

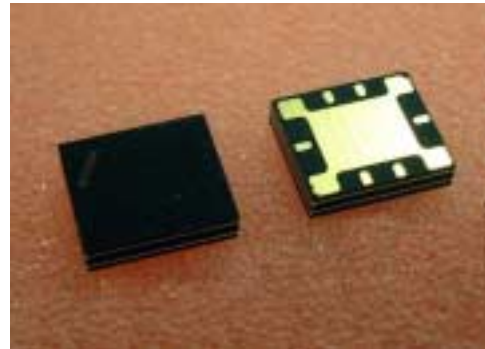
Preliminary

ES/FMM5804YD

K,Ka-Band Power Amplifier MMIC

FEATURES

- High Output Power; P_{1dB} = 24.5 dBm (Typ.)
- High Linear Gain; G_L = 17 dB(Typ.)
- Frequency Band ; 17.5 - 30.0 GHz
- SMT Laminate Package (YD Package)
- Impedance Matched Z_{in}/Z_{out} = 50Ω



DESCRIPTION

The FMM5804YD is a power amplifier MMIC that contains a four stage amplifier, internally matched, for standard communications band in 17.5 to 30.0GHz frequency range. This product is well suited for P-to-P, Ka-band V-SAT applications.

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

ABSOLUTE MAXIMUM RATING

Item	Symbol	Condition	Unit
Drain-Source Voltage	V _{DD}	10	V
Gate-Source Voltage	V _{GG}	-3	V
Input Power	P _{in}	16	dBm
Storage Temperature	T _{stg}	-55 to +125	°C

RECOMMENDED OPERATING CONDITIONS

Item	Symbol	Recommend	Unit
Drain-Source Voltage	V _{DD}	<= 6	V
Input Power	P _{in}	<= +13	dBm
Operating Case Temperature	T _c	-40 to +85	°C

ELECTRICAL CHARACTERISTICS (Ambient Temperature T_a=25°C)

Item	Symbol	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
Output Power at 1dB G.C.P.	P _{1dB}	V _{DD} =6V typ. I _{DD(DC)} =250mA typ. Z _S =Z _L =50ohm	22.5	24.5	-	dBm
Power Gain at 1dB G.C.P.	G _{1dB}		13	16	-	dB
Power-added Efficiency at 1dB G.C.P.	η _{add}		-	10	-	%
Drain Current at 1dB G.C.P.	I _{DDRF}		-	350	430	mA
Input Return Loss (at Pin=-20dBm)	RL _{in}		-	-15	-	dB
Output Return Loss (at Pin=-20dBm)	RL _{out}		-	-8	-	dB

G.C.P. : Gain Compression Point

ESD	Class 0	~ 199V
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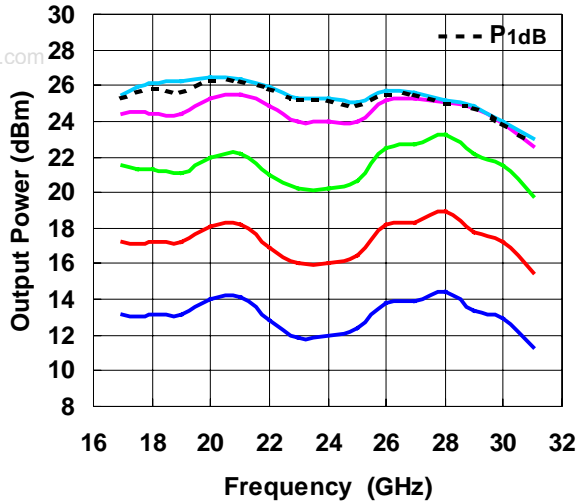
Note : Based on EIAJ ED-4701 C-111A(C=100pF, R=1.5kW)

