5.Telecommunication requirement

5.1 Public switch telephone network interface requirement

5.1.1 Basic requirements

1. The TE shall be an independent entity not belongs to Type 1 telecommunications enterprises and prohibited to modify Type 1 telecommunications enterprises equipment.
2. Any additional functions shall not impact public telecom equipment switching, testing, transport and billing functions when TE is connected to Network.
3. While the TE is damaged or malfunctioning, other connected equipment should be influenced continue to function properly.

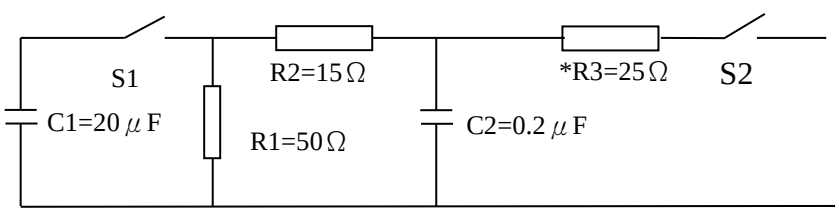
5.1.2 Surge Protection

Voltage Wave-shape of Surge

Front Time (Tf) = 1.67 × T , where T is time from 30% to 90% of peak voltage.

Decay Time (Td): Time from virtual origin to 50% of peak voltage on trailing edge

The circuit diagram of Surge Generator:

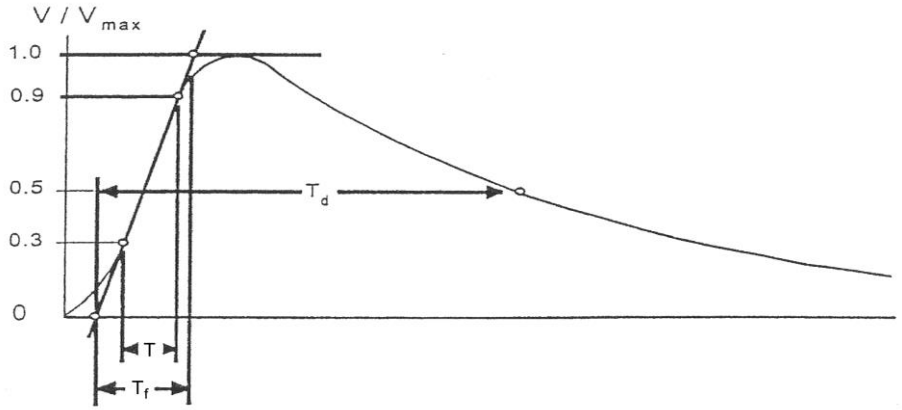


Open circuit voltage waveshape:

T：time from 30% to 90% of peak voltage

Tf = 1.67 × T

Td：Time from virtual origin to 50% of peak voltage on trailing edge


V / V max
1.0
0.9
0.5
0.3
0
T d
T
T f

5.1.2.1 Telephone Line Surge Test:

5.1.2.1.1 Metallic Surge Test:

Requirement: After applying the metallic surge test, all the operational functions must work well.

1. Metallic surge wave form:Front time〔T_f〕≦10 μs、decay time 〔T_d〕≧560 μs and peak voltage≧800V, the surge generator should support over 100A peak current.
2. Apply the above surge wave form on the tip and ring of telephone line, while EUT is at on-hook and any operational mode, and then change the polarity to test it again.

Purpose: To simulate induced metallic surge voltage on a telephone line which could result from lightning.

Test Method:

1. Figure 1 shows the metallic surge test configuration.
2. The method of metallic surge test
   (1) Set the front time(T_f)、decay time(T_d) and peak voltage of metallic surge wave form.
   (2) Set EUT at on-hook mode.
   (3) Apply one surge of each polarity between two leads.
   (4) Record and check the functions of EUT.
   (5) Set the EUT under each operational mode and repeat step (3) to (4).

Test equipment:

1. Surge Generator.
2. Loop Simulator.

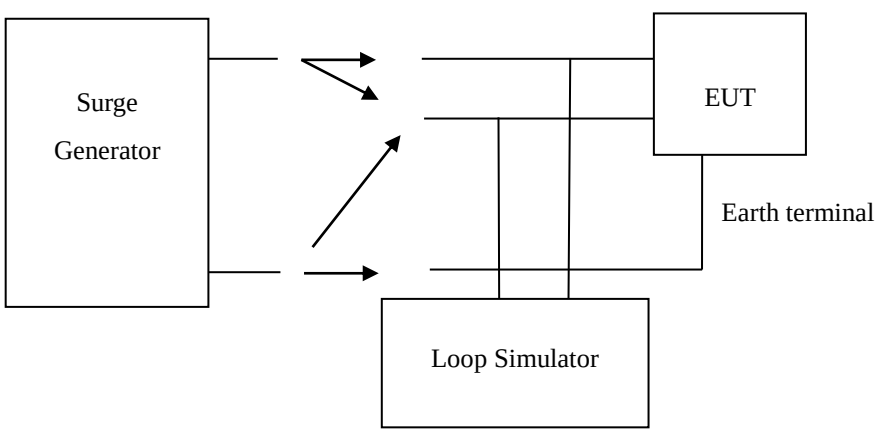


Figure 1 Surge test configuration

5.1.2.1. 2 Longitudinal Surge Test:

Requirement: After applying the metallic surge test, all the operational functions must work well.

1. Longitudinal surge wave form:Front time〔T_f〕≦10 μs、decay time〔T_d〕≧160 μs and peak voltage≧1500V, the surge generator should support over 200A peak current.
2. Apply the above surge wave form on the shorted tip and ring of telephone line about earth, while EUT is at on-hook and any operational mode, and then change the polarity to test it again.

Purpose: To simulate induced longitudinal surge voltage on a telephone line which could result from

lightning.

Test Method:

1. Figure 1 shows the longitudinal surge test configuration.
2. The method of metallic surge test
   (1) Set the front time(T_f)、decay time(T_d) and peak voltage of longitudinal surge wave form.
   (2) Set EUT at on-hook mode.
   (3) With two leads connected together, apply one surge of each polarity between leads and ground.
   (4) Record and check the functions of EUT.
   (5) Set the EUT under each operational mode and repeat step (3) to (4).

Test equipment:

1. Surge Generator.
2. Loop Simulator.

5.1.2.2 AC Power Line Surge Test:

Requirement: After applying the AC power surge test, all the operational functions must work well.

1. AC power surge wave form:Front time (T_f)≦2 μs、decay time (T_d)≧10 μs and peak voltage ≧2500V, the surge generator should support over 1000A peak current.
2. Apply the above surge wave form on the tip and ring of telephone line, while EUT is powered on and off , and then change the polarity to test it three times.

Purpose: To simulate induced AC power surge voltage on a telephone line which could result from lightning.

Test Method:

1. Figure 2 shows the AC power surge test configuration.

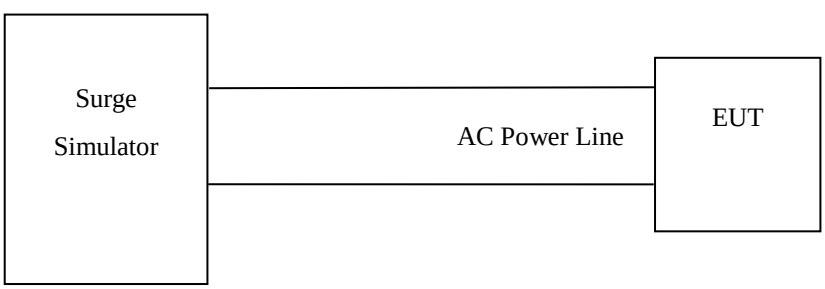


Figure.2 AC Power line surge test configuration

2. The method of AC power surge test
   (1) Set the front time(T_f)、decay time(T_d) and peak voltage of AC power surge wave form.
   (2) Power on EUT.
   (3) Apply three times surge of each polarity between two leads.
   (4) Record and check the functions of EUT.

(5) Power off EUT and repeat step (3) to (4).

Test equipment:

1. Surge Generator.
2. AC Power Source.

5.1.3 Line Polarity:

Requirement: The two polarity connections of TE to PSTN shall comply with the requirements of this technical standard.

Purpose: To make sure TE can work with the PSTN in two polarity connections.

Test method: Where tests with both polarity connections are needed for this regulation.

5.1.4 Leakage current limitations

Requirement: TE shall have a voltage applied to the combination of test points listed in the table 1.

(1) test point:All telephone connections.

(2) test point:All power connections.

(3) test point:All possible combinations of exposed conductive surfaces on the exterior of such equipment.

Gradually increase the voltage from zero to the values listed in Table 1 over a 30 seconds time period, then maintain the voltage for one minute. The current in the mesh formed by the voltage source and these points shall not exceed 10mA peak at any time during this 90-second interval.

Table 1: Voltages applied for various combinations of connection points

Voltage source connected between:	AC voltage value
(1) and (3)	1000V/60Hz
(1) and (2)	1500V/60Hz
(2) and (3)	1500V/60Hz

Purpose: To verify the integrity of the dielectric barrier between the network and power line and the equipment connections of the EUT.

Test method:

1. Leakage current limitations Test Configuration as Fig.3.
2. Leakage current limitations test method:
   (1) Select the appropriate EUT test point, according to the table 1.
   (2) Set EUT at on-hook.
   (3) Gradually increase the test voltage from 0 to the level required for the connections under test in reference to Table 1(i.e. V1), over a 30-second period. Maintain the maximum voltage level during 60 seconds.
   (4) Record the maximum current measured during this period.
   (5) Calculate the the maximum leakage current = V2 ÷ 1000
   (6) Repeat step (3) to (5) in each operational states.
   (7) Change the different test point in table 1, repeat step (2) to (6).

Test equipment:

1. Isolated Adjustable High Voltage Source.
2. Voltmeters (V1 and V2).

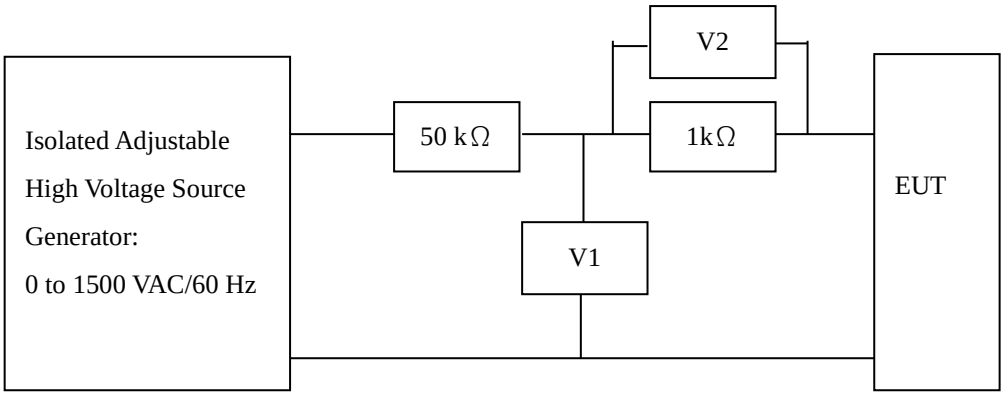


Figure 3 Leakage current limitation test configuration

5.1.5 Insulation resistance

Requirement: The insulation resistance between the following test points shall be greater than 5 MΩ while apply 100 Vdc on th EUT.

1. TE with 2 wires:
   (1) Telephone line, tip to ring.
   (2) Telephone line, short tip with ring v.s. AC power.
   (3) Telephone line, short tip with ring v.s. earth.
2. Leased line TE with 4 wires:
   (1) Telephone line, short tip with ring v.s. shorting of T1 with R1.
   (2) Telephone line, short T/ T1 with R/R1 v.s. earth ground.
   (3) Telephone line, short T/ T1 with R/R1 v.s. AC power.

Purpose: To check whether the TE presents a higher resistance characters between ground and power line and the equipment connections of the EUT.

Test method：

1. Insulation resistance Test Configuration as Fig.4.
2. Insulation resistance test method:
   (1) Set EUT at on-hook state.
   (2) Set the voltage to 100 Vdc.
   (3) Connect output point to the tip an ring of telephone line.
   (4) Measure and record the current. Calculate the insulation resistance = $100 \div I_{dc}$.
   (5) Connect output point to the test pints specified above one by one.
   (6) Measure and record the current. Calculate the insulation resistance for each test point.

Test equipment:

1. 100V DC Power Supply.
2. Voltmenter. (V)

3. Currentmeter (A)

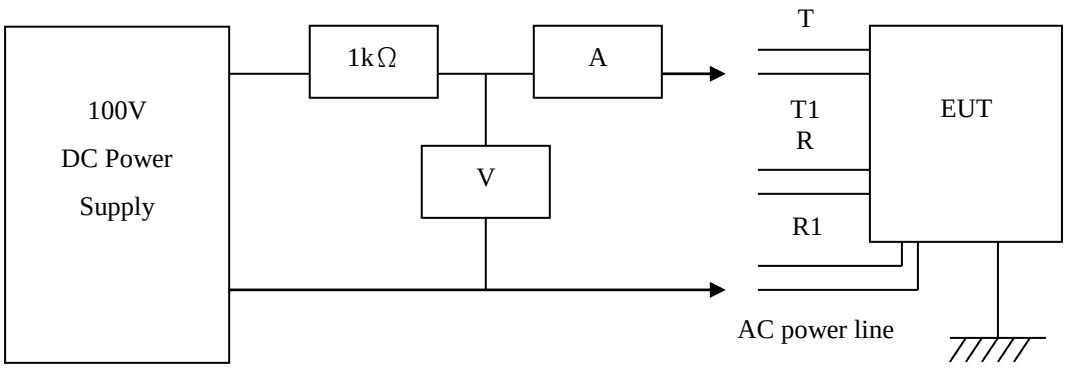


Figure 4 Insulation resistance test configuration Earth Connecting

5.1.6 Characteristics of TE for ringing signals

5.1.6.1 Response to ringing signal

Requirement: If a ring detect function is provided and enabled, the TE shall be able to response to ringing signals of 45 V rms at 20 Hz with a cadence of 1 sec. on and 2 sec. off superimposed on a 48 VDC feeding voltage and series 5 kΩ resistor.

Purpose: To verify the TE has to provide a minimum ringing response characters.

Test method：

1. Response to ringing signal Test Configuration as Fig.5.
2. Response to ringing signal test method:
   (1) The EUT should be at on-hook state.
   (2) Set AC signal generator to 20Hz and adjust the ring signal level to 45Vrms.
   (3) Check to see that the EUT provides an audible acoustic output or other response states.

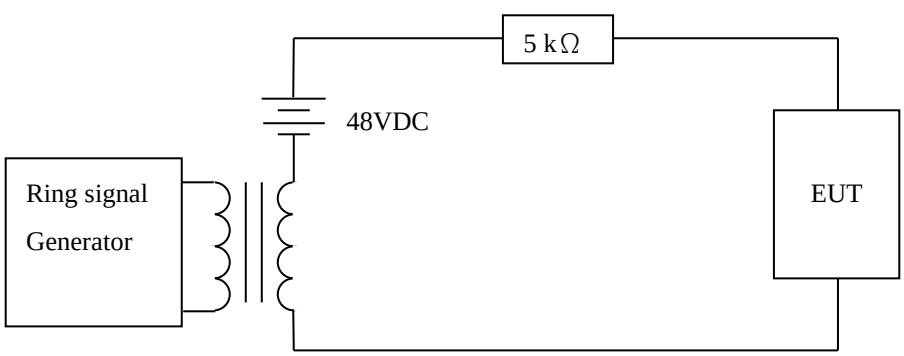


Figure 5 Response to ringing signal test configuration

Test equipment:

1. DC power supply.
2. Ring signal generator : Frequency generator + Ringing amplifier

5.1.6.2 Ringing Impedance

Requirement: Requirement: The ringing impedancce of the terminal equipment at ringing signal 20Hz, 75Vrms shall not be less than 5kΩ and capacitance shall be less than 3.0 μF.

Purpose: It is assured by requiring the TE to present a impedance to ringing signals that is sufficiently high.

Test method：

1. Ringing Impedance Test Configuration as Fig.6.
2. Ringing Impedance test method:
   (1) The EUT should be at on-hook state.
   (2) Set AC signal generator to 20Hz and adjust the signal level until the reading of V1 in EUT is 75Vrms.
   (3) Measure the AC voltage, V2.
   (4) Calculated the ringing impedance of the EUT. Z = V1 ÷ V2 × 1000.
   (5) Digital storage oscilloscope monitor and record the waveform of V1 and V2.
   (6) Calculate the phase angle θ of impedance and the capacitance of EUT.
   (a) θ = △t ÷50ms × 360°
   (b) C = 1 / ω × Z × sinθ where ω = 2× π × f
   θ : phase angle of impedance
   △t : time different of V1 and V2

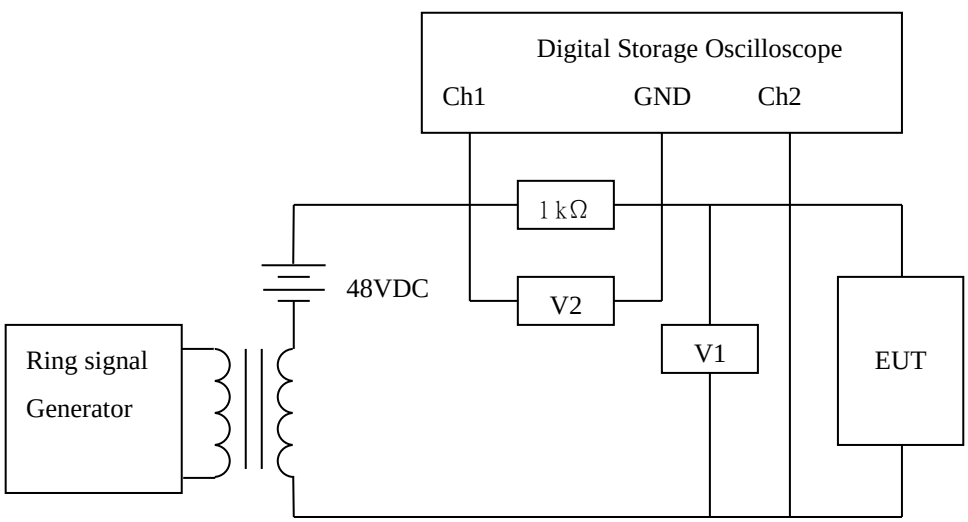


Figure 6 Ringing Impedance Test Configuration

Test equipment:

1. Digital storage oscilloscoge.
2. Ring signal generator : Frequency generator + Ringing amplifier
3. DC power Supply.
4. AC Voltmeter(V1 and V2).

