

**Essential Requirements**  
**under the**  
**MTCTE Framework**  
**for**  
**Equipment used in Satellite**  
**Communication Networks**

This document defines the technical parameters for the telecommunication equipment mentioned in the scope of this document against which Testing & Certification has to be carried as prescribed by G.S.R No. 1131(E) dated 5<sup>th</sup> September, 2017 (Amendment (2017) to Indian Telegraph Rules, 1951).

**CONTENTS**

<b>Particulars</b>	<b>Page No.</b>
History Sheet	ii
References	iii
Scope	1
Section I: EMC Requirements	2
Section II: Safety Requirements	7
Section III: Technical Requirements	8
Section IV: Other Requirements	9
Section V: Security Requirements	10
Annexure I	11
Annexure II	12
Annexure III	13
Abbreviations	14

**HISTORY SHEET**

<b>Sr. No.</b>	<b>Document name/No.</b>	<b>Issued on</b>	<b>Version</b>
1.	Essential Requirements under the MTCTE Framework for Equipment used in Satellite Communication Networks (No: .....)	XXXX-2018	1

**REFERENCES**

<b>Sr No.</b>	<b>Document No.</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.	IEC 61000-4-2 (2008)	Testing and measurement techniques of Electrostatic discharge immunity test
4.	IEC 61000-4-3 (2010)	Radiated RF Electromagnetic Field Immunity test
5.	IEC 61000-4-4 (2012)	Testing and measurement techniques of electrical fast transients/burst immunity test
6.	IEC 61000-4-5(2014)	Test & Measurement techniques for Surge immunity tests
7.	IEC 61000-4-6(2013)	Immunity to conducted disturbances, induced by radio frequency fields
8.	IEC 61000-4-11(2004)	Voltage dips, shot interruptions and voltage variations immunity tests
9.	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
10.	IS 13252 part 1: 2010 Amd 2013 & Amd 2015	Information Technology Equipment –Safety- Part 1: General Requirements
11.	IEC 60950-1:2005+A1:2009+A2:2013	Information Technology Equipment –Safety- Part 1: General Requirements

12.	IEC 62368: 2014	Audio/video, information and communication technology equipment - Part 1: Safety requirements
13.	IEC 60215: 2016	Safety requirements for radio transmitting equipment - General requirements and terminology
14.	ETSI EN 301 443	Satellite Earth Stations and Systems (SES); Harmonized EN for Very Small Aperture Terminal(VSAT); Transmit-only, transmit-and-receive, receive-only satellite earth stations operating in the 4 GHz and 6 GHz frequency bands covering essential requirements under article 3.2 of the R&TTE directive
15.	ETSI EN 301 428	Satellite Earth Stations and Systems (SES); Harmonized EN for Very Small Aperture Terminal(VSAT); Transmit-only, transmit/receive, receive-only satellite earth stations operating in the 11/12/14 GHz frequency bands covering essential requirements under article 3.2 of the R&TTE directive

**Scope**

This document lays down the essential requirements for equipment which is used in satellite communication networks. Such equipment shall operate in the C & Ku band. The document shall cover the satellite RF equipment, baseband processing equipment, amplifiers, other optimization equipment used in the satellite network.

The document also defines the necessary testing requirements for certification under the MTCTE framework.

**Applicability Matrix**

The applicability of tests under different sections of this ER as per the category of equipment is as below:

<b>Equipment Type/Variant</b>	<b>EMC Requirements</b>	<b>Safety Requirements</b>	<b>Technical Requirements</b>	<b>Other Requirements</b>	<b>Security Requirements</b>
Satellite Equipment with RF interface	A	A	A	A	Applicable as prescribed by DoT
Satellite base band processing systems like modems etc.	A	A	NA	A	
Other equipment like Amplifiers, Satellite Network optimization equipment	A	A	NA	A	

A-Applicable NA- Not Applicable

Note:

An indicative list of equipment covered under each category/equipment variant defined in the table above is given in Annexure III.

