

To our customers,

Old Company Name in Catalogs and Other Documents

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Renesas Electronics website: <http://www.renesas.com>

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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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))
- 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.

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Not all products and/or types are available in every country. Please check with an NEC Electronics sales 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
Average Input Power ^{Note}	P _{in (ave.)}	-	28	32	dBm

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Note f = 960 MHz

ELECTRICAL CHARACTERISTICS (T_A = +25°C)

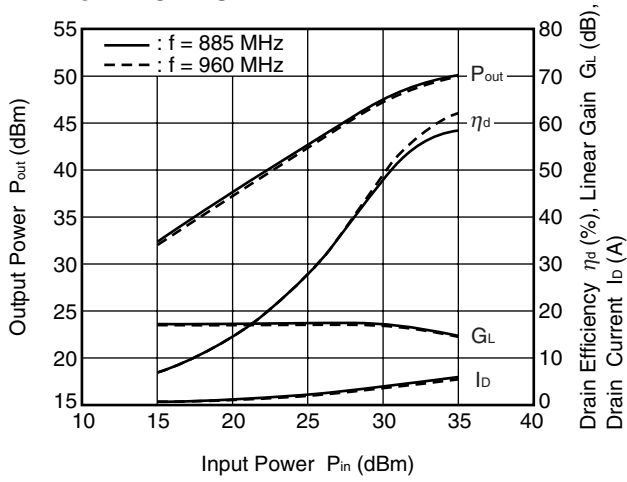
Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Gate to Source Leak Current	I _{GSS}	V _{GS} = 5 V	-	-	1	μA
Saturated Drain Current	I _{DSS}	V _{DSS} = 65 V	-	-	1	mA
Gate Threshold Voltage	V _{th}	V _{DS} = 10 V, I _D = 1 mA	1.7	2.2	2.8	V
Transconductance	g _m	V _{DS} = 28 V, I _{Dset} = 550 mA	-	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

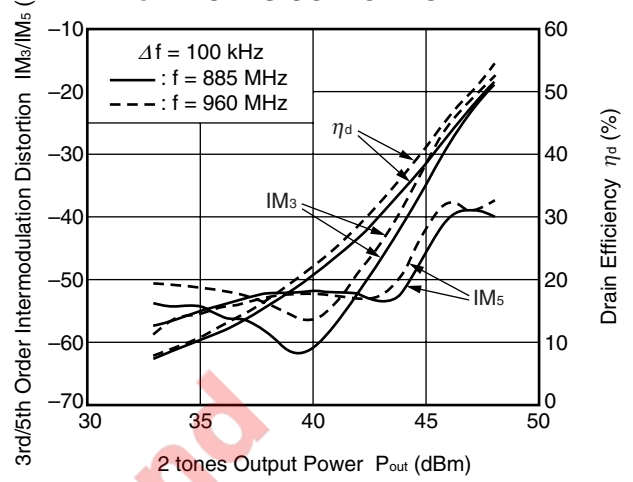
2. P_{in} = 32 dBm

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

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



IM₃/IM₅, DRAIN EFFICIENCY vs. 2 TONES OUTPUT POWER

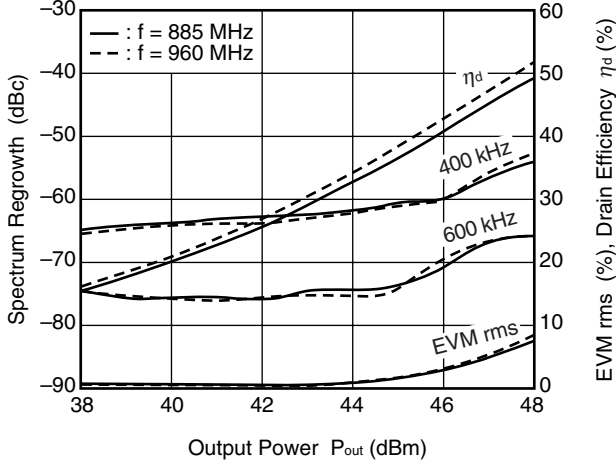


Remark The graphs indicate nominal characteristics.

