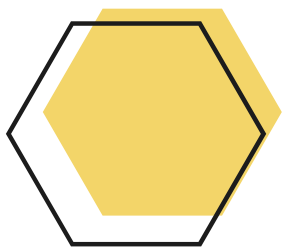




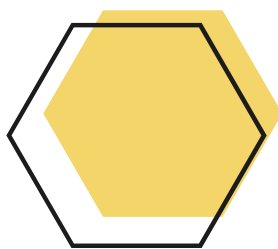
DATASHEET

axE2-2400



Wi-Fi 6

IEEE 802.11 b/g/n/ac/ax
2x2 MU-MIMO
MiniPCIe Radio Module



High Performance

30 dBm TX Power
2412 MHz to 2484 MHz



Industrial grade

-40 deg C to +85 deg C
operation temperature

dun & bradstreet



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HW REV# axE22400.0100
Last updated on Apr-26-2024

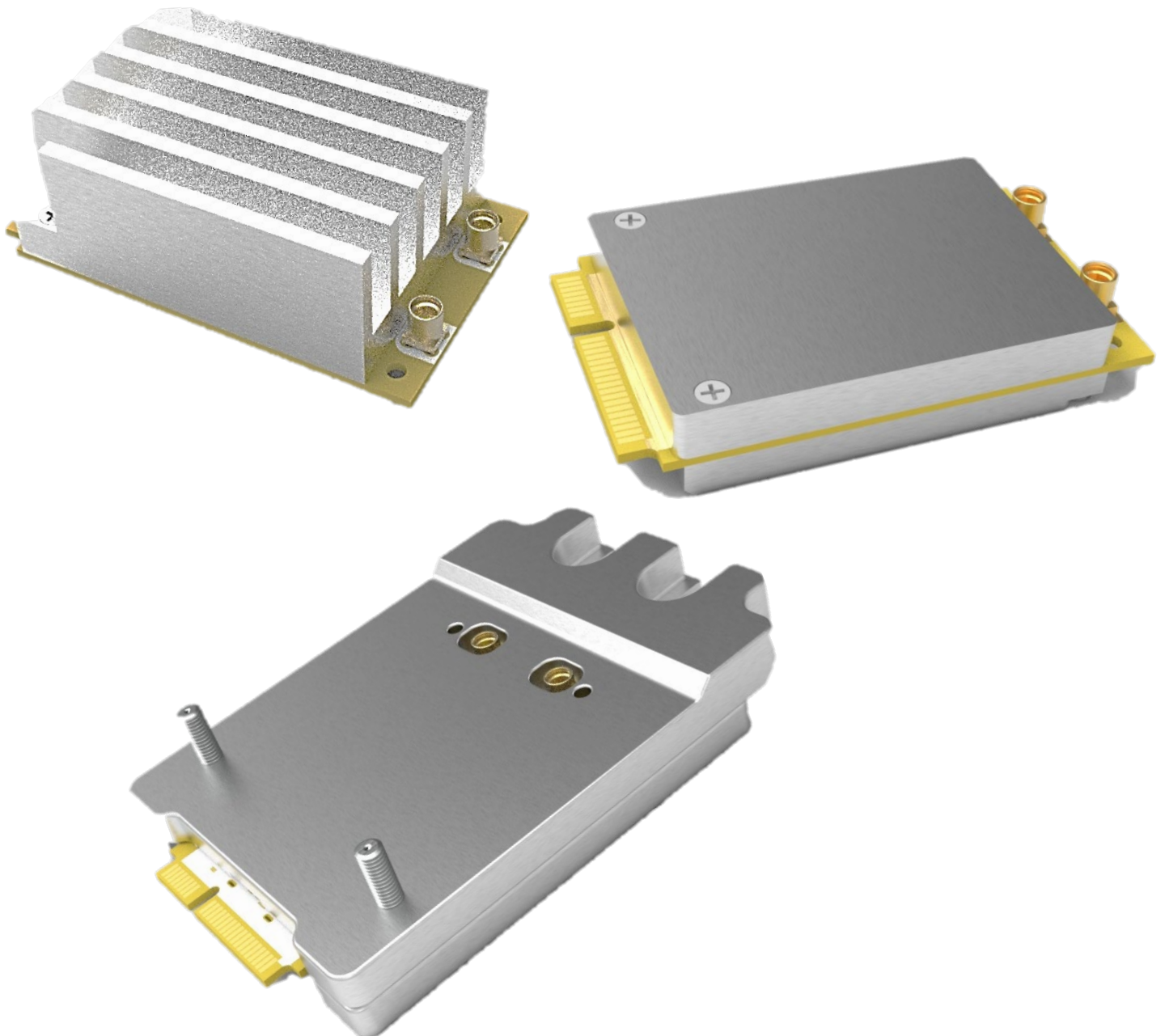
CUSTOM DESIGN (Options)