5.1.6.3 On-hook AC impedance

Requirement: While EUT is at on-hook state loaded with 3Vrms, 200Hz ~ 3200Hz AC signal on the telephone line, the AC impedance shall be in the acceptable region of Figure 7.

Purpose: To prevent the interference to other TE connecting with in parallel.

Test method：

1. On-hook AC impedance test configuration as Fig.8.

2. On-hook AC impedance test method:

(1) EUT set on-hook state.

(2) Set the AC signal generator to 200 Hz and adjust the output level to let V2 be 3 Vrms reading.

(3) Measure and record the V1.

(4) Calculate the AC impedance Z = V2 ÷ V1 x 10 kΩ.

(5) Vary the AC signal generator slowly from 200 Hz to 3200 Hz, keeping V2 at 3 Vrms reading.

(6) Repeat step (3) to (4) .

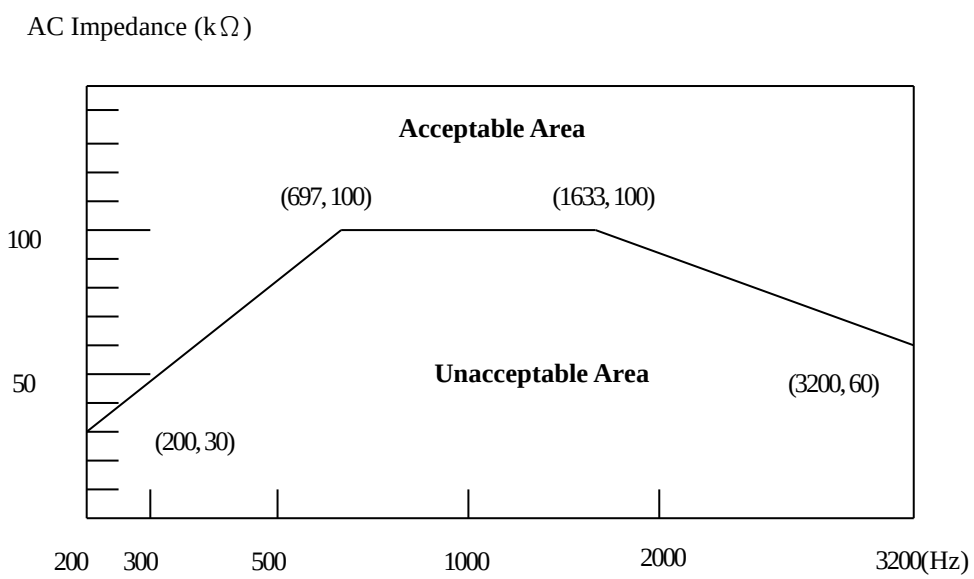


Fig.7 AC Impedance for On-hook Mode

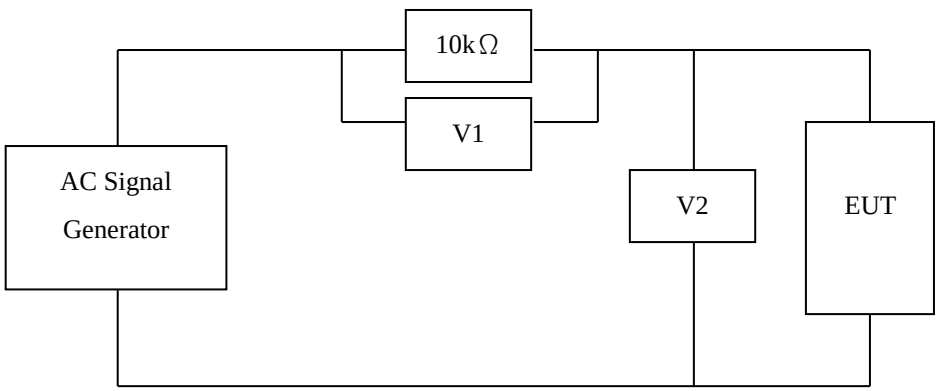


Figure 8 On-hook AC impedance test configuration

Test equipment:

1. AC Signal Generator.
2. AC Voltmeter × 2.

5.1.7 Off-hook DC resistance

Requirement: The DC voltage to loop current characteristics of the TE during the any operating function of off-hook state shall appear on the acceptable region shown in Fig.9.

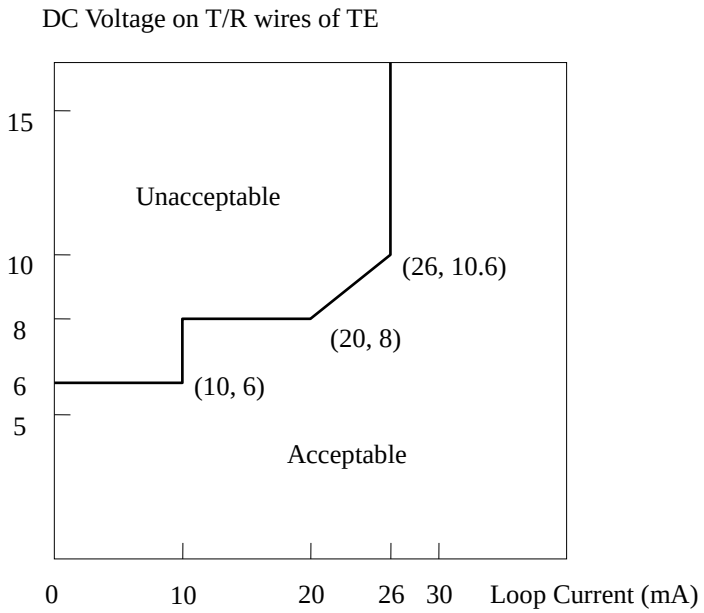


Figure 9: DC Voltage and Current limits

Purpose: To verify that the steady state DC loop characteristics. The test only applies to TE which are capable of reaching the loop state.

Test method：

1. Off-hook DC resistance Test Configuration as Fig.10.
2. Off-hook DC resistance test method:

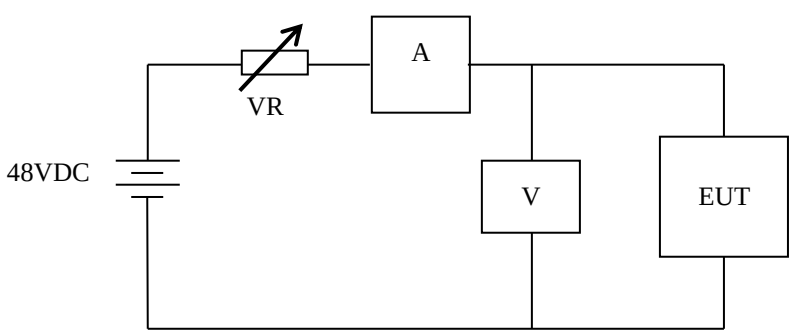


Figure 10　Off-hook DC resistance Test Configuration

(1) The EUT should be at off-hook state.

(2) Adjust the VR to let A be 10mA and 20mA readings separately, then record the corresponding DC voltage and map the point into Fig.9. Each current reading shall stay at least 5 seconds interval.

(3) Adjust the VR to let V be 10.6V reading, then record the DC current and map the point into Fig.9.

(4) Repeat step (2) to (3) for each operating functions states of EUT.

Test equipment:

1. DC Power Supply.
2. DC Voltmeter.
3. DC Currentmeter.
4. Variable Resistor.

5.1.8 Sending level limitations of signals

Requirement: All the output level s of internal signals transmitted from TE except the DTMF, which will be sent to the public switched telephone network, should follow:

(1) The mean sending level in the frequency range 200 Hz to 4000 Hz over a one-minute period shall not be greater than –10dBm when the TE interface is terminated with the reference impedance 600 ohms. Output level shall be not adjustable to over this limit range by the user. This requirement does not apply to DTMF signals.

(2) The mean sending level in the frequency range 4kHz to 8kHz over a one-minute period shall not be greater than –20dBm when the TE interface is terminated with the reference impedance 600 ohms.

(3) The mean sending level in the frequency range 8kHz to 12kHz over a one-minute period shall not be greater than –40dBm when the TE interface is terminated with the reference impedance 600 ohms.

(4) The mean sending level on the 4kHz bandwidth over the frequency range 12kHz to 40kHz over a one-minute period shall not be greater than –60dBm when the TE interface is terminated with the reference impedance 600 ohms.

The leased line equipment have to meet this requirement.

Purpose: To verify that the voice band signal power and out-band noise from internal sources, other than DTMF, which will be sent to public switched telephone network are properly limited.

Test method：

1. Sending level limitations of signals Test Configuration as Fig.11.

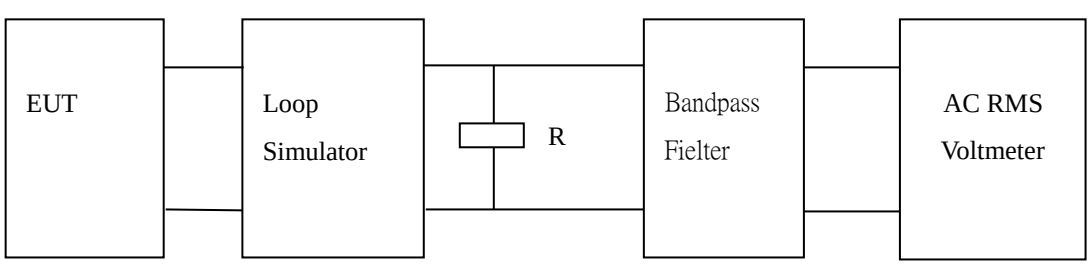


Figure 11 Sending level limitations of signals Test Configuration

2. Sending level limitations of signals test method:
   (1) Place the EUT in the desired state and transmit a signal at maximum power.
   (2) Set band-pass filter in 200Hz to 4000Hz,
   (3) Measure and record the maximum averaged output signal power level in dBm.

(4) Band-pass filter to bandwidth 4kHz~8kHz/ 8kHz~12kHz…… /36kHz~40kHz.
   (5) Measure and record the maximum averaged output signal power level in dBm for each bandwidth.
   (6) Repeat step (2) to step (5) for other internal output signals.

Test equipment:

1. Loop Simulator.
2. Bandpass Fielter.
3. AC RMS Voltmeter.
4. R : Reference Load of 600Ω

5.1.9 Transverse balance limitations

Requirement: TE are at on-hook, off-hook and tip-ring reverse states test, the minimum transverse balance requirements as TABLE 2.

State	Frequency	Balance
Off-hook	200Hz≦f≦4000Hz	40dB
On-hook	200Hz≦f＜1000Hz	60dB
On-hook	1000Hz≦f≦4000Hz	40dB

Technical description: The transverse balance coefficient is expressed as:

Transverse Balance $_{m-1}$ = 20 $\log_{10}$ Vm / V1

V1: is the longitudinal voltage produced across a longitudinal termination R_2(500Ω) Vm (0.775V): is the metallic voltage across the tip and ring interface of the input port when a voltage at frequency band 200Hz to 4000 Hz is applied from a balance source with a metallic impedance R_0 (a corrective circuit) . The source voltage should be set such that Vm = 0.775 Volts when a termination of R_0 is substituted for TE.

Purpose: To ensure that the impedance unbalance about earth, expressed as output signal balance.

Test method：

1. Test Configuration of Transverse balance limitations is as Fig.12.
2. Transverse balance limitation test method:
   (1) Set the AC signal generator to 200 Hz.
   (2) Connect R_0 (corrective circuit) to the test circuit Fig.12.
   (3) Adjust the output voltage (Vm) of AC signal generator to the frequency selective voltmeter, which acrosses R_0 , to be setted at 10Hz bandwidth and 0.775V.
   (4) Connect the frequency selective voltmeter to across the R_2 and test V_1.
   (5) Adjust variable capacitors C3 and C4 until the minimum signal level of V_1 is obtained. (The result of this balance calibration must be at least 20dB greater than the balance requirement for the EUT at the frequency.)
   (6) Replace R_0 with EUT and set EUT at on-hook.

(7) Measure the metallic reference voltage (V_m) and the transverse voltage (V_1).

(8) Calculate the balance using the following formula :

Transverse Balance = 20 log Vm / V1

(9) Reverse the tip and ring connections of the EUT and repeat step (7) to (9). The lesser of the two results is the transverse balance of the EUT at 200 Hz.

(10) Repeat step (2) to (10) for at least each of the following frequencies : 500, 1000, 2000, 3000 and 4000 Hz.

(11) Repeat step (1) to (10) for each operational states.

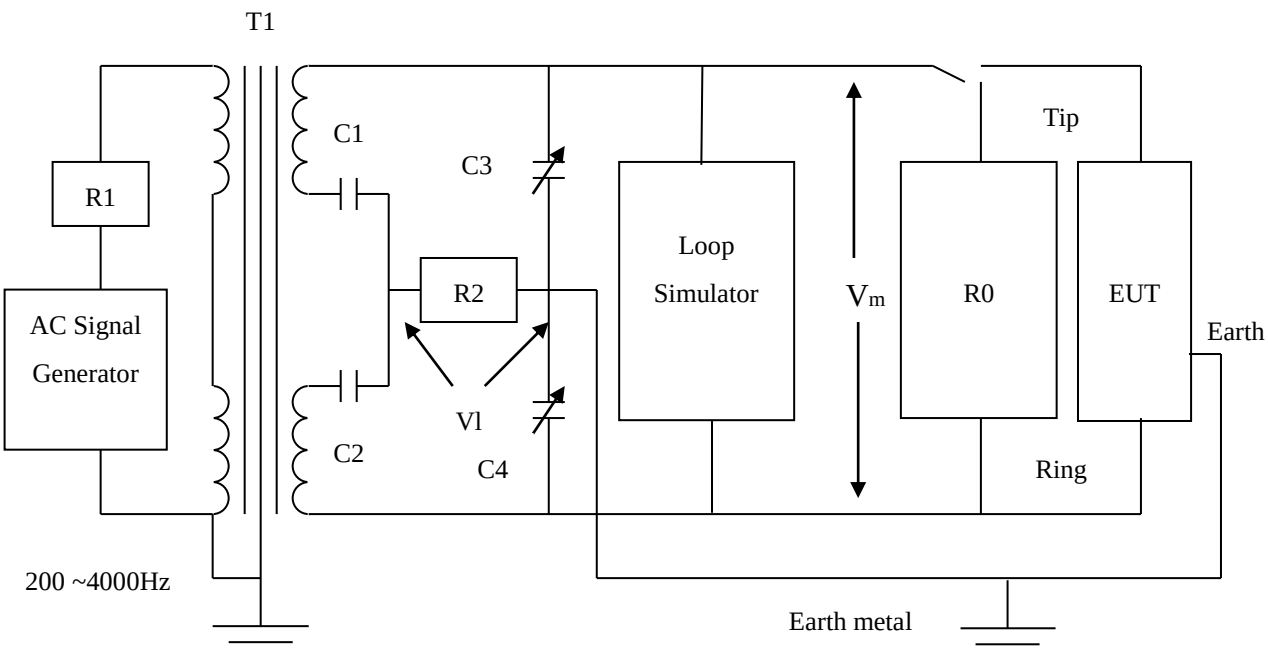


Figure 12 Test Configuration of Transverse balance limitations

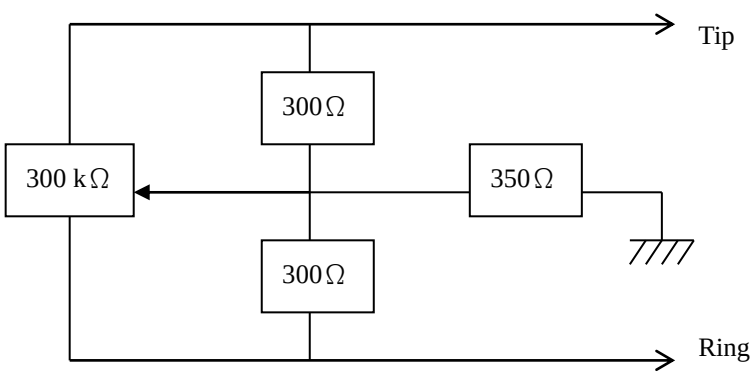


Figure 13 Ro Corrective circuit

Test equipment:

1. AC Signal Generator.(Z_{OSC} must be less or equal to 600Ω)
2. Loop Simulator.
3. R_0：Corrective circuit as Figure 13.

4. R_2：500Ω for longitudinal resistor
5. T1：600Ω ：600Ω split audio transformer
6. C1/C2：8mF±0.1%, 400V
7. C3/C4：100 ~ 500pF adjustable trimmer capacitors
8. R1：Z_{OSC}+R1=600Ω

5.1.10 Return loss

Requirement: For all operational states of TE at 0 KM simulative loop, the return loss of TE shall meet the following requirement:

(1) The return loss shall be greater than an echo return loss (ERL) of 8dB over a frequency band of 500 Hz to 2500 Hz when measured against to 600Ω.

