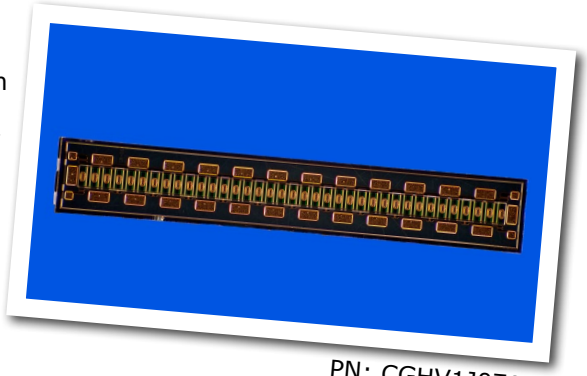
CGHV1J070D

70 W, 18.0 GHz, GaN HEMT Die

Cree's CGHV1J070D is a high voltage gallium nitride (GaN) High Electron Mobility Transistor (HEMT) on a silicon carbide substrate, using a 0.25 µm gate length fabrication process. This GaN-on-SiC product offers superior high frequency, high efficiency features. It is ideal for a variety of applications operating from 10 MHz to 18 GHz at 40 V with a high breakdown voltage.



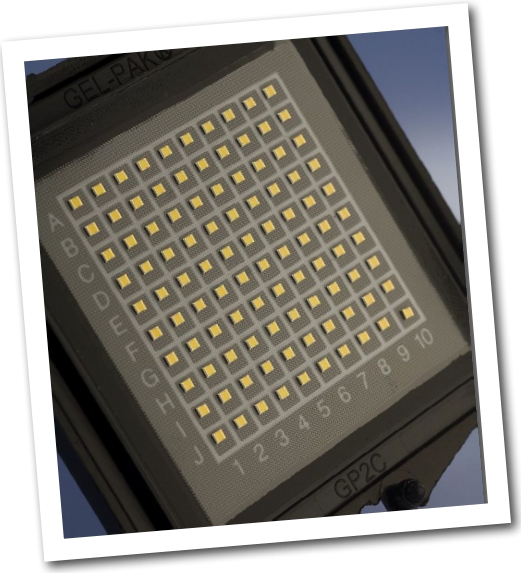
PN: CGHV1J070D

FEATURES

- 17 dB Typ. Small Signal Gain at 10 GHz
- 60% Typ. PAE at 10 GHz
- 70 W Typical Psat
- 40 V Operation
- Up to 18GHz Operation

APPLICATIONS

- Satellite Communications
- PTP Communications Links
- Marine Radar
- Pleasure Craft Radar
- Port Vessel Traffic Services
- Broadband Amplifiers
- High Efficiency Amplifiers



Packaging Information

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

Large Signal Models Available for SiC & GaN

Absolute Maximum Ratings (not simultaneous)

Parameter	Symbol	Rating	Units	Conditions
Drain-source Voltage	V_{DSS}	100	Volts	25˚C
Gate-source Voltage	V_{GS}	-10, +2	Volts	25˚C
Storage Temperature	T_{STG}	-65, +150	˚C	
Operating Junction Temperature	T_J	225	˚C	
Maximum Forward Gate Current	I_{GMAX}	14.4	mA	25˚C
Maximum Drain Current[1]	I_{DMAX}	6.0	A	25˚C
Thermal Resistance, Junction to Case (packaged)[2]	$R_{\theta JC}$	1.8	˚C/W	85˚C
Thermal Resistance, Junction to Case (die only)[2]	$R_{\theta JC}$	1.1	˚C/W	85˚C
Mounting Temperature	T_S	320	˚C	30 seconds

Note[1] Current limit for long term reliable operation.
Note[2] Eutectic die attach using 80/20 AuSn mounted to a 60 mil thick CMC carrier.

