

DATA SHEET



SILICON POWER MOS FET NE5520379A

3.2 V OPERATION SILICON RF POWER LDMOS FET FOR GSM/DCS DUAL-BAND PHONE TRANSMISSION AMPLIFIERS

DESCRIPTION

The NE5520379A is an N-channel silicon power MOS FET specially designed as the transmission power amplifier for 3.2 V GSM 900 handsets. Dies are manufactured using our NEWMOS technology and housed in a surface mount package. This device can deliver 34.6 dBm output power with 68% power efficiency at 915 MHz under the 2.8 V supply voltage.

FEATURES

- High output power : $P_{out} = 35.5$ dBm TYP. ($V_{DS} = 3.2$ V, $V_{GS} = 2.5$ V, $f = 915$ MHz, $P_{in} = 25$ dBm)
: $P_{out} = 33.0$ dBm TYP. ($V_{DS} = 3.2$ V, $V_{GS} = 2.5$ V, $f = 1785$ MHz, $P_{in} = 25$ dBm)
- High power added efficiency : $\eta_{add} = 65\%$ TYP. ($V_{DS} = 3.2$ V, $V_{GS} = 2.5$ V, $f = 915$ MHz, $P_{in} = 25$ dBm)
: $\eta_{add} = 35\%$ TYP. ($V_{DS} = 3.2$ V, $V_{GS} = 2.5$ V, $f = 1785$ MHz, $P_{in} = 25$ dBm)
- High linear gain : $G_L = 16.0$ dB TYP. ($V_{DS} = 3.2$ V, $V_{GS} = 2.5$ V, $f = 915$ MHz, $P_{in} = 10$ dBm)
: $G_L = 8.5$ dB TYP. ($V_{DS} = 3.2$ V, $V_{GS} = 2.5$ V, $f = 1785$ MHz, $P_{in} = 10$ dBm)
- Surface mount package : $5.7 \times 5.7 \times 1.1$ mm MAX.
- Single supply : $V_{DS} = 2.8$ to 6.0 V

APPLICATIONS

- Digital cellular phones : 3.2 V GSM/DCS Dual-Band handsets
- Others : General purpose amplifiers for 1.6 to 2.0 GHz TDMA applications

ORDERING INFORMATION

| Part Number | Package | Marking | Supplying Form |
|----------------|---------|---------|---|
| NE5520379A-T1 | 79A | A3 | • 12 mm wide embossed taping • Gate pin face the perforation side of the tape • Qty 1 kpcs/reel |
| NE5520379A-T1A | | | • 12 mm wide embossed taping • Gate pin face the perforation side of the tape • Qty 5 kpcs/reel |

Remark To order evaluation samples, contact your nearby sales office.
Part number for sample order: NE5520379A-A

Caution: Observe precautions when handling because these devices are sensitive to electrostatic discharge

The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version.

ABSOLUTE MAXIMUM RATINGS (T_A = +25°C)

| Parameter | Symbol | Ratings | Unit |
|----------------------------|--------------------------------|-------------|------|
| Drain to Source Voltage | V _{DS} | 15.0 | V |
| Gate to Source Voltage | V _{GS} | 5.0 | V |
| Drain Current | I _D | 1.5 | A |
| Drain Current (Pulse Test) | I _D ^{Note} | 3.0 | A |
| Total Power Dissipation | P _{tot} | 20 | W |
| Channel Temperature | T _{ch} | 125 | °C |
| Storage Temperature | T _{stg} | -65 to +125 | °C |

