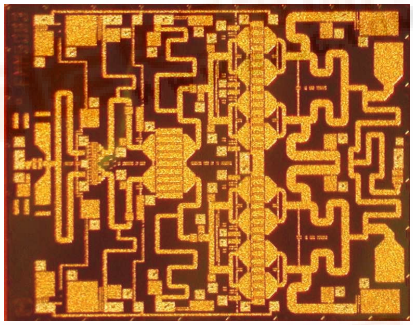
FMM5063X

Ku-Band Power Amplifier MMIC



FEATURES

- •High Output Power; P1dB = 32.0 dBm (Typ.)
- •High Linear Gain; GL = 30 dB(Typ)
- •Wide Frequency Band : 12.75 - 15.4 GHz
- •Impedance Matched Zin/Zout = 50Ω

DESCRIPTION

The FMM5063X is a power amplifier MMIC that contains a three stage amplifier, internally matched, for standard communications band in 12.75 to 15.4GHz frequency range. This product is well suited for point-to-point radio and V-SAT.

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

ABSOLUTE MAXMUM RATING (Ambient Temperature Ta=25 ℃)

Item	Stmbol	Condition	Rating	Unit
Drain-Source Voltage	VDD		10	V
Gate-Source Voltage	VGG		-3	V
Input Power	Pin		24	dBm
Strage Temperature	Tstg		-55 to +125	℃

RECOMMENDED OPERATING CONDITION

Item	Symbol	Condition	Recommended	Unit
Drain-Source Voltage	VDD		≤8	V
Input Power	Pin		≤9	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=6.0V	12.75	-	15.4	GHz
Output Power at 1dB G.C.P.	P1dB	IDD(DC)=900mA typ.	30.0	32.0	-	dBm
Power Gain at 1dB G.C.P.	G1dB	Zs=Zl=50ohm	25	29	-	dB
Power Added Efficiency at 1dB G.C.P.	Nadd		-	22	-	%
Third Order Intermodulation	IM3*	*df=10MHz,Po=20dBm	-32	-37	-	dBc
Drain Current at 1dB G.C.P.	Iddrf	(S.C.L.)	-	1000	1500	mA
Input Return Loss at Pin=-20dBm	RLin		-	-8	-	dB
Output Return Loss at Pin=-20dBm	RLout		-	-12	-	dB

Note : RF parameter sample size 10ps. Criteria (accept/reject)=(0/1)

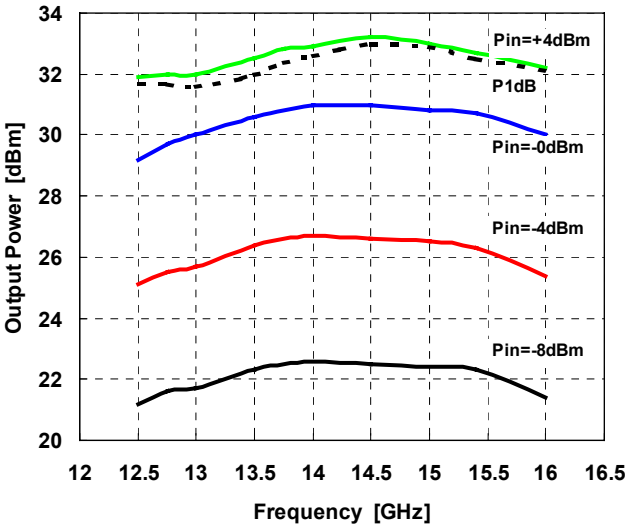
G.C.P. : Gain Compression Point
S.C.L. : Single Carrier Level

ESD	Class 0	~ 199V

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

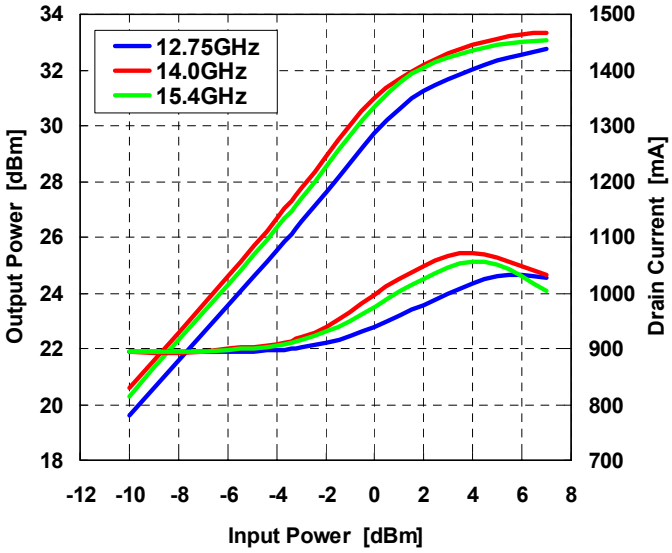
Output Power vs. Frequency

VDD=6V, IDD(DC)=900mA



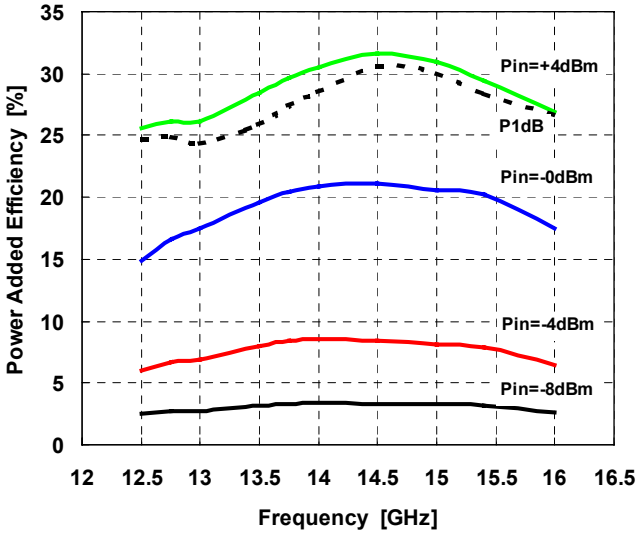
Output Power, Drain Current vs. Input Power

