

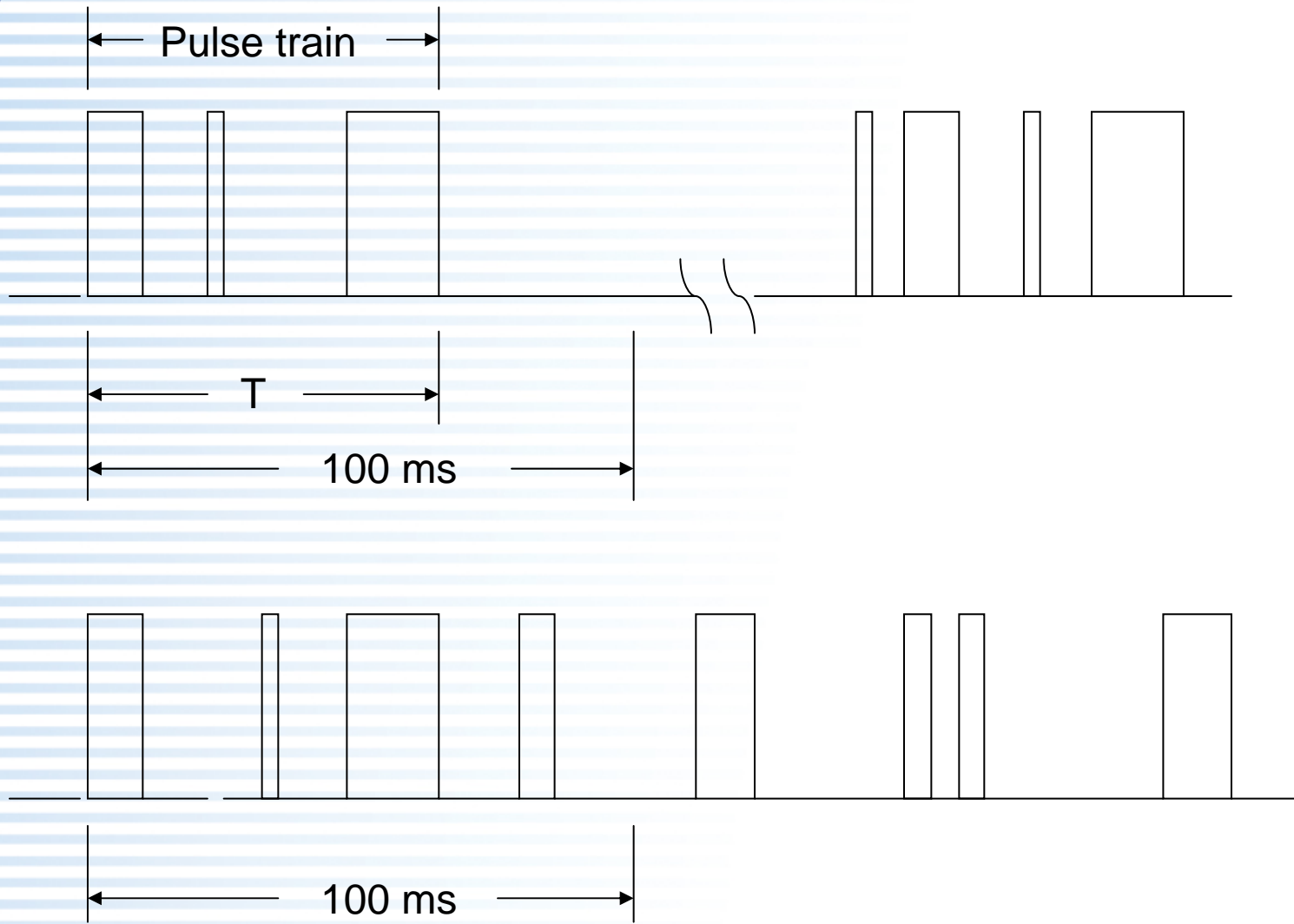


Pulse Emission Measurements Part 15

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Office of Engineering and Technology
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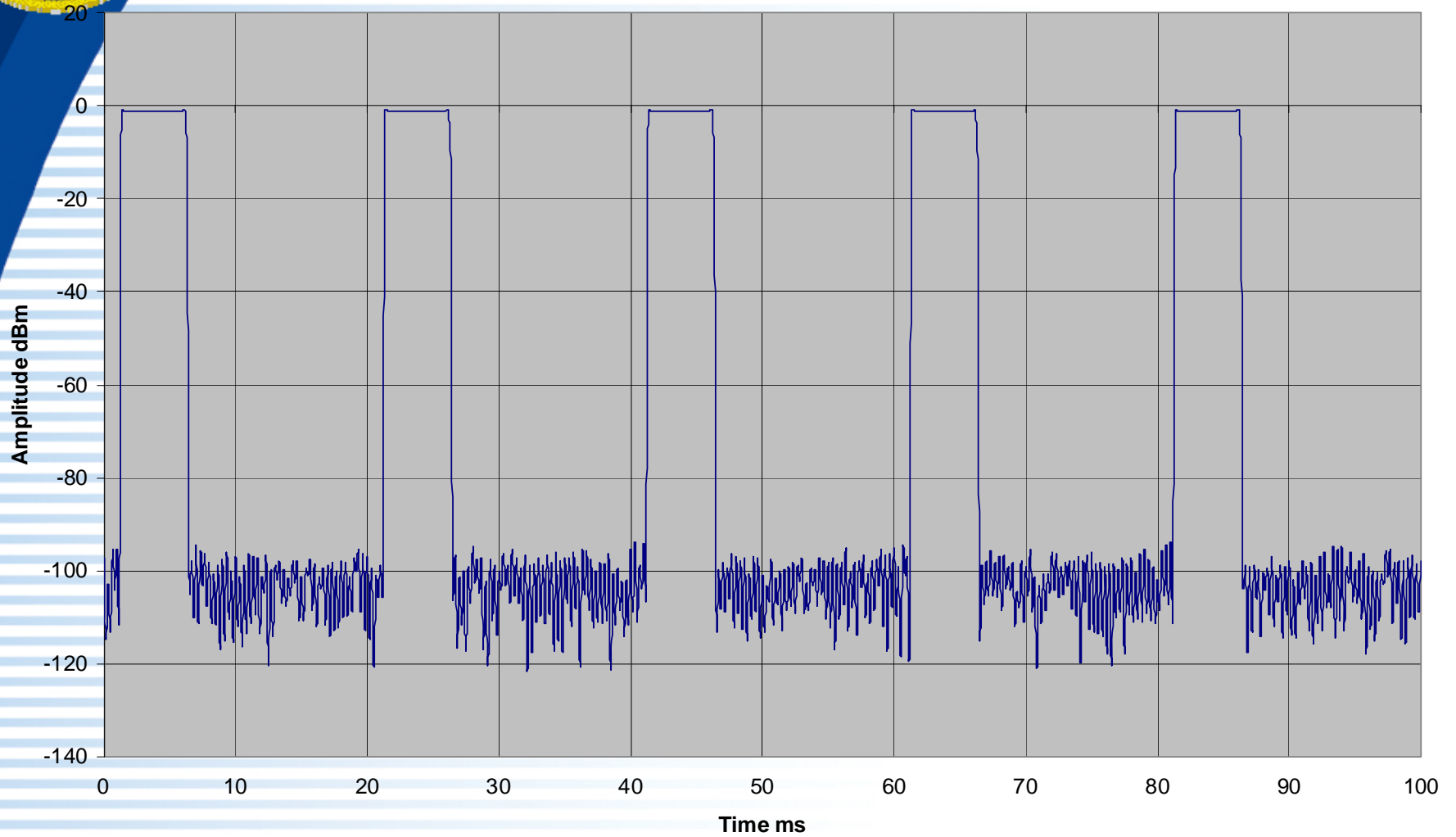


● 15.35(c)

- Average pulsed signal over one complete pulse train or 100 ms time frame if pulse train exceeds 100 ms
