DATA SHEET

NEC

SILICON POWER MOS FET
NE5500479A

3.5 V OPERATION SILICON RF POWER LDMOS FET FOR 900 MHz 1 W TRANSMISSION AMPLIFIERS

DESCRIPTION

The NE5500479A is an N-channel silicon power MOS FET specially designed as the transmission power amplifier for cellular handsets. Dies are manufactured using our NEWMOS technology (our 0.6 μm WSi gate laterally diffused MOS FET) and housed in a surface mount package. The device can deliver 31.5 dBm output power with 62% power added efficiency at 900 MHz as AMPS final output stage amplifier under the 3.5 V supply voltage. It also can deliver 35 dBm output power with 62% power added efficiency at 4.8 V, as GSM 900 class 4 final stage amplifiers.

FEATURES

- High output power : P_{out} = 31.5 dBm TYP. (V_{DS} = 3.5 V, I_{Dset} = 300 mA, f = 900 MHz, P_{in} = 20 dBm)
- High power added efficiency : η_{add} = 62% TYP. (V_{DS} = 3.5 V, I_{Dset} = 300 mA, f = 900 MHz, P_{in} = 20 dBm)
- High linear gain : G_L = 15.0 dB TYP. (V_{DS} = 3.5 V, I_{Dset} = 300 mA, f = 900 MHz, P_{in} = 10 dBm)
- Surface mount package : 5.7 × 5.7 × 1.1 mm MAX.
- ★ Single supply : V_{DS} = 3.0 to 8.0 V

APPLICATIONS

- Analog cellular phones : 3.5 V AMPS handsets
- Digital cellular phones : 4.8 V GSM 900 class 4 handsets
- Others : General purpose amplifiers for 800 to 1 000 MHz TDMA applications

ORDERING INFORMATION

Part Number	Package	Marking	Supplying Form
NE5500479A-T1	79A	R4	• 12 mm wide embossed taping • Gate pin face the perforation side of the tape • Qty 1 kpcs/reel

Remark To order evaluation samples, contact your nearby sales office.
Part number for sample order: NE5500479A

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

Document No. PU10119EJ03V0DS (3rd edition)
Date Published July 2003 CP(K)
Printed in Japan

The mark ★ shows major revised points.

ABSOLUTE MAXIMUM RATINGS (T_A = +25°C)

Parameter	Symbol	Ratings	Unit
Drain to Source Voltage	V_{DS}	20.0	V
Gate to Source Voltage	V_{GS}	5.0	V
Drain Current	I_D	1.0	A
Drain Current (Pulse Test)	I_D Note	2.0	A
Total Power Dissipation	P_{tot}	10	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}		3.0	3.5	8.0	V
Gate to Source Voltage	V_{GS}		0	2.0	3.5	V
Drain Current	I_D		–	600	700	mA
Input Power	P_{in}	f = 900 MHz, V_{DS} = 3.5 V	18	20	22	dBm

