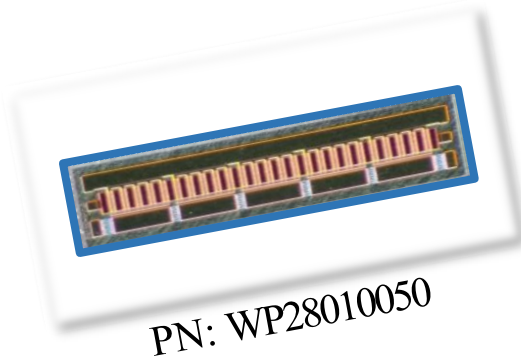




WP28010050

50W, 28V GaN HEMT Die



The WP28010050 is a 25W 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

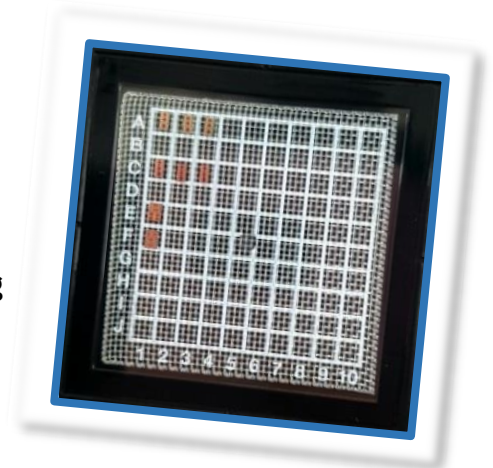
- Up to 10 GHz Operation
- 9.0 dB Typical Small Signal Gain @ 8.15 GHz
- 50 W Typical Psat @8.15GHz
- 28V Operation
- High Breakdown Voltage
- High Breakdown Voltage
- High Efficiency
- Reliability Monitoring Supporting

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



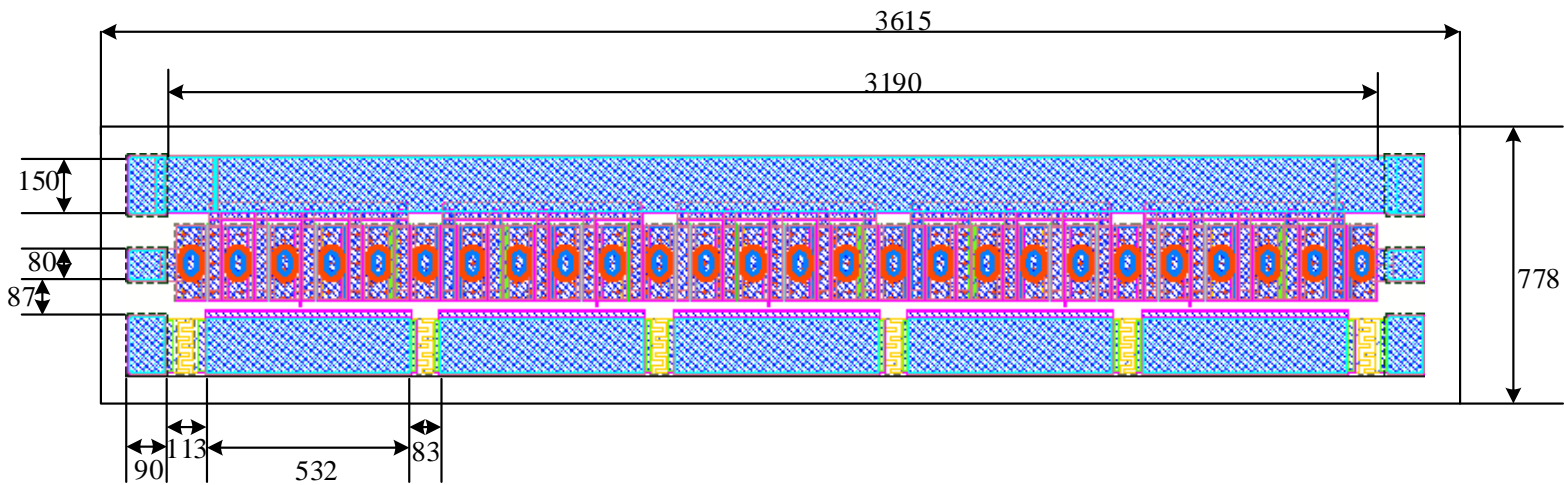
Absolute Maximum Ratings (not simultaneous) at 25 °C

