TOSHIBA

MICROWAVE SEMICONDUCTOR
TECHNICAL DATA

MICROWAVE POWER MMIC AMPLIFIER

TMD1414-1
TMD1414-1B
TMD1414-1C

FEATURES

- Suitable for Ku-band VSAT
- High Power P1dB=31.5dBm(TYP.)
- High Power Added Efficiency ηadd=29%(TYP.)
- High Gain G1dB=26dB(TYP.)
- Broadband Operation f=13.75 – 14.5GHz.

ABSOLUTE MAXIMUM RATINGS(Ta=25°C)

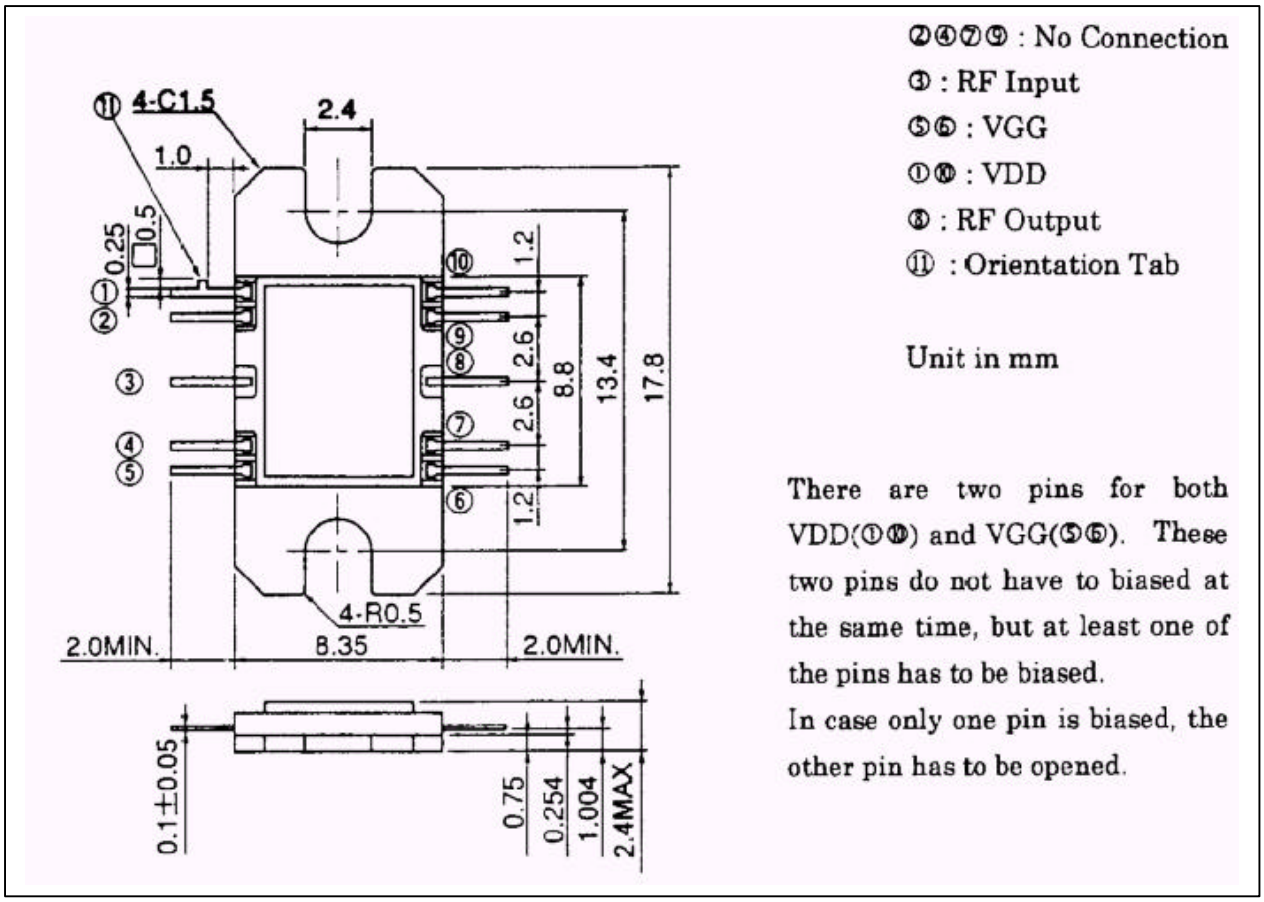
CHARACTERISTICS	SYMBOL	UNIT	RATINGS
DRAIN SUPPLY VOLTAGE	VDD	V	10
GATE SUPPLY VOLTAGE	VGG	V	-10
INPUT POWER	Pin	dBm	20
FLANGE TEMPERATURE	Tf	°C	-40 - +90
STORAGE TEMPERATURE	Tstg	°C	-65 - +175

