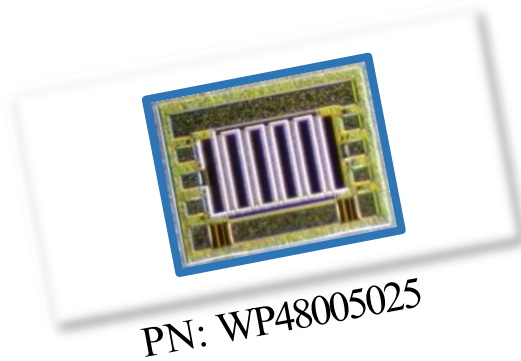




WP48005025

25W, 48V GaN HEMT Die



The WP48005025 is a 25W 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

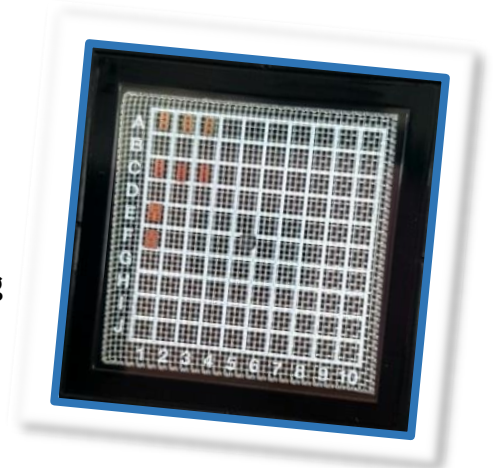
- Up to 5 GHz Operation
- 12.5 dB Typical Small Signal Gain @ 3.5 GHz
- 25 W Typical Psat @3.5GHz
- 48V Operation
- High Breakdown Voltage
- High Efficiency
- Reliability Monitoring Supporting

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

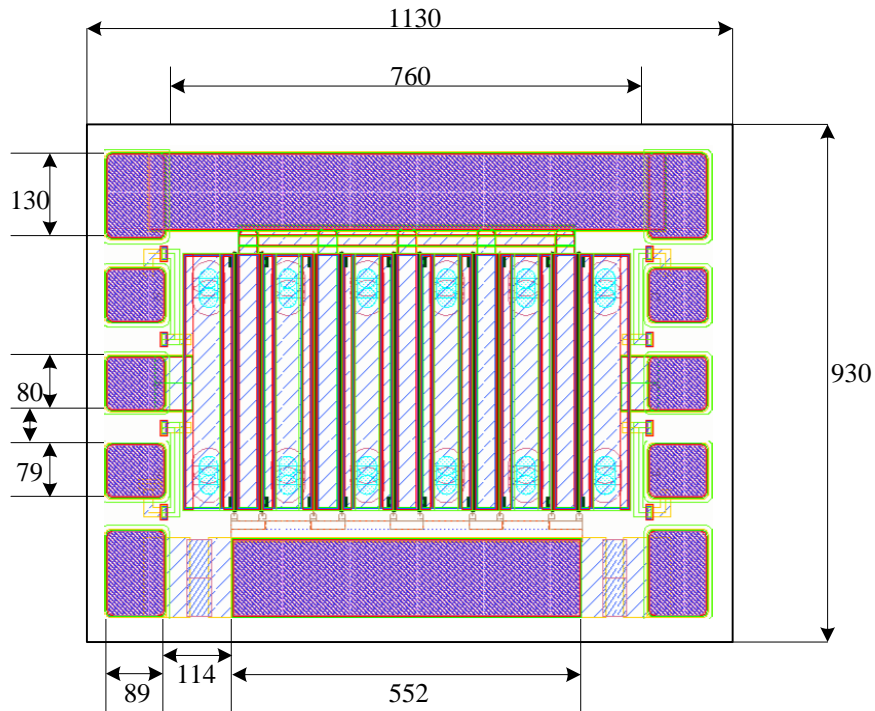
Parameter	Parameter	Typical Value	Units	Conditions
Threshold voltage @ Id=1mA/mm, Vd=10V	V _{to}	-3.4	V	25°C
Breakdown voltage @ Id=1mA/mm	V _{DG}	160	V	25°C
Drain-source current, Id @ Vd=10V, Vg=0	I _{dss}	800	mA/mm	25°C
Operating Junction Temperature	T _J	225	°C	
Storage Temperature	T _{STG}	-65, +150	°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}	12.5	dB	V _{DD} =48V, I _{DQ} =150mA
Saturated Power Output	P _{SAT}	25	W	V _{DD} =48V, I _{DQ} =150mA
Drain Efficiency	η	>60	%	V _{DD} =48V, I _{DQ} =150mA
Intermodulation Distortion	IM3	<-30	dBc	V _{DD} =48V, I _{DQ} =150mA
Output Mismatch Stress	VSWR	10:1	ψ	



DIE Dimensions (units in microns)



Overall die size 1130 x 930 (+0/-50) microns, die thickness 100 (+/- 10) microns.
All Gate and Drain pads must be wire bonded for electrical connection.

