vizmo

FREEDOM FROM WIRES

DATASHEET

nE2-902

IEEE 802.11 b/g/n, MIMO

High-Performance, 2x2 MIMO MiniPCIe Radio Module

Sub GHz ISM Band

902 MHz to 928 MHz operating Frequency in license-free Band, 5/10/20 MHz Channel Bandwidths

Industrial grade

-40 deg C to +85 deg C operation temperature

dun & bradstreet

Business Eminence Awards 2020 Singapore

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TECHNICAL SPECIFICATION

RADIO MODULE – GENERAL INFO	
Chipset	AR 9592-AR1B
EEPROM	EEPROM, SERIAL 32KBIT
Operating frequency (11b/g/n) Baseband Frequency Offset Operating Channel Mapping	902 MHz to 928 MHz 1520 MHz CH4(2427) = 902 MHz CH5(2432) CH6(2437) CH7(2442)
Data rate -11b Data rate-11g Data rate-11n (Data rate-11n (MIMO)	1 Mbps, 2 Mbps, 5.5 Mbps, 11 Mbps 6Mbps, 9Mbps, 12Mbps, 24Mbps, 36Mbps, 48Mbps,54Mbps MCS0, MCS1, MCS2, MCS3, MCS4, MCS5, MCS6, MCS7 MCS8.MCS9.MCS10,MCS11,MCS12,MCS13,MCS14,MCS15
Channel BW	5 MHz/10 MHz/20 MHz – 907 MHz, 912 MHz, 917 MHz, 922 MHz 5 MHz/10 MHz – 907 MHz, 922 MHz
RoHS Compliance	Compliant
INTERFACE SPECIFICATIONS	
Operating Voltage	3.3V DC
RF Antenna connector	x2 MMCX Female(Jack) 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	TBD
REGULATORY INFORMATION	
Compliance	TBD
PACKAGING INFORMATION	
No of units	TBD

ORDERING INFORMATION	
nE2-902	Mini PCIe Radio Module, MIMO, IEEE 802.11 b/g/n ,902 MHz, 29 dBm

RADIO SPECIFICATION

Tolerance for TX Power and Sensitivity = +/- 2 dBm, CH0+CH1 (MIMO)

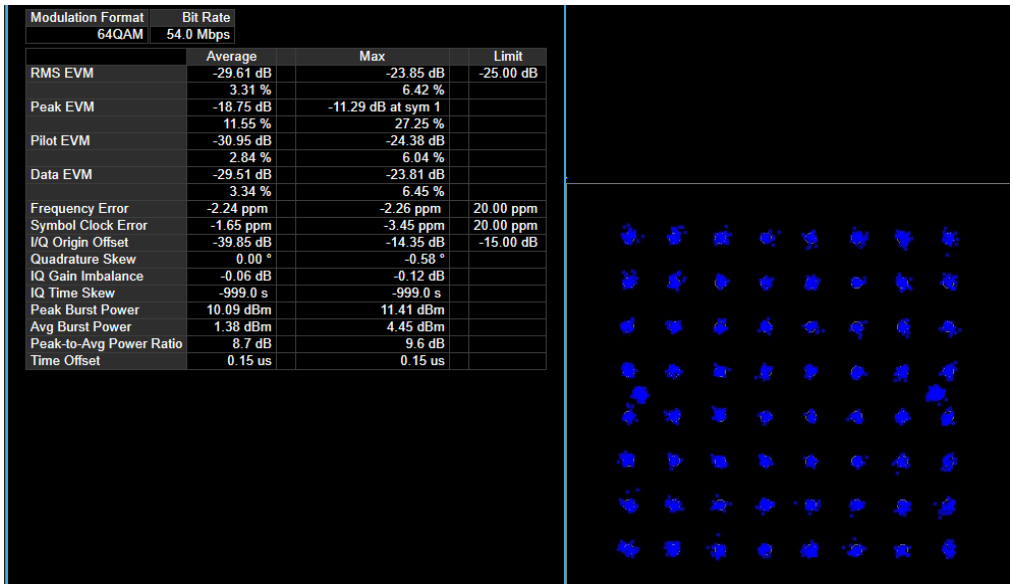
Data Rate	TX Power (dBm) (Per chain)	Power Consumption (W)	RX Sensitivity (dBm)
11 Mbps	29	5.80	-91
5.5 Mbps	29	5.80	-94
2 Mbps	29	5.80	-94
1 Mbps	29	5.80	-98
54 Mbps	23	4.00	-75
48 Mbps	25	4.30	-78
36 Mbps	27	4.90	-81
24 Mbps	29	5.80	-85
18 Mbps	29	5.80	-87
12Mbps	29	5.80	-92
9 Mbps	29	5.80	-93
6 Mbps	29	5.80	-94
HT20-MCS15	23	3.8	-67
HT20-MCS14	24	4.10	-71
HT20-MCS13	24	4.10	-74
HT20-MCS12	27	4.90	-78
HT20-MCS11	29	5.80	-81
HT20-MCS10	29	5.80	-85
HT20-MCS9	29	5.80	-89
HT20-MCS8	29	5.80	-91

