

## DC-20GHz Reflective SPDT Switch

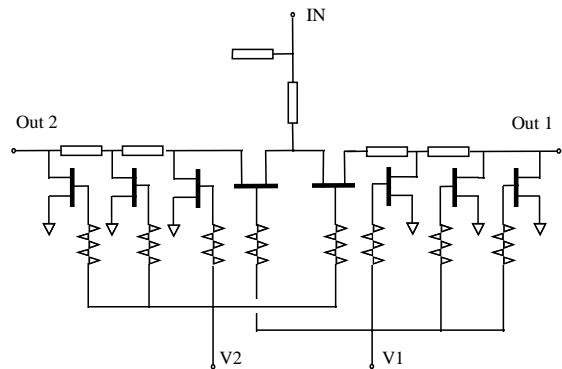
### GaAs Monolithic Microwave IC

#### Description

The CHS5100 is a wideband monolithic FET based reflective switch manufactured on a standard power process using 0.7 $\mu$ m implanted active layer MESFET, via holes, air bridges and electron beam gate lithography.

This wideband switch is suitable for ultra broadband ECM and EW systems. It can also be used in instrumentation and wideband signal processing applications.

Available in chip form



#### Main Features

- Broadband performance : DC-20GHz
- Low insertion loss : 2.1dB@20GHz
- High isolation : 53dB@1GHz
- 30dB@20GHz
- Excellent input and output matching:
- VSWR < 1.5:1
- Chip size : 1,92 x 1,22 x 0.1mm

#### Main Characteristics

Tamb = +25°C

Symbol	Parameter	Min	Typ	Max	Unit
II	On state insertion loss			2.5	dB
Is	Off state isolation	25			dB
VSWR	Input and output matching			1.5:1	

ESD Protections : Electrostatic sensitive discharge device observe handling precautions !

## Electrical Characteristics

Tamb = +25°C, specifications are given for typical control voltages and for 50Ω source and load impedances.

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Fop	Operating frequency range		0.5		20	GHz
Il	On state insertion loss	1GHz 5GHz 10GHz 15GHz 20GHz		1.15 1.20 1.40 1.60 2.10	2.50	dB
Is	Off state reverse isolation	1GHz 5GHz 10GHz 15GHz 20GHz	25	53 42 37 34 30		dB
VSWR	Input VSWR				1.5:1	
VSWR	Ouput VSWR				1.5:1	
P <sub>1dB</sub>	Input 1dB compression point	20GHz		20		dBm
Ic	Control current				100	μA
VH	High level control voltage		-2	0		Volt
VL	Low level control voltage			-6	-4.75	Volt

## Absolute Maximum Ratings (1)

Tamb = +25°C

Symbol	Parameter	Value	Unit
VH,VL	Control voltages	-8 to 0	Volt
Pin	Maximum peak input power overdrive (2)	30	dBm
Top	Operating temperature range	-40 to +85	°C
Tstg	Storage temperature range	-55 to +125	°C

(1) Operation of this device above any one of these parameters may cause permanent damage

