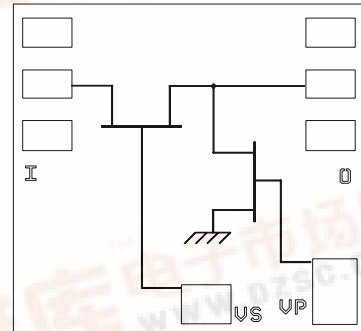


## DC-40GHz ATTENUATOR

### GaAs Monolithic Microwave IC

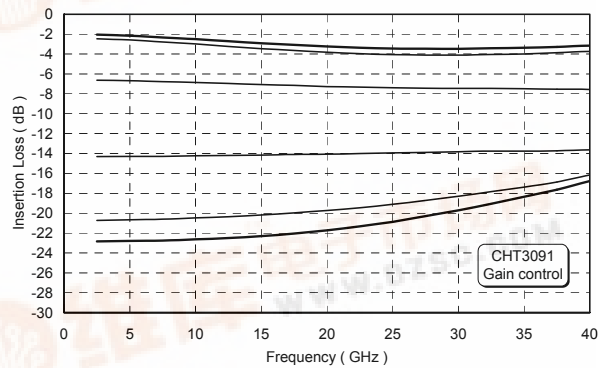
#### Description

The CHT3091a is a variable DC-40GHz attenuator designed for a wide range of applications, from military to commercial communication systems. The backside of the chip is both RF and DC grounds. This helps simplify the assembly process. The circuit is manufactured with a MESFET process, 0.7µm gate length, via holes through the substrate and air bridges. It is supplied in chip form.



#### Main Features

- Broadband performances: DC-40GHz
- 15dBm minimum input 1dB compression point (any attenuation)
- DC bias :  $-5V < V_S < 0V$  ;  $-5V < V_P < 0V$
- Chip size: 0.91 x 0.86 x 0.10 mm



#### Main Characteristics

Tamb. = 25°C

Symbol	Parameter	Min	Typ	Max	Unit
Fin	Input frequency range	DC		40	GHz
Min Att.	Minimum attenuation  S21  (VS=0V;VP=-5V)		3		dB
Max Att.	Maximum attenuation  S21  (VS=-5V;VP=0V)		20		dB
VSWRin	Input VSWR (any attenuation)			2:1	
VSWRout	Output VSWR (any attenuation)			2:1	
Pin1dB	Input 1dB compression point.(any attenuation)	15			dBm

ESD Protection: Electrostatic discharge sensitive device. Observe handling precautions!



## Electrical Characteristics (1)

Tamb = +25°C

Symbol	Parameter	Min	Typ	Max	Unit
Fin	Input frequency range	DC		40	GHz
Min Att.	Minimum attenuation  S21  (VS=0V;VP=-5V)				
	DC-10GHz		2.2		dB
	DC-20GHz		3		dB
	DC-40GHz		3.5	4	dB
Max Att.	Maximum attenuation  S21  (VS=-5V;VP=0V)				
	DC-10GHz		23		dB
	DC-20GHz		21		dB
	DC-40GHz		17	15	dB
VSWRin	Input VSWR (any attenuation)			2:1	
VSWRout	Output VSWR (any attenuation)			2:1	
Pin1dB	Input 1dB compression point.(any attenuation)	15			dBm

(1) These values are representative of on-wafer measurements that are made without bonding wires at the RF ports.

## Absolute Maximum Ratings

Tamb. = 25°C (1)

Symbol	Parameter	Values	Unit
VP	VP control voltage	-6V	V
VS	VS control voltage	-6V	V
Pin	RF input power	20	dBm
Ta	Operating temperature range	-40 to +85	°C
Tstg	Storage temperature range	-55 to +155	°C

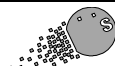
(1) Operation of this device above anyone of these parameters may cause permanent damage.