**SECTION I****Electromagnetic Compatibility (EMC) Requirements**

The equipment shall conform to the EMC requirements as per the following standards and limits indicated therein.

Sr. No	Technical Parameters	Testing requirements
i.	<p><b>Conducted and radiated emission (applicable to telecom equipment):</b>  <b>Name of EMC Standard:</b> "CISPR 22 (2008) - Limits and methods of measurement of radio disturbance characteristics of Information Technology Equipment".  <b>Limits:-</b></p> <ul style="list-style-type: none"> <li>i. To comply with Class A of CISPR 22 (2008) for outdoor equipment.</li> <li>ii. The values of limits shall be as per TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16.</li> <li>iii. For Radiated Emission tests, limits below 1 GHz shall be as per Table 5 (a1) (for Class A) for measuring distance of 3m.</li> </ul> <p style="text-align: center;">OR</p> <p><b>Name of EMC Standard:</b> "CISPR 32 (2015) - Electromagnetic compatibility of multimedia equipment - Emission requirements"</p> <ul style="list-style-type: none"> <li>i. To comply with Class A of CISPR 32 (2015) for outdoor equipment and the limits specified therein.</li> <li>ii. For Radiated Emission tests, limits below 1 GHz shall be for measuring distance of 3m.</li> </ul> <p><i>Note: Test Reports as per limits of CISPR 22 (2008) mentioned above shall be acceptable only upto March 31, 2019.</i></p>	<p>Test results from Designated CAB of TEC to be submitted for compliance.</p>

ii.	<p><b>Immunity to Electrostatic discharge:</b>  <b>Name of EMC Standard:</b> IEC 61000-4-2 {2008} "Testing and measurement techniques of Electrostatic discharge immunity test".  <b>Limits: -</b></p> <ul style="list-style-type: none"> <li>i. Contact discharge level 2 {± 4 kV} or higher voltage;</li> <li>ii. Air discharge level 3 {± 8 kV} or higher voltage;</li> </ul> <p>Performance Criteria shall be as per Table 1 under Clause 6 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16.</p> <p>Applicable Performance Criteria shall be as per Table 3 under Clause 7.2 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16</p>	Test results from Designated CAB of TEC to be submitted for compliance.
iii.	<p><b>Immunity to radiated RF:</b>  <b>Name of EMC Standard:</b> IEC 61000-4-3 (2010) "Testing and measurement techniques-Radiated RF Electromagnetic Field Immunity test" <b>Limits:-</b></p> <p><b>For Telecom Equipment and Telecom Terminal Equipment with Voice interface (s)</b></p> <ul style="list-style-type: none"> <li>i. Under Test level 2 {Test field strength of 3 V/m} for general purposes in frequency range 80 MHz to 1000 MHz and</li> <li>ii. Under test level 3 (10 V/m) for protection against digital radio telephones and other RF devices in frequency ranges 800 MHz to 960 MHz and 1.4 GHz to 6.0 GHz.</li> </ul> <p><b>For Telecom Terminal Equipment without Voice interface (s)</b>  Under Test level 2 {Test field strength of 3 V/m} for general purposes in frequency range 80 MHz to 1000 MHz and for protection against digital radio telephones and other RF devices in frequency ranges 800 MHz to 960 MHz and 1.4 GHz to 6.0 GHz.</p> <p>Performance Criteria shall be as per Table 1 under Clause 6 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16.</p>	Test results from Designated CAB of TEC to be submitted for compliance.