VDD=6V, IDD(DC)=900mA



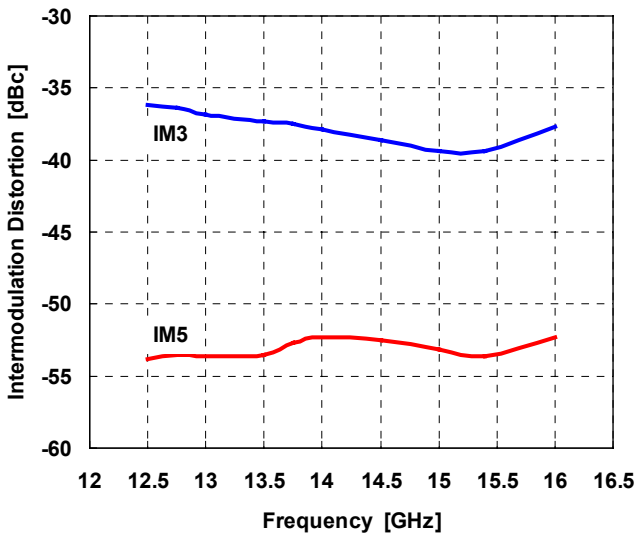
Power Added Efficiency vs. Frequency

VDD=6V, IDD(DC)=900mA



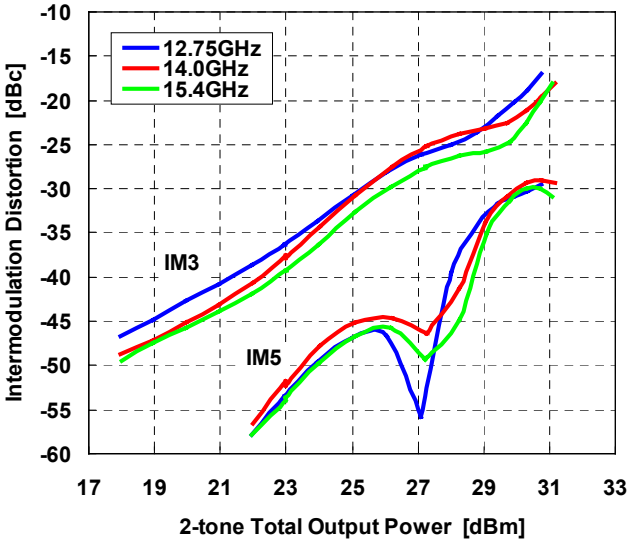
IMD vs. Frequency

VDD=6V, IDD(DC)=900mA, Pout=20dBm S.C.L.



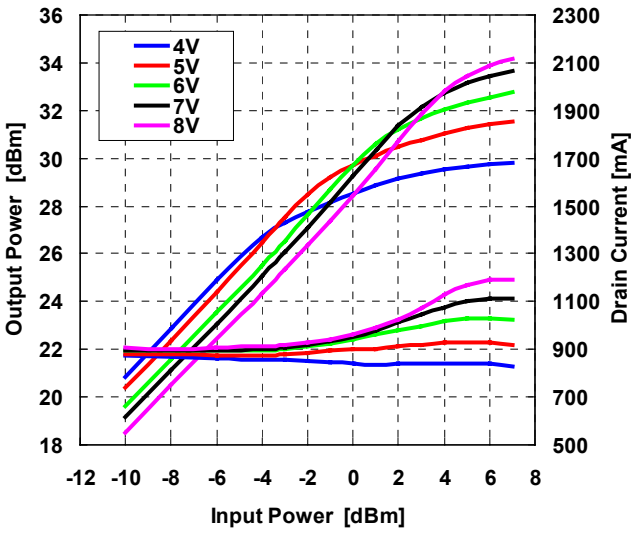
IMD vs. Output Power

VDD=6V, IDD(DC)=900mA



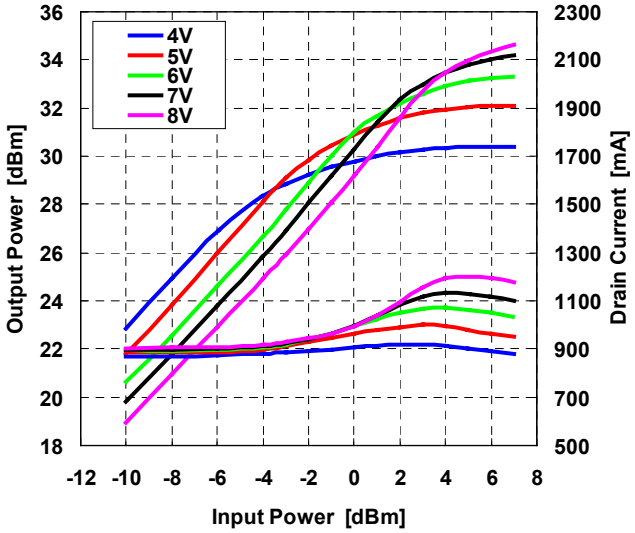
Output Power, Drain Current vs. Input Power by Drain Voltage

