

# MGA-425P8

## GaAs Enhancement-mode PHEMT

### Power Amplifier in 2x2 mm<sup>2</sup> LPCC Package



## Data Sheet

### Description

Avago Technologies's MGA-425P8 power amplifier is designed for wireless application in the 2–10 GHz frequency range. The PA has a high power efficiency (PAE) achieved through the use of Avago Technologies's proprietary GaAs Enhancement-mode pHEMT process.

MGA-425P8 is housed in a miniature 2.0 x 2.0 x 0.75 mm 8-lead leadless-plastic-chip-carrier (LPCC) package. The compact footprint, low profile couple with the excellent thermal efficiency of the LPCC package makes the MGA-425P8 an ideal choice as power amplifier that saves board space.

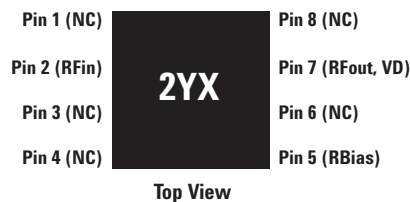
On-chip bias circuitry allows operation from a single +3.3V power supply. The output of the amplifier is near to 50Ω (below 2:1 VSWR) around 4.9–5.8 GHz. This makes MGA-425P8 an ideal choice as power amplifier for broadband IEEE 802.11a system as well as other high performance wireless application in the 2–10 GHz frequency range.

One external resistor (RBias) is used to set the bias current of the device over a wide range.

This allows the designer to use the same part in several circuit positions and tailor the output power/linearity performance, and current consumption, to suit each position.

### Pin Connections and Package Marking

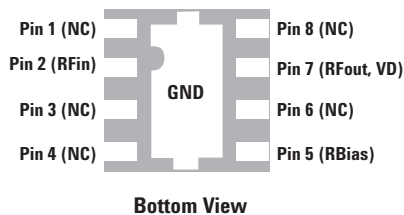
#### 2.0 x 2.0 x 0.75 mm 8-lead LPCC



#### Note:

Package marking provides orientation and identification  
"2Y" = Device Code

"X" = Data code indicates the month of manufacture.



#### Note:

Use Die Attach Padded for electrical grounding and thermal dissipation

### Features

- Near 50Ω broadband output match
- Single +3.3V supply
- High Gain & OIP3
- Miniature 2 x 2 x 0.75 mm LPCC package
- Pb-free & MSL-1 package
- Tape-and-Reel packaging option available

### Specifications @ 5.25 GHz, 3.3V, 58 mA (typ)

- 13.3 dBm Linear Pout @ 5% EVM
- 10.3% PAE @ +13.3 dBm Pout
- 12 dBm Linear Pout @ 3% EVM
- 7.6% PAE @ + 12 dBm Pout
- 47% PAE @ P1dB
- 20.3 dBm P1dB
- 32.9 dBm OIP3
- 16 dB Gain
- 1.7 dB NF



**Attention: Observe precautions for handling electrostatic sensitive devices.**

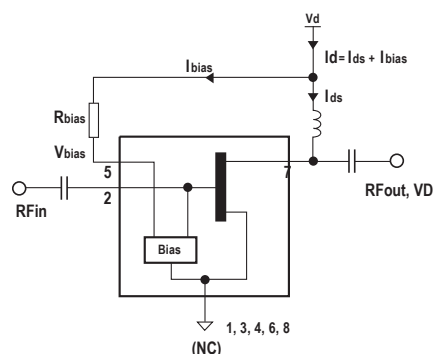
ESD Machine Model (Class A)

ESD Human Body Model (Class 1A)

Refer to Avago Application Note A004R:

Electrostatic Discharge Damage and Control.

### Simplified Schematic



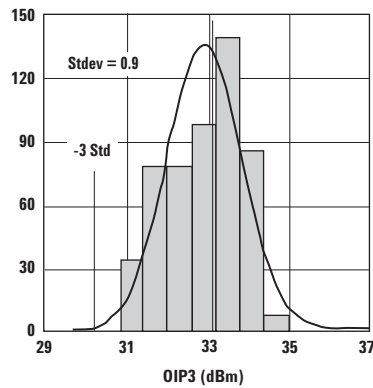
## MGA-425P8 Absolute Maximum Ratings<sup>[1]</sup>

| Symbol           | Parameter                              | Units | Absolute Maximum |
|------------------|----------------------------------------|-------|------------------|
| $V_{DS}$         | Drain – Supply Voltage <sup>[2]</sup>  | V     | 5                |
| $I_{DS}$         | Drain Current <sup>[2]</sup>           | A     | 100              |
| $P_{diss}$       | Total Power Dissipation <sup>[3]</sup> | W     | 0.5              |
| $P_{in\ max.}$   | RF Input Power                         | dBm   | 13               |
| $T_{CH}$         | Channel Temperature                    | °C    | 150              |
| $T_{STG}$        | Storage Temperature                    | °C    | -65 to 150       |
| $\theta_{ch\_b}$ | Thermal Resistance <sup>[4]</sup>      | °C/W  | 34.2             |

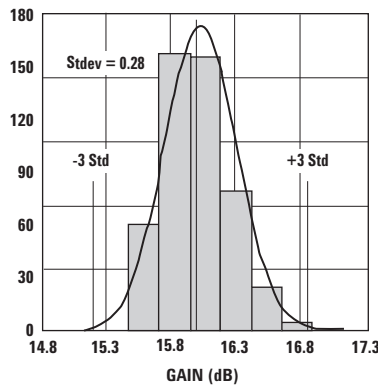
### Notes:

1. Operation of this device above any one of these parameters may cause permanent damage.
2. Assuming DC quiescent conditions.
3. Board (package belly) temperature  $T_B$  is 25°C. Derate 29 mW/°C for  $T_B > 133^\circ\text{C}$ .
4. Channel-to-board thermal resistance measured using 150°C Liquid Crystal Measurement method.

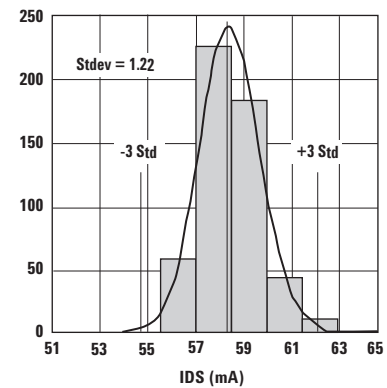
## Product Consistency Distribution Charts at 5.25 GHz, 3.3V RBias = 680 $\Omega$ <sup>[5, 6]</sup>



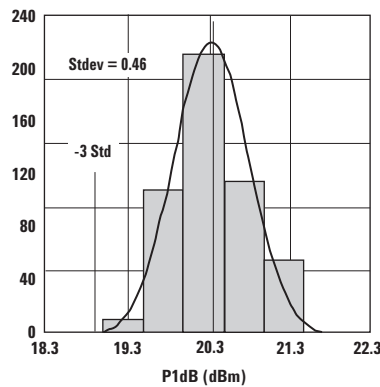
**Figure 1. OIP3;**  
LSL = 29 dBm, Nominal = 32.9 dBm.



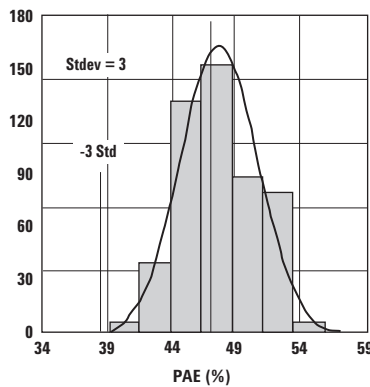
**Figure 2. GAIN;**  
LSL = 14.5 dB, Nominal = 16 dB, USL = 17.5 dB.



**Figure 3. IDS;**  
LSL = 51 mA, Nominal = 58 mA, USL = 65 mA.



**Figure 4. P1dB;**  
LSL = 18.25 dBm, Nominal = 20.3 dBm.



**Figure 5. PAE;**  
LSL = 33.5 %, Nominal = 47 %.

### Notes:

5. Distribution data sample size is 500 samples taken from 3 different wafers and 3 different lots. Future wafers allocated to this product may have nominal values anywhere between the upper and lower limits.
6. Measurements are made on production test board, which represents a trade-off between optimal OIP3, P1dB, Gain and VSWR. Circuit losses have been de-embedded from actual measurements.

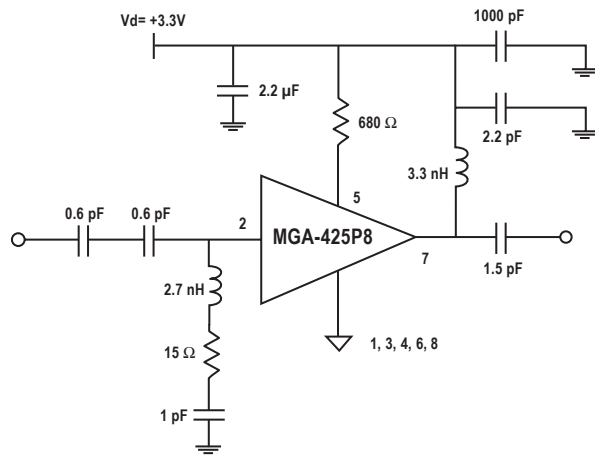
## MGA-425P8 Electrical Specifications

$T_A = 25^\circ\text{C}$ , DC bias for RF parameter is  $V_{ds} = 3.3\text{V}$  and  $R_{bias} = 680\Omega$  (unless specified otherwise)

| Symbol   | Parameter and Test Condition                                 | Units         | Min. | Typ.  | Max. |
|----------|--------------------------------------------------------------|---------------|------|-------|------|
| $I_{ds}$ | Device Current                                               | mA            | 51   | 58    | 65   |
| G        | Gain <sup>[1]</sup>                                          | Freq=5.25 GHz | dB   | 14.5  | 17.5 |
| NF       | Noise Figure <sup>[1]</sup>                                  | Freq=5.25 GHz | dB   | –     | 1.7  |
| OIP3     | Output 3 <sup>rd</sup> Order Intercpt Point <sup>[1,2]</sup> | Freq=5.25 GHz | dBm  | 29    | 32.9 |
| P1dB     | Output 1dB Compressed <sup>[1]</sup>                         | Freq=5.25 GHz | dBm  | 18.25 | 20.3 |
| PAE      | Power Added Efficiency <sup>[1]</sup>                        | Freq=5.25 GHz | %    | 33.5  | 47   |
| EVM      | Error Vector Magnitude <sup>[3]</sup> at Pout=13.3 dBm       |               | %    | –     | 5    |
| EVM      | Error Vector Magnitude <sup>[3]</sup> at Pout=12 dBm         |               | %    | –     | 3    |

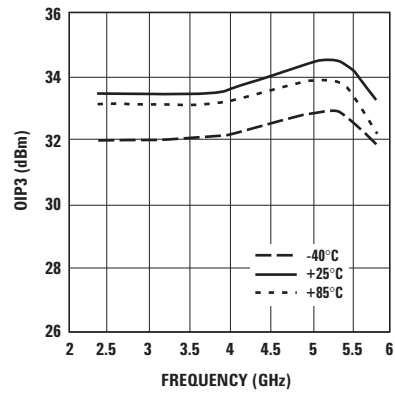
### Notes:

1. Measurement obtained using production test board described in Figure 6 and PAE tested at P1dB condition.
2. 5.25GHz OIP3 test condition:  $F_1 = 5.25\text{ GHz}$ ,  $F_2 = 5.255\text{ GHz}$  and  $\text{Pin} = -5\text{ dBm}$  per tone.
3. EVM test condition: 802.11a 64QAM/54 Mbps OFDM Modulation and Freq = 5.25 GHz.

