



Telecommunications
Standards Advisory
Committee (TSAC)

Technical Specification

Cellular Mobile Terminal

**Draft IMDA TS CMT
Issue 1 Rev 1, 5 June 2017**

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Content

Section (§)	Title	Page
1.	Scope	2
2.	References	2
3.	Abbreviations	4
4.	General Requirements	5
	4.1 International Mobile Station Equipment Identity	5
	4.2 Keypad	5
	4.3 Radiation Safety (SAR) Requirements	5
	4.4 EMC and Equipment Safety Requirements	5
5.	Technical Requirements	7
	5.1 Operating Frequencies	7
	5.2 Radio Interface Requirements	7
Annex A	CMT Conformance Testing / Verification Checklist	8
Annex B	Corrigendum / Addendum	10
	Changes to IMDA TS CMT Issue 1, Oct 16	
	Changes to IDA TS CMT Issue 1, Jun 11	
	Changes to IDA TS GSM-MT and 3G-MT Issue 1 Rev 2, May 11	

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Technical Specification for Cellular Mobile Terminal

1 Scope

This Specification defines the minimum technical requirements for Cellular Mobile Terminal (termed “CMT” in this Specification) to be used in the Public Mobile Radio Communication System and services which employ:

- (a) ITU IMT-2000 radio interface technologies (UTRA FDD and E-UTRA FDD) identified in ITU-R M.1457-12, and transposed from 3GPP Release 8 and 9;
- (b) ITU IMT-Advanced radio interface technologies (LTE-Advanced) identified in ITU-R M.2012-2, and transposed from 3GPP Release 10 and beyond;
- (c) LTE-Advanced technology series from 3GPP Release 13 onwards, marked with LTE-Advanced Pro.

CMTs may include handheld, portable and vehicle-mounted equipment, and RF interface cards and modems.

Note: CMTs’ support of the Global System for Mobile Communications (GSM¹) technology is no longer required after 31 March 2017.

2 References

For the technical requirements captured in this Specification, reference has been made to the following standards. Where versions are not indicated, implementation of this Specification shall be based on current and valid versions of these standards published by the respective Standards Development Organisations².

- [1] ETSI EN 301 908-1: IMT cellular networks; Harmonised EN covering essential requirements of Directive 2014/53/EU; Part 1: Introduction and common requirements
- [2] ETSI EN 301 908-2: IMT cellular networks; Harmonised EN covering essential requirements of Directive 2014/53/EU; Part 2: CDMA Direct Spread (UTRA FDD) User Equipment (UE)
- [3] ETSI EN 301 908-13: IMT cellular networks; Harmonised EN covering essential requirements of Directive 2014/53/EU; Part 13: Evolved Universal Terrestrial Radio Access (E-UTRA) User Equipment (UE)
- [4] ETSI EN 301 489-1: EMC standard for radio equipment and services; Harmonised Standard covering essential requirements of article 3.1(b) of the Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU; Part 1: Common technical requirements
- [5] ETSI EN 301 489-24: EMC standard for radio equipment and services; Part 24: Specific conditions for IMT-2000 CDMA Direct Spread (UTRA and E-UTRA) for Mobile and portable (UE) radio and ancillary equipment
- [6] ITU-R M.1457-12: Detailed specifications of the terrestrial radio interfaces of International Mobile Telecommunications-2000 (IMT-2000)
- [7] ITU-R M.2012-2: Detailed specifications of the terrestrial radio interfaces of International Mobile Telecommunications-Advanced (IMT-Advanced)

¹ Support for the GSM RIT according to the ETSI EN 301 511 for mobile stations in the GSM900 and GSM1800 bands has ceased after 31 March 2017.

² Implementers of these ETSI standards should check with the ETSI Web Server (<http://ipr.etsi.org>) whether Intellectual Property Rights have been declared to ETSI.

