Spectrum Management and Telecommunications

Compliance Specification for Terminal Equipment, Terminal Systems, Network Protection Devices, Connection Arrangements and Hearing Aids Compatibility

Part VI: Requirements for Integrated Services Digital Network Terminal Equipment
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1.0 Introduction

1.1 Scope

CS-03 Part VI sets forth the minimum network protection requirements for Integrated Services Digital Network (ISDN) terminal equipment (TE). Such TE is intended for connection to common carrier provided facilities for both basic rate access (BRA) and primary rate access (PRA).

The requirements contained herein are intended for the protection of the telecommunications network. Conformance to these technical requirements will not ensure compatibility with wireline carrier services.

Note: Requirements in this document do not apply to DS-1 digital interfaces. Refer to CS-03 Part II for all digital interface requirements.

1.2 Network Protection Requirements

1.2.1 Technical Requirements

The technical requirements tables provide a cross-reference between the TE interfaces and the network protection requirements with which they shall comply. These are marked with a single asterisk (*). Network Protection Devices (NPDs) may be used to comply with the requirements of sections 2.0 and 3.2 as described in the Requirements tables.

Compliance with network protection requirements at the U reference point may be established only when both the network terminator and TE functions are connected together. In combination, the two functions will then fully comply with all of the requirements of this specification. Section 3.5 applies to TE that performs the digital encoding function for analog voice band signals to be decoded in the network.
Table A – Technical Requirements

Network Protection Requirements for Connection of ISDN TE to Common Carrier Provided Facilities at the S or T Reference Point

<table>
<thead>
<tr>
<th>Section</th>
<th>Requirement (S or T Reference Point)</th>
<th>BRA</th>
<th>PRA</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0</td>
<td>Electrical and Mechanical Stresses</td>
<td>*(1) (2)</td>
<td>*(1) (2)</td>
</tr>
<tr>
<td>3.2</td>
<td>Allowable DC Energy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.2.1.1</td>
<td>Allowable Positive DC Potential</td>
<td>*(1) (2)</td>
<td>*(1) (2)</td>
</tr>
<tr>
<td>3.2.1.2</td>
<td>Allowable Negative DC Potential</td>
<td>*(1) (2)</td>
<td>*(1) (2)</td>
</tr>
<tr>
<td>3.5</td>
<td>Transmitted Encoded Analog Signals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.5.2</td>
<td>Transmitted Encoded Analog Signal Power – Access Facilities</td>
<td>*(3)</td>
<td>*(3)</td>
</tr>
<tr>
<td>3.5.3</td>
<td>Encoded Analog Equivalent Audio Signal Limiting</td>
<td>*(3)</td>
<td>*(3)</td>
</tr>
<tr>
<td>3.5.4</td>
<td>Encoded Analog Equivalent Signalling Interference</td>
<td>*(3)</td>
<td>*(3)</td>
</tr>
</tbody>
</table>

Notes:

(1) The requirements of sections 2.0 and 3.2 apply only to TE to be connected to network facilities at the S or T reference point.

(2) NPDs that meet the requirements of sections 2.0 and 3.2 as described in the above table may be used in combination with TE. In such cases, the TE is exempt from compliance with sections 2.0 and 3.2, but is subject to compliance with the requirements of Section 3.5.

(3) Section 3.5 applies to TE that performs analog-to-digital conversion for other than live voice signals or generates signals directly in digital form which will be decoded to voice band analog signals in the network.

* means the requirement applies.
Table B – Technical Requirements

Network Protection Requirements for Connection of ISDN TE to Common Carrier Provided Facilities at the U Reference Point

<table>
<thead>
<tr>
<th>Section</th>
<th>Requirements (U Reference Point)</th>
<th>BRA</th>
<th>PRA</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0</td>
<td>Electrical and Mechanical Stresses</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>3.2</td>
<td>Allowable DC Energy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.2.1.1</td>
<td>Allowable Positive DC Potential</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>3.2.1.2</td>
<td>Allowable Negative DC Potential</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>3.3</td>
<td>Transmitted Digital Signal Power</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.3.1</td>
<td>Total Power</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.3.2</td>
<td>Pulse Shape</td>
<td>-</td>
<td>*</td>
</tr>
<tr>
<td>3.4</td>
<td>Transverse Balance at U Reference Point</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>3.5</td>
<td>Transmitted Encoded Analog Signals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.5.2</td>
<td>Transmitted Encoded Analog Signal Power – Access Facilities</td>
<td>*(1)</td>
<td>*</td>
</tr>
<tr>
<td>3.5.3</td>
<td>Encoded Analog Equivalent Audio Signal Limiting</td>
<td>*(1)</td>
<td>*</td>
</tr>
<tr>
<td>3.5.4</td>
<td>Encoded Analog Equivalent Signalling Interference</td>
<td>*(1)</td>
<td>*</td>
</tr>
</tbody>
</table>