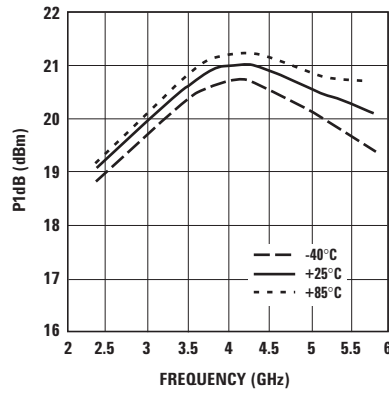


**Figure 6. Simplified schematic of 5.25 GHz production test board used for Gain, NF, OIP3, P1dB, PAE and EVM measurements. This circuit achieves a trade-off between optimal OIP3, P1dB and VSWR. Circuit losses have been de-embedded from actual measurements.**

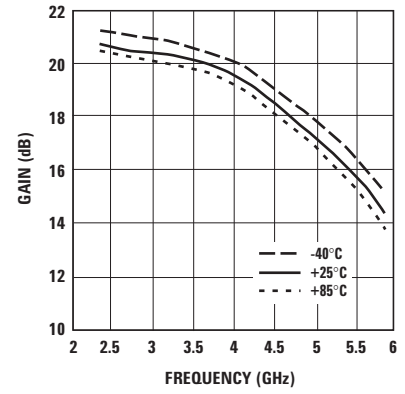
**MGA-425P8 Typical Performance Curves,  $V_{ds} = 3.3V$ ,  $I_{ds} = 58\text{ mA}$  (at  $25^\circ\text{C}$  unless specified otherwise)**



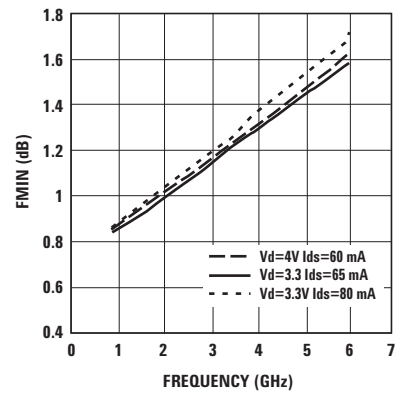
**Figure 7. OIP3 vs. Temperature and Frequency.**



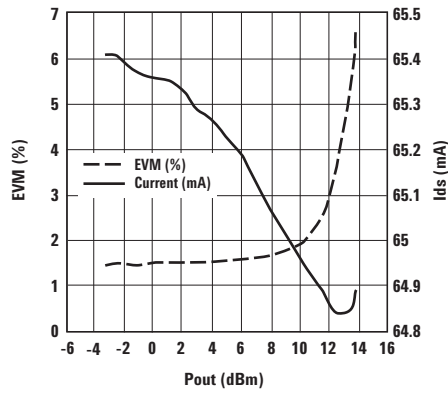
**Figure 8. P1dB vs. Temperature and Frequency.**



**Figure 9. GAIN vs. Temperature and Frequency.**



**Figure 10. FMIN vs. Frequency.**



**Figure 11. EVM and Current vs. Pout.**

**MGA-425P8 Typical Performance Curves,  $V_{ds} = 3.3V$  (at 25°C unless specified otherwise)**

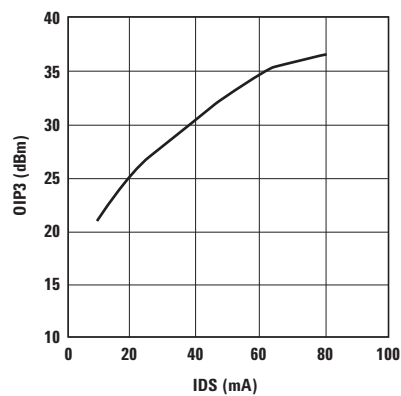


Figure 12. OIP3 vs.  $I_{ds}$  at 5.25 GHz.

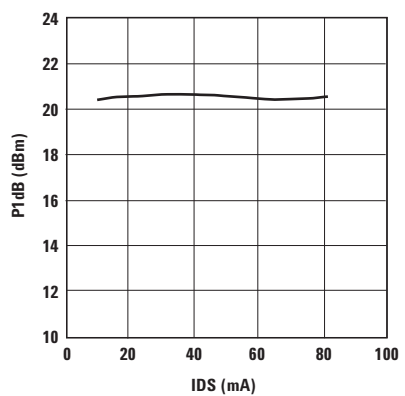


Figure 13. P1dB vs.  $I_{ds}$  at 5.25 GHz.

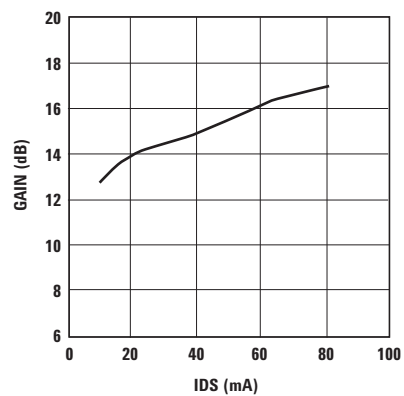


Figure 14. GAIN vs.  $I_{ds}$  at 5.25 GHz.

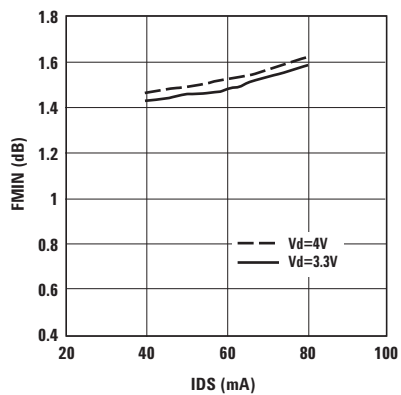


Figure 15. FMIN vs.  $I_{ds}$  at 5.25 GHz.

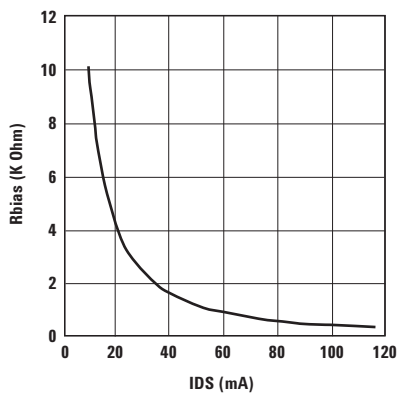


Figure 16. RBias vs.  $I_{ds}$  ( $V_{ds}=3.3V$ ).

# MGA-425P8 Typical Scattering Parameters (at 25°C, $V_{DS} = 2V$ , $I_{DS} = 20\text{ mA}$ )

| Freq.<br>GHz | $S_{11}$ |        |       | $S_{21}$ |       |        | $S_{12}$ |       |       | $S_{22}$ |       |    | MSG/MAG |
|--------------|----------|--------|-------|----------|-------|--------|----------|-------|-------|----------|-------|----|---------|
|              | Mag.     | Ang.   | dB    | Mag.     | Ang.  | dB     | Mag.     | Ang.  | dB    | Mag.     | Ang.  | dB |         |
| 0.1          | 0.806    | -15.3  | 24.42 | 16.629   | 171.6 | -30.46 | 0.030    | 80.3  | 0.657 | -8.9     | 32.67 |    |         |
| 0.5          | 0.789    | -59    | 22.96 | 14.066   | 147.5 | -28.18 | 0.039    | 59.9  | 0.595 | -37.6    | 25.57 |    |         |
| 0.9          | 0.799    | -92.7  | 21.38 | 11.723   | 128.5 | -24.58 | 0.059    | 43.4  | 0.502 | -62.6    | 22.98 |    |         |
| 1            | 0.8      | -99.5  | 20.95 | 11.156   | 124.4 | -24.01 | 0.063    | 39.9  | 0.479 | -68.2    | 22.48 |    |         |
| 1.5          | 0.814    | -126.2 | 18.87 | 8.784    | 107.8 | -22.62 | 0.074    | 26.1  | 0.389 | -93.3    | 20.74 |    |         |
| 1.9          | 0.819    | -141.1 | 17.34 | 7.365    | 97.5  | -22.05 | 0.079    | 17.5  | 0.335 | -110.1   | 19.70 |    |         |
| 2            | 0.823    | -144.8 | 16.94 | 7.03     | 94.8  | -22.05 | 0.079    | 15.7  | 0.328 | -115.4   | 19.49 |    |         |
| 2.4          | 0.824    | -155.7 | 15.56 | 5.999    | 86.7  | -21.72 | 0.082    | 9.6   | 0.3   | -129.4   | 18.64 |    |         |
| 3            | 0.828    | -168.1 | 13.77 | 4.881    | 76.4  | -21.62 | 0.083    | 2.1   | 0.279 | -147.1   | 17.69 |    |         |
| 3.5          | 0.83     | -176.3 | 12.50 | 4.216    | 69    | -21.51 | 0.084    | -2.8  | 0.268 | -158     | 17.01 |    |         |
| 3.9          | 0.827    | 178.3  | 11.55 | 3.778    | 63.2  | -21.51 | 0.084    | -6.9  | 0.269 | -164.9   | 16.53 |    |         |
| 4            | 0.84     | 176.9  | 11.23 | 3.643    | 63.2  | -21.62 | 0.083    | -6.3  | 0.272 | -169.6   | 16.42 |    |         |
| 4.5          | 0.834    | 170.7  | 10.34 | 3.288    | 56.4  | -21.51 | 0.084    | -10.8 | 0.267 | -175.5   | 15.93 |    |         |
| 5            | 0.837    | 164.9  | 9.48  | 2.977    | 50.6  | -21.41 | 0.085    | -14.2 | 0.266 | 177.8    | 15.44 |    |         |
| 5.1          | 0.837    | 163.8  | 9.33  | 2.926    | 49.4  | -21.41 | 0.085    | -15   | 0.265 | 176.6    | 15.37 |    |         |
| 5.2          | 0.836    | 162.7  | 9.17  | 2.875    | 48.2  | -21.41 | 0.085    | -15.7 | 0.263 | 175.7    | 15.29 |    |         |
| 5.3          | 0.836    | 161.7  | 9.01  | 2.821    | 46.9  | -21.41 | 0.085    | -16.5 | 0.264 | 175      | 15.21 |    |         |
| 5.4          | 0.835    | 160.6  | 8.86  | 2.772    | 45.7  | -21.41 | 0.085    | -17.2 | 0.265 | 173.8    | 15.13 |    |         |
| 5.5          | 0.836    | 159.6  | 8.70  | 2.723    | 44.5  | -21.41 | 0.085    | -18.1 | 0.264 | 172.6    | 15.06 |    |         |
| 5.6          | 0.836    | 158.6  | 8.56  | 2.679    | 43.2  | -21.41 | 0.085    | -18.9 | 0.262 | 171.6    | 14.99 |    |         |
| 5.7          | 0.837    | 157.5  | 8.40  | 2.631    | 42    | -21.41 | 0.085    | -19.8 | 0.263 | 170.9    | 14.91 |    |         |
| 5.8          | 0.836    | 156.4  | 8.25  | 2.584    | 40.6  | -21.41 | 0.085    | -20.7 | 0.264 | 170.1    | 14.83 |    |         |
| 6            | 0.842    | 155.3  | 7.82  | 2.461    | 38.2  | -21.51 | 0.084    | -22.3 | 0.268 | 168.9    | 14.67 |    |         |
| 7            | 0.846    | 144.7  | 6.40  | 2.09     | 27.5  | -21.72 | 0.082    | -28.8 | 0.281 | 158.9    | 14.06 |    |         |
| 8            | 0.838    | 134.4  | 5.23  | 1.827    | 16.3  | -21.41 | 0.085    | -34.4 | 0.283 | 145.7    | 13.32 |    |         |
| 9            | 0.842    | 123.3  | 4.30  | 1.641    | 6     | -21.83 | 0.081    | -42.6 | 0.322 | 132.3    | 13.07 |    |         |
| 10           | 0.846    | 112.6  | 3.30  | 1.462    | -6.9  | -21.62 | 0.083    | -49.9 | 0.366 | 115.3    | 12.46 |    |         |
| 11           | 0.857    | 102.3  | 2.03  | 1.264    | -17.6 | -22.50 | 0.075    | -56.5 | 0.391 | 102.3    | 9.68  |    |         |
| 12           | 0.87     | 92.5   | 1.10  | 1.135    | -28.5 | -22.62 | 0.074    | -63.9 | 0.44  | 96.1     | 9.62  |    |         |
| 13           | 0.883    | 84     | 0.01  | 1.001    | -39.5 | -23.10 | 0.07     | -70.6 | 0.482 | 89.3     | 9.26  |    |         |
| 14           | 0.885    | 76.3   | -1.15 | 0.876    | -49.5 | -23.61 | 0.066    | -77.1 | 0.512 | 84.8     | 8.08  |    |         |
| 15           | 0.893    | 69.3   | -2.24 | 0.773    | -58.2 | -24.44 | 0.06     | -82.5 | 0.534 | 81.7     | 7.30  |    |         |
| 16           | 0.881    | 61     | -3.19 | 0.693    | -67.2 | -24.73 | 0.058    | -87.6 | 0.56  | 77.5     | 5.78  |    |         |
| 17           | 0.87     | 53.2   | -4.19 | 0.617    | -75.9 | -25.04 | 0.056    | -91.7 | 0.583 | 72.1     | 4.36  |    |         |
| 18           | 0.884    | 45.1   | -5.32 | 0.542    | -85.1 | -26.74 | 0.046    | -94.9 | 0.608 | 63.5     | 3.72  |    |         |

