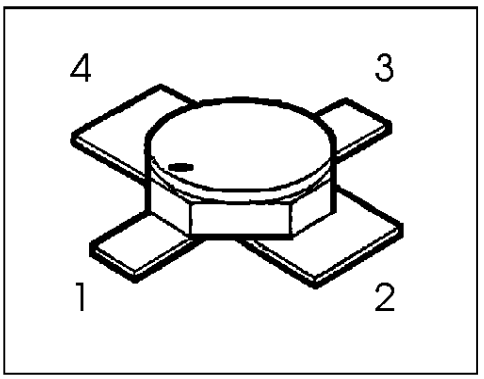
HiRel X-Band GaAs Low Noise / General Purpose MESFET

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



ESD: **E**lectro**s**tatic **d**ischarge sensitive device, observe handling precautions!

Type	Marking	Ordering Code	Pin Configuration				Package
			1	2	3	4	
CFY25-P (ql)	-	see below	G	S	D	S	Micro-X
CFY25-23 (ql)							
CFY25-23P (ql)							
CFY25-20 (ql)							
CFY25-20P (ql)							

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

(ql) Quality Level:	P: Professional Quality,	Ordering Code:	Q62703F120
	H: High Rel Quality,	Ordering Code:	on request
	S: Space Quality,	Ordering Code:	on request
	ES: ESA Space Quality,	Ordering Code:	Q62703F119

(see order instructions for ordering example)

Maximum Ratings

Parameter	Symbol	Values	Unit
Drain-source voltage	V_{DS}	5	V
Drain-gate voltage	V_{DG}	7	V
Gate-source voltage (reverse / forward)	V_{GS}	- 5... + 0.5	V
Drain current	I_D	80	mA
Gate forward current	I_G	1.5	mA
RF Input Power, C- and X-Band [1]	$P_{RF,in}$	+ 17	dBm
Junction temperature	T_J	175	°C
Storage temperature range	T_{stg}	- 65... + 175	°C
Total power dissipation [2]	P_{tot}	250	mW
Soldering temperature [3]	T_{sol}	230	°C
Thermal Resistance			
Junction-soldering point	$R_{th\ JS}$	≤ 410	K/W

Notes.:

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. The same terminal shall not be resoldered until 3 minutes have elapsed.

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	1.0	3.0	V
Drain current at 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	µA
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	$R_{th\ JS}$	-	370	-	K/W

Electrical Characteristics (continued)

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC Characteristics					
Noise figure [1] V_{DS} = 3 V, I_D = 15 mA, f = 12 GHz	NF				dB
CFY25-P		-	< 2.3	-	
CFY25-20, -20P		-	1.9	2.1	
CFY25-23, -23P		-	2.2	2.4	
Associated gain. [1] V_{DS} = 3 V, I_D = 15 mA, f = 12 GHz	G_a				dB
CFY25-P		-	> 8.5	-	
CFY25-20, -20P		8.5	9	-	
CFY25-23, -23P		8.0	8.7	-	
Output power at 1 dB gain compression [2] V_{DS} = 3 V, $I_{D(RF\ off)}$ = 20 mA, f = 12 GHz	P_{1dB}				dBm
CFY25-20, -23		-	15	-	
CFY25-20P, 23P, -P		14	15	-	
Linear power gain [2] V_{DS} = 3 V, I_D = 20 mA, f = 12 GHz, P_{in} = 0 dBm	G_{lp}				dB
CFY25-20		-	9.2	-	
CFY25-23		-	8.5	-	
CFY25-20P, -P		8.5	9.2	-	
CFY25-23P		8.0	8.5	-	

Notes.:

1) Noise figure / sssociated gain characteristics given for minimum noise figure matching conditions (fixed generic matching, no fine-tuning).

2) Output power / linear power gain characteristics given for optimum output power matching conditions (fixed generic matching, no fine-tuning).

Typical Common Source S-Parameters CFY25-20

V_{DS} = 3 V, I_D = 15 mA, Z_o = 50 Ω											
f	|S11|	<S11	|S21|	<S21	|S12|	<S12	|S22|	<S22	k-Fact.	S_{21}/S_{12}	MAG
[GHz]	[magn]	[angle]	[magn]	[angle]	[magn]	[angle]	[magn]	[angle]	[magn]	[dB]	[dB]
0,5	0,958	-22	3,301	160	0,0170	71	0,683	-14	0,44	22,9	
1,0	0,931	-28	3,208	155	0,0287	64	0,673	-18	0,50	20,5	
1,5	0,901	-36	3,107	148	0,0398	59	0,660	-23	0,54	18,9	
2,0	0,875	-45	3,016	139	0,0502	53	0,648	-29	0,56	17,8	
2,5	0,858	-56	2,950	130	0,0602	47	0,635	-35	0,55	16,9	
3,0	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	0,794	-88	2,708	102	0,0834	31	0,590	-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	0,760	-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	14,0	
6,0	0,732	-126	2,365	68	0,1000	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	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	0,674	-158	2,072	38	0,1056	-6	0,504	-101	0,92	12,9	
8,5	0,661	-166	2,020	30	0,1063	-10	0,495	-106	0,97	12,8	
9,0	0,650	-174	1,976	23	0,1068	-13	0,484	-111	1,02	12,7	11,7
9,5	0,640	178	1,933	16	0,1076	-16	0,474	-116	1,06	12,5	11,0
10,0	0,629	170	1,896	9	0,1080	-20	0,463	-121	1,11	12,4	10,4
10,5	0,620	162	1,859	2	0,1084	-23	0,452	-127	1,16	12,3	9,9
11,0	0,613	153	1,826	-5	0,1090	-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	0,600	137	1,767	-20	0,1105	-33	0,431	-147	1,24	12,0	9,1
12,5	0,593	130	1,738	-27	0,1114	-36	0,426	-153	1,27	11,9	8,8
13,0	0,587	122	1,708	-34	0,1125	-40	0,421	-159	1,30	11,8	8,5
13,5	0,580	114	1,678	-41	0,1138	-43	0,419	-166	1,32	11,7	8,3
14,0	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	0,568	90	1,607	-63	0,1180	-55	0,410	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
16,0	0,565	73	1,570	-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	11,0	7,4
17,0	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	0,567	47	1,562	-102	0,1319	-81	0,394	143	1,28	10,7	7,6

