To our customers,

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April 1st, 2010
Renesas Electronics Corporation



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SILICON POWER MOS FET

# NE5500234

## N-CHANNEL SILICON POWER MOS FET
## POWER AMPLIFIER FOR DCS1800/PCS1900 HANDSETS

### DESCRIPTION

The NE5500234 is an N-channel silicon power MOS FET specially designed as the transmission power amplifier for DCS1800 and PCS1900 handsets. Dies are manufactured using our NEWMOS technology (our 0.6 $\mu$m WSi gate lateral MOS FET), housed in a surface mount 3-pin power Minimold (34 PKG) (SOT-89 type) package. The device can deliver 32.5 dBm output power with 50% power added efficiency at 1.9 GHz under the 4.8 V supply voltage.

### FEATURES

- High output power : $P_{out}$ = 32.5 dBm TYP. ($V_{DS}$ = 4.8 V, $I_{Dset}$ = 400 mA, f = 1.9 GHz, $P_{in}$ = 25 dBm)
- High power added efficiency : $\eta_{add}$ = 50% TYP. ($V_{DS}$ = 4.8 V, $I_{Dset}$ = 400 mA, f = 1.9 GHz, $P_{in}$ = 25 dBm)
- High linear gain : $G_L$ = 11 dB TYP. ($V_{DS}$ = 4.8 V, $I_{Dset}$ = 400 mA, f = 1.9 GHz)
- Surface mount package : 3-pin power Minimold (34 PKG) (SOT-89 type)
- Single supply : $V_{DS}$ = 3.0 to 6.0 V

### APPLICATIONS

- Digital cellular phones : DCS1800/PCS1900 handsets
- <R> Handheld transceiver : FRS (Family Radio Service), GMRS (General Mobile Radio Service)
- Others : General purpose amplifiers for various applications

### <R> ORDERING INFORMATION

| Part Number | Order Number | Package | Marking | Supplying Form |
|---|---|---|---|---|
| NE5500234 | NE5500234-AZ | 3-pin power minimold (SOT-89, Our code: 34) (Pb-Free : External solder plating) | V2 | • Magazine case<br>• Qty 25 pcs/case |
| NE5500234-T1 | NE5500234-T1-AZ | 3-pin power minimold (SOT-89, Our code: 34) (Pb-Free : External solder plating) | | • 12 mm wide embossed taping<br>• Source pin face the perforation side of the tape<br>• Qty 1 kpcs/reel |

**Remarks 1.** To order evaluation samples, contact your nearby sales office.
Part number for sample order: NE5500234

**2.** This product is containing Pb-material inside.



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



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The mark <R> shows major revised points.



The revised points can be easily searched by copying an "<R>" in the PDF file and specifying it in the "Find what:" field.

## ABSOLUTE MAXIMUM RATINGS ($T_A$ = +25°C)

Operation in excess of any one of these parameters may result in permanent damage.

| Parameter | Symbol | Ratings | Unit |
|---|---|---|---|
| Drain to Source Voltage | $V_{DS}$ | 20 | V |
| Gate to Source Voltage | $V_{GS}$ | 6.0 | V |
| Drain Current | $I_D$ | 1.0 | A |
| Total Power Dissipation | $P_{tot}$ | 10 | W |
| Channel Temperature | $T_{ch}$ | 125 | °C |
| Storage Temperature | $T_{stg}$ | –65 to +125 | °C |

## RECOMMENDED OPERATING CONDITIONS

| Parameter | Symbol | Test Conditions | MIN. | TYP. | MAX. | Unit |
|---|---|---|---|---|---|---|
| Drain to Source Voltage | $V_{DS}$ | | 3.0 | 4.8 | 6.0 | V |
| Gate to Source Voltage | $V_{GS}$ | | 0 | 2.0 | 3.5 | V |
| Drain Current | $I_D$ | Duty Cycle ≤ 50%, $T_{on}$ ≤ 1 s | – | 0.75 | 1.0 | A |
| Input Power | $P_{in}$ | f = 1.9 GHz, $V_{DS}$ = 4.8 V | – | – | 27 | dBm |



