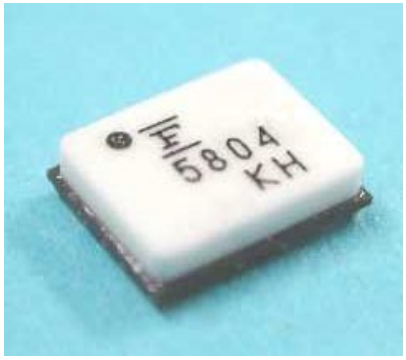
FMM5804VY

K / Ka Band Power Amplifier MMIC



FEATURES

- High Output Power (P1dB): 24.5dBm(typ.)
- High Gain (G1dB): 17dB(typ.)
- Low Input VSWR
- Broad Band: 17.5~31.5GHz
- Ball Grid Array SMT Package(VY-PKG)
- Impedance Matched Zin/Zout = 50Ω

DESCRIPTION

The FMM5804VY is a MMIC amplifier that contains a four-stage amplifier, internally matched, for standard communications in the 17.5 to 31.5GHz frequency range. This product is well suited for Point-to-Point, Point-to-multi Point applications as it offers high power, high gain, and low VSWR.

Eudyna's stringent Quality Assurance Program assures the highest reliability and consistent performance.

ABSOLUTE MAXIMUM RATING

Item	Symbol	Rating	Unit
Drain Voltage	V_{DD}	10	V
Gate Voltage	V_{GG}	-3	V
Input Power	P_{in}	16	dBm
Storage Temperature	T_{stg}	-55 ~ +125	°C

RECOMMENDED OPERATING CONDITIONS

Item	Symbol	Conditions	Unit
Drain Voltage	V_{DD}	<=6	V
Input Power	P_{in}	<=13	dBm
Operating Case Temperature	T_C	-40 ~ +85	°C

ELECTRICAL CHARACTERISTICS (Case Temperature T_C=25°C)

Item	Symbol	Conditions	Limit			Unit
			Min.	Typ.	Max.	
Output Power at 1dB G.C.P.	P_{1dB}	V_{DD}=6V $I_{DD(DC)}$=250mA typ. f=17.5~31.5GHz Z_S=Z_L=50ohm *f=17.5 - 30.0GHz **f=30.0 - 31.5GHz	22.5*	24.5*	-	dBm
			20.5**	22.5**	-	dBm
Power Gain at 1dB G.C.P.	G_{1dB}		13	17	-	dB
Power-added Efficiency at 1dB G.C.P.	η_{add}		-	10	-	%
Drain Current at 1dB G.C.P.	$I_{DD(RF)}$		-	300	430	mA
Input Return Loss (at Pin=-20dBm)	RLin		-	-15	-	dB
Output Return Loss (at Pin=-20dBm)	RLout		-	-8	-	dB

G.C.P. : Gain Compression Point

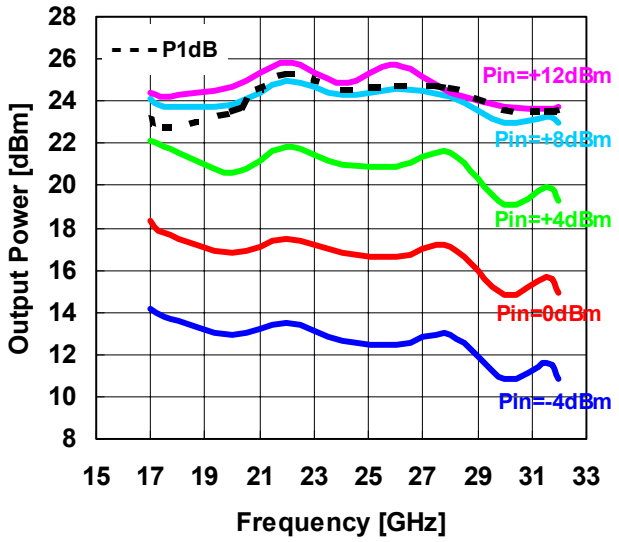
ESD	Class 0	~ 199V

Note : Based on EIAJ ED-4701 C-111A(C=100pF, R=1.5kΩ)

CASE STYLE	VY

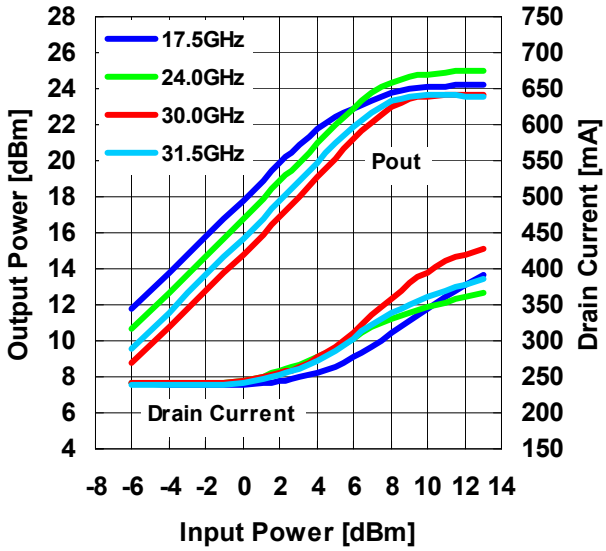
OUTPUT POWER vs. FREQUENCY

V_{DD}=6V, $I_{DD(DC)}$=250mA



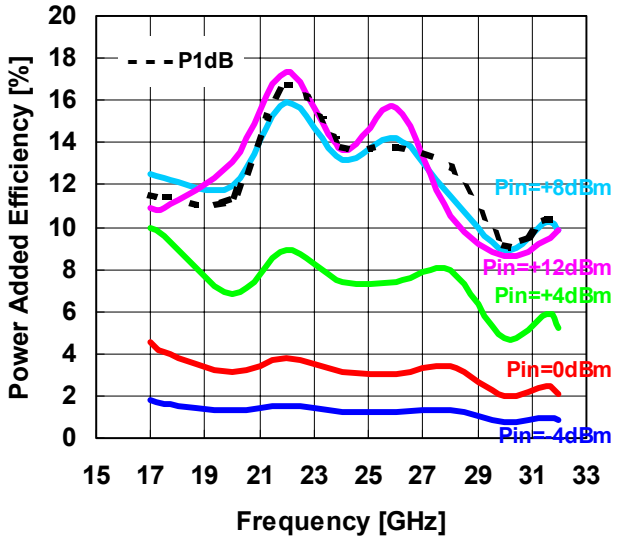
OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER

V_{DD}=6V, $I_{DD(DC)}$=250mA



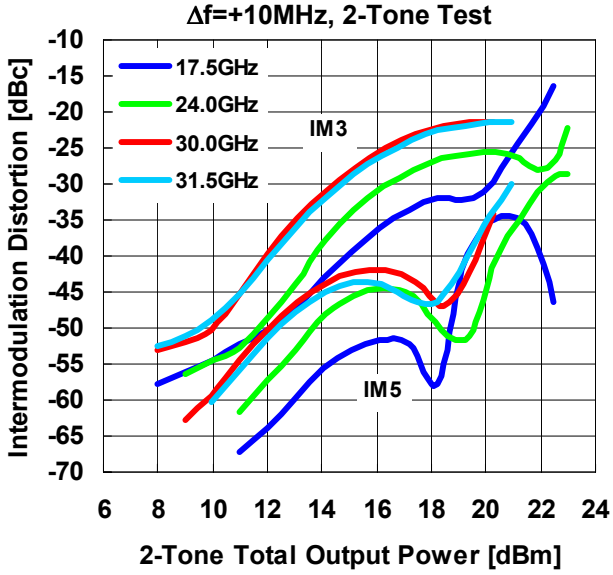
POWER ADDED EFFICIENCY vs. FREQUENCY

V_{DD}=6V, $I_{DD(DC)}$=250mA



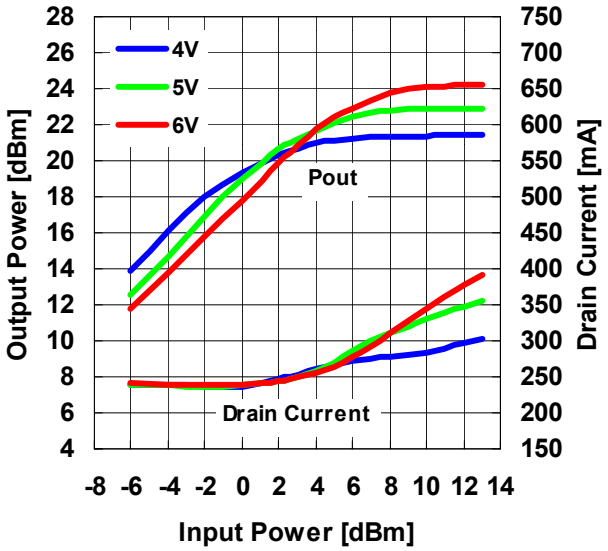
IMD PERFORMENCE vs. TOTAL OUTPUT POWER

V_{DD}=6V, $I_{DD(DC)}$=250mA
Δf=+10MHz, 2-Tone Test

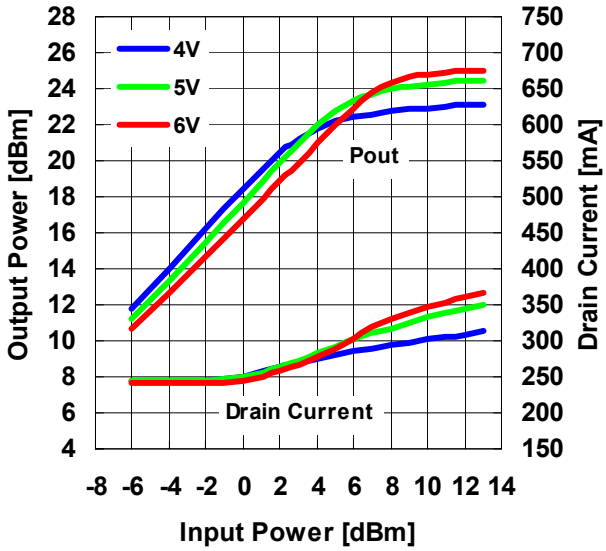


OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER by Drain Voltage

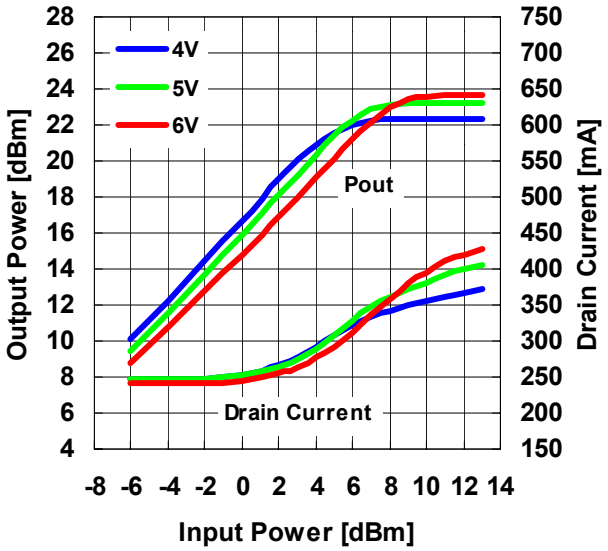
f=17.5GHz, $I_{DD(DC)}$=250mA



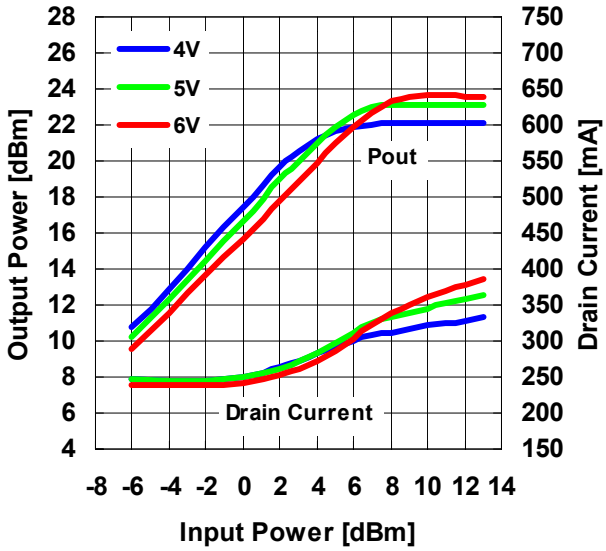
f=24.0GHz, $I_{DD(DC)}$=250mA



f=30.0GHz, $I_{DD(DC)}$=250mA