## Typical Noise Parameters, $V_{DS} = 2V$ , $I_{DS} = 20\text{ mA}$

| Freq<br>GHz | $F_{min}$<br>dB | $\Gamma_{opt}$<br>Mag. | $\Gamma_{opt}$<br>Ang. | $R_{n/50}$ | NF @<br>50 dB |
|-------------|-----------------|------------------------|------------------------|------------|---------------|
| 0.9         | 0.9             | 0.09                   | -123.9                 | 0.08       | 0.91          |
| 1.5         | 0.99            | 0.2                    | 170.4                  | 0.08       | 1.02          |
| 1.9         | 1.04            | 0.25                   | 166.7                  | 0.07       | 1.13          |
| 2           | 1.06            | 0.25                   | 168.1                  | 0.07       | 1.16          |
| 2.4         | 1.12            | 0.27                   | 170.1                  | 0.07       | 1.28          |
| 3           | 1.2             | 0.33                   | 173.4                  | 0.06       | 1.45          |
| 3.5         | 1.27            | 0.38                   | 178                    | 0.06       | 1.6           |
| 3.9         | 1.33            | 0.41                   | -179.5                 | 0.06       | 1.71          |
| 4.5         | 1.41            | 0.45                   | -174.8                 | 0.06       | 1.87          |
| 5           | 1.49            | 0.47                   | -171.6                 | 0.06       | 2.04          |
| 5.2         | 1.51            | 0.48                   | -170.3                 | 0.06       | 2.09          |
| 5.5         | 1.56            | 0.49                   | -167.3                 | 0.06       | 2.18          |
| 5.8         | 1.6             | 0.51                   | -165                   | 0.06       | 2.27          |
| 6           | 1.63            | 0.52                   | -163.4                 | 0.06       | 2.33          |
| 7           | 1.77            | 0.54                   | -154.5                 | 0.09       | 2.62          |
| 8           | 1.91            | 0.56                   | -143.5                 | 0.14       | 2.95          |
| 9           | 2.05            | 0.58                   | -131.6                 | 0.24       | 3.18          |
| 10          | 2.16            | 0.61                   | -120.2                 | 0.32       | 3.56          |

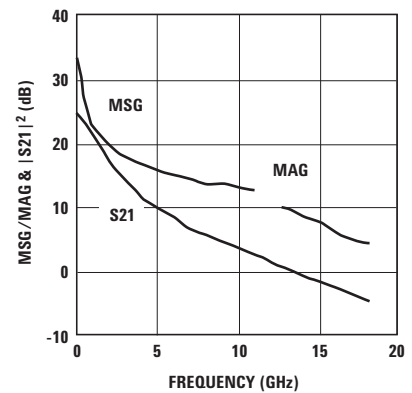


Figure 17. MSG/MAG &  $|S_{21}|^2$  vs. Frequency at 2V, 20 mA.

### Note:

- S Parameter is measured on a microstrip line made on 0.025 inch thick alumina carrier. The input reference plane is at the end of the gate lead. The output reference plane is at the end of the drain lead.

# MGA-425P8 Typical Scattering Parameters (at 25°C, $V_{DS} = 3.3V$ , $I_{DS} = 40\text{ mA}$ )

| Freq.<br>GHz | $S_{11}$ |        |       | $S_{21}$ |       |        | $S_{12}$ |       |       | $S_{22}$ |       |    | MSG/MAG |
|--------------|----------|--------|-------|----------|-------|--------|----------|-------|-------|----------|-------|----|---------|
|              | Mag.     | Ang.   | dB    | Mag.     | Ang.  | dB     | Mag.     | Ang.  | dB    | Mag.     | Ang.  | dB |         |
| 0.1          | 0.8      | -16.1  | 26.67 | 21.547   | 171.2 | -33.15 | 0.022    | 80    | 0.655 | -8.3     | 34.88 |    |         |
| 0.5          | 0.791    | -63.6  | 25.06 | 17.9     | 145.4 | -31.06 | 0.028    | 58.6  | 0.579 | -34.2    | 28.06 |    |         |
| 0.9          | 0.806    | -98.2  | 23.26 | 14.559   | 125.9 | -27.54 | 0.042    | 42.4  | 0.469 | -55.3    | 25.40 |    |         |
| 1            | 0.807    | -105   | 22.79 | 13.783   | 121.9 | -27.13 | 0.044    | 39.1  | 0.443 | -59.8    | 24.96 |    |         |
| 1.5          | 0.822    | -131   | 20.55 | 10.655   | 105.6 | -25.68 | 0.052    | 26.4  | 0.339 | -79.6    | 23.12 |    |         |
| 1.9          | 0.828    | -145.2 | 18.97 | 8.877    | 95.7  | -25.35 | 0.054    | 18.8  | 0.274 | -92.5    | 22.16 |    |         |
| 2            | 0.832    | -148.7 | 18.56 | 8.47     | 93.1  | -25.19 | 0.055    | 17.3  | 0.264 | -97.4    | 21.88 |    |         |
| 2.4          | 0.835    | -159   | 17.15 | 7.199    | 85.3  | -25.04 | 0.056    | 12    | 0.226 | -109.4   | 21.09 |    |         |
| 3            | 0.841    | -170.8 | 15.32 | 5.836    | 75.2  | -24.73 | 0.058    | 5.8   | 0.193 | -126.1   | 20.03 |    |         |
| 3.5          | 0.843    | -178.6 | 14.03 | 5.03     | 68.1  | -24.73 | 0.058    | 1.6   | 0.176 | -136.1   | 19.38 |    |         |
| 3.9          | 0.84     | 176.2  | 13.05 | 4.495    | 62.3  | -24.73 | 0.058    | -1.9  | 0.177 | -143.3   | 18.89 |    |         |
| 4            | 0.852    | 174.9  | 12.73 | 4.328    | 62.6  | -24.73 | 0.058    | -0.8  | 0.17  | -151.1   | 18.73 |    |         |
| 4.5          | 0.847    | 168.8  | 11.84 | 3.909    | 55.8  | -24.73 | 0.058    | -4.6  | 0.168 | -154.8   | 18.29 |    |         |
| 5            | 0.85     | 163.3  | 10.98 | 3.54     | 50.3  | -24.58 | 0.059    | -7.2  | 0.165 | -161.5   | 17.78 |    |         |
| 5.1          | 0.851    | 162.2  | 10.83 | 3.481    | 49.1  | -24.58 | 0.059    | -7.8  | 0.163 | -162.4   | 17.71 |    |         |
| 5.2          | 0.85     | 161.2  | 10.68 | 3.419    | 47.9  | -24.58 | 0.059    | -8.4  | 0.163 | -162.7   | 17.63 |    |         |
| 5.3          | 0.85     | 160.1  | 10.52 | 3.356    | 46.7  | -24.44 | 0.06     | -9.1  | 0.165 | -163.2   | 17.48 |    |         |
| 5.4          | 0.85     | 159.1  | 10.37 | 3.298    | 45.5  | -24.44 | 0.06     | -9.7  | 0.166 | -164.6   | 17.40 |    |         |
| 5.5          | 0.849    | 158.1  | 10.21 | 3.239    | 44.3  | -24.44 | 0.06     | -10.4 | 0.165 | -165.7   | 17.32 |    |         |
| 5.6          | 0.849    | 157.1  | 10.07 | 3.187    | 43    | -24.44 | 0.06     | -11   | 0.165 | -166.1   | 17.25 |    |         |
| 5.7          | 0.851    | 156    | 9.91  | 3.129    | 41.8  | -24.44 | 0.06     | -11.8 | 0.167 | -166.5   | 17.17 |    |         |
| 5.8          | 0.85     | 155.1  | 9.75  | 3.074    | 40.5  | -24.44 | 0.06     | -12.6 | 0.169 | -167.5   | 17.10 |    |         |
| 6            | 0.855    | 153.9  | 9.32  | 2.923    | 38    | -24.58 | 0.059    | -14   | 0.178 | -168.2   | 16.95 |    |         |
| 7            | 0.863    | 143.6  | 7.96  | 2.5      | 27.5  | -24.73 | 0.058    | -18.8 | 0.191 | 178.9    | 16.35 |    |         |
| 8            | 0.855    | 133.6  | 6.79  | 2.185    | 16.4  | -24.15 | 0.062    | -23.7 | 0.188 | 164.8    | 15.47 |    |         |
| 9            | 0.861    | 122.5  | 5.88  | 1.968    | 5.9   | -24.58 | 0.059    | -30.7 | 0.217 | 146.6    | 13.95 |    |         |
| 10           | 0.866    | 111.9  | 4.91  | 1.759    | -6.8  | -24.15 | 0.062    | -36.9 | 0.258 | 125.7    | 12.79 |    |         |
| 11           | 0.875    | 101.7  | 3.65  | 1.523    | -17.8 | -25.04 | 0.056    | -42.1 | 0.286 | 109.9    | 11.07 |    |         |
| 12           | 0.89     | 91.9   | 2.73  | 1.37     | -28.7 | -24.88 | 0.057    | -48.7 | 0.34  | 104.1    | 11.12 |    |         |
| 13           | 0.902    | 83.4   | 1.67  | 1.212    | -40   | -25.19 | 0.055    | -54.3 | 0.392 | 97       | 10.81 |    |         |
| 14           | 0.905    | 75.7   | 0.51  | 1.061    | -50.5 | -25.51 | 0.053    | -60.6 | 0.435 | 92.2     | 9.88  |    |         |
| 15           | 0.912    | 68.7   | -0.58 | 0.935    | -59.6 | -26.38 | 0.048    | -64.5 | 0.468 | 88.9     | 9.13  |    |         |
| 16           | 0.899    | 60.3   | -1.60 | 0.832    | -69.1 | -26.38 | 0.048    | -69.9 | 0.5   | 84.4     | 7.47  |    |         |
| 17           | 0.886    | 52.7   | -2.62 | 0.74     | -78   | -26.38 | 0.048    | -73.8 | 0.529 | 78.4     | 5.93  |    |         |
| 18           | 0.897    | 44.6   | -3.77 | 0.648    | -87.6 |        | 0.04     | -74.3 | 0.555 | 69.3     | 5.16  |    |         |

## Typical Noise Parameters, $V_{DS} = 3.3V$ , $I_{DS} = 40\text{ mA}$

| Freq<br>GHz | $F_{min}$<br>dB | $\Gamma_{opt}$<br>Mag. | $\Gamma_{opt}$<br>Ang. | $R_{n/50}$ | NF @<br>50 dB |
|-------------|-----------------|------------------------|------------------------|------------|---------------|
| 0.9         | 0.84            | 0.1                    | -125.5                 | 0.08       | 0.84          |
| 1.5         | 0.92            | 0.23                   | -176.4                 | 0.08       | 0.97          |
| 1.9         | 0.98            | 0.26                   | -179.7                 | 0.07       | 1.09          |
| 2           | 0.99            | 0.26                   | -180.2                 | 0.07       | 1.11          |
| 2.4         | 1.04            | 0.29                   | 177.9                  | 0.07       | 1.24          |
| 3           | 1.13            | 0.34                   | -179.3                 | 0.06       | 1.35          |
| 3.5         | 1.19            | 0.38                   | -175.3                 | 0.06       | 1.52          |
| 3.9         | 1.25            | 0.41                   | -173.3                 | 0.06       | 1.62          |
| 4.5         | 1.33            | 0.46                   | -169.4                 | 0.06       | 1.81          |
| 5           | 1.39            | 0.47                   | -166.5                 | 0.06       | 1.92          |
| 5.2         | 1.42            | 0.48                   | -164.7                 | 0.06       | 1.98          |
| 5.5         | 1.46            | 0.49                   | -162.3                 | 0.06       | 2.06          |
| 5.8         | 1.5             | 0.5                    | -160.9                 | 0.06       | 2.14          |
| 6           | 1.53            | 0.5                    | -158.4                 | 0.06       | 2.2           |
| 7           | 1.66            | 0.52                   | -151                   | 0.09       | 2.47          |
| 8           | 1.8             | 0.52                   | -141.8                 | 0.14       | 2.76          |
| 9           | 1.93            | 0.54                   | -128.2                 | 0.24       | 3.02          |
| 10          | 2.07            | 0.6                    | -117.3                 | 0.32       | 3.31          |

### Note:

- S Parameter is measured on a microstrip line made on 0.025 inch thick alumina carrier. The input reference plane is at the end of the gate lead. The output reference plane is at the end of the drain lead.

