RF Exposure Evaluation Report

FOR:

Manufacturer: System Planning Corporation

Model #: VERSA 203133-01

FCC ID: XDY-VERSA-01

References:

1. FCC OET Bulletin 65 Supplement
2. FCC CFR Part 1 (1.1307 &1.1310), Part 2 (2.1091)

1 Administrative Data

1.1 Identification of the Testing Laboratory Issuing the Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Address:	411 Dixon Landing Road Milpitas, CA 95035 U.S.A.
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
Test Lab Manager:	Sajay Jose
Test Engineer:	Tunji Yusuf

1.2 Identification of the Client

Client:	System Planning Corporation
Street Address:	3601 Wilson Blvd, Suite 500
City/Zip Code	Arlington VA 22201
Country	USA
Contact Person:	Ronald Martin
Phone No.	703-351-8203
e-mail:	martin@sysplan.com

1.3 Identification of the Manufacturer

Same as Client.

2 Equipment under Test (EUT)

2.1 Specification of the Equipment under Test

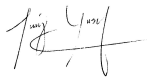
Model No./Name:	VERSA 203133-01
Product Description:	Local Control for remote installations.
HW Version/ SW Version :	203133 -05/ 7.45.1 (SV08)
FCC ID:	XDY-VERSA-01
Integrated Module(s) Info:	Sierra Wireless Q2687 (FCC ID: N7NQ2687) Modular Satellite Transmitter STX2 (FCC ID: L2V-STX2-1)
Supported Frequency Bands:	GSM//GPRS/ EGPRS: 850/900/1800/1900 MHz DTS/ IEEE 802.15.4 (ZigBee): 2.405-2.480 GHz Satellite Transmitter: 1610-1625 MHz GPS: Rx only 1575 MHz
Type(s) of Modulation:	WWAN: GMSK, 8PSK DTS: O-QPSK SAT: BPSK
Antenna Info:	**WWAN:** Internal SMD Antenna Model: Taoglas PA.25a Manufacture reported peak gain (dBi): 0.9-1.8 (in frequency band 800-2200 MHz) **DTS:** Internal Ceramic Antenna Model: Johanson 2450AT18B100 Manufacturer reported peak gain (dBi):0.5 **SAT:** Internal Monopole Printed Trace Antenna Model: Spectrum Controls PA25-1615-025SA Manufacturer reported peak gain: 3 dBi
Rated Operating Voltage (V DC):	3.6
Rated Operating Temperature Range:	–40°C ~ +85°C
Test Sample Status:	Pre-Production
Co-located Transmitters/ Antennas?	■ Yes: DTS may co-transmit with WWAN or Satellite radios ☐ No
Device Category:	■ Fixed Installation, Vehicular ☐ Mobile ☐ Portable
Exposure Category:	☐ Occupational/ Controlled ■General Population/ Uncontrolled

3 Assessment

This report serves as the Technical Information regarding RF Exposure evaluation of the below identified device according to the rules as stipulated in the documents listed under References above.

The device meets the RF exposure limits, or - for some of it's radio functions / bands - the conditions for exemption from routine evaluation as defined in the referenced FCC and IC rule parts.

Company	Description	Model #
System Planning Corporation	Local Control for remote installations.	VERSA 203133-01

Date	Section	Name	Signature
2013-04-02	Compliance	Tunji Yusuf (EMC Engineer)	

4 RF Exposure Evaluation Requirements

4.1 FCC:

Calculations can be made to predict RF field strength and power density levels around typical RF sources using the general equations (3) and (4) on page 19 of the following FCC document:
"OET Bulletin 65, Edition 97-01 - Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields".

The table below is excerpted from Table 1B of 47 CFR 1.1310 titled Limits for Maximum Permissible Exposure (MPE), Limits for General Population/Uncontrolled Exposure:

Frequency Range (MHz)	**Power density (mW/cm^2)**	**Averaging time (minutes)**
300 – 1500	f (MHz) /1500	30
1500 – 100.000	1.0	30

Using the equation from page 19 of OET Bulletin 65, Edition 97-01:

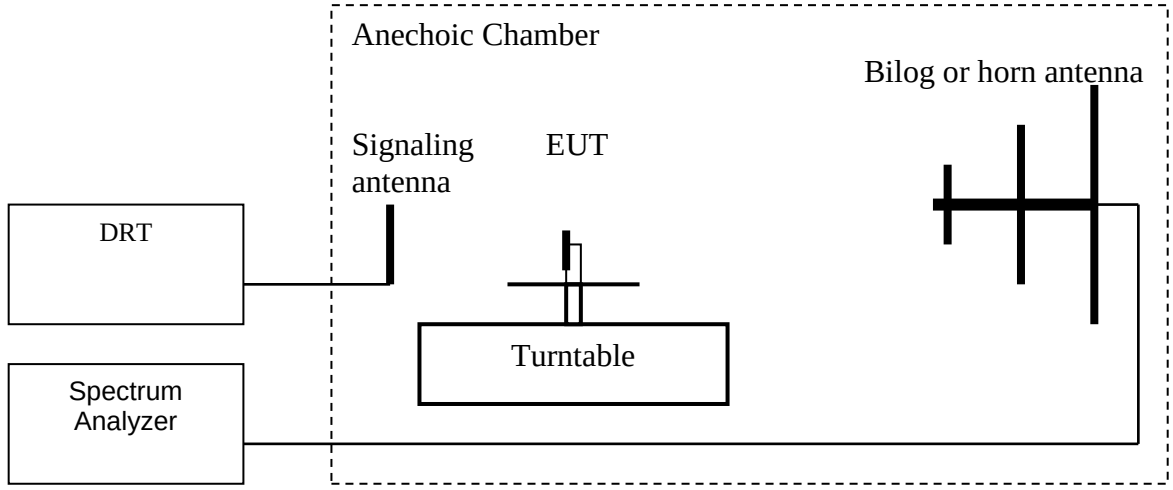
$$S = \frac{PG}{4\pi R^2}$$

where: S = power density (in appropriate units, e.g. mW/cm^2)
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)

Additionally, according to § 2.1091:
The limit for <1.5 GHz mobile operations where no routine evaluation is required is: 1.5W ERP
The limit for >1.5 GHz mobile operations where no routine evaluation is required is: 3W ERP

5 Measurement procedure:

5.1 Radiated power measurement- ERP/EIRP-

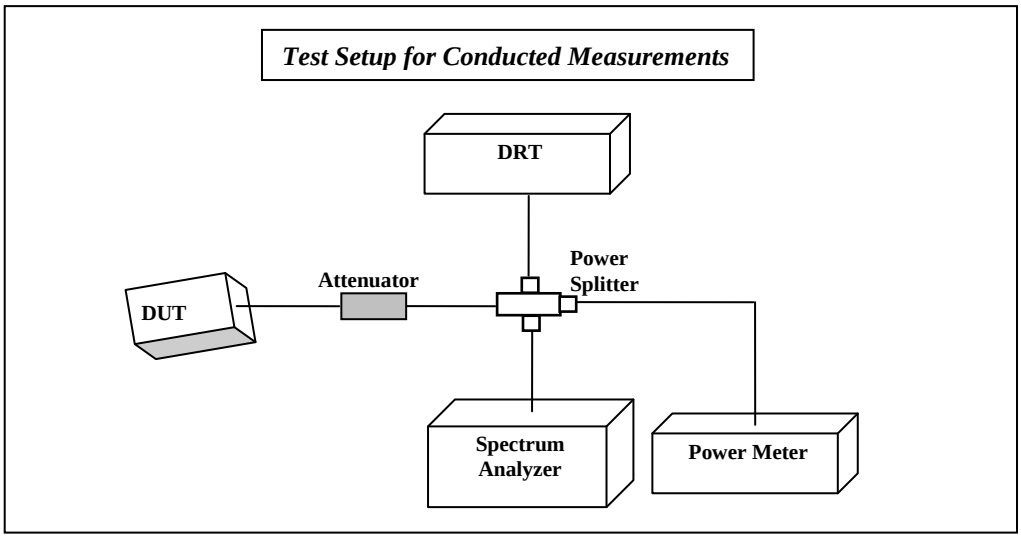


1. Connect the equipment as shown in the above diagram with the EUT's antenna in center of the turn table.
2. Adjust the settings of the Digital Radio Communication Tester (DRT) to set the EUT to its maximum power at the required channel.
3. Set the spectrum analyzer to the channel frequency. Set the analyzer to measure peak hold with the required settings.
4. Rotate the EUT 360°. Record the peak level in dBm (**LVL**).
5. Replace the EUT with a vertically polarized half wave dipole or known gain antenna. The center of the antenna should be at the same location as the center of the EUT's antenna.
6. Connect the antenna to a signal generator with known output power and record the path loss in dB (**LOSS)**. **LOSS** = Generator Output Power (dBm) – Analyzer reading (dBm).
7. Determine the ERP using the following equation:
   ERP (dBm) = **LVL** (dBm) + **LOSS** (dB)
8. Determine the EIRP using the following equation:
   EIRP (dBm) = **ERP** (dBm) + 2.14 (dB)
9. Measurements are to be performed with the EUT set to the low, middle and high channel of each frequency band.