Note Duty Cycle ≤ 50%, T_{on} ≤ 1 s

RECOMMENDED OPERATING CONDITIONS

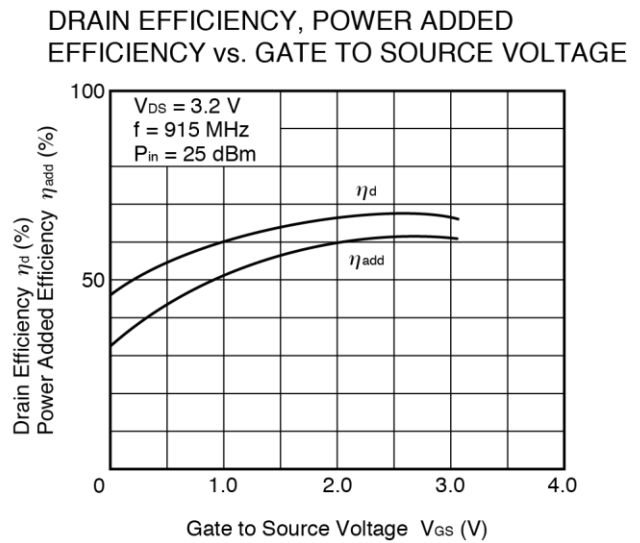
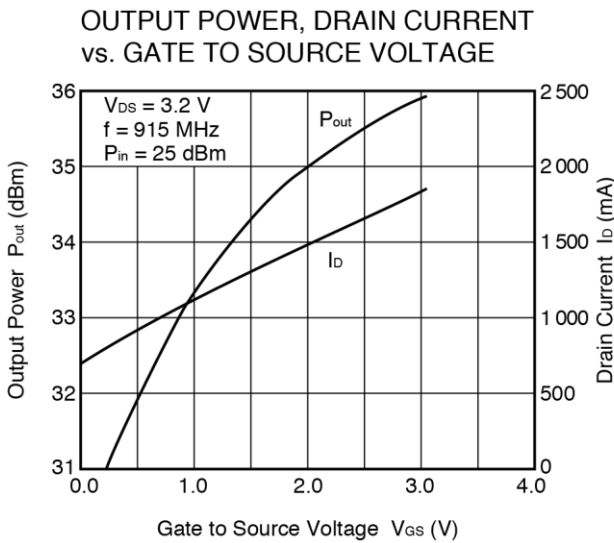
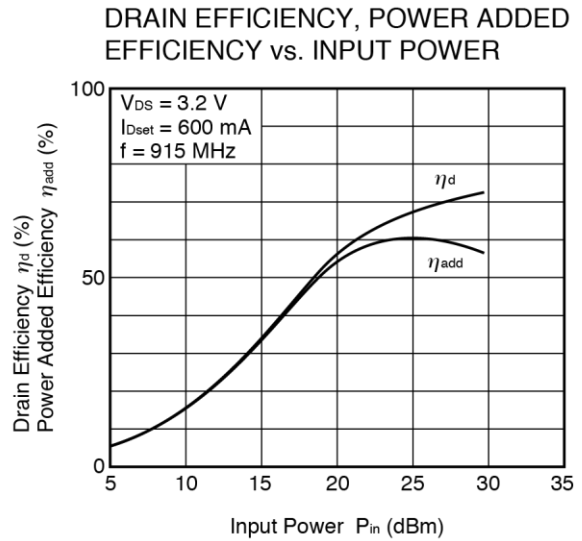
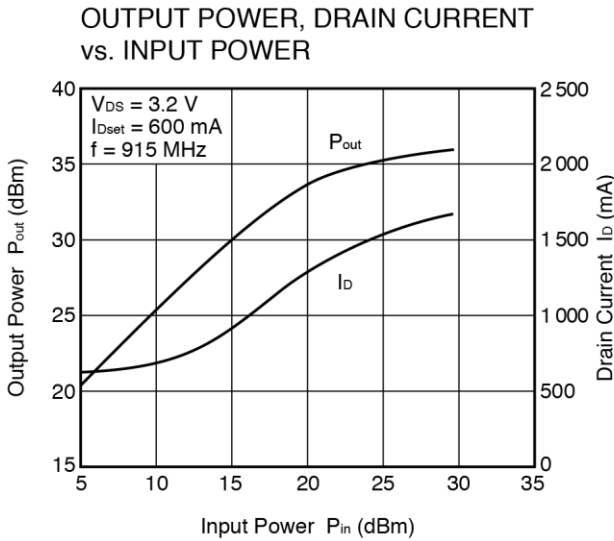
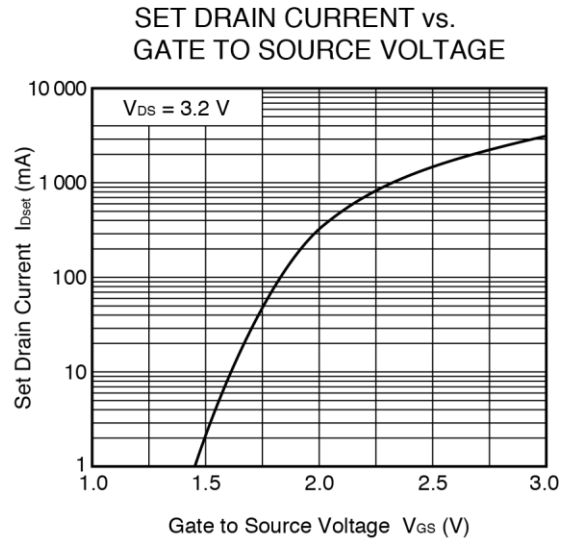
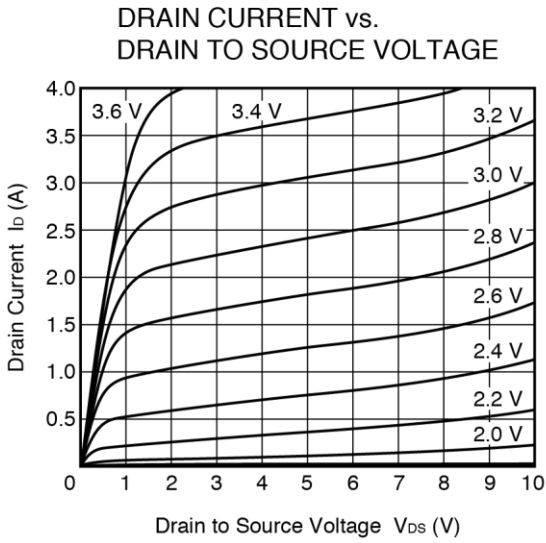
| Parameter | Symbol | Test Conditions | MIN. | TYP. | MAX. | Unit |
|----------------------------|-----------------|---|------|------|------|------|
| Drain to Source Voltage | V _{DS} | | 2.8 | 3.2 | 6.0 | V |
| Gate to Source Voltage | V _{GS} | | 0 | 2.5 | 3.5 | V |
| Drain Current (Pulse Test) | I _D | Duty Cycle ≤ 50%, T _{on} ≤ 1 s | – | 1.75 | 2.0 | A |
| Input Power | P _{in} | f = 1.8 GHz, V _{DS} = 3.6 V | 24 | 25 | 26 | dBm |

