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**EMI TEST REPORT FOR CERTIFICATION to
FCC PART 24(E) – Broadband PCS and
FCC PART 22(H) – Cellular Radiotelephone Service
RSS-132 and RSS-133
Class II Permissive Change**

FCC ID: N7NGOBI2
Industry Canada ID: 2417C-GOBI2

Transmitter: Sierra Wireless Mini-Card UMTS Module
UMTS Features: EGPRS, GPRS, UMTS and HSDPA and HSUPA
Model: Gobi2000

Host Notebook: T900 / TH900 LifeBook

Report Number: M091066_Cert_Gobi2000_C2PC

Issue Date: 4th December 2009

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Report No. M091066_Cert_Gobi2000_C2PC

Transmitter: Sierra Wireless Mini-Card UMTS Module
UMTS Features: EGPRS, GPRS, UMTS and HSDPA and HSUPA
Model: Gobi2000
Manufacturer: Sierra Wireless INC

FCC ID: N7NGOBI2
Industry Canada ID: 2417C-GOBI2
Equipment Type: Intentional Radiator (Transceiver)

Host NoteBook: T900 / TH900 LifeBook
Manufacturer (LifeBook): Fujitsu Ltd
Address: 1-1 Kamikodanaka 4-Chome, Nakahara-Ku, Kawasaki, Japan
Contact: Mr. Tsuyoshi Uchihara, Mobile Computing Division


Test Standards: FCC Part 24 Subpart E – Broadband PCS
FCC Part 22 Subpart H - Cellular Radiotelephone Service
ANSI/TIA/EIA-603
ANSI C63.4 – 2003
RSS-132 – Cellular Telephones
RSS-133 – 2 GHz Personal Communications Services
RSP-100 – Radio Equipment Certification Procedure
RSS-102 - Evaluation Procedure for Mobile and Portable Radio Transmitters with respect to Health Canada's Safety Code 6 for Exposure of Humans to Radio Frequency Fields

Test Dates: 14th to 27th November 2009

Senior Test Engineer: 

Chieu Huynh - B.Eng (Hons) Electronics/ Communications

Attestation: *I hereby certify that the device(s) described herein were tested as described in this report and that the data included is that which was obtained during such testing.*


Authorised Signatory: **Chieu Huynh**
Senior EMC Engineer
EMC Technologies Pty Ltd

EMI TEST REPORT FOR CERTIFICATION
to
FCC PART 24 Subpart E – Broadband PCS and
FCC PART 22 Subpart H - Cellular Radiotelephone Service
RSS-132 and RSS-133
Class II Permissive Change

1.0 INTRODUCTION

EMI testing was performed on the Sierra Wireless Mini-Card UMTS Module, model: Gobi2000 installed in Fujitsu notebook PC, Model: T900 / TH900. The test results and procedures were performed in accordance with the following Federal Communications Commission (FCC) standards/regulations. The test sample **complied** with the requirements of 47 CFR, Part 24 Subpart E – Broadband PCS and Part 22 Subpart H - Cellular Radiotelephone Service. The test sample also complied with the Industry Canada RSS-132 and RSS-133 and the RF exposure requirements of RSS-102.

The Gobi2000 UMTS module was certified by Sierra Wireless INC as a modular approval under FCC ID: N7NGOBI2 (Canada ID: 2417C-GOBI2).

The other Radio Transmitters installed in the T900 / TH900 notebook have already been recently certified by Fujitsu under the following FCC IDs:

FCC ID: EJE-WB0080 (IC: 337J-WB0080) – 622ANHMW WLAN and EYSMJCS Bluetooth.

FCC ID: EJE-WB0059 (IC: 337J-WB0059) – AR5BHB92 WLAN and EYSMJCS Bluetooth.

The intention of this Class II Permissive Change application is to enable the certified Gobi2000 Sierra Wireless UMTS module to be co-located with WLAN and BT modules. Independent antennas are used for each of the Radio modules and simultaneous transmission is possible. The transmitter modules are installed in a controlled environment at the Fujitsu notebook production/assembly factory.

