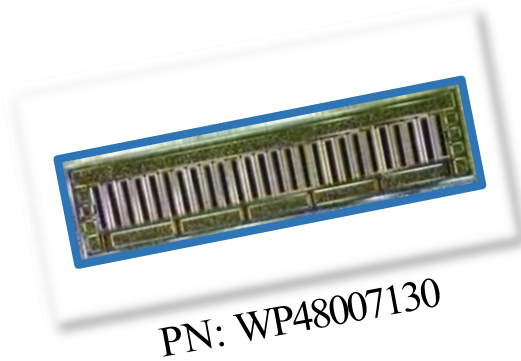




WP48007130

130W, 48V GaN HEMT Die



The WP48007130 is a 130W gallium nitride (GaN) High Electron Mobility Transistor (HEMT). This GaN HEMT is a wideband transistor optimized for 3.5GHz operation in a user-friendly device for high bandwidth applications. Gallium nitride (GaN) HEMT is a device optimized for 5G. GaN HEMT resistance is only 1/10 that of silicon transistors, making it capable of switching frequencies faster for greater energy efficiency.

Features

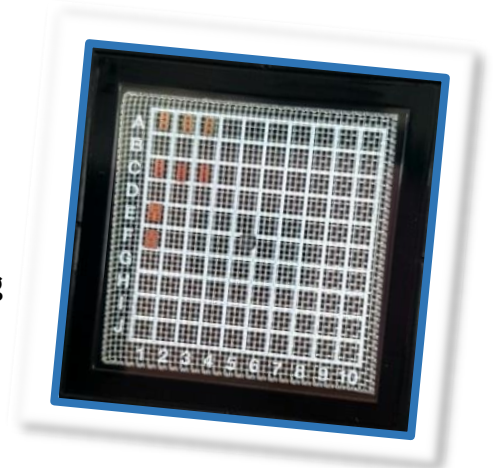
- Up to 5 GHz Operation
- 11.0 dB Typical Small Signal Gain @ 3.5 GHz
- 130 W Typical Psat @3.5GHz
- 48V Operation
- High Breakdown Voltage
- High Breakdown Voltage
- High Efficiency
- Reliability Monitoring Supporting

Applications

- U/VHF Amplifiers
- Broadband Amplifiers
- Base Station Communications
- Drone, UAV
- WiMAX, LTE, WCDMA, GSM
- WPT, V2X
- Radar application

Packaging Information

- Bare die are shipped in Wafer-level with Expander Ring or Gel-Pak® containers.
- Possible UV Curing for Wafer-level with dicing saw



