

TOSHIBA**MICROWAVE SEMICONDUCTOR
TECHNICAL DATA****MICROWAVE POWER MMIC AMPLIFIER****TMD1414-2
TMD1414-2B
TMD1414-2C****FEATURES**

- Suitable for Ku-band VSAT
- High Power $P_{1dB}=34.5\text{dBm(TYP.)}$
- High Power Added Efficiency $\eta_{add}=29\text{(TYP.)}$
- High Gain $G_{1dB}=26\text{dB(TYP.)}$
- Broadband Operation $f=13.75 - 14.5\text{GHz.}$

ABSOLUTE MAXIMUM RATINGS(Ta=25°C)

CHARACTERISTICS	SYMBOL	UNIT	RATINGS
DRAIN SUPPLY VOLTAGE	VDD	V	10
GATE SUPPLY VOLTAGE	VGG	V	-10
INPUT POWER	Pin	dBm	20
FLANGE TEMPERATURE	Tf	°C	-40 - +90
STORAGE TEMPERATURE	Tstg	°C	-65 - +175

RF PERFORMANCE SPECIFICATIONS (Ta=25°C)

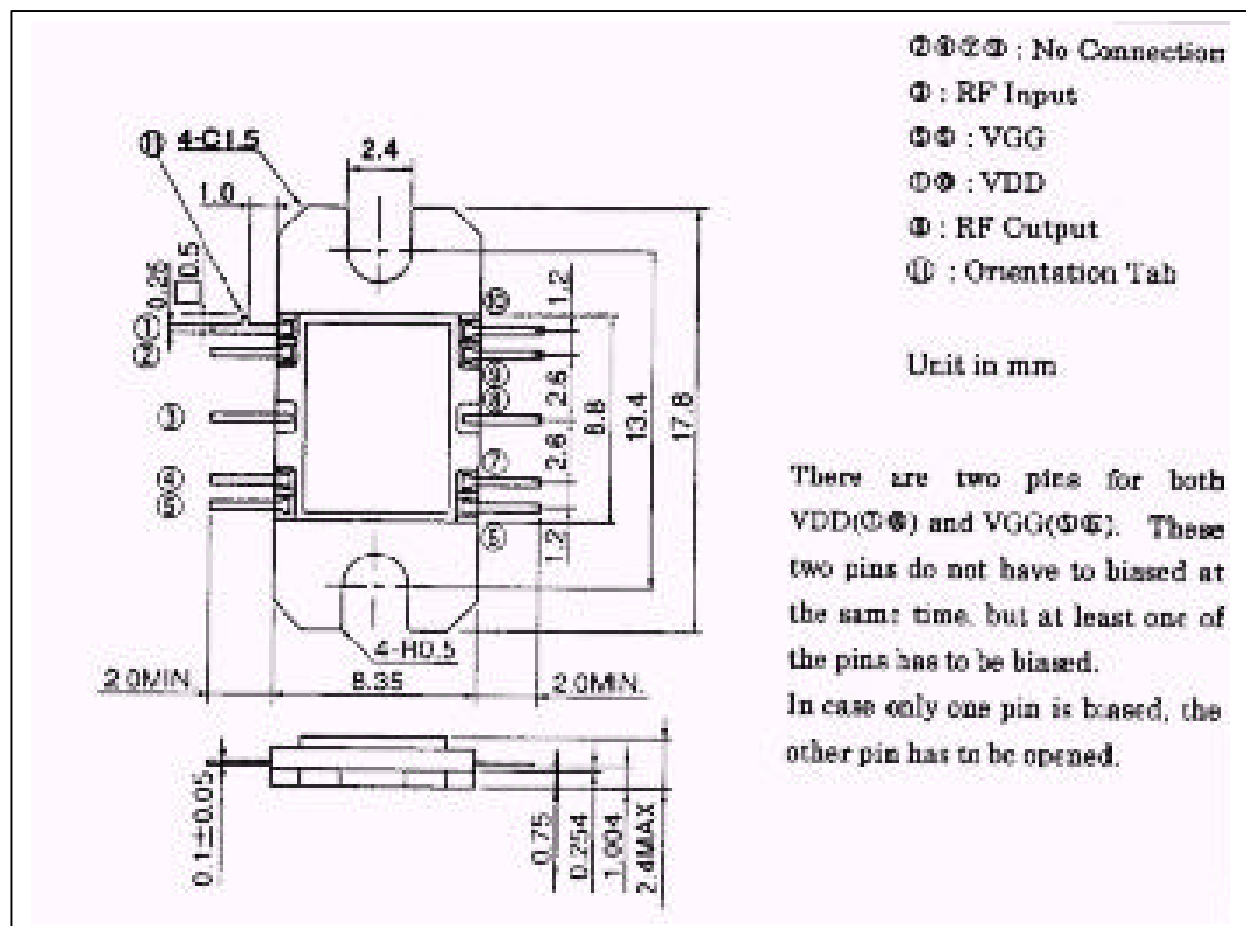
CHARACTERISTICS	SYMBOL	CONDITION	UNIT	MIN.	TYP.	MAX.
Operating Frequency	f		GHz	13.75	—	14.5
Output Power at 1dB Gain Compression Point	P1dB	VDD=7V VGG=-5V	dBm	32.0	34.5	—
Power Gain at 1dB Gain Compression Point	G1dB		dB	21.0	26.0	—
Gain Flatness	G		dB	—	—	±1.0
Drain Current	IDD		A	—	1.4	1.8
Power Added Efficiency	η_{add}		%	—	29	—
Third Order Intercept Point	IP3		dBm	—	40	—
VSWRin (small signal)	VSWRin		—	—	2.0:1	2.5:1
VSWRout (small signal)	VSWRout		—	—	2.0:1	3.0:1
Detector Output Voltage*	Vdet	@Po=33dBm	V	—	3.0	—

