

FMM5056VF

5.8-7.2GHz Power Amplifier MMIC

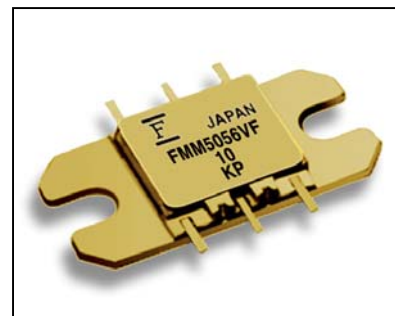
FEATURES

- High Output Power: 34.0dBm(typ.)
- High Linear Gain: 28.0dB(typ.)
- Low VSWR
- Broad Band: 5.8 ~ 7.2GHz
- Impedance Matched $Z_{in}/Z_{out} = 50\Omega$
- Small Hermetic Metal-Ceramic Package(VF)

DESCRIPTION

The FMM5056VF is a MMIC amplifier that contains a four-stage amplifier, internally matched, for standard communications band in the 5.8 to 7.2GHz frequency range.

Fujitsu's stringent Quality Assurance Program assures the highest reliability and consistent performance.



ABSOLUTE MAXIMUM RATINGS (Case Temperature $T_c=25^\circ\text{C}$)

| Item | Symbol | Rating | Unit |
|---------------------|-----------|-------------|------------------|
| DC Input Voltage | V_{DD} | 12 | V |
| DC Input Voltage | V_{GG} | -7 | V |
| Input Power | P_{in} | 12 | dBm |
| Storage Temperature | T_{stg} | -55 to +125 | $^\circ\text{C}$ |

Recommended Operating Condition

| Item | Symbol | Condition | Unit |
|--|----------|-------------|------------------|
| DC Input Voltage at $T_c=25^\circ\text{C}$ | V_{DD} | 10 | V |
| Input Power at $T_c=25^\circ\text{C}$ | P_{in} | 10 | dBm |
| DC Input Current at $T_c=25^\circ\text{C}$ | I_{DD} | ≤ 1200 | mA |
| Operating Case Temperature | T_c | -40 to +85 | $^\circ\text{C}$ |

ELECTRICAL CHARACTERISTICS (Case Temperature $T_c=25^\circ\text{C}$)

| Item | Symbol | Test Conditions | Limit | | | Unit |
|----------------------------|-----------------|---|-----------|-------|---------|------------------|
| | | | Min. | Typ. | Max. | |
| Frequency Range | f | | 5.8 - 7.2 | | | GHz |
| Output Power at 1dB G.C.P. | P_{1dB} | $V_{DD}=10\text{V}$ $V_{GG}=-5\text{V}$ $f=5.8 \text{ to } 7.2\text{GHz}$ | 32.0 | 34.0 | - | dBm |
| Power Gain at 1dB G.C.P. | G_{1dB} | | 25.0 | 28.0 | - | dB |
| Gain Flatness | ΔG | | - | 2.4 | 4.0 | dB |
| Input VSWR | $VSWR_i$ | | - | 2 : 1 | 2.6 : 1 | - |
| Output VSWR | $VSWR_o$ | | - | 2 : 1 | - | - |
| DC Input Current | I_{DD} | $V_{DD}=10\text{V}, V_{GG}=-5\text{V}$ | - | 1100 | 1200 | mA |
| DC Input Current | I_{GG} | | - | 5.0 | 15.0 | mA |
| Channel Temperature Rise | ΔT_{ch} | | - | 50 | - | $^\circ\text{C}$ |

CASE STYLE: VF

Note: G_{1dB} is referenced to Linear Gain measured at $P_{in}=-5\text{dBm}$

G.C.P.: Gain Compression Point

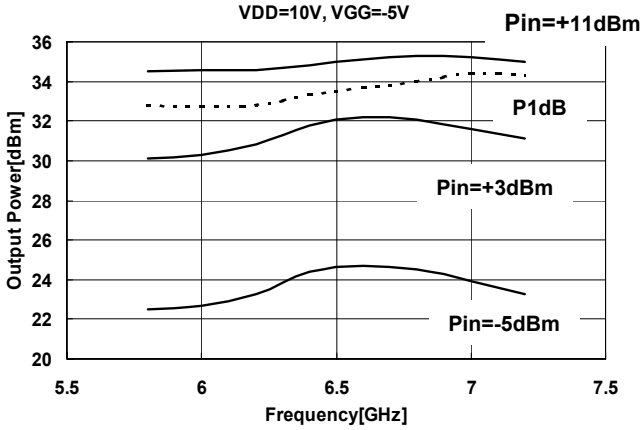
| | | |
|-----|---------|---------|
| ESD | Class 0 | ~ 199 V |
|-----|---------|---------|

