Cinch

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**REV. A**

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| **Customer Drawing None** | |
| **Reference Specification:** | |
| **Cinch Part Number:** **CIN::APSE compression technology** | |
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| | |

**TITLE: CIN::APSE 50 GHz Testing**

**Written By:** **A. Shah** **Date of Issue: May 2008**

**Approved By:** **Bill MacKillop**

| Revision | Date | Revised By | Approved By | Remarks |
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| **1** | **7/24/2008** | | **A.Shah** | **Draft** |
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## 1.0 SCOPE:

To establish, through measurement, the S21 limit of the various connector configurations using the CIN::APSE contact out to 50 GHz. All measurements taken will be single ended and designed to capture the maximum transmission frequency.

## 2.0 SUBJECT PARTS:

Following are typical configurations tested:

CIN::APSE connector (referred as P-C-P / Plunger / Contact / Plunger Fig 3 & 3a)

This configuration gives reliable handling and added height to the connector.

CIN::APSE connector (referred as C-S-C / Contact / Spacer / Contact Fig 4 & 4a)

This configuration gives added height and working range to the connector.

CIN::APSE connector (Contact only – LCP material Fig 5 & 5a)

This configuration achieves the highest data transport.

CIN::APSE connector (Contact only – Teflon material Fig 5 & 5b )

This configuration achieves the highest data transport.

## 3.0 REFERENCE DOCUMENTS:

380-05-20-042

3.1. P/N xxx-xx-xx-xxx (P-C- P connector)
3.2. P/N Custom (C-S-C connector)
3.3. P/N 380 02 20 242 (LCP material)
3.4. P/N Custom (Teflon material)

## 4.0 METHODOLOGY

Accurate measurement of the CIN::APSE contact in various configurations requires a very precise test methodology to capture the characteristics of the contact independent of the tools and fixtures used to identify its electrical properties. The test described outlines a methodology to accurately define the fixtures and algorithms necessary to capture the intrinsic properties of the CIN::APSE contact so that the upper limit of its electrical characteristics can be determined.

Develop fixtures :

- that are of a bandwidth and quality at least as good as the CIN::APSE contact.
- whose characteristics can be repeatably measured accurately. develop de-embedding algorithms
- with a sufficient order of correction detail that is commensurate with the intended DUT application

## 5.0 MEASUREMENT SYSTEM: / SET UP

All measurements were taken using a TEK DSA8200 Digital Serial Analyzer Sampling Oscilliscope; TEK 50 GHz 80E10 Tx / Rx units. The calibration performed using an Agilent 10 MHz to 67 GHz E_calibration kit, N4694-60003; atSpeed 1.85 mm custom fixtures. Precision 50 Ohm loads; shorts and through connections. See pictures below.

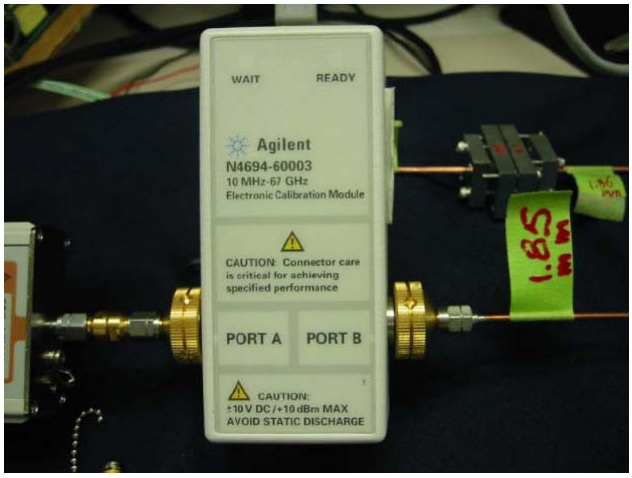


**Figure 1: Calibration Unit**

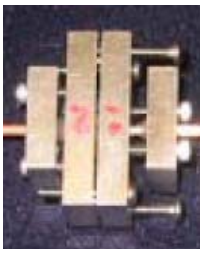

**Figure 2: Custom Fixture**

## 6.0 DISCUSSION:

The CIN::APSE contact can be configured into many different standard and custom connector options By optimizing the geometry of the assembled contacts, the Impedance and XTLK characteristics can be designed in such a way as to maximize the current transport and achieve superior data transmission results. As will be shown in the following illustrations, High (~30 GHz), Very High (~45 GHz) and Ultra High (~60GHz) bandwidth separable interfaces can be designed using the CIN::APSE contact system. This system consists of three types of implementations: P-C-P; C-S-C and the single CIN::APSE contact itself with LCP and Teflon insulators.

