

# FCC PART 30

# **TEST REPORT**

For

# **Corning Optical Communication LLC**

475 Sycamore Drive, Milpitas, CA 95035, USA

# FCC ID: OJFRN510

<b>Report Type:</b>		<b>Product Type:</b>		
Class II Permissive Change Report		5G mmWave SmallCell Radio Node		
<b>Prepared By:</b> Giriraj Gurjar Test Engineer				
Report Number:	R2106163			
<b>Report Date:</b>	2021-07-28			
Reviewed By:	Simon Ma RF Superviso	Samon elle		
Bay	Bay Area Compliance Laboratories Corp.			
		wood Avenue,		
	•	CA 94089, USA		
Tel: +1	(408) 732-916	2, Fax: +1 (408) 732-9164		



**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. \* This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "\*"

# TABLE OF CONTENTS

1	GEN	NERAL DESCRIPTION	4
	1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8	PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) MECHANICAL DESCRIPTION OF EUT OBJECTIVE RELATED SUBMITTAL(S)/GRANT(S) TEST METHODOLOGY MEASUREMENT UNCERTAINTY TEST FACILITY REGISTRATIONS TEST FACILITY ACCREDITATIONS	4 4 4 5 5 5
2	EUI	T TEST CONFIGURATION	8
	2.1 2.2 2.3 2.4 2.5 2.6 2.7	JUSTIFICATION EUT EXERCISE SOFTWARE DUTY CYCLE CORRECTION FACTOR EQUIPMENT MODIFICATIONS LOCAL SUPPORT EQUIPMENT REMOTE SUPPORT EQUIPMENT INTERFACE PORTS AND CABLING	8 10 15 15 15 15
3	SUN	IMARY OF TEST RESULTS	16
4	FCC	C §2.1049 - OCCUPIED BANDWIDTH	17
	4.1 4.2 4.3 4.4 4.5	APPLICABLE STANDARDS MEASUREMENT PROCEDURE TEST EQUIPMENT LIST AND DETAILS TEST ENVIRONMENTAL CONDITIONS TEST RESULTS	17 17 17 17
5	FCC	C §30.202 (A) & §2.1051 - POWER LIMITS	36
	5.1 5.2 5.3 5.4 5.5 5.6	APPLICABLE STANDARDS MEASUREMENT PROCEDURE FAR FIELD DISTANCE CALCULATION TEST EQUIPMENT LIST AND DETAILS TEST ENVIRONMENTAL CONDITIONS TEST RESULTS	36 36 37 37
6	FCC	C §30.203 & §2.1053 - OUT OF BAND EMISSIONS AT THE BAND-EDGE	
	6.1 6.2 6.3 6.4 6.5	APPLICABLE STANDARDS MEASUREMENT PROCEDURE TEST EQUIPMENT LIST AND DETAILS TEST ENVIRONMENTAL CONDITIONS TEST RESULTS	91 91 92 92
7		NEX A (NORMATIVE) - EUT TEST SETUP PHOTOGRAPHS 1	
8		NEX B (NORMATIVE) - ACCREDITED TEST FIRM SCOPE 1	
9	ANN	NEX C (NORMATIVE) - A2LA ELECTRICAL TESTING CERTIFICATE 1	.04

# **DOCUMENT REVISION HISTORY**

Revision Number	Report Number	Description of Revision	Date 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.

#### **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, 3<sup>rd</sup>-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

#### Corning Optical Communication LLC

- 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;
    - NCC (National Communications Commission) APEC Tel MRA -Phase I;
- European Union:
  - EMC Directive 2014/30/EU US-EU EMC & Telecom MRA CAB (NB)
  - Radio Equipment (RE) Directive 2014/53/EU US-EU EMC & Telecom MRA CAB (NB)
  - 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-
- UŜA:
  - 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 (100)				2084166	28300	430
100 (1CC)				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
				2077918	27925	430
				2083332	28250	430
			64QAM	2072500	27600	430
				2077918	27925	430
				2083332	28250	430
200 (2CC)			QPSK	2072500	27600	430
				2077918	27925	430
				2083332	28250	430
				2072500	27600	430
	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 (200)				2082499	28200	430	
300 (3CC)	300 (3CC) Horizontal	139	QPSK	2073333	27650	430	
				2077915	27925	430	
				2082499	28200	430	
			16QAM	2073333	27650	430	
				2077915	27925	430	
				2082499	28200	430	
					2073333	27650	430
			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	

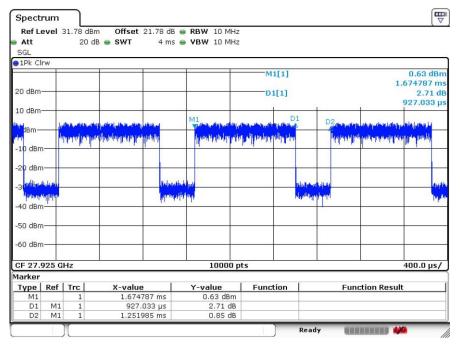
# 2.3 Duty Cycle Correction Factor

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 =  $10*\log(1/duty cycle)$ 

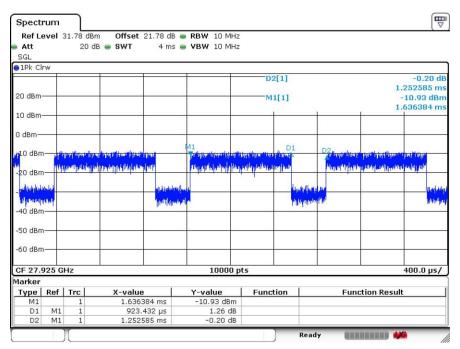
Please refer to the following plots.

#### 1CC-16QAM



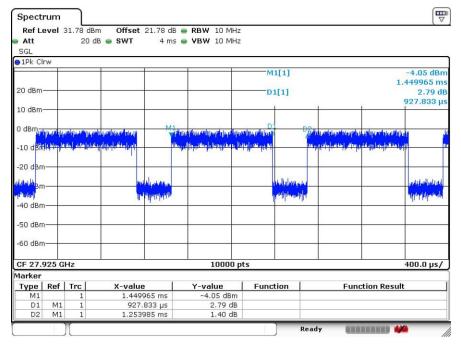
Date: 29.JUN.2021 20:48:44

2CC – QPSK



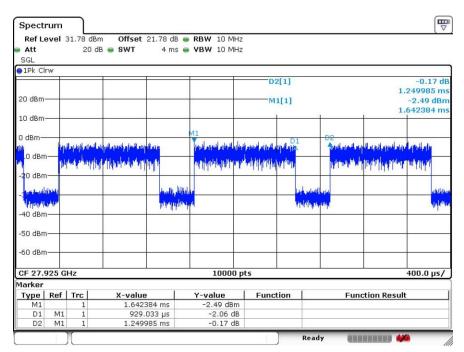
Date: 29.JUN.2021 20:17:56

#### 2CC - 16QAM



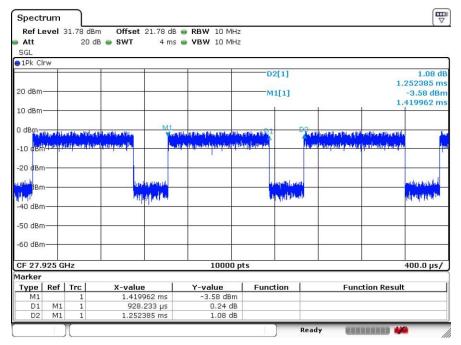
Date: 29.JUN.2021 20:27:25

#### 2CC – 64QAM



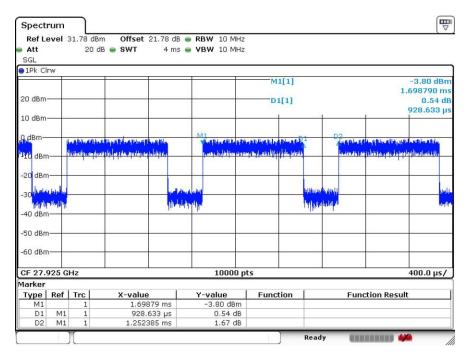
Date: 29.JUN.2021 20:23:40

#### 3CC - QPSK



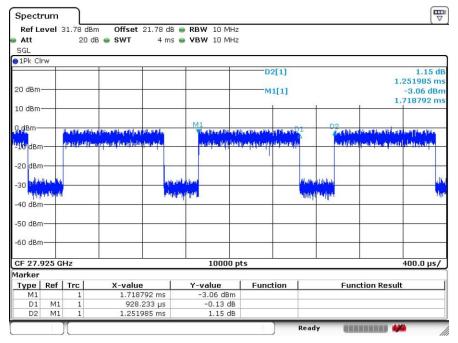
Date: 29.JUN.2021 20:32:20

#### 3CC - 16QAM



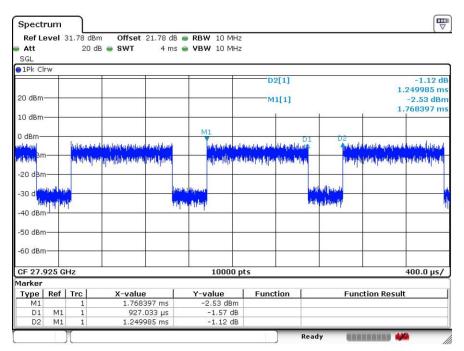
Date: 29.JUN.2021 20:34:54

#### **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 $\geq 3 \times RBW$ .
- 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

Note<sup>1</sup>: 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
<b>Relative Humidity:</b>	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)
			Low	94.7103
	1CC	16QAM	Middle	94.3702
			High	94.5270
			Low	193.3898
		QPSK	Middle	193.2216
			High	193.6434
			Low	193.4998
	2CC	16QAM	Middle	194.4602
			High	193.8463
			Low	195.2616
		64QAM	Middle	193.8483
n261			High	194.7358
n201	3CC	QPSK	Low	292.3500
			Middle	291.8351
			High	291.3982
		16QAM	Low	293.3109
			Middle	292.5046
			High	292.1315
			Low	293.5785
		64QAM	Middle	291.9825
			High	291.3963
			Low	392.2019
	4CC	16QAM	Middle	390.4703
			High	390.0466

## Beam ID: 139 (Horizontal)

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

#### Beam ID: 11 (Vertical)

#### 1CC - 16QAM

#### Agilent Meas Setup Meas Setup Agilent Avg Number Avg Number Ch Freq 27.55 GHz Trig Free Ch Freq 27.778 GHz Trig Free 10 Off Off 0n 0n Occupied Bandwidth Occupied Bandwidth Span 200.0000000 MHz Span 435.6340500 MHz Avg Mode Repeat Avg Mode Ехр Ехр Repeat -10 dBm #Atten 0 dB -10 dBm #Atten 0 dB Max Hold Max Hold ŧPea #Peak <u>0n</u> Off <u>0n</u> Off Log 10 dB/ Occ BW % Pwr 99.00 % Occ BW % Pwr 99.00 % ÷ **OBW Span** 435.634050 MHz 0BW Span 200.000000 MHz Center 27.550 00 GHz #Res BW 2 MHz Span 435.6 MHz ≢Sweep 2.665 ms (2000 pts) Center 27.778 00 GHz Res BW 1.8 MHz Span 200 MHz Sweep 1.066 ms (2000 pts) #VBW 8 MHz VBW 8 MHz **x dB** -26.00 dB **x dB** -26.00 dB Occupied Bandwidth 94.7103 MHz Осс BW % Рwr х dB Осс BW % Рwr x dB 99.00 % Occupied Bandwidth 99.00 % -26.00 dB -26.00 dB 94.3702 MHz Optimize RefLevel Optimize RefLevel Transmit Freq Error x dB Bandwidth 33.768 kHz 432.720 MH; Transmit Freq Error x dB Bandwidth -2.770 MHz 139.857 MH; File Operation Status, C:PICTURE.GIF file saved File Operation Status, C:PICTURE.GIF file saved

#### Low Channel

Middle Channel

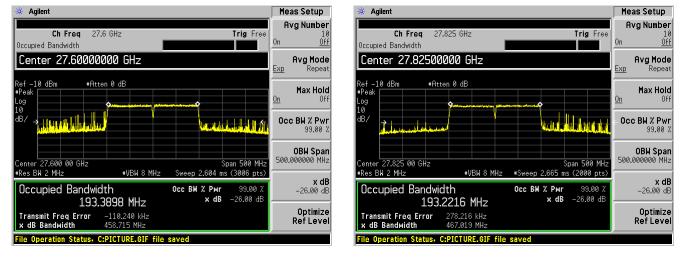
🔆 Agilent			Meas Setup
Ch Freq 28. Occupied Bandwidth	0005 GHz	Trig Free	Avg Number 10 On <u>Off</u>
Center 28.000529	996 GHz		Avg Mode Exp Repeat
#Peak	n 0 dB	• • • • • • • • • • • • • • • • • • •	Max Hold On Off
		hand the second	- Occ BW % Pwr 99.00 %
Center 28.000 53 GHz		Span 200 MHz	<b>OBW Span</b> 200.000000 MHz
Res BW 1.8 MHz Occupied Bandwid	VBW 8 MHz th 270 MHz	Sweep 1.066 ms (2000 pts) Occ BW % Pwr 99.00 % × dB -26.00 dB	<b>x dB</b> –26.00 dB
54.52 Transmit Freq Error x dB Bandwidth	–532.280 kHz		Optimize RefLevel
File Operation Status, C	PICTURE.GIF file	saved	

#### Beam ID: 11 (Vertical)

#### 2CC - QPSK

### Low Channel





🔆 Agilent	Meas Setup
Ch Freq 28.25 GHz Trig Fr Occupied Bandwidth	ee Avg Number 10 0n <u>Off</u>
Span 400.0000000 MHz	Avg Mode Exp Repeat
Ref -10 dBm         +Atten 0 dB           #Peak	<u>On</u> Max Hold
dB/ minutestimation from the second	Occ BW % Pwr 99.00 %
Center 28.250 0 GHz Span 400 M	
Image: Notest and the second	<b>x dB</b> ℤ –20.00 dB
Transmit Freq Error –246.918 kHz × dB Bandwidth 257.842 MHz	Optimize RefLevel
File Operation Status, C:PICTURE.GIF file saved	

Ref -10 dBm

ŧPea

Occupied Bandwidth

Center 27.600 00 GHz #Res BW 2 MHz

Transmit Freq Error x dB Bandwidth

Occupied Bandwidth

Ch Freq 27.6 GHz

#Atten 0 dB

193.4998 MHz

File Operation Status, C:PICTURE.GIF file saved

-169.615 kHz 434.842 MHz

Center 27.60000000 GHz

#### Beam ID: 11 (Vertical)

#### 2CC – 16QAM

Meas Setup

Avg Number

Avg Mode Repeat

Max Hold

Occ BW % Pwr 99.00 %

**OBW Span** 435.634050 MHz

> **x dB** -26.00 dB

Optimize RefLevel

Off

10 Off

Trig Free

99.00 %

-26.00 dB

0n

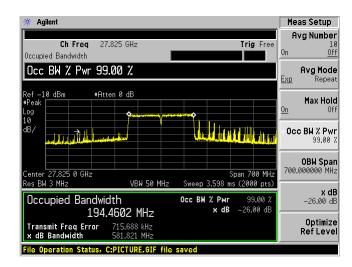
Ехр

<u>0n</u>

## Low Channel

Span 435.6 MHz #VBW 8 MHz #Sweep 2.665 ms (2000 pts)

> Осс BW % Рwr × dB



#### Middle Channel

* Agilent		Meas Setup
Ch Freq 28.05 GHz Occupied Bandwidth	Trig Free	Avg Number 10 On <u>Off</u>
Span 400.0000000 MHz		Avg Mode Exp Repeat
Ref –10 dBm •Atten 0 dB •Peak Log		Max Hold On Off
	Multimeted any al walk	← Occ B₩ % Pwr 99.00 %
Center 28.050 00 GHz Res BW 3 MHz VBW 50 MHz	Span 400 MHz Sweep 1.999 ms (2000 pts)	<b>OBW Spar</b> 400.000000 MHz
Occupied Bandwidth 193.8463 MHz	Occ BW % Pwr 99.00 % x dB -26.00 dB	<b>x dE</b> -26.00 dE
Transmit Freq Error -301.294 kHz x dB Bandwidth 394.035 MHz		Optimize RefLeve
File Operation Status, C:PICTURE.GIF file	saved	

🔆 Agilent

Occupied Bandwidth

dBn

Center 27.600 0 GHz #Res BW 3 MHz

Transmit Freq Error x dB Bandwidth

Occupied Bandwidth

Ch Freq

Span 500.000000 MHz

27.6 GHz

#Atten 0 dB

195.2616 MHz

-427.352 kHz

542 MHz

C:PICTURE.GIF file sav

#### Beam ID: 11 (Vertical)

#### 2CC – 64QAM

Meas Setup

Trig Free

16

Span 500 MHz Sweep 2.52 ms (601 pts)