Parameter	Parameter	Typical Value	Units	Conditions
Threshold voltage @ Id=1mA/mm, Vd=10V	V _{to}	-3.2	V	25°C
Breakdown voltage @ Id=1mA/mm	V _{DG}	>100	V	25°C
Drain-source current, Id @ Vd=10V, Vg=0	I _{dss}	880	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 = 8.15 GHz unless otherwise stated; TC = 25 °C)

Parameter	Parameter	Typical Value	Units	Conditions
DC Characteristics				
Ohmic contact resistance	RC	0.4	Ohm-mm	25°C
Maximum Drain-source current, Id @ Vd=10V, Vg=1V (1X125µm device)	I _{dmax}	1050	mA/mm	25°C
Max. trans-conductance, @ Vd=10V, Vg=-4V ~ -1V (1X125µm device)	GM_PEAK	340	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}	>9	dB	V _{DD} =28V, I _{DQ} =300mA
Saturated Power Output	P _{SAT}	50	W	V _{DD} =28V, I _{DQ} =300mA
Drain Efficiency	η	>40	%	V _{DD} =28V, I _{DQ} =300mA
Intermodulation Distortion	IM3	<-30	dBc	V _{DD} =28V, I _{DQ} =300mA
Output Mismatch Stress	VSWR	10:1	ψ	

DIE Dimensions (units in microns)



Overall die size 3615 x 778 (+0/-50) microns, die thickness 100 (+/- 10) microns.
All Gate and Drain pads must be wire bonded for electrical connection.

Assembly Notes:

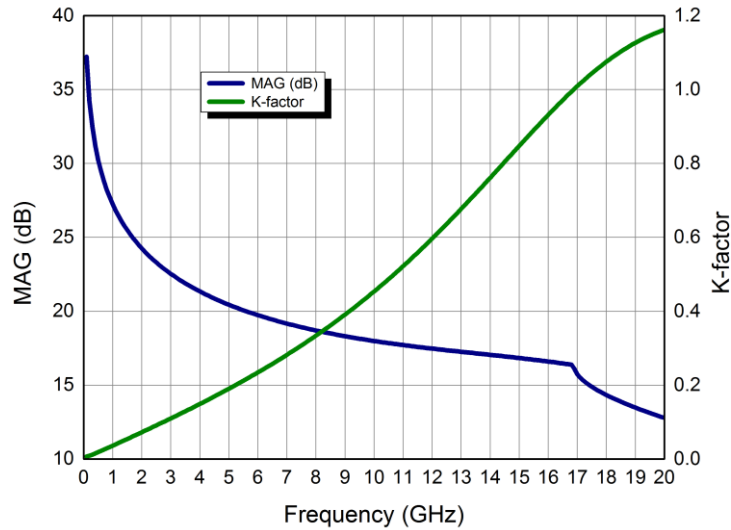
- Recommended solder is AuSn (80/20) solder. Refer to Wavepia's guide for the Eutectic Die Bond Procedure
- Vacuum collet is the preferred method of pick-up.
- The backside of the die is the Source (ground) contact.
- Die back side gold plating is 5 microns thick minimum.
- Thermosonic ball or wedge 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 WP28010050

$$V_{DD} = 28 \text{ V}, I_{DQ} = 300 \text{ mA}$$



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 WP28010050

$$V_{DD} = 28 \text{ V}, I_{DQ} = 300 \text{ mA}$$

Under construction!



Typical Die S-Parameters

(Small Signal, $V_{DS} = 28\text{ V}$, $I_{DQ} = 400\text{ mA}$, magnitude / angle)