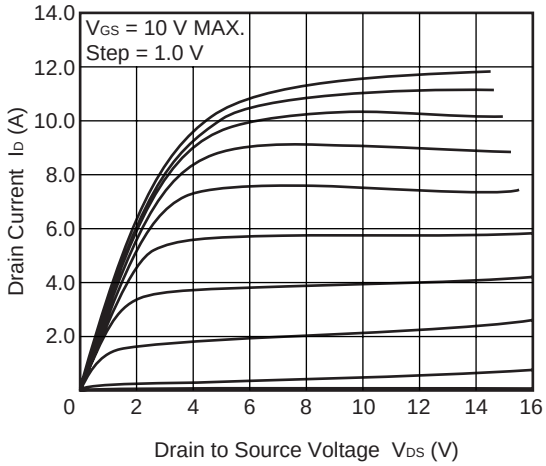
ELECTRICAL CHARACTERISTICS (T_A = +25°C)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Gate to Source Leak Current	I_{GSS}	V_{GSS} = 5.0 V	–	–	100	nA
Drain to Source Leakage Current (Zero Gate Voltage Drain Current)	I_{DSS}	V_{DSS} = 8.5 V	–	–	100	nA
Gate Threshold Voltage	V_{th}	V_{DS} = 4.8 V, I_D = 1 mA	1.0	1.35	2.0	V
Transconductance	G_m	V_{DS} = 4.8 V, I_D = 600 mA	–	1.43	–	S
Drain to Source Breakdown Voltage	BV_{DSS}	I_{DSS} = 10 μA	20	24	–	V
Thermal Resistance	R_{th}	Channel to Case	–	10	–	°C/W
Linear Gain	G_L	f = 900 MHz, P_{in} = 10 dBm, V_{DS} = 3.5 V, I_{Dset} = 300 mA, **Note**	–	15.0	–	dB
Output Power	P_{out}	f = 900 MHz, P_{in} = 20 dBm,	30.5	31.5	–	dBm
Operating Current	I_{op}	V_{DS} = 3.5 V, I_{Dset} = 300 mA, **Note**	–	600	–	mA
Power Added Efficiency	η_{add}		55	62	–	%

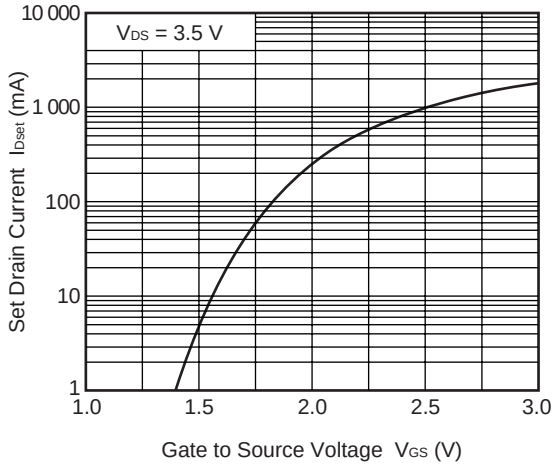
Note DC performance is 100% testing. RF performance is testing several samples per wafer. Wafer rejection criteria for standard devices is 1 reject for several samples.

TYPICAL CHARACTERISTICS (T_A = +25°C)

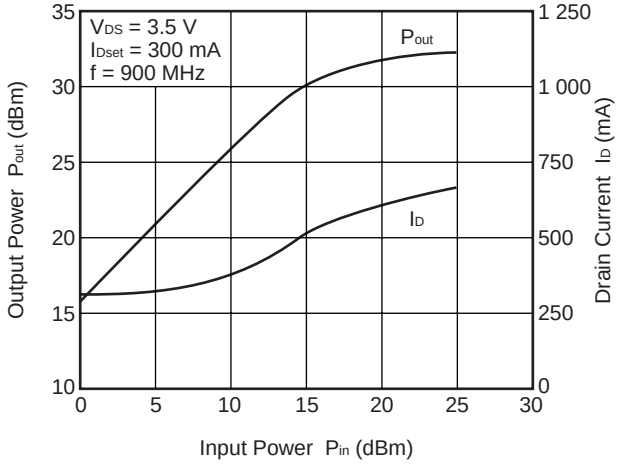
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



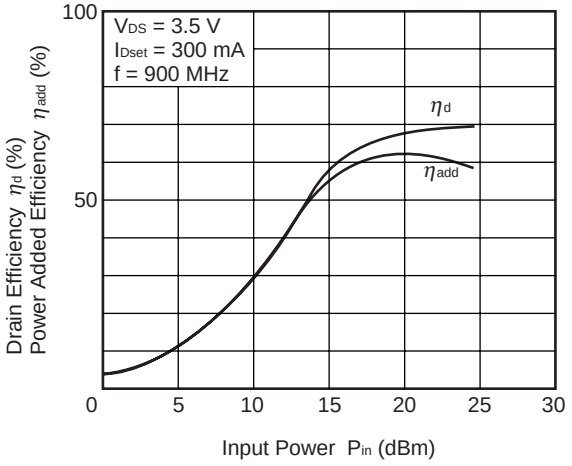
SET DRAIN CURRENT vs.
GATE TO SOURCE VOLTAGE



