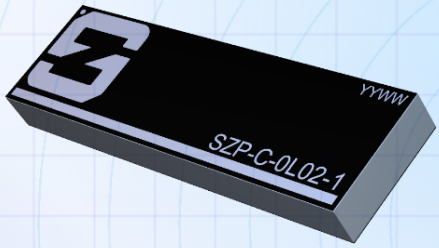
SP TECHNOLOGY

PRODUCT DATASHEET



LTE SMD

OPALA

4G LTE SMD Antenna

SZP-C-0L02

FREQUENCY	PEAK GAIN	MOUNTING	SIZE
698 to 960 / 1710 to 2690 MHz	Up to 3.40 dBi	SMD, PCB edge	32.8 × 9.6 × 3.3 mm

LOW BAND	698 to 960 MHz	Covers 4G LTE / 3G / 2G
MID BAND	1710 to 2200 MHz	Covers 4G LTE / 3G / 2G
2.3 GHZ	2300 to 2400 MHz	Covers 4G LTE
2.6 GHZ	2500 to 2690 MHz	Covers 4G LTE

Key Features

- Designed for compact devices with limited space
- Resistant to de-tuning
- 4G LTE, backward compatible with 3G / 2G
- Less dependency on GND plane length
- SMD, supplied in tape and reel
- Patent pending design

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2026
Rev A

1 Introduction

A highly compact yet high performance solution for devices that require embedded antenna designs. Synzen have created the optimal solution for 4G LTE applications that also simplifies the design in process.

Features

- Designed to work in compact devices with limited space
- Resistant to de-tuning
- For 4G LTE applications, but also backward compatible for 3G / 2G systems
- Less dependency on GND plane length
- SMD component supplied in tape and reel
- Higher performance than larger OTS solutions
- Simple design in process
- Project life support direct from Synzen engineers
- Suitable for sealing with resin / potting compounds
- Patent pending design

Applications

- Telematics
- Smart Metering
- Home Automation
- Smart City
- Gateways
- Healthcare
- Drones
- POS
- OBD-II

2 Mechanical Specifications

Part Number	SZP-C-0L02
Name	OPALA
Dimensions (mm)	32.8 × 9.6 × 3.3
Required Clearance Area (mm)	32.8 × 11.6
Weight	<2 g
Antenna Type	Surface Mount Device

3 RF Specifications

Frequency Range (MHz)	Average Efficiency	Peak Gain (dBi)	S11 (max) dB	VSWR (max)	Impedance
698 to 960	>50%	1.50	<-6.0	3.10:1	**50 Ω**
1710 to 2200	>55%	3.40	<-7.5	2.90:1	
2300 to 2400	>50%	2.70	<6.0	3.25:1	
2500 to 2690	>50%	1.50	<-5.0	3.50:1	

Polarization: Linear. All performance stated is measured on Synzen OPALA DVK (SZDV-C-0L02).

4 Environmental

Operational Temperature	-40 to +125°C
Storage Temperature	-10 to +40°C
Relative Humidity	≤75%
Halogen Free	Yes