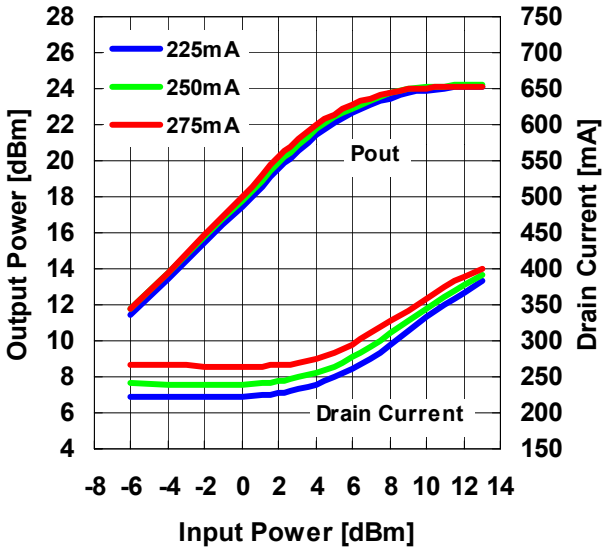


f=31.5GHz, $I_{DD(DC)}$=250mA

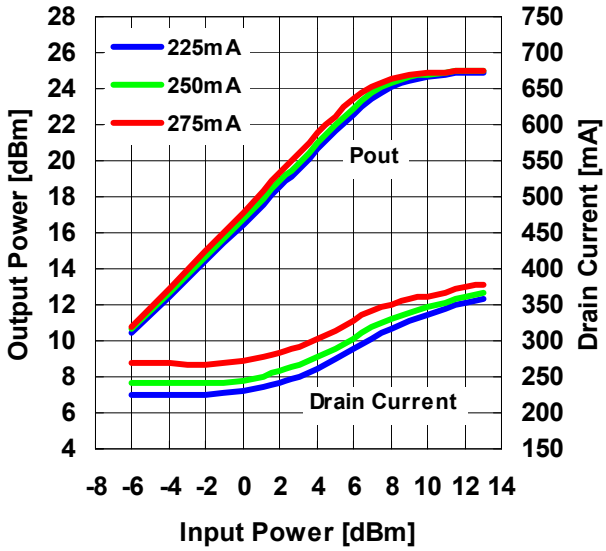


OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER by Drain Current

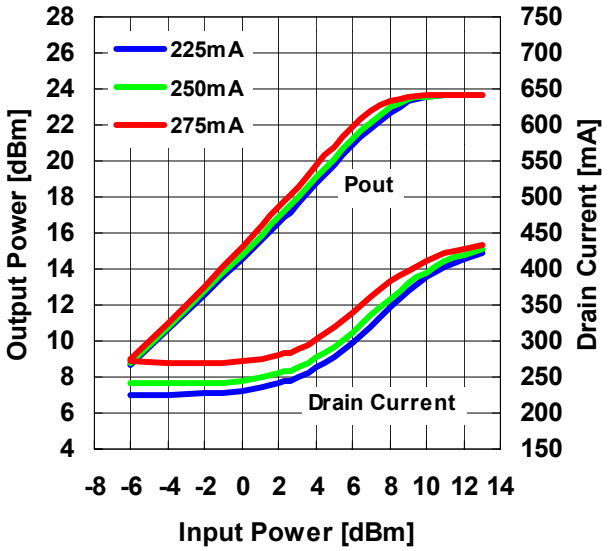
f=17.5GHz, VDD=6V



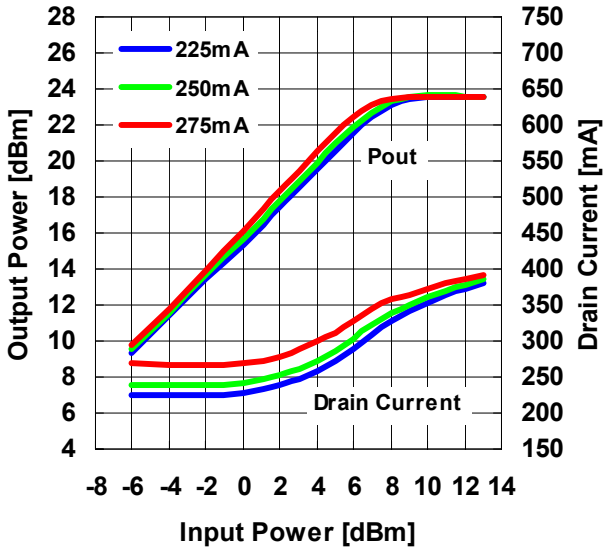
f=24.0GHz, VDD=6V



f=30.0GHz, VDD=6V

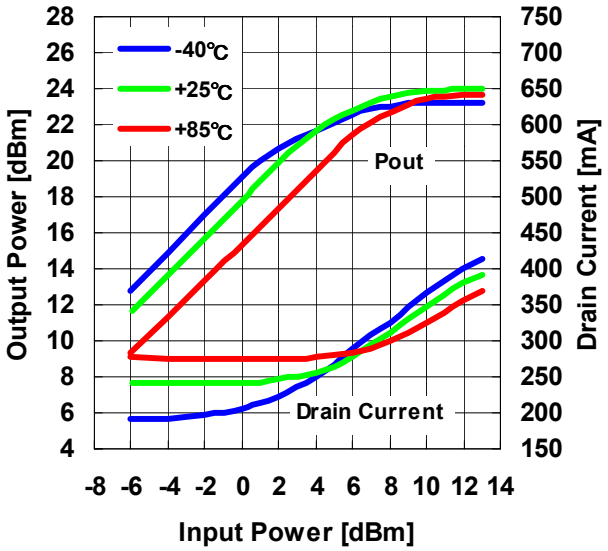


f=31.5GHz, VDD=6V

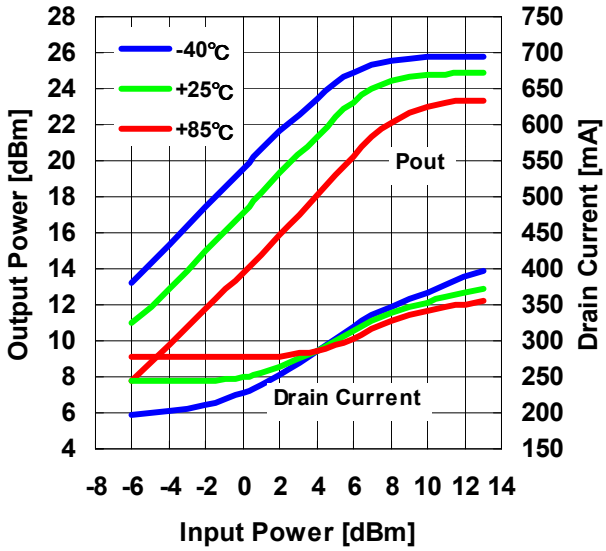


OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER by Temperature

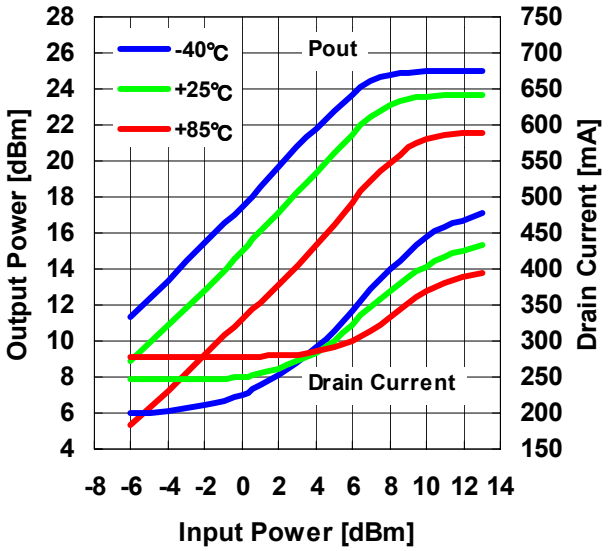
f=17.5GHz, V_{DD}=6V,$I_{DD(DC)}$=250mA@Tc=25°C



