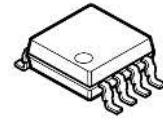


WIDE BAND FM IF DEMODULATOR

GENERAL DESCRIPTION

The **NJM14570** is a wide band IF IC with a maximum IF input frequency of 15 MHz.
It includes an IF Amplifier, Quadrature Detector and RSSI.

PACKAGE OUTLINE



NJM14570RB1

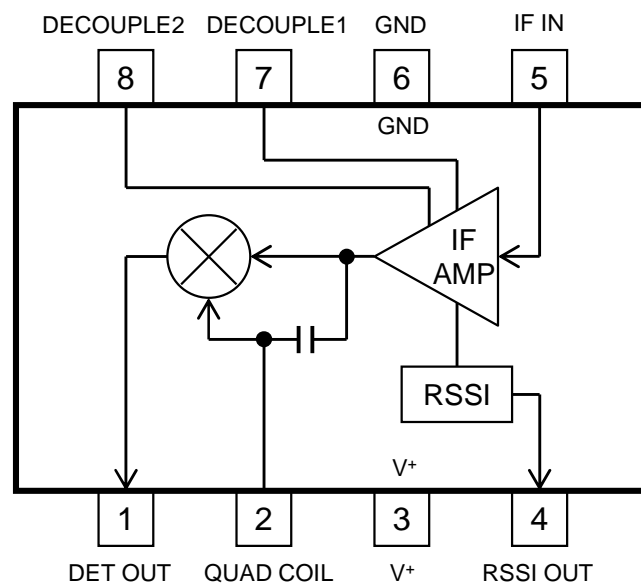
MAIN APPLICATIONS

- RF ID
- Radar detector
- Wireless Infrared Communication System
- Voice Transmission System
- A few MHz band Signal Detector

FEATURES

- Wide Range Operating Voltage 1.8V to 9V (recommended supply voltage)
 - Low Operating Current 2.9mA (Typ., No Signal)
 - Wide Range IF Input Frequency 10.7MHz (Standard)
up to 15MHz (Reference)
 - Wide Band FM Detector Range DC to 1MHz (Reference)
 - High FM Detection Sensitivity - 87dBm (12dB SINAD, typ.)
 - Package Outline MSOP8 (TVSP) *
- *JEDEC MO-187-DA / thin type

BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

| PARAMETER | SYMBOL | RATINGS | UNIT |
|-----------------------|------------------|---------------|------|
| Supply Voltage | V ⁺ | 10 | V |
| Power Dissipation | P _D | 410 | mW |
| Operating Temperature | T _{opr} | - 40 to + 85 | °C |
| Storage Temperature | T _{stg} | - 50 to + 125 | °C |

■ RECOMMENDED OPERATIONAL CONDITION

(Ta=25°C)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|----------------|----------------|-----------------|------|------|------|------|
| Supply Voltage | V ⁺ | | 1.8 | 3.0 | 9.0 | V |

■ ELECTRICAL CHARACTERISTICS

(Ta = 25°C, V⁺ = 3V, IF IN = 10.7MHz / - 30dBm, fdev = ± 50kHz, fmod = 1kHz, unless otherwise noted)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---------------------|------------------|-----------------|------|------|------|------|
| Current Consumption | I _{ccq} | No Signal | - | 2.9 | 4.1 | mA |

DETECTION

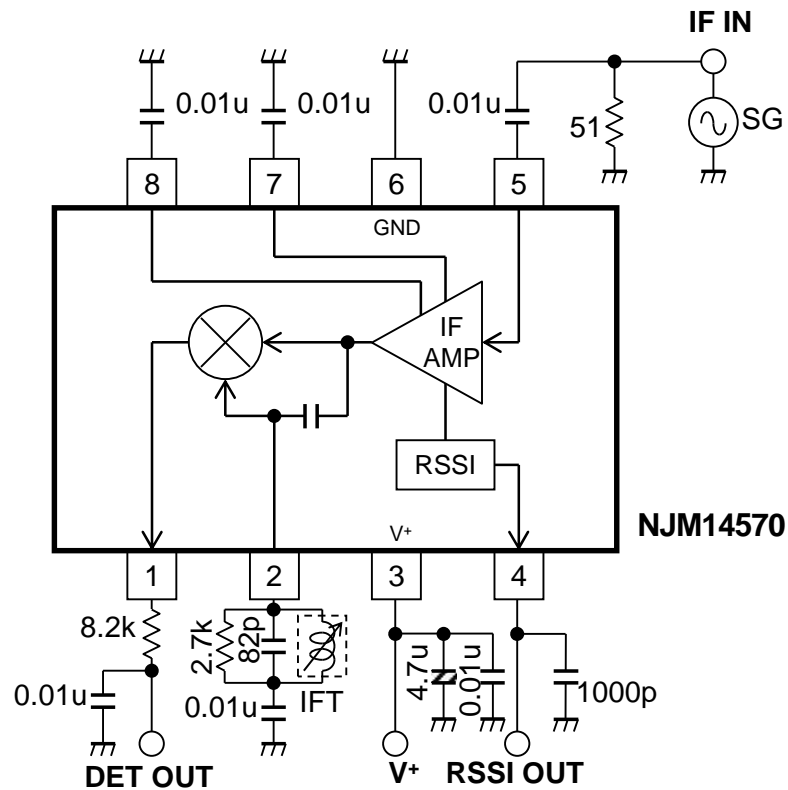
| | | | | | | |
|----------------------------|------------------|--|----|------|------|-------|
| Output Voltage | V _{OUT} | | 60 | 100 | 160 | mVrms |
| Total Harmonics Distortion | THD | | - | 0.5 | 2.0 | % |
| Signal to Noise Ratio | S/N | | 54 | 60 | - | dB |
| 12dB SINAD | SINAD | | - | - 87 | - 81 | dBm |
| Limiter Input Resistance | R _{LIM} | | - | 330 | - | Ω |

RSSI

| | | | | | | |
|---------------------|--------------------|-------------------------|------|------|------|---|
| RSSI Output Voltage | V _{RSSI1} | No Signal | 0.00 | 0.05 | 0.30 | V |
| | V _{RSSI2} | - 60 dBm, No Modulation | 0.20 | 0.40 | 0.60 | V |
| | V _{RSSI3} | - 30 dBm, No Modulation | 0.80 | 1.05 | 1.30 | V |
| | V _{RSSI4} | 0 dBm, No Modulation | 1.20 | 1.50 | 1.80 | V |

■ TEST CIRCUIT

This test circuit allows the measurement of all parameters described in "ELECTRICAL CHARACTERISTICS".

