FCC ID: 9900RT

Test Report

Alcatel 9900 LMDS Terminal Station

This is a summary of the test measurements performed on the Alcatel 9900 LMDS Terminal Station transmitter as required for type certification operating under FCC Part 101.

Also included are measurements required for conformance with FCC Part 15 as a Class B unintentional radiator.

Part 2.1046 - RF Power Output

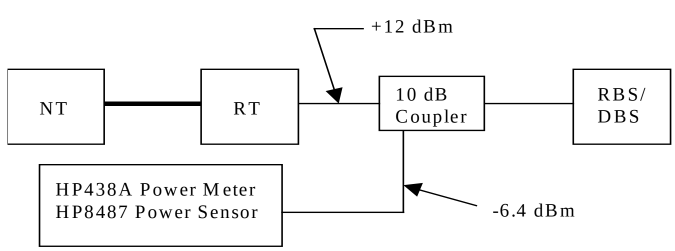
The Alcatel 9900 Terminal Station is composed of two separate assemblies, an indoor Network Termination (NT) and an outdoor Radio Termination (RT). The RT operates at fixed gain that is programmable to compensate for the distance from the base station and for losses generated in the cable between the RT and the NT. The NT uses a combination of the receive signal level and commands from the base station to adjust the IF levels sent to the RT. This forms an Automatic Transmit Powel Control (ATPC) loop that adjusts the RT transmit power to maintain a constant receive level at the base station. The ATPC has a dynamic range of 40 dB. The RT normally operates at a nominal level of -8 dBm when no fading conditions are present.

DC power for the RT is supplied from the NT through the connecting cable. Internal regulator circuits in the RT generate the required bias currents and voltages for the transmitter devices. No operator adjustments are required other than to program the RT with the IF cable length and nominal path distance losses.

The RT uses an integral 3° parabolic antenna. The transmitter power was measured with the antenna removed and a WR-28 to coaxial transition installed in its place. Since the transmitter is shut off if the NT is not connected to the base station, a 10 dB directional coupler (calibrated loss = 11.0 dB) is also installed. The transmitter power was then measured using an HP438A Power Meter with an HP8487A Power sensor.

RT part number:	3CC10886AB
Type design:	solid state
RT DC Power:	+24 VDC nominal 12 W nominal DC power
Gain:	-5 to 35 dB
Output Power:	+12 dBm (measured output when adjusted for maximum power)
Antenna Gain:	34.5 dB
EIRP maximum:	45 W

Test Setup:



Part 2.1047 - Modulation Characteristics

The minimum attenuation limits for the modulated spectrum are defined in 101.111 (a)(2)(ii) by the following equation for frequencies removed from the center frequency by 50 to 250 percent of the authorized bandwidth:

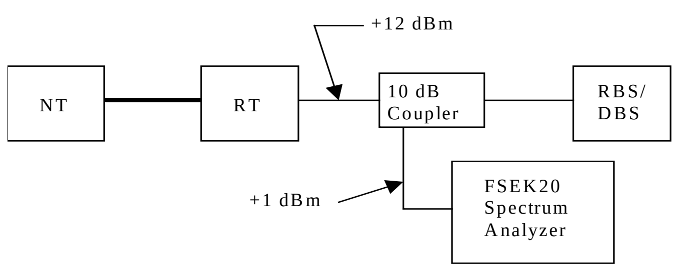
$$A = 11 + 0.4(P-50) + 10\log(B).$$

Maximum required attenuation is 56 dB. Measurements are to be made referenced to a 1 MHz resolution bandwidth.

The authorized bandwidth for the Base Station with emission designator 7M0D7W is 7 MHz. This translates into an attenuation mask defined by the following points:

Frequency (MHz)	Percent	Attenuation (dB)
-17.5	-250	56
-9.9	-141	56
-3.5	-50	19.5
3.5	50	19.5
9.9	141	56
17.5	250	56

Test Setup:



The RT transmitter was set to its maximum nominal output and measured using the HP power meter to be +12 dBm. The transmit spectrum was then measured with a Rhode&Schwarz FSEK20 spectrum analyzer. The power into the spectrum analyzer (including measurement cable losses) was -6.4 dBm. Due to narrow spectrum bandwidth, a 3 kHz resolution bandwidth was used. The reference level was offset by 10log(3/1000) = 25 dB to reference it to a 1 MHz resolution bandwidth. This results in a reference level of -31.4 dBm. The measurement results are shown in Exhibit 1.

