

10 W L, S-BAND POWER GaAs FET
N-CHANNEL GaAs MES FET

DESCRIPTION

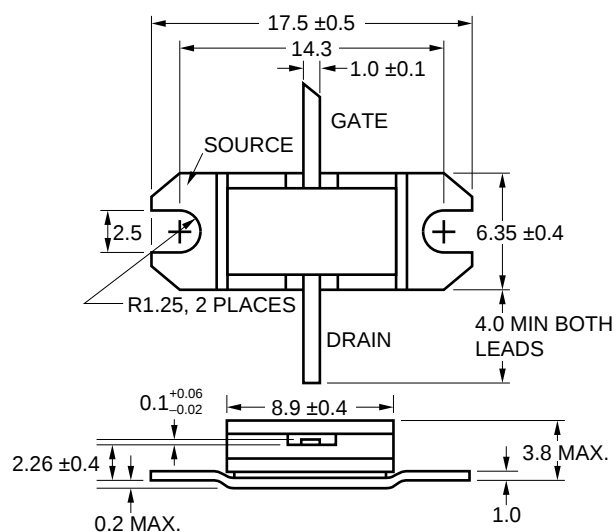
The NE6501077 is power GaAs FET which provides high gain, high efficiency and high output power in L, S band.

To reduce thermal resistance, the device has a PHS (Plated Heat Sink) structure.

FEATURES

- Class A operation
- High output power: 39.5 dBm (typ)
- High gain: 10.5 dB (typ)
- High power added efficiency: 40 % (typ)
- Hermetically sealed ceramic package

PACKAGE DIMENSIONS (UNIT: mm)

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$)

Drain to Source Voltage	V_{DSX}	15	V
Gate to Drain Voltage	V_{GDX}	-18	V
Gate to Source Voltage	V_{GSX}	-12	V
Drain Current	I_D	9.0	A
Gate Current	I_G	50	mA
Total Power Dissipation	$P_T(^*)$	50	W
Channel Temperature	T_{ch}	175	$^\circ\text{C}$
Storage Temperature	T_{stg}	-65 to +175	$^\circ\text{C}$
Temperature Cycling	T_∞	-40 to +120	$^\circ\text{C}$

* $T_C = 25^\circ\text{C}$

Caution Please handle this device at a static-free workstation, because this is an electrostatic sensitive device.

MAXIMUM OPERATION RANGE

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Drain to Source Voltage	V_{DS}	—	10	10	V
Channel Temperature	T_{ch}	—	—	130	°C
Input Power	G_{comp}	—	—	3	dBcomp
Gate Resistance	R_g	—	—	100	Ω

ELECTRICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$)

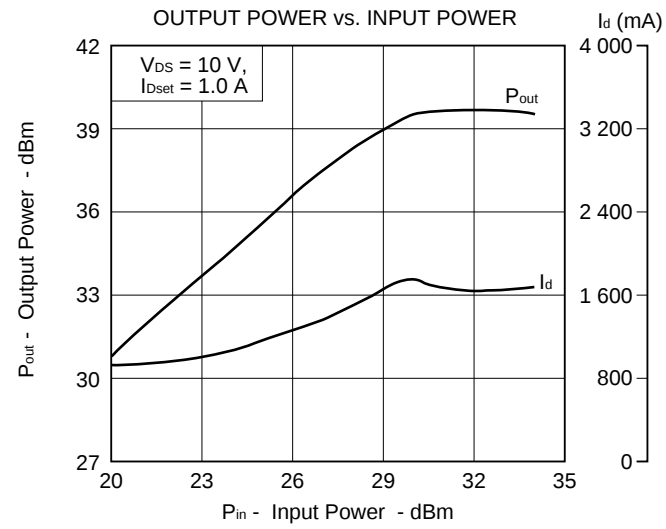
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Saturated Drain Current	I_{dss}	2.0	4.5	7.0	A	$V_{ds} = 1.5\text{ V}$, $V_{gs} = 0\text{ V}$
Pinch-off Voltage	V_P	−3.5	−2.0	−0.5	V	$V_{ds} = 2.5\text{ V}$, $I_{ds} = 30\text{ mA}$
Transconductance	g_m	—	2600	—	mS	$V_{ds} = 2.5\text{ V}$, $I_{ds} = 2\text{ A}$
Thermal Resistance	R_{th}	—	3.5	4.0	°C/W	Channel to Case

PERFORMANCE SPECIFICATIONS ($T_A = 25\text{ }^{\circ}\text{C}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Output Power	P_{out}	39.0	39.5	—	dBm	$f = 2.3\text{ GHz}$, $V_{ds} = 10\text{ V}$ $I_{ds} \leq 1.0\text{ A}$, $P_{in} = 31.0\text{ dBm}$ $R_g = 100\text{ }\Omega$
Gate to Source Current	I_{gs}	−10	—	10	mA	
Power Added Efficiency	η_{add}	—	40	—	%	
Linear Gain	G_L	9.5	10.5	—	dB	

* The other are the same as the above conditions.

TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$)



S-PARAMETER

$V_{DS} = 9.0 \text{ V}$, $I_{DS} = 1\ 000 \text{ mA}$, $V_{GS} = -1.514 \text{ V}$, $I_G = 0.0 \text{ mA}$

FREQUENCY GHZ	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
0.050	0.990	-77.1	18.297	140.3	0.005	16.2	0.822	-177.8
0.100	0.972	-115.8	12.578	120.5	0.007	16.7	0.847	-178.1
0.200	0.971	-146.6	7.135	103.3	0.007	28.1	0.863	179.5
0.300	0.963	-159.1	4.862	95.7	0.008	25.8	0.863	178.1
0.400	0.972	-166.4	3.726	90.3	0.008	26.1	0.869	176.3
0.500	0.969	-170.7	2.996	87.0	0.009	26.1	0.868	175.5
0.600	0.969	-174.6	2.516	83.4	0.009	27.9	0.867	174.0
0.700	0.975	-177.1	2.183	80.9	0.010	31.9	0.872	173.3
0.800	0.972	-179.4	1.939	78.3	0.010	35.2	0.881	172.9
0.900	0.974	178.5	1.722	75.9	0.010	33.7	0.865	171.3
1.000	0.969	176.1	1.556	72.8	0.011	37.4	0.862	169.8
1.010	0.970	176.1	1.545	72.6	0.011	36.8	0.863	169.9
1.100	0.978	174.5	1.436	70.4	0.011	33.8	0.867	168.9
1.200	0.972	172.6	1.328	68.0	0.012	38.2	0.863	167.8
1.300	0.978	170.8	1.243	65.5	0.013	40.7	0.867	166.9
1.400	0.972	169.2	1.160	63.1	0.013	40.4	0.861	165.9
1.500	0.977	167.4	1.106	60.8	0.015	40.4	0.871	165.0
1.600	0.974	166.0	1.044	58.2	0.015	40.6	0.861	163.4
1.700	0.968	164.6	0.992	56.1	0.016	40.4	0.857	162.7
1.800	0.966	162.6	0.951	53.2	0.016	39.3	0.857	161.2
1.900	0.972	161.3	0.921	50.8	0.017	41.4	0.867	159.9
2.000	0.969	159.7	0.882	48.4	0.018	42.8	0.857	158.5
2.100	0.973	158.5	0.858	46.4	0.020	42.1	0.861	157.6
2.200	0.961	156.8	0.825	43.8	0.021	40.9	0.849	156.1
2.300	0.966	154.7	0.808	40.7	0.022	41.1	0.854	154.2
2.400	0.962	153.3	0.784	38.5	0.023	38.5	0.852	153.0
2.500	0.964	151.6	0.768	35.9	0.025	37.2	0.857	151.4
2.600	0.959	150.1	0.751	33.5	0.026	35.9	0.852	149.9
2.700	0.963	148.2	0.738	30.9	0.027	33.7	0.853	148.5
2.800	0.958	146.5	0.722	28.3	0.029	34.1	0.851	146.7
2.900	0.961	144.9	0.714	25.8	0.030	33.2	0.851	145.6
3.000	0.953	143.2	0.699	22.9	0.031	29.9	0.842	143.9
3.100	0.955	141.2	0.696	19.9	0.034	28.9	0.844	142.1
3.200	0.955	139.5	0.689	17.4	0.035	26.4	0.839	140.7
3.300	0.956	137.9	0.683	15.0	0.037	24.5	0.839	139.5
3.400	0.952	136.3	0.675	12.5	0.038	23.1	0.833	138.1
3.500	0.954	134.7	0.670	9.8	0.040	21.5	0.831	136.9
3.600	0.953	132.6	0.667	6.6	0.042	20.0	0.827	135.3
3.700	0.959	131.0	0.668	4.0	0.045	18.1	0.828	134.2
3.800	0.955	129.0	0.667	0.9	0.047	15.5	0.820	132.5
3.900	0.958	127.2	0.671	-1.6	0.049	12.9	0.813	131.1
4.000	0.954	125.2	0.671	-4.2	0.051	11.6	0.805	129.8

