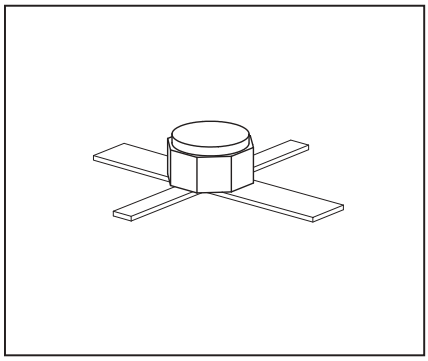
HiRel X-Band GaAs General Purpose MESFET



- HiRel discrete and Microwave semiconductor
- For professional pre- and driver- amplifiers
- For frequencies from 500MHz to 20GHz
- Hermetically sealed microwave package
- Low noise figure, high gain, moderate power
- ESA Space Qualification Expected 1998
  ESA/SCC Detail Spec. No.: 5613/008
  Type Variante No.s 01 to 05

ESD (**E**lectro**s**tatic **d**ischarge) sensitive device, observe handling precaution!

Type	Marking	Pin Configuration						Package
CFY25-20	-	1=G	2=S	3=D	4=S	-	-	MICRO-X
CFY25-20P	-	1=G	2=S	3=D	4=S	-	-	MICRO-X
CFY25-23	-	1=G	2=S	3=D	4=S	-	-	MICRO-X
CFY25-23P	-	1=G	2=S	3=D	4=S	-	-	MICRO-X
CFY25-P	-	1=G	1=S	3=D	4=S	-	-	MICRO-X

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

CFY25-nnl: specifies noise, gain and output power level (see electrical characteristics)

Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	5	V
Drain-gate voltage	V_{DG}	7	
Gate-source voltage (reverse/ forward)	V_{GS}	-5...0.5	
Drain current	I_D	80	mA
Gate forward current	I_G	1.5	
RF input power, C- and X-band[1)]	$P_{RF,in}$	17	dBm
Junction temperature	T_j	175	°C
Storage temperature	T_{stg}	-65...175	
Total power dissipation[2)]	P_{tot}	250	mW
Soldering temperature[3)]	T_{sol}	230	°C

Thermal Resistance

Parameter	Symbol	Value	Unit
Junction - soldering point	R_{thJS}	≤410	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} = 3 V, V_{GS} = 0 V	I_{DSS}	15	30	60	mA
Gate threshold voltage V_{DS} = 3 V, I_D = 1 mA	$-V_{Gth}$	0.3	1	3	V
Drain current pinch-off V_{DS} = 3 V, V_{GS} = -4 V	I_{Dp}	-	< 100	-	µA
Gate leakage current at pinch-off V_{DS} = 3 V, V_{GS} = -4 V	$-I_{Gp}$	-	< 100	200	
Transconductance V_{DS} = 3 V, I_D = 15 mA	g_{m15}	35	40	-	mS
Gate leakage current at operation V_{DS} = 3 V, I_D = 15 mA	$-I_{G15}$	-	< 1	2	µA
Thermal resistance junction to soldering point	R_{thJS}	-	370	-	K/W

[1]For $V_{DS} \leq 3$ V. For $V_{DS} >$ 3 V, derating is required.

[2]At T_s = +72.5 °C. For T_s > +72.5 °C derating is required.

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

Electrical Characteristics

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC Characteristics					
Linear power gain[1)]	G_{lp}				dB
V_{DS} = 3 V, I_D = 20 mA, f = 12 GHz,					
P_{IN} = 0 dBm					
CFY25-20		-	9.2	-	
CFY25-23		-	8.5	-	
CFY25-20P, -P		8.5	9.2	-	
CFY25-23P		8	8.5	-	
Noise figure[2)]	NF				
V_{DS} = 3 V, I_D = 15 mA, f = 12 GHz					
CFY25-P		-	< 2.3	-	
CFY25-20, -20P		-	1.9	2.1	
CFY25-23. -23P		-	2.2	2.4	
Associated gain[2)]	G_a				
V_{DS} = 3 V, I_D = 15 mA, f = 12 GHz					
CFY25-P		-	>8.5	-	
CFY25-20, -20P		8.5	9	-	
CFY25-23, -23P		8	8.7	-	
Output power at 1 dB gain compression[1)]	P_{1dB}				dBm
V_{DS} = 3 V, $I_{D(RFoff)}$ = 20 mA, f = 12 GHz					
CFY25-20, -23		-	15	-	
CFY25-20, -23P, -P		14	15	-	

