

FCC PART 30 TEST REPORT

For

Corning Optical Communication LLC

475 Sycamore Drive, Milpitas, CA 95035, USA

FCC ID: OJFRN510

Report Type:		Product Type:			
Class II Permissive Change Report		5G mmWave SmallCell Radio Node			
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Report Number:	R2106163	R2106163			
Report Date:	2021-07-28				
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Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. This report **must not** be used by the customer to claim product certification, approval, or endorsement by A2LA*, NIST, or any agency of the Federal Government.

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	ort Number Description of Revision	
0	R2106163	Original report	2021-07-28

1 General Description

1.1 Product Description for Equipment under Test (EUT)

This test report was prepared on behalf of *Corning Optical Communication LLC*, and their product model: SCRN-510-28G1, FCC ID: OJFRN510 or the "EUT" as referred to in this report. It is a 5G mmWave SmallCell Radio Node. The device is a Fixed Base Station Device.

FCC ID: OJFRN510

1.2 Mechanical Description of EUT

SCRN-510-28G1 measures approximately 30 cm (Length) x 30 cm (Width) x 10.5 cm (High), and weighs approximately 5.45kg.

The data gathered are from the production samples provided by Corning Optical Communication SN: 693920025

1.3 Objective

This report was prepared on behalf of Corning Optical Communication LLC in accordance with FCC Part 30.

The objective was to determine continue compliance with FCC Part 30 rules for EIRP, 99% Bandwidth, Out of Band Emissions at the Band-edge for the additionally enabled modulation and carrier component configurations. Based on engineering evaluation and preliminary scans, spurious emissions covered by the test report in the original filing represents the worst case. Therefore, spurious emissions for the additional modulation and carrier component are not covered in this report.

1.4 Related Submittal(s)/Grant(s)

N/A

1.5 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.26-2015, American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services, and FCC KDB 842590 D01 Upper Microwave Flexible Use Service v01r01.

1.6 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Parameter	Measurement uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.57 dB
Power Spectral Density, conducted	±1.48dB
Unwanted Emissions, conducted	±1.57dB
All emissions, radiated	±4.0 dB
AC power line Conducted Emission	±2.0 dB
Temperature	±2 ° C
Humidity	±5 %
DC and low frequency voltages	±1.0 %
Time	±2 %
Duty Cycle	±3 %

1.7 Test Facility Registrations

BACLs test facilities that are used to perform Radiated and Conducted Emissions tests are currently recognized by the Federal Communications Commission as Accredited with NIST Designation Number US1129.

BACL's test facilities that are used to perform Radiated and Conducted Emissions tests are currently registered with Industry Canada under Registration Numbers: 3062A-1, 3062A-2, and 3062A-3.

BACL is a Chinese Taipei Bureau of Standards Metrology and Inspection (BSMI) validated Conformity Assessment Body (CAB), under Appendix B, Phase I Procedures of the APEC Mutual Recognition Arrangement (MRA). BACL's BSMI Lab Code Number is: SL2-IN-E-1002R

BACL's test facilities that are used to perform AC Line Conducted Emissions, Telecommunications Line Conducted Emissions, Radiated Emissions from 30 MHz to 1 GHz, and Radiated Emissions from 1 GHz to 6 GHz are currently recognized as Accredited in accordance with the Voluntary Control Council for Interference [VCCI] Article 15 procedures under Registration Number A-0027.

1.8 Test Facility Accreditations

Bay Area Compliance Laboratories Corp. (BACL) is:

A- An independent, 3rd-Party, Commercial Test Laboratory accredited to ISO/IEC 17025:2005 by A2LA (Test Laboratory Accreditation Certificate Number 3297.02), in the fields of: Electromagnetic Compatibility and Telecommunications. Unless noted by an Asterisk (*) in the Compliance Matrix (See Section 3 of this Test Report), BACL's ISO/IEC 17025:2005 Scope of Accreditation includes all of the Test Method Standards and/or the Product Family Standards detailed in this Test Report.

BACL's ISO/IEC 17025:2005 Scope of Accreditation includes a comprehensive suite of EMC Emissions, EMC Immunity, Radio, RF Exposure, Safety and wireline Telecommunications test methods applicable to a wide range of product categories. These product categories include Central Office Telecommunications Equipment [including NEBS - Network Equipment Building Systems], Unlicensed and Licensed Wireless and RF devices, Information Technology Equipment (ITE); Telecommunications Terminal Equipment (TTE); Medical Electrical Equipment; Industrial, Scientific and Medical Test Equipment; Professional Audio and Video Equipment;

Industrial and Scientific Instruments and Laboratory Apparatus; Cable Distribution Systems, and Energy Efficient Lighting.

B- A Product Certification Body accredited to ISO/IEC 17065:2012 by A2LA (Product Certification Body Accreditation Certificate Number 3297.03) to certify

- For the USA (Federal Communications Commission):
 - 1- All Unlicensed radio frequency devices within FCC Scopes A1, A2, A3, and A4;
 - 2- All Licensed radio frequency devices within FCC Scopes B1, B2, B3, and B4;
 - 3- All Telephone Terminal Equipment within FCC Scope C.
- For the Canada (Industry Canada):
 - 1 All Scope 1-Licence-Exempt Radio Frequency Devices;
 - 2 All Scope 2-Licensed Personal Mobile Radio Services;
 - 3 All Scope 3-Licensed General Mobile & Fixed Radio Services;
 - 4 All Scope 4-Licensed Maritime & Aviation Radio Services;
 - 5 All Scope 5-Licensed Fixed Microwave Radio Services
 - 6 All Broadcasting Technical Standards (BETS) in the Category I Equipment Standards List.
- For Singapore (Info-Communications Development Authority (IDA)):
 - 1 All Line Terminal Equipment: All Technical Specifications for Line Terminal Equipment Table 1 of IDA MRA Recognition Scheme: 2011, Annex 2
 - 2. All Radio-Communication Equipment: All Technical Specifications for Radio-Communication Equipment Table 2 of IDA MRA Recognition Scheme: 2011, Annex 2
- For the Hong Kong Special Administrative Region:
 - 1 All Radio Equipment, per KHCA 10XX-series Specifications;
 - 2 All GMDSS Marine Radio Equipment, per HKCA 12XX-series Specifications;
 - 3 All Fixed Network Equipment, per HKCA 20XX-series Specifications.
- For Japan:
 - 1 MIC Telecommunication Business Law (Terminal Equipment):
 - All Scope A1 Terminal Equipment for the Purpose of Calls;
 - All Scope A2 Other Terminal Equipment
 - 2 Radio Law (Radio Equipment):
 - All Scope B1 Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 1 of the Radio Law
 - All Scope B2 Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 2 of the Radio Law
 - All Scope B3 Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 3 of the Radio Law

C- A Product Certification Body accredited to ISO/IEC 17065:2012 by A2LA (Product Certification Body Accreditation Certificate Number 3297.01) to certify Products to USA's Environmental Protection Agency (EPA) ENERGY STAR Product Specifications for:

- 1 Electronics and Office Equipment:
 - for Telephony (ver. 3.0)
 - for Audio/Video (ver. 3.0)
 - for Battery Charging Systems (ver. 1.1)
 - for Set-top Boxes & Cable Boxes (ver. 4.1)
 - for Televisions (ver. 6.1)
 - for Computers (ver. 6.0)
 - for Displays (ver. 6.0)
 - for Imaging Equipment (ver. 2.0)
 - for Computer Servers (ver. 2.0)
- 2 Commercial Food Service Equipment
 - for Commercial Dishwashers (ver. 2.0)
 - for Commercial Ice Machines (ver. 2.0)
 - for Commercial Ovens (ver. 2.1)
 - for Commercial Refrigerators and Freezers

- 3 Lighting Products
 - For Decorative Light Strings (ver. 1.5)
 - For Luminaires (including sub-components) and Lamps (ver. 1.2)
 - For Compact Fluorescent Lamps (CFLs) (ver. 4.3)
 - For Integral LED Lamps (ver. 1.4)
- 4 Heating, Ventilation, and AC Products
 - for Residential Ceiling Fans (ver. 3.0)
 - for Residential Ventilating Fans (ver. 3.2)
- 5 Other
- For Water Coolers (ver. 3.0)

D- A NIST Designated Phase-I and Phase-II Conformity Assessment Body (CAB) for the following economies and regulatory authorities under the terms of the stated MRAs/Treaties:

- Australia: ACMA (Australian Communication and Media Authority) APEC Tel MRA -Phase I;
- Canada: (Innovation, Science and Economic development Canada ISEDC) Foreign Certification Body –
 FCB APEC Tel MRA -Phase I & Phase II;
- Chinese Taipei (Republic of China Taiwan):
 - o BSMI (Bureau of Standards, Metrology and Inspection) APEC Tel MRA -Phase I;
 - o NCC (National Communications Commission) APEC Tel MRA -Phase I;
- European Union:
 - o EMC Directive 2014/30/EU US-EU EMC & Telecom MRA CAB (NB)
 - o Radio Equipment (RE) Directive 2014/53/EU US-EU EMC & Telecom MRA CAB (NB)
 - o Low Voltage Directive (LVD) 2014/35/EU
- Hong Kong Special Administrative Region: (Office of the Telecommunications Authority OFTA)
 APEC Tel MRA -Phase I & Phase II
- Israel US-Israel MRA Phase I
- Republic of Korea (Ministry of Communications Radio Research Laboratory) APEC Tel MRA -Phase I
- Singapore: (Infocomm Media Development Authority IMDA) APEC Tel MRA -Phase I & Phase II;
- Japan: VCCI Voluntary Control Council for Interference US-Japan Telecom Treaty VCCI Side Letter-
- USA:
 - o ENERGY STAR Recognized Test Laboratory US EPA
 - Telecommunications Certification Body (TCB) US FCC;
 - Nationally Recognized Test Laboratory (NRTL) US OSHA
- Vietnam: APEC Tel MRA -Phase I;

2 EUT Test Configuration

2.1 Justification

The EUT was configured for testing according to ANSI C63.26-2015 and FCC KDB 842590 D01 Upper Microwave Flexible Use Service v01r01.

The EUT was tested in a testing mode to represent worst-case results during the final qualification test.

2.2 EUT Exercise Software

The test software used was QRCT. The software is compliant with the standard requirements being tested against.

Beam ID tested was selected based on customer's declaration for worst case. The following configurations were enabled by software in addition to the radio configurations that was tested in the original FCC ID filing. Please refer to the power setting below.

Bandwidth (MHz)	Polarity	Beam ID	Mode	Channel No.	Frequency (MHz)	Power Settings	
				2071666	27550	430	
	Vertical	11	16QAM	2077916	27925	430	
100 (1CC)				2084166	28300	430	
100 (100)				2071666	27550	430	
	Horizontal	139	16QAM	2077916	27925	430	
				2084166	28300	430	
				2072500	27600	430	
			QPSK	2077918	27925	430	
				2083332	28250	430	
		Vertical 11	16QAM	2072500	27600	430	
	Vertical			2077918	27925	430	
				2083332	28250	430	
			64QAM	2072500	27600	430	
				2077918	27925	430	
200 (2CC)			2083332	28250	430		
200 (2CC)				2072500	27600	430	
			QPSK		QPSK	2077918	27925
		20	2083332	28250	430		
			2072500	27600	430		
Horizon	Horizontal	139	16QAM	2077918	27925	430	
				2083332	28250	430	
				2072500	27600	430	
			64QAM	2077918	27925	430	
				2083332	28250	430	

Bandwidth (MHz)	Polarity	Beam ID	Mode	Channel No.	Frequency (MHz)	Power Settings
				2073333	27650	430
			QPSK	2077915	27925	430
				2082499	28200	430
				2073333	27650	430
	Vertical	11	16QAM	2077915	27925	430
				2082499	28200	430
				2073333	27650	430
			64QAM	2077915	27925	430
200 (2CC)				2082499	28200	430
300 (3CC)			QPSK	2073333	27650	430
				2077915	27925	430
		Horizontal 139		2082499	28200	430
				2073333	27650	430
	Horizontal		139 16	16QAM	2077915	27925
				2082499	28200	430
				2073333	27650	430
	64QAM		64QAM	2077915	27925	430
				2082499	28200	430
				2074166	27700	430
	Vertical 11	16QAM	2077918	27925	430	
400 (4CC)				2081666	28150	430
400 (4CC)				2074166	27700	430
	Horizontal	139	16QAM	2077918	27925	430
				2081666	28150	430

2.3 Duty Cycle Correction Factor

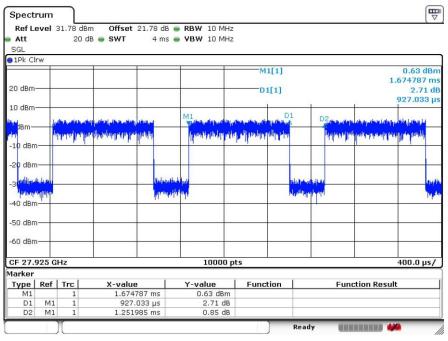
Radio Mode	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
1CC-16QAM	0.927	1.251985	74.04242	1.86948
2CC-QPSK	0.923	1.252585	73.68761	1.86739
2CC-16QAM	0.927	1.253985	73.92433	1.86879
2CC-64QAM	0.929	1.249985	74.32089	1.87111
3CC-QPSK	0.928	1.252385	74.09862	1.86981
3CC-16QAM	0.928	1.252385	74.09862	1.86981
3CC-64QAM	0.928	1.251985	74.12229	1.86995
4CC-16QAM	0.927	1.249985	74.16089	1.87017

Note: Duty Cycle = On Time (ms)/ Period (ms)

Note: Duty Cycle Correction Factor = 10*log(1/duty cycle)

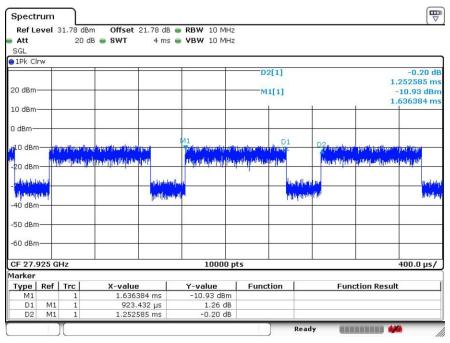
Please refer to the following plots.