Note: Compliance with network protective requirements may be established only when both the NTI and TE functions are connected together. In combination, the two functions will then fully comply with all of the requirements of this specification. Section 3.5 applies to TE that performs analog-to-digital conversion for other than live voice signals or generates signals directly in digital form which will be decoded to voice band analog signals in the network.

* means the requirement applies.

1.3 Sequence of Equipment Testing

1.3.1 Overall Sequence

The tests shall be performed in the following order:

Section 1.4 Connecting Arrangements
Section 1.5 Operational Check
Section 2.2 (Part I) Dielectric Strength
Section 2.3 (Part I) Hazardous Voltage Limitations (as applicable)
Section 3.0 Network Protection Requirements and Tests
Section 2.1 (Part I) Mechanical Shock
Section 2.4 (Part I) Surge Voltage
Section 2.5 (Part I) Power Line Surge
Section 1.5 Operational Check
Section 2.2 (Part I) Dielectric Strength
Section 2.3 (Part I) Hazardous Voltage Limitations (as applicable)
Section 3.0 Network Protection Requirements and Tests
Notes:

(1) Sections 2.3 and 2.4 of CS-03 Part I specify the requirements for:

   (a) environmental conditioning electrical stress prior to the tests specified in Section 3.0 of that document; and
   (b) hazardous voltage isolation.

(2) The steady state voltage stress tests specified in Section 2.3 of Part I shall be performed prior to verifying the surge voltage requirements of Part I, Section 2.4.

1.4 Connecting Arrangements

ISDN TE intended for direct electrical connection shall be equipped with a connector in accordance with CS-03, Part III.

When diagrams shown in this document make reference to tip and ring network interface connections, these references shall be understood to include tip _1 and ring _1 for 4-wire circuits where appropriate.

1.5 Operational Check

When the operational checks are performed before the application of electrical stress, the TE shall be fully operational, in accordance with the manufacturer’s operating instructions, for those features necessary to allow demonstration of compliance with all applicable requirements of Section 3.0. When the operational checks are repeated after the electrical stress as described in Section 2.0, the TE may be partially or fully inoperable.

1.6 Connection to Ground

When the TE makes provision for an external connection to ground (G), the TE shall be connected to ground. When the TE makes no provision for an external ground, the TE shall be placed on a ground plane which is connected to ground and has overall dimensions at least 50% greater than the corresponding dimensions of the TE. The TE shall be centrally located on the ground plane without any additional connection to ground.

2.0 Electrical and Mechanical Stresses

The technical requirements and methods of application for electrical and mechanical stresses are given in CS-03 Part I, Section 2.0.
3.0 Network Protection Requirements and Tests

3.1 Laboratory Environment

All tests to determine compliance with this specification shall be conducted in a laboratory environment at normal room temperature and humidity.

3.2 Allowable DC Energy

3.2.1 Requirement

TE shall not impress DC potentials at the network interface that exceed the limits outlined in sections 3.2.1.1 and 3.2.1.2.

3.2.1.1 Allowable Positive DC Potential

TE that is intended to connect to the network shall not apply any DC potential that is positive with respect to ground potential.

3.2.1.2 Allowable Negative DC Potential

TE shall not apply any DC potential that is more negative than 60 V DC with respect to ground potential.

3.2.2 Method of Measurement

(1) Connect the TE being tested to the test circuit as shown in Figure 3.2.

(2) Set switch S1 to position “a” and record the voltmeter reading.

