

## ER for Tracking Device

### 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 Vehicle tracking device / Asset tracking device/ Animal, pet tracking/ Human Tracking etc to be used in Indian Telecom Network using cellular technologies such as 2G/3G/4G etc.

### **Product Matrix: -**

<b>Product/ Variant</b>	<b>BLE</b>	<b>RFID</b>	<b>NFC</b>	<b>Wi-Fi</b>	<b>GSM 2G</b>	<b>CDMA 2000</b>	<b>WCDMA 3G</b>	<b>LTE/ LTE-A</b>	<b>SAR</b>	<b>IPv6</b>	<b>USB</b>
Vehicle tracking device		NA	NA						NA		
Asset tracking device		NA	NA						NA		
Pet Tracking device	NA	NA	NA	NA							
Human Tracking device/ Safety device		NA	NA								

## 1 EMI/ EMC Requirements

Clause	Parameter	Standard	Limits/ Results expected	Remarks
<b>1.0</b>	<b>EMI/ EMC</b>			
1.1	<p>Conducted and Radiated Emission (Class A or B)?</p> <p>The values of limits shall be as per TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16</p> <p>For Radiated Emission tests, limits below 1 GHz shall be as per Table 4 (a1) (for Class B) or 5 (a1) (for Class A) for measuring distance of 3m</p>	<p>CISPR 22 (2008)/ CISPR 32 (2015) Class A or B</p> <p><b>Note: If tracking device comes along with the vehicle for testing then CISPR 25/ AIS 004- Part3 will be applicable</b></p>	Compliance	<i>As CISPR 32: 2015 has replaced CISPR 22: 2008 and the overlap period of 3 years between the two standards as provided by IEC is over in 2018</i>
1.2	<p>Immunity to Electrostatic discharge: Contact discharge level 2 {± 4 kV} or higher voltage;</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>	IEC-61000-4-2	Compliance	

1.3	<p>Immunity to Electrostatic discharge: Air discharge level 3 {± 8 kV} or higher voltage.</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>	IEC-61000-4-2	Compliance	
1.4	<p>Immunity to radiated RF: Under Test level 2 {Test field strength of 3 V/m or 10V/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. or 80MHz to 6GHz</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>	<p>IEC 61000-4-3 (2010) 80MHz to 6Ghz as per new IEC 61000-4-3 Ed.4</p> <p><b>Note: If tracking device comes along with the vehicle for testing then AIS 004- Part3 will be applicable</b></p>	Compliance	
1.5	<p>Immunity to fast transients (burst): Test Level 2: b) 0.5 kV for signal / control / data / telecom lines.</p>	IEC 61000- 4- 4 {2012}	Compliance	

	<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>			
1.6	<p>Immunity to surges: (a) 2 kV peak open circuit voltage for line to ground</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>	<p>IEC 61000-4-5 (2014)</p> <p><b>Note: For non-rechargeable fixed battery operated device without any telecom or power port, this test is not applicable</b></p>	Compliance	
1.7	<p>Immunity to surges: (b) 2 kV peak open circuit voltage for line to line coupling.</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>	<p>IEC 61000-4-5 (2014)</p> <p><b>Note: For non-rechargeable fixed battery operated device without any telecom or power port, this test is not applicable</b></p>	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</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>	IEC 61000-4-6 (2013)	Compliance	
1.9	<p>Immunity to voltage dips &amp; short interruptions (applicable to only ac mains power input ports, if any):</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>	<p>IEC 61000-4-11 (2004)</p> <p><b>Note: Applicable as per Standard But the product is DC operated then IEC 61000-4-29 is applicable (Most of the vehicle devices are DC operated only)</b></p>	Compliance	