Channel Mapping – 902 MHz to 928 MHz

BASE BAND (MHz)	OP FREQ (MHz)	CH BW (MHz)	STANDARD (11b/g/n)
2427	907	5/10	11g/n
2432	912	5/10/20	11b/g/n
2437	917	5/10/20	11b/g/n
2442	922	5/10	11g/n

EVM PERFORMANCE

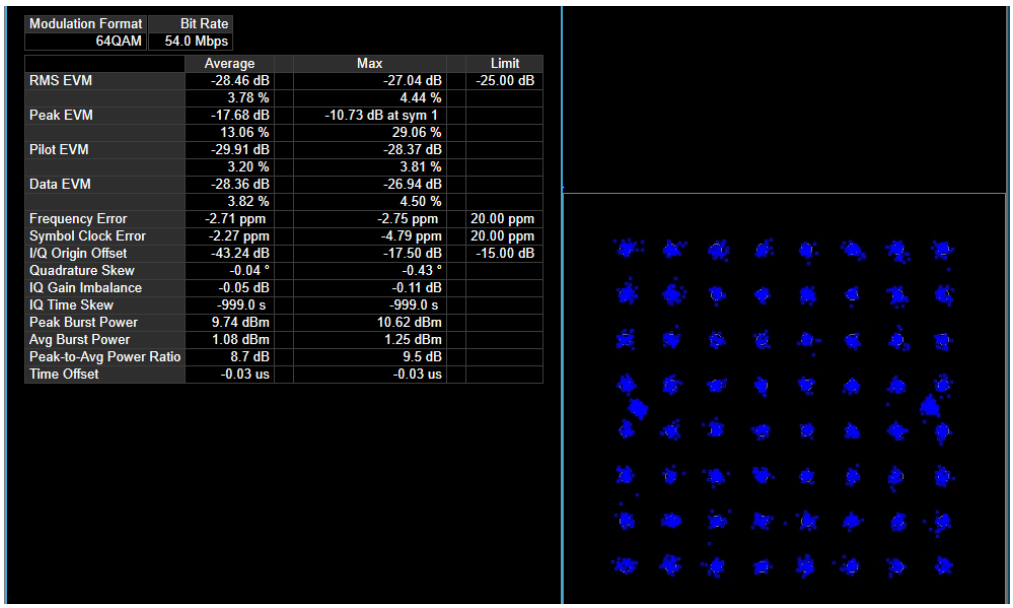
Frequency = 912 MHz, 802.11g, 54 Mbps, CH0



Modulation Format	Bit Rate
64QAM	54.0 Mbps

	Average	Max	Limit
RMS EVM	-29.61 dB	-23.85 dB	-25.00 dB
	3.31 %	6.42 %	
Peak EVM	-18.75 dB	-11.29 dB at sym 1	
	11.55 %	27.25 %	
Pilot EVM	-30.95 dB	-24.38 dB	
	2.84 %	6.04 %	
Data EVM	-29.51 dB	-23.81 dB	
	3.34 %	6.45 %	
Frequency Error	-2.24 ppm	-2.26 ppm	20.00 ppm
Symbol Clock Error	-1.65 ppm	-3.45 ppm	20.00 ppm
I/Q Origin Offset	-39.85 dB	-14.35 dB	-15.00 dB
Quadrature Skew	0.00 °	-0.58 °	
IQ Gain Imbalance	-0.06 dB	-0.12 dB	
IQ Time Skew	-999.0 s	-999.0 s	
Peak Burst Power	10.09 dBm	11.41 dBm	
Avg Burst Power	1.38 dBm	4.45 dBm	
Peak-to-Avg Power Ratio	8.7 dB	9.6 dB	
Time Offset	0.15 us	0.15 us	

