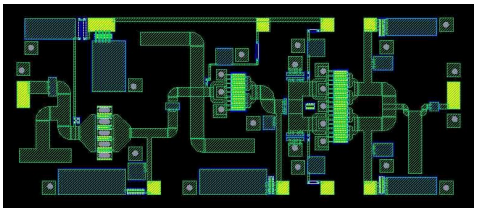
FMM5826X

Ka-Band Power Amplifier MMIC



FEATURES

- •High Output Power; P1dB = 28 dBm (Typ.)
- •High Linear Gain; GL = 21 dB(Typ.)
- •Frequency Band ; 27.0 - 30.0 GHz
- •High Linearity ; OIP3 = 37dBm(typ.)
- •Impedance Matched Zin/Zout = 50Ω

DESCRIPTION

The FMM5826X is a power amplifier MMIC that contains a three-stage amplifier, internally matched, for standard communications band in the 27.0 to 30.0GHz frequency range. This product is well suited for point-to-point radio and Ka-band V-SAT applications.

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

ABSOLUTE MAXIMUM RATING(Ambient Temperature Ta=25℃)

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 ~ +125	℃

RECOMMENDED OPERATING CONDITIONS

Item	Symbol	Condition	Unit
Drain-Source Voltage	VDD	≦7	V
Input Power	Pin	≦12	dBm
Operating Backside Temperature	Top	-40 ~ +85	℃

This product should be hermetically packaged.

ELECTRICAL CHARACTERISTICS (Operating Backside Temperature Tc(op)=25℃)

Item	Symbol	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
Frequency Range	f	VDD=6V	27	-	30	GHz
Output Power at 1dB G.C.P.	P1dB	IDD(DC)=350mA(typ)	26.0	28.0	-	dBm
Power Gain at 1dB G.C.P.	G1dB	Zs=Zl=50ohm	17	20	-	dB
Power-added Efficiency at 1dB G.C.P.	Nadd		-	21	-	%
Third Order Intermodulation*	IM3*	*df=10MHz,	-37	-40	-	dBc
Drain Current at 1dB G.C.P.	Iddrf	Po=17dBm (S.C.L.)	-	500	700	mA
Input Return Loss (at Pin=-20dBm)	RLin		-	-8	-	dB
Output Return Loss (at Pin=-20dBm)	RLout		-	-8	-	dB

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

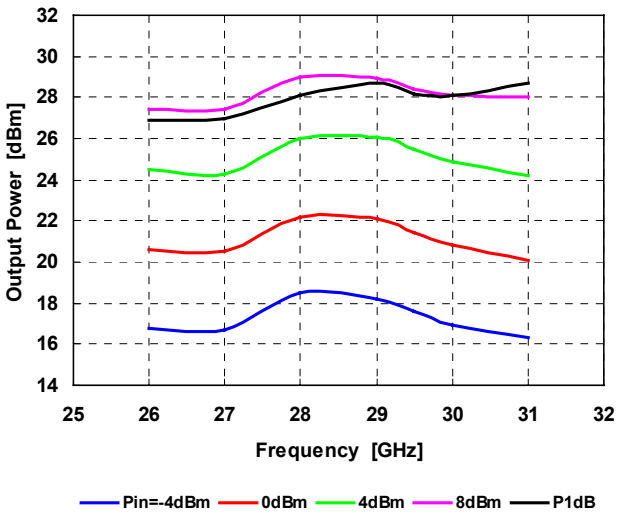
S.C.L. : Single Carrier Level

ESD	Class 0	~ 199V

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

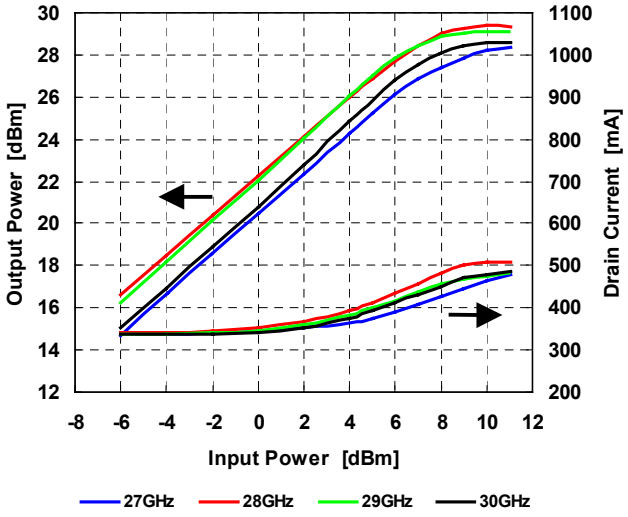
Output Power vs. Frequency

@VDD=6V, IDD(DC)=350mA



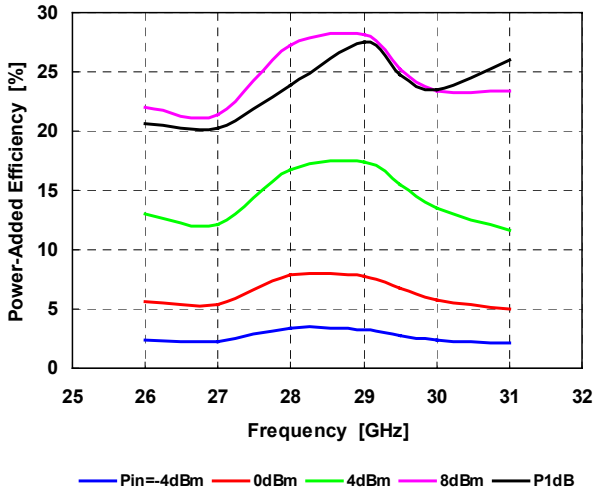
Output Power, Drain Current vs. Input Power

