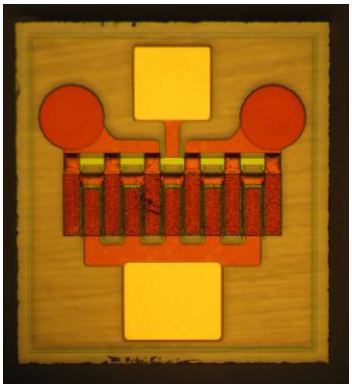
GaN/SiC Bare Die Power HEMT

DC-15 GHz

AM012WN-00-R
Sep 2014
Rev 0

DESCRIPTION

AMCOM's AM012WN-00-R is a discrete GaN/SiC HEMT that has a total gate width of 1.25mm. It is a bare die which can be operated up to 15 GHz. It can provide a typically saturated power of 37.7 dBm. This part is RoHS compliant.



FEATURES

- High Frequency Operation up to 15GHz
- Gain=22dB at 2GHz
- PAE=55%
- P_{5dB}=37.7dBm

APPLICATIONS

- Cellular Radio Base Stations
- WLAN, Repeaters
- C-Band VSAT
- Radar
- Test Instrumentation
- Military

TYPICAL RF PERFORMANCE (CW)

FREQUENCY	2 (GHz)	10 (GHz)
P_{5dB} (dBm)	37.7	37.3
PAE @ P_{5dB}	55%	44%
Small Signal Gain (dB)	22	13
Load Reflection Coeff.	0.19∠101°	0.61∠141°

*(V_{ds} =28V, I_{ds} = 188mA)

**Bond wires are not included and the reference line is 75 microns from the edge of the bonding pads towards the device.

ABSOLUTE MAXIMUM RATING

Parameters	Symbol	Rating
Drain-Source Voltage (V)	V_{ds}	40
Gate-Source Voltage (V)	V_{gs}	-6
Drain Current (mA)	I_{ds}	500
Continuous Dissipation At Room Temp. (W)	P_t	20.7
Operating Temp. (^oC)	T_A	-55 to +85
Max. Channel Temp. (^oC)	T_{ch}	+200

DC PARAMETERS

Parameters	Conditions	MIN	TYP	MAX
Saturation Current I_{dss} (mA)	V_{ds}=10V, V_{gs} =0V	625	1000	1425
Pinch-off Voltage V_p (V)	V_{ds}=10V, I_{ds} =2.5% I_{dss}	-3.9	-2.9	-1.9
Drain to Gate Breakdown Voltage BV_{gd} (V)	I_{dg} = 1 mA/mm	90	120	-
Thermal Resistance ($^oC/W$)		-	8.46	-

E-mail: info@amcomusa.com
http://www.amcomusa.com
Tel. (301) 353-8400 Fax. (301) 353-8401
401 Professional Drive, Gaithersburg, MD 20879

AMCOM Communications, Inc.

SMALL SIGNAL MEASUREMENTS *

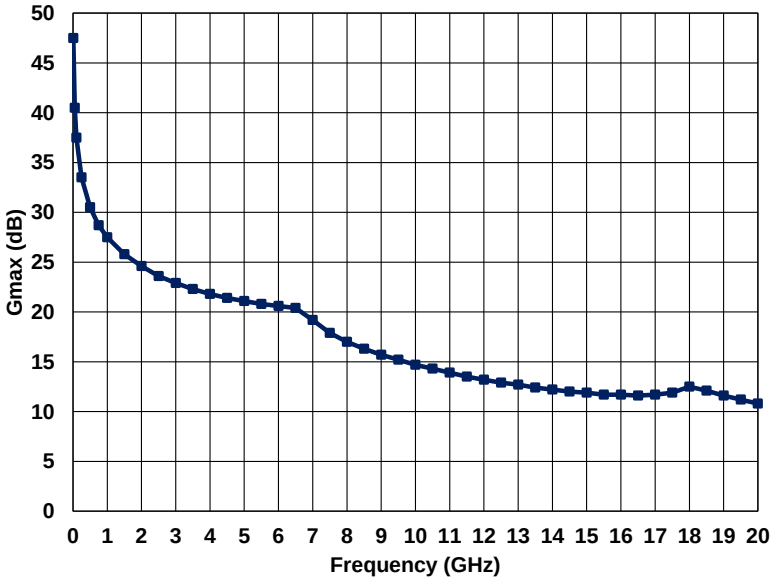
S-Parameters for AM012WN-00-R. V_{ds} =28V, V_{gs} = -2.35V, I_{ds} = 188mA*

