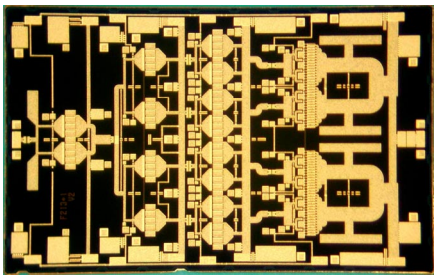
FMM5820X

Ka-Band Power Amplifier MMIC

FEATURES

- •High Output Power; Pout = 35.5 dBm (Typ.)
- •High Linear Gain; GL = 24 dB(Typ.)
- •Frequency Band ; 29.5 - 30.0 GHz
- •Impedance Matched Zin/Zout = 50Ω



DESCRIPTION

The FMM5820X is a power amplifier MMIC that contains a four-stages amplifier, internally matched, for standard communications band in the 29.5 to 30.0GHz frequency range. This product is well suited for Ka-band V-SAT applications.

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

ABSOLUTE MAXIMUM RATING

Item	Symbol	Rating	Unit
Drain-Source Voltage	VDD	10	V
Gate-Source Voltage	VGG	-3	V
Input Power	Pin	21	dBm
Storage Temperature	Tstg	-55 to +125	℃

RECOMMENDED OPERATING CONDITIONS

Item	Symbol	Condition	Unit
Drain-Source Voltage	VDD	≦7	V
Input Power	Pin	≦18	dBm
Operating Backside Temperature	Top	-40 to +85	℃

This product should be hermetically packaged.

ELECTRICAL CHARACTERISTICS (Ambient Temperature Ta=25℃)

Item	Symbol	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
Frequency Range	f	VDD=7.0V	29.5	-	30	GHz
Output Power at Pin=15dBm	Pout	IDD(DC)=1500mA typ.	34.5	35.5		dBm
Output Power at 1dB G.C.P.	P1dB	Zs=Zl=50ohm	-	35	-	dBm
Linear Gain	Gl		20	24		dB
Power Added Efficiency at Pin=15dBm	Nadd		-	23	-	%
Drain Current at Pin=15dBm	Iddrf		-	2200	2800	mA
Input Return Loss at Pin=-20dBm	RLin		-	-8	-	dB
Output Return Loss at Pin=-20dBm	RLout		-	-10	-	dB

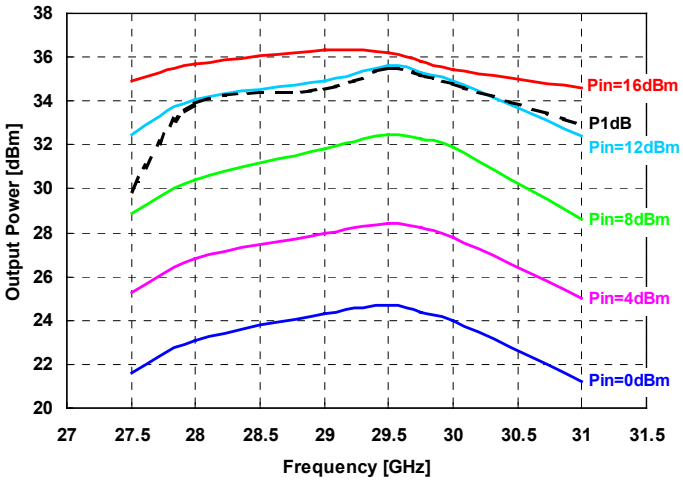
Note : RF parameter sample size 10ps. Criteria (accept/reject)=(0/1) G.C.P. : Gain Compression Point

ESD	**Class 0**	**~ 199V**

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

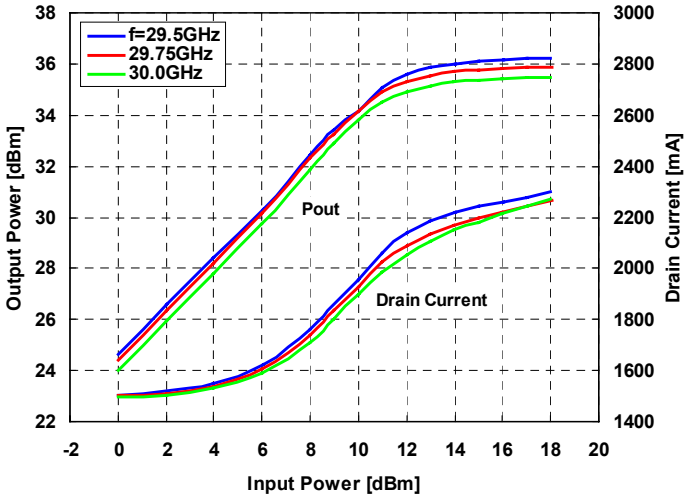
Output Power vs. Frequency

@VDD=7V, IDD(DC)=1500mA



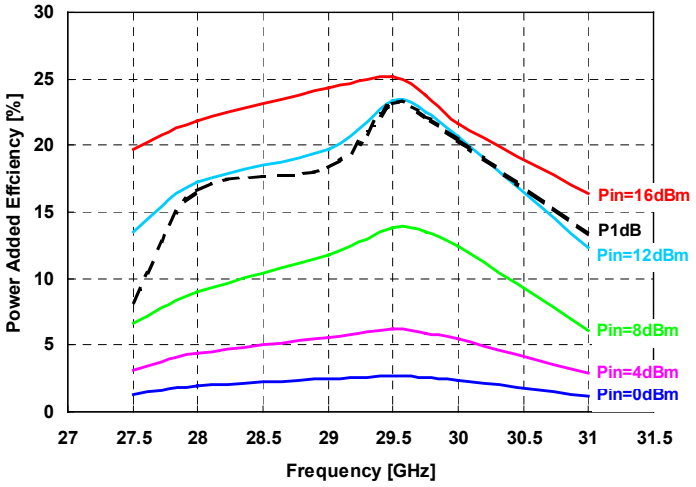
Output Power, Drain Current vs. Input Power