## ELECTRICAL CHARACTERISTICS

**($T_A$ = +25°C, unless otherwise specified, using our standard test fixture.)**

| Parameter | Symbol | Test Conditions | MIN. | TYP. | MAX. | Unit |
|---|---|---|---|---|---|---|
| Gate to Source Leakage Current | $I_{GSO}$ | $V_{GS}$ = 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 | $V_{th}$ | $V_{DS}$ = 4.8 V, $I_{DS}$ = 1 mA | 1.0 | 1.4 | 2.0 | V |
| Thermal Resistance | $R_{th}$ | Channel to Case | – | 10 | – | °C/W |
| Transconductance | $g_m$ | $V_{DS}$ = 4.8 V, $I_{DS}$ = 500 mA | – | 840 | – | mS |
| Drain to Source Breakdown Voltage | $BV_{DSS}$ | $I_{DSS}$ = 10 $\mu$A | 20 | 24 | – | V |
| Output Power | $P_{out}$ | f = 1.9 GHz, $V_{DS}$ = 4.8 V, $P_{in}$ = 25 dBm, $I_{Dset}$ = 400 mA (RF OFF) | 31.5 | 32.5 | – | dBm |
| Drain Current | $I_D$ | | – | 610 | – | mA |
| Power Added Efficiency | $\eta_{add}$ | | 43 | 50 | – | % |
| Linear Gain[Note] | $G_L$ | | – | 11.0 | – | dB |

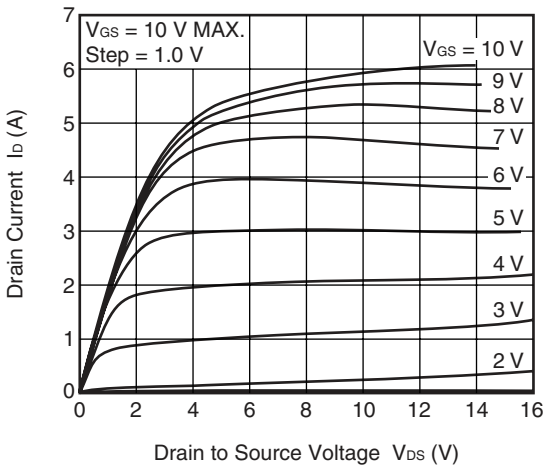
**Note** $P_{in}$ = 10 dBm

DC performance is 100% testing. RF performance is testing several samples per wafer.

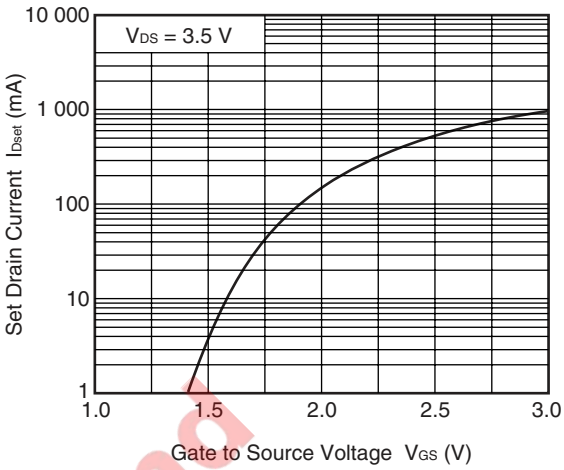
Wafer rejection criteria for standard devices is 1 reject for several samples.

<R> **TYPICAL CHARACTERISTICS ($T_A$ = +25°C)**

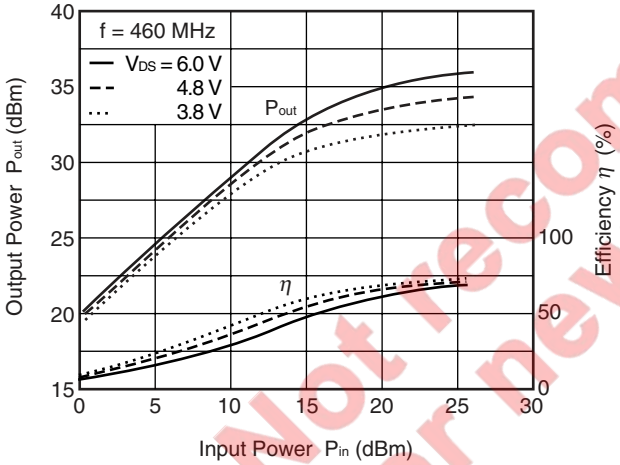
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



