

TECHNICAL CODE

IMT-2020 (FIFTH GENERATION) - USER EQUIPMENT

Developed by



Registered by



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MCMC MTSFB TC T016:2021

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.

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Committee representation

This technical code was developed by the 5G Equipment Sub Working Group under the Fixed and Wireless Terminal Working Group of the Malaysian Technical Standards Forum Bhd (MTSFB) which consists of representatives from the following organisations:

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U Mobile Sdn Bhd
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YTL Communications Sdn Bhd

Foreword

This technical code for the IMT-2020 (Fifth Generation) - User Equipment ('this Technical Code') was developed pursuant to section 185 of the Act 588 by the Malaysian Technical Standards Forum Bhd (MTSFB) via its Fixed and Wireless 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 shall continue to be valid and effective from the date of its registration until it is replaced or revoked.

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IMT-2020 (FIFTH GENERATION) - USER EQUIPMENT

1. Scope

This Technical Code specifies the minimum requirements for User Equipment (UE) that are intended for use in connection with IMT-2020 public mobile telecommunications service in Malaysia. The UE may include, but not limited to, cellular mobile terminals, handheld, portable and vehicle-mounted equipment, and Radio Frequency (RF) interface cards and modems.

This Technical Code applies to IMT-2020 (Fifth Generation) User Equipment (5G UE) based on the technologies as specified in applicable Malaysian Standards, technical codes, international standards, ITU Recommendations and its radio regulations as agreed and adopted by Malaysia.

2. Normative references

The following normative references are indispensable for the application of this Technical Code. 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 purposes of this Technical Code, the following abbreviations apply.

AC	Alternating Current
EDGE	Enhanced Data Rate for Global Evolution
EMC	Electromagnetic Compatibility
EMF	Electromagnetic Field
FDD	Frequency Division Duplexing
GSM	Global System for Mobile Communications
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IMT	International Mobile Telecommunications
LTE	Long Term Evolution
NFC	Near Field Communication
NR	New Radio
NSA	Non-Stand Alone
PD	Power Density
PVC	Polyvinyl Chloride
RF	Radio Frequency
SA	Stand Alone

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SAR	Specific Absorption Rate
SRSP	Standard Radio System Plan
TDD	Time Division Duplexing
UE	User Equipment
UMTS	Universal Mobile Telecommunications Service
Vo5G	Voice over 5G
VoNR	Voice over New Radio
WLAN	Wireless Local Area Network

4. Requirements

4.1 General requirements

4.1.1 Power supply

Alternating Current (AC) adaptor for 5G UE shall not affect the capability of the equipment to meet this specification. The operating voltage shall be 240 V + 5 %, - 10 % and frequency of 50 Hz ± 1 % for single phase equipment as according to MS 406 or MS IEC 60038 whichever is current.

Adaptor shall be pre-approved by the relevant regulatory body before being used with the equipment.

4.1.2 Power supply cord and mains plug

If the equipment is fitted with power supply cord and mains plug, the power supply cord and mains plug shall be pre-approved by the relevant regulatory body with the following requirements before being used with the equipment:

- a) The power supply cord shall be certified according to:
 - i) MS 2112-5 or BS EN 50525-2-11 or IEC 60227-5 (for Polyvinyl Chloride (PVC) insulated - flexible cables/cords); or
 - ii) MS 2127-4 or IEC 60245-1 (for rubber insulated - flexible cables/cords).
- b) The mains plug shall be certified according to:
 - i) MS 589-1 or BS 1363 (for 13 A, fused plug); or
 - ii) MS 1577 (for 15 A, fused plugs); or
 - iii) MS 1578 or BS EN 50075 (for 2.5 A, 250 V, flat non-rewireable two-pole plugs with cord for the connection of class II equipment).

4.1.3 Keypad

Any keypad used in the 5G UE as defined in this scope, shall be alphanumeric and the relationship between the letters and digits shall comply with 2.2, 3.1.1 and 3.6 of ITU-T E.161 (02/2001).

4.1.4 Interoperability and connectivity

The 5G UE shall have the ability to exchange and use information which has been exchanged between two or more systems or components. It shall have the ability to link with other programs and devices to allow interoperability.

4.1.5 Marking

The 5G UE 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, inedible and readily visible. All information on the marking shall be either in Bahasa Melayu or English Language.

4.2 Technical requirements

The 5G UE shall comply with the following requirements:

- a) RF;
- b) Electromagnetic Compatibility (EMC); and
- c) safety and health requirements.

4.2.1 Radio Frequency (RF)

The 5G UE shall operate in any of the following frequency bands as defined in Table 1.