Electrical Characteristics (Frequency = 10 GHz unless otherwise stated; T_C = 25˚C)

Characteristics	Symbol	Min.	Typ.	Max.	Units	Conditions
DC Characteristics						
Gate Threshold Voltage	$V_{(GS)TH}$	-3.8	-3.0	–2.3	V	V_{DS} = 10 V, I_D = 14.4 mA
Gate Quiescent Voltage	$V_{(GS)Q}$	–	-2.7	–	VDC	V_{DD} = 40 V, I_{DQ} = 720 mA
Saturated Drain Current[1]	I_{SAT}	11.5	13.0	–	A	V_{DS} = 6.0 V, V_{GS} = 2.0 V
Drain-Source Breakdown Voltage	V_{BD}	100	–	–	V	V_{GS} = -8 V, I_D = 14.4 mA
On Resistance	R_{ON}	–	0.2	–	Ω	V_{DS} = 0.1 V, V_{GS} = 0 V
Gate Forward Voltage	V_{G-ON}	–	1.85	–	V	I_{GS} = 14.4 mA
RF Characteristics						
Small Signal Gain	G_{SS}	–	17	–	dB	V_{DD} = 40 V, I_{DQ} = 720 mA
Saturated Power Output[1]	P_{SAT}	–	70	–	W	V_{DD} = 40 V, I_{DQ} = 720 mA
Drain Efficiency[2]	η	–	60	–	%	V_{DD} = 40 V, I_{DQ} = 720 mA
Intermodulation Distortion	IM3	–	-30	–	dBc	V_{DD} = 40 V, I_{DQ} = 720 mA, P_{OUT} = 70 W PEP
Output Mismatch Stress	VSWR	–	–	10 : 1	Ψ	No damage at all phase angles, V_{DD} = 40 V, I_{DQ} = 720 mA, P_{OUT} = 70 W CW
Dynamic Characteristics						
Input Capacitance	C_{GS}	–	24.0	–	pF	V_{DS} = 40 V, V_{gs} = -8 V, f = 1 MHz
Output Capacitance	C_{DS}	–	4.2	–	pF	V_{DS} = 40 V, V_{gs} = -8 V, f = 1 MHz
Feedback Capacitance	C_{GD}	–	0.6	–	pF	V_{DS} = 40 V, V_{gs} = -8 V, f = 1 MHz

Notes:
[1] Scaled from PCM unit cell.
[1] P_{SAT} is defined as I_G = 1.44 mA.
[2] Drain Efficiency = P_{OUT} / P_{DC}

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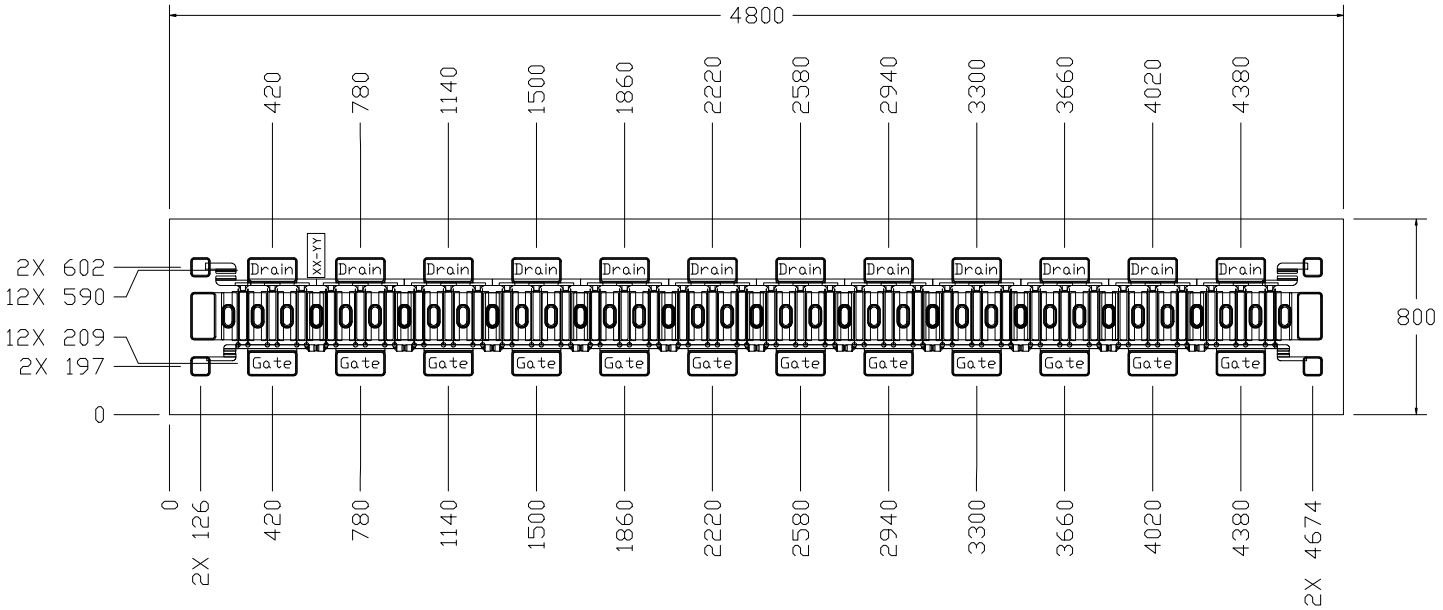
Die Dimensions (units in microns)



