Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(d) RF Conducted Spurious Emissions Requirements and Band Edge

Test Requirement: **15.247(d)** In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Test Procedure: For intentional radiators with a digital device portion which operates below 10 GHz, the spectrum was investigated as per §15.33(a)(1) and §15.33(a)(4); i.e., the lowest RF signal generated or used in the device up to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

The EUT was connected from the SMA connector to a spectrum analyzer. Testing was performed on Low, Mid and High Channels. A resolution bandwidth of 100kHz and video bandwidth of 300kHz were utilized.

For conducted band edge, a delta measurement was taken from the peak of the fundamental to the Band edge then compared to the limit.

See following pages for detailed test results with RF Conducted Spurious Emissions.

Test Results: The EUT was compliant with the Conducted Spurious Emission limits of **§15.247(d)**.

Test Engineer(s): 01/29/13

Test Date(s): Anderson Soungpanya

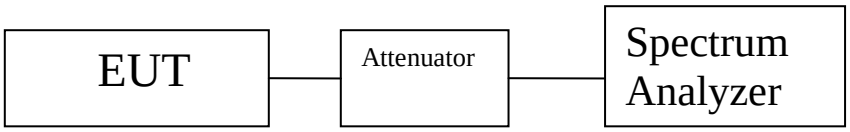
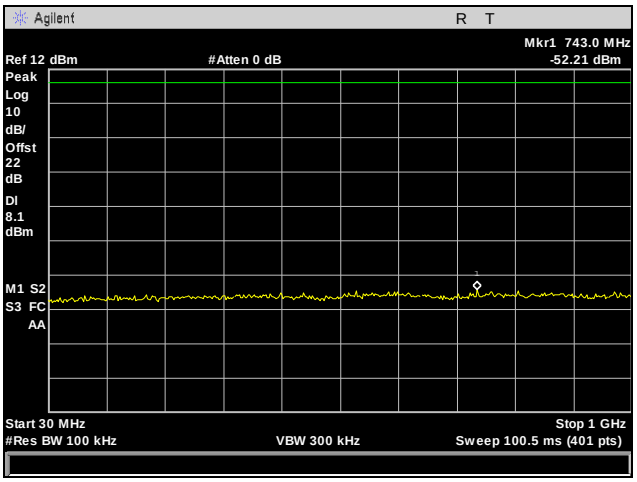
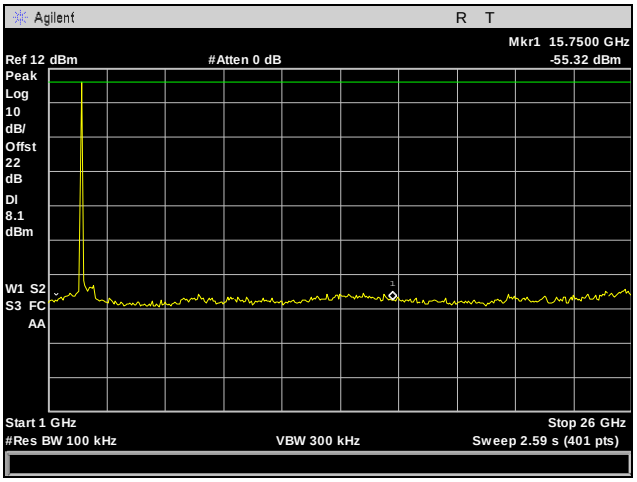


Figure 4. Block Diagram, Conducted Spurious Emissions Test Setup

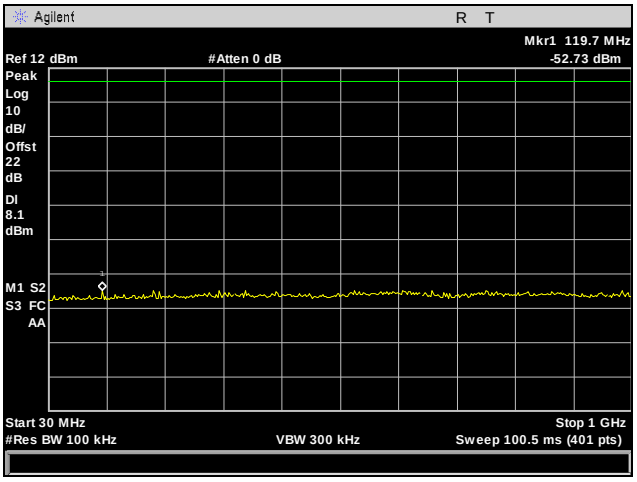
Conducted Spurious Emissions Test Results, 802.11b, 2.4 GHz



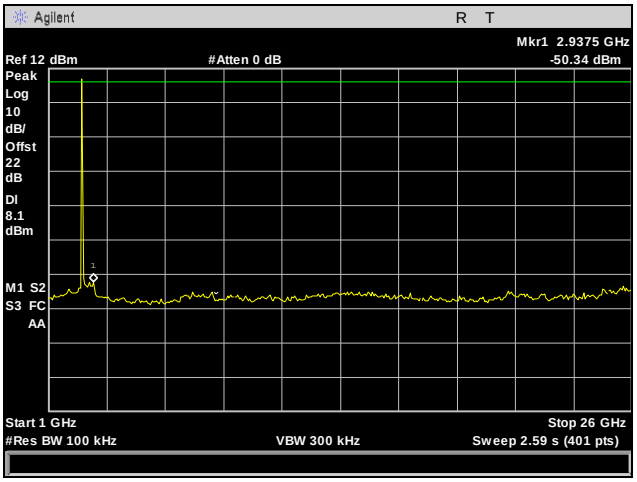
Plot 583. Conducted Spurious Emissions, 802.11b, 2412 MHz, Low Channel, 30 MHz - 1 GHz



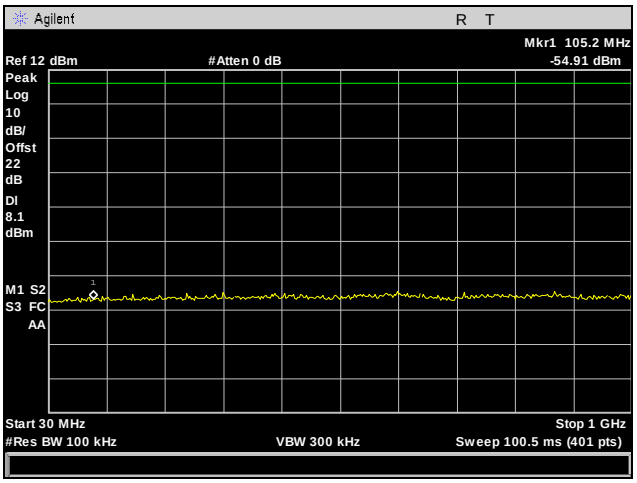
Plot 584. Conducted Spurious Emissions, 802.11b, 2412 MHz, Low Channel, 1 GHz - 26 GHz



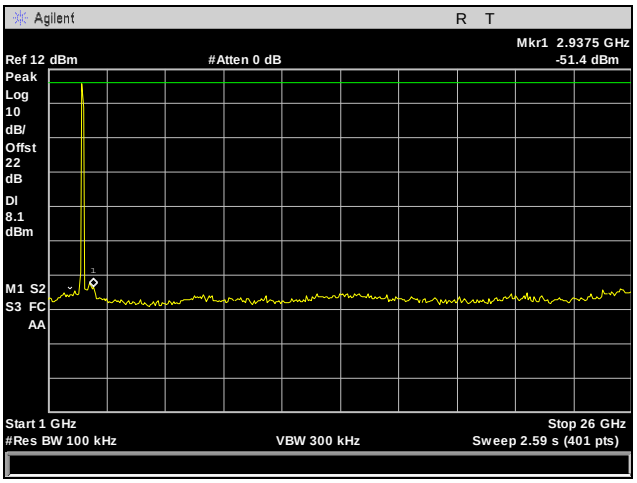
Plot 585. Conducted Spurious Emissions, 802.11b, 2437 MHz, Mid Channel, 30 MHz - 1 GHz



Plot 586. Conducted Spurious Emissions, 802.11b, 2437 MHz, Mid Channel, 1 GHz - 26 GHz

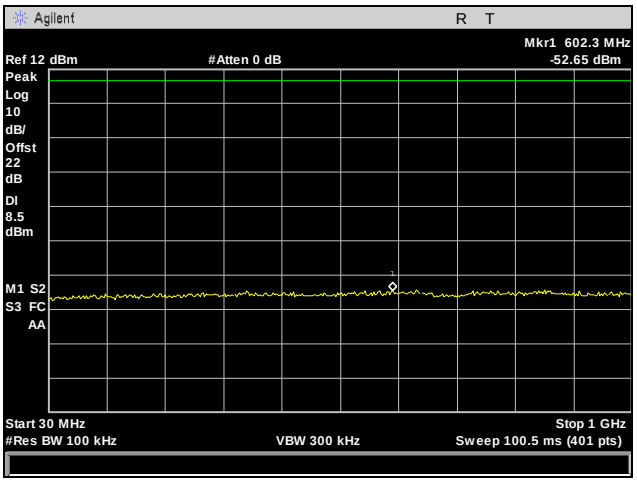


Plot 587. Conducted Spurious Emissions, 802.11b, 2462 MHz, High Channel, 30 MHz - 1 GHz

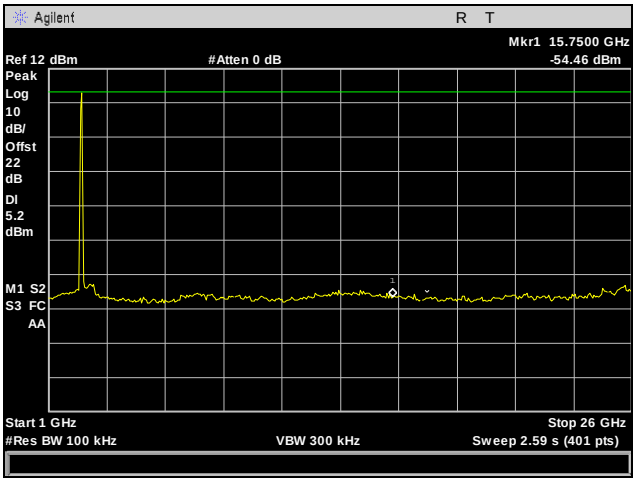


Plot 588. Conducted Spurious Emissions, 802.11b, 2462 MHz, High Channel, 1 GHz - 26 GHz

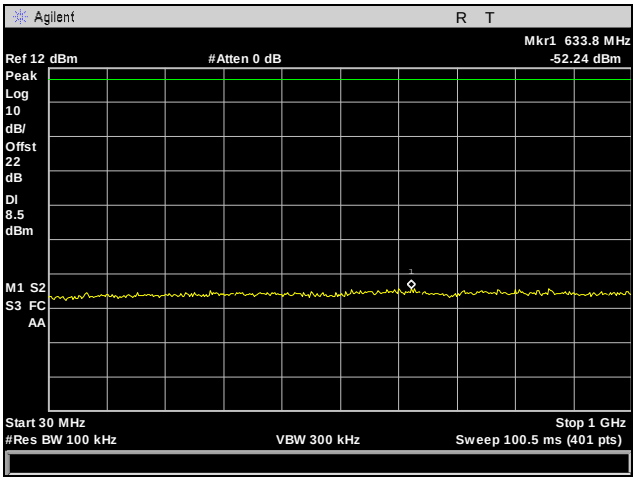
Conducted Spurious Emissions Test Results, 802.11g, 2.4 GHz



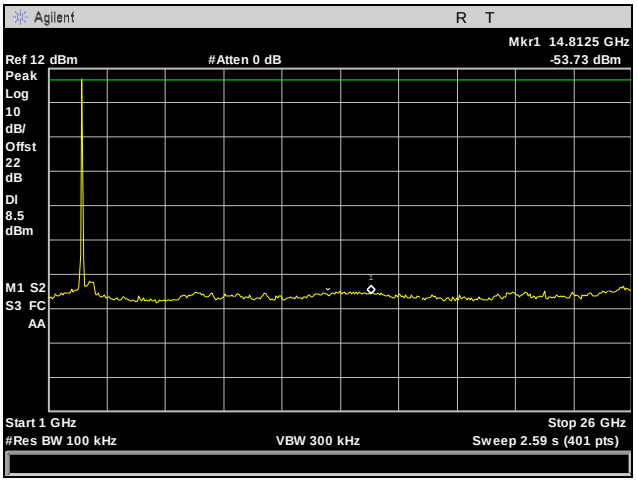
Plot 589. Conducted Spurious Emissions, 802.11g, 2412 MHz, Low Channel, 30 MHz - 1 GHz



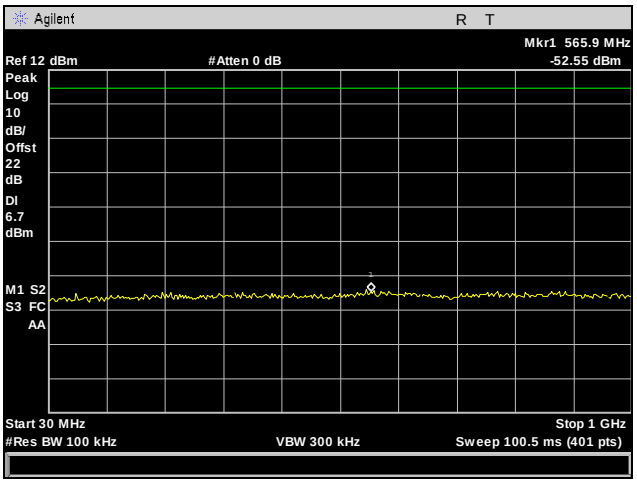
Plot 590. Conducted Spurious Emissions, 802.11g, 2412 MHz, Low Channel, 1 GHz - 26 GHz



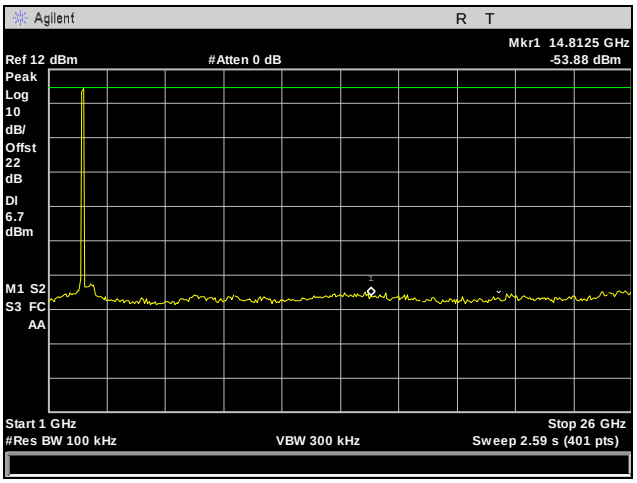
Plot 591. Conducted Spurious Emissions, 802.11g, 2437 MHz, Mid Channel, 30 MHz - 1 GHz



Plot 592. Conducted Spurious Emissions, 802.11g, 2437 MHz, Mid Channel, 1 GHz - 26 GHz

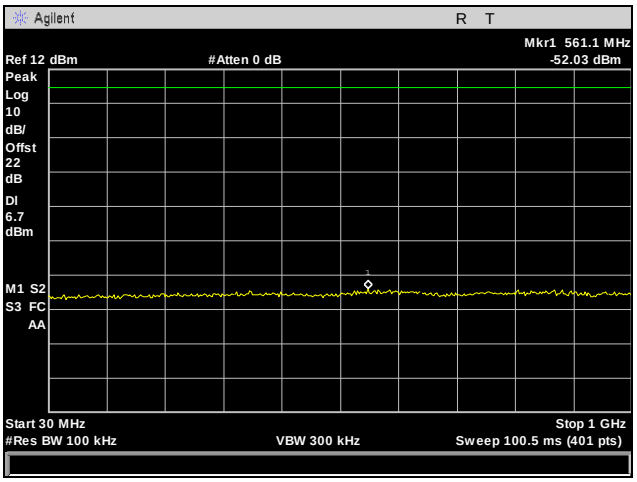


Plot 593. Conducted Spurious Emissions, 802.11g, 2462 MHz, High Channel, 30 MHz - 1 GHz

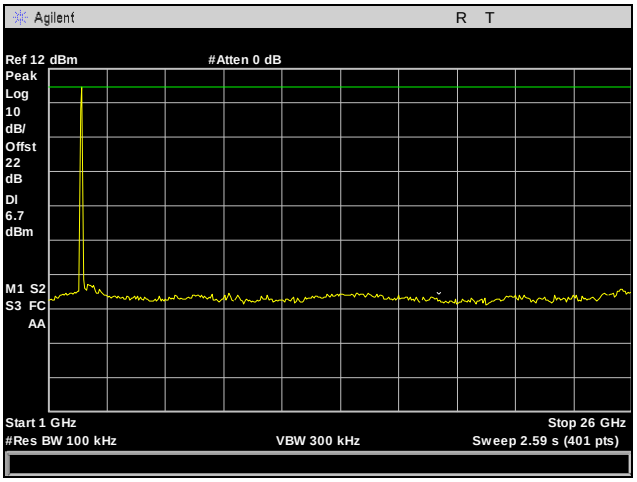


Plot 594. Conducted Spurious Emissions, 802.11g, 2462 MHz, High Channel, 1 GHz - 26 GHz

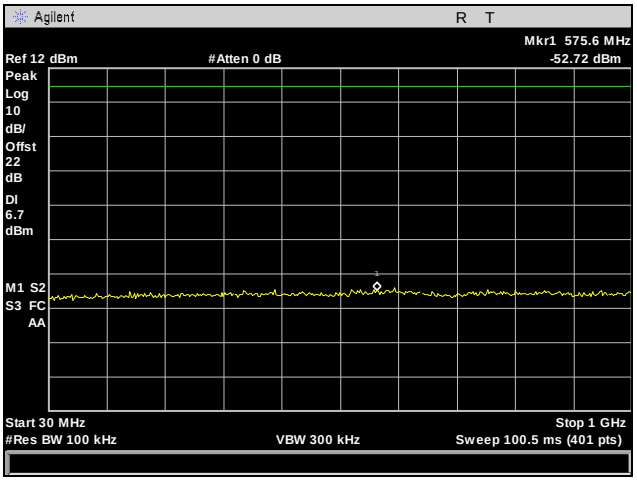
Conducted Spurious Emissions Test Results, 802.11n 20 MHz, Port 1, 2.4 GHz



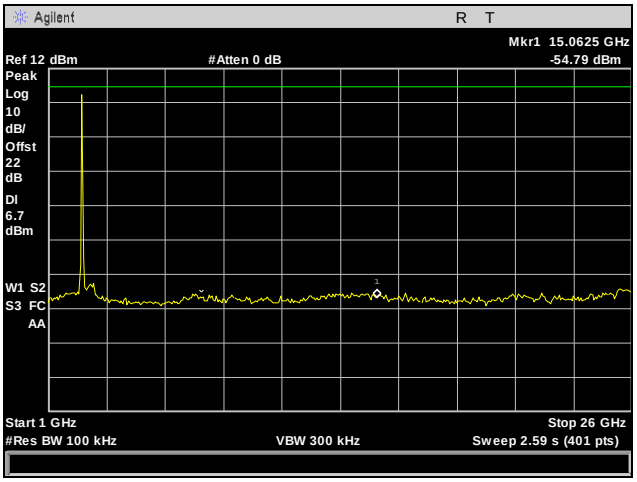
Plot 595. Conducted Spurious Emissions, 802.11n 20 MHz, 2412 MHz, Low Channel, Port 1, 30 MHz, 1 GHz



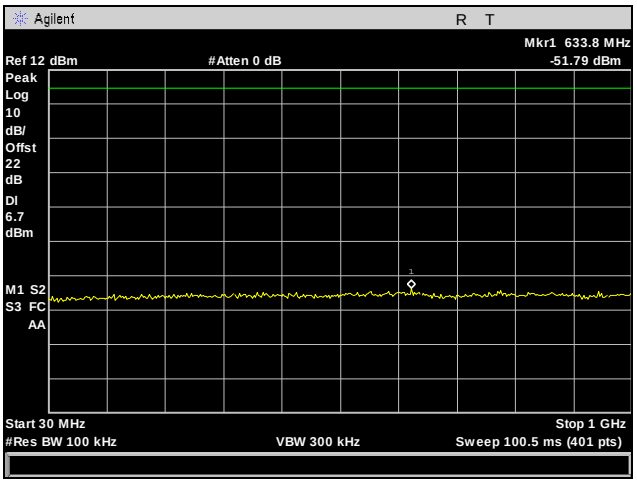
Plot 596. Conducted Spurious Emissions, 802.11n 20 MHz, 2412 MHz, Low Channel, Port 1, 1 GHz - 26 GHz



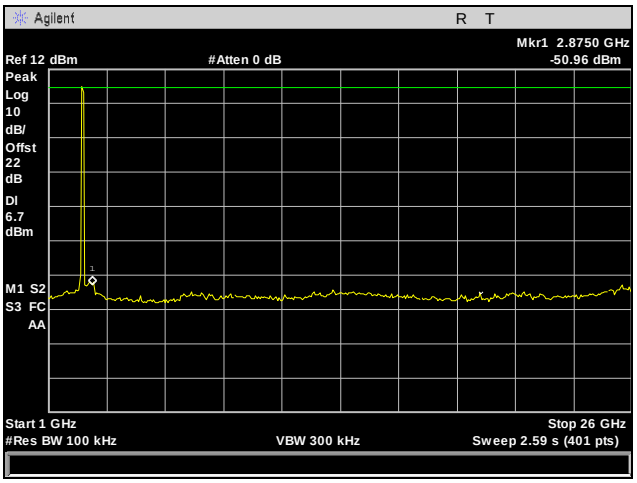
Plot 597. Conducted Spurious Emissions, 802.11n 20 MHz, 2437 MHz, Mid Channel, Port 1, 30 MHz, 1 GHz



Plot 598. Conducted Spurious Emissions, 802.11n 20 MHz, 2437 MHz, Mid Channel, Port 1, 1 GHz - 26 GHz

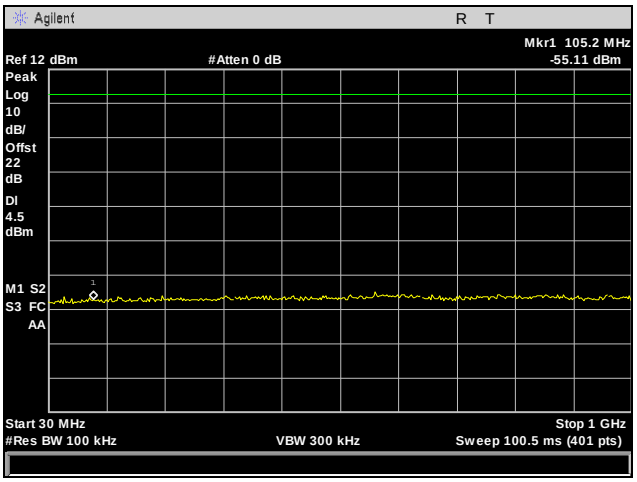


Plot 599. Conducted Spurious Emissions, 802.11n 20 MHz, 2462 MHz, High Channel, Port 1, 30 MHz, 1 GHz

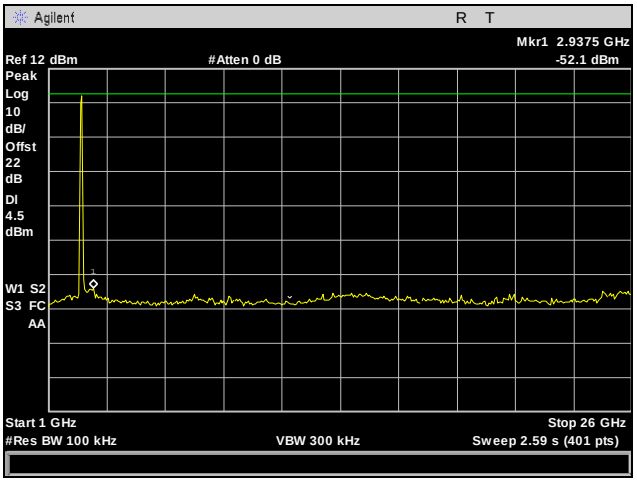


Plot 600. Conducted Spurious Emissions, 802.11n 20 MHz, 2462 MHz, High Channel, Port 1, 1 GHz - 26 GHz

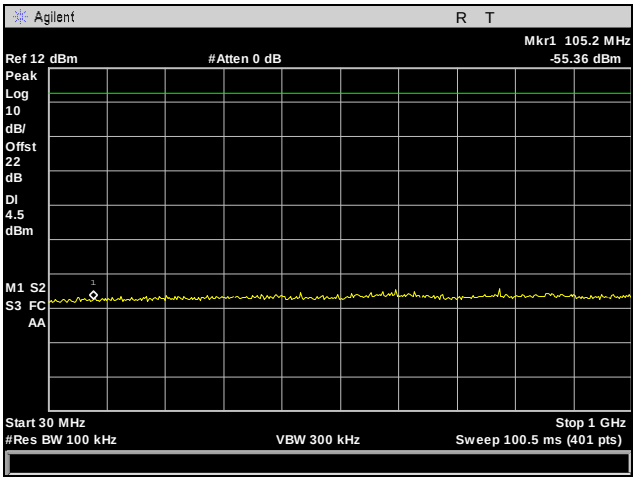
Conducted Spurious Emissions Test Results, 802.11n 20 MHz, Port 2, 2.4 GHz



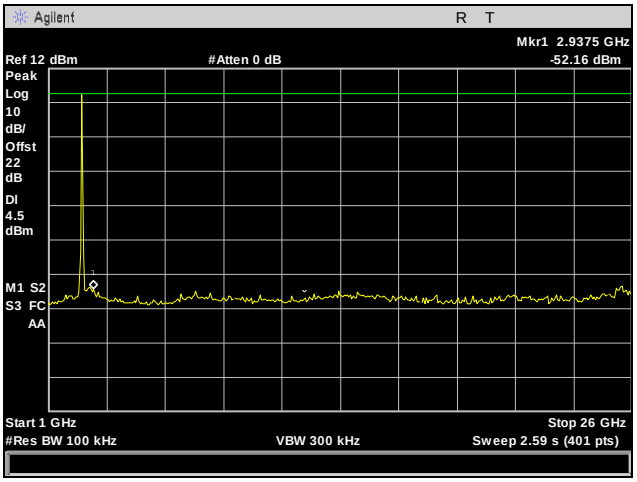
Plot 601. Conducted Spurious Emissions, 802.11n 20 MHz, 2412 MHz, Low Channel, Port 2, 30 MHz, 1 GHz



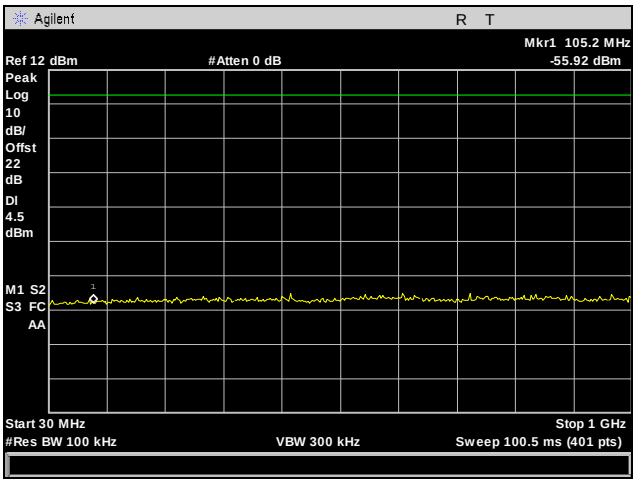
Plot 602. Conducted Spurious Emissions, 802.11n 20 MHz, 2412 MHz, Low Channel, Port 2, 1 GHz - 26 GHz



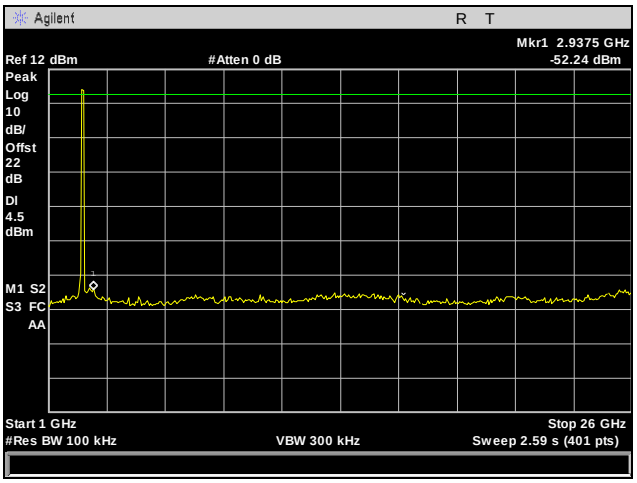
Plot 603. Conducted Spurious Emissions, 802.11n 20 MHz, 2437 MHz, Mid Channel, Port 2, 30 MHz, 1 GHz



Plot 604. Conducted Spurious Emissions, 802.11n 20 MHz, 2437 MHz, Mid Channel, Port 2, 1 GHz - 26 GHz

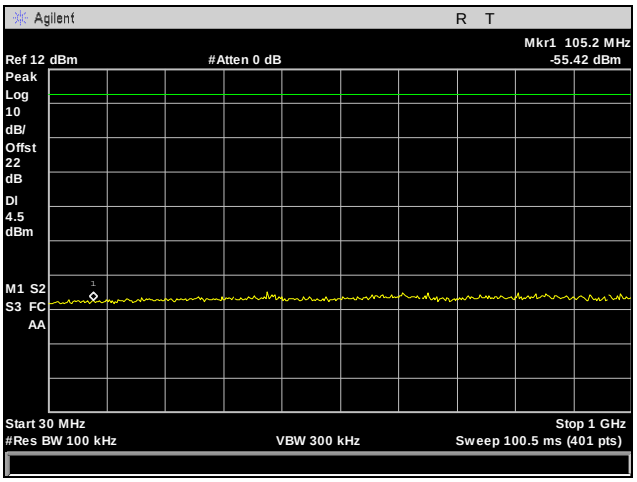


Plot 605. Conducted Spurious Emissions, 802.11n 20 MHz, 2462 MHz, High Channel, Port 2, 30 MHz, 1 GHz

