

**NE5550979A-EV04-A**

**Evaluation Board**

- Circuit Description
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- Circuit Schematic and Assembly Drawing

## Circuit Description

The NE5550979A-EV04-A is an evaluation circuit board for Renesas' LDMOS power FET, NE5550979A optimized for the performance at 460MHz. The circuit board is RoHS compliant.

### Matching and Bias Circuits

Both input and output matching networks consist of shunt capacitors and sections of transmission lines (refer to the schematic and assembly drawing in the two last pages for the component designation). The electrical lengths of the transmission lines labeled on the schematic are estimated and for reference only. Some bench tuning on the actual circuit board is usually required to achieve optimal performance. For applications where there is a constraint on the board space, a serial inductor, instead of transmission lines, can be used for the matching circuits. The efficiency, PAE, will be slightly lower in that case. The resistor, R1(=1ohm) at input is used to improve the stability margin. The gain is reduced by about 1dB when R1 used.

LDMOSFETs essentially draw no gate current under normal operation conditions. Therefore a large value resistor, in the order of  $k\Omega$ , can be used for the bias at gate so that the RF path is completely isolated from the DC line. At the drain an inductor is used as the RF choke. The current rating for this inductor should be high enough to provide the required current at the operation conditions.

### Bias Conditions

This evaluation board was optimized at a specific drain voltage, 7.5V. For different supply voltages, the matching circuits should be adjusted to fully utilize the device capability. The quiescent current is 200mA for the data shown below. The gain is higher at higher quiescent currents, particularly when the device is not completely saturated. For many communication systems, where the PA is never at idle state, a high quiescent current might be used.

### PCB Material:

The PCB is Getek 28mil two layer board. The dielectric constant of Getek is 4.2.

