

Engineering and Testing for EMC and Safety Compliance

TYPE CERTIFICATION REPORT

Vertex Standard Co., LTD.
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MODEL: VX_900U/600U FCC ID: K66VX-900U

December 8, 2000

| STANDARDS REFERENCED FOR | STANDARDS REFERENCED FOR THIS REPORT | | | | |
|--------------------------|--|--|--|--|--|
| PART 2: 1999 | FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS | | | | |
| PART 15: 1999 | §15.109: RADIATED EMISSIONS LIMITS | | | | |
| PART 22: 1998 | PUBLIC MOBILES SERVICES | | | | |
| Part 74: 1998 | Low Power Auxiliary Station | | | | |
| PART 90: 1998 | PRIVATE LAND MOBILE RADIO SERVICES | | | | |
| PART 95 (A): 1998 | GENERAL MOBILE RADIO SERVICES | | | | |
| ANSI C63.4-1992 | STANDARD FORMAT MEASUREMENT/TECHNICAL REPORT PERSONAL COMPUTER AND PERIPHERALS | | | | |
| ANSI/TIA/EIA603- 1992 | LAND MOBILE FM OR PM COMMUNICATIONS EQUIPMENT | | | | |
| | MEASUREMENT AND PERFORMANCE STANDARDS | | | | |
| ANSI/TIA/EIA 603-1-1998 | ADDENDUM TO ANSI/TIA/EIA 603-1992 | | | | |
| RSS-119, Issue 5: 1996 | LAND MOBILE AND FIXED RADIO TRANSMITTERS AND RECEIVERS.27.41 TO 960.0 MHZ | | | | |

| FCC Rules Parts | Frequency Range | Output Power | Freq. Tolerance | Emission Designator |
|-----------------|-----------------|--------------|-----------------|---------------------|
| | | (W) | | |
| 90.210 | 450-485 MHz | 5 | 2.5 ppm | 11K0F3E |
| 90, 22, 74, 95 | 450-485 MHz | 5 | 2.5 ppm | 16K0F3E |
| 90.210 | 450-485 MHz | 2.5 | 2.5 ppm | 11K0F3E |
| 90, 22, 74, 95 | 450-485 MHz | 2.5 | 2.5 ppm | 16K0F3E |
| 90.210 | 450-485 MHz | 1.0 | 2.5 ppm | 11K0F3E |
| 90, 22, 74, 95 | 450-485 MHz | 1.0 | 2.5 ppm | 16K0F3E |
| 90.210 | 450-485 MHz | 0.25 | 2.5 ppm | 11K0F3E |
| 90, 22, 74, 95 | 450-485 MHz | 0.25 | 2.5 ppm | 16K0F3E |
| Canadian | Frequency Range | Output Power | Freq. Tolerance | |
| | | (W) | | |
| RSS-119 | 450-485 MHz | 5 | 2.5 ppm | 16K0F3E |
| RSS-119 | 450-485 MHz | 5 | 2.5 ppm | 11K0F3E |

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Document Number: 2000468

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COMPANY NAME: COM NET ERICSSON. **EUT**: VX_900U/600U WORK ORDER NUMBER: FCC ID:

2000468 K66VX-900U

GENERAL INFORMATION

The following Report of a Type Certification is prepared on behalf of Vertex Standard Co., LTD in accordance with the Federal Communications Commissions and Industry Canada Rules and Regulations. The Equipment Under Test (EUT) was the VX_900U/600U. The test results reported in this document relate only to the item that was tested. The VX-900U and the VX-600U are identical both electrically and mechanically. The only between both units is an LCD display that is removed from the VX-900U to form the VX-600U. The VX-900U/600U supports 5 watt, 2.5 watt, 1 watt, and 0.25 watt. It was determined during testing that the VX-900U 5 watt and 2.5 watt were the worst-case. Hence through out this report the VX-900U was used for testing. The manufacturer intends to remove the LCD display measured at 1 inch by 0.5 inch leaving all other electronic and mechanical supporting components.

All measurements contained in this application were conducted in accordance with FCC Rules and Regulations CFR 47, Industry Canada RSS-119, and ANSI C63.4 Methods of Measurement of Radio Noise Emissions, 1992. The instrumentation utilized for the measurements conforms to the ANSI C63.4 standard for EMI and Field Strength Instrumentation, Calibration checks are performed regularly on the instruments, and all accessories including high pass filter, coaxial attenuator, preamplifier and cables.

1.1 TEST FACILITY

The open area test site and conducted measurement facility used to collect the radiated data is located on the parking lot of Rhein Tech Laboratories, Inc. 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report dated March 3, 1994, submitted to and approved by the Federal Communication Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 1992).

1.2 RELATED SUBMITTAL(S)/GRANT(S) 1.2

This is an original application report.



2 CONFORMANCE STATEMENT

We, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this attached test record. No modifications were made to the equipment during testing in order to achieve compliance with these standards.

Furthermore, there was no deviation from, additions to or exclusions from the FCC Part 2, FCC Part 90 and Industry Canada RSS-119 Certification methodology.

Signature: Date: December 8, 2000

Typed/Printed Name: Desmond A. Fraser Position: President

(NVLAP Signatory)

Accredited by the National Voluntary Accreditation Program for the specific scope of accreditation under Lab Code 200061-0.

Note: This report may not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

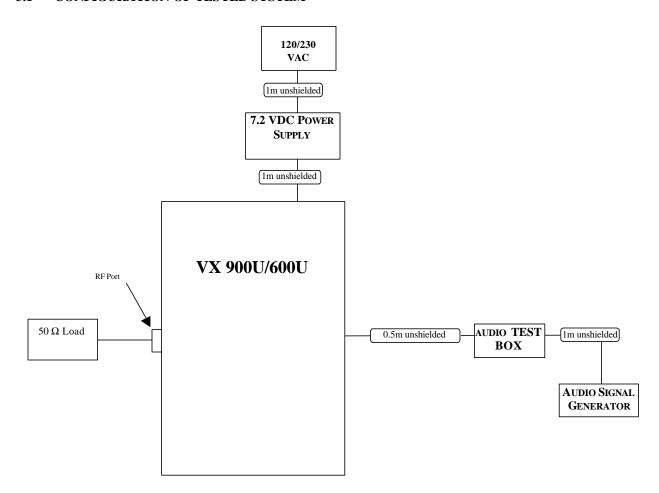


3 TESTED SYSTEM DETAILS

Listed below is the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this test, as applicable.

| PART | MANUFACTURER | MODEL | SERIAL NUMBER | FCC ID |
|----------------------|--------------|--------------|---------------|------------|
| RADIO | VERTEX | VX-900U/600U | N/A | K66VX-900U |
| ANTENNA WHIP | VERTEX | N/A | N/A | N/A |
| AUDIO TEST CABLE | VERTEX | N/A | N/A | N/A |
| AUDIO TEST BOX | VERTEX | TUNING I/F | N/A | N/A |
| BATTERY | VERTEX | FNB-V68L1 | N/A | N/A |
| MICROPHONE / SPEAKER | VERTEX | MH-50E7A | N/A | N/A |

3.1 CONFIGURATION OF TESTED SYSTEM





4 FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FI(dBuV/m) = SAR(dBuV) + SCF(dB/m) FI = Field Intensity SAR = Spectrum Analyzer Reading SCF = Site Correction Factor

The Site Correction Factor (SCF) used in the above equation is determined empirically, and is expressed in the following equation:

SCF(dB/m) = - PG(dB) + AF(dB/m) + CL(dB)

SCF = Site Correction Factor
PG = Pre-amplifier Gain
AF = Antenna Factor
CL = Cable Loss

The field intensity in microvolts per meter can then be determined according to the following equation:

$$FI(uV/m) = 10FI(dBuV/m)/20$$

For example, assume a signal at a frequency of 125 MHz has a received level measured as 49.3 dBuV. The total Site Correction Factor (antenna factor plus cable loss minus preamplifier gain) for 125 MHz is -11.5 dB/m. The actual radiated field strength is calculated as follows:

$$49.3 \ dBuV - 11.5 \ dB/m = 37.8 \ dBuV/m$$

$$10^{37.8/20} = 10^{1.89} = 77.6 \, \text{uV/m}$$



COMPANY NAME: EUT: WORK ORDER NUMBER: FCC ID: COM NET ERICSSON. VX_900U/600U 2000468 K66VX-900U

5 CONDUCTED MEASUREMENT

The power line conducted emission measurements were performed in a Series 81 type shielded enclosure manufactured by Rayproof. The EUT was assembled on a wooden table 80 centimeters high. Power was fed to the EUT through a 50 ohm / 50 microhenry Line Impedance Stabilization Network (EUT LISN). The EUT LISN was fed power through an A.C. filter box on the outside of the shielded enclosure. The filter box and EUT LISN housing are bonded to the ground plane of the shielded enclosure. A second LISN, the peripheral LISN, provides isolation for the EUT test peripherals. This peripheral LISN was also fed A.C. power. A metal power outlet box, which is bonded to the ground plane and electrically connected to the peripheral LISN, powers the EUT host peripherals.

The spectrum analyzer was connected to the A.C. line through an isolation transformer. The 50-ohm output of the EUT LISN was connected to the spectrum analyzer input through a Solar 400 kHz high-pass filter. The filter is used to prevent overload of the spectrum analyzer from noise below 400 kHz. Conducted emission levels were measured on each current-carrying line with the spectrum analyzer operating in the CISPR quasi-peak mode (or peak mode if applicable). The analyzer's 6 dB bandwidth was set to 9 kHz. No video filter less than 10 times the resolution bandwidth was used. Average measurements are performed in linear mode using a 10 kHz resolution bandwidth, a 1 Hz video bandwidth, and by increasing the sweep time in order to obtain a calibrated measurement. The emission spectrum was scanned from (150/450) kHz to 30 MHz. The highest emission amplitudes relative to the appropriate limit were measured and have been recorded in this report.



COMPANY NAME: EUT: WORK ORDER NUMBER: 2000468 FCC ID: K66VX-900U

COM NET ERICSSON. VX_900U/600U

5.1 CONDUCTED MEASUREMENT TEST RESULTS

Mode: 467.525MHz High Wide band

NEUTRAL SIDE (Line 1)

| | Temperature: 74°F Humidity: 34% | | | | | | | | |
|-----------|---------------------------------|----------|------------|----------|--------|--------|--------|---------------|-------|
| Emission | Test | Analyzer | Site | Emission | FCC B | FCC B | FCC B | FCC B | Pass/ |
| Frequency | Detector | Reading | Correction | Level | QP | QP | AV | \mathbf{AV} | Fail |
| (MHz) | | (dBuV) | Factor | (dBuV) | Limit | Margin | Limit | Margin | |
| | | | (dB) | | (dBuV) | (dBuV) | (dBuV) | (dBuV) | |
| 0.464 | Pk | 23.3 | 0.8 | 24.1 | 48.0 | -23.9 | 48.0 | -23.9 | Pass |
| 0.596 | Pk | 23.1 | 0.9 | 24.0 | 48.0 | -24.0 | 48.0 | -24.0 | Pass |
| 0.798 | Pk | 21.0 | 0.9 | 21.9 | 48.0 | -26.1 | 48.0 | -26.1 | Pass |
| 2.698 | Pk | 19.3 | 1.5 | 20.8 | 48.0 | -27.2 | 48.0 | -27.2 | Pass |
| 8.490 | Pk | 16.2 | 2.3 | 18.5 | 48.0 | -29.5 | 48.0 | -29.5 | Pass |
| 15.700 | Pk | 18.6 | 3.0 | 21.6 | 48.0 | -26.4 | 48.0 | -26.4 | Pass |
| 27.810 | Pk | 16.4 | 3.4 | 19.8 | 48.0 | -28.2 | 48.0 | -28.2 | Pass |

Hot Side (L2)

Mode: 467.525 MHz high power wide band

HOT SIDE (Line 2)

| Temperature: 74°F Humidity: 34% | | | | | | | | | |
|---------------------------------|------------------|-------------------------------|--------------------------------------|-----------------------------|--------------------------------|---------------------------------|--------------------------------|---------------------------------|---------------|
| Emission Frequency (MHz) | Test Detector | Analyzer Reading (dBuV) | Site Correction Factor (dB) | Emission Level (dBuV) | FCC B QP Limit (dBuV) | FCC B QP Margin (dBuV) | FCC B AV Limit (dBuV) | FCC B AV Margin (dBuV) | Pass/ Fail |
| 0.613 | Pk | 21.1 | 0.8 | 21.9 | 48.0 | -26.1 | 48.0 | -26.1 | Pass |
| 0.795 | Pk | 19.4 | 0.9 | 20.3 | 48.0 | -27.7 | 48.0 | -27.7 | Pass |
| 0.984 | Pk | 20.1 | 0.9 | 21.0 | 48.0 | -27.0 | 48.0 | -27.0 | Pass |
| 2.130 | Pk | 20.2 | 1.3 | 21.5 | 48.0 | -26.5 | 48.0 | -26.5 | Pass |
| 11.440 | Pk | 18.9 | 2.6 | 21.5 | 48.0 | -26.5 | 48.0 | -26.5 | Pass |
| 22.050 | Pk | 17.8 | 3.4 | 21.2 | 48.0 | -26.8 | 48.0 | -26.8 | Pass |

Pk = Peak; QP = Quasi-Peak; Av = Average

TEST PERSONNEL:

Date: November 29, 2000 Signature:

Typed/Printed Name: Daniel Baltzell



COMPANY NAME: EUT: WORK ORDER NUMBER: FCC ID:

COM NET ERICSSON. VX_900U/600U 2000468 K66VX-900U

6 RADIATED MEASUREMENT

Before final measurements of radiated emissions were made on the open-field three meter range, the EUT was scanned indoors at a three meter distance in order to determine its emissions spectrum signature. The physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. This process was repeated during final radiated emissions measurements on the open-field range, at each frequency, in order to insure that maximum emission amplitudes were attained.

Final radiated emissions measurements were made on the three-meter, open-field test site. The EUT was placed on a nonconductive turntable approximately 0.8 meters above the ground plane.

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

Note: Rhein Tech Laboratories, Inc. has implemented procedures to minimize errors that occur from test instruments, calibration, procedures, and test setups. Test instrument and calibration errors are documented from the manufacturer or calibration lab. Other errors have been defined and calculated within the Rhein Tech quality manual, section 6.1. Rhein Tech implements the following procedures to minimize errors that may occur: yearly as well as daily calibration methods, technician training, and emphasis to employees on avoiding error.



7 FCC RULES AND REGULATIONS PART 2 §2.1046 (A): RF POWER OUTPUT: CONDUCTED

7.1 TEST PROCEDURE

ANSI/TIA/EIA-603-1992, section 2.2.1

The EUT was connected to a coaxial attenuator having a 50 Ω load impedance.