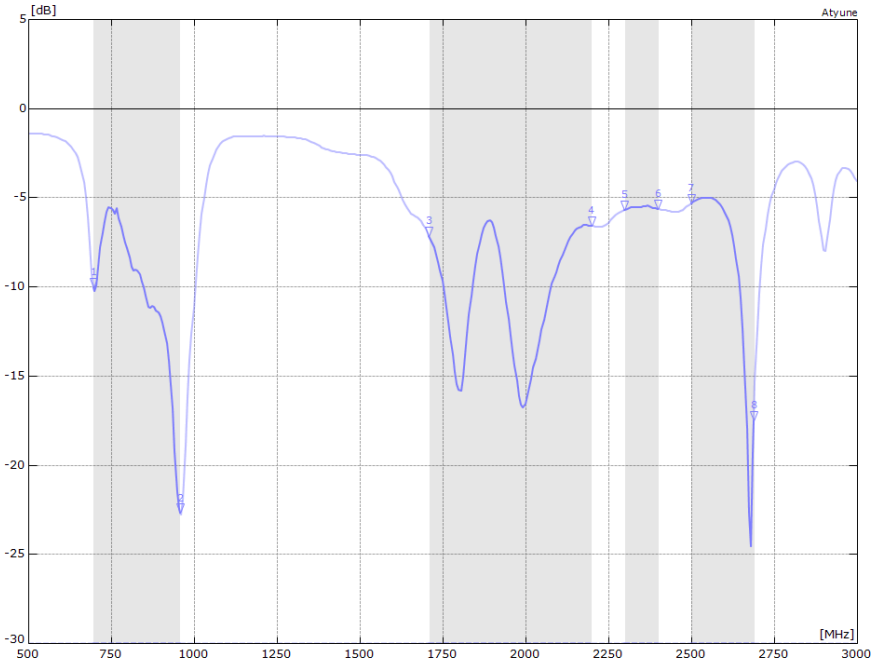
5 4G LTE Supported Band List

Band	Freq. Band (MHz)	Uplink (MHz)	Downlink (MHz)	Supported
1	2100	1920 to 1980	2110 to 2170	YES
2	1900	1850 to 1910	1930 to 1990	YES
3	1800	1710 to 1785	1805 to 1880	YES
4	1700	1710 to 1755	2110 to 2155	YES
5	850	824 to 849	869 to 894	YES
7	2600	2500 to 2570	2620 to 2690	YES
8	900	880 to 915	925 to 960	YES
10	1700	1710 to 1770	2110 to 2170	YES
11	1500	1427.9 to 1447.9	1475.9 to 1495.9	NO
12	700	699 to 716	729 to 746	YES
13	700	777 to 787	746 to 756	YES
14	700	788 to 798	758 to 768	YES
17	700	704 to 716	734 to 746	YES
18	850	815 to 830	860 to 875	YES
19	850	830 to 845	875 to 890	YES
20	800	832 to 862	791 to 821	YES
21	1500	1447.9 to 1462.9	1495.9 to 1510.9	NO
22	3500	3410 to 3490	3510 to 3590	NO
24	1600	1626.5 to 1660.5	1525 to 1559	NO
25	1900	1850 to 1915	1930 to 1995	YES
26	850	814 to 849	859 to 894	YES
27	800	807 to 824	852 to 869	YES
28	700	703 to 748	758 to 803	YES
29	700	N/A	717 to 728	YES
30	2300	2305 to 2315	2350 to 2360	YES
31		452.5 to 457.5	462.5 to 467.5	NO

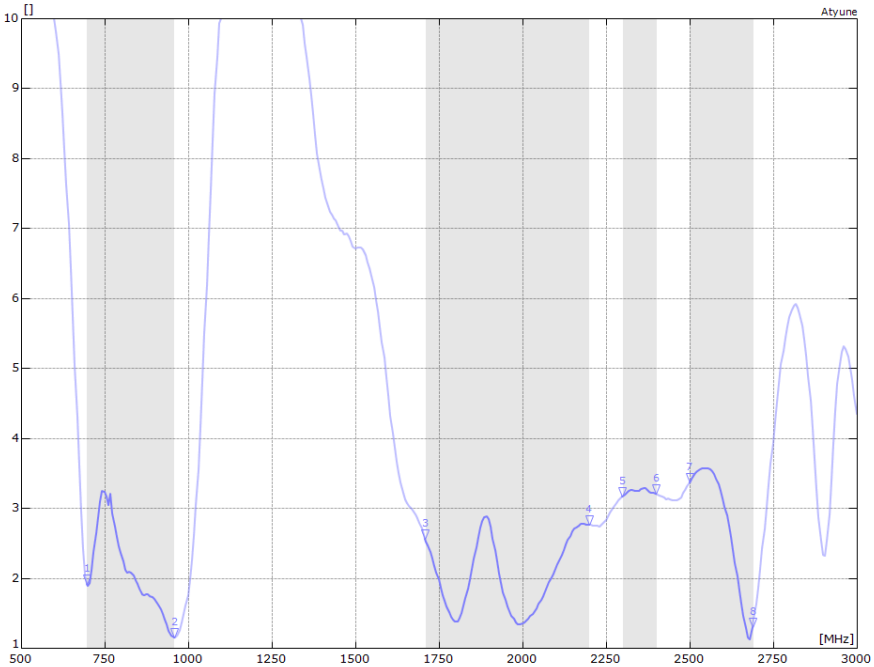
Band	Freq. Band (MHz)	Uplink (MHz)	Downlink (MHz)	Supported
32	1500	N/A	1452 to 1496	NO
33	2100	1900 to 1920		YES
34	2100	2010 to 2025		YES
35	1900	1850 to 1910		YES
36	1900	1930 to 1990		YES
37		1910 to 1930		YES
38	2600	2570 to 2620		YES
39	1900	1880 to 1920		YES
40	2300	2300 to 2400		YES
41	2500	2496 to 2690		YES
42	3500	3400 to 3600		NO
43	3700	3600 to 3800		NO
44	700	703 to 803		YES
45	1500	1447 to 1467		NO
46	5200	5150 to 5925		NO
47	5900	5855 to 5925		NO
48	3600	3550 to 3700		NO
50	1500	1432 to 1517		NO
51	1500	1427 to 1432		NO
65	2100	1920 to 2010	2110 to 2200	YES
66	1700	1710 to 1780	2110 to 2200	YES
67	700	N/A	738 to 758	YES
68	700	698 to 728	753 to 783	YES
69	2600	N/A	2570 to 2620	YES
70	2000	1695 to 1710	1995 to 2020	NO