Осс ВЖ % Рыг 99.00 % х dB -20.00 dB Avg Number

Avg Mode

Max Hold Off

Occ BW % Pwr 99.00 %

0BW Span 500.000000 MHz

> **x dB** –20.00 dB

Optimize RefLevel

Repeat

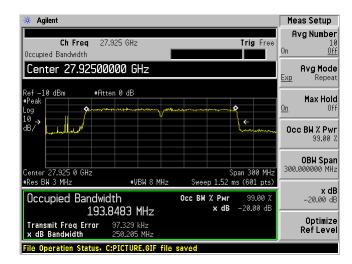
Ехр

<u>0n</u>

<u>0ff</u>

#### Low Channel

#VBW 8 MHz



#### Middle Channel

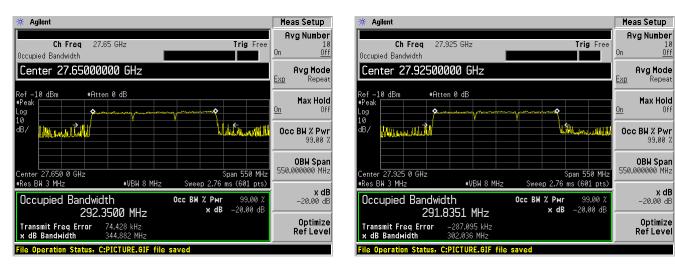
Ch Freq         28.25 GHz         Trig         Free         1           Occupied Bandwidth         0         0         0         0         0           VBW 8.0 MHz         ••••••••••••••••••••••••••••••••••••	🔆 Agilent				Meas Setup
Ref         -10 dBm         •Atten 0 dB           •*Peak         •         •           Log         •         •           10 dB/         •         •           dB/         •         •           Center 28,250 0 GHz         •         •           *Res BW 3 MHz         •         •           Occupied Bandwidth         •         •           Occupied Bandwidth         •         •           Transmit Freq Error         -831.095 kHz         ×		Hz		Trig Free	Avg Number 10 On <u>Off</u>
Peak         Max Hol           Log         0         0         0           dB/         0         0         0         0           Center 28.250 0 GHz         Span 300 MHz         300.000000 MH           *Res BW 3 MHz         •VBW 8 MHz         Sweep 1.52 ms (601 pts)         300.000000 MH           Occupied Bandwidth         Occ BW X Pwr         99.00 X         20.00 dB           194.7358 MHz         × dB         -20.00 dB         0           Transmit Freg Error         -831.095 kHz         × dB         -20.00 dB	,				Avg Mode Exp Repeat
dB/7         Center 28.250 0 GHz         Span 300 MHz         Occ BH % Pw         99.00           *Res EW 3 MHz         *VEW 8 MHz         Sweep 1.52 ms (601 pts)         300.000000 MH         300.000000 MH           *Res EW 3 MHz         *VEW 8 MHz         Sweep 1.52 ms (601 pts)         x d         -20.00 d           Occupied Bandwidth         Occ BH % Pwr         99.00 %         -20.00 dB         -20.00 dB           Transmit Freg Error         -831.095 kHz         x dB         -20.00 dB         Optimiz	*Peak Log			\$	Max Hold On Off
Center         28,250         0         GHz         Span         300         MHz         300,00000         MH           #Res         BW 3         MHz         \$weep         1.52         ms         601         pts)         x d           Occupied         Bandwidth         Occ         BW %         MHz         Sweep         1.52         ms         601         pts)           194.7358         MHz         × dB         -20.00         dB         -20					Occ BW % Pwr 99.00 %
Occupied Bandwidth         осс ВИ % Риг         99.00 %         20.00 %           194.7358         MHz         × dB         -20.00 dB         -20.00 dB           Transmit Freq Error         -831.095 kHz         Participant for the second					<b>OBW Spar</b> 300.000000 MHz
Transmit Freg Error -831.095 kHz Optimiz	Occupied Bandwidth		Occ BW % Pwr	99.00 %	<b>x dE</b> -20.00 dE
File Operation Status, C:PICTURE.GIF file saved	Transmit Freq Error -831 x dB Bandwidth 246.	095 kHz 399 MHz			Optimize RefLeve

Off

Off

#### Beam ID: 11 (Vertical)

#### **3CC - QPSK**



#### Low Channel

Middle Channel

Ch Freq         28.2 GHz         Trig Free         On           Occupied Bandwidth         Image: Comparison of the state of th	* Agilent		Meas Setup
Ref         -10         dBm         •Atten         0         Max H           Log	•	Trig Free	Avg Number 10 On <u>Off</u>
Peak         Max H           Log         Image: Construction of the second			Avg Mode Exp Repeat
dB/         Conc BH %         Occ BH % <th< td=""><td>#Peak</td><td>~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~</td><td>Max Hold On Off</td></th<>	#Peak	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Max Hold On Off
Center         28.200         0 GHz         Span         550         MHz         550.000000           #Res         BW 3 MHz         #VBW 8 MHz         Sweep 2.76 ms (601 pts)         500         50			Occ BW % Pwr 99.00 %
Occupied Bandwidth         Осс ВН % Риг         99.00 %         -20.00 %           291.3982 MHz         × dB         -20.00 dB         Optim           Transmit Freq Error         -744.208 kHz         Optim         Optim			<b>OBW Spar</b> 550.000000 MHz
Transmit Freq Error -744.208 kHz Optim	Occupied Bandwidth	Осс ВЖ % Рыг 99.00 %	<b>x dE</b> -20.00 dE
File Operation Status, C:PICTURE.GIF file saved	Transmit Freq Error -744.208 kHz x dB Bandwidth 307.908 MHz		Optimize RefLeve

Ref−10 dBm #Peak

\_og 10 18∠

Occupied Bandwidth

Center 27.650 0 GHz #Res BW 4 MHz

Occupied Bandwidth

Transmit Freq Error 37.066 kHz x dB Bandwidth 332.854 MHz

Ch Freq 27.65 GHz

#Atten 0 dB

293.3109 MHz

File Operation Status, C:PICTURE.GIF file saved

#VBW 8 MHz

Center 27.65000000 GHz

#### Beam ID: 11 (Vertical)

#### 3CC – 16QAM

Meas Setup

Trig Free

Span 550 MHz

99.00 2

-20.00 dB

Sweep 2.76 ms (601 pts)

x dB

Occ BW % Pwr

0n

Ехр

<u>0n</u>

Avg Number

Avg Mode

Max Hold

Occ BW % Pwr 99.00 %

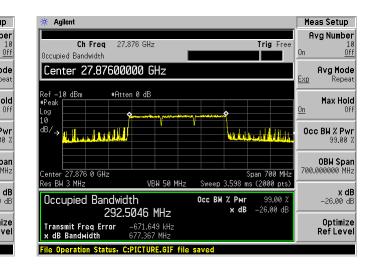
0BW Span 550.000000 MHz

> **x dB** -20.00 dB

Optimize RefLevel

Repeat

#### Low Channel



#### Middle Channel

🔆 Agilent		Meas Setup
	Tuin C	Avg Number
Ch Freq 28.0995 GHz Occupied Bandwidth	Trig Free	10 On <u>Off</u>
Center 28.09950000 GHz		Avg Mode Exp Repeat
Ref –10 dBm •Atten 0 dB •Peak		Max Hold On Off
		< <b>Occ BW % Pwr</b> 99.00 %
Center 28.099 50 GHz Res BW 3 MHz VBW 50 MHz	Span 500 MHz	<b>OBW Span</b> 500.000000 MHz
Occupied Bandwidth 292.1351 MHz	: Sweep 2.532 ms (2000 pts) Осс ВЖ % Рмг 99.00 % х dB -26.00 dB	<b>x dB</b> -26.00 dB
ZSZ.ISSI MHZ Transmit Freq Error 707.790 kHz x dB Bandwidth 453.169 MHz		Optimize Ref Level
File Operation Status, C:PICTURE.GIF fil	e saved	

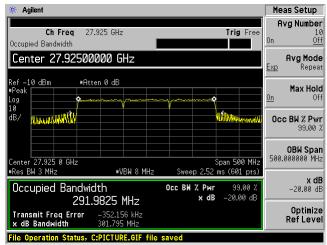
Low Channel

#### Beam ID: 11 (Vertical)

#### 3CC – 64QAM

#### Agilent Meas Setup Avg Number Ch Freq 27.65 GHz Trig Free <u>0ff</u> 0n Occupied Bandwidth Center 27.65000000 GHz Avg Mode Ехр Ref -10 dBm #Peak #Atten 0 dB Ref — 10 dBm Max Hold <u>0n</u> Off Log 10 dB/ Occ BW % Pwr 99.00 % WITTER WAY **OBW Span** 500.000000 MHz Span 500 MHz Sweep 2.52 ms (601 pts) Center 27.650 0 GHz #Res BW 3 MHz #VBW 8 MHz **x dB** -20.00 dB Occupied Bandwidth Occ BW % Pwr 99.00 2 **× dB** −20.00 dB 293.5785 MHz Optimize Ref Level Transmit Freq Error x dB Bandwidth 341.478 kHz 322.024 MHz ile Operation Status, C:PICTURE.GIF file saved

#### Middle Channel



🔆 Agilent		Meas Setup
Ch Freq 28.2 GHz Occupied Bandwidth	Trig Free	AvgNumber 10 On <u>Off</u>
Center 28.20000000 GHz		Avg Mode Exp Repeat
Ref -10 dBm #Atten 0 dB #Peak Log 10	~~~~~	Max Hold On Off
	When men well	Occ BW % Pwr 99.00 %
Center 28.200 0 GHz	Span 500 MHz	<b>OBW Spar</b> 500.000000 MHz
+Res BW 3 MHz +VBW 8 MHz Occupied Bandwidth 291.3963 MHz	Sweep 2.52 ms (601 pts) Occ BW % Pwr 99.00 % x dB -20.00 dB	<b>x dE</b> -20.00 dE
Z91.3903 FINZ Transmit Freq Error -906.806 kHz x dB Bandwidth 301.165 MHz		Optimize Ref Level

Off

Off

#### Beam ID: 11 (Vertical)

#### 4CC - 16QAM

#### Meas Setup Meas Setup Agilent Agilent Avg Number Avg Number Ch Freq 27.7 GHz Trig Free Ch Freq 27.925 GHz Trig Free 10 Off 0n 0n Occupied Bandwidth Occupied Bandwidth Center 27.92500000 GHz Avg Mode Repeat Avg Mode Repeat Ехр Ехр #Atten 0 dB #Atten 0 dB -10 dBm -10 dBm Max Hold Max Hold Pea <u>0n</u> Off <u>0n</u> 10 ¢ Occ BW % Pwr 99.00 % Occ BW % Pwr 99.00 % B 0BW Span 550.000000 MHz **OBW Span** 500.000000 MHz Center 27.700 0 GHz #Res BW 4 MHz Span 550 MHz Sweep 2.76 ms (601 pts) Center 27.925 0 GHz #Res BW 4 MHz Span 500 MHz Sweep 2.52 ms (601 pts) #VBW 8 MHz #VBW 8 MHz **x dB** –20.00 dB **x dB** –20.00 dB Осс BW % Рwr x dB Осс BW % Рwr x dB Occupied Bandwidth 99.00 % Occupied Bandwidth 99.00 % -20.00 dB -20.00 dB 392.2019 MHz 390.4703 MHz Optimize RefLevel Optimize RefLevel Transmit Freq Error x dB Bandwidth Transmit Freq Error x dB Bandwidth 330.697 kHz 402.468 MHz 602.606 kHz 549.211 MHz File Operation Status, C:PICTURE.GIF file saved File Operation Status, C:PICTURE.GIF file saved

#### Low Channel

#### Middle Channel

🔆 Agilent				Meas Setup
Ch Freq 28 Occupied Bandwidth	.15 GHz		Trig Free	Avg Number 10 On <u>Off</u>
Center 28.15000				Avg Mode Exp Repeat
Ref -10 dBm #Att #Peak Log 10	en 0 dB	· · · · · · · · · · · · · · · · · · ·	*	Max Hold On Off
dB/ →				Occ BW % Pwr 99.00 %
Center 28.150 0 GHz			pan 500 MHz	<b>OBW Span</b> 500.000000 MHz
Res BW 4 MHz Occupied Bandwig عمم	*VBW 8 MHz 1th 0466 MHz	Sweep 2.52 r Occ BW % Pwr x dB		<b>x dB</b> –20.00 dB
	–257.082 kHz			Optimize Ref Level
File Operation Status, (	PICTURE.GIF file s	aved		

27.55 GHz

#Atten 0 dB

95.4530 MHz

C:PICTU

-138.899 kHz

3.133 MHz

🔆 Agilent

Occupied Bandwidth

dBn

Center 27.550 0 GHz #Res BW 3 MHz

Transmit Freq Error x dB Bandwidth

Occupied Bandwidth

Ch Freq

Center 27.55000000 GHz

#### Beam ID: 139 (Horizontal)

#### 1CC – 16QAM

### Low Channel

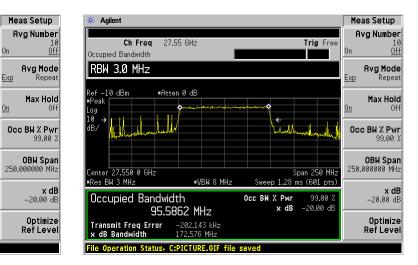
#VBW 8 MHz

RE.GIF file s

Trig Free

Span 250 MHz Sweep 1.28 ms (601 pts)

Осс ВЖ % Рыг 99.00 % х dB -20.00 dB



#### Middle Channel

🔆 Agilent				Meas Se	tup
		-		Avg Nu	
Ch Freq 28.3 GH Occupied Bandwidth	z		rig Free	0n	10 <u>Off</u>
Center 28.30000000				Avg I	tode
Center 20.30000000	UNZ				epeat
Ref—10 dBm #Atten 0	dB				
#Peak Log	weigen and the state of the sta			0n Max	Hold
$10 \rightarrow 1$		←			
dB/		Whomsdowed	nterentification	Occ BW 2	
			and the state of t	99	9.00 %
				OBW	Span
Center 28.300 0 GHz		Spar	250 MHz	250.00000	
#Res BW 3 MHz	₩VBW 8 MHz	Sweep 1.28 ms	(601 pts)		
Occupied Bandwidth		Occ BW % Pwr	99.00 %	-20.	<b>x dB</b> 00 dB
95.4557	MHz	×dB –	20.00 dB		
Transmit Freq Error -200	6.493 kHz			Opt Ref L	imize
× dB Bandwidth 146.	097 MHz			RefL	evei
File Operation Status, C:PIC	URE.GIF file s	aved			

Ref -10 dBm

ήR

Occupied Bandwidth

Center 27.600 0 GHz #Res BW 3 MHz

Occupied Bandwidth

Transmit Freq Error x dB Bandwidth

Ch Freq 27.6 GHz

#Atten 0 dB

194.5497 MHz

File Operation Status, C:PICTURE.GIF file saved

–171.070 kHz 294.645 MHz

Center 27.60000000 GHz

#### Beam ID: 139 (Horizontal)

#### 2CC – QPSK

### Low Channel

#VBW 8 MHz

Trig Free

Span 400 MHz

99.00 2

-20.00 dB

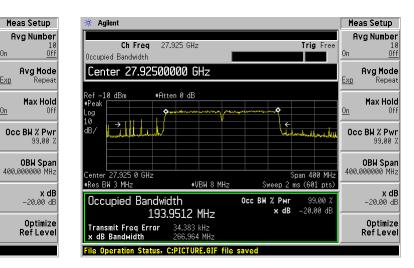
ep 2 ms (601 pts)

Осс BW % Рwr x dB

0n

Ехр

<u>0n</u>



#### Middle Channel

* Agilent		Meas Setup
Ch Freq 28.25 GHz Occupied Bandwidth	Trig Free	Avg Number 10 On <u>Off</u>
Center 28.25000000 GHz		Avg Mode Exp Repeat
Ref –10 dBm *Atten 0 dB *Peak Log	~~~	Max Hold On Off
	<	Occ BW % Pwr 99.00 7
Center 28.250 0 GHz	Span 400 MHz	<b>OBW Spar</b> 400.000000 MHz
*Res BW 3 MHz *VBW 8 MHz Occupied Bandwidth 194.0296 MHz	Sweep 2 ms (601 pts) Occ BW % Pwr 99.00 % × dB -20.00 dB	<b>x dE</b> -20.00 dE
Transmit Freq Error         -271.700 kHz           x dB Bandwidth         268.946 MHz		Optimize Ref Level
File Operation Status, C:PICTURE.GIF file	saved	

Occupied Bandwidth

-10 dBm

Center 27.600 0 GHz #Res BW 3 MHz

Transmit Freq Error x dB Bandwidth

Occupied Bandwidth

Ch Freq

Center 27.60000000 GHz

27.6 GHz

#Atten 0 dB

193.3512 MHz

ile Operation Status, C:PICTURE.GIF file saved

#### Beam ID: 139 (Horizontal)

#### 2CC - 16QAM

#### Low Channel

#VBW 8 MHz

.335 MHz

Trig Free

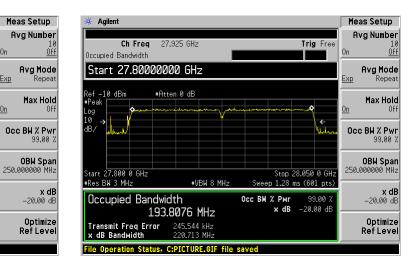
Span 250 MHz Sweep 1.28 ms (601 pts)

Осс ВЖ X Рыг 99.00 X х dB -20.00 dB

0n

Ехр

<u>0n</u>



#### Middle Channel

🔆 Agilent			Meas Setup
Ch Freq 28.2 Occupied Bandwidth	5 GHz	Trig F	ree Avg Number 10 On <u>Off</u>
Span 500.000000			Avg Mode Exp Repeat
Ref -10 dBm #Atter #Peak Log 10			0n Max Hold
		vilethudthudtalkerval	Occ BW % Pwr 99.00 %
Center 28.250 0 GHz		Span 500	
Res BW 3 MHz     Occupied Bandwidt     1929	*VBW 8 MHz h 998 MHz	Sweep 2.52 ms (601 р Осс ВЖ % Рмг 99.00 х dB -20.00	• <b>x dB</b> • <b>X</b> −20.00 dB
Transmit Freq Error × dB Bandwidth	-539.648 kHz		Optimize RefLevel
File Operation Status, C:	PICTURE.GIF file s	saved	

