



Telecommunications
Standards Advisory
Committee (TSAC)

Technical Specification

Cellular Base Station and
Repeater System

IMDA TS CBS
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Technical Specification for Cellular Base Station and Repeater System

1 Scope

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

- (a) ITU IMT-2000 radio interface technologies (E-UTRA FDD) identified in ITU-R M.1457-14, and transposed from 3GPP Release 8 and 9;
- (b) ITU IMT-Advanced radio interface technologies (LTE-Advanced) identified in ITU-R M.2012-4, and transposed from 3GPP Release 10 and beyond;
- (c) LTE-Advanced technology series from 3GPP Release 13 onwards, marked with LTE-Advanced Pro; and
- (d) ITU IMT-2020 radio interface technologies (5G NR) identified in ITU-R M.2412-0, and transposed from 3GPP Release 15 and beyond.

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 Organisations¹.

- 1. ETSI EN 301 908-1: IMT cellular networks; Harmonised Standard for access to radio spectrum; Part 1: Introduction and common requirements
- 2. ETSI EN 301 908-14: IMT cellular networks; Harmonised Standard for access to radio spectrum; Part 14: Evolved Universal Terrestrial Radio Access (E-UTRA) Base Stations (BS)
- 3. ETSI EN 301 908-15: IMT cellular networks; Harmonised Standard for access to radio spectrum; Part 15: Evolved Universal Terrestrial Radio Access (E-UTRA) FDD Repeaters
- 4. ETSI EN 301 908-18: IMT cellular networks; Harmonised Standard for access to radio spectrum; Part 18: E-UTRA, UTRA and GSM/EDGE Multi-Standard Radio (MSR) Base Station (BS) 3GPP Rel-15 update including NR
- 5. ETSI EN 301 908-23: IMT cellular networks; Harmonised Standard for access to radio spectrum; Part 23: Active Antenna System (AAS) Base Station (BS)
- 6. ETSI EN 301 908-24: IMT cellular networks; Harmonised Standard for access to radio spectrum; Part 24: New Radio (NR) Base Stations (BS)
- 7. ETSI TS 136 141: LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) conformance testing
- 8. ETSI TS 137 145-1: Universal Mobile Telecommunications System (UMTS); LTE; 5G; Active Antenna System (AAS) Base Station (BS) conformance testing; Part 1: conducted conformance testing
- 9. ETSI TS 137 145-2: Universal Mobile Telecommunications System (UMTS); LTE; 5G; Active Antenna

¹ 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.

- System (AAS) Base Station (BS) conformance testing; Part 2: radiated conformance testing
10. ETSI TS 138 114: 5G; NR; Repeaters ElectroMagnetic Compatibility (EMC)
 11. ETSI TS 138 115-1: 5G; NR; Repeater conformance testing – Part 1: Conducted conformance testing
 12. ETSI TS 138 115-2: 5G; NR; Repeater conformance testing – Part 2: Radiated conformance testing
 13. ETSI TS 138 141-1: 5G; NR; Base Station (BS) conformance testing; Part1: Conducted conformance testing
 14. ETSI TS 138 141-2: 5G; NR; Base Station (BS) conformance testing; Part 2: Radiated conformance testing
 15. ETSI EN 301 489-1: EMC standard for radio equipment and services; Part 1: Common technical requirements
 16. ETSI EN 301 489-50: EMC standard for radio equipment and services; Part 50: Specific conditions for Cellular Communication Base Station (BS), repeater and ancillary equipment
 17. FCC Part 22 Subpart H: Cellular radiotelephone service
 18. FCC Part 15 §15.407: General technical requirements
 19. FCC Part 90 Subpart S: Regulations governing the licensing and use of frequencies in the 806-824, 851-869, 896-901, and 935-940 MHz bands
 20. ANSI C63.10-2013: Procedures for compliance testing of unlicensed wireless devices
 21. ANSI C63.26-2015: Standard For Compliance Testing Of Transmitters Used In Licensed Radio Services
 22. ITU-R M.1457-14: Detailed specifications of the terrestrial radio interfaces of International Mobile Telecommunications-2000 (IMT-2000)
 23. ITU-R M.2012-4: Detailed specifications of the terrestrial radio interfaces of International Mobile Telecommunications-Advanced (IMT-Advanced)
 24. IEC CISPR 32: Electromagnetic compatibility of multimedia equipment – Emission requirements
 25. IEC/EN 61000-3-2: Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)
 26. IEC/EN 61000-3-3: Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection
 27. IEC/EN 61000-3-11: Electromagnetic compatibility (EMC) - Part 3-11: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems - Equipment with rated current ≤ 75 A and subject to conditional connection
 28. IEC/EN 61000-3-12: Electromagnetic compatibility (EMC) - Part 3-12: Limits - Limits for harmonic currents produced by equipment connected to public low-voltage systems with input current >16 A and ≤ 75 A per phase
 29. IEC CISPR 35: Electromagnetic compatibility of multimedia equipment – Immunity requirements
 30. IEC 62368-1: Audio/video, information and communication technology equipment – Part 1: Safety requirements

