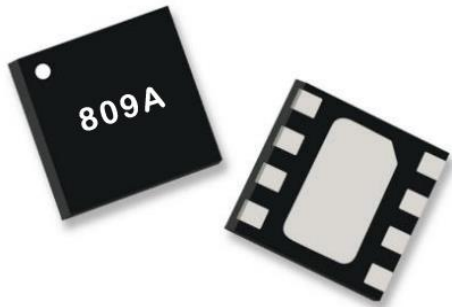


GSL809AD

0.5-6 GHz Low Noise Amplifier



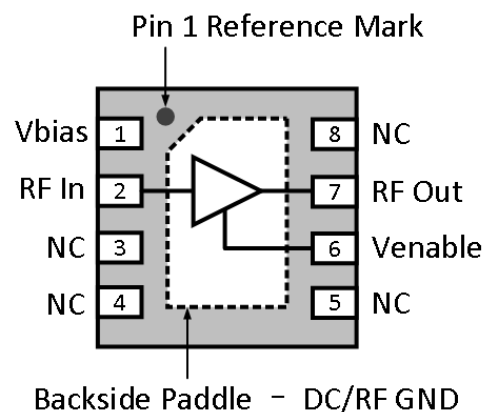
Description

The GSL809AD is a low noise amplifier (LNA) that operates in the 0.5GHz to 6GHz frequency range. The device incorporates on-chip input/output matching circuits and is fabricated with GaAs pHEMT process. Its industry-leading noise figure, together with high linearity, makes it ideal as a first stage LNA. This LNA integrates a Venable biasing capability to allow for operation in TDD applications. The GSL809AD is provided in a 2x2 mm, 8 pin DFN package.

Features

- 8 Pin 2X2 mm DFN Package
- 0.5GHz to 6GHz operation
- $NF \leq 0.85\text{dB}$ across 0.5GHz to 5GHz
- $>21\text{dB}$ gain across 0.5GHz to 6GHz
- $>33.5\text{dBm}$ OIP3 @ 70mA IDD, 2.6GHz
- Shut-down mode pin with 1.8V TTL logic
- +3V to +5V supply; does not require -Vgg
- Maintains OFF state with high input power drive
- Unconditionally stable

Functional Block Diagram



Applications

- LTE / WCDMA / CDMA / GSM / Massive MIMO
- Repeaters / DAS
- TDD or FDD Systems
- General Purpose Wireless

Ordering Information

- GSL809AD
- GSL809AD-TR
- GSL809AD-EVB



Recommended Operating Conditions

| Parameter | Units | Min | Typ | Max |
|------------------------------|-------|-----|-----|------|
| DC Supply Voltage (VDD) | V | 3 | 5 | 5.5 |
| Operational Frequency Range | GHz | 0.5 | | 6 |
| Enable Voltage (Venable) On | V | 0 | | 0.65 |
| Enable Voltage (Venable) Off | V | 1.1 | | VDD |
| Operating Temperature | °C | -40 | | 105 |

Absolute Maximum Ratings

| Parameter | Units | Min | Typ | Max |
|---------------------------------------------|-------|-----|------|------|
| DC Supply Voltage (VDD) | V | 0 | | 7 |
| DC Control Voltage | V | 0 | | 6 |
| RF Input Power (Pin), CW, 50ohms, T=25°C | dBm | | | 30 |
| RF Input Power (Pin), CW, Off State, T=25°C | dBm | | | 30 |
| Storage Temperature | °C | -65 | | +150 |
| ESD Rating | HBM | V | 1000 | |
| | CDM | V | 1000 | |



Electrical Specifications (VDD=5V)