Heatsink, Shield Cover and Mechanical Parts

Talk to our experts



enquiry@vizmonet.com



TECHNICAL SPECIFICATION

RADIO MODULE – GENERAL INFO	
Chipset	QUALCOMM QCN-9074-1
EEPROM	2-Mbit serial I ² C bus EEPROM
Host Interface	Mini PCIe interface with PCIe 3.0
Operating System	Linux, supports open source ath11K Linux driver
Security	AES-CCMP at 128/256 bits AES-GCMP at 128/256 bits WEP, TKIP hardware encryption WAPI-2 hardware encryption WPA/WPA2-Personal/WPA2-Enterprise and WPA3 Personal
Operating frequency (11b/g/n)	2412 MHz to 2484 MHz (Operating channels)
Data rate -11b	1 Mbps, 2 Mbps, 5.5 Mbps, 11 Mbps
Data rate-11g	6Mbps, 9Mbps, 12Mbps, 18 Mbps, 24Mbps, 36Mbps, 48Mbps, 54Mbps
Data rate-11n	MCS0, MCS1, MCS2, MCS3, MCS4, MCS5, MCS6, MCS7
Data rate-11ac	MCS0, MCS1, MCS2, MCS3, MCS4, MCS5, MCS6, MCS7 ,MCS8, MCS9, MCS10, MCS11
Data rate-11ax	MCS0, MCS1, MCS2, MCS3, MCS4, MCS5, MCS6, MCS7 ,MCS8, MCS9, MCS10, MCS11, MCS12, MCS13
Channel BW	5 MHz/10 MHz/20 MHz/40 MHz
Compliance	RoHS, MIL-STD-810G Shock & Vibration
MAC ID	74E277 Series
INTERFACE SPECIFICATIONS	
Operating Voltage	3.3V DC / 5V DC (through miniPCI pins 45,47,49,51 for PA)
Total DC Power Consumption	7 Watts in 2x2 MIMO mode
RF Antenna connector	x2 MMCX Female(Jack), Straight connectors
ENVIRONMENTAL SPECIFICATIONS	
Operating Temperature Range	-40 deg C to +85 deg C
PHYSICAL SPECIFICATIONS	
Mechanical Dimension	(L) 51 mm x (W) 30 mm x (W) 21 mm
Weight (grams)	45
REGULATORY INFORMATION	
Compliance	Work in Progress
PACKAGING INFORMATION	
No of units	100, Shipping Carton Dimension (52 cm x 23 cm x 13 cm)

ORDERING INFORMATION

axE2-2400

Mini PCIe Radio Module, 2x2 MU-MIMO, IEEE 802.11 b/g/n/ac/ax, 2.4 GHz
30 dBm**RADIO SPECIFICATION****TX/RX Specification (11b/g) – 2412 MHz to 2462 MHz**TX Power per chain (SISO mode), ± 2 dBm.

DC power consumption is the total dc power drawn only by the miniPCIe module in 2x2 MIMO mode and it excludes the dc power drawn by the main board to which the module is connected.

RX Sensitivity per chain (SISO mode) , ± 2 dBm.

Data Rate	Modulation	TX Power (dBm)	DC Power Consumption (Watts)	RX Sensitivity (dBm)
1 Mbps	DBPSK	27	7.0	-100
2 Mbps	DQPSK	27	7.0	-97
5.5 Mbps	QPSK	27	7.0	-95
11 Mbps	QPSK	27	7.0	-91
6 Mbps	BPSK	27	7.0	-96
9 Mbps	BPSK	27	7.0	-94
12 Mbps	QPSK	27	7.0	-93
18 Mbps	QPSK	27	7.0	-91
24 Mbps	16-QAM	24	6.1	-86
36 Mbps	16-QAM	24	6.1	-83
48 Mbps	64-QAM	24	6.1	-80
54 Mbps	64-QAM	24	6.1	-78

TX/RX Specification (11n) – 2412 MHz to 2462 MHz

TX Power per chain (SISO mode), ± 2 dBm.