Overall die size 800 x 4800 (+0/-50) microns, die thickness 100 (+/-10) microns.
All Gate and Drain pads must be wire bonded for electrical connection.

Pad	Size (microns)
Drain	200 x 100
Gate	200 x 100
Interconnect	80 x 80

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
- 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.

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Figure 1. CGHV1J070D - Stability with Gmax and K Factor
V_{DD} = 40 V, I_{DS} = 360 mA

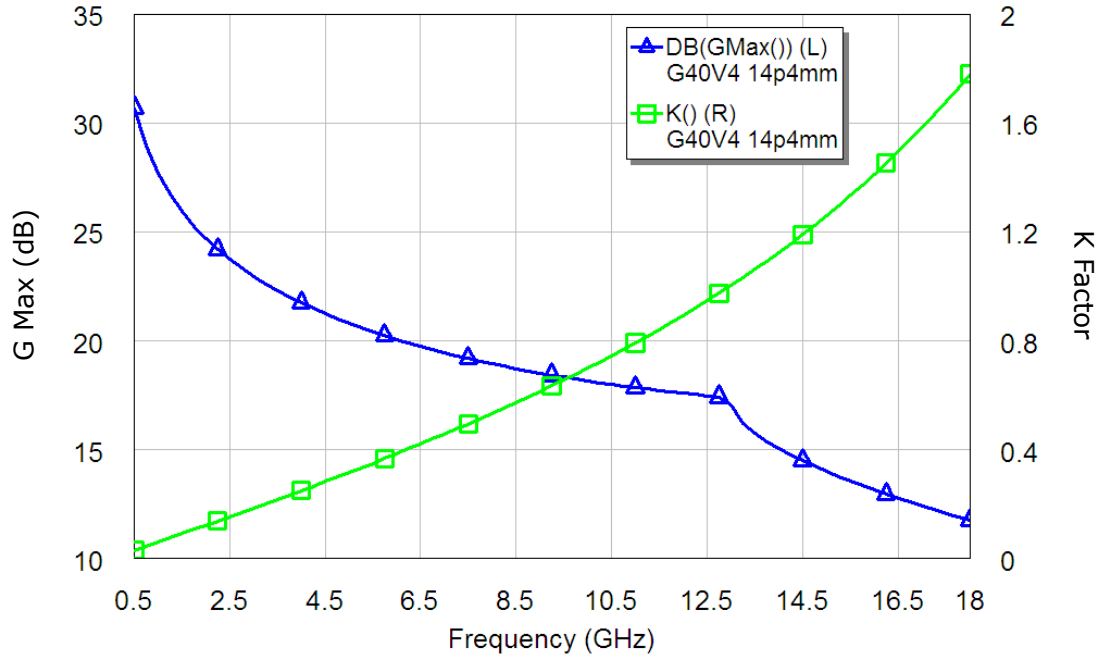
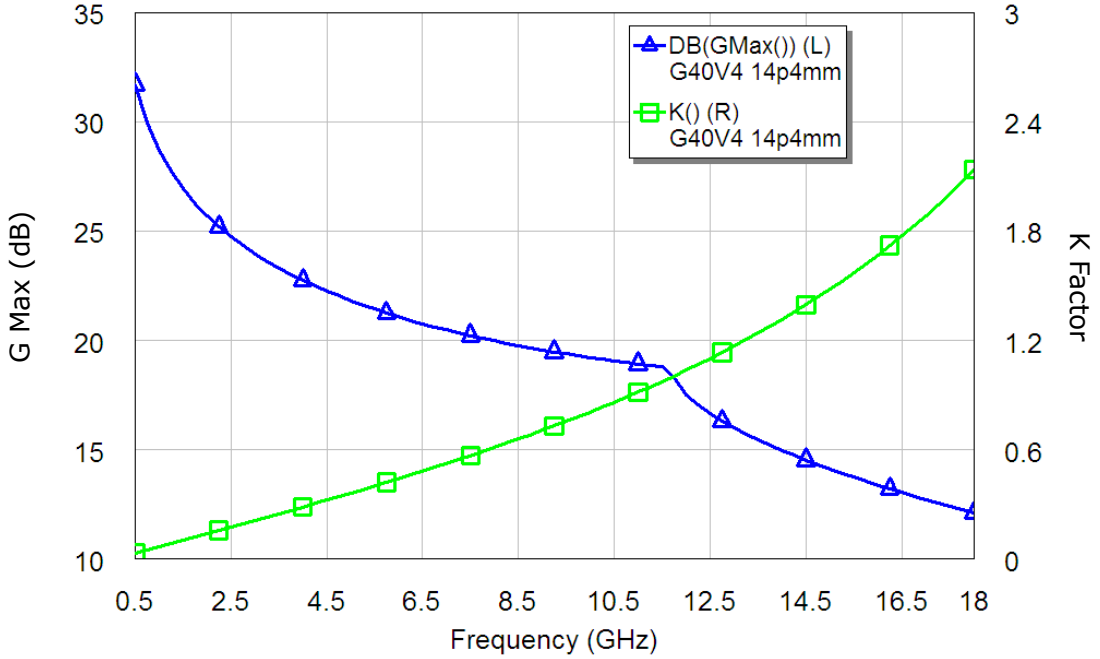


