

**अनिवार्य आवश्यकताएं**

## **ESSENTIAL REQUIREMENTS**

**सं.: टी.ई.सी./ई.आर./एम.टी./बी.एस.-००१/०१/अप्रैल २०१८**

**No. : TEC/ER/MT/BS-001/01/APRIL 2018**

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### **Base Station**

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## Scope

This document lays down the Essential Requirements under the mandatory testing Framework in accordance with Government of India Gazette Notification No. G.S.R. 1131(E), dated 05<sup>th</sup> September 2017, for **Base Station** to be used in Indian Telecom Network using 2G/3G/4G technology.

The document defines the mandatory testing requirements for certification under the MT&CTE framework.

This ER covers following variants of the product:

Name of Product	Variant(s)
Base Station	<ol style="list-style-type: none"><li>1. BTS (GSM)</li><li>2. NodeB (WCDMA)</li><li>3. eNodeB (LTE)</li><li>4. MSR – GSM</li><li>5. MSR – WCDMA</li><li>6. MSR – LTE</li><li>7. MSR – GSM + WCDMA</li><li>8. MSR WCDMA + LTE</li><li>9. MSR GSM + WCDMA + LTE</li><li>10. MSR GSM + LTE</li><li>11. MSR LTE – WCDMA and/ or LTE with Active Antenna System</li></ol>

## History

<b>S. No.</b>	<b>Name of the Product</b>	<b>ER Number</b>	<b>Remarks</b>
1.	Base Station	TEC/ER/MT/BS-001/01/APRIL 2018	<b>New ER</b> Release Date - __/04/2018

## Applicability Matrix

<b>Product Variant\ Interface</b>	BSC	RNC	Um	Uu	MME	SGW	eNB	eSMLC	AAS	Management
BTS (GSM)	Yes		Yes							Through BSC
NodeB (WCDMA)		Yes		Yes						Through RNC
eNodeB (LTE)				Yes	Yes	Yes	Yes	Yes		Yes
MSR – GSM	Yes		Yes							Through BSC
MSR – WCDMA		Yes		Yes						Through RNC
MSR – LTE				Yes	Yes	Yes	Yes	Yes		Yes
MSR – GSM + WCDMA	Yes	Yes	Yes	Yes						Yes
MSR WCDMA + LTE		Yes		Yes	Yes	Yes	Yes	Yes		Yes
MSR GSM + WCDMA + LTE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes
MSR GSM + LTE	Yes		Yes	Yes	Yes	Yes	Yes	Yes		Yes
MSR LTE – WCDMA and/ or LTE with Active Antenna System		Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: The equipment certified for MSR GSM+WCDMA+LTE can also be operated in any one technology.

## 1 EMI/ EMC Requirements

(These requirements shall be as per TEC Standard No. **TEC/SD/DD/EMC-221/05.OCT-16** as modified/ amended from time to time)

Clause	Parameter	Standard	Limits/ Results expected
1.1	Conducted and Radiated Emission	CISPR 22 (2008) OR CISPR 32 Class-A	Compliance
1.2	Immunity to Electrostatic discharge: Contact discharge level 2 { $\pm 4$ kV}	IEC-61000-4-2 Performance Criteria-B, Clause 9	Compliance
1.3	Immunity to Electrostatic discharge: Air discharge level 3 { $\pm 8$ kV}	IEC-61000-4-2 Performance Criteria-B, Clause 9	Compliance
1.4	Immunity to radiated RF: (a) Radio Frequency: 80 MHz to 1 GHz, Electromagnetic field: 3V/m (b) Radio Frequency: 800 MHz to 960 MHz, Electromagnetic field: 10V/m (c) Radio Frequency: 1.4 GHz to 6 GHz, Electromagnetic field: 10V/m	IEC 61000-4-3 (2010); Performance Criteria-A, Clause 9	Compliance
1.5	Immunity to fast transients (burst): Test Level 2: (a) 1 kV for AC/DC power port (b) 0.5 kV for signal / control / data / telecom lines.	IEC 61000-4-4 (2012); Performance Criteria-B, Clause 9	Compliance
1.6	Immunity to surges: AC/DC ports a. 2 kV peak open circuit voltage for line to ground b. 1kV peak open circuit voltage for line to line	IEC 61000-4-5 (2014) Performance Criteria-B, Clause 9	Compliance

