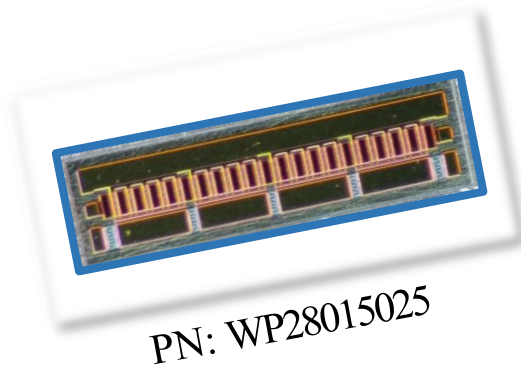




# WP28015025

## 25W, 28V GaN HEMT Die



The WP28015025 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

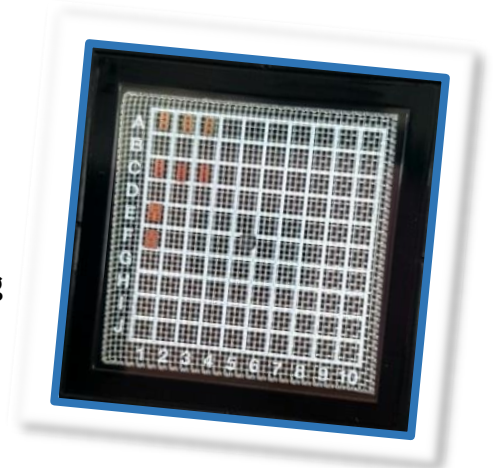
- Up to 15 GHz Operation
- 10.0 dB Typical Small Signal Gain @ 8.15 GHz
- 25 W Typical Psat @8.15GHz
- 28V Operation
- High Breakdown Voltage
- High Breakdown Voltage
- High Efficiency
- Reliability Monitoring Supporting

### 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

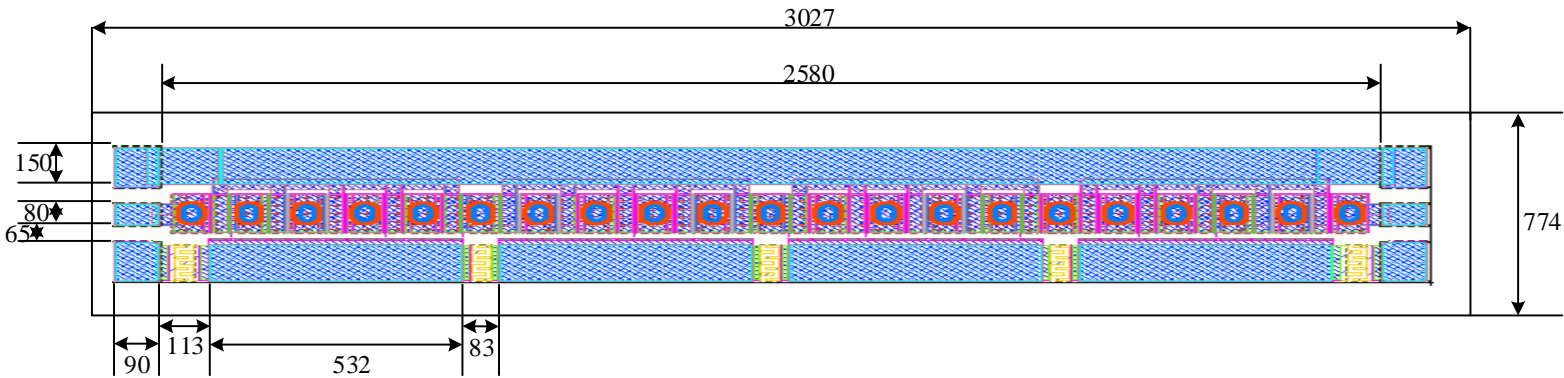
Parameter	Parameter	Typical Value	Units	Conditions
Threshold voltage @ Id=1mA/mm, Vd=10V	V <sub>to</sub>	-3.2	V	25°C
Breakdown voltage @ Id=1mA/mm	V <sub>DG</sub>	>100	V	25°C
Drain-source current, Id @ Vd=10V, Vg=0	I <sub>dss</sub>	880	mA/mm	25°C
Operating Junction Temperature	T <sub>J</sub>	225	°C	
Storage Temperature	T <sub>STG</sub>	-65, +150	°C	
Thermal Resistance, Junction to Case (packaged)	R <sub>θJC</sub>		°C/W	
Thermal Resistance, Junction to Case (die only)	R <sub>θJC</sub>		°C/W	
Mounting Temperature (30 seconds)	T <sub>S</sub>	320	°C	30 seconds