ELECTRICAL CHARACTERISTICS (T_A = +25°C)

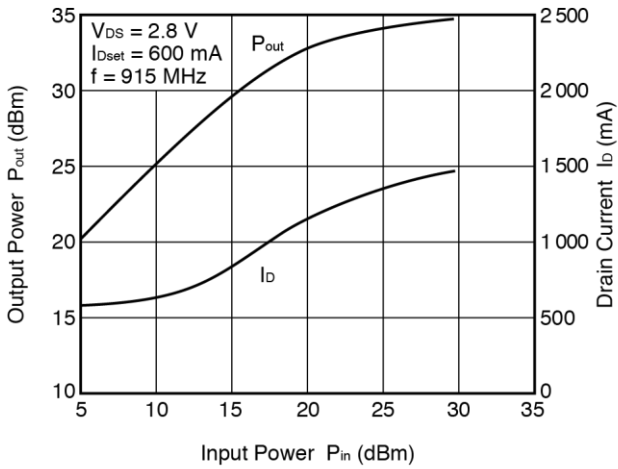
| Parameter | Symbol | Test Conditions | MIN. | TYP. | MAX. | Unit |
|--|-------------------|---|------|------|------|------|
| Gate to Source Leak Current | I _{GSS} | V _{GS} = 6.0 V | – | – | 100 | nA |
| Drain to Source Leakage Current (Zero Gate Voltage Drain Current) | I _{DSS} | V _{DS} = 8.5 V | – | – | 100 | nA |
| Gate Threshold Voltage | V _{th} | V _{DS} = 3.5 V, I _b = 1 mA | 1.0 | 1.35 | 2.0 | V |
| Transconductance | G _m | V _{DS} = 3.5 V, I _b = 0.8 to 1.0 A | – | 2.5 | – | S |
| Drain to Source Breakdown Voltage | BV _{DSS} | I _{DSS} = 10 μA | 15 | 20 | – | V |
| Thermal Resistance | R _{th} | Channel to Case | – | – | 5 | °C/W |
| Linear Gain | G _L | f = 915 MHz, P _{in} = 10 dBm, V _{DS} = 3.2 V, V _{GS} = 2.5 V, Note | – | 16.0 | – | dB |
| Output Power | P _{out} | f = 915 MHz, P _{in} = 25 dBm, | – | 35.5 | – | dBm |
| Drain Efficiency | η _d | V _{DS} = 3.2 V, V _{GS} = 2.5 V, Note | – | 68 | – | % |
| Power Added Efficiency | η _{add} | | – | 65 | – | % |
| Linear Gain | G _L | f = 1 785 MHz, P _{in} = 10 dBm, V _{DS} = 3.2 V, V _{GS} = 2.5 V, Note | – | 8.5 | – | dB |
| Output Power | P _{out} | f = 1 785 MHz, P _{in} = 25 dBm, | 31.0 | 33.0 | – | dBm |
| Drain Efficiency | η _d | V _{DS} = 3.2 V, V _{GS} = 2.5 V, Note | 29 | 38 | – | % |
| Power Added Efficiency | η _{add} | | – | 35 | – | % |

