# MGA-68563

Current-Adjustable, Low Noise Amplifier

AVAGO TECHNOLOGIES

# Data Sheet

## Description

Avago Technologies MGA-68563 is an economical, easy-to-use GaAs MMIC amplifier that offers excellent linearity and low noise figure for applications from 0.1 to 1.5 GHz. Packaged in an miniature SOT-363 package, it requires half the board space of a SOT-143 package.

One external resistor is used to set the bias current from 5mA to 30mA. This allows the designer to use the same part in several circuit positions and tailor the linearity performance (and current consumption) to suit each position.

The output of the amplifier is matched to 50Ω (below 2:1 VSWR) across the entire bandwidth and only requires minimum input matching. The amplifier allows a wide dynamic range by offering a 1.0 dB NF coupled with a +20 dBm Output IP3. The circuit uses state-of-the-art E-pHEMT technology with proven reliability. On-chip bias circuitry allows operation from a single +3V power supply, while internal feedback ensures stability (K>1) over all frequencies for Id at 10mA and above.

## Applications

- LNA for DVB-T,DVB-H, T-DMB, ISDB-T, DAB and Media-FLO

## Features

- Single +3V supply
- High linearity
- Low noise figure
- Miniature package
- Unconditionally stable

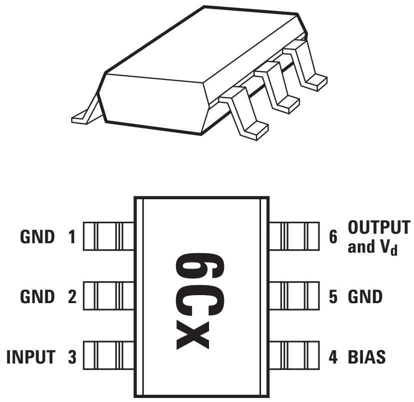
## Specifications at 500 MHz; 3V, 10 mA (Typ.)

- 1.0 dB noise figure
- 20 dBm OIP3
- 19.7 dB gain

* This represents what Avago Technologies has managed to achieve on a device level with trade off between optimal NF, Gain, OIP3 and input return loss.

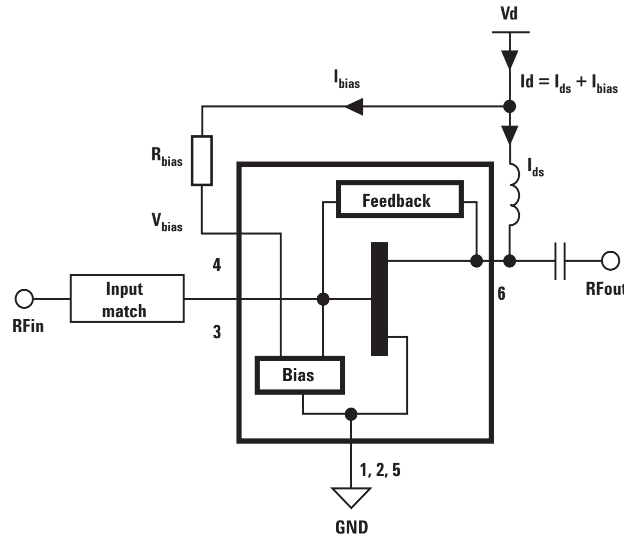
**Attention: Observe precautions for handling electrostatic sensitive devices.**
ESD Machine Model (Class A)
ESD Human Body Model (CLass 1A)
*Refer to Agilent Application Note A004R: Electrostatic Discharge Damage and Control.*

## Pin Connections and Package Marking




Note:
Package marking provides orientation and identification:
"6C" = Device Code
"x" = Date code indicates the month of manufacture.

## Simplified Schematic




### MGA-68563 Absolute Maximum Ratings[1]

| Symbol | Parameter | Units | Absolute Maximum |
|---|---|---|---|
| $V_d$ | Device Voltage (pin 6) [2] | V | 6 |
| $I_d$ | Device Current (pin 6) [2] | mA | 100 |
| $P_{in}$ | CW RF Input (pin3)<br>(Vd=3V, Id=10mA) [3]<br>(Vd=0V, Id=0mA) | <br>dBm<br>dBm | <br>21<br>21 |
| $I_{ref}$ | Bias Reference Current (pin 4) | mA | 1 |
| $P_{diss}$ | Total Power Dissipation [4] | mW | 600 |
| $T_{CH}$ | Channel Temperature | °C | 150 |
| $T_{STG}$ | Storage Temperature | °C | 150 |
| $\theta_{ch\_b}$ | Thermal Resistance [5] | °C/W | 97 |

Notes:
1. Operation of this device above any one of these parameters may cause permanent damage.
2. Bias is assumed at DC quiescent conditions.
3. With the DC (typical bias) and RF applied to the device at board temperature TB = 25°C.
4. Total dissipation power is referred to lead "5" temperature. Tc=92°C, derate Pdiss at 10.3mW/°C for Tc>92°C.
5. Thermal resistance measured using 150°C Liquid Crystal Measurement method.

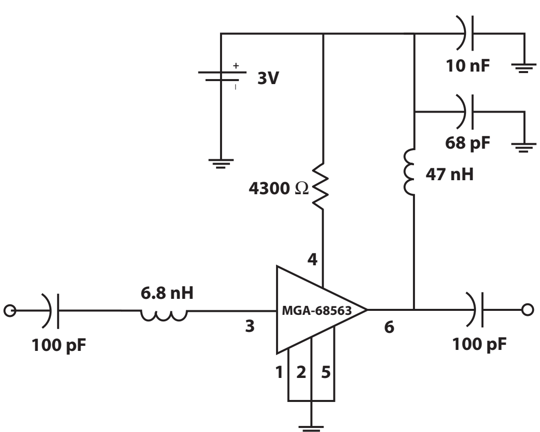



**Figure 1a. Test circuit of the 0.5 GHz production test board used for NF, Gain and OIP3 measurements. This circuit achieves a trade-off between optimal NF, Gain, OIP3 and input return loss. Circuit losses have been de-embedded from actual measurements.**

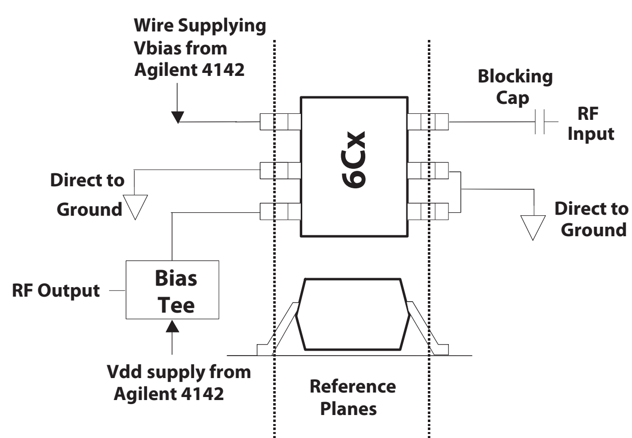



**Figure 1b. A diagram showing the connection to the DUT during an S and Noise parameter measurement using an automated tuner system.**

## MGA-68563 Electrical Specifications

$T_C$ = 25°C, $Z_O$ = 50Ω, $V_d$ = 3V (unless otherwise specified)

| Symbol | Parameters and Test Conditions | Freq | Units | Min. | Typ. | Max. |
|---|---|---|---|---|---|---|
| Id [1,2] | Device Current | | mA | | 11 | 16 |
| $NF_{test}$ [1,2] | Noise Figure in test circuit [1] | f = 0.5 GHz | dB | | 1.0 | 1.4 |
| $G_{test}$ [1,2] | Associated Gain in test circuit [1] | f = 0.5 GHz | dB | 18 | 19.7 | 21.5 |
| $OIP3_{test}$ [1,2] | Output 3rd Order Intercept in test circuit [1] | f = 0.5 GHz | dBm | 18 | 20.7 | |
| $P1dB_{test}$ [1,2] | Output Power at 1dB Gain Compression in test circuit. [1] | | f = 0.5 GHz | | dBm | 17.5 |

Notes:
1. Guaranteed specifications are 100% tested in the production test circuit, the typical value is based on measurement of at least 600 parts from two non-consecutive wafer lots during initial characterization of this product.
2. Circuit achieved a trade-off between optimal NF, Gain, OIP3 and input return loss.