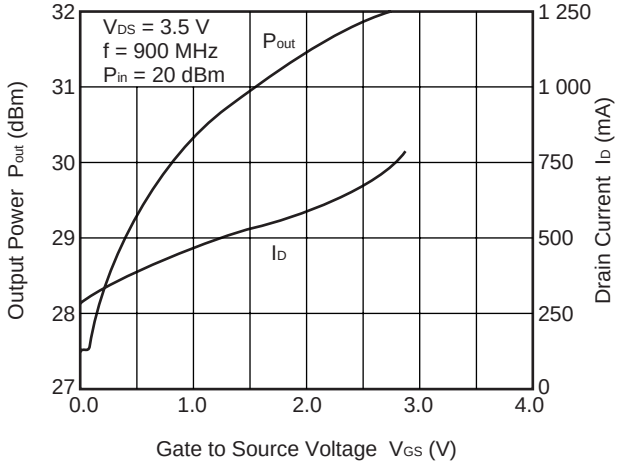
OUTPUT POWER, DRAIN CURRENT
vs. INPUT POWER



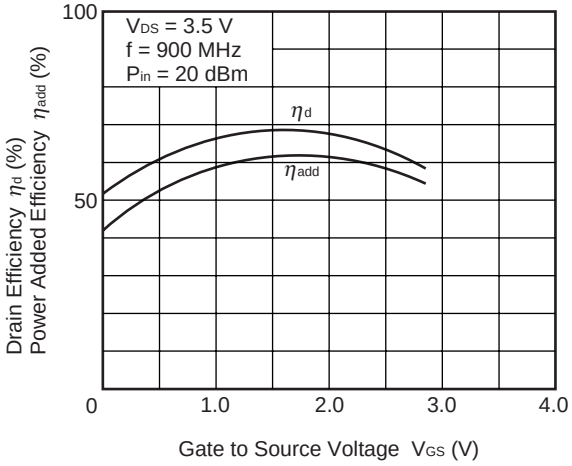
DRAIN EFFICIENCY, POWER ADDED
EFFICIENCY vs. INPUT POWER



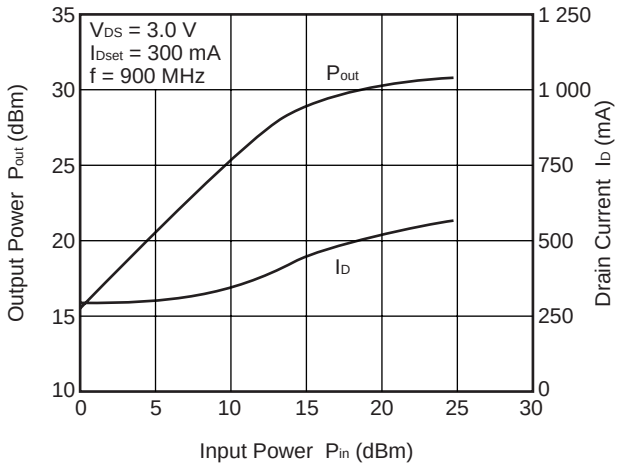
OUTPUT POWER, DRAIN CURRENT
vs. GATE TO SOURCE VOLTAGE



