

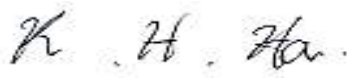
TECHNICAL SPECIFICATION


LSSS-LN0099-03


FOR

4 PAIR F/UTP CABLES (ENHANCED CATEGORY 5)

(Ref : ISO/IEC 11801, IEC 61156-5, IEC 60332-1, IEC 60332-3)

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1. SCOPE

This specification is based on the standards of IEC 61156-5 and ISO/IEC 11801, and covers the requirements for foiled twisted pair (F/UTP) cables of 100Ω, Enhanced Category 5 (Cat.5E).
 - Applicable cable size & type ; 4 Pairs, PVC or LSZH sheath

2. CABLE CONSTRUCTION

2.1 Conductor

The conductors shall be solid , annealed and bare copper with a diameter of AWG24 and minimum acceptable diameter shall be 0.485mm.

2.2 Insulation

Each conductor shall be insulated with solid high density polyethylene. The insulation shall be uniform and shall not have any defects. The diameter over the insulation shall be maximum 1.22mm.

2.3 Color code

The color code of insulation shall be shown as Table 1.

Table 1. Color code of insulation

Pair No.	A - wire		B - wire	
	Base	Stripe	Base	Stripe
1	White	Blue	Blue	-
2	White	Orange	Orange	-
3	White	Green	Green	-
4	White	Brown	Brown	-

*Note) The stripe marking shall be applied on the white color.

2.4 Core Assembly

Two insulated conductors shall be twisted into a pair. Four twisted pairs shall be assembled into a cable core.

2.5 Screen

The aluminum tape coated on one side with plastic film shall be applied over the cable core for screening on jacketing process. A tinned copper wire with the diameter of 0.4mm shall be applied with cable core in jacket.

2.6 Sheath

The flame retardant PVC or LSZH(Low Smoke Zero Halogen) compound colored grey or other colors shall be applied over the screening. The sheath shall be uniform and shall not have any defects. The thickness of sheath and cable diameter shall be shown as table 2.

Table.2 thickness of sheath and cable diameter

Thickness (mm)	Outer Diameter (mm)
0.45±0.05	6.0±0.2

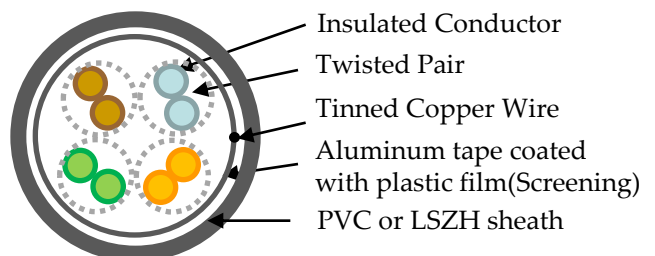


Fig 1. Cross Sectional Diagram of Cable

3. ELECTRICAL CHARACTERISTICS

3.1 Electrical Performances

Characteristics	units	Specification
DC Resistance	$\Omega/100\text{m}$	≤ 9.5
DC Resistance Unbalance	%	≤ 2.00
Capacitance Unbalance (Pair to Ground)	pF/km (800~1000Hz)	≤ 1600
Insulation Resistance	$\text{M}\Omega \cdot \text{m}$	≥ 5000
Dielectric Strength	DC kV/sec	2.5 / 2
Impedance (Characteristic mean)	Ω	$100 \pm 5\%$ (at 100MHz)
Return Loss	dB/100m	$\geq 20 + 5 * \log(\text{freq})$, 4 $\leq f < 10\text{MHz}$ ≥ 25 , 10 $\leq f < 20\text{MHz}$ $\geq 25 - 7 * \log(\text{freq}/20)$, 20 $\leq f \leq 100\text{MHz}$
Attenuation (Insertion Loss)	dB/100m	$\leq 1.967 * \sqrt{(\text{freq}) + 0.023 * (\text{freq}) + 0.1 / \sqrt{(\text{freq})}}$, 4 ~ 100 MHz
NEXT Loss	dB/100m	$\geq 65.3 - 15 * \log(\text{freq})$, 4 ~ 100MHz
Power sum NEXT Loss	dB/100m	$\geq 62.3 - 15 * \log(\text{freq})$, 4 ~ 100MHz
ELFEXT Loss	dB/100m	$\geq 64 - 20 * \log(\text{freq})$, 4 ~ 100MHz
Power sum ELFEXT Loss	dB/100m	$\geq 61 - 20 * \log(\text{freq})$, 4 ~ 100MHz
Propagation Delay	ns/100m	$\leq 534 + 36 / \sqrt{(\text{Freq})}$, 4 ~ 100MHz
Propagation Delay Skew	ns/100m	≤ 45 , <u>4~100MHz</u>

