

Spread Spectrum Techniques

With Low EMI Oscillator

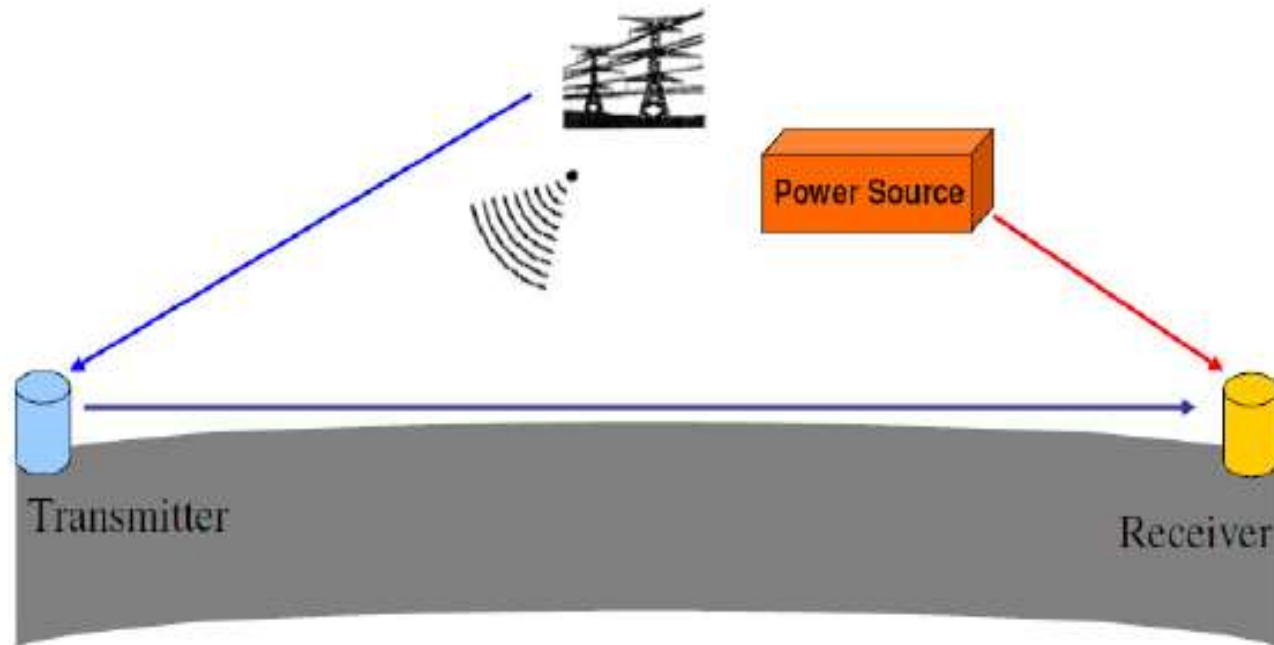
CONTENTS

- What Is 「EMI」 ?
- EMC Structure
- Spread Spectrum Techniques
- The Comparison Of Different Spread Magnitude
- EMI Reduction

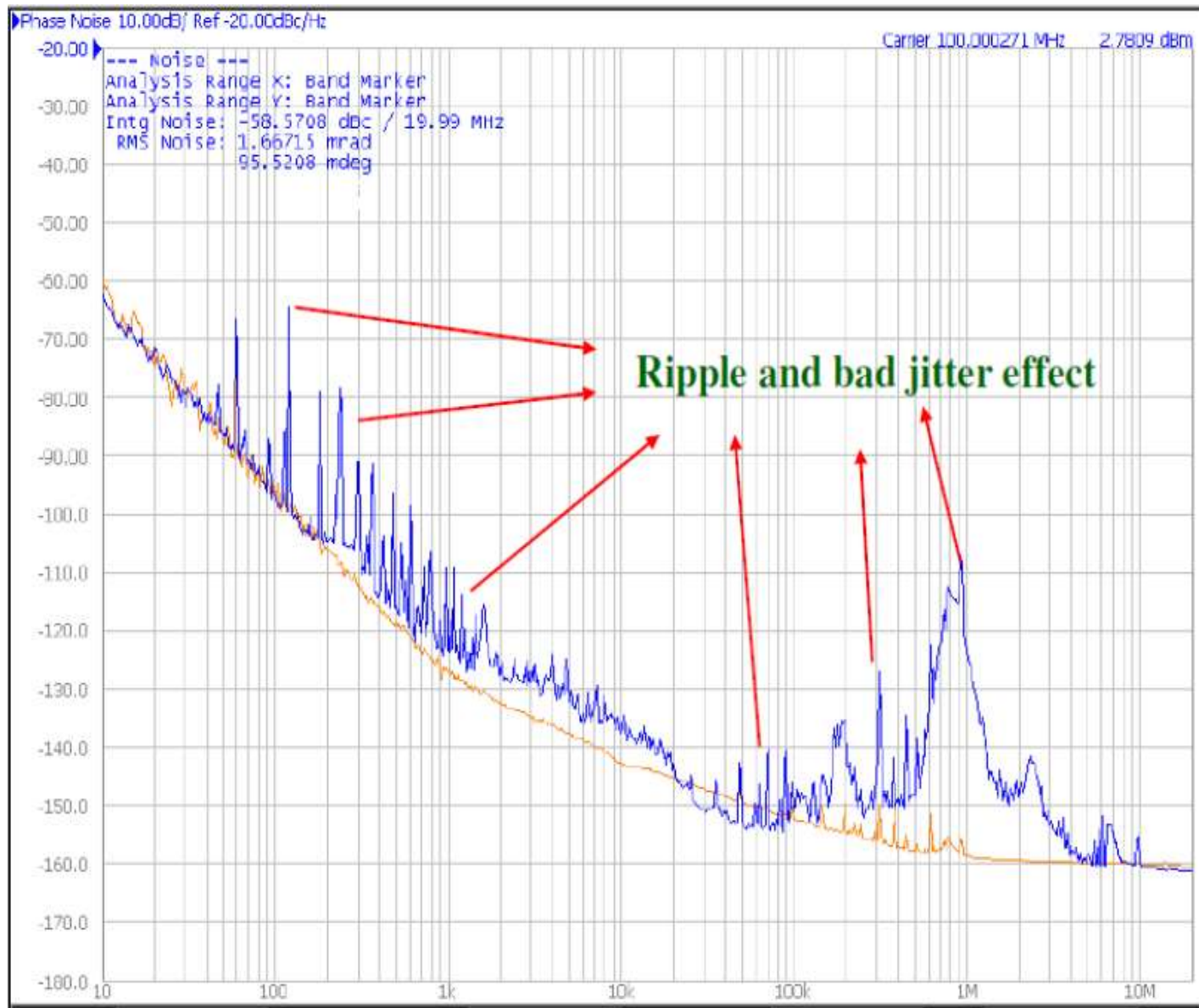
■ What Is 「EMI」 ?