Test results and procedures were performed in accordance with the following Federal Communications Commission (FCC) standards/regulations:

1.1 Summary of Results

FCC Part 24 Subpart E Clauses	FCC Part 22 Subpart H Clauses	IC RSS-132 Clauses	IC RSS-133 Clauses	Test Performed	Result
24.232	22.913	4.4	6.4	Power Limits	Complies (1)*
24.235	22.355	4.3	6.3	Frequency Stability	Complies (1)*
24.238	22.917	4.5.1	6.5.1	Emission Limits	Complies

(1)* Refer to FCC Part 22 and 24 test report, tested by QUADCOMM Incorporated, San Diego CA.

Note: Refer to M091071_Cert_GOBI2000_SAR_GSM-UMTS (FCC SAR Report) for details of SAR Compliance.

The measurement procedure used was in accordance with ANSI/TIA/EIA-603, ANSI C63.4-2003 and RSP-100. The instrumentation conformed to the requirements of ANSI C63.2-1996.

1.2 Modifications by EMC Technologies

No modifications were required.

2.0 GENERAL INFORMATION

(Information supplied by the Client)

2.1 Transmitter (UMTS) Details

GOBI2000 Transmitter: Mini-Card UMTS Module
Wireless Module: UMTS
Model Number: GOBI2000
Manufacturer: Sierra Wireless, Inc.

GSM Frequency Bands: 850 / 900 / 1800 / 1900 MHz
UMTS Frequency Bands: Band I (2100MHz) / Band II (1900MHz) / Band V (850MHz)

Features: EGPRS, GPRS, UMTS and HSDPA and HSUPA
Antenna Type: Nissei Electric
Antenna Gain: Max peak gain 0.89 dBi (refer to antenna details)
Output Power: **GPRS:** 850 MHz = 33 dBm and 1900 MHz = 30 dBm
EGPRS: 850 MHz = 27 dBm and 1900 MHz = 26 dBm
UMTS: 850 MHz and 1900 MHz bands = 24 dBm

2.2 Host (Notebook PC) Details

Host: LifeBook T series
***Model Name:** T900 / TH900
Serial Number: Pre-production Sample
Manufacturer: FUJITSU LIMITED

CPU Type and Speed: Core i7 M620 2.67GHz
LCD: 13.3" WXGA
Wired LAN: Intel 82577LM : 10 Base-T/100 Base-TX/1000Base-T
Modem: Agere MDC1.5 modem Model: D40
Port Replicator Model: ZPR0030

AC Adapter Model: 80W: SEE100P2-19.0 (Sanken), SEC100P3-19.0 (Sanken) and ADP-80NB A (Delta)
 100W: SEE120P2-19.0 (Sanken)
Voltage: 19V
Current Specs: 4.22A / 5.27A
Watts: 80W / 100W

*The model numbers shown T900 and TH900 are for the same product. The difference is for marketing purposes. "H" in the model name means "Home" which is for the consumer market, while no "H" means it is for the commercial market.

2.3 Test Configuration

Radiated Measurements - The CMU200 Rohde & Schwarz Universal Radio Communication Tester and a dipole antenna were used to establish a connection. The EUT was transmitted continuously during all tests.

Testing was performed in the two operating frequency ranges: 824.0 – 849 MHz and 1850 – 1910 MHz. The transmitter continuously transmitted at maximum output power.

The UMTS module supports GPRS, EGPRS, WCDMA and HSDPA mode. All four modes were tested and reported.

The following CMU 200 settings were used to establish a connection:

- (a) Network Support: GPRS and EGPRS
Service Selection: Test Mode B
Main Service: Packet Data

- (b) Network Support: WCDMA and HSDPA
Band Select: Operating Band II (1900 MHz) and V (850 MHz)
Dedicated Channel: RMC

2.4 Support Equipment

Rohde & Schwarz Universal Radio Communication Tester, Model: CMU200.
Rohde & Schwarz Signal Generator, Model: SMR40
Refer to measurement instruments used.

2.5 Test Procedure

Emissions measurements were performed in accordance with the procedures of ANSI/TIA/EIA-603 and ANSI C63.4-2003. Radiated emissions tests were performed at a distance of 3 metres from the EUT.

