



TEST REPORT

Test Report No. NC1305993.3 Rev A Date of issue: 28 August 2013

Manufacturer CalAmp WNG

Address 299 Johnson Avenue – Suite 110
Waseca MN 56093

Name of Equipment VIPER SC+ 900 MHz Radio Modem

Model No(s) Tested 1405098304

Serial No(s) Tested EP8911

Test Result **Compliant** **Non-compliant**

TÜV SÜD America Inc reports apply only to the specific samples tested under stated test conditions. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. TÜV SÜD America Inc shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV SÜD America Inc issued reports.

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<input type="checkbox"/> - not applicable	
<input checked="" type="checkbox"/> - applicable	

REVISION RECORD

REVISION	TOTAL NUMBER OF PAGES	DATE	DESCRIPTION
	29	25 July 2013	Initial Release
A	29	28 August 2013	Added substitution measurement example

STATEMENT OF MEASUREMENT UNCERTAINTY

The data and results referenced in this document are accurate. The reader is cautioned that there is some measurement variability due to the tolerances of the test equipment that can contribute to a nominal product measurement uncertainty. Furthermore, component differences and manufacturing process variability of production units similar to that tested may result in additional product uncertainty. If necessary, refer to the test lab for the actual measurement uncertainty for specific tests.

ENVIRONMENTAL CONDITIONS IN THE LAB

	<u>Actual</u>
Temperature:	: 22°C
Relative Humidity	: 65%
Atmospheric pressure	: 99 kPa

POWER SUPPLY UTILIZED

Power supply system : 20 VDC

TEST EQUIPMENT

All measurement instrumentation is traceable to the National Institute of Standards and Technology and is calibrated according to internal procedure.

EMISSIONS TEST REGULATIONS :

The emissions tests were performed according to following regulations:

FCC Part 2, Section 2.1053

FCC Part 90, Section 90.210 (c)(3), (d)(3), (e)(3), (j) (3)

FCC Part 22, Section 359

FCC Part 24, Section 24.133



Radiated emission limits - Transmitter, FCC Part 90, Section 90.210, FCC Part 22: 239, FCC Part 24.133

Test summary

The requirements are: ■ - MET □ - NOT MET

Test location

■ - Oakwood Lab (Open Area Test Site)

Test Distance

■ - 3 meters
□ - 10 meters

Test equipment used:

TÜV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
WRLE03958	SL18B4020	Phase One Microwave	Preamplifier 1 – 18 GHz	0002	Code B 02-Jan-14
OWLE02074	3115	Electro-Mechanics (EMCO)	Ridge Guide Antenna	2504	07-Mar-14
NBLE03196	8566B	Hewlett-Packard	Spectrum Analyzer	2240A01856	13-Jan-14
NBLE03195	85662A	Hewlett-Packard	Analyzer Display	2648A13518	13-Jan-14
WRLE03333	SME03	Rohde & Schwarz	Signal Generator	100003	29-Oct-13
OWLE02075	3115	Electro-Mechanics (EMCO)	Ridge Guide Antenna	9001-3275	14-Feb-14
NBLE03196	8566B	Hewlett-Packard	Spectrum Analyzer	2240A01856	13-Jan-14
NBLE03195	85662A	Hewlett-Packard	Analyzer Display	2648A13518	13-Jan-14
WRLE02681	85650A	Hewlett-Packard	Quasi-Peak Adapter	2430A00562	29-Jun-13
OWLE03202	EM-6917B	Electro-Metrics	Biconicalog Periodic	101	02-Jul-13
OWLE02671	8447D	Hewlett-Packard	Preamplifier	2648A04942	Code B 07-Feb-14
WRLE03236	UHAP-10dB	Schwarzbeck	Dipole Antenna 300-1000	164	Code Y
WRLE03333	SME03	Rohde & Schwarz	Signal Generator	100003	29-Oct-13

Cal Code B = Calibration verification performed internally.

Cal Code Y = Calibration not required when used with other calibrated equipment.

Test Limit

-25 dBm eirp

Test Data

See following pages

RADIATED EMISSIONS



Test Report #: NC1305993 Run 5 Test Area: OW
 EUT Model #: 1405098304 Date: 6/18/2013
 EUT Serial #: EP8911 EUT Power: 20.0 Vdc Temperature: 22.0 °C
 Test Method: FCC Air Pressure: 99.0 kPa
 Customer: CalAmp WNG Rel. Humidity: 65.0 %

EUT Description: Viper SC+ 900 VHF 880-902 MHz Radio Modem

DUT antenna port terminated into 50 ohm load

Notes:

Data File Name: 5993.dat

Page: 1 of 4

List of measurements for run #: 5

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 -25 dBm eirp	DELTA2
Begin transmitter spurious emissions scan, 30 - 1000 MHz						
f0 = 880.05 MHz, 10 W						
125.0 MHz	32.65 Pk	0.82 / 8.51 / 24.23 / 0.0	17.74	V / 1.00 / 0	-52.46	n/a
150.0 MHz	35.75 Pk	0.91 / 9.71 / 24.33 / 0.0	22.05	V / 1.00 / 0	-48.15	n/a
175.0 MHz	31.6 Pk	1.01 / 9.37 / 24.4 / 0.0	17.58	V / 1.00 / 0	-52.62	n/a
177.786 MHz	32.45 Pk	1.02 / 9.64 / 24.4 / 0.0	18.7	V / 1.00 / 0	-51.5	n/a
199.493 MHz	44.1 Pk	1.1 / 10.63 / 24.37 / 0.0	31.45	V / 1.00 / 0	-38.75	n/a
200.0 MHz	45.25 Pk	1.1 / 10.61 / 24.37 / 0.0	32.58	V / 1.00 / 0	-37.62	n/a
225.0 MHz	37.7 Pk	1.19 / 11.12 / 24.3 / 0.0	25.71	V / 1.00 / 0	-44.49	n/a
240.004 MHz	40.0 Pk	1.24 / 11.66 / 24.3 / 0.0	28.61	V / 1.00 / 0	-41.59	n/a
250.0 MHz	37.75 Pk	1.28 / 12.02 / 24.3 / 0.0	26.75	V / 1.00 / 0	-43.45	n/a
275.0 MHz	34.25 Pk	1.37 / 12.4 / 24.3 / 0.0	23.72	V / 1.00 / 0	-46.48	n/a
299.362 MHz	30.8 Pk	1.46 / 13.17 / 24.3 / 0.0	21.13	V / 1.00 / 0	-49.07	n/a
375.0 MHz	28.75 Pk	1.74 / 15.35 / 24.3 / 0.0	21.54	V / 1.00 / 0	-48.66	n/a
500.0 MHz	27.4 Pk	2.2 / 17.4 / 24.22 / 0.0	22.78	V / 1.00 / 0	-47.42	n/a
550.0 MHz	30.4 Pk	2.29 / 18.1 / 24.13 / 0.0	26.66	V / 1.00 / 0	-43.54	n/a
650.0 MHz	29.75 Pk	2.47 / 19.6 / 24.23 / 0.0	27.59	V / 1.00 / 0	-42.61	n/a
299.362 MHz	34.1 Pk	1.46 / 13.17 / 24.3 / 0.0	24.43	V / 1.00 / 90	-45.77	n/a
266.34 MHz	41.0 Pk	1.34 / 12.66 / 24.3 / 0.0	30.7	V / 1.00 / 90	-39.5	n/a
275.0 MHz	36.45 Pk	1.37 / 12.4 / 24.3 / 0.0	25.92	V / 1.00 / 180	-44.28	n/a
125.0 MHz	34.85 Pk	0.82 / 8.51 / 24.23 / 0.0	19.94	V / 1.00 / 270	-50.26	n/a
240.004 MHz	44.35 Pk	1.24 / 11.66 / 24.3 / 0.0	32.96	V / 1.00 / 270	-37.24	n/a
250.0 MHz	42.7 Pk	1.28 / 12.02 / 24.3 / 0.0	31.7	V / 1.00 / 270	-38.5	n/a
375.0 MHz	31.75 Pk	1.74 / 15.35 / 24.3 / 0.0	24.54	H / 1.00 / 0	-45.66	n/a
250.0 MHz	43.45 Pk	1.28 / 12.02 / 24.3 / 0.0	32.45	H / 1.00 / 90	-37.75	n/a

Tested by: Greg Jakubowski
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Greg Jakubowski
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Reviewed by: Joel T Schneider
Printed

Joel T. Schneider
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RADIATED EMISSIONS