Case Style	YD
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ES/FMM5804YD

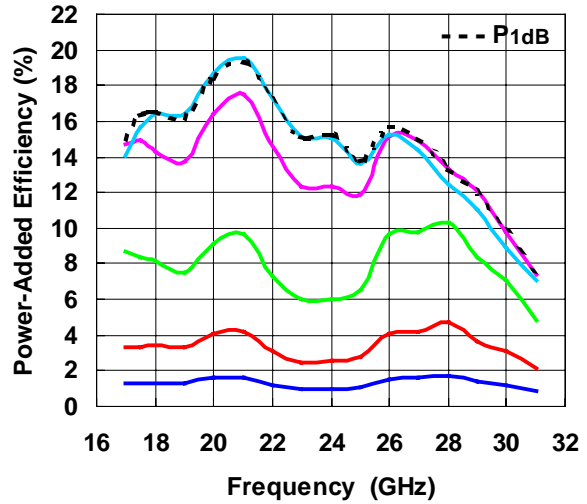
K, Ka-Band Power Amplifier MMIC

Output Power vs. Frequency
@ VDD=6V, IDD(DC)=250mA



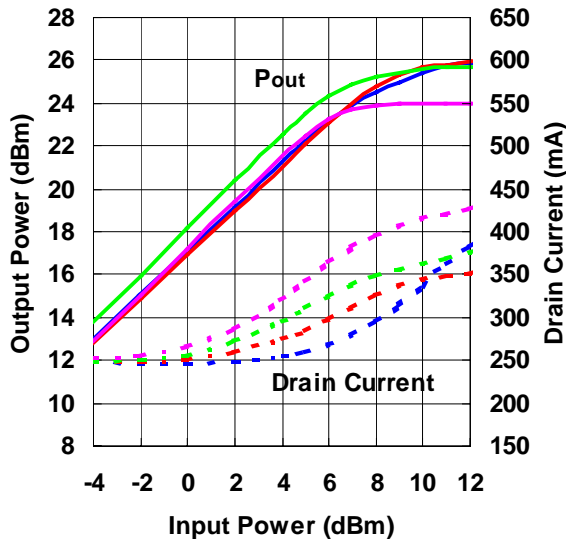
Pin=-4dBm 0dBm 4dBm
8dBm 12dBm

Power Added Efficiency vs. Frequency
@ VDD=6V, IDD(DC)=250mA



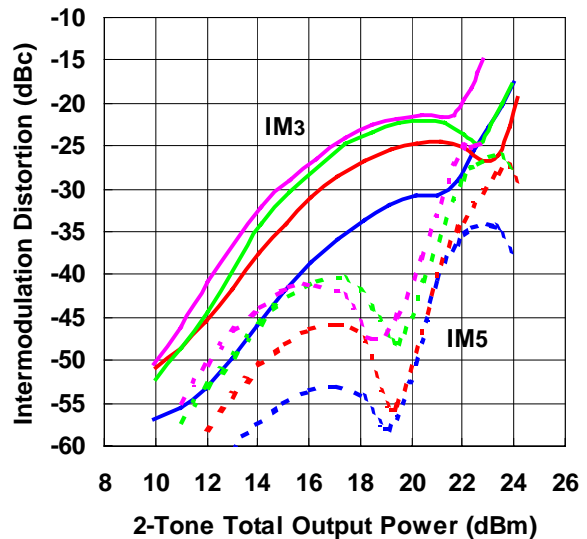
Pin=-4dBm 0dBm 4dBm
8dBm 12dBm

Output Power, Drain Current vs. Input Power
@ VDD=6V, IDD(DC)=250mA



17.5GHz 22GHz 26GHz 30GHz

IMD Performance vs. Total Output Power
@ VDD=6V, IDD(DC)=250mA
 $\Delta f = +10\text{MHz}$, 2-Tone test



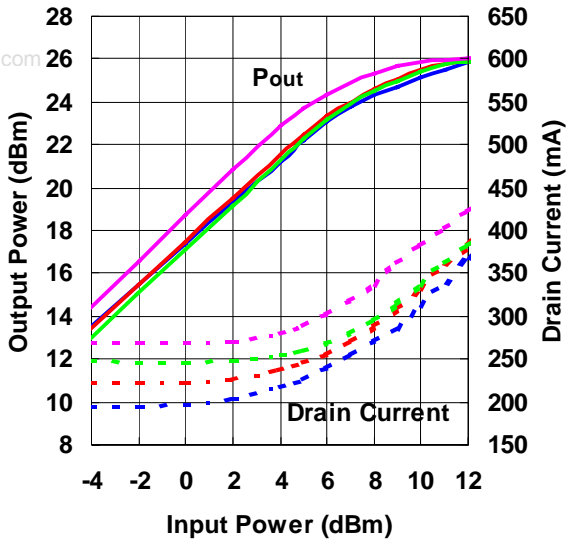
17.5GHz 22GHz 26GHz 30GHz

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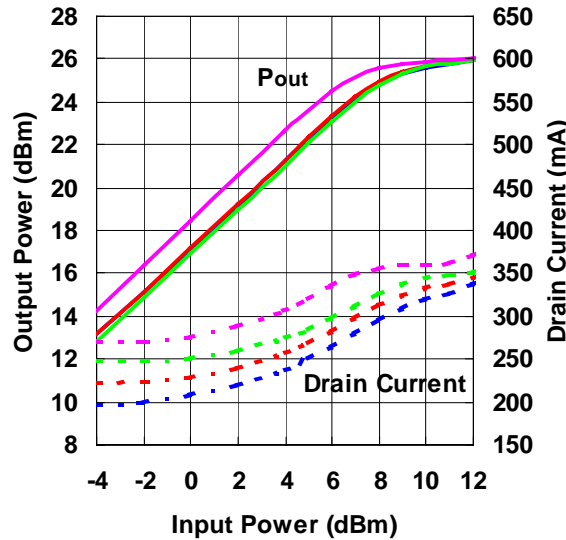
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Output Power, Drain Current vs. Input Power by Drain Current
@ freq.=17.5GHz, VDD=6V



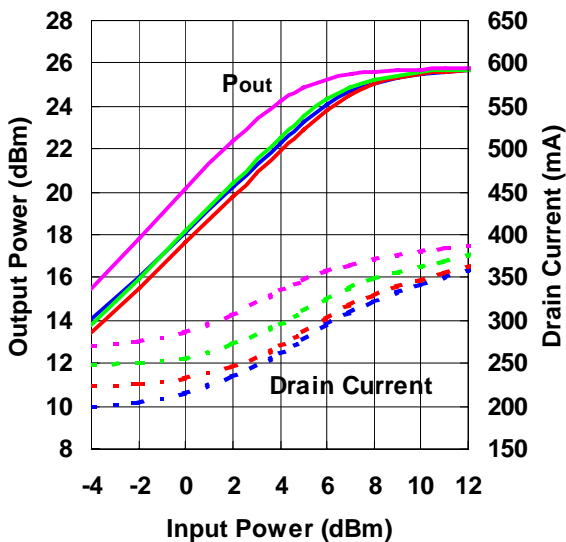
— 200mA — 225mA — 250mA — 275mA

Output Power, Drain Current vs. Input Power by Drain Current
@ freq.=22GHz, VDD=6V



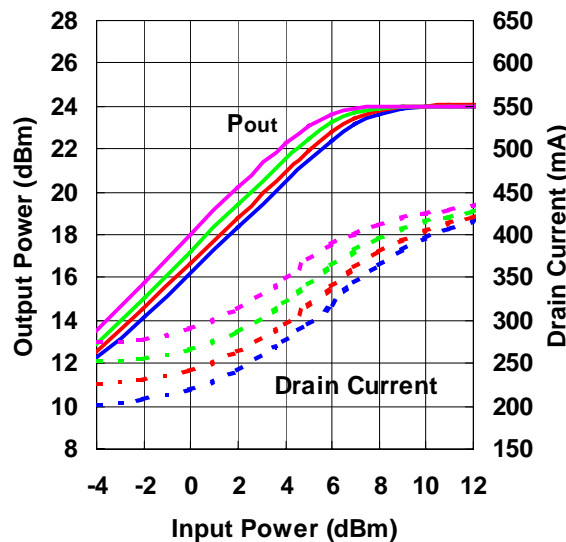
— 200mA — 225mA — 250mA — 275mA

Output Power, Drain Current vs. Input Power by Drain Current
@ freq.=26GHz, VDD=6V



