

**Preliminary**

# ES/EMM5832VU

## K-Band Power Amplifier MMIC

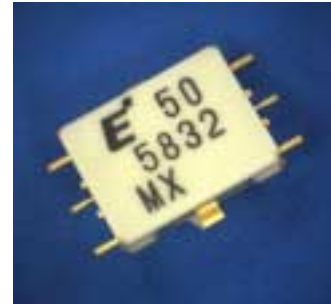
### FEATURES

- High Output Power: Pout=31.0dBm (typ.)
- High Linear Gain: GL=23.0dB (typ.)
- Broad Band: 21.2~26.5GHz
- Impedance Matched Zin/Zout=50Ω
- Small Hermetic Metal-Ceramic SMT Package(VU)

### DESCRIPTION

The EMM5832VU is a MMIC amplifier that contains a four-stage amplifier, internally matched, for standard communications band in the 21.2 to 26.5GHz frequency range.

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



### ABSOLUTE MAXIMUM RATING

Item	Symbol	Rating	Unit
Drain-Source Voltage	V <sub>DD</sub>	10	V
Gate-Source Voltage	V <sub>GG</sub>	-3	V
Input Power	P <sub>in</sub>	22	dBm
Storage Temperature	T <sub>stg</sub>	-55 to +125	°C

### RECOMMENDED OPERATING CONDITIONS

Item	Symbol	Condition	Unit
Drain-Source Voltage	V <sub>DD</sub>	≤ 7	V
Input Power	P <sub>in</sub>	≤ 12	dBm
Operating Case Temperature	T <sub>C</sub>	-40 to +85	°C

### ELECTRICAL CHARACTERISTICS (Case Temperature Ta=25°C)

Item	Symbol	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
RF Frequency Range	f	V <sub>DD</sub> =+6V	21.2	-	26.5	GHz
Output Power at 1dB G.C.P.	P <sub>1dB</sub>	I <sub>DD(DC)</sub> =800mA typ.	TBD	31	-	dBm
Power Gain at 1dB G.C.P.	G <sub>1dB</sub>	Z <sub>S</sub> =Z <sub>L</sub> =50ohm	TBD	21	TBD	dB
Power-added Efficiency at 1dB G.C.P.	η <sub>add</sub>		-	20	-	%
Drain Current at 1dB G.C.P.	I <sub>DDRF</sub>		-	1000	TBD	mA
3rd. Order Intermodulation Distortion *	IM <sub>3</sub>	* df=+10MHz	TBD	33	-	dBc
Input Return Loss (at Pin=-20dBm)	RL <sub>IN</sub>	Po=20dBm S.C.L	-	-8	-	dB
Output Return Loss (at Pin=-20dBm)	RL <sub>OUT</sub>		-	-8	-	dB

G.C.P. : Gain Compression Point  
S.C.L. : Single Carrier Level

ESD	Class 0	~199V
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Note : Based on EIAJ ED4701 C-111A(C=100pF, R=1.5kohm)

CASE STYLE	VU
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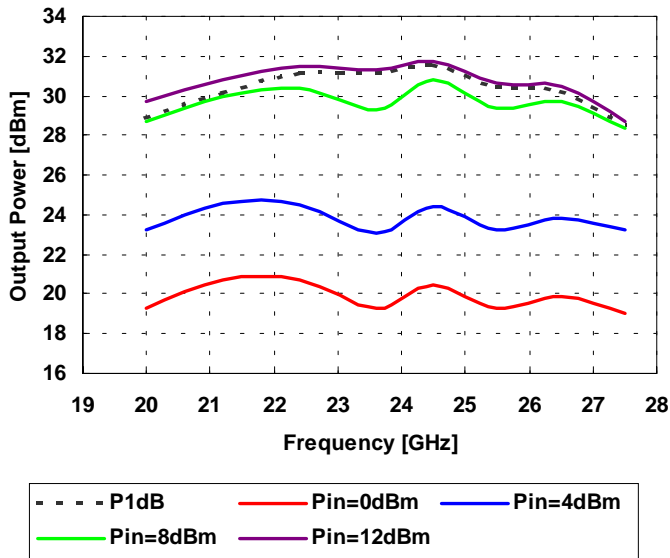
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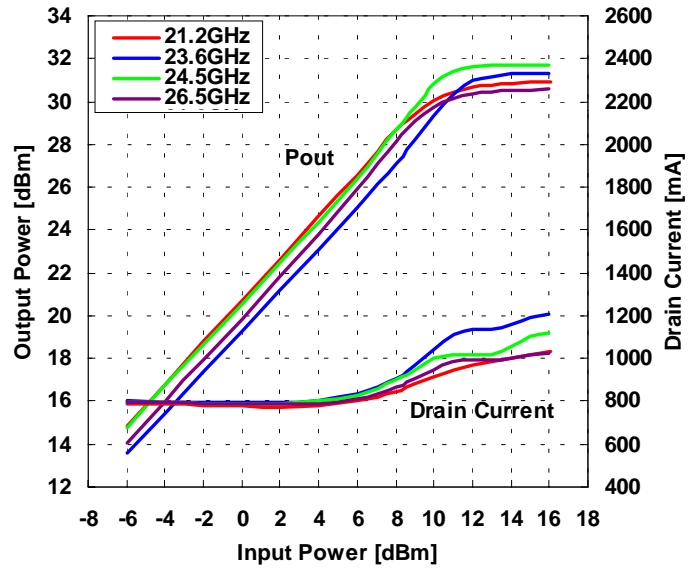
OUTPUT POWER vs. FREQUENCY

VDD=6V, IDD(DC)=800mA



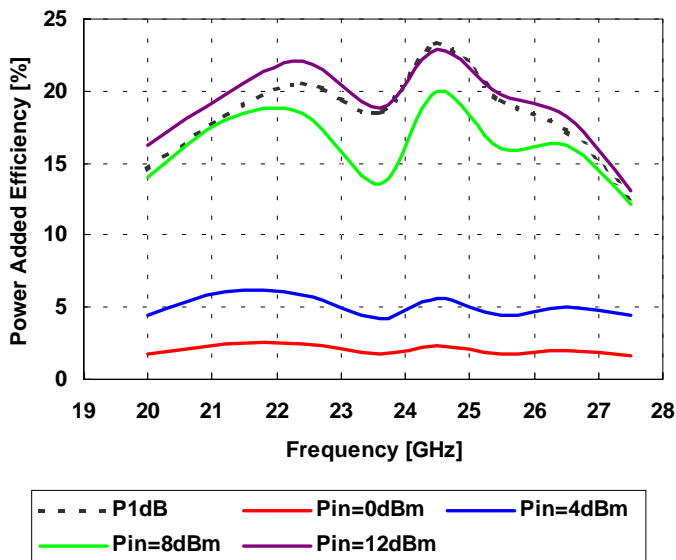
OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER

VDD=6V, IDD(DC)=800mA



POWER-ADDED EFFICIENCY vs FREQUENCY

VDD=6V, IDD(DC)=800mA



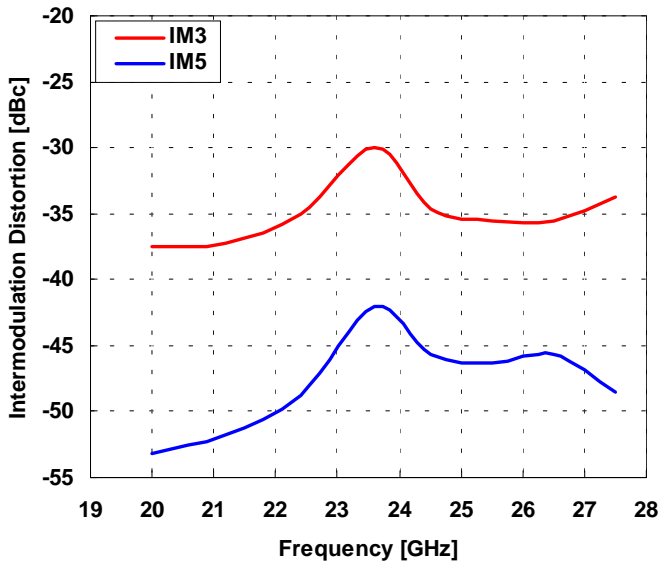
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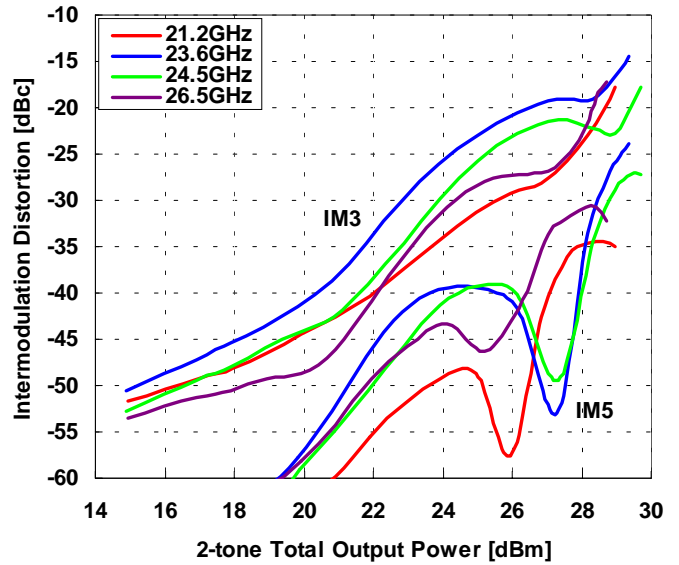
### IMD vs. FREQUENCY

VDD=6V, IDD(DC)=800mA, Pout=20dBm S.C.L



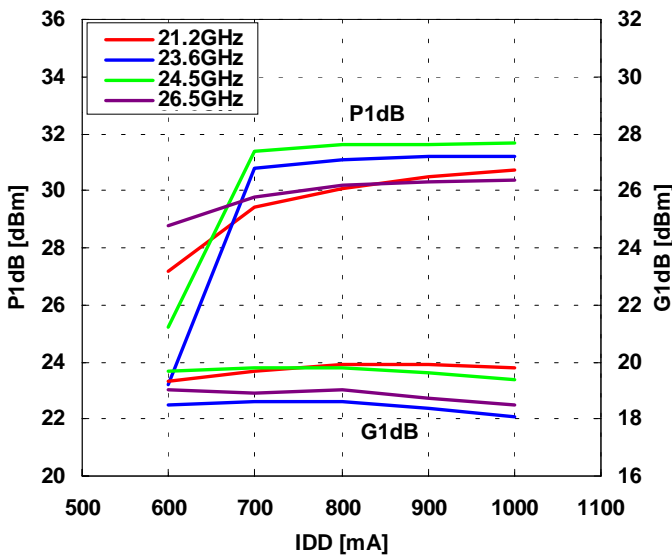
### IMD vs OUTPUT POWER

VDD=6V, IDD(DC)=800mA



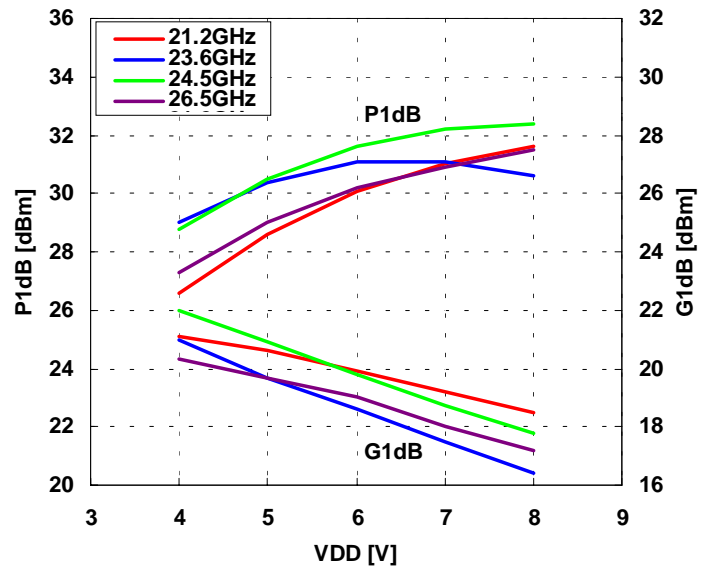
### OUTPUT POWER, GAIN vs. DRAIN CURRENT

