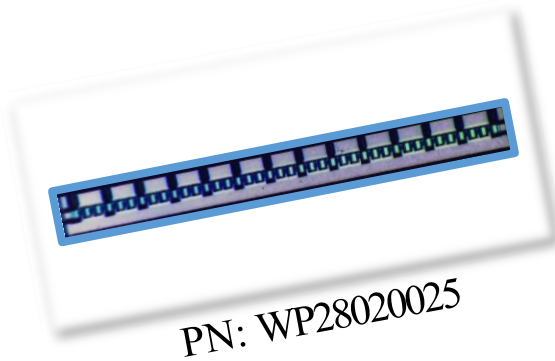




WP28020025

25W, 28V GaN HEMT Die



The WP28020025 is a 25W gallium nitride (GaN) High Electron Mobility Transistor (HEMT). This GaN HEMT is a wideband transistor optimized for 16GHz operation in a user-friendly device for high bandwidth applications. Gallium nitride (GaN) HEMT is a device optimized for ku-band applications. GaN HEMT resistance is only 1/10 that of silicon transistors, making it capable of switching frequencies faster for greater energy efficiency. In addition, we're no EL Issue.

Features

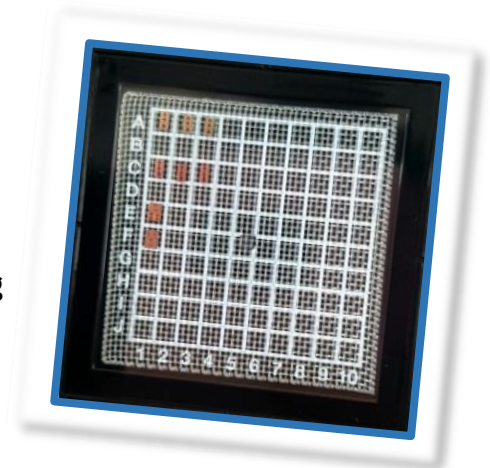
- Up to 20 GHz Operation
- 10.0 dB Typical Small Signal Gain @ 16 GHz
- 25 W Typical Psat @16GHz
- 28V Operation
- High Breakdown Voltage
- High Breakdown Voltage
- High Efficiency
- Reliability Monitoring Supporting

Applications

- ku-band Amplifiers
- Broadband Amplifiers
- Base Station Communications
- Drone, UAV
- Satellite Communications
- 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

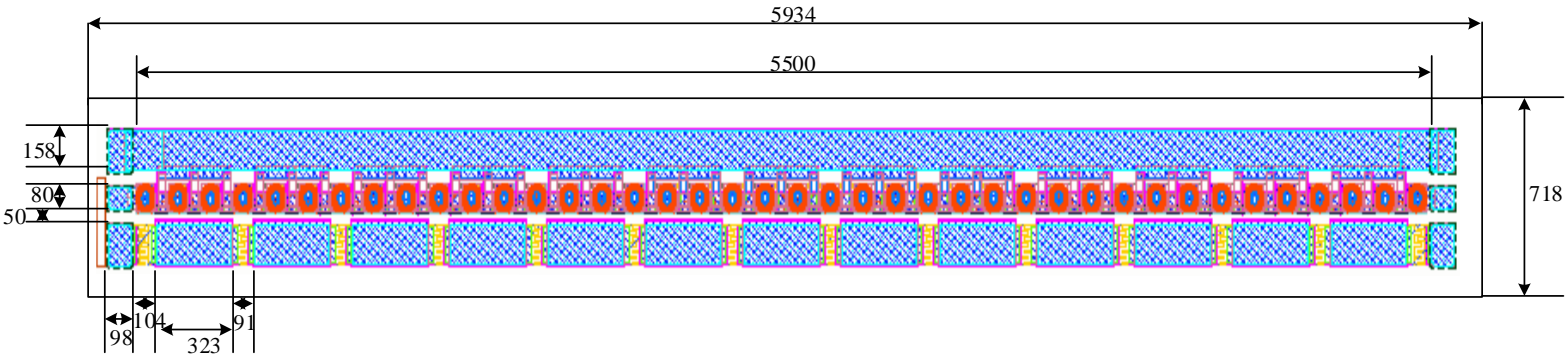
Parameter	Parameter	Typical Value	Units	Conditions
Threshold voltage @ Id=1mA/mm, Vd=10V	V _{to}	-3.4	V	25°C
Breakdown voltage @ Id=1mA/mm	V _{DG}	>100	V	25°C
Drain-source current, Id @ Vd=10V, Vg=0	I _{dss}	880	mA/mm	25°C
Operating Junction Temperature	T _J	225	°C	
Storage Temperature	T _{STG}	-65, +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 = 3.5 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} =380mA
Saturated Power Output	P _{SAT}	25	W	V _{DD} =28V, I _{DQ} =380mA
Drain Efficiency	η	>20	%	V _{DD} =28V, I _{DQ} =380mA
Intermodulation Distortion	IM3	<-30	dBc	V _{DD} =28V, I _{DQ} =380mA
Output Mismatch Stress	VSWR	10:1	ψ	



