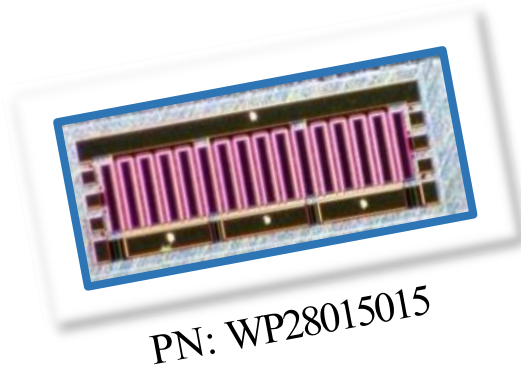




WP28015015

15W, 28V GaN HEMT Die



The WP28015015 is a 15W 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

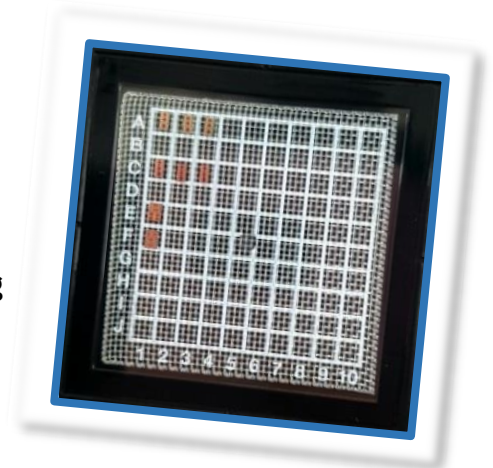
- Up to 15 GHz Operation
- 10.0 dB Typical Small Signal Gain @ 8.15 GHz
- 15 W Typical Psat @8.15GHz
- 28V Operation
- High Breakdown Voltage
- High Breakdown Voltage
- High Efficiency
- Reliability Monitoring Supporting

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

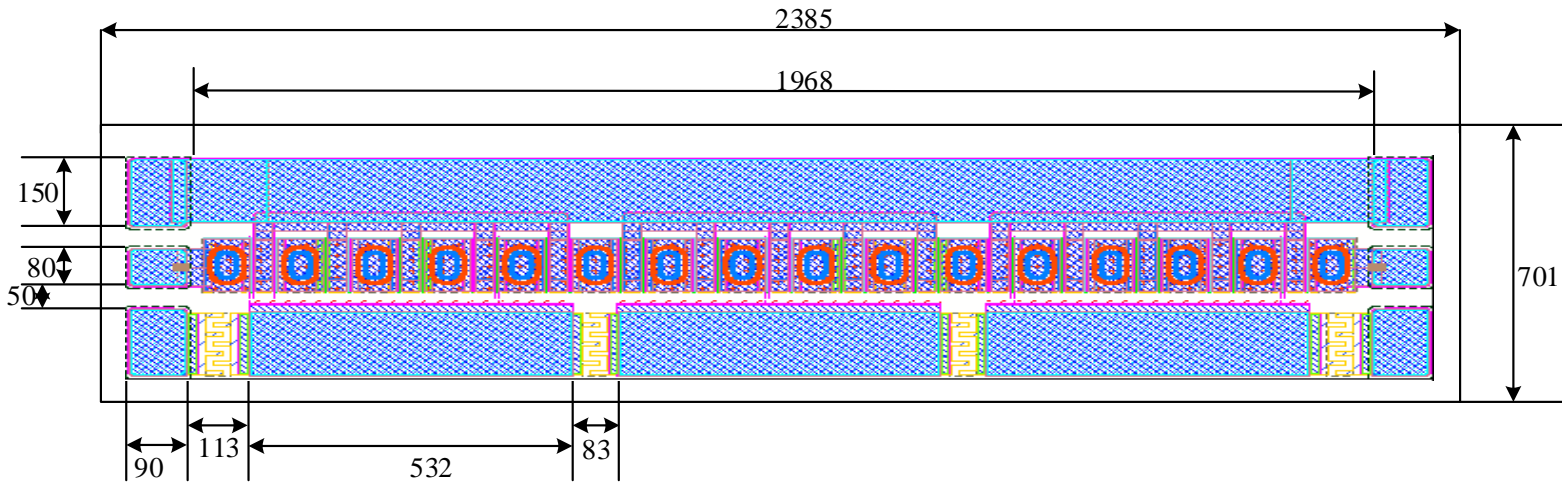
Parameter	Parameter	Typical Value	Units	Conditions
Threshold voltage @ Id=1mA/mm, Vd=10V	V _{to}	-3.2	V	25°C
Breakdown voltage @ Id=1mA/mm	V _{DG}	>100	V	25°C
Drain-source current, Id @ Vd=10V, Vg=0	I _{dss}	880	mA/mm	25°C
Operating Junction Temperature	T _J	225	°C	
Storage Temperature	T _{STG}	-65, +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}	>10	dB	V _{DD} =28V, I _{DQ} =300mA
Saturated Power Output	P _{SAT}	15	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 2385 x 701 (+0/-50) microns, die thickness 100 (+/- 10) microns.
All Gate and Drain pads must be wire bonded for electrical connection.