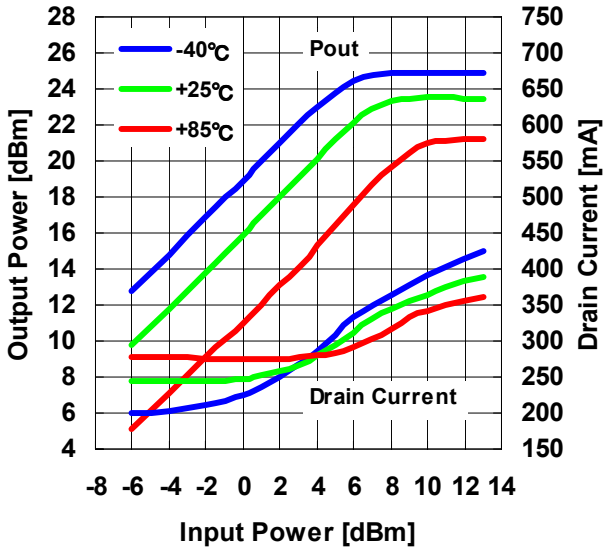
f=24.0GHz, V_{DD}=6V,$I_{DD(DC)}$=250mA@Tc=25°C



f=30.0GHz, V_{DD}=6V,$I_{DD(DC)}$=250mA@Tc=25°C

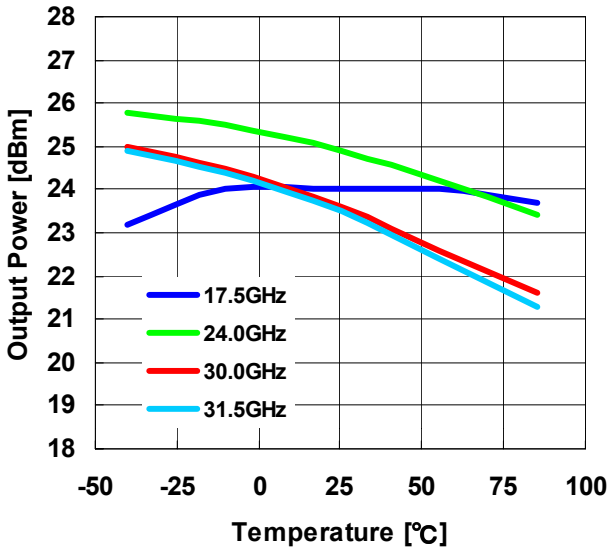


f=31.5GHz, V_{DD}=6V,$I_{DD(DC)}$=250mA@Tc=25°C



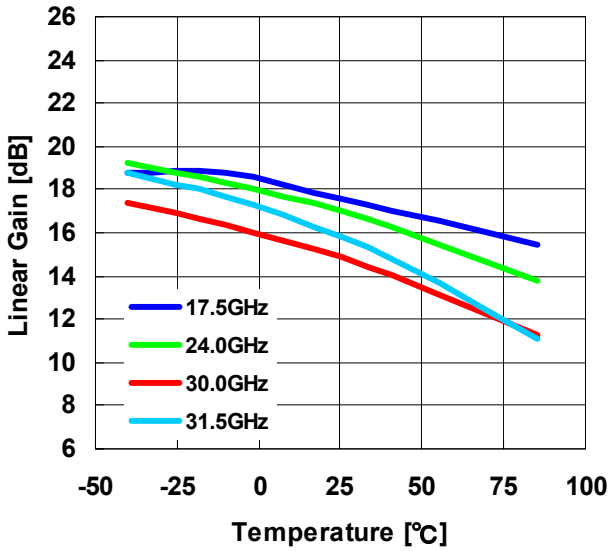
OUTPUT POWER vs. TEMPERATURE

Pin=+13dBm, VDD=6V,IDD(DC)=250mA@Tc=25°C



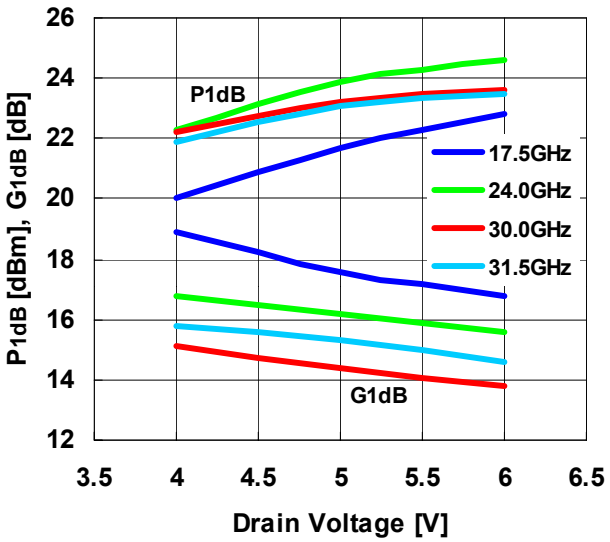
LINEAR GAIN vs. TEMPERATURE

Pin=-6dBm, VDD=6V,IDD(DC)=250mA@Tc=25°C



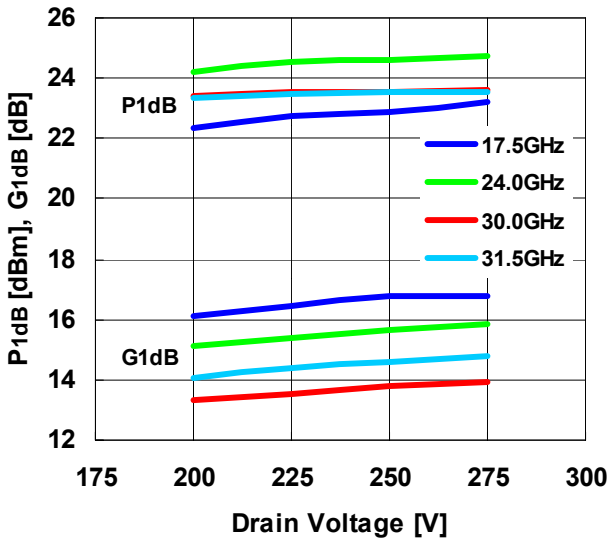
P1dB, G1dB vs. DRAIN VOLTAGE

IDD(DC)=250mA



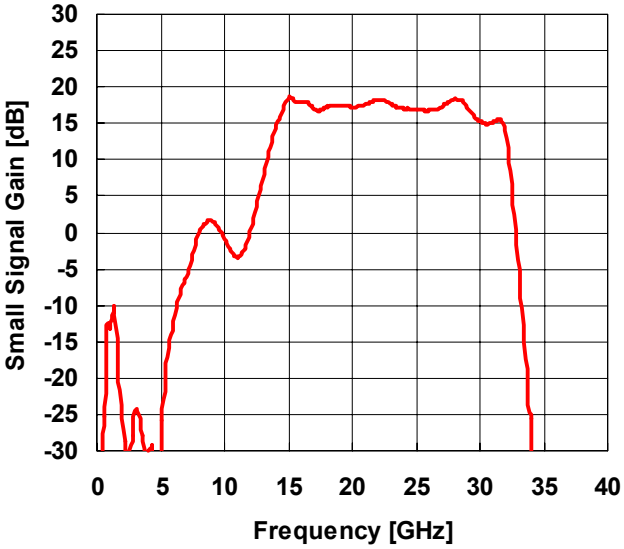
P1dB, G1dB vs. DRAIN CURRENT

VDD=6V



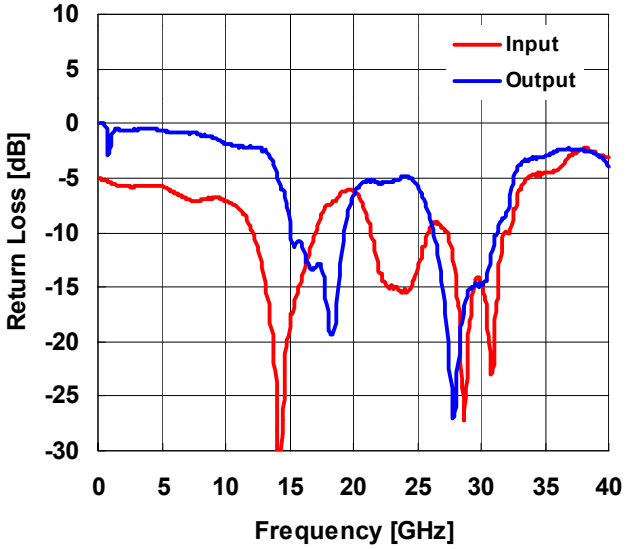
SMALL SIGNAL GAIN vs. FREQUENCY

V_{DD}=6V,$I_{DD(DC)}$=250mA



RETURN LOSS vs. FREQUENCY

V_{DD}=6V,$I_{DD(DC)}$=250mA

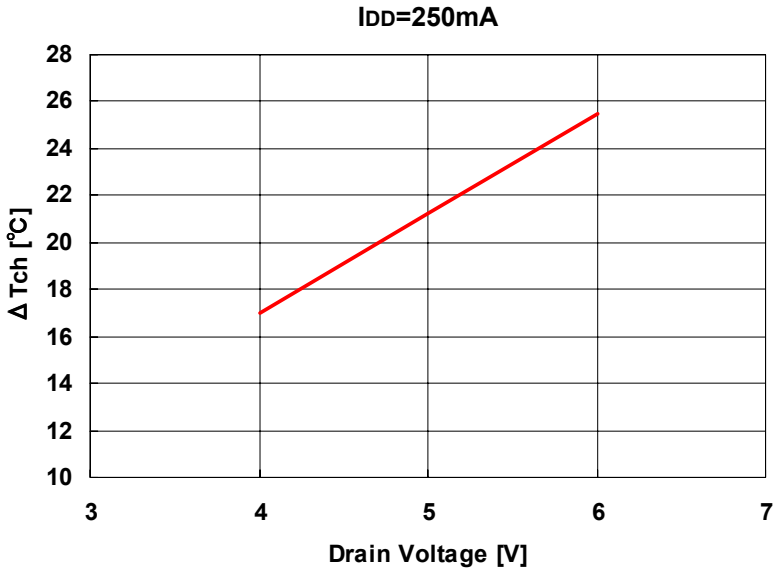


■ S-Parameter

VDD=6V, IDD=250mA

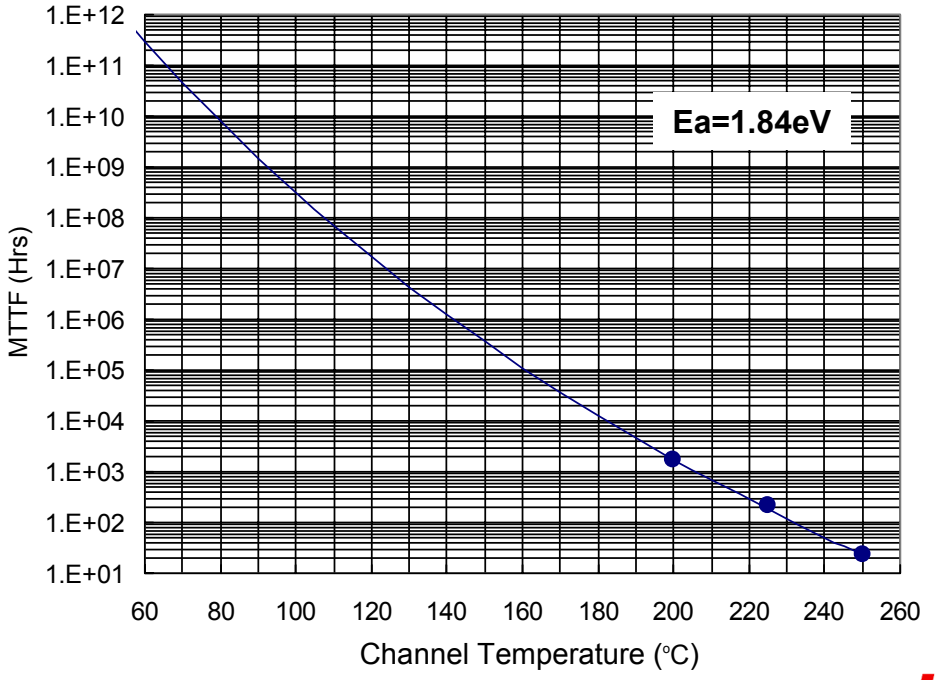
FREQ.	S11		S22		S12		S22	
[MHz]	mag.	ang.	mag.	ang.	mag.	ang.	mag.	ang.
1000	0.537	118.2	0.215	-103.7	0.000	124.1	0.852	-82.6
