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Department	Research Institute		Reference		Receiver	

RN.2 Technologies

Datasheet

S2525N100

Rev. 1.2

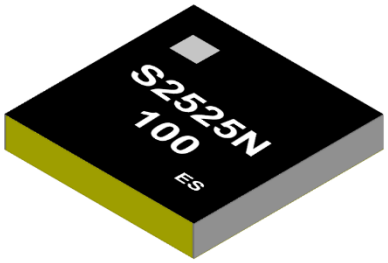
Release Date 2020-07-30

Revision History

Rev	Release Date	Description	Author
1.0	2017-05-17	• Initial release	G.H. Baek
1.1	2018-05-17	• Electrical specification modify	G.H. Baek
1.2	2020-07-30	• Power Capacity Specification modify	Y.J. Ko

150W, Termination
with High-Power Capacity and Stable Performance based on RN2 Resistor Technology
Model Name: S2525N100

KEY FEATURES
- Excellent high-power capacity up to average 150watts
- Excellent stable performance at different temperatures
- Surface mount type
- RoHS compliance (Pb-Free)



APPLICATIONS
- Applications using mobile networks, broadcast
- High power amplifiers
- Isolator, Circulator
- Military

GENERAL DESCRIPTIONS
The S2525N100 is a 150W termination with high-power capacity and stable performance in different temperatures. The AlN, high conductivity metal conductor (Ag), and gold (Au) plating enable the S2525N100 to low VSWR and improve durability for thermal stabilization and electricity.

The S2525N100 is suited for applications using GSM, UMTS, and LTE and communications equipment, requiring high power.

The S2525N100 supports up to average 150 watts. It is a SMD type product enabling Pb-Free solder and meets RoHS-6.

ELECTRICAL SPECIFICATIONS

Frequency (MHz)	DC Impedance (ohms)	Return Loss(S11) (dB, Min.)	Power Capacity Avg.(Watt)	Operating Temperature(℃)
DC – 3000	50 ± 2%	20	150	-55 - +125
3000 – 4000	50 ± 2%	23	150	-55 - +125

NOTE: These electrical specifications are measured by using a RN2 test board.
Specifications subject to change without notice.

Contents

PORT CONFIGURATIONS

Figure 1 shows the locations of the S2525N100 ports. The orientation marker is included to represent input port.

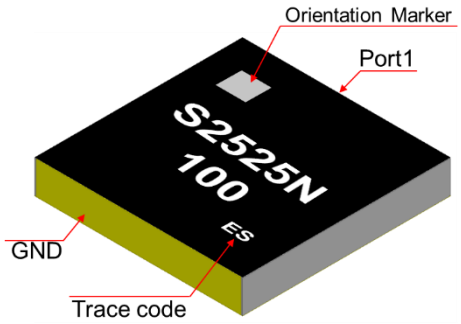
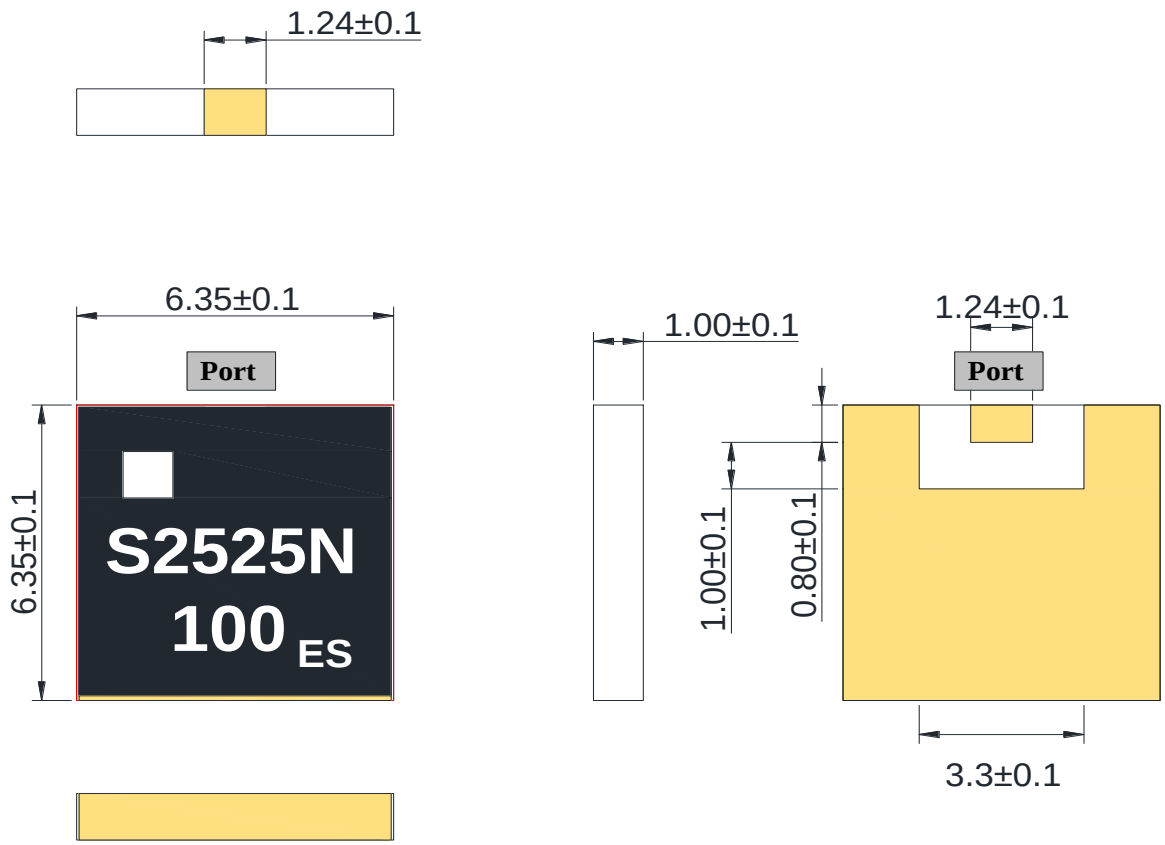