IDD(DC)=900mA, f=12.75GHz



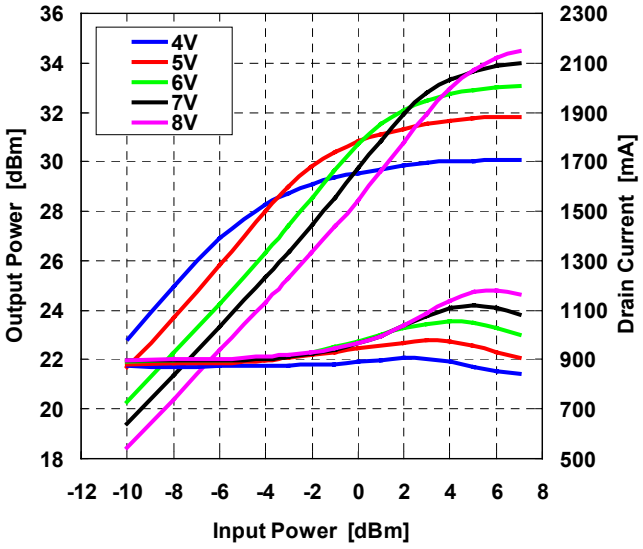
Output Power, Drain Current vs. Input Power by Drain Voltage

IDD(DC)=900mA, f=14.0GHz



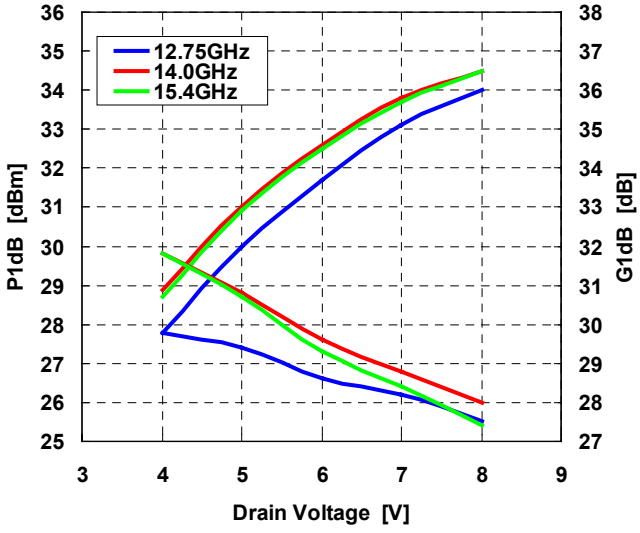
Output Power, Drain Current vs. Input Power by Drain Voltage

IDD(DC)=900mA, f=15.4GHz

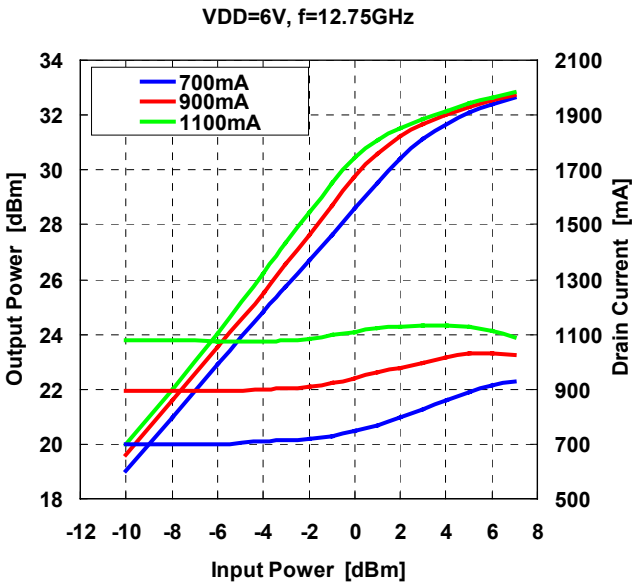


Output Power, Gain vs. Drain Voltage

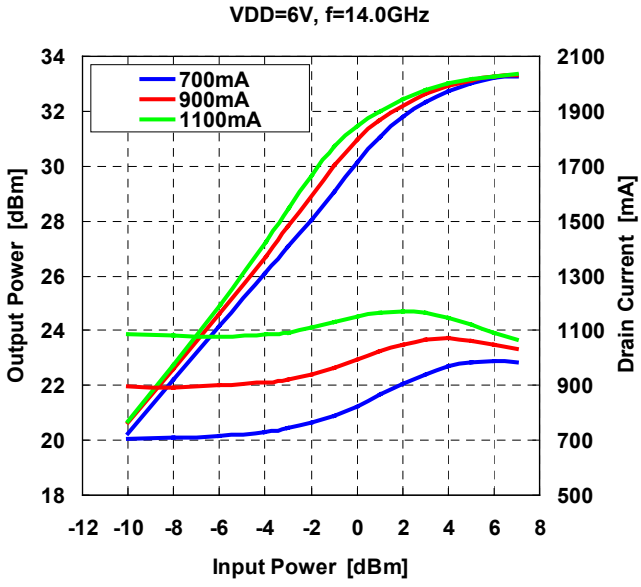
IDD(DC)=900mA, f=15.4GHz



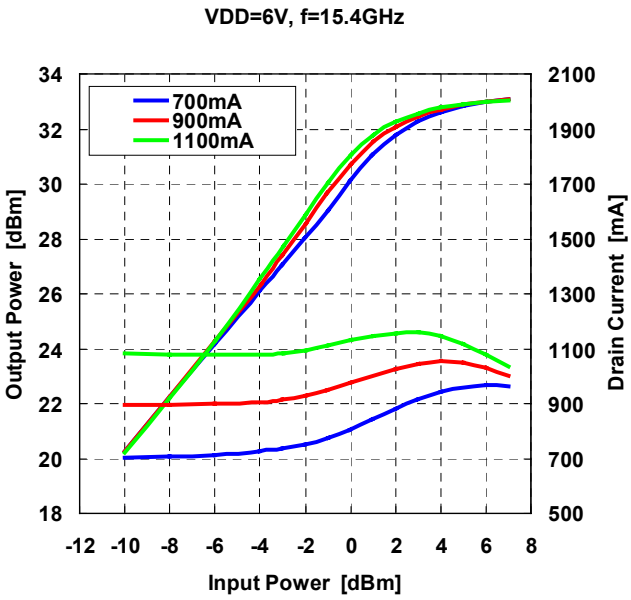
Output Power, Drain Current vs. INPUT POWER by Drain Current