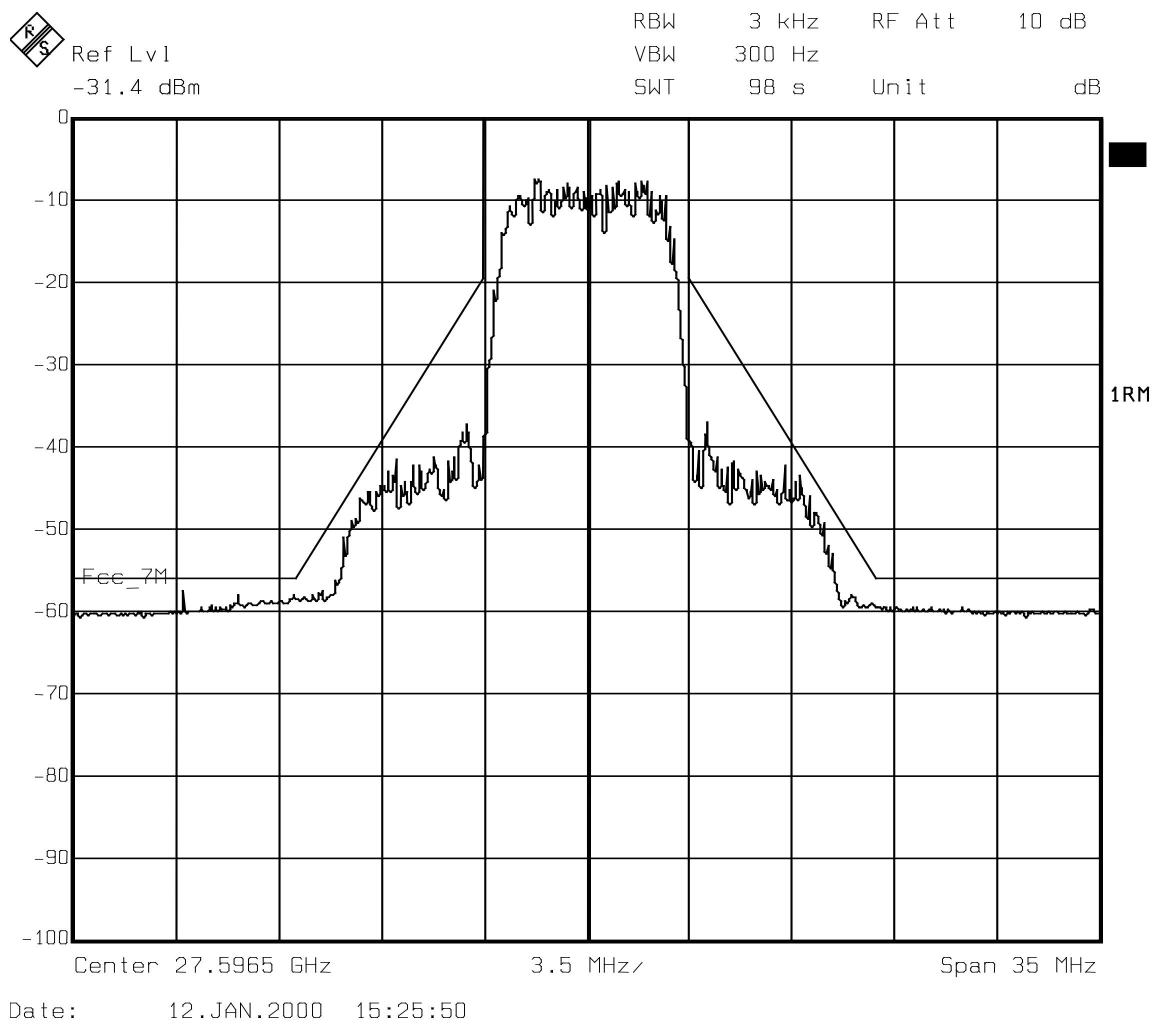


Exhibit 1 - Modulation Characteristics

Part 2.1049 - Occupied Bandwidth

The FSEK20 Spectrum Analyzer has the capability to calculate occupied bandwidth from a measured spectrum. The analyzer was set up to measure 99% bandwidth, resulting in the measurement of 5.962 MHz as shown in Exhibit 2.

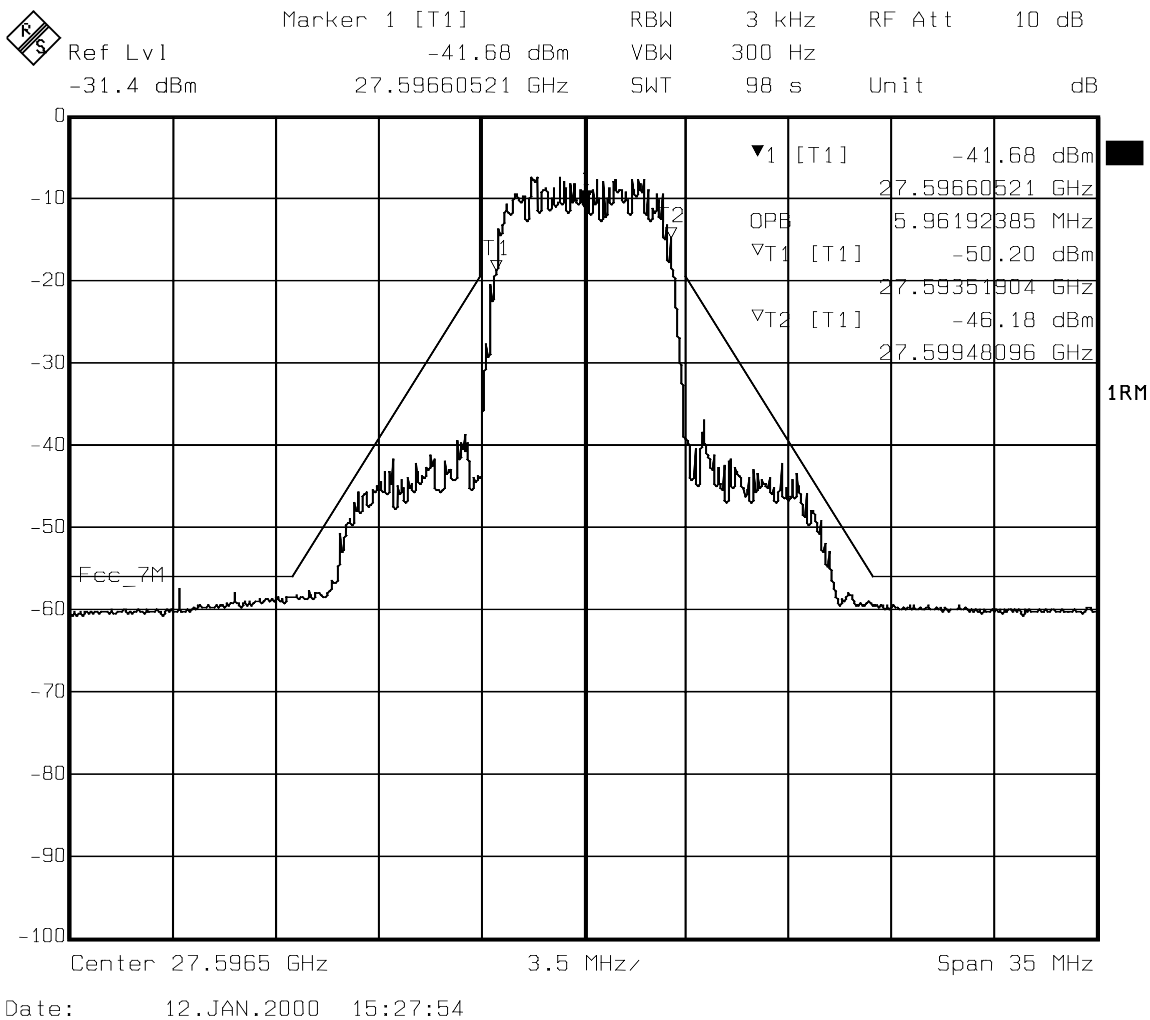


Exhibit 2 - Occupied Bandwidth

Part 2.1051 - Emissions at the Antenna Port

Emissions removed from the center frequency by more than 250 percent of the authorized bandwidth are required by Part 101.111(a)(2)(iii) to be attenuated from the transmitter output power by 43 + 10log(Power in watts) decibels. For a +12 dBm transmit power, this results in an attenuation of 25 dB. Measurements are to be made using a 4 kHz resolution bandwidth. Since this is not a standard spectrum analyzer bandwidth, a resolution bandwidth of 3 kHz was used with the -6.4 dBm reference level offset by -1 dB.