(2) The return loss in the frequency band 200 Hz to 3200 Hz shall be greater than 6dB when measured against to 600Ω.

Purpose: To assured by requiring the TE to present a impedance which allows proper functioning of call control and to maintain stability in the PSTN.

Test method：

1. Return loss Test Configuration as Fig.14.
2. Return loss test method:
   (1) Set the EUT not to transmit any signals in the off-hook state.
   (2) Put EUT in the off-hook state with the simulative loop be set at 0 KM.
   (3) Vary the oscillator frequency from 200 Hz to 3200 Hz and record the minimum value of return loss and frequency at which it occurs.
   (4)Set EUT to be at each off-hook operational states, then repeat step (3).

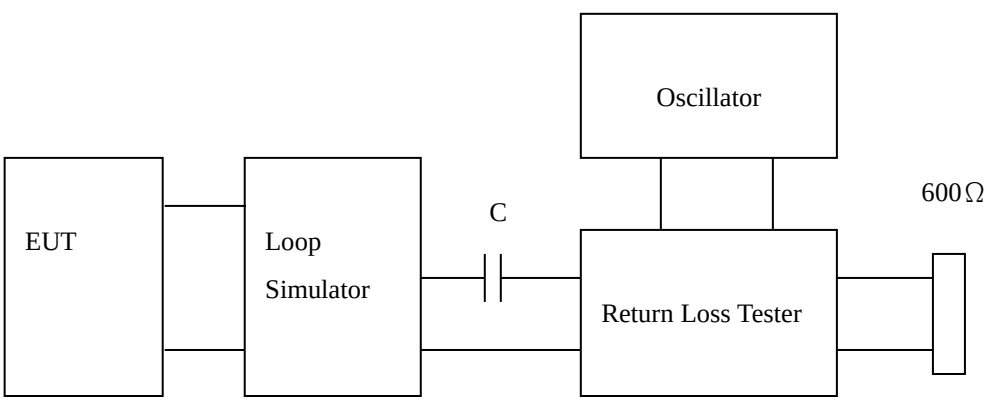


Figure 14 Return loss Test Configuration

Test equipment:

1. Loop Simulator.
2. Return Loss Tester.
3. Oscillator.
4. C: 125 μF±10%

5.1.11 Pulse dialing

Requirement: TE shall send normal pulse when TE be dialed the specifications are as follows.

(1) Pulse speed：10±1 P.P.S.

(2) Make / Brake ratio：33±3%.

(3) Minimum Inter-digit time：600msec.

Pulse dialing trigger current: High = 18 mA, Low = 6mA.

Purpose: To assure effective pulse dialing of TE to PSTN.

Test method：

1.Pulse dialing test configuration as Fig.15.

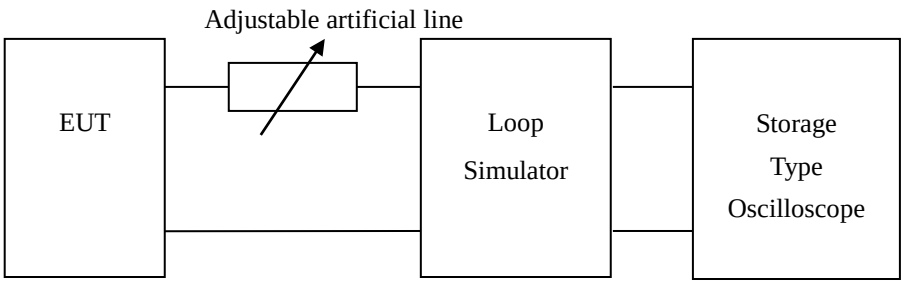


Figure 15 Pulse dialing test configuration

2. Pulse dialing test method:

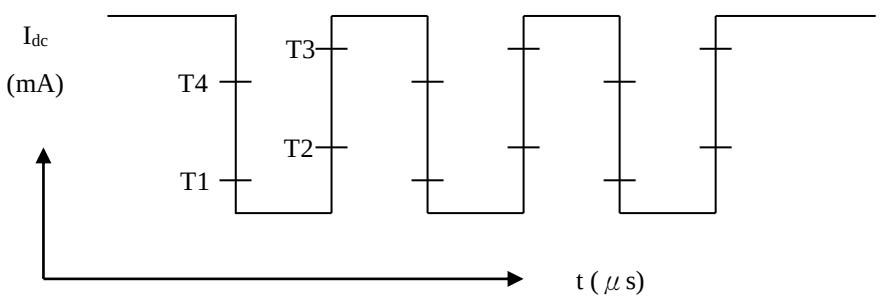
(1) Set artificial line at 0 kM.

(2) Let TE send out Pulse Dial signals.

(3) Measure and record the DC Voltage of Pulse Dial signals.

(4) Set artificial line at 5 kM, repeat steps (2) to (3).

(5) Use the below fomula to calculate the average pulse speed, M/B ratio and minimum interdigital time.



T1 & T2 : Time at low trigger current

T3 & T4 : Time at high trigger current

Make interval	: begins≧T3	ends≦T4
Brake interval	: begins≦T1	ends≧T2
Rise time	: begins≧T2	ends≧T3
Fall time	: begins≦T3	ends≦T1
Period	: begins≧T4	ends≧T3

- P.P.S. = 1 ÷Period.
- Make / Brake ratio = Make interval ÷Period x 100%.
- Minimum Interdigital Interval Pause:

The minimum pause time between any two pulse dial digits.

Test equipment:

1.Adjustable artificial line.

2.Loop Simulator.

3.Storage Type Oscilloscope.

5.1.12 Dual tone multiple frequency (DTMF) dialing

5.1.12.1 Frequency combination

Requirement: The TE shall use DTMF signaling characters according to table 3. The tolerances on the frequencies for the characters supported shall be ±1.5 % when artificial line at 0 kM and 5 kM.

Purpose: To verify whether the TE sends appropriate DTMF signal frequency combination to PSTN. The allowed combinations are listed in the table3.

Table 3 : Frequency of DTMF signals

LGP(Hz)	HGP (Hz)			
	1209	1336	1477	1633
697	**1**	**2**	**3**	**A**
770	**4**	**5**	**6**	**B**
852	**7**	**8**	**9**	**C**
941	*****	**0**	**#**	**D**

Test method：

1. Frequency combination test configuration as Fig.16.
2. Frequency combination test method:
   (1) The artificial line set to 0 KM.
   (2) Let the EUT transmit DTMF signal "1"to line.
   (3) Measure and record the frequency of DTMF signals.
   (4) Calculate the frequency deviation.
   (5) Repeat for each of the other dialer number that the EUT is equipped to generate. Repeat step (3) to (4).
   (6) Set artificial line to 5 KM, Repeat step (2) to (5).

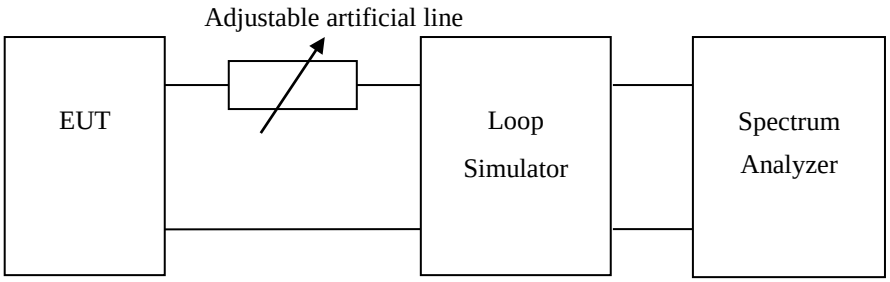


Figure 16 Frequency combination test configuration

Test equipment:

1. Adjustable Artificial line.
2. Loop Simulator.
3. Spectrum Analyzer.

5.1.12.2 Signaling level

Requirement:

(1) The level of any tone in the DTMF high frequency group shall be –6 ±2dBm and the level of any tone in the low frequency group shall be –8 ±2dBm when the TE interface is terminated with the reference impedance 600 ohms and artificial line at 0 KM.

(2) The level of any tone in the DTMF high or low frequency group shall be ≧-21dBm when the TE interface is terminated with the reference impedance 600 ohms and artificial line at 5 KM.

Purpose: To check whether the TE sends appropriate DTMF signals.

Test method：

1. Signaling level test configuration as Fig.17.
2. Signaling level test method:
   (1) The artificial line set to 0 KM.
   (2) Let the EUT transmit DTMF signal "1"to line.
   (3) Measure and record the frequency of DTMF signals power level.
   (4) Repeat for each of the other dialer number that the EUT is equipped to generate. Repeat step (3).
   (5) Set artificial line to 5 KM, Repeat step (2) to (4).

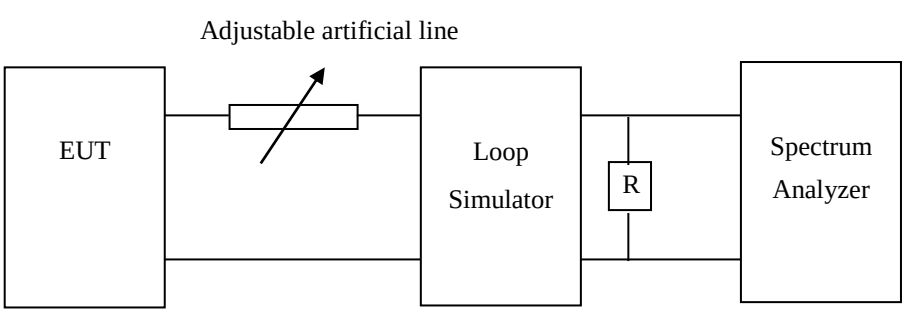


Figure 17 Signaling level test configuration

Test equipment:

1. Adjustable Artificial line.
2. Loop Simulator.
3. Spectrum Analyzer.
4. R: 600Ω Reference Load.

5.1.12.3 Signaling level difference

Requirement: During sending of any DTMF frequency combination, the level of the tone in the high frequency group shall be 0 to 3 dB high than the level of the tone in the low frequency group when artificial line at 0KM.

Purpose: To check whether the TE sends appropriate DTMF signals.

Test method：

1. Signaling level difference test configuration as Fig.17.
2. Signaling level test method:
   (1) The artificial line set to 0 KM.
   (2) The EUT set in the off-hook stated, transmitting DTMF signal to line.
   (3) Send dialer no. 1 signal, measure and record the frequency of DTMF signals power level.
   (4) Calculate the signal level difference.
   (5) Repeat for each of the other dialer number that the EUT is equipped to generate. Repeat step (2) to (4).

Test equipment:

1. Adjustable Artificial line.
2. Loop Simulator.
3. Spectrum Analyzer.

5.1.12.4 Tone duration

Requirement: The TE shall provide a setting whereby the duration for which any individual DTMF tone combination sent is not less than 40 ms. This requirement applies only to a TE with an automatic dialing function. It applies when the TE is in automatic dialing mode.

Purpose: To check whether the TE sends DTMF signals of the appropriate duration.

Test method：

1. Tone duration test configuration as Fig.18.
2. Tone duration test method:
   (1) The artificial line set to 0 KM.
   (2) The EUT set in the off-hook stated and automatic dialing mode.
   (3) Transmitting DTMF signal to line.
   (4) Measure and record the all DTMF signal.
   (5) Calculate and record the minimum tone duration.
   (6) Adjust the artificial line to 5KM, Repeat step(2) to (5).

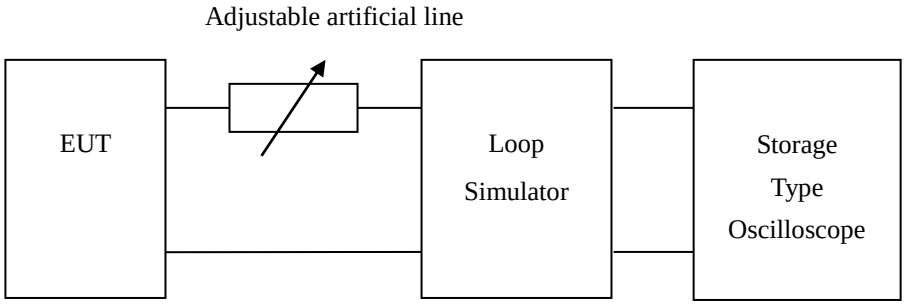


Figure 18 Tone duration test configuration

Test equipment:

1. Adjustable Artificial line.
2. Loop Simulator.
3. Storage Type Oscilloscope.

5.1.12.5 Pause duration

Requirement: The TE shall provide a setting whereby the duration of the pause between any individual DTMF tone combination is not less than 50 ms. This requirement applies only to a TE with an automatic dialing function.Purpose: To check whether the TE sends DTMF signals of the appropriate duration. This requirement applies only to a TE with an automatic dialing function. It applies when the TE is in automatic dialing mode.

Purpose: To check whether the TE sends DTMF signals of the appropriate duration.

Test method：

1. Pause duration test configuration as Fig.18.
2. Pause duration test method:
   (1) The artificial line set to 0 KM.
   (2) The EUT set in the off-hook stated and automatic dialing mode.
   (3) Transmitting DTMF signal to line.
   (4) Measure and record the all DTMF signal.
   (5) Calculate and record the minimum pause duration between any individual DTMF signal.
   (6) Adjust the artificial line to 0 KM and repeat step (2) to (5).

Test equipment:

1. Adjustable Artificial line.
2. Loop Simulator.
3. Storage Type Digital Oscilloscope.

5.1.13 Series equipment

5.1.13.1 DC voltage drop of series equipment

Requirement: The DC voltage drop across the line connections shall be less than 3V with loop current at 30mA and shall be less than 6V with loop current at 60mA.

Purpose: Series equipment which is connected and operates with another TE which is in the

off-hook condition, or which remain in the circuit at all times.

Test method：

1. DC voltages drop of series equipment test configuration as Fig.19.
2. DC voltage drop of series equipment test method:
   (1) Adjust variable resistor to give a loop current 30mA.
   (2) Measure and record DC voltmeter V1.
   (3) EUT set to be at on-hook state and connect to the configuration as fig.19.
   (4) Measure and record DC voltmeter V2.
   (5) Calculate DC voltage drop = V2 – V1.
   (6) Adjust variable resistor to give a loop current 60mA and repeat step (2) to (5).

Test equipment:

1. Loop Simulator.
2. Currentmeter A.
3. DC Voltmeter V1 and V2.
4. VR：variable resistor

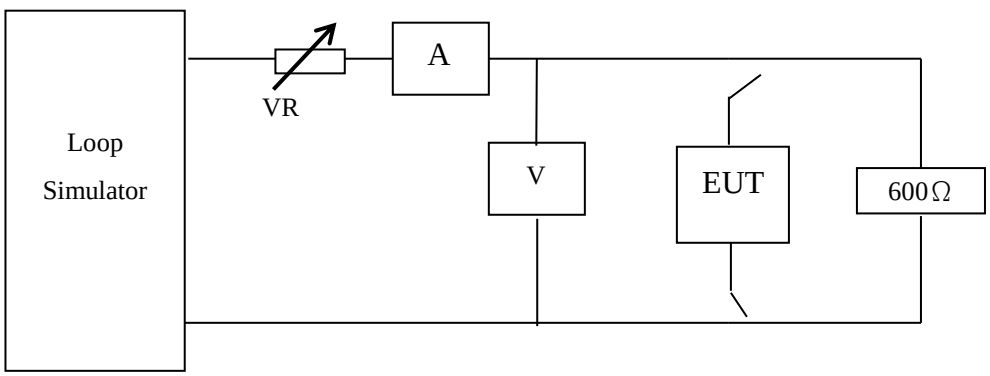


Figure 19 DC voltages drop of series equipment test configuration

5.1.13.2 Insertion loss of series equipment

Requirement: The Insertion Loss of Series Equipment shall be less than 1.5 dB at frequency 1500 Hz when test with signal level of – 10dBV and reference load 600Ω.

Purpose: Series equipment which is connected and operates with another TE which is in the off-hook condition, or which remain in the circuit at all times.

Test method：

1. Insertion loss of series equipment test configuration as Fig.20.
2. Insertion loss of series equipment test method
   (1) Set the frequency generator to 1500 Hz and adjust to an output level of –10dBV as measured by the AC voltmeter across 600 ohms resistor.
   (2) EUT set to on-hook state and connect EUT to the test circuit Fig.20.
   (3) Measure and record the AC voltmeter V (dB_V).
   (4) Calculate insertion loss = –10dBV – V.

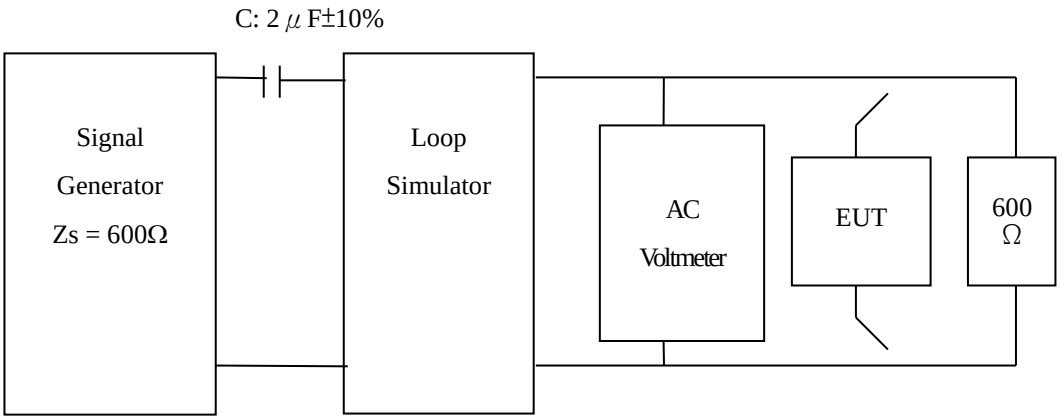


Figure 20 Insertion loss of series equipment test configuration

Test equipment:

1. Signal Genterator.
2. Loop Simulator.
3. AC Voltmeter.

5.2 Handset function

5.2.1 Transmission objective reference equivalent

5.2.1.1 Sending objective reference equivalent (According to OREM-A specification)

Requirement: According to OREM-A specification, the sending objective reference equivalent shall be +11~ -2 dB when measured with the artificial line set to 0KM and +11 ~ 0 dB when measured with the artificial line set to 5KM.

