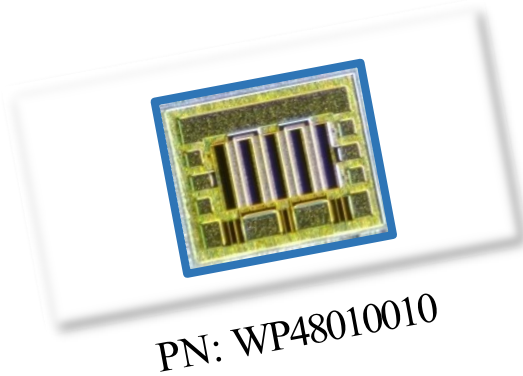




WP48010010

10W, 48V GaN HEMT Die



The WP48010010 is a 10W gallium nitride (GaN) High Electron Mobility Transistor (HEMT). This GaN HEMT is a wideband transistor optimized for X-band 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

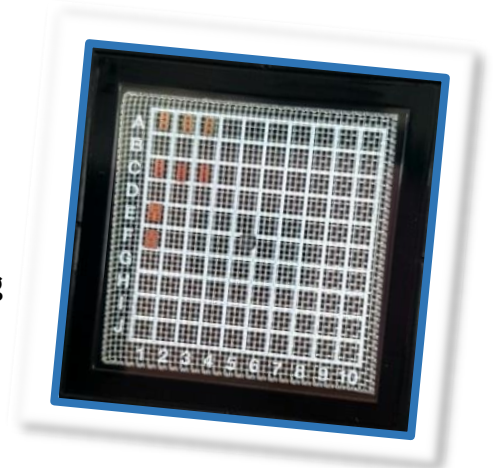
- Up to 10 GHz Operation
- 10.0 dB Typical Small Signal Gain @ 7.8 GHz
- 10 W Typical Psat @7.8GHz
- 48V Operation
- High Breakdown Voltage
- High Breakdown Voltage
- High Efficiency
- Reliability Monitoring Supporting

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



Absolute Maximum Ratings (not simultaneous) at 25 °C

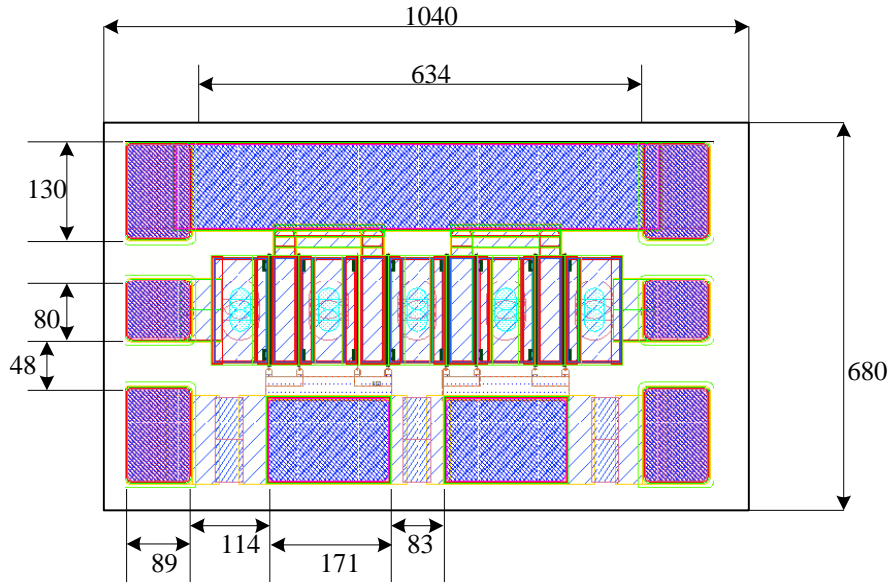
Parameter	Parameter	Typical Value	Units	Conditions
Threshold voltage @ Id=1mA/mm, Vd=10V	V _{to}	-3.4	V	25°C
Breakdown voltage @ Id=1mA/mm	V _{DG}	160	V	25°C
Drain-source current, Id @ Vd=10V, Vg=0	I _{dss}	800	mA/mm	25°C
Operating Junction Temperature	T _J	225	°C	
Storage Temperature	T _{STG}	-65, +150	°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}	>16	dB	V _{DD} =48V, I _{DQ} =60mA
Saturated Power Output	P _{SAT}	10	W	V _{DD} =48V, I _{DQ} =60mA
Drain Efficiency	η	>60	%	V _{DD} =48V, I _{DQ} =60mA
Intermodulation Distortion	IM3	<-30	dBc	V _{DD} =48V, I _{DQ} =60mA
Output Mismatch Stress	VSWR	10:1	ψ	



DIE Dimensions (units in microns)



Overall die size 1040 x 680 (+0/-50) microns, die thickness 100 (+/- 10) microns.
All Gate and Drain pads must be wire bonded for electrical connection.