@VDD=7V, IDD(DC)=1500mA



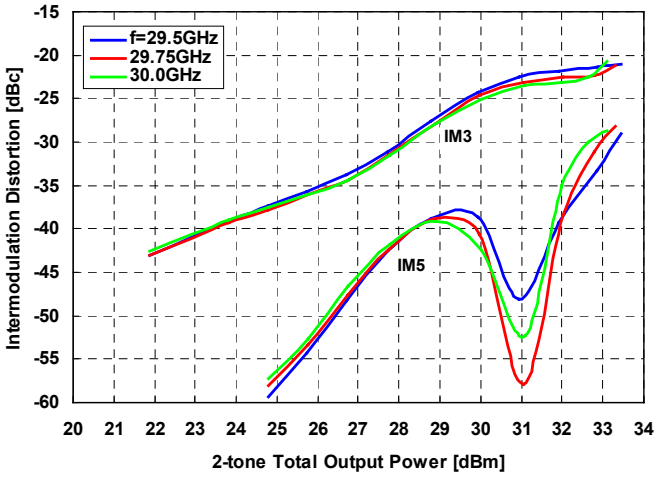
Power Added Efficiency vs. Frequency

@VDD=7V, IDD(DC)=1500mA



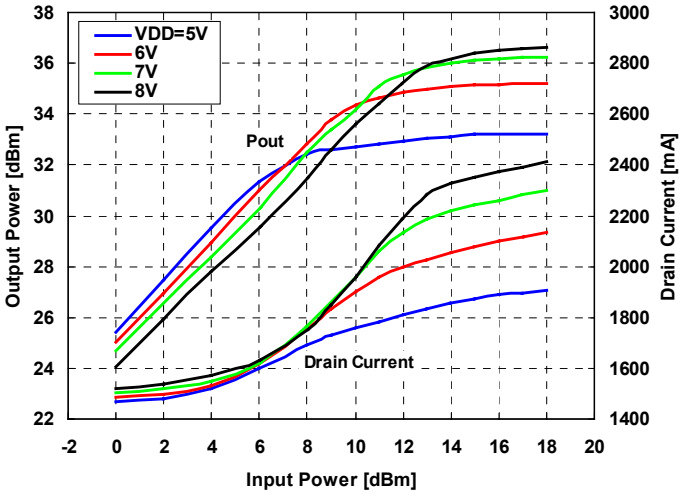
IMD vs. Output Power

@VDD=7V, IDD(DC)=1500mA



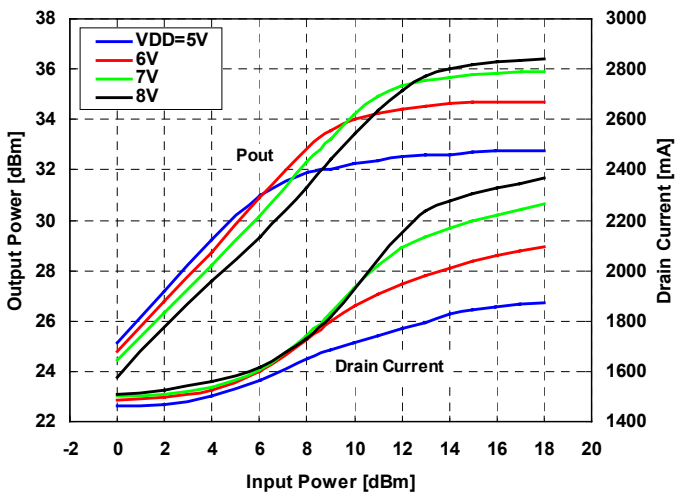
Output Power, Drain Current vs. Input Power by Drain Voltage

@f=29.5GHz, IDD(DC)=1500mA



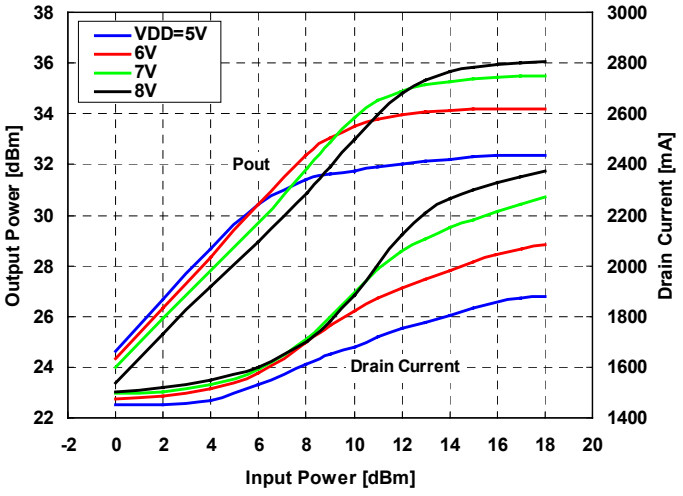
Output Power, Drain Current vs. Input Power by Drain Voltage

