

### FEATURES

- **HIGH OUTPUT POWER:** 10 W
- **HIGH LINEAR GAIN:** 10.5 dB
- **HIGH EFFICIENCY:** 40%
- **INDUSTRY STANDARD PACKAGING**

### DESCRIPTION

The NE6501077 is a medium power GaAs MESFET designed for up to a 10 W output stage or as a driver for high power devices. The device has no internal matching and can be used from UHF frequencies up to 3.0 GHz. The chips used in this series offer superior reliability and consistent performance for which NEC microwave semiconductors are known.

The NE6501077 transistors are manufactured to NEC's stringent quality assurance standards to ensure highest reliability and consistent superior performance.

### RECOMMENDED OPERATING LIMITS

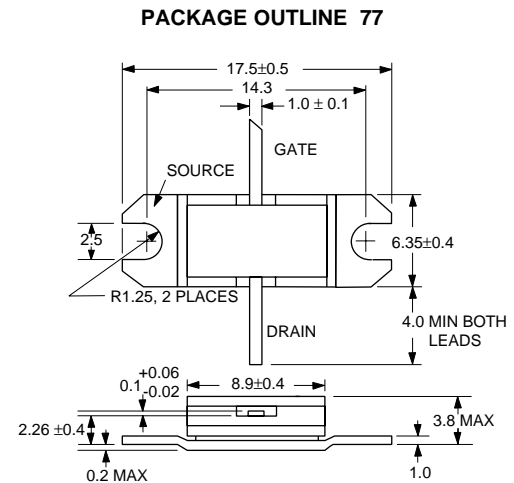
| SYMBOLS           | PARAMETERS              | UNITS | MIN | TYP | MAX |
|-------------------|-------------------------|-------|-----|-----|-----|
| V <sub>DS</sub>   | Drain to Source Voltage | V     |     | 10  | 10  |
| T <sub>CH</sub>   | Channel Temperature     | °C    |     |     | 130 |
| G <sub>COMP</sub> | Gain Compression        | dB    |     |     | 3.0 |
| R <sub>G</sub>    | Gate Resistance         | Ω     |     |     | 100 |

### ABSOLUTE MAXIMUM RATINGS

(T<sub>c</sub> = 25 °C unless otherwise noted)

| SYMBOLS          | PARAMETERS              | UNITS | RATINGS     |
|------------------|-------------------------|-------|-------------|
| V <sub>DSX</sub> | Drain to Source Voltage | V     | 15          |
| V <sub>GDX</sub> | Gate to Drain Voltage   | V     | -18         |
| V <sub>GSX</sub> | Gate to Source Voltage  | V     | -12         |
| I <sub>DS</sub>  | Drain Current           | A     | 9.0         |
| I <sub>GS</sub>  | Gate Current            | mA    | 50          |
| P <sub>T</sub>   | Total Power Dissipation | W     | 50          |
| T <sub>CH</sub>  | Channel Temperature     | °C    | 175         |
| T <sub>STG</sub> | Storage Temperature     | °C    | -65 to +175 |

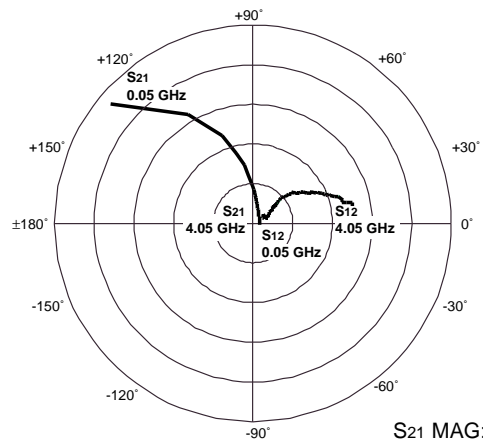
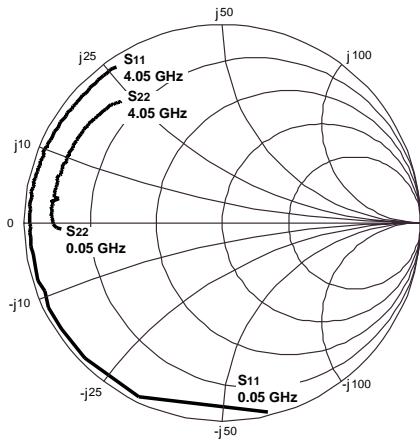
### OUTLINE DIMENSIONS (Units in mm)