Note DC performance is 100% testing. RF performance is testing several samples per wafer.
Wafer rejection criteria for standard devices is 1 reject for several samples.

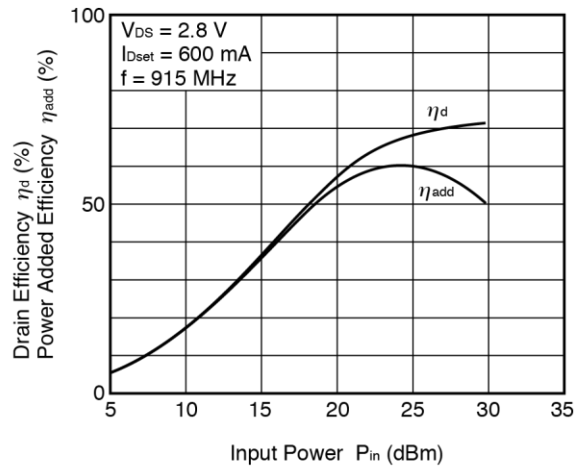
TYPICAL CHARACTERISTICS (T_A = +25°C)



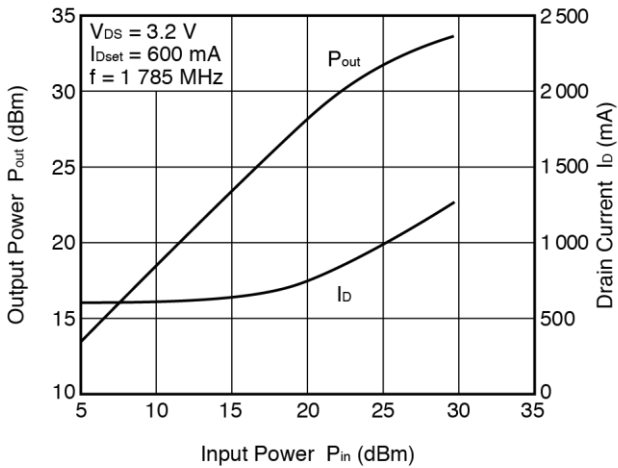
OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER (915 MHz)



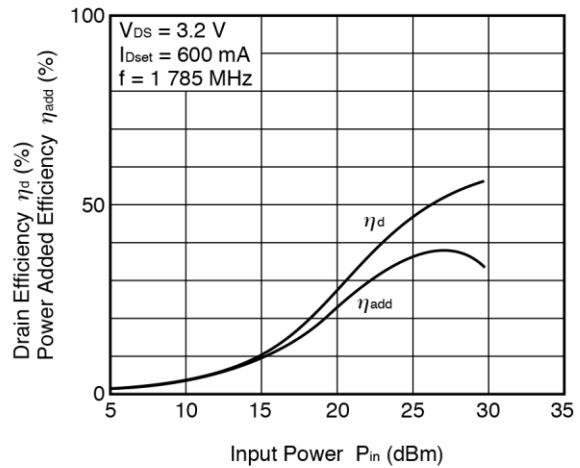
DRAIN EFFICIENCY, POWER ADDED EFFICIENCY vs. INPUT POWER



