

Low Noise Amplifier for GNSS Application

Features

- Operation frequencies:
L1 Band: 1550MHz to 1615MHz
L2&L5 Band: 1160MHz to 1300MHz
- Low noise figure:
0.55dB@ L1 Band
0.6dB@ L2&L5 Band
- High power gain:
19dB@ L1 Band
21dB@ L2&L5 Band
- Require only one input matching inductor
- Supply voltage: 1.08V to 3.1V
- DFN 1.1X0.7-6L package

Applications

Mobile Phones

Tablet PCs

Personal Navigation Devices

General Description

AW15345DNR is a Low Noise Amplifier designed for Global Navigation Satellite Systems (GNSS) as GPS, BDS, GLONASS and Galileo. AW15345DNR requires only one external input matching inductor, and reduces assembly complexity and the PCB area, enabling a cost-effective solution.

AW15345DNR with patented Smart Linearity Technology (SLT) achieves ultra-low noise figure, high linearity, high gain, over a wide range of supply voltages from 1.08V to 3.1V. These features make AW15345DNR an excellent choice for GNSS LNA as it improves sensitivity with low noise figure and high gain, provide better immunity against out-of-band jammer signals with high linearity, reduces filtering requirement of preceding stage and hence reduces the overall cost of the GNSS receiver.

AW15345DNR is available in a small lead-free, RoHS-Compliant, DFN 1.1X0.7-6L package.

Typical Application Circuit

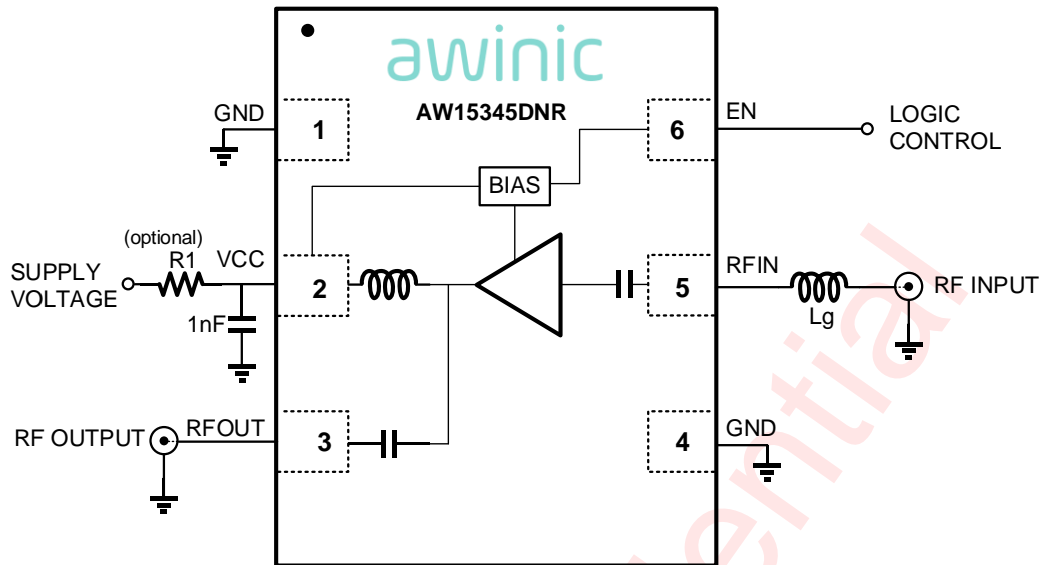


Figure 1 Typical Application Circuit of AW15345DNR

Recommended Components List

Table 1 List of components for AW15345DNR

| Component | Frequencies Range | Part Number | Inductance | Supplier | Size |
|-----------|--------------------|-------------|------------|----------|------|
| Lg | 1160MHz to 1300MHz | LQW15A | 22nH | Murata | 0402 |
| Lg | 1550MHz to 1615MHz | LQW15A | 12nH | Murata | 0402 |