*: For 2B,2C

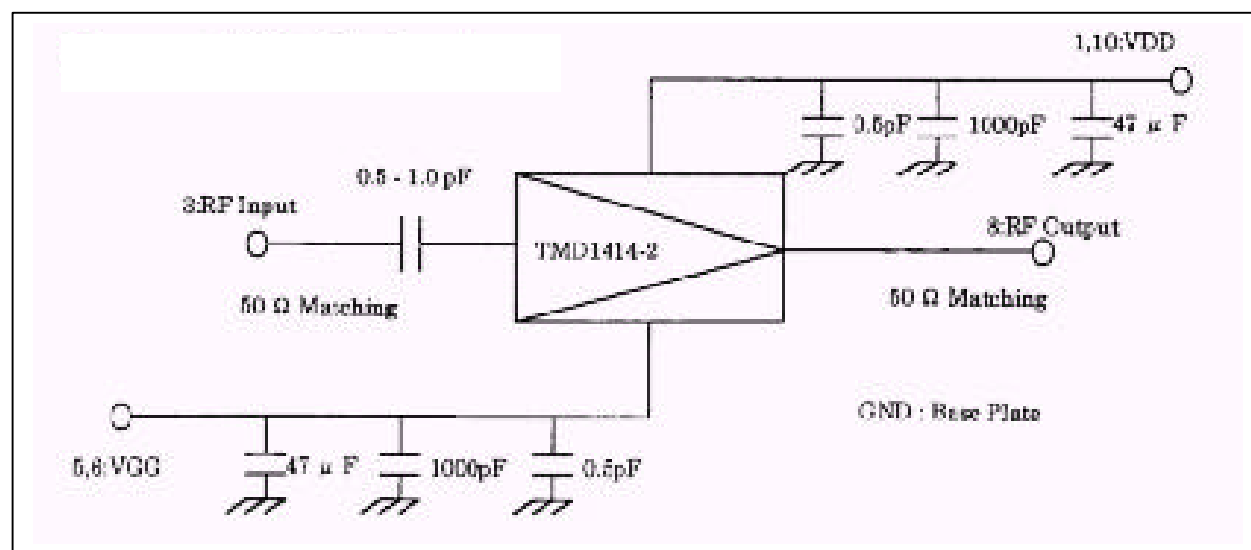
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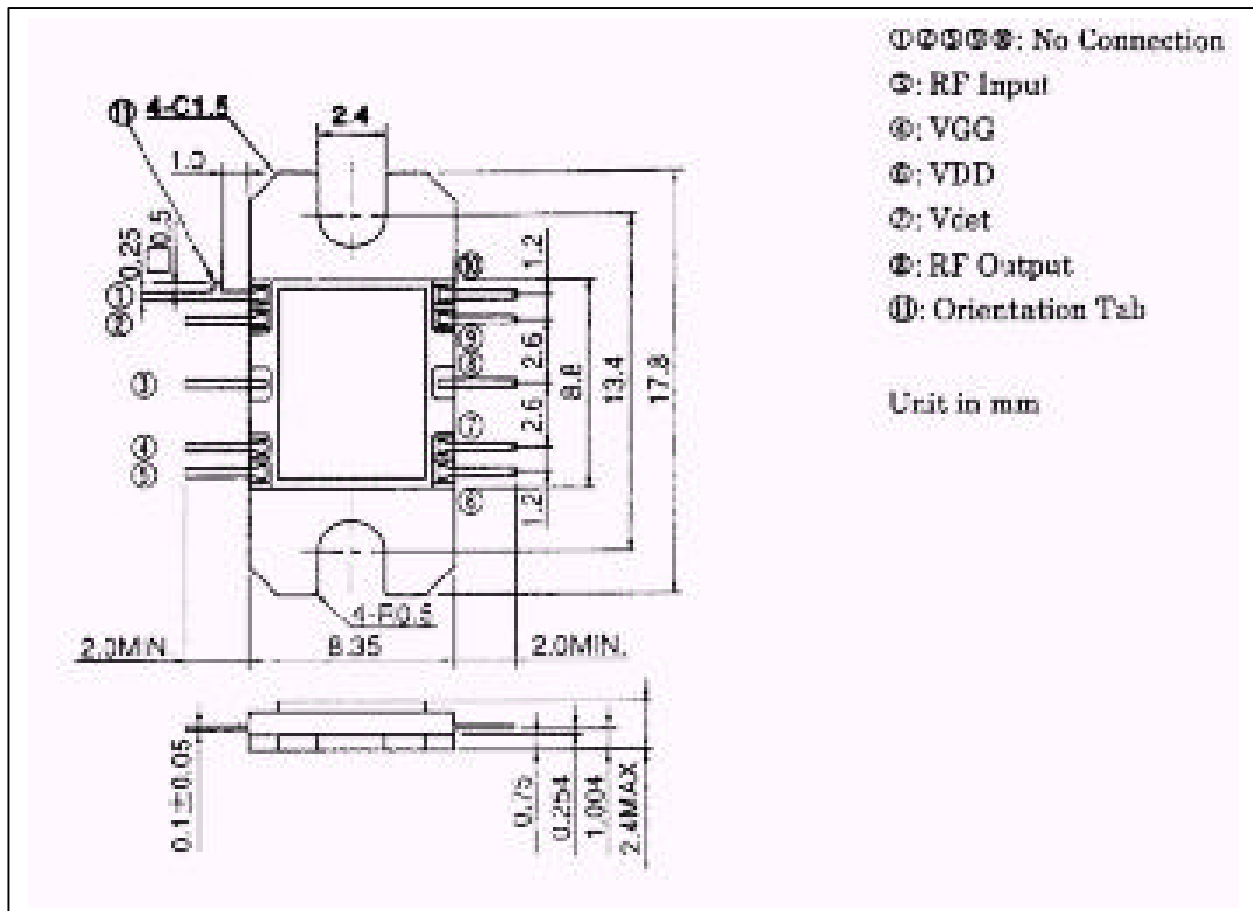
Package Outline (TMD1414-2)