Assembly Notes:

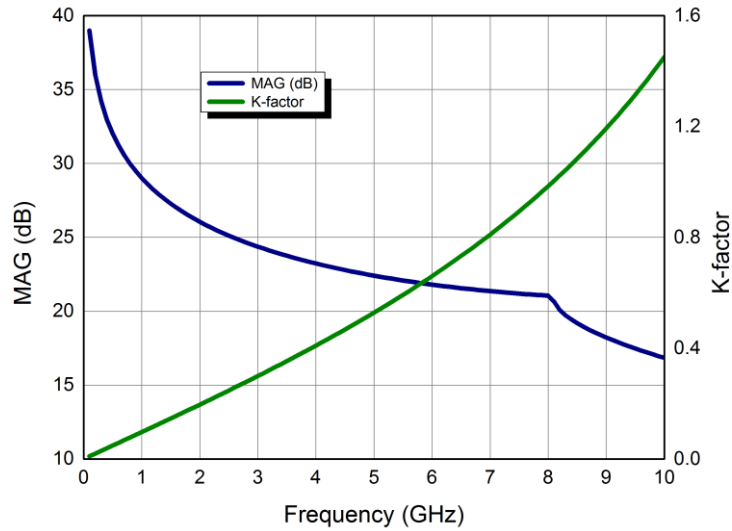
- Recommended solder is AuSn (80/20) solder. Refer to Wavepia's guide for the Eutectic Die Bond Procedure
- Vacuum collet is the preferred method of pick-up.
- The backside of the die is the Source (ground) contact.
- Die back side gold plating is 5 microns thick minimum.
- Thermosonic ball or wedge 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 WP48005025

$$V_{DD} = 48 \text{ V}, I_{DQ} = 150 \text{ mA}$$

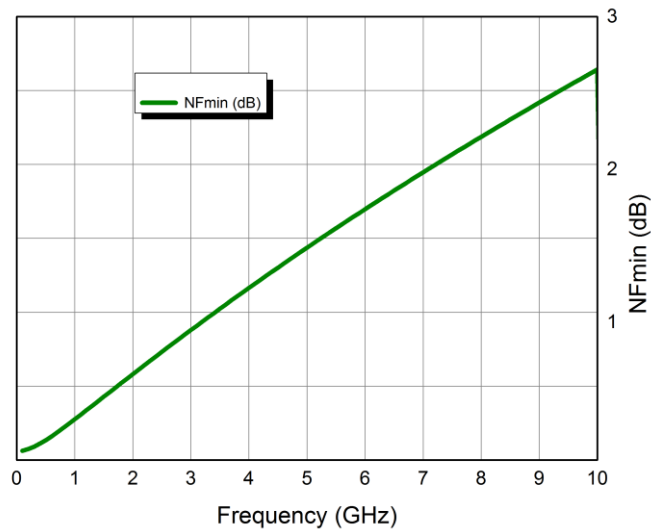


Intrinsic die parameters - reference planes at centers of gate and drain bonding pads. No wire bonds assumed.

Typical Performance

Simulated Minimum Noise Figure of the WP48005025

$$V_{DD} = 48 \text{ V}, I_{DQ} = 150 \text{ mA}$$





Typical Die S-Parameters

(Small Signal, $V_{DS} = 48\text{ V}$, $I_{DQ} = 150\text{ mA}$, magnitude / angle)