6 RF Characteristics

S11 Parameter

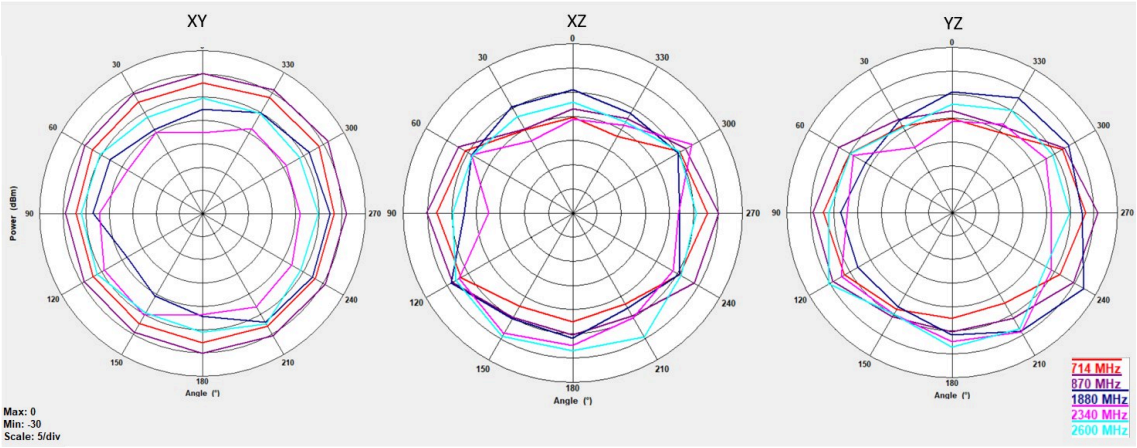


VSWR



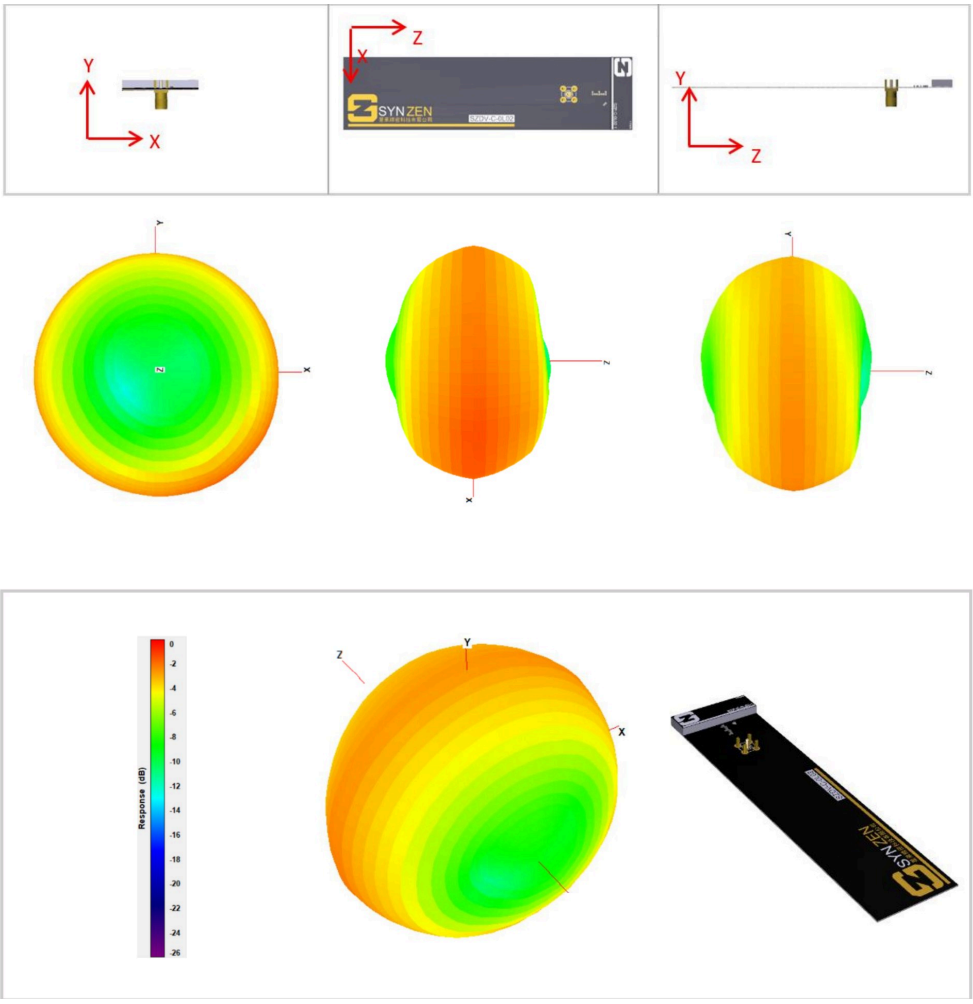
7 2D Polar Plot

MEASURED ON SYNZEN OPALA DVK (SZDV-C-0L02)