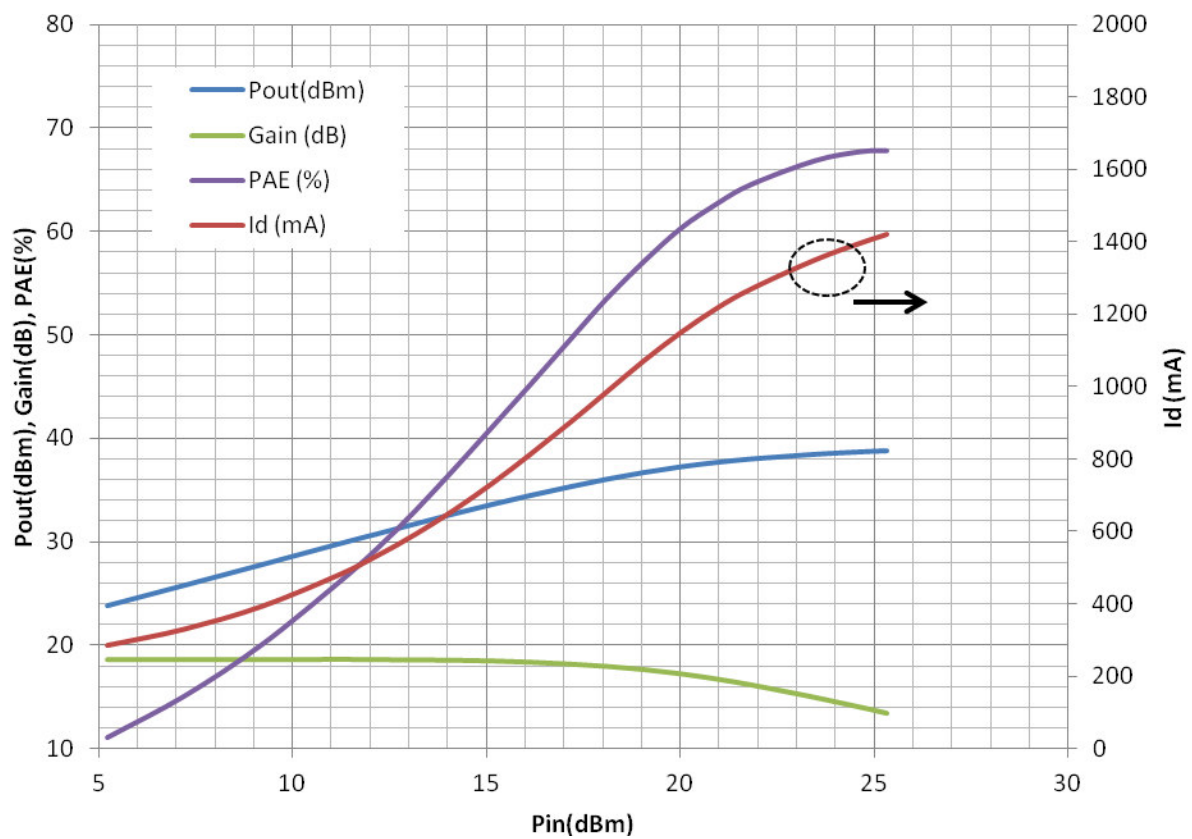
## Typical Performance Data

Test Conditions:

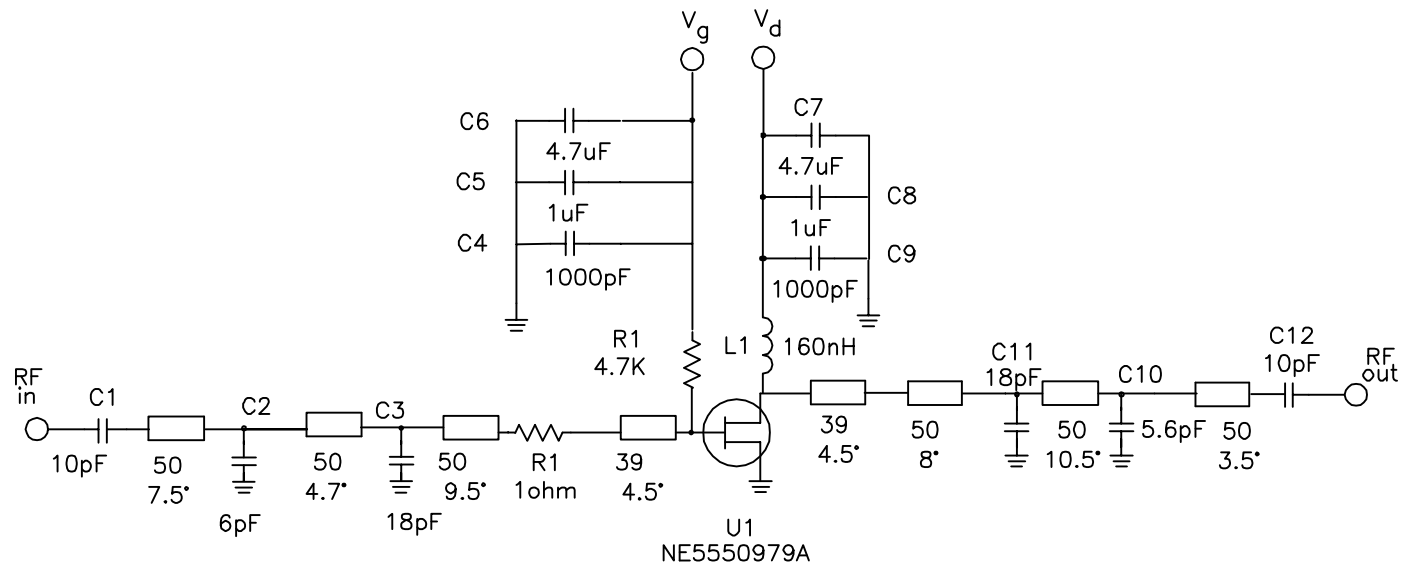
$f=460\text{MHz}$

$V_d=7.5\text{V}$ ,  $I_{dsq}=200\text{mA}$

$P_{out}$ , Gain, PAE and Current vs  $P_{in}$  are shown in the following plot.