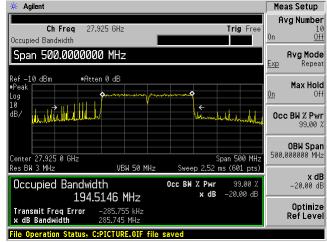
Low Channel

#### Beam ID: 139 (Horizontal)

#### 2CC - 64QAM

#### Agilent Meas Setup Avg Number Ch Freq 27.6 GHz Trig Free <u>0ff</u> 0n Occupied Bandwidth RBW 3.0 MHz Avg Mode Ехр #Atten 0 dB -10 dBm lei -10 dBm Max Hold ŧPea <u>0n</u> Off Occ BW % Pwr 99.00 % **OBW Span** 600.000000 MHz Start 27.300 GHz #Res BW 3 MHz Stop 27.900 GH #VBW 8 MHz p 3 ms (601 pts) **x dB** -20.00 dB Осс BW % Рwr x dB Occupied Bandwidth 99.00 2 -20.00 dB 194.8569 MHz Optimize Ref Level Transmit Freq Error x dB Bandwidth –119.560 kHz 398.127 MHz le Operation Status, C:PICTURE.GIF file saved

#### Middle Channel



🔆 Agilent	Meas Setup
Ch Freg 28.25 GHz	Avg Number
Occupied Bandwidth	Trig Free 10 On <u>Off</u>
Center 28.25000000 GHz	Avg Mode Exp Repeat
Ref – 10 dBm #Atten 0 dB #Peak Log	<u>on</u> Max Hold
	Occ BW % Pwr 99.00 %
	OBW Spar Span 500 MHz
Occupied Bandwidth Occ BW % Pwr	ms (601 pts) 99.00 % -20.00 dB
193.1813         MHz         * dB           Transmit Freq Error         -554.917         kHz           × dB Bandwidth         275.716         MHz	Optimize RefLevel
File Operation Status, C:PICTURE.GIF file saved	

Occupied Bandwidth

10 dBm

Center 27.650 0 GHz #Res BW 4 MHz

Occupied Bandwidth

Transmit Freq Error x dB Bandwidth

Ch Freq 27.65 GHz

#Atten 0 dB

292.7444 MHz

le Operation Status, C:PICTURE.GIF file saved

-94.593 kHz 345.969 MHz

Center 27.65000000 GHz

#### Beam ID: 139 (Horizontal)

#### 3CC – QPSK

#### Low Channel

∗VBW 8 MHz

Trig Free

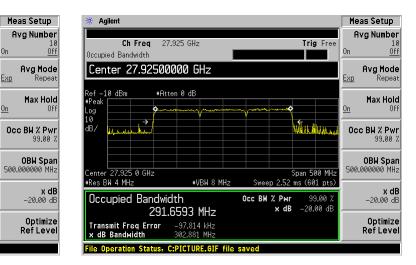
Span 500 MHz Sweep 2.52 ms (601 pts)

Осс ВЖ X Рыг 99.00 X х dB -20.00 dB

0n

Ехр

<u>0n</u>



#### Middle Channel

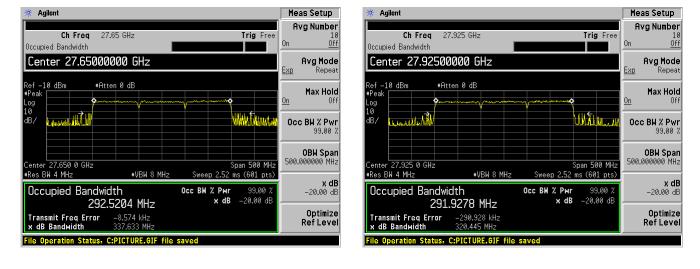
🔆 Agilent		Meas Setup
Ch Freq 28.2 GHz Occupied Bandwidth	Trig Free	Avg Number 10 On <u>Off</u>
Center 28.20000000 GHz		Avg Mode Exp Repeat
Ref –10 dBm •Atten 0 dB •Peak 	~	Max Hold On Off
		Occ BW % Pwr 99.00 %
Center 28.200 0 GHz	Span 500 MHz	<b>OBW Span</b> 500.000000 MHz
•Res BW 4 MHz ••VBW 8 MHz Occupied Bandwidth 291.0580 MHz	Sweep 2.52 ms (601 pts) Occ BW % Pwr 99.00 % × dB -20.00 dB	<b>x dB</b> –20.00 dB
ZSLUDOCULIZ Transmit Freq Error –558.184 kHz × dB Bandwidth 302.055 MHz		Optimize Ref Level

#### Beam ID: 139 (Horizontal)

#### CC – 16QAM

#### Low Channel

Middle Channel



🔆 Agilent				Meas Setup
Ch Freq 28 Occupied Bandwidth	.2 GHz		Trig Free	Avg Number 10 On <u>Off</u>
Center 28.20000				Avg Mode Exp Repeat
Ref —10 dBm #Att #Peak Log 10	en 0 dB	· · · · · · · · · · · · · · · · · · ·		Max Hold On Off
				Occ BW % Pwr 99.00 %
Center 28.200 0 GHz			an 500 MHz	<b>OBW Span</b> 500.000000 MHz
*Res BW 4 MHz Occupied Bandwid 291	*VBW 8 MHz ith 5456 MHz	Sweep 2.52 ms Occ BW % Pwr x dB		<b>x dB</b> –20.00 dB
Transmit Freq Error x dB Bandwidth	-604.200 kHz 301.884 MHz			Optimize Ref Level
File Operation Status, C	:PICTURE.GIF file :	saved		

Occupied Bandwidth

dBr

Center 27.650 0 GHz #Res BW 4 MHz

Transmit Freq Error x dB Bandwidth

Occupied Bandwidth

Ch Freq 27.65 GHz

#Atten 0 dB

292.2039 MHz

C:PICTU

-289.392 kHz

Center 27.65000000 GHz

#### Beam ID: 139 (Horizontal)

#### 3CC - 64QAM

#### Low Channel

#VBW 8 MHz

RE.GIF file sa

Trig Free

Span 500 MH:

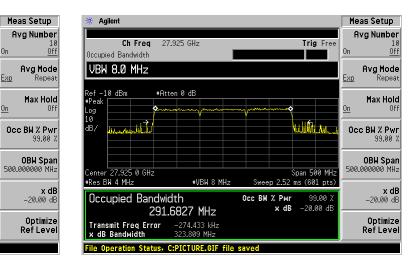
Sweep 2.52 ms (601 pts)

Осс ВЖ % Рыг 99.00 % х dB -20.00 dB

0n

Ехр

<u>0n</u>



#### Middle Channel

🔆 Agilent				Meas Setup
Ch Freq 28 Occupied Bandwidth	.2 GHz		Trig Free	Avg Number 10 On <u>Off</u>
Center 28.20000				Avg Mode Exp Repeat
#Peak Log	en 0 dB	~~~~		Max Hold On Off
			di Mananani An	0cc BW % Pwr 99.00 %
Center 28.200 0 GHz			pan 500 MHz	<b>OBW Span</b> 500.000000 MHz
*Res BW 4 MHz Occupied Bandwid 291	VBW 50 MHz ith 7019 MHz	Sweep 2.52 r Occ BW % Pwr x dB		<b>x dB</b> –20.00 dB
231. Transmit Freq Error x dB Bandwidth	-617.111 kHz			Optimize Ref Level
File Operation Status, C	:PICTURE.GIF file :	saved		

Occupied Bandwidth

-10 dBm

Center 27.700 GHz #Res BW 5 MHz

Occupied Bandwidth

Transmit Freq Error x dB Bandwidth

Ch Freq

Center 27.70000000 GHz

27.7 GHz

#Atten 0 dB

391.9357 MHz

ile Operation Status, C:PICTURE.GIF file saved

150.386 kHz 591 MHz

#### Beam ID: 139 (Horizontal)

#### 4CC - 16QAM

#### Low Channel

#VBW 8 MHz

Trig Free

R. A. A. A. A.

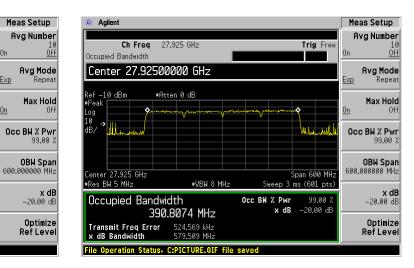
Span 600 MHz ep 3 ms (601 pts)

Осс ВЖ X Рыг 99.00 % х dB -20.00 dB

0n

Ехр

<u>0n</u>



#### Middle Channel

🔆 Agilent			Meas Setup
Ch Freq 28 Occupied Bandwidth	3.15 GHz	Trig Free	Avg Number 10 On <u>Off</u>
RBW 5.0 MHz			Avg Mode Exp Repeat
#Peak Log معمد م	ten 0 dB	un-any and the and the angle of	Max Hold On Off
			Occ BW % Pwr 99.00 7
Start 27.850 GHz		Stop 28.450 GHz	<b>OBW Spar</b> 600.000000 MH;
Res BW 5 MHz Occupied Bandwi	*VBW 8 MHz dth .7109 MHz	Sweep 3 ms (601 pts) Осс ВМ % Рмг 99.00 % х dB -20.00 dB	<b>x dE</b> -20.00 dE
	–155.820 kHz		Optimize RefLeve
File Operation Status,	C:PICTURE.GIF file	saved	

# 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 +75dBm/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 $\mu$ 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,  $\lambda$  is the wavelength. Wavelength = v/f, where v is the speed of light (3 x 10<sup>9</sup> 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

Note<sup>1</sup>: 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
<b>Relative Humidity:</b>	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)	H + V (MIMO) (dBm/100MHz)	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)	H + V (MIMO) (dBm/100MHz)	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
	Low	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		27975	37.70	37.18	40.46	75	-34.54
	High	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
	M: 141.	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

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

# 2CC Total EIRP across 200 MHz Bandwidth

Modulation	Channel	CC Frequency (MHz)	EIRP Horizontal (dBm/100MHz)	EIRP Vertical (dBm/100MHz)	H + V (MIMO) (dBm/100MHz)	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
		27825.06	35.06	34.86	37.97	75	-37.03
16QAM	Middle	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

2	C	n
3	U	U

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
64QAM	27650	39.19	39.31	42.26
	27925	39.36	39.49	42.44
	28200	39.30	39.27	42.30

# 3CC Total EIRP across 300 MHz Bandwidth

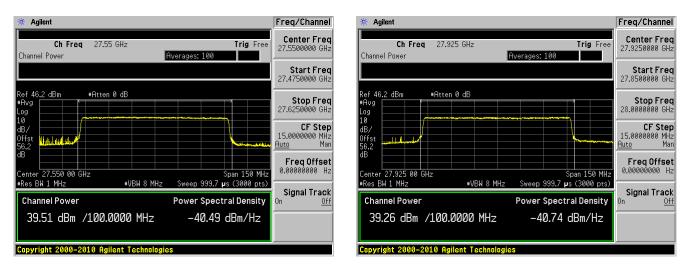
# 4CC

Modulation	Channel	CC Frequency (MHz)	EIRP Horizontal (dBm/100MHz)	EIRP Vertical (dBm/100MHz)	H + V (MIMO) (dBm/100MHz)	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
TOQAM	Midule	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
	High	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	

# 1CC – QPSK

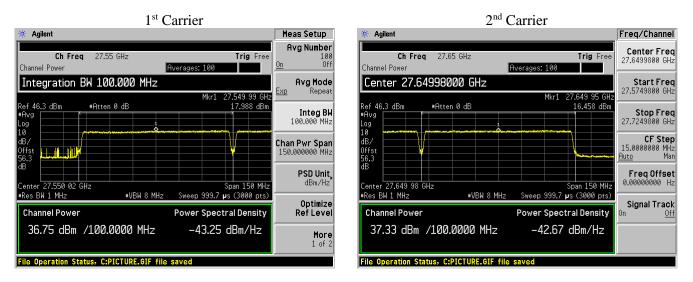


# Low Channel

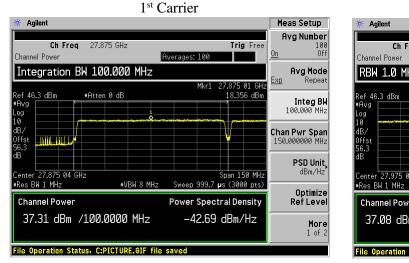
Middle Channel

* Agilent	Freq/Channel
Ch Freq 28.3 GHz Trig Fre Channel Power Averages: 100	Center Freq 28.3000000 GHz
	Start Freq 28.2250000 GHz
Ref 46.5 dBm •Atten 0 dB •Atte	Stop Freq 28.3750000 GHz
dB/ Offst 56.5	CF Step 15.0000000 MHz <u>Auto</u> Man
dB Center 28.300 00 GHz Span 150 Mk	
PRes BW 1 MHz     *VBW 8 MHz     Sweep 999.7 µs (3000 pts     Channel Power     Power Spectral Density	Signal Track
39.39 dBm /100.0000 MHz -40.61 dBm/Hz	
L Copyright 2000–2010 Agilent Technologies	

#### Beam ID: 11 (Vertical) 2CC – QPSK – Low Channel

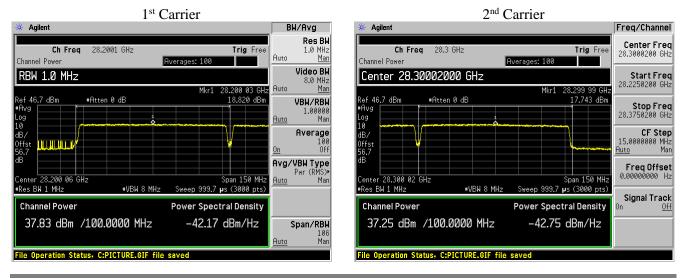


# 2CC – QPSK – Middle Channel



#### 2<sup>nd</sup> Carrier BW/Avg Res BW Ch Frea 27.975 GHz Trig Free 1.0 MHz Man Auto Averages: 100 Video BW RBW 1.0 MHz 8.0 MHz Mkr1 27.974 97 GHz 17.190 dBm Auto Mar #Atten 0 dB VBW/RBW 1.00000 Man Auto Average Off Avg/VBW Type Pwr (RMS)• Span 150 MHz Center 27.975 00 GHz <u>Auto</u> Mar #VBW 8 MHz Sweep 999.7 µs (3000 pts) **Channel Power Power Spectral Density** 37.08 dBm /100.0000 MHz -42.92 dBm/Hz Span/RBW Man Auto File Operation Status, C:PICTURE.GIF file saved

# 2CC – QPSK – High Channel

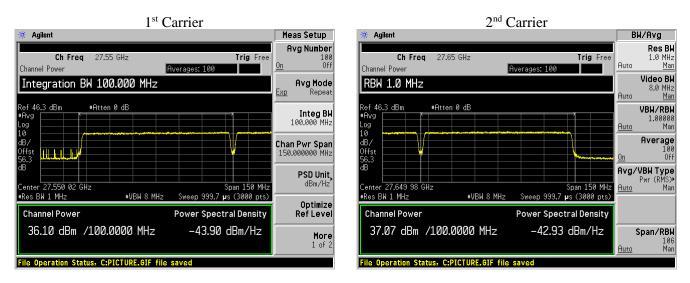


Report Number: R2106163

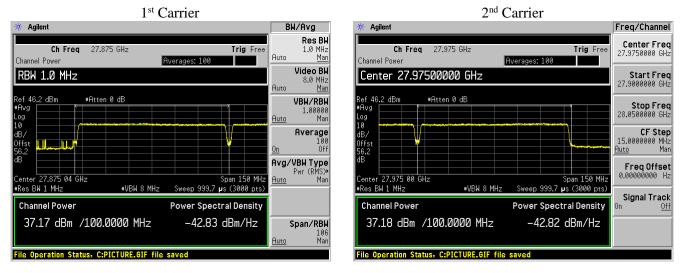
Page 43 of 104

FCC Part 30 Test Report

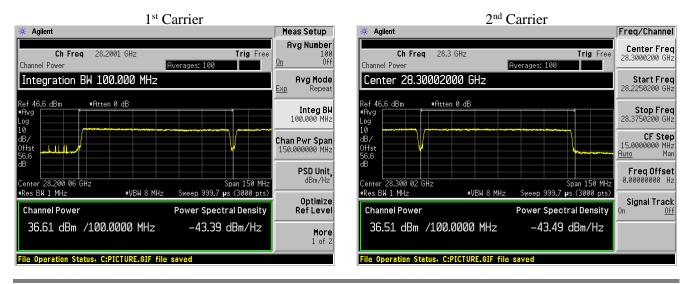
#### Beam ID: 11 (Vertical) 2CC – 16QAM – Low Channel



# 2CC - 16QAM - Middle Channel

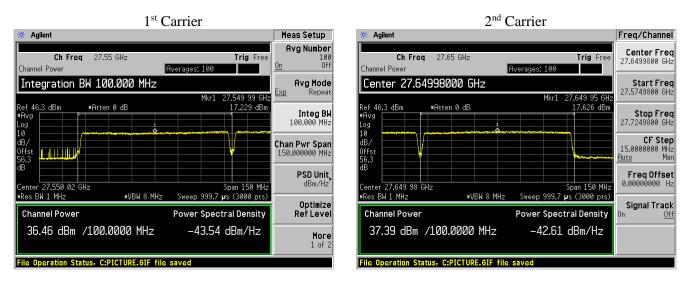


# 2CC - 16QAM - High Channel

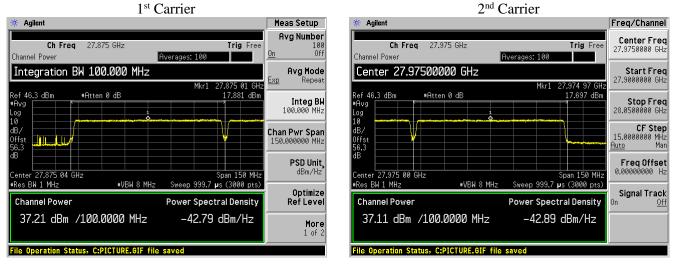


Report Number: R2106163

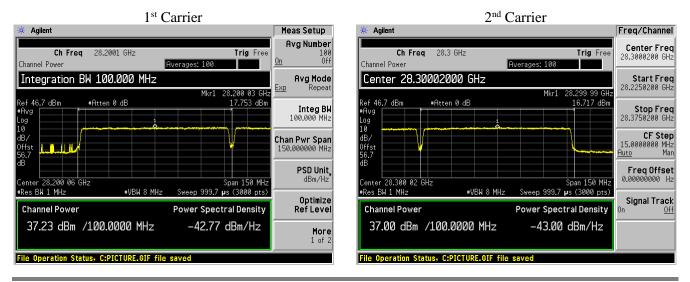
#### Beam ID: 11 (Vertical) 2CC – 64QAM – Low Channel