— 200mA — 225mA — 250mA — 275mA

Output Power, Drain Current vs. Input Power by Drain Current
@ freq.=30GHz, VDD=6V

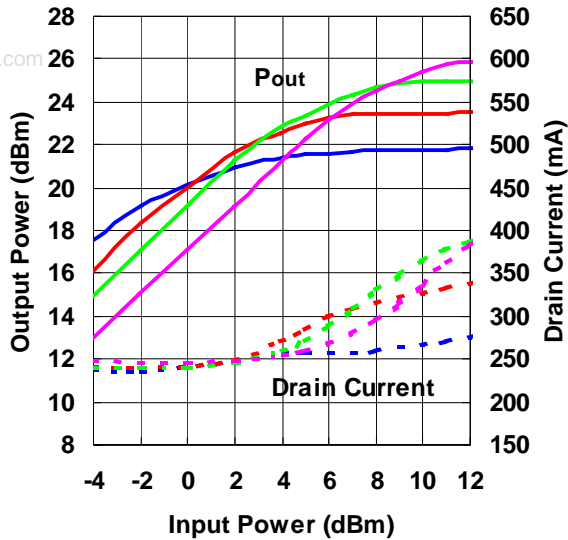


— 200mA — 225mA — 250mA — 275mA

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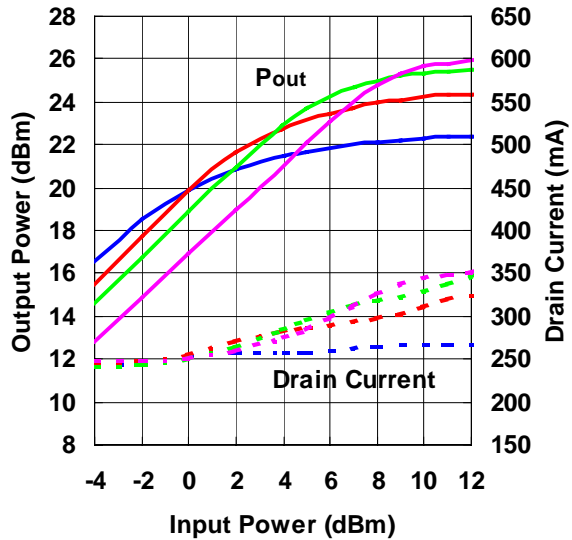
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Output Power, Drain Current vs. Input Power by Drain Voltage @ freq.=17.5GHz, I_{DD}(DC)=250mA



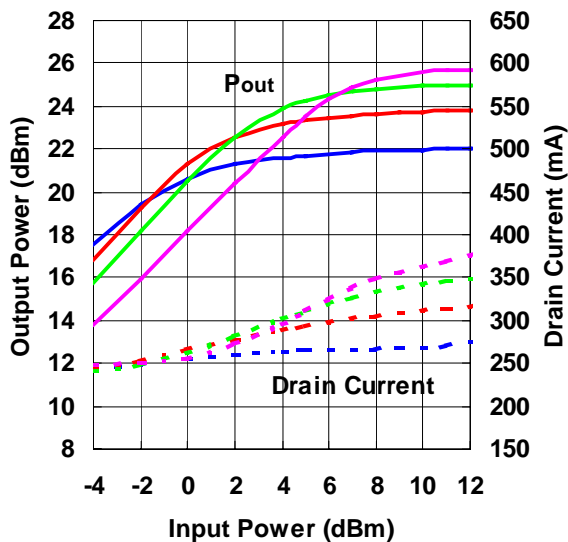
— 3V — 4V — 5V — 6V

Output Power, Drain Current vs. Input Power by Drain Voltage @ freq.=22GHz, I_{DD}(DC)=250mA



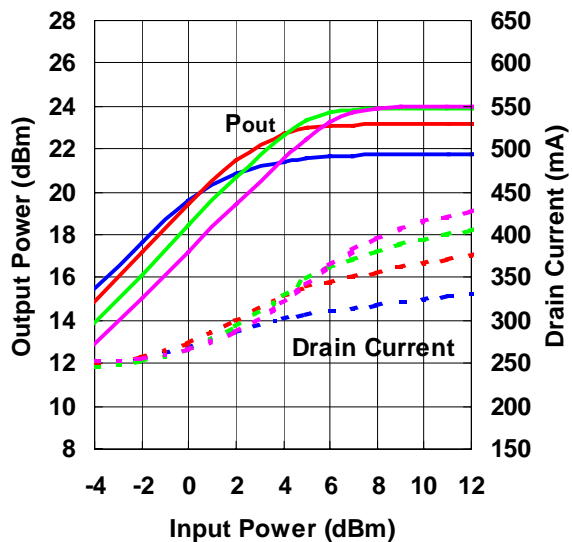
— 3V — 4V — 5V — 6V

Output Power, Drain Current vs. Input Power by Drain Voltage @ freq.=26GHz, I_{DD}(DC)=250mA



— 3V — 4V — 5V — 6V

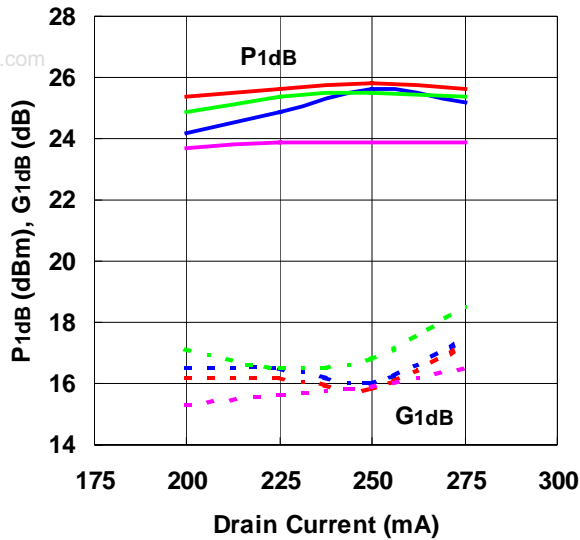
Output Power, Drain Current vs. Input Power by Drain Voltage @ freq.=30GHz, I_{DD}(DC)=250mA