**Typical Result**

Chip Typical Response (On wafer Sij):

Tamb = +25°C Vp=0V Vs=-5V

Frequency	MS11	PS11	MS12	PS12	MS21	PS21	MS22	PS22
	<i>mod</i>	<i>pha</i>	<i>mod</i>	<i>pha</i>	<i>mod</i>	<i>pha</i>	<i>mod</i>	<i>pha</i>
GHz	dB	deg	dB	deg	dB	deg	dB	deg
1.000	-2,53E+01	-7,45E+00	-2,24E+01	-1,90E+00	-2,24E+01	-2,14E+00	-2,43E+01	-5,46E+00
2.000	-2,47E+01	-1,19E+01	-2,24E+01	-3,81E+00	-2,23E+01	-3,70E+00	-2,45E+01	-1,20E+01
3.000	-2,46E+01	-1,80E+01	-2,24E+01	-5,50E+00	-2,23E+01	-5,54E+00	-2,43E+01	-1,80E+01
4.000	-2,44E+01	-2,33E+01	-2,24E+01	-7,42E+00	-2,24E+01	-7,55E+00	-2,41E+01	-2,43E+01
5.000	-2,42E+01	-2,90E+01	-2,24E+01	-9,20E+00	-2,23E+01	-9,27E+00	-2,38E+01	-2,97E+01
6.000	-2,39E+01	-3,43E+01	-2,23E+01	-1,12E+01	-2,23E+01	-1,13E+01	-2,35E+01	-3,56E+01
7.000	-2,36E+01	-3,92E+01	-2,23E+01	-1,29E+01	-2,23E+01	-1,31E+01	-2,33E+01	-4,04E+01
8.000	-2,32E+01	-4,32E+01	-2,23E+01	-1,43E+01	-2,22E+01	-1,46E+01	-2,29E+01	-4,43E+01
9.000	-2,29E+01	-4,77E+01	-2,22E+01	-1,63E+01	-2,22E+01	-1,68E+01	-2,27E+01	-4,96E+01
10.000	-2,26E+01	-5,20E+01	-2,22E+01	-1,81E+01	-2,21E+01	-1,88E+01	-2,23E+01	-5,38E+01
11.000	-2,22E+01	-5,56E+01	-2,21E+01	-2,01E+01	-2,21E+01	-2,04E+01	-2,18E+01	-5,64E+01
12.000	-2,19E+01	-5,90E+01	-2,21E+01	-2,17E+01	-2,20E+01	-2,24E+01	-2,16E+01	-6,05E+01
13.000	-2,16E+01	-6,18E+01	-2,20E+01	-2,34E+01	-2,19E+01	-2,42E+01	-2,13E+01	-6,32E+01
14.000	-2,13E+01	-6,51E+01	-2,19E+01	-2,52E+01	-2,19E+01	-2,60E+01	-2,07E+01	-6,69E+01
15.000	-2,10E+01	-6,81E+01	-2,18E+01	-2,70E+01	-2,18E+01	-2,78E+01	-2,06E+01	-6,91E+01
16.000	-2,07E+01	-6,99E+01	-2,17E+01	-2,88E+01	-2,17E+01	-2,97E+01	-2,03E+01	-7,09E+01
17.000	-2,04E+01	-7,28E+01	-2,16E+01	-3,04E+01	-2,15E+01	-3,15E+01	-1,99E+01	-7,48E+01
18.000	-2,02E+01	-7,49E+01	-2,15E+01	-3,23E+01	-2,15E+01	-3,32E+01	-1,97E+01	-7,64E+01
19.000	-1,98E+01	-7,70E+01	-2,13E+01	-3,43E+01	-2,13E+01	-3,51E+01	-1,93E+01	-7,85E+01
