

TECHNICAL CODE

SPECIFICATION FOR TERMINAL EQUIPMENT CONNECTING TO THE PUBLIC SWITCHED TELEPHONE NETWORK (PSTN)

First Revision

Developed by



Registered by



Issued date: 31 January 2013

SKMM MTSFB TC T001:2013

DEVELOPMENT OF TECHNICAL CODES

The Communications and Multimedia Act 1998 ('the Act') provides for Technical Standards Forum designated under section 184 of the Act or the Malaysian Communications and Multimedia Commission ('the Commission') to prepare a technical code. The technical code prepared pursuant to section 185 of the Act shall consist of, at least, the requirement for network interoperability and the promotion of safety of network facilities.

Section 96 of the Act also provides for the Commission to determine a technical code in accordance with section 55 of the Act if the technical code is not developed under an applicable provision of the Act and it is unlikely to be developed by the Technical Standards Forum within a reasonable time.

In exercise of the power conferred by section 184 of the Act, the Commission has designated the Malaysian Technical Standards Forum Bhd ('MTSFB') as a Technical Standards Forum which is obligated, among others, to prepare the technical code under section 185 of the Act.

A technical code prepared in accordance with section 185 shall not be effective until it is registered by the Commission pursuant to section 95 of the Act.

For further information on the technical code, please contact:

Malaysian Communications and Multimedia Commission (SKMM)

Off Pesiaran Multimedia
63000 Cyberjaya
Selangor Darul Ehsan
MALAYSIA

Tel: +60 3 8688 8000

Fax: +60 3 8688 1000

<http://www.skmm.gov.my>

OR

Malaysian Technical Standards Forum Bhd (MTSFB)

L2-E-11, Lab 3, Digital Media Centre
Enterprise 4
Technology Park Malaysia
Lebuhraya Puchong –Sg Besi
Bukit Jalil
57000 Kuala Lumpur
MALAYSIA

Tel: +60 3 8996 5505/5509

Fax: +60 3 8996 5507

<http://www.mtsfb.org.my>

CONTENTS

Committee Representation	iii
FOREWORD	iv
1. Scope	1
2. Normative references	1
3. Abbreviations.....	1
4. Requirements.....	1
4.1 General requirements	1
4.2 Technical requirements.....	4
Acknowledgement.....	24
 Figures	
Figure 1. Connections method	4
Figure 2. TE voltage/current characteristics	5
Figure 3. Alphanumeric keypad layout.....	7
Figure B1. Circuit for measurement of transmission characteristics.....	12
 Tables	
Table 1. TE voltage/current characteristics.....	5
Table 2. DTMF signalling frequency combination.....	6
Table C1. Additional requirements.....	13
 Annexes	
Annex A: Normative references	9
Annex B: Analogue handset function	11
Annex C: Additional requirements	13

Committee Representation

The Fixed Terminal Working Group under the Malaysian Technical Standards Forum Bhd (MTSFB) which developed this Technical Code consists of representatives from the following organisations:

AJV Holding Sdn Bhd

Epson Malaysia Sdn Bhd

NEC Corporation of Malaysia Sdn. Bhd.

Packet One Networks (Malaysia) Sdn. Bhd.

SIRIM QAS International Sdn Bhd

Telekom Malaysia Berhad

TIME dotCom Berhad

Panasonic Malaysia Sdn Bhd

Panasonic System Networks Malaysia Sdn Bhd

FOREWORD

This technical code for the Specification for Terminal Equipment Connecting to the Public Switched Telephone Network (PSTN) ('this Technical Code') was developed pursuant to section 185 of the Act 588 by the Malaysian Technical Standard Forum Berhad ('MTSFB') via its Fixed Terminal Working Group.

This Technical Code was developed for the purpose of certifying communications equipment under the Communications and Multimedia (Technical Standards) Regulations 2000.

This Technical Code cancels and replaces the Technical Specification for Terminal Equipment Connecting to the Public Switched Telephone Network (PSTN), SKMM FTS PSTN Rev. 1.01:2007.

This Technical Code shall continue to be valid and effective until reviewed or cancelled.

SPECIFICATION FOR TERMINAL EQUIPMENT CONNECTING TO THE PUBLIC SWITCHED TELEPHONE NETWORK (PSTN)

1. Scope

This document is applicable to all types of terminal equipment (TE) that can be approved for connection to the Public Switched Telephone Network (PSTN).