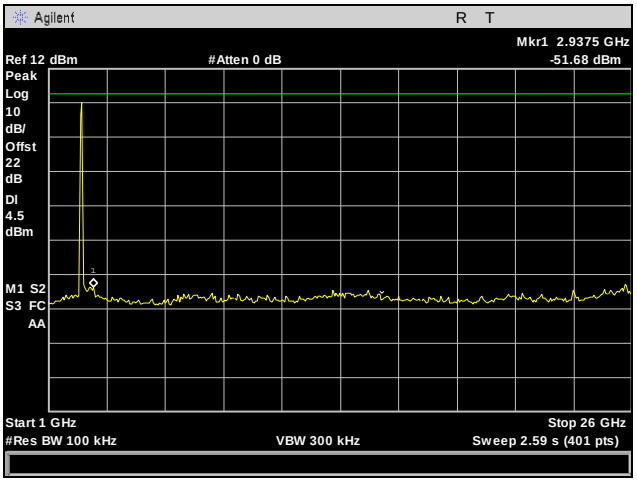


Plot 606. Conducted Spurious Emissions, 802.11n 20 MHz, 2462 MHz, High Channel, Port 2, 1 GHz - 26 GHz

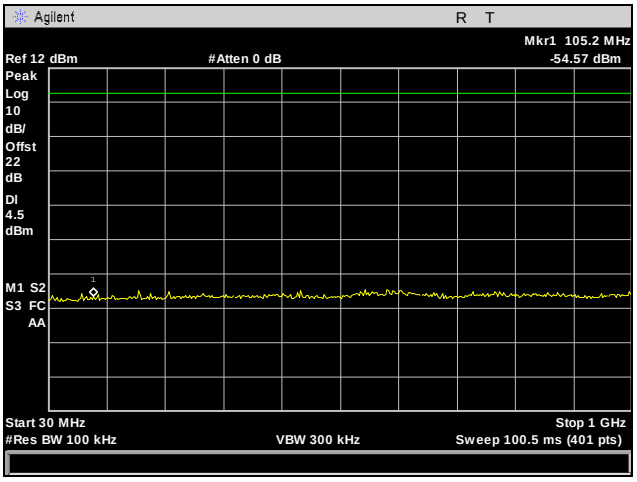
Conducted Spurious Emissions Test Results, 802.11n 20 MHz, Port 3, 2.4 GHz



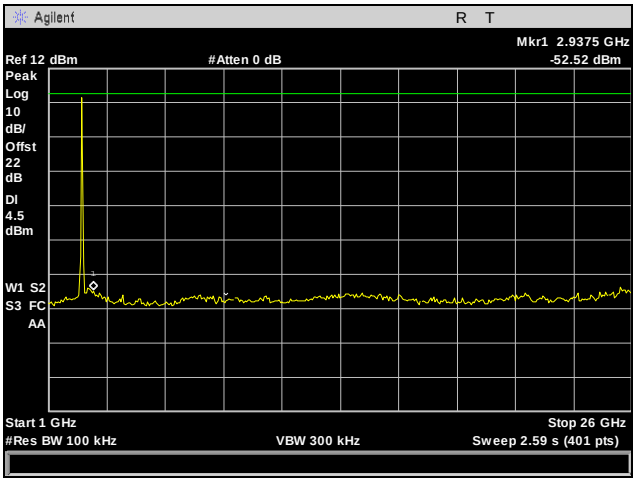
Plot 607. Conducted Spurious Emissions, 802.11n 20 MHz, 2412 MHz, Low Channel, Port 3, 30 MHz, 1 GHz



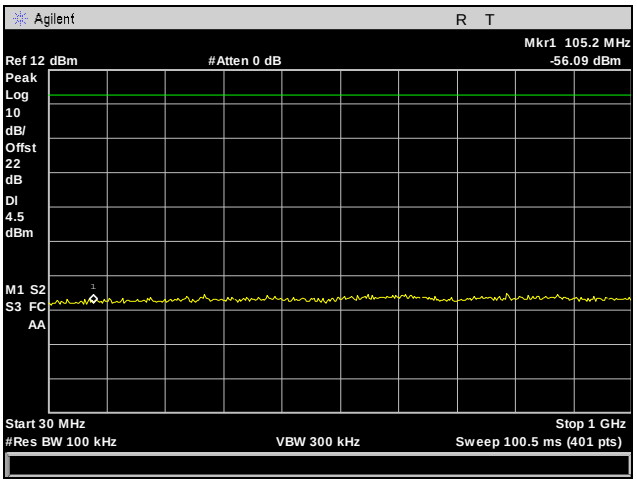
Plot 608. Conducted Spurious Emissions, 802.11n 20 MHz, 2412 MHz, Low Channel, Port 3, 1 GHz - 26 GHz



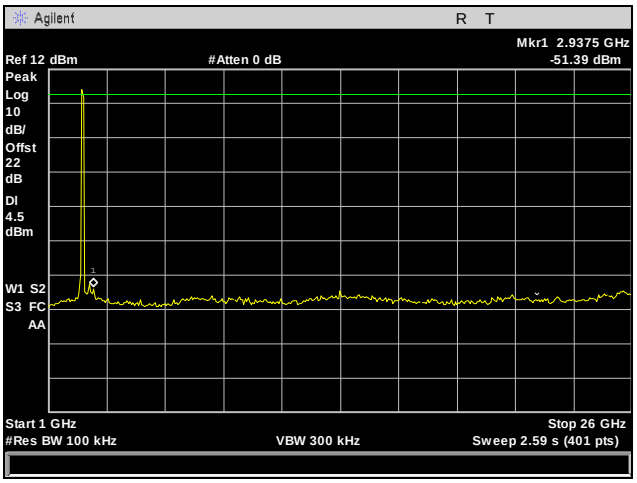
Plot 609. Conducted Spurious Emissions, 802.11n 20 MHz, 2437 MHz, Mid Channel, Port 3, 30 MHz, 1 GHz



Plot 610. Conducted Spurious Emissions, 802.11n 20 MHz, 2437 MHz, Mid Channel, Port 3, 1 GHz - 26 GHz

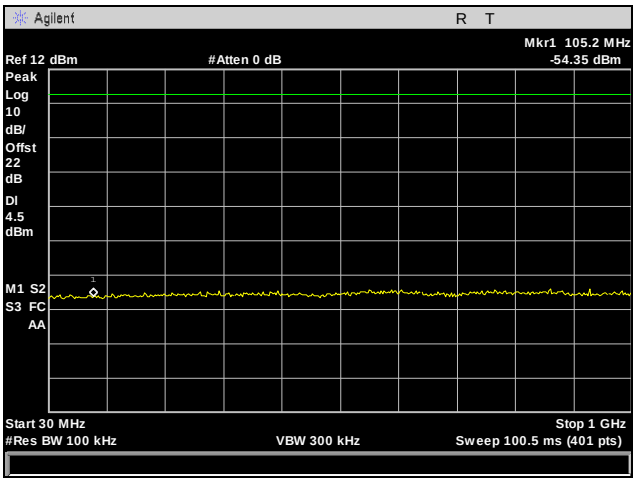


Plot 611. Conducted Spurious Emissions, 802.11n 20 MHz, 2462 MHz, High Channel, Port 3, 30 MHz, 1 GHz

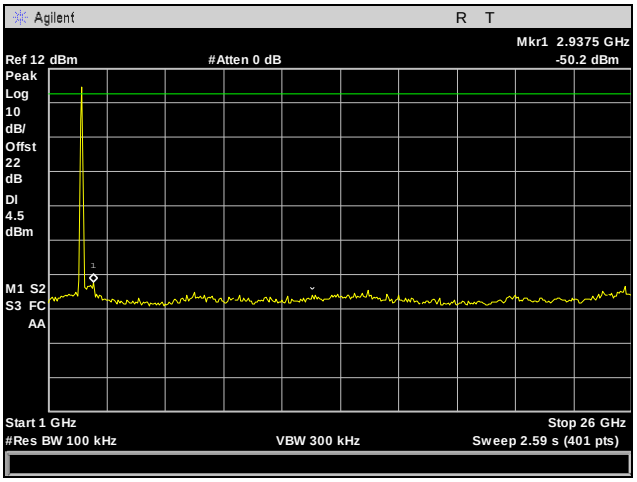


Plot 612. Conducted Spurious Emissions, 802.11n 20 MHz, 2462 MHz, High Channel, Port 3, 1 GHz - 26 GHz

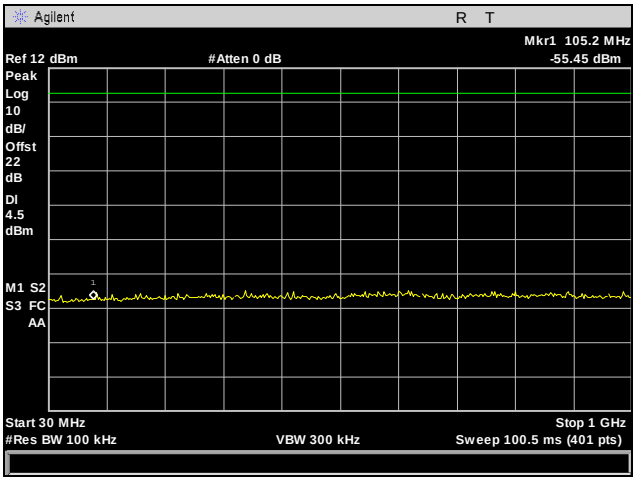
Conducted Spurious Emissions Test Results, 802.11n 40 MHz, Port 1, 2.4 GHz



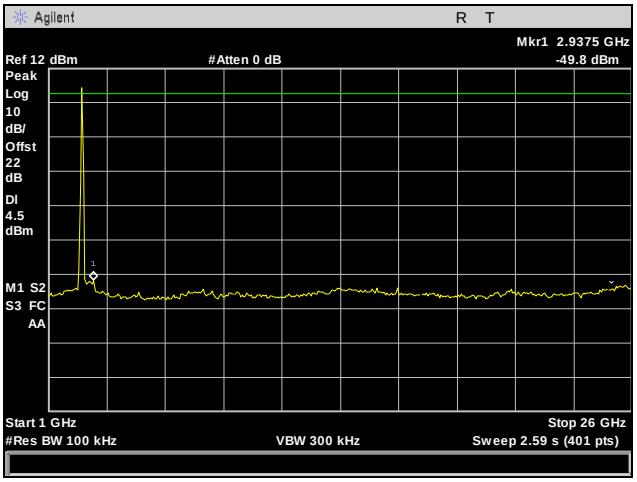
Plot 613. Conducted Spurious Emissions, 802.11n 40 MHz, 2422 MHz, Low Channel, Port 1, 30 MHz - 1 GHz



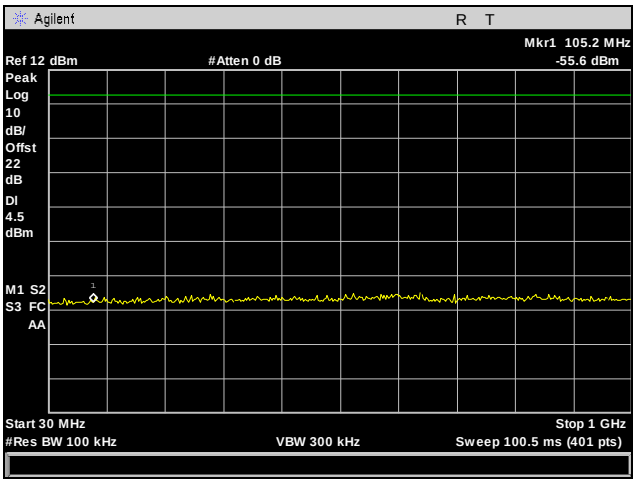
Plot 614. Conducted Spurious Emissions, 802.11n 40 MHz, 2422 MHz, Low Channel, Port 1, 1 GHz - 26 GHz



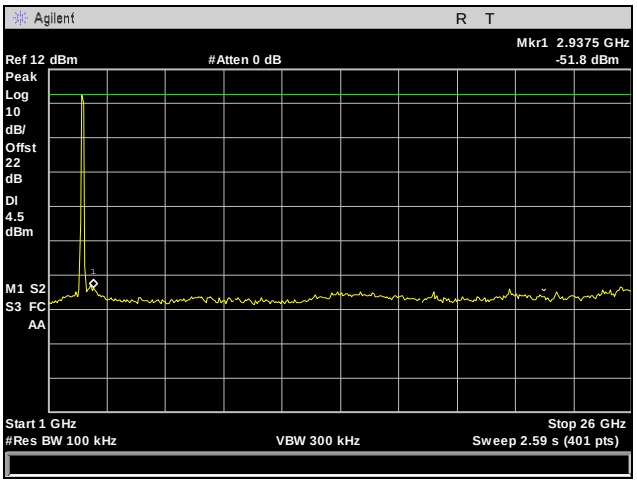
Plot 615. Conducted Spurious Emissions, 802.11n 40 MHz, 2437 MHz, Mid Channel, Port 1, 30 MHz - 1 GHz



Plot 616. Conducted Spurious Emissions, 802.11n 40 MHz, 2437 MHz, Mid Channel, Port 1, 1 GHz - 26 GHz

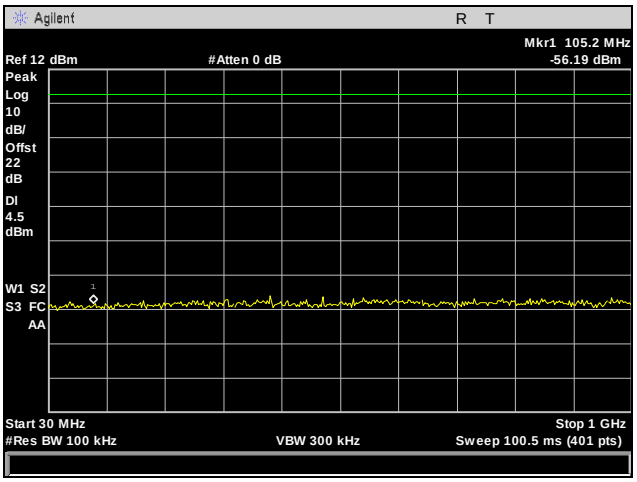


Plot 617. Conducted Spurious Emissions, 802.11n 40 MHz, 2452 MHz, High Channel, Port 1, 30 MHz - 1 GHz

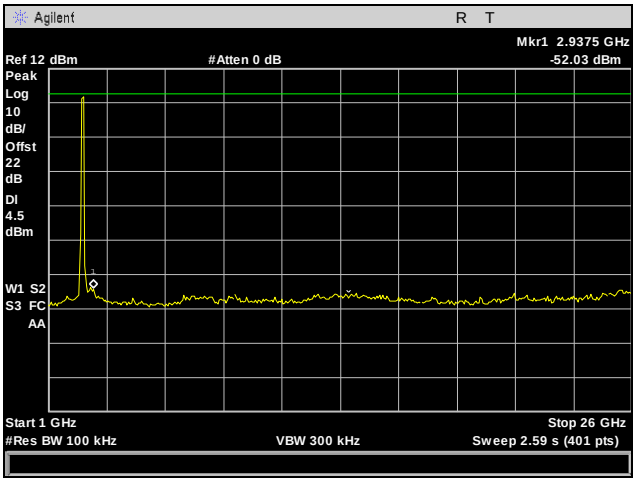


Plot 618. Conducted Spurious Emissions, 802.11n 40 MHz, 2452 MHz, High Channel, Port 1, 1 GHz - 26 GHz

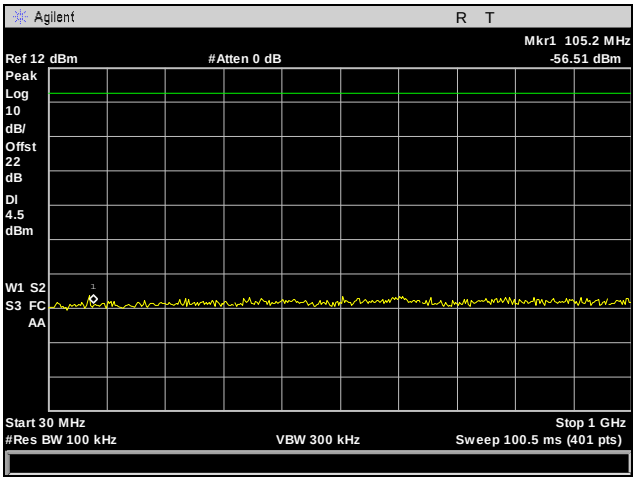
Conducted Spurious Emissions Test Results, 802.11n 40 MHz, Port 2, 2.4 GHz



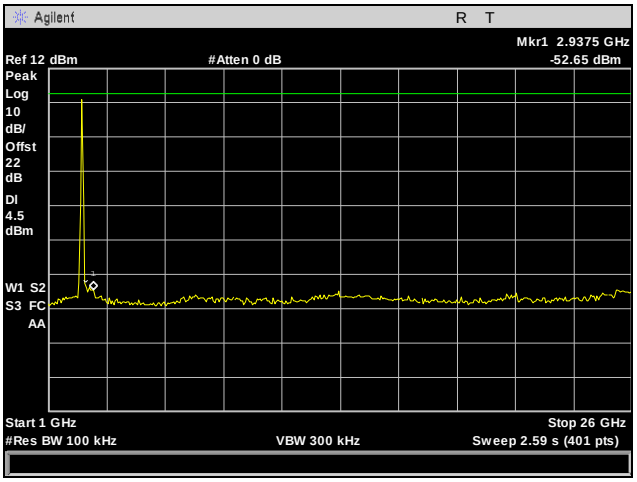
Plot 619. Conducted Spurious Emissions, 802.11n 40 MHz, 2422 MHz, Low Channel, Port 2, 30 MHz, 1 GHz



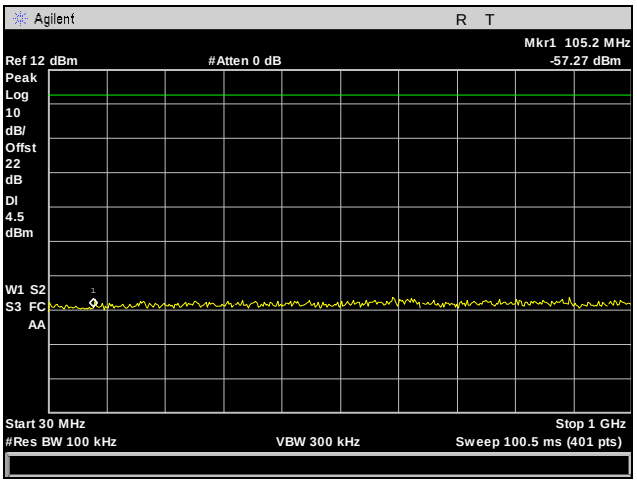
Plot 620. Conducted Spurious Emissions, 802.11n 40 MHz, 2422 MHz, Low Channel, Port 2, 1 GHz - 26 GHz



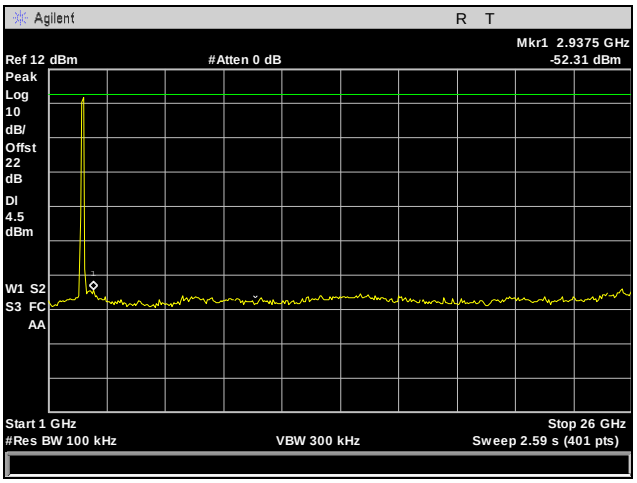
Plot 621. Conducted Spurious Emissions, 802.11n 40 MHz, 2437 MHz, Mid Channel, Port 2, 30 MHz, 1 GHz



Plot 622. Conducted Spurious Emissions, 802.11n 40 MHz, 2437 MHz, Mid Channel, Port 2, 1 GHz - 26 GHz

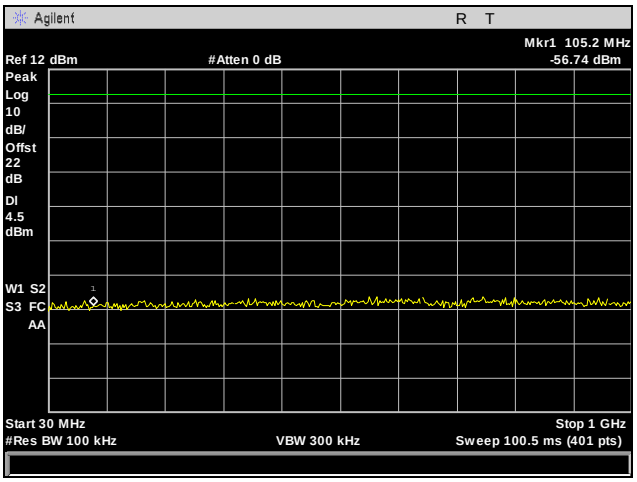


Plot 623. Conducted Spurious Emissions, 802.11n 40 MHz, 2452 MHz, High Channel, Port 2, 30 MHz, 1 GHz

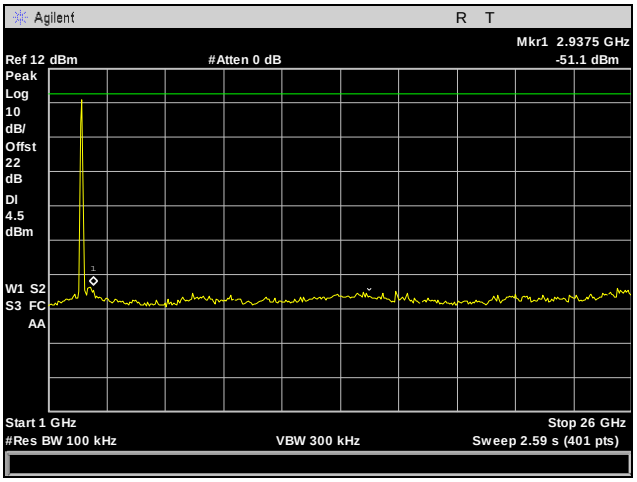


Plot 624. Conducted Spurious Emissions, 802.11n 40 MHz, 2452 MHz, High Channel, Port 2, 1 GHz - 26 GHz

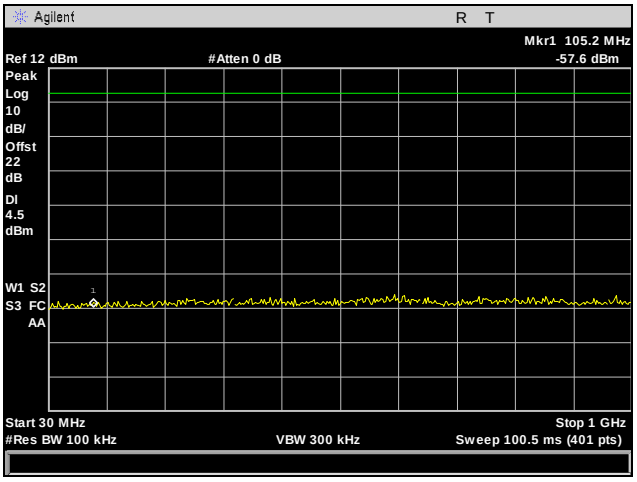
Conducted Spurious Emissions Test Results, 802.11n 40 MHz, Port 3, 2.4 GHz



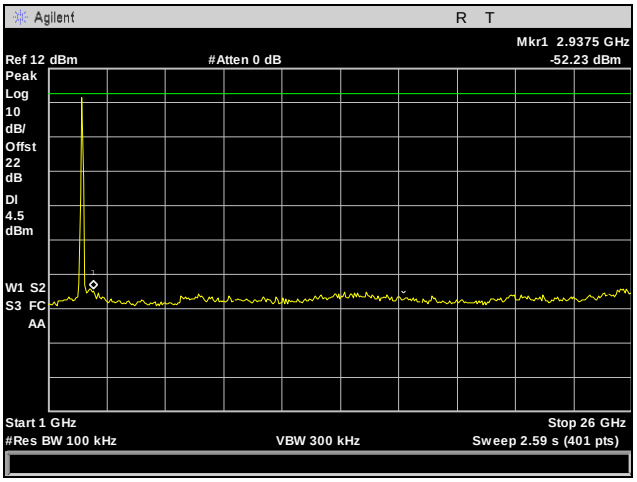
Plot 625. Conducted Spurious Emissions, 802.11n 40 MHz, 2422 MHz, Low Channel, Port 3, 30 MHz, 1 GHz



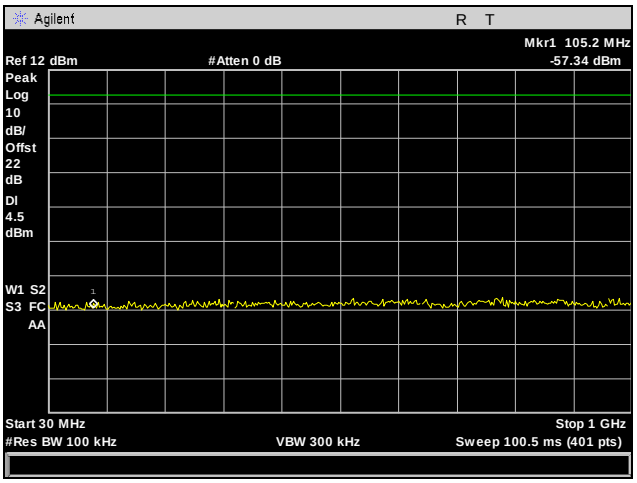
Plot 626. Conducted Spurious Emissions, 802.11n 40 MHz, 2422 MHz, Low Channel, Port 3, 1 GHz - 26 GHz



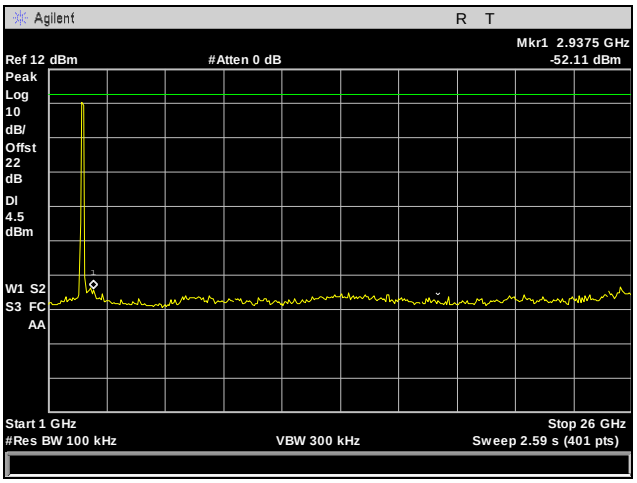
Plot 627. Conducted Spurious Emissions, 802.11n 40 MHz, 2437 MHz, Mid Channel, Port 3, 30 MHz, 1 GHz



Plot 628. Conducted Spurious Emissions, 802.11n 40 MHz, 2437 MHz, Mid Channel, Port 3, 1 GHz - 26 GHz

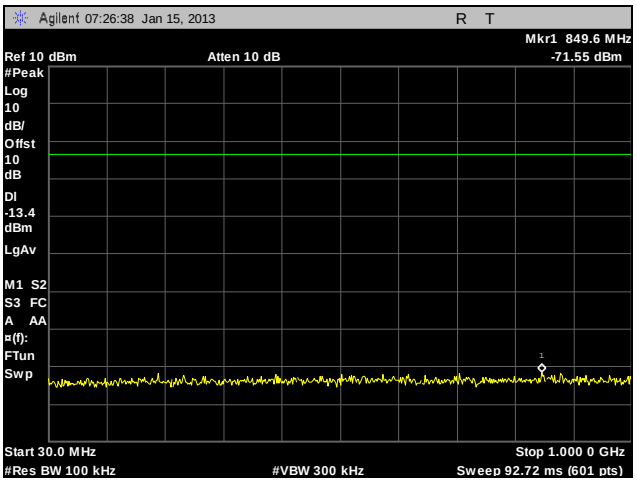


Plot 629. Conducted Spurious Emissions, 802.11n 40 MHz, 2452 MHz, High Channel, Port 3, 30 MHz, 1 GHz

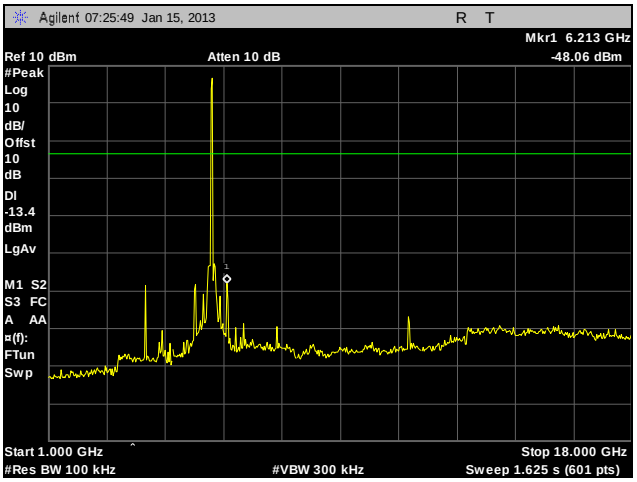


Plot 630. Conducted Spurious Emissions, 802.11n 40 MHz, 2452 MHz, High Channel, Port 3, 1 GHz - 26 GHz

Conducted Spurious Emissions Test Results, 802.11a, 5 GHz

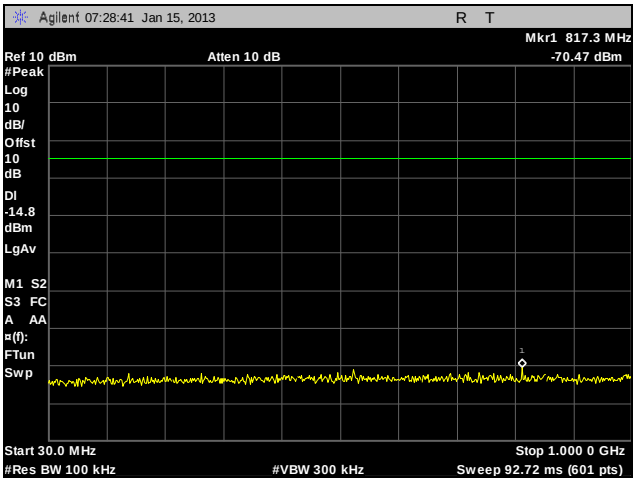


Plot 631. Conducted Spurious Emissions, 802.11a, 5745 MHz, Low Channel, Port 1, 30 MHz - 1 GHz