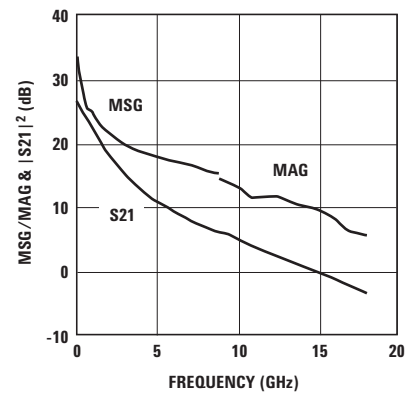


Figure 18. MSG/MAG &  $|S_{21}|^2$  vs. Frequency at 3.3V, 40 mA.

# MGA-425P8 Typical Scattering Parameters (at 25°C, $V_{DS} = 3.3V$ , $I_{DS} = 58\text{ mA}$ )

| Freq.<br>GHz | $S_{11}$ |        |       | $S_{21}$ |       |        | $S_{12}$ |       |       | $S_{22}$ |       |    | MSG/MAG |
|--------------|----------|--------|-------|----------|-------|--------|----------|-------|-------|----------|-------|----|---------|
|              | Mag.     | Ang.   | dB    | Mag.     | Ang.  | dB     | Mag.     | Ang.  | dB    | Mag.     | Ang.  | dB |         |
| 0.1          | 0.796    | -16.4  | 27.39 | 23.407   | 171   | -33.15 | 0.022    | 79.7  | 0.632 | -8.4     | 35.91 |    |         |
| 0.5          | 0.792    | -65.5  | 25.72 | 19.324   | 144.5 | -31.70 | 0.026    | 58    | 0.554 | -34.4    | 28.71 |    |         |
| 0.9          | 0.807    | -100.5 | 23.83 | 15.548   | 124.8 | -28.40 | 0.038    | 41.9  | 0.443 | -55.1    | 26.12 |    |         |
| 1            | 0.809    | -107.2 | 23.34 | 14.687   | 120.8 | -27.96 | 0.04     | 38.7  | 0.418 | -59.4    | 25.65 |    |         |
| 1.5          | 0.825    | -132.9 | 21.04 | 11.266   | 104.7 | -26.74 | 0.046    | 26.5  | 0.316 | -78.4    | 23.89 |    |         |
| 1.9          | 0.83     | -146.9 | 19.42 | 9.355    | 95.1  | -26.38 | 0.048    | 19.2  | 0.253 | -90.6    | 22.90 |    |         |
| 2            | 0.836    | -150.3 | 19.01 | 8.923    | 92.5  | -26.20 | 0.049    | 17.9  | 0.244 | -95.4    | 22.60 |    |         |
| 2.4          | 0.838    | -160.3 | 17.58 | 7.571    | 84.9  | -26.02 | 0.05     | 12.9  | 0.208 | -107     | 21.80 |    |         |
| 3            | 0.844    | -171.8 | 15.75 | 6.134    | 75    | -25.85 | 0.051    | 7.3   | 0.177 | -123.3   | 20.80 |    |         |
| 3.5          | 0.846    | -179.5 | 14.47 | 5.289    | 68    | -25.68 | 0.052    | 3.4   | 0.161 | -133.1   | 20.07 |    |         |
| 3.9          | 0.844    | 175.4  | 13.49 | 4.727    | 62.3  | -25.68 | 0.052    | 0.1   | 0.164 | -140.4   | 19.59 |    |         |
| 4            | 0.855    | 174.2  | 13.16 | 4.549    | 62.6  | -25.68 | 0.052    | 1.3   | 0.156 | -149     | 19.42 |    |         |
| 4.5          | 0.852    | 168.2  | 12.28 | 4.112    | 55.8  | -25.68 | 0.052    | -2.1  | 0.154 | -152.4   | 18.98 |    |         |
| 5            | 0.855    | 162.7  | 11.42 | 3.722    | 50.4  | -25.51 | 0.053    | -4.5  | 0.151 | -159     | 18.47 |    |         |
| 5.1          | 0.855    | 161.6  | 11.26 | 3.658    | 49.1  | -25.51 | 0.053    | -5.1  | 0.15  | -159.8   | 18.39 |    |         |
| 5.2          | 0.854    | 160.6  | 11.11 | 3.593    | 48    | -25.35 | 0.054    | -5.7  | 0.149 | -160     | 18.23 |    |         |
| 5.3          | 0.854    | 159.6  | 10.95 | 3.527    | 46.8  | -25.35 | 0.054    | -6.3  | 0.151 | -160.4   | 18.15 |    |         |
| 5.4          | 0.855    | 158.5  | 10.79 | 3.465    | 45.6  | -25.35 | 0.054    | -6.9  | 0.153 | -161.8   | 18.07 |    |         |
| 5.5          | 0.854    | 157.5  | 10.64 | 3.404    | 44.3  | -25.35 | 0.054    | -7.5  | 0.152 | -162.9   | 18.00 |    |         |
| 5.6          | 0.854    | 156.5  | 10.50 | 3.348    | 43.1  | -25.35 | 0.054    | -8.2  | 0.151 | -163.2   | 17.92 |    |         |
| 5.7          | 0.855    | 155.5  | 10.33 | 3.286    | 41.9  | -25.35 | 0.054    | -8.8  | 0.154 | -163.5   | 17.84 |    |         |
| 5.8          | 0.854    | 154.5  | 10.18 | 3.228    | 40.6  | -25.35 | 0.054    | -9.6  | 0.156 | -164.5   | 17.77 |    |         |
| 6            | 0.859    | 153.5  | 9.74  | 3.07     | 38.2  | -25.51 | 0.053    | -10.8 | 0.166 | -165.1   | 17.63 |    |         |
| 7            | 0.867    | 143.2  | 8.38  | 2.625    | 27.9  | -25.51 | 0.053    | -15.3 | 0.179 | -178.4   | 16.95 |    |         |
| 8            | 0.86     | 133.3  | 7.22  | 2.295    | 16.8  | -24.88 | 0.057    | -19.9 | 0.176 | 167.7    | 16.05 |    |         |
| 9            | 0.866    | 122.2  | 6.32  | 2.069    | 6.4   | -25.35 | 0.054    | -26.4 | 0.203 | 148.4    | 14.25 |    |         |
| 10           | 0.871    | 111.7  | 5.33  | 1.847    | -6.3  | -24.73 | 0.058    | -32.5 | 0.243 | 126.9    | 13.24 |    |         |
| 11           | 0.881    | 101.5  | 4.07  | 1.598    | -17.3 | -25.68 | 0.052    | -37   | 0.271 | 110.5    | 11.57 |    |         |
| 12           | 0.895    | 91.7   | 3.16  | 1.439    | -28.2 | -25.35 | 0.054    | -43.8 | 0.325 | 104.9    | 11.61 |    |         |
| 13           | 0.909    | 83.3   | 2.10  | 1.273    | -39.4 | -25.68 | 0.052    | -49.1 | 0.377 | 97.8     | 11.45 |    |         |
| 14           | 0.912    | 75.6   | 0.93  | 1.113    | -49.9 | -26.02 | 0.05     | -55.6 | 0.421 | 93.2     | 10.51 |    |         |
| 15           | 0.919    | 68.6   | -0.16 | 0.982    | -58.8 | -26.74 | 0.046    | -59.2 | 0.456 | 89.9     | 9.82  |    |         |
| 16           | 0.904    | 60.2   | -1.17 | 0.874    | -68.4 | -26.74 | 0.046    | -64.7 | 0.489 | 85.5     | 7.97  |    |         |
| 17           | 0.89     | 52.5   | -2.18 | 0.778    | -77.3 | -26.74 | 0.046    | -68.7 | 0.518 | 79.7     | 6.37  |    |         |
| 18           | 0.902    | 44.4   | -3.35 | 0.68     | -86.9 | -28.18 | 0.039    | -68.1 | 0.547 | 70.5     | 5.65  |    |         |

## Typical Noise Parameters, $V_{DS} = 3.3V$ , $I_{DS} = 58\text{ mA}$

| Freq<br>GHz | $F_{min}$<br>dB | $\Gamma_{opt}$<br>Mag. | $\Gamma_{opt}$<br>Ang. | $R_{n/50}$ | NF @<br>50 dB |
|-------------|-----------------|------------------------|------------------------|------------|---------------|
| 0.9         | 0.85            | 0.1                    | -134                   | 0.06       | 0.82          |
| 1.5         | 0.93            | 0.25                   | -177.4                 | 0.06       | 1.01          |
| 1.9         | 0.98            | 0.27                   | -179.1                 | 0.06       | 1.1           |
| 2           | 1               | 0.28                   | -179.9                 | 0.06       | 1.13          |
| 2.4         | 1.06            | 0.3                    | 179.5                  | 0.06       | 1.25          |
| 3           | 1.14            | 0.36                   | -176.8                 | 0.05       | 1.41          |
| 3.5         | 1.23            | 0.41                   | -173.3                 | 0.05       | 1.58          |
| 3.9         | 1.27            | 0.43                   | -171.3                 | 0.06       | 1.69          |
| 4.5         | 1.36            | 0.48                   | -166.7                 | 0.06       | 1.89          |
| 5           | 1.43            | 0.48                   | -164.4                 | 0.06       | 2.02          |
| 5.2         | 1.46            | 0.49                   | -162.9                 | 0.06       | 2.09          |
| 5.5         | 1.51            | 0.5                    | -160.5                 | 0.07       | 2.17          |
| 5.8         | 1.55            | 0.5                    | -159                   | 0.07       | 2.26          |
| 6           | 1.58            | 0.51                   | -157.5                 | 0.07       | 2.32          |
| 7           | 1.75            | 0.53                   | -149.7                 | 0.1        | 2.61          |
| 8           | 1.88            | 0.55                   | -140.3                 | 0.15       | 2.94          |
| 9           | 2.03            | 0.56                   | -127.1                 | 0.26       | 3.25          |
| 10          | 2.16            | 0.62                   | -115.8                 | 0.36       | 3.59          |

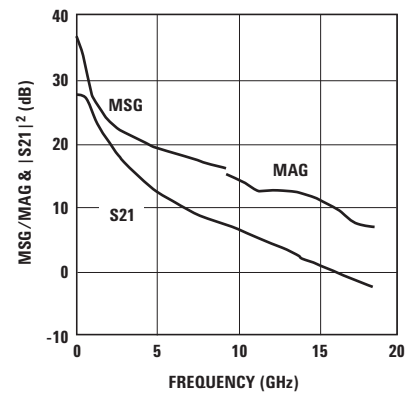


Figure 19. MSG/MAG &  $|S_{21}|^2$  vs. Frequency at 3.3V, 58 mA.

### Note:

1. S Parameter is measured on a microstrip line made on 0.025 inch thick alumina carrier. The input reference plane is at the end of the gate lead. The output reference plane is at the end of the drain lead.