Frequency = 912 MHz, 802.11g, 54 Mbps, CH1



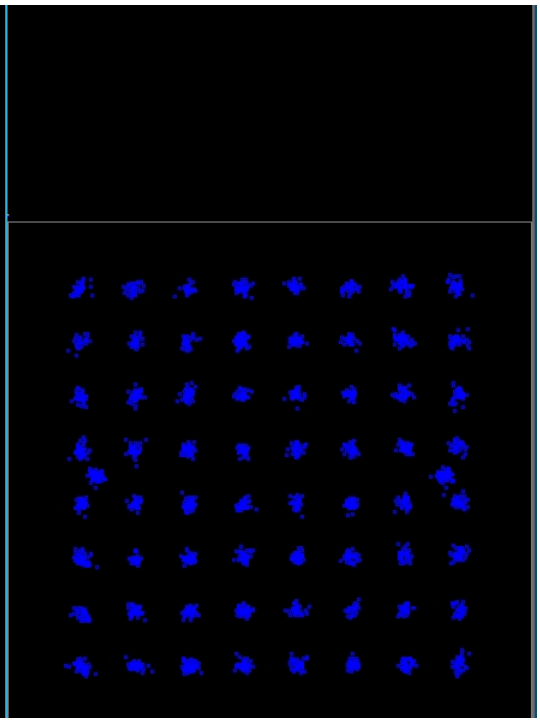
Modulation Format	Bit Rate
64QAM	54.0 Mbps

	Average	Max	Limit
RMS EVM	-28.46 dB	-27.04 dB	-25.00 dB
	3.78 %	4.44 %	
Peak EVM	-17.68 dB	-10.73 dB at sym 1	
	13.06 %	29.06 %	
Pilot EVM	-29.91 dB	-28.37 dB	
	3.20 %	3.81 %	
Data EVM	-28.36 dB	-26.94 dB	
	3.82 %	4.50 %	
Frequency Error	-2.71 ppm	-2.75 ppm	20.00 ppm
Symbol Clock Error	-2.27 ppm	-4.79 ppm	20.00 ppm
I/Q Origin Offset	-43.24 dB	-17.50 dB	-15.00 dB
Quadrature Skew	-0.04 °	-0.43 °	
IQ Gain Imbalance	-0.05 dB	-0.11 dB	
IQ Time Skew	-999.0 s	-999.0 s	
Peak Burst Power	9.74 dBm	10.62 dBm	
Avg Burst Power	1.08 dBm	1.25 dBm	
Peak-to-Avg Power Ratio	8.7 dB	9.5 dB	
Time Offset	-0.03 us	-0.03 us	

Frequency = 912 MHz, 802.11n, MCS0 (65Mbps), CH0

Modulation Format	Bit Rate
64QAM	65.0 Mbps

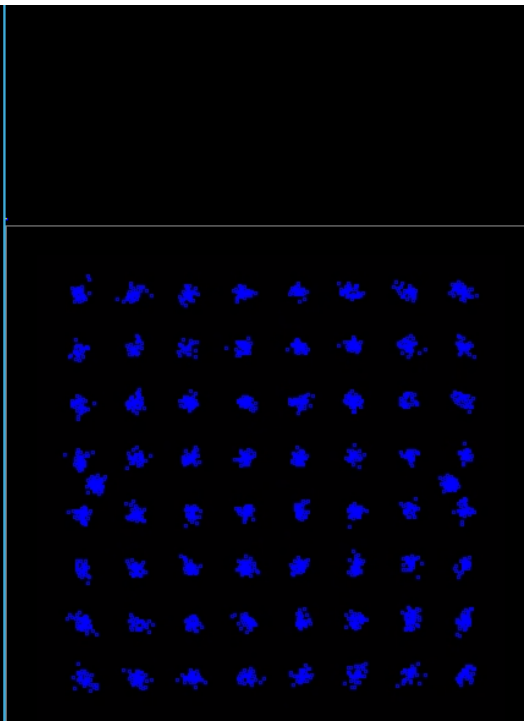
	Average	Max	Limit
RMS EVM	-29.52 dB	-28.29 dB	-27.00 dB
	3.34 %	3.85 %	
Peak EVM	-19.15 dB	-16.00 dB at sym 12	
	11.03 %	15.85 %	
Pilot EVM	-30.81 dB	-29.22 dB	
	2.88 %	3.46 %	
Data EVM	-29.44 dB	-28.17 dB	
	3.37 %	3.90 %	
Frequency Error	-2.85 ppm	-2.88 ppm	25.00 ppm
Symbol Clock Error	-2.63 ppm	-5.15 ppm	25.00 ppm
I/Q Origin Offset	-31.99 dB	-30.70 dB	-15.00 dB
Quadrature Skew	0.23 °	0.39 °	
IQ Gain Imbalance	-0.10 dB	-0.12 dB	
IQ Time Skew	1.947 ps	72.25 ps	
Peak Burst Power	10.23 dBm	11.15 dBm	
Avg Burst Power	1.46 dBm	1.58 dBm	
Peak-to-Avg Power Ratio	8.8 dB	9.7 dB	
Time Offset	0.18 us	0.18 us	



