

LDMOS FIELD EFFECT TRANSISTOR NEM090603M-28

N-CHANNEL SILICON POWER LDMOS FET FOR 75 W UHF-BAND SINGLE-END POWER AMPLIFIER

DESCRIPTION

The NEM090603M-28 is an N-channel enhancement-mode lateral diffused MOS FET designed for driver or final stage in 0.8 to 1.0 GHz PA, such as, analog/digital TV-transmitter and GSM/EDGE/D-AMPS/PDC cellular base station amplifiers. Dies are manufactured using our NEWMOS technology (our WSi gate lateral MOS FET), and its nitride surface passivation and triple layer aluminum silicon metallization offer a high degree of reliability.

FEATURES

- High 1 dB compression output power : $P_{O(1\text{ dB})} = 75\text{ W TYP.}$ ($V_{DS} = 28\text{ V}$, $I_{Dset} = 550\text{ mA}$, $f = 960\text{ MHz}$)
- High linear gain : $G_L = 17.5\text{ dB TYP.}$ ($V_{DS} = 28\text{ V}$, $I_{Dset} = 550\text{ mA}$, $f = 960\text{ MHz}$)
- High drain efficiency : $\eta_d = 54\% \text{ TYP.}$ ($V_{DS} = 28\text{ V}$, $I_{Dset} = 550\text{ mA}$, $f = 960\text{ MHz}$)
- Low intermodulation distortion : $IM_3 = -31\text{ dBc TYP.}$ ($V_{DS} = 28\text{ V}$, $I_{Dset} = 550\text{ mA}$, $f = 960/960.1\text{ MHz}$,
 $P_{out} = 45\text{ dBm}$ (2 tones))
- Internal matched (Input and Output) for case at use
- Excellent thermal stability
- Low cost hollow plastic packages
- Integrated ESD protection
- Excellent stability against HCI (Hot Carrier Injection)

APPLICATIONS

- Digital cellular base station PA : GSM/EDGE/D-AMPS/PDC/N-CDMA etc.
- UHF-band TV-transmitter PA

ORDERING INFORMATION

Part Number	Order Number	Package	Supplying Form
NEM090603M-28	NEM090603M-28-A	3M (T-91M) (Pb-Free)	ESD protective tray

Remark To order evaluation samples, contact your nearby sales office.
The unit sample quantity is 1 pcs.

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.
Not all devices/types available in every country. Please check with local NEC Compound Semiconductor Devices representative for availability and additional information.

ABSOLUTE MAXIMUM RATINGS (T_A = +25°C, unless otherwise specified)

Parameter	Symbol	Ratings	Unit
Drain to Source Voltage	V _{DS}	65	V
Gate to Source Voltage	V _{GS}	±7	V
Drain Current	I _D	6	A
Total Device Dissipation	P _D ^{Note 1}	146	W
Input Power	P _{in} ^{Note 2}	3.0	W
Channel Temperature	T _{ch}	200	°C
Storage Temperature	T _{stg}	-65 to +150	°C

Notes 1. T_C = 25 °C

2. f = 960 MHz, V_{DS} = 28 V

RECOMMENDED OPERATING RANGE

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Drain to Source Voltage	V _{DS}	-	28	30	V
Gate to Source Voltage	V _{GS}	2.6	3.0	3.6	V
Input Power	P _{in}	-	28	32	dBm

ELECTRICAL CHARACTERISTICS (T_A = +25°C)

