



**5G;
NR;**
Base Station (BS) conformance testing
Part 1: Conducted conformance testing
(3GPP TS 38.141-1 version 16.4.0 Release 16)



Reference

RTS/TSGR-0438141-1vG40

Keywords

5G

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Important notice

The present document can be downloaded from:

<http://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the prevailing version of an ETSI deliverable is the one made publicly available in PDF format at www.etsi.org/deliver.

Users of the present document should be aware that the document may be subject to revision or change of status.

Information on the current status of this and other ETSI documents is available at

<https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx>

If you find errors in the present document, please send your comment to one of the following services:

<https://portal.etsi.org/People/CommitteeSupportStaff.aspx>

Copyright Notification

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© ETSI 2020.

All rights reserved.

DECT™, PLUGTESTS™, UMTS™ and the ETSI logo are trademarks of ETSI registered for the benefit of its Members.

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

oneM2M™ logo is a trademark of ETSI registered for the benefit of its Members and of the oneM2M Partners.

GSM® and the GSM logo are trademarks registered and owned by the GSM Association.

Intellectual Property Rights

Essential patents

IPRs essential or potentially essential to normative deliverables may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<https://ipr.etsi.org/>).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

Legal Notice

This Technical Specification (TS) has been produced by ETSI 3rd Generation Partnership Project (3GPP).

The present document may refer to technical specifications or reports using their 3GPP identities. These shall be interpreted as being references to the corresponding ETSI deliverables.

The cross reference between 3GPP and ETSI identities can be found under <http://webapp.etsi.org/key/queryform.asp>.

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

Contents

Intellectual Property Rights	2
Legal Notice	2
Modal verbs terminology.....	2
Foreword.....	13
1 Scope	15
2 References	15
3 Definitions, symbols and abbreviations	17
3.1 Definitions	17
3.2 Symbols.....	19
3.3 Abbreviations	21
4 General conducted test conditions and declarations.....	22
4.1 Measurement uncertainties and test requirements	22
4.1.1 General.....	22
4.1.2 Acceptable uncertainty of Test System.....	22
4.1.2.1 General	22
4.1.2.2 Measurement of transmitter	23
4.1.2.3 Measurement of receiver.....	24
4.1.2.4 Measurement of performance requirements.....	27
4.1.3 Interpretation of measurement results.....	27
4.2 Conducted requirement reference points	27
4.2.1 BS type 1-C	27
4.2.2 BS type 1-H.....	28
4.3 Base station classes	29
4.4 Regional requirements.....	29
4.5 BS configurations	30
4.5.1 BS type 1-C	30
4.5.1.1 Transmit configurations	30
4.5.1.1.1 General	30
4.5.1.1.2 Transmission with multiple transmitter antenna connectors.....	30
4.5.1.2 Receive configurations.....	31
4.5.1.2.1 General	31
4.5.1.2.2 Reception with multiple receiver antenna connectors, receiver diversity.....	31
4.5.1.3 Duplexers	31
4.5.1.4 Power supply options	32
4.5.1.5 Ancillary RF amplifiers.....	32
4.5.2 BS type 1-H.....	33
4.5.2.1 Transmit configurations	33
4.5.2.2 Receive configurations.....	33
4.5.2.3 Power supply options	34
4.5.3 BS with integrated Luant BS modem	34
4.6 Manufacturer declarations.....	34
4.7 Test configurations	38
4.7.1 General.....	38
4.7.2 Test signal used to build Test Configurations.....	38
4.7.3 NRTC1: Contiguous spectrum operation.....	38
4.7.3.1 NRTC1 generation	38
4.7.3.2 NRTC1 power allocation	39
4.7.4 NRTC2: Contiguous CA occupied bandwidth.....	39
4.7.4.1 NRTC2 generation	39
4.7.4.2 NRTC2 power allocation	39
4.7.5 NRTC3: Non-contiguous spectrum operation	39
4.7.5.1 NRTC3 generation	40
4.7.5.2 NRTC3 power allocation	40
4.7.6 NRTC4: Multi-band test configuration for full carrier allocation.....	40

