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## Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China





# DATA SHEET

## HETERO JUNCTION FIELD EFFECT TRANSISTOR NE3210S01

### X to Ku BAND SUPER LOW NOISE AMPLIFIER N-CHANNEL HJ-FET

#### DESCRIPTION

The NE3210S01 is a Hetero Junction FET that utilizes the hetero junction to create high mobility electrons. Its excellent low noise and associated gain make it suitable for DBS and another commercial systems.

#### FEATURES

- Super Low Noise Figure & High Associated Gain  
NF = 0.35 dB TYP. Ga = 13.5 dB TYP. at f = 12 GHz
- Gate Length:  $L_g \leq 0.20 \mu\text{m}$
- Gate Width :  $W_g = 160 \mu\text{m}$

#### ORDERING INFORMATION (PLAN)

Part Number	Supplying Form	Marking
NE3210S01-T1	Tape & reel 1 000 pcs./reel	K
NE3210S01-T1B	Tape & reel 4 000 pcs./reel	

**Remark** For sample order, please contact your nearby sales office. (Part number for sample order: NE3210S01-A)

#### ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ )

Parameter	Symbol	Ratings	Unit
Drain to Source Voltage	$V_{DS}$	4.0	V
Gate to Source Voltage	$V_{GS}$	-3.0	V
Drain Current	$I_D$	IDSS	mA
Gate Current	$I_G$	100	$\mu\text{A}$
Total Power Dissipation	$P_{tot}$	165	mW
Channel Temperature	$T_{ch}$	125	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-65 to +125	$^\circ\text{C}$

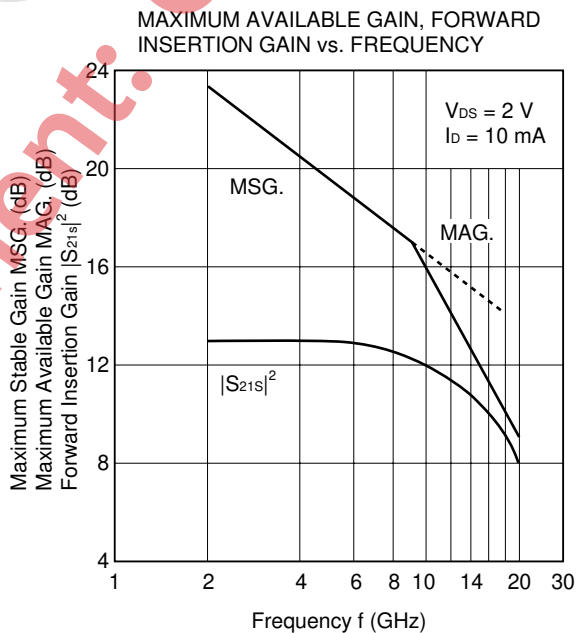
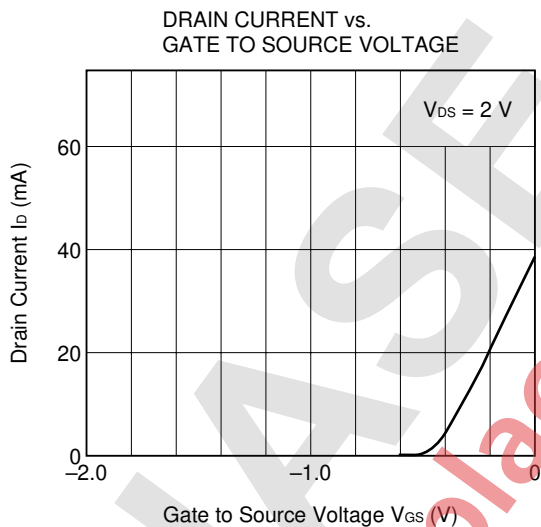
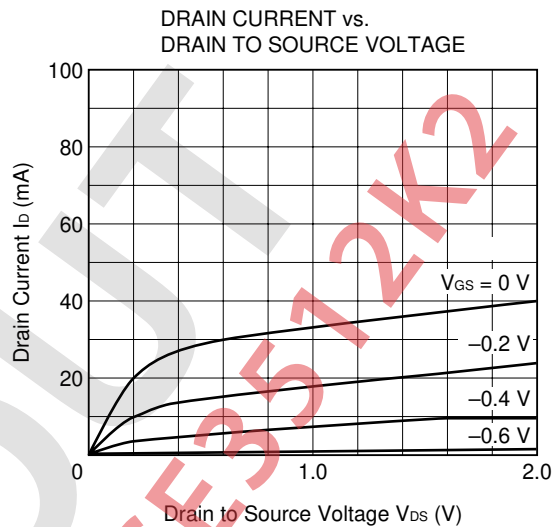
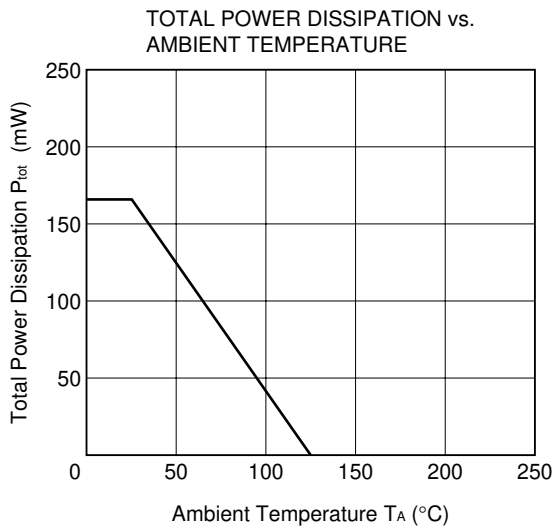
#### RECOMMENDED OPERATING CONDITIONS ( $T_A = +25^\circ\text{C}$ )