Test Conditions: 50Ω system, VDD=5V, Temp=+25°C, (de-embedded data);

| Parameter | Conditions | Units | Min | Typ | Max |
|-----------------------------|------------------------------|-------|-----|------|-----|
| Operational Frequency Range | | GHz | 0.5 | | 6 |
| Test Frequency | | GHz | | 2.6 | |
| Input Return Loss | | dB | | 9 | |
| Output Return Loss | | dB | | 9 | |
| Gain | | dB | | 22.2 | |
| Reverse ISO | | dB | | 28 | |
| Off State Gain | Pin=20dBm | dB | | -21 | |
| OP1dB | | dBm | | 22.5 | |
| OIP3 | Pout=+5 dBm/tone Δf=1 MHz | dBm | | 33.5 | |
| Noise Figure | | dB | | 0.65 | |
| Drain Current | Venable=0V | mA | | 70 | |
| Drain Current | Venable=5V | mA | | 2 | |
| Venable Current | Venable=5V | uA | | 400 | |
| Switching Time | Switching OFF | ns | | 100 | |
| | Switching ON | ns | | 100 | |

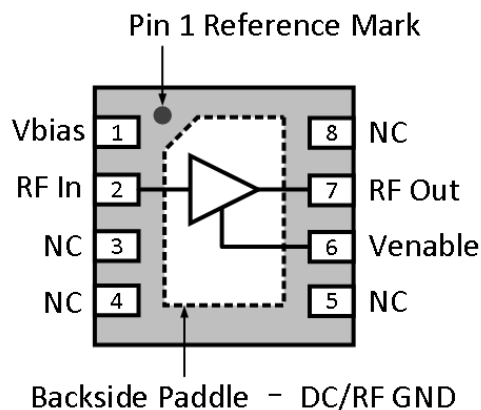


Electrical Specifications (VDD=3.3V)

Test Conditions: 50Ω system, VDD=3.3V, Temp=+25°C, (de-embedded data);

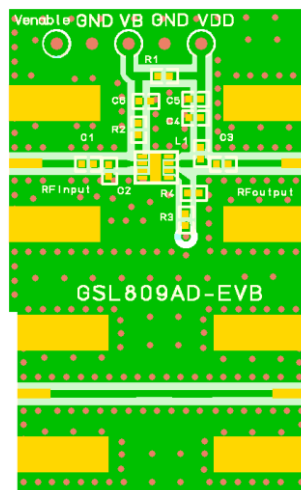
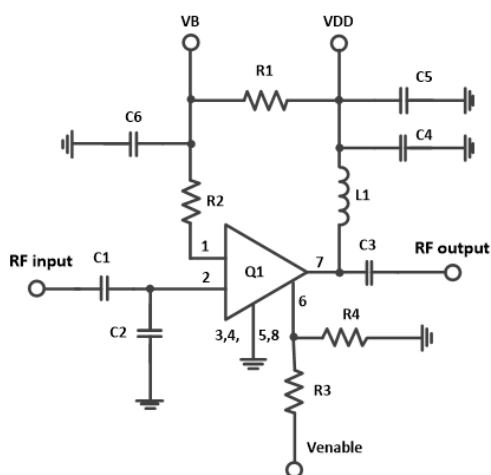
| Parameter | Conditions | Units | Min | Typ | Max |
|-----------------------------|------------------------------|-------|-----|------|-----|
| Operational Frequency Range | | GHz | 0.5 | | 6 |
| Test Frequency | | GHz | | 2.6 | |
| Input Return Loss | | dB | | 11 | |
| Output Return Loss | | dB | | 11 | |
| Gain | | dB | | 22.2 | |
| Reverse ISO | | dB | | 28 | |
| Off State Gain | Pin=20dBm | dB | | -21 | |
| OP1dB | | dBm | | 18 | |
| OIP3 | Pout=+5 dBm/tone Δf=1 MHz | dBm | | 35 | |
| Noise Figure | | dB | | 0.65 | |
| Drain Current | Venable=0V | mA | | 75 | |
| Drain Current | Venable=3.3V | mA | | 2 | |
| Venable Current | Venable=3.3V | uA | | 250 | |
| Switching Time | Switching OFF | ns | | 100 | |
| | Switching ON | ns | | 100 | |

Pin Assignments and Description



| Pin | Name | Description |
|-----------------|-----------|-------------------------------------------------------------------------------------|
| 1 | Vbias | Setting the Icq bias point for the device. |
| 2 | RF In | RF Input pin, DC Block is required. |
| 3, 4, 5, 8 | NC | No electrical connection. Provide grounded land pads for PCB mounting integrity. |
| 6 | Venable | A high voltage ($\geq 1.1V$) turning off the device. |
| 7 | RF Out | RF output pin. |
| Backside Paddle | DC/RF GND | Use recommended via pattern to minimize inductance and thermal resistance. |