## Electrical Characteristics (Frequency = 8.15 GHz unless otherwise stated; TC = 25 °C)

Parameter	Parameter	Typical Value	Units	Conditions
<b>DC Characteristics</b>				
Ohmic contact resistance	RC	0.4	Ohm-mm	25°C
Maximum Drain-source current, Id @ Vd=10V, Vg=1V (1X125µm device)	I <sub>dmax</sub>	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 <sub>dmax</sub>	1000	mA/mm	25°C
<b>RF Characteristics</b>				
Small Signal Gain	G <sub>SS</sub>	>10	dB	V <sub>DD</sub> =28V, I <sub>DQ</sub> =300mA
Saturated Power Output	P <sub>SAT</sub>	25	W	V <sub>DD</sub> =28V, I <sub>DQ</sub> =300mA
Drain Efficiency	η	>40	%	V <sub>DD</sub> =28V, I <sub>DQ</sub> =300mA
Intermodulation Distortion	IM3	<-30	dBc	V <sub>DD</sub> =28V, I <sub>DQ</sub> =300mA
Output Mismatch Stress	VSWR	10:1	ψ	



**DIE Dimensions (units in microns)**



Overall die size 3027 x 774 (+0/-50) microns, die thickness 100 (+/- 10) microns.  
All Gate and Drain pads must be wire bonded for electrical connection.

**Assembly Notes:**

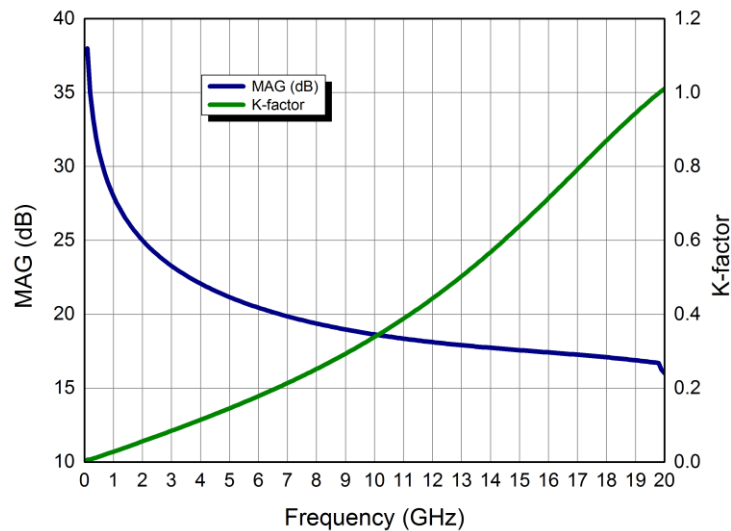
- Recommended solder is AuSn (80/20) solder. Refer to Wavepia's guide for the Eutectic Die Bond Procedure
- Vacuum collet is the preferred method of pick-up.
- The backside of the die is the Source (ground) contact.
- Die back side gold plating is 5 microns thick minimum.
- Thermosonic ball or wedge 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 WP28015025

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



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 WP28015025

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

# Under construction



## Typical Die S-Parameters

(Small Signal,  $V_{DS} = 28\text{ V}$ ,  $I_{DQ} = 300\text{ mA}$ , magnitude / angle)