31. Recommendation ITU-R M.[IMT-2020.SPECS] - Detailed specifications of the terrestrial radio interfaces of International Mobile Telecommunications-2020 (IMT-2020)
32. IMDA TS SRD: IMDA Technical Specification for Short Range Devices

3 Abbreviations²

3GPP	3rd Generation Partnership Project
AAS	Active Antenna System
AC	Alternating Current
ACLR	Adjacent channel leakage power ratio
BS	Base Station
CBS	Cellular Base Station or Repeater
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)
FCC	Federal Communications Commission
FDD	Frequency Division Duplex
IEC	International Electrotechnical Commission
IMT	International Mobile Telecommunications
ITU	International Telecommunication Union
ITU-R	ITU Radiocommunication Sector
LAA	Licence Assisted Access
LTE	Long Term Evolution (also known as E-UTRA)
MSR	Multi Standard Radio
NR	New Radio
OTA	Over The Air
RAT	Radio Access Technology
RF	Radio Frequency
RIT	Radio Interface Technology
SDO	Standards Development Organisation
TDD	Time Division Duplex
TRP	Total Radiated Power

² 3GPP™ and LTE™ are Trade Marks registered by ETSI for the benefit of its Members and 3GPP Organizational Partners.

4 General Requirements

4.1 Power Supply

The CBS may be AC powered or DC powered. For an AC powered equipment, the Specification shall be complied with when operating from an AC mains supply of voltage, $230V \pm 10\%$ and frequency, $50 \text{ Hz} \pm 2\%$. Where external power supply is used (e.g. AC/DC power converter), it shall not affect the capability of the equipment to meet the requirements of this Specification.

4.2 Electromagnetic Compatibility (EMC) and Equipment Safety Requirements

4.2.1 EMC assessment

For EMC assessment, the CBS shall be classified as equipment for fixed use. This equipment classification is used to determine the applicability of the EMC (emission and immunity) testing requirements based on §7 of ETSI EN 301 489-1. The ETSI EN 301 489-1 standard shall be used in conjunction with the ETSI EN 301 489-50 standard for CBS.

For NR Repeaters, the EMC (emission and immunity) testing requirement shall be based on §7 of ETSI EN 138 114 standard.