Table 1. Operating band plans

No	Frequency (MHz)	Duplex mode	Operating band		Band Plan Reference
			Uplink (MHz)	Downlink (MHz)	
1	700	FDD	703 - 743	758 - 798	MCMC SRSP MS 700
2	3 500	TDD	3 400 – 3 600		MCMC SRSP MS 3500
3	28 000	TDD	26 500 - 28 100		MCMC SRSP MS 28000

Notwithstanding the mentioned bands above in Table 1, 5G UE may operate in other existing frequency bands identified for the International Mobile Telecommunications (IMT) Systems as specified in the Spectrum Plan and relevant Standard Radio System Plan (SRSPs). The frequency bands are listed in Annex B.

The 5G UE is recommended to support both 5G Non-Stand Alone (NSA) and Stand Alone (SA) mode.

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4.2.1.1 Conformity

The 5G UE shall comply with the frequency bands stated in item 4.2.1, and the requirements of one or more of the following standards:

- a) 3GPP TS 38.101-1 (at least release 15);
- b) ETSI TS 138 101-1;
- c) ETSI TS 138 101-2;
- d) ETSI TS 138 101-3;
- e) ETSI TS 138 521-1;
- f) ETSI TS 138 521-2; and/or
- g) ETSI TS 138 521-3.

The 5G UE shall comply with the minimum parameters as specified in Annex C.

In the case of the 5G UE supports Voice over New Radio (VoNR)/Voice over 5G (Vo5G), the requirements stated in 3GPP TS 34.229-5 shall be complied.

If the 5G UE supports technologies other than 5G, for example Long Term Evolution (LTE), Universal Mobile Telecommunications Service (UMTS), Global System for Mobile Communications (GSM)/Enhanced Data GSM Environment (EDGE), Wireless Local Area Network (WLAN), bluetooth and Near Field Communication (NFC), suppliers shall demonstrate that the 5G UE has been tested and certified for conformance to related Technical Codes or Class Assignments.

In the case of 5G UE support multiple network modes, the priority shall be configured to 5G followed by LTE, UMTS, and/or GSM/EDGE.

4.2.2 Electromagnetic Compatibility (EMC)

The 5G UE shall comply with the EMC emission requirements as defined in ETSI EN 301 489-1 or ETSI EN 301 489-52 or any equivalent standards.

Specific to mobile phones adaptor, the adaptor shall comply to ETSI EN 301 489-1 or ETSI EN 301 489-34 or any equivalent standard.

4.2.3 Safety and health

4.2.3.1 Electrical safety and health

The 5G UE shall comply with the safety requirements defined in MS IEC 60950-1, IEC 62368-1 or any equivalent standards.

4.2.3.2 Electromagnetic Field (EMF) exposure

The 5G UE shall comply with the International Commission on Non-Ionizing Radiation Protection (ICNIRP) and one or more of the following standards for the measurement of Specific Absorption Rate (SAR) and incident Power Density (PD).

4.2.3.2.1 Specific Absorption Rate (SAR)

Electromagnetic Field (EMF) exposure determination for frequency range 300 MHz to 6 GHz shall comply with one or more of the following standards:

- a) BS EN 50360;
- b) IEC 62209-1;
- c) IEC 62209-2; and/or
- d) IEC 62311.

4.2.3.2.2 Power Density (PD)

EMF exposure determination for frequency range above 6 GHz shall comply with IEC TR 63170 or any equivalent standard.

Annex A
(normative)

Normative references

MS 406, *Specification for voltages and frequency for alternating current transmission and distribution systems (Second revision)*

MS 589-1, *13 A Plugs, socket-outlets, adaptors and connection units - Part 1: Specification for rewirable and non-rewirable 13 A fused plugs (Fourth revision)*

MS 1577, *Specification for 15 a plugs and socket-outlets for domestic and similar purposes*

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 2112-5, *Electric cable and wire - Polyvinyl Chloride (PVC) insulated cables of rated voltages up to and including 450/750 V - Part 5: Flexible cables*

MS 2127-4, *Rubber insulated cables of rated voltages up to and including 450/750 V - Part 4: Cords and flexible cables*

MS IEC 60038, *IEC standard voltages*

MS IEC 60950-1, *Information technology equipment - Safety - Part 1: General requirements (First revision) (IEC 60950-1:2005, IDT)*

ITU-T E.161 (02/2001), *Arrangement of digits, letters and symbols on telephones and other devices that can be used for gaining access to a telephone network*

IEC 60227-1, *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V - Part 1: General requirements*

IEC 60227-5, *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V - Part 5: Flexible cables (cords)*