Characteristics	Symbol	MIN.	TYP.	MAX.	Unit
★ Drain to Source Voltage	$V_{DS}$	1	2	3	V
★ Drain Current	$I_D$	5	10	15	mA
Input Power	$P_{in}$	-	-	0	dBm

**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = +25 °C)**

Characteristics	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Gate to Source Leak Current	I <sub>GSO</sub>	V <sub>GS</sub> = -3 V	-	0.5	10	μA
Saturated Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 2 V, V <sub>GS</sub> = 0 V	15	40	70	mA
Gate to Source Cut off Voltage	V <sub>GS(off)</sub>	V <sub>DS</sub> = 2 V, I <sub>DS</sub> = 100 μA	-0.2	-0.7	-2.0	V
Transconductance	g <sub>m</sub>	V <sub>DS</sub> = 2 V, I <sub>DS</sub> = 10 mA	40	55	-	mS
Noise Figure	NF	V <sub>DS</sub> = 2 V, I <sub>DS</sub> = 10 mA	-	0.35	0.45	dB
Associated Gain	G <sub>a</sub>	f = 12 GHz	12.0	13.5	-	dB

TYPICAL CHARACTERISTICS (T<sub>A</sub> = +25 °C)

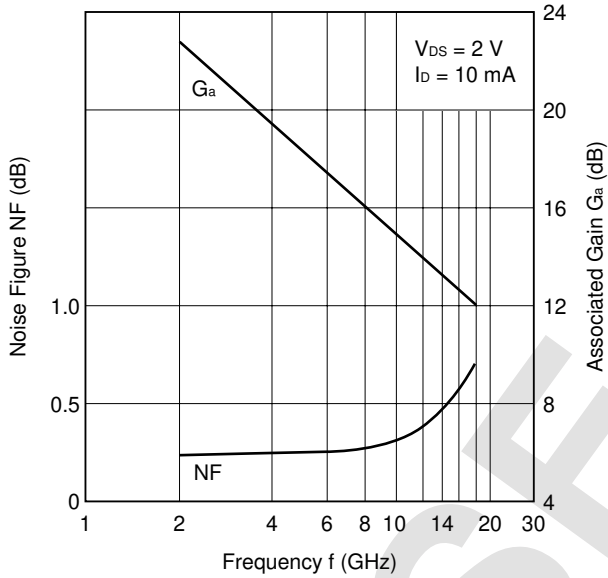


Gain Calculations

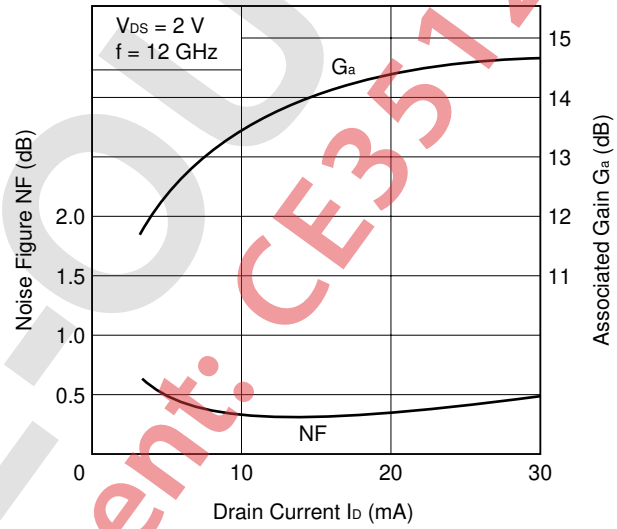
$$\text{MSG.} = \left| \frac{S_{21}}{S_{12}} \right| \quad K = \frac{1 + |\Delta|^2 - |S_{11}|^2 - |S_{22}|^2}{2 |S_{12}| |S_{21}|}$$

$$\text{MAG.} = \left| \frac{S_{21}}{S_{12}} \right| (k \pm \sqrt{k^2 - 1}) \quad \Delta = S_{11} \cdot S_{22} - S_{21} \cdot S_{12}$$

