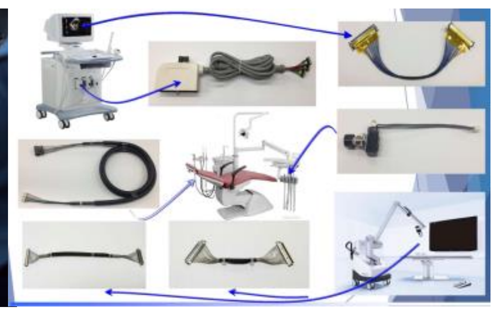
US MaruniTech INC.

www.usmarunitech.com

US MaruniTech, Inc is the exclusive NAFTA Sales Agent for Marunix Co., Ltd of Saitama Japan.

MARUNIX

(https://www.marunix.co.jp/)



Display : Embedded Cable Assemblies

VESA® : eDP or LVDS

- High speed differential signal transfer cables
- Shielded—Fine Pitch capabilities (IATF)
- Micro-coax or Twisted Pair technology
- Japanese QA Management
- Production in China

MARUNIX Co. Ltd Established: September 1, 1973 6794-2 Masubayashi Koshigaya-city, Saitama, Japan
Business: Cable Assembly Fabricator including custom mechanical components, this plant now produces gaming cables.
MARUNIX presently employs ~6,000 people worldwide

Dongguan Marunix Electronics Co., LTD.
Established: September 1994 Hujie Town, Dongguan City, Guandong China ISO9001/2000_ISO14000, UL, CSA
Business: Discrete Wire cable assemblies, Twisted Pair Technology for general signal transfer like LVDS & Automotive
Present employment ~500 people

Marunix Electronics (Nanjing) Limited
Established: June 2002 Nanjing, Jiangsu, China
ISO9001/2000_ ISO14000, UL, CSA
Business: Discrete Wire cable assemblies, Twisted Pair Technology for general signal transfer like LVDS & Automotive
Also produces Micro-coax cable assemblies. Present employment ~600 people

Shaoguan Marunix Electronics Limited
Established: October 2000 Shaoguan City, Guangdong, China
ISO9001/2008_ISO14000/2004, UL, IATF16949/2016
Business: High speed, Fine Pitch (0.25mm –SGC48) Micro-Coax RoHS cable assemblies & for Medical Ultrasound Transducer
Customers: **Sony, Cannon, NEC, Fujitsu, Epson, Ricoh,DJI, LG, BYD**, & more. Present employment ~1000+ people
Sony Certified & Cannon Certified Mass production supplier
On ~5 Acers with 3 permanent Japanese Managers

Marunix Hong Kong Limited - Shatin, NT, Hong Kong

Table of Contents

Video Electronics Standards Association

VESA 16:9 Wide Notebook Panel Standard

Version 3
9 November 2010

Purpose

This standard defines the requirements for the standardization of mechanical dimensions and selected electrical interface requirements for 10.1-, 11.6-, 13.3-, 13.4-, 14.0-, 15.6-, 17.3- and 18.4-inch W (wide format) 16:9 panels. The intent of this standard is to help LCD manufacturers and panel consumers to better control panel supply and demand cycles, as panels built to these specifications will be able to be used interchangeably without requiring alterations in product tooling or the display module.

Summary

This standard describes the selected electrical interfaces, mechanical dimensions and data formatting for 10.1-, 11.6-, 13.3-, 13.4-, 14.0-, 15.6-, 17.3-, and 18.4-inch wide format (W) 16:9 panels.

Pin1 Confusion – Mechanical Specifications Defined from Front View of Display Panel

2.4 Mechanical Interface Requirements

2.4.1 10.1-inch Wide 16:9 Panel (LED Backlight Version)

Figure 2-5 shows the critical exterior dimensions and the location of connectors.

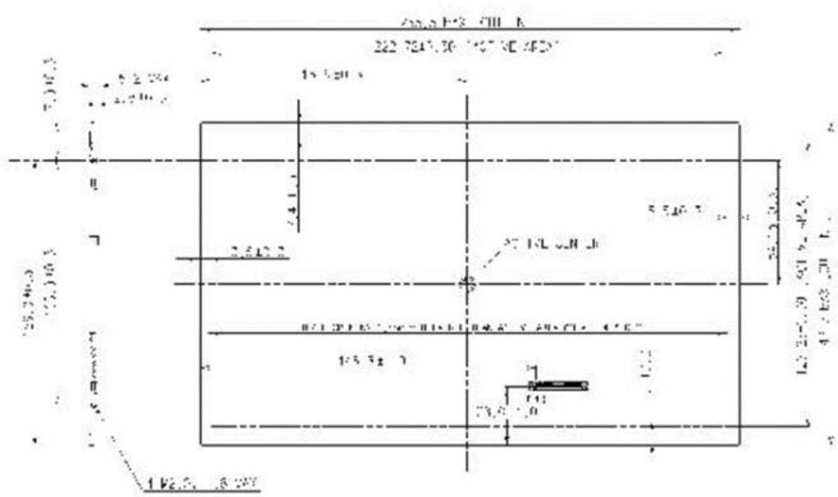


Figure 2-5: Mechanical Dimensions and Connector Location of 10.1-inch Wide 16:9 LED Panel

Notes:

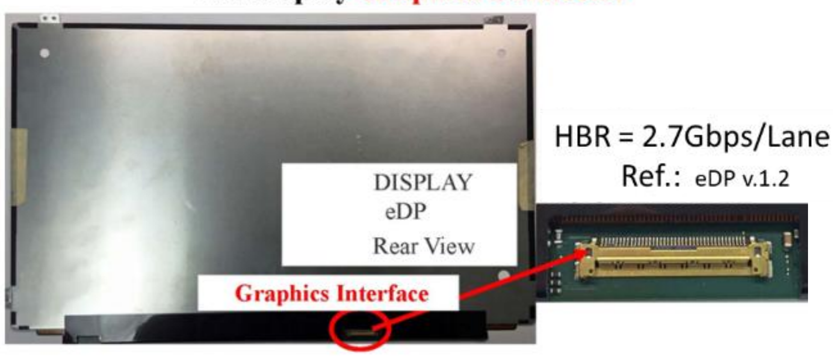
All dimensions are in mm, and other than side dimensions, are viewed from the front of the panel.

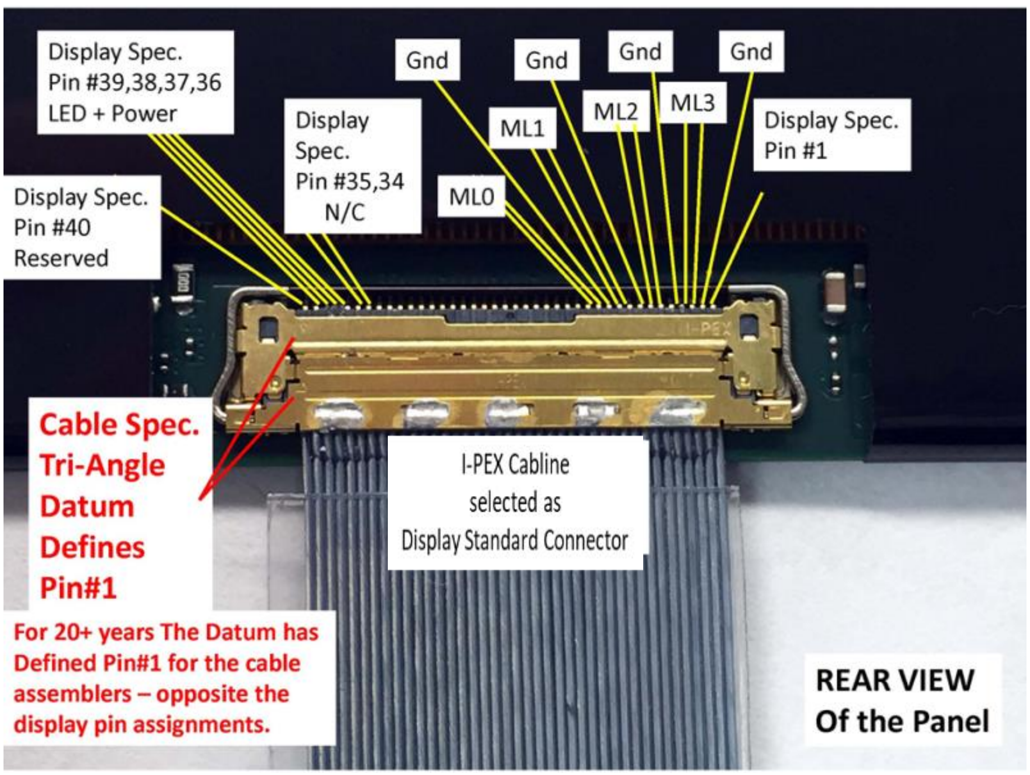
Drawings are not necessarily to scale.

Pin1 Confusion – Mechanical Specifications Defined from "Front" View of Display Panel

VESA 16:9 Notebook Panel Standard
LVDS Protocol has different Signal Assignments than eDP™
Pin1 Nomenclature Confusion remains consistent

The Display Graphics Connector



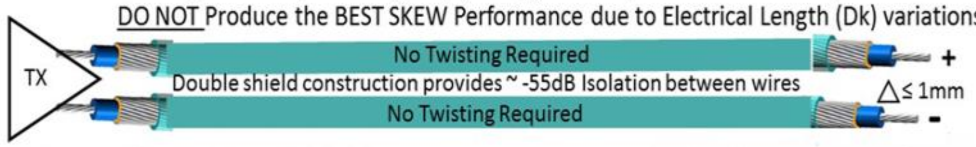


US MaruniTech, Inc *(MARUNIX) a Cable Assembly Company will use the* ***Connector Datum Mark as the Pin 1 designator***

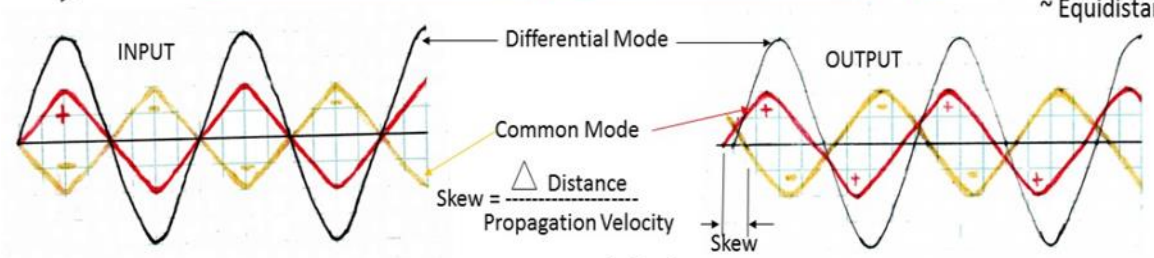
Note: Alternative Cabline Connector Sources I-PEX Licensed TE Connectivity, JAE & others

"Two SGC" Micro-Coaxial Wires recommended for Differential Signal High Speed Data Transfer

Perfectly/Exact Physical Lengths (+) and (-) are not practical in volume production and DO NOT Produce the BEST SKEW Performance due to Electrical Length (Dk) variations



TWO Small Gauge Coax (SGC) ~ Equidistant



Propagation Velocity changes due to **variation in Insulator** Dielectric Constant

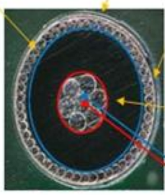
Dk changes with frequency & insulator material properties (Air is the best but not practical)

Single Spiral Shield 1

Polyester Outer Jacket

FLEXIBLE Concentric Circles

SGC



Copper coated Polyester Tape Shield 2

Usually PFA (Perfluoroalkoxy) Dk ~ 2.1

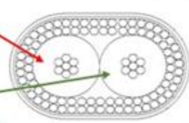
PFA Skew < 10ps per meter per lot typical

Insulation Mid-Point (blue)

Center-Conductor Mid-Point (red)

Color 1

Color 2



Variation between two insulators
Non-Flexible types of
Twin-Coax Construction

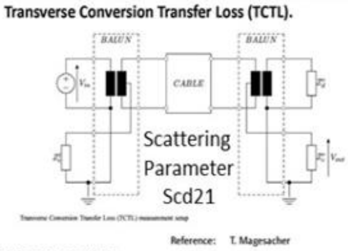
Nonperfect shared Insulator
RIGID-solid center-conductor
TwinAx Construction

Time Domain Parameters: Skew, Impedance, Eye - Peak Distortion Analysis (PDA) EH & EW
Scattering Parameters in frequency domain: Insertion Loss (IL)/ ILD , Return Loss (RL) , Crosstalk (XTALK), Scd21 Differential conversion

Balanced SGC Transmission Line to control : Differential to Common Mode Conversion Scd21

Balanced = Equidistant transfer lengths (physically/electrically) & Impedance & Equal Grounding "Symmetry"

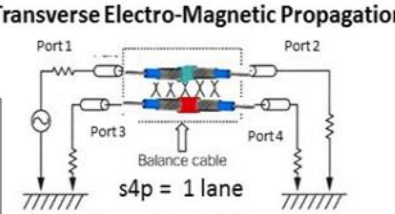
At the receiving end, the leakage from the differential-mode to the common mode of a differential lane is called Transverse Conversion Transfer Loss (TCTL).



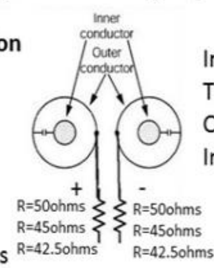
Unbalanced Terminations create EMI issues

Balanced Terminations With Different Grounding Path Designs: Shield currents take the shortest GND path

Transverse Electro-Magnetic Propagation



s4p-No Crosstalk, NO Aggressor Lanes



Insulation Thickness Controls Impedance

SCD21-SDD21 = Returning differential Signal- The Amplitude SCD21 At Zero Crossing of the Differential Output Causes Differential Skew

Ground fingers = smaller bundle size & weight for data ≤30Gbps ≤ 15GHz

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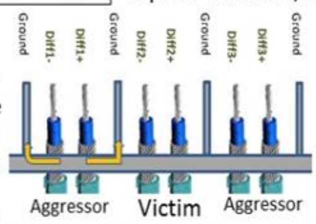
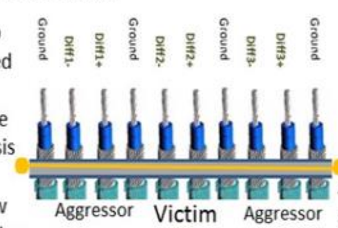
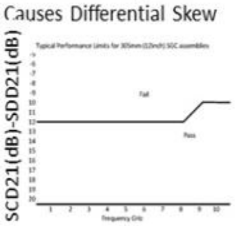
Shorter GND Path provides Better Low Freq. "RL" Performance for shorter cables

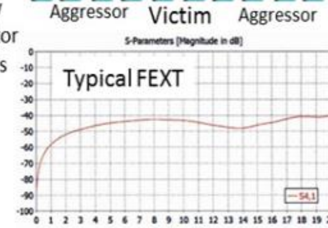


s12p needed for 3 Lane Analysis of 1 Row connector designs



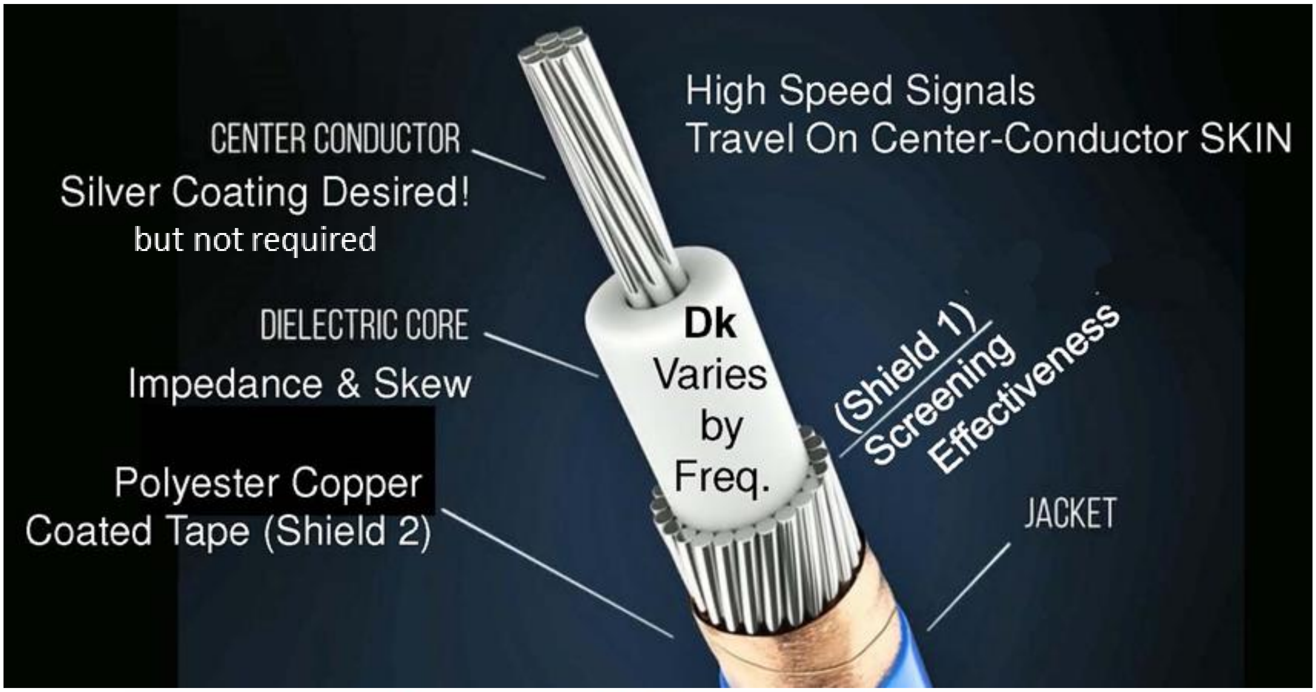
All Coax wire suggested for >30Gbps >15GHz Nyq.