Pin Configuration And Top Mark

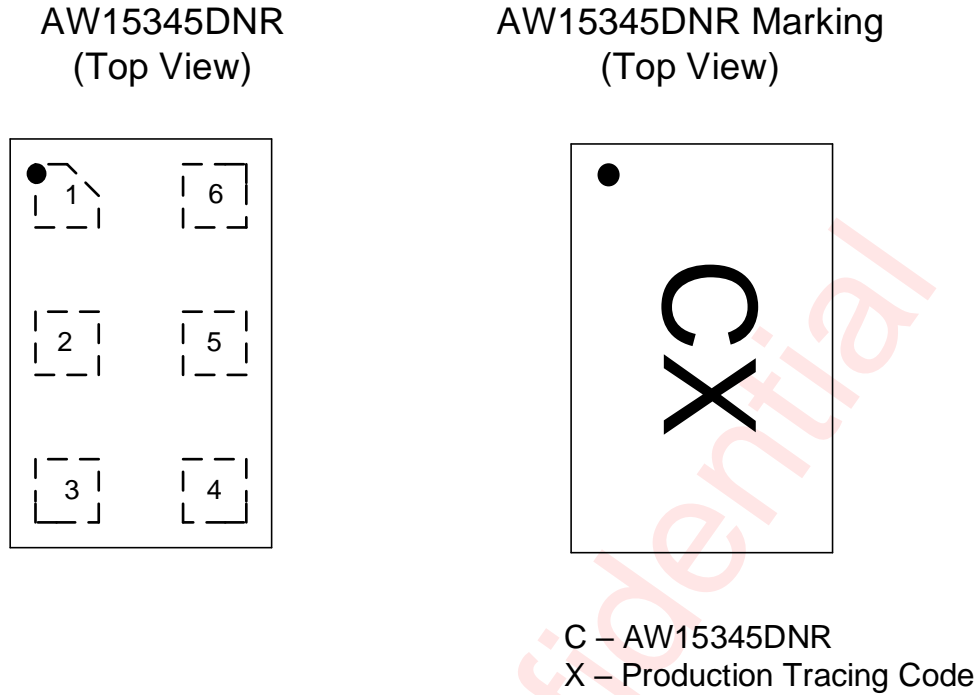


Figure 2 Pin Configuration and Top Mark

Pin Definition

| No. | NAME | DESCRIPTION |
|-----|-------|---------------|
| 1 | GND | Ground |
| 2 | VCC | DC Supply |
| 3 | RFOUT | LNA output |
| 4 | GND | Ground |
| 5 | RFIN | LNA input |
| 6 | EN | Logic control |

Functional Block Diagram

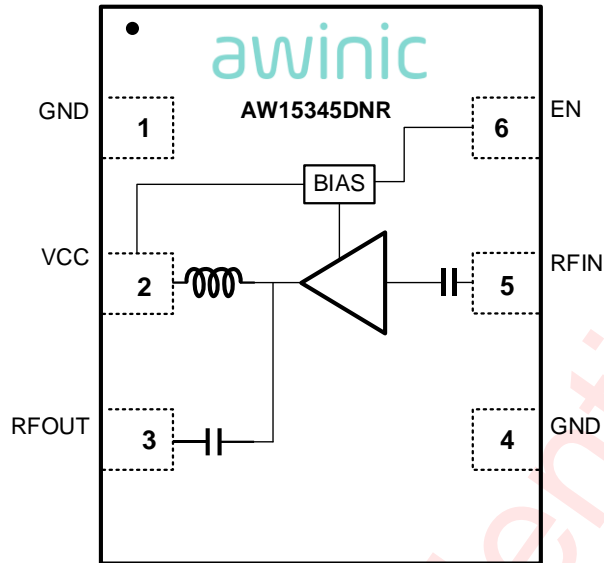


Figure 3 Functional Block Diagram

Ordering Information

| Part Number | Temperature | Package | Marking | Moisture Sensitivity Level | Environmental Information | Delivery Form |
|-------------|-------------|----------------|---------|----------------------------|---------------------------|----------------------------|
| AW15345DNR | -40°C~105°C | DFN 1.1X0.7-6L | C | MSL1 | ROHS+HF | 9000 units/ Tape & Reel |

Absolute Maximum Ratings^(NOTE1)

| PARAMETERS | RANGE |
|---|---------------------------|
| Supply voltage V_{CC} | -0.3V to 3.3V |
| Control voltage V_{EN} | -0.3V to V_{CC} |
| Maximum RF input power | 30dBm |
| Maximum operating junction temperature T_{JMAX} | 150°C |
| Operating free-air temperature range | -40°C to 105°C |
| Storage temperature T_{STG} | -65°C to 150°C |
| Lead temperature (soldering 10 seconds) | 260°C |
| ESD (NOTE 2) | |
| HBM | ±1.5kV |
| CDM | ±1kV |
| Latch-Up | |
| JESD78F | +IT: 450mA -IT: -450mA |

NOTE1: Conditions out of those ranges listed in "absolute maximum ratings" may cause permanent damages to the device. Exposure to absolute-maximum-rated conditions for prolonged periods may affect device reliability.