# MGA-425P8 Typical Scattering Parameters (at 25°C, $V_{DS} = 3.3V$ , $I_{DS} = 65\text{ mA}$ )

| Freq.<br>GHz | $S_{11}$ |        |       | $S_{21}$ |       |        | $S_{12}$ |       |       | $S_{22}$ |       |    | MSG/MAG |
|--------------|----------|--------|-------|----------|-------|--------|----------|-------|-------|----------|-------|----|---------|
|              | Mag.     | Ang.   | dB    | Mag.     | Ang.  | dB     | Mag.     | Ang.  | dB    | Mag.     | Ang.  | dB |         |
| 0.1          | 0.795    | -16.4  | 27.50 | 23.716   | 171.1 | -33.98 | 0.02     | 79.4  | 0.63  | -8.4     | 35.97 |    |         |
| 0.5          | 0.792    | -65.6  | 25.84 | 19.578   | 144.4 | -32.04 | 0.025    | 58    | 0.552 | -34.1    | 28.94 |    |         |
| 0.9          | 0.808    | -100.7 | 23.94 | 15.736   | 124.7 | -28.64 | 0.037    | 41.9  | 0.441 | -54.5    | 26.29 |    |         |
| 1            | 0.81     | -107.5 | 23.44 | 14.861   | 120.8 | -28.18 | 0.039    | 38.7  | 0.415 | -58.8    | 25.81 |    |         |
| 1.5          | 0.825    | -133.1 | 21.13 | 11.389   | 104.7 | -26.94 | 0.045    | 26.7  | 0.314 | -77.3    | 24.03 |    |         |
| 1.9          | 0.83     | -147   | 19.51 | 9.454    | 95.1  | -26.56 | 0.047    | 19.4  | 0.251 | -89.1    | 23.04 |    |         |
| 2            | 0.836    | -150.4 | 19.10 | 9.018    | 92.5  | -26.56 | 0.047    | 18.2  | 0.241 | -93.8    | 22.83 |    |         |
| 2.4          | 0.838    | -160.4 | 17.68 | 7.652    | 84.9  | -26.20 | 0.049    | 13.3  | 0.206 | -105.1   | 21.94 |    |         |
| 3            | 0.844    | -171.9 | 15.85 | 6.201    | 75.1  | -26.02 | 0.05     | 7.7   | 0.174 | -121     | 20.93 |    |         |
| 3.5          | 0.846    | -179.5 | 14.56 | 5.348    | 68    | -25.85 | 0.051    | 3.8   | 0.159 | -130.7   | 20.21 |    |         |
| 3.9          | 0.845    | 175.4  | 13.59 | 4.782    | 62.3  | -25.85 | 0.051    | 0.7   | 0.161 | -138.2   | 19.72 |    |         |
| 4            | 0.855    | 174.1  | 13.26 | 4.6      | 62.6  | -26.02 | 0.05     | 1.8   | 0.153 | -147     | 19.64 |    |         |
| 4.5          | 0.852    | 168.2  | 12.38 | 4.161    | 55.9  | -25.85 | 0.051    | -1.5  | 0.152 | -150.3   | 19.12 |    |         |
| 5            | 0.856    | 162.7  | 11.52 | 3.766    | 50.4  | -25.68 | 0.052    | -3.9  | 0.148 | -156.9   | 18.60 |    |         |
| 5.1          | 0.855    | 161.6  | 11.37 | 3.702    | 49.2  | -25.68 | 0.052    | -4.5  | 0.147 | -157.8   | 18.52 |    |         |
| 5.2          | 0.855    | 160.5  | 11.21 | 3.636    | 48    | -25.68 | 0.052    | -5.1  | 0.147 | -157.9   | 18.45 |    |         |
| 5.3          | 0.855    | 159.6  | 11.05 | 3.569    | 46.8  | -25.51 | 0.053    | -5.7  | 0.148 | -158.3   | 18.28 |    |         |
| 5.4          | 0.855    | 158.5  | 10.90 | 3.506    | 45.6  | -25.51 | 0.053    | -6.3  | 0.15  | -159.8   | 18.21 |    |         |
| 5.5          | 0.855    | 157.5  | 10.74 | 3.444    | 44.4  | -25.51 | 0.053    | -6.9  | 0.149 | -160.9   | 18.13 |    |         |
| 5.6          | 0.855    | 156.5  | 10.60 | 3.387    | 43.1  | -25.51 | 0.053    | -7.5  | 0.149 | -161.1   | 18.06 |    |         |
| 5.7          | 0.856    | 155.5  | 10.44 | 3.325    | 42    | -25.51 | 0.053    | -8.2  | 0.151 | -161.5   | 17.98 |    |         |
| 5.8          | 0.856    | 154.5  | 10.28 | 3.266    | 40.7  | -25.51 | 0.053    | -9    | 0.153 | -162.5   | 17.90 |    |         |
| 6            | 0.86     | 153.5  | 9.84  | 3.106    | 38.2  | -25.68 | 0.052    | -10.2 | 0.164 | -163.2   | 17.76 |    |         |
| 7            | 0.869    | 143.2  | 8.49  | 2.657    | 27.9  | -25.68 | 0.052    | -14.5 | 0.177 | -176.7   | 17.08 |    |         |
| 8            | 0.861    | 133.3  | 7.31  | 2.321    | 16.8  | -25.04 | 0.056    | -19.1 | 0.173 | 169.4    | 16.17 |    |         |
| 9            | 0.867    | 122.2  | 6.41  | 2.092    | 6.4   | -25.51 | 0.053    | -25.5 | 0.199 | 149.7    | 13.35 |    |         |
| 10           | 0.872    | 111.7  | 5.43  | 1.869    | -6.3  | -24.88 | 0.057    | -31.5 | 0.238 | 127.7    | 11.71 |    |         |
| 11           | 0.882    | 101.5  | 4.17  | 1.616    | -17.2 | -25.68 | 0.052    | -36   | 0.266 | 111.1    | 11.77 |    |         |
| 12           | 0.897    | 91.7   | 3.26  | 1.455    | -28.1 | -25.51 | 0.053    | -42.6 | 0.32  | 105.5    | 11.55 |    |         |
| 13           | 0.91     | 83.3   | 2.20  | 1.288    | -39.3 | -25.85 | 0.051    | -48   | 0.372 | 98.4     | 10.57 |    |         |
| 14           | 0.912    | 75.5   | 1.03  | 1.126    | -49.8 | -26.02 | 0.05     | -54.3 | 0.417 | 93.7     | 9.88  |    |         |
| 15           | 0.919    | 68.5   | -0.05 | 0.994    | -58.8 | -26.74 | 0.046    | -57.9 | 0.452 | 90.4     | 8.03  |    |         |
| 16           | 0.904    | 60.2   | -1.07 | 0.884    | -68.4 | -26.74 | 0.046    | -63.5 | 0.485 | 86       | 6.47  |    |         |
| 17           | 0.891    | 52.5   | -2.10 | 0.785    | -77.4 | -26.74 | 0.046    | -67.5 | 0.515 | 80.2     | 5.84  |    |         |
| 18           | 0.904    | 44.4   | -3.22 | 0.69     | -87   | -28.18 | 0.039    | -66.8 | 0.544 | 71       | 13.35 |    |         |

## Typical Noise Parameters, $V_{DS} = 3.3V$ , $I_{DS} = 65\text{ mA}$

| Freq<br>GHz | $F_{min}$<br>dB | $\Gamma_{opt}$<br>Mag. | $\Gamma_{opt}$<br>Ang. | $R_{n/50}$ | NF @<br>50 dB |
|-------------|-----------------|------------------------|------------------------|------------|---------------|
| 0.9         | 0.85            | 0.1                    | -136.7                 | 0.06       | 0.82          |
| 1.5         | 0.93            | 0.24                   | -178.7                 | 0.06       | 0.98          |
| 1.9         | 1               | 0.27                   | -179.8                 | 0.06       | 1.12          |
| 2           | 1.02            | 0.27                   | -179.9                 | 0.06       | 1.15          |
| 2.4         | 1.07            | 0.3                    | 179.7                  | 0.06       | 1.26          |
| 3           | 1.17            | 0.36                   | -177.5                 | 0.06       | 1.38          |
| 3.5         | 1.24            | 0.4                    | -173.8                 | 0.06       | 1.6           |
| 3.9         | 1.3             | 0.44                   | -171.5                 | 0.06       | 1.72          |
| 4.5         | 1.39            | 0.48                   | -167.4                 | 0.06       | 1.92          |
| 5           | 1.46            | 0.49                   | -164.1                 | 0.06       | 2.04          |
| 5.2         | 1.49            | 0.5                    | -163                   | 0.06       | 2.12          |
| 5.5         | 1.54            | 0.51                   | -160.7                 | 0.07       | 2.2           |
| 5.8         | 1.58            | 0.52                   | -158.4                 | 0.07       | 2.29          |
| 6           | 1.62            | 0.53                   | -156.8                 | 0.07       | 2.36          |
| 7           | 1.78            | 0.55                   | -148.6                 | 0.1        | 2.66          |
| 8           | 1.93            | 0.54                   | -139.4                 | 0.16       | 3.02          |
| 9           | 2.08            | 0.56                   | -126.3                 | 0.28       | 3.33          |
| 10          | 2.23            | 0.62                   | -115.3                 | 0.38       | 3.6           |

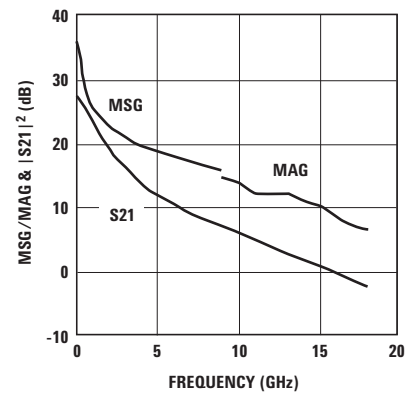


Figure 20. MSG/MAG &  $|S_{21}|^2$  vs. Frequency at 3.3V, 65 mA.

### Note:

1. S Parameter is measured on a microstrip line made on 0.025 inch thick alumina carrier. The input reference plane is at the end of the gate lead. The output reference plane is at the end of the drain lead.