Frequency	Mag S11	Ang S11	Mag S21	Ang S21	Mag S12	Ang S12	Mag S22	Ang S22
1000MHz	0.950739	-173.196	6.312608	83.94397	0.011911	-3.60169	0.75807	-174.184
1100MHz	0.95094	-173.756	5.725556	82.74991	0.011879	-4.54569	0.759647	-174.21
1200MHz	0.951166	-174.218	5.23484	81.60856	0.011843	-5.43698	0.761289	-174.196
1300MHz	0.951412	-174.606	4.818351	80.50925	0.011804	-6.28611	0.763005	-174.152
1400MHz	0.951679	-174.936	4.460266	79.44447	0.011762	-7.10054	0.764799	-174.086
1500MHz	0.951965	-175.219	4.148967	78.40878	0.011716	-7.88564	0.766672	-174.004
1600MHz	0.952268	-175.464	3.875732	77.39817	0.011667	-8.64537	0.768624	-173.911
1700MHz	0.952587	-175.678	3.633886	76.40963	0.011616	-9.38269	0.770651	-173.81
1800MHz	0.952921	-175.867	3.418233	75.44087	0.011562	-10.0998	0.772752	-173.703
1900MHz	0.953269	-176.034	3.22467	74.49013	0.011506	-10.7985	0.774921	-173.594
2000MHz	0.95363	-176.183	3.049913	73.55606	0.011447	-11.4801	0.777154	-173.483
2100MHz	0.954003	-176.317	2.891302	72.63756	0.011386	-12.1456	0.779448	-173.372
2200MHz	0.954387	-176.438	2.746661	71.7338	0.011322	-12.7959	0.781796	-173.262
2300MHz	0.954782	-176.547	2.614191	70.8441	0.011257	-13.4315	0.784195	-173.154
2400MHz	0.955186	-176.647	2.492394	69.9679	0.011189	-14.053	0.78664	-173.049
2500MHz	0.955598	-176.738	2.38001	69.10477	0.01112	-14.6608	0.789124	-172.947
2600MHz	0.956018	-176.822	2.275972	68.25433	0.011049	-15.2552	0.791645	-172.848
2700MHz	0.956444	-176.9	2.179372	67.4163	0.010977	-15.8366	0.794196	-172.754
2800MHz	0.956877	-176.972	2.089431	66.5904	0.010902	-16.4051	0.796774	-172.664
2900MHz	0.957315	-177.039	2.005477	65.77643	0.010827	-16.9609	0.799373	-172.578
3000MHz	0.957757	-177.102	1.926928	64.9742	0.01075	-17.5041	0.801989	-172.498
3100MHz	0.958203	-177.161	1.853275	64.18355	0.010672	-18.035	0.804619	-172.422
3200MHz	0.958653	-177.216	1.784074	63.40432	0.010593	-18.5535	0.807258	-172.351
3300MHz	0.959104	-177.269	1.718934	62.63639	0.010513	-19.0599	0.809902	-172.284
3400MHz	0.959557	-177.319	1.657509	61.87963	0.010431	-19.5542	0.812548	-172.223
3500MHz	0.960012	-177.366	1.599493	61.13393	0.010349	-20.0365	0.815192	-172.166
3600MHz	0.960466	-177.411	1.544613	60.39916	0.010267	-20.5069	0.817832	-172.114
3700MHz	0.960921	-177.455	1.492625	59.67522	0.010183	-20.9654	0.820463	-172.067
3800MHz	0.961376	-177.496	1.443312	58.96201	0.010099	-21.4122	0.823084	-172.025
3900MHz	0.961829	-177.536	1.396476	58.25941	0.010015	-21.8472	0.825692	-171.987
4000MHz	0.962281	-177.575	1.35194	57.56732	0.00993	-22.2706	0.828283	-171.953
4100MHz	0.962731	-177.613	1.309545	56.88563	0.009844	-22.6825	0.830857	-171.924
4200MHz	0.963179	-177.649	1.269145	56.21424	0.009759	-23.0829	0.83341	-171.898
4300MHz	0.963624	-177.684	1.230608	55.55303	0.009673	-23.4719	0.835941	-171.877
4400MHz	0.964066	-177.719	1.193814	54.90188	0.009587	-23.8496	0.838449	-171.859
4500MHz	0.964504	-177.752	1.158653	54.2607	0.009501	-24.216	0.840931	-171.845
4600MHz	0.96494	-177.785	1.125023	53.62935	0.009414	-24.5712	0.843386	-171.835
4700MHz	0.965371	-177.817	1.092833	53.00773	0.009328	-24.9154	0.845813	-171.828
4800MHz	0.965798	-177.849	1.061998	52.39571	0.009242	-25.2486	0.848211	-171.825



Typical Die S-Parameters

(Small Signal, $V_{DS} = 28\text{ V}$, $I_{DQ} = 400\text{ mA}$, magnitude / angle)