@f=29.75GHz, IDD(DC)=1500mA



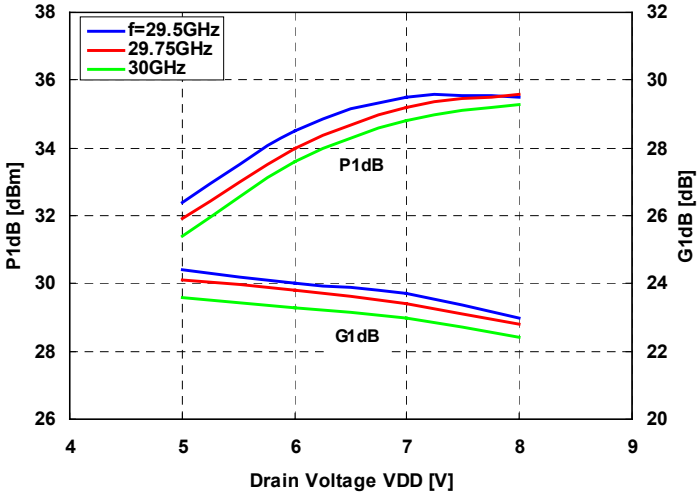
Output Power, Drain Current vs. Input Power by Drain Voltage

@f=30.0GHz, IDD(DC)=1500mA



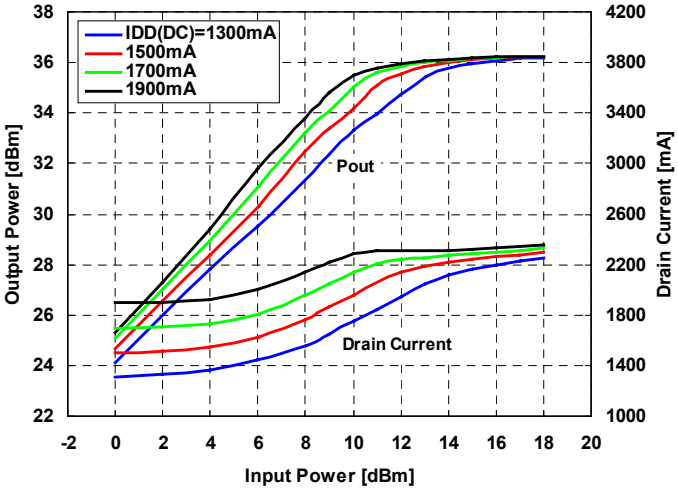
Output Power, Gain vs. Drain Voltage

@IDD(DC)=1500mA



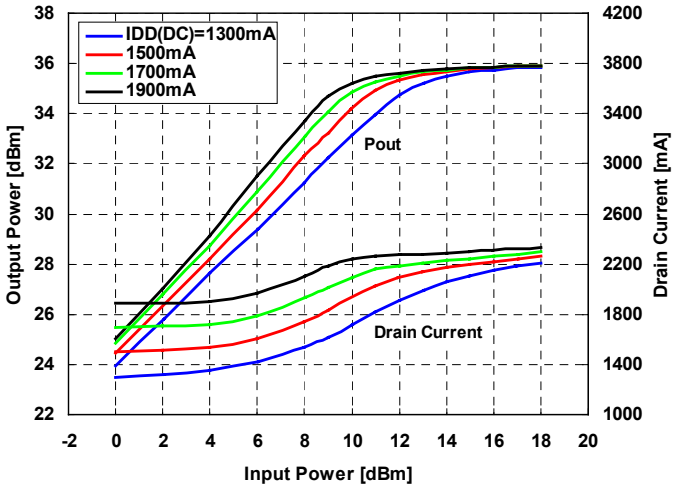
Output Power, Drain Current vs. Input Power by Drain Current

@f=29.5GHz, VDD=7V



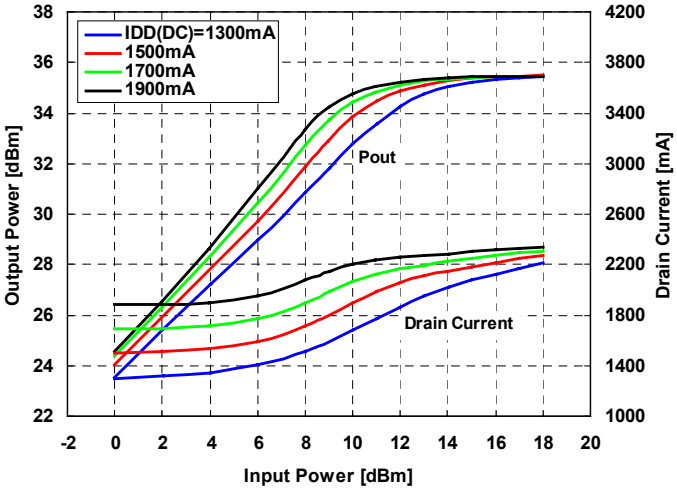
Output Power, Drain Current vs. Input Power by Drain Current