- [8] ITU-T K.116: EMC requirements and test methods for radio telecommunication terminal equipment
- [9] IEC CISPR 32: Electromagnetic compatibility of multimedia equipment – Emission requirements

Note: Validity of the IEC CISPR 22, EMC standard for information technology equipment, has lapsed since 31 March 2017, in sync with IEC's timeline for replacing it with the CISPR 32 standard.
- [10] IEC CISPR 24: Information technology equipment – Immunity characteristics – Limits and methods of measurement
- [11] ISO 7637-2: Road vehicles - Electrical disturbances from conduction and coupling - Part 2: Electrical transient conduction along supply lines only
- [12] CENELEC EN 50360: Product standard to demonstrate the compliance of mobile phones with the basic restrictions related to human exposure to electromagnetic fields (300 MHz – 3 GHz)
- [13] 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)
- [14] IEC 60950-1: Information technology equipment – Safety – Part 1: General requirements

3 Abbreviations³

3GPP	3rd Generation Partnership Project
AC	Alternating Current
CA	Carrier Aggregation
CENELEC	European Committee for Electrotechnical Standardization
CMT	Cellular Mobile Terminal
CDMA	Code Division Multiple Access
CISPR	International Special Committee on Radio Interference of the IEC
DC	Direct Current
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
EMS	Electromagnetic Sustainability
EN	European Standard
ETSI	European Telecommunications Standards Institute
E-UTRA	Evolved Universal Terrestrial Radio Access (also known as LTE)
FDD	Frequency Division Duplex
GSM	Global System for Mobile communications
ICNIRP	International Commission on Non-Ionizing Radiation Protection
ICT	Information and Communications Technology
IEC	International Electrotechnical Commission
IMEI	International Mobile Station Equipment Identity
IMT	International Mobile Telecommunications
ISO	International Organization for Standardization
ITU	International Telecommunication Union
ITU-T	ITU Telecommunication Standardization Sector
LTE	Long Term Evolution (also known as E-UTRA)
RF	Radio Frequency
RIT	Radio Interface Technology
SAR	Specific Absorption Rate
SDO	Standards Development Organisation
SELV	Safety Extra-Low Voltage
TDD	Time Division Duplex
UTRA	Universal Terrestrial Radio Access (UTRA FDD also known as WCDMA)
WCDMA	Wideband Code Division Multiple Access
WLAN	Wireless Local Area Network

³ 3GPP™ and LTE™ are Trade Marks registered by ETSI for the benefit of its Members and 3GPP Organizational Partners.

4 General Requirements

4.1 International Mobile Station Equipment Identity

Each individual CMT shall be allocated a unique International Mobile Station Equipment Identity (IMEI). Manufacturer shall ensure that adequate security measures have been taken to protect the IMEI against duplication, unauthorised removal or change.

4.2 Keypad

Any keypad used in the CMT shall be alphanumeric and the relationships between digits, letters and symbols shall comply with the ITU-T Recommendation E.161 (02/2001), sections 2.2, 3.1.1 and 3.6.

4.3 Radiation Safety (SAR) Requirements

4.3.1 Manufacturers or suppliers shall demonstrate that the CMT has been tested and certified for conformity with the International Commission on Non-Ionizing Radiation Protection (ICNIRP) recommendations: CENELEC EN 50360 [12] and IEC 62209-1 [13].

4.3.2 Compliance with the specified radiation safety standards does not by itself confer immunity from legal obligations and requirements imposed by national health or safety authorities. IDA may invalidate the equipment registration if so requested by the relevant authority for reasons of safety or hazards that would likely be caused to users.

4.3.3 Where applicable, the equipment supplier shall provide the SAR information in printed form or in other appropriate form such as in the user guide or as a leaflet or brochure in the equipment package. Furthermore, the supplier shall provide each unit of approved CMT with advisory information pertaining to electrical safety and non-ionising radiation hazards and on the safe operation of the CMT at potentially hazardous areas such as in moving vehicles, in aircrafts and at fuel depots, chemical plants and blasting sites.

4.4 Electromagnetic Compatibility (EMC) and Equipment Safety Requirements

4.4.1 EMC assessment

For EMC assessment, the CMT and/or ancillary equipment shall be classified as equipment for vehicular use (i.e. mobile terminal connected with vehicular charger or DC supply); or equipment for portable/mobile use (i.e. powered by its integral battery). This equipment classification is used to determine the applicability of the EMC (emission and immunity) testing requirements based on §5.5 and §7 of ETSI EN 301 489-1 [4]; or §7.5 and §9 of ITU-T K.116 [8]. The ETSI EN 301 489-1 [4] standard shall be used in conjunction with the ETSI EN 301 489-24 [5] standard for CMT that supports the UTRA and E-UTRA RITs.

