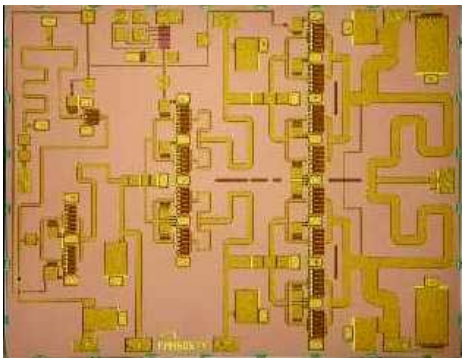
FMM5057X

C-Band Power Amplifier MMIC



FEATURES

- •High Output Power; P1dB = 34 dBm (Typ.)
- •High Linear Gain; GL = 27 dB(Typ.)
- •Frequency Band ; 7.1 - 8.5 GHz
- •High Linearity ; OIP3 = 42.5 dBm(typ.)
- •Impedance Matched Zin/Zout = 50Ω

DESCRIPTION

The FMM5057X is a power amplifier MMIC that contains a four stage amplifier, internally matched, for standard communications band in 7.1 to 8.5GHz frequency range. This product is well suited for point-to-point radio 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	12	V
Gate-Source Voltage	VGG	-3	V
Input Power	Pin	14	dBm
Strage Temperature	Tstg	-55 to +125	℃

RECOMMENDED OPERATING CONDITIONS

Item	Symbol	Condition	Unit
Drain-Source Voltage	VDD	≦10	V
Input Power	Pin	12	dBm
Drain Current without RF	IDD(DC)	≦1200	mA
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=10.0V	7.1	-	8.5	GHz
Output Power at 1dB G.C.P.	P1dB	IDD(DC)=1200mA typ.	32.0	34.0	-	dBm
Power Gain at 1dB G.C.P.	G1dB	Zs=Zl=50ohm	23	26	-	dB
Gain Flatness	ΔG		-	+/- 1.2	+/-2.0	dB
Input Return Loss	RLin		7.0	10	-	dB
Output Return Loss	RLout		-	10	-	dB

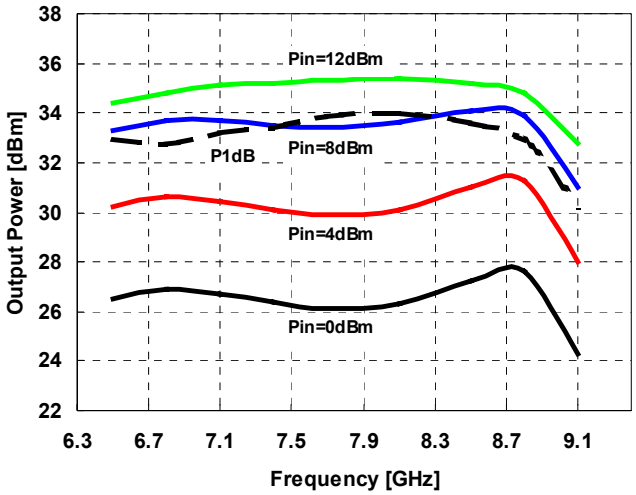
Note : RF parameter sample size 10ps. Criteria (accept/reject)=(0/1) G.C.P. : Gain Compression Point

ESD	Class 0	~ 199V

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

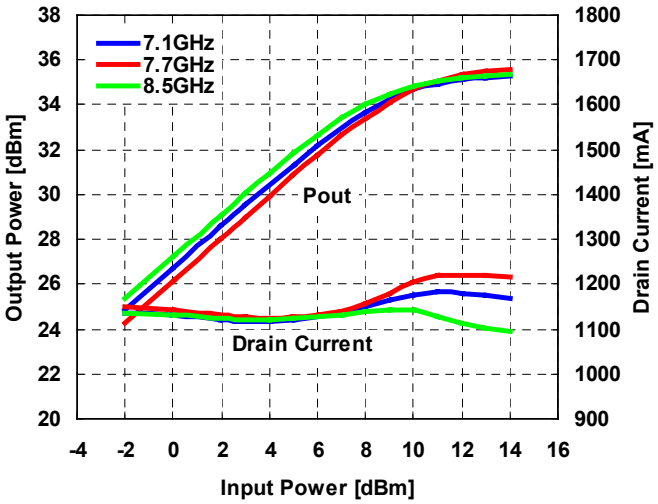
Output Power vs. Frequency

VDD=10V, IDD(DC)=1200mA



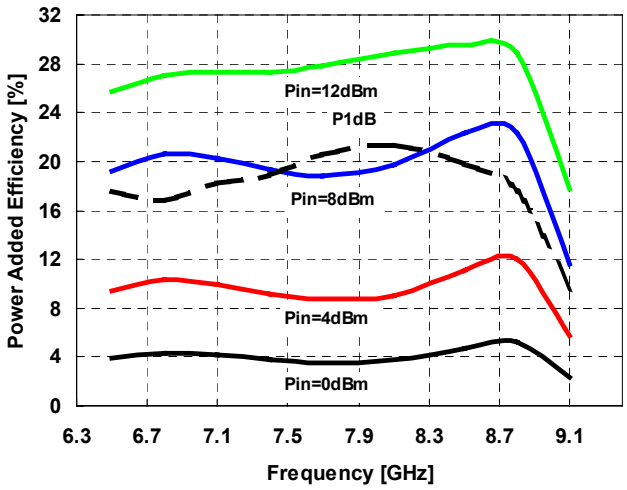
Output Power, Drain Current vs. Input Power

