Filtered D-Sub Adapters

Product Overview

Filtered D-Sub Adapters

- **Corry Micronics offers a complete line of Male to Female D-Sub Adapter products with integrated, ceramic dielectric, EMI filters.**
- **Product is offered in standard density D-Sub formats, 9 pin thru 50 pin.**

Definitions

- **Electromagnetic Interference (EMI)**
  - Electromagnetic radiation which is emitted by electrical circuits carrying rapidly changing signals, as a by-product of their normal operation, and which causes unwanted signals (interference or noise) to be induced into other circuits.
- **Electromagnetic Compatability (EMC)**
  - A condition which exists when a system, or an individual piece of equipment, is performing its intended operation without causing, or suffering from, unintentional EMI.
- **Insertion Loss (IL)**
  - Insertion loss is the measurement used to determine the ability of the filter to eliminate the unwanted EMI. IL is calculated as dB = 20 Log (Vof/Vo). Vof is wthe amplitude of the signal at a given frequency with the filter in the circuit, and Vo is the same but without the filter in the circuit. This calculation results in a negative number indicating that the signal has been reduced, but often times IL is only mentions as a dB magnitude (ie: 25 dB).

What Is The Need

- ElectroMagnetic Interference (EMI) is all around us.
  - Wireless devices
  - Cell Phones
  - Garage Door openers
- If systems are improperly designed for EMI, it can cause improper operations of the system, and potentially have catastrophic affects, especially in digital designs.

What Is The Need

- **In today's global marketplace, medical equipment has become one of the major areas of concern for EMI.**
  - **Surgical Equipment**
  - **Diagnostic Equipment (X-Ray, CT Scan, MRI, etc.)**
  - **Patient Monitoring Equipment (Telemetry)**
- **Filtering products such as the Filtered D-Sub Adapters assist in achieving and/or maintaining EMC compliancy for systems that are vulnerable to EMI.**

Regulatory Compliance

- **Common Regulations**
  - **FCC Part 15 (US)**
  - **FCC Part 18 (US)**
  - **Cenelec EN61000 (Europe)**
- **Measurement Standards**
  - **MIL-STD-461**
  - **MIL-STD-220**

Product Description

- **Product Family**
  - **9, 15, 25, 37, and 50 Pin versions available.**
  - **Standard Density D-Sub Connector interface for both Male and Female sides.**
  - **Compact Design: Adapters fit in-line with existing connectors and add less than ¾” to the total connection length.**
  - **EMI grounding is achieved through both the cable shielding and a direct connection to chassis ground.**

Product Description

- **Product Family (cont.)**
  - **Machined contacts for both Pin and Socket contacts, offering excellent mechanical strength and low contact resistance.**
  - **Captive combination jackscrews/thumbscrews are included with each adapter.**

Product Description

- **Filtering Options**
  - **Chip “C” Type**
  - **Tubular “C” Type**
  - **Tubular “Pi” type**

Product Description

- **Chip "C" Type**
  - **Filter elements are Ceramic Chip Capacitors.**
  - **Chip capacitors are solder onto a compact PCB which is integrated into the housing of the adapter.**
  - **Each individual contact is filtered by soldering the chip capacitor between the contact and the ground.**
  - **Extensive array of standard capacitance options are available, based on the current chip capacitor market.**
  - **Working Voltages: 100 VDC for standard values thru 5600 pF. Lower working voltage apply to higher capacitance values.**
  - **Current Rating: 5 Amps**

Product Description

- **Chip “C” type**
  - **Filtering is most effective at frequencies below 100 MHz**
  - **Filtering is limited at frequencies above 100 MHz due to the non-coaxial design of the circuit (32 dB Max.)**
  - **Higher frequency portions of the signal can pass by the filter element unaltered.**

Product Description

- **Tubular “C” Type**
  - **Filter elements are Tubular Ceramic Capacitors.**
  - **Each contact passes through, and is soldered to an individual tubular capacitor.**
  - **Each filter is soldered to a metal ground plate (backshell) which is integrated into the adapter housing.**
  - **Each filter has a coaxial design which eliminates the possibility of the higher frequency portions of the signal passing by the filter element. There are no available signal paths around the filtering elements.**