Absolute Maximum Ratings (not simultaneous) at 25 °C

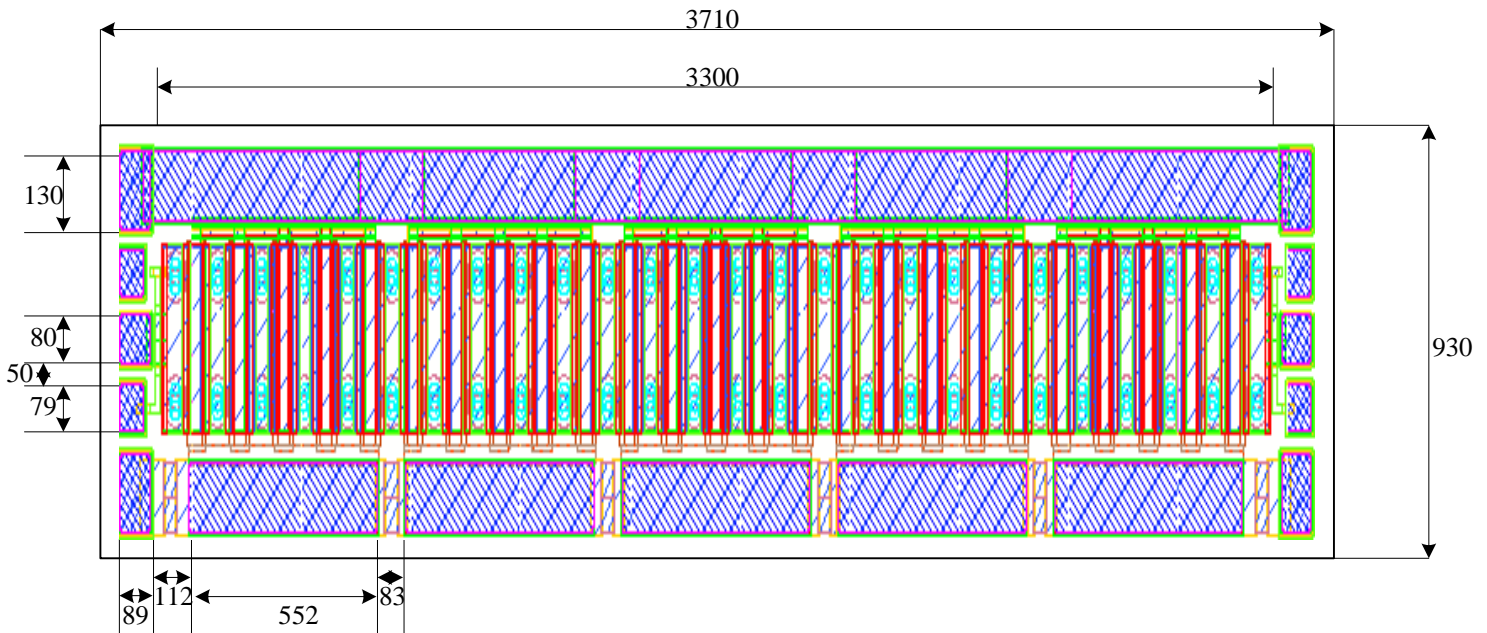
Parameter	Parameter	Typical Value	Units	Conditions
Threshold voltage @ Id=1mA/mm, Vd=10V	V _{to}	-3.4	V	25°C
Breakdown voltage @ Id=1mA/mm	V _{DG}	160	V	25°C
Drain-source current, Id @ Vd=10V, Vg=0	I _{dss}	800	mA/mm	25°C
Operating Junction Temperature	T _J	225	°C	
Storage Temperature	T _{STG}	-65, +150	°C	
Thermal Resistance, Junction to Case (packaged)	R _{θJC}		°C/W	
Thermal Resistance, Junction to Case (die only)	R _{θJC}		°C/W	
Mounting Temperature (30 seconds)	T _S	320	°C	30 seconds

Electrical Characteristics (Frequency = 3.5 GHz unless otherwise stated; TC = 25 °C)

Parameter	Parameter	Typical Value	Units	Conditions
DC Characteristics				
Ohmic contact resistance	RC	0.3	Ohm-mm	25°C
Maximum Drain-source current, Id @ Vd=10V, Vg=1V (1X125µm device)	I _{dmax}	1000	mA/mm	25°C
Max. trans-conductance, @ Vd=10V, Vg=-4V ~ -1V (1X125µm device)	GM_PEAK	290	mS/mm	25°C
Maximum Drain-source current, Id @ Vd=10V, Vg=1V (1X125µm device)	I _{dmax}	1000	mA/mm	25°C
RF Characteristics				
Small Signal Gain	G _{SS}	>11	dB	V _{DD} =48V, I _{DQ} =200mA
Saturated Power Output	P _{SAT}	130	W	V _{DD} =48V, I _{DQ} =200mA
Drain Efficiency	η	>60	%	V _{DD} =48V, I _{DQ} =200mA
Intermodulation Distortion	IM3	<-30	dBc	V _{DD} =48V, I _{DQ} =200mA
Output Mismatch Stress	VSWR	10:1	ψ	



DIE Dimensions (units in microns)



Overall die size 3710 x 930 (+0/-50) microns, die thickness 100 (+/- 10) microns.
All Gate and Drain pads must be wire bonded for electrical connection.