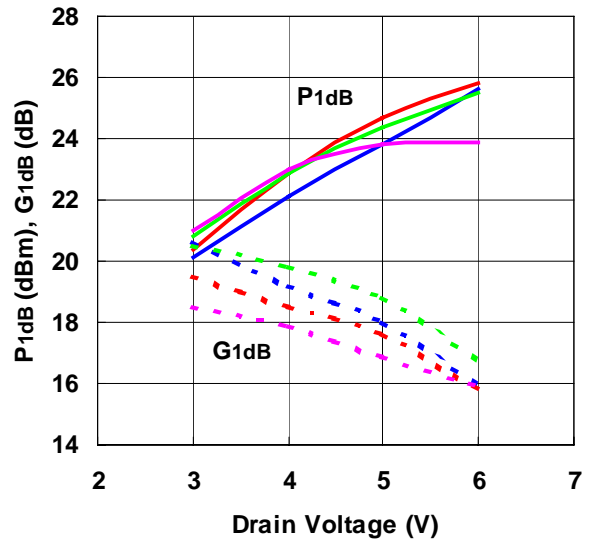
— 3V — 4V — 5V — 6V

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K,Ka-Band Power Amplifier MMIC

P1dB, G1dB vs. Drain Current
 @ freq.=17.5GHz, VDD=6V



P1dB, G1dB vs. Drain Voltage
 @ freq.=22GHz, IDD(DC)=250mA



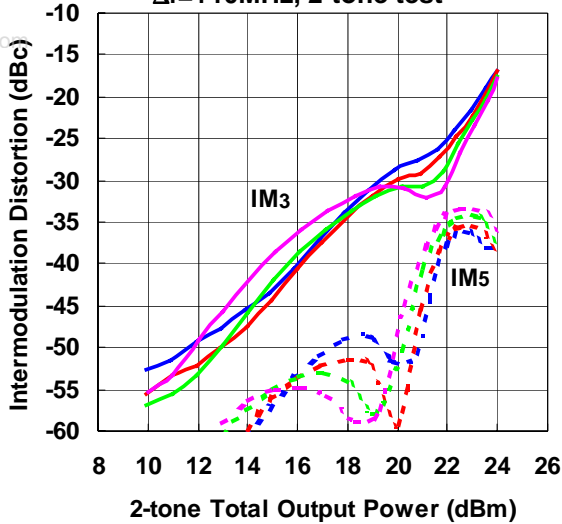
— 17.5GHz — 22GHz — 26GHz — 30GHz

— 17.5GHz — 22GHz — 26GHz — 30GHz

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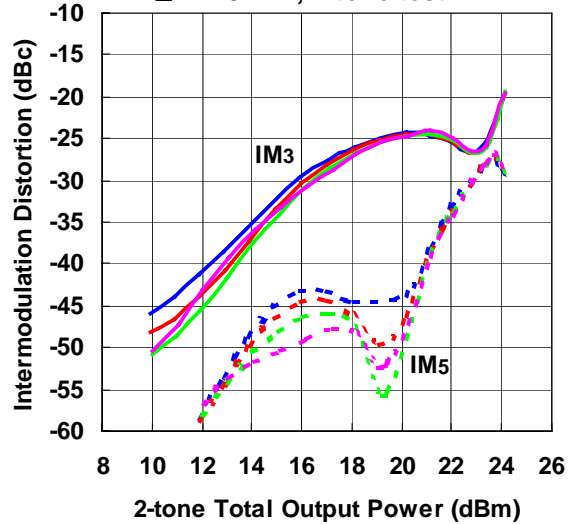
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IMD Performance vs. Total Output Power by Drain Current
@ freq.=17.5GHz, VDD=6V
 $\Delta f=+10\text{MHz}$, 2-tone test



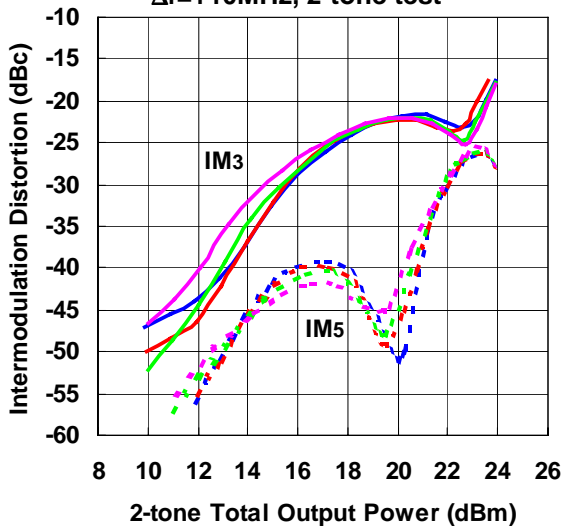
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IMD Performance vs. Total Output Power by Drain Current
@ freq.=22GHz, VDD=6V
 $\Delta f=+10\text{MHz}$, 2-tone test