Purpose: The TE have a objective reference equivalent compatible with other telephones connected to the network so as to be capable of providing adequate speech performance.

Test method：

1. Sending objective reference equivalent test configuration as Fig.21.
2. Sending objective reference equivalent test method:
   (1) The Sending objective reference equivalent value shall be determined from measured frequency response curve using the calculation method described in OREM-A.
   (2) The frequency response curve shall be measured over a range from at least 200Hz to 5000Hz in accordance with OREM-A method.
   (3) The handset setup on artificial ear and mouth accordance with OREM-A method.
   (4) Artificial line set to 0KM.
   (5) The nominal sound pressure level produced by the artificial mouth shall be 0.6dBPa.
   (6) Measure and record the Sending objective reference equivalent value from objective equivalent tester.
   (7) Artificial line set to 5KM and Repeat step (5) to (6).

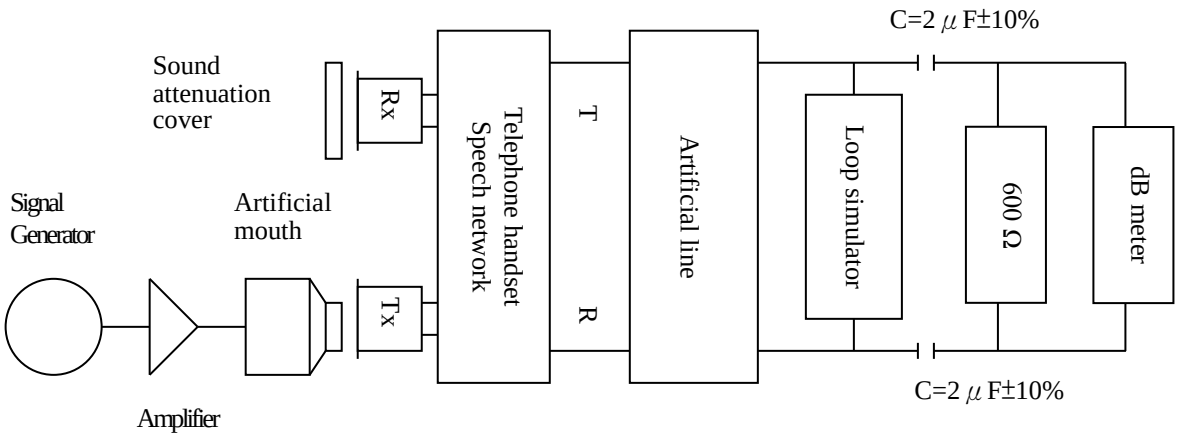


Figure 21 Sending objective reference equivalent test configuration

Test equipment:

1. Signal Generator.
2. Amplifier.
3. Artificial mouth.
4. Sound attenuation cover.
5. Telephone handset Speech network.
6. Artificial line.
7. Loop simulator.
8. dB meter : Objective reference equivalent meter or level recorder

5.2.1.2 Receiving objective reference equivalent (According to OREM-A specification)

Requirement: According to OREM-A specification, the receiving objective reference equivalent shall be 5 ~ -6 dB when measured with the artificial line set to 0KM and 5 ~ -4 dB when measured with the artificial line set to 5Km.

If the telephone handset has adjustable receive gain, it shall be set to provide the nominal output level.

Purpose: The TE have a objective reference equivalent compatible with other telephones connected to the network so as to be capable of providing adequate speech performance.

Test method：

1. Receiving objective reference equivalent test configuration as Fig.22.
2. Receiving objective reference equivalent test method:
   (1) The receiving objective reference equivalent value shall be determined from measured frequency response curve using the calculation method described in OREM-A.
   (2) The frequency response curve shall be measured over a range from at least 200Hz to 5000Hz in accordance with OREM-A method.
   (3) The handset setup on artificial ear and mouth accordance with OREM-A method.
   (4) Artificial line set to 0 KM.
   (5) The AC signal generator generates a 570mV open circuit voltage signal and

transmits it to the loop simulator.

(6) Measure and record the receiving objective reference equivalent value from objective equivalent meter.

(7) Artificial line set to 5KM and Repeat step (5).

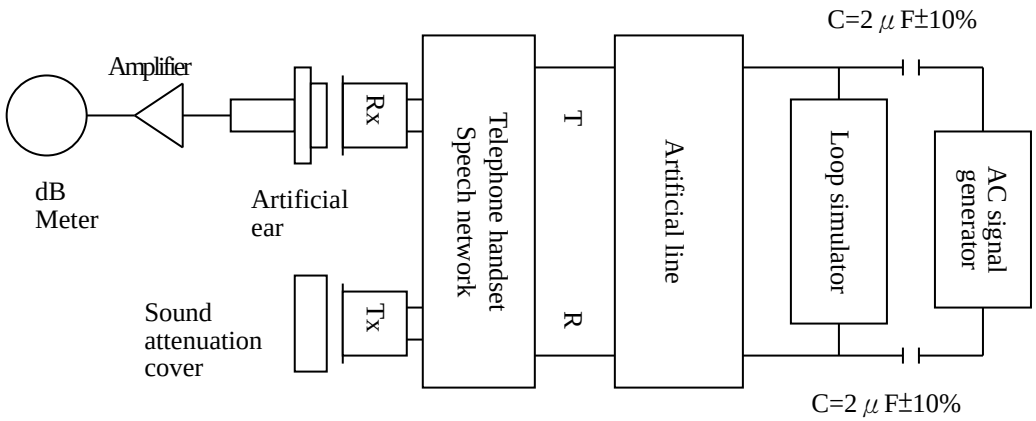


Figure 22 Receiving objective reference equivalent test configuration

Test equipment:

1. dB meter : Objective reference equivalent meter or level recorder
2. Amplifier.
3. Sound attenuation cover.
4. Artificial ear.
5. Telephone handset Speech network.
6. Artificial line.
7. Loop simulator.
8. AC signal generator.

5.2.2 Transmission characteristics frequency response

5.2.2.1 Sending frequency response (According to OREM-A specification)

Requirement: According to OREM-A specification, the sending frequency response, as a function of frequency, shall be not greater than the upper limit and not less than the lower limit shown in figure 23 between 180 Hz to 5000 Hz. The 1000 Hz point on the frequency response graph is to be placed at the 0dB level on Fig.23 when measured with the artificial line set to 0KM.

Purpose: The TE have a frequency response compatible with the network and with other telephones connected to the network so as to be capable of providing adequate speech performance.

Test method：

1. Sending frequency response test configuration as Fig.21.
2. Sending frequency response test method:
   (1) The handset setup on artificial ear and mouth accordance with OREM-A method.
   (2) Artificial line set to 0KM.
   (3) The nominal sound pressure level generated by the artificial mouth at the MRP position is 0.6 dBPa.
   (4) The frequency response curve shall be measured in a range of 200 Hz to 5kHz in

according to OREM-A method.

(5) Measure and record the sending frequency response.

Test equipment:

1. Signal Generator.
2. Amplifier.
3. Artificial mouth
4. Sound attenuation cover
5. Telephone handset Speech network.
6. Artificial line.
7. Loop simulator.
8. dB meter: Objective reference equivalent metor (OREM) or level recorder.

5.2.2.2 Receiving frequency response (According to OREM-A specification)

Requirement: According to OREM-A specification, the receiving frequency response, as a function of frequency, shall be not greater than the upper limit and not less than the lower limit shown in figure 24 between 240 Hz to 5000 Hz. The 1000 Hz point on the frequency response graph is to be placed at the 0dB level on Fig.24 when measured with the artificial line set to 0KM.

If the handset has an adjustable receiver gain that is a hearing aid function, it can be set to test at the nominal output level and must comply with this requirement.

Purpose: The TE have a frequency response compatible with the network and with other telephones connected to the network so as to be capable of providing adequate speech performance.

Test method：

1. Receiving frequency response test configuration as Fig.22.
2. Receiving frequency response test method:
   (1) The handset setup on artificial ear and mouth accordance with OREM-A method.
   (2) Artificial line set to 0KM.

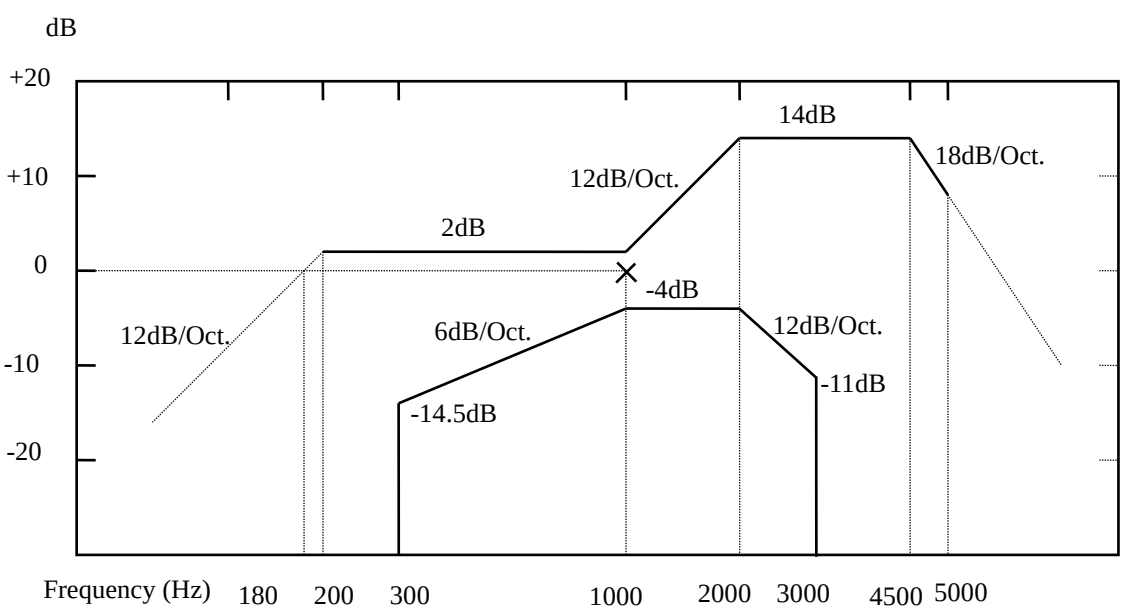


Figure 23: Frequency Response of Sending

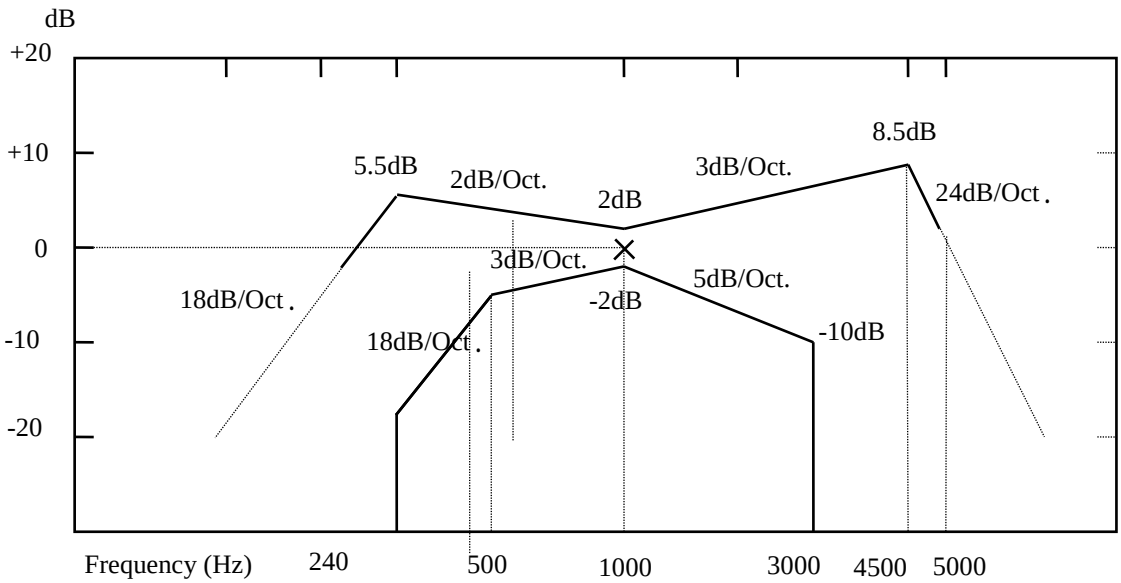


Figure 24: Frequency Response of Receiving

(3) The AC signal generator generates a 570mV open circuit voltage signal and transmits it to the loop simulator.

(4) The frequency response curve shall be measured in a range of 200 Hz to 5kHz in accordance with OREM-A method.

(5) Measure and record the receiving frequency response.

Test equipment:

1. dB meter : Objective reference equivalent meter or level recorder
2. Amplifier.
3. Sound attenuation cover.
4. Artificial ear.
5. Telephone handset Speech network.
6. Artificial line.
7. Loop simulator.
8. dB meter: Objective reference equivalent meter (OREM) or level recorder.

5.2.3 Side-tone objective reference equivalent (According to OREM-A specification)

Requirement: According to OREM-A specification, the side-tone objective reference equivalent shall be $\geqq$ 4 dB when measured with the artificial line set to 0KM and 5KM.

If the telephone handset has adjustable receive gain, it shall be set to provide the nominal output level.

Purpose: The TE have a side-tone performance which neither disturbs the user nor interferes with the speech levels to such an extent as to render the telephone incompatible with adequate speech performance.

Test method：

1. Side-tone objective reference equivalent test configuration as Fig.25.

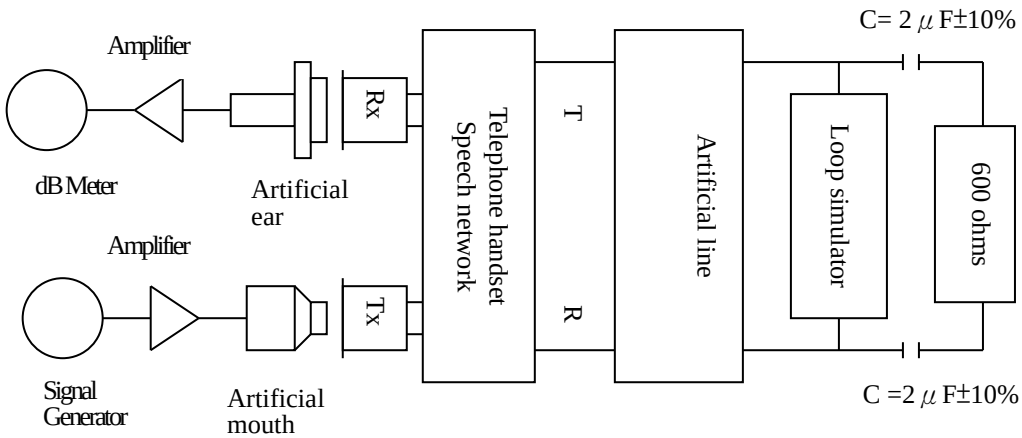


Figure 25 Side-tone objective reference equivalent test configuration

2. Side-tone objective reference equivalent test method:
   (1) The side-tone objective reference equivalent shall be measured according to OREM-A method.
   (2) The handset setup on artificial ear and mouth accordance with OREM-A method.
   (3) The nominal sound pressure level generated by the artificial mouth at the MRP position is 0.6 dBPa, and the test frequency band is 200 Hz to 5 KHz.
   (4) Artificial line set to 0KM.
   (5) Measure and record the side-tone objective reference equivalent value from objective equivalent tester.
   (6) Artificial line set to 5KM and Repeat step (5).

Test equipment:

1. Sinal generator.
2. Amplifier × 2.
3. Artificial ear.
4. Artificial mouth.
5. Telephone handset Speech network.
6. Artificial line.
7. Loop simulator.
8. dB meter: Objective reference equivalent meter (OREM) or level recorder.

5.2.4 Distortion

5.2.4.1 Sending distortion (According to OREM-A specification)

Requirement: The total distortion in the electric output signal of transmitter to telephone line shall not exceed 5% when measured with the artificial line set to 0KM.

Purpose: The TE not to produce distortion of the transmitted speech signals sufficient to interfere with adequate speech performance.

Test method：

1. Sending distortion test configuration as Fig.26.
2. Sending distortion test method:
   (1) The handset setup on artificial ear and mouth accordance with OREM-A method.
   (2) Artificial line set to 0KM.
   (3) The nominal sound pressure level generated by the artificial mouth at the MRP position is set at 0 dBPa / frequency 1000 Hz.
   (4) Measure and record the sending distortion from distortion meter.