(2) Duration < 1s

**Typical on wafer scattering parameters**

Tamb = +25°C, Bias Conditions : VL = -6V , VH = 0V, on-state IN-Out1 path

Freq. GHz	S11 dB	S11 /°	S12 dB	S12 /°	S21 dB	S21 /°	S22 dB	S22 /°
0.50	-19.93	-4.0	-1.10	-5.6	-1.11	-5.6	-19.98	-5.8
1.00	-19.85	-11.9	-1.12	-10.3	-1.13	-10.3	-19.88	-15.7
1.50	-19.73	-19.5	-1.14	-15.2	-1.14	-15.2	-19.75	-25.1
2.00	-19.63	-26.6	-1.15	-20.1	-1.15	-20.1	-19.60	-33.4
2.50	-19.59	-33.4	-1.17	-25.0	-1.17	-25.0	-19.41	-42.0
3.00	-19.46	-39.7	-1.18	-29.9	-1.19	-29.9	-19.27	-50.1
3.50	-19.38	-46.0	-1.19	-34.8	-1.20	-34.8	-19.08	-58.0
4.00	-19.27	-52.0	-1.21	-39.8	-1.21	-39.7	-18.91	-65.0
4.50	-19.21	-57.8	-1.23	-44.7	-1.23	-44.7	-18.74	-72.6
5.00	-19.22	-62.4	-1.25	-49.6	-1.25	-49.6	-18.62	-78.5
5.50	-19.05	-67.7	-1.26	-54.5	-1.26	-54.6	-18.45	-85.2
6.00	-19.02	-72.0	-1.28	-59.5	-1.28	-59.5	-18.45	-90.5
6.50	-18.96	-75.5	-1.30	-64.4	-1.30	-64.4	-18.35	-95.8
7.00	-18.59	-88.0	-1.31	-69.6	-1.31	-69.6	-18.01	-109.3
7.50	-18.61	-92.8	-1.33	-74.5	-1.33	-74.6	-17.84	-115.5
8.00	-18.52	-96.7	-1.34	-79.5	-1.35	-79.6	-17.92	-121.1
8.50	-18.56	-101.6	-1.36	-84.6	-1.36	-84.6	-17.76	-127.2
9.00	-18.50	-104.7	-1.38	-89.6	-1.38	-89.6	-17.83	-132.3
9.50	-18.51	-109.3	-1.40	-94.7	-1.40	-94.7	-17.82	-138.3
10.00	-18.56	-112.4	-1.42	-99.8	-1.42	-99.8	-18.04	-143.2
10.50	-18.59	-115.7	-1.45	-104.9	-1.44	-104.9	-18.05	-149.0
11.00	-18.69	-119.2	-1.46	-110.1	-1.46	-110.1	-18.22	-153.3
11.50	-18.67	-122.1	-1.48	-115.2	-1.48	-115.3	-18.29	-158.7
12.00	-18.83	-124.5	-1.50	-120.5	-1.50	-120.5	-18.52	-162.7
12.50	-18.95	-127.1	-1.52	-125.7	-1.52	-125.7	-18.68	-167.4
13.00	-18.97	-130.0	-1.54	-131.0	-1.55	-131.1	-19.01	-171.5
13.50	-19.12	-132.8	-1.57	-136.4	-1.57	-136.4	-19.21	-175.7
14.00	-19.19	-134.6	-1.58	-141.8	-1.59	-141.8	-19.63	-179.8
14.50	-19.33	-136.9	-1.60	-147.2	-1.60	-147.3	-20.01	175.2
15.00	-19.54	-139.0	-1.63	-152.7	-1.63	-152.7	-20.18	172.7
15.50	-19.67	-141.7	-1.66	-158.2	-1.66	-158.2	-20.59	166.4
16.00	-19.73	-143.1	-1.68	-163.8	-1.68	-163.8	-20.97	163.5
16.50	-20.17	-145.3	-1.71	-169.5	-1.71	-169.5	21.10	160.4
17.00	-20.44	-148.3	-1.75	-175.3	-1.75	-175.3	-21.89	154.9
17.50	-20.80	-149.5	-1.78	179.0	-1.78	178.9	-21.89	151.5
18.00	-21.11	-154.0	-1.82	173.0	-1.82	173.0	-22.51	147.0
18.50	-21.78	-156.3	-1.86	167.1	-1.86	167.1	-23.39	140.1
19.00	-22.61	-159.3	-1.91	161.1	-1.91	161.0	-22.64	126.9
19.50	-24.05	-164.4	-1.95	155.1	-1.95	155.0	-22.32	125.9
20.00	-25.54	-162.9	-1.98	148.8	-1.98	148.7	-23.99	122.6
20.50	-29.33	-165.4	-2.02	142.3	-2.03	142.3	-23.53	99.0
21.00	-33.39	-164.3	-2.07	135.7	-2.08	135.7	-22.77	89.5
21.50	-46.45	-92.3	-2.13	129.1	-2.13	129.0	-23.50	92.1
22.00	-32.38	-30.2	-2.21	122.3	-2.21	122.2	-22.97	61.6
22.50	-26.53	-20.4	-2.30	115.0	-2.31	115.0	-20.57	52.6
23.00	-22.06	-23.9	-2.44	107.6	-2.44	107.6	-19.13	47.1
23.50	-19.35	-29.7	-2.62	100.5	-2.63	100.4	-18.64	27.7
24.00	-16.65	-34.4	-2.78	93.1	-2.79	93.1	-17.00	15.9
24.50	-14.54	-39.5	-2.98	85.5	-2.97	85.6	-15.65	6.2
25.00	-12.84	-45.9	-3.21	78.0	-3.21	77.9	-14.67	-6.7
25.50	-11.32	-51.7	-3.45	70.2	-3.45	70.2	-13.41	-16.0