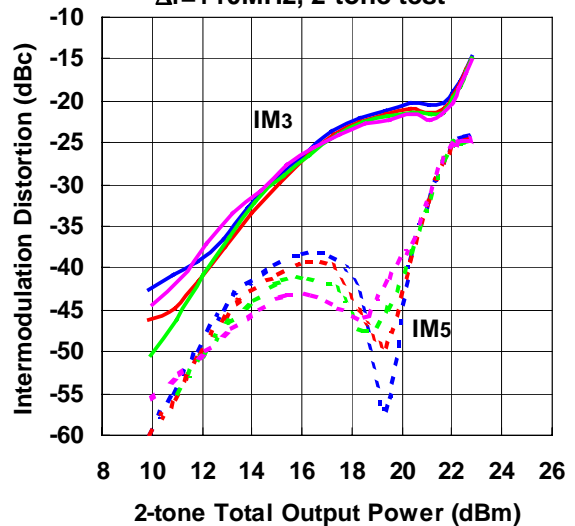
— 200mA — 225mA — 250mA — 275mA

IMD Performance vs. Total Output Power by Drain Current
@ freq.=26GHz, VDD=6V
 $\Delta f=+10\text{MHz}$, 2-tone test



— 200mA — 225mA — 250mA — 275mA

IMD Performance vs. Total Output Power by Drain Current
@ freq.=30GHz, VDD=6V
 $\Delta f=+10\text{MHz}$, 2-tone test

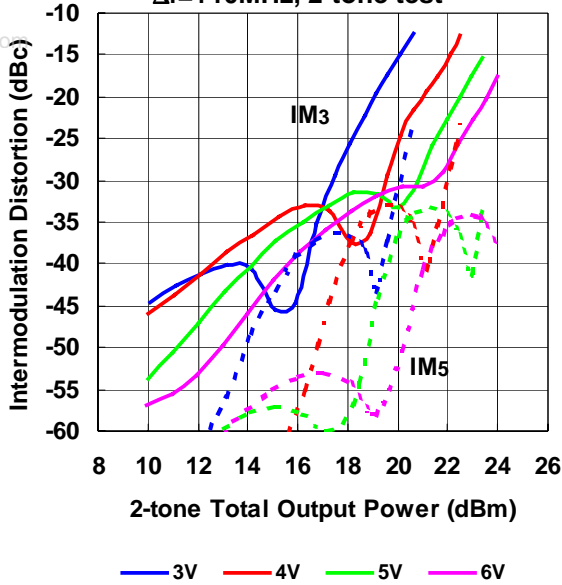


— 200mA — 225mA — 250mA — 275mA

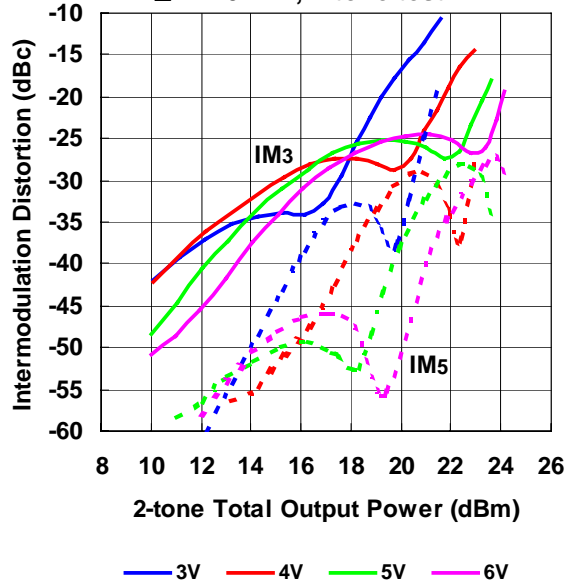
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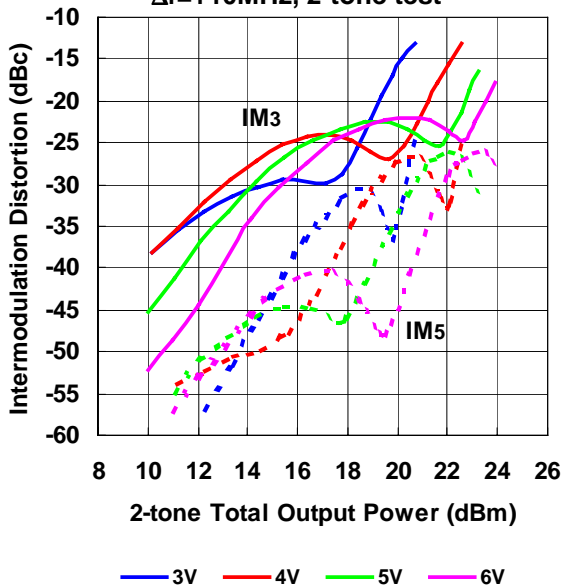
IMD Performance vs. Total Output Power by Drain Voltage
 @ freq.=17.5GHz, I_{DD}(DC)=250mA
 Δf=+10MHz, 2-tone test



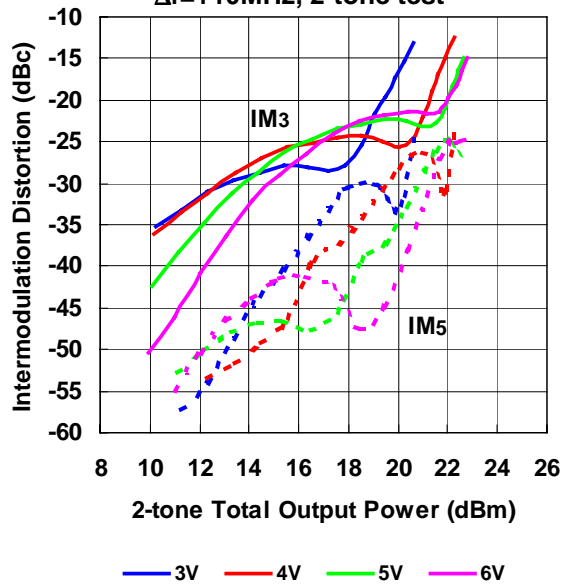
IMD Performance vs. Total Output Power by Drain Voltage
 @ freq.=22GHz, I_{DD}(DC)=250mA
 Δf=+10MHz, 2-tone test



IMD Performance vs. Total Output Power by Drain Voltage
 @ freq.=26GHz, I_{DD}(DC)=250mA
 Δf=+10MHz, 2-tone test