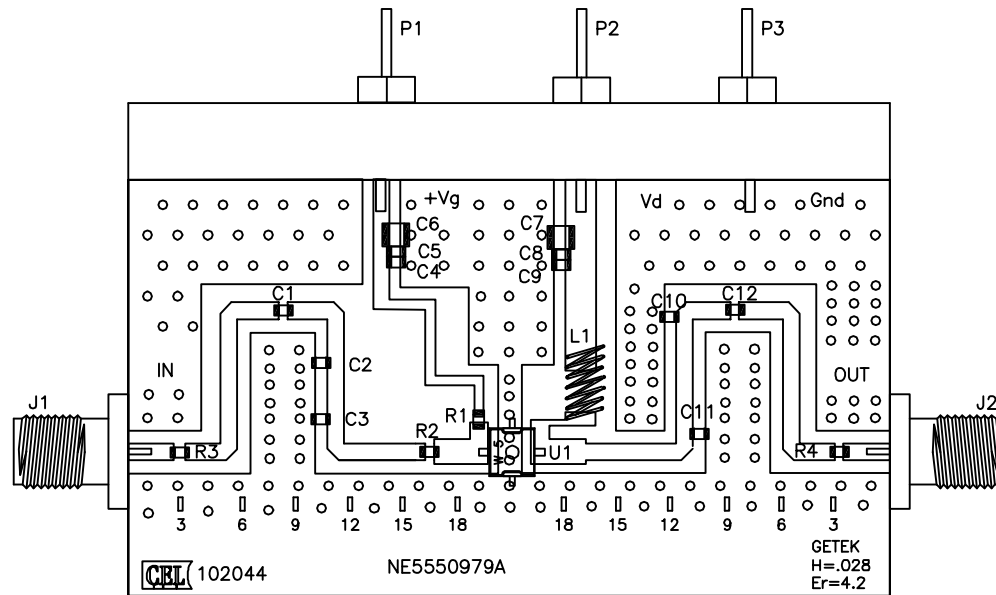
| REVISIONS |     |             |          |
|-----------|-----|-------------|----------|
| ZONE      | LTR | DESCRIPTION | DATE     |
|           |     |             | APPROVED |



Note: All trace electrical lengths are at 460MHz

|             |         |                                                                                                                                                                                                                                              |                             |          |                                                                                                                                                                                    |          |                     |           |         |          |  |
|-------------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------|-----------|---------|----------|--|
|             |         | <div>UNLESS OTHERWISE SPECIFIED<br/>DIMENSIONS ARE IN INCHES<br/>TOLERANCES</div> <div>DECIMALS    ANGULAR<br/>.XX±        .01 ±        1°<br/>.XXX±      .005 ±</div> <div>DO NOT SCALE DRAWING</div> <div>MATERIAL</div> <div>FINISH</div> | APPROVALS                   |          | <div><div>CEL</div><div>CALIFORNIA EASTERN LABS</div><div>4590 PATRICK HENRY DR. SANTA CLARA CA. 95054</div></div> <div>TITLE:<br/><br/>NE5550979A-EV04-A<br/><br/>SCHEMTAIC</div> |          |                     |           |         |          |  |
|             |         |                                                                                                                                                                                                                                              | Drawing by:<br>Mouqun Dong  | 3/1/2012 |                                                                                                                                                                                    |          |                     |           |         |          |  |
|             |         |                                                                                                                                                                                                                                              | Designed by:<br>Mouqun Dong | 3/1/2012 |                                                                                                                                                                                    |          |                     |           |         |          |  |
|             |         |                                                                                                                                                                                                                                              | Checked by:                 |          |                                                                                                                                                                                    |          |                     |           |         |          |  |
|             |         |                                                                                                                                                                                                                                              | Project Engineer:           |          | SIZE<br>C                                                                                                                                                                          | FSCM NO. | DWG NO.<br>AD102044 |           |         | REV<br>— |  |
|             |         |                                                                                                                                                                                                                                              | Quality Control:            |          | SCALE NONE                                                                                                                                                                         |          | RELEASE DATE        | PROTOTYPE | SHEET 1 | OF 1     |  |
| NEXT ASSY   | USED ON |                                                                                                                                                                                                                                              |                             |          |                                                                                                                                                                                    |          |                     |           |         |          |  |
| APPLICATION |         |                                                                                                                                                                                                                                              |                             |          |                                                                                                                                                                                    |          |                     |           |         |          |  |
|             |         |                                                                                                                                                                                                                                              |                             |          |                                                                                                                                                                                    |          |                     |           |         |          |  |
|             |         |                                                                                                                                                                                                                                              |                             |          |                                                                                                                                                                                    |          |                     |           |         |          |  |

