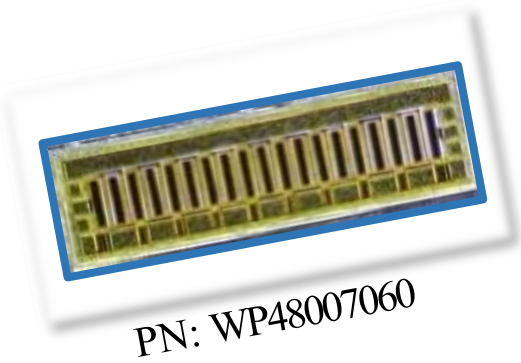
WAVE PIA

I C D E S I G N

WP48007060

60W, 48V GaN HEMT Die



PN: WP48007060

The WP48007060 is a 60W gallium nitride (GaN) High Electron Mobility Transistor (HEMT). This GaN HEMT is a wideband transistor optimized for 5.8GHz 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

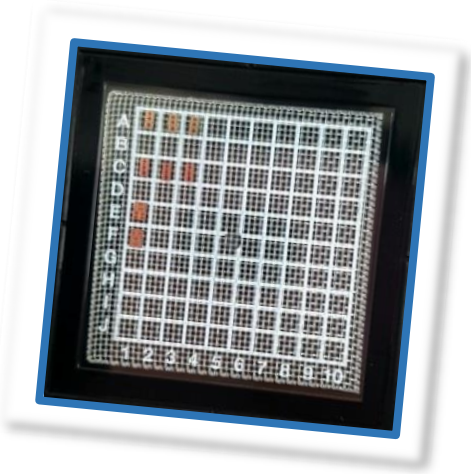
- Up to 8 GHz Operation
- 14.0 dB Typical Small Signal Gain @ 3.5 GHz
- 60 W Typical Psat @5.8GHz
- 48V Operation
- High Breakdown Voltage
- High Breakdown Voltage
- High Efficiency
- Reliability Monitoring Supporting

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



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• Application Support: platune@wavepia.com

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)	$R_{\theta JC}$		°C/W	
Thermal Resistance, Junction to Case (die only)	$R_{\theta JC}$		°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}	>12	dB	V_{DD}=48V, I_{DQ}=400mA
Saturated Power Output	P_{SAT}	60	W	V_{DD}=48V, I_{DQ}=400mA
Drain Efficiency	η	>60	%	V_{DD}=48V, I_{DQ}=400mA
Intermodulation Distortion	IM3	<-30	dBc	V_{DD}=48V, I_{DQ}=400mA
Output Mismatch Stress	VSWR	10:1	ψ	

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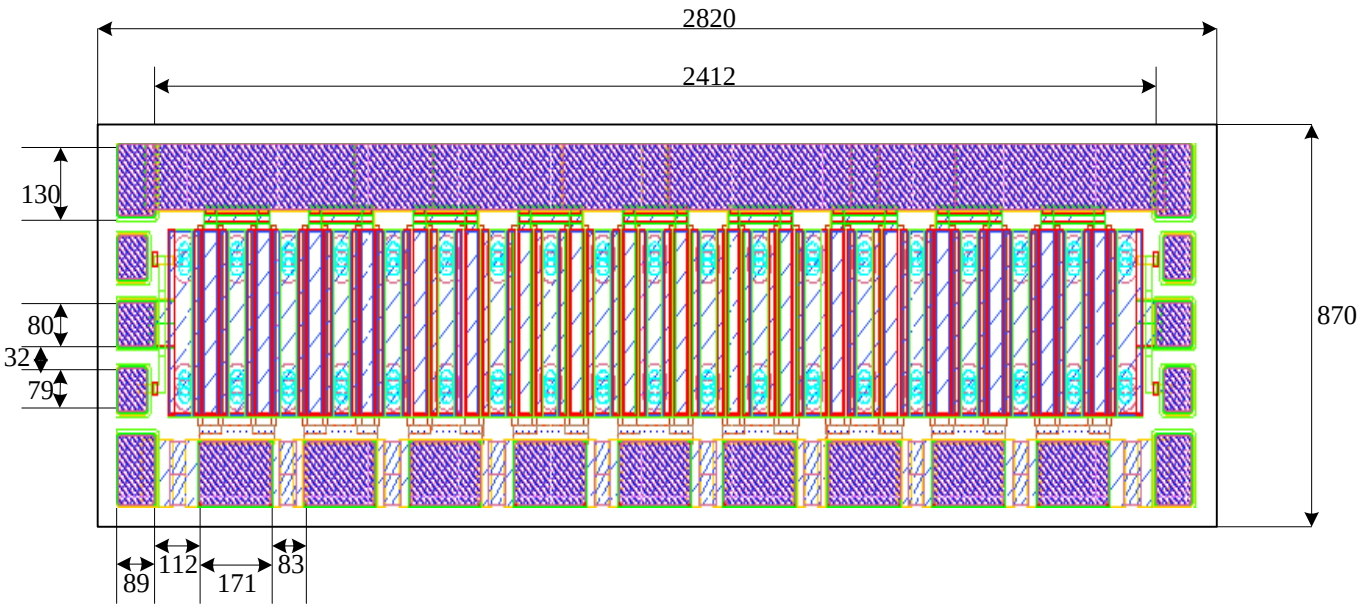
DIE Dimensions (units in microns)



