**HiRel Ku-Band GaAs General Purpose MESFET**

- **HiRel Discrete and Microwave Semiconductor**
- For professional pre- and driver- amplifiers
- For frequencies from 500 MHz to 20 GHz
- Hermetically sealed microwave package
- High gain, medium power
- **esa Space Qualification Expected 1998**
  ESA/SCC Detail Spec. No.: 5613/008
  Type Variante No.s 06 and 07 foressen (tbc.)
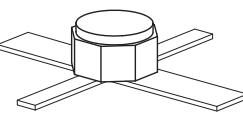
ESD (**E**lectro**s**tatic **d**ischarge) sensitive device, observe handling precaution!

Type	Marking	Pin Configuration				Package
CFY27-38	-	1=G	2=S	3=D	4=S	MICRO-X
CFY27-P	-	1=G	2=S	3=D	4=S	MICRO-X

(ql) Testing level: P: Professional testing
                     H: High Rel quality
                     S: Space quality
                     ES: ESA qualified

CFY27-nnl: specifies gain and output power levels (see electrical characteristics)

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Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	9	V
Drain-gate voltage	V_{DG}	11	
Gate-source voltage (reverse/ forward)	V_{GS}	-6...0.5	
Drain current	I_D	420	mA
Gate forward current	I_G	5	
RF input power, C- and X-band[1]	$P_{RF,in}$	20 (tbc.)	dBm
Junction temperature	T_j	175	°C
Storage temperature	T_{stg}	-65...175	
Total power dissipation[2]	P_{tot}	900	mW
Soldering temperature[3]	T_{sol}	230	°C

Thermal Resistance

Parameter	Symbol	Value	Unit
Junction - soldering point	R_{thJS}	≤150 (tbc.)	K/W

Electrical Characteristics (at T_A = 25 °C; unless otherwise specified)

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
DC Characteristics					
Drain- source saturation current V_{DS} = 2 V, V_{GS} = 0 V	I_{DSS}	150	270	420	mA
Gate threshold voltage V_{DS} = 3 V, I_D = 1 mA	- V_{Gth}	1	2	3.2	V
Drain current pinch-off V_{DS} = 3 V, V_{GS} = -4 V	I_{Dp}	-	<12	60	µA
Gate leakage current at pinch-off V_{DS} = 3 V, V_{GS} = -4 V	-I_{Gp}	-	<12	30	
Transconductance V_{DS} = 3 V, I_D = !"= mA	g_{m120}	130	160	-	mS
Gate leakage current at operation V_{DS} = 3 V, I_D = 120 mA	-I_{G120}	-	<3	-	µA
Thermal resistance junction to soldering point	R_{thJS}	-	125	-	K/W

[1]For V_{DS} ≤5V. For V_{DS} >5V, derating is requiered.

[2]At T_S = 40°C. For T_S > 40°C derating is required.

[3]During 15 sec. maximum. The same terminal shall not be resoldered until 3 minuntes have elapsed.

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Electrical Characteristics

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC Characteristics					
Linear power gain[1] V_{DS} = 5 V, I_D = 120 mA, f = 2.3 GHz, P_{IN} = 0 dBm CFY27-P CFY27-38	G_{lp}	17.5 -	19 >18	- -	dB
Noise figure V_{DS} = 3 V, I_D = 120 mA, f = 12 GHz CFY27-P CFY27-38	NF	- -	<3,6 3.5	- 3.8	
Associated gain[2] V_{DS} = 3 V, I_D = 120 mA, f = 12 GHz CFY27-P CFY27-38	G_a	- 7.5	>7,8 8	- -	
Output power at 1 dB gain compression[1] V_{DS} = 5 V, $I_{D(RF\ off)}$ = 120 mA, f = 2.3 GHz CFY27-P CFY27-38	P_{1dB}	24.5 -	- 26 >25	- -	

[1]Output power /linear gain characteristics given for optimum output power matching conditions (fixed generic matching, no fine- tuning).
[2]Noise figure/ associated gain characteristics given for minimum noise figure matching conditions (fixed generic matching, no fine- tuning).

