10W,12V High Power RF LDMOS FETs

MM2201N

Description

The MM2201N is a 10-watt, highly rugged, unmatched LDMOS FET, designed for commercial and industrial applications at frequencies up to 2.2 GHz. It can be used in linear or saturated power amplifier, for CW and pulsed signal, and any modulation format.

- Typical 1.6GHz 1C WCDMA Performance (On Innogration fixture with device soldered).

  VDS= **12V**, IDQ=100mA

Freq (MHz)	Pout (dBm)	CCDF (dB)	Ppeak (dBm)	Ppeak (W)	ACPR (dBc)	Gain (dB)	Eff (%)
1585	31.02	9.91	40.92	12.4	-37.1	14.6	24.0
1615	31.01	9.84	40.85	12.2	-36.9	14.7	25.1
1645	31.01	9.69	40.69	11.7	-36.5	14.7	26.5

Typical 2.1GHz 1C WCDMA Performance (On Innogration fixture with device soldered)

VDS= **12V**, IDQ=100mA

Freq (MHz)	Pout (dBm)	CCDF (dB)	Ppeak (dBm)	Ppeak (W)	ACPR (dBc)	Gain (dB)	Eff (%)
2110	29.99	9.96	39.94	9.9	-33.4	11.1	22.9
2140	29.99	9.90	39.89	9.7	-32.7	11.3	23.6
2170	30.00	9.63	39.63	9.2	-31.0	11.5	24.4

- Typical 1.6GHz CW Performance at Psat and Pavg=5W (On Innogration fixture with device soldered).

  VDS= **8V**, Idq=45mA,

Freq(MHz)	Pin(dBm)	Psat(dBm)	Psat(W)	IDS(A)	Gain(dB)	Eff(%)
1615	27.81	38.52	7.1	1.4	10.71	63.50%
1620	29.8	38.91	7.8	1.47	9.11	66.16%
1625	28.79	38.61	7.3	1.389	9.82	65.34%
Freq(MHz)	Pin(dBm)	Pav(dBm)	Pav(W)	IDS(A)	Gain(dB)	Eff(%)
1615	24.26	37	5.0	1.09	12.74	57.48%
1620	24.3	37	5.0	1.1	12.7	56.95%
1625	24.42	37	5.0	1.12	12.58	55.94%

Features

- High Efficiency and Linear Gain Operations
- Integrated ESD Protection
- Excellent thermal stability, low HCI drift
- Large Positive and Negative Gate/Source Voltage Range for Improved Class C Operation
- Pb-free, RoHS-compliant

Suitable Applications

- Small cell final stage below 2.2GHz
- VHF/UHF mobile radio
- Beidou amplifier

Table 1. Maximum Ratings

Rating	Symbol	Value	Unit
Drain--Source Voltage	V_{DSS}	+40	Vdc
Gate--Source Voltage	V_{GS}	-10 to +10	Vdc
Operating Voltage	V_{DD}	+13.6	Vdc
Storage Temperature Range	Tstg	-65 to +150	°C
Case Operating Temperature	T_C	+150	°C
Operating Junction Temperature	T_J	+225	°C

Table 2. Thermal Characteristics

Characteristic	Symbol	Value	Unit
Thermal Resistance, Junction to Case T_C= 85°C, T_J=200°C, DC test	$R_{\theta JC}$	1.5	°C/W

Table 3. ESD Protection Characteristics

Test Methodology	Class
Human Body Model (per JESD22--A114)	Class 2

Table 4. Electrical Characteristics (TA = 25 ℃ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
DC Characteristics					
Drain-Source Voltage V_{GS}=0, I_{DS}=100uA	$V_{(BR)DSS}$		43		V
Zero Gate Voltage Drain Leakage Current (V_{DS} = 12V, V_{GS} = 0 V)	I_{DSS}	——	——	1	μA
Zero Gate Voltage Drain Leakage Current (V_{DS} = 28V, V_{GS} = 0 V)	I_{DSS}	——	——	1	μA
Gate--Source Leakage Current (V_{GS} = 9 V, V_{DS} = 0 V)	I_{GSS}	——	——	1	μA
Gate Threshold Voltage (V_{DS} = 12V, I_D = 600 μA)	$V_{GS(th)}$	——	2	——	V
Gate Quiescent Voltage (V_{DD} = 12 V, I_D = 300mA, Measured in Functional Test)	$V_{GS(Q)}$	——	3.1	——	V