2.6 Test Facility

2.6.1 General

Radiated Emission measurements were performed at EMC Technologies open area test site (OATS) situated at Lerderberg Gorge, near the township of Bacchus Marsh in Victoria, Australia. Conducted measurements at an antenna ports were performed at EMC Technologies' laboratory in Keilor Park, Victoria Australia.

The above test sites have been accepted for testing by the Federal Communications Commission (FCC) - **FCC Registration Number 90560**.

EMC Technologies open area test site (OATS) has also been accepted by Industry Canada for the performance of radiated measurements in accordance with RSS 212, Issue 1 (Provisional). **Industry Canada File Number IC 3569B-1**.

2.6.2 NATA Accreditation

EMC Technologies is accredited in Australia to test to the following standards by the National Association of Testing Authorities (NATA).

“FCC Part 15 unintentional and intentional emitters in the frequency range 9kHz to 18 GHz excluding TV receivers (15.117 and 15.119), TV interface devices (15.115), cable ready consumer electronic equipment (15.118), cable locating equipment (15.213) and unlicensed national information infrastructure devices (Sub part E).”

The current full scope of accreditation can be found on the NATA website: www.nata.asn.au
It also includes a large number of emissions, immunity, SAR, EMR and Safety standards.

NATA is the Australian national laboratory accreditation body and has accredited EMC Technologies to operate to the IEC/ISO17025 requirements. A major requirement for accreditation is the assessment of the company and its personnel as being technically competent in testing to the standards. This requires fully documented test procedures, continued calibration of all equipment to the National Standard at the National Measurements Institute (NMI) and an internal quality system to ISO 9002. NATA has mutual recognition agreements with the National Voluntary Laboratory Accreditation Program (NVLAP) and the American Association for Laboratory Accreditation (A²LA).

2.7 Test Equipment Calibration

All measurement instrumentation and transducers were calibrated in accordance with the applicable standards by an independent NATA registered laboratory such as Agilent Technologies (Australia) Pty Ltd or the National Measurement Institute (NMI). All equipment calibration is traceable to Australia national standards at the National Measurements Institute. The reference antenna calibration was performed by NMI and the working antennas (biconical and log-periodic) calibrated by the NATA approved procedures. The complete list of test equipment used for the measurements, including calibration dates and traceability is contained in Appendix A.

2.8 Ambients at OATS

The Open Area Test Site (OATS) is an area of low background ambient signals. No significant broadband ambients are present however commercial radio and TV signals exceed the limit in the FM radio, VHF and UHF television bands. Radiated prescan measurements were performed in the shielded enclosure to check for possible radiated emissions at the frequencies where the OATS ambient signals exceeded the test limit.

RESULTS

3.0 PEAK POWER OUTPUT MEASUREMENTS

Refer to original approval under FCC ID: N7NGOBI2 (Canada ID: 2417C-GOBI2) certified by Sierra Wireless.

Testing was performed by QUADCOMM Incorporated, San Diego CA.

4.0 EIPR and OUT of BAND EMISSIONS (Fundamental & Spurious/ Harmonics)

4.1 Test Procedure

Testing was performed in accordance with the requirements of FCC Part 24.238 and FCC Part 22.917(a).

As per 24.238(a) – The limits of any emissions outside the frequency band shall be attenuated by at least $43 + 10\log(P)$ dB, where P is the measured transmitter output power.

This UMTS module was originally tested and certified by the manufacturer as a stand-alone module outside a laptop (host) with higher gain antennas. Refer to manufacturer's original FCC Part 22 & 24 radiated test report for full results showing compliance with the spurious and harmonics limits. However, to ensure the UMTS module install in T900 / TH900 LifeBook is still in compliance, verification tests were performed at selected frequencies for harmonics and spurious emissions.

The EUT was slowly rotated with the Peak Detector set to Max-Hold. This was performed for two antenna heights. When an emission was located, it was positively identified and its maximum level found by rotating the automated turntable, and by varying the antenna height. Each significant peak was investigated. This process was performed for both horizontal and vertical antenna polarisations.