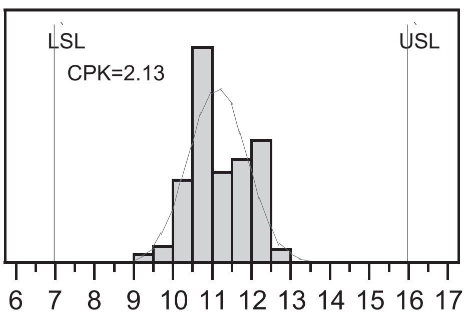



**Figure 2. Id @ 3V.LSL=7, Nominal=11, USL=16**

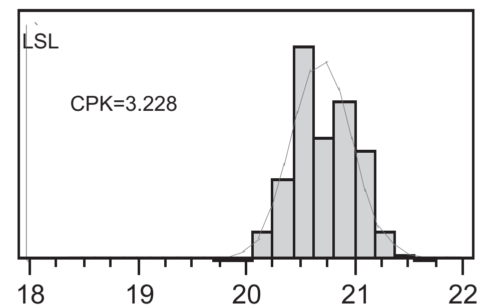



**Figure 3, OIP3 @ 0.5GHz 3V. LSL=18, Nominal=20.7**

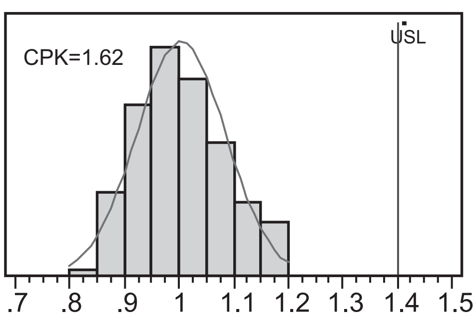



**Figure 4. NF @ 0.5GHz 3V.USL=1.4, Nominal=1.0**

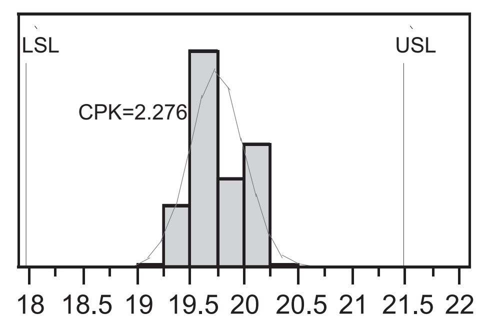



**Figure 5. Gain @ 0.5GHz 3V.USL=18, Nominal=19.7, USL=21.5**

Note:
Measured on the production circuit.
Distribution data sample size is 600 samples taken from 2 non-consecutive wafer lots. Future wafers allocated to this product may have nominal values anywhere between upper and lower limits.

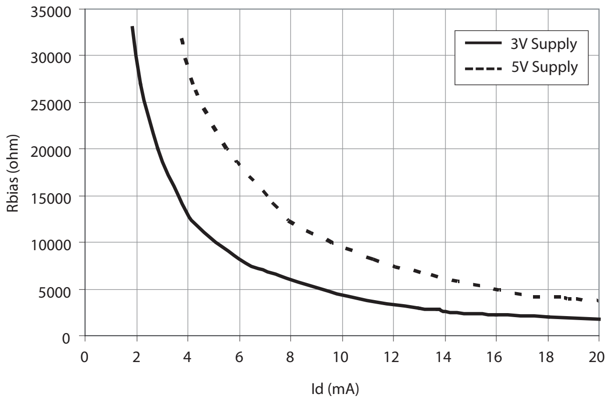



**Figure 6. Rbias vs Id (3V Supply and 5V Supply)**

## MGA-68563 Typical Performance, Vd = 3V, Ids (q) = 5mA at 50ohm Input and Output

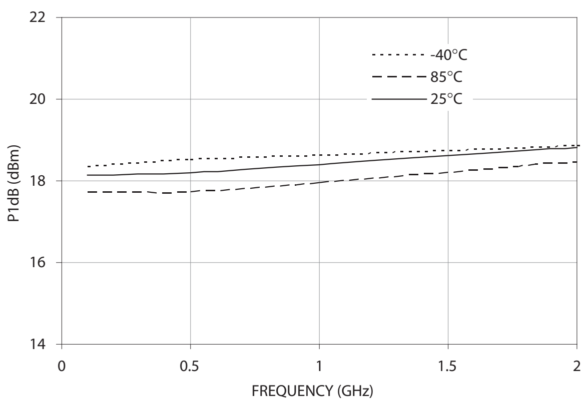



**Figure 7. P1dB vs. Frequency (3V,5mA), Ids=5mA during small signal, i.e. Pin=-20dBm)**

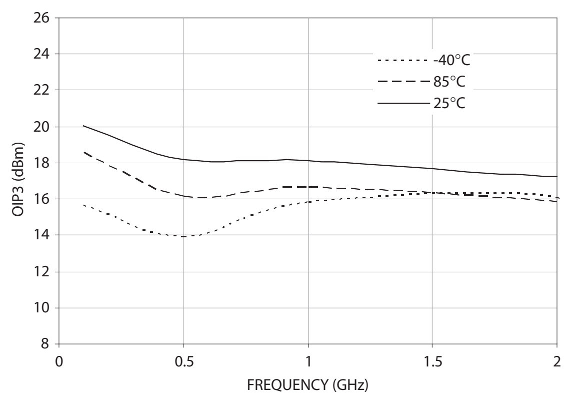



**Figure 8. OIP3 vs. Frequency (3V 5mA)**

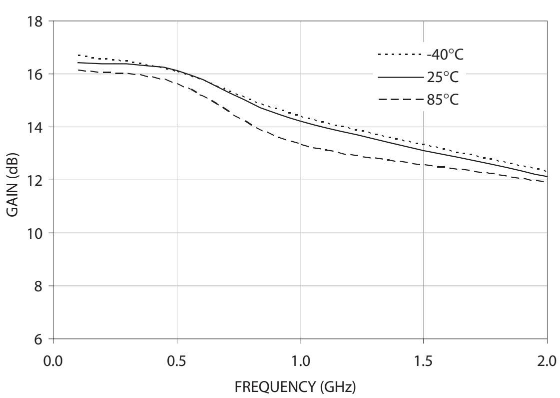



**Figure 9. Gain vs. Frequency (3V 5mA)**

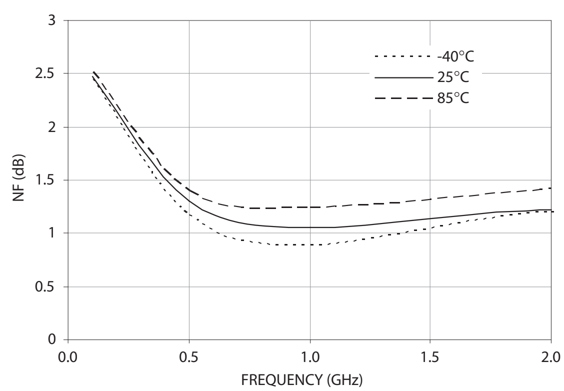



**Figure 10. NF vs. Frequency (3V 5mA)**

Notes:

1. Ids taken @ ambient temperature of 25°C may change with temperature variation.
2. Bias current (Ids) for the above charts are quiescent conditions. Actual level may increase or decrease depending on amount of RF drive.