PCB Evaluation Board



Evaluation Board BOM

| Reference Des. | Conditions | Value | Manuf. | Part Num. |
|----------------|------------|-------|---------|--------------|
| PCB | N/A | N/A | SDSX | GSL809AD-EVB |
| Q1 | N/A | N/A | SDSX | GSL809AD |
| R1 | N/A | 0Ω | Various | 0402 |
| R2 | VDD=5V | 4.7kΩ | Various | 0402 |
| | VDD=3.3V | 1.0kΩ | Various | 0402 |
| R3 | N/A | 0Ω | Various | 0402 |
| R4 | N/A | N/A | N/A | N/A |
| L1 | N/A | 22nH | Murata | LQW15 |
| C1 | VDD=5V | 1uF | Various | 0402 |
| | VDD=3.3V | 22pF | Various | 0402 |
| C2 | N/A | 0.4pF | Various | 0402 |
| C3 | N/A | 15pF | Various | 0402 |
| C4 | N/A | 100pF | Various | 0402 |
| C5 | N/A | 1uF | Various | 0402 |
| C6 | N/A | 100nF | Various | 0402 |

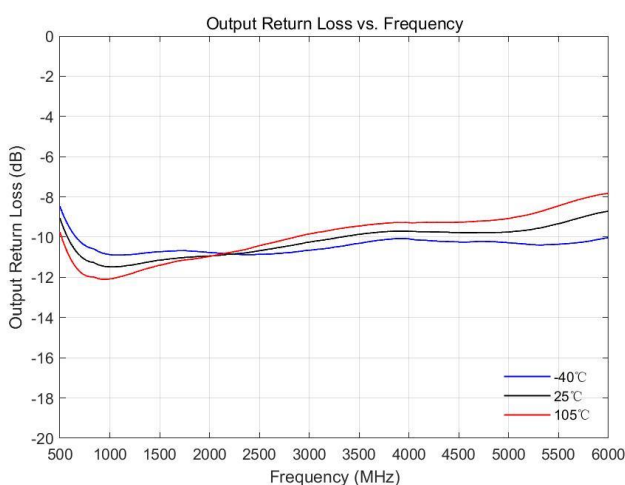
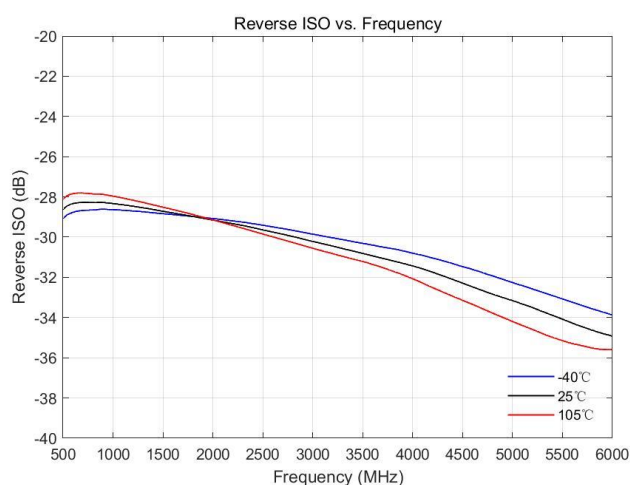
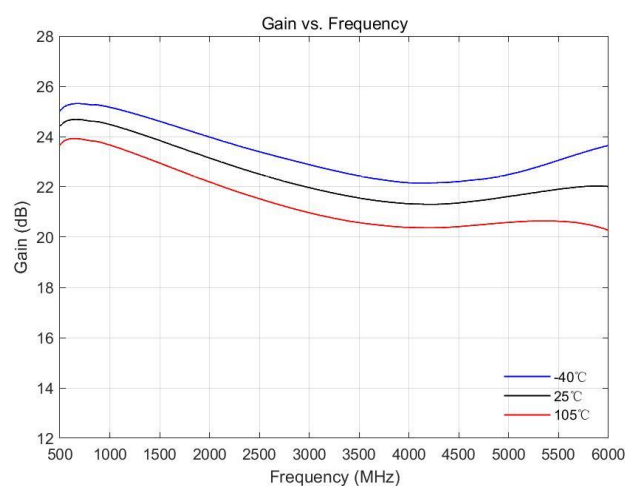
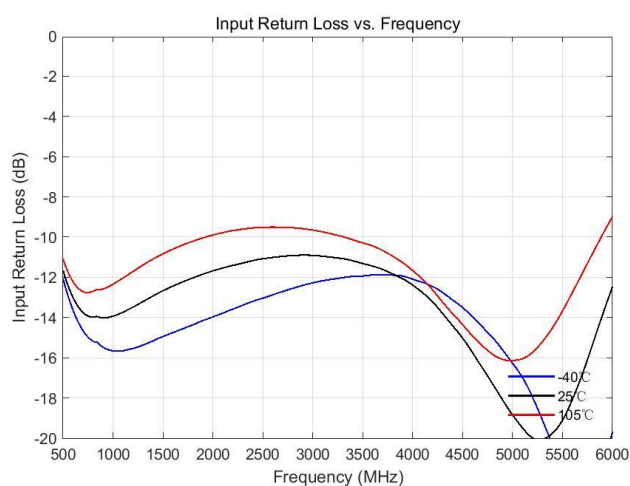
Typical Performance - VDD=5V