VDD=10V, IDD(DC)=1200mA



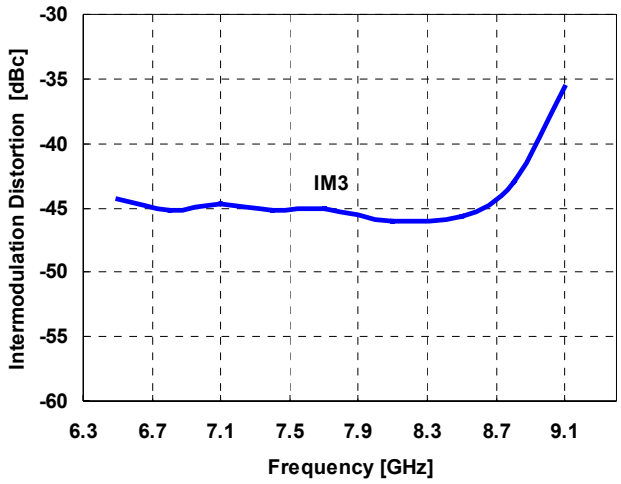
Power Added Efficiency vs. Frequency

VDD=10V, IDD(DC)=1200mA



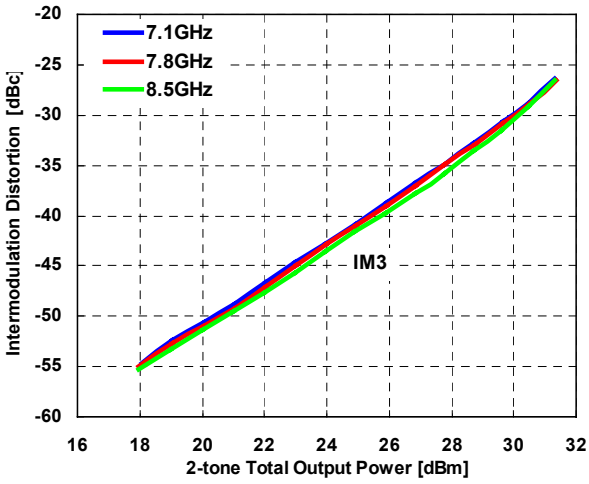
IMD vs. Frequency

VDD=10V, IDD(DC)=1200mA, Pout=20dBm S.C.L.



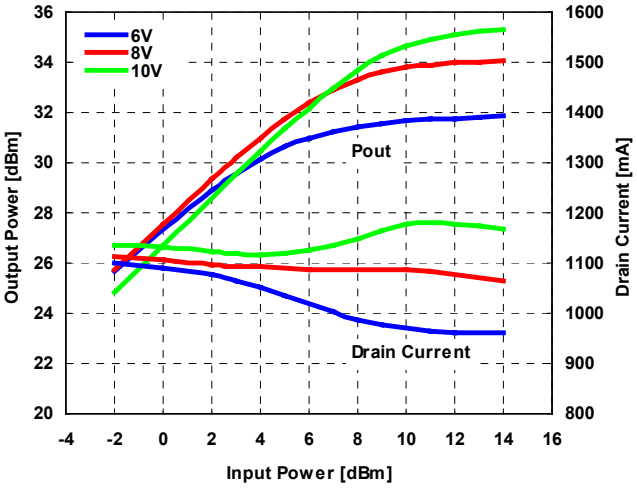
IMD vs. Output Power

VDD=10V, IDD(DC)=1200mA



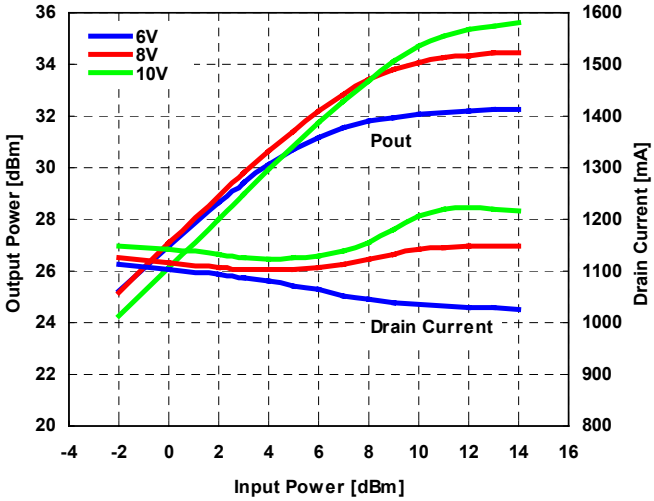
Output Power, Drain Current vs. Input Power by Drain Voltage

IDD(DC)=1200mA, f=7.1GHz



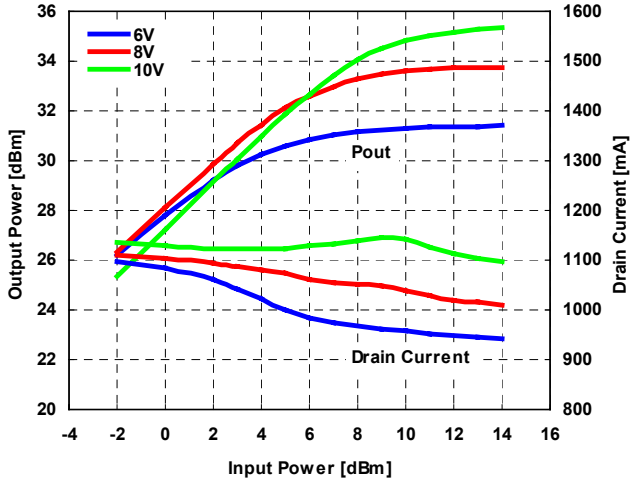
Output Power, Drain Current vs. Input Power by Drain Voltage