@f=29.75GHz, VDD=7V



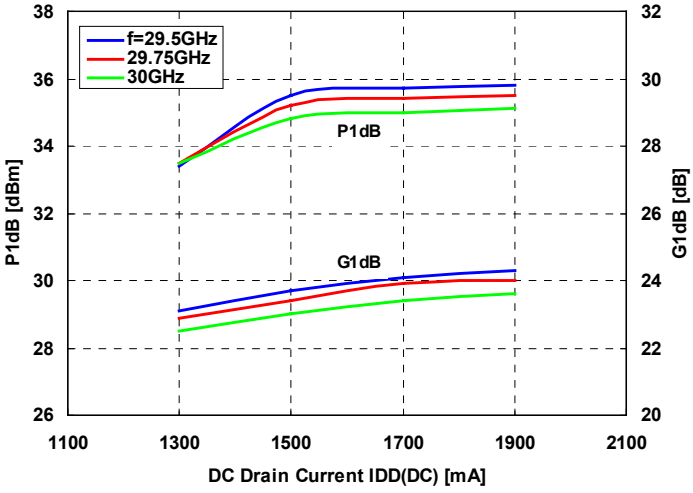
Output Power, Drain Current vs. Input Power by Drain Current

@f=30.0GHz, VDD=7V



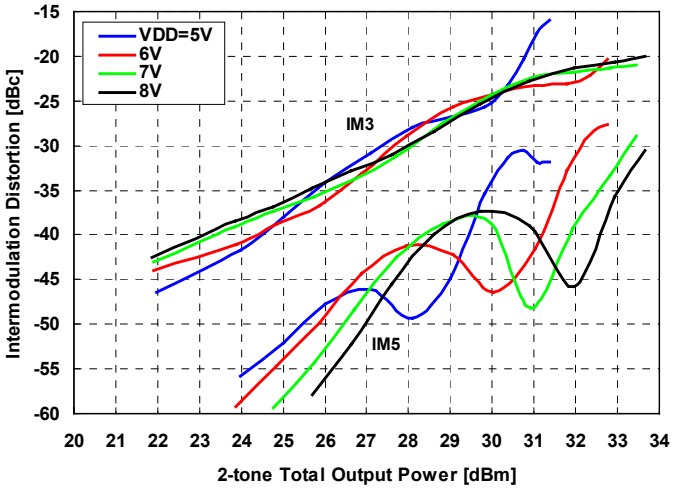
Output Power, Gain vs. Drain Current

@VDD=7V



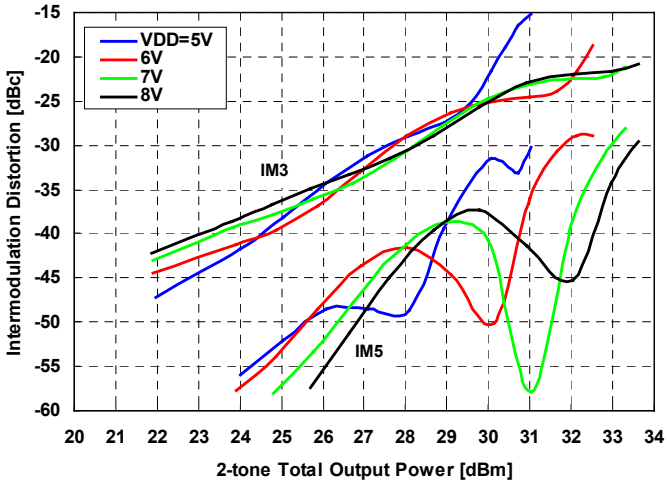
IMD vs. Output Power by Drain Voltage

@f=29.5GHz, IDD(DC)=1500mA



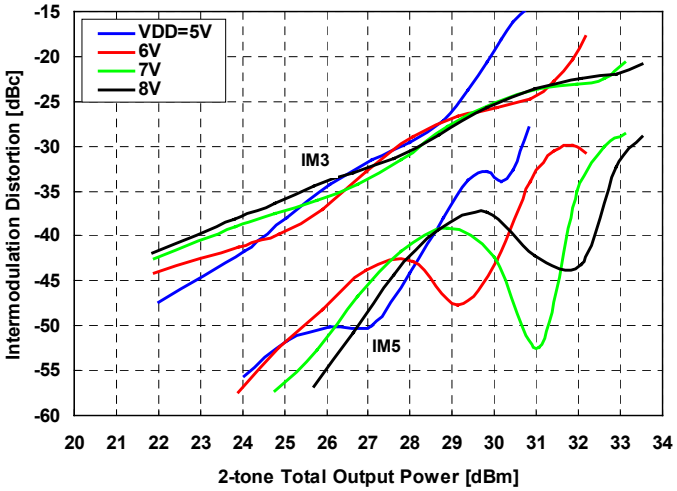
IMD vs. Output Power by Drain Voltage

@f=29.75GHz, IDD(DC)=1500mA



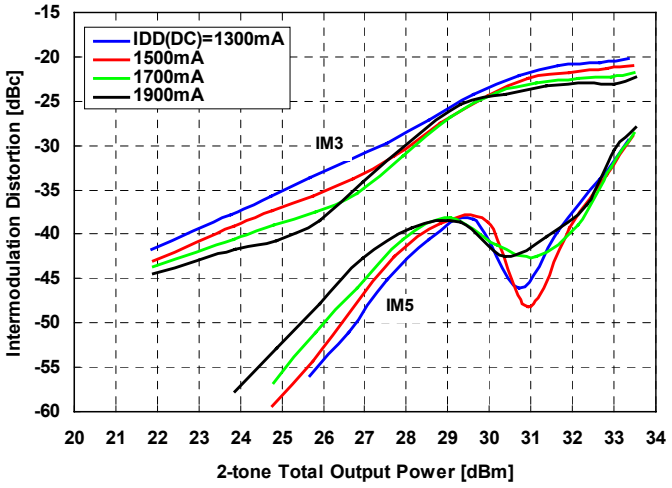
IMD vs. Output Power by Drain Voltage

@f=30.0GHz, IDD(DC)=1500mA



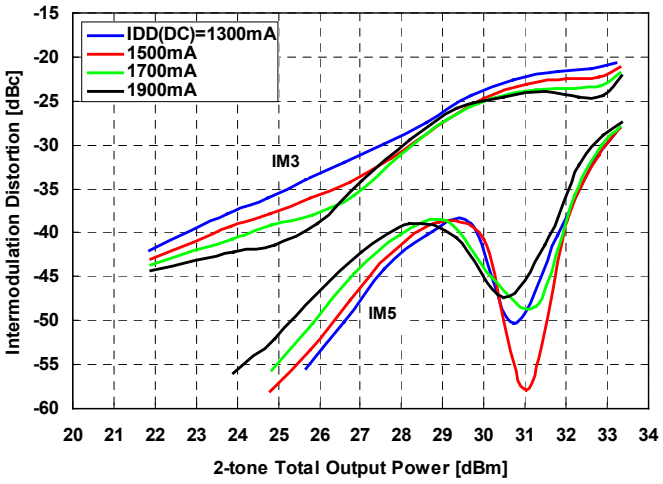
IMD vs. Output Power by Drain Current

@f=29.5GHz, VDD=7V



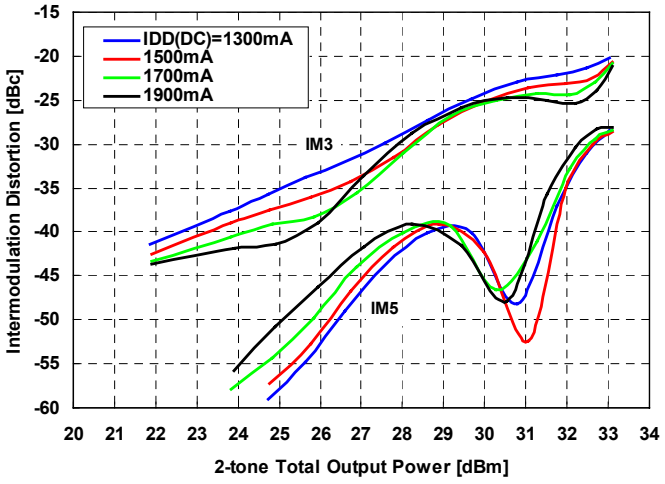
IMD vs. Output Power by Drain Current

@f=29.75GHz, VDD=7V



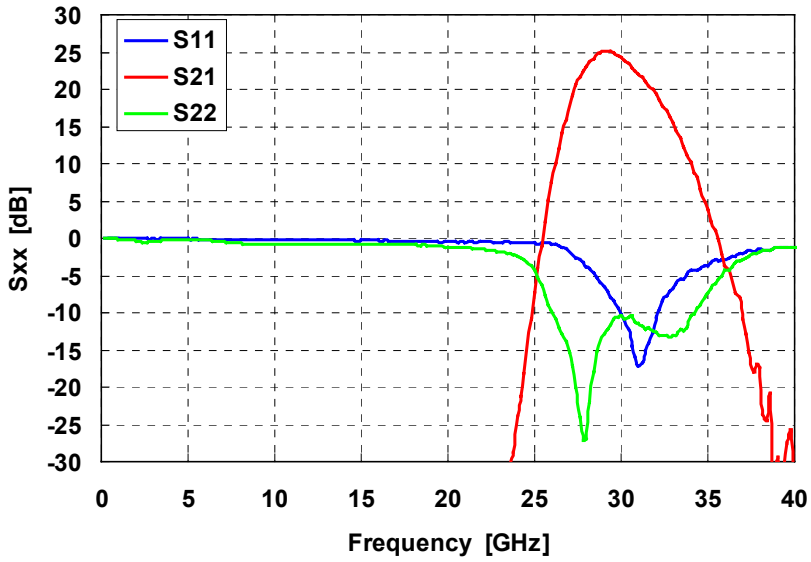
IMD vs. Output Power by Drain Current

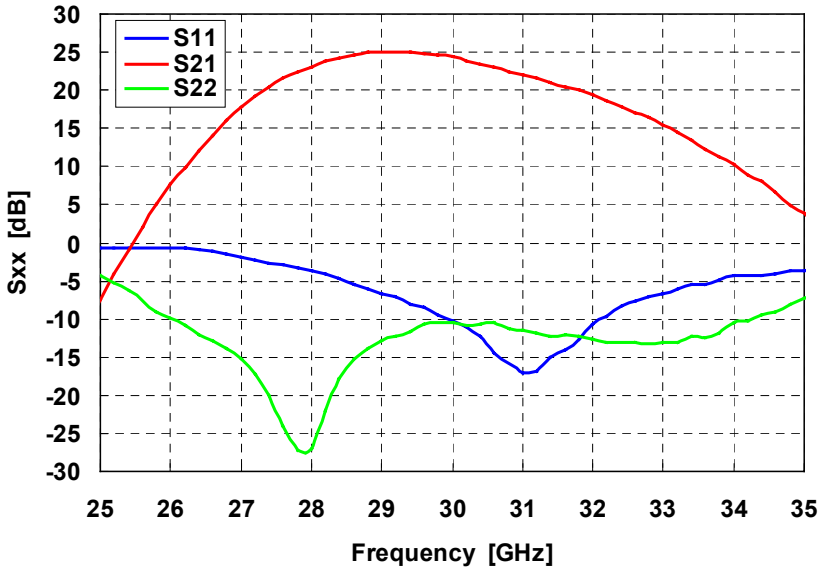
@f=30.0GHz, VDD=7V



S-Parameter

@VDD=7V, IDD(DC)=1500mA





S-Parameter

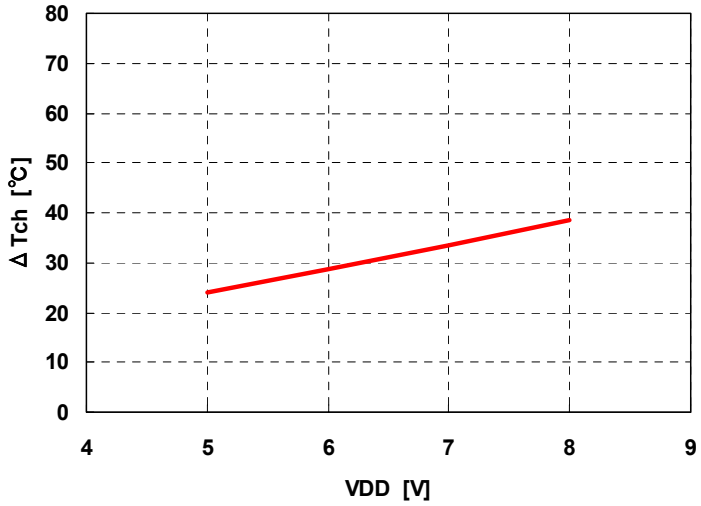
VDD=7V, IDD=1500mA

Freq.	S11		S21		S12		S21	
GHz	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
1	1.000	-8.84	0.018	36.54	0.001	124.01	0.984	-61.76
2	0.999	-17.66	0.015	143.44	0.000	15.28	0.962	-102.23
3	0.996	-26.37	0.006	-82.94	0.001	-45.86	0.947	-123.54