- Maximum average in 100 ms
- Calculate duty cycle for pulse train or 100 ms
- Duty cycle = $(t_1 + t_2 + t_3 + \dots + t_n) / T$
where t_n = pulse width, T = pulse train length or 100 ms
- Average = pulse amplitude x duty cycle



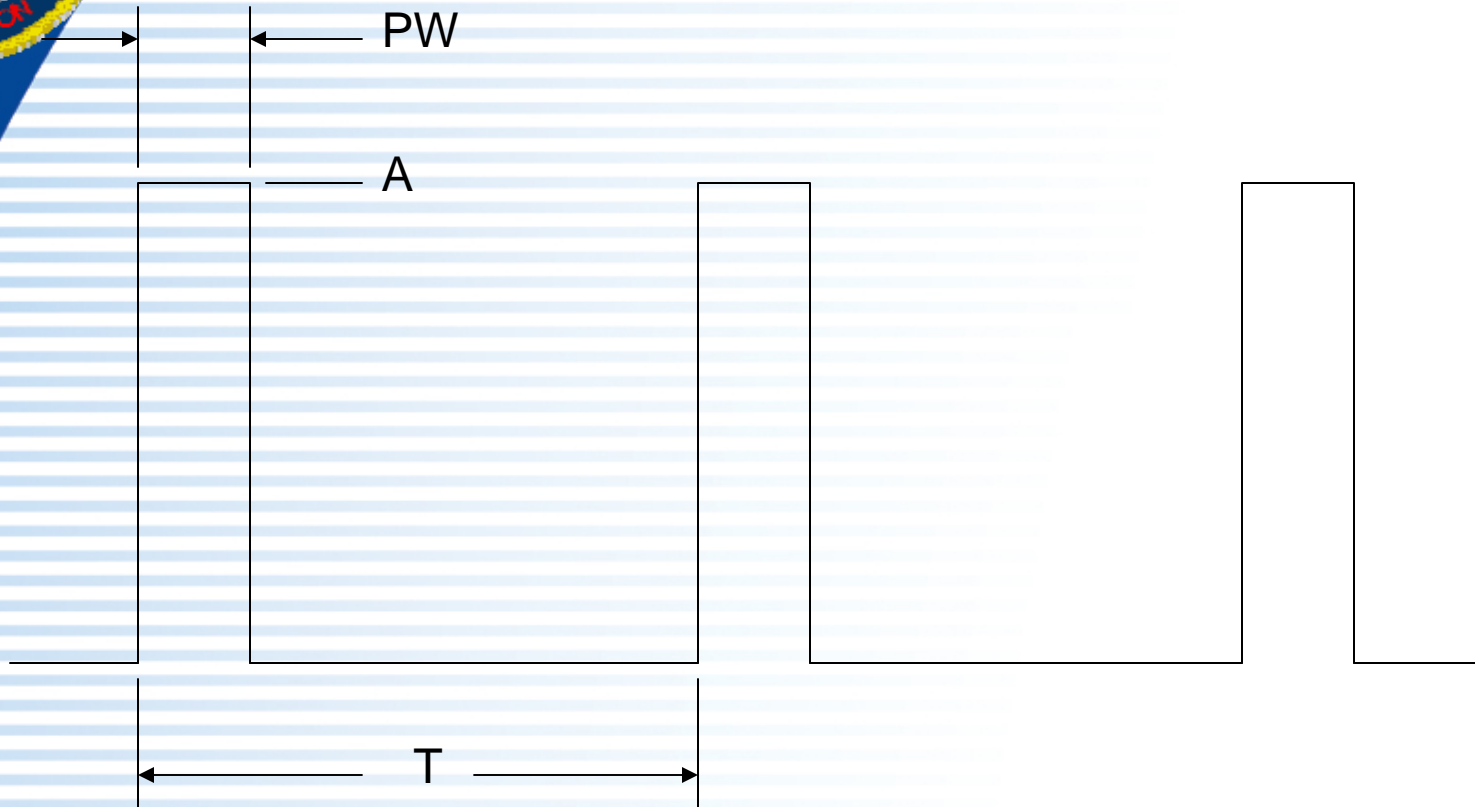
**5 ms 0 dBm Pulse, 20 ms Period
0 Span, 10 kHz RBW, Single Sweep**