IDD(DC)=1200mA, f=7.7GHz



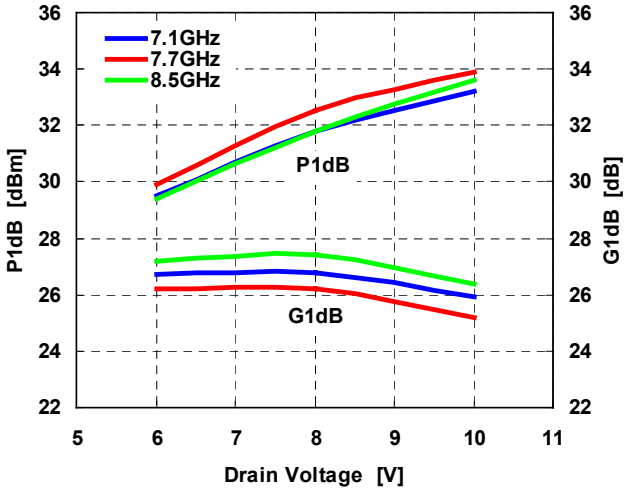
Output Power, Drain Current vs. Input Power by Drain Voltage

IDD(DC)=1200mA, f=8.5GHz



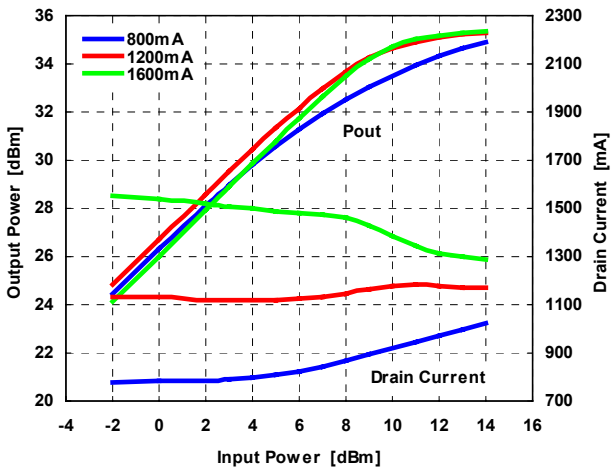
Output Power, Gain vs. Drain Voltage

IDD(DC)=1200mA



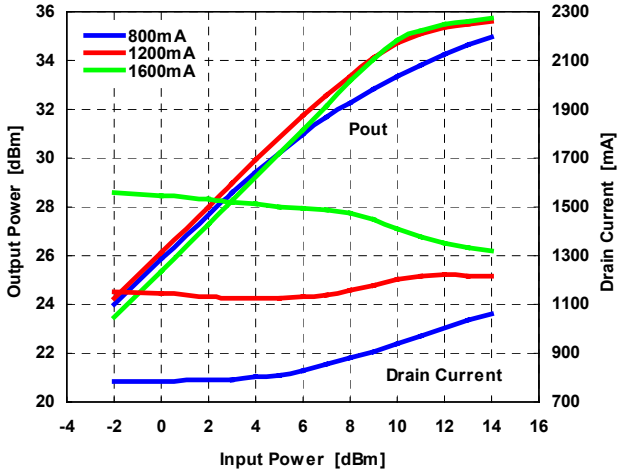
Output Power, Drain Current vs. Input Power by Drain Current

VDD=10V, f=7.1GHz



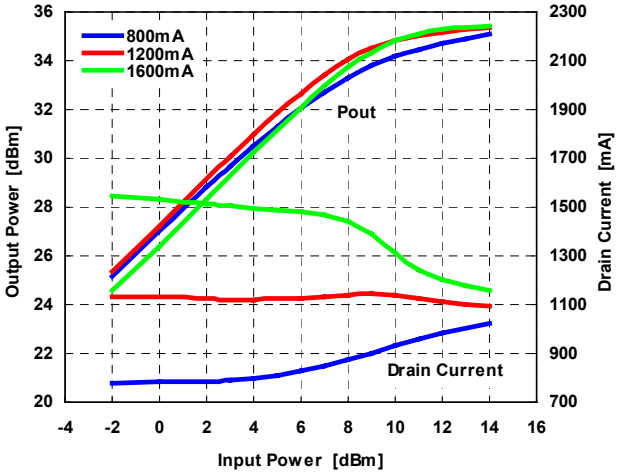
Output Power, Drain Current vs. Input Power by Drain Current

VDD=10V, f=7.7GHz



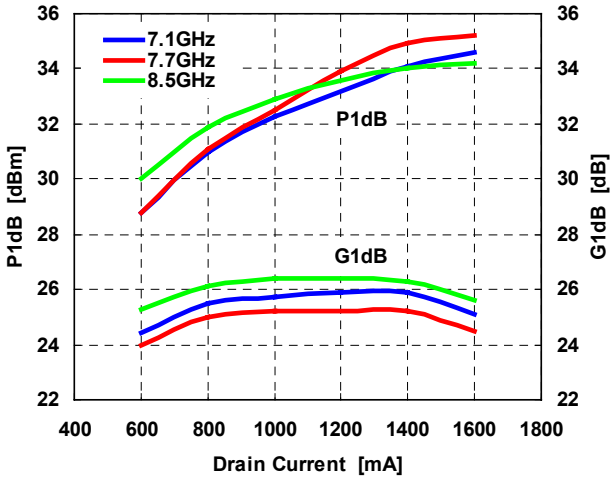
Output Power, Drain Current vs. Input Power by Drain Current