Dynamic capacitance

Ciss	Vds= 12V,Vgs=0V, f=1MHz	23.31pF
Coss		12.7pF
Crss		0.76pF

Load Mismatch (In Innogration Test Fixture, 50 ohm system): V_{DD} = 12Vdc, I_{DQ} = 100 mA, f = 2100 MHz

VSWR 10:1 at 10W pulse CW Output Power	No Device Degradation

Reference Circuit of Test Fixture Assembly Diagram
1.6GHz(up) and 2.1GHz(down) RO4350B 20mils

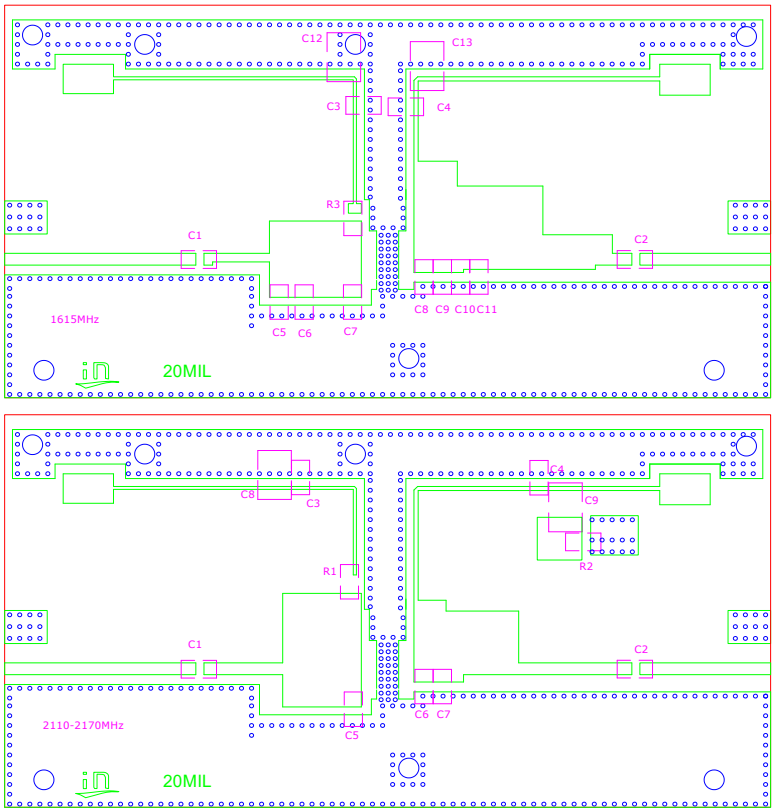


Figure 1. Test Circuit Component Layout