Figure 2. CGHV1J070D - Stability with Gmax and K Factor
V_{DD} = 40 V, I_{DS} = 720 mA



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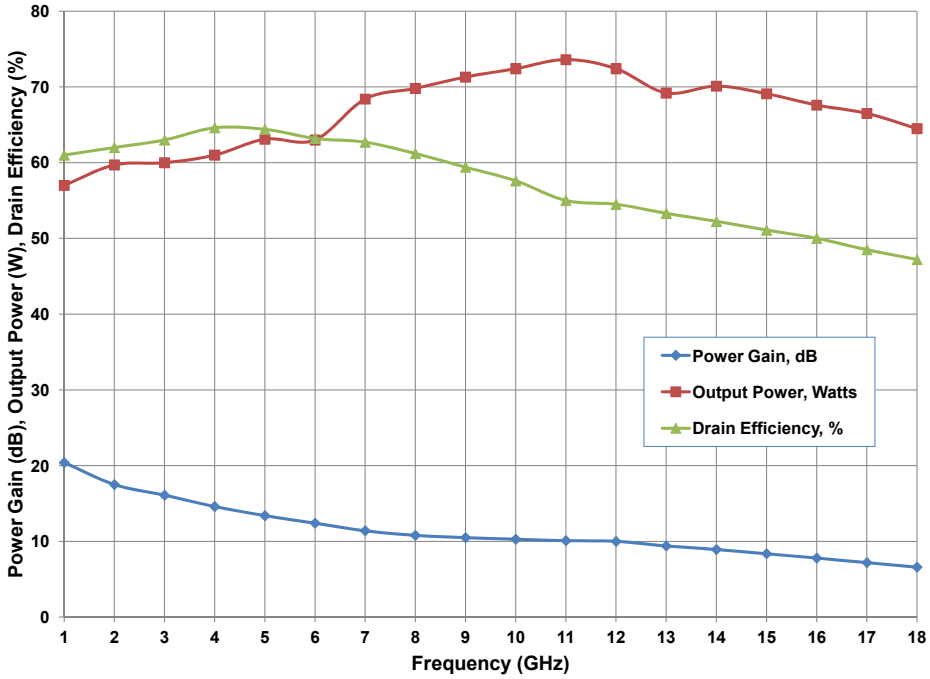
Source and Load Impedances