VDD=10V, f=8.5GHz



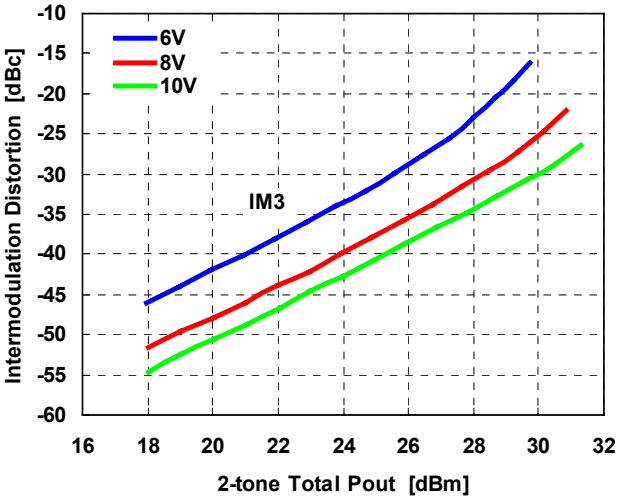
Output Power, Gain vs. Drain Current

VDD=10V



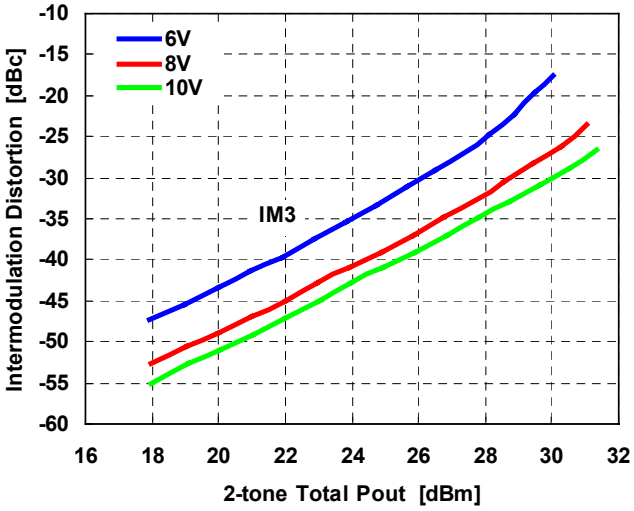
IMD vs. Output Power by Drain Voltage

IDD(DC)=1200mA, f=7.1GHz



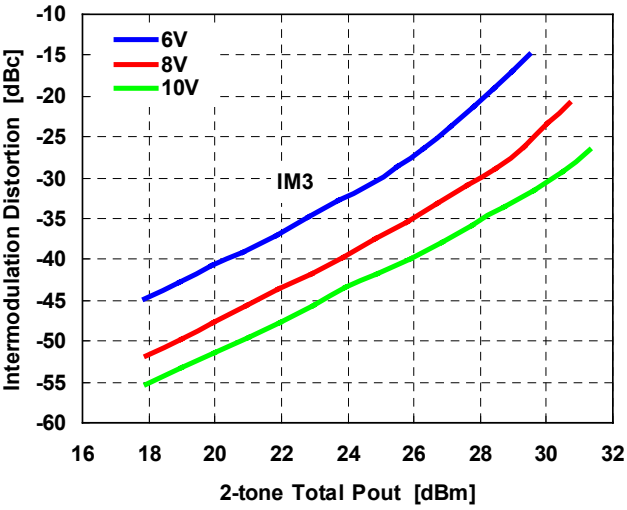
IMD vs. Output Power by Drain Voltage

IDD(DC)=1200mA, f=7.7GHz



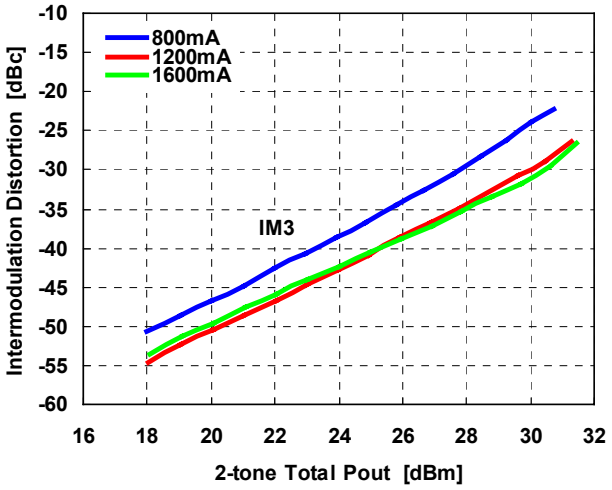
IMD vs. Output Power by Drain Voltage

IDD(DC)=1200mA, f=8.5GHz



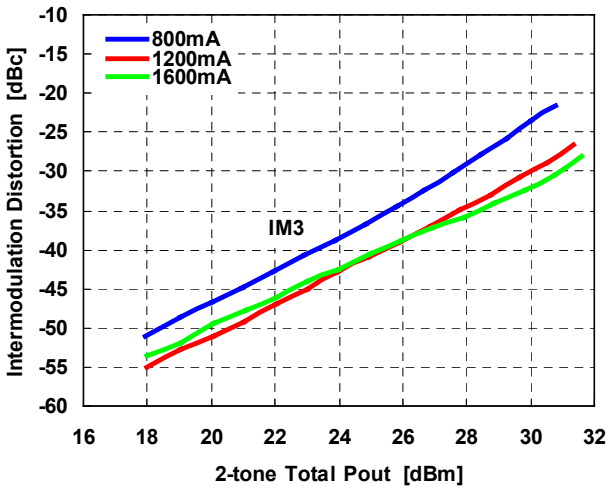
IMD vs. Output Power by Drain Current

VDD=10V, f=7.1GHz



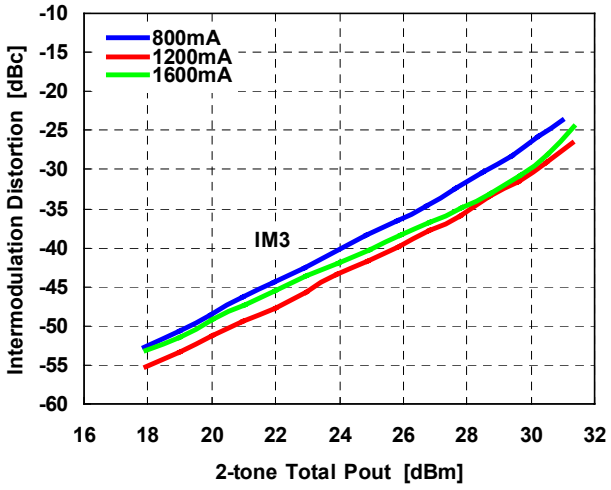
IMD vs. Output Power by Drain Current

VDD=10V, f=7.7GHz



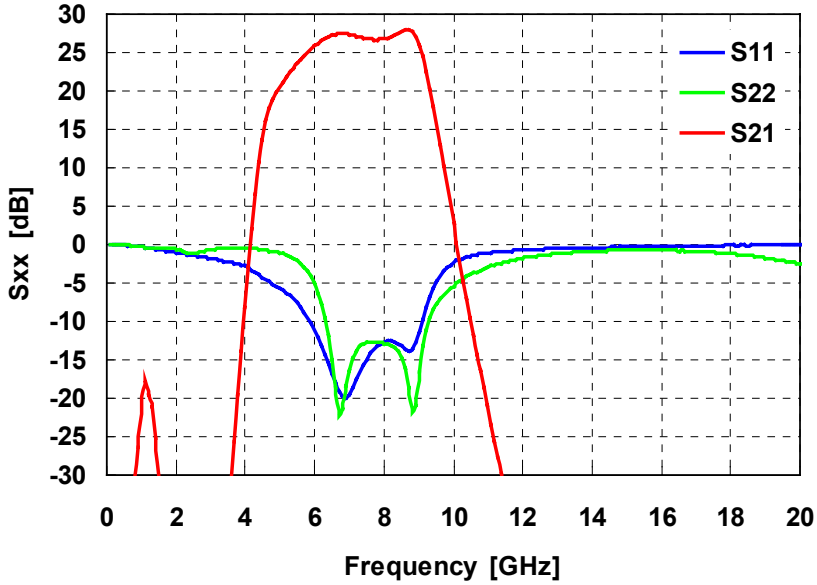
IMD vs. Output Power by Drain Current

VDD=10V, f=8.5GHz

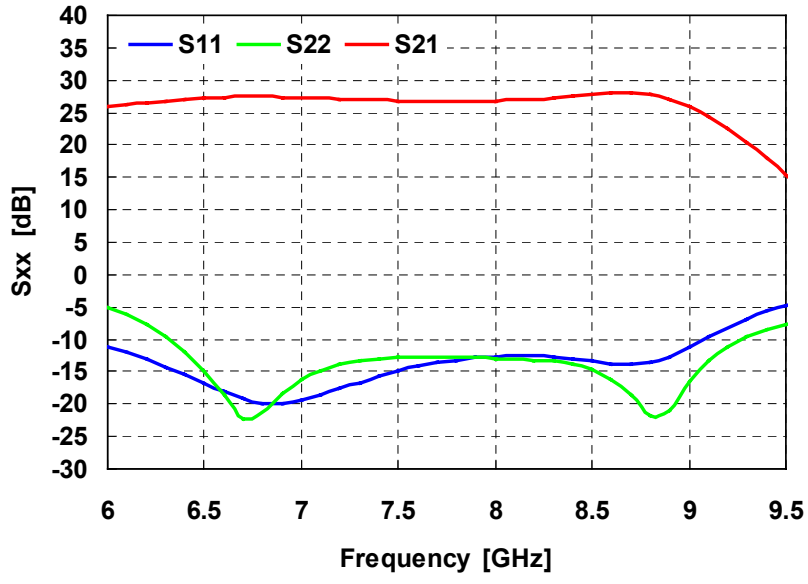


■S-PARAMETER

@VDD=10V, IDD=1200mA



@VDD=10V, IDD=1200mA

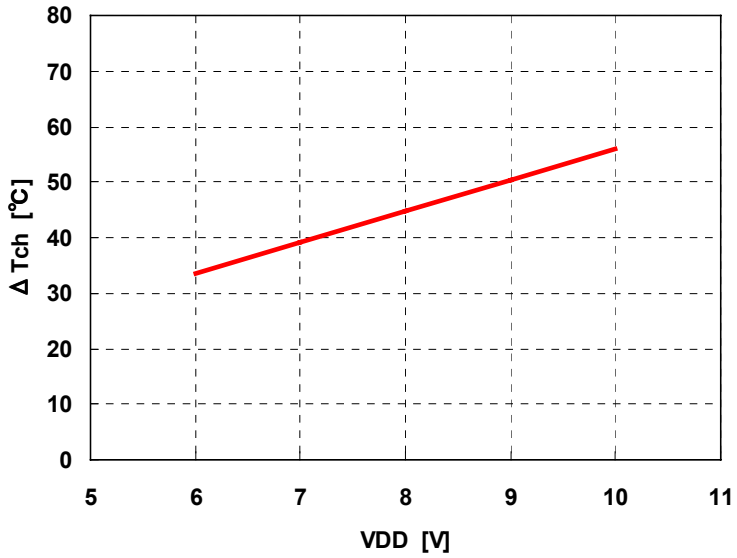


■S-PARAMETER

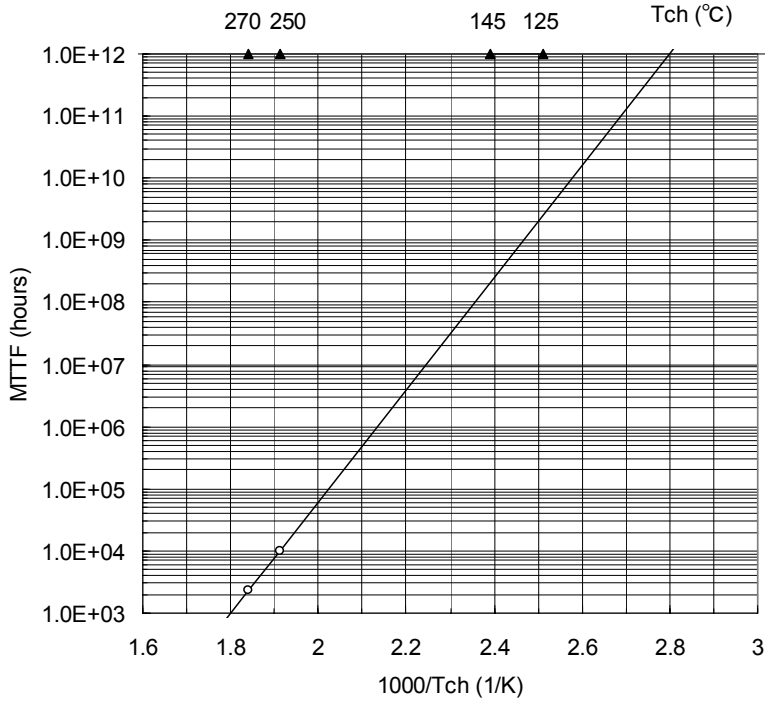
@VDD=10V, IDD=1200mA

Freq.	S11 Mag.	S11 Ang.	S21 Mag.	S21 Ang.	S12 Mag.	S12 Ang.	S22 Mag.	S22 Ang.