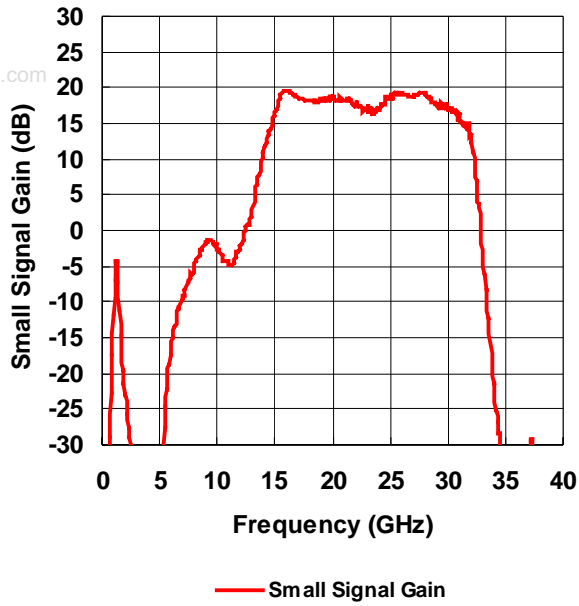
IMD Performance vs. Total Output Power by Drain Voltage
 @ freq.=30GHz, I_{DD}(DC)=250mA
 Δf=+10MHz, 2-tone test



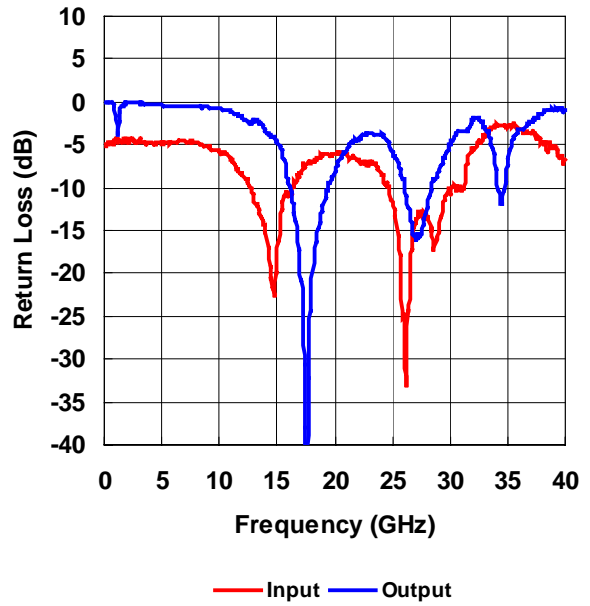
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Small Signal Gain vs. Frequency
@ VDD=6V, IDD(DC)=250mA



Return Loss vs. Frequency
@ VDD=6V, IDD(DC)=250mA



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■ S-Parameters

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

FREQ. [MHz]	S11		S21		S12		S22	
	mag.	ang.	mag.	ang.	mag.	ang.	mag.	ang.
1000	0.607	141.1	0.258	5.5	0.001	-120.2	0.835	-87.5
2000	0.583	100.0	0.070	-4.1	0.000	129.0	0.994	-130.4
3000	0.591	54.5	0.028	-62.0	0.001	-24.5	0.999	172.2
4000	0.577	10.3	0.022	-72.4	0.004	-23.9	0.974	121.5
5000	0.574	-30.7	0.016	-78.4	0.004	-51.4	0.959	71.8
6000	0.582	-70.4	0.154	-94.9	0.005	-72.3	0.947	23.2
7000	0.590	-105.6	0.347	170.6	0.005	-87.7	0.944	-24.5
8000	0.575	-138.3	0.554	84.9	0.006	-94.3	0.947	-68.5
9000	0.552	-169.3	0.820	-2.6	0.005	-107.6	0.938	-109.2
10000	0.506	164.9	0.761	-87.0	0.005	-65.6	0.917	-145.6
11000	0.460	137.2	0.601	-137.9	0.007	-88.3	0.879	-179.5
12000	0.374	109.7	0.771	-169.9	0.007	-103.3	0.809	148.8
13000	0.274	85.5	1.366	142.2	0.009	-95.3	0.790	119.8
14000	0.172	73.4	3.505	73.6	0.007	-99.8	0.681	82.7
15000	0.129	137.6	6.838	-16.2	0.010	-113.4	0.587	46.5
16000	0.290	98.6	9.513	-125.7	0.006	-67.6	0.340	0.8
17000	0.390	68.6	8.599	143.0	0.009	-118.1	0.105	-42.2
18000	0.449	39.5	8.189	63.0	0.006	-102.4	0.084	103.9
19000	0.496	8.2	8.098	-14.0	0.006	-100.4	0.249	66.2
20000	0.503	-24.1	8.316	-93.7	0.007	-99.9	0.397	29.7
21000	0.483	-54.8	8.051	-172.5	0.008	-100.8	0.533	-9.8
22000	0.462	-85.4	7.427	108.2	0.008	-113.5	0.607	-50.5
23000	0.464	-113.8	6.774	32.2	0.009	-149.0	0.662	-89.5
24000	0.378	-145.3	7.104	-36.3	0.006	153.5	0.646	-128.7
25000	0.253	176.0	8.354	-118.1	0.010	46.2	0.506	-179.5
26000	0.057	138.3	9.016	153.5	0.016	7.6	0.345	127.0
27000	0.212	-137.3	8.667	65.2	0.023	-30.1	0.156	82.8
28000	0.209	142.8	9.179	-29.5	0.024	-62.7	0.241	19.3
29000	0.174	62.2	7.605	-126.1	0.018	-65.0	0.393	-42.8
30000	0.287	-24.6	7.114	125.1	0.026	-86.9	0.564	-80.9
31000	0.307	-65.9	6.564	9.4	0.021	-130.5	0.673	-121.1
32000	0.532	-91.7	4.711	-141.2	0.003	-117.6	0.792	-148.9
33000	0.630	-115.8	0.696	59.2	0.018	-50.9	0.712	163.0
34000	0.739	-147.1	0.085	-59.4	0.021	-103.4	0.402	91.2
35000	0.732	-171.0	0.015	-153.7	0.018	-158.0	0.424	-85.2
36000	0.700	170.6	0.019	100.1	0.014	90.6	0.694	-149.9
37000	0.657	148.5	0.030	0.6	0.015	-1.4	0.764	-177.9
38000	0.581	132.1	0.022	-53.3	0.016	-38.7	0.858	158.4
39000	0.545	118.6	0.005	-38.3	0.013	-56.7	0.909	135.9
40000	0.464	97.9	0.013	-64.6	0.010	-63.0	0.887	114.4

