ISL74324MEVAL1Z

Radiation Tolerant 500MHz to 6.5GHz RF Amplifier Board

Description

The ISL74324MEVAL1Z provides a quick way to evaluate the ISL74324M RF Amplifier. The board provides access to the STBY and RSET pins. Therefore, the standby functionality can be evaluated. With access to the RSET pin, the user can change the bias point of the amplifier.

Specifications

The ISL74324MEVAL1Z is initially configured to operate at 60mA of bias current. The bias current can be adjusted. See Setup and Configuration for more information. The PCB includes a through line so the loss of the PCB line can be removed and the gain of the device can be measured accurately.

Features

- RF Range: 500MHz to 6500MHz
- I_{CC}: 40mA to 60mA
- V_{CC}: 3.3V to 5V
- Gain = 16.6dB at 4200MHz
- Output P1dB = +21.5dBm at 4200MHz
- OIP3 = +38.4dBm at 4200MHz
- EVB Operates across full temperature range

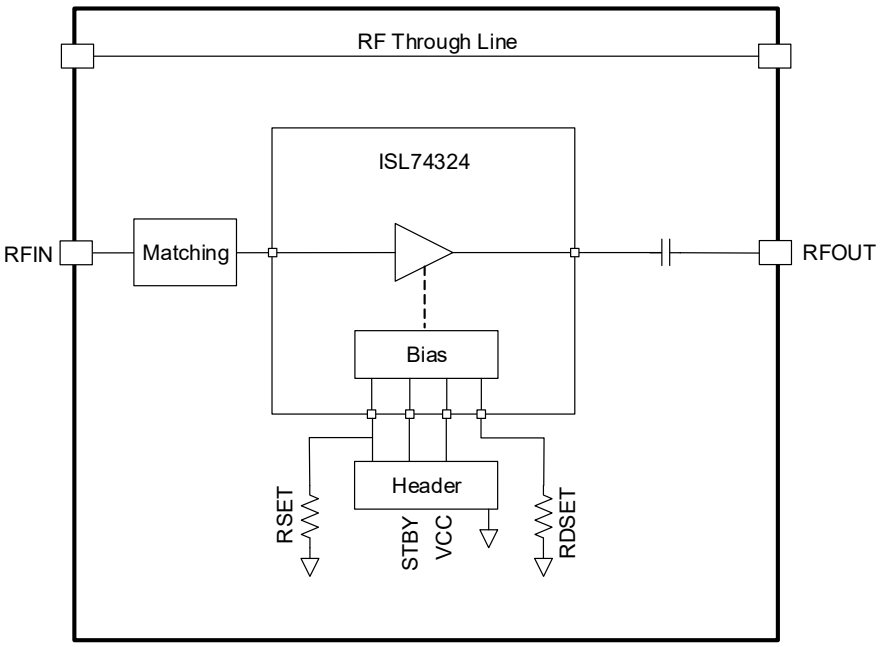

Figure 1. Board Block Diagram

Contents

1. Functional Description

The ISL74324MEVAL1Z provides all necessary component connections to fully evaluate the ISL74324M RF Amplifier.

1.1 Operational Characteristics

The ISL74324MEVAL1Z is shipped with the bias point configured for 60mA. This bias point can be adjusted using the PCB features outlined in the following section. This EVB is similar to the PCB that was used to characterize and qualify the ISL74324M and it operates across the entire V_{CC} range, the full frequency range, and the full temperature range.

1.2 Setup and Configuration

Ensure to review the limits of the device that are listed in the Absolute Maximum Ratings table found in the datasheet. This part was tested for cold sparing applications (such as RF power applied with no V_{CC}). However, it is best practice to ensure that the proper V_{CC} is applied before applying an RF signal. Refer to the schematic in Figure 7 for the EVB connections.

1.2.1 Standard Operation

1. Connect the cable of the input test equipment to J1 (RFIN). Connect the output cable of the test equipment to J2 (RFOUT).
2. Connect the positive DC supply lead to the pin labeled VDD/VCC of the P1 header (pin 2, 4, or 6).
3. Connect the ground DC supply lead to the pin labeled GND of the P1 header (pin 3, 5, or 7).
4. Turn on the DC power supply and verify that the device is sourcing around 60mA.
5. Take RF measurements as required.

1.2.2 Standby Operation

To quickly check standby operation of the device, use a jumper between the STBY pin of P1 (pin 8) and any of the three VCC pins. When the pin is pulled high, the device goes into standby mode and draws 2mA to 3mA.