(3) Set switch S1 to position “b” and record the voltmeter reading.
3.3 Transmitted Digital Signal Power

3.3.1 Total Power

3.3.1.1 Requirements

For a transmitted pattern of all “ones,” the power at 772 kHz shall not exceed +19 dBm and the power at 1.544 MHz shall be at least 25 dB less, when measured in a 3 kHz bandwidth across a 100 ohms ± 1%, 1W resistor, when averaged over a 3-second interval, through the minimum length of cable specified by the applicant.

Figure 3.2: Allowable DC Energy Measurement
3.3.1.2 Method of Measurement - Total Power (With All “Ones” Pattern)

(1) Connect the TE to the test circuit as shown in Figure 3.3(a).

(2) Arrange the TE to generate an all “ones” signal pattern. When this is not possible, use the method of measurement in Section 3.3.1.3.

(3) Adjust the spectrum analyzer to obtain a 3 kHz pass band centred at 772 kHz.

(4) Measure the transmitted signal power level at 772 kHz averaged over 3 seconds.

(5) Arrange the spectrum analyzer to obtain a 3 kHz pass band centred at 1.544 MHz.

(6) Measure the transmitted signal power level at 1.544 MHz averaged over 3 seconds.

R1 = R2 = 100 ohms ± 1%; 1 W.

Note: The spectrum analyzer should provide the correct termination for R2, a high impedance balanced input with a resistor or an appropriate BALUN.

Figure 3.3(a): Measurement of Transmitted Signal Power at 1.544 MHz and 772 kHz
3.3.1.3 Method of Measurement – Total Power (Alternative Method)

The following alternative method of measurement may be used when an all “ones” pattern cannot be achieved:

1. Using the test circuit shown in Figure 3.3(c), measure the amplitude of the PRA pulse. Calculate the power at 772 kHz in dBm using the formula:

\[
P_{772} \text{ (dBm)} = 10 \times \log \left[ \frac{4}{\pi} \times V \times 0.707 \right]^2 / 200 + 30
\]

where \( V \) is the amplitude of the PRA pulse.

2. Connect the TE to the test circuit shown in Figure 3.3(b). Adjust the trigger level of the frequency counter at the midpoint of the PRA pulse amplitude. Measure the frequency of the active PRA channel.

3. Measure the 1.544 MHz level using the test circuit shown in Figure 3.3(a) and steps (5) and (6) of Section 3.3.1.2.

4. Calculate the ones density using the formula:

\[
\text{Ones density \%} = \left[ \frac{\text{result from step 2 (kHz)}}{772} \right] \times 100
\]

5. With reference to Table 3.3.1, use the ones density calculated in step (4) above to obtain the correction factor to be added to the level measured in step (3) above. In the event that the calculated ones density does not exactly equal a value shown in the table, select the closest value.

<table>
<thead>
<tr>
<th>ones density (%)</th>
<th>correction factor (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.5</td>
<td>18.1</td>
</tr>
<tr>
<td>25</td>
<td>12.0</td>
</tr>
<tr>
<td>37.5</td>
<td>8.5</td>
</tr>
<tr>
<td>50</td>
<td>6.0</td>
</tr>
<tr>
<td>62.5</td>
<td>4.1</td>
</tr>
<tr>
<td>75</td>
<td>2.5</td>
</tr>
<tr>
<td>87.5</td>
<td>1.1</td>
</tr>
<tr>
<td>100</td>
<td>0.0</td>
</tr>
</tbody>
</table>
R1 = R2 = 100 ohms ± 1%; 1 W.

**Figure 3.3(b): Measurement of Digital Signal Power (Alternative Method)**
R = 100 ohms ± 1%; 1 W.

Figure 3.3(c): Measurement of Pulse Amplitude (Alternative Method)
3.3.2 Pulse Shape

3.3.2.1 Requirement

The shape of an isolated pulse shall fall within the mask in Figure 3.3(d) when measured at the end of the shortest cable specified by the applicant.

Note: The voltage within a time slot containing a zero may be greater than this limit because of the undershoot remaining from preceding pulses (i.e. intersymbol interference). The use of an alternate zero and ones (dotting pattern) signal will minimize this problem.

3.3.2.2 Method of Measurement

(1) Connect the TE to the test circuit as shown in Figure 3.3(e).

(2) Use an oscilloscope which is capable of balanced differential measurement and has an input bandwidth greater than 100 MHz; with a measurement accuracy for the pulse time interval and voltage which will enable comparison of both positive and negative pulses for compliance with the specified pulse mask.