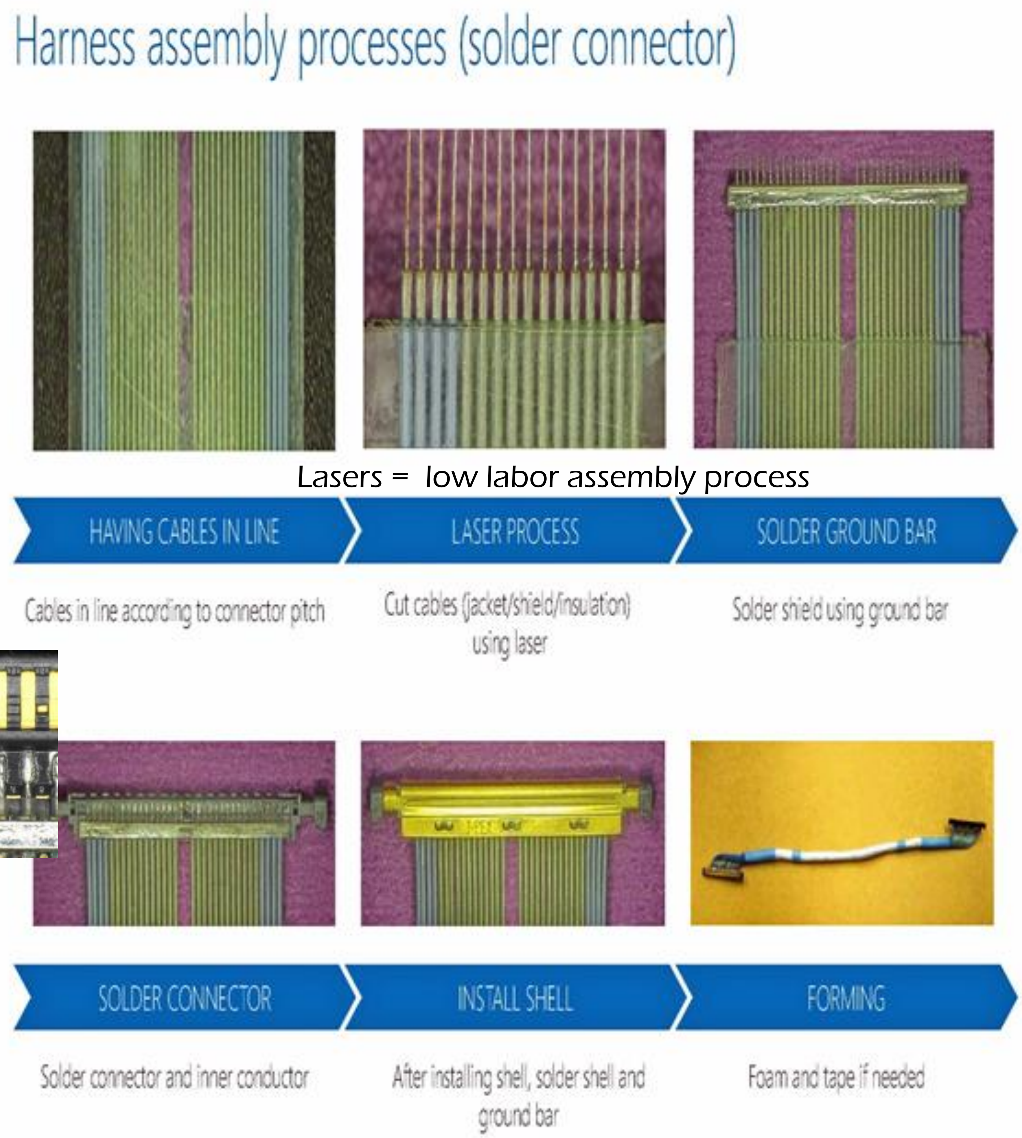


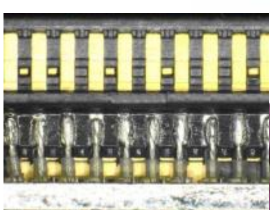


Long Ground Paths = Worse RL @ Low Freq.

greg_young@usmarunitech.com


CENTER CONDUCTOR
Silver Coating Desired!
but not required
DIELECTRIC CORE
Impedance & Skew
Polyester Copper
Coated Tape (Shield 2)
High Speed Signals
Travel On Center-Conductor SKIN
Dk
Varies
by
Freq.
(Shield 1)
Screening
Effectiveness
JACKET


Harness assembly processes (solder connector)
Lasers = low labor assembly process
HAVING CABLES IN LINE
Cables in line according to connector pitch
LASER PROCESS
Cut cables (jacket/shield/insulation) using laser
SOLDER GROUND BAR
Solder shield using ground bar
SOLDER CONNECTOR
Solder connector and inner conductor
INSTALL SHELL
After installing shell, solder shell and ground bar
FORMING
Foam and tape if needed



eDP™

DisplayPort Data Rates:

HBR = 2.7 Gbps per Lane = Nyquist Frequency 1.35 GHz

HBR2 = 5.4Gbps per Lane = Nyquist Frequency 2.7 GHz

HBR3 = 8.1Gbps per Lane = Nyquist Frequency 4.05 GHz

Note: HBR was released during 2010

In Development

- UHBR10 Lane Data Rates to 10Gbps = Nyquist Frequency 5.0 GHz
- UHBR20 Lane Data Rates to 20 Gbps = Nyquist Frequency 10 GHz

Example eDP Panel Connector Pinout

2 Lane eDP Connector for up to 1920 x 1080 60Hz

Conn. Pin	Pin	Signal Name	Description
30	1	NC - RESERVED	RESERVED for LCD manufacturer's use
29	2	H_GND	High Speed Ground
28	3	Lane1_N	Complement Signal Link Lane 1
27	4	Lane1_P	True Signal Link Lane 1
26	5	H_GND	High Speed Ground
25	6	Lane0_N	Complement Signal Link Lane 0
24	7	Lane0_P	True Signal Link Lane 0
23	8	H_GND	High Speed Ground
22	9	AUX_CH_P	True Signal Auxiliary Channel
21	10	AUX_CH_N	Complement Signal Auxiliary Channel
20	11	H_GND	High Speed Ground
19	12	LCD_VCC	LCD logic and driver power
18	13	LCD_VCC	LCD logic and driver power
17	14	LCD_Self_Test or NC	LCD Panel Self Test Enable (Optional)
16	15	LCD_GND	LCD logic and driver ground
15	16	LCD_GND	LCD logic and driver ground
14	17	HPD	HPD signal pin
13	18	BL_GND	Backlight ground
12	19	BL_GND	Backlight ground
11	20	BL_GND	Backlight ground
10	21	BL_GND	Backlight ground
09	22	BL_ENABLE or NC	Backlight On/Off (Optional)
08	23	BL_PWM_DIM or NC	System PWM signal input for dimming (optional)
07	24	NC - Reserved	Reserved for LCD manufacturer's use
06	25	NC - Reserved	Reserved for LCD manufacturer's use
05	26	BL_PWR	Backlight power
04	27	BL_PWR	Backlight power
03	28	BL_PWR	Backlight power
02	29	BL_PWR	Backlight power
01	30	NC - RESERVED	RESERVED for LCD manufacturer's use

Optional, depending on display resolution

Signal Pins

Main Link Lanes (Display data)

AUX Channel (Control data)

Hot Plug Detect (AUX interrupt)

Power and Ground Pins

Display Control Pins (Now optional with eDP v1.2)

Reserved Pins (For LCD OEM's use)

DisplayPort™

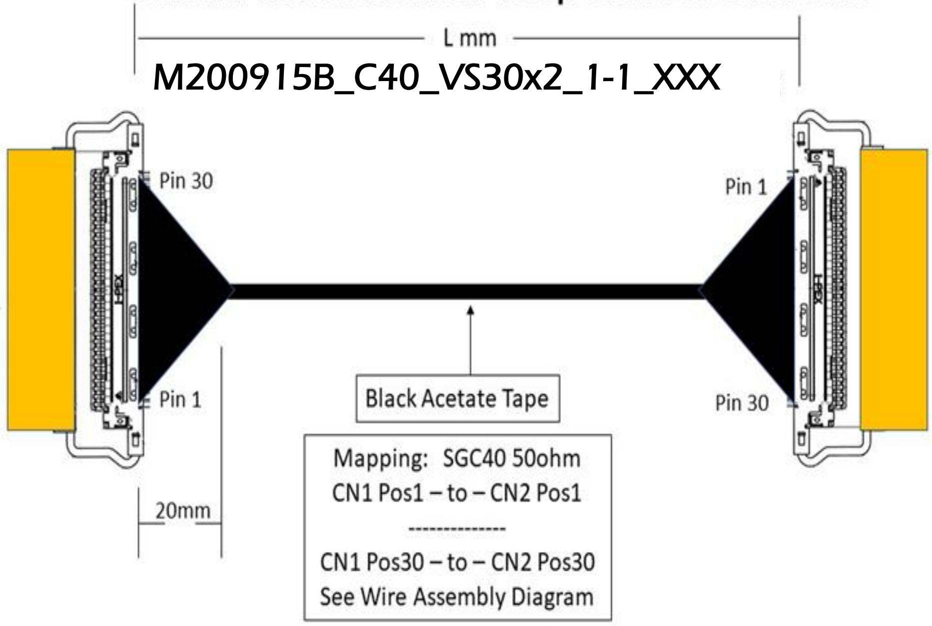
Table 5-3 in eDP v1.2

VESA®

DISPLAY CABLE ASSEMBLY VS30p BUNDLED STANDARD

CN1
Contacts Up

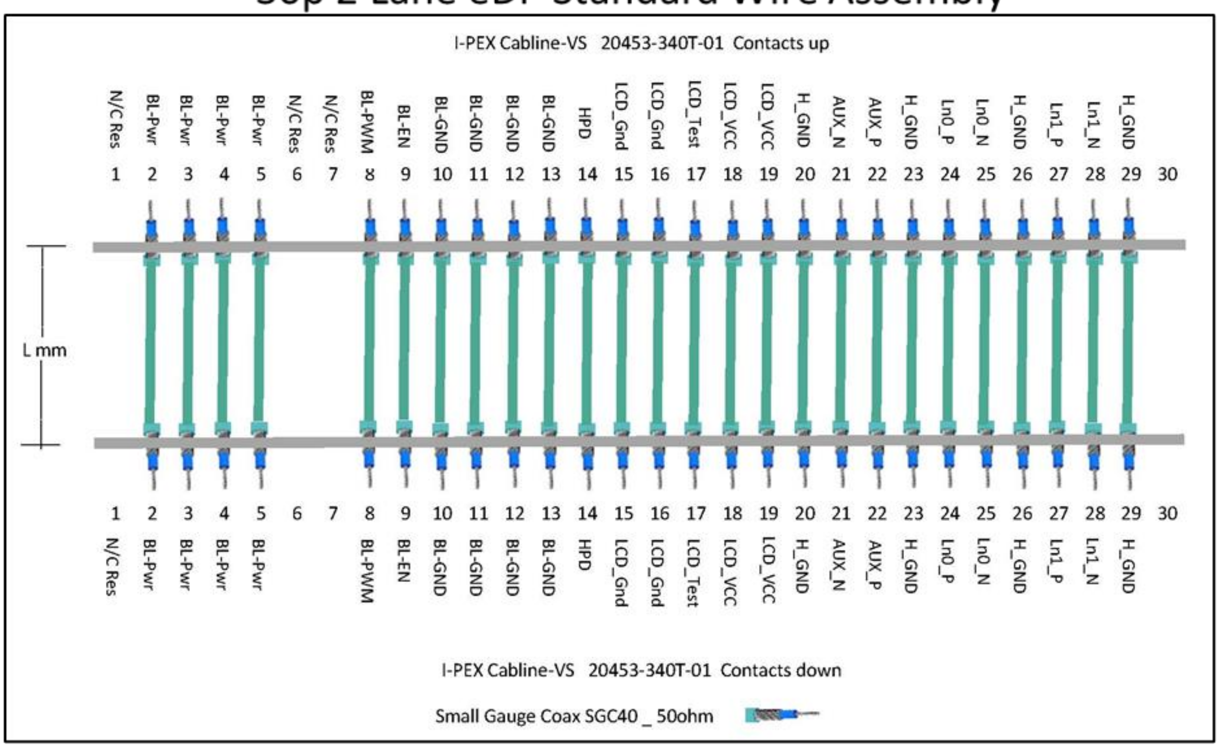
I-PEX
20453-230T-01
Or
TE Connectivity
5-2069715-2



CN2
Contacts Up

I-PEX
20453-230T-01
Or
TE Connectivity
5-2069715-2

30p 2 Lane eDP Standard Wire Assembly



Bundle Formula

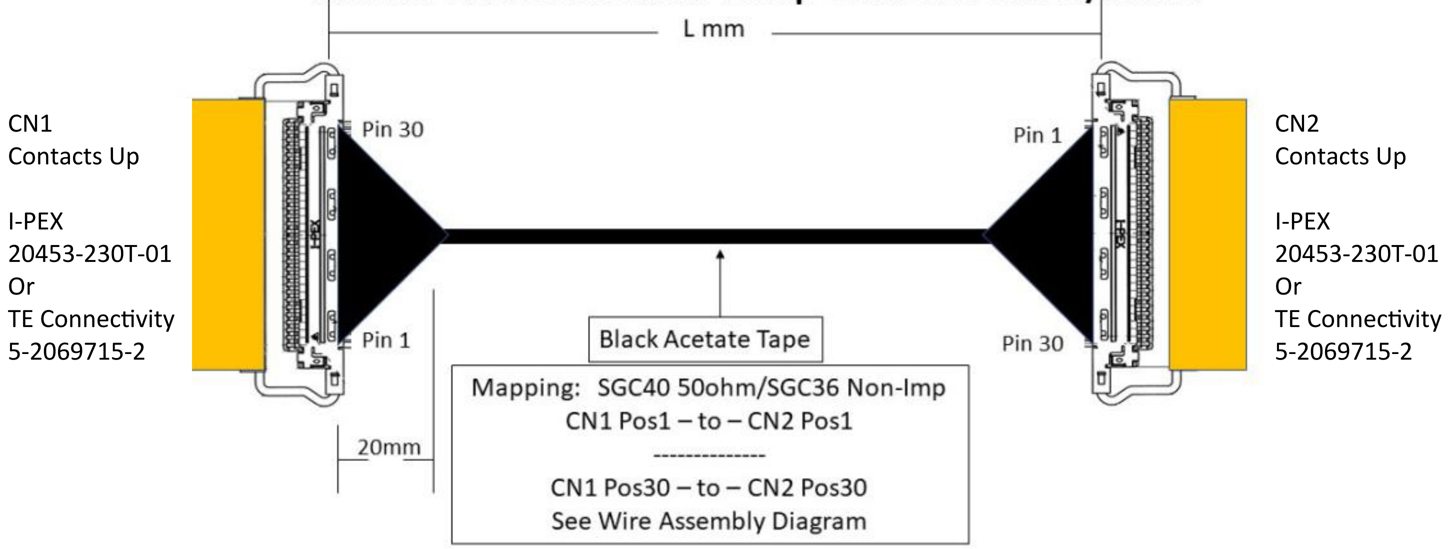
$$(D=\sqrt{[(\sum d_i^2)]}+\sum \Delta t_i)$$

$$D = 1.2\sqrt{Q_1 d_1^2 + Q_2 d_2^2 + Q_3 d_3^2 \ldots}$$

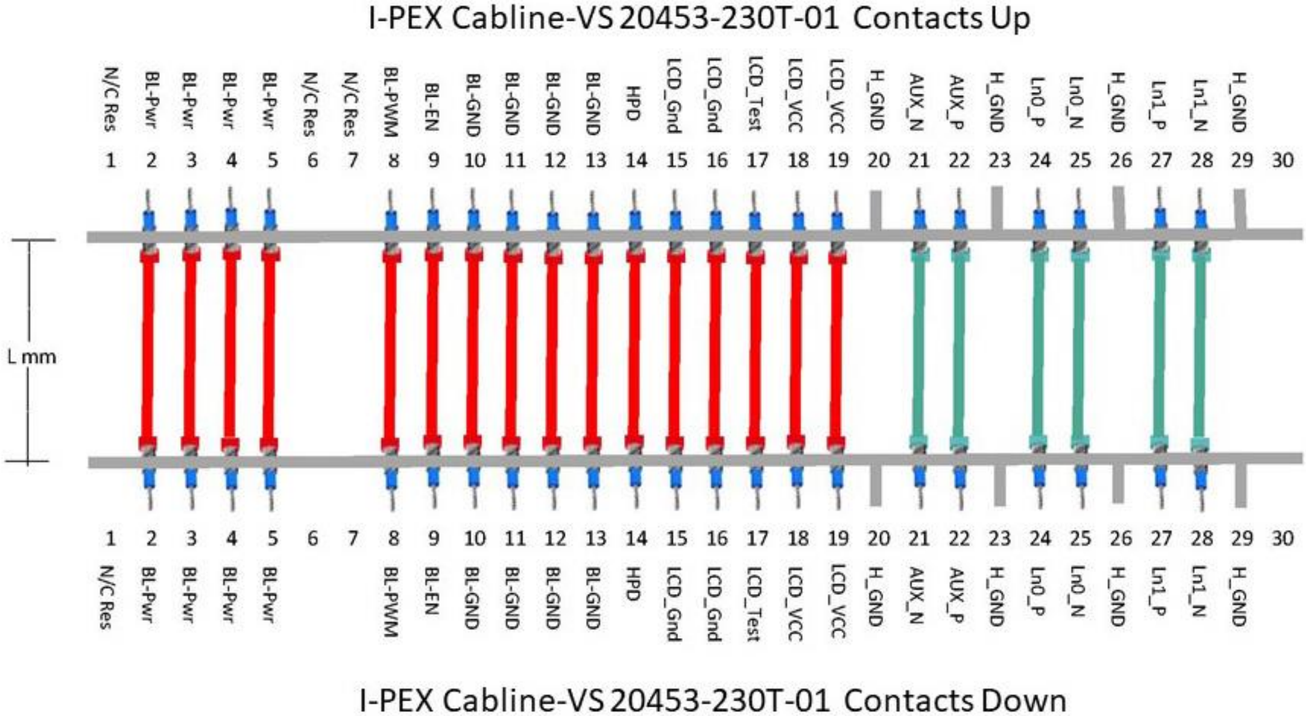
SGC40 50ohm = Ø0.36 ± 0.02mm
Center Conductor Resistance = 5 Ω/m
D = Ø 2.33 mm
Est. 180deg. Bending Radius = ~11.6 mm

Bundled Construction 1-1 signal mapping & Wire Assembly Options

M200915B_C40-36_VS30x2_1-1_XXX



M200915_B_C40-36_VS30x2_1-1_XXX wire assembly



Small Gauge Coax SGC36
Non-Controlled Impedance Signals
Center Conductor Resistance: 1.5 ohms/m

Small Gauge Coax SGC40 _ 50ohm
Controlled Impedance Signals

Bundle Formula

$$(D=\sqrt{[(\sum d_i^2)]}+\sum \Delta t_i)$$

$$D = 1.2\sqrt{Q_1 d_1^2 + Q_2 d_2^2 + Q_3 d_3^2 \ldots}$$

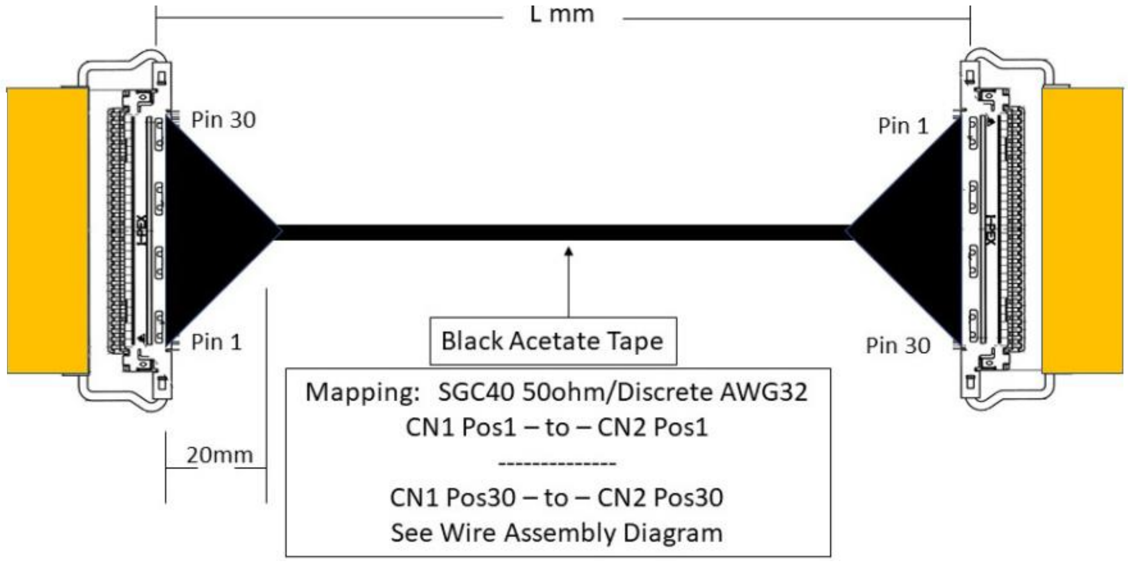
SGC40 50ohm = Ø0.36 ± 0.02mm
SGC36 Non-Imp Controlled = Ø0.365 ± 0.02mm
D = Ø 2.16 mm
Est. 180deg. Bending Radius = ~10.8 mm