Measurement results are shown in Exhibits 3 and 4.

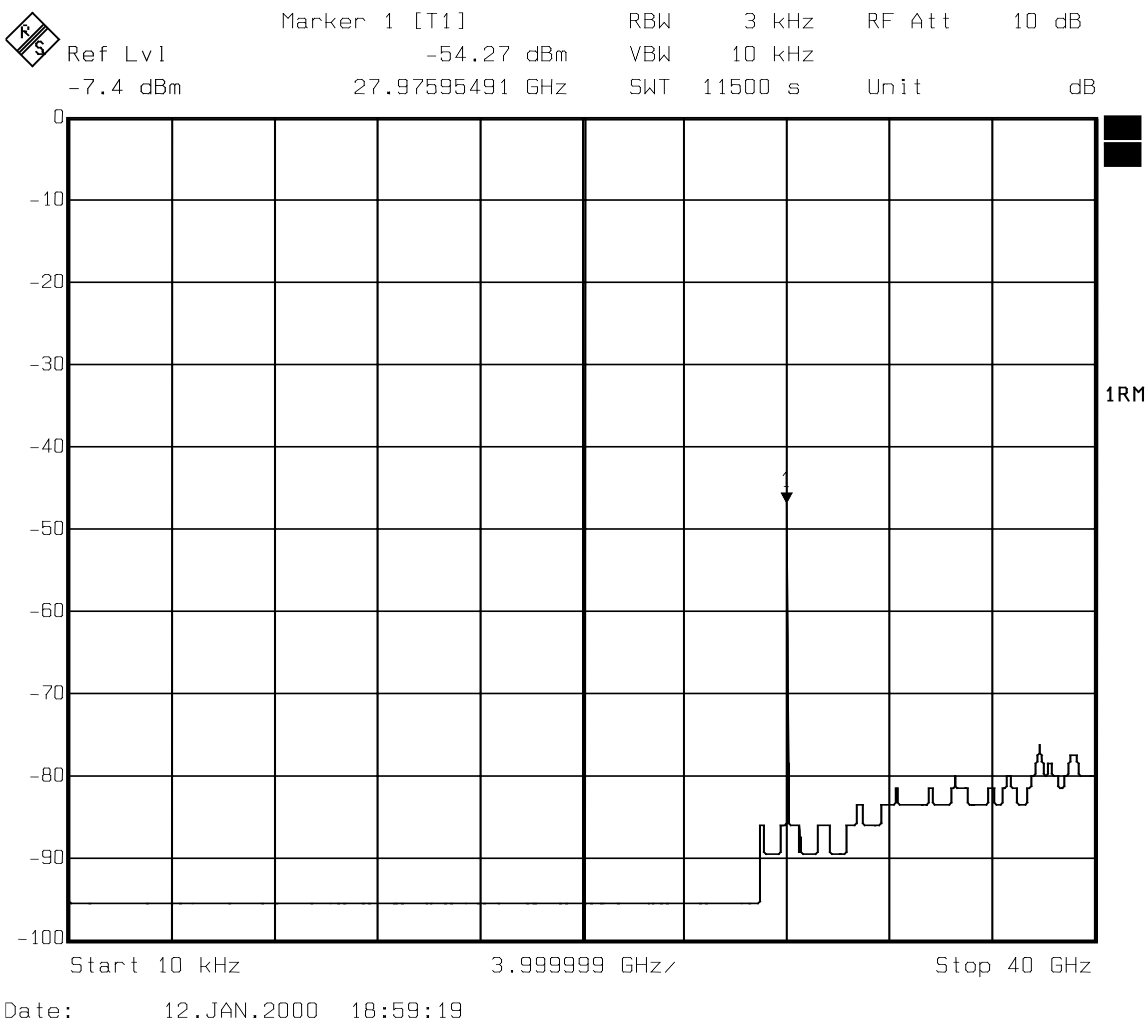


Exhibit 3 - Emissions at the Antenna Port

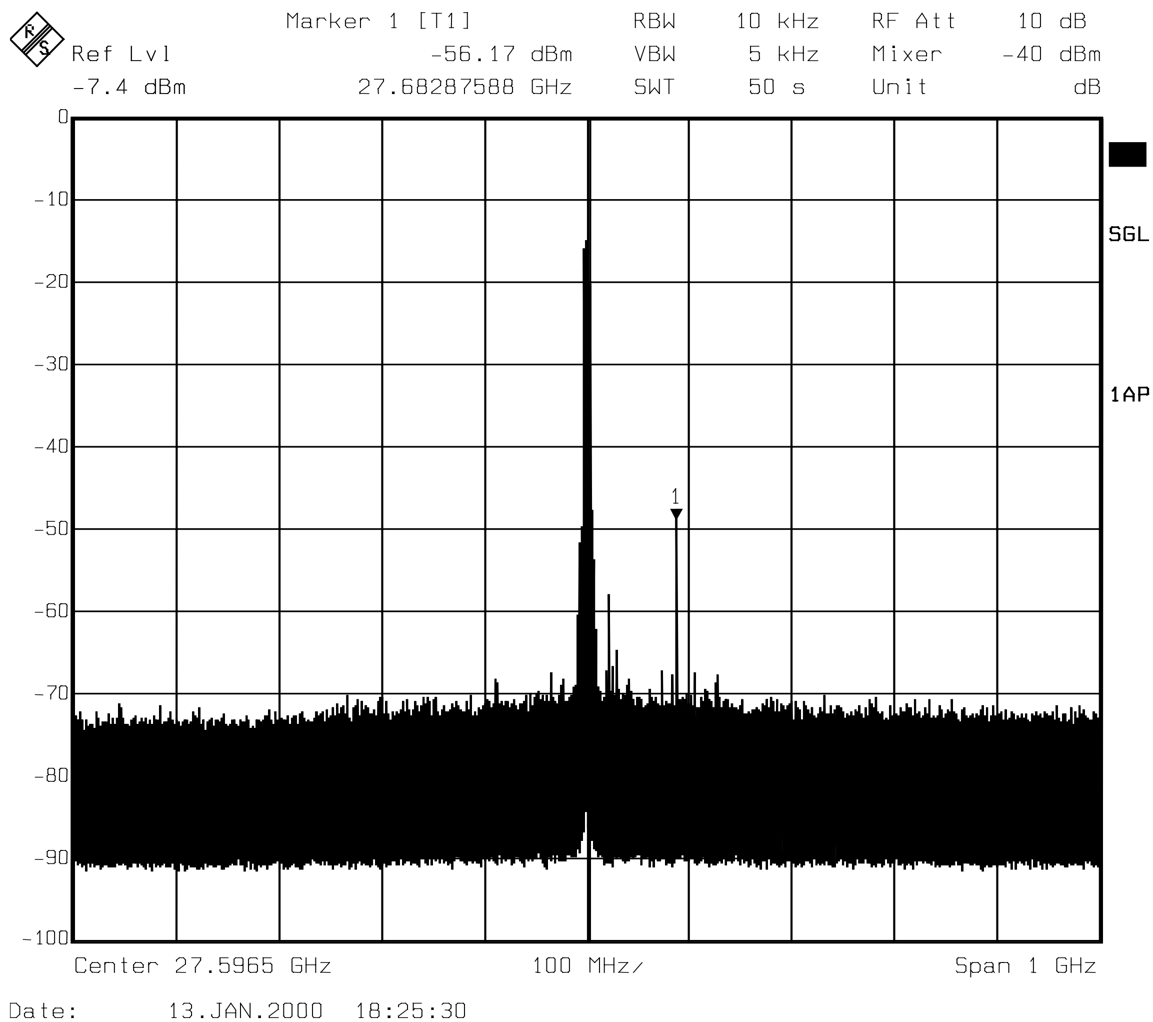


Exhibit 4 - Emissions at the Antenna Port

The only significant spurious signal that was found is shown in Exhibit 4. This signal is within the allowed 25 dB attenuation limit.