7.2 TEST DATA

The following channel (in MHz) were tested: 450.025, 469.975, 487.975 The worst-case Output Power (highest) levels are shown.

CARRIER OUTPUT POWER (UNMODULATED)

| Power Setting | RF Power measured (Watt)* |
|---------------|---------------------------|
| Low1 | 2.5 |
| High | 5 |

^{*}Measurement accuracy: +/- 3%

Rated Power:

| Power Setting | Rated Power (W) |
|---------------|-----------------|
| Low1 | 2.5 |
| High | 5 |

7.3 TEST EQUIPMENT

| Power Meter | HP437B | s/n 2949A02966 |
|-------------------|----------|---------------------------------|
| | HP 8901A | s/n 2545A04102 (power mode) |
| Power Sensor | HP8481B | s/n 2702A05059 |
| Frequency Counter | HP8901A | s/n 2545A04102 (Frequency mode) |



| COMPANY NAME: | COMPANY NAME: | VX_ | VX_ | WORK ORDER NUMBER: | 2000 | FCC ID: | K66

COM NET ERICSSON. VX_900U/600U 2000468 K66VX-900U

8 PART 2.1046 (A) RF POWER OUTPUT: RADIATED - ERP

8.1 TEST PROCEDURE

Substitution Method:

The EUT was setup at an antenna to EUT distance of 3 meters on an open area test site. The EUT was placed on a nonconductive turntable approximately 0.8 meters above the ground plane.

The physical arrangement of the EUT and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. At each frequency, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters in order to determine the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarizations.

The worst-case, maximum radiated emission was recorded and used as reference for the ERP measurement.

The EUT was then replaced by an ½wave dipole antenna and polarized in accordance with the EUT's antenna polarization. The ½wave dipole antenna was connected to a RF signal generator with a coaxial cable.

The search antenna height, and search antenna polarity was set to levels that produced the maximum reading obtained in step 3. The signal generator was adjusted to a level that produced the radiated emission level obtained in step 3.

The signal generator level was recorded and corrected by the power loss in the cable between the generator and the antenna and further corrected for the gain of the substitution antenna used relative to an ideal ½wave dipole antenna. The signal generator corrected level is the ERP level

Calculation Method:

$$P_{Watt} = \frac{E_{v/m}^2 x d_m^2}{30x1.64}$$



8.2 TEST DATA

Settings:

• High Power: 5 Watt delivered to antenna

• 5W VX-900U/600U radiated power measurements (3 meter)

| Frequency (MHz) | Level Measured (dBµV) | Site Factor (dB/m) | ERP Calculated (Watt) | ERP Substitution Method (dBm) |
|--------------------|--------------------------|-----------------------|-----------------------------|--|
| 450.025 | 106.0 | 30.8 | 5.0 | 37.0 |
| 469.975 | 104.5 | 31.7 | 6.0 | 37.8 |
| 487.975 | 102.6 | 31.8 | 5.0 | 37.0 |

^{*}Antenna as specified by manufacturer (unity gain)

8.3 TEST EQUIPMENT

Spectrum Analyzer HP8566B

Antenna Roberts ½wave dipoles

^{**}Measurement accuracy is +/- 1.5 dB

9 FCC RULES AND REGULATIONS PART 2 §2.1051: SPURIOUS EMISSIONS AT ANTENNA TERMINALS

9.1 TEST PROCEDURE

ANSI/TIA/EIA-603-1992, Section 2.2.13

The transmitter is terminated with a 50Ω load and interfaced with a spectrum analyzer.

The transmitter is modulated with a 2,500 Hz sine wave at an input level 16 dB greater than that required to produce 50% of the rated system deviation at 1000 Hz.

9.2 TEST DATA

9.2.1 CFR PART 90 REQUIREMENTS

Frequency range of measurement per Part 2.1057: 9kHz to 10 x Fc

Limits: Mask B (dBm): P(dBm) - (43+10xLOG P(W))

Mask D (dBm): P(dBm) - (50+10xLOG P(W))

The following channel (in MHz) was investigated: 450.025, 467.525, and 484.975 in 5W, 2.5W, 1W and 0.25W mode for both 25KHz and 12.5 KHz channel spacing.

The worst case (unwanted emissions) channels are shown. The magnitude of emissions attenuated more than 20 dB below the FCC limit need not be recorded.

Channel 4 (450.025 MHz) – 5 Watt and 12.5 kHz Channel Bandwidth: Mask D

| Frequency (MHz) | Level Measured (dBm) | Limit (dBm) | Margin (dB) |
|--------------------|-------------------------|----------------|----------------|
| 830.050 | Noise floor | | |
| 1245.075 | Noise floor | | |
| 1660.100 | Noise floor | | |
| 2075.125 | Noise floor | | |
| 2490.150 | Noise floor | | |
| 2513.000 | -26.3 | -20.0 | -6.3 |
| 2905.175 | Noise floor | | |
| 3320.200 | Noise floor | | |
| 3735.225 | Noise floor | | |
| 4150.250 | Noise floor | | |

COMPANY NAME: EUT: WORK ORDER NUMBER: FCC ID: COM NET ERICSSON. VX_900U/600U 2000468 K66VX-900U

Channel 5 (467.525 MHz) – 5 Watt and 12.5 kHz Channel Bandwidth: Mask D

| Frequency (MHz) | Level Measured (dBm) | Limit (dBm) | Margin (dB) |
|--------------------|----------------------|-------------|----------------|
| 830.050 | Noise floor | | |
| 1245.075 | Noise floor | | |
| 1660.100 | Noise floor | | |
| 2075.125 | Noise floor | | |
| 2490.150 | Noise floor | | |
| 2905.175 | Noise floor | | |
| 3073.333 | -24.7 | -20.0 | -4.7 |
| 3320.200 | Noise floor | | |
| 3735.225 | Noise floor | | |
| 4150.250 | Noise floor | | |

Channel 1 (484.975MHz) – 5 Watt and 12.5 kHz Channel Bandwidth: Mask D

| Frequency (MHz) | Level Measured (dBm) | Limit (dBm) | Margin (dB) |
|--------------------|----------------------|-------------|----------------|
| 969.952 | Noise floor | | |
| 1454.928 | Noise floor | | |
| 1939.9050 | Noise floor | | |
| 2424882 | Noise floor | | |
| 2909.856 | Noise floor | | |
| 3394.835 | Noise floor | | |
| 3467.000 | -26.0 | -20 | -6.0 |
| 3879.812 | Noise floor | | |

4.3 Test Equipment

Audio Generator:

Synthesized Level Generator HP3336B s/n 2127A00559 Selective Level Meter HP3585 s/n B032374

Spectrum Analyzer:

HP8564E s/n 3943A01719 HP8546A s/n 3525A00159



10 FCC RULES AND REGULATIONS PART 2 §2.1053 (A): FIELD STRENGTH OF SPURIOUS RADIATION

10.1 TEST PROCEDURE

ANSI/TIA/EIA-603-1992, section 2.2.12

The transmitter is terminated with a 50 Ω load and is modulated with a 2,500 Hz sine wave at an input level 16 dB greater than that required to produce 50% of the rated system deviation at 1000 Hz.

Refer to section "Radiated Measurement" in this report for further information.