4.4.1.1 EMI or emission measurements

- (a) Radiated emissions from associated ancillary equipment not incorporated in the CMT shall be measured to Class B requirements defined in §4 and Tables A.4 and A.5 of CISPR 32 [9].
- (b) Conducted emission at the DC power port of the CMT intended for vehicular use, shall be measured to Class B requirements defined in §4 and Table A10 of CISPR 32 [9].
- (c) Conducted emission at the AC mains port shall be measured for CMT with dedicated charger or adapter [4] to Class B requirements defined in §4 and Table A.10 of CISPR 32 [9]. Equipment with DC power port which is powered by a dedicated AC/DC power converter is defined as AC mains powered equipment (§3.1.1 [9]).

Note: If CMT is a module intended to be marketed and sold separately from a host, it shall be assessed with at least one representative host system. Modules may be internal, mounted, plug-in or external (§6.2 of CISPR 32 [9]).

4.4.1.2 EMS or immunity testing

The following immunity tests may be performed on the CMT to requirements defined in CISPR 24 [10], §11 of ITU-T K.116 [8] or §9 of EN 301 489-1 [4], where applicable:

- (a) RF electromagnetic field (80 MHz to 1 GHz and 1.4 GHz to 6 GHz) at the enclosure of the equipment
- (b) Electrostatic discharge at the enclosure of the equipment
- (c) Fast transients (common mode) at DC power and AC main power ports that have cables longer than 3 m
- (d) RF common mode 0.15 MHz to 80 MHz at DC power and AC mains power ports that have cables longer than 3 m
- (e) Transients and surges (vehicular environment) on nominal 12V and 24V DC supply voltage input ports of mobile terminal and ancillary equipment intended also for mobile use in vehicles [11]
- (f) Voltage dips and interruptions at AC mains power port of mobile or portable terminal with dedicated charger/power adapter [4]
- (g) Surges, common and differential mode at AC mains power port of mobile or portable terminal with dedicated charger/power adapter [4]

4.4.2 Equipment safety testing ⁴

Equipment safety testing or assessment shall be performed to requirements defined in IEC 60950-1, based on the following assumptions:

- (a) CMT is powered by a dedicated external power supply (charger/power adapter); and
- (b) CMT operates with SELV in environments where overvoltage from telecommunication networks is not possible. SELV refers to voltages not exceeding 42.4 V peak or 60 V DC.

⁴ Equipment safety testing performed to the IEC 60950-1 safety standard is required, as recommended by SPRING Singapore, the Safety Authority.

5 Technical Requirements

5.1 Operating Frequencies

5.1.1 The CMT shall operate within the frequency bands given in Table1.

Table 1: CMT Operating Frequency Bands

UTRA FDD Band	E-UTRAN Band	Direction of Transmission	Frequency Range
I	1	Transmit	1920 MHz – 1980 MHz
		Receive	2110 MHz – 2170 MHz
III	3	Transmit	1710 MHz – 1785 MHz
		Receive	1805 MHz – 1880 MHz
VII	7	Transmit	2500 MHz – 2570 MHz
		Receive	2620 MHz – 2690 MHz
VIII	8	Transmit	880 MHz – 915 MHz
		Receive	925 MHz – 960 MHz
-	38	Transmit and Receive	2570 MHz – 2615 MHz ^{Note 1}
-	40	Transmit and Receive	2300 MHz – 2340 MHz ^{Note 2}
Note 1: CMT operating in band 38 shall only transmit and receive within the indicated frequency range.			
Note 2: CMT operating in band 40 shall only transmit and receive within the indicated frequency range.			

5.1.2 The precise operating frequency range of a CMT shall follow that of the Network Operator from whom the service is obtained.

5.2 Radio Interface Requirements

5.2.1 Manufacturers or suppliers shall demonstrate that the CMTs have been tested and certified for operating in the frequency bands stated in clause 5.1.1, and conformity to any or a combination of standards given in Table 2. The CMT shall comply with the applicable requirements specified in these standards, in addition to the requirements identified in the ETSI EN 301 908-1 [1] for compliance by the CMT.