Test Conditions: 50Ω system, VDD=5V, Temp=+25°C, (de-embedded data);

| Parameter | Conditions | Units | Typical | | | | | |
|--------------------|------------------------------|-------|---------|------|------|------|------|------|
| Frequency | | GHz | 0.6 | 1.9 | 2.6 | 3.5 | 4.2 | 5 |
| Input Return Loss | | dB | 12 | 10 | 9 | 10 | 11 | 12 |
| Output Return Loss | | dB | 10 | 9.5 | 9 | 9 | 9.5 | 9 |
| Gain | | dB | 24.5 | 23.0 | 22.2 | 21.2 | 21.1 | 21.2 |
| OP1dB | | dBm | 22 | 22.5 | 22.5 | 22 | 22 | 21 |
| OIP3 | Pout=+5 dBm/tone Δf=1 MHz | dBm | 36 | 35 | 33.5 | 33 | 33 | 32 |
| Noise Figure | | dB | 0.60 | 0.60 | 0.65 | 0.70 | 0.75 | 0.85 |

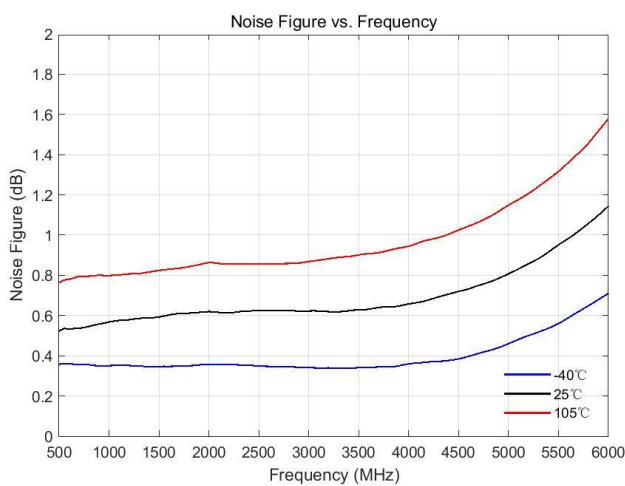
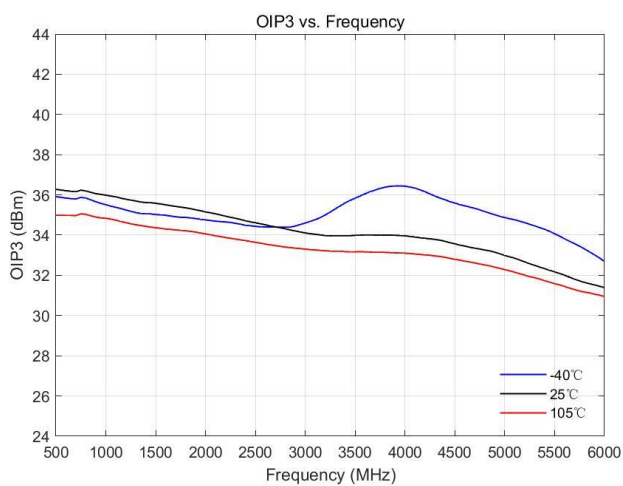
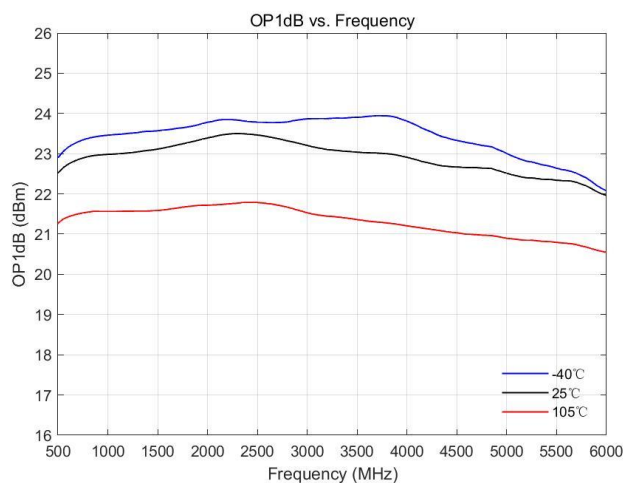
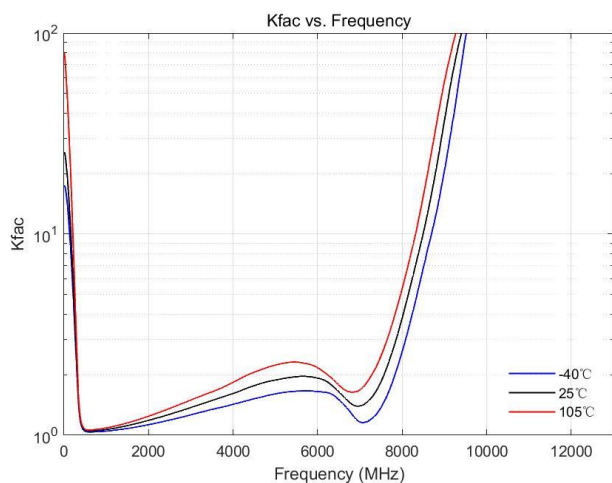
Performance Plots - VDD=5V

Test Conditions: 50Ω system, VDD=5V, (de-embedded data);



Performance Plots - VDD=5V (Cont.)

Test Conditions: 50Ω system, VDD=5V, (de-embedded data);