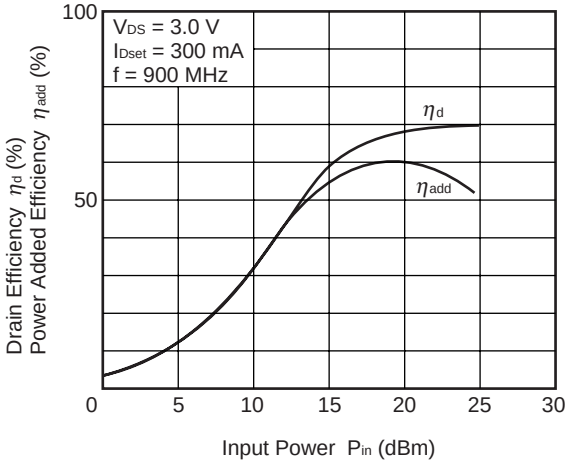
DRAIN EFFICIENCY, POWER ADDED
EFFICIENCY vs. GATE TO SOURCE VOLTAGE



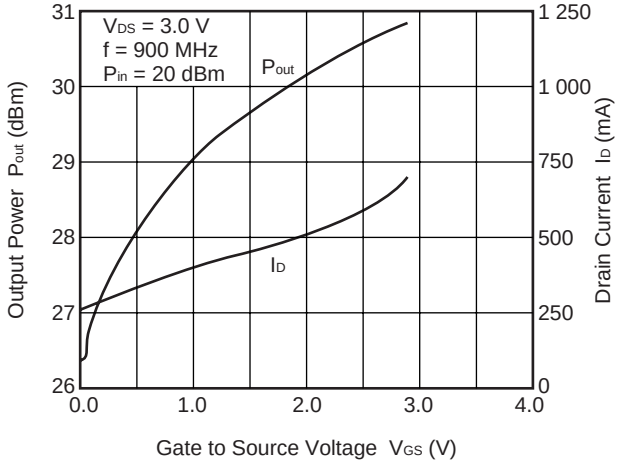
OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER



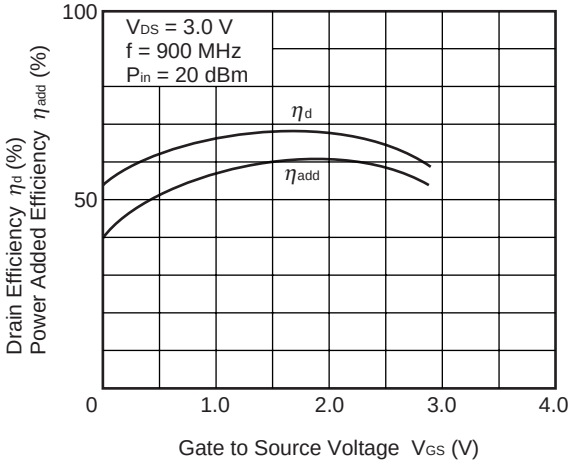
DRAIN EFFICIENCY, POWER ADDED EFFICIENCY vs. INPUT POWER



OUTPUT POWER, DRAIN CURRENT vs. GATE TO SOURCE VOLTAGE



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



Remark The graphs indicate nominal characteristics.

S-PARAMETERS

S-parameters/Noise parameters are provided on the NEC Compound Semiconductor Devices Web site in a form (S2P) that enables direct import to a microwave circuit simulator without keyboard input.

Click here to download S-parameters.

[RF and Microwave] → [Device Parameters]

