

TYPE 9230-1 RADIATING LOOP; TYPE 9229-1 LOOP SENSOR

for MIL-STD-461D/RS101 magnetic field tests



DESCRIPTION

Test Method RS101 of MIL-STD-461D requires radiated magnetic fields over the frequency range 30 Hz to 100 KHz to determine the susceptibility or immunity of the equipment under test (EUT). Two loop antennas are required for compliance with the requirements. The radiating loop is 12 cm in diameter and the sensing loop (used for calibration) is 4 cm in diameter. The **Type 9230-1 Radiating Loop** has been designed so that the **Type 9229-1 Loop Sensor** can be attached at the required 5 cm distance.

APPLICATION

The test method requires calibration of the radiated energy at 1.0 KHz prior to the test. Calibration of the **Type 9230-1 Radiating Loop** is accomplished by coupling the **Type 9229-1 Loop Sensor** to it at a distance of 5 cm. The arrangement is indicated in Fig. 1 on the next page. With a known current flowing in the radiating loop, the magnetic field can be measured.

Two graphs are supplied with the loops to make life easier for the test engineer. Fig. 2 shows a typical correction factor curve for the **Type 9229-1 Loop Sensor**. Fig. 3 indicates the amount of current flowing through the **Type 9230-1 Radiating Loop** to generate the required magnetic field, in dB/pT.

The current level to produce 110 dB/pT at 1.0 KHz is 3.0 mA. An accurately calibrated EMI meter or spectrum analyzer will measure this as 42 dB/ μ V. Adding the correction factor of 68 dB/pT/ μ V from Fig. 2 equals 110 dB/pT as required by the specification.

In those instances where the spectrum analyzer does not have sufficient sensitivity, the calibration can be accomplished just as well at a higher current level. For example, using 300 mA, the measurement would be 82 dB. Subtracting 40 dB from this answer and adding the 68 dB factor will equal 110 dB/pT/ μ V.

Another approach to the calibration and the measurement depends on the accuracy of the EMI receiver. Simply subtract the sensor correction factor in dB/pT/ μ V (Fig. 2) from the desired magnetic field level in dB/pT (Fig. 3). Then adjust the current until the EMI meter reads this value in dB above one microvolt.

Example: For a field of 110 dB/pT at 1.0 KHz, subtract 68 dB (Fig. 2) from this to obtain 42 dB. This value in dB above one microvolt on the EMI meter is equal to 126 μ V as indicated in RS101.

A typical calibration test setup is shown in Fig. 4a. For current levels below 25 mA, it is feasible to use a standard laboratory signal generator. For higher current levels, the signal must be amplified (Fig. 4b). Both methods show a 0.1 ohm precision resistor (**Type 9817-0.1**) and a digital voltmeter for measuring the current.

USEFUL ANCILLARY DEVICE

Type 9817-0.1 Precision Resistor, 0.1 ohm, $\pm 1\%$. For measuring current flowing in the radiating loop.



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TYPE 9230-1 RADIATING LOOP AND TYPE 9229-1 LOOP SENSOR

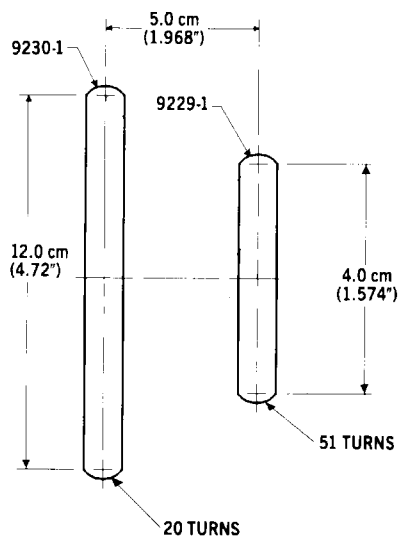


FIG. 1 PHYSICAL RELATIONSHIP

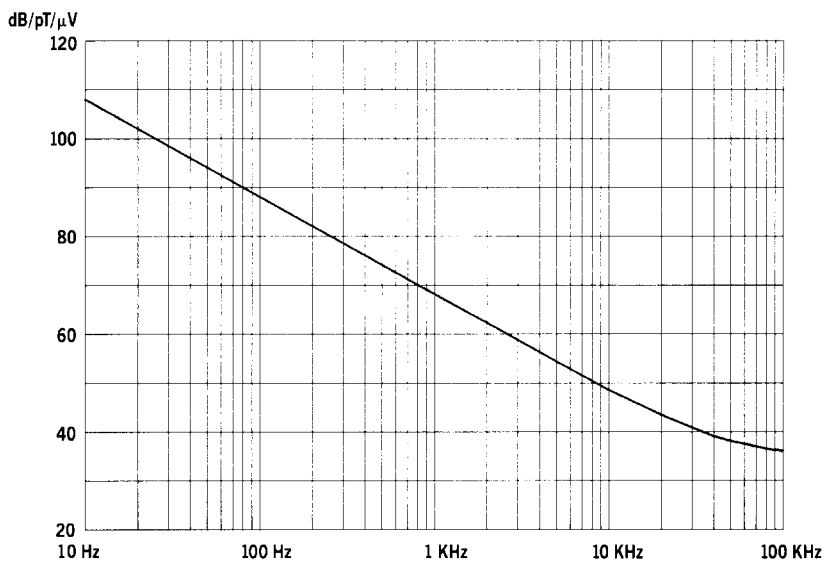


FIG. 2 CORRECTION FACTOR, TYPE 9229-1 LOOP SENSOR

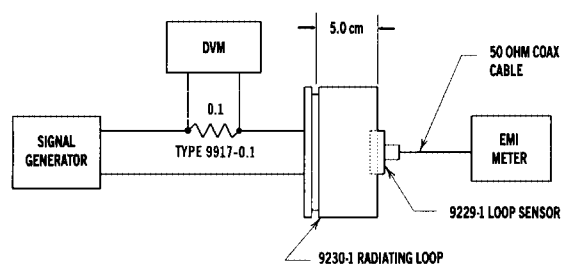


FIG. 4a TEST SETUP FOR CURRENTS UP TO 25 mA

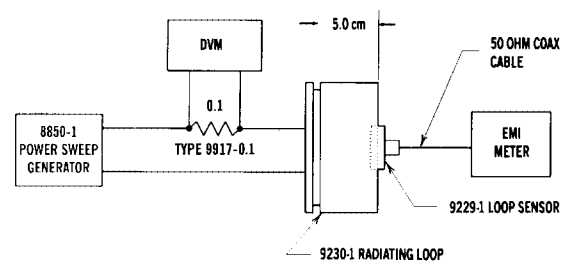


FIG. 4b TEST SETUP FOR CURRENTS GREATER THAN 25 mA

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