

For Transformer & Coil Manufacturers About Vasavi Electronics make LCRTZ

LCRTZ is specially designed for transformer and coil manufacturers and users. Study this write-up before buying LCR meter.

1. Transformation ratio: For transformers the transformation ratio is more important parameter than inductance. You might be testing only inductance values. With LRTZ you can test the transformation ratio and winding phase in addition to inductance values.

2. Bifilar windings: Bifilar windings are meant for perfect coupling. The only test for the bifilar winding is the transformation ratio and not the inductance value. By testing inductance only you can not guarantee the bifilar winding. The only and the best test is transformation ratio which assures the coupling.

3. Turns testing: The main process of the transformer manufacturer is to wind the bobbin or coil. Turns or TR test is the main process test for transformer manufacturers. For coils and transformers with closed cores; the Inductance will not guarantee the turns or ratio. The inductance values of closed cored transformers must be given with a wide range. Presume that the core has +30% AL value and number of turns were accidentally wound with -15%. With these conditions the transformer is accepted without expected performance. Once you define the core and number of turns, you have no control over the inductance value. Testing the number of turns of the bobbin is the most important parameter. LCTZ can be upgraded for turns testing apart from other existing parameters by attaching TURNS TEST PLATFORM. Otherwise the transformation ratio test in addition to inductance value would guarantee the required transformer function.

4. Centre tap. Centre tapping is a regular requirement for the transformer manufacturers. Instead of taking the tapping at the time of winding; it is a common practice to either wind as a bifilar or wind separately and then join them in series. In a bobbin with multiple windings locating the start and finish may not be possible by visual checking. So you have to make some way of cross checking the start and finish of the windings to make the terminations properly. One way is to put the windings in series and check the inductance and thus locate the start finish and terminate. The best way is to check the transformation ratio. When you are testing the transformation ratio with LCRTZ you are locating the start finish and also cross checking the transformation ratio.

5. Test Conditions: To understand the test conditions let us consider the following case. The buyer rejects the transformers saying that the inductance values are not within limits. The vendor tests them again in his instrument and finds the values well within the limits. There must be some scientific reason for the difference in readings. The most possible reason could be in the specification itself. Some engineer designs and closes the drawing ignoring some of the important test conditions. The value of an inductor depends more on the conditions of measurement. This is particularly true for iron core (ferrite also) inductors for which measurement repeatability within a few percent is considered good and is usually adequate. Most of the higher value inductors are iron cored (ferrite or laminated cored). Iron core inductors are non linear and therefore the measured inductance depends on the level of the test signal, test frequency, measurement mode etc. Inductance value without giving the test conditions is incomplete specification. Many designers give the test frequency. Some even give series or parallel equivalent value. But many ignore the test voltage. Some of the designers use hit and trial method. They design the transformer, it works. To make the specs, they measure the inductance values on the available instrument say; XYZ. May be this instrument is set to measure at 1.0 Vrms by default. When the vendor measures the same transformer with the available ABC LCR meter, it is showing a different value. In ABC LCR meter the test voltage is 0.3 V. Can we say that XYZ is good and ABC is bad. Both may be good. Only the difference could be the test voltage. **Vasavi's LCRTZ comes with the variable test voltage and variable test frequency.** Verify the specs. These specs may or may not be sufficient for all the conditions. No single instrument can meet all requirements.

6. Simultaneous display of Q factor: For some of the coils the Q factor is more important than the inductance value. For high inductance coils like CT's, the Q factor will indicate the health of the coil. Irrespective of whether specified or not, the manufacturer must make his own specs for Q factor based on his experience of the coils and tests. **Vasavi's LCRTZ is provided with two displays**, one for L value and the other for Q indication simultaneously. Let us study the example of the ferrite CTs with large number of turns. Suppose 1 to 2 adjacent turns are shorted in the process. Can you check by testing resistance? Or inductance? 2 turns short in 5000 turns. Now verify the inductance value. You will not find any difference in L value. The difference is negligible. Then how do you find such a short? Observe the Q value with and without shorting. You will be surprised to see that the Q factor reduces by a large extent. Thus you will be able to catch such usual winding defects while testing L value along with Q factor. Now you may agree why you need simultaneous display of Q factor.

7. DC resistance Test: For transformer people the resistance means DC resistance. Most of the LCR meters come with AC resistance test. For non inductive resistors there is no problem. But for coils and transformers the windings have large reactance in series with the resistance. So the AC resistance measurement will be totally different from the DC resistance values. **LCRTZ has both AC resistance and DC resistance tests.**

8. Impedance matching transformers: The very name indicates the importance of impedance measurement. The telecom transformers are specified to test impedance along with other parameters. For these types of coils and transformers, the impedance is the main parameter but the inductance and resistance are the subsidiary parameters. As the transformer and coil manufacturers use LCR meters without this test; the end users ignore or avoid giving this test to the manufacturers. **With Vasavi's LCRTZ** You can check the impedance at different test frequencies and test voltages.

9. RS232C Control of LCRTZ from PC (Option):

Let us imagine the usual method. Test with LCR meter, note down the readings, type the readings into the computer and then take the report. Each job is done by a different person. There can be error at each stage. While reading, the technician may make error. The operator's mind is recorded like a hard copy with the pass results and there is every chance of missing the rarely observed fail readings. Apart from reading, the operator has to judge whether the readings fall within the limits or not. When he records, he may write 3 as 8, the recording error. Now these values are to be typed. Can not you have typing error? Finally what is the result? A mess of mistakes and human errors. The entire exercise is for name sake only.

Now let us study the alternative. Imagine LCRTZ with RS232C control. The limits along with test conditions are carefully set by a more experienced engineer once for all and stored in a file. To test the transformer, the operator has to load the file and connect the transformer to jig or connectors. Any unskilled person can do the handling work. The PC saves the test results into a database table, which you can use for taking reports or analysing the results. The operator's efficiency will increase as he has not to strain his mind. Speed is increased without losing quality. Is this not a better choice?

10. System with 20 pin scanner : For multi pin transformers you can consider Vasavi's CVCT-S20 an automatic test system with scanning facility. This system is very ideal for testing **SMALL TRANSFORMERS like SMPS transformers, Telecom transformers (HYBRID, POT CORE, RM-CORE), Pulse transformers etc.** The testing will be very fast and fool proof. The system scans at one stroke, all the windings of a transformer.

11. System without scanning facility: Even without having a scanner, you can have the luxury of transformer testing automatically. The operator's job is to make the connections only. He need not worry about readings. Instead of a scanner selecting the pins automatically, the operator is doing that job. But his burden of noting and judging the reading is totally removed. The system consolidates all the defined tests, displays the tested results and also prompts you Go or No Go based on limits entered for each parameter. Further you can also save the data in to a database table.

12. Testing on sampling basis: This is a notion by the inward inspection and QC departments. This may be valid for capacitors, resistors or semiconductors; because, the manufacturing is done by automatic machines. Further the process lines also include 100% testing in the production chain itself. In the case of transformers and coils, they are generally manufactured by semiskilled labour and are being handled by small manufacturers without having proper environment. So 100% must be tested both at the manufacturer and the end user. The notion of sample testing should not be applied for transformers and coils.