EMI = Electromagnetic Interference

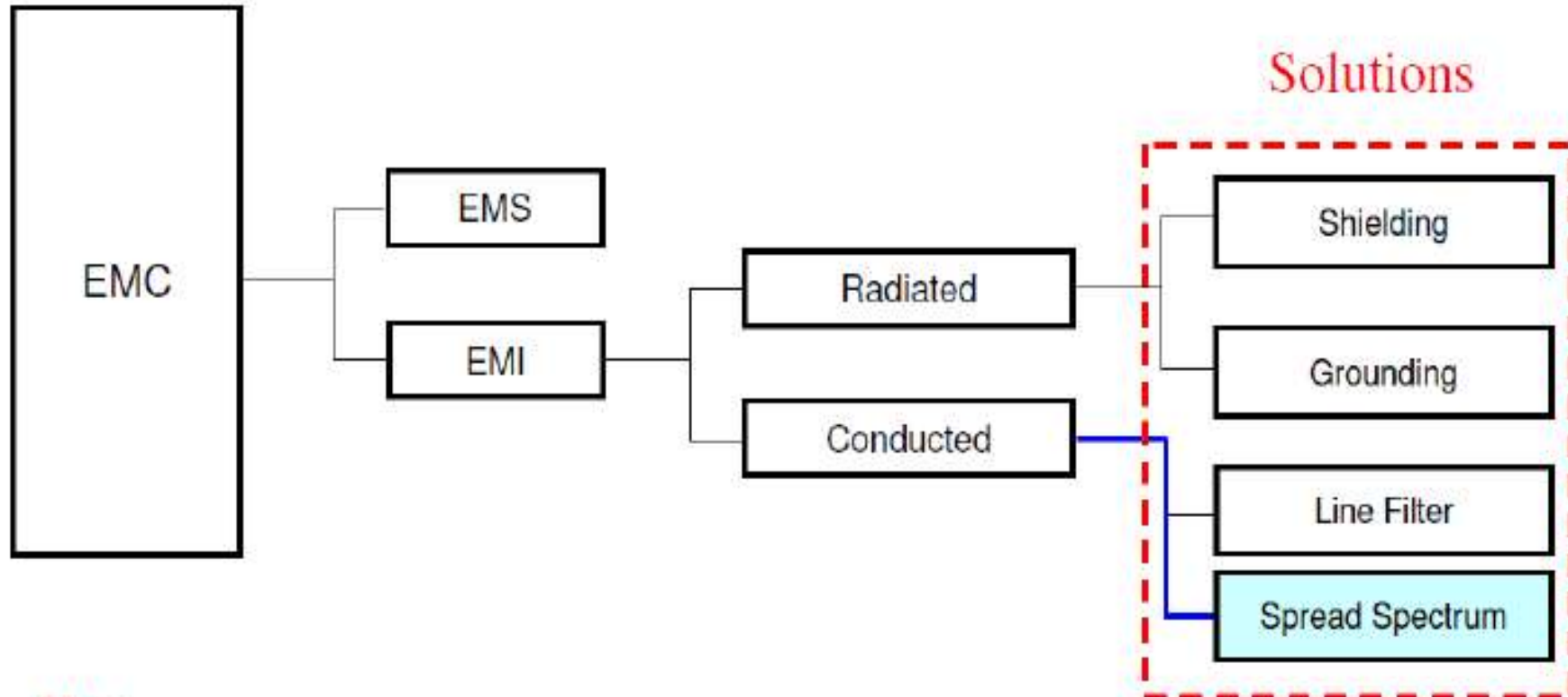
EMI appears on random. It is caused by radiated electromagnetic fields or conducted power source. The precise equipment and the circuit will be damaged by the electromagnetic interference. The electromagnetic interference also increases noise and leads to bad jitter performance.



Electromagnetic Interference From Power Device



■ EMC Structure



Note:

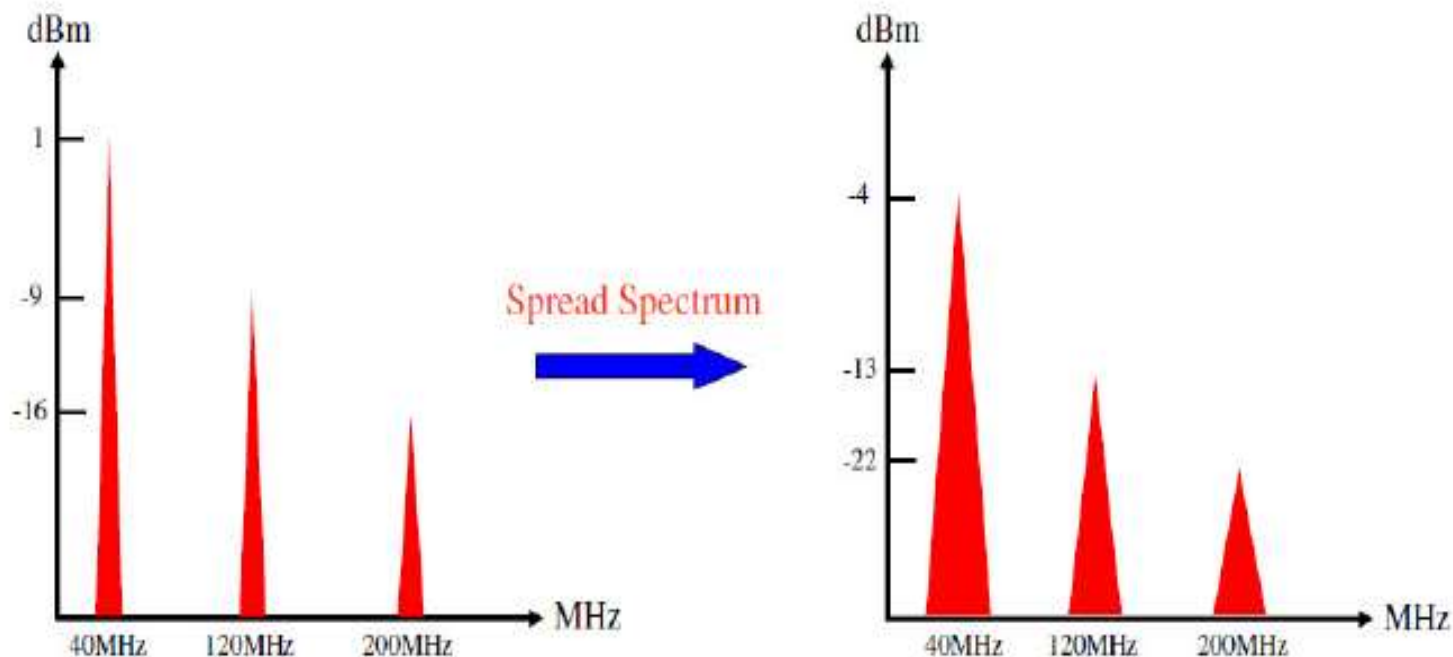
EMC = Electro Magnetic Compatibility , EMC = EMI+EMS