1.7	<p>Immunity to surges: Telecom ports</p> <p>(a) 2 kV peak open circuit voltage for line to ground coupling.</p> <p>(b) 2 kV peak open circuit voltage for line to line coupling.</p>	IEC 61000-4-5 (2014) Performance Criteria-C, Clause 9	Compliance
1.8	<p>Immunity to conducted disturbance induced by Radio frequency fields: Under the test level 2 {3 V r.m.s.} in the frequency range 150 kHz-80 MHz for AC / DC lines and Signal /Control/telecom lines.</p>	IEC 61000-4-6 (2013) Performance Criteria-A, Clause 9	Compliance
1.9	<p>Immunity to voltage dips &amp; short interruptions (applicable to only ac mains power input ports, if any):</p> <p><b>Limits: -</b></p> <p>(a) a voltage dip corresponding to a reduction of the supply voltage of 30% for 500ms (i.e. 70% supply voltage for 500ms)</p> <p>(b) a voltage dip corresponding to a reduction of the supply voltage of 60% for 200ms; (i.e.40% supply voltage for 200ms)</p> <p>(c) a voltage interruption corresponding to a reduction of supply voltage of &gt; 95% for 5s.</p> <p>(d) a voltage interruption corresponding to a reduction of supply voltage of &gt;95% for 10ms.</p>	<p>IEC 61000-4-11 (2004):</p> <p>a. Performance Criteria B for Reduction of Supply 30% for 500ms or Dip to reduction of 60% for 100ms</p> <p>b. Performance Criteria C for Reduction of 60% for 200ms</p> <p>c. Performance criteria C for Voltage Interruption&gt;95% for 5 s (Note: In case of Battery back-up performance criteria A is applicable).</p> <p>d. Performance Criteria B for Voltage Interruption &gt;95% duration :10ms (Note: In case of Battery back-up Performance Criteria A is applicable for above conditions.)</p>	Compliance



1.10	<p>Immunity to voltage dips &amp; short interruptions (applicable to only DC power input ports, if any):</p> <ul style="list-style-type: none"> <li>a. Voltage Interruption with 0% of supply for 10ms.</li> <li>b. Voltage Interruption with 0% of supply for 30ms, 100ms, 300ms and 1000ms.</li> <li>c. Voltage dip corresponding to 40% &amp; 70% of supply for 10ms, 30 ms.</li> <li>d. Voltage dip corresponding to 40% &amp; 70% of supply for 100ms, 300 ms and 1000 ms.</li> <li>e. Voltage variations corresponding to 80% and 120%of supply for 100 ms to 10s as per Table 1c of IEC 61000-4-29.</li> </ul>	<p>IEC 61000-4-29(2000)</p> <ul style="list-style-type: none"> <li>a. Applicable Performance Criteria shall be B.</li> <li>b. Applicable Performance Criteria shall be C.</li> <li>c. Applicable Performance Criteria shall be B.</li> <li>d. Applicable Performance Criteria shall be C.</li> <li>e. Applicable Performance Criteria shall be B.</li> </ul>	Compliance
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## 2 Safety Requirements

Clause	Parameter	Standard	Limits/ Results expected
2.1	The equipment shall conform to IS 13252 part 1:2010- “Information Technology Equipment – Safety- Part 1: General Requirements” [equivalent to IEC 60950-1 {2005} “Information Technology Equipment –Safety- Part 1: General Requirements”] Or IEC 62368-I:2014	IS 13252 part 1:2010 / IEC 60950-1 {2005} part 1; or IEC 62368-I:2014	Compliance

### 3 Security Requirements

Clause	Parameter	Standard	Limits/ Results expected
Under finalisation by DOT Security Wing			

## 4 Technical Requirements

### 4.1 Technical Requirements for GSM

Clause	Parameter	Standard	Limits/ Results expected
4.1.1.	<b>Operating Frequency</b>  The Base Station shall be capable of operating in at least one of the frequency bands as per the National Frequency Allocation Plan.	Applicable National Frequency Allocation Plan	Compliance
4.1.2.	Output Power	3GPP TS 45.005 Clause 4.1.2	
	<b>Transmitter</b>	<b>3GPP TS 51.021</b>	
4.1.3.	Adjacent channel power	Clause 6.5	Compliance
4.1.4.	Wideband noise and intra BSS intermodulation attenuation in multicarrier operation	Clause 6.12	Compliance
4.1.5.	Spurious emissions from the transmitter antenna connector	Clause 6.6	Compliance
4.1.6.	Mean transmitted RF carrier power and equivalent combined power	Clause 6.3	Compliance
4.1.7.	Intermodulation attenuation	Clause 6.7	Compliance
4.1.8.	Intra Base Station System intermodulation attenuation	Clause 6.8	Compliance
4.1.9.	Radiated spurious emissions	Clause 8	Compliance
	<b>Receiver</b>	<b>3GPP TS 51.021</b>	
4.1.10.	Static Reference Sensitivity Level	Clause 7.3	Compliance
4.1.11.	Reference interference level	Clause 7.5	Compliance
4.1.12.	Blocking Characteristics	Clause 7.6	Compliance
4.1.13.	Intermodulation characteristics	Clause 7.7	Compliance
4.1.14.	AM suppression	Clause 7.8	Compliance
4.1.15.	Spurious emissions from the receiver antenna connector	Clause 7.9	Compliance