VDD=6V



### OUTPUT POWER, GAIN vs. DRAIN VOLTAGE

IDD(DC)=800mA



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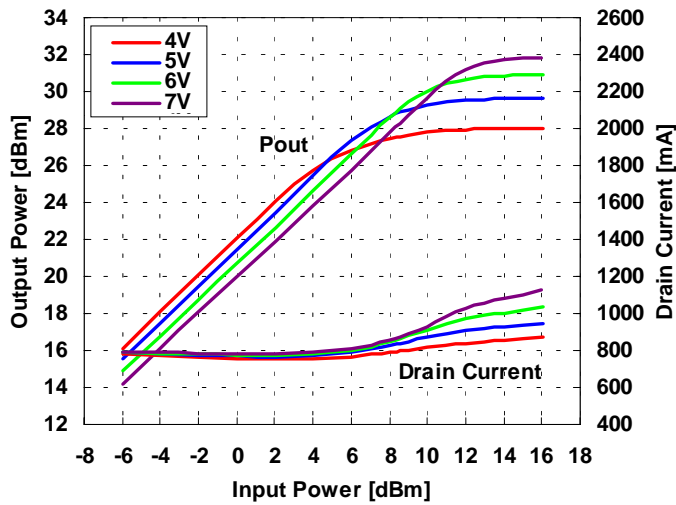
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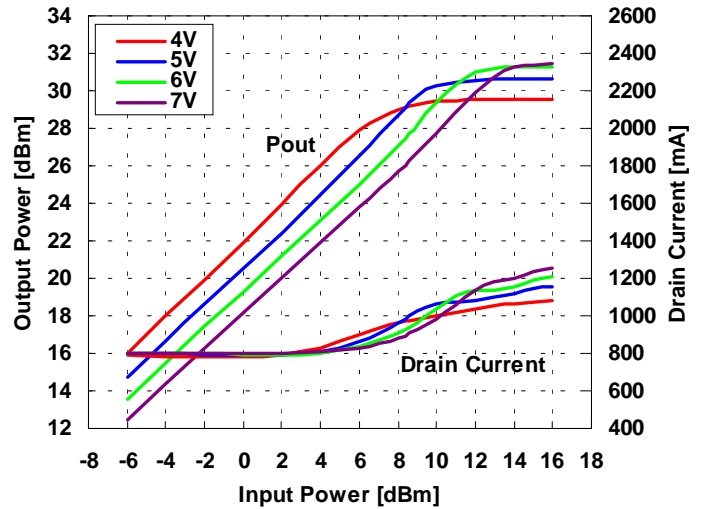
OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER by Drain Voltage

IDD(DC)=800mA, f=21.2GHz



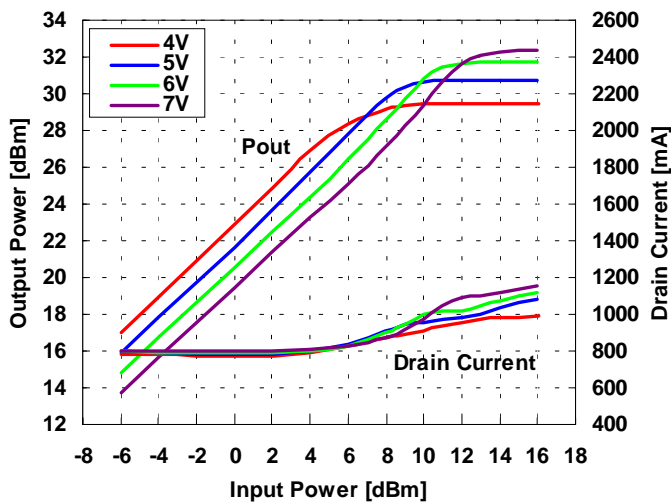
OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER by Drain Voltage

IDD(DC)=800mA, f=23.6GHz



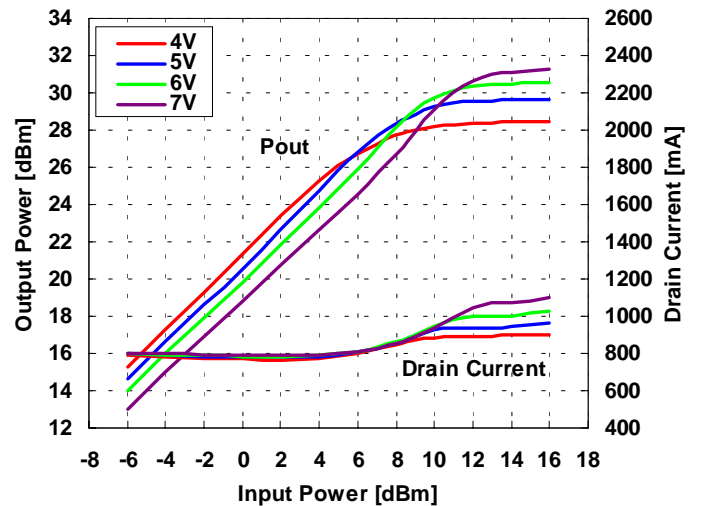
OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER by Drain Voltage

IDD(DC)=800mA, f=24.5GHz



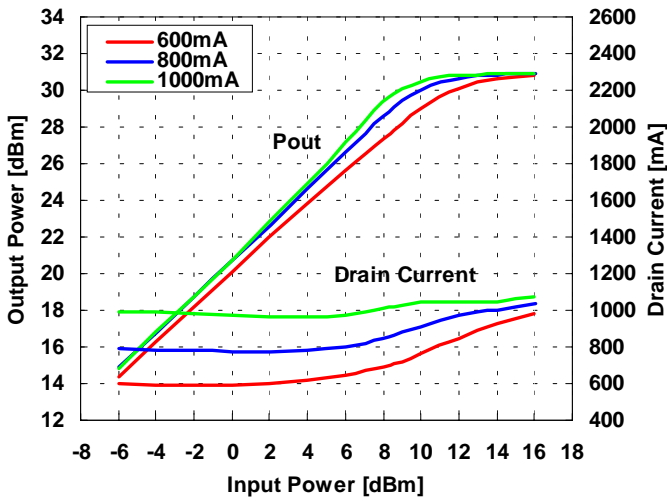
OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER by Drain Voltage