4.7.6.1	NRTC4 generation	40
4.7.6.2	NRTC4 power allocation	41
4.7.7	NRTC5: Multi-band test configuration with high PSD per carrier	41
4.7.7.1	NRTC5 generation	41
4.7.7.2	NRTC5 power allocation	41
4.8	Applicability of requirements	42
4.8.1	General	42
4.8.2	Requirement set applicability	42
4.8.3	Applicability of test configurations for single-band operation	42
4.8.4	Applicability of test configurations for multi-band operation	43
4.9	RF channels and test models	44
4.9.1	RF channels	44
4.9.2	Test models	45
4.9.2.1	General	45
4.9.2.2	FR1 test models	45
4.9.2.2.1	FR1 test model 1.1 (NR-FR1-TM1.1)	47
4.9.2.2.2	FR1 test model 1.2 (NR-FR1-TM1.2)	48
4.9.2.2.3	FR1 test model 2 (NR-FR1-TM2)	48
4.9.2.2.4	FR1 test model 2a (NR-FR1-TM2a)	49
4.9.2.2.5	FR1 test model 3.1 (NR-FR1-TM3.1)	49
4.9.2.2.6	FR1 test model 3.1a (NR-FR1-TM3.1a)	49
4.9.2.2.7	FR1 test model 3.2 (NR-FR1-TM3.2)	50
4.9.2.2.8	FR1 test model 3.3 (NR-FR1-TM3.3)	50
4.9.2.2.9	NB-IoT operation in NR in-band test model (NR-N-TM)	51
4.9.2.3	Data content of Physical channels and Signals for NR-FR1-TM	51
4.9.2.3.1	PDCCH	52
4.9.2.3.2	PDSCH	52
4.9.2.4	Data content of Physical channels and Signals for NR-N-TM	53
4.9.3	NB-IoT testing	54
4.10	Requirements for contiguous and non-contiguous spectrum	54
4.11	Requirements for BS capable of multi-band operation	54
4.12	Format and interpretation of tests	55
5	Operating bands and channel arrangement	57
6	Conducted transmitter characteristics	58
6.1	General	58
6.1.1	BS type 1-C	58
6.1.2	BS type 1-H	58
6.2	Base station output power	58
6.2.1	Definition and applicability	58
6.2.2	Minimum requirement	59
6.2.3	Test purpose	59
6.2.4	Method of test	59
6.2.4.1	Initial conditions	59
6.2.4.2	Procedure	59
6.2.5	Test requirement	60
6.3	Output power dynamics	60
6.3.1	General	60
6.3.2	RE power control dynamic range	60
6.3.2.1	Definition and applicability	60
6.3.2.2	Minimum requirement	60
6.3.2.3	Test purpose	61
6.3.3	Total power dynamic range	61
6.3.3.1	Definition and applicability	61
6.3.3.2	Minimum requirement	61
6.3.3.3	Test purpose	61
6.3.3.4	Method of test	61
6.3.3.4.1	Initial conditions	61
6.3.3.4.2	Procedure	61
6.3.3.5	Test requirements	62
6.3.4	NB-IoT RB power dynamic range	62