This document specifies:

- a) the protection of users and personnel operating the network from hazards that may arise from the connection of terminal equipment to public telecommunication network;
- b) the protection of public telecommunication network and service from interference and other adverse effects; and
- c) the assessment of compatibility of the terminal equipment with the network.

Additional requirements are included as Annexes B and C to the specification. They are applicable to the optional facilities supported by the TE.

2. Normative references

The following normative references are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the normative references (including any amendments) applies.

See Annex A.

3. Abbreviations

For the purpose of this document, the following abbreviation applies.

CR	Conformance requirement defines features and functions, which must be supported at minimum
TE	Terminal Equipment
M	Mandatory requirements
O	Optional requirements
GID	General Information and definitions

4. Requirements

4.1 General requirements

4.1.1 Power supply requirements

The TE may be AC or DC powered. For AC powered equipment, the operating voltage shall be 240 V + 5%, -10% and frequency 50 Hz ± 1% as according to MS 406 or 230 V ± 10 % and frequency 50 Hz ± 1 % as according to MS IEC 60038 whichever is current. For DC powered voltage, the operating voltage shall be 48 V (Malaysia Standard).

Where external power supply is used, e.g. AC adaptor or battery, it shall not affect the capability of the equipment to meet this specification.

Adaptor must be pre-approved by the relevant regulatory body before it can be used with the equipment.

4.1.2 Power supply cord and mains plug requirements

The equipment shall be fitted with a suitable and appropriate approved power supply cord and mains plug. Both are regulated products and must be pre-approved by the relevant regulatory body before it can be used with the equipment.

The power supply cord shall be certified according to:

- a) MS 140; or
- b) BS 6500; or
- c) IEC 60227-5; or
- d) IEC 60245-4.

The main plug shall be certified according to:

- a) 13 A fused plugs: MS 589: Part 1 or BS 1363: Part 1; or
- b) 2.5 A, 250 V, flat non-rewirable two-pole plugs: MS 1578 or BS EN 50075.

4.1.3 Polarity

The performance of the terminal equipment shall be independent of the PSTN line polarity i.e. the TE shall conform to the requirements of these requirements for both polarities of the line feeding (ETSI ES 203 021-1, clause A.3).

4.1.4 Interoperability and connectivity requirements

The TE shall comply with the minimum requirement that is specified by the regulatory body.

4.1.4.1 Interoperability

The TE shall have the ability to exchange information and to use the information that has been exchanged between two or more systems or components.

4.1.4.2 Connectivity

The TE shall have the ability to link with other programs and devices to allow interoperability.

4.1.5 Marking requirements

The equipment shall be marked with the following information:

- a) supplier/manufacturer's name or identification mark;
- b) supplier/manufacturer's model or type reference; and
- c) other markings as required by the relevant standards

The markings shall be legible, indelible and readily visible.

SKMM MTSFB TC T001:2013

4.1.6 Language

All markings, software and related documents shall be in Bahasa Melayu or English language.

4.1.7 Electromagnetic Compatibility and electrical safety requirements

4.1.7.1 The equipment shall comply with the limits for conducted disturbance at the mains terminals and telecommunication ports, and the limits for radiated disturbance defined in the IEC CISPR 22.

4.1.7.2 The equipment shall comply with the MS IEC 60950-1 safety standard. The requirements in MS IEC 60950-1 that are applicable to the equipment [e.g. class of equipment, type of telecommunication network voltage (TNV) circuit and types of components] shall be identified and complied with.

4.1.8 Connections method

4.1.8.1	Public Telecommunication Network Termination	CR	Remarks
	Public telecommunication network termination for the connection of the TE is a miniature 6 - position socket shown in Figure 1.	GID	
4.1.8.1.1	Connection of the TE to the public telecommunication network termination is in accordance with Figure 1 a).	O	
4.1.8.1.2	Connection of the TE to the public telecommunication network termination is in accordance with Figure 1 b).	O	
4.1.8.1.3	Line connection of plug and socket is in accordance with Figure 1 c).	O	