IDD(DC)=800mA, f=26.5GHz



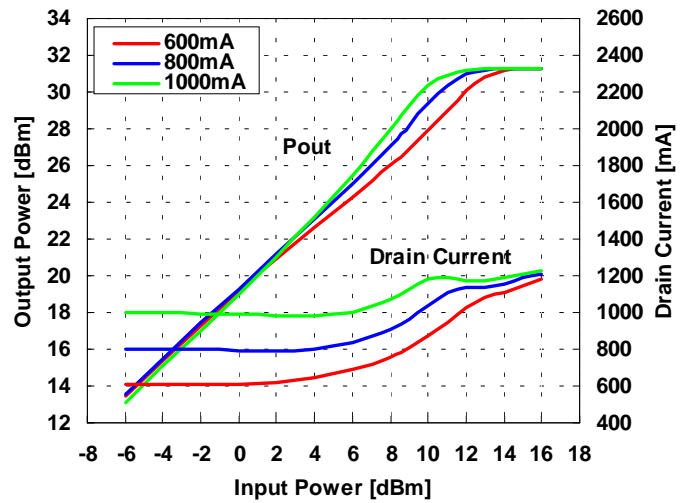
OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER by Drain Current

VDD=6V, f=21.2GHz



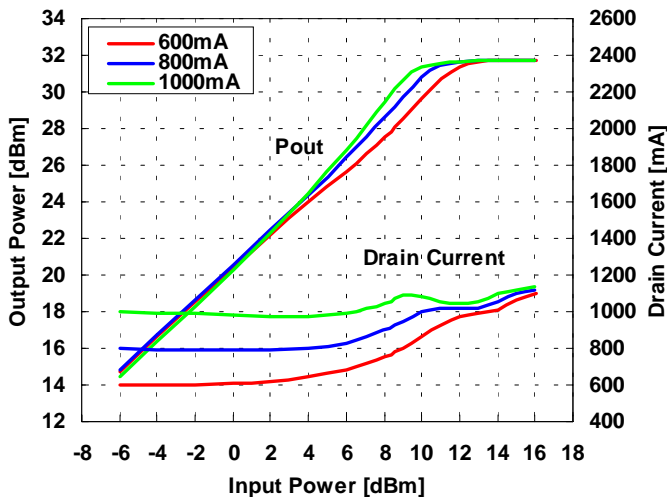
OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER by Drain Current

VDD=6V, f=23.6GHz



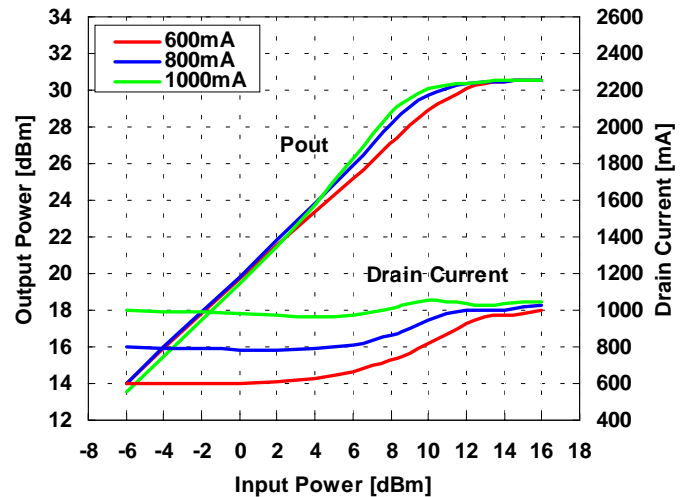
OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER by Drain Current

VDD=6V, f=24.5GHz



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

VDD=6V, f=26.5GHz



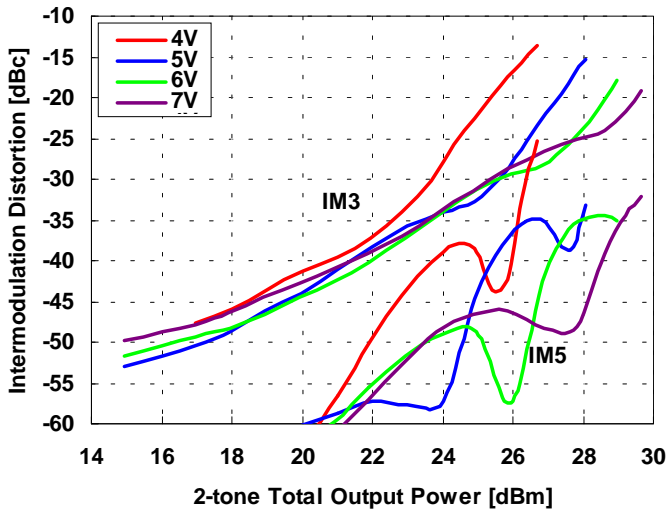
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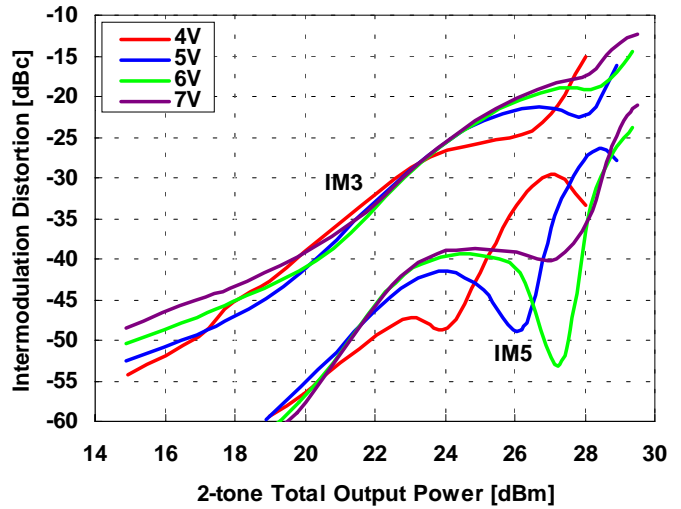
IMD PERFORMANCE vs. OUTPUT POWER  
by Drain Voltage

IDD(DC)=800mA, f=21.2GHz



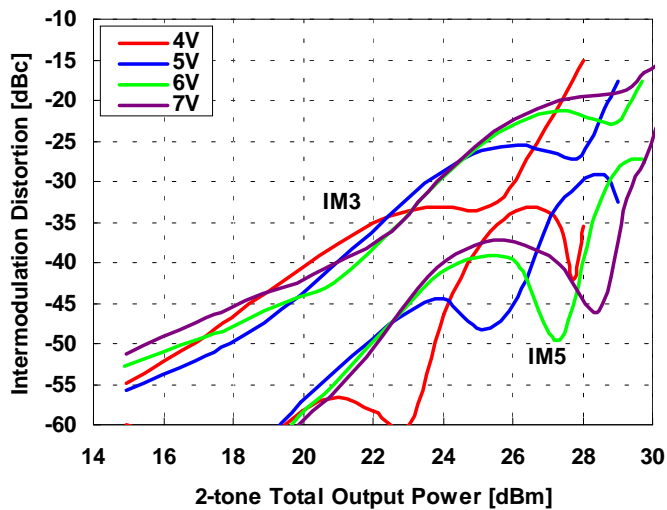
IMD PERFORMANCE vs. OUTPUT POWER  
by Drain Voltage

