ISL74324M

Radiation Tolerant Broadband RF Amplifier 500MHz to 6500MHz

Description

The ISL74324M is a radiation tolerant 500MHz to 6500MHz SiGe BiCMOS high-gain broadband radio-frequency (RF) Amplifier. The combination of low noise figure (NF) and high linearity performance allows the device to be used in both receiver and transmitter applications.

The ISL74324M operates with a single 5V or 3.3V power supply using a nominal 60mA. With a supply voltage of 5V, the ISL74324M provides 16.6dB gain with +38.4dBm OIP3 and 2.2dB noise figure at 4200. The device is bias adjustable and can be operated as low as at 40mA for improved efficiency. This device incorporates convenient shutdown capability through the STBY pin.

The device is packaged in a 3×3mm, 16-pin QFN with 50Ω single-ended RF input and output impedances for ease of integration into the signal path.

Competitive Advantage

- Radiation tolerant
- High gain
- Broadband
- STBY feature
- Bias adjustable

Features

- Qualified to Renesas Rad Tolerant Screening and QCI Flow (R34TB0004EU)
- RF range: 500MHz to 6500MHz
- Noise figure = 2.2dB at 4200MHz
- Gain = 16.6dB at 4200MHz
- OIP3 = +38.4dBm at 4200MHz
- Output P1dB = +21.5dBm at 4200MHz
- Near-constant gain versus temperature
- 3.3V or 5V power supply
- I_{CC} = 40mA to 60mA
- 2mA standby current
- 300mW typical DC power at 5V supply
- TID Radiation Lot Acceptance Testing (RLAT) (LDR: ≤ 10mrad(Si)/s)
    - ISL74324M30RZ: 30krad(Si)
    - ISL74324M50RZ: 50krad(Si)
- SEE Characterization:
    - No DSEE with V_{CC} = 5.5V, I_{CC} = 75mA, and RF Input Power = 22dBm at 43MeV·cm^2/mg
    - SET cross-section ~340μm^2 at 43MeV·cm^2/mg
- Passes NASA Low Outgassing specifications
- Operating temperature (T_J) range: -55°C to +125°C
- 3×3mm, 16-QFN package
- SiGe BiCMOS Process

Applications

- L-Band, S-Band Rx/Tx Satellite Chains
- Satellite IF Rx/Tx Chains

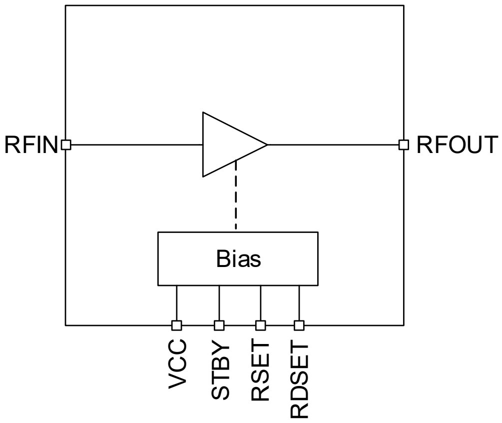


Figure 1. Block Diagram

Contents

1. Pin Information

1.1 Pin Assignments

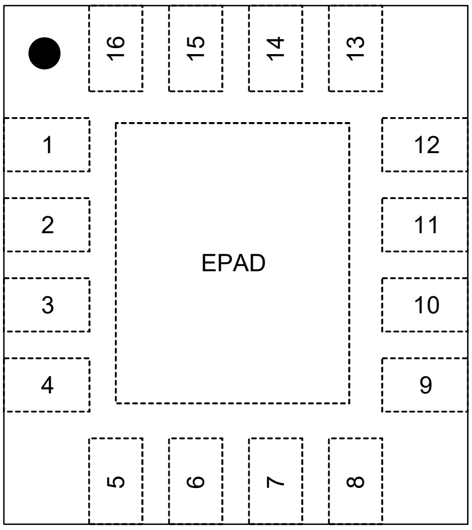


Figure 2. Pin Assignments – Top View

1.2 Pin Descriptions

Pin Number	Pin Name	Description
1	VCC	Power supply. The bypass capacitor must be as close to the pin as possible.
2	RFIN	RF input internally matched to 50Ω. An external DC block is required.
3	NC	No Internal Bond Wire. Connect to GND.
4	RSET	Main amplifier current bias setting resistor. Connect to GND.
5	NC	No Internal Bond Wire. Connect to GND.
6	NC	
7	NC	
8	NC	
9	RDSET	Distortion amplifier current bias setting resistor. Connect to GND.
10	STBY	Standby. If this pin is not connected or is logic LOW, the device operates under its normal operating condition. If this pin is logic HIGH, the ISL74324M is in STBY Mode.
11	RFOUT	RF output internally matched to 50Ω. An external DC block is required.
12	NC	Internally bonded. Connect to GND.
13	NC	No Internal Bond Wire. Connect to GND.
14	NC	
15	NC	
16	NC	
-	EPAD	Exposed pad. This pad is internally connected to GND. Solder this exposed pad to a printed circuit board (PCB) pad that uses multiple ground vias to provide heat transfer out of the device into the PCB ground planes. These multiple ground vias are also required to achieve the specified RF performance.

2. Specifications

2.1 Absolute Maximum Ratings

Caution: Do not operate at or near the maximum ratings listed for extended periods of time. Exposure to such conditions can adversely impact product reliability and result in failures not covered by warranty.

Parameter	Minimum	Maximum	Unit
VCC to GND	-0.3	+5.5	V
STBY	-0.3	+3.6	V
STBY Minus VCC Voltage (voltage difference)	-	0.3	V
RFOUT Externally Applied DC Voltage	$V_{CC} – 0.15$	$V_{CC} + 0.15$	V
ICC, Bias Current	-	75	mA
RFIN Externally Applied DC Current	-1	+1	mA
RSET Pin Maximum DC Current	-1	+1	mA
RDSET Pin Maximum DC Current	-1	+1	mA
RF Input Power (RFOUT) Present for 24 Hours Maximum[1]	-	+20	dBm
Continuous Power Dissipation	-	0.6	W
Maximum Junction Temperature	-	125	°C
Maximum Storage Temperature Range	-65	150	°C
Lead Temperature (soldering, 10s)	-	260	°C
Human Body Model (Tested per JS-001-2023)	-	2	kV
Charged Device Model (Tested per JS-002-2022)	-	1	kV
Latch-Up (Tested per JESD78E; Class 2, Level A)	-	100	mA

1. Exposure to these maximum RF levels can result in significant V_{CC} current draw due to overdriving the amplifier stages.

2.2 Recommended Operating Conditions

Parameter	Minimum	Maximum	Unit
Supply Voltage, V_{CC}	3.15	5.25	V
Supply Current, I_{CC}	-	65	mA
Junction Temperature	-	+125	°C
Case Temperature (Exposed Paddle)	-55	+115	°C
Ambient Temperature	-55	+105	°C
Frequency Range	500	6500	MHz

2.3 Outgas Testing

Specification (Tested per ASSTM E 595, 1.5)[1]	Value	Unit
Total Mass Lost	0.05	%
Collected Volatile Condensible Material	<0.01	%
Water Vapor Recovered	0.03	%

1. Outgassing results meet NASA requirements of Total Mass Lost <1% and Collected Volatile Condensible Material of <0.1%.

2.4 Thermal Specifications

Parameter	Package	Symbol	Conditions	Typical Value	Unit
Thermal Resistance	16 Ld 3x3 QFN Package	θ_{JA}[1]	Junction to ambient	57	°C/W
		θ_{JC}[2]	Junction to case	16	°C/W

1. θ_{JA} is measured in free air with the component mounted on a high-effective thermal conductivity test board with direct attach features. See TB379.
2. For θ_{JC}, the case temperature location is the center of the exposed metal pad on the package underside.

2.5 Electrical Specifications

2.5.1 Standby Pin Specifications

These parameters are common across all bias points. T_C = -55°C to +115°C, T_A = -55°C to +105°C.

Parameter	Symbol	Test Conditions	Min[1]	Typ	Max[1]	Unit
Logic Input High Threshold	V_{IH}	-	1.07	-	-	V
Logic Input Low Threshold	V_{IL}	-	-	-	0.8	V
Logic Current, V_{CC} = 3.3V	I_{IH}, I_{IL}	Applied STBY voltage = VCC	-1	-	+100	µA
Logic Current, V_{CC} = 5.0V	I_{IH}, I_{IL}	Applied STBY voltage = 3.45V	-1	-	+100	µA
Pull-Down Resistor on STBY pin	R_{STBY}	-	-	50	-	kΩ
Standby Current	I_{CC_STBY}	-	-	2	3	mA
Settling Time	t_{SETTLE}	50% STBY control to within ±0.5dB of final power level	-	0.25	-	µs

1. Parameters with Min and/or Max limits are 100% tested at +25°C, unless otherwise specified. Temperature limits established by characterization and are not production tested.

2.5.2 5V Supply, I_{CC} = 60mA

Recommended operating conditions, V_{CC} = 5V with nominal I_{CC} = 60mA. **Boldface limits apply across the operating temperature range, T_A = -55°C to +105°C by characterization with production testing at +25°C; over a total ionizing dose of 30krad(Si) at +25°C with exposure at a low dose rate of <10mrad(Si)/s (ISL74324M30RZ); or over a total ionizing dose of 50krad(Si) at +25°C with exposure at a low dose rate of <10mrad(Si)/s (ISL74324M50RZ).**

Parameter	Symbol	Test Conditions	Min[1]	Typ	Max[1]	Unit
DC Supply Current	I_{CC}	No RF Input	-	60	**70**	mA
Gain (RF Input Power = -20 dBm)	G	F_{RF} = 500MHz	-	16.5	-	dB
		F_{RF} = 1600MHz	**16.5**	17.2	-	dB
		F_{RF} = 2600MHz	-	16.9	-	dB
		F_{RF} = 3500MHz	-	16.7	-	dB
		F_{RF} = 4200MHz	**14.5**	16.6	-	dB
		F_{RF} = 6000MHz	-	15.0	-	dB
Gain Flatness	G_{VAR}	F_{RF} = 600MHz, ±100MHz	-	±0.2	-	dB
		F_{RF} = 1600MHz, ±100MHz	-	±0.15	-	dB
		F_{RF} = 2600MHz, ±100MHz	-	±0.1	-	dB
		F_{RF} = 3500MHz, ±100MHz	-	±0.1	-	dB
		F_{RF} = 4200MHz, ±100MHz	-	±0.1	-	dB
		F_{RF} = 6000MHz, ±100MHz	-	±0.5	-	dB

Recommended operating conditions, V_{CC} = 5V with nominal I_{CC} = 60mA. **Boldface limits apply across the operating temperature range, T_A = -55°C to +105°C by characterization with production testing at +25°C; over a total ionizing dose of 30krad(Si) at +25°C with exposure at a low dose rate of <10mrad(Si)/s (ISL74324M30RZ); or over a total ionizing dose of 50krad(Si) at +25°C with exposure at a low dose rate of <10mrad(Si)/s (ISL74324M50RZ). (Cont.)**

Parameter	Symbol	Test Conditions	Min[1]	Typ	Max[1]	Unit
RF Input Return Loss	RL_{IN}	F_{RF} = 500MHz	-	7.6	-	dB
		F_{RF} = 1600MHz	-	10.2	-	dB
		F_{RF} = 2600MHz	-	13.0	-	dB
		F_{RF} = 3500MHz	-	21.6	-	dB
		F_{RF} = 4200MHz	-	24.9	-	dB
		F_{RF} = 6000MHz	-	10.6	-	dB
RF Output Return Loss	RL_{OUT}	F_{RF} = 500MHz	-	8.7	-	dB
		F_{RF} = 1600MHz	-	11.2	-	dB
		F_{RF} = 2600MHz	-	11.4	-	dB
		F_{RF} = 3500MHz	-	12.8	-	dB
		F_{RF} = 4200MHz	-	18.4	-	dB
		F_{RF} = 6000MHz	-	11.5	-	dB
Gain Variation over Temperature	G_{TEMP}	F_{RF} = 500MHz	-	±0.47	-	dB
		F_{RF} = 1600MHz	-	±0.48	-	dB
		F_{RF} = 2600MHz	-	±0.42	-	dB
		F_{RF} = 3500MHz	-	±0.32	-	dB
		F_{RF} = 4200MHz	-	±0.32	-	dB
		F_{RF} = 6000MHz	-	±0.57	-	dB
Noise Figure	NF	F_{RF} = 500MHz	-	2.4	-	dB
		F_{RF} = 1600MHz	-	2.3	-	dB
		F_{RF} = 2600MHz	-	2.3	-	dB
		F_{RF} = 3500MHz	-	2.2	-	dB
		F_{RF} = 4200MHz	-	2.2	-	dB
		F_{RF} = 6000MHz	-	4.8	-	dB
Noise Figure Variation over Temperature	NF_{TEMP}	F_{RF} = 2600MHz	-	± 0.5	-	dB
Output P1dB Compression	OP_{1dB}	F_{RF} = 500MHz	-	19.5	-	dBm
		F_{RF} = 1600MHz	**18.5**	20.5	-	dBm
		F_{RF} = 2600MHz	-	21.5	-	dBm
		F_{RF} = 3500MHz	-	21.1	-	dBm
		F_{RF} = 4200MHz	**18.0**	21.5	-	dBm
		F_{RF} = 6000MHz	-	19.2	-	dBm
Output Third-Order Intercept Point[2]	OIP3	F_{RF} = 500MHz	-	30.7	-	dBm
		F_{RF} = 1600MHz	**25**	32.7	-	dBm
		F_{RF} = 2600MHz	-	33.9	-	dBm
		F_{RF} = 3500MHz	-	36.7	-	dBm
		F_{RF} = 4200MHz	-	38.4	-	dBm
		F_{RF} = 6000MHz	-	32.9	-	dBm

Recommended operating conditions, V_{CC} = 5V with nominal I_{CC} = 60mA. **Boldface limits apply across the operating temperature range, T_A = -55°C to +105°C by characterization with production testing at +25°C; over a total ionizing dose of 30krad(Si) at +25°C with exposure at a low dose rate of <10mrad(Si)/s (ISL74324M30RZ); or over a total ionizing dose of 50krad(Si) at +25°C with exposure at a low dose rate of <10mrad(Si)/s (ISL74324M50RZ). (Cont.)**

Parameter	Symbol	Test Conditions	Min[1]	Typ	Max[1]	Unit
Output Third-Order Intercept Point Variation over Temperature[2]	$OIP3_{VAR}$	F_{RF} = 2600MHz	-	± 1.5	-	dBm
Reverse Isolation	REV_{ISO}	F_{RF} = 500MHz	-	23.6	-	dB
		F_{RF} = 1600MHz	-	22.9	-	dB
		F_{RF} = 2600MHz	-	23.8	-	dB
		F_{RF} = 3500MHz	-	24.9	-	dB
		F_{RF} = 4200MHz	-	26.6	-	dB
		F_{RF} = 6000MHz	-	38.9	-	dB