Figure 1. S2525N100 (Top View)

MECHANICAL SPECIFICATIONS

Top View **Bottom View**



- Weight: 0.14 grams
- Camber specifications: Less than ±0.08 mm

POWER DERATING CURVE

Figure 2 shows the maximum allowable average power (Maximum input power, CW) of the S2525N100 depending on base PCB temperature changes. The maximum allowable average power of the S2525N100 is limited by the following power derating curve.

The S2525N100 factors that determine the power derating curve are as follows:

- Internal circuit
- Thickness
- Thermal conductivity of materials
- Operating temperature
- Mounting interface temperature between the S2525N100 and the base PCB

The maximum operating temperature of the S2525N100 is 125 ºC. Therefore, when the base PCB temperature is over 125 ºC, the S2525N100 operates stably by decreasing its durable average input power. When the base PCB temperature reaches 200 ºC, the maximum allowable average power decreases to 0 watt.

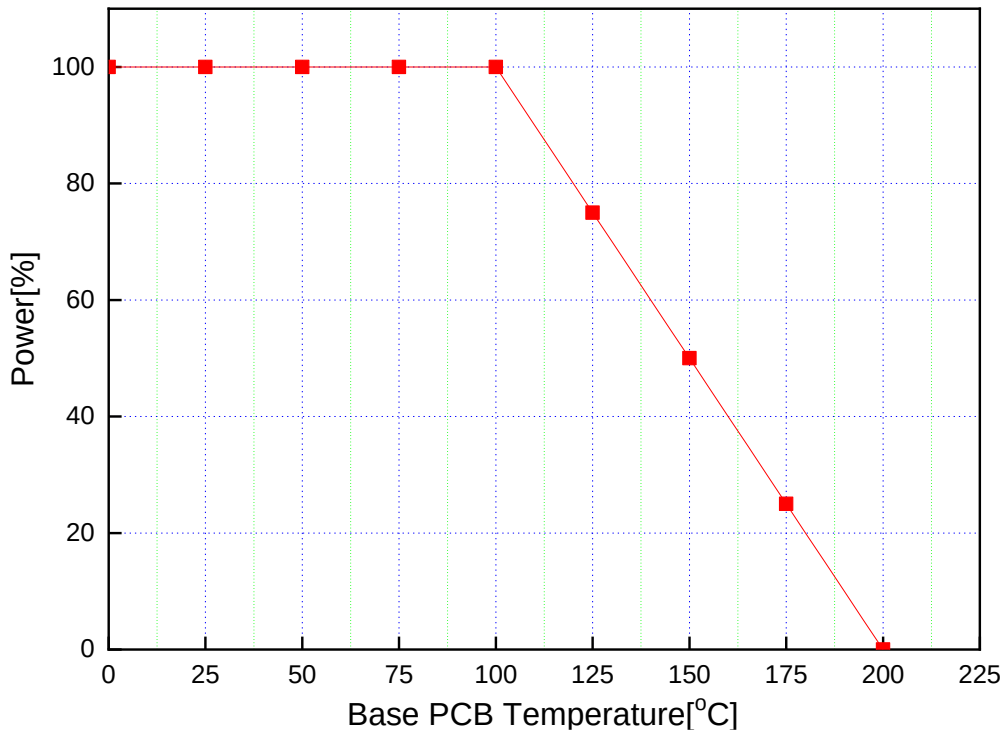
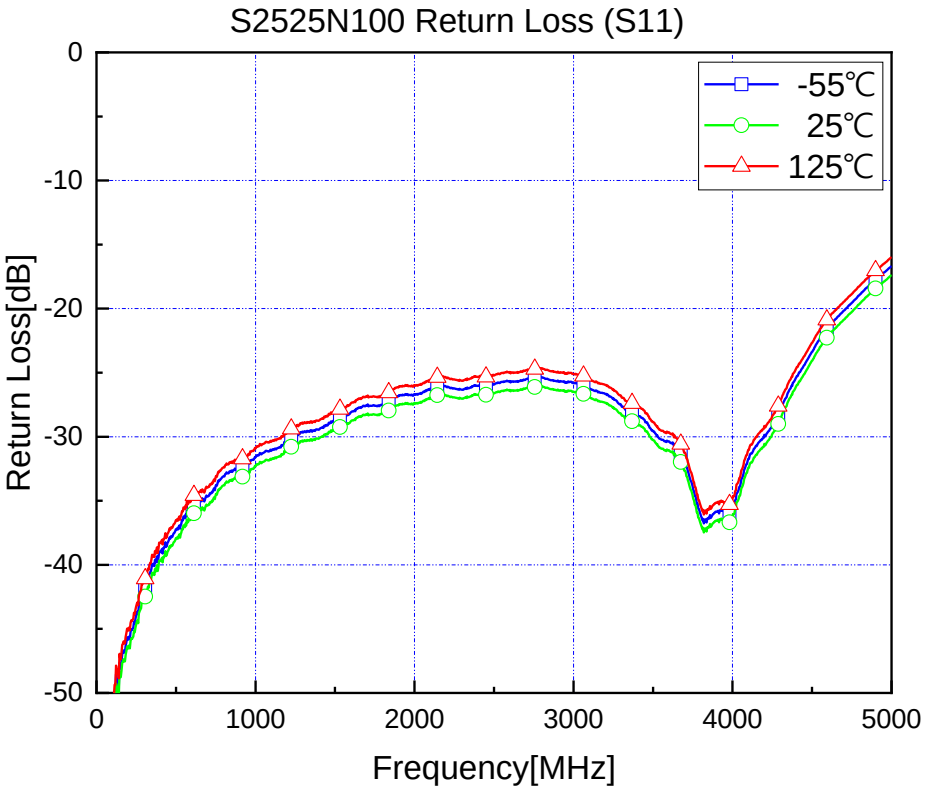


Figure 2. Power Derating Curve

RF PERFORMANCE CURVES



RF TEST METHODS

This section describes how to test the S2525N100 RF performance. To ensure s-parameters reliability, we follow our internal test procedures by using the RN2 bare test board, RN2 test board, Vector network analyzer, and test fixture. In addition, we use the Automatic Port Extensions (APE) function of the Vector network analyzer to obtain accurate s-parameters.

Check the following sections for more details:

- RF TEST PROCEDURES
- RN2 TEST BOARD LAYOUT
- AUTOMATIC PORT EXTENSIONS (APE) FUNCTION

RF TEST PROCEDURES

To test the S2525N100 RF performance, we perform the following steps:

1. Preparing the Test Equipment
2. Performing the Automatic Port Extensions (APE) Function of the Vector Network Analyzer
3. Measuring the S-parameters (Impedance and Return Loss)
4. Obtaining the Characteristic Parameters (Impedance and Return Loss)

STEP 1: Preparing the Test Equipment

The following test equipment is prepared to test the S2525N100 RF performance.

- RN2 bare test board
- RN2 test board
- Vector network analyzer
- Test fixture

NOTE: See *'RN2 TEST BOARD LAYOUT'* for the RN2 test board details.

STEP 2: Performing the Automatic Port Extensions (APE) Function of the Vector Network Analyzer

The APE function is used with the RN2 bare test board to correctly check the S2525N100 RF performance. This reduces or eliminates both electrical delay and insertion loss of the test fixture.