URL http://www.csd-nec.com/

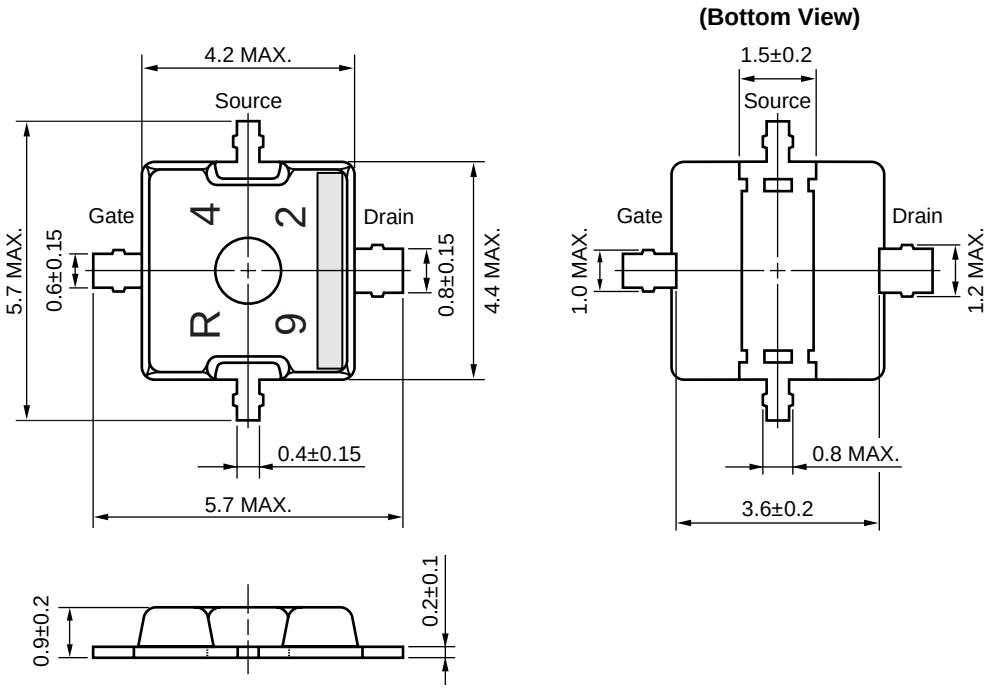
LARGE SIGNAL IMPEDANCE (V_{DS} = 3.5 V, I_D = 300 mA, P_{in} = 20 dBm)

f (MHz)	Z_{in} (Ω)	Z_{OL} (Ω) Note
900	TBD	TBD

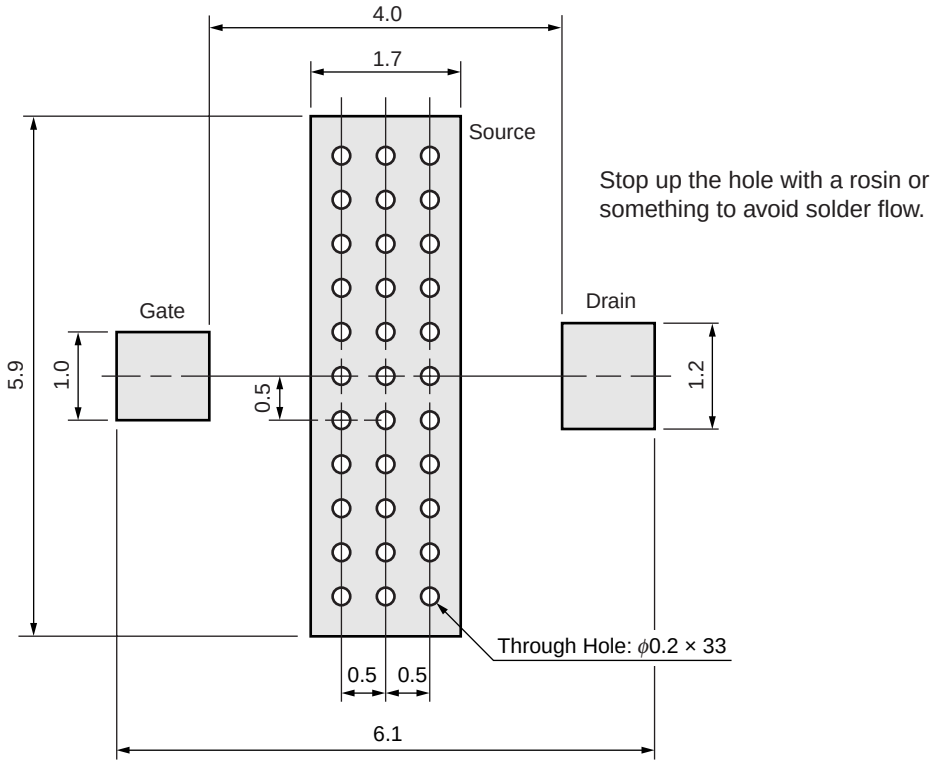
Note Z_{OL} is the conjugate of optimum load impedance at given voltage, idling current, input power and frequency.