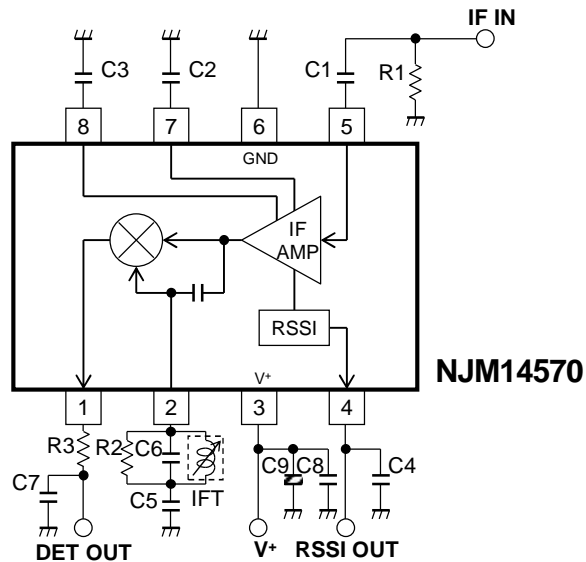


IFT:10.7MHz IF Transformer

EVALUATION BOARD

The evaluation board is useful for your design and to have more understanding of the usage and performance of this device. This circuit is the same as TEST CIRCUIT. Note that this board is not prepared to show the recommendation of pattern and parts layout.

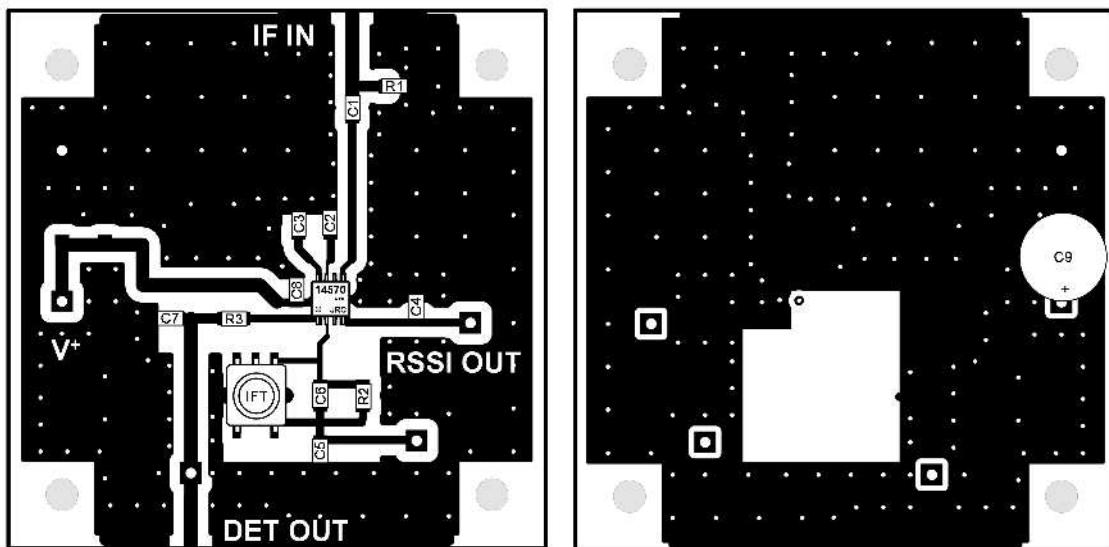
Circuit Diagram



PRINTED CIRCUIT BOARD

Top View

Bottom View



List of Component

| Items | Designation | Value | Items | Designation | Value |
|-----------|-------------|--------|-------------|-------------|---------------------------|
| Capacitor | C1 | 0.01uF | Resistor | R1 | 51Ω |
| Capacitor | C2 | 0.01uF | | | For testing purposes only |
| Capacitor | C3 | 0.01uF | Resistor | R2 | 2.7kΩ |
| Capacitor | C4 | 1000pF | Resistor | R3 | 8.2kΩ |
| Capacitor | C5 | 0.01uF | | | |
| Capacitor | C6 | 82pF | Transformer | IFT | 10.7MHz IF Transformer |
| Capacitor | C7 | 0.01uF | | | |
| Capacitor | C8 | 0.01uF | IC | NJM14570 | NJM14570RB1 |
| Capacitor | C9 | 4.7uF | | | |