The detailed steps are as follows:

1. Place the RN2 bare test board on the text fixture.
2. Click the **Cal** button of the Vector network analyzer to calibrate it.
3. Connect the four ports of the test fixture into the fours ports of the Vector network analyzer.
4. Click the **Port Extensions** button of the Vector network analyzer to measure the data of the RN2 bare test board.

NOTE: See *'AUTOMATIC PORT EXTENSIONS FUNCTION'* for more details.

STEP 3: Measuring the S-parameters (Impedance and Return Loss)
After performing the APE function, the S2525N100 s-parameters are measured through the following steps:

1. Place the RN2 test board on the text fixture.
2. Apply pressure to the text fixture using a pneumatic piston.
3. Connect the four ports of the test fixture into the fours ports of the Vector network analyzer.
4. Calibrate the Vector network analyzer.
5. Measure the Impedance and return loss value from port 1 to port 1 (S11).

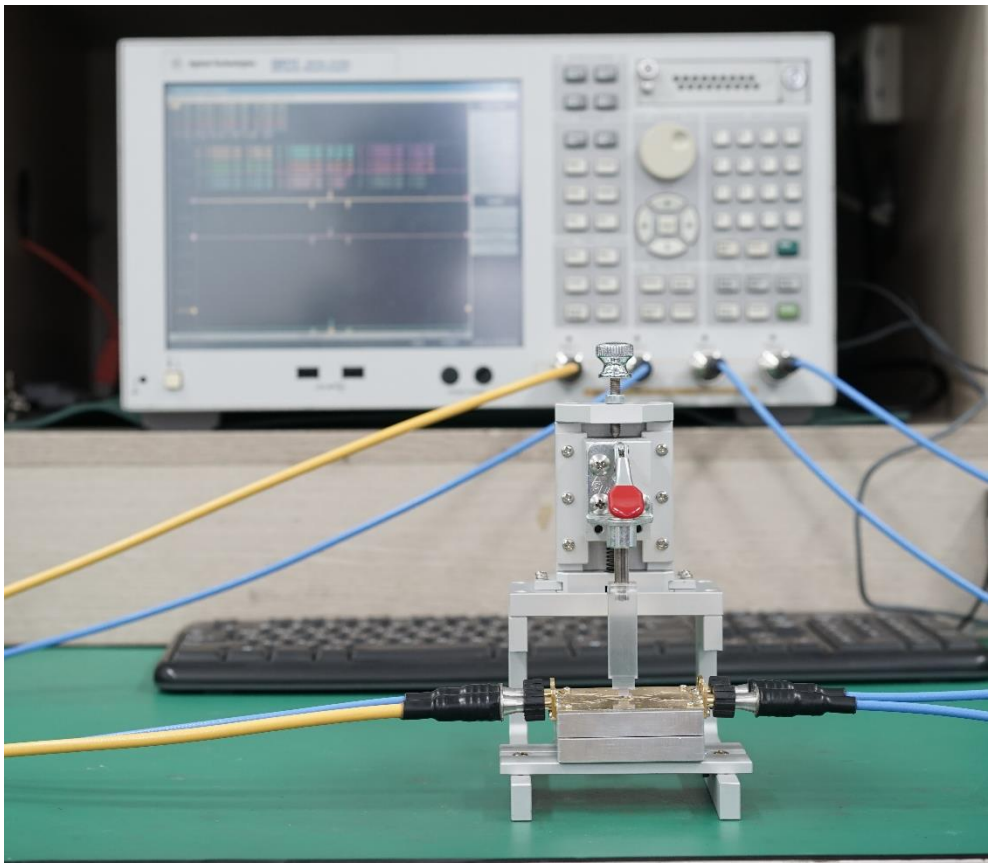


Figure 3. Test Setting to Measure the S2525N100 S-parameters

RN2 TEST BOARD LAYOUT

Figure 6 shows the RN2 test board layout used for testing the S2525N100 RF performance. The RN2 test board is based on the Taconic RF35 board with the dielectric constant of 3.5, board thickness of 0.8 mm, and copper of 1 Oz.

We recommend that you use the same material and design layout, as shown in ***Figure 6***, to meet the specifications in this datasheet. However, if you use different materials, you must follow the basic guildelines. See *'RECOMMENDED PCB LAYOUT AND SOLDER MASK PATTERN'* for more details.