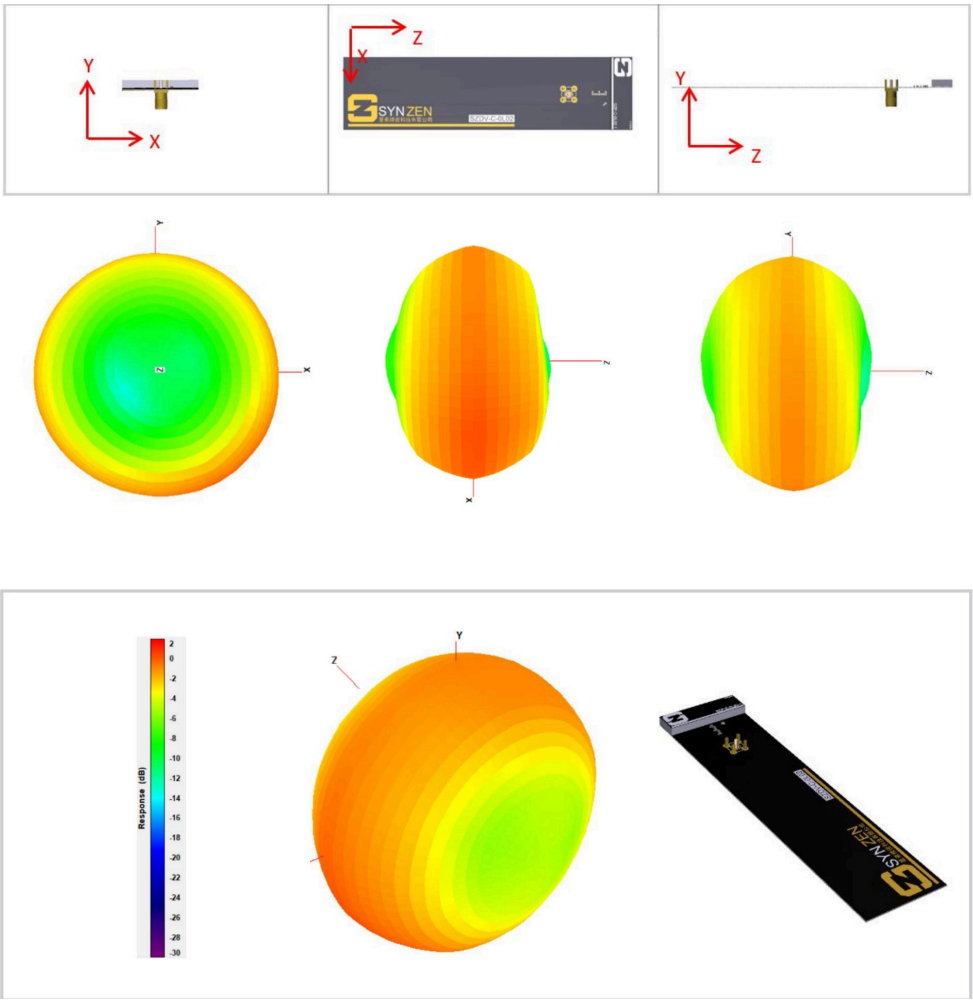
8 3D Radiation Pattern at 714 MHz

MEASURED ON SYNZEN OPALA DVK (SZDV-C-0L02), FREQUENCY POINT 714 MHZ



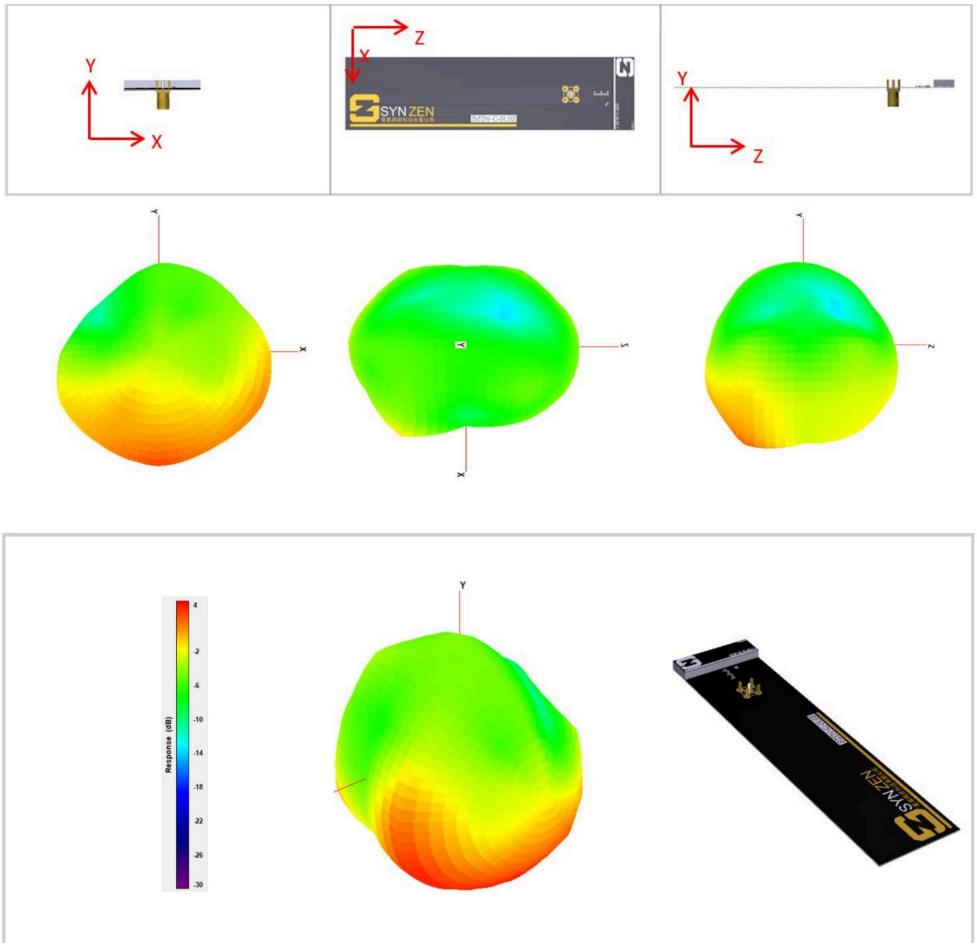
9 3D Radiation Pattern at 870 MHz

MEASURED ON SYNZEN OPALA DVK (SZDV-C-0L02), FREQUENCY POINT 870 MHZ



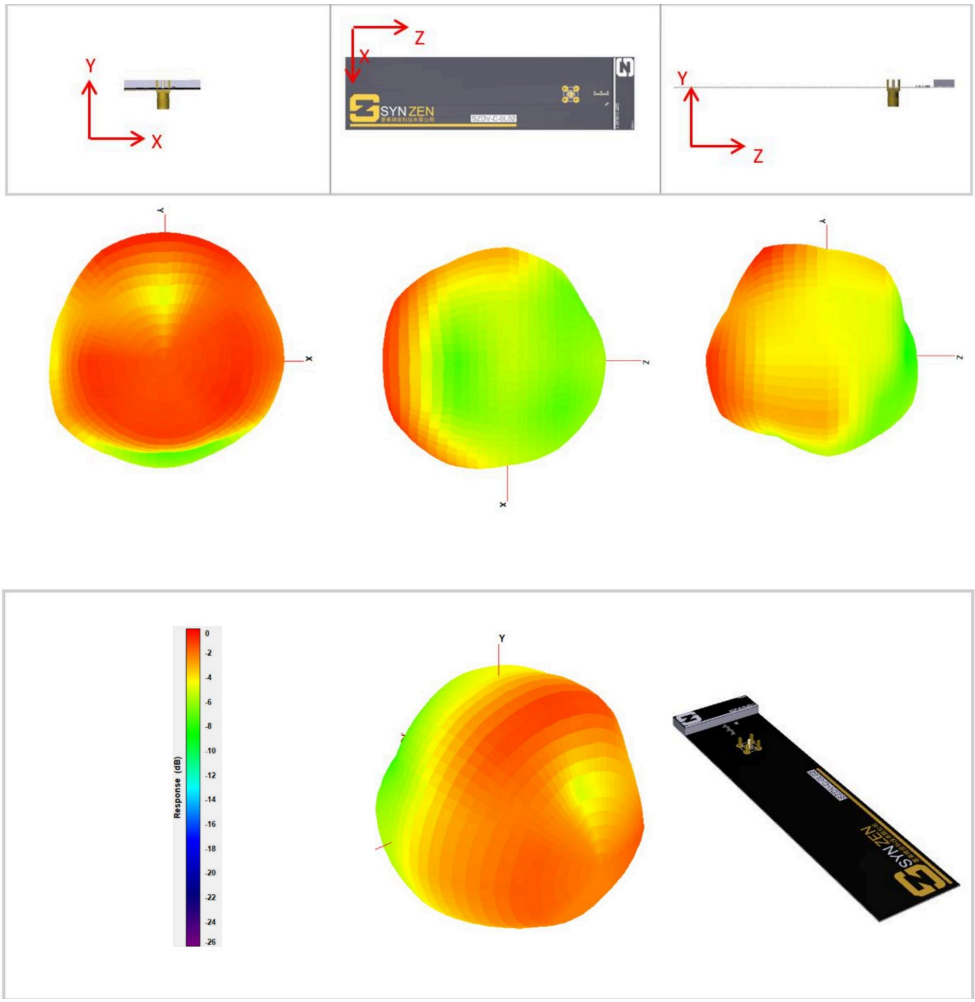
10 3D Radiation Pattern at 1880 MHz

MEASURED ON SYNZEN OPALA DVK (SZDV-C-0L02), FREQUENCY POINT 1880 MHZ

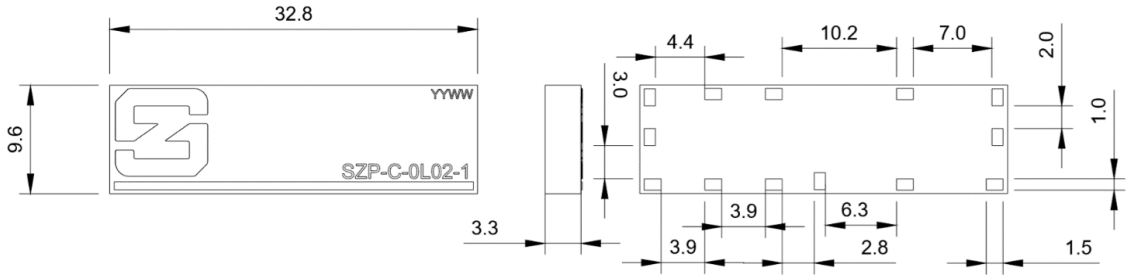


11 3D Radiation Pattern at 2600 MHz

MEASURED ON SYNZEN OPALA DVK (SZDV-C-0L02), FREQUENCY POINT 2600 MHZ



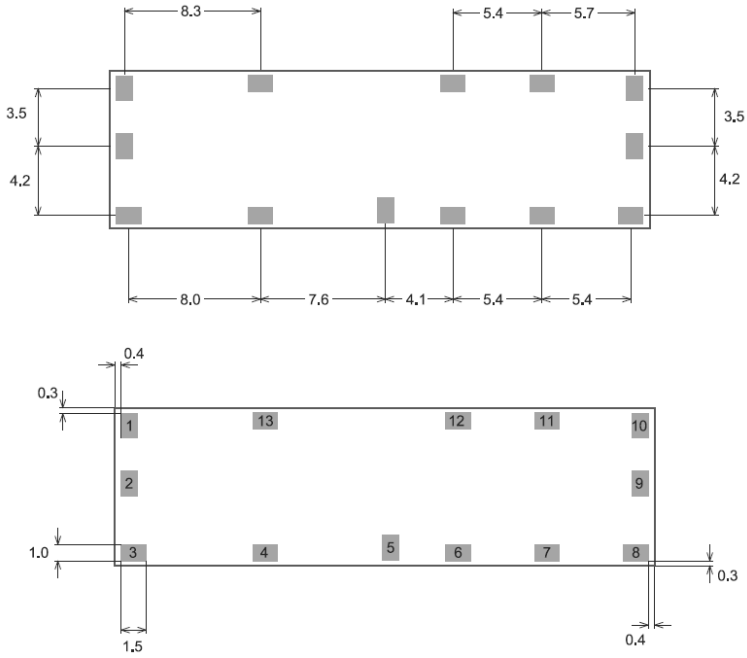
12 Antenna Mechanical Drawing