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

Typical Common Source S-Paramters CFY25-20

V_{DS} = 3 V, I_D = 15 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	0.958	-22	3.301	160	0.017	71	0.683	-14	0.44	22.9	-
1	0.931	-28	3.208	155	0.0287	64	0.673	-18	0.5	20.5	-
1.5	0.901	-36	3.107	148	0.0398	59	0.66	-23	0.54	18.9	-
2	0.875	-45	3.016	139	0.0502	53	0.648	-29	0.56	17.8	-
2.5	0.858	-56	2.95	130	0.0602	47	0.635	-35	0.55	16.9	-
3	0.838	-67	2.877	120	0.0691	42	0.621	-41	0.56	16.2	-
3.5	0.815	-78	2.795	111	0.0767	36	0.603	-48	0.58	15.6	-
4	0.794	-88	2.708	102	0.0834	31	0.59	-54	0.61	15.1	-
4.5	0.776	-98	2.621	93	0.0893	25	0.573	-60	0.64	14.7	-
5	0.76	-108	2.537	84	0.0939	20	0.562	-67	0.66	14.3	-
5.5	0.746	-117	2.451	76	0.0975	15	0.549	-73	0.69	14	-
6	0.732	-126	2.365	68	0.1	10	0.539	-80	0.72	13.7	-
6.5	0.718	-135	2.281	60	0.1017	5	0.529	-86	0.77	13.5	-
7	0.703	-143	2.202	52	0.1035	1	0.521	-91	0.81	13.3	-
7.5	0.689	-150	2.133	45	0.1049	-3	0.511	-96	0.87	13.1	-
8	0.674	-158	2.072	38	0.1056	-6	0.504	-101	0.92	12.9	-
8.5	0.661	-166	2.02	30	0.1063	-10	0.495	-106	0.97	12.8	-
9	0.65	-174	1.976	23	0.1068	-13	0.484	-111	1.02	12.7	11.7
9.5	0.64	178	1.933	16	0.1076	-16	0.474	-116	1.06	12.5	11
10	0.629	170	1.896	9	0.108	-20	0.463	-121	1.11	12.4	10.4
10.5	0.62	162	1.859	2	0.1084	-23	0.452	-127	1.16	12.3	9.9
11	0.613	153	1.826	-5	0.109	-26	0.443	-133	1.19	12.2	9.6
11.5	0.607	145	1.797	-13	0.1097	-29	0.436	-140	1.22	12.1	9.3
12	0.6	137	1.767	-20	0.1105	-33	0.431	-147	1.24	12	9.1
12.5	0.593	130	1.738	-27	0.1114	-36	0.426	-153	1.27	11.9	8.8
13	0.587	122	1.708	-34	0.1125	-40	0.421	-159	1.3	11.8	8.5
13.5	0.58	114	1.678	-41	0.1138	-43	0.419	-166	1.32	11.7	8.3
14	0.575	106	1.651	-49	0.1149	-47	0.417	-172	1.34	11.6	8.1
14.5	0.572	98	1.627	-56	0.1161	-51	0.413	-178	1.36	11.5	7.9
15	0.568	90	1.607	-63	0.118	-55	0.41	176	1.37	11.3	7.7
15.5	0.565	82	1.589	-70	0.1198	-59	0.408	170	1.37	11.2	7.6

Typical Common Source S-Paramters CFY25-20

V_{DS} = 3 V, I_D = 15 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
16	0.565	73	1.57	-78	0.1219	-64	0.404	164	1.37	11.1	7.5
16.5	0.564	65	1.552	-86	0.1242	-69	0.402	157	1.36	11	7.4
17	0.564	57	1.548	-92	0.1266	-74	0.398	152	1.35	10.9	7.4
17.5	0.564	51	1.554	-98	0.1292	-78	0.396	147	1.32	10.8	7.4
18	0.567	47	1.562	-102	0.1319	-81	0.394	143	1.28	10.7	7.6