Frequency (GHz)	Source Impedance (ohms)	Load Impedance (ohms)	Series Gate Stability Resistor (ohms)
1.0	2.77 + j3.567	11 + j8.57	2.40
2.0	1.33 + j1.78	5.83 + j8.15	1.15
3.0	0.76 + j1.11	3.06 + j6.97	0.65
4.0	0.627 + j0.778	2.06 + j5.82	0.45
5.0	0.55 + j0.57	1.48 + j4.88	0.325
6.0	0.458 + j0.41	1.07 + j4.16	0.250
7.0	0.465 + j0.296	0.896 + j3.5	0.180
8.0	0.453 + j0.19	0.785 + j3.2	0.125
9.0	0.399 + j0.096	0.71 + j2.86	0.090
10.0	0.328 + j0.01	0.643 + j2.56	0.060
11.0	0.245 – j0.018	0.61 +j2.32	0.035
12.0	0.173 – j0.03	0.52 + j2.06	0.013
13.0	0.247 – j0.085	0.474 + j1.917	0
14.0	0.149 – j0.19	0.417 + j1.73	0
15.0	0.143 – j0.268	0.377 + j1.57	0
16.0	0.144 – j0.34	0.34 + j1.43	0
17.0	0.142 – j0.41	0.31 + j1.29	0
18.0	0.158 – j0.478	0.279 + j1.18	0

Table 1.

Note: V_{DD} = 40 V, I_{DQ} = 535 mA.

Figure 3. CGHV1J070D - Power Gain, Output Power and Drain Efficiency using Source and Load Pull Impedances (Series gate stability resistor values chosen to make K>1)



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Typical S-Parameters for CGHV1J070D
(Small Signal, V_{DS} = 40 V, I_{DQ} = 360 mA, angle in degrees)

Frequency	Mag S11	Ang S11	Mag S21	Ang S21	Mag S12	Ang S12	Mag S22	Ang S22
500 MHz	0.944	-165.60	12.49	87.69	0.011	-1.78	0.603	-167.23
1.00 GHz	0.947	-172.19	6.08	75.58	0.010	-13.31	0.637	-166.40
1.50 GHz	0.952	-174.26	3.86	66.38	0.010	-21.95	0.680	-164.85
2.00 GHz	0.957	-175.28	2.72	58.56	0.009	-29.21	0.725	-164.11
2.50 GHz	0.962	-175.92	2.03	51.82	0.009	-35.39	0.766	-164.10
3.00 GHz	0.967	-176.39	1.57	45.99	0.008	-40.66	0.802	-164.56
3.50 GHz	0.971	-176.78	1.25	40.95	0.007	-45.14	0.832	-165.26
4.00 GHz	0.974	-177.11	1.02	36.56	0.007	-48.97	0.857	-166.06
4.50 GHz	0.977	-177.40	0.84	32.73	0.006	-52.24	0.877	-166.88
5.00 GHz	0.980	-177.67	0.70	29.35	0.006	-55.05	0.894	-167.69
5.50 GHz	0.982	-177.91	0.60	26.36	0.005	-57.47	0.908	-168.45
6.00 GHz	0.983	-178.12	0.52	23.69	0.005	-59.58	0.919	-169.16
6.50 GHz	0.985	-178.32	0.45	21.29	0.005	-61.41	0.928	-169.82
7.00 GHz	0.986	-178.51	0.39	19.11	0.004	-63.02	0.936	-170.42
7.50 GHz	0.987	-178.68	0.35	17.12	0.004	-64.43	0.943	-170.98
8.00 GHz	0.988	-178.84	0.31	15.29	0.004	-65.68	0.949	-171.49
8.50 GHz	0.989	-178.99	0.28	13.61	0.004	-66.79	0.953	-171.96
9.00 GHz	0.989	-179.13	0.25	12.04	0.003	-67.77	0.958	-172.40
9.50 GHz	0.990	-179.27	0.22	10.58	0.003	-68.65	0.961	-172.80
10.00 GHz	0.990	-179.40	0.20	9.21	0.003	-69.42	0.964	-173.18
10.50 GHz	0.991	-179.52	0.19	7.92	0.003	-70.12	0.967	-173.52
11.00 GHz	0.991	-179.63	0.17	6.70	0.003	-70.74	0.970	-173.85
11.50 GHz	0.991	-179.75	0.16	5.55	0.003	-71.29	0.972	-174.15
12.00 GHz	0.992	-179.85	0.15	4.45	0.003	-71.77	0.974	-174.43
12.50 GHz	0.992	-179.96	0.14	3.40	0.002	-72.20	0.975	-174.70
13.00 GHz	0.992	179.94	0.13	2.39	0.002	-72.58	0.977	-174.95
13.50 GHz	0.992	179.84	0.12	1.43	0.002	-72.91	0.978	-175.19
14.00 GHz	0.992	179.75	0.11	0.50	0.002	-73.20	0.979	-175.41
14.50 GHz	0.993	179.65	0.10	-0.39	0.002	-73.43	0.980	-175.62
15.00 GHz	0.993	179.56	0.10	-1.26	0.002	-73.63	0.981	-175.82
15.25 GHz	0.993	179.52	0.09	-1.68	0.002	-73.71	0.982	-175.92
15.50 GHz	0.993	179.47	0.09	-2.09	0.002	-73.79	0.982	-176.01
15.75 GHz	0.993	179.43	0.09	-2.50	0.002	-73.85	0.983	-176.11
16.00 GHz	0.993	179.39	0.09	-2.90	0.002	-73.90	0.983	-176.20
16.25 GHz	0.993	179.34	0.08	-3.30	0.002	-73.95	0.983	-176.28
16.50 GHz	0.993	179.30	0.08	-3.69	0.002	-73.98	0.984	-176.37
16.75 GHz	0.993	179.26	0.08	-4.07	0.002	-74.00	0.984	-176.45
17.00 GHz	0.993	179.21	0.08	-4.45	0.002	-74.02	0.985	-176.54
17.25 GHz	0.993	179.17	0.07	-4.82	0.002	-74.02	0.985	-176.62
17.50 GHz	0.993	179.13	0.07	-5.19	0.001	-74.01	0.985	-176.70
17.75 GHz	0.993	179.09	0.07	-5.56	0.001	-73.99	0.985	-176.77
18.00 GHz	0.993	179.05	0.07	-5.92	0.001	-73.97	0.986	-176.85

