

# FLL300IL-1, FLL300IL-2, FLL300IL-3

## L-Band Medium & High Power GaAs FET

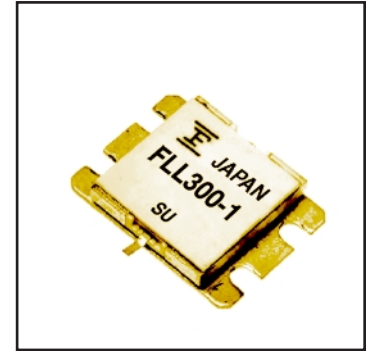
### FEATURES

- High Output Power:  $P_{1dB} = 44.5\text{dBm}$  (Typ.)
- High Gain:  $G_{1dB} = 12.0\text{dB}$  (Typ.) @ 1.8GHz (FLL300IL-2)
- High PAE:  $\eta_{add} = 44\%$  (Typ.)
- Proven Reliability
- Hermetically Sealed Package

### DESCRIPTION

The FLL300IL-1, FLL300IL-2, FLL300IL-3 are Power GaAs FETs that are specifically designed to provide high power at L-Band frequencies with gain, linearity and efficiency superior to that of silicon devices. The performance in multitone environments for Class AB operation make them ideally suited for base station applications.

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



### ABSOLUTE MAXIMUM RATING (Ambient Temperature $T_a=25^\circ\text{C}$ )

| Item                    | Symbol    | Condition                | Rating      | Unit             |
|-------------------------|-----------|--------------------------|-------------|------------------|
| Drain-Source Voltage    | $V_{DS}$  |                          | 15          | V                |
| Gate-Source Voltage     | $V_{GS}$  |                          | -5          | V                |
| Total Power Dissipation | $P_T$     | $T_C = 25^\circ\text{C}$ | 100         | W                |
| Storage Temperature     | $T_{stg}$ |                          | -65 to +175 | $^\circ\text{C}$ |
| Channel Temperature     | $T_{ch}$  |                          | 175         | $^\circ\text{C}$ |

Fujitsu recommends the following conditions for the reliable operation of GaAs FETs:

1. The drain-source operating voltage ( $V_{DS}$ ) should not exceed 10 volts.
2. The forward and reverse gate currents should not exceed 80.4 and -17.4 mA respectively with gate resistance of  $25\Omega$ .
3. The operating channel temperature ( $T_{ch}$ ) should not exceed  $145^\circ\text{C}$ .

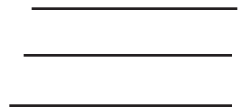
### ELECTRICAL CHARACTERISTICS (Ambient Temperature $T_a=25^\circ\text{C}$ )

| Item                          | Symbol          | Test Conditions*   | Limit |      |      | Unit                      |          |
|-------------------------------|-----------------|--|-------|------|------|---------------------------|----------|
|                               |                 |  | Min.  | Typ. | Max. |                           |          |
| Saturated Drain Current       | $I_{DSS}$       | $V_{DS} = 5\text{V}, V_{GS} = 0\text{V}$                       | -     | 12   | 16   | A                         |          |
| Transconductance              | $g_m$           | $V_{DS} = 5\text{V}, I_{DS} = 7200\text{mA}$                   | -     | 6000 | -    | mS                        |          |
| Pinch-off Voltage             | $V_p$           | $V_{DS} = 5\text{V}, I_{DS} = 720\text{mA}$                    | -1.0  | -2.0 | -3.5 | V                         |          |
| Gate Source Breakdown Voltage | $V_{GSO}$       | $I_{GS} = -720\mu\text{A}$                                     | -5    | -    | -    | V                         |          |
| Output Power at 1dB G.C.P.    | FLL300IL-1      | $V_{DS} = 10\text{V}$<br>$I_{DS} = 0.5 I_{DSS}$ (Typ.)         | 43.0  | 44.5 | -    | dBm                       |          |
|                               | FLL300IL-2      |  |       |      |      |                           | f=900MHz |
|                               | FLL300IL-3      |  |       |      |      |                           | f=1.8GHz |
| Power Gain at 1dB G.C.P.      | FLL300IL-1      | $V_{DS} = 10\text{V}$<br>$I_{DS} = 0.5 I_{DSS}$ (Typ.)         | 11.0  | 13.0 | -    | dB                        |          |
|                               | FLL300IL-2      |  |       |      |      |                           | f=2.6GHz |
|                               | FLL300IL-3      |  |       |      |      |                           | f=900MHz |
| Drain Current                 | $I_{dsr}$       | $V_{DS} = 10\text{V}$  | -     | 6.0  | 8.0  | A                         |          |
| Power added Efficiency        | $\eta_{add}$    | $I_{DS} = 0.5 I_{DSS}$ (Typ.)                                  | -     | 44   | -    | %                         |          |
| Thermal Resistance            | $R_{th}$        | Channel to Case  | -     | 1.1  | 1.5  | $^\circ\text{C}/\text{W}$ |          |
| Channel Temperature Rise      | $\Delta T_{ch}$ | $(10\text{V} \times I_{dsr} - P_{out} + P_{in}) \times R_{th}$ | -     | -    | 80   | $^\circ\text{C}$          |          |