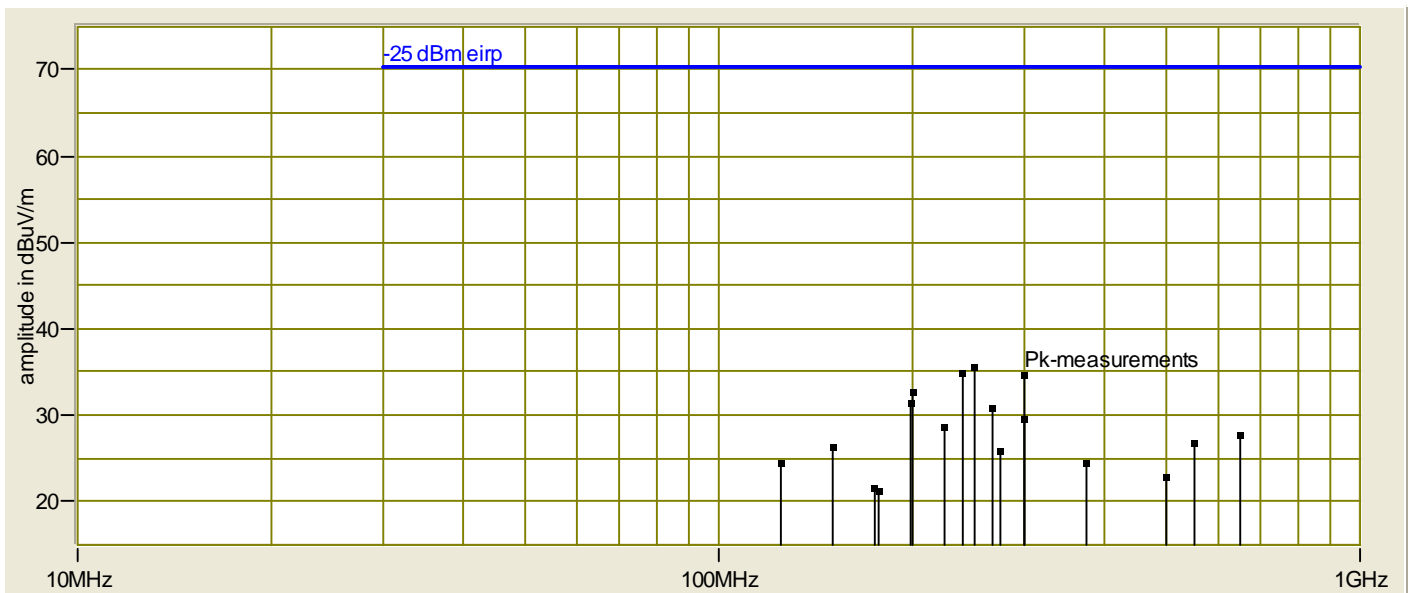
America

Test Report #: NC1305993 Run 5 Test Area: OW
 EUT Model #: 1405098304 Date: 6/18/2013
 EUT Serial #: EP8911 EUT Power: 20.0 Vdc Temperature: 22.0 °C
 Test Method: FCC Air Pressure: 99.0 kPa
 Customer: CalAmp WNG Rel. Humidity: 65.0 %

EUT Description: Viper SC+ 900 VHF 880-902 MHz Radio Modem
 Notes: DUT antenna port terminated into 50 ohm load

Data File Name: 5993.dat Page: 4 of 4

Graph:



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 Reviewed by: Joel T Schneider *Joel T. Schneider*
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RADIATED EMISSIONS



Test Report #: NC1305993 Run 6 Test Area: OW
 EUT Model #: 1405098304 Date: 6/18/2013
 EUT Serial #: EP8911 EUT Power: 20.0 Vdc Temperature: 22.0 °C
 Test Method: FCC Air Pressure: 99.0 kPa
 Customer: CalAmp WNG Rel. Humidity: 65.0 %

EUT Description: Viper SC+ 900 VHF 880-902 MHz Radio Modem

Notes: DUT antenna port terminated into a 50 ohm load.