Note : Based on EIAJ ED-4701 C-111A(C=100pF, R=1.5k Ω)

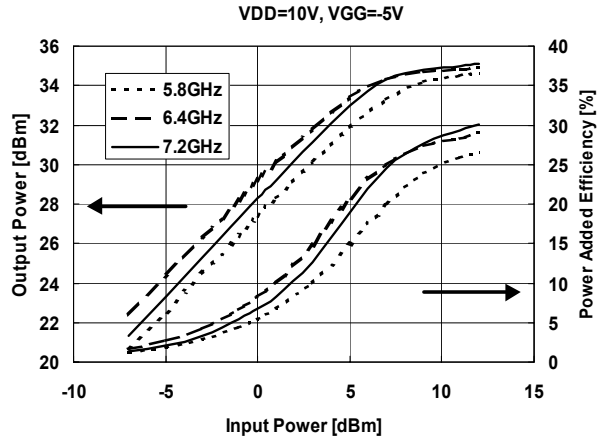
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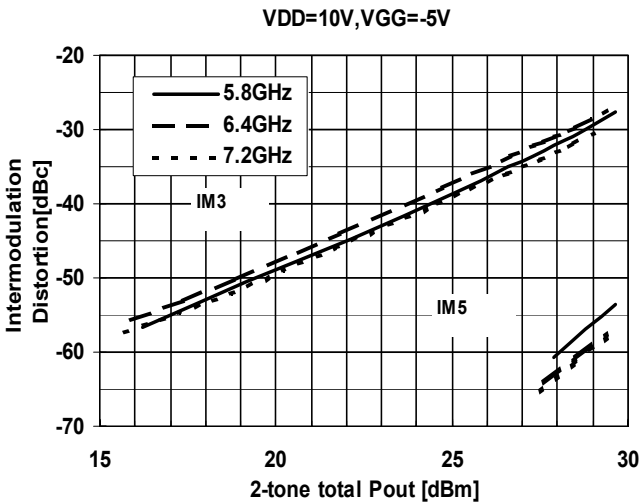
OUTPUT POWER vs. FREQUENCY



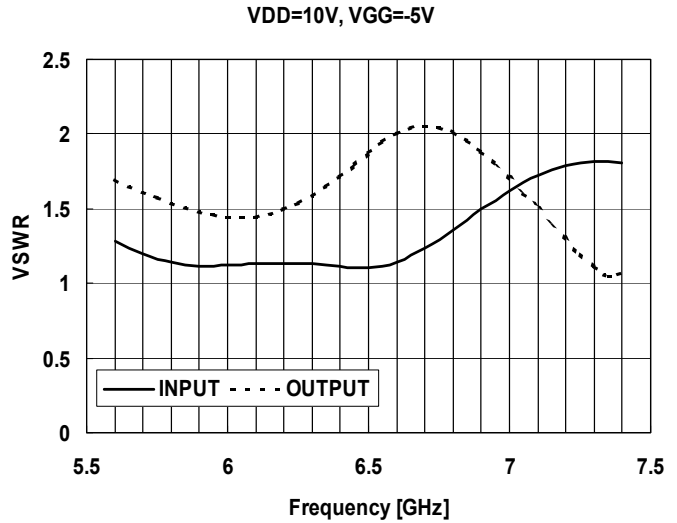
OUTPUT POWER, POWER ADDED EFFICIENCY vs. INPUT POWER



IMD vs. OUTPUT POWER(S.C.L.)