RF PERFORMANCE SPECIFICATIONS (Ta=25°C)

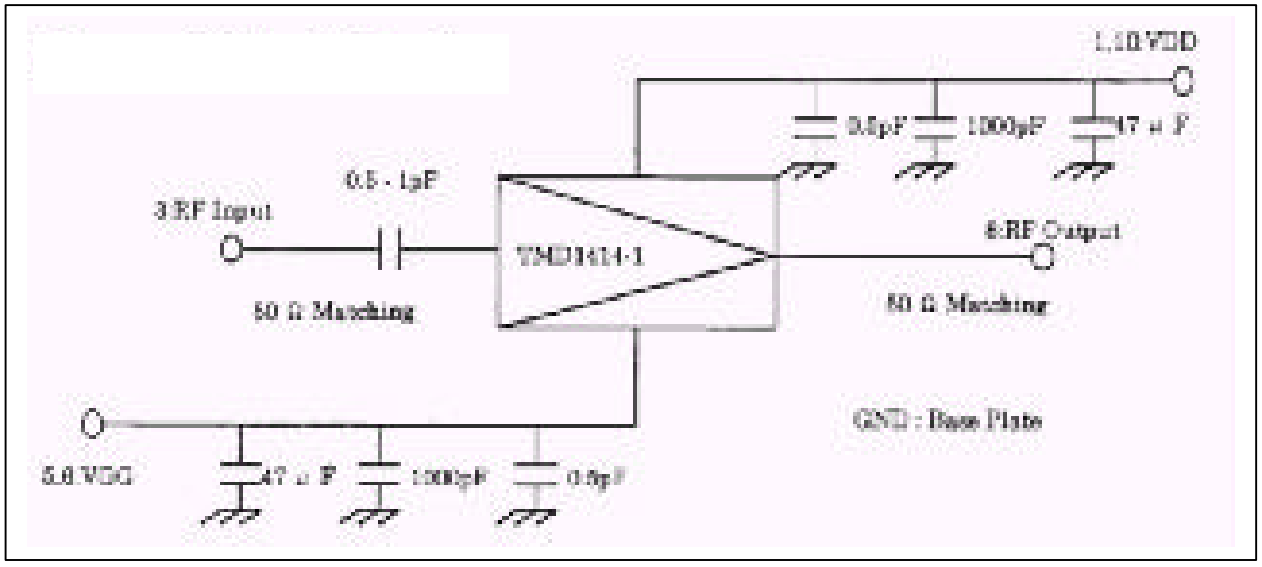
CHARACTERISTICS	SYMBOL	CONDITION	UNIT	MIN.	TYP.	MAX.
Operaing Frequency	f		GHz	13.75	–	14.5
Output Power at 1dB Gain Compression Point	P1dB	VDD=7V VGG=-5V	dBm	29.0	31.5	–
Power Gain at 1dB Gain Compression Point	G1dB		dB	21.0	26.0	–
Gain Flatness	G		dB	–	–	±1.0
Drain Current	IDD		A	–	0.7	1.0
Power Added Efficiency	ηadd		%	–	29	–
Third Order Intercept Point	IP3		dBm	–	37	–
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=30dBm	V	–	2.5	–