4.2.1.1 EMI or emission measurements

The following emissions measurements shall be performed on the CBS, where applicable:

- (a) Radiated emissions from associated ancillary equipment not incorporated in the CBS shall be measured to Class B requirements defined in §5 and Tables A.4 and A.5 of CISPR 32; or §8.2 of EN 301 489-1;
- (b) Conducted emission at the DC power port of the CBS shall be measured to the limits defined in §8.3 of EN 301 489-1;
- (c) Conducted emission at the AC mains port shall be measured for CBS with dedicated AC/DC power converter to Class B requirements defined in §5 and Table A.10 of CISPR 32; or §8.4 of EN 301 489-1. 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 of CISPR 32);
- (d) For current harmonics emission the test methods and limits of either IEC/EN 61000-3-2 or IEC/EN 61000-3-12 shall apply;
- (e) For voltage fluctuations (Flickers) the test methods and limits of either IEC/EN 61000-3-3 or IEC/EN 61000-3-11 shall apply; and
- (f) Conducted emission at the wired network port of the CBS shall be measured to Class B requirements defined in Table A.12 of CISPR 32; or §8.7 of EN 301 489-1.

4.2.1.2 EMS or immunity testing

The following immunity tests may be performed on the CBS to requirements defined in CISPR 35, or §9 of EN 301 489-1, where applicable:

- (a) RF electromagnetic field (80 MHz to 6 GHz) at the enclosure of equipment;
- (b) Electrostatic discharge at the enclosure of equipment;
- (c) Fast transients (common mode) at AC mains power ports, and additionally on signal ports, wired ports, control ports and DC power ports that have cables longer than 3 m;

- (d) RF common mode 0.15 MHz to 80 MHz at AC mains power ports, and additionally on signal ports, wired ports, control ports and DC power ports that have cables longer than 3 m;
- (e) Voltage dips and interruptions at AC mains power port of equipment with dedicated AC/DC power converter; and
- (f) Surges, common and differential mode at AC mains power port of equipment with dedicated AC/DC power converter, and additionally on wired network ports.

4.2.2 Equipment safety testing

Equipment suppliers (including manufacturers, importers, distributors, retailers and other traders) shall ensure that they only place products which are safe on the market. They can enhance the safety of their products by the following ways:

- (a) Vigorously testing their products before placing them on the market;
- (b) Ensuring that their products are certified to international safety standards;
- (c) Where products are already under the purview of other government agencies, ensure that they satisfied the relevant regulatory requirements by the agencies; and
- (d) Informing users/consumers of any potential hazards or risks arising from the use of their products.

Equipment shall comply with the IEC 62368-1 (minimum Ed. No. 2) standard if it is designed for use with a voltage rating between 50V and 1000V for AC or between 75 V and 1500V for DC.

5 Technical Requirements

5.1 Operating Frequencies

The CBS shall operate within the frequency bands given in Table 1. Conformance with technical requirements outlined in this Specification is based on the assumption that the operating frequency bands are shared between systems of the IMT family. When LAA is supported, in addition to frequency bands in Table 1, the license-exempt spectrum given in Table 1a should be utilised.

Table 1: CBS Operating Frequency Bands

E-UTRAN Band	NR Band	Direction of Transmission	Frequency Range
1	n1	Transmit	2110 MHz – 2170 MHz
		Receive	1920 MHz – 1980 MHz
3	n3	Transmit	1805 MHz – 1880 MHz
		Receive	1710 MHz – 1785 MHz
7	n7	Transmit	2620 MHz – 2690 MHz
		Receive	2500 MHz – 2570 MHz
8	n8	Transmit	925 MHz – 960 MHz
		Receive	880 MHz – 915 MHz
26	n26	Transmit	859 MHz – 894 MHz
		Receive	814 MHz – 849 MHz
28	n28	Transmit	758 MHz – 803 MHz
		Receive	703 MHz – 748 MHz
38	n38	Transmit and Receive	2570 MHz – 2620 MHz
40	n40	Transmit and Receive	2300 MHz – 2400 MHz
-	n77	Transmit and Receive	3300 MHz – 4200 MHz
-	n78	Transmit and Receive	3300 MHz – 3800 MHz
-	n257	Transmit and Receive	26500 MHz – 29500 MHz
-	n258	Transmit and Receive	24250 MHz – 27500 MHz
-	n261	Transmit and Receive	27500 MHz – 28350 MHz