2000	0.517	52.8	0.053	-24.9	0.001	39.8	0.931	-166.8
3000	0.514	-15.5	0.059	-74.0	0.001	-33.8	0.936	122.3
4000	0.519	-79.2	0.031	-141.7	0.001	-89.6	0.948	51.3
5000	0.516	-139.1	0.035	-140.6	0.001	-128.4	0.928	-15.6
6000	0.480	159.2	0.228	120.1	0.000	-89.3	0.908	-74.3
7000	0.447	91.8	0.497	9.0	0.001	-173.3	0.902	-132.6
8000	0.442	24.2	1.008	-97.9	0.001	-59.4	0.889	167.1
9000	0.453	-36.6	1.201	140.3	0.005	-151.5	0.864	105.4
10000	0.440	-88.2	0.911	37.1	0.008	116.6	0.809	45.0
11000	0.409	-137.8	0.674	-29.0	0.009	36.4	0.784	-12.8
12000	0.328	170.9	1.009	-78.5	0.008	-33.8	0.776	-63.3
13000	0.202	122.9	2.305	-154.7	0.007	-96.7	0.751	-108.0
14000	0.057	74.0	5.218	98.4	0.004	-146.3	0.595	-155.0
15000	0.117	177.0	8.461	-24.9	0.005	168.2	0.353	152.2
16000	0.199	115.8	7.875	-141.7	0.004	83.1	0.272	101.7
17000	0.313	42.5	7.090	110.9	0.001	-169.5	0.219	58.8
18000	0.421	-25.6	7.333	16.1	0.005	96.9	0.127	30.9
19000	0.477	-68.0	7.482	-84.0	0.004	9.1	0.228	89.9
20000	0.491	-108.0	7.271	177.6	0.002	-50.9	0.465	58.2
21000	0.385	-155.1	7.559	81.3	0.001	-134.4	0.546	16.9