1. Parameters with Min and/or Max limits are 100% tested at +25°C, unless otherwise specified. Temperature limits established by characterization and are not production tested.
2. 1MHz tone separation, P_{OUT} = 0dBm

2.5.3 3.3V Supply, I_{CC} = 60mA

Recommended operating conditions, V_{CC} = 3.3V with nominal I_{CC} = 60mA. **Boldface limits apply across the operating temperature range, T_A = -55°C to +105°C by characterization with production testing at +25°C; over a total ionizing dose of 30krad(Si) at +25°C with exposure at a low dose rate of <10mrad(Si)/s (ISL74324M30RZ); or over a total ionizing dose of 50krad(Si) at +25°C with exposure at a low dose rate of <10mrad(Si)/s (ISL74324M50RZ).**

Parameter	Symbol	Test Conditions	Min[1]	Typ	Max[1]	Unit
DC Supply Current	I_{CC}	No RF Input	-	60	**70**	mA
Gain (RF Input Power = -20 dBm)	G	F_{RF} = 500MHz	-	16.5	-	dB
		F_{RF} = 1600MHz	**16.5**	17.2	-	dB
		F_{RF} = 2600MHz	-	16.9	-	dB
		F_{RF} = 3500MHz	-	16.7	-	dB
		F_{RF} = 4200MHz	**14.5**	16.5	-	dB
		F_{RF} = 6000MHz	-	14.8	-	dB
Gain Flatness	G_{VAR}	F_{RF} = 600MHz, ±100MHz	-	±0.2	-	dB
		F_{RF} = 1600MHz, ±100MHz	-	±0.15	-	dB
		F_{RF} = 2600MHz, ±100MHz	-	±0.1	-	dB
		F_{RF} = 3500MHz, ±100MHz	-	±0.1	-	dB
		F_{RF} = 4200MHz, ±100MHz	-	±0.1	-	dB
		F_{RF} = 6000MHz, ±100MHz	-	±0.5	-	dB
RF Input Return Loss	RL_{IN}	F_{RF} = 500MHz	-	7.5	-	dB
		F_{RF} = 1600MHz	-	10.2	-	dB
		F_{RF} = 2600MHz	-	12.9	-	dB
		F_{RF} = 3500MHz	-	20.7	-	dB
		F_{RF} = 4200MHz	-	22.9	-	dB
		F_{RF} = 6000MHz	-	10.3	-	dB

Recommended operating conditions, V_{CC} = 3.3V with nominal I_{CC} = 60mA. **Boldface limits apply across the operating temperature range, T_A = -55°C to +105°C by characterization with production testing at +25°C; over a total ionizing dose of 30krad(Si) at +25°C with exposure at a low dose rate of <10mrad(Si)/s (ISL74324M30RZ); or over a total ionizing dose of 50krad(Si) at +25°C with exposure at a low dose rate of <10mrad(Si)/s (ISL74324M50RZ). (Cont.)**

Parameter	Symbol	Test Conditions	Min[1]	Typ	Max[1]	Unit
RF Output Return Loss	RL_{OUT}	F_{RF} = 500MHz	-	8.7	-	dB
		F_{RF} = 1600MHz	-	11.5	-	dB
		F_{RF} = 2600MHz	-	11.8	-	dB
		F_{RF} = 3500MHz	-	13.7	-	dB
		F_{RF} = 4200MHz	-	20.4	-	dB
		F_{RF} = 6000MHz	-	10.3	-	dB
Gain Variation over Temperature	G_{TEMP}	F_{RF} = 500MHz	-	±0.44	-	dB
		F_{RF} = 1600MHz	-	±0.43	-	dB
		F_{RF} = 2600MHz	-	±0.37	-	dB
		F_{RF} = 3500MHz	-	±0.28	-	dB
		F_{RF} = 4200MHz	-	±0.29	-	dB
		F_{RF} = 6000MHz	-	±0.59	-	dB
Noise Figure	NF	F_{RF} = 500MHz	-	2.4	-	dB
		F_{RF} = 1600MHz	-	2.3	-	dB
		F_{RF} = 2600MHz	-	2.3	-	dB
		F_{RF} = 3500MHz	-	2.2	-	dB
		F_{RF} = 4200MHz	-	2.2	-	dB
		F_{RF} = 6000MHz	-	4.8	-	dB
Noise Figure Variation over Temperature	NF_{TEMP}	F_{RF} = 2600MHz	-	± 0.5	-	dB
Output P1dB Compression	OP_{1dB}	F_{RF} = 500MHz	-	16.9	-	dBm
		F_{RF} = 1600MHz	**16.5**	17.8	-	dBm
		F_{RF} = 2600MHz	-	17.7	-	dBm
		F_{RF} = 3500MHz	-	16.9	-	dBm
		F_{RF} = 4200MHz	**14.0**	17.2	-	dBm
		F_{RF} = 6000MHz	-	14.5	-	dBm
Output Third-Order Intercept Point[2]	OIP3	F_{RF} = 500MHz	-	30.4	-	dBm
		F_{RF} = 1600MHz	**25.0**	33.0	-	dBm
		F_{RF} = 2600MHz	-	34.6	-	dBm
		F_{RF} = 3500MHz	-	32.1	-	dBm
		F_{RF} = 4200MHz	-	30.6	-	dBm
		F_{RF} = 6000MHz	-	28.0	-	dBm
Output Third-Order Intercept Point Variation over Temperature[2]	$OIP3_{VAR}$	F_{RF} = 2600MHz	-	± 2.3	-	dBm

Recommended operating conditions, V_{CC} = 3.3V with nominal I_{CC} = 60mA. **Boldface limits apply across the operating temperature range, T_A = -55°C to +105°C by characterization with production testing at +25°C; over a total ionizing dose of 30krad(Si) at +25°C with exposure at a low dose rate of <10mrad(Si)/s (ISL74324M30RZ); or over a total ionizing dose of 50krad(Si) at +25°C with exposure at a low dose rate of <10mrad(Si)/s (ISL74324M50RZ). (Cont.)**

Parameter	Symbol	Test Conditions	Min[1]	Typ	Max[1]	Unit
Reverse Isolation	REV_{ISO}	F_{RF} = 500MHz	-	23.5	-	dB
		F_{RF} = 1600MHz	-	22.9	-	dB
		F_{RF} = 2600MHz	-	23.9	-	dB
		F_{RF} = 3500MHz	-	25.2	-	dB
		F_{RF} = 4200MHz	-	27.0	-	dB
		F_{RF} = 6000MHz	-	39.6	-	dB

1. Parameters with Min and/or Max limits are 100% tested at +25°C, unless otherwise specified. Temperature limits established by characterization and are not production tested.
2. 1MHz tone separation, P_{OUT} = 0dBm

2.5.4 5V Supply, I_{CC} = 40mA

Recommended operating conditions, V_{CC} = 5V with nominal I_{CC} = 40mA. **Boldface limits apply across the operating temperature range, T_A = -55°C to +105°C by characterization with production testing at +25°C; over a total ionizing dose of 30krad(Si) at +25°C with exposure at a low dose rate of <10mrad(Si)/s (ISL74324M30RZ); or over a total ionizing dose of 50krad(Si) at +25°C with exposure at a low dose rate of <10mrad(Si)/s (ISL74324M50RZ).**

Parameter	Symbol	Test Conditions	Min[1]	Typ	Max[1]	Unit
DC Supply Current	I_{CC}	No RF Input	-	40	**50**	mA
Gain (RF Input Power = -20 dBm)	G	F_{RF} = 500MHz	-	15.6	-	dB
		F_{RF} = 1600MHz	**15.5**	16.2	-	dB
		F_{RF} = 2600MHz	-	16.0	-	dB
		F_{RF} = 3500MHz	-	15.9	-	dB
		F_{RF} = 4200MHz	**14.0**	15.8	-	dB
		F_{RF} = 6000MHz	-	14.4	-	dB
Gain Flatness	G_{VAR}	F_{RF} = 600MHz, ±100MHz	-	±0.2	-	dB
		F_{RF} = 1600MHz, ±100MHz	-	±0.15	-	dB
		F_{RF} = 2600MHz, ±100MHz	-	±0.1	-	dB
		F_{RF} = 3500MHz, ±100MHz	-	±0.1	-	dB
		F_{RF} = 4200MHz, ±100MHz	-	±0.1	-	dB
		F_{RF} = 6000MHz, ±100MHz	-	±0.5	-	dB
RF Input Return Loss	RL_{IN}	F_{RF} = 500MHz	-	7.3	-	dB
		F_{RF} = 1600MHz	-	9.0	-	dB
		F_{RF} = 2600MHz	-	10.9	-	dB
		F_{RF} = 3500MHz	-	16.9	-	dB
		F_{RF} = 4200MHz	-	19.0	-	dB
		F_{RF} = 6000MHz	-	9.8	-	dB

Recommended operating conditions, V_{CC} = 5V with nominal I_{CC} = 40mA. **Boldface limits apply across the operating temperature range, T_A = -55°C to +105°C by characterization with production testing at +25°C; over a total ionizing dose of 30krad(Si) at +25°C with exposure at a low dose rate of <10mrad(Si)/s (ISL74324M30RZ); or over a total ionizing dose of 50krad(Si) at +25°C with exposure at a low dose rate of <10mrad(Si)/s (ISL74324M50RZ). (Cont.)**

Parameter	Symbol	Test Conditions	Min[1]	Typ	Max[1]	Unit
RF Output Return Loss	RL_{OUT}	F_{RF} = 500MHz	-	8.9	-	dB
		F_{RF} = 1600MHz	-	10.6	-	dB
		F_{RF} = 2600MHz	-	10.7	-	dB
		F_{RF} = 3500MHz	-	12.3	-	dB
		F_{RF} = 4200MHz	-	16.7	-	dB
		F_{RF} = 6000MHz	-	9.8	-	dB
Gain Variation over Temperature	G_{TEMP}	F_{RF} = 500MHz	-	±0.56	-	dB
		F_{RF} = 1600MHz	-	±0.57	-	dB
		F_{RF} = 2600MHz	-	±0.51	-	dB
		F_{RF} = 3500MHz	-	±0.44	-	dB
		F_{RF} = 4200MHz	-	±0.40	-	dB
		F_{RF} = 6000MHz	-	±0.74	-	dB
Noise Figure	NF	F_{RF} = 500MHz	-	2.4	-	dB
		F_{RF} = 1600MHz	-	2.4	-	dB
		F_{RF} = 2600MHz	-	2.4	-	dB
		F_{RF} = 3500MHz	-	2.3	-	dB
		F_{RF} = 4200MHz	-	2.3	-	dB
		F_{RF} = 6000MHz	-	4.8	-	dB
Noise Figure Variation over Temperature	NF_{TEMP}	F_{RF} = 2600MHz	-	± 0.5	-	dB
Output P1dB Compression	OP_{1dB}	F_{RF} = 500MHz	-	16.7	-	dBm
		F_{RF} = 1600MHz	**15.0**	17.7	-	dBm
		F_{RF} = 2600MHz	-	18.4	-	dBm
		F_{RF} = 3500MHz	-	19.8	-	dBm
		F_{RF} = 4200MHz	**18.0**	20.0	-	dBm
		F_{RF} = 6000MHz	-	17.1	-	dBm
Output Third-Order Intercept Point[2]	OIP3	F_{RF} = 500MHz	-	25.1	-	dBm
		F_{RF} = 1600MHz	**21.0**	25.9	-	dBm
		F_{RF} = 2600MHz	-	26.7	-	dBm
		F_{RF} = 3500MHz	-	29.4	-	dBm
		F_{RF} = 4200MHz	-	29.8	-	dBm
		F_{RF} = 6000MHz	-	27.3	-	dBm
Output Third-Order Intercept Point Variation over Temperature[2]	$OIP3_{VAR}$	F_{RF} = 2600MHz	-	± 0.9	-	dBm

Recommended operating conditions, V_{CC} = 5V with nominal I_{CC} = 40mA. **Boldface limits apply across the operating temperature range, T_A = -55°C to +105°C by characterization with production testing at +25°C; over a total ionizing dose of 30krad(Si) at +25°C with exposure at a low dose rate of <10mrad(Si)/s (ISL74324M30RZ); or over a total ionizing dose of 50krad(Si) at +25°C with exposure at a low dose rate of <10mrad(Si)/s (ISL74324M50RZ). (Cont.)**

Parameter	Symbol	Test Conditions	Min[1]	Typ	Max[1]	Unit
Reverse Isolation	REV_{ISO}	F_{RF} = 500MHz	-	22.8	-	dB
		F_{RF} = 1600MHz	-	22.3	-	dB
		F_{RF} = 2600MHz	-	23.2	-	dB
		F_{RF} = 3500MHz	-	24.4	-	dB
		F_{RF} = 4200MHz	-	26.1	-	dB
		F_{RF} = 6000MHz	-	42.7	-	dB

1. Parameters with Min and/or Max limits are 100% tested at +25°C, unless otherwise specified. Temperature limits established by characterization and are not production tested.
2. 1MHz tone separation, P_{OUT} = 0dBm

2.5.5 3.3V Supply, I_{CC} = 40mA

Recommended operating conditions, V_{CC} = 3.3V with nominal I_{CC} = 40mA. **Boldface limits apply across the operating temperature range, T_A = -55°C to +105°C by characterization with production testing at +25°C; over a total ionizing dose of 30krad(Si) at +25°C with exposure at a low dose rate of <10mrad(Si)/s (ISL74324M30RZ); or over a total ionizing dose of 50krad(Si) at +25°C with exposure at a low dose rate of <10mrad(Si)/s (ISL74324M50RZ).**

Parameter	Symbol	Test Conditions	Min[1]	Typ	Max[1]	Unit
DC Supply Current	I_{CC}	No RF Input	-	40	**50**	mA
Gain (RF Input Power = -20 dBm)	G	F_{RF} = 500MHz	-	15.6	-	dB
		F_{RF} = 1600MHz	**15.5**	16.2	-	dB
		F_{RF} = 2600MHz	-	16.0	-	dB
		F_{RF} = 3500MHz	-	15.9	-	dB
		F_{RF} = 4200MHz	**14.0**	15.7	-	dB
		F_{RF} = 6000MHz	-	14.1	-	dB
Gain Flatness	G_{VAR}	F_{RF} = 600MHz, ±100MHz	-	±0.2	-	dB
		F_{RF} = 1600MHz, ±100MHz	-	±0.15	-	dB
		F_{RF} = 2600MHz, ±100MHz	-	±0.1	-	dB
		F_{RF} = 3500MHz, ±100MHz	-	±0.1	-	dB
		F_{RF} = 4200MHz, ±100MHz	-	±0.1	-	dB
		F_{RF} = 6000MHz, ±100MHz	-	±0.5	-	dB
RF Input Return Loss	RL_{IN}	F_{RF} = 500MHz	-	7.2	-	dB
		F_{RF} = 1600MHz	-	8.9	-	dB
		F_{RF} = 2600MHz	-	10.8	-	dB
		F_{RF} = 3500MHz	-	16.4	-	dB
		F_{RF} = 4200MHz	-	17.9	-	dB
		F_{RF} = 6000MHz	-	9.3	-	dB