NOISE FIGURE, ASSOCIATED GAIN vs. FREQUENCY



NOISE FIGURE, ASSOCIATED GAIN vs. DRAIN CURRENT



PHASER  
 Drop-In Replacement: CE3512K2

**S-PARAMETERS**  
**MAG. AND ANG.**

V<sub>DS</sub> = 2 V, I<sub>D</sub> = 10 mA

FREQUENCY MHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
2000.0000	0.973	-21.2	4.450	154.2	0.022	75.9	0.550	-15.2
2500.0000	0.951	-27.7	4.453	147.1	0.028	71.2	0.538	-19.9
3000.0000	0.935	-34.3	4.439	140.3	0.033	66.7	0.523	-25.2
3500.0000	0.914	-40.6	4.389	133.5	0.038	63.5	0.511	-30.3
4000.0000	0.893	-46.3	4.314	127.3	0.042	57.7	0.500	-34.9
4500.0000	0.872	-51.4	4.230	121.1	0.045	54.5	0.495	-39.1
5000.0000	0.848	-55.9	4.158	115.3	0.048	49.7	0.492	-42.9
5500.0000	0.829	-60.0	4.118	109.9	0.050	48.2	0.484	-45.8
6000.0000	0.814	-64.8	4.130	104.3	0.053	46.1	0.482	-48.8
6500.0000	0.781	-70.1	4.149	98.3	0.058	42.8	0.472	-52.6
7000.0000	0.745	-76.3	4.180	91.8	0.063	40.4	0.450	-56.3
7500.0000	0.699	-82.7	4.170	85.3	0.065	36.6	0.423	-59.2
8000.0000	0.660	-90.3	4.184	78.7	0.070	33.7	0.393	-62.6
8500.0000	0.635	-99.8	4.197	71.7	0.074	29.4	0.360	-67.3
9000.0000	0.602	-109.5	4.171	64.7	0.077	25.4	0.327	-72.4
9500.0000	0.578	-118.3	4.109	57.9	0.081	22.3	0.290	-78.8
10000.0000	0.554	-127.2	4.063	51.3	0.086	18.9	0.268	-86.8
10500.0000	0.537	-135.2	4.030	44.6	0.092	15.3	0.251	-96.2
11000.0000	0.507	-144.1	3.978	37.6	0.095	10.8	0.233	-105.3
11500.0000	0.477	-154.0	3.950	30.8	0.099	5.9	0.224	-114.3
12000.0000	0.445	-166.2	3.906	23.5	0.103	2.1	0.211	-123.1
12500.0000	0.428	-179.6	3.851	16.0	0.108	-2.2	0.187	-132.5
13000.0000	0.418	165.3	3.762	8.5	0.110	-6.6	0.157	-146.2
13500.0000	0.430	150.6	3.642	1.1	0.111	-10.3	0.123	-164.0
14000.0000	0.453	137.9	3.517	-6.1	0.110	-14.8	0.110	169.0
14500.0000	0.486	126.7	3.395	-13.0	0.112	-19.6	0.125	141.4
15000.0000	0.513	116.7	3.259	-19.9	0.111	-22.0	0.161	121.7
15500.0000	0.526	108.4	3.150	-26.4	0.113	-25.6	0.207	113.4
16000.0000	0.531	100.4	3.046	-33.3	0.110	-29.3	0.255	109.0
16500.0000	0.539	91.1	2.911	-40.7	0.112	-32.1	0.299	105.4
17000.0000	0.533	82.1	2.739	-48.0	0.111	-36.1	0.329	101.5
17500.0000	0.537	72.2	2.573	-54.3	0.110	-40.1	0.343	95.9
18000.0000	0.546	64.7	2.400	-59.4	0.106	-41.6	0.347	90.6