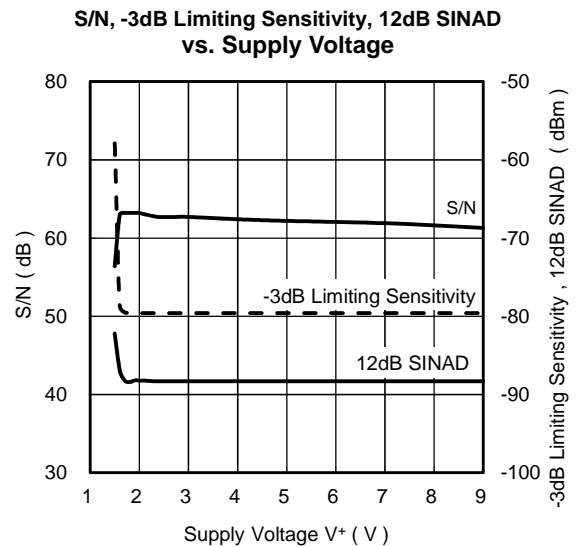
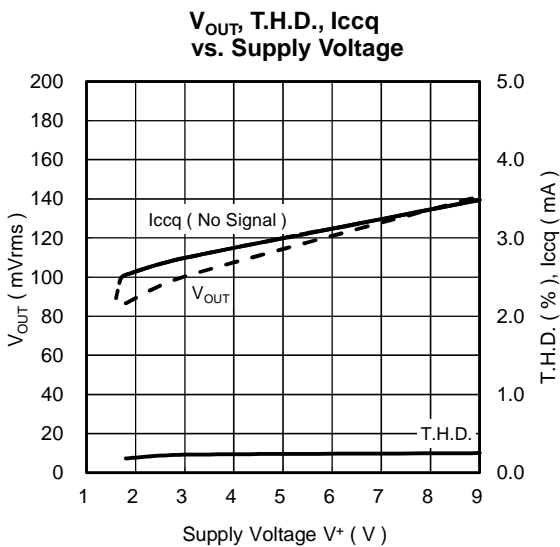
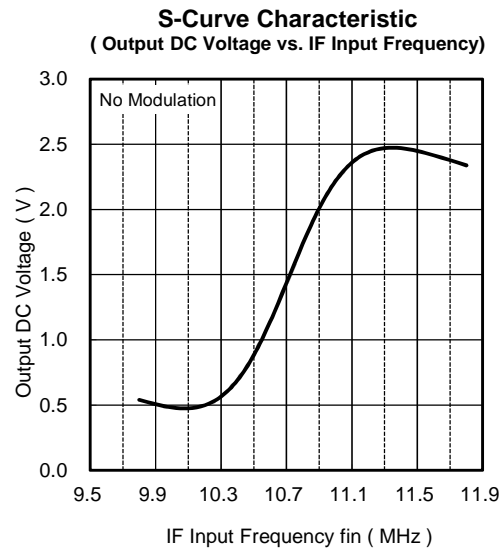
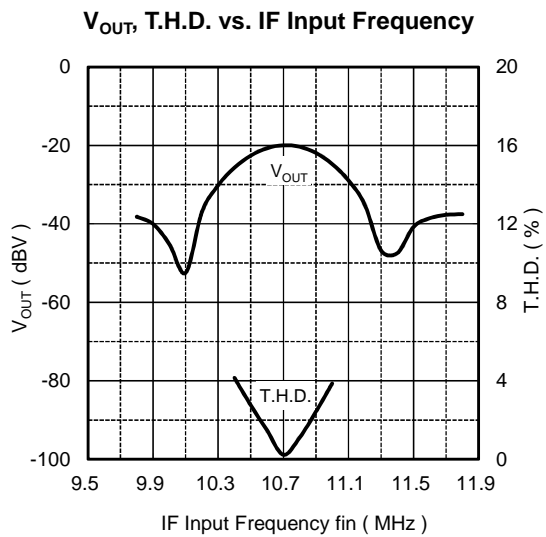
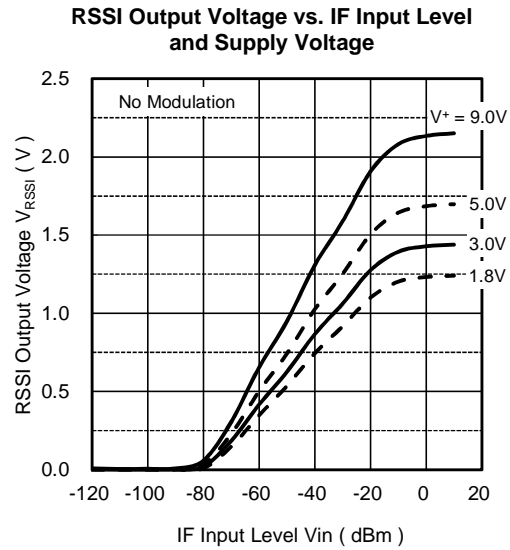
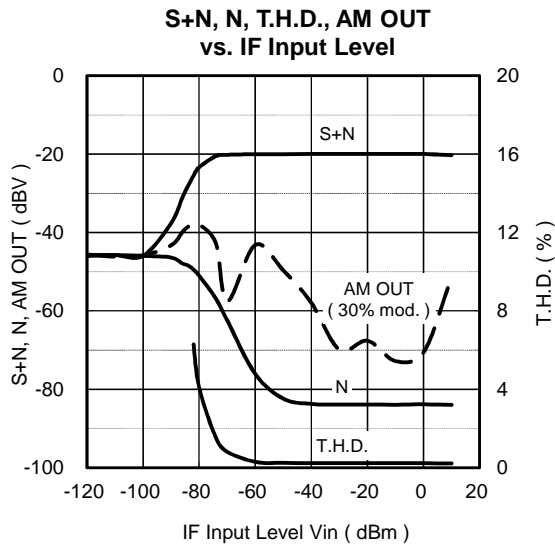
■ TERMINAL FUNCTION

(Ta = 25°C, V⁺ = 3V, No signal)

| Pin No. | SYMBOL | EQUIVARENT CIRCUIT | VOLTAGE | FUNCTION |
|-------------|---------------------------------|--------------------|--------------|--|
| 1 | DET OUT | | 1.5V | FM Detector Output |
| 2 | QUAD COIL | | 3.0V | FM Detector Input Connection for the phase shift circuit. |
| 3 6 | V ⁺ GND | | 3.0V 0.0V | 3pin:Supply Voltage 6pin:GND Terminal |
| 4 | RSSI OUT | | -- | Received Signal Strength Indicator Output Pin4 outputs DC level proportional to the log of pin5 input signal level. |
| 5 7 8 | IF IN DECOUPLE1 DECOUPLE2 | | 2.6V | 5pin: IF Amplifier Input 7,8pin: IF Decoupling An external decoupling capacitor is connected to enhance stability. The bandwidth of IF Amplifier can be adjusted. Large capacity: wide band Small capacity: narrow band |

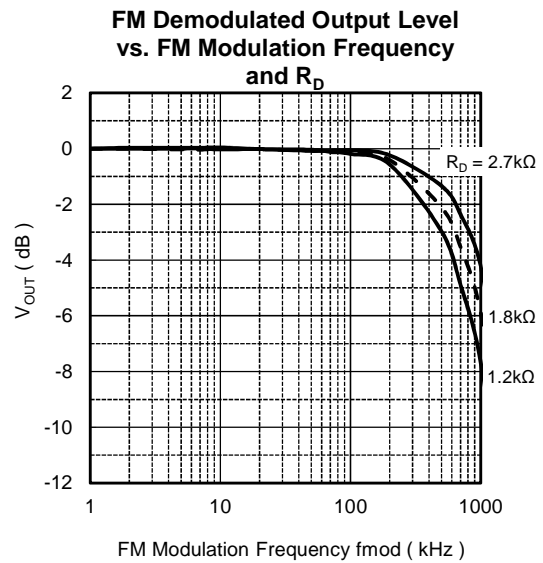
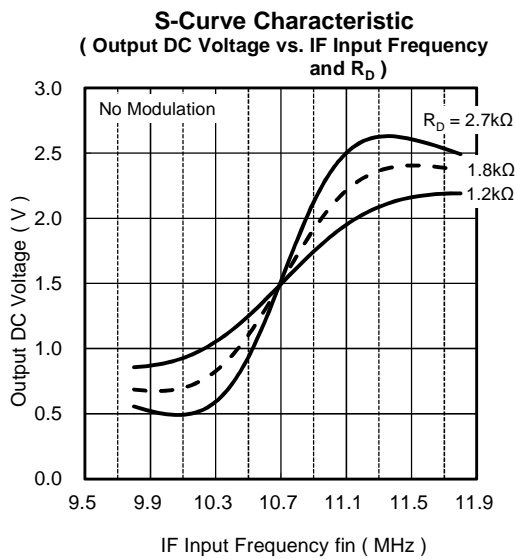
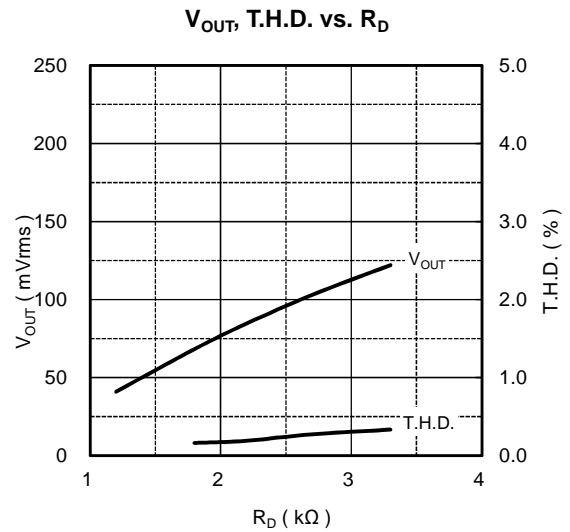
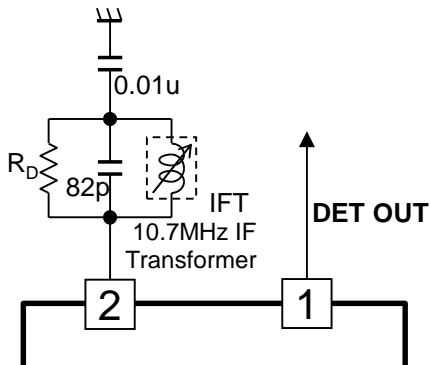
TYPICAL CHARACTERISTICS