A substitution measurement was used to measure the fundamental and harmonics. The EUT was replaced with a calibrated horn antenna (above 1 GHz) and calibrated dipole antenna (below 1 GHz) that was connected to a calibrated signal generator. The output level of the signal generator was adjusted until the same level on the spectrum analyser observed. The level of the signal generator output in dBm less any loss/gain due to the coax cable and the antenna.

4.2 Radiated Emissions

4.2.1 Frequency Band: 1 – 20 GHz

Calibrated EMCO 3115, EMCO 3116 and ETS Standard Horn antennas were used for measurements between 1 to 20 GHz.

The measurements were made at the open area test site at a distance of 3 metres.

The measurement of emissions was measured using the following setting:

RBW = VBW = 1 MHz

Except band-edge, RBW = VBW = 10 kHz

The receiver bandwidth was set to 6 dB.

Testing was performed while transmitter continuously transmitted on a low, middle and high frequency channel. All orientations were investigated and tested. Worst cases of harmonics were reported below.

4.2.1.1 850 MHz GSM**Low Channel – 824.2 MHz**

Modes	Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
GPRS	824.2	Horizontal	31.8	38.5	Pass
	1648.4	Vertical	-31.4	-13	Pass
	2472.6	Horizontal	-35.3	-13	Pass
	824 - Band Edge	Horizontal	-16.8	-13	Pass
EGPRS	Fundamental, harmonic and band-edge levels are lower than in GPRS mode				

Middle Channel – 836.6 MHz

Modes	Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
GPRS	836.6	Horizontal	32.3	38.5	Pass
	1673.2	Vertical	-30.5	-13	Pass
	2509.8	Horizontal	-35.9	-13	Pass
	3346.4	Horizontal	-40.8	-13	Pass
EGPRS	Fundamental and harmonic levels are lower than in GPRS mode				

High Channel – 848.8 MHz

Modes	Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
GPRS	848.8	Horizontal	32.9	38.5	Pass
	1697.6	Vertical	-29.6	-13	Pass
	2546.4	Horizontal	-35.7	-13	Pass
	3395.2	Horizontal	-37.4	-13	Pass
	849 - Band Edge	Horizontal	-18.2	-13	Pass
EGPRS	Fundamental, harmonic and band-edge levels are lower than in GPRS mode				

4.2.1.2 850 MHz UMTS**Low Channel – 826.4 MHz**

Modes	Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
WCDMA	826.4	Horizontal	23.3	38.5	Pass
	1652.8	Vertical	-45.8	-13	Pass
	2479.2	Horizontal	-45.7	-13	Pass
	824 - Band Edge	Horizontal	-21.1	-13	Pass
HSDPA	826.4	Horizontal	23.4	38.5	Pass
	Harmonic levels are same as in WCDMA mode				
	824 - Band Edge	Horizontal	-21.4	-13	Pass

Middle Channel – 836.4 MHz

Modes	Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
WCDMA	836.4	Horizontal	24.0	38.5	Pass
	1652.8	Vertical	-45.4	-13	Pass
	2479.2	Horizontal	-46.5	-13	Pass
HSDPA	Fundamental and harmonic levels are similar to WCDMA mode				

4.2.1.3 1900 MHz GSM**Low Channel – 1850.2 MHz**

Modes	Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
GPRS	1850.2	Horizontal	29.5	33.0	Pass
	3700.4	Vertical	-31.1	-13	Pass
	5550.6	Vertical	-39.4	-13	Pass
	1850 Band Edge	Horizontal	-15.6	-13	Pass
EGPRS	Fundamental, harmonic and band-edge levels are lower than in GPRS mode				

Middle Channel – 1880 MHz

Modes	Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
GPRS	1880	Horizontal	29.3	33.0	Pass
	3760	Vertical	-36.6	-13	Pass
	5640	Vertical	-41.9	-13	Pass
EGPRS	Fundamental and harmonic levels are lower than in GPRS mode				

High Channel – 1909.8 MHz

Modes	Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
GPRS	1909.8	Horizontal	29.8	33.0	Pass
	3819.6	Vertical	-37.4	-13	Pass
	5729.4	Vertical	-40.7	-13	Pass
	1910 Band Edge	Horizontal	-15.0	-13	Pass
EGPRS	Fundamental, harmonic and band-edge levels are lower than in GPRS mode				

