

1. WIDE L-BAND APPLICATION

1-1 SUMMARY

This is Wide L-band application note of NJG1187KG1. This application note shows the typical electrical characteristics and application circuit.

1-2 MEASURED DATA

General conditions: $V_{DD}=3.3V$, $f_{RF}=1164$ to $1610MHz$, $T_a=+25^{\circ}C$, $Z_s=Z_l=50\Omega$, with application circuit

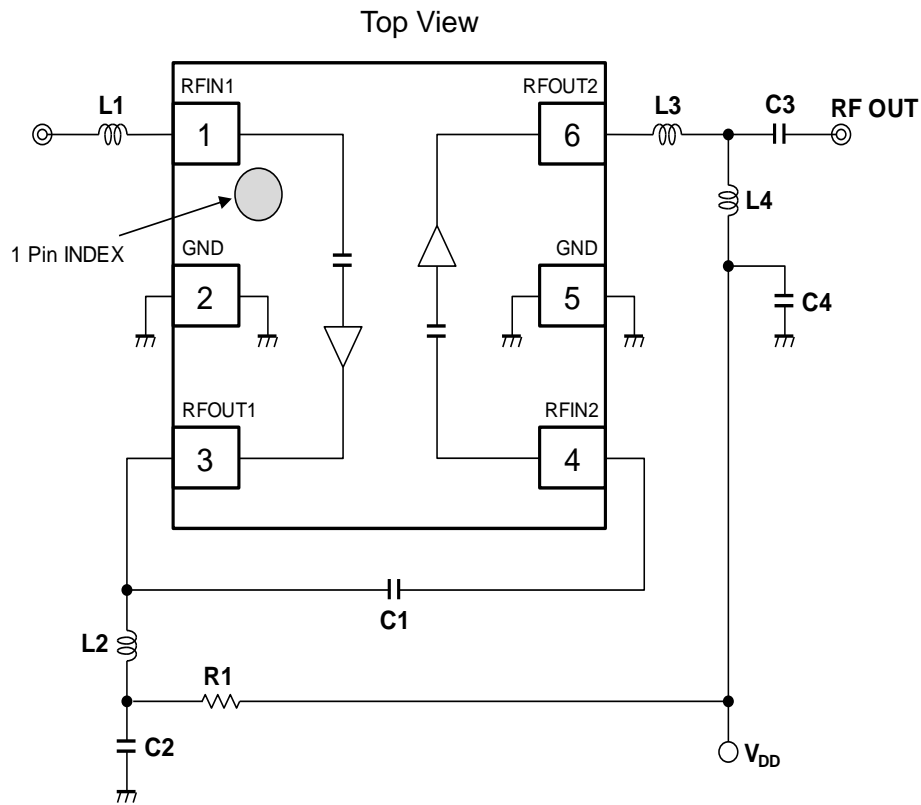
| PARAMETERS | SYMBOL | CONDITIONS | DATA | UNITS |
|----------------------------------|-------------|---|-------|-------|
| Supply Voltage | V_{DD} | | 3.3 | V |
| Operating Current | I_{DD} | RF OFF | 7.4 | mA |
| Small Signal Gain | Gain1 | f=1575MHz (L1 band) Exclude PCB, connector losses (0.15dB) | 28.2 | dB |
| | Gain2 | f=1176MHz (L5 band) Exclude PCB, connector losses (0.10dB) | 32.5 | dB |
| | Gain3 | f=1227MHz (L2 band) Exclude PCB, connector losses (0.10dB) | 34.8 | dB |
| | Gain4 | f=1278MHz (L6 band) Exclude PCB, connector losses (0.11dB) | 36.1 | dB |
| Noise figure | NF1 | f=1575MHz (L1 band) Exclude PCB, connector losses (0.08dB) | 0.71 | dB |
| | NF2 | f=1176MHz (L5 band) Exclude PCB, connector losses (0.05dB) | 0.72 | dB |
| | NF3 | f=1227MHz (L2 band) Exclude PCB, connector losses (0.06dB) | 0.69 | dB |
| | NF4 | f=1278MHz (L6 band) Exclude PCB, connector losses (0.06dB) | 0.67 | dB |
| Isolation | ISL1 | f=1575MHz (L1 band) | 62.2 | dB |
| | ISL2 | f=1176MHz (L5 band) | 57.5 | dB |
| | ISL3 | f=1227MHz (L2 band) | 56.6 | dB |
| | ISL4 | f=1278MHz (L6 band) | 56.3 | dB |
| Output power 1dB compression | P-1dB(OUT)1 | f=1575MHz (L1 band) | +8.8 | dBm |
| | P-1dB(OUT)2 | f=1176MHz (L5 band) | +11.0 | dBm |
| | P-1dB(OUT)3 | f=1227MHz (L2 band) | +11.0 | dBm |
| | P-1dB(OUT)4 | f=1278MHz (L6 band) | +10.6 | dBm |
| Output 3rd order intercept point | OIP3_1 | f1=1575MHz, f2=f1+1MHz, Pin=-42dBm | +15.9 | dBm |
| | OIP3_2 | f1=1176MHz, f2=f1+1MHz, Pin=-42dBm | +18.6 | dBm |
| | OIP3_3 | f1=1227MHz, f2=f1+1MHz, Pin=-42dBm | +19.4 | dBm |
| | OIP3_4 | f1=1278MHz, f2=f1+1MHz, Pin=-42dBm | +19.1 | dBm |