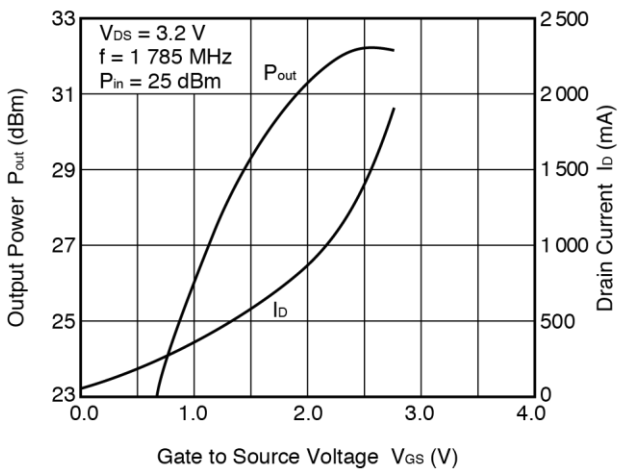
OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER (1 785 MHz)



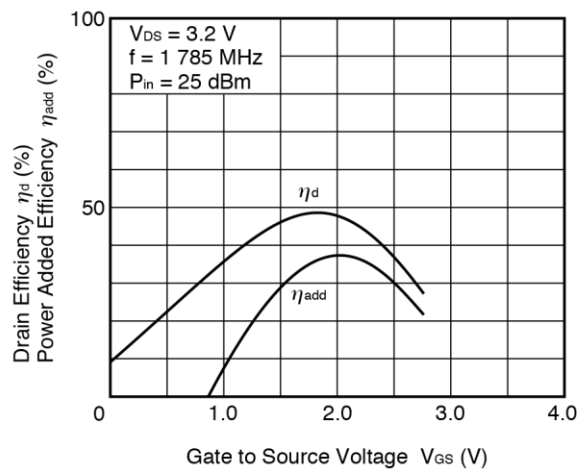
DRAIN EFFICIENCY, POWER ADDED EFFICIENCY vs. INPUT POWER



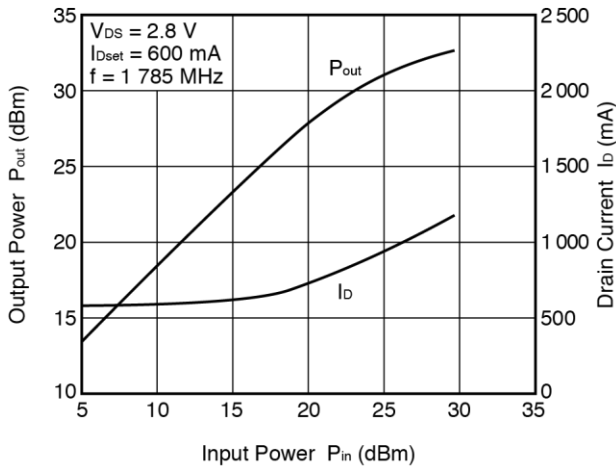
OUTPUT POWER, DRAIN CURRENT vs. GATE TO SOURCE VOLTAGE



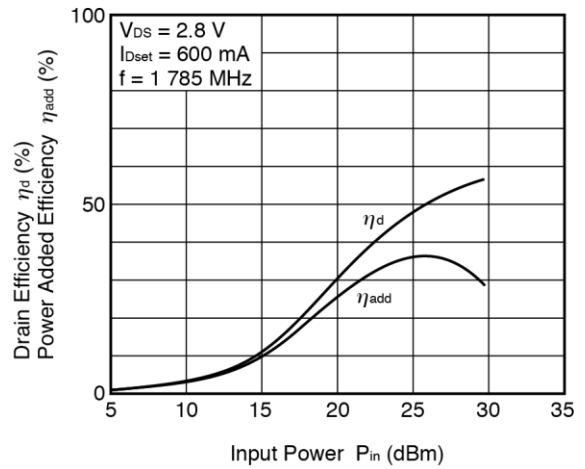
DRAIN EFFICIENCY, POWER ADDED EFFICIENCY vs. GATE TO SOURCE VOLTAGE



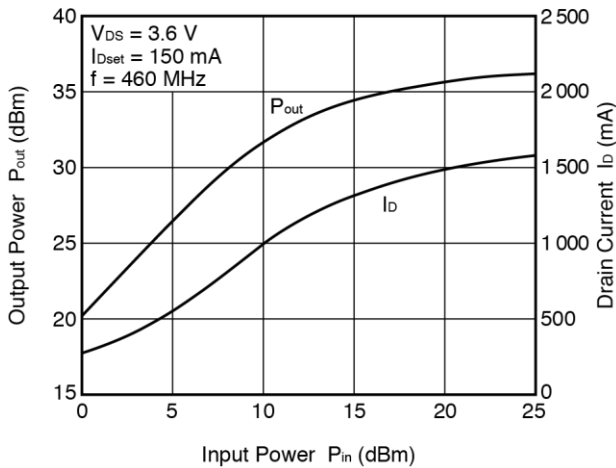
OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER (1 785 MHz)