@VDD=6V, IDD(DC)=350mA



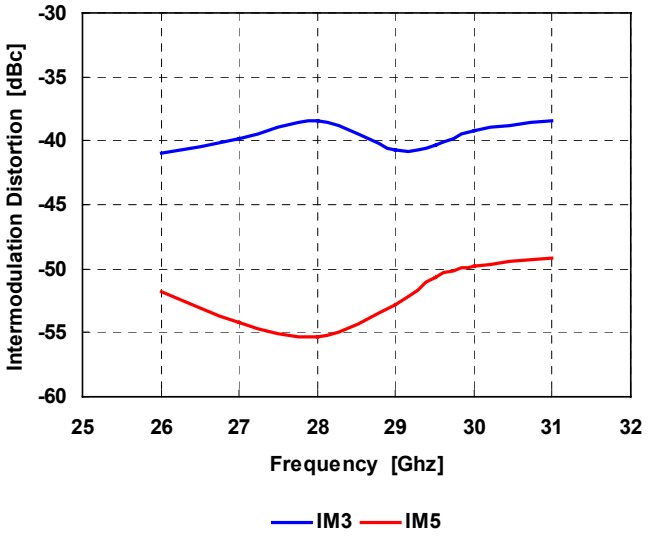
Power Added Efficiency vs. Frequency

@VDD=6V, IDD(DC)=350mA



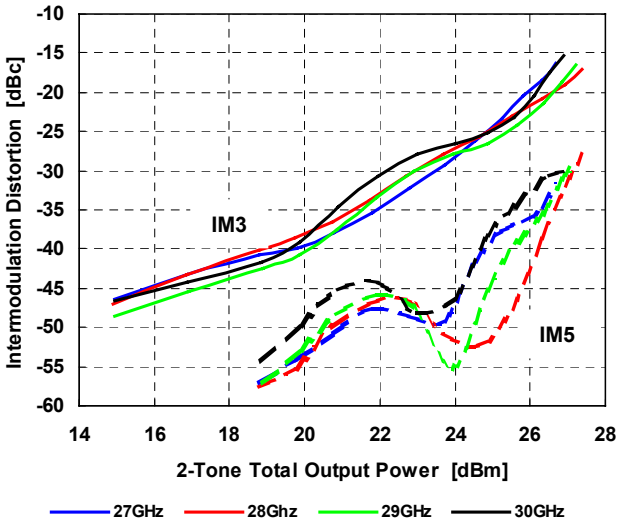
IMD vs. Frequency

@VDD=6V, IDD(DC)=350mA,
Po=17dBm S.C.L. df=+10MHz



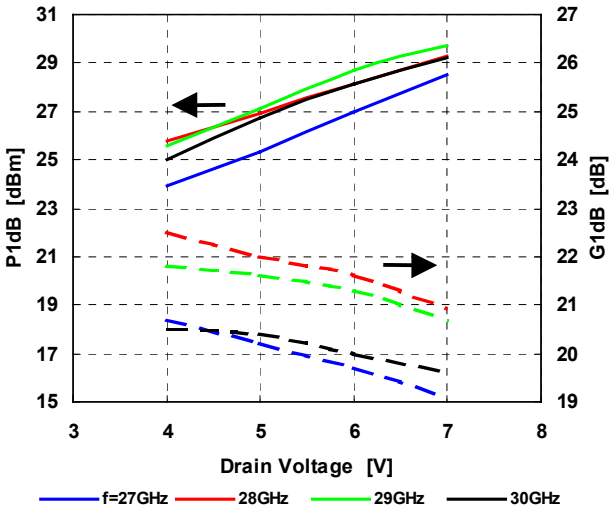
IMD vs. Output Power

@VDD=6V, IDD(DC)=350mA, df=+10MHz



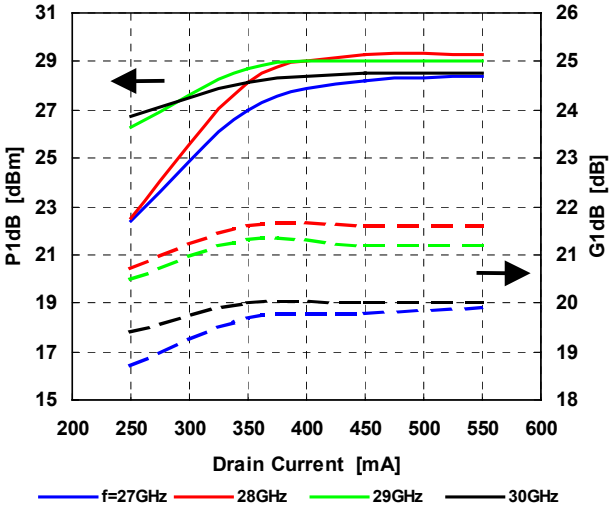
Output Power, Gain vs. Drain Voltage

@IDD(DC)=350mA



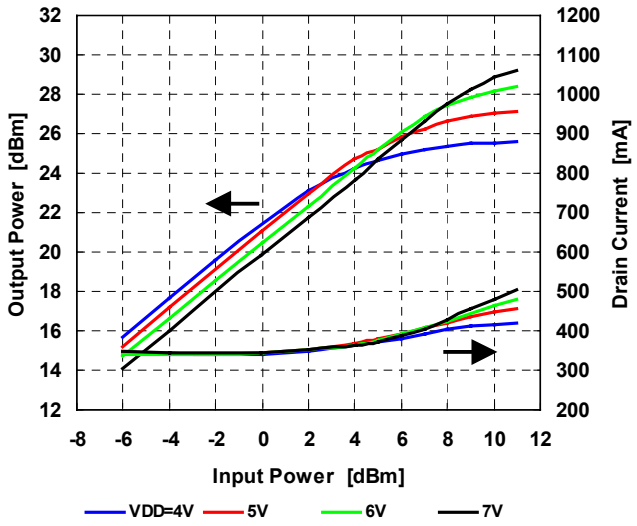
Output Power, Gain vs. Drain Current

@VDD=6V



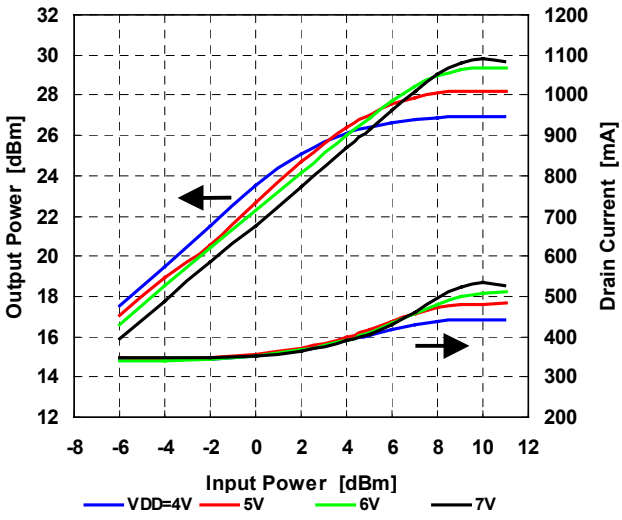