Recommended operating conditions, V_{CC} = 3.3V with nominal I_{CC} = 40mA. **Boldface limits apply across the operating temperature range, T_A = -55°C to +105°C by characterization with production testing at +25°C; over a total ionizing dose of 30krad(Si) at +25°C with exposure at a low dose rate of <10mrad(Si)/s (ISL74324M30RZ); or over a total ionizing dose of 50krad(Si) at +25°C with exposure at a low dose rate of <10mrad(Si)/s (ISL74324M50RZ). (Cont.)**

Parameter	Symbol	Test Conditions	Min[1]	Typ	Max[1]	Unit
RF Output Return Loss	RL_{OUT}	F_{RF} = 500MHz	-	8.9	-	dB
		F_{RF} = 1600MHz	-	10.8	-	dB
		F_{RF} = 2600MHz	-	11.0	-	dB
		F_{RF} = 3500MHz	-	13.1	-	dB
		F_{RF} = 4200MHz	-	17.4	-	dB
		F_{RF} = 6000MHz	-	9.0	-	dB
Gain Variation over Temperature	G_{TEMP}	F_{RF} = 500MHz		±0.53		dB
		F_{RF} = 1600MHz		±0.51		dB
		F_{RF} = 2600MHz	-	±0.46	-	dB
		F_{RF} = 3500MHz		±0.40		dB
		F_{RF} = 4200MHz		±0.36		dB
		F_{RF} = 6000MHz		±0.72		dB
Noise Figure	NF	F_{RF} = 500MHz	-	2.4	-	dB
		F_{RF} = 1600MHz	-	2.4	-	dB
		F_{RF} = 2600MHz	-	2.4	-	dB
		F_{RF} = 3500MHz	-	2.3	-	dB
		F_{RF} = 4200MHz	-	2.3	-	dB
		F_{RF} = 6000MHz	-	4.8	-	dB
Noise Figure Variation over Temperature	NF_{TEMP}	F_{RF} = 2600MHz	-	± 0.5	-	dB
Output P1dB Compression	OP_{1dB}	F_{RF} = 500MHz	-	15.2	-	dBm
		F_{RF} = 1600MHz	**15.0**	16.2	-	dBm
		F_{RF} = 2600MHz	-	16.7	-	dBm
		F_{RF} = 3500MHz	-	16.0	-	dBm
		F_{RF} = 4200MHz	**13.5**	16.3	-	dBm
		F_{RF} = 6000MHz	-	13.9	-	dBm
Output Third-Order Intercept Point[2]	OIP3	F_{RF} = 500MHz	-	24.6	-	dBm
		F_{RF} = 1600MHz	**21.0**	25.7	-	dBm
		F_{RF} = 2600MHz	-	26.7	-	dBm
		F_{RF} = 3500MHz	-	28.6	-	dBm
		F_{RF} = 4200MHz	-	27.5	-	dBm
		F_{RF} = 6000MHz	-	25.3	-	dBm
Output Third-Order Intercept Point Variation over Temperature[2]	$OIP3_{VAR}$	F_{RF} = 2600MHz	-	± 0.7	-	dBm

Recommended operating conditions, V_{CC} = 3.3V with nominal I_{CC} = 40mA. **Boldface limits apply across the operating temperature range, T_A = -55°C to +105°C by characterization with production testing at +25°C; over a total ionizing dose of 30krad(Si) at +25°C with exposure at a low dose rate of <10mrad(Si)/s (ISL74324M30RZ); or over a total ionizing dose of 50krad(Si) at +25°C with exposure at a low dose rate of <10mrad(Si)/s (ISL74324M50RZ). (Cont.)**

Parameter	Symbol	Test Conditions	Min[1]	Typ	Max[1]	Unit
Reverse Isolation	REV_{ISO}	F_{RF} = 500MHz	-	22.7	-	dB
		F_{RF} = 1600MHz	-	22.3	-	dB
		F_{RF} = 2600MHz	-	23.3	-	dB
		F_{RF} = 3500MHz	-	24.7	-	dB
		F_{RF} = 4200MHz	-	26.6	-	dB
		F_{RF} = 6000MHz	-	43.6	-	dB

1. Parameters with Min and/or Max limits are 100% tested at +25°C, unless otherwise specified. Temperature limits established by characterization and are not production tested.
2. 1MHz tone separation, P_{OUT} = 0dBm

3. Typical Performance Graphs

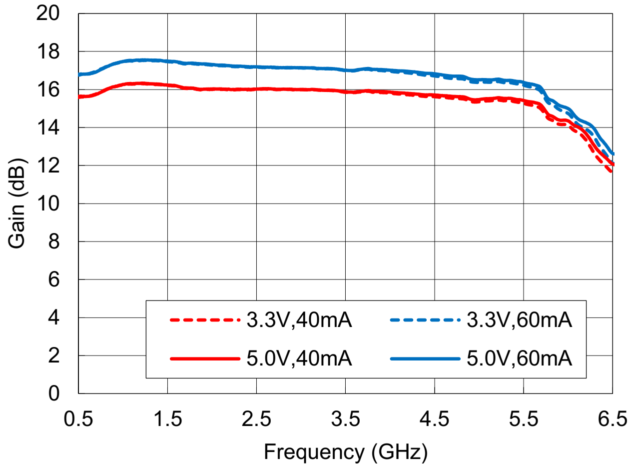


Figure 3. Gain vs Bias Point, 25°C

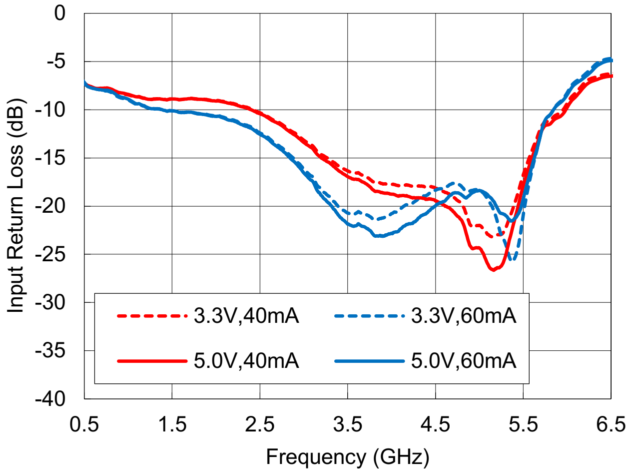


Figure 4. Input Return Loss vs Bias Point, 25°C

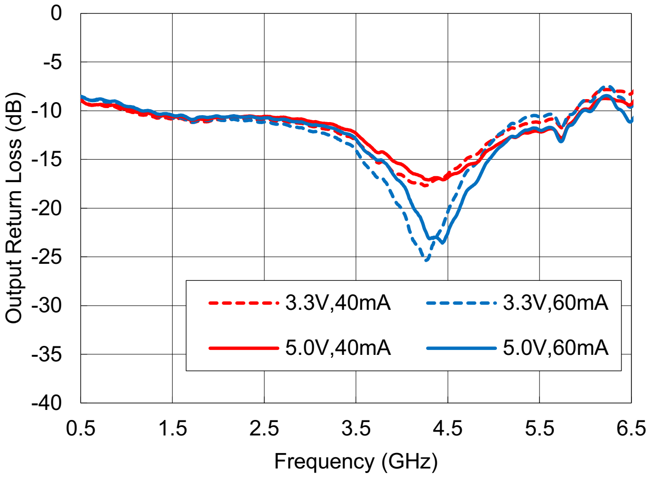


Figure 5. Output Return Loss vs Bias Point, 25°C

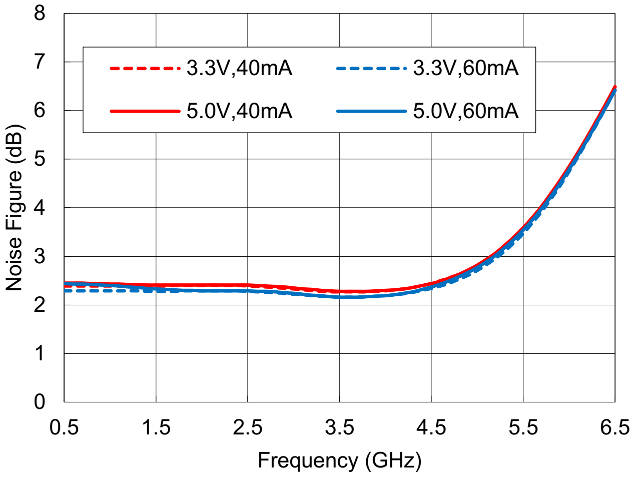


Figure 6. Noise Figure vs Bias Point, 25°C

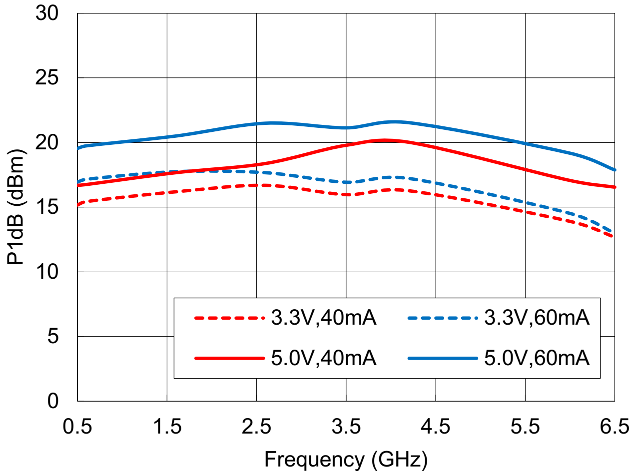


Figure 7. P1dB vs Bias Point, 25°C

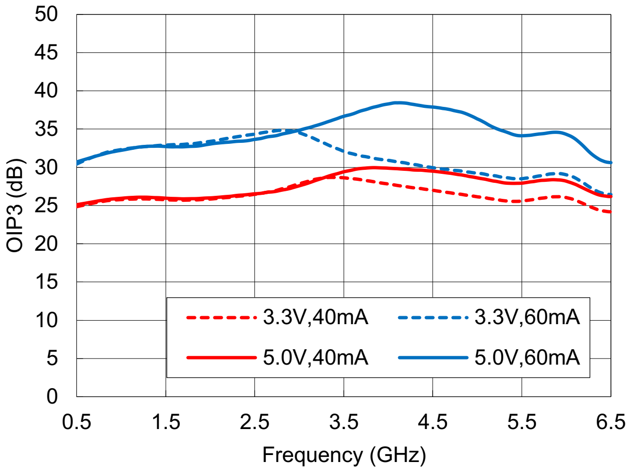


Figure 8. OIP3 vs Bias Point, 25°C

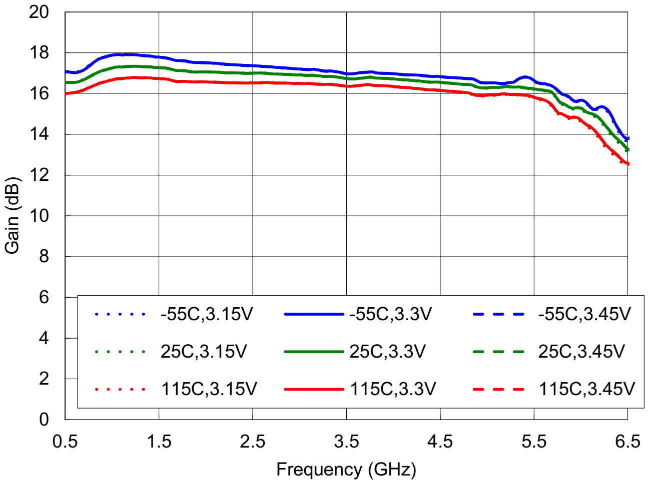


Figure 9. Gain vs Temperature (5V, 60mA)

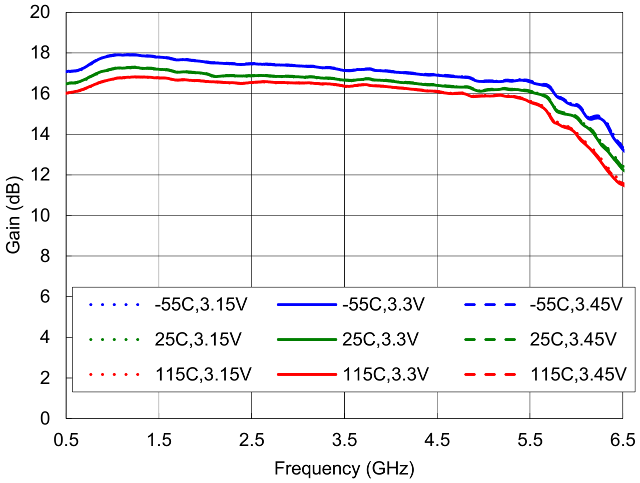


Figure 10. Gain vs Temperature (3.3V, 60mA)

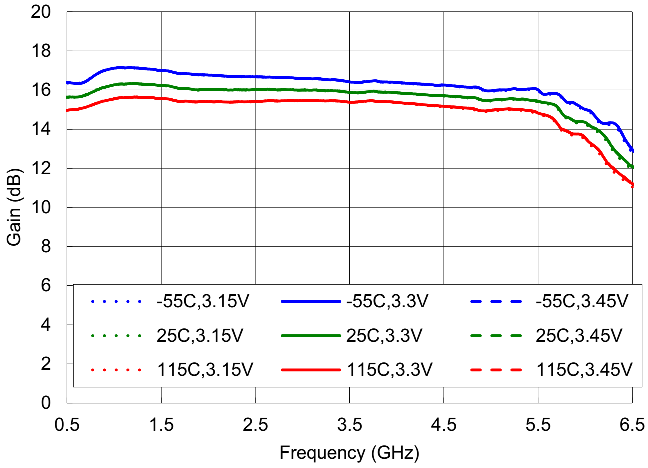


Figure 11. Gain vs Temperature (5V, 40mA)

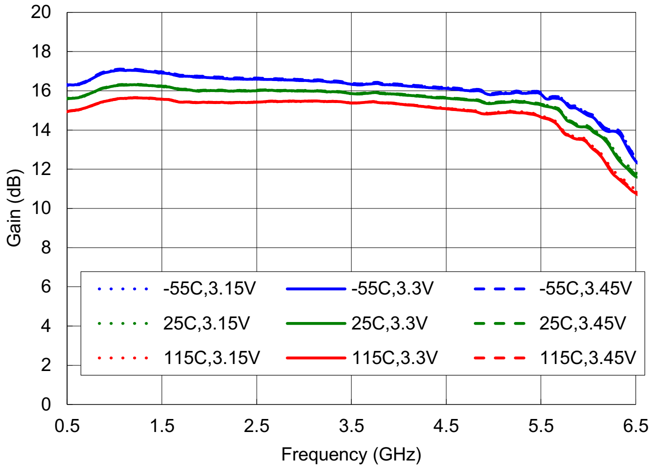


Figure 12. Gain vs Temperature (3.3V, 40mA)