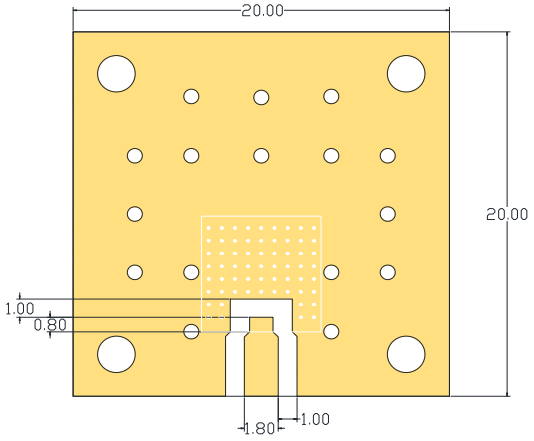


Figure 4. RN2 Test Board Layout

AUTOMATIC PORT EXTENSIONS (APE) FUNCTION

To accurately measure the S2525N100 s-parameters, we use the Automatic Port Extensions (APE) function of the Vector network analyzer. The APE function is used for reducing or eliminating both electrical delay and insertion loss of test fixtures. It provides a convenient, automated way to calculate the insertion loss and electrical delay terms by a simple measurement of an open or short circuit, which is easy to do in test fixtures.

We consider the transmission lines of the RN2 bare test board as extensions of the coaxial test cables that are between the Vector network analyzer and the S2525N100. With the APE function, we extend the coaxial test ports so that our calibration plane is right at the terminals of the S2525N100, and not at the connectors of the RN2 bare test board.