IDD(DC)=800mA, f=23.6GHz



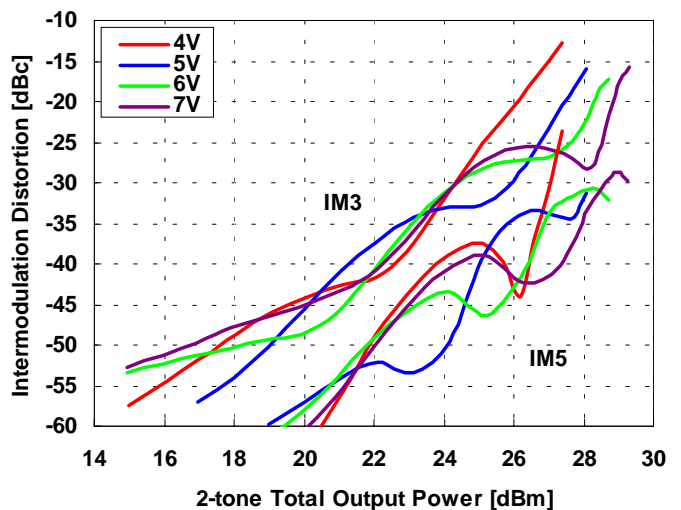
IMD PERFORMANCE vs. OUTPUT POWER  
by Drain Voltage

IDD(DC)=800mA, f=24.5GHz



IMD PERFORMANCE vs. OUTPUT POWER  
by Drain Voltage

IDD(DC)=800mA, f=26.5GHz

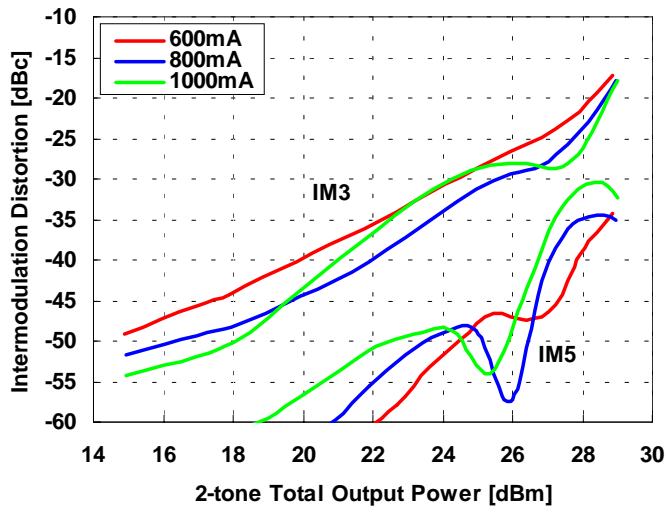


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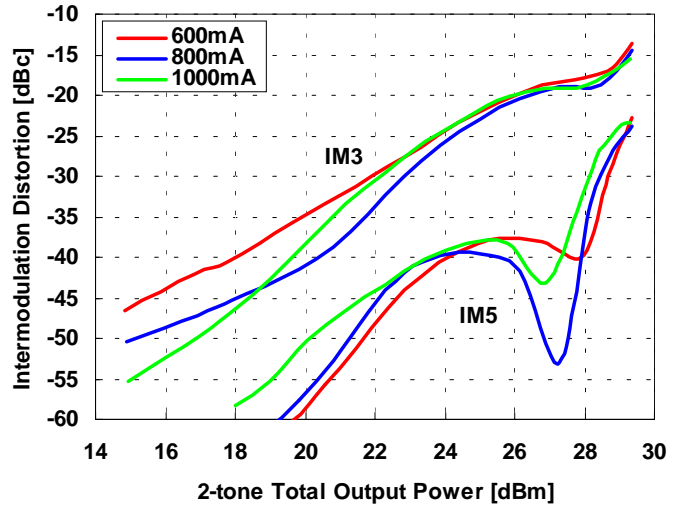
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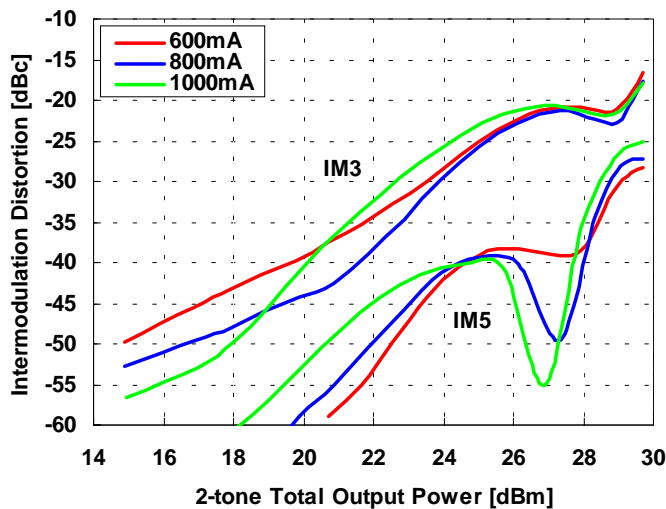
**IMD PERFORMANCE vs. OUTPUT POWER  
by Drain Current**  
VDD=6V, f=21.2GHz



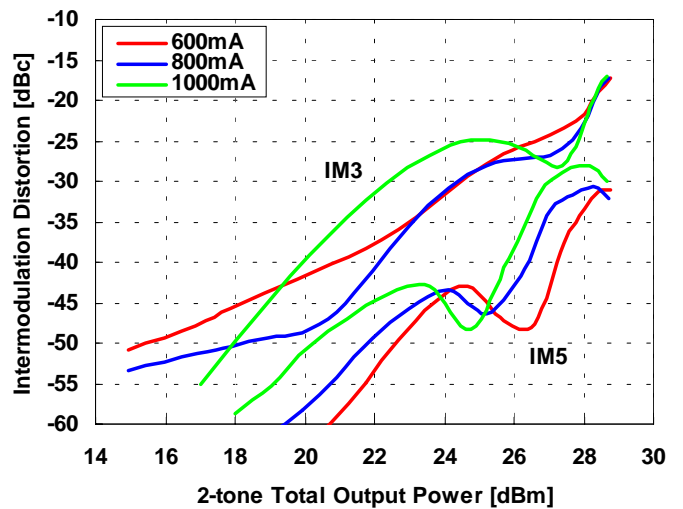
**IMD PERFORMANCE vs. OUTPUT POWER  
by Drain Current**  
VDD=6V, f=23.6GHz