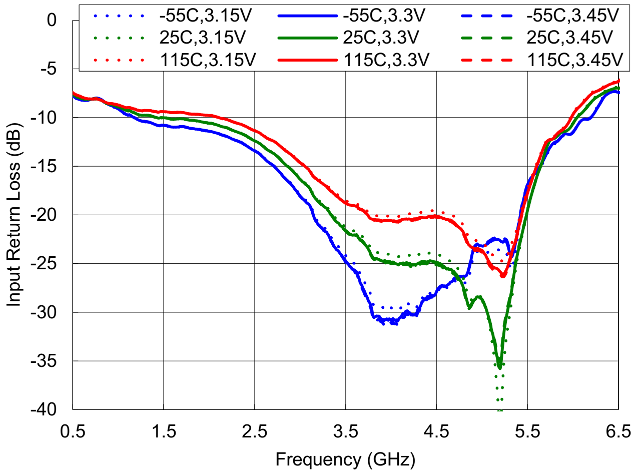


Figure 13. Input Return Loss vs Temperature (5V, 60mA)

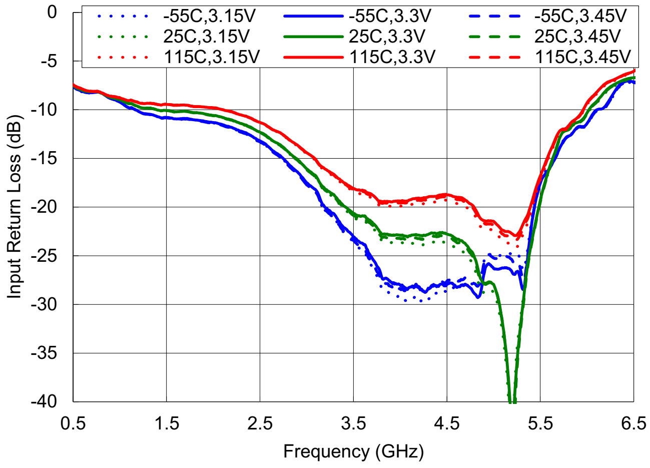


Figure 14. Input Return Loss vs Temperature (3.3V, 60mA)

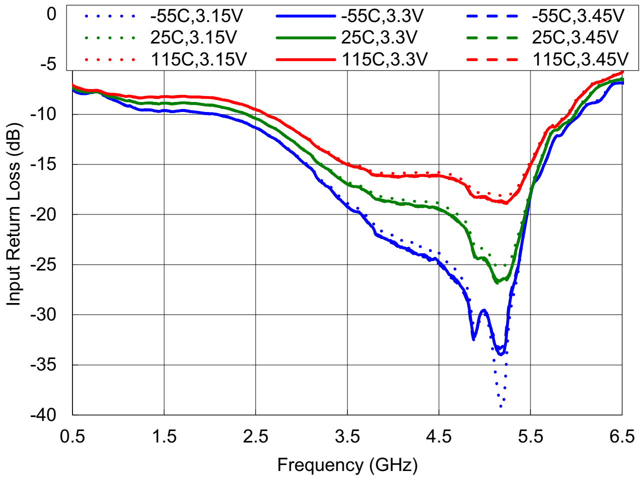


Figure 15. Input Return Loss vs Temperature (5V, 40mA)

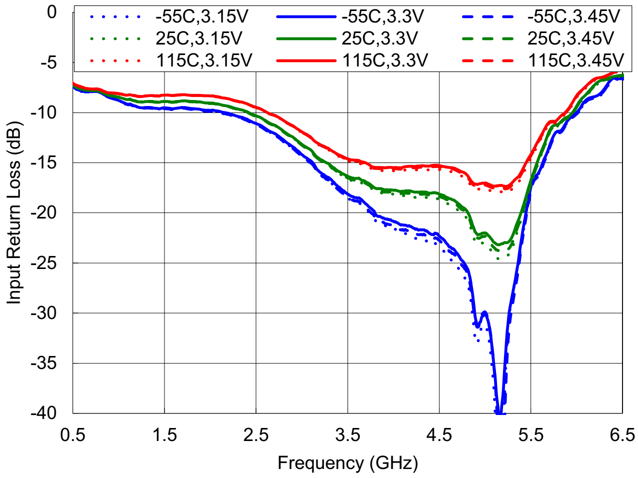


Figure 16. Input Return Loss vs Temperature (3.3V, 40mA)

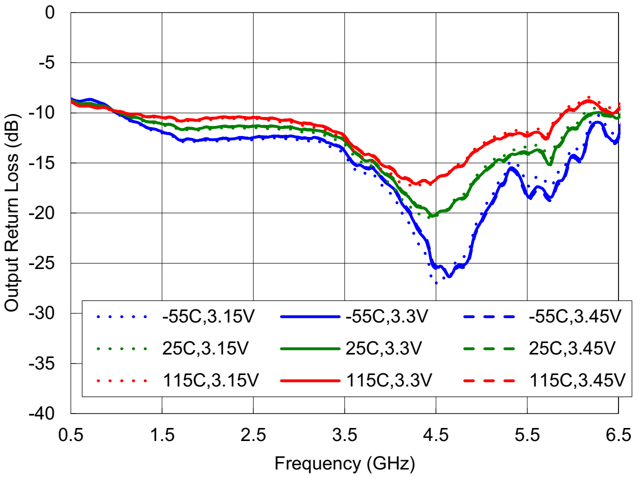


Figure 17. Output Return Loss vs Temperature (5V, 60mA)

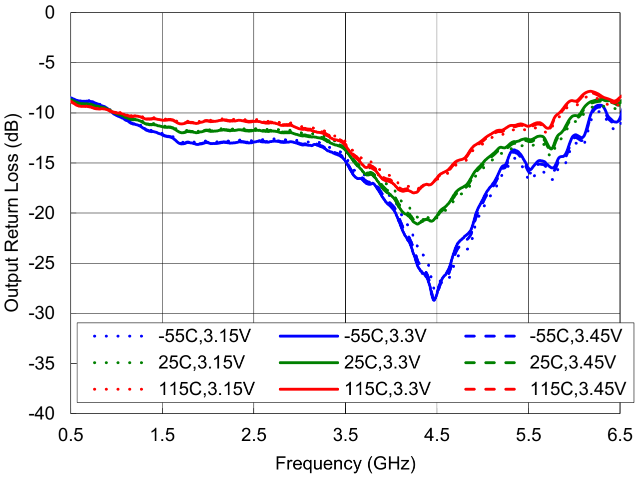


Figure 18. Output Return Loss vs Temperature (3.3V, 60mA)

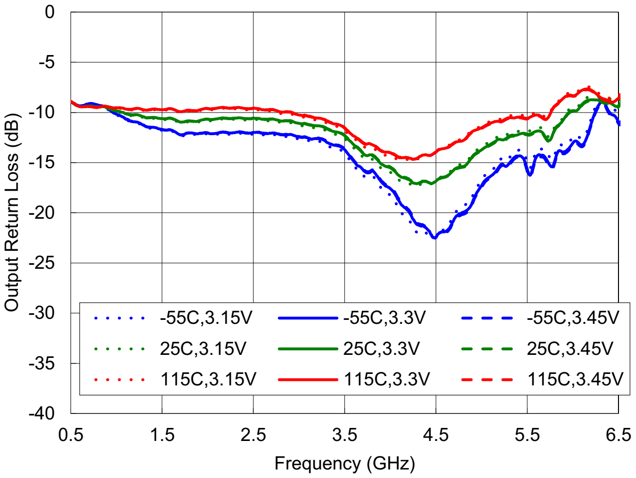


Figure 19. Output Return Loss vs Temperature (5V, 40mA)

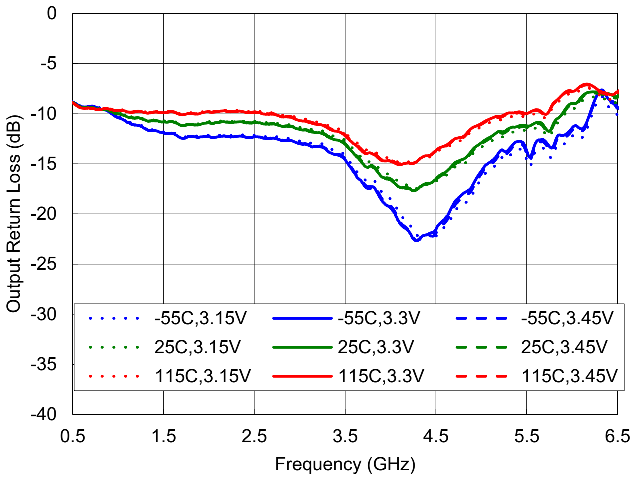


Figure 20. Output Return Loss vs Temperature (3.3V, 40mA)

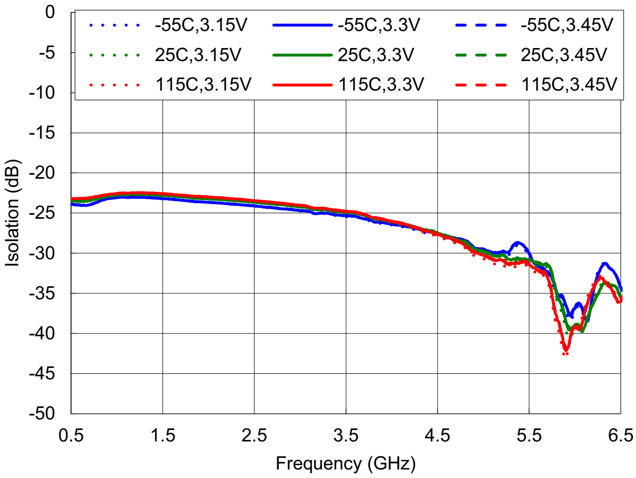


Figure 21. Isolation vs Temperature (5V, 60mA)

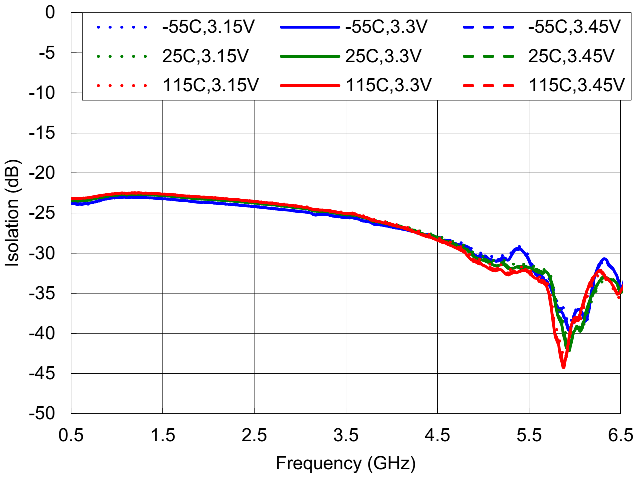


Figure 22. Isolation vs Temperature (3.3V, 60mA)

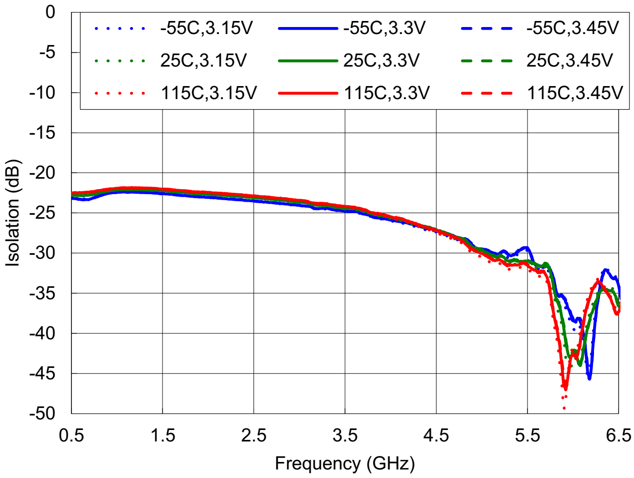


Figure 23. Isolation vs Temperature (5V, 40mA)

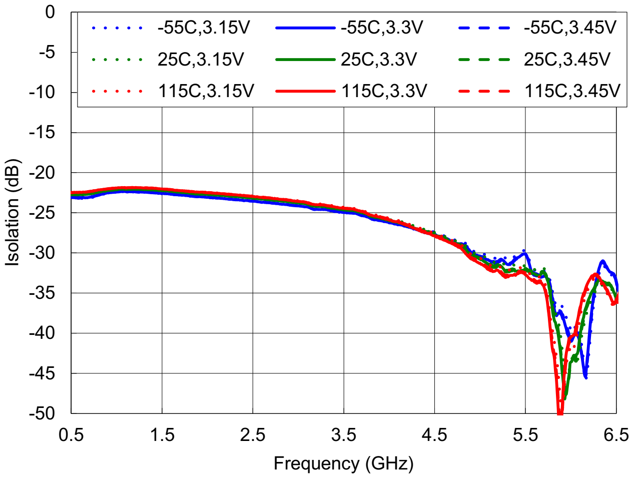


Figure 24. Isolation vs Temperature (3.3V, 40mA)

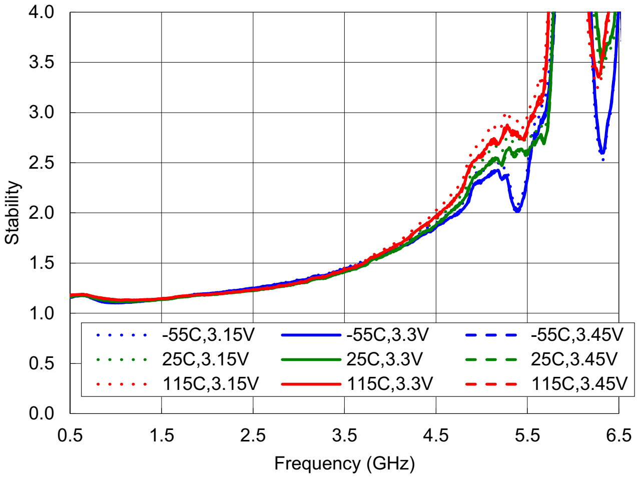


Figure 25. Stability vs Temperature (5V, 60mA)

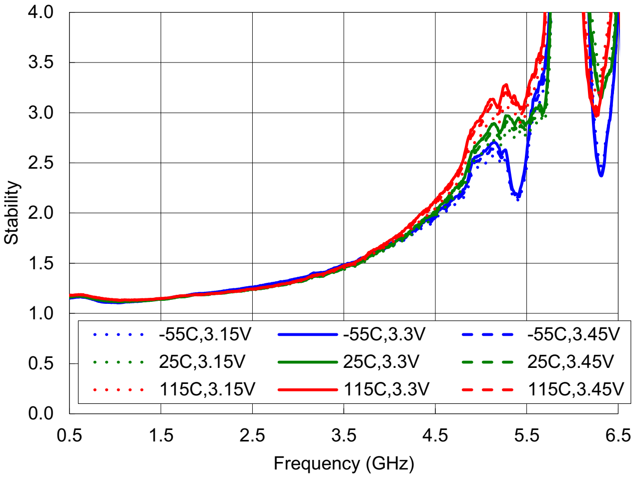


Figure 26. Stability vs Temperature (3.3V, 60mA)