**AMPLIFIER PARAMETERS**

V<sub>DS</sub> = 2 V, I<sub>D</sub> = 10 mA

FREQUENCY MHz	GU <sub>max</sub> dB	GA <sub>max</sub> dB	S <sub>21</sub>   <sup>2</sup> dB	S <sub>12</sub>   <sup>2</sup> dB	K	Delay nsec	Mason's U dB	G1 dB	G2 dB
2000.0000	27.26		12.97	-33.03	0.27	0.389	31.735	12.72	1.56
2500.0000	24.63		12.97	-31.20	0.38	0.040	27.870	10.18	1.48
3000.0000	23.33		12.95	-29.75	0.42	0.038	26.985	9.00	1.39
3500.0000	21.99		12.85	-28.44	0.47	0.038	26.594	7.83	1.32
4000.0000	20.87		12.70	-27.53	0.54	0.035	24.253	6.92	1.25
4500.0000	19.95		12.53	-26.98	0.60	0.034	23.581	6.21	1.22
5000.0000	19.11		12.38	-26.29	0.67	0.032	22.154	5.53	1.21
5500.0000	18.50		12.29	-26.00	0.73	0.030	22.043	5.05	1.16
6000.0000	18.19		12.32	-25.48	0.74	0.031	22.571	4.73	1.15
6500.0000	17.54		12.36	-24.70	0.79	0.034	21.992	4.09	1.09
7000.0000	16.92		12.42	-24.08	0.84	0.036	21.786	3.51	0.98
7500.0000	16.18		12.40	-23.76	0.94	0.036	20.486	2.92	0.86
8000.0000	15.65		12.43	-23.13	0.98	0.037	20.250	2.49	0.73
8500.0000	15.30		12.46	-22.59	1.00	0.039	20.283	2.24	0.60
9000.0000	14.85	16.16	12.40	-22.22	1.04	0.039	20.009	1.96	0.49
9500.0000	14.42	15.56	12.27	-21.80	1.06	0.038	19.986	1.77	0.38
10000.0000	14.09	15.25	12.18	-21.32	1.06	0.037	20.235	1.59	0.32
10500.0000	13.87	15.24	12.11	-20.75	1.04	0.037	21.050	1.48	0.28
11000.0000	13.52	14.66	11.99	-20.46	1.07	0.039	20.646	1.29	0.24
11500.0000	13.28	14.39	11.93	-20.07	1.07	0.038	20.667	1.12	0.22
12000.0000	12.99	13.98	11.83	-19.76	1.09	0.041	20.584	0.96	0.20
12500.0000	12.74	13.69	11.71	-19.35	1.09	0.042	20.774	0.88	0.15
13000.0000	12.45	13.26	11.51	-19.17	1.12	0.042	20.290	0.83	0.11
13500.0000	12.18	12.87	11.23	-19.12	1.14	0.041	19.748	0.89	0.07
14000.0000	11.97	12.58	10.92	-19.15	1.16	0.040	19.301	1.00	0.05
14500.0000	11.86	12.48	10.62	-19.02	1.15	0.038	19.613	1.17	0.07
15000.0000	11.70	12.27	10.26	-19.06	1.16	0.039	19.428	1.33	0.11
15500.0000	11.56	12.16	9.97	-18.90	1.14	0.036	19.651	1.41	0.19
16000.0000	11.41	11.97	9.67	-19.17	1.16	0.038	18.875	1.44	0.29
16500.0000	11.18	11.75	9.28	-19.03	1.16	0.041	18.560	1.49	0.41
17000.0000	10.70	11.16	8.75	-19.11	1.21	0.041	16.897	1.45	0.50
17500.0000	10.23	10.54	8.21	-19.15	1.27	0.035	15.483	1.48	0.54
18000.0000	9.70	9.85	7.60	-19.53	1.39	0.028	13.782	1.54	0.56