All dimensions in mm

13 Required Host PCB Footprint

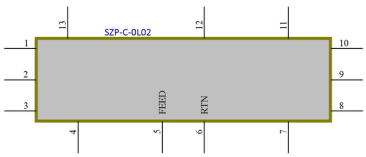
The host PCB requires the footprint shown below. PCB library files and DXF are available from our website www.synzen.com.tw/products.



All dimensions in mm

14 SZP-C-0L02 Schematic Symbol

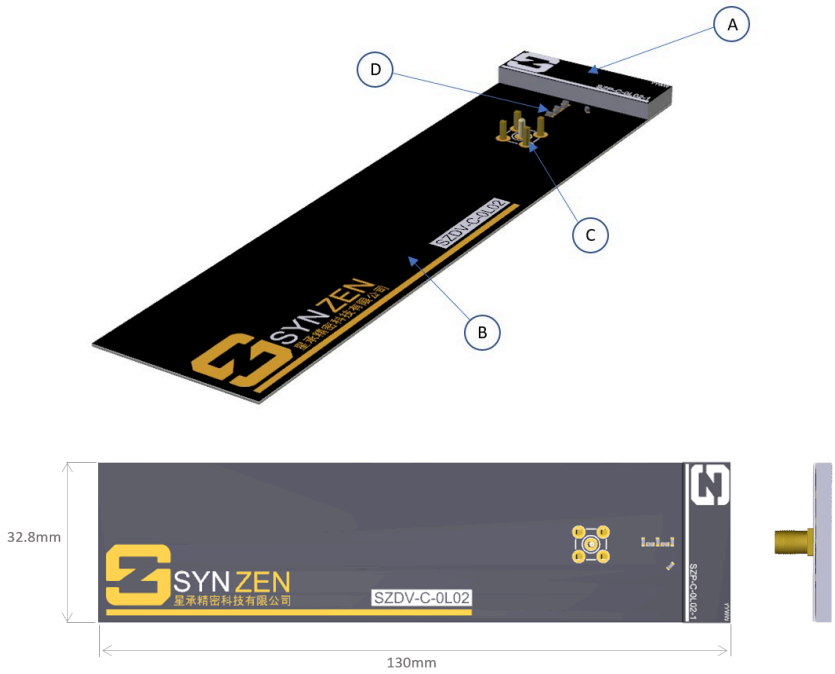
The schematic symbol for the antenna is shown below with a description of each pin.



Pin	Description
1, 2, 3, 4, 7, 8, 9, 10, 11, 12, 13	Not used (mechanical support)
5	Feed to matching network
6	Tuning return

15 SZDV-C-0L02 Development Kit

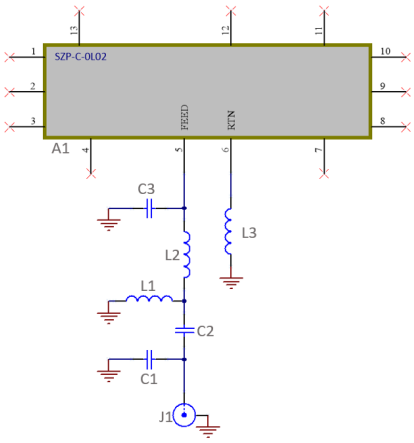