Typical Common Source S-Parameters CFY25-20 (continued)

V_{DS} = 3 V, I_D = 30 mA, Z_o = 50 Ω

f	|S11|	<S11	|S21|	<S21	|S12|	<S12	|S22|	<S22	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	0,0140	74	0,657	-15	0,49	24,5	
1,0	0,921	-30	3,858	153	0,0246	67	0,647	-18	0,53	22,0	
1,5	0,892	-39	3,714	146	0,0346	60	0,634	-23	0,56	20,3	
2,0	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	0,814	-72	3,374	118	0,0621	43	0,594	-41	0,60	17,4	
3,5	0,790	-83	3,254	108	0,0684	38	0,576	-47	0,63	16,8	
4,0	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	0,70	15,9	
5,0	0,731	-114	2,890	82	0,0810	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	0,699	-133	2,662	65	0,0863	14	0,505	-78	0,83	14,9	
6,5	0,683	-141	2,556	57	0,0880	10	0,498	-84	0,88	14,6	
7,0	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	0,645	-165	2,299	35	0,0918	0	0,480	-99	1,02	14,0	13,1
8,5	0,632	-173	2,233	28	0,0933	-2	0,474	-103	1,07	13,8	12,2
9,0	0,620	179	2,174	21	0,0945	-5	0,467	-108	1,11	13,6	11,6
9,5	0,609	171	2,120	14	0,0960	-8	0,459	-112	1,15	13,4	11,1
10,0	0,600	163	2,071	7	0,0976	-10	0,453	-118	1,18	13,3	10,7
10,5	0,592	154	2,026	0	0,0990	-13	0,446	-123	1,21	13,1	10,4
11,0	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	0,574	130	1,910	-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	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	-161	1,28	12,1	9,0
14,0	0,561	99	1,774	-50	0,1140	-35	0,422	-167	1,27	11,9	8,8
14,5	0,559	91	1,745	-57	0,1170	-39	0,421	-173	1,26	11,7	8,7
15,0	0,556	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
16,0	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	0,559	50	1,646	-93	0,1320	-63	0,410	157	1,20	11,0	8,3
17,5	0,561	45	1,649	-99	0,1350	-67	0,409	152	1,16	10,9	8,4
18,0	0,565	40	1,656	-103	0,1376	-71	0,407	148	1,13	10,8	8,6

Order Instructions:

Full type variant including quality level must be specified by the orderer. For *HiRel* Discrete and Microwave Semiconductors the ordering code specifies device family and quality level only.

Ordering Form:

Ordering Code: Q.....
CFY25- (nnl) (ql)
(nnl): Noise/Gain/Power Level
(ql): Quality Level

Ordering Example:

Ordering Code: Q62703F119
CFY25-20P

For CFY25, Noise/Gain/Power Level 20P:
NF < 2.1dB, G_a > 8.5 dB, P_{1dB} > 14 dBm @ 12 GHz
in ESA Space Quality Level

Further Informations:

See our WWW-Pages:

- Discrete and RF-Semiconductors (Small Signal Semiconductors)

  www.siemens.de/semiconductor/products/35/35.htm

- *HiRel* Discrete and Microwave Semiconductors

  www.siemens.de/semiconductor/products/35/353.htm

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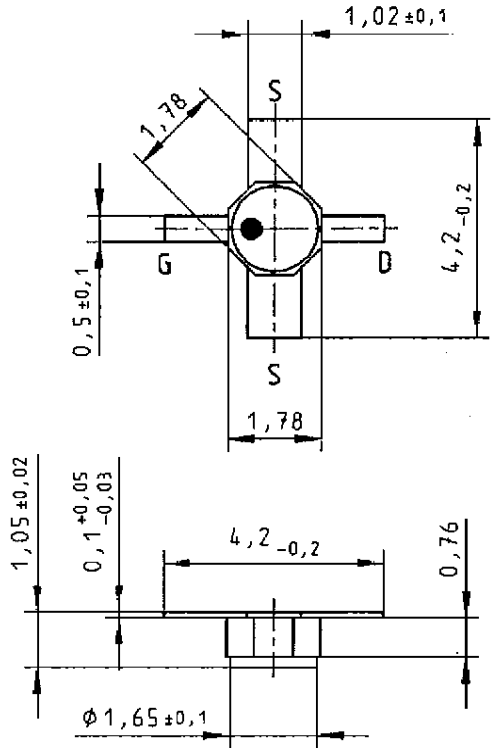
Micro-X Package



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