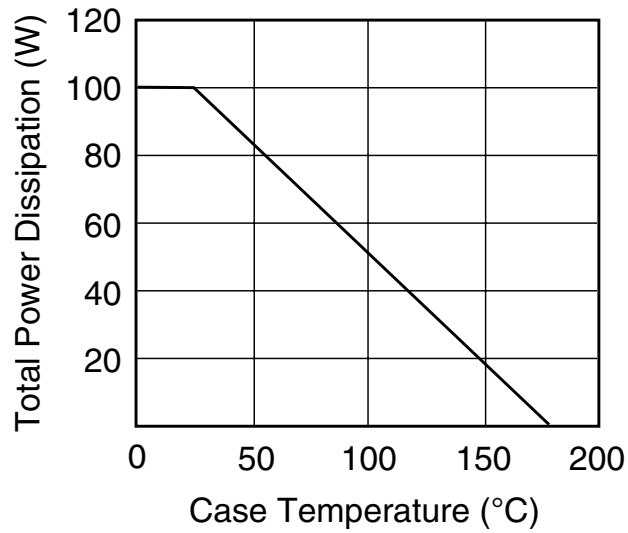
### CASE STYLE: IL

G.C.P.: Gain Compression Point

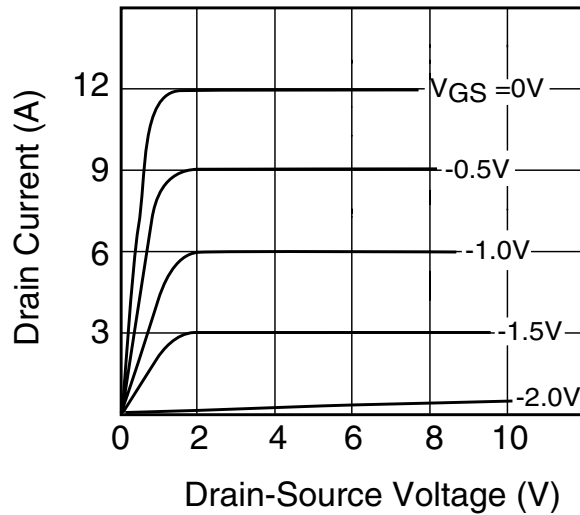
\* Under fixed VGS bias condition



### POWER DERATING CURVE

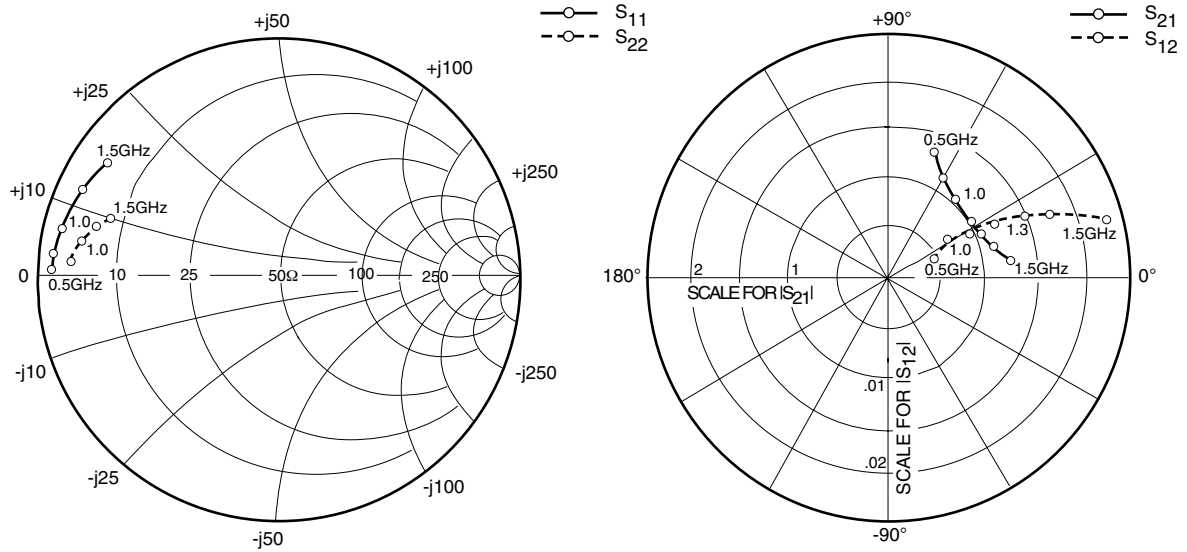


### DRAIN CURRENT vs. DRAIN-SOURCE VOLTAGE



# FLL300IL-1

## L-Band Medium & High Power GaAs FET

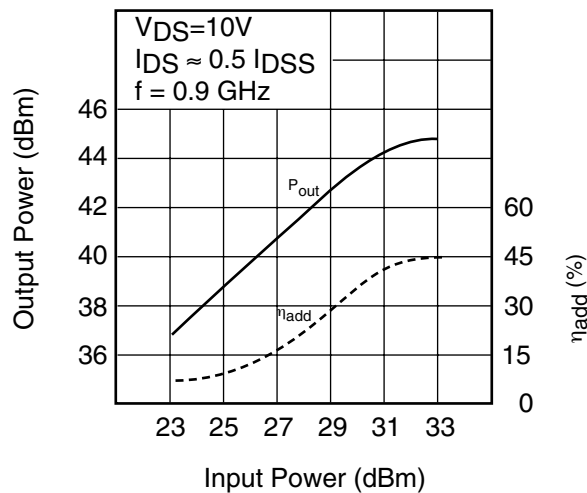


### S-PARAMETERS

$V_{DS} = 10V, I_{DS} = 6000mA$

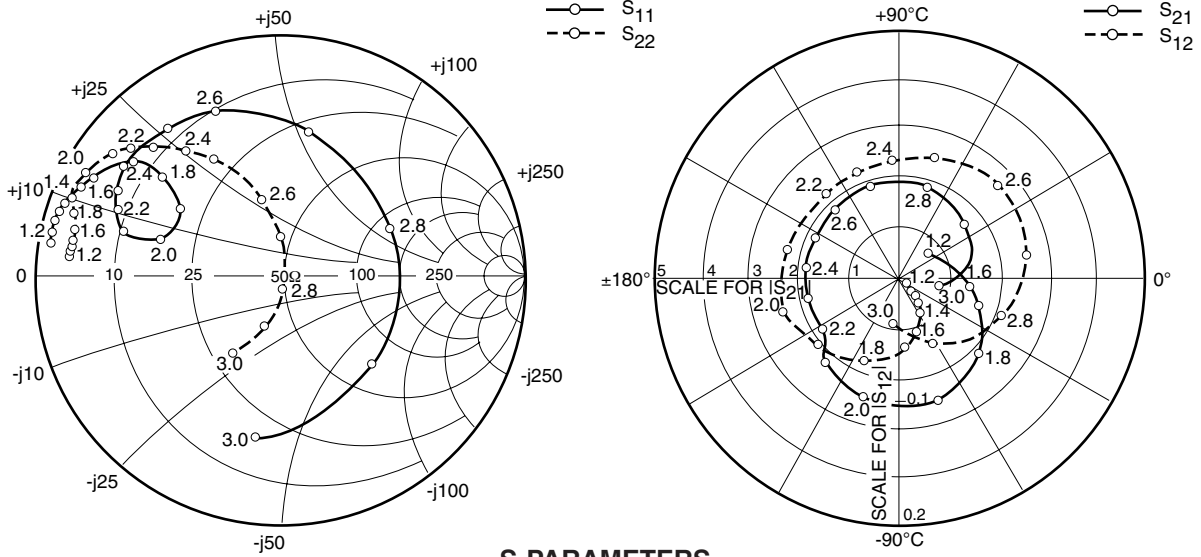
| FREQUENCY<br>(MHZ) | S11  |       | S21   |      | S12  |      | S22  |       |
|--------------------|------|-------|-------|------|------|------|------|-------|
|                    | MAG  | ANG   | MAG   | ANG  | MAG  | ANG  | MAG  | ANG   |
| 500                | .961 | 176.7 | 1.318 | 70.0 | .005 | 26.1 | .889 | 174.0 |
| 600                | .957 | 174.7 | 1.162 | 64.9 | .005 | 26.6 | .884 | 173.0 |
| 700                | .956 | 172.5 | 1.053 | 59.9 | .006 | 33.0 | .880 | 171.7 |
| 800                | .955 | 170.6 | .989  | 55.1 | .007 | 32.2 | .871 | 170.5 |
| 900                | .948 | 168.2 | .951  | 49.6 | .008 | 28.6 | .865 | 169.5 |
| 1000               | .943 | 166.0 | .944  | 44.5 | .009 | 25.7 | .855 | 167.7 |
| 1100               | .933 | 161.9 | .952  | 37.9 | .010 | 32.6 | .841 | 167.0 |
| 1200               | .923 | 158.8 | .975  | 31.7 | .012 | 25.2 | .828 | 165.1 |
| 1300               | .910 | 155.1 | 1.021 | 24.7 | .015 | 23.1 | .810 | 163.3 |
| 1400               | .898 | 151.0 | 1.094 | 16.8 | .017 | 19.7 | .789 | 161.1 |
| 1500               | .875 | 145.8 | 1.182 | 8.4  | .023 | 15.1 | .760 | 158.9 |