**S-PARAMETERS**  
**MAG. AND ANG.**

V<sub>DS</sub> = 0 V, V<sub>GS</sub> = 0 V

FREQUENCY MHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
2000.0000	0.987	-21.3	0.013	103.3	0.015	109.1	0.775	151.9
2500.0000	0.984	-27.9	0.019	103.6	0.020	102.3	0.786	145.8
3000.0000	0.978	-34.8	0.024	106.2	0.026	106.6	0.786	140.4
3500.0000	0.973	-41.5	0.031	102.7	0.033	105.2	0.787	134.6
4000.0000	0.967	-47.7	0.039	99.2	0.039	101.9	0.786	129.0
4500.0000	0.964	-53.6	0.048	97.3	0.048	99.3	0.783	123.0
5000.0000	0.959	-59.1	0.056	95.2	0.057	94.9	0.782	116.4
5500.0000	0.954	-64.8	0.067	90.9	0.068	90.9	0.781	109.7
6000.0000	0.948	-70.7	0.077	85.9	0.079	86.8	0.782	103.2
6500.0000	0.944	-77.9	0.087	81.4	0.090	81.4	0.781	96.6
7000.0000	0.934	-85.5	0.102	76.1	0.104	76.8	0.785	90.2
7500.0000	0.920	-95.5	0.117	70.0	0.118	70.2	0.796	84.7
8000.0000	0.906	-106.1	0.132	62.7	0.132	62.9	0.802	80.4
8500.0000	0.893	-117.9	0.144	55.8	0.144	55.2	0.814	76.7
9000.0000	0.885	-129.6	0.155	48.4	0.158	48.7	0.819	73.8
9500.0000	0.877	-140.4	0.167	41.9	0.166	42.2	0.830	70.7
10000.0000	0.873	-151.4	0.177	35.7	0.179	35.9	0.832	67.9
10500.0000	0.876	-162.1	0.190	28.8	0.193	29.2	0.836	64.3
11000.0000	0.874	-173.2	0.205	21.9	0.206	21.4	0.838	60.7
11500.0000	0.874	174.1	0.219	13.9	0.218	13.5	0.837	56.5
12000.0000	0.867	160.1	0.228	5.1	0.229	5.2	0.839	52.1
12500.0000	0.870	146.2	0.232	-4.0	0.232	-3.5	0.838	47.3
13000.0000	0.872	132.8	0.230	-11.4	0.232	-11.6	0.845	42.8
13500.0000	0.874	121.0	0.227	-19.4	0.227	-19.7	0.854	38.5
14000.0000	0.884	110.6	0.218	-26.4	0.221	-25.5	0.862	35.9
14500.0000	0.899	101.9	0.211	-30.5	0.215	-30.6	0.871	34.0
15000.0000	0.904	92.9	0.208	-35.0	0.208	-35.4	0.879	33.5
15500.0000	0.907	85.1	0.201	-39.5	0.201	-40.0	0.882	33.0
16000.0000	0.907	77.7	0.198	-43.9	0.200	-44.0	0.876	32.4
16500.0000	0.900	69.3	0.198	-49.3	0.198	-49.5	0.877	30.8
17000.0000	0.881	60.5	0.192	-54.4	0.194	-54.5	0.878	28.5
17500.0000	0.860	52.8	0.183	-59.2	0.186	-60.2	0.875	25.4
18000.0000	0.846	46.0	0.176	-63.5	0.176	-63.9	0.866	21.4



**AMPLIFIER PARAMETERS**

V<sub>DS</sub> = 0 V, V<sub>GS</sub> = 0 V

FREQUENCY MHz	GU <sub>max</sub> dB	GA <sub>max</sub> dB	S <sub>21</sub>   <sup>2</sup> dB	S <sub>12</sub>   <sup>2</sup> dB	K	Delay nsec	Mason's U dB	G1 dB	G2 dB
2000.0000	-18.01	-18.00	-37.95	-36.77	27.53	-0.027	-32.707	15.95	3.98
2500.0000	-15.58	-15.57	-34.65	-34.03	16.79	-0.001	-37.496	14.90	4.17
3000.0000	-14.62	-14.69	-32.43	-31.68	13.52	-0.015	-35.198	13.63	4.18
3500.0000	-13.19	-13.31	-30.17	-29.75	10.24	0.019	-36.355	12.79	4.19
4000.0000	-12.04	-12.23	-28.13	-28.14	8.39	0.019	-38.318	11.90	4.18
4500.0000	-10.79	-11.09	-26.37	-26.30	6.41	0.011	-39.156	11.45	4.13
5000.0000	-9.94	-10.33	-24.99	-24.83	5.35	0.011	-43.704	10.95	4.11
5500.0000	-8.97	-9.49	-23.51	-23.31	4.40	0.024	-41.071	10.45	4.09
6000.0000	-8.21	-8.84	-22.26	-22.06	3.82	0.028	-38.980	9.93	4.11
6500.0000	-7.41	-8.19	-21.17	-20.87	3.27	0.025	-36.002	9.66	4.09
7000.0000	-6.75	-7.66	-19.85	-19.67	2.94	0.029	-38.253	8.95	4.15
7500.0000	-6.16	-7.19	-18.62	-18.54	2.69	0.034	-44.914	8.11	4.35
8000.0000	-5.64	-6.76	-17.60	-17.59	2.48	0.041	-52.360	7.48	4.48
8500.0000	-5.17	-6.40	-16.82	-16.81	2.30	0.038	-43.933	6.94	4.71
9000.0000	-4.71	-6.06	-16.18	-16.03	2.11	0.041	-38.048	6.65	4.83
9500.0000	-4.13	-5.61	-15.56	-15.61	1.97	0.036	-45.414	6.36	5.07
10000.0000	-3.68	-5.31	-15.03	-14.94	1.83	0.035	-41.367	6.22	5.13
10500.0000	-2.85	-4.73	-14.41	-14.28	1.64	0.038	-36.934	6.34	5.22
11000.0000	-2.26	-4.30	-13.78	-13.72	1.52	0.039	-40.336	6.26	5.27
11500.0000	-1.68	-3.90	-13.20	-13.21	1.43	0.044	-41.533	6.28	5.25
12000.0000	-1.53	-3.82	-12.86	-12.82	1.41	0.049	-46.170	6.04	5.29
12500.0000	-1.29	-3.67	-12.68	-12.69	1.38	0.051	-40.248	6.14	5.25
13000.0000	-1.13	-3.65	-12.75	-12.71	1.37	0.041	-43.093	6.20	5.43
13500.0000	-0.94	-3.56	-12.88	-12.86	1.35	0.044	-43.034	6.27	5.68
14000.0000	-0.70	-3.47	-13.21	-13.13	1.33	0.039	-32.688	6.62	5.89
14500.0000	-0.17	-3.27	-13.51	-13.33	1.28	0.023	-31.483	7.15	6.19
15000.0000	0.15	-3.09	-13.65	-13.66	1.27	0.025	-40.622	7.39	6.42
15500.0000	0.09	-3.15	-13.95	-13.92	1.27	0.025	-38.265	7.51	6.52
16000.0000	-0.24	-3.31	-14.06	-14.00	1.30	0.024	-39.573	7.50	6.32
16500.0000	-0.48	-3.42	-14.06	-14.05	1.32	0.030	-46.013	7.22	6.35
17000.0000	-1.43	-4.00	-14.34	-14.24	1.44	0.028	-37.600	6.51	6.40
17500.0000	-2.60	-4.72	-14.76	-14.60	1.63	0.027	-33.228	5.85	6.31
18000.0000	-3.60	-5.38	-15.08	-15.09	1.87	0.024	-44.662	5.47	6.01

