White Paper

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# Burst Detect

## Spectrum Master™ and VNA Master™

By Steve Thomas

Burst detect is a sweep method that makes it easy to see short-duration, bursty signals, such as those emanating from an improperly installed cell phone booster. It can also show the envelope of a Wi-Fi signal – which is basically anything that occurs infrequently. A 1% duty cycle is enough to detect a bursty signal.

As many as 20,000 measurements per second – thousands of times faster than a normal FFT – can be made with the Burst Detect method. The result is that users can see a 200 microsecond pulse every time, making it much easier to find burst signals.

Burst detection is accomplished by capturing a portion of the spectrum using digital signal processing techniques and is not a swept measurement; the entire span to be observed is captured simultaneously. The captured span can be as wide as 15 MHz and as narrow as 20 kHz. Within the digital signal processor, a max hold operation is performed on the spectra. About 8 times a second the display is updated with the latest max hold values, which are then reset. The display update rate is high enough so that the hardware max hold is useful and fast enough that the display updates frequently; changes in the signal being observed will be quickly seen. This automatic operation allows a user to do direction finding on a very low duty cycle signal, something that had not been practical previously. While Burst Detect can be used with several detection modes, for most practical purposes, using the peak detector makes the most sense.

The RBW is automatically set when using Burst Detect per the following table. When using Burst Detect, the VBW is always set to 10 MHz.

| **Bandwidth** | **RBW** |
|---|---|
| 10 to 15 MHz | 100 kHz |
| 3 MHz to 9.999 MHz | 30 kHz |
| 1 MHz to 2.999 MHz | 10 kHz |
| 300 kHz to 999 kHz | 3 kHz |
| 100 kHz to 299 kHz | 1 kHz |
| 20 kHz to 99 kHz | 300 Hz |

Below a span of 20 kHz Burst Detect isn't used.

After the presence of an interfering signal is detected, you may be able to gain significant insight by looking at the signal in zero span. Doing so lets you see timing information for the signal but doesn't show you the spectrum, so it is generally a step later in the process of identifying a signal. Here is an example of a signal measured in zero span. To see a stable presentation of the signal video triggering is used with the trigger amplitude set to about 15 dB below the peak of the signal, triggering on the rising slope (which is the default) and the trigger delay set to –1% to place the rising edge of the signal on screen.