The P-C-P geometry has mating contacts cone shaped, gold tipped plungers, with a CIN::APSE contact interposed axially between them. The P-C-P can achieve High bandwidth.

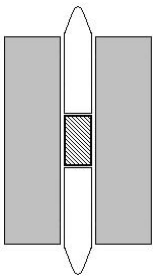

**Figure 3**

This configuration gives reliable handling and added height to the connector.

The C-S-C geometry has mating face CIN::APSE contacts, with a spacer contact interposed axially between them. The C-S-C can achieve Very High bandwidth.

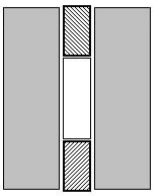

**Figure 4**

This configuration gives added height and working range to the connector.

The Contact only geometry, the CIN::APSE contact, gives the ultimate in high frequency performance. The CIN::APSE contact can achieve Ultra High bandwidth.

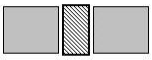

**Figure 5**

This configuration achieves the highest data transport.

Contact Configurations and Results
Each of the parts tested used the same High Speed Fixture which is represented as a gold coaxial structure overlaid on the part. The grounding pattern for each case becomes apparent from the picture.

P-C-P (.277” height)

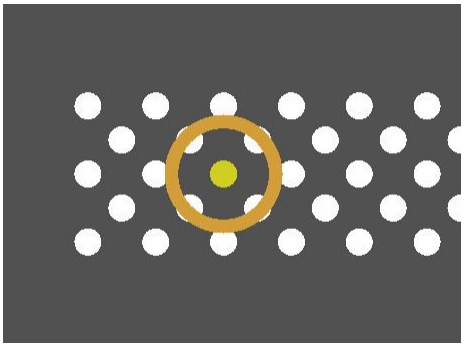

**Figure 3a**

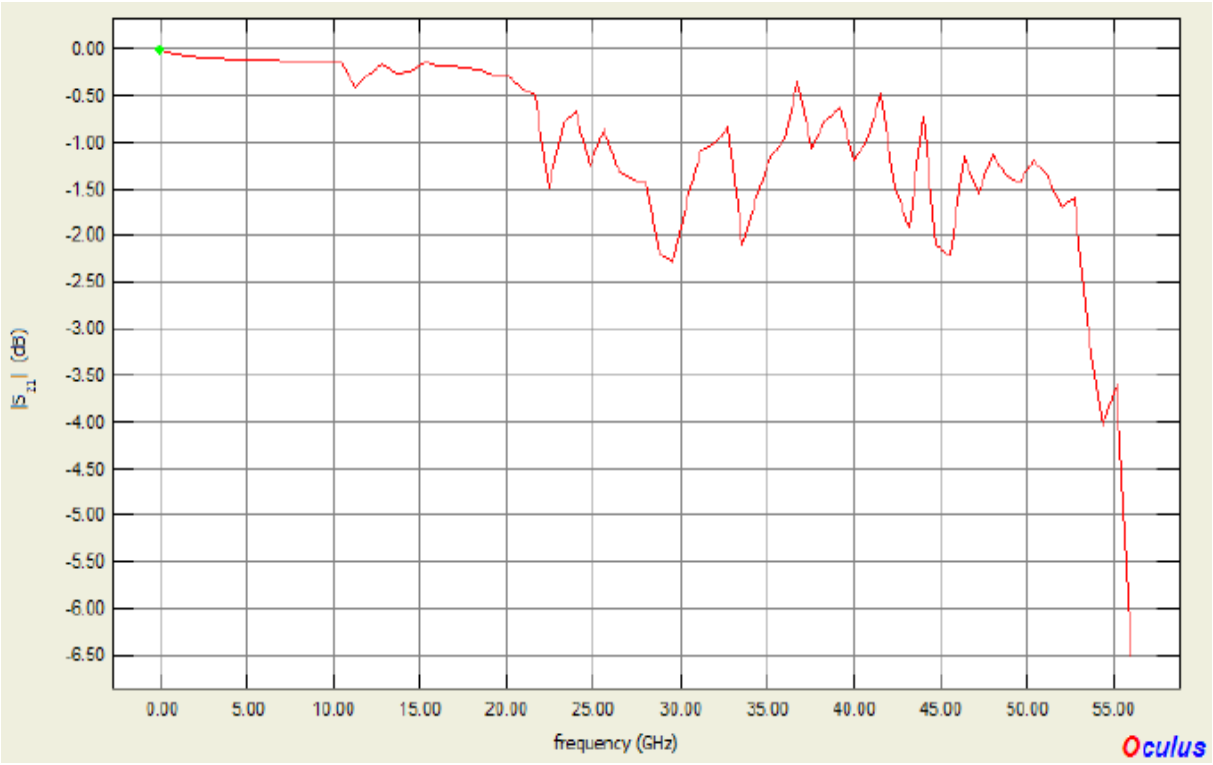


**Figure 6**

Al frame

C-S-C (0.143” length)

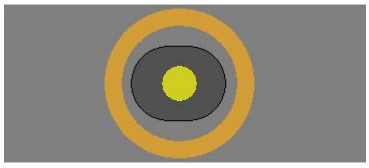

**Figure 4a**

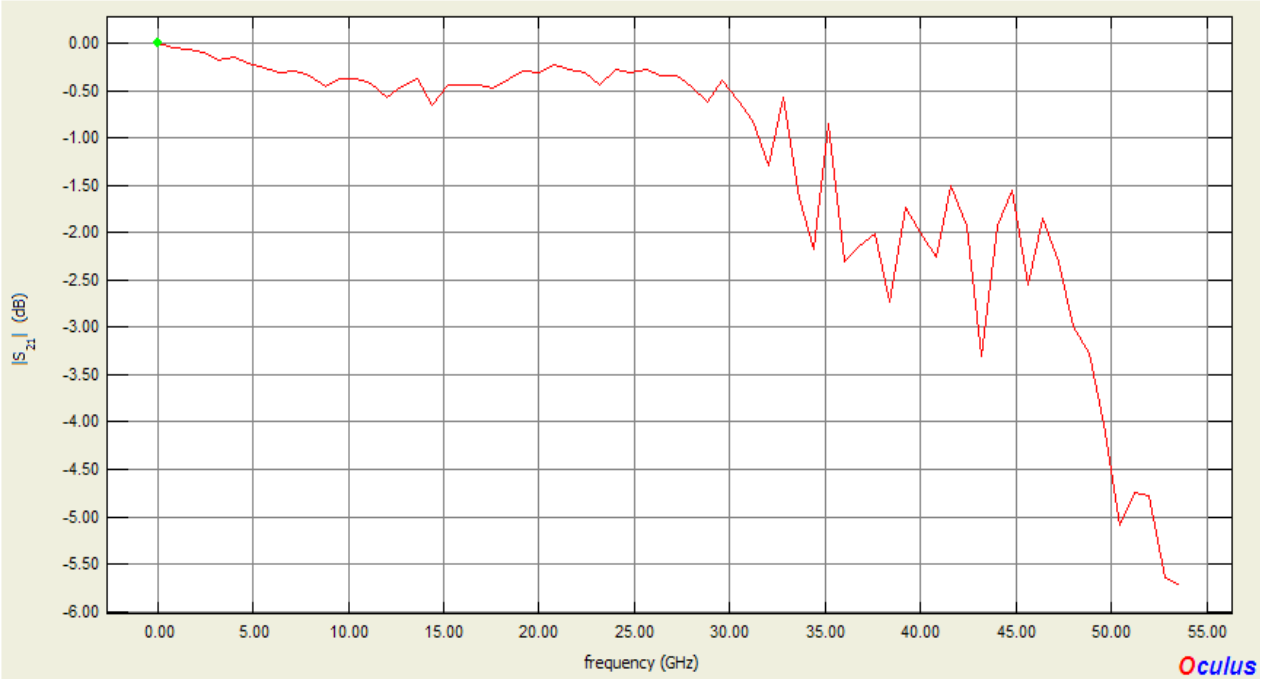


**Figure 7**

Standard 1mm x 1mm array CIN::APSE

.032” (Height)

