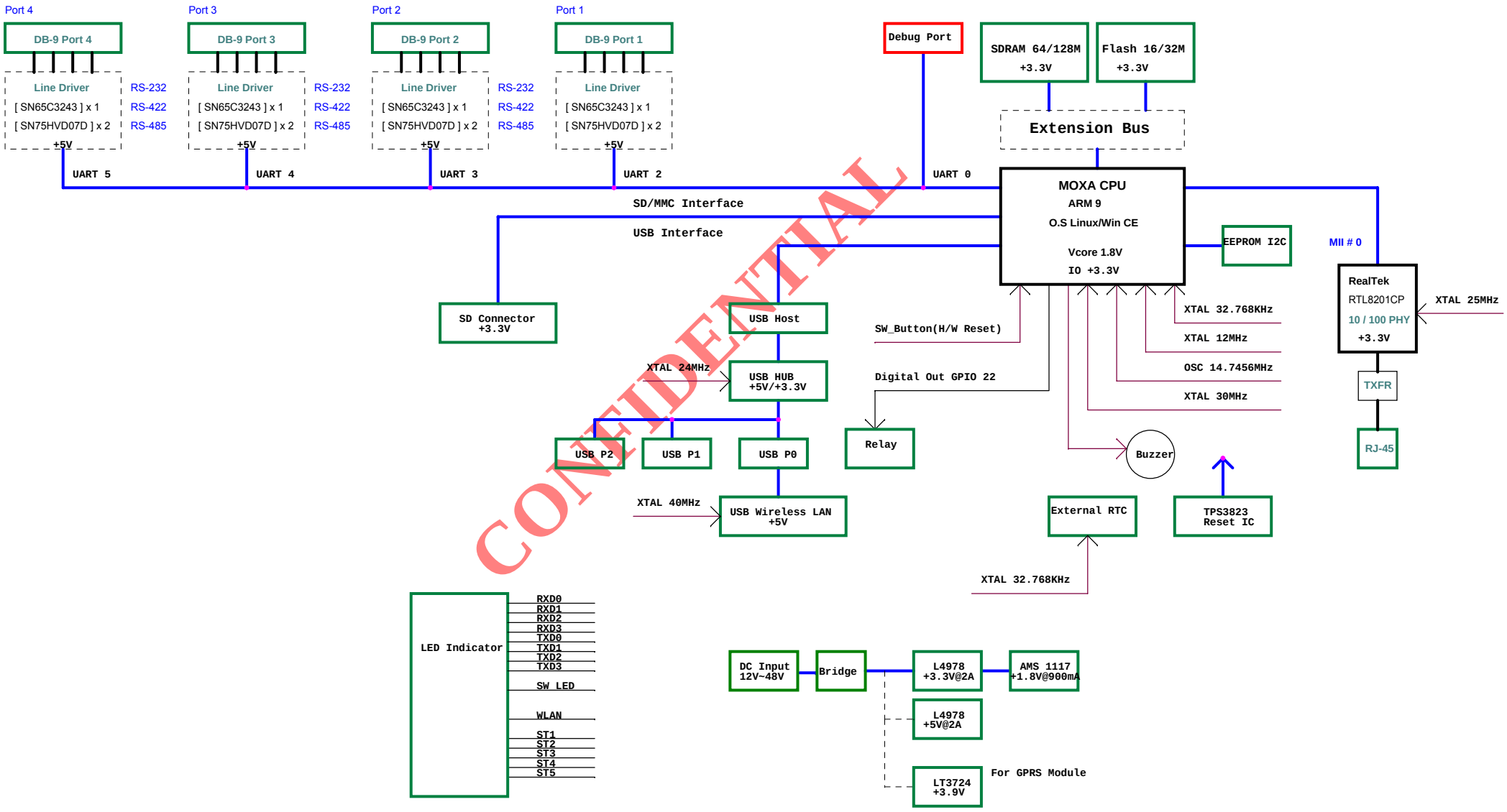
1103022011100	C/M 22pF/25V NPO ±20%	8	C29 C34 C35 C38 C40 C45 C141 C142
1103022023000	C/M 22nF/50V X7R ±10%	2	C144 C152
1103022836000	C/MEC 0.22u F/63V	2	TC3 TC4
1103027723000	C/M 2.7nF/50V X7R ±10%	2	C133 C150
1103047023000	C/M 47nF/50V Y5V 80~-20%	6	C90 C91 C104 C105 C106 C164
1103100013000	C/M 100pF/50V NPO ±5%	4	C26 C54 C159 C177
1103100034300	C/E 100uF/63V	1	TC2
1103330023000	C/M 0.33uF/16V X7R 10%	18	C82 C85 C89 C93 C96 C98 C99 C101 C107 C109 C111 C112 C113 C114 C166 C171 C172 C
1103330031100	C 330uF/6.3V	4	C22 C67 C79 C163
1103330034100	C/E 330uF/25V	2	TC1 TC5
1104000002101	Bead 60ohm@100MHz 3A	25	L1 L2 L3 L4 L6 L7 L8 L9 L10 L11 L12 L13 L14 L15 L17 L18 L19 L24 L25 L26 L27 L28
1104075031000	L/Choke 75uH/4.0A 20%	2	L5 L16
1105239040100	TR NPN 2N3904	2	Q1 Q2
1106000545000	Schottky barrier BAT54C	1	D30
1106004030000	BRIDGE DIODE RS403L	1	D6
1106158225001	DIODE 1N5822	2	D7 D8
1106999994200	LED GREEN/0805/180DEG	4	D2 D3 D4 D5
1106999999000	LED 3mm with HOLDER	1	D1
1107000000200	RELAY TX2-3V	1	U3
1107000000600	Relay/N/1C 20V/1.7A	1	U38
1109000040700	TACTIAL PUSHBUTTON	1	S1
1111000002200	TERMINAL BLOCK 300V 15A	1	CN1
1111002002400	TERMINAL BLOCK 300V 8A	1	CN2
1114000000000	Battery	1	BT1
1116000000101	Buzzer	1	SU1
1118000000300	T.V.S-MLV1608E18N101A	3	D9 D29 D32
1119002017101	CRYSTAL 25MHz 49US +/-30PPM	1	Y1
1119012070000	CRYSTAL 12MHz +/-30PPM	1	Y4
1119024070000	CRYSTAL 24MHz	1	X1
1119030070000	XTAL 30MHz 20pF 30ppm	1	Y2
1119327760100	CRYSTAL 32.768KHz+/-20PPM	2	X2 X3
1120002000501	OSC 14.7456MHZ	1	X4
1122011170000	REGULATOR CM1117GCM3223	1	U14
1122025050000	MIC2505-2YM	1	U8
1122049780000	REGULATOR L4978(Minidip)	2	U7 U9
1126001102100	HEADER 1*2PIN/M/180DEG	1	JP1
1126001104100	HEADER 1*4PIN/M/90DEG	1	DEBUG1
1126002104100	HEADER 1*4PIN/F/180DEG	1	WLAN1
1126002210500	HEADER 2*10PIN/F/180DEG	2	J1 J2
1126003090000	CONN.DB 9/M/90DEG	4	P1 P2 P3 P4
1126005083201	RJ45T/U/S 100M DIP/90D	1	T1
1126010001000	USB_ATYPE_DU	1	CN3

1126024001000	SD Push-Pull Connector	1	CN4
1128000000000	HT1381	1	U12
1151000226100	SDRAM 4*2M*16	4	U10 U15 U24 U28
1157073230000	#Flash W341-LX	1	U25
1160004853203	RS-485 transceiver	8	U29 U30 U32 U33 U34 U35 U36 U37
1160032433201	ZT3243LFEY	6	U16 U17 U18 U20 U21 U22
1161082017000	RTL 8201 CP-VD-LF PHY	1	U23
1162038233101	ResetIC EM6323LXSP5B-2.9A	1	U31
1162656400000	USB Hub Controller CY7C65640	1	U5
1164001813000	PHOTO HCPL-181	1	U4
1174008010000	TTL IC SN74LVC1G08	1	U27
1174014019000	74LVC14 TTL SMD	1	U19
1175005553000	TLC 555C	1	U13
1180004040000	MOXA ART RISC CPU	1	U26
1199003410100	#PCB W341 CPU 6L V1.0_1	1	
1201000000000	Label	1	

EXHIBIT H

Block Diagram

W341 Ver:1.0



MOXA Moxa Systems Co., Ltd.			
Design Name: W341	Schematic Function Name: Block Diagram		
PCB Part No.: 1199003410100	品名規格: W341-LX		
Department: System	Auther: Abel	Version: 1.1	Size: Custom
Date: Tuesday, April 17, 2007		Sheet: 2 of 17	

EXHIBIT I

Operational Description

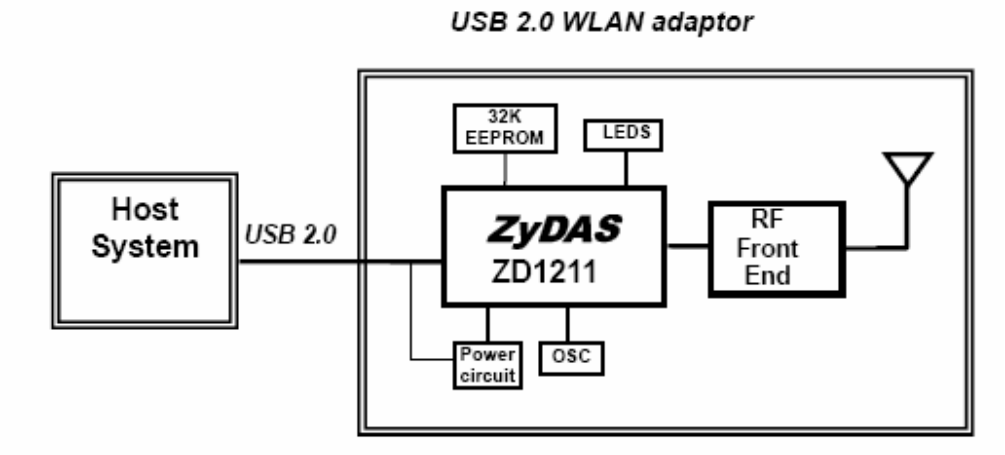
Operation Principles:

AL7230：

AL7230 is a highly integrated RF transceiver IC for 2.4 GHz and 5 GHz dual-band 802.11a/b/g applications, and combines all functions of the transceiver in a single chip. AL7230 also integrates on-chip PA and PLL with embedded loop filter to help you to minimize the use of external components to design an RF subsystem .The receive path includes two single-ended input Low Noise Amplifiers (LNA) and down-conversion mixers with DC-offset cancellation for both 2.4GHz and 5GHz band, and a variable gain amplifier with a baseband low-pass filter without the need of external SAW filters .The transmitter consists of a up-conversion quadrate modulator with a baseband low pass filter, a variable gain amplifier, and two power amplifiers with power detector and temperature sensor to complete the whole transmit path function for both 2.4GHz and 5GHz band. A power-on calibration procedure is established to correct the TX DC offset, filters mismatch and phase imbalance. These functions are housed in a 56-pin QFPN package.

ZD1211B：

ZD1211 is a compact, low power, high security and high performance solution for versatile WLAN applications.ZD1211 integrates WLAN MAC controller, base-band processor and USB 2.0 interface in single chip. The integrated USB 2.0 controller reduces the cost and design complexity. No extra memory device is needed. It can fit into small PCB form factor. There is Micro-Controller inside the chip. This allows the flexibility to software change the operation scenario to adapt in USB or WLAN compatibility issues. Integrated standard compliant hardware security engine to improve the performance in security mode. The hardware engine includes the WEP64, WEP128, WEP256, AES-CCM, TKIP that comply Wi-Fi and IEEE 802.11 defined standards. ZD1211 considers the power management issues in WLAN applications and USB certification. It provides the lower power consumption for WLAN in power saving mode and USB suspend mode. ZD1211 can operate in the mode of station and access point. It can fit to feature demand in different WLAN applications. Optional 16 bit host interface is provided. This interface can connect to the memory bus of host processor . It will be useful in embedded application.

