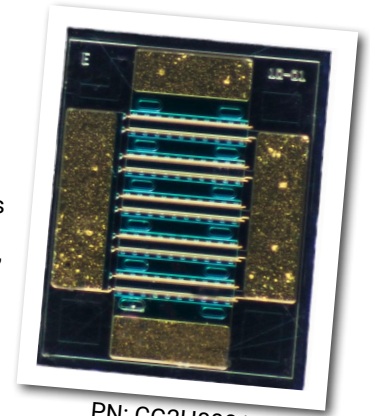


# CG2H80015D

15 W, 8.0 GHz, GaN HEMT Die

Cree's CG2H80015D is a gallium nitride (GaN) High Electron Mobility Transistor (HEMT). GaN has superior properties compared to silicon or gallium arsenide, including higher breakdown voltage, higher saturated electron drift velocity, and higher thermal conductivity. GaN HEMTs offer greater power density and wider bandwidths compared to Si and GaAs transistors.



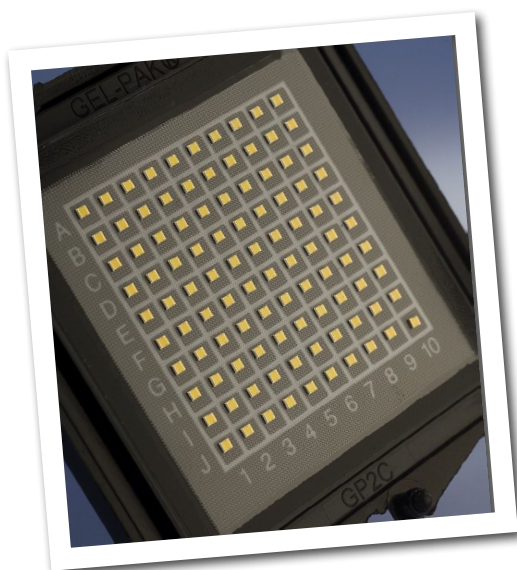
PN: CG2H80015D

## FEATURES

- 17 dB Typical Small Signal Gain at 4 GHz
- 12 dB Typical Small Signal Gain at 8 GHz
- 15 W Typical  $P_{SAT}$
- 28 V Operation
- High Breakdown Voltage
- High Temperature Operation
- Up to 8 GHz Operation
- High Efficiency

## APPLICATIONS

- 2-Way Private Radio
- Broadband Amplifiers
- Cellular Infrastructure
- Test Instrumentation
- Class A, AB, Linear amplifiers suitable for OFDM, W-CDMA, EDGE, CDMA waveforms



## Packaging Information



- Bare die are shipped in Gel-Pak® containers.
- Non-adhesive tacky membrane immobilizes die during shipment.

Large Signal Models Available for ADS and MWO



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

Parameter	Symbol	Rating	Units	Conditions
Drain-source Voltage	$V_{DS}$	120	VDC	25°C
Gate-source Voltage	$V_{GS}$	-10, +2	VDC	25°C
Storage Temperature	$T_{STG}$	-65, +150	°C	
Operating Junction Temperature	$T_J$	225	°C	
Maximum Forward Gate Current	$I_{GMAX}$	4.0	mA	25°C
Maximum Drain Current <sup>1</sup>	$I_{DMAX}$	1.5	A	25°C
Thermal Resistance, Junction to Case (packaged) <sup>2</sup>	$R_{\theta JC}$	8.0	°C/W	
Thermal Resistance, Junction to Case (die only)	$R_{\theta JC}$	5.1	°C/W	85°C
Mounting Temperature (30 seconds)	$T_S$	320	°C	30 seconds

Note<sup>1</sup> Current limit for long term, reliable operation

Note<sup>2</sup> Eutectic die attach using 80/20 AuSn mounted to a 40 mil thick CuMoCu carrier.