NOTE2: HBM: ESDA/JEDEC JS-001-2024, CDM: ESDA/JEDEC JS -002-2022

Electrical Characteristics

DC and Switching Characteristic

| PARAMETER | | TEST CONDITION | MIN | TYP | MAX | UNIT |
|-------------------|-------------------------------------|--|------|-----|----------|---------|
| $V_{CC}^{[1]}$ | Supply Voltage | - | 1.08 | 1.8 | 3.1 | V |
| I_{SD} | Shut-Down Current | $V_{EN}=V_{EN_L}$ | - | - | 1 | μA |
| I_{EN} | Control current | $V_{CC}=1.8V$ | - | 1 | 2 | μA |
| I_{CC} | Supply Current, $V_{CC}=1.8V\&1.2V$ | $V_{EN}=V_{EN_H}$ | - | 5 | 7.5 | mA |
| $V_{EN_H}^{[1]}$ | Digital Input-Logic High | $V_{CC}=1.8V\&1.2V$ | 0.78 | - | V_{CC} | V |
| $V_{EN_L}^{[1]}$ | Digital Input-Logic Low | $V_{CC}=1.8V\&1.2V$ | - | - | 0.45 | V |
| $K^{[1]}$ | Stability factor | $f=200MHz\sim 10GHz$ | 1 | - | - | |
| $t_{on}^{[1]}$ | turn-on time, $V_{CC}=1.8V\&1.2V$ | time from V_{EN} ON to 90% of the final gain | - | 1.5 | 3 | μs |
| $t_{off}^{[1]}$ | turn-off time, $V_{CC}=1.8V\&1.2V$ | time from V_{EN} OFF to 10% of the gain | - | - | 2 | μs |

Typically: $V_{CC}=1.8V$, $V_{EN_H}=1.8V$, $V_{EN_L}=0V$ and $T_A=+25^\circ C$, unless otherwise noted

| PARAMETER | | TEST CONDITION | MIN | TYP | MAX | UNIT |
|----------------------------------|--|---|------|---------------------|------|------|
| Frequency Range | | - | 1550 | 1575.42 | 1615 | MHz |
| G_p | Power Gain | $V_{EN}=V_{EN_H}$ | 17 | 19 | 21 | dB |
| RL_{in} | Input Return Loss | | 6.5 | 9 | - | dB |
| RL_{out} | Output Return Loss | | 7 | 8.5 | - | dB |
| ISL | Reverse Isolation | | 25 | 32 | - | dB |
| | | $V_{EN}=V_{EN_L}^{[1]}$ | 19 | 25 | - | dB |
| $NF^{[1]}$ | Noise Figure | $Z_s=50\ ohm$; No jammer | - | 0.55 ^[2] | 1.0 | dB |
| $IP1dB^{[1]}$ | Input 1dB-compression point | $f=1575.42MHz$ | -13 | -10 | - | dBm |
| $IIP3_{ib}^{[1]}$ | In-band input 3 rd -order intercept point | $f_1=1574.42MHz$; $f_2=1575.42MHz$; $P_{in}=-25dBm$; | -7 | -4 | - | dBm |
| $IIP3_{oob}^{[1]}$ | Out-of-band input 3 rd -order intercept point | -20dBm@ $f_1=1712.7MHz$; -65dBm@ $f_2=1850MHz$; | -4 | -1 | - | dBm |
| H2-input referred ^[1] | LTE band-13 2 nd Harmonic | $f=787.76MHz$ $P_{in}=-25dBm$ | - | -53 | -45 | dBm |