DIE Dimensions (units in microns)



Overall die size 5934 x 718 (+0/-50) microns, die thickness 100 (+/- 10) microns.
All Gate and Drain pads must be wire bonded for electrical connection.

Assembly Notes:

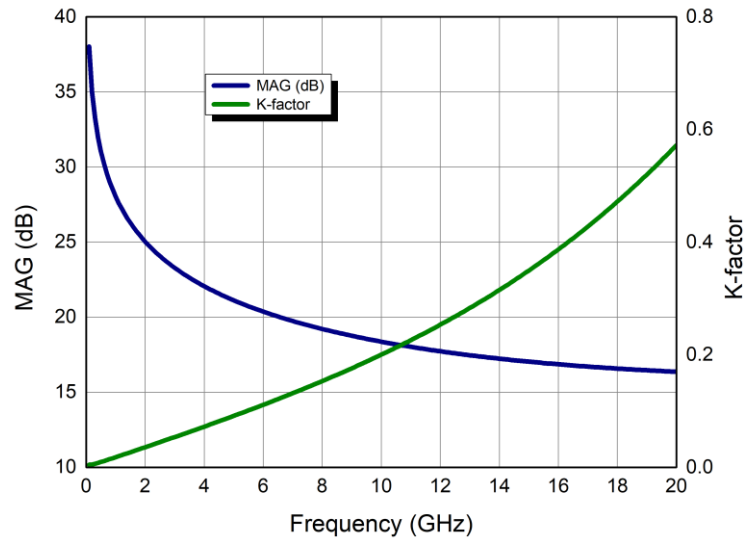
- Recommended solder is AuSn (80/20) solder. Refer to Wavepia's guide for the Eutectic Die Bond Procedure
- Vacuum collet is the preferred method of pick-up.
- The backside of the die is the Source (ground) contact.
- Die back side gold plating is 5 microns thick minimum.
- Thermosonic ball or wedge 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 WP28020025

$$V_{DD} = 28 \text{ V}, I_{DQ} = 380 \text{ mA}$$



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 WP28020025

$$V_{DD} = 28 \text{ V}, I_{DQ} = 380 \text{ mA}$$

Under construction



Typical Die S-Parameters

(Small Signal, $V_{DS} = 28\text{ V}$, $I_{DQ} = 380\text{ mA}$, magnitude / angle)