10.2 TEST DATA

The worst-case emissions test data are shown. The magnitude of emissions attenuated more than 20 dB below the FCC limit need not be recorded.

| 5Watt at 12.5 kHz chan | Watt at 12.5 kHz channel spacing | | | | | |
|------------------------|---|-------|--------------------|-------------|-------------|--------|
| | Radiated Emissions (Channel 5 at 467.525 MHz) | | | | | |
| | | Sub | ostitution Method | | | |
| | ERP | | Difference in gain | | | |
| | S/G level | Cable | (ref. to 1/2 wave | Emission | Limit (dBm) | Margin |
| Frequency | (dBm) | Loss* | dipole) | level (dBm) | Mask D | (dB) |
| 935.050 | -27.3 | 4.2 | 1.1 | -24.2 | -20 | -4.2 |
| 1402.575 | -38.0 | 6.7 | -3.7 | -27.6 | -20 | -7.6 |
| 1870.100 | -38.0 | 7.7 | -4.8 | -25.5 | -20 | -5.5 |
| 2337.625 | -40.7 | 10.5 | -5.1 | -25.1 | -20 | -5.1 |
| 2805.15 | -68.8 | 12.0 | -5.8 | -51.0 | -20 | -31.0 |
| 3272.675 | -57.4 | 13.5 | -6.2 | -37.7 | -20 | -17.7 |
| 3740.2 | -69.1 | 15.9 | -5.9 | -47.3 | -20 | -27.3 |
| 4207.725 | -66.0 | 17.8 | -6.4 | -41.8 | -20 | -21.8 |
| 4675.25 | -61.7 | 20.1 | -7.0 | -34.6 | -20 | -14.6 |

^{*}This insertion loss corresponds to the cable connecting the RF Signal Generator to the ½wave dipole antenna.

10.3 TEST EQUIPMENT

Antenna: CHASE CBL6112 s/n 2099 Amplifier: HP8449B s/n 3008A00505

Spectrum analyzer: HP8564E s/n 3943A01719

RF Signal Generator HP8648C s/n 3537A01741 Synthesized Sweeper HP83752A s/n 3610A00846

11 FCC RULES AND REGULATIONS PART 2 §2.1049 (C) (1): OCCUPIED BANDWIDTH

OCCUPIED BANDWIDTH - COMPLIANCE WITH THE EMISSION MASKS

11.1 TEST PROCEDURE

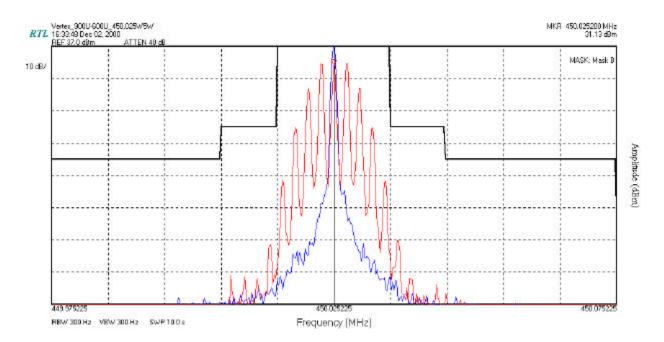
ANSI/TIA/EIA-603-1992, section 2.2.11

Device with audio modulation: Transmitter is modulated with a 2500 Hz sine wave at an input level of 16 dB greater than that required to produce 50% of rated system deviation at 1000 Hz.

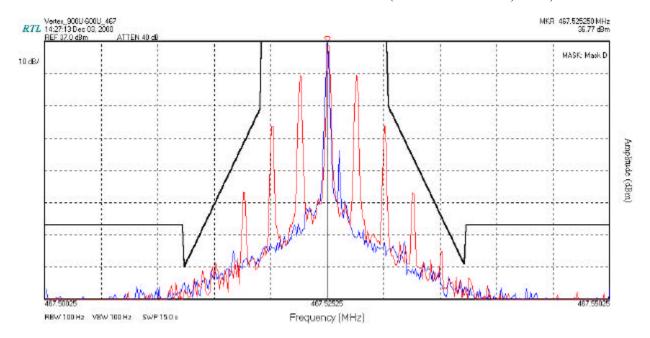
Device with digital modulation: N/A

11.2 TEST DATA

11.2.1 CHANNEL 1: 5W FOR 25 KHZ CHANNEL BANDWIDTH: MASK B (AUDIO MODULATION: 2,500 Hz)



11.2.2 CHANNEL 4: 5 W FOR 12.5 KHZ CHANNEL BANDWIDTH: MASK D (AUDIO MODULATION: 2,500 HZ)



11.3 TEST EQUIPMENT

Spectrum Analyzer HP8564E s/n 3943A01719



12 FCC RULES AND REGULATION PART 2 §2.1055: FREQUENCY STABILITY

12.1 TEST PROCEDURE

ANSI/TIA/EIA-603-1992, section 2.2.2

The carrier frequency stability is the ability of the transmitter to maintain an assigned carrier frequency.

The EUT was evaluated over the temperature range -30° C to $+50^{\circ}$ C.

The temperature was initially set to -30°C and a 2-hour period was observed for stabilization of the EUT.

The frequency stability was measured within one minute after application of primary power to the transmitter. The temperature was raised at intervals of 10 degrees centigrade through the range. A $\frac{1}{2}$ an hour period was observed to stabilize the EUT at each measurement step and the frequency stability was measured within one minute after application of primary power to the transmitter.

Additionally, the power supply voltage of the EUT was varied from 85% to 115% of the nominal voltage.

The worst-case test data are shown.

12.2 TEST DATA

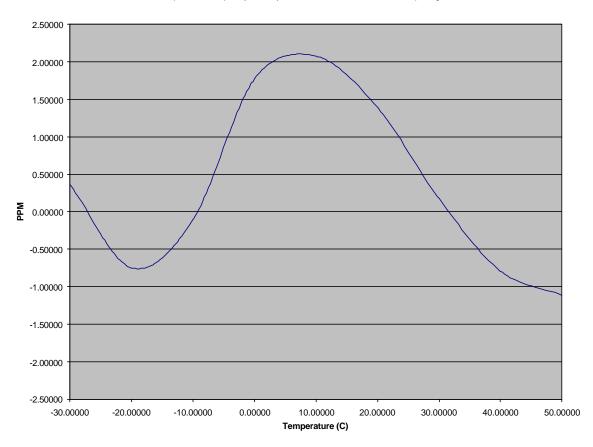
12.2.1 Frequency stability/Temperature variation

Limit is 2.5 ppm for device with a 12.5 kHz channel bandwidth Limit is 5 ppm for device with a 25 kHz channel bandwidth

The VX-900U/600U 5Watt radios was tested with 12.5 kHz and 25 kHz channel bandwidth. The worst-case temperature deviation on the following plots.