20.000	-1,97E+01	-7,93E+01	-2,11E+01	-3,59E+01	-2,11E+01	-3,72E+01	-1,90E+01	-8,02E+01
21.000	-1,93E+01	-8,08E+01	-2,10E+01	-3,84E+01	-2,09E+01	-3,96E+01	-1,86E+01	-8,19E+01
22.000	-1,92E+01	-8,26E+01	-2,08E+01	-4,03E+01	-2,08E+01	-4,20E+01	-1,84E+01	-8,31E+01
23.000	-1,90E+01	-8,35E+01	-2,06E+01	-4,28E+01	-2,06E+01	-4,38E+01	-1,82E+01	-8,43E+01
24.000	-1,87E+01	-8,54E+01	-2,04E+01	-4,49E+01	-2,04E+01	-4,59E+01	-1,79E+01	-8,81E+01
25.000	-1,86E+01	-8,60E+01	-2,01E+01	-4,70E+01	-2,02E+01	-4,81E+01	-1,78E+01	-8,83E+01
26.000	-1,83E+01	-8,71E+01	-1,99E+01	-4,95E+01	-2,00E+01	-5,09E+01	-1,70E+01	-8,99E+01
27.000	-1,82E+01	-8,86E+01	-1,96E+01	-5,21E+01	-1,98E+01	-5,31E+01	-1,71E+01	-9,26E+01
28.000	-1,79E+01	-8,90E+01	-1,95E+01	-5,44E+01	-1,95E+01	-5,62E+01	-1,67E+01	-9,15E+01
29.000	-1,78E+01	-8,92E+01	-1,93E+01	-5,74E+01	-1,92E+01	-5,85E+01	-1,66E+01	-9,34E+01
30.000	-1,77E+01	-9,00E+01	-1,90E+01	-6,03E+01	-1,90E+01	-6,17E+01	-1,68E+01	-9,20E+01
31.000	-1,74E+01	-9,07E+01	-1,87E+01	-6,32E+01	-1,87E+01	-6,47E+01	-1,61E+01	-9,23E+01
32.000	-1,72E+01	-9,05E+01	-1,85E+01	-6,59E+01	-1,85E+01	-6,77E+01	-1,62E+01	-9,71E+01
33.000	-1,69E+01	-9,02E+01	-1,81E+01	-6,98E+01	-1,82E+01	-7,11E+01	-1,60E+01	-9,57E+01
34.000	-1,67E+01	-8,99E+01	-1,79E+01	-7,31E+01	-1,79E+01	-7,45E+01	-1,52E+01	-9,89E+01
35.000	-1,63E+01	-9,09E+01	-1,76E+01	-7,62E+01	-1,77E+01	-7,72E+01	-1,49E+01	-1,01E+02
36.000	-1,60E+01	-8,99E+01	-1,73E+01	-8,02E+01	-1,73E+01	-8,13E+01	-1,46E+01	-9,37E+01
37.000	-1,58E+01	-9,11E+01	-1,71E+01	-8,40E+01	-1,71E+01	-8,51E+01	-1,46E+01	-9,89E+01
38.000	-1,54E+01	-9,10E+01	-1,68E+01	-8,81E+01	-1,68E+01	-8,99E+01	-1,55E+01	-1,04E+02
39.000	-1,50E+01	-9,00E+01	-1,66E+01	-9,15E+01	-1,67E+01	-9,32E+01	-1,34E+01	-1,02E+02
40.000	-1,47E+01	-9,03E+01	-1,63E+01	-9,53E+01	-1,64E+01	-9,77E+01	-1,37E+01	-1,05E+02