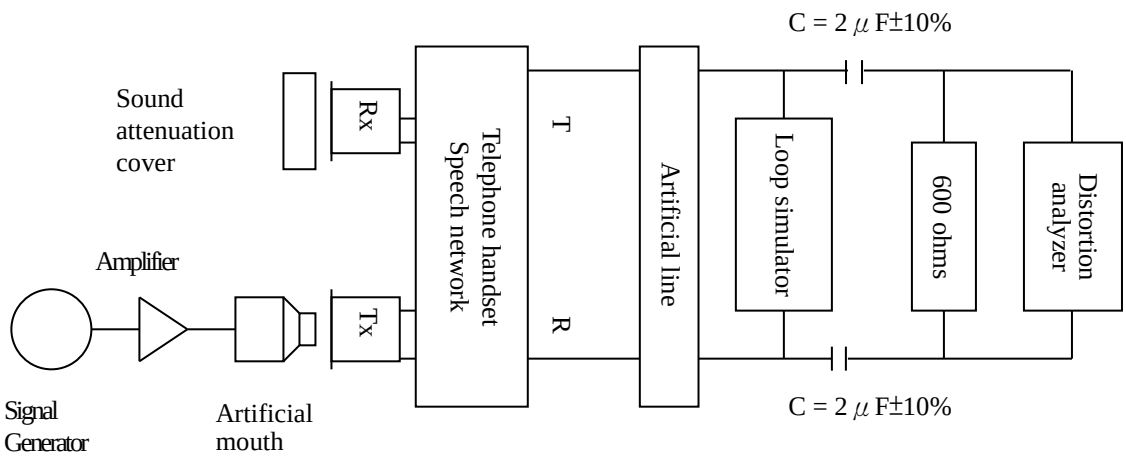


Figure 26 Sending distortion test configuration

Test equipment:

1. Signal Generator.
2. Amplifier.
3. Artificial Ear.
4. Artificial mouth.
5. Telephone handset Speech network.
6. Loop simulator
7. Distortion analyzer.
8. Artificial line

5.2.4.2 Receiving distortion (According to OREM-A specification)

Requirement: The total distortion of receiver shall not exceed 7% when measured with the artificial line set to 0KM.

If the handset has an adjustable receiver gain that is a hearing aid function, it can be set to test at the nominal output level and must comply with this requirement.

Purpose: The TE not to produce distortion of the received speech signals sufficient to interfere with adequate speech performance.

Test method：

1. Receiving distortion test configuration as Fig.27.
2. Receiving distortion test method:
   (1) The handset setup on artificial ear and mouth accordance with OREM-A method.

(2) Artificial line set to 0KM.

(3) The signal generator shall be set to –12dBv / 1000 Hz. Sine wave to EUT.

(4) Measure and record the receiving distortion from distortion meter.

(5) If the EUT has the function of increasing receiver gain, set the voice level in the maximum and repeat step(4).

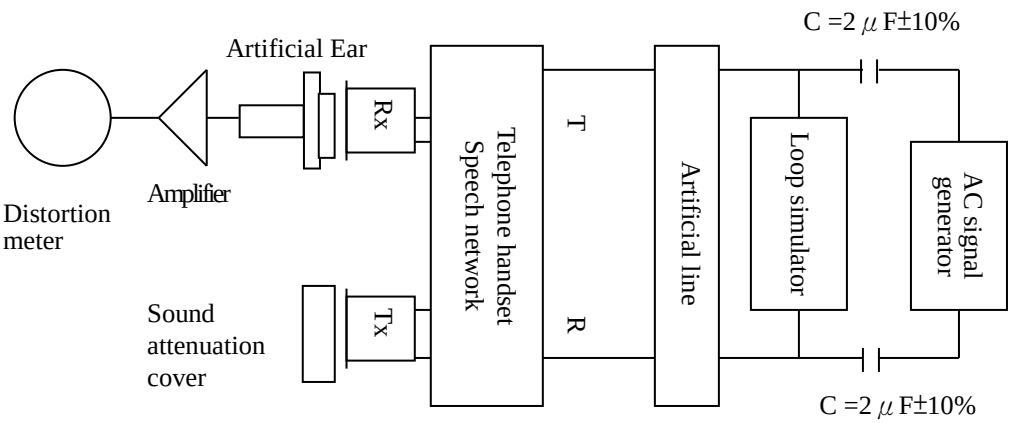


Figure 27 Receiving distortion test configuration

Test equipment:

1. Signal Generator.
2. Distortion meter
3. Amplifier
4. Artificial era
5. Sound attenuation cover
6. Telephone handset speech network
7. Loop simulator
8. Artificial line

5.2.5 Received volume control (applicable when there is no hearing aid function)

Requirement: If the telephone handset has adjustable receive gain, it shall be provide 3dB of gain minimum and up to 6dB of gain maximum when measured in term of receiving objective reference equivalent.

The 6dB of gain maximum may be exceed if the receiver volume is automatically restored to its nominal value when the TE is returned to the on-hook state.

Purpose: To provide adequate speech receiving performance with other TE in connected through the network.

Test method：

1. Receiver volume control test configuration as Fig.22.
2. Receiver volume control test method:
   (1) Artificial line set to 0KM.
   (2) Receiver volume control set to minimum condition.
   (3) Measure and record receiving objective reference equivalent. SORE1 according to

section 5.2.1.2.

(4) Receiver volume control adjusted to maximum condition and repeated step (3) then get the SORE2.

(5) Calculate the receive gain = SORE2 – SORE1.

(6) Artificial line adjusted to 5KM and repeated step (2) to (5).

Test equipment:

1. Signal generator.
2. Amplifier.
3. Artificial ear.
4. Sound attenuation cover.
5. Telephone handset Speech network.
6. Artificial line.
7. Loop simulator.
8. dB meter: Objective reference equivalent meter (OREM) or level recorder.

5.2.6 Continuous sound pressure level of receiver

Requirement: In the off-hook mode, rms acoustic pressure of receiver shall be less than 125 dB(A). If the handset has an adjustable receiver gain that is a hearing aid function, it can be set to test at the nominal output level and must comply with this requirement.

Purpose: To protect the user not hurt in hearing function.

Test method：

1. Continuous sound pressure level of receiver test configuration as Fig.28.
2. Continuous sound pressure level of receiver test method:
   (1) Set the sound level amplifier to provide “A” weighting and “slow” response.
   (2) EUT set off-hook state and adjust variable resistor to give a loop current 30mA.
   (3) Set the signal generator to give an output 4.0Vrms into an open circuit at a frequency of 1000 Hz.
   (4) Sweep the signal generator frequency from 180 Hz to 10 kHz.
   (5) Measure and record the maximum acoustic output reading of receiver during the frequency sweep.

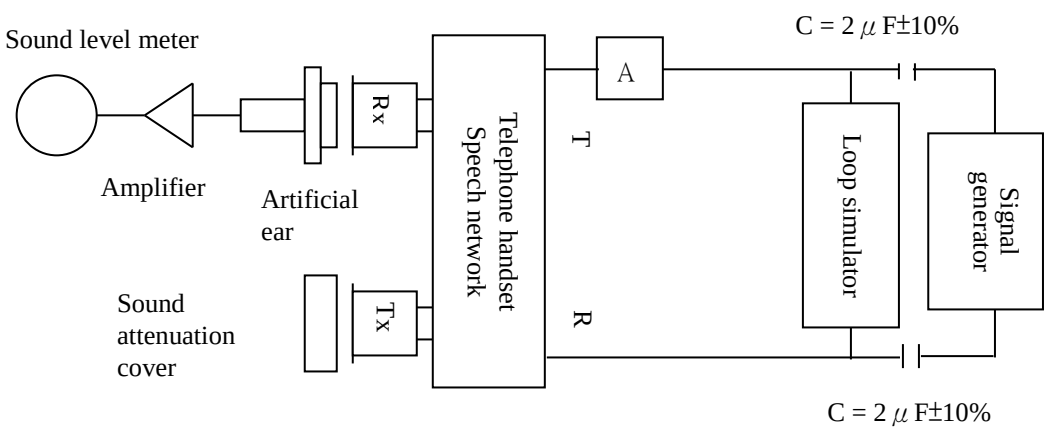


Figure 28 Continuous sound pressure level of receiver test configuration

Test equipment:

1. Sound level meter.
2. Artificaial ear.
3. Sound attenuation cover.
4. Telephone handset Speech network.
5. DC current meter.
6. Loop simulator
7. Signal generator.

5.2.7 : Receiver magnetic flux test(Applicable for hearing aid function)

Requirement：If the terminal equipment to be tested contains an earpiece, it shall adhere to the following requirements:

1.The axial magnetic field strength is 1000 Hz, the input is -10 dBv, and the test shall be greater than -22 dB relative to 1 A/m.

If the axial magnetic field strength test value is greater than -19 dB, the axial magnetic field induced voltage frequency response curve shall comply with the requirements of Figure A.

If the axial magnetic field strength test value is greater than -22 dB, the axial magnetic field induced voltage frequency response curve shall comply with the requirements of Figure B.

2.The radial magnetic field strength is 1000 Hz, and the input is -10dBv vs. 1A/m. The values measured at 0°, 90°, 180°, 270° shall be greater than -27 dB relative to 1 A/m.

Purpose: Allow the person using the hearing aid to hear sound normally.

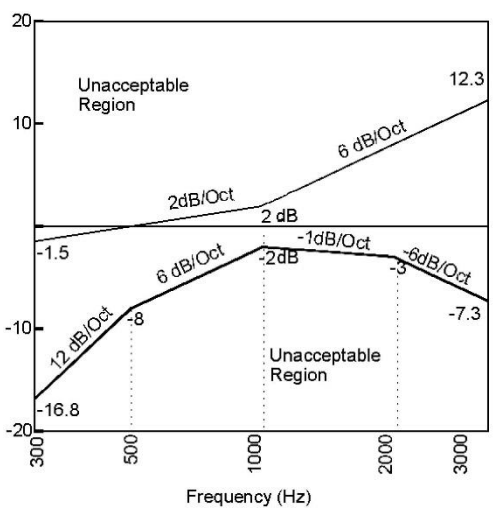


Figure A

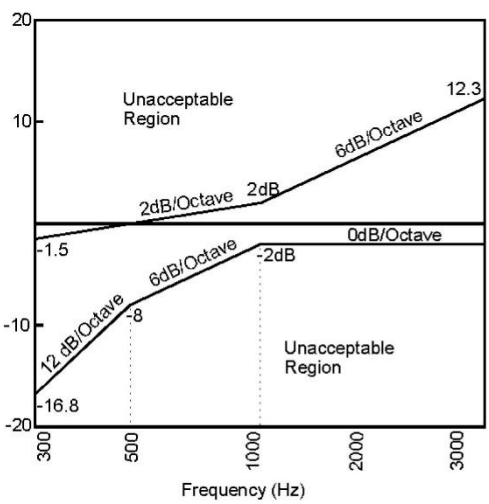


Figure B

Test Method:

1. The earphone magnetic flux measurement configuration diagram is as follows.
2. Handset magnetic flux measurement method.

(1) According to the above figure, connect the object to be tested, set it to the open state

(Off Hook), and adjust the volume to the nominal value.

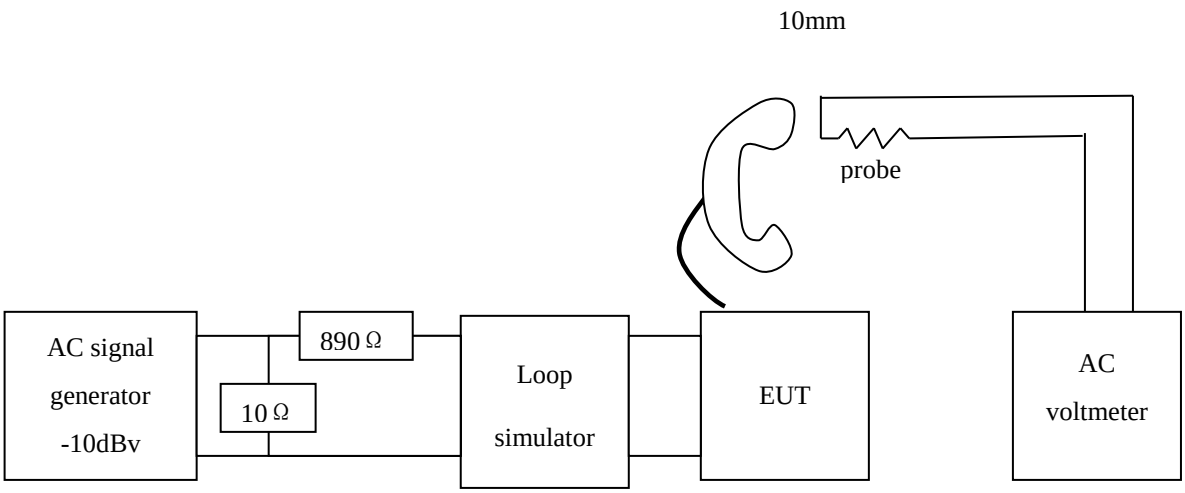
(2) Set the AC signal generator to 1kHz, -10dBV (316 mV).

(3) Test the axial magnetic field (Axial Field) intensity and record the reading.

(4) Draw an axial magnetic field induced voltage frequency response curve 300 Hz to 3300 Hz.

(5) Change the probe to set the Radial Field strength test.

(6) Test and record respectively the radial magnetic field strength values of 0, 90, 180, 270 degrees.



Test Equipment:

(1) AC signal generator.

(2) AC voltmeter.

(3) Drawing device.

(4) Loop simulator, see Figure C.

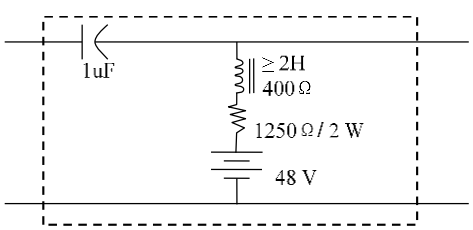


Figure C: Loop simulator

5.2.8: Receiver volume control (applicable for hearing aid function)

Requirement：If the terminal equipment to be tested contains an earpiece, it must meet the following rules.

If the handset has an adjustable receiver gain function, the test transmission equivalent should be controlled between 12dB and 18dB. (Nominal value volume position ~ Maximum volume position)

If it exceeds 18dB, it must meet the following rules.

(1) After the volume of the object to be tested is on hook, the volume setting will be automatically restored to the normal value (below 18 dB).

(2) Beside the switch for its forced amplification function, a label is required to indicate.

(3) The phone must have its obvious light in front of the phone. After the forced amplification function is turned on, its light is on.

(4) There must be a label next to the light to indicate that it is forced to expand.

(5) On the back of the handheld microphone of the telephone, you need to have a blind slogan "High volume, please use it carefully" to remind the switch that the forced amplification function may be turned on. (If the phone only has a handset, the blind slogan should be printed on its phone keypad.)

(6) Applicant needs to provide hearing aid function manual.

Purpose: Let the person who uses the handset adjust the volume and sound as needed.

Test Method：

1. Received volume control test configuration diagram as shown in Figure 22.
2. Received volume control test method：
   (1) Artificial line is set at 0 km.
   (2) The AC signal generator generates a 570mV open circuit voltage signal and transmits it to the pseudo feed circuit.
   (3) The volume control of the received call is adjusted to set the handset volume to a normal value (not necessarily the minimum sound).
   (4) Test the received transmission equivalent SORE1 in accordance with 5.2.1.2.
   (5) Adjust the volume control of the received call to the maximum volume and repeat step (3) to measure SORE2.
   (6) Calculate the receive gain= SORE2 – SORE1
   (7) Set the earpiece volume to the maximum value, set artificial line to 2.5 km and 5 km, and repeat the test steps (2) to (6).

5.3 Cordless Phone function in connecting to PSTN

5.3.1 Radio frequency requirement

The frequency below 80 MHz of the low power duplex cordless telephone shall be adapted by DGT (as table 4 and table 5).

Table 4 The operation frequency for 1.6 / 49MHz cordless phone

Channel	Base station frequency(MHz)		Portable frequency(MHz)	
	Receive	Transmission	Transmission	Receive
1	49.830	1.665	49.830	1.665
2	49.830	1.695	49.830	1.695
3	49.830	1.725	49.830	1.725
4	49.830	1.755	49.830	1.755
5	49.830	1.785	49.830	1.785
6	49.845	1.665	49.845	1.665
7	49.845	1.695	49.845	1.695
8	49.845	1.725	49.845	1.725
9	49.845	1.755	49.845	1.755
10	49.845	1.785	49.845	1.785

Table 5 The operation frequency for 46 / 49MHz cordless phone

Channel	Portable(Transmission frequency)	Base station(Transmission frequency)
1	49.670 MHz	46.610 MHz
2	49.845 MHz	46.630 MHz
3	49.860 MHz	46.670 MHz
4	49.770 MHz	46.710 MHz
5	49.875 MHz	46.730 MHz
6	49.830 MHz	46.770 MHz
7	49.890 MHz	46.830 MHz
8	49.930 MHz	46.870 MHz
9	49.990 MHz	46.930 MHz
10	49.970 MHz	46.970 MHz

5.3.2 Security code requirement

The security measures of probability unauthorised use should be less than 1 in 1000 for both base and handset unit.

A declaration of conformance to this requirement should be provided by the supplier.

5.3.3 Transmitter requirement

5.3.3.1 Carrier frequency

Requirement: The carrier frequency is the ability of the transmitter to maintain an assigned carrier frequency (The shift should be less than ±500Hz).

Purpose: Test carrier frequency of transmitter to avoid interfering to other electrical equipments.

Test Method:

1. Carrier frequency test configuration as Fig.29.
2. Test method of measuring carrier frequency
   (1) Operate the equipment in standby transmitter conditions.
   (2) Record the carrier frequency of the transmitter as MCF.
   (3) Calculate the frequency error by the following:
   Frequency error = ACG – MCF.
   MCF is the Measured Carrier Frequency in Hz.
   ACF is the Assigned Carrier Frequency in Hz.