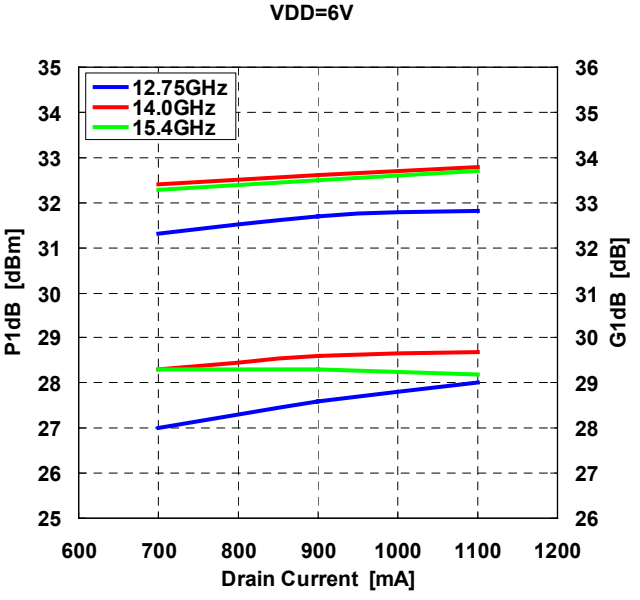
Output Power, Drain Current vs. INPUT POWER by Drain Current