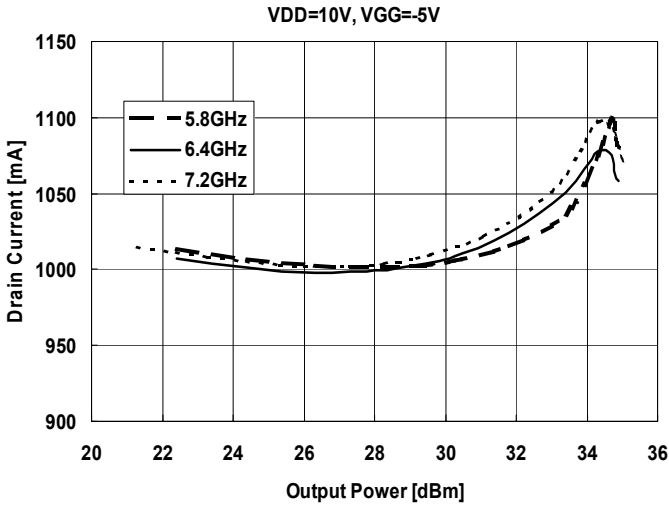
VSWR vs. FREQUENCY



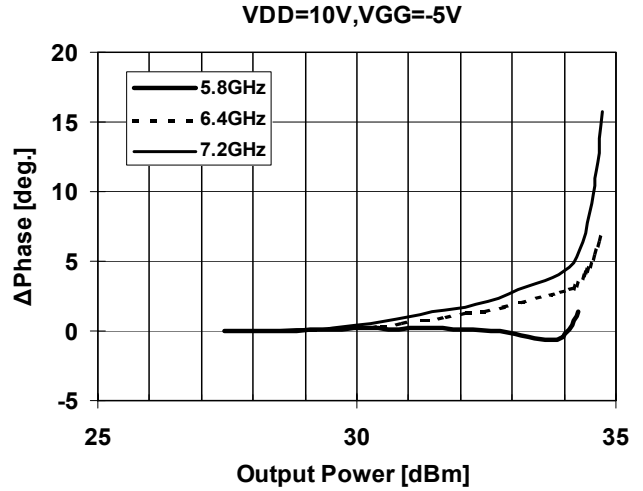
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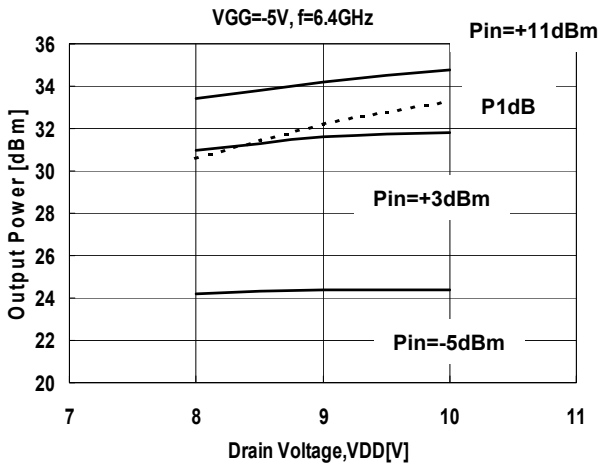
DRAIN CURRENT vs OUTPUT POWER