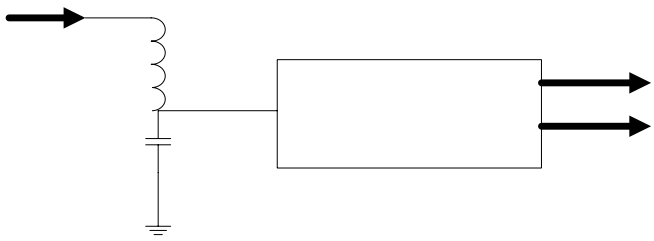


1. 802.11 supported speed and modulation

Standard	Modulation Type	Data Rate	Modulation First/Second	Encoding Rate	Note
IEEE802.11a	OFDM.BPSK (6 Mbps)	6 Mbps	BPSK/OFDM	1/2	
	OFDM.BPSK (9 Mbps)	9 Mbps	BPSK/OFDM	3/4	
	OFDM.QPSK (12 Mbps)	12 Mbps	QPSK/OFDM	1/2	
	OFDM.QPSK (18 Mbps)	18 Mbps	QPSK/OFDM	3/4	
	OFDM.16QAM (24 Mbps)	24 Mbps	16QAM/OFDM	1/2	
	OFDM.16QAM (36 Mbps)	36 Mbps	16QAM/OFDM	3/4	
	OFDM.64QAM (48 Mbps)	48 Mbps	64QAM/OFDM	2/3	
	OFDM.64QAM (54 Mbps)	54 Mbps	64QAM/OFDM	3/4	
	AUTO	Auto	Auto		
IEEE802.11b	DSSS.DBPSK (1 Mbps)	1 Mbps	DBPSK/DSSS		LongPLCP
	DSSS.DQPSK (2 Mbps)	2 Mbps	DQPSK/DSSS		LongPLCP or ShortPLCP
	CCK (5.5 Mbps)	5.5 Mbps	CCK		
	CCK (11 Mbps)	11 Mbps	CCK		
	PBCC.BPSK (5.5 Mbps)	5.5 Mbps	BPSK/PBCC		
	PBCC.QPSK (11 Mbps)	11 Mbps	QPSK/PBCC		
	AUTO	Auto	Auto		
IEEE802.11g	DSSS.DBPSK (1 Mbps)	1 Mbps	DBPSK/ERP_DSSS		LongPLCP
	DSSS.DQPSK (2 Mbps)	2 Mbps	DQPSK/ERP_DSSS		LongPLCP or ShortPLCP
	CCK (5.5 Mbps)	5.5 Mbps	CCK		
	CCK (11 Mbps)	11 Mbps	CCK		
	PBCC.BPSK (5.5 Mbps)	5.5 Mbps	BPSK/ERP_PBCC		
	PBCC.QPSK (11 Mbps)	11 Mbps	QPSK/ERP_PBCC		
	PBCC.8PSK (22 Mbps)	22 Mbps	8PSK/ER_PBCC		
	PBCC.8PSK (33 Mbps)	33 Mbps	8PSK/ER_PBCC		
	OFDM.BPSK (6 Mbps)	6 Mbps	BPSK/DSSS_OFDM	1/2	
	OFDM.BPSK (9 Mbps)	9 Mbps	BPSK/DSSS_OFDM	3/4	
	OFDM.QPSK (12 Mbps)	12 Mbps	BPSK/DSSS_OFDM	1/2	
	OFDM.QPSK (18 Mbps)	18 Mbps	BPSK/DSSS_OFDM	3/4	
	OFDM.16QAM (24 Mbps)	24 Mbps	16QAM/DSSS_OFDM	1/2	
	OFDM.16QAM (36 Mbps)	36 Mbps	16QAM/DSSS_OFDM	3/4	
	OFDM.64QAM (48 Mbps)	48 Mbps	64QAM/DSSS_OFDM	2/3	
	OFDM.64QAM (54 Mbps)	54 Mbps	64QAM/DSSS_OFDM	3/4	
	AUTO	Auto	Auto		

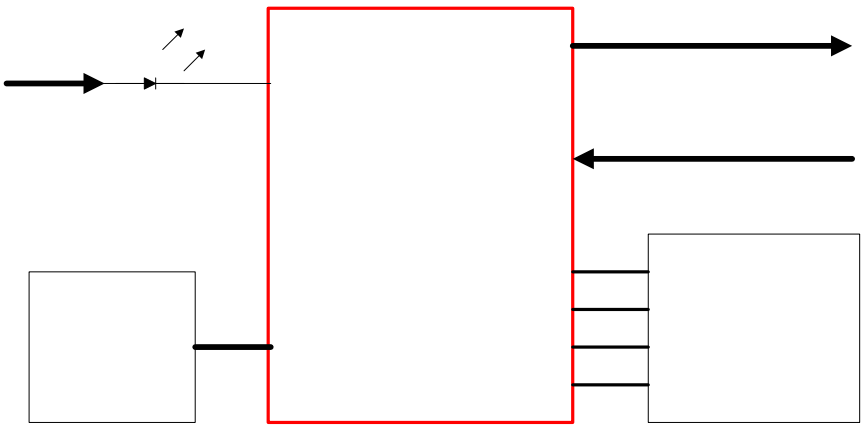
2. Clock system

That oscillator is support 40MHz clock to RF/PLL, Analog, and Digital circuit. Among DC noise must be isolated by LC circuit.



3. Baseband Chipset

ZD1211 integrates WLAN MAC controller, base-band processor and USB 2.0 interface in single chip. ZD1211 needs a 32K bit or 64K bit serial EEPROM to provide the card identification on booting stage and RF information on operation. The interface also provides software interface to read and write EEPROM. USB 2.0 interface is fully compatible to 480M USB high speed mode and 12M full speed mode. It integrates USB 2.0 physical layer transceiver and controller in chip. The embedded microcontroller and serial EEPROM provide flexibility for customization of card identification in USB enumeration. The behavior of LED may be programmable by software on host system.



4. Transceiver and Front-end

The AL7230 is a 2.4/5GHz dual-band transceiver for 802.11a/b/g applications. There are five main blocks – power amplifier, transmitter, receiver, synthesizer and three-wire interface. And external two baluns transfer 2.4/5GHz power to antenna. The receiver path includes two single-ended input Low Noise Amplifiers, down-conversion mixers with DC-offset cancellation for both 2.4GHz and 5GHz band, and a variable gain amplifier with a baseband low-pass filter without the external SAW filter.

EXHIBIT J

Photographs of EUT


ThinkCore W341
Wireless Embedded Computer
MOXA
Ready
P1 P2 P3 P4
WLAN
P1 P2 P3 P4
Tx
Rx