Output Power, Drain Current vs. INPUT POWER by Drain Current

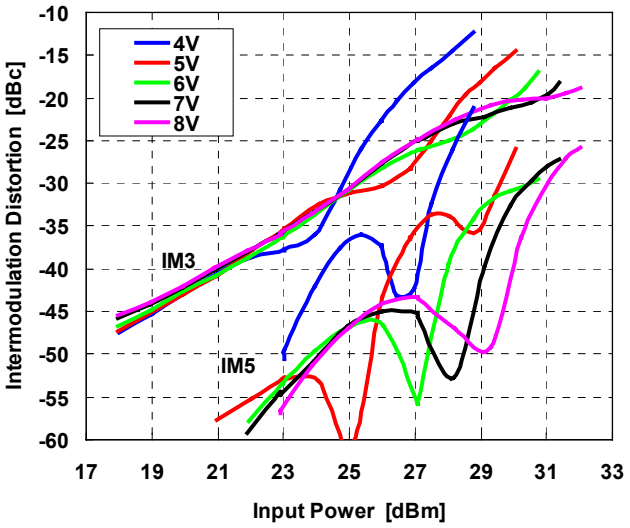


Output Power, Gain vs. Drain Current



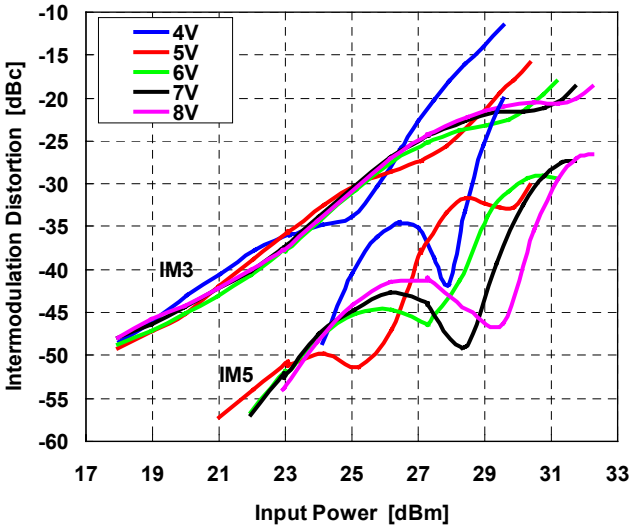
IMD vs. OUTPUT POWER
by Drain Voltage

IDD(DC)=900mA, f=12.75GHz



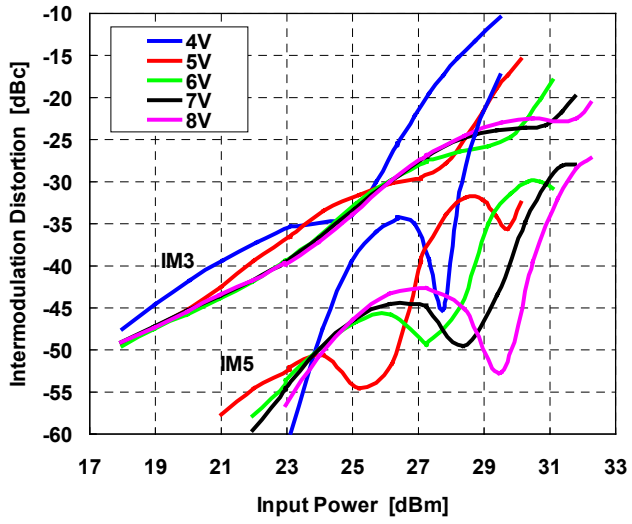
IMD vs. OUTPUT POWER
by Drain Voltage

IDD(DC)=900mA, f=14.0GHz



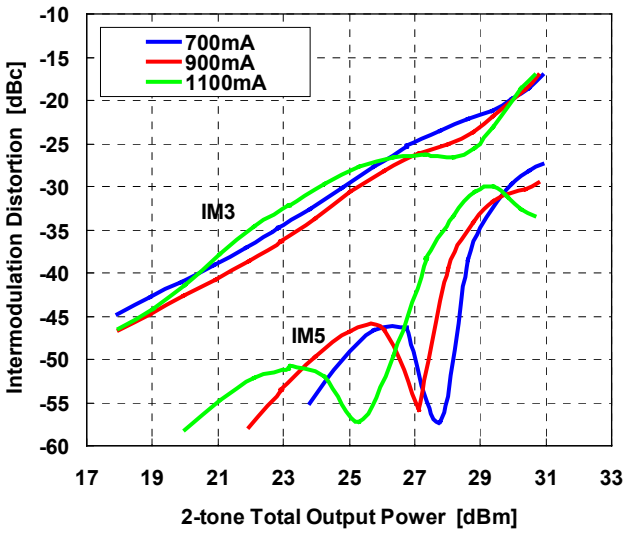
IMD vs. OUTPUT POWER
by Drain Voltage

IDD(DC)=900mA, f=15.4GHz



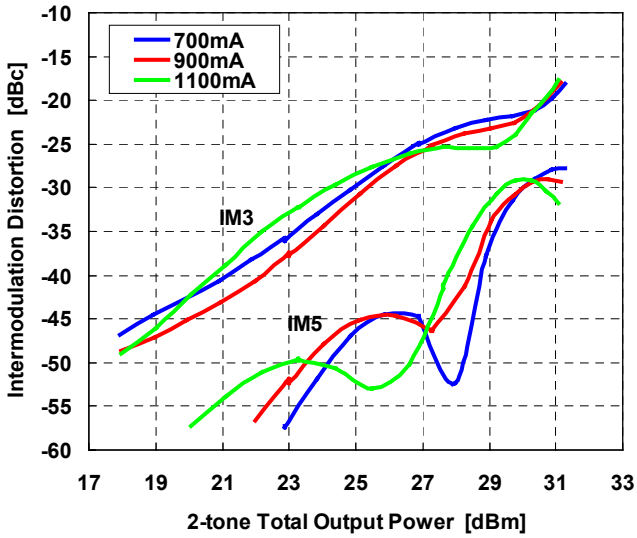
IMD vs. OUTPUT POWER
by Drain Current

VDD=6V, f=12.75GHz



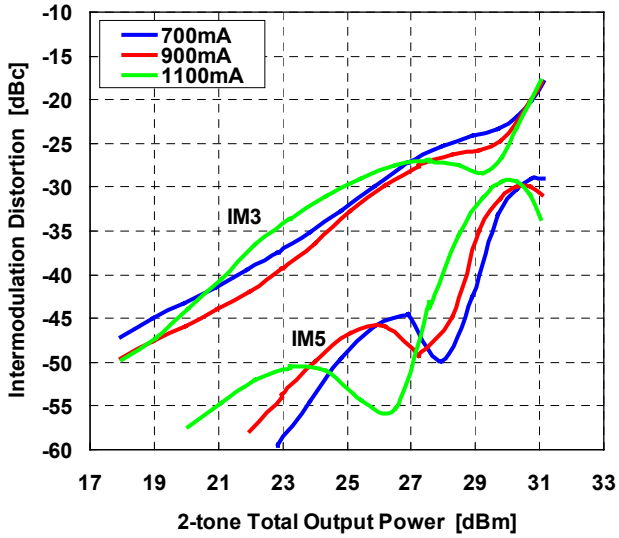
IMD vs. OUTPUT POWER
by Drain Current

VDD=6V, f=14.0GHz

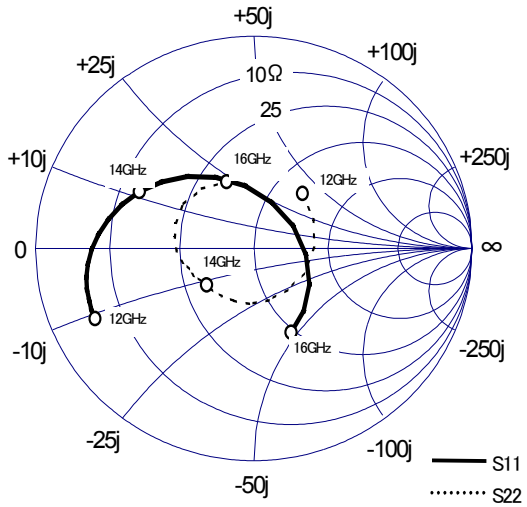


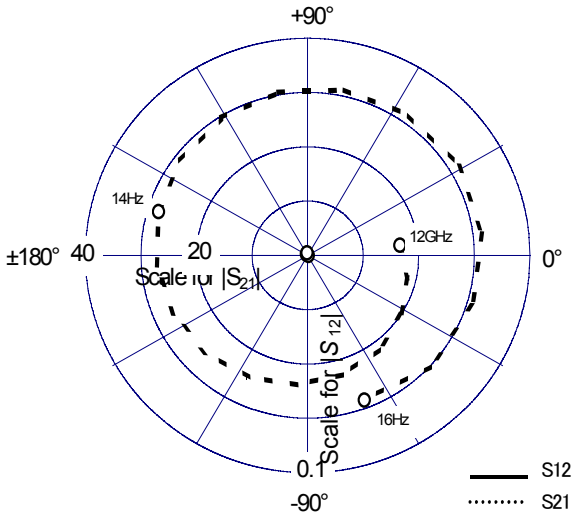
IMD vs. OUTPUT POWER
by Drain Current

VDD=6V, f=15.4GHz



■S-PARAMETER


+50j
+25j
+100j
10Ω
25
+10j
+250j
14GHz
16GHz
12GHz
0
∞
14GHz
12GHz
16GHz
-10j
-250j
-25j
-100j
-50j
S11
S22