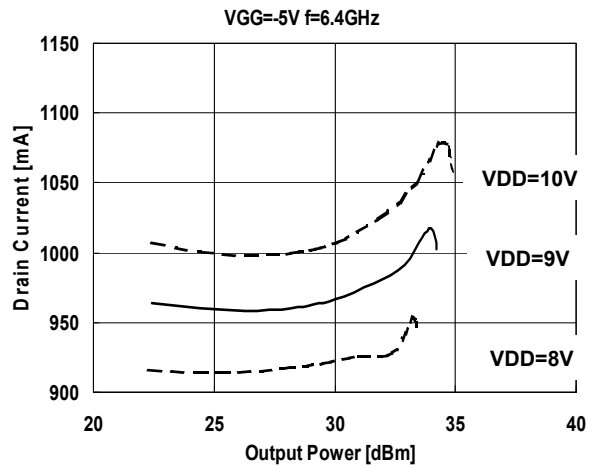
AMPM vs OUTPUT POWER



OUTPUT POWER vs. DRAIN VOLTAGE



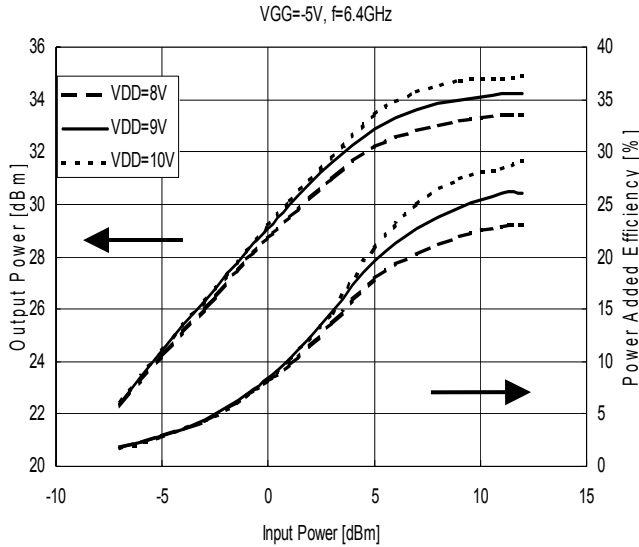
DRAIN CURRENT vs OUTPUT POWER



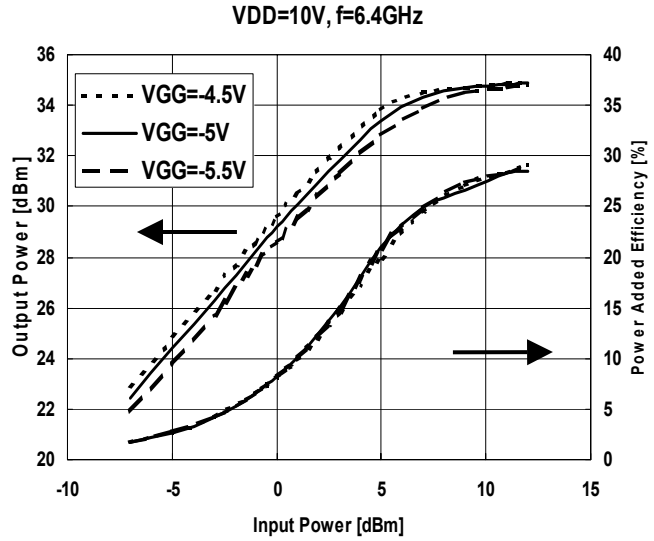
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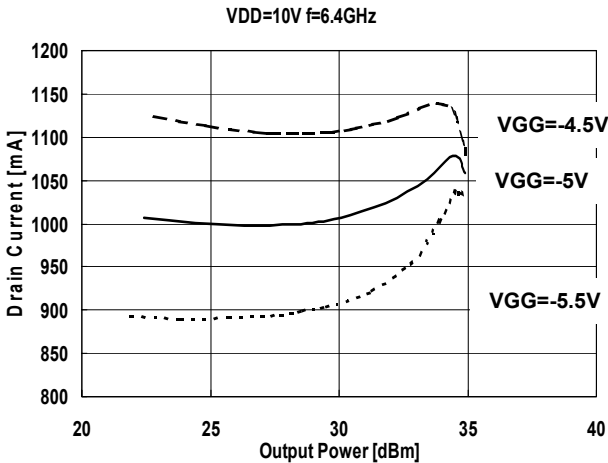
OUTPUT POWER , POWER ADDED EFFICIENCY vs. INPUT POWER



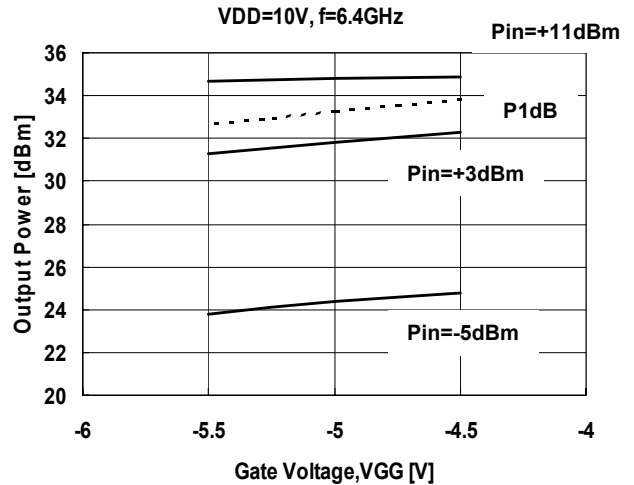
OUTPUT POWER , POWER ADDED EFFICIENCY vs. INPUT POWER