1.2.3 Bias Adjustment

The bias point of the device is set by the resistor connected to the RSET pin (device pin 4). The board ships with two resistors in parallel R3 and R4. With this resistance (3.6kΩ), the bias point is 60mA. There is a 0Ω resistor (R2) between R3 and R4. This resistor can be removed and the RSET resistance is 7.23kΩ. This resistance provides a bias point around 40mA. With R2 removed, a resistor decade box can be used to control the bias current. Connect the resistor box between pin 1 of P1 and GND. By adjusting the resistance at RSET, between 3.57kΩ and 7.23kΩ, the bias can be adjusted between 40mA and 60mA.

2. Board Design

The ISL74324MEVAL1Z is a multi-layer RF PCB. Figure 2 shows the top of the board. The bottom of the board contains no components.

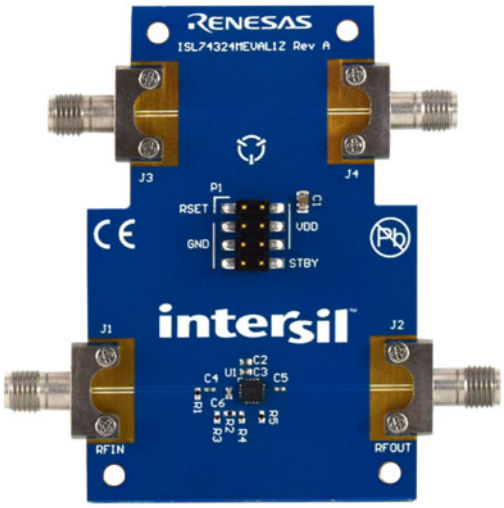

Figure 2. ISL74324MEVAL1Z Evaluation Board (Top)

2.1 Layout Guidelines

Figure 3 through Figure 6 show the layout images of each board metal layer. The 1st inner layer is a solid ground plane that serves as the RF ground for the top RF transmission lines. Layer 2 provides a VCC plane, routing and the rest is filled with ground metal. The bottom layer is also a solid ground plane.

- Material Stack up
  - Top Dielectric: 0.012” RO4350B
  - Inner Dielectric: 0.035” FR-4/Prepreg
  - Bottom Dielectric: 0.012” R04350B
- Each metal layer is 0.5oz Cu with 0.001” of additional plating and ENIG finish.
- Nominal PCB Thickness: 0.062”
- The top RF transmission lines are CPWG design: Line Width = 0.010”, Gap = 0.008”. This line width and spacing provides a 50Ω line through 10GHz.