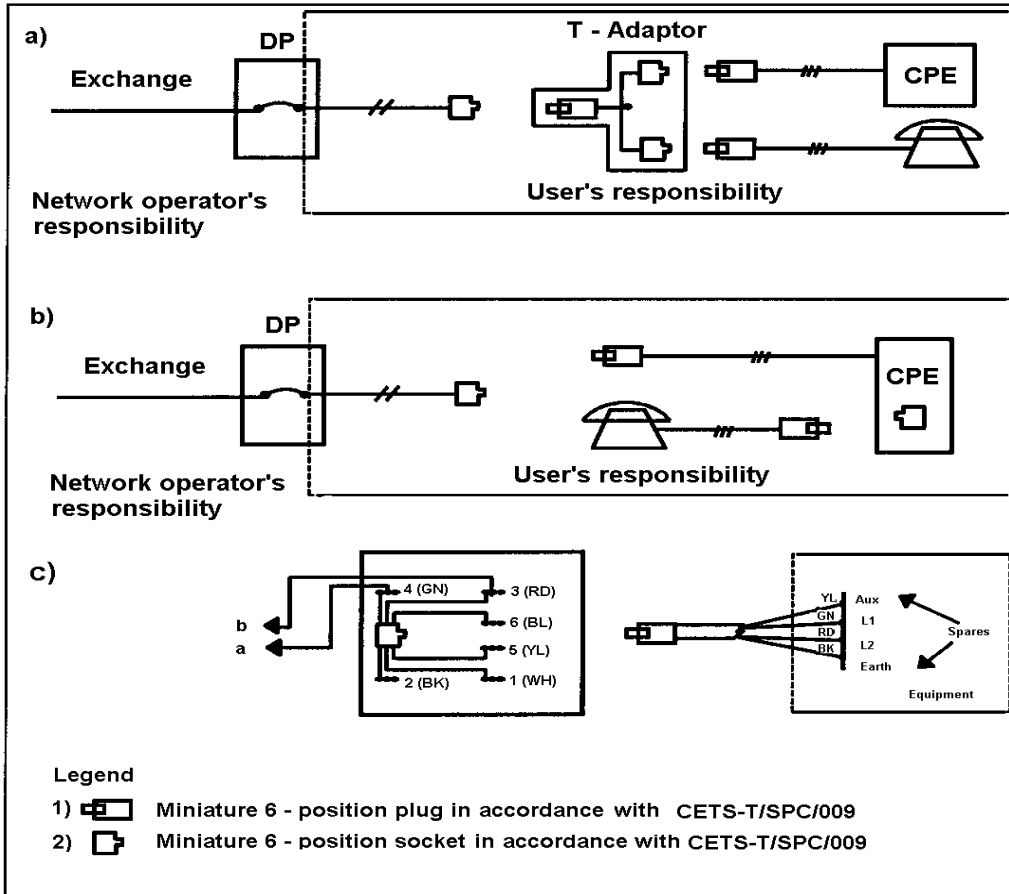


Figure 1. Connections method

4.2 Technical requirements

4.2.1 General operating requirements

4.2.1.1	Ringing signal and service tones	CR	Remarks
	TE shall be able to work with the ringing signal and service tones from public exchange.	M	
4.2.1.2	Power fail condition	CR	Remarks
4.2.1.2.1	For equipment powered by an exchange, it shall be designed such that no interruption of normal telephone service is possible during 240 V AC power failures.	M	
4.2.1.2.2	In the event of an exchange power failure, the equipment shall immediately release the exchange lines and shall revert to the normal free condition on the restoration of power.	M	
4.2.1.2.3	The equipment shall place the exchange lines in readiness to incoming calls after releasing the exchange lines.	M	
4.2.1.2.4	Incorrect manual operation of the equipment will not interfere with the proper operation of any PSTN	M	

SKMM MTSFB TC T001:2013

plant.