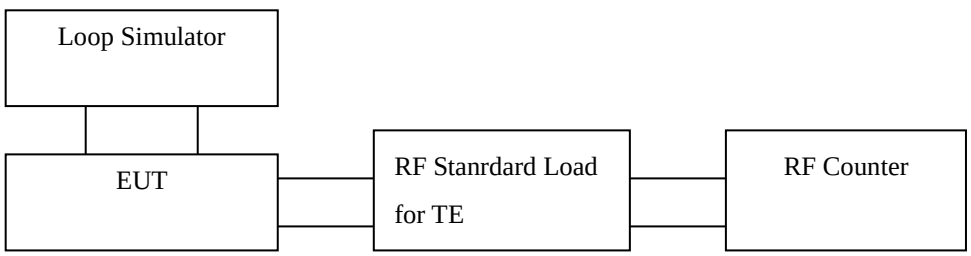


Figure 29 Carrier frequency test configuration

Test equipment:

1. Loop Simulator.
2. RF. Stanrdard Load for TE.
3. RF Counter.

5.3.3.2 Modulation sensitivity (Use for Base station only)

Requirement: While input voice-band signal via loop simulator to TE, the signal level of standard test modulation produced should be -12 ±3dB.(During testing, any microphone auto-functions should be disable)

Purpose：The Modulation sensitivity is testing the Audio Input signal produce ±3KHz Deviation is to modulate its sensitivity.

Test method:

1. Modulation sensitivity test configuration as Fig.30.
2. Test method of measuring Modulation sensitivity
   (1) Apply a 1000Hz tone from the audio generator and adjust is output level until 60% of rated system deviation is reached.
   (2) Record the audio generator output level as the Modulation sensitivity.

Test equipment:

1. Loop Simulator.
2. Audio Frequency Signal Generator.
3. Standard R.F. Load for TE.
4. Modulation Meter.

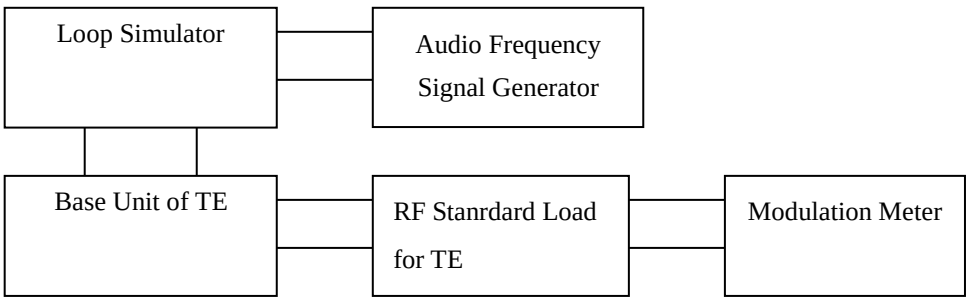


Figure 30 Modulation sensitivity test configuration

5.3.3.3 Audio distortion

Requirement : The audio distortion is the voltage ratio, usually expressed as a percentage of the rms value of the undesired signal of the transmitter's demodulated output tot the rms value of the complete signal at the output of the transmitter's demodulator. (specification：< 5%).

Purpose: The Audio Input signal produce ±3KHz Deviation is to modulate its distortion in order to assure its quality.

Test Method:

1. Audio distortion test configuration as Fig. 31.
2. Test method of measuring Audio distortion
   (1) Set Audio Frequency at 1000Hz and adjust the output level to produce 60% of the rated system deviation.
   (2) Measure and record the audio distortion of the transmitter.

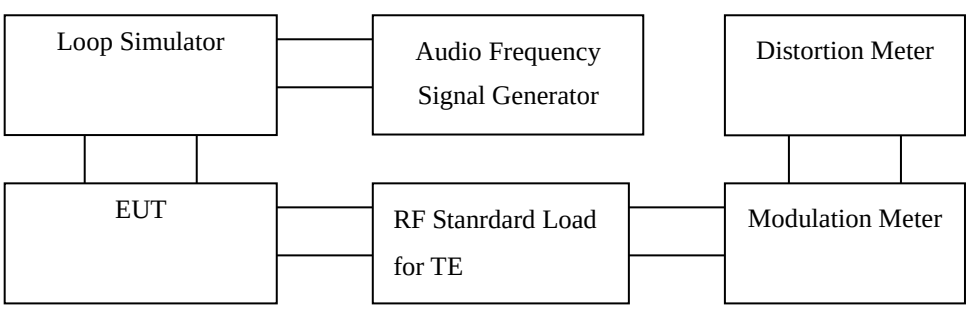


Figure 31 Audio distortion test configuration

Test equipment:

1. Loop Simulator.
2. Standard R.F. Load for TE.

3. Audio Frequency Signal Generator.
4. Modulation Meter.
5. Distortion Meter.

5.3.4 Receiver requirement

5.3.4.1 Useable sensitivity

Requirement: The level of receiver input signal at a specified frequency with specified modulation which will result in the standard SINAD at the output of the receiver.
Specification:<2.0 μ V.

Purpose：Testing the ability of Receiving signal for the transmitter.

Test method:

1. Usable sensitivity test configuration as Fig. 32.

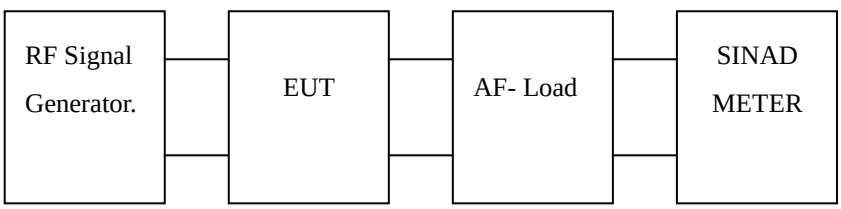


Figure 32 Usable sensitivity test configuration

2. Test method of measuring Usable sensitivity
   (1) Apply a standard input signal to the receiver input terminals.
   (2) Adjust the output level of RF signal generator to let the receiver reach the standard 12 dB SINAD.
   (3) Such RF signal level is useable sensitivity.

Test equipment:

1. RF Signal Generator.
2. AF-Load.
3. SINAD Meter.

5.3.4.2 Useable bandwidth

Requirement: The useable Bandwidth is the input signal frequency displacement that reduces the SINAD produced by a signal 6dB in the reference sensitivity of the standard 12 dB SINAD.
Specification：Over±500 Hz.

Purpose:The Useable Bandwidth is testing shift frequency of Base Unit for receiving in order to reduce the sensitivity of Bandwidth by 6 dB.

Test method:

1. Useable bandwidth test configuration as Fig. 33.
2. Test method of measuring Useable bandwidth
   (1) Sending a standard input signal from RF signal generator to the input of receiver.
   (2) Adjust RF signal generator and adjust its level to a value that produces 12 dB SINAD reference sensitivity.

(3) The output level of RF signal generator is the level of sensitivity (Reference Sensitivisty).

(4) Increase the signal level by 6dB.

(5) Increase the input signal frequency until the 12 dB SINAD reference sensitivity is obtained Record this frequency as FM.

(6) SINAD reference sensitivity is abtained. Record this frequency ad FL.

(7) Calculate the frequency differences by the following:

GDIFF1= FH - nominal frequency.

GDIFF2= nominal frequency –FL.

The smaller of GDIFF1, or GDIFF2 is the useable Bandwidth.

Test equipment:

1. RF Signal Generator.
2. AF-Load.
3. Audio Frequency Distortion Meter.

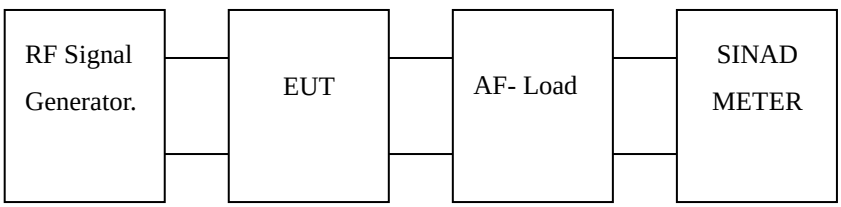


Figure 33 Useable bandwidth test configuration

5.3.4.3 Audio distortion

Requirement: The audio distortion is the voltage ratio, usually expressed as a percentage of the rms value of the undesired signal to the rms value of the complete signal at the output of the receiver. (Specification: < 5%).

Purpose: The Audio distortion is testing the distortion rate of Receiving signal in order to assure its quality.

Test method:

1. Audio distortion test configuration as Fig. 34.
2. Test method of measuring Audio distortion
   (1) RF Signal Generator apply a standard input signal to the receive input terminals.
   (2) Measure and record the audio distortion readings.

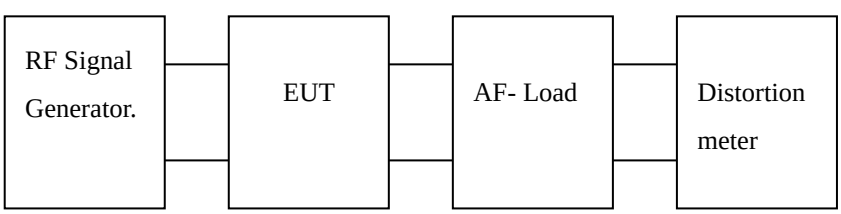


Figure 34 Audio distortion test configuration

Test equipment:

1. RF Signal Generator.

2. AF-Load.
3. Distortion Meter.

5.3.4.4 Signal and noise ratio

Requirement: The ratio of the rated output power to the residual output power in the absence of modulation, measured at standard input signal level. Specification: > 40dB.

Purpose：The signal and Noise Ratio is testing the ratio between signal and noise of output power in the absence of modulation circumstance.

Test method:

1. Signal and noise ratio test configuration as Fig. 35.
2. Test method of measuring Signal and noise ratio
   (1) Apply a standard input signal to the receiver.
   (2) Record the audio output level as V1.
   (3) Remove the modulation in the RF Sigal Generator and record the audio output level as V2.
   (4) Calculated as signal to Noise Ratio=20log(V1/V2).

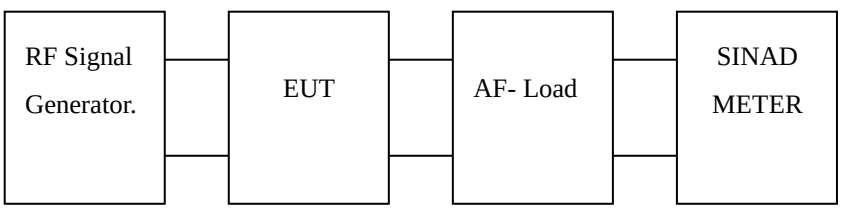


Figure 35 Signal and noise ratio test configuration

Test equipment:

1. RF-Signal Generator.
2. AF-Load.
3. SINAD Meter.

5.3.4.5 Adjacent channel rejection

Requirement: The adjacent channel rejection is the ratio of the level of an adjacent input signal that causes the SINAD produced by a wanted signal 3 dB in excess of the reference sensitivity to be reduced to the standard 12 dB SINAD to the reference sensitivity. Specification：> 45dB.

Purpose：The Adjacent channel Rejection is the testing the Receiving of transmitter is to avoid to the possibility of rejection from adjacent channel.

Test method:

1. Adjacent channel rejection test configuration as Fig. 36.

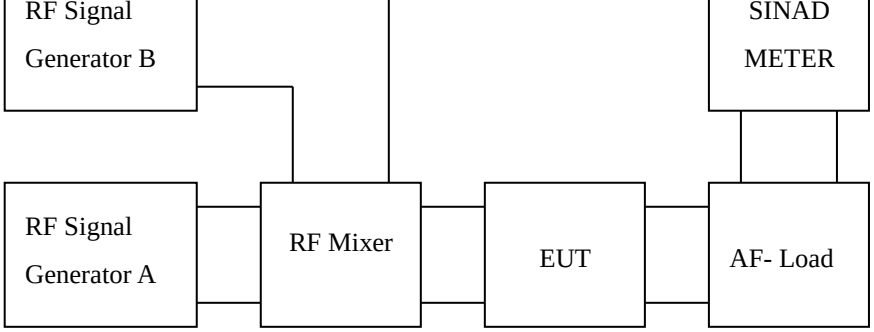


Figure 36 Adjacent channel rejection test configuration

2. Test method of measuring Adjacent channel rejection
   (1) Power off the RF - Signal Generator B.
   (2) RF - Signal Generator A send out the standard nput signal.
   (3) Record the signal level P0 of EUT receiving reference sensitivity.
   (4) Increase the input signal level 3dB.
   (5) Power on the RF - Signal Generator B and apply an input signal modulated with 400 Hz at 60% of the maximum permissible frequency deviation to adjacent channel.
   (6) Adjust the signal level between one channel and its adjacent channel to reach the reference sensitivity of receiver signal frequency, record their channel levels as P1 and P2.
   (7) Calculate the Adjacent channel rejection:
   The adjacent channel rejection high = P1 – P0.
   The adjacent channel rejection low = P2 – P0.

Test equipment:

1. RF-Signal Generator × 2.
2. RF Mixer.
3. SINAD Meter.
4. AF-Load.

5.3.4.6 Spurious response rejection

Requirement: Spurious response rejection is to keep the spurious response signal less than input signal of receiver to avoid the spurious response. Specification：>35 dB.

Purpose：The Spurious response rejection is testing the receiving of TE is to avoid to the possibility of Interference from unwanted signal in output port.

Test method:

1. Spurious response rejection test configuration as Fig. 37.

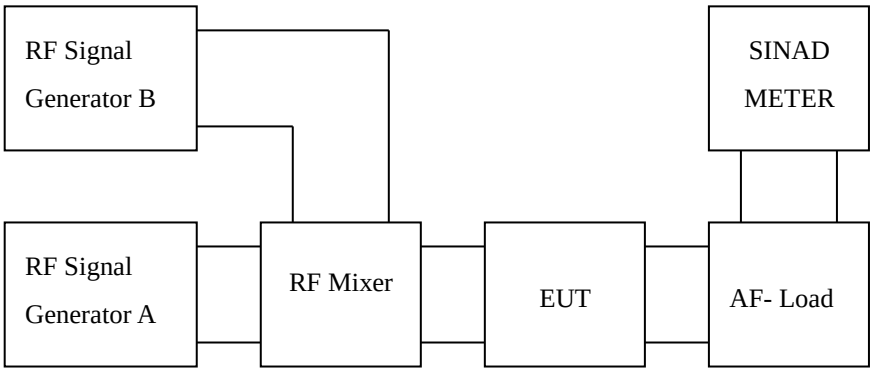


Figure 37 Spurious response rejection test configuration

2. Test method of Spurious response rejection.
   (1) Power off the RF - Signal Generator B.
   (2) RF - Signal Generator A send out the standard nput signal.
   (3) Record the signal level P0 of EUT receiving reference sensitivity.
   (4) Increase the input signal level 3dB.
   (5) Power on the RF - Signal Generator B and apply an input signal modulated with 400 Hz at 60% of the maximum permissible frequency deviation to adjacent channel.
   (6) Adjust the Spurious response frequency from receiver 1/2 middle frequency to double receiver frequency (except the receiver frequency in ±100kHz), adjust the Spurious response frequency to the maximum effect.
   (7) Adjust the input signal level of Spurious respons to reach the reference sensitivity and record the signal level of Spurious respons as P1.
   (8) Calculate the Spurious respons rejection = P1 - P0

Test method:

1. RF-Signal Generator × 2.
2. RF Mixer.
3. SINAD Meter.
4. AF-Load.

5.3.5 Radiated Field Intensity and Interference test

Requirement: The radiated field intensity at 3 meter distance should be less than 10000 μV / m. The radiated field intensity at 3 meter distance of harmonied frequency and unwanted power should be less than the requirements list in the table 6 below:

Purpose：To measure the radiated field intensity of harmonied frequency and unwanted power of cordless telephone handset at transmission and receiving states to prevent the interference.

Test method: According to CNS 13438.

Test equipment: According to CNS 13438.

Table 6

Frequency (MHz)	Maximum field intensity at 3 m of harmonied frequency (μ V/m)	Maximum field intensity at 3 m of unwanted power (μ V/m)
25 ~ 88	100	100
88 ~ 216	150	150
216 ~ 1000	200	200

5.4 Transmission characteristics of public automatic switching exchange

5.4.1 General function

5.4.1.1 AC Power Failure

Requirement:

1. When AC power is failed, PABX should keep at least on line for emergency dialing.
2. PABX system on restoration of ac power shall keep the services been set up till the time just before the restoration of ac power.
3. The operation instruction or user manual should have instruction to ac power failed.

Purpose: To assure PBX can provide emergency telephone function when lost or recovery of AC power supplied.

Test method:

1. Lost of AC power test configuration as Fig. 38.
2. Test method of AC Power Failure:
   (1) Without supplying the AC power to TE.
   (2) Set a on line communication to one PSTN line from extension line.Reference the operation manual of vendor.
   (3) Plug in the AC power.
   (4) Check TE should keep the communication status of being set up.

Test equipment:

1. Loop Simulator.

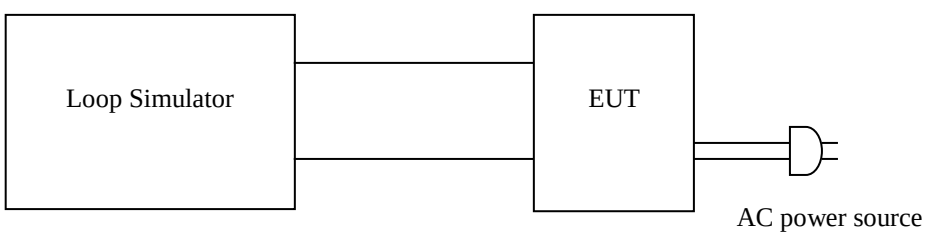


Figure 38. AC power failure test configuration

5.4.1.2 Release of the PSTN Line

Requirement: The release of PSTN line should be within 3 seconds after the extension line is released or interrupted by console.

Purpose: To prevent call intrusion of PSTN lines.

Test method:

1. Release the PSTN Line test configuration as Fig. 39.

2. Test method of Release of the PSTN Line:
   (1) Set the extension telephone on line and in communication to PSTN line.
   (2) Set the extension telephone off line, the PSTN line will be released.
   (3) Record the DC voltage and measure the timing from the extension line released to PSTN line is released.

