Preliminary Specification

Product Specification

Model

:DLC1/ DULC1

M2L Co., Ltd.

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1. General Description

DULC1 is detachable DVI Extender using one multi mode fiber optic,

which can send DVI signal up to 300 meter.

DULC1 is able to transmit video up to UHD (4096 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.

- ▣ DVI Interface
- ▣ 1 Core Multi Mode Fiber
- ▣ Up to 4096X 2160@30Hz
- ▣ Support Live EDID
- ▣ Support HDCP (When using DVI to HDMI Gender)
- ▣ Support USB 1.1
- ▣ Maximum Reach:

  DVI: 300m

  DVI + USB1.1 Full speed: 40m

  DVI + 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	DVI Plug Type
	Video band-width	2.97 Gbps
	Maximum Reach	DVI : 300m DVI + Full Speed USB : 40m DVI + 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
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 $T_{character}$	
TDR Clock duty cycle	40%	50%	60%	
TMDS Differential Clock Jitter			0.25Tbit	

2.1.3 DVI Receptacle Pin Assignment

The DVI ports are in compliance with the latest DVI standard 1.0.

DVI Connector Pin Assignment

Pin No.	Signal Name	Pin No.	Signal Name
1	TMDS DATA 2-	15	DDC/CEC/HEC Ground
2	TMDS DATA 2+	16	Hot Plug detect (all versions)
3	TMDS DATA Shield	17	TMDS DATA 0-
6	SCL (I²C Serial Clock for DDC)	18	TMDS DATA 0+
7	SDA (I²C Serial Data Line for DDC)	19	TMDS DATA Shield
8	Analog vertical sync	22	TMDS Clock Shield
9	TMDS DATA 1-	23	TMDS Clock +
10	TMDS DATA 1+	24	TMDS Clock -
11	TMDS DATA Shield		
14	+5 V (max 50 mA)		

2.2 Optical Specification

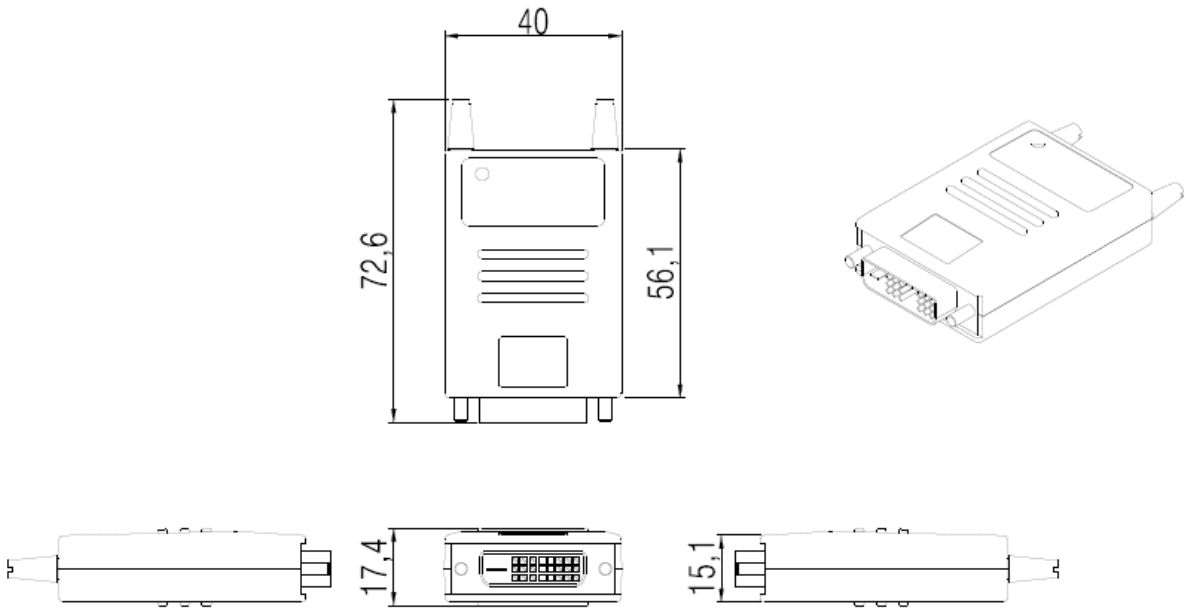
2.2.1 Transmitter Module

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 72.6mm x 17.4mm
Weight w/o Packaging	90g
Weight	400g

5. Accessories list

Item	Quantity	Item	Quantity
5V AC-DC Adaptor [USB Type]	2	**USB Data Cable(For RX)**	1
USB Data Cable(For TX)	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

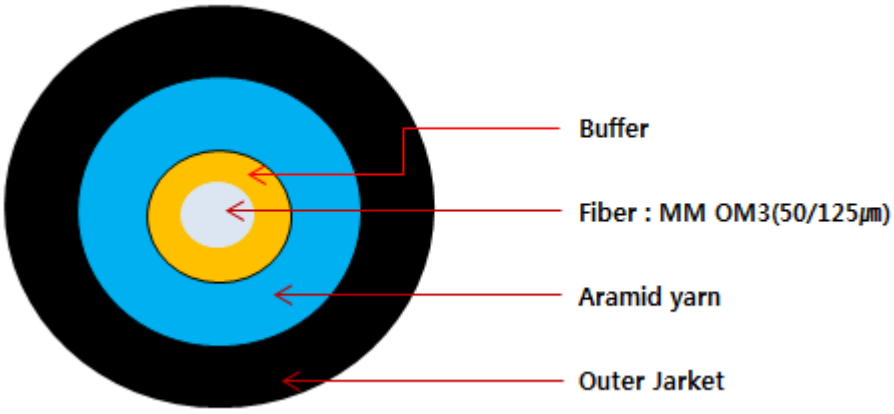
<US FDA CDRH Class 1>

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	- Φ3.0 : 900 μm ± 50 μm
Outer jacket	Strength member			- Aramid yarn
	jacket		Material	- polyurethane
			Diameter	- Φ3.0 : 0.50 ± 0.10㎜
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 ± 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^{o}C to +70^{o}C)

Installation temperature range : 14˚F ~ 140˚F (-10^{o}C to +60^{o}C)