# MGA-425P8 Typical Scattering Parameters (at 25°C, $V_{DS} = 3.3V$ , $I_{DS} = 80\text{ mA}$ )

| Freq.<br>GHz | $S_{11}$ |        |       | $S_{21}$ |       |        | $S_{12}$ |       |       | $S_{22}$ |       |    | MSG/MAG |
|--------------|----------|--------|-------|----------|-------|--------|----------|-------|-------|----------|-------|----|---------|
|              | Mag.     | Ang.   | dB    | Mag.     | Ang.  | dB     | Mag.     | Ang.  | dB    | Mag.     | Ang.  | dB |         |
| 0.1          | 0.79     | -16.3  | 27.73 | 24.356   | 171.1 | -34.89 | 0.018    | 79.5  | 0.628 | -8.1     | 36.08 |    |         |
| 0.5          | 0.79     | -65.7  | 26.07 | 20.124   | 144.5 | -32.40 | 0.024    | 58.1  | 0.55  | -33.1    | 29.24 |    |         |
| 0.9          | 0.807    | -100.8 | 24.18 | 16.172   | 124.7 | -29.12 | 0.035    | 42.1  | 0.439 | -52.5    | 26.65 |    |         |
| 1            | 0.809    | -107.6 | 23.68 | 15.273   | 120.8 | -28.87 | 0.036    | 39    | 0.414 | -56.6    | 26.28 |    |         |
| 1.5          | 0.825    | -133.2 | 21.36 | 11.698   | 104.7 | -27.54 | 0.042    | 27.1  | 0.312 | -73.9    | 24.45 |    |         |
| 1.9          | 0.83     | -147.1 | 19.75 | 9.712    | 95.1  | -27.13 | 0.044    | 20    | 0.249 | -84.6    | 23.44 |    |         |
| 2            | 0.835    | -150.5 | 19.34 | 9.266    | 92.6  | -26.94 | 0.045    | 18.7  | 0.239 | -89.1    | 23.14 |    |         |
| 2.4          | 0.839    | -160.4 | 17.91 | 7.863    | 85    | -26.74 | 0.046    | 14    | 0.202 | -99.5    | 22.33 |    |         |
| 3            | 0.845    | -171.8 | 16.09 | 6.374    | 75.2  | -26.56 | 0.047    | 8.6   | 0.169 | -114.5   | 21.32 |    |         |
| 3.5          | 0.847    | -179.5 | 14.81 | 5.501    | 68.2  | -26.38 | 0.048    | 4.9   | 0.154 | -123.6   | 20.59 |    |         |
| 3.9          | 0.845    | 175.4  | 13.84 | 4.918    | 62.5  | -26.38 | 0.048    | 1.8   | 0.156 | -131.3   | 20.11 |    |         |
| 4            | 0.855    | 174.2  | 13.50 | 4.732    | 62.8  | -26.38 | 0.048    | 3     | 0.145 | -140.4   | 19.94 |    |         |
| 4.5          | 0.853    | 168.2  | 12.63 | 4.282    | 56    | -26.38 | 0.048    | -0.3  | 0.144 | -143.4   | 19.50 |    |         |
| 5            | 0.857    | 162.7  | 11.77 | 3.875    | 50.6  | -26.20 | 0.049    | -2.5  | 0.14  | -150     | 18.98 |    |         |
| 5.1          | 0.857    | 161.7  | 11.62 | 3.81     | 49.3  | -26.02 | 0.05     | -3.1  | 0.139 | -150.7   | 18.82 |    |         |
| 5.2          | 0.856    | 160.6  | 11.46 | 3.742    | 48.1  | -26.02 | 0.05     | -3.6  | 0.139 | -150.8   | 18.74 |    |         |
| 5.3          | 0.856    | 159.6  | 11.30 | 3.673    | 46.9  | -26.02 | 0.05     | -4.2  | 0.141 | -151.3   | 18.66 |    |         |
| 5.4          | 0.856    | 158.6  | 11.15 | 3.609    | 45.7  | -26.02 | 0.05     | -4.8  | 0.142 | -152.8   | 18.58 |    |         |
| 5.5          | 0.856    | 157.6  | 10.99 | 3.544    | 44.5  | -26.02 | 0.05     | -5.4  | 0.141 | -153.9   | 18.51 |    |         |
| 5.6          | 0.856    | 156.6  | 10.85 | 3.486    | 43.3  | -26.02 | 0.05     | -6    | 0.141 | -154     | 18.43 |    |         |
| 5.7          | 0.858    | 155.6  | 10.69 | 3.423    | 42.1  | -26.02 | 0.05     | -6.7  | 0.144 | -154.5   | 18.35 |    |         |
| 5.8          | 0.857    | 154.6  | 10.53 | 3.361    | 40.8  | -25.85 | 0.051    | -7.5  | 0.146 | -155.6   | 18.19 |    |         |
| 6            | 0.862    | 153.5  | 10.09 | 3.196    | 38.3  | -26.02 | 0.05     | -8.7  | 0.158 | -156.7   | 18.06 |    |         |
| 7            | 0.87     | 143.3  | 8.75  | 2.738    | 28    | -26.20 | 0.049    | -12.6 | 0.169 | -171     | 17.47 |    |         |
| 8            | 0.862    | 133.3  | 7.58  | 2.392    | 16.9  | -25.35 | 0.054    | -17.2 | 0.164 | 175      | 16.46 |    |         |
| 9            | 0.869    | 122.3  | 6.67  | 2.156    | 6.5   | -25.85 | 0.051    | -23.3 | 0.187 | 154.1    | 14.70 |    |         |
| 10           | 0.875    | 111.8  | 5.70  | 1.928    | -6.2  | -25.19 | 0.055    | -29.2 | 0.224 | 130.8    | 13.77 |    |         |
| 11           | 0.884    | 101.6  | 4.43  | 1.666    | -17.2 | -26.02 | 0.05     | -33.6 | 0.251 | 113.3    | 12.01 |    |         |
| 12           | 0.898    | 91.8   | 3.54  | 1.503    | -28   | -25.68 | 0.052    | -40.3 | 0.305 | 107.5    | 12.08 |    |         |
| 13           | 0.912    | 83.4   | 2.48  | 1.33     | -39.4 | -26.02 | 0.05     | -45.5 | 0.359 | 100.3    | 11.95 |    |         |
| 14           | 0.915    | 75.6   | 1.31  | 1.163    | -49.9 | -26.20 | 0.049    | -51.9 | 0.405 | 95.5     | 11.03 |    |         |
| 15           | 0.921    | 68.6   | 0.22  | 1.026    | -59   | -26.94 | 0.045    | -55.5 | 0.442 | 92.1     | 10.25 |    |         |
| 16           | 0.908    | 60.3   | -0.79 | 0.913    | -68.6 | -26.94 | 0.045    | -61.2 | 0.477 | 87.6     | 8.48  |    |         |
| 17           | 0.893    | 52.5   | -1.83 | 0.81     | -77.6 | -26.94 | 0.045    | -64.9 | 0.507 | 81.7     | 6.76  |    |         |
| 18           | 0.905    | 44.4   | -2.96 | 0.711    | -87.2 | -28.18 | 0.039    | -63.9 | 0.537 | 72.4     | 6.09  |    |         |

## Typical Noise Parameters, $V_{DS} = 3.3V$ , $I_{DS} = 80\text{ mA}$

| Freq<br>GHz | $F_{min}$<br>dB | $\Gamma_{opt}$<br>Mag. | $\Gamma_{opt}$<br>Ang. | $R_{n/50}$ | NF @<br>50 dB |
|-------------|-----------------|------------------------|------------------------|------------|---------------|
| 0.9         | 0.86            | 0.1                    | -134.9                 | 0.06       | 0.84          |
| 1.5         | 0.95            | 0.25                   | -173.6                 | 0.06       | 1.03          |
| 1.9         | 1.03            | 0.27                   | -177.4                 | 0.06       | 1.16          |
| 2           | 1.05            | 0.28                   | -177.7                 | 0.06       | 1.19          |
| 2.4         | 1.1             | 0.31                   | 178.9                  | 0.06       | 1.32          |
| 3           | 1.19            | 0.37                   | -177.4                 | 0.05       | 1.48          |
| 3.5         | 1.28            | 0.42                   | -174                   | 0.05       | 1.68          |
| 3.9         | 1.35            | 0.44                   | -170.6                 | 0.06       | 1.81          |
| 4.5         | 1.46            | 0.48                   | -167                   | 0.06       | 2.01          |
| 5           | 1.53            | 0.5                    | -163.6                 | 0.06       | 2.15          |
| 5.2         | 1.56            | 0.5                    | -161.8                 | 0.07       | 2.17          |
| 5.5         | 1.62            | 0.52                   | -159.4                 | 0.07       | 2.23          |
| 5.8         | 1.66            | 0.53                   | -157.8                 | 0.07       | 2.44          |
| 6           | 1.7             | 0.54                   | -156.1                 | 0.07       | 2.52          |
| 7           | 1.86            | 0.55                   | -147.8                 | 0.12       | 2.8           |
| 8           | 2.03            | 0.56                   | -138.6                 | 0.18       | 3.22          |
| 9           | 2.2             | 0.57                   | -125.5                 | 0.31       | 3.52          |
| 10          | 2.37            | 0.63                   | -114.8                 | 0.42       | 3.95          |

### Note:

- S Parameter is measured on a microstrip line made on 0.025 inch thick alumina carrier. The input reference plane is at the end of the gate lead. The output reference plane is at the end of the drain lead.

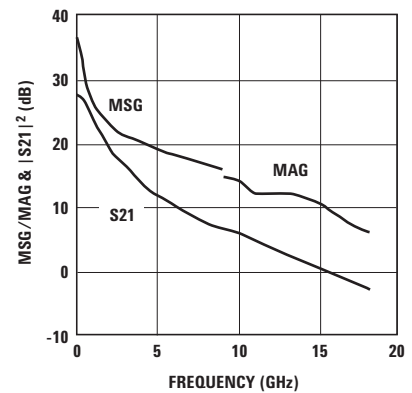


Figure 21. MSG/MAG &  $|S_{21}|^2$  vs. Frequency at 3.3V, 80 mA.

# MGA-425P8 Typical Scattering Parameters (at 25°C, $V_{DS} = 4V$ , $I_{DS} = 60\text{ mA}$ )

| Freq.<br>GHz | $S_{11}$ |        |       | $S_{21}$ |       |        | $S_{12}$ |       |       | $S_{22}$ |       |    | MSG/MAG |
|--------------|----------|--------|-------|----------|-------|--------|----------|-------|-------|----------|-------|----|---------|
|              | Mag.     | Ang.   | dB    | Mag.     | Ang.  | dB     | Mag.     | Ang.  | dB    | Mag.     | Ang.  | dB |         |
| 0.1          | 0.797    | -16.4  | 27.38 | 23.399   | 171   | -33.98 | 0.02     | 79.2  | 0.66  | -7.8     | 35.91 |    |         |
| 0.5          | 0.793    | -65.7  | 25.70 | 19.285   | 144.4 | -32.40 | 0.024    | 58    | 0.578 | -31.2    | 29.05 |    |         |
| 0.9          | 0.809    | -100.8 | 23.80 | 15.495   | 124.6 | -29.12 | 0.035    | 41.9  | 0.463 | -49.1    | 26.46 |    |         |
| 1            | 0.81     | -107.5 | 23.31 | 14.637   | 120.7 | -28.64 | 0.037    | 38.7  | 0.437 | -52.8    | 25.97 |    |         |
| 1.5          | 0.826    | -133.2 | 21.00 | 11.22    | 104.6 | -27.33 | 0.043    | 26.7  | 0.331 | -68.1    | 24.17 |    |         |
| 1.9          | 0.83     | -147   | 19.39 | 9.32     | 95    | -26.94 | 0.045    | 19.6  | 0.266 | -76.9    | 23.16 |    |         |
| 2            | 0.836    | -150.5 | 18.98 | 8.891    | 92.4  | -26.74 | 0.046    | 18.4  | 0.254 | -80.9    | 22.86 |    |         |
| 2.4          | 0.839    | -160.4 | 17.56 | 7.551    | 84.7  | -26.56 | 0.047    | 13.5  | 0.215 | -89.5    | 22.06 |    |         |
| 3            | 0.844    | -171.8 | 15.74 | 6.125    | 74.9  | -26.38 | 0.048    | 8     | 0.177 | -102.1   | 21.06 |    |         |
| 3.5          | 0.847    | -179.5 | 14.47 | 5.288    | 67.7  | -26.20 | 0.049    | 4.3   | 0.16  | -109.9   | 20.33 |    |         |
| 3.9          | 0.845    | 175.4  | 13.49 | 4.726    | 61.9  | -26.20 | 0.049    | 1     | 0.16  | -117.9   | 19.84 |    |         |
| 4            | 0.856    | 174.2  | 13.15 | 4.547    | 62.4  | -26.20 | 0.049    | 2.3   | 0.142 | -126.1   | 19.68 |    |         |
| 4.5          | 0.854    | 168.1  | 12.29 | 4.116    | 55.4  | -26.20 | 0.049    | -1    | 0.144 | -128.7   | 19.24 |    |         |
| 5            | 0.856    | 162.7  | 11.42 | 3.726    | 49.9  | -26.02 | 0.05     | -3.3  | 0.139 | -134.7   | 18.72 |    |         |
| 5.1          | 0.856    | 161.6  | 11.28 | 3.664    | 48.6  | -26.02 | 0.05     | -3.9  | 0.138 | -135.2   | 18.65 |    |         |
| 5.2          | 0.856    | 160.6  | 11.12 | 3.598    | 47.4  | -26.02 | 0.05     | -4.5  | 0.138 | -135.4   | 18.57 |    |         |
| 5.3          | 0.856    | 159.6  | 10.96 | 3.533    | 46.2  | -25.85 | 0.051    | -5    | 0.141 | -136.1   | 18.41 |    |         |
| 5.4          | 0.856    | 158.5  | 10.81 | 3.47     | 45    | -25.85 | 0.051    | -5.6  | 0.142 | -137.7   | 18.33 |    |         |
| 5.5          | 0.855    | 157.5  | 10.65 | 3.409    | 43.8  | -25.85 | 0.051    | -6.2  | 0.141 | -138.7   | 18.25 |    |         |
| 5.6          | 0.855    | 156.5  | 10.51 | 3.352    | 42.5  | -25.85 | 0.051    | -6.9  | 0.142 | -138.9   | 18.18 |    |         |
| 5.7          | 0.857    | 155.5  | 10.35 | 3.291    | 41.3  | -25.85 | 0.051    | -7.5  | 0.145 | -139.7   | 18.10 |    |         |
| 5.8          | 0.857    | 154.5  | 10.19 | 3.231    | 40    | -25.85 | 0.051    | -8.3  | 0.147 | -141     | 18.02 |    |         |
| 6            | 0.861    | 153.4  | 9.75  | 3.072    | 37.5  | -26.02 | 0.05     | -9.4  | 0.16  | -143.5   | 17.88 |    |         |
| 7            | 0.87     | 143.3  | 8.42  | 2.635    | 27    | -26.02 | 0.05     | -13.4 | 0.167 | -158.6   | 17.22 |    |         |
| 8            | 0.862    | 133.3  | 7.25  | 2.305    | 15.8  | -25.35 | 0.054    | -17.9 | 0.16  | -172.5   | 16.30 |    |         |
| 9            | 0.869    | 122.3  | 6.36  | 2.079    | 5.1   | -25.85 | 0.051    | -24.1 | 0.174 | 164.9    | 13.27 |    |         |
| 10           | 0.873    | 111.8  | 5.38  | 1.858    | -7.7  | -25.19 | 0.055    | -29.8 | 0.204 | 139.2    | 11.66 |    |         |
| 11           | 0.883    | 101.5  | 4.13  | 1.608    | -18.8 | -26.02 | 0.05     | -34.2 | 0.228 | 119.6    | 11.72 |    |         |
| 12           | 0.897    | 91.8   | 3.23  | 1.451    | -29.8 | -25.68 | 0.052    | -40.7 | 0.284 | 113      | 11.59 |    |         |
| 13           | 0.911    | 83.3   | 2.18  | 1.285    | -41.4 | -26.02 | 0.05     | -45.9 | 0.341 | 105.1    | 10.70 |    |         |
| 14           | 0.914    | 75.5   | 1.01  | 1.123    | -52.2 | -26.20 | 0.049    | -52.4 | 0.392 | 99.7     | 9.93  |    |         |
| 15           | 0.92     | 68.6   | -0.10 | 0.989    | -61.5 | -26.94 | 0.045    | -56   | 0.433 | 95.9     | 8.07  |    |         |
| 16           | 0.906    | 60.2   | -1.13 | 0.878    | -71.3 | -26.94 | 0.045    | -61.6 | 0.469 | 91       | 6.48  |    |         |
| 17           | 0.893    | 52.4   | -2.17 | 0.779    | -80.5 | -26.94 | 0.045    | -65.5 | 0.502 | 84.9     | 5.78  |    |         |
| 18           | 0.904    | 44.3   | -3.30 | 0.684    | -90.4 | -28.18 | 0.039    | -64.6 | 0.533 | 75.3     | 13.27 |    |         |