## Electrical Characteristics (Frequency = 4 GHz unless otherwise stated; $T_C = 25^\circ\text{C}$ )

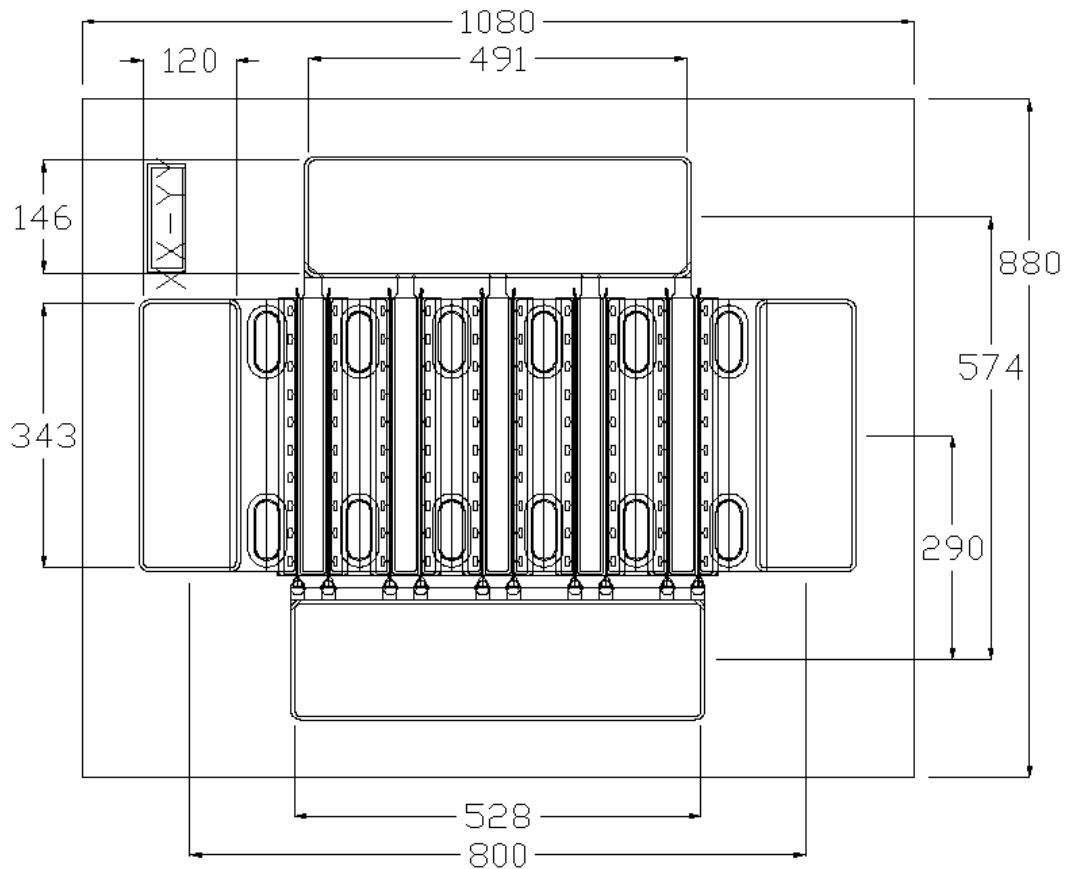
Characteristics	Symbol	Min.	Typ.	Max.	Units	Conditions
<b>DC Characteristics</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	-3.8	-3.0	-2.3	V	$V_{DS} = 10\text{ V}, I_D = 3.6\text{ mA}$
Gate Quiescent Voltage	$V_{GS(Q)}$	-	-2.7	-	V <sub>DC</sub>	$V_{DD} = 28\text{ V}, I_{DQ} = 100\text{ mA}$
Drain Current	$I_{DS}$	2.9	3.5	-	A	$V_{DS} = 6.0\text{ V}, V_{GS} = 2.0\text{ V}$
Drain-Source Breakdown Voltage	$V_{BD}$	120	-	-	V	$V_{GS} = -8\text{ V}, I_D = 3.6\text{ mA}$
On Resistance	$R_{ON}$	-	0.67	-	Ω	$V_{DS} = 0.1\text{ V}$
Gate Forward Voltage	$V_{G-ON}$	-	1.9	-	V	$I_{GS} = 3.6\text{ mA}$
<b>RF Characteristics</b>						
Small Signal Gain	$G_{SS}$	-	17	-	dB	$V_{DD} = 28\text{ V}, I_{DQ} = 100\text{ mA}$
Saturated Power Output <sup>1</sup>	$P_{SAT}$	-	15	-	W	$V_{DD} = 28\text{ V}, I_{DQ} = 100\text{ mA}$
Drain Efficiency <sup>2</sup>	$\eta$	-	65	-	%	$V_{DD} = 28\text{ V}, I_{DQ} = 100\text{ mA}, P_{SAT} = 15\text{ W}$
Intermodulation Distortion	IM3	-	-30	-	dBc	$V_{DD} = 28\text{ V}, I_{DQ} = 100\text{ mA}, P_{OUT} = 15\text{ W PEP}$
Output Mismatch Stress	VSWR	-	-	10 : 1	Ψ	No damage at all phase angles, $V_{DD} = 28\text{ V}, I_{DQ} = 100\text{ mA}, P_{OUT} = 15\text{ W CW}$
<b>Dynamic Characteristics</b>						
Input Capacitance	$C_{GS}$	-	3.7	-	pF	$V_{DS} = 28\text{ V}, V_{GS} = -8\text{ V}, f = 1\text{ MHz}$
Output Capacitance	$C_{DS}$	-	1.1	-	pF	$V_{DS} = 28\text{ V}, V_{GS} = -8\text{ V}, f = 1\text{ MHz}$
Feedback Capacitance	$C_{GD}$	-	0.2	-	pF	$V_{DS} = 28\text{ V}, V_{GS} = -8\text{ V}, f = 1\text{ MHz}$