Output Power, Drain Current vs. Input Power by Drain Voltage

@IDD(DC)=350mA, f=27GHz



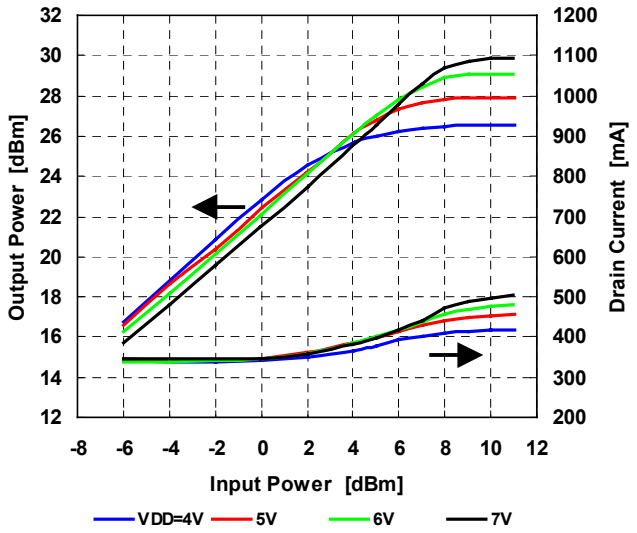
Output Power, Drain Current vs. Input Power by Drain Voltage

@IDD(DC)=350mA, f=28GHz



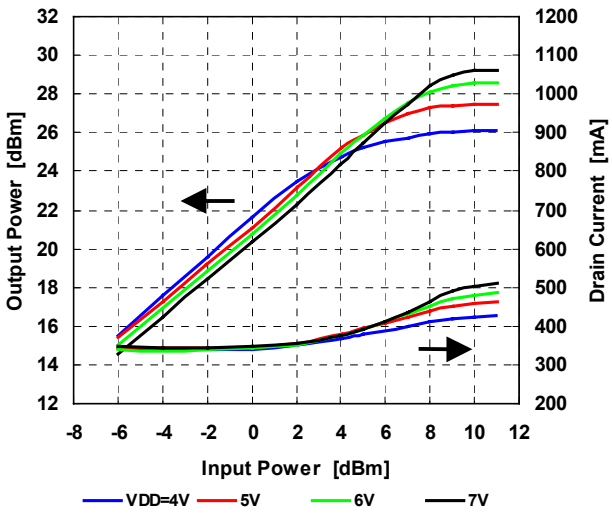
Output Power, Drain Current vs. Input Power by Drain Voltage

@IDD(DC)=350mA, f=29GHz



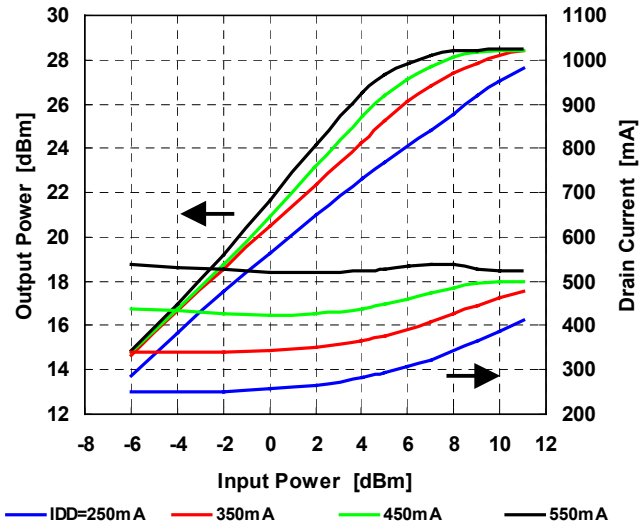
Output Power, Drain Current vs. Input Power by Drain Voltage

@IDD(DC)=350mA, f=30GHz



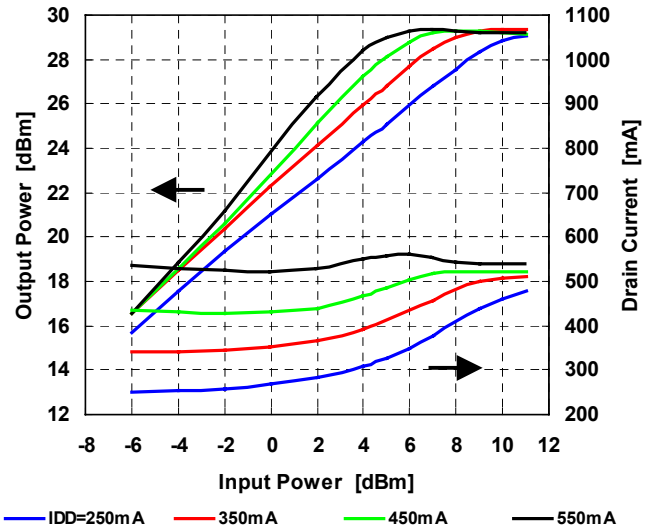
Output Power, Drain Current vs. Input Power by Drain Current