Bundled Construction 1-1 signal mapping & Wire Assembly Options

M200915B_C40-D32_VS30x2_1-1_XXX

CN1
Contacts Up

I-PEX
20453-230T-01
Or
TE Connectivity
5-2069715-2

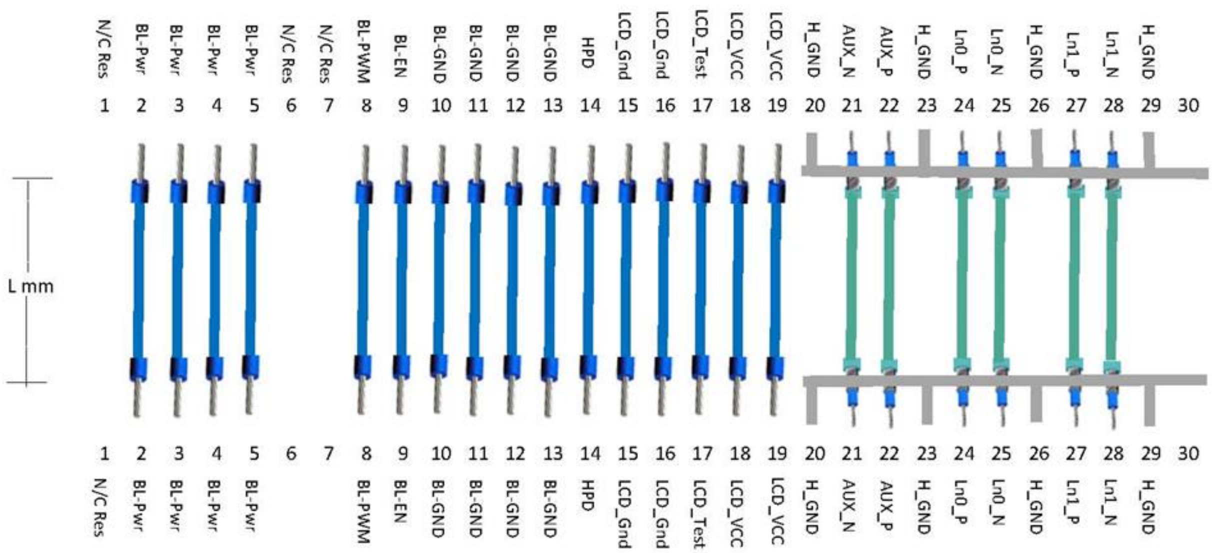


CN2
Contacts Up

I-PEX
20453-230T-01
Or
TE Connectivity
5-2069715-2

30p 2 Lane eDP SGC40 Gnd-Finger/D32 Mixed Wire Assembly

I-PEX Cabline-VS 20453-240T-01 Contacts Up



I-PEX Cabline-VS 20453-240T-01 Contacts Down

UL 10064 Discrete AWG32
Center Conductor Resistance: 0.6 Ω/m 

Small Gauge Coax SGC40 _ 50ohm
Controlled Impedance Signals 

Bundle Formula

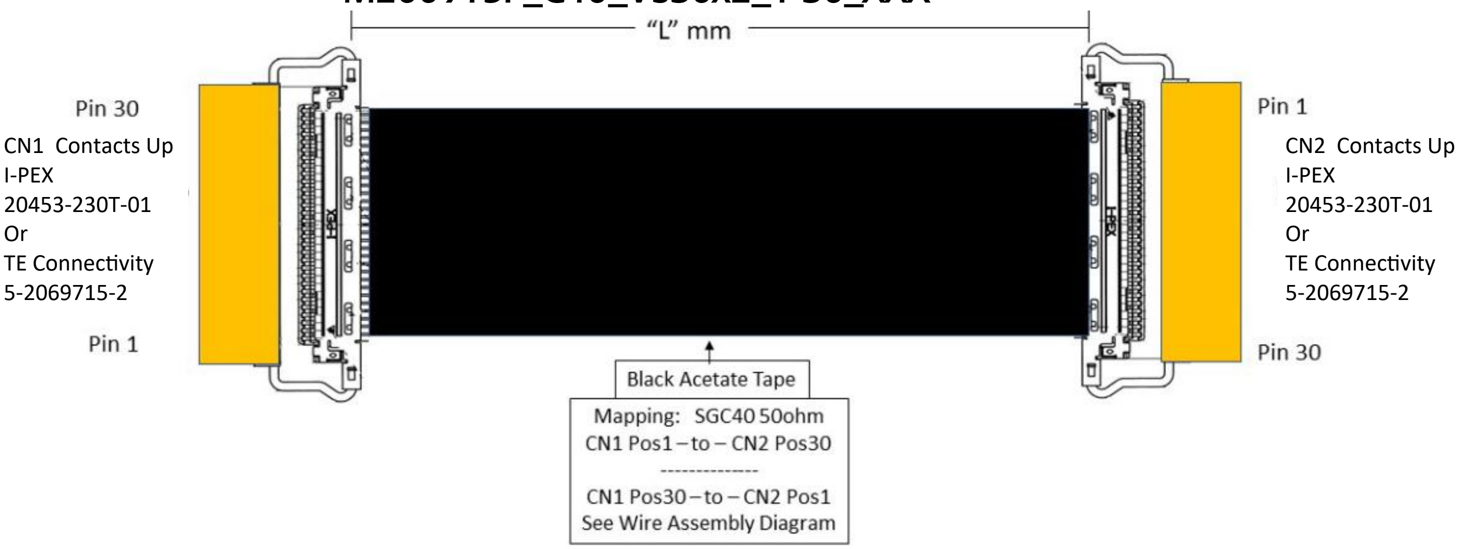
$$(D=\sqrt{[(\sum d_i^2)]}+\sum \Delta t_i)$$

$$D = 1.2\sqrt{Q_1 d_1^2 + Q_2 d_2^2 + Q_3 d_3^2 \ldots}$$

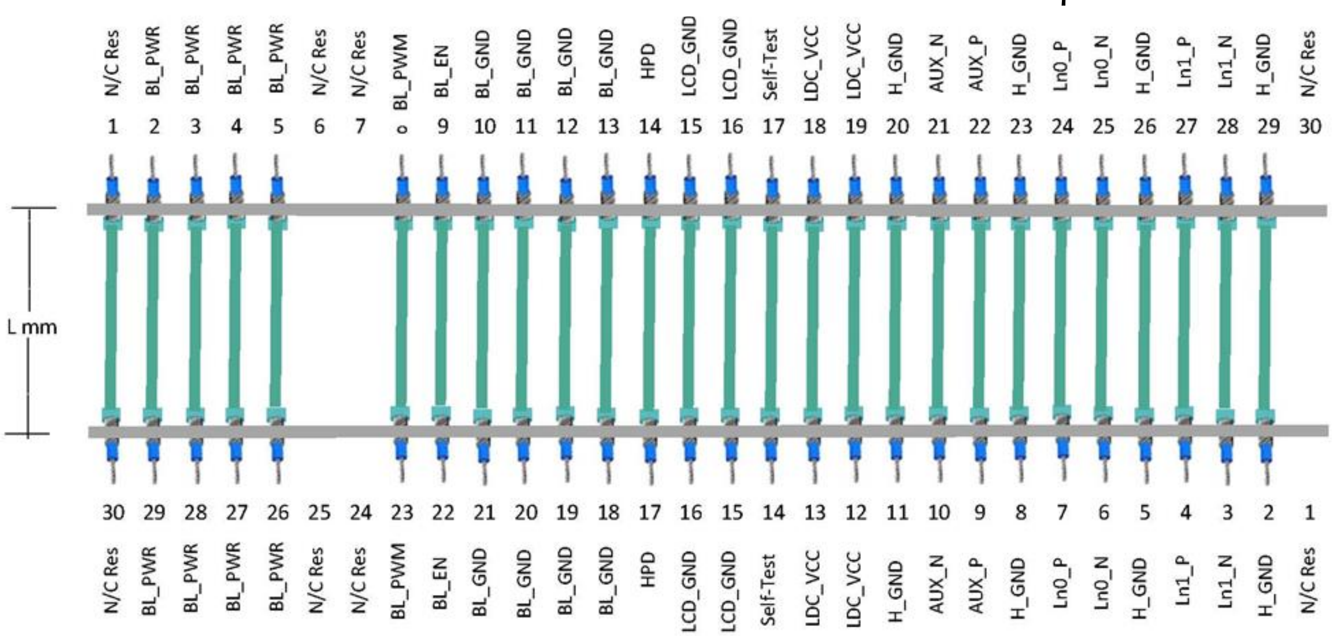
SGC40 50ohm = Ø0.36 ± 0.02mm
Discrete D32 = Ø0.38 ± 0.03mm
D = Ø 2.26 mm (no tape included)
Est. 180deg. Bending Radius = ~11.3 mm

30p 2-Lane eDP Display Cable Assembly 1-30 Flat Ribbon Type

M200915F_C40_VS30x2_1-30_XXX



Cabline-VS 20453-230T-01 Contacts Up



Cabline-VS 20453-230T-01 Contacts Up

Small Gauge Coax SGC40 _ 50ohm
Controlled Impedance

For Power signals: SGC40 Center Conductor Resistance = 5 Ω/m

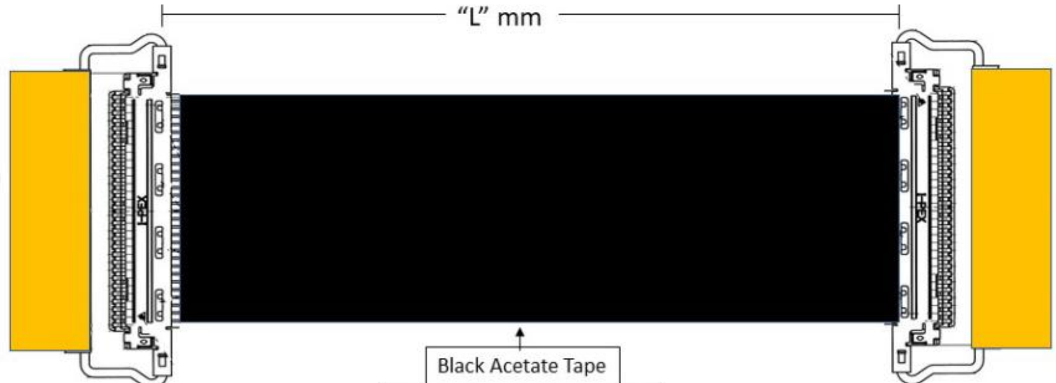
180 deg. Bending Radius = ~ 2.4mm

30p 2-Lane eDP Display Cable Assembly

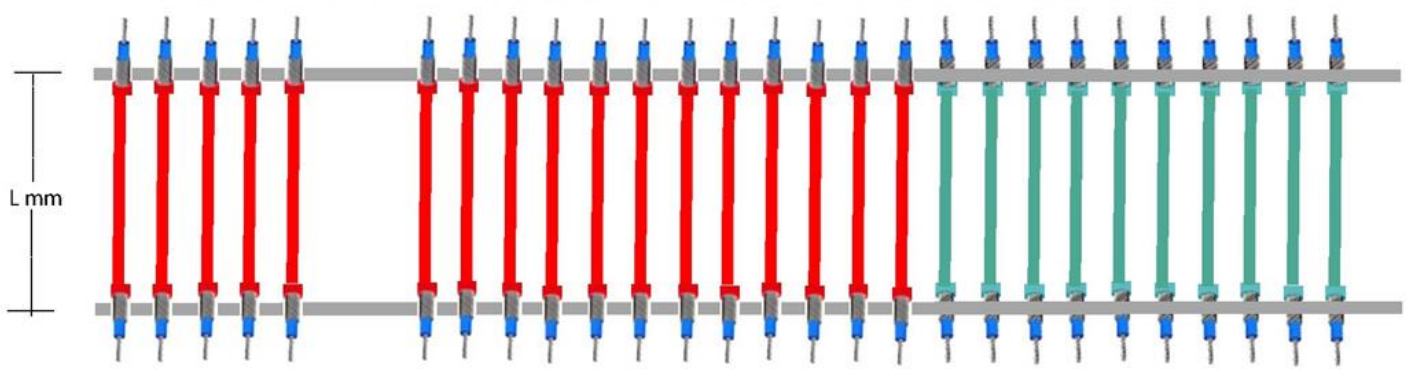
SGC40-36

Flat Ribbon SGC40 50 ohm/SGC36 Non-Imp

M200915F_C40-36_VS30x2_1-30_XXX



Cabline-VS 20453-230T-01 Contacts Up



Cabline-VS 20453-230T-01 Contacts Up

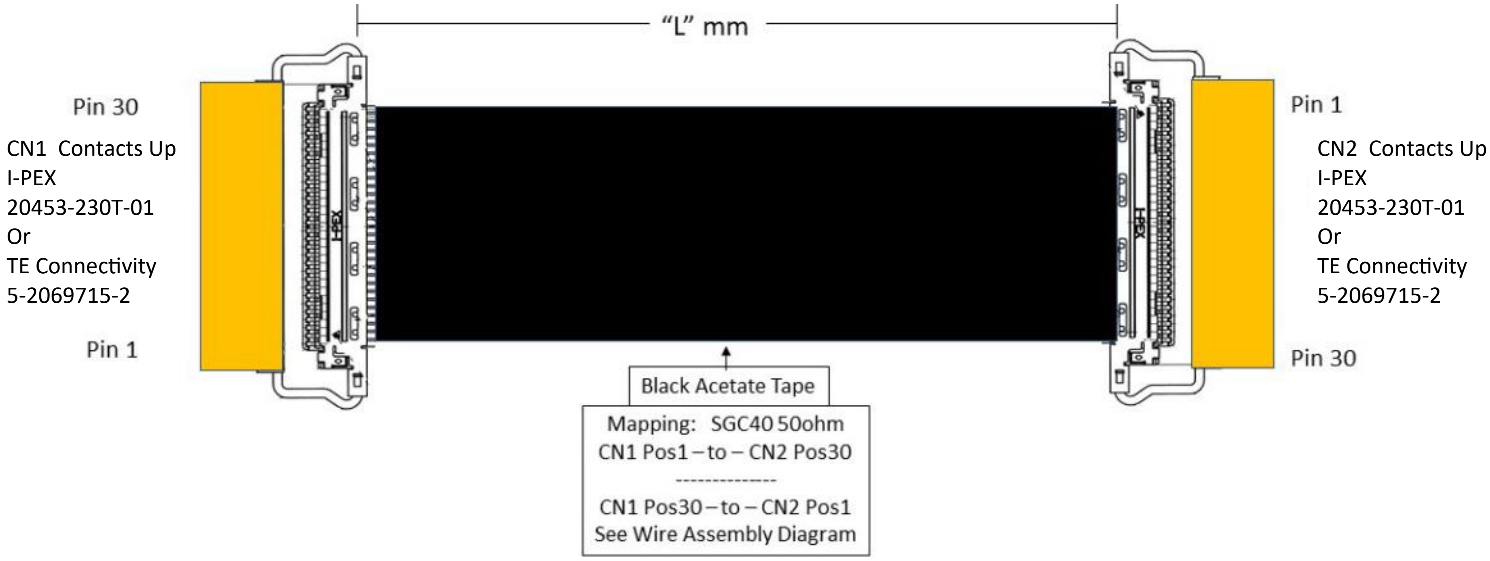
Small Gauge Coax SGC36
For NON-Controlled Impedance Signals
Center conductor Resistance = 1.5 Ω/m

Small Gauge Coax SGC40 _ 50ohm
Controlled Impedance Signals

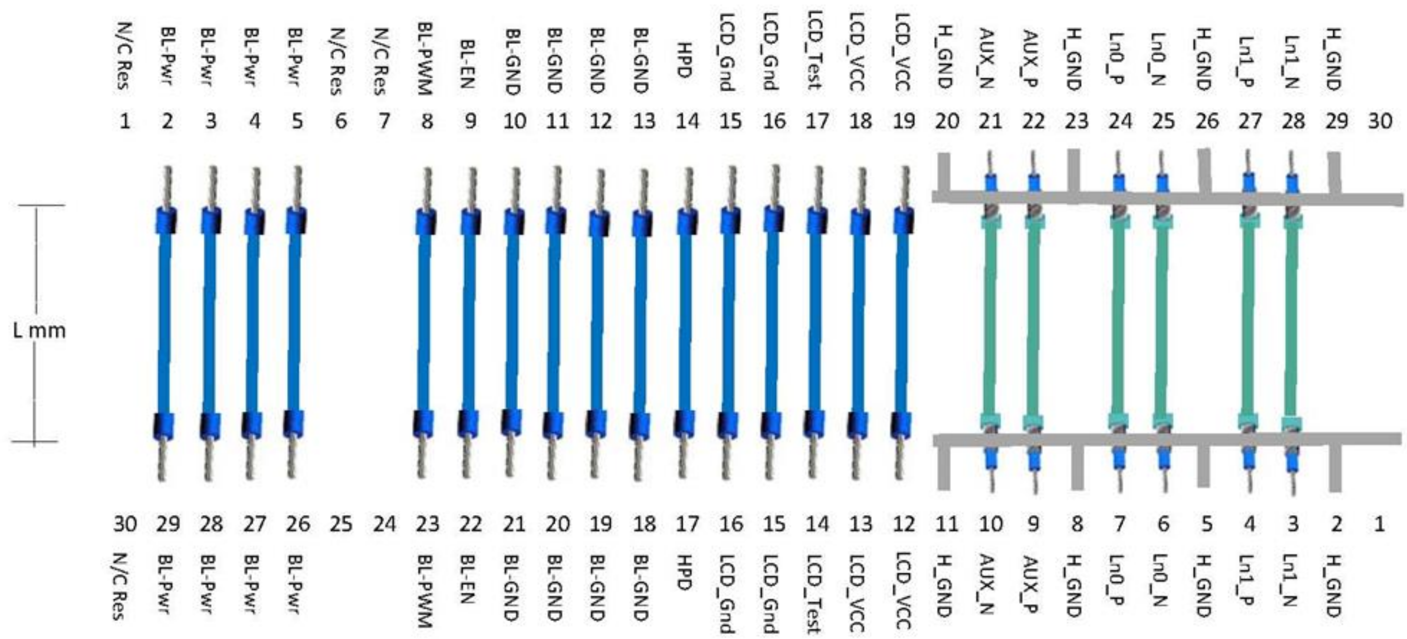
For Power signals: SGC36 Center Conductor Resistance = 1.5 Ω/m
180 deg. Bending Radius = ~ 2.53mm

