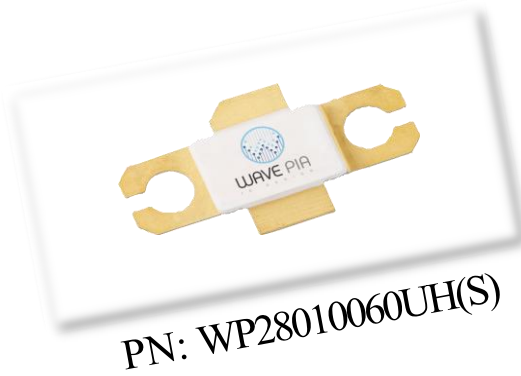




# WP28010060UH(S)

## 60W, 28V GaN HEMT Unmatched TR



The WP28010060UH(S) is a 60W gallium nitride (GaN) High Electron Mobility Transistor (HEMT). This GaN HEMT is a wideband transistor optimized for C-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

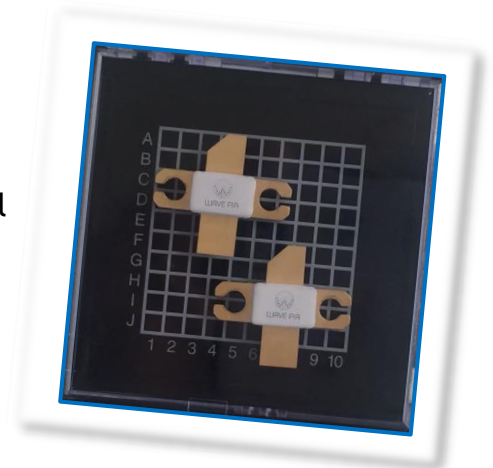
- Up to 10 GHz Operation
- 11.7 dB Typical Small Signal Gain @ 6.0 GHz
- 60 W Typical Psat @6.0GHz
- 28V Operation
- High Breakdown Voltage
- High Breakdown Voltage
- High Efficiency
- Reliability Monitoring Supporting

### Applications

- U/VHF Amplifiers
- C-band Amplifiers
- Broadband Amplifiers
- Base Station Communications
- Drone, UAV
- WiMAX, LTE, WCDMA, GSM
- WPT, V2X
- Radar application

### Packaging Information

- Unmatched TRs are shipped in packaged-level with each-bag or Gel-Pak® containers.
- Possible Reel-type container for SMT



## Absolute Maximum Ratings (not simultaneous) at 25 °C

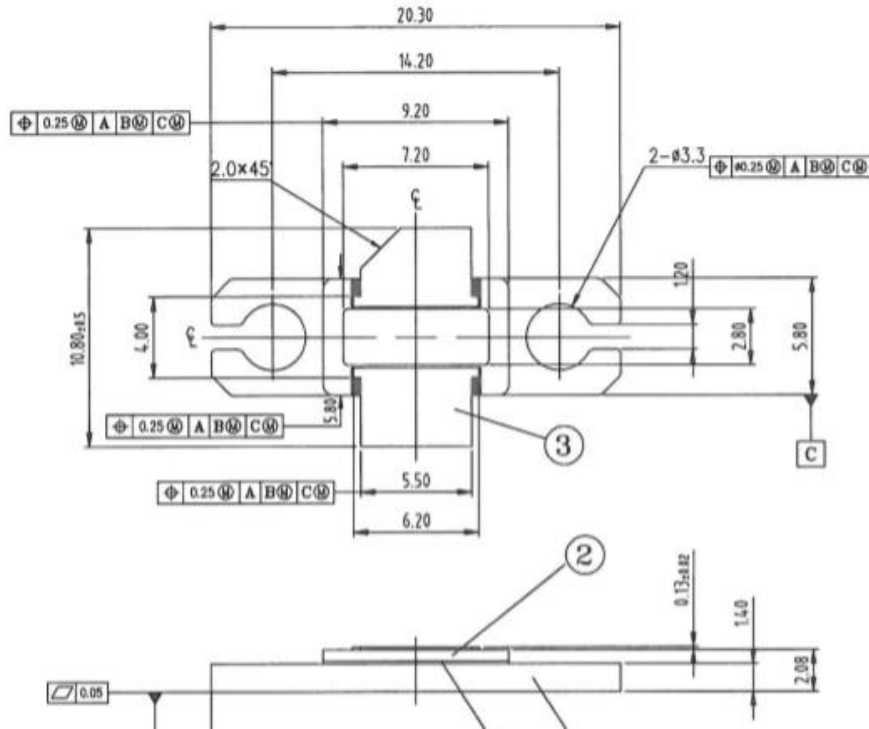
Parameter	Parameter	Typical Value	Units	Conditions
Threshold voltage @ Id=1mA/mm, Vd=10V	V <sub>to</sub>	-3.2	V	25°C
Breakdown voltage @ Id=1mA/mm	V <sub>DG</sub>	>100	V	25°C
Drain-source current, Id @ Vd=10V, Vg=0	I <sub>dss</sub>	880	mA/mm	25°C
Operating Junction Temperature	T <sub>J</sub>	225	°C	
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 = 6.0 GHz unless otherwise stated; TC = 25 °C)