USB
LAN
NO
COM
NC
12-48V
Reset
MOXA

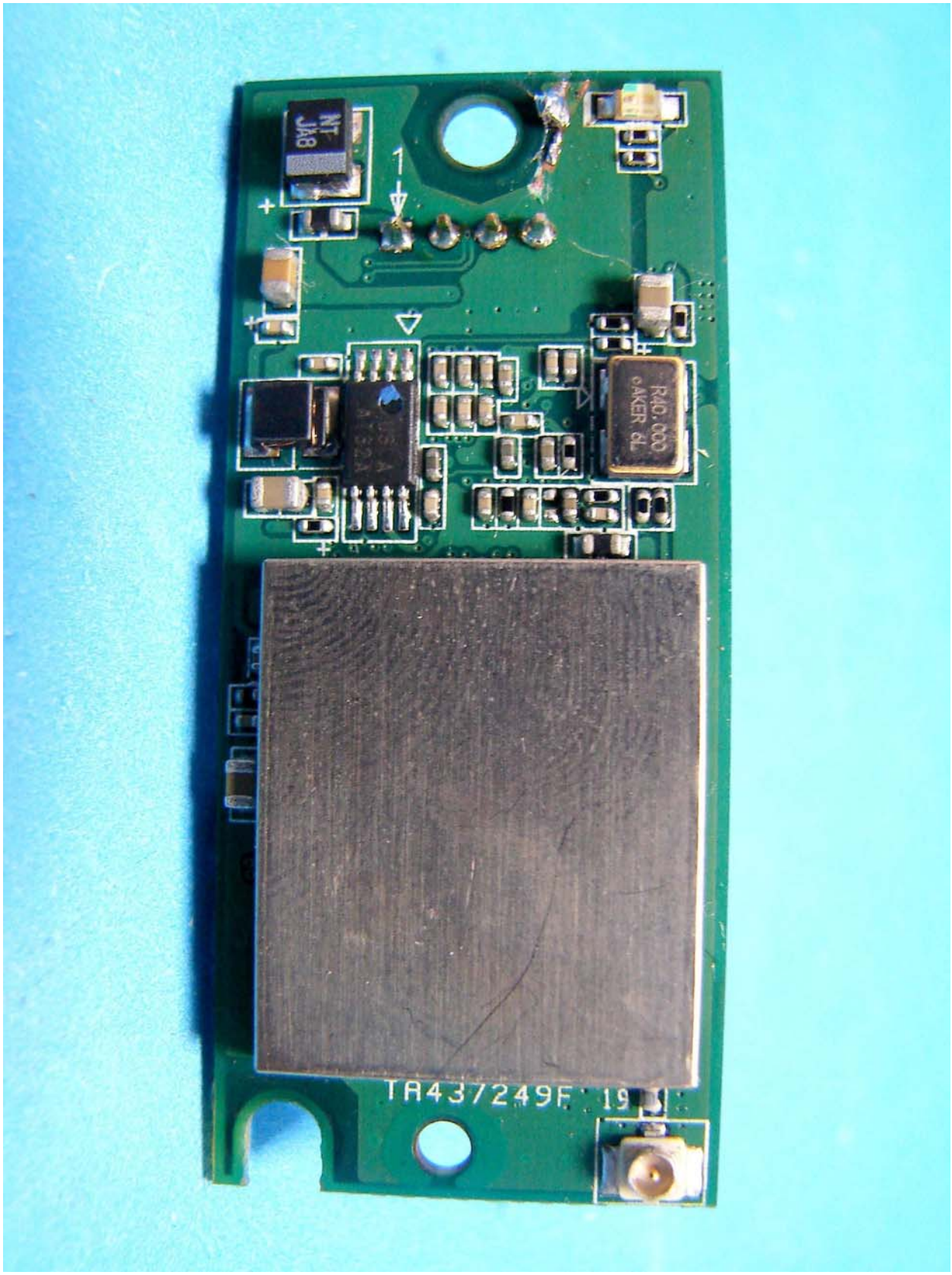

ThinkCore W341
MOXA
P1
RS-232/422/485
P2
P3
RS-232/422/485
P4

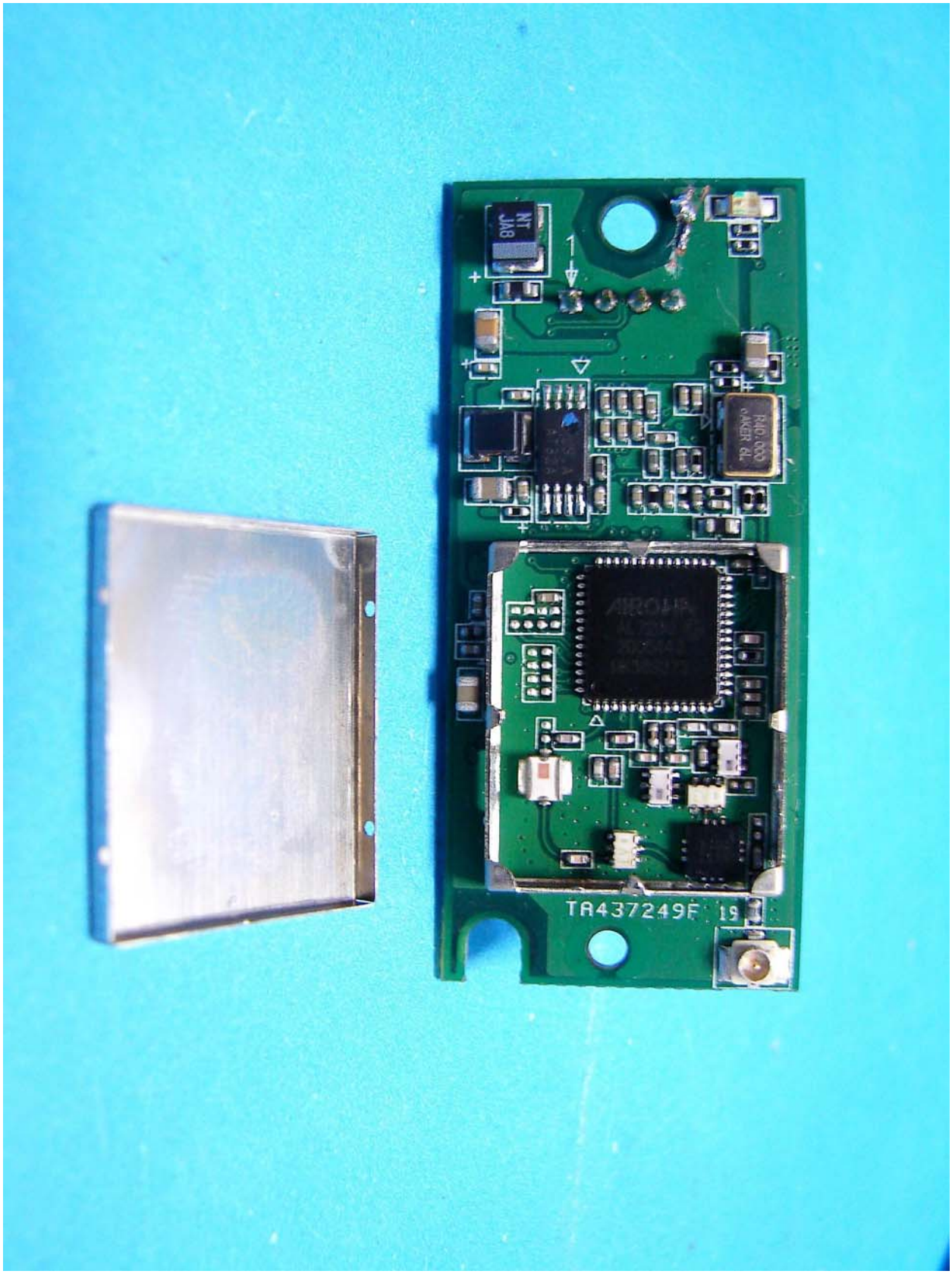

12-48V
V+ V- m
Reset
NO
COM
NC
RELAY
LAN
USB

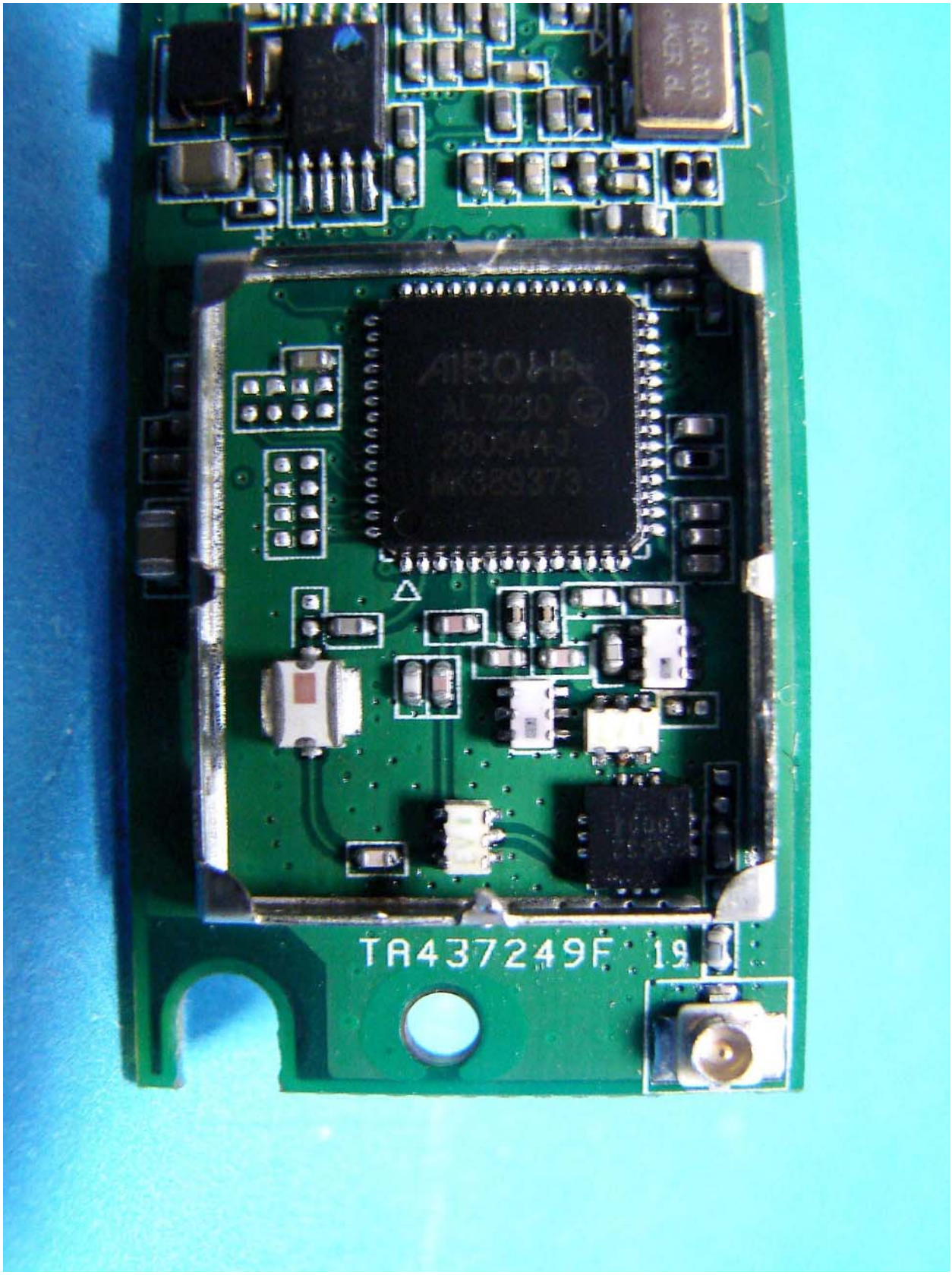

ThinkCore W341
Wireless Embedded Computer
Ready
P1 P2 P3 P4
Tx
Rx
WLAN
P1 P2 P3 P4
MOXA

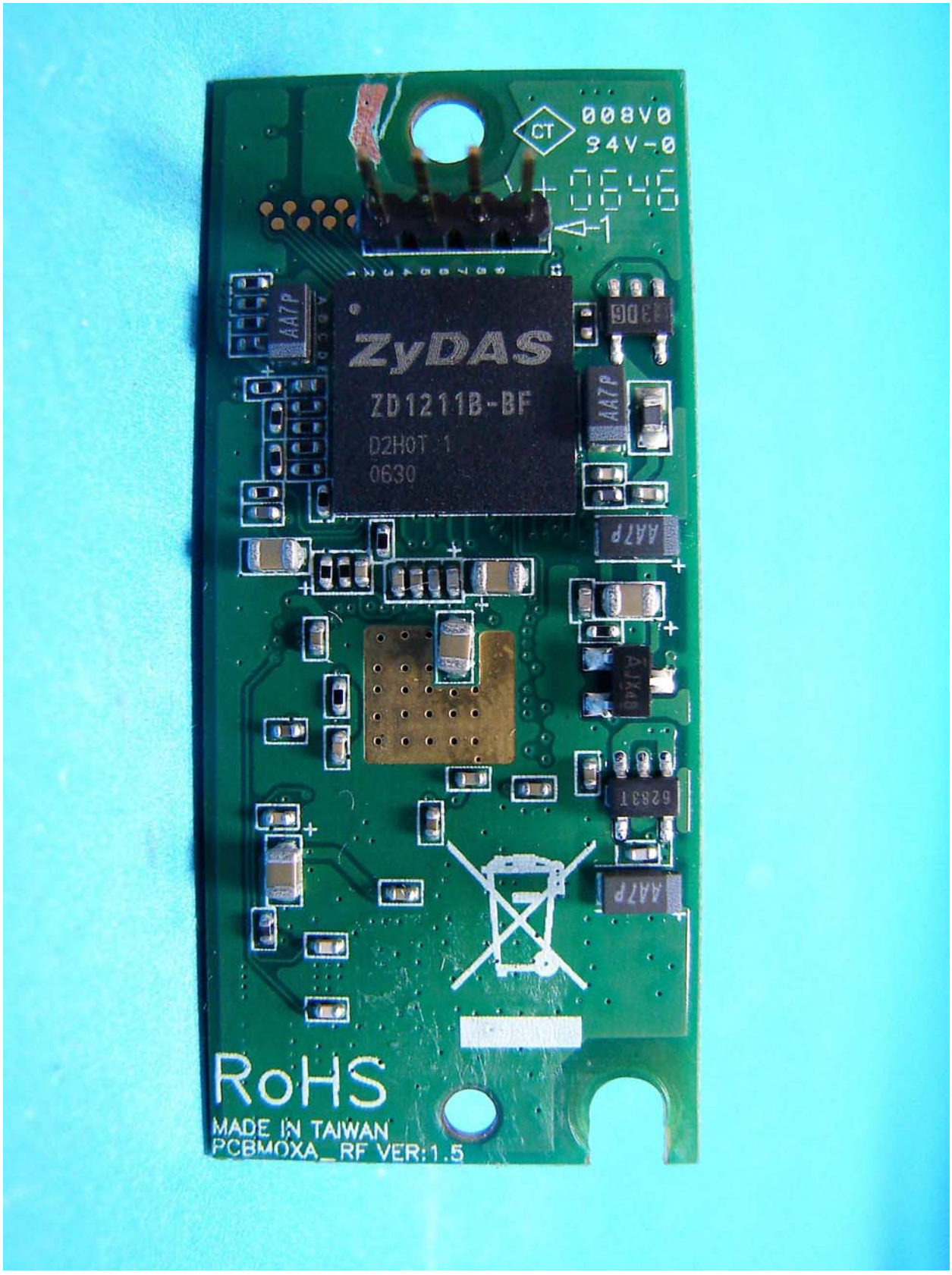

BALANCE ELECTRONICS CO.,LTD.
MODEL: GPSA-1200125
INPUT: 100-240V~ 50-60Hz 0.5A
OUTPUT: 12V ⎓ 1.2A
CAUTION: RISK OF
ELECTRIC SHOCK DO NOT OPEN.
I.T.E. POWER SUPPLY
LPS
E221622
933150 V05474
MADE IN CHINA