Frequency	Mag S11	Ang S11	Mag S21	Ang S21	Mag S12	Ang S12	Mag S22	Ang S22
100MHz	0.992363	-30.8078	46.78407	162.7878	0.005887	72.9514	0.413544	-24.9805
200MHz	0.975285	-57.7172	42.13201	147.7995	0.010603	58.12679	0.393344	-47.0251
300MHz	0.95742	-79.1807	36.73347	135.8367	0.013864	46.32771	0.371907	-64.8761
400MHz	0.942966	-95.641	31.77235	126.5672	0.015985	37.22193	0.354689	-78.7305
500MHz	0.93236	-108.2	27.60236	119.3391	0.017353	30.15765	0.342703	-89.3297
600MHz	0.92481	-117.895	24.19886	113.5779	0.018249	24.56029	0.335224	-97.4376
700MHz	0.91945	-125.512	21.43168	108.8634	0.018847	20.00978	0.331242	-103.68
800MHz	0.915618	-131.611	19.16676	104.9052	0.019253	16.21564	0.329903	-108.532
900MHz	0.912858	-136.585	17.29302	101.504	0.01953	12.97863	0.330569	-112.345
1000MHz	0.910859	-140.709	15.7246	98.52171	0.019719	10.16071	0.332781	-115.375
1100MHz	0.909414	-144.179	14.39649	95.86106	0.019844	7.664576	0.336205	-117.814
1200MHz	0.908381	-147.137	13.25962	93.45215	0.019923	5.420351	0.3406	-119.803
1300MHz	0.907659	-149.69	12.27669	91.24377	0.019965	3.376862	0.345782	-121.446
1400MHz	0.90718	-151.915	11.41914	89.19778	0.01998	1.495964	0.35161	-122.824
1500MHz	0.906891	-153.874	10.66482	87.28524	0.019973	-0.25125	0.357973	-123.997
1600MHz	0.906755	-155.612	9.996352	85.4839	0.019947	-1.88703	0.364782	-125.012
1700MHz	0.906745	-157.167	9.399988	83.77639	0.019906	-3.42872	0.371962	-125.904
1800MHz	0.906839	-158.568	8.864702	82.14896	0.019852	-4.89003	0.37945	-126.701
1900MHz	0.907019	-159.837	8.381577	80.59067	0.019787	-6.28193	0.387195	-127.424
2000MHz	0.907274	-160.994	7.943333	79.09263	0.019712	-7.61325	0.395151	-128.091
2100MHz	0.907592	-162.054	7.54397	77.64763	0.019629	-8.8912	0.403278	-128.713
2200MHz	0.907965	-163.031	7.178509	76.24971	0.019538	-10.1217	0.411541	-129.302
2300MHz	0.908385	-163.935	6.842781	74.89396	0.019439	-11.3097	0.41991	-129.865
2400MHz	0.908847	-164.775	6.533274	73.57623	0.019334	-12.4593	0.428358	-130.409
2500MHz	0.909345	-165.559	6.247008	72.29307	0.019224	-13.5739	0.436861	-130.938
2600MHz	0.909876	-166.292	5.981441	71.04154	0.019108	-14.6564	0.445398	-131.456
2700MHz	0.910434	-166.982	5.734389	69.81913	0.018987	-15.7094	0.453949	-131.967
2800MHz	0.911018	-167.633	5.503967	68.62368	0.018862	-16.7349	0.462497	-132.471
2900MHz	0.911623	-168.248	5.288543	67.45334	0.018733	-17.7348	0.471028	-132.971
3000MHz	0.912248	-168.831	5.086689	66.30651	0.018599	-18.7108	0.479528	-133.469
3100MHz	0.91289	-169.386	4.897161	65.18177	0.018462	-19.664	0.487985	-133.964
3200MHz	0.913546	-169.915	4.71886	64.07789	0.018322	-20.5959	0.496387	-134.459
3300MHz	0.914215	-170.421	4.550818	62.99379	0.018179	-21.5075	0.504725	-134.952
3400MHz	0.914896	-170.906	4.392178	61.92851	0.018033	-22.3996	0.512992	-135.446
3500MHz	0.915585	-171.371	4.242176	60.88117	0.017885	-23.2731	0.521178	-135.939
3600MHz	0.916282	-171.819	4.100131	59.85102	0.017734	-24.1288	0.529278	-136.432
3700MHz	0.916986	-172.251	3.965434	58.83736	0.01758	-24.9674	0.537286	-136.924
3800MHz	0.917695	-172.668	3.837537	57.83956	0.017425	-25.7894	0.545197	-137.417
3900MHz	0.918407	-173.071	3.715947	56.85706	0.017268	-26.5953	0.553006	-137.909



Typical Die S-Parameters

(Small Signal, $V_{DS} = 48\text{ V}$, $I_{DQ} = 150\text{ mA}$, magnitude / angle)