Notes:

<sup>1</sup>  $P_{SAT}$  is defined as  $I_G = 0.4\text{ mA}$ .

<sup>2</sup> Drain Efficiency =  $P_{OUT} / P_{DC}$

## DIE DIMENSIONS (units in microns)



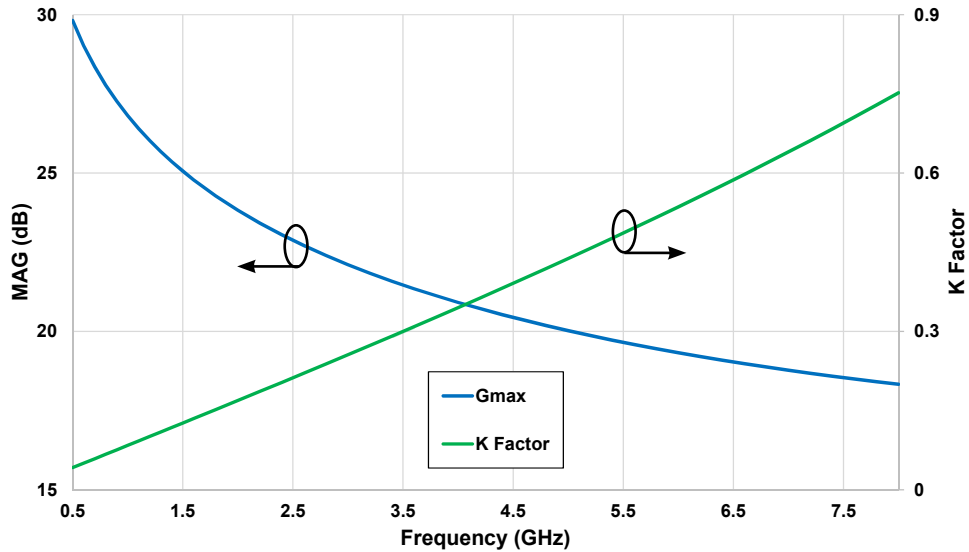
Overall die size 1080 x 880 (+0/-50) microns, die thickness 100 (+/- 10) microns.  
All Gate and Drain pads must be wire bonded for electrical connection.

### Assembly Notes:

- Recommended solder is AuSn (80/20) solder. Refer to Cree's website for the Eutectic Die Bond Procedure application note at [http://www.cree.com/products/wireless\\_documents.asp](http://www.cree.com/products/wireless_documents.asp)
- 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.
- Use the die label (XX-YY) for correct orientation.