Part 2.1053/15.109 - Field Strength of Spurious Radiation

Measurements for spurious radiation were taken as part of the CISPR testing performed by CETECOM ICT Services.   These results are shown in Exhibits 5, 6, and 7.

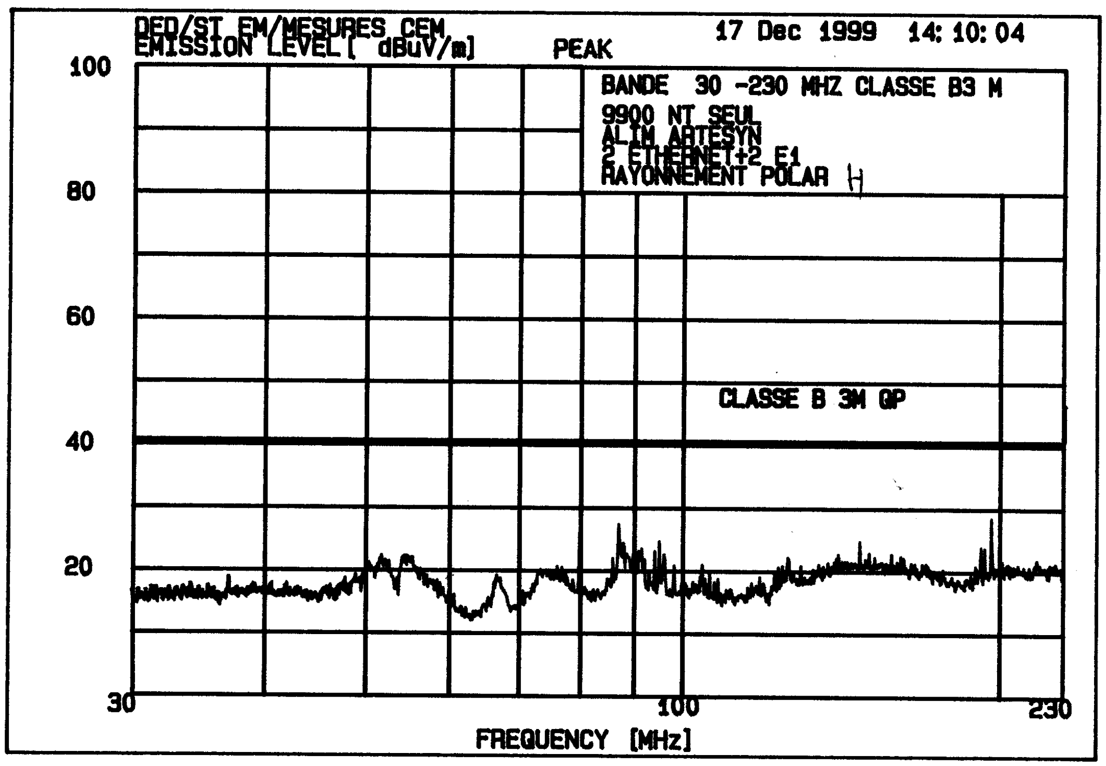


Exhibit 5 - Spurious Radiation (horizontal)