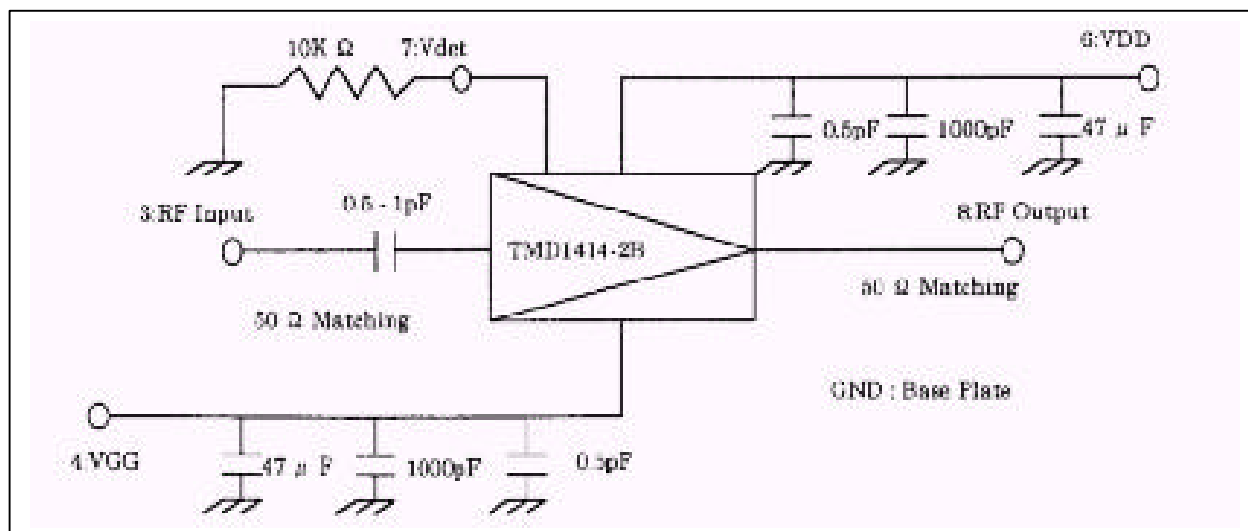
Recommended Bias Configuration (TMD1414-2)



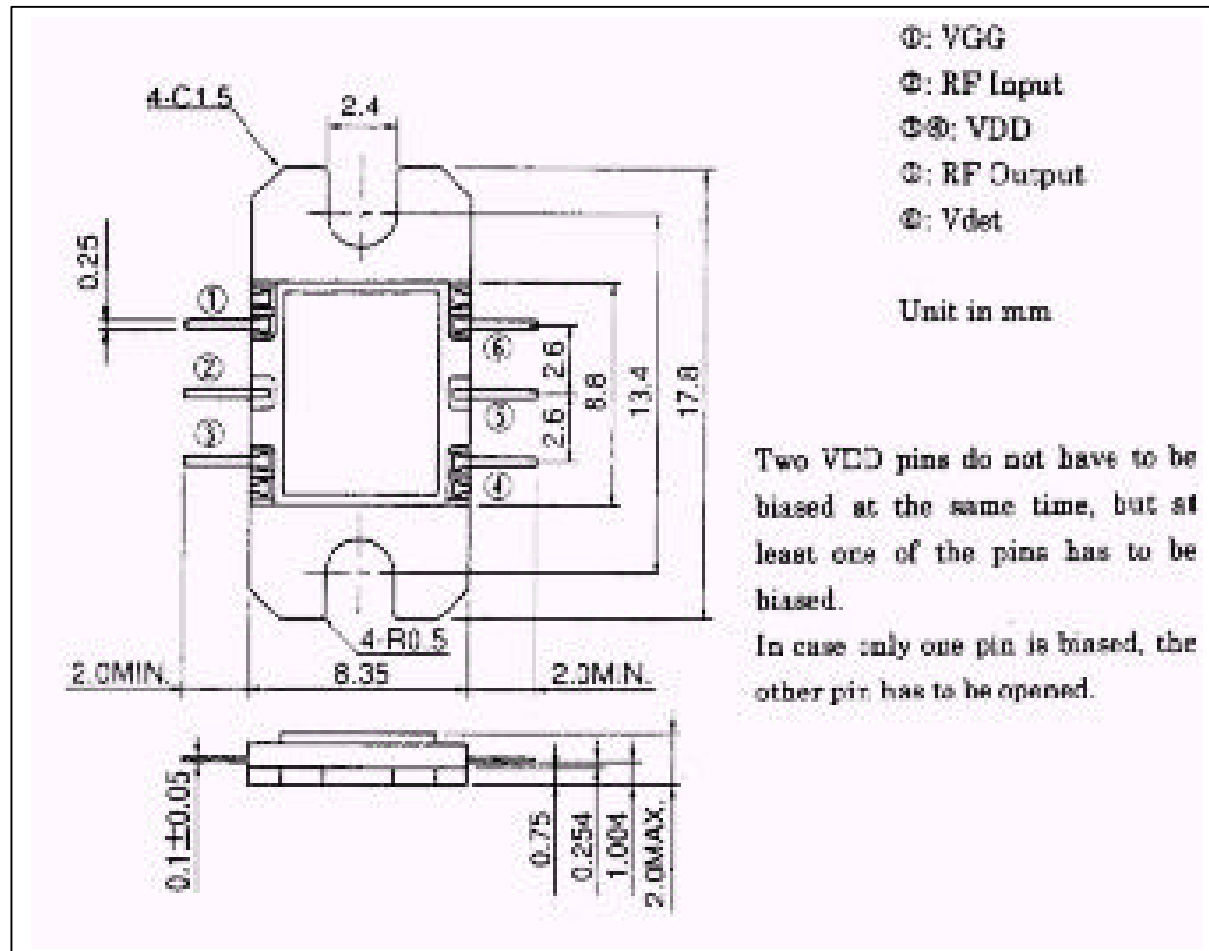
Package Outline (TMD1414-2B)