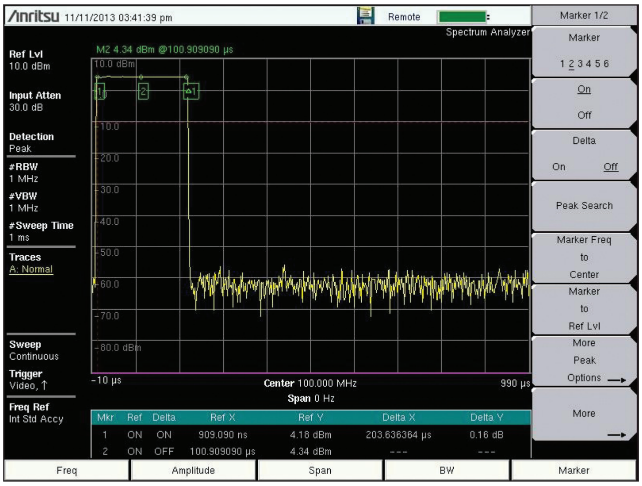



*Figure 1. Narrow signal in zero span*

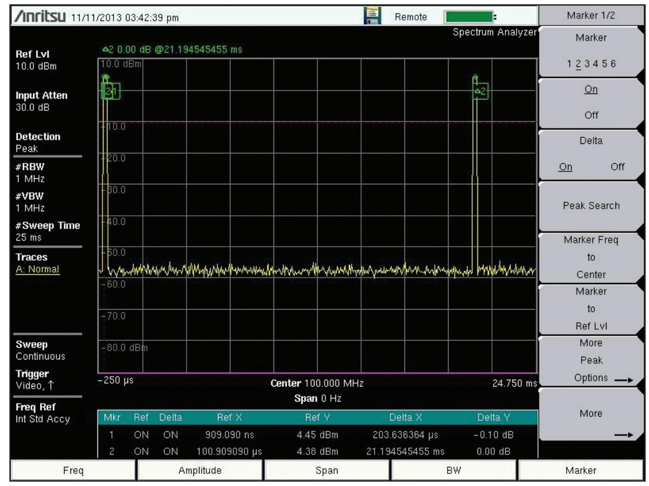



*Figure 2. Narrow Signal showing low duty cycle in zero span*

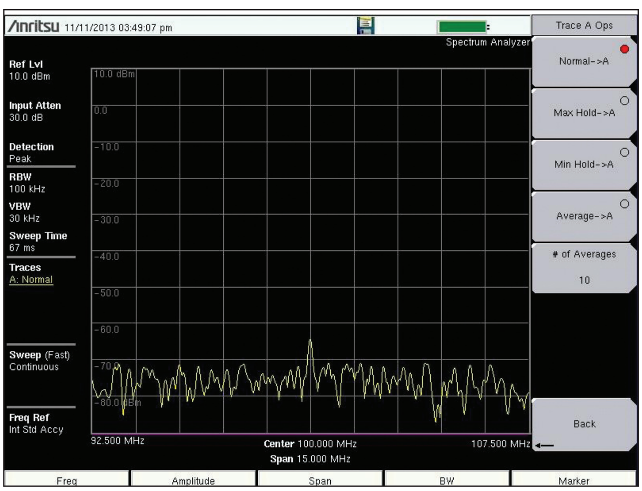



*Figure 3. Low duty cycle signal with peak detector*

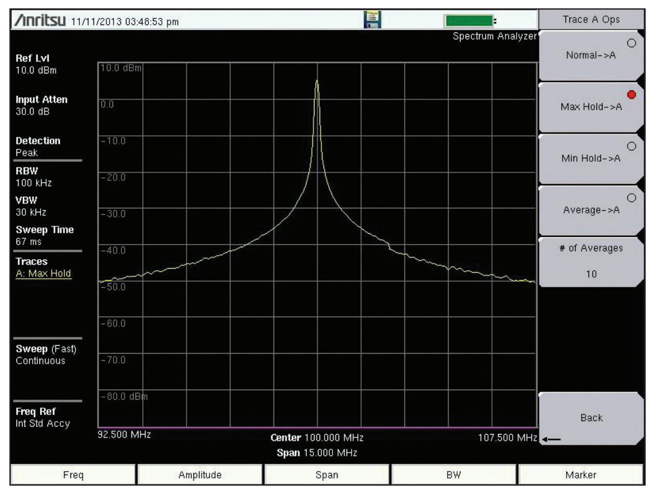
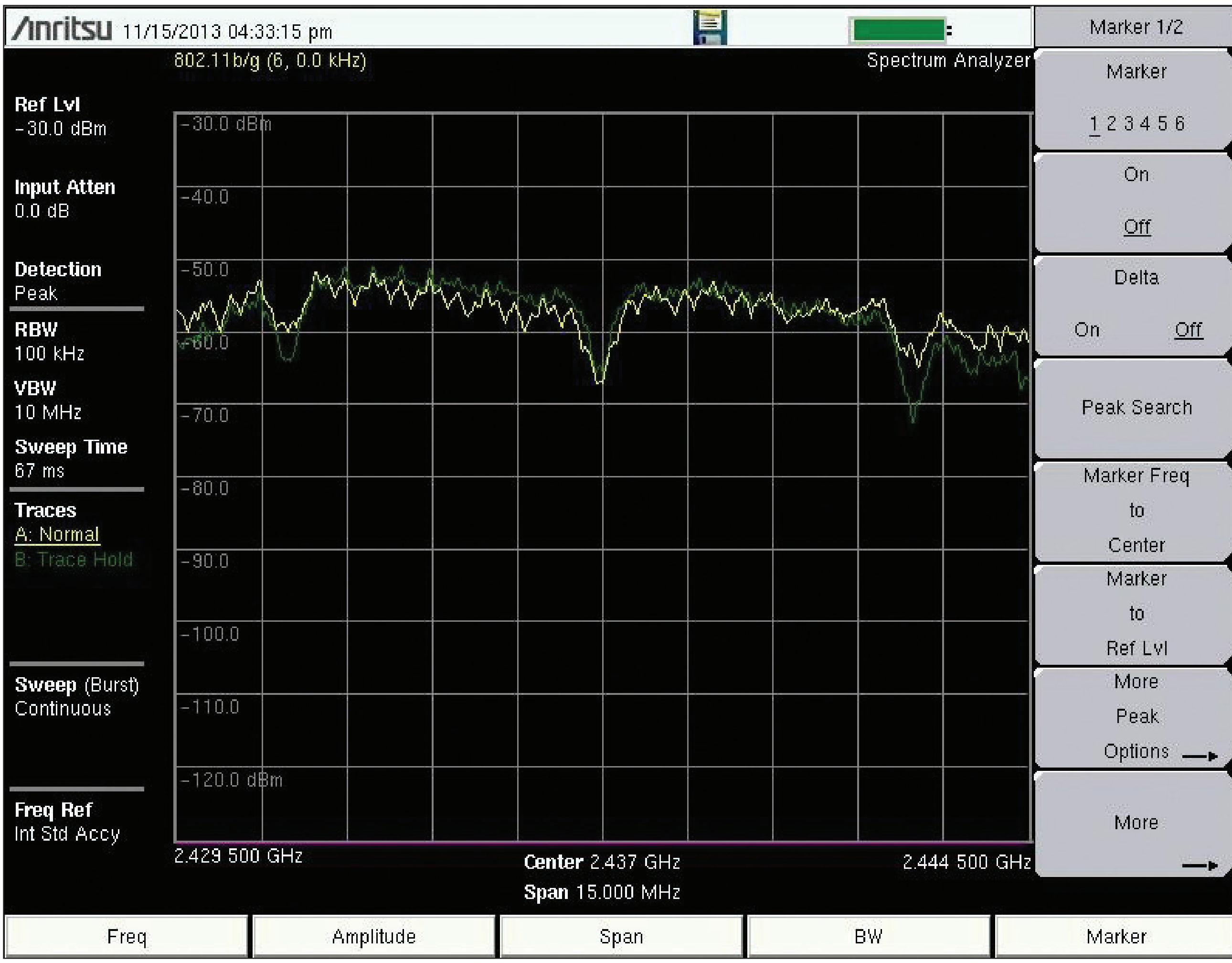