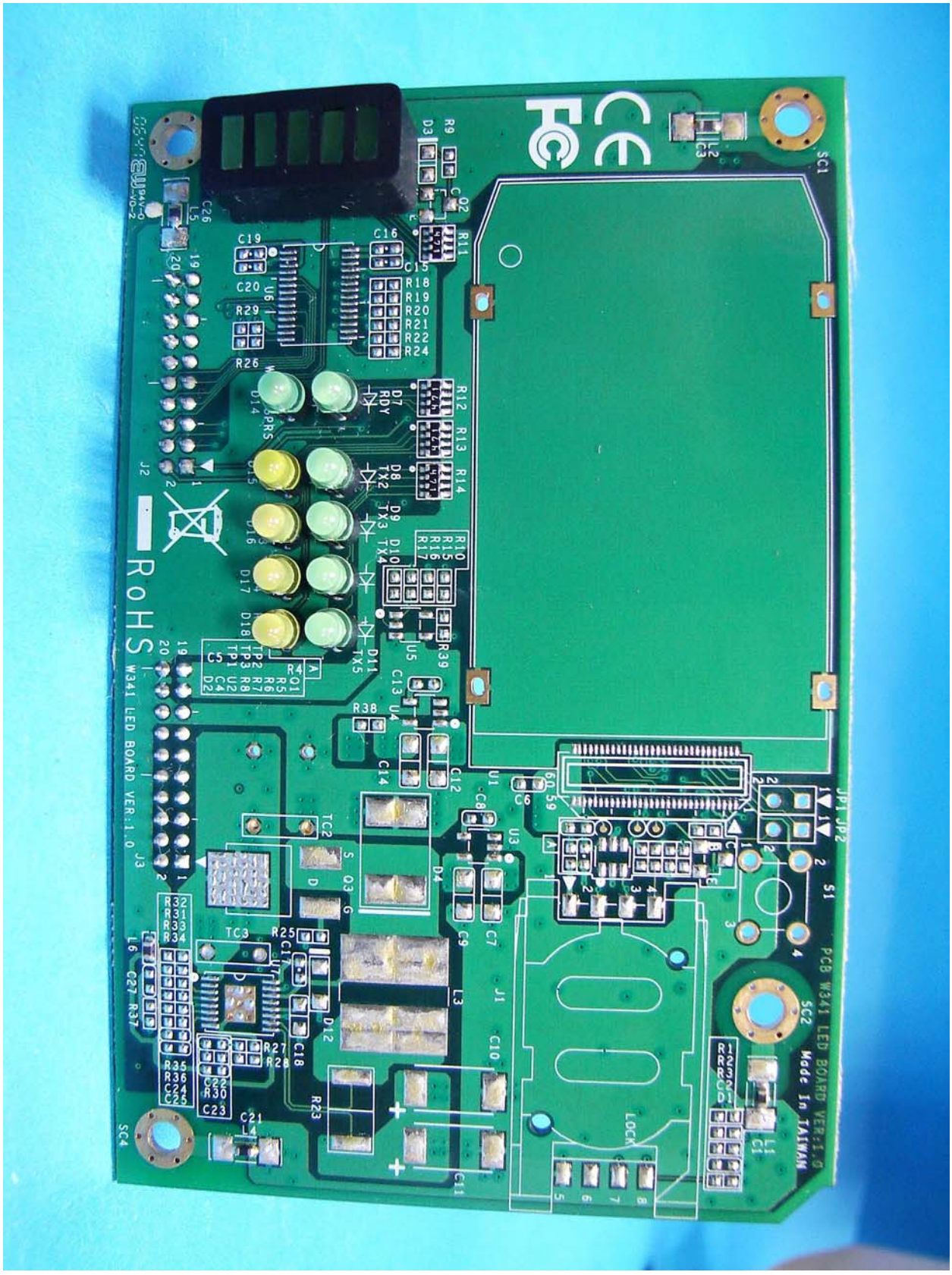

6342
MOXA
MOXA ART
C-BGA292-VOC
D2GAA-010
0628-UNC-CE-AS-CE

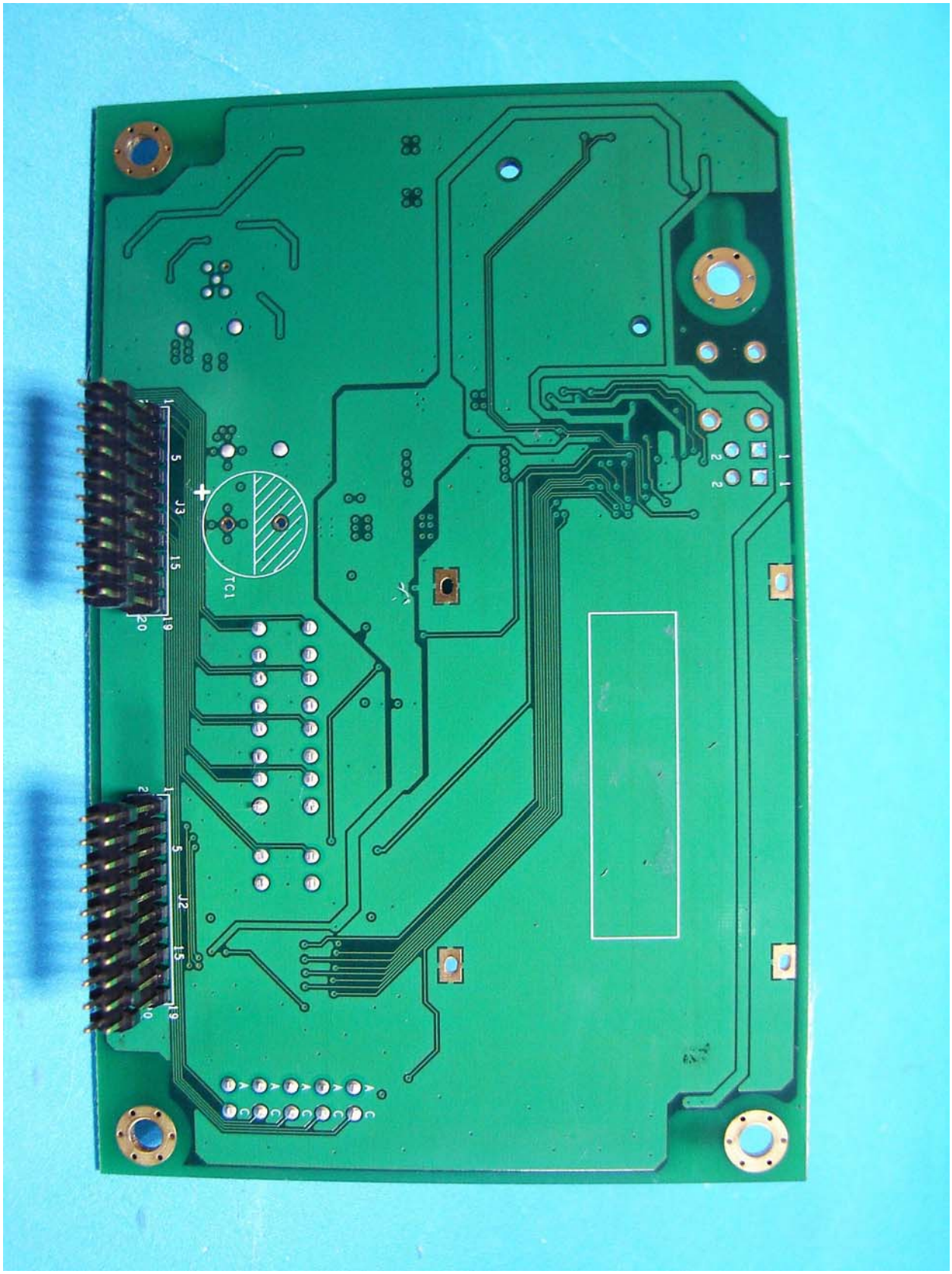

NT
JA8
1
R40.000
AKER 6L
TA437249F 19

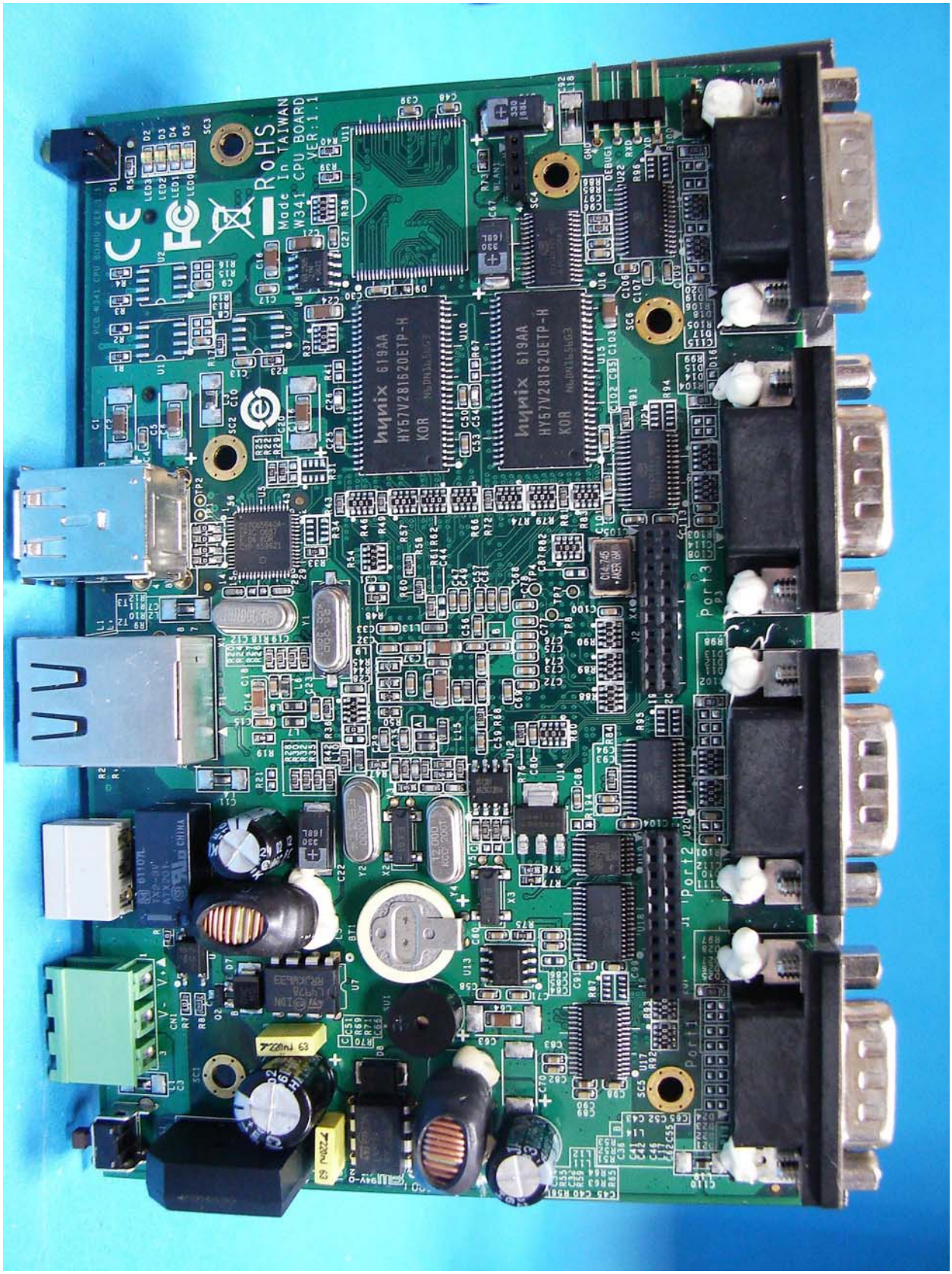

TA437249F 19


TA437249F 19


ZyDAS
ZD1211B-BF
D2H0T 1
0630
RoHS
MADE IN TAIWAN
PCBMOXA_RF VER:1.5


W341 LED BOARD VER:1.0
PCB W341 LED BOARD VER:1.0
Made In TAIWAN
RoHS


J3
J2
TC1


RoHS
Made In TAIWAN
W341 CPU BOARD
VER:1.1
Hynix 619AA
HY57V281620ETP-H
KOR
Port3
Port2
Port1

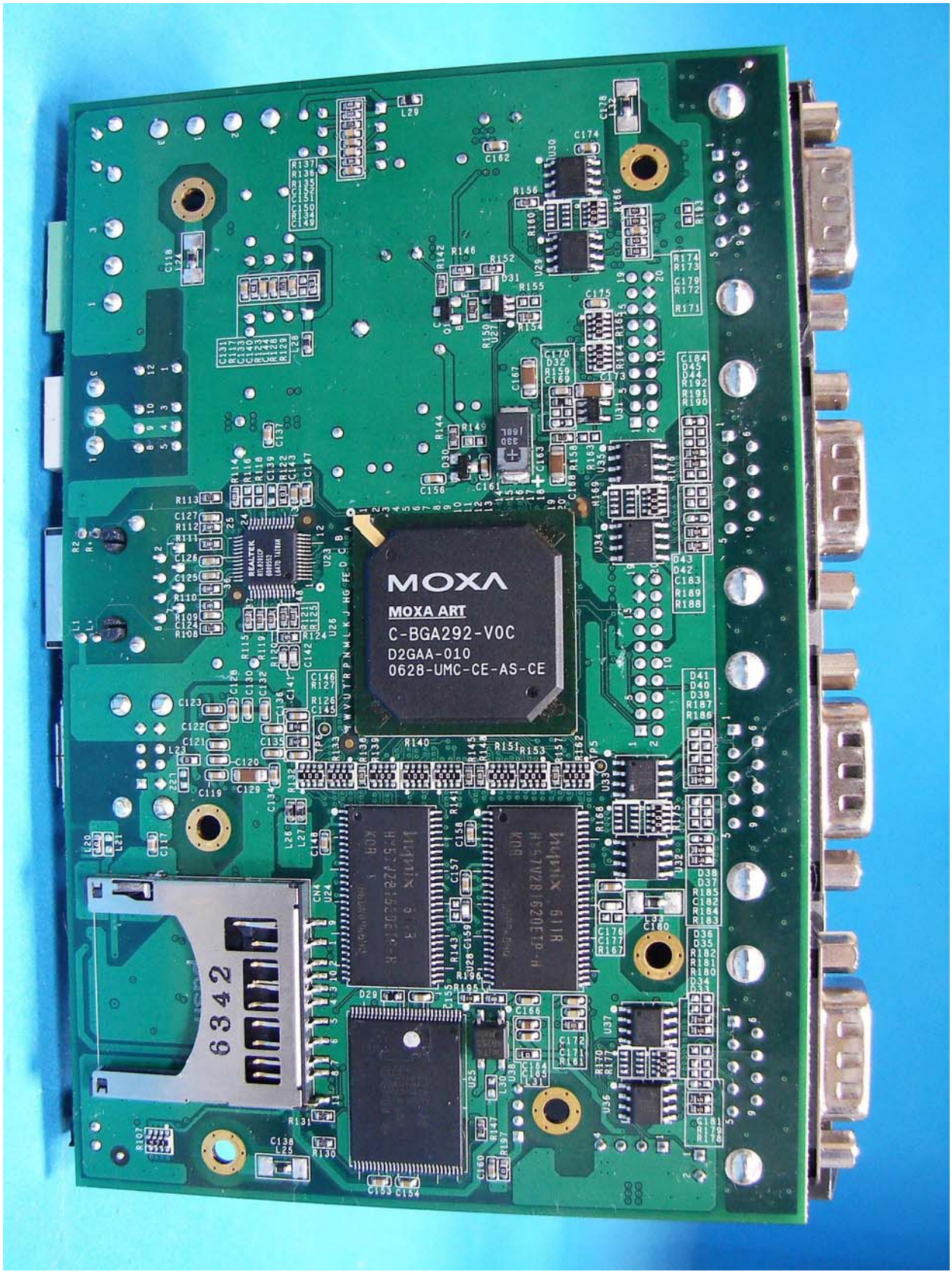

MOXA
MOXA ART
C-BGA292-V0C
D2GAA-010
0628-UMC-CE-AS-CE

EXHIBIT K

RF Exposure Calculations

Measurement of Maximum Permissible Exposure

1. Foreword

In adopt with the Human Exposure IEEE C95.1, and according to the FCC 1.1310. The *Maximum Permissible Exposure (MPE)* is obligated to measure in order to prove the safety of radiation harmfulness to the human body.

The *Gain* of the antenna used is measured in an *Anechoic chamber.* The *maximum total power to the antenna* is to be recorded. By adopting the ***Friis Transmission Formula*** and the *power gain of the antenna,* we can find the distance right away from the product, where the limit of the MPE is.