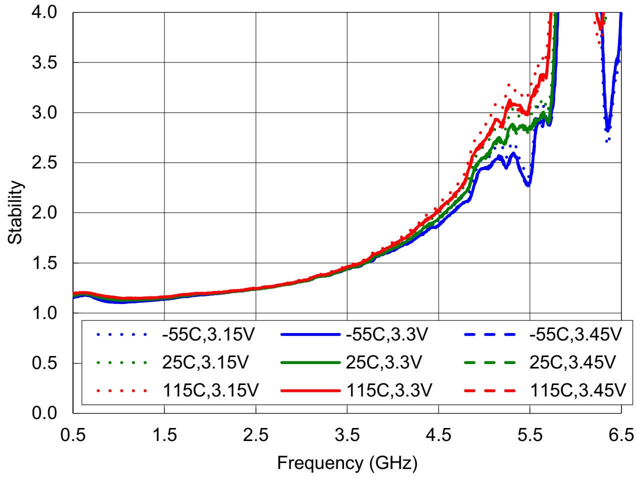


Figure 27. Stability vs Temperature (5V, 40mA)

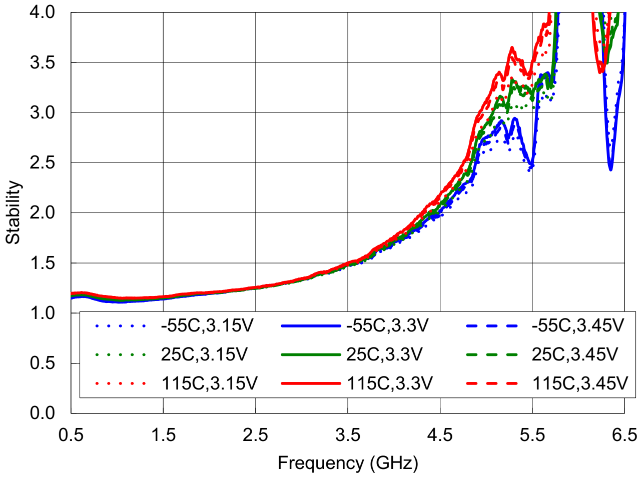


Figure 28. Stability vs Temperature (3.3V, 40mA)

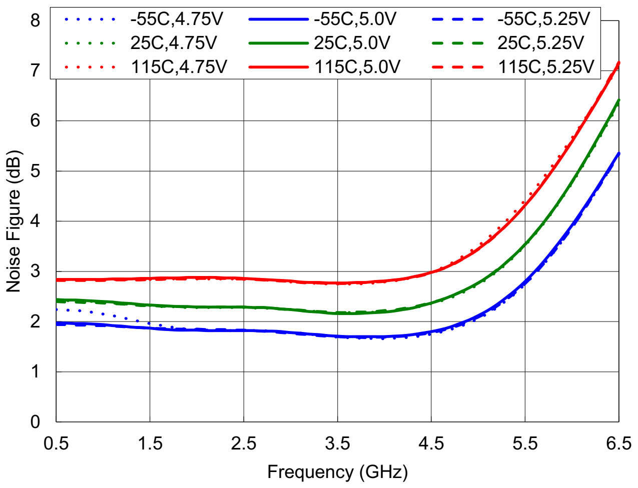


Figure 29. Noise Figure vs Temperature (5V, 60mA)

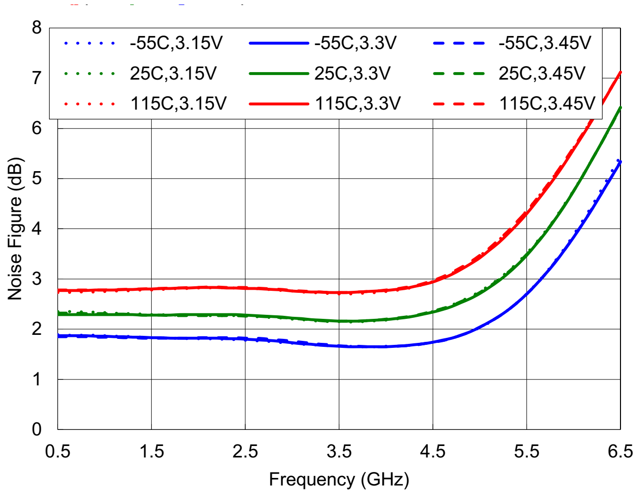


Figure 30. Noise Figure vs Temperature (3.3V, 60mA)

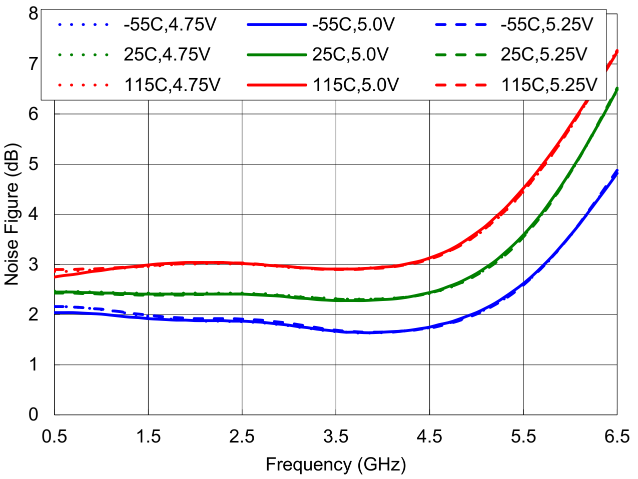


Figure 31. Noise Figure vs Temperature (5V, 40mA)

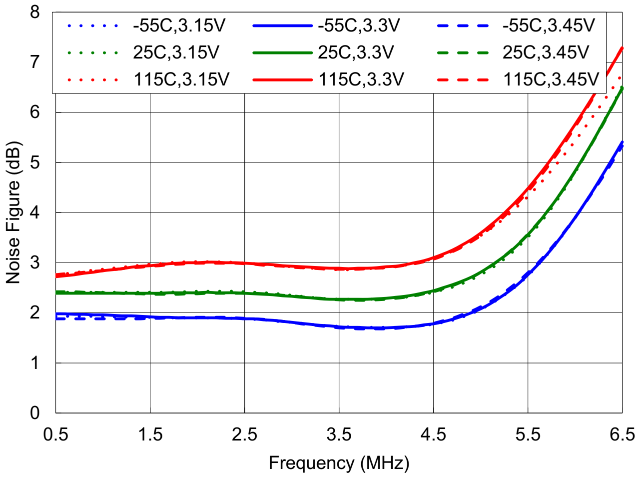


Figure 32. Noise Figure vs Temperature (3.3V, 40mA)

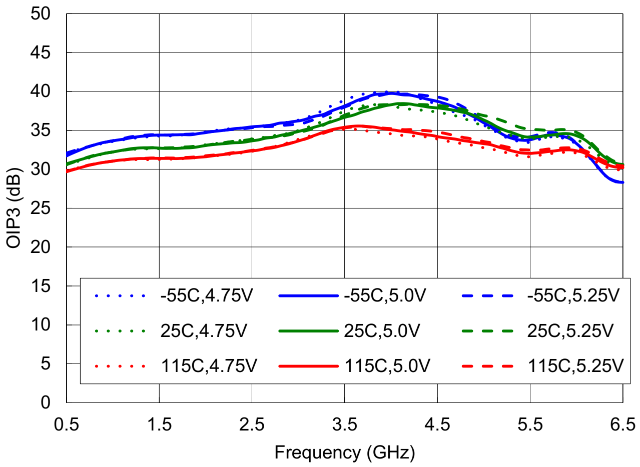


Figure 33. OIP3 vs Temperature (5V, 60mA)

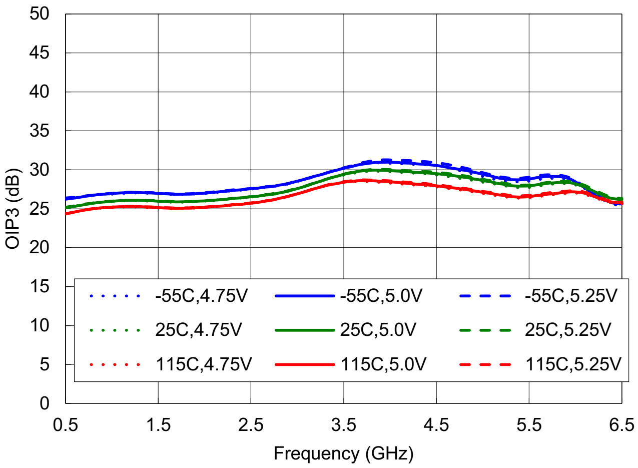


Figure 34. OIP3 vs Temperature (3.3V, 60mA)

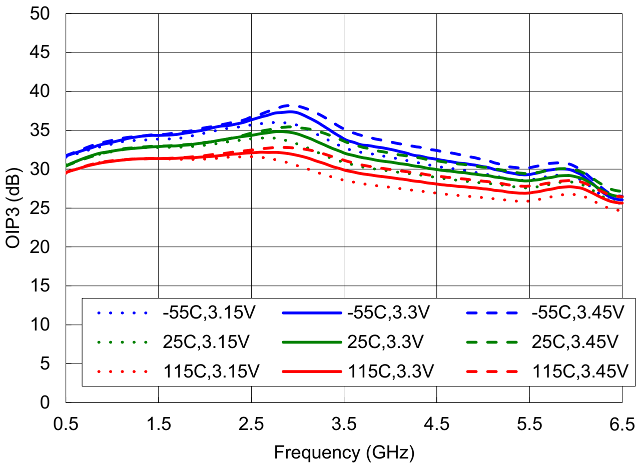


Figure 35. OIP3 vs Temperature (5V, 40mA)

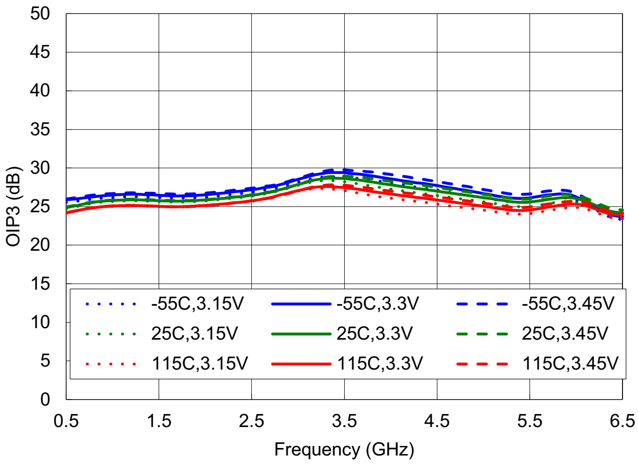


Figure 36. OIP3 vs Temperature (3.3V, 40mA)

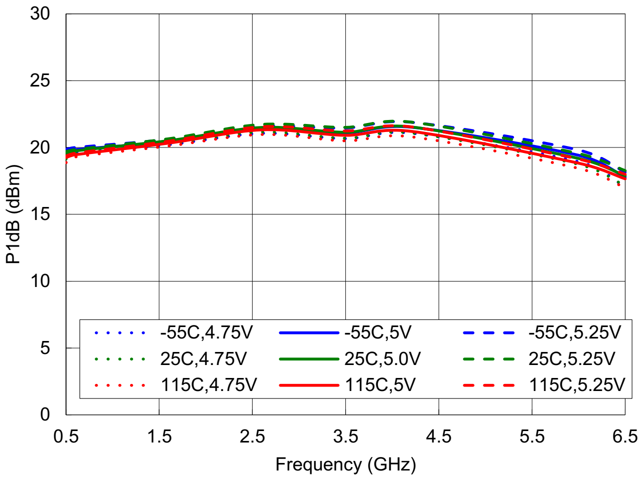


Figure 37. P1dB vs Temperature (5V, 60mA)

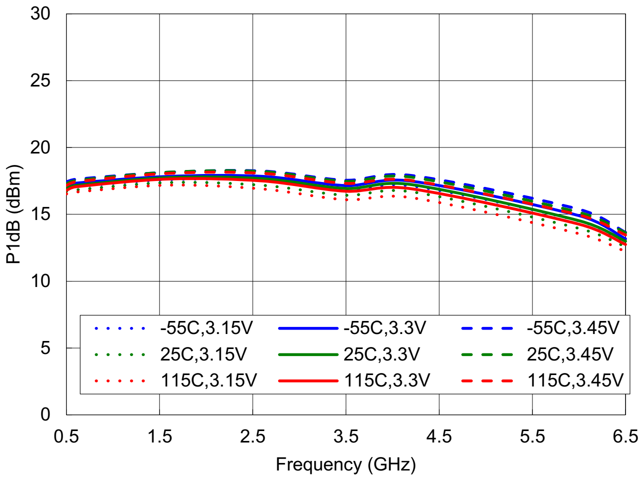


Figure 38. P1dB vs Temperature (3.3V, 60mA)

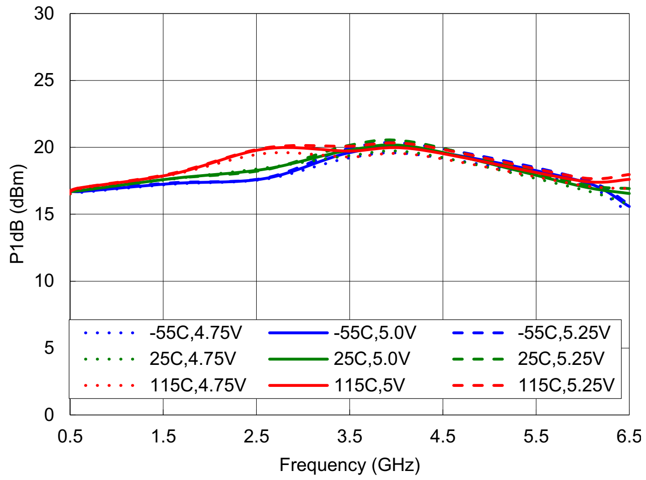


Figure 39. P1dB vs Temperature (5V, 40mA)

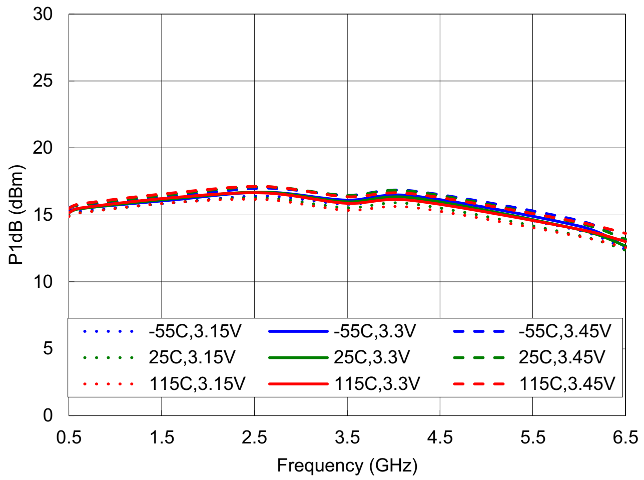


Figure 40. P1dB vs Temperature (3.3V, 40mA)