Data File Name: 5993.dat

Page: 1 of 7

List of measurements for run #: 6

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 -25 dBm eirp	DELTA2
Begin spurious emissions scan 1 - 9.02 GHz						
f0 = 880.05 MHz, 10 W						
1.048 GHz	58.0 Pk	3.17 / 25.03 / 50.61 / 0.0	35.59	V / 1.00 / 0	-34.61	n/a
1.048 GHz	57.85 Pk	3.17 / 25.03 / 50.61 / 0.0	35.44	V / 1.00 / 0	-34.76	n/a
1.097 GHz	56.95 Pk	3.26 / 25.48 / 50.52 / 0.0	35.17	V / 1.00 / 0	-35.03	n/a
1.147 GHz	61.8 Pk	3.35 / 25.69 / 50.43 / 0.0	40.41	V / 1.00 / 0	-29.79	n/a
1.147 GHz	64.35 Pk	3.35 / 25.69 / 50.43 / 0.0	42.96	V / 1.00 / 0	-27.24	n/a
1.197 GHz	64.35 Pk	3.44 / 25.89 / 50.34 / 0.0	43.34	V / 1.00 / 0	-26.86	n/a
1.247 GHz	66.85 Pk	3.53 / 25.81 / 50.24 / 0.0	45.94	V / 1.00 / 0	-24.26	n/a
1.297 GHz	64.05 Pk	3.62 / 25.71 / 50.15 / 0.0	43.22	V / 1.00 / 0	-26.98	n/a
1.347 GHz	61.45 Pk	3.71 / 25.61 / 50.06 / 0.0	40.7	V / 1.00 / 0	-29.5	n/a
1.396 GHz	62.65 Pk	3.79 / 25.51 / 49.97 / 0.0	41.98	V / 1.00 / 0	-28.22	n/a
1.1 GHz	61.55 Pk	3.27 / 25.5 / 50.52 / 0.0	39.8	V / 1.00 / 0	-30.4	n/a
1.25 GHz	69.05 Pk	3.53 / 25.8 / 50.24 / 0.0	48.15	V / 1.00 / 0	-22.05	n/a
1.15 GHz	63.55 Pk	3.36 / 25.7 / 50.42 / 0.0	42.18	V / 1.00 / 0	-28.02	n/a
1.2 GHz	64.9 Pk	3.44 / 25.9 / 50.33 / 0.0	43.91	V / 1.00 / 0	-26.29	n/a
1.25 GHz	69.1 Pk	3.53 / 25.8 / 50.24 / 0.0	48.2	V / 1.00 / 0	-22.0	n/a
1.3 GHz	63.95 Pk	3.62 / 25.7 / 50.15 / 0.0	43.13	V / 1.00 / 0	-27.07	n/a
1.5 GHz	59.05 Pk	4.0 / 25.75 / 49.78 / 0.0	39.02	V / 1.00 / 0	-31.18	n/a
harmonics						
1.76 GHz	61.5 Pk	4.52 / 26.97 / 49.3 / 0.0	43.7	V / 1.00 / 0	-26.5	n/a
2.64 GHz	56.7 Pk	6.48 / 29.05 / 48.56 / 0.0	43.67	V / 1.00 / 0	-26.53	n/a
2.64 GHz	55.2 Pk	6.48 / 29.05 / 48.56 / 0.0	42.17	V / 1.00 / 0	-28.03	n/a
3.52 GHz	53.75 Pk	8.05 / 31.4 / 47.41 / 0.0	45.78	V / 1.00 / 0	-24.42	n/a
4.4 GHz	62.5 Pk	8.98 / 32.16 / 46.46 / 0.0	57.18	V / 1.00 / 0	-13.02	n/a
5.28 GHz	55.8 Pk	10.27 / 33.66 / 45.62 / 0.0	54.11	V / 1.00 / 0	-16.09	n/a
6.16 GHz	52.6 Pk	13.26 / 34.4 / 45.71 / 0.0	54.55	V / 1.00 / 0	-15.65	n/a
7.04 GHz	48.35 Pk	13.61 / 35.53 / 45.81 / 0.0	51.68	V / 1.00 / 0	-18.52	n/a

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RADIATED EMISSIONS



Test Report #: NC1305993 Run 6 Test Area: OW
 EUT Model #: 1405098304 Date: 6/18/2013
 EUT Serial #: EP8911 EUT Power: 20.0 Vdc Temperature: 22.0 °C
 Test Method: FCC Air Pressure: 99.0 kPa
 Customer: CalAmp WNG Rel. Humidity: 65.0 %

EUT Description: Viper SC+ 900 VHF 880-902 MHz Radio Modem

Notes: DUT antenna port terminated into a 50 ohm load.

Data File Name: 5993.dat

Page: 4 of 7

List of measurements for run #: 6

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 -25 dBm eirp	DELTA2
f0 = 901.95 MHz, 1 W						
maximized						
3.608 GHz	64.05 Pk	8.14 / 31.59 / 47.3 / 0.0	56.49	V / 1.20 / 159	-13.71	n/a
f0 = 896.05 MHz, 10 W						
maximized						
4.48 GHz	72.0 Pk	9.06 / 32.26 / 46.49 / 0.0	66.83	V / 1.20 / 176	-3.37	n/a
3.584 GHz	63.25 Pk	8.12 / 31.54 / 47.33 / 0.0	55.58	V / 1.10 / 186	-14.62	n/a
8.064 GHz	48.95 Pk	14.01 / 36.8 / 45.92 / 0.0	53.85	V / 1.30 / 177	-16.35	n/a
f0 = 896.05 MHz, 1 W						
No higher emissions detected						
f0 = 898.5 MHz, 10 W						
maximized						
4.492 GHz	72.5 Pk	9.08 / 32.28 / 46.5 / 0.0	67.35	V / 1.20 / 196	-2.85	n/a
f0 = 898.5 MHz, 1 W						
No higher emissions detected						
f0 = 900.95 MHz, 10 W						
maximized						
4.505 GHz	73.6 Pk	9.09 / 32.29 / 46.42 / 0.0	68.57	V / 1.10 / 182	-1.63	n/a
f0 = 900.95 MHz, 1 W						
No higher emissions detected						
End scan 1 - 9.02 GHz						
(sample substitution on run 1)						

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RADIATED EMISSIONS



Test Report #: NC1305993 Run 6 Test Area: OW
 EUT Model #: 1405098304 Date: 6/18/2013
 EUT Serial #: EP8911 EUT Power: 20.0 Vdc Temperature: 22.0 °C
 Test Method: FCC Air Pressure: 99.0 kPa
 Customer: CalAmp WNG Rel. Humidity: 65.0 %

EUT Description: Viper SC+ 900 VHF 880-902 MHz Radio Modem

Notes: DUT antenna port terminated into a 50 ohm load.