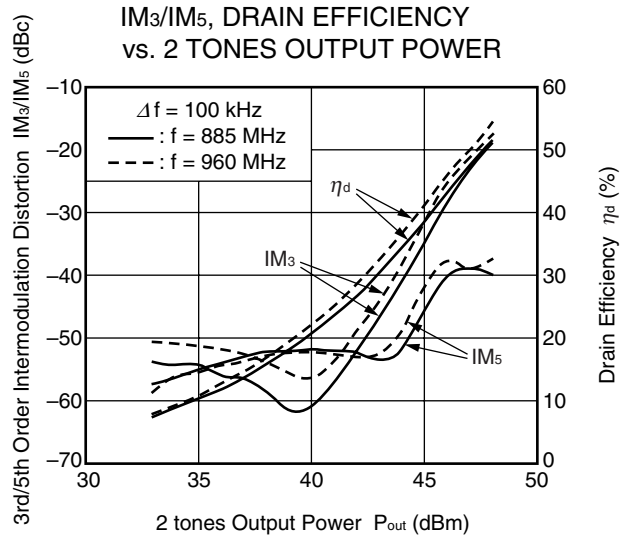
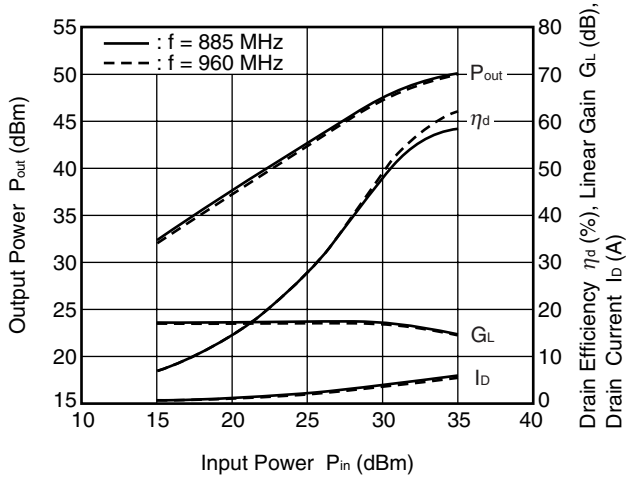
Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Gate to Source Leak Current	I _{GSS}	V _{GS} = 5V	-	-	1	μA
Saturated Drain Current	I _{DSS}	V _{DSS} = 65 V	-	-	1	mA
Gate Threshold Voltage	V _{th}	V _{DS} = 10 V, I _D = 1 mA	1.7	2.2	2.8	V
Transconductance	g _m	V _{DS} = 28 V, I _{Dset} = 550 mA	-	2.7	-	S
Drain to Source Breakdown Voltage	BV _{DSS}	I _{DSS} = 10 μA	65	75	-	V
Thermal Resistance	R _{th(ch-c)}	Channel to Case	-	1.0	1.2	°C/W
Gain 1 dB Compression Output Power	P _{O(1 dB)}	f = 960 MHz, V _{DS} = 28 V,	-	48.8	-	dBm
Linear Gain	G _L ^{Note 1}	I _{Dset} = 550 mA	16	17.5	-	dB
Output Power	P _{out} ^{Note 2}		47.5	48.3	-	dBm
Drain Efficiency	η _d		48	54	-	%
Power Added Efficiency	η _{add}		-	53	-	%
3rd Order Intermodulation Distortion	IM ₃	f = 960/960.1 MHz, V _{DS} = 28 V, I _{Dset} = 550 mA, 2 tones P _{out} = 45 dBm	-	-31	-	dBc

Notes 1. P_{in} = 21 dBm

2. P_{in} = 32 dBm

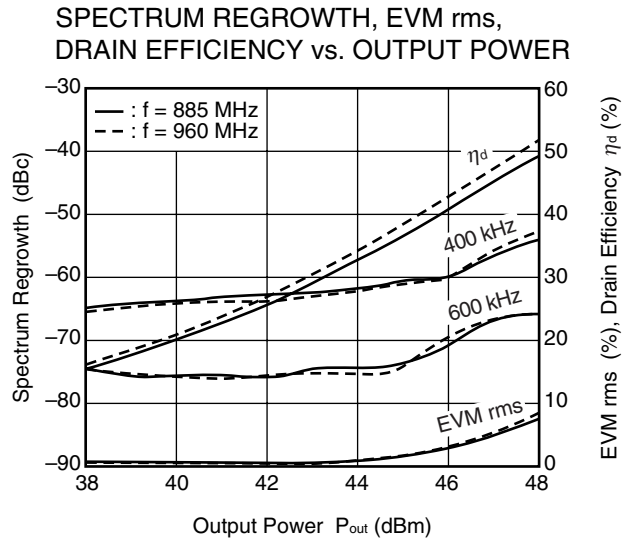
TYPICAL CHARACTERISTICS (TA = +25°C, VDS = 28 V, IDset = 550 mA, unless otherwise specified)