Table 5. Test Circuit Component Designations and Values

1.6GHz

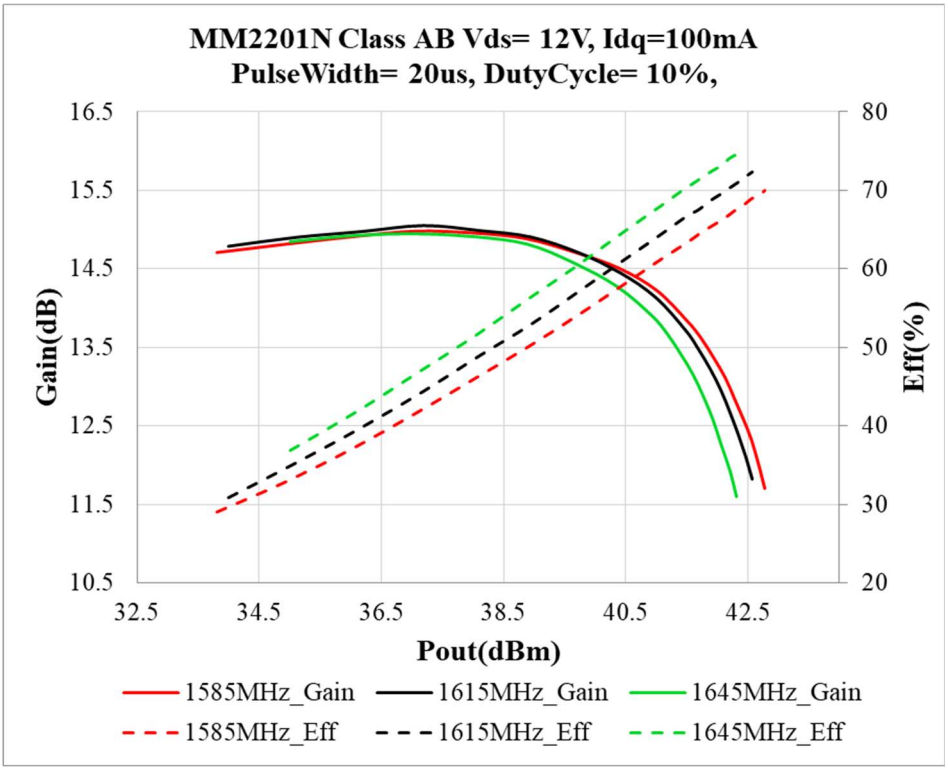
Designator	Comment	Footprint	Quantity
C1	3.9pF	0603	1
C2, C3, C4	27 pF	0603	3
C5, C6, C8, C9	2.0pF	0603	4
C7, C10	1.0pF	0603	2
C11	0.5pF	0603	1
C12, C13	10uF/100V	1210	2
R1	10ohm	0603	1

2.1GHz

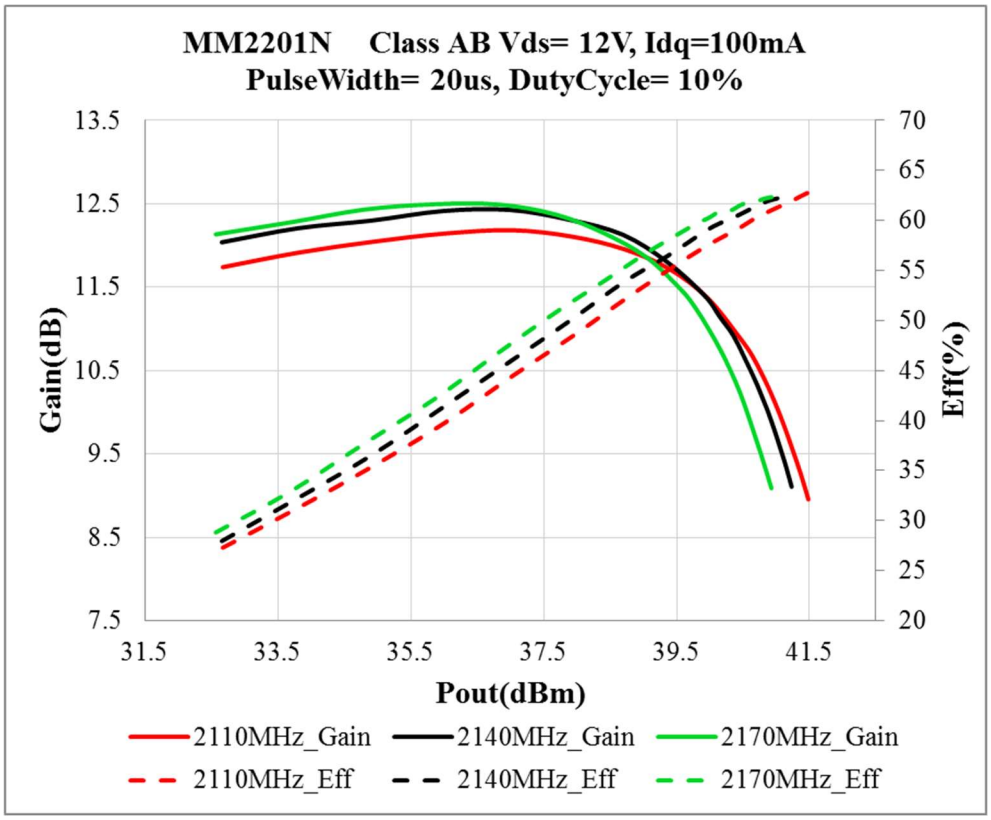
Designator	Comment	Footprint	Quantity
C1	3.9pF	0603	1
C2, C3, C4	15 pF	0603	3
C5, C6, C7	1.0pF	0603	3
C8, C9	10uF/100V	1210	2
R1, R2	10ohm	0603	2