4	0.996	-34.93	0.002	163.03	0.001	-154.12	0.975	-138.63
5	0.989	-43.05	0.005	-123.49	0.001	-86.15	0.982	-150.35
6	0.987	-50.92	0.003	-96.08	0.003	-85.88	0.972	-159.39
7	0.983	-58.34	0.003	-62.12	0.002	-108.04	0.948	-166.26
8	0.982	-65.47	0.004	-122.20	0.002	-100.39	0.923	-171.16
9	0.982	-72.29	0.004	-67.33	0.003	-87.88	0.909	-174.58
10	0.975	-78.95	0.005	44.42	0.003	-83.82	0.904	-177.70
11	0.976	-85.28	0.005	-44.57	0.003	-101.83	0.908	179.04
12	0.972	-91.04	0.003	-149.21	0.002	-94.18	0.910	175.78
13	0.969	-96.64	0.005	-47.61	0.004	-99.30	0.914	172.35
14	0.975	-101.60	0.006	-77.32	0.006	-94.51	0.914	168.68
15	0.969	-107.14	0.008	52.24	0.005	-82.14	0.914	165.11
16	0.971	-113.35	0.013	-23.85	0.004	-106.79	0.913	161.20
17	0.952	-117.39	0.007	-73.84	0.005	-112.94	0.905	156.88
18	0.955	-122.71	0.020	-95.86	0.005	-65.11	0.903	152.43
19	0.950	-126.63	0.010	-79.59	0.005	-108.92	0.895	147.82
20	0.951	-131.24	0.011	-61.73	0.006	-90.82	0.877	141.79
21	0.937	-135.73	0.008	23.94	0.001	-42.84	0.861	134.93
22	0.949	-140.89	0.005	-29.90	0.001	-170.93	0.839	127.19
23	0.936	-145.71	0.011	43.99	0.006	-70.45	0.803	117.33
24	0.937	-150.80	0.063	-13.13	0.006	-121.97	0.756	102.26
25	0.931	-158.12	0.424	-89.02	0.006	-77.70	0.615	76.43
26	0.914	-167.84	2.398	159.23	0.006	-95.63	0.321	61.83