30p 2-Lane eDP Display Cable Assembly SGC40-D32
Flat Ribbon Mixed

M20915F_C40-D32_VS30x2_1-30_XXX



Cabline-VS 20453-230T-01 Contacts Up



Cabline-VS 20453-230T-01 Contacts Up

For Power signals: D32 Center Conductor Resistance = 0.6 Ω/m
180 deg. Bending Radius = ~2.53 mm

40p 4 Lanes eDP Display Cable Signal Assignments

Conn Pin	Display Pin Position	Signal Name	Description
40	1	N/C Reserved	Reserved for LCD Manufacturers Use
39	2	H_Gnd	High Speed Ground
38	3	Lane3_N	Complement Signal Link Lane 3
37	4	Lane3_P	True Signal Link Lane 3
36	5	H_Gnd	High Speed Ground
35	6	Lane2_N	Complement Signal Link Lane 2
34	7	Lane2_P	True Signal Link Lane 2
33	8	H_Gnd	High Speed Ground
32	9	Lane1_N	Complement Signal Link Lane 1
31	10	Lane1_P	True Signal Link Lane 1
30	11	H_Gnd	High Speed Ground
29	12	Lane0_N	Complement Signal Link Lane 0
28	13	Lane0_P	True Signal Link Lane 0
27	14	H_Gnd	High Speed Ground
26	15	AUX_CH_P	True Signal Auxiliary Channel
25	16	AUX_CH_N	Complement Signal Auxiliary Channel
24	17	H_Gnd	High Speed Ground
23	18	LCD_VCC	LCD Logic and DriverPower
22	19	LCD_VCC	LCD Logic and DriverPower
21	20	LCD_VCC	LCD Logic and DriverPower
20	21	LCD_VCC	LCD Logic and DriverPower
19	22	LCD_Self_Test or NC	Reserved for LCD Manufacturers Use
18	23	LCD_GND Return	LCD Logic and Driver Ground
17	24	LCD_GND Return	LCD Logic and Driver Ground
16	25	LCD_GND Return	LCD Logic and Driver Ground
15	26	LCD_GND Return	LCD Logic and Driver Ground
14	27	HPD	Hot Plug Detect Signal
13	28	BL_GND	Backlight Ground Return
12	29	BL_GND	Backlight Ground Return
11	30	BL_GND	Backlight Ground Return
10	31	BL_GND	Backlight Ground Return
9	32	BL_ENABLE or NC	Backligh On/Off (optional)
8	33	BL_PWM_DIM or NC	System PWM signal input for dimming
7	34	NC - Reserved	Reserved for LCD Manufacturers Use
6	35	NC - Reserved	Reserved for LCD Manufacturers Use
5	36	BL_PWR	Backlight Power
4	37	BL_PWR	Backlight Power
3	38	BL_PWR	Backlight Power
2	39	BL_PWR	Backlight Power
1	40	NC - Reserved	Reserved for LCD Manufacturers Use

Main Link Lanes (Display data)

High Speed Differential Grounds

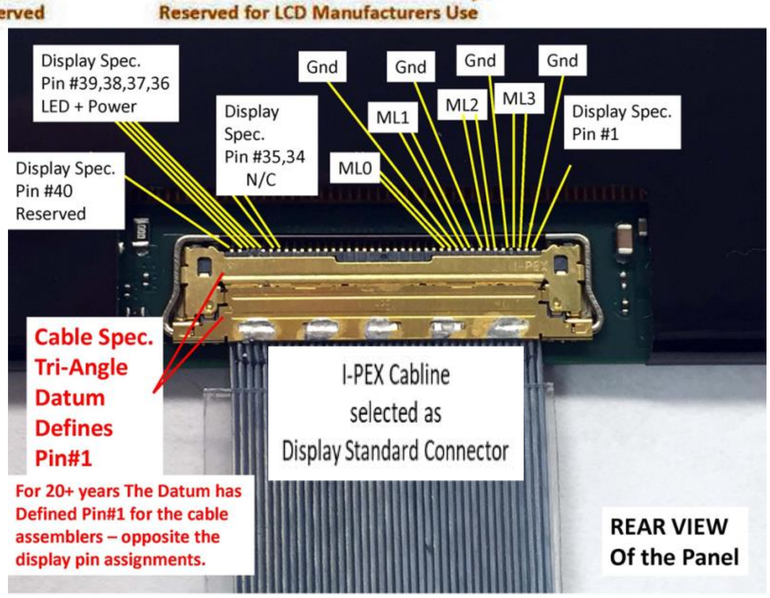
AUX Channel (Control data)

HOT PLUG Detect (AUX interrupt)

Ground Return Logic and Backlight

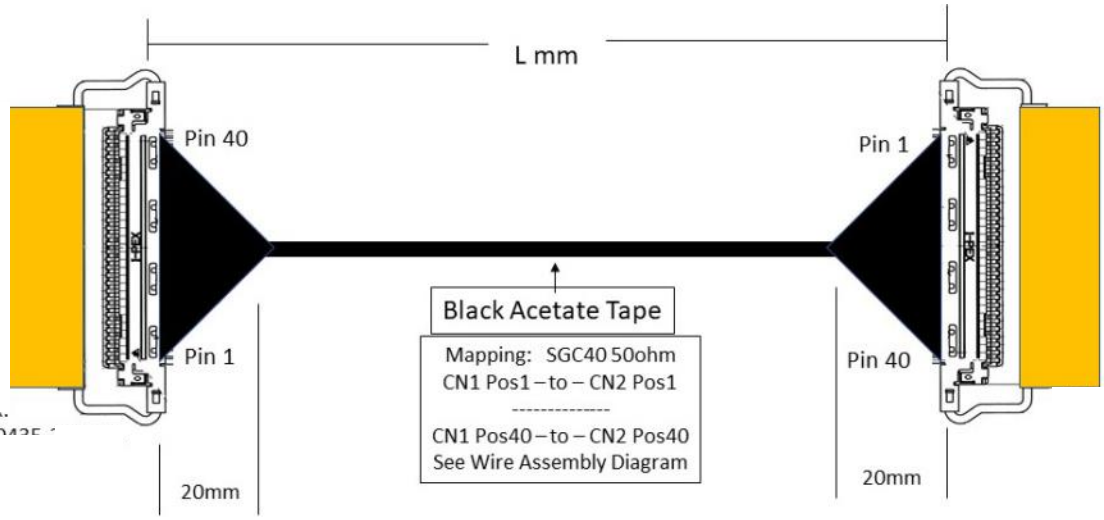
Reserved Pins (For LCD OEM's use)

Power Logic and Backlight



M200915B_C40_VS40x2_1-1_XXX

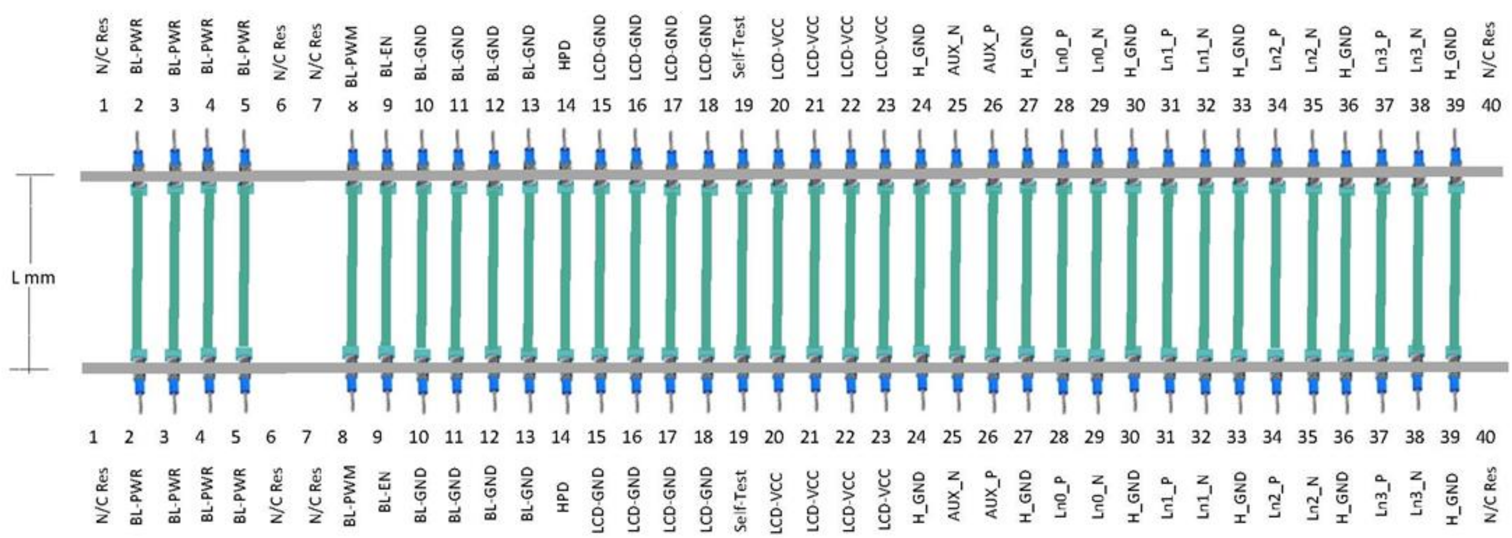
CN1 Contacts Up
I-PEX
20453-240T-01
Or
TE Connectivity
5-2069715-3
Or
JAE
HD1P040MA1R6000



CN2 Contacts Up
I-PEX
20453-240T-01
Or
TE Connectivity
5-2069715-3
Or
JAE
HD1P040MA1R6000

WIRE Assembly

I-PEX Cabline-VS 20453-240T-01 Contacts UP



I-PEX Cabline-VS 20453-240T-01 Contacts DOWN

Small Gauge Coax SGC40 _ 50ohm
Controlled Impedance
Center Conductor Resistance = 5 Ω/m

Bundle Formula

$$(D=\sqrt{[(\sum d_i^2)]}+\sum \Delta t_i)$$

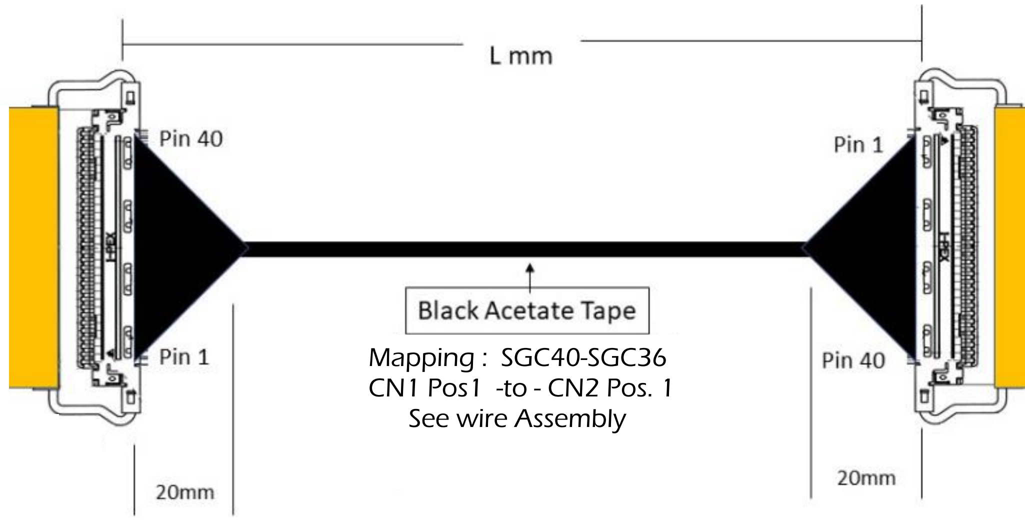
$$D = 1.2\sqrt{Q_1 d_1^2 + Q_2 d_2^2 + Q_3 d_3^2 \ldots}$$

SGC40 50ohm = Ø0.36 ± 0.02mm
Center Conductor Resistance = 5 Ω/m
D = Ø 2.86 mm
Est. 180deg. Bending Radius = ~14.3 mm

OPTIMUM Wire Assembly Design

M200915B_C40-36_VS40x2_1-1_xxx

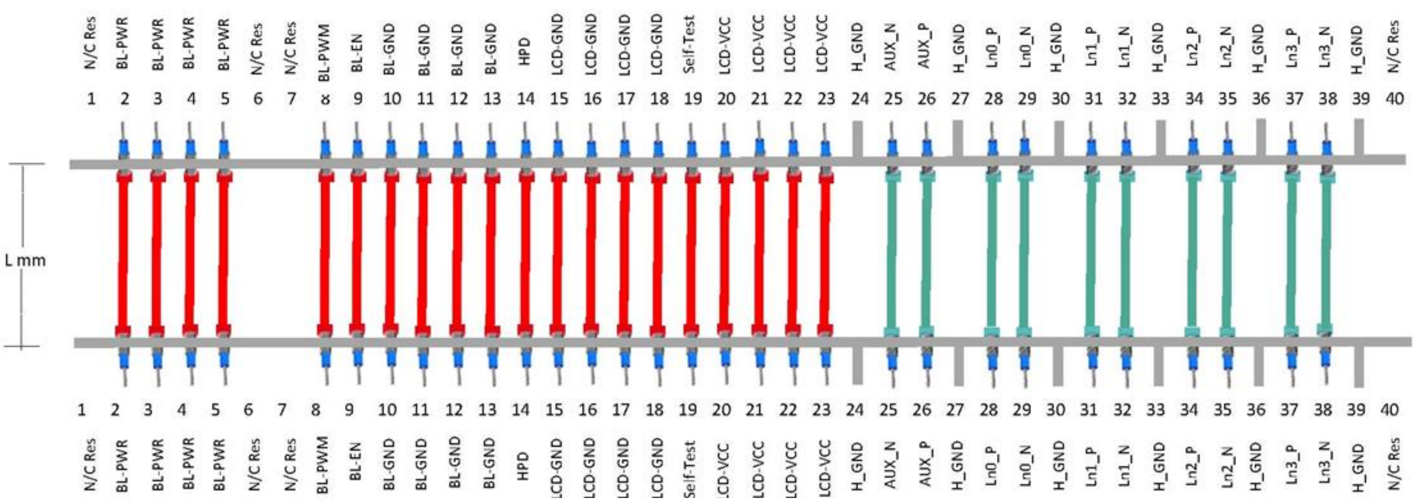
CN1 Contacts Up
I-PEX
20453-240T-01
Or
TE Connectivity
5-2069715-3
Or
JAE
HD1P040MA1R6000



CN2 Contacts Up
I-PEX
20453-240T-01
Or
TE Connectivity
5-2069715-3
Or
JAE
HD1P040MA1R6000

WIRE Assembly

I-PEX Cabline-VS 20453-240T-01 Contacts UP



I-PEX Cabline-VS 20453-240T-01 Contacts DOWN

I-PEX Cabline-VS 20453-340T-01 Contacts DOWN

Small Gauge Coax SGC36 
NON-Controlled Impedance Signals
Center Conductor Resistance = 1.5 Ω/m

Small Gauge Coax SGC40 _ 50ohm 
Controlled Impedance Signals

Bundle Formula

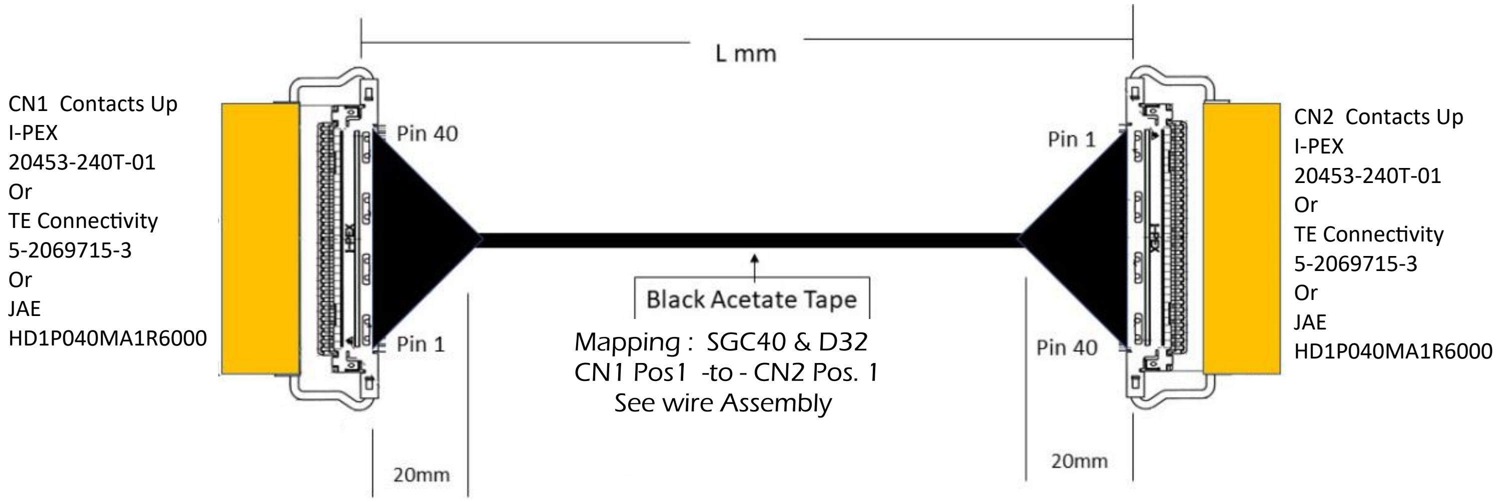
$$(D=\sqrt{[(\sum d_i^2)]}+\sum \Delta t_i)$$

$$D = 1.2\sqrt{Q_1 d_1^2 + Q_2 d_2^2 + Q_3 d_3^2 \ldots}$$

SGC40 50ohm = Ø0.36 ± 0.02mm
SGC36 Non-Imp = Ø0.365 ±0.02mm
D = Ø 2.63 mm
Est. 180deg. Bending Radius = ~13.2 mm