Table 1a: License-exempt Bands for LAA

E-UTRA Operating Band <small>Note 1</small>	BS Transmit and Receive Frequency Range
46a	5150 MHz – 5250 MHz
46b	5250 MHz – 5350 MHz
46c	5470 MHz – 5725 MHz
46d	5725 MHz – 5925 MHz <small>Note 2</small>
Note 1: Band 46 is divided into four sub-bands Note 2: LAA operating in band 46d shall only transmit and receive within Singapore's frequency spectrum allocation (5725 MHz – 5850 MHz)	

The precise operating frequency range of a CBS shall follow that of the Network Operator from whom the service is provided. Information on spectrum assignment to different Network Operators could also be found in IMDA's Spectrum Management Handbook.

5.2 Radio Interface Requirements

Manufacturers or suppliers shall demonstrate that the CBS (base stations or repeaters) have been tested and certified for operating in the frequency bands stated in Table 1 clause 5.1.1, and conformity to any or a combination of standards given in Table 2 for Base Stations or Table 3 for Repeaters.

Table 2: IMT RITs and the Reference Standards used for Base Stations

IMT-2000 / IMT-Advanced / IMT-2020 terrestrial RIT		RAT name in SDO	Reference standards used
(a)	LTE-Advanced	E-UTRA	ETSI EN 301 908-14 / FCC Part 22 ³ / FCC Part 90S ³
(b)	LTE-Advanced and IMT-2020	E-UTRA and NR	ETSI EN 301 908-18 covers MSR capable CBS.
(c)	IMT-2020	NR	ETSI EN 301 908-24
(d)	LTE-Advanced and IMT-2020	E-UTRA and NR	For AAS: ETSI EN 301 908-23

Table 3: IMT RITs and the Reference Standards used for Repeaters

IMT-2000 / IMT-Advanced terrestrial RIT		RAT name in SDO	Reference standards used
(a)	LTE-Advanced	E-UTRA FDD	ETSI EN 301 908-15
(b)	IMT-2020	NR	ETSI TS 138 115-1 / ETSI TS 138 115-2

The effective isotropic radiating power (EIRP) of base stations or repeaters in operation shall be limited to 62dBm/5MHz. The rated output power/TRP limits for base station classes (wide area, medium range and local area) will be according to Tables 6.2.1-1 and/or 6.2.1-2 (in ETSI TS 136 141 / TS 138 141-1) and 6.3.1-1 (in ETSI TS 138 141-2).

Use of the CBS shall comply with the International Commission on Non-Ionizing Radiation Protection (ICNIRP) guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz).

CBS that supports E-UTRA with LAA shall be tested for compliance with the applicable requirements following test methods and conditions given in EN 301 908-14, or FCC Part 15 §15.407 and ANSI C63.10-2013. Power output limits and spurious emissions shall be tested and certified for conformity to the relevant requirements as given IMDA TS SRD.

³ Only for equipment that operates on LTE Band 26

Annex A CBS 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 Base Stations and Repeater Equipment ("IMDA TS CBS").

Please note:

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

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

"**C**" means that compliance with the technical requirement set out in the IMDA TS CBS § cited in this Checklist is **Conditional**. In this case, the need to comply is contingent on the type of CBS (base station or repeater), RIT/RAT and application indicated in the remarks column.