Frequency = 912 MHz, 802.11n, MCS0 (65Mbps), CH0

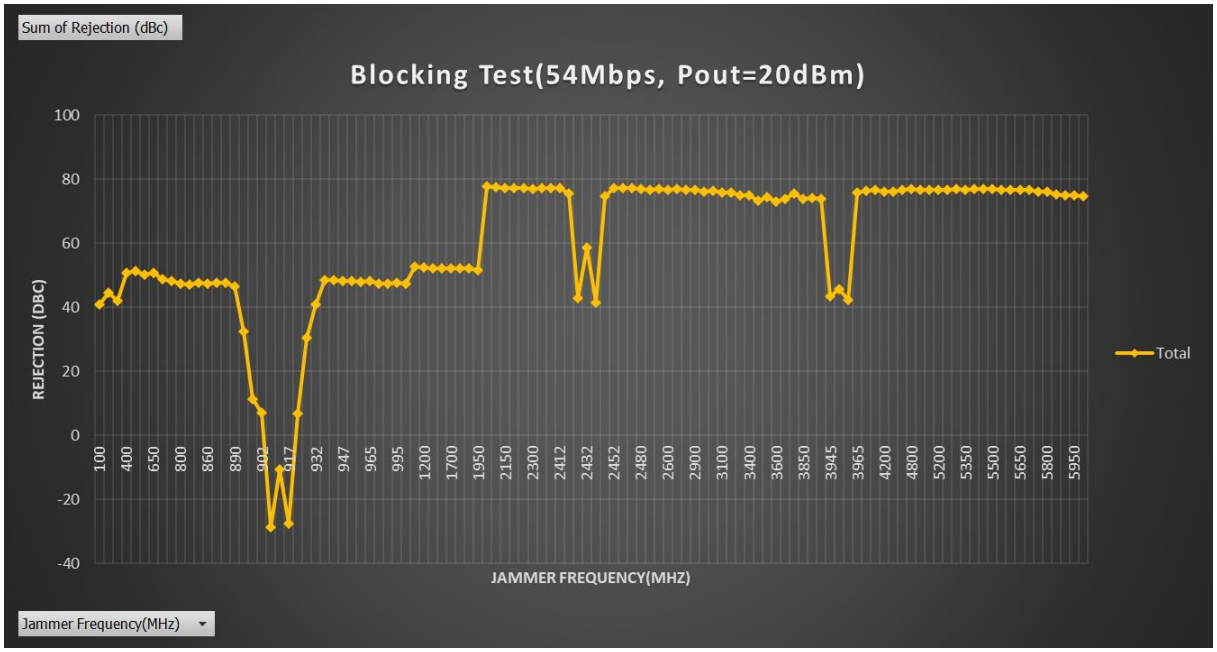
Modulation Format	Bit Rate
64QAM	65.0 Mbps

	Average	Max	Limit
RMS EVM	-28.76 dB	-27.07 dB	-27.00 dB
	3.65 %	4.43 %	
Peak EVM	-17.82 dB	-14.14 dB at sym 41	
	12.86 %	19.63 %	
Pilot EVM	-30.10 dB	-28.52 dB	
	3.13 %	3.75 %	
Data EVM	-28.68 dB	-26.97 dB	
	3.68 %	4.48 %	
Frequency Error	-2.64 ppm	-2.67 ppm	25.00 ppm
Symbol Clock Error	-2.29 ppm	-5.97 ppm	25.00 ppm
I/Q Origin Offset	-38.11 dB	-17.50 dB	-15.00 dB
Quadrature Skew	0.32 °	0.51 °	
IQ Gain Imbalance	-0.06 dB	-0.10 dB	
IQ Time Skew	107.7 ps	193.1 ps	
Peak Burst Power	9.72 dBm	10.74 dBm	
Avg Burst Power	1.04 dBm	1.19 dBm	
Peak-to-Avg Power Ratio	8.7 dB	9.6 dB	
Time Offset	-0.15 us	-0.15 us	