6.3.4.1	Definition and applicability	62
6.3.4.2	Minimum requirement	62
6.3.4.3	Test purpose	62
6.3.4.4	Method of test	62
6.3.4.5	Test requirements	63
6.4	Transmit ON/OFF power	63
6.4.1	Transmitter OFF power	63
6.4.1.1	Definition and applicability	63
6.4.1.2	Minimum requirement	63
6.4.1.3	Test purpose	63
6.4.1.4	Method of test	63
6.4.1.5	Test requirements	63
6.4.2	Transmitter transient period	64
6.4.2.1	Definition and applicability	64
6.4.2.2	Minimum requirement	64
6.4.2.3	Test purpose	64
6.4.2.4	Method of test	64
6.4.2.4.1	Initial conditions	64
6.4.2.4.2	Procedure	65
6.4.2.5	Test requirements	65
6.5	Transmitted signal quality	65
6.5.1	General	65
6.5.2	Frequency error	66
6.5.2.1	Definition and applicability	66
6.5.2.2	Minimum Requirement	66
6.5.2.3	Test purpose	66
6.5.2.4	Method of test	66
6.5.2.5	Test Requirements	66
6.5.3	Modulation quality	66
6.5.3.1	Definition and applicability	66
6.5.3.2	Minimum Requirement	66
6.5.3.3	Test purpose	67
6.5.3.4	Method of test	67
6.5.3.4.1	Initial conditions	67
6.5.3.4.2	Procedure	67
6.5.3.5	Test requirements	68
6.5.4	Time alignment error	69
6.5.4.1	Definition and applicability	69
6.5.4.2	Minimum requirement	69
6.5.4.3	Test purpose	69
6.5.4.4	Method of test	69
6.5.4.4.1	Initial conditions	69
6.5.4.4.2	Procedure	70
6.5.4.5	Test requirement	70
6.6	Unwanted emissions	71
6.6.1	General	71
6.6.2	Occupied bandwidth	71
6.6.2.1	Definition and applicability	71
6.6.2.2	Minimum Requirements	71
6.6.2.3	Test purpose	72
6.6.2.4	Method of test	72
6.6.2.4.1	Initial conditions	72
6.6.2.4.2	Procedure	72
6.6.2.5	Test requirements	73
6.6.3	Adjacent Channel Leakage Power Ratio (ACLR)	73
6.6.3.1	Definition and applicability	73
6.6.3.2	Minimum requirement	73
6.6.3.3	Test purpose	73
6.6.3.4	Method of test	73
6.6.3.4.1	Initial conditions	73
6.6.3.4.2	Procedure	74
6.6.3.5	Test requirements	74

6.6.3.5.1	General requirements.....	74
6.6.3.5.2	Limits and <i>basic limits</i>	75
6.6.3.5.3	<i>BS type 1-C</i>	77
6.6.3.5.4	<i>BS type 1-H</i>	78
6.6.4	Operating band unwanted emissions	78
6.6.4.1	Definition and applicability.....	78
6.6.4.2	Minimum requirement	80
6.6.4.3	Test purpose	80
6.6.4.4	Method of test	80
6.6.4.4.1	Initial conditions.....	80
6.6.4.4.2	Procedure.....	80
6.6.4.5	Test requirements.....	81
6.6.4.5.1	General requirements.....	81
6.6.4.5.2	Basic limits for Wide Area BS (Category A)	81
6.6.4.5.3	Basic limits for Wide Area BS (Category B)	82
6.6.4.5.3.1	Category B requirements (Option 1).....	82
6.6.4.5.3.2	Category B requirements (Option 2).....	83
6.6.4.5.4	Basic limits for Medium Range BS (Category A and B).....	84
6.6.4.5.5	Basic limits for Local Area BS (Category A and B)	86
6.6.4.5.6	Basic limits for additional requirements.....	87
6.6.4.5.6.1	Limits in FCC Title 47.....	87
6.6.4.5.6.2	Protection of DTT.....	87
6.6.4.5.6.3	Additional operating band unwanted emissions limits for Band n48.....	87
6.6.4.5.6.4	Additional operating band unwanted emissions limits for Band n53.....	88
6.6.4.5.7	<i>BS type 1-C</i>	88
6.6.4.5.8	<i>BS type 1-H</i>	88
6.6.5	Transmitter spurious emissions.....	88
6.6.5.1	Definition and applicability.....	88
6.6.5.2	Minimum requirement	89
6.6.5.3	Test purpose	89
6.6.5.4	Method of test	89
6.6.5.4.1	Initial conditions.....	89
6.6.5.4.2	Procedure.....	89
6.6.5.5	Test requirements.....	90
6.6.5.5.1	Basic limits	90
6.6.5.5.1.1	Tx spurious emissions.....	90
6.6.5.5.1.2	Protection of the BS receiver of own or different BS	91
6.6.5.5.1.3	Additional spurious emissions requirements	91
6.6.5.5.1.4	Co-location with other base stations	99
6.6.5.5.2	(void)	104
6.6.5.5.3	<i>BS type 1-C</i>	104
6.6.5.5.4	<i>BS type 1-H</i>	104
6.7	Transmitter intermodulation.....	105
6.7.1	Definition and applicability	105
6.7.2	Minimum requirement	105
6.7.3	Test purpose.....	105
6.7.4	Method of test	105
6.7.4.1	Initial conditions	105
6.7.4.2	Procedure	106
6.7.5	Test requirements.....	107
6.7.5.1	<i>BS type 1-C</i>	107
6.7.5.1.1	Co-location minimum requirements	107
6.7.5.1.2	Additional requirements	108
6.7.5.2	<i>BS type 1-H</i>	108
6.7.5.2.1	Co-location minimum requirements.....	108
6.7.5.2.2	Intra-system minimum requirements.....	108
6.7.5.2.3	Additional requirements	109
7	Conducted receiver characteristics	110
7.1	General	110
7.2	Reference sensitivity level.....	110
7.2.1	Definition and applicability	110