1CC-16QAM



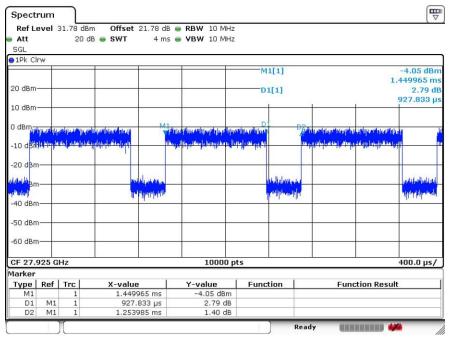
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2CC - QPSK



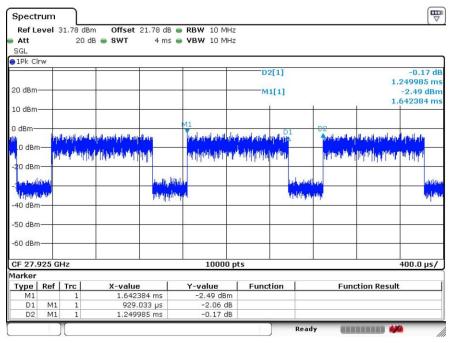
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2CC - 16QAM



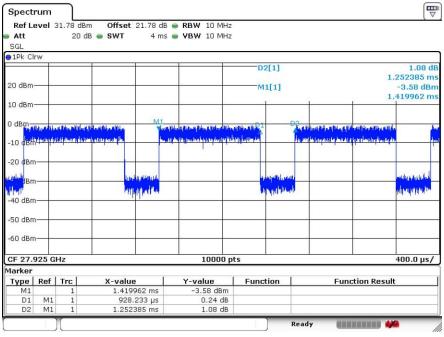
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2CC - 64QAM



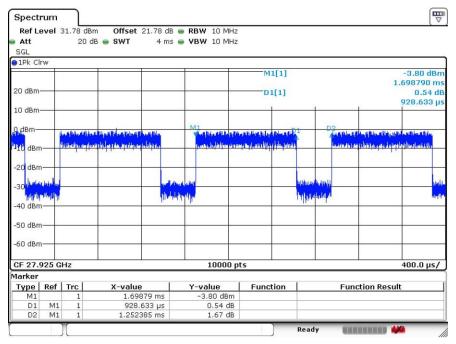
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3CC - QPSK



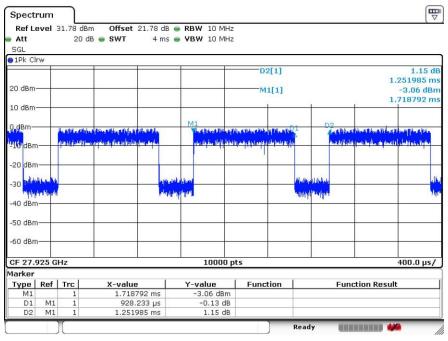
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3CC - 16QAM



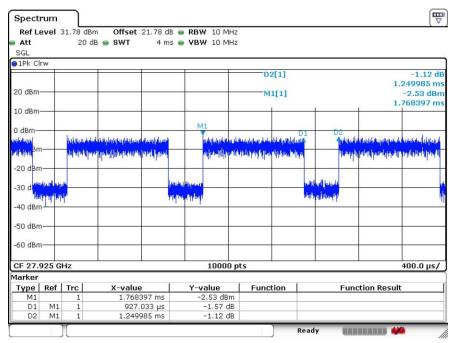
Date: 29.JUN.2021 20:34:54

3CC - 64QAM



Date: 29.JUN.2021 20:37:29

4CC - 16QAM



Date: 29.JUN.2021 20:46:45

2.4 Equipment Modifications

None

2.5 Local Support Equipment

None

2.6 Remote Support Equipment

Manufacturer Description		Model
Dell	Laptop	Latitude E5520
MikroTik	10 Gigabit SFP+ Switch	CRS305-1G-4S+IN

2.7 Interface Ports and Cabling

Cable Description	Length (m)	То	From
Ethernet Cable	1m	Laptop	Switch
Power Cable	> 5m	EUT	Power Source
Fiber Cable	> 10 m	EUT	Switch

3 Summary of Test Results

FCC Rules	Description of Test Result	
§2.1049	99% Bandwidth	Compliant
§2.1051, §30.202(a)	EIRP	Compliant
§2.1053, §30.203	Out of Band Emission at the Band-edge	Compliant

4 FCC §2.1049 - Occupied Bandwidth

4.1 Applicable Standards

As per FCC §2.1049, Occupied bandwidth of tranmissions falls within authorized bands

4.2 Measurement Procedure

- 1. The spectrum analyzer's automatic bandwidth measurement function was used to perform the 99% occupied bandwidth measurement.
- 2. Set the RBW = $1\sim5\%$ of the anticipated OBW, and the VBW ≥ 3 x RBW.
- 3. Set spectrum analyzer detection mode to peak, and the trace mode to max hold.
- 4. Sweep = auto couple.
- 5. Record the test plots and test results.

4.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer 44 GHz	E4446A	US44300386	2021-04-27	1 years
-	RF Cable	-	-	Each Time	-
Wisewave	Antenna, Horn	ARH-2823-02	10555-02	2020-02-27	2 years

Note¹: cable and attenuator included in the test set-up will be checked each time before testing.

Statement of Traceability: BACL Corp. attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with the latest version of A2LA policy P102 "A2LA Policy on Metrological Traceability".

4.4 Test Environmental Conditions

Temperature:	23° C
Relative Humidity:	42 %
ATM Pressure:	102.7 KPa

The testing was performed by Giriraj Gurjar on 2021-06-21 at 5m3 chamber.

4.5 Test Results

Please refer to the following tables and plots.

Beam ID: 11 (Vertical)

Band	Component Carriers	Modulation	Channel	Occupied Bandwidth (MHz)
	1CC	16QAM	Low	94.7103
			Middle	94.3702
			High	94.5270
		QPSK	Low	193.3898
			Middle	193.2216
			High	193.6434
		16QAM	Low	193.4998
	2CC		Middle	194.4602
			High	193.8463
n261		64QAM	Low	195.2616
			Middle	193.8483
			High	194.7358
	3CC	QPSK	Low	292.3500
			Middle	291.8351
			High	291.3982
		16QAM	Low	293.3109
			Middle	292.5046
			High	292.1315
		64QAM	Low	293.5785
			Middle	291.9825
			High	291.3963
	4CC 16QAM	16QAM	Low	392.2019
			Middle	390.4703
			High	390.0466

Beam ID: 139 (Horizontal)

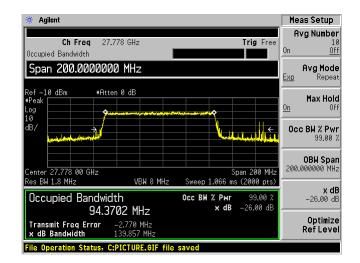
Band	Component Carriers	Modulation	Channel	Occupied Bandwidth (MHz)
	1CC	16QAM	Low	95.4530
			Middle	95.5862
			High	95.4557
		QPSK	Low	194.5497
			Middle	193.9512
			High	194.0296
		16QAM	Low	193.3512
	2CC		Middle	193.8076
			High	193.9998
			Low	194.8569
n261		64QAM	Middle	194.5146
			High	193.1813
11201	3CC	QPSK	Low	292.7444
			Middle	291.6593
			High	291.0580
		16QAM	Low	292.5204
			Middle	291.9278
			High	291.5456
		64QAM	Low	292.2039
			Middle	291.6827
			High	291.7019
	4CC	16QAM	Low	391.9357
			Middle	390.8074
			High	390.7109

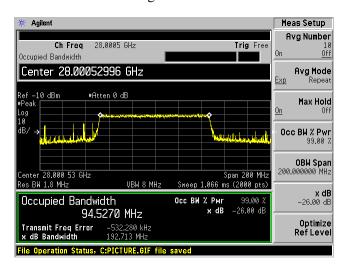
1CC - 16QAM

Low Channel

Meas Setup Avg Number Ch Freq 27.55 GHz Trig Free Off Occupied Bandwidth Span 435.6340500 MHz Avg Mode #Atten 0 dB Max Hold <u>0n</u> Occ BW % Pwr 99.00 % **OBW Span** 435.634050 MHz Center 27.550 00 GHz #Res BW 2 MHz Span 435.6 MHz #Sweep 2.665 ms (2000 pts) #VBW 8 MHz **x dB** -26.00 dB Occ BW % Pwr x dB Occupied Bandwidth -26.00 dB 94.7103 MHz Optimize Ref Level Transmit Freq Error x dB Bandwidth

Middle Channel



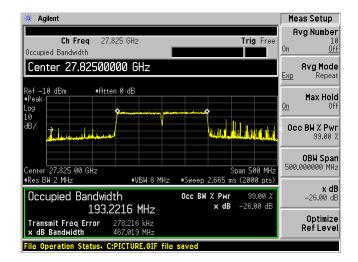


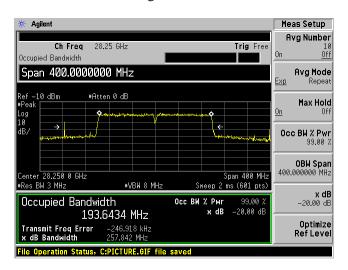
2CC - QPSK

Low Channel

* Agilent Meas Setup Avg Number Ch Freq Trig Free 27.6 GHz 0ff Occupied Bandwidth Center 27.60000000 GHz Avg Mode Max Hold Off <u>0n</u> Occ BW % Pwr 99.00 % 0BW Span 500.000000 MHz Center 27.600 00 GHz #Res BW 2 MHz Span 500 MHz Sweep 2.604 ms (3006 pts) #VBW 8 MHz **x dB** -26.00 dB Occupied Bandwidth 0cc BW % Pwr 99.00 % x dB -26.00 dB 193.3898 MHz Optimize Ref Level Transmit Freq Error x dB Bandwidth -110.240 kHz

Middle Channel





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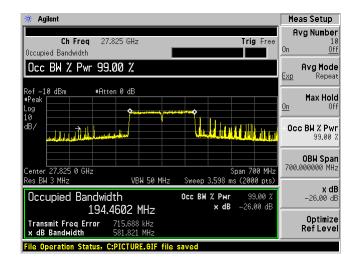
Beam ID: 11 (Vertical)

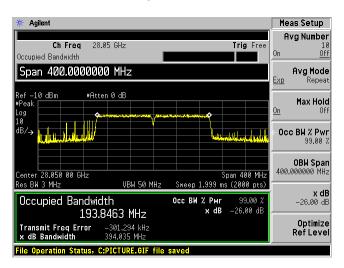
2CC - 16QAM

Low Channel

Meas Setup Avg Number Ch Freq 27.6 GHz Trig Free Off Occupied Bandwidth Center 27.60000000 GHz Avg Mode Ref -10 dBm #Atten 0 dB Max Hold <u>0n</u> Occ BW % Pwr 99.00 % **OBW Span** 435.634050 MHz Center 27.600 00 GHz Span 435.6 MHz #Sweep 2.665 ms (2000 pts) #VBW 8 MHz **x dB** -26.00 dB Occ BW % Pwr x dB Occupied Bandwidth -26.00 dB 193.4998 MHz Optimize Ref Level Transmit Freq Error x dB Bandwidth -169.615 kHz 434.842 MHz

Middle Channel



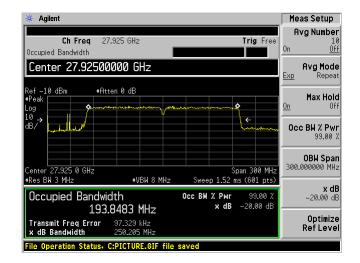


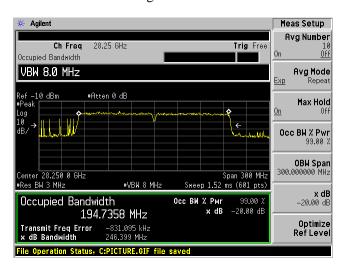
2CC - 64QAM

Low Channel

* Agilent Meas Setup Avg Number Ch Freq Trig Free 27.6 GHz 0ff Occupied Bandwidth Span 500.00000000 MHz Avg Mode Max Hold Off <u>0n</u> Occ BW % Pwr 99.00 % 0BW Span 500.000000 MHz Center 27.600 0 GHz #Res BW 3 MHz Span 500 MHz #VBW 8 MHz Sweep 2.52 ms (601 pts) **x dB** -20.00 dB Occupied Bandwidth 0cc BW % Pwr 99.00 % x dB -20.00 dB 195.2616 MHz Optimize Ref Level Transmit Freq Error x dB Bandwidth -427.352 kHz

Middle Channel



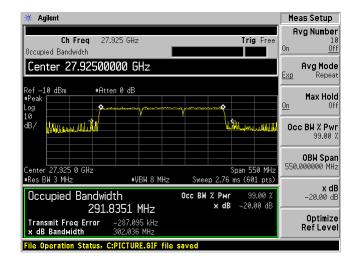


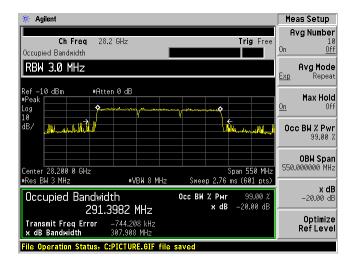
3CC - QPSK

Low Channel

Meas Setup Avg Number Ch Freq 27.65 GHz Trig Free Off Occupied Bandwidth Center 27.65000000 GHz Avg Mode Ref -10 dBm #Atten 0 dB Max Hold <u>0n</u> Occ BW % Pwr 99.00 % **OBW Span** 550.000000 MHz Center 27.650 0 GHz #Res BW 3 MHz Span 550 MHz Sweep 2.76 ms (601 pts) #VBW 8 MHz **x dB** -20.00 dB Occ BW % Pwr x dB Occupied Bandwidth -20.00 dB 292.3500 MHz Optimize Ref Level Transmit Freq Error x dB Bandwidth 74.428 kHz 344.882 MHz

Middle Channel

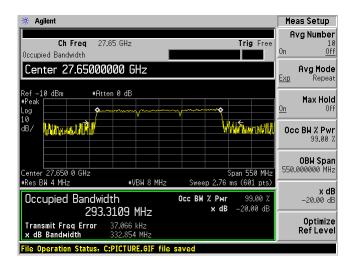


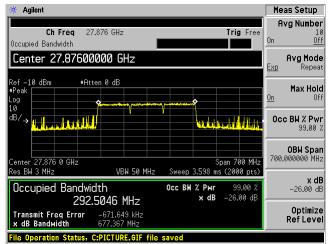


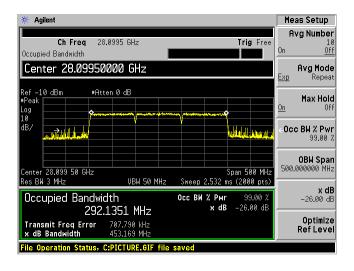
3CC - 16QAM

Low Channel

Middle Channel



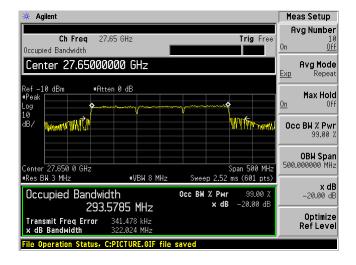


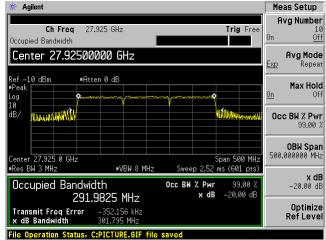


3CC - 64QAM

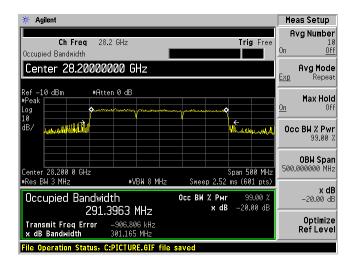
Low Channel

Agilent





Middle Channel

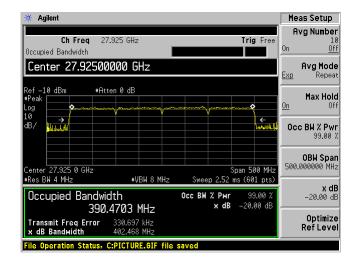


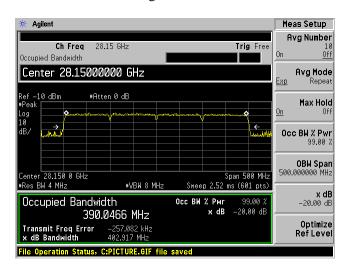
4CC - 16QAM

Low Channel

Meas Setup Avg Number Ch Freq 27.7 GHz Trig Free Off Occupied Bandwidth Avg Mode #Atten 0 dB Max Hold <u>0n</u> Occ BW % Pwr 99.00 % **OBW Span** 550.000000 MHz Center 27.700 0 GHz #Res BW 4 MHz Span 550 MHz Sweep 2.76 ms (601 pts) #VBW 8 MHz **x dB** -20.00 dB Occ BW % Pwr x dB Occupied Bandwidth -20.00 dB 392.2019 MHz Optimize Ref Level Transmit Freq Error x dB Bandwidth

Middle Channel



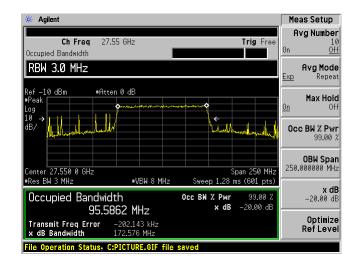


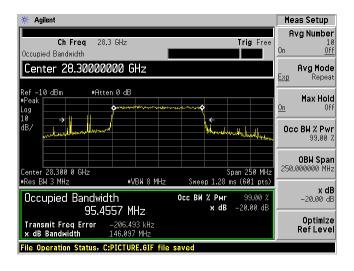
1CC - 16QAM

Low Channel

* Agilent Meas Setup Avg Number Ch Freq Trig Free 27.55 GHz 0ff Occupied Bandwidth Center 27.55000000 GHz Avg Mode Max Hold Off <u>0n</u> Occ BW % Pwr 99.00 % 0BW Span 250.000000 MHz Center 27.550 0 GHz #Res BW 3 MHz Span 250 MHz Sweep 1.28 ms (601 pts) #VBW 8 MHz **x dB** -20.00 dB Occupied Bandwidth 0cc BW % Pwr 99.00 % x dB -20.00 dB 95.4530 MHz Optimize Ref Level Transmit Freq Error x dB Bandwidth -138.899 kHz