IEC 60245-1, *Rubber insulated cables - Rated voltages up to and including 450/750 V - Part 1: General requirements*

IEC 60245-4, *Rubber insulated cables - Rated voltages up to and including 450/750 V - Part 4: Cords and flexible cables*

IEC 62209-1, *Measurement procedure for the assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Part 1: Devices used next to the ear (Frequency range of 300 MHz to 6 GHz)*

IEC 62209-2, *Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)*

IEC 62311, *Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz to 300 GHz)*

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IEC 62368-1, *Audio/video, information and communication technology equipment - Part 1: Safety requirements*

IEC TR 63170, *Measurement procedure for the evaluation of power density related to human exposure to radio frequency fields from wireless communication devices operating between 6 GHz and 100 GHz*

ETSI EN 301 489-1, *ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU*

ETSI EN 301 489-34, *ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 34: Specific conditions for External Power Supply (EPS) for mobile phones; Harmonised Standard covering the essential requirements of article 6 of Directive 2014/30/EU*

ETSI EN 301 489-52, *Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 52: Specific conditions for Cellular Communication Mobile and portable (UE) radio and ancillary equipment; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU*

ETSI TS 138 101-1, *5G; NR; User Equipment (UE) radio transmission and reception; Part 1: Range 1 Standalone (3GPP TS 38.101-1)*

ETSI TS 138 101-2, *5G; NR; User Equipment (UE) radio transmission and reception; Part 2: Range 2 Standalone (3GPP TS 38.101-2)*

ETSI TS 138 101-3, *5G; NR; User Equipment (UE) radio transmission and reception; Part 3: Range 1 and Range 2 Interworking operation with other radios (3GPP TS 38.101-3)*

ETSI TS 138 521-1, *5G; NR; User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: Range 1 standalone (3GPP TS 38.521-1)*

ETSI TS 138 521-2, *5G; NR; User Equipment (UE) conformance specification; Radio transmission and reception; Part 2: Range 2 standalone (3GPP TS 38.521-2)*

ETSI TS 138 521-3, *5G; NR; User Equipment (UE) conformance specification; Radio transmission and reception; Part 3: Range 1 and Range 2 Interworking operation with other radios (3GPP TS 38.521-3)*

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*

BS EN 50360, *Product standard to demonstrate the compliance of wireless communication devices, with the basic restrictions and exposure limit values related to human exposure to electromagnetic fields in the frequency range from 300 MHz to 6 GHz: devices used next to the ear*

BS EN 50525-2-11, *Electric cables. Low voltage energy cables of rated voltages up to and including 450/750V (U0/U). Cables for general applications. Flexible cables with thermoplastic PVC insulation*

BS 1363-1, *Fire resistance tests. General requirements*

3GPP 34.229-5, *Internet Protocol (IP) multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); User Equipment (UE) conformance specification; Part 5: Protocol conformance specification using 5G Systems (5GS)*

Annex B
(normative)

Existing frequency bands identified for the IMT systems in Malaysia

No	Frequency (MHz)	Band	Duplex mode	Operating band		Reference
				Uplink (MHz)	Downlink (MHz)	
1	800	20	FDD	839 - 844	798 - 803	MCMC SRSP MS 800
2	850	5	FDD	824 - 834	869 - 879	MCMC SRSP 504
3	900	8	FDD	880 - 915	925 - 960	MCMC SRSP 504
4	1 800	3	FDD	1 710 - 1 785	1 805 - 1 880	MCMC SRSP 508
5	2 100	1	FDD	1 920 - 1 980	2 110 - 2 170	MCMC SRSP MS 2100
6	2 100	33	TDD	1 915 - 1 920	1 915 - 1 920	MCMC SRSP MS 2100
		34		2 010 - 2 025	2 010 - 2 025	MCMC SRSP MS 2100
7	2 300	40	TDD	2 300 - 2 400	2 300 - 2 400	SKMM SRSP-532
8	2 600	7	FDD	2 500 - 2 570	2 620 - 2 690	SKMM SRSP-523
9	2 600	38	TDD	2 570 - 2 620	2 570 - 2 620	SKMM SRSP-523

Annex C
(normative)

Parameters for Radio Frequency (RF) conformity

The detailed parameters for RF conformity are as follows:

- a) transmitter maximum output power;
- b) output RF spectrum emissions:
 - i) transmitter spectrum emission mask;
 - ii) transmitter spurious emissions;
 - iii) transmitter adjacent channel leakage ratio;
- c) transmitter minimum output power;
- d) receiver spurious response;
- e) receiver spurious emissions; and
- f) reference sensitivity.

Acknowledgements

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