1-2 MEASURED DATA

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| PARAMETERS | SYMBOL | CONDITIONS | DATA | UNITS |
|-------------------------------|--------|---------------------|------|-------|
| RF input port return loss | RLi1 | f=1575MHz (L1 band) | 7.3 | dB |
| | RLi2 | f=1176MHz (L5 band) | 7.8 | dB |
| | RLi3 | f=1227MHz (L2 band) | 10.1 | dB |
| | RLi4 | f=1278MHz (L6 band) | 12.4 | dB |
| RF output port return loss | RLo1 | f=1575MHz (L1 band) | 8.1 | dB |
| | RLo2 | f=1176MHz (L5 band) | 8.0 | dB |
| | RLo3 | f=1227MHz (L2 band) | 11.8 | dB |
| | RLo4 | f=1278MHz (L6 band) | 17.1 | dB |
| k factor | k | f=50MHz to 10GHz | 4.1 | - |

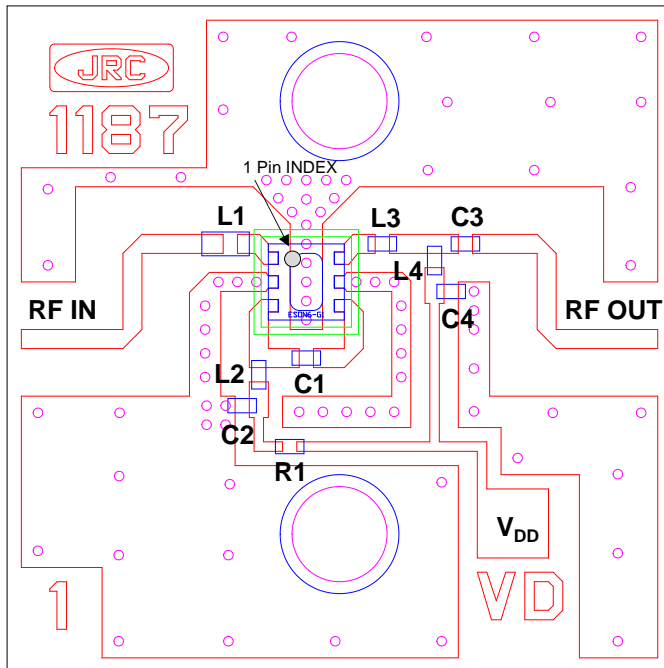
1-3 APPLICATION CIRCUIT



Parts list (Wide L-band)

| Parts ID | Value | Manufacture |
|----------|--------|----------------------------|
| L1 | 13nH | LQW15AN_00 Series (MURATA) |
| L2 | 6.8nH | LQP03TN_02 Series (MURATA) |
| L3 | 9.1nH | |
| L4 | 8.2nH | |
| C1 | 1.8pF | GRM03 Series (MURATA) |
| C2 | 1000pF | |
| C3 | 100pF | |
| C4 | 1000pF | |
| R1 | 180Ω | 0603 size |

1-4 PCB DESIGN



PCB

Substrate: FR-4

Thickness: 0.2mm

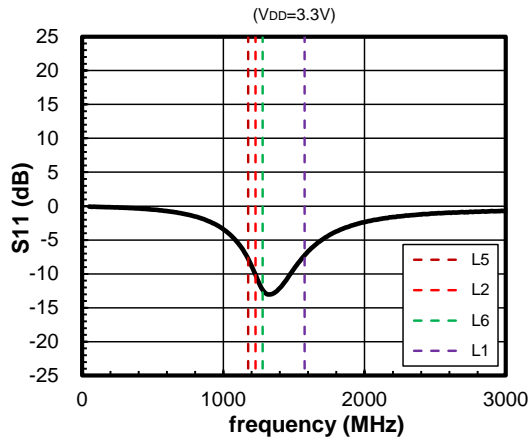
Microstrip line width: 0.4mm ($Z_0=50\Omega$)