27	0.804	179.46	7.722	34.35	0.008	-84.40	0.173	47.18
28	0.647	171.95	14.224	-92.06	0.003	-114.00	0.045	-104.08
29	0.468	167.28	17.900	146.98	0.009	-98.96	0.230	-169.24
29.2	0.440	166.82	17.789	123.51	0.011	-99.31	0.245	-175.41
29.4	0.399	167.70	17.899	100.05	0.010	-89.98	0.263	179.90
29.6	0.380	165.35	17.595	79.78	0.016	-68.23	0.291	175.02
29.8	0.337	165.07	16.941	57.74	0.010	-75.84	0.297	166.30
30	0.306	165.99	16.452	36.28	0.007	-146.43	0.300	158.16
30.2	0.282	165.32	15.515	15.36	0.005	-102.11	0.287	153.01
30.4	0.243	166.41	14.801	-4.24	0.008	-93.97	0.293	148.54
30.6	0.188	172.86	14.021	-24.82	0.011	-78.28	0.301	141.72
30.8	0.160	-176.97	13.350	-43.74	0.004	-132.86	0.274	138.48
31	0.140	-160.53	12.746	-63.98	0.009	-84.49	0.267	134.17
32	0.294	-108.35	9.312	-162.05	0.013	-69.16	0.232	107.88
33	0.465	-114.03	5.954	99.72	0.003	-115.53	0.222	66.80
34	0.606	-122.32	3.266	10.14	0.015	-141.11	0.303	6.06
35	0.657	-124.85	1.550	-74.90	0.004	-141.37	0.430	-38.89
36	0.722	-131.46	0.650	-147.68	0.010	-113.61	0.605	-68.64
37	0.799	-137.43	0.290	152.90	0.006	-27.36	0.722	-92.46
38	0.851	-145.04	0.135	119.98	0.008	-102.47	0.808	-111.31
39	0.859	-147.72	0.034	-45.15	0.001	-29.35	0.861	-126.53
40	0.869	-151.54	0.011	2.17	0.009	-123.73	0.866	-138.77