## MGA-68563 Typical Performance, Vd = 3V, Ids (q) = 10mA at 50ohm Input and Output

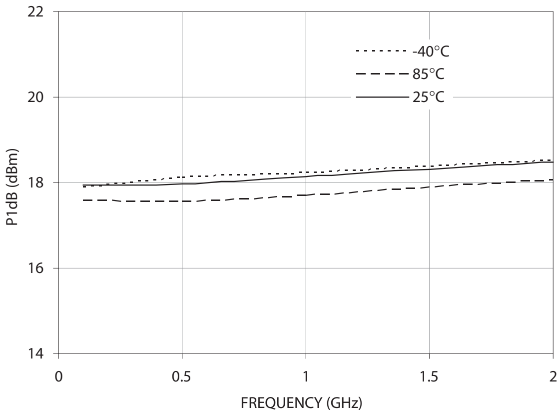



**Figure 11. P1dB vs. Frequency (3V,10mA), Ids=10mA during small signal, i.e. Pin=-20dBm)**

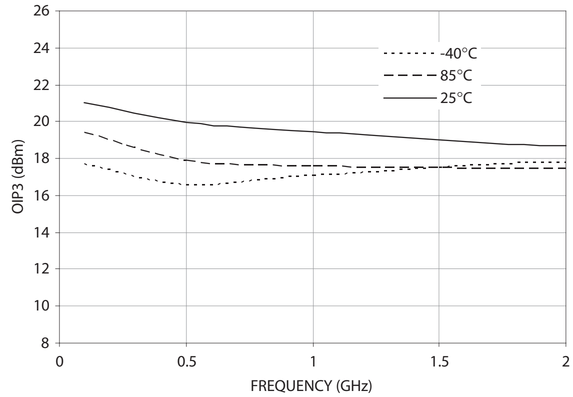



**Figure 12. OIP3 vs. Frequency (3V 10mA)**

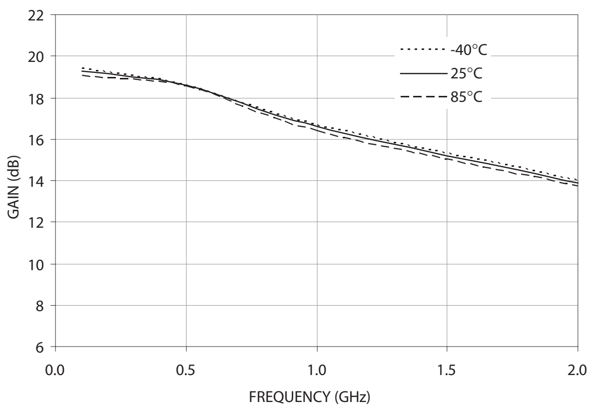



**Figure 13. Gain vs. Frequency (3V 10mA)**

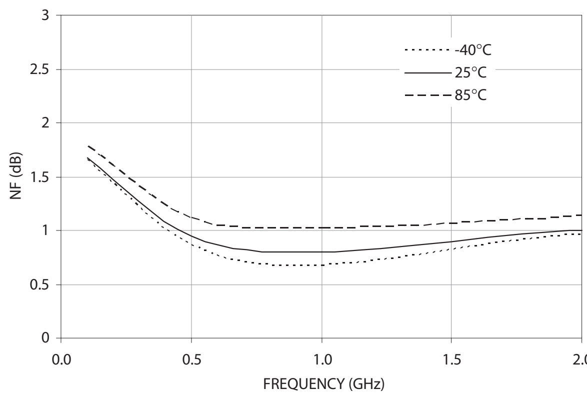



**Figure 14. NF vs. Frequency (3V 10mA)**

Notes:
1. Ids taken @ ambient temperature of 25°C may change with temperature variation.
2. Bias current (Ids) for the above charts are quiescent conditions. Actual level may increase or decrease depending on amount of RF drive.

## MGA-68563 Typical Performance, Vd = 3V, Ids (q) = 15mA at 50ohm Input and Output

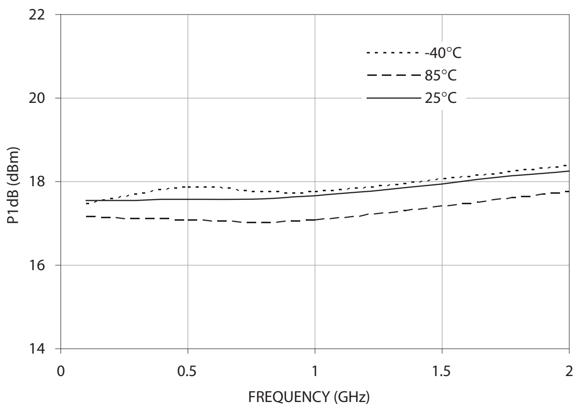



**Figure 15. P1dB vs. Frequency (3V,15mA), Ids=15mA during small signal, i.e. Pin=-20dBm)**

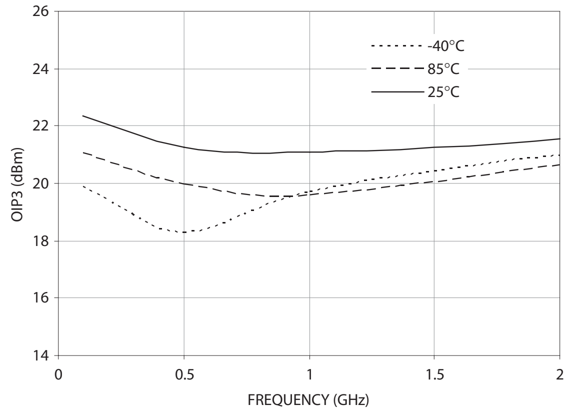



**Figure 16. OIP3 vs. Frequency (3V 15mA)**

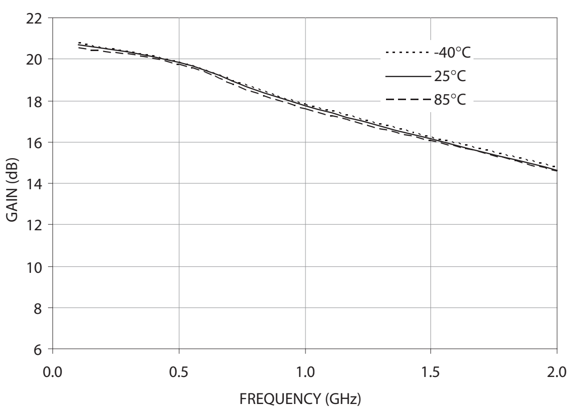



**Figure 17. Gain vs. Frequency (3V 15mA)**

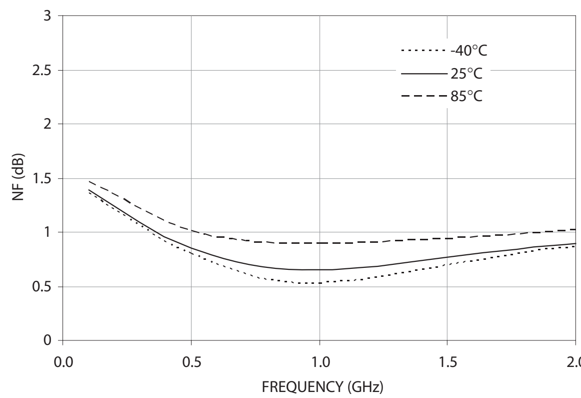



**Figure 18. NF vs. Frequency (3V 15mA)**

Notes:

1. Ids taken @ ambient temperature of 25°C may change with temperature variation.
2. Bias current (Ids) for the above charts are quiescent conditions. Actual level may increase or decrease depending on amount of RF drive.

