

Low Profile SMD Ceramic Chip Antenna for GNSS Applications

Product Datasheet **AC30157-01**

June, 2023

Rev. 1.0

Revision History

Date	Rev.	Summary of Changes
29 June 2023	1.0	First version of preliminary product datasheet

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1 Description and Specifications

1.1 Scope and purpose

The AC30157-01 is a high efficiency 1559-1609 MHz SMD ceramic antenna optimized for GNSS applications:

- Asset trackers
- Telematics
- Smart Grid
- Smart meters
- Connected health (patient monitoring)
- Sensors and wearables
- OBDII
- Tablets and handheld devices

1.2 Features

- Ultra-small high efficiency (>75%) antenna
- Low profile (< 0.8mm) SMD component for ease of integration
- Surface mount device suitable for automated assembly (SMT process)
- Supplied on tape & reel
- Highly resistant to detuning
- Small form factor of 1.6 x 0.8 x 0.8 (mm)
- Ideal for smaller wearable designs
- Suitable for sealing with resin / potting compounds
- RoHS and REACH-compliant
- For GNSS applications 1559-1609 MHz

1.3 Antenna specifications

Table 1: AC30157-01 RF specifications

Parameters	AC30157-01
Frequency (MHz)	1559-1609
Typical efficiency	>75%
VSWR (max)	1.70:1
GND plane size	25 x 80 mm
Input impedance	50Ω
Radiation pattern	Quasi-omnidirectional
Polarization	Linear
Peak realized gain	3.1 dBi

Notes:

- The characterization is performed with the antennas mounted on the evaluation board AC93157-080 with size W x L = 25 x 80mm.
- The evaluation board is tested in free space.

Table 2: Physical specifications

Parameter	AC30157-01
Size (L x W x H)	1.6 x 0.8 x 0.8 mm
Required clearance area	7.0 x 6.0 mm
Weight	<0.1 g
Soldering Type	SMT through reflow

Notes:

- For all dimensions, the ISO 2768-mK standard is followed. For the outer dimensions this means a tolerance of ±0.1 mm is applicable

Table 3: AC30157-01 environmental specifications

Parameter	AC30157-01
Operational temperature	-40 °C to +125 °C
Storage temperature	-10 °C to +40 °C
Relative humidity	≤75%
RoHS and REACH	Yes

The visual representation and the dimensions of the AC30157-01 antenna are shown in Figure 1.

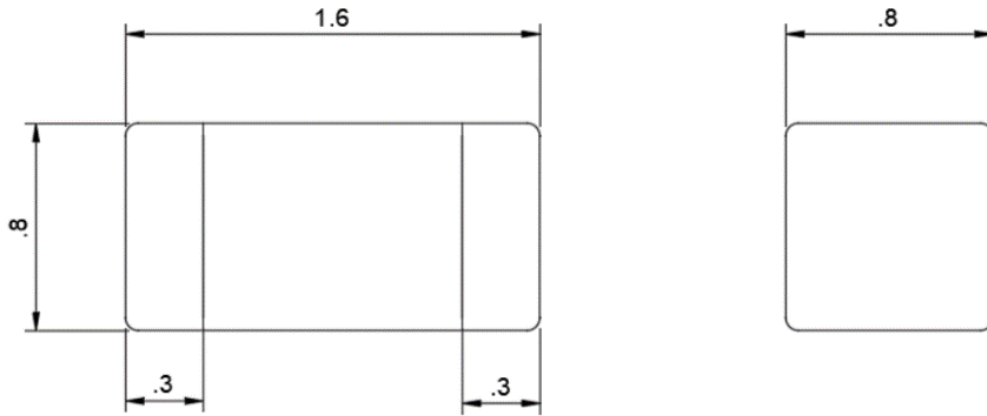
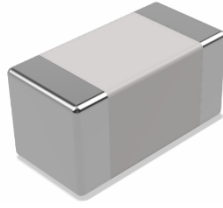


Figure 1: AC30157-01 visual representation and dimensions (in mm).

1.4 Radiation pattern

The typical radiation patterns of the AC30157-01 antenna, measured when operating on a 25 x 80 mm host PCB, are depicted in Table 4. The coordinate axes defining the evaluation planes during the measurements are demonstrated in Figure 2.