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

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

A1 General requirements for base stations and repeaters

IMDA TS CBS §	Parameter	Reference standard	CR	Remarks	
1	IMT-Advanced /LTE-Advanced / LTE-Advanced Pro / IMT-2020 RITs		M	Refer to §5.2 of IMDA TS CBS	
4.1	Power supply		M	CBS powered by a dedicated AC/DC power converter is defined as AC mains powered equipment.	
4.2	EMC and safety requirements		M		
4.2.1	EMC assessment	IEC CISPR 32 / ETSI EN 301 489-1 (to be used with ETSI EN 301 489-50)	M		
4.2.1.1 (a)	Radiated emission		C	Applicable to ancillary equipment not incorporated in the CBS	
4.2.1.1 (b)	Conducted emission: DC power port		C	Applicable to CBS with DC power port	
4.2.1.1 (c)	Conducted emission: AC mains power port		C	Applicable to CBS with dedicated AC/DC power converter	
4.2.1.1 (d)	Harmonic current emission		IEC/EN 61000-3-2 / IEC/EN 61000-3-12	C	Applicable to AC mains input port
4.2.1.1 (e)	Voltage fluctuations and flicker		IEC/EN 61000-3-3 / IEC/EN 61000-3-11	C	Applicable to AC mains input port
4.2.1.1 (f)	Conducted emission: Wired network port	IEC CISPR 32 / ETSI EN 301 489-1 (to be used with ETSI EN 301 489-50)	C	Applicable to radio equipment and/or ancillary equipment for fixed use which have wired network port	
4.2.1.2 (a)	RF electromagnetic field (80 MHz to 6 GHz)	IEC CISPR 35 / ETSI EN 301 489-1 (to be used with ETSI EN 301 489-50)	V		
4.2.1.2 (b)	Electrostatic discharge		V		
4.2.1.2 (c)	Fast transients common mode		V	Applicable to CBS with dedicated AC/DC power converter	
4.2.1.2 (d)	RF common mode 0.15 MHz to 80 MHz		V		
4.2.1.2 (e)	Voltage dips and interruptions		V	Applicable to CBS with dedicated AC/DC power converter	
4.2.1.2 (f)	Surges		V	Applicable to CBS with dedicated AC/DC power converter	
4.2.2	Equipment safety testing	IEC 62368-1 (min. Ed. no. 2)	M		

Note: For 5G repeaters, EMC parameters given in §4.2.1 IMDA TS CBS shall be tested according to ETSI TS 138 114

A2 Conformance requirements for base stations and repeaters that operate on band 26

IMDA TS CBS §	Parameter	Reference Standard	CR
5.1	Operating frequencies	As specified by IMDA	M
5.2	Radio interface requirements	FCC Part 22 / FCC Part 90S / IEEE/ANSI C63.26-2015	M
			M

A3 Conformance requirements for base stations that operate on bands other than band 26

A3.1 Requirements for base stations

IMDA TS CBS §	Parameter	Reference Standard	CR
5.1	Operating frequencies	As specified by IMDA	M
5.2	Radio interface requirements	ETSI EN 301 908-1	M
	Radiated emissions		M

A3.2 Requirements for base stations that support the E-UTRA technology

IMDA TS CBS §	Parameter	Reference Standard	CR
5.2 - Table 2 (b)	Operating band unwanted emissions	ETSI EN 301 908-14	M
	Adjacent channel leakage power ratio (ACLR)		M
	Transmitter spurious emissions		M
	Base station maximum output power		M
	Transmitter intermodulation		M
	Receiver spurious emissions		M
	Blocking characteristics		M
	Receiver intermodulation characteristics		M
	Adjacent channel selectivity (ACS) and narrowband blocking		M
	Home BS output power for adjacent UTRA channel protection		M
	Home BS output power for adjacent E-UTRA channel protection		M
	Home BS output power for co-channel E-UTRA protection		M
	Reference sensitivity level		M

A3.3 Requirements for MSR capable base stations that support the E-UTRA, UTRA and/or NR technologies

IMDA TS CBS §	Parameter	Reference Standard	CR
5.2 - Table 2 (c)	Operating band unwanted emissions	ETSI EN 301 908-18	M
	Adjacent channel leakage power ratio (ACLR)		M
	Transmitter spurious emissions		M
	Base station maximum output power		M
	Transmitter intermodulation		M
	Receiver spurious emissions		M
	In-band blocking		M
	Out-of-band blocking		M
	Receiver intermodulation characteristics		M
	Narrowband blocking		M
	Reference sensitivity level		M

