



Lab Code: 200707-0



FCC PART 22H, 24E

MEASUREMENT AND TEST REPORT

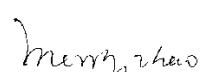
For

Shenzhen Castel Wireless Telecommunications Co., Ltd.

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Hi-Tech Industrial Park, Nanshan, Shenzhen, Guangdong, China

FCC ID: XDV802

Report Type: Original Report	Product Type: Iridium /GPRS Dual Mode Communication Terminal
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Report Number:	<u>RSZ11041907-22H&24E</u>
Report Date:	<u>2011-06-03</u>
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Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. This report **must not** be used by the customer to claim product certification, approval, or endorsement by NVLAP*, or any agency of the Federal Government.

* This report contains data that are not covered by the NVLAP accreditation and are marked with an asterisk ★ (Rev.2)

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Shenzhen Castel Wireless Telecommunications Co., Ltd.*'s product, model number: *SAT802 (FCC ID: XDV802)* or the "EUT" as referred to in this report is an *Iridium /GPRS Dual mode communication terminal*, which measures approximately: 11.5 cm (L) x 8.5 cm (W) x 4.5 cm (H), rated input voltage: DC 9-36 V.

* *All measurement and test data in this report was gathered from production sample serial number: 1104073 (Assigned by BACL, Shenzhen). The EUT was received on 2011-04-19.*

Objective

This type approval report is prepared on behalf of *Shenzhen Castel Wireless Telecommunications Co., Ltd.* in accordance with Part 2, Subpart J, Part 22 Subpart H, and Part 24 Subpart E of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC rules for output power, modulation characteristic, occupied bandwidth, and spurious emission at antenna terminal, spurious radiated emission, frequency stability, band edge and radiated margin.

Related Submittal(s)/Grant(s)

GSM/GPRS module with FCC ID: UDV-0912142009007
FCC Part 25 submission with FCC ID: XDV802

Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-part J as well as the following parts:

Part 22 Subpart H - Public Mobile Services
Part 24 Subpart E - Personal Communication Services

Applicable Standards: TIA/EIA 603-C, ANSI C63.4-2009.

All radiated and conducted emissions measurements were performed at Bay Area Compliance Laboratories Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp.(Shenzhen) to collect test data is located in the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on December 06, 2010. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2009.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratories Corp. (Shenzhen) is an ISO/IEC 17025 guide accredited laboratory, and is accredited by National Voluntary Laboratory Accredited Program (Lab Code 200707-0).



The current scope of accreditations can be found at <http://ts.nist.gov/Standards/scopes/2007070.htm>

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The EUT was configured for testing according to TIA/EIA-603-C.

The GSM/PCS test items were performed with the EUT operating at normal mode.

EUT Exercise Software

Iridium Serial Tool.exe which was provided by client.

Equipment Modifications

No modifications were made to the EUT.

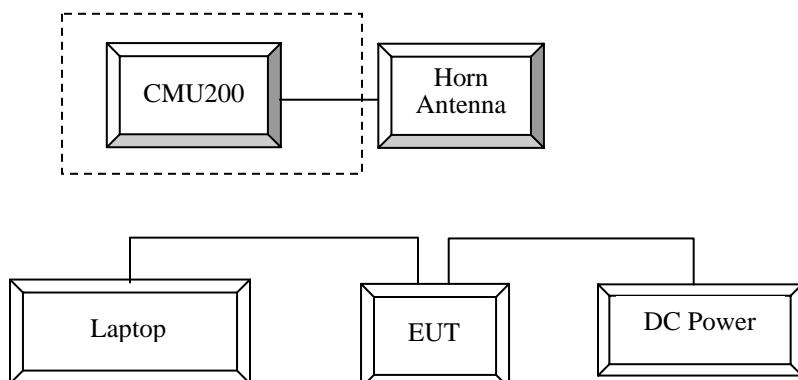
Local Support Equipment List and Details