4.2.2 Electrical characteristics

4.2.2.1	Insulation resistance	CR	Remarks
	The insulation resistance between any one of the line terminals and the earth terminal shall be more than 5 MΩ measured at 100 V DC.	M	
4.2.2.2	Impedance limits	CR	Remarks
4.2.2.2.1	Unlooped condition		
4.2.2.2.1.1	TE shall present to the exchange line a DC resistance more than 5 MΩ measured at 56 V DC with current less than or equal to 10 μA.	M	Acceptable test method: ETSI ES 203 021-3, A.4.4.1
4.2.2.2.1.2	TE shall present to the exchange line an impedance more than 2 000 Ω at 25 Hz.	M	Acceptable test method: ETSI ES 203 021-3, A.4.4.2.1
4.2.2.2.1.3	TE shall be able to withstand sustained ringing voltages from the telephone line of 75 V to 85 V r.m.s at nominal frequency of 25 Hz ± 2 Hz.	M	
4.2.2.2.2	Looped condition		
4.2.2.2.2.1	The DC voltage/current characteristics of the TE within the operating range as shall not exceed the limits given in table 1.	M	Acceptable test method: ETSI ES 203 021-3, A.4.7.1

Table 1. TE voltage/current characteristics

Point	Voltage (V)	Current (mA)
A	9.0	0
B	9.0	20
C	49.5	110

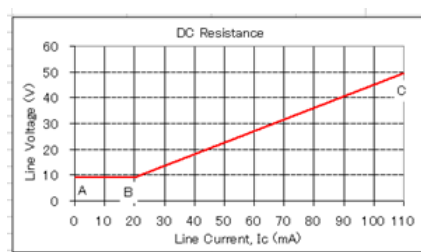


Figure 2. TE voltage/current characteristics

4.2.2.2.2.2	For analogue TE supporting non-voice services only, the return loss calculated shall be more than 8 dB with respect to 600 Ω in the frequency range of 300 Hz to 3 400 Hz for line current up to 110 mA.	M	Acceptable test method: ETSI ES 203 021-3, A.4.7.2
4.2.2.2.2.3	For analogue TE supporting handset telephony, the return loss calculated shall be more than 14 dB with respect to 600 Ω in the frequency range of 300 Hz to 3 400 Hz for line current up to 110 mA. NOTE. Requirement is mandatory if TE incorporate analogue handset function.	O	Acceptable test method: ETSI ES 203 038, A.2.8

4.2.2.2.2.4 M Acceptable test method:
ETSI ES 203 021-3,
A.4.7.1

4.2.2.3 Impedance unbalance about earth CR Remarks

Impedance unbalance about earth expressed in Longitudinal Conversion Loss (LCL) shall be more than or equivalent to 40 dB in the frequency range of 300 Hz to 600 Hz and more than or equivalent to 46 dB in the frequency range of 600 Hz to 3 400 Hz.

M Acceptable test method:
ETSI TBR A.4.7.4.1

4.2.2.4 Signal frequencies and sending levels CR Remarks

4.2.2.4.1 The mean sending level in the frequency range 200 Hz to 3800 Hz over a one-minute period shall not be greater than -9.7 dBV when the TE interface is terminated with the reference impedance ZR (600 ohm).

M Acceptable test method:
ETSI ES 203 021-2,
A.4.2.1

NOTE. These requirements do not apply to DTMF signals.

4.2.2.4.2 The sending level across the termination points of the TE shall be in the frequency range 4.3 kHz (4300 Hz) to 200 kHz, is less than or equal to the limits -35.7 dBV in the range 4.3 kHz to 20 kHz and -40.7 dBV in the range 20 kHz to 200 kHz.

M Acceptable test method:
ETSI ES 203 021-2,
A.4.2.4

4.2.3 Calling function

TE that initiates calls to the public telephone exchange shall conform to the requirements of this clause.

4.2.3.1 Dual Tone Multifrequency (DTMF) signalling CR Remarks

4.2.3.1.1 The equipment shall send the call address information to the public exchange by means of DTMF signalling codes as specified in Table 1.

M Acceptable test method:
ETSI ES 203 021-3,
A.4.8.2.1

Table 2. DTMF signalling frequency combination

Low group (Hz)	High group (Hz)		
	1 209	1 336	1 477
697	1	2	3
770	4	5	6
852	7	8	9
941	*	0	#