@VDD=6V, f=27GHz



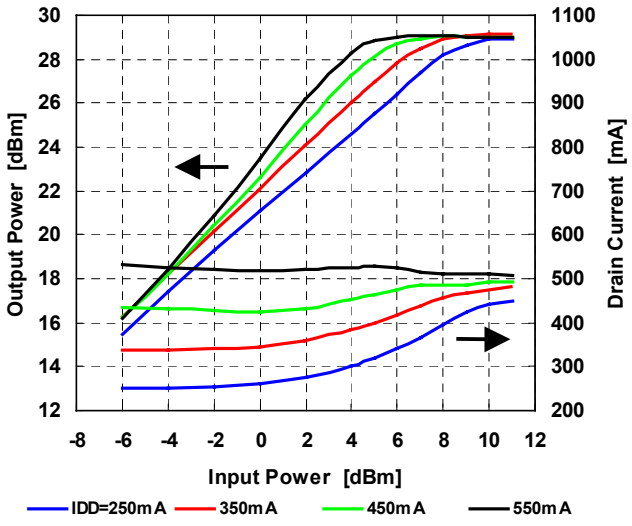
Output Power, Drain Current vs. Input Power by Drain Current

@VDD=6V, f=28GHz



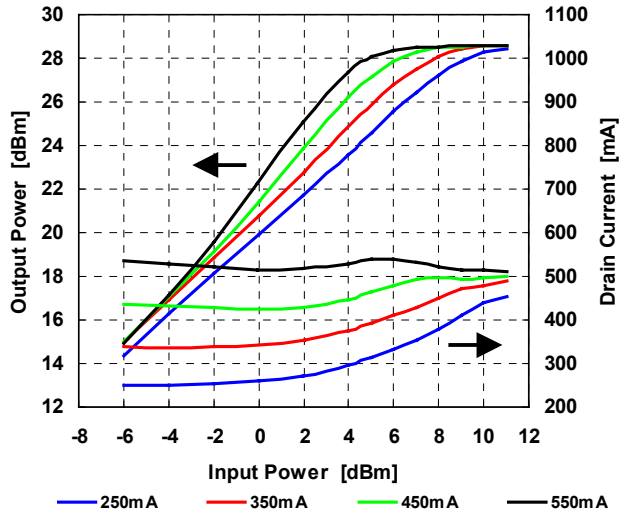
Output Power, Drain Current vs. Input Power by Drain Current

@VDD=6V, f=29GHz



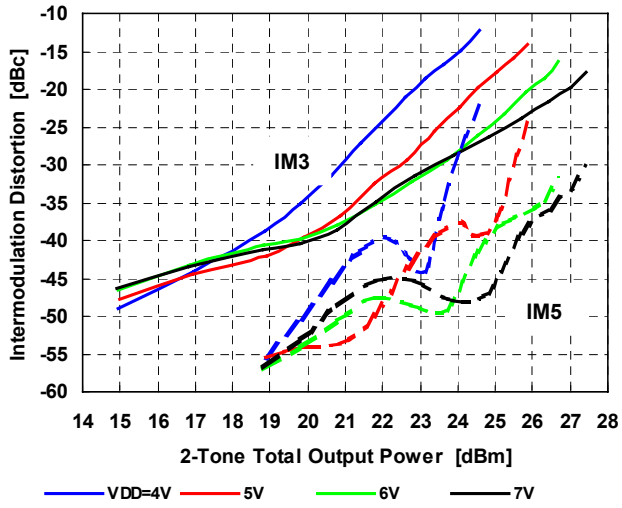
Output Power, Drain Current vs. Input Power by Drain Current