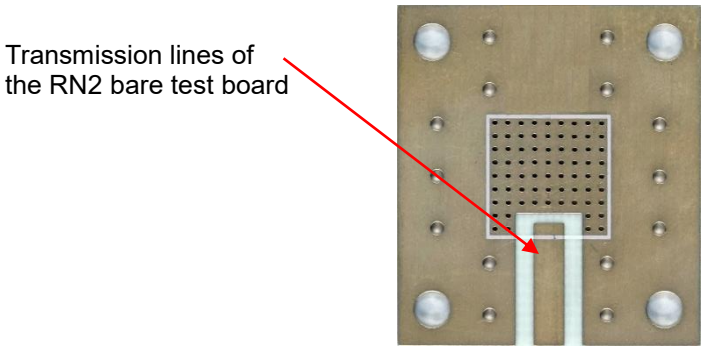


Figure 5. Performing the APE Function Test

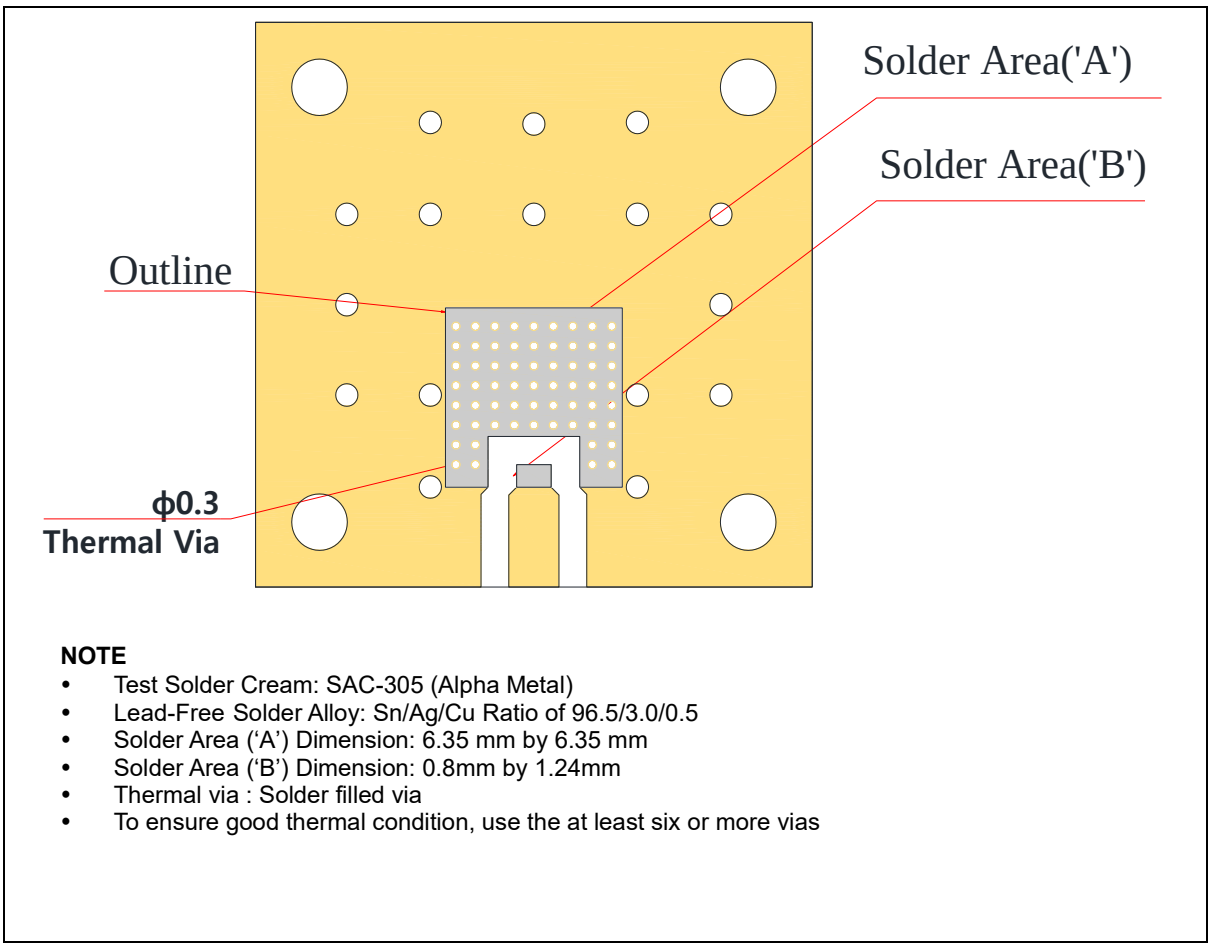
RECOMMENDED PCB LAYOUT AND SOLDER MASK PATTERN

Figure 6 shows the recommended PCB layout and solder mask pattern to meet the specifications in this datasheet. When you use different materials other than the RN2 test board, you must follow the basic guidelines at minimum.

Basic Guidelines

- Place GND more than 30% of the S2525N100 GND dimension regardless of a via size.
- Appropriately increase via sizes and numbers to allow low impedance ground connection and good thermal conductivity.
- Align the S2525N100 ground plane with the solder to have good connection to ground.
- Fill the via holes under the S2525N100 with the solder for thermal emission.

NOTE: Contact the RN2 Technologies sales team for more detailed PCB layout and solder mask pattern information.



NOTE

- Test Solder Cream: SAC-305 (Alpha Metal)
- Lead-Free Solder Alloy: Sn/Ag/Cu Ratio of 96.5/3.0/0.5