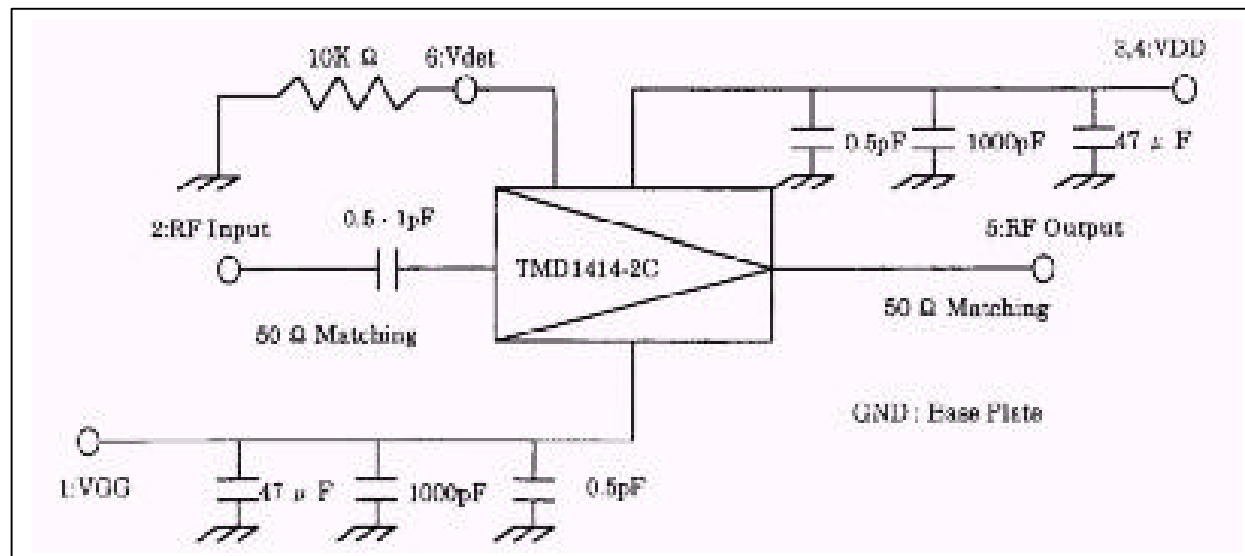
Recommended Bias Configuration (TMD1414-2B)



Package Outline (TMD1414-2C)



Recommended Bias Configuration (TMD1414-2C)