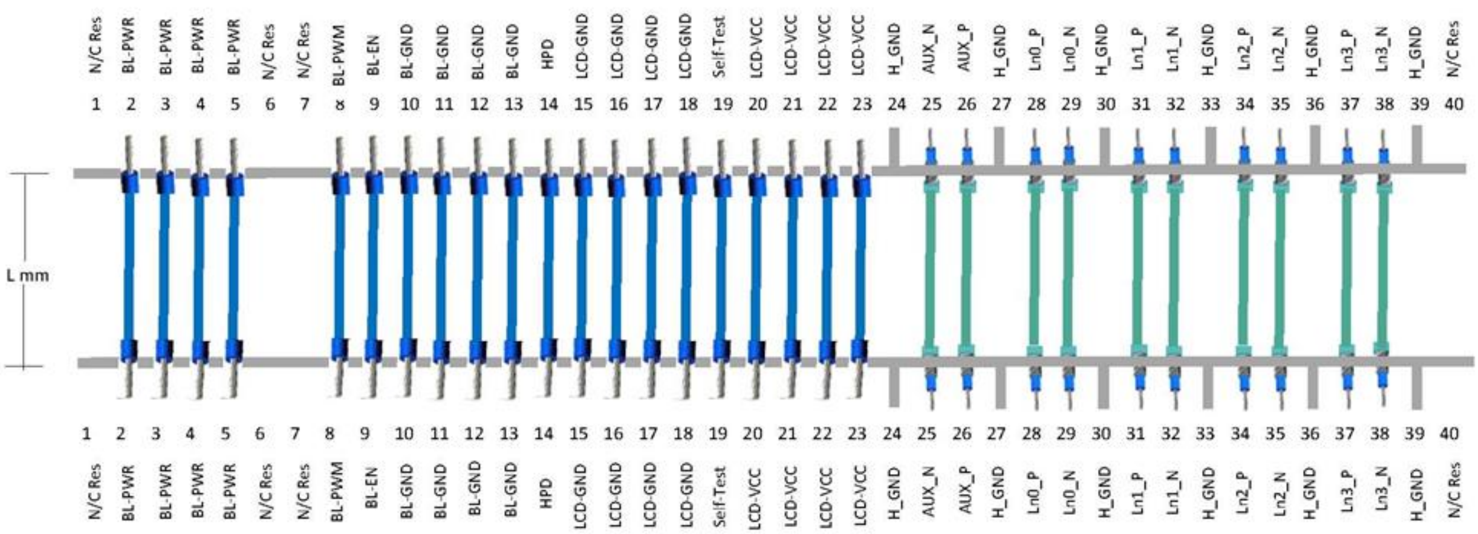
Mixed Coax & Discrete Wire Assembly

M200915B_C40-D32_VS40x2_1-1_xxx



WIRE Assembly

I-PEX Cabline-VS 20453-240T-01 Contacts UP



I-PEX Cabline-VS 20453-240T-01 Contacts Down

UL 10064 Discrete AWG32
Center Conductor Resistance = 0.6 Ω/m

Small Gauge Coax SGC40 _ 50ohm
Controlled Impedance Signals

Bundle Formula

$$(D=\sqrt{[(\sum d_i^{\,2})]+\sum \Delta t_i})$$

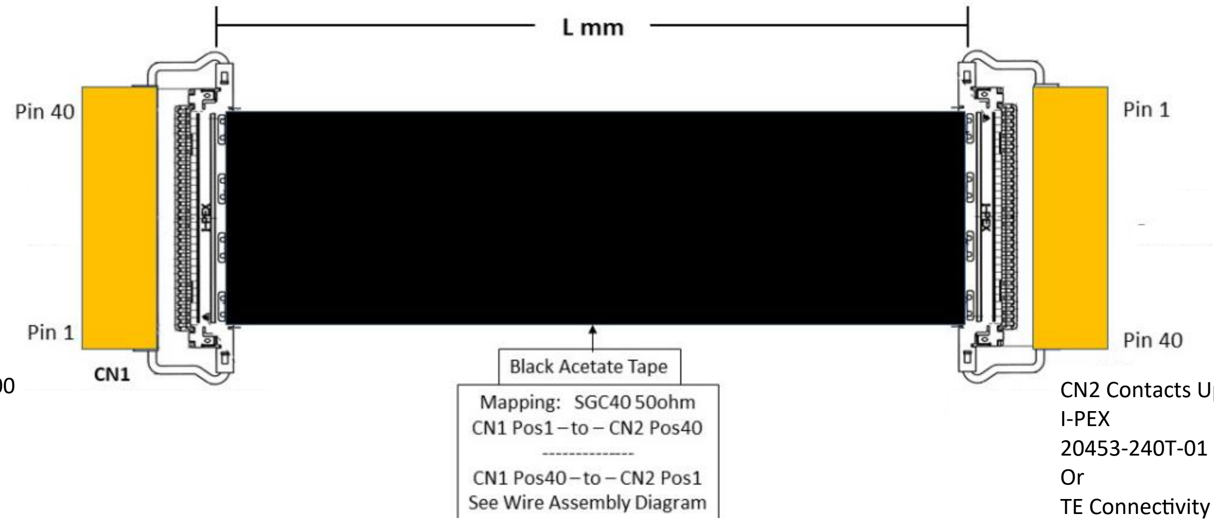
$$D = 1.2\sqrt{Q_1 d_1^2 + Q_2 d_2^2 + Q_3 d_3^2 \ldots}$$

SGC40 50ohm = Ø0.36 ± 0.02mm
D32 = Ø0.38±0.03mm
D = Ø 2.75 mm
Est. 180deg. Bending Radius = ~13.75 mm

For Power signals: D32 Center Conductor Resistance = 0.6 Ω/m

M200915F_C40_VS40x2_1-40_xxx

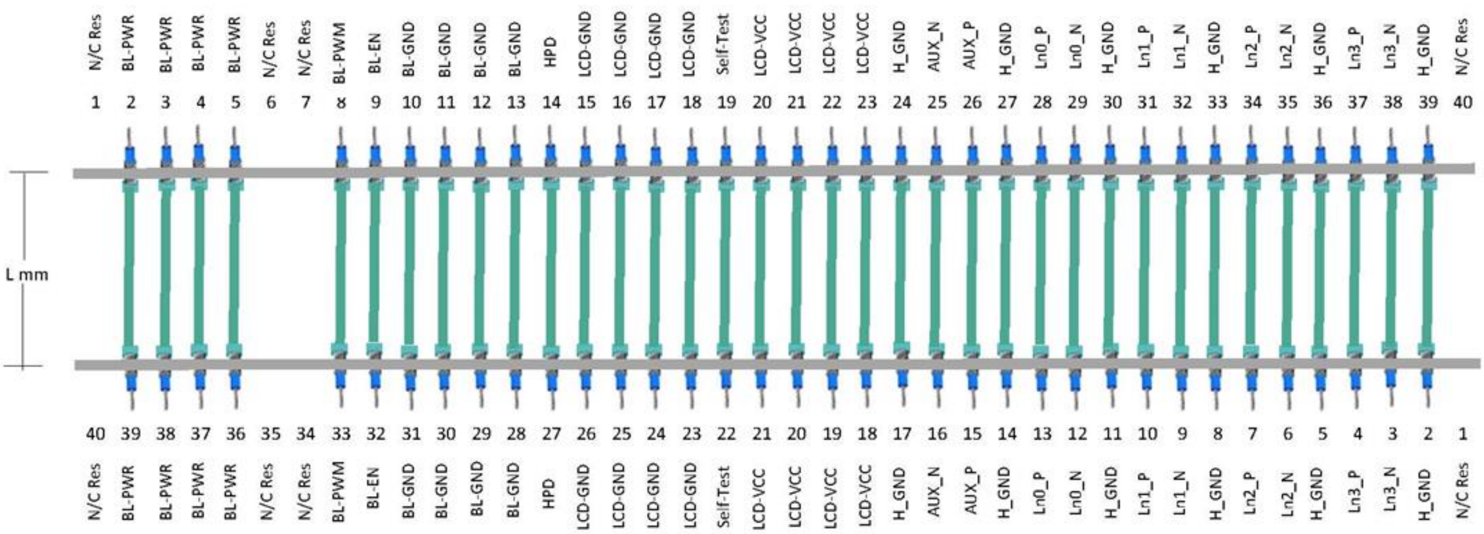
CN1 Contacts Up
I-PEX
20453-240T-01
Or
TE Connectivity
5-2069715-3
Or
JAE
HD1P040MA1R6000



CN2 Contacts Up
I-PEX
20453-240T-01
Or
TE Connectivity
5-2069715-3
Or
JAE
HD1P040MA1R6000

WIRE Assembly

I-PEX Cabline-VS 20453-240T-01 Contacts UP



I-PEX Cabline-VS 20453-240T-01 Contacts UP

Small Gauge Coax SGC40 _ 50ohm
Controlled Impedance
Center Conductor Resistance = 5 Ω/m

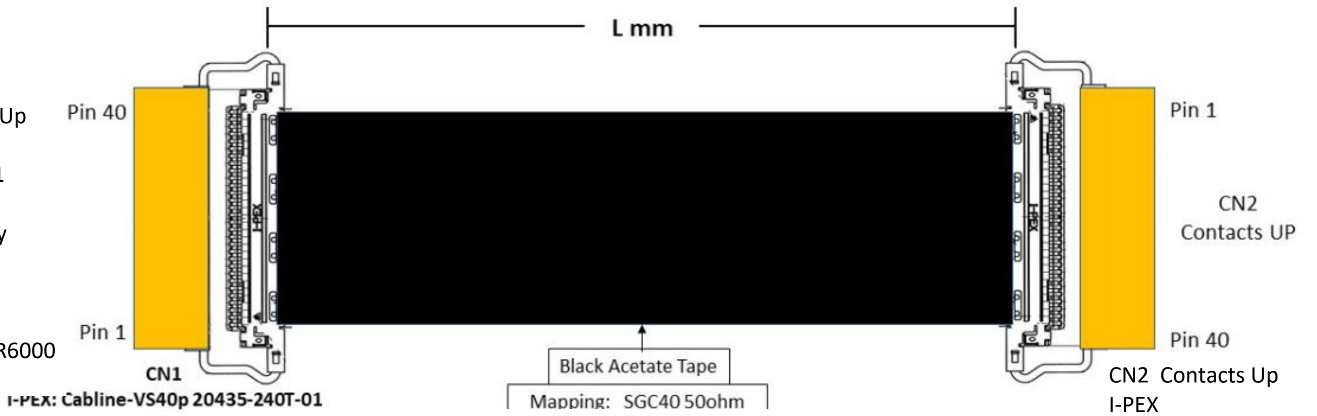
For Power signals: SGC40 Center Conductor Resistance = 5 Ω/m
180 deg. Bending Radius = ~ 2.5mm

40p 4 Lanes eDP 1-40 Flat Cable Assembly

OPTIMUM Wire Assembly Design

M200915F_C40-36_VS40x2_1-40_xxx

CN1 Contacts Up
I-PEX
20453-240T-01
Or
TE Connectivity
5-2069715-3
Or
JAE
HD1P040MA1R6000

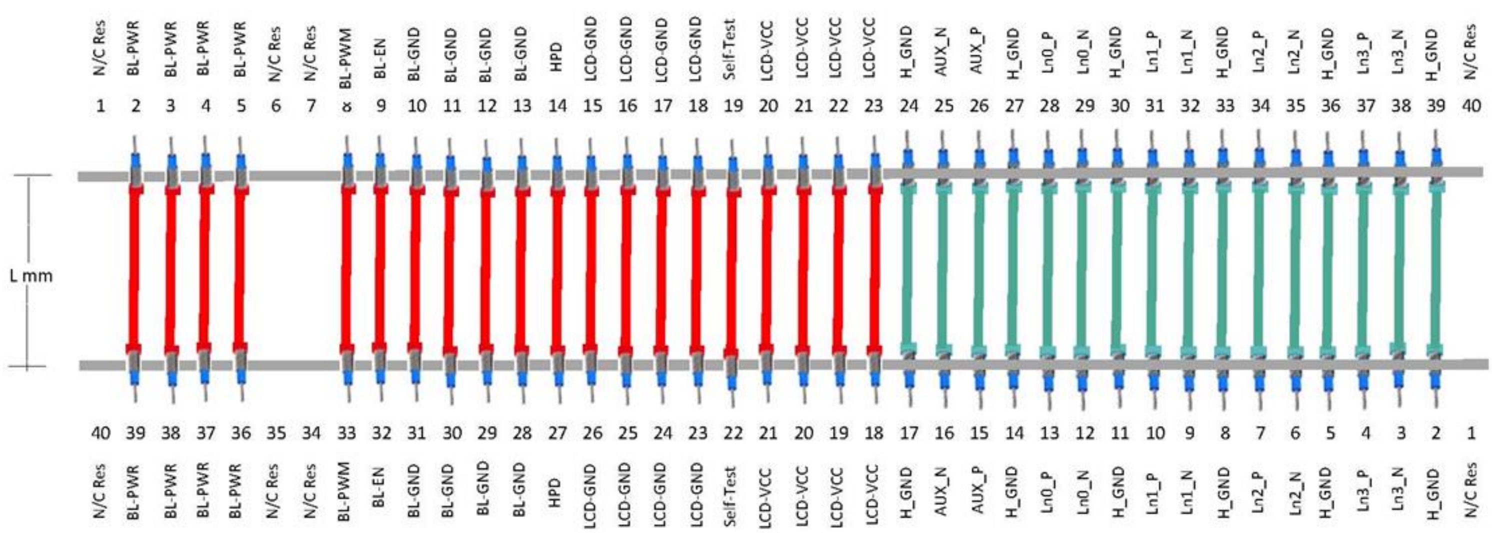


CN2 Contacts Up
I-PEX
20453-240T-01
Or
TE Connectivity
5-2069715-3
Or
JAE
HD1P040MA1R6000

Mapping : SGC40-SGC36
CN1 Pos1 -to - CN2 Pos. 40
See wire Assembly

WIRE Assembly

I-PEX Cabline-VS 20453-240T-01 Contacts UP



I-PEX Cabline-VS 20453-240T-01 Contacts UP

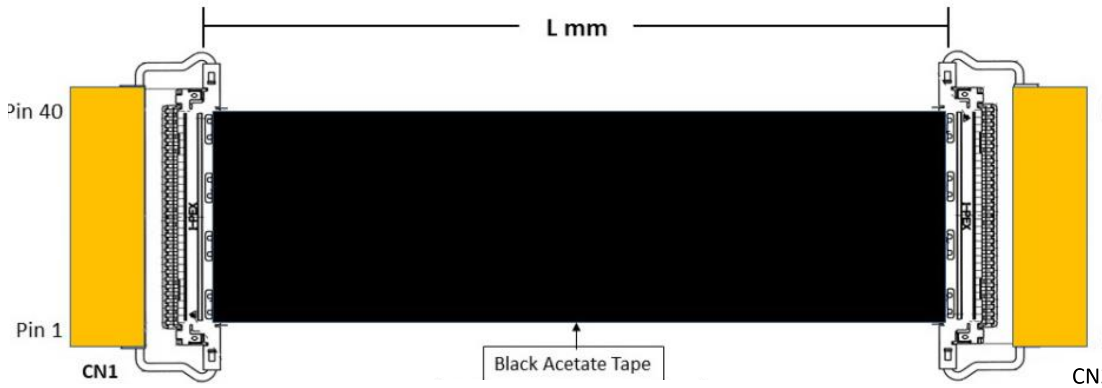
Small Gauge Coax SGC36
NON-Controlled Impedance Signals
Center Conductor Resistance = 1.5 Ω/m

Small Gauge Coax SGC40 _ 50ohm
Controlled Impedance Signals

For Power signals: SGC36 (Non-Imp) Center Conductor Resistance = 1.5 Ω/m
180 deg. Bending Radius = ~ 2.53 mm

M200915F_C40-D32_VS40x2_1-40_xxx

CN1 Contacts Up
I-PEX
20453-240T-01
Or
TE Connectivity
5-2069715-3
Or
JAE
HD1P040MA1R6000

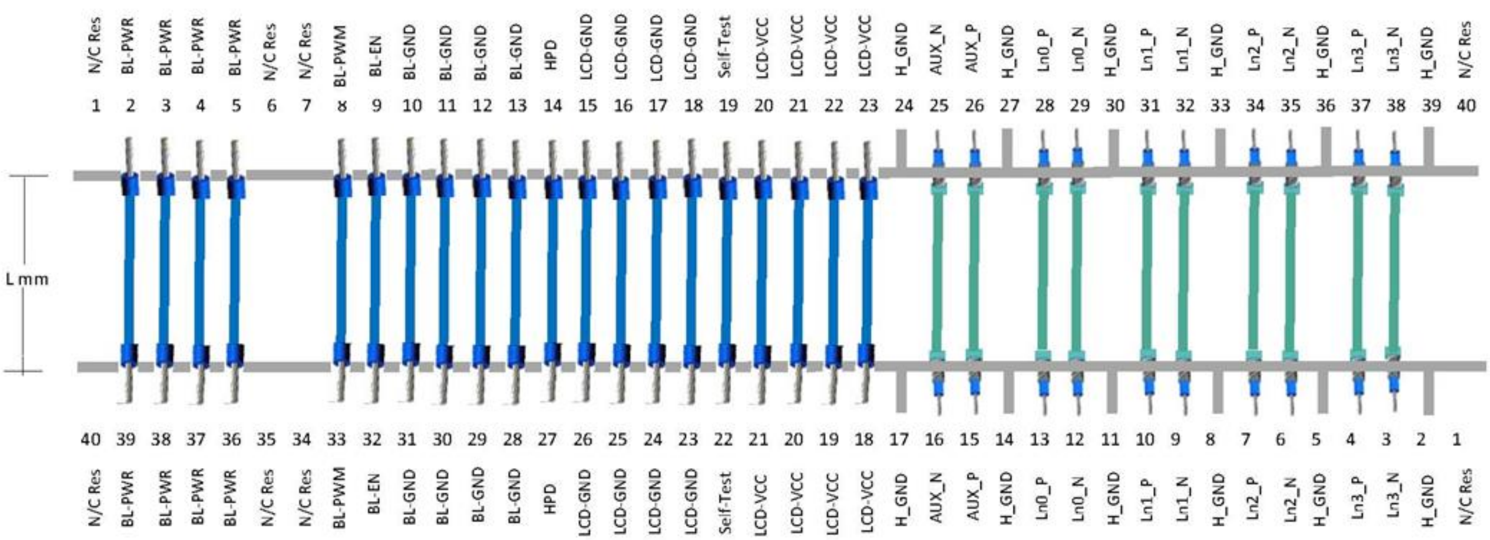


Mapping : SGC40—D32
CN1 Pos1 -to - CN2 Pos. 40
See wire Assembly

CN2 Contacts Up
I-PEX
20453-240T-01
Or
TE Connectivity
5-2069715-3
Or
JAE
HD1P040MA1R6000

WIRE Assembly

I-PEX Cabline-VS 20453-240T-01 Contacts UP



I-PEX Cabline-VS 20453-240T-01 Contacts UP

UL 10064 Discrete AWG32
Center Conductor Resistance = 0.6 Ω/m

Small Gauge Coax SGC40 _ 50ohm
Controlled Impedance Signals

For Power signals: D32 Center Conductor Resistance = 0.6 Ω/m
180 deg. Bending Radius = ~ 2.65 mm

~596 Mbps per Differential Lane

VESA
Video Electronics Standards Association

VESA 16:9 Wide Notebook Panel Standard

Version 3

9 November 2010

Purpose

This standard defines the requirements for the standardization of mechanical dimensions and selected electrical interface requirements for 10.1-, 11.6-, 13.3-, 13.4-, 14.0-, 15.6-, 17.3- and 18.4-inch W (wide format) 16:9 panels. The intent of this standard is to help LCD manufacturers and panel consumers to better control panel supply and demand cycles, as panels built to these specifications will be able to be used interchangeably without requiring alterations in product tooling or the display module.

Summary

This standard describes the selected electrical interfaces, mechanical dimensions and data formatting for 10.1-, 11.6-, 13.3-, 13.4-, 14.0-, 15.6-, 17.3-, and 18.4-inch wide format (W) 16:9 panels.