1.0	0.96	-48.7	0.09	68.8	0.00	28.3	0.97	-93.8
2.0	0.89	-90.7	0.01	103.2	0.00	60.4	0.93	-144.5
3.0	0.81	-125.8	0.00	-5.5	0.00	-131.6	0.93	-169.9
4.0	0.72	-159.6	0.39	86.7	0.00	-13.7	0.94	161.7
5.0	0.52	171.1	10.59	139.2	0.00	147.8	0.88	128.6
6.0	0.28	143.0	19.53	-98.2	0.00	28.6	0.56	69.6
6.5	0.14	147.0	23.03	150.4	0.00	-146.7	0.18	11.8
6.6	0.13	151.8	23.37	128.2	0.00	116.4	0.12	-12.6
6.7	0.11	159.9	23.50	106.3	0.00	97.7	0.08	-56.3
6.8	0.10	171.2	23.52	84.6	0.00	16.9	0.09	-108.2
6.9	0.10	-177.2	23.42	63.1	0.00	-132.3	0.12	-137.4
7.0	0.11	-167.9	23.21	42.0	0.00	-110.9	0.15	-153.7
7.1	0.12	-160.1	22.96	21.1	0.00	177.5	0.18	-164.8
7.2	0.13	-155.2	22.67	0.6	0.00	32.5	0.20	-173.3
7.3	0.15	-152.8	22.39	-19.8	0.00	-113.4	0.22	-179.1
7.4	0.17	-152.6	22.14	-40.1	0.00	136.3	0.23	175.6
7.5	0.18	-153.2	21.89	-60.1	0.00	-27.5	0.23	171.7
7.6	0.20	-155.2	21.72	-80.1	0.00	-159.1	0.23	169.1
7.7	0.21	-157.7	21.57	-100.1	0.00	-139.9	0.23	167.4
7.8	0.22	-161.4	21.57	-120.1	0.00	129.3	0.23	165.7
7.9	0.23	-166.3	21.66	-140.3	0.00	86.7	0.23	164.6