Table 2: IMT RITs in EN 301 908 [1] and the Standards Parts for CMT

IMT-2000 / IMT-Advanced terrestrial RIT	RIT name in SDO	Reference SDO	EN 301 908 Part
IMT-2000 CDMA Direct Spread	UTRA FDD	ETSI (3GPP)	Part 2 [2]
LTE-Advanced	E-UTRA	ETSI (3GPP)	Part 13 [3]

5.2.2 If the CMT also supports other wireless modes of operation such as WLAN, Bluetooth, suppliers shall demonstrate that the mobile terminal has been tested and certified for conformity to the relevant requirements as given in IMDA Technical Specification for Short Range Devices (“IMDA TS SRD”).

Annex A

CMT Conformance Testing / Verification Checklist

This Checklist is intended for facilitating Supplier's Declaration of Conformity to the requirements defined in the IMDA Technical Specification for Cellular Mobile Terminals ("IMDA TS CMT").

Please note:

"**CR**" indicates that the general or technical requirement set out in a particular section or sub-section ("§") of the IMDA TS CMT is a **Compliance Requirement**.

"**M**" means that it shall be **Mandatory** for the CMT to comply with the requirement set out in the IMDA TS CMT § cited in this Checklist (Table given below).

"**C**" means that compliance with the technical requirement set out in the IMDA TS CMT § cited in this Checklist is **Conditional**. In this case, the need to comply is contingent on the type of CMT, RIT and application indicated in the remarks column.

"**V**" means that compliance with the requirement is **Voluntary**.

"**NA**" means that the requirement is **Not Applicable**.

IMDA TS CMT §	Parameter	Reference [n] given in § 2 of TS CMT	CR	Yes /No/ NA	Remarks
1	IMT-2000 / IMT-Advanced / LTE-Advanced / LTE-Advanced Pro RITs	ITU-R M.1457-12 [6] and M.2012-2 [7]	M		State the type of CMT (examples given in §1 of this Spec).
4.1	International Mobile Station Equipment Identity (IMEI)		M		
4.2	Keypad	ITU-T E.161	C		
4.3	Radiation safety (SAR) requirements	[12] and [13]	M		Applicable to handheld equipment to be used next to the ear
4.4	EMC and safety requirements		-	-	
4.4.1	EMC assessment		-	-	
4.4.1.1 (a)	Radiated emission	Tables A.4 and A.5 [9]; or §8.2 [4]	C		Applicable to ancillary equipment not incorporated in the radio equipment
4.4.1.1 (b)	Conducted emission: DC power port	Table A.10 [9]; or §8.3 [4]	C		Applicable to CMT for vehicular use (regardless of DC cable length)
4.4.1.1 (c)	Conducted emission: AC mains power port	Table A.10 [9]; or §8.4 [4]	C		Applicable to CMT with dedicated charger/power adapter
4.4.1.2 (a)	RF electromagnetic field (80 MHz to 1 GHz and 1.4 GHz to 6 GHz)	§4.2.3.2 [10]; or §9.2 [4]	V		
4.4.1.2 (b)	Electrostatic discharge	§4.2.1 [10]; or §9.3 [4]	V		
4.4.1.2 (c)	Fast transients common mode	§4.2.2 [10]; or §9.4 [4]	V		Applicable to CMT with dedicated charger/power, and DC power port with cable longer than 3 m
4.4.1.2 (d)	RF common mode 0.15 MHz to 80 MHz	§4.2.3.3 [10]; or §9.5 [4]	V		
4.4.1.2 (e)	Transients and surges, vehicular environment	§9.6 [4]; or ISO 7637-2 [13]	V		Applicable to CMT intended for mobile use in vehicles
4.4.1.2 (f)	Voltage dips and interruptions	§4.2.6 [10]; or §9.7 [4]	V		Applicable to CMT with dedicated charger/power adapter
4.4.1.2 (g)	Surges, common and differential mode	§4.2.6 [10]; or §9.7 [4]	V		
4.4.2	Equipment safety testing	IEC 60950-1 [14]	M		

Annex A

CMT Conformance Testing / Verification Checklist (Cont'd)