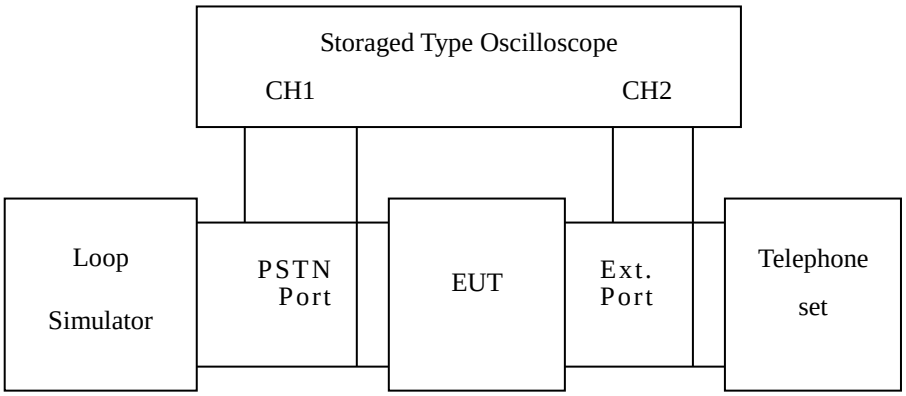


Figure 39 Release of the PSTN Line test configuration

Test equipment:

1. Loop Simulator.
2. Storaged Type Oscilloscope.
3. Telephone.

5.4.2 Quiescent state noise

Requirement: The Quiescent state noise of each PSTN port should be less than 1.5mVp (36 dBrnc).

Purpose: To assure the quality of communication in PSTN.

Test method:

1. Quiescent state noise test configuration as Fig. 40.
2. Quiescent state noise Test method:
   (1) Connecting 600Ω load and set a communication to PSTN line.
   (2) Bandpass Filter set at frequency of 200 Hz to 4000 Hz.
   (3) Measuring the peak noise level at PSTN port.

Note: Bandpass filter and voltameter can be substituded by spectrum analyzer.

Test equipment:

1. Loop Simulator.
2. Bandpass Filter.
3. AC Voltameter.
4. 600Ω Reference Load.

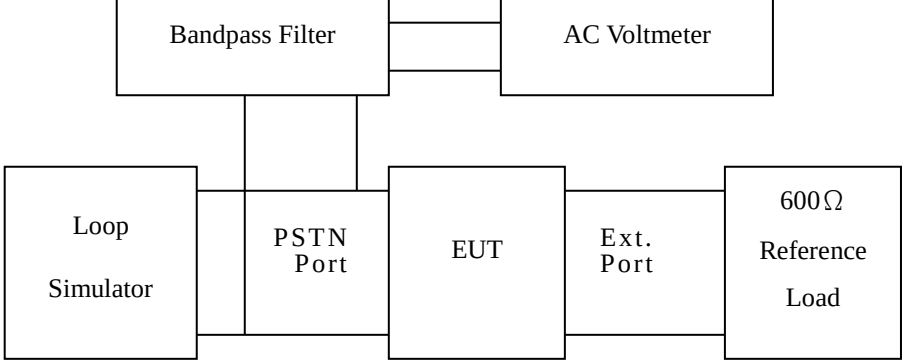


Figure 40 Quiescent state noise test configuration

5.4.3 Transmission Loss

Requirement: Transmission loss of extension port to PSTN port should be less than 2 dB.

Purpose: To assure a good quality of through port communication.

Test method:

1. Transmission loss test configuration as Fig. 41.

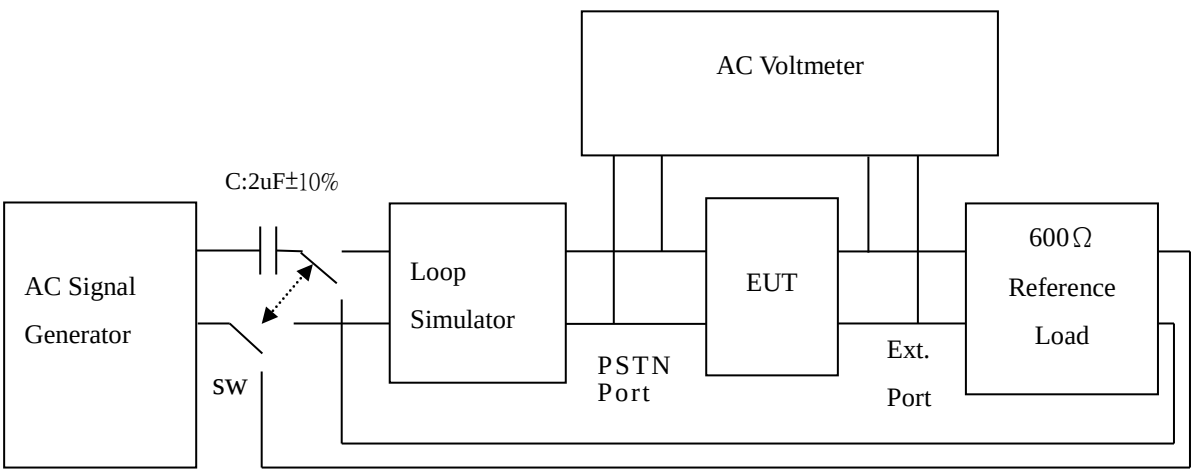


Figure 41 Transmission loss test configuration

2. Transmission loss Test method:
   (1) Connecting 600Ω load and set extension port in communication with PSTN port.
   (2) Set AC Signal Generator in connection to loop simulator.
   (3) Adjust the level of 1000 Hz signal to get 0 dBV output at PSTN port.
   (4) Measure the input signal level V1(in dBV) at the extension port.
   (5) Caculate the Transmission loss = 0 – V1.
   (6) Set AC Signal Generator in connection to 600Ω load.
   (7) Adjust the level of 1000 Hz signal to get 0 dBV output at extension port.
   (8) Measure the input signal level V2(in dBV) at the PSTN port.
   (9) Caculate the Transmission loss = 0 – V2.
   (10) Select the higher value from the results of step (5) and (9).
   (11) Selecting another port of extensions and PSTN lines, repeat step (1) to (10).
   (12) The maximum value get from step (1) to (11) is the Transmission loss.

Test equipment:

1. AC Signal Generator.
2. Loop Simulator.
3. AC Voltmeter.
4. 600Ω Reference Load.

5.4.4 Cross talk

Requirement: The crosstalk loss of 1 kHz signal should be more than 65 dB. For any TE with more than two PSTN ports.

Purpose: To assure good quality of communication and not be interfered by another communication lines in another PSTN port.

Test method:

1. Crosstalk test configuration as Fig. 42.

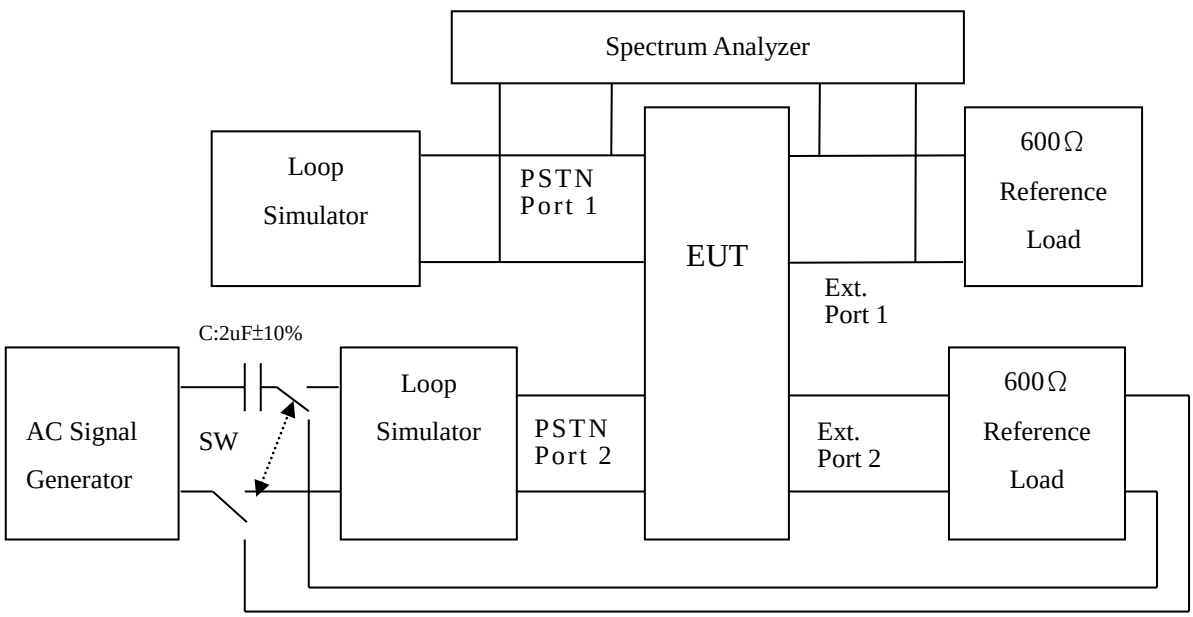


Figure 42 Crosstalk test configuration

2. Crosstalk Test method:
   (1) Set two connections with PSTN lines by two referenced 600Ω reference load.
   (2) Set AC Signal Gerenator to connect with loop simulator.
   (3) Adjust Signal Generator to get 1 kHz 0 dBV at PSTN port 2.
   (4) PSTN port 1 and Ext. port 1 is no signals applied.
   (5) Set spectrum analyzer frequency range at 200 Hz to 4000 Hz.
   (6) Measuring the peak level Vp1 at PSTN port 1 and Ext. Port 1(dBv)
   (7) Caculate crosstalk loss = 0 – Vp1.
   (8) Set AC Signal Generator to connect with reference 600Ω load. repeat step (3) to (7).
   (9) Selecting another port of extensions and PSTN lines of EUT, repeat step (1) to (8).
   (10) The minimum value get from step (1) to (9) is the crosstalk loss.

Test equipment:

1. AC Signal Generator.
2. Loop Simulator × 2.
3. Spectrum Analyzer.
4. 600Ω Reference Load × 2.

5.5 Protocol requirement

Data Equipments using communication protocal should follow the recommandations of ITU-T.

A declaration of conformance to this requirement should be provided from the supplier.

5.6 Caller ID requirement

5.6.1 FSK signals inspection standard

The test case and definition of test data is attached in Appendix I.

5.6.1.1 AC / DC Termination

5.6.1.1.1DC Termination

Requirement: The controller is set to transmit a valid alerting signal to the TE to place in the signal state. The current drawn by TE in the signal state is calculated from measurement of the voltage across R1.

The current drawn by TE shall not exceed 0.5 mA.

Purpose: To make sure the loop current drawn by the caller ID equipment is not over the limits lead to on line state of PSTN.

Test method：

1. DC termination test configuration as Figure 43.

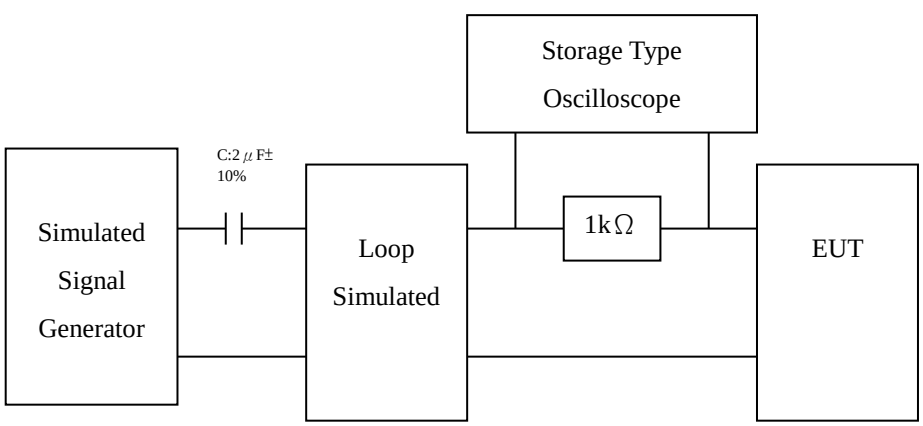


Figure 43 DC termination test configuration

2. DC termination test method:
   (1) Set the Simulated Signal Generator to send the alerting signal.
   (2) Check the EUT is at signal state.
   (3) Measure and record the DC voltage on the 1 kΩ resistor.
   (4) Caculate the DC current = V / 1000.

Test equipment:

1. Simulated Signal Generator.
2. Loop Simulator
3. Storage Type Oscilloscope.

5.6.1.1.2 AC Termination

Requirement:During the signaling state the TE shall present the following AC conditions: an impedance not less than 8 kΩ, but with a phase angle not exceeding +5° over the frequency range 200 Hz to 4 000 Hz; Compliance shall be by suppliers declaration.

Purpose: To make sure the input impedance can meet the requirement of PSTN.

Test method：

1. AC termination test configuration as Figure 44.

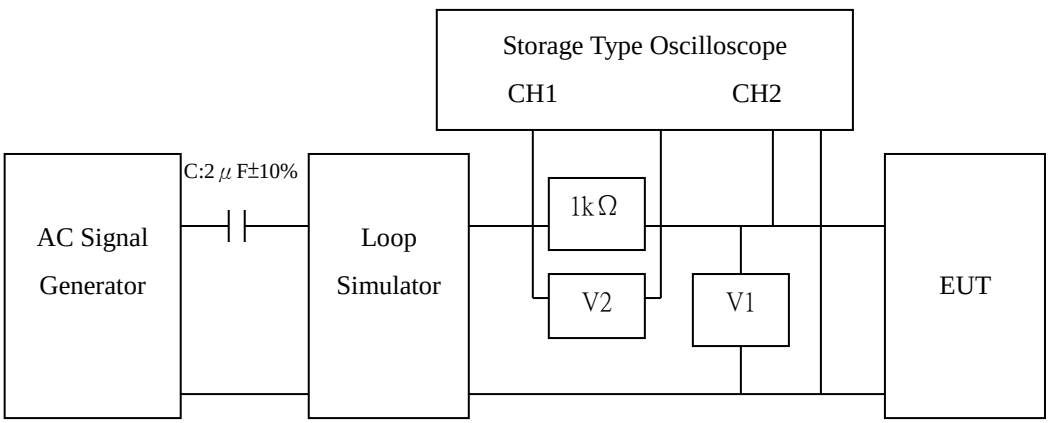


Figure 44 AC termination test configuration

2. AC termination test method:
   (1) Set the EUT at signal state.
   (2) Set the Simulated Signal Generator to send 200 Hz signal and adjust the level of V1= 3Vrms at EUT side.
   (3) Measure and record the AC voltage level of V2.
   (4) Caculate the AC impedance Z = V1 / (V2 × 1000).
   (5) Use Storage Type Oscilloscope to measure and record signal of V1 and V2.
   (6) Caculate the phase angle θ by:
   θ = △t ÷50ms × 360°.
   △ t : the difference of timeing V1 and V2.
   (7) Repeat steps (3) to (6) by set the AC Signal Generator to send from 200 Hz to 4000Hz signal.

Test equipment:

1. AC Signal Generator.
2. Loop Simulator.
3. Storage Type Oscilloscope.
4. AC Voltage Meter V1, V2

5.6.1.2 Timing

5.6.1.2.1 Alerting case

Requirement:The controller is set to transmit the test packet TP1 to the TEUT for each following test cases.

Table 7: Timing requirements DT-AS

TAS case	Modem case	Result
DT1	FSK1	Correct reception of FSK data
DT2	FSK1	Correct reception of FSK data
DT4 first ring pattern starts 1 sec after end of TAS single ring burst	FSK1	TEUT return to the idle state at the start of first ring pattern No message or error displayed
DT4	No data packet	TEUT return to the idle state
DT4	FSK1	Correct reception of FSK data
DT5	FSK1	Correct reception of FSK data

Purpose: To make sure the correct function of caller ID equipment at each signal condition.

Test method：

1. Alerting case test configuration as Figure 45.

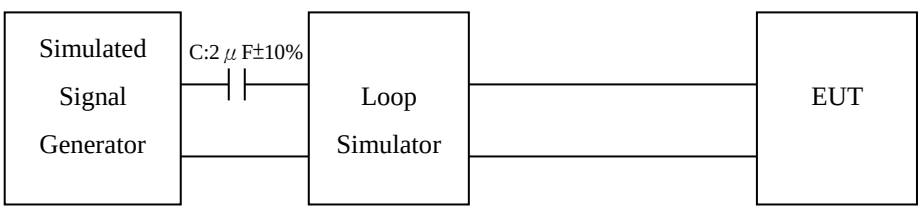


Figure 45 Alerting case test configuration

2. Alerting case test method:
   (1) Set the EUT at idle state.
   (2) Set the Simulated Signal Generator to send signal of each TAS case and Modem case as listed in table 6.1 and sending the message of test pattern TP1.
   (3) After the EUT received the signals, check the result with Table 7.

Test equipment:

1. Simulated Signal Generator.
2. Loop Simulator.

5.6.1.2.2 Start Time

Requirement: The TE shall enter the signaling state within 45ms from the end of the DT-AS. Compliance shall be by supplier declaration.

Purpose:To make sure caller ID can receive FSK signal after DT-AS signal is received.

Test method：

1. Start Time test configuration as Figure 45.
2. Start Time test method:

(1) Set the EUT at idle state.

(2) Set the Simulated Signal Generator to send DTAS(Dual tone alert signal) and after 45ms, send the FSK Data Signal.

(3) Check the FSK Data received by the EUT is correct as set in step (2).