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Typical Common Source S-Paramters CFY27

V_{DS} = 3 V, I_D = 120 mA, Z_0 = 50 Ω

f	S_{11}		S_{21}		S_{12}		S_{22}		k-Fact.	S_{21}/S_{12}	MAG
GHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	MAG	dB	dB
0.5	0.936	-43	8.72	153	0.0203	68	0.149	-55	0.33	26.3	-
0.6	0.921	-50	8.47	148	0.0245	65	0.151	-64	0.35	25.4	-
0.7	0.904	-55	8.2	143	0.028	61	0.153	-72	0.38	24.7	-
0.8	0.89	-62	7.943	138	0.0311	57	0.156	-81	0.41	24.1	-
0.9	0.876	-68	7.698	135	0.0333	54	0.161	-87	0.43	23.6	-
1	0.864	-74	7.449	130	0.0357	51	0.164	-94	0.46	23.2	-
1.1	0.854	-80	7.198	126	0.0383	49	0.169	-100	0.47	22.7	-
1.2	0.846	-86	6.948	122	0.0407	46	0.173	-105	0.48	22.3	-
1.3	0.837	-91	6.702	119	0.0419	44	0.179	-110	0.51	22	-
1.4	0.83	-96	6.465	115	0.0435	43	0.186	-114	0.52	21.7	-
1.5	0.823	-101	6.24	112	0.0448	41	0.19	-118	0.54	21.4	-
1.6	0.816	-106	5.99	109	0.0461	39	0.194	-122	0.57	21.1	-
1.7	0.81	-110	5.805	106	0.0475	38	0.199	-125	0.58	20.9	-
1.8	0.804	-114	5.603	103	0.0486	36	0.203	-128	0.61	20.6	-
1.9	0.799	-118	5.41	100	0.0494	34	0.208	-131	0.63	20.4	-
2	0.795	-122	5.225	97	0.0502	33	0.212	-134	0.65	20.2	-
2.1	0.791	-126	5.03	94	0.0508	32	0.216	-137	0.68	20	-
2.2	0.788	-130	4.877	92	0.0513	31	0.219	-139	0.7	19.8	-
2.3	0.784	-133	4.718	89	0.0519	30	0.222	-142	0.73	19.6	-
2.4	0.781	-136	4.569	87	0.0524	29	0.225	-144	0.75	19.4	-
2.5	0.779	-139	4.429	84	0.0528	28	0.227	-147	0.78	19.2	-
2.6	0.776	-142	4.296	82	0.0532	27	0.229	-149	0.8	19.1	-
2.7	0.773	-145	4.17	80	0.0537	26	0.232	-150	0.83	18.9	-
2.8	0.771	-148	4.047	78	0.054	25	0.235	-152	0.85	18.7	-
2.9	0.769	-150	3.936	76	0.0543	25	0.237	-154	0.88	18.6	-
3	0.767	-153	3.829	74	0.0545	24	0.24	-155	0.91	18.5	-
3.1	0.765	-155	3.729	72	0.0547	24	0.242	-157	0.93	18.3	-
3.2	0.764	-157	3.633	70	0.055	23	0.244	-159	0.96	18.2	-
3.3	0.763	-160	3.539	68	0.0554	23	0.246	-160	0.98	18.1	-
3.4	0.762	-162	3.45	66	0.0556	22	0.249	-162	1.01	17.9	17.5
3.5	0.761	-164	3.367	64	0.0559	22	0.251	-164	1.03	17.8	16.8

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Typical Common Source S-Paramters CFY27

V_{DS} = 3 V, I_D = 120 mA, Z_0 = 50 Ω

f	S_{11}		S_{21}		S_{12}		S_{22}		k-Fact.	S_{21}/S_{12}	MAG
GHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	MAG	dB	dB
4	0.758	-174	3.014	54	0.0574	21	0.266	-171	1.13	17.2	15
4.5	0.757	177	2.713	46	0.0594	20	0.283	-178	1.21	16.6	13.8
5	0.759	169	2.513	38	0.062	20	0.3	177	1.25	16.1	13.1
5.5	0.761	161	2.31	30	0.0644	19	0.316	171	1.3	15.5	12.3
6	0.763	154	2.133	22	0.0676	18	0.332	166	1.32	15	11.6
6.5	0.764	147	1.983	15	0.0709	17	0.349	160	1.35	14.5	10.9
7	0.766	140	1.856	8	0.0751	15	0.366	154	1.35	13.9	10.4
7.5	0.768	133	1.747	0	0.0801	14	0.381	149	1.33	13.4	9.9
8	0.771	126	1.649	-8	0.0849	11	0.398	142	1.32	12.9	9.5
8.5	0.775	119	1.561	-16	0.0891	8	0.414	137	1.3	12.4	9.1
9	0.78	111	1.478	-23	0.0937	5	0.431	131	1.28	12	8.8
9.5	0.787	104	1.401	-31	0.0981	2	0.45	125	1.24	11.5	8.6
10	0.794	97	1.329	-39	0.1022	-2	0.469	119	1.21	11.1	8.4
10.5	0.802	90	1.262	-47	0.1057	-7	0.488	112	1.18	10.8	8.2
11	0.81	83	1.198	-55	0.1083	-11	0.505	106	1.16	10.4	8
11.5	0.816	77	1.138	-62	0.1106	-16	0.525	99	1.14	10.1	7.8
12	0.823	70	1.081	-70	0.1126	-20	0.547	93	1.13	9.8	7.7
12.5	0.829	63	1.026	-78	0.1138	-26	0.566	86	1.11	9.5	7.5
13	0.835	56	0.974	-86	0.1144	-31	0.584	80	1.1	9.3	7.4
13.5	0.841	49	0.925	-94	0.1137	-37	0.601	73	1.1	9.1	7.2
14	0.846	41	0.881	-102	0.1128	-42	0.616	67	1.1	8.9	7
14.5	0.851	34	0.839	-110	0.111	-48	0.631	59	1.11	8.8	6.8
15	0.857	27	0.793	-119	0.1084	-54	0.648	52	1.12	8.6	6.6
15.5	0.863	20	0.748	-127	0.1047	-60	0.666	44	1.13	8.5	6.4
16	0.869	12	0.702	-137	0.0997	-67	0.688	36	1.14	8.5	6.2
16.5	0.874	5	0.652	-147	0.0943	-73	0.713	27	1.17	8.4	5.9
17	0.881	-1	0.602	-157	0.0892	-78	0.741	20	1.16	8.3	5.9
17.5	0.887	-7	0.555	-166	0.0845	-83	0.772	13	1.12	8.2	6.1
18	0.895	-12	0.514	-176	0.0805	-87	0.805	6	1.04	8.1	6.9