2CC - 64QAM - Middle Channel



# 2CC - 64QAM - High Channel



Report Number: R2106163

Page 45 of 104

FCC Part 30 Test Report

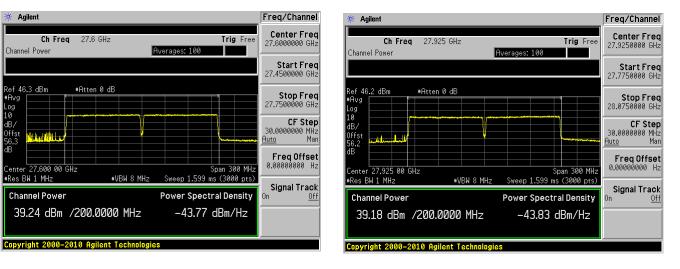
Agilent

offst

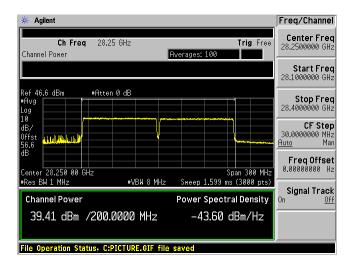
### Beam ID: 11 (Vertical) (Channel Power)

# **2CC QPSK**

# Low Channel

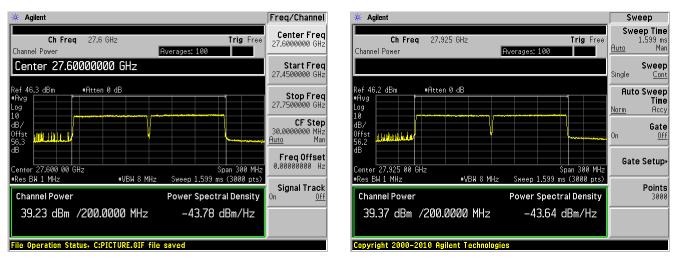


# Middle Channel



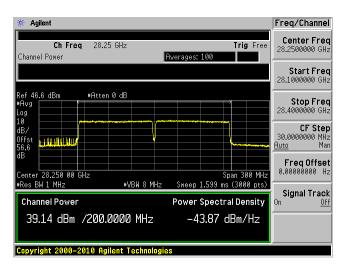
### Beam ID: 11 (Vertical) (Channel Power)

# 2CC – 16QAM



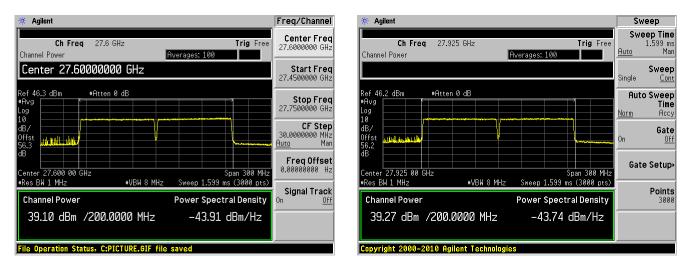
### Low Channel

Middle Channel



# Beam ID: 11 (Vertical) (Channel Power)

# 2CC - 64QAM

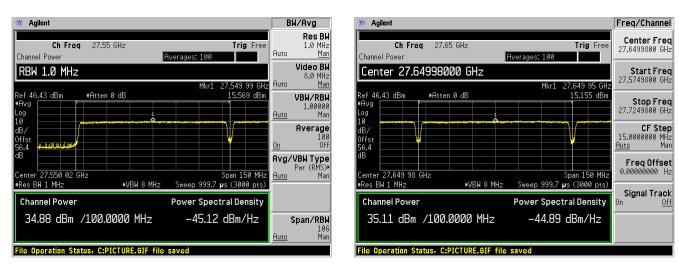


# Low Channel

Middle Channel

* Agilent				Freq/Channel
Ch Freq 28.2 Channel Power	25 GHz	Averages: 100	Trig Free	Center Freq 28.2500000 GHz
		10143001 200		<b>Start Freq</b> 28.1000000 GHz
#Avg K	n 0 dB			<b>Stop Freq</b> 28.4000000 GHz
10 provident				<b>CF Step</b> 30.0000000 MHz <u>Auto</u> Man
dB Center 28.250 00 GHz			Span 300 MHz	Freq Offset 0.00000000 Hz
*Res BW 1 MHz Channel Power	₩VBW 8 MHz	Sweep 1.599 Power Spect	ms (3000 pts) Tral Density	Signal Track
39.16 dBm /200	.0000 MHz		dBm/Hz	
Copyright 2000-2010 As	jilent Technologia	)S		J

# **3CC – QPSK – Low Channel**



#### 1st Carrier

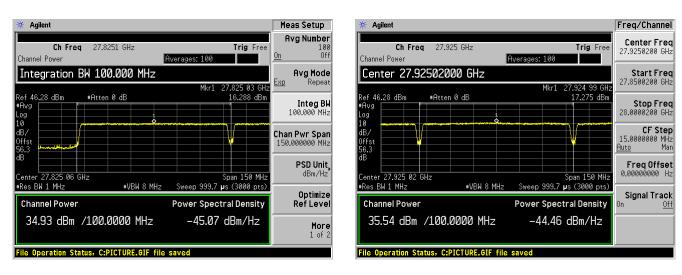
2<sup>nd</sup> Carrier

🔆 Agilent	BW/Avg
Ch Freq 27.7499 GHz Channel Power	Trig Free 1.0 MH Averages: 100
RBW 1.0 MHz	Video B 8.0 MH Mkr1 27.749 91 GHz <sup>Auto</sup> Ma
Ref 46.43 dBm	15.490 dBm 1.0000 <u>Auto</u> Ma
10 dB/ 0ffst 56.4	Averag
dB Center 27.749 94 GHz	Pwr (RMS) Span 150 MHz Auto Ma
#Res BW 1 MHz #VBW 8 M	Sweep 999.7 µs (3000 pts)
Channel Power	Power Spectral Density
35.37 dBm /100.0000 MHz	-44.63 dBm/Hz Span/RB
File Operation Status, C:PICTURE.GIF	Auto Ma

2<sup>nd</sup> Carrier

# Beam ID: 11 (Vertical)

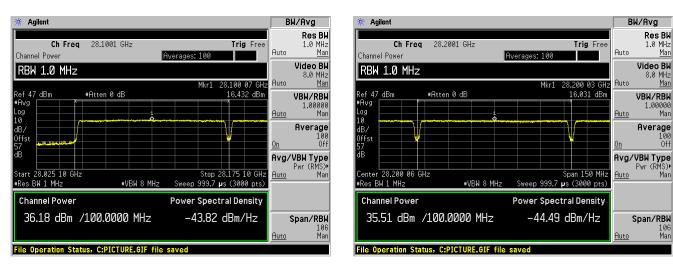
# **3CC – QPSK – Middle Channel**



#### 1st Carrier

Ch Freq         28.025         GHz         Trig         Free           Channel Power         Averages: 100         Average: 100         Average: 100         Average: 100         Averages: 100         Averages: 100         Av	28.0249900 GH2 Start Freq 27.9499800 GHz
Mkr1 28.024 95 GHz Ref 46.28 dBm     ●Atten 0 dB	27.9499800 GHz
Log t	<b>Stop Freq</b> 28.0999800 GHz
10	<b>CF Step</b> 15.0000000 MHz <u>Auto</u> Mar
dB	Freq Offset 0.00000000 Hz
"Res BW 1 MHz **VBW 8 MHz Sweep 999.7 µs (3000 pts)     Channel Power Power Spectral Density	Signal Track
35.75 dBm /100.0000 MHz -44.25 dBm/Hz	

# **3CC – QPSK – High Channel**



#### 1st Carrier

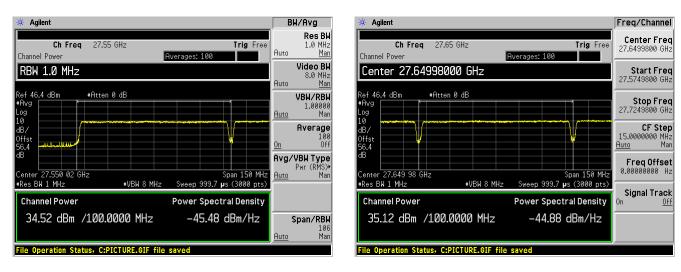
2<sup>nd</sup> Carrier

# 3<sup>rd</sup> Carrier

🔆 Agilent				Freq/Channel
Ch Freq 28.3 Channel Power		Averages: 100	Trig Free	Center Freq 28.3000200 GHz
Center 28.3000200			28.299 99 GHz	Start Freq 28.2250200 GHz
Ref 47 dBm #Atten #Avg K Log	0 dB		16.301 dBm	<b>Stop Freq</b> 28.3750200 GHz
10 dB/ 0ffst 57				<b>CF Step</b> 15.0000000 MHz <u>Auto</u> Man
dB Center 28.300 02 GHz			Span 150 MHz	Freq Offset 0.00000000 Hz
#Res BW 1 MHz Channel Power	#VBW 8 MHz	Sweep 999.7 Power Spect	µs (3000 pts) tral Density	<b>Signal Track</b> On <u>Off</u>
35.48 dBm /100.0	)000 MHz	-44.52	dBm/Hz	
File Operation Status, C:P	ICTURE.GIF file	saved		,

Report Number: R2106163

# **3CC - 16QAM - Low Channel**



#### 1st Carrier

2<sup>nd</sup> Carrier

* Agilent	Freq/Channel
Ch Freq 27.7499 GHz Trig Free Channel Power Averages: 100	Center Freq 27.7499400 GHz
Center 27.74994000 GHz	<b>Start Freq</b> 27.6749400 GHz
Ref 46.4 dBm •Atten 0 dB **********************************	<b>Stop Freq</b> 27.8249400 GHz
10 dB/ Offst 56.4	<b>CF Step</b> 15.0000000 MHz <u>Auto</u> Man
dB Center 27.749 94 GHz Span 150 MHz	Freq Offset 0.00000000 Hz
•Res BH 1 MHz •VBH 8 MHz Sweep 999.7 µs (3000 pts)           Channel Power         Power Spectral Density	Signal Track On <u>Off</u>
35.49 dBm /100.0000 MHz -44.51 dBm/Hz	
File Operation Status, C:PICTURE.GIF file saved	

#Atten 0 dB

34.86 dBm /100.0000 MHz

File Operation Status, C:PICTURE.GIF file saved

Agilent

Channel Powe

Ref 46.2 dBm #Avg

Center 27.825 06 GHz #Res BW 1 MHz

**Channel Power** 

)g

)ffst

## Beam ID: 11 (Vertical)

# 3CC - 16QAM - Middle Channel

Auto

Auto

Auto

<u>0n</u>

Auto

Span 150 MHz Sweep 999.7 µs (3000 pts)

Power Spectral Density

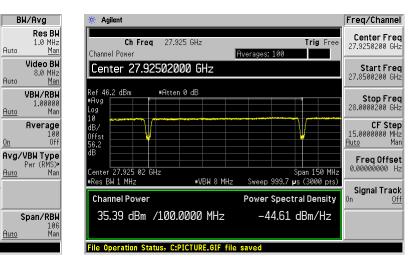
-45.14 dBm/Hz

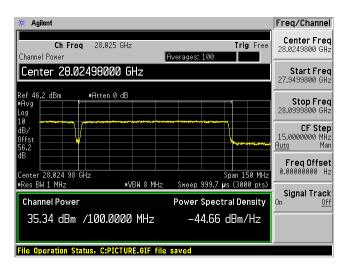
# Ch Freq 27.8251 GHz Trig Free Averages: 100 RBW 1.0 MHz

#VBW 8 MHz

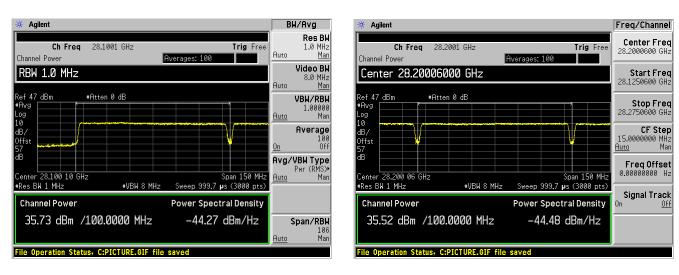
1<sup>st</sup> Carrier







# **3CC – 16QAM – High Channel**



#### 1st Carrier

2<sup>nd</sup> Carrier

* Agilent	Freq/Channel
Ch Freq 28.3 GHz Trig Free Channel Power Averages: 100	Center Freq 28.3000200 GHz
Center 28.30002000 GHz	<b>Start Freq</b> 28.2250200 GHz
Ref 47 dBm #Atten 0 dB #Avg	<b>Stop Freq</b> 28.3750200 GHz
10 dB/ 0ffst	CF Step 15.0000000 MHz <u>Auto</u> Man
dB Center 28.300 02 GHz Span 150 MHz	
•Res BW 1 MHz •VBW 8 MHz Sweep 999.7 µs (3000 pts) Channel Power Power Spectral Density	Signal Track <sup>On <u>Off</u></sup>
34.62 dBm /100.0000 MHz -45.38 dBm/Hz	
File Operation Status, C:PICTURE.GIF file saved	

Agilent

Channel Powe

Ref 46.4 dBm #Ava

Center 27.550 02 GHz #Res BW 1 MHz

**Channel Power** 

)ffsi

Ch Freq 27.55 GHz

Integration BW 100.000 MHz

34.52 dBm /100.0000 MHz

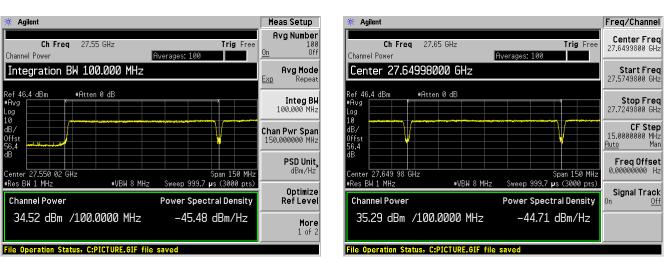
#Atten 0 dB

∗VBW 8 MHz

# Beam ID: 11 (Vertical)

# **3CC - 64QAM - Low Channel**

## 1st Carrier



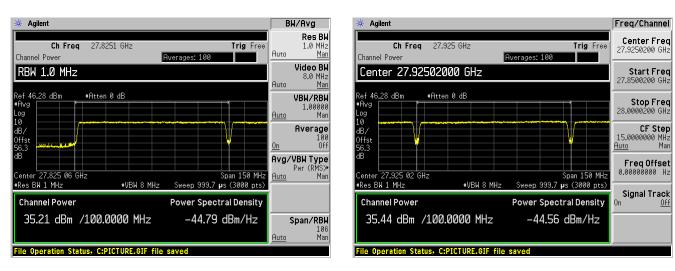
# 2<sup>nd</sup> Carrier

3rd Carrier

Ch Freq         27.7439 GH2         Trig Free         27.7439400 GH           Channel Power         Ref 46.4 dBm         •Attern 0 dB	* Agilent	Freq/Channel
Center 27.74994000 GHz         Start Fre           Ref 46.4 dBm         *Atten 0 dB         *By           Log         Image: Conter 27.749 94 GHz         Stop Fre           Offst         Image: Conter 27.749 94 GHz         Span 150 MHz           *Res BW 1 MHz         *VBW 8 MHz         Sweep 999.7 µs (3000 pts)           Channel Power         Power Spectral Density         Image: Conter 27.7 dBm /100.0000 MHz		ee Center Fred 27.7499400 GHz
• flvg		Start Fred 27.6749400 GHz
dB/ Offst offst offst dB/ dB/ Center 27.749 94 GHz ■Res EW 1 MHz Channel Power 35.57 dBm /100.0000 MHz Channel All 100.0000 MHz Channel Power Channel Power	+Avg	Stop Fred 27.8249400 GHz
Center 27.749         94 GHz         Freq Offset           •Res BH 1 MHz         •VBW 8 MHz         Sweep 999.7 µs (3000 pts)           Channel Power         Power Spectral Density         Signal Trac           35.57 dBm         /100.00000 MHz         -44.43 dBm/Hz	dB/ Offst 56.4	CF Step 15.0000000 MH; <u>Auto</u> Mai
Channel Power Power Spectral Density 35.57 dBm /100.0000 MHz -44.43 dBm/Hz	Center 27.749 94 GHz Span 150 №	IHZ
		Signal Tracl
	35.57 dBm /100.0000 MHz -44.43 dBm/Hz	2
File Operation Status, CPUCTURE GIE file saved	File Operation Status, C:PICTURE.GIF file saved	

