Laboratory	**Electronics and Telecommunications Test Laboratory, X-35, 3rd Floor, Okhla Phase II, New Delhi**		
Accreditation Standard	**ISO/IEC 17025: 2005**		
Discipline	**Electronics Testing**	**Issue Date**	**19.10.2014**
Certificate Number	**T-2339**	**Valid Until**	**18.10.2016**
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S.No.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
I. ELECTRONICS COMPONENTS & EQUIPMENTS				
1.	**Products with 2048 kbps (E1) interface**	Pulse Characteristics (E1/2048 kbps) - Width - Amplitude - Mask - Time	ITU-T G.703	1ns to 300ns 2.0V to 4.0V Waveform shape : As per G.703
		Output Jitter/Wander (E1/2048 kbps)	ITU-T G.823 ITU-T G.732 ITU-T G.813	0.0 to 1.6 UI p-p 0.0 to 0.8 UI rms
		Jitter/Wander Tolerance (E1/2048 kbps)	ITU-T G.823 ITU-T G.813	20 Hz to 100 kHz 0.01 UI to 80 UI
		Return Loss (E1/2048 kbps)	ITU-T G.703	51 kHz to 3.072 MHz 0 to 99 dB
		Bit Error Rate (E1/2048 kbps)	ITU-T G.821	Bit, Code, Frame, CRC, REBE
		Clock frequency / Bit Rate (E1/2048 kbps)	ITU-T G.703	2048kbps ± 100 ppm
		Bit Slip (E1/2048 kbps)	ITU-T G.822 TEC/IR/SWN/2MB/07/MAR-10	+ve Bit slips -ve Bit slips
		Wander Measurement / Time Interval Error (E1/2048 kbps)	ITU-T G.823	10µHz to 10 Hz TIE(p-p) range : 0.1ns to 10000s

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2.	**Products with 34,368 kbps (E3) interface**	Pulse Characteristics (E3/34368 kbps) - Width - Amplitude - Mask - Time	ITU-T G.703	1ns to 300ns 0.5V to 1.5V Waveform shape :As per G.703
		Output Jitter/Wander (E3/34368 kbps)	ITU-T G.823 ITU-T G.732 ITU-T G.813	0.0 to 1.6 UI p-p 0.0 to 0.8 UI rms
		Jitter/Wander Tolerance (E3/34368 kbps)	ITU-T G.823	50 Hz to 800 kHz 0.01 UI to 80 UI
		Return Loss (E3/34368 kbps)	ITU-T G.703	860 KHz to 51.550 MHz
		Bit Error Rate (E3/34368 kbps)	ITU-T G.821	Bit, Code, Frame, CRC, REBE errors
		Clock frequency / Bit Rate (E3/34368 kbps)	ITU-T G.703	34368 kbps ± 100 ppm
3.	**Products with 155mbps (STM-1 optical) interface**	Bit Rate / Clock Frequency (STM-1)	ITU-T G.957	155 mbps ± 100 ppm
		Operating Wavelength (STM-1)	ITU-T G.957	600nm to 1700nm
		Bit Error Rate (STM-1)	ITU-T G.826 ITU-T G.828	Bit, Frame (A1A2), B1, B2, MS-REI, B3, HP-REI, HP-IEC, LP-REI, LP-BIP-2 errors

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	Products with 155mbps (STM-1 optical) interface	Spectral Width (RMS) (STM-1)	ITU-T G.957	600nm to 1700nm
		Spectral Width (-20dB) (STM-1)	ITU-T G.957	600nm to 1700nm
		Side Mode Suppression Ratio (STM-1)	ITU-T G.957	600nm to 1700nm 0 to 50 dB
		Mean Launch Power (STM-1)	ITU-T G.957	-60 dBm to +26 dBm
		Extinction Ratio (STM-1)	ITU-T G.957	At.1310nm : -24dBm to -3dBm At.1550nm: -24dBm to -3dBm
		Receiver Sensitivity (STM-1)	ITU-T G.957	1200nm to 1600nm 0 to to 60dB
		Receiver Reflectance (STM-1)	ITU-T G.957	1310nm,1550nm -60dB to +26dB
		Eye Pattern Mask (STM-1)	ITU-T G.957	Eye diagram as per - ITU-T G957
		Output Jitter/Wander (STM-1)	ITU-T G.825 ITU-T G.813	500 Hz to 1.3 MHz 0 UI p-p to 1.6 UI p-p
		Jitter/Wander Tolerance (STM-1)	ITU-T G.825 ITU-T G.813	500 Hz to 1.3 MHz 0.01 UI to 50 UI