@VDD=6V, f=30GHz



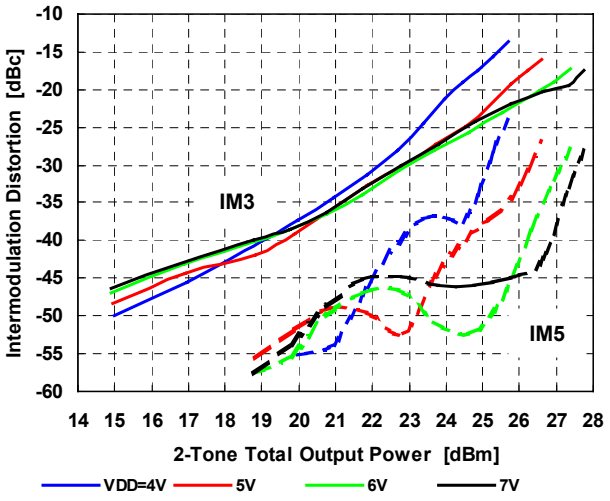
IMD vs. Output Power by Drain Voltage

@IDD(DC)=350mA, f=27GHz, df=+10MHz



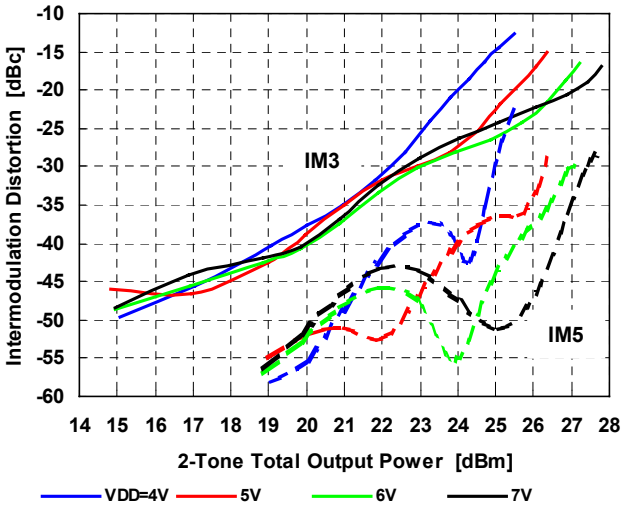
IMD vs. Output Power by Drain Voltage

@IDD(DC)=350mA, f=28GHz, df=+10MHz



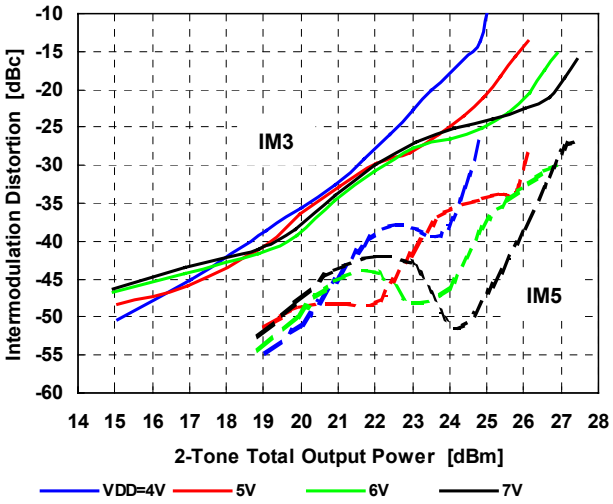
IMD vs. Output Power by Drain Voltage

@IDD(DC)=350mA, f=29GHz, df=+10MHz



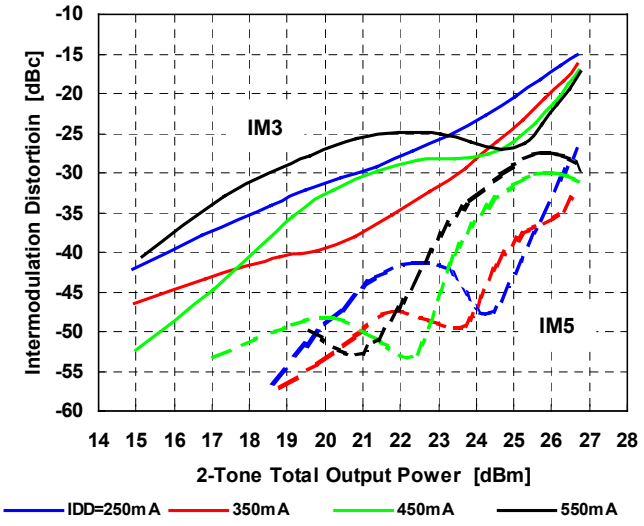
IMD vs. Output Power by Drain Voltage

@IDD(DC)=350mA, f=30GHz, df=+10MHz



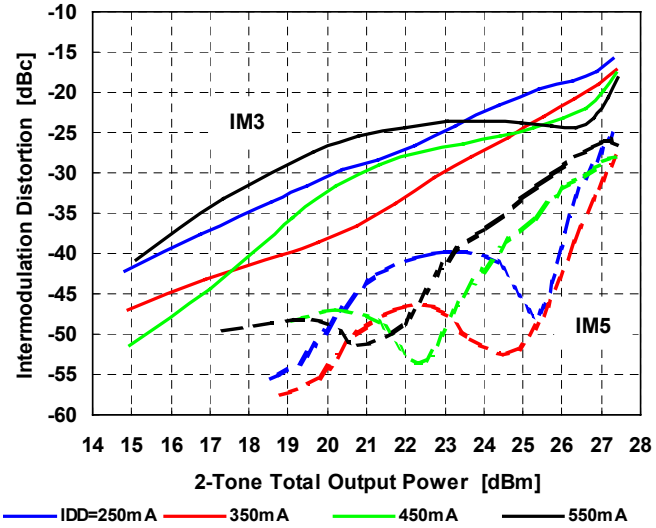
IMD vs. Output Power by Drain Current

@VDD=6V, f=27GHz, df=+10MHz



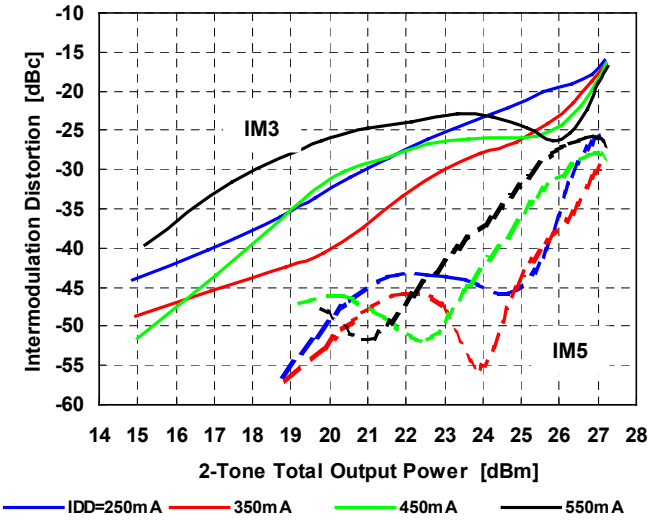
IMD vs. Output Power by Drain Current

@VDD=6V, f=28GHz, df=+10MHz



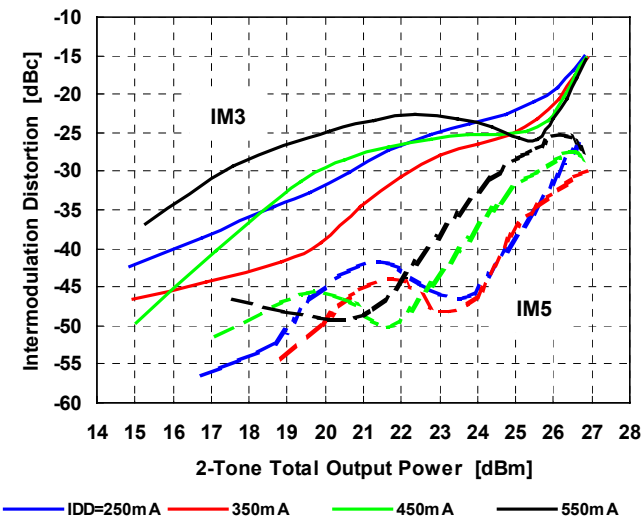
IMD vs. Output Power by Drain Current

@VDD=6V, f=29GHz, df=+10MHz



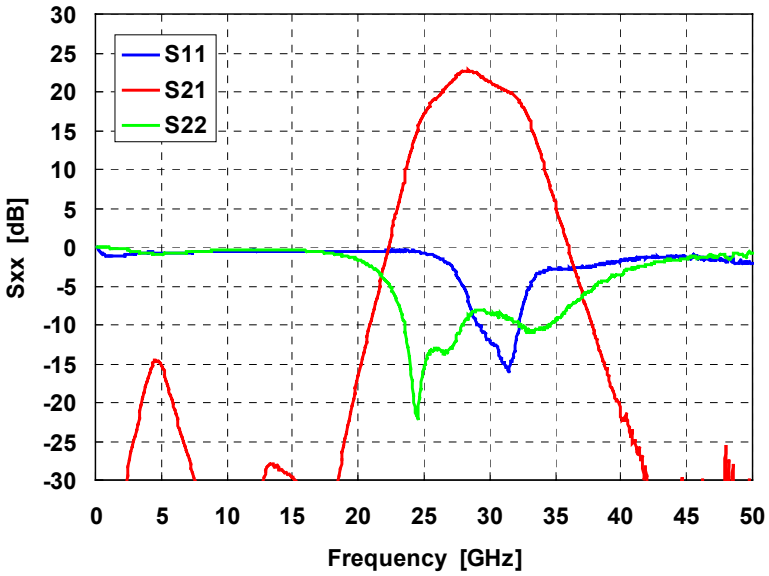
IMD vs. Output Power by Drain Current

@VDD=6V, f=30GHz, df=+10MHz

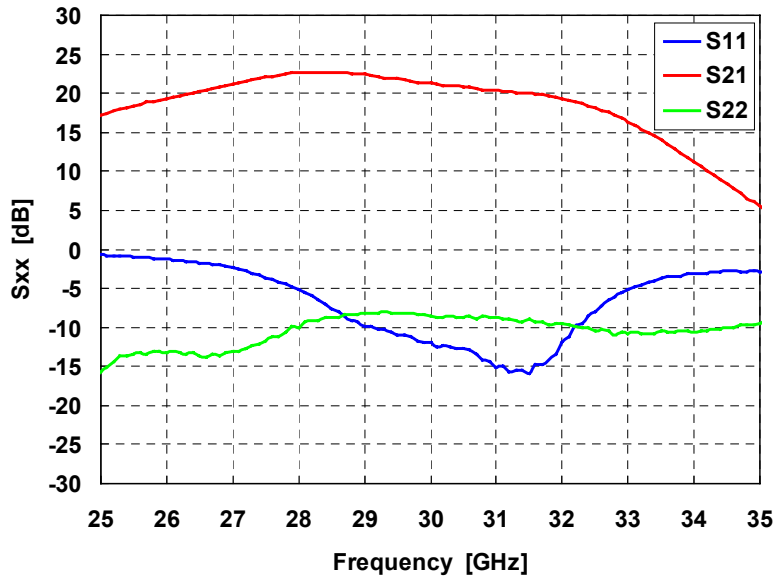


■S-Parameter

@VDD=6V, IDD=350mA



@VDD=6V, IDD=350mA

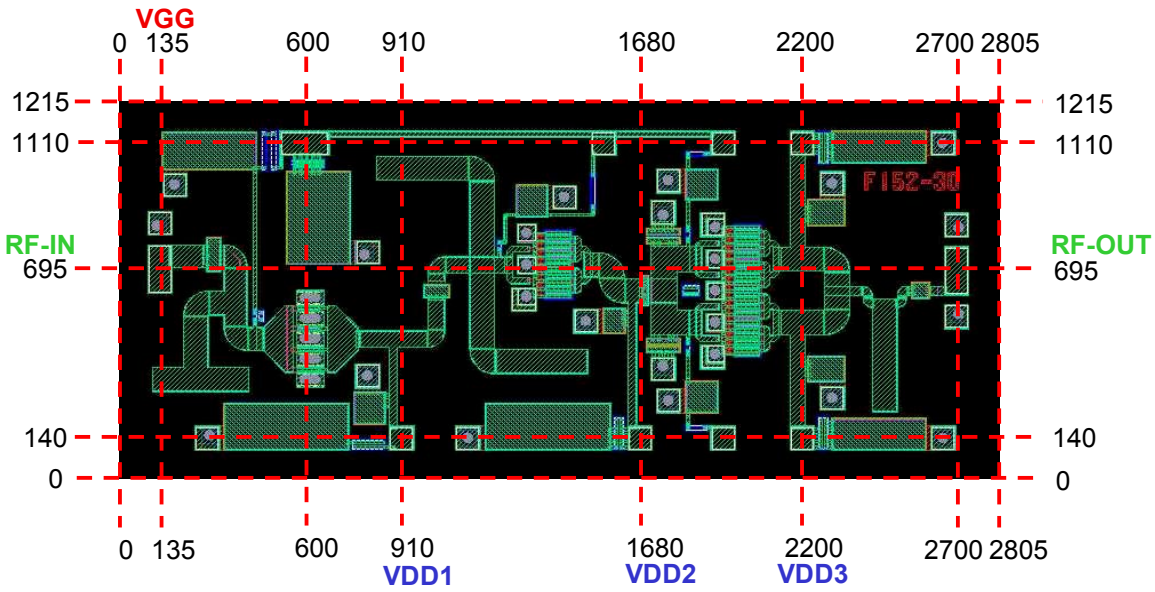


■S-Parameter

Freq.	S11		S21		S12		S22	
GHz	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
1	0.878	-35.8	0.001	89.2	0.000	-100.45	0.991	-31.84
2	0.881	-63.9	0.001	-48.1	0.001	-109.69	0.981	-60.33
3	0.904	-88.9	0.004	-101.8	0.001	-92.11	0.932	-83.57
4	0.926	-110.3	0.021	-177.4	0.001	-95.00	0.910	-100.62
5	0.912	-128.4	0.030	77.5	0.002	-102.80	0.906	-114.08