Product Description

- **Tubular “C” Type**
  - **Capacitance values are available from 100 pF to 5000 pF.**
  - **Effective filtering is provided to over 10 GHz. 50 dB+ can be obtained at 1 GHz.**
  - **Working Voltage: 100 VDC**
  - **Current rating: 5 Amps**

Product Description

- **tubular “Pi” Type**
  - **Filter elements are dual terminated, Tubular Ceramic Capacitors. Each dielectric contains two tubular capacitors.**
  - **Each filter element includes a coaxial shielding bead to provide separation inductance between the tubular capacitors.**
  - **Each contact passes through, and is soldered to both filter elements with the shielding bead enclosed inside.**
  - **Each filter is soldered to a metal ground plate (backshell) which is integrated into the adapter housing.**
  - **The filter is also a coaxial design which eliminates the possibility of the higher frequency portions of the signal passing by the filter element. There are no available signal paths around the filtering elements.**

Product Description

- **Tubular “Pi” Type**
  - **The “Pi” Type filter is a three element filter which provides superior filtering characteristics as compared to the “C” Types.**
  - **Capacitance values are available from 100 pF to 5000 pF.**
  - **Effective filtering is provided to over 10 GHz. 70 dB+ can be obtained at 1 GHz.**
  - **Working Voltage: 100 VDC**
  - **Current rating: 5 Amps**

Product Description

- **Circuit Type and Capacitance Selection**
  - **The circuit type and capacitance value of the filter is chosen based on a measurement called Insertion Loss (IL).**
    - **Insertion loss is the ability of the filter to eliminate the unwanted interference from a signal at a particular frequency.**
    - **Generally speaking, in the circuit types offered, the insertion loss will become greater as the signal frequency increases. However, this measurement curve is also dependant on the circuit type and capacitance value**

Product Description

- **Circuit Type**
  - **Chip "C" Type**
    - **These filters can begin filtering (roll-off point, IL = 3 dB) at frequencies well below 1 Mhz, but have a very low slope through the frequency plot. As frequency is plotted on a logarithmic scale, the maximum slope of this filter type is 20 dB per Decade.**
    - **This filter type also has a maximum IL limit of 32 dB.**