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4.	**Products with 622mbps (STM-4 optical) interface**	Bit Rate / Clock Frequency (STM-4)	ITU-T G.957	622mbps ± 100 ppm
		Operating Wavelength (STM-4)	ITU-T G.957	600nm to 1700nm
		Bit Error Rate (STM-4)	ITU-T G.826 ITU-T G.828	Bit, Frame (A1A2), B1, B2, MS-REI, B3, HP-REI,HP-IEC, LP-REI, LP-BIP-2 errors
		Spectral Width (RMS) (STM-4)	ITU-T G.957	600nm to 1700nm
		Spectral Width (-20dB) (STM-4)	ITU-T G.957	600nm to 1700nm
		Side Mode Suppression Ratio (STM-4)	ITU-T G.957	600nm to 1700nm 0 to 50 dB
		Mean Launch Power (STM-4)	ITU-T G.957	-60dBm to +26dBm
		Extinction Ratio (STM-4)	ITU-T G.957	1310nm : -24dBm to -3dBm 1550nm:-24dBm to -3dBm
		Receiver Sensitivity (STM-4)	ITU-T G.957	1200nm to 1600nm 0 to -60dB
		Receiver Reflectance (STM-4)	ITU-T G.957	1310nm,1550nm -60dB to +26dB
		Eye Pattern Mask (STM-4)	ITU-T G.957	Eye diagram as per - ITU-T G957
		Output Jitter/Wander (STM-4)	ITU-T G.825 ITU-T G.813	0 UI p-p to 1.6 UI p-p
		Jitter/Wander Tolerance (STM-4)	ITU-T G.825 ITU-T G.813	1 kHz to 5 MHz 0.01 UI – 200 UI

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5.	**PABX, Group Audio Terminal and other products with 2 wire analog interface**	Cross Talk	TEC/IR/SW/PBX /004/02 MAR 2011	Frequency 20 Hz to 3.99 kHz 0 to 100 dB
		Longitudinal Conversion Loss	TEC/IR/SW/PBX /004/02 MAR 2011	Frequency 20 Hz to 3.99 kHz 0 to 100 dB
		Return Loss (Analog)	TEC/IR/SW/PBX /004/02 MAR 2011	Frequency 20 Hz to 3.99 kHz 0 to 100 dB
		Idle Channel Noise	TEC/IR/SW/PBX /004/02 MAR 2011	Frequency 20 Hz to 3.99 kHz 0 to 100 dB
		DTMF Frequency Measurement	TEC/IR/SW/PBX/004/02 MAR 2011 TEC/IR/PST-01/01.SEP 2005	Frequency 20 Hz to 3.99 kHz
		DTMF Level Measurement	TEC/IR/SW/PBX/004/02 MAR 2011 TEC/IR/PST-01/01.SEP 2005	Level 0 to -19.9dB
		Dial Speed	TEC/IR/SW/PBX /004/02 MAR 2011	3.0 to 20.0 IPS
		Make Brake Ratio	TEC/IR/SW/PBX/004/02 MAR 2011 TEC/IR/PST-01/01.SEP 2005	10% to 90%
		Inter Digital Pause	TEC/IR/SW/PBX/004/02 MAR 2011 TEC/IR/PST-01/01.SEP 2005	164 ms to 999 ms

