

**Essential Requirement**

**for**

**Dense Wavelength Division**

**Multiplexing (DWDM)**

**(Transmission Division)**

## Scope

This document describes the essential requirements for Dense Wavelength Division Multiplexing (DWDM) Equipment under Mandatory Testing & Certification of Telecommunication Equipment (MTCTE) notified by Government of India vide Gazette Notification no. G.S.R. 113 (E) dated 5<sup>th</sup> September 2017.

Table I: List of products and product variants		
Variants→ Products↓	Variant1	Variant2
DWDM Equipment	DWDM System	DWDM with OTN DXC

Table II: List of Interfaces for products and their variants		
Product Variants → Interface ↓	DWDM System	DWDM with OTN DXC
STM-1 Electrical	Y	Y
STM-1 Optical	Y	Y
STM-4 Optical	Y	Y
STM-16 Optical	Y	Y
STM-64 Optical	Y	Y
STM-256 Optical	Y	Y
10/100 Ethernet Electrical	Y	Y
10/100/1000 Ethernet Electrical	Y	Y
GE Optical	Y	Y
10 GE Optical	Y	Y
40 GE Optical	Y	Y
100 GE Optical	Y	Y
OTU-1	Y	Y
OTU-2	Y	Y
OTU-3	Y	Y
OTU-4	Y	Y

## 1.0 EMI/EMC Requirements

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

Sr. No.	Test Parameter	Test Result
i)	<p><b>Conducted and radiated emission:</b></p> <p><b>Name of EMC Standard:</b> "CISPR 22 {2008}- Limits and methods of measurement of radio disturbance characteristics of Information Technology Equipment"</p> <p><b>Limits:-</b></p> <p>i) To comply with Class A of CISPR 22 {2008} or CISPR {2015}.</p> <p>ii) The values of limits shall be as per TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16.</p> <p>iii) For radiated Emission tests, limits below 1Ghz shall be as per Table 4(a) or 5(a) for measuring distance of 10m or Table 4(a1) or 5(a1) for measuring distance of 3m</p> <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> <p>i. To comply with Class A</p> <p>ii. For Radiated Emission tests, limits below 1 GHz shall be for measuring distance of 3m.</p>	Test results from Designated CAB of TEC to be submitted for compliance.

	<p><i>Note: Test Reports as per limits of CISPR 22 (2008) mentioned above shall be acceptable only upto March 31, 2019.</i></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".</p> <p><b>Limits: -</b></p> <p>i) Contact discharge level 2 {± 4 kV} or higher voltage;</p> <p>ii) 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>	<p>Test results from Designated CAB of TEC to be submitted for compliance.</p>
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"</p> <p><b>Limits: -</b>  <b>For Telecom Equipment and Telecom Terminal Equipment with Voice interfaces (s)</b></p>	<p>Test results from Designated CAB of TEC to be submitted for compliance.</p>

	<p>i) Under Test level 2 {Test field strength of 3 V/m} for general purposes in frequency range 80 MHz to 1000 MHz and</p> <p>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.</p> <p><b>For Telecom Terminal Equipment without Voice interfaces (s)</b></p> <p>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 range 800 MHz to 960 MHz and 1.4 GHz and 6.0 GHz.</p> <p>Performance Criteria shall for both the cases 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 for both the cases shall be as per Table 3 under Clause 7.2 of TEC Standard No. TEC/SD/DD/EMC-221/05/OCT-16</p>	
<p>iv)</p>	<p><b>Immunity to fast transients (burst):</b></p> <p><b>Name of EMC Standard:</b> IEC 61000- 4- 4 {2012) "Testing and measurement techniques of electrical fast transients/burst immunity test"</p> <p><b>Limits:</b> -</p> <p>Test Level 2 i.e. a) 1 kV for AC/DC power lines;</p>	<p>Test results from Designated CAB of TEC to be submitted for compliance.</p>

	<p>b) 0. 5 kV for signal / control / data / 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>	
<p>v)</p>	<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”</p> <p><b>Limits: -</b></p> <p>i) For mains power input ports: (a)2.0 kV peak open circuit voltage for line to ground coupling  (b) 1.0 kV peak open circuit voltage for line to line coupling</p> <p>ii) For telecom ports: (a) 2 kV for common mode.</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>Test results from Designated CAB of TEC to be submitted for compliance.</p>
<p>vi)</p>	<p><b>Immunity to conducted disturbance induced by Radio frequency fields:</b>  <b>Name of EMC Standard:</b> IEC 61000-4-6 (2013)</p>	<p>Test results from Designated CAB of TEC to be submitted for compliance.</p>

	<p>with amendment 1 (2004) &amp; amendment 2 (2006) "Testing &amp; measurement techniques- Immunity to conducted disturbances induced by radio- frequency fields"</p> <p><b>Limits:-</b> Under the test level 2 {3V 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>	
vii)	<p><b>Immunity to voltage dips &amp; short interruptions (applicable to only ac mains power input ports, if any):</b></p> <p><b>Name of EMC Standard:</b> IEC 6100-4-11 (2004) "Testing &amp; measurement techniques- voltage dips, short interruptions and voltage variation immunity tests"</p> <p><b>Limits:</b></p> <ul style="list-style-type: none"> <li>i. A voltage dip corresponding to reduction of the supply voltage of 30% for 500 ms (i.e 70 % supply voltage for 500 ms)</li> <li>ii. A voltage dip corresponding to reduction of the supply voltage of 60% for 200 ms (i.e 40 % supply voltage for 200 ms)</li> <li>iii. A voltage dip corresponding to reduction of</li> </ul>	<p>Test results from Designated CAB of TEC to be submitted for compliance.</p>

	<p>the supply voltage of &gt; 95% for 5 s</p> <p>iv. A voltage dip corresponding to reduction of the supply voltage of &gt; 95% for 10 ms</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>	
viii)	<p><b>Immunity to voltage dips &amp; short interruptions (applicable to only DC power input ports, if any):</b></p> <p>Name of EMC Standard: 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</p> <p>Limits:</p> <p>i. Voltage Interruption with 0% of supply for 10ms. Applicable Performance Criteria shall be B.</p> <p>ii. Voltage Interruption with 0% of supply for 30ms, 100ms, 300ms and 1000ms. Applicable Performance Criteria shall be C.</p> <p>iii. Voltage dip corresponding to 40% &amp; 70% of supply for 10ms, 30 ms. Applicable Performance Criteria shall be B.</p> <p>iv. Voltage dip corresponding to 40% &amp; 70% of supply for 100ms, 300 ms and 1000 ms. Applicable Performance Criteria shall be C.</p>	<p>Test results from Designated CAB of TEC to be submitted for compliance.</p>



	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.	
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## 2.0 Safety Requirements

Clause	Requirements	Testing requirements
i.	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"].	Test results from Designated CAB of TEC to be submitted for compliance.

## 3.0 Security Requirements

Security requirements will be incorporated in the document based on the inputs received from Security Wing, DOT.

## 4.0 Technical Requirements

Refer Table II & III of Compendium for Essential Requirements of Transmission Division.

## 5.0 Other Requirements