(3) Terminate the transmit pair (T and R) of the TE digital interface in a resistive load of 100 ohms ±1%, 1 W, using the shortest cable specified by the applicant.

(4) Arrange the TE in accordance with the equipment instructions, so that it generates a quasi-random or dotting pattern at the network interface.

(5) Synchronize the oscilloscope to a negative pulse of the incoming 1.544 Mbps digital signal, so that a single positive pulse is clearly displayed.

(6) Compare the displayed pulse with the pulse mask.

(7) Synchronize the oscilloscope to a positive pulse of the incoming 1.544 Mbps signal, so that a single negative pulse is clearly displayed and repeat step (6).
Figure 3.3(d): Isolated Pulse Template and Corner Points
R = 100 ohms ± 1%; 1 W.

**Note:** The oscilloscope should provide the correct termination for tip and ring leads via a high impedance balanced input across the 100 ohms resistive load.

**Figure 3.3(e): Measurement of Pulse Shape**
3.4 Transverse Balance at U Reference Point

3.4.1 Requirement

TE intended to connect to ISDN access, either BRA or PRA, at the U reference point shall comply with the following requirements:

The transverse balance at the network interface shall equal or exceed the minimum values shown in Figure 3.4(a) at all frequencies as specified, under all reasonable applications of earth ground to the TE. Transverse balance is defined as: $20 \log_{10} (V_M/V_L)$.

For the purpose of this section, $1.544 \text{ Mbps} = 1.544 \text{ MHz}$.

![Figure 3.4(a): Transverse Balance Requirements at the U Reference Point](image-url)
3.4.2 Method of Measurement

(1) Connect the TE as shown in Figure 3.4(b).

(2) Set the spectrum analyzer/tracking generator to sweep the appropriate frequency range:
   (a) for BRA: 200 Hz to 192 kHz;
   (b) for PRA: 12 kHz to 1.544 MHz.

(3) Adjust the tracking generator voltage to measure -10 dBV (316 mV) across the calibration test resistor $R_{\text{CAL}}$.

(4) Connect the detector across the longitudinal resistor $R_L$ ($R_L = 500$ ohms for frequencies $< 12$ kHz, and 90 ohms for frequencies $> 12$ kHz).

(5) Adjust capacitor $C_1$ until a minimum voltage across resistor $R_L$ is obtained. This represents the highest degree to which the bridge can be balanced. This balance measurement must be at least 20 dB better than the requirement for the applicable frequency band. If this degree of balance cannot be attained, further attention should be given to the component selection and the construction of the test circuit.

(6) Reverse the polarity of the tip and ring leads of the TE being tested, using switch $S_2$. If the longitudinal voltage ($V_L$) changes by less than 1 dB, the calibration is acceptable. If the longitudinal voltage changes by more than 1 dB, the bridge needs further adjustment to be sufficiently balanced to accurately measure the TE. Repeat the calibration process until the measurements differ by less than 1 dB while maintaining the 20 dB minimum balance noted in step (5) above.

(7) Replace the calibration resistor with the TE.

(8) Measure the voltage across the tip and ring of the TE. This is the metallic reference voltage ($V_M$).

(9) Measure the voltage across resistor $R_L$. This is the longitudinal voltage ($V_L$).

(10) Calculate the balance using the following formula:

\[
\text{Balance M/L (dB)} = 20 \log_{10} \left( \frac{V_M}{V_L} \right)
\]

Notes:

(1) If the readings are taken in dBV, the equation can be simplified as follows:

\[
\text{Balance M/L (dB)} = V_M(\text{dBV}) - V_L(\text{dBV})
\]

(2) TE which is not normally grounded should be set in its normal rest position directly on a grounded plane whose overall dimensions are at least 50% greater than the footprint of the TE. From a transverse balance standpoint, this represents a worst case condition (i.e. the closest proximity to ground is likely to be encountered by the TE).
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Notes:

(1) A 3pF capacitance may be required between tip to ground or ring to ground depending on bridge construction.
(2) Use a transformer with an appropriate frequency response for the frequency band under test.
(3) The combined impedance of the 50 ohm generator plus R1 shall equal the nominal impedance of the device under test.
(4) Use an R_{CAL} value of 100 ohms for 1.544 Mbps devices and 135 ohms for BRA devices.