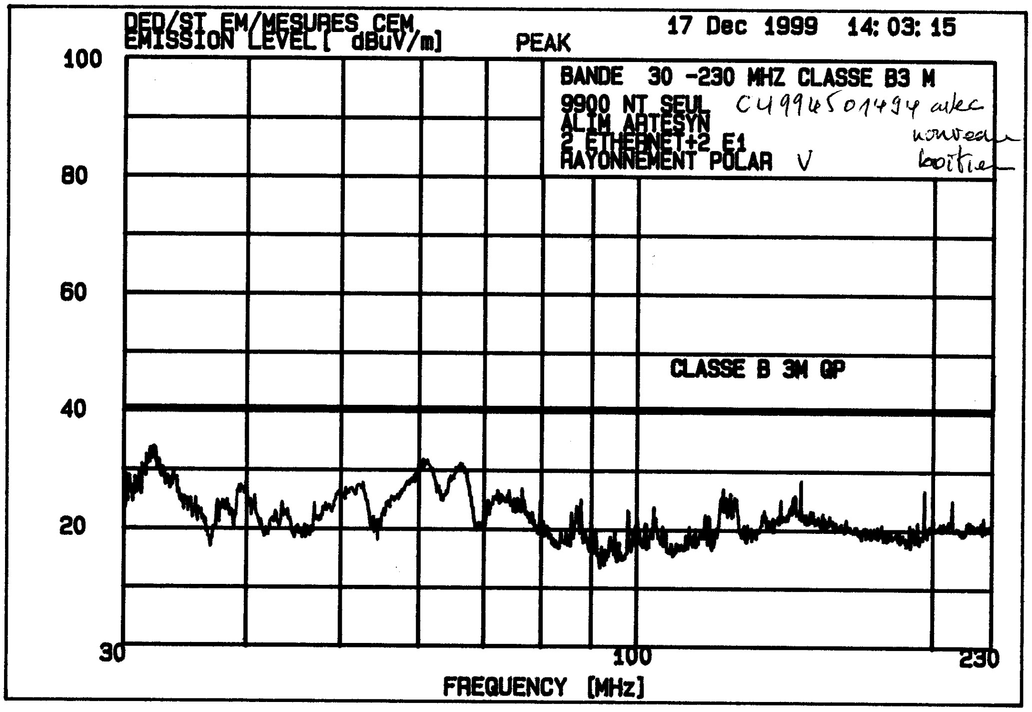


Exhibit 6 - Spurious Radiation (vertical)

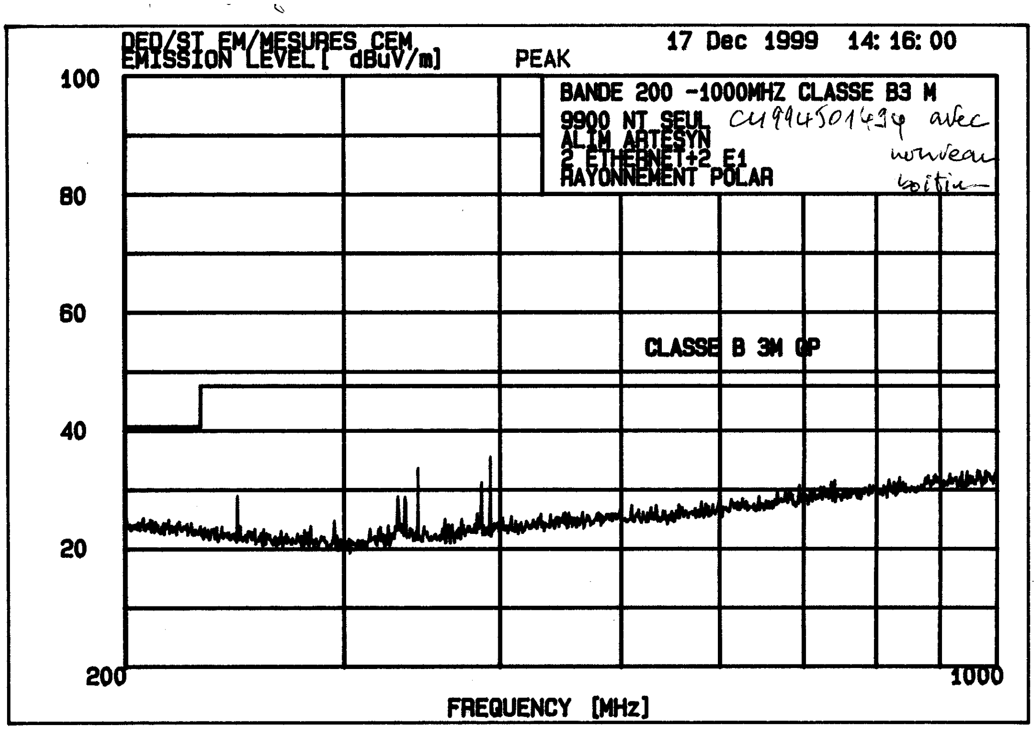


Exhibit 7 - Spurious Radiation (circular)

Part 2.1055 - Frequency Stability

The RT uses a common fixed local oscillator for both the receive and transmit RF/IF conversions. Error in the local oscillator frequency or in the frequency of the base station signal cause an error in the receive IF frequency at the NT. The NT measures the error in the receive IF frequency and offsets the frequency of the transmit IF signal by the same amount. This cancels the error in the RT local oscillator when the transmit IF signal is mixed back to RF. Any remaining error in the transmit RF frequency is due to error in the signal transmitted from the base station. The base station uses the same LO for both the transmit and receive. Residual frequency error in the receive IF at the base station is detected and a correction message is sent to the terminal station. This correction message is used by the NT to fine adjust the transmit IF frequency. Thus the stability of the terminal station transmitter is the same as the base station transmitter (+/- 0.0008 percent). Turning off the modulation at the terminal station breaks this feedback loop and therefore the transmit frequency cannot be directly measured.

The terminal station transmitter is turned off whenever the terminal station receiver is not locked to the base station signal. This prevents the terminal station from transmitting at the wrong frequency.

All frequency determining circuits are powered by internal voltage regulators. Changes in the primary power supplied to the NT and RT have no effect on frequency of operation.

Part 15.107 - AC Power Conducted Emissions

The 9900 NT uses an 85-264V AC power supply manufactured by Artesyn or Martek.

Measurements for conducted emissions were taken as part of the CISPR testing performed by CETECOM ICT Services. These results are shown in Exhibit 8 through and Exhibit 15.