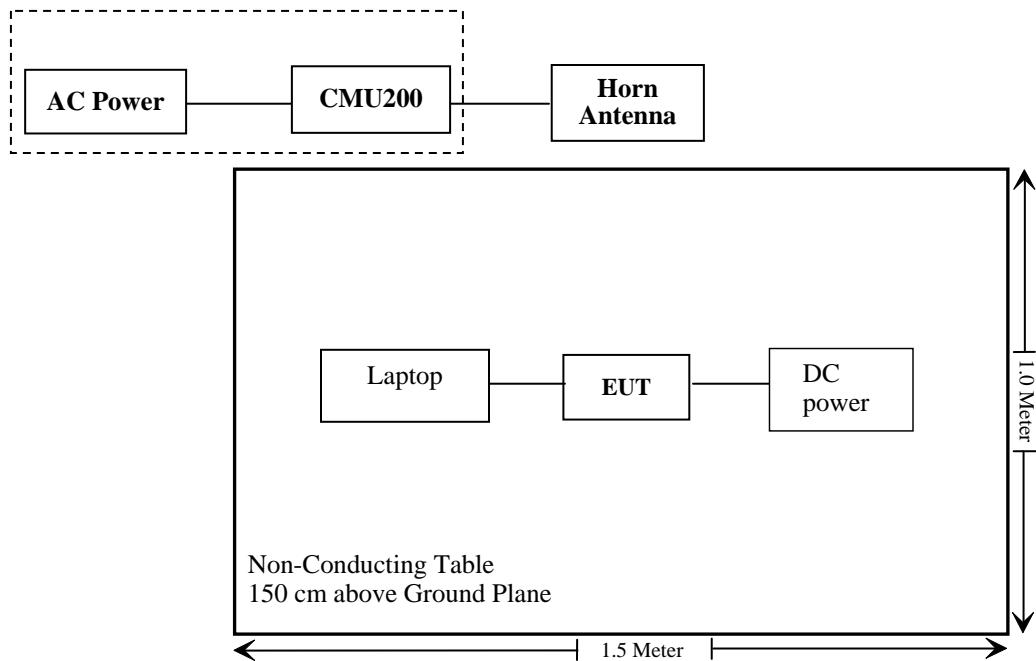
Manufacturer	Description	Model	Serial Number
DELL	Laptop	D600	B5RF831
ZAOXIN	DC Power Supply	RXN-605D	20030842184

External I/O Cable

Cable Description	Length (m)	From/Port	To
Unshielded detachable power cable	1.5	EUT	DC Power

Configuration of Test Setup



Block Diagram of Test Setup

SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1307, §2.1091	Maximum Permissible exposure (MPE)	Compliance
§2.1046; §22.913 (a); §24.232 (c)	RF Output Power	Compliance
§2.1049; §22.905 §22.917; §24.238	99% & -26 dB Occupied Bandwidth	N/A*
§2.1051, §22.917 (a); §24.238 (a)	Spurious Emissions at Antenna Terminal	N/A*
§2.1053 §22.917 (a); §24.238 (a)	Field Strength of Spurious Radiation	Compliance
§22.917 (a); §24.238 (a)	Out of band emission, Band Edge	N/A*
§2.1055 §22.355; §24.235	Frequency stability vs. temperature Frequency stability vs. voltage	N/A*

Note: N/A* please refer to FCC ID: UDV-0912142009007, report No.: SHEMO09120140807.

FCC §1.1307 (b)(1) & §2.1091 - MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to FCC Part 2.1091 and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minutes)
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

f = frequency in MHz;

* = Plane-wave equivalent power density;

MPE Calculation

Predication of MPE at a given distance, equation from OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

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

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

G = 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);

Band	Antenna Gain		Conducted Power			Time-Averaged Transmit Power (mW)	Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)	
	(dBi)	(numeric)	Slot No.	(dBm)	(mW)					
GSM850	2.0	1.58	1 slot	33.1	2042	1/8	255.25	20	0.08	0.55
	2.0	1.58	2 slot	33.1	2042	1/4	510.5	20	0.16	0.55
PCS1900	2.0	1.58	1 slot	30.5	1122	1/8	140.25	20	0.04	1.0
	2.0	1.58	2 slot	30.3	1072	1/4	268	20	0.08	1.0

Result:

The MPE meets FCC limit at 20 cm distance.