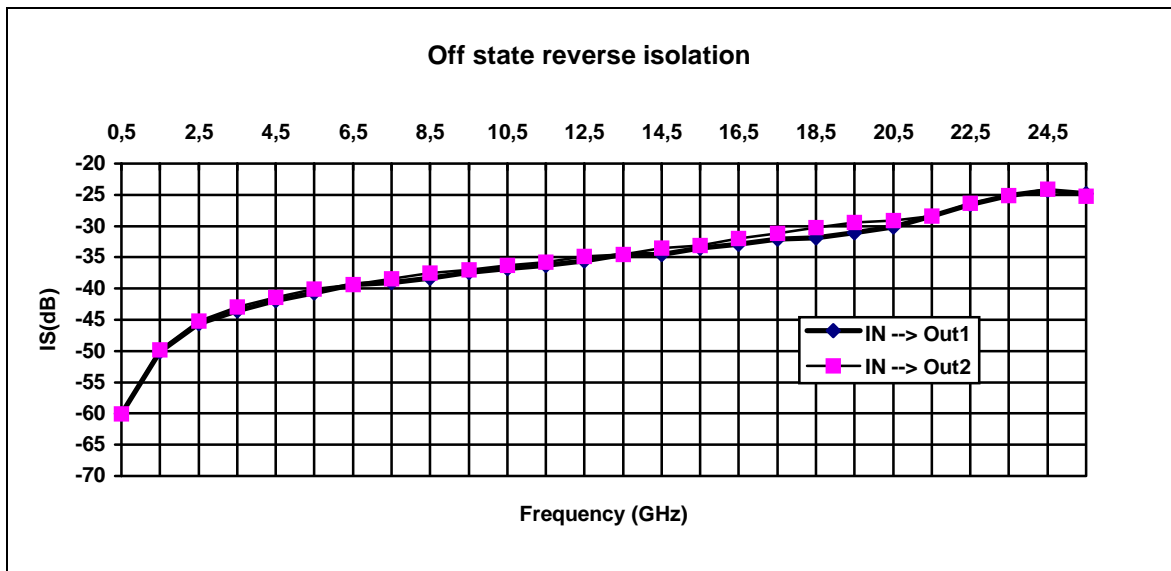
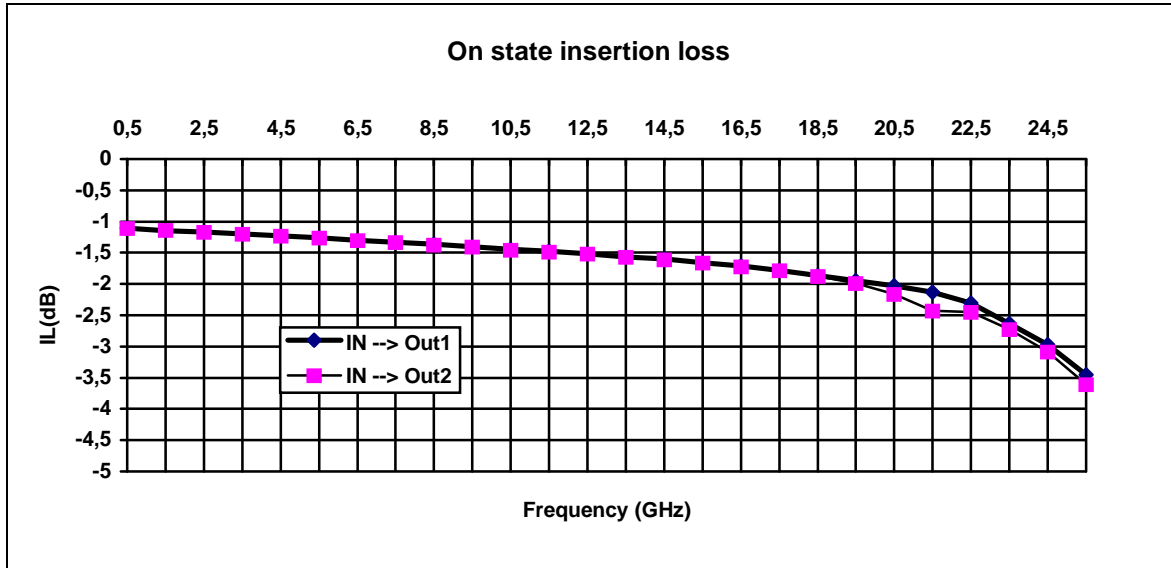
## Typical on wafer scattering parameters

