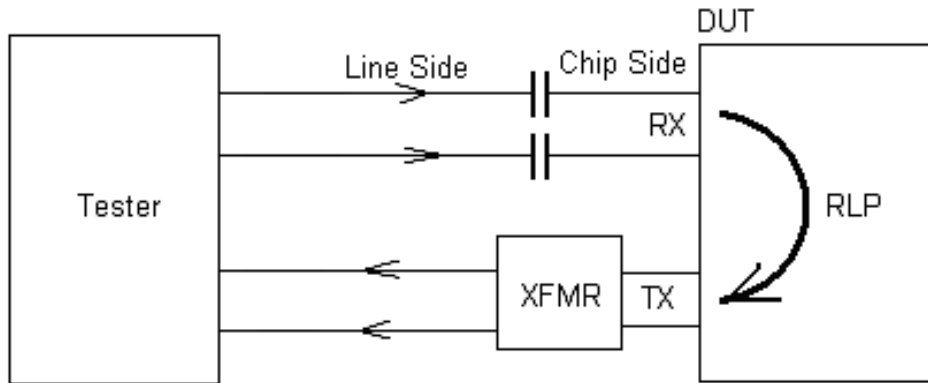


### Introduction

In a conventional LIU application, line side and chip side are coupled with a transformer. In a particular customer application, a capacitor instead of a transformer for the same coupling is desired. This test is to explore if a capacitor coupling is acceptable.

### Test Platform

A simple test platform is setup as the following. The transformer of 82V2082 receiver is replaced with two capacitors (one for RTIP and one for RRING). By using different capacitance, both waveforms and BERT testing are compared and verified.



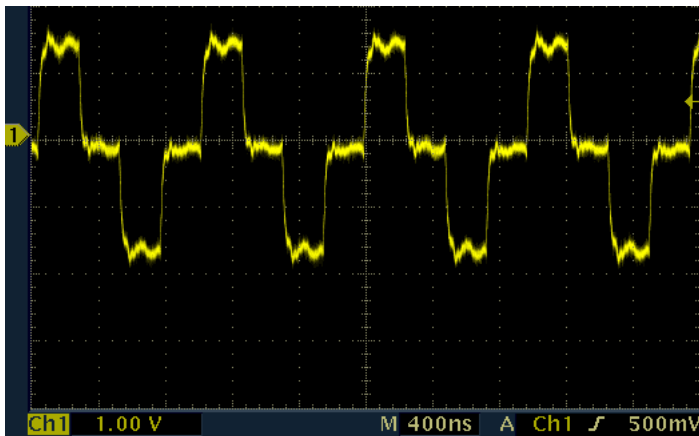
### Test Results

#### [A] Waveform comparisons

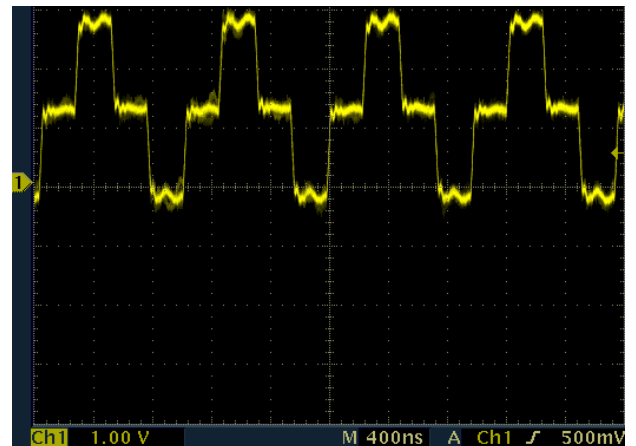
Waveforms of transformer coupling and capacitor coupling are compared. Please see waveform screen captures below.

#### [1] Transformer coupling waveforms

Line side:

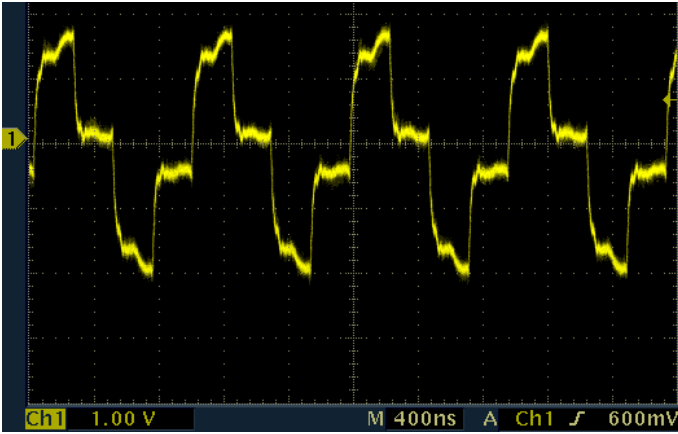


Chip side:

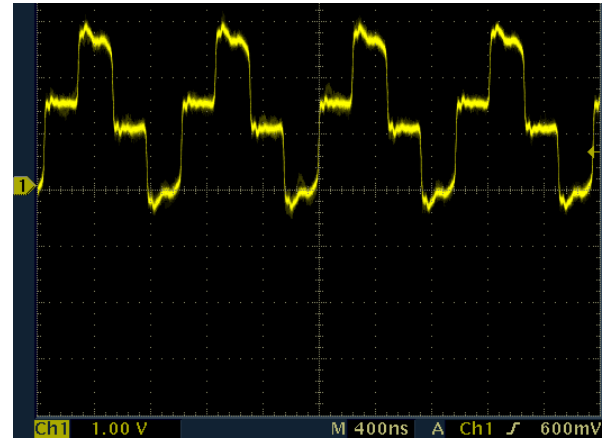


**[2] Capacitor coupling waveforms**

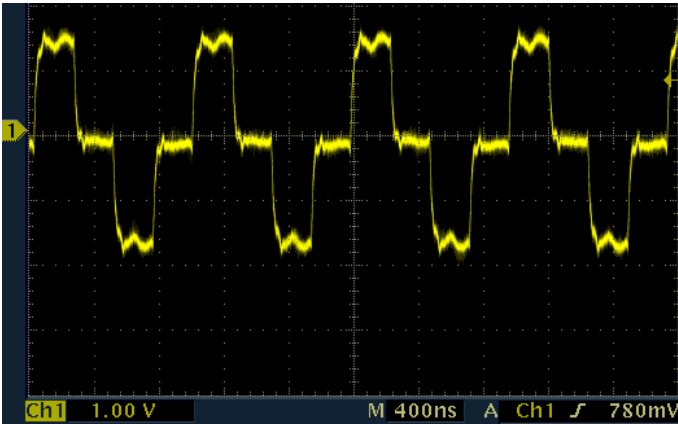
6.8µF, Line side:



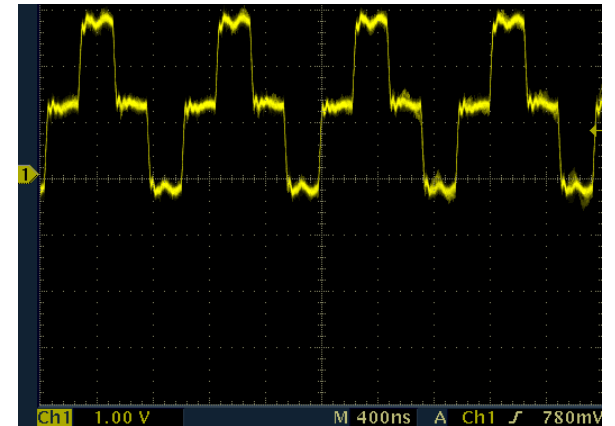
6.8µF, Chip side:



22µF, Line side:



22µF, Chip side:



**[B] BERT Testing**

Other than waveform comparison, BERT was done to functionally test if any bit errors occur with capacitor coupling. The results are shown in the following table.

**Table 1: BER Test Observation**

Data Pattern	Transformer Coupling	6.8µF Capacitor Coupling	22µF Capacitor Coupling
2 <sup>11</sup> - 1	Error Free	Error Free	Error Free
2 <sup>15</sup> - 1	Error Free	Error Free	Error Free
2 <sup>20</sup> - 1	Error Free	Error Free	Error Free
2 <sup>23</sup> - 1	Error Free	Error Free	Error Free

## Analytical Comments

1. From the test results, it appears capacitor coupling can be used for LIU receiver;
2. From waveform comparisons, big capacitance coupling (22 $\mu$ F vs. 6.8 $\mu$ F) generates better waveforms with respect to transformer coupling.
3. The effect of capacitor coupling on Return Loss was not tested in this test.
4. Please note: capacitors used in this test is of Z5U type, which has a wide variation (-85%~+20%) from its nominal capacitance. Ceramic capacitors with narrow variations, such as X7R/X5R/C0G, are recommended.



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