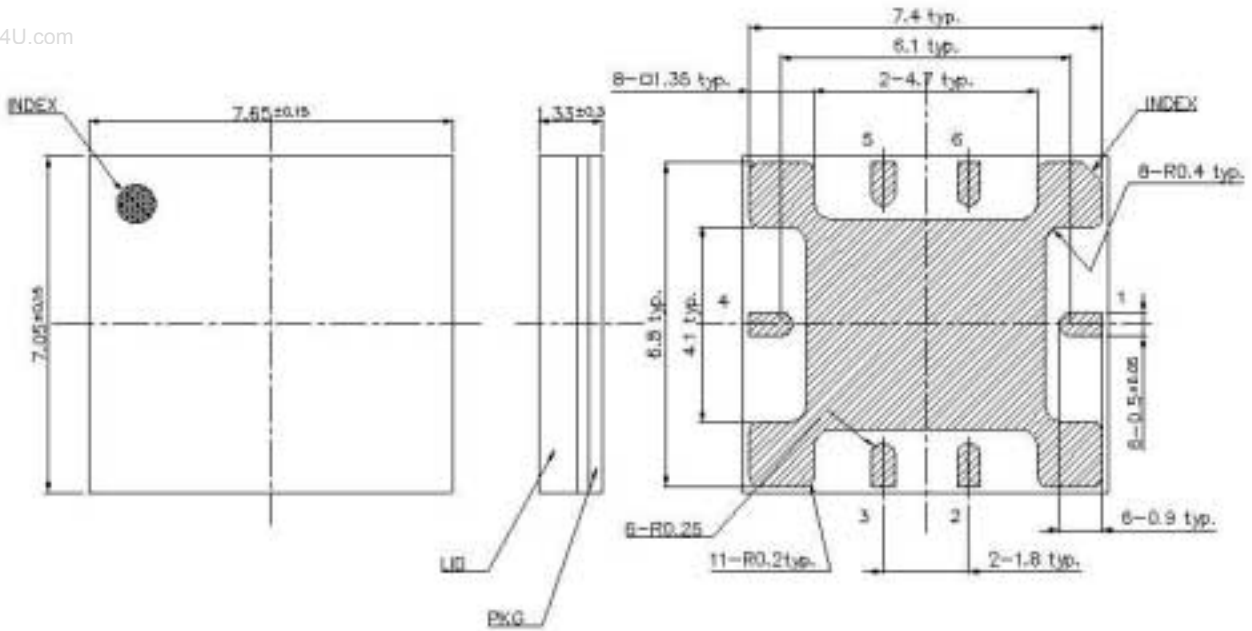
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K, Ka-Band Power Amplifier MMIC

■ Package Outline

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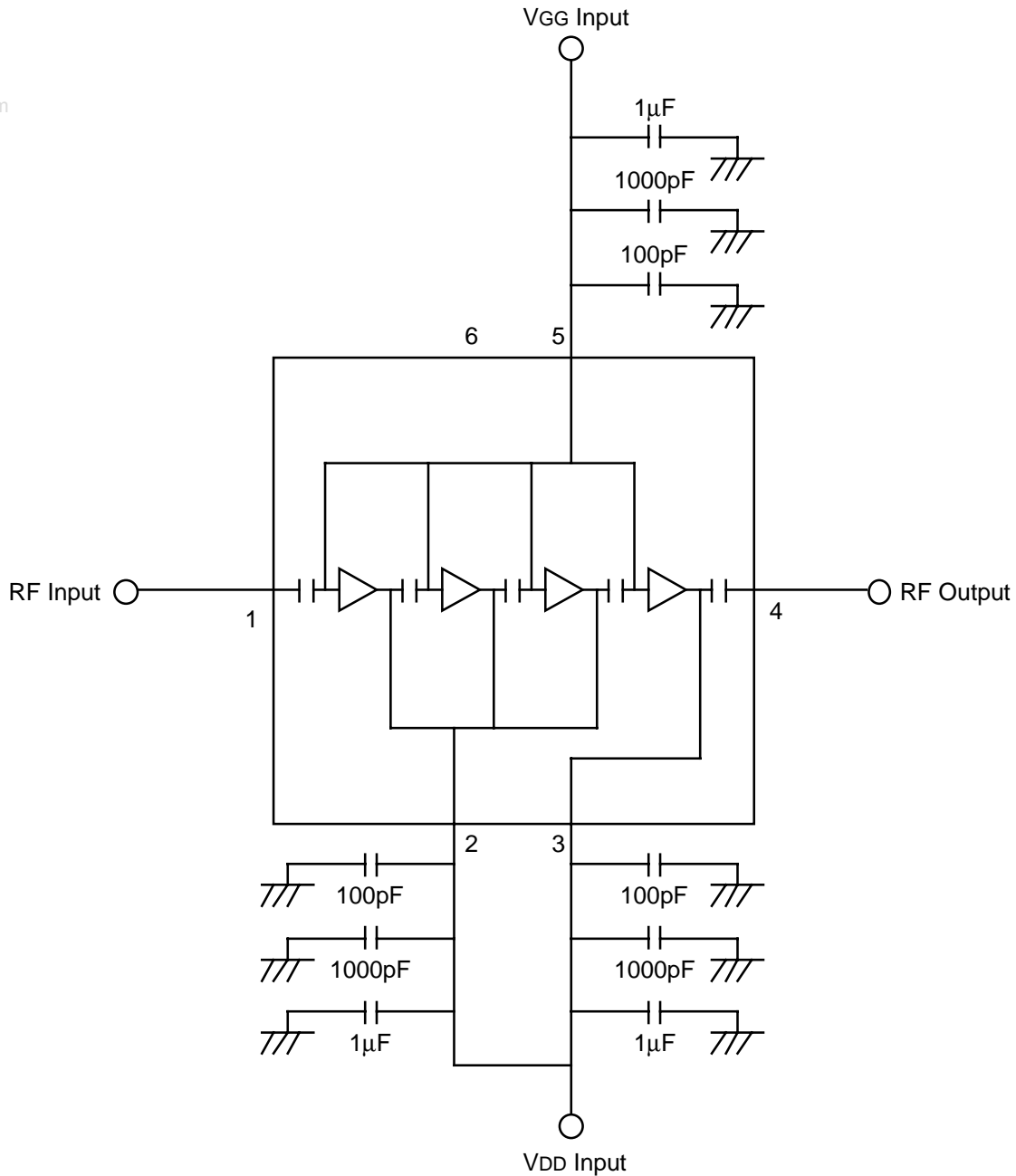
Pin Assignment