Ta = 25°C, V⁺ = 3V, IF IN = 10.7MHz / -30dBm, fdev = ±50kHz, fmod = 1kHz, unless otherwise noted



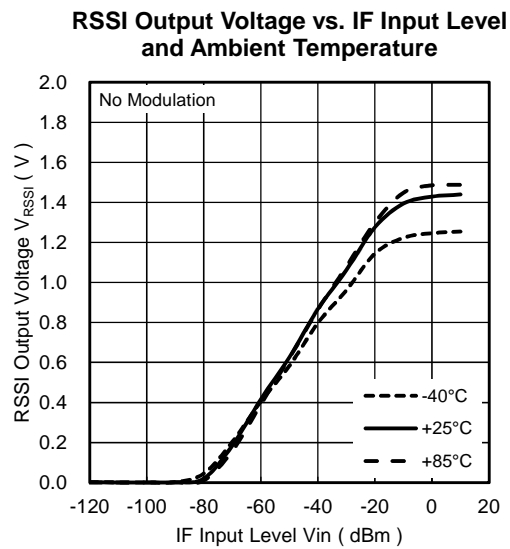
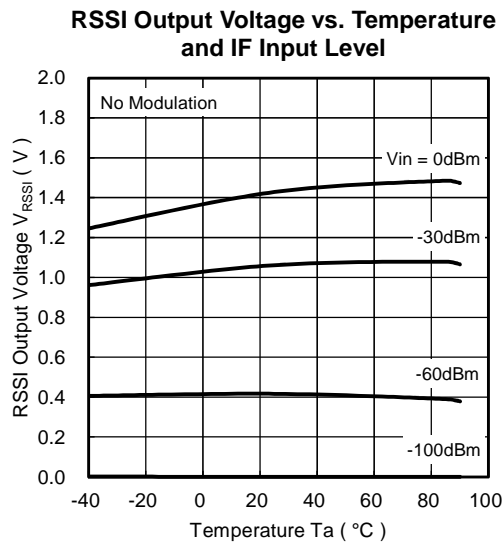
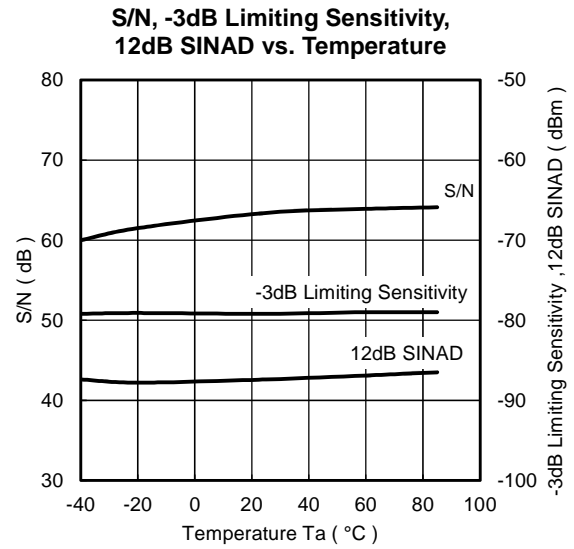
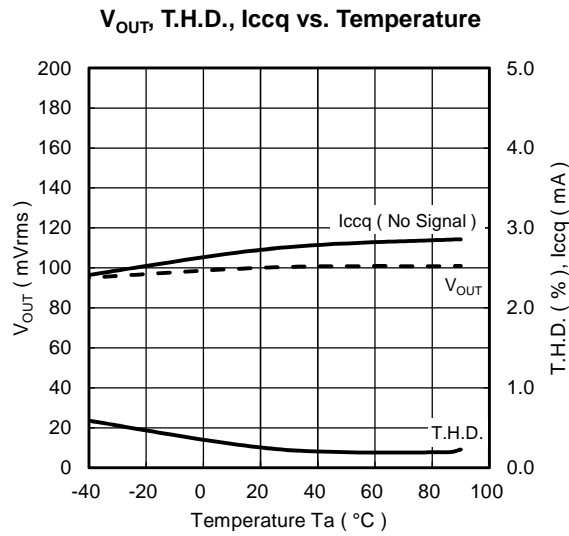
■ Electrical characteristics by changing damping resistor R_D

$T_a = 25^\circ\text{C}$, $V^+ = 3\text{V}$, IF IN = 10.7MHz / -30dBm, $f_{\text{dev}} = \pm 50\text{kHz}$, $f_{\text{mod}} = 1\text{kHz}$, unless otherwise noted