EMS = Electro Magnetic Susceptibility

■ Spread Spectrum Techniques

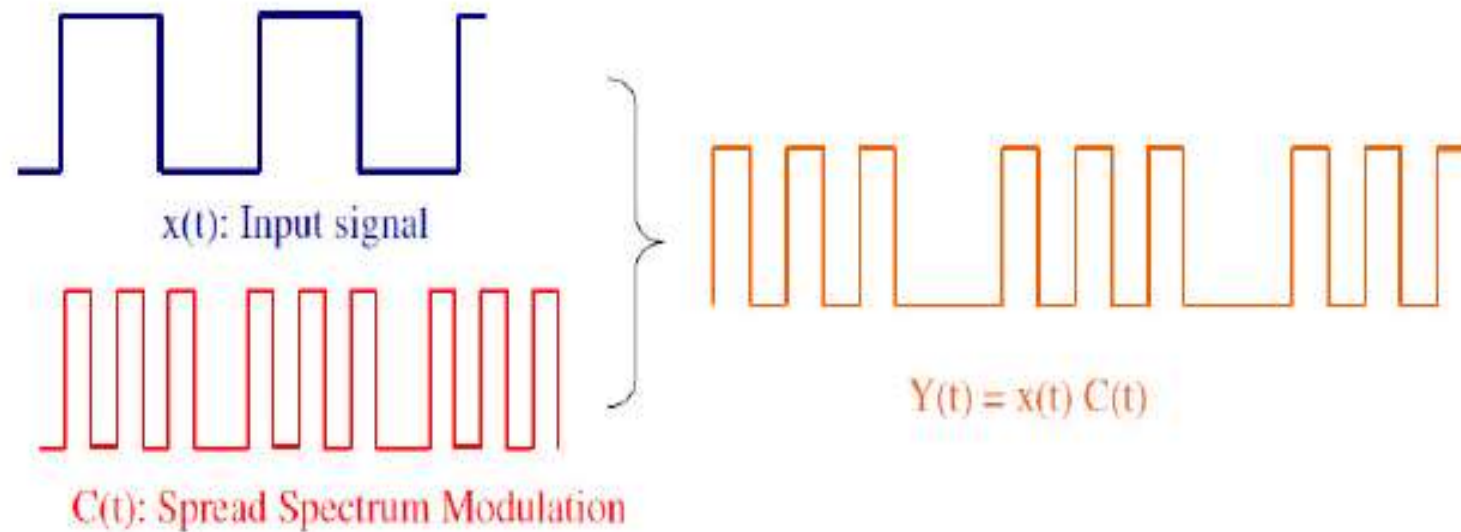
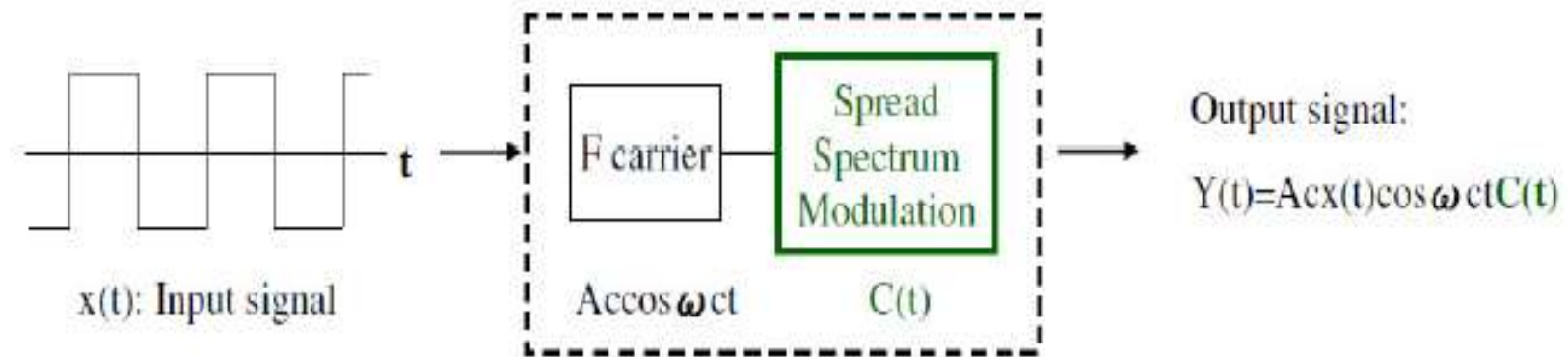
Spread spectrum which is one of transmission techniques is used to reduce electromagnetic interference. If the electromagnetic interference becomes a troubled issue during signal transmission, the spread spectrum is one solution. It is able to reduce the peak level of the fundamental and harmonic frequencies and solve the electromagnetic interference problem.

➤ Too large spread magnitude will lead to the signal weakness and distortion. It must take a balance between the signal strength and spread magnitude. Therefore, the general spread magnitude is selected from 0.125% to 4.0%.