22000	0.218	133.2	8.059	-20.7	0.000	-56.9	0.539	-38.1
23000	0.181	47.6	7.734	-126.4	0.001	-48.1	0.542	-102.4
24000	0.173	16.0	7.170	134.8	0.001	-80.4	0.567	-159.2
25000	0.216	21.8	6.930	33.7	0.001	-149.2	0.517	152.1
26000	0.334	9.9	6.850	-68.9	0.001	169.3	0.366	106.9
27000	0.335	-18.9	7.295	-173.7	0.000	125.4	0.172	59.9
28000	0.203	-59.3	8.268	68.9	0.003	140.6	0.055	-99.6
29000	0.094	104.7	7.245	-60.3	0.005	70.0	0.166	154.8
30000	0.186	39.0	5.832	177.4	0.007	12.6	0.184	84.0
31000	0.086	-123.7	5.702	44.6	0.010	-59.1	0.277	29.2
32000	0.318	125.2	5.033	-144.1	0.013	-141.4	0.387	-28.0
33000	0.495	107.7	0.641	24.5	0.014	137.2	0.644	-81.8
34000	0.585	60.2	0.052	-76.6	0.015	55.3	0.696	-144.0
35000	0.593	-5.1	0.017	-40.3	0.014	-29.1	0.713	156.3
36000	0.612	-86.0	0.017	-116.1	0.013	-118.3	0.744	99.0
37000	0.720	-143.9	0.008	-169.2	0.009	-175.2	0.764	47.4
38000	0.765	170.6	0.012	113.6	0.009	118.0	0.754	-6.1
39000	0.723	124.4	0.013	42.5	0.012	50.1	0.723	-63.9
40000	0.699	73.8	0.007	-95.0	0.020	-57.4	0.628	-130.0

ΔTch vs DRAIN VOLTAGE (Reference Data)