# CHT3091a

# Attenuator

Tamb = +25°C Vp=-5V Vs=0V

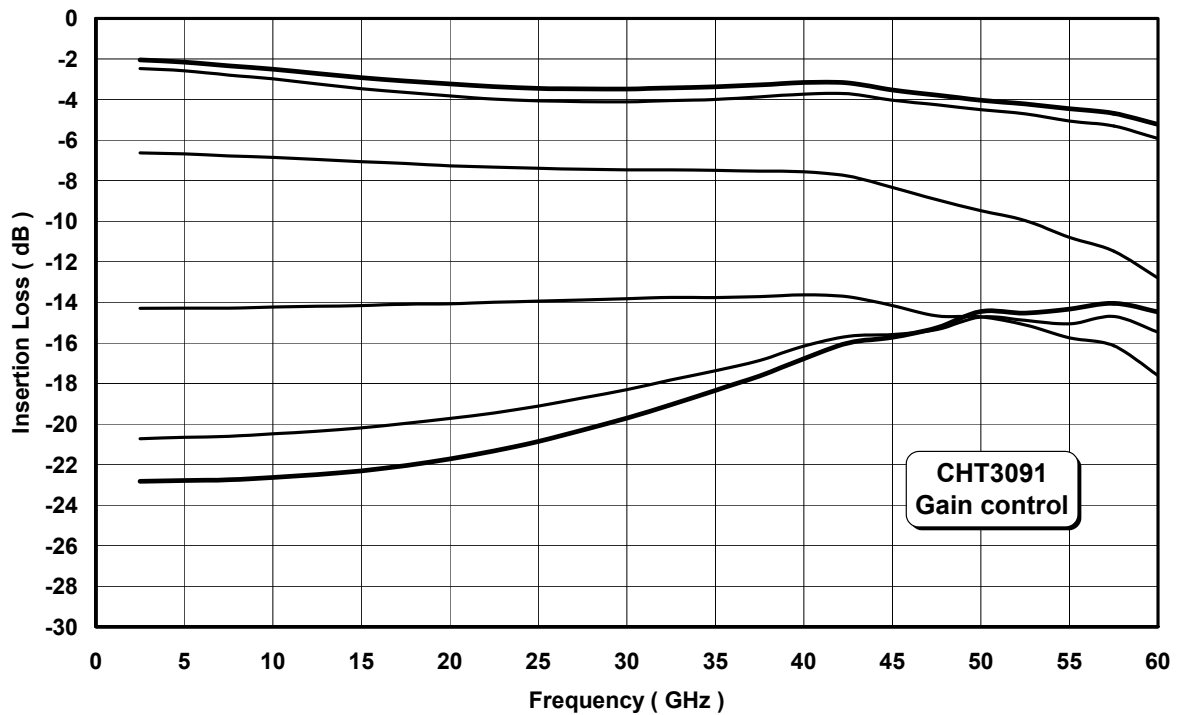
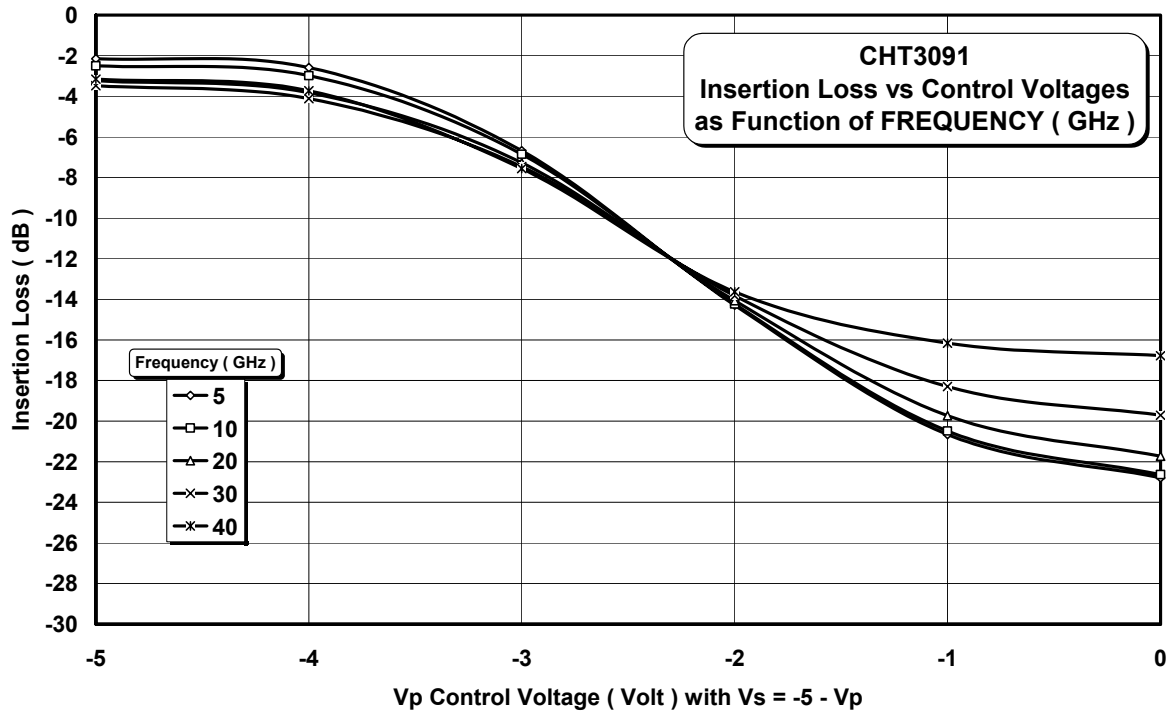
Frequency	MS11	PS11	MS12	PS12	MS21	PS21	MS22	PS22
	<i>mod</i>	<i>pha</i>	<i>mod</i>	<i>pha</i>	<i>mod</i>	<i>pha</i>	<i>mod</i>	<i>pha</i>
GHz	dB	deg	dB	deg	dB	deg	dB	deg
1.000	-1,68E+01	-1,62E+01	-2,09E+00	-5,63E+00	-1,91E+00	-5,65E+00	-1,61E+01	-1,48E+01
2.000	-1,59E+01	-2,74E+01	-1,92E+00	-1,10E+01	-1,88E+00	-1,08E+01	-1,59E+01	-2,75E+01
3.000	-1,57E+01	-3,97E+01	-1,98E+00	-1,61E+01	-1,94E+00	-1,61E+01	-1,55E+01	-3,99E+01
4.000	-1,54E+01	-5,27E+01	-2,07E+00	-2,15E+01	-2,03E+00	-2,15E+01	-1,52E+01	-5,27E+01
5.000	-1,50E+01	-6,26E+01	-2,13E+00	-2,65E+01	-2,09E+00	-2,66E+01	-1,48E+01	-6,32E+01
6.000	-1,44E+01	-7,38E+01	-2,20E+00	-3,19E+01	-2,17E+00	-3,20E+01	-1,42E+01	-7,42E+01
7.000	-1,41E+01	-8,31E+01	-2,30E+00	-3,67E+01	-2,26E+00	-3,70E+01	-1,39E+01	-8,28E+01
8.000	-1,37E+01	-8,94E+01	-2,34E+00	-4,12E+01	-2,29E+00	-4,16E+01	-1,35E+01	-8,91E+01
9.000	-1,30E+01	-9,89E+01	-2,41E+00	-4,69E+01	-2,40E+00	-4,73E+01	-1,28E+01	-9,87E+01
10.000	-1,28E+01	-1,07E+02	-2,53E+00	-5,18E+01	-2,49E+00	-5,24E+01	-1,24E+01	-1,07E+02
11.000	-1,25E+01	-1,14E+02	-2,62E+00	-5,65E+01	-2,61E+00	-5,69E+01	-1,22E+01	-1,13E+02