**S-PARAMETERS**  
**MAG. AND ANG.**

$V_{DS} = 0\text{ V}$ ,  $V_{GS} = -2.5\text{ V}$

FREQUENCY MHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
2000.0000	0.993	-13.3	0.041	75.0	0.041	75.0	0.986	-15.4
2500.0000	0.987	-17.7	0.051	70.4	0.052	70.7	0.982	-19.9
3000.0000	0.982	-22.2	0.062	65.3	0.062	65.9	0.979	-24.7
3500.0000	0.978	-26.7	0.072	60.3	0.072	59.3	0.974	-29.7
4000.0000	0.975	-30.7	0.080	55.1	0.080	54.9	0.969	-34.6
4500.0000	0.970	-34.4	0.088	50.6	0.087	50.1	0.968	-39.2
5000.0000	0.968	-37.5	0.095	46.0	0.095	46.5	0.967	-43.4
5500.0000	0.965	-40.3	0.103	42.9	0.102	42.5	0.965	-47.5
6000.0000	0.966	-43.4	0.111	40.2	0.111	40.2	0.957	-50.8
6500.0000	0.963	-45.9	0.123	37.4	0.122	37.0	0.961	-54.9
7000.0000	0.959	-48.8	0.136	33.0	0.137	32.9	0.955	-59.3
7500.0000	0.947	-52.6	0.149	27.8	0.148	28.0	0.950	-63.5
8000.0000	0.944	-57.6	0.164	23.0	0.162	23.0	0.939	-68.5
8500.0000	0.939	-63.2	0.180	17.7	0.178	17.9	0.930	-74.1
9000.0000	0.928	-69.2	0.196	12.0	0.196	12.0	0.920	-80.4
9500.0000	0.922	-75.5	0.212	5.5	0.211	5.2	0.915	-87.9
10000.0000	0.913	-81.2	0.224	-1.0	0.224	-1.2	0.903	-95.8
10500.0000	0.912	-86.2	0.240	-7.0	0.239	-7.3	0.899	-104.5
11000.0000	0.913	-91.2	0.255	-13.1	0.257	-13.3	0.906	-111.8
11500.0000	0.909	-96.6	0.271	-19.6	0.273	-20.1	0.906	-119.1
12000.0000	0.904	-102.7	0.289	-27.3	0.288	-27.0	0.913	-126.6
12500.0000	0.905	-109.8	0.307	-34.7	0.305	-34.6	0.900	-134.7
13000.0000	0.897	-118.1	0.324	-43.7	0.324	-43.6	0.887	-143.4
13500.0000	0.884	-127.9	0.339	-53.8	0.338	-53.7	0.879	-153.5
14000.0000	0.869	-139.1	0.346	-64.3	0.343	-64.5	0.874	-164.8
14500.0000	0.868	-150.3	0.345	-76.4	0.345	-76.3	0.875	-177.8
15000.0000	0.866	-161.6	0.333	-88.1	0.334	-88.3	0.877	169.0
15500.0000	0.867	-172.6	0.311	-99.3	0.313	-98.7	0.882	156.9
16000.0000	0.872	177.4	0.294	-109.3	0.289	-109.7	0.897	146.1
16500.0000	0.885	166.6	0.269	-119.0	0.268	-119.1	0.905	136.8
17000.0000	0.870	153.6	0.251	-129.3	0.246	-129.4	0.926	128.7
17500.0000	0.871	139.7	0.226	-140.8	0.227	-140.2	0.927	122.1
18000.0000	0.855	124.6	0.198	-151.5	0.198	-152.4	0.923	115.3

