

Preliminary Specification

# **Product Specification**

## **Model : HULC1**

**M2L Co., Ltd.**

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## 1. General Description

HULC1 is detachable HDMI Extender using one multi mode fiber optic, which can send HDMI signal up to 300 meter.

HULC1 is able to transmit video and audio signal up to UHD (3840 x 2160) resolution, as well as support USB (1.1) data for touch function, which none of other vendors can support at the moment.

One single core fiber optic cable is enough to implement all these features.

Module and cables are detachable which brings the convenience of installing the units.

- HDMI Interface(Receptacle Type)

- 1 Core Multi Mode Fiber

- Up to 4096 X 2160@30Hz

- Support Live EDID / HDCP

- Support USB 1.1

- Maximum Reach:

- HDMI: 300m

- HDMI + USB1.1 Full speed: 40m

- HDMI + USB1.1 Low Speed: 200m

- Application

- Interactive White Board System

- Conference System

- Video Wall System

- DID(PID), LCD, PDP and conference room projectors.

- Medical, Broadcasting, Military, Factory Automation and Traffic control system.

- CCTV System

## 2. Technical Specification

Category		Detail spec
Electrical	Electrical Connector	HDMI Receptacle Type
	Video band-width	2.97Gbps
	Maximum Reach	HDMI : 300m HDMI + Full Speed USB : 40m HDMI + Low Speed USB : 200m
	Graphic Resolution Support	4096x2160@30Hz
	External Power Connector	Micro USB
Optical	Optical Connector	LC Connector
	Recommended Fiber	50/125um Multi Mode Fiber [OM3]
	TX Module	850nm VCSEL 1310 InGaAs/InP laser diode 1550 InGaAs/InP PIN type photo diode
	RX Module	1550 InGaAs/InP laser diode 850 InGaAs/InP PIN type photo diode 1310 InGaAs/InP PIN type photo diode

### 2.1 Electrical Specification

#### 2.1.1 Transmitter Module

PARAMETER	Min	Typ	Max	Unit
Supply Voltage	4.5	5	5.5	V
Supply Current	-	450	470	mA
Power consumption	-	0.85	1	W
TMDS Input Differential Voltage Level	150		1200	mV
TMDS Input Common Mode Voltage	2.9		3.26	V
TMDS Min Differential Sensitivity (Peak-to-Peak)	150			mV
TMDS Max Differential Input (Peak-to-Peak)	1560			mV
TMDS Max Allowable Intra-Pair Skew at Connector	0.15Tbit+112ps			
TMDS Max Allowable Inter-Pair Skew at Connector	0.2 Tcharacter+1.78ns			
TDR Rise Time			200	ps

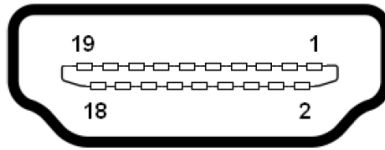
#### 2.1.2 Receiver Module

PARAMETER	Min	Typ	Max	Unit
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Supply Voltage	4.5	5	5.5	V
Supply Current	-	400	420	mA
Power consumption	-	2	2.1	W
TMDS Single-ended output swing voltage	400		600	mV
TMDS Single-ended high level output voltage	3.3V-200mV		3.3V+10mV	
TMDS Min Single-ended low level output voltage	3.3V-700mV		3.3V-400mV	
TMDS Rise time/ fall time (20%-80%)			75	PS
TMDS Intra-Pair Skew at Source Connector			0.15Tbit	
TMDS Inter-Pair Skew at Source Connector			0.2 T <sub>character</sub>	
TDR Clock duty cycle	40%	50%	60%	
TMDS Differential Clock Jitter			0.25Tbit	

### 2.1.3 HDMI Receptacle Pin Assignment

The HDMI ports are in compliance with the latest HDMI standard 1.3 or later and must support HDCP.



**HDMI Connector Pin Assignment**

Pin No.	Signal Name	Pin No.	Signal Name
1	TMDS DATA 2+	11	TMDS Clock Shield
2	TMDS DATA Shield	12	TMDS Clock -
3	TMDS DATA 2-	13	CEC
4	TMDS DATA 1+	14	Reserved (HDMI 1.0–1.3c)
5	TMDS DATA Shield	15	SCL (I <sup>2</sup> C Serial Clock for DDC)
6	TMDS DATA 1-	16	SDA (I <sup>2</sup> C Serial Data Line for DDC)
7	TMDS DATA 01+	17	DDC/CEC/HEC Ground
8	TMDS DATA Shield	18	+5 V (max 50 mA)
9	TMDS DATA 0-	19	Hot Plug detect (all versions)
10	TMDS Clock +	20	