To download the s-parameters in s2p format, go to the CGHV1J070D Product Page and click on the documentation tab.

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Typical S-Parameters for CGHV1J070D
(Small Signal, V_{DS} = 40 V, I_{DQ} = 720 mA, angle in degrees)

Frequency	Mag S11	Ang S11	Mag S21	Ang S21	Mag S12	Ang S12	Mag S22	Ang S22
500 MHz	0.956	-167.23	12.34	87.98	0.008	-1.48	0.639	-170.66
1.00 GHz	0.958	-173.22	6.04	77.07	0.008	-11.78	0.664	-169.66
1.50 GHz	0.961	-175.13	3.87	68.67	0.008	-19.59	0.696	-168.00
2.00 GHz	0.964	-176.05	2.76	61.38	0.007	-26.29	0.731	-166.94
2.50 GHz	0.968	-176.62	2.08	54.97	0.007	-32.11	0.766	-166.50
3.00 GHz	0.971	-177.03	1.63	49.32	0.007	-37.17	0.797	-166.52
3.50 GHz	0.974	-177.36	1.31	44.34	0.006	-41.56	0.825	-166.85
4.00 GHz	0.977	-177.64	1.07	39.94	0.006	-45.36	0.848	-167.34
4.50 GHz	0.979	-177.89	0.89	36.05	0.005	-48.66	0.868	-167.91
5.00 GHz	0.981	-178.11	0.75	32.60	0.005	-51.52	0.885	-168.52
5.50 GHz	0.983	-178.31	0.64	29.50	0.005	-54.01	0.899	-169.13
6.00 GHz	0.984	-178.50	0.55	26.72	0.004	-56.19	0.910	-169.72
6.50 GHz	0.986	-178.67	0.48	24.21	0.004	-58.10	0.920	-170.28
7.00 GHz	0.987	-178.83	0.42	21.92	0.004	-59.77	0.929	-170.81
7.50 GHz	0.987	-178.98	0.38	19.83	0.004	-61.25	0.936	-171.30
8.00 GHz	0.988	-179.12	0.34	17.91	0.003	-62.56	0.942	-171.76
8.50 GHz	0.989	-179.26	0.30	16.13	0.003	-63.71	0.948	-172.19
9.00 GHz	0.990	-179.38	0.27	14.48	0.003	-64.74	0.952	-172.60
9.50 GHz	0.990	-179.51	0.25	12.93	0.003	-65.64	0.956	-172.97
10.00 GHz	0.990	-179.62	0.22	11.49	0.003	-66.45	0.960	-173.32
10.50 GHz	0.991	-179.73	0.20	10.13	0.003	-67.16	0.963	-173.65
11.00 GHz	0.991	-179.84	0.19	8.84	0.002	-67.79	0.965	-173.96
11.50 GHz	0.991	-179.94	0.17	7.62	0.002	-68.34	0.968	-174.25