**AMPLIFIER PARAMETERS**

V<sub>DS</sub> = 0 V, V<sub>GS</sub> = -2.5 V

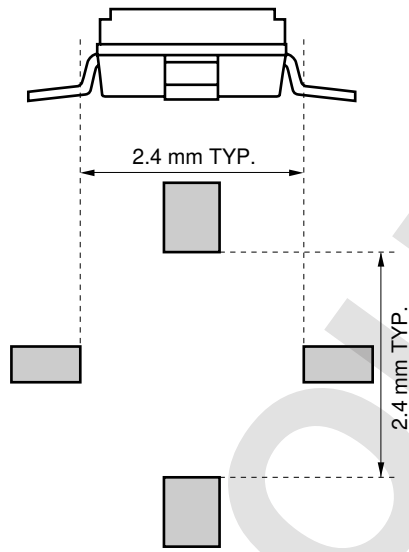
FREQUENCY MHz	GU <sub>max</sub> dB	GA <sub>max</sub> dB	S <sub>21</sub>   <sup>2</sup> dB	S <sub>12</sub>   <sup>2</sup> dB	K	Delay nsec	Mason's U dB	G1 dB	G2 dB
2000.0000	6.59	-1.81	-27.69	-27.72	1.09	0.037	-41.579	18.66	15.62
2500.0000	4.66	-2.29	-25.78	-25.76	1.14	0.026	-37.612	15.91	14.53
3000.0000	4.16	-2.37	-24.10	-24.15	1.16	0.028	-32.931	14.46	13.79
3500.0000	3.77	-2.45	-22.90	-22.89	1.16	0.027	-30.070	13.70	12.97
4000.0000	3.27	-2.57	-21.96	-21.97	1.18	0.029	-46.684	13.12	12.12
4500.0000	3.06	-2.59	-21.12	-21.17	1.19	0.025	-36.484	12.23	11.95
5000.0000	3.35	-2.46	-20.43	-20.42	1.16	0.026	-36.357	11.96	11.82
5500.0000	3.47	-2.35	-19.76	-19.86	1.16	0.017	-32.225	11.57	11.66
6000.0000	3.33	-2.41	-19.10	-19.12	1.16	0.015	-46.847	11.70	10.73
6500.0000	4.33	-2.04	-18.22	-18.27	1.12	0.015	-34.379	11.37	11.18
7000.0000	4.16	-2.07	-17.36	-17.24	1.11	0.025	-30.925	10.93	10.58
7500.0000	3.50	-2.14	-16.54	-16.59	1.13	0.029	-37.284	9.90	10.14
8000.0000	3.26	-2.14	-15.68	-15.80	1.13	0.026	-31.894	9.67	9.28
8500.0000	3.09	-2.15	-14.91	-15.00	1.13	0.030	-33.177	9.30	8.70
9000.0000	2.57	-2.31	-14.16	-14.16	1.14	0.032	-60.851	8.60	8.13
9500.0000	2.64	-2.21	-13.47	-13.52	1.13	0.036	-37.108	8.25	7.87
10000.0000	2.13	-2.37	-13.01	-13.00	1.15	0.036	-47.342	7.79	7.36
10500.0000	2.50	-2.17	-12.40	-12.44	1.13	0.033	-36.990	7.72	7.18
11000.0000	3.39	-1.82	-11.86	-11.80	1.09	0.034	-33.577	7.81	7.45
11500.0000	3.74	-1.63	-11.33	-11.29	1.07	0.036	-31.606	7.62	7.45
12000.0000	4.38	-1.32	-10.79	-10.80	1.05	0.043	-33.886	7.37	7.79
12500.0000	4.37	-1.23	-10.26	-10.32	1.04	0.041	-33.321	7.42	7.22
13000.0000	4.00	-1.27	-9.79	-9.78	1.04	0.050	-40.261	7.08	6.71
13500.0000	3.67	-1.30	-9.38	-9.42	1.05	0.056	-36.338	6.61	6.44
14000.0000	3.15	-1.46	-9.22	-9.30	1.06	0.059	-31.349	6.12	6.25
14500.0000	3.16	-1.48	-9.24	-9.24	1.06	0.067	-48.824	6.09	6.31
15000.0000	2.83	-1.66	-9.54	-9.52	1.07	0.065	-38.005	6.02	6.35
15500.0000	2.44	-1.92	-10.14	-10.09	1.10	0.062	-31.130	6.05	6.53
16000.0000	2.65	-1.85	-10.64	-10.80	1.10	0.055	-27.440	6.21	7.08
16500.0000	2.64	-2.01	-11.41	-11.43	1.11	0.054	-47.034	6.65	7.40
17000.0000	2.61	-1.99	-12.01	-12.17	1.12	0.057	-28.001	6.14	8.48
17500.0000	1.77	-2.46	-12.90	-12.88	1.16	0.064	-33.848	6.18	8.49
18000.0000	-0.05	-3.35	-14.05	-14.06	1.31	0.059	-33.797	5.71	8.29