A3.4 Requirements for base stations that support NR

A3.4.1 Requirements for BS type 1-C and BS type 1-H

IMDA TS CBS §	Parameter	Reference Standard	CR	
			BS type 1-C	BS type 1-H
5.2 – Table 2 (d)	Operating band unwanted emissions	ETSI EN 301 908-24	M	M
	Adjacent channel leakage power ratio (ACLR)		M	M
	Transmitter spurious emissions		M	M
	Base station maximum output power		M	M
	Transmitter intermodulation		M	M
	Receiver spurious emissions		M	M
	In-band blocking		M	M
	Out-of-band blocking		M	M
	Receiver intermodulation		M	M
	Adjacent Channel Selectivity (ACS)		M	M
	Reference sensitivity level		M	M

Note: For the definition of “BS type 1-C” and “BS type 1-H”, see EN 301 908-24

A3.4.2 Requirements for BS type 1-H, type 1-O and type 2-O

IMDA TS CBS §	Parameter	Reference Standard	CR		
			BS type 1-H	BS type 1-O	BS type 2-O
5.2 – Table 2 (d)	OTA Operating band unwanted emissions	ETSI EN 301 908-24	NA	M	M
	OTA Adjacent channel leakage power ratio (ACLR)			M	M
	OTA Transmitter spurious emissions			M	M
	Radiated transmit power		M	M	M
	OTA Base station maximum power		NA	M	M
	OTA Transmitter intermodulation			M	NA
	OTA Receiver spurious emissions			M	M
	OTA In-band blocking			M	M
	OTA Out-of-band blocking			M	M
	OTA Receiver intermodulation			M	M
	OTA Adjacent channel selectivity (ACS)			M	M
	OTA Sensitivity		M	M	NA
	OTA Reference sensitivity level		NA	M	M

Note: For the definition of “BS type 1-H”, “BS type 1-O” and “BS type 2-O”, see EN 301 908-24

A3.5 Requirements for AAS capable base stations that support single-RAT E-UTRA or MSR (E-UTRA, NR)

IMDA TS CBS §	Parameter	Reference Standard	CR	
			Hybrid BS	OTA BS
5.2 – Table 2 (e)	Operating Band unwanted emissions	ETSI EN 301 908-23	M	NA
	Spectrum Emission Mask		M	
	Adjacent channel leakage power ratio (ACLR)		M	
	Transmitter spurious emissions		M	
	Base station maximum output power		M	
	Transmitter intermodulation		M	
	Receiver spurious emissions		M	
	Blocking		M	
	Receiver intermodulation		M	
	Adjacent Channel Selectivity (ACS)		M	
	Reference sensitivity level		M	
	OTA Operating Band unwanted emissions		NA	M
	OTA Spectrum Emission Mask			M
	OTA Adjacent channel leakage power ratio (ACLR)			M
OTA Transmitter spurious		M		

	emissions			
	Radiated transmit power		M	M
	OTA Base station maximum output power		NA	M
	OTA Transmitter intermodulation			M
	OTA Receiver spurious emissions			M
	OTA blocking			M
	OTA Receiver intermodulation			M
	OTA Adjacent Channel Selectivity (ACS)			M
	OTA Sensitivity		M	M
	OTA Reference sensitivity level		NA	M
Note: For the definition of “Hybrid BS” and “OTA BS”, see EN 301 908-23				

A3.6 Requirements for repeaters that support E-UTRA FDD technology

IMDA TS CBS §	Parameter	Reference Standard	CR
5.2 - Table 3 (b)	Operating band unwanted emissions	ETSI EN 301 908-15	M
	Spurious emissions		M
	Maximum output power		M
	Input intermodulation		M
	Out-of-band gain		M
	Adjacent channel rejection ratio		M
	Output intermodulation		M