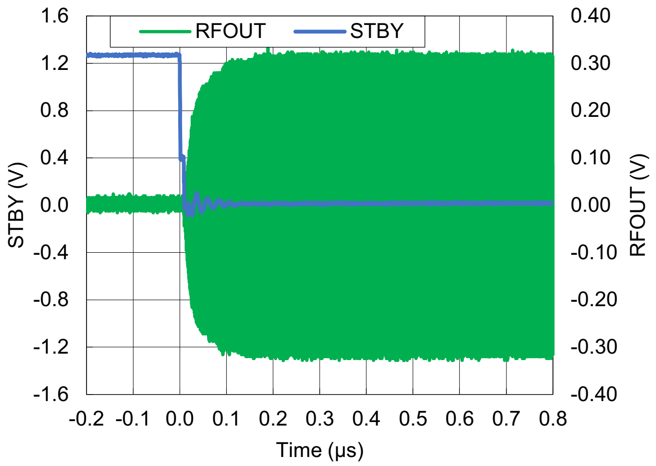


Figure 41. Turn-On Time, V_{CC} = 5V

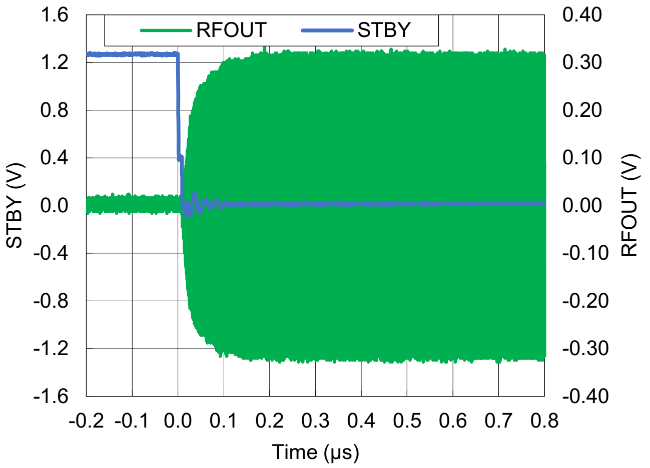


Figure 42. Turn-On Time, V_{CC} = 3.3V

4. Application Information

4.1 Evaluation Board Circuit

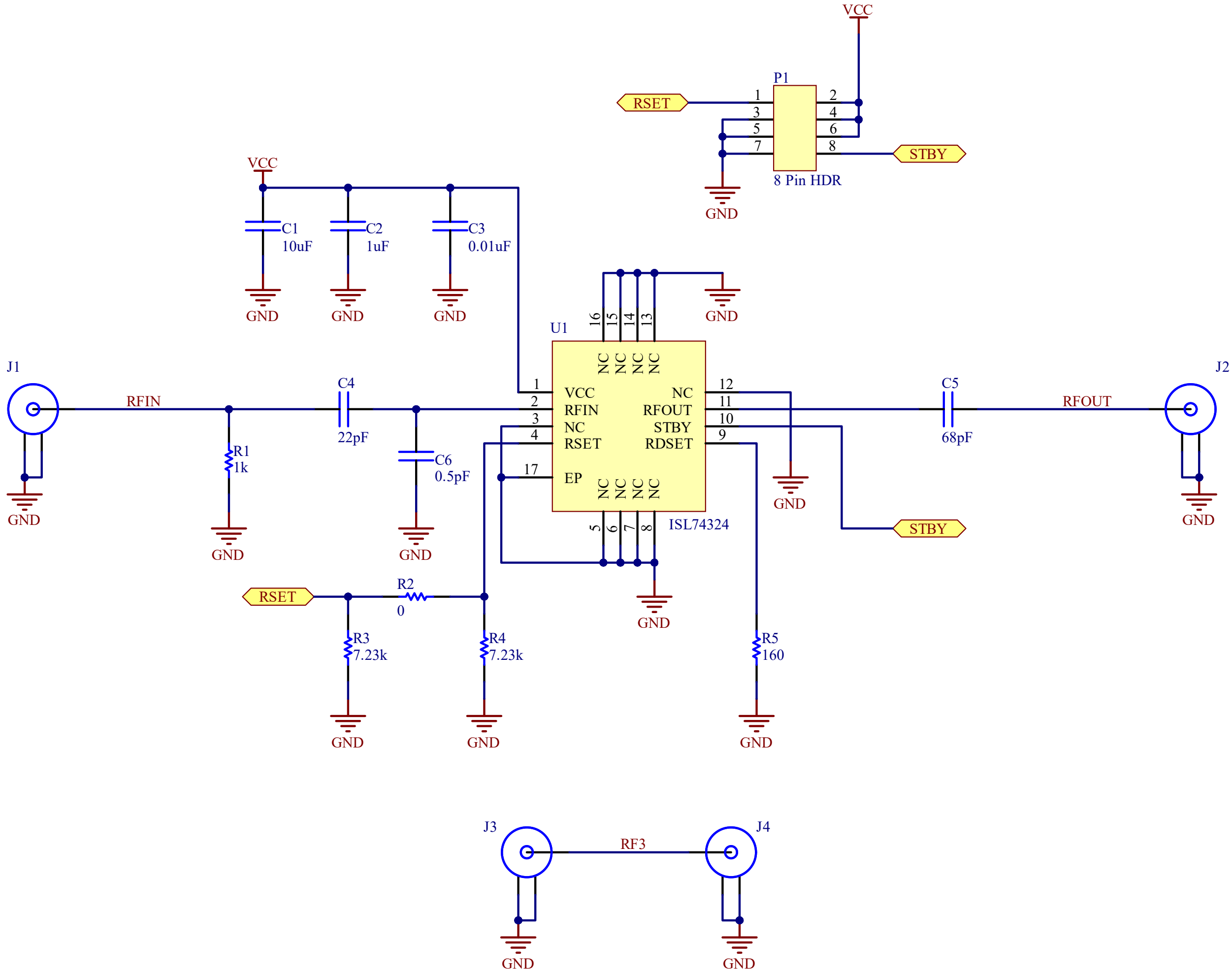


Figure 43. Evaluation Board Schematic

R_3 and R_4 set the bias current. With R_3 and R_4 in place, the bias current is 60mA. With R_2 removed, the bias current is 40mA. R_{SET} can also be changed by connecting an external resistor to pin 1 of P1.

Table 1. Bias Current vs RSET

Bias Current, I_{CC} (mA)	R_{SET} (R_3//R_4) (kΩ)
40	7.23
60	3.57

4.2 Cold Sparing

4.2.1 Setup and Test Conditions

The cold sparing test is intended to verify performance of the part when the part is unpowered while still having a large RF input power applied. The parts were tested under three conditions:

- Condition 1: V_{CC} is off and floating. (Units 1, 2, and 3)
- Condition 2: V_{CC} is off and grounded. (Units 4, 5, and 6)
- Condition 3: The part is powered on at 5V and in standby mode. (Units 7, 8, and 9)

For each condition, an input power of 20dBm was applied at a frequency of 1.6GHz. Three parts were tested under each condition for a 24 hour period. Before each test, the supply current was measured along with the s-parameters. After each test, the supply current was measured along with the s-parameters.

4.2.2 Results

There were no noticeable changes in the s-parameters between the pre-test data and the post-test data.

Table 2 shows the pre-test and post-test supply currents.

Table 2. Cold Sparing Supply Current Results

Unit	Pre-Test (mA) (V_{CC} = 5V, 60mA)	Post-Test (mA) (V_{CC} Floating	Post-Test (mA) (V_{CC} Grounded)	Post-Test (mA) (Powered and in Standby)
1	56.6	56.6	-	-
2	58.8	58.5	-	-
3	57.1	57.0	-	-
4	58.1	-	58.1	-
5	57.3	-	57.3	-
6	57.4	-	57.4	-
7	57.6	-	-	57.6
8	58.0	-	-	57.9
9	57.6	-	-	57.5

5. Radiation Tolerance

The ISL74324M is a radiation tolerant device for commercial space applications, Low Earth Orbits (LEO) applications, high altitude avionics, launch vehicles, and other harsh environments. This device response to Total Ionizing Dose (TID) radiation effects, and Single Event Effects (SEE) has been measured, characterized, and reported in the following sections. The ISL74324M30RZ is radiation lot acceptance tested (RLAT) to 30krad(Si), and the ISL74324M50RZ undergoes RLAT to 50krad(Si).

5.1 Total Ionizing Dosage (TID) Testing

5.1.1 Introduction

Total dose testing of the ISL74324M proceeded in accordance with the guidelines of MIL-STD-883 Test Method 1019. The experimental matrix consisted of 12 samples irradiated under bias, as shown in Table 3, and 12 samples irradiated with all pins grounded (unbiased). Four control units were used. Figure 44 shows the bias configuration.

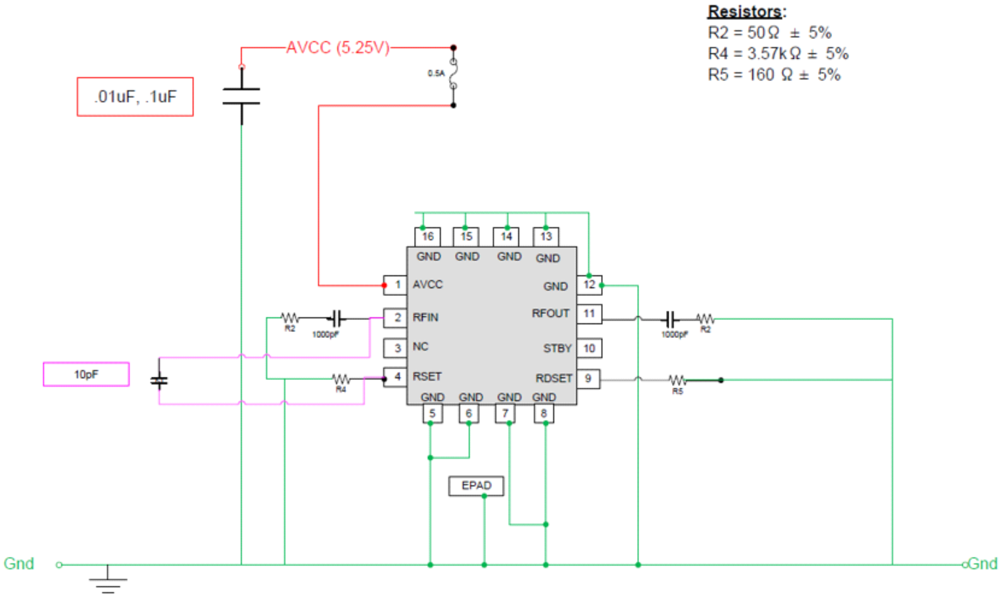


Figure 44. LDR Biased Circuit Configuration

Samples of the ISL74324M were drawn from wafer lots 38V3B00000C, 39BHB00000A, and 3A9AB00B33A. They were packaged in the production 16-lead QFN. The samples were screened to datasheet limits at room temperature only before irradiation.

Total dose irradiations were performed using a Hopewell Designs N40 panoramic vault-type low dose rate irradiation located in the Renesas Palm Bay, Florida facility. The dose rate was 10mrad(Si)/s. PbAl spectrum hardening filters were used to shield the test board and devices under test against low energy secondary gamma radiation.

Downpoints for the testing were 0krad(Si), 10krad(Si), 30krad(Si), and 50krad(Si).

All electrical testing was performed outside the irradiator using production Automated Test Equipment (ATE) with data logging of all parameters at each downpoint. All downpoint electrical testing was performed at room temperature.

5.1.2 Results

All tested parameters passed the datasheet limits up to the characterized dose of 50krad(Si). Table 3 summarizes the results.

Table 3. LDR Test Results

Dose Rate (rad(Si)/s)	Bias	Sample Size	Downpoint	Pass[1]	Fail
0.01	Biased (Figure 44)	12	Pre-irradiation	12	0
			10krad(Si)	12	0
			30krad(Si)	12	0
			50krad(Si)	12	0
0.01	Grounded	12	Pre-irradiation	12	0
			10krad(Si)	12	0
			30krad(Si)	12	0
			50krad(Si)	12	0

1. A Pass indicates a sample that passes all datasheet limits.

Figure 45 through Figure 61 show data for key parameters at all downpoints. The plots show the average as a function of total dose for each of the irradiation conditions. The error bars, if visible, represent the maximum and minimum measured values. All parts showed excellent stability over irradiation, and are not considered bias sensitive.

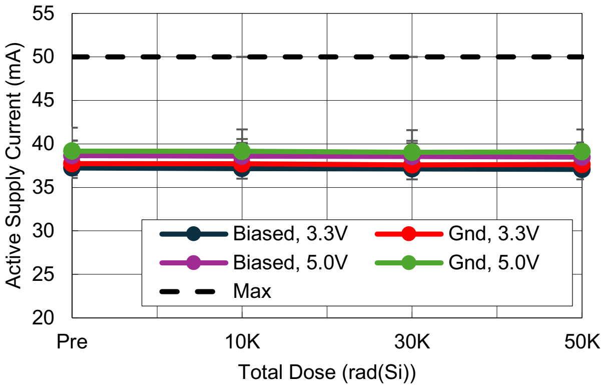


Figure 45. Active Supply Current (Low Bias Setting)

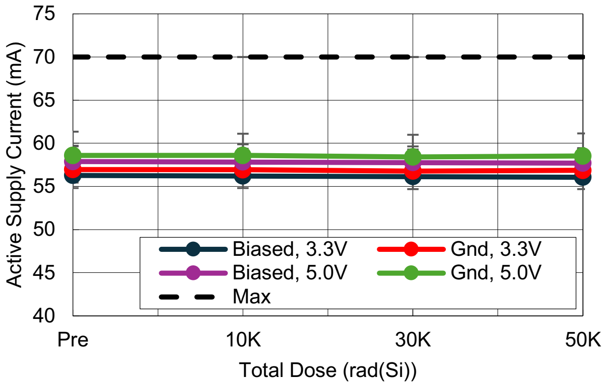


Figure 46. Active Supply Current (High Bias Setting)