Figure 2: Illustration of radiation pattern evaluation planes

Table 4: Radiation patterns of AC30157-01 in standalone configuration

XY Plane	XZ Plane	YZ Plane
1580 MHz		

1.5 VSWR and Antenna Efficiency

The AC30157-01 has been characterized on the AC93157-080 evaluation board.

The measured VSWR and efficiency as functions of frequency are depicted in Figure 3 and Figure 4, respectively.

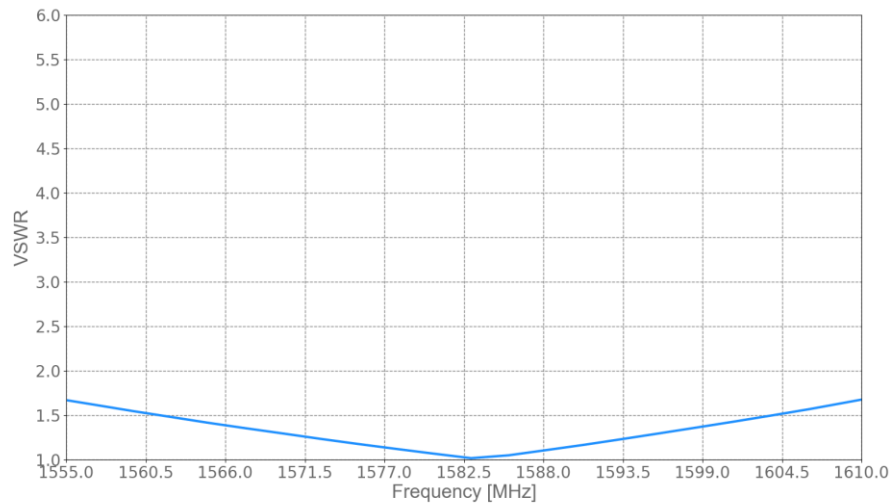


Figure 3: VSWR of the AC30157-01

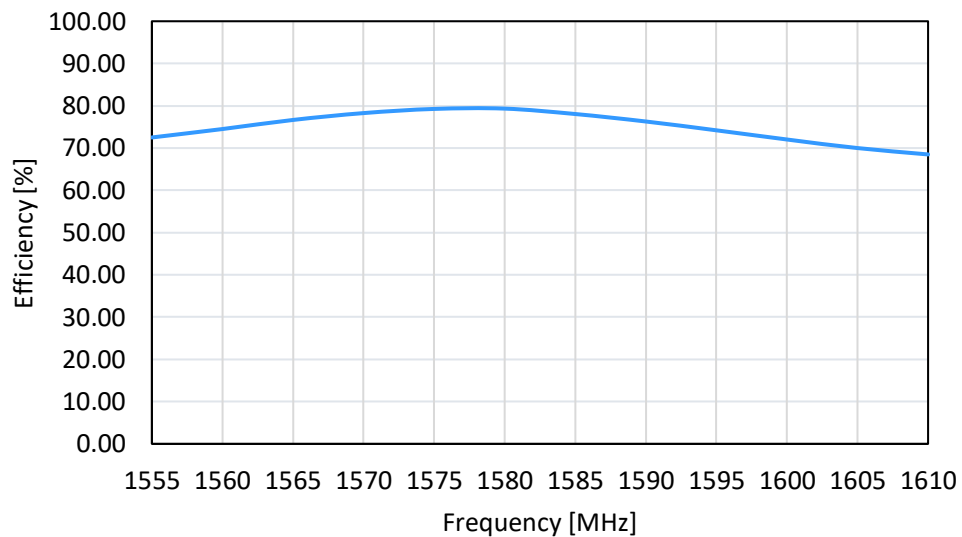


Figure 4: Efficiency of the AC30157-01

2 Product Handling & Integration

2.1 Assembly Recommendation

Figure 5 and Figure 6 show the recommended location of the AC30157-01 antenna on the host PCB. The optimum location is the center of the longest PCB edge, with a minimum length of 20 mm. A ground-free clearance area of (7 x 6) mm, highlighted by the green rectangle is required through all PCB layers.