IMDA TS CMT §	Parameter	Reference [n] given in § 2 of TS CMT	CR	Yes /No/ NA	Remarks
5.1	Operating frequencies		M		
5.2.1	Radio interface requirements	Table C-1 [1], [6] and [7], where applicable	M		State the RITs and the 3GPP Releases supported by the CMT, e.g. 3GPP Release 8, 9, 10 and beyond.
	CMT common requirements	§4.2 [1]	-	-	
	Radiated emissions	§4.2.2 [1]	M		
	Control and monitoring functions	§4.2.4 [1]	M		
	Transmitter spectrum emissions mask	§4.2.3 [2] and/or §4.2.3 [3]	C		In addition to the common requirements in [1], the CMT shall be tested to the essential requirements in [2] for the UTRA FDD technology; and/or essential requirements in [3] for the E-UTRA technology, which includes CA.
	Transmitter adjacent channel leakage power ratio	§4.2.12 [2] and/or §4.2.11 [3]	C		
	Transmitter spurious emissions	§4.2.4 [2] and/or §4.2.4 [3]	C		
	Transmitter maximum output power	§4.2.2 [2] and/or §4.2.2 [3]	C		
	Transmitter minimum output power	§4.2.5 [2] and/or §4.2.5 [3]	C		
	Receiver spurious emissions	§4.2.10 [2] and/or §4.2.10 [3]	C		
	Receiver blocking characteristics	§4.2.7 [2] and/or §4.2.7 [3]	C		
	Receiver spurious response	§4.2.8 [2] and/or §4.2.8 [3]	C		
	Receiver intermodulation characteristics	§4.2.9 [2] and/or §4.2.9 [3]	C		
	Receiver Adjacent Channel Selectivity (ACS)	§4.2.6 [2] and/or §4.2.6 [3]	C		
	Receiver reference sensitivity level	§4.2.13 [2] and/or §4.2.12 [3]	C		
	Out of synchronization handling of output power	§4.2.11 [2] See Note	C		
5.2.2	Other wireless modes such as WLAN, Bluetooth, etc.		C		
<p>Note: Out of synchronization requirement in EN 301 908-2 [2] is not included in EN 301 908-13 [3] due to the fact that E-UTRA has network controlled dynamic resource allocation, mitigating the risk of interference in out of synchronization situation.</p>					

Annex B

Corrigendum / Addendum

Revised TS		Items Changed	Effective Date
Page	Reference		
Changes to IMDA TS CMT Issue 1, Oct 16			
2, 7 and 8	§1, §5.2.1 and Annex A	The IMDA TS CMT Issue 1 has been replaced by the IMDA TS CMT Issue 1 Rev 1. Main changes include: (a) Support for LTE-Advanced TDD RIT (E-UTRAN RAT)	1 Jul 17
7	§5.1.1 Table 1	(b) Use of E-UTRAN band 38 (2570 MHz – 2615 MHz) and band 40 (2300 MHz – 2340 MHz)	
6	§4.4.2	(c) Equipment safety testing to be performed to the IEC 60950-1 safety standard	

Revised TS		Items Changed	Date of Issue
Page	Reference		
Changes to IDA TS CMT Issue 1, Jun 11			
2 5 5 7 8	§1 §4.3 §4.4 §5.2 Annex A	The IDA TS CMT Issue 1 has been replaced by the IMDA TS CMT Issue 1. Changes are largely editorial to provide clarity of requirements for conformity assessment by equipment suppliers, in line with standards development that has taken place in the SDOs and the IMT systems adopted by network operators. Main changes include: (a) Cessation of support for the GSM RITs by 1 April 2017; (b) Updating of measurement procedure for assessment of SAR; (c) Updating of EMC requirements for CMT; (d) Updating of essential requirements for the support of IMT-Advanced / LTE-Advanced RITs; and (e) Addition of a Checklist for facilitating suppliers' declaration of conformity to requirements defined in the Specification.	1 Oct 16

Revised TS		Items Changed	Effective Date
Page	Reference		
Changes to IDA TS GSM-MT and 3G-MT Issue 1 Rev 2, May 11			
3 4	§1.1 §2.2.1	Title of Specification has been renamed as "Technical Specification for Cellular Mobile Terminal" (IDA TS CMT Issue 1). The Technical Specification has superseded the following two IDA Technical Specifications: (a) IDA TS GSM-MT Issue 1 Rev 2 (b) IDA TS 3G-MT Issue 1 Rev 2 Changes are mainly editorial in nature, in which the essential technical requirements for compliance formerly defined under the two Specifications (TS GSM-MT and 3G-MT) are now incorporated as one. It also includes the requirements for the Radio Access Technology, E-UTRA.	Jun 11