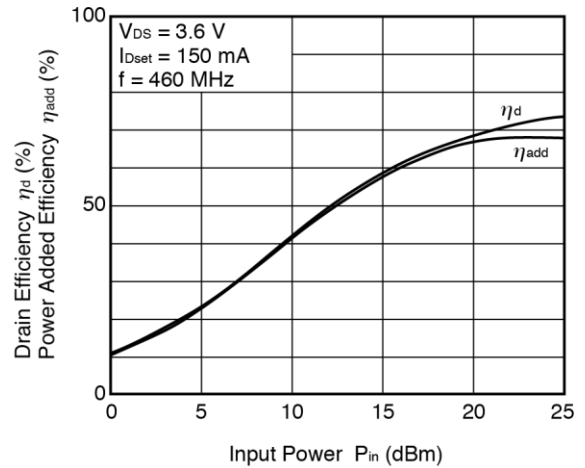
DRAIN EFFICIENCY, POWER ADDED EFFICIENCY vs. INPUT POWER



OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER (460 MHz)



DRAIN EFFICIENCY, POWER ADDED EFFICIENCY vs. INPUT POWER



Remark The graphs indicate nominal characteristics.

S-PARAMETERS

- S-parameters and noise parameters are provided on our Web site in a format (S2P) that enables the direct import of the parameters to microwave circuit simulators without the need for keyboard inputs.
- Click here to download S-parameters.
- [RF and Microwave] ® [Device Parameters]
- URL <http://www.necel.com/microwave/en/>

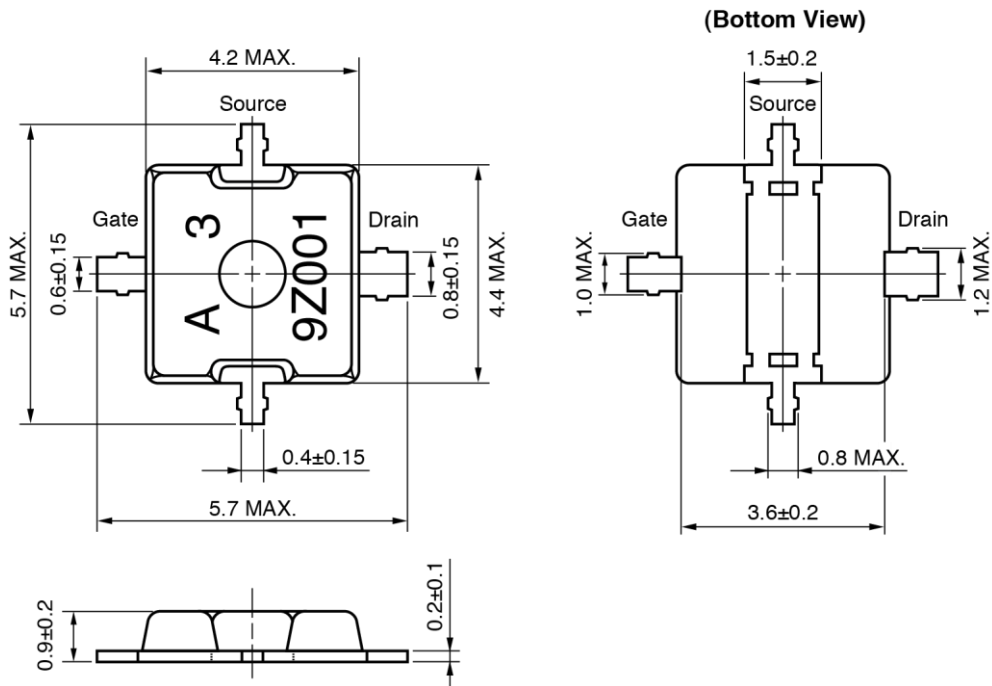
LARGE SIGNAL IMPEDANCE ($V_{DS} = 3.2\text{ V}$, $I_{Dset} = 600\text{ mA}$, $P_{in} = 25\text{ dBm}$)

| f (MHz) | Z_{in} (Ω) | Z_{oL} (Ω) ^{Note} |
|---------|-----------------------|---------------------------------------|
| 1 785 | TBD | TBD |