2. Description of EUT

FCC ID	**:**	SLEW341
Product name	**:**	RISC-based Ready-to-Run Wireless Embedded Computer
Model	**:**	ThinkCore W341, ThinkCore W341-LX
Classification	**:**	Mobile Device (i) Under normal use condition, the antenna is at least 20cm away from the user; (ii) Warning statement for keeping 20cm separation distance and the prohibition of operating next to the person has been printed in the user's manual
Frequency Range	**:**	2.412 GHz ~ 2.462GHz
Supported Channel	**:**	11 Channels
Modulation Skill	**:**	DBPSK, DQPSK, CCK, OFDM
Power Type	**:**	Powered by the switching adapter, Manufacture: BALANCE ELECTRONICS CO., LTD. Model: GPSA-1200125 I/P: 100 ~ 240VAC ~ 50/60Hz 0.5A O/P: 12VDC 1.2A. Primary: 182cm length, non-shielded, without ferrite core Secondary: 186cm length, non-shielded, without ferrite core

3. Limits for *Maximum Permissible Exposure (MPE)*

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Filed Strength (H) (A/m)	Power Density (S) (mW/cm2)	Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	100	6
3.0-30	1842/f	4.89/f	$900/f^2$	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	100	30
1.34-30	824/f	2.19/f	$180/f^2$	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

[The EUT is tested in transmit and receive modes and in the first, middle and the last channel separately. The following shows only our observation have the greatest emissions.]

According to **OET BULLETIN 56 Fourth Edition/August 1999**, **Equation for Predicting RF Fields:**

Friis Transmission Formula: $S = \frac{PG}{4\pi R^2} = \frac{75.68 \times 1.585}{4\pi (20)^2} = 0.0239 mW/cm^2$

Estimated safe separation: $R = \sqrt{\frac{PG}{4\pi}} = \sqrt{\frac{75.68 \times 1.585}{4\pi}} = 3.09 cm$

Remarks: "The safe estimated separation that the user must maintain from the antenna is at least 4.73cm"

Where: S = *power density* (in appropriate units, e.g. mW/cm2)

P = *power input* to the antenna (in appropriate units, e.g., mW)

G = *power gain* of the antenna in the direction of interest relative to an isotropic radiator

R = *distance* to the center of radiation of the antenna (appropriate units, e.g., cm)

The *Numeric gain G* of antenna with a gain specified in dB is determined by:

G = Log $^{-1}$ (***dB*** antenna gain / 10)

G = Log $^{-1}$ (2.00 / 10) = 1.585

Appendix

Antenna Specification

料件承認書

文件編號：		版本：1.0
品號：	1602020019400	製造商： 寰波
品名：	Dual-Band Omni-Directional Antenna	
規格：		
適用產品：	2.4/ 5.0/ 5.2/ 5.6/ 5.8GHz	
附件：	☐ 1.系列承認清單 ☐ 2.Moxa 內部測試報告 ✓ 3.廠商承認書 ☐ 4.UL 認證報告 ☐ 5 CSA 認證報告 ☐ 6.TUV 認證報告	
	✓ 7.RoHS 認證報告/RepNo. CE/2004/A1528 CE/2006/10629 KA/2005/40650 CE/2006/63956 CE/2004/C1498 CE/2006/63959 CE/2005/83039 CE/2004/53035 CE/2006/41802 CE/2006/47581 KE/2005/41696 CE/2004/B4117A CE/2005/92596A CE/2005/92597A CE/2006/14801A KE/2006/20995 ☐ 8. SONY 認證報告/RepNo. /自我	

核准：洪誠	審核：洪誠	撰寫：明松			發 行 章
相 關 單 位 會 簽					
				品保	
				家齊	

品號	版本	修訂內容	修訂原因	日期	修訂者
1602020019400	1.0	新料件承認		09-12-06	明松

料件檢驗標準

品號	1602020019400	品名	Dual-Band Omni-Directional Antenna	規格	2.4/ 5.0/ 5.2/ 5.6/ 5.8GHz

料件承認作業確認

1. 電氣功能之驗証 ✔ 已完成 ☐未執行，原因：
2. 實體組裝之測試 ✔ 已完成 ☐未執行，原因：
3. 執行生產可行性評估 ☐ 已完成 ✔未執行，原因：
4. 檢查供應商所附文件是否完整 ✔ 已完成 ☐未執行，原因：
5. 檢驗綠色料件標準 ✔ 符合 RoHS ☐符合 SONY ☐非綠色料件

檢驗項目

尺寸(含公差)部份

☐說明如下(單位標示公制) ✔如附之尺寸圖

Mechanism size Check/Compare (單位 ：mm)

項次	檢驗項目	檢驗方法	規格	公差	圖面位置	實測 1	實測 2	實測 3	實測 4
1									
2									
3									
4									
5									
6									
7									
8									
9									

顏色部份

顏色：

可參考：✔sample ☐附件之色板

外觀印刷規格說明

圖案之大小、顏色、位置－ ☐如下說明 ✔參考所附文件

文字之大小、顏色、位置、字型－ ☐如下說明 ✔參考所附文件

原物料封裝及包裝說明

IC 封裝方式：

料件包裝方式：25 支裝一包,20 包裝一紙箱

特殊檢驗要求

IC 版本：

IC 外觀標示圖與標註檢驗項目：

其它注意事項

操作溫度 ：-10~55℃

Dual-Band Omni-Directional Antenna for 2.4 / 5.0 / 5.2 / 5.6 / 5.8 GHz

Version 2

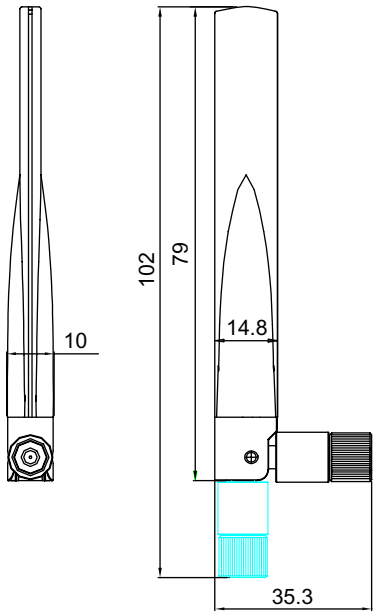
SAA05-220420

Electrical Specification

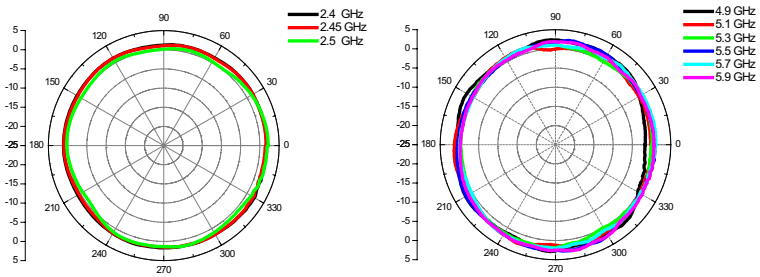
Frequency range	2400 MHz - 2500 MHz	4900 MHz - 5875 MHz
Peak Gain	2 dBi	2 dBi
Average Gain	1 dBi	1 dBi
VSWR	2.0 : 1 Max.	2.0 : 1 Max.
HPBW / horizontal	360°	360°
HPBW / vertical	80°	80°
Polarization	Linear, vertical	Linear, vertical
Power handling	2 W (cw)	2 W (cw)
Impedance	50 Ohms	50 Ohms
Connector	RP SMA Plug	

Environmental & Mechanical Characteristics

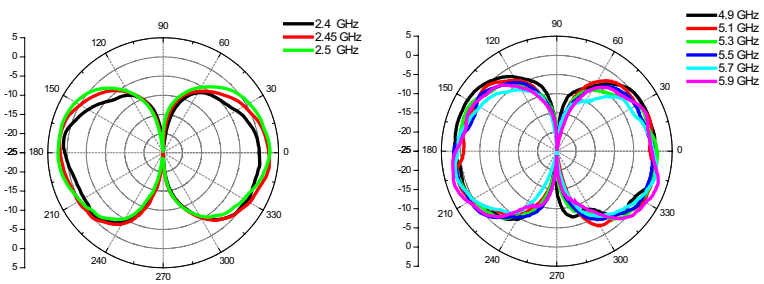
Temperature	- 10° C to +55° C
Humidity	95% @ 55° C
Radome color	Black
Weight	9 g
Dimensions	79 x 35.3 x 10 mm



H-plane Co-polarization Pattern



V-plane Co-polarization Pattern

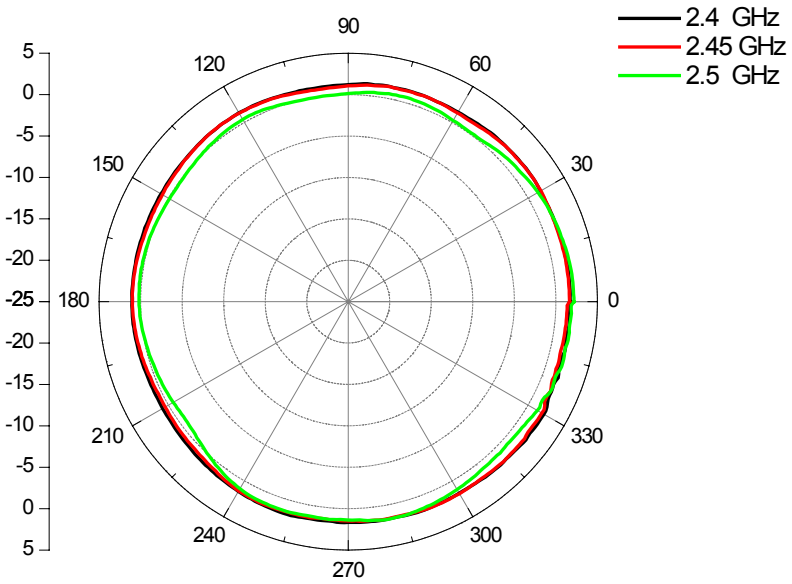


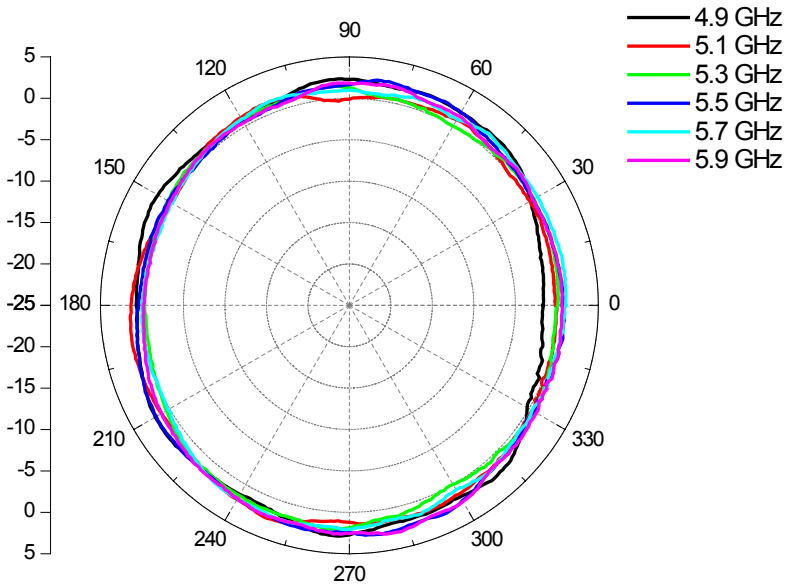
http:// www.smartant.com TEL: +886 (0)3 583-6000 FAX: +886 (0)3 583-7000 E-mail: service@smartant.com

SAA05-220420

Radiation Pattern (1/2)

H-plane Co-polarization Pattern

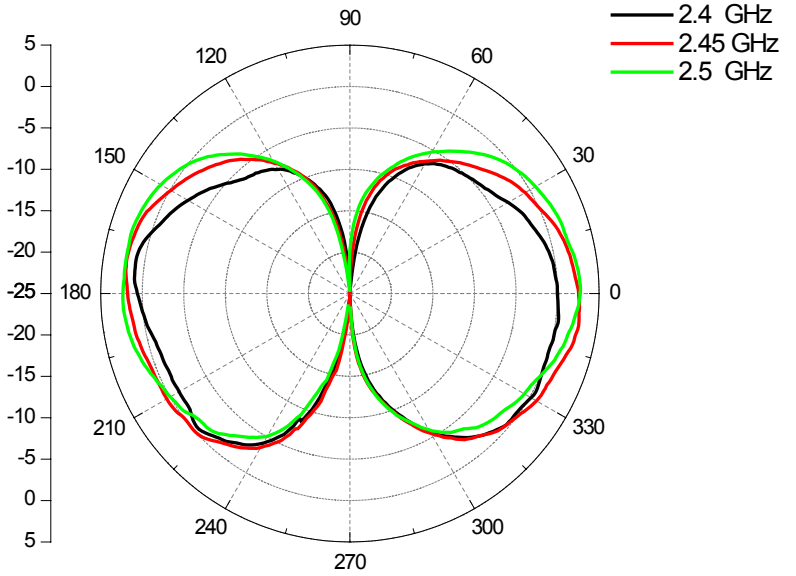


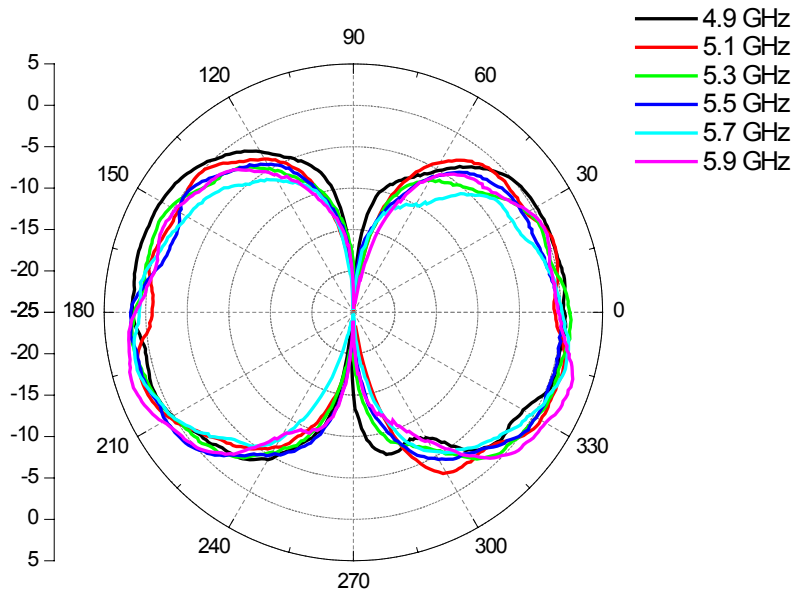


SAA05-220420

Radiation Pattern (2/2)