Middle Channel

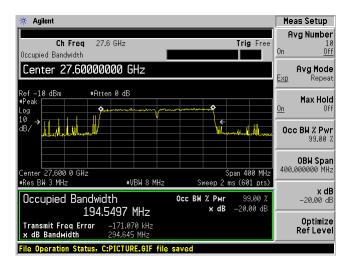


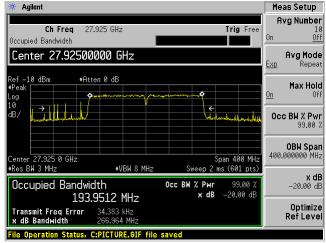


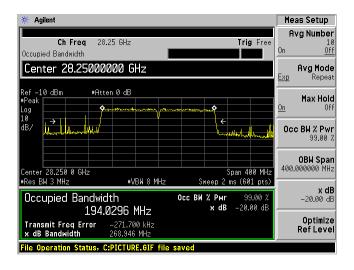
2CC - QPSK

Low Channel

Middle Channel





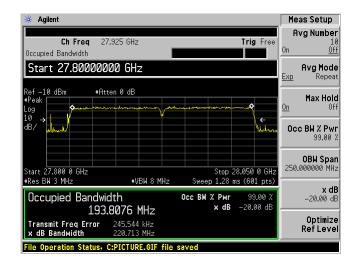


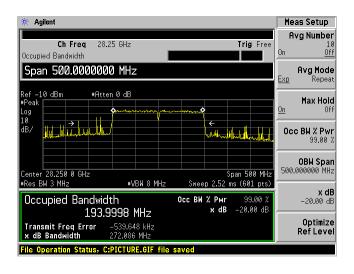
2CC - 16QAM

Low Channel

Meas Setup Avg Number Ch Freq Trig Free Occupied Bandwidth Center 27.600000000 GHz Avg Mode #Atten 0 dB Max Hold Occ BW % Pwr 99.00 % **OBW Span** 250.000000 MHz Center 27.600 0 GHz #Res BW 3 MHz Span 250 MHz Sweep 1.28 ms (601 pts) #VBW 8 MHz **x dB** -20.00 dB Occupied Bandwidth Occ BW % Pwr -20.00 dB 193.3512 MHz x dB Optimize Ref Level Transmit Freq Error x dB Bandwidth

Middle Channel



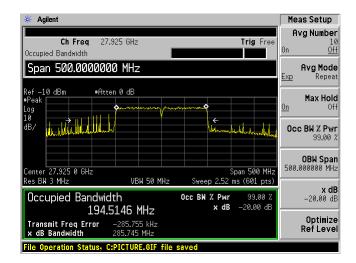


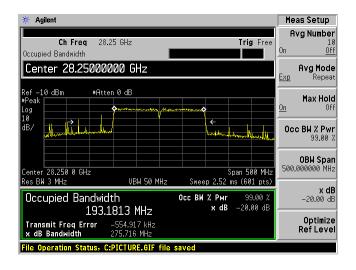
2CC - 64QAM

Low Channel

Meas Setup Avg Number Trig Free Occupied Bandwidth RBW 3.0 MHz Avg Mode #Atten 0 dB Max Hold <u>0n</u> Occ BW % Pwr 99.00 % 0BW Span 600.000000 MHz #VBW 8 MHz p 3 ms (601 pts) **x dB** -20.00 dB Occupied Bandwidth Occ BW % Pwr -20.00 dB 194.8569 MHz x dB Optimize Ref Level Transmit Freq Error x dB Bandwidth -119.560 kHz 398.127 MHz

Middle Channel





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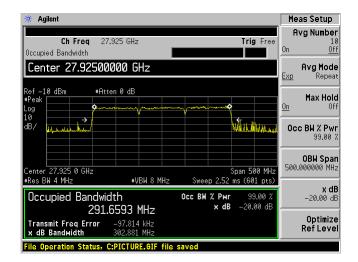
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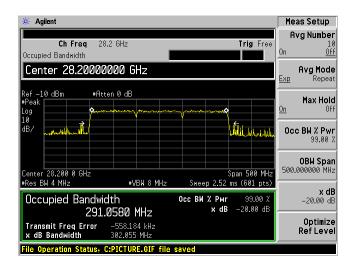
3CC - QPSK

Low Channel

Meas Setup Avg Number Ch Freq 27.65 GHz Trig Free Occupied Bandwidth Center 27.65000000 GHz Avg Mode Max Hold <u>0n</u> Occ BW % Pwr 99.00 % **OBW Span** 500.000000 MHz Center 27.650 0 GHz #Res BW 4 MHz Span 500 MHz Sweep 2.52 ms (601 pts) #VBW 8 MHz **x dB** -20.00 dB Occ BW % Pwr × dB Occupied Bandwidth -20.00 dB 292.7444 MHz Optimize Ref Level -94.593 kHz 345.969 MHz Transmit Freq Error x dB Bandwidth

Middle Channel





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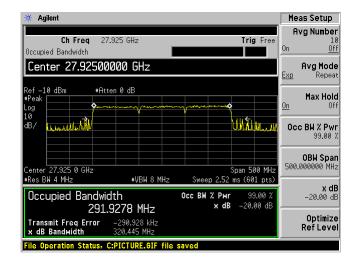
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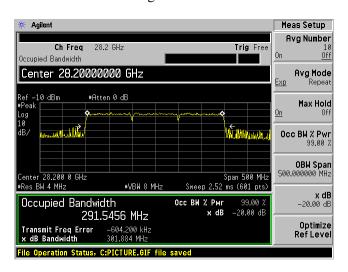
CC - 16QAM

Low Channel

Agilent Meas Setup Avg Number Ch Freq 27.65 GHz Trig Free 10 0ff Occupied Bandwidth Center 27.65000000 GHz Avg Mode #Atten 0 dB Max Hold Off <u>0n</u> Occ BW % Pwr 99.00 % **OBW Span** 500.000000 MHz Center 27.650 0 GHz #Res BW 4 MHz Span 500 MHz Sweep 2.52 ms (601 pts) #VBW 8 MHz **x dB** -20.00 dB Occupied Bandwidth Occ BW % Pwr x dB 99.00 % -20.00 dB 292.5204 MHz Optimize Ref Level Transmit Freq Error x dB Bandwidth -8.574 kHz 337.633 MH:

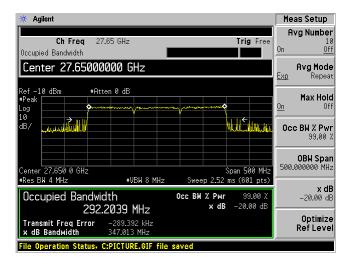
Middle Channel

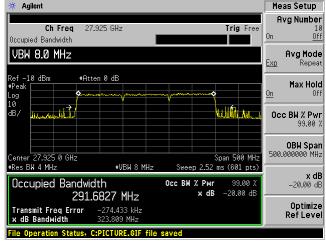




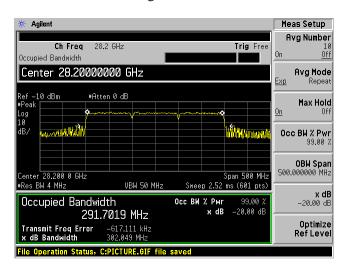
3CC - 64QAM

Low Channel





Middle Channel

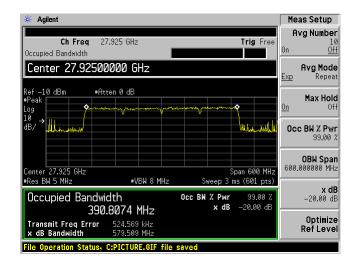


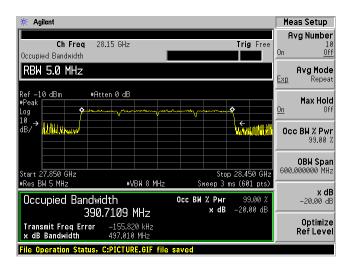
4CC - 16QAM

Low Channel

Meas Setup Avg Number Ch Freq Trig Free Occupied Bandwidth Center 27.700000000 GHz Avg Mode #Atten 0 dB Max Hold <u>0n</u> Occ BW % Pwr 99.00 % 0BW Span 600.000000 MHz Center 27.700 GHz #Res BW 5 MHz Span 600 MHz Sweep 3 ms (601 pts) #VBW 8 MHz **x dB** -20.00 dB Occupied Bandwidth Occ BW % Pwr -20.00 dB 391.9357 MHz x dB Optimize Ref Level Transmit Freq Error x dB Bandwidth

Middle Channel





5 FCC §30.202 (a) & §2.1051 - Power Limits

5.1 Applicable Standards

According to FCC §30.202:

(a) For fixed and base stations operating in connection with mobile systems, the average power of the sum of all antenna elements is limited to an equivalent isotopically radiated power (EIRP) density of +75 dBm/100 MHz. For channel bandwidths less than 100 megahertz the EIRP must be reduced proportionally and linearly based on the bandwidth relative to 100 megahertz.

5.2 Measurement Procedure

EIRP Measurement

According to ANSI C63.26-2015 section 5.2.7 Radiated power measurements

 $E(dB\mu V/m) = Measured amplitude level (dBm) + 107 + Cable Loss (dB) + Antenna Factor (dB/m).$

EIRP (dBm) = E (dB μ V/m) + 20log(D) – 104.8; where D is the measurement distance (in the far field region) in m.

Based on both equations above, the offset should equal to Antenna Factor(dB/m) + Cable Loss(dB) + 107 + 20log(D) -104.8 when set the unit to dBm on the PSA. The duty cycle correction factor in section 2.3 was also added in the offset for average measurement.

5.3 Far Field Distance Calculation

Note: Measurements were taken in the far field distance R based on the firmular $R \ge 2D^2/\lambda$, where D is the antenna length, λ is the wavelength. Wavelength = v/f, where v is the speed of light (3 x 10^9 m/s).

EUT antenna dimension 44mm, TX range: 27500 MHz – 28350 MHz

R range: 0.0355 m to 0.0366 m.

Receiving antenna frequency range and dimension are shown in the following table:

Frequency (GHz)	Antenna	Dimension (Length) (mm)	Far Field Range (m)	
26.5 – 40	ARH-2823-02	66	0.077 - 0.116	

Note: measurement was made at 3 meters.

5.4 Test Equipment List and Details

Manufacturer	Description Model No. Serial No.		Calibration Date	Calibration Interval	
Agilent	Spectrum Analyzer 44 GHz	E4446A	US44300386	2021-04-27	1 years
-	RF Cable	-	-	Each Time	-
Wisewave	Antenna, Horn	ARH-2823-02	10555-02	2020-02-27	2 years

Note¹: cable and attenuator included in the test set-up will be checked each time before testing. **Statement of Traceability: BACL Corp.** attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with the latest version of A2LA policy P102 "A2LA Policy on Metrological Traceability".

5.5 Test Environmental Conditions

Temperature:	22-24 °C
Relative Humidity:	40-41 %
ATM Pressure:	103.1-104.1 kPa

The testing was performed by Giriraj Gurjar from 2021-06-23 to 2021-06-24 in 5m3 Chamber.

5.6 Test Results

1CC

Modulation	Channel Frequency (MHz)	EIRP Horizontal (dBm/100MHz)	EIRP Vertical (dBm/100MHz)	$\begin{array}{c} H+V\\ (MIMO)\\ (dBm/100MHz) \end{array}$	Limit (dBm/100MHz)	Margin (dB)
	27550	39.54	39.51	42.53	75	-32.46
16QAM	27925	39.48	39.26	42.38	75	-32.61
	28300	39.35	39.39	42.38	75	-32.61

2CC

Modulation	Channel	CC Frequency (MHz)	EIRP Horizontal (dBm/100MHz)	EIRP Vertical (dBm/100MHz)	$\begin{array}{c} H+V\\ (MIMO)\\ (dBm/100MHz) \end{array}$	Limit (dBm/100MHz)	Margin (dB)
	Low	27550.02	36.75	36.75	39.76	75	-35.24
	Low	27649.98	38.03	37.33	40.70	75	-34.30
QPSK	Middle	27875.04	37.23	37.31	40.28	75	-34.72
QPSK	Middle	27975	37.33	37.08	40.22	75	-34.78
	High	28200.06	37.58	37.83	40.72	75	-34.28
	High	28300.02	36.36	37.25	39.84	75	-35.16
	T	27550.02	36.79	36.1	39.47	75	-35.53
	Low	27649.98	37.64	37.07	40.37	75	-34.63
160AM	Middle	27875.04	37.51	37.17	40.35	75	-34.65
16QAM	Middle	27975	37.70	37.18	40.46	75	-34.54
	TT:1-	28200.06	37.43	36.61	40.05	75	-34.95
	High	28300.02	36.82	36.51	39.68	75	-35.32
	Low	27550.02	36.77	36.46	39.63	75	-35.37
	Low	27649.98	38.20	37.39	40.82	75	-34.18
C40 AM	M: 441.	27875.04	37.36	37.21	40.30	75	-34.70
64QAM	Middle	27975	37.45	37.11	40.29	75	-34.71
	High	28200.06	37.01	37.23	40.13	75	-34.87
	High	28300.02	37.28	37.00	40.15	75	-34.85

2CC Total EIRP across 200 MHz Bandwidth

Modulation	Channel Frequency (MHz)	EIRP Horizontal (dBm/200MHz)	EIRP Vertical (dBm/200MHz)	H + V (MIMO) (dBm/200MHz)
	27600	39.38	39.24	42.32
QPSK	27925	39.31	39.18	42.26
	28250	39.30	39.41	42.37
	27600	39.19	39.23	42.22
16QAM	27925	39.24	39.37	42.32
	28250	39.21	39.14	42.19
	27600	39.37	39.10	42.25
64QAM	27925	39.20	39.27	42.25
	28250	39.21	39.16	42.20

3CC

Modulation	Channel	CC Frequency (MHz)	EIRP Horizontal (dBm/100MHz)	EIRP Vertical (dBm/100MHz)	$\begin{array}{c} H+V\\ (MIMO)\\ (dBm/100MHz) \end{array}$	Limit (dBm/100MHz)	Margin (dB)
		27550.02	35.50	34.88	38.21	75	-36.79
	Low	27649.98	35.50	35.11	38.32	75	-36.68
		27749.94	36.34	35.37	38.89	75	-36.11
		27825.06	34.69	34.93	37.82	75	-37.18
QPSK	Middle	27925.02	35.62	35.54	38.59	75	-36.41
		28024.98	35.96	35.75	38.87	75	-36.13
		28100.1	35.49	36.18	38.86	75	-36.14
	High	28200.06	35.82	35.51	38.68	75	-36.32
		28300.02	35.65	35.48	38.58	75	-36.42
		27550.02	35.10	34.52	37.83	75	-37.17
	Low	27649.98	35.26	35.12	38.20	75	-36.80
		27749.94	35.77	35.49	38.64	75	-36.36
	Middle	27825.06	35.06	34.86	37.97	75	-37.03
16QAM		27925.02	34.94	35.39	38.18	75	-36.82
		28024.98	35.61	35.34	38.49	75	-36.51
		28100.1	36.01	35.73	38.88	75	-36.12
	High	28200.06	35.90	35.52	38.72	75	-36.28
		28300.02	35.65	34.62	38.18	75	-36.82
		27550.02	35.68	34.52	38.15	75	-36.85
	Low	27649.98	35.54	35.29	38.43	75	-36.57
		27749.94	36.09	35.57	38.85	75	-36.15
		27825.06	34.35	35.21	37.81	75	-37.19
64QAM	Middle	27925.02	35.69	35.44	38.58	75	-36.42
		28024.98	36.00	34.91	38.50	75	-36.50
		28100.1	35.76	35.95	38.87	75	-36.13
	High	28200.06	36.04	35.23	38.66	75	-36.34
		28300.02	35.58	35.51	38.56	75	-36.44