Assembly Notes:

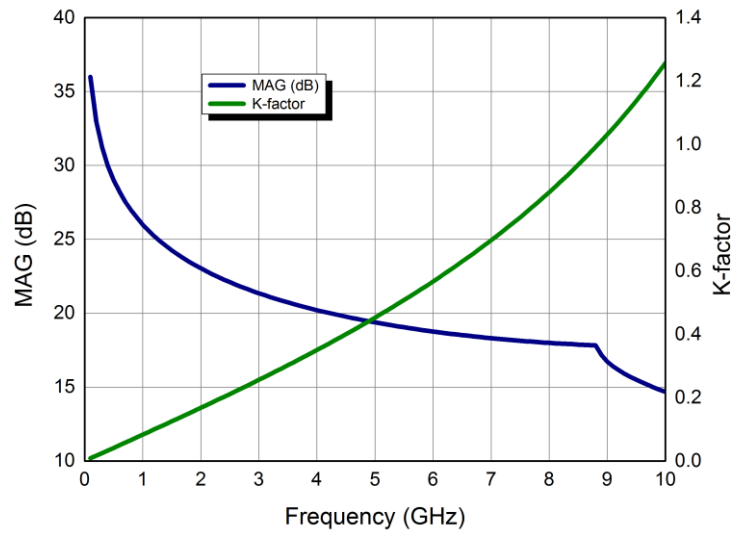
- Recommended solder is AuSn (80/20) solder. Refer to Wavepia's guide for the Eutectic Die Bond Procedure
- Vacuum collet is the preferred method of pick-up.
- The backside of the die is the Source (ground) contact.
- Die back side gold plating is 5 microns thick minimum.
- Thermosonic ball or wedge bonding are the preferred connection methods.
- Gold wire must be used for connections.



Typical Performance

Simulated Maximum Available Gain (MAG) and K Factor of the WP48007130

$V_{DD} = 48 \text{ V}$, $I_{DQ} = 200 \text{ mA}$

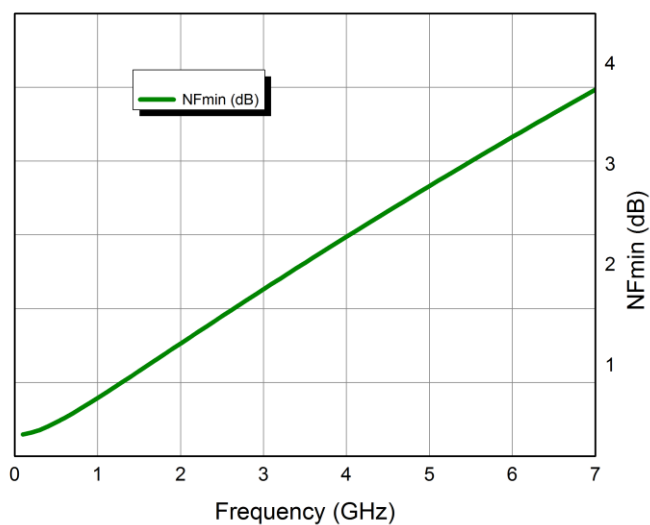


Intrinsic die parameters - reference planes at centers of gate and drain bonding pads. No wire bonds assumed.

Typical Performance

Simulated Minimum Noise Figure of the WP48007130

$V_{DD} = 48 \text{ V}$, $I_{DQ} = 200 \text{ mA}$





Typical Die S-Parameters

(Small Signal, $V_{DS} = 48\text{ V}$, $I_{DQ} = 200\text{ mA}$, magnitude / angle)