OUTPUT POWER, DRAIN EFFICIENCY, LINEAR GAIN, DRAIN CURRENT vs. INPUT POWER



Remark The graphs indicate nominal characteristics.

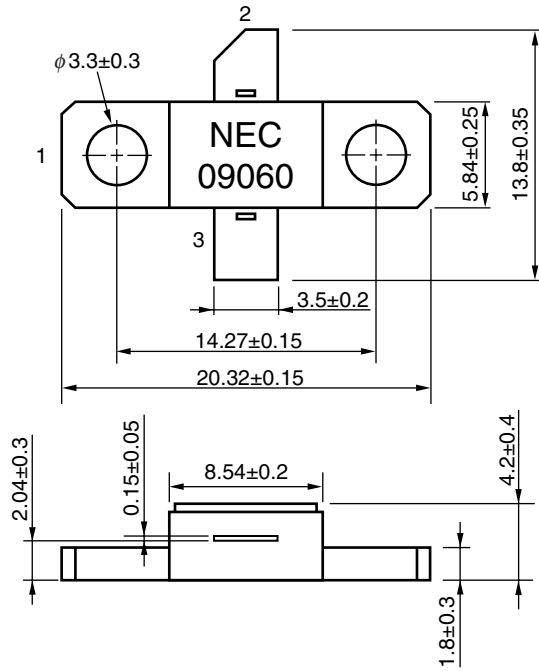
TYPICAL CHARACTERISTICS (T_A = +25°C, V_{DS} = 28 V, I_{Dset} = 550 mA, EDGE Modulation Spectrum Performance, unless otherwise specified)



Remark The graph indicates nominal characteristics.

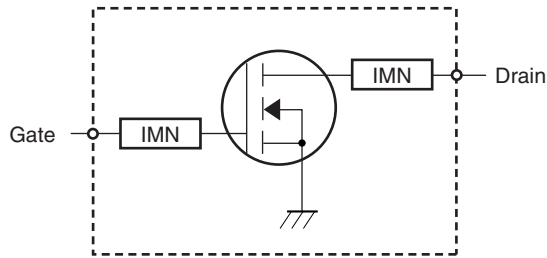
PACKAGE DIMENSIONS

3M (T-91M) (UNIT: mm)



PIN CONNECTIONS

- 1. Source
- 2. Drain
- 3. Gate



IMN : Internal Matching Network

RECOMMENDED MOUNTING CONDITIONS FOR CORRECT USE

- (1) Fix to a heat sink or mount surface completely with screws at the two holes of the flange.
- (2) The recommended torque strength of the screws is 29.4 N-cm typical using M3 type screws.
- (3) The recommended flatness of the mount surface is less than $\pm 10 \mu\text{m}$ (roughness of surface is $\nabla\nabla\nabla$).

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
Partial Heating	Peak temperature (terminal temperature) : 350°C or below Soldering time (per terminal 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).

- **The information in this document is current as of October, 2004. 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.ncsd.necel.com/>

E-mail: salesinfo@ml.ncsd.necel.com (sales and general)

techinfo@ml.ncsd.necel.com (technical)

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: +49-211-6503-0 FAX: +49-211-6503-1327

California Eastern Laboratories, Inc. <http://www.cel.com/>

TEL: +1-408-988-3500 FAX: +1-408-988-0279