DC power consumption is the total dc power drawn only by the miniPCIe module in 2x2 MIMO mode and it excludes the dc power drawn by the main board to which the module is connected.

RX Sensitivity per chain (SISO mode) , ± 2 dBm.

Data Rate	Modulation	TX Power (dBm)	DC Power Consumption (Watts)	RX Sensitivity (dBm)
HT20-MCS0	BPSK	27	7.0	-94
HT20-MCS1	QPSK	27	7.0	-90
HT20-MCS2	QPSK	27	7.0	-88
HT20-MCS3	16-QAM	27	7.0	-85
HT20-MCS4	16-QAM	24	6.1	-81
HT20-MCS5	64-QAM	24	6.1	-77
HT20-MCS6	64-QAM	24	6.1	-76
HT20-MCS7	64-QAM	24	6.1	-74
HT40-MCS0	BPSK	27	7.0	-91
HT40-MCS1	QPSK	27	7.0	-87
HT40-MCS2	QPSK	27	7.0	-85
HT40-MCS3	16-QAM	26	6.5	-82
HT40-MCS4	16-QAM	23	5.9	-78
HT40-MCS5	64-QAM	23	5.9	-74
HT40-MCS6	64-QAM	23	5.9	-73
HT40-MCS7	64-QAM	23	5.9	-71

TX/RX Specification (11ac) – 2412 MHz to 2462 MHz

TX Power per chain (SISO mode), ± 2 dBm.

DC power consumption is the total dc power drawn only by the miniPCIe module in 2x2 MIMO mode and it excludes the dc power drawn by the main board to which the module is connected.

RX Sensitivity per chain (SISO mode), ± 2 dBm.

Data Rate	Modulation	TX Power (dBm)	DC Power Consumption (Watts)	RX Sensitivity (dBm)
VHT20-MCS0	BPSK	27	7.0	-96
VHT20-MCS1	QPSK	27	7.0	-94
VHT20-MCS2	QPSK	27	7.0	-92
VHT20-MCS3	16-QAM	27	7.0	-89
VHT20-MCS4	16-QAM	24	6.1	-85
VHT20-MCS5	64-QAM	24	6.1	-81
VHT20-MCS6	64-QAM	24	6.1	-80
VHT20-MCS7	64-QAM	24	6.1	-79
VHT20-MCS8	256-QAM	23	5.9	-74
VHT20-MCS9	256-QAM	23	5.9	-72
VHT20-MCS10	1024-QAM	22	5.8	-69
VHT20-MCS11	1024-QAM	22	5.8	-67
VHT40-MCS0	BPSK	27	7.0	-93
VHT40-MCS1	QPSK	27	7.0	-91
VHT40-MCS2	QPSK	27	7.0	-89
VHT40-MCS3	16-QAM	26	6.5	-86
VHT40-MCS4	16-QAM	23	5.9	-82
VHT40-MCS5	64-QAM	23	5.9	-78
VHT40-MCS6	64-QAM	23	5.9	-77
VHT40-MCS7	64-QAM	23	5.9	-76
VHT40-MCS8	256-QAM	23	5.9	-71
VHT40-MCS9	256-QAM	23	5.9	-69
VHT40-MCS10	1024-QAM	22	5.8	-66
VHT40-MCS11	1024-QAM	21	5.7	-64

TX/RX Specification (11ax) – 2412 MHz to 2462 MHz

TX Power per chain (SISO mode), ± 2 dBm.

DC power consumption is the total dc power drawn only by the miniPCIe module in 2x2 MIMO mode and it excludes the dc power drawn by the main board to which the module is connected.

RX Sensitivity per chain (SISO mode), ± 2 dBm.