Assembly Notes:

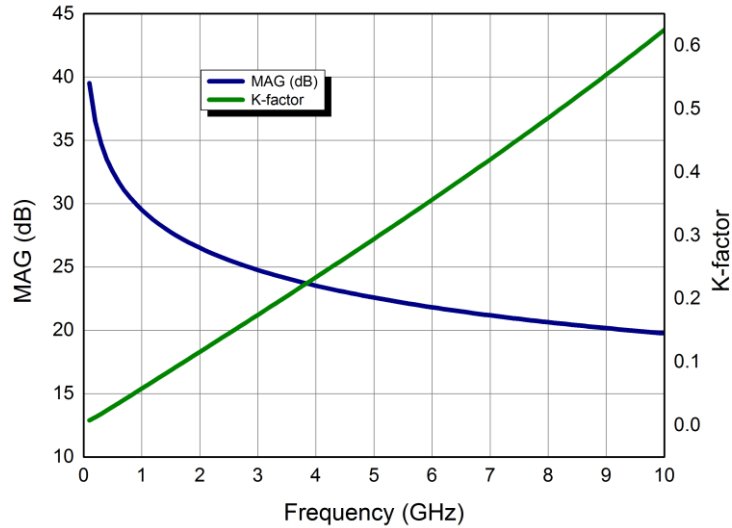
- Recommended solder is AuSn (80/20) solder. Refer to Wavepia's guide for the Eutectic Die Bond Procedure
- Vacuum collet is the preferred method of pick-up.
- The backside of the die is the Source (ground) contact.
- Die back side gold plating is 5 microns thick minimum.
- Thermosonic ball or wedge 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 WP48010010

$$V_{DD} = 48 \text{ V}, I_{DQ} = 60 \text{ mA}$$

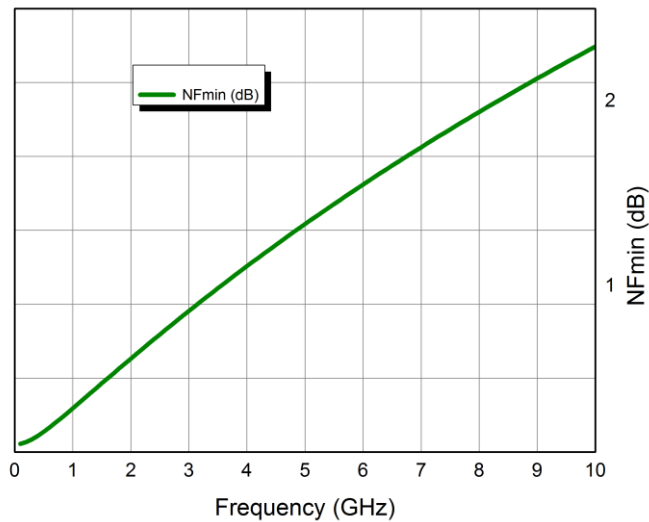


Intrinsic die parameters - reference planes at centers of gate and drain bonding pads. No wire bonds assumed.

Typical Performance

Simulated Minimum Noise Figure of the WP48010010

$$V_{DD} = 48 \text{ V}, I_{DQ} = 60 \text{ mA}$$





Typical Die S-Parameters

(Small Signal, $V_{DS} = 48\text{ V}$, $I_{DQ} = 60\text{ mA}$, magnitude / angle)