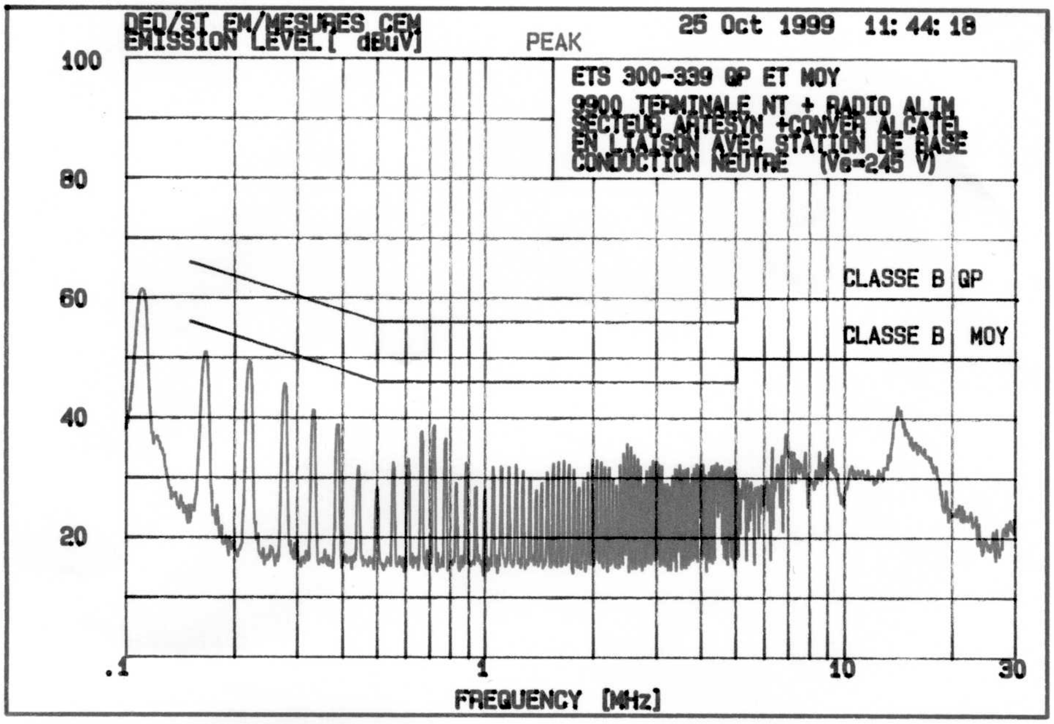


Exhibit 8 - Artesyn supply, nuetral conductor @ 245V

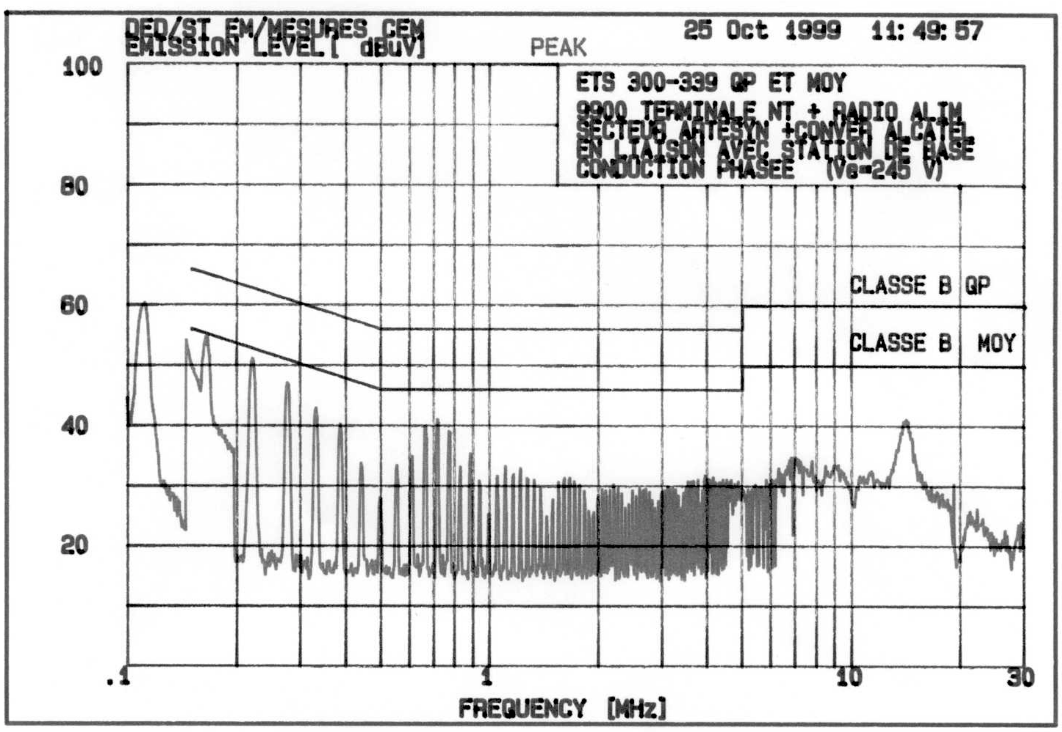


Exhibit 9 - Artesyn supply, power conductor @ 245V

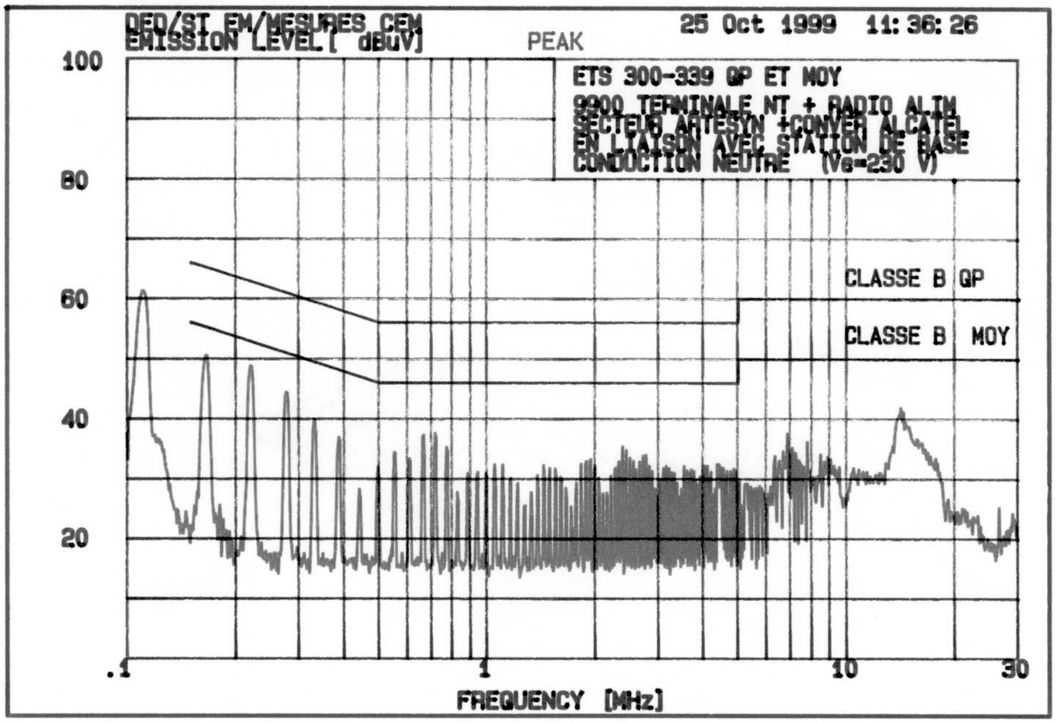