4.2.3.1.2 Transmit signalling frequencies shall not deviate more than $\pm 1.5\%$ from the nominal values.

M Acceptable test method:
ETSI ES 203 021-3,
A.4.8.2.1

4.2.3.1.3 The sending level for low group frequencies into public telecommunication network line shall be -10

M Acceptable test method:
ETSI ES 203 021-3,

SKMM MTSFB TC T001:2013

	dBm \pm 2 dB.		A.4.8.2.2																				
4.2.3.1.4	The sending level for high group frequencies into public telecommunication network line shall be -8 dBm \pm 2 dB.	M	Acceptable test method: ETSI ES 203 021-3, A.4.8.2.2																				
4.2.3.1.5	During sending of any DTMF frequency combination, the level of the tone in the high frequency group shall be 1 dB to 4 dB higher than the level of the tone in the low frequency group.	M	Acceptable test method: ETSI ES 203 021-3, A.4.8.2.2																				
4.2.3.1.6	The total power of unwanted frequency components during signalling shall be at least 20 dB below the power level of signal frequency.	M	Acceptable test method: ETSI ES 203 021-3, A.4.8.2.3																				
4.2.3.2	Decadic pulse	CR	Remarks																				
	a) The nominal dial speed is 10 pulses per second (pps) \pm 1 pps.	M																					
	b) The nominal pulse width is as follows: Break pulse : 66.7 ms \pm 2.5 ms Make pulse : 33.3 ms \pm 2.5 ms																						
	c) The inter-digital pause is between 600 ms to 1 000 ms.																						
	NOTE. Requirements are applicable only to TE equipped with pulse dialling.																						
4.2.3.3	Keypad dialling	CR	Remarks																				
4.2.3.3.1	Keypads used in equipment for dialling shall be alphanumeric keypads and the relationships between the letters and the digits shall comply with ITU-T Recommendation E.161 option A as shown in Figure 3.	M																					
	<table border="0"> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> <td style="text-align: center;">3</td> </tr> <tr> <td></td> <td style="text-align: center;">ABC</td> <td style="text-align: center;">DEF</td> </tr> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">5</td> <td style="text-align: center;">6</td> </tr> <tr> <td style="text-align: center;">GHI</td> <td style="text-align: center;">JKL</td> <td style="text-align: center;">MNO</td> </tr> <tr> <td style="text-align: center;">7</td> <td style="text-align: center;">8</td> <td style="text-align: center;">9</td> </tr> <tr> <td style="text-align: center;">PQRS</td> <td style="text-align: center;">TUV</td> <td style="text-align: center;">WXYZ</td> </tr> <tr> <td style="text-align: center;">*</td> <td style="text-align: center;">0</td> <td style="text-align: center;">#</td> </tr> </table>	1	2	3		ABC	DEF	4	5	6	GHI	JKL	MNO	7	8	9	PQRS	TUV	WXYZ	*	0	#	
1	2	3																					
	ABC	DEF																					
4	5	6																					
GHI	JKL	MNO																					
7	8	9																					
PQRS	TUV	WXYZ																					
*	0	#																					
	Figure 3. Alphanumeric keypad layout																						
4.2.3.3.2	The associated letters must not impair the legibility of the digit (§ 3.1.1, ITU-T Recommendation E.161).	M																					
4.2.3.3.3	The tactile identifier on the "5" button shall be provided (§ 3.6, ITU-T Recommendation E.161).	M																					
4.2.3.4	Automatic dialling	CR	Remarks																				

For equipment which carries out dialling automatically: M Acceptable test method: ETSI ES 203 021-3, A.4.8.2.4 and A.4.8.2.5

- a) the sending length of the DTMF signal shall be at least 65 ms; and
- b) the inter-digit pause between 2 DTMF signals shall not be less than 65 ms.

4.2.4 Automatic answering CR Remarks

4.2.4.1 TE shall have a ringing signal detector and answer an incoming call by looping the line within 9 seconds from the start of the ringing signal. See note

4.2.4.2 TE shall restore the exchange line to unlooped condition: See note

- a) after the detection of busy tone sent by the exchange to indicate that the calling party has cleared first;
- b) alternatively, for equipment with a timer, after the time pre-set for the automatic transmission or recording of message; and.
- c) If failure occurs when the equipment is answering an incoming call, the exchange line shall be immediately released and the equipment reset on resumption of mains supply

NOTE. Requirement is "M" if TE incorporates features with telephone answering capability e.g. Direct Inward System Access (DISA), voice message system etc.