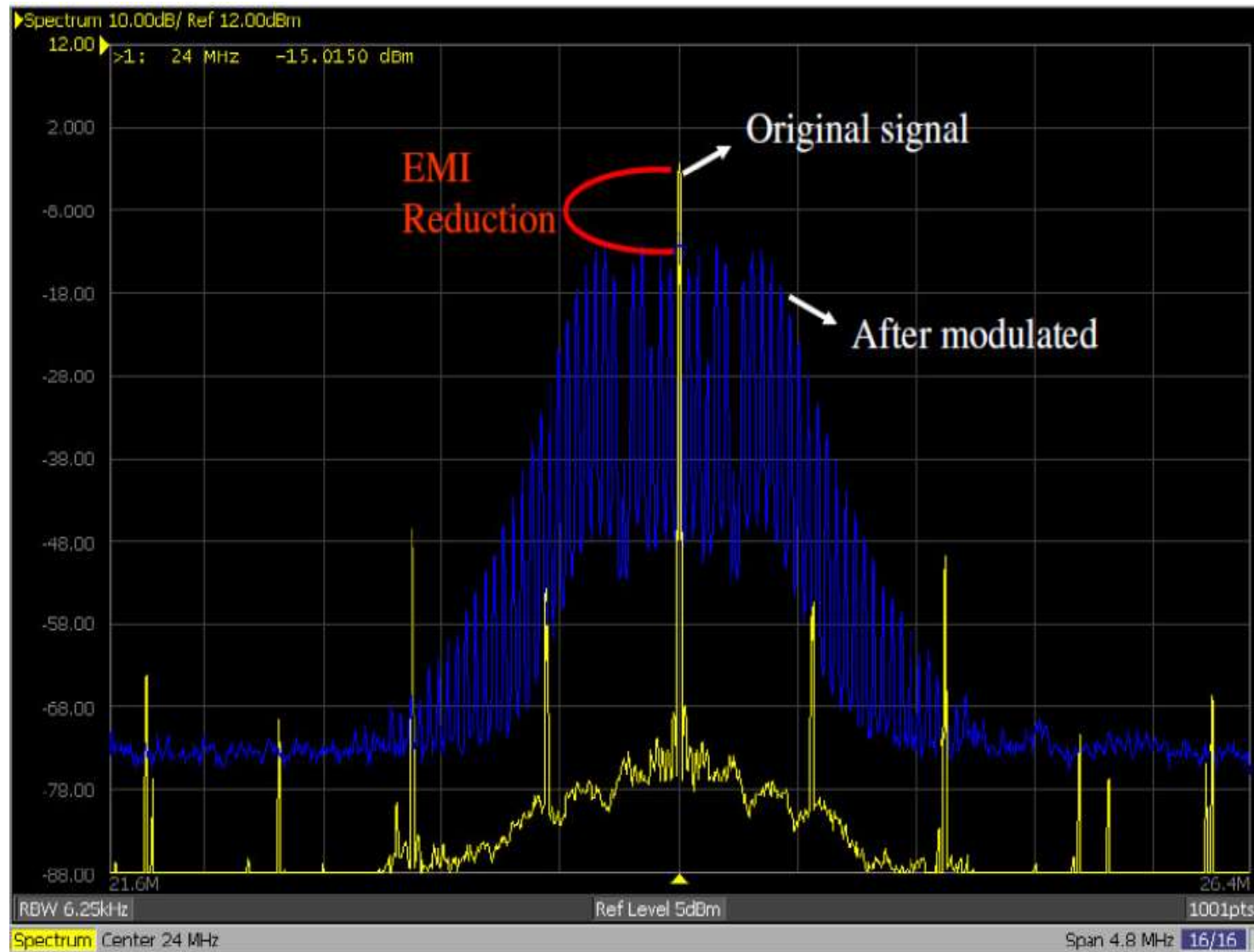
■ Spread Spectrum Techniques

Spread Spectrum Diagram:



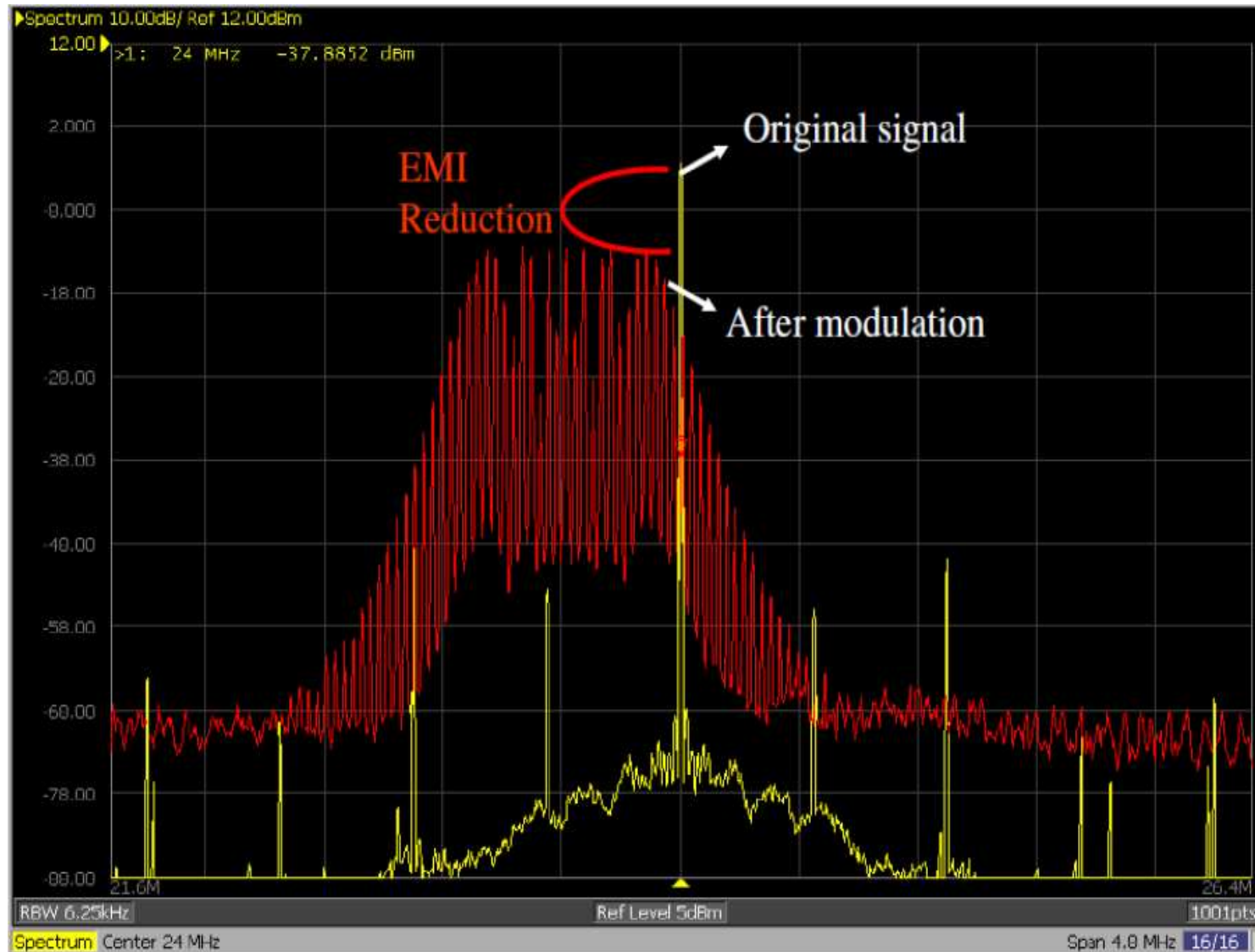
■ Spread Spectrum Techniques

Center Spread $\pm 2.0\%$



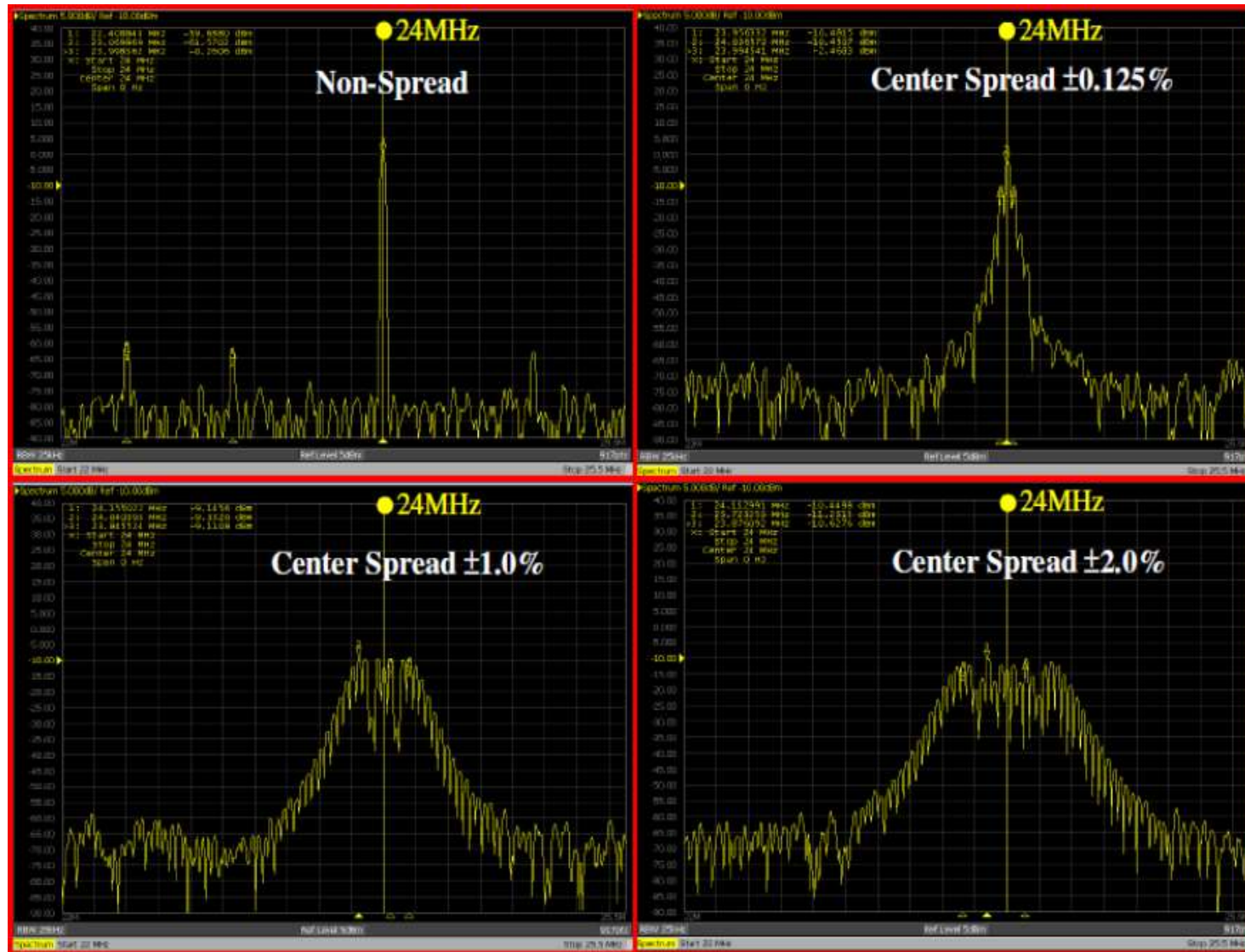
■ Spread Spectrum Techniques

Down Spread - 4.0%



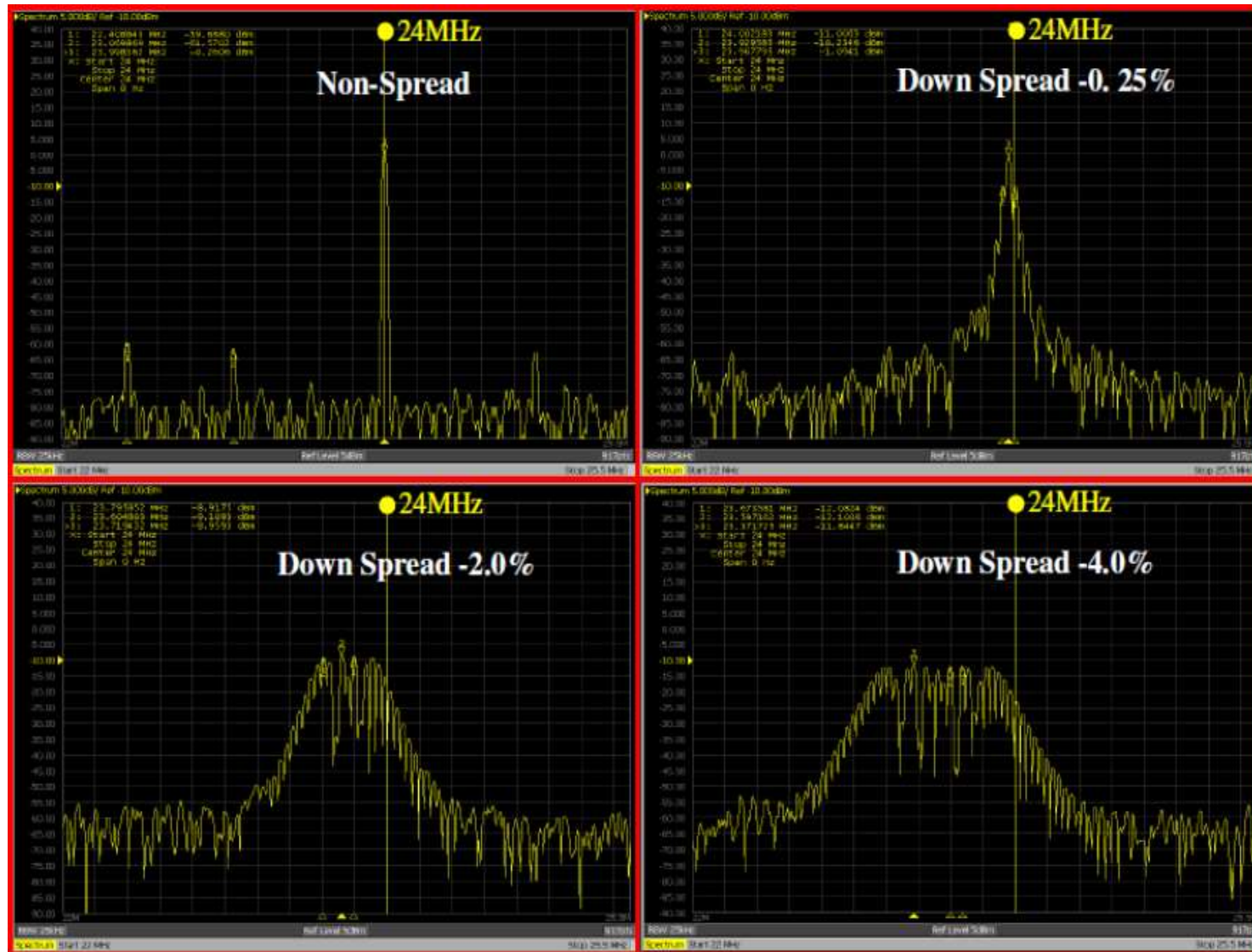
■ The Comparison Of Different Spread Magnitude