*Figure 4. Low duty cycle signal using Burst Detect*

The signal, when measured using the peak detector in Fast, Performance, or No FFT sweep mode, often shows nothing as shown in Figure 3 and sometimes will show a portion of the signal. Using one of those detection modes, Performance and No FFT, will start to show portions of the signal quickly, but it takes a long time to fill in the shape of the signal. Fast Sweep mode fills in wide sections of the display at a time, but it also takes quite a while to see the entire signal. Also, Max Hold is not particularly useful when doing direction finding because of the need to clear max hold whenever you want to take a new measurement. This makes interference hunting or other direction finding very tedious.

Measuring the envelope of a Wi-Fi signal is easy and quick with Burst Detect. In the followingpicture, the green trace is a Wi-Fi signal that has been captured using Max Hold. The yellowtrace is a live trace using Burst Detect. The live Burst Detect trace is updated every 67 ms,whereas the Max Hold trace required from about three to about fourteen seconds dependingon whether the measurement was done using fast sweep, performance sweep, or No FFTsweep. One minor limitation of Burst Detect is that the maximum specified span is 15 MHz.




For anyone desiring to look for signals that are repetitive but occur infrequently, Burst Detect is a very useful feature.

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Specifications are subject to change without notice.


**• United States**
**Anritsu Company**
1155 East Collins Boulevard, Suite 100,
Richardson, TX, 75081 U.S.A.
Toll Free: 1-800-267-4878
Phone: +1-972-644-1777
Fax: +1-972-671-1877

**• Canada**
**Anritsu Electronics Ltd.**
700 Silver Seven Road, Suite 120,
Kanata, Ontario K2V 1C3, Canada
Phone: +1-613-591-2003
Fax: +1-613-591-1006

**• Brazil**
**Anritsu Electrônica Ltda.**
Praça Amadeu Amaral, 27 - 1 Andar
01327-010 - Bela Vista - Sao Paulo - SP - Brazil
Phone: +55-11-3283-2511
Fax: +55-11-3288-6940

**• Mexico**
**Anritsu Company, S.A. de C.V.**
Av. Ejército Nacional No. 579 Piso 9, Col. Granada
11520 México, D.F., México
Phone: +52-55-1101-2370
Fax: +52-55-5254-3147