Exhibit 10 - Artesyn supply, nuetral conductor @ 230V

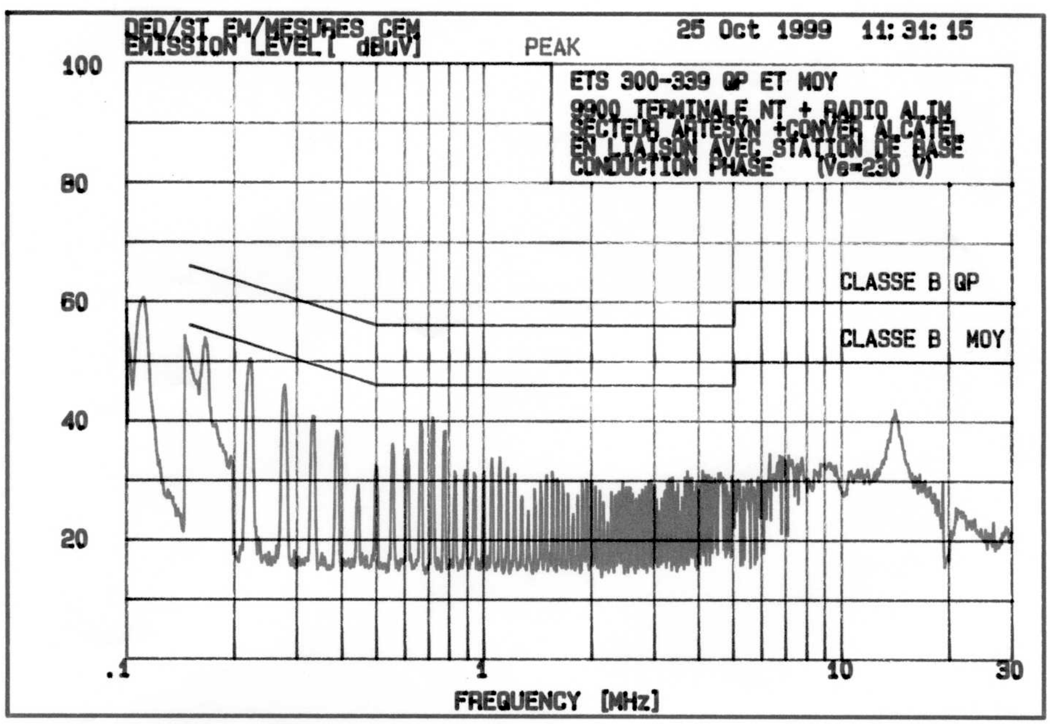


Exhibit 11 - Artesyn supply, power conductor @ 230V

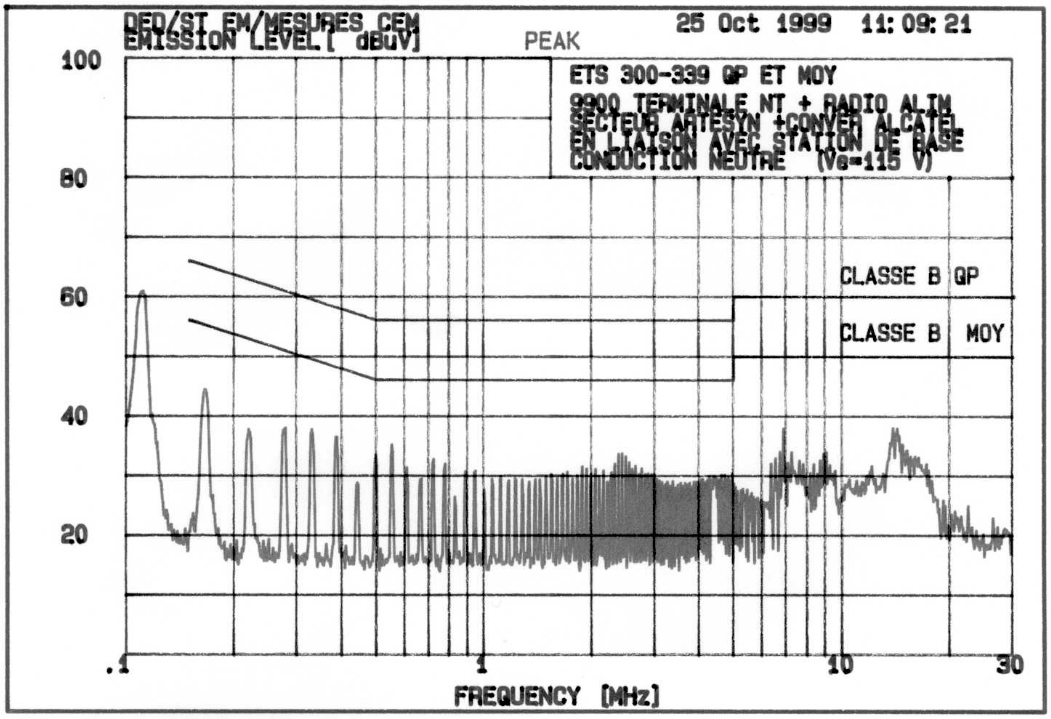


Exhibit 12 - Artesyn supply, nuetral conductor @ 115V

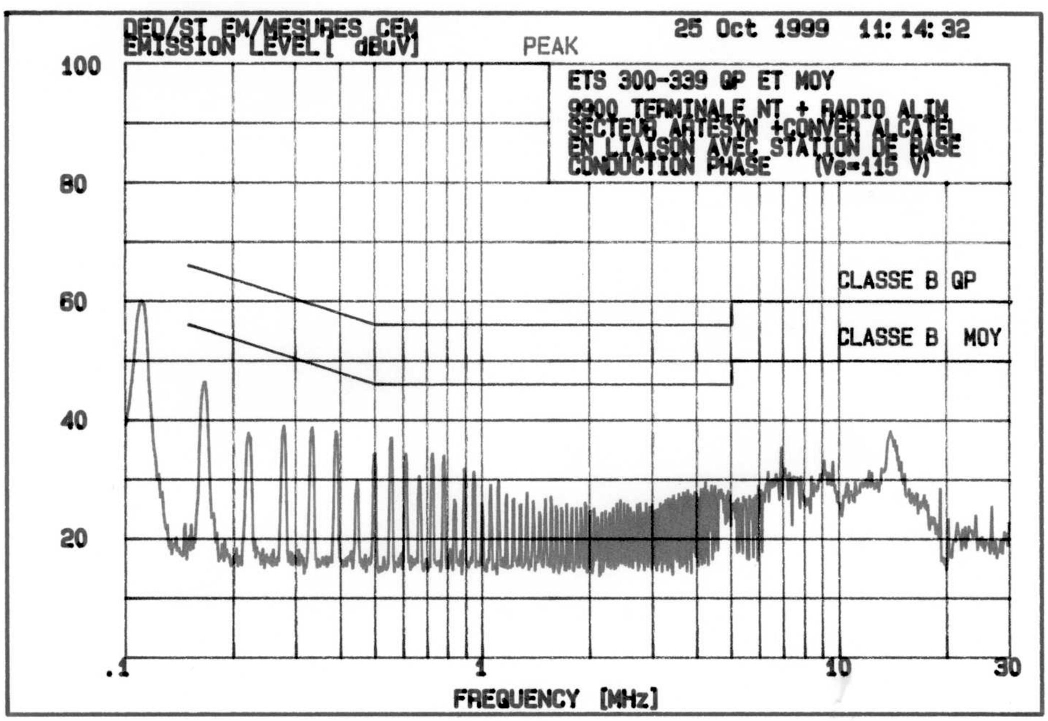