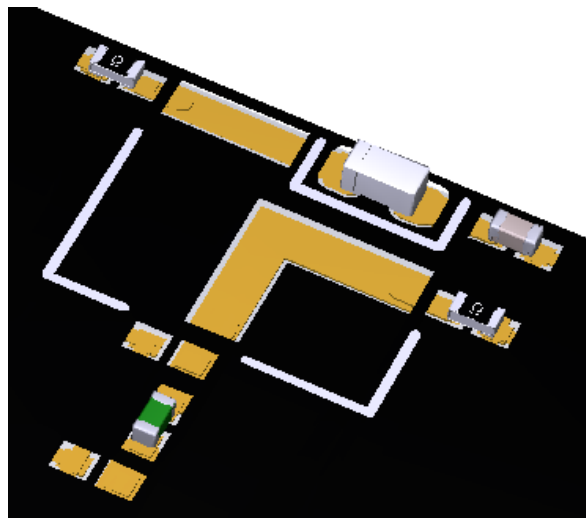


Figure 5: Isometric view of the AC30157-01 placement on the host PCB

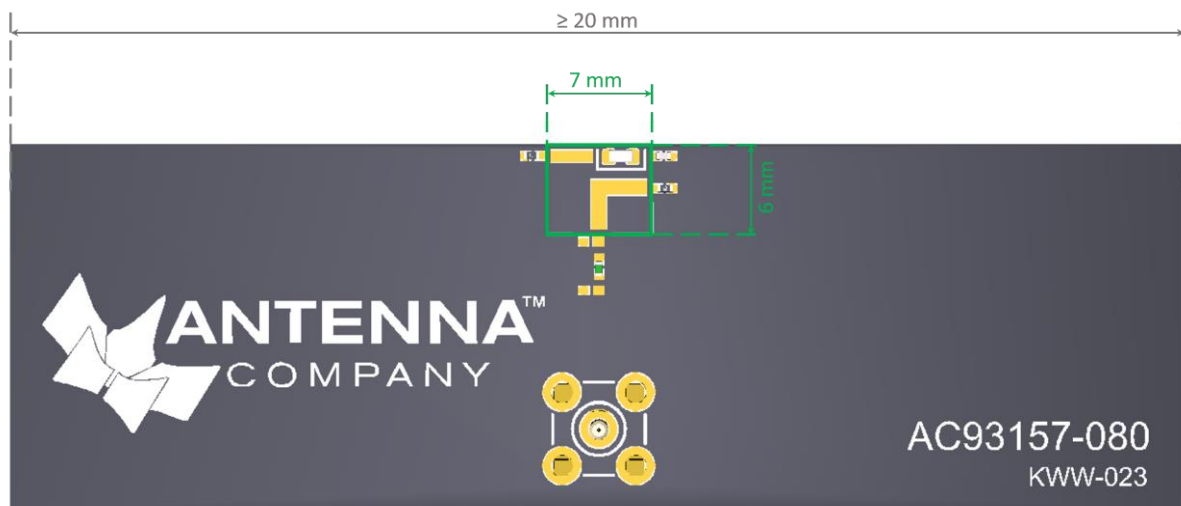


Figure 6: AC30157-01 integration on the top surface of the host PCB

2.2 Antenna Footprint

The required PCB footprint is shown in Figure 7. The soldering pads 1 and 2 have the following dimensions: (1.0 x 0.8) mm. Trace width to antenna is 0.8 mm; trace width to the feed is 1.0 mm.

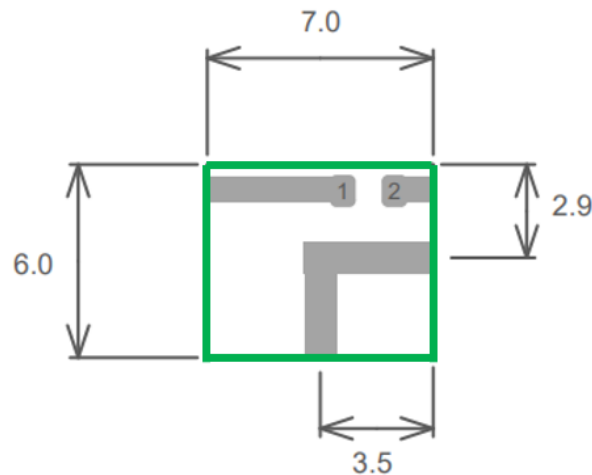


Figure 7: Footprint of the AC30157-01 on the top PCB layer. The two soldering pads are marked by digits “1” and “2”.

Additional notes

- Any inner PCB layer should be free from ground in the antenna section, delimited by the 6.0 x 7.0 mm clearance area.
- The top and bottom layers of the PCB should be flooded with GND to optimize the antenna performance.
- For all dimension tolerances, standard PCB manufacturing guidelines should be followed.