	Applicable Performance Criteria shall be as per Table 3 under Clause 7.2 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16	
<b>iv.</b>	<p><b>Immunity to fast transients (burst):</b> Name of EMC Standard: IEC 61000- 4- 4 {2012} "Testing and measurement techniques of electrical fast transients/burst immunity test" Limits:- Test Level 2 i.e. a) 1 kV for AC/DC power lines; b) 0. 5 kV for signal / control / data / telecom lines; Performance Criteria shall be as per Table 1 under Clause 6 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16. Applicable Performance Criteria shall be as per Table 3 under Clause 7.2 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16</p>	Test results from Designated CAB of TEC to be submitted for compliance.
<b>v.</b>	<p><b>Immunity to surges:</b> <b>Name of EMC Standard:</b> IEC 61000-4-5 (2014) "Testing &amp; Measurement techniques for Surge immunity test" <b>Limits:-</b> i. For mains power input ports: (a)2 kV peak open circuit voltage for line to ground coupling (b) 1 kV peak open circuit voltage for line to line coupling ii. For telecom ports: (a) 2 kV for common mode. Performance Criteria shall be as per Table 1 under Clause 6 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16. Applicable Performance Criteria shall be as per Table 3 under Clause 7.2 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16</p>	Test results from Designated CAB of TEC to be submitted for compliance.
<b>vi.</b>	<p><b>Immunity to conducted disturbance induced by Radio frequency fields:</b> <b>Name of EMC Standard:</b> IEC 61000-4-6 (2013) "Testing &amp; measurement techniques-Immunity to conducted disturbances induced by radio- frequency fields" <b>Limits:-</b></p>	Test results from Designated CAB of TEC to be submitted for compliance.

	<p>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> <p>Performance Criteria shall be as per Table 1 under Clause 6 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16.</p> <p>Applicable Performance Criteria shall be as per Table 3 under Clause 7.2 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16</p>	
<b>vii.</b>	<p><b>Immunity to voltage dips &amp; short interruptions (applicable to only ac mains power input ports, if any):</b>  <b>Name of EMC Standard:</b> IEC 61000-4-11 (2004) "Testing &amp; measurement techniques-voltage dips, short interruptions and voltage variations immunity tests"  <b>Limits:-</b></p> <ul style="list-style-type: none"> <li>i. a voltage dip corresponding to a reduction of the supply voltage of 30% for 500ms (i.e. 70 % supply voltage for 500ms)</li> <li>ii. a voltage dip corresponding to a reduction of the supply voltage of 60% for 200ms; (i.e. 40% supply voltage for 200ms)</li> <li>iii. a voltage interruption corresponding to a reduction of supply voltage of &gt; 95% for 5s.</li> <li>iv. a voltage interruption corresponding to a reduction of supply voltage of &gt;95% for 10ms.</li> </ul> <p>Performance Criteria shall be as per Table 1 under Clause 6 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16.</p> <p>Applicable Performance Criteria shall be as per Table 3 under Clause 7.2 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16</p>	Test results from Designated CAB of TEC to be submitted for compliance.
<b>viii.</b>	<p><b>Immunity to voltage dips &amp; short interruptions (applicable to only DC power input ports, if any):</b>  <b>Name of EMC Standard:</b> IEC 61000-4-29:2000: Electromagnetic compatibility (EMC) - Part 4-29: Testing and measurement techniques - Voltage dips, short interruptions</p>	Test results from Designated CAB of TEC to be submitted for compliance.

	<p>and voltage variations on d.c. input power port immunity tests</p> <p>Limits:</p> <ul style="list-style-type: none"><li>i. Voltage Interruption with 0% of supply for 10ms. Applicable Performance Criteria shall be B.</li><li>ii. Voltage Interruption with 0% of supply for 30ms, 100ms, 300ms and 1000ms. Applicable Performance Criteria shall be C.</li><li>iii. Voltage dip corresponding to 40% &amp; 70% of supply for 10ms, 30 ms. Applicable Performance Criteria shall be B.</li><li>iv. Voltage dip corresponding to 40% &amp; 70% of supply for 100ms, 300 ms and 1000 ms. Applicable Performance Criteria shall be C.</li><li>v. Voltage variations corresponding to 80% and 120%of supply for 100 ms to 10s as per Table 1c of IEC 61000-4-29. Applicable Performance Criteria shall be B.</li></ul>	
--	---	--

**SECTION II****Safety Requirements**

The safety requirements shall be as below:

<b>Sr. No</b>	<b>Technical Parameters</b>	<b>Testing requirements</b>
<b>i.</b>	<p>a) The equipment shall conform to IS 13252 part 1: 2010 Amd 2013 &amp; Amd 2015 "Information Technology Equipment –Safety- Part 1: General Requirements" [equivalent to IEC 60950-1:2005+A1:2009+A2:2013 "Information Technology Equipment – Safety- Part 1: General Requirements"]</p> <p style="text-align: center;">OR</p> <p>The equipment shall conform to IEC 62368-1: 2014 "Audio/video, information and communication technology equipment - Part 1: Safety requirements".</p> <p>b) In case of radio transmitting equipment, it shall conform to IEC 60215: 2016 "Safety requirements for radio transmitting equipment - General requirements and terminology"].</p> <p><i>Note: Test reports as per IEC 60215:1987 shall be acceptable only till March 31, 2019.</i></p>	Test results from Designated CAB of TEC to be submitted for compliance.

**SECTION III****Technical Requirements**

<b>Sr. No</b>	<b>Requirements</b>	<b>Testing requirements</b>
<b>i.</b>	<p>Frequency of operation</p> <p>As per Table 1 in Annexure I</p> <p><i>Note: Frequency of operation requirements are as per the latest NFAP issued by WPC and the requirements in NFAP supersede the requirements listed here.</i></p>	<p>i. Test setup as prescribed in Annexure II.</p> <p>ii. Test results and certificate from TEC Designated CAB.</p>
<b>ii.</b>	<p>Transmit Power</p> <p>Transmit power requirements shall be as per DoT/WPC prescribed limits.</p>	<p>i. Test setup as prescribed in Annexure II.</p> <p>ii. Test results and certificate from TEC Designated CAB.</p>
<b>iii.</b>	<p>For VSAT terminals, conformance to latest version of</p> <p>a. ETSI EN 301 443 for C band</p> <p>b. ETSI EN 301 428 for Ku band</p>	<p>Test results and certificate from TEC Designated CAB.</p>

## **SECTION IV**

### **Other Requirements**

**1. ROHS**

Applicable when prescribed. Deferred at present.

**2. IPv6**

As per applicable order of Department of Telecommunications, Ministry of Communications, Government of India.

**SECTION V**

**Security Requirements**

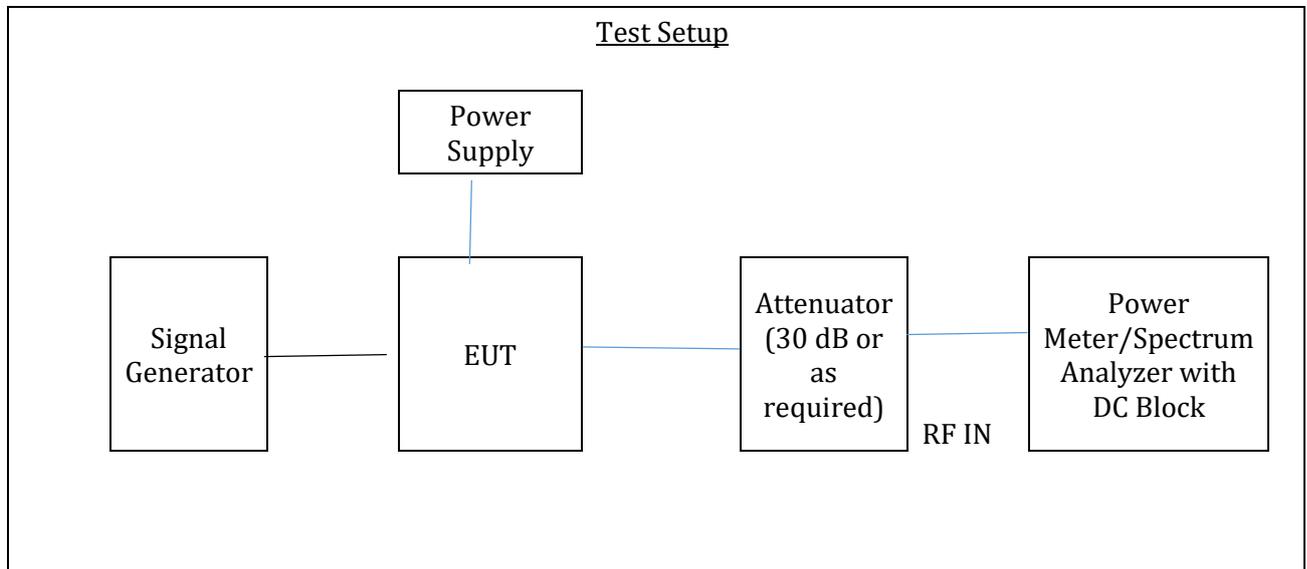
As and when prescribed by Department of Telecommunications, Ministry of Communications, Government of India.