Frequency	Mag S11	Ang S11	Mag S21	Ang S21	Mag S12	Ang S12	Mag S22	Ang S22
4900MHz	0.966221	-177.88	1.032438	51.79318	0.009156	-25.5708	0.850579	-171.824
5000MHz	0.966639	-177.91	1.004083	51.20002	0.00907	-25.8822	0.852916	-171.827
5100MHz	0.967052	-177.940499	0.976864	50.61609	0.008984	-26.1829	0.855221	-171.832
5200MHz	0.967461	-177.97007	0.95072	50.04128	0.008899	-26.4729	0.857493	-171.84
5300MHz	0.967864	-177.999237	0.925593	49.47546	0.008814	-26.7524	0.859732	-171.85
5400MHz	0.968263	-178.028032	0.901429	48.91851	0.008729	-27.0213	0.861938	-171.863
5500MHz	0.968656	-178.056481	0.87818	48.37029	0.008644	-27.2799	0.86411	-171.879
5600MHz	0.969043	-178.085	0.855798	47.83069	0.00856	-27.5281	0.866247	-171.896
5700MHz	0.969426	-178.112434	0.83424	47.29957	0.008476	-27.7661	0.868351	-171.916
5800MHz	0.969802	-178.139978	0.813465	46.7768	0.008393	-27.994	0.87042	-171.937
5900MHz	0.970174	-178.167258	0.793436	46.26226	0.00831	-28.2119	0.872454	-171.961
6000MHz	0.970539	-178.194289	0.774118	45.75582	0.008228	-28.4198	0.874454	-171.986
6100MHz	0.970899	-178.221083	0.755475	45.25735	0.008146	-28.6178	0.876419	-172.013
6200MHz	0.971254	-178.247653	0.737478	44.76672	0.008065	-28.806	0.87835	-172.041
6300MHz	0.971603	-178.27401	0.720097	44.28381	0.007984	-28.9845	0.880247	-172.071
6400MHz	0.971946	-178.300163	0.703304	43.8085	0.007904	-29.1534	0.88211	-172.102
6500MHz	0.972283	-178.32612	0.687073	43.34065	0.007824	-29.3128	0.883939	-172.134
6600MHz	0.972615	-178.35189	0.671378	42.88014	0.007745	-29.4627	0.885735	-172.168
6700MHz	0.972942	-178.377478	0.656198	42.42686	0.007667	-29.6032	0.887497	-172.203
6800MHz	0.973263	-178.402891	0.64151	41.98067	0.007589	-29.7344	0.889227	-172.238
6900MHz	0.973578	-178.428135	0.627292	41.54146	0.007512	-29.8564	0.890925	-172.275
7000MHz	0.973888	-178.453213	0.613526	41.1091	0.007435	-29.9692	0.89259	-172.313
7100MHz	0.974192	-178.478131	0.600193	40.68348	0.007359	-30.0729	0.894223	-172.351
7200MHz	0.974491	-178.502892	0.587275	40.26449	0.007284	-30.1676	0.895826	-172.39
7300MHz	0.974785	-178.528	0.574755	39.85199	0.00721	-30.2534	0.897398	-172.43
7400MHz	0.975074	-178.551957	0.562617	39.44589	0.007136	-30.3303	0.898939	-172.47
7500MHz	0.975357	-178.576267	0.550846	39.04607	0.007063	-30.3984	0.90045	-172.511
7600MHz	0.975635	-178.600432	0.539428	38.65242	0.00699	-30.4577	0.901932	-172.553
7700MHz	0.975908	-178.624455	0.528349	38.26482	0.006918	-30.5083	0.903385	-172.595
7800MHz	0.976176	-178.648336	0.517597	37.88317	0.006847	-30.5503	0.90481	-172.637
7900MHz	0.97644	-178.67208	0.507158	37.50737	0.006777	-30.5837	0.906207	-172.68
8000MHz	0.976698	-178.696	0.49702	37.13731	0.006707	-30.6085	0.907576	-172.723
8100MHz	0.976952	-178.719158	0.487173	36.77289	0.006638	-30.6249	0.908918	-172.767
8200MHz	0.9772	-178.742495	0.477606	36.414	0.00657	-30.6328	0.910234	-172.811
8300MHz	0.977445	-178.765701	0.468309	36.06055	0.006502	-30.6324	0.911524	-172.855
8400MHz	0.977684	-178.788776	0.459271	35.71243	0.006435	-30.6236	0.912788	-172.899
8500MHz	0.97792	-178.812	0.450484	35.36956	0.006369	-30.6065	0.914027	-172.944
8600MHz	0.97815	-178.834537	0.441939	35.03184	0.006304	-30.5812	0.915242	-172.988
8700MHz	0.978377	-178.857226	0.433626	34.69917	0.006239	-30.5476	0.916432	-173.033

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