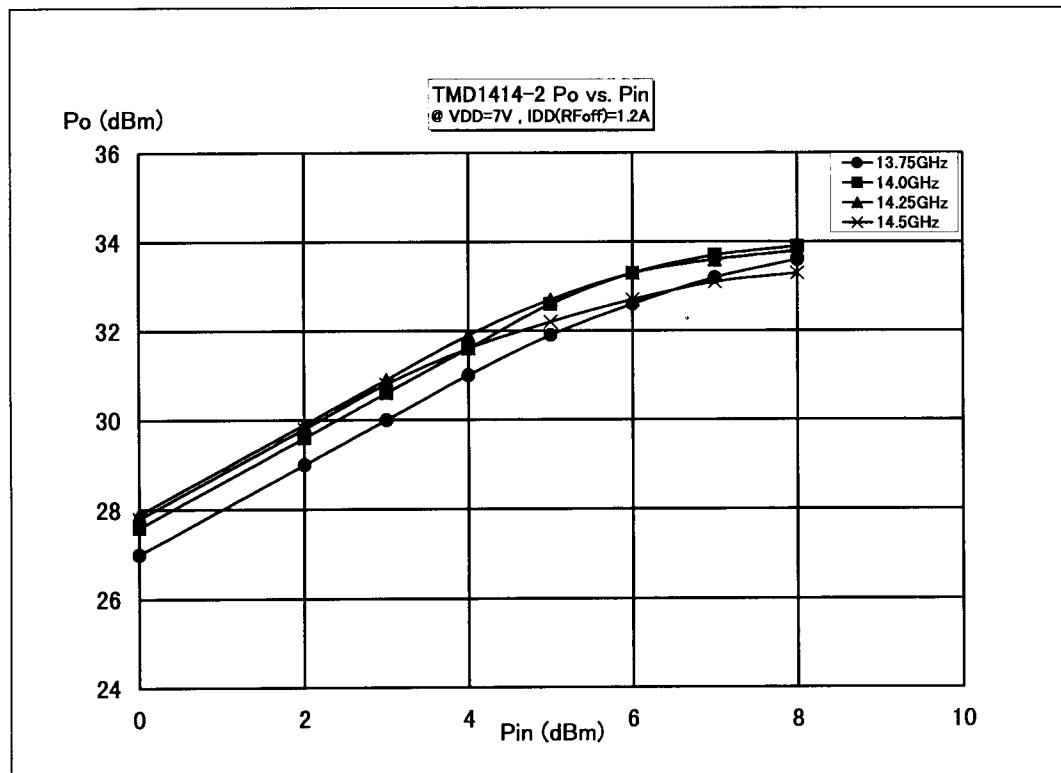
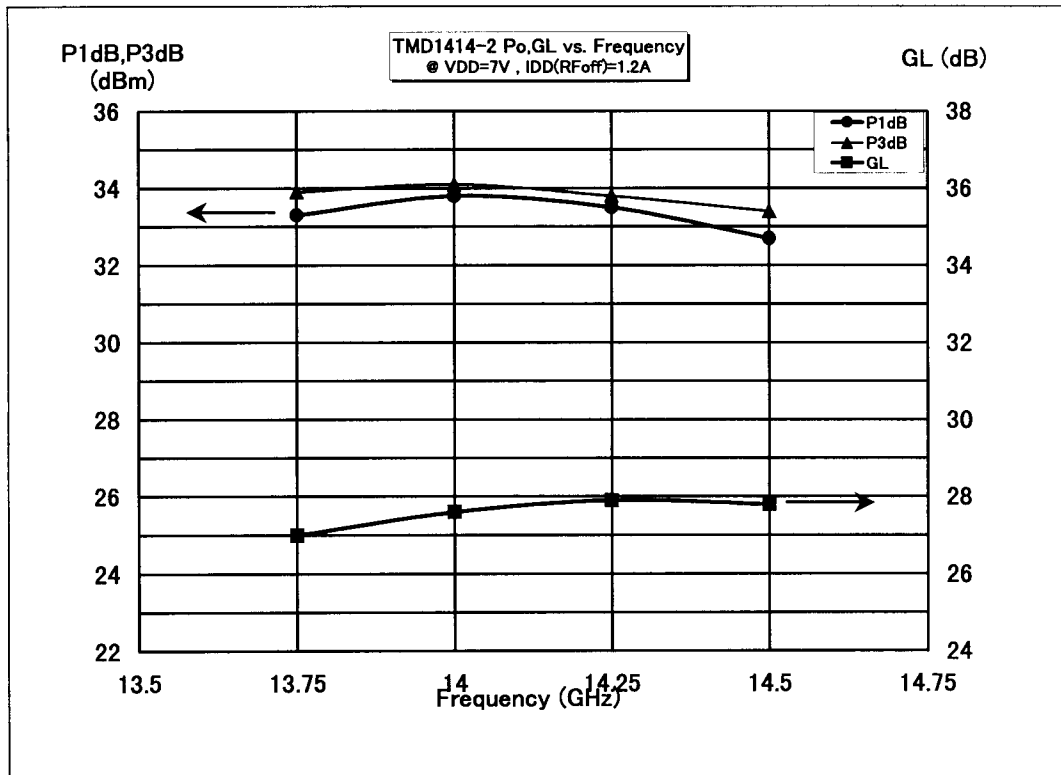


S-Parameters (TMD1414-2/2B/2C)