*: For 1B,1C

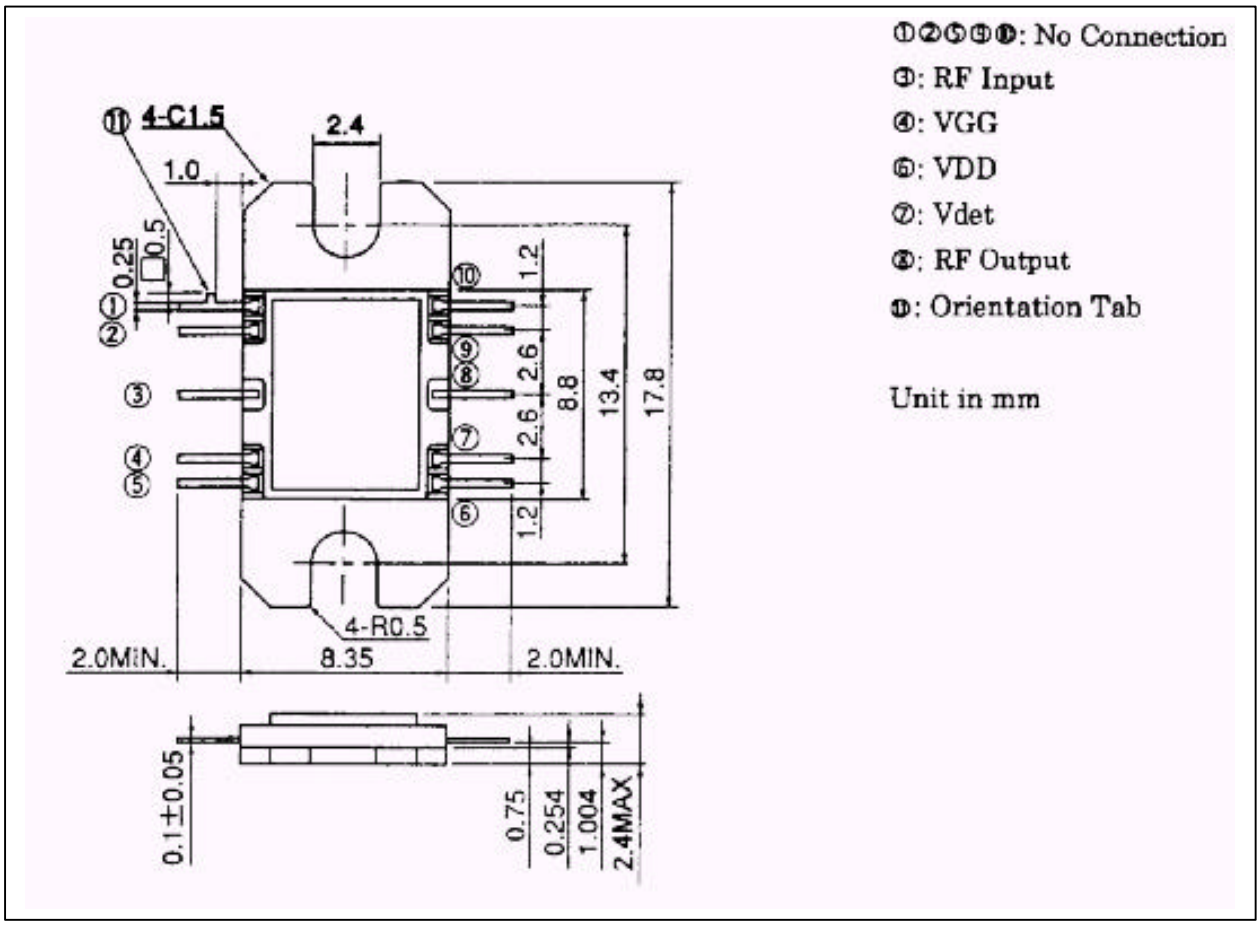
Package Outline (TMD1414-1)



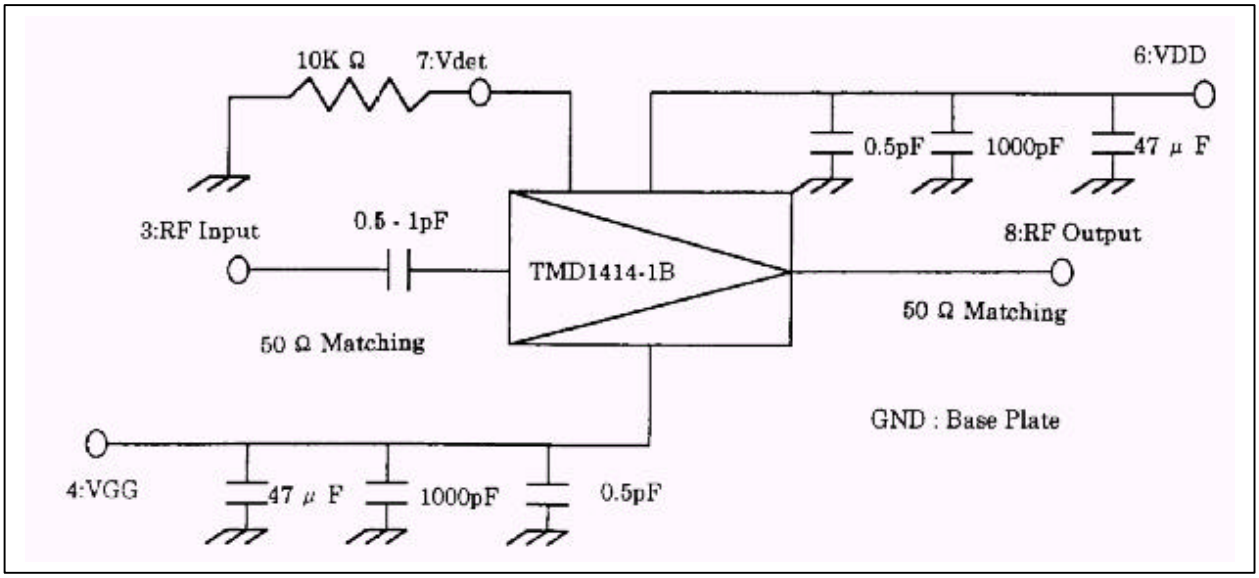
Recommended Bias Configuration (TMD1414-1)