## MGA-68563 Typical Performance, Vd = 5V, Ids (q) = 5mA at 50ohm Input and Output

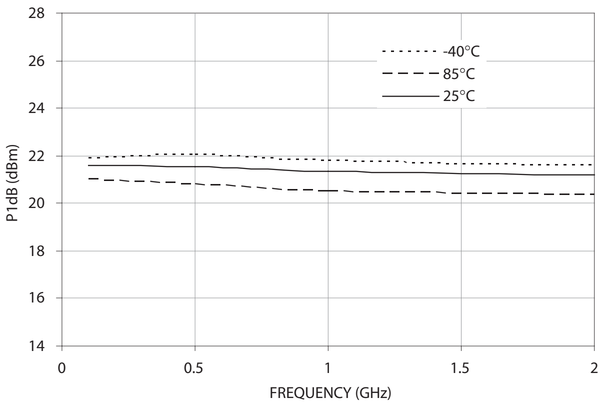



**Figure 19. P1dB vs. Frequency (5V,5mA), Ids=5mA during small signal, i.e. Pin=-20dBm)**

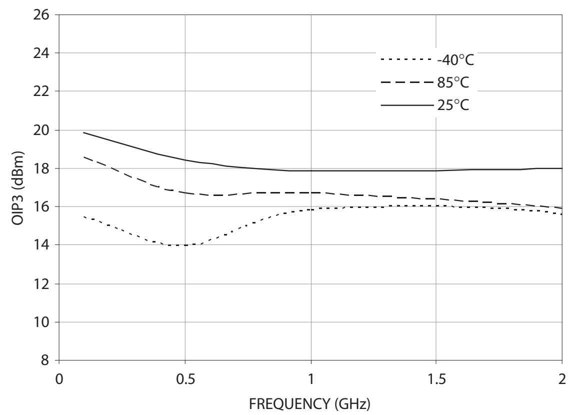



**Figure 20. OIP3 vs. Frequency (5V 5mA)**

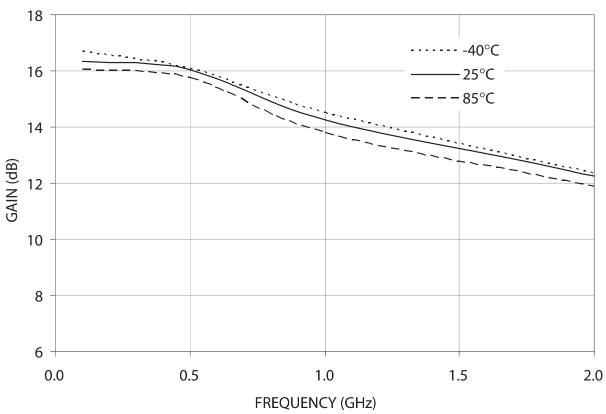



**Figure 21. Gain vs. Frequency (5V 5mA)**

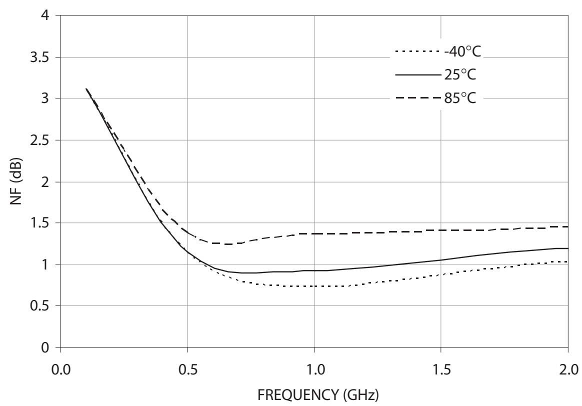



**Figure 22. NF vs. Frequency (5V 5mA)**

Notes:
1. Ids taken @ ambient temperature of 25°C may change with temperature variation.
2. Bias current (Ids) for the above charts are quiescent conditions. Actual level may increase or decrease depending on amount of RF drive.

## MGA-68563 Typical Performance, Vd = 5V, Ids (q) = 10mA at 50ohm Input and Output

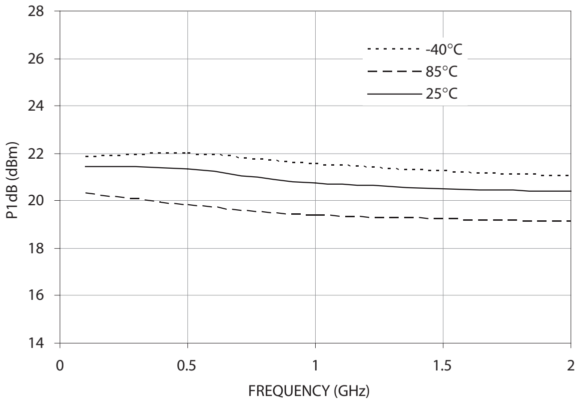



**Figure 23. P1dB vs. Frequency (5V,10mA), Ids=10mA during small signal, i.e. Pin=-20dBm)**

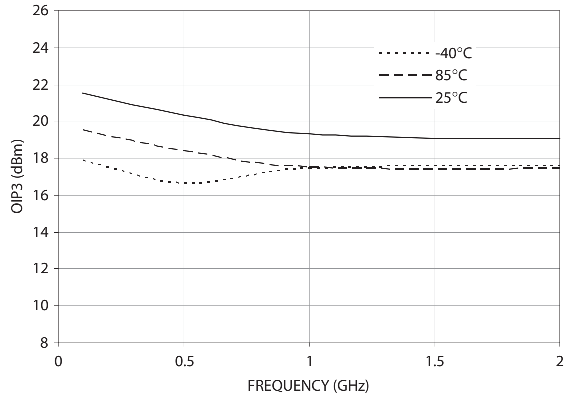



**Figure 24. OIP3 vs. Frequency (5V 10mA)**

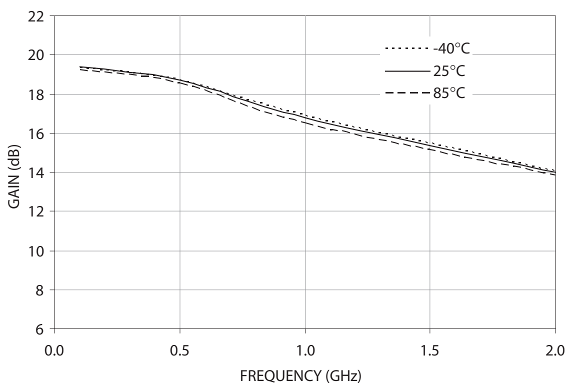



**Figure 25. Gain vs. Frequency (5V 10mA)**

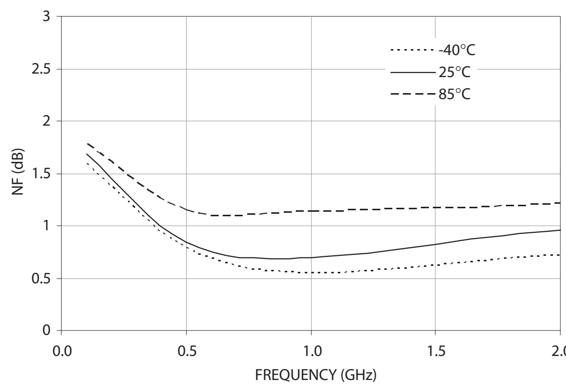



**Figure 26. NF vs. Frequency (5V 10mA)**

Notes:

1. Ids taken @ ambient temperature of 25°C may change with temperature variation.
2. Bias current (Ids) for the above charts are quiescent conditions. Actual level may increase or decrease depending on amount of RF drive.