$V_{DS} = 10.0 \text{ V}$, $I_{DS} = 1\ 000 \text{ mA}$, $V_{GS} = -1.552 \text{ V}$, $I_G = 0.0 \text{ mA}$

FREQUENCY	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	GHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG
0.050	0.984	−76.4	18.696	140.1	0.006	23.7	0.812	−177.7
0.100	0.974	−115.7	12.798	120.5	0.006	28.6	0.840	−178.1
0.200	0.970	−146.6	7.261	103.2	0.007	22.0	0.857	179.6
0.300	0.962	−159.0	4.949	95.6	0.007	25.6	0.855	178.0
0.400	0.971	−166.4	3.794	90.1	0.008	25.9	0.862	176.4
0.500	0.969	−170.7	3.049	86.8	0.008	26.1	0.862	175.5
0.600	0.969	−174.6	2.561	83.2	0.009	27.6	0.861	174.1
0.700	0.974	−177.1	2.220	80.6	0.009	32.5	0.865	173.5
0.800	0.972	−179.5	1.969	77.9	0.010	34.1	0.873	172.9
0.900	0.973	178.4	1.751	75.4	0.010	34.6	0.859	171.3
1.000	0.968	176.0	1.582	72.4	0.010	35.5	0.856	169.9
1.100	0.977	174.5	1.460	70.0	0.011	34.6	0.860	169.1
1.200	0.971	172.5	1.349	67.5	0.012	37.1	0.856	167.9
1.300	0.977	170.7	1.264	64.9	0.013	38.0	0.860	167.0
1.400	0.971	169.1	1.179	62.5	0.013	38.8	0.855	166.0
1.500	0.976	167.4	1.124	60.1	0.015	39.7	0.865	165.1
1.600	0.973	166.0	1.060	57.5	0.015	39.5	0.854	163.5
1.700	0.967	164.5	1.007	55.4	0.015	39.8	0.850	162.8
1.800	0.965	162.5	0.964	52.5	0.016	41.6	0.851	161.4
1.900	0.971	161.2	0.934	50.0	0.017	42.5	0.860	160.0
2.000	0.968	159.7	0.894	47.6	0.018	41.5	0.850	158.7
2.100	0.972	158.5	0.870	45.6	0.020	41.5	0.854	157.8
2.200	0.960	156.8	0.835	43.0	0.021	41.0	0.843	156.3
2.300	0.965	154.7	0.818	39.8	0.021	39.9	0.847	154.4
2.400	0.962	153.2	0.794	37.6	0.023	38.7	0.846	153.3
2.500	0.962	151.5	0.778	35.0	0.024	37.5	0.850	151.7
2.600	0.958	149.9	0.760	32.5	0.026	35.8	0.847	150.3
2.700	0.962	148.1	0.747	30.0	0.027	33.4	0.846	148.8
2.800	0.957	146.4	0.729	27.2	0.028	33.4	0.844	147.0
2.900	0.961	144.8	0.721	24.7	0.030	32.1	0.845	145.9
3.000	0.952	143.1	0.705	21.8	0.031	29.5	0.836	144.3
3.100	0.954	141.1	0.702	18.9	0.033	28.5	0.838	142.4
3.200	0.954	139.4	0.694	16.3	0.035	25.7	0.834	141.1
3.300	0.955	137.8	0.688	13.9	0.036	24.7	0.834	139.9
3.400	0.951	136.2	0.680	11.4	0.038	24.0	0.828	138.5
3.500	0.953	134.7	0.674	8.7	0.039	21.3	0.825	137.3
3.600	0.952	132.5	0.671	5.4	0.041	19.8	0.822	135.7
3.700	0.958	130.9	0.672	2.8	0.045	17.4	0.823	134.6
3.800	0.954	128.9	0.671	−0.3	0.047	14.3	0.814	133.0
3.900	0.957	127.1	0.674	−2.8	0.048	12.5	0.809	131.6
4.000	0.954	125.2	0.673	−5.5	0.051	12.0	0.800	130.4

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