Center Spread – 24MHz Oscillator



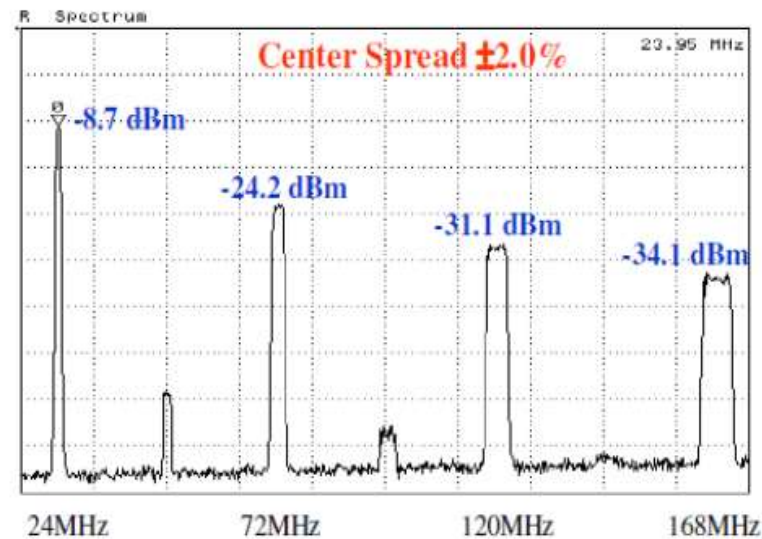
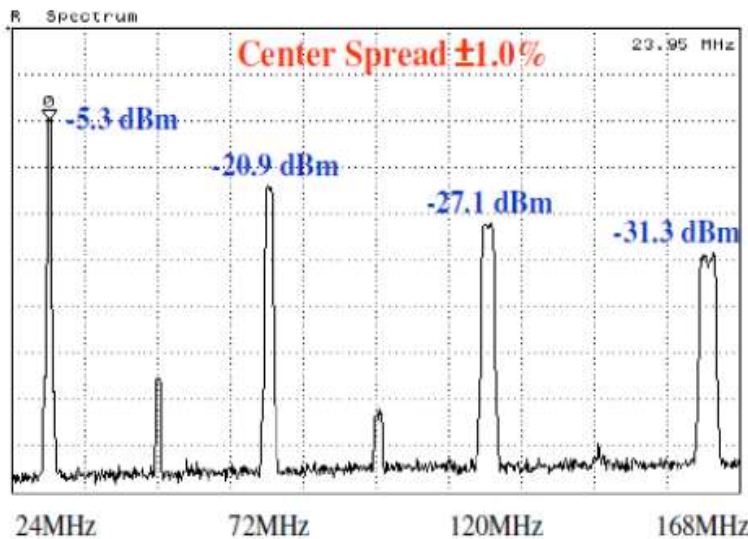
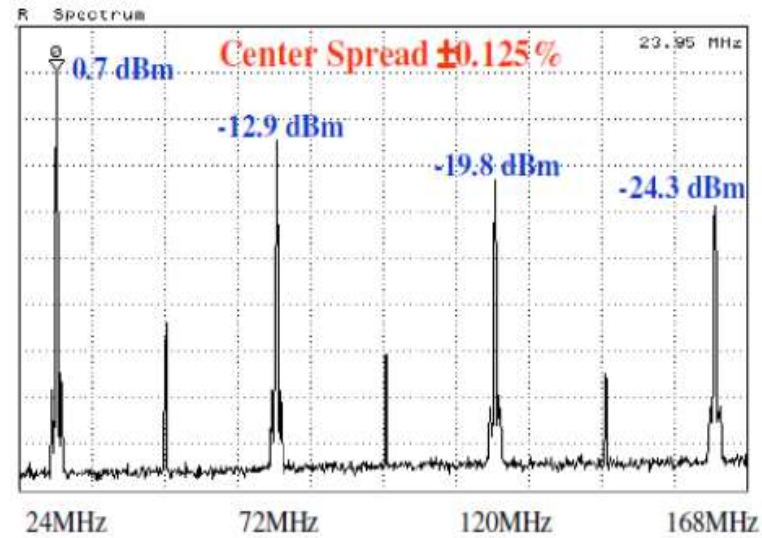
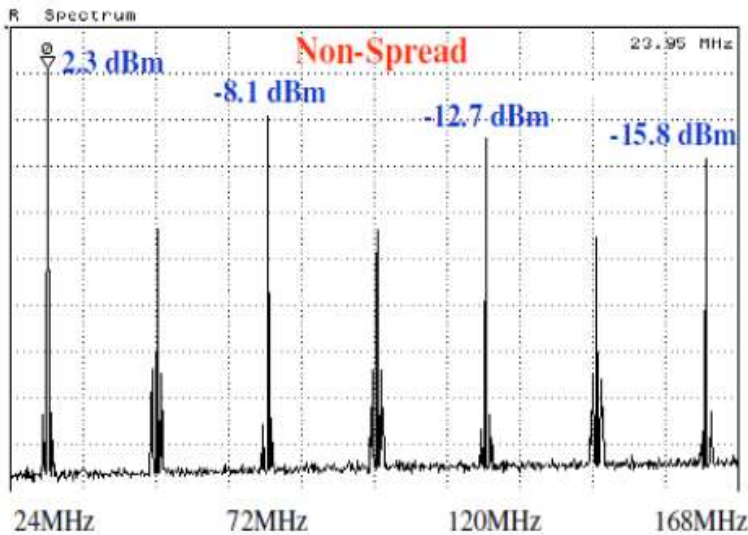
■ The Comparison Of Different Spread Magnitude