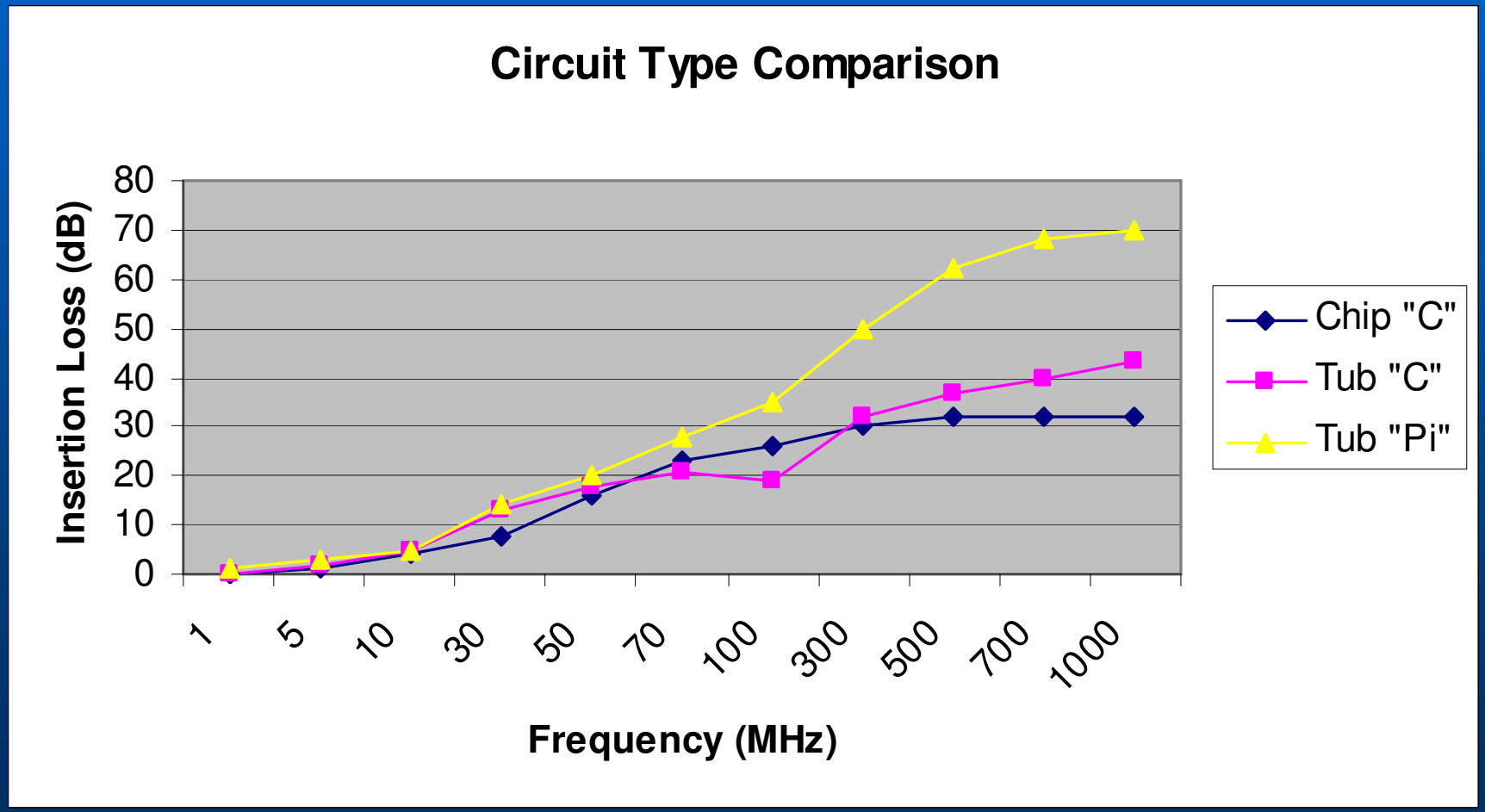
Product Description

- **Circuit Type**
  - **Tubular "C" Type**
    - **These filters can begin filtering (roll-off point, IL = 3 dB) at a frequency of approx. 1 MHz.**
    - **These filters are not limited as the Chip Cap Type is, but still only achieves IL of 20 dB per Decade. Additionally, there are some resonant affects that limit IL in the 100 – 300 MHz region.**

Product Description

- **Circuit Type**
  - **Tubular “Pi” Type**
    - **These filters can begin filtering (roll-off point, IL = 3 dB) at a frequency of approx. 1 MHz.**
    - **These filters offer the best IL performance, and can offer IL slopes from 40 - 60 dB per Decade.**