2.2 Board Layout

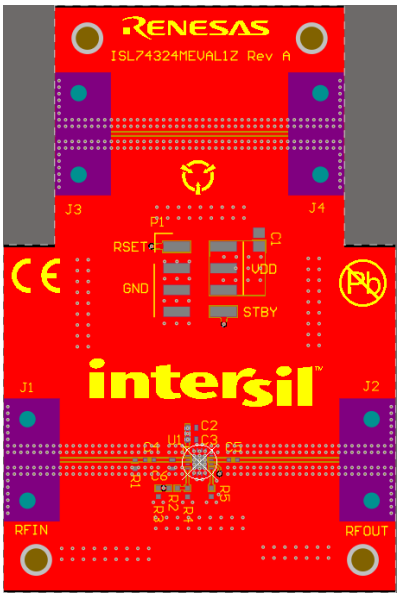

Figure 3. Top Layer

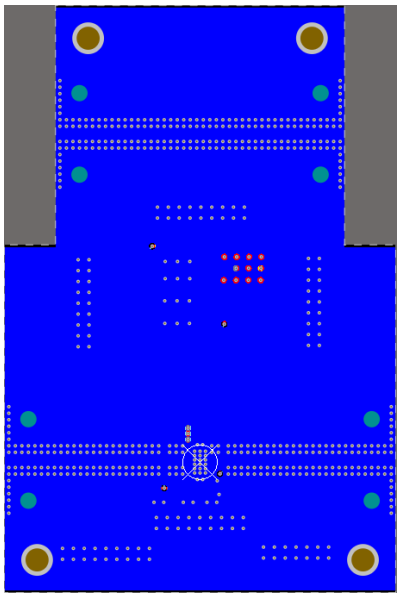

Figure 4. Bottom Layer

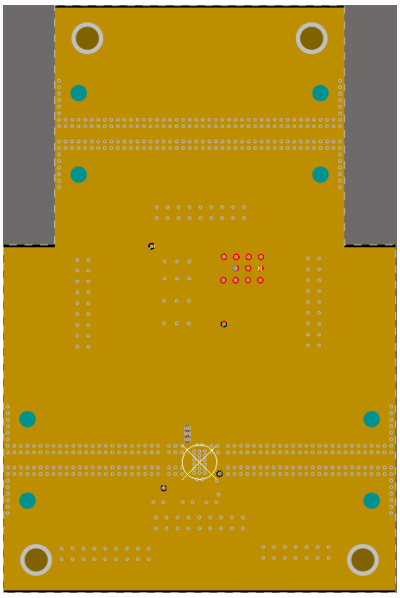

Figure 5. Middle Layer 1

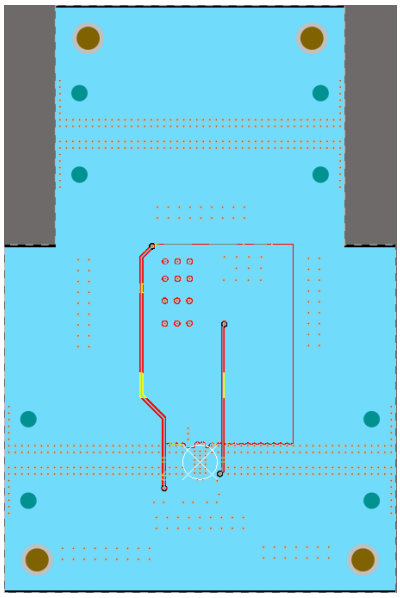

Figure 6. Middle Layer 2

2.3 Schematic Diagrams

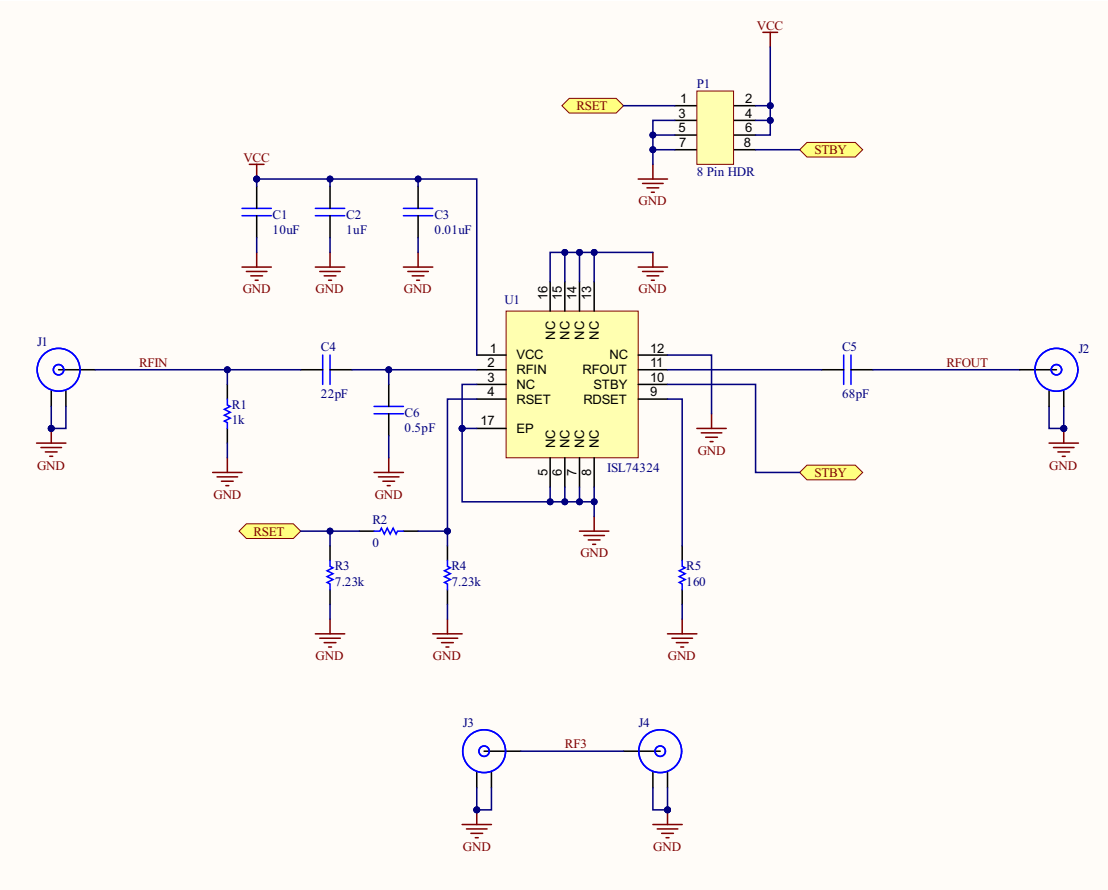

Figure 7. EVB Schematic

2.4 Bill of Materials

Qty	Reference Designator	Description	Manufacturer	Manufacturer Part Number
1	C1	CAP, SMD, 0805, 10µF	Samsung	CL21A106KOQNNNE
1	C2	CAP, SMD, 0402, 1µF	Kyocera AVX	0402ZD105KAT2A
1	C3	CAP, SMD, 0402, 0.01µF	Kyocera AVX	04023C103KAT2A
1	C4	CAP, SMD, 0402, 22pF	Kyocera AVX	04025A220JAT2A
1	C5	CAP, SMD, 0402, 68pF	Kyocera AVX	04025A680JAT2A
1	C6	CAP, SMD, 0402, 0.5pF	Johanson Technology	500R07S0R5AV4T
4	J1, J2, J3, J4	3.5mm Edge Launch RF Female Connector	Amphenol	TMB-E5F2-1L1
1	P1	Male 2×4 at 0.100" Pitch Header	Amphenol FCI	54202-S0804CLF
1	R1	RES, SMD, 0402, 1kΩ	Vishay Dale	CRCW04021K00FKED
1	R2	RES, SMD, 0402, 0Ω	Panasonic	ERJ-2GE0R00X
2	R3, R4	RES, SMD, 0402, 7.23kΩ	Koa Speer	RN73H1ETTP7231D25
1	R5	RES, SMD, 0402, 160Ω	Vishay Dale	CRCW0402160RFKED
1	U1	500MHz to 6500MHz RF Amplifier	Renesas	ISL74324M30RZ

3. Typical Performance Graphs

Figure 8 through Figure 13 show typical s-parameter data for the ISL74324MEVAL1Z operating at 5V, 60mA.