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	PABX, Group Audio Terminal and other products with 2 wire analog interface	Loop Current	TEC/IR/SW/PBX /004/02 MAR 2011	0.1 mA to 400 mA
		Insulation Resistance	TEC/IR/SW/PBX/004/02 MAR 2011 TEC/IR/PST-01/01.SEP 2005	Upto 20 MOhms @ 500 VDC
6.	**PABX**	General Functions / Features of PABX	TEC/IR/SW/PBX/004/02.MAR 2011	Qualitative
		Inter/Intra PABX Calls PSTN Connectivity Emergency services Compatibility with existing - Networks Fault Localization Operation & Maintenance - features Security & logs Performance monitoring Other general - functions/features etc.		
7.	**Digital Switch**	General Functions / Features of Digital Switch	TEC/IR/SWN-2MB/07/MAR.10 TEC/IR/SWN-1ST/06/JUNE.10	Qualitative
		PSTN Connectivity & compatibility Voice/Data functions Performance Reporting O & M features		

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8.	**Products with SS7 signaling interface**	SS7 Signaling Protocols MTP-2 MTP-3 ISUP	ITU-T Q.781 ITU-T Q.782 ITU-T Q.784	SS7 Protocol Suite MTP-2 MTP-3 ISUP
9.	**Products with IP protocol interface**	IP Protocols	TEC/IR/SWN-2MB/07/ MAR.10. TEC/IR/SWN-1ST/06/JUN.10 TEC/IR/MGW-001/04/OCT 2012 TEC/IR/SW/PBX/004/02. MAR 2011 TEC/IR/CTI-001/04. SEP 2012 TEC/IR/I/TCP-001/04 MAR 2012	IP version 4 IP version 6 TCP UDP PPP PPPoE HDLC Static Routing RIP OSPF BGP H.248 SIP MEGACO MGCP H323 BICC RTP RTCP

S.No.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
10.	***Media Gateway**	Functions / Features of Media Gateway - PSTN Connectivity - Voice/Data functions - Compatibility with other networks - Performance Reporting - Operation & Maintenance	TEC/IR/MGW-001/04.OCT 2012	Qualitative
11.	**Video Conferencing Equipment**	Functions / Features of Video Conferencing Equipment with ISDN BRI interface - PSTN Connectivity - Video/Audio - Conference Control - Connection Rate - Availability of Service	TEC/IR/CPE-02/03. OCT 2003 (Chapter 7)	Qualitative
12.	**Router**	General Functions / Features of Router PSTN Connectivity Data Rates Availability of service Operation & Maintenance Performance reporting	TEC/IR/I/TCP-001/04/MAR 12	Qualitative

S.No.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
13.	**Group Audio Terminal**	Functions / Features of Group Audio Terminal - PSTN Connectivity - Availability of Service	TEC/IR/PST-01/01. SEP 2005	Qualitative
14.	**Products with digital and analog interfaces**	Group Delay	TEC/IR/SW/PBX/004/02/MAR-2011 TEC/IR/SWN-2MB/07/MAR-10	20 to 3.99 kHz 0 to 3000 micro sec
		Transmission Loss	TEC/IR/SW/PBX/004/02/MAR-2011 TEC/IR/SWN-2MB/07/MAR-10	20 to 3.99 kHz 0 to 100 dB
		Weighted Noise	TEC/IR/SW/PBX/004/02/MAR-2011 TEC/IR/SWN-2MB/07/MAR-10	20 to 3.99 kHz 0 to 100 dB
		Total Distortion	TEC/IR/SW/PBX/004/02/MAR-2011 TEC/IR/SWN-2MB/07/MAR-10	20 to 3.99 kHz 0 to 100 dB
15.	**Products with G.957 optical interface**	Optical Return Loss	ITU-T G.957	6 to 70 dB
16.	**Products with ISDN PRI interface**	ISDN PRI protocol	ITU-T Q.931 TEC/SD/ISN-01	Layer 2 and Layer 3 ISDN Signaling (PRI)