A3.7 Requirements for repeaters that support NR technology

IMDA TS CBS §	Parameter	Reference Standard	CR	Remarks
5.2 - Table 3 (b)	Conducted conformance test	ETSI TS 138 115-1		Applicable to repeaters of type 1-C
	Repeater output power		C	
	Out of band gain		C	
	Adjacent channel leakage power ratio		C	
	Operating band unwanted emissions		C	
	Transmitter spurious emissions		C	
	Receiver spurious emissions		C	
	Adjacent channel rejection ratio		C	
	Radiated conformance test	ETSI TS 138 115-2		Applicable to repeaters of type 2-O
	OTA output power (EIRP)		C	
	OTA repeater output power (TRP)		C	
	OTA out of band gain		C	

	OTA Adjacent channel leakage power ratio (ACLR)		C	
	OTA operating band unwanted emissions		C	
	OTA transmitter spurious emissions		C	
	OTA adjacent channel rejection ratio (ACRR)		C	

A3.8 Requirements for E-UTRA equipment that uses LAA

IMDA TS CBS §	Parameter	Reference Standard	CR
5.1	Operating frequencies	-	M
5.2.1	Maximum RF power	Table 1 of IMDA TS SRD	M
	Spurious emission limits		M
	DFS functions		M
	Energy detection threshold	ETSI EN 301 908-14	M
	Maximum channel occupancy time		M
	Conformance tests at band 46	ETSI EN 301 908-14, or FCC Part15 §15.407 / ANSI C63.10-2013	M

Annex B Corrigendum / Addendum

Revised TS Reference	Items Changed	Date of Issue
Changes to IMDA TS CBS Issue 1 Rev 3, Nov 2023		
	The IMDA TS CBS Issue 1 Rev 3 has been replaced by the IMDA TS CBS Issue 1 Rev 4. Major changes: i. Removal of reference standards for UTRA equipment ii. Addition of band 28 iii. Addition of conformance requirements for NR repeaters	Dec 2024
Whole document §4.2.1 §5.1 Table 1 §5.2 Table 3 Annex A1 Annex A3 Annex A3	(a) Removal of reference standards (ETSI EN 301 908-3 and ETSI EN 301 908-11) for UTRA equipment (b) Inclusion of reference standard ETSI TS 138 114 for EMC for 5G repeaters (c) Inclusion of band 28 (d) Inclusion of reference standards ETSI TS 138 115-1 and ETSI TS 138 115-2 for NR repeaters (e) Inclusion of reference standard ETSI TS 138 114 for EMC for 5G repeaters (f) Removal of conformance requirements for UTRA FDD repeaters (g) Inclusion of conformance requirements for NR repeaters	

Revised TS Reference	Items Changed	Date of Issue
Changes to IMDA TS CBS Issue 1 Rev 2, Sep 20		
	The IMDA TS CBS Issue 1 Rev 2 has been replaced by the IMDA TS CBS Issue 1 Rev 3.	Nov 2023
Whole document §4.2.1.1 §4.2.1.2 §4.2.2 §5 Table 1 §5 Table 2 §5.2.2 Annex A Annex A Annex A	(a) Reorganising the document by removing unnecessary information and avoiding pointing to references in the reference section (b) Inserting "limits" in clauses (b), (d) and (e) (c) Inclusion of current harmonics test methods of IEC/EN 61000-3-2 or IEC/EN 61000-3-12 (d) Inclusion of voltage fluctuations test methods of IEC/EN 61000-3-3 or IEC/EN 61000-3-11 (e) Changes to clauses (c) and (d) to clarify that tests are to be done on all AC power ports regardless of cable lengths, and that tests are to be done on signal, wired, controlled and DC power ports that have cables longer than 3 m; (f) Changes to clauses (f) to include tests on wired network ports (g) Changes to equipment safety testing specifications (h) Inclusion of band 26 (i) Including FCC Part 22/90S (for band 26 only) (j) Including ETSI EN 301 908-23 as reference standards for AAS BS (k) Inclusion of rated output power/TRP limits according to base station classes (l) Providing requirements for base stations operating on band 26 (m) Providing better clarity to requirements for different RAT by streamlining the requirement tables and separating them (n) Providing requirements for NR based on the base station types (BS Type 1C, Type 1H, Type 1-0 and Type 2-0) (o) Providing requirements for AAS capable BS	