## Typical Noise Parameters, $V_{DS} = 4V$ , $I_{DS} = 60\text{ mA}$

| Freq<br>GHz | $F_{min}$<br>dB | $\Gamma_{opt}$<br>Mag. | $\Gamma_{opt}$<br>Ang. | $R_{n/50}$ | NF @<br>50 dB |
|-------------|-----------------|------------------------|------------------------|------------|---------------|
| 0.9         | 0.86            | 0.1                    | -133.6                 | 0.06       | 0.83          |
| 1.5         | 0.94            | 0.23                   | -175.5                 | 0.06       | 1.01          |
| 1.9         | 1               | 0.26                   | -178.3                 | 0.06       | 1.12          |
| 2           | 1.03            | 0.27                   | -179.6                 | 0.06       | 1.15          |
| 2.4         | 1.08            | 0.3                    | 178.7                  | 0.06       | 1.27          |
| 3           | 1.17            | 0.36                   | -178.1                 | 0.06       | 1.41          |
| 3.5         | 1.25            | 0.4                    | -173.8                 | 0.06       | 1.59          |
| 3.9         | 1.3             | 0.43                   | -171.7                 | 0.06       | 1.7           |
| 4.5         | 1.39            | 0.47                   | -167                   | 0.06       | 1.9           |
| 5           | 1.47            | 0.48                   | -164.8                 | 0.06       | 2.08          |
| 5.2         | 1.5             | 0.49                   | -163                   | 0.06       | 2.1           |
| 5.5         | 1.53            | 0.5                    | -160.2                 | 0.07       | 2.18          |
| 5.8         | 1.6             | 0.51                   | -158.6                 | 0.07       | 2.27          |
| 6           | 1.62            | 0.53                   | -157.1                 | 0.07       | 2.33          |
| 7           | 1.76            | 0.54                   | -149.2                 | 0.1        | 2.63          |
| 8           | 1.93            | 0.53                   | -139.8                 | 0.16       | 2.94          |
| 9           | 2.08            | 0.55                   | -126.4                 | 0.28       | 3.25          |
| 10          | 2.22            | 0.61                   | -115.6                 | 0.37       | 3.61          |

### Note:

1. S Parameter is measured on a microstrip line made on 0.025 inch thick alumina carrier. The input reference plane is at the end of the gate lead. The output reference plane is at the end of the drain lead.

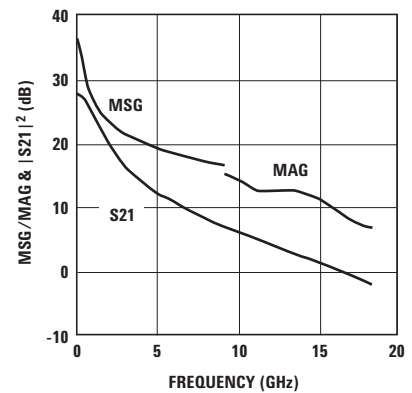


Figure 22. MSG/MAG &  $|S_{21}|^2$  vs. Frequency at 4V, 60 mA.

# MGA-425P8 Typical Scattering Parameters (at 25°C, $V_{DS} = 4V$ , $I_{DS} = 65\text{ mA}$ )

| Freq.<br>GHz | $S_{11}$ |        |       | $S_{21}$ |       |        | $S_{12}$ |       |       | $S_{22}$ |       |    | MSG/MAG |
|--------------|----------|--------|-------|----------|-------|--------|----------|-------|-------|----------|-------|----|---------|
|              | Mag.     | Ang.   | dB    | Mag.     | Ang.  | dB     | Mag.     | Ang.  | dB    | Mag.     | Ang.  | dB |         |
| 0.1          | 0.796    | -16.5  | 27.47 | 23.632   | 171   | -33.98 | 0.02     | 79.6  | 0.657 | -7.8     | 35.95 |    |         |
| 0.5          | 0.793    | -66    | 25.79 | 19.472   | 144.3 | -32.40 | 0.024    | 57.9  | 0.575 | -31.2    | 29.09 |    |         |
| 0.9          | 0.809    | -101.1 | 23.88 | 15.63    | 124.5 | -29.12 | 0.035    | 41.8  | 0.46  | -49      | 26.50 |    |         |
| 1            | 0.811    | -107.8 | 23.38 | 14.76    | 120.6 | -28.64 | 0.037    | 38.7  | 0.434 | -52.7    | 26.01 |    |         |
| 1.5          | 0.826    | -133.4 | 21.06 | 11.304   | 104.5 | -27.33 | 0.043    | 26.7  | 0.329 | -67.8    | 24.20 |    |         |
| 1.9          | 0.832    | -147.3 | 19.45 | 9.386    | 94.9  | -26.94 | 0.045    | 19.6  | 0.264 | -76.5    | 23.19 |    |         |
| 2            | 0.836    | -150.6 | 19.04 | 8.956    | 92.3  | -26.94 | 0.045    | 18.3  | 0.252 | -80.4    | 22.99 |    |         |
| 2.4          | 0.839    | -160.6 | 17.62 | 7.605    | 84.7  | -26.74 | 0.046    | 13.6  | 0.213 | -88.9    | 22.18 |    |         |
| 3            | 0.846    | -172   | 15.80 | 6.169    | 74.8  | -26.56 | 0.047    | 8.1   | 0.176 | -101.5   | 21.18 |    |         |
| 3.5          | 0.848    | -179.6 | 14.53 | 5.326    | 67.7  | -26.38 | 0.048    | 4.4   | 0.159 | -109.3   | 20.45 |    |         |
| 3.9          | 0.846    | 175.3  | 13.55 | 4.759    | 61.9  | -26.38 | 0.048    | 1.2   | 0.159 | -117.3   | 19.96 |    |         |
| 4            | 0.856    | 174    | 13.21 | 4.578    | 62.3  | -26.38 | 0.048    | 2.5   | 0.141 | -125.6   | 19.79 |    |         |
| 4.5          | 0.854    | 168    | 12.35 | 4.144    | 55.4  | -26.38 | 0.048    | -0.8  | 0.142 | -128     | 19.36 |    |         |
| 5            | 0.857    | 162.6  | 11.49 | 3.752    | 49.9  | -26.20 | 0.049    | -2.9  | 0.137 | -133.9   | 18.84 |    |         |
| 5.1          | 0.857    | 161.6  | 11.34 | 3.688    | 48.7  | -26.02 | 0.05     | -3.5  | 0.136 | -134.4   | 18.68 |    |         |
| 5.2          | 0.857    | 160.5  | 11.18 | 3.623    | 47.5  | -26.02 | 0.05     | -4.1  | 0.137 | -134.5   | 18.60 |    |         |
| 5.3          | 0.857    | 159.5  | 11.02 | 3.556    | 46.2  | -26.02 | 0.05     | -4.7  | 0.139 | -135.2   | 18.52 |    |         |
| 5.4          | 0.857    | 158.5  | 10.87 | 3.494    | 45    | -26.02 | 0.05     | -5.2  | 0.141 | -136.9   | 18.44 |    |         |
| 5.5          | 0.856    | 157.5  | 10.71 | 3.431    | 43.8  | -26.02 | 0.05     | -5.8  | 0.14  | -137.8   | 18.36 |    |         |
| 5.6          | 0.856    | 156.4  | 10.57 | 3.375    | 42.5  | -26.02 | 0.05     | -6.5  | 0.141 | -138     | 18.29 |    |         |
| 5.7          | 0.858    | 155.4  | 10.40 | 3.312    | 41.3  | -26.02 | 0.05     | -7.1  | 0.144 | -138.8   | 18.21 |    |         |
| 5.8          | 0.857    | 154.5  | 10.25 | 3.253    | 40    | -26.02 | 0.05     | -7.8  | 0.146 | -140.1   | 18.13 |    |         |
| 6            | 0.862    | 153.4  | 9.81  | 3.093    | 37.5  | -26.20 | 0.049    | -9    | 0.159 | -142.7   | 18.00 |    |         |
| 7            | 0.87     | 143.2  | 8.48  | 2.654    | 27.1  | -26.20 | 0.049    | -12.9 | 0.166 | -157.9   | 17.34 |    |         |
| 8            | 0.863    | 133.2  | 7.31  | 2.321    | 15.8  | -25.51 | 0.053    | -17.4 | 0.159 | -171.8   | 16.41 |    |         |
| 9            | 0.869    | 122.2  | 6.42  | 2.093    | 5.2   | -25.85 | 0.051    | -23.6 | 0.173 | 165.5    | 14.43 |    |         |
| 10           | 0.874    | 111.7  | 5.45  | 1.872    | -7.6  | -25.19 | 0.055    | -29.2 | 0.203 | 139.6    | 13.43 |    |         |
| 11           | 0.884    | 101.5  | 4.18  | 1.618    | -18.8 | -26.20 | 0.049    | -33.5 | 0.227 | 119.9    | 11.73 |    |         |
| 12           | 0.898    | 91.8   | 3.29  | 1.461    | -29.7 | -25.85 | 0.051    | -40   | 0.282 | 113.3    | 11.79 |    |         |
| 13           | 0.912    | 83.3   | 2.24  | 1.294    | -41.3 | -26.02 | 0.05     | -45.3 | 0.339 | 105.3    | 11.74 |    |         |
| 14           | 0.915    | 75.5   | 1.08  | 1.132    | -52.1 | -26.20 | 0.049    | -51.6 | 0.39  | 100      | 10.84 |    |         |
| 15           | 0.921    | 68.6   | -0.03 | 0.997    | -61.3 | -26.94 | 0.045    | -55.2 | 0.431 | 96.1     | 10.05 |    |         |
| 16           | 0.906    | 60.2   | -1.07 | 0.884    | -71.2 | -26.94 | 0.045    | -60.9 | 0.468 | 91.3     | 8.12  |    |         |
| 17           | 0.894    | 52.4   | -2.09 | 0.786    | -80.3 | -26.94 | 0.045    | -64.8 | 0.501 | 85.2     | 6.59  |    |         |
| 18           | 0.905    | 44.4   | -3.25 | 0.688    | -90.2 | -28.18 | 0.039    | -63.8 | 0.532 | 75.5     | 5.86  |    |         |

