Pulse Emission Measurements Part 15

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Pulse train

\[ T \]

100 ms

100 ms
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 = \( \frac{t_1 + t_2 + t_3 + \ldots + t_n}{T} \)
  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

$A \frac{PW}{T} = \text{Avg}$

$\frac{1}{PW} \xrightarrow{0} \frac{1}{T} \xrightarrow{\frac{1}{PW}} = \text{PRF}$
40 usec 0 dBm Pulse, 400 usec Period
100 Hz RBW

PRF = 2.5 kHz

BW = 50 kHz
April 5 - 6, 2011 TCB Workshop

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

PRF = 2.5 kHz
BW = 50 kHz
40 usec 0 dBm Pulse, 400 usec Period
10 kHz RBW
40 usec 0 dBm Pulse, 400 usec Period
1MHz RBW

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

PRF = 1 MHz

BW = 2 GHz
Pulse Desensitization Correction Factor PDCF

- **Line spectrum**
  - RBW < PRF
  - PDCF = PW/T
  - PDCFdB = 20 Log PW/T
  - Pulse amplitude = center line amp – PDCFdB

- **Pulse spectrum**
  - RBW > PRF
  - PDCFdB = 20 Log PW * RBWimp
1 nsec 0dBm Pulse, 1000 nsec Period
RBW = 100 kHz

PRF = 1 MHz
Amp = A PW/T
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
Questions and Answers

Thanks!