TYPICAL CHARACTERISTICS

Figure 2. Power Gain and Drain Efficiency as function of Power Out



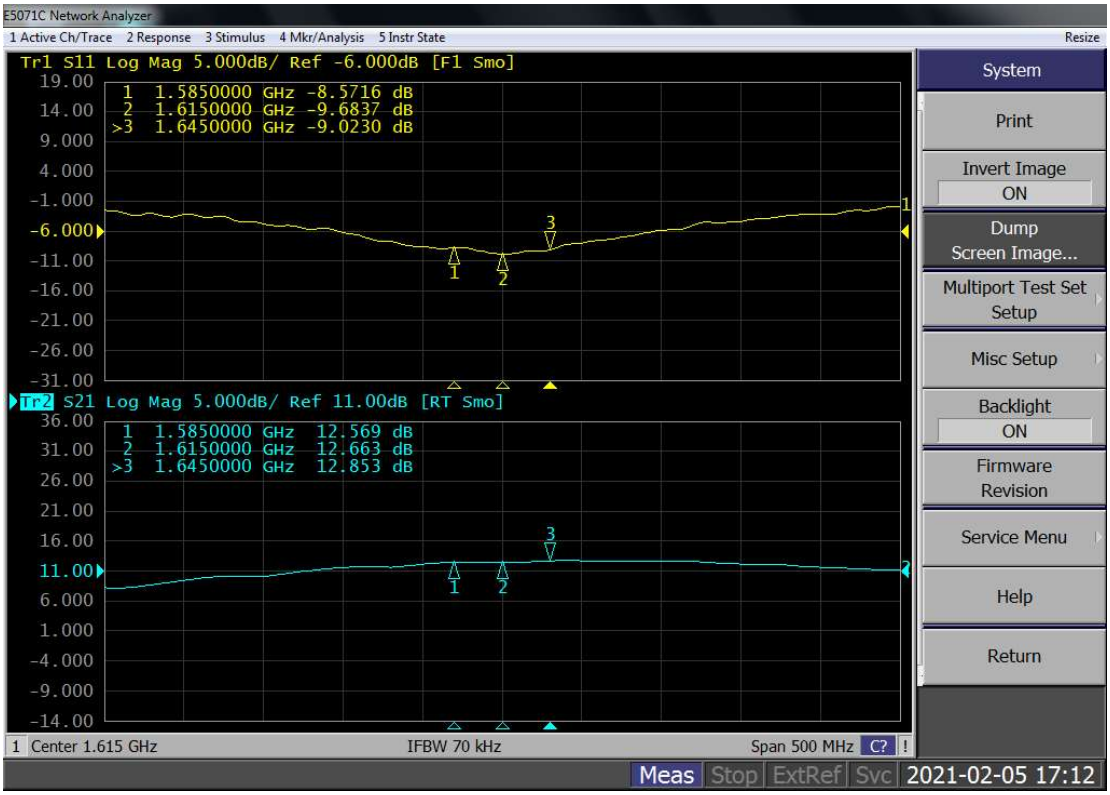
Freq (MHz)	P1dB (dBm)	P1dB (W)	P1dB Eff(%)	P1dB Gain(dB)	P3dB (dBm)	P3dB (W)	P3dB Eff(%)
1585	41.3	13.5	62.3	14	42.68	18.5	69.3
1615	41.07	12.8	64.4	14.07	42.48	17.7	71.9
1645	40.83	12.1	66.7	13.96	42.19	16.6	74.0



