



Coupling Decoupling Networks



Applications

IEC 1000-4-6 requires that the EUT be tested from 150 kHz to 80MHz with the capability to test up to 230 MHz. Several other test specifications extend the use of Coupling Decoupling Networks IEC 61000-4-16 defines conducted immunity testing from DC – 150 kHz. Practical application of Coupling Decoupling networks is usually from 9 kHz – 150 kHz. Fischer Custom Communications can provide all CDN types in our product line to cover 9 kHz – 80 MHz, thereby allowing testing in accordance with IEC 61000-4-16 and IEC 61000-4-6. Germany's NAMUR test specification requires much higher test levels up to 30 volt open circuit. This requires a much higher wattage rating than standard Coupling Decoupling Networks of 6 – 10 watts. The rating must be no less than 40 watts in order to include the basic insertion loss from the RF Disturbance port to the EUT port, the 1 kHz 80% modulation as well as the reflections always present in all CDN circuits made by all manufacturers. Some manufacturers rate the CDN as capable of 30 volt testing but have not equipped the CDN with the power rating required for the modulation.

Each of our CDN designs can be customized to handle up to 75 watts, guaranteeing adequate capability to couple higher voltage levels than any other CDN existing on the market.

Coupling and Decoupling Networks

The common mode current disturbance signal can be delivered to the EUT using a variety of coupling networks to inject the signal onto the unshielded cables, shielded cables, balanced cables, coaxial cables and power mains.

Decoupling networks are used to insure that the disturbance signal does not influence the auxiliary equipment and are placed between the EUT and the auxiliary equipment and are placed between the EUT and the auxiliary equipment. One decoupling network is inductive and uses a high impedance choke. The second decoupling network combines resistive and inductive technique by using ferrite toroids that are placed around the cables connecting the EUT and the auxiliary equipment. These coupling and decoupling networks can be separate or combined in the same instrument.

Choosing a CDN

The Coupling/Decoupling Network or CDN incorporates both the decoupling and coupling circuitry in the same housing. The CDN contains integrated direct capacitive coupling along with a high impedance choke for inductive decoupling.

The CDN acts as a low pass filter preventing the susceptibility test signals from interfering with the auxiliary equipment. A family of Coupling Decoupling Networks are required to match the wide variety of electronics instruments, systems, computer, printers and appliances. Fischer Custom Communications, Inc. offers over 35 different Coupling Decoupling Networks and custom configurations are available. All Coupling Decoupling Networks maintain the 150Ω impedance from 150 kHz – 230 MHz.

M Series

The M1 power line CDN is used to couple common mode CW and modulated signals onto single power line systems. The M1 is ideal for automotive systems using the chassis as the DC return. The M2 is commonly used for 2 wire power conductor cables and the M3 is used for two line single phase cables. The M4 is used on three phase power mains with P.E. and the M5 is used on three phase systems with neutral and protected earth ground conductors. Fischer Custom Communications, Inc. offers more than 15 power line configurations with current ratings of 16, 25, 32, 50, 100, and 200 amperes

T Series

The T series CDN is used to couple RF CW and modulated signals into balanced or unshielded lines. It permits normal operation of balanced circuits with impedance to 600Ω up to 1 MHz and 100Ω impedance up to 250 MHz. It is available in 2, 4 and 8 line configurations.

S Series

The S Series CDN is used to test shield cables and is available with 2 to 50 pins.

C Series

The C series CDN is used to couple RF interference signals onto shields of RF coaxial cables.

AF Series

The AF series is ideal for unshielded audio cables and is available with 2 to 50 pins. This CDN allows for transmission bandwidth of intentional signal greater than 2 kHz. CISPR 15 uses a variant of this CDN type with extended operation to 300 MHz. It is important to review the impedance and frequency of operation of audio systems to insure there is no influence on the CDN.



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CDN Selection Guide

Specifications	C Series	S Series	M Series	AF Series	T Series
EUT/AE Port AC Voltage DC Voltage Current Rating	< 350 V < 600 V 1.0 Ampere	< 350 V < 600 V 3.0 Amperes	< 480 line to line < 600 V 16 to 200 Amperes	< 350 V < 600 V 2.0 Amperes	100 V 400 milliamperes
I/O Connections	BNC, Type-N	S2 to S50, USB, D-Sub min	Multi-Contact, Safety Socket	Multi-Contact, Safety Socket, Audio Socket, D-Sub series	RJ 11, RJ45
Common Mode Impedance at EUT Connector 150 kHz – 26 MHz 26 MHz – 80 MHz 80 MHz – 230 MHz	150±20Ω 150+60/-45Ω 150+60/-45Ω	150±20Ω 150+60/-45Ω 150+60/45Ω	150±20Ω 150+60/-45Ω 150+60/-45Ω	150±20Ω 150+60/-45Ω 150+60/-45Ω	150±20Ω 150+60/-45Ω 150+60/45Ω
Disturbance Coupling Circuit Frequency Connector RF Voltage	150 kHz to 230 MHz 50ΩBNC ≤30V	150 kHz to 230 MHz 50ΩBNC ≤30V	150 kHz to 230 MHz 50ΩBNC ≤30V	150 kHz to 230 MHz 50ΩBNC ≤30V	150 kHz to 230 MHz 50ΩBNC ≤30V
Voltage Attenuation Generator/EUT	10dB ±1dB	10dB +1dB/-3dB	10dB +1dB/-3dB	10dB +1dB/-3dB	10dB +1dB/-3dB
Insertion Loss EUT/AE	<1dB at 230 MHz	<3dB up to 20 kHz <10dB at 1 MHz <20dB up to 10 MHz	<0.1 dB up to 400 Hz <8dB at 10 kHz >45dB at 150 kHz	<0.5dB DC to 20 kHz >30dB at 150 kHz >20dB at 230 MHz	<3dB at 100 MHz
Coupling Factor	0dB±1dB	0dB±1dB	0dB±1dB	0dB±1dB	0dB±1dB
Decoupling Attenuation Generator/AE	>50dB up to 100 MHz >20dB up at 230 MHz	>50dB up to 20 MHz >20dB up at 230 MHz	>50dB up to 20 MHz >20dB up at 230 MHz	>50dB up to 30 MHz >20dB up at 230 MHz	Unbalanced Attenuation Generator /EUT >70dB at 150 kHz >60dB at 1 MHz >40dB at 10 MHz >35dB above 20 MHz