Measurement uncertainty: +/-3.0 dB

(**Note:** Steps 5 and 6 above are performed prior to testing and **LOSS** is recorded by test software. Steps 3, 4, 7 and 8 above are performed with test software.)

5.2 Radiated power Calculation- ERP/EIRP-



1. Connect the equipment as shown in the above diagram.
2. Adjust the settings of the Digital Radio Communication Tester (DRT) to connect the EUT at the required channel (OR) alternatively use the EUT to set to transmit at a specific mode.
3. Measure conducted power using the power meter or the Spectrum Analyzer.
4. ERP/EIRP is calculated by adding the antenna gain to the measured conducted power.
   EIRP= Measured conducted power+ Antenna Gain (dBi)
   (Antenna gain based on measurement or data from the antenna manufacturer.)
   ERP= EIRP- 2.14

5.3 Measurement Equipment information:

Instrument/Ancillary	Model	Manufacturer	Serial No.	Cal Date	Cal Interval
Radio Communication Tester	CMU 200	Rohde & Schwarz	101821	May 2011	2 Years
EMI Receiver/Analyzer	ESIB 40	Rohde & Schwarz	100107	May 2011	2 Years
Spectrum Analyzer	FSU	Rohde & Schwarz	200302	May 2011	2 Years
Biconilog Antenna	3141	EMCO	0005-1186	June 2009	3 years
Horn Antenna (1-18GHz)	3115	ETS	00035114	Mar 2009	3 years
Horn Antenna (18-40GHz)	3116	ETS	00070497	Feb 2012	3 years
Communication Antenna	IBP5-900/1940	Kathrein	n/a	n/a	n/a
High Pass Filter	5HC2700	Trilithic Inc.	9926013	Part of system calibration	
High Pass Filter	4HC1600	Trilithic Inc.	9922307	Part of system calibration	
Pre-Amplifier	JS4-00102600	Miteq	00616	Part of system calibration	
Power Smart Sensor	R&S	NRP-Z81	100161	May 2011	2 Years

5.4 Measurement Summary:

Band of operation	**Peak Radiated Power- EIRP**		**Peak Radiated Power ERP**		**ERP Limits (FCC)** (where no routine evaluation is required)
MHz	dBm	mW	dBm	mW	W
GSM/GPRS/EDGE 824.2-848.8	34.23	2648.5	32.09	1618.1	1.5
GSM/GPRS/EDGE 1850.2-1909.8	32.92	1958.8	30.78	1196.7	3
DTS 2405-2480	0.89	1.23	3.03	2.0	3
SAT 1610-1625	20.70	117.5	22.84	192.3	3

Since the Peak ERP <3W (FCC), this device is exempt from Routine evaluation for all modes of operation except in GSM/GPRS/EDGE 850 MHz.

Power Density:

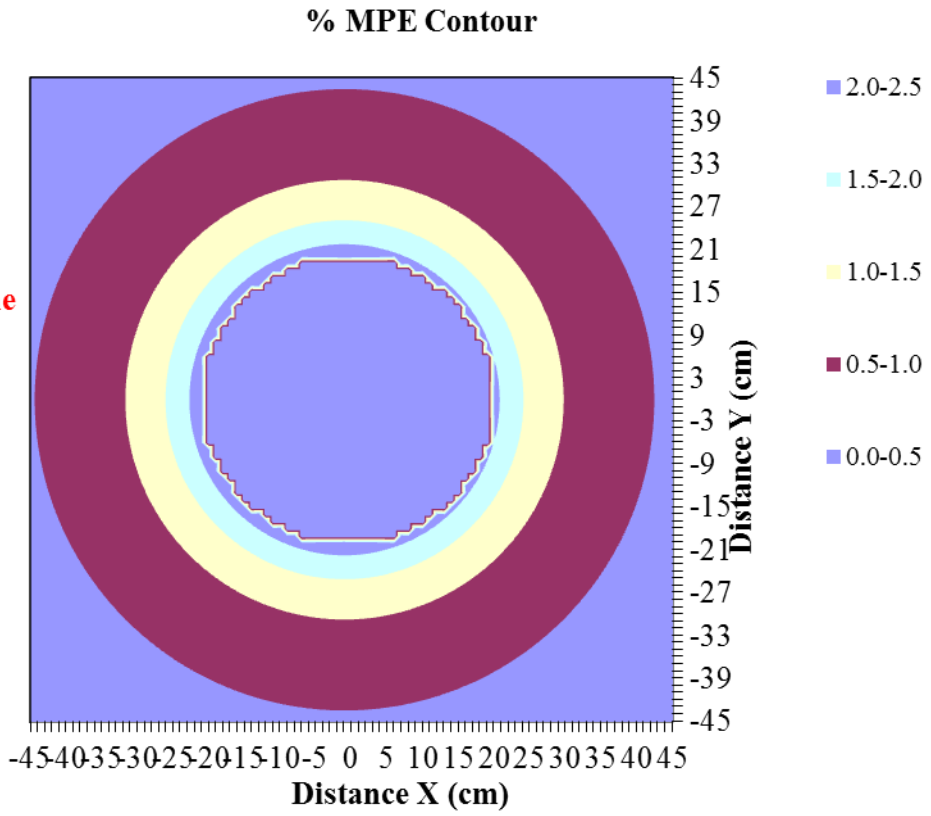
Band of operation	**Peak Radiated Power- EIRP**		**Duty Cycle (worst case)**	**Distance (R)**	**Power Density** $(EIRP*DutyCycle)/(4\pi R^2)$	**Limit**	**Verdict**
MHz	dBm	mW	%	cm	mW/cm^2	mW/cm^2	
GSM/GPRS/EDGE 824.2-848.8	34.23	2648.5	50	20	0.26	0.57	Pass

Prediction for Simultaneous Transmission

The MPE contour estimation was made using a separation distance of 1 cm to represent the worse case.

Antenna No.		Total	1	2
Tx Status			On	On
Frequency	MHz		2405	1611.25
MPE Limit	mW/cm^2		1.00	1.00
Max % MPE	%	2.4	0.0	2.3
Power	(W)	0.118	0.001	0.117
Antenna Gain	dBi		0.00	0.00
EIRP	(W)	0.12	0.001	0.117
X	(cm)		0.0	-1.0
Y	(cm)		0.0	0.0

Note: The 0% contour surrounding the antennas

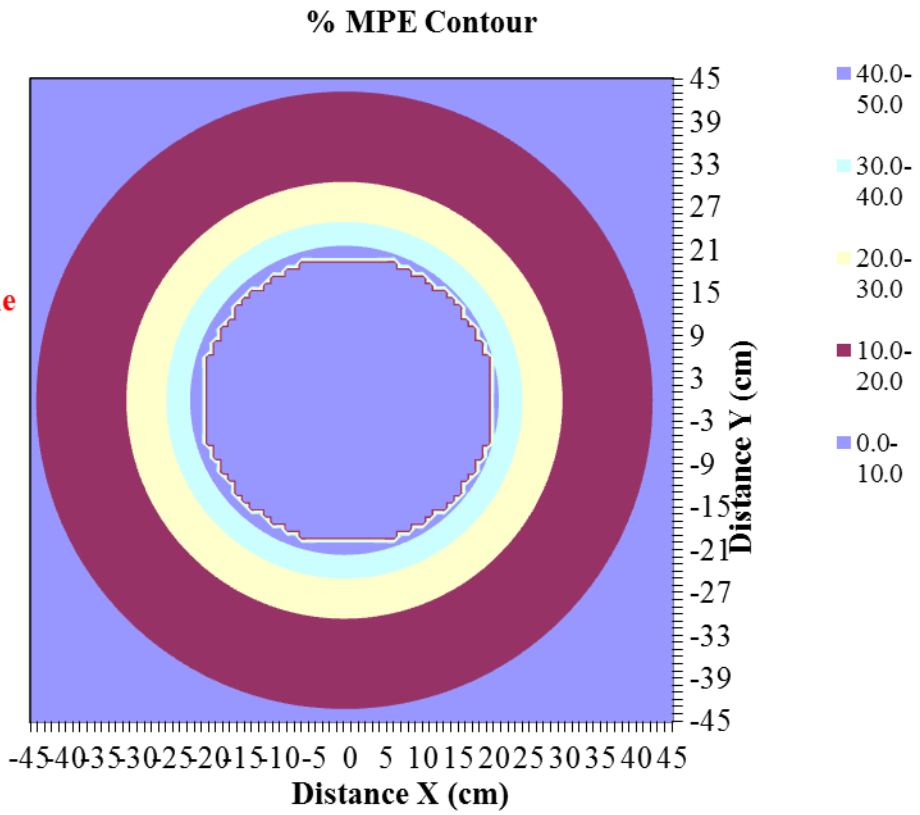


Verdict: Since the max MPE is <100%, the device is compliant in simultaneous transmission mode for the DTS and Satellite radios.