The SZDV-C-0L02 development kit is a PCBA with the LTE antenna (OPALA) fitted and optimized with a matching network. Connection to the antenna is made using the fitted female SMA connector.



Item	Description
A	SZP-C-0L02 (Antenna)
B	Host PCB
C	SMA Connector
D	Matching Circuit

16 Development Kit Matching Circuit

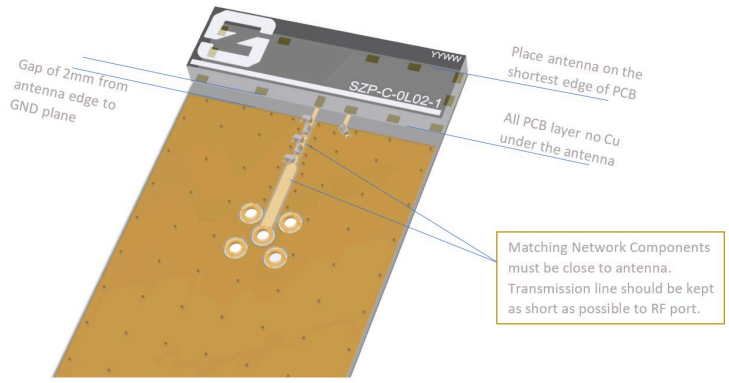
The circuit of the development kit along with the BOM is shown below. The matching network topology should be used on the device host PCB, although the matching values will be dependent on the host PCB and device environment. Synzen provide a matching service to optimize your device to ensure the best performance. Please contact sales@synzen.com.tw for more information.