- Solder Area (‘A’) Dimension: 6.35 mm by 6.35 mm
- Solder Area (‘B’) Dimension: 0.8mm by 1.24mm
- Thermal via : Solder filled via
- To ensure good thermal condition, use the at least six or more vias

Figure 6. Recommended PCB Layout and Solder Mask Pattern

SOLDERING PROCESS

The S2525N100 soldering steps are as follows:

1. Cleaning the PCB
2. Applying solder paste to the PCB
3. Placing the S2525N100 on the PCB
4. Reflowing the S2525N100 to the PCB
5. Cleaning and inspecting the soldered PCB with the S2525N100

STEP 1: Cleaning the PCB
Carefully clean the PCB surface where the S2525N100 is soldered.
Particles must not be placed on the PCB surface where the S2525N100 is soldered.

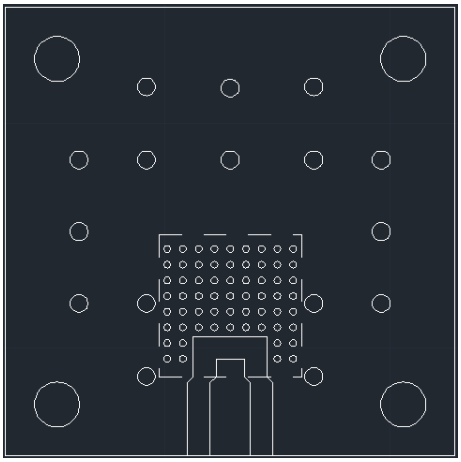


Figure 7. Cleaning the PCB Surface Where the S2525N100 is soldered

STEP 2: Applying the Solder Paste to the PCB
Apply the solder paste to the 7 points on the PCB surface.
It enables good thermal conductivity because the S2525N100 is firmly attached to the PCB surface without air.