Frequency	Mag S11	Ang S11	Mag S21	Ang S21	Mag S12	Ang S12	Mag S22	Ang S22
1000MHz	0.931494	-166.787	9.910821	87.1674	0.01573	-0.83322	0.649845	-167.694
1100MHz	0.931662	-167.89	8.996819	85.73085	0.015702	-2.0658	0.652511	-167.978
1200MHz	0.931888	-168.805	8.231418	84.39039	0.015667	-3.20237	0.655203	-168.157
1300MHz	0.932161	-169.574	7.580897	83.12545	0.015626	-4.26341	0.657954	-168.258
1400MHz	0.932475	-170.229	7.021008	81.92132	0.015578	-5.26356	0.660784	-168.3
1500MHz	0.932824	-170.793	6.53387	80.7673	0.015526	-6.2135	0.663704	-168.298
1600MHz	0.933204	-171.282	6.106017	79.65536	0.01547	-7.12118	0.666718	-168.262
1700MHz	0.933612	-171.711	5.727117	78.57945	0.015409	-7.99265	0.669827	-168.202
1800MHz	0.934045	-172.089	5.389111	77.53487	0.015344	-8.83255	0.673029	-168.123
1900MHz	0.934501	-172.425	5.085622	76.51796	0.015276	-9.64451	0.67632	-168.031
2000MHz	0.934978	-172.725	4.81154	75.52584	0.015205	-10.4314	0.679696	-167.93
2100MHz	0.935475	-172.994	4.562721	74.55619	0.01513	-11.1955	0.68315	-167.823
2200MHz	0.935989	-173.238	4.335769	73.60714	0.015052	-11.9387	0.686678	-167.712
2300MHz	0.936519	-173.458	4.127878	72.67719	0.014972	-12.6624	0.690272	-167.601
2400MHz	0.937063	-173.659	3.936703	71.76508	0.014889	-13.3679	0.693925	-167.49
2500MHz	0.937621	-173.843	3.760277	70.86978	0.014803	-14.0561	0.697631	-167.382
2600MHz	0.93819	-174.012	3.59693	69.99042	0.014715	-14.728	0.701382	-167.276
2700MHz	0.938771	-174.168	3.445242	69.12629	0.014625	-15.3842	0.705173	-167.175
2800MHz	0.93936	-174.313	3.303992	68.27676	0.014533	-16.0254	0.708996	-167.079
2900MHz	0.939958	-174.447	3.172127	67.44131	0.014439	-16.652	0.712846	-166.987
3000MHz	0.940563	-174.572	3.048735	66.61949	0.014343	-17.2644	0.716715	-166.902
3100MHz	0.941175	-174.689	2.93302	65.81089	0.014246	-17.8631	0.720598	-166.822
3200MHz	0.941791	-174.798	2.824284	65.01517	0.014147	-18.4483	0.72449	-166.749
3300MHz	0.942412	-174.901	2.721914	64.23202	0.014046	-19.0204	0.728385	-166.682
3400MHz	0.943035	-174.999	2.625368	63.46116	0.013944	-19.5796	0.732277	-166.621
3500MHz	0.943662	-175.091	2.534166	62.70234	0.013842	-20.1261	0.736163	-166.567
3600MHz	0.944289	-175.178	2.44788	61.95533	0.013738	-20.6602	0.740037	-166.52
3700MHz	0.944918	-175.261	2.366128	61.21991	0.013633	-21.182	0.743895	-166.478
3800MHz	0.945547	-175.341	2.288568	60.49588	0.013527	-21.6918	0.747734	-166.443
3900MHz	0.946175	-175.417	2.21489	59.78306	0.01342	-22.1896	0.75155	-166.414
4000MHz	0.946801	-175.489	2.144819	59.08128	0.013313	-22.6757	0.755338	-166.39
4100MHz	0.947426	-175.559	2.078102	58.39034	0.013206	-23.1502	0.759097	-166.373
4200MHz	0.948048	-175.626	2.014512	57.7101	0.013097	-23.6132	0.762824	-166.361
4300MHz	0.948667	-175.691	1.953843	57.0404	0.012989	-24.0649	0.766515	-166.354
4400MHz	0.949283	-175.754	1.895904	56.38107	0.01288	-24.5054	0.770169	-166.352
4500MHz	0.949894	-175.815	1.840524	55.73197	0.012771	-24.9349	0.773782	-166.356
4600MHz	0.950501	-175.873	1.787545	55.09295	0.012661	-25.3534	0.777355	-166.364
4700MHz	0.951104	-175.931	1.736822	54.46386	0.012552	-25.7611	0.780884	-166.377
4800MHz	0.951701	-175.986	1.688222	53.84455	0.012443	-26.1581	0.784368	-166.394

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## Typical Die S-Parameters

(Small Signal,  $V_{DS} = 28\text{ V}$ ,  $I_{DQ} = 300\text{ mA}$ , magnitude / angle)