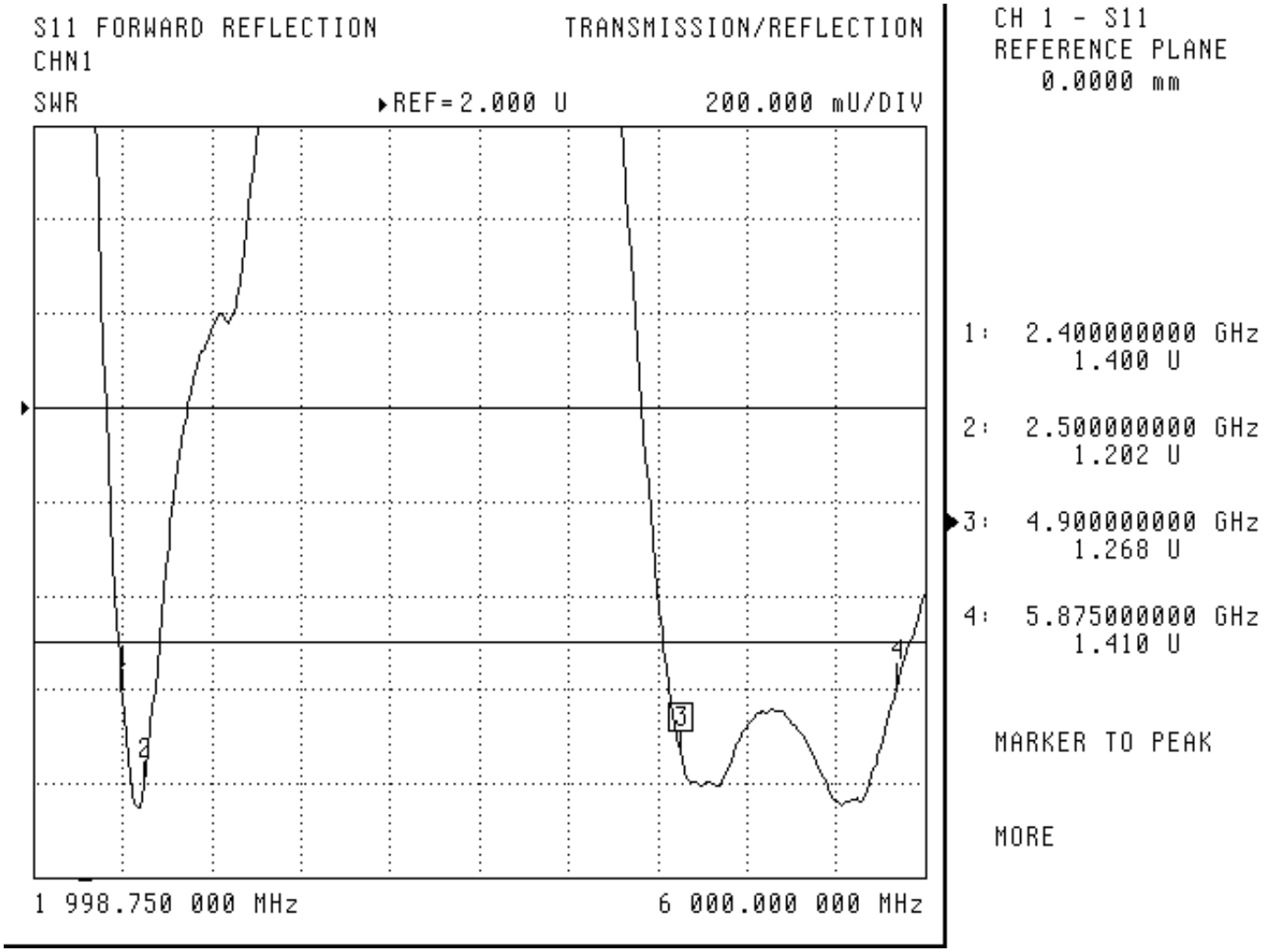
V-plane Co-polarization Pattem





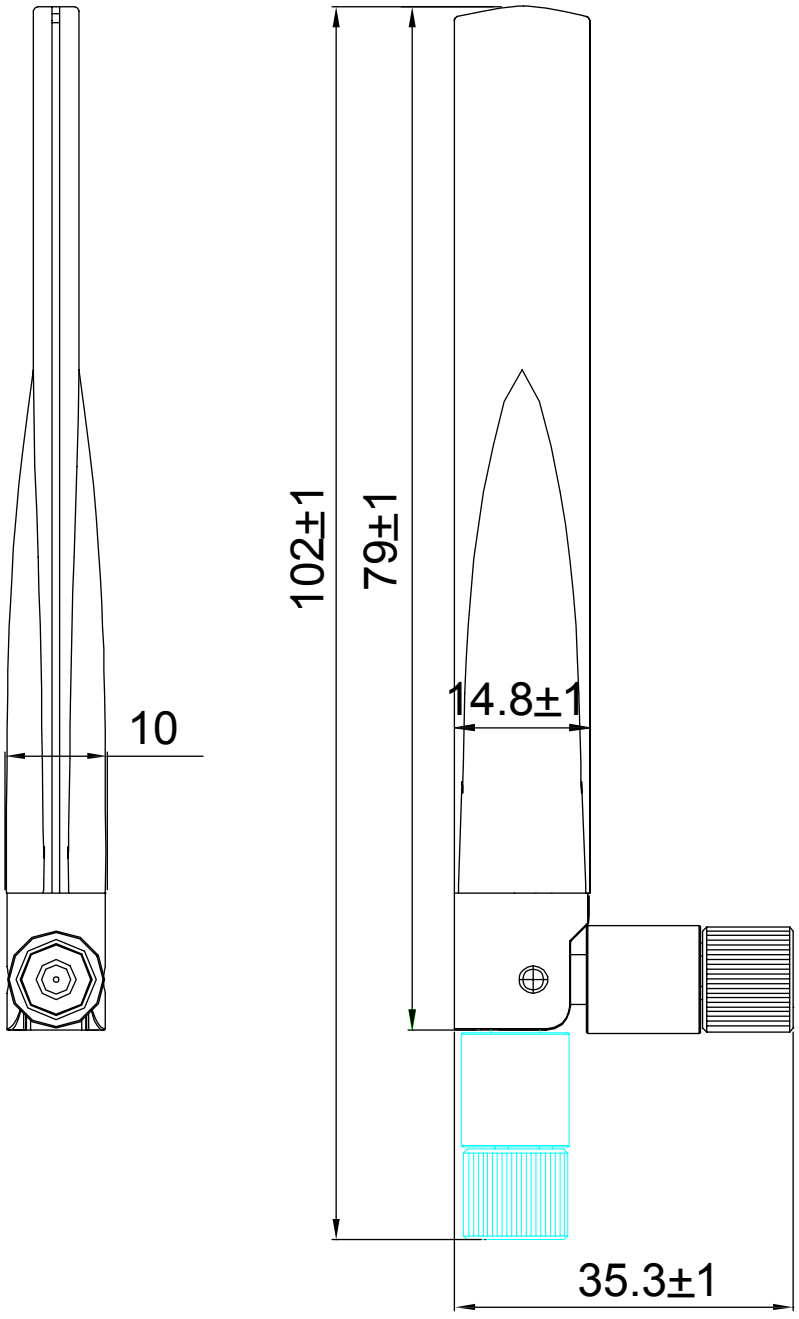
SAA05-220420

VSWR



SAA05-220420

Product Drawing



Reliability Test Report (1/2)

寰波科技股份有限公司

SmartAnt Telecom Co.,Ltd.

Reliability Test Report

Model： SAA05-220420

Product Name：Dual-Band Omni-Directional Antenna

Nickname：小小王子

Frequency：2.4GHz~2.5GHz
4.9GHz~5.875GHz

VSWR：2.0：1 Max

Test Results：■ PASS □ NG

Approved By	Review By	Prepared By

Reliability Test Report (2/2)

Reliability Test Result :

	Test Group		A					Judgment
	Test Sample No.		01	02	03	04	05	
Test Flow	1	Composite Temperature/Humidity Cycling Test	○	○	○	○	○	PASS
	2	Cold Test	○	○	○	○	○	PASS
	3	High Temperature Test	○	○	○	○	○	PASS
	4	Pull Force	○	○	○	○	○	NA
	5	Angel Measurement	○	○	○	○	○	PASS

Conclusion: All visual inspection is normal and function is ok.

Reliability Test Specification:

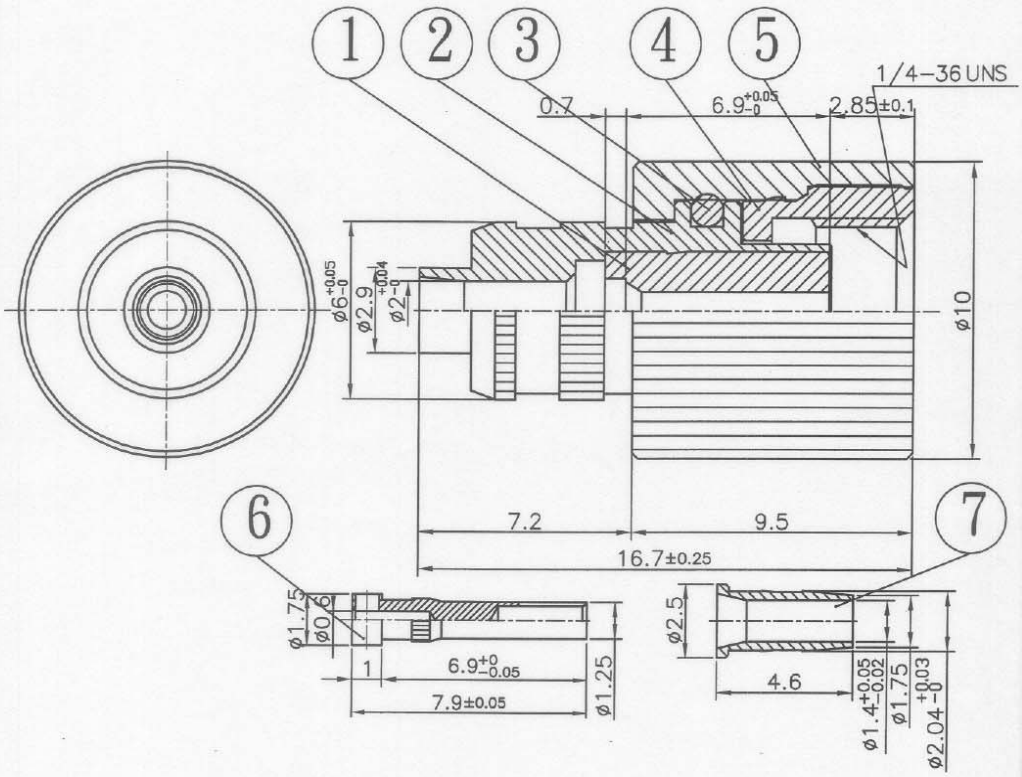
No	Test Item	Duration	Temperature	Refer to standard	Note
1	Composite Temperature/Humidity Cycling Test	65hr	-10~55℃ 95%RH	IEC 68-2-30	NA
2	Cold Test	50hr	-10℃	IEC 68-2-1	NA
3	High Temperature Test	50hr	55℃	IEC 68-2-2	NA
4	Pull Force	EA/Time	23±5℃	Smartant Standard	NA
5	Angel Measurement	EA/Time	23±5℃	Smartant Standard	NA

SAA05-220420

Material Approval - Connector (1/7)