### ELECTRICAL CHARACTERISTICS (T<sub>c</sub> = 25°C)

| PART NUMBER<br>PACKAGE OUTLINE |                  |                                |       | NE6501077<br>77 |      |      | TEST CONDITIONS  |
|--------------------------------|------------------|--------------------------------|-------|-----------------|------|------|--|
|                                | SYMBOLS          | CHARACTERISTICS                | UNITS | MIN             | TYP  | MAX  |  |
| Functional Characteristics     | P <sub>OUT</sub> | Power Out at Fixed Input Power | dBm   | 39.0            | 39.5 |      | P <sub>IN</sub> = 31.0 dBm<br>f = 2.3 GHz<br>V <sub>DS</sub> = 10 V; I <sub>DSQ</sub> = 1 A<br>R <sub>G</sub> = 100Ω |
|                                | GL               | Linear Gain                    | dB    | 9.5             | 10.5 |      |  |
|                                | η <sub>ADD</sub> | Power Added Efficiency         | %     |                 | 40   |      |  |
|                                | I <sub>DS</sub>  | Drain Source Current           | A     |                 | 2.0  |      |  |
| Electrical DC Characteristics  | I <sub>DSS</sub> | Saturated Drain Current        | A     | 2.0             | 4.5  | 7.0  | V <sub>DS</sub> = 2.5 V; V <sub>GS</sub> = 0 V   |
|                                | V <sub>P</sub>   | Pinch-off Voltage              | V     | -3.5            | -2.0 | -0.5 | V <sub>DS</sub> = 2.5 V; I <sub>DS</sub> = 15 mA   |
|                                | g <sub>m</sub>   | Transconductance               | mS    |                 | 2600 |      | V <sub>DS</sub> = 2.5 V; I <sub>DS</sub> = 2 A   |
|                                | R <sub>TH</sub>  | Thermal Resistance             | °C/W  |                 | 2.5  | 3.0  | Channel to Case  |

TYPICAL SCATTERING PARAMETERS (TA = 25°C)



S21 MAG:  
4.0 / DIV., 20.0 FS  
S12 MAG:  
0.02 / DIV., 0.1 FS

VDS = 10.0 V, IDS = 1000 mA

| FREQUENCY<br>(GHz) | S11   |          | S21    |         | S12   |        | S22   |          | K      | MAG <sup>1</sup><br>(dB) |
|--------------------|-------|----------|--------|---------|-------|--------|-------|----------|--------|--------------------------|
|                    | MAG   | ANG      | MAG    | ANG     | MAG   | ANG    | MAG   | ANG      |        |                          |
| 0.05               | 0.984 | -76.400  | 18.696 | 140.100 | 0.006 | 23.700 | 0.812 | -177.700 | -0.320 | 34.936                   |
| 0.10               | 0.974 | -115.700 | 12.798 | 120.500 | 0.006 | 28.600 | 0.840 | -178.100 | 0.036  | 33.290                   |
| 0.20               | 0.970 | -146.600 | 7.261  | 103.200 | 0.007 | 22.000 | 0.857 | 179.600  | 0.212  | 30.159                   |
| 0.25               | 0.973 | -154.100 | 5.934  | 98.700  | 0.008 | 21.500 | 0.862 | 178.600  | 0.251  | 28.703                   |
| 0.40               | 0.971 | -166.400 | 3.794  | 90.100  | 0.008 | 25.900 | 0.862 | 176.400  | 0.488  | 26.760                   |
| 0.50               | 0.969 | -170.700 | 3.049  | 86.800  | 0.008 | 26.100 | 0.862 | 175.500  | 0.593  | 25.811                   |
| 1.00               | 0.968 | 176.000  | 1.582  | 72.400  | 0.010 | 35.500 | 0.856 | 169.900  | 0.979  | 21.992                   |
| 1.50               | 0.976 | 167.400  | 1.124  | 60.100  | 0.015 | 39.700 | 0.865 | 165.100  | 0.874  | 18.747                   |
| 2.00               | 0.968 | 159.700  | 0.894  | 47.600  | 0.018 | 41.500 | 0.850 | 158.700  | 1.088  | 15.156                   |
| 2.50               | 0.962 | 151.500  | 0.778  | 35.000  | 0.024 | 37.500 | 0.850 | 151.700  | 1.081  | 13.368                   |
| 3.00               | 0.952 | 143.100  | 0.705  | 21.800  | 0.031 | 29.500 | 0.836 | 144.300  | 1.100  | 11.639                   |
| 3.50               | 0.953 | 134.700  | 0.674  | 8.700   | 0.039 | 21.300 | 0.825 | 137.300  | 0.940  | 12.376                   |
| 4.00               | 0.954 | 125.200  | 0.673  | -5.500  | 0.051 | 12.000 | 0.800 | 130.400  | 0.761  | 11.204                   |

Note:

1. Gain Calculations:

$$MAG = \frac{|S_{21}|}{|S_{12}|} (K \pm \sqrt{K^2 - 1})$$

When  $K \leq 1$ , MAG is undefined and MSG values are used.  $MSG = \frac{|S_{21}|}{|S_{12}|}$ ,  $K = \frac{1 + |\Delta|^2 - |S_{11}|^2 - |S_{22}|^2}{2 |S_{12} S_{21}|}$ ,  $\Delta = S_{11} S_{22} - S_{21} S_{12}$

MAG = Maximum Available Gain

MSG = Maximum Stable Gain

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