12.000	-1,23E+01	-1,21E+02	-2,72E+00	-6,13E+01	-2,69E+00	-6,20E+01	-1,19E+01	-1,20E+02
13.000	-1,22E+01	-1,27E+02	-2,82E+00	-6,60E+01	-2,80E+00	-6,66E+01	-1,17E+01	-1,26E+02
14.000	-1,20E+01	-1,34E+02	-2,91E+00	-7,06E+01	-2,88E+00	-7,14E+01	-1,15E+01	-1,32E+02
15.000	-1,19E+01	-1,40E+02	-3,00E+00	-7,52E+01	-2,99E+00	-7,61E+01	-1,14E+01	-1,37E+02
16.000	-1,19E+01	-1,45E+02	-3,07E+00	-7,98E+01	-3,09E+00	-8,06E+01	-1,14E+01	-1,43E+02
17.000	-1,18E+01	-1,50E+02	-3,14E+00	-8,44E+01	-3,13E+00	-8,52E+01	-1,12E+01	-1,48E+02
18.000	-1,18E+01	-1,56E+02	-3,22E+00	-8,89E+01	-3,22E+00	-8,97E+01	-1,13E+01	-1,53E+02
19.000	-1,19E+01	-1,61E+02	-3,29E+00	-9,35E+01	-3,28E+00	-9,45E+01	-1,13E+01	-1,58E+02
20.000	-1,20E+01	-1,66E+02	-3,31E+00	-9,78E+01	-3,31E+00	-9,88E+01	-1,14E+01	-1,62E+02
21.000	-1,20E+01	-1,71E+02	-3,35E+00	-1,03E+02	-3,34E+00	-1,04E+02	-1,14E+01	-1,66E+02
22.000	-1,22E+01	-1,77E+02	-3,41E+00	-1,07E+02	-3,41E+00	-1,08E+02	-1,16E+01	-1,72E+02
23.000	-1,25E+01	1,78E+02	-3,41E+00	-1,12E+02	-3,43E+00	-1,13E+02	-1,19E+01	-1,76E+02
24.000	-1,28E+01	1,73E+02	-3,43E+00	-1,16E+02	-3,47E+00	-1,18E+02	-1,19E+01	1,80E+02
25.000	-1,32E+01	1,68E+02	-3,46E+00	-1,21E+02	-3,51E+00	-1,22E+02	-1,22E+01	1,75E+02