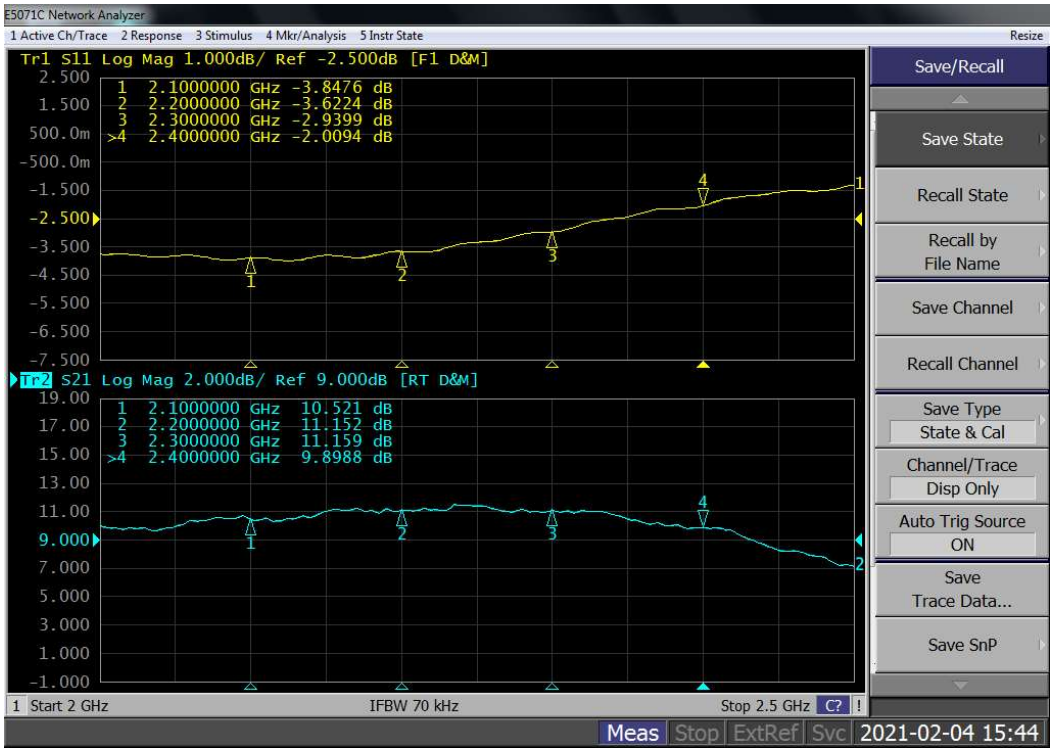
Freq (MHz)	P1dB (dBm)	P1dB (W)	P1dB Eff(%)	P1dB Gain(dB)	P3dB (dBm)	P3dB (W)	P3dB Eff(%)
2110	40.14	10.3	58.2	11.19	41.39	13.8	62.5
2140	39.86	9.7	58.6	11.44	41.11	12.9	62.4
2170	39.52	9.0	58.6	11.51	40.76	11.9	62.1