Test equipment:

1. Simulated Signal Generator.
2. Loop Simulator.

5.6.1.2.3 End Time

Requirement:The TE shall leave the signaling state and revert to the idle state within 150ms from when the caller display message has been completely signaled. Compliance shall be by supplier declaration.

Purpose: To make sure caller ID can go back to idle state after the FSK signal is received.

Test method：

1. End Time test configuration as Figure 45.
2. End Time test method:
   (1) Set the Simulated Signal Generator to send FSK1 Data Signals and after 150ms, send the FSK2 Data Signal.
   (2) Check FSK1 Data is only recevied by EUT.

Test equipment:

1. Simulated Signal Generator.
2. Loop Simulator.

5.6.1.3 Signaling case

5.6.1.3.1 Frequency, Level, Twist and Interference tolerance

Requirement:The controller is set to transmit the test packet TP1 to the EUT for table 8 each test cases.

Purpose: To make sure caller ID can correctively receiving the FSK signals.

Test method：

1. Frequency, Level, Twist and Interference tolerance test configuration as Figure 45.
2. Frequency, Level, Twist and Interference tolerance test method:
   (1) Set the EUT is at idle state.
   (2) Set the Simulated Signal Generator to send signal of each TAS case and Modem case as listed in table 6.2 and sending the message of test pattern TP1.
   (3) After the EUT received the signals, check the result with Table 8.

Table 8: Signaling requirements

TAS case	Modem case	Result
DT5	FSK1	Correct reception of FSK data
DT5	FSK2	Correct reception of FSK data
DT5	FSK3	Correct reception of FSK data

Test equipment:

1. Simulated Signal Generator.

2. Loop Simulator.

5.6.1.4 Packet case

5.6.1.4.1 Channel seizure

Requirement: The controller is set to transmit the test message DT5:FSK1:TP1 to the EUT. Check the message is correctly interpreted by the EUT.

Purpose: To make sure caller ID can correctively receiving the FSK signals.

Test method：

1. Channel seizure test configuration as Figure 45.
2. Channel seizure test method:
   (1) Set the EUT at idle state.
   (2) Set the Simulated Signal Generator to send test data of DT5:FSK1:TP1.
   (3) Check the data is received and displayed on EUT correctly.

Test equipment:

1. Simulated Signal Generator.
2. Loop Simulator.

5.6.1.4.2 Mark

Requirement:The controller is set to transmit the test message DT5:FSK1:TP1 to the EUT. Check the message is correctly interpreted by the EUT.

Purpose: To make sure caller ID can correctively receiving the signals.

Test method：

1. Mark test configuration as Figure 45.
2. Mark test method:
   (1) Set the EUT at idle state.
   (2) Set the Simulated Signal Generator to send test data of DT5:FSK1:TP1.
   (4) Check the data is received and displayed on EUT correctly.

Test equipment:

1. Simulated Signal Generator.
2. Loop Simulator.

5.6.1.4.3 Message type

Requirement:The controller is set to transmit the following test message to the EUT.
Check that each message is correctly interpreted by the EUT.

Table 9 Message Type

Test data	Test case	Result
DT5:FSK1:TP1	(call setup type message)	Correct reception of FSK data
DT5:FSK1:TP2 (* Optional)	(message waiting indicator type message) (test on/off alternate)	Correct reception of FSK data
DT5:FSK1:TP5	(non call setup type message)	rejected or an error message

Note: the function of caller ID is optional for this item.

Purpose: To make sure caller ID can correctively receiving the FSK signals.

Test method：

1. Message type test configuration as Figure 45.
2. Message type test method:
   (1) Set the EUT at idle state.
   (2) Set the Simulated Signal Generator to send smessages as listed in table 9.
   (3) Check the results of EUT meet with Table 9.

Test equipment:

1. Simulated Signal Generator.
2. Loop Simulator.

5.6.1.4.4 Checksum

Requirement: The controller is set to transmit the test message DT5:FSK1:TP6 to the EUT (incorrect checksum). Check the message is correctly rejected or an error message displayed by the EUT.

Purpose: To make sure caller ID can detect the error messages.

Test method：

1. Checksum test configuration as Figure 45.
2. Checksum test method:
   (1) Set the EUT at idle state.
   (2) Set the Simulated Signal Generator to send test data of DT5:FSK1:TP6.
   (3) Check the message is correctly rejected or an error message is displayed on the EUT.

Test equipment:

1. Simulated Signal Generator.
2. Loop Simulator.

5.6.1.5 Presentation layer messages case

Requirement:The test controller is set to transmit the test messages as listed in Table 10 to the EUT. Check that each message is correctly interpreted by the EUT.

Purpose: To make sure caller ID can correctively receiving and displaying the FSK signals.

Test method：

1. Presentation layer messages case test configuration as Figure 45.
2. Presentation layer messages case test method:
   (1) Set the EUT at idle state.
   (2) Set the Simulated Signal Generator to send smessages as listed in table 10.
   (3) Check the results of EUT meet with Table 10.

Test equipment:

1. Simulated Signal Generator.
2. Loop Simulator.

Table 10: Presentation layer messages

Test data	Test case	Result
DT5:FSK1:TP7	Call type: ring back when free (valid CLI message)	Message ignore
DT5:FSK1:TP8	Call type: absent (valid CLI message)	Correct reception of FSK data
DT5:FSK1:TP9	Call type: voice (valid CLI message)	Correct reception of FSK data
DT5:FSK1:TP10	Call type: voice (valid CLI message)	Correct reception of FSK data
DT5:FSK1:TP11	Call type: message waiting(valid message)	Message either ignore or Correctly displayed
DT5:FSK1:TP13	Call type: voice (maximum length valid CLI message)	Correct reception of FSK data
DT5:FSK1:TP14 (* Optional)	Call type: voice (valid CLI message)	Correct reception of FSK data
DT5:FSK1:TP15 (* Optional)	Call type: voice (valid CLI message)	Correct reception of FSK data

Note: the function of caller ID is optional for this item.

5.6.2 DTMF signaling Test criteria

The following test cases and data is defined as Appendix II.

5.6.2.1 DC resistance in the NIT state

Requirement: In the NIT state the DC resistance between the line terminals shall be great than 90 kΩ.

Purpose: To make sure the impedance of caller ID is no interference to PSTN.

Test method：

1. DC resistance in the NIT state test configuration as Figure 46.

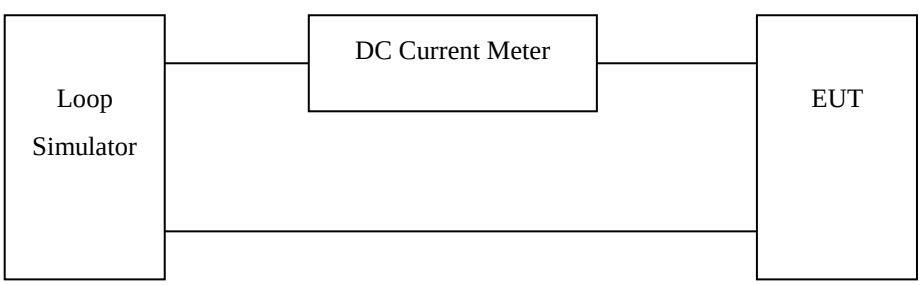


Figure 46 DC resistance in the NIT state test configuration

2. DC resistance in the NIT state test method:
   (1) Set the EUT at NIT state.
   (2) Measure and record the DC current Idc.
   (3) Caculate the DC resistance = 48V / Idc.

Test equipment:

1. Loop Simulator.
2. DC Current Meter.

5.6.2.2 Leaving the NIT state

Requirement: When the number information transfer is completed, the TE shall leave the NIT state and return to the quiescent condition with the ringing function.

Criteria for leaving the NIT state.

The transfer of number information is to be regarded as completed when one of the following criteria are met:

1. The DTMF code "C" (end code) is received;
2. Ringing signal is received;
3. After receipt of a DTMF code the DTMF pause condition is present for more than 1 sec.

At least the criteria 2. And 3. Shall be supported by the TE, as these criteria will guarantee in both normal and abnormal number information transfer procedures, that the NIT state is left before or as soon as possible after the line comes into loop condition.

Purpose: To make sure caller ID can go back to idle state after the DTMF signal is received.

Test method：

1. Leaving the NIT state test configuration as Figure 46.
2. Leaving the NIT state test method:
   (1) Set the EUT at idle state.
   (2) Set the Simulated Signal Generator to send test signals of DTMF1 data / End Code / DTMF2 data.
   (3) Check there is only DTMF1 data displayed on EUT.
   (4) Set the Simulated Signal Generator to send test signals of DTMF1 data / Ringing Signal / DTMF2 data.
   (5) Check there is only DTMF1 data displayed on EUT.
   (6) Set the Simulated Signal Generator to send test signals of DTMF1 data, stop to wait for 1 second then send test signals of DTMF2 data.
   (7) Check there is only DTMF1 data displayed on EUT.

Test equipment:

1. Simulated Signal Generator.
2. Loop Simulator.

5.6.2.3 DTMF signaling

Requirement:The Tolerance of Frequencies, Timing, Level and differences features of DTMF codes received between the line terminals is performed as following table 11.

The EUT receiver performance must be:

1. Receiving Level (High, Low Group):-3 to -24dBm.
2. Maximum level difference between two frequencies:5dB.
3. Frequency tolerance: within +/- 1.5%.

Purpose: To make sure capability of caller ID in receiving the DTMF signals.

Test method：

1. DTMF signaling test configuration as Figure 45.

2. DTMF signaling test method:
   (1) Set the EUT at idle state.
   (2) Set the Simulated Signal Generator to send test signals as the limits in the requirements of the Receiving Level, Maximum Level Difference between two frequencies, Frequency Tolerance and the conditions and code listed in Table 11.
   (3) Check the correct code is displayed on EUT.

Table 11 DTMF signals

Signaling Case	Code Number	Result
DS1	TC2	Correct reception of number
DS2	TC2	Correct reception of number
DS3	TC2	Correct reception of number
DS4	TC2	Correct reception of number
DS5	TC2	Correct reception of number

Test equipment:

1. Simulated Signal Generator.
2. Loop Simulator.

5.6.2.4 DTMF Code / Number

Requirement:

Purpose: To make sure capability of caller ID in receiving the DTMF signals.

Test method：

1. DTMF Code / Number test configuration as Figure 45.
2. DTMF Code / Number test method:
   (1) Set the EUT at idle state.
   (2) Set the Simulated Signal Generator to send each Signaling Case and numbers as listed in Table 12.
   (3) Check the results of EUT meet with Table 12.

Test equipment:

1. Simulated Signal Generator.
2. Loop Simulator.

Table 12 DTMF Code/Number

Signaling Case	Code / Number	Result
DS1	TC1	Correct reception of number
DS1	TC3	Call restriction
DS1	TC4	Call restriction

5.6.2.5 Guarding against interference from the parallel equipment

Requirement:The Caller ID must guard against interference from the parallel equipment which is in communication state.

Purpose: To make sure the Caller ID can guard against interference from the parallel Terminal equipment which is in communication state.

Test method：

1. Test configuration of guarding against interference from the parallel equipment is as Figure 47.
2. Test method of guarding against interference from the parallel equipment:
   (1) Set the EUT at idle state.
   (2) Set parallel TE at Off Line state.
   (3) Set the Simulated Signal Generator to send DTMF Signaling Case and Numbers.
   (4) Check there shall be no error of codes displayed on EUT.

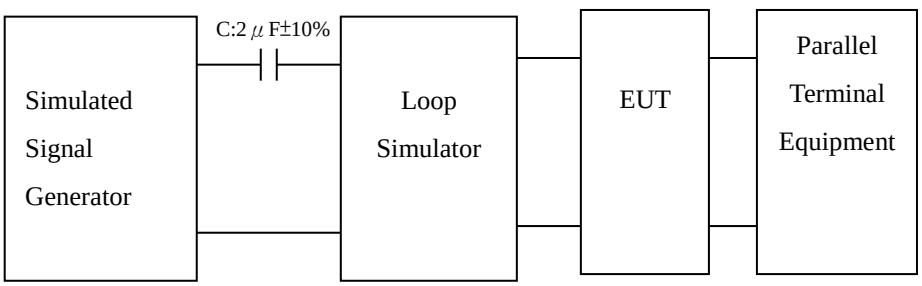


Figure 47 Test configuration of guarding against interference from the parallel equipment

Test equipment:

1. Simulated Signal Generator.
2. Loop Simulator
3. Telephone set.

5.7 Automatic redialing function requirement

5.7.1 Automatic dialing function requirement

5.7.1.1 Automatic repeated call attempts

Requirement:

1. If an automatic repeated dial without dial tone detection, the dial digit should not send out within 2 seconds after on line.
2. The Automatic repeated call should be equal or no more than 2 attempts and should wait more than or equal 1 minute after previor attemp.
3. The Automatic repeated call is no limits on attempts if the wait time of repeated call is more than or equal 3 minutes after previor attemp.
4. For Emergency call, the repeated call attempt is no limited.

Purpose: To prevent the unreasonable wast to the using of PSTN source.

Test method：

1. Automatic repeated call attempts test circuit as Figure 48.
2. Automatic repeated call attempts test method:
   (1) Set loop simulator without sending dial tone and with sending busy tone after received all digits of the call.
   (2) Set TE to automatic repeated call attemp mode.
   (3) Measure and record the AC and DC voltage on the line of the test.
   (4) Caculate the time from loop start to first digit sent out.
   (5) Caculate the time from TE goes off line to the next on line.
   (6) Count the total attempts of repeated calls, not including the first call.

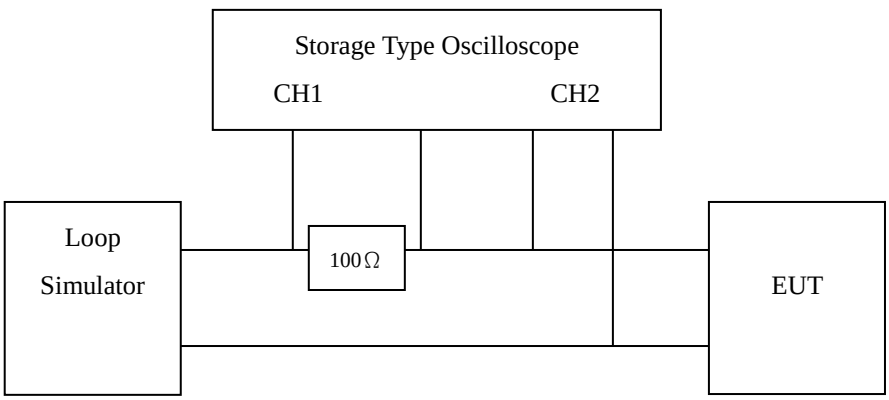


Figure 48 Automatic repeated call attempts test circuit

Test equipment:

1. Loop Simulator.
2. Storage Type Oscilloscope.

5.7.1.2 Disconnection Time of automatic dialing

Requirement:

1. Disconnection Time should be less than 20 seconds after busy tone send out.
2. Disconnection Time should be less than 2 minutes of no answering ring back signals.

Purpose: To prevent the unreasonable design of TE to waisting of PSTN source.

Test method：

1. Disconnection Time of automatic dialing test as Figure 48.
2. Disconnection Time of automatic dialing test method:
   (1) Loop simulator set to send busy tone after receiving the dial digits.
   (2) TE set at automatic dial mode.
   (3) Measuring the AC and DC voltage during all the test.
   (4) Caculate the time when last digit dialled to release the line.
   (5) Loop simulator set to send ring back tone after receiving the dial digits.
   (6) Repaet step (2) to (4).

Test equipment:

1. Loop Simulator.
2. Storage Type Oscilloscope.

5.7.2 Automatic answer function requirement

Requirement: TE with Automatic answer function should

(1) Seizure the calling line before receiving more than 3 cycle rings.

(2) Release the line before passing more than 3 seconds after the calling party released the line at the other side.

Note: Item(2) is only suitable for the moden function TTE.

Purpose: To prevent the unreasonable design of TE in waisting of PSTN source.

Test method：

1. Automatic answering function test as Figure 49.
2. Automatic answering function test method:
   (1) Set TE at on-hook mode.
   (2) Using the calling party equipment diall to theTE.
   (3) Loop simulator will send rings to TE.
   (4) Count the number of rings received by TE till the line is seizured.
   (5) Change calling side to turn to on-hook mode.
   (6) Wait untill TE turn to on-hook mode.
   (7) Record the timing and DC voltage in step (5) to (6).
   (8) Caculate the time between calling party release the line and TE release the line.

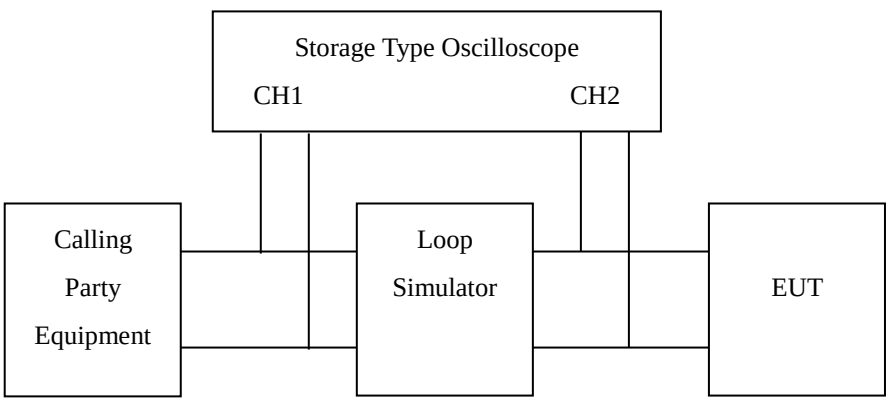


Figure 49 Automatic answering function test configuration

Test equipment:

1. Calling Party Equipment.
2. Storage Type Oscilloscope.
3. Loop Simulator.