Freq(GHz)	MAG(S11)	ANG(S11)	MAG(S21)	ANG(S21)	MAG(S12)	ANG(S12)	MAG(S22)	ANG(S22)
0.01	1	-0.919	20.443	176.21	0	88.057	0.493	-4.554
0.1	0.997	-9.168	20.305	172.31	0.004	84.497	0.488	-7.147
0.5	0.962	-43.614	18.553	150.84	0.017	64.664	0.461	-32.144
1	0.906	-77.276	15.119	129.86	0.027	45.763	0.416	-56.733
1.5	0.866	-100.48	12.095	115.01	0.032	33.023	0.388	-73.678
2	0.843	-116.37	9.837	104.11	0.034	24.28	0.376	-85.29
2.5	0.83	-127.64	8.183	95.596	0.035	17.98	0.377	-93.533
3	0.824	-135.97	6.949	88.558	0.035	13.238	0.386	-99.684
3.5	0.821	-142.38	6.001	82.489	0.035	9.564	0.4	-104.52
4	0.82	-147.48	5.254	77.093	0.034	6.686	0.418	-108.52
4.5	0.821	-151.67	4.651	72.188	0.033	4.448	0.437	-111.96
5	0.823	-155.21	4.156	67.658	0.032	2.767	0.457	-115.02
5.5	0.825	-158.26	3.742	63.428	0.031	1.602	0.477	-117.81
6	0.828	-160.95	3.39	59.445	0.03	0.946	0.497	-120.39
6.5	0.832	-163.37	3.089	55.67	0.028	0.811	0.518	-122.81
7	0.835	-165.56	2.828	52.079	0.027	1.229	0.537	-125.1
7.5	0.839	-167.59	2.599	48.648	0.025	2.244	0.556	-127.28
8	0.843	-169.48	2.398	45.364	0.024	3.911	0.575	-129.36
8.5	0.846	-171.27	2.219	42.212	0.023	6.283	0.592	-131.36
9	0.85	-172.96	2.06	39.183	0.021	9.405	0.609	-133.27
9.5	0.853	-174.58	1.918	36.268	0.02	13.289	0.625	-135.12
10	0.857	-176.14	1.789	33.459	0.02	17.895	0.64	-136.89
10.5	0.86	-177.65	1.673	30.75	0.019	23.107	0.654	-138.61
11	0.863	-179.12	1.568	28.136	0.019	28.726	0.668	-140.26
11.5	0.866	179.45	1.472	25.61	0.019	34.49	0.68	-141.86
12	0.869	178.05	1.385	23.169	0.02	40.121	0.692	-143.4
12.5	0.872	176.68	1.305	20.808	0.02	45.381	0.704	-144.89
13	0.874	175.32	1.232	18.524	0.022	50.108	0.714	-146.34
13.5	0.876	173.99	1.164	16.313	0.023	54.223	0.724	-147.74
14	0.879	172.67	1.102	14.172	0.024	57.714	0.733	-149.09
14.5	0.881	171.37	1.045	12.099	0.026	60.618	0.742	-150.41
15	0.882	170.07	0.991	10.09	0.028	62.991	0.75	-151.69
15.5	0.884	168.79	0.942	8.143	0.03	64.901	0.758	-152.93
16	0.886	167.51	0.896	6.256	0.032	66.413	0.765	-154.14
16.5	0.887	166.23	0.853	4.426	0.035	67.586	0.772	-155.31
17	0.888	164.96	0.814	2.653	0.037	68.471	0.779	-156.46
17.5	0.889	163.69	0.776	0.934	0.039	69.113	0.785	-157.58
18	0.89	162.42	0.742	-0.732	0.042	69.55	0.79	-158.66
18.5	0.891	161.15	0.709	-2.347	0.044	69.812	0.796	-159.73
19	0.892	159.88	0.678	-3.912	0.047	69.925	0.801	-160.77
19.5	0.892	158.61	0.65	-5.427	0.049	69.911	0.805	-161.78
20	0.892	157.33	0.623	-6.895	0.052	69.788	0.81	-162.78

*Notes:

1) Bond wires are not included and the reference line is 75 microns from the edge of the bonding pads towards the device.
2) S2P file downloadable from the web : http://www.amcomusa.com/products/rftrans.html

MAXIMUM AVAILABLE GAIN (Gmax) 28V/188 mA



POWER DATA (CW)

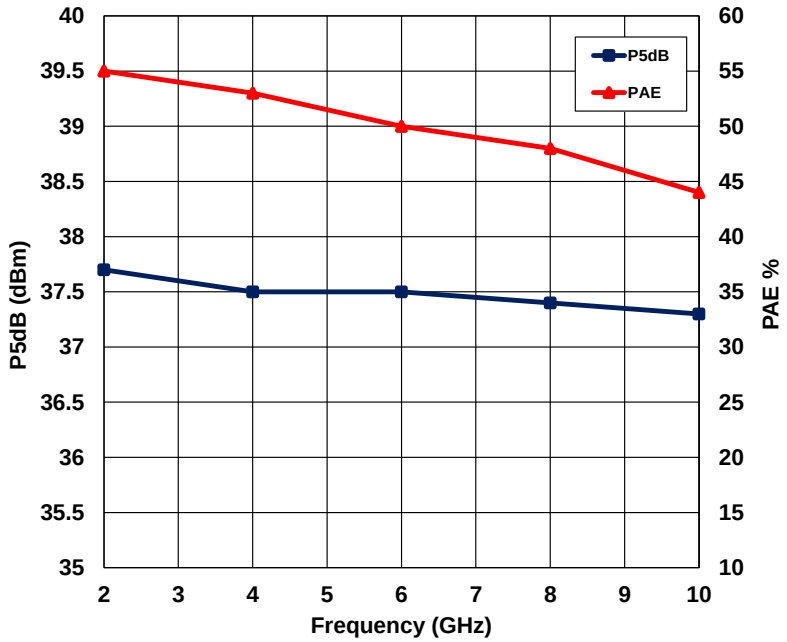
1) Optimum P_{SAT} tune (V_{ds} =28V, I_{ds} = 188mA) *

