

# CDNs for EMC/EMI Testing

## A Versatile range of CDNs for IEC61000-4-6 and EN55022 testing

- Fully compliant range of CDNs
- High specification .. No compromises.
- Reduce equipment costs and maximise flexibility due to the 'Versatile' benefits of the range. Just 5 models cover over 23 different cable types.
- Improve test productivity (and accuracy) with the 'Enhanced' range. Avoid time consuming pre-calibration scans and mis-match errors.
- Reduce power amplifier requirements (Enhanced model).



The Coupling/Decoupling Network (CDN) facilitates the testing of EMC immunity by coupling RF directly to or from cables connected to the equipment under test. This technique is the preferred method for immunity testing according to IEC61000-4-6. CDNs can also be used for pre-compliant emissions measurements according to EN55022.

The Laplace 46 series of CDNs is unique in offering 2 distinct and unique features:

- Versatility.... The 46 series are programmable such that many different cable types can be accommodated with one CDN.
- Enhanced.... The 'E' version provides a calibrated feedback signal so that the stress level can be accurately controlled during the test.

Each model is shipped complete with an appropriate set of adaptors and cables. Calibration adaptors and modular ground plane sets also available.

*Photo shows T24, M3, ST6, S25 and ST8 enhanced models*

**Comprehensive** 5 models available to cover a wide range of cable types. Connector sets are included to give the flexibility required.

**Compliance** The type 46 CDNs are 100% compliant with the specifications detailed in IEC61000-4-6. Frequency range is extended to 500MHz, more than necessary for immunity testing.

**Integration** These CDNs are offered as an integral part of a complete immunity test system. They can be used with any standard IEC46000-4-6 system, or with the RFIC-4-6 system from Laplace. The Laplace system offers the benefits of closed loop control for improved productivity and reduced power amplifier requirement.

**Simplicity** These systems are renowned for ease of operation. The software is outstanding in terms of flexibility and intuitive user interface.



## CDNs for immunity testing to IEC61000-4-6

The type 46 CDNs are offered in two ranges, Standard and Enhanced.

Both are Versatile. Each model offers the ability to be used on a wide range of cable types as shown in the chart below.

Note that conventionally, CDNs are not versatile, for instance an M3 cannot be used for an M1 or M2 application. The Laplace CDNs however, are designed such that this versatility is achieved whilst retaining full compliance with the standards.

*The "Enhanced" E46xx variant offers built-in voltage monitoring that makes it independent of the generator source impedance. This improves accuracy and traceability by allowing continuous and direct calibration without need of off-line checks. It frees voltage and frequency calibration from dependence on the characteristics of specific cable, attenuator and amplifier parameters. Thanks to the voltage monitor the E46xx has no need of a defined rf power source impedance, avoiding the power attenuator required in other systems to stabilize this impedance. This gives an immediate saving of cost and complexity whilst leading to a reduced power requirement for the drive amplifier that can further reduce system cost. Immunity tests to the severe "Class A" level of 10volts with 80% superimposed amplitude modulation require an amplifier of only 5watts nominal rating. This enhanced variant is particularly recommended as providing the highest performance at the lowest system cost for pre-compliance and production testing. The E46xx versions are supplied complete with the manufacturers calibration curves, but if desired they may be checked on-site using 46ZZ impedance adaptors.*

### The range

Model	Cable type	Cables included.	Standard CDN types covered	Imax per core	AE filter capacitance
<b>S46ST6 Standard</b> or <b>E46ST6 Enhanced</b>	Shielded and unshielded cables up to 6 core, rated up to 2 amps	50R BNC cable for S1 Cable for S2—S6* Cable for Tx and Afx*	S1, S2, S3, S4, S5, S6 AF2, AF3, AF6 T2, T3, T6 M1, M2, M3	1A	Nil or 22pF per core with 47nF available on 2 cores
<b>S46ST8 Standard</b> or <b>E46ST8 Enhanced</b>	Screened Telecom cables up to Cat 5, 4 pair cables	4 pair RJ45 STP cable 4 pair RJ45 UTP cable 2 pair RJ11 cable	STP and UTP 4 pair. 2 pair RJ11 S1—S8 AF1, AF2, AF4, AF8 T1, T2, T4, T8	250mA	Nil or 47pF per core
<b>S46T24 Standard</b> or <b>S46T24 Enhanced</b>	Unscreened cables with individual cores and twisted pairs up to 24 cores	Qty 2 unterminated cable sets	AF1, AF2, AF3, AF4, AF6, AF8, AF12 & AF24	250mA	47pF per core
<b>S46S25 Standard</b> or <b>E46S25 Enhanced</b>	Screened cables up to 25 cores	Cable set terminated in D type connector. Cable set unterminated.	Any Sxx type up to 25 cores	250mA	None required
<b>S46M3 Standard</b> or <b>E46M3 Enhanced</b>	Power and ground feeds rated up to 16A	IEC/UK13A cable set. Qty 2 sets unterminated	M1, M2, M3	16A	47nF on L and N

### SPECIFICATION

#### Injection/receiver circuit:

EUT rf common mode  
Impedance.  
RF input/output BNC socket.  
For E46xx only:  
Monitor output (E46xx):

0.15MHz—26MHz: 150 ± 20Ω  
26MHz—230MHz: 150 +60 -45Ω  
3W max cont. input power.  
VSWR <2.5:1 referred to 50Ω.  
BNC socket.  
Freq. DC to >2KHz. Load ≥ 1MΩ.

#### User Circuit:

Connectors:  
Input: 25 way D plug  
Output: 25 way D socket  
250Vac.  
100mA Pk or DC per cable.

Max voltage:  
Max unbalanced current:  
Characteristic impedance:  
S1 config:  
T8, balanced mode:  
Longitudinal Conv. Loss:

50Ω for ST6, ST8, & S25  
100Ω (as reqd by Ethernet spec.)  
>60dB typ.for T8, others 40dB

**Physical:** 115 x 90 x 80mm excl. connectors

### ANCILLARIES

#### 46ZZ Impedance adaptor pair

For on-site calibration of x46xx VCDN and 22L test adaptor.

Connects directly to the CDN EUT and AE ports.

Fitted with BNC or N type RF sockets (specify with order).

Whilst conforming to the requirements of IEC61000-4-6, the 46ZZ has built-in spacing to establish the 30mm separation from the CDN.

#### 46GP Ground plane

An Aluminium ground plane with sprung retainers to hold 1 or 2 CDNs during calibration and use. Compact, convenient & transportable.

An extension plate (46XP) is available to cope with larger EUTs.

#### 22L Emission receiver adaptor

For emission testing of telecom ports with the 'Enhanced' model, the 22L adaptor secures the appropriate impedance matching according to EN55022:1998 Fig D4.

	46GP	46XP
<b>Plate Size</b>	515 x 625	515 x 625
<b>Formal test EUT size</b>	190 x 115	290 x 315
<b>Informal test EUT size</b>	595 x 225	695 x 425

Designed & developed by Richard Marshall Ltd  
[www.design-emc.co.uk](http://www.design-emc.co.uk)

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