7.2.2	Minimum requirement	110
7.2.3	Test purpose	110
7.2.4	Method of test	111
7.2.4.1	Initial conditions	111
7.2.4.2	Procedure	111
7.2.5	Test requirements	111
7.3	Dynamic range	114
7.3.1	Definition and applicability	114
7.3.2	Minimum requirement	114
7.3.3	Test purpose	114
7.3.4	Method of test	114
7.3.4.1	Initial conditions	114
7.3.4.2	Procedure	115
7.3.5	Test requirements	115
7.4	In-band selectivity and blocking	121
7.4.1	Adjacent Channel Selectivity (ACS)	121
7.4.1.1	Definition and applicability	121
7.4.1.2	Minimum requirement	121
7.4.1.3	Test purpose	121
7.4.1.4	Method of test	121
7.4.1.4.1	Initial conditions	121
7.4.1.4.2	Procedure	122
7.4.1.5	Test requirements	122
7.4.2	In-band blocking	123
7.4.2.1	Definition and applicability	123
7.4.2.2	Minimum requirement	123
7.4.2.3	Test purpose	123
7.4.2.4	Method of test	124
7.4.2.4.1	Initial conditions	124
7.4.2.4.2	Procedure for general blocking	124
7.4.2.4.3	Procedure for narrowband blocking	124
7.4.2.5	Test requirements	125
7.5	Out-of-band blocking	128
7.5.1	Definition and applicability	128
7.5.2	Minimum requirement	128
7.5.3	Test purpose	128
7.5.4	Method of test	128
7.5.4.1	Initial conditions	128
7.5.4.2	Procedure	128
7.5.5	Test requirements	129
7.5.5.1	General requirements	129
7.5.5.2	Co-location requirements	129
7.6	Receiver spurious emissions	130
7.6.1	Definition and applicability	130
7.6.2	Minimum requirement	131
7.6.3	Test purpose	131
7.6.4	Method of test	131
7.6.4.1	Initial conditions	131
7.6.4.2	Procedure	131
7.6.5	Test requirements	131
7.6.5.1	Basic limits	131
7.6.5.2	BS type 1-C	132
7.6.5.3	BS type 1-H	132
7.7	Receiver intermodulation	132
7.7.1	Definition and applicability	132
7.7.2	Minimum requirement	133
7.7.3	Test purpose	133
7.7.4	Method of test	133
7.7.4.1	Initial conditions	133
7.7.4.2	Procedure	133
7.7.5	Test requirements	134
7.8	In-channel selectivity	138