Frequency	Mag S11	Ang S11	Mag S21	Ang S21	Mag S12	Ang S12	Mag S22	Ang S22
100MHz	0.950799	-119.219	42.85637	117.0338	0.010784	27.16561	0.502156	-147.629
200MHz	0.939938	-147.142	23.6299	100.8813	0.011891	11.14495	0.557804	-160.267
300MHz	0.937791	-157.568	16.02111	93.33189	0.012091	3.72736	0.574223	-163.985
400MHz	0.937503	-162.885	12.0377	88.29085	0.012111	-1.18183	0.584873	-165.207
500MHz	0.93791	-166.075	9.594084	84.31382	0.012062	-5.02699	0.594763	-165.465
600MHz	0.938687	-168.186	7.940585	80.89872	0.011975	-8.31019	0.605053	-165.302
700MHz	0.939705	-169.678	6.745217	77.82858	0.011862	-11.2484	0.616007	-164.958
800MHz	0.940899	-170.786	5.839105	74.99578	0.01173	-13.9492	0.627611	-164.554
900MHz	0.942226	-171.64	5.127464	72.3416	0.011581	-16.4714	0.639751	-164.153
1000MHz	0.943654	-172.318	4.553048	69.83161	0.011419	-18.8493	0.652281	-163.79
1100MHz	0.945158	-172.871	4.079249	67.44437	0.011246	-21.1044	0.665049	-163.483
1200MHz	0.946714	-173.332	3.681568	65.1658	0.011064	-23.2508	0.677914	-163.239
1300MHz	0.948303	-173.724	3.342977	62.9861	0.010875	-25.2982	0.69075	-163.06
1400MHz	0.949908	-174.064	3.051266	60.8981	0.01068	-27.2539	0.703449	-162.944
1500MHz	0.951516	-174.362	2.797439	58.89618	0.01048	-29.1233	0.715922	-162.885
1600MHz	0.953113	-174.629	2.574712	56.97576	0.010278	-30.9112	0.728095	-162.88
1700MHz	0.954689	-174.87	2.377863	55.13286	0.010074	-32.6215	0.739915	-162.921
1800MHz	0.956236	-175.09	2.202801	53.3639	0.00987	-34.2578	0.751339	-163.004
1900MHz	0.957747	-175.293	2.046269	51.66559	0.009666	-35.8232	0.762338	-163.122
2000MHz	0.959217	-175.482	1.905639	50.03482	0.009463	-37.3211	0.772894	-163.27
2100MHz	0.960641	-175.659	1.778759	48.46859	0.009262	-38.7542	0.782998	-163.444
2200MHz	0.962017	-175.825	1.663854	46.96405	0.009063	-40.1256	0.792646	-163.639
2300MHz	0.963343	-175.984	1.559438	45.51842	0.008867	-41.4379	0.801843	-163.851
2400MHz	0.964618	-176.134	1.464261	44.12903	0.008674	-42.6938	0.810594	-164.076
2500MHz	0.965842	-176.278	1.37726	42.79327	0.008484	-43.8959	0.818912	-164.313
2600MHz	0.967014	-176.416	1.297528	41.50865	0.008298	-45.0468	0.826809	-164.558
2700MHz	0.968135	-176.549	1.22428	40.27276	0.008116	-46.1487	0.834302	-164.809
2800MHz	0.969206	-176.677	1.156841	39.08326	0.007938	-47.2041	0.841406	-165.065
2900MHz	0.970229	-176.8	1.09462	37.93793	0.007764	-48.2151	0.848138	-165.323
3000MHz	0.971204	-176.92	1.0371	36.83465	0.007595	-49.1839	0.854517	-165.582
3100MHz	0.972134	-177.035859	0.983829	35.77136	0.007429	-50.1125	0.860559	-165.842
3200MHz	0.973021	-177.148311	0.934406	34.74611	0.007268	-51.0028	0.866282	-166.101
3300MHz	0.973865	-177.257563	0.888479	33.75706	0.007111	-51.8567	0.871704	-166.358
3400MHz	0.974669	-177.363818	0.845732	32.80243	0.006957	-52.676	0.876839	-166.613
3500MHz	0.975435	-177.467257	0.805886	31.88055	0.006808	-53.4623	0.881706	-166.865
3600MHz	0.976164	-177.568042	0.76869	30.98982	0.006663	-54.2172	0.886317	-167.114
3700MHz	0.976858	-177.666318	0.73392	30.12872	0.006522	-54.9422	0.890689	-167.36
3800MHz	0.977519	-177.762218	0.701376	29.29584	0.006384	-55.6387	0.894835	-167.601
3900MHz	0.978149	-177.855863	0.670877	28.48979	0.006251	-56.3081	0.898768	-167.839

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Typical Die S-Parameters

(Small Signal, $V_{DS} = 48\text{ V}$, $I_{DQ} = 200\text{ mA}$, magnitude / angle)

