

# AND9694/D

## Diode Detector Circuit Using the NSR201MX



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### APPLICATION NOTE

#### Overview

This application note explains about ON Semiconductor NSR201MX which is used as a diode detector circuit.

A Schottky diode is a diode using the schottky barrier generating due to the junction of the metal and the semiconductor. Because of its low forward voltage and fast switching operation, it is suitable for high-frequency use.

In wireless applications like WiFi, it is necessary to detect the received power and to feed back the detection voltage to transceiver IC. A Schottky diode is used in detection circuit in this case.

The principle of diode detection is rectifying the signal (AC component) through a diode and generating voltage as DC component. The detection makes use of the non-linear characteristic of the Schottky diode, so a bias circuit is not necessary.

#### Evaluation Board

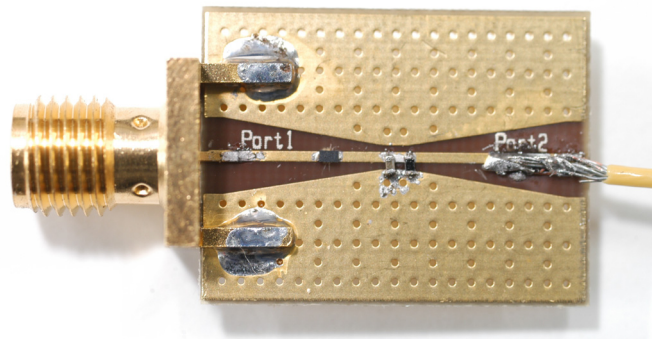


Figure 1. Evaluation Board

#### Circuit Design

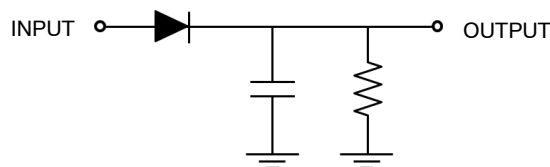


Figure 2. Circuit Design

Table 1. BILL OF MATERIALS

| Item     | Symbol | Value    | Manufacturer     | Size       |
|----------|--------|----------|------------------|------------|
| SBD      | D1     | NSR201MX | ON Semiconductor | X2DFN2     |
|          | C1     | 18 pF    | Various          | 1005       |
| Resistor | R1     | 100 kΩ   | Various          | 1005       |
| Material |        | FR-4     |                  | 25 x 10 mm |

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## Measurement Results

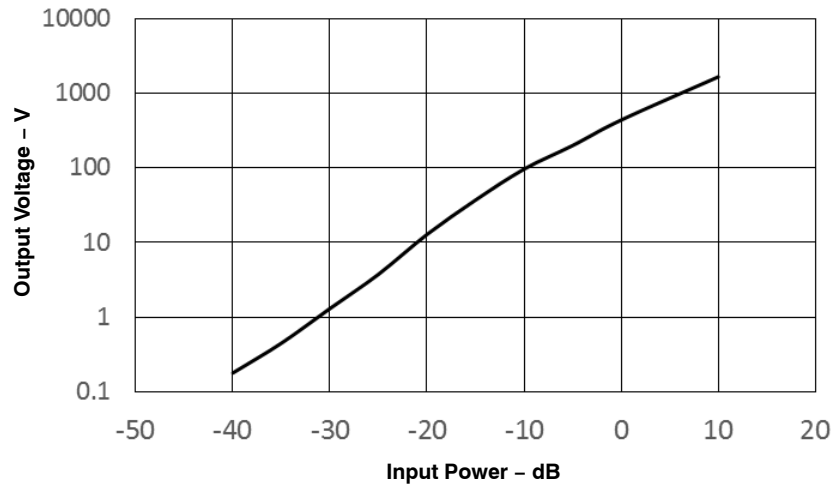


Figure 3. Output Voltage vs. Input Power

## Spice Model

Table 2. MODEL : DIODE

| Parameter       | Value | Unit     | Parameter | Value  | Unit |
|-----------------|-------|----------|-----------|--------|------|
| IS              | 123n  | A        | Ibv       | 7.65u  | A    |
| N               | 1.28  |          | Nbv       | 40.56  |      |
| BV              | 5.338 |          | Ibvl      | 0.008m | A    |
| IBV             | 7.65u | A        | Nbvl      | 1      |      |
| RS              | 12.2  | $\Omega$ | Visw      | 0.5    | V    |
| CJO             | 100f  | F        | Fcsw      | 0.5    |      |
| VJ              | 0.5   | V        | EG        | 690.0m | eV   |
| M               | 0.5   |          | XTI       | 2      |      |
| FC              | 0.5   |          |           |        |      |
| TT              | 3p    | S        | C         | 50f    | F    |
| I <sub>sr</sub> | 93.5f | A        | L         | 0.45n  | H    |
| Nr              | 2.4   |          |           |        |      |

## Equivalent Circuit Model

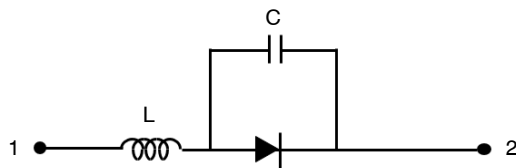


Figure 4. Equivalent Circuit Model

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