## Typical Performance

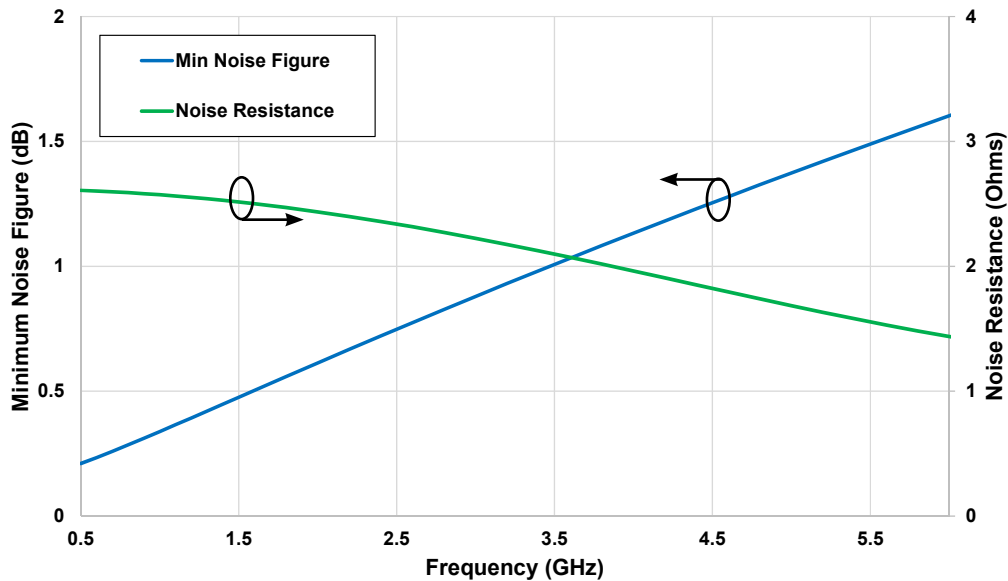
**Figure 1. - Simulated Maximum Available Gain and K Factor of the CG2H80015D**  
 $V_{DD} = 28\text{ V}, I_{DQ} = 200\text{ mA}$



Intrinsic die parameters - reference planes at centers of gate and drain bonding pads. No wire bonds assumed.

## Typical Noise Performance

**Figure 2. - Simulated Minimum Noise Figure and Noise Resistance vs Frequency of the CG2H80015D**  
 $V_{DD} = 28\text{ V}, I_{DQ} = 200\text{ mA}$



Typical Die S-Parameters (Small Signal,  $V_{DS} = 28\text{ V}$ ,  $I_{DQ} = 100\text{ mA}$ , magnitude / angle)

Frequency	Mag S11	Ang S11	Mag S21	Ang S21	Mag S12	Ang S12	Mag S22	Ang S22
0.5	0.909	-110.59	21.66	117.76	0.030	28.48	0.437	-96.69
0.6	0.900	-120.05	18.90	112.17	0.031	23.04	0.426	-105.26
0.7	0.893	-127.43	16.69	107.63	0.032	18.63	0.419	-111.87
0.8	0.889	-133.31	14.89	103.82	0.033	14.98	0.414	-117.03
0.9	0.885	-138.08	13.41	100.56	0.033	11.86	0.412	-121.10
1.0	0.883	-142.02	12.18	97.71	0.034	9.15	0.412	-124.36
1.1	0.881	-145.32	11.15	95.16	0.034	6.75	0.413	-126.99
1.2	0.880	-148.13	10.26	92.86	0.034	4.59	0.415	-129.14
1.3	0.879	-150.55	9.50	90.74	0.034	2.62	0.418	-130.90
1.4	0.879	-152.65	8.83	88.79	0.034	0.80	0.421	-132.37
1.5	0.879	-154.49	8.25	86.95	0.034	-0.89	0.425	-133.61
1.6	0.878	-156.12	7.73	85.23	0.034	-2.47	0.430	-134.65
1.8	0.879	-158.88	6.86	82.02	0.034	-5.38	0.440	-136.33
2.0	0.879	-161.14	6.15	79.08	0.034	-8.03	0.451	-137.62
2.2	0.880	-163.03	5.57	76.35	0.034	-10.48	0.463	-138.66
2.4	0.881	-164.63	5.07	73.77	0.033	-12.77	0.476	-139.54
2.6	0.883	-166.03	4.65	71.32	0.033	-14.93	0.489	-140.32
2.8	0.884	-167.26	4.28	68.98	0.033	-16.98	0.502	-141.04
3.0	0.886	-168.35	3.97	66.73	0.032	-18.94	0.516	-141.72
3.2	0.887	-169.34	3.69	64.57	0.032	-20.81	0.530	-142.39
3.4	0.889	-170.24	3.44	62.48	0.032	-22.61	0.543	-143.05
3.6	0.891	-171.07	3.21	60.45	0.031	-24.34	0.556	-143.71
3.8	0.893	-171.84	3.01	58.49	0.031	-26.01	0.570	-144.37
4.0	0.895	-172.57	2.83	56.59	0.030	-27.62	0.583	-145.03
4.2	0.896	-173.25	2.67	54.74	0.030	-29.17	0.595	-145.70
4.4	0.898	-173.90	2.52	52.94	0.030	-30.68	0.608	-146.37
4.6	0.900	-174.51	2.38	51.18	0.029	-32.14	0.620	-147.05
4.8	0.902	-175.11	2.26	49.48	0.029	-33.55	0.632	-147.73
5.0	0.904	-175.68	2.14	47.81	0.028	-34.91	0.643	-148.41
5.2	0.905	-176.23	2.04	46.19	0.028	-36.24	0.654	-149.09
5.4	0.907	-176.76	1.94	44.60	0.027	-37.52	0.665	-149.77
5.6	0.909	-177.28	1.85	43.06	0.027	-38.77	0.675	-150.45
5.8	0.910	-177.79	1.76	41.54	0.027	-39.98	0.685	-151.13
6.0	0.912	-178.29	1.68	40.07	0.026	-41.15	0.695	-151.81
6.2	0.914	-178.77	1.61	38.63	0.026	-42.29	0.704	-152.48
6.4	0.915	-179.25	1.54	37.21	0.025	-43.40	0.713	-153.14
6.6	0.917	-179.72	1.48	35.83	0.025	-44.47	0.722	-153.80
6.8	0.918	-179.82	1.42	34.48	0.024	-45.52	0.730	-154.46
7.0	0.919	-179.36	1.36	33.16	0.024	-46.53	0.738	-155.11
7.2	0.921	-178.91	1.31	31.87	0.024	-47.51	0.745	-155.75
7.4	0.922	-178.46	1.26	30.60	0.023	-48.47	0.753	-156.38
7.6	0.923	-178.02	1.21	29.36	0.023	-49.40	0.760	-157.01
7.8	0.925	-177.58	1.17	28.14	0.022	-50.30	0.767	-157.63
8.0	0.926	-177.15	1.12	26.94	0.022	-51.18	0.773	-158.24