The MPE contour estimation was made using a separation distance of 1 cm to represent the worse case.
Output power listed below is for 50% duty cycle in GSM mode.

Antenna No.		Total	1	2
Tx Status			On	On
Frequency	MHz		2405	848.8
MPE Limit	mW/cm^2		1.00	0.57
Max % MPE	%	46.6	0.0	46.5
Power	(W)	1.325	0.001	1.324
Antenna Gain	dBi		0.00	0.00
EIRP	(W)	1.33	0.001	1.324
X	(cm)		0.0	-1.0
Y	(cm)		0.0	0.0

Note: The 0% contour surrounding the antennas

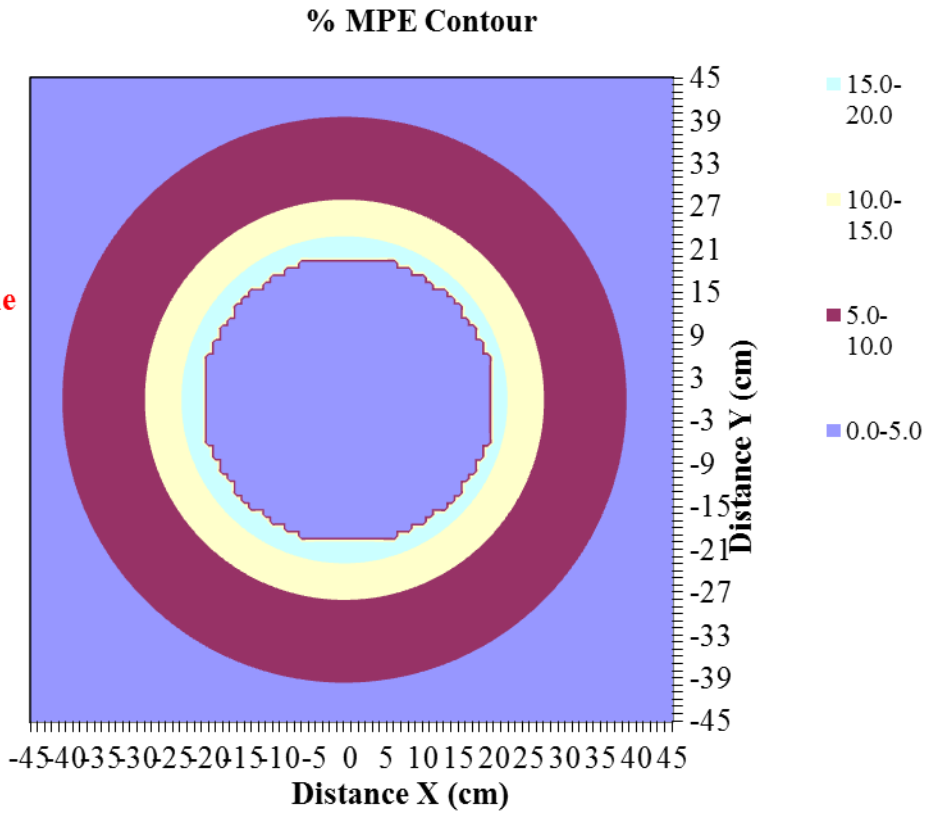


Verdict: Since the max MPE is <100%, the device is compliant in simultaneous transmission mode DTS and GSM 850.

The MPE contour estimation was made using a separation distance of 1 cm to represent the worse case.
Output power listed below is for 50% duty cycle in GSM mode.

Antenna No.		Total	1	2
Tx Status			On	On
Frequency	MHz		2405	1909.8
MPE Limit	mW/cm^2		1.00	1.00
Max % MPE	%	19.5	0.0	19.5
Power	(W)	0.980	0.001	0.979
Antenna Gain	dBi		0.00	0.00
EIRP	(W)	0.98	0.001	0.979
X	(cm)		0.0	-1.0
Y	(cm)		0.0	0.0

Note: The 0% contour surrounding the antennas



Verdict: Since the max MPE is <100%, the device is compliant in simultaneous transmission mode DTS and GSM 1900.