Clear & Clean Display Graphics

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SGC vs. Discrete TP: Provide a 2.7Gb/s Data Transfer Performance Comparison between Discrete Twisted Pair #34 Wire Construction and SGC40 50 ohm Impedance Controlled Coaxial Optimum construction as used in a typical notebook display application.

I-PEX Experience

Performance Parameters:
- Construction Comparison: All SGC vs. Discrete T.P.
  - Process/ Mechanical Integrity
- Impedance Control (Tr = 130pS 20/80)
- Eye Pattern (Time Domain)
- Frequency Domain Scattering Parameters
  - Insertion Loss and Return Loss
  - FEXT
- EMI
1995

SGC Connector

CABLINE I
Construction: SMALL GAUGE COAXIAL WIRE (SGC) vs. Discrete Wire

Twisted Pair Creates Common Mode Rejection for a 50 ohm transmission line which performs well for slower LVDS Signals (0.6~0.9 Gb/s) but may have some performance issues at 2.7 Gb/s and higher...
All Small Gauge Coaxial Construction Process

1. Cut each SGC wire to exact length.
2. Attach and Fix Each Wire with Laminate to the Pitch plate.
3. Score outer insulation batch with CO2 Laser and Remove it.
4. Dip the exposed braid shield into Tin for coating.
5. Solder the Grounding Bar onto all the braids.
6. Score the metal braid batch with YAG Laser and Remove it.
7. Score the inner insulation batch with CO2 Laser and Remove it.
8. Dip the exposed center conductor into Tin for coating.

SGC 36 Non-impedance controlled wire can safely carry approximately 0.3Amps at 50degC Ambient Temperature.
Grounding Bar Provides Inherit Strain Relief
Discrete Wire Construction Process

1. Cut each Discrete wire to exact length.
2. Attach and Fix Each Wire with Laminate to the Pitch plate.
3. Score outer insulation batch with CO2 Laser and Remove it.
4. Dip the exposed center conductor into Tin for coating

AWG #34 discrete wire can safely carry approximately 0.385 Amps at 50degC Ambient Temperature. AWG #32 can safely carry approx. 0.45Amps @ 50C.
Center Conductor is directly attached to the contact.

Epoxy is used as a strain relief.
Performance

- Impedance
- Eye Pattern
- Frequency Domain “S”
- EMI
Cable Assembly Under Test
SGC Construction VS.
Discrete Twisted Pair Construction

VESATM Standard Connector

Bundle by Teflon tape

I-PEX Cab-VS
20453-030T-01
20455-030E-02

I-PEX FPL-II
20437-040T-01
20439-030E-01
Empirical Probe Testing

Measurement equipment
- Oscilloscope: Tektronix 8000B
- Pulse generator: Tektronix AWG7102
- Network Analyzer: Agilent technologies N5230A
**Impedance**

Data Rate of 2.7 Gb/s, Tr = 130pS  20%-80%

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**Characteristic Impedance**

I-PeX® by DAI-ICHI SEIKO
SGC 40 has superior Impedance performance at 2.7 Gb/s data rate.

Discrete Twisted Pair (shielded) has poor Impedance performance at 2.7 Gb/s data rate.
Eye Pattern from the Source (TX)
PRBS $2^{7-1}$, BER $10^{-9}$

2.7 Gbps

200mV/Div

50ps/Div

0.84UI (310ps MIN.)

0.08UI (30ps MAX.)
The SGC cable had acceptable results.

The Discrete Twisted Pair Shielded cable had acceptable results.
FREQUENCY DOMAIN “S” Parameters
10MHz to 10GHz

Insertion Loss
Return Loss
FEXT
INSERTION and RETURN LOSS TEST SETUP

IL & RL

Network Analyzer

Coaxial probe

Connector

Cable

Connector

Coaxial probe

Board

Board

by DAI-ICHI SEIKO
All Cable Results had acceptable IL results

- Sample No. 1 CABLINE-VS / FPL II (SGC)
- Sample No. 2 CABLINE-VS / FPL-D (Discrete Twist Pair)
- Sample No. 3 CABLINE-VS / FPL-D (Discrete Twist Pair with Shield)
- Sample No. 4 CABLINE-FX III / FPL-D (Twincoax)
- DisplayPort Spec.
Discrete Twisted Pair with Shield Failed DP1.1a RL Limit

- Sample No. 1 CABLINE-VS / FPL II (SGC)
- Sample No. 2 CABLINE-VS / FPL-D (Discrete Twist Pair)
- Sample No. 3 CABLINE-VS / FPL-D (Discrete Twist Pair with Shield)
- Sample No. 4 CABLINE-FX III / FPL-D (Twincoax)
- DisplayPort Spec.
Both Discrete Wire Cables Fail DP1.1a FEXT Limits

- Sample No. 1 CABLINE-VS / FPL II (SGC)
- Sample No. 2 CABLINE-VS / FPL-D (Discrete Twist Pair)
- Sample No. 3 CABLINE-VS / FPL-D (Discrete Twist Pair with Shield)
- Sample No. 4 CABLINE-FX III / FPL-D (Twincoax)
- DisplayPort Spec.
The SGC cable had acceptable EMI Performance

2.7 Gbps
EMI Test Results at 2.7Gb/s

The Discrete Twisted without a shield had many leaks.

The Discrete Twisted with a Shield had acceptable results.
WHY use Small Gauge Coaxial Wire?

Cable Assembly using SGC

Clear and Clean Appearance

Cable Assembly without SGC
THANK YOU