Frequency	SOURCE Γ	LOAD Γ	Gain (dB)	P_{1dB} (dBm)	P_{5dB} (dBm)	PAE @ P_{5dB}
2 GHz	0.8∠101°	0.19∠101°	22	36.1	37.7	55%
4 GHz	0.8∠131°	0.36∠113°	19	35	37.5	53%
6 GHz	0.81∠141°	0.44∠125°	15.5	34.5	37.5	50%
8 GHz	0.8∠165°	0.54∠138°	15	34.2	37.4	48%
10 GHz	0.75∠170°	0.61∠141°	13	33.2	37.3	44%

*Notes:

1) Source tuning has effect on P_{1dB} & small signal gain, and the source points in this table is a compromise between high gain and high P_{1dB} at that frequency.
2) Bond wires are not included and the reference line is 75 microns from the edge of the bonding pads towards the device.

Optimum P_{SAT} tune (28V/ 188 mA)



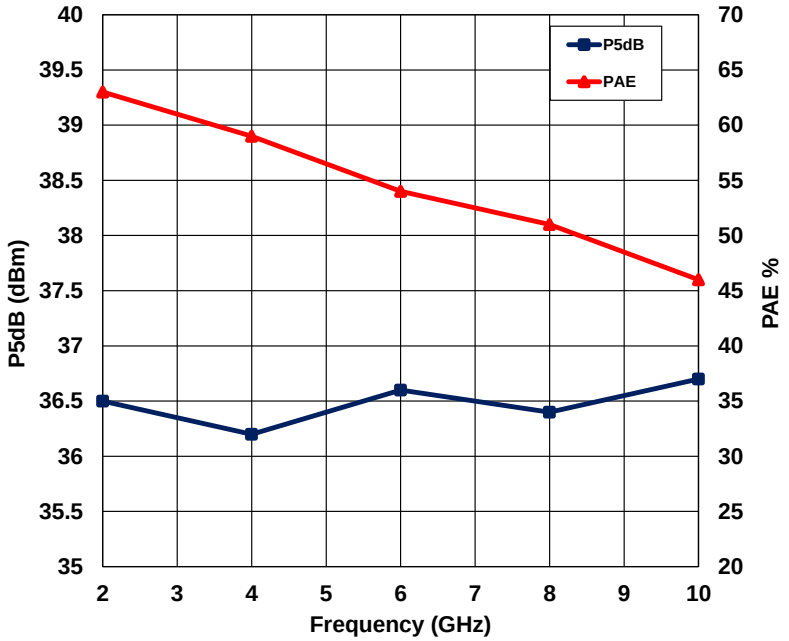
2) Optimum PAE tune (V_{ds} =28V, I_{ds} = 188mA) *

Frequency	SOURCE Γ	LOAD Γ	Gain (dB)	P_{1dB} (dBm)	P_{5dB} (dBm)	PAE @ P_{5dB}
2 GHz	0.8∠101°	0.54∠67°	23	35.3	36.5	63%
4 GHz	0.8∠131°	0.63∠92°	18	34	36.2	59%
6 GHz	0.81∠141°	0.65∠108°	15	33.9	36.6	54%
8 GHz	0.8∠165°	0.7∠131°	15	33.5	36.4	51%
10 GHz	0.75∠170°	0.72∠134°	13	33.2	36.7	46%

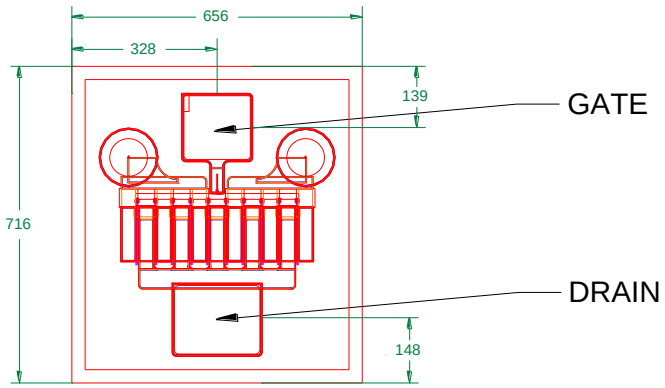
*Notes:

1) Source tuning has effect on P_{1dB} & small signal gain, and the source points in this table is a compromise between high gain and high P_{1dB} at that frequency.
2) Bond wires are not included and the reference line is 75 microns from the edge of the bonding pads towards the device.

Optimum PAE tune (28V/ 188 mA)



CHIP OUTLINE



Notes:
1- 1.25 mm GaN HEMT
2- Chip is 100 µm thick
3- Dimensions in microns
4- Use eutectic bonding Au85Sn15 at 290°C