Frequency	Mag S11	Ang S11	Mag S21	Ang S21	Mag S12	Ang S12	Mag S22	Ang S22
4900MHz	0.952292	-176.04	1.641622	53.23488	0.012333	-26.5445	0.787806	-166.415
5000MHz	0.952878	-176.093	1.596908	52.63471	0.012224	-26.9205	0.791197	-166.44
5100MHz	0.953457	-176.145	1.553976	52.0439	0.012115	-27.2861	0.79454	-166.468
5200MHz	0.954031	-176.195	1.51273	51.4623	0.012006	-27.6416	0.797834	-166.5
5300MHz	0.954597	-176.244	1.473078	50.88978	0.011897	-27.9869	0.801079	-166.536
5400MHz	0.955157	-176.293	1.434937	50.32619	0.011789	-28.3223	0.804273	-166.574
5500MHz	0.95571	-176.34	1.398228	49.77141	0.011681	-28.6477	0.807417	-166.616
5600MHz	0.956256	-176.387	1.362881	49.22529	0.011573	-28.9634	0.81051	-166.66
5700MHz	0.956795	-176.432	1.328825	48.68769	0.011466	-29.2695	0.813551	-166.707
5800MHz	0.957326	-176.477	1.295999	48.15849	0.01136	-29.566	0.816542	-166.756
5900MHz	0.95785	-176.521	1.264343	47.63754	0.011253	-29.8531	0.819482	-166.808
6000MHz	0.958367	-176.565	1.233801	47.12472	0.011148	-30.1309	0.822371	-166.861
6100MHz	0.958875	-176.608	1.20432	46.61988	0.011043	-30.3994	0.825209	-166.917
6200MHz	0.959377	-176.65	1.175852	46.12291	0.010938	-30.6588	0.827997	-166.974
6300MHz	0.959871	-176.692	1.148352	45.63366	0.010834	-30.9093	0.830734	-167.033
6400MHz	0.960357	-176.733	1.121774	45.15202	0.010731	-31.1508	0.833422	-167.094
6500MHz	0.960835	-176.773	1.096079	44.67784	0.010629	-31.3835	0.83606	-167.156
6600MHz	0.961306	-176.813	1.071228	44.21102	0.010527	-31.6075	0.838649	-167.22
6700MHz	0.961769	-176.853	1.047184	43.75141	0.010426	-31.8228	0.84119	-167.285
6800MHz	0.962225	-176.892	1.023913	43.2989	0.010325	-32.0297	0.843683	-167.35
6900MHz	0.962673	-176.931	1.001382	42.85336	0.010226	-32.2281	0.846128	-167.417
7000MHz	0.963114	-176.968936	0.979561	42.41467	0.010127	-32.4182	0.848527	-167.485
7100MHz	0.963547	-177.006716	0.958421	41.98272	0.010029	-32.6	0.85088	-167.554
7200MHz	0.963973	-177.044088	0.937933	41.55739	0.009931	-32.7737	0.853187	-167.623
7300MHz	0.964392	-177.081065	0.918072	41.13855	0.009835	-32.9393	0.85545	-167.693
7400MHz	0.964803	-177.117658	0.898812	40.7261	0.009739	-33.097	0.857668	-167.764
7500MHz	0.965207	-177.153879	0.880131	40.31992	0.009644	-33.2467	0.859843	-167.835
7600MHz	0.965605	-177.189738	0.862004	39.9199	0.00955	-33.3886	0.861976	-167.907
7700MHz	0.965995	-177.225245	0.844412	39.52593	0.009456	-33.5227	0.864066	-167.979
7800MHz	0.966378	-177.260408	0.827333	39.1379	0.009364	-33.6492	0.866116	-168.051
7900MHz	0.966754	-177.295237	0.810749	38.75571	0.009272	-33.768	0.868124	-168.124
8000MHz	0.967124	-177.329739	0.79464	38.37925	0.009181	-33.8794	0.870093	-168.197
8100MHz	0.967487	-177.364	0.778989	38.00842	0.009091	-33.9832	0.872023	-168.27
8200MHz	0.967843	-177.397791	0.76378	37.64311	0.009002	-34.0797	0.873915	-168.343
8300MHz	0.968193	-177.431355	0.748995	37.28323	0.008913	-34.1689	0.875769	-168.416
8400MHz	0.968537	-177.464619	0.734621	36.92869	0.008826	-34.2507	0.877587	-168.489
8500MHz	0.968874	-177.497589	0.720641	36.57937	0.008739	-34.3254	0.879368	-168.563
8600MHz	0.969206	-177.53	0.707043	36.2352	0.008653	-34.3929	0.881114	-168.636
8700MHz	0.969531	-177.562672	0.693813	35.89607	0.008568	-34.4534	0.882825	-168.709

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