## 2 Safety Requirements

Clause	Parameter	Standard	Limits/ Results expected	Remarks
2.1	General Safety Requirement	IS 13252/ IEC 60950  Note: If the device comes along with the product for testing then ISO 16750-2 will be applicable	Compliance	
2.2	<p><b>Radiation Safety (SAR) Requirements</b></p> <p>SAR value: 1.6 W/Kg averaged over 1 gm tissue.</p> <p>SAR (Specific Absorption Rate) Measurement System for wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6 GHz)</p>	<p>TEC/GR/RS/SAR-002/01/JUL 17</p> <p>OR</p> <p>IEC 62209-2:2010</p> <p><b>Note:</b></p> <ol style="list-style-type: none"> <li><b>1. If the device is operating within 20cm from human/ animal body, only then device conformance to SAR is required</b></li> <li><b>2. For pet tracking device, conformance to head SAR is required</b></li> <li><b>3. For human tracking device conformance to body SAR is required</b></li> </ol>	Compliance	As limits for body SAR is not defined yet hence SAR conformance for body SAR may be deferred at present but will be applicable when prescribed by TEC

### 3 Security Requirements

As and when prescribed by DoT

<b>Clause</b>	<b>Parameter</b>	<b>Standard</b>	<b>Limits/ Results expected</b>	<b>Remarks</b>
3.0				

## 4 Technical Requirements

### 4.1 Technical Requirements for GSM

Clause	Parameter	Standard	Limits/ Results expected	Remarks
4.1.1.	<p><b>Operating Frequency</b></p> <p>EUT shall be capable of at least operating in the following frequency bands.</p> <p><b>GSM:</b> 1710-1785 MHz (U/L) and 1805-1880 MHz (D/L)</p> <p><b>GSM:</b> 890-915 MHz (U/L) and 935-960 MHz (D/L)</p>	Current National Frequency Allocation Plan	Compliance	
4.1.2.	Transmitter Maximum output power	3GPP TS 51 010-1 13.16.2 (GPRS) and 3GPP TS 51 010-1 13.3 (GSM) or EN 301 511 (GSM) 4.2.10	Compliance	
4.1.3.	Output RF Spectrum	3GPP TS 51 010-1 13.4 or EN 301 511 (GSM) 4.2.6	Compliance	
4.1.4.	Transmitter spurious emissions in active mode (Conducted)	3GPP TS 51 010-1 12.1.1 or EN 301 511 (GSM) 4.2.12	Compliance	
4.1.5.	Receiver spurious emission in idle mode (Conducted)	3GPP TS 51 010-1 12.1.2 or EN 301 511 (GSM) 4.2.13	Compliance	
4.1.6.	Frequency Stability	3GPP TS 51 010-1 13.1 or	Compliance	

		EN 301 511 (GSM) 4.2.1		
4.1.7.	Receiver Reference sensitivity level	3GPP TS 51 010-1 14.2.1 or EN 301 511 (GSM)	Compliance	
4.1.8.	Adjacent Channel Rejection	3GPP TS 51 010-1 14.5.1 or EN 301 511 (GSM)	Compliance	
4.1.9.	Receiver blocking	3GPP TS 51 010-1 14.7.1 or EN 301 511 (GSM) 4.2.20	Compliance	

## 4.2 Technical Requirements for WCDMA/HSPA

Clause	Parameter	Standard	Limits/ Results expected	Remarks
4.2.1.	<p><b>Operating Frequency</b></p> <p>EUT shall be capable of at least operating in the following frequency bands.</p> <p><b>WCDMA:</b> 1920-1980 MHz (U/L) and 2110-2170 MHz (D/L)</p> <p><b>WCDMA:</b> 890-915 MHz (U/L) and 935-960 MHz (D/L)</p>	Current National Frequency Allocation Plan	Compliance	
4.2.2.	Transmitter Maximum output power	3GPP TS 34.121-1 5.2 or EN 301 908-2 (UMTS) 4.2.2	Compliance	
4.2.3.	Transmitter Spectrum emissions mask	3GPP TS 34.121-1 5.9 or EN 301 908-2 (UMTS) 4.2.3	Compliance	
4.2.4.	Transmitter spurious emissions in active mode (Conducted)	3GPP TS 34.121-1 5.11 or EN 301 908-2 (UMTS) 4.2.4	Compliance	
4.2.5.	Receiver spurious emission in idle mode (Conducted)	3GPP TS 34.121-1 6.8 or EN 301 908-2 (UMTS) 4.2.10	Compliance	
4.2.6.	Frequency Stability	3GPP TS 34.121-1 5.3 or EN 301 908-2 (UMTS)	Compliance	