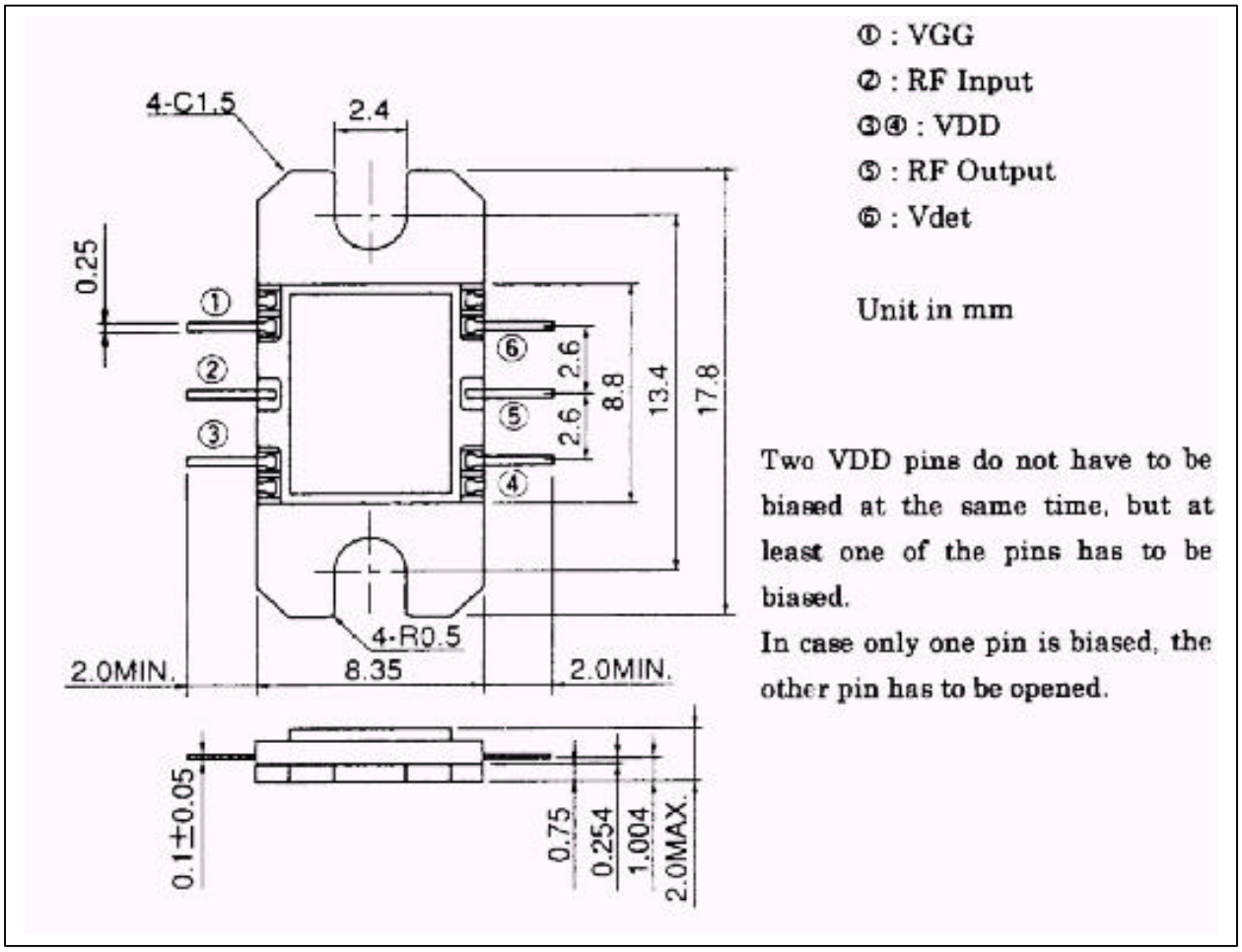
Package Outline (TMD1414-1B)