Size: 14.0mm x 14.0mm

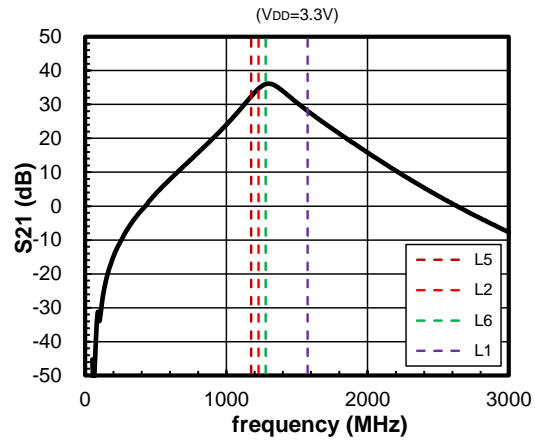
1-5-1 Typical Characteristics

General condition : $V_{DD}=3.3V$, $T_a=+25^{\circ}C$, $Z_s=Z_l=50\Omega$, with Wide L-band application circuit

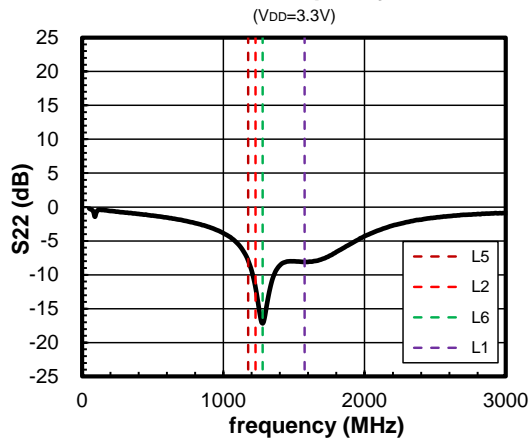
S11 vs. frequency



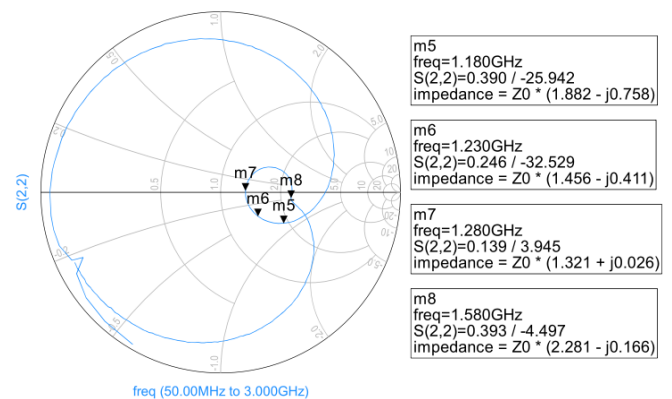
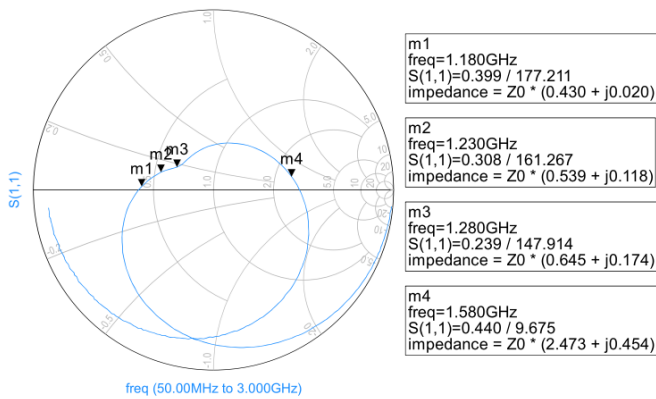
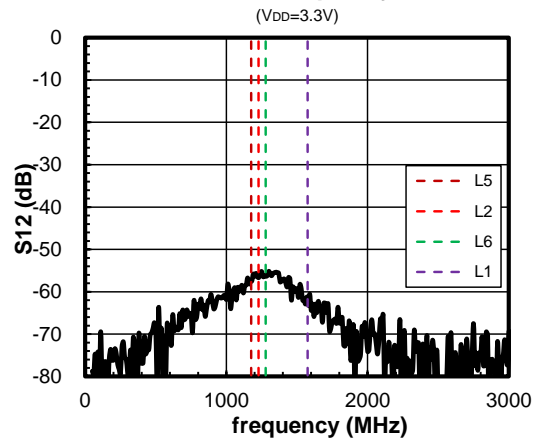
S21 vs. frequency