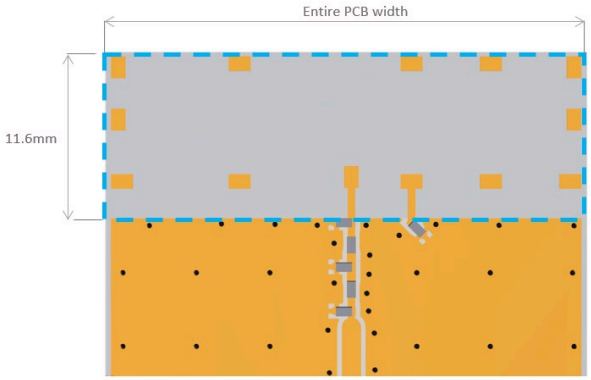
Designator	Component Type	Value	Size	Manufacturing Part No.
A1	Antenna	OPALA		SZP-C-0L02
C2	Resistor	0R	0402	Nonspecific part
L2	Inductor	3.3 nH	0402	LQG15HS3N3S02D
C1	NA	DNP	0402	Do Not Place
C3	Capacitor	0.5 pF	0402	GJM1555C1HR50CB01D
L1, L3	Inductor	15 nH	0402	LQG15HS15NJ02D
J1	SMA Connector			ACE solution A3SAFTST135

17 Placement

The antenna is designed to function placed at the shortest PCB edge to utilize the PCB length for best low band performance.



18 Clearance



A clearance is required through all PCB layers for the precise area shown. No components must be placed within this area, otherwise RF coupling from the antenna to any conductor will occur, reducing performance significantly. Also, any components such as battery or display must also avoid this area.

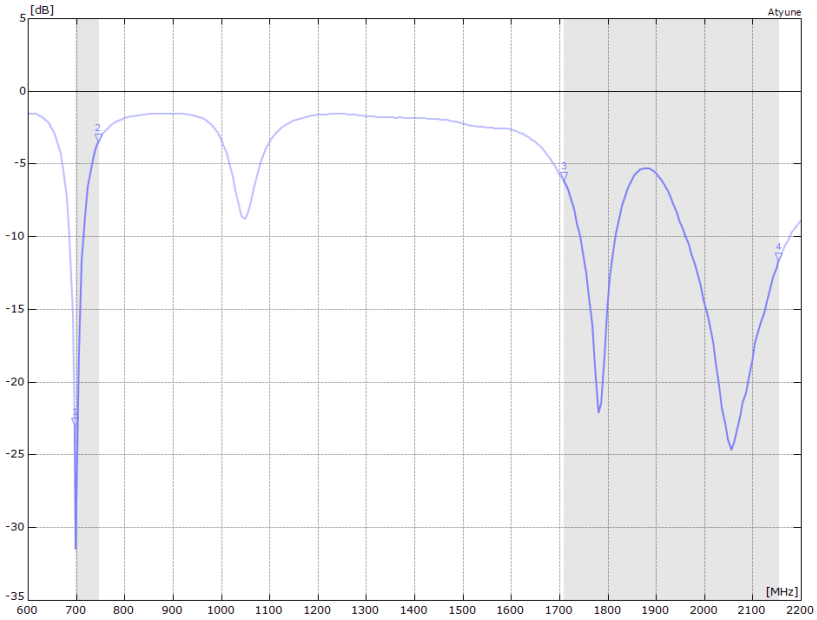
19 Small Host PCB Performance

Other antennas rely on the host PCB GND length for the low band to perform well. OPALA still relies on the host GND to radiate, but due to an innovative antenna element design it can still function and perform well on a GND plane of only 60 × 33 mm, smaller than a credit card.



20 Example 1: AT&T Cat-M1 Bands (2, 4, 12)

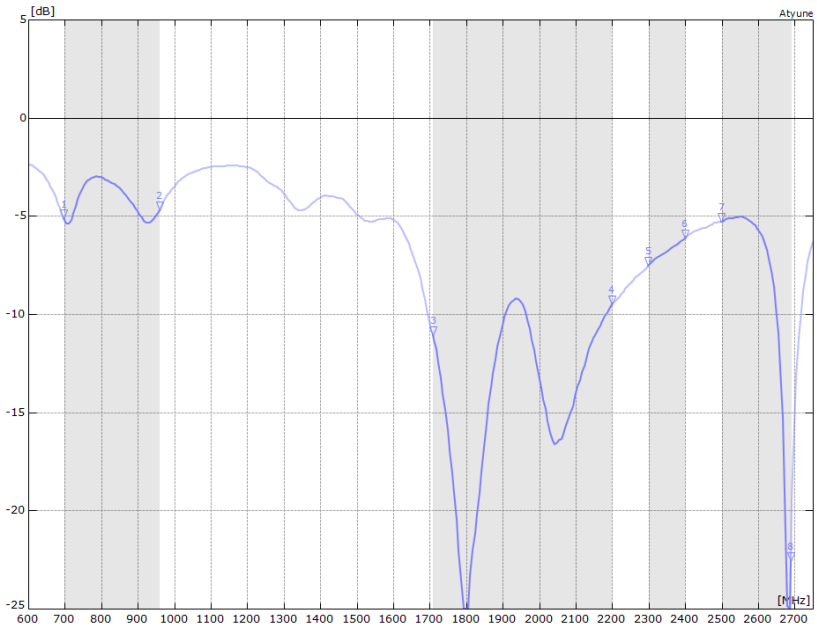
698 to 746 MHz; 1710 to 2155 MHz. PCB dimensions: 60 × 30 mm.