! S-PARAMETERS FOR TMD1414-2 VDD=7 V, VGG=-5V

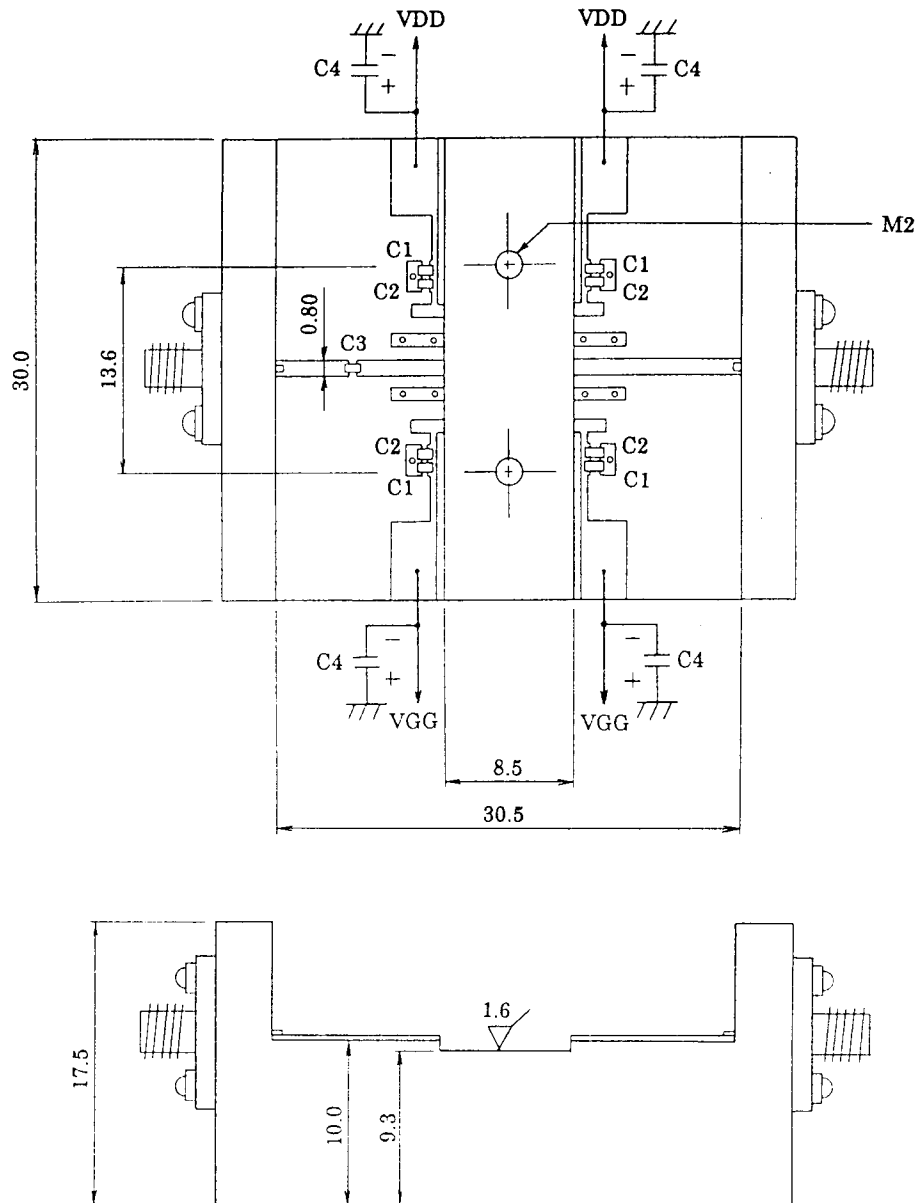
GHZ S M A R 50

! FREQ	S11		S21		S12		S22		ANG
!	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	
13.475	0.247	-79.9	15.958	58.0	0.004	146.2	0.415	-90.2	
13.500	0.240	-79.4	16.107	55.0	0.004	150.0	0.417	-91.2	
13.525	0.234	-78.8	16.295	52.0	0.004	155.5	0.418	-92.3	
13.550	0.229	-78.1	16.469	49.0	0.004	141.2	0.421	-93.3	
13.575	0.224	-77.1	16.646	45.9	0.005	145.3	0.423	-94.3	
13.600	0.218	-76.2	16.847	42.7	0.005	146.6	0.425	-95.5	
13.625	0.213	-75.0	17.001	39.5	0.004	141.5	0.426	-96.7	
13.650	0.208	-74.0	17.157	36.4	0.004	139.0	0.429	-97.8	
13.675	0.202	-72.9	17.349	33.3	0.005	144.9	0.432	-99.0	
13.700	0.198	-71.7	17.519	30.2	0.005	138.8	0.435	-100.3	
13.725	0.194	-70.7	17.739	26.9	0.004	141.5	0.436	-101.7	
13.750	0.190	-69.4	17.915	23.6	0.005	144.8	0.438	-103.0	
13.775	0.186	-68.4	18.098	20.3	0.005	135.4	0.441	-104.6	
13.800	0.183	-67.0	18.293	17.0	0.006	142.5	0.445	-106.1	
13.825	0.181	-65.6	18.476	13.7	0.005	145.1	0.448	-107.5	
13.850	0.177	-64.4	18.674	10.2	0.005	140.0	0.449	-109.3	
13.875	0.174	-63.0	18.832	6.9	0.005	136.6	0.452	-110.9	
13.900	0.171	-61.7	19.025	3.5	0.005	128.7	0.455	-112.7	
13.925	0.169	-60.2	19.236	0.0	0.005	138.8	0.456	-114.5	
13.950	0.166	-59.3	19.415	-3.6	0.006	139.5	0.459	-116.3	
13.975	0.164	-57.8	19.581	-7.1	0.006	134.3	0.460	-118.3	
14.000	0.163	-56.4	19.740	-10.8	0.006	135.0	0.462	-120.4	
14.025	0.161	-55.3	19.900	-14.4	0.006	134.4	0.463	-122.6	
14.050	0.159	-53.7	20.041	-18.0	0.006	131.8	0.464	-124.6	
14.075	0.158	-52.4	20.195	-21.7	0.006	133.0	0.466	-126.8	
14.100	0.157	-51.2	20.309	-25.5	0.007	134.5	0.466	-129.0	
14.125	0.155	-50.1	20.445	-29.3	0.006	134.5	0.467	-131.5	
14.150	0.154	-48.6	20.539	-33.0	0.006	128.5	0.465	-133.8	
14.175	0.153	-47.9	20.641	-36.8	0.006	132.1	0.465	-136.2	
14.200	0.152	-46.7	20.715	-40.7	0.006	130.3	0.466	-138.8	
14.225	0.150	-44.9	20.751	-44.6	0.007	134.3	0.467	-141.6	
14.250	0.149	-43.9	20.790	-48.5	0.008	130.7	0.464	-144.2	
14.275	0.148	-42.6	20.787	-52.5	0.007	125.1	0.462	-146.9	
14.300	0.146	-41.3	20.788	-56.3	0.007	131.7	0.460	-149.7	
14.325	0.145	-39.4	20.761	-60.4	0.008	123.5	0.455	-152.5	
14.350	0.143	-37.8	20.708	-64.4	0.007	124.8	0.452	-155.4	
14.375	0.140	-35.4	20.610	-68.3	0.008	123.0	0.447	-158.4	
14.400	0.139	-33.4	20.504	-72.3	0.008	119.0	0.441	-161.2	
14.425	0.138	-31.0	20.373	-76.3	0.008	120.3	0.434	-164.2	
14.450	0.136	-28.4	20.220	-80.2	0.008	120.5	0.427	-167.3	
14.475	0.136	-25.7	20.023	-84.2	0.008	119.9	0.418	-170.2	
14.500	0.137	-23.1	19.813	-88.0	0.008	118.1	0.411	-173.2	
14.525	0.138	-20.3	19.592	-91.8	0.008	115.8	0.402	-176.1	
14.550	0.141	-17.6	19.371	-95.7	0.009	115.4	0.393	-179.1	
14.575	0.144	-14.6	19.094	-99.3	0.008	113.2	0.385	177.9	
14.600	0.148	-11.6	18.830	-103.0	0.008	115.2	0.375	174.9	
14.625	0.153	-8.9	18.536	-106.6	0.009	113.6	0.365	172.1	
14.650	0.158	-6.9	18.292	-110.2	0.009	111.5	0.355	169.3	
14.675	0.164	-5.2	17.990	-113.7	0.009	105.5	0.345	166.4	
14.700	0.172	-3.9	17.700	-117.0	0.009	111.0	0.335	163.7	