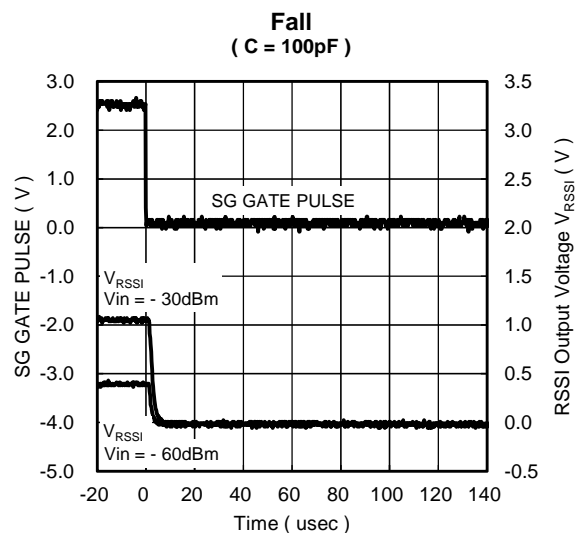
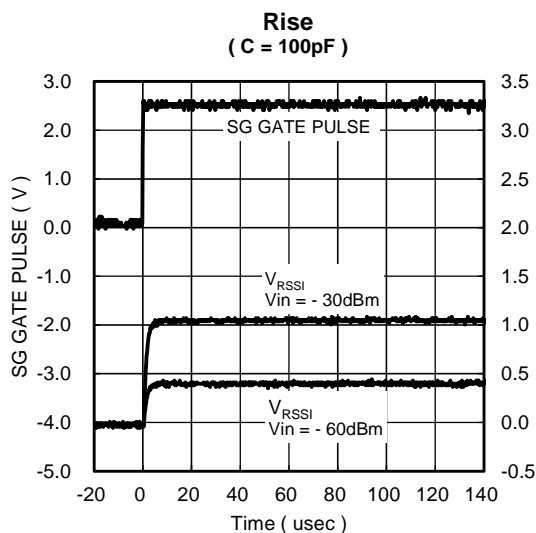
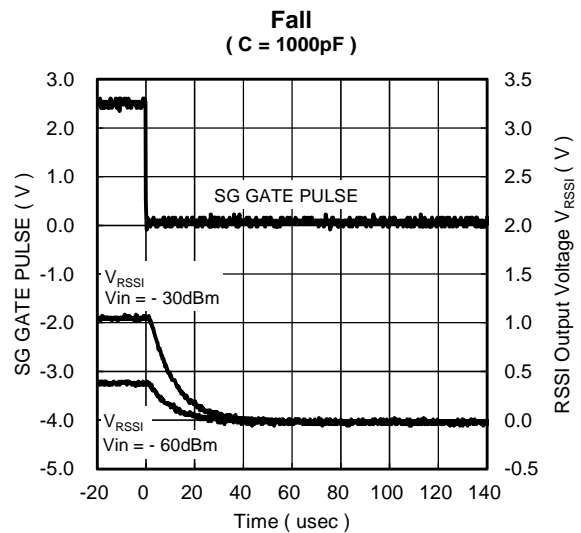
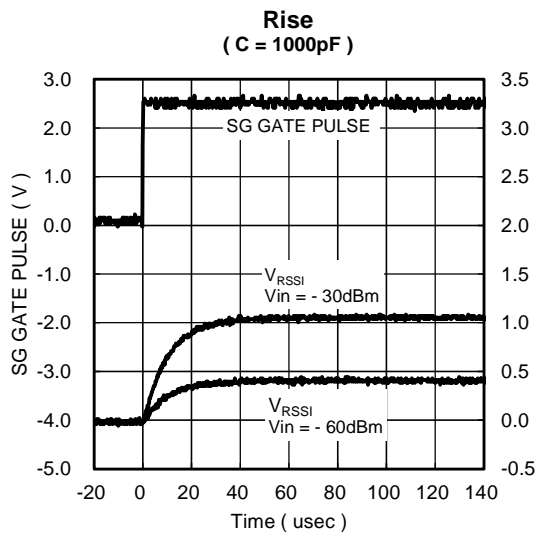
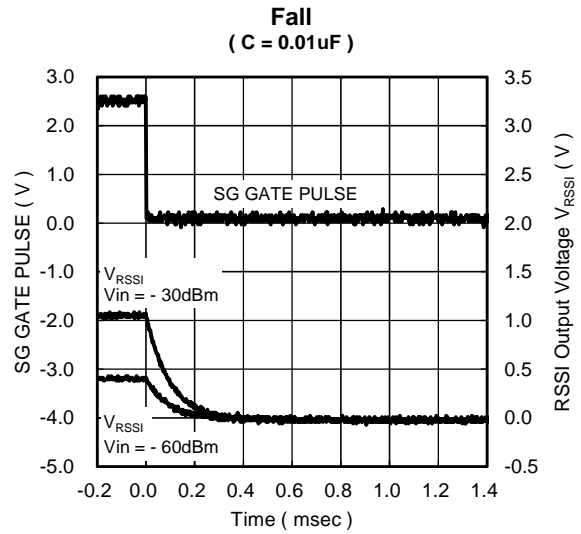
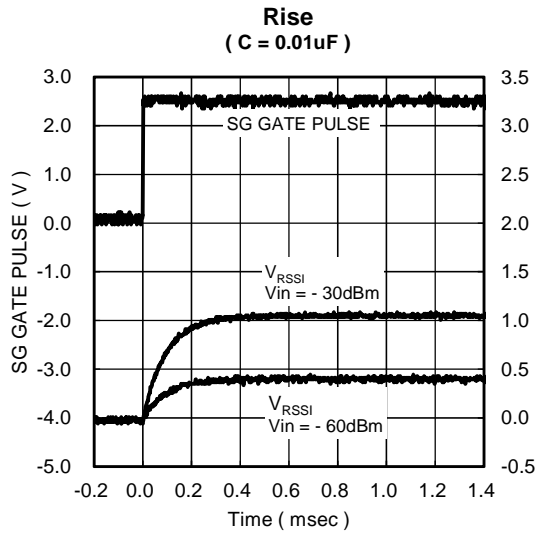
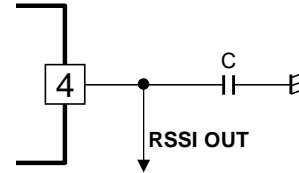
Ambient Temperature Characteristics

$T_a = 25^\circ\text{C}$, $V^+ = 3\text{V}$, IF IN = 10.7MHz / - 30dBm, $f_{\text{dev}} = \pm 50\text{kHz}$, $f_{\text{mod}} = 1\text{kHz}$, unless otherwise noted