Frequency	Mag S11	Ang S11	Mag S21	Ang S21	Mag S12	Ang S12	Mag S22	Ang S22
1000MHz	0.923404	-167.591	9.444245	85.85032	0.014857	-2.85981	0.696426	-169.319
1100MHz	0.923705	-168.58	8.56769	84.38707	0.014824	-4.19074	0.699073	-169.539
1200MHz	0.924072	-169.396	7.833677	83.01358	0.014783	-5.43209	0.701752	-169.67
1300MHz	0.924494	-170.079	7.209795	81.71107	0.014737	-6.60259	0.704494	-169.737
1400MHz	0.924964	-170.657	6.672758	80.46621	0.014685	-7.71552	0.707315	-169.756
1500MHz	0.925475	-171.152	6.205417	79.26925	0.014629	-8.78059	0.710224	-169.738
1600MHz	0.926025	-171.58	5.794863	78.11297	0.014568	-9.805	0.713223	-169.695
1700MHz	0.926608	-171.952	5.431197	76.9919	0.014504	-10.7942	0.716312	-169.631
1800MHz	0.927222	-172.278	5.106704	75.90182	0.014435	-11.7524	0.719487	-169.554
1900MHz	0.927864	-172.567	4.815281	74.83947	0.014364	-12.6828	0.722743	-169.467
2000MHz	0.928531	-172.823	4.552037	73.80226	0.014289	-13.588	0.726076	-169.374
2100MHz	0.92922	-173.052	4.31301	72.78814	0.014211	-14.4701	0.729478	-169.278
2200MHz	0.929931	-173.257	4.094951	71.79545	0.01413	-15.3306	0.732942	-169.18
2300MHz	0.930659	-173.443	3.895177	70.82284	0.014047	-16.171	0.736462	-169.083
2400MHz	0.931404	-173.611	3.711447	69.86921	0.013961	-16.9923	0.740029	-168.987
2500MHz	0.932163	-173.764	3.541878	68.93364	0.013873	-17.7955	0.743638	-168.895
2600MHz	0.932935	-173.904	3.384876	68.01536	0.013783	-18.5812	0.747279	-168.806
2700MHz	0.933718	-174.033	3.239081	67.11372	0.013691	-19.3502	0.750948	-168.722
2800MHz	0.93451	-174.152	3.103326	66.22815	0.013597	-20.103	0.754636	-168.643
2900MHz	0.935309	-174.263	2.976603	65.35819	0.013502	-20.84	0.758338	-168.569
3000MHz	0.936114	-174.365	2.85804	64.5034	0.013405	-21.5617	0.762047	-168.501
3100MHz	0.936925	-174.461	2.746874	63.66341	0.013307	-22.2685	0.765757	-168.439
3200MHz	0.937738	-174.55	2.642438	62.83789	0.013207	-22.9606	0.769463	-168.383
3300MHz	0.938553	-174.635	2.544144	62.02653	0.013106	-23.6384	0.77316	-168.333
3400MHz	0.939369	-174.714	2.451472	61.22905	0.013005	-24.3022	0.776842	-168.288
3500MHz	0.940185	-174.79	2.363962	60.44518	0.012903	-24.9522	0.780506	-168.25
3600MHz	0.940999	-174.861	2.281203	59.67469	0.0128	-25.5886	0.784147	-168.217
3700MHz	0.941811	-174.929	2.202828	58.91735	0.012696	-26.2117	0.787761	-168.191
3800MHz	0.94262	-174.994	2.128508	58.17292	0.012592	-26.8216	0.791346	-168.169
3900MHz	0.943424	-175.057	2.057946	57.4412	0.012487	-27.4187	0.794896	-168.154
4000MHz	0.944223	-175.117	1.990876	56.72198	0.012382	-28.003	0.798411	-168.143
4100MHz	0.945016	-175.174	1.927055	56.01505	0.012277	-28.5748	0.801886	-168.137
4200MHz	0.945803	-175.23	1.866264	55.32022	0.012172	-29.1343	0.805321	-168.136
4300MHz	0.946583	-175.283	1.808303	54.63729	0.012067	-29.6817	0.808712	-168.14
4400MHz	0.947356	-175.336	1.752989	53.96607	0.011962	-30.2172	0.812058	-168.148
4500MHz	0.94812	-175.386	1.700157	53.30636	0.011857	-30.7408	0.815357	-168.16
4600MHz	0.948876	-175.435	1.649652	52.65799	0.011752	-31.2529	0.818608	-168.176
4700MHz	0.949623	-175.483	1.601335	52.02076	0.011647	-31.7536	0.82181	-168.196
4800MHz	0.95036	-175.53	1.555077	51.39448	0.011543	-32.2431	0.824962	-168.219