| REVISIONS |     |             |      |          |
|-----------|-----|-------------|------|----------|
| ZONE      | LTR | DESCRIPTION | DATE | APPROVED |



|     |                                |                             |                                |          |
|-----|--------------------------------|-----------------------------|--------------------------------|----------|
| 1   | GRM1885C1H5R6CZ01B+C01         | C10                         | 0603 5.6pF CAP MURATA          | 15       |
| 2   | GRM185R61C105KE44D             | C5,C8                       | 0603 1uF CAP MURATA            | 14       |
| 2   | GRM1885C1H102JA01B+A01         | C4,C9                       | 0603 1000pF CAP MURATA         | 13       |
| 2   | GRM1885C1H180JA01B+A01         | C3,C11                      | 0603 18pF CAP MURATA           | 12       |
| 2   | 267M1002475K                   | C6,C7                       | 4.7uF 10V TANT CHIP CAP B MATS | 11       |
| 1   | GRM1885C1H6R0DZ01B+C01         | C2                          | 0603 6.0pF CAP MURATA          | 10       |
| 2   | GRM1885C1H100JA01B+A01         | C1,C12                      | 0603 10pF CAP MURATA           | 9        |
| 2   | GENERIC                        | R3,R4                       | 0603 0 OHM RESISTOR            | 8        |
| 1   | GENERIC                        | R2                          | 0603 1 OHM RESISTOR            | 7        |
| 1   | GENERIC                        | R1                          | 0603 4.7K OHM RESISTOR         | 6        |
| 1   | 2222SQ-161-JE                  | L1                          | 160nH INDUCTOR COILCRAFT       | 5        |
| 3   | 2340-6111 TG                   | P1,P2,P3                    | PIN HEADER 3M                  | 4        |
| 2   | 5308-2CC                       | J1,J2                       | SMA 4H FLANGE JACK TENSOLITE   | 3        |
| 1   | NE5550979A-A                   | U1                          | RENESAS NE5550979A-A           | 2        |
| 1   | CL-102044                      | DRAWING                     | COMPONENT LAYOUT DRAWING       | 1        |
| QTY | PART NUMBER OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION | MATERIAL/SPECIFICATION         | ITEM NO. |

|                                                                                                                                         |  |           |  |                                                                                                                                    |          |           |                                  |           |         |      |
|-----------------------------------------------------------------------------------------------------------------------------------------|--|-----------|--|------------------------------------------------------------------------------------------------------------------------------------|----------|-----------|----------------------------------|-----------|---------|------|
| UNLESS OTHERWISE SPECIFIED<br>DIMENSIONS ARE IN INCHES<br>TOLERANCES<br>DECIMALS .01 ANGULAR ± 1°<br>.XXX± .005<br>DO NOT SCALE DRAWING |  | APPROVALS |  | CALIFORNIA EASTERN LABS<br>4590 PATRICK HENRY DR. SANTA CLARA CA. 95054<br>TITLE:<br>NE5550979A-EV04-A<br>ASSEMBLY DRAWING AND BOM |          |           |                                  |           |         |      |
|                                                                                                                                         |  |           |  |                                                                                                                                    |          |           |                                  |           |         |      |
|                                                                                                                                         |  | MATERIAL  |  | Drawing by:<br>M Dong                                                                                                              | 3/1/2012 | SIZE<br>C | FSCM NO.<br>DWG NO.<br>AD-102044 | REV<br>—  |         |      |
|                                                                                                                                         |  | FINISH    |  | Designed by:<br>M Dong                                                                                                             | 3/1/2012 |           |                                  |           |         |      |
| NEXT ASSY                                                                                                                               |  | USED ON   |  | Project Engineer:                                                                                                                  |          | SCALE     | RELEASE DATE                     | PROTOTYPE | SHEET 1 | OF 1 |
| APPLICATION                                                                                                                             |  |           |  | Quality Control:                                                                                                                   |          |           |                                  |           |         |      |



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Электрон  
Связь**

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