Freq. (MHz)	Attenuation (dB/100m) Max.	NEXT (dB/100m) Min.	PSNEXT (dB/100m) Min.	ELFEXT (dB/100m) Min.	PSELFEXT (dB/100m) Min.	RL (dB/100m) Min.	P.Delay (ns/100m) Max.
4	4.1	56.3	53.3	52.0	49.0	23.0	552
8	5.8	51.8	48.8	45.9	42.9	24.5	547
10	6.5	50.3	47.3	44.0	41.0	25.0	545
16	8.3	47.2	44.2	39.9	36.9	25.0	543
20	9.3	45.8	42.8	38.0	35.0	25.0	542
25	10.4	44.3	41.3	36.0	33.0	24.3	541
31.25	11.7	42.9	39.9	34.1	31.1	23.6	540
62.5	17.0	38.4	35.4	28.1	25.1	21.5	539
100	22.0	35.3	32.3	24.0	21.0	20.1	538

The cable performance between 1MHz and 4MHz is achieved by design only and it is therefore not necessary to test for this performance below 4MHz. (According to the IEC 61156-5 standard)

3.2 Measurements Precaution

All electrical characteristics specified in clause 3.1 shall be tested on one sample length of 100 meter or greater removed from the package.

4. PHYSICAL PROPERTIES

4.1 Insulation

The un-aged elongation, measured in accordance with clause 6.4.4 of IEC 61156-5 shall be minimum 100% , respectively.

The shrinkage of insulation, measured in accordance with clause 6.5.1 of IEC 61156-5, shall not exceed 5%

The bending test of insulation at low temperature, measured in accordance with clause 6.5.3 of IEC 61156-5, shall show no visible cracks.

4.2 Sheath

The un-aged tensile strength and elongation, measured in accordance with clause 6.4.6 & 6.4.7 of IEC 61156-5 shall be minimum 9MPa and 100%, respectively.

The heat-aged tensile strength and elongation, measured in accordance with clause 6.5.4 & 6.5.5 of IEC 61156-5 shall be minimum 70% and 50% of un-aged, respectively.

The LSZH compound shall meet with IEC 60754-2 and IEC 61034.

4.3 Cable Cold Bend

All cables shall meet the requirements of clause 6.5.7 of IEC 61156-5.

4.4 Flame Requirements

A cable marked "IEC 60332-1" or "CMX" shall meet the VW-1 flame test specified in IEC 60332-1.

A cable marked "IEC 60332-3" or "CM" shall meet the **vertical** flame test specified in IEC 60332-3.

5. PACKING AND IDENTIFICATION

5.1 Cable Marking

The cable shall be marked on the sheath to designate the transmission performance and/or others. (if ordered by purchaser)

The marking shall be repeated through the outer sheath clearly.

5.2 Cable Packing

The standard delivery length of cable is 305m or 500m.

Each length of completed cable shall be wound on box or wooden reel.

Marking on tag or reel

The following details shall be marked on a tag affixed to each shipping length of cable in a reel or directly printed on the outer surface of the reel.

- AWG size and number of pairs
- Flame test classification
- Manufacturer name and logo
- length
- Others

- End of Specification -

※ APPENDIX – PRODUCT PART NUMBER

Description	Part Number
Category 5e F/UTP 4Pair CMX	FTP-E-C5G-E1VN-X 0.5X004P/xx
Category 5e F/UTP 4Pair CM	FTP-E-C5G-E1VN-M 0.5X004P/xx
Category 5e F/UTP 4Pair LSZH 332-1	FTP-E-C5G-E1ZN-X 0.5X004P/xx
Category 5e F/UTP 4Pair LSZH 332-3	FTP-E-C5G-E1ZN-M 0.5X004P/xx

- xx denotes color: WH=White, BL=Blue, GY=Gray, VI=Violet, OR=Orange, RD=Red, GN=Green, YL=Yellow, BK=Black
 - Other colors are available

REV.	Date	Prepared By	Checked By	Approved By	Remark
00	2012.05.30	K. H. Ha	T.W. Kim	Y.H. Lee	1. Issued
01	2012.06.05	K. H. Ha	T.W. Kim	Y.H. Lee	1. Reference specifications are changed to IEC standards. 2. Clause 2.5 Screen & Fig. 1 changed - Tinned Copper Wire is applied between cable core and sheath.
02	2012.06.25	K. H. Ha	T.W. Kim	Y.H. Lee	1. Clause 2.5 Screen & Fig. 1 changed - Tinned Copper Wire is applied with cable core in jacket.
03	2012.07.06	K. H. Ha	T.W. Kim	Y.H. Lee	1. Product part number is added to Appendix. 2. Changed sheath thickness & deviation range, Clause 2.6 3. Freq. range for propagation delay skew is added (Clause 3.1) 4. Contents for flame requirement are changed. (Clause 4.4)