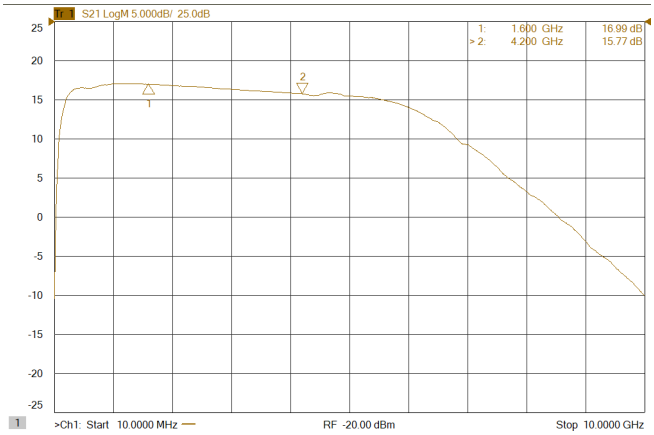

Figure 8. Typical S21

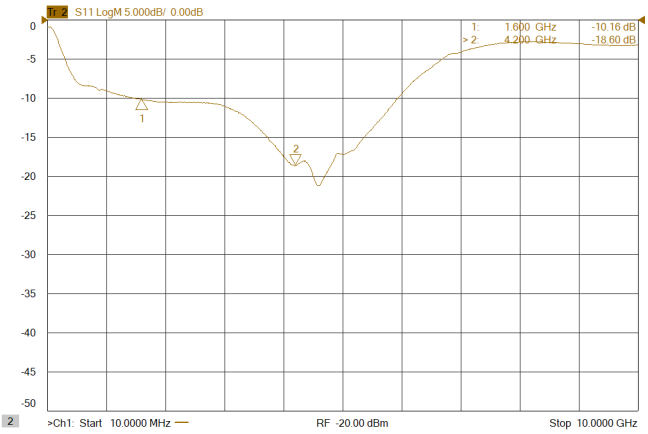

Figure 9. Typical S11

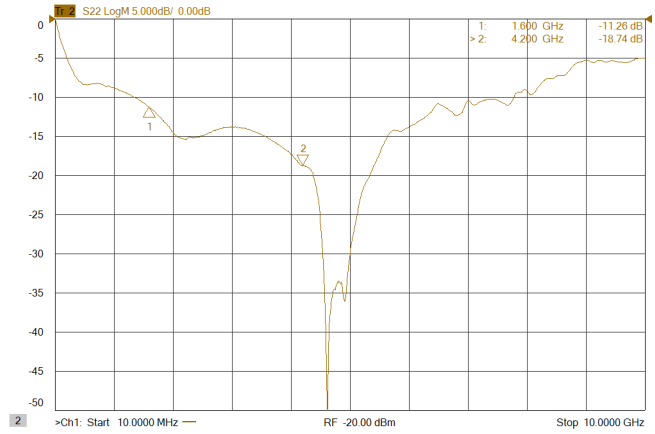

Figure 10. Typical S22

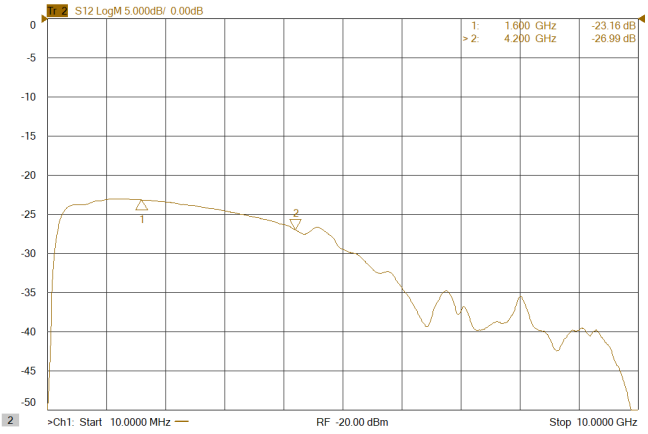

Figure 11. Typical S12

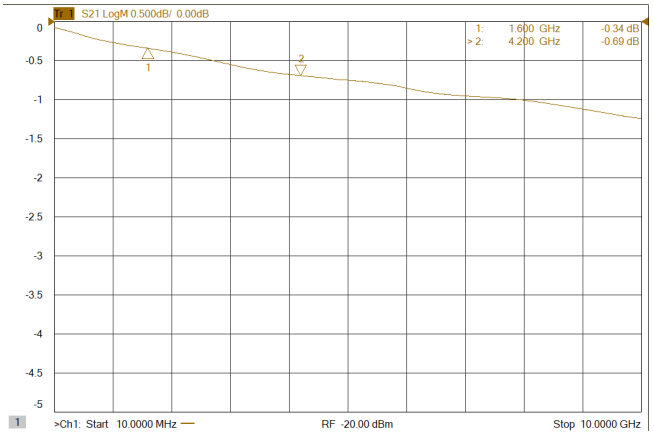

Figure 12. Through Line Insertion Loss

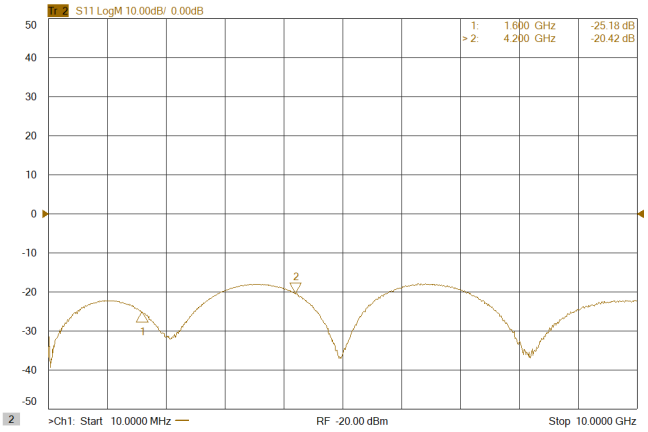

Figure 13. Through Line Return Loss

4. Ordering Information

Part Number	Description
ISL74324MEVAL1Z	Radiation Tolerant 500MHz to 6.5GHz RF Amplifier Board

5. Revision History

Revision	Date	Description
1.00	Dec 15, 2025	Initial release.

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Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu,
Koto-ku, Tokyo 135-0061, Japan
www.renesas.com

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