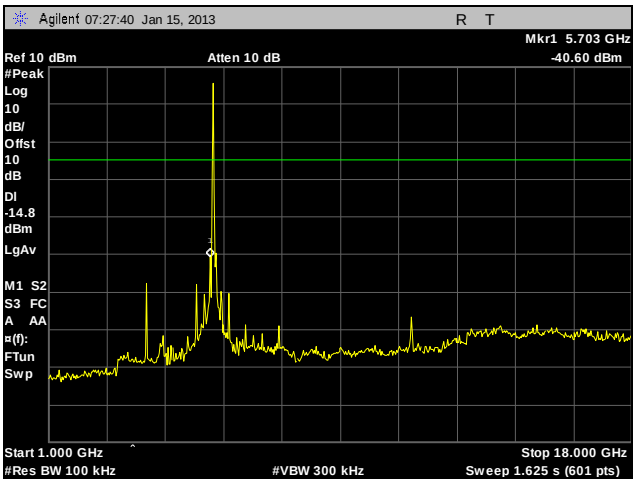


Plot 632. Conducted Spurious Emissions, 802.11a, 5745 MHz, Low Channel, Port 1, 1 GHz - 18 GHz

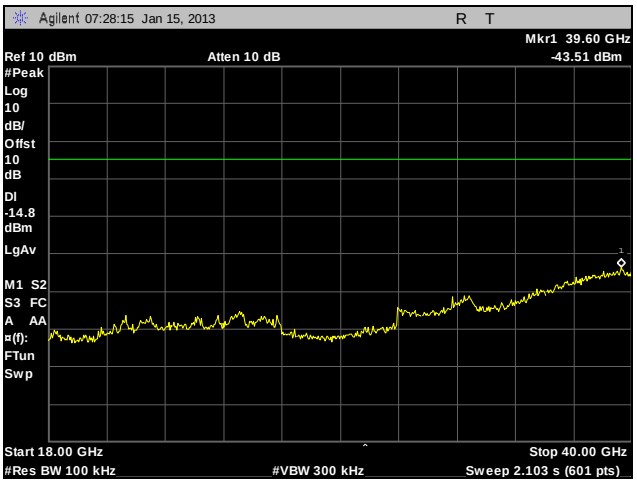
Plot 633. Conducted Spurious Emissions, 802.11a, 5745 MHz, Low Channel, Port 1, 18 GHz - 40 GHz



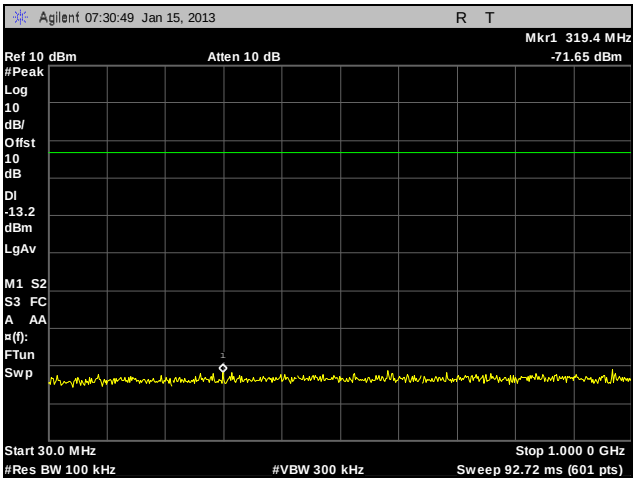
Plot 634. Conducted Spurious Emissions, 802.11a, 5785 MHz, Mid Channel, Port 1, 30 MHz - 1 GHz



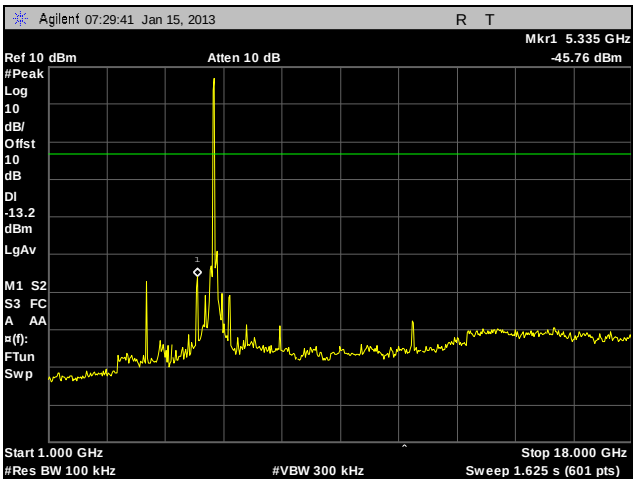
Plot 635. Conducted Spurious Emissions, 802.11a, 5785 MHz, Mid Channel, Port 1, 1 GHz - 18 GHz



Plot 636. Conducted Spurious Emissions, 802.11a, 5785 MHz, Mid Channel, Port 1, 18 GHz - 40 GHz



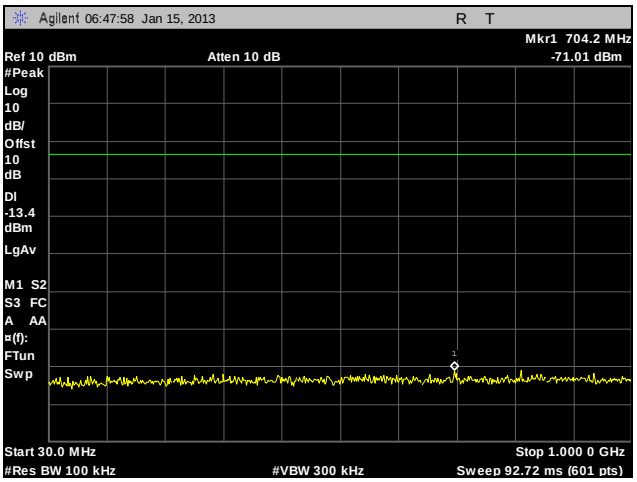
Plot 637. Conducted Spurious Emissions, 802.11a, 5805 MHz, High Channel, Port 1, 30 MHz - 1 GHz



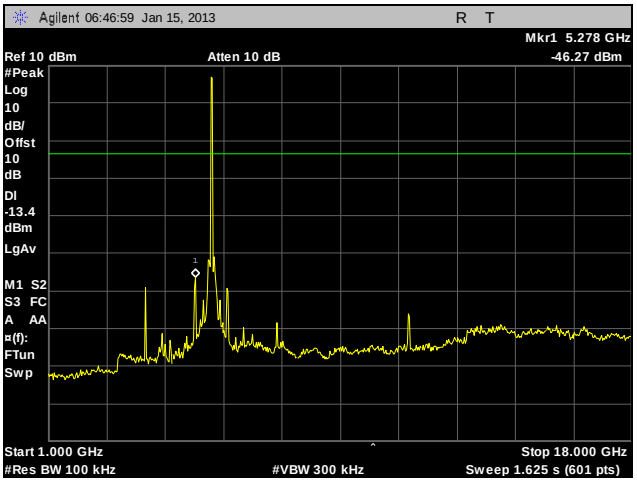
Plot 638. Conducted Spurious Emissions, 802.11a, 5805 MHz, High Channel, Port 1, 1 GHz - 18 GHz

Plot 639. Conducted Spurious Emissions, 802.11a, 5805 MHz, High Channel, Port 1, 18 GHz - 40 GHz

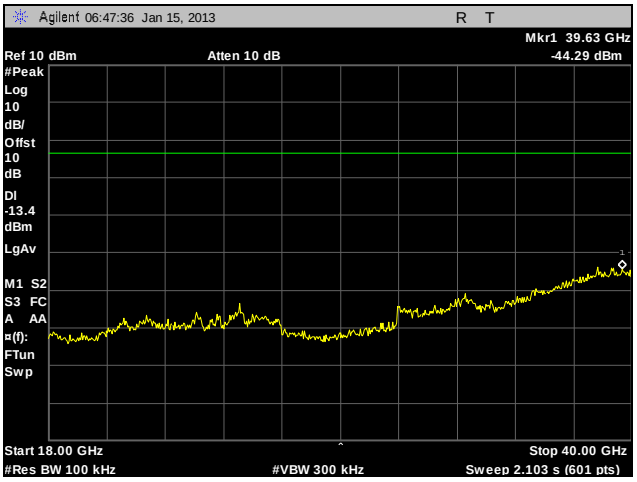
Conducted Spurious Emissions Test Results, 802.11n 20 MHz, Port 1, 5 GHz



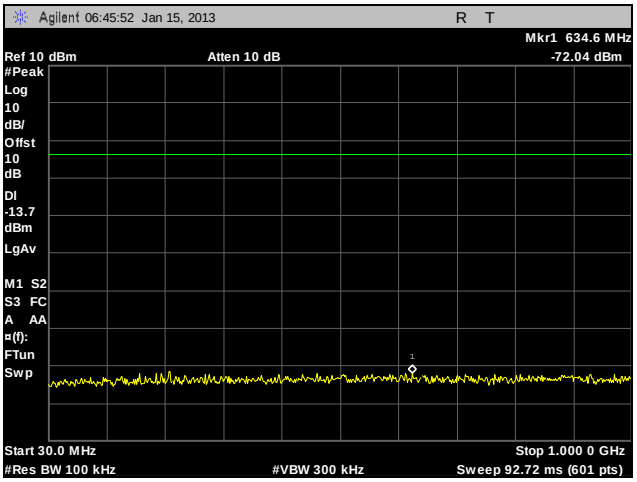
Plot 640. Conducted Spurious Emissions, 802.11n 20 MHz, 5745 MHz, Low Channel, Port 1, 30 MHz - 1 GHz



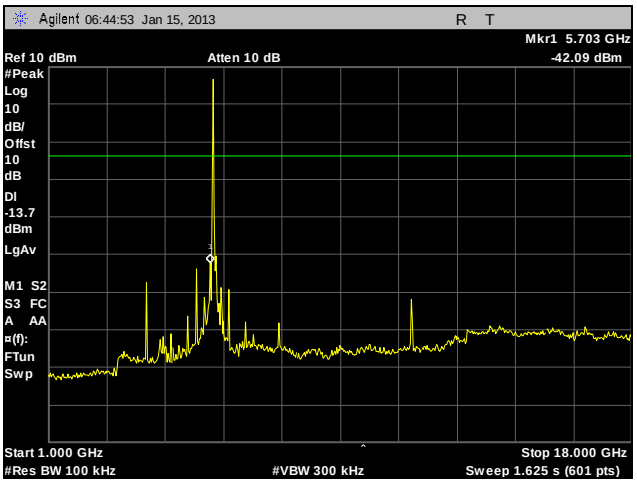
Plot 641. Conducted Spurious Emissions, 802.11n 20 MHz, 5745 MHz, Low Channel, Port 1, 1 GHz - 18 GHz



Plot 642. Conducted Spurious Emissions, 802.11n 20 MHz, 5745 MHz, Low Channel, Port 1, 18 GHz - 40 GHz

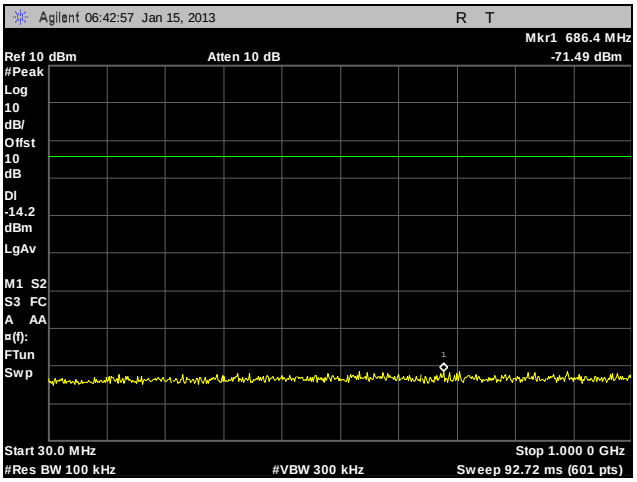


Plot 643. Conducted Spurious Emissions, 802.11n 20 MHz, 5785 MHz, Mid Channel, Port 1, 30 MHz - 1 GHz

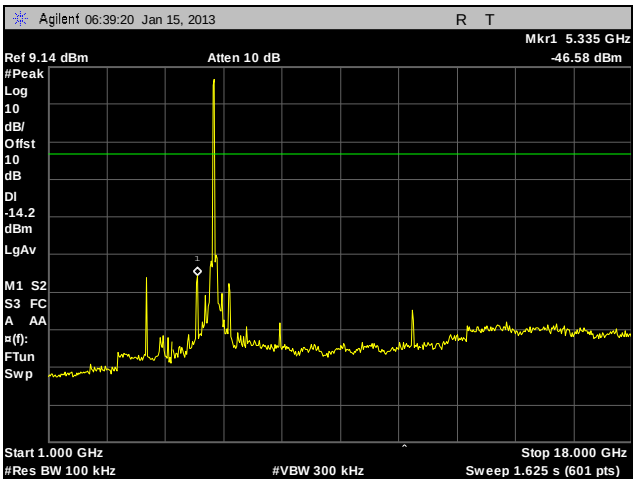


Plot 644. Conducted Spurious Emissions, 802.11n 20 MHz, 5785 MHz, Mid Channel, Port 1, 1 GHz - 18 GHz

Plot 645. Conducted Spurious Emissions, 802.11n 20 MHz, 5785 MHz, Mid Channel, Port 1, 18 GHz - 40 GHz



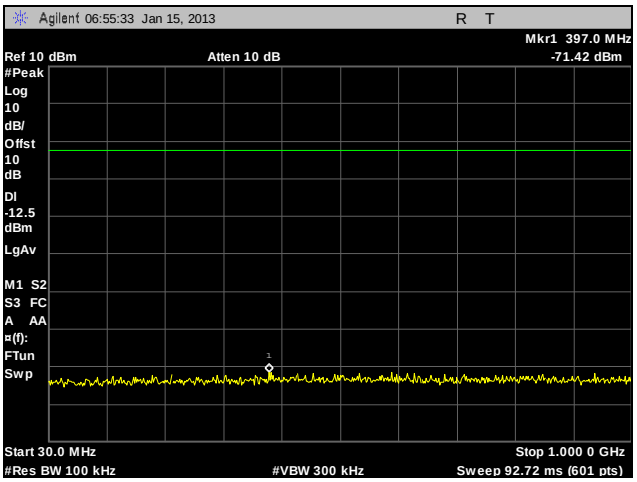
Plot 646. Conducted Spurious Emissions, 802.11n 20 MHz, 5805 MHz, High Channel, Port 1, 30 MHz - 1 GHz



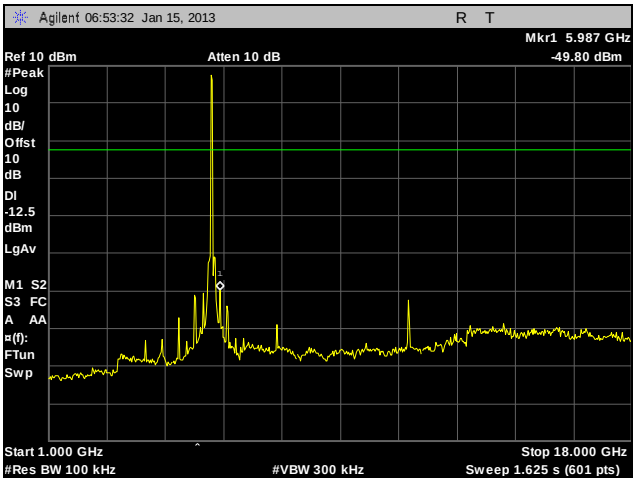
Plot 647. Conducted Spurious Emissions, 802.11n 20 MHz, 5805 MHz, High Channel, Port 1, 1 GHz - 18 GHz

Plot 648. Conducted Spurious Emissions, 802.11n 20 MHz, 5805 MHz, High Channel, Port 1, 18 GHz - 40 GHz

Conducted Spurious Emissions Test Results, 802.11n 20 MHz, Port 2, 5 GHz

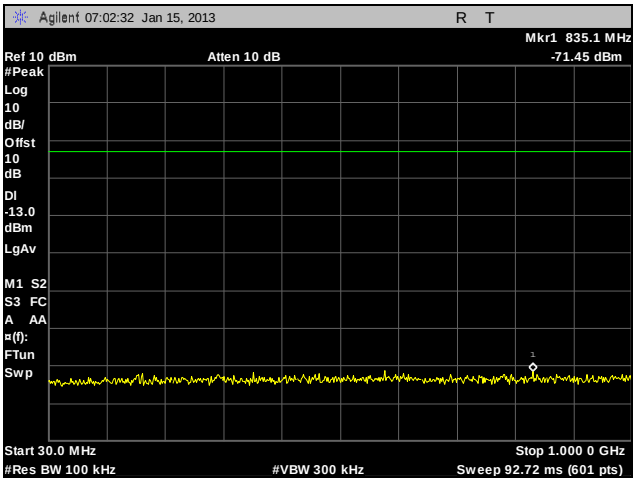


Plot 649. Conducted Spurious Emissions, 802.11n 20 MHz, 5745 MHz, Low Channel, Port 2, 30 MHz - 1 GHz

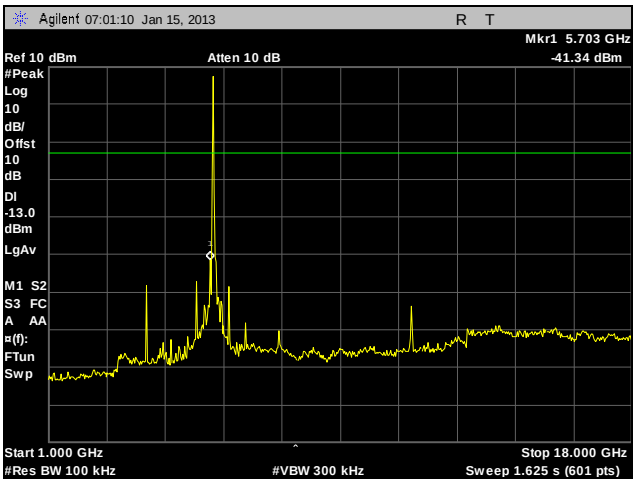


Plot 650. Conducted Spurious Emissions, 802.11n 20 MHz, 5745 MHz, Low Channel, Port 2, 1 GHz - 18 GHz

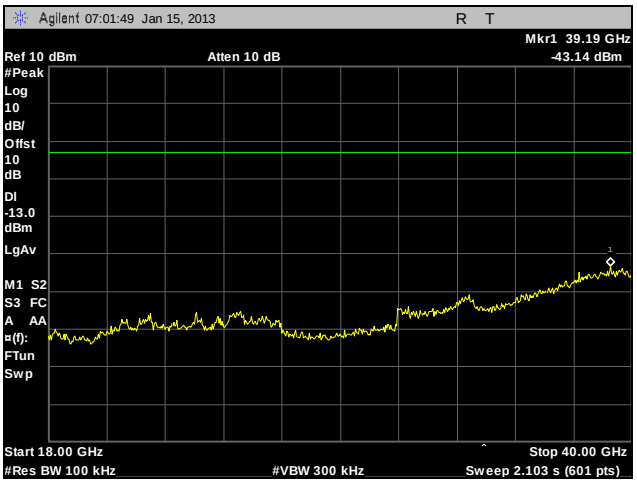
Plot 651. Conducted Spurious Emissions, 802.11n 20 MHz, 5745 MHz, Low Channel, Port 2, 18 GHz - 40 GHz



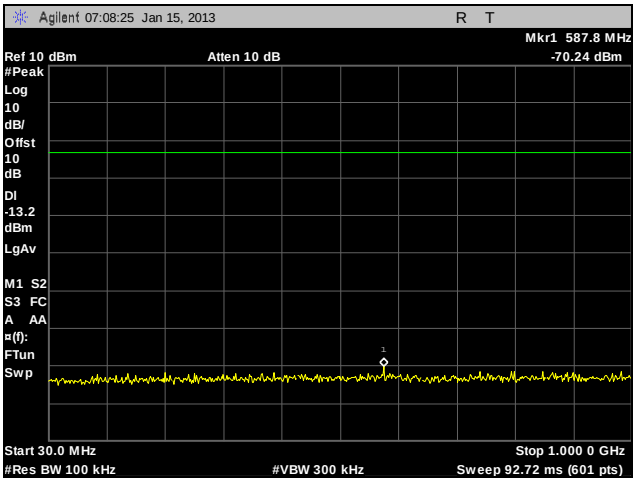
Plot 652. Conducted Spurious Emissions, 802.11n 20 MHz, 5785 MHz, Mid Channel, Port 2, 30 MHz - 1 GHz



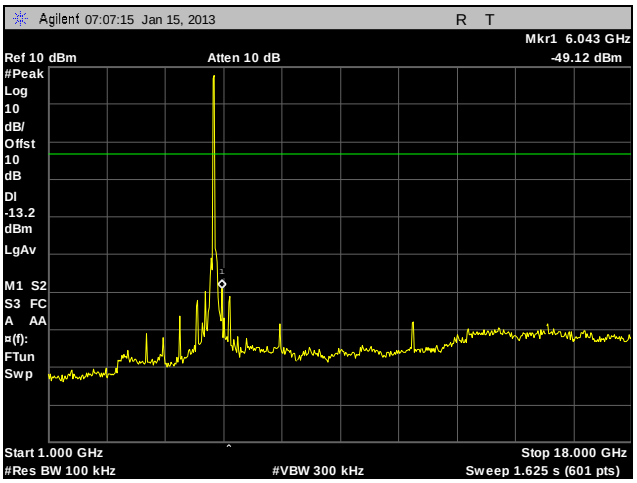
Plot 653. Conducted Spurious Emissions, 802.11n 20 MHz, 5785 MHz, Mid Channel, Port 2, 1 GHz - 18 GHz



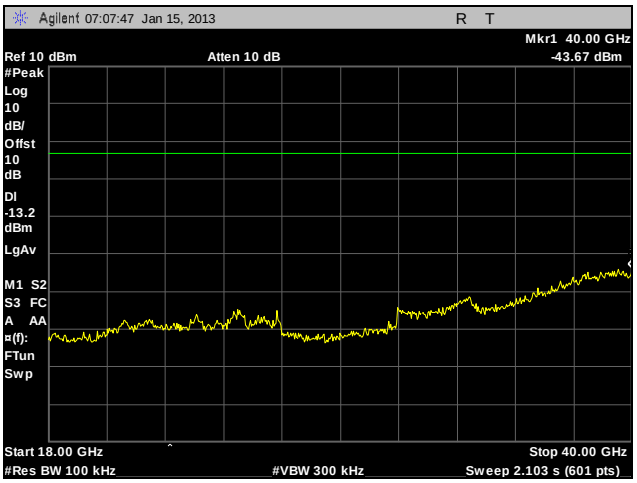
Plot 654. Conducted Spurious Emissions, 802.11n 20 MHz, 5785 MHz, Mid Channel, Port 2, 18 GHz - 40 GHz



Plot 655. Conducted Spurious Emissions, 802.11n 20 MHz, 5805 MHz, High Channel, Port 2, 30 MHz - 1 GHz

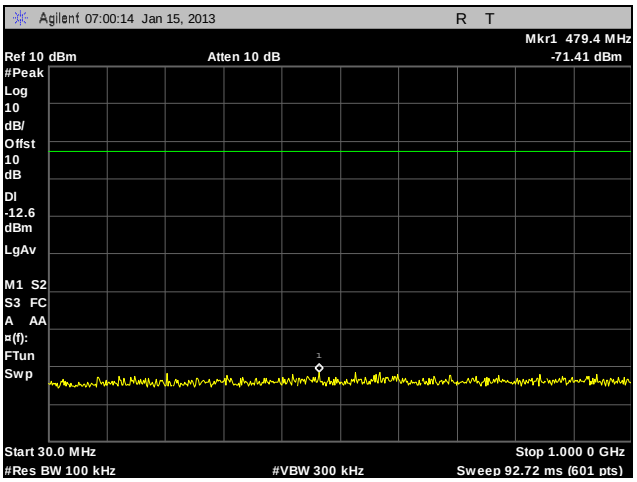


Plot 656. Conducted Spurious Emissions, 802.11n 20 MHz, 5805 MHz, High Channel, Port 2, 1 GHz - 18 GHz

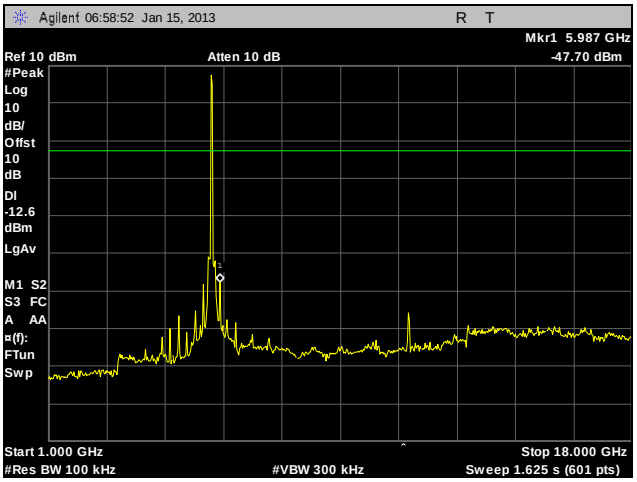


Plot 657. Conducted Spurious Emissions, 802.11n 20 MHz, 5805 MHz, High Channel, Port 2, 18 GHz - 40 GHz

Conducted Spurious Emissions Test Results, 802.11n 20 MHz, Port 3, 5 GHz

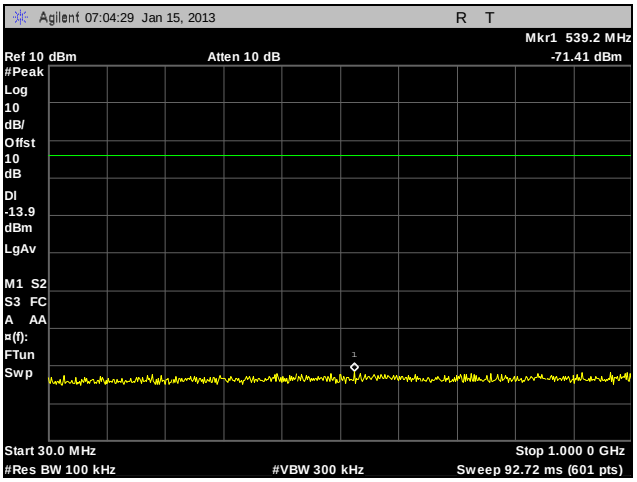


Plot 658. Conducted Spurious Emissions, 802.11n 20 MHz, 5745 MHz, Low Channel, Port 3, 30 MHz - 1 GHz

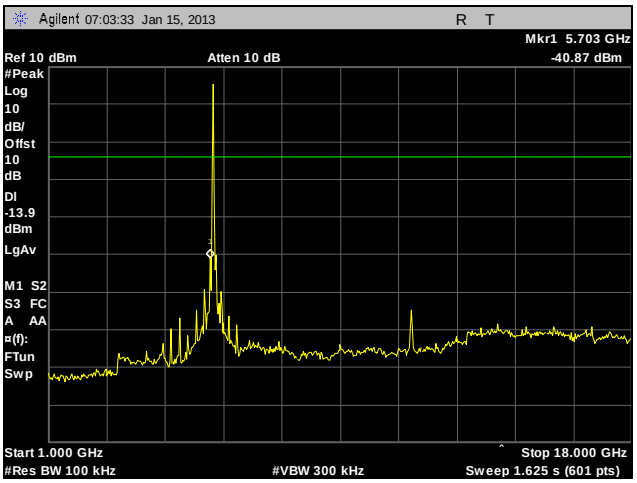


Plot 659. Conducted Spurious Emissions, 802.11n 20 MHz, 5745 MHz, Low Channel, Port 3, 1 GHz - 18 GHz

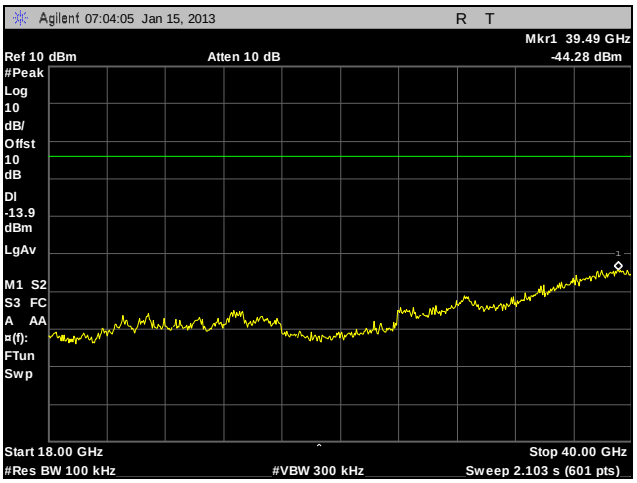
Plot 660. Conducted Spurious Emissions, 802.11n 20 MHz, 5745 MHz, Low Channel, Port 3, 18 GHz - 40 GHz



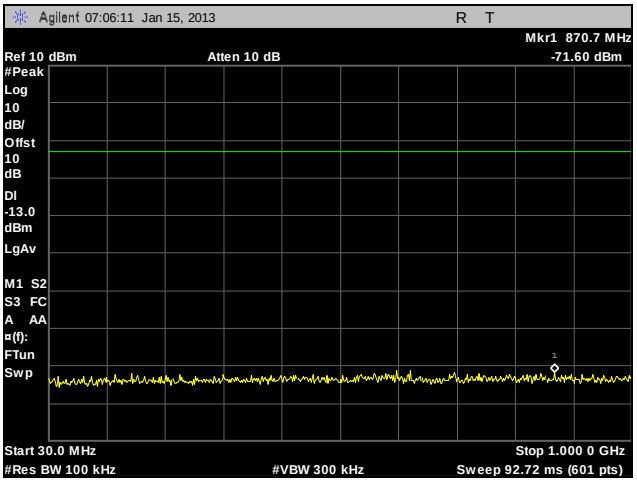
Plot 661. Conducted Spurious Emissions, 802.11n 20 MHz, 5785 MHz, Mid Channel, Port 3, 30 MHz - 1 GHz



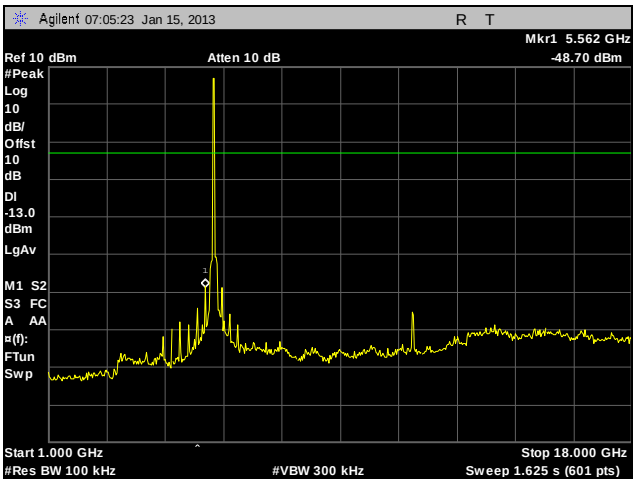
Plot 662. Conducted Spurious Emissions, 802.11n 20 MHz, 5785 MHz, Mid Channel, Port 3, 1 GHz - 18 GHz