Typically: $V_{CC}=1.2V$, $V_{EN_H}=1.2V$, $V_{EN_L}=0V$ and $TA=+25^{\circ}C$, unless otherwise noted

| PARAMETER | | TEST CONDITION | MIN | TYP | MAX | UNIT |
|------------------------------------|--|---|------|---------------------|------|------|
| Frequency Range | | - | 1550 | 1575.42 | 1615 | MHz |
| Gp | Power Gain | $V_{EN}=V_{EN_H}$ | 16 | 18 | 20 | dB |
| RL _{in} | Input Return Loss | | 6 | 9 | - | dB |
| RL _{out} | Output Return Loss | | 6 | 8.5 | - | dB |
| ISL | Reverse Isolation | | 25 | 30 | - | dB |
| | | $V_{EN}=V_{EN_L}^{[1]}$ | 19 | 25 | - | dB |
| NF ^[1] | Noise Figure | Zs=50 ohm; No jammer | - | 0.55 ^[2] | 1.0 | dB |
| IP1dB ^[1] | Input 1dB-compression point | f=1575.42MHz | -19 | -15 | - | dBm |
| IIP3 _{ib} ^[1] | In-band input 3 rd -order intercept point | f1=1574.42MHz; f2=1575.42MHz; Pin=-25dBm; | -11 | -6.5 | - | dBm |
| IIP3 _{oob} ^[1] | Out-of-band input 3 rd -order intercept point | -20dBm@f1=1712.7MHz; -65dBm@f2=1850MHz; | -7 | -3.7 | - | dBm |
| H2-input referred ^[1] | LTE band-13 2 nd Harmonic | f=787.76MHz Pin=-25dBm | - | -53 | -45 | dBm |

Typically: $V_{CC}=1.8V$, $V_{EN_H}=1.8V$, $V_{EN_L}=0V$ and $TA=+25^{\circ}C$, unless otherwise noted

| PARAMETER | | TEST CONDITION | MIN | TYP | MAX | UNIT |
|------------------------------------|--|---|------|--------------------|------|------|
| Frequency Range | | - | 1160 | 1176.45 | 1215 | MHz |
| Gp | Power Gain | $V_{EN}=V_{EN_H}$ | 19 | 21 | 23 | dB |
| RL _{in} | Input Return Loss | | 6.5 | 8.5 | - | dB |
| RL _{out} | Output Return Loss | | 10 | 17.5 | - | dB |
| ISL | Reverse Isolation | | 25 | 35 | - | dB |
| | | $V_{EN}=V_{EN_L}^{[1]}$ | 19 | 30 | - | dB |
| NF ^[1] | Noise Figure | Zs=50 ohm; No jammer | - | 0.6 ^[2] | 1.0 | dB |
| IP1dB ^[1] | Input 1dB-compression point | f=1176.45MHz | -18 | -14 | - | dBm |
| IIP3 _{ib} ^[1] | In-band input 3 rd -order intercept point | f1=1175.45MHz; f2=1176.45MHz; Pin=-25dBm; | -11 | -8 | - | dBm |
| IIP3 _{oob} ^[1] | Out-of-band input 3 rd -order intercept point | -20dBm@f1=1800MHz; -65dBm@f2=2400MHz; | 8 | 11 | - | dBm |

Typically: $V_{CC}=1.2V$, $V_{EN_H}=1.2V$, $V_{EN_L}=0V$ and $TA=+25^{\circ}C$, unless otherwise noted

| PARAMETER | | TEST CONDITION | MIN | TYP | MAX | UNIT |
|------------------------------------|--|---|------|--------------------|------|------|
| Frequency Range | | - | 1160 | 1176.45 | 1215 | MHz |
| Gp | Power Gain | $V_{EN}=V_{EN_H}$ | 17.5 | 19.5 | 21.5 | dB |
| RL _{in} | Input Return Loss | | 6 | 8.5 | - | dB |
| RL _{out} | Output Return Loss | | 8 | 15 | - | dB |
| ISL | Reverse Isolation | | 25 | 33 | - | dB |
| | | $V_{EN}=V_{EN_L}^{[1]}$ | 19 | 25 | - | dB |
| NF ^[1] | Noise Figure | Zs=50 ohm; No jammer | - | 0.6 ^[2] | 1.0 | dB |
| IP1dB ^[1] | Input 1dB-compression point | f=1176.45MHz | -21 | -18 | - | dBm |
| IIP3 _{ib} ^[1] | In-band input 3 rd -order intercept point | f1=1175.45MHz; f2=1176.45MHz; Pin=-25dBm; | -15 | -11 | - | dBm |
| IIP3 _{oob} ^[1] | Out-of-band input 3 rd -order intercept point | -20dBm@f1=1800MHz; -65dBm@f2=2400MHz; | 5 | 9 | - | dBm |