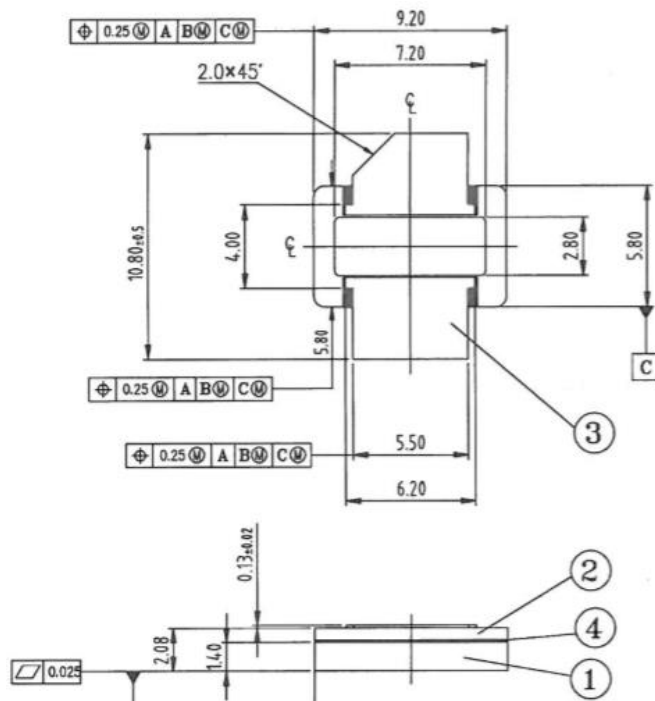
Parameter	Parameter	Typical Value	Units	Conditions
<b>DC Characteristics</b>				
Ohmic contact resistance	RC	0.4	Ohm-mm	25°C
Maximum Drain-source current, Id @ Vd=10V, Vg=1V (1X125µm device)	I <sub>dmax</sub>	1050	mA/mm	25°C
Max. trans-conductance, @ Vd=10V, Vg=-4V ~ -1V (1X125µm device)	GM_PEAK	340	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> =200mA
Saturated Power Output	P <sub>SAT</sub>	60	W	V <sub>DD</sub> =28V, I <sub>DQ</sub> =200mA
Drain Efficiency	η	>40	%	V <sub>DD</sub> =28V, I <sub>DQ</sub> =200mA
Intermodulation Distortion	IM3	<-30	dBc	V <sub>DD</sub> =28V, I <sub>DQ</sub> =200mA
Output Mismatch Stress	VSWR	10:1	ψ	



TR Dimensions (units in inch)



<WP28010060UH>



<WP28010060US>

Assembly Notes:

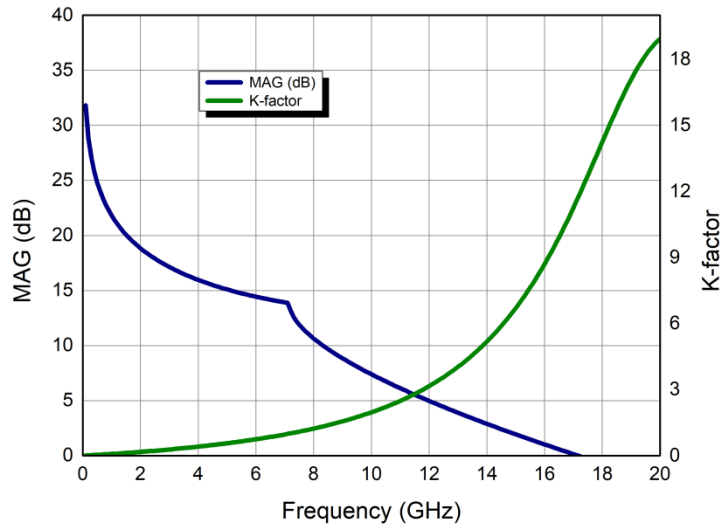
- Recommended solder is AuSn (80/20) solder. Refer to Wavepia's guide for the Eutectic Die Bond Procedure



## Typical Performance

Simulated Maximum Available Gain (MAG) and K Factor of the WP28010060UH(S)

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



Intrinsic TR parameters - reference planes at centers of gate and drain pads. Wire bonds assumed.