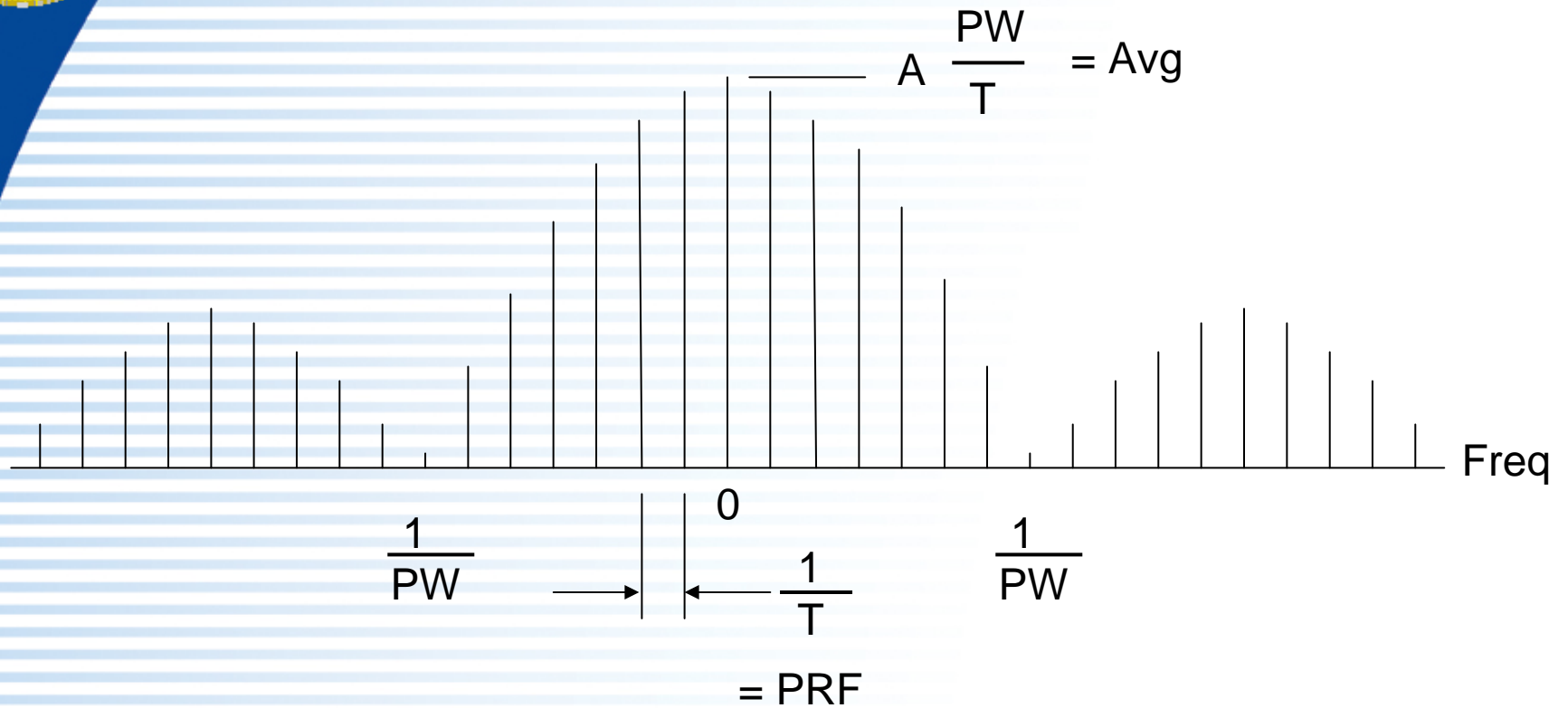


● 15.35(b)

- Total peak emission limit 20 dB above average emission limit
- Unless otherwise specified
e.g. 15.250, 15.252, 15.255 & 15.509-15.519
not including 15.209
- Pulse Desensitization Correction Factor (PDCF) may be needed
 - Wideband pulses