8.0	0.23	-172.1	21.82	-160.8	0.00	-122.6	0.23	163.9
8.1	0.24	-178.1	22.14	178.3	0.00	68.0	0.22	162.6
8.2	0.24	174.6	22.56	156.8	0.00	-9.7	0.22	160.8
8.3	0.23	166.0	23.14	134.5	0.00	70.0	0.21	159.1
8.4	0.23	155.5	23.78	111.2	0.00	103.6	0.20	157.3
8.5	0.22	142.2	24.41	86.4	0.00	61.9	0.18	155.4
8.6	0.21	126.4	24.94	60.0	0.00	-112.2	0.16	154.4
8.7	0.20	105.6	25.02	31.7	0.00	-156.2	0.12	158.3
8.8	0.21	81.3	24.33	1.5	0.00	76.2	0.08	178.1
8.9	0.23	56.2	22.63	-30.0	0.00	-132.5	0.09	-142.2
9.0	0.27	31.7	19.90	-61.9	0.00	130.0	0.15	-125.3
10.0	0.76	-89.7	1.35	58.6	0.00	-146.5	0.54	-160.3
11.0	0.88	-131.4	0.09	-86.9	0.00	151.1	0.71	176.7
12.0	0.92	-154.6	0.01	159.7	0.00	-171.4	0.81	157.1
13.0	0.94	-171.2	0.00	108.8	0.00	76.6	0.87	139.4
14.0	0.95	175.3	0.00	153.7	0.00	42.9	0.90	122.8
15.0	0.96	163.5	0.00	79.2	0.00	156.2	0.92	105.8
16.0	0.97	152.8	0.00	-5.1	0.00	85.6	0.92	87.6
17.0	0.98	142.7	0.00	2.9	0.00	-61.6	0.90	67.2
18.0	0.99	132.9	0.00	26.7	0.00	-34.0	0.87	43.1
19.0	0.99	123.6	0.00	14.3	0.00	-133.3	0.82	14.0
20.0	1.00	114.0	0.00	42.1	0.00	148.1	0.75	-22.7