## Typical Performance

Simulated Minimum Noise Figure of the WP28010060UH(S)

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

**Under construction**



## Typical TR S-Parameters

(Small Signal,  $V_{DS} = 28\text{ V}$ ,  $I_{DQ} = 200\text{ mA}$ , magnitude / angle)

Frequency	Mag S11	Ang S11	Mag S21	Ang S21	Mag S12	Ang S12	Mag S22	Ang S22
100MHz	0.932782	-140.404	29.46602	106.7955	0.019445	16.84905	0.672061	-152.978
200MHz	0.926948	-160.564	15.37632	94.67919	0.020292	4.917457	0.697873	-166.278
300MHz	0.92581	-168.079	10.32747	88.71194	0.020441	-0.89418	0.704061	-170.93
400MHz	0.925551	-172.218	7.758594	84.38718	0.020472	-5.07059	0.707486	-173.33
500MHz	0.925623	-174.99	6.205618	80.73816	0.020463	-8.57414	0.710413	-174.833
600MHz	0.925879	-177.077	5.165756	77.43791	0.020435	-11.7303	0.713384	-175.901
700MHz	0.92626	-178.777	4.420749	74.34637	0.020396	-14.6786	0.716561	-176.735
800MHz	0.926737	179.7615	3.860738	71.39416	0.020349	-17.488	0.719982	-177.437
900MHz	0.927289	178.4531	3.424454	68.54326	0.020297	-20.1964	0.723643	-178.064
1000MHz	0.927901	177.2474	3.075047	65.77125	0.020241	-22.826	0.727516	-178.652
1100MHz	0.92856	176.1112	2.789032	63.06406	0.020183	-25.3909	0.731568	-179.224
1200MHz	0.929254	175.0222	2.550737	60.41233	0.020125	-27.9004	0.735757	-179.794
1300MHz	0.929973	173.9644	2.349305	57.80952	0.020068	-30.3609	0.740044	179.6261
1400MHz	0.930706	172.9263	2.176974	55.25074	0.020012	-32.7774	0.74439	179.0304
1500MHz	0.931443	171.8988	2.028051	52.73208	0.01996	-35.1537	0.748757	178.4135
1600MHz	0.932176	170.8749	1.898262	50.25028	0.019912	-37.493	0.753109	177.7716
1700MHz	0.932897	169.849	1.784337	47.80238	0.01987	-39.7983	0.757414	177.1022
1800MHz	0.933598	168.8161	1.683731	45.38562	0.019835	-42.0724	0.761644	176.4035
1900MHz	0.934272	167.7724	1.594432	42.9973	0.019808	-44.3179	0.765772	175.6741
2000MHz	0.934912	166.714	1.514828	40.63469	0.01979	-46.5376	0.769774	174.9131
2100MHz	0.935514	165.6376	1.443614	38.29506	0.019781	-48.7341	0.773632	174.1196
2200MHz	0.936072	164.5402	1.37972	35.97555	0.019784	-50.9103	0.777327	173.2929
2300MHz	0.936581	163.4188	1.322262	33.67321	0.019799	-53.0691	0.780844	172.4323
2400MHz	0.937037	162.2703	1.270503	31.38496	0.019827	-55.2136	0.784171	171.5371
2500MHz	0.937435	161.0918	1.223825	29.10761	0.019869	-57.347	0.787296	170.6065
2600MHz	0.937772	159.8804	1.181703	26.8378	0.019927	-59.4727	0.79021	169.6395
2700MHz	0.938045	158.6329	1.143693	24.57201	0.02	-61.5941	0.792905	168.635
2800MHz	0.93825	157.3462	1.109414	22.30658	0.020091	-63.7148	0.795374	167.5917
2900MHz	0.938383	156.0168	1.078542	20.03767	0.020199	-65.8388	0.79761	166.5081
3000MHz	0.938443	154.6412	1.050796	17.76123	0.020327	-67.97	0.799608	165.3824
3100MHz	0.938424	153.2155	1.025935	15.47302	0.020475	-70.1127	0.801363	164.2126
3200MHz	0.938326	151.7357	1.003748	13.1686	0.020645	-72.2713	0.80287	162.9964
3300MHz	0.938143	150.19735	0.984057	10.84325	0.020837	-74.4506	0.804124	161.7312
3400MHz	0.937874	148.5957	0.966705	8.492024	0.021053	-76.6553	0.805121	160.4141
3500MHz	0.937513	146.925526	0.951557	6.109678	0.021294	-78.8908	0.805853	159.0417
3600MHz	0.937059	145.181375	0.938497	3.690658	0.021562	-81.1627	0.806317	157.6104
3700MHz	0.936506	143.357168	0.927424	1.229068	0.021858	-83.4767	0.806505	156.1159
3800MHz	0.935851	141.446339	0.918251	-1.28136	0.022183	-85.8392	0.806411	154.5537
3900MHz	0.93509	139.441752	0.910904	-3.8473	0.022539	-88.2567	0.806027	152.9186