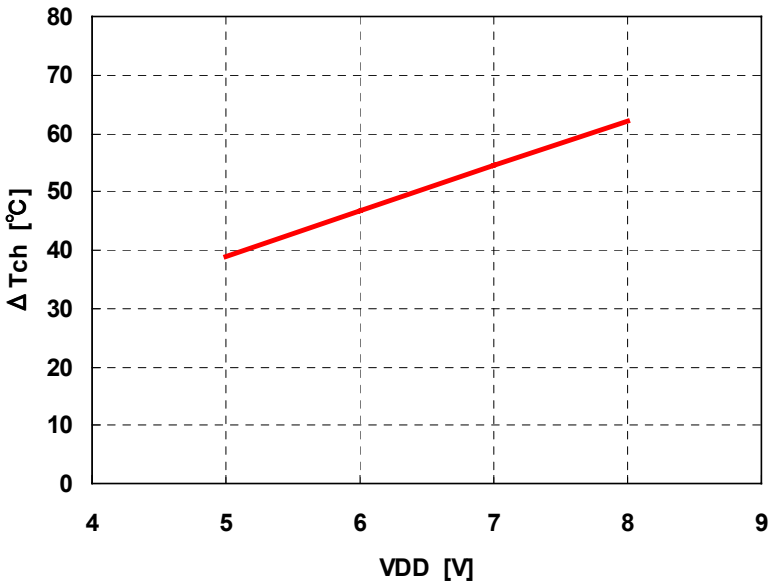

+90°
14Hz
±180°
40
20
12GHz
0°
Scale for |S21|
Scale for |S12|
16Hz
0.1
-90°
S12
S21

■S-PARAMETER

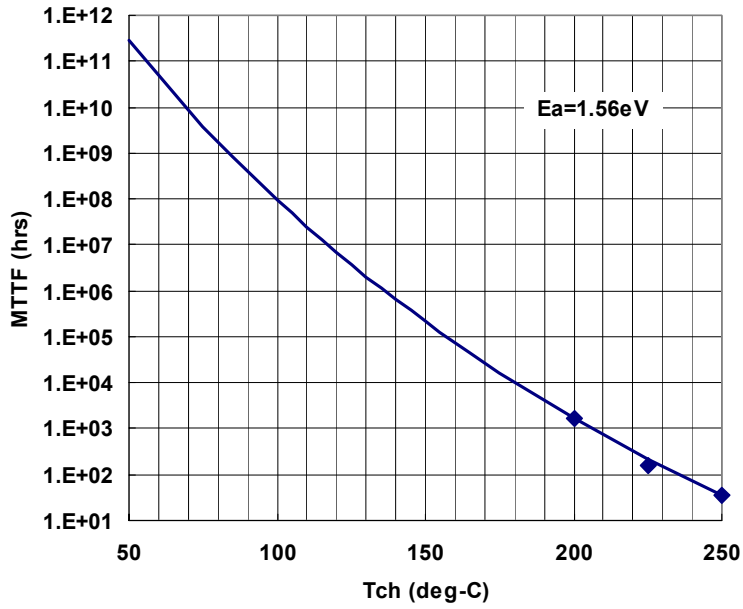
VDD=6V, IDD=900mA

Frequency	S11		S21		S12		S22	
[GHz]	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
1.0	0.58	-29.2	0.01	132.2	0.00	-148.2	1.00	-30.2
2.0	0.57	-42.7	0.07	-14.0	0.00	-95.8	0.97	-60.9
3.0	0.59	-57.2	0.08	-163.4	0.00	-152.7	0.96	-88.1
4.0	0.62	-70.5	0.05	169.5	0.00	36.6	0.96	-119.3
5.0	0.66	-82.8	0.10	-157.9	0.00	-99.4	0.92	-153.1
6.0	0.69	-94.0	0.57	137.7	0.00	145.6	0.83	170.2
7.0	0.73	-105.0	1.59	65.8	0.00	128.2	0.71	123.2
8.0	0.75	-115.4	3.64	-29.5	0.00	10.3	0.49	49.6
9.0	0.76	-123.8	5.00	-119.1	0.00	-67.9	0.43	-67.8
10.0	0.78	-132.7	6.54	164.2	0.00	-104.4	0.53	-158.1
11.0	0.80	-143.0	9.79	91.3	0.00	-175.6	0.51	134.5
12.0	0.80	-155.5	16.72	6.4	0.00	137.7	0.34	49.2
12.2	0.80	-158.6	18.43	-13.0	0.00	103.1	0.30	26.6
12.4	0.79	-162.0	20.09	-33.1	0.00	127.8	0.28	0.7
12.6	0.79	-165.8	21.57	-53.6	0.00	92.8	0.26	-26.6
12.8	0.78	-170.0	22.85	-74.3	0.00	88.2	0.25	-51.8
13.0	0.76	-174.6	23.90	-94.9	0.00	108.5	0.25	-74.3
13.2	0.74	-179.7	24.82	-115.5	0.00	56.1	0.26	-94.7
13.4	0.72	174.6	25.64	-135.8	0.00	27.2	0.26	-110.7
13.6	0.68	168.4	26.41	-156.0	0.00	49.2	0.27	-123.0
13.8	0.64	161.2	27.17	-176.3	0.00	15.6	0.27	-133.8
14.0	0.59	152.9	28.00	163.3	0.00	3.1	0.28	-141.7
14.2	0.53	143.3	28.82	142.7	0.00	-17.6	0.29	-147.8
14.4	0.46	131.7	29.71	121.5	0.00	-52.1	0.30	-155.0
14.6	0.38	117.3	30.51	99.9	0.00	-34.7	0.31	-162.1
14.8	0.30	97.7	31.16	77.6	0.00	-115.4	0.33	-168.4
15.0	0.23	69.1	31.60	54.7	0.00	-136.6	0.35	-177.7
15.2	0.21	30.6	31.80	31.2	0.00	145.0	0.36	172.0
15.4	0.24	-6.8	31.64	7.2	0.00	166.5	0.38	161.4
15.6	0.31	-33.5	31.10	-17.5	0.00	153.5	0.38	147.0
15.8	0.37	-52.3	30.12	-43.0	0.00	123.9	0.37	130.0
16.0	0.43	-66.5	28.53	-69.0	0.00	104.3	0.34	111.6
17.0	0.55	-97.6	14.50	164.0	0.00	-19.5	0.29	-34.6
18.0	0.65	-107.2	5.42	61.8	0.00	-98.3	0.51	-112.7
19.0	0.74	-116.4	2.25	-25.6	0.00	152.2	0.71	-150.9
20.0	0.79	-123.6	1.07	-127.3	0.00	165.1	0.82	-177.6
21.0	0.84	-130.0	0.20	117.7	0.00	-176.2	0.87	159.5
22.0	0.86	-136.1	0.03	56.9	0.00	91.7	0.92	140.5
23.0	0.87	-140.9	0.00	94.4	0.00	98.7	0.94	124.6
24.0	0.88	-144.6	0.00	80.0	0.00	65.9	0.93	108.6
25.0	0.88	-148.2	0.00	69.8	0.00	66.2	0.93	91.3
26.0	0.89	-150.9	0.00	62.1	0.00	27.9	0.93	73.6
27.0	0.90	-154.0	0.00	17.8	0.00	41.2	0.87	50.3
28.0	0.90	-156.6	0.00	3.2	0.00	-16.8	0.77	14.1
29.0	0.91	-159.7	0.00	31.5	0.00	-14.0	0.63	-44.3
30.0	0.92	-161.9	0.00	131.7	0.00	27.1	0.60	-132.2
31.0	0.92	-164.8	0.00	8.4	0.00	147.7	0.79	169.8
32.0	0.92	-167.9	0.00	145.0	0.00	15.4	0.86	136.0
33.0	0.92	-170.8	0.00	49.5	0.00	14.4	0.92	113.1
34.0	0.91	-174.1	0.00	39.1	0.00	-25.8	0.96	99.9
35.0	0.90	-177.1	0.00	16.1	0.00	118.9	0.95	88.2
36.0	0.87	179.5	0.00	-25.3	0.00	-53.4	0.94	75.7
37.0	0.85	175.7	0.00	-12.7	0.00	-61.3	0.96	68.3
38.0	0.79	172.2	0.00	-142.6	0.00	-56.1	0.98	62.8
39.0	0.74	170.8	0.00	-43.0	0.01	-99.2	0.94	53.3
40.0	0.67	168.9	0.00	-96.1	0.00	-9.9	0.97	44.9