Typically: $V_{CC}=1.8V$, $V_{EN_H}=1.8V$, $V_{EN_L}=0V$ and $TA=+25^{\circ}C$, unless otherwise noted

| PARAMETER | | TEST CONDITION | MIN | TYP | MAX | UNIT |
|------------------------------------|--|---|------|--------------------|------|------|
| Frequency Range | | - | 1215 | 1227.6 | 1300 | MHz |
| Gp | Power Gain | $V_{EN}=V_{EN_H}$ | 18 | 20 | 23 | dB |
| RL _{in} | Input Return Loss | | 5 | 8 | - | dB |
| RL _{out} | Output Return Loss | | 10 | 18 | - | dB |
| ISL | Reverse Isolation | | 25 | 35 | - | dB |
| | | $V_{EN}=V_{EN_L}^{[1]}$ | 19 | 28 | - | dB |
| NF ^[1] | Noise Figure | Zs=50 ohm; No jammer | - | 0.6 ^[2] | 1.0 | dB |
| IP1dB ^[1] | Input 1dB-compression point | f=1227.6MHz | -17 | -13 | - | dBm |
| IIP3 _{ib} ^[1] | In-band input 3 rd -order intercept point | f1=1226.6MHz; f2=1227.6MHz; Pin=-25dBm; | -11 | -7 | - | dBm |
| IIP3 _{oob} ^[1] | Out-of-band input 3 rd -order intercept point | -20dBm@f1=1800MHz; -65dBm@f2=2400MHz; | 8 | 11 | - | dBm |

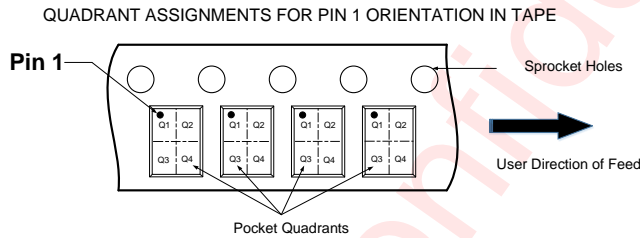
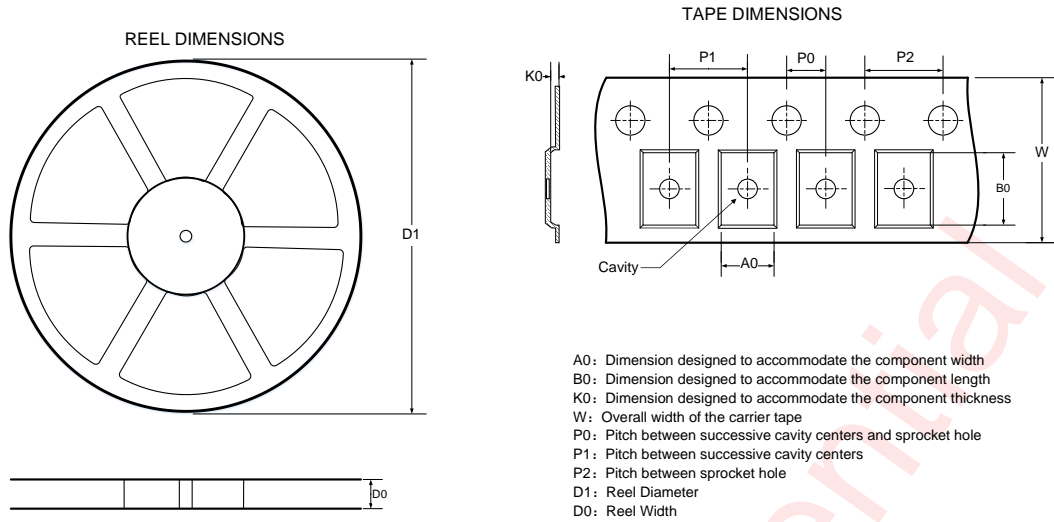
Typically: $V_{CC}=1.2V$, $V_{EN_H}=1.2V$, $V_{EN_L}=0V$ and $TA=+25^{\circ}C$, unless otherwise noted