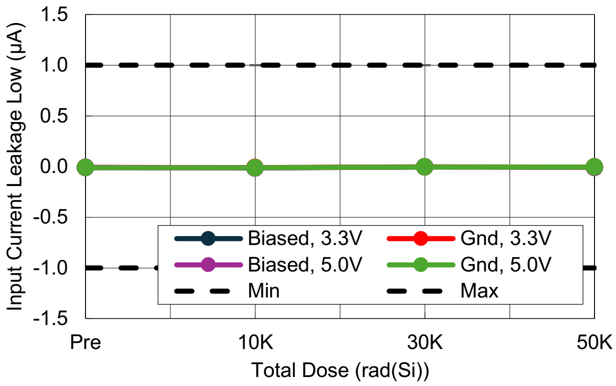


Figure 47. Input Leakage Current Low

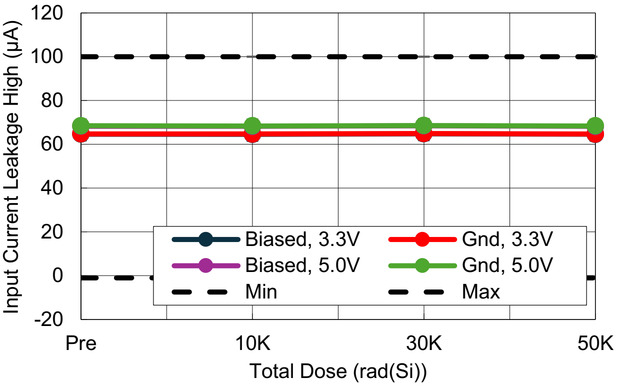


Figure 48. Input Leakage Current High

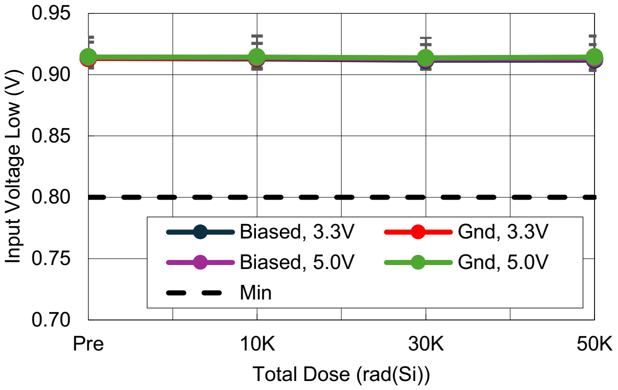


Figure 49. Input Voltage Low

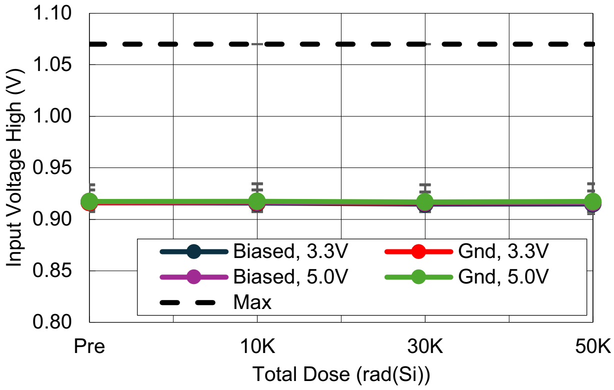


Figure 50. Input Voltage High

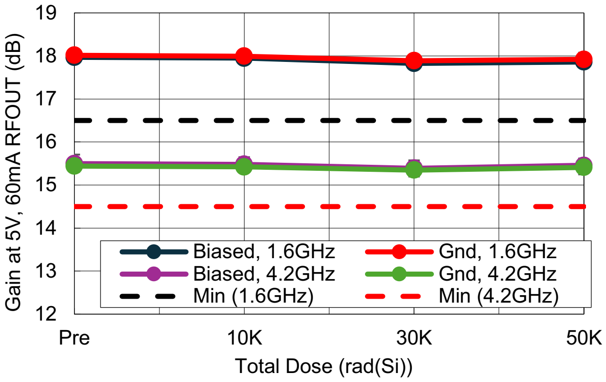


Figure 51. Gain at 5.0V, 60mA

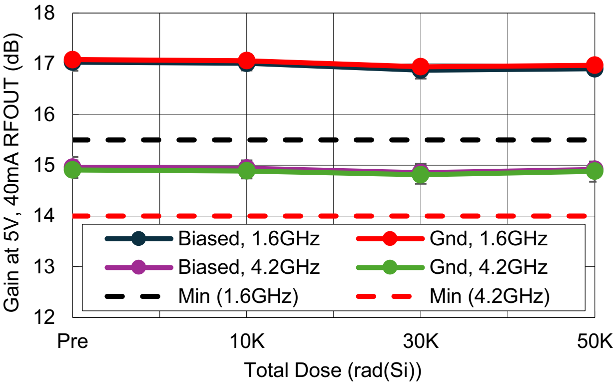


Figure 52. Gain at 5.0V, 40mA

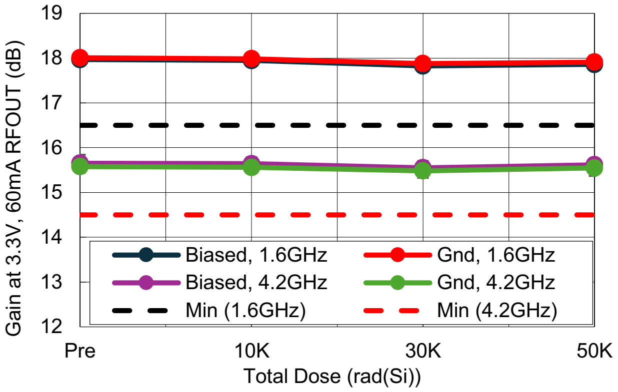


Figure 53. Gain at 3.3V, 60mA

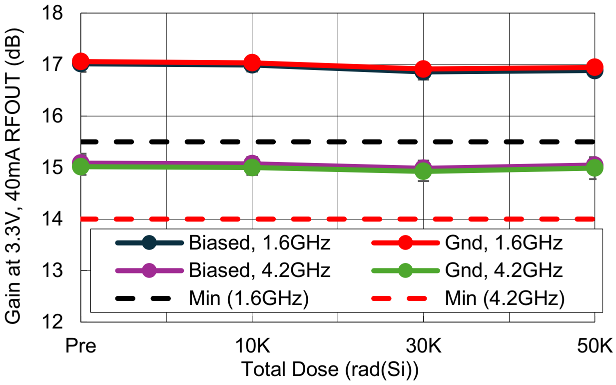


Figure 54. Gain at 3.3V, 40mA

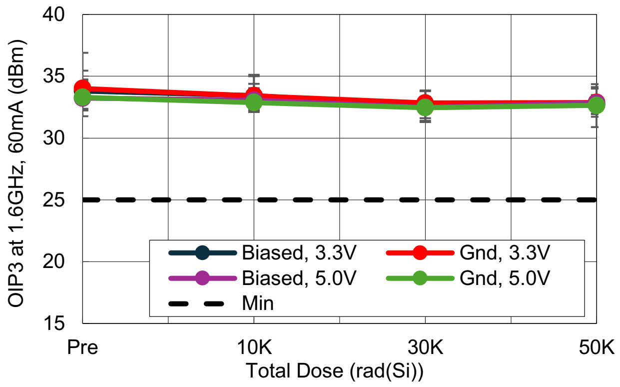


Figure 55. OIP3 at 3.3V & 5V, 60mA

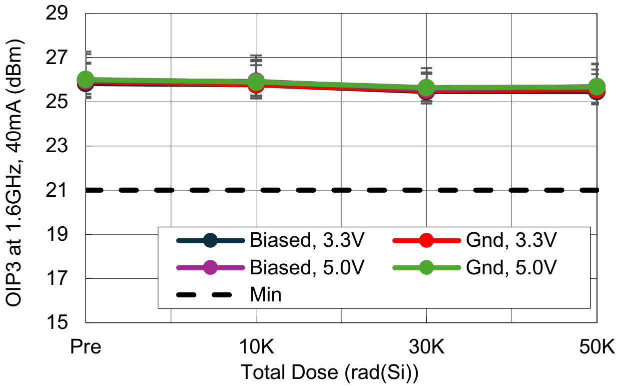


Figure 56. OIP3 at 3.3V & 5.0V, 40mA

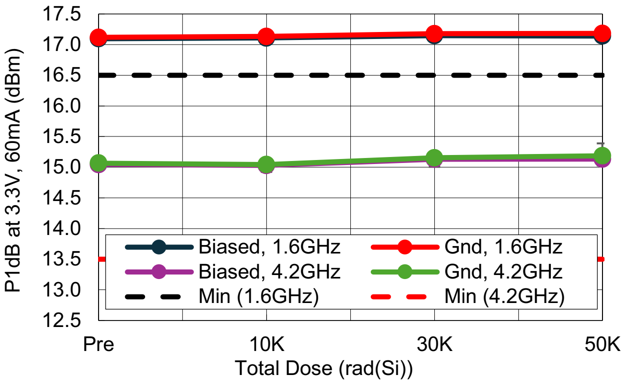


Figure 57. P1dB at 3.3V, 60mA

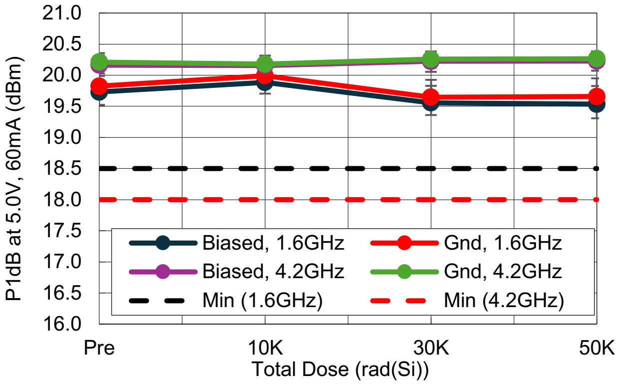


Figure 58. P1dB at 5.0V, 60mA

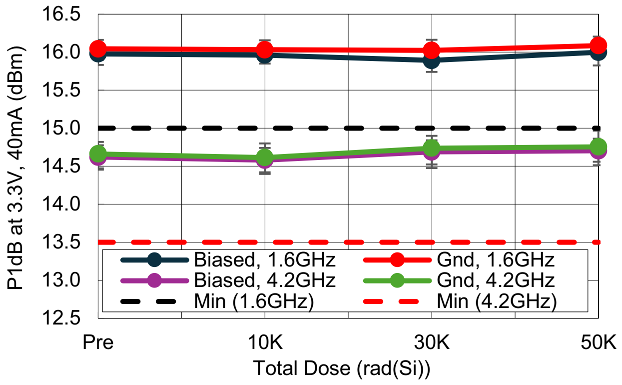


Figure 59. P1dB at 3.3V, 40mA

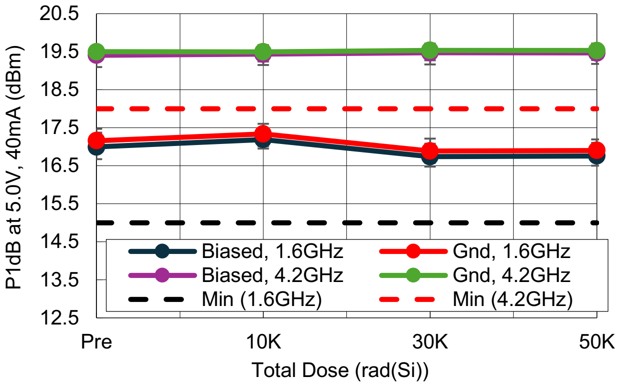


Figure 60. P1dB at 5.0V, 40mA

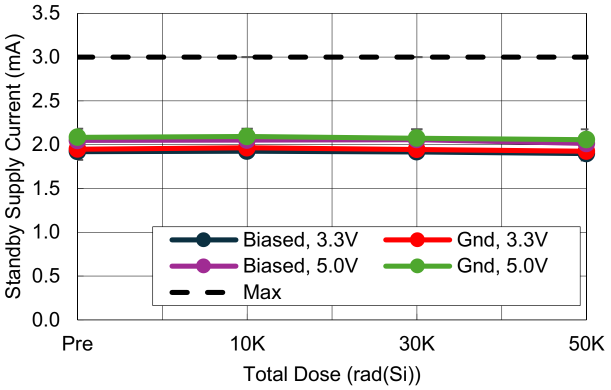


Figure 61. Standby Supply Current

5.2 Single Event Effects Testing

The intense proton and heavy ion environment encountered in space applications can cause a variety of Single Event Effects (SEE) in electronic circuitry, including Single Event Upset (SEU), Single Event Transient (SET), Single Event Functional Interrupt (SEFI), Single Event Gate Rupture (SEGR), and Single Event Burnout (SEB). SEE can lead to system-level performance issues, including disruption, degradation, and destruction. Individual electronic components should be characterized for predictable and reliable space system operation to determine their SEE response.

5.2.1 SEE Test Facility

SEE Testing was performed at the Texas A&M University (TAMU) Radiation Effects Facility of the Cyclotron Institute heavy ion facility. This facility is coupled to a K500 super-conducting cyclotron that can generate a wide range of particle beams with the various energy, flux, and fluence levels needed for advanced radiation testing.

SEE testing was performed with normal incidence silver ions for an linear energy transfer (LET) of 43MeV·cm^2/mg at the surface of the device. Additional SET testing was performed at lower LETs so that a Weibull curve could be generated. Signals were communicated to and from the DUT test fixture through 20ft cables connecting to the control room.

5.2.2 Destructive Single Event Effects (DSEE) Results

For DSEE testing, four units were tested at the maximum conditions outlined in Table 4.

Table 4. DSEE Test Conditions

Parameter	Level	Notes
LET	43MeV•cm^2/mg	-
Fluence	1E7ions/cm^2	Per Run
Temperature	115°C	Case Temperature
V_{CC}	5.5V	-
I_{CC}	75mA	-
RF Input Power	18dBm to 22dBm	Calibrated to device pin, 1GHz Sinewave

For each unit, the RF input power was set to 18dBm for the first run. In the two subsequent runs, the power was increased to 20dBm and 22dBm, respectively. Each unit reached a Total Ionizing Dosage of 42krad(Si) after three runs under beam. The output of the device was monitored with a spectrum analyzer. The output level was continuously monitored for permanent drops in the level, indicating device damage. The supply current was also monitored with a digital multimeter. The current was continuously monitored to determine if there were any large changes in supply current that could indicate device damage.

For all four devices, there were no indications of device failure or Single Event Latch-up (SEL); therefore, the ISL74324M can be operated with a maximum parameter set of V_{CC} = 5.5V, I_{CC} = 75mA, and RF Input Power = 22dBm at 43MeV·cm^2/mg. The s-parameters of each device were measured before and after the DSEE test. The measurements are within 0.2dB of each other.

5.2.3 Single Event Transient Testing

For Single Event Transient (SET) testing, four devices were tested at each LET. The device under test was exposed to heavy ions to a fluence of 1E7ions/cm^2 during each test run. Testing was performed at an ambient temperature of 25°C. A 1GHz sinewave at -20dBm was input to the device. A Tektronix MSO71254C oscilloscope was used to capture transient events on the output of the device. The MSO71254C has a bandwidth of 12.5GHz. The FastFrame software was used to capture the transients. The trigger was set to width mode with limits at 480ns and 520ns. If a pulse width was outside of these limits, a trigger event occurred, and the frame was captured. Figure 62 through Figure 64 show examples of the transient events that were captured while under beam.