FCC §2.1046, §22.913 (a) & §24.232 (c) - RF OUTPUT POWER

Applicable Standard

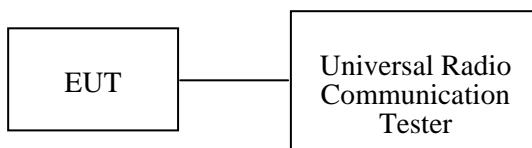
According to FCC §2.1046 and §22.913 (a), the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

According to FCC §2.1046 and §24.232 (C), mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

Test Procedure

Conducted method:

The RF output of the transmitter was connected to the wireless test set and the spectrum analyzer through sufficient attenuation.



Radiated method:

TIA 603-C section 2.2.17

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Sunol Sciences	Horn Antenna	DRH-118	A052604	2011-05-05	2012-05-04
Rohde & Schwarz	Spectrum Analyzer	FSEM30	849720/019	2010-07-08	2011-07-07
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2010-07-05	2011-07-04
Mini-Circuits	Amplifier	ZVA-213+	T-E27H	2011-03-08	2012-03-07
HP	Signal Generator	HP8657A	2849U00982	2010-10-28	2011-10-27
HP	Amplifier	HP8447D	2944A09795	2010-08-02	2011-08-02
HP	Synthesized Sweeper	8341B	2624A00116	2010-11-07	2011-11-06
COM POWER	Dipole Antenna	AD-100	041000	2010-09-25	2011-09-25
A.H. System	Horn Antenna	SAS-200/571	135	2010-05-17	2011-05-17
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	109038	2010-06-11	2011-06-10

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Data**Environmental Conditions**

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	100.0kPa

The testing was performed by Felix Li on 2011-05-06.

ERP & EIRP

ERP for Cellular Band (Part 22H)

Indicated		Table Angle Degree	Test Antenna		Substituted			Antenna Gain Correction (dBd)	Cable Loss (dB)	Absolute Level (dBm)	Part 22H Limit (dBm)
Frequency (MHz)	S.A. Reading (dB μ V)		Height (m)	Polar (H/V)	Frequency (MHz)	S.G. Level (dBm)	Ant. Polar (H/V)				
Low Channel											
824.2	95.16	125	1.8	H	824.2	26.3	H	0	0.9	25.4	38.45
824.2	100.36	23	1.5	V	824.2	28.8	V	0	0.9	27.9	38.45
Middle Channel											
836.6	96.6	118	1.7	H	836.6	27.3	H	0	0.9	26.4	38.45
836.6	101.05	334	1.7	V	836.6	29.5	V	0	0.9	28.6	38.45
High Channel											
848.8	95.83	32	1.5	H	848.8	26.4	H	0	0.9	25.5	38.45
848.8	100.45	360	2.0	V	848.8	29.2	V	0	0.9	28.3	38.45

EIRP for PCS Band (Part 24E)

Indicated		Table Angle Degree	Test Antenna		Substituted			Antenna Gain Correction (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Part 24E Limit (dBm)
Frequency (MHz)	S.A. Reading (dB μ V)		Height (m)	Polar (H/V)	Frequency (MHz)	S.G. Level (dBm)	Ant. Polar (H/V)				
Low Channel											
1850.2	85.54	327	1.8	H	1850.2	19.8	H	6.2	1.02	24.98	33
1850.2	92.25	245	1.6	V	1850.2	22.2	V	6.2	1.02	27.38	33
Middle Channel											
1880	85.3	254	1.5	H	1880	19.5	H	6.2	1.03	24.67	33
1880	93.4	312	1.5	V	1880	22.8	V	6.2	1.03	27.97	33
High Channel											
1909.8	85.27	236	1.8	H	1909.8	19.4	H	6.2	1.03	24.57	33
1909.8	92.06	164	1.7	V	1909.8	22.1	V	6.2	1.03	27.27	33

Note: all data was collected without the amplifier.

FCC §2.1053, §22.917 & §24.238 - SPURIOUS RADIATED EMISSIONS

Applicable Standard

FCC §2.1053, §22.917 and §24.238.

Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB = $10 \lg (\text{TX pwr in Watts}/0.001)$ – the absolute level

Spurious attenuation limit in dB = $43 + 10 \log_{10} (\text{power out in Watts})$

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Sunol Sciences	Horn Antenna	DRH-118	A052604	2011-05-05	2012-05-04
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2010-07-05	2011-07-04
Rohde & Schwarz	Spectrum Analyzer	FSEM30	849720/019	2010-07-08	2011-07-07
Mini-Circuits	Amplifier	ZVA-213+	T-E27H	2011-03-08	2012-03-07
HP	Signal Generator	HP8657A	2849U00982	2010-10-28	2011-10-27
HP	Amplifier	HP8447D	2944A09795	2010-08-02	2011-08-02
HP	Synthesized Sweeper	8341B	2624A00116	2010-11-07	2011-11-06
COM POWER	Dipole Antenna	AD-100	041000	2010-09-25	2011-09-25
A.H. System	Horn Antenna	SAS-200/571	135	2010-05-17	2011-05-17
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	109038	2010-06-11	2011-06-10

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	100.0kPa

The testing was performed by Felix Li on 2011-05-06.

Test mode: Transmitting

Cellular Band (Part 22H)

Indicated		Table Angle Degree	Test Antenna		Substituted				Absolute Level (dBm)	Limit (dBm)	Margin (dB)
Frequency (MHz)	S.A. Reading (dB μ V)		Height (m)	Polar (H/V)	Frequency (MHz)	Level (dBm)	Ant. Gain (dB)	Cable Loss (dB)			
Below 1 GHz, Middle Channel											
443.95	45.25	25	1.3	H	443.95	-52.2	0	0.46	-52.66	-13	39.66
264.98	45.70	234	1.5	V	264.98	-54.0	0	0.32	-54.32	-13	41.32
333.09	44.34	128	1.5	V	333.09	-55.1	0	0.39	-55.49	-13	42.49
398.52	42.34	145	1.5	H	398.52	-56.2	0	0.44	-56.64	-13	43.64
Above 1 GHz, Middle Channel											
3346.6	44.20	232	1.60	V	3346.6	53.5	6.7	1.38	-48.18	-13	35.18
1673.2	48.78	325	1.50	V	1673.2	-55.3	6.2	0.94	-50.04	-13	37.04
2509.8	42.41	0	1.60	V	2509.8	-57.2	7.3	1.19	-51.09	-13	38.09
1673.2	46.25	235	1.50	H	1673.2	-57.2	6.2	0.94	-51.94	-13	38.94
3346.6	41.38	147	1.50	H	3346.6	-57.8	6.7	1.38	-52.48	-13	39.48
2509.8	40.25	325	1.60	H	2509.8	-59.1	7.3	1.19	-52.99	-13	39.99

PCS Band (Part 24E)

Indicated		Table Angle Degree	Test Antenna		Substituted				Absolute Level (dBm)	Limit (dBm)	Margin (dB)
Frequency (MHz)	S.A. Reading (dB μ V)		Height (m)	Polar (H/V)	Frequency (MHz)	Level (dBm)	Ant. Gain (dB)	Cable Loss (dB)			
Below 1 GHz, Middle Channel											
39.85	45.25	45	1.5	V	39.85	-46.7	0	0.10	-46.8	-13	33.8
98.42	47.45	134	1.5	V	98.42	-50.2	0	0.20	-50.4	-13	37.4
299.68	43.57	157	1.6	H	299.68	-55.4	0	0.36	-55.76	-13	42.76
333.12	42.06	58	1.3	H	333.12	-56.3	0	0.39	-56.69	-13	43.69
Above 1 GHz, Middle Channel											
3760	55.61	324	1.6	V	3760	-39.8	6.9	1.47	-34.37	-13	21.37
3760	54.18	157	1.8	H	3760	-41.6	6.9	1.47	-36.17	-13	23.17
5640	49.66	254	1.6	V	5640	-43.6	8.3	1.76	-37.06	-13	24.06
7520	47.62	118	1.6	V	7520	-43.1	7.6	2.09	-37.59	-13	24.59
5640	43.85	21	1.5	H	5640	-49.8	8.3	1.76	-43.26	-13	30.26
7520	42.18	124	2.0	H	7520	-49.2	7.6	2.09	-43.69	-13	30.69

***** END OF REPORT *****