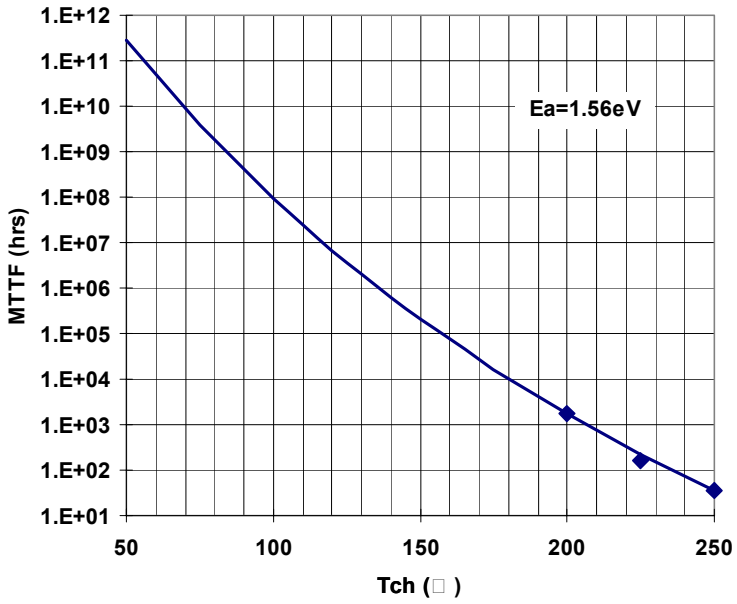
ΔTch vs. Drain Voltage (Reference)

IDD=1500mA

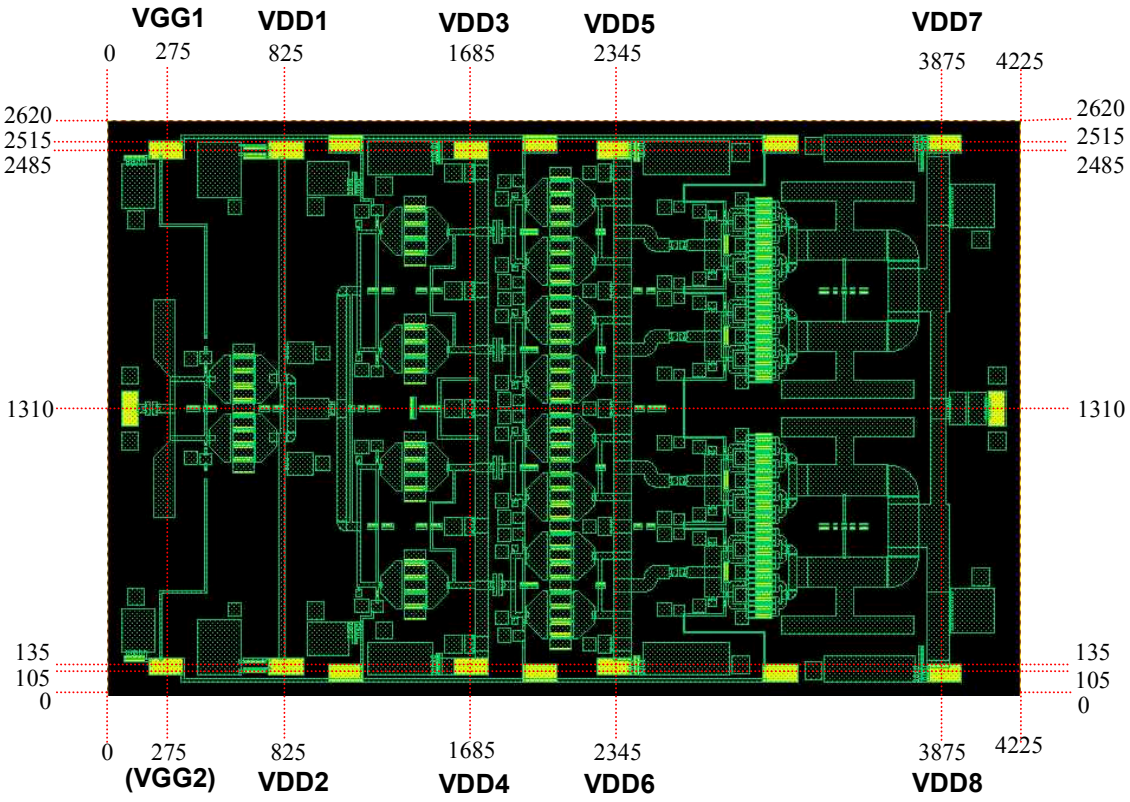
Monunted on Cu-Plate(t=0.5mm) with AuSn soldering.