Typical Die S-Parameters

(Small Signal, $V_{DS} = 28\text{ V}$, $I_{DQ} = 380\text{ mA}$, magnitude / angle)

Frequency	Mag S11	Ang S11	Mag S21	Ang S21	Mag S12	Ang S12	Mag S22	Ang S22
4900MHz	0.951088	-175.576	1.510758	50.77897	0.011439	-32.7216	0.828063	-168.246
5000MHz	0.951806	-175.62	1.468269	50.17405	0.011335	-33.1891	0.831112	-168.276
5100MHz	0.952514	-175.664	1.427507	49.57954	0.011232	-33.646	0.834109	-168.309
5200MHz	0.953212	-175.707	1.388378	48.99525	0.011129	-34.0924	0.837054	-168.345
5300MHz	0.953899	-175.749	1.350795	48.421	0.011027	-34.5285	0.839946	-168.383
5400MHz	0.954575	-175.79	1.314676	47.85662	0.010926	-34.9544	0.842785	-168.423
5500MHz	0.955241	-175.831	1.279944	47.30193	0.010825	-35.3702	0.845572	-168.466
5600MHz	0.955896	-175.87	1.24653	46.75675	0.010725	-35.7763	0.848307	-168.511
5700MHz	0.95654	-175.91	1.214366	46.22092	0.010625	-36.1727	0.850989	-168.558
5800MHz	0.957173	-175.948	1.183391	45.69424	0.010526	-36.5596	0.853619	-168.607
5900MHz	0.957796	-175.986	1.153548	45.17657	0.010428	-36.9372	0.856197	-168.657
6000MHz	0.958407	-176.024	1.12478	44.66772	0.010331	-37.3056	0.858725	-168.709
6100MHz	0.959008	-176.061	1.097039	44.16754	0.010234	-37.665	0.861201	-168.763
6200MHz	0.959598	-176.098	1.070275	43.67585	0.010138	-38.0155	0.863628	-168.817
6300MHz	0.960177	-176.134	1.044443	43.1925	0.010043	-38.3574	0.866005	-168.873
6400MHz	0.960745	-176.169	1.019502	42.71732	0.009949	-38.6907	0.868333	-168.93
6500MHz	0.961303	-176.204417	0.995411	42.25015	0.009856	-39.0156	0.870613	-168.988
6600MHz	0.96185	-176.239141	0.972132	41.79084	0.009764	-39.3323	0.872846	-169.047
6700MHz	0.962387	-176.273448	0.949629	41.33924	0.009672	-39.6409	0.875032	-169.106
6800MHz	0.962914	-176.307348	0.92787	40.89519	0.009581	-39.9415	0.877172	-169.166
6900MHz	0.963431	-176.340853	0.906822	40.45855	0.009491	-40.2344	0.879266	-169.227
7000MHz	0.963937	-176.373972	0.886455	40.02916	0.009402	-40.5195	0.881317	-169.288
7100MHz	0.964434	-176.407	0.866741	39.60689	0.009314	-40.7971	0.883323	-169.35
7200MHz	0.964921	-176.43909	0.847652	39.19159	0.009227	-41.0674	0.885287	-169.412
7300MHz	0.965398	-176.471104	0.829163	38.78312	0.009141	-41.3303	0.887209	-169.475
7400MHz	0.965866	-176.503	0.81125	38.38135	0.009055	-41.5861	0.88909	-169.538
7500MHz	0.966325	-176.534081	0.793889	37.98614	0.008971	-41.835	0.89093	-169.601
7600MHz	0.966774	-176.565055	0.777058	37.59736	0.008887	-42.0769	0.892731	-169.664
7700MHz	0.967215	-176.595696	0.760737	37.21488	0.008804	-42.312	0.894493	-169.727
7800MHz	0.967647	-176.626008	0.744905	36.83857	0.008722	-42.5406	0.896217	-169.791
7900MHz	0.96807	-176.655996	0.729545	36.46831	0.008641	-42.7625	0.897904	-169.854
8000MHz	0.968484	-176.685665	0.714637	36.10398	0.008561	-42.9781	0.899555	-169.918
8100MHz	0.96889	-176.715021	0.700164	35.74546	0.008482	-43.1874	0.90117	-169.981
8200MHz	0.969288	-176.744068	0.686111	35.39263	0.008404	-43.3904	0.90275	-170.044
8300MHz	0.969678	-176.77281	0.672461	35.04538	0.008326	-43.5874	0.904297	-170.107
8400MHz	0.970061	-176.801251	0.6592	34.70359	0.008249	-43.7784	0.90581	-170.17
8500MHz	0.970435	-176.829396	0.646314	34.36715	0.008173	-43.9635	0.907291	-170.233
8600MHz	0.970802	-176.857248	0.633788	34.03596	0.008098	-44.1428	0.90874	-170.296
8700MHz	0.971161	-176.884811	0.62161	33.70991	0.008024	-44.3165	0.910158	-170.358