Assembly Notes:

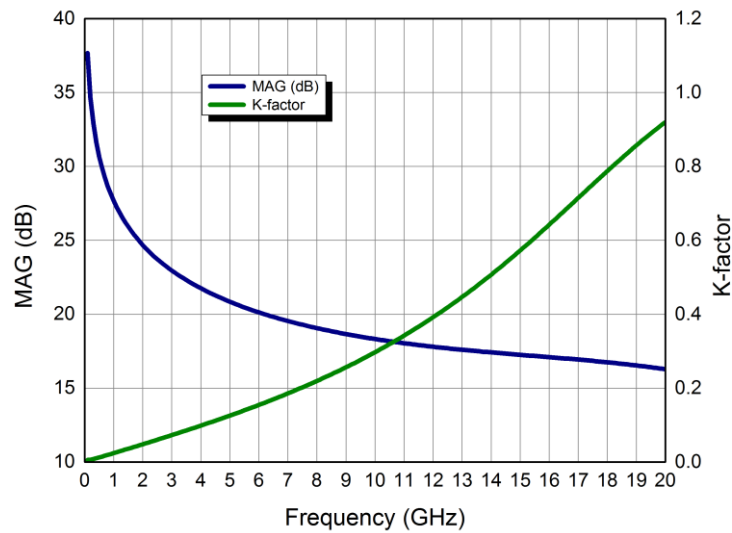
- Recommended solder is AuSn (80/20) solder. Refer to Wavepia's guide for the Eutectic Die Bond Procedure
- Vacuum collet is the preferred method of pick-up.
- The backside of the die is the Source (ground) contact.
- Die back side gold plating is 5 microns thick minimum.
- Thermosonic ball or wedge 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 WP28015015