**• United Kingdom**
**Anritsu EMEA Ltd.**
200 Capability Green, Luton, Bedfordshire LU1 3LU, U.K.
Phone: +44-1582-433280
Fax: +44-1582-731303

**• France**
**Anritsu S.A.**
12 avenue du Québec, Batiment Iris 1-Silic 612,
91140 Villebon-sur-Yvette, France
Phone: +33-1-60-92-15-50
Fax: +33-1-64-46-10-65

**• Germany**
**Anritsu GmbH**
Nemetschek Haus, Konrad-Zuse-Platz 1
81829 München, Germany
Phone: +49-89-442308-0
Fax: +49-89-442308-55

**• Italy**
**Anritsu S.r.l.**
Via Elio Vittorini 129, 00144 Roma Italy
Phone: +39-06-509-9711
Fax: +39-06-502-2425

**• Sweden**
**Anritsu AB**
Kistagången 20B, 164 40 KISTA, Sweden
Phone: +46-8-534-707-00
Fax: +46-8-534-707-30

**• Finland**
**Anritsu AB**
Teknobulevardi 3-5, FI-01530 VANTAA, Finland
Phone: +358-20-741-8100
Fax: +358-20-741-8111

**• Denmark**
**Anritsu A/S**
Kay Fiskers Plads 9, 2300 Copenhagen S, Denmark
Phone: +45-7211-2200
Fax: +45-7211-2210

**• Russia**
**Anritsu EMEA Ltd.**
**Representation Office in Russia**
Tverskaya str. 16/2, bld. 1, 7th floor.
Moscow, 125009, Russia
Phone: +7-495-363-1694
Fax: +7-495-935-8962

**• Spain**
**Anritsu EMEA Ltd.**
**Representation Office in Spain**
Edificio Cuzco IV, Po. de la Castellana, 141, Pta. 5
28046, Madrid, Spain
Phone: +34-915-726-761
Fax: +34-915-726-621

**• United Arab Emirates**
**Anritsu EMEA Ltd.**
**Dubai Liaison Office**
P O Box 500413 - Dubai Internet City
Al Thuraya Building, Tower 1, Suite 701, 7th floor
Dubai, United Arab Emirates
Phone: +971-4-3670352
Fax: +971-4-3688460

**• India**
**Anritsu India Pvt Ltd.**
2nd & 3rd Floor, #837/1, Binnamangla 1st Stage,
Indiranagar, 100ft Road, Bangalore - 560038, India
Phone: +91-80-4058-1300
Fax: +91-80-4058-1301

**• Singapore**
**Anritsu Pte. Ltd.**
11 Chang Charn Road, #04-01, Shriro House
Singapore 159640
Phone: +65-6282-2400
Fax: +65-6282-2533

**• P. R. China (Shanghai)**
**Anritsu (China) Co., Ltd.**
27th Floor, Tower A,
New Caohejing International Business Center
No. 391 Gui Ping Road Shanghai, Xu Hui Di District,
Shanghai 200233, P.R. China
Phone: +86-21-6237-0898
Fax: +86-21-6237-0899

**• P. R. China (Hong Kong)**
**Anritsu Company Ltd.**
Unit 1006-7, 10/F., Greenfield Tower, Concordia Plaza,
No. 1 Science Museum Road, Tsim Sha Tsui East,
Kowloon, Hong Kong, P. R. China
Phone: +852-2301-4980
Fax: +852-2301-3545

**• Japan**
**Anritsu Corporation**
8-5, Tamura-cho, Atsugi-shi,
Kanagawa, 243-0016 Japan
Phone: +81-46-296-6509
Fax: +81-46-225-8352

**• Korea**
**Anritsu Corporation, Ltd.**
5FL, 235 Pangyoyeok-ro, Bundang-gu, Seongnam-si,
Gyeonggi-do, 13494 Korea
Phone: +82-31-696-7750
Fax: +82-31-696-7751

**• Australia**
**Anritsu Pty Ltd.**
Unit 20, 21-35 Ricketts Road,
Mount Waverley, Victoria 3149, Australia
Phone: +61-3-9558-8177
Fax: +61-3-9558-8255

**• Taiwan**
**Anritsu Company Inc.**
7F, No. 316, Sec. 1, Neihu Rd., Taipei 114, Taiwan
Phone: +886-2-8751-1816
Fax: +886-2-8751-1817





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