#### Report Number: R2106163

# 3CC – 64QAM – Middle Channel

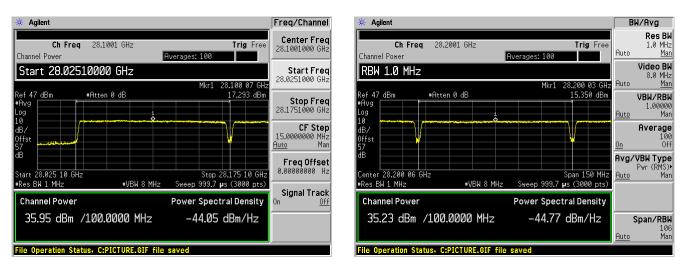


#### 1st Carrier

2<sup>nd</sup> Carrier

🔆 Agilent			B	W/Avg
<b>Ch Freq</b> 28.025 GHz Channel Power	Averages	Trig Free 100	Auto	Res Bl 1.0 MHz <u>Mar</u>
RBW 1.0 MHz		Mkr1 28.024 95 GH	z Auto	Video Bl 8.0 MH: <u>Mar</u>
Ref 46.28 dBm #Atten 0 dB #Avg		16.134 dBm	<u>Auto</u>	VBW/RBP 1.00000 Mai
10 dB/ 0ffst 56.3			<u>0n</u>	Average 10 Of
dB		Span 150 MH:	Auto	<b>/VBW Type</b> Pwr (RMS) Ma
*Res BW 1 MHz *VE Channel Power		999.7 µs (3000 pts) Spectral Density		
34.91 dBm /100.0000	MHz –4	15.09 dBm/Hz	Auto	Span/RBI 10 Ma
File Operation Status, C:PICTURE	.GIF file saved			

# **3CC – 64QAM – High Channel**



#### 1st Carrier

2<sup>nd</sup> Carrier

* Agilent		Freq/Channel
Ch Freq 28.3 GHz Channel Power	Trig Free Averages: 100	Center Freq 28.3000200 GHz
Start 28.22502000 GHz	Mkr1 28.299 99 GHz	Start Freq 28.2250200 GHz
Ref 47 dBm #Atten 0 dB #Avg Log	16.880 dBm	<b>Stop Freq</b> 28.3750200 GHz
10 dB/ 0ffst 57		<b>CF Step</b> 15.0000000 MHz <u>Auto</u> Man
dB Start 28.225 02 GHz	Stop 28.375 02 GHz	FreqOffset 0.00000000 Hz
*Res BW 1 MHz *VBW 8 Channel Power	: MHz Sweep 999.7 µs (3000 pts) Power Spectral Density	<b>Signal Track</b> On <u>Off</u>
35.51 dBm ∕100.0000 M⊦	lz -44.49 dBm/Hz	
File Operation Status, C:PICTURE.GI	F file saved	

Low Channel

Sweep

Cont

Accy

Gate

Points 3000

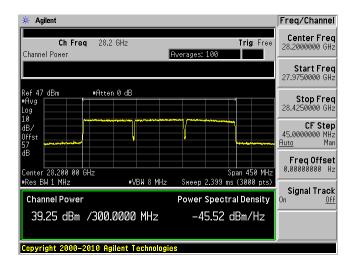
<u>Off</u>

### Beam ID: 11 (Vertical) (Channel Power)

# **3CC QPSK**

#### Freq/Channel Agilent Sweep Sweep Time 2.399 ms to Man Center Freq 27.6500000 GHz Ch Freq 27.65 GHz Trig Free Ch Freq 27.925 GHz Trig Free Channel Power Averages: 100 Channel Power Averages: 100 Auto Start Freq 27.4250000 GHz Sweep Time 2.399 ms Single #Atten 0 dB Ref 46.4 dBm Ref 46.2 dBm #Atten 0 dB Auto Sweep Time Stop Freq 27.8750000 GHz #Aw #Avg Log 10 og <u>Norm</u> 0 **CF Step** 45.0000000 MHz <del>Auto</del> Man B iΒ, Offst 56.2 dB offsi 0n FreqOffset 0.00000000 Hz Gate Setup► Span 450 MHz Sweep 2.399 ms (3000 pts) Center 27.650 00 GHz #Res BW 1 MHz Span 450 MHz Sweep 2.399 ms (3000 pts) Center 27.925 00 GHz #Res BW 1 MHz ∗VBW 8 MHz ₩VBW 8 MHz Signal Track Power Spectral Density **Channel Power** 0n **Channel Power Power Spectral Density** Off 39.33 dBm /300.0000 MHz -45.44 dBm/Hz 39.21 dBm /300.0000 MHz -45.56 dBm/Hz File Operation Status, C:PICTURE.GIF file saved File Operation Status, C:PICTURE.GIF file saved

# Middle Channel



# Beam ID: 11 (Vertical) (Channel Power)

# 3CC – 16QAM

#### Freq/Channel Freq/Channel Agilent Center Freq 27.6500000 GHz Center Freq 27.9250000 GHz Ch Freq 27.65 GHz Trig Free Ch Freq 27.925 GHz Trig Free Channel Power Averages: 100 Channel Power Averages: 100 Start Freq 27.4250000 GHz Start Freq 27.7000000 GHz #Atten 0 dB #Atten 0 dB Ref 46.4 dBm Ref 46.2 dBm Stop Freq 27.8750000 GHz Stop Freq 28.1500000 GHz #Avg .og CF Step 45.0000000 MHz Auto Man 0 CF Step 45.0000000 MHz <u>Auto</u>Man ffs offs Auto 1P FreqOffset 0.00000000 Hz FreqOffset 0.00000000 Hz Span 450 MHz Sweep 2.399 ms (3000 pts) Span 450 MHz Sweep 2.399 ms (3000 pts) Center 27.650 00 GHz #Res BW 1 MHz Center 27.925 00 GHz #Res BW 1 MHz #VBW 8 MHz #VBW 8 MHz Signal Track Signal Track Power Spectral Density **Channel Power** Power Spectral Density **Channel Power** 0n Ûn <u>0ff</u> <u>0ff</u> 39.29 dBm /300.0000 MHz -45.48 dBm/Hz 39.17 dBm /300.0000 MHz -45.60 dBm/Hz Copyright 2000-2010 Agilent Technologies File Operation Status, C:PICTURE.GIF file saved

# Low Channel

Middle Channel

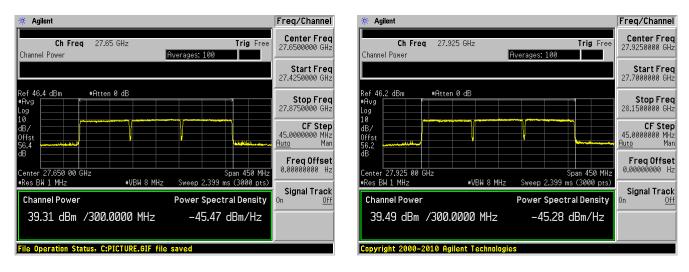
# High Channel

🔆 Agilent				S٧	/eep
Ch Freq 28.2 Channel Power	GHz	lverages: 97	Trig Free	Swo <u>Auto</u>	e <b>ep Time</b> 2.399 ms Man
Sweep Time 2.399	ms			Single	Sweep Cont
#Avg	n Ø dB			Aut	o Sweep Time Accy
10 dB/ 0ffst 57				0n	Gate <u>Off</u>
dB Center 28.200 00 GHz #Res BW 1 MHz	#VBW 8 MHz	Succes 2 200	Span 450 MHz ms (3000 pts)	Gat	e Setup•
Channel Power	#VDW © MHZ	· ·	tral Density		Points 3000
39.20 dBm /300.	0000 MHz	-45.57	′dBm/Hz		
File Operation Status, C:	PICTURE.GIF file	saved			

Report Number: R2106163

# Beam ID: 11 (Vertical) (Channel Power)

# 3CC - 64QAM



# Low Channel

Middle Channel

<b>#</b> Agilent				Freq/Channel
Ch Freq 28.2 Channel Power	2 GHz	Averages: 100	Trig Free	Center Freq 28.2000000 GHz
	J			Start Freq 27.9750000 GHz
*Avg Log	n 0 dB			<b>Stop Freq</b> 28.4250000 GHz
10 dB/ Offst 57				<b>CF Step</b> 45.0000000 MHz <u>Auto</u> Man
dB Center 28.200 00 GHz			Span 450 MHz	Freq Offset 0.00000000 Hz
#Res BW 1 MHz Channel Power	#VBW 8 MHz	Power Spec	ms (3000 pts) tral Density	<b>Signal Track</b> On <u>Off</u>
39.27 dBm /300	.0000 MHz	-45.50	dBm/Hz	
Copyright 2000-2010 Ag	ilent Technologie	8		

Ch Freq 27.55 GHz

#Atten 0 dB

₩VBW 8 MHz

Center 27.55002000 GHz

550 02 GHz

33.07 dBm /100.0000 MHz

File Operation Status, C:PICTURE.GIF file saved

🐇 Aailent

Channel Power

Ref 45.4 dBm

#Res BW 1 MHz

**Channel Power** 

ŧAvc

og

10

dB,

)ffst

# Beam ID: 11 (Vertical)

# 4CC - 16QAM- Low Channel

#### 1<sup>st</sup> Carrier

Averages: 100

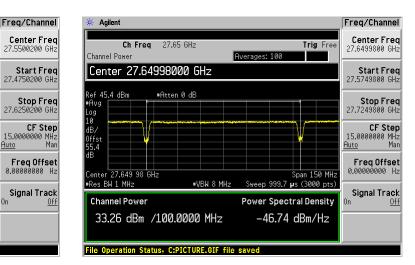
Span 150 MHz Sweep 999.7 µs (3000 pts)

Power Spectral Density

-46.93 dBm/Hz

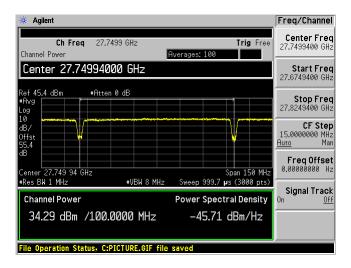
0n

Trig Free



# 2<sup>nd</sup> Carrier

3<sup>rd</sup> Carrier



#### Freq/Channel 🔆 Agilent Center Freq 27.8499000 GHz Ch Freq 27.8499 GHz Trig Fre Channel Power Averages: 100 Center 27.84990000 GHz Start Freq 27.7749000 GHz Ref 45.4 dBm #Atten 0 dB Stop Freq 27.9249000 GHz #Avg Log 10 **CF Step** 15.0000000 MHz <u>Auto</u> Man iΒ <u>Auto</u> Freq Offset 0.00000000 Hz Center 27.849 90 GHz #Res BW 1 MHz Span 150 MHz ∗VBW 8 MHz Sweep 999.7 µs (3000 pts) Signal Track Power Spectral Density **Channel Power** Ĥn <u>0ff</u> 34.53 dBm /100.0000 MHz -45.47 dBm/Hz File Operation Status, C:PICTURE.GIF file sav

4th Carrier

Ch Freq 27.7751 GHz

#Atten 0 dB

#VBW 8 MHz

Integration BW 100.000 MHz

7.775 08 GHz

33.88 dBm /100.0000 MHz

ile Operation Status, C:PICTURE.GIF file saved

🔆 Agilent

Channel Power

Ref 45.4 dBm

#Res BW 1 MHz

**Channel Power** 

#Avş .0g

Ŵ

ήR.

tts: 5 /

## Beam ID: 11 (Vertical)

# 4CC - 16QAM - Middle Channel

#### 1st Carrier

Averages: 100

Trig Free

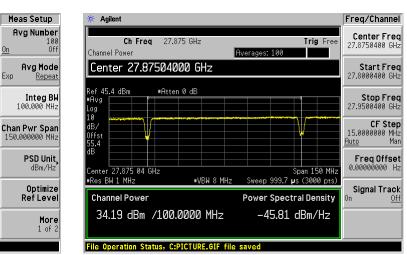
Span 150 MHz Sweep 999.7 µs (3000 pts)

**Power Spectral Density** 

-46.12 dBm/Hz

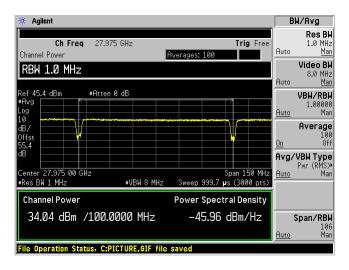
<u>0n</u>

Ехр



2<sup>nd</sup> Carrier

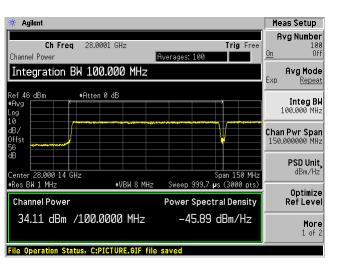
#### 3<sup>rd</sup> Carrier



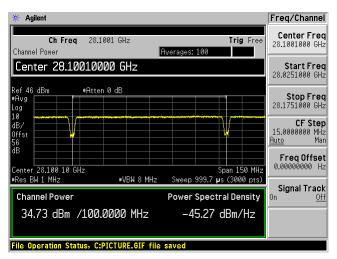
#### Freq/Channel Agilent Center Freq 28.0749600 GHz Ch Freq 28.075 GHz Trig Free Channel Power Averages: 100 Start Freq 27.9999600 GHz Center 28.07496000 GHz Ref 45.4 dBm #Atten 0 dB Stop Freq 28.1499600 GHz #Avg Log 10 CF Step iΒ 15.0000000 MHz <u>Auto</u> Man )ffst <u>Auto</u> FreqOffset 0.00000000 Hz Span 150 MHz Sweep 999.7 µs (3000 pts) Center 28.074 96 GHz #Res BW 1 MHz #VBW 8 MHz Signal Track **Channel Power Power Spectral Density** Ûn <u>0ff</u> 34.27 dBm /100.0000 MHz -45.73 dBm/Hz File Operation Status, C:PICTURE.GIF file saved

# 4th Carrier

# 4CC – 16QAM – High Channel

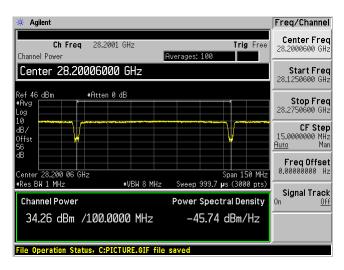


### 1st Carrier



# 2<sup>nd</sup> Carrier

### 3<sup>rd</sup> Carrier

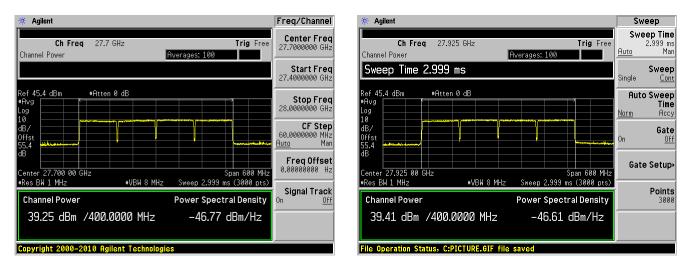


#### 🔆 Agilent Freq/Channel Center Freq 28.3000200 GHz Ch Freq 28.3 GHz Trig Fre Channel Power es 100 Center 28.30002000 GHz Start Freq 28.2250200 GHz Ref 46<u>dB</u>m #Atten 0 dB Stop Freq 28.3750200 GHz #Avg Log 10 **CF** Step dB/ 15.0000000 MHz <u>Auto</u> Man Offst Auto FreqOffset 0.00000000 Hz Span 150 MHz Center 28.300 02 GHz #Res BW 1 MHz Sweep 999.7 µs (3000 pts) ∗VBW 8 MHz Signal Track **Channel Power Power Spectral Density** <u>0ff</u> 34.14 dBm /100.0000 MHz -45.86 dBm/Hz File Operation Status, C:PICTURE.GIF file saved

4th Carrier

#### Report Number: R2106163

# 4CC – 16QAM



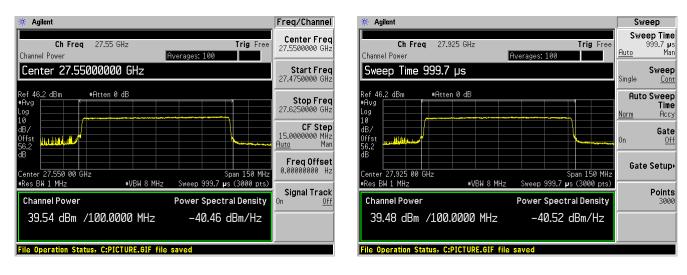
# Low Channel

Middle Channel

* Agilent		Sweep
Ch Freq 28.15 GHz Channel Power	Trig Free Averages: 100	Sweep Time 2.999 ms <u>Auto</u> Mar
Sweep Time 2.999 ms		Sweep Single <u>Con</u>
Ref 46 dBm +Atten 0 dB #Avg Log 10		Auto Sweep Time Norm Acc
dB/ Offst 56		On Of
dB Center 28.150 00 GHz #Res BW 1 MHz #VBW	Span 600 MHz 8 MHz Sweep 2.999 ms (3000 pts)	Gate Setup
Channel Power	Power Spectral Density	Points 300
39.20 dBm /400.0000 M	1Hz -46.82 dBm/Hz	
Copyright 2000–2010 Agilent Tec	hnologies	

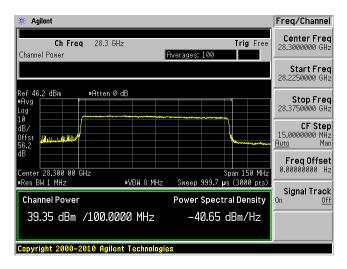
## Beam ID: 139 (Horizontal)

# 1CC - 16QAM



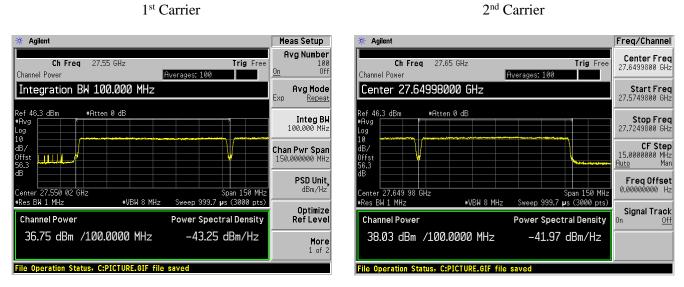
### Low Channel

Middle Channel



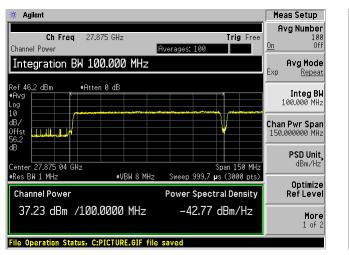
# Beam ID: 139 (Horizontal)