Annex A
(normative)

Normative references

BS 1363: Part 1	13 A plugs, socket-outlets, adaptors and connection units - Part 1: Specification for rewirable and non-rewirable 13 A fused plugs
BS 6500	Electric cables Flexible cords rated up to 300/500 V, for use with appliances and equipment intended for domestic, office and similar environments
BS EN 50075	Specification for flat non-wirable two-pole plugs 2.5 A 250 V, with cord, for the connection of class II-equipment for household and similar purposes
CETS-T/SPC/002	Data/Facsimile Modem
CETS-T/SPC/003	Facsimile Machine
CETS-T/SPC/006	Alarm System (PSTN)
CETS-T/SPC/009	Miniature Plug and Socket
CETS-T/SPC/011	Cordless Telephone 46/49 MHz
CETS-T/SPC/012	PABX/KTS Equipment
CETS-T/SPC/015	Analogue Calling Line Identification
ETSI ES 203 021	Terminal Equipment (TE); Attachment Requirements for pan-European approval for connection to the analogue Public Switched Telephone Networks (PSTNs) to TE (excluding TE supporting the voice telephony service) in which network addressing, if provided, is by means of Dual Tone Multi Frequency (DTMF) signalling
ETSI ES 203 038	Public Switched Telephone Network (PSTN); Attachment Requirements for a terminal equipment incorporating and analogue handset function capable of supporting the justified case service when connected to the analogue interface of the PSTN in Europe
IEC 60227-5	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V - Part 5: Flexible cables (cords)
IEC 60245-4	Rubber insulated cables - Rated voltages up to and including 450/750 V - Part 4: Cords and flexible cables
IEC CISPR 22	Information Technology Equipment - Radio disturbance characteristics - Limits and methods of measurement
ITU-T Recommendation E.161	Arrangement of digits, letters and symbols on telephones and other devices that can be used for gaining access to a telephone network
MS 140	Specification for insulated flexible cords and cables
MS 406	Specification for voltages and frequency for alternating current

	transmission and distribution systems
MS 589: Part 1	Specification for 13 A plugs, socket outlets, adaptors and connection units Part 1: Specification for rewirable and non-rewirable 13 A fused plugs
MS 1578	Specification for flat non-rewirable two-pole plugs, 2.5 A, 250 V, with cord, for the connection of class II-Equipment for household and similar purposes
MS IEC 60038	IEC standard voltages
MS IEC 60950-1	Information technology equipment - Safety - Part 1: General requirements

Annex B (normative)

Analogue handset function

If TE supports handset telephony, then the following additional requirements are applicable. (Circuit for measurement of transmission characteristic refer to Figure B1).

B1.	Sending and Receiving Loudness Ratings (SLR and RLR)	CR	Remarks
B.1.1	<p>The SLR shall be +3 dB \pm 4 dB when measured with the feed resistance R_f set to 2,800 Ω and 1,000 Ω and +3 dB +7/-4 dB when measured with the feed resistance R_f set to 600 Ω.</p> <p>For TE supporting handsfree or loudspeaking functions which is not powered from a separate power supply, the requirement to measure with R_f set to 2,800 Ω shall be replaced by a requirement to measure with R_f set to 2,300 Ω.</p>	M	Acceptable test method: ETSI ES 203 038, A.2.2.1
B.1.2	<p>The RLR shall be -8 dB \pm 4 dB when measured with the feed resistance R_f set to 2,800 Ω and 1,000 Ω and -8 dB +7/-4 dB when measured with the feed resistance R_f set to 600 Ω.</p> <p>For TE supporting handsfree or loudspeaking functions which is not powered from a separate power supply, the requirement to measure with R_f set to 2,800 Ω shall be replaced by a requirement to measure with R_f set to 2,300 Ω. Should be 2,800</p>	M	Acceptable test method: ETSI ES 203 038, A 2.2.1
B2.	<p>Sidetone</p> <p>Sidetone Masking Rating (STMR) shall not be less than +10 dB.</p>	CR	Remarks Acceptable test method: ETSI ES 203 038, A.2.3