Frequency	Mag S11	Ang S11	Mag S21	Ang S21	Mag S12	Ang S12	Mag S22	Ang S22
100MHz	0.999268	-7.63687	20.24397	175.4294	0.002265	85.53289	0.753037	-3.08363
200MHz	0.997732	-15.2062	20.09356	170.8985	0.004496	81.10551	0.74956	-6.13462
300MHz	0.995265	-22.6441	19.85006	166.4447	0.006663	76.7553	0.743957	-9.12248
400MHz	0.991994	-29.8932	19.52338	162.1014	0.008737	72.51544	0.736491	-12.0207
500MHz	0.988075	-36.9053	19.12581	157.8958	0.010698	68.41344	0.727488	-14.808
600MHz	0.983674	-43.6422	18.67092	153.8492	0.012532	64.47039	0.717304	-17.4692
700MHz	0.978954	-50.0765	18.1724	149.9762	0.014229	60.70087	0.706294	-19.9946
800MHz	0.974065	-56.1908	17.64328	146.2852	0.015787	57.1134	0.694793	-22.3803
900MHz	0.969136	-61.9765	17.09523	142.7795	0.017207	53.71122	0.683095	-24.6269
1000MHz	0.964268	-67.4327	16.53833	139.4579	0.018494	50.49321	0.671449	-26.7385
1100MHz	0.959542	-72.5647	15.98087	136.3161	0.019656	47.45493	0.660052	-28.722
1200MHz	0.955014	-77.3821	15.42946	133.3471	0.0207	44.58949	0.649058	-30.586
1300MHz	0.950722	-81.8978	14.88915	130.5425	0.021637	41.88842	0.638577	-32.34
1400MHz	0.946687	-86.1271	14.36364	127.8927	0.022475	39.34225	0.628682	-33.9942
1500MHz	0.942921	-90.0861	13.85551	125.388	0.023225	36.94107	0.61942	-35.5584
1600MHz	0.939424	-93.7917	13.36644	123.0182	0.023894	34.6749	0.610812	-37.0421
1700MHz	0.936189	-97.2608	12.89738	120.7737	0.024492	32.53397	0.602862	-38.4543
1800MHz	0.933208	-100.51	12.44871	118.645	0.025026	30.50888	0.595564	-39.8034
1900MHz	0.930468	-103.555	12.02041	116.6232	0.025502	28.59073	0.588897	-41.0966
2000MHz	0.927953	-106.41	11.61216	114.7001	0.025927	26.77118	0.58284	-42.3408
2100MHz	0.925649	-109.09	11.22341	112.8678	0.026305	25.0425	0.577362	-43.542
2200MHz	0.923542	-111.608	10.85347	111.1192	0.026643	23.39754	0.572433	-44.7053
2300MHz	0.921615	-113.977	10.50155	109.4477	0.026944	21.82972	0.568023	-45.8353
2400MHz	0.919855	-116.207	10.16681	107.8473	0.027212	20.33303	0.564099	-46.9361
2500MHz	0.918248	-118.309	9.848396	106.3126	0.027451	18.90195	0.56063	-48.011
2600MHz	0.916782	-120.292	9.545436	104.8384	0.027662	17.53147	0.557587	-49.0631
2700MHz	0.915446	-122.166	9.257082	103.4202	0.02785	16.217	0.55494	-50.0948
2800MHz	0.914228	-123.939	8.982507	102.0539	0.028016	14.95438	0.552663	-51.1083
2900MHz	0.913118	-125.617	8.720918	100.7356	0.028162	13.7398	0.550729	-52.1055
3000MHz	0.912109	-127.208	8.471556	99.46185	0.028291	12.5698	0.549116	-53.088
3100MHz	0.911191	-128.717	8.233701	98.22952	0.028403	11.44123	0.547801	-54.057
3200MHz	0.910358	-130.152	8.006675	97.03571	0.028501	10.3512	0.546762	-55.0137
3300MHz	0.909602	-131.516	7.789838	95.87782	0.028585	9.297106	0.545981	-55.9591
3400MHz	0.908917	-132.815	7.582588	94.75343	0.028656	8.276534	0.545439	-56.8939
3500MHz	0.908297	-134.052	7.384362	93.66036	0.028717	7.287296	0.545121	-57.8187
3600MHz	0.907738	-135.233	7.194633	92.5966	0.028767	6.327389	0.545009	-58.7342
3700MHz	0.907235	-136.361	7.012909	91.56032	0.028807	5.394974	0.545091	-59.6408
3800MHz	0.906784	-137.439	6.83873	90.54982	0.028838	4.488369	0.545352	-60.5389
3900MHz	0.90638	-138.47	6.671664	89.56357	0.028861	3.606028	0.545781	-61.4287



Typical Die S-Parameters

(Small Signal, $V_{DS} = 48\text{ V}$, $I_{DQ} = 60\text{ mA}$, magnitude / angle)