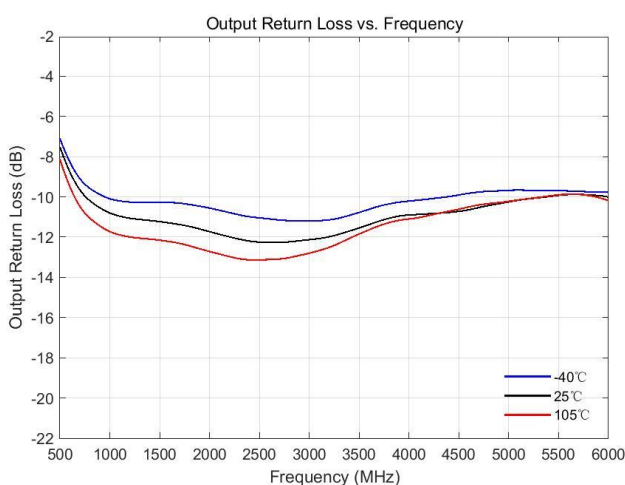
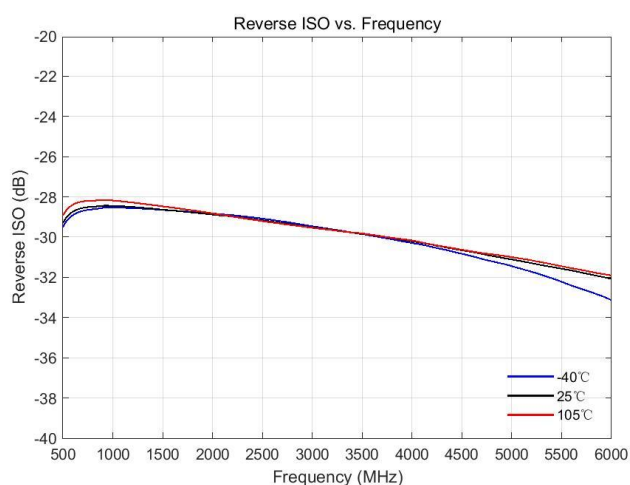
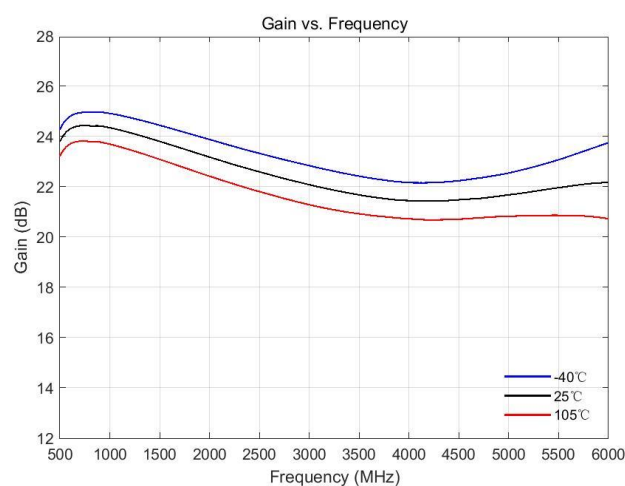
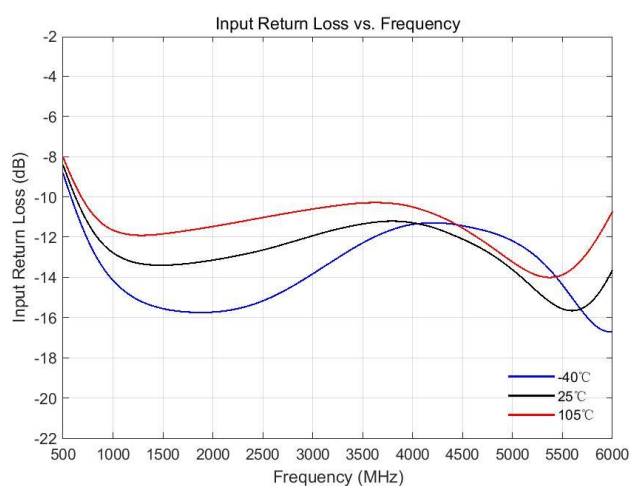
Typical Performance - VDD=3.3V

Test Conditions: 50Ω system, VDD=3.3V, Temp=+25°C, (de-embedded data);

| Parameter | Conditions | Units | Typical | | | | | |
|--------------------|------------------------------|-------|---------|------|------|------|------|------|
| Frequency | | GHz | 0.6 | 1.9 | 2.6 | 3.5 | 4.2 | 5 |
| Input Return Loss | | dB | 11 | 12 | 11 | 10.5 | 10.5 | 11 |
| Output Return Loss | | dB | 10 | 11 | 11 | 11 | 8.5 | 9 |
| Gain | | dB | 24.2 | 23 | 22.2 | 21.4 | 21 | 21.3 |
| OP1dB | | dBm | 18.5 | 18 | 18 | 18.5 | 18 | 17.5 |
| OIP3 | Pout=+5 dBm/tone Δf=1 MHz | dBm | 34 | 35 | 35 | 34 | 34 | 32 |
| Noise Figure | | dB | 0.60 | 0.65 | 0.65 | 0.70 | 0.75 | 0.85 |