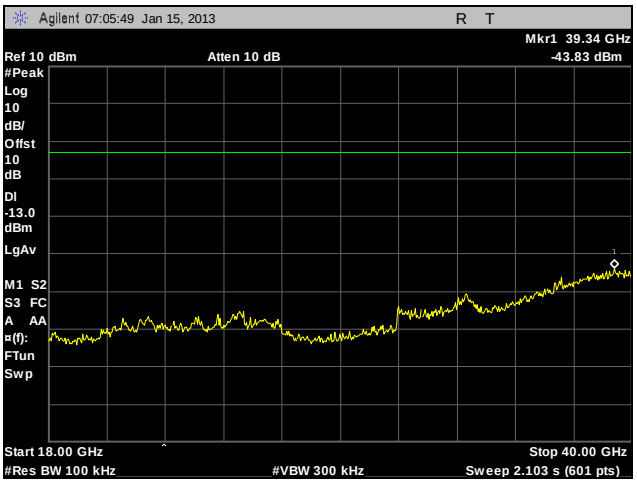
Plot 663. Conducted Spurious Emissions, 802.11n 20 MHz, 5785 MHz, Mid Channel, Port 3, 18 GHz - 40 GHz



Plot 664. Conducted Spurious Emissions, 802.11n 20 MHz, 5805 MHz, High Channel, Port 3, 30 MHz - 1 GHz

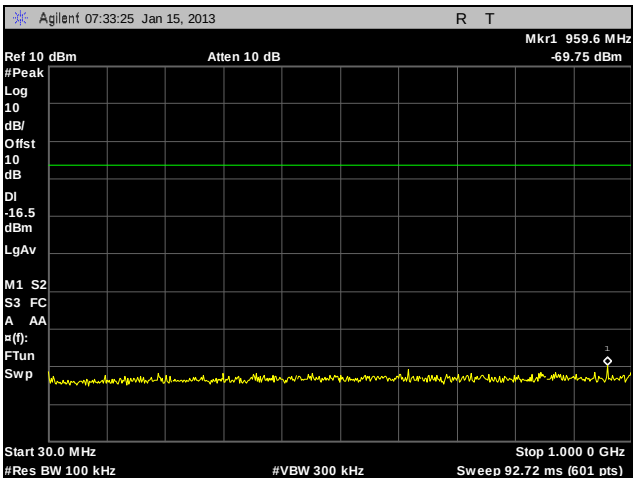


Plot 665. Conducted Spurious Emissions, 802.11n 20 MHz, 5805 MHz, High Channel, Port 3, 1 GHz - 18 GHz

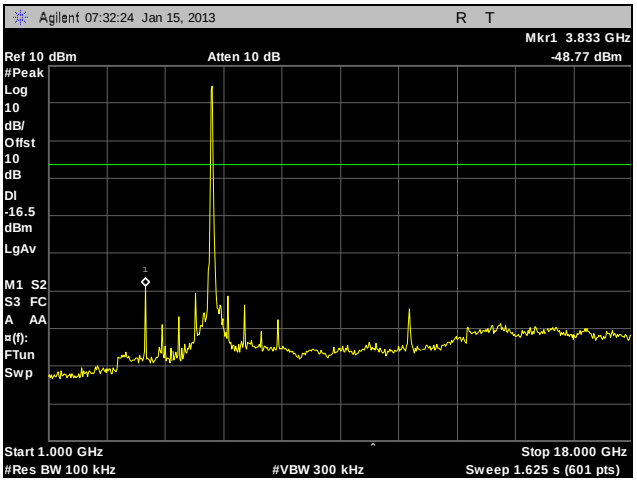


Plot 666. Conducted Spurious Emissions, 802.11n 20 MHz, 5805 MHz, High Channel, Port 3, 18 GHz - 40 GHz

Conducted Spurious Emissions Test Results, 802.11n 40 MHz, Port 1, 5 GHz

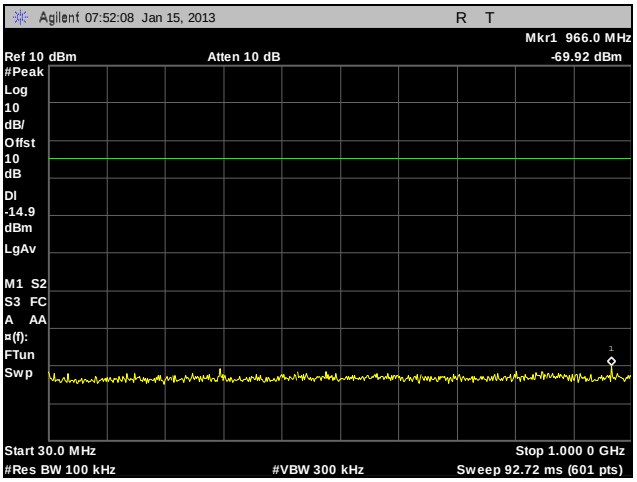


Plot 667. Conducted Spurious Emissions, 802.11n 40 MHz, 5755 MHz, Low Channel, Port 1, 30 MHz - 1 GHz

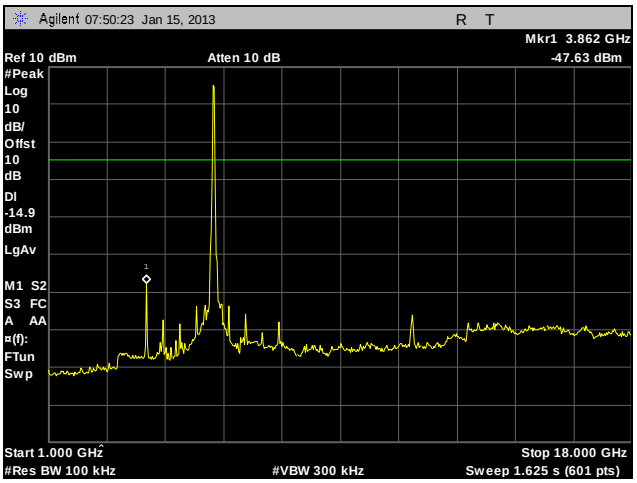


Plot 668. Conducted Spurious Emissions, 802.11n 40 MHz, 5755 MHz, Low Channel, Port 1, 1 GHz - 18 GHz

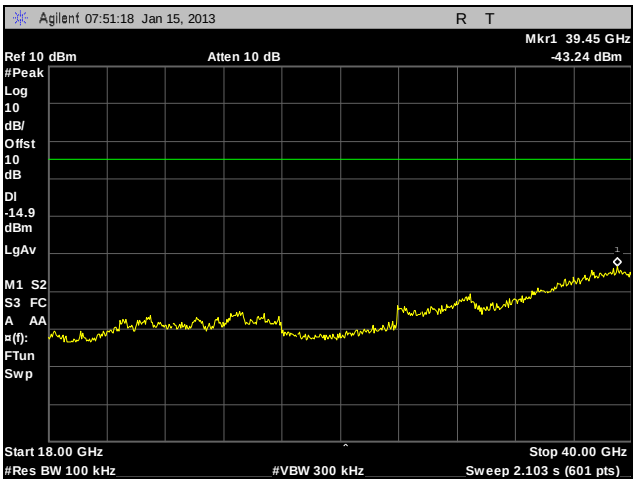
Plot 669. Conducted Spurious Emissions, 802.11n 40 MHz, 5755 MHz, Low Channel, Port 1, 18 GHz - 40 GHz



Plot 670. Conducted Spurious Emissions, 802.11n 40 MHz, 5795 MHz, High Channel, Port 1, 30 MHz - 1 GHz

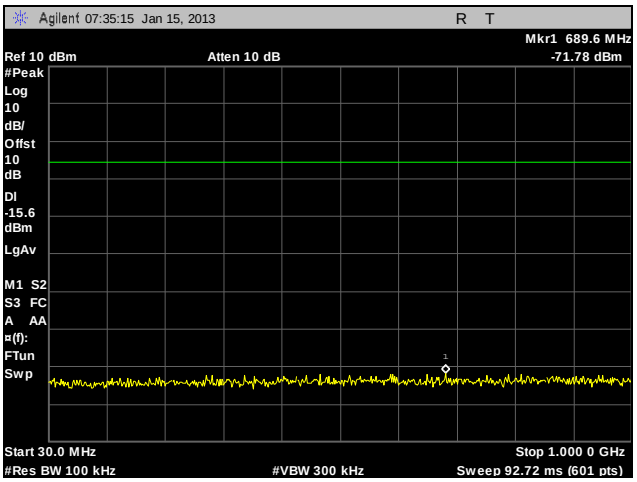


Plot 671. Conducted Spurious Emissions, 802.11n 40 MHz, 5795 MHz, High Channel, Port 1, 1 GHz - 18 GHz

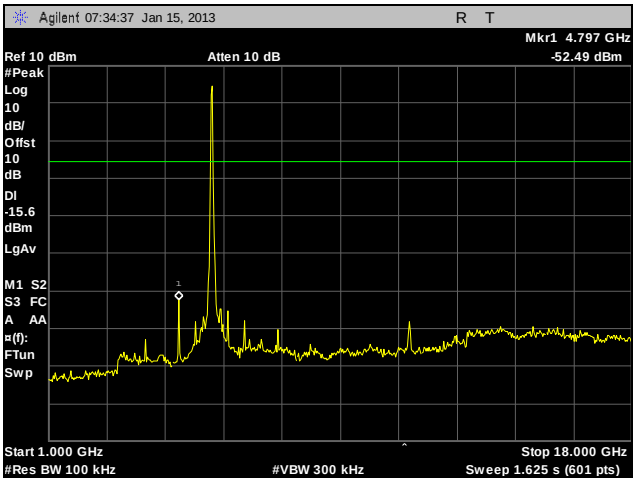


Plot 672. Conducted Spurious Emissions, 802.11n 40 MHz, 5795 MHz, High Channel, Port 1, 18 GHz - 40 GHz

Conducted Spurious Emissions Test Results, 802.11n 40 MHz, Port 2, 5 GHz

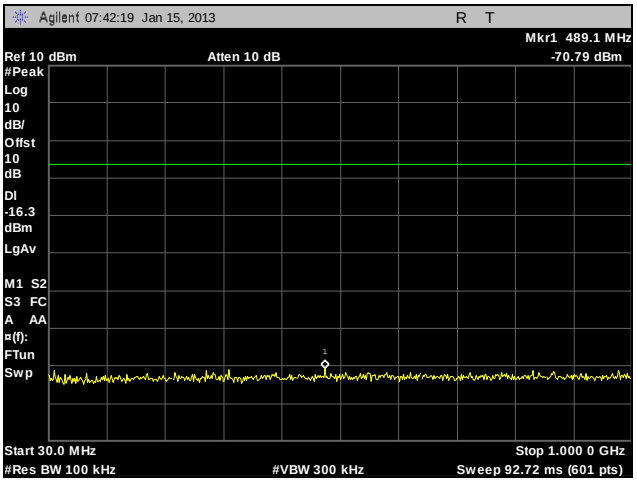


Plot 673. Conducted Spurious Emissions, 802.11n 40 MHz, 5755 MHz, Low Channel, Port 2, 30 MHz - 1 GHz

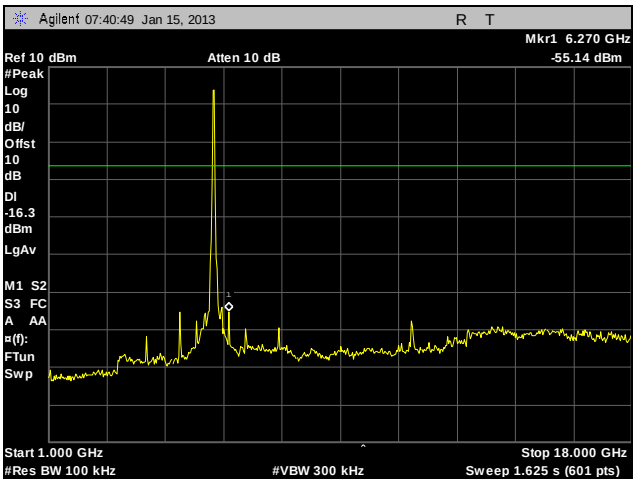


Plot 674. Conducted Spurious Emissions, 802.11n 40 MHz, 5755 MHz, Low Channel, Port 2, 1 GHz - 18 GHz

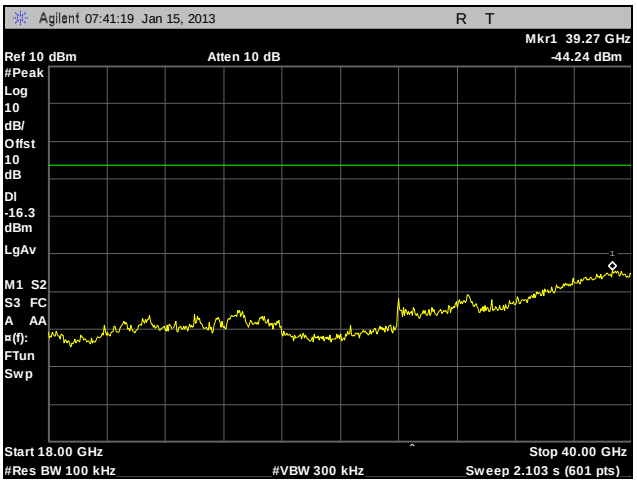
Plot 675. Conducted Spurious Emissions, 802.11n 40 MHz, 5755 MHz, Low Channel, Port 2, 18 GHz - 40 GHz



Plot 676. Conducted Spurious Emissions, 802.11n 40 MHz, 5795 MHz, High Channel, Port 2, 30 MHz - 1 GHz

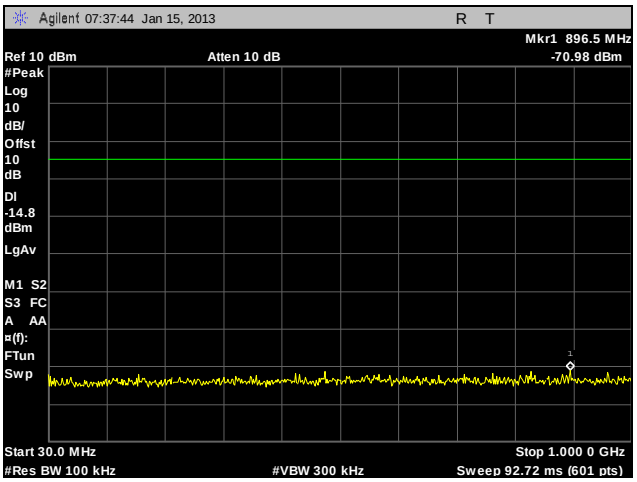


Plot 677. Conducted Spurious Emissions, 802.11n 40 MHz, 5795 MHz, High Channel, Port 2, 1 GHz - 18 GHz

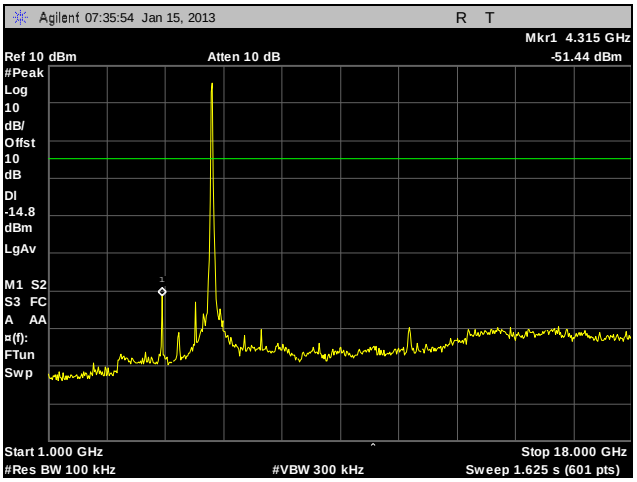


Plot 678. Conducted Spurious Emissions, 802.11n 40 MHz, 5795 MHz, High Channel, Port 2, 18 GHz - 40 GHz

Conducted Spurious Emissions Test Results, 802.11n 40 MHz, Port 3, 5 GHz

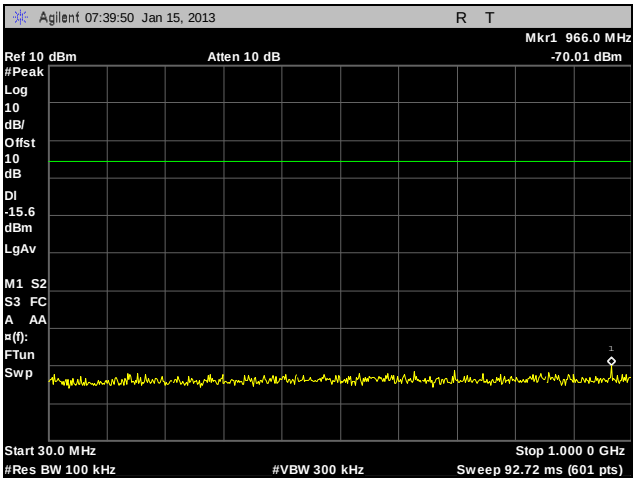


Plot 679. Conducted Spurious Emissions, 802.11n 40 MHz, 5755 MHz, Low Channel, Port 3, 30 MHz - 1 GHz

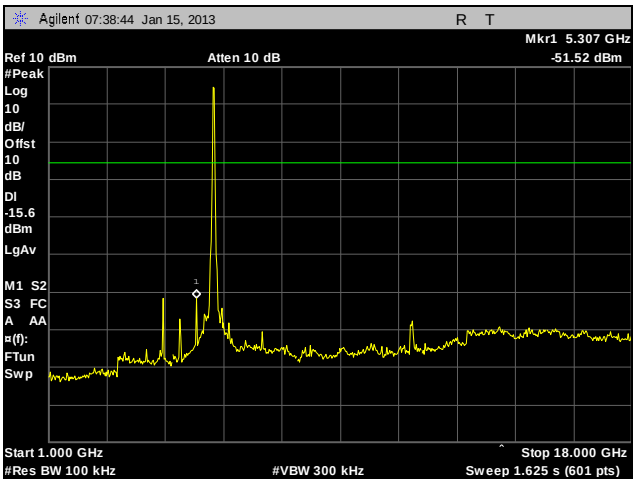


Plot 680. Conducted Spurious Emissions, 802.11n 40 MHz, 5755 MHz, Low Channel, Port 3, 1 GHz - 18 GHz

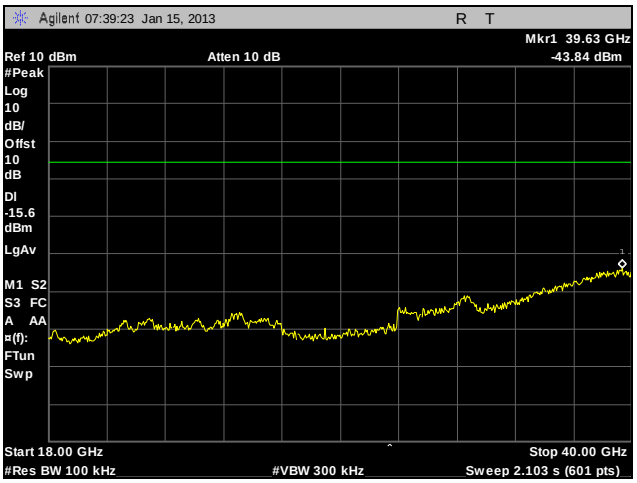
Plot 681. Conducted Spurious Emissions, 802.11n 40 MHz, 5755 MHz, Low Channel, Port 3, 18 GHz - 40 GHz



Plot 682. Conducted Spurious Emissions, 802.11n 40 MHz, 5795 MHz, High Channel, Port 3, 30 MHz - 1 GHz

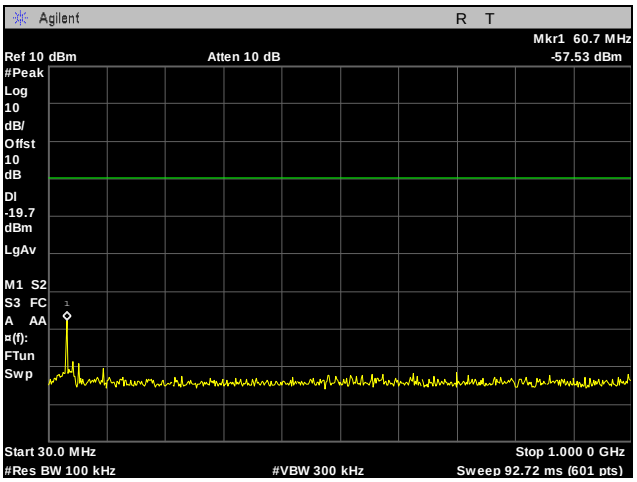


Plot 683. Conducted Spurious Emissions, 802.11n 40 MHz, 5795 MHz, High Channel, Port 3, 1 GHz - 18 GHz

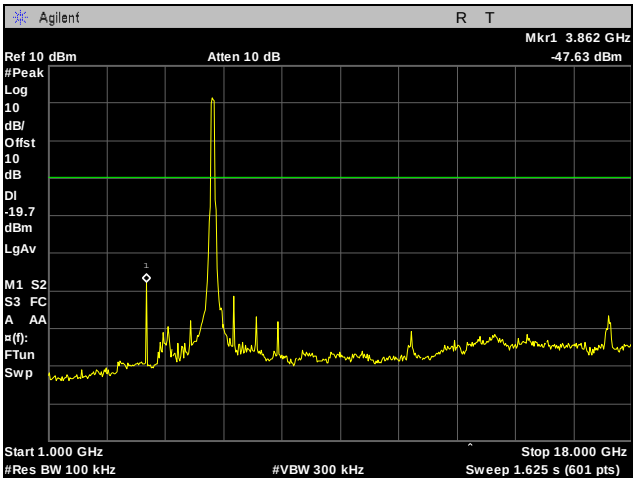


Plot 684. Conducted Spurious Emissions, 802.11n 40 MHz, 5795 MHz, High Channel, Port 3, 18 GHz - 40 GHz

Conducted Spurious Emissions Test Results, 802.11n 80 MHz, Port 1, 5 GHz



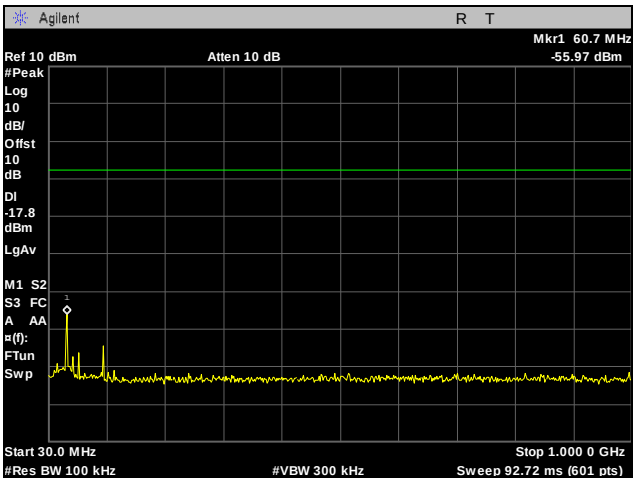
Plot 685. Conducted Spurious Emissions, 802.11n 80MHz, 5775 MHz, Port 1, 30 MHz - 1 GHz



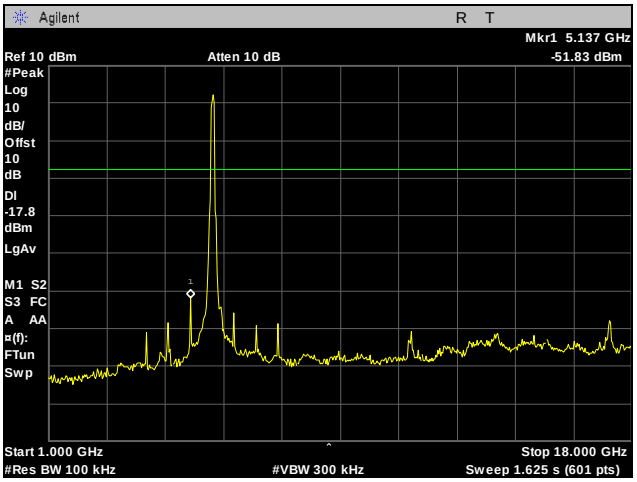
Plot 686. Conducted Spurious Emissions, 802.11n 80MHz, 5775 MHz, Port 1, 1 GHz - 18 GHz

Plot 687. Conducted Spurious Emissions, 802.11n 80MHz, 5775 MHz, Port 1, 18 GHz - 40 GHz

Conducted Spurious Emissions Test Results, 802.11n 80 MHz, Port 2, 5 GHz



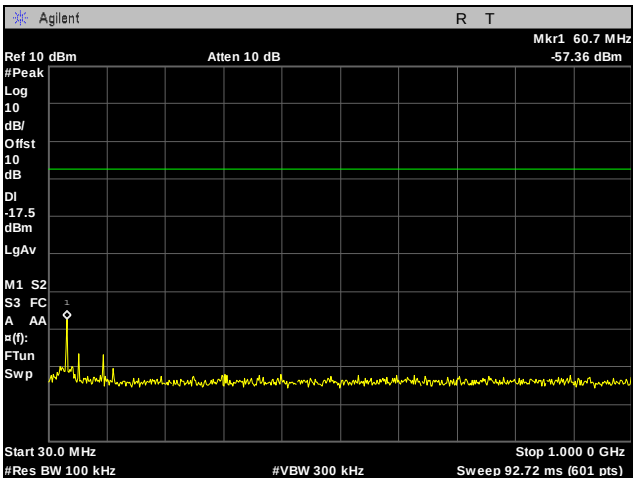
Plot 688. Conducted Spurious Emissions, 802.11n 80MHz, 5775 MHz, Port 2, 30 MHz - 1 GHz



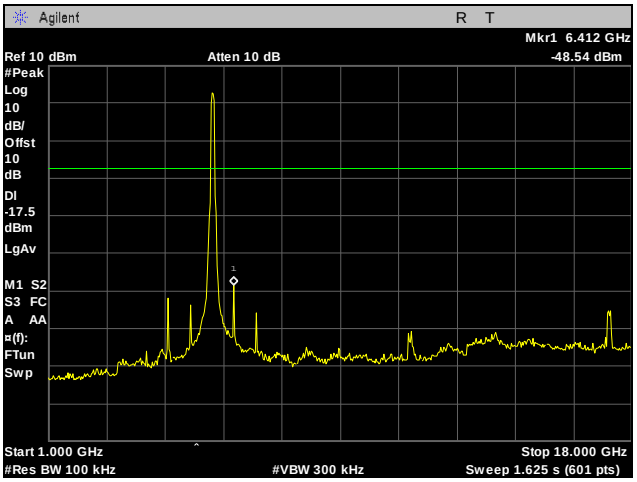
Plot 689. Conducted Spurious Emissions, 802.11n 80MHz, 5775 MHz, Port 2, 1 GHz - 18 GHz

Plot 690. Conducted Spurious Emissions, 802.11n 80MHz, 5775 MHz, Port 2, 18 GHz - 40 GHz

Conducted Spurious Emissions Test Results, 802.11n 80 MHz, Port 3, 5 GHz



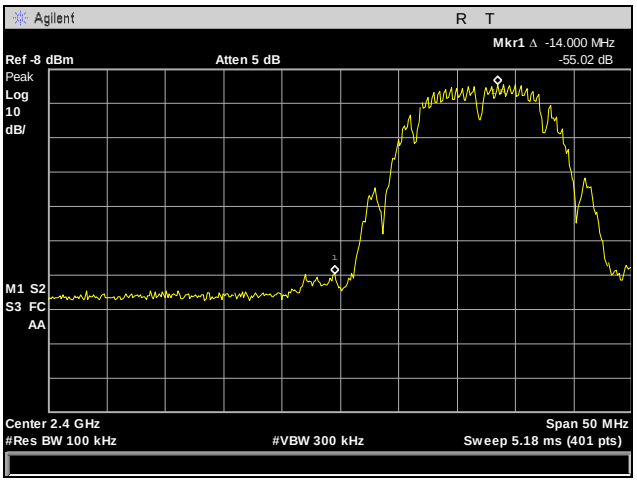
Plot 691. Conducted Spurious Emissions, 802.11n 80MHz, 5775 MHz, Port 3, 30 MHz - 1 GHz



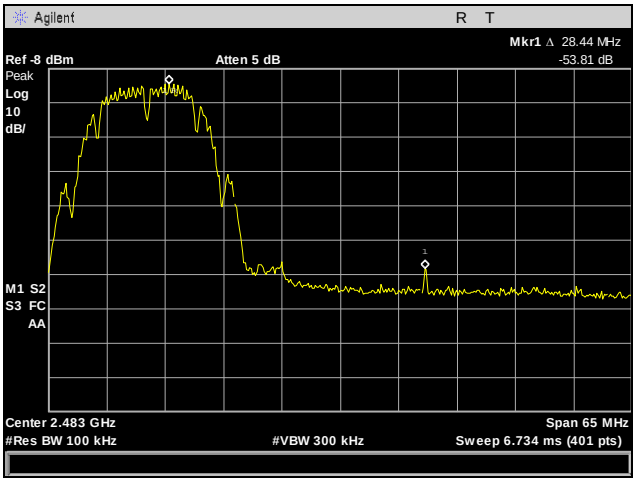
Plot 692. Conducted Spurious Emissions, 802.11n 80MHz, 5775 MHz, Port 3, 1 GHz - 18 GHz

Plot 693. Conducted Spurious Emissions, 802.11n 80MHz, 5775 MHz, Port 3, 18 GHz - 40 GHz