Frequency	Mag S11	Ang S11	Mag S21	Ang S21	Mag S12	Ang S12	Mag S22	Ang S22
4000MHz	0.906021	-139.457	6.511313	88.60014	0.028877	2.74653	0.546366	-62.3107
4100MHz	0.905702	-140.404	6.3573	87.65823	0.028885	1.90857	0.547096	-63.1848
4200MHz	0.905422	-141.312	6.209276	86.73663	0.028887	1.090943	0.547962	-64.0514
4300MHz	0.905177	-142.184	6.066916	85.83423	0.028883	0.29254	0.548954	-64.9106
4400MHz	0.904965	-143.022	5.929914	84.95001	0.028872	-0.48766	0.550063	-65.7625
4500MHz	0.904784	-143.827	5.797986	84.08301	0.028857	-1.25062	0.551283	-66.6072
4600MHz	0.904631	-144.603	5.670866	83.23237	0.028836	-1.99719	0.552604	-67.4447
4700MHz	0.904505	-145.349	5.548304	82.39726	0.028811	-2.7282	0.554021	-68.2752
4800MHz	0.904404	-146.069	5.430068	81.57695	0.028781	-3.4444	0.555527	-69.0987
4900MHz	0.904326	-146.764	5.315941	80.77072	0.028747	-4.14648	0.557115	-69.9153
5000MHz	0.90427	-147.434	5.205717	79.97793	0.028709	-4.8351	0.55878	-70.7249
5100MHz	0.904234	-148.081	5.099205	79.19797	0.028668	-5.51086	0.560517	-71.5276
5200MHz	0.904217	-148.707	4.996227	78.43028	0.028622	-6.17432	0.562321	-72.3235
5300MHz	0.904219	-149.312	4.896612	77.67434	0.028574	-6.82601	0.564186	-73.1125
5400MHz	0.904237	-149.897	4.800204	76.92964	0.028522	-7.46641	0.566109	-73.8948
5500MHz	0.904271	-150.465	4.706854	76.19575	0.028467	-8.09599	0.568086	-74.6702
5600MHz	0.90432	-151.014	4.616421	75.47222	0.02841	-8.71517	0.570111	-75.4389
5700MHz	0.904383	-151.547	4.528774	74.75866	0.02835	-9.32435	0.572183	-76.2009
5800MHz	0.904459	-152.064	4.443789	74.05469	0.028287	-9.92391	0.574297	-76.9562
6000MHz	0.904547	-152.565	4.36135	73.35995	0.028221	-10.5142	0.576449	-77.7049
6100MHz	0.904647	-153.053	4.281345	72.67412	0.028154	-11.0956	0.578638	-78.4469
6200MHz	0.904758	-153.526	4.203671	71.99689	0.028084	-11.6683	0.580859	-79.1823
6300MHz	0.904879	-153.986	4.12823	71.32795	0.028012	-12.2327	0.583111	-79.9111
6400MHz	0.90501	-154.434	4.054929	70.66704	0.027938	-12.789	0.58539	-80.6334
6500MHz	0.90515	-154.869	3.98368	70.0139	0.027863	-13.3375	0.587694	-81.3492
6600MHz	0.905298	-155.294	3.9144	69.36828	0.027785	-13.8785	0.590021	-82.0585
6700MHz	0.905455	-155.707	3.847011	68.72994	0.027706	-14.4121	0.592368	-82.7614
6800MHz	0.905619	-156.109	3.781438	68.09867	0.027625	-14.9387	0.594734	-83.4579
6900MHz	0.90579	-156.502	3.71761	67.47426	0.027542	-15.4583	0.597116	-84.1481
7000MHz	0.905968	-156.885	3.65546	66.85652	0.027458	-15.9713	0.599513	-84.8319
7100MHz	0.906343	-157.623	3.535945	65.64029	0.027285	-16.9777	0.604342	-86.1809
7200MHz	0.906539	-157.98	3.478461	65.04146	0.027197	-17.4716	0.606772	-86.8461
7300MHz	0.90674	-158.328	3.42242	64.44861	0.027108	-17.9595	0.609209	-87.5053
7400MHz	0.906946	-158.668	3.367769	63.86158	0.027017	-18.4415	0.611653	-88.1583
7500MHz	0.907156	-159.001	3.314458	63.28023	0.026925	-18.9178	0.614102	-88.8053
7600MHz	0.907371	-159.326	3.262441	62.70441	0.026832	-19.3885	0.616555	-89.4464
7700MHz	0.90759	-159.645	3.211673	62.13401	0.026738	-19.8538	0.61901	-90.0816
7800MHz	0.907813	-159.957	3.162111	61.5689	0.026643	-20.3137	0.621466	-90.7108
7900MHz	0.908039	-160.262	3.113713	61.00895	0.026547	-20.7684	0.623923	-91.3343

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