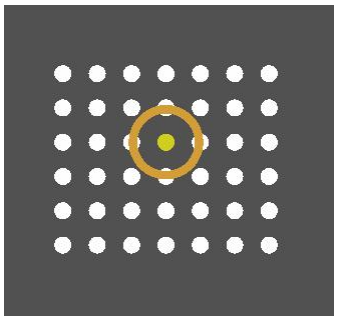

**Figure 5a**

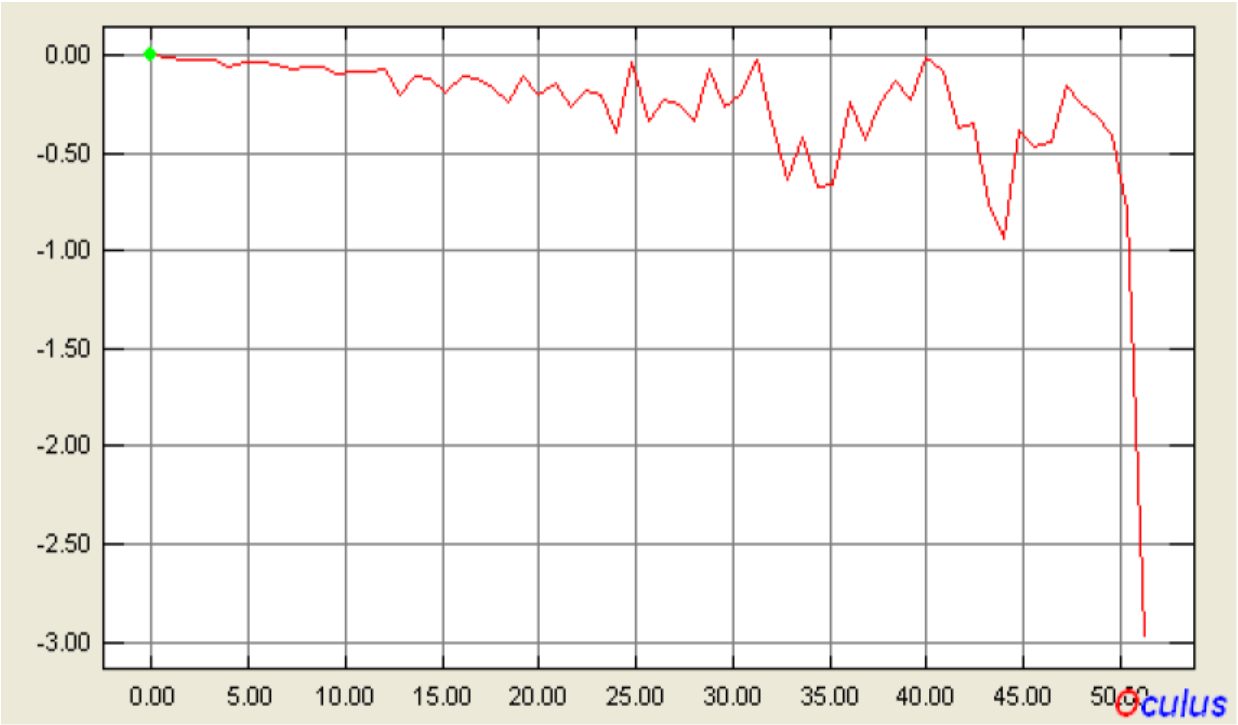


**Figure 8**

Custom CIN::APSE in coax pattern aerated Teflon .032” (height)