## MGA-68563 Typical Performance, Vd = 5V, Ids (q) = 15mA at 50ohm Input and Output

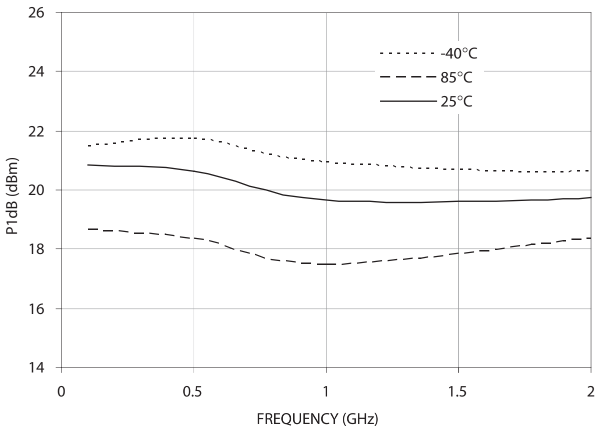



**Figure 27. P1dB vs. Frequency (5V,15mA), Ids=15mA during small signal, i.e. Pin=-20dBm)**

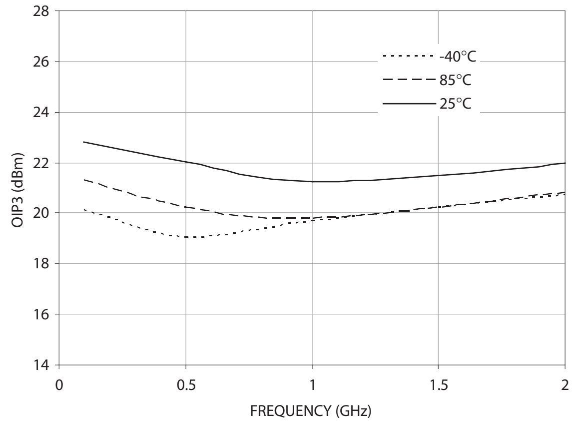



**Figure 28. OIP3 vs. Frequency (5V 15mA)**

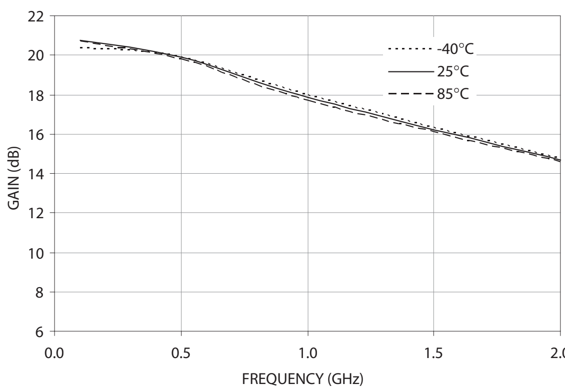



**Figure 29. Gain vs. Frequency (5V 15mA)**

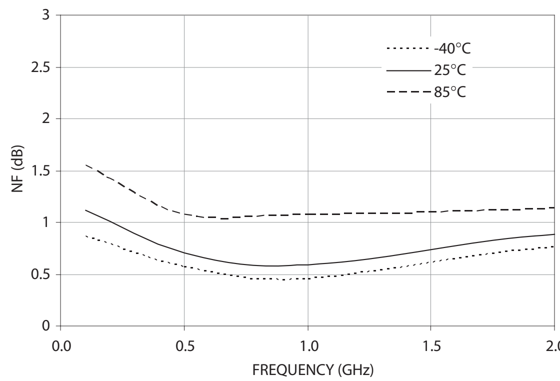



**Figure 30. NF vs. Frequency (5V 15mA)**

Notes:

1. Ids taken @ ambient temperature of 25°C may change with temperature variation.
2. Bias current (Ids) for the above charts are quiescent conditions. Actual level may increase or decrease depending on amount of RF drive.

## MGA-68563 Typical Performance, Freq = 0.5GHz, Tc = 25°C at 50ohm Input and Output

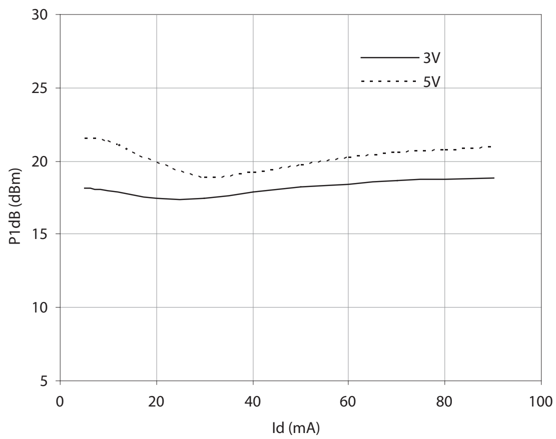



**Figure 31. P1dB vs. Id (500MHz), Id at small signal, i.e. Pin=-20dBm)**

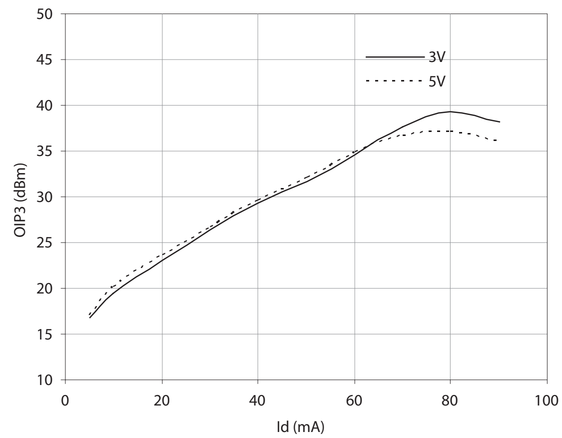



**Figure 32. OIP3 vs. Id (500 MHz)**

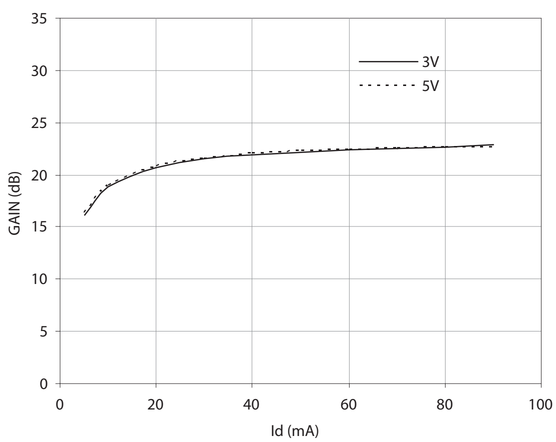



**Figure 33. Gain vs. Id (500 MHz)**

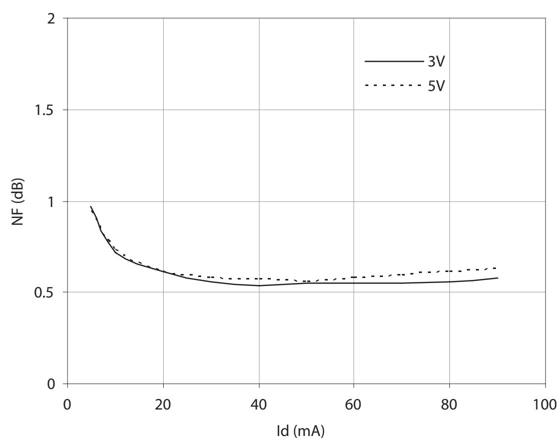



**Figure 34. NF vs. Id (500 MHz)**

Notes:

1. Bias current (Ids) for the above charts are quiescent conditions. Actual level may increase or decrease depending on amount of RF drive.