# 2CC - QPSK - Low Channel



#### 1st Carrier

# Beam ID: 139 (Horizontal)



1st Carrier

### 2CC – QPSK – Middle Channel

#### Freq/Channel Agile Center Freq 27.9750000 GHz Ch Freg 27.975 GHz Trig Free Channel Power Averages: 100 Center 27.97500000 GHz Start Freq 27.9000000 GHz #Atten 0 dB Ref 46.2 dBm Stop Freq 28.0500000 GHz ŧÃvg .og 10 CF Step łR 15.0000000 MHz )ffs<sup>.</sup> Mar Auto Freq Offset 27.975 00 GHz Span 150 MHz Center #VBW 8 MHz Res BW 1 MH: Sweep 999.7 µs (3000 pts Signal Track **Channel Power** Power Spectral Density 37.33 dBm /100.0000 MHz -42.67 dBm/Hz File Operation Status, C:PICTURE.GIF file saved

Ch Freq 28.2001 GHz

#Atten 0 dB

₩VBW 8 MHz

Integration BW 100.000 MHz

37.58 dBm /100.0000 MHz

File Operation Status, C:PICTURE.GIF file saved

Agilent

Channel Powe

Ref 46.6 dBm #Ava

)ffst

Center 28.200 06 GHz #Res BW 1 MHz

**Channel Power** 

# Beam ID: 139 (Horizontal)

# 2CC - QPSK - High Channel

Meas Setup

Avg Mode

Integ BW 100.000 MHz

PSD Unit, dBm/Hz

Optimize RefLevel

**More** 1 of 2

Chan Pwr Span 150.000000 MHz

Repeat

100 Off

Trig Free

0n

Ехр

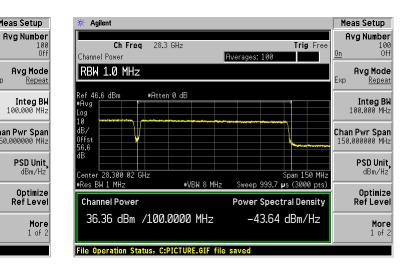
# 1st Carrier

Averages: 100

Span 150 MHz Sweep 999.7 µs (3000 pts)

Power Spectral Density

-42.42 dBm/Hz

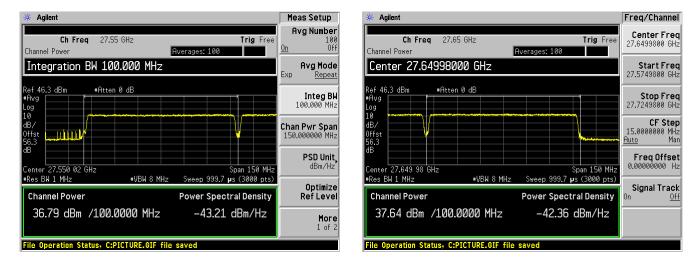


# Beam ID: 139 (Horizontal)

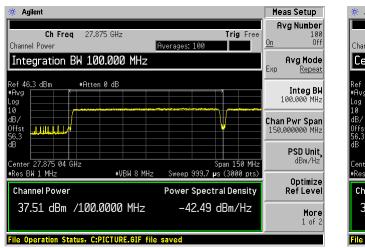
# 2CC - 16QAM - Low Channel



2<sup>nd</sup> Carrier



# Beam ID: 139 (Horizontal)



1st Carrier

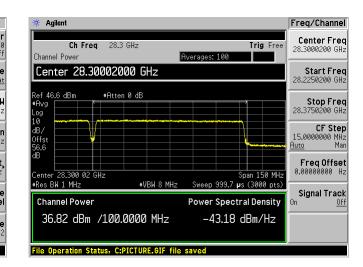
#### 2CC - 16QAM - Middle Channel

#### Freq/Channel Agilent Center Freq 27.9750000 GHz Ch Freq 27.975 GHz Trig Free Channel Power Averages: 100 Center 27.97500000 GHz Start Freq 27.9000000 GHz Ref 46.3 dBm #Atten 0 dB Stop Freq 28.0500000 GHz **CF** Step 15.0000000 MHz ffs Mar Auto Freq Offset 0.00000000 Hz Center 27.975 00 GHz #Res BW 1 MHz Span 150 MHz #VBW 8 MHz Sweep 999.7 µs (3000 pts) Signal Track **Power Spectral Density Channel Power** 37.70 dBm /100.0000 MHz -42.30 dBm/Hz File Operation Status, C:PICTURE.GIF file saved

# Beam ID: 139 (Horizontal)

# 2CC – 16QAM – High Channel

# 1st Carrier



2<sup>nd</sup> Carrier

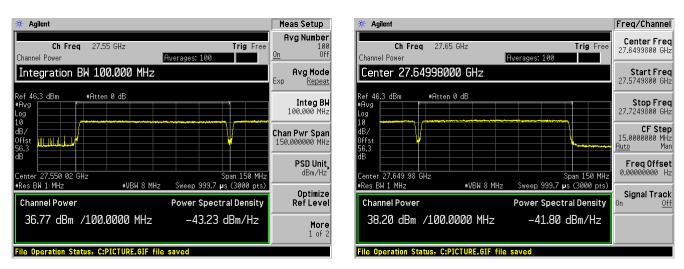
Agilent Meas Setup Avg Number Ch Freq 28.2001 GHz Trig Free 100 Off 0n Channel Powe Averages: 100 Integration BW 100.000 MHz Avg Mode Ехр Repeat #Atten 0 dB ef 46.6 dBm Integ BW 100.000 MHz Chan Pwr Span 150.000000 MHz )ffst 11 PSD Unit, dBm/Hz Span 150 MHz Sweep 999.7 µs (3000 pts) Center 28.200 06 GHz #Res BW 1 MHz ₩VBW 8 MHz Optimize RefLevel **Channel Power** Power Spectral Density 37.43 dBm /100.0000 MHz -42.57 dBm/Hz **More** 1 of 2 File Operation Status, C:PICTURE.GIF file saved

1st Carrier

1st Carrier

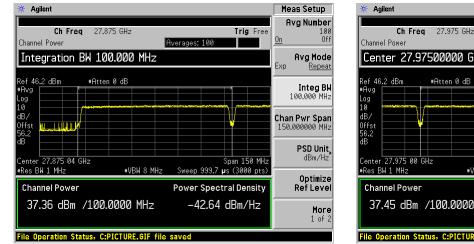
# Beam ID: 139 (Horizontal)

# 2CC - 64QAM - Low Channel



## 2<sup>nd</sup> Carrier

### Beam ID: 139 (Horizontal)



### 2CC - 64QAM - Middle Channel

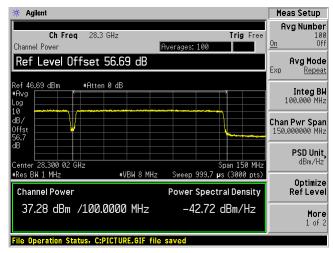
* Agilent	Freq/Channel
Ch Freq 27.975 GHz Trig Free Channel Power Averages: 100	Center Freq 27.9750000 GHz
Center 27.97500000 GHz	Start Freq 27.9000000 GHz
Ref 46.2 dBm •Atten 0 dB •Avg Log 10	<b>Stop Freq</b> 28.0500000 GHz
10 dB/ 0ffst 56.2 dB	<b>CF Step</b> 15.0000000 MHz <u>Auto</u> Man
OD         Span 150 MHz           Center 27.975 00 GHz         Span 150 MHz           •Res BM 1 MHz         •VBW 8 MHz         Sweep 999.7 µs (3000 pts)	
Channel Power Power Spectral Density	<b>Signal Track</b> <sup>On <u>Off</u></sup>
37.45 dBm /100.0000 MHz -42.55 dBm/Hz	

# Beam ID: 139 (Horizontal)

# 2CC – 64QAM – High Channel

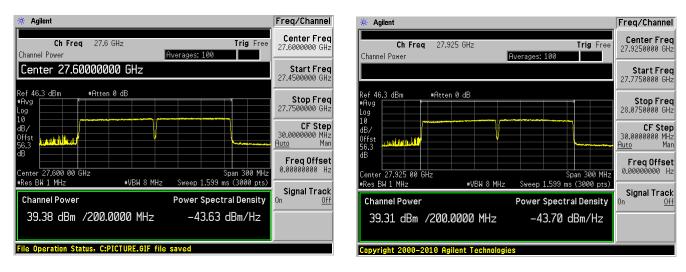
#### Agilent Freq/Channel Center Freq 8.2000600 GHz Ch Freq 28.2001 GHz Trig Free Channel Power Averages: 100 Center 28.20006000 GHz Start Freq 28.1250600 GHz #Atten 0 dB Ref 46.69 dBm Stop Freq 28.2750600 GHz Av. )a **CF Step** 15.0000000 MHz <u>Auto</u> Man B offst <u>Auto</u> FreqOffset 0.00000000 Hz Span 150 MHz Sweep 999.7 µs (3000 pts) Center 28.200 06 GHz #Res BW 1 MHz #VBW 8 MHz Signal Track Power Spectral Density **Channel Power** 0n Off 37.01 dBm /100.0000 MHz -42.99 dBm/Hz File Operation Status, C:PICTURE.GIF file saved

1st Carrier



# Beam ID: 139 (Horizontal) (Channel Power)

# 2CC – QPSK

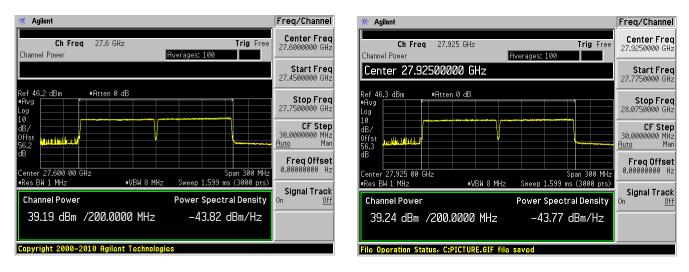


# Low Channel

Middle Channel

* Agilent		Freq/Channel
Ch Freq 28.25	GHz Trig Averages: 100	Free Center Freq 28.2500000 GHz
		<b>Start Freq</b> 28.1000000 GHz
Ref 46.6 dBm #Atten 0 #Avg Log	dB	<b>Stop Freq</b> 28.4000000 GHz
10 dB/ 0ffst 56.6		<b>CF Step</b> 30.0000000 MHz <u>Auto</u> Man
dB	Span 300	
*Res BW 1 MHz Channel Power	+VBW 8 MHz Sweep 1.599 ms (3000 Power Spectral Dens	Signal Track
39.30 dBm /200.00	z	
File Operation Status, C:PICTURE.GIF file saved		

#### 2CC – 16QAM

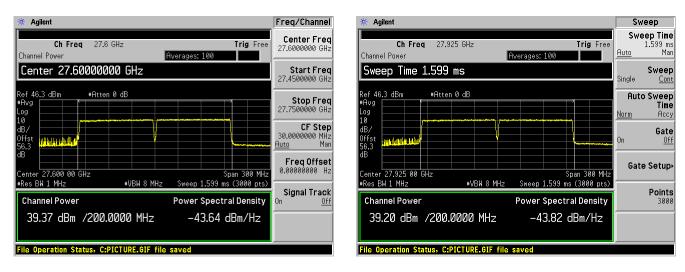


#### Low Channel

Middle Channel

* Agilent	Freq/Channel
Ch Freq 28.25 GHz Trig Free Channel Power Averages: 100	Center Freq 28.2500000 GHz
Center 28.25000000 GHz	<b>Start Freq</b> 28.1000000 GHz
Ref 46.6 dBm +Atten 0 dB +Avg Log	<b>Stop Freq</b> 28.4000000 GHz
10 dB/ 0ffst 55.6	CF Step 30.0000000 MHz <u>Auto</u> Man
dB Center 28.250 00 GHz Span 300 MHz	FreqOffset 0.00000000 Hz
Res BW 1 MHz = VBW 8 MHz Sweep 1.539 ms (3000 pts)     Channel Power Power Spectral Density	Signal Track On <u>Off</u>
39.21 dBm /200.0000 MHz -43.80 dBm/Hz	
Copyright 2000–2010 Agilent Technologies	

#### 2CC - 64QAM



#### Low Channel

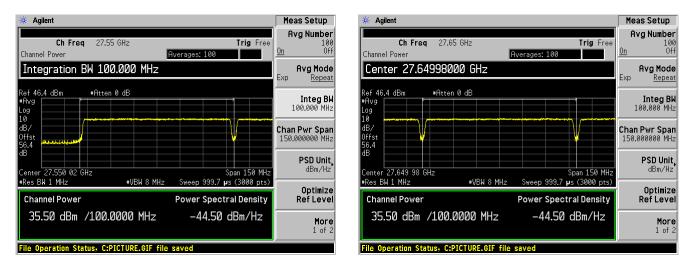
Middle Channel

🔆 Agilent				Freq/Channel
Ch Freq 28.2 Channel Power	5 GHz	Averages: 100	Trig Free	Center Freq 28.2500000 GHz
	-			Start Freq 28.1000000 GHz
Ref 46.6 dBm #Atter #Avg K Log K	n 0 dB			<b>Stop Freq</b> 28.4000000 GHz
10 dB/ 0ffst 56.6				CF Step 30.0000000 MHz <u>Auto</u> Man
dB Center 28.250 00 GHz		1 500	Span 300 MHz	FreqOffset 0.00000000 Hz
#Res BW 1 MHz Channel Power	₩VBW 8 MHz	Power Spec	ms (3000 pts) tral Density	<b>Signal Track</b> On <u>Off</u>
39.21 dBm /200.	0000 MHz	-43.80	dBm/Hz	
Copyright 2000–2010 Ag	ilent Technologie	s		

#### **3CC – QPSK – Low Channel**

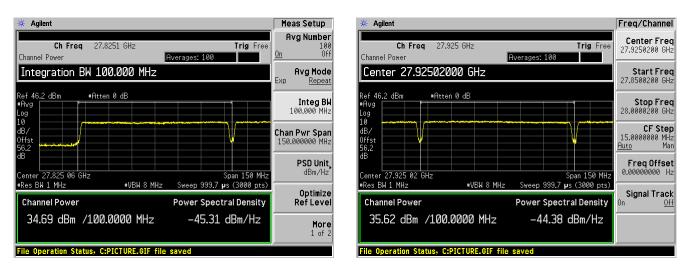
#### 1st Carrier





🔆 Agilent				Freq/Channel
Ch Freq 27. Channel Power	7499 GHz	Averages: 100	Trig Free	Center Freq 27.7499400 GHz
Center 27.749940	000 GHz			Start Freq 27.6749400 GHz
#Avg Log	n 0 dB			<b>Stop Freq</b> 27.8249400 GHz
10 dB/ 0ffst 56.4				<b>CF Step</b> 15.0000000 MHz <u>Auto</u> Mar
dB Center 27.749 94 GHz #Res BW 1 MHz	#VBW 8 MHz	Sweep 999.7 µ	Span 150 MHz	Freq Offset 0.00000000 Ha
Channel Power	#VDW O MHZ	Power Spect		<b>Signal Track</b> On <u>Of</u>
36.34 dBm /100	.0000 MHz	-43.66	dBm/Hz	
File Operation Status, C	PICTURE.GIF file	saved		

#### **3CC – QPSK – Middle Channel**



#### 1st Carrier

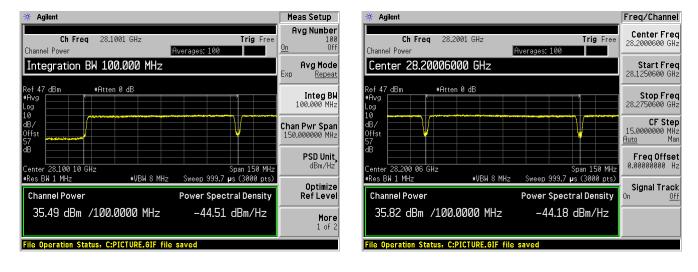
2<sup>nd</sup> Carrier

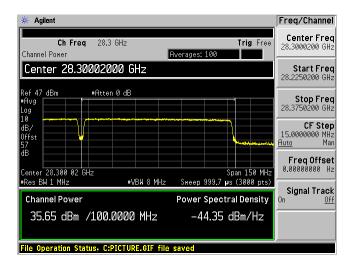
🔆 Agilent	Freq/Channel
Ch Freq 28.025 GHz Trig Free Channel Power Averages: 100	Center Freq 28.0249800 GHz
Center 28.02498000 GHz	<b>Start Freq</b> 27.9499800 GHz
Ref 46.2 dBm	<b>Stop Freq</b> 28.0999800 GHz
10 dB/ Offst 56.2	<b>CF Step</b> 15.0000000 MHz <u>Auto</u> Man
dB Center 28.024 98 GHz Span 150 MHz	FreqOffset 0.00000000 Hz
•Res BW 1 MHz •VBW 8 MHz Sweep 999.7 µs (3000 pts) Channel Power Power Spectral Density	<b>Signal Track</b> On <u>Off</u>
35.96 dBm /100.0000 MHz -44.04 dBm/Hz	
File Operation Status, C:PICTURE.GIF file saved	