6	0.913	-141.7	0.008	0.2	0.002	-83.61	0.914	-125.29
7	0.925	-153.9	0.002	-47.5	0.002	-85.33	0.927	-135.12
8	0.930	-164.8	0.001	-85.4	0.002	-94.22	0.938	-143.84
9	0.935	-174.6	0.000	-111.3	0.003	-91.43	0.949	-151.84
10	0.939	176.4	0.000	-105.1	0.003	-88.59	0.957	-159.31
11	0.943	167.8	0.009	-66.3	0.003	-97.69	0.963	-166.26
12	0.945	159.7	0.009	-17.5	0.004	-95.90	0.966	-173.14
13	0.937	151.6	0.037	-32.8	0.003	-94.71	0.965	-179.76
14	0.938	144.7	0.037	-73.5	0.003	-89.88	0.962	173.63
15	0.940	137.7	0.033	-94.6	0.004	-82.99	0.957	166.90
16	0.940	130.6	0.028	-106.7	0.004	-94.03	0.949	160.03
17	0.943	123.4	0.018	-105.2	0.005	-102.90	0.934	152.54
18	0.945	116.4	0.020	-50.7	0.004	-74.72	0.911	144.22
19	0.943	109.2	0.058	-34.3	0.004	-80.61	0.878	135.01
20	0.942	101.9	0.148	-49.0	0.005	-100.06	0.825	124.25
21	0.944	93.9	0.341	-72.9	0.005	-87.66	0.748	111.50
22	0.945	86.0	0.776	-104.4	0.005	-100.01	0.627	96.18
23	0.947	77.2	1.801	-145.3	0.005	-84.97	0.441	77.08
24	0.946	66.3	4.109	158.8	0.007	-98.06	0.163	62.16
25	0.920	53.5	7.177	87.6	0.007	-86.74	0.164	149.28
26	0.860	39.9	9.227	19.8	0.007	-77.87	0.217	139.73
27	0.766	21.5	11.429	-42.9	0.010	-101.60	0.224	149.87
27.1	0.748	19.3	11.698	-49.1	0.008	-78.69	0.222	149.95
27.2	0.725	17.9	11.864	-55.9	0.010	-80.78	0.234	153.18
27.3	0.702	15.0	12.107	-62.5	0.011	-87.57	0.244	152.89
27.4	0.690	13.1	12.439	-69.0	0.007	-99.78	0.249	152.00
