F-201 ABSORBING CLAMP

The Absorbing Clamp method of measurement is accepted by CISPR as a standard method of measuring the interference power levels on cables connected to electronic and electrical devices. Measurements can be made from 30MHz – 1GHz.

The Absorbing Clamp consists of a ferrite current transformer calibrated for the frequency range of 30MHz – 1GHz and two groups of ferrite rings. The ferrite rings act as absorbers of energy and impedance stabilizers. One group of ferrite rings surrounds the lead from the current transformer to the measuring device to minimize standing waves. The second group of ferrite rings surrounds the mains lead connected to the apparatus under test. These rings act as an impedance to stabilize the power mains and as an absorber of energy to isolate the device under test from the mains. The mains lead to the apparatus under test is easily placed inside the aperture of the rings since the rings can be opened and closed. The 6dB attenuator at the output of the Absorbing Clamp is for impedance matching purposes per CISPR 16-1-3.

The current transformer is placed around the mains lead, and provides a voltage proportional to the resultant current in the leads. The test set up is shown in figure 1. The equipment under test is placed on a non-metallic table at least 70cm from any other metallic objects and the mains lead is placed horizontally in a straight line for a distance sufficient to permit the movement of the position of the clamp for tuning. The current transformer and the absorbing rings are placed around the mains lead.

Connect the output current transformer and the 6dB attenuator to the measuring set by means of a 50Ω coaxial cable. Move the ferrite clamp along the mains cable to obtain the highest reading at each test frequency. The Absorbing Clamp case is equipped with rollers so that movement along the mains line to the highest interference location is easily accomplished.

The measured interference power is derived by reference to the calibration curve. The calibration curve is the insertion loss of the Absorbing Clamp plus the 6dB attenuator.

Measurements to the CISPR standard require a measuring receiver having an input impedance of 50Ω. The power measured using a 50Ω load is equal to the square of the voltage measured divided by 50. Expressing the above in decibels is:

$$10 \log P = 10 \log V^2/50 = 20 \log V - 10 \log 50$$
$$10 \log P = 20 \log V - 17 \text{ dB}$$

Taking into account the insertion loss of the clamp and the 6dB attenuator, the power is computed by adding it to the voltage reading in dB.

$$10 \log P = 20 \log V - 17 \text{ dB} + \text{dB IL of Clamp} + 6\text{dB (attenuator)}$$

If the power P is expressed in Pico watts the equivalent voltage V is in micro-volts. The numerical value of the power P, expressed in dB (Pico watts across 50Ω) is found by subtracting 17dB from the numerical value of V in dB (micro volts across 50Ω) plus the dB value of the Absorbing Clamp which is supplied with each instrument.

The clamp can be positioned at more than one anti-node. The anti-node nearest the equipment under test gives the maximum reading on the receiver.

F-201-23/32MM

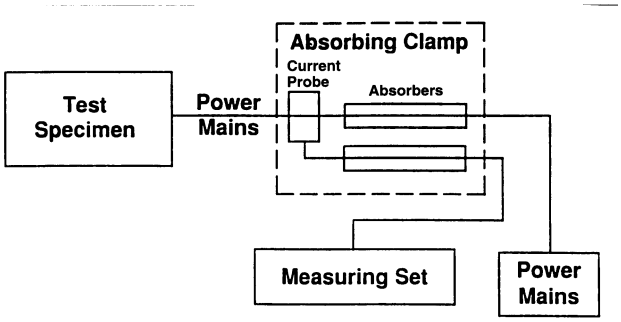
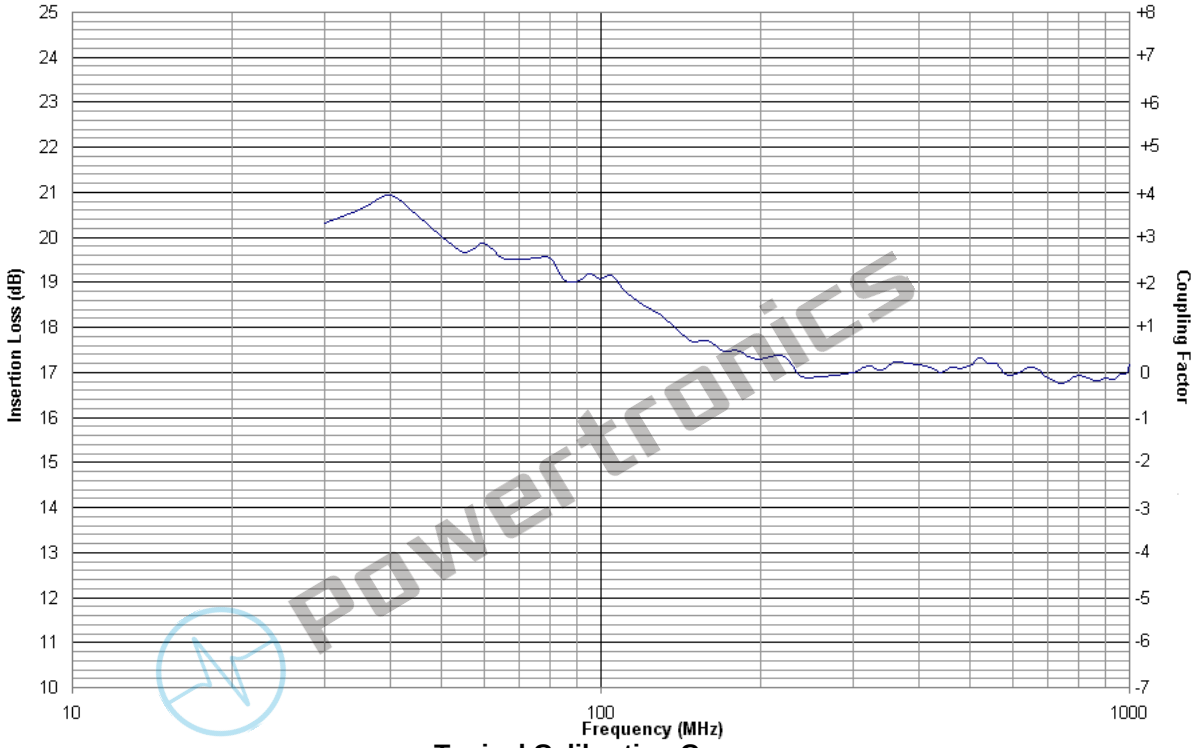


Figure 1 – Test Set Up

Figure 1 shows the test set-up. The equipment under test is placed on an insulated surface or test platform. The platform should be at least 70cm from a conducting floor or wall. Extend the cable to a minimum length per the table below for frequencies being measured.

30MHz	5.5 meters
40MHz	4.2 meters
50MHz	3.5meters

The cable is placed horizontally on the platform and passed through the aperture of the clamp. Move the clamp along the entire length of the cable. The current probe of the clamp is placed pointing toward the equipment under test. The current probe end is on the end opposite the output coax connector.



Typical Calibration Curve

Specification	F-201-23mm	F-201-32mm
Coupling Aperature	23mm	32mm
Length:	61.5cm	60.4cm
Width:	8cm	10cm
Height (including handle):	12.6cm	16.2cm
Input Connector:	BNC	BNC
Wheel Separation (width)	5.1cm	6.6cm

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