S22 vs. frequency



S12 vs. frequency

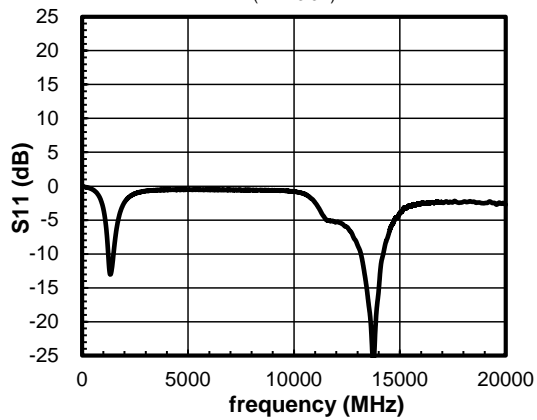


1-5-2 Typical Characteristics

General condition : $V_{DD}=3.3V$, $T_a=+25^{\circ}C$, $Z_s=Z_l=50\Omega$, with Wide L-band application circuit

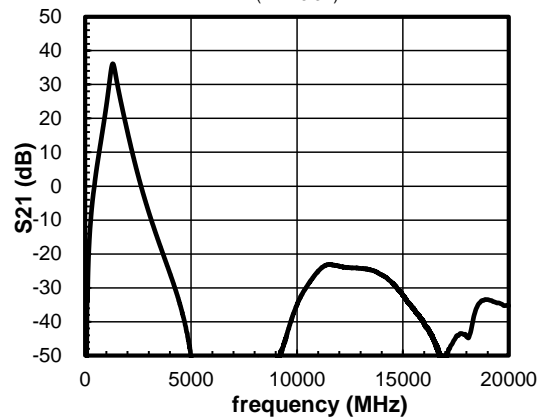
S11 vs. frequency

($V_{DD}=3.3V$)



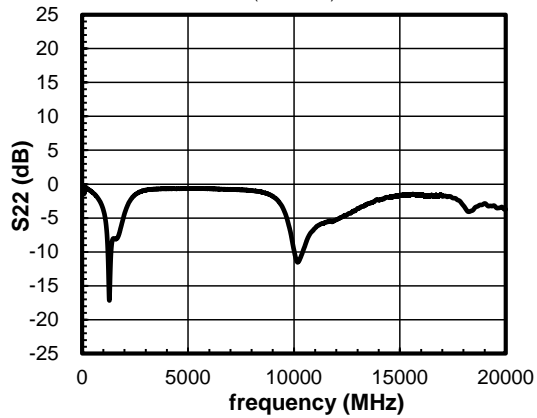
S21 vs. frequency

($V_{DD}=3.3V$)



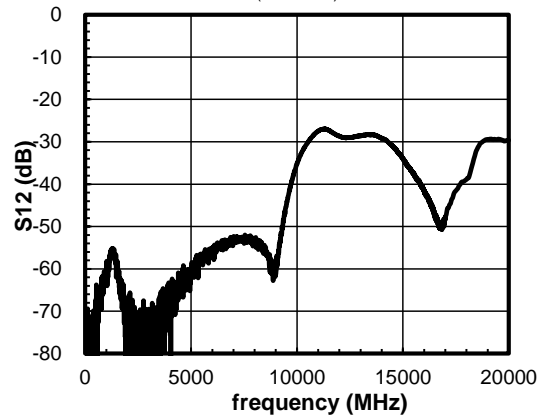
S22 vs. frequency

($V_{DD}=3.3V$)



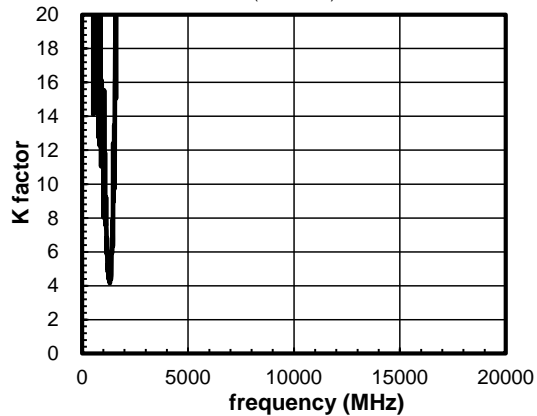
S12 vs. frequency

($V_{DD}=3.3V$)



K factor vs. frequency

($V_{DD}=3.3V$)



1-5-3 Typical Characteristics

General condition : $V_{DD}=3.3V$, $T_a=+25^{\circ}C$, $Z_s=Z_l=50\Omega$, with Wide L-band application circuit