Data File Name: 5993.dat

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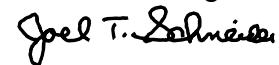
Measurement summary for limit1: -25 dBm eirp (Pk)

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 -25 dBm eirp
4.505 GHz	73.6 Pk	9.09 / 32.29 / 46.42 / 0.0	68.57	V / 1.10 / 182	-1.63
4.492 GHz	72.5 Pk	9.08 / 32.28 / 46.5 / 0.0	67.35	V / 1.20 / 196	-2.85
4.48 GHz	72.0 Pk	9.06 / 32.26 / 46.49 / 0.0	66.83	V / 1.20 / 176	-3.37
4.4 GHz	71.9 Pk	8.98 / 32.16 / 46.46 / 0.0	66.58	V / 1.00 / 175	-3.62
4.51 GHz	71.2 Pk	9.09 / 32.3 / 46.33 / 0.0	66.27	V / 1.10 / 173	-3.93
4.455 GHz	71.0 Pk	9.04 / 32.23 / 46.48 / 0.0	65.78	V / 1.10 / 170	-4.42
3.52 GHz	66.44 Pk	8.05 / 31.4 / 47.41 / 0.0	58.47	V / 1.00 / 163	-11.73
7.92 GHz	53.19 Pk	13.95 / 36.68 / 45.9 / 0.0	57.92	V / 1.39 / 163	-12.28
8.117 GHz	52.4 Pk	14.03 / 36.85 / 45.92 / 0.0	57.35	V / 1.40 / 158	-12.85
3.564 GHz	64.6 Pk	8.1 / 31.49 / 47.36 / 0.0	56.83	V / 1.10 / 171	-13.37
3.608 GHz	64.05 Pk	8.14 / 31.59 / 47.3 / 0.0	56.49	V / 1.20 / 159	-13.71
3.584 GHz	63.25 Pk	8.12 / 31.54 / 47.33 / 0.0	55.58	V / 1.10 / 186	-14.62
6.16 GHz	52.6 Pk	13.26 / 34.4 / 45.71 / 0.0	54.55	V / 1.00 / 0	-15.65
8.019 GHz	49.5 Pk	13.99 / 36.77 / 45.91 / 0.0	54.35	V / 1.30 / 170	-15.85
5.28 GHz	55.8 Pk	10.27 / 33.66 / 45.62 / 0.0	54.11	V / 1.00 / 0	-16.09
7.04 GHz	50.6 Pk	13.61 / 35.53 / 45.81 / 0.0	53.93	V / 1.07 / 170	-16.27
8.064 GHz	48.95 Pk	14.01 / 36.8 / 45.92 / 0.0	53.85	V / 1.30 / 177	-16.35
1.25 GHz	70.95 Pk	3.53 / 25.8 / 50.24 / 0.0	50.05	V / 1.00 / 180	-20.15
1.247 GHz	69.65 Pk	3.53 / 25.81 / 50.24 / 0.0	48.74	V / 1.00 / 180	-21.46
1.76 GHz	65.1 Pk	4.52 / 26.97 / 49.3 / 0.0	47.3	V / 1.00 / 90	-22.9
1.3 GHz	66.95 Pk	3.62 / 25.7 / 50.15 / 0.0	46.13	V / 1.00 / 180	-24.07
1.297 GHz	66.95 Pk	3.62 / 25.71 / 50.15 / 0.0	46.12	V / 1.00 / 180	-24.08
1.347 GHz	65.7 Pk	3.71 / 25.61 / 50.06 / 0.0	44.95	V / 3.00 / 180	-25.25
2.64 GHz	57.8 Pk	6.48 / 29.05 / 48.56 / 0.0	44.77	V / 1.00 / 180	-25.43
1.2 GHz	64.9 Pk	3.44 / 25.9 / 50.33 / 0.0	43.91	V / 1.00 / 0	-26.29
1.197 GHz	64.35 Pk	3.44 / 25.89 / 50.34 / 0.0	43.34	V / 1.00 / 0	-26.86
1.147 GHz	64.35 Pk	3.35 / 25.69 / 50.43 / 0.0	42.96	V / 1.00 / 0	-27.24
1.15 GHz	63.55 Pk	3.36 / 25.7 / 50.42 / 0.0	42.18	V / 1.00 / 0	-28.02
1.396 GHz	62.65 Pk	3.79 / 25.51 / 49.97 / 0.0	41.98	V / 1.00 / 0	-28.22

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Reviewed by: Joel T Schneider
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RADIATED EMISSIONS



America

Test Report #: NC1305993 Run 6 Test Area: OW
 EUT Model #: 1405098304 Date: 6/18/2013
 EUT Serial #: EP8911 EUT Power: 20.0 Vdc Temperature: 22.0 °C
 Test Method: FCC Air Pressure: 99.0 kPa
 Customer: CalAmp WNG Rel. Humidity: 65.0 %

EUT Description: Viper SC+ 900 VHF 880-902 MHz Radio Modem

Notes: DUT antenna port terminated into a 50 ohm load.