## NOISE PARAMETERS

 $V_{DS} = 2\text{ V}$ ,  $I_D = 10\text{ mA}$ 

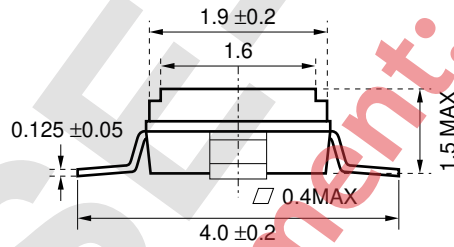
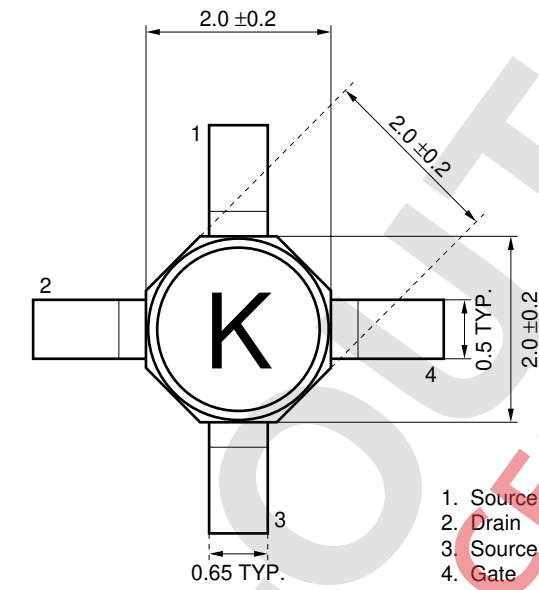
Freq. (GHz)	NF <sub>min.</sub> (dB)	G <sub>a</sub> (dB)	Γ <sub>opt</sub>		Rn/50
			MAG.	ANG.	
2.0	0.25	21.2	0.94	12	0.38
4.0	0.26	19.5	0.80	26	0.33
6.0	0.28	18.2	0.66	44	0.26
8.0	0.30	16.2	0.50	68	0.18
10.0	0.32	14.7	0.38	97	0.11
12.0	0.34	13.5	0.29	133	0.09
14.0	0.42	12.9	0.27	177	0.08
16.0	0.56	12.3	0.33	-129	0.11
18.0	0.72	11.9	0.39	-82	0.23

TYPICAL MOUNT PAD LAYOUT



PHASE-OUT  
Drop-In Replacement: CE3512K2

PACKAGE DIMENSIONS (Unit: mm)



PHASER  
 Drop-In Replacement: CE3572K2

**RECOMMENDED SOLDERING CONDITIONS**

This product should be soldered under the following recommended conditions.

Soldering Method	Soldering Conditions	Recommended Condition Symbol
Infrared Reflow	Package peak temperature: 230 °C or below Time: 30 seconds or less (at 210 °C) Count: 1, Exposure limit <sup>Note</sup> : None	IR30-00-1
Partial Heating	Pin temperature: 230 °C Time: 10 seconds or less (per pin row) Exposure limit <sup>Note</sup> : None	

**Note** After opening the dry pack, keep it in a place below 25 °C and 65 % RH for the allowable storage period.

**Caution** Do not use different soldering methods together (except for partial heating).

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