26.000	-1,37E+01	1,62E+02	-3,47E+00	-1,26E+02	-3,52E+00	-1,27E+02	-1,25E+01	1,72E+02
27.000	-1,42E+01	1,56E+02	-3,44E+00	-1,31E+02	-3,54E+00	-1,32E+02	-1,28E+01	1,67E+02
28.000	-1,49E+01	1,51E+02	-3,52E+00	-1,36E+02	-3,53E+00	-1,37E+02	-1,36E+01	1,64E+02
29.000	-1,57E+01	1,45E+02	-3,51E+00	-1,40E+02	-3,50E+00	-1,42E+02	-1,40E+01	1,60E+02
30.000	-1,66E+01	1,41E+02	-3,49E+00	-1,46E+02	-3,49E+00	-1,47E+02	-1,47E+01	1,53E+02
31.000	-1,77E+01	1,34E+02	-3,45E+00	-1,51E+02	-3,49E+00	-1,52E+02	-1,58E+01	1,50E+02
32.000	-1,92E+01	1,29E+02	-3,45E+00	-1,56E+02	-3,52E+00	-1,57E+02	-1,62E+01	1,48E+02
33.000	-2,10E+01	1,22E+02	-3,40E+00	-1,61E+02	-3,48E+00	-1,63E+02	-1,74E+01	1,43E+02
34.000	-2,29E+01	1,11E+02	-3,43E+00	-1,67E+02	-3,46E+00	-1,68E+02	-1,86E+01	1,49E+02
35.000	-2,63E+01	1,01E+02	-3,42E+00	-1,72E+02	-3,48E+00	-1,74E+02	-1,99E+01	1,51E+02
36.000	-3,12E+01	7,94E+01	-3,41E+00	-1,78E+02	-3,46E+00	-1,79E+02	-2,38E+01	1,51E+02
37.000	-3,55E+01	2,69E+01	-3,39E+00	1,77E+02	-3,47E+00	1,75E+02	-2,35E+01	1,58E+02
38.000	-3,11E+01	-3,53E+01	-3,41E+00	1,70E+02	-3,41E+00	1,68E+02	-2,30E+01	1,49E+02
39.000	-2,50E+01	-6,00E+01	-3,45E+00	1,64E+02	-3,49E+00	1,63E+02	-2,35E+01	-1,63E+02
40.000	-2,27E+01	-7,35E+01	-3,54E+00	1,58E+02	-3,55E+00	1,57E+02	-2,28E+01	-1,64E+02