2.2.4 LVDS 6-bit I/F Signal Definition (40 pin for LED BL, 2-channel Input with LED Driver in PCB)

The LVDS signal interface cable shall be terminated into an I-PEX 20455-040E-12 or equivalent connector. The interface connector pin assignments are listed in Table 2-4.

~596 Mbps per Differential Lane

2.2.4 LVDS 6-bit I/F Signal Definition (40 pin for LED BL, 2-channel Input with LED Driver in PCB)

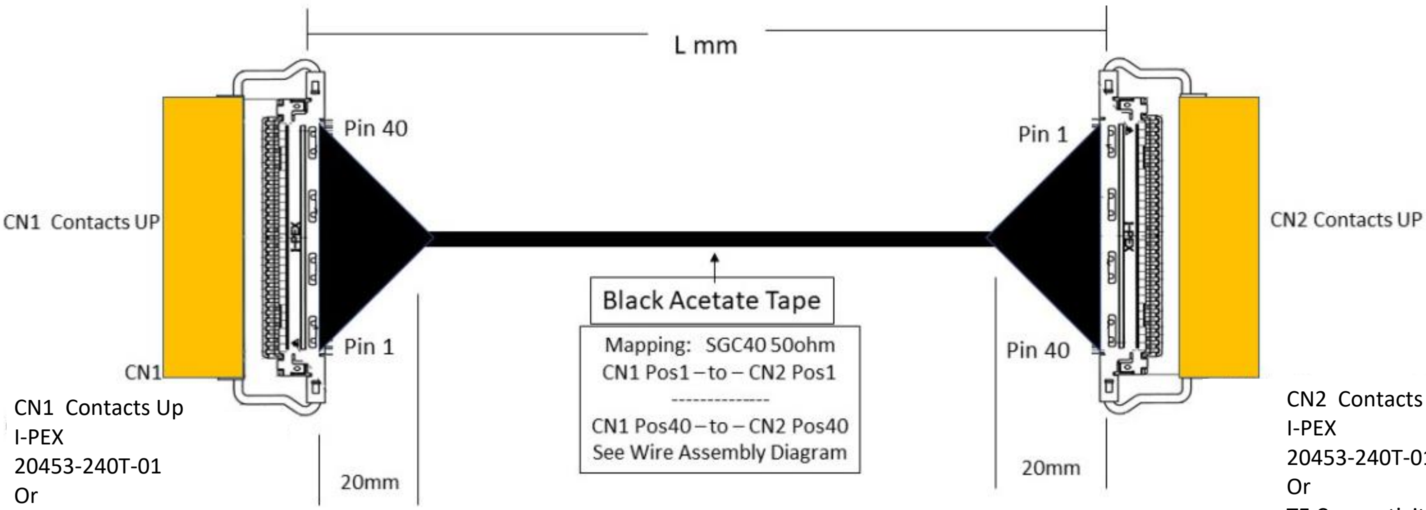
I-PEX Cabline Connector

The LVDS signal interface cable shall be terminated into an I-PEX 20455-040E-12 or equivalent connector. The interface connector pin assignments are listed in Table 2-4.

Connector Pin	Pin No.	Symbol	Function
40	1	NC-Reserved	Reserved for LCD manufacturer's use
39	2	LCD_VCC	LCD logic and driver power (3.3V typical)
38	3	LCD_VCC	LCD logic and driver power (3.3V typical)
37	4	VCC_EDID	DDC power
36	5	LCD_Self_Test or NC	LCD panel self test enable (optional)
35	6	CLK_EDID	DDC clock
34	7	DAT_EDID	DDC data
33	8	ORX0-	Negative LVDS differential data input for odd pixel
32	9	ORX0+	Positive LVDS differential data input for odd pixel
31	10	H_GND	High speed ground
30	11	ORX1-	Negative LVDS differential data input for odd pixel
29	12	ORX1+	Positive LVDS differential data input for odd pixel
28	13	H_GND	High speed ground
27	14	ORX2-	Negative LVDS differential data input for odd pixel
26	15	ORX2+	Positive LVDS differential data input for odd pixel
25	16	H_GND	High speed ground
24	17	ORXC-	Negative LVDS differential clock input for odd pixel
23	18	ORXC+	Positive LVDS differential clock input for odd pixel
22	19	H_GND or CEE	High speed ground (Color engine enable optional)
21	20	ERX0-	Negative LVDS differential data input for even pixel
20	21	ERX0+	Positive LVDS differential data input for even pixel
19	22	H_GND	High speed ground
18	23	ERX1-	Negative LVDS differential data input for even pixel
17	24	ERX1+	Positive LVDS differential data input for even pixel
16	25	H_GND	High speed ground
15	26	ERX2-	Negative LVDS differential data input for even pixel
14	27	ERX2+	Positive LVDS differential data input for even pixel
13	28	H_GND	High speed ground
12	29	ERXC-	Negative LVDS differential clock input for even pixel
11	30	ERXC+	Positive LVDS differential clock input for even pixel
10	31	BL_GND	Backlight ground
09	32	BL_GND	Backlight ground
08	33	BL_GND	Backlight ground
07	34	NC-Reserved	Reserved for LCD manufacturer's use
06	35	BL_PWM_DIM	System PWM signal input for dimming
05	36	BL_ENABLE	Backlight on/off
04	37	DBC	Dynamic backlight control
03	38	BL_PWR	Backlight power
02	39	BL_PWR	Backlight power
01	40	BL_PWR	Backlight power

~596 Mbps per Differential Lane

M200915B_C40LVDS_VS40x2_1-1_xxx

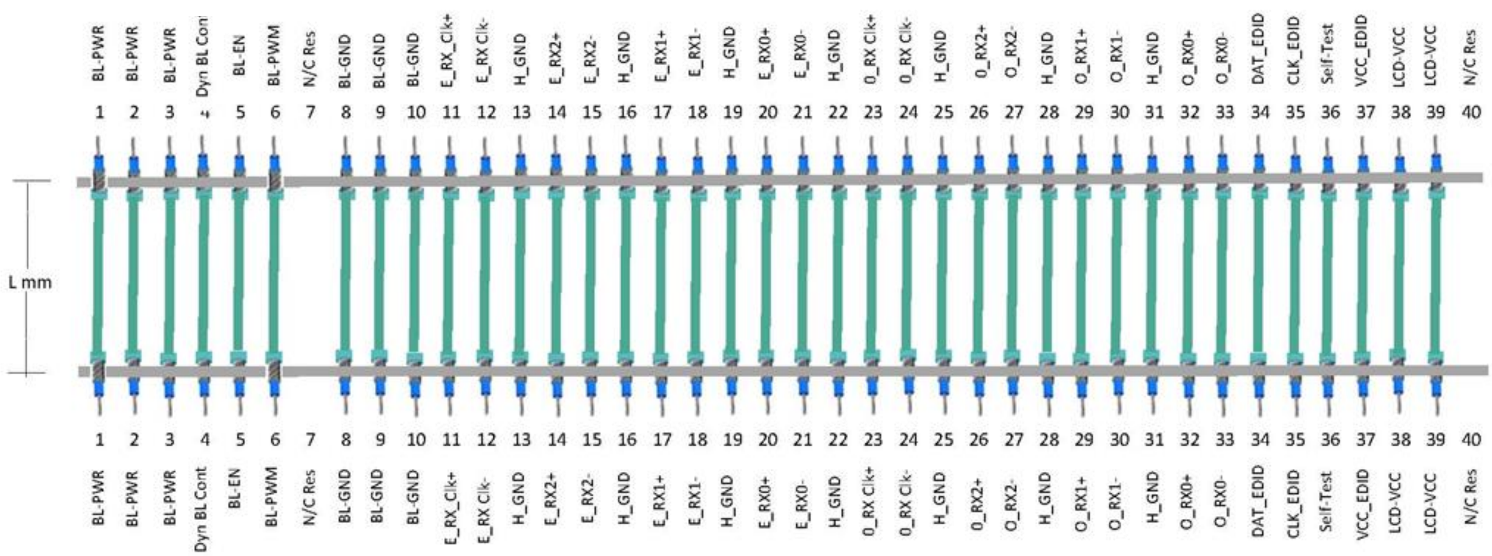


CN1 Contacts Up
I-PEX
20453-240T-01
Or
TE Connectivity
5-2069715-3
Or
JAE
HD1P040MA1R6000

CN2 Contacts Up
I-PEX
20453-240T-01
Or
TE Connectivity
5-2069715-3
Or
JAE
HD1P040MA1R6000

WIRE Assembly

I-PEX Cabline-VS 20453-240T-01 Contacts UP



I-PEX Cabline-VS 20453-240T-01 Contacts DOWN

Small Gauge Coax SGC40 _ 50ohm
Controlled Impedance
Center Conductor Resistance = 5 Ω/m

Bundle Formula

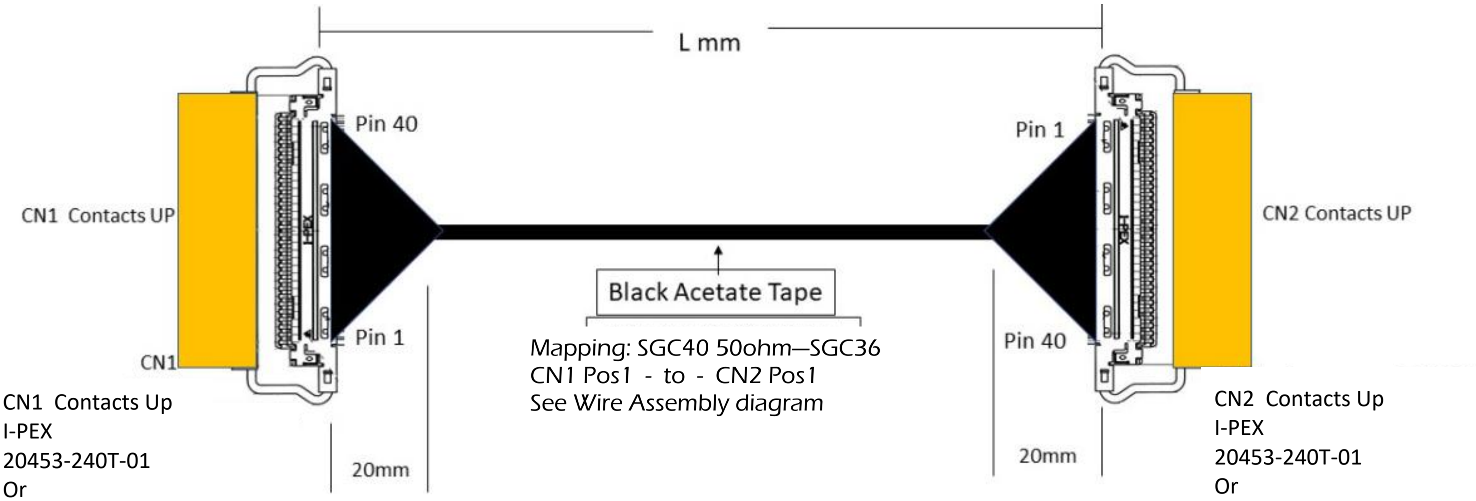
$$(D=\sqrt{[(\sum d_i^{2})]}+\sum \Delta t_i)$$

$$D = 1.2\sqrt{Q_1 d_1^2 + Q_2 d_2^2 + Q_3 d_3^2 \ldots}$$

SGC40 50ohm = Ø0.36 ± 0.02mm
Center Conductor Resistance = 5 Ω/m
D = Ø 2.81 mm
Est. 180deg. Bending Radius = ~14.1 mm

~596 Mbps per Differential Lane

M20915B_C40-36LV_VS40x2_1-1_xxx



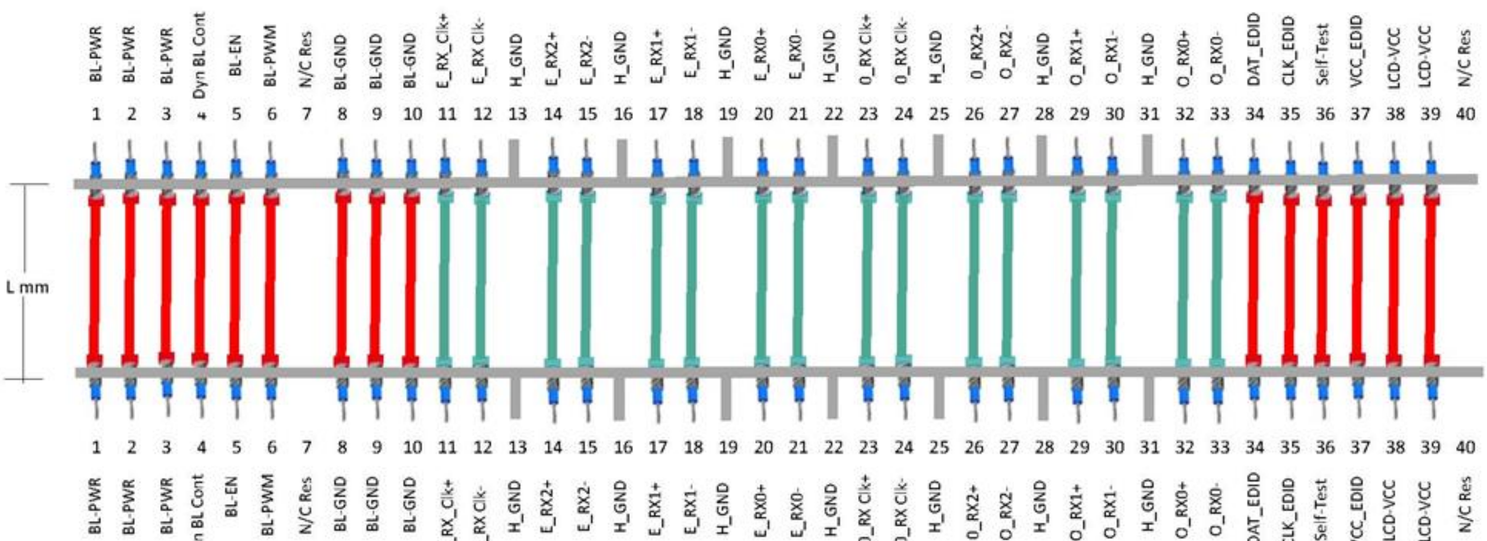
Mapping: SGC40 50ohm—SGC36
CN1 Pos1 - to - CN2 Pos1
See Wire Assembly diagram

CN1 Contacts Up
I-PEX
20453-240T-01
Or
TE Connectivity
5-2069715-3
Or
JAE
HD1P040MA1R6000

CN2 Contacts Up
I-PEX
20453-240T-01
Or
TE Connectivity
5-2069715-3
Or
JAE
HD1P040MA1R6000

WIRE Assembly

I-PEX Cabline-VS 20453-240T-01 Contacts UP



I-PEX Cabline-VS 20453-240T-01 Contacts DOWN

Small Gauge Coax SGC36
Non-Controlled Impedance Signals
Center Conductor Resistance = 1.5 Ω/m

Small Gauge Coax SGC40 _ 50ohm
Controlled Impedance Signals

SGC40 50ohm = Ø0.36 ± 0.02mm

SGC36 Non-Imp = 0.365 ± 0.02
Center Conductor Resistance = 1.5 Ω/m
D = Ø 2.55 mm
Est. 180deg. Bending Radius = ~12.8 mm

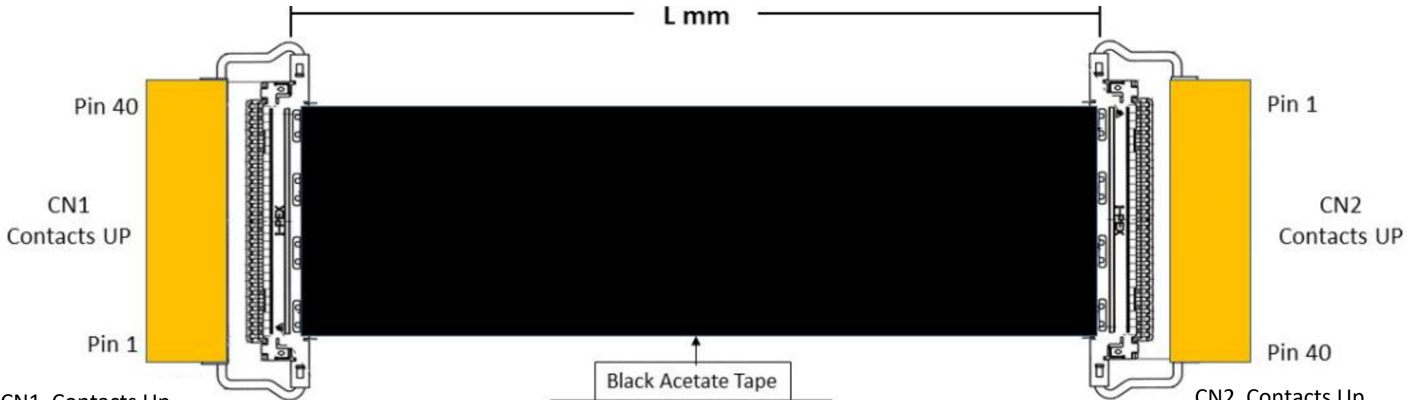
Bundle Formula

$$(D=\sqrt{[(\sum d_i^2)]}+\sum \Delta t_i)$$

$$D = 1.2\sqrt{Q_1 d_1^2 + Q_2 d_2^2 + Q_3 d_3^2 \ldots}$$

~596 Mbps per Differential Lane

M200915F_C40LV_VS40x2_1-40_xxx



Mapping: SGC40 50ohm
CN1 Pos1 – to – CN2 Pos40

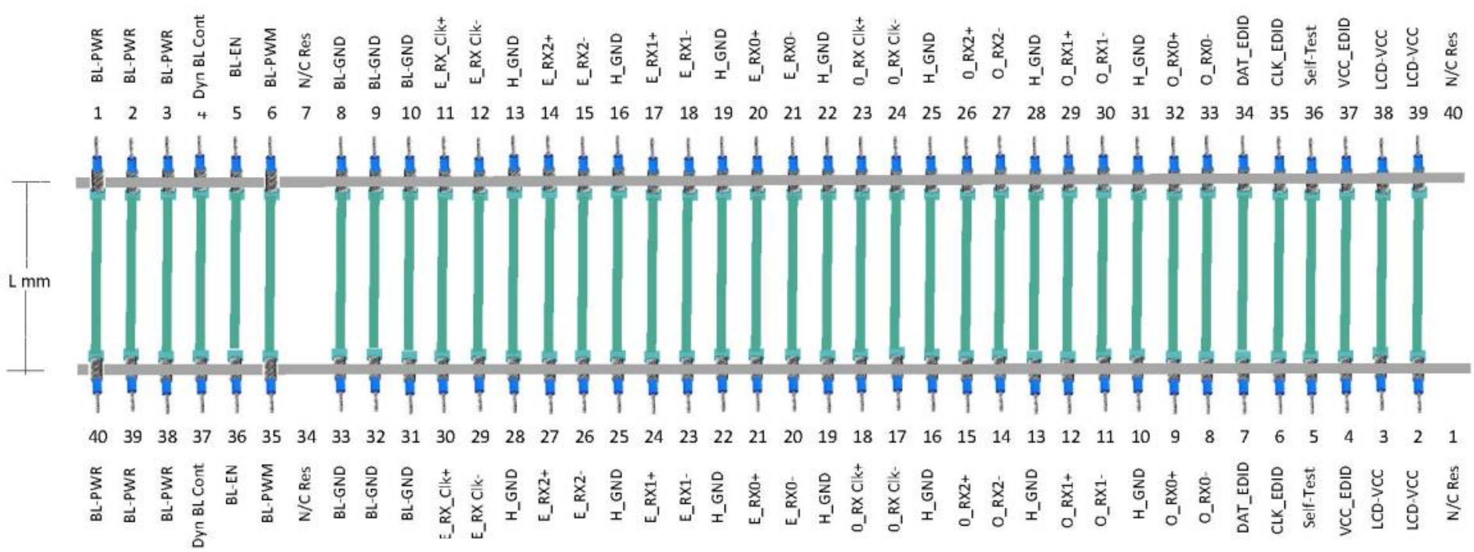
CN1 Pos40 – to – CN2 Pos1
See Wire Assembly Diagram