**IMD PERFORMANCE vs. OUTPUT POWER  
by Drain Current**  
VDD=6V, f=24.5GHz



**IMD PERFORMANCE vs. OUTPUT POWER  
by Drain Current**  
VDD=6V, f=26.5GHz



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## K-Band Power Amplifier MMIC

### ■ S-PARAMETER

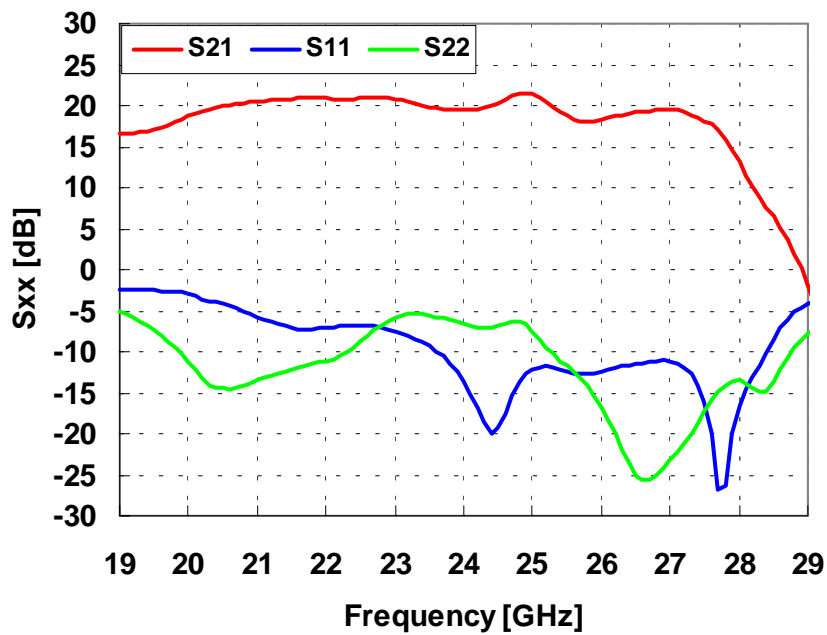
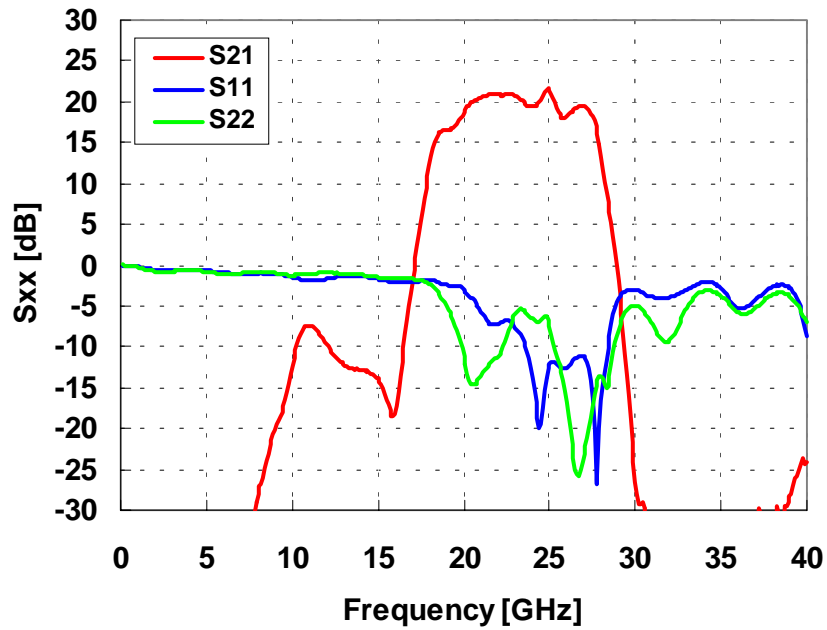
VDD=6V, IDD=800mA