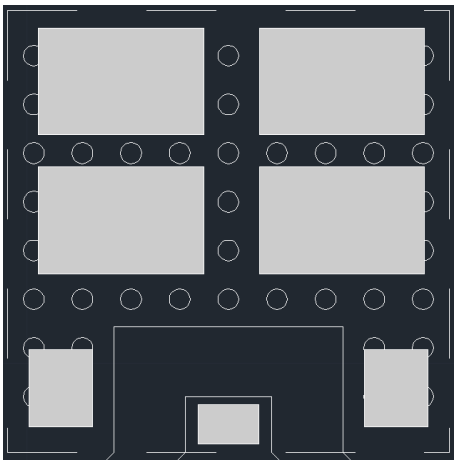


Figure 8. Applying the Solder Paste to the 7 Points on the PCB Surface

STEP 3: Placing the S2525N100 on the PCB

Correctly place the S2525N100 on the 7 points of the PCB surface.
Applying the solder paste to the 7 points helps you firmly attach the S2525N100 to the PCB surface.

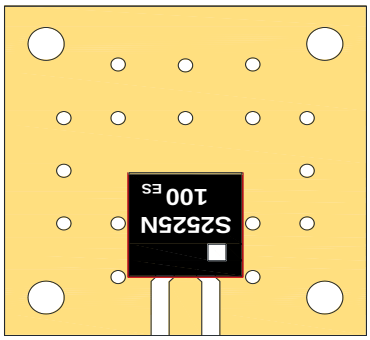


Figure 9. Placing the S2525N100 on the 7 Points of the PCB Surface

STEP 4: Reflowing the S2525N100 to the PCB

We recommend both manual soldering and PCB surface pre-heating methods when reflowing the S2525N100 to the PCB surface. Be careful NOT to touch the iron tip to the S2525N100 when you use the manual soldering method.
See '*REFLOW PROFILE*' for more details.

REFLOW PROFILE

Figure 12 shows the thermal reflow profile of the SAC-305 (Alpha metal), which is a test solder cream we used.