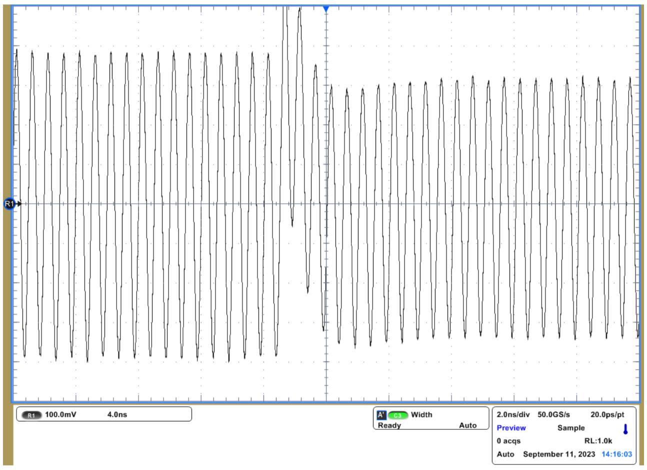


Figure 62. SET Example 1

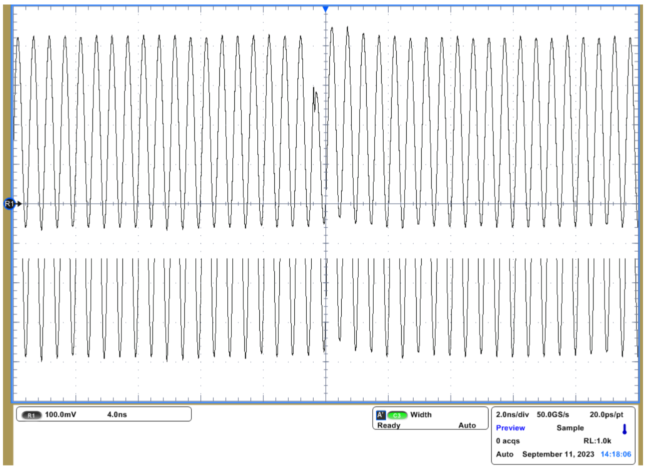


Figure 63. SET Example 2

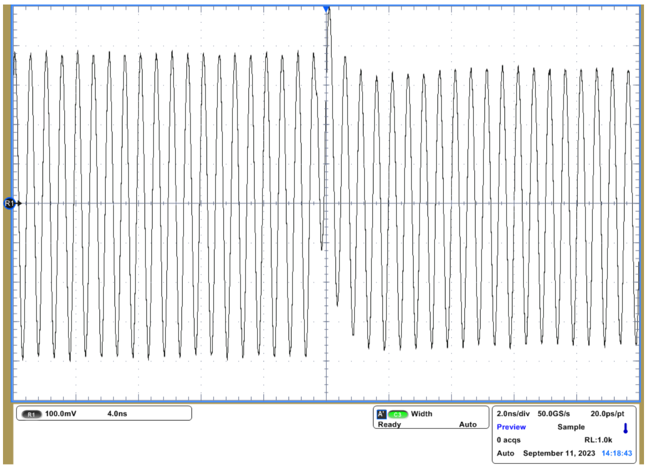


Figure 64. SET Example 3

Table 5 shows a summary of results for each LET. The number of SETs is the worst case across the four units tested at each bias point.This data was fitted to a Weibull curve using a least-squares regression. The parameters of the Weibull curve are: width = 550MeV·cm^2/mg, exponent = 0.95, onset = 8.3MeV·cm^2/mg, and saturation = 5750µm^2.

Table 5. SETs vs LET

LET (MeV•cm^2/mg)	# of SETs I_{CC} = 60mA	Cross-Section (µm^2)
64.5	47	470
48.0	34	340
29.0	24	240
8.3	0	0

Table 6 shows the events/year based on four orbits to provide an estimation of the part performance over typical orbits. The error rate calculations were made using CRÈME96.

Table 6. SET Rates vs Orbit

Orbit	Orbit Type	Apogee (km)	Perigee (km)	Inclination (°)	Magnetic Weather Condition	Shielding (mils of Al)	Solar Cycle Condition	SET Rate (SET/Year)	Mean Time between Transients (Year)
#1	LEO	551	550	53	Stormy	100	Min	4.31E-4	2318
							Max	1.87E-4	5352
#2	LEO	750	750	97	Stormy	100	Min	1.08E-3	926
							Max	4.66E-4	2147
#3	LEO	1202	1200	87.4	Stormy	100	Min	3.72E-3	269
							Max	2.68E-3	373
#4	GEO	-	-	-	-	100	Min	2.24E-3	446
							Max	5.21E-4	1918

5.2.4 Conclusion

Testing showed that the ISL74324M did not exhibit any DSEEs with the maximum parameter set of V_{CC} = 5.5V, I_{CC} = 75mA, and RF Input Power = 22dBm at 43MeV·cm^2/mg.

The ISL74324M exhibits SETs where the output signal has a pulse width deviation beyond the 480ns to 520ns window. The cross-section for these events is ~340µm^2 at 48MeV·cm^2/mg, and the onset LET is greater than 8.3MeV·cm^2/mg. CRÈME96 simulation for GEO during solar minimum and behind 100mils of aluminum shielding estimates an error rate of 0.00224 SETs per year. Given the rarity of the events, the SETs pose little risk to any mission.

6. Package Outline Drawing

The package outline drawing is located at the end of this document and is accessible from the Renesas website. The package information is the most current data available and is subject to change without revision of this document.

7. Ordering Information

Part Number[1]	Part Marking	Radiation Lot Acceptance Testing	Package Description[2] (RoHS Compliant)	Pkg. Dwg #	MSL Rating[3]	Carrier Type[4]	Junction Temp. Range
ISL74324M30RZ	74324	30krad(Si)	16-QFN, 3×3mm	L16.3x3G	1	Tray	-55 to +125°C
ISL74324M50RZ		50krad(Si)					
ISL74324MEVAL1Z	Evaluation Board						

1. These Pb-free plastic packaged products employ special Pb-free material sets; molding compounds/die attach materials and NiPdAu-Ag plate-e4 termination finish, which is RoHS compliant and compatible with both SnPb and Pb-free soldering operations. Pb-free products are MSL classified at Pb-free peak reflow temperatures that meet or exceed the Pb-free requirements of IPC/JEDEC J-STD-020.
2. For the Pb-Free Reflow Profile, see TB493.
3. For more information about Moisture Sensitivity Level (MSL) , see TB363.
4. See TB347 for details about reel specifications.

8. Revision History

Revision	Date	Description
1.00	Dec 2, 2025	Initial release.

A. ECAD Design Information

This information supports the development of the PCB ECAD model for this device. It is intended to be used by PCB designers.

A.1 Part Number Indexing

Orderable Part Number	Number of Pins	Package Type	Package Code/POD Number
ISL74324M30RZ	16	QFN	L16.3x3G
ISL74324M50RZ	16	QFN	L16.3x3G

A.2 Symbol Pin Information

A.2.1 16-QFN

Pin Number	Primary Pin Name	Primary Electrical Type	Alternate Pin Name(s)
1	VCC	Power	-
2	RFIN	Input	-
3	NC	Passive	-
4	RSET	Passive	-
5	NC	Passive	-
6	NC	Passive	-
7	NC	Passive	-
8	NC	Passive	-
9	RDSET	Passive	-
10	STBY	Input	-
11	RFOUT	Output	-
12	NC	Passive	-
13	NC	Passive	-
14	NC	Passive	-
15	NC	Passive	-
16	NC	Passive	-
EPAD17	GND	Power	-

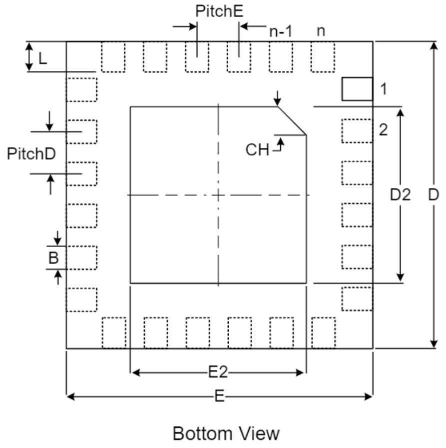
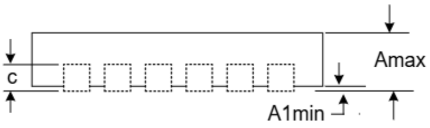
A.3 Symbol Parameters

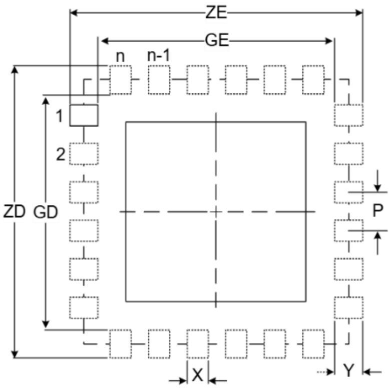
Orderable Part Number	Qualification	Radiation Qualification	LDR	Mounting Type	RoHS	Min Operating Temperature	Max Operating Temperature	Min Supply Current	Max Supply Current	Min Supply Voltage	Max Supply Voltage	Min Frequency	Max Frequency
ISL74324M30RZ	Space	Radiation Tolerant	30 krad(Si)	SMD	Compliant	-55 °C	125 °C	40 mA	65mA	3.15 V	5.25 V	500 MHz	6500 MHz
ISL74324M50RZ	Space	Radiation Tolerant	50 krad(Si)	SMD	Compliant	-55 °C	125 °C	40 mA	65mA	3.15 V	5.25 V	500 MHz	6500 MHz

A.4 Footprint Design Information

A.4.1 16-QFN

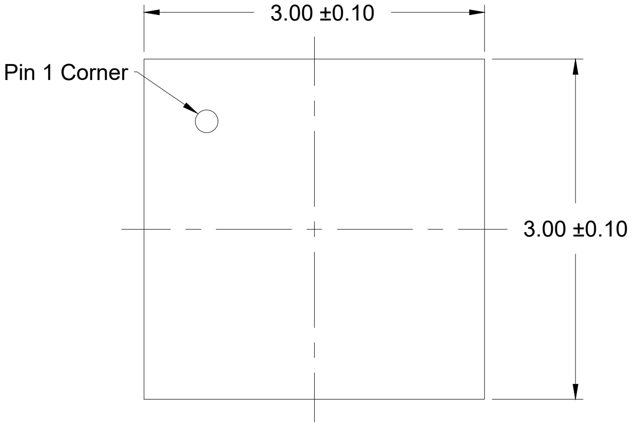
IPC Footprint Type	Package Code/ POD Number	Number of Pins
QFN	L16.3x3G	16

Description	Dimension	Value (mm)	Diagram
Minimum body span (vertical side)	Dmin	2.90	 Bottom View
Maximum body span (vertical side)	Dmax	3.10	
Minimum body span (horizontal side)	Emin	2.90	
Maximum body span (horizontal side)	Emax	3.10	
Minimum Lead Width	Bmin	0.20	
Maximum Lead Width	Bmax	0.30	
Minimum Lead Length	Lmin	0.30	
Maximum Lead Length	Lmax	0.50	
Number of pins (vertical side)	PinCountD	4	
Number of pins (horizontal side)	PinCountE	4	
Distance between the center of any two adjacent pins (vertical side)	PitchD	0.50	
Distance between the center of any two adjacent pins (horizontal side)	PitchE	0.50	
Location of pin 1; S2 = corner of D side (top left), C1 = center of E side(center).	Pin1	S2	
Thermal pad Chamfer. If not present give hyphen (-).	CH	0.30	
Minimum thermal pad size (vertical side)	D2min	1.50	
Maximum thermal pad size (vertical side)	D2max	1.70	
Minimum thermal pad size (horizontal side)	E2min	1.50	
Maximum thermal pad size (horizontal side)	E2max	1.70	
Maximum Height	Amax	1.00	 Side View
Minimum Standoff Height	A1min	0.00	
Minimum Lead Thickness	cmin	0.153	
Maximum Lead Thickness	cmax	0.253	

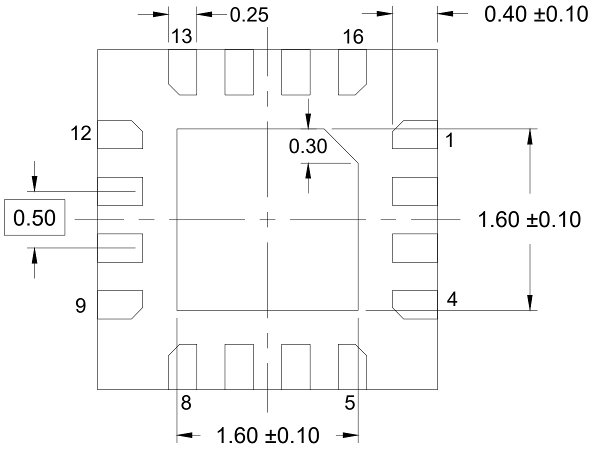
Recommended Land Pattern			
Description	**Dimension**	**Value (mm)**	**Diagram**
Distance between left pad toe to right pad toe (horizontal side)	ZE	3.30	 PCB Top View
Distance between top pad toe to bottom pad toe (vertical side)	ZD	3.30	
Distance between left pad heel to right pad heel (horizontal side)	GE	2.20	
Distance between top pad heel to bottom pad heel (vertical side)	GD	2.20	
Pad Width	X	0.25	
Pad Length	Y	0.45	

Package Outline Drawing

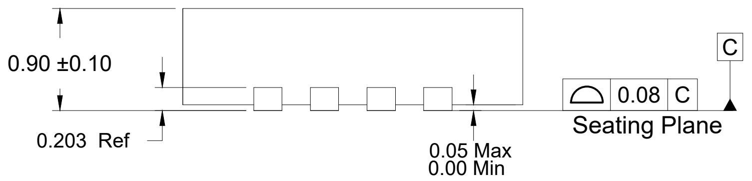
L16.3x3G
QV0016AB
16-QFN 3.0 x 3.0 x 0.90 mm Body, 0.5 mm Pitch
Rev01, Mar 19 2025



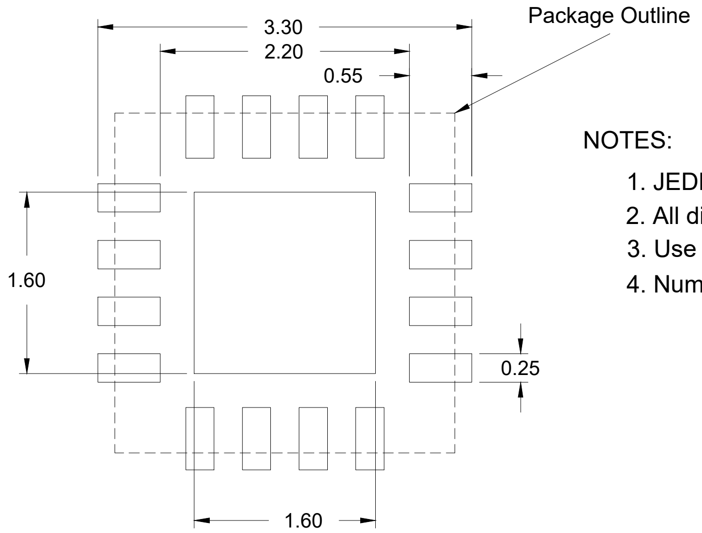
Top View



Bottom View



Side View



Recommended Land Pattern

NOTES:

1. JEDEC compatible.
2. All dimensions are in mm and angles are in degrees.
3. Use ±0.05 mm for the non-toleranced dimensions.
4. Numbers in ( ) are for references only.

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