## 4.2 Technical Requirements for WCDMA/HSPA

Clause	Parameter	Standard	Limits/ Results expected
4.2.1.	<b>Operating Frequency</b>  The Base Station shall be capable of operating in at least one of the frequency bands as per the National Frequency Allocation Plan.	Applicable National Frequency Allocation Plan	Compliance
	<b>Transmitter</b>	<b>3GPP TS 25.141</b>	
4.2.2.	Spectrum emission mask	Clause 6.5.2.1	Compliance
4.2.3.	Adjacent Channel Leakage power Ratio (ACLR)	Clause 6.5.2.2	Compliance
4.2.4.	Home base station output power for adjacent channel protection Applicable to Home base Station only	Clause 6.4.6	Compliance
4.2.5.	Spurious emissions	Clause 6.5.3	Compliance
4.2.6.	Base station output power	Clause 6.2	Compliance
4.2.7.	Transmitter intermodulation	Clause 6.6	Compliance
4.2.8.	<b>Receiver</b>	<b>3GPP TS 25.141</b>	
4.2.9.	Spurious Emissions	Clause 7.7	Compliance
4.2.10.	Blocking characteristics	Clause 7.5	Compliance
4.2.11.	Intermodulation characteristics	Clause 7.6	Compliance
4.2.12.	Adjacent Channel Selectivity (ACS)	Clause 7.4	Compliance
4.2.13.	Reference sensitivity level	Clause 7.2	Compliance

### 4.3 Technical Requirements for LTE/LTE-A

Clause	Parameter	Standard	Limits/ Results expected
4.3.1.	<b>Operating Frequency</b>  The Base Station shall be capable of operating in at least one of the frequency bands as per the National Frequency Allocation Plan.	Applicable National Frequency Allocation Plan	Compliance
	<b>Transmitter</b>	<b>3GPP TS 36.141</b>	
4.3.2.	Operating band unwanted emissions	Clause 6.6.3	Compliance
4.3.3.	Adjacent Channel Leakage power Ratio (ACLR)	Clause 6.6.2	Compliance
4.3.4.	Home BS output power for adjacent UTRA channel protection : Applicable to Home base Station only	Clause 6.2.6	Compliance
4.3.5.	Home BS output power for adjacent E-UTRA channel protection: Applicable to Home base Station only	Clause 6.2.7	Compliance
4.3.6.	Home BS output power for co-channel E-UTRA protection: Applicable to Home base Station only	Clause 6.2.8	Compliance
4.3.7.	Transmitter spurious emissions	Clause 6.6.4	Compliance
4.3.8.	Base station output power	Clause 6.2	Compliance
4.3.9.	Transmitter intermodulation	Clause 6.7	Compliance
	<b>Receiver</b>	<b>3GPP TS 36.141</b>	
4.3.10.	Receiver spurious emissions	Clause 7.7	Compliance
4.3.11.	Blocking	Clause 7.6	Compliance
4.3.12.	Receiver intermodulation	Clause 7.8	Compliance
4.3.13.	Adjacent Channel Selectivity (ACS) and narrow-band blocking	Clause 7.5	Compliance
4.3.14.	Reference sensitivity level	Clause 7.2	Compliance

#### 4.4 Technical Requirements for MSR

Clause	Parameter	Standard	Limits/ Results expected
4.4.1	<b>Operating Frequency</b>  The Base Station shall be capable of operating in at least one of the frequency bands as per the National Frequency Allocation Plan.	Applicable National Frequency Allocation Plan	Compliance
	<b>Transmitter</b>	3GPP TS 37.141	
4.4.2	Base Station output power	Clause 6.2	Compliance
4.4.3	Transmitter spurious emissions	Clause 6.6.1	Compliance
4.4.4	Operating band unwanted emissions	Clause 6.6.2	Compliance
4.4.5	Adjacent Channel Leakage power Ratio (ACLR)	Clause 6.6.4	Compliance
4.4.6	Transmitter intermodulation	Clause 6.7	Compliance
	<b>Receiver</b>	3GPP TS 37.141	
4.4.7	Receiver spurious emissions	Clause 7.6	Compliance
4.4.8	In-band selectivity and blocking	Clause 7.4	Compliance
4.4.9	Out-of-band blocking	Clause 7.5	Compliance
4.4.10	Receiver intermodulation	Clause 7.7	Compliance
4.4.11	In-band selectivity and blocking	Clause 7.4	Compliance
4.4.12	Reference sensitivity level	Clause 7.2	Compliance