$$V_{DD} = 28 \text{ V}, I_{DQ} = 200 \text{ mA}$$



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 WP28015015

$$V_{DD} = 28 \text{ V}, I_{DQ} = 200 \text{ mA}$$

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	0.903529	-154.696	13.50386	92.95148	0.023056	4.999855	0.535088	-152.314
1100MHz	0.903218	-156.806	12.29192	91.06037	0.023078	3.317398	0.538711	-153.515
1200MHz	0.90311	-158.566	11.27027	89.3403	0.023075	1.805933	0.542385	-154.436
1300MHz	0.903156	-160.056	10.39752	87.75448	0.023053	0.428752	0.546148	-155.147
1400MHz	0.903324	-161.331	9.643362	86.27628	0.023016	-0.84073	0.550022	-155.695
1500MHz	0.903589	-162.433	8.985107	84.88596	0.022967	-2.02218	0.554017	-156.117
1600MHz	0.903936	-163.394	8.405479	83.56865	0.022907	-3.13046	0.558138	-156.441
1700MHz	0.904351	-164.239	7.891092	82.31291	0.022838	-4.17695	0.562384	-156.689
1800MHz	0.904825	-164.987	7.431429	81.10984	0.02276	-5.17053	0.566675	-156.875
1900MHz	0.90535	-165.653	7.01811	79.95241	0.022676	-6.11819	0.571232	-157.015
2000MHz	0.905919	-166.25	6.644386	78.835	0.022585	-7.02552	0.575822	-157.118
2100MHz	0.906528	-166.787	6.304758	77.75309	0.022488	-7.89704	0.580511	-157.192
2200MHz	0.907172	-167.274	5.994704	76.70298	0.022386	-8.7364	0.585291	-157.244
2300MHz	0.907848	-167.716	5.710469	75.68162	0.022278	-9.54663	0.590152	-157.279
2400MHz	0.908551	-168.12	5.448915	74.68651	0.022166	-10.3302	0.595084	-157.303
2500MHz	0.90928	-168.49	5.207393	73.71553	0.02205	-11.0892	0.600079	-157.319
2600MHz	0.910031	-168.83	4.983659	72.76691	0.02193	-11.8255	0.605127	-157.328
2700MHz	0.910802	-169.145	4.775792	71.83914	0.021806	-12.5404	0.61022	-157.335
2800MHz	0.91159	-169.436	4.582144	70.93096	0.021678	-13.2352	0.615347	-157.341
2900MHz	0.912395	-169.707	4.401289	70.04125	0.021548	-13.9111	0.620501	-157.347
3000MHz	0.913213	-169.959	4.231989	69.16905	0.021414	-14.5689	0.625674	-157.355
3100MHz	0.914043	-170.195	4.073165	68.31355	0.021277	-15.2094	0.630857	-157.365
3200MHz	0.914883	-170.416	3.923869	67.47402	0.021138	-15.8334	0.636045	-157.379
3300MHz	0.915732	-170.624	3.783267	66.64981	0.020997	-16.4415	0.641228	-157.397
3400MHz	0.916589	-170.82	3.650621	65.84035	0.020854	-17.0342	0.646402	-157.42
3500MHz	0.917451	-171.006	3.525277	65.04514	0.020708	-17.6121	0.65156	-157.447
3600MHz	0.918317	-171.181	3.406653	64.26373	0.020561	-18.1755	0.656697	-157.479
3700MHz	0.919187	-171.348	3.294227	63.49569	0.020412	-18.7248	0.661806	-157.516
3800MHz	0.920059	-171.506	3.187531	62.74066	0.020262	-19.2604	0.666883	-157.559
3900MHz	0.920932	-171.658	3.086147	61.99828	0.02011	-19.7826	0.671925	-157.606
4000MHz	0.921804	-171.802	2.989694	61.26824	0.019957	-20.2918	0.676925	-157.659
4100MHz	0.922676	-171.94	2.897831	60.55024	0.019803	-20.7881	0.681882	-157.716
4200MHz	0.923546	-172.073	2.810245	59.84401	0.019648	-21.2718	0.686791	-157.779
4300MHz	0.924413	-172.201	2.726655	59.14929	0.019492	-21.7433	0.691649	-157.846
4400MHz	0.925277	-172.323	2.646802	58.46584	0.019336	-22.2026	0.696454	-157.918
4500MHz	0.926136	-172.442	2.570451	57.79342	0.019179	-22.65	0.701203	-157.994
4600MHz	0.926991	-172.556	2.497386	57.13181	0.019021	-23.0858	0.705893	-158.075
4700MHz	0.92784	-172.667	2.427409	56.4808	0.018863	-23.51	0.710524	-158.159
4800MHz	0.928683	-172.774	2.360339	55.84019	0.018705	-23.9229	0.715093	-158.247