Conducted Band Edge Test Results, 802.11b, 2.4 GHz

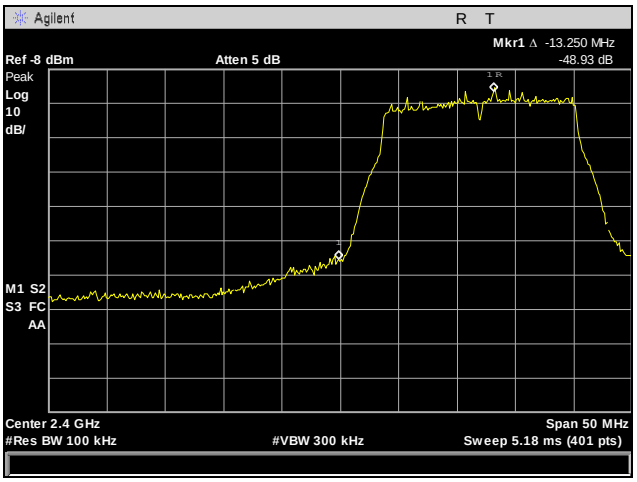


Plot 694. Conducted Band Edge, 802.11b, 2412 MHz, Port 1

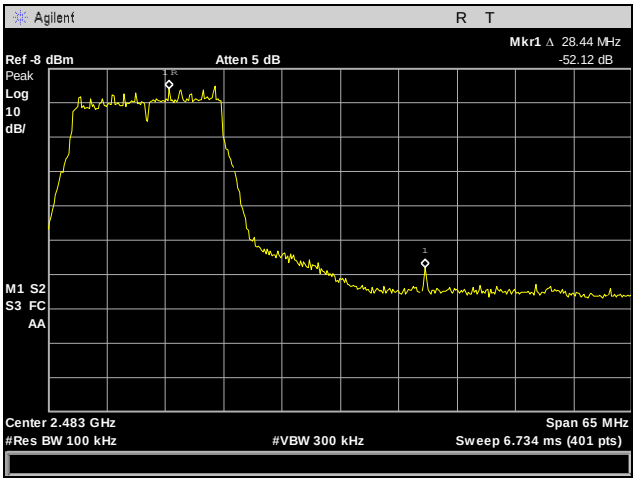


Plot 695. Conducted Band Edge, 802.11b, 2462 MHz, Port 1

Conducted Band Edge Test Results, 802.11g, 2.4 GHz

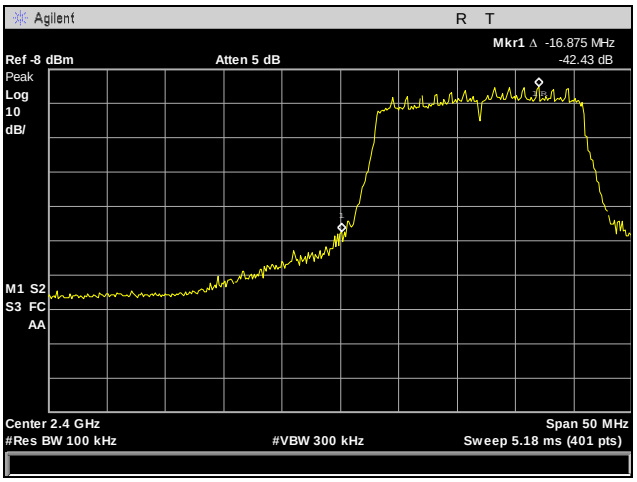


Plot 696. Conducted Band Edge, 802.11g, 2412 MHz, Port 1

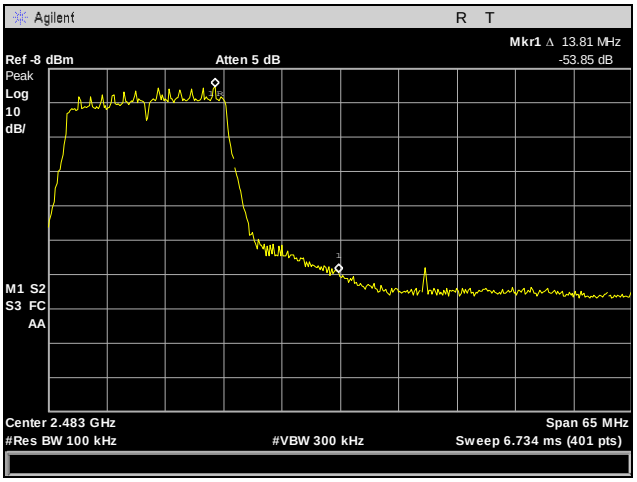


Plot 697. Conducted Band Edge, 802.11g, 2462 MHz, Port 1

Conducted Band Edge Test Results, 802.11n 20 MHz, Port 1, 2.4 GHz

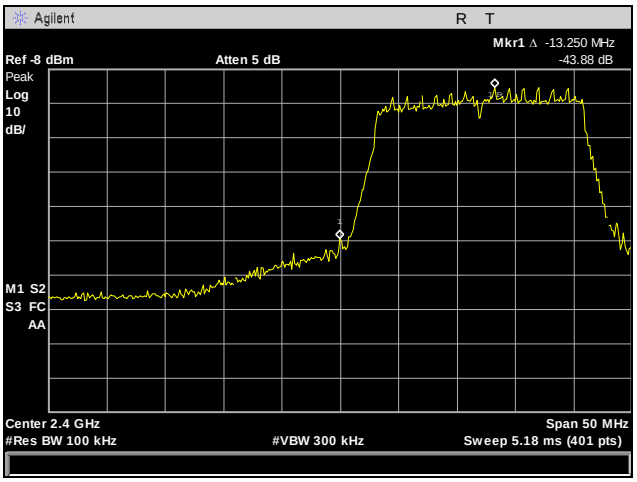


Plot 698. Conducted Band Edge, 802.11n 20 MHz, 2412 MHz, Port 1

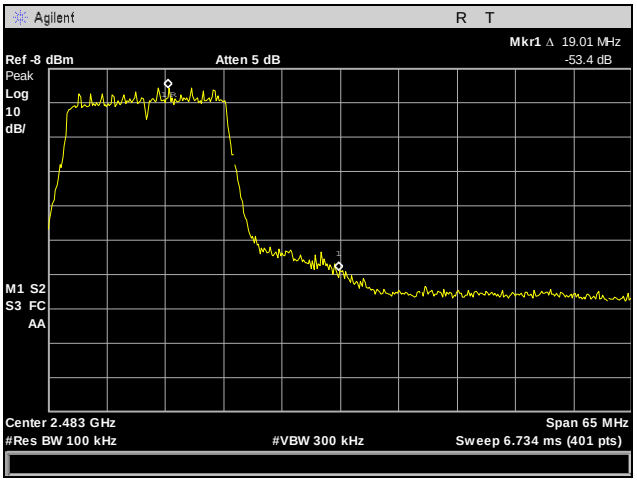


Plot 699. Conducted Band Edge, 802.11n 20 MHz, 2462 MHz, Port 1

Conducted Band Edge Test Results, 802.11n 20 MHz, Port 2, 2.4 GHz

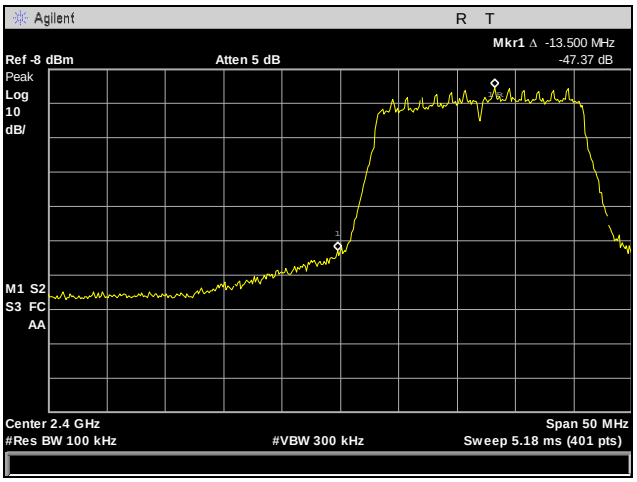


Plot 700. Conducted Band Edge, 802.11n 20 MHz, 2412 MHz, Port 2

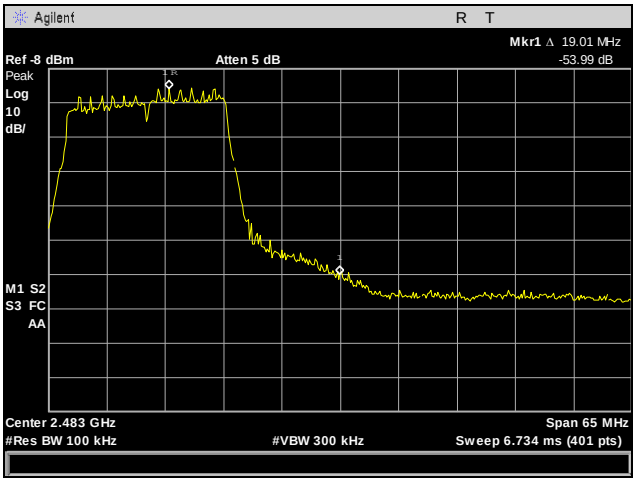


Plot 701. Conducted Band Edge, 802.11n 20 MHz, 2462 MHz, Port 2

Conducted Band Edge Test Results, 802.11n 20 MHz, Port 3, 2.4 GHz

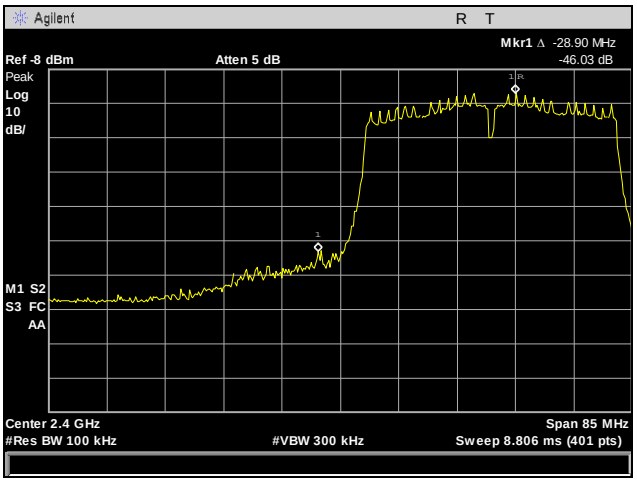


Plot 702. Conducted Band Edge, 802.11n 20 MHz, 2412 MHz, Port 3

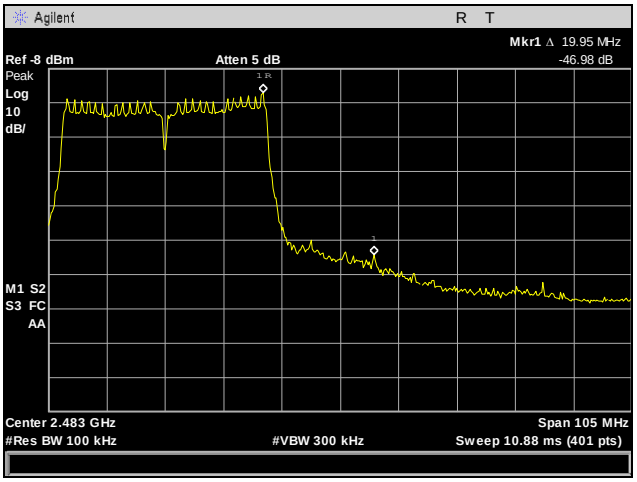


Plot 703. Conducted Band Edge, 802.11n 20 MHz, 2462 MHz, Port 3

Conducted Band Edge Test Results, 802.11n 40 MHz, Port 1, 2.4 GHz

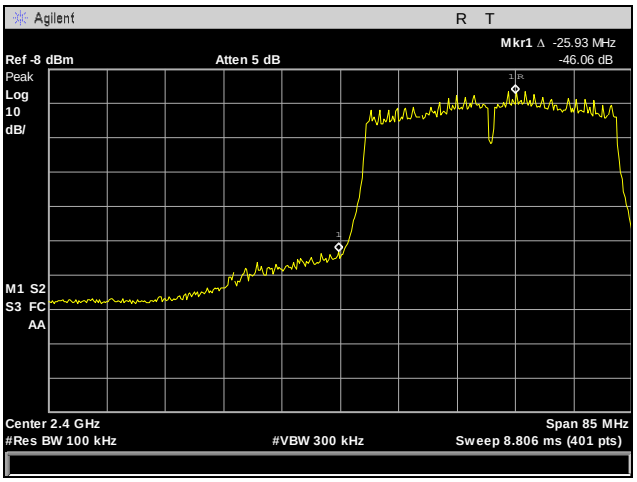


Plot 704. Conducted Band Edge, 802.11n 40 MHz, 2422 MHz, Port 1

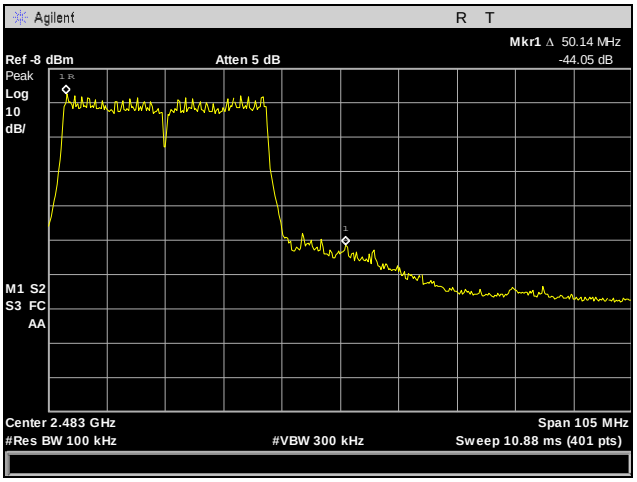


Plot 705. Conducted Band Edge, 802.11n 40 MHz, 2452 MHz, Port 1

Conducted Band Edge Test Results, 802.11n 40 MHz, Port 2, 2.4 GHz

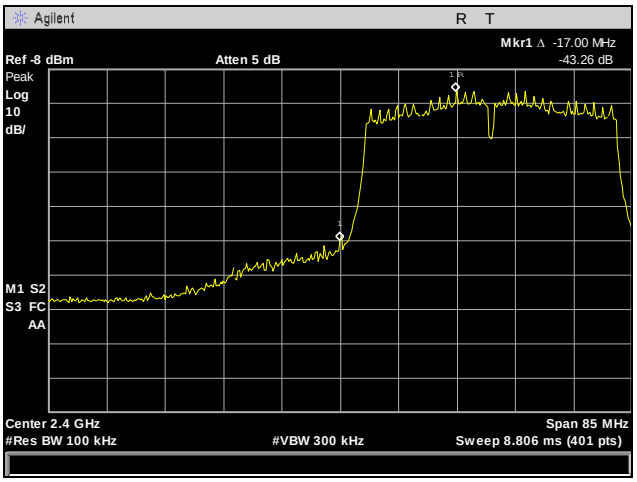


Plot 706. Conducted Band Edge, 802.11n 40 MHz, 2422 MHz, Port 2

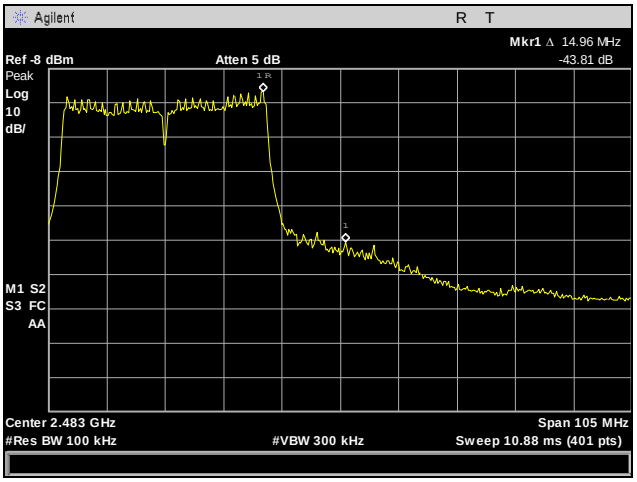


Plot 707. Conducted Band Edge, 802.11n 40 MHz, 2452 MHz, Port 2

Conducted Band Edge Test Results, 802.11n 40 MHz, Port 3, 2.4 GHz

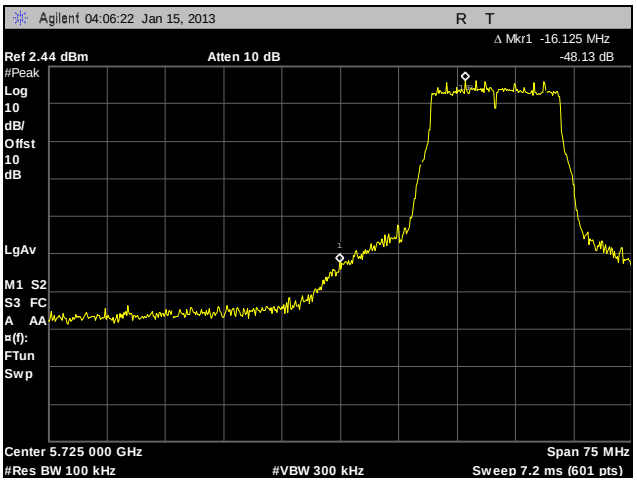


Plot 708. Conducted Band Edge, 802.11n 40 MHz, 2422 MHz, Port 3

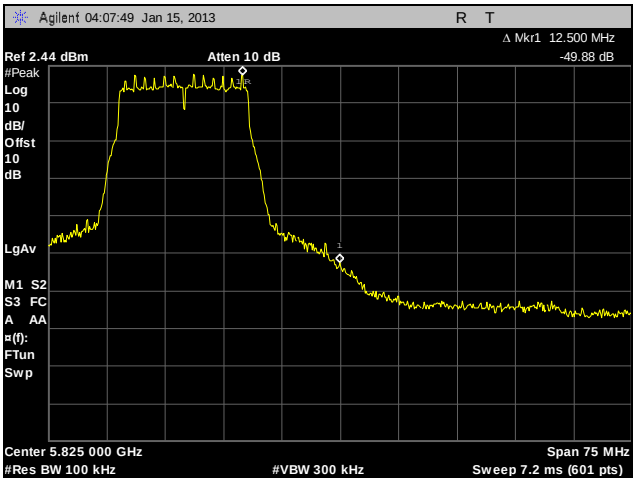


Plot 709. Conducted Band Edge, 802.11n 40 MHz, 2452 MHz, Port 3

Conducted Band Edge Test Results, 802.11a 20 MHz, 5 GHz

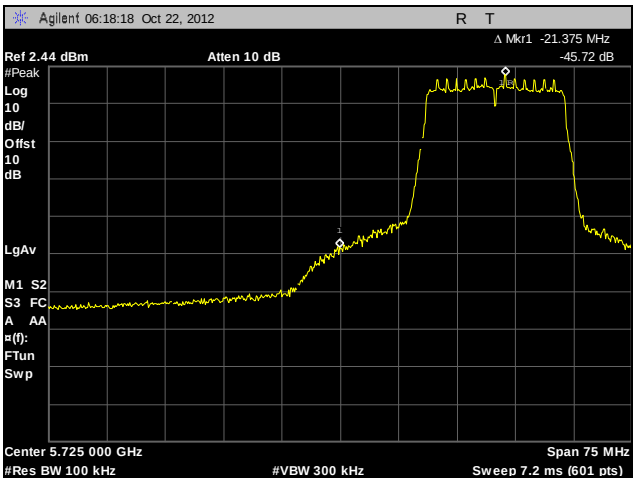


Plot 710. Conducted Band Edge, 802.11a 20 MHz, 5745 MHz, Low Channel, Port 1

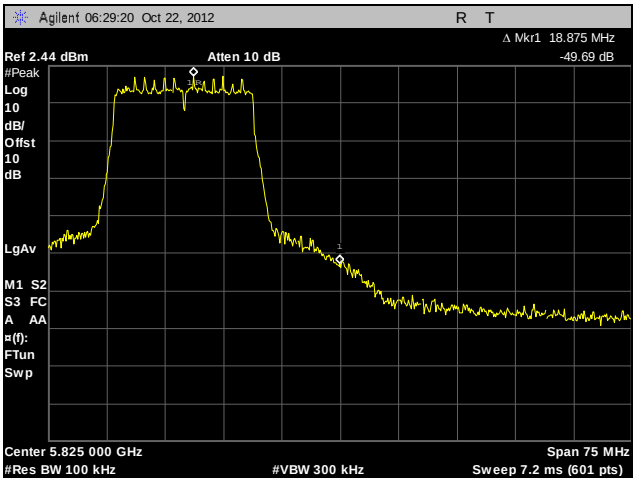


Plot 711. Conducted Band Edge, 802.11a 20 MHz, 5805 MHz, High Channel, Port 1

Conducted Band Edge Test Results, 802.11n 20 MHz, Port 1, 5 GHz

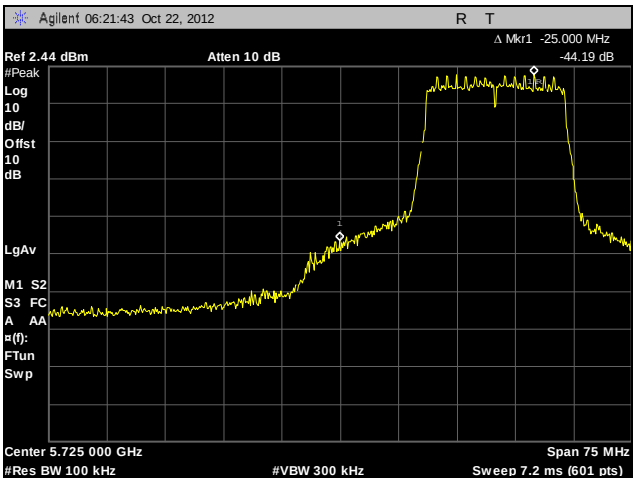


Plot 712. Conducted Band Edge, 802.11n 20 MHz, 5745 MHz, Low Channel, Port 1

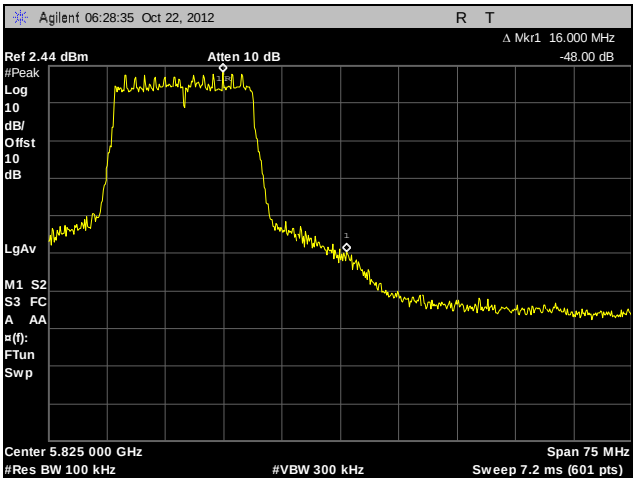


Plot 713. Conducted Band Edge, 802.11n 20 MHz, 5805 MHz, High Channel, Port 1

Conducted Band Edge Test Results, 802.11n 20 MHz, Port 2, 5 GHz

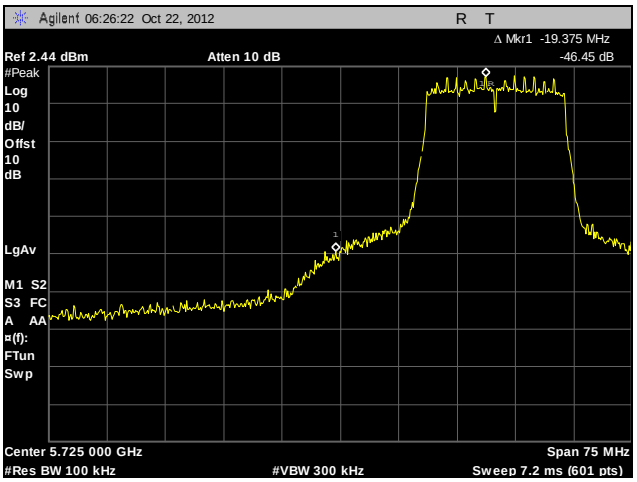


Plot 714. Conducted Band Edge, 802.11n 20 MHz, 5745 MHz, Low Channel, Port 2

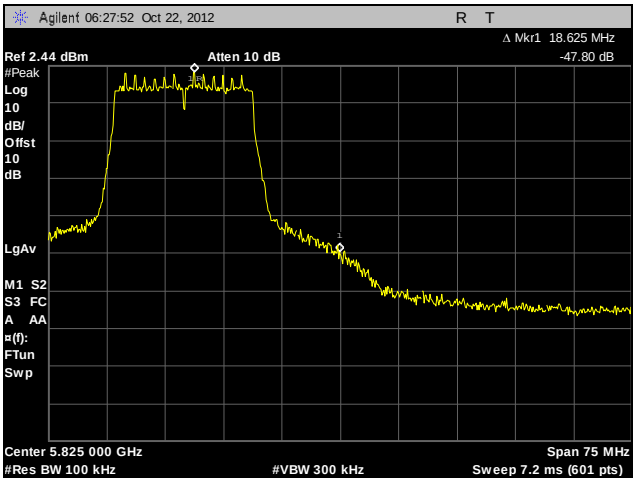


Plot 715. Conducted Band Edge, 802.11n 20 MHz, 5805 MHz, High Channel, Port 2

Conducted Band Edge Test Results, 802.11n 20 MHz, Port 2, 5 GHz

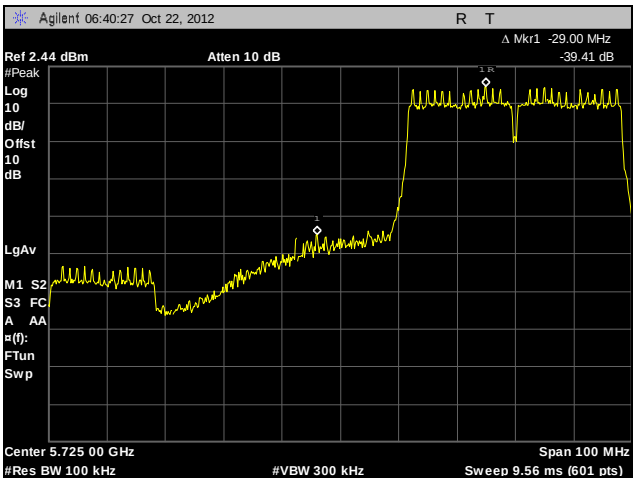


Plot 716. Conducted Band Edge, 802.11n 20 MHz, 5745 MHz, Low Channel, Port 3

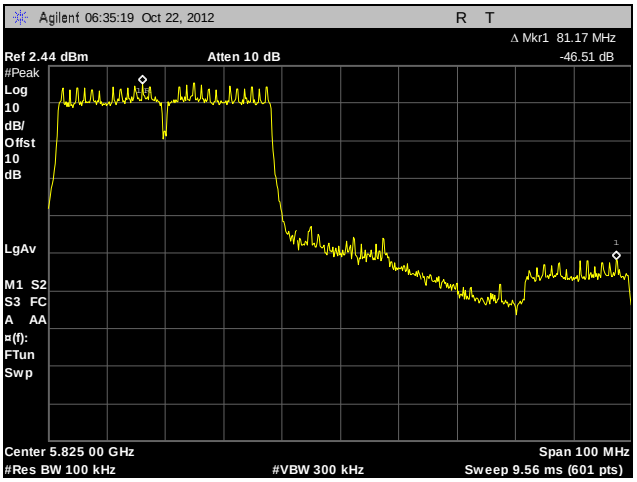


Plot 717. Conducted Band Edge, 802.11n 20 MHz, 5805 MHz, High Channel, Port 3

Conducted Band Edge Test Results, 802.11n 40 MHz, Port 1, 5 GHz

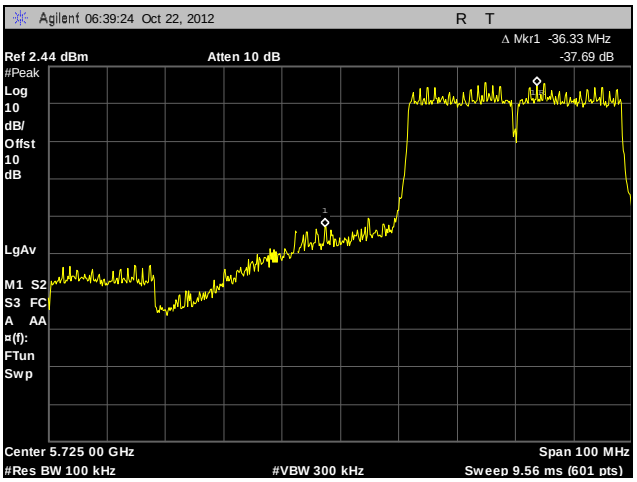


Plot 718. Conducted Band Edge, 802.11n 40 MHz, 5755 MHz Low Channel, Port 1

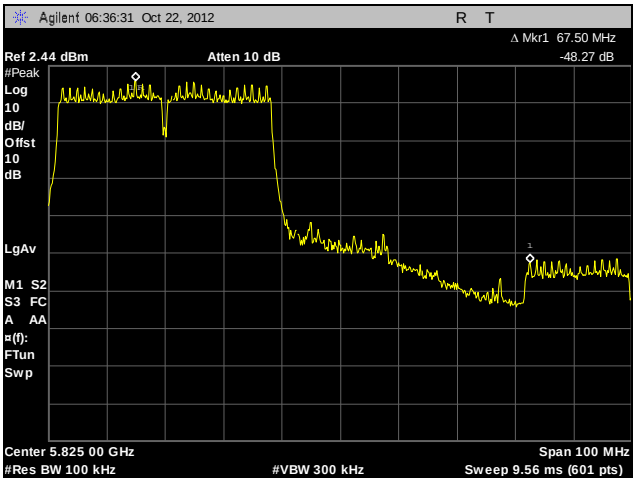


Plot 719. Conducted Band Edge, 802.11n 40 MHz, 5795 MHz, High Channel, Port 1

Conducted Band Edge Test Results, 802.11n 40 MHz, Port 2, 5 GHz

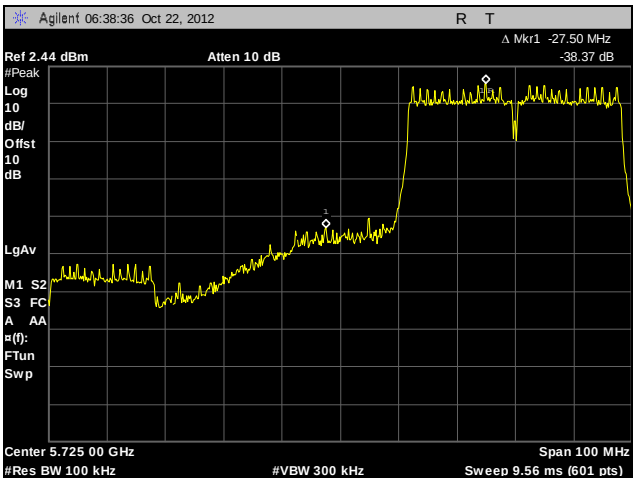


Plot 720. Conducted Band Edge, 802.11n 40 MHz, 5755 MHz, Low Channel, Port 2

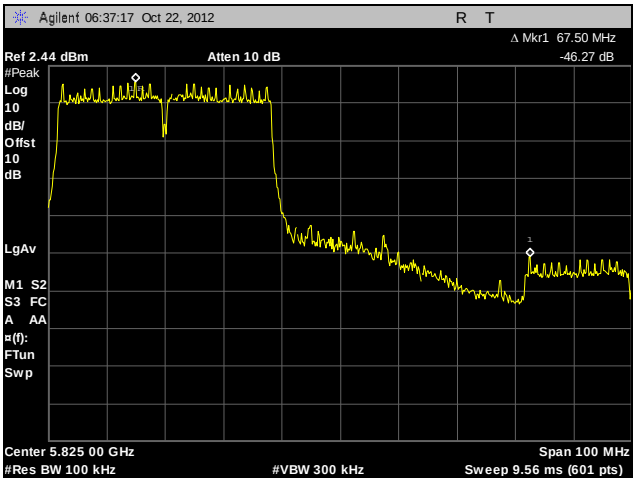


Plot 721. Conducted Band Edge, 802.11n 40 MHz, 5795 MHz, High Channel, Port 2

Conducted Band Edge Test Results, 802.11n 40 MHz, Port 3, 5 GHz

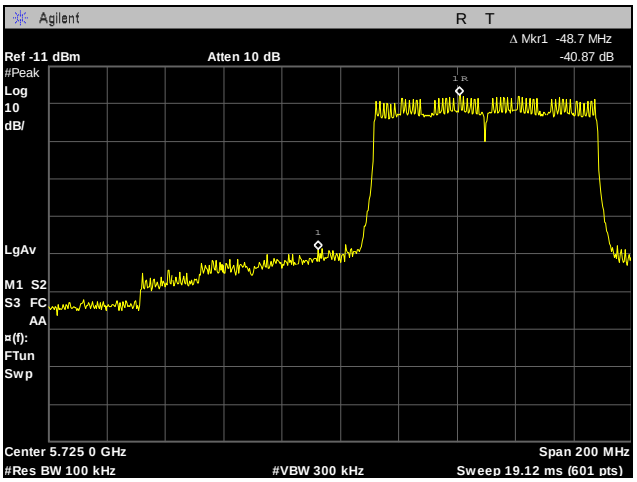


Plot 722. Conducted Band Edge, 802.11n 40 MHz, 5755 MHz, Low Channel, Port 3

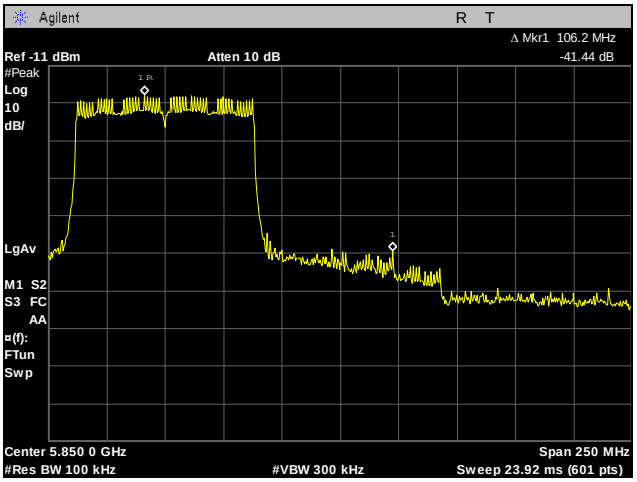


Plot 723. Conducted Band Edge, 802.11n 40 MHz, 5795 MHz, High Channel, Port 3

Conducted Band Edge Test Results, 802.11n 80 MHz, Port 1, 5 GHz

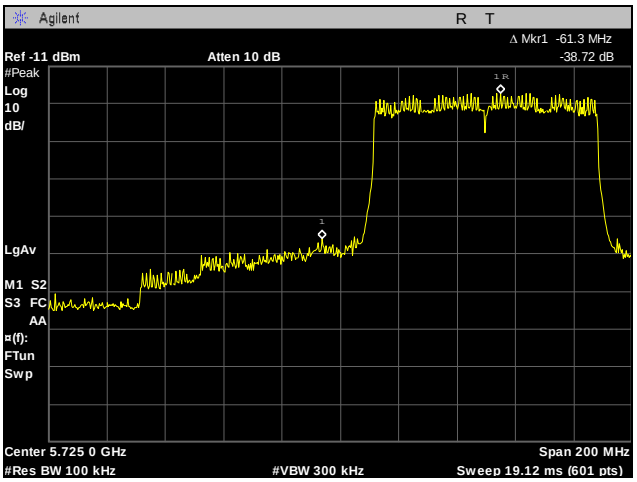


Plot 724. Conducted Band Edge, 802.11n 80 MHz, 5775 MHz, Port 1, Low Band Edge

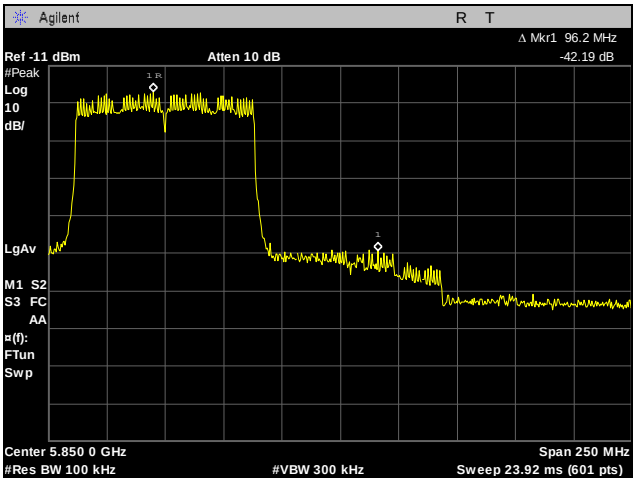


Plot 725. Conducted Band Edge, 802.11n 80 MHz, 5775 MHz, Port 1, High Band Edge

Conducted Band Edge Test Results, 802.11n 80 MHz, Port 2, 5 GHz

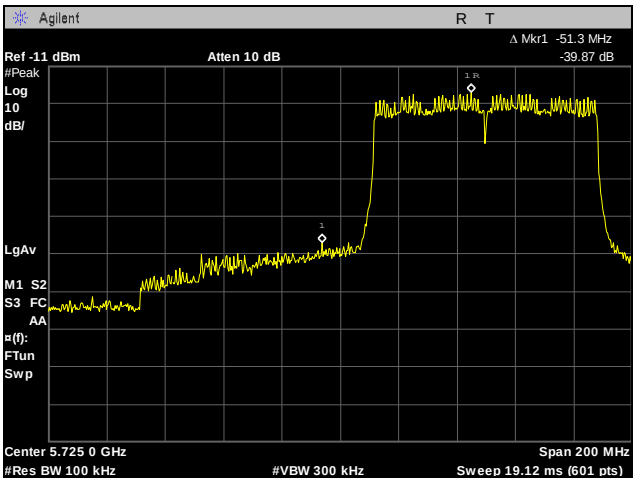


Plot 726. Conducted Band Edge, 802.11n 80 MHz, 5775 MHz, Port 2, Low Band Edge

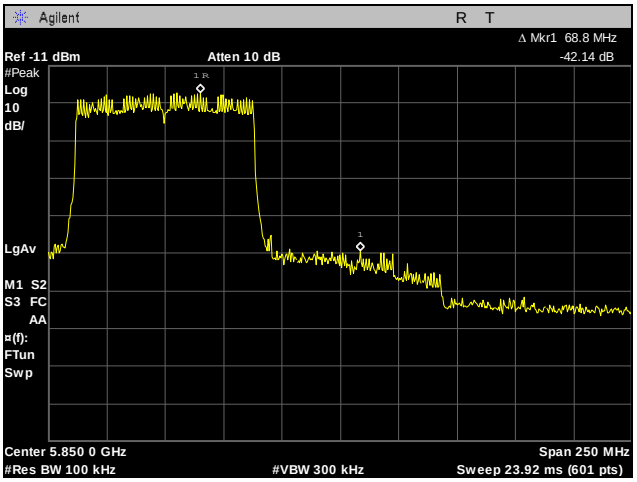


Plot 727. Conducted Band Edge, 802.11n 80 MHz, 5775 MHz, Port 2, High Band Edge

Conducted Band Edge Test Results, 802.11n 80 MHz, Port 3, 5 GHz



Plot 728. Conducted Band Edge, 802.11n 80 MHz, 5775 MHz, Port 3, Low Band Edge



Plot 729. Band Edge, 802.11n 80 MHz, 5775 MHz, Port 3, High Band Edge