| PARAMETER | | TEST CONDITION | MIN | TYP | MAX | UNIT |
|------------------------------------|--|---|------|--------------------|------|------|
| Frequency Range | | - | 1215 | 1227.6 | 1300 | MHz |
| Gp | Power Gain | $V_{EN}=V_{EN_H}$ | 17 | 19.5 | 21.5 | dB |
| RL _{in} | Input Return Loss | | 5 | 8.5 | - | dB |
| RL _{out} | Output Return Loss | | 8 | 15 | - | dB |
| ISL | Reverse Isolation | | 25 | 33 | - | dB |
| | | $V_{EN}=V_{EN_L}$ ^[1] | 19 | 25 | - | dB |
| NF ^[1] | Noise Figure | Zs=50 ohm; No jammer | - | 0.6 ^[2] | 1.0 | dB |
| IP1dB ^[1] | Input 1dB-compression point | f=1227.6MHz | -21 | -17 | - | dBm |
| IIP3 _{ib} ^[1] | In-band input 3 rd -order intercept point | f1=1226.6MHz; f2=1227.6MHz; Pin=-25dBm; | -15 | -11 | - | dBm |
| IIP3 _{oob} ^[1] | Out-of-band input 3 rd -order intercept point | -20dBm@f1=1800MHz; -65dBm@f2=2400MHz; | 5 | 9 | - | dBm |

[1] Minimum and/or maximum limit is guaranteed by design and by statistical analysis of device characterization data. The specification is not guaranteed by production testing.

[2] 0.08dB PCB losses are subtracted

Tape And Reel Information



Note: The above picture is for reference only. Please refer to the value in the table below for the actual size

DIMENSIONS AND PIN1 ORIENTATION

| D1 (mm) | D0 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P0 (mm) | P1 (mm) | P2 (mm) | W (mm) | Pin1 Quadrant |
|---------|---------|---------|---------|---------|---------|---------|---------|--------|---------------|
| 178 | 9.5 | 0.8 | 1.2 | 0.55 | 2 | 2 | 4 | 8 | Q1 |