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Typical Common Source Ss- Paramters CFY25-20

V_{DS} = 5 V, I_D = 120 mA, Z_0 = 50 Ω

f	S_{11}		S_{21}		S_{12}		S_{22}		k-Fact.	S_{21}/S_{12}	MAG
GHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	MAG	dB	dB
0.5	0.937	-44	9.39	149	0.0152	65	0.319	-27	0.38	27.9	-
0.6	0.922	-50	9.01	146	0.0183	63	0.314	-30	0.4	26.9	-
0.7	0.905	-56	8.72	141	0.0207	61	0.309	-34	0.44	26.2	-
0.8	0.889	-61	8.37	138	0.0231	58	0.303	-37	0.48	25.6	-
0.9	0.876	-67	8.083	134	0.0255	55	0.298	-41	0.5	25	-
1	0.866	-73	7.823	130	0.0273	52	0.292	-45	0.51	24.6	-
1.1	0.857	-79	7.56	126	0.0289	50	0.287	-49	0.53	24.2	-
1.2	0.848	-85	7.305	122	0.0304	48	0.282	-52	0.55	23.8	-
1.3	0.839	-90	7.046	118	0.0315	45	0.278	-55	0.58	23.5	-
1.4	0.832	-96	6.798	114	0.0326	43	0.275	-59	0.6	23.2	-
1.5	0.826	-100	6.561	111	0.0335	42	0.272	-62	0.62	22.9	-
1.6	0.819	-105	6.327	108	0.0343	40	0.269	-64	0.65	22.7	-
1.7	0.813	-109	6.1	104	0.0348	39	0.268	-67	0.68	22.4	-
1.8	0.807	-114	5.886	101	0.0355	38	0.266	-70	0.71	22.2	-
1.9	0.804	-118	5.681	98	0.036	37	0.265	-73	0.73	22	-
2	0.8	-121	5.485	95	0.0364	35	0.264	-76	0.76	21.8	-
2.1	0.796	-125	5.298	93	0.0368	34	0.263	-79	0.79	21.6	-
2.2	0.793	-129	5.122	90	0.0371	34	0.263	-81	0.82	21.4	-
2.3	0.79	-132	4.957	87	0.0375	33	0.263	-84	0.84	21.2	-
2.4	0.788	-135	4.8	85	0.0379	32	0.263	-86	0.87	21	-
2.5	0.785	-138	4.654	82	0.0381	32	0.263	-88	0.9	20.9	-
2.6	0.784	-141	4.515	80	0.0384	31	0.264	-90	0.93	20.7	-
2.7	0.782	-144	4.381	78	0.0386	31	0.265	-92	0.95	20.6	-
2.8	0.78	-147	4.253	75	0.039	31	0.266	-94	0.98	20.4	-
2.9	0.778	-149	4.136	73	0.0392	31	0.266	-96	1.01	20.2	19.6
3	0.776	-152	4.02	71	0.0394	31	0.267	-98	1.04	20.1	18.9
3.1	0.775	-154	3.912	69	0.0396	30	0.269	-100	1.07	19.9	18.4
3.2	0.774	-156	3.811	67	0.0398	30	0.27	-102	1.09	19.8	17.9
3.3	0.773	-159	3.714	65	0.0401	30	0.272	-104	1.12	19.7	17.6
3.4	0.773	-161	3.621	63	0.0403	30	0.273	-106	1.14	19.5	17.3
3.5	0.772	-163	3.534	61	0.0406	30	0.274	-108	1.16	19.4	17