Data File Name: 5993.dat

Page: 6 of 7

Measurement summary for limit1: -25 dBm eirp (Pk)

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 -25 dBm eirp
1.5 GHz	61.15 Pk	4.0 / 25.75 / 49.78 / 0.0	41.12	V / 1.00 / 180	-29.08
1.1 GHz	61.55 Pk	3.27 / 25.5 / 50.52 / 0.0	39.8	V / 1.00 / 0	-30.4
1.048 GHz	58.0 Pk	3.17 / 25.03 / 50.61 / 0.0	35.59	V / 1.00 / 0	-34.61
1.097 GHz	56.95 Pk	3.26 / 25.48 / 50.52 / 0.0	35.17	V / 1.00 / 0	-35.03

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Reviewed by: Joel T Schneider
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Test Setup Photo
Radiated emissions



Test Setup Photo
Radiated emissions



Test Setup Photo
Radiated emissions



DEVIATIONS FROM STANDARD:

None.

GENERAL REMARKS:Modifications required to pass:

- None
- As indicated in the Test Plan

Test Specification Deviations: Additions to or Exclusions from:

- None
- As indicated in the Test Plan

SUMMARY:

The requirements according to the technical regulations are

- met
- **not** met.

The device under test does

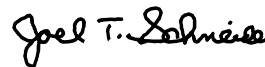
- fulfill the general approval requirements mentioned on page 3.
- **not** fulfill the general approval requirements mentioned on page 3.

EUT Received Date: 17 June 2013
Condition of EUT: Normal
Testing Start Date: 18 June 2013
Testing End Date: 18 June 2013

- TÜV SÜD AMERICA INC -



Greg S Jakubowski
Senior EMC Technician



Joel T Schneider
Senior EMC Engineer

Appendix A

Constructional Data Form

and

Block Diagram





EMC Test Plan and Constructional Data Form

PLEASE COMPLETE THIS DOCUMENT IN FULL, ENTERING N/A IF THE FIELD IS NOT APPLICABLE. IF TESTING RESULTS IN MODIFICATIONS TO THE EQUIPMENT, PLEASE SUBMIT A REVISED TP/CDF INDICATING THOSE MODIFICATIONS.
NOTE: This information will be input into your test report as shown below. Press the F1 key at any time to get HELP for the current field selected.

Company: CalAmp WNG
 Address: 299 Johnson Ave Suite 110
Waseca, MN 56093
 Contact: Bill Junge Position: RF Engineering Technologist
 Phone: 507-833-6733 Fax: 507-833-6758
 E-mail Address: bjunge@calamp.com

General Equipment Description -- NOTE: This information will be input into your test report as shown below.

EUT Description 900 MHz Radio Modem
 EUT Name VIPER SC+ 900, 880-902MHZ
 Model No.: 1405098304 Serial No.: TBD
 Product Options: None
 Configurations to be tested: Power Supply @ 20.0 Vdc, RS232 connected to laptop, Antenna port 50 ohm load.

Equipment Modification (If applicable, indicate modifications since EUT was last tested. If modifications are made during this testing, submit revised TP/CDF after testing is complete.)

Modifications since last test: _____
 Modifications made during test: _____

Test Objective(s): Please indicate the tests to be performed, entering the applicable standard(s) where noted.

- | | |
|---|---|
| <input type="checkbox"/> EMC Directive 2004/108/EC (EMC)
Std: _____ | <input checked="" type="checkbox"/> FCC: Class <input checked="" type="checkbox"/> A <input type="checkbox"/> B Part _____ |
| <input type="checkbox"/> Machinery Directive 89/392/EEC (EMC)
Std: _____ | <input type="checkbox"/> VCCI: Class <input type="checkbox"/> A <input type="checkbox"/> B |
| <input type="checkbox"/> Medical Device Directive 93/42/EEC (EMC)
Std: _____ | <input type="checkbox"/> BSMI: Class <input type="checkbox"/> A <input type="checkbox"/> B (Separate Report) |
| | <input checked="" type="checkbox"/> Canada: Class <input checked="" type="checkbox"/> A <input type="checkbox"/> B |
| | <input type="checkbox"/> Australia: Class <input type="checkbox"/> A <input type="checkbox"/> B |
| | FCC Parts 15 Subpart B receive mode radiated emissions.
FCC Parts 22, 24, and 90 transmitter mode radiated emissions.
IC RSS119 transmitter mode radiated emissions.
IC RSS-Gen receive mode radiated emissions. |
| | <input type="checkbox"/> Other: _____ |
| <input type="checkbox"/> Vehicle Directive - 2004/104/EC (EMC)
<input type="checkbox"/> Other Vehicle Std: _____ | <input type="checkbox"/> Ag Directive *2009/64/EC (EMC) |
| <input type="checkbox"/> FDA Reviewers Guidance for Premarket Notification Submissions (EMC) | |