Frequency	Mag S11	Ang S11	Mag S21	Ang S21	Mag S12	Ang S12	Mag S22	Ang S22
4000MHz	0.978749	-177.947363	0.642258	27.70931	0.00612	-56.9516	0.902501	-168.073
4100MHz	0.97932	-178.037	0.615373	26.95317	0.005994	-57.5706	0.906044	-168.302
4200MHz	0.979864	-178.124	0.590089	26.22023	0.005871	-58.166	0.90941	-168.527
4300MHz	0.980383	-178.209991	0.566282	25.50939	0.005751	-58.7389	0.912609	-168.747
4400MHz	0.980878	-178.293872	0.543845	24.81962	0.005634	-59.2905	0.91565	-168.963
4500MHz	0.98135	-178.376	0.522676	24.14994	0.00552	-59.8216	0.918543	-169.175
4600MHz	0.981801	-178.456619	0.502684	23.49945	0.005409	-60.3332	0.921296	-169.383
4700MHz	0.982231	-178.535626	0.483785	22.86726	0.005301	-60.8261	0.923917	-169.586
4800MHz	0.982641	-178.613143	0.465904	22.25256	0.005196	-61.3012	0.926414	-169.784
4900MHz	0.983033	-178.689	0.448969	21.65455	0.005094	-61.7591	0.928794	-169.979
5000MHz	0.983408	-178.763952	0.432917	21.07251	0.004994	-62.2007	0.931063	-170.169
5100MHz	0.983767	-178.837358	0.41769	20.50574	0.004897	-62.6265	0.933229	-170.356
5200MHz	0.984109	-178.91	0.403232	19.95357	0.004802	-63.0373	0.935296	-170.538
5300MHz	0.984437	-178.980431	0.389495	19.41538	0.00471	-63.4337	0.93727	-170.717
5400MHz	0.984751	-179.050196	0.376431	18.89058	0.004619	-63.8162	0.939157	-170.892
5500MHz	0.985052	-179.11884	0.363999	18.3786	0.004531	-64.1854	0.94096	-171.063
5600MHz	0.98534	-179.186408	0.352159	17.87892	0.004446	-64.5417	0.942685	-171.23
5700MHz	0.985616	-179.252938	0.340876	17.39103	0.004362	-64.8857	0.944336	-171.395
5800MHz	0.98588	-179.318471	0.330114	16.91444	0.00428	-65.2179	0.945917	-171.555
6000MHz	0.986134	-179.383043	0.319844	16.44871	0.0042	-65.5386	0.947431	-171.713
6100MHz	0.986378	-179.44669	0.310037	15.99341	0.004121	-65.8484	0.948882	-171.867
6200MHz	0.986612	-179.509446	0.300665	15.54812	0.004045	-66.1474	0.950274	-172.018
6300MHz	0.986836	-179.571342	0.291704	15.11247	0.00397	-66.4362	0.951609	-172.166
6400MHz	0.987052	-179.63241	0.283131	14.68607	0.003897	-66.7151	0.95289	-172.311
6500MHz	0.98726	-179.692679	0.274923	14.26857	0.003826	-66.9844	0.95412	-172.453
6600MHz	0.987459	-179.752177	0.267061	13.85966	0.003756	-67.2444	0.955301	-172.592
6700MHz	0.987651	-179.810932	0.259525	13.459	0.003687	-67.4954	0.956437	-172.729
6800MHz	0.987836	-179.868968	0.252299	13.06629	0.00362	-67.7377	0.957528	-172.863
6900MHz	0.988014	-179.926312	0.245366	12.68125	0.003555	-67.9716	0.958578	-172.994
7000MHz	0.988185	-179.982985	0.238711	12.3036	0.00349	-68.1972	0.959589	-173.123
7100MHz	0.98835	179.960988	0.232318	11.93309	0.003427	-68.4148	0.960562	-173.25
7200MHz	0.988509	179.905586	0.226175	11.56945	0.003366	-68.6247	0.961498	-173.374
7300MHz	0.988663	179.85079	0.220269	11.21247	0.003305	-68.827	0.962401	-173.496
7400MHz	0.988811	179.796577	0.214588	10.8619	0.003246	-69.0219	0.963271	-173.616
7500MHz	0.988954	179.7429	0.209121	10.51754	0.003188	-69.2096	0.964109	-173.734
7600MHz	0.989091	179.689831	0.203858	10.17917	0.00313	-69.3903	0.964918	-173.849
7700MHz	0.989224	179.63726	0.198788	9.8466	0.003074	-69.5642	0.965699	-173.963
7800MHz	0.989353	179.585203	0.193903	9.519644	0.003019	-69.7313	0.966452	-174.075
7900MHz	0.989477	179.533642	0.189193	9.19812	0.002965	-69.8919	0.96718	-174.184

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