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(e) Peak Power Spectral Density

Test Requirements: **§15.247(e):** For digitally modulated systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.

Test Procedure: The transmitter was connected directly to a Spectrum Analyzer through an attenuator. The power level was set to the maximum level based on the output power settings of 15.247(b). A RBW of 3 kHz and VBW of 10 kHz were used to determine the peak emissions within the band. The Peak Marker function of the analyzer was used to determine the highest peak spectral density in a 3 kHz band. Measurements were carried out at the low, mid and high channels.

Test Results: The EUT was compliant with the peak power spectral density limits of **§ 15.247 (e)**.

The peak power spectral density was determined from plots on the following page(s).

Test Engineer: Anderson Soungpanya

Test Date: 01/30/13

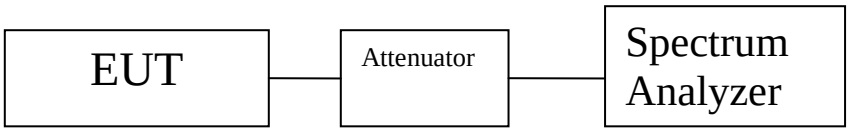


Figure 5. Block Diagram, Peak Power Spectral Density Test Setup

Peak Power Spectral Density Test Results

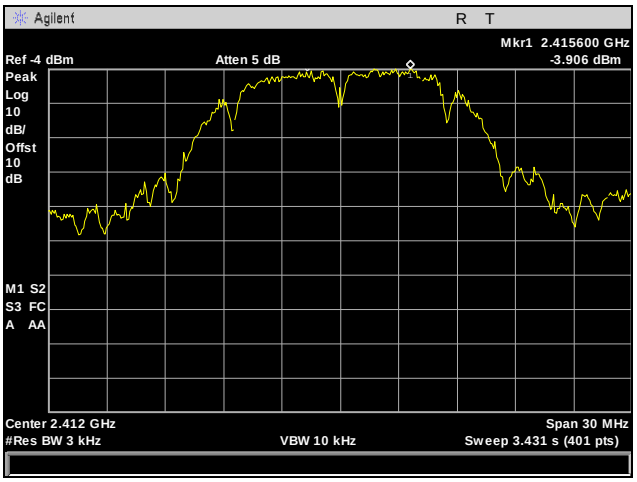
	Peak Power Spectral Density				
	Carrier Channel	Frequency (MHz)	Measured PPSD (dBm)	Limit (dBm)	Margin (dB)
802.11b	Low	2412	-3.906	8	-11.906
	Mid	3437	-4.381	8	-12.381
	High	2462	-3.548	8	-11.548
802.11g	Low	2412	-6.989	8	-14.989
	Mid	2437	-6.181	8	-14.181
	High	2462	-8.899	8	-16.899
802.11n 20 MHz Port 1	Low	2412	-8.678	8	-16.678
	Mid	2437	-5.45	8	-13.45
	High	2462	-9.778	8	-17.778
802.11n 20 MHz Port 2	Low	2412	-7.049	8	-15.049
	Mid	2437	-5.45	8	-13.45
	High	2462	-8.949	8	-16.949
802.11n 20 MHz Port 3	Low	2412	-12.26	8	-20.26
	Mid	2437	-5.011	8	-13.011
	High	2462	-6.896	8	-14.896
802.11n 20 MHz Summed	Low	2422	-4.06	2.23	-6.29
	Mid	2437	-0.53	2.23	-2.76
	High	2452	-3.60	2.23	-5.83
802.11n 40 MHz Port 1	Low	2422	-11.44	8	-19.44
	Mid	2437	-10.06	8	-18.06
	High	2452	-12.67	8	-20.67
802.11n 40 MHz Port 2	Low	2422	-11.31	8	-19.31
	Mid	2437	-10.36	8	-18.36
	High	2452	-12.9	8	-20.9
802.11n 40 MHz Port 3	Low	2422	-10.74	8	-18.74
	Mid	2437	-10.28	8	-18.28
	High	2452	-13.47	8	-21.47
802.11n 40 MHz Summed	Low	2422	-6.38	2.23	-8.61
	Mid	2437	-5.46	2.23	-7.69
	High	2452	-8.23	2.23	-10.46

Table 40. Peak Power Spectral Density, Test Results, 2.4 GHz

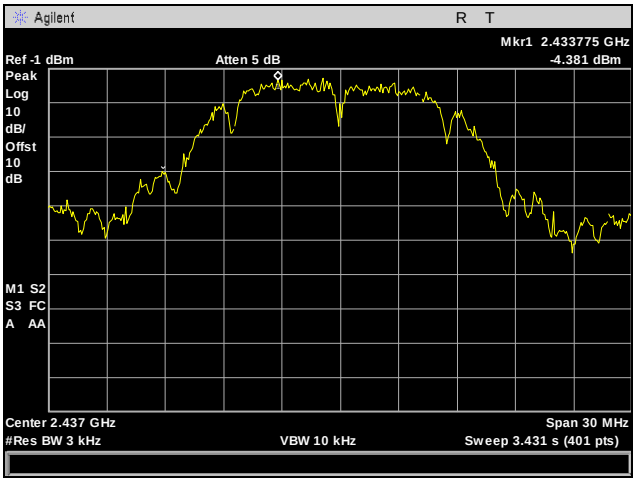
	Peak Power Spectral Density				
	Carrier Channel	Frequency (MHz)	Measured PPSD (dBm)	Limit (dBm)	Margin (dB)
802.11a	Low	5745	-4.763	8	-12.763
	Mid	5785	-4.061	8	-12.061
	High	5825	-3.627	8	-11.627
802.11n 20 MHz Port 1	Low	5745	-4.697	8	-12.697
	Mid	5785	-2.565	8	-10.565
	High	5825	-2.608	8	-10.608
802.11n 20 MHz Port 2	Low	5745	-3.807	8	-11.807
	Mid	5785	-3.774	8	-11.774
	High	5825	-3.572	8	-11.572
802.11n 20 MHz Port 3	Low	5745	-3.328	8	-11.328
	Mid	5785	-3.88	8	-11.88
	High	5825	-3.209	8	-11.209
802.11n 20 MHz Summed	Low	5745	0.86	2.23	-1.37
	Mid	5785	1.41	2.23	-0.82
	High	5825	1.66	2.23	-0.57
802.11n 40 MHz Port 1	Low	5755	-6.956	8	-14.956
	High	5795	-7.46	8	-15.46
802.11n 40 MHz Port 2	Low	5755	-6.342	8	-14.342
	High	5795	-7.067	8	-15.067
802.11n 40 MHz Port 3	Low	5755	-6.657	8	-14.657
	High	5795	-6.552	8	-14.552
802.11n 40 MHz Summed	Low	5755	-1.87	2.23	-4.1
	High	5795	-2.24	2.23	-4.47
802.11n 80 MHz Port 1	--	5775	-11.11	8	-19.11
802.11n 80 MHz Port 2	--	5775	-10.78	8	-18.78
802.11n 80 MHz Port 3	--	5775	-10.78	8	-18.78
802.11n 80 MHz Summed	--	5775	-6.12	2.23	-8.35

Table 41. Peak Power Spectral Density, Test Results, 5 GHz

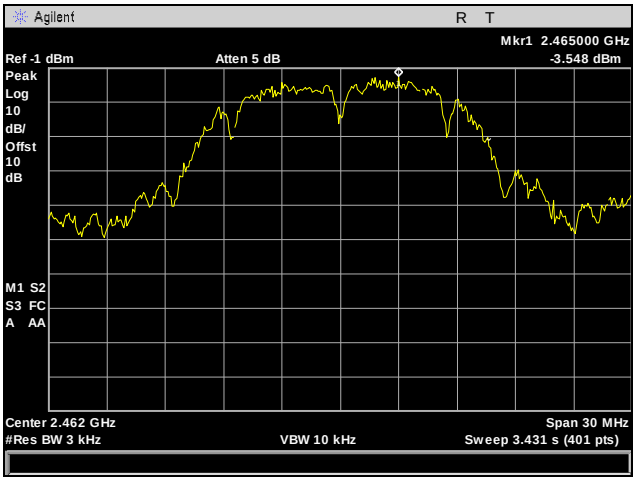
Peak Power Spectral Density, 802.11b, 2.4 GHz



Plot 730. Peak Spectral Density, 802.11b 20 MHz, 2412 MHz, Low Channel

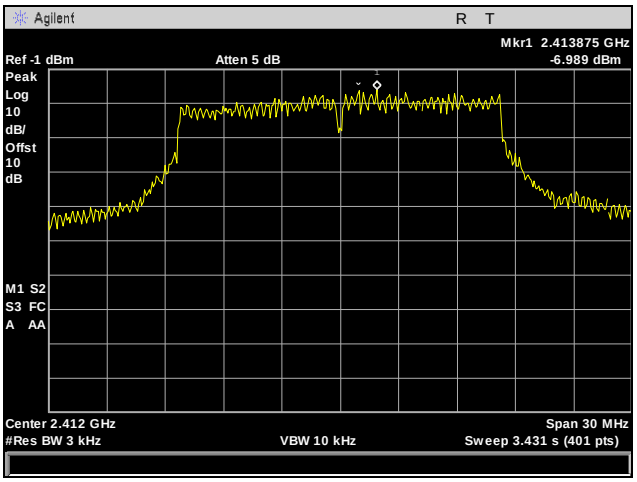


Plot 731. Peak Spectral Density, 802.11b 20 MHz, 2437 MHz, Mid Channel

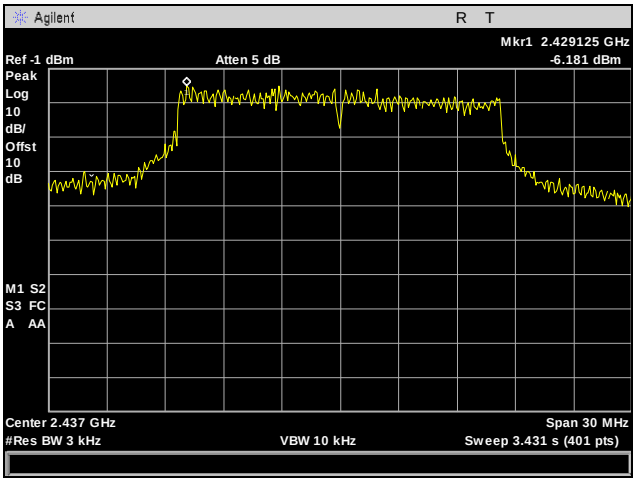


Plot 732. Peak Spectral Density, 802.11b 20 MHz, 2462 MHz, High Channel

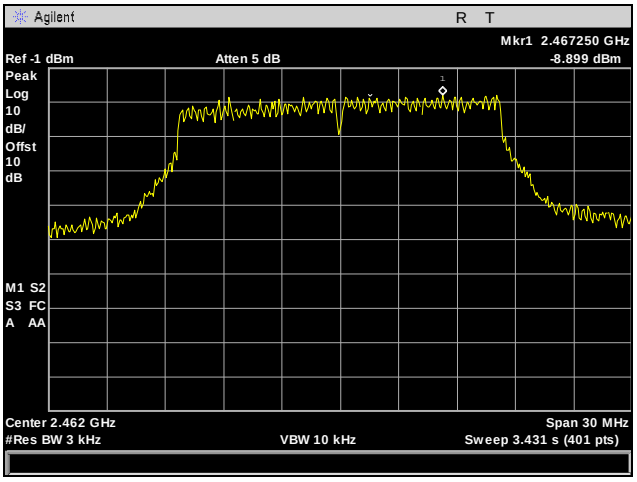
Peak Power Spectral Density, 802.11g, 2.4 GHz



Plot 733. Peak Spectral Density, 802.11g 20 MHz, 2412 MHz, Low Channel

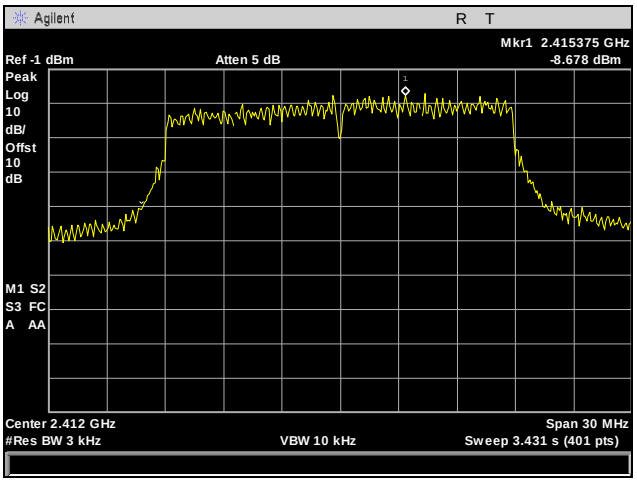


Plot 734. Peak Spectral Density, 802.11g 20 MHz, 2437 MHz, Mid Channel

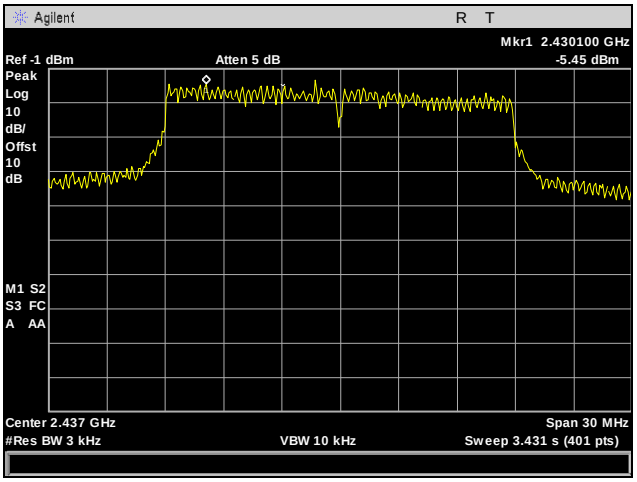


Plot 735. Peak Spectral Density, 802.11g 20 MHz, 2462 MHz, High Channel

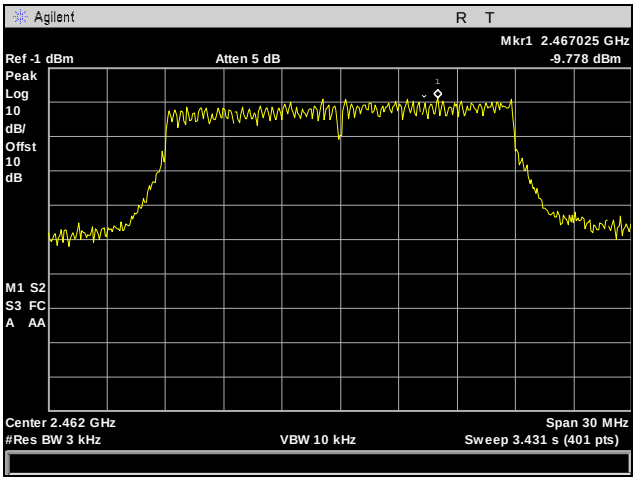
Peak Power Spectral Density, 802.11n 20 MHz, Port 1, 2.4 GHz



Plot 736. Peak Spectral Density, 802.11n 20 MHz, 2412 MHz, Low Channel, Port 1

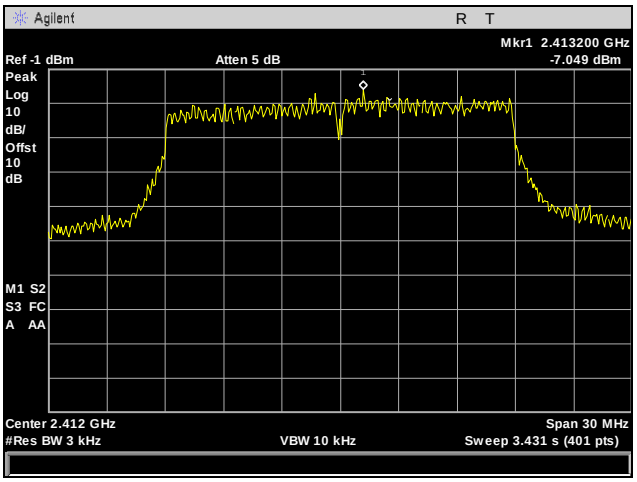


Plot 737. Peak Spectral Density, 802.11n 20 MHz, 2437 MHz, Mid Channel, Port 1

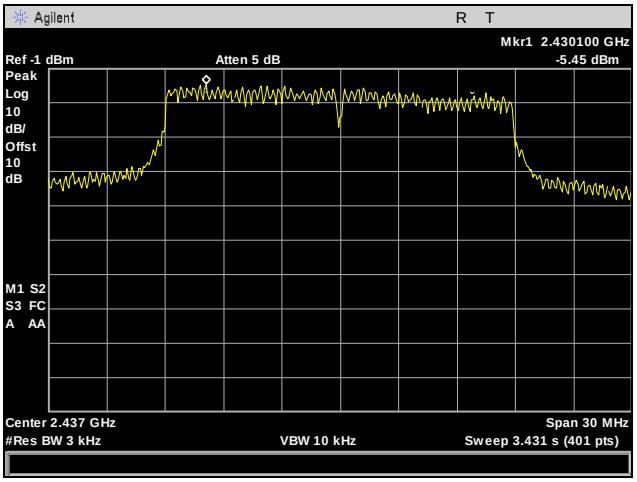


Plot 738. Peak Spectral Density, 802.11n 20 MHz, 2462 MHz, High Channel, Port 1

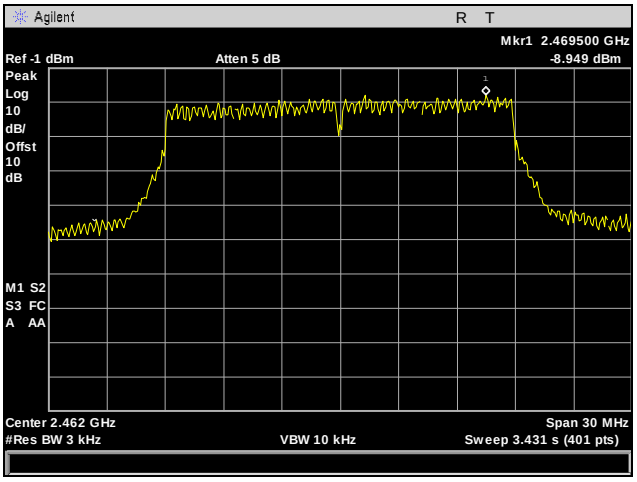
Peak Power Spectral Density, 802.11n 20 MHz, Port 2, 2.4 GHz



Plot 739. Peak Spectral Density, 802.11n 20 MHz, 2412 MHz, Low Channel, Port 2

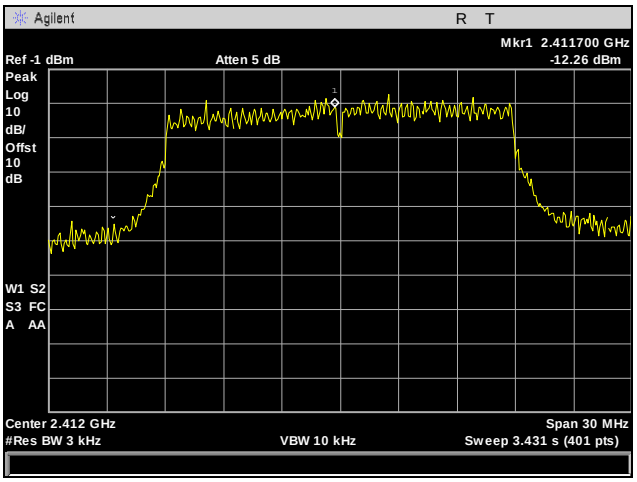


Plot 740. Peak Spectral Density, 802.11n 20 MHz, 2437 MHz, Mid Channel, Port 2

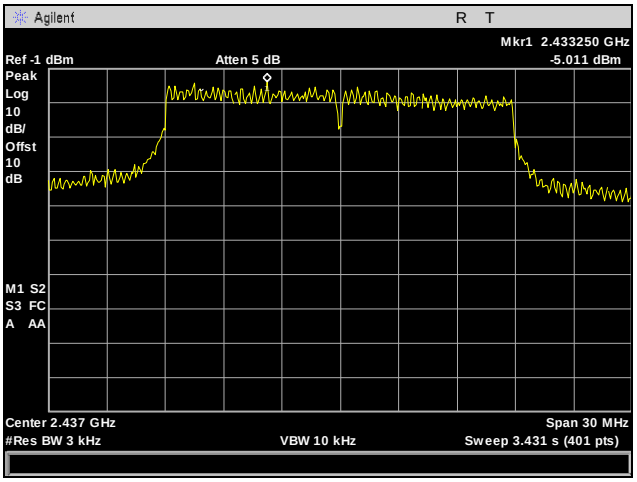


Plot 741. Peak Spectral Density, 802.11n 20 MHz, 2462 MHz, High Channel, Port 2

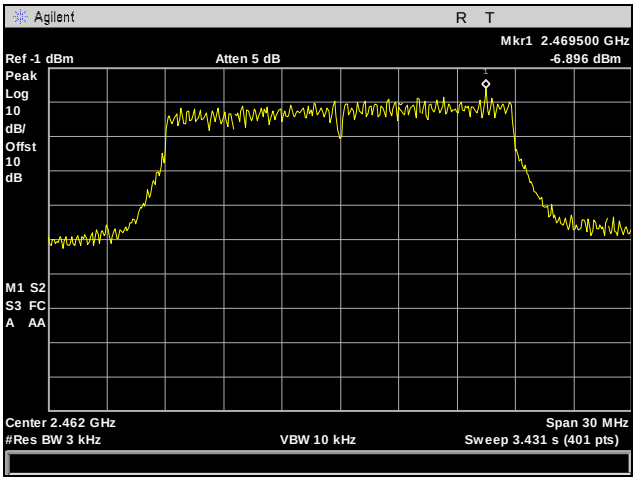
Peak Power Spectral Density, 802.11n 20 MHz, Port 3, 2.4 GHz