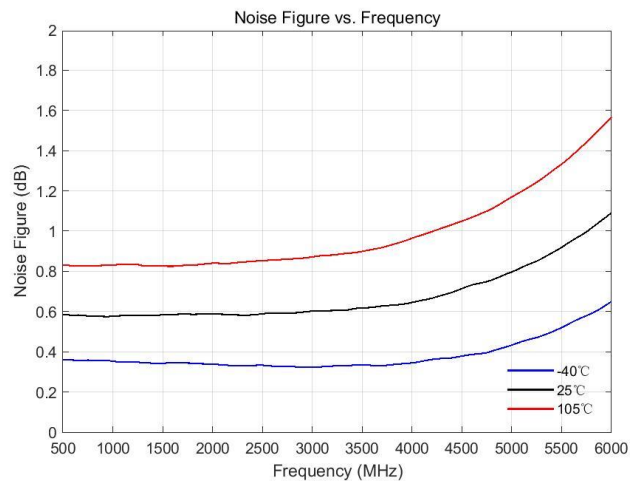
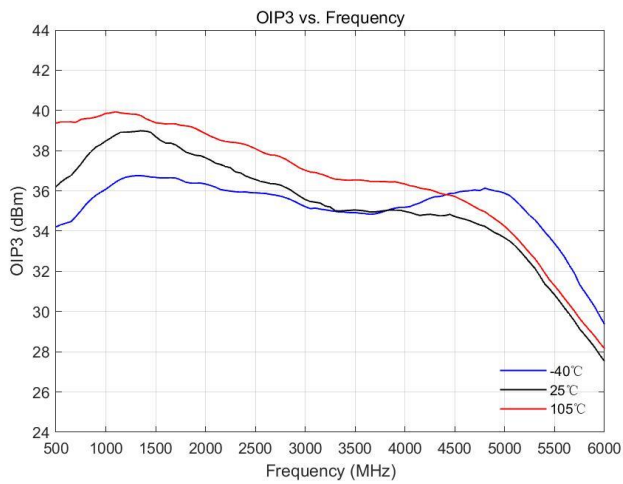
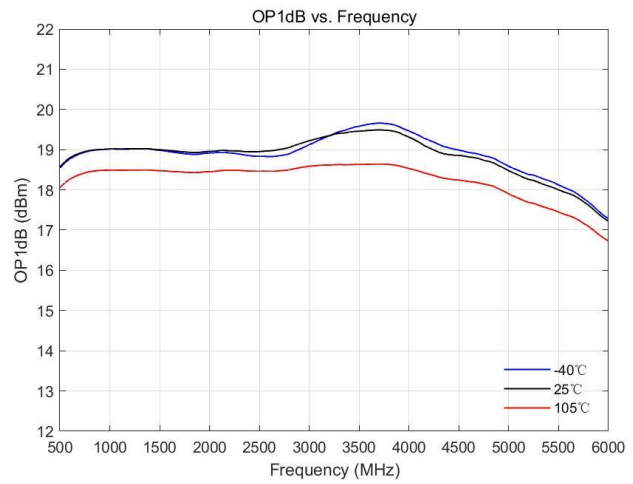
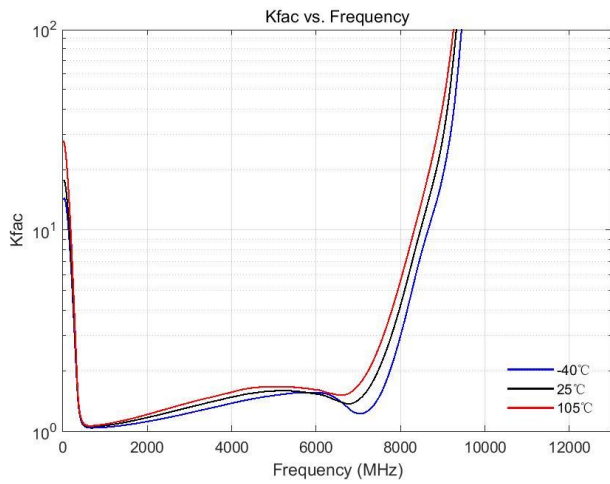
Performance Plots - VDD=3.3V

Test Conditions: 50Ω system, VDD=3.3V, (de-embedded data);



Performance Plots - VDD=3.3V (Cont.)

