Industrial Cabling Channel

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Introduction

This presentation contains the preliminary cabling requirements for 1G signaling targeted for high noise high temperature environments. Depending on the expected noise level, the immunity levels are adjusted for the cabling. The immunity levels are aligned with the MICE concept.

Cable Parameters for 1G

Maximum OD of Conductor	1.52mm (0.060 in) Maximum TBD
Gauge	23 AWG to 26 AWG Stranded 1,35 max diameter
Number of Pairs	1 or 2
Construction	Twisted Pairs with overall Pair twist Lay length TBD
Color Code	Accordance with ANSI/TIA 568C.2 section 5.3.3 Table 2
Cable Diameter	</= 9.0mm (0.354 in) Max
Cable Jacket Concentricity	TBD

Cable Parameters (Continued)

Breaking Strength	400 N (90 lbf) minimum	Notes/Comments
Cold Bend Radius @-20 degrees C	4X cable diameter UTP	no cracking of jacket or primary conductor insulation
	8X screened	no cracking of jacket or primary conductor insulation
Markings		cable markings to identify appropriate specifications
Core Wrap concentricity	TBD	

Cable Parameters (Continued)

Core Shield Foil thickness minimum	Foil thickness	
Drain Wire (foil only)	26 AWG	
Core Shield Braided	Shall be Tin coated copper braid. Need AWG	
Dielectric Strength (screened only)	DC 2.5kV for 2 Seconds or AC 1.7kV 2 seconds in accordance with IEC 60189-1	May need to adopt 5kV for 3 seconds per Ansi/TIA 568C.2 Section 5.6.8

Cable Parameters (Continued)

Surface Transfer Impedance	$1 \le f \le 100$	$Ztcable = 10 * f$	Standard cables only. High Flex designs TBD
Elecrical			
Shield DCR	<= R = 62.5/D where R Ohms/km and D =OD of outside diameter of shield in mm		
RL	$1 \le f < 10$ $10 \le f < 20$ $20 \le f \le 250$	$20 + 5 * \log(f)$ 25 $25 - 7 * \log(\frac{f}{20})$	
RL Stranded construction	$1 \le f < 10$ $10 \le f < 20$ $20 \le f \le 250$	$20 + 5 * \log(f)$ 25 $25 - 8.6 * \log(\frac{f}{20})$	
IL	$1 \le f \le 250$	$1.808 * \sqrt{f} + 0.017 * f + \frac{0.2}{\sqrt{f}}$	correct for temperature 0.4% per degrees C from 20 deg C to 40 deg C. 0.6% 40 deg C to specified temp
IL stranded construction	$1 \le f \le 250$	$1.2 * \left(1.808 * \sqrt{f} + 0.017 * f + \frac{0.2}{\sqrt{f}}\right)$	correct for temperature 0.4% per degrees C from 20 deg C to 40 deg C. 0.6% 40 deg C to specified temp

Cable Parameters (Continued)

NEXT	$1 \leq f \leq 250$	$44.3 - 15 * \log\left(\frac{f}{100}\right)$
PSNEXT	$1 \leq f \leq 250$	$42.3 - 15 * \log\left(\frac{f}{100}\right)$
FEXT		
ACRF (ELFEXT)	$1 \leq f \leq 250$	$27.8 - 20 * \log\left(\frac{f}{100}\right)$
PSACRF	$1 \leq f \leq 250$	$24.8 - 20 * \log\left(\frac{f}{100}\right)$
TCL	$1 \leq f \leq 250$	$30 - 10 * \log\left(\frac{f}{100}\right)$

Cable Parameters (Continued)

ELTCTL	$1 \leq f < 30$	$35 - 20 * \log(f)$	
Coupling Attenuation	$30 \leq f \leq 250$	$55 - 20 * \log\left(\frac{f}{100}\right)$	
Transfer Impedance	Zt:10*f mOhms/m < 50 mOhms/m revert to 50 m Ohms/m		1 MHz to 100 MHz
Propagation Delay	$1 \leq f < 250$	$534 + \left(\frac{36}{\sqrt{f}}\right)$	
Propagation delay Skew	Less than 45 ns/100 meter 20 deg C to upper operating temperature		
PSANEXT	$1 \leq f < 250$	$42.3 - 15 * \log\left(\frac{f}{100}\right)$	

Cable Parameters (Continued)

Average PSANEXT	$1 \leq f < 250$	$42.3 - 15 * \log\left(\frac{f}{100}\right)$	
PSACRF	$1 \leq f < 250$	$24.8 - 20 * \log\left(\frac{f}{100}\right)$	
Average PSACRF	$1 \leq f < 250$	$27.8 - 20 * \log\left(\frac{f}{100}\right)$	
DC Resistance	9.38 Ohms per 100 Meter (328 ft) @20 degrees C, Max		Per ASTM D4566
DC Resistance Stranded Construction	14 Ohms per 100 Meter (328 ft) @20 degrees C, Max		Per ASTM D4566
DC Unbalance	<=5% between the two conductors of any cable pair, Max		Per ASTM D4566

Cable Parameters (Continued)

	or 2%	in accordance with IEC 61156-1
Mutual Capacitance	5.6 nf per 100 m (328 ft)	'@ 1KHz, corrected to 20 degrees C
Capacitance Unbalance PR to PR	330 pf per 100 m (328 ft)	@ 1KHz, corrected to 20 degrees C