Frequency [GHz]	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
1.0	0.98	-32.4	0.01	-30.1	0.00	165.4	0.97	-49.9
2.0	0.93	-62.5	0.02	45.1	0.00	144.3	0.92	-90.2
3.0	0.93	-84.7	0.02	-38.2	0.00	167.6	0.92	-120.7
4.0	0.94	-103.5	0.02	-94.5	0.00	166.4	0.93	-149.6
5.0	0.93	-127.4	0.02	-130.9	0.00	132.8	0.91	174.3
6.0	0.90	-159.1	0.02	-169.6	0.00	102.5	0.88	136.1
7.0	0.89	168.7	0.02	170.9	0.00	14.9	0.89	107.2
8.0	0.89	143.8	0.04	153.3	0.00	-13.0	0.92	84.9
9.0	0.89	121.2	0.10	105.3	0.00	-100.8	0.90	55.4
10.0	0.84	89.4	0.24	47.3	0.00	-158.6	0.87	15.9
11.0	0.80	45.0	0.43	-60.8	0.00	162.8	0.89	-12.3
12.0	0.83	9.7	0.33	-147.1	0.00	-68.9	0.90	-25.2
13.0	0.85	-7.1	0.25	156.4	0.00	-83.4	0.89	-34.6
14.0	0.85	-16.0	0.23	110.3	0.00	-135.2	0.87	-51.2
15.0	0.83	-33.3	0.20	62.6	0.01	-170.4	0.84	-78.8
16.0	0.78	-64.9	0.12	72.6	0.01	115.9	0.83	-105.9
17.0	0.79	-99.5	0.79	67.6	0.00	21.9	0.82	-125.5
18.0	0.81	-120.6	4.02	-21.4	0.00	-82.4	0.77	-142.9
19.0	0.76	-128.6	6.67	-150.4	0.00	-115.8	0.56	-164.7
20.0	0.71	-139.8	8.59	118.6	0.00	174.5	0.27	139.1
21.0	0.52	-175.1	10.65	17.0	0.00	64.8	0.21	-19.6
21.2	0.48	172.6	10.84	-2.4	0.00	22.7	0.23	-34.5
21.4	0.45	159.4	10.99	-22.2	0.00	-26.9	0.24	-49.2
21.6	0.43	145.7	11.12	-41.7	0.00	-102.6	0.25	-66.2
21.8	0.43	133.3	11.17	-61.3	0.00	-157.3	0.27	-86.0
22.0	0.44	120.9	11.06	-80.7	0.00	128.8	0.28	-107.0
22.2	0.45	109.7	10.93	-99.4	0.00	63.7	0.30	-124.3
22.4	0.46	100.0	11.02	-117.8	0.00	20.8	0.34	-139.3
22.6	0.46	91.2	11.12	-136.6	0.00	-0.5	0.39	-152.2
22.8	0.44	84.0	11.12	-157.0	0.00	-12.0	0.46	-164.9
23.0	0.42	77.6	10.93	-176.4	0.00	-34.0	0.51	-176.8
23.2	0.39	72.6	10.63	163.5	0.00	-50.9	0.54	173.3
23.4	0.36	66.2	10.12	145.1	0.00	-57.0	0.53	164.9
23.6	0.32	59.2	9.66	128.0	0.00	-64.5	0.52	160.0
23.8	0.27	50.4	9.53	111.5	0.00	-73.2	0.49	157.5
24.0	0.20	38.1	9.38	95.6	0.00	-73.5	0.47	156.9
24.2	0.14	16.4	9.47	79.2	0.00	-77.1	0.45	158.0
24.4	0.10	-31.6	9.97	62.5	0.00	-70.3	0.45	160.3
24.6	0.13	-93.2	10.88	43.7	0.00	-60.7	0.47	159.0
24.8	0.21	-131.1	11.84	19.9	0.01	-71.2	0.48	151.3
25.0	0.25	-155.7	11.72	-7.8	0.01	-92.4	0.42	140.5
25.2	0.26	-171.8	10.52	-33.0	0.01	-111.0	0.34	135.6
25.4	0.25	179.6	9.21	-53.4	0.01	-126.2	0.28	134.8
25.6	0.24	175.9	8.30	-70.4	0.01	-127.9	0.24	130.5
25.8	0.23	174.3	7.97	-85.2	0.00	-130.5	0.20	121.0
26.0	0.24	172.5	8.12	-101.7	0.00	-136.5	0.15	106.8
26.2	0.25	168.8	8.57	-121.4	0.00	-143.3	0.10	88.6
26.4	0.26	162.7	8.90	-143.6	0.00	-158.3	0.07	61.7
26.6	0.27	154.5	9.23	-167.8	0.00	-165.8	0.05	23.1
26.8	0.28	145.3	9.45	166.6	0.00	-172.7	0.06	-16.6
27.0	0.28	132.0	9.41	137.8	0.00	-165.6	0.07	-50.7
28.0	0.15	-125.7	4.59	-25.6	0.01	96.4	0.21	-173.2
29.0	0.62	-168.9	0.81	-156.4	0.01	-99.6	0.40	-168.3
30.0	0.71	155.4	0.05	150.2	0.01	-179.6	0.56	172.9
31.0	0.64	119.8	0.01	157.7	0.01	-15.9	0.43	158.8
32.0	0.64	88.1	0.01	167.4	0.01	-107.6	0.34	124.5
33.0	0.71	76.0	0.00	-172.0	0.01	-116.2	0.55	81.1
34.0	0.79	67.6	0.00	-164.3	0.01	-133.6	0.69	62.8
35.0	0.72	42.5	0.01	-119.5	0.01	-124.2	0.65	45.5
36.0	0.54	-9.8	0.02	-174.3	0.02	-177.1	0.51	-3.1
37.0	0.61	-49.6	0.03	115.0	0.03	115.8	0.55	-50.8
38.0	0.74	-53.9	0.03	28.5	0.03	24.8	0.66	-59.6
39.0	0.73	-53.6	0.04	-22.8	0.04	-28.7	0.65	-65.9
40.0	0.37	-82.9	0.06	-120.3	0.06	-118.6	0.45	-100.3



■ S-PARAMETER

VDD=6V, IDD(DC)=800mA

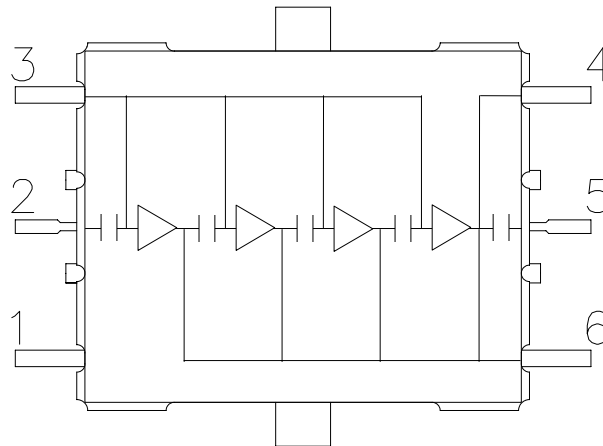


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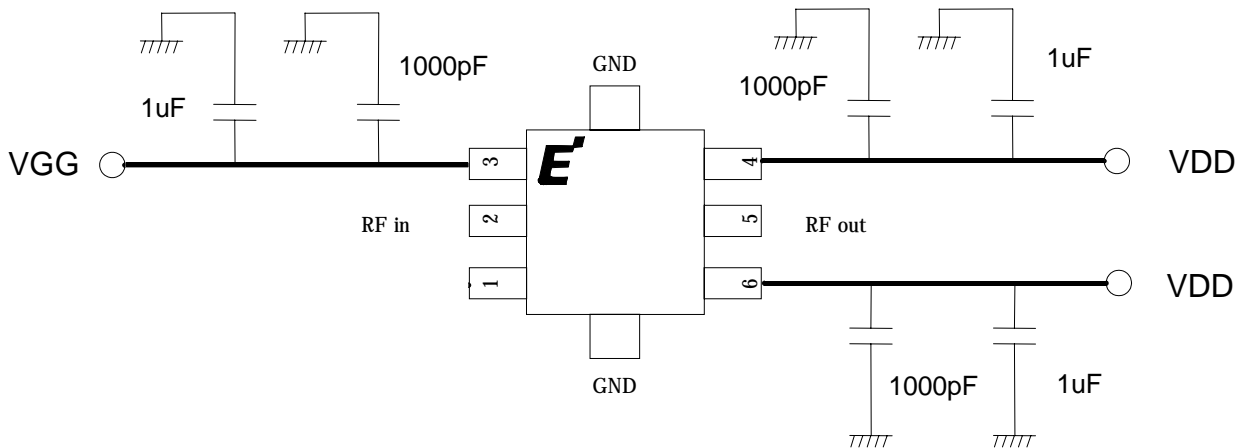
## ■ Block diagram



### PIN ASSIGNMENT

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

## ■ Recommended Bias Circuit



Note 1: The capacitors are recommended on the bias supply line, close to the package, in order to prevent video oscillations which could damage the module.