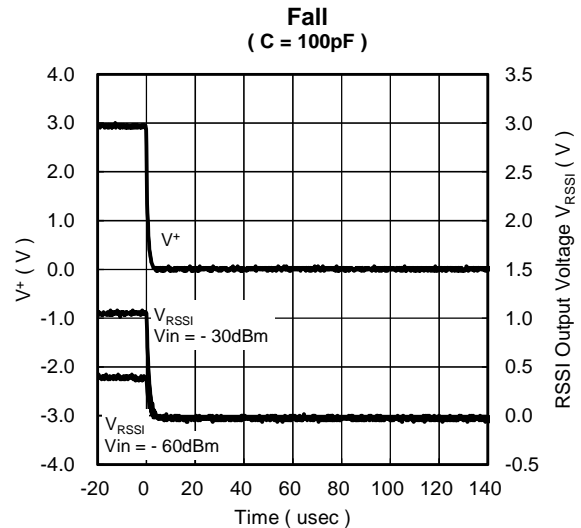
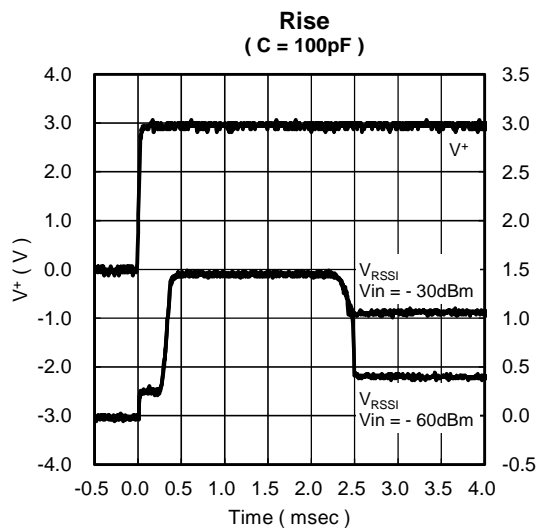
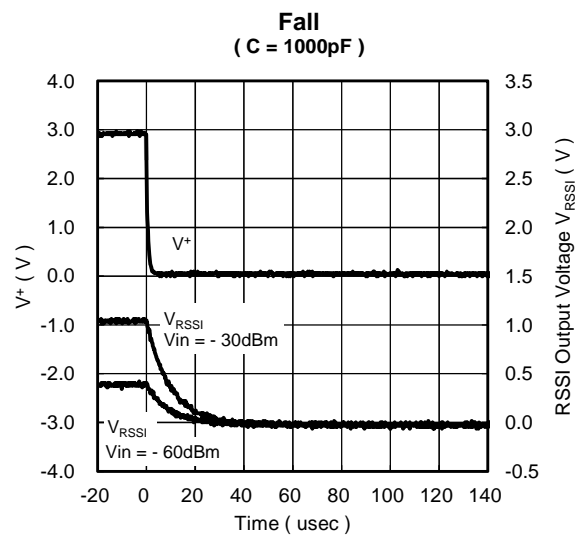
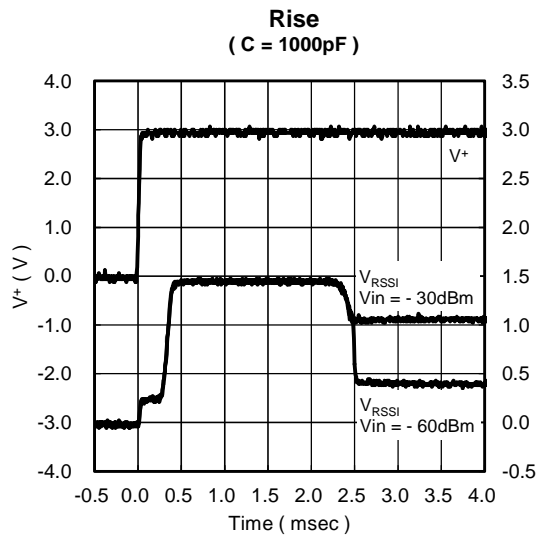
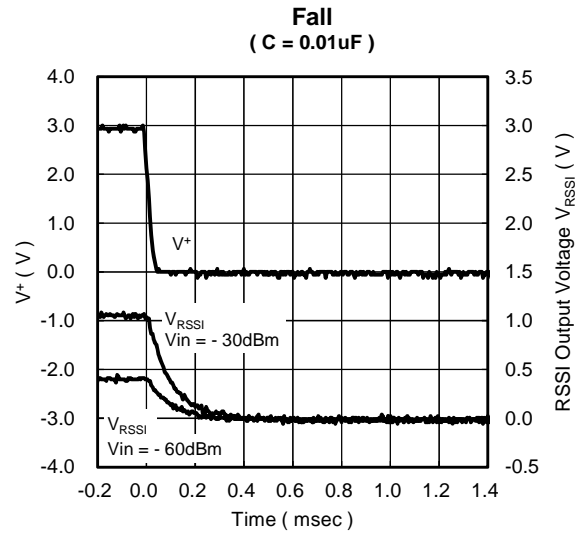
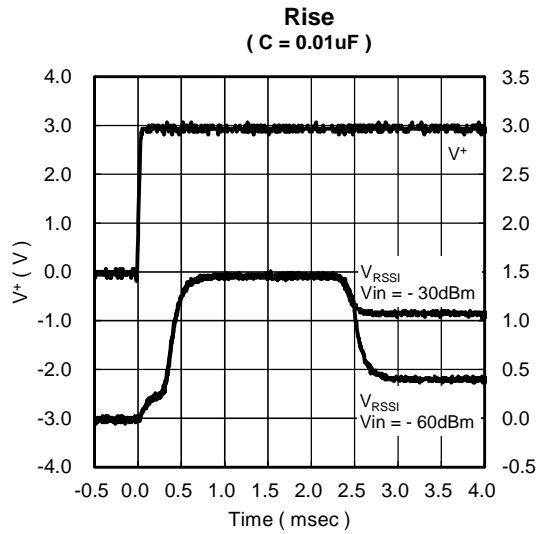
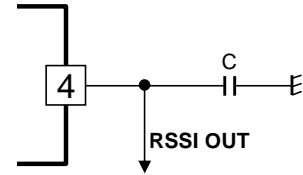
■ RSSI Output Transient Response (IF Input ON/ OFF)