DRAIN CURRENT vs. OUTPUT POWER



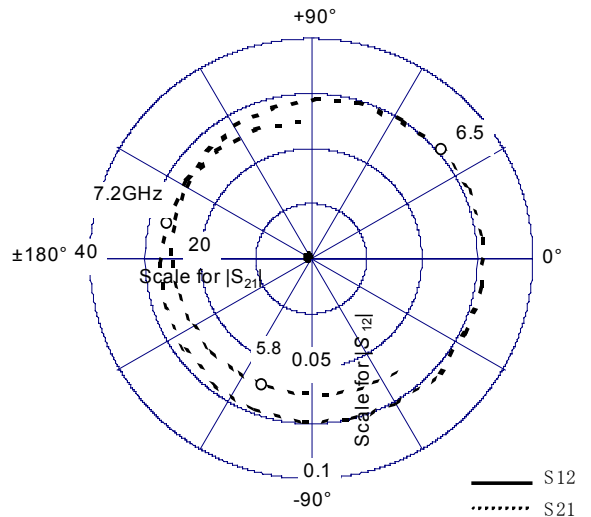
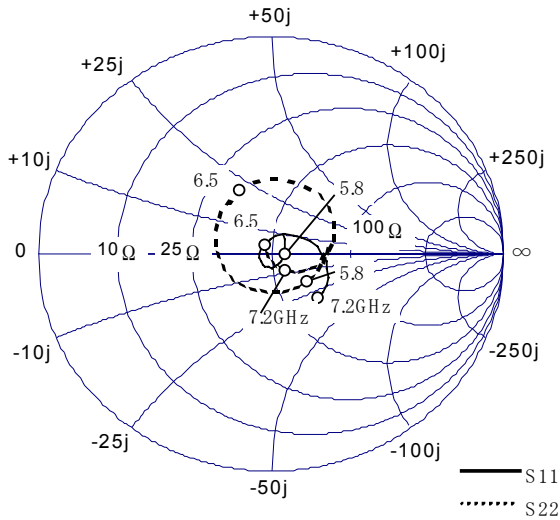
OUTPUT POWER vs. GATE VOLTAGE