Figure 3.4(b): Transverse Balance Bridge for Basic and Primary Rate Access

3.5 Transmitted Encoded Analog Signals

3.5.1 General

The requirements of this section apply to ISDN TE that performs analog-to-digital conversion for other than live voice signals, or that generates signals directly in digital form which will be decoded to voice band analog signals in the network. These requirements ensure that, when such signals are decoded in the network, no network harm will occur due to high signal levels, restricted frequencies, etc.

When such encoded analog signals are decoded in accordance with the specifications for the µ255 PCM encoding law, which are set forth in ITU-T Recommendation G.711, the signals shall comply with the requirements of this section. The requirements of this section do not apply to ISDN terminal interfaces which transmit digital signals that do not contain encoded analog signals.
3.5.2 Transmitted Encoded Analog Signal Power – Access Facilities

3.5.2.1 Requirement

(1) The maximum equivalent power of encoded analog signals at the network interface, as derived by a zero-level decoder on any B-channel, shall not exceed the following limits:

(a) 0 dBm when averaged over 250 ms for all signals other than live voice and dual tone multi-frequency (DTMF) signals;
(b) -3 dBm for DTMF signals when averaged over 3 seconds;
(c) -6 dBm for V.90 or V.92 modem signals when averaged over 3 seconds; and
(d) -9 dBm for all other signals other than live voice when averaged over 3 seconds.

Notes:

(1) All limits are in reference to a 600 ohms resistor.

(2) TE providing through transmission capability to other public switched network connections shall meet the requirements of Table 3.5.2.
### Table 3.5.2 - Allowable Net Amplification Between Ports

<table>
<thead>
<tr>
<th>To</th>
<th>Tie Trunk Type Ports</th>
<th>Lossless 2/4-wire</th>
<th>Subrate 1.544 Mbps Satellite (4-wire)</th>
<th>Subrate 1.544 Mbps Satellite (4-wire)</th>
<th>Integrated Services Trunk Ports</th>
<th>Off-Premises Station Ports (2-wire)</th>
<th>Analog Public Switched Network Ports (2-wire)</th>
<th>Subrate 1.544 Mbps Digital PBX-CO Trunk (4-wire)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lossless Tie Trunk Port (2/4-wire)</td>
<td>0 dB</td>
<td>2 dB</td>
<td>2 dB</td>
<td>2 dB</td>
<td>2 dB</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Subrate 1.544 Mbps Satellite Tie Trunk Port (4-wire)</td>
<td>1 dB</td>
<td>-</td>
<td>3 dB</td>
<td>3 dB</td>
<td>3 dB</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Subrate 1.544 Mbps Tandem Tie Trunk Port (4-wire)</td>
<td>-2 dB</td>
<td>0 dB</td>
<td>0 dB</td>
<td>0 dB</td>
<td>0 dB</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Integrated Services Trunk Ports</td>
<td>-2 dB</td>
<td>0 dB</td>
<td>0 dB</td>
<td>0 dB</td>
<td>0 dB</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Registered Digital TE</td>
<td>-2 dB</td>
<td>0 dB</td>
<td>0 dB</td>
<td>0 dB</td>
<td>0 dB</td>
<td>0 dB</td>
<td>0 dB</td>
<td>0 dB</td>
</tr>
<tr>
<td>On-premises Station Port with Registered TE</td>
<td>-2 dB</td>
<td>0 dB</td>
<td>0 dB</td>
<td>0 dB</td>
<td>0 dB</td>
<td>0 dB</td>
<td>0 dB</td>
<td>0 dB</td>
</tr>
<tr>
<td>Off-premises Station Port (2-wire)</td>
<td>2 dB</td>
<td>4 dB</td>
<td>4 dB</td>
<td>4 dB</td>
<td>4 dB</td>
<td>4 dB</td>
<td>4 dB</td>
<td>4 dB</td>
</tr>
<tr>
<td>Analog Public Switched Network Ports (2-wire)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3 dB</td>
<td>3 dB</td>
<td>-</td>
</tr>
<tr>
<td>Subrate 1.544 Mbps Digital PBX-CO Trunk Ports (4-wire)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0 dB</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Notes:**
1. The source impedance for all measurements shall be 600 ohms. All ports shall be terminated in appropriate loop or private line channel simulator circuits or 600 ohm terminations.
2. These ports are for 2-wire, on-premises station ports to separately registered TE.
(3) The above through gain limitations are applicable to multi-port systems where channels are not derived by time or frequency compression methods. TE employing such compression techniques shall assure that equivalent compensation for through gain parameters is evaluated and included in the test report.