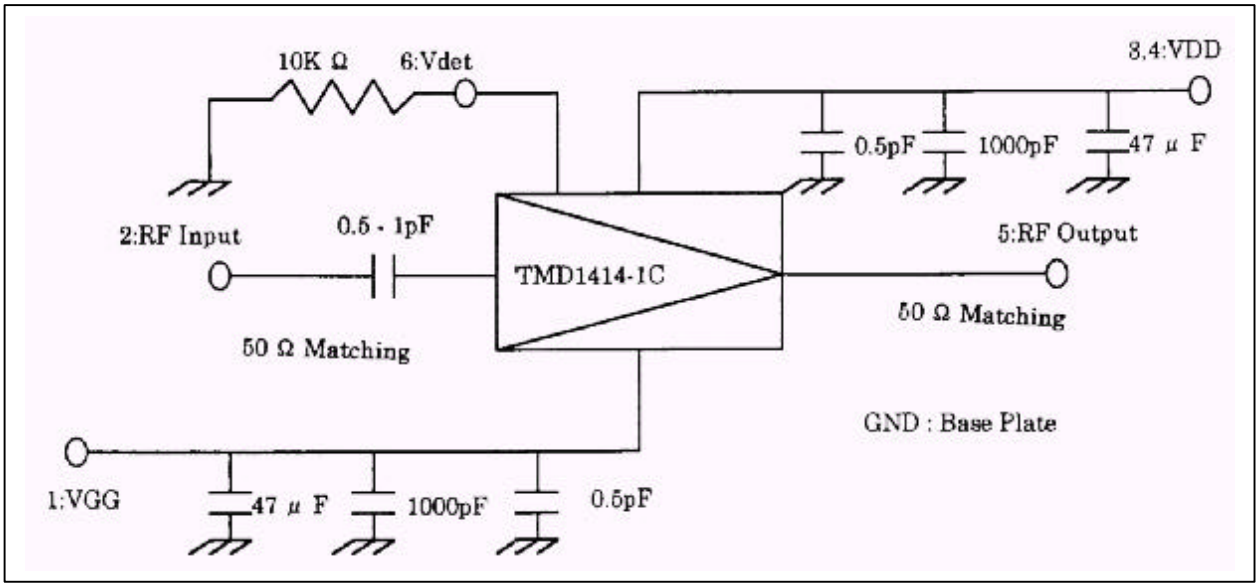
Recommended Bias Configuration (TMD1414-1B)



Package Outline (TMD1414-1C)



Recommended Bias Configuration (TMD1414-1C)

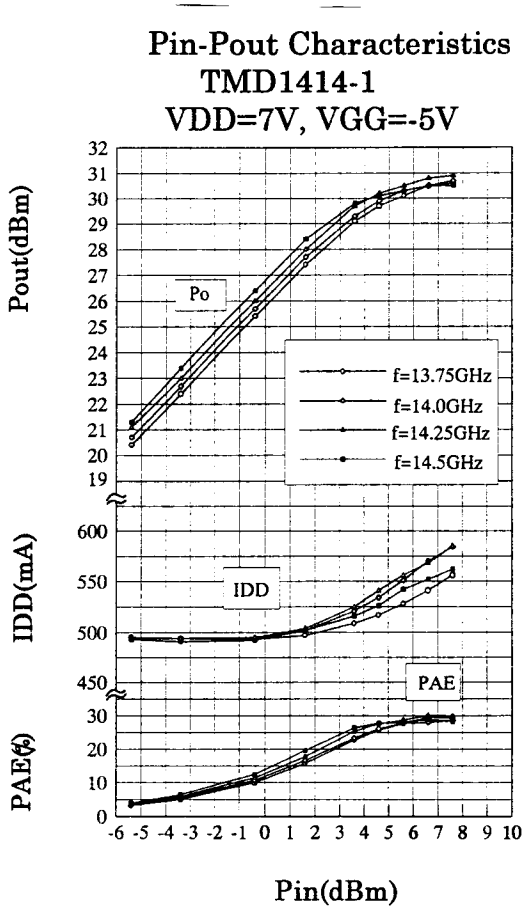


S-Parameters (TMD1414-1/1B/1C)