Data Rate	Modulation	TX Power (dBm)	DC Power Consumption (Watts)	RX Sensitivity (dBm)
HE20-MCS0	BPSK	27	7.0	-94
HE20-MCS1	QPSK	27	7.0	-93
HE20-MCS2	QPSK	27	7.0	-91
HE20-MCS3	16-QAM	26	6.5	-89
HE20-MCS4	16-QAM	24	6.1	-85
HE20-MCS5	64-QAM	24	6.1	-81
HE20-MCS6	64-QAM	24	6.1	-80
HE20-MCS7	64-QAM	24	6.1	-78
HE20-MCS8	256-QAM	22	5.8	-75
HE20-MCS9	256-QAM	22	5.8	-73
HE20-MCS10	1024-QAM	21	5.7	-70
HE20-MCS11	1024-QAM	21	5.7	-67
HE20-MCS12	4096-QAM	20	5.5	-64
HE20-MCS13	4096-QAM	20	5.5	-60
HE40-MCS0	BPSK	27	7.0	-91
HE40-MCS1	QPSK	27	7.0	-90
HE40-MCS2	QPSK	27	7.0	-88
HE40-MCS3	16-QAM	26	6.5	-86
HE40-MCS4	16-QAM	24	6.1	-82
HE40-MCS5	64-QAM	24	6.1	-78
HE40-MCS6	64-QAM	24	6.1	-77
HE40-MCS7	64-QAM	24	6.1	-75
HE40-MCS8	256-QAM	22	5.8	-72
HE40-MCS9	256-QAM	22	5.8	-70
HE40-MCS10	1024-QAM	21	5.7	-67
HE40-MCS11	1024-QAM	20	5.5	-64
HE40-MCS12	4096-QAM	20	5.5	-61
HE40-MCS13	4096-QAM	20	5.5	-57

TX Specification

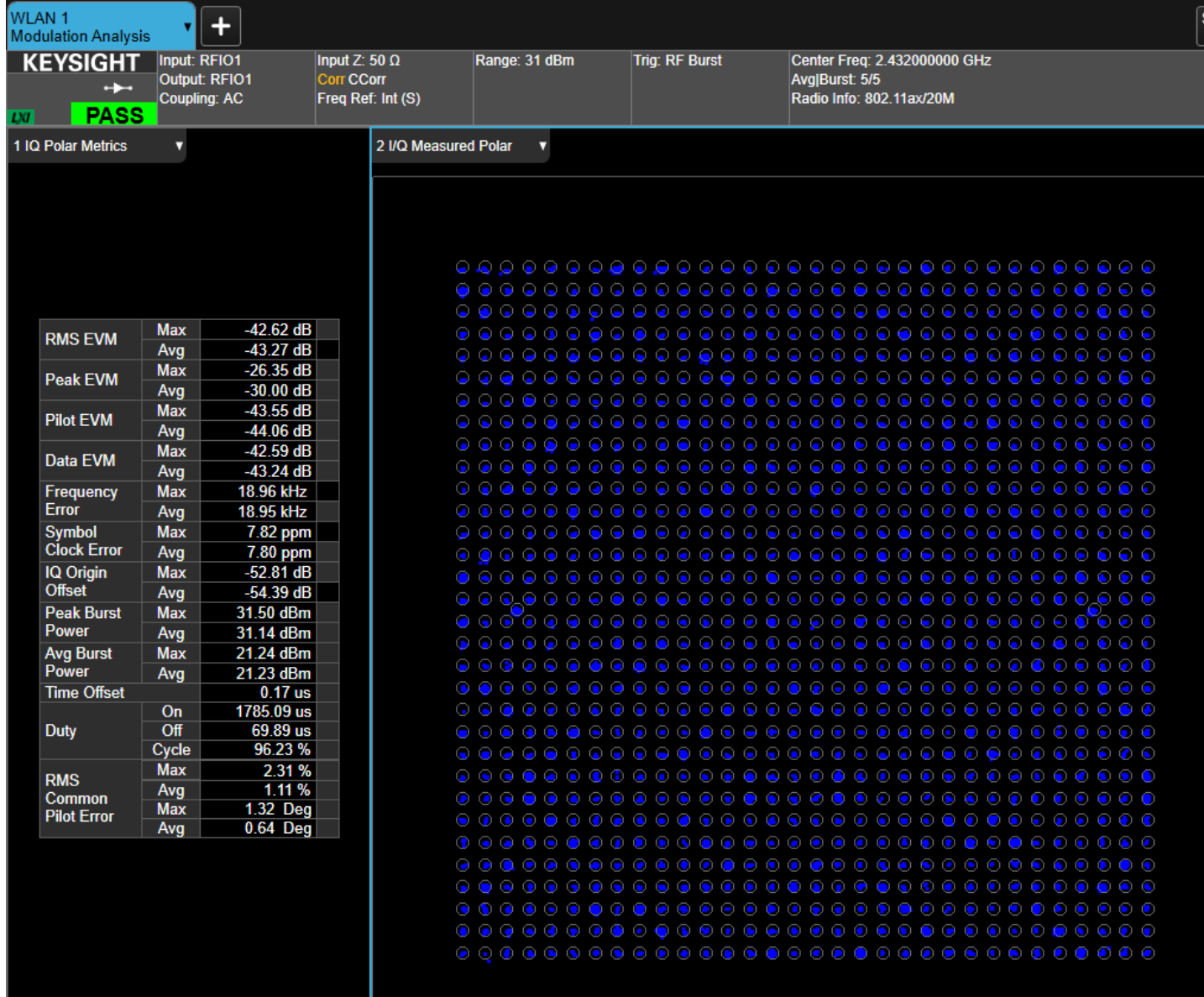
Parameter	Specification
RF Power control Step	0.5 dBm
Spectral Mask Compliance	Compliant with IEEE 802.11b/g/n/ac/ax Mask, with > 5 dB margin
EVM Compliance	Compliant with IEEE 802.11b/g/n/ac/ax EVM requirement with > 5 dB margin
Second Harmonic Spurious Emission	-30 dBC
Third Harmonic Spurious Emission	-40 dBC
Transmitter Spurious Emission	FCC PART 15C COMPLIANT