2.3 Evaluation Kit

The evaluation kit depicted in Figures 8 and 9 includes a SMA female connector and can be ordered for evaluation purposes. As shown on the evaluation board, it is recommended to mount the ceramic chip antenna on the longer side of the PCBA.



Figure 8: Isometric view of the evaluation kit



Figure 9: Top view of the evaluation board

2.4 Matching Network Topology

The matching network topology depicted in Figure 10 is required on the main PCB, as close as possible to the AC30157-01 main antenna. The characteristic impedance of all transmission lines should be designed as 50 Ω . The length of the transmission lines connecting the antenna to the matching circuit and the radio module should be kept as short as possible. Any other part of the RF circuit connected to the antenna, such as power amplifiers, should also be designed with a 50 Ω impedance.

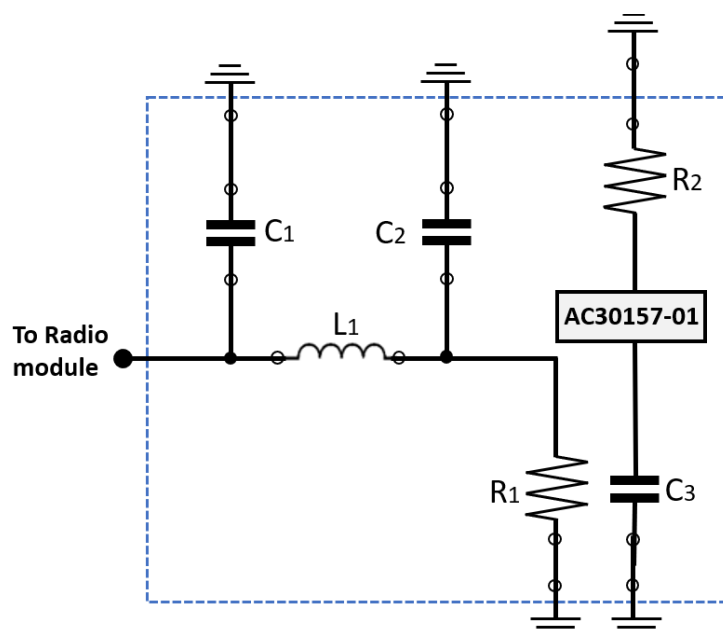


Figure 10: Required Matching Network Topology for AC30157-01

The component values and recommended types are listed in Table 5. Different values might be required depending on the host PCBA and the end-device environment. If you need assistance, please contact sales@antennacompany.com for antenna matching network support.

Table 5: Matching network component values

Standalone configuration: AC30157-01		
Component	Value	Type
Capacitor (C ₁)	Not fitted	N/A
Capacitor (C ₂)	Not fitted	N/A
Capacitor (C ₃)	10 pF	GCQ1555C1H100RB01D
Inductor (L ₁)	2.0 nH	LQG15HS2N0B02D
Resistor (R ₁)	0 Ω	N/A
Resistor (R ₂)	0 Ω	N/A

2.5 Assembly Recommendation: Reflow Profile

The recommended reflow profile is presented in Figure 11 and Table 6.