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■ S-PARAMETER



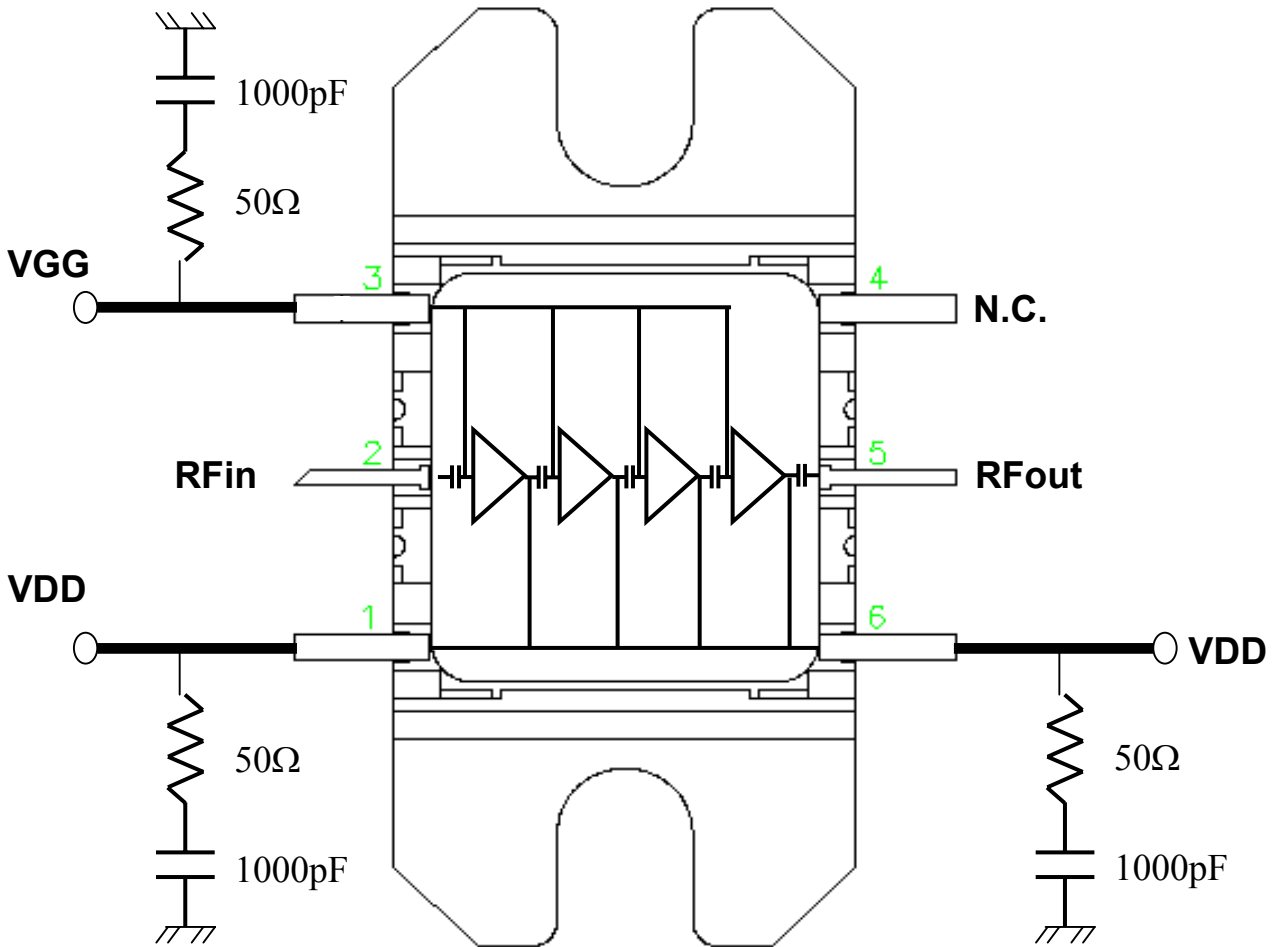
VDD=10.0V, VGG=-5.0V

| Frequency [GHz] | S11 | | S21 | | S12 | | S22 | |
|--------------------|------|---------|-------|---------|--------|---------|------|---------|
| | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 5.6 | 0.11 | 60.30 | 25.75 | -53.50 | 0.0013 | -167.09 | 0.24 | 3.68 |
| 5.7 | 0.08 | 36.46 | 24.87 | -83.02 | 0.0013 | -168.43 | 0.22 | -16.53 |
| 5.8 | 0.06 | 3.99 | 24.46 | -111.49 | 0.0011 | -159.93 | 0.20 | -39.28 |
| 5.9 | 0.05 | -32.63 | 24.49 | -139.66 | 0.0012 | -157.97 | 0.19 | -65.48 |
| 6 | 0.06 | -63.96 | 24.97 | -167.78 | 0.0013 | -154.12 | 0.18 | -95.80 |
| 6.1 | 0.06 | -89.50 | 25.80 | 163.81 | 0.0014 | -154.94 | 0.19 | -127.81 |
| 6.2 | 0.06 | -113.38 | 27.01 | 134.51 | 0.0016 | -156.94 | 0.21 | -159.39 |
| 6.3 | 0.06 | -140.43 | 28.37 | 104.22 | 0.0018 | -161.66 | 0.24 | 170.47 |
| 6.4 | 0.05 | 178.94 | 29.70 | 72.78 | 0.0021 | -170.22 | 0.28 | 141.84 |
| 6.5 | 0.05 | 121.67 | 30.74 | 40.05 | 0.0024 | -178.69 | 0.32 | 114.82 |
| 6.6 | 0.08 | 74.14 | 31.19 | 6.88 | 0.0026 | 169.54 | 0.34 | 88.83 |
| 6.7 | 0.13 | 42.82 | 31.06 | -26.88 | 0.0026 | 157.81 | 0.34 | 63.73 |
| 6.8 | 0.18 | 19.89 | 30.58 | -60.37 | 0.0026 | 144.13 | 0.32 | 40.09 |
| 6.9 | 0.22 | 0.51 | 29.67 | -93.74 | 0.0026 | 132.25 | 0.29 | 17.13 |
| 7 | 0.25 | -16.23 | 28.78 | -127.22 | 0.0024 | 118.43 | 0.23 | -4.92 |
| 7.1 | 0.28 | -31.24 | 27.80 | -160.64 | 0.0020 | 110.25 | 0.17 | -27.22 |
| 7.2 | 0.29 | -45.18 | 26.86 | 165.59 | 0.0017 | 98.22 | 0.09 | -51.99 |
| 7.3 | 0.29 | -58.16 | 25.84 | 130.81 | 0.0014 | 91.48 | 0.02 | -122.39 |

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■ Recommended Bias Circuit and Internal Block Diagram



Note 1: The RC networks are recommended on the bias supply lines, close to the package, to prevent video oscillations which could damage the module.