#### **3CC – QPSK – High Channel**

#### 1st Carrier

2<sup>nd</sup> Carrier





Agilent

Channel Powe

Ref 46.4 dBm #Ava

Center 27.550 02 GHz #Res BW 1 MHz

**Channel Power** 

)ffsi

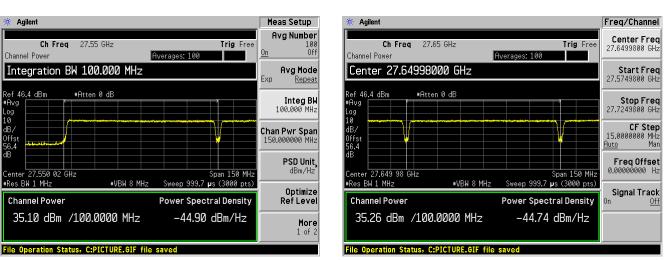
Ch Freq 27.55 GHz

#Atten 0 dB

#### Beam ID: 139 (Horizontal)

#### **3CC - 16QAM - Low Channel**

#### 1st Carrier



2<sup>nd</sup> Carrier

## 3rd Carrier

🔆 Agilent	Freq/Channel
Ch Freq 27.7499 GHz Trig Free Channel Power Averages: 100	Center Freq 27.7499400 GHz
Center 27.74994000 GHz	<b>Start Freq</b> 27.6749400 GHz
Ref 46.4 dBm +Atten 0 dB +Avg	<b>Stop Freq</b> 27.8249400 GHz
10 dB/ offst 56.4	<b>CF Step</b> 15.0000000 MHz <u>Auto</u> Man
dB Center 27.749 94 GHz Span 150 MHz	FreqOffset 0.00000000 Hz
•Res BW 1 MHz •VBW 8 MHz Sweep 999.7 µs (3000 pts) Channel Power Power Spectral Density	<b>Signal Track</b> On <u>Off</u>
35.77 dBm /100.0000 MHz -44.23 dBm/Hz	
File Operation Status, C:PICTURE.GIF file saved	1

#### Report Number: R2106163

Agilent

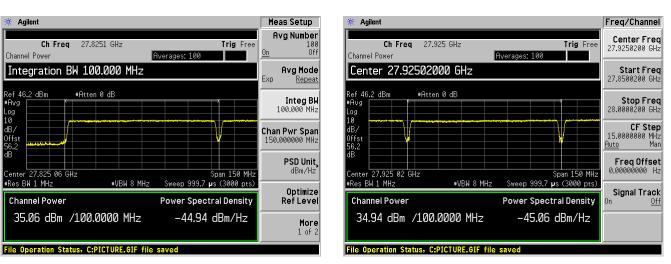
Channel Powe

)ffst

#### Beam ID: 139 (Horizontal)

#### 3CC - 16QAM - Middle Channel

#### 1st Carrier

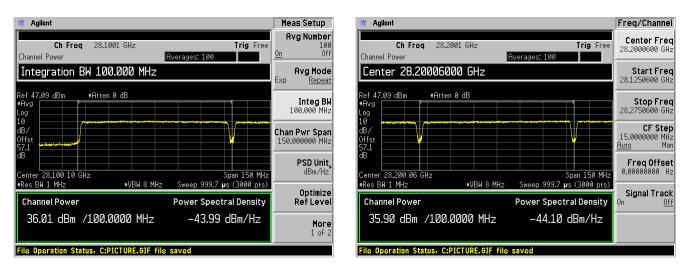


2<sup>nd</sup> Carrier

## 3rd Carrier

* Agilent	Freq/Channel
Ch Freq 28.025 GHz Trig Free Channel Power Averages: 100	Center Freq 28.0249800 GHz
Center 28.02498000 GHz	<b>Start Freq</b> 27.9499800 GHz
Ref 46.2 dBm #Atten 0 dB *Avg Log	<b>Stop Freq</b> 28.0999800 GHz
10 dB/ 0ffst 56.2	<b>CF Step</b> 15.0000000 MHz <u>Auto</u> Man
dB Center 28.024 98 GHz Span 150 MHz	Freq Offset 0.00000000 Hz
•Res BW 1 MHz •VBW 8 MHz Sweep 999.7 µs (3000 pts) Channel Power Power Spectral Density	<b>Signal Track</b> On <u>Off</u>
35.61 dBm /100.0000 MHz -44.39 dBm/Hz	
File Operation Status, C:PICTURE.GIF file saved	

#### **3CC – 16QAM – High Channel**



#### 1st Carrier

2<sup>nd</sup> Carrier

### 3rd Carrier

🔆 Agilent	Freq/Channel
Ch Freq 28.3 GHz Trig Free Channel Power Averages: 100	Center Freq 28.3000200 GHz
Center 28.30002000 GHz	Start Freq 28.2250200 GHz
Ref 47.09 dBm + Atten 0 dB + Avg	<b>Stop Freq</b> 28.3750200 GHz
57.1	<b>CF Step</b> 15.0000000 MHz <u>Auto</u> Man
dB Center 28.300 02 GHz Span 150 MHz	Freq Offset 0.00000000 Hz
■Res BW 1 MHz ■VBW 8 MHz Sweep 999.7 μs (3000 pts) Channel Power Power Spectral Density	Signal Track
35.65 dBm /100.0000 MHz -44.35 dBm/Hz	
File Operation Status, C:PICTURE.GIF file saved	

Agilent

Channel Powe

Ref 46.4 dBm #Ava

Start 27.475 02 GHz ≢Res BW 1 MHz

**Channel Power** 

)ffsi

Ch Freq 27.55 GHz

Integration BW 100.000 MHz

35.68 dBm /100.0000 MHz

File Operation Status, C:PICTURE.GIF file saved

#Atten 0 dB

∗VBW 8 MHz

#### Beam ID: 139 (Horizontal)

#### 3CC - 64QAM - Low Channel

#### 1st Carrier

Averages: 100

Stop 27.625 02 GHz Sweep 999.7 µs (3000 pts)

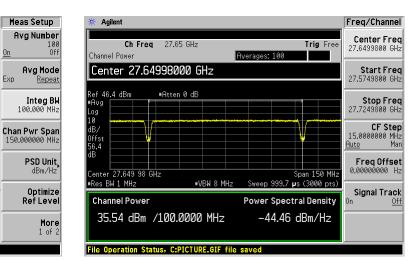
Power Spectral Density

-44.32 dBm/Hz

Trig Free

0n

Ехр



#### 2<sup>nd</sup> Carrier

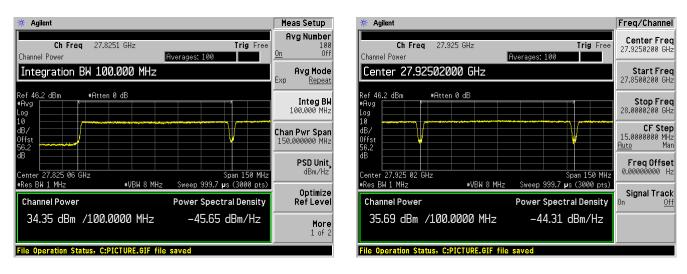
* Agilent	Freq/Channel
Ch Freq 27.7499 GHz Trig Free Channel Power Averages: 100	Center Frec 27.7499400 GHz
Center 27.74994000 GHz	Start Frec 27.6749400 GHz
Ref 46.4 dBm +Atten 0 dB +Avg Log	Stop Fred 27.8249400 GH:
10 dB/ 0ffst 56.4 0ffst	<b>CF Step</b> 15.0000000 MH: <u>Auto</u> Ma
dB Center 27.749 94 GHz Span 150 MHz	Freq Offse 0.00000000 H:
•Res BW 1 MHz •VBW 8 MHz Sweep 999.7 µs (3000 pts) Channel Power Power Spectral Density	<b>Signal Tracl</b> On <u>Of</u>
36.09 dBm /100.0000 MHz -43.91 dBm/Hz	
File Operation Status, C:PICTURE.GIF file saved	ļ

#### Report Number: R2106163

#### **3CC - 64QAM - Middle Channel**







₩ Agilent	Freq/Channel
Ch Freq 28.025 GHz Trig Free Channel Power Averages: 100	Center Freq 28.0249800 GHz
Center 28.02498000 GHz	<b>Start Freq</b> 27.9499800 GHz
Raf 46.2 dBm +Atten 0 dB +Avg	<b>Stop Freq</b> 28.0999800 GHz
10	<b>CF Step</b> 15.0000000 MHz <u>Auto</u> Man
dB Center 28.024 98 GHz Span 150 MHz	Freq Offset 0.00000000 Hz
"Res BH 1 MHz     "VBN 8 MHz     Sweep 999.7 µs (3000 pts)     Channel Power     Power     Power	Signal Track
36.00 dBm /100.0000 MHz -44.00 dBm/Hz	
File Operation Status, C:PICTURE.GIF file saved	

#### **3CC – 64QAM – High Channel**

#### Agilent Freq/Channel Freq/Channel Agilent Center Freq 28.1001000 GHz Center Freq 28.2000600 GHz Ch Freq 28.1001 GHz Trig Free Ch Freq 28.2001 GHz Trig Free Channel Powe Averages: 100 Channel Power Averages: 100 Center 28.10010000 GHz Start Freq 28.0251000 GHz Start Freq 28.1250600 GHz Center 28.20006000 GHz Ref 47 dBm #Avg Ref 47 dBm #Avg #Atten 0 dB #Atten 0 dB Stop Freq 28.1751000 GHz Stop Freq 28.2750600 GHz Log 10 og 10 **CF Step** 15.0000000 MHz <u>Auto</u> Man **CF Step** 15.0000000 MHz <u>Auto</u> Man dB/ iΒ, )ffst <u>Of</u>fst Auto <u>Auto</u> FreqOffset 0.00000000 Hz FreqOffset 0.00000000 Hz Span 150 MHz Sweep 999.7 µs (3000 pts) Span 150 MHz Sweep 999.7 µs (3000 pts) Center 28.100 10 GHz #Res BW 1 MHz Center 28.200 06 GHz #Res BW 1 MHz ₩VBW 8 MHz ₩VBW 8 MHz **Signal Track** On <u>Off</u> Signal Track **Channel Power** Power Spectral Density **Channel Power Power Spectral Density** 35.76 dBm /100.0000 MHz -44.24 dBm/Hz 36.04 dBm /100.0000 MHz -43.96 dBm/Hz File Operation Status, C:PICTURE.GIF file saved File Operation Status, C:PICTURE.GIF file saved

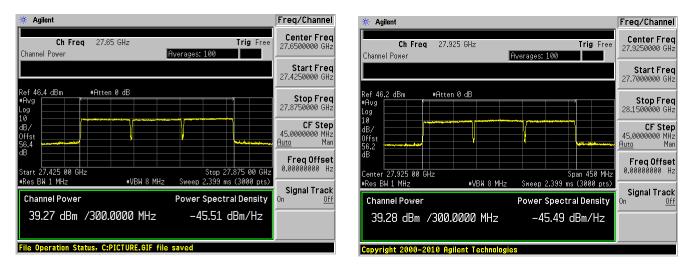
#### 1<sup>st</sup> Carrier

2<sup>nd</sup> Carrier

### 3rd Carrier

* Agilent	Freq/Channel
Ch Freq 28.3 GHz Trig Free Channel Power Averages: 100	Center Freq 28.3000200 GHz
Center 28.30002000 GHz	Start Freq 28.2250200 GHz
Ref 47 dBm +Atten 0 dB +Avg	<b>Stop Freq</b> 28.3750200 GHz
10	CF Step 15.0000000 MHz <u>Auto</u> Man
dB Center 28.300 02 GHz Span 150 MHz	FreqOffset 0.00000000 Hz
•Res BW 1 MHz •VBW 8 MHz Sweep 999.7 µs (3000 pts) Channel Power Power Spectral Density	<b>Signal Track</b> On <u>Off</u>
35.58 dBm /100.0000 MHz -44.42 dBm/Hz	
File Operation Status, C:PICTURE.GIF file saved	,

#### 3CC – QPSK

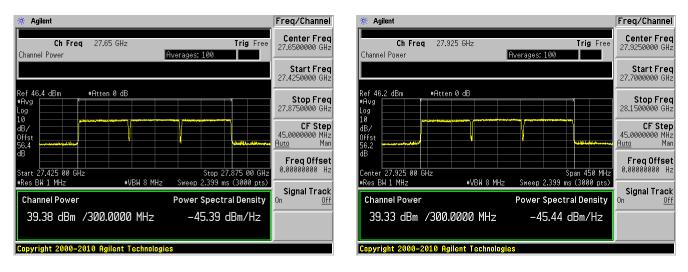


#### Low Channel

Middle Channel

* Agilent				Freq/Channel
Ch Freq 28.3 Channel Power	2 GHz	Averages: 100	Trig Free	Center Freq 28.2000000 GHz
	<u>u</u>			Start Freq 27.9750000 GHz
#Avg K	n 0 dB			<b>Stop Freq</b> 28.4250000 GHz
10 dB/ 0ffst 57				<b>CF Step</b> 45.0000000 MHz <u>Auto</u> Man
dB Center 28.200 00 GHz			Span 450 MHz	Freq Offset 0.00000000 Hz
#Res BW 1 MHz	₩VBW 8 MHz		ms (3000 pts)	Signal Track
Channel Power 39.25 dBm /300	.0000 MHz	Power Spec -45.52	dBm/Hz	On <u>Off</u>
File Operation Status, C	PICTURE.GIF file	saved		P

#### 3CC – 16QAM

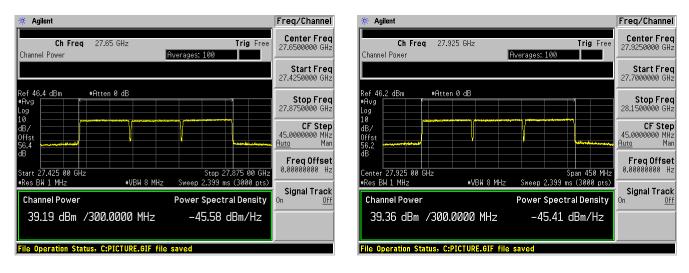


#### Low Channel

Middle Channel

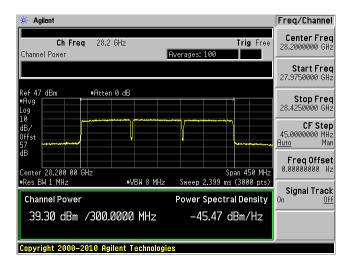
Ch Freq     28.2 GHz     Trig Free       Channel Power     Averages: 100       Sweep Time 2.399 ms       Ref 47 dBm     •Atten 0 dB       •Hyg       Log       0       10       dB/       0ffst       0       dB       Center 28.200 00 GHz       •VBW 8 MHz       Sweep 2.399 ms (3000 pts)	Sweep	* Agilent
Ref 47 dBm +Atten 0 dB +Avg Log 10 dB/ 0ffst 57 dB Center 28.200 00 GHz Span 450 MHz	Sweep Time 2.399 ms <u>Auto</u> Man	Channel Power Averages: 100
flvg         Image: Constraint of the second se	Sweep Single <u>Cont</u>	Sweep Time 2.399 ms
*(Les DM 1 Hitz	Auto Sweep Time Norm Accy On <u>Off</u> Gate Setup	•Avg Log 10 dB/ Offst 57 dB         •<
Channel PowerPower Spectral Density39.27 dBm /300.0000 MHz-45.50 dBm/Hz	Points 3000	

#### 3CC – 64QAM



#### Low Channel

Middle Channel



Agilent

Channel Power

Ref 45.49 dBm

■Res BW 1 MHz

**Channel Power** 

ŧĤγ₀

)q 1 Ĥ

)ffsi

Ch Freq 27.55 GHz

Integration BW 100.000 MHz

550 02 GHz

33.59 dBm /100.0000 MHz

File Operation Status, C:PICTURE.GIF file saved

#Atten 0 dB

∗VBW 8 MHz

#### Beam ID: 139 (Horizontal)

#### 4CC - 16QAM- Low Channel

#### 1<sup>st</sup> Carrier

Averages: 100

Span 150 MHz Sweep 999.7 µs (3000 pts)

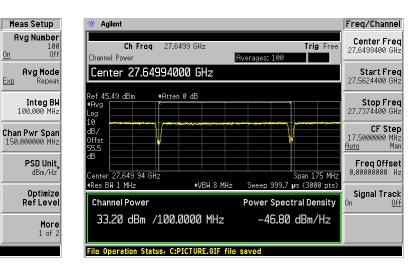
Power Spectral Density

-46.41 dBm/Hz

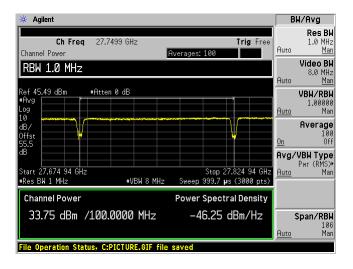
Trig Free

0r

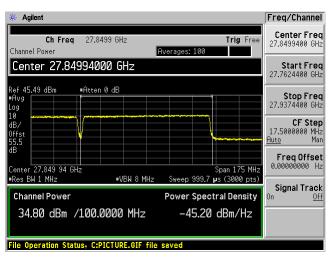
Exp



#### 2<sup>nd</sup> Carrier







)g

10

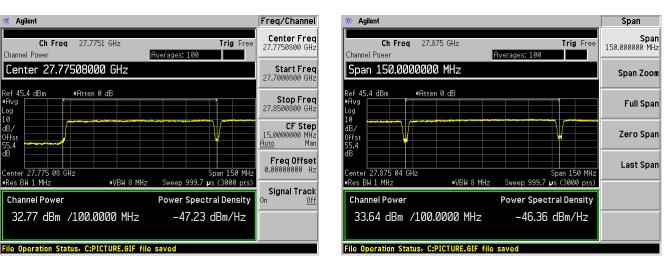
iΒ,

)ffsi

#### Beam ID: 139 (Horizontal)

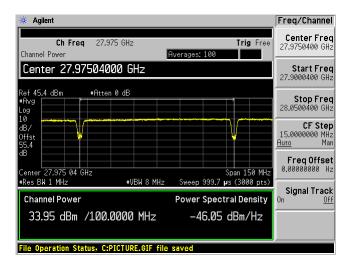
#### 4CC - 16QAM - Middle Channel

#### 1st Carrier



#### 2<sup>nd</sup> Carrier

3<sup>rd</sup> Carrier



#### Freq/Channel 🔆 Agilent Center Freq 28.0749600 GHz Ch Freq 28.075 GHz Trig Fre Channel Power Averages: 100 Center 28.07496000 GHz Start Freq 27.9999600 GHz Ref 45.4 dBm #Atten 0 dB Stop Freq 28.1499600 GHz #Avg Log CF Step 15.0000000 MHz Auto Man Freq Offset 0.00000000 Hz Center 28.074 96 GHz #Res BW 1 MHz Span 150 MHz ∗VBW 8 MHz Sweep 999.7 µs (3000 pts) Signal Track **Channel Power** Power Spectral Density Ûn <u>0ff</u> 33.90 dBm /100.0000 MHz -46.10 dBm/Hz File Operation Status, C:PICTURE.GIF file sav