EMC Test Plan and Constructional Data Form

Third Party Certification (contact TÜV for quote), if applicable (*Signature on last page required).	
<input type="checkbox"/> Attestation of Compliance (AoC)*	<input type="checkbox"/> EMC Certification (used with Octagon Mark)*
<input type="checkbox"/> Statement of Compliance (SoC, previously CoC)* - All aspects of the essential requirements were assessed	
Protection Class (Req'd for AoC, SoC, EMC Cert. N/A for vehicles) <input type="checkbox"/> Class I <input type="checkbox"/> Class II <input type="checkbox"/> Class III (Press F1 when field is selected to show additional information on Protection Class.)	
<input type="checkbox"/> FCC / TCB Certification	<input type="checkbox"/> Taiwan Certification
<input type="checkbox"/> Industry Canada / FCB Certification	<input type="checkbox"/> Korean Certification
<input type="checkbox"/> e-Mark Certification	

Attendance
Test will be: <input type="checkbox"/> Attended by the customer <input type="checkbox"/> Unattended by the customer

Failure - Complete this section if testing will not be attended by the customer.
If a failure occurs, TÜV SÜD America should:
<input type="checkbox"/> Call contact listed above, if not available then stop testing. (After hrs phone): _____
<input type="checkbox"/> Continue testing to complete test series.
<input type="checkbox"/> Continue testing to define corrective action.
<input type="checkbox"/> Stop testing.

EUT Specifications and Requirements
Length: <u>4.74"</u> Width: <u>5.75"</u> Height: <u>2.17"</u> Weight: <u>2.4 lbs.</u>

Power Requirements
<i>Regulations require testing to be performed at typical power ratings in the countries of intended use. (i.e., European power is typically 230 VAC 50 Hz or 400 VAC 50 Hz, single and three phase, respectively)</i>
Voltage: <u>10-30 Vdc</u> (If battery powered, make sure battery life is sufficient to complete testing.)
of Phases: _____
Current (Amps/phase(max)): <u>2.3</u> Current (Amps/phase(nominal)): _____
Other _____

Other Special Requirements
None

Typical Installation and/or Operating Environment
(ie. Hospital, Small Business, Industrial/Factory, etc.) Industrial Monitoring and Control

EUT Power Cable
<input type="checkbox"/> Permanent OR <input checked="" type="checkbox"/> Removable Length (in meters): <u>1.5m (60")</u>
<input type="checkbox"/> Shielded OR <input checked="" type="checkbox"/> Unshielded
<input type="checkbox"/> Not Applicable



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EUT Interface Ports and Cables														
Type	Analog	Digital	During Test		Qty	Shielding		Termination	Connector Type	Port Termination	Length tested (in meters)	Removable	Permanent	
			Active	Passive		Yes	No							Type
EXAMPLE: RS232	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Foil over braid	Coaxial	Metallized 9-pin D-Sub	Characteristic Impedance	6	<input checked="" type="checkbox"/>	<input type="checkbox"/>
RS232	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	<input type="checkbox"/>	<input checked="" type="checkbox"/>			Metallized 9-pin D-Sub	Characteristic Impedance	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Power Cable	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Weidmuller Power Plug		Two DC Power and Ground.	Characteristic Impedance of the power supply.	1.5m	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Antenna Port	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1	<input type="checkbox"/>	<input type="checkbox"/>	Bird 25-T-MN 50 ohm 25 Watt Load		Shielded Load	50 ohms	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>



EMC Test Plan and Constructional Data Form

EUT Software.

Revision Level: V1.01.00

Description: Viper Tools Software

Equipment Under Test (EUT) Operating Modes to be Tested -- list the operating modes to be used during test. It is recommended the equipment be tested while operating in a typical operation mode. FCC testing of personal computers and/or peripherals requires that a simple program generate a complete line of upper case H's. Provide a general description of all software, firmware, and PLD algorithms used in the equipment. List all code modules as described above, with the revision level used during testing. Consult with your TÜV Product Service Representative if additional assistance is required.

1. Tested with the transmitter keyed up at 10.0 Watts at the low, mid and high frequencies of the authorized FCC and IC bands into a 50 ohm load.
2. Tested with the transmitter keyed up at 1.0 Watts at the low, mid and high frequencies of the authorized FCC and IC bands into a 50 ohm load.
3. Tested in receive mode for Local Oscillators and Modem emissions at the mid frequencies of the FCC and IC authorized bands into a 50 ohm load.

Equipment Under Test (EUT) System Components -- List and describe all components which are part of the EUT. For FCC & Taiwan testing a minimum configuration is required. (ie. Mouse, Printer, Monitor, External Disk Drive, Motherboard, etc)

Description	Model #	Serial #	FCC ID #
None			



EMC Test Plan and Constructional Data Form

Support Equipment -- List and describe all support equipment which is not part of the EUT. (i.e. peripherals, simulators, etc)
This information is required for FCC & Taiwan testing.