3CC Total EIRP across 300 MHz Bandwidth

Modulation	Channel Frequency (MHz)	EIRP Horizontal (dBm/300MHz)	EIRP Vertical (dBm/300MHz)	H + V (MIMO) (dBm/300MHz)
	27650	39.27	39.33	42.31
QPSK	27925	39.28	39.21	42.26
	28200	39.25	39.25	42.26
	27650	39.38	39.29	42.35
16QAM	27925	39.33	39.17	42.26
	28200	39.27	39.20	42.25
	27650	39.19	39.31	42.26
64QAM	27925	39.36	39.49	42.44
	28200	39.30	39.27	42.30

4CC

Modulation	Channel	CC Frequency (MHz)	EIRP Horizontal (dBm/100MHz)	EIRP Vertical (dBm/100MHz)	$\begin{array}{c} H+V\\ (MIMO)\\ (dBm/100MHz) \end{array}$	Limit (dBm/100MHz)	Margin (dB)
		27550.08	33.59	33.07	36.35	75	-38.65
	Low	27650.04	33.20	33.26	36.24	75	-38.76
	Low	27750	33.75	34.29	37.04	75	-37.96
		27849	34.80	34.53	37.68	75	-37.32
		27750.2	32.77	33.88	36.37	75	-38.63
16QAM	Middle	27875.16	33.64	34.19	36.93	75	-38.07
IOQAM	Middle	27975.12	33.95	34.04	37.01	75	-37.99
		28075.08	33.90	34.27	37.10	75	-37.90
		28000.08	33.72	34.11	36.93	75	-38.07
	Lligh	28100.04	34.35	34.73	37.55	75	-37.45
	High	28200	34.39	34.26	37.34	75	-37.66
		28299.96	34.17	34.14	37.17	75	-37.83

4CC Total EIRP across 400 MHz Bandwidth

Modulation	Channel Frequency (MHz)	EIRP Horizontal (dBm/400MHz)	EIRP Vertical (dBm/400MHz)	H + V (MIMO) (dBm/400MHz)
	27700	39.31	39.25	42.29
16QAM	27925	39.33	39.41	42.38
	28150	39.39	39.20	42.31

39.51 dBm /100.0000 MHz

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Beam ID: 11 (Vertical)

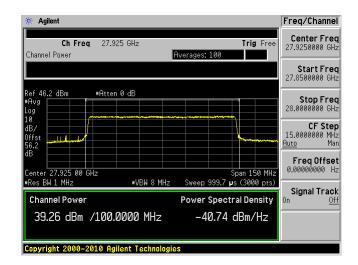
1CC - QPSK

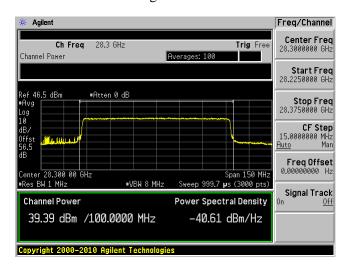
Low Channel

Freq/Channel Center Freq 27.5500000 GHz Ch Freq 27.55 GHz Trig Free Channel Power Averages: 100 Start Freq 27.4750000 GHz #Atten 0 dB Ref 46.2 dBm Stop Freq 27.6250000 GHz CF Step 15.0000000 MHz Auto Man hard and d Freq Offset 0.00000000 Hz Span 150 MHz Sweep 999.7 **µ**s (3000 pts) Center 27.550 00 GHz #Res BW 1 MHz #VBW 8 MHz Signal Track **Channel Power** Power Spectral Density

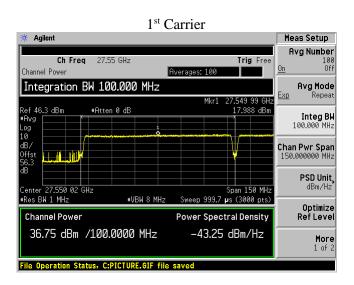
-40.49 dBm/Hz

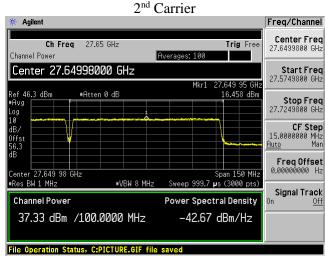
Middle Channel



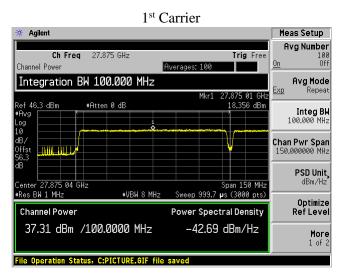


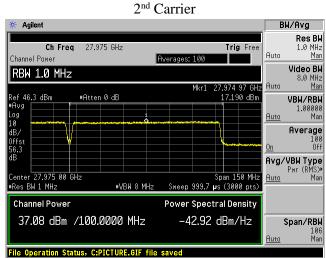
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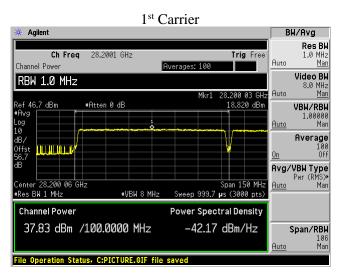


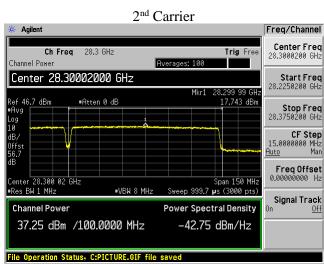
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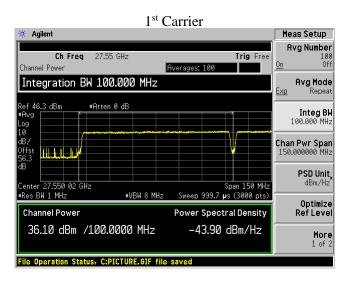


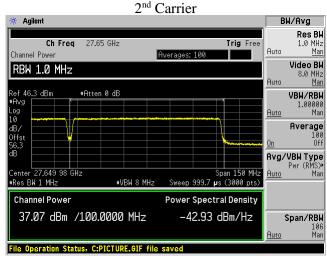
2CC - QPSK - High Channel



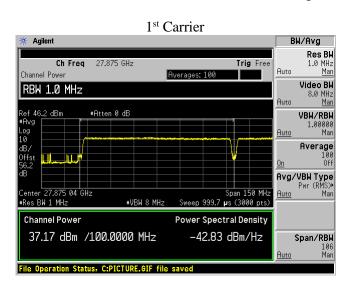


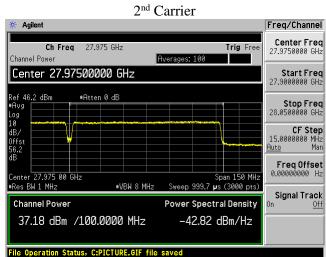
Beam ID: 11 (Vertical) 2CC – 16QAM – Low Channel



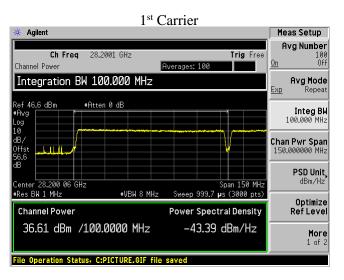


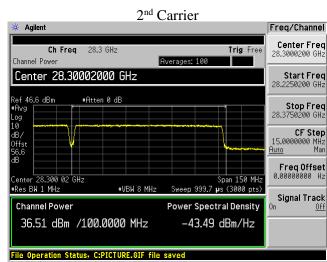
2CC - 16QAM - Middle Channel



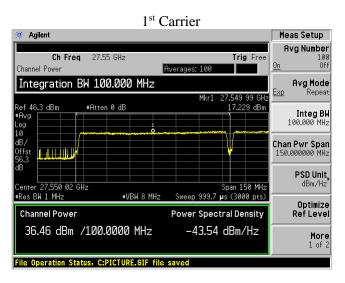


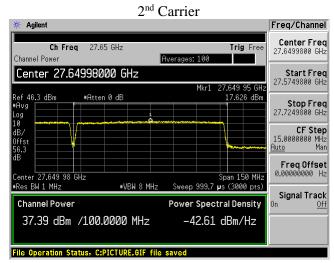
2CC - 16QAM - High Channel



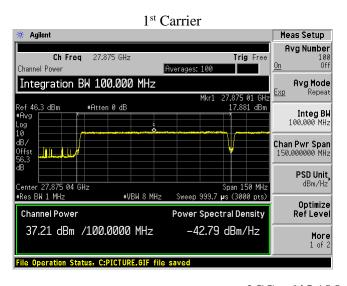


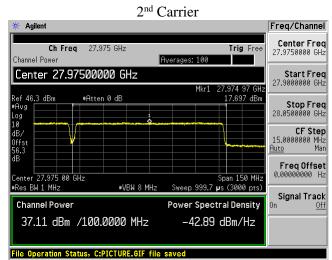
Beam ID: 11 (Vertical) 2CC – 64QAM – Low Channel



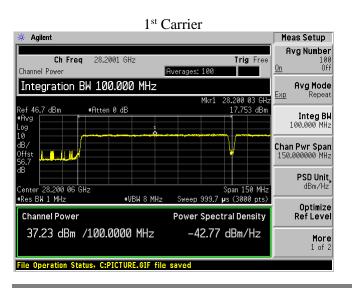


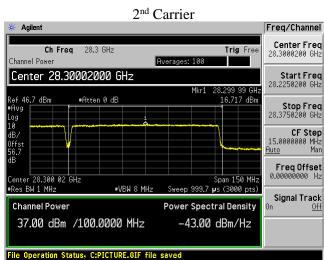
2CC - 64QAM - Middle Channel





2CC - 64QAM - High Channel



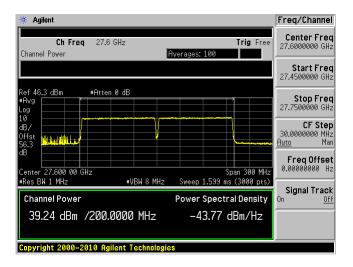


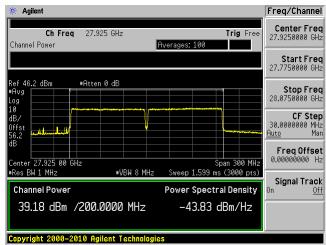
Beam ID: 11 (Vertical) (Channel Power)

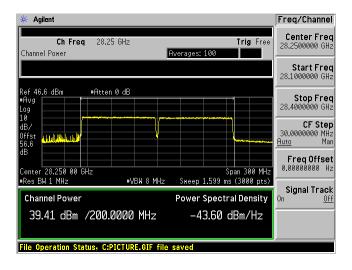
2CC QPSK

Low Channel

Middle Channel



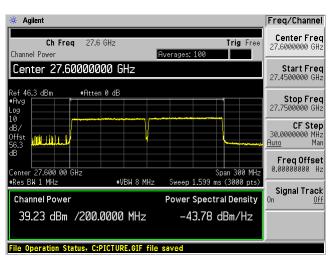




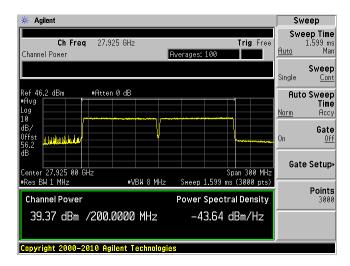
Beam ID: 11 (Vertical) (Channel Power)

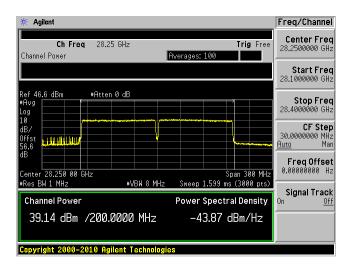
2CC - 16QAM

Low Channel



Middle Channel





File Operation Status, C:PICTURE.GIF file saved

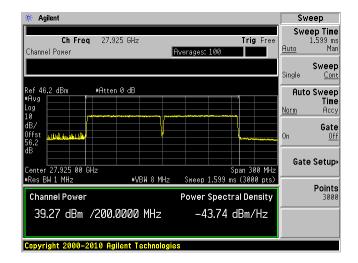
Beam ID: 11 (Vertical) (Channel Power)

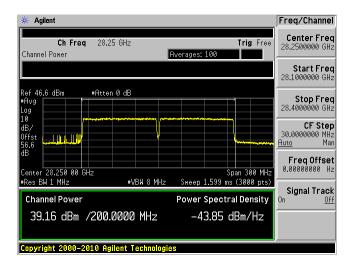
2CC - 64QAM

Low Channel

Freq/Channel Center Freq 27.6000000 GHz Ch Freq 27.6 GHz Trig Free Averages: 100 Center 27.60000000 GHz Start Freq 27.4500000 GHz #Atten 0 dB Ref 46.3 dBm Stop Freq 27.7500000 GHz **CF Step** 30.0000000 MHz Nuto Man ok toll, de Freq Offset 0.00000000 Hz Center 27.600 00 GHz #Res BW 1 MHz Span 300 MHz Sweep 1.599 ms (3000 pts) #VBW 8 MHz Signal Track **Channel Power** Power Spectral Density 39.10 dBm /200.0000 MHz -43.91 dBm/Hz

Middle Channel

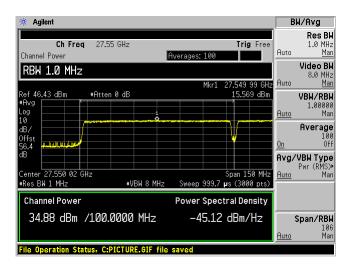


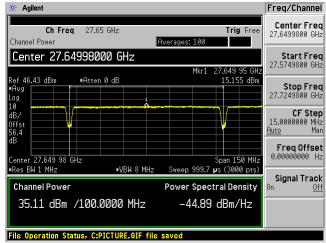


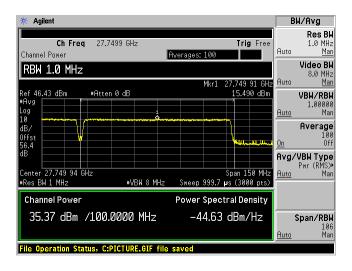
3CC - QPSK - Low Channel

1st Carrier

2nd Carrier



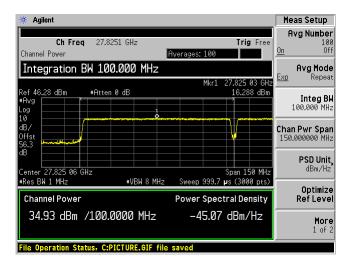


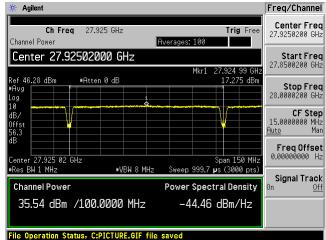


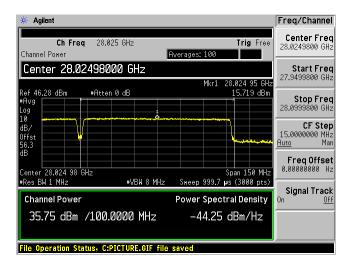
3CC - QPSK - Middle Channel

1st Carrier

2nd Carrier







Ch Freq 28.1001 GHz

36.18 dBm /100.0000 MHz

File Operation Status, C:PICTURE.GIF file saved

#Atten 0 dB

#VBW 8 MHz

RBW 1.0 MHz

Start 28.025 10 GHz #Res BW 1 MHz

Channel Power

Beam ID: 11 (Vertical)

3CC - QPSK - High Channel

1st Carrier

Trig Free

Mkr1 28.100 07 GHz 16.432 dBm

Stop 28.175 10 GHz Sweep 999.7 **µ**s (3000 pts)

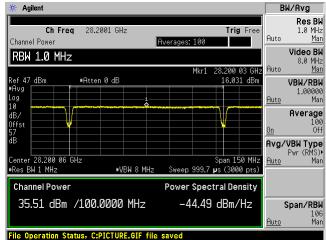
Power Spectral Density

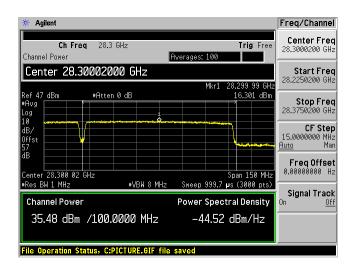
-43.82 dBm/Hz

| Res BW | 1.0 MHz | Man | Wideo BW | 8.0 MHz | Man | WBW/RBW | 1.00000 | Man | Average | 100 On | Off | Rvg/VBW Type | Pwr (RMS) | Auto | Man |