### OUTPUT POWER vs. INPUT POWER



# FLL300IL-2

## L-Band Medium & High Power GaAs FET

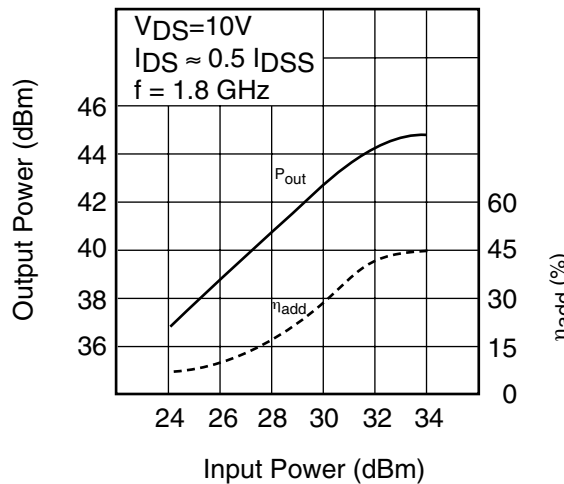


### S-PARAMETERS

$V_{DS} = 10V, I_{DS} = 6000mA$

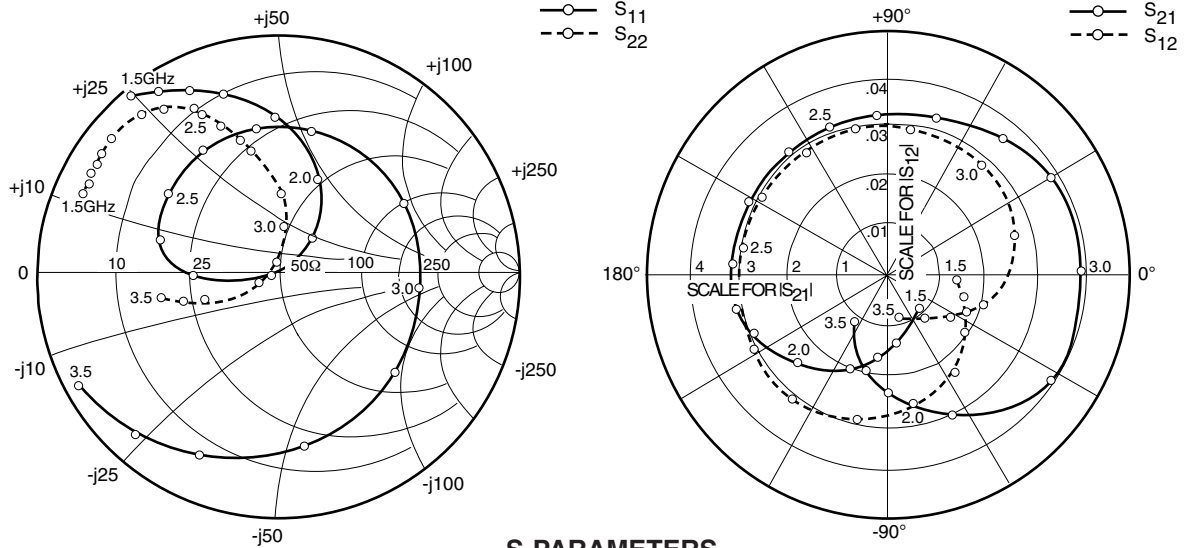
| FREQUENCY<br>(MHZ) | S11  |        | S21   |        | S12  |        | S22  |        |
|--------------------|------|--------|-------|--------|------|--------|------|--------|
|                    | MAG  | ANG    | MAG   | ANG    | MAG  | ANG    | MAG  | ANG    |
| 1000               | .953 | 167.2  | .788  | 34.0   | .003 | -32.3  | .869 | 169.9  |
| 1100               | .944 | 164.6  | .811  | 28.0   | .005 | -31.6  | .864 | 169.0  |
| 1200               | .933 | 161.0  | .882  | 21.5   | .006 | -50.9  | .859 | 167.9  |
| 1300               | .923 | 157.3  | .997  | 14.0   | .007 | -50.6  | .857 | 166.2  |
| 1400               | .903 | 153.3  | 1.169 | 5.3    | .008 | -60.5  | .850 | 165.2  |
| 1500               | .864 | 148.3  | 1.419 | -6.9   | .010 | -71.2  | .853 | 164.7  |
| 1600               | .788 | 142.2  | 1.752 | -23.0  | .014 | -86.6  | .868 | 162.7  |
| 1700               | .654 | 137.8  | 2.179 | -45.3  | .018 | -109.7 | .889 | 160.0  |