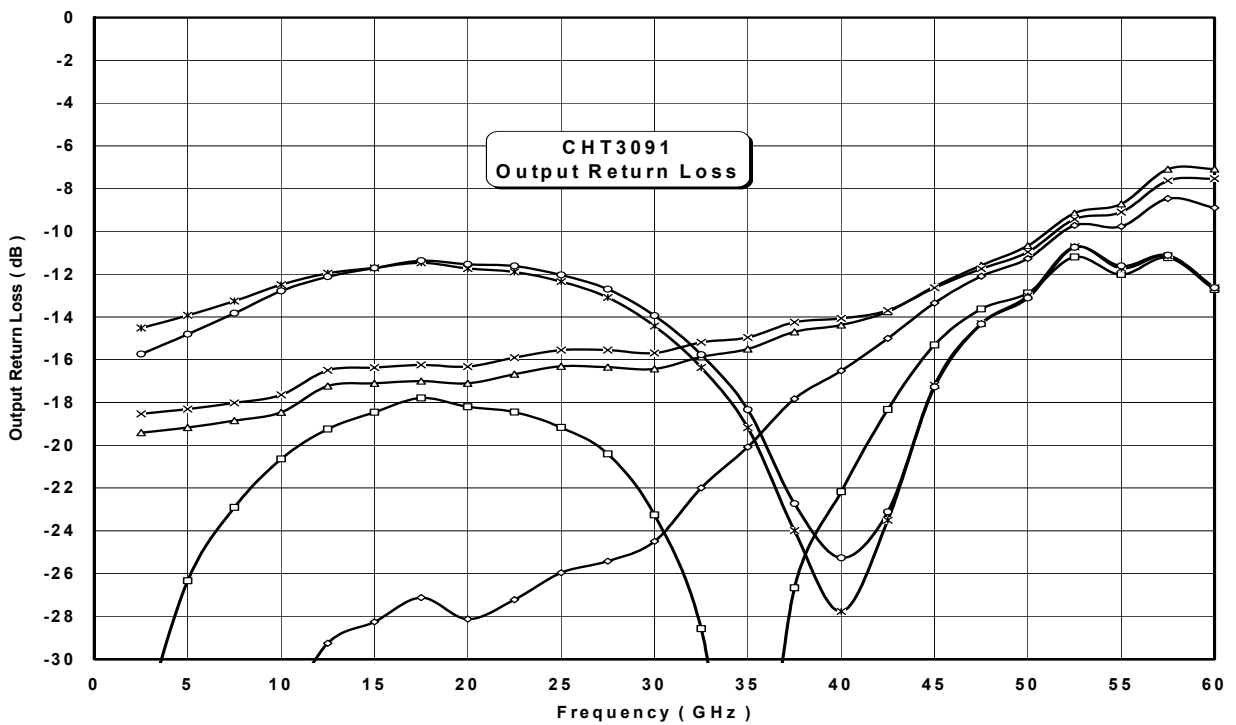
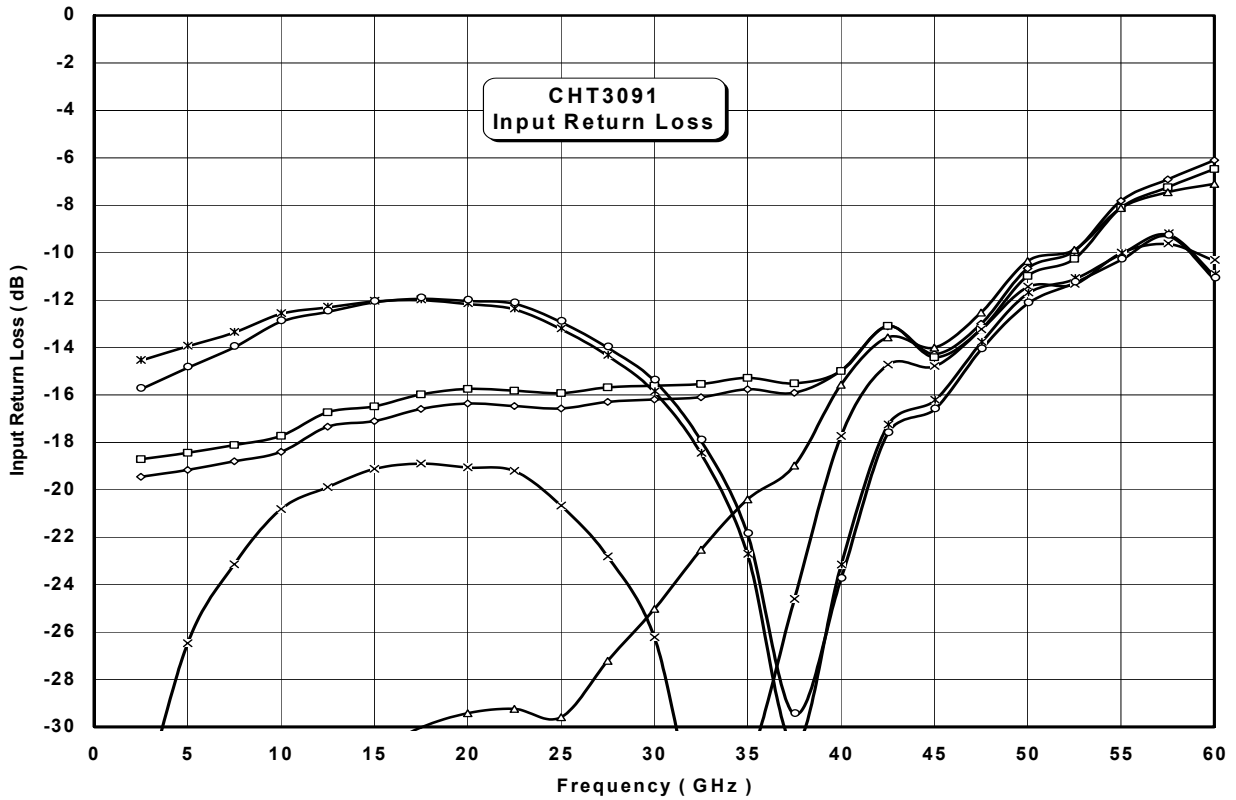
Typical Results