4.2.7.	Transmitter Minimum Output Power	3GPP TS 34.121-1 5.4.3 or EN 301 908-2 (UMTS) 4.2.5	Compliance	
4.2.8.	Receiver Reference sensitivity level	3GPP TS 34.121-1 6.2 or EN 301 908-2 (UMTS) 4.2.13	Compliance	
4.2.9.	Receiver Adjacent Channel Selectivity (ACS)	3GPP TS 34.121-1 6.4 or EN 301 908-2 (UMTS) 4.2.6	Compliance	
4.2.10.	Receiver In-band blocking	3GPP TS 34.121-1 6.5.2.1 or EN 301 908-2 (UMTS) 4.2.7	Compliance	

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

Clause	Parameter	Standard	Limits/ Results expected	Remarks
4.3.1.	<p><b>Operating Frequency</b></p> <p>EUT shall be capable of operating in FDD bands or TDD bands or both FDD and TDD bands as mentioned below as per the band allocation to different operators.</p> <p><b>LTE(FDD):</b>824 – 849 MHz (U/L) and 869 – 894 MHz (D/L)</p> <p><b>LTE(FDD):</b>1710-1785 MHz (U/L) and 1805-1880 MHz (D/L)</p> <p><b>LTE(FDD):</b> 1920-1980 MHz (U/L) and 2110-2170 MHz (D/L)</p> <p><b>LTE (TDD):</b> 2300 – 2400 MHz</p> <p><b>LTE (TDD):</b> 2496 – 2690 MHz</p>	Current National Frequency Allocation Plan	Compliance	

4.3.2.	Transmitter Maximum output power	3GPP TS 36.521-1 6.2.2 or EN 301 908-13 (LTE) 4.2.2	Compliance	
4.3.3.	Transmitter Spectrum emissions mask	3GPP TS 36.521-1 6.6.2.1 or EN 301 908-13 (LTE) 4.2.3	Compliance	
4.3.4.	Transmitter spurious emissions in active mode (Conducted)	3GPP TS 36.521-1 6.6.3.1, 6.6.3.2, 6.6.3.3 or EN 301 908-13 (LTE) 4.2.4	Compliance	
4.3.5.	Receiver spurious emission in idle mode (Conducted)	3GPP TS 36.521-1 7.9 or EN 301 908-13 (LTE) 4.2.10	Compliance	
4.3.6.	Frequency Stability	3GPP TS 36.521-1 6.5 or EN 301 908-13 (LTE)	Compliance	
4.3.7.	Power Control Absolute power tolerance	3GPP TS 36.521-1 6.3.5.1 or EN 301 908-13 (LTE)	Compliance	
4.3.8.	Receiver Reference sensitivity level	3GPP TS 36.521-1 7.3 or EN 301 908-13 (LTE) 4.2.12	Compliance	
4.3.9.	Receiver Adjacent Channel Selectivity (ACS)	3GPP TS 36.521-1 7.5 or EN 301 908-13 (LTE) 4.2.6	Compliance	
4.3.10.	Receiver In-band blocking	3GPP TS 36.521-1 7.6.1 or EN 301 908-13 (LTE) 4.2.7	Compliance	