7.8.1	Definition and applicability	138
7.8.2	Minimum requirement	138
7.8.3	Test purpose.....	138
7.8.4	Method of test	138
7.8.4.1	Initial conditions	138
7.8.4.2	Procedure	138
7.8.5	Test requirements.....	138
8	Conducted performance characteristics.....	143
8.1	General	143
8.1.1	Scope and definitions.....	143
8.1.2	Applicability rule	143
8.1.2.0	General	143
8.1.2.1	Applicability of PUSCH performance requirements.....	143
8.1.2.1.1	Applicability of requirements for different subcarrier spacings	143
8.1.2.1.2	Applicability of requirements for different channel bandwidths	144
8.1.2.1.3	Applicability of requirements for different configurations.....	144
8.1.2.2	Applicability of PUCCH performance requirements	144
8.1.2.2.1	Applicability of requirements for different formats.....	144
8.1.2.2.2	Applicability of requirements for different subcarrier spacings	144
8.1.2.2.3	Applicability of requirements for different channel bandwidths	144
8.1.2.2.4	Applicability of requirements for different configurations.....	144
8.1.2.2.5	Applicability of requirements for multi-slot PUCCH.....	145
8.1.2.3	Applicability of PRACH performance requirements	145
8.1.2.3.1	Applicability of requirements for different formats.....	145
8.1.2.3.2	Applicability of requirements for different subcarrier spacings	145
8.1.2.3.3	Applicability of requirements for different channel bandwidths	145
8.2	Performance requirements for PUSCH.....	145
8.2.1	Performance requirements for PUSCH with transform precoding disabled	145
8.2.1.1	Definition and applicability.....	145
8.2.1.2	Minimum Requirement	145
8.2.1.3	Test Purpose	145
8.2.1.4	Method of test	145
8.2.1.4.1	Initial Conditions	145
8.2.1.4.2	Procedure.....	146
8.2.1.5	Test Requirement	146
8.2.2	Performance requirements for PUSCH with transform precoding enabled	154
8.2.2.1	Definition and applicability.....	154
8.2.2.2	Minimum Requirement	154
8.2.2.3	Test Purpose	154
8.2.2.4	Method of test	154
8.2.2.4.1	Initial Conditions	154
8.2.2.4.2	Procedure.....	155
8.2.2.5	Test Requirement	155
8.2.3	Performance requirements for UCI multiplexed on PUSCH	157
8.2.3.1	Definition and applicability.....	157
8.2.3.2	Minimum Requirements.....	157
8.2.3.3	Test purpose	157
8.2.3.4	Method of test	157
8.2.3.4.1	Initial conditions.....	157
8.2.3.4.2	Procedure.....	157
8.2.3.5	Test Requirement	158
8.2.4	Performance requirements for PUSCH for high speed train.....	160
8.2.4.1	Definition and applicability.....	160
8.2.4.2	Minimum Requirement	160
8.2.4.3	Test Purpose	160
8.2.4.4	Method of test	160
8.2.4.4.1	Initial Conditions	160
8.2.4.4.2	Procedure.....	160
8.2.4.5	Test Requirement	161
8.3	Performance requirements for PUCCH.....	162
8.3.1	Performance requirements for PUCCH format 0.....	162

8.3.1.1	Definition and applicability	162
8.3.1.2	Minimum Requirement	163
8.3.1.3	Test purpose	163
8.3.1.4	Method of test	163
8.3.1.4.1	Initial conditions	163
8.3.1.4.2	Procedure	163
8.3.1.5	Test Requirement	164
8.3.2	Performance requirements for PUCCH format 1	165
8.3.2.1	NACK to ACK detection	165
8.3.2.1.1	Definition and applicability	165
8.3.2.1.2	Minimum Requirement	165
8.3.2.1.3	Test purpose	165
8.3.2.1.4	Method of test	165
8.3.2.1.4.1	Initial Conditions	165
8.3.2.1.4.2	Procedure	165
8.3.2.1.5	Test Requirement	166
8.3.2.2	ACK missed detection	167
8.3.2.2.1	Definition and applicability	167
8.3.2.2.2	Minimum Requirement	167
8.3.2.2.3	Test purpose	167
8.3.2.2.4	Method of test	167
8.3.2.2.4.1	Initial Conditions	167
8.3.2.2.4.2	Procedure	167
8.3.2.2.5	Test Requirement	168
8.3.3	Performance requirements for PUCCH format 2	169
8.3.3.1	ACK missed detection	169
8.3.3.1.1	Definition and applicability	169
8.3.3.1.2	Minimum requirements	169
8.3.3.1.3	Test purpose	169
8.3.3.1.4	Method of test	170
8.3.3.1.4.1	Initial Condition	170
8.3.3.1.4.2	Procedure	170
8.3.3.1.5	Test requirements	171
8.3.3.2	UCI BLER performance requirements	171
8.3.3.2.1	Definition and applicability	171
8.3.3.2.2	Minimum Requirement	171
8.3.3.2.3	Test purpose	171
8.3.3.2.4	Method of test	171
8.3.3.2.4.1	Initial Condition	171
8.3.3.2.4.2	Procedure	171
8.3.3.2.5	Test requirements	172
8.3.4	Performance requirements for PUCCH format 3	173
8.3.4.1	Definition and applicability	173
8.3.4.2	Minimum requirement	173
8.3.4.3	Test purpose	173
8.3.4.4	Method of test	173
8.3.4.4.1	Initial conditions	173
8.3.4.4.2	Procedure	173
8.3.4.5	Test requirement	174
8.3.5	Performance requirements for PUCCH format 4	176
8.3.5.1	Definition and applicability	176
8.3.5.2	Minimum requirement	176
8.3.5.3	Test purpose	176
8.3.5.4	Method of test	176
8.3.5.4.1	Initial conditions	176
8.3.5.4.2	Procedure	176
8.3.5.5	Test requirement	177
8.3.6	Performance requirements for multi-slot PUCCH	178
8.3.6.1	Performance requirements for multi-slot PUCCH format 1	178
8.3.6.1.1	NACK to ACK detection	178
8.3.6.1.1.1	Definition and applicability	178
8.3.6.1.1.2	Minimum Requirement	178