Ta = 25°C, V⁺ = 3V, IF IN = 10.7MHz, No Modulation, unless otherwise noted



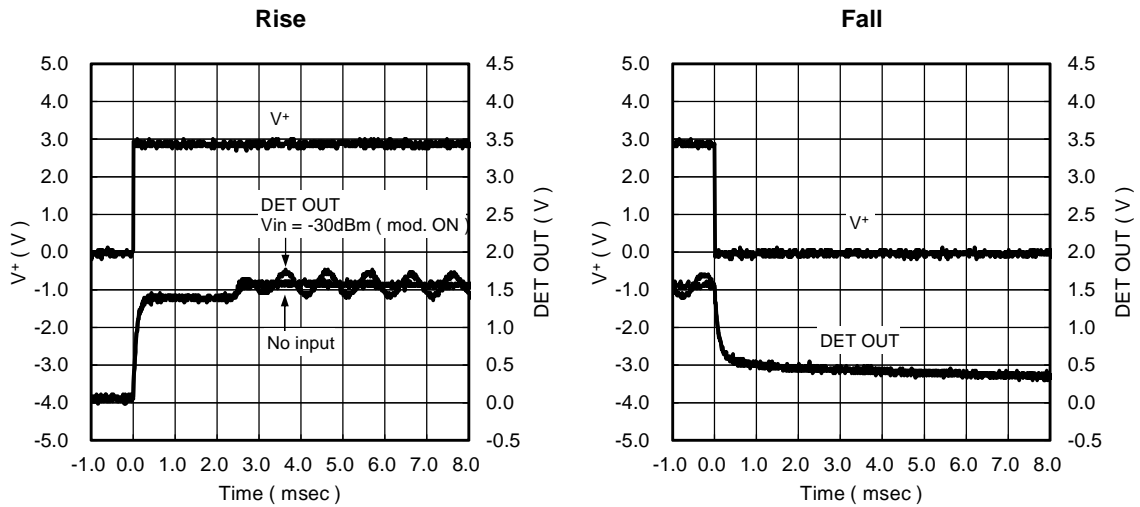
■ RSSI Output Transient Response (V^+ ON/ OFF)

$T_a = 25^\circ\text{C}$, $V^+ = 3\text{V}$, IF IN = 10.7MHz, No Modulation, unless otherwise noted



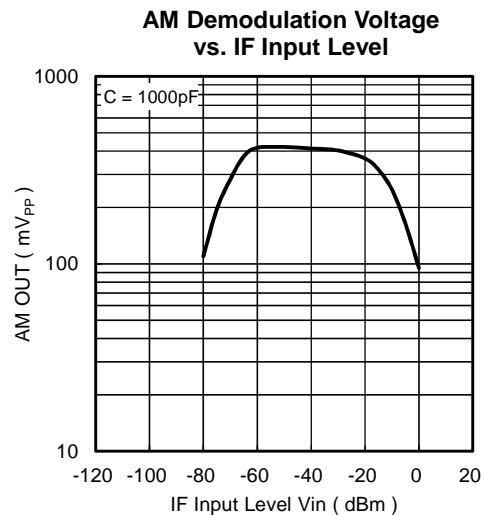
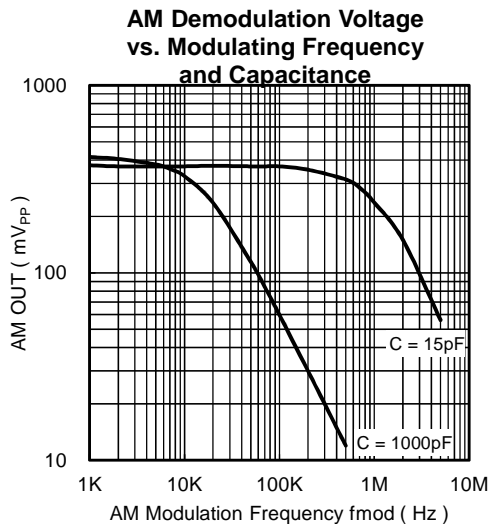
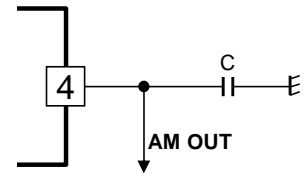
DETECTOR Output Transient Response

$T_a = 25^\circ\text{C}$, $V^+ = 3\text{V}$, IF IN = 10.7MHz / - 30dBm, $f_{\text{dev}} = \pm 50\text{kHz}$, $f_{\text{mod}} = 1\text{kHz}$, unless otherwise noted



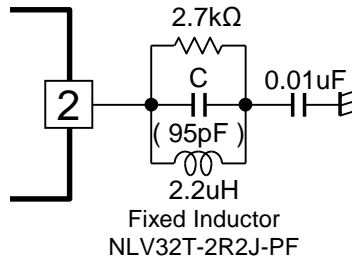
AM Demodulation output characteristics by using the RSSI output

$T_a = 25^\circ\text{C}$, $V^+ = 3\text{V}$, IF IN = 10.7MHz / - 50dBm, AM mod. = 80%, $f_{\text{mod}} = 10\text{kHz}$, unless otherwise noted

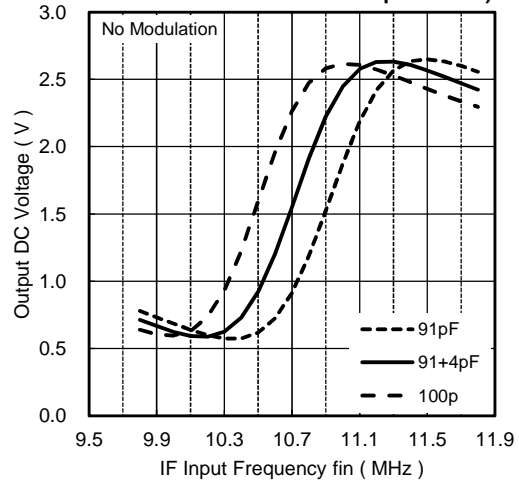


■ Electrical characteristics by using a Fixed Inductor

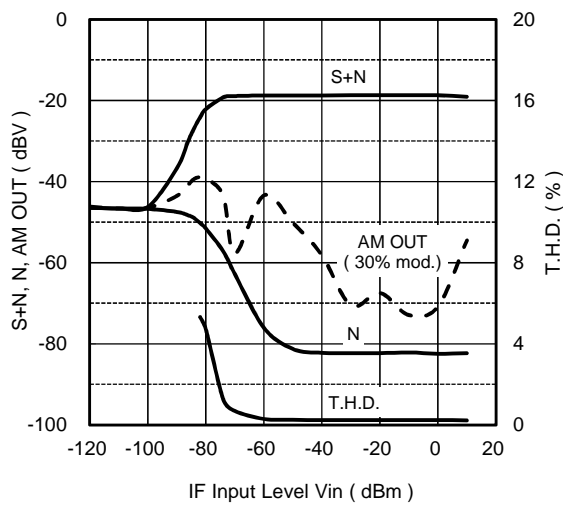
$T_a = 25^\circ\text{C}$, $V^+ = 3\text{V}$, IF IN = 10.7MHz / - 30dBm, $f_{\text{dev}} = \pm 50\text{kHz}$, $f_{\text{mod}} = 1\text{kHz}$, unless otherwise noted