106 Man

2nd Carrier

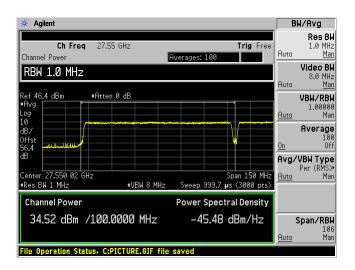


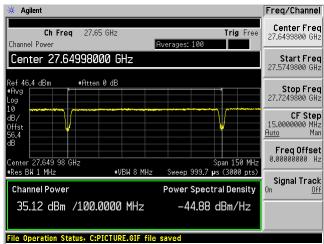


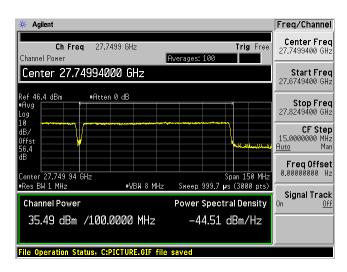
3CC - 16QAM - Low Channel

1st Carrier

2nd Carrier



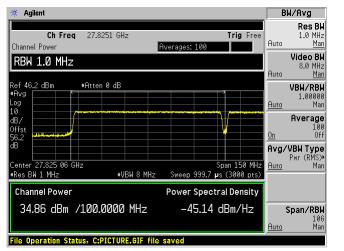


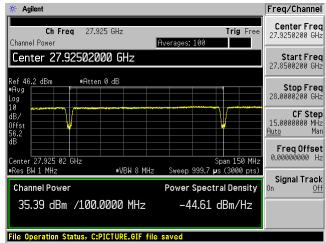


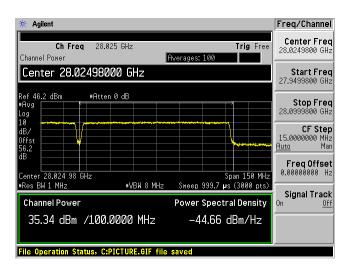
3CC - 16QAM - Middle Channel

1st Carrier

2nd Carrier



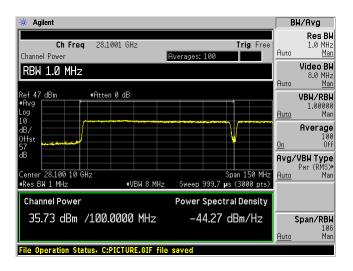


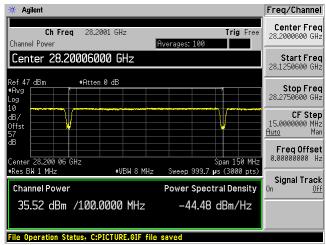


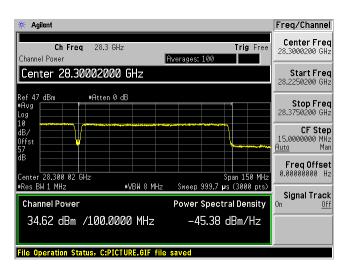
3CC - 16QAM - High Channel

1st Carrier

2nd Carrier







Agilent

Channel Power

Ch Freq 27.55 GHz

Integration BW 100.000 MHz

34.52 dBm /100.0000 MHz

File Operation Status, C:PICTURE.GIF file saved

#Atten 0 dB

#VBW 8 MHz

Beam ID: 11 (Vertical)

3CC - 64QAM - Low Channel

1st Carrier

Trig Free

Span 150 MHz Sweep 999.7 **µ**s (3000 pts)

Power Spectral Density

-45.48 dBm/Hz

Meas Setup

Avg Number
100
0n
0ff

Avg Mode
Repeat

Integ BW
100.000 MHz

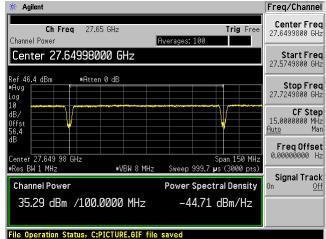
Chan Pwr Span
150.000000 MHz

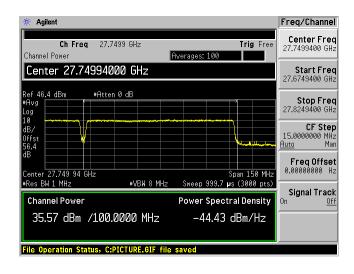
PSD Unit,
dBm/Hz

Optimize
Ref Level

More 1 of 2

2nd Carrier

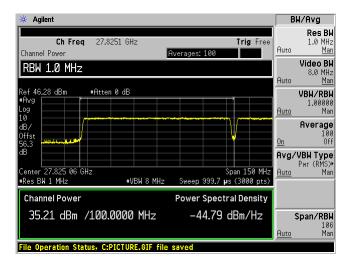


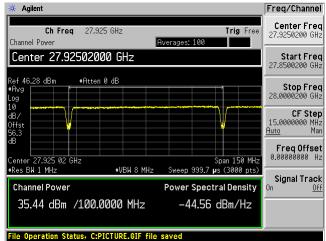


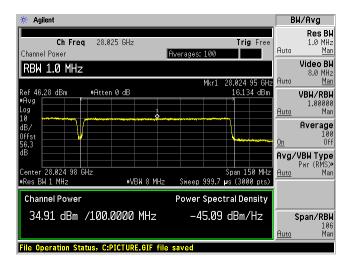
3CC - 64QAM - Middle Channel

1st Carrier

2nd Carrier



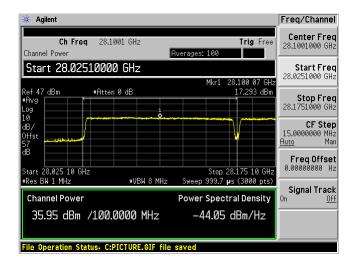


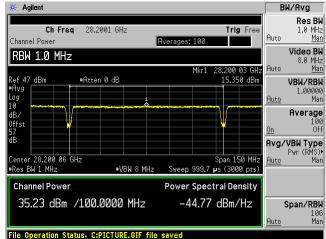


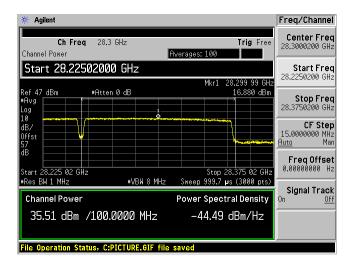
3CC - 64QAM - High Channel

1st Carrier

2nd Carrier







Ch Freq 27.65 GHz

#Atten 0 dB

Channel Power

Ref 46.4 dBm

Center 27.650 00 GHz #Res BW 1 MHz

Beam ID: 11 (Vertical) (Channel Power)

3CC QPSK

Freq/Channel

Center Freq 27.6500000 GHz

Start Freq 27.4250000 GHz

Stop Freq 27.8750000 GHz

CF Step 45.0000000 MHz Auto Man

Freq Offset 0.00000000 Hz

Trig Free

Span 450 MHz Sweep 2.399 ms (3000 pts)

Low Channel

Averages: 100

Sweep Time 2.399 ms to Man Trig Free Channel Power Averages: 100 Sweep Time 2.399 ms Sweep Ref 46.2 dBm #Atten 0 dB Auto Sweep Time Accy Gate 0ff Gate Setup> Span 450 MHz Sweep 2.399 ms (3000 pts) Center 27.925 00 GHz #Res BW 1 MHz #VBW 8 MHz Points 3000 **Channel Power Power Spectral Density**

-45.56 dBm/Hz

39.21 dBm /300.0000 MHz

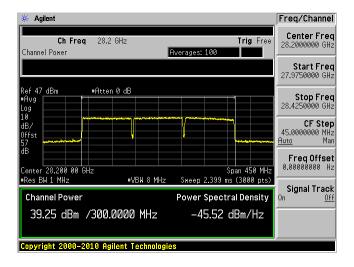
File Operation Status, C:PICTURE.GIF file saved

Middle Channel





#VBW 8 MHz

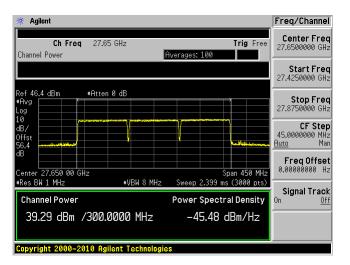


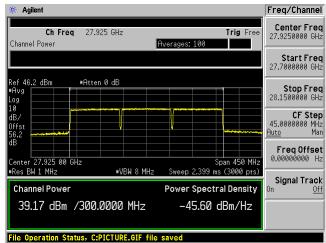
Beam ID: 11 (Vertical) (Channel Power)

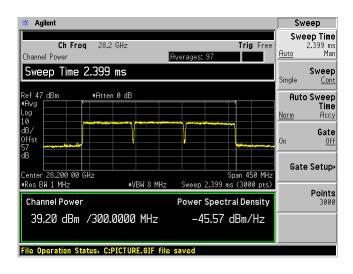
3CC - 16QAM

Low Channel

Middle Channel





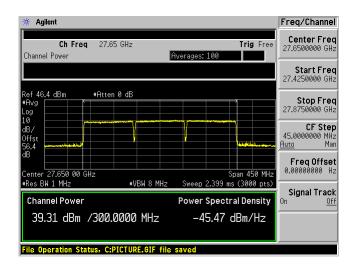


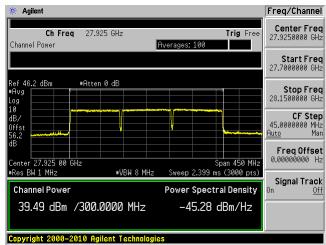
Beam ID: 11 (Vertical) (Channel Power)

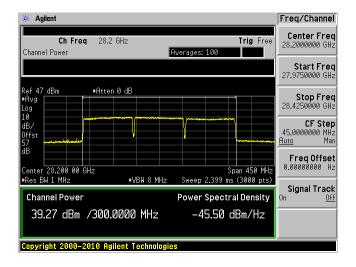
3CC - 64QAM

Low Channel

Middle Channel

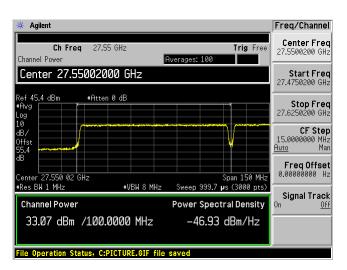




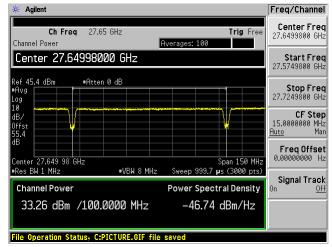


4CC - 16QAM- Low Channel

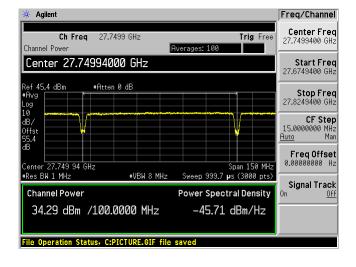
1st Carrier



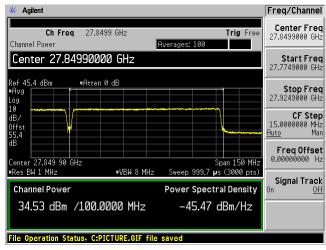
2nd Carrier



3rd Carrier

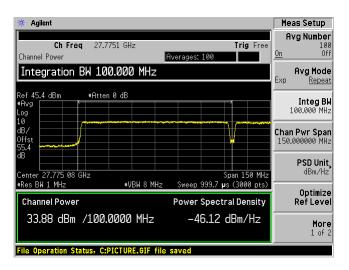


4th Carrier

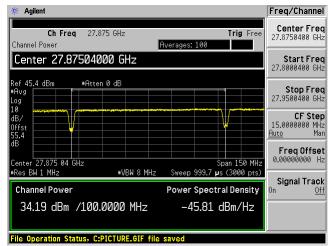


4CC - 16QAM - Middle Channel

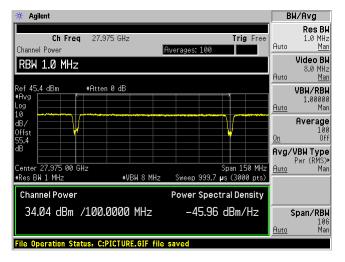
1st Carrier



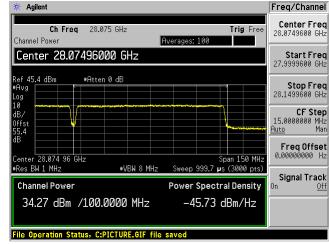
2nd Carrier



3rd Carrier



4th Carrier

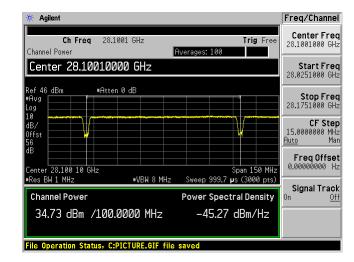


4CC - 16QAM - High Channel

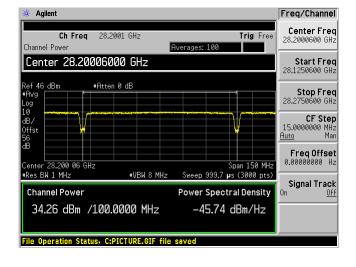
1st Carrier

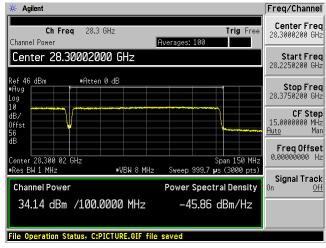
Meas Setup Avg Number Ch Freq 28.0001 GHz Trig Free Averages: 100 Integration BW 100.000 MHz Avg Mode Ref 46 dBm #Atten 0 dB Integ BW 100.000 MHz Chan Pwr Span 150.000000 MHz PSD Unit, Span 150 MHz Sweep 999.7 **µ**s (3000 pts) Center 28.000 14 GHz #Res BW 1 MHz #VBW 8 MHz Optimize Ref Level **Channel Power** Power Spectral Density -45.89 dBm/Hz 34.11 dBm /100.0000 MHz File Operation Status, C:PICTURE.GIF file saved

2nd Carrier



3rd Carrier



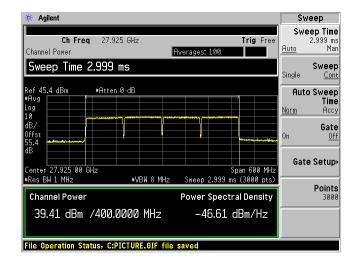


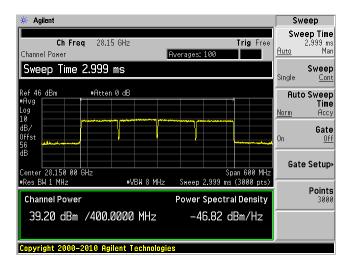
4CC - 16QAM

Low Channel

Freq/Channel Center Freq 27.7000000 GHz Ch Freq 27.7 GHz Trig Free Channel Power Averages: 100 Start Freq 27.4000000 GHz #Atten 0 dB Ref 45.4 dBm Stop Freq 28.0000000 GHz **CF Step** 60.0000000 MHz 1uto Man Freq Offset 0.00000000 Hz Center 27.700 00 GHz #Res BW 1 MHz Span 600 MHz Sweep 2.999 ms (3000 pts) #VBW 8 MHz Signal Track Power Spectral Density **Channel Power** 39.25 dBm /400.0000 MHz -46.77 dBm/Hz Copyright 2000-2010 Agilent Technologie

Middle Channel





File Operation Status, C:PICTURE.GIF file saved

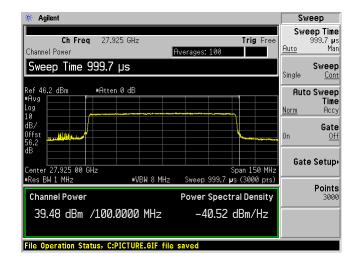
Beam ID: 139 (Horizontal)