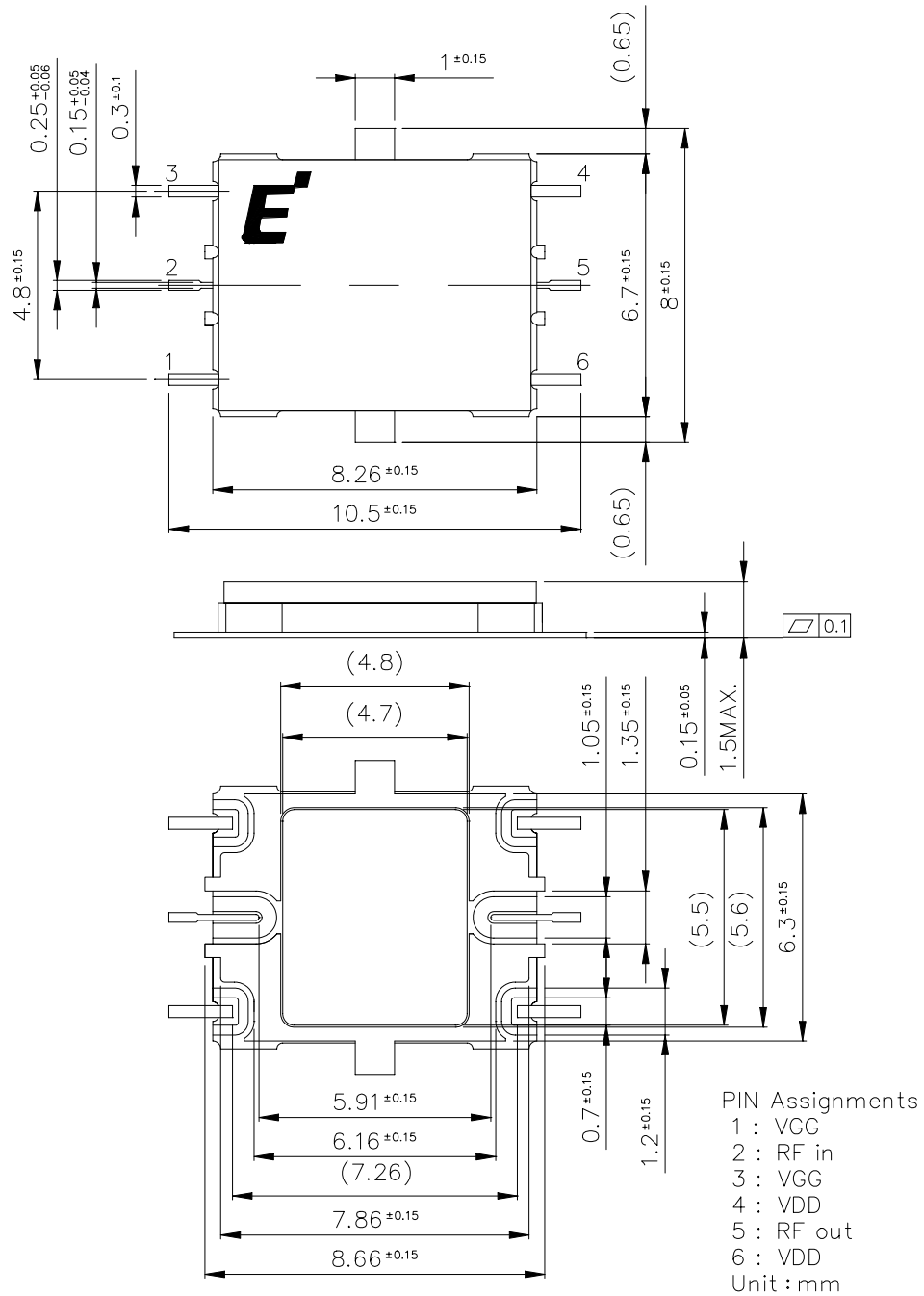
Note 2: Two pins named VDD are internally connected.

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### Package Outline

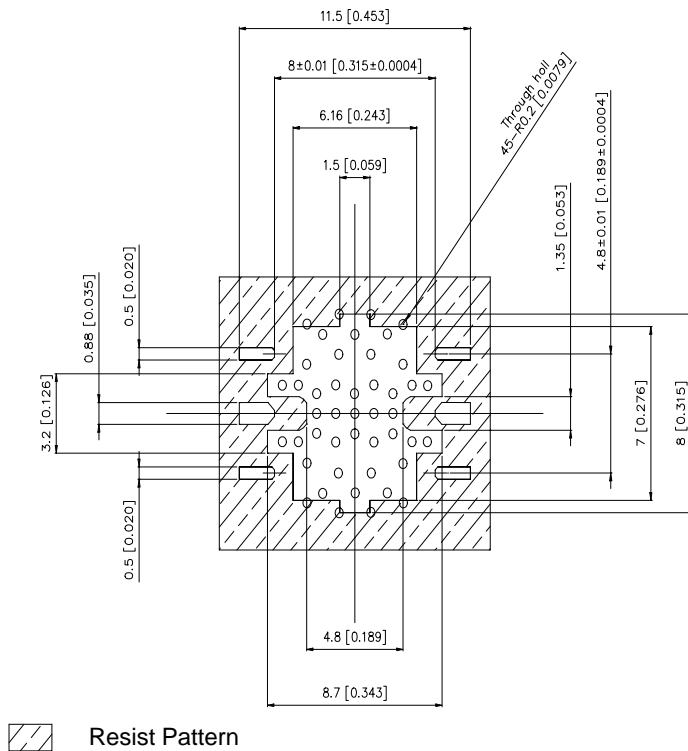


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## ■ PCB Pads and Solder-resist Pattern



Unit: mm [inches]  
PCB: Diclad-522  
Under plating: Cu  
: Nickel (Ni) 1 ~ 4 μm  
Top plating: Gold (Au)  
(Flash plating 0.1 μm or less)

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For further information please contact :

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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.

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