Figure 3. Network analyzer output S11/S21

1.6GHz

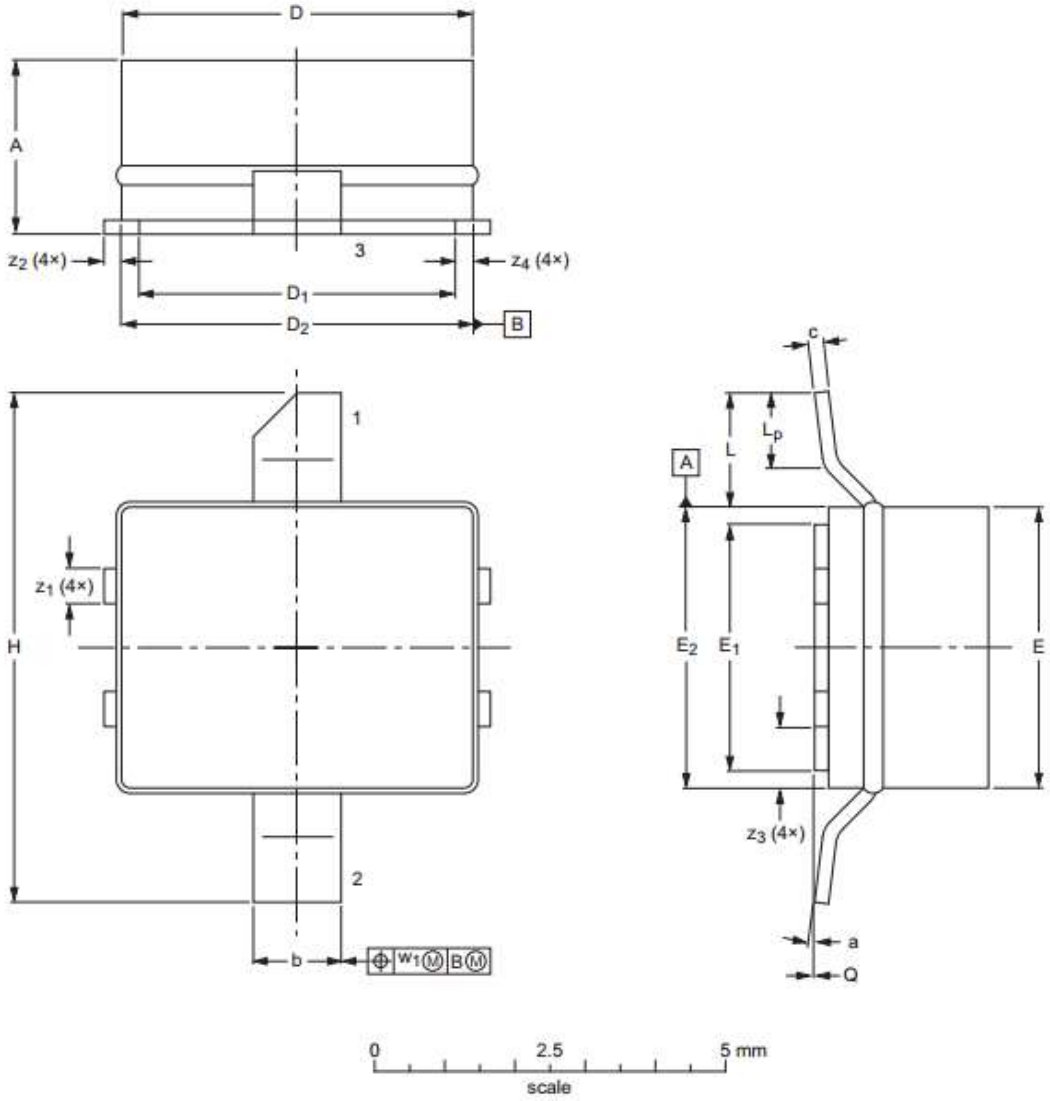


2.1GHz



Package Outline

Earless Flanged ceramic package; 2 leads(1-Drain,2-Gate,3-Source)



UNIT	A	b	c	D	D_1	E	E_1	E_2	H	L	L_P	Q	w_1	z_1	z_2	z_3	z_4	α
mm	2.34	1.35	0.23	5.16	4.65	4.14	3.63	4.14	7.49	2.03	1.02	0.1	0.25	0.58	0.25	0.97	0.51	7°
	2.13	1.19	0.18	5.00	4.50	3.99	3.48	3.99	7.24	1.27	0.51	0.0		0.43	0.18	0.81	0.00	0°

OUTLINE VERSION	REFERENCE			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
PKG-MM					18/6/2014

Revision history

Table 7. Document revision history

Date	Revision	Datasheet Status
2021/2/5	Rev 1.0	Preliminary Datasheet
2021/3/11	Rev 1.1	Add CW performance at 8V according to HL-21-09

Application data based on LSM-21-02/03, HL-21-09

Disclaimers

Specifications are subject to change without notice. Innogration believes the information contained within this data sheet to be accurate and reliable. However, no responsibility is assumed by Innogration for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of Innogration . Innogration makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose."Typical" parameters are the average values expected by Innogration in large quantities and are provided for information purposes only. These values can and do vary in different applications and actual performance can vary over time. All operating parameters should be validated by customer's technical experts for each application. Innogration products are not designed, intended or authorized for use as components in applications intended for surgical implant into the body or to support or sustain life, in applications in which the failure of the Innogration product could result in personal injury or death or in applications for planning, construction, maintenance or direct operation of a nuclear facility. For any concerns or questions related to terms or conditions, pls check with Innogration and authorized distributors