4.2.1.4 1900 MHz UMTS**Low Channel – 1852.4 MHz**

Modes	Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
WCDMA	1852.4	Horizontal	22.0	33.0	Pass
	3704.8	Horizontal	-41.6	-13	Pass
	1850 Band Edge	Horizontal	-31.3	-13	Pass
HSDPA	1852.4	Horizontal	22.3	33.0	Pass
	Harmonic levels are same as in WCDMA mode				
	1850 Band Edge	Horizontal	-33.2	-13	Pass

Middle Channel – 1880 MHz

Modes	Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
WCDMA	1880	Horizontal	22.9	33.0	Pass
	3760	Horizontal	-38.2	-13	Pass
HSDPA	Fundamental and harmonic levels are similar to WCDMA mode				

High Channel – 1907.6 MHz

Modes	Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
WCDMA	1907.6	Horizontal	23.0	33.0	Pass
	3815.2	Horizontal	-37.3	-13	Pass
	5722.8	Horizontal	-38.4	-13	Pass
	1910 Band Edge	Horizontal	-27.7	-13	Pass
HSDPA	Fundamental, harmonic and band-edge levels are similar to WCDMA mode				

4.2.1.5 Worst Case Results

Harmonic and spurious emissions were recorded up to 20 GHz. Other harmonics were confirmed low with both RBW and VBW reduced. The worst case emission (band-edge) complied with the FCC limits (the limit is -13dBm) by a margin of 2.0 dB.

4.2.2 Frequency Band: 30 - 1000 MHz

A calibrated Biconical antenna was used for measurements between 30 MHz to 232 MHz and a calibrated Logperiodic antenna used for measurements between 230 MHz to 1000 MHz.

The measurements were made at the open area test site at a distance of 3 metres.

The resolution bandwidth of 120 kHz and the video bandwidth of 300 kHz were utilised.

The worst case emission occurred at 166.6 MHz and complied with the FCC limits (the limit is -13 dBm) by a margin of greater than 20 dB.

4.3 Band Edge Measurements

Refer to original approval under FCC ID: N7NGOBI2 (Canada ID: 2417C-GOBI2) certified by Sierra Wireless.

Testing was performed by QUADCOMM Incorporated, San Diego CA.

4.4 Antenna Conducted RF Measurements

Refer to original approval under FCC ID: N7NGOBI2 (Canada ID: 2417C-GOBI2) certified by Sierra Wireless.

Testing was performed by QUADCOMM Incorporated, San Diego CA.

5.0 FREQUENCY STABILITY

Refer to original approval under FCC ID: N7NGOBI2 (Canada ID: 2417C-GOBI2) certified by Sierra Wireless.

Testing was performed by QUADCOMM Incorporated, San Diego CA.

6.0 CHANNEL BANDWIDTH

Refer to original approval under FCC ID: N7NGOBI2 (Canada ID: 2417C-GOBI2) certified by Sierra Wireless.

Testing was performed by QUADCOMM Incorporated, San Diego CA.

7.0 CONDUCTED EMISSION MEASUREMENTS

7.1 Test Procedure

The arrangement specified in ANSI/TIA/EIA-603 and ANSI C63.4-2003 was adhered to for the conducted EMI measurements. The EUT was placed in the RF screened enclosure and a CISPR EMI Receiver as defined in ANSI C63.2-1996 was used to perform the measurements.

The EMI Receiver was operated under program control using the Max-Hold function and automatic frequency scanning, measurement and data logging techniques. The specified 0.15 MHz to 30 MHz frequency range was sub-divided into sub-ranges to ensure that all short duration peaks were captured.

7.2 Peak Maximising Procedure

The various operating modes of the system were investigated. For each of the sub-ranges, the EMI receiver was set to continuous scan with the Peak detector set to Max-Hold mode. The Quasi-Peak detector and the Average detector were then invoked to measure the actual Quasi-Peak and Average level of the most significant peaks, which were detected.