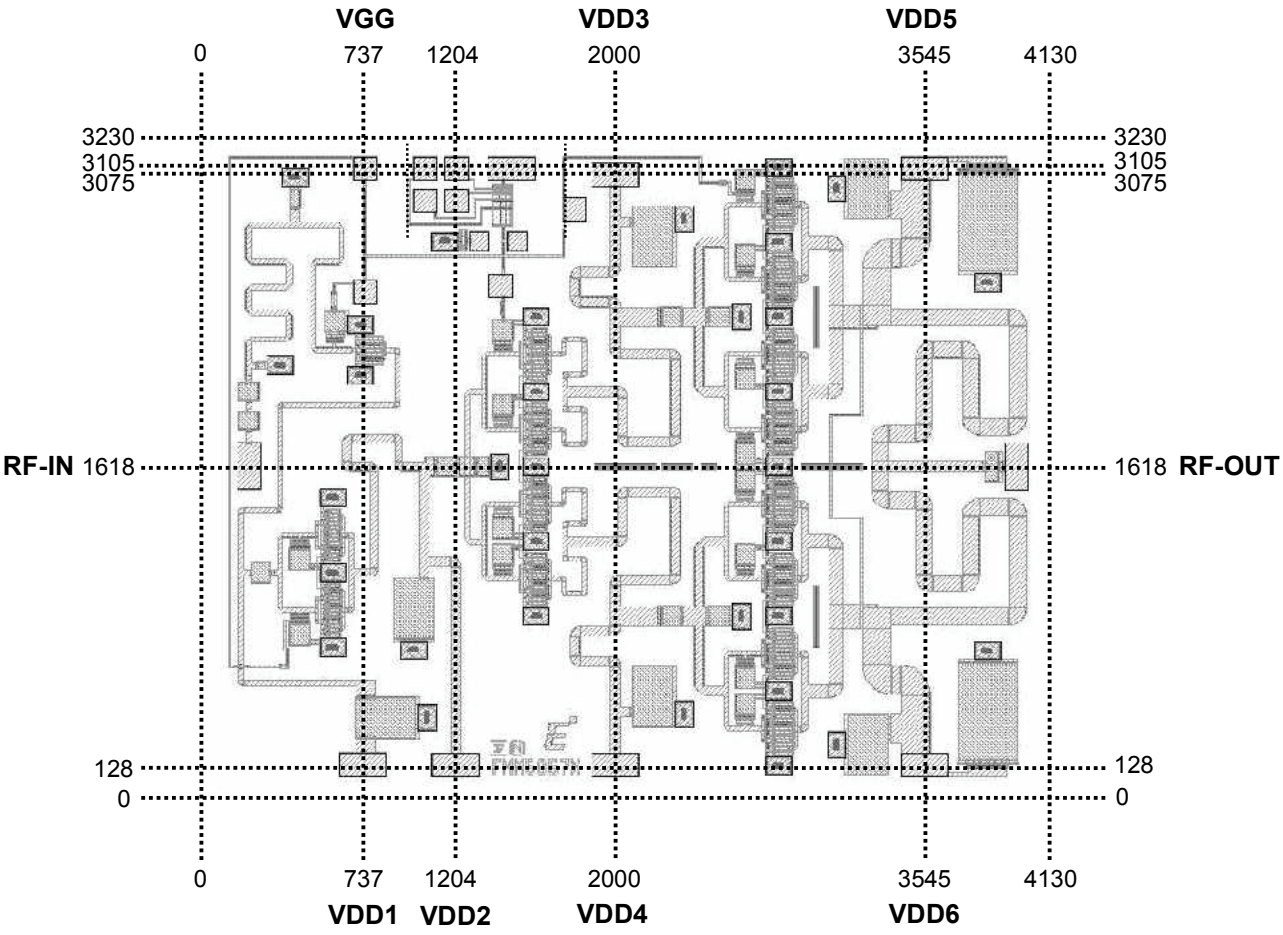
ΔTch vs. Drain Voltage (Reference)