Plot 742. Peak Spectral Density, 802.11n 20 MHz, 2412 MHz, Low Channel, Port 3

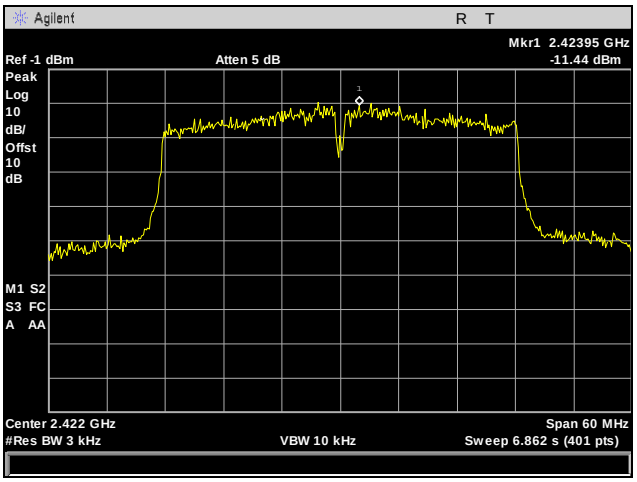


Plot 743. Peak Spectral Density, 802.11n 20 MHz, 2437 MHz, Mid Channel, Port 3

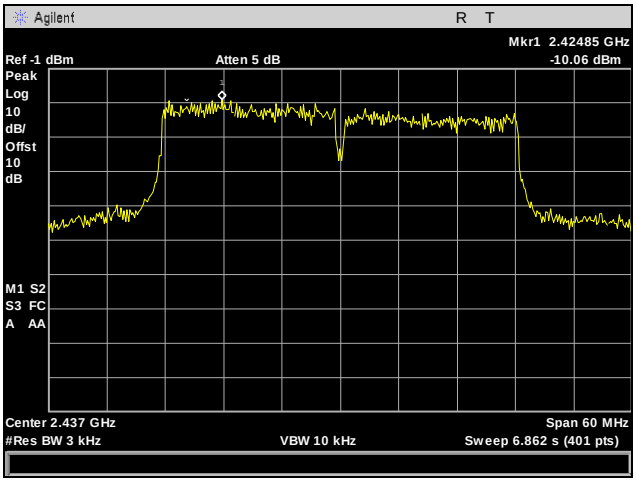


Plot 744. Peak Spectral Density, 802.11n 20 MHz, 2462 MHz, High Channel, Port 3

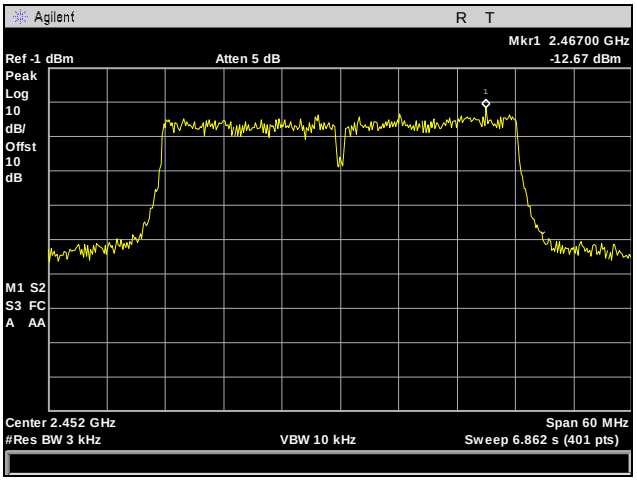
Peak Power Spectral Density, 802.11n 40 MHz, Port 1, 2.4 GHz



Plot 745. Peak Spectral Density, 802.11n 40 MHz, 2422 MHz, Low Channel, Port 1

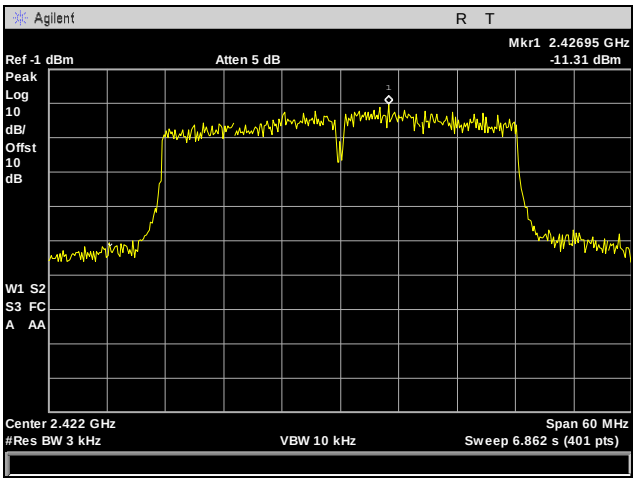


Plot 746. Peak Spectral Density, 802.11n 40 MHz, 2437 MHz, Mid Channel, Port 1

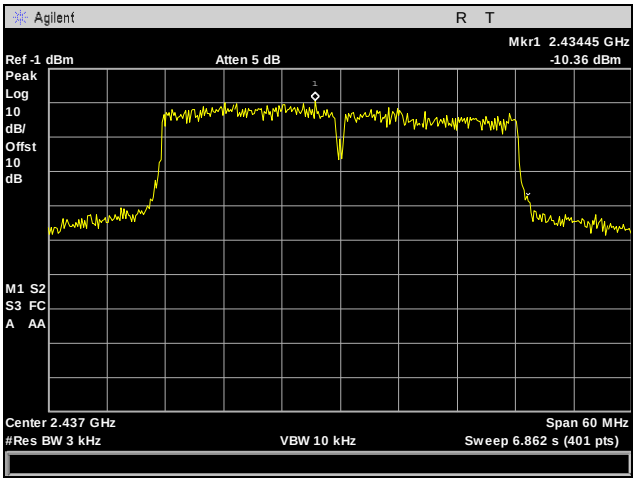


Plot 747. Peak Spectral Density, 802.11n 40 MHz, 2452 MHz, High Channel, Port 1

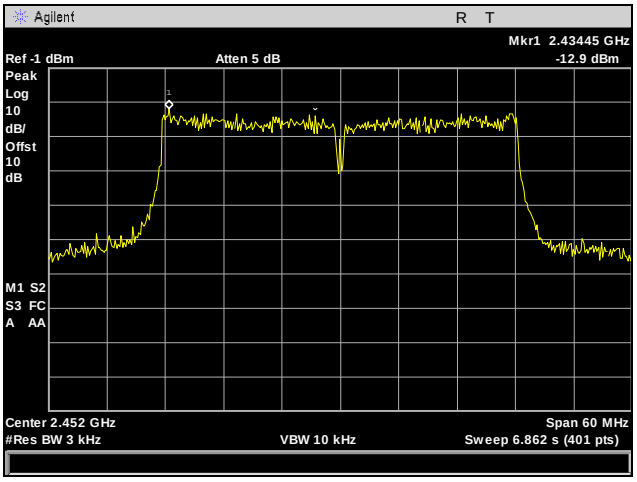
Peak Power Spectral Density, 802.11n 40 MHz, Port 2, 2.4 GHz



Plot 748. Peak Spectral Density, 802.11n 40 MHz, 2422 MHz, Low Channel, Port 2

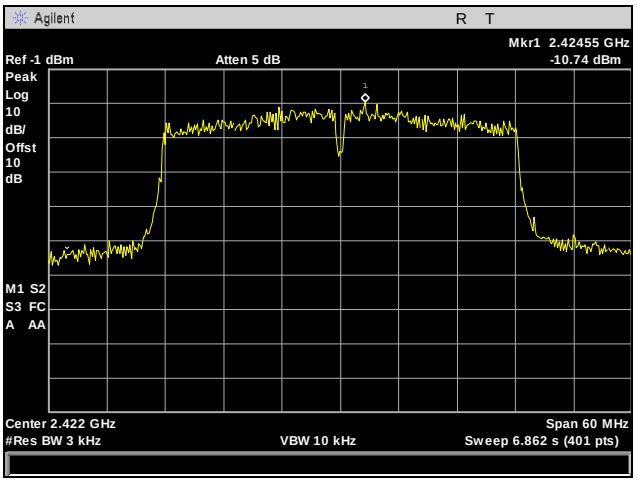


Plot 749. Peak Spectral Density, 802.11n 40 MHz, 2437 MHz, Mid Channel, Port 2

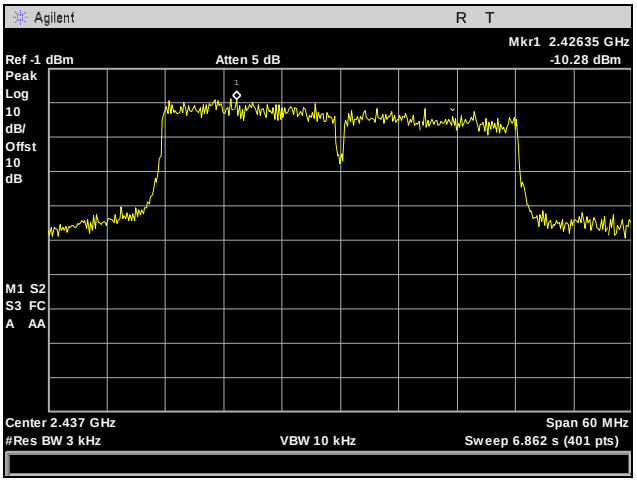


Plot 750. Peak Spectral Density, 802.11n 40 MHz, 2452 MHz, High Channel, Port 2

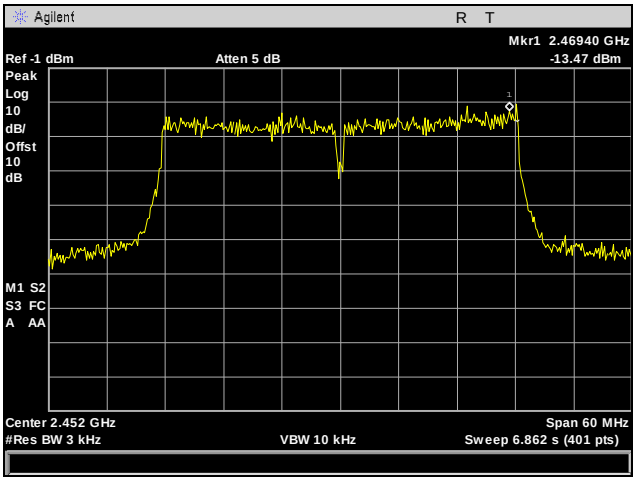
Peak Power Spectral Density, 802.11n 40 MHz, Port 3, 2.4 GHz



Plot 751. Peak Spectral Density, 802.11n 40 MHz, 2422 MHz, Low Channel, Port 3

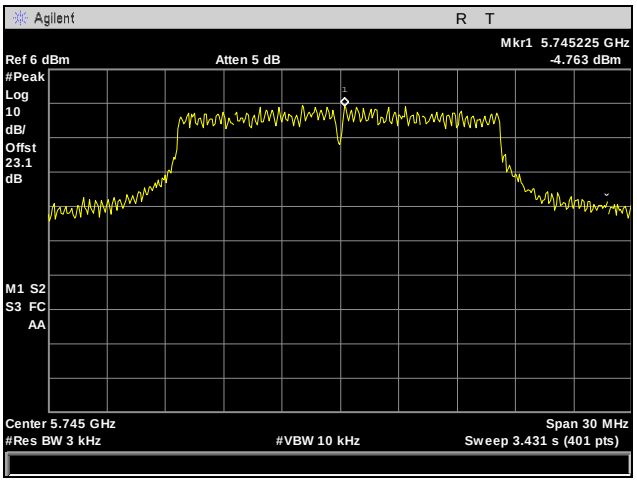


Plot 752. Peak Spectral Density, 802.11n 40 MHz, 2437 MHz, Mid Channel, Port 3

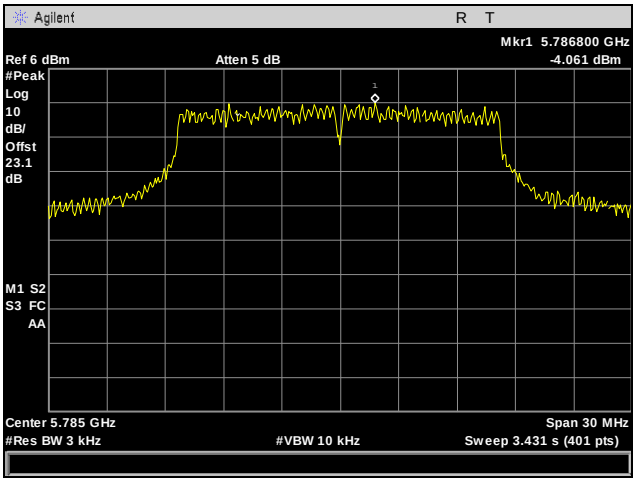


Plot 753. Peak Spectral Density, 802.11n 40 MHz, 2452 MHz, High Channel, Port 3

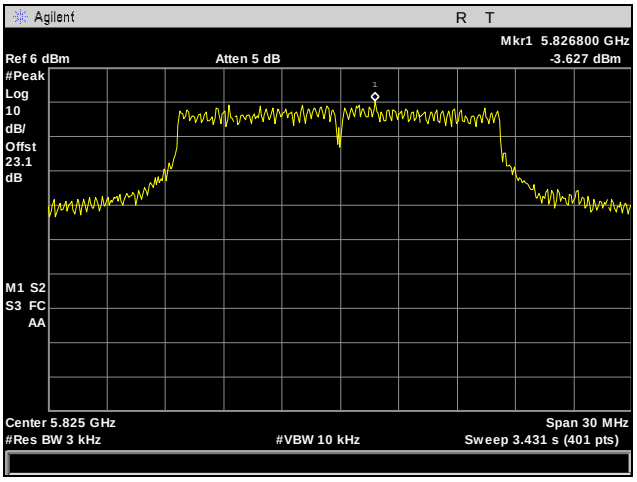
Peak Power Spectral Density, 802.11a, 5 GHz



Plot 754. Power Spectral Density, 802.11a, 5745 MHz, Low Channel, Port 1

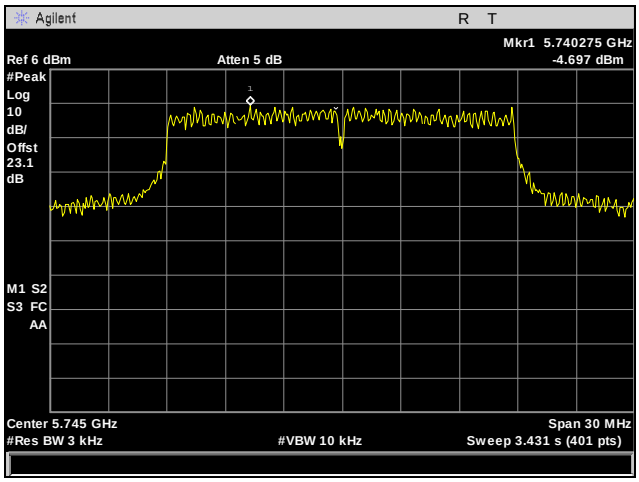


Plot 755. Power Spectral Density, 802.11a, 5785 MHz, Mid Channel, Port 1

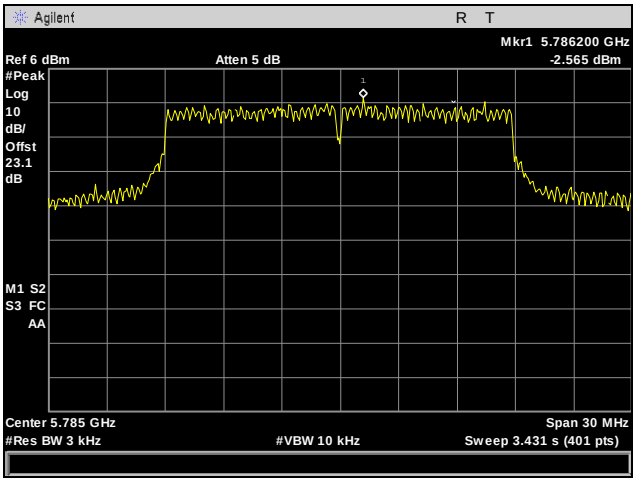


Plot 756. Power Spectral Density, 802.11a, 5825 MHz, High Channel, Port 1

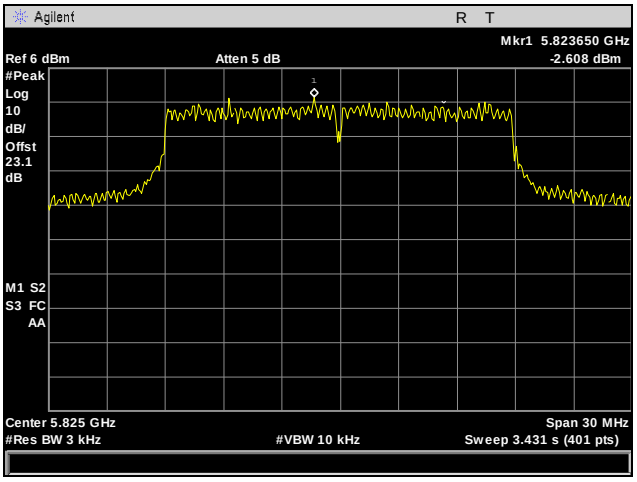
Peak Power Spectral Density, 802.11n 20 MHz, Port 1, 5 GHz



Plot 757. Power Spectral Density, 802.11n 20 MHz, 5745 MHz, Low Channel, Port 1

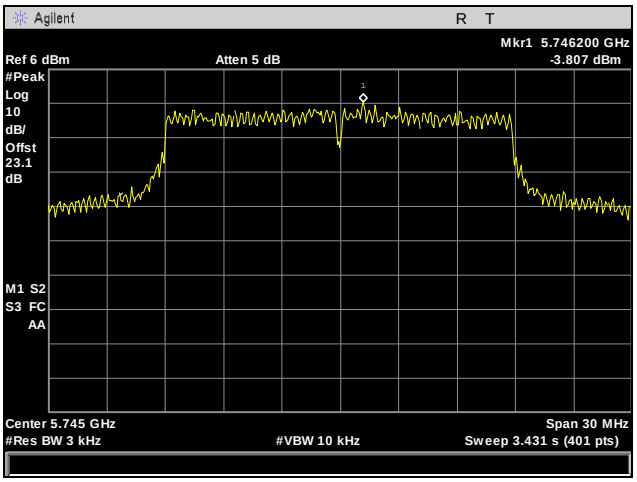


Plot 758. Power Spectral Density, 802.11n 20 MHz, 5785 MHz, Mid Channel, Port 1

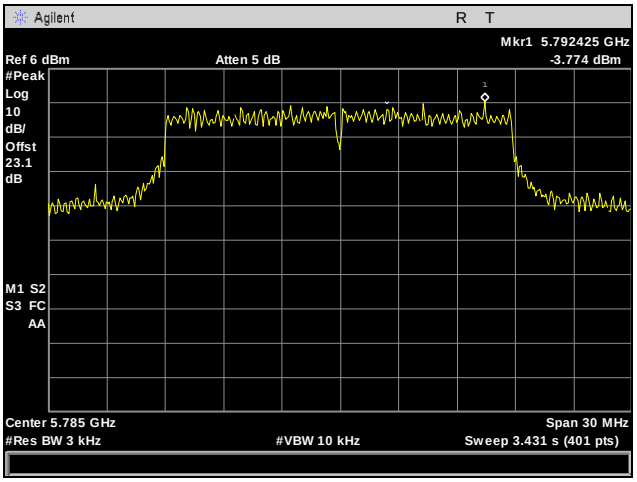


Plot 759. Power Spectral Density, 802.11n 20 MHz, 5825 MHz, High Channel, Port 1

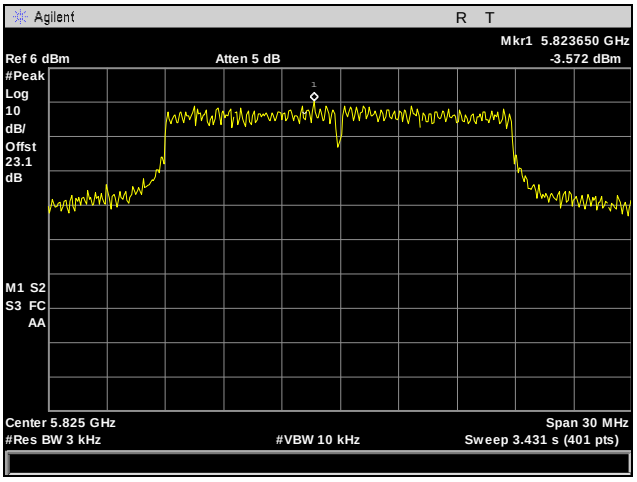
Peak Power Spectral Density, 802.11n 20 MHz, Port 2, 5 GHz



Plot 760. Power Spectral Density, 802.11n 20 MHz, 5745 MHz, Low Channel, Port 2

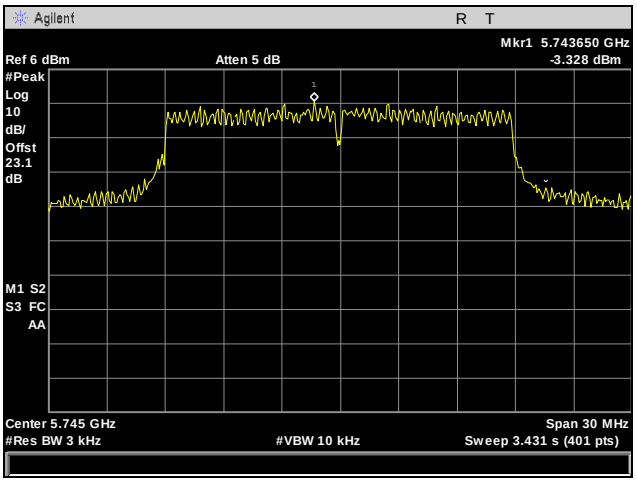


Plot 761. Power Spectral Density, 802.11n 20 MHz, 5785 MHz, Mid Channel, Port 2

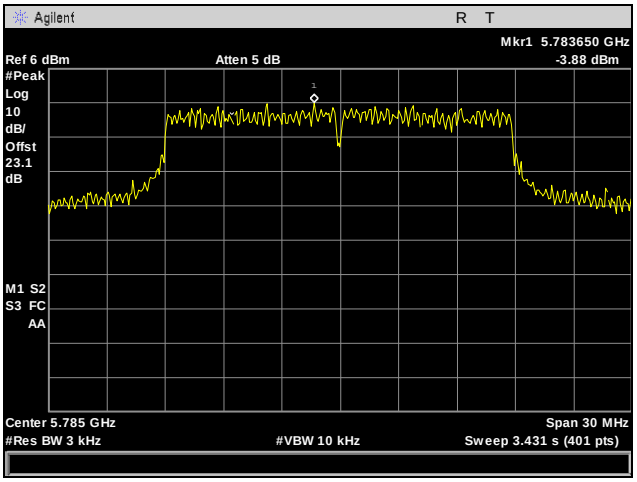


Plot 762. Power Spectral Density, 802.11n 20 MHz, 5825 MHz, High Channel, Port 2

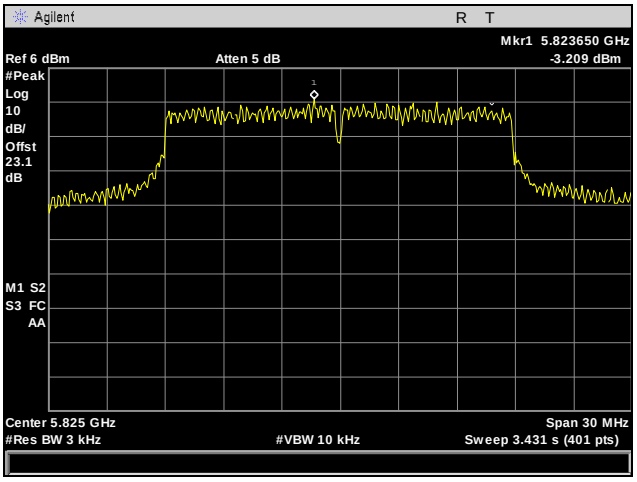
Peak Power Spectral Density, 802.11n 20 MHz, Port 3, 5 GHz



Plot 763. Power Spectral Density, 802.11n 20 MHz, 5745 MHz, Low Channel, Port 3

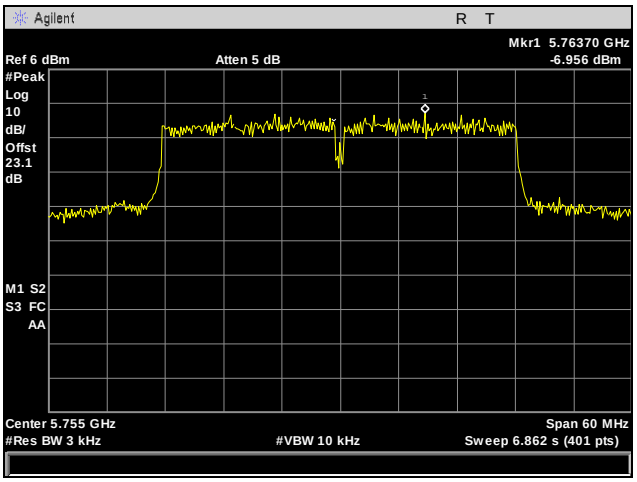


Plot 764. Power Spectral Density, 802.11n 20 MHz, 5785 MHz, Mid Channel, Port 3

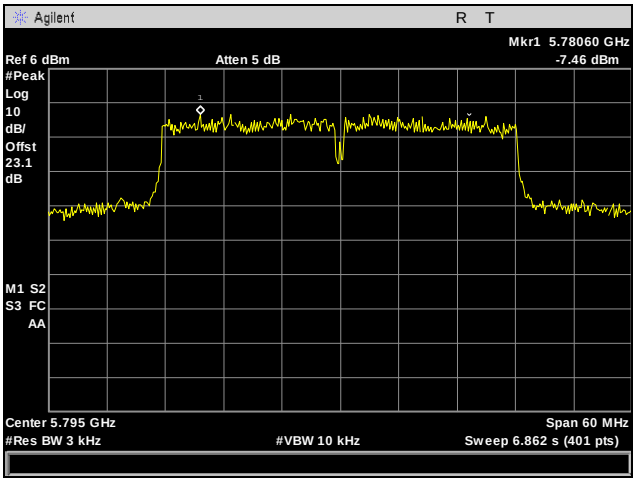


Plot 765. Power Spectral Density, 802.11n 20 MHz, 5825 MHz, High Channel, Port 3

Peak Power Spectral Density, 802.11n 40 MHz, Port 1, 5 GHz

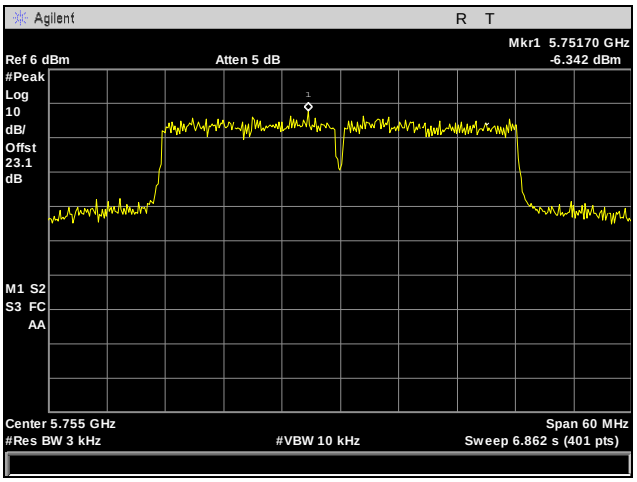


Plot 766. Power Spectral Density, 802.11n 40 MHz, 5755 MHz, Low Channel, Port 1

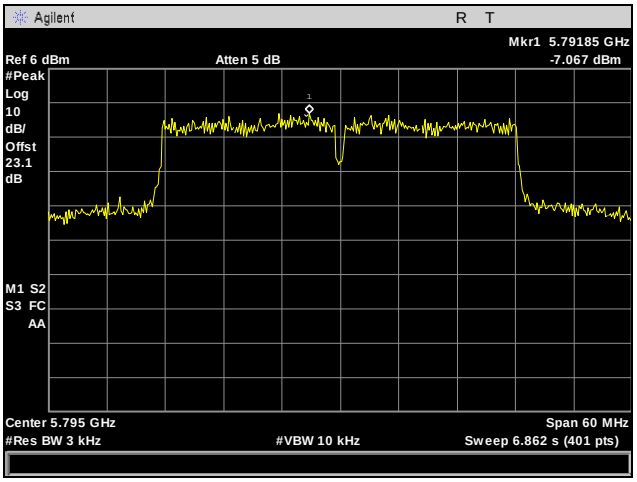


Plot 767. Power Spectral Density, 802.11n 40 MHz, 5795 MHz, High Channel, Port 1

Peak Power Spectral Density, 802.11n 40 MHz, Port 2, 5 GHz

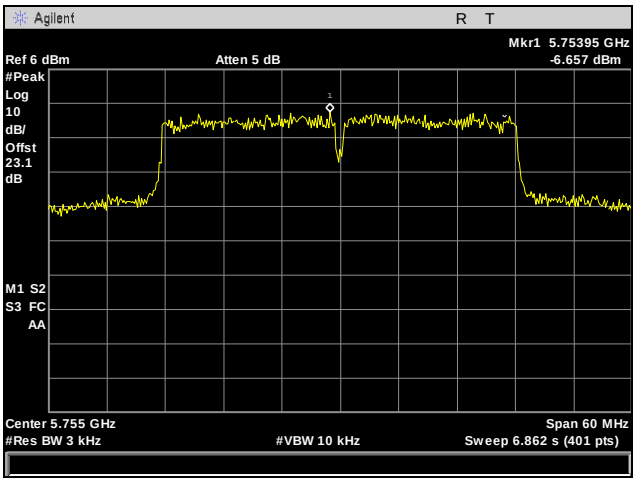


Plot 768. Power Spectral Density, 802.11n 40 MHz, 5755 MHz, Low Channel, Port 2

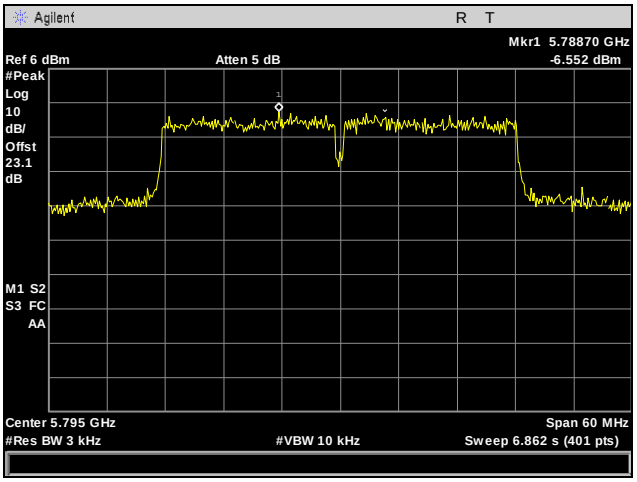


Plot 769. Power Spectral Density, 802.11n 40 MHz, 5795 MHz, High Channel, Port 2

Peak Power Spectral Density, 802.11n 40 MHz, Port 3, 5 GHz

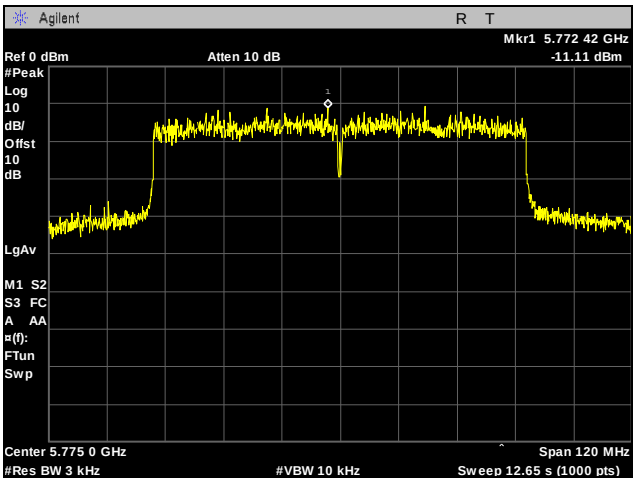


Plot 770. Power Spectral Density, 802.11n 40 MHz, 5755 MHz, Low Channel, Port 3

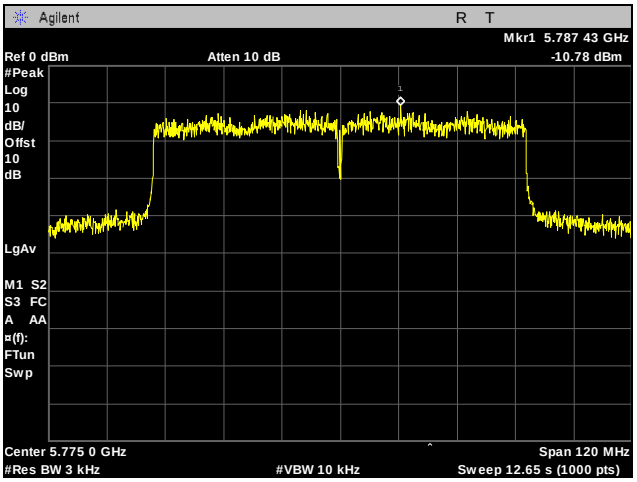


Plot 771. Power Spectral Density, 802.11n 40 MHz, 5795 MHz, High Channel, Port 3

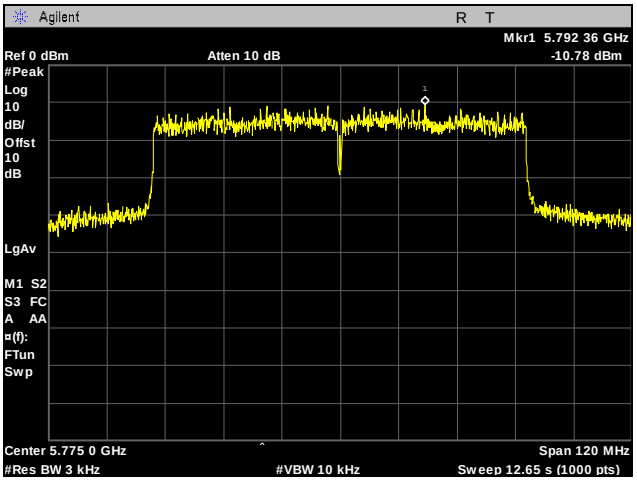
Peak Power Spectral Density, 802.11n 80 MHz, 5 GHz



Plot 772. Power Spectral Density, 802.11n 80 MHz, 5775 MHz, Port 1



Plot 773. Power Spectral Density, 802.11n 80 MHz, 5775 MHz, Port 2



Plot 774. Power Spectral Density, 802.11n 80 MHz, 5775 MHz, Port 3

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(i) Maximum Permissible Exposure

RF Exposure Requirements: **§1.1307(b)(1) and §1.1307(b)(2):** Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

RF Radiation Exposure Limit: **§1.1310:** As specified in this section, the Maximum Permissible Exposure (MPE) Limit shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in Sec. 1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of Sec. 2.1093 of this chapter.