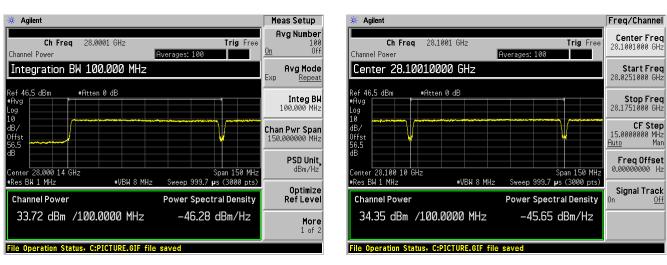
#### 4th Carrier

Off

#### Beam ID: 139 (Horizontal)

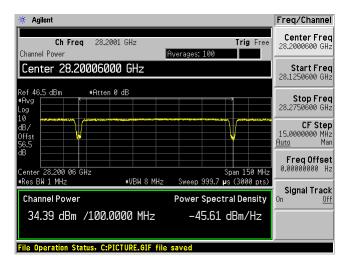
#### 4CC - 16QAM - High Channel

#### 1st Carrier



#### 2<sup>nd</sup> Carrier

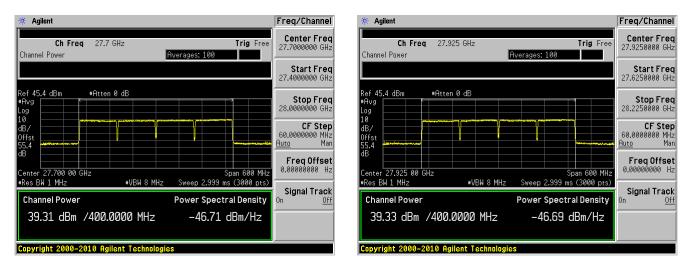
3<sup>rd</sup> Carrier



#### Freq/Channel Agilent Center Freq 28.3000200 GHz Ch Freq 28.3 GHz Trig Free Channel Power Averages: 100 Start Freq 28.2250200 GHz Center 28.30002000 GHz Ref 46.5 dBm #Atten 0 dB Stop Freq 28.3750200 GHz #Avg Log 10 CF Step iΒ 15.0000000 MHz <u>Auto</u> Man )ffst <u>Auto</u> FreqOffset 0.00000000 Hz Span 150 MHz Sweep 999.7 µs (3000 pts) Center 28.300 02 GHz #Res BW 1 MHz #VBW 8 MHz Signal Track **Channel Power Power Spectral Density** Ûn <u>0ff</u> 34.17 dBm /100.0000 MHz -45.83 dBm/Hz File Operation Status, C:PICTURE.GIF file saved

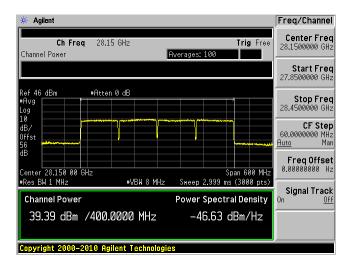
#### 4th Carrier

#### 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 $\mu$ 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

Note<sup>1</sup>: 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
<b>Relative Humidity:</b>	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	
Channel	Woullation	Horizontal	Vertical	Emission (dBm/MHz)	(dBm/MHz)	( <b>dB</b> )
Low	- 16QAM	-23.27	-25.98	-21.4067	-5	-16.4067
		-25.39	-29.13	-23.859	-13	-10.859
Uliah		-29.45	-31.28	-27.259	-5	-22.259
High		-38.48	-37.48	-34.941	-13	-21.941

#### **2CC**

Channel	Modulation	Modulation Conducted Emission (dBm/MHz)		Total Conducted	Limit	Margin
Channel		Horizontal	Vertical	Emission (dBm/MHz)	(dBm/MHz)	( <b>dB</b> )
Low		-23.48	-25.95	-21.5314	-5	-16.5314
LOW	ODSV	-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	16QAM	-23.45	-27.90	-22.1181	-5	-17.1181
Low		-28.24	-30.03	-26.0331	-13	-13.0331
Uich		-39.13	-34.86	-33.4798	-5	-28.4798
High		-41.89	-39.29	-37.388	-13	-24.388
Low		-23.38	-26.52	-21.6619	-5	-16.6619
LOW	C4O AM	-30.64	-25.64	-24.4467	-13	-11.4467
High	64QAM	-34.70	-34.61	-31.6445	-5	-26.6445
		-39.41	-40.38	-36.8577	-13	-23.8577

Channel	Modulation	Conducted Emission (dBm/MHz)		Total Conducted	Limit	Margin	
Channel	Modulation	Horizontal	Vertical	Emission (dBm/MHz)	(dBm/MHz)	( <b>dB</b> )	
Low		-34.22	-37.40	-32.5149	-5	-27.5149	
LOW	ODSK	-36.24	-40.25	-34.7874	-13	-21.7874	
Hich	QPSK	-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	
		-37.39	-39.32	-35.2384	-13	-22.2384	
<b>TT</b> 1		-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	
High		-35.99	-39.67	-34.4411	-5	-29.4411	
		-40.00	-41.97	-37.8639	-13	-24.8639	

#### 3CC

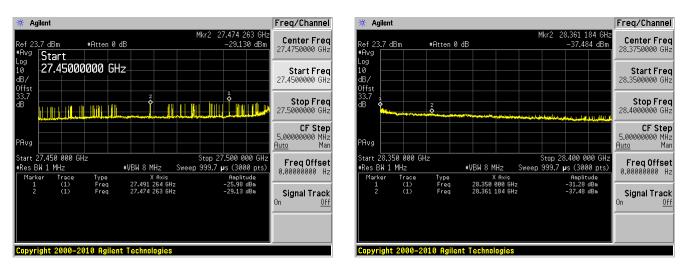
### **4CC**

Channel	Modulation	Conducted Emission (dBm/MHz)		Total Conducted	Limit	Margin	
Channel	Wouldation	Horizontal	Vertical	Emission (dBm/MHz)	(dBm/MHz)	( <b>dB</b> )	
Low	- 16QAM	-35.15	-37.99	-33.3316	-5	-28.3316	
		-37.99	-38.71	-35.3248	-13	-22.3248	
Uich		-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

#### 1CC-16QAM

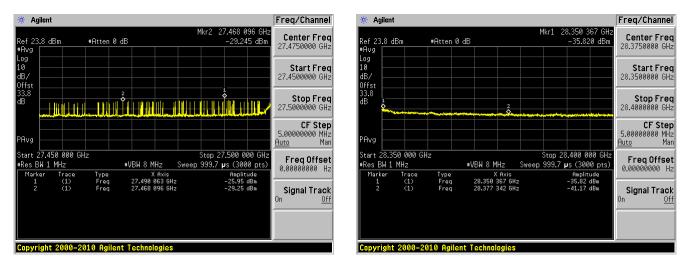
Low Channel – Beam ID=11 (Vertical)



#### 2CC-QPSK

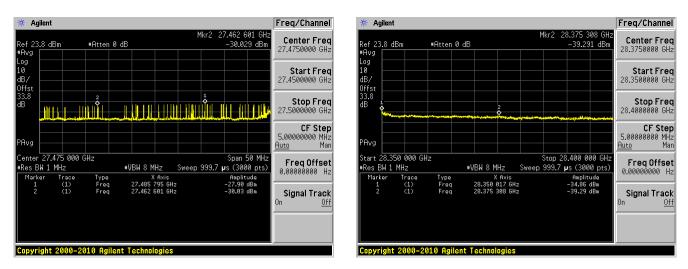
Low Channel – Beam ID=11 (Vertical)





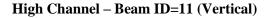
#### 2CC-16QAM

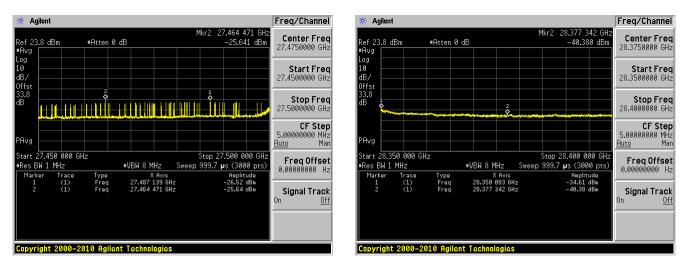
Low Channel – Beam ID=11 (Vertical)



#### 2CC-64QAM

Low Channel – Beam ID=11 (Vertical)



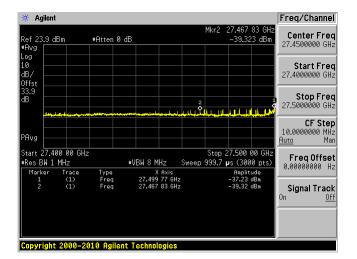


#### **3CC-QPSK**

Low Channel – Beam ID=11 (Vertical)

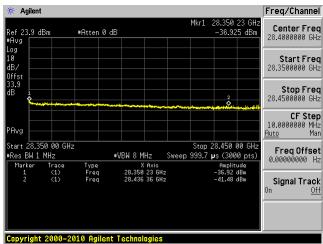


# 3CC-16QAM



Low Channel – Beam ID=11 (Vertical)

#### High Channel – Beam ID=11 (Vertical)

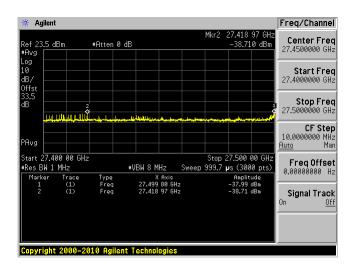


#### 3CC-64QAM

Low Channel – Beam ID=11 (Vertical)

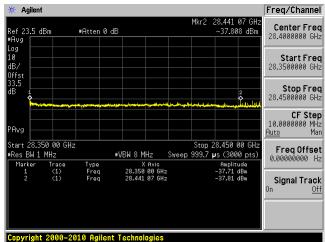


#### 4CC-16QAM



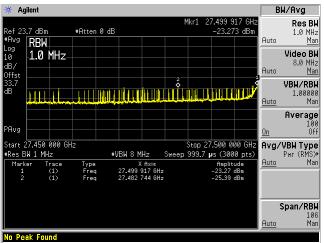
Low Channel – Beam ID=11 (Vertical)

#### High Channel – Beam ID=11 (Vertical)



#### **1CC-16OAM**

Low Channel - Beam ID=139 (Horizontal)



Peak Search Agilent Mkr2 28.391 854 GH 23.7 dBm #Atten 0 dB Next Peak Ref 2 #Avg Marker 28.391854000 GHz Log 10 dB/ Offst Next Pk Right -38.483 dBm ٨Ř Next Pk Left 2 **Min Search** PAvg Stop 28.400 000 GHz 8.350 000 GHz Start : Pk-Pk Search Res BW 1 MHz #VBW 8 MHz Sweep 999.7 µs (3000 pts) X Axis 28.350 200 GHz 28.391 854 GHz Amplitude -29.45 dBm -38.48 dBm Trac (1) (1) Type Freq Freq Marker Mkr → CF More 1 of 2 No Peak Found

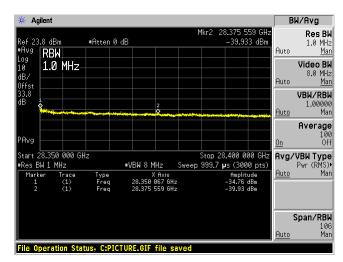
High Channel – Beam ID=139 (Horizontal)

#### **2CC-QPSK**

#### Agilent BW/Avg 27.463 268 GH Res BW 1.0 MHz <u>Man</u> 23.8 dBm #Atten 0 dB -29.220 dBm ⊧Avc RBW Auto Ŵ Video BW 1.0 MHz 8.0 MHz dB∕ Auto Man 0ffst ୨୨.୫ VBW/RBW dĔ 1.00000 Man Auto Average 100 Off °Avg 0n Avg/VBWType Pwr(RMS)► Auto Man Stop 27.500 000 GHz Sweep 999.7 µs (3000 pts) Start 27.450 000 GHz ∎Res BW 1 MHz #VBW 8 MHz Type Freq Freq Amplitude -23.48 dBm -29.22 dBm (1) (1) 27.499 883 GHz 27.463 268 GHz Span/RBW 106 Man <u>Auto</u> File Operation Status, C:PICTURE.GIE file saved

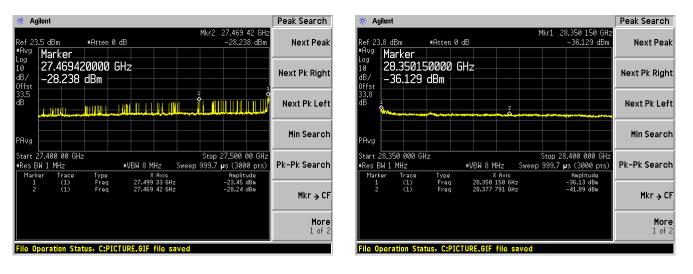
Low Channel – Beam ID=139 (Horizontal)

#### High Channel – Beam ID=139 (Horizontal)



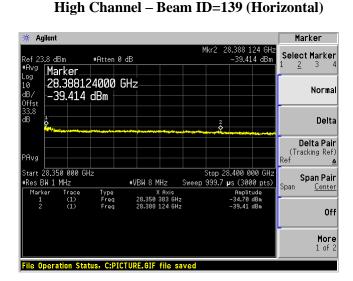
#### 2CC-16QAM

Low Channel – Beam ID=139 (Horizontal)



#### 2CC-64QAM

#### Low Channel - Beam ID=139 (Horizontal)

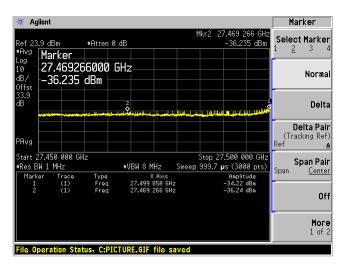


🗧 Agilent	Peak Search
ef 23,8 dBm ●Atten 0 dB	
Avg Marker 27.476532000 GHz Avg Avg 	Next Pk Right
	Next Pk Left
Avg	Min Search
tart 27.450 000 GHz Stop 27.500 000 GH Res BW 1 MHz ■VBW 8 MHz Sweep 999.7 µs (3000 pts Marker Trace Type X Axis Amplitude	
1 (1) Freq 27.499 533 GHz -23.38 dBm 2 (1) Freq 27.476 532 GHz -30.64 dBm	Mkr → CF
	More 1 of 2

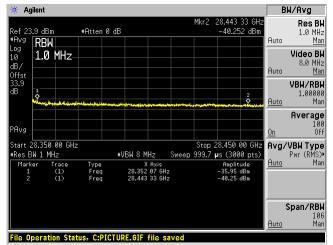
#### High Channel – Beam ID=139 (Horizontal)

#### **3CC-QPSK**

Low Channel - Beam ID=139 (Horizontal)

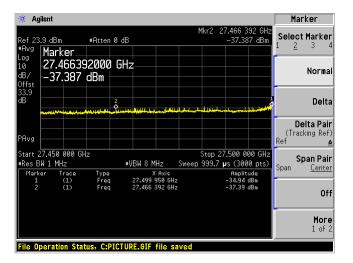


High Channel - Beam ID=139 (Horizontal)

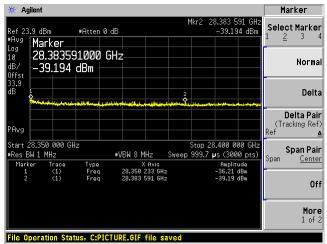


#### 3CC-16QAM

#### Low Channel - Beam ID=139 (Horizontal)

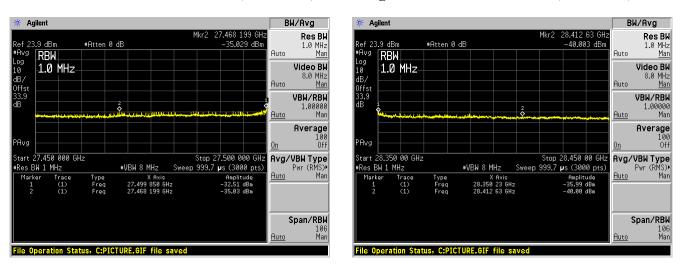


#### High Channel - Beam ID=139 (Horizontal)

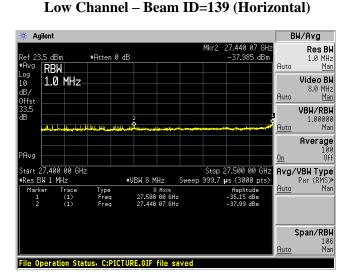


#### 3CC-64QAM

Low Channel - Beam ID=139 (Horizontal)

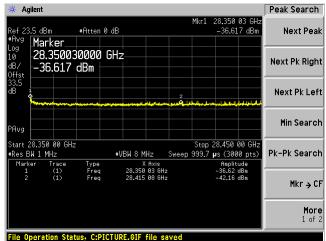


## 4CC-16QAM



#### High Channel – Beam ID=139 (Horizontal)

High Channel – Beam ID=139 (Horizontal)



Corning Optical Communication LLC

# 7 Annex A (Normative) - EUT Test Setup Photographs

Please 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

Scope	FCC Rule Parts	Maximum	<u>Status</u>		Recognition
		Assessed Frequency in Mhz		Date	Date
Unintentional Radiators	FCC Part15, Subpart B	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 10<sup>th</sup> 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 ---