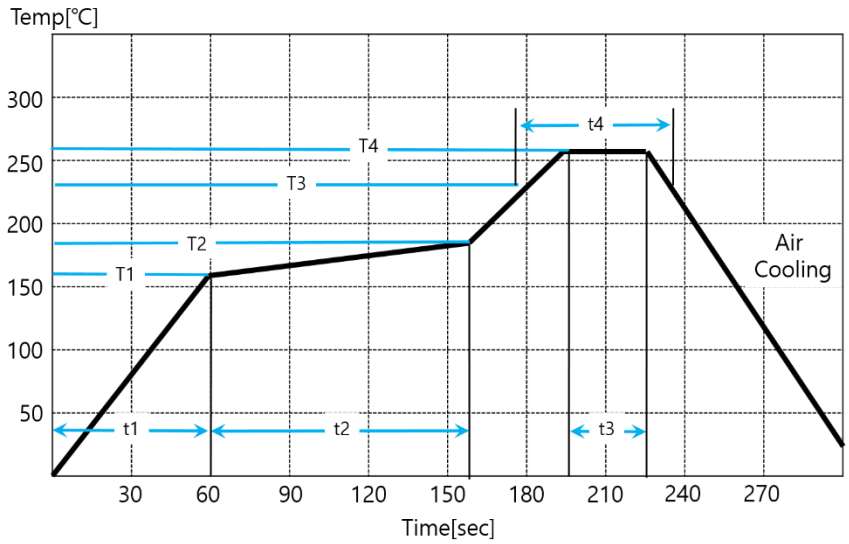
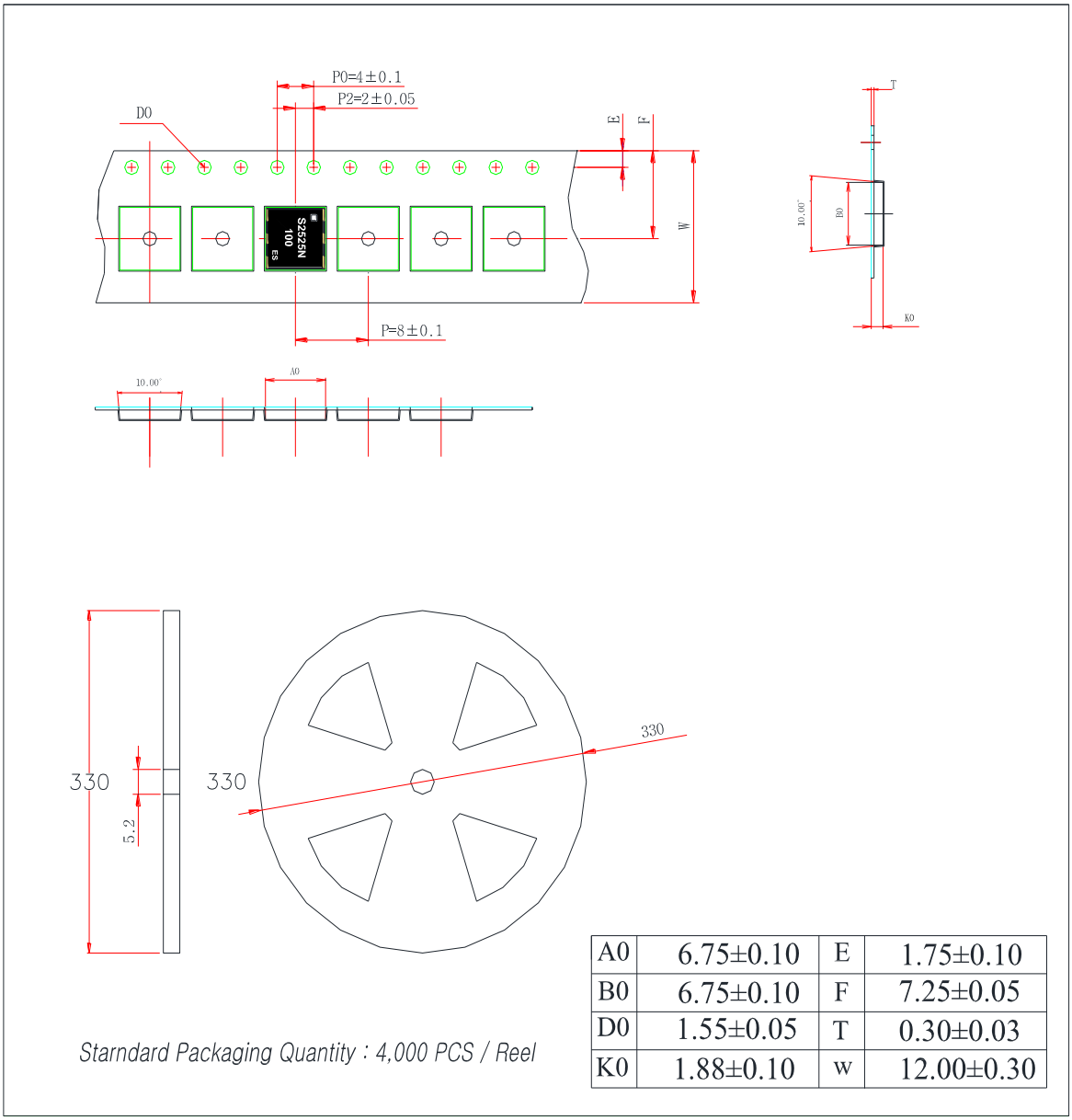


Figure 10. Thermal Reflow Profile

	Ramp Up	Pre-Heating	Peak	Soaking
Temperature(□)	T1:160±5℃	T2:180±5℃	T4:260±5℃	T3:230±5℃
Time(sec)	t1:60±5sec	t2:100±15sec	t3:30±5sec	t4:60±10sec

PACKAGING AND ORDERING INFORMATION



A0	6.75±0.10	E	1.75±0.10
B0	6.75±0.10	F	7.25±0.05
D0	1.55±0.05	T	0.30±0.03
K0	1.88±0.10	w	12.00±0.30

Starndard Packaging Quantity : 4,000 PCS / Reel

CAUTION

PLEASE READ THIS NOTICE BEFORE USING OUR TERMINATION.

I. Be careful when transporting

- Ensure proper transportation as excessive stress or shock may damage Termination due to the nature of ceramics structure.
- Terminations cracked or damaged on terminals may have their property changed.

II. Be careful during storage

- Store Termination in the temperature of -55℃ to +125℃.
- Keep the humidity at 45% to 75% around Termination.
- Prevent corrosive gas (Cl_2, NH_3, SO_X, NO_X, etc.) from contacting Terminations.
- It is recommended to use Termination within 6 months of receipt. If the period exceeds 6 months, solderability may need to be verified.

III. Be careful when soldering

- Solder all the ground terminals, IN pad of Termination on the ground plane of the PCB.
- Termination may be cracked or broken by uneven forces from a claw or suction device.
- Mechanical stress by any other devices may damage Termination when positioning them on PCB.
- Do not use dropped Termination.
- Ensure that any soldering is carried out by the condition of specification sheet.
- Do not re-use Termination which are de-soldered from PCB.

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