MTTF vs. Tch

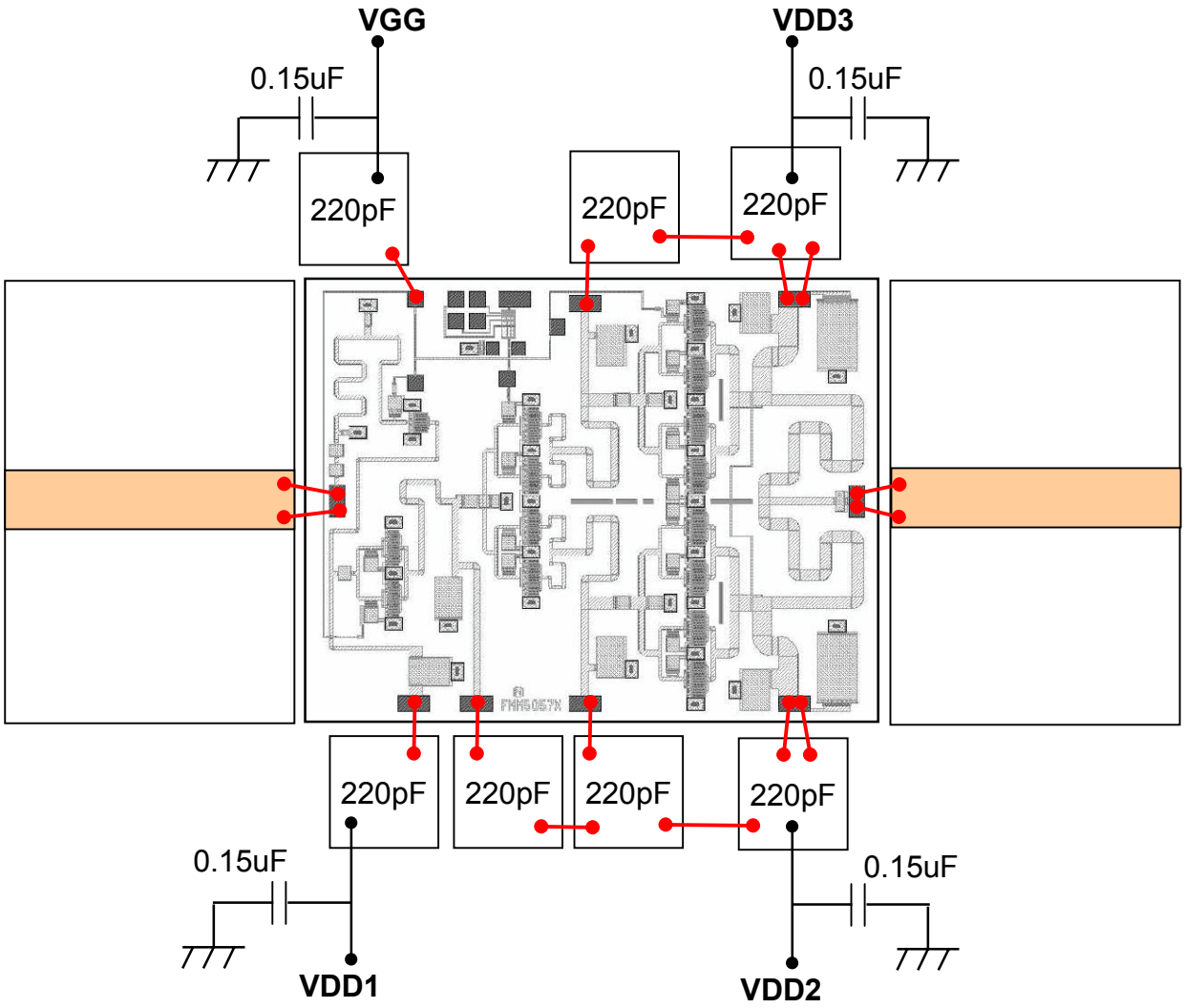


■ **Chip Outline and Bonding Pad Locations (Dimension in Micro-Meters)**



Chip Size : 4130±30um x 3230±30um
Chip Thickness : 70±20um
Bonding Pad Size :
RF-Pad : 120um x 240um
VDD Pad : 240um x 120um
VGG Pad : 120um x 120um

■ Recommended Assembly Diagrams



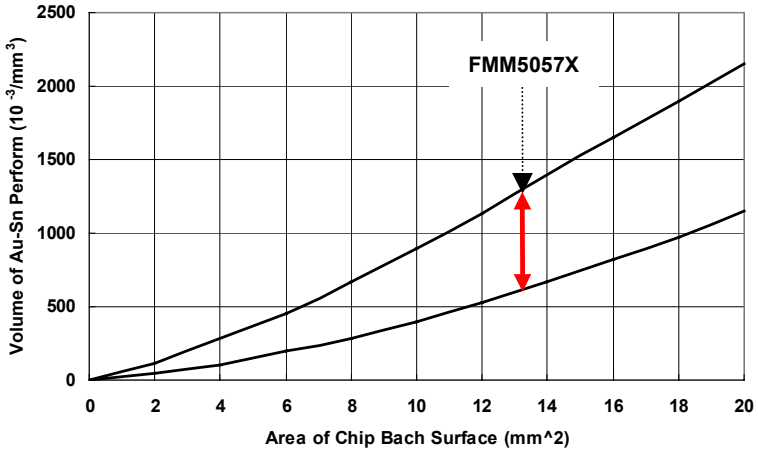
Note :

*** High isolation between VDD1 and VDD2 is needed.**

*** "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

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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.