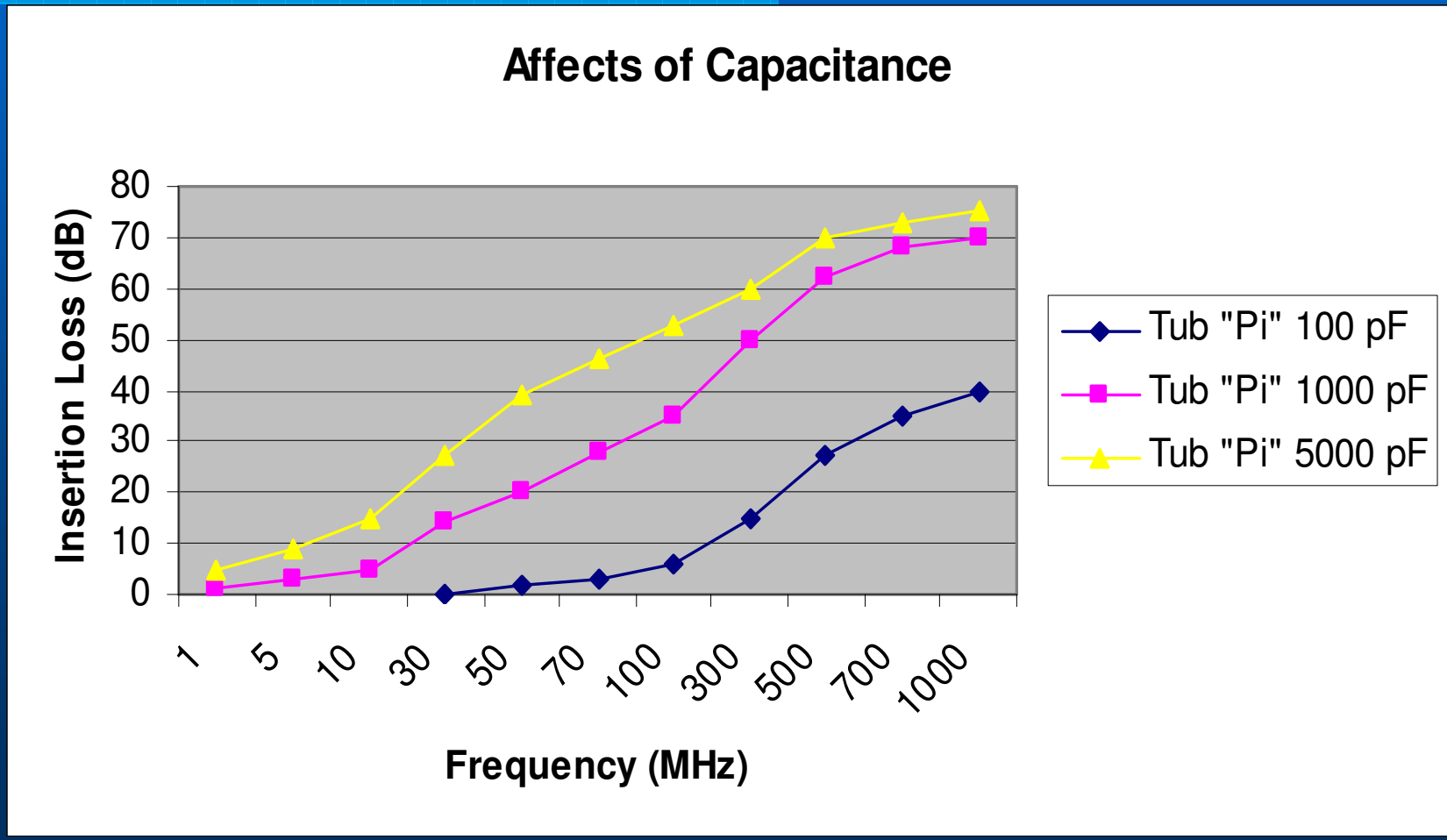
Product Description



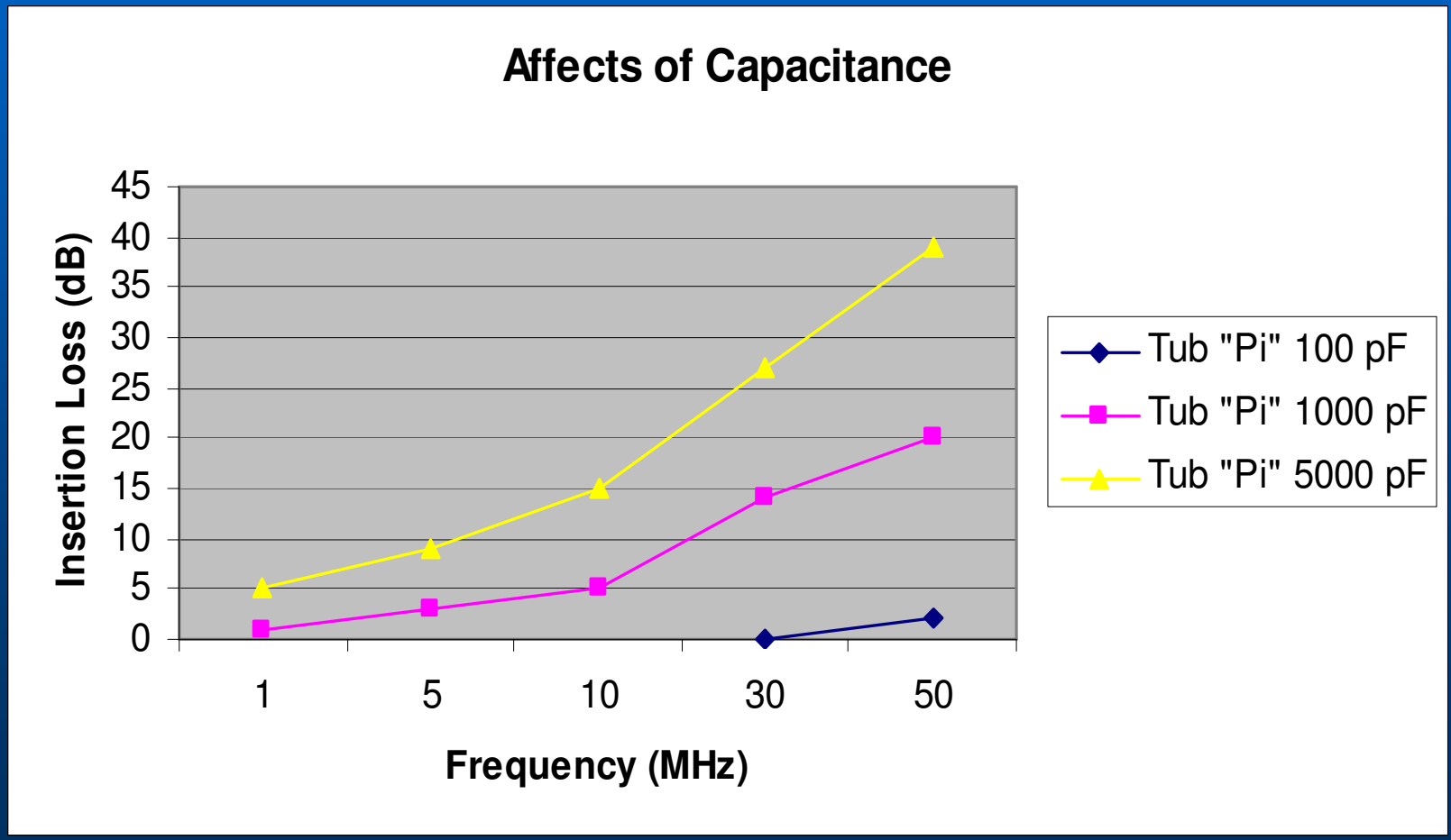
Product Description

- **Capacitance**
  - **The capacitance value is the “trigger” for starting the IL curve.**
  - **In all the circuit types mentioned, increasing the capacitance value of the filter will create a lower frequency Roll-off point.**
  - **Higher capacitance values have an adverse affect on digital signals. Increased capacitance affects the rise and fall times of the digital signal (Slewing) and can create problems with the latching the signal.**

Product Description



Product Description



Product Description

- Cost / Filter type Comparison
  - Chip “C” Type
    - Most economical
    - Limited filtering performance
  - Tubular “C” Type
    - Economical
    - Better filtering performance
    - Used where series inductance is to be avoided
  - Tubular “Pi” Type
    - Economical (similar to Tubular “Pi” Type)
    - Best filtering performance

Why Use Filtered D-Sub Adapters

- **Adapters provide EMC Testing Facilities a tool for including value-added data to their customers whose system have encountered EMC issues. Adapters can be used to determine what circuit type and capacitance value is needed to bring the system into compliance, and this analysis can be offered as part of the routine EMC screening.**
  - **For direct applications, Filtered D-Sub Adapters are best suited as a post system design "fix" to EMI problems.**