27.5	0.660	10.7	12.683	-75.6	0.010	-104.12	0.260	155.61
27.6	0.640	7.7	12.856	-82.5	0.011	-102.21	0.276	153.28
27.7	0.620	5.7	13.111	-89.1	0.008	-101.65	0.275	152.67
27.8	0.597	3.4	13.306	-95.9	0.012	-101.82	0.293	156.40
27.9	0.573	1.2	13.468	-102.8	0.012	-105.88	0.318	151.88
28	0.557	0.9	13.574	-109.4	0.008	-93.12	0.315	151.99
28.1	0.529	-0.5	13.674	-116.5	0.011	-116.66	0.341	150.55
28.2	0.506	-1.1	13.631	-123.5	0.010	-108.74	0.346	147.10
28.3	0.478	-2.4	13.655	-130.9	0.011	-102.08	0.348	145.13
28.4	0.447	-3.2	13.718	-138.0	0.008	-110.02	0.365	144.31
28.5	0.417	-3.8	13.641	-145.2	0.003	-140.25	0.363	141.09
28.6	0.402	-4.3	13.549	-152.0	0.004	-116.82	0.369	139.47
28.7	0.377	-2.6	13.520	-159.0	0.006	-100.78	0.382	137.84
28.8	0.353	-3.0	13.377	-165.2	0.008	-131.94	0.381	133.12
28.9	0.344	-4.0	13.320	-172.0	0.003	-95.19	0.383	132.65
29	0.324	-2.8	13.211	-178.4	0.007	-89.42	0.392	130.50
29.1	0.318	-2.3	12.981	174.7	0.006	-107.81	0.391	128.01
29.2	0.307	-1.1	12.819	168.3	0.003	-105.66	0.390	126.39
29.3	0.307	-1.4	12.559	162.0	0.008	-97.27	0.396	124.69
29.4	0.297	-0.1	12.486	155.4	0.005	-105.30	0.392	121.39
29.5	0.284	-0.6	12.332	149.4	0.004	-38.88	0.393	118.86
29.6	0.282	-0.6	12.122	143.1	0.002	-80.41	0.391	117.10
29.7	0.275	-1.3	11.982	136.9	0.005	-52.89	0.386	115.26
29.8	0.257	-1.4	11.800	131.1	0.010	-84.96	0.379	113.17
29.9	0.255	-2.5	11.739	125.0	0.011	-83.57	0.379	111.84
30	0.251	-6.3	11.593	119.0	0.003	-72.55	0.377	108.47