REV:1

NO.	REV' NO.	DATE	NOTE	REV' BY	APPROVED	REMARK
⚠						
⚠						



NOTE:
1. PATENT PENDING
2. GENERAL TOLERANCE: ±0.1mm

Q'TY	NO.	DWG. NO.	PART NAME	MATL	REMARK
1	7	XAE4B035	RP-SSMA-PIN	PHOS.BRZN	Gold 1u"
1	6	XAF4B034	RP-SSMA-E	BRASS	Gold 1u"
1	5		SSMA-D-X1	DELRIN	Black
1	4		SSMA-A-X	BRASS	Gold 1u"
1	3		SSMA-O	NBR	Black
1	2		SSMA-B-X	BRASS	Gold 1u"
1	1		RP-SSMA-P	HD.PE	

SCALE	MATL	FINISHED	ASS'Y	
5/1				
THIRD ANGLE	UNIT mm		PART NAME	RP-SSMA-BL
APPROVED	CHECKED			DWG. NO. XAA4C626
John 92.10.27	Irven 92.10.27	LILY 92.10.27		

Material Approval - Connector (2/7)

REV:1

SPECIFICATIONS		
VOLTAGE WITHSTANDING	AC500V	
CURRENT RATING	1A	
IMPEDANCE	50Ω	REMARK
FREQUENCY RANGE	6 GHz	
CABLE TYPE	RG 178	
WEIGHT		

STANDARD SPEC

NO	ITEM	CONDITION	SPEC.				CHECK(1)	
			MAX	MIN	UNIT	TIME	A	B
1	THREAD	USE GO –NO GO GAUGE TEST					–	○
2	INSULATION RESISTANCE	DC 500V, >5000 MΩ		5000	MΩ		–	○
3	VSWR	6 GHz, ≦1.5	1.5				–	○
4	Salt Spray	Min. 48 Hours		48	hrs		–	○
5	TEMPERATURE RANGE	-20℃~85℃						
6	-	-	-					

PART NAME	CONTROL NO.	RECORD	CHECK	APPROVED
RP SSMA-BL		Lily 10/6-03'	Irven 10/6-03'	John 10/7-03'
DWG. NO.	ASS'Y DWG. NO.			

(1) A : OFTEN CHECK B : REGULAR CHECK

Material Approval - Connector (3/7)

宮前五金股份有限公司 REV:1

BRASS 黃銅材質

檢驗報告表

編號:：　　91年4月22日

客　戶			
品　名		FREE CUTTING BRASS ROD	
規　格		JIS H3250 C3604 BD	
項目 \ 數據		成份含量	備　註
化學成份%	Cu	57.0 - 61.0	
	pb	1.8 - 3.7	
	Fe	< 0.5	
	Sn+Fe	< 1.2	
	Zn	REMAINDER	
其它			

宮前五金股份有限公司 TEL:(03)3282411-5

桃園縣龜山鄉頂湖一街 24號　TEL: (03) 3283055-70

SAA05-220420

Material Approval - Connector (4/7)

宮前五金股份有限公司 REV:1

BRASS 黃銅材質

檢驗報告表

編號:

91年4月22日

客戶			
品名	FREE CUTTING BRASS ROD		
規格	JIS H3250 C3604 BD		
項目 \ 數據		成份含量	備註
化學成份%	Cu	57.0 - 61.0	
	pb	1.8 - 3.7	
	Fe	< 0.5	
	Sn+Fe	< 1.2	
	Zn	REMAINDER	
其它			

宮前五金股份有限公司 TEL:(03)3283211-5

桃園縣龜山鄉頂湖一街 24 號 TEL: (03) 3283065-70

Dual-Band Omni-Directional Antenna for 2.4 / 5.0 / 5.2 / 5.6 / 5.8 GHz

Version 2

SAA05-220420

Material Approval - Connector (5/7)

HDPE 射出

USI

UNITHENE® 聯塑烯 **HIGH DENSITY POLYETHYLENE RESINS**

高密度聚乙烯塑膠原料

產品 Products / 物性 Physical Properties	單位 UNIT	檢驗方法 TEST METHOD (ASTM)	擠壓 Extrusion	射出成型 Injection Molding						迴轉成型 Rotomolding
			LH901	LH606	LH606-13	LH614	LH506	LH514	LH523	LH405
主要用途 MAIN APPLICATIONS			•扁絲加工 •粗圓絲加工 •薄膜與平板擠壓 •Flat yarn •Coarse monofilament •Film & Sheet extrusion	•射出成型 •細圓絲加工 •Injection molding •Fine monofilament	•射出成型(用於製造塑膠箱) •Injection molding for crate	•射出成型 •鑄膜擠壓 •Injection molding •Casting	•射出成型 •Injection molding	•射出成型 •鑄膜擠壓 •Injection molding •Casting	•射出成型 •Injection molding	•迴轉成型 •射出成型 •Rotation molding •Injection molding
熔融指數 MELT INDEX	克/10分 g/10min	D1238	0.95	6.0	6.0	12	6.0	12	23	6.0
密度 DENSITY	克/立方公分 g/cm³	D1505	0.953	0.962	0.962	0.962	0.955	0.956	0.956	0.938
降伏點抗張強度 YIELD POINT TENSILE STRENGTH A.模片(MOLDED) B.吹膜(BLOWN FILM) MD*/TD**	公斤/平方公分 kg/cm²	D638 D882	A. 250 B. —	A. 310 B. —	A. 320 B. —	A. 310 B. —	A. 250 B. —	A. 250 B. —	A. 230 B. —	A. 230 B. —
斷裂點抗張強度 BREAK POINT TENSILE STRENGTH A.模片(MOLDED) B.吹膜(BLOWN FILM) MD*/TD**	公斤/平方公分 kg/cm²	D638 D882	A. 300 B. —	A. 220 B. —	A. 220 B. —	A. 150 B. —	A. 290 B. —	A. 180 B. —	A. 290 B. —	A. 240 B. —
伸長率 ELONGATION A.模片(MOLDED) B.吹膜(BLOWN FILM) MD*/TD**	百分率 %	D638 D882	A. 1100 B. —	A. 600 B. —	A. 620 B. —	A. 170 B. —	A. 760 B. —	A. 550 B. —	A. 300 B. —	A. 1100 B. —
抗衝擊強度 IZOD IMPACT STRENGTH	公斤力公分/公分 kg-cm/cm	D256	55	7.0	7.0	3.5	11	4.0	3.5	8.0
彈性係數(模片) 1% SECANT MODULUS (MOLDED)	公斤/平方公分 kg/cm²	D638	7400	9900	10000	10000	8400	7800	7600	6800
扭轉剛性 TORSIONAL STIFFNESS	公斤/平方公分 kg/cm²	D1043	6100	12500	12500	12100	10000	9600	9200	5800
彎曲剛性 FLEXURAL STIFFNESS	公斤/平方公分 kg/cm²	D747	11000	9900	9900	9800	9200	8300	8200	6600
低溫脆裂溫度 LOW TEMPERATURE BRITTLENESS	原/半數破壞 °C /F50*	D746	<-76	<-76	<-76	<-76	<-76	<-76	<-76	<-76
維氏軟化溫度 VICAT SOFTENING TEMPERATURE	度 °C	D1525	125	127	127	126	125	125	125	115
熔點 MELTING POINT	度 °C	D2117	130	131	131	131	129	129	128	125
硬度 HARDNESS	蕭氏 D Shore D	D2240	68	69	69	69	68	68	68	62

*F50=50% failure
+MD : Machine Direction
++TD : Transverse Direction

50%破裂或脆裂
縱向：加工方向
橫向：橫切方向

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公元二 00 一年六月發行
ISSUED IN June 2001

REV:1

Material Approval - Connector (6/7)

REV:1

Home | What's New | Product | Company

Polyplastics Product lines> POM(TEPCON) Grade Line-Up

Product
Product Lines
POM(TEPCON)
Brand Name List

Search
Search for :
GO
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Global Top

▶POM(TEPCON) Polyplastics Taiwan Co., Ltd. 台湾宝

POM(TEPCON) Grade Line-Up(ISO)

Item	Unit	Testing Method	M25	M90	M130	Standard M270	M3
			High Viscocity	General	High Fluidity	High Fluidity·High Cycle	High Fluidity Cycle
Density	g/cm³	ISO 1183	1.41	1.41	1.41	1.41	1.4
Stress at yield	MPa	ISO 527-1, 2	59	62	62	63	6:
Strain at break	%	ISO 527-1, 2	40*	35*	33*	30*	28
Tensile modulus	MPa	ISO 527-1, 2	2,500	2,700	2,700	2,800	2,8
Flexural strength	MPa	ISO 178	81	87	87	88	8
Flexural modulus	MPa	ISO 178	2,350	2,500	2,500	2,550	2,5
Charpy notched impact strength	kJ/m²	ISO 179/1eA	8.0	6.0	5.5	5.3	5.
Temperature of deflection under load (1.80MPa)	°C	ISO 75-1, 2	90	95	100	100	10
Coefficient of linear thermal expansion (23-55°C) Parallel	×10-5/°C	ISO 11359-2	13	12	11	11	1
Coefficient of linear thermal expansion (23-55°C) transverse	×10⁻⁵/°C	ISO 11359-2	12	12	11	11	1
Electric strength	kV/mm	IEC 60243-1	19	19	19	19	1
Volume resistivity	Ohm·cm	IEC 60093	1×10¹⁴	1×10¹⁴	1×10¹⁴	1×10¹⁴	1×1
Surface resistivity	Ohm	IEC 60093	1×10¹⁶	1×10¹⁶	1×10¹⁶	1×10¹⁶	1×1
Comparative tracking index	CTI	IEC 60112	600+	600+	600+	600+	60
Arc resistance (UL)	s	—	—	—	—	—	—
Flammability	—	UL94	HB	HB	HB	HB	H

DELRIN 材質.

* Nominal strain at break

- All figures in the table are the typical values of the material and not the minimu the material specifications.
- For qualified values of UL (Underwriters Laboratories Inc.) refer to the yellow No.E146187) issued by UL

1)Please note that these···

Material Approval - Connector (7/7)

FAX NO. =   P. 002 REV:1

[redacted]

NANCAR®

NBR

NBR 材質.

POLYMER DATA

NANCAR® 1051

NANCAR® 1051 rubber is a cold polymerized, high acrylonitrile copolymer with excellent oil resistance. This polymer has excellent processing characteristics in compounds where improved flow and knitting are desired and is especially valuable in high durometer compounds.

NANCAR® 1051 rubber provides good processing and building tack. It is suggested for use in molded goods, friction stock and similar applications.

POLYMER PROPERTIES

	Typical Value
Bound acrylonitrile, %	41
Mooney viscosity, ML_{1+4} @ 100 ℃	68
Heat loss, %	0.4
Ash, %	0.6
Specific gravity,	1.00
Solubility in MEK, %	100
Stabilizer,	Slight-staining

COMPOUND PROPERTIES

	Cured @ 150 ℃ Minutes	Typical Value
Compound mooney, ML_{1+4} @ 100 ℃	—	85
Mooney scorch, large rotor, @ 125 ℃		
Minimum viscosity	—	51
Minutes to 5 points rise, t_5	—	27.5
Minutes to 35 points rise, t_{35}	—	32.0
Tensile strength, kg/㎠	40	255
Elongation, %	40	480
Modulus at 300 % elongation, kg/㎠	20	124
	40	156
	60	166
Hardness, Durometer A, points	40	72
Compression set, @ 100 ℃ × 70hours, %	60	58

TEST RECIPE ASTM D-3187

	Parts
NANCAR 1051	100.00
NBS 370 Znic oxide	3.00
Sulfur, 2 % $MgCO_3$ coated	1.50
NBS 372 Stearic acid	1.00
NBS 378 HAF black	40.00
NBS 384 TBBS	0.70
Total	146.20