Down Spread – 24MHz Oscillator



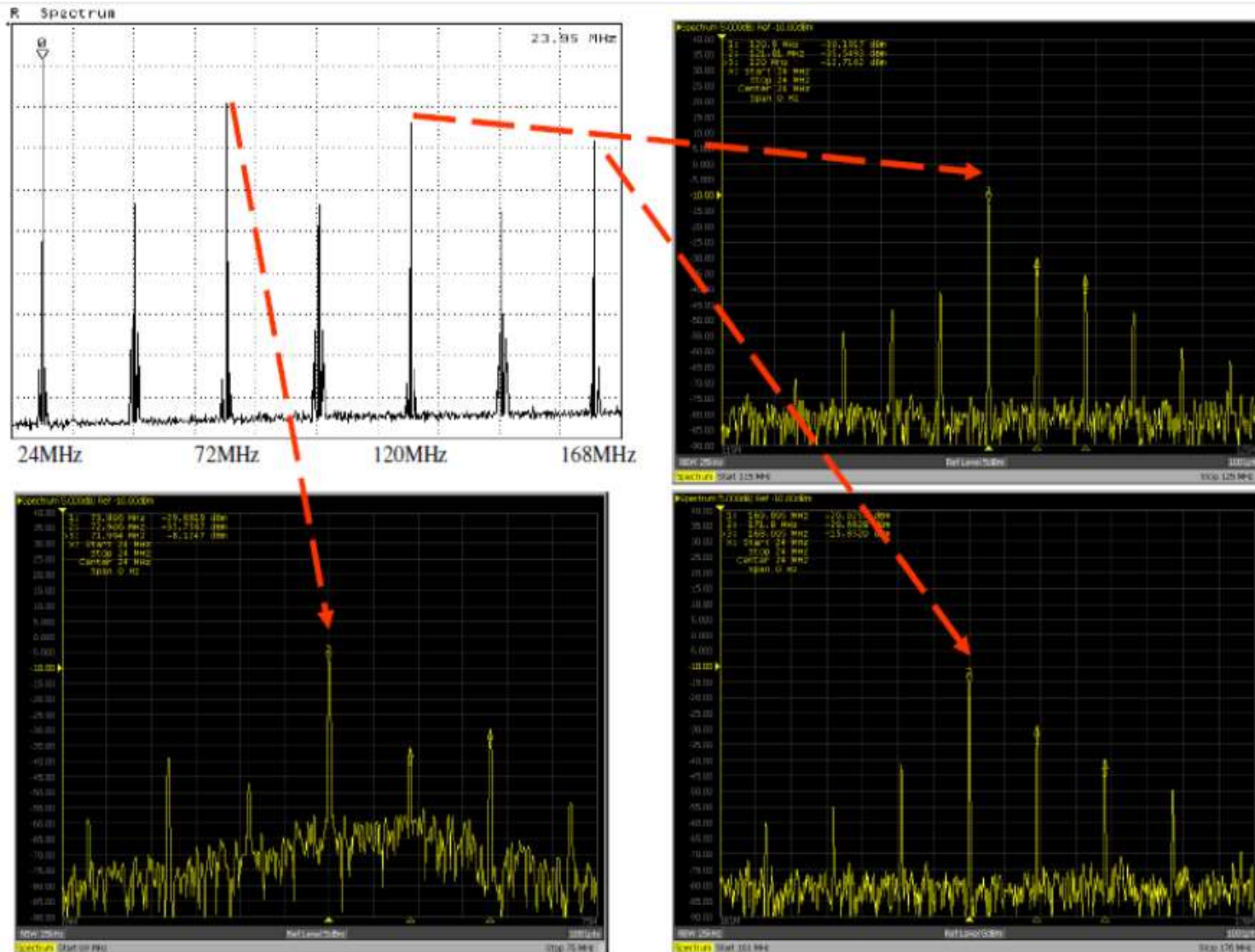
EMI Reduction

Harmonics Comparison



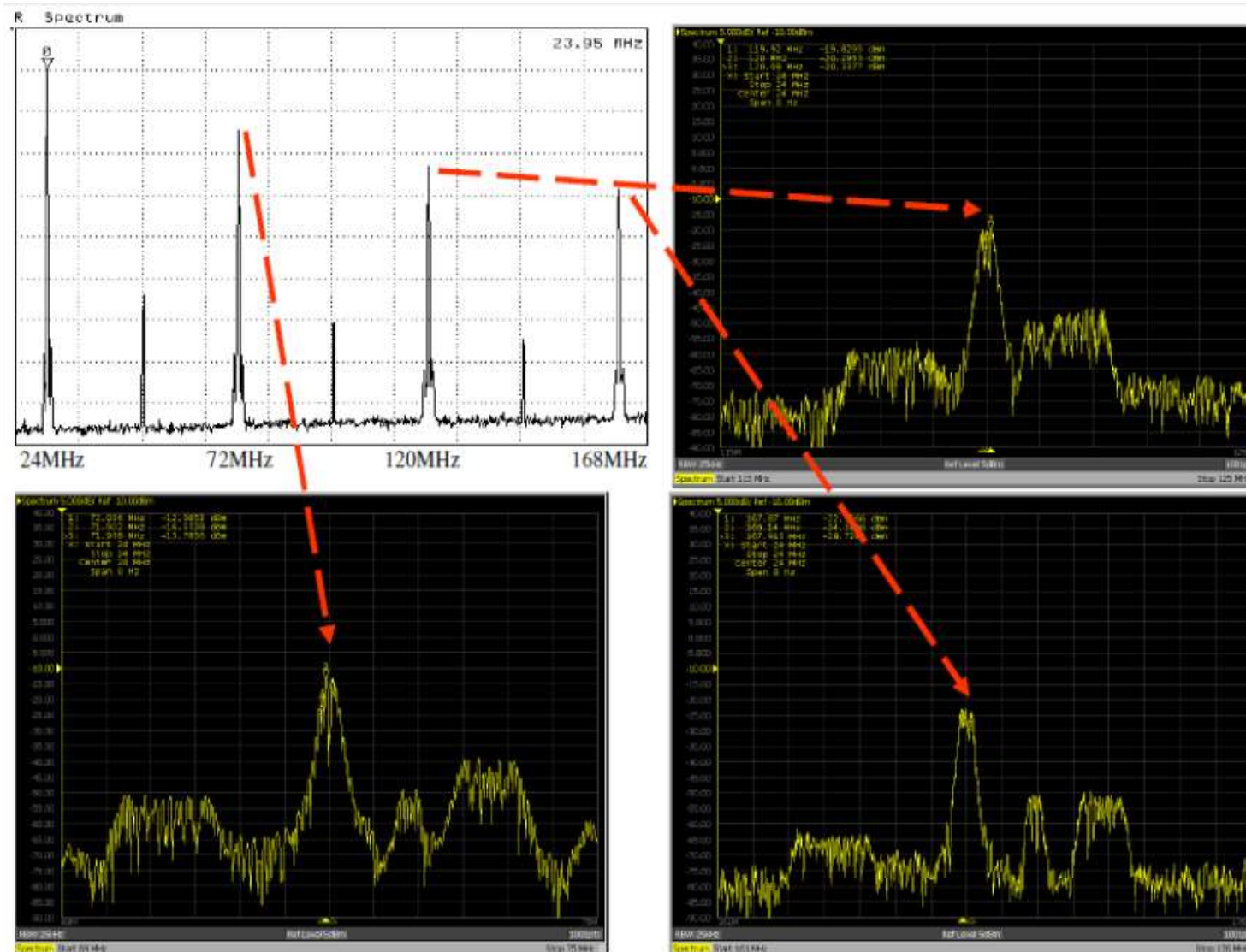
EMI Reduction

Detailed Harmonics - Non-Spread – 24MHz Oscillator



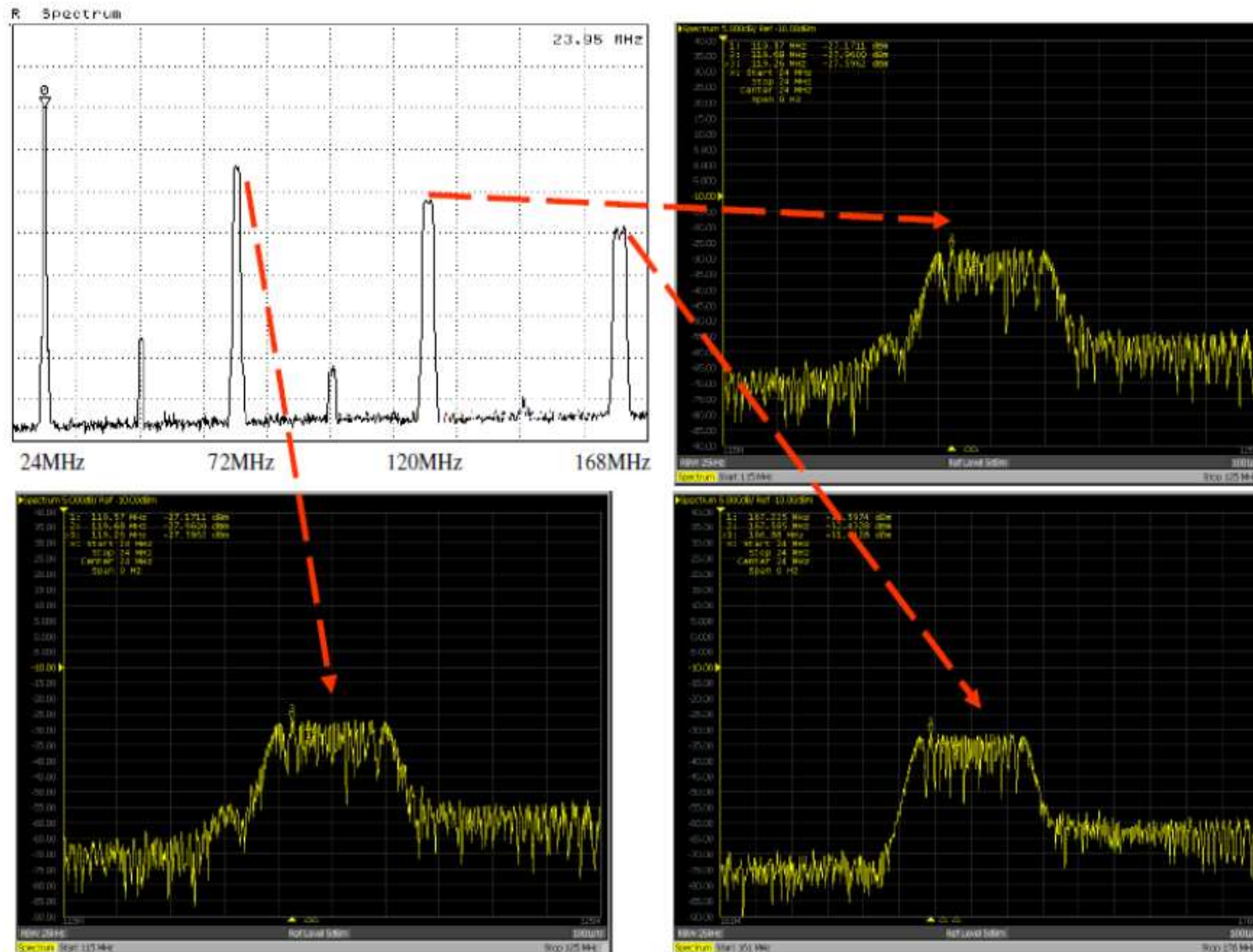
EMI Reduction

Detailed Harmonics - Center Spread $\pm 0.125\%$ – 24MHz Oscillator



EMI Reduction

Detailed Harmonics - Center Spread $\pm 1.0\%$ – 24MHz Oscillator



EMI Reduction

Detailed Harmonics - Center Spread $\pm 2.0\%$ – 24MHz Oscillator