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	0.929519	-172.878	2.296007	55.20979	0.018547	-24.3246	0.719599	-158.339
5000MHz	0.930348	-172.978	2.234259	54.5894	0.018389	-24.7153	0.72404	-158.434
5100MHz	0.93117	-173.076	2.174951	53.97885	0.018231	-25.0952	0.728416	-158.532
5200MHz	0.931983	-173.172	2.117951	53.37795	0.018073	-25.4644	0.732726	-158.633
5300MHz	0.932789	-173.265	2.063136	52.78653	0.017915	-25.823	0.736968	-158.737
5400MHz	0.933585	-173.356	2.010392	52.20442	0.017758	-26.1713	0.741143	-158.844
5500MHz	0.934373	-173.444	1.959611	51.63146	0.017601	-26.5093	0.745251	-158.952
5600MHz	0.935152	-173.531	1.910696	51.06749	0.017444	-26.8372	0.749291	-159.063
5700MHz	0.935921	-173.615	1.863552	50.51234	0.017288	-27.1551	0.753262	-159.176
5800MHz	0.93668	-173.698	1.818093	49.96587	0.017132	-27.4631	0.757166	-159.291
5900MHz	0.93743	-173.78	1.774239	49.42792	0.016977	-27.7614	0.761002	-159.408
6000MHz	0.93817	-173.859	1.731914	48.89834	0.016822	-28.0501	0.76477	-159.526
6100MHz	0.9389	-173.937	1.691045	48.37698	0.016668	-28.3293	0.768471	-159.645
6200MHz	0.93962	-174.014	1.651567	47.86371	0.016515	-28.5992	0.772106	-159.765
6300MHz	0.940329	-174.089	1.613416	47.35837	0.016363	-28.8597	0.775674	-159.887
6400MHz	0.941029	-174.163	1.576533	46.86083	0.016211	-29.1111	0.779177	-160.009
6500MHz	0.941718	-174.236	1.540861	46.37096	0.016061	-29.3535	0.782614	-160.133
6600MHz	0.942396	-174.307	1.50635	45.88861	0.015911	-29.5869	0.785987	-160.257
6700MHz	0.943065	-174.378	1.472948	45.41365	0.015762	-29.8115	0.789297	-160.381
6800MHz	0.943723	-174.447	1.440608	44.94595	0.015614	-30.0274	0.792544	-160.506
6900MHz	0.94437	-174.515	1.409287	44.48539	0.015467	-30.2347	0.795729	-160.632
7000MHz	0.945008	-174.583	1.378942	44.03184	0.015322	-30.4334	0.798853	-160.757
7100MHz	0.945635	-174.649	1.349533	43.58517	0.015177	-30.6236	0.801916	-160.883
7200MHz	0.946252	-174.714	1.321022	43.14526	0.015033	-30.8055	0.80492	-161.009
7300MHz	0.946859	-174.779	1.293375	42.71198	0.01489	-30.9792	0.807866	-161.135
7400MHz	0.947456	-174.843	1.266555	42.28523	0.014748	-31.1446	0.810754	-161.261
7500MHz	0.948043	-174.905	1.240532	41.86489	0.014608	-31.302	0.813585	-161.387
7600MHz	0.94862	-174.967	1.215274	41.45083	0.014468	-31.4514	0.816361	-161.513
7700MHz	0.949188	-175.029	1.190752	41.04295	0.01433	-31.5928	0.819082	-161.638
7800MHz	0.949745	-175.089	1.166939	40.64114	0.014192	-31.7264	0.82175	-161.763
7900MHz	0.950294	-175.149	1.143807	40.24529	0.014056	-31.8522	0.824365	-161.888
8000MHz	0.950832	-175.208	1.121332	39.85528	0.013921	-31.9703	0.826928	-162.013
8100MHz	0.951362	-175.266	1.099489	39.47103	0.013787	-32.0807	0.82944	-162.136
8200MHz	0.951882	-175.324	1.078255	39.09242	0.013655	-32.1836	0.831902	-162.26
8300MHz	0.952393	-175.381	1.057608	38.71935	0.013523	-32.2789	0.834316	-162.383
8400MHz	0.952896	-175.437	1.037528	38.35172	0.013393	-32.3669	0.836681	-162.505
8500MHz	0.953389	-175.493	1.017994	37.98944	0.013264	-32.4474	0.839	-162.627
8600MHz	0.953874	-175.547805	0.998987	37.63241	0.013136	-32.5207	0.841273	-162.748
8700MHz	0.95435	-175.602	0.980488	37.28053	0.013009	-32.5866	0.8435	-162.869

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