Contact WAVEPIA to receive this s-parameter file in “.s2p” format at platune@wavepia.com



Typical Die S-Parameters

(Small Signal, $V_{DS} = 28\text{ V}$, $I_{DQ} = 380\text{ mA}$, magnitude / angle)

Frequency	Mag S11	Ang S11	Mag S21	Ang S21	Mag S12	Ang S12	Mag S22	Ang S22
8800MHz	0.971513	-176.912089	0.609768	33.3889	0.007951	-44.4845	0.911546	-170.42
8900MHz	0.971858	-176.939086	0.598249	33.07283	0.007878	-44.647	0.912904	-170.482
9000MHz	0.972196	-176.965805	0.587042	32.76159	0.007807	-44.8042	0.914233	-170.544
9100MHz	0.972528	-176.99225	0.576137	32.4551	0.007736	-44.956	0.915534	-170.605
9200MHz	0.972852	-177.018423	0.565523	32.15325	0.007666	-45.1025	0.916808	-170.666
9300MHz	0.97317	-177.044329	0.55519	31.85596	0.007596	-45.2439	0.918054	-170.726
9400MHz	0.973482	-177.069971	0.545128	31.56313	0.007528	-45.3803	0.919274	-170.787
9500MHz	0.973788	-177.095351	0.535328	31.27468	0.00746	-45.5116	0.920469	-170.847
9600MHz	0.974087	-177.120474	0.525782	30.99052	0.007393	-45.6381	0.921639	-170.906
9700MHz	0.97438	-177.145343	0.516481	30.71057	0.007326	-45.7596	0.922784	-170.965
9800MHz	0.974668	-177.169959	0.507417	30.43474	0.007261	-45.8764	0.923905	-171.024
9900MHz	0.97495	-177.194328	0.498582	30.16295	0.007196	-45.9886	0.925003	-171.082
10000MHz	0.975226	-177.218451	0.489969	29.89513	0.007132	-46.096	0.926078	-171.14
11000MHz	0.975497	-177.242332	0.481571	29.63119	0.007069	-46.199	0.927131	-171.198
11100MHz	0.975762	-177.265973	0.47338	29.37106	0.007006	-46.2974	0.928163	-171.255
11200MHz	0.976022	-177.289	0.465391	29.11467	0.006944	-46.3914	0.929173	-171.312
11300MHz	0.976277	-177.312551	0.457596	28.86195	0.006883	-46.481	0.930162	-171.368
11400MHz	0.976527	-177.335492	0.449989	28.61283	0.006822	-46.5663	0.931132	-171.424
11500MHz	0.976773	-177.358206	0.442566	28.36723	0.006762	-46.6474	0.932082	-171.479