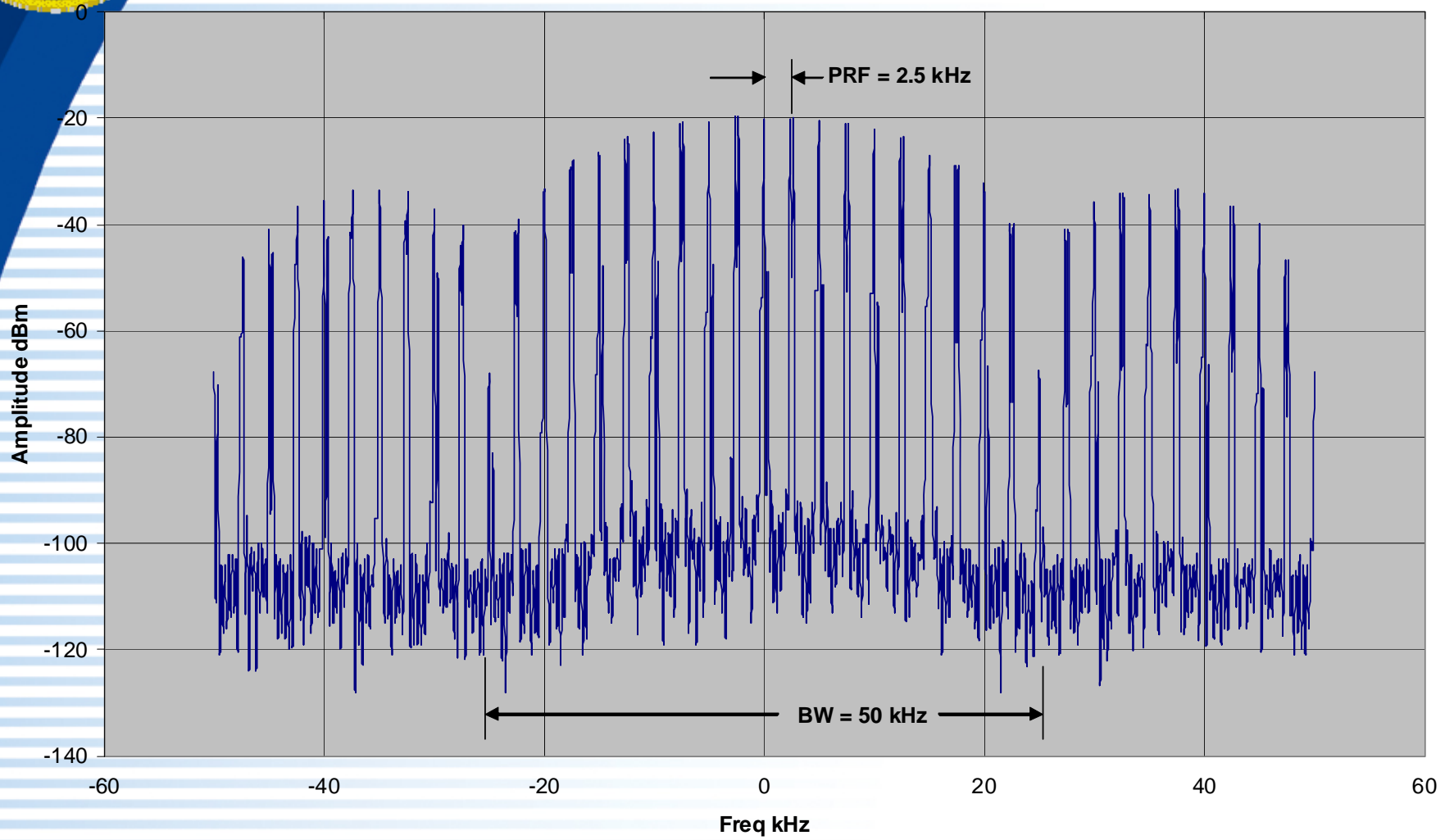
Periodic Square Pulse



Frequency Spectrum of Periodic Square Pulse

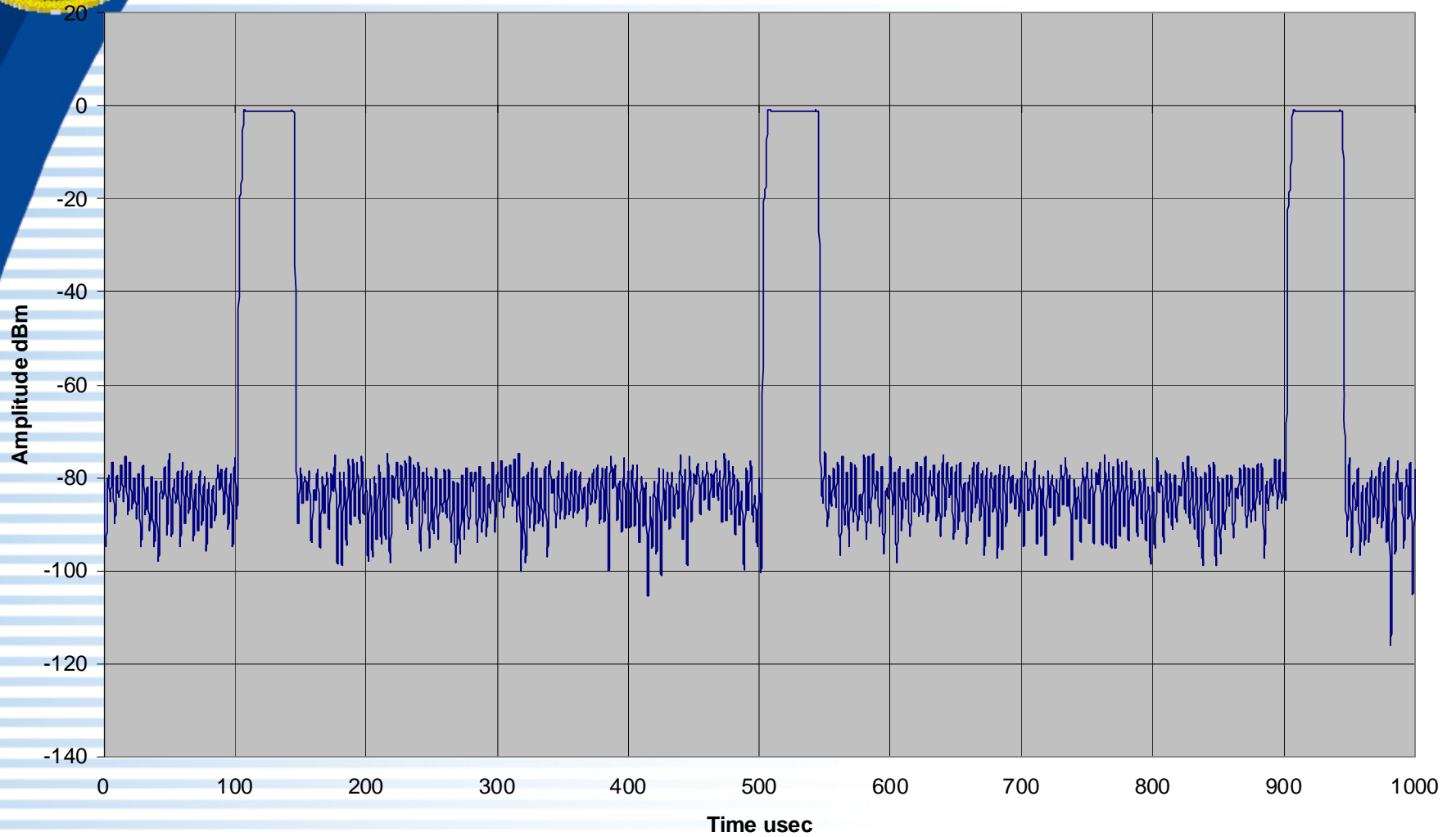


40 usec 0 dBm Pulse, 400 usec Period
100 Hz RBW



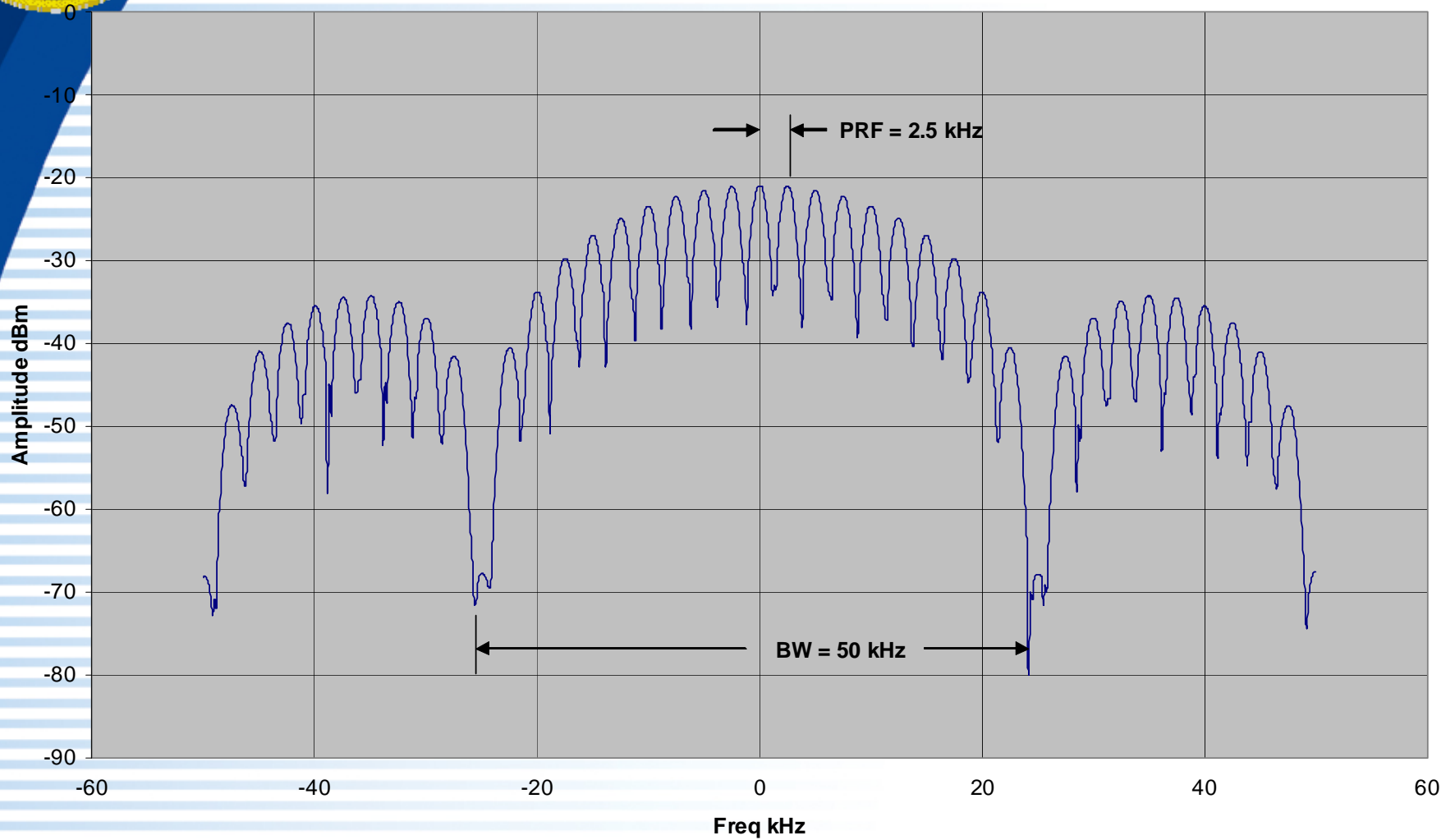


**40 usec 0 dBm Pulse, 400 usec Period
0 Span, 1 MHz RBW, Single Sweep**