Typical Die 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
0.5	0.914	-119.76	23.66	114.12	0.025	24.92	0.414	-115.65
0.6	0.908	-128.48	20.44	109.01	0.026	19.96	0.414	-123.32
0.7	0.903	-135.16	17.92	104.91	0.026	16.02	0.414	-128.96
0.8	0.900	-140.41	15.92	101.51	0.027	12.78	0.415	-133.20
0.9	0.898	-144.63	14.29	98.61	0.027	10.04	0.417	-136.45
1.0	0.896	-148.09	12.95	96.08	0.027	7.66	0.419	-138.97
1.1	0.895	-150.98	11.83	93.82	0.027	5.56	0.422	-140.95
1.2	0.894	-153.43	10.87	91.77	0.027	3.68	0.425	-142.52
1.3	0.894	-155.54	10.06	89.90	0.027	1.96	0.428	-143.78
1.4	0.893	-157.37	9.35	88.16	0.027	0.38	0.432	-144.79
1.5	0.893	-158.97	8.73	86.52	0.027	-1.09	0.436	-145.61
1.6	0.893	-160.39	8.18	84.98	0.027	-2.47	0.440	-146.29
1.8	0.893	-162.80	7.26	82.12	0.027	-5.02	0.448	-147.30
2.0	0.894	-164.77	6.51	79.48	0.027	-7.34	0.458	-148.00
2.2	0.894	-166.42	5.90	77.01	0.027	-9.49	0.468	-148.51
2.4	0.895	-167.84	5.38	74.67	0.027	-11.51	0.478	-148.89
2.6	0.896	-169.07	4.94	72.45	0.026	-13.41	0.489	-149.21
2.8	0.897	-170.15	4.56	70.31	0.026	-15.23	0.500	-149.49
3.0	0.898	-171.13	4.23	68.25	0.026	-16.97	0.511	-149.76
3.2	0.899	-172.01	3.93	66.25	0.026	-18.64	0.523	-150.03
3.4	0.900	-172.81	3.68	64.32	0.026	-20.24	0.534	-150.30
3.6	0.902	-173.55	3.44	62.44	0.025	-21.80	0.545	-150.59
3.8	0.903	-174.25	3.24	60.62	0.025	-23.30	0.557	-150.90
4.0	0.904	-174.90	3.05	58.83	0.025	-24.75	0.568	-151.23
4.2	0.906	-175.51	2.88	57.09	0.024	-26.16	0.579	-151.57
4.4	0.907	-176.09	2.72	55.40	0.024	-27.53	0.590	-151.94
4.6	0.908	-176.65	2.58	53.74	0.024	-28.86	0.601	-152.33
4.8	0.910	-177.19	2.45	52.11	0.023	-30.15	0.612	-152.73
5.0	0.911	-177.71	2.33	50.53	0.023	-31.40	0.622	-153.15
5.2	0.912	-178.21	2.22	48.97	0.023	-32.62	0.632	-153.59
5.4	0.913	-178.69	2.11	47.45	0.023	-33.81	0.642	-154.03
5.6	0.915	-179.17	2.02	45.96	0.022	-34.96	0.652	-154.49
5.8	0.916	-179.63	1.93	44.50	0.022	-36.08	0.661	-154.96
6.0	0.917	-179.92	1.85	43.07	0.022	-37.17	0.670	-155.43
6.2	0.918	-179.47	1.77	41.67	0.021	-38.22	0.679	-155.92
6.4	0.920	-179.03	1.70	40.29	0.021	-39.25	0.688	-156.41
6.6	0.921	-178.60	1.63	38.94	0.021	-40.25	0.696	-156.90
6.8	0.922	-178.17	1.56	37.62	0.020	-41.22	0.704	-157.39
7.0	0.923	-177.75	1.50	36.32	0.020	-42.17	0.712	-157.89
7.2	0.924	-177.33	1.45	35.04	0.020	-43.09	0.720	-158.39
7.4	0.925	-176.92	1.39	33.79	0.019	-43.98	0.727	-158.90
7.6	0.926	-176.51	1.34	32.56	0.019	-44.85	0.734	-159.40
7.8	0.927	-176.10	1.30	31.35	0.019	-45.69	0.741	-159.90
8.0	0.928	-175.69	1.25	30.16	0.018	-46.51	0.747	-160.40