| 1800               | .506 | 144.5  | 2.526 | -74.2  | .023 | -136.9 | .923 | 155.3  |
| 1900               | .522 | 161.1  | 2.523 | -104.9 | .024 | -167.7 | .907 | 148.1  |
| 2000               | .652 | 162.2  | 2.249 | -131.4 | .022 | 165.4  | .852 | 141.8  |
| 2100               | .716 | 154.3  | 1.946 | -149.5 | .021 | 148.1  | .789 | 136.7  |
| 2200               | .746 | 150.0  | 1.984 | -167.8 | .023 | 129.7  | .730 | 130.5  |
| 2300               | .771 | 139.4  | 1.902 | 171.9  | .022 | 110.3  | .644 | 124.2  |
| 2400               | .763 | 125.1  | 1.887 | 152.6  | .023 | 91.3   | .555 | 117.9  |
| 2500               | .722 | 106.2  | 1.935 | 133.4  | .025 | 71.1   | .460 | 113.5  |
| 2600               | .626 | 75.9   | 1.998 | 106.5  | .027 | 41.9   | .323 | 103.1  |
| 2700               | .508 | 23.4   | 1.932 | 73.3   | .026 | 9.1    | .161 | 89.3   |
| 2800               | .544 | -45.8  | 1.613 | 36.7   | .021 | -25.1  | .031 | -62.8  |
| 2900               | .686 | -94.8  | 1.136 | 3.4    | .016 | -63.2  | .210 | -105.9 |
| 3000               | .791 | -123.6 | .726  | -22.0  | .010 | -90.8  | .370 | -118.5 |