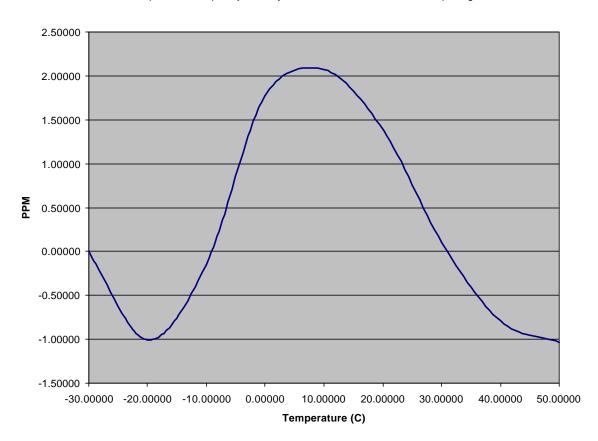
Temperature Frequency Stability; 467.525 MHz; 12.5 kHz channel spacing



| Temperature (C) | Frequency (MHz) | ppm |
|-----------------|-----------------|----------|
| -30.00000 | 467.52517 | 0.36362 |
| -20.00000 | 467.52465 | -0.74862 |
| -10.00000 | 467.52495 | -0.10695 |
| 0.00000 | 467.52583 | 1.77531 |
| 10.00000 | 467.52597 | 2.07476 |
| 20.00000 | 467.52565 | 1.39030 |
| 30.00000 | 467.52508 | 0.17111 |
| 40.00000 | 467.52463 | -0.79140 |
| 50.00000 | 467.52448 | -1.11224 |



Temperature Frequency Stability; 467,525 MHz; 25KHz channel spacing



| Temperature (C) | Frequency (MHz) | ppm |
|-----------------|-----------------|----------|
| -30.00000 | 467.52500 | 0.00000 |
| -20.00000 | 467.52453 | -1.00529 |
| -10.00000 | 467.52493 | -0.14972 |
| 0.00000 | 467.52583 | 1.77531 |
| 10.00000 | 467.52597 | 2.07476 |
| 20.00000 | 467.52565 | 1.39030 |
| 30.00000 | 467.52505 | 0.10695 |
| 40.00000 | 467.52463 | -0.79140 |
| 50.00000 | 467.52452 | -1.03310 |

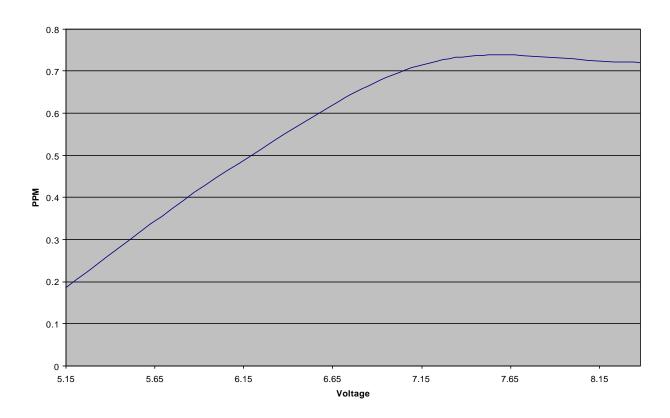


12.2.2 FREQUENCY STABILITY/VOLTAGE VARIATION

Assigned Frequency 467.525 MHz

Voltage Frequency Stability 467.525MHz; 12.5KHz channel spacing

COM NET ERICSSON. VX_900U/600U 2000468 K66VX-900U

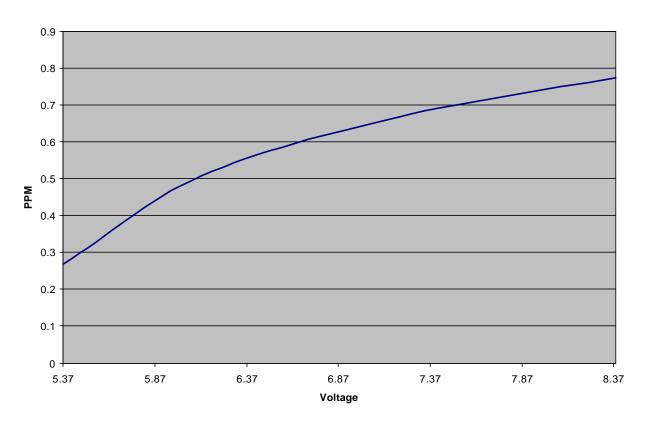


| Voltage (7.2V +/- | Frequency (MHz) | ppm |
|-------------------|-----------------|---------|
| 85-115%) | | |
| 5.15 | 467.525087 | 0.18609 |
| 6.12 | 467.525225 | 0.48126 |
| 7.2 | 467.525337 | 0.72082 |
| 8.38 | 467.525337 | 0.72082 |

Battery end point = 5.15V



Voltage Frequency Stability 467.525MHz; 25KHz channel spacing



| Voltage (7.2V +/- 85-115%) | Frequency (MHz) | ppm |
|----------------------------|-----------------|---------|
| 5.15 | 467.525087 | 0.18609 |
| 6.12 | 467.525225 | 0.48126 |
| 7.2 | 467.525337 | 0.72082 |
| 8.38 | 467.525337 | 0.72082 |

Battery end point = 5.15

12.3 7.3 TEST EQUIPMENT

Temperature Chamber Tenney TH65 s/n 11380

Frequency Counter HP8901A (Frequency Mode) s/n 2545A04102

13 FCC RULES AND REGULATIONS PART 2 §2.1047 (A): MODULATION CHARACTERISTICS - AUDIO FREQUENCY RESPONSE

13.1 TEST PROCEDURE

ANSI/TIA/EIA-603-1992, section 2.2.6

The audio frequency response is the degree of closeness to which the frequency deviation of the transmitter follows a prescribed characteristic.

The input audio level at 1000 Hz is set to produce 20% of the rated system deviation. This point is shown as the 0 dB reference level, noted DEVref.

The audio signal generator was varied from 100Hz to 5kHz with the input level held constant.

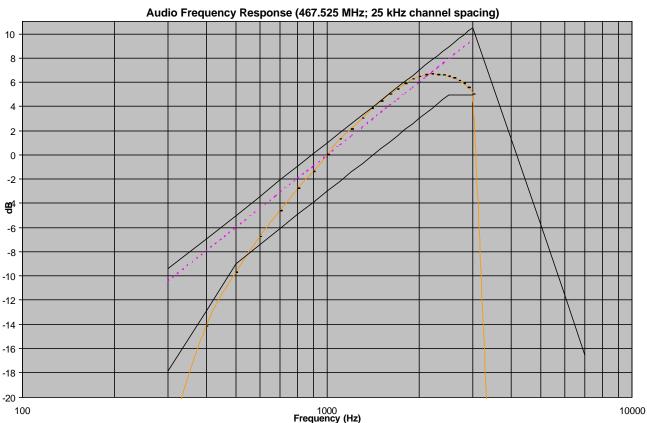
The deviation in kHz was recorded using a modulation analyzer as DEVfreq.

