WE-LAN
LAN Transfomer

The High Performance & Low EMI (HPLE) RJ45 ports feature integrated magnetic filters that improve noise attenuation in the range of 100 MHz to 500 MHz. Better noise attenuation means effectively meeting class B compliance FCC15 or CISPR22 tests. The discrete HPLE series can be used for gigabit speeds and PoE applications.

The Common Mode Rejection between 1 MHz– 100 MHz has to be at least –30 dB to meet the IEEE802.3xx standards, but there is no reference as to how much attenuation (Common Mode Rejection) is needed above 100 MHz.

One of the main issues during compliance testing is the noise generated by the internal clock of the PHY chip. The IC controller clock usually runs at 125 MHz and the resulting harmonics may appear up to a range of 875 MHz. See Figure 1.

The first three harmonics of the125 MHz fundamental frequency are the main source of noise and interference. To solve this issue, Würth Elektronik designed their HPLE RJ45 ports specifically for very high Common Mode Rejection in the frequency range of 100 MHz to 400 MHz. See Figure 2.

The HPLE series has several different configurations which may or may not be optimal with certain PHY's. Please check with your vendor for the most compatible HPLE port. Replacing standard RJ45 ports with HPLE ports improves performance significantly. Comparison tests between standard and HPLE ports show that the1st noise harmonic goes down from 45 dBuV to 20 dBuV, the 2nd harmonic from 50 dBuV down to 37 dBuV and the 3rd from 47 dBuV to 39 dBuV (see Figure 3).

Fig. 1: Typical EMI Spectrum PHY Chip Clock

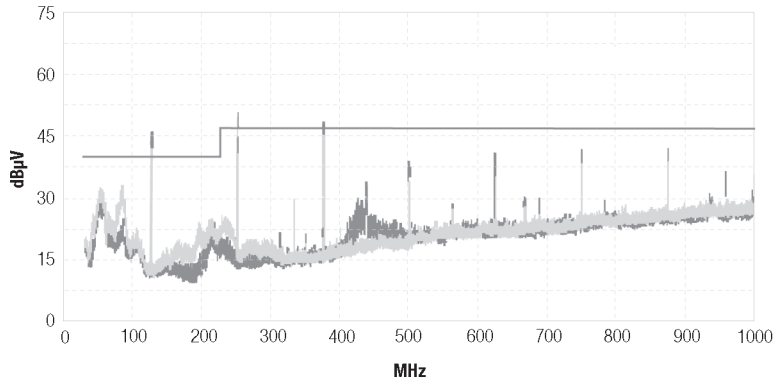


Fig. 2: Improved EMI Spectrum

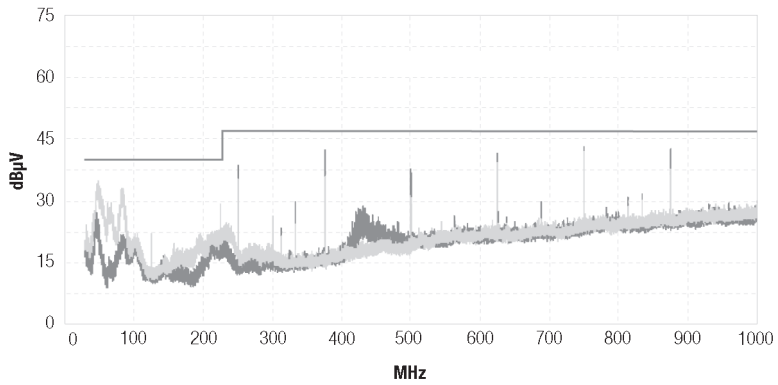
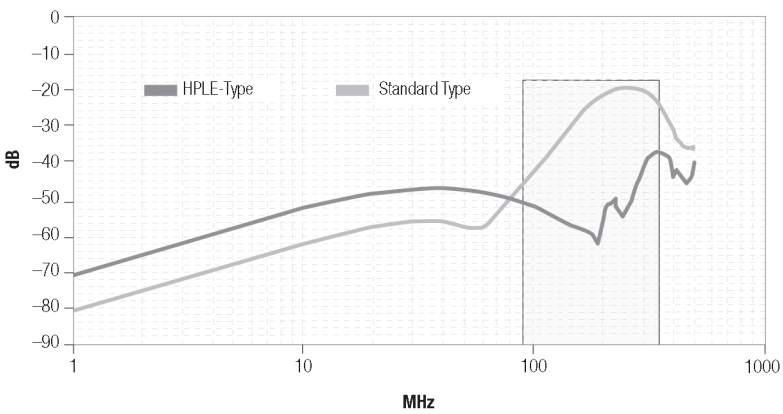


Fig. 3: Common Mode Rejection



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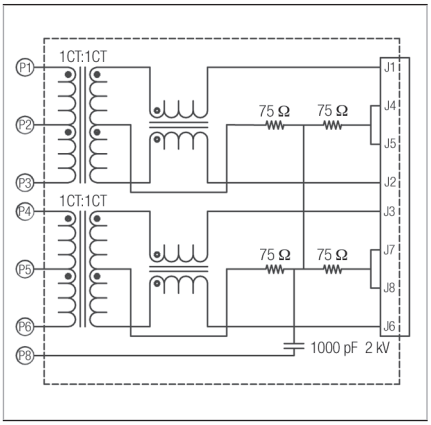
Standard Type
CMC on Cable side and
Bob Smith Termination



HPLE Type
CMC on PHY/Cable side and
Bob Smith Termination