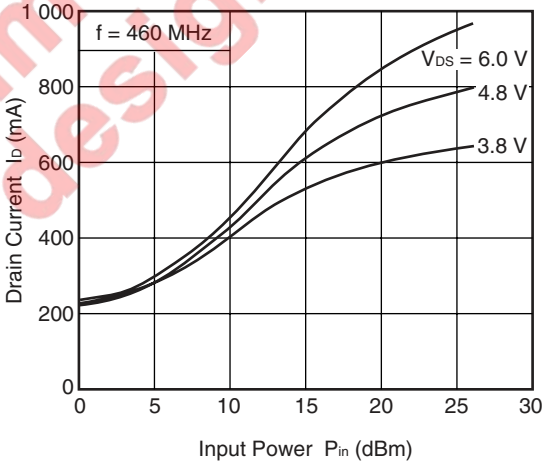

SET DRAIN CURRENT vs.
GATE TO SOURCE VOLTAGE



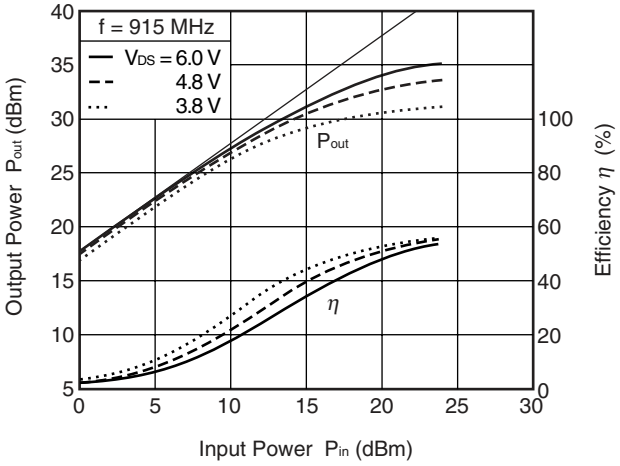

OUTPUT POWER, EFFICIENCY
vs. INPUT POWER



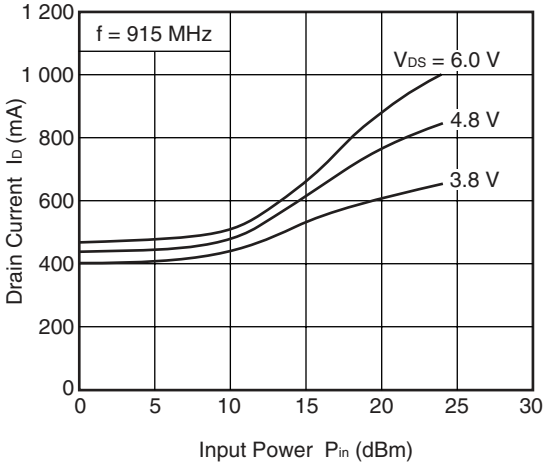

DRAIN CURRENT vs. INPUT POWER




OUTPUT POWER, EFFICIENCY
vs. INPUT POWER



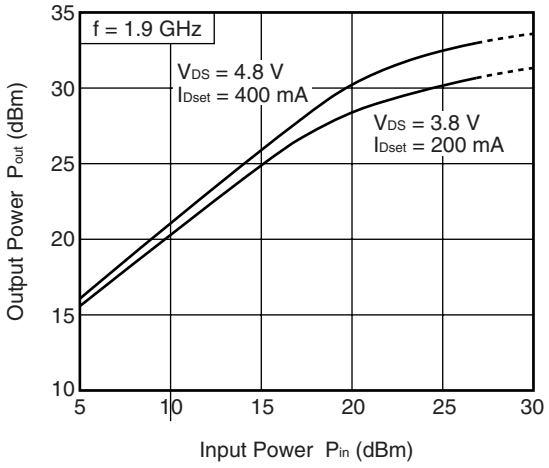

DRAIN CURRENT vs. INPUT POWER



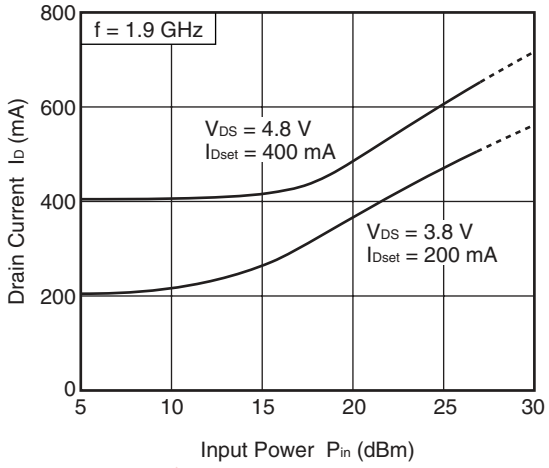



**Remark** The graphs indicate nominal characteristics.

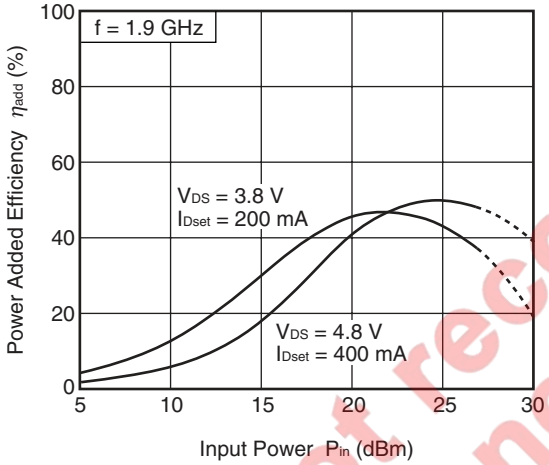
OUTPUT POWER vs. INPUT POWER




DRAIN CURRENT vs. INPUT POWER




POWER ADDED EFFICIENCY vs. INPUT POWER

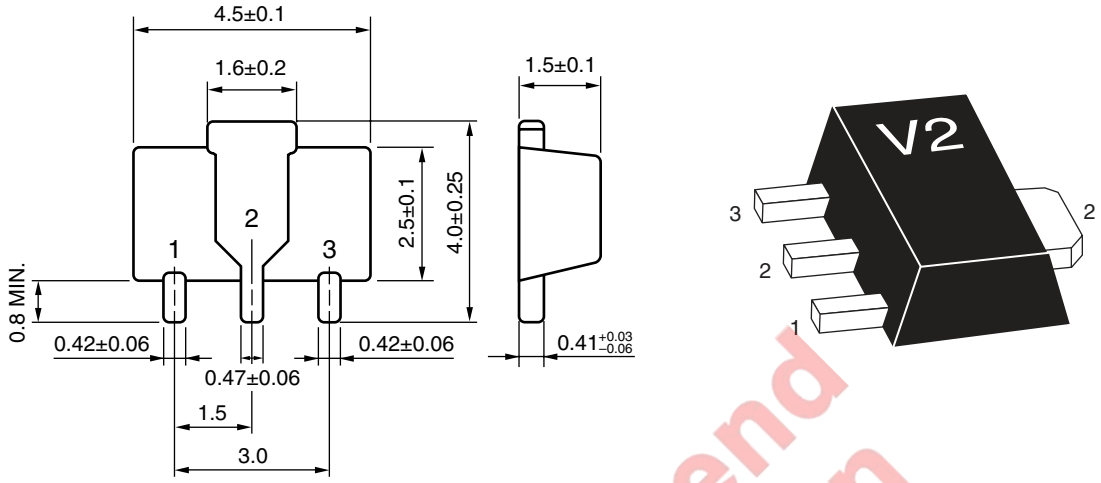



**Remark** The graphs indicate nominal characteristics.

## PACKAGE DIMENSIONS

### 3-PIN POWER MINIMOLD (34 PKG) (UNIT: mm)

(Bottom View) (Side View) (Top View)




### PIN CONNECTIONS

1. Drain
2. Source
3. Gate

## <R> 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)<br>Time at peak temperature<br>Time at temperature of 220°C or higher<br>Preheating time at 120 to 180°C<br>Maximum number of reflow processes<br>Maximum chlorine content of rosin flux (% mass) | : 260°C or below<br>: 10 seconds or less<br>: 60 seconds or less<br>: 120±30 seconds<br>: 3 times<br>: 0.2%(Wt.) or below | IR260 |
| Wave Soldering | Peak temperature (molten solder temperature)<br>Time at peak temperature<br>Preheating temperature (package surface temperature)<br>Maximum number of flow processes<br>Maximum chlorine content of rosin flux (% mass) | : 260°C or below<br>: 10 seconds or less<br>: 120°C or below<br>: 1 time<br>: 0.2%(Wt.) or below | WS260 |
| Partial Heating | Peak temperature (terminal temperature)<br>Soldering time (per side of device)<br>Maximum chlorine content of rosin flux (% mass) | : 350°C or below<br>: 3 seconds or less<br>: 0.2%(Wt.) or below | HS350 |

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

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