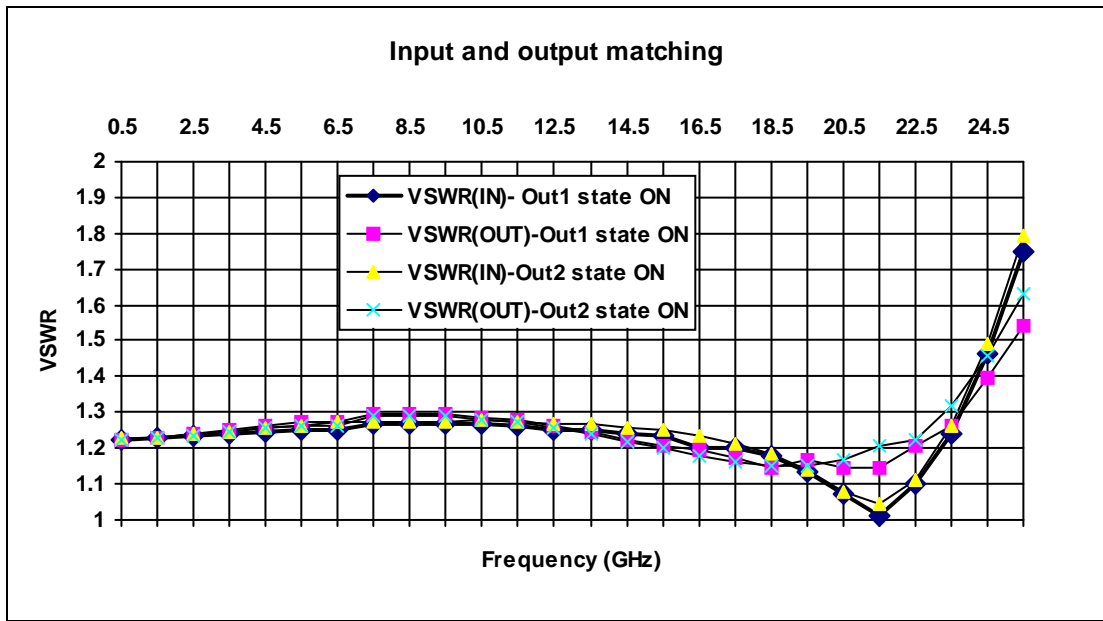
Tamb = +25°C, Bias Conditions : VL = -6V , VH = 0V, off-state IN-Out1 path