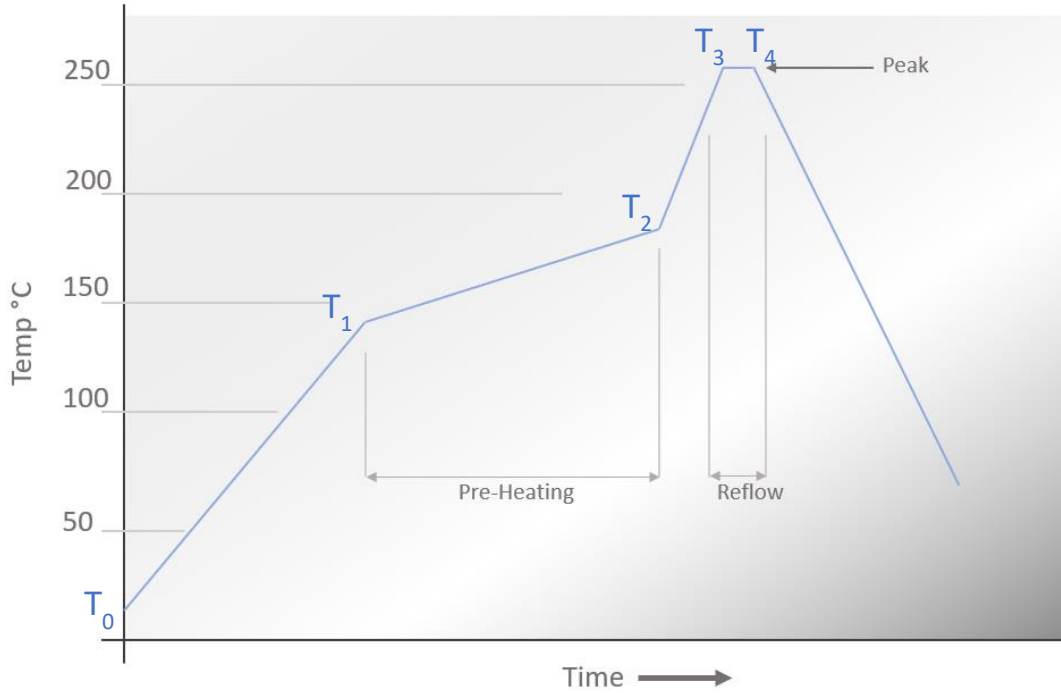


Figure 11: Suggested Reflow profile

Table 6 - Reflow Temperature Table

		Temp Range	Time
$T_0 - T_1$	Heating Zone	0 to 130°C	Controlled 1°C~3°C/sec
$T_1 - T_2$	Pre-Heating	130°C to 180°C	50s to 190s
$T_3 - T_4$	Peak Temperature	260°C	15s to 45s
	Reflow	220°C to 260°C	50s to 160s
$T_4 - \text{End}$	Cooling Zone	Cool down	Controlled ~4°C/sec

3 Product Marking & Ordering Information

3.1 Packaging

The AC30157-01 main antenna will be delivered in tape and reel. The packaging details are presented in Table 7 and Figures 12, 13. The number of units per reel is 4000pcs.

Table 7. AC30157-01 packaging details.

	A0	B0	W	T	T1	P0	P1	P2	D0	E1	E2	F
TOLERANCES	typ.	typ.	+0.3/-0.1	typ.	max	±0.1		+0.05	+0.1/-0.0	±0.1	min.	±0.05
Size (mm)	1.05	1.85	8.00	0.95	0.10	4.00	4.00	2.00	1.50	1.75	6.25	3.50

	A	B	C	D	N	W1	W2	W3	W3	Type	material	VPE
TOLERANCES	±2.0	min.	min.	min.	min.	+1.5	max.	min.	max.			pcs
Size (mm)	178	1.5	12.8	20.2	50	8.4	14.4	7.9	10.9	Paper	polystyrene	4000