Note 2: Bias point VDD can be connected at the input side or at the output. The two pins named VDD are internally connected.

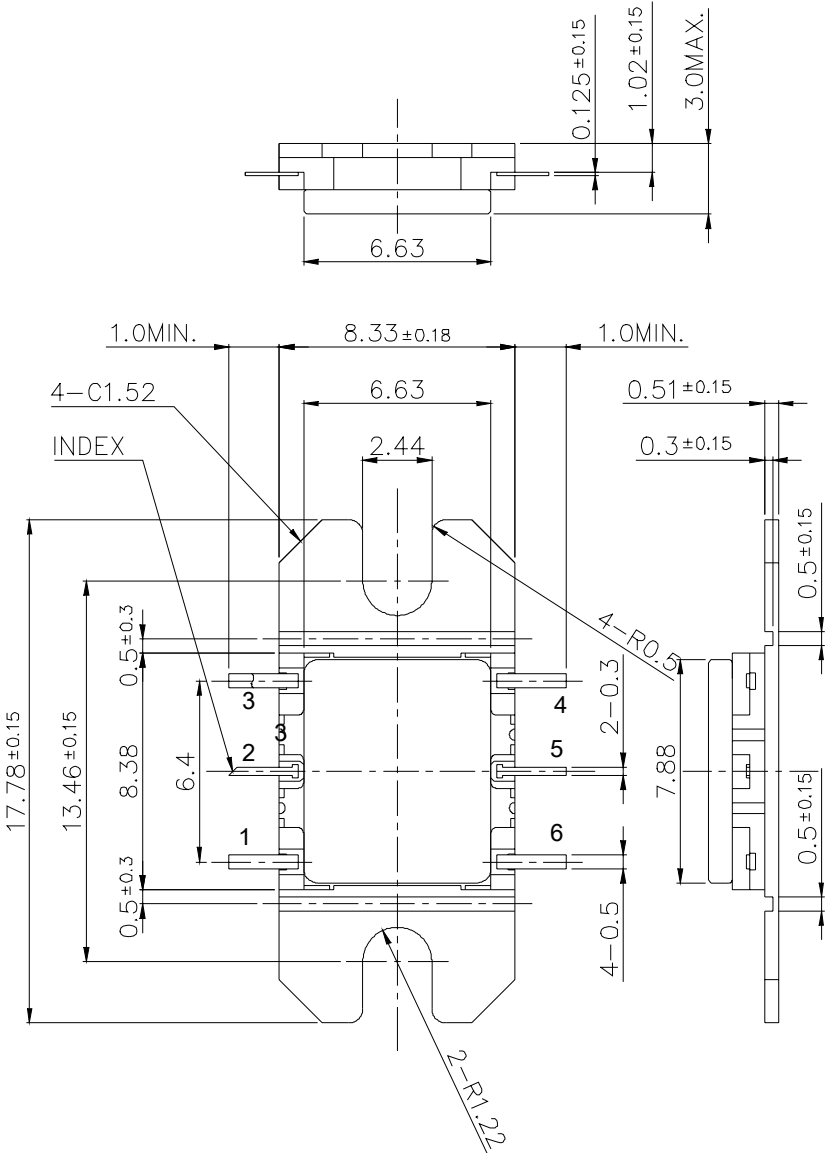
PIN ASSIGNMENT

- 1 : VDD
- 2 : RF in
- 3 : VGG
- 4 : N.C.
- 5 : RF out
- 6 : VDD

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■ Package Out Line



- PIN ASSIGNMENT**
1 : VDD
2 : RF in
3 : VGG
4 : N.C.
5 : RF out
6 : VDD

Unit : mm

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