TYPICAL RF PERFORMANCE

H. OUTLINE OF TEST JIG AND BIAS CIRCUIT FOR TMD1414-02 / -1 / -2

Unit in mm



Substrate : Thickness = 0.25 mm, $\epsilon_r = 2.2$

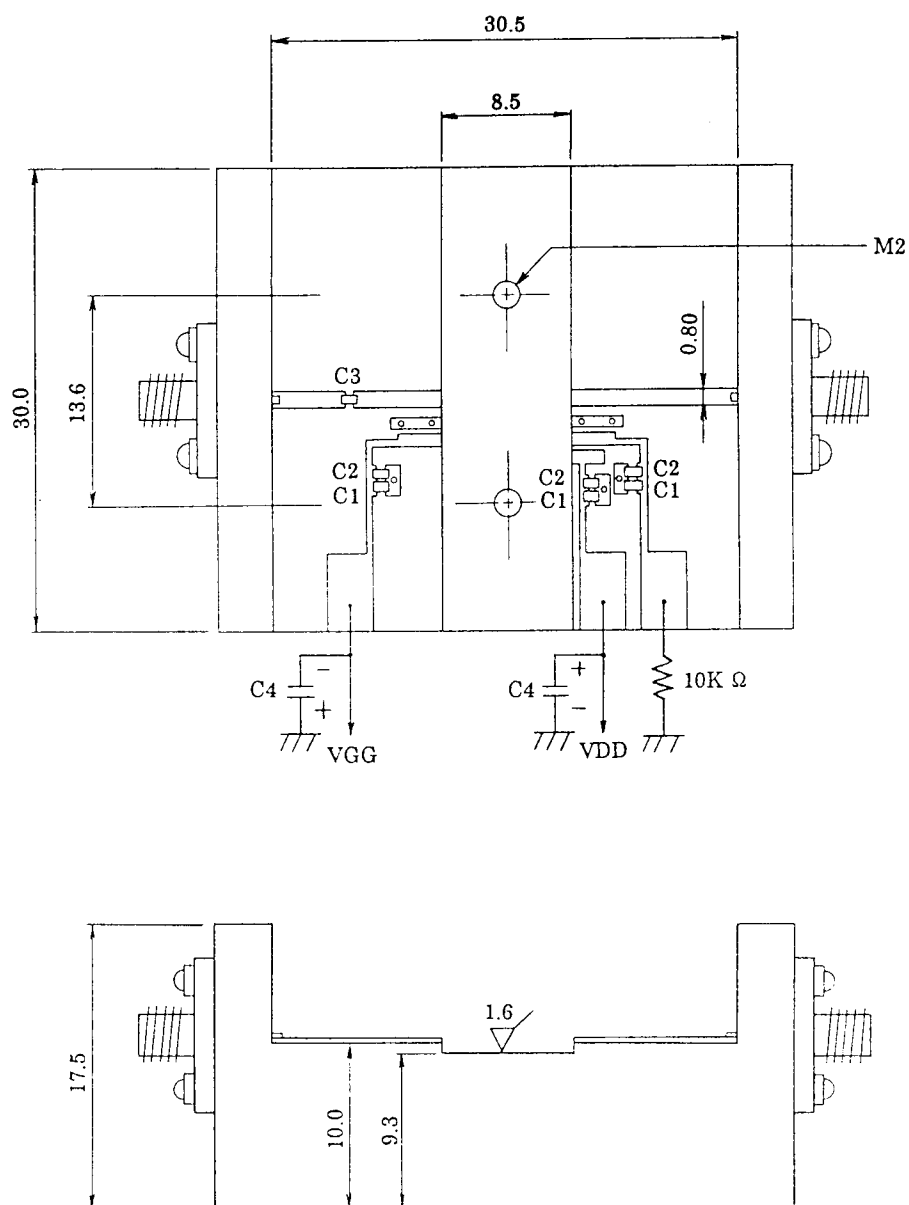
Microstripline : $t = 35 \mu m$

$C1 = 1,000 \text{ pF}$, $C2 = 0.5 \text{ pF}$, $C3 = 0.5 - 1.0 \text{ pF}$, $C4 = 47 \mu F$