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

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

- **The information in this document is current as of July, 2003. The information is subject to change without notice. For actual design-in, refer to the latest publications of NEC's data sheets or data books, etc., for the most up-to-date specifications of NEC semiconductor products. Not all products and/or types are available in every country. Please check with an NEC sales representative for availability and additional information.**
- No part of this document may be copied or reproduced in any form or by any means without prior written consent of NEC. NEC assumes no responsibility for any errors that may appear in this document.
- NEC does not assume any liability for infringement of patents, copyrights or other intellectual property rights of third parties by or arising from the use of NEC semiconductor products listed in this document or any other liability arising from the use of such products. No license, express, implied or otherwise, is granted under any patents, copyrights or other intellectual property rights of NEC or others.
- Descriptions of circuits, software and other related information in this document are provided for illustrative purposes in semiconductor product operation and application examples. The incorporation of these circuits, software and information in the design of customer's equipment shall be done under the full responsibility of customer. NEC assumes no responsibility for any losses incurred by customers or third parties arising from the use of these circuits, software and information.
- While NEC endeavours to enhance the quality, reliability and safety of NEC semiconductor products, customers agree and acknowledge that the possibility of defects thereof cannot be eliminated entirely. To minimize risks of damage to property or injury (including death) to persons arising from defects in NEC semiconductor products, customers must incorporate sufficient safety measures in their design, such as redundancy, fire-containment, and anti-failure features.
- NEC semiconductor products are classified into the following three quality grades:
  "Standard", "Special" and "Specific". The "Specific" quality grade applies only to semiconductor products developed based on a customer-designated "quality assurance program" for a specific application. The recommended applications of a semiconductor product depend on its quality grade, as indicated below. Customers must check the quality grade of each semiconductor product before using it in a particular application.
  "Standard": Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots
  "Special": Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)
  "Specific": Aircraft, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems and medical equipment for life support, etc.
  The quality grade of NEC semiconductor products is "Standard" unless otherwise expressly specified in NEC's data sheets or data books, etc. If customers wish to use NEC semiconductor products in applications not intended by NEC, they must contact an NEC sales representative in advance to determine NEC's willingness to support a given application.
  (Note)
  (1) "NEC" as used in this statement means NEC Corporation, NEC Compound Semiconductor Devices, Ltd. and also includes its majority-owned subsidiaries.
  (2) "NEC semiconductor products" means any semiconductor product developed or manufactured by or for NEC (as defined above).

M8E 00.4-0110

▶**For further information, please contact**

NEC Compound Semiconductor Devices, Ltd. **http://www.csd-nec.com/**
E-mail: salesinfo@csd-nec.com (sales and general)
techinfo@csd-nec.com (technical)
5th Sales Group, Sales Division TEL: +81-44-435-1588 FAX: +81-44-435-1579

NEC Compound Semiconductor Devices Hong Kong Limited
E-mail: ncsd-hk@elhk.nec.com.hk (sales, technical and general)

Hong Kong Head Office	TEL: +852-3107-7303	FAX: +852-3107-7309
Taipei Branch Office	TEL: +886-2-8712-0478	FAX: +886-2-2545-3859
Korea Branch Office	TEL: +82-2-558-2120	FAX: +82-2-558-5209

NEC Electronics (Europe) GmbH **http://www.ee.nec.de/**
TEL: +49-211-6503-01 FAX: +49-211-6503-487

California Eastern Laboratories, Inc. **http://www.cel.com/**
TEL: +1-408-988-3500 FAX: +1-408-988-0279

0306