The response in dB relative to 1 kHz was calculated as follows:

Audio Frequency Response = 20 LOG (DEVfreq/DEVref)

13.2 TEST DATA

13.2.1 CHANNEL 1 – 25 KHZ AUDIO FREQUENCY RESPONSE

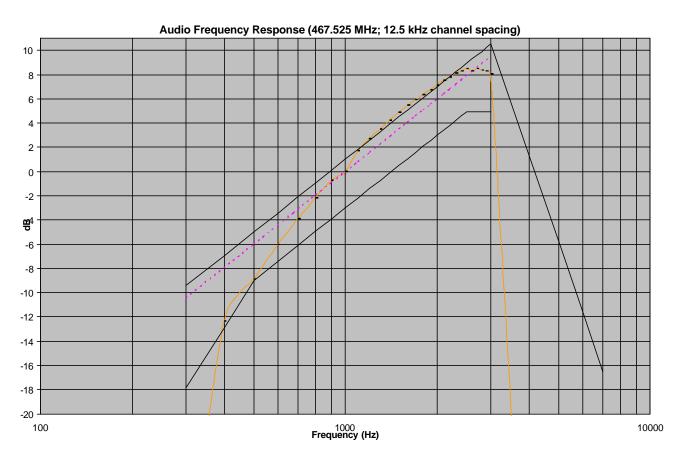


13.2.2



K66VX-900U

13.2.3 CHANNEL 4 – 12.5 KHZ AUDIO FREQUENCY RESPONSE



13.3 TEST EQUIPMENT

s/n 2127A00559 Audio generator HP3336B Modulation analyzer HP8901A s/n 2545A04102



14 FCC RULES AND REGULATIONS PART 2 §2.1047 (A): MODULATION CHARACTERISTICS - AUDIO LOW PASS FILTER RESPONSE

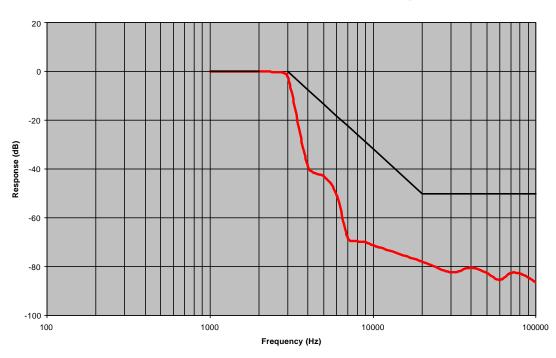
14.1 TEST PROCEDURE

ANSI/TIA/EIA-603-1992, 2.2.15

The Audio Low Pass Filter Response is the frequency response of the post limiter low pass filter circuit above 3000 Hz.

14.2 TEST DATA

Audio Low Pass Filter Response (25 kHz channel spacing)

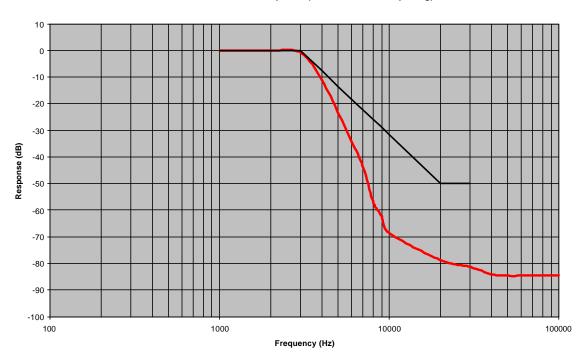




COMPANY NAME: CO

COM NET ERICSSON. VX_900U/600U 2000468 K66VX-900U

Audio Low Pass Filter Response (12.5 kHz channel spacing)



14.3 TEST EQUIPMENT

Audio generatorHP3336Bs/n 2127A00559Modulation analyzerHP8901As/n 2545A04102Selective level meterHP3586Bs/n 1928A01892

Synthesizer/Level generator HP3336B s/n 2514A02585



15 FCC RULES AND REGULATIONS PART 2 §2.1047 (B): MODULATION CHARACTERISTICS - MODULATION LIMITING

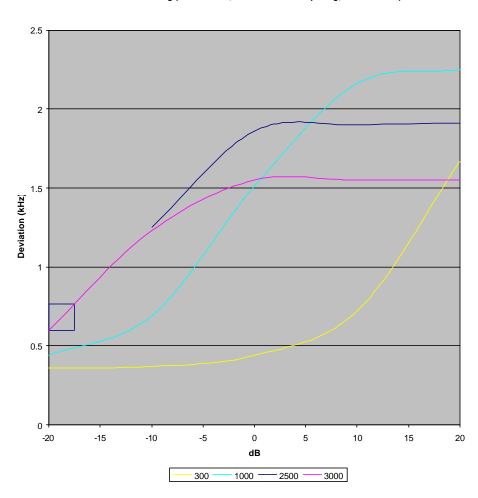
15.1 TEST PROCEDURE

ANSI/TIA/EIA-603-1992, section 2.2.3

The transmitter is adjusted for full rated system deviation. The audio input level is adjusted for 60% of rated system deviation at 1000Hz. Using this level as a reference (0dB) the audio input level is varied from the reference to a level +20 dB above it and -20 dB under it, for modulation frequencies of 300Hz, 1,000Hz, and 2,500Hz. The system deviation obtained as a function of the input level is recorded. Both Positive and Negative Peak deviations were recorded.

15.2 TEST DATA

Modulation Limiting (467.525 MHz; 12.5 kHz channel spacing; Positive Peak)

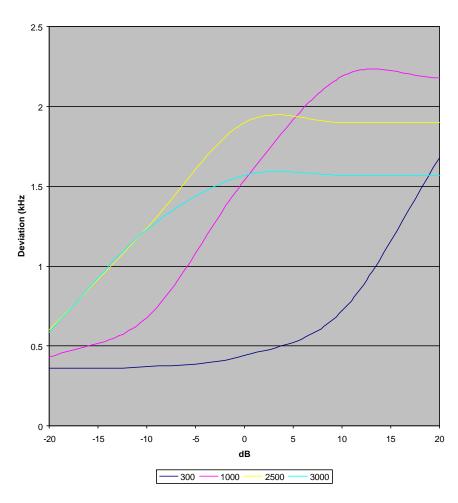




COMPANY NAME: EUT: WORK ORDER NUMBER: FCC ID:

COM NET ERICSSON. VX_900U/600U 2000468 K66VX-900U

Modulation Limiting (467.525 MHz; 12.5 kHz channel spacing; Negative Peak)

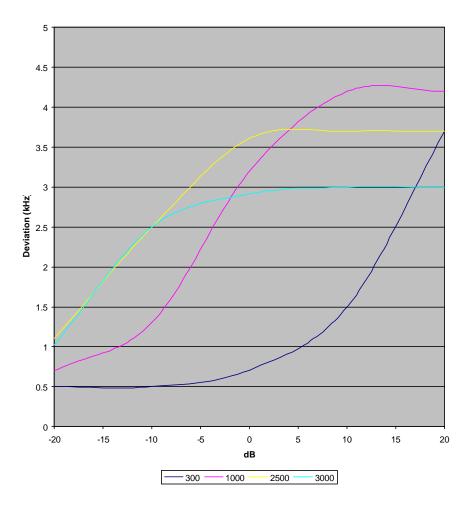




COMPANY NAME: EUT: WORK ORDER NUMBER: FCC ID:

COM NET ERICSSON. VX_900U/600U 2000468 K66VX-900U

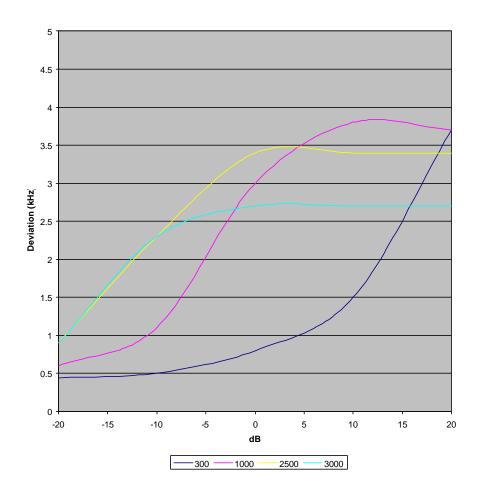
Modulation Limiting (467.525 MHz; H power 25 kHz channel spacing; Positive Peak)





COMPANY NAME: COM NET ERICSSON. EUT: VX_900U/600U (ORDER NUMBER: 2000468 FCC ID: K66VX-900U WORK ORDER NUMBER: FCC ID:

Modulation Limiting (467.525 MHz; H power 25 kHz channel spacing; Negative Peak)



15.3 TEST EQUIPMENT

| Audio generator | HP3336B | s/n 2127A00559 |
|---------------------------|----------|-------------------|
| Modulation analyzer | HP8901A | s/n 2545A04102 |
| Selective level meter | HP3586B | s/n 1928A01892 |
| Synthesizer/Level generat | or HP333 | 6B s/n 2514A02585 |

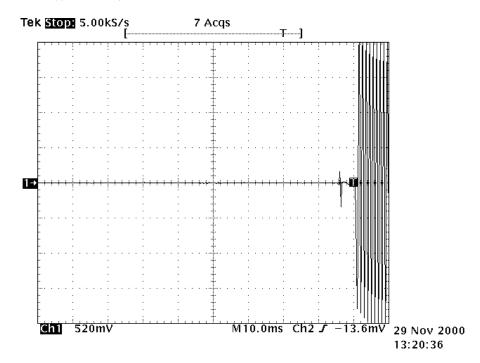


16 FCC RULES AND REGULATIONS PART 90 §90.214: TRANSIENT FREQUENCY BEHAVIOR

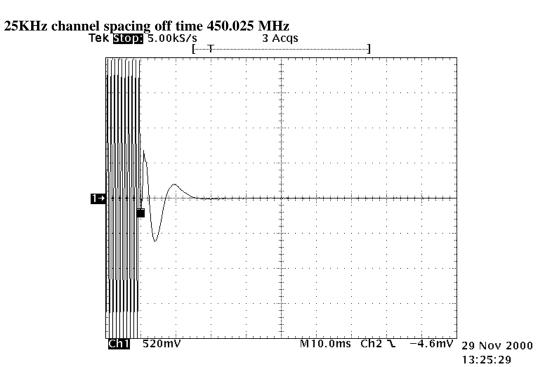
16.1 TEST PROCEDURE

ANSI/TIA/EIA-603-1992, section 2.2.19

16.2 TEST DATA WIDE BAND

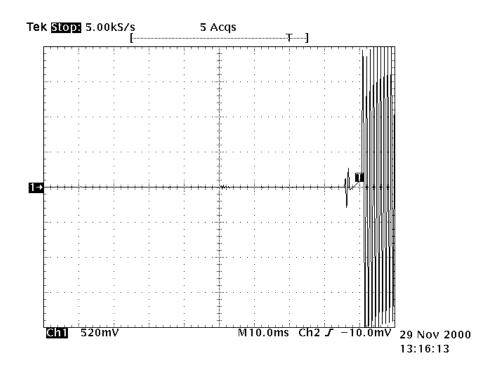




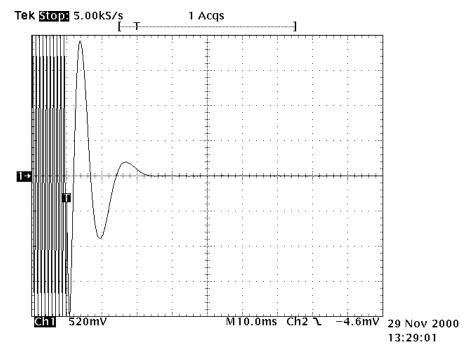


25KHz channel spacing on time 450.025 MHz



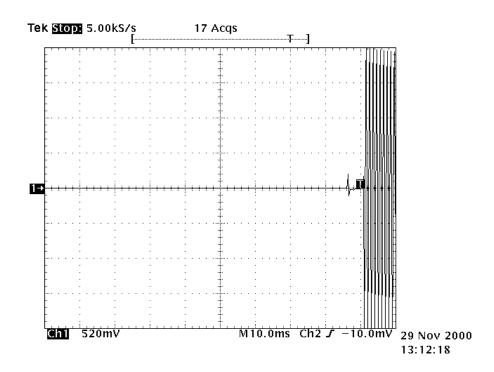


25KHz channel spacing off time 484.975 MHz

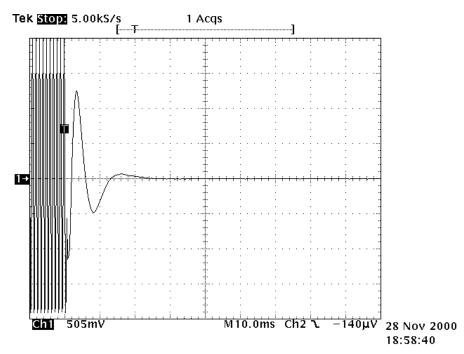


25KHz channel spacing on time 484.975 MHz





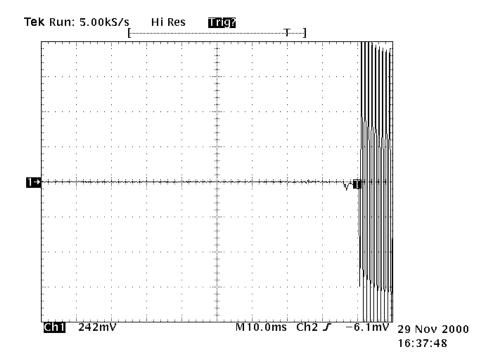
25KHz channel spacing off time 467.525 MHz



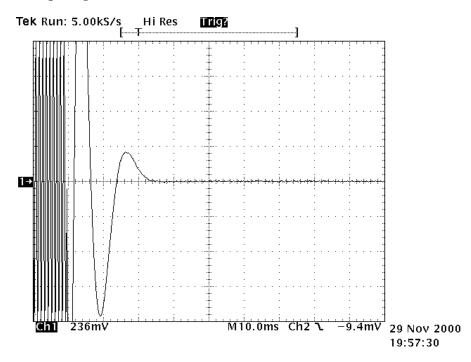
25KHz channel spacing on time 467.525 MHz



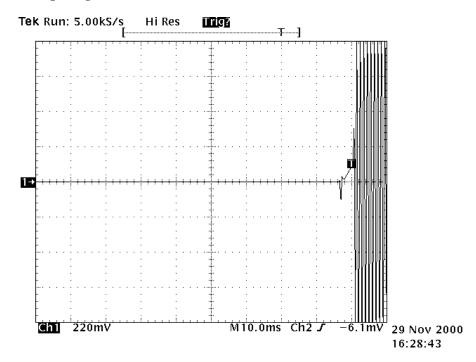
Test Data Narrow Band



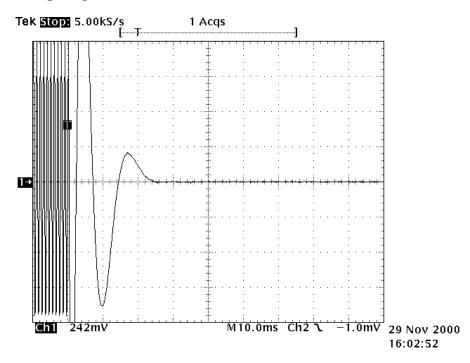
12.5KHz channel spacing off time 450.025 MHz



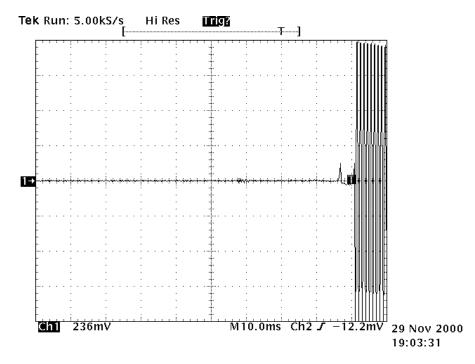
12.5KHz channel spacing on time 450.025 MHz