#### 4.4 Technical Requirements for CDMA 2000

Clause	Parameter	Standard	Limits/ Results expected	Remarks
4.4.1.	<b>Operating Frequency</b>  EUT shall be capable of at least operating in the following frequency bands. <b>CDMA:</b> 824-844 MHz (U/L) and 869-889 MHz (D/L)	Current National Frequency Allocation Plan	Compliance	
4.4.2.	Transmitter Maximum output power	1x: S0011 4.4.5 or EN 301 908-04 (CDMA) 4.2.3	Compliance	
4.4.3.	Transmitter Spectrum emissions mask	1x: S0011 4.5.1 or EN 301 908-04 (CDMA) 4.2.2	Compliance	
4.4.4.	Transmitter spurious emissions in active mode (Conducted)	1x: S0011 4.5.1 or EN 301 908-04 (CDMA) 4.2.2	Compliance	
4.4.5.	Receiver spurious emission in idle mode (Conducted)	1x: S0011 3.6 or EN 301 908-04 (CDMA) 4.2.5	Compliance	
4.4.6.	Frequency Stability	1x: S0011 4.1 or EN 301 908-04 (CDMA)	Compliance	
4.4.7.	Receiver Reference sensitivity level	EN 301 908-04 (CDMA)	Compliance	
4.4.8.	Receiver Adjacent	EN 301 908-04 (CDMA) 4.2.8	Compliance	

	Channel Selectivity (ACS)			
4.4.9.	Receiver In-band blocking	EN 301 908-04 (CDMA) 4.2.6	Compliance	

#### 4.5 Technical Requirements for Bluetooth Low Energy (BLE)

Clause	Parameter	Standard	Limits/ Results expected	Remarks
4.6.1.	Basic RF requirements	Conformance to IEEE 15.1, Bluetooth Special Interest Group (SIG)  Product compliance accordance with TEC specification- SD/RAD-01/01.SEP 2005  ETSI EN 300.328.V2.1.1	Compliance	
4.6.2.	Frequency of operation A. 2.4 GHz band as per latest NFAP provisions.  <i>Note: Frequency of operation requirements are as per the latest NFAP and GSRs issued by WPC and the requirements in NFAP and GSRs supersede the requirements listed here.</i>	Current National Frequency Allocation Plan	Compliance	

#### 4.6 Technical Requirements for USB

As per the technical requirement of ER of USB

#### 4.7 Technical Requirements for Wi-Fi

As per the technical requirement of ER of Wi-Fi

## 5 Other Requirements

Clause	Parameter	Standard	Limits/ Results expected	Remarks
5.1.	<b>Identification of Equipment for GSM/UMTS/LTE</b>			
a)	Each device shall have a unique 'International Mobile Station Equipment Identity' (IMEI) which shall not be with all zeros/ null/ invalid IMEI.	GSMA Official Document TS.06, 2017 - IMEI Allocation and Approval Process  <b>Test Procedure:</b> Manufacturer shall mention the suitable procedure for testing IMEI by connecting device to smart phone/ tablet/ PC and without using any specialised test equipment	Compliance	
5.2.	<b>Identification of Equipment for CDMA 2000</b>		Compliance	
a)	Each device shall be allocated a unique 'Mobile Equipment Identifier (MEID/ESN)' which shall not be with all zeroes/ null/ invalid MEID/ESN.	Similar Procedure as in Clause 5.1. above	Compliance	
5.3.	<b>Identification of Equipment for technologies other than cellular (BLE, Wi-Fi, etc.)</b>	<b>Test Procedure:</b> Manufacturer shall mention the suitable procedure for	Compliance	

	Each individual gateway shall have a unique "Media Access Control address" (MAC address) mentioned in the label attached to it, by which it shall be uniquely identified within the network.	testing MAC address/ any other unique ID by connecting device to smart phone/ tablet/ PC and without using any specialised test equipment		
5.4.	GPS in all Vehicle Tracking devices	Government of India Gazette Notification No. G.S.R. No. 436 (E) AIS 140	Compliance	
5.5.	<b>IPv6 Compliance</b> All data (Packet) enabled devices shall be capable of carrying IPv6 traffic either on dual stack (IPv4v6) or on native IPv6 compliant	For IPv6: RFC 2460: Clause no. 3, 4.1, 4.2, 4.3, 4.4 For Dual stack: RFC 4213: Clause 2.1 & Clause 2.2 (Note: Date of implementation will be as per DoT policy)	Compliance	