Frequency	Mag S11	Ang S11	Mag S21	Ang S21	Mag S12	Ang S12	Mag S22	Ang S22
4000MHz	0.919122	-173.462	3.600219	55.88934	0.01711	-27.3858	0.560709	-138.401
4100MHz	0.91984	-173.841	3.489948	54.93591	0.016949	-28.1611	0.568303	-138.893
4200MHz	0.920557	-174.21	3.384768	53.99634	0.016788	-28.9218	0.575786	-139.383
4300MHz	0.921275	-174.569	3.284347	53.07022	0.016625	-29.6683	0.583156	-139.873
4400MHz	0.921992	-174.919	3.188379	52.15717	0.016461	-30.4008	0.590409	-140.361
4500MHz	0.922707	-175.26	3.096585	51.25684	0.016296	-31.1197	0.597546	-140.849
4600MHz	0.92342	-175.594	3.008712	50.36889	0.01613	-31.8252	0.604564	-141.335
4700MHz	0.92413	-175.92	2.924525	49.49301	0.015964	-32.5178	0.611464	-141.819
4800MHz	0.924836	-176.239	2.843807	48.6289	0.015797	-33.1976	0.618244	-142.302
4900MHz	0.925538	-176.552	2.766361	47.77629	0.015629	-33.8649	0.624905	-142.782
5000MHz	0.926235	-176.859	2.692003	46.93491	0.015461	-34.5199	0.631446	-143.261
5100MHz	0.926927	-177.16	2.620562	46.1045	0.015293	-35.1628	0.637868	-143.737
5200MHz	0.927614	-177.456	2.551882	45.28482	0.015125	-35.7939	0.644172	-144.211
5300MHz	0.928294	-177.747	2.485815	44.47564	0.014956	-36.4133	0.650357	-144.683
5400MHz	0.928969	-178.033	2.422227	43.67673	0.014787	-37.0212	0.656425	-145.152
5500MHz	0.929637	-178.315	2.36099	42.88787	0.014619	-37.6178	0.662376	-145.618
5600MHz	0.930298	-178.593	2.301986	42.10886	0.01445	-38.2033	0.668212	-146.081
5700MHz	0.930952	-178.867	2.245105	41.33949	0.014282	-38.7779	0.673934	-146.542
5800MHz	0.931598	-179.137	2.190244	40.57957	0.014113	-39.3416	0.679544	-146.999
6000MHz	0.932238	-179.404	2.137306	39.82891	0.013946	-39.8946	0.685041	-147.454
6100MHz	0.932869	-179.667	2.086202	39.08732	0.013778	-40.4371	0.690429	-147.905
6200MHz	0.933493	-179.927	2.036844	38.35463	0.013611	-40.9691	0.695709	-148.354
6300MHz	0.934109	179.8161	1.989155	37.63066	0.013444	-41.4909	0.700881	-148.799
6400MHz	0.934716	179.5619	1.943059	36.91524	0.013278	-42.0025	0.705948	-149.241
6500MHz	0.935316	179.3105	1.898485	36.20821	0.013112	-42.5041	0.710912	-149.679
6600MHz	0.935907	179.0617	1.855366	35.50939	0.012947	-42.9957	0.715773	-150.115
6700MHz	0.936491	178.8154	1.81364	34.81865	0.012782	-43.4774	0.720535	-150.547
6800MHz	0.937065	178.5715	1.773247	34.13581	0.012619	-43.9494	0.725198	-150.975
6900MHz	0.937632	178.3299	1.734131	33.46074	0.012455	-44.4117	0.729764	-151.401
7000MHz	0.93819	178.0905	1.696239	32.79328	0.012293	-44.8644	0.734236	-151.822
7100MHz	0.93874	177.8532	1.659521	32.13328	0.012131	-45.3077	0.738614	-152.241
7200MHz	0.939282	177.6179	1.623928	31.48062	0.01197	-45.7414	0.742901	-152.656
7300MHz	0.939816	177.3846	1.589416	30.83515	0.01181	-46.1658	0.747099	-153.068
7400MHz	0.940341	177.1531	1.555942	30.19674	0.011651	-46.5809	0.751209	-153.476
7500MHz	0.940858	176.9234	1.523465	29.56524	0.011493	-46.9866	0.755232	-153.881
7600MHz	0.941367	176.6955	1.491946	28.94055	0.011335	-47.3832	0.759172	-154.282
7700MHz	0.941868	176.4693	1.461348	28.32252	0.011178	-47.7706	0.763029	-154.68
7800MHz	0.942361	176.2446	1.431637	27.71104	0.011022	-48.1489	0.766805	-155.075
7900MHz	0.942846	176.0215	1.402779	27.10598	0.010868	-48.518	0.770502	-155.467

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