CN1 Contacts Up
I-PEX
20453-240T-01
Or
TE Connectivity
5-2069715-3
Or
JAE
HD1P040MA1R6000

CN2 Contacts Up
I-PEX
20453-240T-01
Or
TE Connectivity
5-2069715-3
Or
JAE
HD1P040MA1R6000

WIRE Assembly

I-PEX Cabline-VS 20453-240T-01 Contacts UP



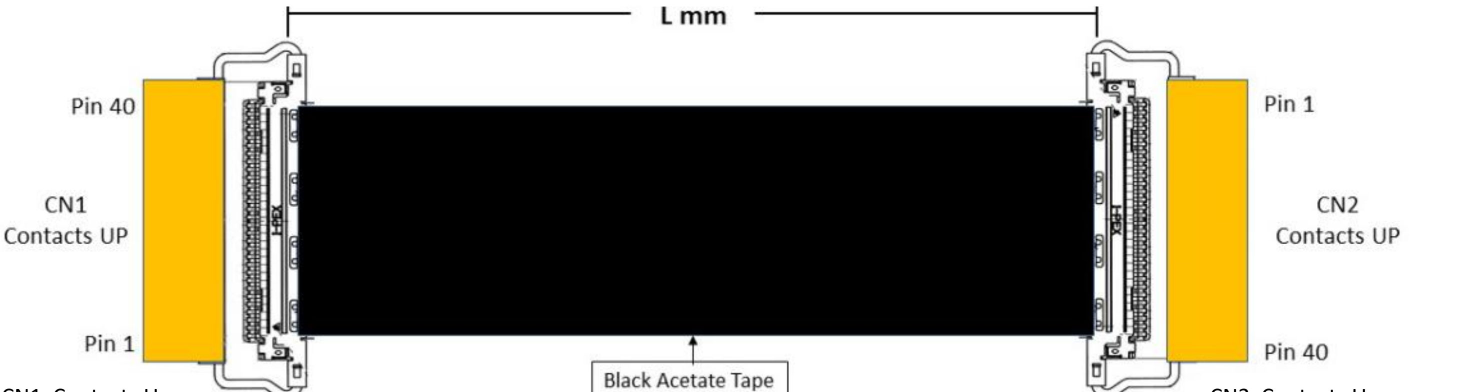
I-PEX Cabline-VS 20453-240T-01 Contacts UP

Small Gauge Coax SGC40 _ 50ohm
Controlled Impedance
Center Conductor Resistance = 5 Ω/m

For Power signals: SGC40 Center Conductor Resistance = 5 Ω/m
180 deg. Bending Radius = ~ 2.5mm

~596 Mbps per Differential Lane

M20915F_C40-36LV_VS40x2_1-40_xxx



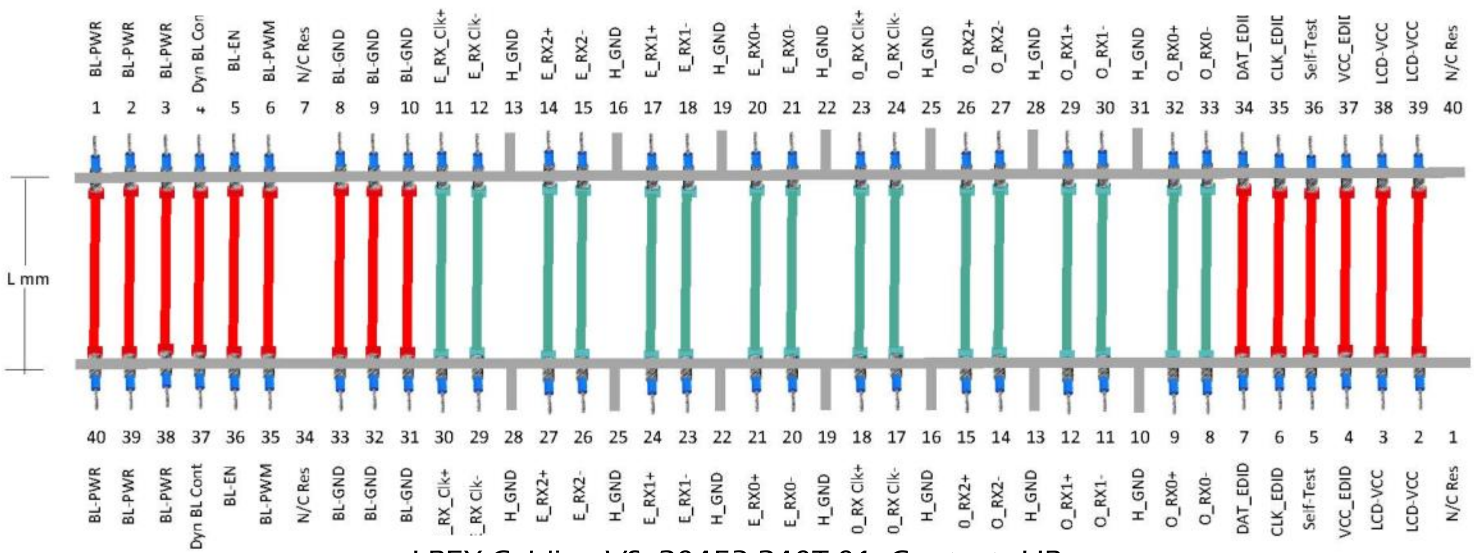
CN1 Contacts Up
I-PEX
20453-240T-01
Or
TE Connectivity
5-2069715-3
Or
JAE
HD1P040MA1R6000

Mapping : SGC40-SGC36
CN1 Pos1 -to - CN2 Pos. 40
See wire Assembly

CN2 Contacts Up
I-PEX
20453-240T-01
Or
TE Connectivity
5-2069715-3
Or
JAE
HD1P040MA1R6000

WIRE Assembly

I-PEX Cabline-VS 20453-240T-01 Contacts UP



I-PEX Cabline-VS 20453-240T-01 Contacts UP

Small Gauge Coax SGC36
Non-Controlled Impedance Signals
Center Conductor Resistance = 1.5 Ω/m

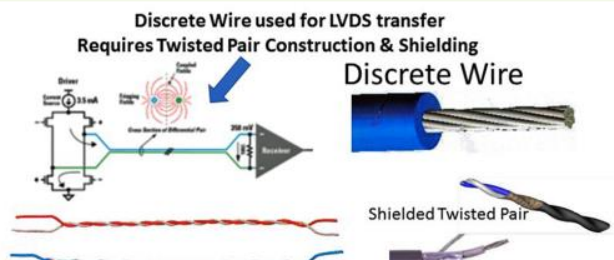
Small Gauge Coax SGC40 _ 50ohm
Controlled Impedance Signals

For Power signals: SGC36 (Non-Imp) Center Conductor Resistance = 1.5 Ω/m
180 deg. Bending Radius = ~ 2.53 mm

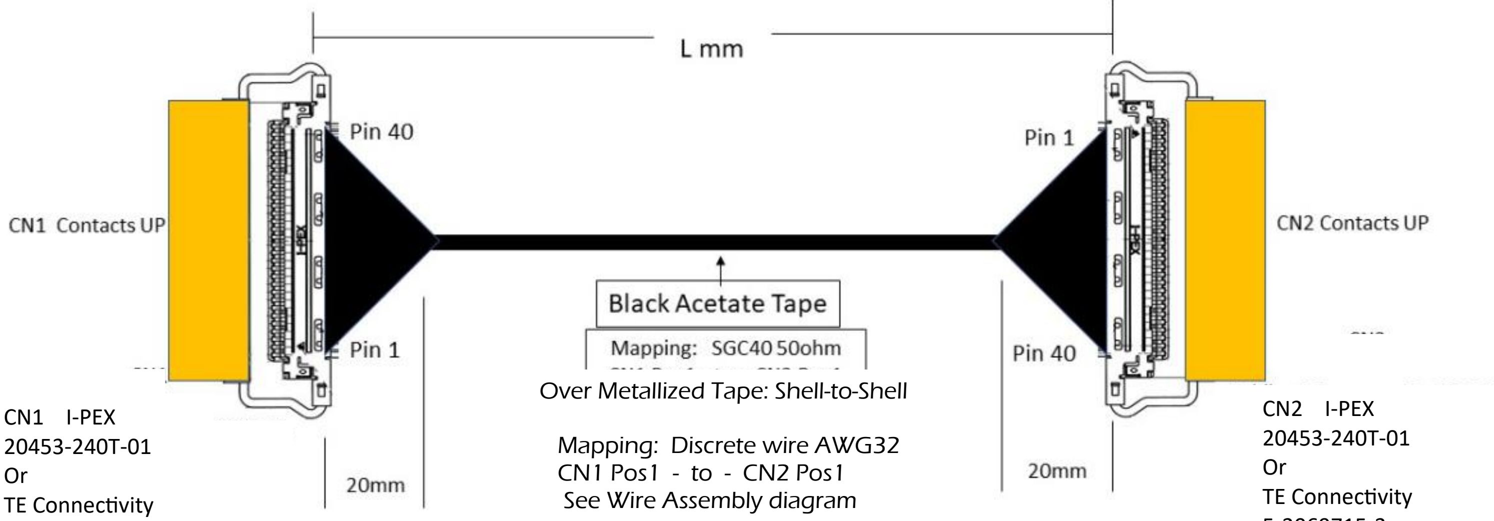
LVDS Technology

Discrete Wire—Twisted Pair

~596 Mbps per Differential Lane



M200915B_D32LVDS_VS40x2_1-1_xxx



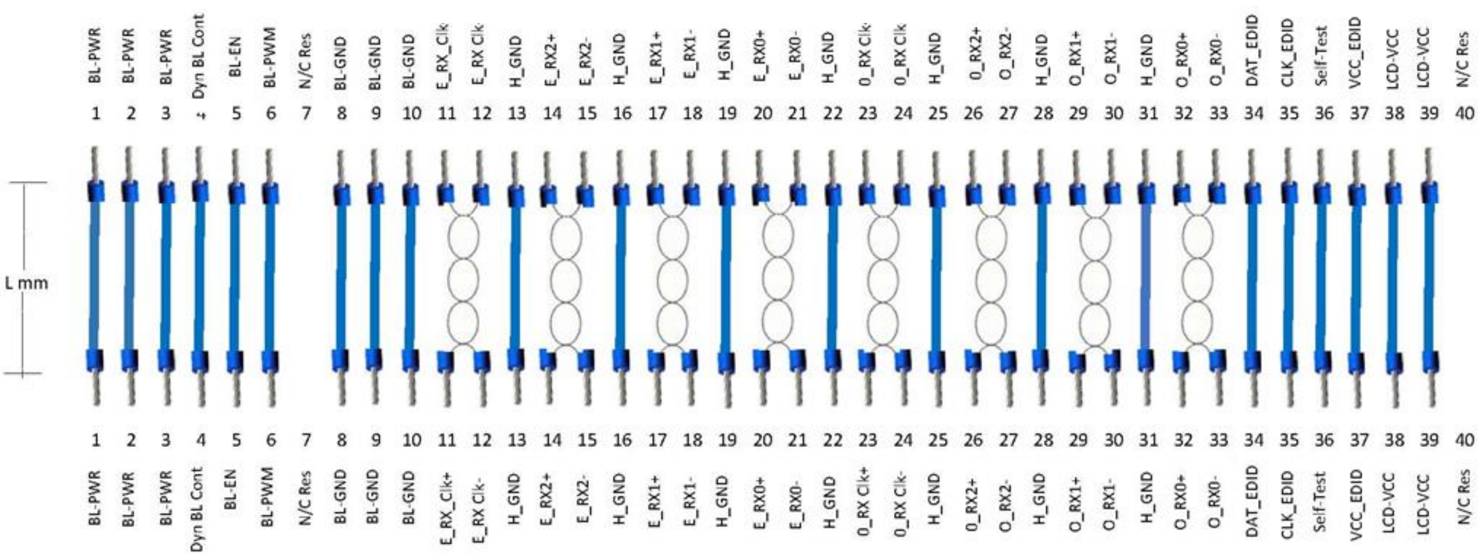
Over Metallized Tape: Shell-to-Shell

Mapping: Discrete wire AWG32
CN1 Pos1 - to - CN2 Pos1
See Wire Assembly diagram

CN1 I-PEX
20453-240T-01
Or
TE Connectivity
5-2069715-3
Or
JAE
HD1P040MA1R6000

CN2 I-PEX
20453-240T-01
Or
TE Connectivity
5-2069715-3
Or
JAE
HD1P040MA1R6000

I-PEX Cabline-VS 20453-240T-01 Contacts UP



I-PEX Cabline-VS 20453-240T-01 Contacts DOWN

Discrete Wre AWG32 
UL16004
Center Conductor Resistance : 0.6 Ω/m

Twisted-Pair used for Differential Pair Lanes 

Bundle Formula

$$(D=\sqrt{[(\sum d_i^{2})]}+\sum \Delta t_i)$$

$$D = 1.2\sqrt{Q_1 d_1^2 + Q_2 d_2^2 + Q_3 d_3^2 \ldots}$$

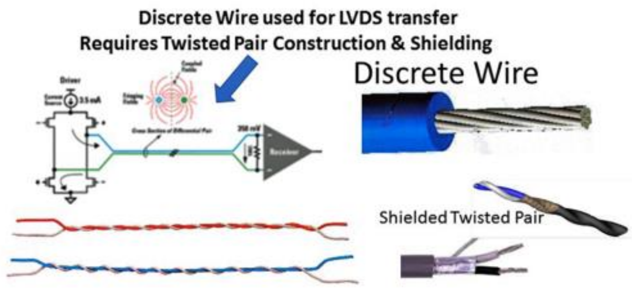
Discrete UL10064 AWG32 = Ø0.38 ± 0.03mm

Center Conductor Resistance = 0.6 Ω/m

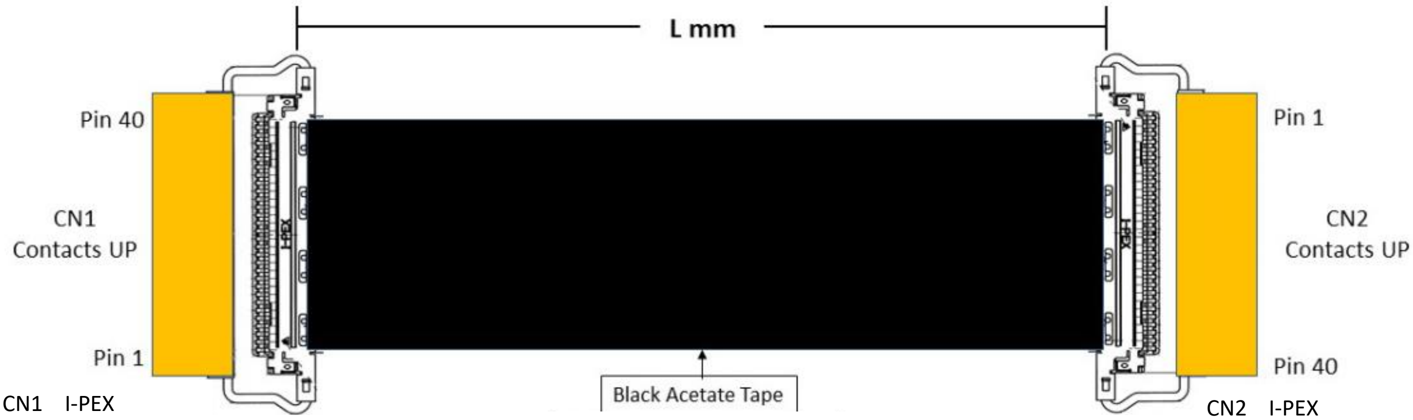
D = Ø 3.03 mm (no tape included)

Est. 180deg. Bending Radius = ~15.2 mm

~596 Mbps per Differential Lane



M200915F_D32LV_VS40x2_1-40_xxx



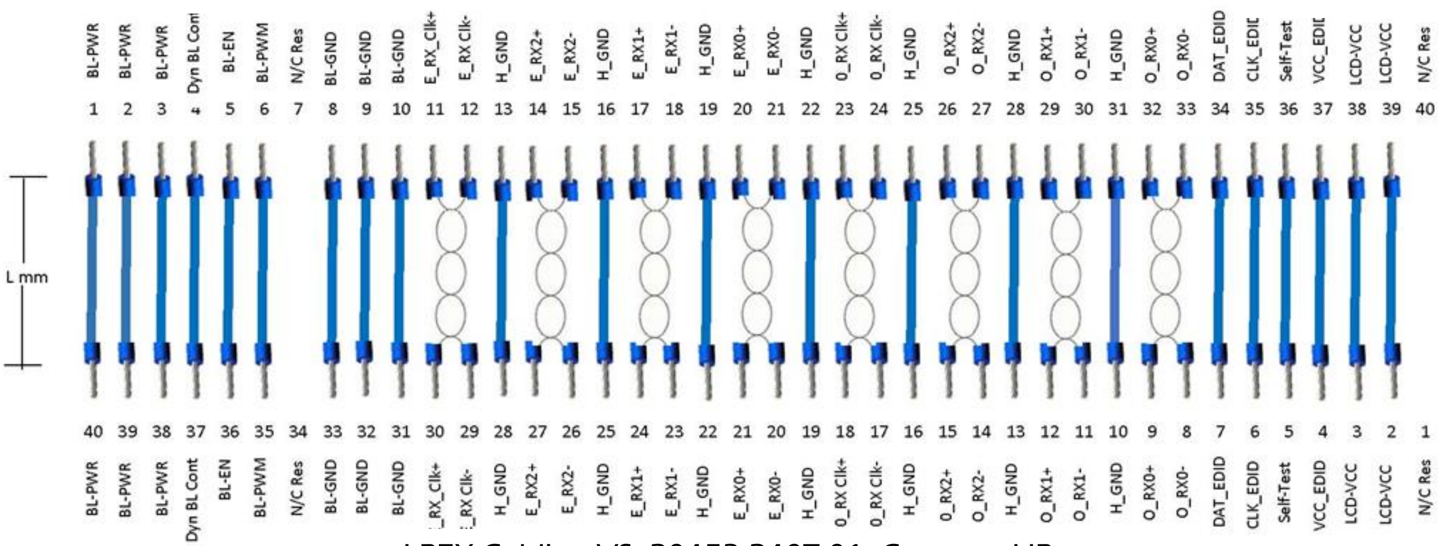
CN1 I-PEX
20453-240T-01
Or
TE Connectivity
5-2069715-3
Or
JAE
HD1P040MA1R6000