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

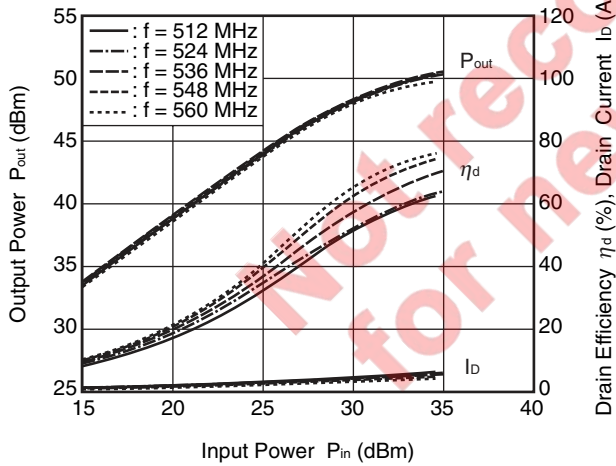
SPECTRUM REGROWTH, EVM rms, DRAIN EFFICIENCY vs. OUTPUT POWER



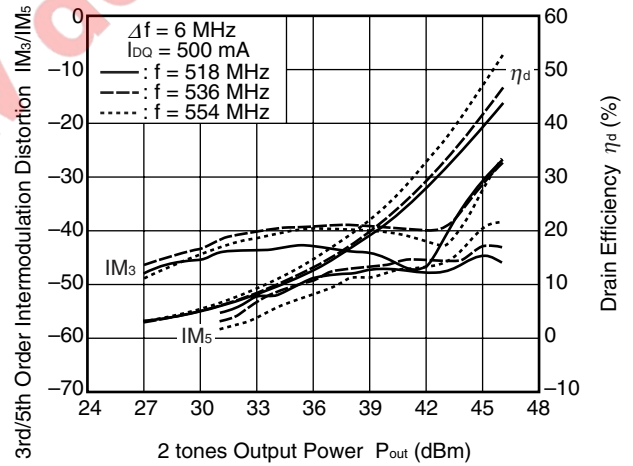
Remark The graph indicates nominal characteristics.

<R> TYPICAL CHARACTERISTICS ($T_A = +25^\circ\text{C}$, unless otherwise specified)

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



IM3/IM5, DRAIN EFFICIENCY vs. 2 TONES OUTPUT POWER



Remark The graphs indicate nominal characteristics.

<R> S-PARAMETERS

S-parameters/Noise parameters are provided on our web site in a form (S2P) that enables direct import to a microwave circuit simulator without keyboard input.

Click here to download S-parameters.

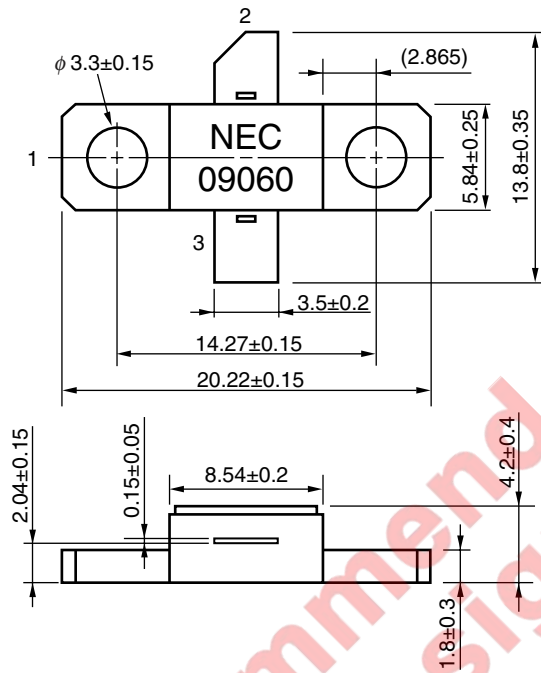
[RF and Microwave] → [Device Parameters]

URL <http://www.ncsd.necel.com/microwave/index.html>

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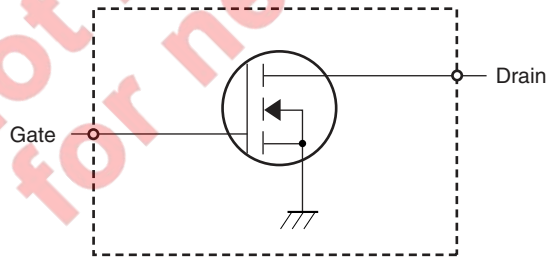
<R> PACKAGE DIMENSIONS

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



PIN CONNECTIONS

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



Remark (): Reference value

RECOMMENDED MOUNTING CONDITIONS FOR CORRECT USE

- <R>
- (1) Fix to a heatsink or mount surface completely with screws at the two holes of the flange.
 - (2) The recommended torque strength of the screws is 53 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).

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