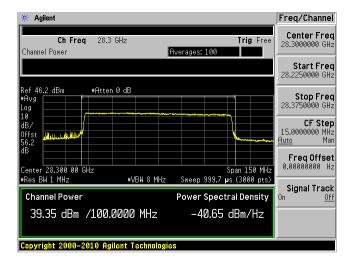
1CC - 16QAM

Low Channel

Freq/Channel Center Freq 27.5500000 GHz Ch Freq 27.55 GHz Trig Free Averages: 100 Center 27.55000000 GHz Start Freq 27.4750000 GHz #Atten 0 dB Ref 46.2 dBm Stop Freq 27.6250000 GHz **CF Step** 15.0000000 MHz <u>Auto</u> Man Freq Offset 0.00000000 Hz Span 150 MHz Sweep 999.7 **µ**s (3000 pts) Center 27.550 00 GHz #Res BW 1 MHz #VBW 8 MHz Signal Track Power Spectral Density **Channel Power** 39.54 dBm /100.0000 MHz -40.46 dBm/Hz

Middle Channel





Integration BW 100.000 MHz

36.75 dBm /100.0000 MHz

File Operation Status, C:PICTURE.GIF file saved

#Atten 0 dB

#VBW 8 MHz

Ref 46.3 dBm

⊭Res BW 1 MHz

Channel Power

Beam ID: 139 (Horizontal)

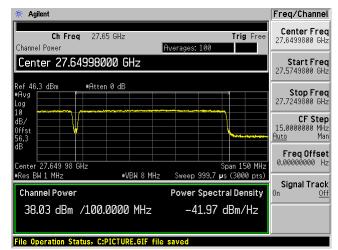
2CC - QPSK - Low Channel

1st Carrier

Averages: 100

Meas Setup Avg Number Trig Free Avg Mode Integ BW 100.000 MHz Chan Pwr Span 150.000000 MHz PSD Unit Span 150 MHz Sweep 999.7 **µ**s (3000 pts) Optimize Ref Level Power Spectral Density -43.25 dBm/Hz

2nd Carrier

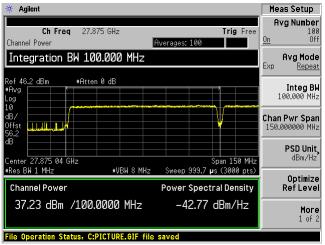


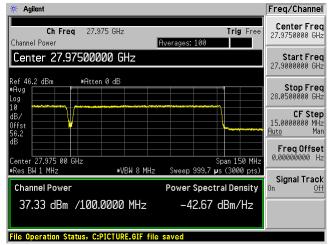
Beam ID: 139 (Horizontal)

2CC - QPSK - Middle Channel

1st Carrier



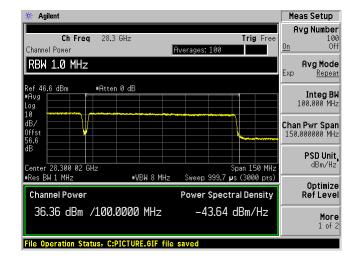




2CC - QPSK - High Channel

1st Carrier

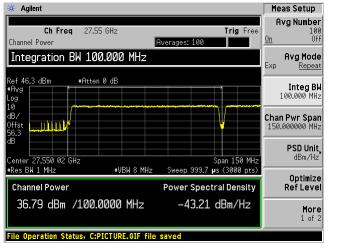
Meas Setup Avg Number Ch Freq 28.2001 GHz Trig Free Integration BW 100.000 MHz Avg Mode Integ BW 100.000 MHz Chan Pwr Span 150.000000 MHz PSD Unit Span 150 MHz Sweep 999.7 **µ**s (3000 pts) #VBW 8 MHz Optimize Ref Level **Channel Power** Power Spectral Density 37.58 dBm /100.0000 MHz -42.42 dBm/Hz **More** 1 of 2 File Operation Status, C:PICTURE.GIF file saved

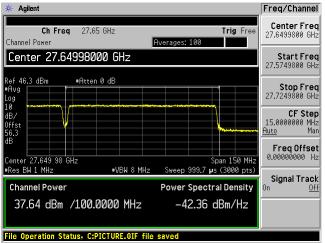


2CC - 16QAM - Low Channel

1st Carrier

2nd Carrier



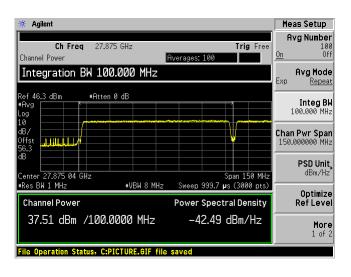


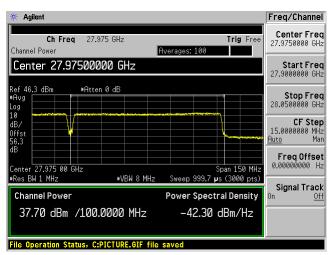
Beam ID: 139 (Horizontal)

2CC - 16QAM - Middle Channel

1st Carrier

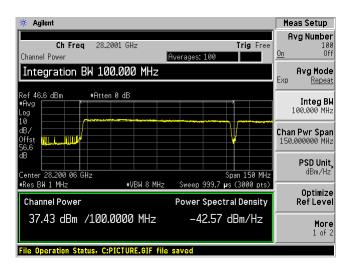
2nd Carrier

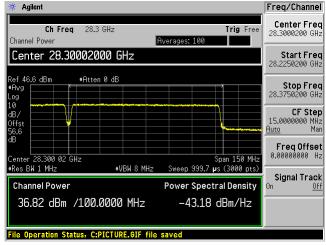




2CC - 16QAM - High Channel

2nd Carrier

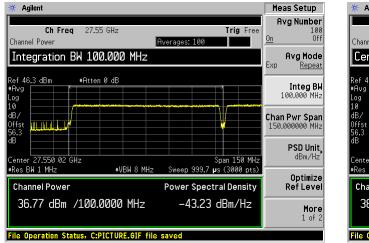


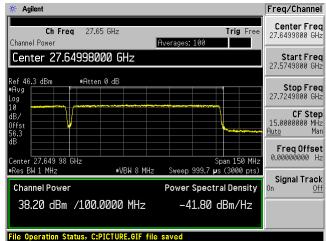


2CC - 64QAM - Low Channel

1st Carrier

2nd Carrier



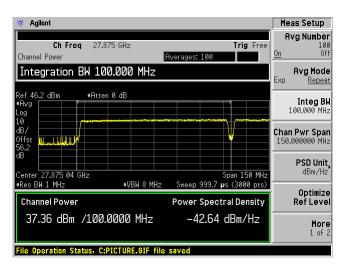


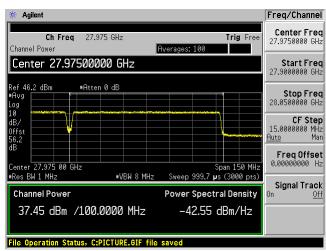
Beam ID: 139 (Horizontal)

2CC - 64QAM - Middle Channel

1st Carrier

2nd Carrier

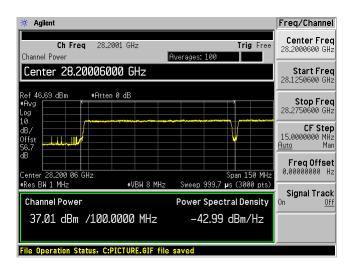


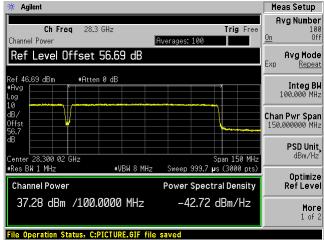


2CC - 64QAM - High Channel

1st Carrier

2nd Carrier



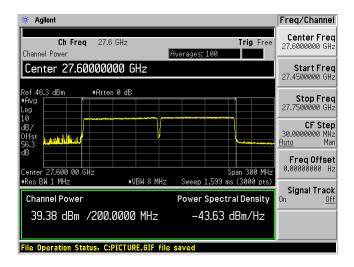


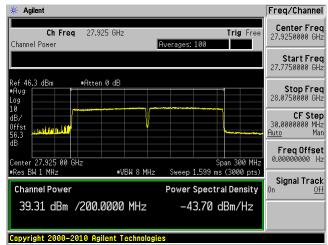
Beam ID: 139 (Horizontal) (Channel Power)

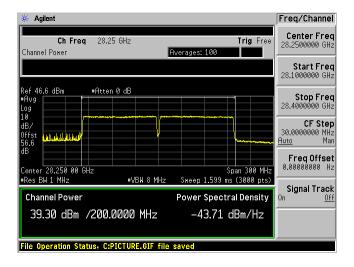
2CC - QPSK

Low Channel

Middle Channel



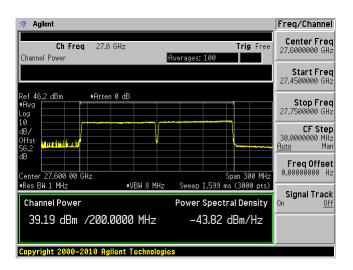


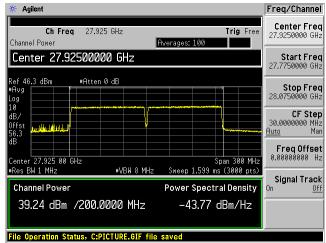


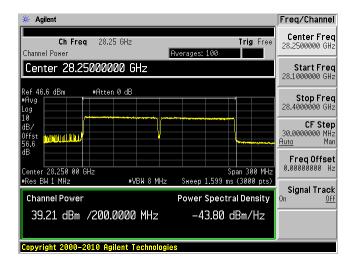
2CC - 16QAM

Low Channel

Middle Channel



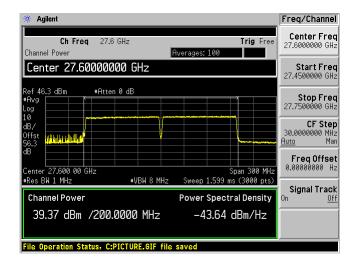


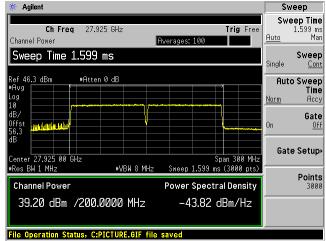


2CC - 64QAM

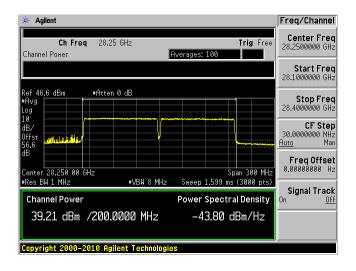
Low Channel

igilent





Middle Channel

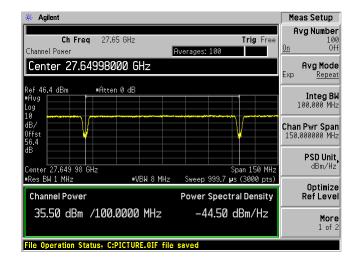


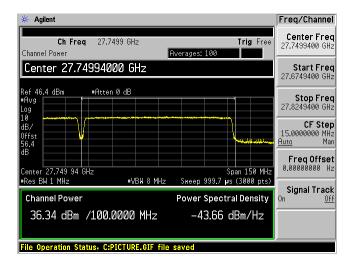
3CC - QPSK - Low Channel

1st Carrier

Agilent Meas Setup Avg Number Ch Freq 27.55 GHz Trig Free Channel Power Averages: 100 Integration BW 100.000 MHz Avg Mode #Atten 0 dB Integ BW 100.000 MHz Chan Pwr Span 150.000000 MHz PSD Unit, Span 150 MHz Sweep 999.7 **µ**s (3000 pts) #Res BW 1 MHz #VBW 8 MHz Optimize Ref Level **Channel Power Power Spectral Density** 35.50 dBm /100.0000 MHz -44.50 dBm/Hz More 1 of 2 File Operation Status, C:PICTURE.GIF file saved

2nd Carrier

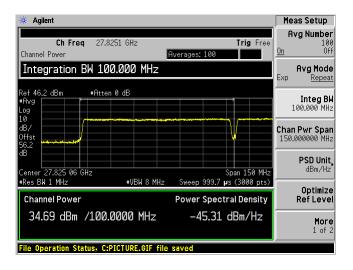


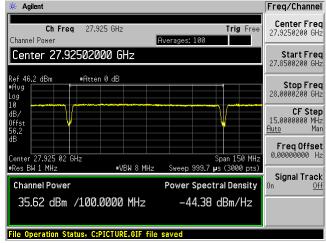


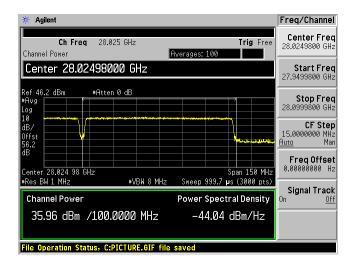
3CC - QPSK - Middle Channel

1st Carrier

2nd Carrier







Ch Freq 28.1001 GHz

#Atten 0 dB

#VBW 8 MHz

Integration BW 100.000 MHz

35.49 dBm /100.0000 MHz

File Operation Status, C:PICTURE.GIF file saved

Center 28.100 10 GHz #Res BW 1 MHz

Channel Power

Beam ID: 139 (Horizontal)

3CC - QPSK - High Channel

1st Carrier

Trig Free

Span 150 MHz Sweep 999.7 **µ**s (3000 pts)

Power Spectral Density

-44.51 dBm/Hz

Meas Setup

Avg Number
100
0n
Off

Avg Mode
Repeat

Integ BW
100.000 MHz

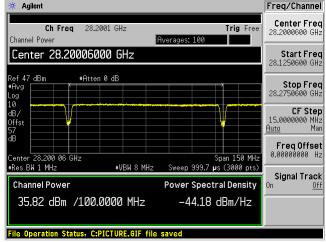
Chan Pwr Span
150.000000 MHz

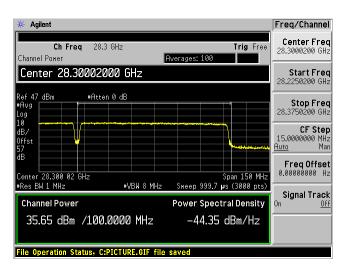
PSD Unit,
dBm/Hz

Optimize Ref Level

More 1 of 2

2nd Carrier





Ch Freq 27.55 GHz

Integration BW 100.000 MHz

35.10 dBm /100.0000 MHz

File Operation Status, C:PICTURE.GIF file saved

Channel Power

#Atten 0 dB

#VBW 8 MHz

FCC Part 30 Test Report

Beam ID: 139 (Horizontal)

3CC - 16QAM - Low Channel

1st Carrier

Trig Free

Span 150 MHz Sweep 999.7 **µ**s (3000 pts)