12.00 GHz	0.992	179.96	0.16	6.46	0.002	-68.82	0.970	-174.52
12.50 GHz	0.992	179.86	0.15	5.36	0.002	-69.23	0.972	-174.77
13.00 GHz	0.992	179.77	0.14	4.30	0.002	-69.58	0.974	-175.02
13.50 GHz	0.992	179.67	0.13	3.29	0.002	-69.88	0.975	-175.25
14.00 GHz	0.993	179.58	0.12	2.32	0.002	-70.12	0.976	-175.46
14.50 GHz	0.993	179.50	0.11	1.38	0.002	-70.30	0.978	-175.67
15.00 GHz	0.993	179.41	0.11	0.48	0.002	-70.44	0.979	-175.86
15.25 GHz	0.993	179.37	0.10	0.03	0.002	-70.48	0.979	-175.96
15.50 GHz	0.993	179.32	0.10	-0.40	0.002	-70.52	0.980	-176.05
15.75 GHz	0.993	179.28	0.10	-0.82	0.001	-70.54	0.980	-176.14
16.00 GHz	0.993	179.24	0.09	-1.24	0.001	-70.54	0.981	-176.23
16.25 GHz	0.993	179.20	0.09	-1.66	0.001	-70.53	0.981	-176.32
16.50 GHz	0.993	179.16	0.09	-2.06	0.001	-70.51	0.982	-176.40
16.75 GHz	0.993	179.12	0.09	-2.46	0.001	-70.48	0.982	-176.48
17.00 GHz	0.993	179.08	0.08	-2.86	0.001	-70.43	0.983	-176.56
17.25 GHz	0.993	179.04	0.08	-3.25	0.001	-70.37	0.983	-176.64
17.50 GHz	0.993	179.00	0.08	-3.63	0.001	-70.29	0.983	-176.72
17.75 GHz	0.993	178.96	0.08	-4.01	0.001	-70.20	0.984	-176.80
18.00 GHz	0.993	178.92	0.08	-4.39	0.001	-70.09	0.984	-176.87

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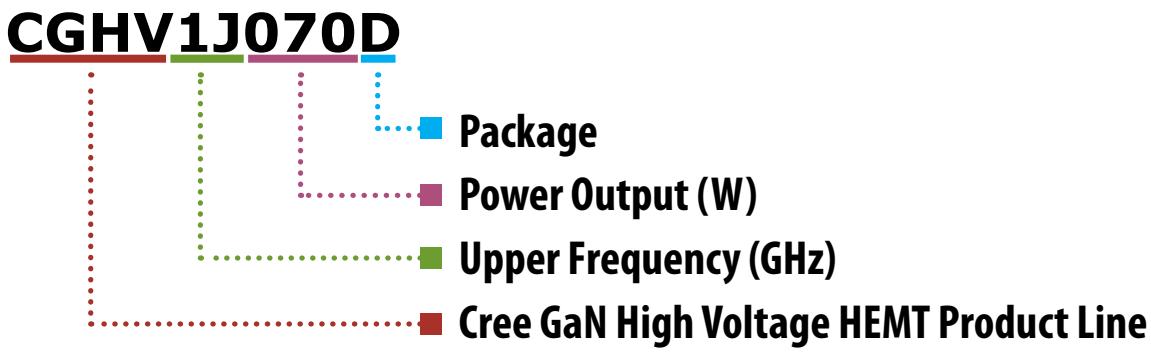
Part Number System



Parameter	Value	Units
Lower Frequency	DC	GHz
Upper Frequency[1]	18.0	GHz
Power Output	70	W
Package	Bare Die	-

Table 1.

Note[1]: Alpha characters used in frequency code indicate a value greater than 9.9 GHz. See Table 2 for value.

Character Code	Code Value
A	0
B	1
C	2
D	3
E	4
F	5
G	6
H	7
J	8
K	9
Examples:	1A = 10.0 GHz 2H = 27.0 GHz

Table 2.

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http://moschip.ru/get-element

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

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