## MGA-68563 Typical Performance, Freq = 0.1GHz, Tc = 25°C at 50ohm Input and Output

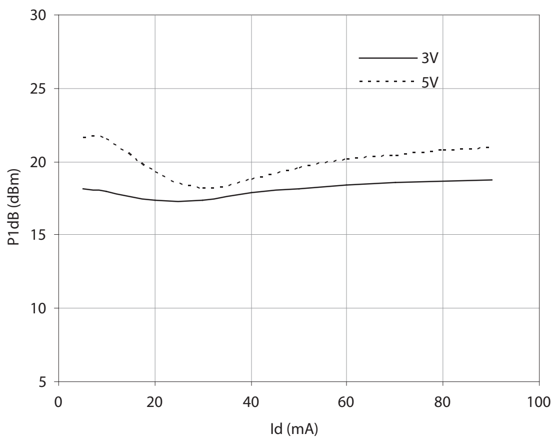



**Figure 35. P1dB vs. Id (100MHz), Id at small signal, i.e. Pin=-20dBm)**

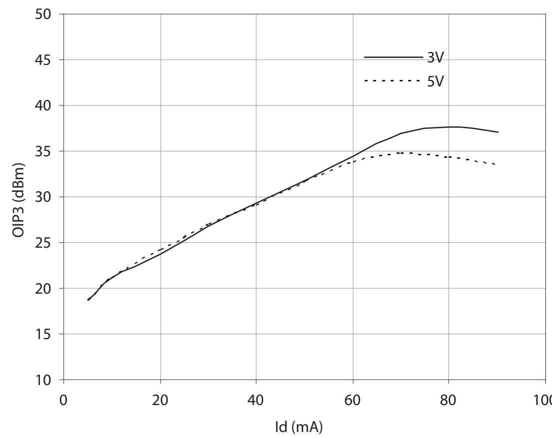



**Figure 36. OIP3 vs. Id (100 MHz)**

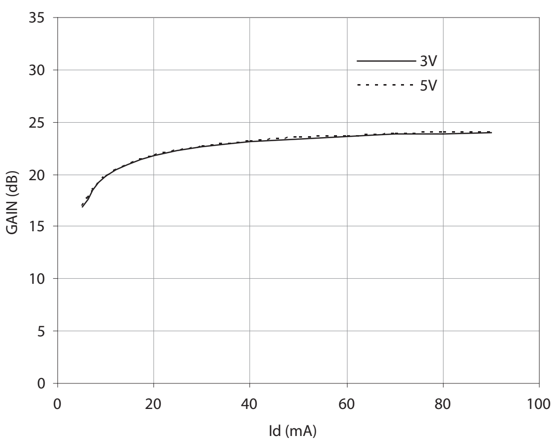



**Figure 37. Gain vs. Id (500 MHz)**

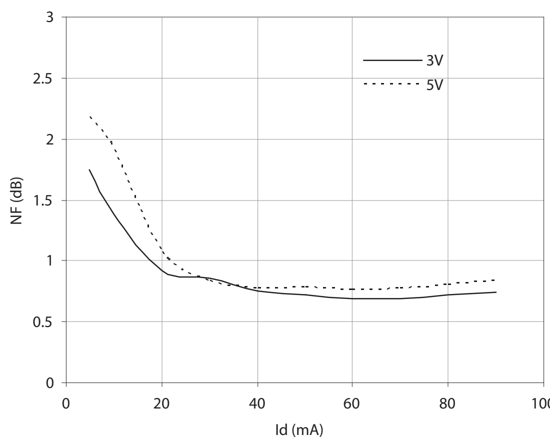



**Figure 38. NF vs. Id (500 MHz)**

Notes:

1. Bias current (Ids) for the above charts are quiescent conditions. Actual level may increase or decrease depending on amount of RF drive.

## MGA-68563 Typical Performance, Freq = 0.5GHz, Ids(q) = 10mA, Tc=25°C at 50ohm Input and Output

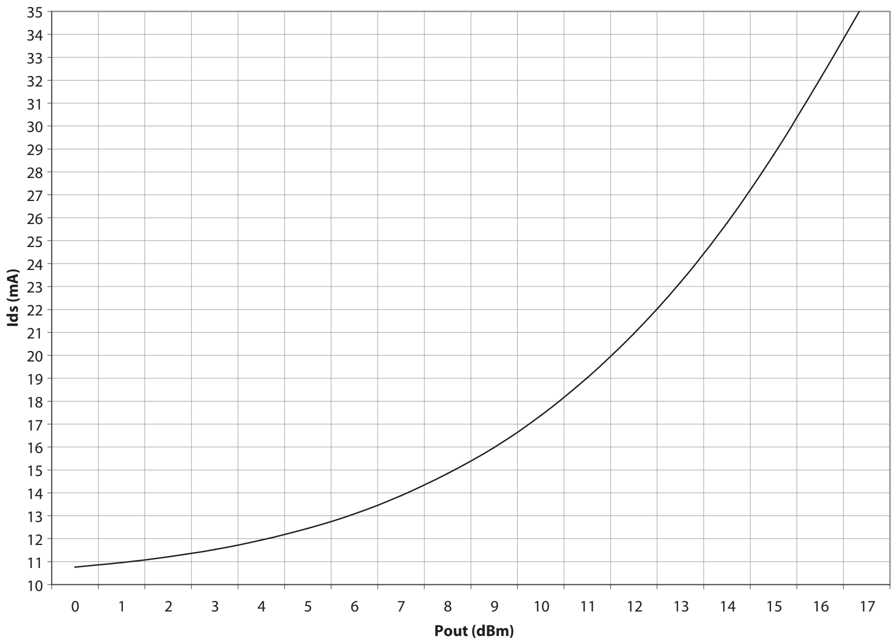



**Figure 39. Ids vs. Pout (Vd = 3V)**

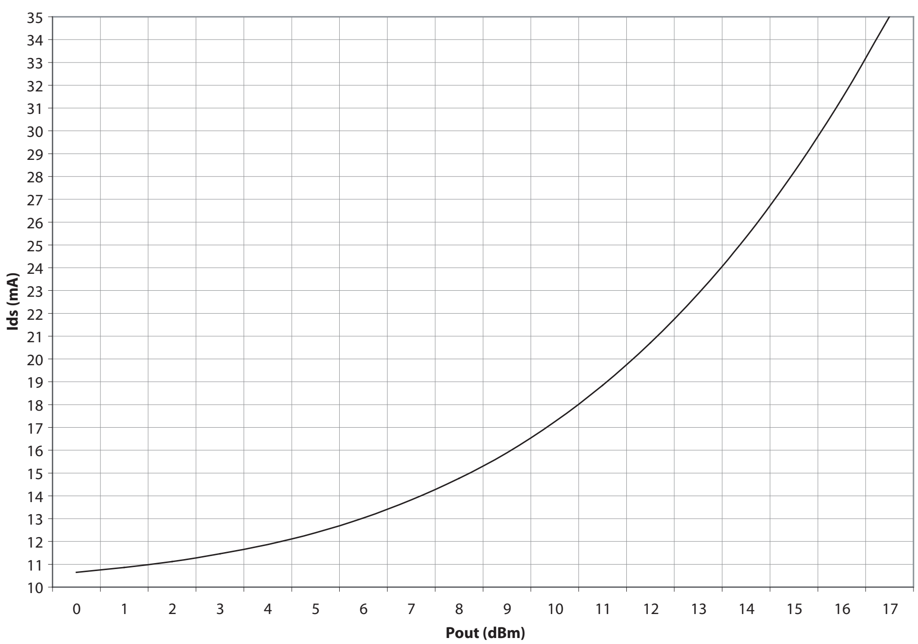



**Figure 40. Ids vs. Pout (Vd = 5V)**

Notes:
1. Bias current (Ids = 10mA) for the above charts are quiescent conditions.

## MGA-68563 Typical Scattering Parameters, Tc = 25°C, Zo = 50ohm, Vd = 3V, Ids = 10mA

| Freq. | S11 | | S21 | | | S12 | | S22 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| GHz | Mag. | Ang. | dB | Mag. | Ang. | Mag. | Ang. | Mag. | Ang. | K-factor |
| 0.3 | 0.42 | -37.10 | 19.26 | 9.18 | 158.40 | 0.07 | 5.40 | 0.27 | -32.20 | 1.01 |
| 0.5 | 0.36 | -57.20 | 18.81 | 8.72 | 145.00 | 0.07 | 3.80 | 0.19 | -47.50 | 1.04 |
| 0.7 | 0.38 | -76.30 | 18.16 | 8.09 | 133.90 | 0.07 | 3.90 | 0.19 | -63.10 | 1.02 |
| 0.9 | 0.40 | -92.50 | 17.43 | 7.44 | 123.90 | 0.07 | 4.10 | 0.18 | -75.80 | 1.03 |
| 1.0 | 0.41 | -99.70 | 17.07 | 7.14 | 119.30 | 0.07 | 4.10 | 0.17 | -81.80 | 1.03 |
| 1.1 | 0.42 | -106.70 | 16.70 | 6.84 | 115.00 | 0.07 | 4.20 | 0.17 | -86.30 | 1.04 |
| 1.3 | 0.44 | -119.50 | 16.00 | 6.31 | 106.80 | 0.07 | 4.40 | 0.16 | -95.10 | 1.04 |
| 1.5 | 0.45 | -132.30 | 15.36 | 5.86 | 99.40 | 0.07 | 4.50 | 0.17 | -98.30 | 1.06 |
| 1.7 | 0.47 | -141.10 | 14.71 | 5.44 | 92.30 | 0.07 | 4.60 | 0.16 | -107.70 | 1.08 |
| 1.9 | 0.48 | -150.50 | 14.09 | 5.06 | 85.60 | 0.08 | 4.60 | 0.15 | -115.30 | 1.11 |
| 2.0 | 0.49 | -154.60 | 13.81 | 4.90 | 82.50 | 0.08 | 4.60 | 0.15 | -116.20 | 1.11 |
| 2.5 | 0.51 | -176.40 | 12.46 | 4.20 | 67.00 | 0.08 | 3.10 | 0.14 | -131.90 | 1.16 |
| 3.0 | 0.50 | 160.80 | 11.13 | 3.60 | 53.80 | 0.09 | 2.00 | 0.15 | -153.10 | 1.28 |
| 3.5 | 0.50 | 142.70 | 10.13 | 3.21 | 41.80 | 0.09 | 0.30 | 0.15 | -176.10 | 1.35 |
| 4.0 | 0.51 | 126.90 | 9.74 | 3.07 | 25.20 | 0.11 | -8.60 | 0.08 | 162.40 | 1.29 |