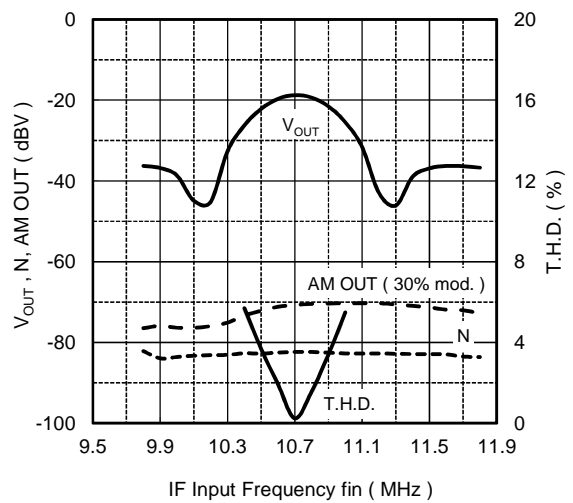
S-Curve Characteristics
(Output DC Voltage vs. IF Input Frequency and Capacitance)



S+N, N, T.H.D., AM OUT vs. IF Input Level



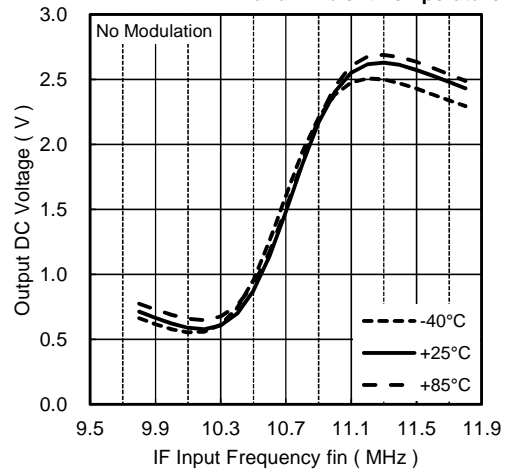
V_{OUT} , T.H.D. vs. IF Input Frequency



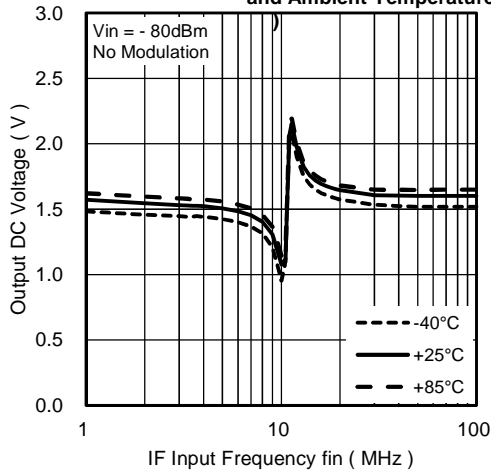
■ Electrical characteristics by using a Fixed Inductor

$V^+ = 3V$, IF IN = 10.7MHz / - 30dBm, $f_{dev} = \pm 50kHz$, $f_{mod} = 1kHz$, unless otherwise noted

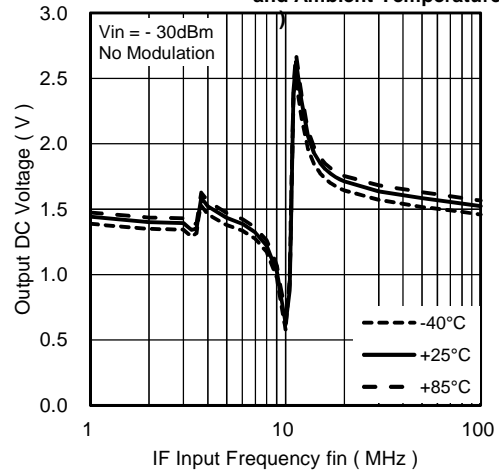
S-Curve Characteristics
(Output DC Voltage vs. IF Input Frequency and Ambient Temperature)



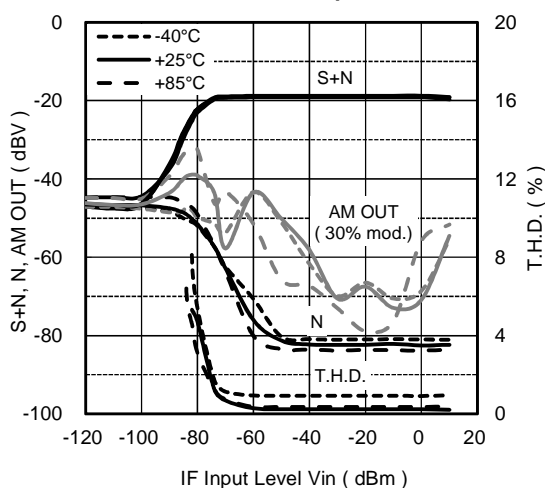
S-Curve Characteristics for wide band
(Output DC Voltage vs. IF Input Frequency and Ambient Temperature)



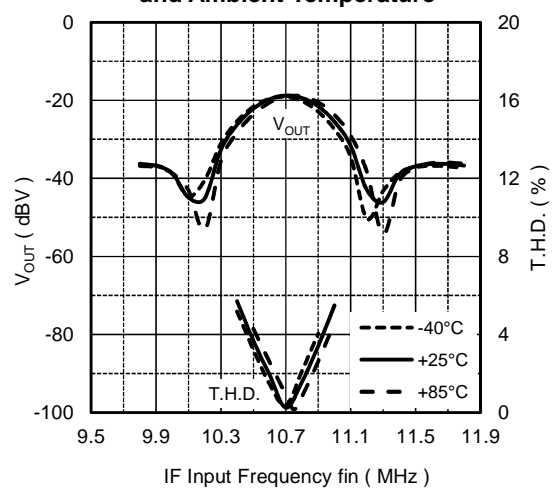
S-Curve Characteristics for wide band
(Output DC Voltage vs. IF Input Frequency and Ambient Temperature)



S+N, N, T.H.D., AM OUT vs. IF Input Level and Ambient Temperature



V_{OUT} , T.H.D. vs. IF Input Frequency and Ambient Temperature



[CAUTION]

The specifications on this databook are only given for information, without any guarantee as regards either mistakes or omissions. The application circuits in this databook are described only to show representative usages of the product and not intended for the guarantee or permission of any right including the industrial rights.