

# Agilent Effective Transformer/LF Coil Testing

Application Note 1305-3



Agilent Technologies

## Introduction

Transformers/LF coils have gradually become miniaturized and are used in power supply circuits and digital networks (for example, ISDN), and are manufactured in increasing volume. QA and manufacturing have to improve evaluation of transformers/LF coils, but they are faced with big measurement problems due to the complicated evaluation parameters which are required to be measured. We will describe the solutions offered by the Agilent 4263B LCR meter to meet these measurement requirements.

## Current Problems for Transformer/LF Coil Evaluation

The major parameters which need to be known for transformer/LF coils ,are self inductance, dc resistance, turns ratio, and interwinding capacitance. Existing low cost LCR meters have the following shortcomings when used for transformer/LF coil evaluation.

1. Primary and secondary dc resistance can't be measured. The dc resistance is measured using a multimeter.
2. The turns ratio, one of the major parameters of a transformer, can't be measured with existing LCR meters. (The turns ratio commonly requires using a special turns ratio checker.)
3. The major parameters can't be measured at 100 kHz because low cost LCR meters' frequency range doesn't extend up to 100 kHz.
4. The test signal level is automatically selected according to the measurement range, so the test signal level can't be set to a user specified level.
5. Total throughput isn't improved for measurements on the production line because of slow measurement speed.
6. It's troublesome to change the connections required for measuring transformer primary and secondary parameters.

# Agilent 4263B LCR Meter Solution

## 1. Dc resistance measurement capability

The Agilent 4263B equipped with option 001 (N/M/DCR measurement capability) can also measure dc resistance in addition to self inductance, so a separate multimeter and the additional measurement step isn't needed, thereby test efficiency is improved.

## 2. Turns ratio, mutual inductance measurement capability

The Agilent 4263B equipped with option 001 adds turns ratio and mutual inductance measurement capability. Turns ratios of 0.9000 to 200.00 at 100 kHz can be measured, and this combination is suitable for standards specification pulse transformer evaluation.

## 3. Wide frequency range

The Agilent 4263B covers test frequencies of 100 Hz, 120 Hz, 1 kHz, 10 kHz, and 100 kHz, and can be used to evaluate transformers at test frequencies up to 100kHz. So you can perform the 1 kHz transformer evaluation as defined in IEC 1007, also JIS C 6435, and in addition you can measure the leakage inductance and the interwinding, capacitance at 100 kHz to evaluate transformers used in switching power supplies.

## 4. Flexible test signal level and level monitor

The flexible test signal level settings (20 mV to 1V in 5 mV steps) and signal level monitor function allow you to evaluate your device at the level you specify.

## 5. Higher throughput

The 4263B's measurement speed is 25 ms (in the short integration time mode) In addition, the 4263B has the following functions which make for easy system integration, and improve measurement throughput and reliability.

- Built-in comparator
- Handler interface
- GPIB interface
- Fast contact check
- Trigger delay function

## 6. Agilent 16060A transformer test fixture

The 16060A transformer test fixture used with the 4263B, can measure both the primary and secondary parameters by just changing the position of a switch on the test fixture. Figure 1 shows you the 4263B with the 16060A for the transformer measurements.

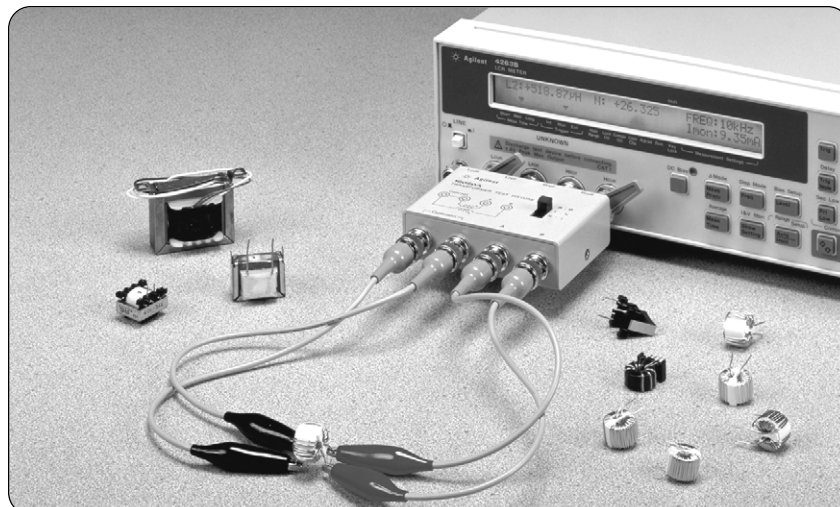


Figure 1. Transformer measurement using the 16060A

# Conclusion

The Agilent 4263B LCR meter realizes the wide frequency range, and flexible test signals with high measurement speed. In addition, when equipped with option 001 the 4263B offers a one box measurement solution for dc resistance, turns ratio, and mutual inductance. So now an effective measurement solution is available for your transformer/LF coil evaluation needs.

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Printed in USA October 16, 2001  
5967-5377E



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