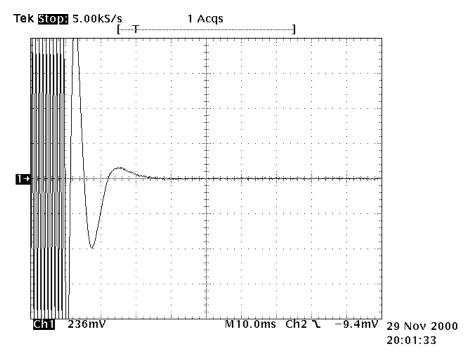
12.5KHz channel spacing off time 484.975 MHz



12.5KHz channel spacing on time 484.975 MHz



12.5KHz channel spacing off time 450.025 MHz



12.5KHz channel spacing on time 450.025 MHz



COMPANY NAME: **COM NET ERICSSON. EUT**: **WORK ORDER NUMBER:** FCC ID:

VX_900U/600U 2000468 K66VX-900U

Limits:

Requirements for EUT with 25 kHz channel spacing:

| Time Intervals (*)(**) | Maximum Frequency | 150-174 MHz | 421-512 MHz | | | | | |
|------------------------|-------------------|-------------|-------------|--|--|--|--|--|
| | Difference(***) | | | | | | | |
| | | | | | | | | |
| t1(****) | ± 25 kHz | 5.0 mSec | 10.0 mSec | | | | | |
| t2 | ± 12.5 kHz | 20.0 mSec | 25.0 mSec | | | | | |
| t3(****) | ± 25 kHz | 5.0 mSec | 10.0 mSec | | | | | |

Requirements for EUT with 12.5 kHz channel spacing:

| Time Intervals (*)(**) | Maximum Frequency | 150-174 MHz | 421-512 MHz | |
|------------------------|-------------------|-------------|-------------|--|
| | Difference(***) | | | |
| t1(****) | ± 12.5 kHz | 5.0 mSec | 10.0 mSec | |
| t2 | ± 6.25 kHz | 20.0 mSec | 25.0 mSec | |
| t3(****) | ± 12.5 kHz | 5.0 mSec | 10.0 mSec | |

- t on is the instant when a 1 kHz test signal is completely suppressed, including any capture time due to phasing.
- t 1 is the time period immediately following ton.
- t2 is the time period immediately following t1.
- t3 is the time period from the instant when the transmitter is turned off until toff.
- toff is the instant when the 1 kHz test signal starts to rise.
- During the time from the end of t2 to the beginning of t3, the frequency difference must not exceed the limits specified in § 90.213.
- Difference between the actual transmitter frequency and the assigned transmitter frequency.
- If the transmitter carrier output power rating is 6 watts or less, the frequency difference during this time period may exceed the maximum frequency difference for this time period.

Maximum frequency difference between time T2 and T3: Calculation for Channel 6:

The frequency stability is required to be 2.5ppm.

Calculation for Channel 6:

4 div. on scope represent 12.5kHz for narrow band channel.

Therefore, 487.975M times 2.5 ppm times +/- 4 Divisions divided by 12.5kHz equals about +/- 0.4 division. 0.4 Div. correspond to 1.219 kHz

16.3 **TEST EQUIPMENT**

HP8471D s/n 2952A Detector:

RF signal generator: HP8648C s/n 3537A01741 Modulation Analyzer: HP8901A s/n 2545A04102 Tektronix TDS540B Oscilloscope: s/n B020129 Receiver: HP 8546A s/n 3525A00159



17 FCC RULES AND REGULATIONS PART 2.202: NECESSARY BANDWIDTH AND EMISSION BANDWIDTH

Type of Emission: F3E

Necessary Bandwidth and Emission Bandwidth: 12.5kHz (NB channel): Bn = 11K0F3E 25kHz (WB channel): Bn = 16K0F3E

Calculation:

 $\overline{\text{Max modulation}}(M) \text{ in kHz } : 3$

Max deviation (D) in kHz: 2.5 (NB) and 5 (BB)

Constant factor (K): 1 Bn = 2xM+2xDK



18 RECEIVER DATA

Radiated Test Data - OATS 1

Test Date: December 01, 2000 - 4:28:14 PM

Work Order: 1

Customer Reference: 1

Model: 900U Mode: 900U Name: DB

Limit/Distance: FCC B/3M

Notes: IF 423.275

| Temperature: 1°F Humidity: 1% | | | | | | | | | | |
|--------------------------------|------------------|------------------------------|-------------------------------|--------------------------|---------------------------------|--|-------------------------------|-------------------|-------------|--|
| Emission Frequency (MHz) | Test Detector | Antenna Polarity (H/V) | Turntable Azimuth (deg) | Antenna Height (m) | Analyzer Reading (dBuV/m) | Site Correction Factor (dB/m) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | |
| 160.600 | Qp | Н | 0 | 1.0 | 11.5 | -17.5 | -6.0 | 43.5 | -49.5 | |
| 233.600 | Qp | Н | 0 | 1.0 | 14.5 | -16.2 | -1.7 | 46.0 | -47.7 | |
| 306.600 | Qp | Н | 0 | 1.0 | 13.7 | -13.1 | 0.6 | 46.0 | -45.4 | |
| 379.600 | Qp | Н | 0 | 1.0 | 9.6 | -10.6 | -1.0 | 46.0 | -47.0 | |
| 423.275 | Qp | Н | 30 | 1.0 | 42.2 | -8.6 | 33.6 | 46.0 | -12.4 | |
| 423.275 | Qp | V | 30 | 1.0 | 36.7 | -8.9 | 27.8 | 46.0 | -18.2 | |
| 846.550 | Qp | Н | 30 | 1.8 | 42.9 | -3.0 | 39.9 | 46.0 | -6.1 | |
| 846.550 | Qp | V | 90 | 1.0 | 41.6 | -3.6 | 38.0 | 46.0 | -8.0 | |



APPENDIX A

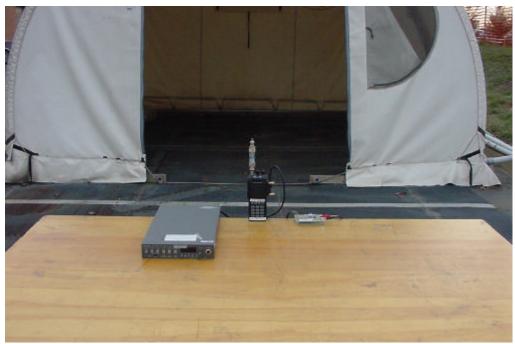
TEST CONFIGURATION PHOTOGRAPHS



WORK ORDER NUMBER: FCC ID:

COMPANY NAME: COM NET ERICSSON.
EUT: VX_900U/600U

CORDER NUMBER: 2000468
FCC ID: K66VX-900U



Radiated Back View



Radiated Front View



APPENDIX B

LABEL INFORMATION

Please see the following page



APPENDIX C

PRODUCT DESCRIPTION

Please see the following page



APPENDIX D

SCHEMATICS

Please see the following page.





APPENDIX E

OPERATOR'S MANUAL

Please see the following page



APPENDIX F

INTERNAL PHOTOGRAPHS



APPENDIX G

EXTERNAL PHOTOGRAPHS