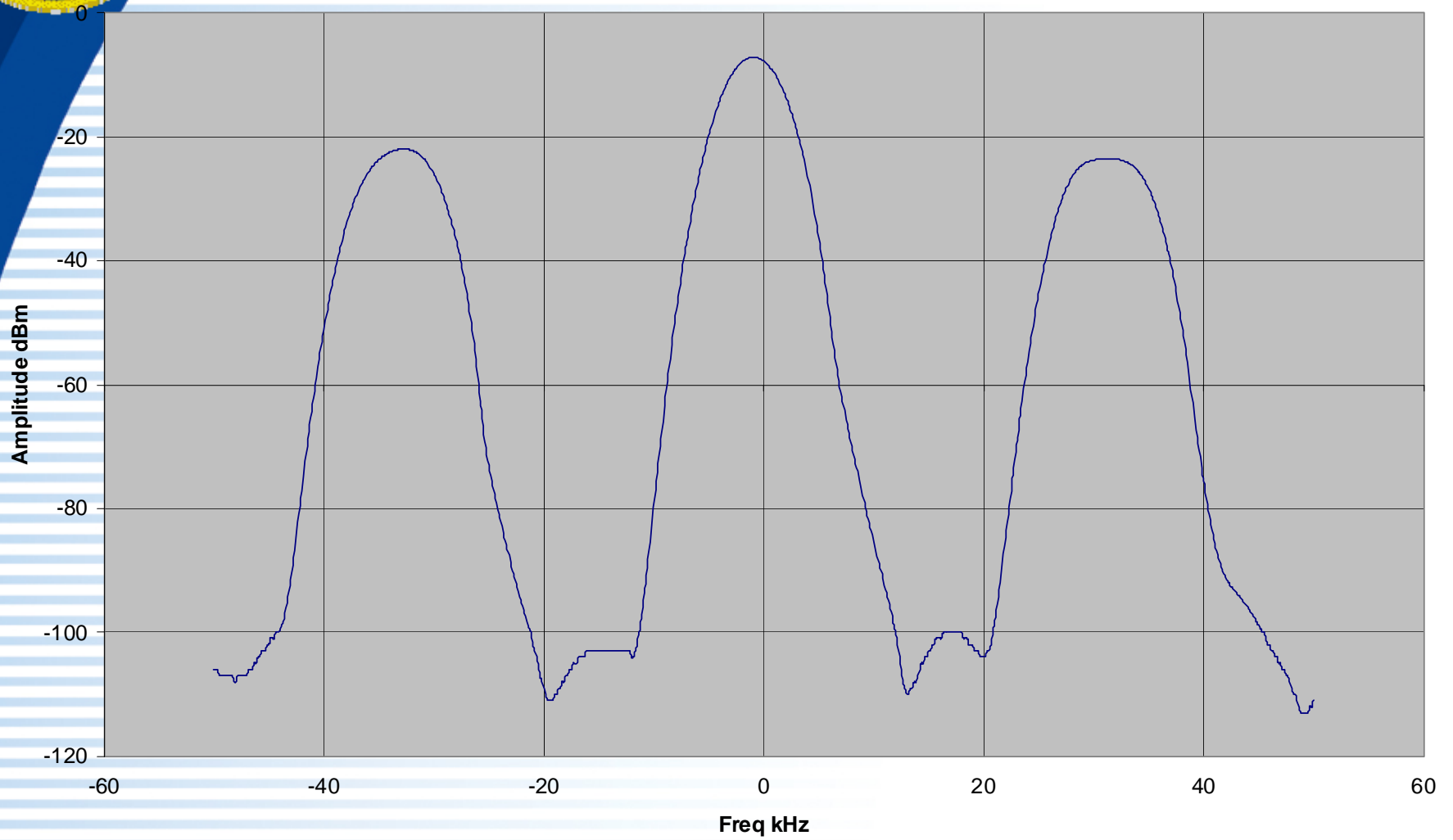


40 usec 0 dBm Pulse, 400 usec Period
1 kHz RBW



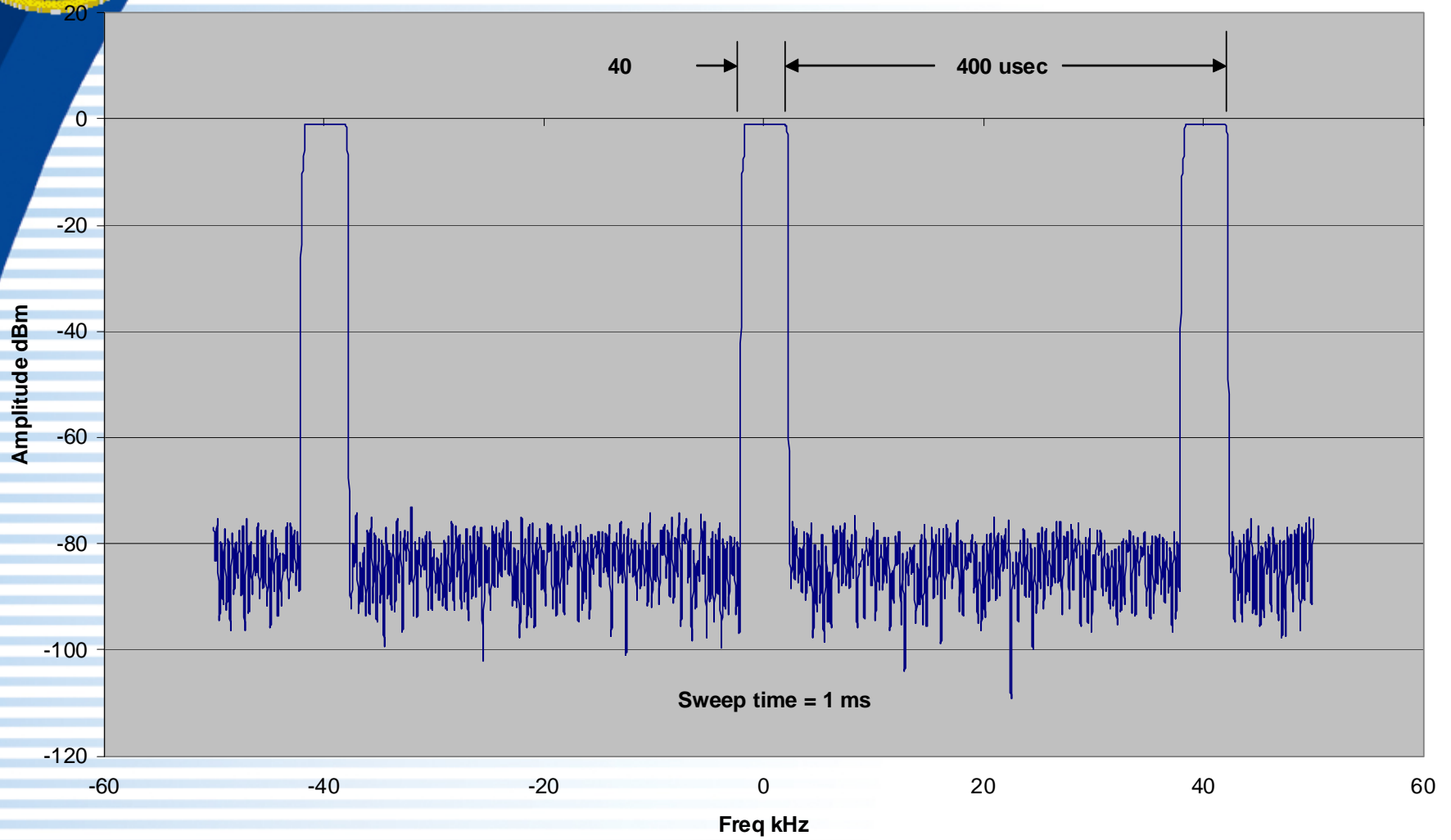


**40 usec 0 dBm Pulse, 400 usec Period
10 kHz RBW**



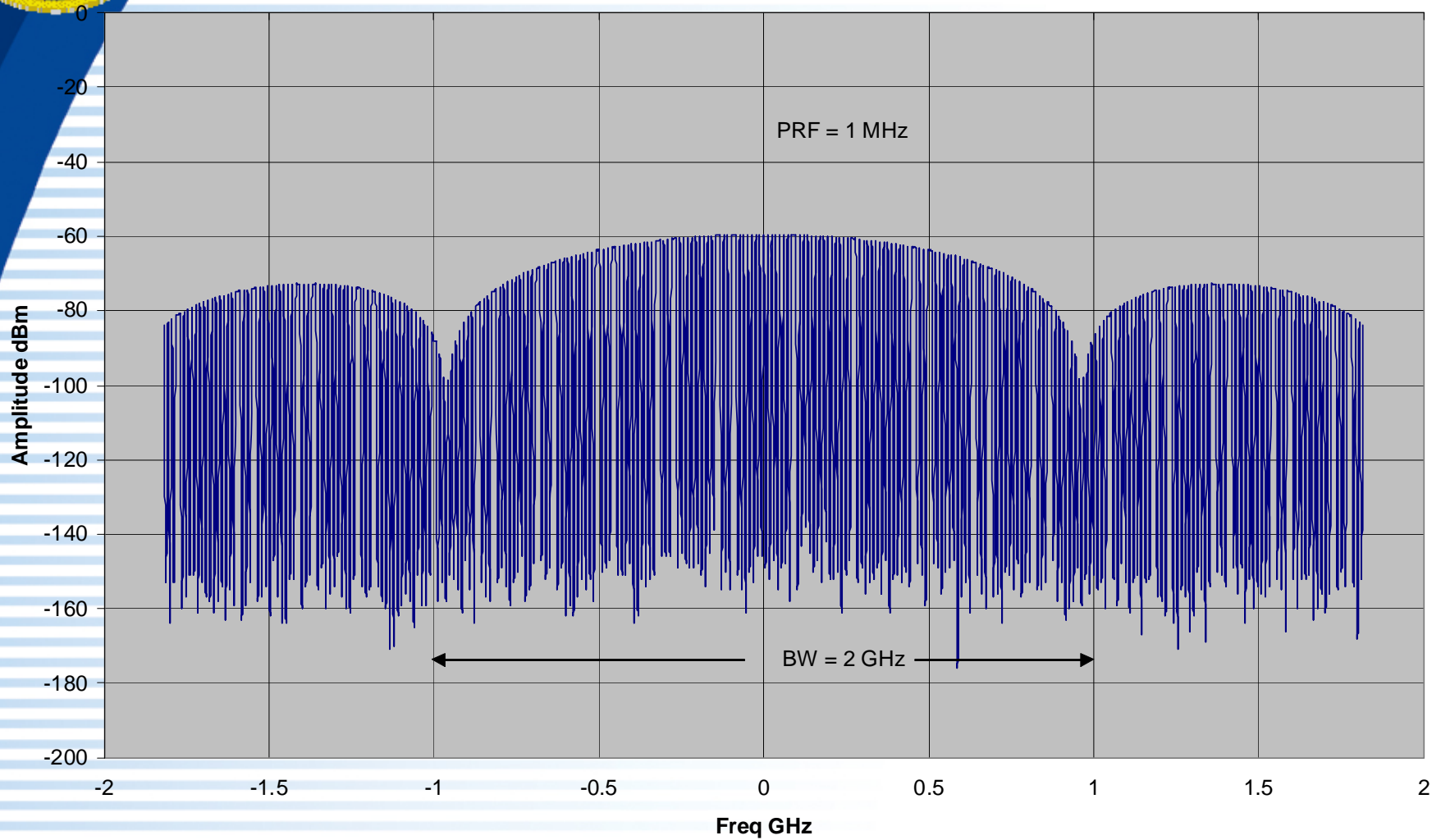


40 usec 0 dBm Pulse, 400 usec Period