MTTF vs. Tch



■ **Chip Outline and Bonding Pad Locations (Dimension in Micro-Meters)**

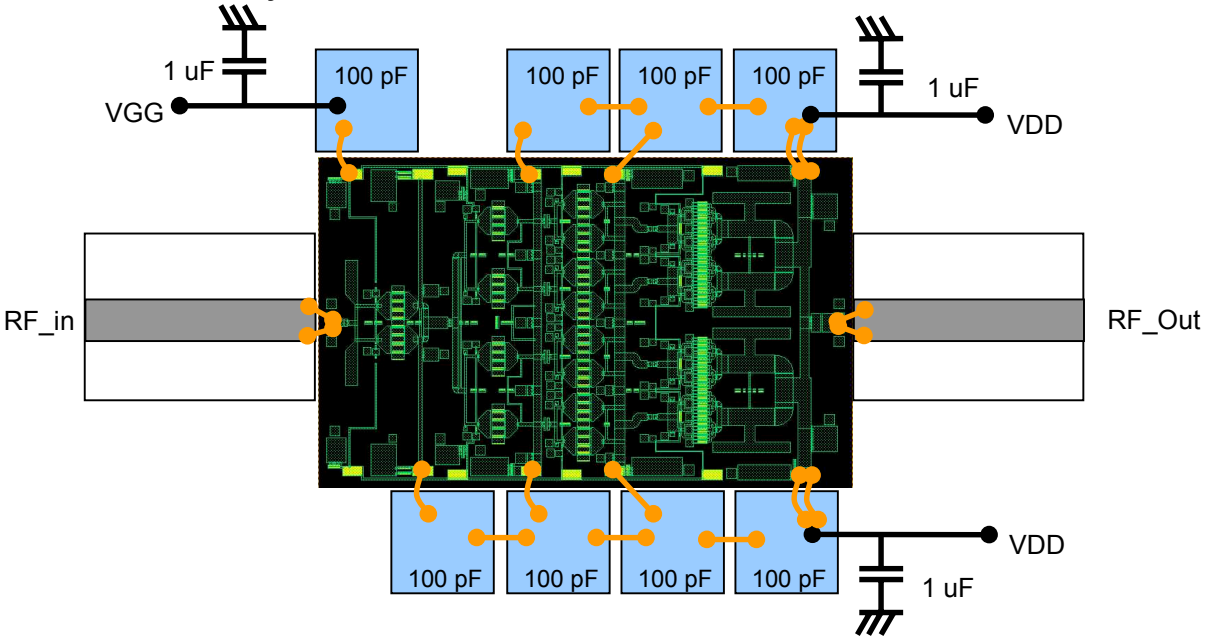


Chip Size : 4225±30um x 2620±30um
Chip Thickness : 60±20um
Bonding Pad Size : 160um x 80um

NOTE: Gate voltage is required from either or both bonding pad(VGG1 or/and VGG2).

■ Assembly Diagrams

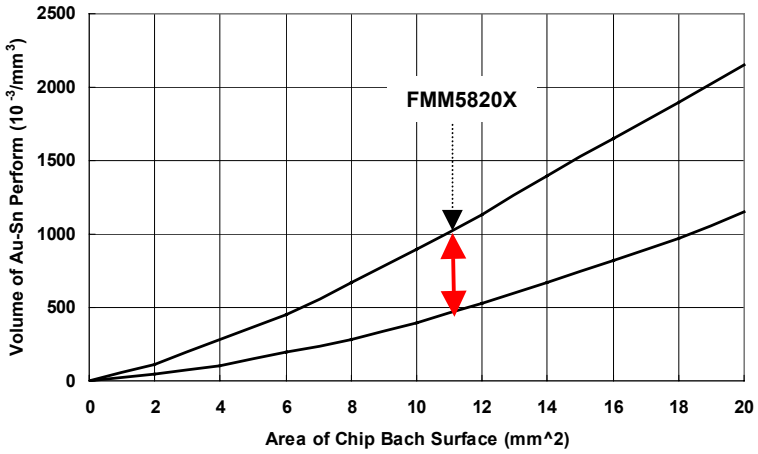
Recommended assembly



"Copper" is the recommended material for the package or carrier.

■DIE ATTACH

1) The die-attach station must have accurate temperature control, and an inert forming gas should be used.
2) Chips should be kept at room temperature except during die-attach.
3) Place package or carrier on the heated stage.
4) Lightly grasp the chip edges by the longer side using tweezers.
   Die attach conditions
   Stage Temperature: 300 to 310 ℃
   Time : less than 15 seconds
   AuSn Preform Volume : per next Figure



■ WIRE BONDING

The bonding equipment must be properly grounded. The following or equivalent equipment, tools, materials, and conditions are recommended.

1) Bonding Equipment and Bonding Tool.
   Bonding Equipment : West Bond Model 7400 (Manual Bonder)
   Bonding Tool : CCOD-1/16-S-437-60-F-2010-MP (Deweyl)
2) Bonding Wire
   Material : Hard or Half hard gold
   Diameter : 0.7 to 1.0 mil
3) Bonding Conditions
   Method : Thermal Compression Bonding with Ultrasonic Power
   Tool Force : 0.196 N ± 0.0196 N
   Stage Temperature : 215 ℃ ± 5 ℃
   Tool Heater : None
   Ultrasonic Power Transmitter : West Bond Model 1400
   Duration : 150 mS/Bond

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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.

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