### OUTPUT POWER vs. INPUT POWER



# FLL300IL-3

## L-Band Medium & High Power GaAs FET

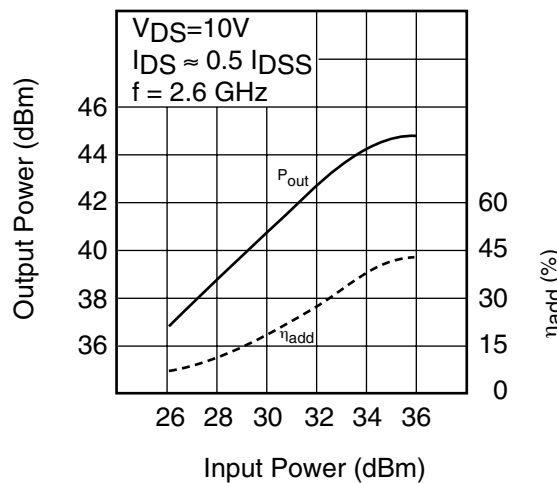


### S-PARAMETERS

$V_{DS} = 10V, I_{DS} = 6000mA$

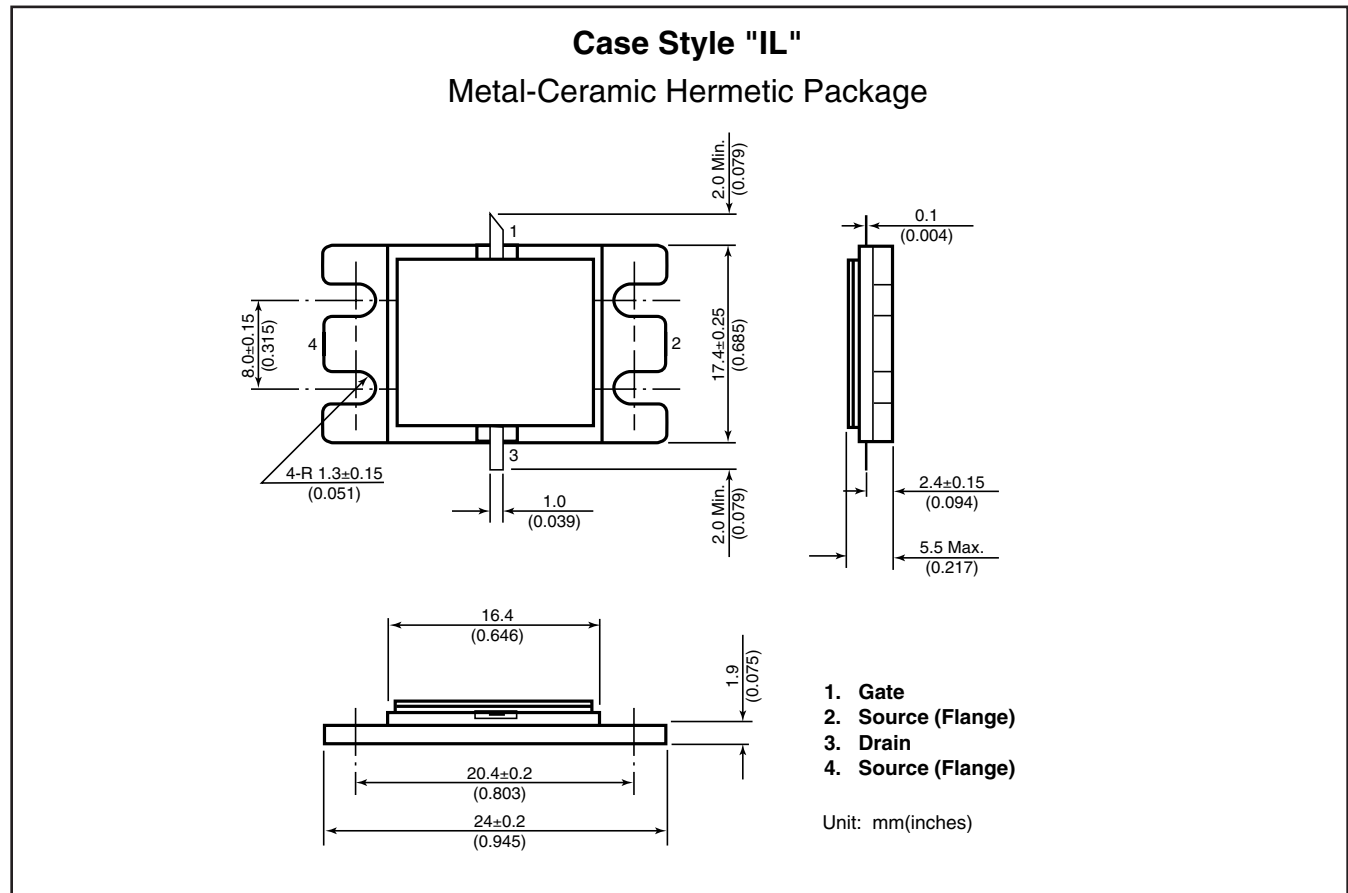
| FREQUENCY<br>(MHZ) | S11  |        | S21   |        | S12  |        | S22  |        |
|--------------------|------|--------|-------|--------|------|--------|------|--------|
|                    | MAG  | ANG    | MAG   | ANG    | MAG  | ANG    | MAG  | ANG    |
| 1500               | .902 | 130.6  | 1.169 | -3.1   | .009 | -55.7  | .854 | 155.0  |
| 1600               | .872 | 123.3  | 1.324 | -13.4  | .010 | -69.8  | .852 | 153.2  |
| 1700               | .829 | 114.2  | 1.539 | -25.8  | .012 | -81.5  | .847 | 150.7  |
| 1800               | .756 | 102.9  | 1.824 | -40.5  | .016 | -96.1  | .847 | 148.5  |
| 1900               | .645 | 88.8   | 2.199 | -57.7  | .019 | -113.4 | .854 | 146.1  |
| 2000               | .463 | 71.7   | 2.604 | -78.8  | .024 | -134.7 | .860 | 142.2  |
| 2100               | .217 | 54.5   | 2.939 | -103.5 | .028 | -160.3 | .867 | 137.4  |
| 2200               | .065 | 173.9  | 3.080 | -129.4 | .031 | 173.7  | .848 | 131.6  |
| 2300               | .285 | 175.2  | 3.055 | -153.9 | .032 | 150.2  | .808 | 125.3  |