1MHz RBW





1 nsec 0dBm Pulse, 1000 nsec Period
RBW = 100 kHz



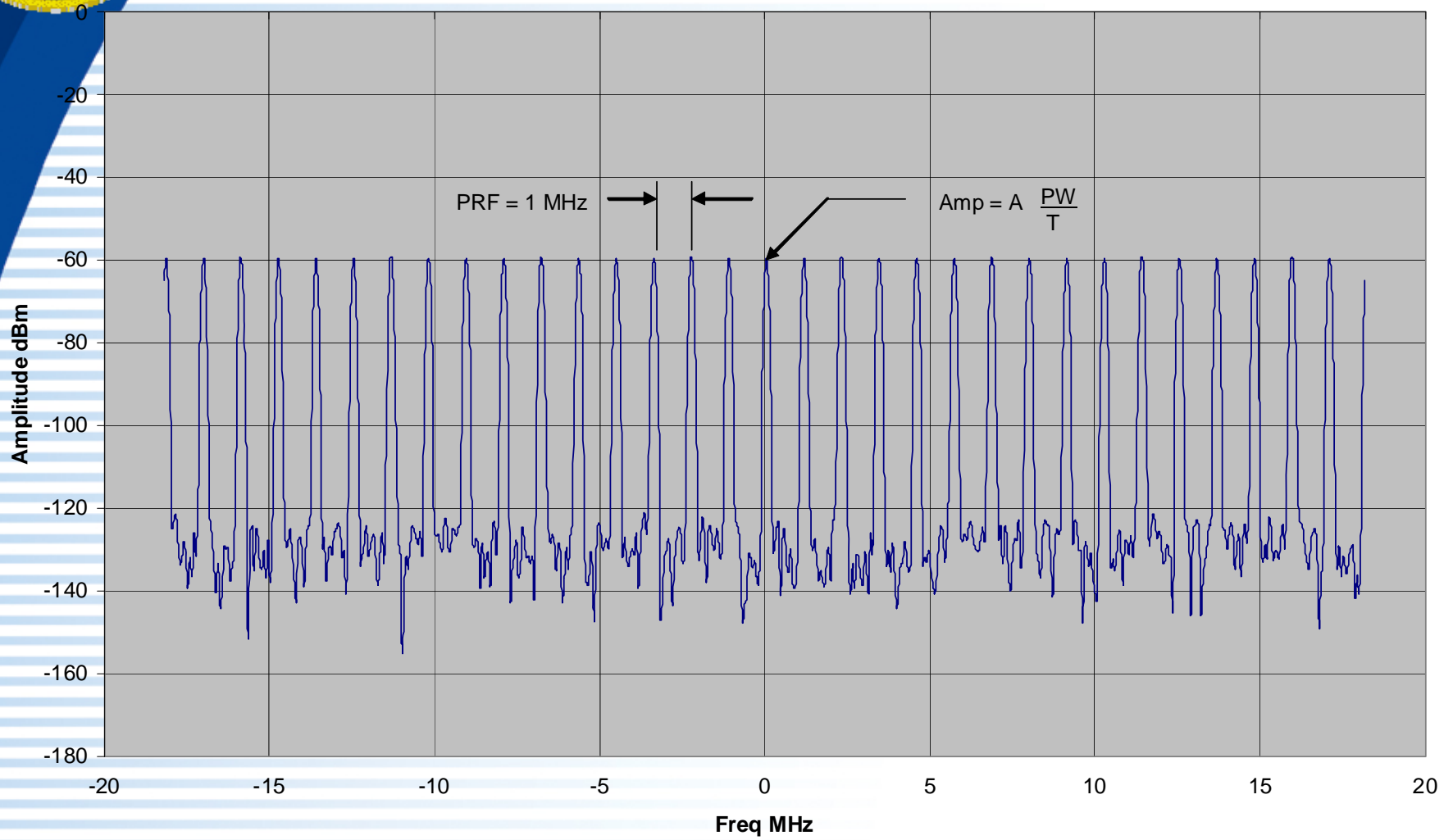


Pulse Desensitization Correction Factor PDCF

- Line spectrum
 - $RBW < PRF$
 - $PDCF = PW/T$
 - $PDCF_{dB} = 20 \text{ Log } PW/T$
 - Pulse amplitude = center line amp – $PDCF_{dB}$
- Pulse spectrum
 - $RBW > PRF$
 - $PDCF_{dB} = 20 \text{ Log } PW * RBW_{imp}$



1 nsec 0dBm Pulse, 1000 nsec Period
RBW = 100 kHz





Common Errors

- Assuming peak detector yields peak pulse amplitude
- Confusing average detector with time average of pulsed signal
- Comparing peak pulse amplitude to average value rather than average limit
- Applying averaging of 15.35(c) to peak pulse amplitude of 15.35(b)



References

- Agilent Application Note 150-2
- ANSI C63.10, Annex C
- Public Notice DA: 04-3946
 - http://hraunfoss.fcc.gov/edocs_public/attachmatch/DA-04-3946A1.pdf



Questions and Answers

Thanks!