## Typical TR S-Parameters

(Small Signal,  $V_{DS} = 28\text{ V}$ ,  $I_{DQ} = 200\text{ mA}$ , magnitude / angle)

Frequency	Mag S11	Ang S11	Mag S21	Ang S21	Mag S12	Ang S12	Mag S22	Ang S22
4000MHz	0.934219	137.3356	0.905319	-6.47588	0.022927	-90.7365	0.805345	151.2051
4100MHz	0.933233	135.119575	0.901439	-9.1747	0.02335	-93.2861	0.804355	149.4066
4200MHz	0.932127	132.784367	0.899213	-11.9519	0.023808	-95.9136	0.803047	147.5163
4300MHz	0.930897	130.32006	0.898597	-14.8161	0.024304	-98.6277	0.801411	145.5263
4400MHz	0.92954	127.715858	0.899546	-17.7767	0.024838	-101.438	0.799433	143.4282
4500MHz	0.928052	124.960089	0.902016	-20.8436	0.025412	-104.353	0.797102	141.2123
4600MHz	0.92643	122.0402	0.90596	-24.0272	0.026028	-107.385	0.794405	138.8682
4700MHz	0.924672	118.942666	0.911322	-27.339	0.026685	-110.545	0.791329	136.3842
4800MHz	0.922779	115.653187	0.918037	-30.7907	0.027384	-113.844	0.787859	133.7476
4900MHz	0.920753	112.156588	0.926022	-34.3949	0.028125	-117.295	0.783985	130.9443
5000MHz	0.9186	108.43704	0.935171	-38.1648	0.028906	-120.911	0.779697	127.9587
5100MHz	0.916329	104.478258	0.94535	-42.1137	0.029724	-124.705	0.774987	124.7741
5200MHz	0.913955	100.263816	0.956388	-46.2557	0.030576	-128.692	0.769853	121.3721
5300MHz	0.911499	95.7776087	0.968065	-50.6046	0.031456	-132.885	0.764302	117.7329
5400MHz	0.908989	91.0044587	0.980111	-55.1741	0.032354	-137.298	0.758347	113.8355
5500MHz	0.906464	85.930923	0.992187	-59.9769	0.033262	-141.944	0.752019	109.6576
5600MHz	0.903971	80.54629	1.003887	-65.0246	0.034163	-146.833	0.745365	105.1765
5700MHz	0.901568	74.8438	1.014726	-70.327	0.035041	-151.977	0.738457	100.3692
5800MHz	0.899324	68.82198	1.024145	-75.8908	0.035874	-157.382	0.731395	95.21358
6000MHz	0.897317	62.48612	1.031516	-81.7193	0.036638	-163.05	0.724318	89.68971
6100MHz	0.895631	55.84968	1.036157	-87.811	0.037305	-168.98	0.717403	83.78136
6200MHz	0.894354	48.93543	1.037364	-94.1591	0.037846	-175.167	0.710873	77.47821
6300MHz	0.89357	41.77622	1.034443	-100.75	0.038229	178.4047	0.704998	70.77826
6400MHz	0.893352	34.41491	1.026766	-107.565	0.038424	171.7536	0.700084	63.69052
6500MHz	0.893757	26.90358	1.013822	-114.577	0.038407	164.9066	0.696461	56.23751
6600MHz	0.894818	19.3016237	0.99527	-121.752	0.038157	157.8974	0.694464	48.45718
6700MHz	0.896542	11.6731251	0.97099	-129.051	0.037662	150.765	0.694399	40.40357
6800MHz	0.898907	4.0835309	0.941108	-136.43	0.036919	143.5535	0.69651	32.14578
6900MHz	0.901864	-3.40379631	0.906004	-143.842	0.035937	136.3097	0.700946	23.76486
7000MHz	0.905342	-10.7307805	0.866293	-151.24	0.034734	129.082	0.707735	15.34894

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