Typical Die S-Parameters (Small Signal,  $V_{DS} = 28\text{ V}$ ,  $I_{DQ} = 500\text{ mA}$ , magnitude / angle)

Frequency	Mag S11	Ang S11	Mag S21	Ang S21	Mag S12	Ang S12	Mag S22	Ang S22
0.5	0.925	-129.48	24.00	109.96	0.020	20.87	0.401	-131.97
0.6	0.920	-137.20	20.52	105.38	0.020	16.47	0.406	-137.90
0.7	0.918	-143.01	17.88	101.74	0.021	13.01	0.411	-142.09
0.8	0.916	-147.53	15.81	98.73	0.021	10.18	0.414	-145.14
0.9	0.914	-151.13	14.15	96.16	0.021	7.79	0.418	-147.40
1.0	0.914	-154.07	12.79	93.91	0.021	5.73	0.421	-149.10
1.1	0.913	-156.52	11.66	91.90	0.021	3.90	0.424	-150.39
1.2	0.913	-158.60	10.71	90.08	0.021	2.26	0.428	-151.38
1.3	0.912	-160.38	9.89	88.39	0.021	0.76	0.431	-152.14
1.4	0.912	-161.93	9.19	86.83	0.021	-0.63	0.435	-152.72
1.5	0.912	-163.29	8.58	85.35	0.021	-1.92	0.439	-153.16
1.6	0.912	-164.49	8.04	83.95	0.021	-3.14	0.443	-153.50
1.8	0.912	-166.54	7.13	81.34	0.021	-5.38	0.451	-153.93
2.0	0.913	-168.23	6.40	78.92	0.021	-7.44	0.459	-154.16
2.2	0.913	-169.65	5.79	76.63	0.021	-9.36	0.468	-154.27
2.4	0.914	-170.87	5.29	74.46	0.021	-11.16	0.478	-154.31
2.6	0.914	-171.94	4.85	72.38	0.021	-12.87	0.488	-154.32
2.8	0.915	-172.89	4.48	70.38	0.020	-14.50	0.498	-154.32
3.0	0.916	-173.74	4.16	68.44	0.020	-16.07	0.508	-154.33
3.2	0.916	-174.52	3.87	66.56	0.020	-17.58	0.519	-154.36
3.4	0.917	-175.24	3.62	64.72	0.020	-19.03	0.529	-154.41
3.6	0.918	-175.91	3.39	62.94	0.020	-20.44	0.540	-154.49
3.8	0.919	-176.53	3.19	61.19	0.019	-21.80	0.550	-154.60
4.0	0.920	-177.12	3.01	59.49	0.019	-23.12	0.561	-154.75
4.2	0.921	-177.68	2.84	57.82	0.019	-24.41	0.571	-154.92
4.4	0.922	-178.21	2.69	56.19	0.019	-25.65	0.582	-155.12
4.6	0.923	-178.72	2.55	54.59	0.018	-26.86	0.592	-155.35
4.8	0.923	-179.21	2.43	53.03	0.018	-28.04	0.602	-155.61
5.0	0.924	-179.69	2.31	51.49	0.018	-29.18	0.612	-155.89
5.2	0.925	-179.85	2.20	49.99	0.018	-30.29	0.622	-156.19
5.4	0.926	-179.40	2.10	48.51	0.018	-31.37	0.631	-156.51
5.6	0.927	-178.96	2.01	47.06	0.017	-32.41	0.640	-156.85
5.8	0.928	-178.53	1.92	45.64	0.017	-33.43	0.649	-157.21
6.0	0.929	-178.10	1.84	44.24	0.017	-34.42	0.658	-157.57
6.2	0.930	-177.69	1.76	42.87	0.017	-35.37	0.667	-157.96
6.4	0.931	-177.28	1.69	41.52	0.016	-36.30	0.675	-158.35
6.6	0.931	-176.87	1.63	40.20	0.016	-37.21	0.683	-158.75
6.8	0.932	-176.47	1.56	38.90	0.016	-38.08	0.691	-159.16
7.0	0.933	-176.07	1.50	37.62	0.015	-38.93	0.699	-159.58
7.2	0.934	-175.68	1.45	36.36	0.015	-39.75	0.707	-160.00
7.4	0.934	-175.29	1.40	35.13	0.015	-40.54	0.714	-160.43
7.6	0.935	-174.90	1.35	33.91	0.015	-41.31	0.721	-160.86
7.8	0.936	-174.51	1.30	32.72	0.014	-42.05	0.728	-161.30
8.0	0.937	-174.13	1.26	31.54	0.014	-42.77	0.734	-161.73