8.3.6.1.1.3	Test purpose	178
8.3.6.1.1.4	Method of test	178
8.3.6.1.1.4.1	Initial conditions	178
8.3.6.1.1.4.2	Procedure	178
8.3.6.1.1.5	Test Requirement	179
8.3.6.1.2	ACK missed detection	180
8.3.6.1.2.1	Definition and applicability	180
8.3.6.1.2.2	Minimum Requirement	180
8.3.6.1.2.3	Test purpose	180
8.3.6.1.2.4	Method of test	180
8.3.6.1.2.4.1	Initial conditions	180
8.3.6.1.2.4.2	Procedure	180
8.3.6.1.2.5	Test Requirement	181
8.4	Performance requirements for PRACH	181
8.4.1	PRACH false alarm probability and missed detection	181
8.4.1.1	Definition and applicability	181
8.4.1.2	Minimum requirement	182
8.4.1.3	Test purpose	182
8.4.1.4	Method of test	182
8.4.1.4.1	Initial conditions	182
8.4.1.4.2	Procedure	182
8.4.1.5	Test requirement for Normal Mode	184
8.4.1.6	Test requirement for high speed train	184
Annex A (normative):	Reference measurement channels	186
A.1	Fixed Reference Channels for reference sensitivity level, ACS, in-band blocking, out-of-band blocking, receiver intermodulation and in-channel selectivity (QPSK, R=1/3)	186
A.2	Fixed Reference Channels for dynamic range (16QAM, R=2/3)	186
A.3	Fixed Reference Channels for performance requirements (QPSK, R=193/1024)	187
A.4	Fixed Reference Channels for performance requirements (16QAM, R=658/1024)	189
A.5	Fixed Reference Channels for performance requirements (64QAM, R=567/1024)	191
A.6	PRACH test preambles	192
Annex B (normative):	Environmental requirements for the BS equipment	193
B.1	General	193
B.2	Normal test environment	193
B.3	Extreme test environment	193
B.3.1	Extreme temperature	193
B.4	Vibration	194
B.5	Power supply	194
B.6	Measurement of test environments	194
Annex C (informative):	Test tolerances and derivation of test requirements	195
C.1	Measurement of transmitter	195
C.2	Measurement of receiver	197
C.3	Measurement of performance requirements	198
Annex D (informative):	Measurement system set-up	199
D.1	BS type 1-C transmitter	199
D.1.1	Base station output power, output power dynamics, transmitter ON/OFF power, frequency error, EVM, unwanted emissions for BS type 1-C	199
D.1.2	Transmitter intermodulation for BS type 1-C	199

