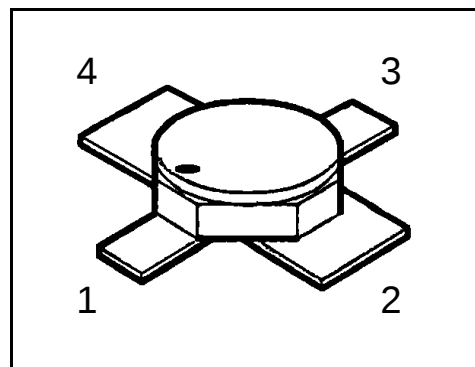


HiRel X-Band GaAs Low Noise / General Purpose MESFET

- **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: Electrostatic discharge 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 $T_A=25^{\circ}\text{C}$; unless otherwise specified)

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
DC Characteristics					
Drain-source saturation current $V_{DS} = 3\text{ V}, V_{GS} = 0\text{ V}$	I_{DSS}	15	30	60	mA
Gate threshold voltage $V_{DS} = 3\text{ V}, I_D = 1\text{ mA}$	$-V_{Gth}$	0.3	1.0	3.0	V
Drain current at pinch-off $V_{DS} = 3\text{ V}, V_{GS} = -4\text{ V}$	I_{Dp}	-	< 100	-	μA
Gate leakage current at pinch-off $V_{DS} = 3\text{ V}, V_{GS} = -4\text{ V}$	$-I_{Gp}$	-	< 100	200	μA
Transconductance $V_{DS} = 3\text{ V}, I_D = 15\text{ mA}$	g_{m15}	35	40	-	mS
Gate leakage current at operation $V_{DS} = 3\text{ V}, I_D = 15\text{ mA}$	$-I_{G15}$	-	< 1	2	μA
Thermal resistance junction to soldering point	$R_{th\text{ JS}}$	-	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 CFY25-P CFY25-20, -20P CFY25-23, -23P	NF	- - -	< 2.3 1.9 2.2	- 2.1 2.4	dB
Associated gain. ¹⁾ V _{DS} = 3 V, I _D = 15 mA, f = 12 GHz CFY25-P CFY25-20, -20P CFY25-23, -23P	G _a	- 8.5 8.0	> 8.5 9 8.7	- - -	dB
Output power at 1 dB gain compression ²⁾ V _{DS} = 3 V, I _{D(RF off)} = 20 mA, f = 12 GHz CFY25-20, -23 CFY25-20P, 23P, -P	P _{1dB}	- 14	15 15	- -	dBm
Linear power gain ²⁾ V _{DS} = 3 V, I _D = 20 mA, f = 12 GHz, P _{in} = 0 dBm CFY25-20 CFY25-23 CFY25-20P, -P CFY25-23P	G _{lp}	- - 8.5 8.0	9.2 8.5 9.2 8.5	- - - -	dB

Notes.:

1) Noise figure / associated 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

$V_{DS} = 3 \text{ V}, I_D = 15 \text{ mA}, Z_o = 50 \text{ } \Omega$?											
f [GHz]	S11 [mag]	<S11 [angle]	S21 [mag]	<S21 [angle]	S12 [mag]	<S12 [angle]	S22 [mag]	<S22 [angle]	k-Fact. [mag]	S_{21}/S_{12} [dB]	MAG [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)

$V_{DS} = 3 \text{ V}, I_D = 30 \text{ mA}, Z_o = 50 \text{ } \Omega$											
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:
 $NF < 2.1\text{dB}$, $G_a > 8.5\text{ dB}$, $P_{1\text{dB}} > 14\text{ dBm}$ @ 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

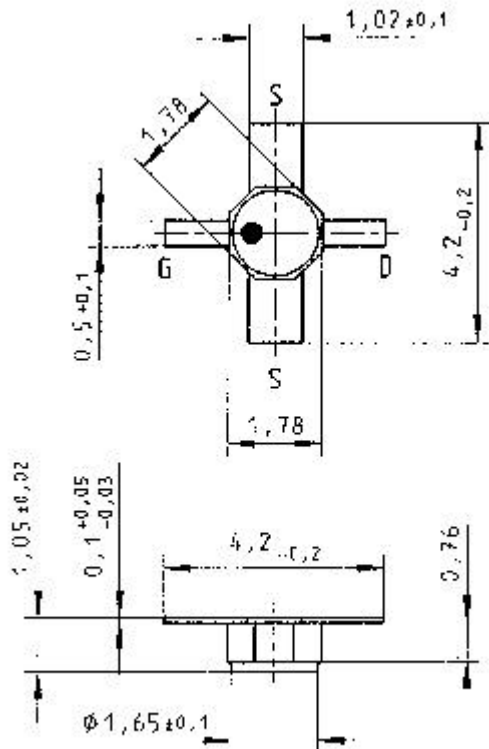
- *HiRel* Discrete and Microwave Semiconductors

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

Please contact also our marketing division :

Tel.: ++89 6362 4480
Fax.: ++89 6362 5568
e-mail: martin.wimmers@siemens-scg.com
Address: Siemens Semiconductors,
High Frequency Products Marketing,
P.O.Box 801709,
D-81617 Munich

Micro-X Package



Published by Siemens Semiconductors, High Frequency Products Marketing, P.O.Box 801709, D-81617 Munich.

© Siemens AG 1998. All Rights Reserved.

As far as patents or other rights of third parties are concerned, liability is only assumed for components per se, not for applications, processes and circuits implemented within components or assemblies.

The information describes the type of component and shall not be considered as assured characteristics.

Terms of delivery and rights to change design reserved.

For questions on technology, delivery and prices please contact the Offices of Semiconductor Group in Germany or the Siemens Companies and Representatives worldwide (see address list).

Due to technical requirements components may contain dangerous substances. For information on the type in question please contact your nearest Siemens Office, Semiconductor Group.

Siemens Semiconductors is a certified CECC and QS9000 manufacturer (this includes ISO 9000).