! S-PARAMETERS FOR TMD1414-1 VDD=7 V, VGG=-5V
GHZ S MA R 50

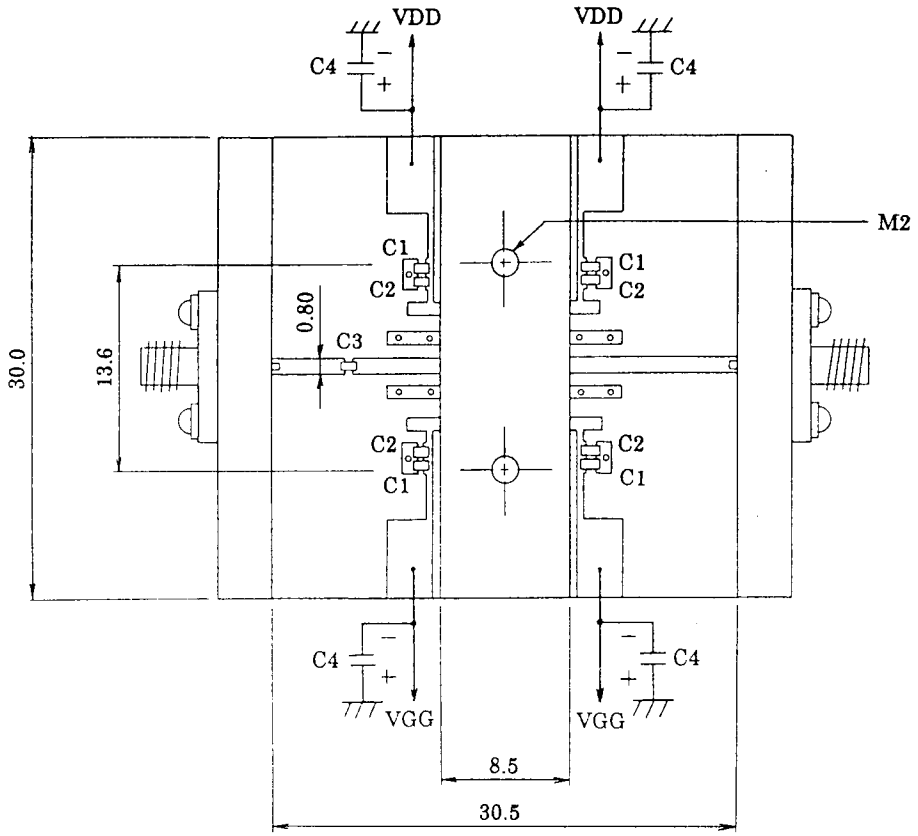
! FREQ	S11		S21		S12		S22	
!	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
13.475	0.468	-101.5	15.006	94.1	0.001	125.2	0.324	-87.6
13.500	0.459	-102.3	15.123	91.5	0.002	121.9	0.322	-89.3
13.525	0.449	-103.0	15.290	88.8	0.002	121.1	0.321	-90.9
13.550	0.440	-103.7	15.427	86.0	0.002	136.4	0.319	-92.6
13.575	0.430	-104.4	15.581	83.4	0.002	129.1	0.318	-94.0
13.600	0.420	-105.0	15.731	80.6	0.001	122.8	0.315	-96.0
13.625	0.410	-105.6	15.845	77.8	0.001	140.6	0.312	-97.6
13.650	0.399	-106.3	15.972	75.0	0.001	124.5	0.310	-99.4
13.675	0.388	-106.9	16.100	72.3	0.001	154.3	0.308	-101.1
13.700	0.379	-107.4	16.236	69.6	0.001	116.3	0.305	-102.7
13.725	0.367	-107.9	16.399	66.8	0.001	145.2	0.303	-104.2
13.750	0.358	-108.3	16.539	64.0	0.001	161.6	0.301	-105.6
13.775	0.347	-108.7	16.706	61.2	0.001	126.9	0.300	-107.4
13.800	0.337	-108.9	16.866	58.4	0.001	161.9	0.299	-108.6
13.825	0.327	-109.0	17.017	55.6	0.002	155.8	0.298	-110.2
13.850	0.317	-109.1	17.195	52.8	0.002	170.7	0.298	-111.6
13.875	0.307	-109.2	17.333	49.9	0.002	154.0	0.298	-113.5
13.900	0.297	-109.2	17.520	47.1	0.001	174.9	0.298	-114.9
13.925	0.288	-109.5	17.716	44.2	0.002	147.4	0.301	-116.9
13.950	0.280	-109.5	17.928	41.2	0.002	160.5	0.303	-118.7
13.975	0.273	-109.7	18.103	38.2	0.003	153.5	0.306	-120.8
14.000	0.264	-109.9	18.290	35.1	0.003	151.1	0.309	-123.0
14.025	0.255	-110.1	18.469	32.1	0.002	138.3	0.311	-125.3
14.050	0.247	-110.2	18.671	28.9	0.002	164.3	0.315	-127.4
14.075	0.239	-110.7	18.857	25.7	0.002	147.7	0.318	-129.7
14.100	0.231	-110.9	19.037	22.6	0.003	134.2	0.320	-132.1
14.125	0.222	-111.2	19.195	19.4	0.003	148.1	0.325	-134.3
14.150	0.211	-111.1	19.353	16.1	0.002	140.9	0.326	-136.9
14.175	0.200	-111.6	19.522	12.9	0.002	139.4	0.329	-139.6
14.200	0.189	-111.5	19.620	9.4	0.003	133.9	0.334	-142.6
14.225	0.177	-111.0	19.742	6.2	0.002	117.1	0.334	-144.9
14.250	0.167	-111.0	19.832	2.8	0.002	119.9	0.339	-147.3
14.275	0.156	-109.9	19.954	-0.5	0.002	122.2	0.342	-149.7
14.300	0.145	-108.9	20.052	-3.8	0.002	118.7	0.345	-152.1
14.325	0.136	-107.3	20.139	-7.2	0.002	121.3	0.349	-154.5
14.350	0.125	-105.2	20.223	-10.6	0.002	120.2	0.353	-156.6
14.375	0.115	-102.6	20.280	-13.9	0.002	117.8	0.354	-159.1
14.400	0.105	-99.7	20.324	-17.4	0.002	125.4	0.358	-161.4
14.425	0.096	-95.2	20.374	-20.9	0.002	124.3	0.361	-163.8
14.450	0.089	-89.6	20.406	-24.3	0.002	107.2	0.364	-166.4
14.475	0.082	-84.3	20.425	-27.8	0.002	128.1	0.368	-168.5
14.500	0.078	-76.8	20.438	-31.2	0.002	106.6	0.371	-171.1
14.525	0.074	-69.0	20.432	-34.7	0.002	130.0	0.373	-173.6
14.550	0.076	-60.5	20.394	-38.2	0.002	113.6	0.376	-175.3
14.575	0.078	-52.7	20.386	-41.5	0.002	125.2	0.380	-177.7
14.600	0.081	-45.0	20.348	-45.0	0.002	111.1	0.383	-179.8
14.625	0.086	-39.2	20.284	-48.5	0.002	115.4	0.386	178.0
14.650	0.091	-33.5	20.223	-51.9	0.002	121.3	0.388	176.0
14.675	0.097	-28.7	20.143	-55.4	0.002	131.2	0.392	173.7
14.700	0.105	-25.1	20.040	-58.9	0.002	116.4	0.392	171.6
14.725	0.114	-21.9	19.907	-62.4	0.002	98.7	0.393	169.6