Revised TS		Items Changed	Date of Issue
Page	Reference		
Changes to IMDA TS CBS Issue 1 Rev 1, Jul 17			
5 5 5 and 6 7 8 8 8 and 12 9	 §4.3.1.2 §4.3 Table 1, Table 1a Table 2 §5.2.2 §5.2.3 and Annex A Annex A	<p>The IMDA TS CBS Issue 1 Rev 1 has been replaced by the IMDA TS CBS Issue 1 Rev 2.</p> <p>Changes were made to include specifications for 5G NR and to keep up with new developments that have taken place in the IMT systems of the network operators and standards.</p> <p>Main changes include:</p> <ul style="list-style-type: none"> (a) Removal of section on radiation safety (b) Replacing CISPR 24 with CISPR 35 for immunity testing (c) Removal of need to comply with ITU-T K.116 and IEC 60215 (d) Updating of CBS operating bands to include 5G NR; include license-exempt bands for LAA (e) Support for 5G NR (f) Included maximum power limits of equipment in operation (g) Included support for LAA-enabled CBS (h) Revision of Checklist to include support for 5G NR and to reflect changes in new developments in standards 	Sep 2020

Revised TS		Items Changed	Date of Issue
Page	Reference		
Changes to IMDA TS CBS Issue 1, Oct 16			
2 and 7 7 9	§1 and §5.2 Table 2 §5.1.1 Table 1 Annex A	<p>The IMDA TS CBS Issue 1 has been replaced by the IMDA TS CBS Issue 1 Rev 1.</p> <p>Changes are intended to provide clarity of requirements for conformity assessment by equipment suppliers, in line with development that has taken place in the IMT systems of the network operators.</p> <p>Main changes include:</p> <ul style="list-style-type: none"> (a) Support for LTE-Advanced TDD RIT (E-UTRAN RAT); (b) Use of E-UTRAN band 38 (2570 MHz – 2615 MHz) and band 40 (2300 MHz – 2340 MHz) (c) Revision of Checklist for clarity in supporting LTE-Advanced TDD RIT (E-UTRAN RAT) 	1 Jul 2017

Revised TS		Items Changed	Date of Issue
Page	Reference		
Changes to IDA TS CBS Issue 1, Jun 11			
2 5 7 8	§1 §4.3 §5.2 Annex A	<p>The IDA TS CBS Issue 1 has been replaced by the IMDA TS CBS Issue 1.</p> <p>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.</p> <p>Main changes include:</p> <ul style="list-style-type: none"> (a) Cessation of support for the GSM RITs by 1 April 2017; (b) Updating of EMC and safety requirements for CBS; (c) Updating of essential requirements for the support of IMT-Advanced / LTE-Advanced RITs; and (d) Addition of a Checklist for facilitating suppliers' declaration of conformity to requirements defined in the Specification. 	1 Oct 2016

Revised TS		Items Changed	Effective Date
Page	Reference		
Changes to IDA TS GSM-BS Issue 1 Rev 2 and 3G-BS Issue 1 Rev 1, May 11			
3 4	§1.1 §2.2.1	<p>Title of Specification has been renamed as "Technical Specification for Cellular Base Station and Repeater System" (IDA TS CBS Issue 1).</p> <p>The Technical Specification has superseded the following two IDA Technical Specifications:</p> <ul style="list-style-type: none"> (a) IDA TS GSM-BS Issue 1 Rev 2 (b) IDA TS 3G-BS Issue 1 Rev 1 <p>Changes are mainly editorial in nature, in which the essential technical requirements for compliance formerly defined under the two Specifications (TS GSM-BS and 3G-BS) are now incorporated as one.</p> <p>It also includes the requirements for the Radio Access Technology, E-UTRA.</p>	Jun 2011