(4) TE and NPD may have net amplification exceeding the limitations of this subsection provided that, for each network interface type to be connected, the absolute signal power levels specified in this section are not exceeded.

(5) The indicated gain is in the direction which results when moving from the horizontal entry toward the vertical entry.

(6) TE and NPD with the capability for through transmission from voice band private line channels or voice band metallic channels to other telephone network interfaces must not exceed the absolute signal power levels specified in this section for the telephone network interface type to be connected.

(7) TE and NPD with the capability for through transmission from voice band private line channels or voice band metallic private line channels to other telephone network interfaces shall ensure, for each telephone network interface type to be connected, that signals with energy in the frequency band 2450-2750 Hz are not through transmitted unless there is at least an equal amount of energy in the frequency band 800-2450 Hz within 20 milliseconds of application of the signal.

3.5.2.2 Method of Measurement

(1) Connect the TE to the test circuit as shown in Figure 3.5(a). Select a B channel output from the B channel decoder.

(2) Set the filter cut-off frequencies to achieve a 100 Hz to 4000 Hz pass band and arrange the spectrum analyzer to read power in dBm averaged over 3 seconds.

(3) Operate the TE at maximum gain to transmit each of its possible output signals other than live voice, including voice band data signals. If the TE has input interfaces for connection to registered analog terminals, apply a white noise test signal at -9 dBm at such interfaces.

(4) Record the maximum power level reading in dBm.

(5) Calculate the gain of the through transmission path from the output level measured in step (4) to the input level set in step (3).

(6) Arrange the spectrum analyzer to read power averaged over 250 milliseconds. Repeat steps (3) and (4).
R = 600 ohms ± 1%, 1W.

Notes:

(1) The B channel decoder enables the following functions:

(a) operates the D channel to satisfy the TE operating requirements;
(b) provides separate outputs from the B channel; and
(c) provides a stable clock to operate the TE.

(2) The spectrum analyzer should provide the correct termination for tip and ring leads via a high impedance balanced input across 600 ohms resistive load or via an appropriate BALUN.

Figure 3.5(a): Measurement of Transmitted Encoded Analog Signal Power
3.5.3 Encoded Analog Equivalent Audio Signal Limiting

The applicable technical requirements and methods of measurement for audio signal limiting are outlined in CS-03 Part I, Section 3.4.8.

3.5.4 Encoded Analog Equivalent Signalling Interference

3.5.4.1 Requirement

The equivalent power of encoded analog signals at the network interface for other than live voice, as derived by a zero level decoder delivered by the TE for the first 2 seconds in response to an incoming alerting signal (by analogy “off-hook” in PSTN) on any B channel, in the frequency band 2450-2750 Hz, shall be less than the power present simultaneously in the frequency band 800-2450 Hz. The gain in the frequency band 2450-2750 Hz shall not exceed by more than 1 dB the gain present in the frequency band 800-2450 Hz.

If the signal power in the frequency band 2450-2750 Hz is less than -44 dBm, this requirement does not apply.

3.5.4.2 Method of Measurement

(1) Connect the TE to the test circuit as shown in Figure 3.5(b).

(2) Connect and select the B channel on the TE.

(3) Record the maximum power value in dBm that occurs during the first 2 seconds after the B channel connected state is obtained, for each of the possible output signals in step (4).

(4) Set the TE to transmit each of its possible output signals.

(5) Record the maximum power value obtained.
R = 600 ohms ± 1%, 1W.

Notes:

(1) The B channel decoder enables the following functions:

   (a) operates the D channel to satisfy the TE operating requirements;
   (b) provides separate outputs from the B channel; and
   (c) provides a stable clock to operate the TE.

(2) The spectrum analyzer should provide the correct termination for tip and ring leads via a high impedance balanced input across 600 ohms resistive load or via an appropriate BALUN.

   Figure 3.5(b): Single Frequency Restriction Measurement