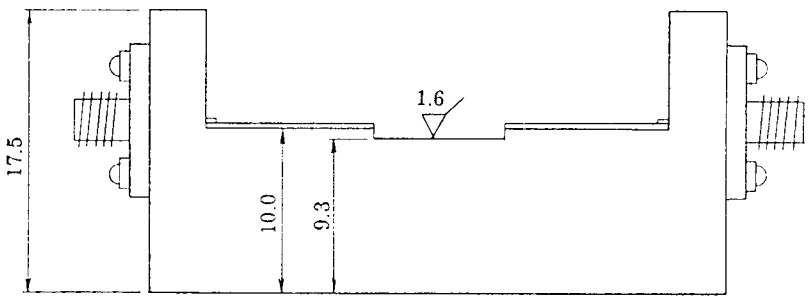
TYPICAL RF PERFORMANCE



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

Unit in mm





Substrate : Thickness = 0.25 mm, ε r= 2.2

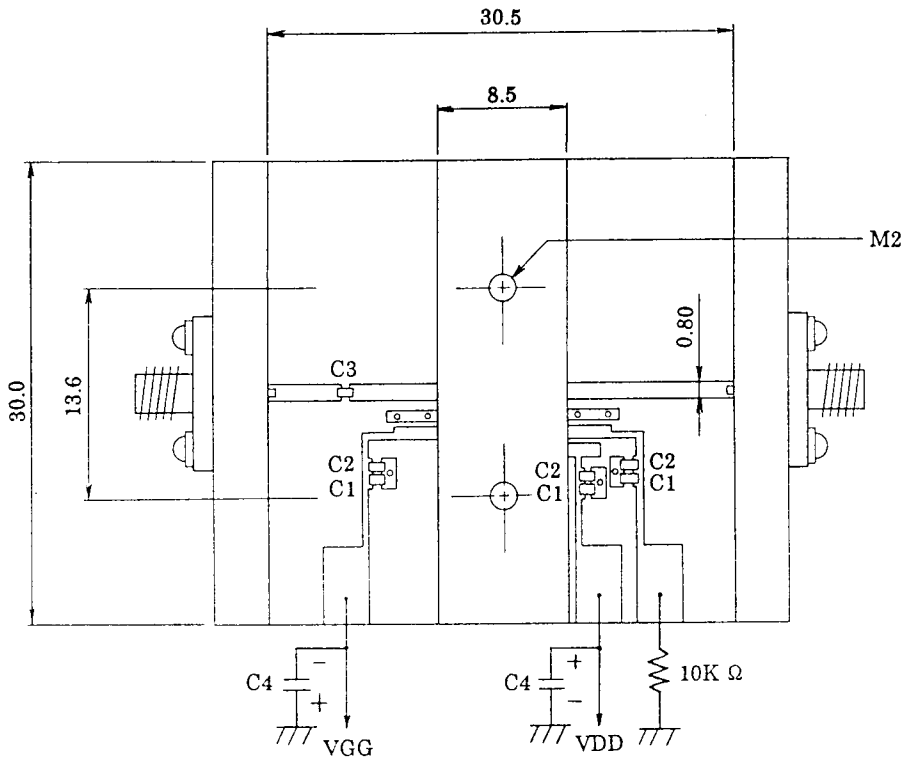
Microstripline : t= 35 μ m

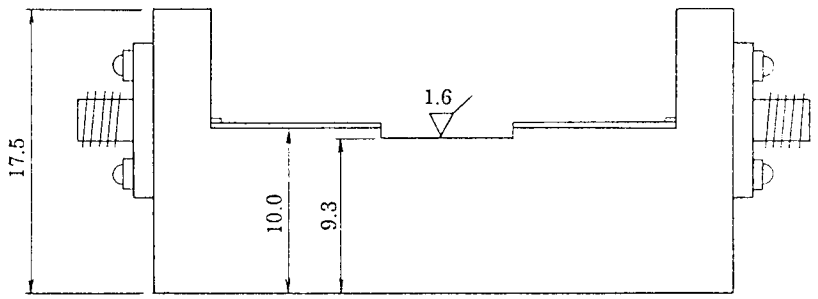
C1 = 1,000 pF , C2= 0.5 pF , C3= 0.5 - 1.0 pF , C4=47 μ F

* 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 biased, the other pin has to be opened.