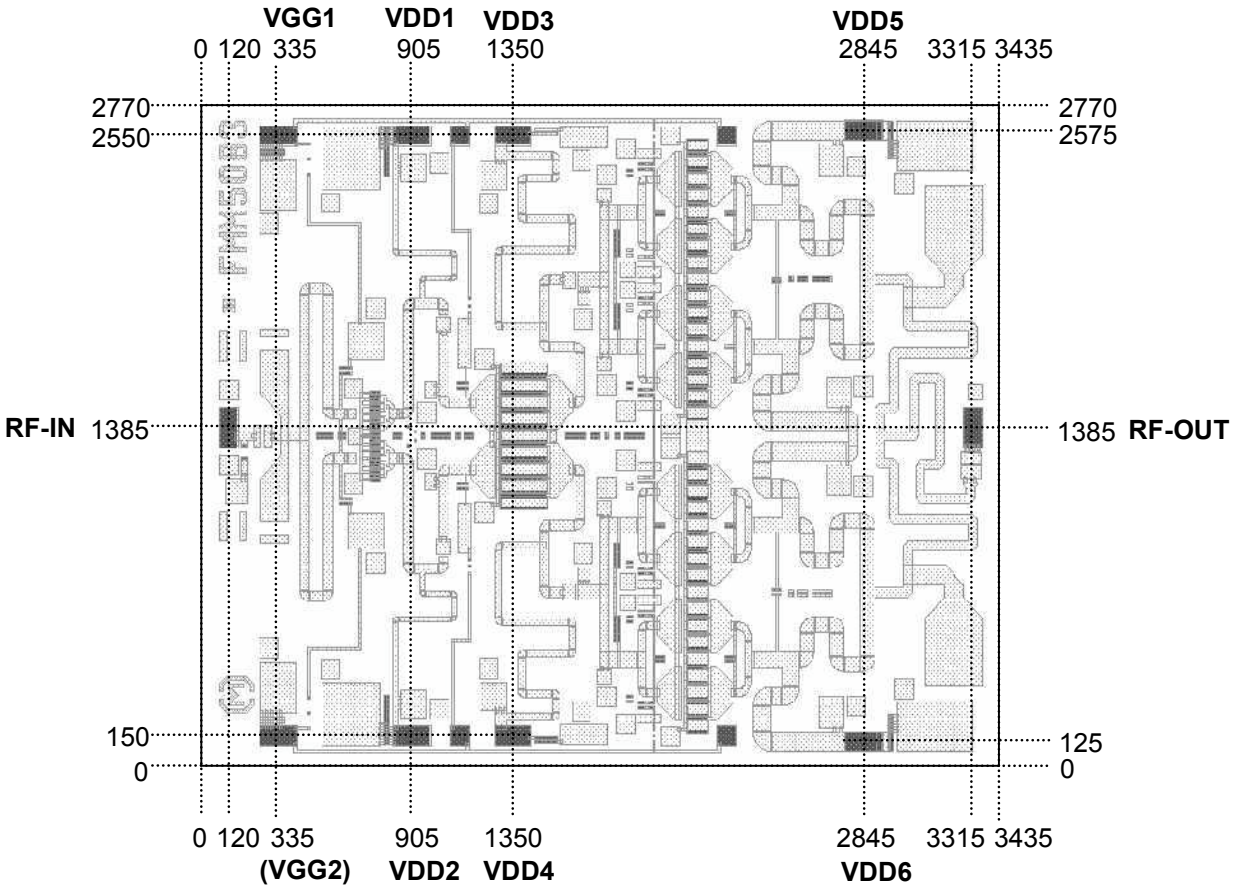
ΔTch vs. Drain Voltage (Reference)