Over Metallized Tape: Shell-to-Shell

Mapping: Discrete wire AWG32
CN1 Pos1 - to - CN2 Pos40
See Wire Assembly diagram

CN2 I-PEX
20453-240T-01
Or
TE Connectivity
5-2069715-3
Or
JAE
HD1P040MA1R6000

I-PEX Cabline-VS 20453-240T-01 Contacts UP



I-PEX Cabline-VS 20453-240T-01 Contacts UP

Discrete Wre AWG32
UL16004
Center Conductor Resistance : 0.6 Ω/m

Twisted-Pair used for
Differential Pair Lanes

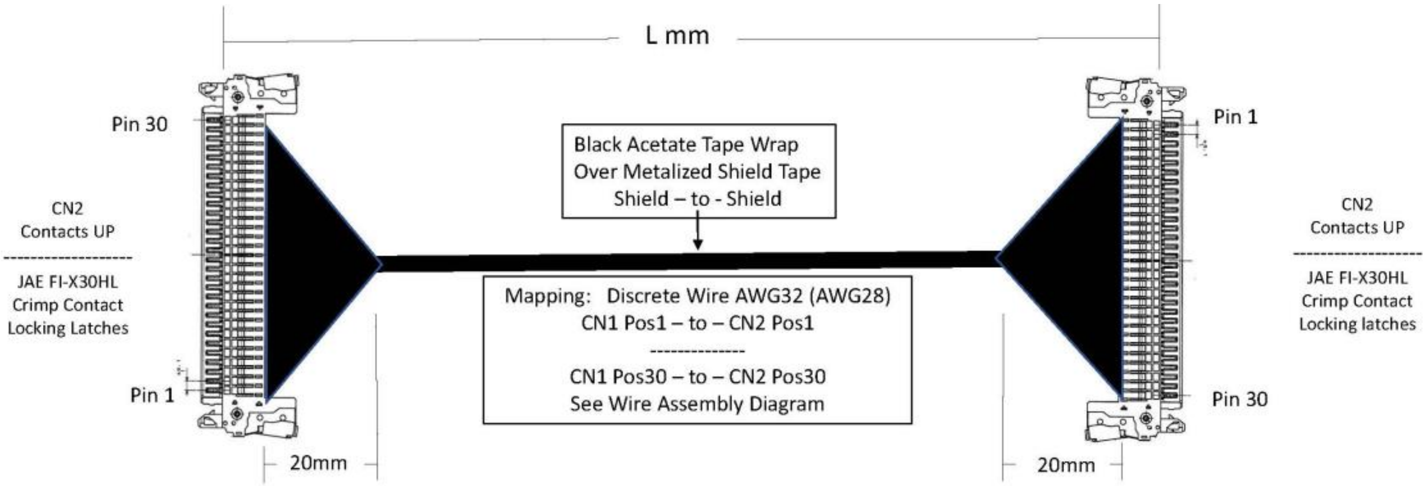
For Power signals: UL10064 AWG32 Center Conductor Resistance = 0.6 Ω/m

LVDS Technology 1-1 Bundled Cable Assembly

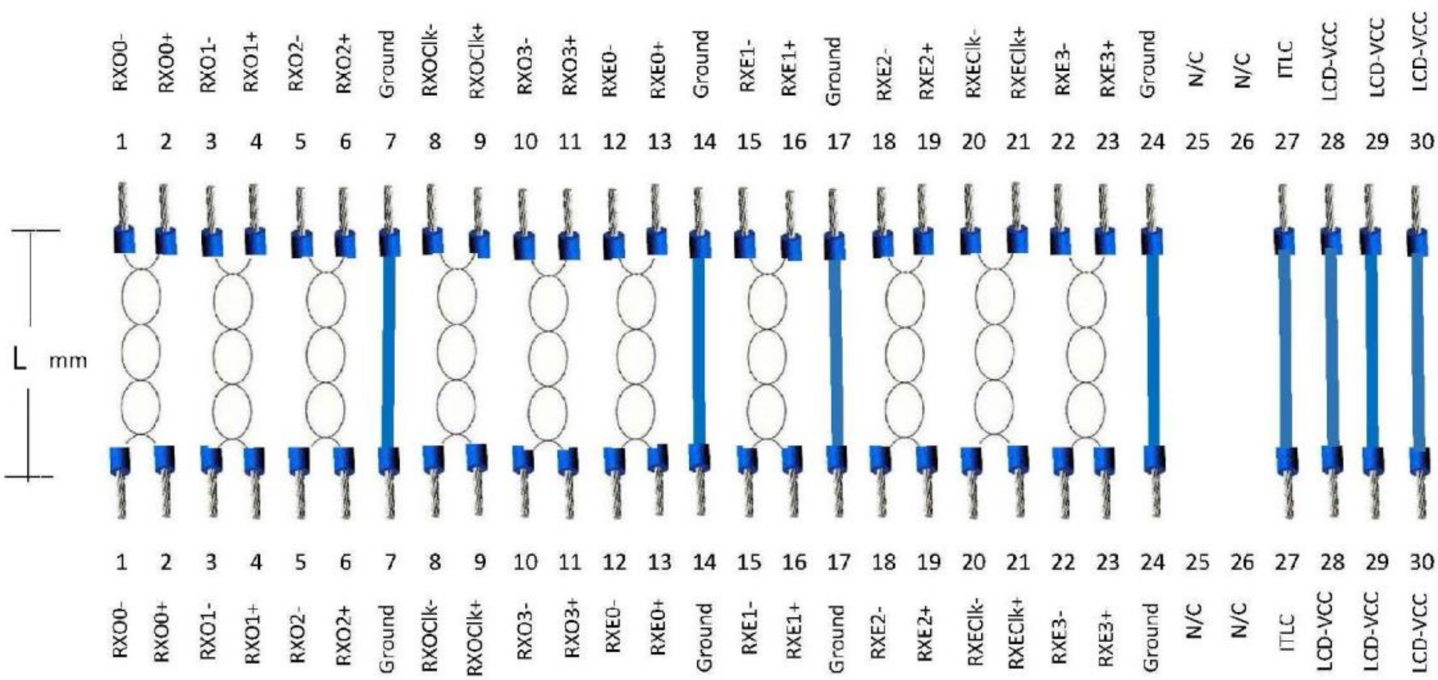
Discrete Wire— Twisted Pair Locking

~596 Mbps per Differential Lane

M200915B_D28_FIX30HLx2_1-1_XXX



CN1 JAE FI-X30HL x2 crimp Contacts **UP**



Note: Discrete Wire AWG28 is commonly used in this application.

CN2 JAE FI-X30HL x2 crimp Contacts DOWN

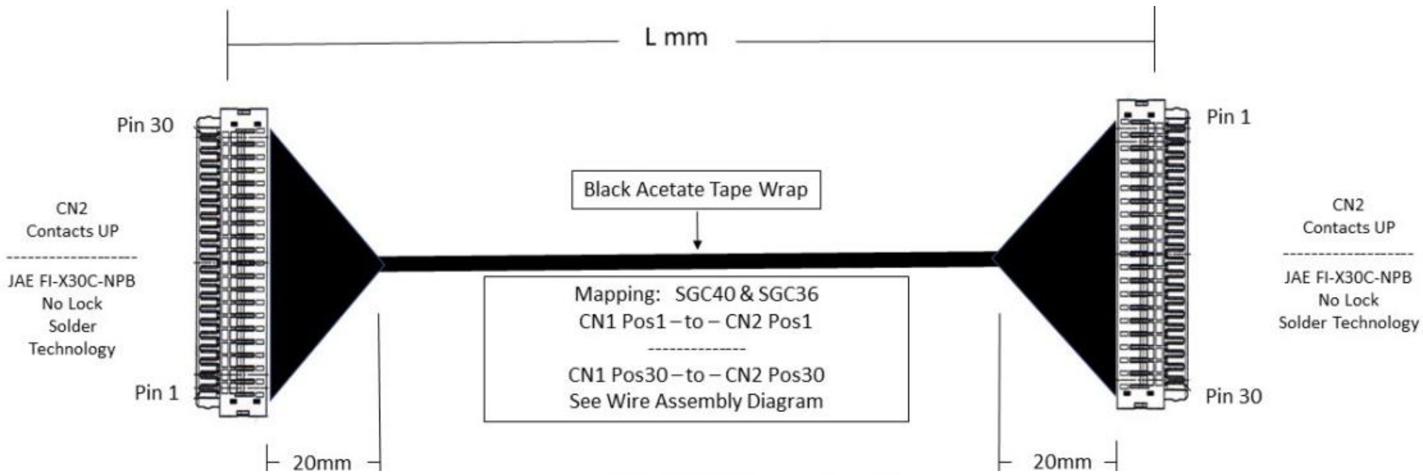
Twisted-Pair used for Differential Pair Lanes 100 ohm Controlled

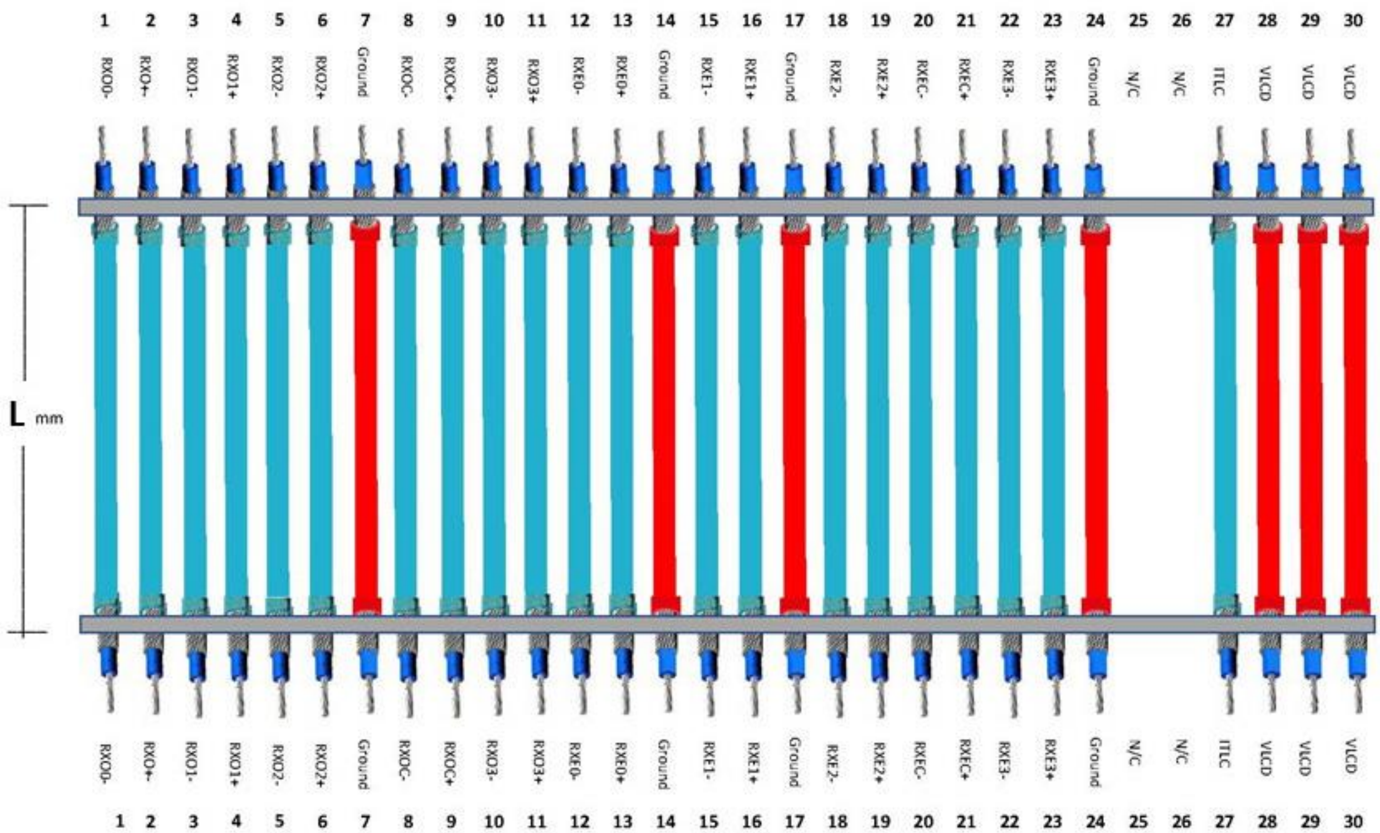
Bundle Formula

$$(D=\sqrt{[(\sum d_i^2)]}+\sum \Delta t_i)$$

$$D = 1.2\sqrt{Q_1 d_1^2 + Q_2 d_2^2 + Q_3 d_3^2 \ldots}$$

M20915B_C40-36_FIX30Cx2_1-1_XXX

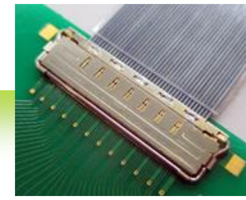


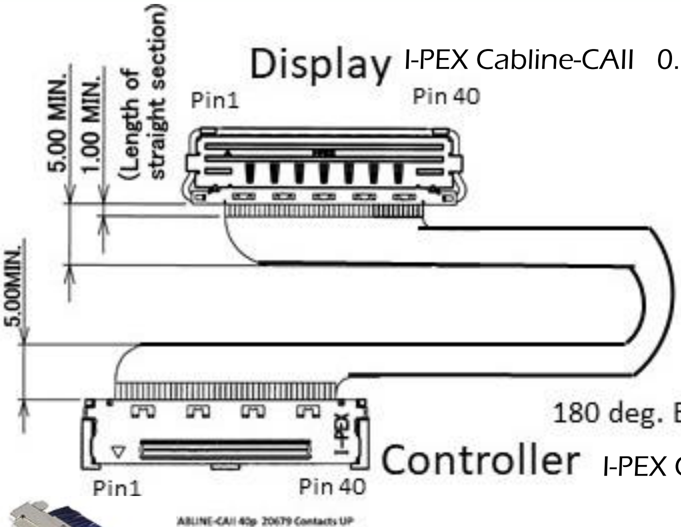


Micro-Coax wire: SGC40
50 ohm Impedance Controlled

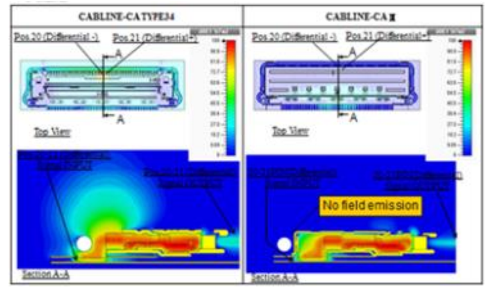
Micro-Coax wire: SGC36
NON-Impedance Controlled

Typical CUSTOM eDP Display Notebook Cable Assembly





Display I-PEX Cabline-CAII 0.4mm Pitch Full shielded Horizontal Mate Connector



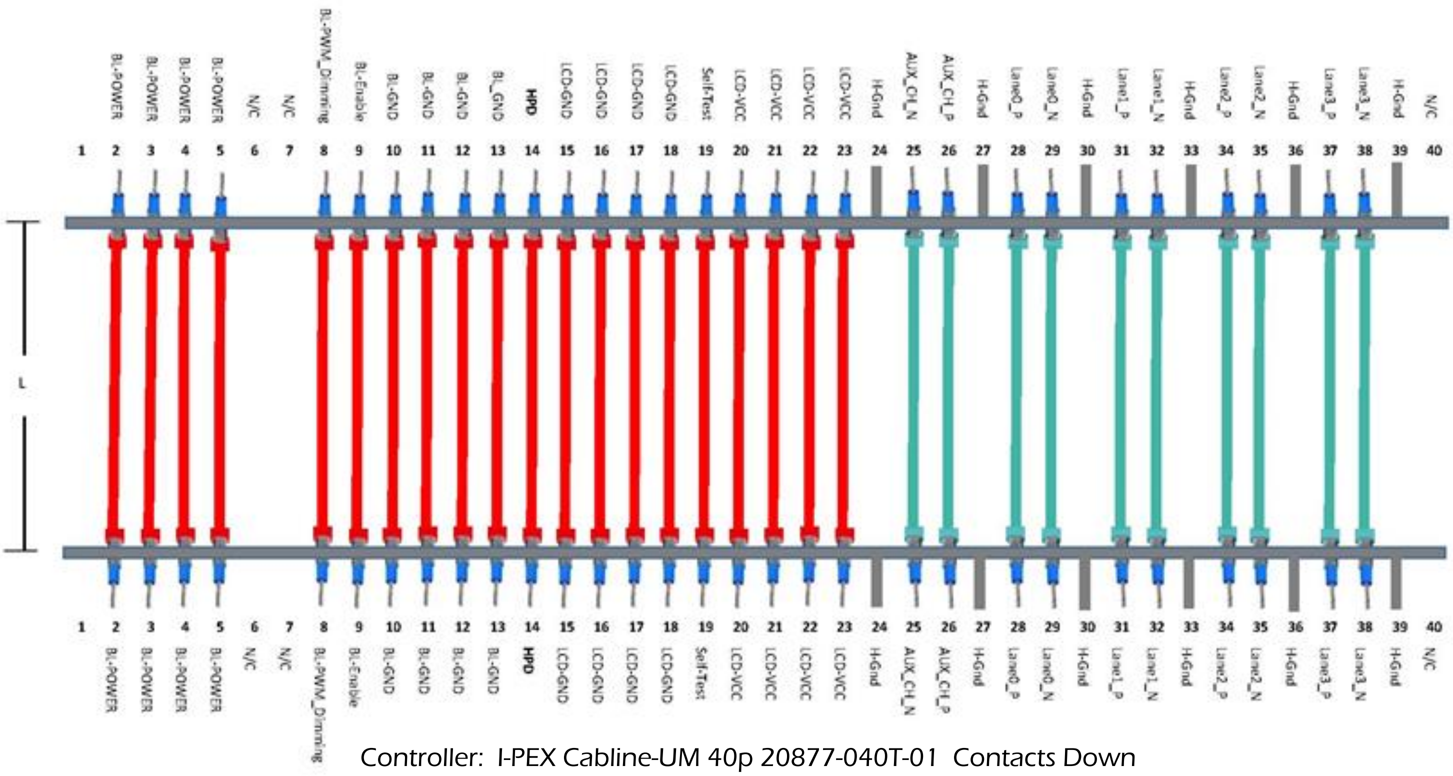
Diameter

Ø = ~ 2.53mm

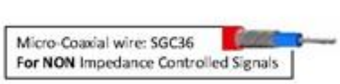
180 deg. Bending radius ~ 12.66mm

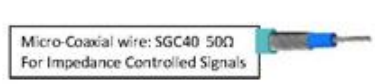
Controller I-PEX Cabline-UM 0.4mm Pitch Full shielded Vertical mate

Display : I-PEX Cabline-CAII 40p 20679 Contacts UP



Controller: I-PEX Cabline-UM 40p 20877-040T-01 Contacts Down





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