All dimensions are nominal

Figure 4 Tape And Reel Information

Package Description

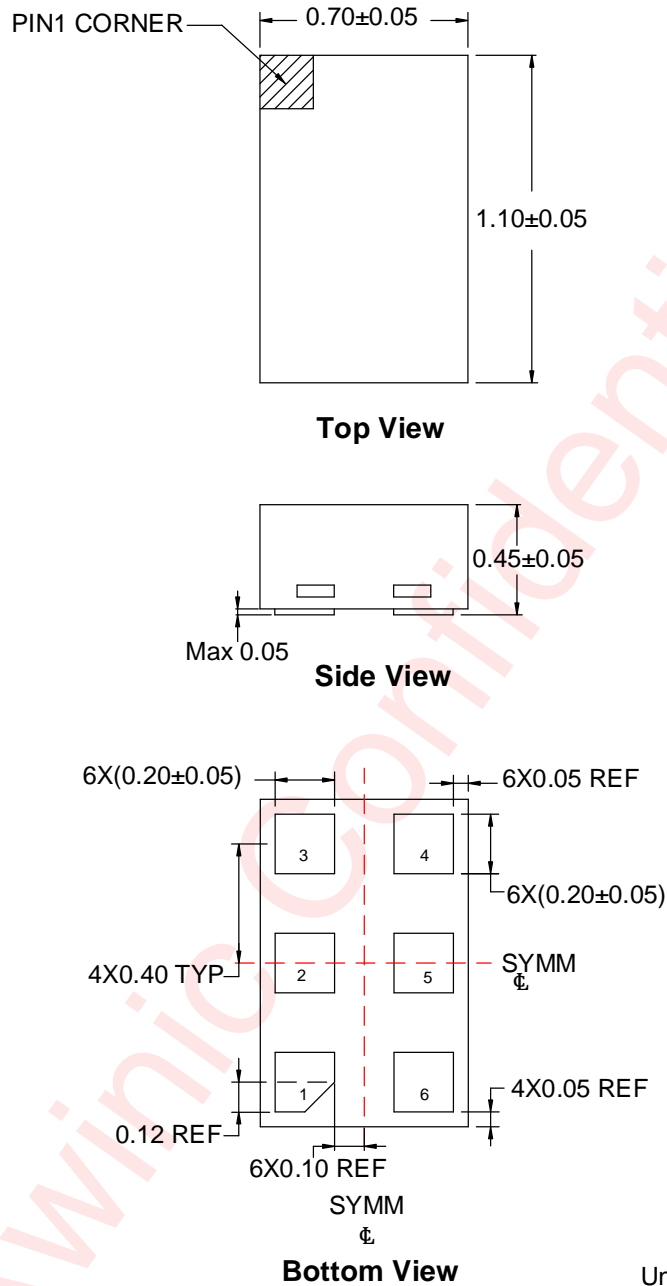


Figure 5 Package Description

Land Pattern Data

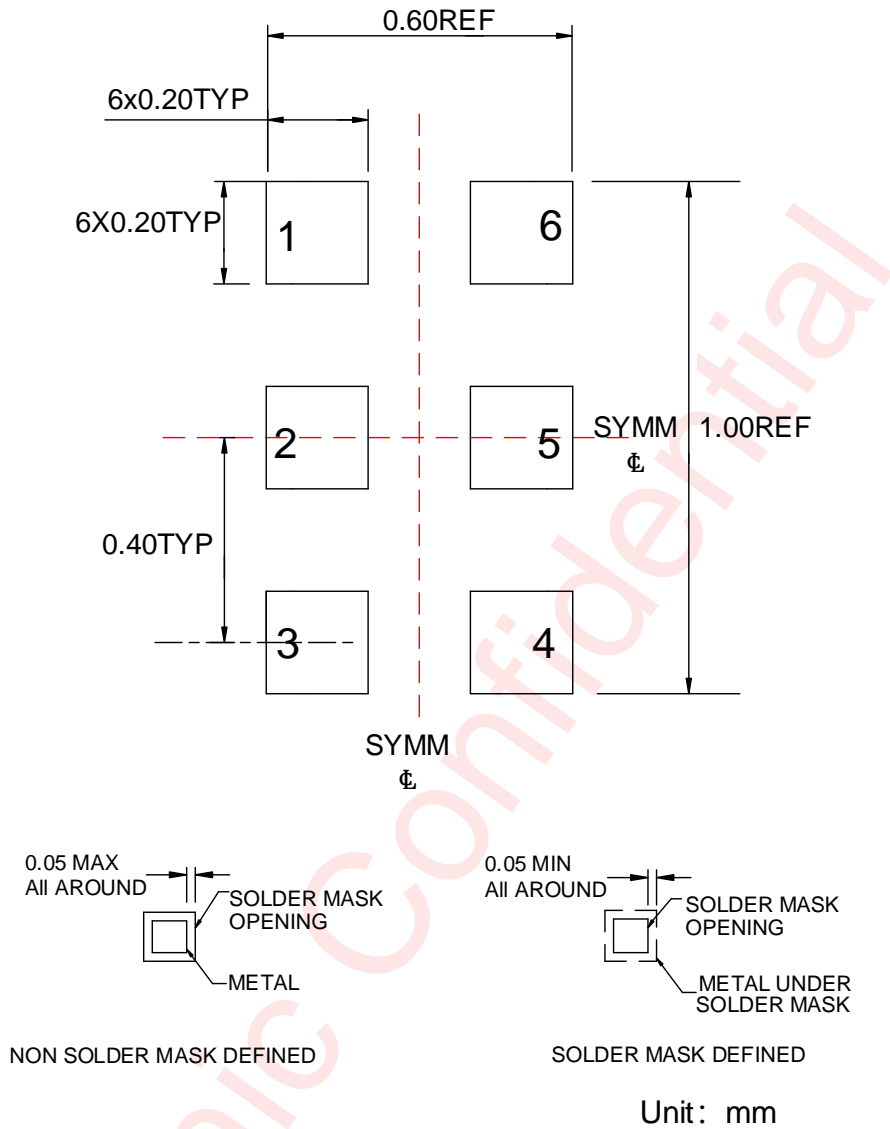


Figure 6 Land Pattern

Revision History

| Version | Date | Change Record |
|---------|----------|---|
| V1.0 | Aug.2025 | Officially released |
| V1.1 | Oct.2025 | Update Package information and Electrical Characteristics |

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