Freq. GHz	S11 dB	S11 /°	S12 dB	S12 /°	S21 dB	S21 /°	S22 dB	S22 /°
0.50	-18.28	2.8	-60.07	100.4	-62.13	82.9	-1.64	177.1
1.00	-17.46	-6.1	-52.95	85.5	-54.18	79.4	-1.66	175.3
1.50	-18.42	-30.5	-50.17	78.2	-49.95	76.6	-1.70	173.4
2.00	-17.00	-33.7	-47.30	71.7	-47.23	71.4	-1.74	171.4
2.50	-18.65	-43.5	-45.64	71.5	-45.87	67.7	-1.80	169.6
3.00	-19.40	-39.9	-44.56	63.7	-44.59	65.9	-1.85	167.7
3.50	-16.10	-53.3	-43.57	59.8	-43.48	61.0	-1.90	166.0
4.00	-17.52	-65.5	-42.76	54.3	-42.72	56.3	-1.95	164.1
4.50	-20.00	-85.2	-41.88	53.2	-41.87	51.5	-1.99	162.6
5.00	-18.14	-70.0	-40.89	50.3	-41.19	50.4	-2.05	160.8
5.50	-19.42	-83.4	-40.66	47.2	-40.67	47.4	-2.10	159.3
6.00	-18.43	-86.0	-40.18	44.0	-40.16	44.2	-2.14	157.5
6.50	-17.59	-76.1	-39.40	41.9	-39.44	42.2	-2.18	156.1
7.00	-18.33	-108.9	-39.34	39.4	-39.53	39.6	-2.17	153.9
7.50	-17.68	-115.8	-39.09	37.6	-38.91	36.0	-2.20	152.4
8.00	-22.95	-97.1	-38.53	38.5	-38.79	37.6	-2.23	150.6
8.50	-20.38	-105.2	-38.31	35.6	-38.16	34.2	-2.26	149.2
9.00	-17.48	-107.6	-37.71	32.3	-37.69	31.3	-2.29	147.5
9.50	-18.61	-116.2	-37.41	31.1	-37.43	30.3	-2.30	145.9
10.00	-20.56	-116.4	-37.08	29.7	-37.13	28.4	-2.34	144.1
10.50	-18.57	-111.6	-36.76	27.3	-36.83	27.3	-2.35	142.6
11.00	-16.32	-119.9	-36.27	25.9	-36.23	25.1	-2.38	141.0
11.50	-18.80	-130.9	-36.24	23.4	-36.26	22.2	-2.37	139.4
12.00	-16.65	-135.8	-35.73	21.5	-35.69	20.4	-2.40	137.8
12.50	-18.34	-147.2	-35.60	18.8	-35.68	19.7	-2.42	136.2
13.00	-23.83	-126.4	-35.47	19.6	-35.38	19.6	-2.44	134.6
13.50	-14.94	-132.1	-34.53	16.4	-34.62	16.6	-2.46	133.0
14.00	-17.12	-166.8	-34.51	14.1	-34.74	12.5	-2.49	131.4
14.50	-17.13	176.4	-34.60	13.8	-34.74	15.3	-2.48	129.5
15.00	-16.70	-131.4	-33.60	12.2	-33.74	12.0	-2.52	128.1
15.50	-17.75	-157.7	-33.51	8.6	-33.71	10.0	-2.51	126.3
16.00	-18.49	177.3	-33.18	4.5	-33.24	6.1	-2.54	124.8
16.50	-19.10	-177.5	-32.91	5.2	-32.66	3.7	-2.52	123.3
17.00	-37.58	165.7	-33.06	4.1	-32.88	4.4	-2.58	121.3
17.50	-21.78	-133.6	-32.09	3.4	-32.26	3.6	-2.59	119.9
18.00	-15.61	-168.0	-31.17	-2.6	-31.45	-2.6	-2.63	118.0
18.50	-21.68	113.7	-31.92	-6.6	-32.08	-7.0	-2.69	116.3
19.00	-42.95	175.9	-31.66	-4.9	-31.49	-4.6	-2.61	114.5
19.50	-27.64	-149.1	-31.10	-6.7	-31.03	-6.1	-2.61	113.6
20.00	-26.13	-24.4	-31.31	-7.2	-31.09	-7.5	-2.72	112.4
20.50	-21.30	-124.6	-30.11	-6.6	-30.11	-6.8	-2.68	109.3
21.00	-23.02	-162.6	-29.61	-8.0	-29.61	-7.6	-2.59	107.8
21.50	-26.02	54.4	-28.43	-7.5	-28.39	-7.6	-2.61	107.3
22.00	-30.85	-11.7	-26.93	-15.9	-26.97	-16.0	-2.82	104.3
22.50	-23.81	-46.8	-26.54	-23.0	-26.51	-22.8	-2.71	102.0
23.00	-20.26	-8.9	-26.28	-30.3	-26.28	-31.0	-2.65	100.2
23.50	-19.14	-64.5	-25.11	-31.2	-25.03	-31.1	-3.00	99.2
24.00	-21.68	-36.9	-24.32	-45.3	-24.34	-45.2	-2.96	97.8
24.50	-14.51	-18.5	-24.33	-58.0	-24.31	-57.9	-2.93	96.1
25.00	-14.74	-45.9	-24.38	-63.4	-24.39	-63.2	-3.02	95.2
25.50	-11.78	-45.7	-24.82	-74.5	-24.87	-74.1	-3.05	93.6