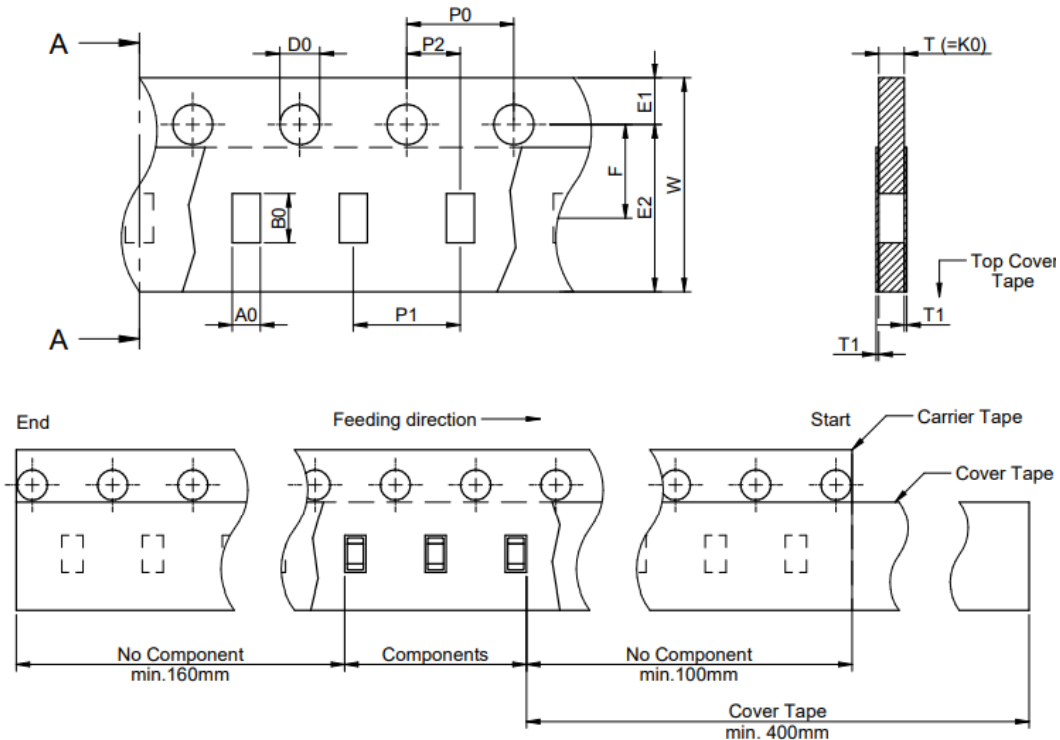


Figure 12: Tape packaging details of AC30157-01

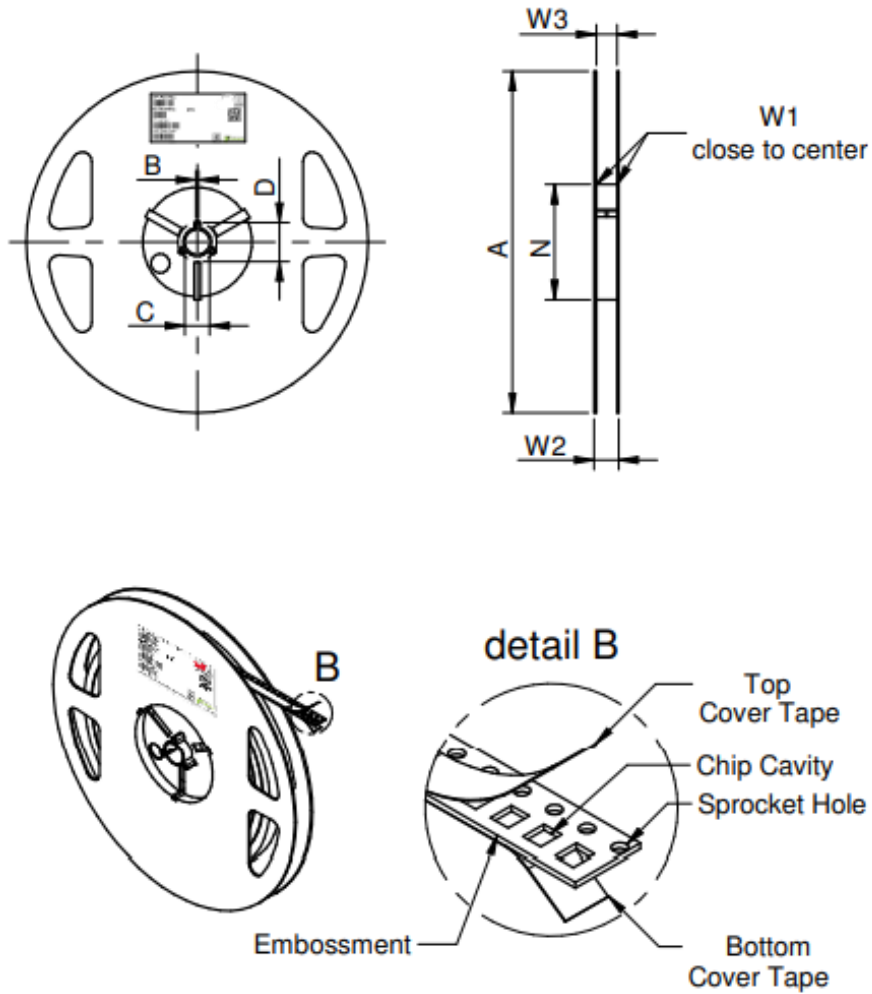


Figure 13: Reel packaging details of AC30157-01

3.2 Product Marking

There will be no markings on the ceramic chip antenna.

3.3 Ordering Information

Orders should be placed at orders@antennacompany.com.

For purchase orders please state: part number, description, quantity, and price

Table 8: AC30157-01, ordering information

Part number	Description	Minimum Order Quantity [pcs]	Order multiple [pcs]
AC30157-01	Low profile SMD ceramic chip antenna	4000	4000

For sample quantities, please contact sales@antennacompany.com.

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