**ANNEXURE I***Table 1*

<b>Frequency band</b>	<b>Receive (GHz)</b>	<b>Transmit (GHz)</b>
Lower C-band	3.400-3.700	6.425-6.725
Normal C-band	3.700-4.200	5.925-6.425
Extended C-band	4.500-4.800	6.725-7.025
Ku band	10.7-11.7, 12.2-12.75	12.75-13.25 13.75-14.0 14.0-14.5

**Note:**

- i. The equipment may operate in part of the bands or cover the full bands listed in Table 1 above.
- ii. All the frequency bands mentioned in the table above, may be revised as per the “National Frequency Allocation Plan (NFAP)” in force.

**ANNEXURE II****Typical setup of Frequency of Operation & Transmit Power measurement****Note:**

- i. For measurement of Transmit Power, Power Meter is to be connected to the Equipment Under Test(EUT).
- ii. For measurement of Frequency of Operation, Spectrum Analyzer (with DC block if required) is to be connected to the EUT.

**ANNEXURE III****List of Equipment under different categories:**

<b>Category of Equipment</b>	<b>Equipment covered in the category</b>
Satellite Equipment with RF interface	<ul style="list-style-type: none"> <li>i. RFT (Radio Frequency Transceivers)</li> <li>ii. VSAT Terminals with ancillary equipment *</li> </ul>
Satellite base band processing systems like modems etc.	<ul style="list-style-type: none"> <li>iii. Satellite Modems</li> <li>iv. Baseband Chassis with modulator/demodulator</li> <li>v. Controllers</li> </ul>
Other equipment	<ul style="list-style-type: none"> <li>i. Amplifiers (SSPA, HPA etc.)</li> <li>ii. LNA (Low Noise Amplifier)</li> <li>iii. LNB (Low Noise Block Down Converter)</li> <li>iv. BUC(Block Up Converter)</li> <li>v. Optimization Equipment</li> <li>vi. IF Transceivers</li> </ul>

\* VSAT Terminals and ancillary equipment are as defined in the respective ETSI EN specifications prescribed under Section III: Technical Requirements of this document.

Note:

This list may not be exhaustive and is subject to updation from time to time.

**ABBREVIATIONS**

BUC	Block Up Converter
CAB	Conformance Assessment Body
	Comité International Spécial des Perturbations
CISPR	Radioélectriques
CPE	Customer Premise Equipment
	Department of Telecommunication, Ministry of
DoT	Communications, Government of India
EIRP	Effective Isotropic Radiated Power
EMC	Electromagnetic Compatibility
ER	Essential Requirements
ETSI	European Telecommunications Standards Institute
EUT	Equipment Under Test
GHz	Giga Hertz
HPA	High Power Amplifier
IDU	Indoor Unit
IEC	International Electrotechnical Commission
IPv6	Internet Protocol version 6
LNA	Low Noise Amplifier
LNB	Low Noise Block Down Converter
MHz	Mega Hertz
ms	Millisecond
MTCTE	Mandatory Testing & Certification of Telecom Equipment
NFAP	National Frequency Allocation Plan
ODU	Outdoor Unit
RFT	Radio Frequency Transceiver
SSPA	Solid State Power Amplifier
TEC	Telecommunication Engineering Center
VSAT	Very Small Aperture Terminal
WPC	Wireless Planning & Coordination