Exhibit 13 - Artesyn supply, power conductor @ 115V

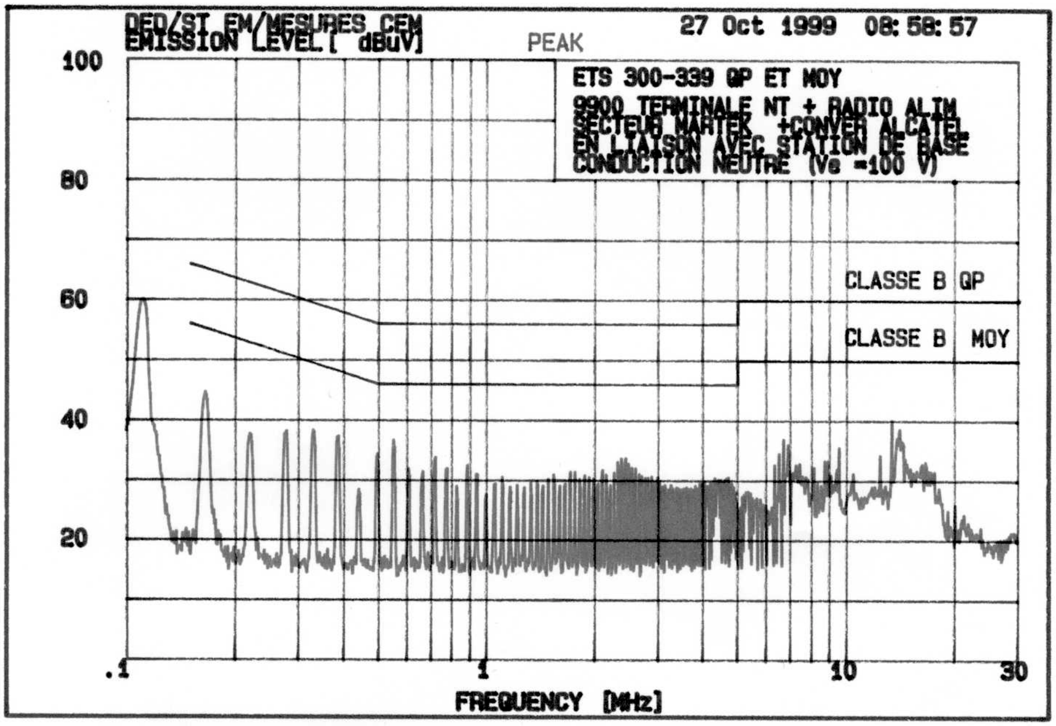


Exhibit 14 - Martek supply, nuetral conductor @ 100V

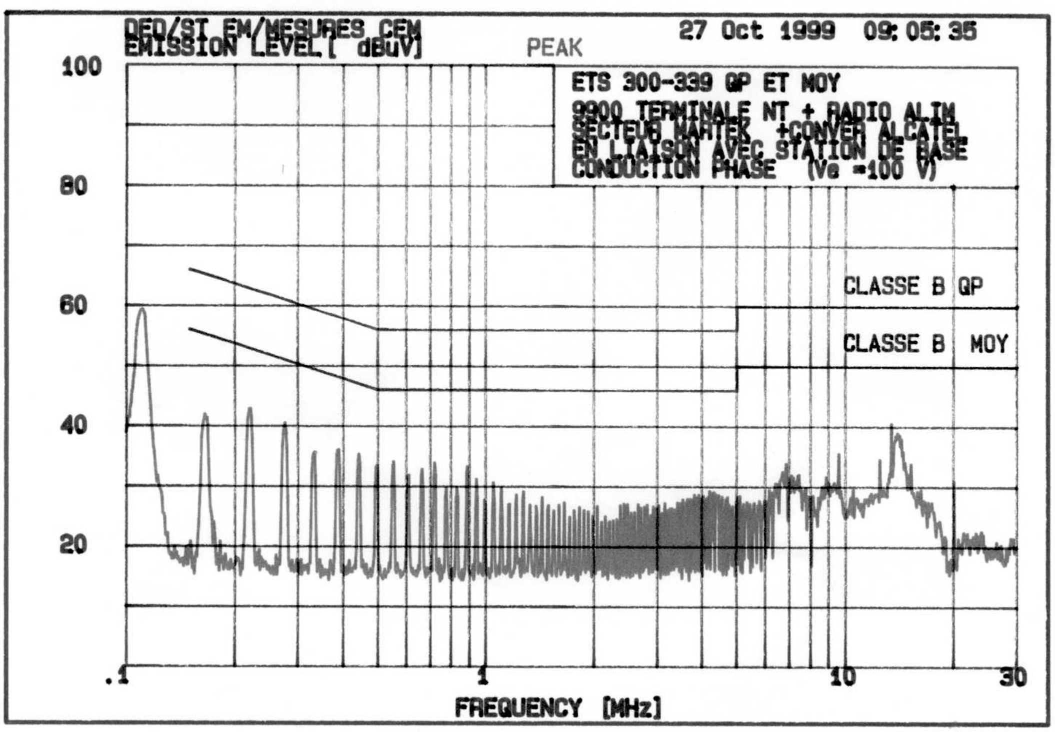


Exhibit 15 - Martek supply, power conductor @ 100V