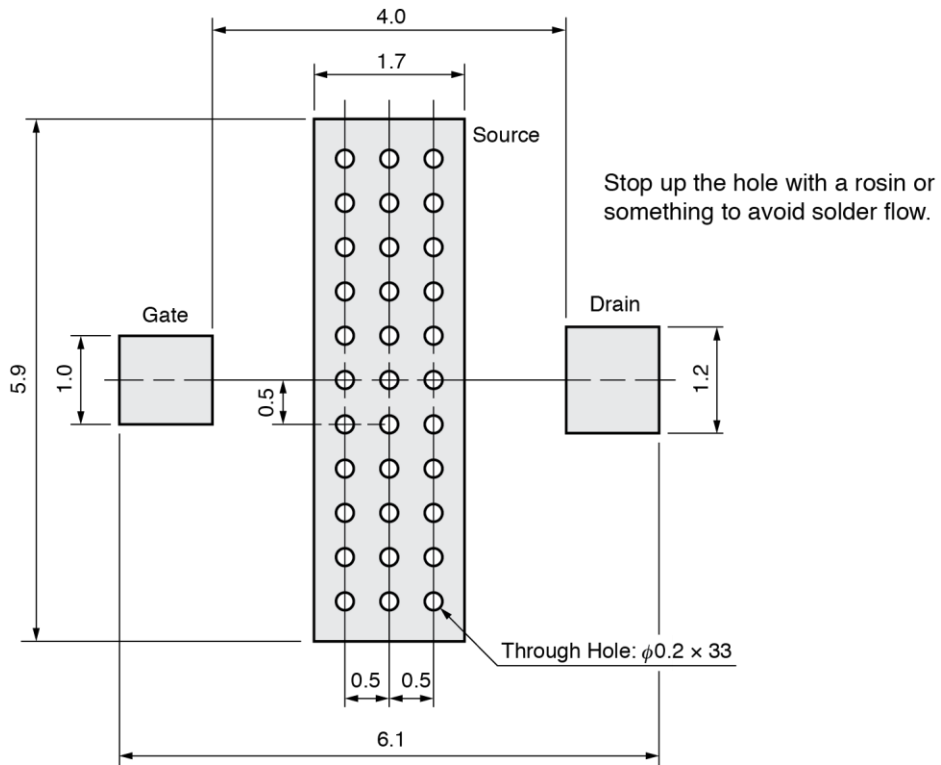
Note Z_{oL} is the conjugate of optimum load impedance at given voltage, idling current, input power and frequency.

PACKAGE DIMENSIONS

79A (UNIT: mm)



79A PACKAGE RECOMMENDED P.C.B. LAYOUT (UNIT: mm)



RECOMMENDED SOLDERING CONDITIONS

This product should be soldered and mounted under the following recommended conditions. For soldering methods and conditions other than those recommended below, contact your nearby sales office.

| Soldering Method | Soldering Conditions | Condition Symbol |
|------------------|---|------------------|
| Infrared Reflow | Peak temperature (package surface temperature) : 260°C or below Time at peak temperature : 10 seconds or less Time at temperature of 220°C or higher : 60 seconds or less Preheating time at 120 to 180°C : 120±30 seconds Maximum number of reflow processes : 3 times Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below | IR260 |
| VPS | Peak temperature (package surface temperature) : 215°C or below Time at temperature of 200°C or higher : 25 to 40 seconds Preheating time at 120 to 150°C : 30 to 60 seconds Maximum number of reflow processes : 3 times Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below | VP215 |
| Wave Soldering | Peak temperature (molten solder temperature) : 260°C or below Time at peak temperature : 10 seconds or less Preheating temperature (package surface temperature) : 120°C or below Maximum number of flow processes : 1 time Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below | WS260 |
| Partial Heating | Peak temperature (pin temperature) : 350°C or below Soldering time (per pin of device) : 3 seconds or less Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below | HS350-P3 |

Caution Do not use different soldering methods together (except for partial heating).