RX Specification

Parameter	Specification
Receiver Maximum input level (10% PER)	
11b, 11g < 18 Mbps, 11n/11ac/11ax < MCS5	> 2 dBm
11b, 11g > 18 Mbps, 11n/11ac/11ax > MCS5	> -10 dBm
Frequency Accuracy	Within \pm 10 PPM
Receiver Adjacent Channel Rejection (ACR)	
11g, 6 Mbps	> 25 dBC
11ac, 11ax, HE40-MCS0	> 30 dBC
11ax, HE40-MCS11	> 11 dBC
Interference De-sensitization 11ax, HE20-MCS13	
400 MHz to 2350 MHz	> 50 dBC
4800 MHz to 5825 MHz	> 60 dBC

TX EVM PERFORMANCE

Frequency = 2432 MHz, TX Power=21 dBm, IEEE 802.11ax, HE20, MCS11



TX EVM PERFORMANCE

Frequency = 2432 MHz, TX Power = 22 dBm, IEEE 802.11ac, VHT20, MCS11

WLAN 1

+

Modulation Analysis

KEYSIGHT

Input: RFIO1
 Output: RFIO1
 Coupling: AC

Input Z: 50 Ω
 Corr CCorr
 Freq Ref: Int (S)

Range: 32 dBm

Trig: RF Burst

Center Freq: 2.43200000 GHz
 AvgBurst: 5/5
 Radio Info: 802.11ac/20M

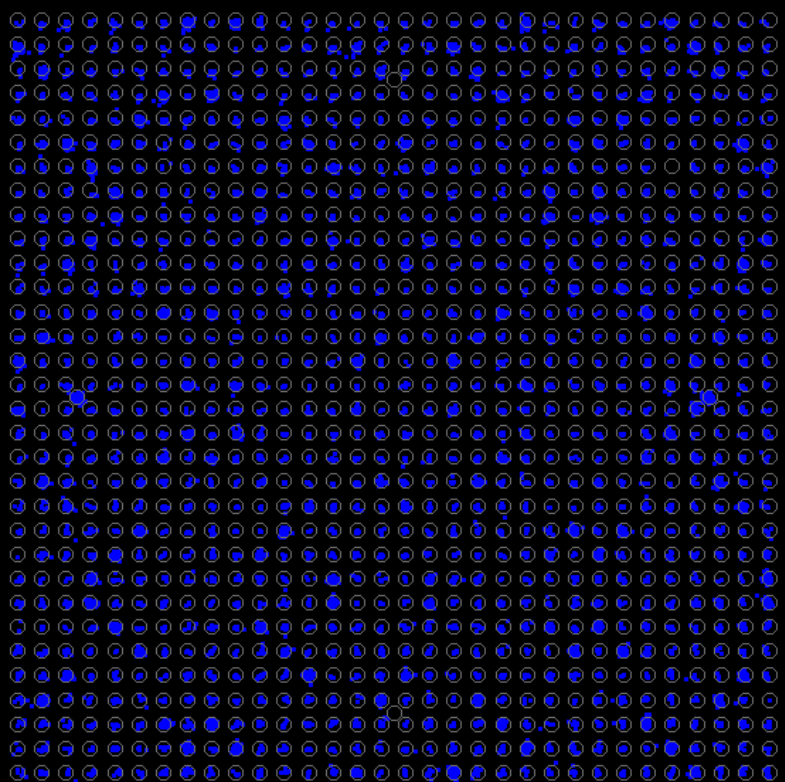
R T →

PASS

1 IQ Polar Metrics

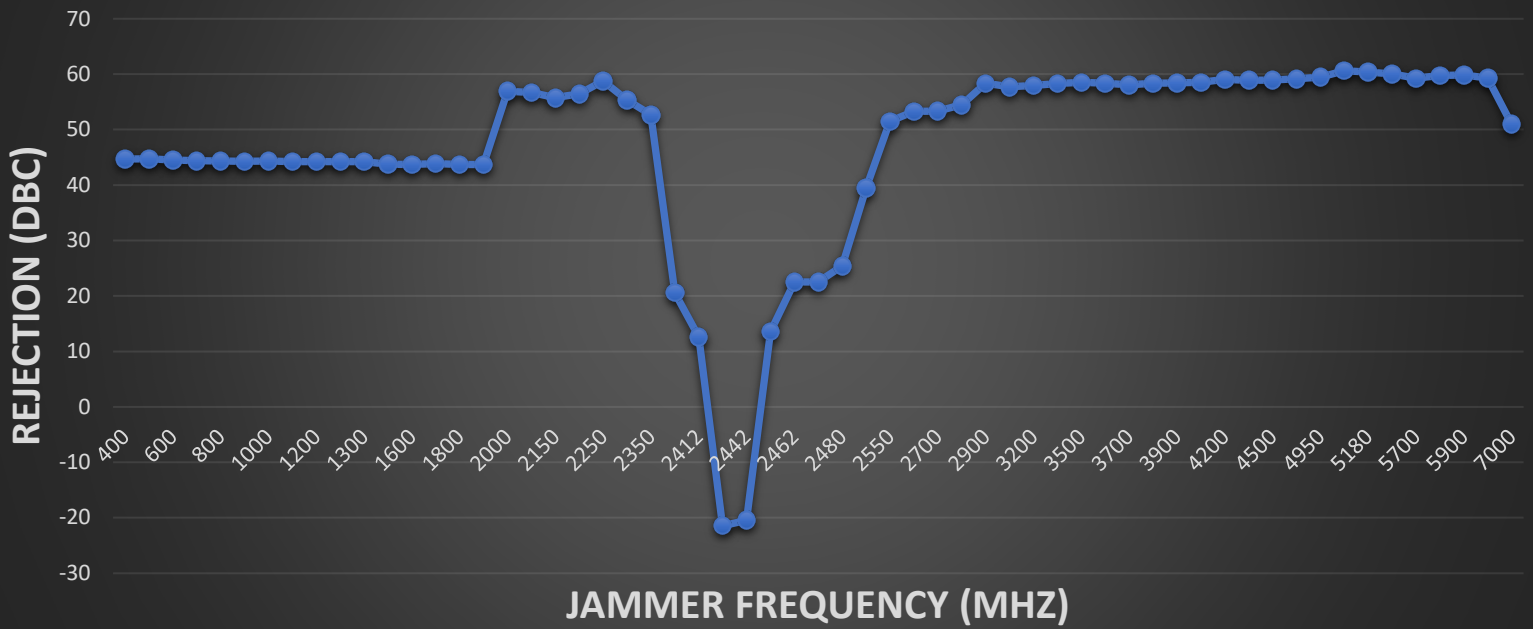
RMS EVM	Max	-40.02 dB
	Avg	-40.39 dB
Peak EVM	Max	-25.81 dB
	Avg	-26.34 dB
Pilot EVM	Max	-40.91 dB
	Avg	-41.77 dB
Data EVM	Max	-39.93 dB
	Avg	-40.30 dB
Frequency Error	Max	16.14 kHz
	Avg	16.11 kHz
Symbol Clock Error	Max	6.64 ppm
	Avg	6.62 ppm
IQ Origin Offset	Max	-55.68 dB
	Avg	-57.67 dB
Peak Burst Power	Max	31.32 dBm
	Avg	31.13 dBm
Avg Burst Power	Max	21.86 dBm
	Avg	21.86 dBm
Time Offset		0.17 us
	On	2320.26 us
Duty	Off	69.73 us
	Cycle	97.08 %
RMS Common Pilot Error	Max	1.74 %
	Avg	1.12 %
	Max	1.00 Deg
	Avg	0.64 Deg