Overall die size 2820 x 870 (+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.

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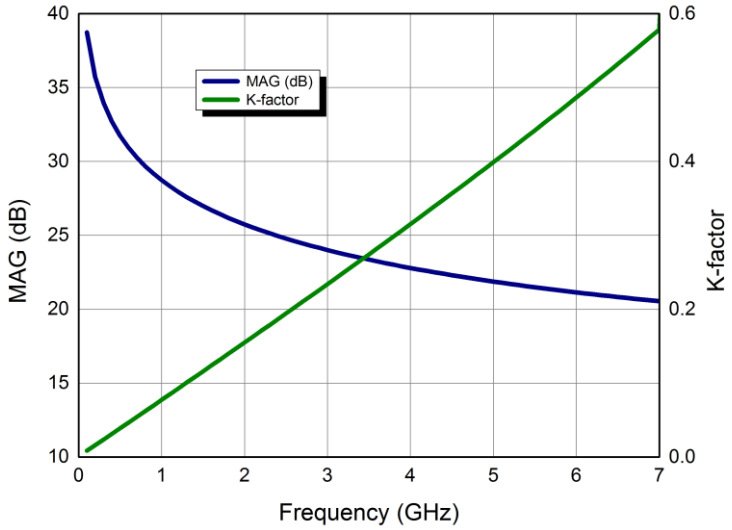
Typical Performance

Simulated Maximum Available Gain (MAG) and K Factor of the WP48007060

V_{DD} = 48 V, I_{DQ} = 400 mA

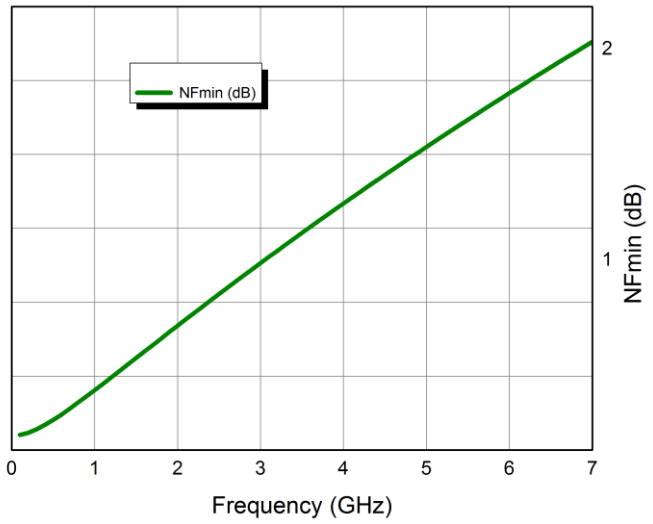


Intrinsic die parameters - reference planes at centers of gate and drain bonding pads. No wire bonds assumed.