Power Spectral Density

-44.90 dBm/Hz

Meas Setup

Avg Number
100
0n 0ff

Rvg Mode
Repeat

Integ BW
100.000 MHz

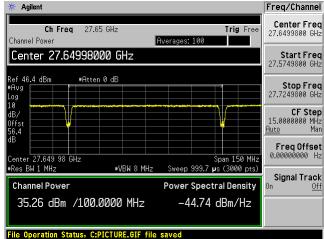
Chan Pwr Span
150.000000 MHz

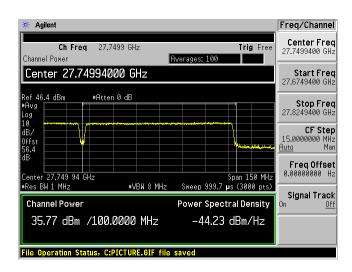
PSD Unit,
dBm/Hz

Optimize
Ref Level

More 1 of 2

2nd Carrier

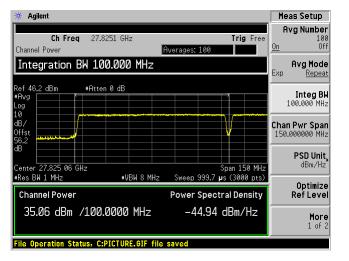


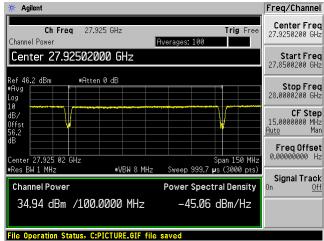


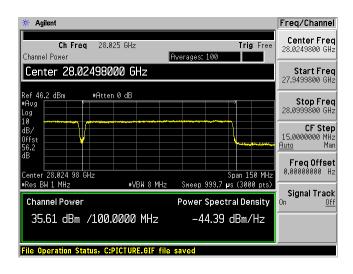
3CC - 16QAM - Middle Channel

1st Carrier

2nd Carrier



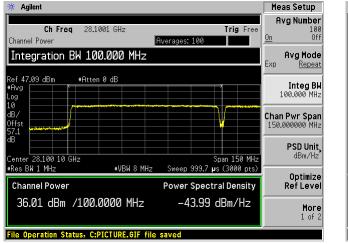


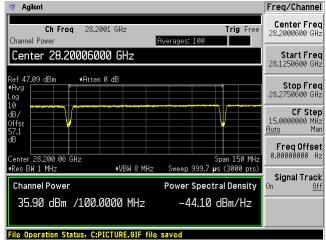


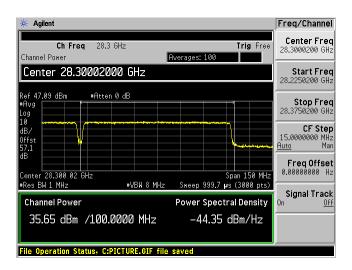
3CC - 16QAM - High Channel

1st Carrier

2nd Carrier



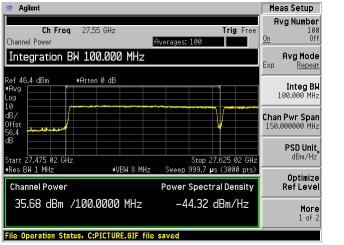


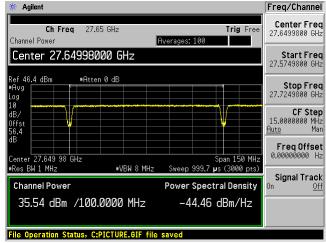


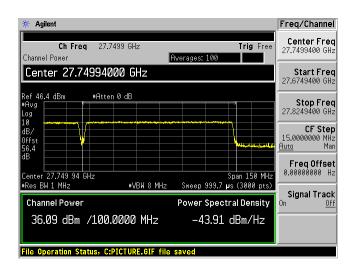
3CC - 64QAM - Low Channel

1st Carrier

2nd Carrier



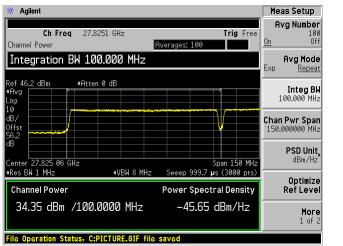


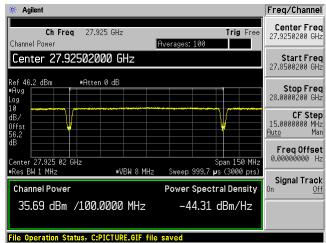


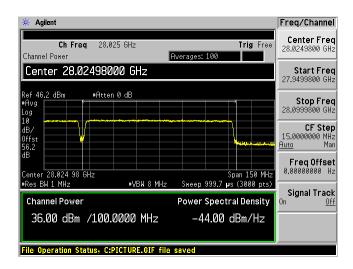
3CC - 64QAM - Middle Channel

1st Carrier

2nd Carrier



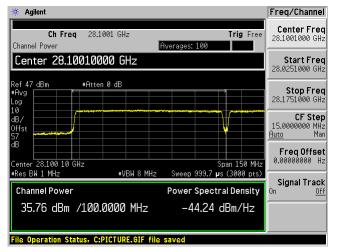


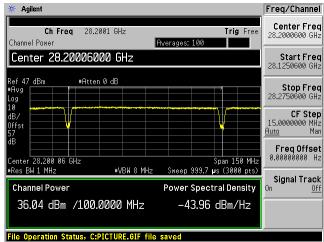


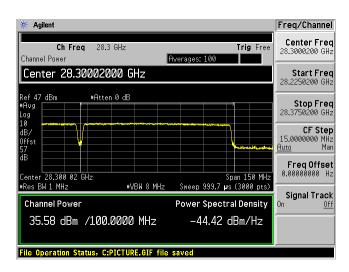
3CC - 64QAM - High Channel

1st Carrier

2nd Carrier



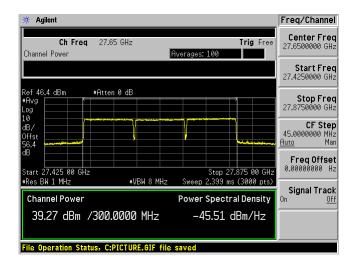


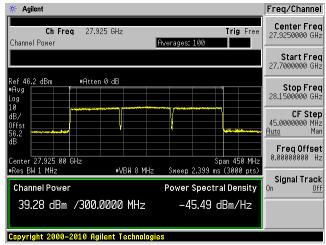


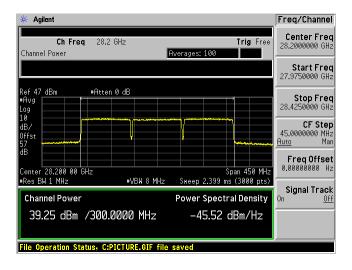
3CC - QPSK

Low Channel

Middle Channel



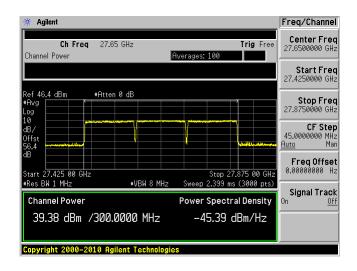


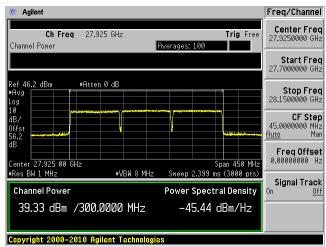


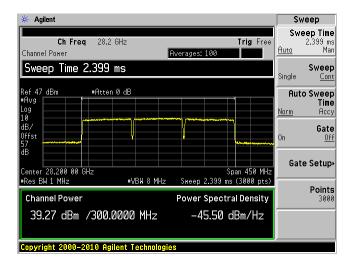
3CC - 16QAM

Low Channel

Middle Channel

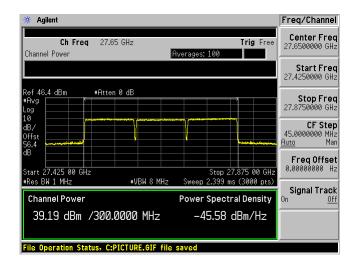


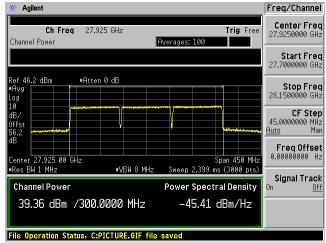




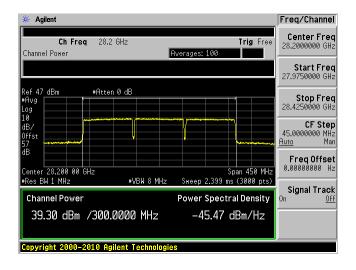
3CC - 64QAM

Low Channel





Middle Channel

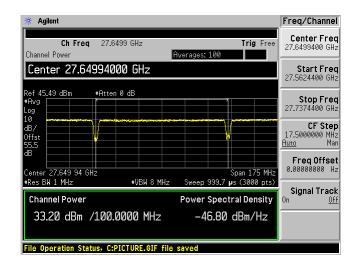


4CC - 16QAM- Low Channel

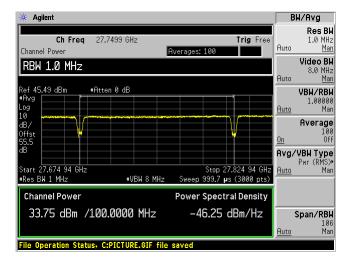
1st Carrier

Meas Setup Avg Number Trig Free Averages: 100 Integration BW 100.000 MHz Avg Mode Ref 45.49 dBm #Atten 0 dB Integ BW 100.000 MHz Chan Pwr Span 150.000000 MHz PSD Unit, dBm/Hz Span 150 MHz Sweep 999.7 **µ**s (3000 pts) #VBW 8 MHz ⊭Res BW 1 MHz Optimize Ref Level **Channel Power** Power Spectral Density 33.59 dBm /100.0000 MHz -46.41 dBm/Hz File Operation Status, C:PICTURE.GIF file saved

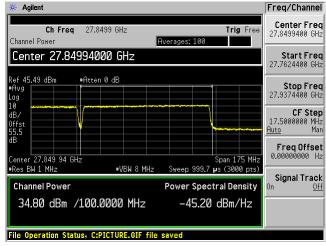
2nd Carrier



3rd Carrier



4th Carrier

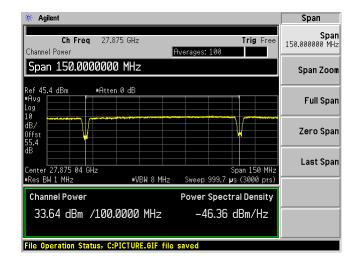


4CC - 16QAM - Middle Channel

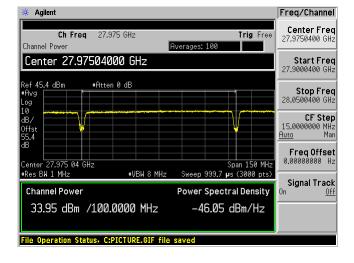
1st Carrier

Freq/Channel Center Freq 27.7750800 GHz Ch Freq 27.7751 GHz Trig Free Center 27.77508000 GHz Start Freq 27.7000800 GHz #Atten 0 dB Stop Freq 27.8500800 GHz CF Step 15.0000000 MHz Auto Man Freq Offset 0.00000000 Hz Span 150 MHz Sweep 999.7 **µ**s (3000 pts) #VBW 8 MHz Signal Track Power Spectral Density **Channel Power** 32.77 dBm /100.0000 MHz -47.23 dBm/Hz File Operation Status, C:PICTURE.GIF file saved

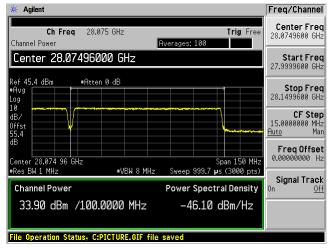
2nd Carrier



3rd Carrier

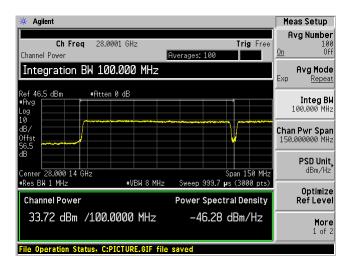


4th Carrier

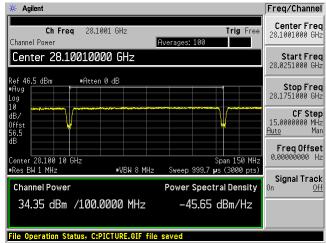


4CC - 16QAM - High Channel

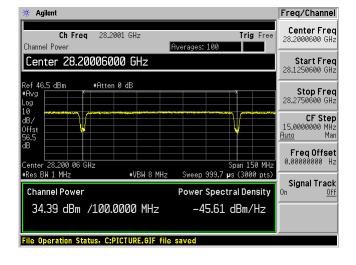
1st Carrier



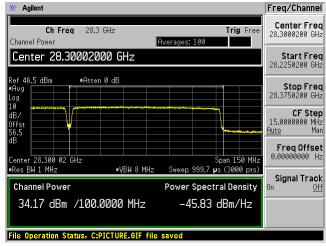
2nd Carrier



3rd Carrier

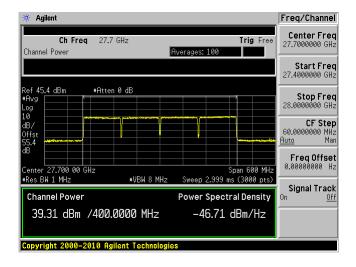


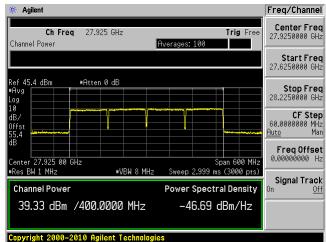
4th Carrier



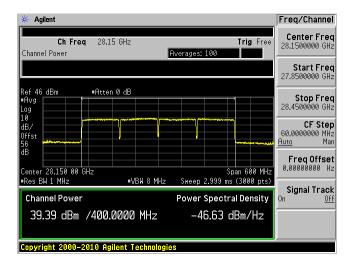
4CC - 16QAM

Low Channel





Middle Channel



6 FCC §30.203 & §2.1053 - Out of Band Emissions at the Band-edge

6.1 Applicable Standards

According to FCC §30.203

The conductive power or the total radiated power of any emission outside a licensee's frequency block shall be -13 dBm/MHz or lower. However, in the bands immediately outside and adjacent to the licensee's frequency block, having a bandwidth equal to 10 percent of the channel bandwidth, the conductive power or the total radiated power of any emission shall be -5 dBm/MHz or lower.

6.2 Measurement Procedure

Unwanted Emission Measurement:

According to ANSI C63.26-2015 section 5.2.7 Radiated power measurements

 $E(dB\mu V/m) = Measured amplitude level (dBm) + 107 + Cable Loss (dB) + Antenna Factor (dB/m).$

EIRP (dBm) = E (dB μ V/m) + 20log(D) – 104.8; where D is the measurement distance (in the far field region) in m.

Based on both equations above, the offset should equal to Antenna Factor(dB/m) + Cable Loss(dB) + 107 + 20log(D) -104.8 when set the unit to dBm on the PSA. The duty cycle correction factor in section 2.3 was also added in the offset for average measurement.

Maximum emission levels are measured by setting the analyzer as follows:

- i. RBW = 1 MHz
- ii. $VBW \ge 3 MHz$
- iii. Detector = RMS(average)
- iv. Sweep time = auto
- v. Trace mode = max hold to present worst case

Note: Lower limit -13dBm was selected to show compliance

Note: EUT antenna gain 22.5 dBi was subtracted in the offset for the conductive power measurement.

6.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer 44 GHz	E4446A	US44300386	2021-04-27	1 years
-	RF Cable	-	-	Each Time	-
Wisewave	Antenna, Horn	ARH-2823-02	10555-02	2020-02-27	2 years

Note¹: equipment included in the test set-up will be checked each time before testing.

Statement of Traceability: BACL Corp. attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with the latest version of A2LA policy P102 "A2LA Policy on Metrological Traceability".

6.4 Test Environmental Conditions

Temperature:	22-24° C
Relative Humidity:	40-41 %
ATM Pressure:	103.1-104.1 kPa

The testing was performed by Giriraj Gurjar on 2021-06-25 in 5m3 Chamber.