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Typical Common Source Ss- Paramters CFY25-20

V_{DS} = 5 V, I_D = 120 mA, Z_0 = 50 Ω

f	S_{11}		S_{21}		S_{12}		S_{22}		k-Fact.	S_{21}/S_{12}	MAG
GHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	MAG	dB	dB
4	0.773	-173	3.163	51	0.0421	32	0.285	-116	1.24	18.8	15.8
4.5	0.774	177	2.869	42	0.0446	34	0.301	-125	1.27	18.1	14.9
5	0.777	169	2.6	34	0.048	37	0.321	-134	1.29	17.3	14.1
5.5	0.779	161	2.383	26	0.0522	38	0.343	-143	1.27	16.6	13.5
6	0.781	154	2.195	18	0.0574	39	0.366	-151	1.24	15.8	12.9
6.5	0.784	147	2.035	10	0.0642	39	0.392	-159	1.16	15	12.6
7	0.787	140	1.918	1	0.0711	37	0.413	-166	1.09	14.3	12.5
7.5	0.791	133	1.777	-7	0.0782	35	0.434	-174	1.04	13.6	12.3
8	0.796	126	1.672	-15	0.0859	32	0.452	179	0.98	12.9	-
8.5	0.801	119	1.576	-23	0.0937	28	0.47	171	0.92	12.3	-
9	0.808	111	1.486	-32	0.1019	24	0.49	163	0.87	11.6	-
9.5	0.816	104	1.404	-40	0.1092	19	0.514	154	0.82	11.1	-
10	0.824	97	1.326	-48	0.1156	15	0.534	145	0.78	106	-
10.5	0.833	90	1.252	-56	0.1216	9	0.555	136	0.75	10.1	-
11	0.842	83	1.181	-64	0.127	4	0.578	127	0.72	9.7	-
11.5	0.85	76	1.115	-72	0.1316	-2	0.603	119	0.68	9.3	-
12	0.857	69	1.051	-81	0.1348	-8	0.628	111	0.65	8.9	-
12.5	0.862	62	0.99	-89	0.1372	-14	0.648	103	0.63	8.6	-
13	0.866	55	0.932	-97	0.139	-21	0.67	96	0.61	8.3	-
13.5	0.871	48	0.877	-105	0.1401	-27	0.688	88	0.6	8	-
14	0.874	40	0.822	-114	0.1403	-33	0.705	80	0.6	7.7	-
14.5	0.878	33	0.765	-122	0.1385	-40	0.721	72	0.6	7.4	-
15	0.881	25	0.721	-131	0.1355	-47	0.739	64	0.61	7.3	-
15.5	0.883	18	0.666	-140	0.1312	-53	0.752	55	0.63	7.1	-
16	0.886	11	0.617	-150	0.1254	-60	0.772	46	0.64	6.9	-
16.5	0.89	4	0.558	-159	0.118	-66	0.793	37	0.66	6.7	-
17	0.892	-3	0.51	-169	0.1112	-72	0.814	30	0.67	6.6	-
17.5	0.897	-8	0.464	-178	0.1049	-80	0.834	21	0.62	6.5	-
18	0.901	-15	0.421	173	0.0994	-86	0.858	13	0.6	6.3	-
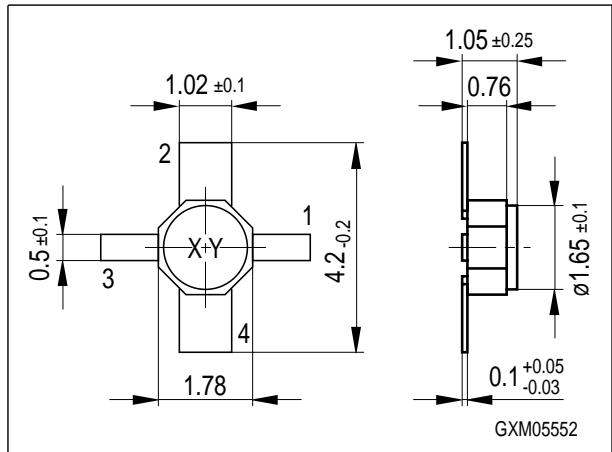
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Micro- X Package

1.05 ±0.25

0.76

1.02 ±0.1

2

1

0.5 ±0.1

X+Y

3

4.2 −0.2

⌀1.65 ±0.1

4

1.78

$0.1^{+0.05}_{-0.03}$

GXM05552

2007-08-17

Attention please!

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