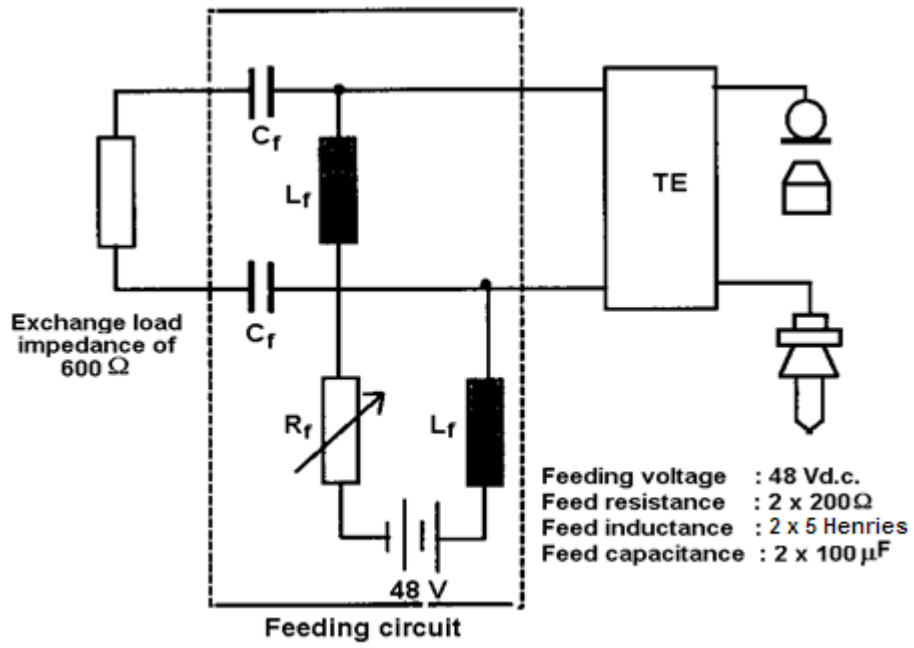


Figure B1. Circuit for measurement of transmission characteristics

Annex C
(normative)

Additional requirements

If the TE falls under any of the categories below, then the requirements specified in the related documents listed in Table C1 are also applicable.

Table C1. Additional requirements

Category	Related documents
Data/Facsimile Modem	CETS-T/SPC/002
Facsimile Machine	CETS-T/SPC/003
Alarm System (PSTN)	CETS-T/SPC/006
Cordless Telephone 46/49 MHz	CETS-T/SPC/011
PABX/KTS Equipment	CETS-T/SPC/012
Analogue Calling Line Identification	CETS-T/SPC/015

Acknowledgement

Members of the Fixed Terminal Working Group:

Encik Abd. Hamid Mustafa (Chairman)	Telekom Malaysia Berhad
Encik Ahmad Faizan Pardi (Vice Chairman)	SIRIM QAS International Sdn Bhd
Puan Nur Rashidah Abas Azmi (Secretary)	Telekom Malaysia Berhad
EncShahadan Man	AJV Holding Sdn. Bhd
Encik Zulkhairi Zainal Abidin	Epson Malaysia Sdn Bhd
Encik Tan Keok Kuang	NEC Corporation of Malaysia Sdn Bhd
Encik Khairul Akmal Zahri	Packet One Networks (M) Sdn Bhd
Encik Syed Ahmad Anas	Packet One Networks (M) Sdn Bhd
Encik Pang Chieng Yong	Panasonic Malaysia Sdn Bhd
Encik Sam Choong	Panasonic Malaysia Sdn Bhd
Mohd Ackmal Abd. Samad	Panasonic System Networks Malaysia Sdn Bhd
Puan Hafizah Zainal Abiddin	SIRIM QAS International Sdn Bhd
Puan Nurhafenah Abdul Jalil	SIRIM QAS International Sdn Bhd
Encik Zul Jaafar	SIRIM QAS International Sdn Bhd
Encik Amin Hapis Khairan	Telekom Malaysia Berhad
Puan Badariah Zainal	Telekom Malaysia Berhad
Encik Mazram Idzuny	Telekom Malaysia Berhad
Encik Md Azmi Karnain	Telekom Malaysia Berhad
Encik Mohamad Ali Abu Bakar	Telekom Malaysia Berhad
Encik Mohd Syaukiazahar	Telekom Malaysia Berhad
Encik Muhd Hadzir Abu Hassan	Telekom Malaysia Berhad
Puan Nor Maizatul Syima	Telekom Malaysia Berhad
Puan Nur Faliza Yaakup	Telekom Malaysia Berhad
Puan Raja Nor Suha	Telekom Malaysia Berhad
Puan Rosliza Abu Bakar	Telekom Malaysia Berhad
Puan Suriyati Rahim	Telekom Malaysia Berhad
Cik Wan Nur Hanani	Telekom Malaysia Berhad
Encik Othman Sidek	TIME dotCom Berhad