## Typical Noise Parameters at 25°C,

Tc = 25°C, Zo = 50ohm, Vd = 3V, Ids = 10mA

| Freq. | Fmin | opt | | | NF@50 |
|---|---|---|---|---|---|
| GHz | dB | Mag. | Ang. | Rn/50 | dB |
| 0.5 | 0.83 | 0.12 | 108.80 | 0.11 | 0.85 |
| 1.0 | 0.74 | 0.05 | 109.80 | 0.08 | 0.74 |
| 1.5 | 0.76 | 0.16 | 151.40 | 0.07 | 0.80 |
| 2.0 | 0.88 | 0.21 | 147.90 | 0.07 | 0.94 |
| 2.5 | 1.05 | 0.24 | 161.50 | 0.06 | 1.12 |
| 3.0 | 1.24 | 0.26 | -173.10 | 0.09 | 1.31 |

## MGA-68563 Typical Scattering Parameters, Tc = 25°C, Zo = 50ohm, Vd = 3V, Ids = 5mA

| Freq. | S11 | | S21 | | | S12 | | S22 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| GHz | Mag. | Ang. | dB | Mag. | Ang. | Mag. | Ang. | Mag. | Ang. | K-factor |
| 0.3 | 0.54 | -28.80 | 16.61 | 6.77 | 160.50 | 0.07 | 6.50 | 0.43 | -24.60 | 1.01 |
| 0.5 | 0.47 | -44.40 | 16.31 | 6.54 | 147.20 | 0.08 | 4.20 | 0.35 | -36.80 | 1.02 |
| 0.7 | 0.48 | -60.80 | 15.77 | 6.15 | 136.80 | 0.08 | 4.00 | 0.33 | -49.10 | 1.00 |
| 0.9 | 0.48 | -75.60 | 15.15 | 5.72 | 127.10 | 0.08 | 3.60 | 0.31 | -59.50 | 0.98 |
| 1.0 | 0.48 | -82.30 | 14.85 | 5.53 | 122.60 | 0.08 | 3.10 | 0.30 | -64.30 | 0.98 |
| 1.1 | 0.49 | -89.20 | 14.53 | 5.33 | 118.40 | 0.08 | 2.80 | 0.29 | -68.50 | 0.98 |
| 1.3 | 0.50 | -102.00 | 13.93 | 4.97 | 110.30 | 0.09 | 2.00 | 0.28 | -76.00 | 0.98 |
| 1.5 | 0.50 | -114.50 | 13.37 | 4.66 | 102.90 | 0.09 | 1.10 | 0.28 | -81.10 | 0.98 |
| 1.7 | 0.52 | -124.30 | 12.82 | 4.38 | 95.80 | 0.09 | 0.10 | 0.25 | -88.20 | 0.98 |
| 1.9 | 0.52 | -134.20 | 12.27 | 4.11 | 88.90 | 0.09 | -1.10 | 0.24 | -94.80 | 1.01 |
| 2.0 | 0.53 | -138.60 | 12.03 | 3.99 | 85.70 | 0.09 | -1.50 | 0.23 | -96.00 | 1.02 |
| 2.5 | 0.55 | -162.10 | 10.86 | 3.49 | 69.70 | 0.10 | -5.30 | 0.21 | -110.40 | 1.07 |
| 3.0 | 0.53 | 173.50 | 9.61 | 3.02 | 55.60 | 0.10 | -8.00 | 0.20 | -127.80 | 1.23 |
| 3.5 | 0.51 | 153.90 | 8.67 | 2.71 | 42.90 | 0.10 | -10.40 | 0.18 | -146.80 | 1.35 |
| 4.0 | 0.53 | 137.40 | 8.38 | 2.62 | 26.70 | 0.11 | -18.20 | 0.12 | -153.40 | 1.32 |

## Typical Noise Parameters at 25°C,

Tc = 25°C, Zo = 50ohm, Vd = 3V, Ids = 5mA

| Freq. | Fmin | Γopt | | | NF@50Ω |
|---|---|---|---|---|---|
| GHz | dB | Mag. | Ang. | Rn/50 | dB |
| 0.5 | 1.21 | 0.15 | 97.70 | 0.14 | 1.25 |
| 1.0 | 1.01 | 0.12 | 62.80 | 0.11 | 1.03 |
| 1.5 | 1.04 | 0.18 | 114.20 | 0.11 | 1.10 |
| 2.0 | 1.07 | 0.24 | 123.90 | 0.09 | 1.17 |
| 2.5 | 1.20 | 0.28 | 141.00 | 0.08 | 1.33 |
| 3.0 | 1.41 | 0.29 | 162.20 | 0.10 | 1.50 |

## MGA-68563 Typical Scattering Parameters, Tc = 25°C, Zo = 50ohm, Vd = 3V, Ids = 15mA

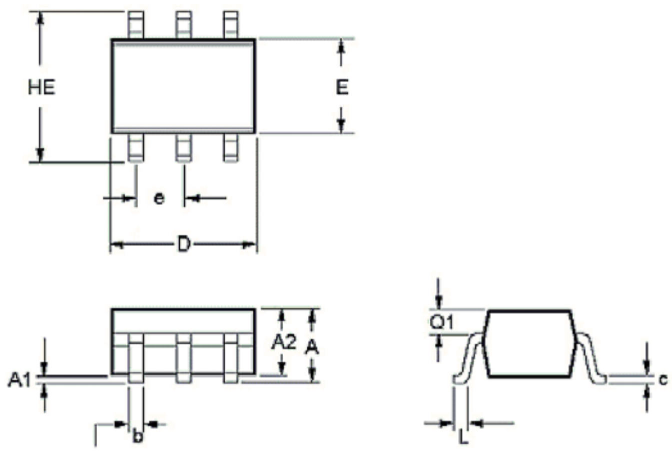
| Freq. | S11 | | S21 | | | S12 | | S22 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| GHz | Mag. | Ang. | dB | Mag. | Ang. | Mag. | Ang. | Mag. | Ang. | K-factor |
| 0.3 | 0.35 | -43.60 | 20.54 | 10.64 | 157.30 | 0.06 | 5.00 | 0.18 | -41.30 | 1.01 |
| 0.5 | 0.30 | -67.40 | 19.99 | 9.99 | 143.70 | 0.06 | 3.90 | 0.11 | -64.30 | 1.04 |
| 0.7 | 0.33 | -87.40 | 19.27 | 9.20 | 132.40 | 0.06 | 4.40 | 0.12 | -82.80 | 1.05 |
| 0.9 | 0.36 | -103.80 | 18.49 | 8.41 | 122.20 | 0.06 | 5.30 | 0.12 | -96.80 | 1.06 |
| 1.0 | 0.37 | -110.90 | 18.10 | 8.03 | 117.60 | 0.06 | 5.60 | 0.12 | -103.50 | 1.07 |
| 1.1 | 0.39 | -117.60 | 17.70 | 7.68 | 113.20 | 0.06 | 6.10 | 0.12 | -107.50 | 1.07 |
| 1.3 | 0.41 | -129.90 | 16.95 | 7.04 | 105.00 | 0.06 | 7.10 | 0.12 | -116.50 | 1.10 |
| 1.5 | 0.43 | -142.10 | 16.26 | 6.50 | 97.60 | 0.06 | 7.90 | 0.12 | -116.30 | 1.12 |
| 1.7 | 0.46 | -150.20 | 15.57 | 6.00 | 90.70 | 0.07 | 8.60 | 0.12 | -127.30 | 1.13 |
| 1.9 | 0.46 | -159.10 | 14.91 | 5.56 | 84.00 | 0.07 | 9.10 | 0.12 | -134.70 | 1.17 |
| 2.0 | 0.47 | -162.90 | 14.61 | 5.38 | 81.00 | 0.07 | 9.30 | 0.11 | -135.30 | 1.16 |
| 2.5 | 0.50 | 176.50 | 13.19 | 4.56 | 65.80 | 0.08 | 8.70 | 0.12 | -149.80 | 1.20 |
| 3.0 | 0.50 | 154.70 | 11.82 | 3.90 | 53.00 | 0.08 | 7.90 | 0.14 | -170.30 | 1.30 |
| 3.5 | 0.50 | 137.50 | 10.80 | 3.47 | 41.40 | 0.09 | 5.90 | 0.15 | 167.50 | 1.33 |
| 4.0 | 0.50 | 122.10 | 10.35 | 3.29 | 24.70 | 0.11 | -3.90 | 0.09 | 137.50 | 1.27 |