2 I/Q Measured Polar



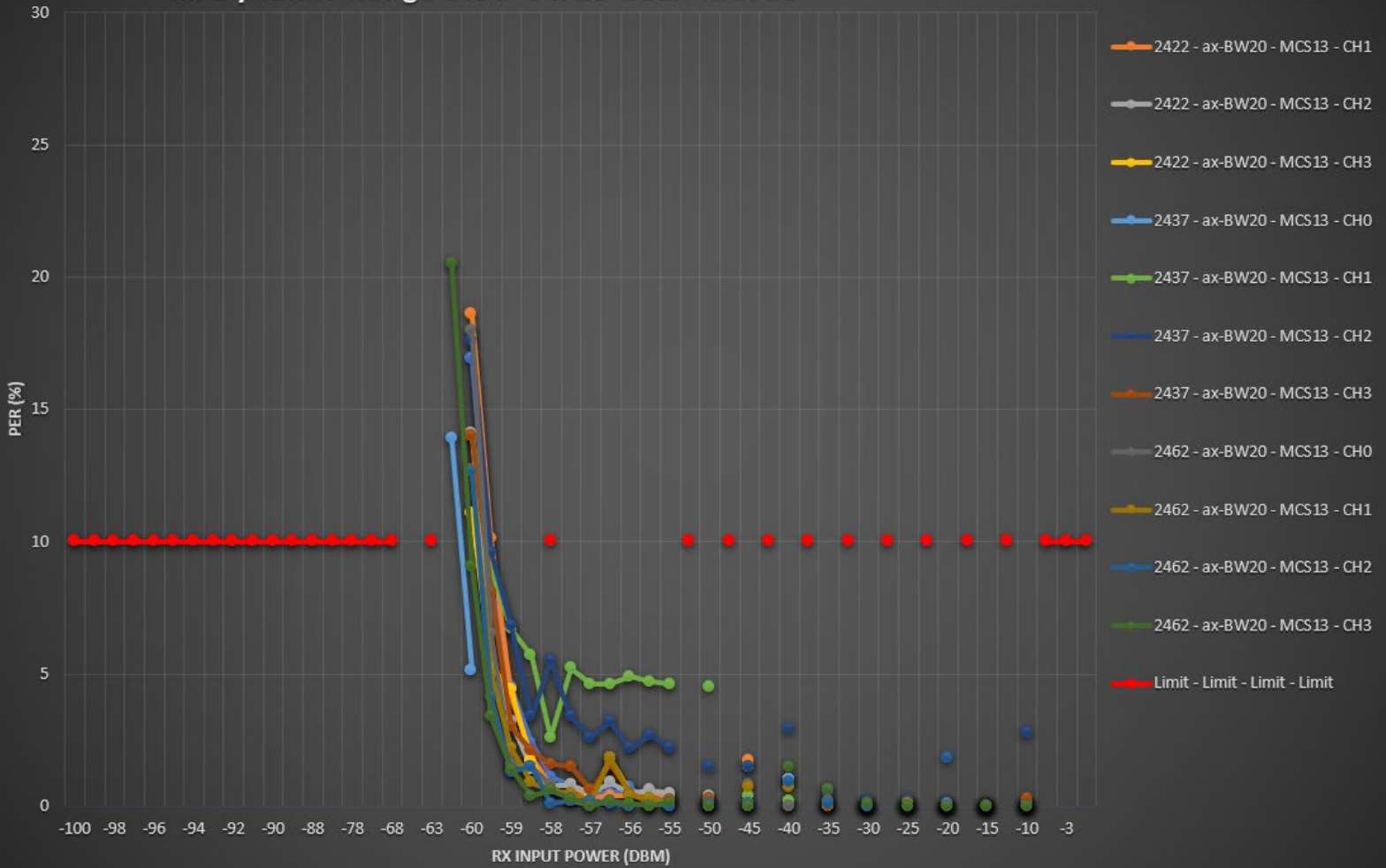
Interference Desensitization

**RX Interference DeSensitization
2432MHz, 11ax-MCS13-HE20-SISO**



Receiver Dynamic Range

Rx Dynamic Range-SISO-BW20-11ax-MCS13

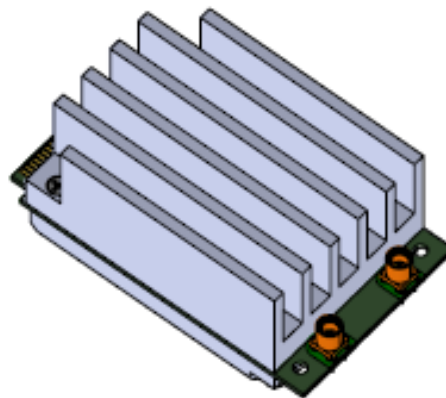
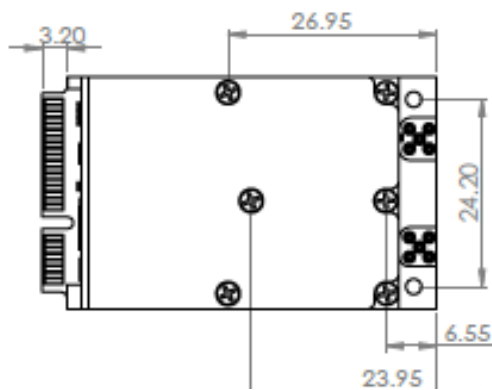
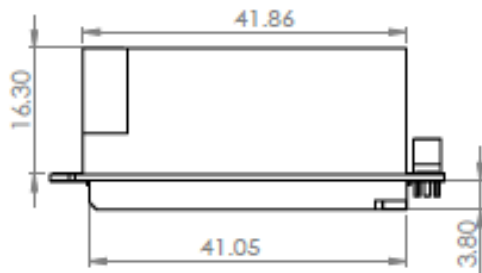
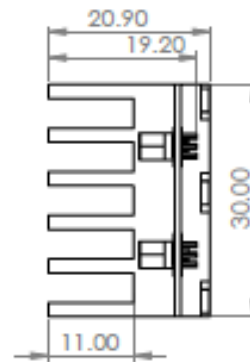
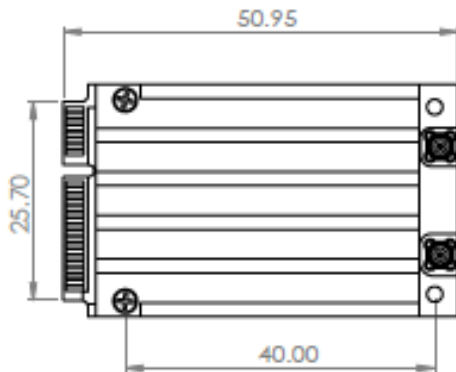


MINIPCIE (GOLD FINGER) PIN-OUT

Pin#	Description
1	WAKE_L
2	3.3V
3	RESERVED (NC)
5	RESERVED (NC)
6	1.5V (NC)
7	CLKREQ_L, connected to GND through a pull-down resistor of 0 Ohms.
8	UIM_PWR (NC)
10	UIM_DATA (NC)
11	REFCLK-
12	UIM-CLK (NC)
13	REFCLK+
14	UIM-RESET (NC)
16	UIM_VPP (NC)
17	UIM_C8 (NC)
19	UIM_C4 (NC)
20	W_DISABLE_L (Pulled up to 3.3V)
22	RESET
23	PERNO
24	3.3VAUX (NC)
25	PERPO
28	1.5V (NC)
30	SMB_CLK (NC)
31	PETNO
32	SMB_DATA(NC)
33	PETPO
36	USB_D- (NC)
37	RESERVED (NC)
38	USB_D+ (NC)
39	3.3V
41	3.3V
42	LED_WWAN_L (NC)
44	LED_WLAN_L (NC)
45	5V (FOR PA)
46	LED_WPAN_L (NC)
47	5V (FOR PA)
48	1.5V (NC)
49	5V (FOR PA)
51	5V (FOR PA)
52	3.3V
4,9,15,18,21,26,27,29,34,35,40,43,50	GND

NC- NO CONNECTION

MECHANICAL DIMENSIONS



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