Freq.	S11		S21		S12		S22	
GHz	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
31	0.175	-48.1	10.461	58.8	0.006	-99.12	0.364	86.75
32	0.254	-154.6	9.236	-7.9	0.012	-86.57	0.332	55.52
33	0.548	138.1	6.553	-80.2	0.011	-93.87	0.287	21.35
34	0.693	102.6	3.623	-143.7	0.009	-47.93	0.293	-12.06
35	0.719	79.4	1.898	162.8	0.013	-63.61	0.338	-40.15
36	0.719	66.2	0.993	117.1	0.005	-96.42	0.408	-60.85
37	0.751	55.2	0.517	73.2	0.011	-98.08	0.482	-79.03
38	0.750	46.5	0.275	34.9	0.015	-109.02	0.561	-94.08
39	0.783	36.2	0.151	-1.7	0.016	-95.40	0.613	-106.55
40	0.808	26.5	0.086	-31.8	0.009	-76.90	0.668	-117.23
41	0.846	16.9	0.056	-76.2	0.009	-69.62	0.730	-128.73
42	0.858	4.8	0.034	-105.5	0.018	-75.57	0.769	-137.74
43	0.863	-6.7	0.012	-96.7	0.007	-55.97	0.804	-146.02
44	0.882	-18.1	0.021	-93.6	0.010	-103.39	0.816	-153.85
45	0.865	-30.4	0.012	-134.0	0.010	-88.24	0.836	-160.49
46	0.859	-45.7	0.011	-109.3	0.006	-84.79	0.852	-167.22
47	0.860	-60.6	0.010	-75.7	0.019	-98.53	0.877	-174.84
48	0.808	-75.5	0.052	-125.4	0.007	-98.52	0.862	178.54
49	0.782	-96.1	0.011	-110.5	0.018	-32.98	0.899	172.90
50	0.793	-117.3	0.015	40.1	0.022	-111.63	0.921	166.27

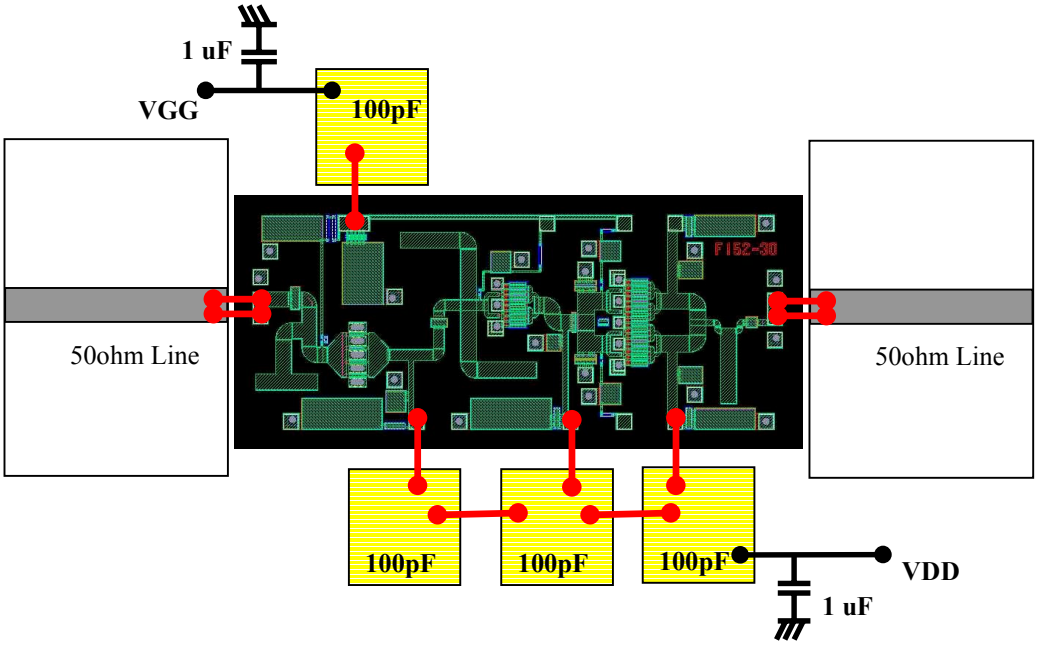
■ **Chip Outline and Bonding Pad Locations (Dimension in Micro-Meters)**



Chip Size : 2805±30um x 1215±30um
Chip Thickness : 60±20um
Bonding Pad Size : 160um x 80um(RF, VGG), 80um x 80um (VDD)

■ Assembly Diagrams

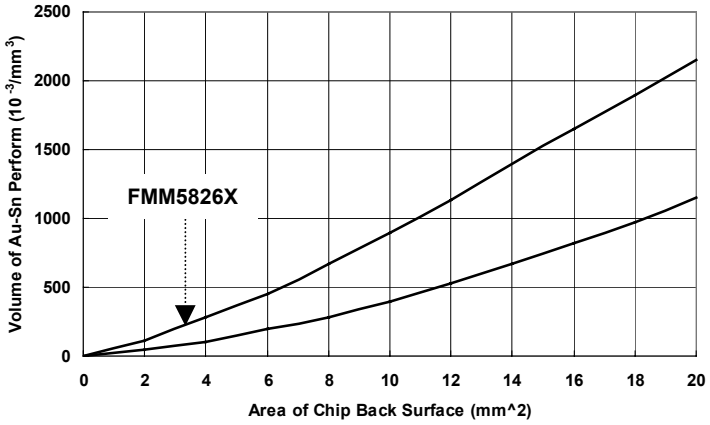
Recommended Assembly



"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.