7.3 Calculation of Voltage Levels

The voltage levels were automatically measured in software and compared to the test limit. The method of calculation was as follows:

$$\mathbf{VEMI} = \mathbf{VRx} + \mathbf{LBPF}$$

Where:

- VEMI** = the Measured EMI voltage in dB μ V to be compared to the limit.
- VRx** = the Voltage in dB μ V read directly at the EMI receiver.
- LBPF** = the loss in dB of the cables and the Limiter and Pass Filter.

7.4 Plotting of Conducted Emission Measurement Data

The measurement data pertaining to each frequency sub-range were then concatenated to form a single graph of (peak) amplitude versus frequency. This was performed for both Active and Neutral lines and the composite graph were subsequently plotted. A list of the highest relevant peaks and the respective Quasi-Peak and Average values were also plotted on the graph.

7.5 Results of Conducted Emission Measurements (AC Mains Ports)

The worst case conducted EMI complied with both quasi peak and average limits by margins of greater than 10 dB.

8.0 RADIO FREQUENCY EXPOSURE (HAZARD) INFORMATION

The Personal Communications Services operating in the 824 – 849 MHz and 1850 - 1910 MHz bands are required to be operated in a manner that ensures that the public is not exposed to RF energy levels in accordance with CFR 47, Section 1.1307(b)(1).

The intention of this Class II Permissive Change application is to enable the certified Gobi2000 Sierra Wireless UMTS module (FCC ID: N7NGOBI2 (Canada ID: 2417C-GOBI2)) to be co-located with the followings WLAN and BT modules.

FCC ID: EJE-WB0080 (IC: 337J-WB0080) – 622ANHMW WLAN and EYSMJCS Bluetooth.

FCC ID: EJE-WB0059 (IC: 337J-WB0059) – AR5BHB92 WLAN and EYSMJCS Bluetooth.

Independent antennas are used for each of the Radio modules and simultaneous transmission is possible.

In accordance with this section and also section 2.1091 this device has been defined as a portable device and SAR testing was performed in accordance with OET Bulletin 65 and reported under EMC Technologies M091071_Cert_GOBI2000_SAR_GSM-UMTS. The highest SAR value measured 0.135 mW/g complied with the FCC human exposure requirements of 47 CFR 2.1093(d).

9.0 COMPLIANCE STATEMENT

The Sierra Wireless Mini-Card UMTS module, model: GOBI2000 installed in Fujitsu notebook PC, Model: T900 / TH900, **complied** with the requirements of 47 CFR, Part 24 Subpart E – Broadband PCS and Part 22 Subpart H - Cellular Radiotelephone Service. The test sample also complied with the Industry Canada RSS-132 and RSS-133 and the RF exposure requirements of RSS-102.

Results were as follows:

FCC Part 24 Subpart E Clauses	FCC Part 22 Subpart H Clauses	IC RSS-132 Clauses	IC RSS-133 Clauses	Test Performed	Result
24.232	22.913	4.4	6.4	Power Limits	Complies (1)*
24.235	22.355	4.3	6.3	Frequency Stability	Complies (1)*
24.238	22.917	4.5.1	6.5.1	Emission Limits	Complies

(1)* Refer to FCC Part 22 and 24 test report, tested by QUADCOMM Incorporated, San Diego CA.

Note: Refer to M091071_Cert_GOBI2000_SAR_GSM-UMTS (FCC SAR Report) for details of SAR Compliance.

10.0 UNCERTAINTIES

EMC Technologies has evaluated the equipment and the methods used to perform the emissions testing. The estimated measurement uncertainties for emissions tests shown within this report are as follows:

Conducted Emissions:	9 kHz to 30 MHz	±3.2 dB
Radiated Emissions:	30 MHz to 300 MHz	±5.1 dB
	300 MHz to 1000 MHz	±4.7 dB
	1 GHz to 18 GHz	±4.6 dB

The above expanded uncertainties are based on standard uncertainties multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

11.0 APPENDICES

MEASUREMENT INSTRUMENT DETAILS
PHOTOGRAPHS
ANTENNA INFORMATION
FCC LABELLING DETAILS
USER MANUAL

Sierra Wireless FCC Part 22 and 24 Conducted Test Report
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