Note) ΔTch : BGA Package Balls to channel temperature rise

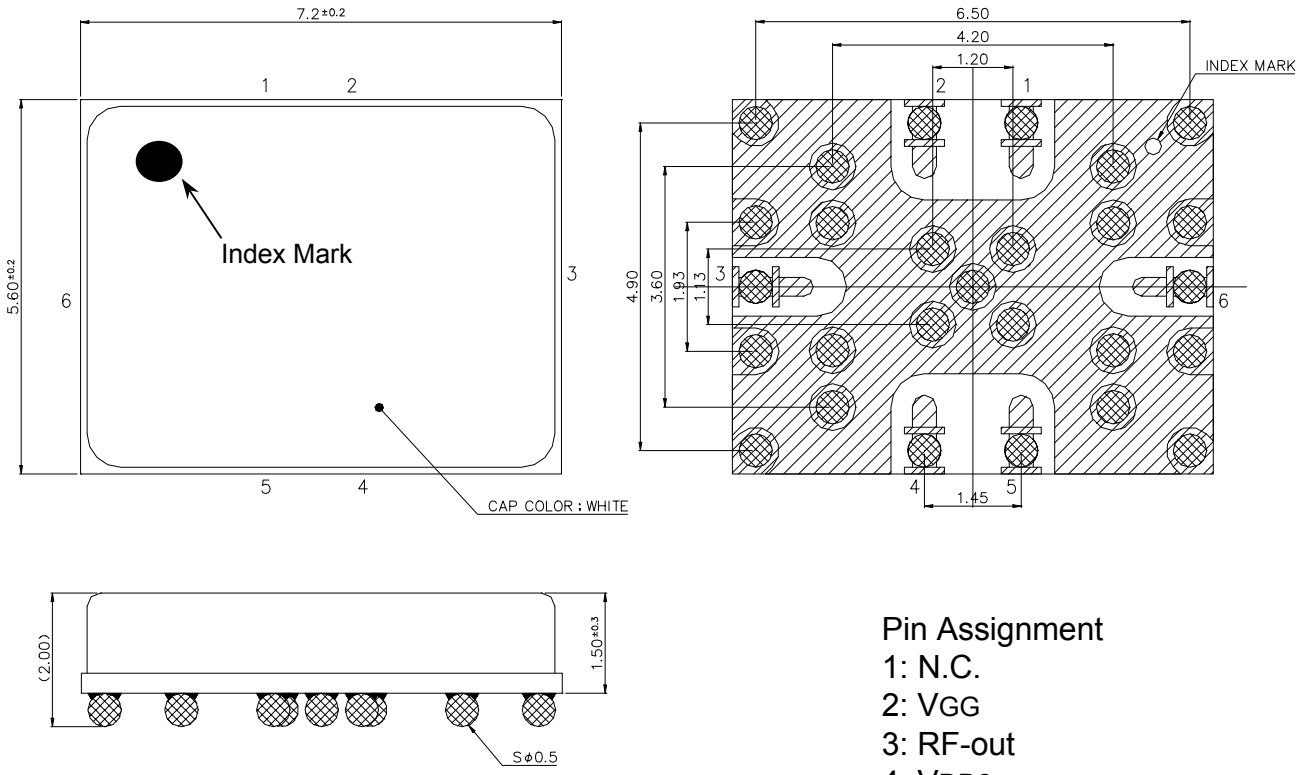
MTTF vs. Tch



FMM5804VY

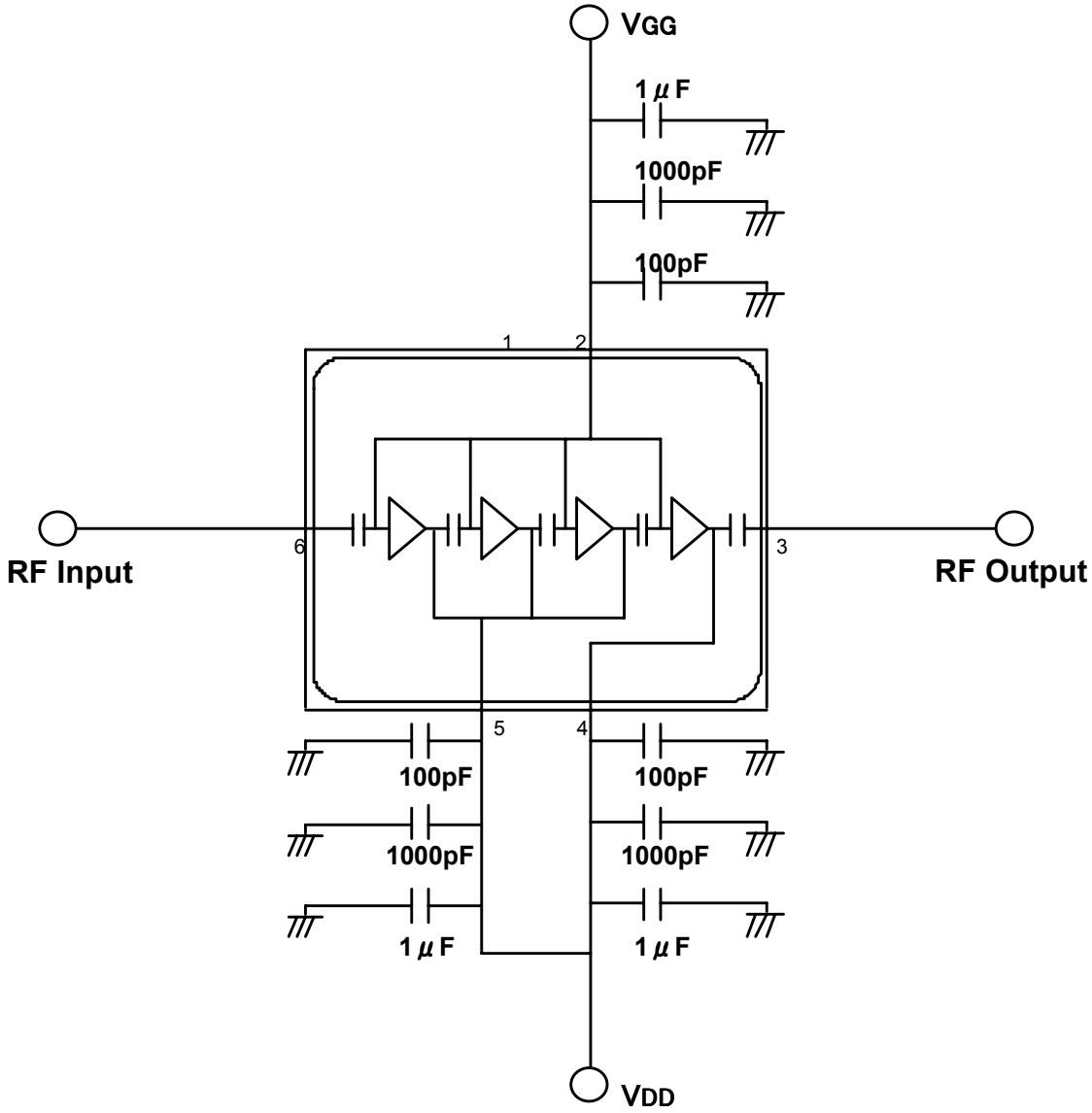
K / Ka Band Power Amplifier MMIC

■ Package Outline and Pin Assignment



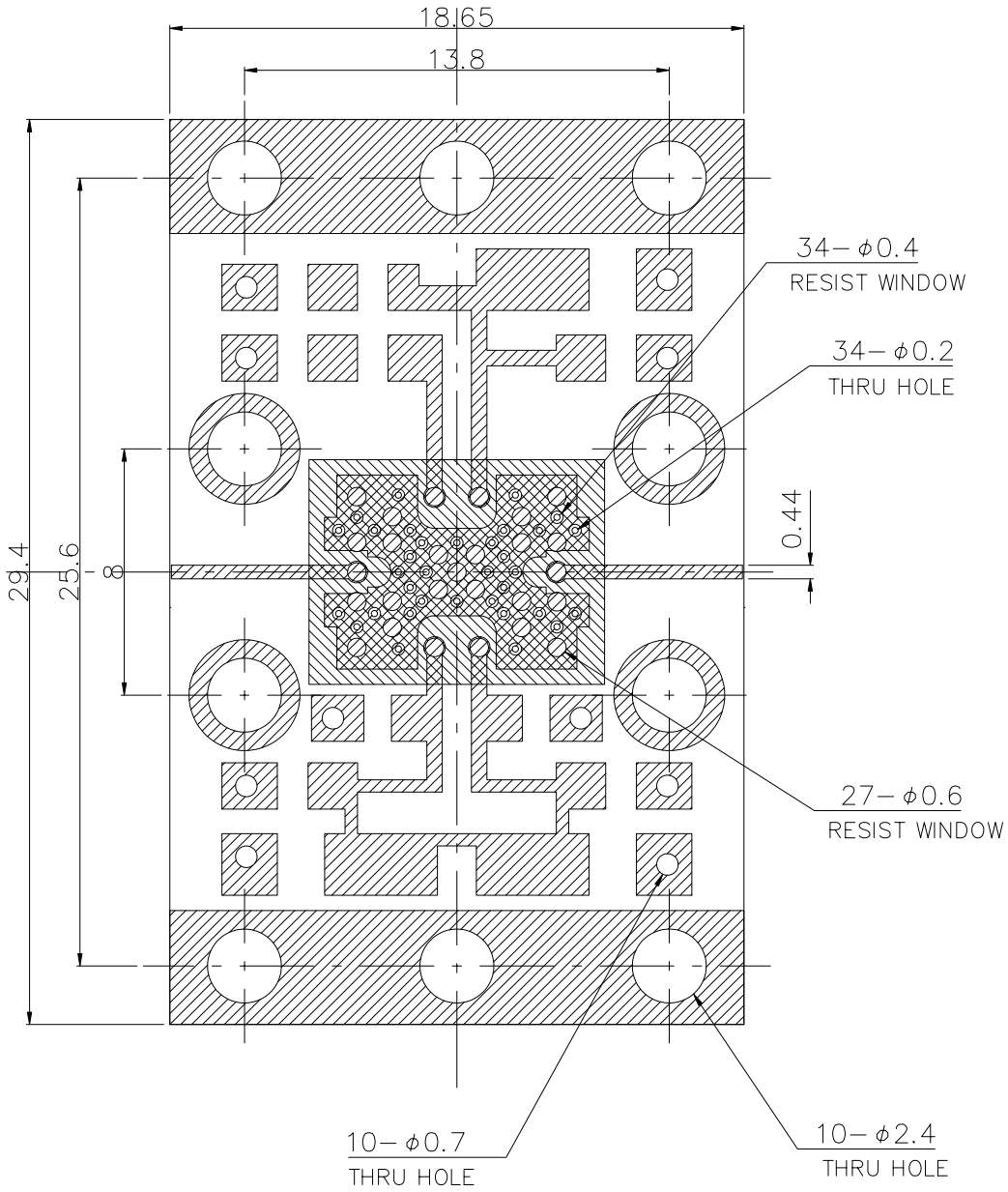
Pin Assignment
1: N.C.
2: V_{GG}
3: RF-out
4: V_{DD2}
5: V_{DD1}
6: RF-in

■ Block Diagram and External Component



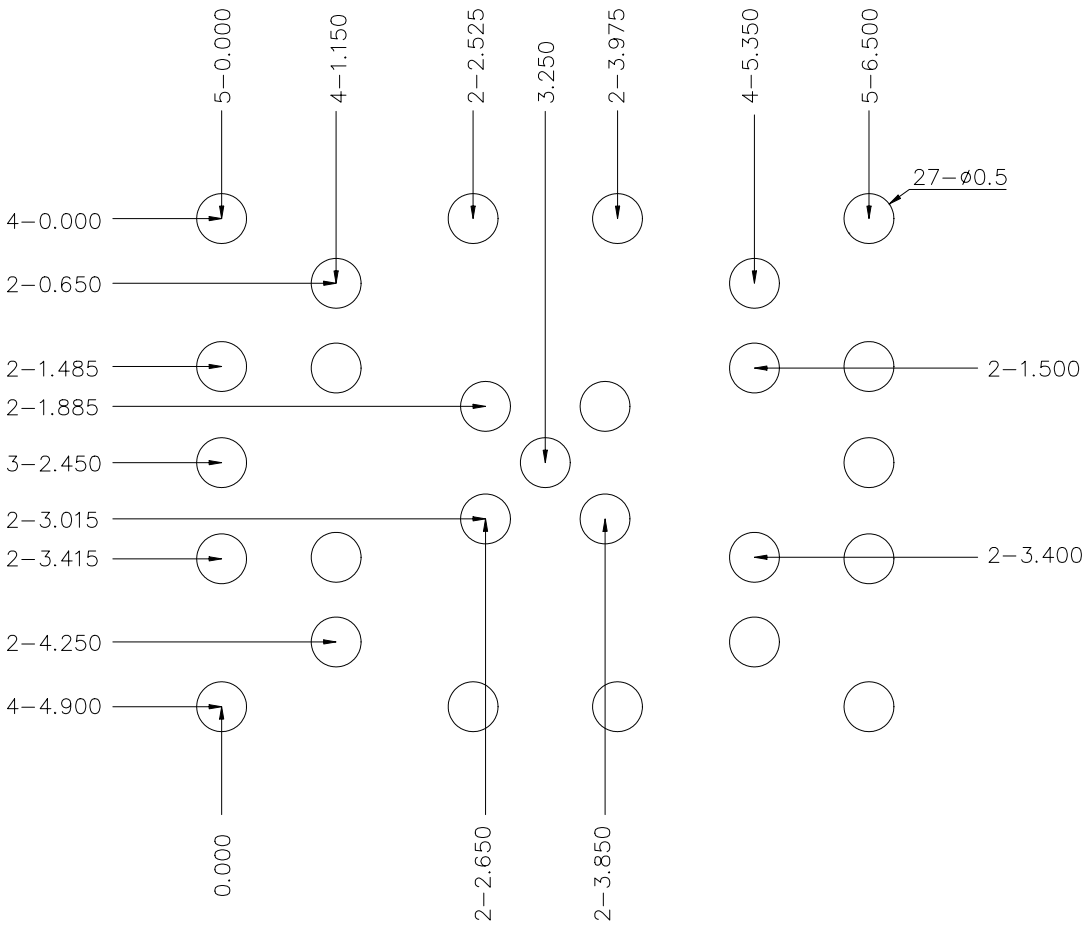
Note) : The capacitors are recommended on the bias supply line, close to the package, in order to prevent video oscillations which could damage the module.

■ Recommended Foot Pattern Layout



Notes :
1.LAMINATE : Rogers Corporation RO4003, Thickness t=0.2mm, Cu Foil 18 μm
2. : Finish to copper foil ; Ni 0.1 μm min./Au 0.1±0.08 μm (Both side)
3. : Resist

■ Recommended Stencil Pattern



Thickness : 0.15 μm

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CAUTION

Eudyna Devices Inc. products contain **gallium arsenide (GaAs)** which can be hazardous to the human body and the environment. For safety, observe the following procedures:

・Do not put these products into the mouth.

・Do not alter the form of this product into a gas, powder, or liquid through burning, crushing, or chemical processing as these by-products are dangerous to the human body if inhaled, ingested, or swallowed.

・Observe government laws and company regulations when discarding this product. This product must be discarded in accordance with methods specified by applicable hazardous waste procedures.