## Typical Noise Parameters at 25°C,

Tc = 25°C, Zo = 50ohm, Vd = 3V, Ids = 15mA

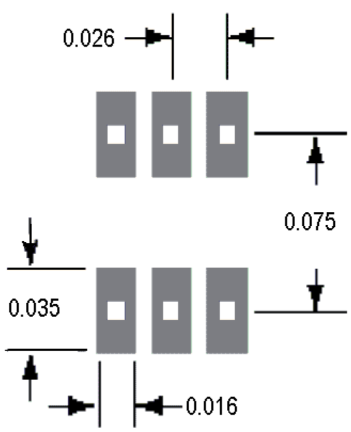
| Freq. | Fmin | opt | | | NF@50 |
|---|---|---|---|---|---|
| GHz | dB | Mag. | Ang. | Rn/50 | dB |
| 0.5 | 0.65 | 0.10 | 119.90 | 0.09 | 0.66 |
| 1.0 | 0.55 | 0.06 | 158.20 | 0.07 | 0.56 |
| 1.5 | 0.59 | 0.13 | 163.00 | 0.07 | 0.62 |
| 2.0 | 0.81 | 0.21 | 160.60 | 0.06 | 0.86 |
| 2.5 | 0.99 | 0.22 | 172.00 | 0.06 | 1.05 |
| 3.0 | 1.17 | 0.25 | -163.70 | 0.09 | 1.22 |

## SOT-363/SC-70 (JEDEC DFP-N) Package Dimensions



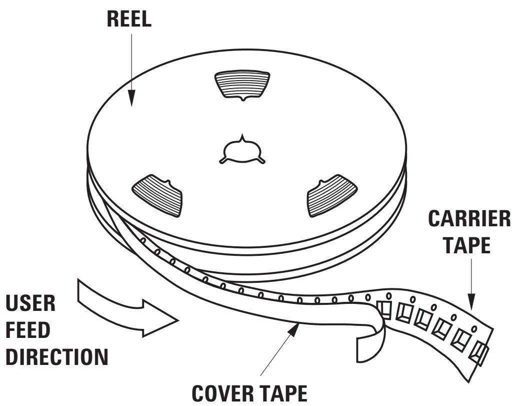

| Symbol | Dimensions | |
|---|---|---|
| | Min (mm) | Max (mm) |
| E | 1.15 | 1.35 |
| D | 1.80 | 2.25 |
| HE | 1.80 | 2.40 |
| A | 0.80 | 1.10 |
| A2 | 0.80 | 1.00 |
| A1 | 0.00 | 0.10 |
| e | 0.650 BCS | 0.650 BCS |
| b | 0.15 | 0.30 |
| c | 0.08 | 0.25 |
| L | 0.26 | 0.46 |

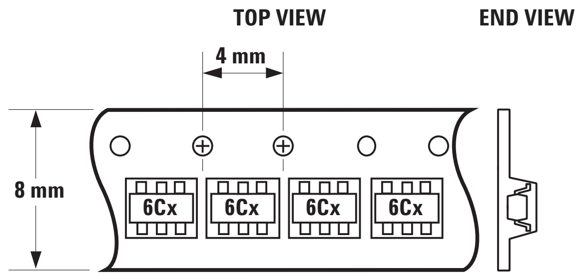
## Recommended PCB Pad Layout for Avago Technologies SC70 6L/SOT-363 Products




(dimensions in inches)

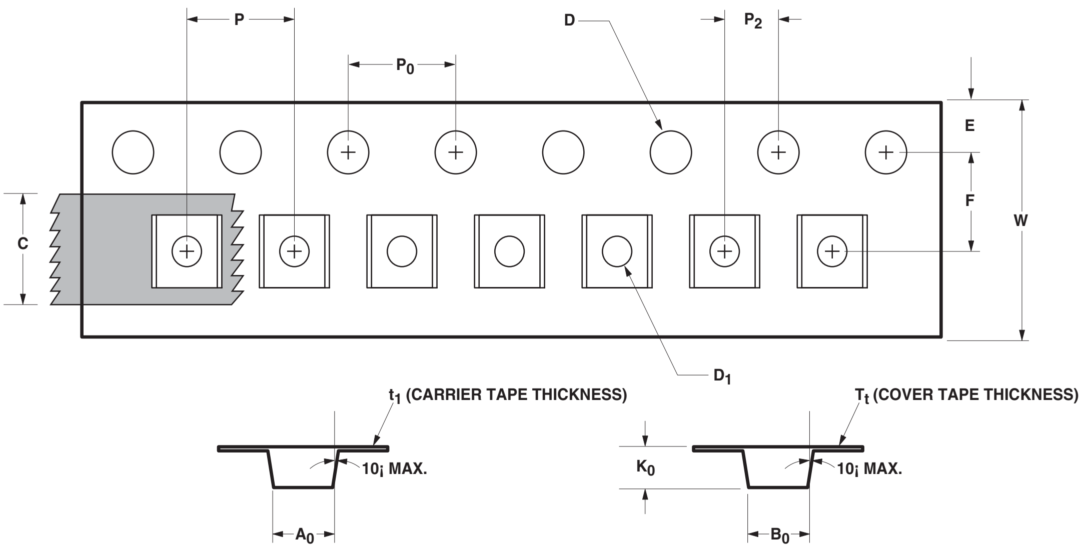
## Device Orientation




(Package marking example orientation shown.)

## Tape Dimensions




| DESCRIPTION | | SYMBOL | SIZE (mm) | SIZE (INCHES) |
|---|---|---|---|---|
| CAVITY | LENGTH | $A_0$ | 2.40 ± 0.10 | 0.094 ± 0.004 |
| | WIDTH | $B_0$ | 2.40 ± 0.10 | 0.094 ± 0.004 |
| | DEPTH | $K_0$ | 1.20 ± 0.10 | 0.047 ± 0.004 |
| | PITCH | P | 4.00 ± 0.10 | 0.157 ± 0.004 |
| | BOTTOM HOLE DIAMETER | $D_1$ | 1.00 + 0.25 | 0.039 + 0.010 |
| PERFORATION | DIAMETER | D | 1.50 ± 0.10 | 0.061 ± 0.002 |
| | PITCH | $P_0$ | 4.00 ± 0.10 | 0.157 ± 0.004 |
| | POSITION | E | 1.75 ± 0.10 | 0.069 ± 0.004 |
| CARRIER TAPE | WIDTH | W | 8.00 ± 0.30 - 0.10 | 0.315 ± 0.012 |
| | THICKNESS | $t_1$ | 0.254 ± 0.02 | 0.010 ± 0.0005 |
| COVER TAPE | WIDTH | C | 5.40 ± 0.10 | 0.205 ± 0.004 |
| | TAPE THICKNESS | $T_t$ | 0.062 ± 0.001 | 0.0025 ± 0.00004 |
| DISTANCE | CAVITY TO PERFORATION (WIDTH DIRECTION) | F | 3.50 ± 0.05 | 0.138 ± 0.002 |
| | CAVITY TO PERFORATION (LENGTH DIRECTION) | $P_2$ | 2.00 ± 0.05 | 0.079 ± 0.002 |

## Ordering Information

| Part No. | No. of Devices | Container |
|---|---|---|
| MGA-68563-TR1G | 3000 | 7" Reel |
| MGA-68563-TR2G | 10000 | 13" Reel |
| MGA-68563-BLKG | 100 | antistatic bag |

For product information and a complete list of distributors, please go to our web site: **www.avagotech.com**


AV02-0654EN - April 4, 2011

Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits,General Dynamics и др.);

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- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.


### Как с нами связаться

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**Факс:** 8 (812) 320-02-42
**Электронная почта:** org@eplast1.ru
**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.