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17.	**Products with ISDN BRI interface**	ISDN BRI Protocol	ITU-T Q.931 TEC/SD/ISN-01 TEC/SD/ISN-02	Layer 2 and Layer 3 ISDN Signaling (BRI)
18.	***Products with MFC-R2 Protocol interface**	MFC-R2 Signaling	TEC/GR/LLT-01 TEC/IR/MFR-SIG	MFC-R2 signaling protocol messages
19.	**Multi Point Conferencing Server**	Functions & Features of Multi point Conferencing Server with ISDN PRI protocol	TEC/IR/CPE-02/03.OCT 2003 (Chapter 11)	Qualitative
		Functions & Features of Multi point Conferencing Server with ISDN BRI protocols	TEC/IR/CPE-02/03.OCT 2003 (Chapter 10)	Qualitative
20.	**Products with 2 wire analog interface**	Flash	TEC/IR/SW/PBX/004/02 MAR 2011 TEC/IR/PST-01/01.SEP 2005	300ms ± 30 ms
		DC Voltage	TEC/IR/SW/PBX/004/02 MAR 2011 TEC/IR/PST-01/01.SEP 2005	0.1mV to 100V
		AC Voltage	TEC/IR/SW/PBX/004/02 MAR 2011 TEC/IR/PST-01/01.SEP 2005	0.1mV to 400V 40Hz to 60 Hz

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	Products with 2 wire analog interface	DC Current	TEC/IR/SW/PBX/004/02 MAR 2011 TEC/IR/PST-01/01.SEP 2005	0.1mA to 400mA 0.01A to 10A
		AC Current	TEC/IR/SW/PBX/004/02 MAR 2011 TEC/IR/PST-01/01.SEP 2005	0.1mA to 400mA 0.01A to 10A 40Hz to 60 Hz
		Resistance	TEC/IR/SW/PBX/004/02 MAR 2011 TEC/IR/PST-01/01.SEP 2005	0.1 ohms to 40Mega ohms
21.	**Products with 2488mbps (STM-16 optical) interface**	Bit Rate / Clock Frequency (STM-16)	ITU-T G.957	2488 MHz ± 100 ppm
		Operating Wavelength (STM-16)	ITU-T G.957	600nm to 1700nm
		Bit Error Rate (STM-16)	ITU-T G.826 ITU-T G.828	Bit, Frame (A1A2), B1, B2, MS-REI, B3, HP-REI,HP-IEC, LP-REI, LP-BIP-2 errors
		Spectral Width (RMS) (STM-16)	ITU-T G.957	600nm to 1700nm
		Spectral Width (-20dB) (STM-16)	ITU-T G.957	600nm to 1700nm
		Side Mode Suppression Ratio (STM-16)	ITU-T G.957	600nm to 1700nm 0 to 60 dB
		Mean Launch Power (STM-16)	ITU-T G.957	-60dBm to +26dBm

S.No.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
	Products with 2488mbps (STM-16 optical) interface	Extinction Ratio (STM-16)	ITU-T G.957	1310nm : -24dBm to -3dBm 1550nm:-24dBm to -3dBm
		Receiver Sensitivity (STM-16)	ITU-T G.957	1200nm to 1600nm 0 to -60dB
		Receiver Reflectance (STM-16)	ITU-T G.957	1310nm,1550nm -60dB to +26dB
		Eye Pattern Mask (STM-16)	ITU-T G.957	Eye diagram as per - ITU-T G957
		Output Jitter/Wander (STM-16)	ITU-T G.825 ITU-T G.813	0 UI p-p to 16 UI p-p
		Jitter/Wander Tolerance (STM-16)	ITU-T G.825 ITU-T G.813	5k to 20 MHz 0.01 UI to 200 UI
22.	**Products with G.957 interface**	Multiplexing Structure & Mapping	ITU-T G.707	All G.957 interfaces from STM-1 to STM-16
23.	**Condensor Click**	Condenser Click /Bell Capacitance	TEC/IR/SW/PBX/004/02 MAR 2011	0 to 9.9 µF

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