- 1 : RF-in
- 2 : VDD1
- 3 : VDD2
- 4 : RF-out
- 5 : VGG
- 6 : N.C.

ES/FMM5804YD

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■ Block Diagram and External Component

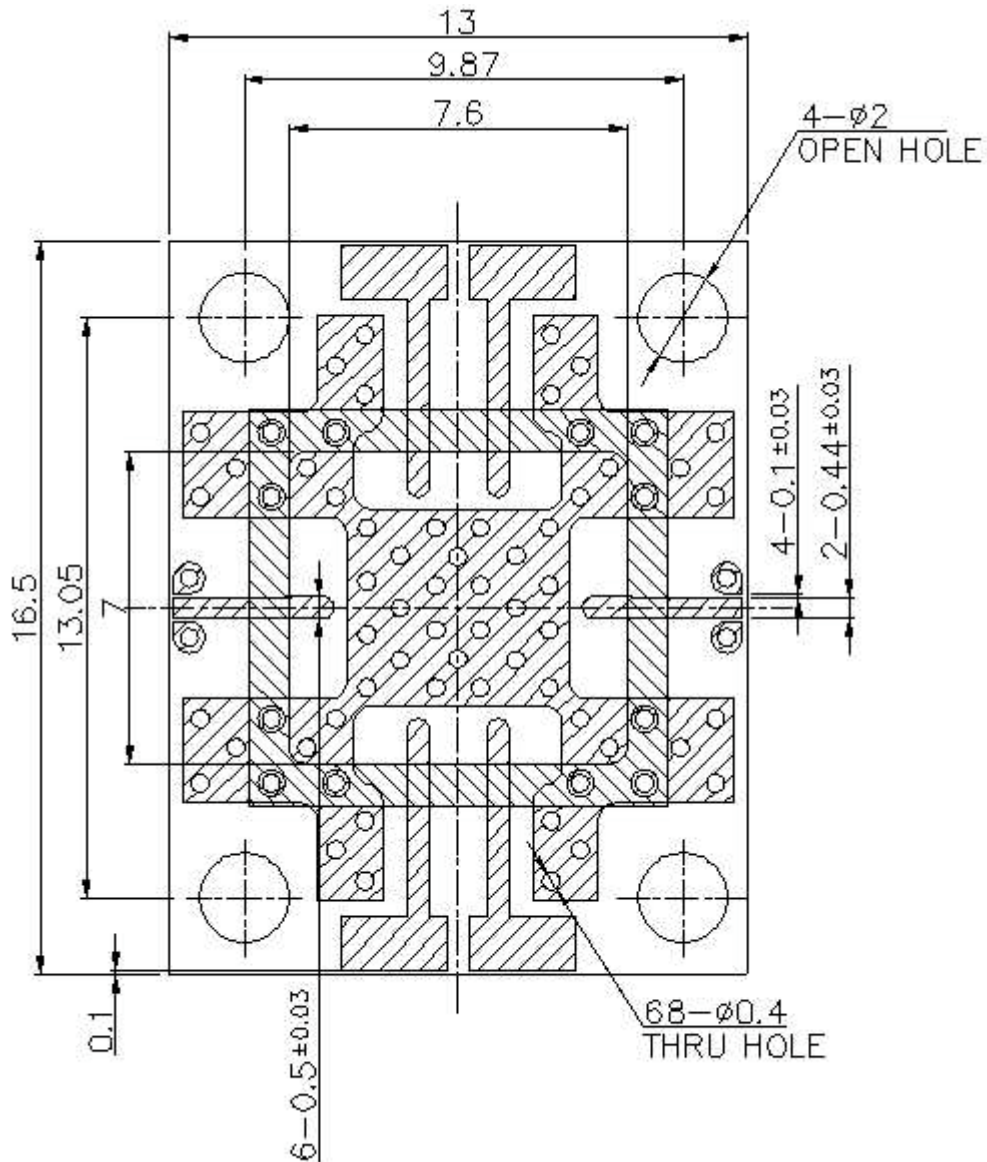


Note) : The capacitors are recommended on the bias supply line, close to the package, in order to prevent video oscillations which could damage the module.



ES/FMM5804YD

K, Ka-Band Power Amplifier MMIC

■ Recommended Foot Pattern Layout



Notes :

- 1.LAMINATE : Rogers Corporation RO4003, Thickness $t=0.2\text{mm}$, Cu Foil $18\ \mu\text{m}$
2.  : Finish to copper foil ; Ni $0.1\ \mu\text{m}$ min./Au $0.1\pm 0.08\ \mu\text{m}$ (Both side)
3.  : Resist

Eudyna

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- 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.

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