## Product Ordering Information

Order Number	Description	Unit of Measure
CG2H80015D	GaN HEMT Bare Die	Each





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For more information, please contact:

Cree, Inc.  
4600 Silicon Drive  
Durham, North Carolina, USA 27703  
[www.cree.com/RF](http://www.cree.com/RF)

Sarah Miller  
Marketing  
Cree, RF Components  
1.919.407.5302

Ryan Baker  
Marketing & Sales  
Cree, RF Components  
1.919.407.7816

Tom Dekker  
Sales Director  
Cree, RF Components  
1.919.407.5639

Компания «Life Electronics» занимается поставками электронных компонентов импортного и отечественного производства от производителей и со складов крупных дистрибьюторов Европы, Америки и Азии.

С конца 2013 года компания активно расширяет линейку поставок компонентов по направлению коаксиальный кабель, кварцевые генераторы и конденсаторы (керамические, пленочные, электролитические), за счёт заключения дистрибьюторских договоров

Мы предлагаем:

- Конкурентоспособные цены и скидки постоянным клиентам.
- Специальные условия для постоянных клиентов.
- Подбор аналогов.
- Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.
- Приемлемые сроки поставки, возможна ускоренная поставка.
- Доставку товара в любую точку России и стран СНГ.
- Комплексную поставку.
- Работу по проектам и поставку образцов.
- Формирование склада под заказчика.
- Сертификаты соответствия на поставляемую продукцию (по желанию клиента).
- Тестирование поставляемой продукции.
- Поставку компонентов, требующих военную и космическую приемку.
- Входной контроль качества.
- Наличие сертификата ISO.

В составе нашей компании организован Конструкторский отдел, призванный помогать разработчикам, и инженерам.

Конструкторский отдел помогает осуществить:

- Регистрацию проекта у производителя компонентов.
- Техническую поддержку проекта.
- Защиту от снятия компонента с производства.
- Оценку стоимости проекта по компонентам.
- Изготовление тестовой платы монтаж и пусконаладочные работы.



Тел: +7 (812) 336 43 04 (многоканальный)  
Email: [org@lifeelectronics.ru](mailto:org@lifeelectronics.ru)