11600MHz	0.977013	-177.380695	0.43532	28.12509	0.006703	-46.7242	0.933012	-171.534
11700MHz	0.977249	-177.402963	0.428245	27.88634	0.006644	-46.7969	0.933924	-171.588
11800MHz	0.97748	-177.425011	0.421337	27.65093	0.006586	-46.8655	0.934818	-171.642
11900MHz	0.977707	-177.446844	0.41459	27.41878	0.006529	-46.9301	0.935693	-171.696
12000MHz	0.977929	-177.468462	0.408	27.18984	0.006472	-46.9907	0.936552	-171.749
12100MHz	0.978147	-177.48987	0.401561	26.96404	0.006416	-47.0474	0.937393	-171.802
12200MHz	0.978361	-177.51107	0.39527	26.74134	0.006361	-47.1002	0.938217	-171.854
12300MHz	0.978571	-177.532064	0.389122	26.52166	0.006306	-47.1491	0.939026	-171.906
12400MHz	0.978777	-177.552856	0.383113	26.30496	0.006252	-47.1942	0.939818	-171.957
12500MHz	0.978979	-177.573448	0.377239	26.09118	0.006198	-47.2356	0.940595	-172.008
12600MHz	0.979177	-177.593842	0.371495	25.88026	0.006145	-47.2733	0.941358	-172.058
12700MHz	0.979372	-177.61404	0.365879	25.67217	0.006092	-47.3073	0.942105	-172.108
12800MHz	0.979563	-177.634047	0.360386	25.46683	0.00604	-47.3376	0.942838	-172.158
12900MHz	0.97975	-177.653864	0.355013	25.26421	0.005989	-47.3644	0.943556	-172.207
13000MHz	0.979934	-177.673	0.349757	25.06426	0.005938	-47.3875	0.944262	-172.256
13100MHz	0.980114	-177.692937	0.344614	24.86692	0.005888	-47.4072	0.944953	-172.304
13200MHz	0.980292	-177.712198	0.339581	24.67215	0.005838	-47.4234	0.945632	-172.352
13300MHz	0.980465	-177.73128	0.334655	24.47991	0.005789	-47.4361	0.946297	-172.399
13400MHz	0.980636	-177.750183	0.329833	24.29015	0.00574	-47.4454	0.946951	-172.446
13500MHz	0.980804	-177.768911	0.325113	24.10283	0.005692	-47.4513	0.947592	-172.493



Typical Die S-Parameters

(Small Signal, $V_{DS} = 28\text{ V}$, $I_{DQ} = 380\text{ mA}$, magnitude / angle)