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

Unit in mm





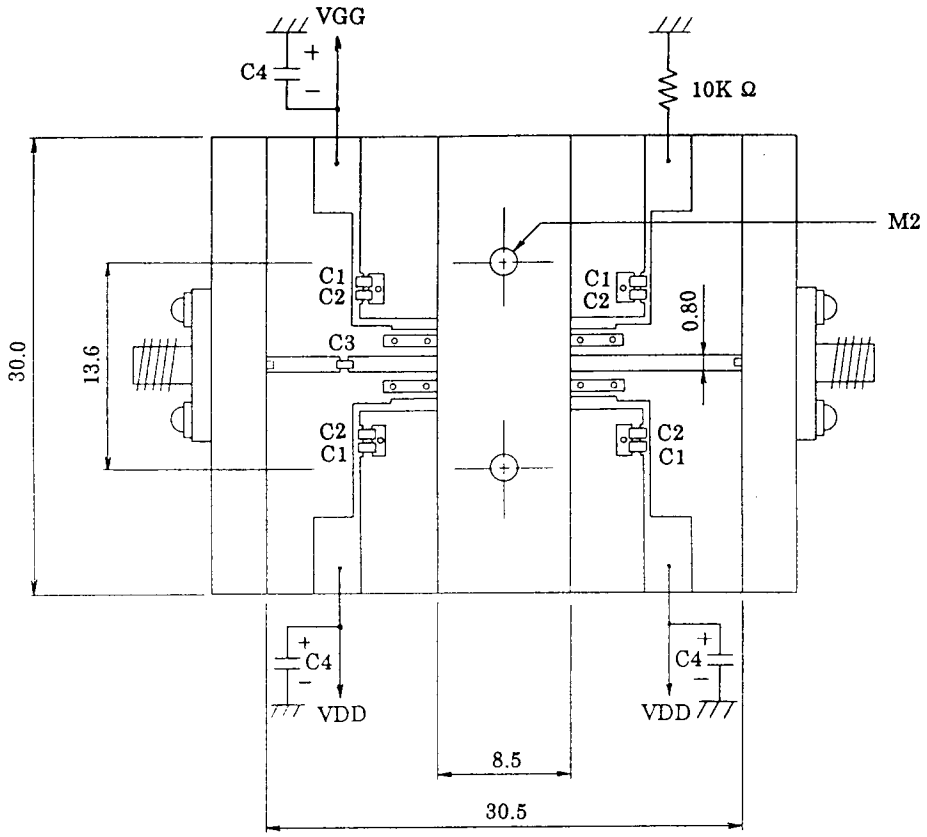
Substrate : Thickness = 0.25 mm, ε r= 2.2

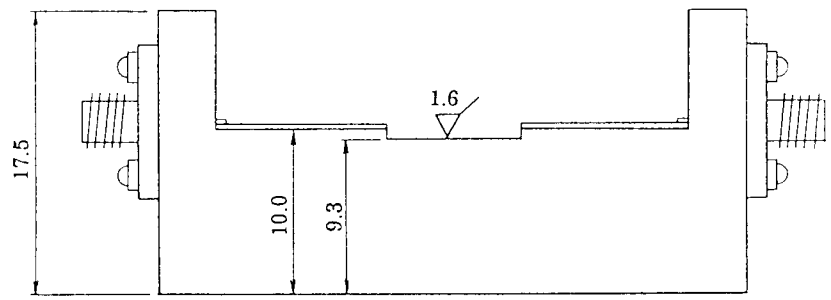
Microstripline : t= 35 μ m

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

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

Unit in mm





Substrate : Thickness = 0.25 mm, ε r= 2.2

Microstripline : t= 35 μ m

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