PRELIMINARY DATA SHEET

NEC

HETERO JUNCTION FIELD EFFECT TRANSISTOR

NE1280 SERIES

K-BAND MEDIUM POWER AMPLIFIE
N-CHANNEL HJ-FET CHIPS

DESCRIPTION

The NE1280 series is medium power HJ-FET chips which offer high output power and high gain for telecom transmit power amplifier applications to 30 GHz.

NE1280100 is one cell die of 450 μm gate width, offering 0.1 W output power. NE1280200 is two cells of 900 μm gate width, offering 0.2 W output power.

NE1280400 is four cells of 1.8 μm gate width, offering 0.4 W output power.

The devices incorporate WSi/Au gate to get high gain and silicon nitride glassivation for superior scratch resistance and mechanical protection.

Via hole source grounding result in superior RF performance. To reduce the thermal resistance, the devices have a PHS. (Plated Heat Sink)

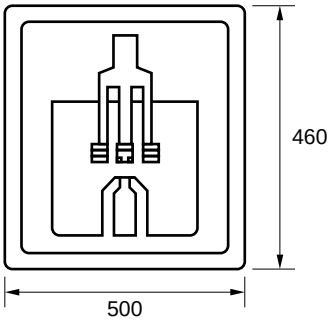
NEC's strigent quality assurance and test procedures assure the highest reliability and performance.

FEATURES

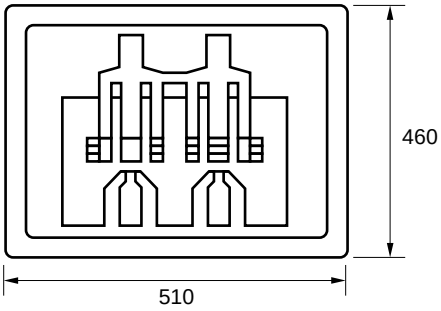
- Class A operation
- High power output
- High liniar gain
- High reliability

CHIP DIMENSIONS (unit: μm)

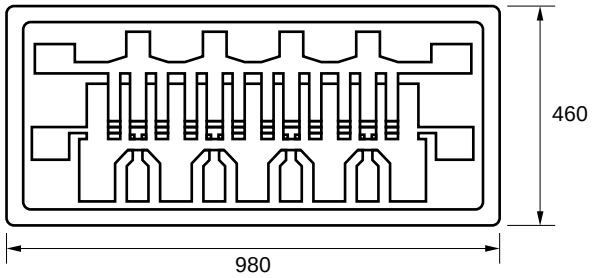
NE1280100



NE1280200



NE1280400



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ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

CHARACTERISTIC	SYMBOL	RATINGS			UNIT
		NE1280100	NE1280200	NE1280400	
Drain to Source Voltage	V_{DS}	10	10	10	V
Gate to Source Voltage	V_{GSO}	–5	–5	–5	V
Total Power Disipation	P_T	1.2	2.5	5.0	W
Drain Current	I_D	0.3	0.6	1.2	A
Gate Current	I_G	1.0	2.0	4.0	mA
Channel Temperature	T_{ch}	175	175	175	°C
Storage Temperature	T_{stg}	–65 to +175	–65 to +175	–65 to +175	°C

RECOMMENDED OPERATION RANGE

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Drain to Source Voltage	V_{DS}	4	–	5	V
Drain Current	I_{DS}	–	0.4*****I_{DSS}	0.5*****I_{DSS}	mA
Gain Compression	Gcomp	–	2	3	dBcomp

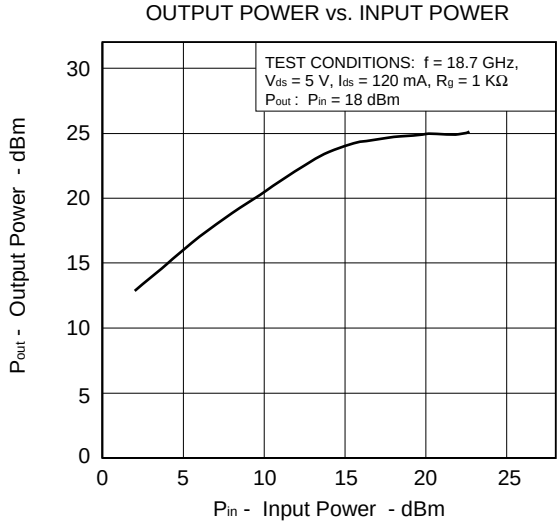
PERFORMANCE SPECIFICATIONS (T_A = 25)

PART NUMBER	Pout (dBm)			G_L (dB)			TEST CONDITIONS
	MIN.	TYP.	UNIT	MIN.	TYP.	UNIT	
NE1280100	20.5	21.5	dBm	9.5	10.5	dB	f = 18.7 GHz, V_D = 5 V, I_D = 60 mA Rg = 1 kΩ set, Pin = 14 dBm(*****)
NE1280200	23.5	24.5	dBm	8.5	10.0	dB	f = 18.7 GHz, V_D = 5 V, I_D = 120 mA Rg = 1 kΩ set, Pin = 18 dBm(*****)
NE1280400	26.5	27.5	dBm	7.5	9.0	dB	f = 18.7 GHz, V_D = 5 V, I_D = 240 mA Rg = 1 kΩ set, Pin = 22 dBm(*****)