Chip Typical Response (On wafer Sij):

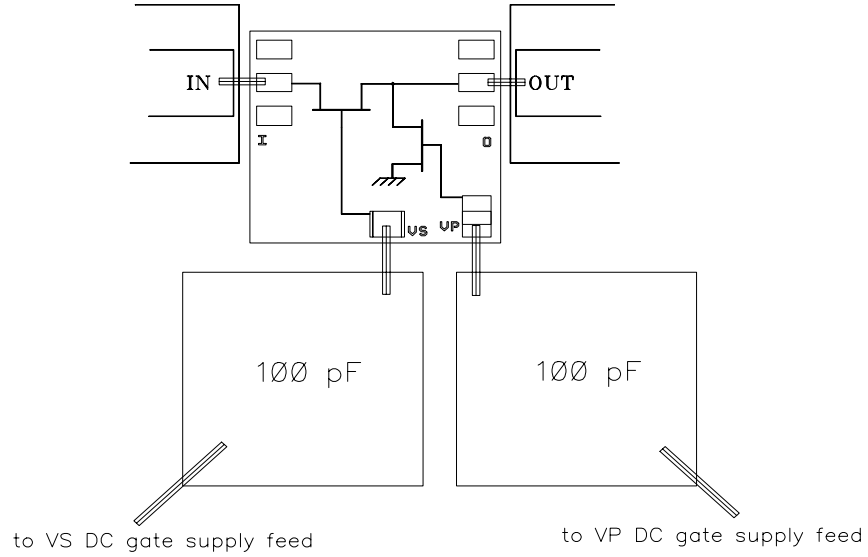
Tamb = +25°C

Vp = 0V to -5V & Vs = -5V to 0V

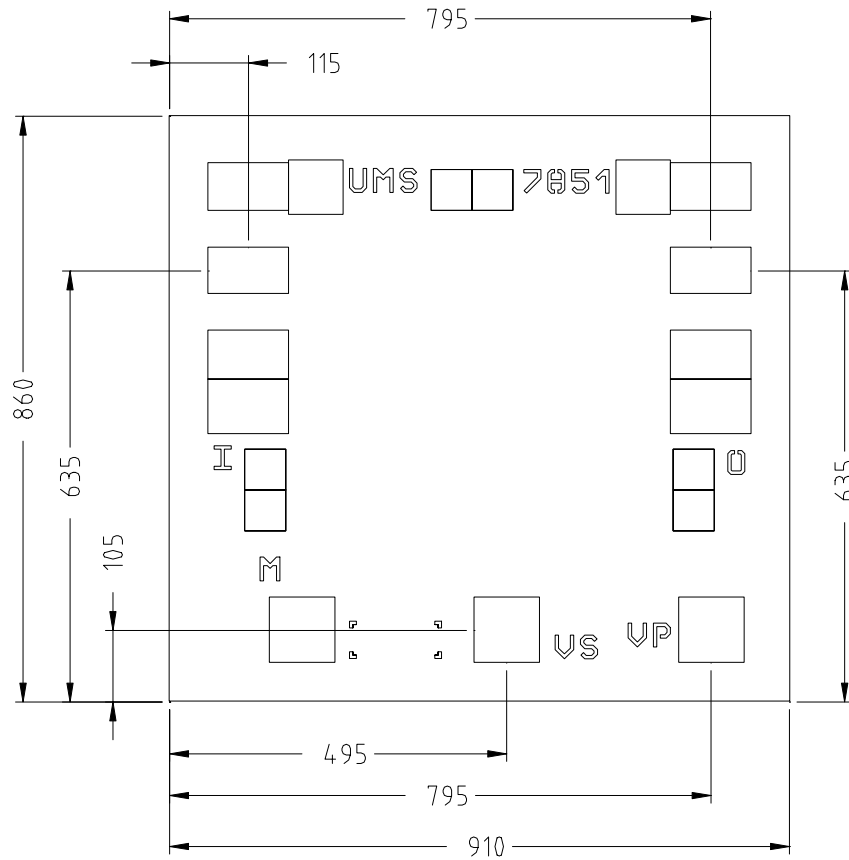




Chip Assembly and Mechanical Data



Note : Supply feed might be capacitively bypassed. 25µm diameter gold wire is to be preferred.



UNITS : µm  
Tol : ±35µm

**Bonding pad positions.**

(Chip thickness: 100µm. All dimensions are in micrometers)

## Ordering Information

Chip form: CHT3091a99F/00

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