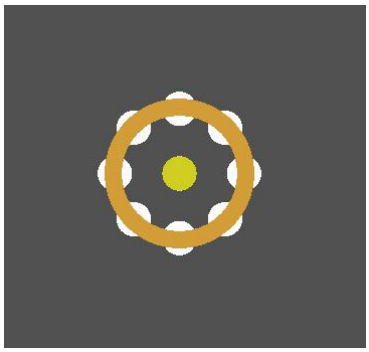

**Figure 5b**

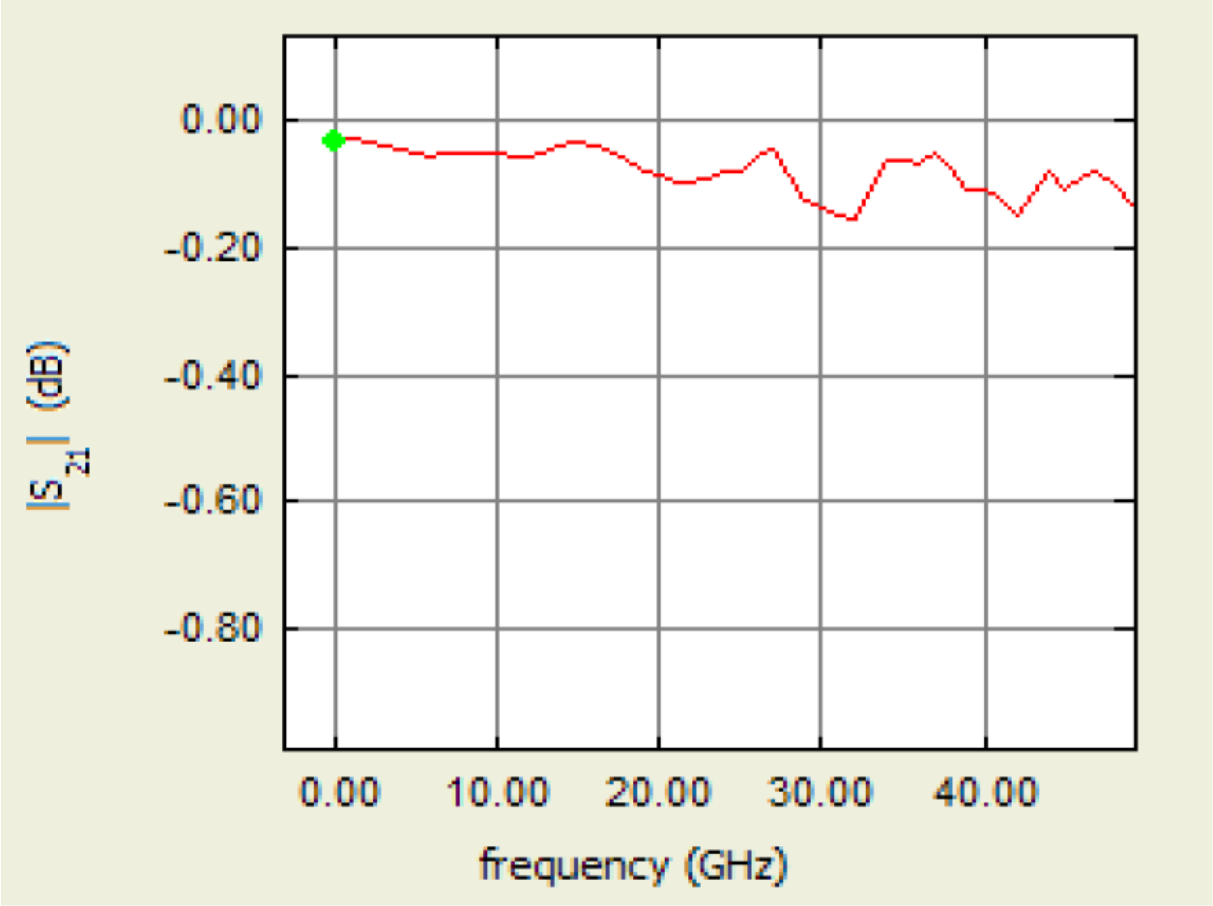


**Figure 9**

## 7. 0 SUMMARY

As shown in Table 1, summarizing S21 graphs, the bandwidth of the various CIN::APSE contact configurations is virtually unlimited for the High (~30 GHz), Very High (~45 GHz) and Ultra High (~60GHz) bandwidth separable interfaces designed using the CIN::APSE contact system with superior electrical, mechanical and environmental characteristics.

| | S21 Performance (in dB) | | | | |
|---|---|---|---|---|---|
| **Configuration** | **10 GHz** | **20 GHz** | **30 GHz** | **40 GHz** | **50 GHz** |
| **P-C-P** | **0.15** | **0.27** | **1.86** | **1.15** | **1.28** |
| **C-S-C** | **0.71** | **0.62** | **0.62** | **0.75** | **4.1** |
| **1mm grid LCP** | **0.1** | **0.2** | **0.22** | **0.03** | **0.6** |
| **custom Teflon** | **0.053** | **0.087** | **0.133** | **0.11** | **0.133** |

**Table 1**