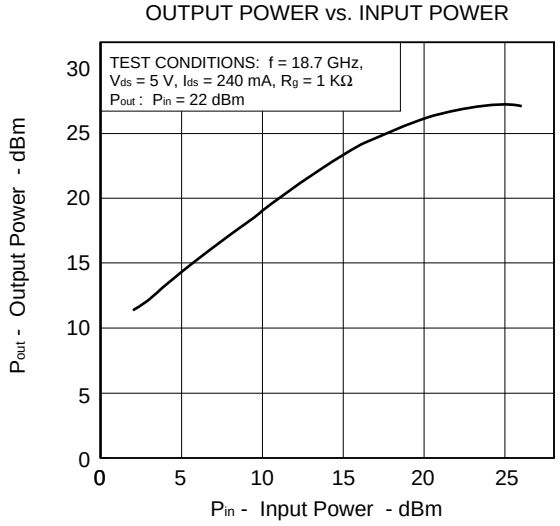
***** Pin for Pout specification

TYPICAL CHARACTERISTICS (T_A = 25 °C)

NE1280200



NE1280400



S-PARAMETER

NE1280100

FREQUENCY	S11		S21		S12		S22	
GHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
2.0	0.971	–51.6	8.94	148.0	0.026	62.2	0.524	–20.4
4.0	0.922	–88.3	7.09	125.4	0.040	43.2	0.454	–33.8
6.0	0.902	–113.6	5.43	109.2	0.048	31.4	0.408	–43.0
8.0	0.883	–128.9	4.37	98.1	0.051	23.7	0.384	–49.6
10.0	0.871	–139.2	3.63	89.3	0.052	17.6	0.372	–55.5
12.0	0.862	–147.2	3.03	81.3	0.052	13.0	0.370	–60.7
14.0	0.855	–152.3	2.63	75.1	0.052	10.3	0.375	–65.9
16.0	0.847	–156.6	2.28	68.6	0.049	5.7	0.375	–70.8
18.0	0.862	–159.8	2.06	64.0	0.050	9.7	0.398	–75.3
20.0	0.874	–163.5	1.87	58.2	0.053	7.4	0.410	–79.9

Measured with V_{DC} = 5 V, I_{DS} = 1/2 I_{DSS}

NE1280200

FREQUENCY	S11		S21		S12		S22	
GHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
2.0	0.948	–94.8	10.91	125.9	0.032	40.6	0.248	–76.4
4.0	0.918	–130.9	6.72	103.3	0.038	21.6	0.234	–104.2
6.0	0.917	–147.2	4.57	90.6	0.040	12.9	0.252	–114.7
8.0	0.913	–156.1	3.48	82.3	0.040	7.9	0.278	–119.2
10.0	0.910	–161.1	2.79	75.3	0.040	3.4	0.307	–122.2
12.0	0.907	–164.9	2.31	68.5	0.039	0.2	0.337	–124.0
14.0	0.905	–167.2	1.95	62.9	0.038	–1.9	0.370	–125.7
16.0	0.904	–169.5	1.67	57.1	0.037	–2.7	0.397	–128.2
18.0	0.914	–170.9	1.49	52.6	0.037	–1.7	0.436	–128.8
20.0	0.920	–172.2	1.32	46.9	0.037	–3.8	0.465	–130.6

Calculated from the S-parameter of the NE1280100 with V_{DC} = 5 V, I_{DS} = 1/2 I_{DSS}

NE1280400

FREQUENCY	S11		S21		S12		S22	
GHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
2.0	0.949	–135.9	8.90	105.3	0.026	20.1	0.407	–156.7
4.0	0.940	–157.2	4.75	89.4	0.027	7.7	0.437	–161.8
6.0	0.944	–165.1	3.09	79.7	0.027	2.1	0.462	–161.2
8.0	0.944	–169.3	2.30	73.1	0.026	–1.3	0.487	–159.9
10.0	0.943	–171.5	1.82	66.7	0.026	–5.1	0.513	–158.8
12.0	0.942	–173.2	1.49	60.4	0.025	–7.8	0.539	–157.9
14.0	0.942	–174.1	1.25	54.9	0.024	–9.9	0.568	–157.3
16.0	0.943	–175.1	1.05	49.4	0.023	–10.4	0.594	–157.5
18.0	0.949	–175.8	0.93	44.7	0.023	–9.6	0.624	–156.9
20.0	0.952	–176.4	0.82	39.1	0.023	–11.6	0.648	–157.1

V_{DS} = 5 V, I_{DS} = 240 mA

CHIP HANDLING

DIE ATTACHMENT

Die attach can be accomplished with a Au-Sn (300 ±10 ˚C) performs in a forming gas environment.

Epoxy die attach is not recommended.

BONDING

Gate and drain bonding wires should be minimum length, semi-hard gold wire (3-8 % elongation) 30 microns or less in diameter.

Bonding should be performed with a wedge tip that has a taper of approximately 15 %.

Die attach and bonding time should be kept to a minimum. As a general rule, the bonding operation should be kept within a 280 ˚C _ 5 minute curve. If longer periods are required, the temperature should be lowered.

PRECAUTIONS

The user must operate in a clean, dry environment.

The chip channel is glassivated for mechanical protection only and does not preclude the necessity of a clean environment.

The bonding equipment should be periodically checked for sources of surge voltage and should be properly grounded at all times. In fact, all test and handling equipment should be grounded to minimize the possibilities of static discharge.

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