* There are two pins for both VDD and VGG. These two pins do not have to be biased at the same time but at least one of the pins has to be biased. In case only one pin is

I. OUTLINE OF TEST JIG AND BIAS CIRCUIT FOR TMD1414-02B / -1B / -2B

Unit in mm



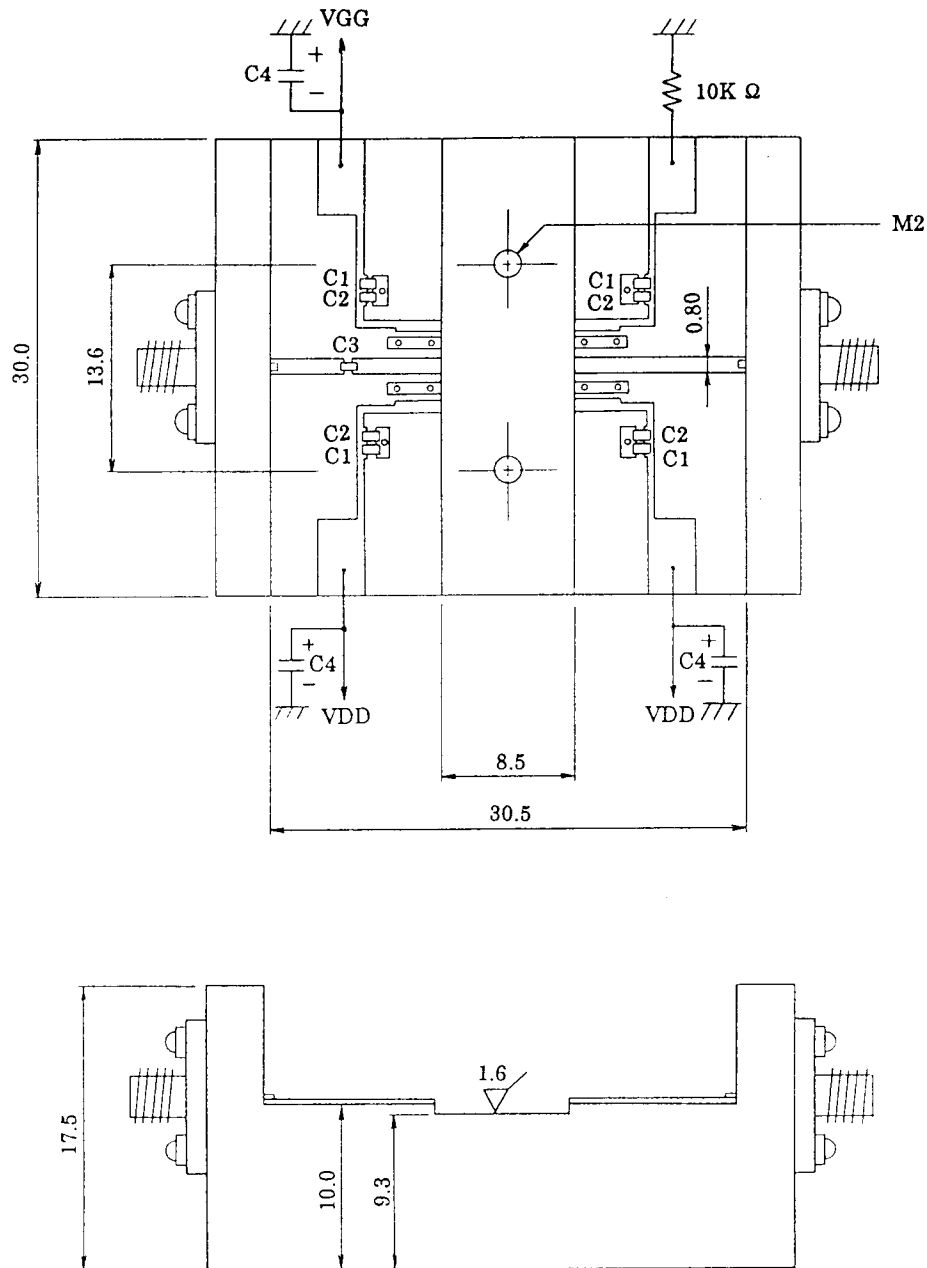
Substrate : Thickness = 0.25 mm, $\epsilon_r = 2.2$

Microstripline : $t = 35 \mu\text{m}$

C1 = 1,000 pF , C2 = 0.5 pF , C3 = 0.5 - 1.0 pF , C4 = 47 μF

J. OUTLINE OF TEST JIG AND BIAS CIRCUIT FOR TMD1414-02C / -1C / -2C

Unit in mm



Substrate : Thickness = 0.25 mm, $\epsilon_r = 2.2$

Microstripline : $t = 35 \mu\text{m}$

$C1 = 1,000 \text{ pF}$, $C2 = 0.5 \text{ pF}$, $C3 = 0.5 - 1.0 \text{ pF}$, $C4 = 47 \mu\text{F}$

* Two VDD pins do not have to be biased at the same time, but at least one of the pins has to be biased. In case only one pin is biased, the other pin has to be opened.