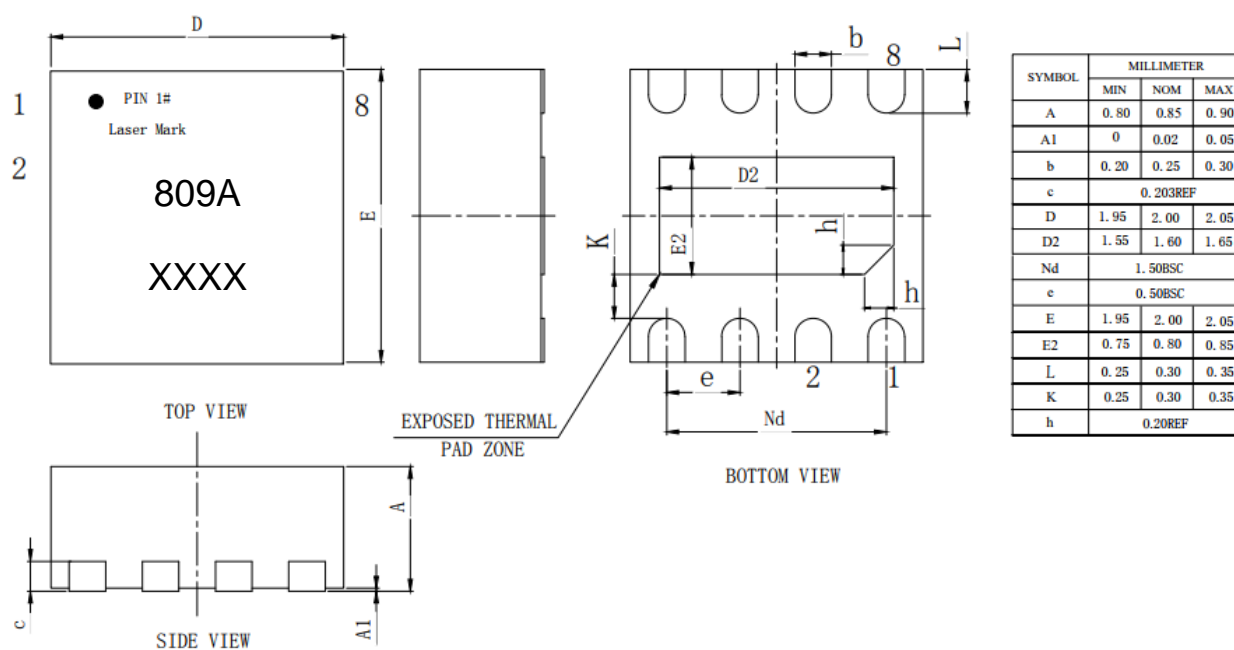
Test Conditions: 50Ω system, VDD=3.3V, (de-embedded data);



Package Marking and Dimensions

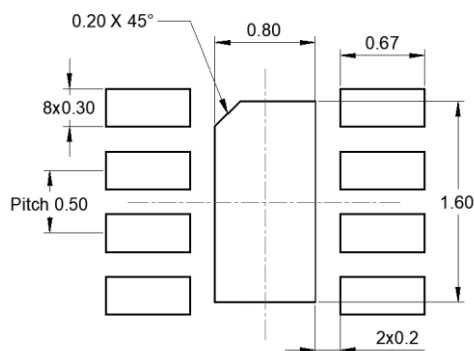
Marking: Part number – 809A

Lot code – XXXX



- Notes:
1. All dimensions are in millimeters.
 2. Coplanarity applies to the exposed heat sink slug as well as the terminals.
 3. DFN 8 pin 2x2x0.85mm Package.

PCB Mounting Pattern



PCB Layout Footprint (Top View)

- Notes:
1. All dimensions are in millimeters.



Handling Precaution

ESD countermeasure methods should be developed and used to control potential ESD damage during handling in a factory environment at each manufacturing site.

Solderability

Compatible with lead-free (260 °C maximum reflow temperature) soldering processes.

RoHS Compliance

This product is compliant with the EU RoHs2.0, EU Directive 2015/863.

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