**Typical on Wafer [S] Parameters**

Tamb = +25°C, Bias Conditions : VL= -6V , VH = 0V

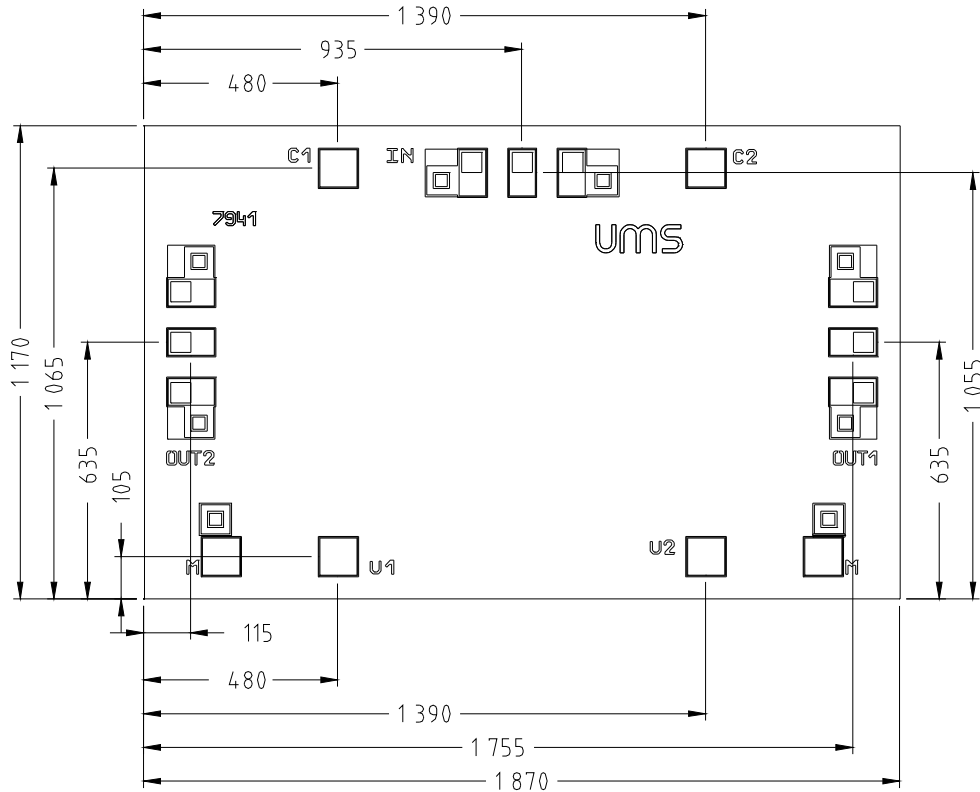




**Switch truth table (complementary logic)**

V1	V2	In to Out1	In to Out2
Low	High	On	Off
High	Low	Off	On

**Chip Mechanical Data**



UNITS :  $\mu\text{m}$   
 Tol :  $\pm 35\mu\text{m}$

RF Pad Size :  $120 \times 80\mu\text{m}$   
 DC Pad Size :  $100 \times 100\mu\text{m}$   
 chip thickness  $100\mu\text{m} \pm 10\mu\text{m}$

## Ordering Information

Chip form: CHS5100-99F/00

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