  - **Once the right Adapter is tested and approved, it can be added to the Bill of Materials and the system can remain on track for production release without lengthy system redesigns and retesting.**

Why Use Filtered D-Sub Adapters

- **D-Sub Filtered Adapters can also be used to bridge the gap between the immediate production release of the system, and any future redesigns of the system to integrate even more effective filtering solutions offered by Corry Micronics.**

Other Filtering Products

- Corry Micronics also offers the following filtering products for applications similar to that of the Filtered D-Sub Adapters.
  - Filtered D-Sub Connectors
    - Male & Female, PCB Mount, Right Angle Mount, & Solder Cup versions are available in all standard density pin configurations.
  - Filtered Terminal Blocks
    - For use on power lines connected to the system.
    - Keeps unwanted EMI from entering the system through the power inputs.
    - Current ratings up 60 Amps
  - Filter Plate Arrays
    - Various mounting plates are available that include 1-40 filters per plate in standard .100" x .100" spacings. Tubular "C" and Tubular "Pi" circuits, as well as custom capacitance values are available.
  - Surface mount Filters
    - Tubular "C" and Tubular "Pi" circuit types are available in many standard capacitance values for PCB applications. Units are taped and reeled for use with automated pick and place equipment.

Corry Micronics, Inc

Thank you

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