6.5 Test Results

1CC

Channel	Modulation	Conducted Emission (dBm/MHz)		Total Conducted	Limit	Margin	
Chamiei	Wiodulation	Horizontal	Vertical	Emission (dBm/MHz)	(dBm/MHz)	(dB)	
Low	- 16QAM	-23.27	-25.98	-21.4067	-5	-16.4067	
Low		-25.39	-29.13	-23.859	-13	-10.859	
High		-29.45	-31.28	-27.259	-5	-22.259	
		-38.48	-37.48	-34.941	-13	-21.941	

2CC

Channel	Modulation	Conducted Emission (dBm/MHz)		Total Conducted	Limit	Margin	
Chamler	Wiodulation	Horizontal	Vertical	Emission (dBm/MHz)	(dBm/MHz)	(dB)	
Low		-23.48	-25.95	-21.5314	-5	-16.5314	
Low	QPSK	-29.22	-29.25	-26.2247	-13	-13.2247	
High	QPSK	-34.76	-35.82	-32.2474	-5	-27.2474	
nigii		-39.93	-41.17	-37.4956	-13	-24.4956	
Low		-23.45	-27.90	-22.1181	-5	-17.1181	
Low	16QAM	-28.24	-30.03	-26.0331	-13	-13.0331	
TT: -1-		-39.13	-34.86	-33.4798	-5	-28.4798	
High		-41.89	-39.29	-37.388	-13	-24.388	
T		-23.38	-26.52	-21.6619	-5	-16.6619	
Low	640AM	-30.64	-25.64	-24.4467	-13	-11.4467	
Uigh	64QAM	-34.70	-34.61	-31.6445	-5	-26.6445	
High		-39.41	-40.38	-36.8577	-13	-23.8577	

3CC

Channel	Modulation	Conducted Emission (dBm/MHz)		Total Conducted	Limit	Margin	
Chamier	Modulation	Horizontal	Vertical	Emission (dBm/MHz)	(dBm/MHz)	(dB)	
Low		-34.22	-37.40	-32.5149	-5	-27.5149	
Low	QPSK	-36.24	-40.25	-34.7874	-13	-21.7874	
Uiah		-35.95	-36.65	-33.2756	-5	-28.2756	
High		-40.25	-40.65	-37.4351	-13	-24.4351	
Low	- 16QAM	-34.94	-37.23	-32.9255	-5	-27.9255	
Low		-37.39	-39.32	-35.2384	-13	-22.2384	
High		-36.21	-36.92	-33.5402	-5	-28.5402	
High		-39.19	-41.48	-37.1755	-13	-24.1755	
Low	- 64QAM	-32.51	-36.66	-31.0968	-5	-26.0968	
Low		-35.03	-39.00	-33.566	-13	-20.566	
Uigh		-35.99	-39.67	-34.4411	-5	-29.4411	
High		-40.00	-41.97	-37.8639	-13	-24.8639	

4CC

Channel	Modulation	Conducted Emission (dBm/MHz)		Total Conducted	Limit	Margin	
Chamler		Horizontal	Vertical	Emission (dBm/MHz)	(dBm/MHz)	(dB)	
Low	- 16QAM	-35.15	-37.99	-33.3316	-5	-28.3316	
Low		-37.99	-38.71	-35.3248	-13	-22.3248	
High		-36.62	-37.71	-34.1206	-5	-29.1206	
High		-42.16	-37.91	-36.5243	-13	-23.5243	

Please refer to the following plots

Freq/Channel

Center Freq 28.3750000 GHz

Start Freq 28.3500000 GHz

Stop Freq 28.4000000 GHz

CF Step 5.00000000 MHz <u>Auto</u> Man

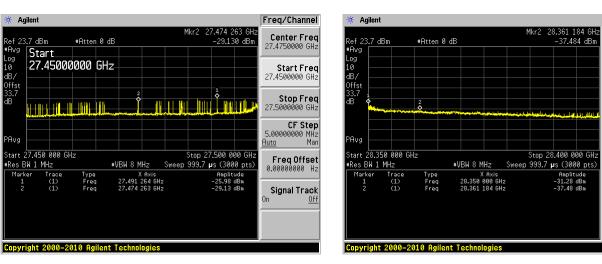
Freq Offset 0.00000000 Hz

Signal Track <u>0ff</u>

1CC-16QAM

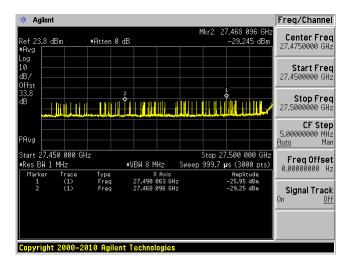
Low Channel – Beam ID=11 (Vertical)

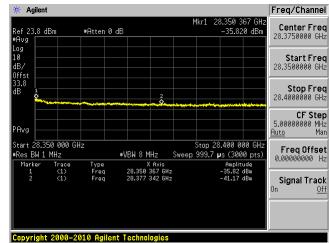
High Channel – Beam ID=11 (Vertical)



2CC-QPSK

Low Channel – Beam ID=11 (Vertical)





Center 27.475 000 GHz Res BW 1 MHz

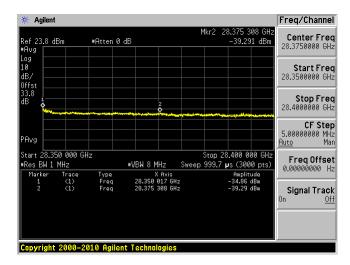
Copyright 2000-2010 Agilent Technologies

2CC-16QAM

Low Channel – Beam ID=11 (Vertical)

Span 50 MHz Sweep 999.7 **µ**s (3000 pts)

High Channel – Beam ID=11 (Vertical)

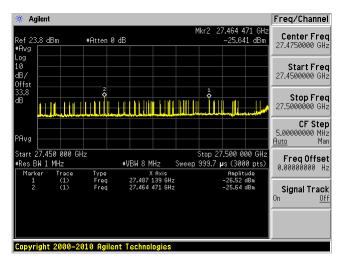


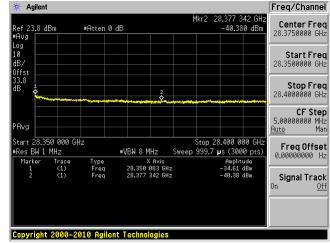
2CC-64QAM

Freq Offset 0.00000000 Hz

Signal Track

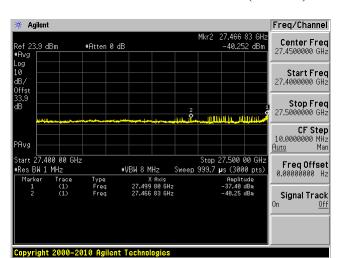
Low Channel – Beam ID=11 (Vertical)



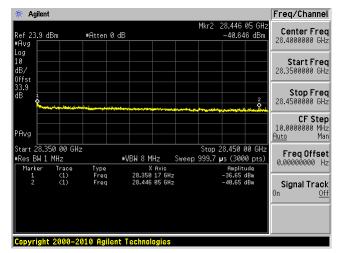


3CC-QPSK

Low Channel – Beam ID=11 (Vertical)

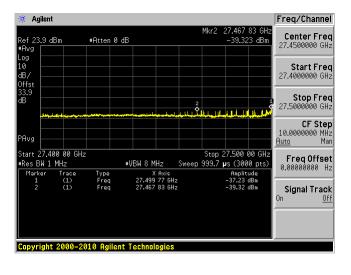


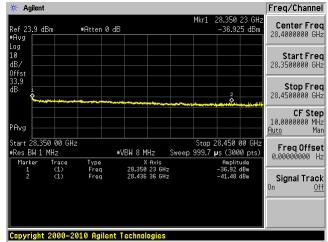
High Channel – Beam ID=11 (Vertical)



3CC-16QAM

Low Channel – Beam ID=11 (Vertical)



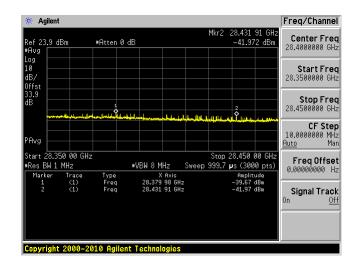


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3CC-64QAM

Low Channel – Beam ID=11 (Vertical)

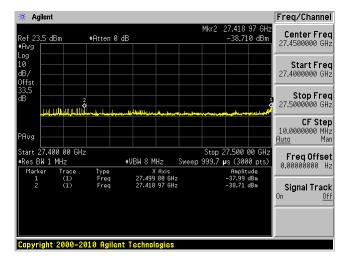
High Channel – Beam ID=11 (Vertical)

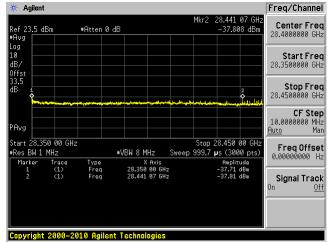


4CC-16QAM

Signal Track

Low Channel – Beam ID=11 (Vertical)

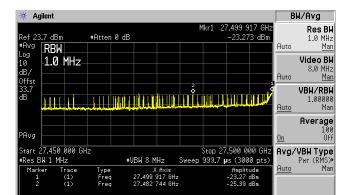




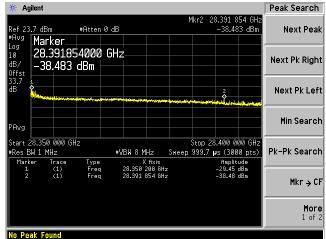
No Peak Found

1CC-16QAM

Low Channel – Beam ID=139 (Horizontal)



High Channel – Beam ID=139 (Horizontal)

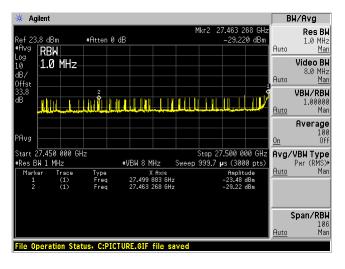


2CC-QPSK

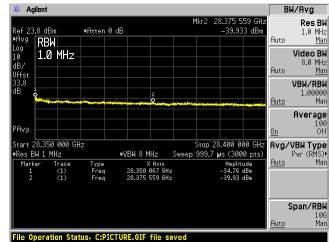
Span/RBW

106 Man

Low Channel – Beam ID=139 (Horizontal)

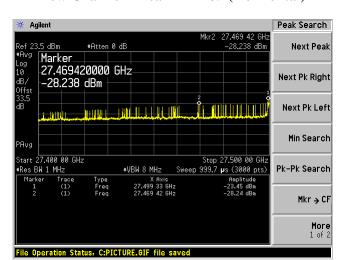


High Channel – Beam ID=139 (Horizontal)

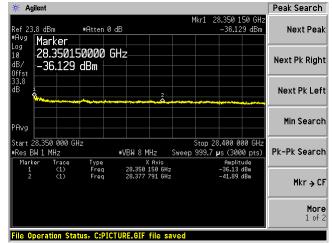


2CC-16QAM

Low Channel – Beam ID=139 (Horizontal)

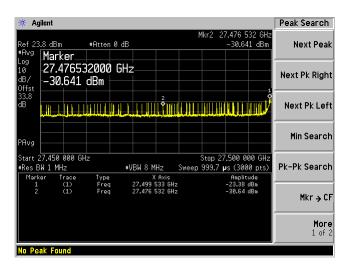


High Channel – Beam ID=139 (Horizontal)

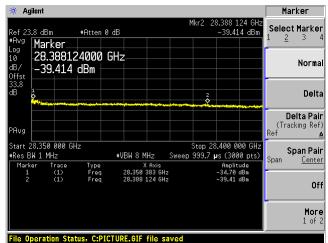


2CC-64QAM

Low Channel – Beam ID=139 (Horizontal)

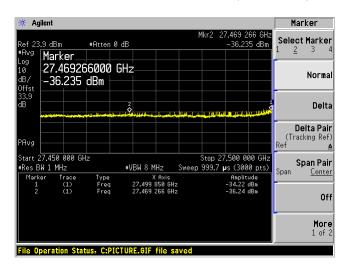


High Channel – Beam ID=139 (Horizontal)

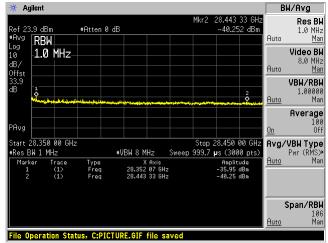


3CC-QPSK

Low Channel – Beam ID=139 (Horizontal)

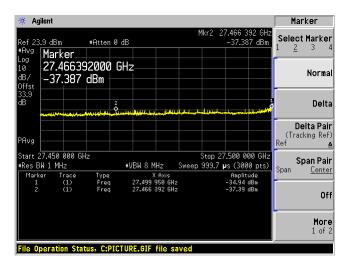


High Channel – Beam ID=139 (Horizontal)

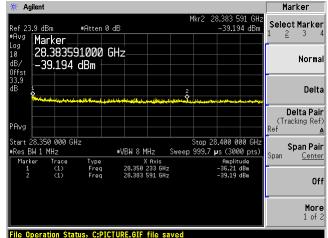


3CC-16QAM

Low Channel – Beam ID=139 (Horizontal)



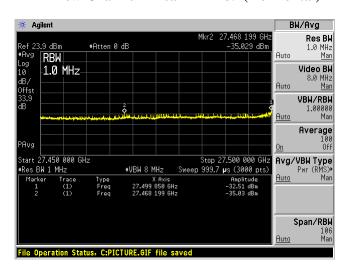
High Channel – Beam ID=139 (Horizontal)



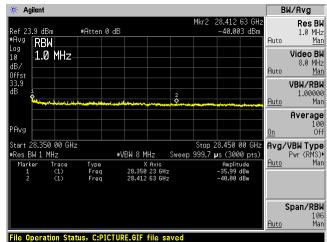
FCC Part 30 Test Report

3CC-64QAM

Low Channel – Beam ID=139 (Horizontal)

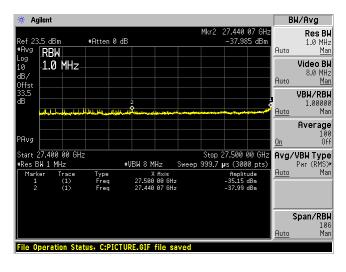


High Channel – Beam ID=139 (Horizontal)

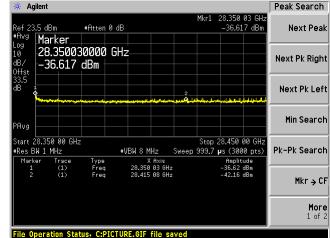


4CC-16QAM

Low Channel – Beam ID=139 (Horizontal)



High Channel – Beam ID=139 (Horizontal)



Corr	ning Optical Communication LLC	FCC ID: OJFRN510
7	Annex A (Normative) - EUT Test Setup Photographs	
Plea	ase refer to the attachment.	

8 Annex B (Normative) - Accredited Test Firm Scope

OET Accredited Test firm scope List

Test Firm: Bay Area Compliance Laboratories Corporation

<u>Scope</u>	FCC Rule Parts	Maximum Assessed	<u>Status</u>	Expiration Date	Recognition Date
Unintentional Radiators	FCC Part15, Subpart B	Frequency in Mhz 40000.00	Approved	09-30- 2022	12-15-2020
Industrial, Scientific, and Medical Equipment	FCC Part 18	325000.00	Approved	09-30- 2022	12-15-2020
Intentional Radiators	FCC Part 15 Subpart C	200000.00	Approved	09-30- 2022	12-15-2020
UPCS	FCC Part 15, Subpart D	200000.00	Approved	09-30- 2022	12-15-2020
U-NII without DFS Intentional Radiators	FCC Part 15, Subpart E	200000.00	Approved	09-30- 2022	12-15-2020
U-NII with DFS Intentional Radiators	FCC Part 15, Subpart E	200000.00	Approved	09-30- 2022	12-15-2020
UWB Intentional Radiators	FCC Part 15, Subpart F	200000.00	Approved	09-30- 2022	12-15-2020
BPL Intentional Radiators	FCC Part 15, Subpart G	40000.00	Approved	09-30- 2022	12-15-2020
White Space Device Intentional Radiators	FCC Part 15, Subpart H	200000.00	Approved	09-30- 2022	12-15-2020
Commercial Mobile Services	Part 22 (cellular), Part 24, Part 25 (below 3 GHz), Part 27	200000.00	Approved	09-30- 2022	12-15-2020
General Mobile Radio Services	Part 22 (non-cellular), Part 90 (below 3 GHz), Part 95 (below 3 GHz), Part 97 (below 3 GHz), Part 101 (below 3 GHz)		Approved	09-30- 2022	12-15-2020
Citizens Broadband Radio Services	Part 96	200000.00	Approved	03-31- 2022	12-15-2020
Maritime and Aviation Radio Services	Part 80, Part 87	200000.00	Approved	09-30- 2022	12-15-2020
Microwave and Millimeter Bands Radio Services	Part 25 (above 3 GHz), Part 30, Part 74, Part 90 (above 3 GHz), Part 95 (above 3 GHz), Part 97 (above 3 GHz) Part 101	200000.00	Approved	09-30- 2022	12-15-2020
Broadcast Radio Services	Part 73, Part 74 (below 3 GHz)	200000.00	Approved	09-30- 2022	12-15-2020
RF Exposure		6000.00	Approved	09-30- 2022	12-15-2020
Hearing Aid Compatibility	Part 20	6000.00	Approved	09-30- 2022	12-15-2020
Signal Boosters	Part 20, Part 90.219	200000.00	Approved	09-30- 2022	12-15-2020

9 Annex C (Normative) - A2LA Electrical Testing Certificate



Accredited Laboratory

A2LA has accredited

BAY AREA COMPLIANCE LABORATORIES CORP.

Sunnyvale, CA

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017

General requirements for the competence of testing and calibration laboratories. This laboratory also meets A2LA R222

- Specific Requirements EPA ENERGY STAR Accreditation Program. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).



Presented this 10th day of March 2021.

Trace McInturff, Vice President, Accreditation Services For the Accreditation Council Certificate Number 3297.02 Valid to September 30, 2022

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

Please follow the web link below for a full ISO 17025 scope

https://www.a2la.org/scopepdf/3297-02.pdf

--- END OF REPORT ---