## 2.2 Optical Specification

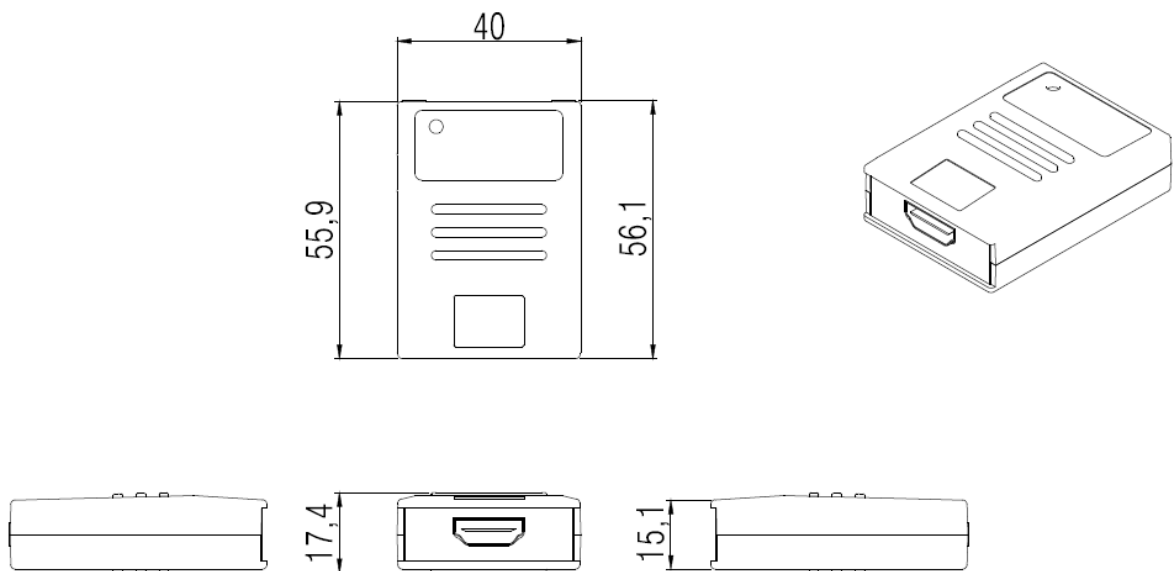
### 2.2.1 Transmitter Module

PARAMETER	Min	Typ	Max	Unit
Output Power 10G	-2.5		2.5	dBm
Output Power 1G	-5		2.5	dBm
Output Power 10G Extinction Ratio	3			dB
Output Power 1G Extinction Ratio	5.5			dB
Sensitivity			-20	dBm

### 2.2.2 Receiver Module

PARAMETER	Min	Typ	Max	Unit
Output Power 1G	-5		2.5	dBm
Extinction Ratio	5.5			dB
Output Power 10G Sensitivity			-20	dBm
Output Power 1G Sensitivity			-6	dBm

### 3. Mechanical Specifications



#### 4. Environmental

Items	Status
Operating Temperature	32°F ~ 122°F (0°C ~ 50°C)
Operating Humidity	10% ~ 80%, non-condensing
Storage Temperature	-4°F ~ 158°F (-20°C ~ 70°C)
Storage Humidity	5% ~ 95%, non-condensing
Dimension set (WxDxH)	40mm x 56.1mm x 17.4mm
Weight w/o Packaging	90g
Weight	400g

#### 5. Accessories list

Item	Quantity	Item	Quantity
5V AC-DC Adaptor [USB Type]	2	50mm HDMI Copper Cable	2
USB Data Cable(For TX)	1	USB Data Cable(For RX)	1
User Manual	1		

#### 6. Safety and Regulatory Approvals

Countries	EMC	Status
Europe	CE Class A(or B)	
America	FCC Class A(or B)	
Korea	KC Class A(or B)	
EU	RoHS compliance	

#### **Laser Safety Information**

##### <US FDA CDRH Class 1>

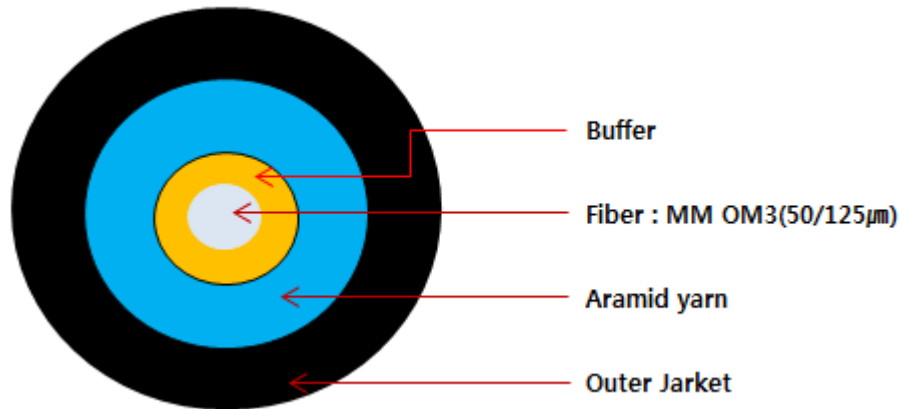
Ensure to avoid exposure of human eyes to high power laser diode emitted laser beams.

Especially do not look into the laser diode or the collimated laser beam when the diode is activated.

US FDA CDRH Class 1, IEC60950, 60825-1.

## 7. Cable Structure

### 7.1 Cross Section



### 7.2 Construction

Structure	Material	SPECCIFICATIONS	
Optical fiber	Fiber	- MMF : 62.5(OM1), 50.0(OM2), 50.0(OM3)	
Tight Buffer	Material	- PVC, FR-PE(LSZH), Hytrel, Nylon	
	Diameter	- $\Phi 3.0 : 900 \mu\text{m} \pm 50 \mu\text{m}$	
Outer jacket	Strength member		
	jacket	Material	- polyurethane
		Diameter	- $\Phi 3.0 : 0.50 \pm 0.10\text{mm}$
Marking	Ink Jet	- Black , 1m,	

### 7.3 Cable diameter & Tensile strength

Fiber Count	Outer Diameter	Weight	Max. Pulling Strength	Remark
	mm	Kg/km	N	
1F	$3.0 \pm 0.1$	7.0	350	



## **8. Cable Property**

### **8.1 Mechanical & Environmental properties**

8.1.1 Cable bending radius: 10 x cable diameter (during operation)

15 x cable diameter (during installation)

8.1.2 Operating temperature range : -4°F ~ 158°F (-20°C to +70°C)

Installation temperature range : 14°F ~ 140°F (-10°C to +60°C)