Description	Model #	Serial #	FCC ID #
Compaq	nc6000	CNU447F26M	CNTWM3B2200BGA
RS232	Cable	N/A	N/A

Oscillator Frequencies

Manufacturer	Frequency	Derived Frequency	Component # / Location	Description of Use
Crystek CVCO55BE -1750-1810	1750-1810 MHz		4180001750 - Y800	880-902 MHz Transmitter VCO
Discrete Component s	809-831 MHz		On Board VCO	On board Receiver Local Oscillator
Transko TCXO-1250	23.04 MHz		4187009230 - Y101	TCXO stable frequency source for the VCO/Synthesizers.
AD9864 PLL VCO	73.880 MHz		4444002040 - Y280	Second Oscillator Mix frequency

Power Supply

Manufacturer	Model #	Serial #	Type
HP	HP6284	N/A	<input type="checkbox"/> Switched-mode: (Frequency) _____ <input checked="" type="checkbox"/> Linear <input type="checkbox"/> Other: _____
			<input type="checkbox"/> Switched-mode: (Frequency) _____ <input type="checkbox"/> Linear <input type="checkbox"/> Other: _____

Power Line Filters

Manufacturer	Model #	Location in EUT
None		



EMC Test Plan and Constructional Data Form

Critical EMI Components (Capacitors, ferrites, etc.)				
<i>Description</i>	<i>Manufacturer</i>	<i>Part # or Value</i>	<i>Qty</i>	<i>Component # / Location</i>
None				

EMC Critical Detail -- Describe other EMC Design details used to reduce high frequency noise.

None

PLEASE ENTER NAMES BELOW (INSERT ELECTRONIC SIGNATURE IF POSSIBLE)

Authorization (Signature Required if a Third Party Certification is checked on pg 1)

William M. Junge

5/22/2013

Customer authorization to perform tests according to this test plan.

Date

Test Plan/CDF Prepared By (please print)

Date

Appendix B

Measurement Protocol



MEASUREMENT PROTOCOL

Test Methodology

Emissions testing is performed according to the procedures in TIA-603-C and ANSI C63.4-2003.

Measurement Uncertainty

The test system for conducted emissions is defined as the LISN, tuned receiver or spectrum analyzer, and coaxial cable. The test system has a measurement uncertainty of ± 1.8 dB. The test system for radiated emissions is defined as the antenna, the pre-amplifier, the spectrum analyzer and the coaxial cable. The test system has a measurement uncertainty of ± 4.8 dB. The equipment comprising the test systems is calibrated on an annual basis.

Justification

The Equipment Under Test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral into its characteristic impedance or left unterminated. When appropriate, the cables are manually manipulated with respect to each other to obtain maximum emissions from the unit.

Radiated Emissions

The final level, in $\text{dB}\mu\text{V}/\text{m}$, equals the reading from the spectrum analyzer (Level $\text{dB}\mu\text{V}$), adding the antenna correction factor and cable loss factor (Factor dB) to it, and subtracting the preamp gain (and duty cycle correction factor, if applicable). This result then has the limit subtracted from it to provide the Delta, which gives the tabular data as shown in the data sheets in Attachment A.

Example:

FREQ (MHz)	LEVEL ($\text{dB}\mu\text{V}$)	CABLE/ANT/PREAMP (dB) (dB/m) (dB)	FINAL ($\text{dB}\mu\text{V}/\text{m}$)	POL/HGT/AZ (m) (deg)	DELTA1
60.80	42.5Qp +	1.2 + 10.9 - 25.5 =	29.1	V 1.0 0.0	-10.9

Substitution Method

Per TIA/EIA 603-C-2004, a radiated emission scan was also made with the EUT's antenna replaced with a termination to demonstrate case radiation compliance to the -25 dBm requirement. Radiated emissions from the EUT are measured in the frequency range of 30 to 9020 MHz using a spectrum analyzer and appropriate broadband linearly polarized antennas. Table top equipment is placed on a 1.0 X 1.5 meter non-conducting table 80 centimeters above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Interface cables that are closer than 40 centimeters to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimeters from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screen room located outside the test area. The antenna is positioned 3 meters horizontally from the EUT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters, measurement scans are made with both horizontal and vertical antenna polarizations and the EUT are rotated 360 degrees. The field strength levels were measured per ANSI C63.4. The EUT is then replaced with a tuned dipole antenna (below 1 GHz) or horn antenna (above 1 GHz). The substitute antenna was placed in the same polarization as the test antenna. A signal generator was used to generate a signal level that matched the highest level measured from the EUT. The signal generator level minus the cable attenuation from the signal generator to the substitute antenna plus the substitute antenna gain equals the spurious power level.