## Typical Noise Parameters, $V_{DS} = 4V$ , $I_{DS} = 65\text{ mA}$

| Freq<br>GHz | $F_{min}$<br>dB | $\Gamma_{opt}$<br>Mag. | $\Gamma_{opt}$<br>Ang. | $R_{n/50}$ | NF @<br>50 dB |
|-------------|-----------------|------------------------|------------------------|------------|---------------|
| 0.9         | 0.87            | 0.1                    | -136.8                 | 0.06       | 0.85          |
| 1.5         | 0.97            | 0.23                   | -173.5                 | 0.06       | 1.01          |
| 1.9         | 1.03            | 0.26                   | -176.5                 | 0.06       | 1.14          |
| 2           | 1.05            | 0.27                   | -177.5                 | 0.07       | 1.16          |
| 2.4         | 1.1             | 0.3                    | 179.7                  | 0.07       | 1.27          |
| 3           | 1.19            | 0.36                   | -177.7                 | 0.06       | 1.41          |
| 3.5         | 1.27            | 0.39                   | -173.7                 | 0.06       | 1.61          |
| 3.9         | 1.35            | 0.43                   | -171.2                 | 0.06       | 1.72          |
| 4.5         | 1.45            | 0.47                   | -167.3                 | 0.06       | 1.92          |
| 5           | 1.5             | 0.48                   | -164                   | 0.07       | 2.06          |
| 5.2         | 1.52            | 0.49                   | -162.4                 | 0.07       | 2.12          |
| 5.5         | 1.57            | 0.5                    | -159.9                 | 0.07       | 2.23          |
| 5.8         | 1.63            | 0.52                   | -158.2                 | 0.07       | 2.31          |
| 6           | 1.66            | 0.53                   | -156.4                 | 0.07       | 2.37          |
| 7           | 1.81            | 0.54                   | -148.6                 | 0.11       | 2.68          |
| 8           | 2               | 0.54                   | -139.3                 | 0.17       | 3.04          |
| 9           | 2.13            | 0.56                   | -125.4                 | 0.29       | 3.29          |
| 10          | 2.28            | 0.62                   | -115.1                 | 0.39       | 3.59          |

### Note:

1. S Parameter is measured on a microstrip line made on 0.025 inch thick alumina carrier. The input reference plane is at the end of the gate lead. The output reference plane is at the end of the drain lead.

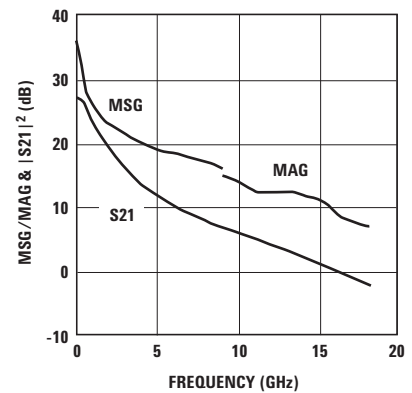


Figure 23. MSG/MAG &  $|S_{21}|^2$  vs. Frequency at 4V, 65 mA.

## Device Models

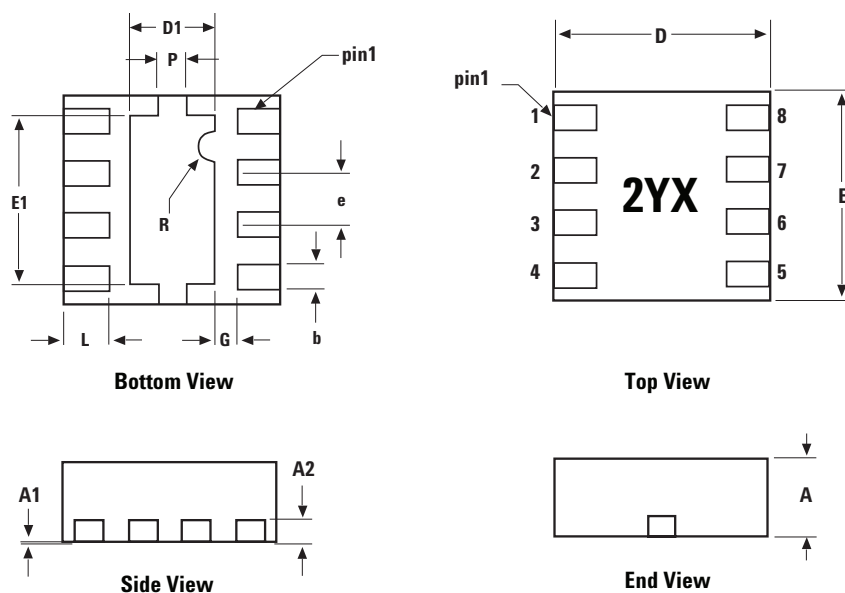
Refer to Avago's Web Site

[www.Avagotech.com/view/rf](http://www.Avagotech.com/view/rf)

## Ordering Information

| Part Number   | No. of Devices | Container      |
|---------------|----------------|----------------|
| MGA-425P8-TR1 | 3000           | 7" Reel        |
| MGA-425P8-TR2 | 10000          | 13" Reel       |
| MGA-425P8-BLK | 100            | antistatic bag |

## 2 x 2 LPCC (JEDEC DFP-N) Package Dimensions

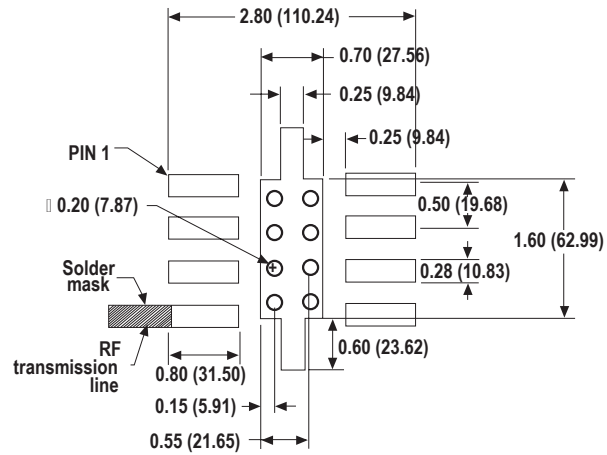


| SYMBOL | DIMENSIONS (mm) |           |       |
|--------|-----------------|-----------|-------|
|        | MIN.            | NOM.      | MAX.  |
| A      | 0.70            | 0.75      | 0.80  |
| A1     | 0               | 0.02      | 0.05  |
| A2     |                 | 0.203 REF |       |
| b      | 0.225           | 0.250     | 0.275 |
| D      | 1.9             | 2.0       | 2.1   |
| D1     | 0.65            | 0.80      | 0.95  |
| E      | 1.9             | 2.0       | 2.1   |
| E1     | 1.45            | 1.60      | 1.75  |
| e      |                 | 0.50 BSC  |       |
| L      |                 | 0.40 REF  |       |
| P      | 0.20            | 0.25      | 0.30  |
| R      |                 | 0.15 REF  |       |
| G      | 0.15            | 0.20      | 0.25  |

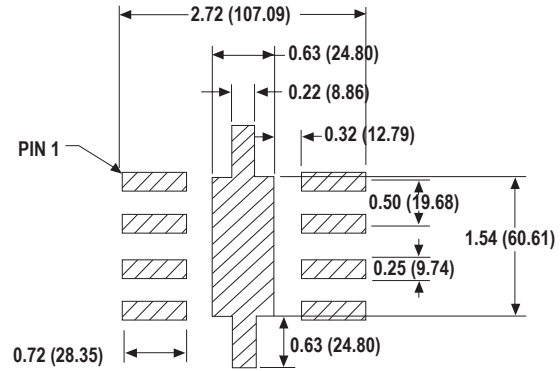
Dimensions are inclusive of plating.

Dimensions are exclusive of mold flash and metal burr.

## PCB Land Pattern and Stencil Design



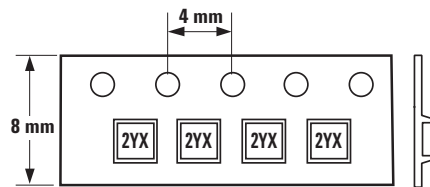
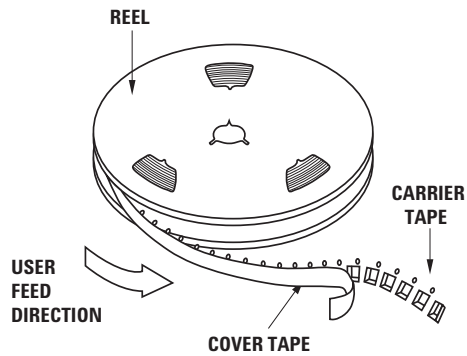
PCB Land Pattern (top view)



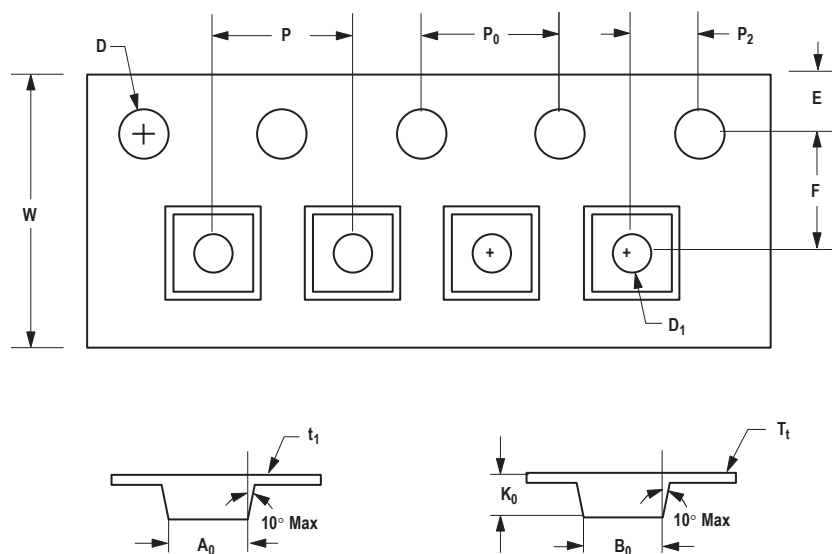
Stencil Layout (top view)

Notes: Typical stencil thickness is 5 mils.  
Measurements are in millimeters (mils).

## Device Orientation



## Tape Dimensions



| DESCRIPTION  |                                             | SYMBOL         | SIZE (mm)                  | SIZE (inches)                  |
|--------------|---------------------------------------------|----------------|----------------------------|--------------------------------|
| CAVITY       | LENGTH                                      | A <sub>0</sub> | 2.30 ± 0.05                | 0.091 ± 0.004                  |
|              | WIDTH                                       | B <sub>0</sub> | 2.30 ± 0.05                | 0.091 ± 0.004                  |
|              | DEPTH                                       | K <sub>0</sub> | 1.00 ± 0.05                | 0.039 ± 0.002                  |
|              | PITCH                                       | P              | 4.00 ± 0.10                | 0.157 ± 0.004                  |
|              | BOTTOM HOLE DIAMETER                        | D <sub>1</sub> | 1.00 + 0.25                | 0.039 + 0.002                  |
| PERFORATION  | DIAMETER                                    | D              | 1.50 ± 0.10                | 0.060 ± 0.004                  |
|              | PITCH                                       | P <sub>0</sub> | 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<br>8.00 - 0.10 | 0.315 ± 0.012<br>0.315 ± 0.004 |
|              | THICKNESS                                   | t <sub>1</sub> | 0.254 ± 0.02               | 0.010 ± 0.0008                 |
| COVER TAPE   | WIDTH                                       | C              | 5.4 ± 0.10                 | 0.205 ± 0.004                  |
|              | TAPE THICKNESS                              | T <sub>t</sub> | 0.062 ± 0.001              | 0.0025 ± 0.0004                |
| DISTANCE     | CAVITY TO PERFORATION<br>(WIDTH DIRECTION)  | F              | 3.50 ± 0.05                | 0.138 ± 0.002                  |
|              | CAVITY TO PERFORATION<br>(LENGTH DIRECTION) | P <sub>2</sub> | 2.00 ± 0.05                | 0.079 ± 0.002                  |

For product information and a complete list of distributors, please go to our web site: [www.avagotech.com](http://www.avagotech.com)

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