## 4.5 Technical Requirements for Active Antenna System

Clause	Parameter	Standard	Limit/Result expected
4.5.1.	Transmitter	<b>3GPP TS 37.145-1</b>	
4.5.2.	Base Station output power	Clause 6.2	Compliance
4.5.3.	Spurious emission	Clause 6.6.6	Compliance
4.5.4.	Operating band unwanted emission	Clause 6.6.5	Compliance
4.5.5.	Adjacent Channel Leakage power Ratio	Clause 6.6.3	Compliance
4.5.6.	Spectrum emission mask	Clause 6.6.4	Compliance
4.5.7.	Transmitter intermodulation	Clause 6.7	Compliance
4.5.8.	Receiver	<b>3GPP TS 37.145-1</b>	
4.5.9.	Reference sensitivity level	Clause 7.2	Compliance
4.5.10.	Adjacent channel selectivity and narrowband blocking	Clause 7.4	Compliance
4.5.11.	Blocking	Clause 7.5	Compliance
4.5.12.	Receiver spurious emissions	Clause 7.6	Compliance
4.5.13.	Receiver intermodulation	Clause 7.7	Compliance



## 5 Other Requirements

Clause	Parameter	Standard	Limits/ Results expected

## References

<b>S. No.</b>	<b>Document Reference</b>	<b>Document Title</b>
1.	TEC/SD/DD/EMC-221/05/ OCT-16	Electromagnetic Compatibility Standard for Telecommunication Equipment
2.	CISPR 22 (2008)	Limits and methods of measurement of radio disturbance characteristics of Information Technology equipment
3.	CISPR 32 (2015)	Electromagnetic compatibility of multimedia equipment - Emission requirements
4.	IEC 61000-4-2 (2008)	Testing and measurement techniques of Electrostatic discharge immunity test
5.	IEC 61000-4-3 (2010)	Radiated RF Electromagnetic Field Immunity test
6.	IEC 61000-4-4 (2012)	Testing and measurement techniques of electrical fast transients/burst immunity test
7.	IEC 61000-4-5(2014)	Test & Measurement techniques for Surge immunity tests
8.	IEC 61000-4-6(2013)	Immunity to conducted disturbances, induced by radio frequency fields
9.	IEC 61000-4-11(2004)	Voltage dips, shot interruptions and voltage variations immunity tests
10.	IEC 61000-4-29(2000)	Electromagnetic compatibility (EMC) - Part 4-29: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations on d.c. input power port immunity tests
11.	IS 13252 part 1: 2010 Amd 2013 & Amd 2015	Information Technology Equipment –Safety- Part 1: General Requirements
12.	IEC 60950-1:2005+A1: 2009 +A2: 2013	Information Technology Equipment –Safety- Part 1: General Requirements
13.	IEC 62368: 2014	Audio/video, information and communication technology equipment - Part 1: Safety requirements
14.	3GPP TS 45.005	Digital cellular telecommunications system (Phase 2+); Radio transmission and reception
15.	3GPP TS 51.021	Digital cellular telecommunications system (Phase 2+); Base Station System (BSS) equipment specification; Radio aspects
16.	3GPP TS 25.141	Universal Mobile Telecommunications System (UMTS); Base Station (BS) conformance testing (FDD)
17.	3GPP TS 36.141	LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) conformance testing
18.	3GPP TS 37.141	Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; E-UTRA, UTRA and GSM/EDGE; Multi-Standard Radio (MSR) Base Station (BS) conformance testing

19.	3GPP TS 37.145-1	Universal Mobile Telecommunications System (UMTS); LTE; Active Antenna System (AAS) Base Station (BS) conformance testing; Part 1: conducted conformance testing
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## Glossary

BSS	Base Station Subsystem
CAB	Conformance Assessment Body
CISPR	Comité International Spécial des Perturbations Radioélectriques
EIR	Equipment Identity Register
EMC	Electromagnetic Compatibility
ER	Essential Requirements
ETSI	European Telecommunications Standards Institute
EUT	Equipment Under Test
GHz	Giga Hertz
GSM	Global System for Mobile
GSR	General Statutory Rules
HSPA	High Speed Packet Access
IEC	International Electrotechnical Commission
IPv6	Internet Protocol version 6
MHz	Mega Hertz
ms	millisecond
LTE	Long Term Evolution
MSR	Multi Standard Radio
MTCTE	Mandatory Testing and Certification of Telecom Equipment
NFAP	National Frequency Allocation Plan
TEC	Telecommunication Engineering Centre
WCDMA	Wideband Code Division Multiple Access
WPC	Wireless Planning & Coordination

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