Dual-Band Omni-Directional Antenna for 2.4 / 5.0 / 5.2 / 5.6 / 5.8 GHz

Version 2

SAA05-220420

Material Approval - Radome

ABS Characteristics

POLYLAC

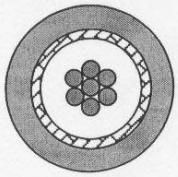
特性 Typical Proper	試驗法 ASTM Test	單位 Units	一般級(General Purpose)						防火級(Flame Retardant)					耐熱級(Hifh Heart)		
			PA-707	PA-757	PA-717C	PA-727	PA-747	PA-709	PA-765	PA-765A	PA-765B	PA-764	PA-764B	PA-777B	PA-777D	PA-777E
引張強度 Tensile Strenght	D-638	kg/cm² (lb/in²)	500 (7,090)	480 (6,800)	450 (6,380)	485 (6,870)	385 (5,470)	400 (5,670)	690 (5,530)	400 (5,670)	400 (5,670)	370 (5,250)	430 (6,100)	430 (6,100)	440 (6,240)	440 (6,240)
延伸率 Tensile Elongation	D-638	%	15	20	25	20	30	40	15	15	25	15	20	15	15	10
彎曲彈性率 Flexural Modulus	D-790	10^4 kg/cm² (10^4 lb/in²)	2.9 (4.1)	2.7 (3.8)	2.5 (3.5)	2.7 (3.8)	2.2 (3.1)	2.3 (3.2)	2.1 (3.0)	2.3 (3.2)	2.4 (3.4)	2.0 (2.8)	2.3 (3.2)	2.4 (3.4)	2.5 (3.5)	2.5 (3.5)
彎曲強度 Flexural Strenght	D-790	10^4 kg/cm² (10^4 lb/in²)	860 (12,200)	790 (11,200)	720 (10,200)	780 (11,000)	620 (8,800)	640 (9,070)	620 (8,800)	640 (9,070)	650 (9,200)	590 (8,360)	660 (9,370)	700 (9,920)	750 (10,630)	750 (10,630)
洛氏硬度 Rockwell Hardness	D-790		R-116	R-116	R-115	R-110	R-108	R-102	R-100	R-100	R-102	R-96	R-102	R-112	R-115	R-115
IZOD衝擊強度 (NOTCHED) IZOD Impact Strenght)	D-256	1/8" kg-cm/cm (ft-lb/in)	14 (2.6)	20 (3.7)	28 (5.2)	26 (4.8)	41 (7.5)	45 (8.4)	22 (4.0)	24 (4.4)	26 (4.8)	14 (2.6)	20 (3.7)	23 (4.3)	17 (3.2)	12 (2.2)
		1/4" kg-cm/cm (ft-lb/in)	14 (2.6)	18 (3.3)	25 (4.6)	23 (4.2)	36 (6.6)	40 (7.4)	18 (3.3)	20 (3.7)	22 (4.0)	12 (2.2)	15 (2.8)	20 (3.7)	14 (2.6)	11 (2.0)
軟化點 Vicat Softening Temp	D-1525	℃(°F)	105 (221)	105 (221)	104 (219)	105 (221)	103 (217)	105 (221)	90 (194)	92 (197)	95 (203)	97 (208)	101 (214)	115 (239)	125 (257)	129 (264)
熱變形溫度 H.D.T	D-648 (annealed) (unanealed)	℃(°F)	99(210) 88(190)	99(210) 88(190)	98(208) 87(189)	99(210) 88(190)	97(206) 86(187)	98(208) 88(190)	83(181) 73(165)	85(185) 76(179)	86(187) 79(174)	92(198) 79(174)	96(205) 81(178)	107(225) 97(206)	115(239) 105(221)	120(248) 109(228)
比重 Specific Gravity	D-792	23/23℃	1.06	1.05	1.04	1.04	1.03	1.03	1.19	1.17	1.16	1.19	1.16	1.03	1.06	1.07
流動係數 Melt Flow Index	D-1238	200℃x5kg g/10min(Cond.G)	1.9	1.8	1.2	1.8	1.2	0.5	5.2	4.8	4.2	3.3	2.8	–	–	–
	ISO-1133*	220℃x5kg g/10min	20	22	12	19	13	5	60	48	42	33	28	6.7	6.0	5.0
燃燒率 Flammability		File No. E56070 UL & C-UL	1/16" HB	1/16" HB	1/16" HB	1/16" HB	1/16" HB	1/16" HB	1/16" V-O 1/10"5VA	1/12"V-O 1/10"5VA	1/10"V-O 1/16" V-2 1/8"5VA	1/16"V-O 1/10"5VA	1/10"V-O 1/8"5VA	1/16" HB	1/16" HB	1/16" HB
產品特性			高光澤性 高剛性	高剛性 高光澤性	一般射出成型用	電鍍級	超高強度 射出成型用	超高衝擊強度 押管用	難燃性 耐光性	難燃性 耐光性	難燃性 耐光性 耐熱性	難燃性 耐光性 耐熱性	難燃性 耐光性 耐熱性	耐熱性	超耐熱性	超高耐熱
Product Description			High Gloss High Rigid	High Gloss Medium	Medium Impact	Electro-Plating	High Impact	Super pact	F.R High Flow	F.R High Flow	F.R Medium Impact	F.R Weather Resistant	F.R Weather Resistant	High Heat High Impact	Super Hifh Heat	Super Hifh Heat

http:// www.smartant.com TEL: +886 (0)3 583-6000 FAX: +886 (0)3 583-7000 E-mail: service@smartant.com

SAA05-220420

Material Approval - Cable (1/2)

SPECIFICATION

STYLE	200℃ 30V COAXIAL	DOCUMENT NO : A30178B001	
SIZE	RG-178B/U	ESTABLISHED DATE: 2000/06/29	
STANDARD : MIL-C-17			
Conductor	Size	AWG	30
	Material	----	Silver-Coated Copper Clad Steel
	Conductors No.	----	7
	Conductors Size	mm	0.102
	O.D.	mm	0.30
Insulation	Average Thickness	mm	0.28
	Diameter	mm	0.86
	Material	----	FEP
	Color	----	Clear
Braid	Material	----	Silver-Coated Copper
	Construction	mm	16 / 3 / 0.10
	Coverage	%	95
Jacket	Average Thickness	mm	0.25
	Diameter	mm	1.80 ±0.05
	Material	----	FEP
	Color	----	Brown
Marking	M17/93-RG178B/U WONDERFUL		
Drawing			

AK001/210X297/1.0 PAGE : 1
EDITION : 1.0 REVISED DATE :
MAKER : CONFIRM : APPROVAL :

WONDERFUL WIRE CABLE CO., LTD

SAA05-220420

Material Approval - Cable (2/2)

SPECIFICATION

Electrical & Physical Properties			
Item			RG-178B/U
Rating Temp Voltage			200℃ 30V
Conductor Resistance			838.0 OHM/KM/20℃ MAX.
Insulation Resistance			100 MEGA OHM/KM MIN.
Dielectric Strength			AC 1.0 KV/Minute
Spark Test			0.5 KV
Insulation	Unaged	Tensile Strength	2500 PSI MIN.(1.76 Kg / ㎟)
		Elongation	200% MIN.
	Aged	Tensile Strength	**UNAGED MIN.75%(168HRS×232℃)**
		Elongation	**UNAGED MIN.75%(168HRS×232℃)**
Jacket	Unaged	Tensile Strength	2500 PSI MIN.(1.76 Kg / ㎟)
		Elongation	200% MIN.
	Aged	Tensile Strength	**UNAGED MIN.75%(168HRS×232℃)**
		Elongation	**UNAGED MIN.75%(168HRS×232℃)**
Nom. Impedance			50 Ohms
VSWR			MAX. 1.3 at 0.4G~3GHz
Nom. Vel. of Prop.			69.5%
Flame Test			VW-1 OK

Attenuation (dB/100m)	50MHz	100MHz	400MHz	900MHz	1.8GHz	3GHz
	34.4	45.9	91.8	139.4	207.5	308.2

AK001/210X297/1.0 PAGE : 2
EDITION : 1.0 REVISED DATE :
MAKER : CONFIRM : APPROVAL :

SAA05-220420

Material Approval - PCB

I NAN YA PLASTICS CORPORATION
COPPER CLAD LAMINATE
QUALITY TEST REPORT

2, ng-Yang Ind. Park,
Hsin-Kang Hsiang,
Jiayih, Taiwan
TEL:(05)3772111 FAX:(05)3771640

CUSTOMER: 文翔公司
ORDER NO: HCAFAS11
LOT NO: 4927243D
DATE:2004/10/18
PALLET NO:

MATERIAL SPEC.: NP-140TL H/H 0.77mm 1240mm x 0930mm WLCFHG (OVERALL THICKNESS)
IPC DESIGNATION: L21 0300 HH/HH B/A 48.8" x 36.6" (f x g)
REQUIREMENT: IPC-4101A
SPECIFICATION SHEET: IPC-4101A / 21

NAN YA PLASTICS
COPPER CLAD LAMINATE
QUALITY ASSURANCE

CHARACTERISTICS	UNIT	CONDITIONING	SPECIFICATION	RESULTS
VISUALS(SUB-/SURFACE)	-	IPC-4101A	A	OK
METAL THICKNESS	μm	IPC-4101A	Q:8.1~9.9 T:10.8~13.2 H:15.5~18.9 1:30.9~37.7 R:46.4~56.7 2:61.4~75.5 P:77.2~94.4 3:92.7~113.3 4:123.3~150.7	17.4
DIELECTRIC CONSTANT(1MHZ)		C 24/23/50	<5.4	4.22
SURFACE RESISTANCE	MΩ	C 96/35/90	<0.50mm 10^4↑ ≧0.50mm -----	4.5E7
SURFACE RESISTIVITY	MΩ	E 24/125	10^3↑	1.8E5
VOLUME RESISTANCE	MΩ-cm	C 96/35/90	<0.50mm 10^6↑ ≧0.50mm -----	6.5E8
VOLUME RESISIVITY	MΩcm	E 24/125	10^3↑	6.8E5
DISSIPATION FACTOR(1MHZ)		C 24/23/50	0.035↓ (CFRD、CFMD:0.020↓)	.018
ARC-RESISTANCE	sec	D48/50+D1/2 /23	60↑ (CFR5、CFM5:90↑)	121
FLEXURAL STRENGTH	N/mm²	LENGTHWISE A	<0.50mm ----- ≧0.50mm 414.27↑	560
FLEXURAL STRENGTH	N/mm²	CROSSWISE A	<0.50mm ----- ≧0.50mm 345.28↑	424
THICKNESS	m/m	A	≦1.2mm CLASS C/M >1.2mm CLASS B/L	OK
THERMAL STRESS		288℃ x 10sec	No blister delamination	OK
WARP AND TWIST	%		SINGLE DOUBLE	.296
		0.5-0.78 mm A	2.0↓ 1.5↓	
		>0.79 mm A	1.5↓ 1.0↓	
PRESSURE VESSEL		D25/119.6+des (260℃X 15sec)	IPC-TM-650	OK
MOISTURE ABSORPTION	%	E1/105+des+D24/23	<0.50 mm ≧0.50 mm 0.80%↓ 0.35%↓	.167
PEEL STRENGTH	lb/in	AFTER THERMAL STRESS	Qoz:5.0↑ Toz:5.0↑ Hoz:6.0↑ 1oz:8.0↑ Roz:10.0↑ 2oz:11.0↑ Poz:11.5↑ 3oz↑:12.0↑	8.97
TG GLASS TRANSITION TEMP	℃	A	140±5	140.9
FLAMMABILITY	sec	C 24/23/50	94-V0	OK
		E 24/125	94-V0	
DIELECTRIC BREAKDOWN	KV		40↑	60

THIS IS TO CERTIFY THAT THE MATERIAL BEING FURNISHED TO YOU MEETS THE IPC-4101A.
THE RESULTS OF THIS QUALITY TEST REPORT IS PASS.

APPROVED BY : N. C. Cheng. 合格

寰波科技股份有限公司

SmartAnt Telecom Co.,Ltd

Environment-Related Substances Report

Product Description: Antenna

SmartAnt P/N : SAA05-220420

Customer P/N:

2006/9/4

ENVIRONMENT-RELATED SUBSTANCES TO BE CONTROLLED-SAA05-220420

Item	Components		Test Item(Cr6+,Hg,Pb,PBBs,PBBEs<1000ppm,Cd<100ppm)							Pass/ Fail
			Cr6+	Cd	Hg	Pb	PBBs	PBBEs	Report No.	
1	Antenna Components	PCB	N.D	N.D	N.D	N.D	N.D	N.D	CE/2004/A1528	Pass
2		RG178 CABLE	N.D	N.D	N.D	N.D	N.D	N.D	CE/2006/10629	Pass
3		Joint	N.D	N.D	N.D	N.D	N.D	N.D	KA/2005/40050	Pass
4		Connector	Brass	N.D	34.9	N.D	27001.4	X	X	CE/2006/63956	Pass
			Phos.Bronze	N.D	N.D	N.D	N.D	X	X	CE/2004/C1498	Pass
			Au Plating	N.D	N.D	N.D	N.D	X	X	CE/2006/63959	Pass
			HD.PE	N.D	N.D	N.D	N.D	N.D	N.D	CE/2005/83039	Pass
			NBR	N.D	N.D	N.D	N.D	N.D	N.D	CE/2004/53035	Pass
			Delrin	N.D	N.D	N.D	N.D	N.D	N.D	CE/2006/41802,CE/2006/47581	Pass
5		Radome	N.D	N.D	N.D	N.D	N.D	N.D	KE/2005/41696	Pass
6	Packing	PE Bag	N.D	N.D	N.D	N.D	N.D	N.D	CE/2004/B4117A	Pass
7		Carton	表面紙板	N.D	N.D	N.D	11.3	X	X	CE/2005/92596A	Pass
			瓦稜芯紙	N.D	N.D	N.D	21.3	X	X	CE/2005/92597A	Pass
			INK	N.D	N.D	N.D	N.D	N.D	N.D	CE/2006/14801A	Pass
			RESIN	N.D	N.D	N.D	N.D	N.D	N.D	KE/2006/20995	Pass