| 2400               | .441 | 157.4  | 2.938 | -176.2 | .032 | 128.8  | .752 | 119.7  |
| 2500               | .523 | 137.6  | 2.843 | 166.5  | .032 | 110.8  | .700 | 119.6  |
| 2600               | .560 | 119.7  | 2.768 | 146.9  | .033 | 91.6   | .628 | 113.6  |
| 2700               | .583 | 99.3   | 2.791 | 126.7  | .035 | 72.2   | .550 | 109.0  |
| 2800               | .578 | 72.8   | 2.840 | 104.2  | .036 | 49.8   | .461 | 102.5  |
| 2900               | .564 | 37.9   | 2.854 | 79.1   | .039 | 28.0   | .348 | 94.4   |
| 3000               | .564 | -4.7   | 2.789 | 51.3   | .039 | 0.5    | .208 | 91.8   |
| 3100               | .605 | -44.2  | 2.536 | 20.3   | .039 | -33.2  | .081 | 125.9  |
| 3200               | .731 | -80.2  | 1.981 | -9.0   | .031 | -63.6  | .132 | -167.4 |
| 3300               | .813 | -109.5 | 1.502 | -32.7  | .023 | -88.0  | .253 | -158.6 |
| 3400               | .864 | -131.0 | 1.130 | -52.7  | .019 | -106.9 | .345 | -162.2 |
| 3500               | .895 | -147.1 | .853  | -69.8  | .013 | -121.2 | .408 | -168.1 |

### OUTPUT POWER vs. INPUT POWER



# FLL300IL-1, FLL300IL-2, FLL300IL-3

## L-Band Medium & High Power GaAs FET



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