Interference Desensitization

Frequency = 912 MHz, 802.11n, MCS0 (65Mbps), CH0+CH1



Data rate vs Attenuation (MIMO) – with Mikrotik RBM33G

Frequency = 912 MHz, 802.11 b/g/n mode, MIMO

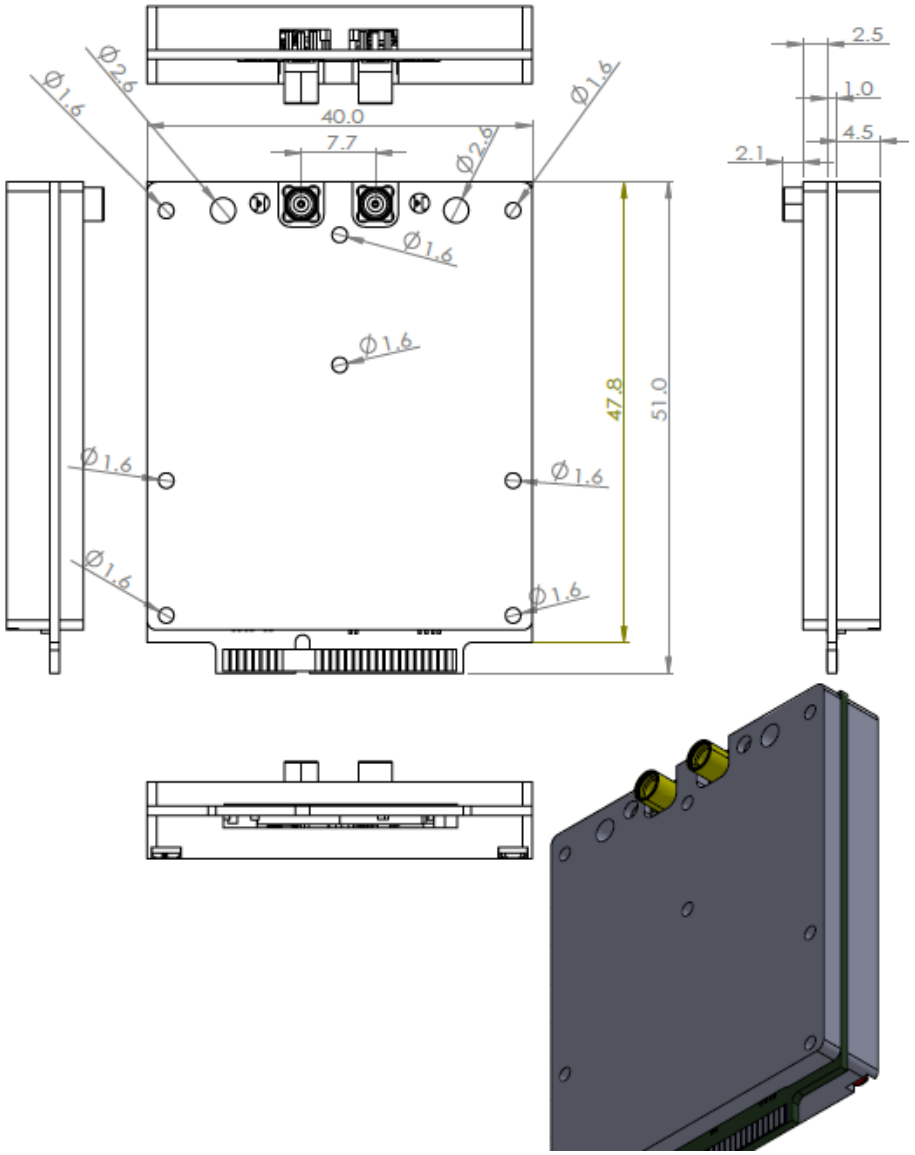
Att (dB)	BW (MHz)	WR (Mbps)	BW (MHz)	WR (Mbps)	BW (MHz)	WR (Mbps)
86	20	144.4	10	72.2	5	36.1
106	20	57.7	10	39	5	19.5
120	20	11	10	7.2	5	3.6

Legends
Att – RF Attenuation between Transmitter and Receiver
BW – Channel Bandwidth
WR – Working Rate

MINIPCIE (GOLD FINGER) PIN-OUT

Pin#	Description
1	WAKE_L
2	3.3V
3	RESERVED (Connected to GPIO12)
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 and connected to GPIO7 of AR9592)
22	RESET
23	PERN0
24	3.3VAUX (NC)
25	PERP0
28	1.5V (NC)
30	SMB_CLK (NC)
31	PETN0
32	SMB_DATA(NC)
33	PETP0
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 (Connected to GPIO10)
45	NC
46	LED_WPAN_L (NC)
47	NC
48	1.5V (NC)
49	NC
51	NC
52	3.3V
4,9,15,18,21,26,27,29,34,35,40,43,50	GND

MECHANICAL DIMENSIONS



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