Frequency	Mag S11	Ang S11	Mag S21	Ang S21	Mag S12	Ang S12	Mag S22	Ang S22
13600MHz	0.982323	-177.947037	0.28292	22.35483	0.005237	-47.3293	0.953389	-172.935
13700MHz	0.982461	-177.963982	0.279151	22.19172	0.005194	-47.2995	0.953912	-172.977
13800MHz	0.982596	-177.980777	0.275455	22.0306	0.005151	-47.2667	0.954427	-173.019
13900MHz	0.982729	-177.997425	0.271832	21.87143	0.005109	-47.2307	0.954932	-173.06
14000MHz	0.98286	-178.013927	0.268278	21.71418	0.005068	-47.1917	0.955428	-173.101
14100MHz	0.982988	-178.03	0.264792	21.55883	0.005026	-47.1496	0.955916	-173.141
14200MHz	0.983114	-178.046503	0.261373	21.40533	0.004986	-47.1044	0.956395	-173.182
14300MHz	0.983238	-178.06258	0.258019	21.25367	0.004945	-47.0563	0.956866	-173.221
14400MHz	0.98336	-178.078519	0.254728	21.1038	0.004905	-47.0051	0.957329	-173.261
14500MHz	0.98348	-178.094322	0.251498	20.95571	0.004866	-46.9509	0.957784	-173.3
14600MHz	0.983598	-178.109991	0.248329	20.80936	0.004826	-46.8937	0.958231	-173.338
14700MHz	0.983714	-178.125527	0.245218	20.66473	0.004787	-46.8336	0.958671	-173.377
14800MHz	0.983828	-178.140933	0.242165	20.52179	0.004749	-46.7704	0.959103	-173.415
14900MHz	0.98394	-178.156209	0.239168	20.38051	0.004711	-46.7044	0.959527	-173.452
15000MHz	0.98405	-178.171358	0.236225	20.24088	0.004673	-46.6353	0.959945	-173.49
15100MHz	0.984159	-178.186382	0.233335	20.10285	0.004636	-46.5633	0.960355	-173.527
15200MHz	0.984265	-178.201281	0.230498	19.96642	0.004599	-46.4884	0.960759	-173.563
15300MHz	0.98437	-178.216058	0.227711	19.83155	0.004562	-46.4106	0.961156	-173.599
15400MHz	0.984473	-178.230714	0.224975	19.69822	0.004526	-46.3298	0.961547	-173.635
15500MHz	0.984575	-178.245251	0.222286	19.56641	0.00449	-46.2462	0.961931	-173.671
15600MHz	0.984675	-178.259671	0.219645	19.4361	0.004455	-46.1596	0.962309	-173.706
15700MHz	0.984773	-178.273974	0.21705	19.30725	0.004419	-46.0701	0.96268	-173.741
15800MHz	0.98487	-178.288163	0.214501	19.17986	0.004385	-45.9777	0.963046	-173.776
15900MHz	0.984965	-178.302239	0.211996	19.05391	0.00435	-45.8824	0.963405	-173.81
16000MHz	0.985059	-178.316204	0.209534	18.92936	0.004316	-45.7842	0.963759	-173.844
16100MHz	0.985151	-178.330058	0.207114	18.8062	0.004282	-45.6831	0.964108	-173.878
16200MHz	0.985242	-178.343803	0.204735	18.68441	0.004248	-45.5792	0.96445	-173.912
16300MHz	0.985331	-178.357442	0.202397	18.56397	0.004215	-45.4723	0.964788	-173.945
16400MHz	0.985419	-178.370974	0.200098	18.44486	0.004182	-45.3626	0.96512	-173.978
16500MHz	0.985506	-178.384402	0.197838	18.32706	0.00415	-45.2499	0.965446	-174.01
16600MHz	0.985591	-178.397727	0.195616	18.21056	0.004117	-45.1344	0.965768	-174.043
16700MHz	0.985675	-178.41095	0.19343	18.09533	0.004085	-45.0159	0.966084	-174.075
16800MHz	0.985758	-178.424	0.191281	17.98136	0.004054	-44.8946	0.966396	-174.106
16900MHz	0.98584	-178.437096	0.189167	17.86863	0.004022	-44.7704	0.966703	-174.138
17000MHz	0.98592	-178.450021	0.187088	17.75712	0.003991	-44.6433	0.967005	-174.169
17100MHz	0.985999	-178.46285	0.185043	17.64682	0.003961	-44.5132	0.967303	-174.2
17200MHz	0.986077	-178.475583	0.18303	17.53771	0.00393	-44.3803	0.967596	-174.23
17300MHz	0.986153	-178.488222	0.18105	17.42978	0.0039	-44.2445	0.967884	-174.261
17400MHz	0.986229	-178.500768	0.179102	17.323	0.00387	-44.1057	0.968168	-174.291

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For more information, please contact :

- *For more details : WAVEPIA Co., Ltd.*
- *#1301, 557, Dongtangiheung-ro, Hwaseong-si, Gyeonggi-do, Republic of Korea*
- *Application Support: platune@wavepia.com*

Sanghun Lee
CTO
WAVEPIA, IC DESIGN
+82.31.8058.3374