MTTF vs. Tch



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

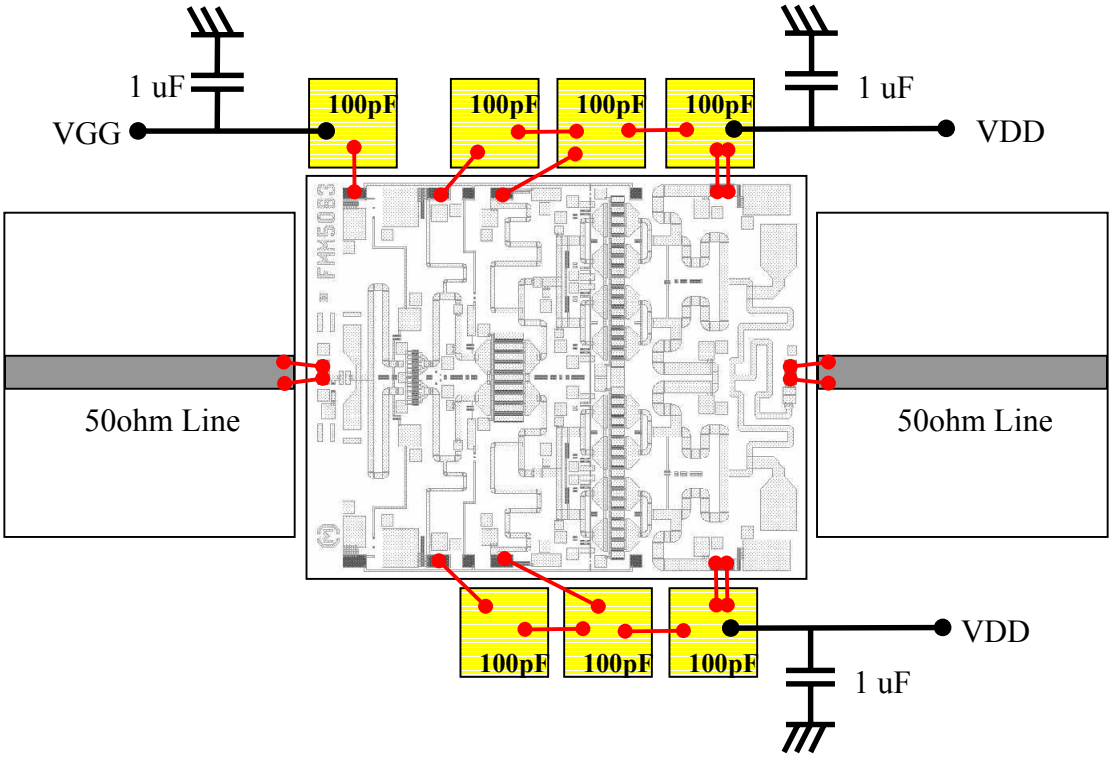


Chip Size : 3435±30um x 2770±30um
Chip Thickness : 60±20um
Bonding Pad Size : 160um x 80um

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

■ Assembly Diagrams

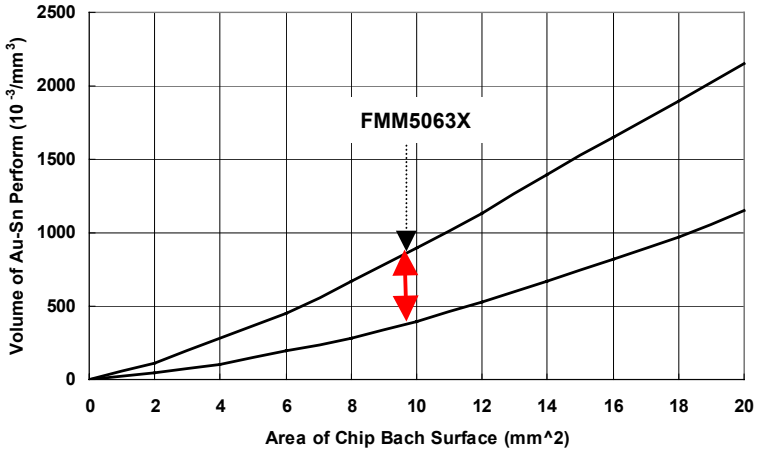
Recommended assembly



"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 deg.C
   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 deg.C ± 5 deg.C
   Tool Heater : None
   Ultrasonic Power Transmitter : West Bond Model 1400
   Duration : 150 mS/Bond

For further information please contact :

Eudyna Devices USA Inc.
2355 Zanker Rd.
San Jose, CA 95131-1138, U.S.A.
TEL: +1 408 232-9500
FAX: +1 408 428-9111

Eudyna Devices Europe Ltd.
Network House
Norreys Drive
Maidenhead, Berkshire SL6 4FJ
United Kingdom
TEL: +44 (0) 1628 504800
FAX: +44 (0) 1628 504888

Eudyna Devices International Srl
Via Teglio 8/2 - 20158
Milano, Italy
TEL: +39-02-8738-1695

Eudyna Devices Asia Pte. Ltd.
Hong Kong Branch
Suite 1906B, Tower 6, China Hong Kong City
33 Canton Road, Tsimshatsui, Kowloon
Hong Kong
TEL: +852-2377-0227
FAX: +852-2377-3921

Eudyna Devices Inc.
1000 Kamisukiahara, showa-cho
Nakakomagun, Yamanashi
409-3883, Japan
(Kokubo Industrial Park)
TEL +81-55-275-4411
FAX +81-55-275-9461
Sales Division
1, Kanai-cho, Sakae-ku
Yokohama, 244-0845, Japan
TEL +81-45-853-8156
FAX +81-45-853-8170

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.