MPE Limit Calculation: EUT's operating frequencies @ 2400-2483.5 MHz & 5745-5825MHz; **Limit for Uncontrolled exposure: 1 mW/cm^2 or 10 W/m^2**

2.4 GHz highest power density:
EUT antenna gain = (3dBi x3) 7.77 *dBi;* power = 638.3 mW

Equation from page 18 of OET 65, Edition 97-01

$S = PG / 4\pi R^2$ or $R = \sqrt{PG / 4\pi S}$

where, S = Power Density
P = Power Input to antenna
G = Antenna Gain (5.98 numeric)
R = 20 cm

S = (638.3*5.98/ 4*3.14*400) = **0.759 mW/cm2**

5.8 GHz highest power density:
EUT antenna gain = (7dBi x3) 11.77 *dBi;* power = 227 mW

Equation from page 18 of OET 65, Edition 97-01

$S = PG / 4\pi R^2$ or $R = \sqrt{PG / 4\pi S}$

where, S = Power Density
P = Power Input to antenna
G = Antenna Gain (15.03 numeric)
R = 20 cm

S = (227*15.03/ 4*3.14*400) = **0.679 mW/cm2**

Electromagnetic Compatibility Criteria for Intentional Radiators

RSS-GEN Receiver Spurious Emissions Requirements

Test Requirements: The following receiver spurious emission limits shall be complied with:

(a) If a radiated measurement is made, all spurious emissions shall comply with the limits of Table 42.

Spurious Frequency (MHz)	Field Strength (microvolt/m at 3 metres)
30 – 88	100
88 – 216	150
216 – 960	200
Above 960	500

Table 42. Spurious Emission Limits for Receivers

(b) If a conducted measurement is made, no spurious output signals appearing at the antenna terminals shall exceed 2 nanowatts per any 4 kHz spurious frequency in the band 30-1000 MHz, or 5 nanowatts above 1 GHz.

Test Procedures: The EUT was programmed for receive mode only. Conducted measurements were taken at the antenna port of the EUT. 300 kHz resolution bandwidth was used from 30 MHz - 1 GHz and 1MHz resolution was used for measurements done above 1 GHz. All plots are corrected for cable loss.

Test Results: Equipment is compliant with the Receiver Spurious Emissions Requirements of RSS-GEN.

Test Engineer(s): Anderson Soungpanya

Test Date(s): 01/29/13

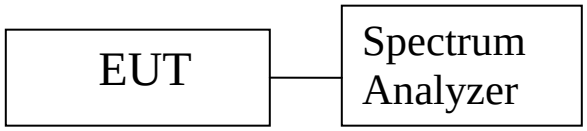
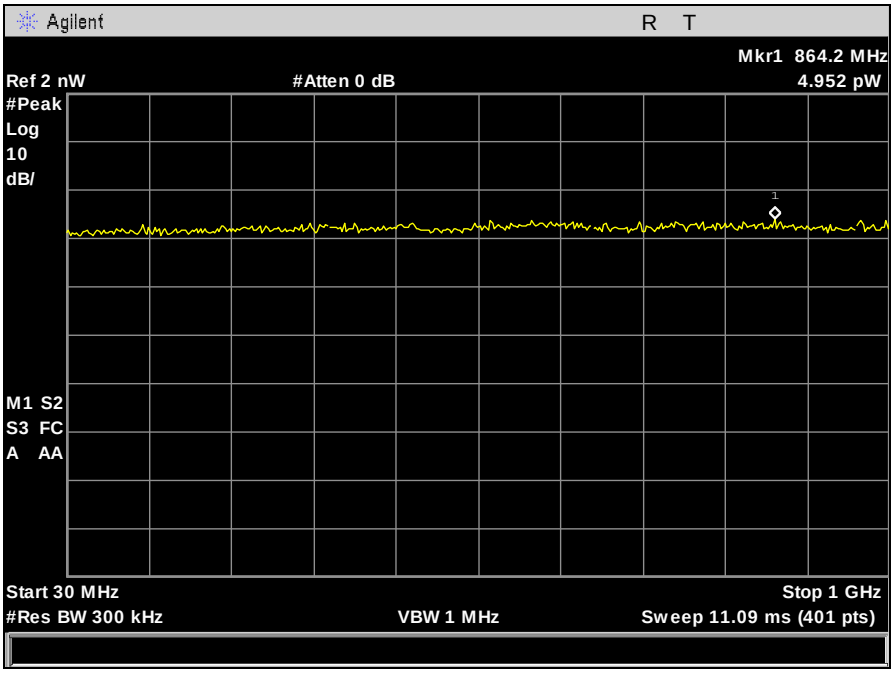
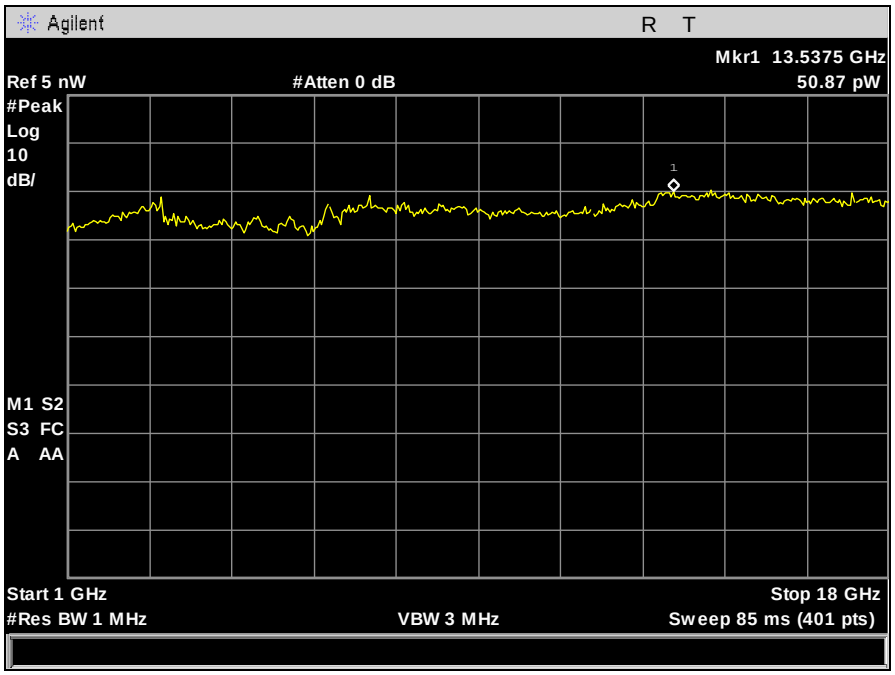


Figure 6. Block Diagram, Conducted Receiver Spurious Emissions Test Setup

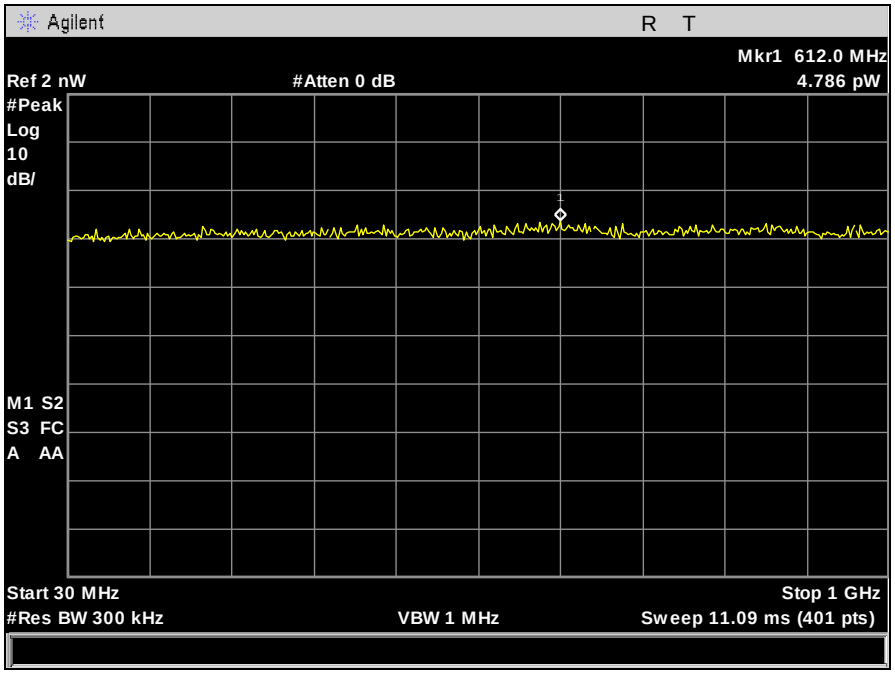
Conducted Receiver Spurious Emissions



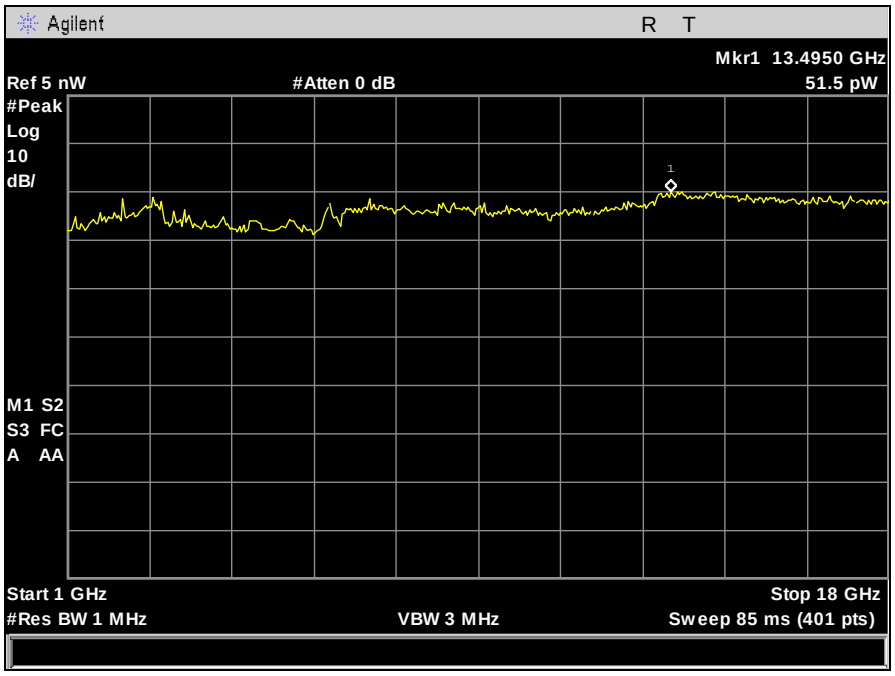
Plot 775. Receiver Spurious Emission, 30 MHz – 1 GHz, Port 1



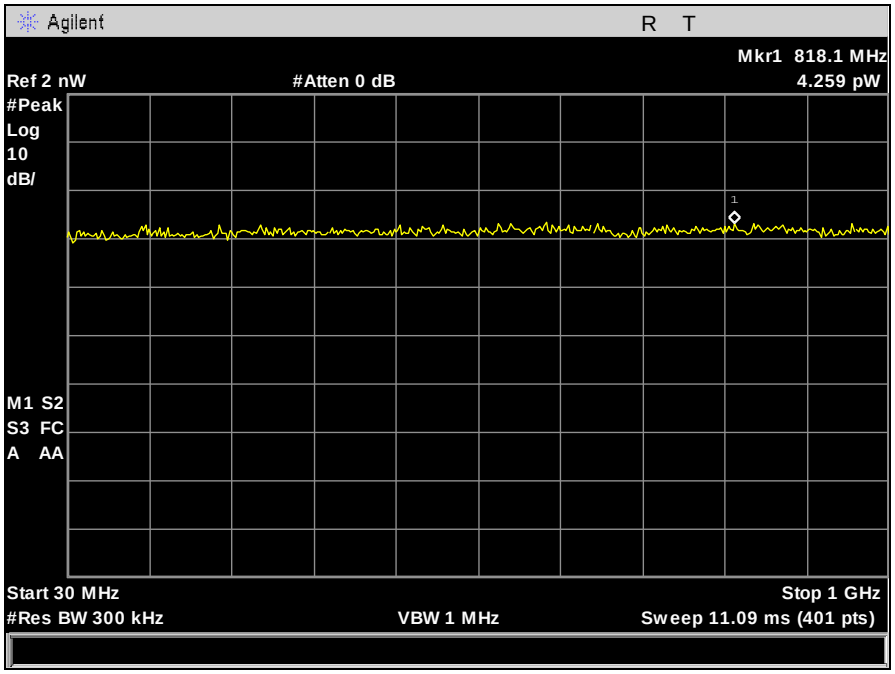
Plot 776. Receiver Spurious Emission, 1 GHz – 18 GHz, Port 1



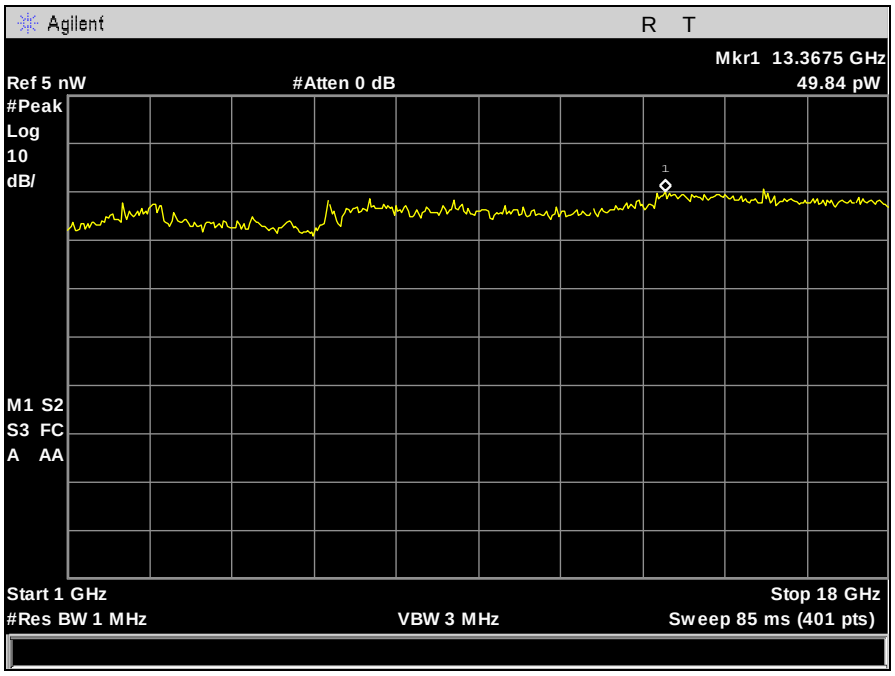
Plot 777. Receiver Spurious Emission, 30 MHz – 1 GHz, Port 2



Plot 778. Receiver Spurious Emission, 1 GHz – 18 GHz, Port 2



Plot 779. Receiver Spurious Emission, 30 MHz – 1 GHz, Port 3



Plot 780. Receiver Spurious Emission, 1 GHz – 18 GHz, Port 3

IV. Test Equipment

Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2005.

MET Asset #	Equipment	Manufacturer	Model	Last Cal Date	Cal Due Date
1S2600	BILOG ANTENNA	TESEQ	CBL6112D	4/14/2010	4/14/2013
1S2482	5 METER CHAMBER (NSA)	PANASHIELD	5 METER SEMI-ANECHOIC CHAMBER	11/22/2011	5/22/2013
1S2501	EMI TEST RECEIVER 20HZ-40GHZ	ROHDE & SCHWARZ	ESU40	7/16/2012	7/16/2013
1S2583	SPECTRUM ANALYZER	AGILENT/HP	E4447A	3/27/2012	9/27/2013
1S2603	DOUBLE RIDGED WAVEGUIDE HORN	ETS-LINDGREN	3117	4/15/2011	4/15/2013
1S2583	SPECTRUM ANALYZER	AGILENT/HP	E4447A	3/27/2012	9/27/2013
1S2460	1-26GHZ SPECTRUM ANALYZER	AGILENT TECHNOLOGIES	E4407B	7/27/2012	1/27/2014
1S2202	HORN ANTENNA (1 METER)	EMCO	3116	4/23/2010	4/23/2013
1S2523	PREAMPLIFIER	AGILENT TECHNOLOGIES	8449B	SEE NOTE	
1S2603	DOUBLE RIDGED WAVEGUIDE HORN	ETS-LINDGREN	3117	4/15/2011	4/15/2013
1S2729	SONOMA AMPLIFIER	SONOMA INSTRUMENT	310N	4/18/2012	10/18/2013
1S2229	TEMPERATURE CHAMBER	TENNY ENGINEERING	T63C	2/18/2012	8/18/2013
1S2710	DRG HORN ANTENNA	AH SYSTEMS, INC	SAS-574	12/13/2012	6/13/2014
NA	HIGH PASS FILTER	MICRO-TRONICS	HPM13147	SEE NOTE	
NA	NOTCH FILTER	MICRO-TRONICS	BRM50702	SEE NOTE	

Table 43. Test Equipment List

Note: Functionally tested equipment is verified using calibrated instrumentation at the time of testing.

V. Certification & User's Manual Information

Certification & User's Manual Information

A. Certification Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 2, Subpart I — Marketing of Radio frequency devices:

§ 2.801 Radio-frequency device defined.

As used in this part, a radio-frequency device is any device which in its operation is capable of Emitting radio-frequency energy by radiation, conduction, or other means. Radio- frequency devices include, but are not limited to:

(a) The various types of radio communication transmitting devices described throughout this chapter.

(b) The incidental, unintentional and intentional radiators defined in Part 15 of this chapter.

(c) The industrial, scientific, and medical equipment described in Part 18 of this chapter.

(d) Any part or component thereof which in use emits radio-frequency energy by radiation, conduction, or other means.

§ 2.803 Marketing of radio frequency devices prior to equipment authorization.

(a) Except as provided elsewhere in this chapter, no person shall sell or lease, or offer for sale or lease (including advertising for sale or lease), or import, ship or distribute for the purpose of selling or leasing or offering for sale or lease, any radio frequency device unless:

(1) In the case of a device subject to certification, such device has been authorized by the Commission in accordance with the rules in this chapter and is properly identified and labeled as required by §2.925 and other relevant sections in this chapter; or

(2) In the case of a device that is not required to have a grant of equipment authorization issued by the Commission, but which must comply with the specified technical standards prior to use, such device also complies with all applicable administrative (including verification of the equipment or authorization under a Declaration of Conformity, where required), technical, labeling and identification requirements specified in this chapter.

(d) Notwithstanding the provisions of paragraph (a) of this section, the offer for sale solely to business, commercial, industrial, scientific or medical users (but not an offer for sale to other parties or to end users located in a residential environment) of a radio frequency device that is in the conceptual, developmental, design or pre-production stage is permitted prior to equipment authorization or, for devices not subject to the equipment authorization requirements, prior to a determination of compliance with the applicable technical requirements *provided* that the prospective buyer is advised in writing at the time of the offer for sale that the equipment is subject to the FCC rules and that the equipment will comply with the appropriate rules before delivery to the buyer or to centers of distribution.

(e)(1) Notwithstanding the provisions of paragraph (a) of this section, prior to equipment authorization or determination of compliance with the applicable technical requirements any radio frequency device may be operated, but not marketed, for the following purposes and under the following conditions:

(i) Compliance testing;

(ii) Demonstrations at a trade show provided the notice contained in paragraph (c) of this section is displayed in a conspicuous location on, or immediately adjacent to, the device;

(iii) Demonstrations at an exhibition conducted at a business, commercial, industrial, scientific or medical location, but excluding locations in a residential environment, provided the notice contained in paragraphs (c) or (d) of this section, as appropriate, is displayed in a conspicuous location on, or immediately adjacent to, the device;

(iv) Evaluation of product performance and determination of customer acceptability, provided such operation takes place at the manufacturer's facilities during developmental, design or pre-production states; or

(v) Evaluation of product performance and determination of customer acceptability where customer acceptability of a radio frequency device cannot be determined at the manufacturer's facilities because of size or unique capability of the device, provided the device is operated at a business, commercial, industrial, scientific or medical user's site, but not at a residential site, during the development, design or pre-production stages.

(e)(2) For the purpose of paragraphs (e)(1)(iv) and (e)(1)(v) of this section, the term *manufacturer's facilities* includes the facilities of the party responsible for compliance with the regulations and the manufacturer's premises, as well as the facilities of other entities working under the authorization of the responsible party in connection with the development and manufacture, but not the marketing, of the equipment.

(f) For radio frequency devices subject to verification and sold solely to business, commercial, industrial, scientific and medical users (excluding products sold to other parties or for operation in a residential environment), parties responsible for verification of the devices shall have the option of ensuring compliance with the applicable technical specifications of this chapter at each end user's location after installation, provided that the purchase or lease agreement includes a proviso that such a determination of compliance be made and is the responsibility of the party responsible for verification of the equipment.

Certification & User's Manual Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 2, Subpart J — Equipment Authorization Procedures:

§ 2.901 Basis and Purpose

(a) In order to carry out its responsibilities under the Communications Act and the various treaties and international regulations, and in order to promote efficient use of the radio spectrum, the Commission has developed technical standards for radio frequency equipment and parts or components thereof. The technical standards applicable to individual types of equipment are found in that part of the rules governing the service wherein the equipment is to be operated.[1] *In addition to the technical standards provided, the rules governing the service may require that such equipment be verified by the manufacturer or importer*, be authorized under a Declaration of Conformity, or receive an equipment authorization from the Commission by one of the following procedures: certification or registration.

(b) The following sections describe the verification procedure, the procedure for a Declaration of Conformity, and the procedures to be followed in obtaining certification from the Commission and the conditions attendant to such a grant.

§ 2.907 Certification.

(a) Certification is an equipment authorization issued by the Commission, based on representation and test data submitted by the applicant.

(b) Certification attaches to all units subsequently marketed by the grantee which are identical (see Section 2.908) to the sample tested except for permissive changes or other variations authorized by the Commission pursuant to Section 2.1043.

[1] In this case, the equipment is subject to the rules of Part 15. More specifically, the equipment falls under Subpart B (of Part 15), which deals with unintentional radiators.

Certification & User's Manual Information

§ 2.948 Description of measurement facilities.

(a) Each party making measurements of equipment that is subject to an equipment authorization under Part 15 or Part 18 of this chapter, regardless of whether the measurements are filed with the Commission or kept on file by the party responsible for compliance of equipment marketed within the U.S. or its possessions, shall compile a description of the measurement facilities employed.

(1) If the measured equipment is subject to the verification procedure, the description of the measurement facilities shall be retained by the party responsible for verification of the equipment.

(i) If the equipment is verified through measurements performed by an independent laboratory, it is acceptable for the party responsible for verification of the equipment to rely upon the description of the measurement facilities retained by or placed on file with the Commission by that laboratory. In this situation, the party responsible for the verification of the equipment is not required to retain a duplicate copy of the description of the measurement facilities.

(ii) If the equipment is verified based on measurements performed at the installation site of the equipment, no specific site calibration data is required. It is acceptable to retain the description of the measurement facilities at the site at which the measurements were performed.

(2) If the equipment is to be authorized by the Commission under the certification procedure, the description of the measurement facilities shall be filed with the Commission's Laboratory in Columbia, Maryland. The data describing the measurement facilities need only be filed once but must be updated as changes are made to the measurement facilities or as otherwise described in this section. At least every three years, the organization responsible for filing the data with the Commission shall certify that the data on file is current.

Certification & User's Manual Information

1. Label and User's Manual Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 15, Subpart A — General:

§ 15.19 Labeling requirements.

(a) In addition to the requirements in Part 2 of this chapter, a device subject to certification or verification shall be labeled as follows:

(1) Receivers associated with the operation of a licensed radio service, e.g., FM broadcast under Part 73 of this chapter, land mobile operation under Part 90, etc., shall bear the following statement in a conspicuous location on the device:

This device complies with Part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

(2) A stand-alone cable input selector switch, shall bear the following statement in a conspicuous location on the device:

This device is verified to comply with Part 15 of the FCC Rules for use with cable television service.

(3) All other devices shall bear the following statement in a conspicuous location on the device:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

(4) Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified under paragraph (a) of this section is required to be affixed only to the main control unit.

(5) When the device is so small or for such use that it is not practicable to place the statement specified under paragraph (a) of this section on it, the information required by this paragraph shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC identifier or the unique identifier, as appropriate, must be displayed on the device.

§ 15.21 Information to user.

The user's manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Verification & User's Manual Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 15, Subpart B — Unintentional Radiators:

§ 15.105 Information to the user.

(a) For a Class A digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at own expense.

(b) For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

– Reorient or relocate the receiving antenna.

– Increase the separation between the equipment and receiver.

– Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

– Consult the dealer or an experienced radio/TV technician for help.

ICES-003 Procedural & Labeling Requirements

From the Industry Canada Electromagnetic Compatibility Advisory Bulletin entitled, "Implementation and Interpretation of the Interference-Causing Equipment Standard for Digital Apparatus, ICES-003" (EMCAB-3, Issue 2, July 1995):

> "At present, CISPR 22: 2002 and ICES technical requirements are essentially equivalent. Therefore, if you have CISPR 22: 2002 approval by meeting CISPR Publication 22, the only additional requirements are: to attach a note to the report of the test results for compliance, indicating that these results are deemed satisfactory evidence of compliance with ICES-003 of the Canadian Interference-Causing Equipment Regulations; to maintain these records on file for the requisite five year period; and to provide the device with a notice of compliance in accordance with ICES-003."

Procedural Requirements:

According to Industry Canada's Interference Causing Equipment Standard for Digital Apparatus ICES-003 Issue 5 August 2012:

Section 6.1: A record of the measurements and results, showing the date that the measurements were completed, shall be retained by the manufacturer or importer for a period of at least five years from the date shown in the record and made available for examination on the request of the Minister.

Section 6.2: A written notice indicating compliance must accompany each unit of digital apparatus to the end user. The notice shall be in the form of a label that is affixed to the apparatus. Where because of insufficient space or other constraints it is not feasible to affix a label to the apparatus, the notice may be in the form of a statement in the users' manual.

Labeling Requirements:

The suggested text for the notice, in English and in French, is provided below, from the Annex of ICES-003:

> This Class [2] digital apparatus complies with Canadian ICES-003.
>
> Cet appareil numérique de la classe [1] est conforme à la norme NMB-003 du Canada.

[2] Insert either A or B but not both as appropriate for the equipment requirements.

End of Report