Typical Performance

Simulated Minimum Noise Figure of the WP48007060

V_{DD} = 48 V, I_{DQ} = 400 mA



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Typical Die S-Parameters

(Small Signal, V_{DS} = 48 V, I_{DQ} = 400 mA, magnitude / angle)

Frequency	Mag S11	Ang S11	Mag S21	Ang S21	Mag S12	Ang S12	Mag S22	Ang S22
100MHz	0.966949	-95.9509	59.69612	129.7508	0.007997	39.8653	0.456755	-144.412
200MHz	0.951199	-131.409	36.29644	110.8004	0.009725	21.02931	0.55401	-157.929
300MHz	0.946515	-146.415	25.32035	102.0381	0.010175	12.38151	0.581258	-163.394
400MHz	0.94478	-154.402	19.28884	96.72547	0.010335	7.183379	0.593117	-165.962
500MHz	0.944082	-159.305	15.52312	92.92516	0.010395	3.497567	0.6003	-167.255
600MHz	0.94385	-162.601	12.95828	89.9145	0.010412	0.601406	0.605827	-167.894
700MHz	0.943869	-164.96	11.10095	87.36825	0.010404	-1.83033	0.610777	-168.164
800MHz	0.944046	-166.727	9.693934	85.11983	0.010382	-3.96423	0.6156	-168.211
900MHz	0.944331	-168.097	8.590728	83.07561	0.010348	-5.89392	0.620501	-168.122
1000MHz	0.9447	-169.188	7.701989	81.17918	0.010306	-7.67579	0.62557	-167.947
1100MHz	0.945135	-170.075	6.970224	79.39473	0.010257	-9.34567	0.630847	-167.721
1200MHz	0.945624	-170.81	6.356803	77.6985	0.010202	-10.9273	0.636341	-167.465
1300MHz	0.94616	-171.429	5.834826	76.07421	0.010141	-12.437	0.642046	-167.196
1400MHz	0.946736	-171.956	5.384994	74.51038	0.010076	-13.8862	0.647945	-166.924
1500MHz	0.947347	-172.41	4.993105	72.99871	0.010007	-15.2832	0.654019	-166.658
1600MHz	0.947988	-172.806	4.648479	71.53307	0.009933	-16.6341	0.660243	-166.402
1700MHz	0.948655	-173.154	4.342932	70.10887	0.009857	-17.9436	0.666593	-166.161
1800MHz	0.949344	-173.463	4.070084	68.72257	0.009777	-19.2152	0.673043	-165.938
1900MHz	0.950052	-173.738	3.824892	67.37142	0.009694	-20.4516	0.67957	-165.734
2000MHz	0.950775	-173.986	3.603312	66.05326	0.009608	-21.6549	0.68615	-165.549
2100MHz	0.951511	-174.211	3.402067	64.76633	0.00952	-22.827	0.69276	-165.385
2200MHz	0.952257	-174.415	3.21847	63.50918	0.009431	-23.9693	0.699379	-165.241
2300MHz	0.95301	-174.603	3.050299	62.2806	0.009339	-25.0829	0.705989	-165.118
2400MHz	0.953768	-174.776	2.895695	61.07957	0.009246	-26.169	0.712571	-165.014
2500MHz	0.954528	-174.936	2.753096	59.90518	0.009151	-27.2284	0.71911	-164.929
2600MHz	0.955289	-175.085	2.621176	58.75665	0.009056	-28.2618	0.725592	-164.863
2700MHz	0.956049	-175.225	2.498801	57.63324	0.008959	-29.2702	0.732003	-164.813
2800MHz	0.956806	-175.356	2.384998	56.5343	0.008862	-30.2539	0.738332	-164.78
2900MHz	0.957558	-175.479	2.278923	55.45921	0.008764	-31.2138	0.74457	-164.762
3000MHz	0.958304	-175.596	2.179845	54.40739	0.008666	-32.1504	0.750708	-164.758
3100MHz	0.959043	-175.707	2.08712	53.37828	0.008568	-33.0642	0.756739	-164.768
3200MHz	0.959774	-175.813	2.000187	52.37134	0.008469	-33.9558	0.762657	-164.79
3300MHz	0.960496	-175.914	1.918547	51.38605	0.008371	-34.8256	0.768457	-164.823
3400MHz	0.961207	-176.011	1.841759	50.4219	0.008273	-35.6743	0.774135	-164.867
3500MHz	0.961908	-176.104	1.769431	49.47841	0.008175	-36.5022	0.779688	-164.921
3600MHz	0.962597	-176.194	1.701211	48.55506	0.008077	-37.31	0.785114	-164.983
3700MHz	0.963274	-176.28	1.636785	47.6514	0.00798	-38.0979	0.790412	-165.053
3800MHz	0.963939	-176.363	1.575868	46.76694	0.007883	-38.8667	0.79558	-165.131
3900MHz	0.964591	-176.444	1.518205	45.90122	0.007787	-39.6166	0.800618	-165.215