Frequency Range (MHz)	Average Efficiency	Peak Gain (dBi)	S11 (max) dB	VSWR (max)
698 to 746	21%	-3.0	<-3.5	3.10:1
1710 to 2155	55%	3.50	<-6.0	2.90:1

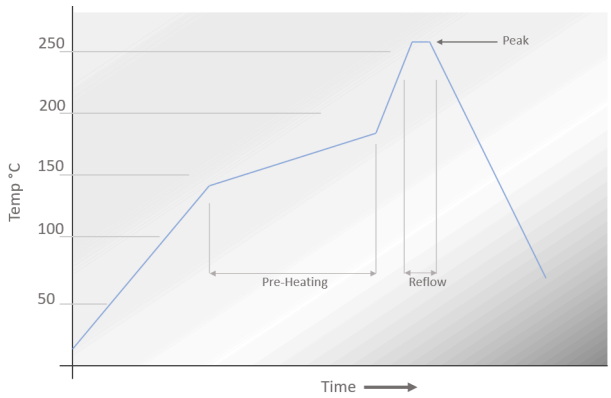
21 Example 2: LTE Bands

698 to 746 MHz; 1710 to 2170 MHz; 2300 to 2400 MHz; 2500 to 2690 MHz.



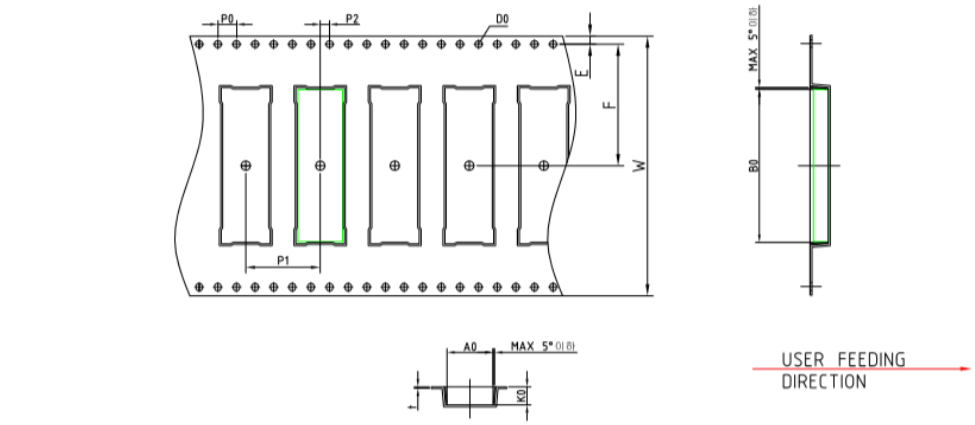
Frequency Range (MHz)	Average Efficiency	Peak Gain (dBi)	S11 (max) dB
698 to 960	15%	-3.20	<-3.0
1710 to 2200	60%	3.45	<-8.0
2300 to 2400	45%	2.8	<-6.5
2500 to 2690	40%	0.50	<-5.0

22 Reflow Profile



Stage	Temperature	Time
Pre-Heating	130 to 180°C	50 to 190 seconds
Reflow	>220°C	50 to 160 seconds
Peak Temperature	260°C	15 to 45 seconds

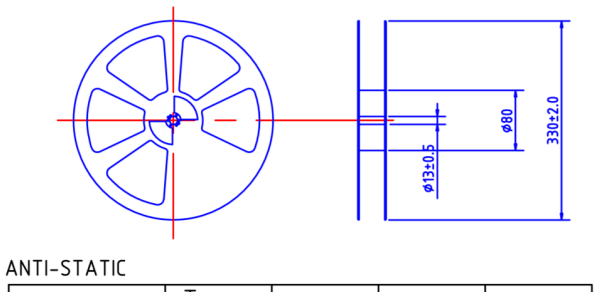
23 Tape



1. 10 sprocket hole pitch cumulative tolerance ±0.2
2. Camber not to exceed 1mm in 100mm.
3. Ao and Bo measured on a plane 0.1mm above the bottom of the pocket
4. Ko measured from a plane on the inside bottom of the pocket to the top surface of the carrier.

Dimension	Value (mm)
W	56.0 ±0.3
E	1.75 ±0.1
F	26.20 ±0.1
D0	1.55 ±0.05
P1	16.0 ±0.1
P0	4.0 ±0.1
P2	2.0 ±0.1
A0	9.90 ±0.1
B0	33.10 ±0.1
K0	3.90 ±0.1
T	0.40 ±0.05

24 Reel



Type	Color	Size	Hub
PS, anti-static	Black	Ø 330 mm	Ø 80 mm

25 Compliance

ROHS
Compliant
Conforms to EU RoHS Directive 2011/65/EU as amended by Delegated Directive (EU) 2015/863.

REACH
Compliant
Conforms to EU REACH Regulation (EC) No 1907/2006.

CERTIFICATE
On request
A certificate of conformance is available upon request from sales@synzen.com.tw.

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