D.1.3	Time alignment error for <i>BS type 1-C</i>	200
D.2	<i>BS type 1-C</i> receiver	200
D.2.1	Reference sensitivity level for <i>BS type 1-C</i>	200
D.2.2	Dynamic range for <i>BS type 1-C</i>	201
D.2.3	In-channel selectivity for <i>BS type 1-C</i>	201
D.2.4	Adjacent Channel Selectivity (ACS) and narrowband blocking for <i>BS type 1-C</i>	202
D.2.5	Blocking characteristics for <i>BS type 1-C</i>	202
D.2.6	Receiver spurious emission for <i>BS type 1-C</i>	203
D.2.7	Intermodulation characteristics for <i>BS type 1-C</i>	203
D.3	<i>BS type 1-H</i> transmitter	204
D.3.1	Base station output power, output power dynamics, transmitter ON/OFF power, frequency error, EVM, unwanted emissions for <i>BS type 1-H</i>	204
D.3.2	Transmitter intermodulation for <i>BS type 1-H</i>	205
D.3.3	Transmitter spurious emissions for <i>BS type 1-H</i>	205
D.3.4	Time alignment error for <i>BS type 1-H</i>	207
D.4	<i>BS type 1-H</i> receiver	207
D.4.1	Reference sensitivity level for <i>BS type 1-H</i>	207
D.4.2	Receiver dynamic range for <i>BS type 1-H</i>	208
D.4.3	Receiver adjacent channel selectivity and narrowband blocking for <i>BS type 1-H</i>	208
D.4.4	Receiver spurious emissions	208
D.4.5	Receiver In-channel selectivity for <i>BS type 1-H</i>	210
D.4.6	Receiver intermodulation for <i>BS type 1-H</i>	211
D.5	<i>BS type 1-C</i> performance requirements	211
D.5.1	Performance requirements for PUSCH, single user PUCCH, PRACH on single antenna port in multipath fading conditions and for high speed condition	211
D.5.2	Performance requirements for PUSCH transmission on two antenna ports in multipath fading conditions ..	212
D.5.3	Performance requirements for PRACH in static conditions	212
D.6	<i>BS type 1-H</i> performance requirements	213
D.6.1	Performance requirements for PUSCH, single user PUCCH, PRACH on single antenna port in multipath fading conditions and for high speed condition	213
D.6.2	Performance requirements for PUSCH transmission on two antenna ports in multipath fading conditions ..	214
D.6.3	Performance requirements for PRACH in static conditions	214
Annex E (normative):	Characteristics of interfering signals	215
Annex F (normative):	Void	216
Annex G (normative):	Propagation conditions	217
G.1	Static propagation condition	217
G.2	Multi-path fading propagation conditions	217
G.2.1	Delay profiles	217
G.2.1.1	Delay profiles for FR1	218
G.2.2	Combinations of channel model parameters	219
G.2.3	MIMO channel correlation matrices	220
G.2.3.1	MIMO correlation matrices using Uniform Linear Array	220
G.2.3.1.1	Definition of MIMO correlation matrices	220
G.2.3.1.2	MIMO correlation matrices at high, medium and low level	221
G.2.3.2	Multi-antenna channel models using cross polarized antennas	223
G.2.3.2.1	Definition of MIMO correlation matrices using cross polarized antennas	224
G.2.3.2.2	Spatial correlation matrices at UE and gNB sides	224
G.2.3.2.2.1	Spatial correlation matrices at UE side	224
G.2.3.2.2.2	Spatial correlation matrices at gNB side	224
G.2.3.2.3	MIMO correlation matrices using cross polarized antennas	225
G.3	High speed train condition	225
Annex H (normative):	In-channel TX tests	230
H.1	General	230

H.2	Basic principles	230
H.2.1	Output signal of the TX under test	230
H.2.2	Ideal signal	230
H.2.3	Measurement results.....	231
H.2.4	Measurement points	231
H.3	Pre-FFT minimization process	232
H.4	Timing of the FFT window	232
H.5	Resource element TX power	233
H.6	Post-FFT equalisation.....	234
H.7	EVM.....	235
H.7.0	General.....	235
H.7.1	Averaged EVM (FDD).....	236
H.7.2	Averaged EVM (TDD).....	236
Annex I (informative):	Change history	238
History		246

iTeh STANDARD PREVIEW
(standards.iteh.ai)
Full standard:
<https://standards.iteh.ai/catalog/standards/sist/a8873e2a-ffc2-4478-ba33-9c40e26cf120/etsi-ts-138-141-1-v16.4.0-2020-07>