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Typical Die S-Parameters

(Small Signal, V_{DS} = 48 V, I_{DQ} = 400 mA, magnitude / angle)

Frequency	Mag S11	Ang S11	Mag S21	Ang S21	Mag S12	Ang S12	Mag S22	Ang S22
4000MHz	0.965229	-176.523	1.463565	45.05378	0.007692	-40.3481	0.805527	-165.305
4100MHz	0.965855	-176.599	1.411738	44.22416	0.007598	-41.0617	0.810308	-165.4
4200MHz	0.966467	-176.673	1.36253	43.41192	0.007504	-41.7579	0.81496	-165.5
4300MHz	0.967065	-176.746	1.315769	42.61661	0.007411	-42.4371	0.819486	-165.605
4400MHz	0.96765	-176.816	1.271294	41.83782	0.007319	-43.0997	0.823887	-165.713
4500MHz	0.968221	-176.885	1.228959	41.0751	0.007229	-43.7461	0.828166	-165.824
4600MHz	0.968779	-176.952	1.188628	40.32805	0.007139	-44.3767	0.832324	-165.939
4700MHz	0.969323	-177.018	1.150179	39.59626	0.00705	-44.9921	0.836364	-166.055
4800MHz	0.969854	-177.082	1.113496	38.87931	0.006962	-45.5924	0.840288	-166.174
4900MHz	0.970372	-177.145	1.078475	38.17683	0.006875	-46.1783	0.844099	-166.295
5000MHz	0.970877	-177.207	1.045019	37.48842	0.00679	-46.7499	0.847798	-166.417
5100MHz	0.971369	-177.268	1.013035	36.8137	0.006705	-47.3077	0.85139	-166.541
5200MHz	0.971848	-177.327416	0.982441	36.15232	0.006622	-47.8522	0.854877	-166.666
5300MHz	0.972315	-177.385888	0.953159	35.5039	0.006539	-48.3835	0.858261	-166.791
5400MHz	0.97277	-177.443	0.925117	34.86809	0.006458	-48.9021	0.861546	-166.917
5500MHz	0.973212	-177.49981	0.898246	34.24456	0.006378	-49.4084	0.864733	-167.043
5600MHz	0.973643	-177.555344	0.872483	33.63297	0.006299	-49.9026	0.867826	-167.169
5700MHz	0.974063	-177.609978	0.847771	33.03299	0.006221	-50.385	0.870828	-167.296
5800MHz	0.974472	-177.663746	0.824053	32.44431	0.006144	-50.8561	0.873741	-167.422
6000MHz	0.974869	-177.71668	0.801279	31.86661	0.006069	-51.316	0.876568	-167.548
6100MHz	0.975256	-177.768811	0.7794	31.29961	0.005994	-51.7651	0.879311	-167.674
6200MHz	0.975632	-177.820166	0.758372	30.74299	0.005921	-52.2037	0.881974	-167.799
6300MHz	0.975999	-177.870772	0.738151	30.19648	0.005848	-52.6321	0.884558	-167.924
6400MHz	0.976355	-177.920654	0.718699	29.65981	0.005777	-53.0505	0.887066	-168.048
6500MHz	0.976702	-177.969834	0.699977	29.13271	0.005706	-53.4592	0.889501	-168.172
6600MHz	0.97704	-178.018335	0.68195	28.61491	0.005637	-53.8584	0.891864	-168.294
6700MHz	0.977368	-178.066177	0.664586	28.10616	0.005569	-54.2485	0.894159	-168.416
6800MHz	0.977688	-178.113381	0.647853	27.60621	0.005502	-54.6296	0.896387	-168.537
6900MHz	0.977999	-178.159964	0.631722	27.11484	0.005435	-55.002	0.89855	-168.657
7000MHz	0.978302	-178.205946	0.616165	26.6318	0.00537	-55.3659	0.900651	-168.776

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