Typical Common Source S-Paramters CFY25-20

V_{DS} = 3 V, I_D = 30 mA, Z_0 = 50 Ω

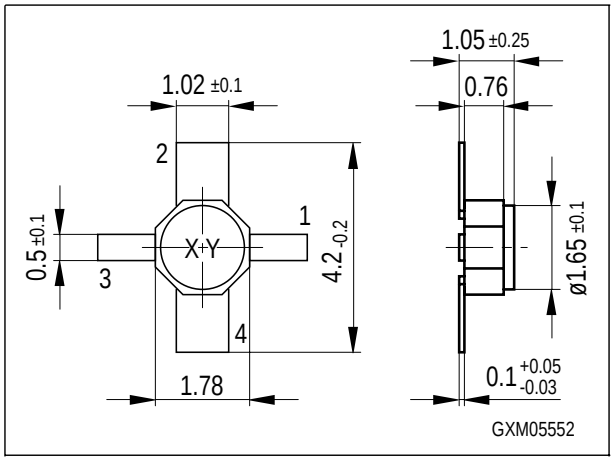
f	S_{11}		S_{21}		S_{12}		S_{22}		k-Fact.	S_{21}/S_{12}	MAG
GHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	MAG	dB	dB
0.5	0.953	-24	3.987	159	0.014	74	0.657	-15	0.49	24.5	-
1	0.921	-30	3.858	153	0.0246	67	0.647	-18	0.53	22	-
1.5	0.892	-39	3.714	146	0.0346	60	0.634	-23	0.56	20.3	-
2	0.861	-49	3.583	138	0.0444	55	0.621	-28	0.59	19.1	-
2.5	0.836	-60	3.484	128	0.0543	49	0.608	-35	0.58	18.1	-
3	0.814	-72	3.374	118	0.0621	43	0.594	-41	0.6	17.4	-
3.5	0.79	-83	3.254	108	0.0684	38	0.576	-47	0.63	16.8	-
4	0.768	-94	3.129	99	0.0736	32	0.557	-53	0.67	16.3	-
4.5	0.749	-104	3.007	90	0.0779	27	0.541	-59	0.7	15.9	-
5	0.731	-114	2.89	82	0.081	22	0.527	-65	0.74	15.5	-
5.5	0.714	-124	2.776	73	0.0844	18	0.515	-72	0.78	15.2	-
6	0.699	-133	2.662	65	0.0863	14	0.505	-78	0.83	14.9	-
6.5	0.683	-141	2.556	57	0.088	10	0.498	-84	0.88	14.6	-
7	0.669	-149	2.458	50	0.0893	6	0.492	-89	0.93	14.4	-
7.5	0.657	-157	2.374	42	0.0904	3	0.486	-94	0.98	14.2	-
8	0.645	-165	2.299	35	0.0918	0	0.48	-99	1.02	14	13.1
8.5	0.632	-173	2.233	28	0.0933	-2	0.474	-103	1.07	13.8	12.2
9	0.62	179	2.174	21	0.0945	-5	0.467	-108	1.11	13.6	11.6
9.5	0.609	171	2.12	14	0.096	-8	0.459	-112	1.15	13.4	11.1
10	0.6	163	2.071	7	0.0976	-10	0.453	-118	1.18	13.3	10.7
10.5	0.592	154	2.026	0	0.099	-13	0.446	-123	1.21	13.1	10.4
11	0.586	146	1.984	-7	0.1006	-16	0.441	-129	1.23	12.9	10.1
11.5	0.579	138	1.947	-14	0.1026	-19	0.436	-136	1.24	12.8	9.8
12	0.574	130	1.91	-21	0.1047	-22	0.432	-142	1.25	12.6	9.6
12.5	0.571	123	1.876	-29	0.1066	-25	0.428	-149	1.26	12.5	9.4
13	0.566	115	1.842	-36	0.1088	-28	0.425	-155	1.27	12.3	9.2
13.5	0.563	107	1.806	-43	0.1108	-32	0.424	-16961	1.28	12.1	9
14	0.561	99	1.774	-50	0.114	-35	0.422	-167	1.27	11.9	8.8
14.5	0.559	91	1.745	-57	0.117	-39	0.421	-173	1.26	11.7	8.7
15	0.566	83	1.719	-64	0.1199	-43	0.419	-179	1.26	11.6	8.5
15.5	0.556	75	1.698	-72	0.1229	-48	0.417	175	1.24	11.4	8.4

Typical Common Source S-Paramters CFY25-20

V_{DS} = 3 V, I_D = 30 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
16	0.556	66	1.676	-79	0.1257	-53	0.414	168	1.23	11.2	8.3
16.5	0.557	58	1.653	-87	0.1286	-58	0.412	162	1.23	11.1	8.2
17	0.559	50	1.646	-93	0.132	-63	0.41	157	1.2	11	8.3
17.5	0.561	45	1.649	-99	0.135	-67	0.409	152	1.16	10.9	8.4
18	0.565	40	1.656	-103	0.1376	-71	0.407	148	1.13	10.8	8.6

Micro-X Package



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