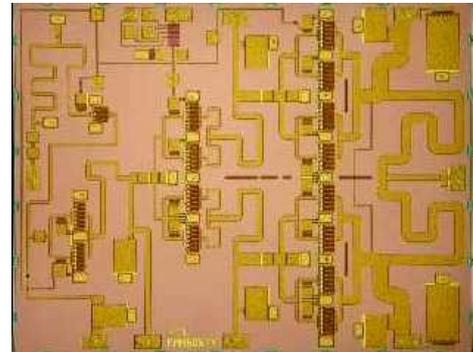


FMM5057X

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
Storage Temperature	Tstg	-55 to +125	°C

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	°C

This Product should be hermetically packaged.

ELECTRICAL CHARACTERISTICS (Ambient Temperature Ta=25°C)

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
------------	----------------	---------------

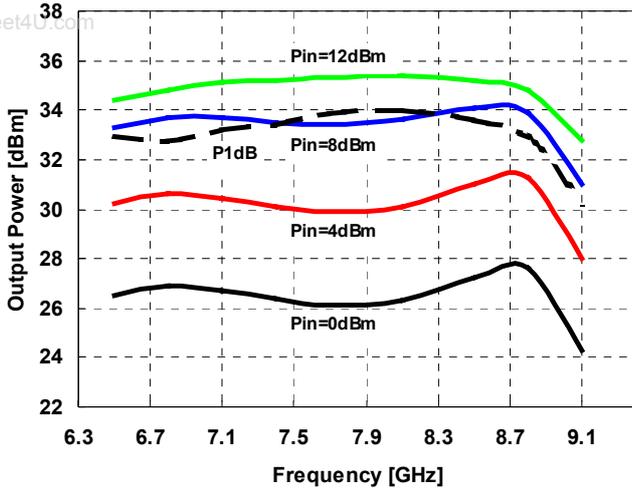
Note : Based on EIAJ ED-4701 C-111A(C=100pF, R=1.5kΩ)

FMM5057X

C-Band Power Amplifier MMIC

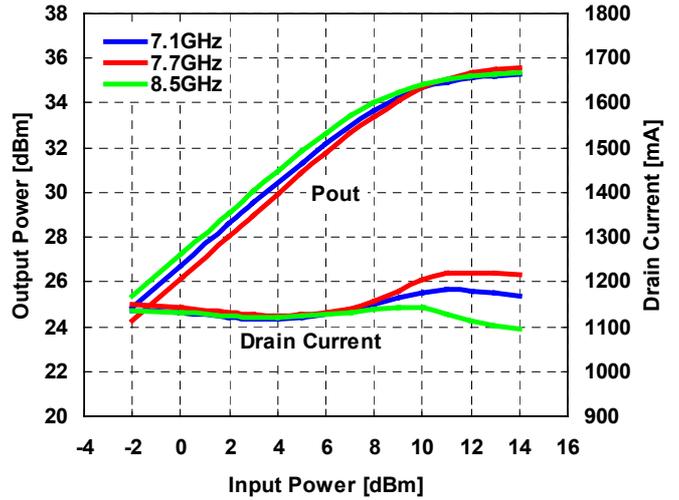
Output Power vs. Frequency

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



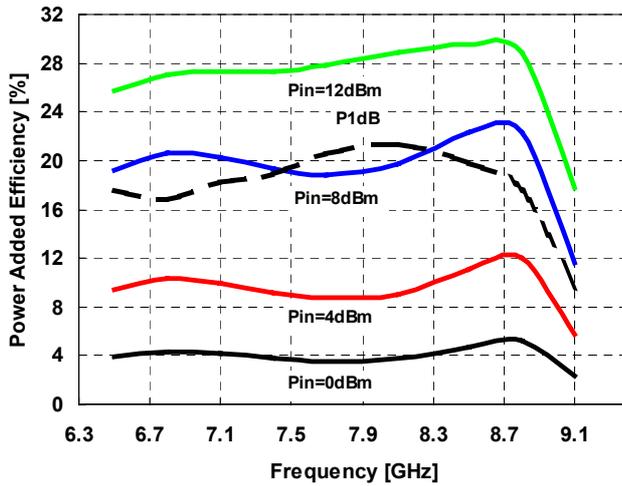
Output Power, Drain Current vs. Input Power

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



Power Added Efficiency vs. Frequency

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

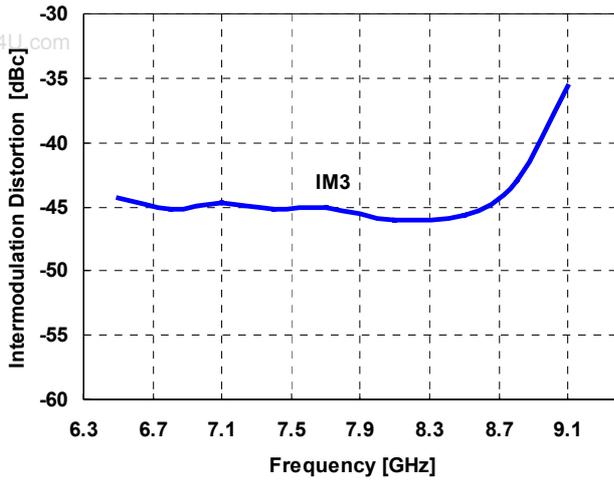


FMM5057X

C-Band Power Amplifier MMIC

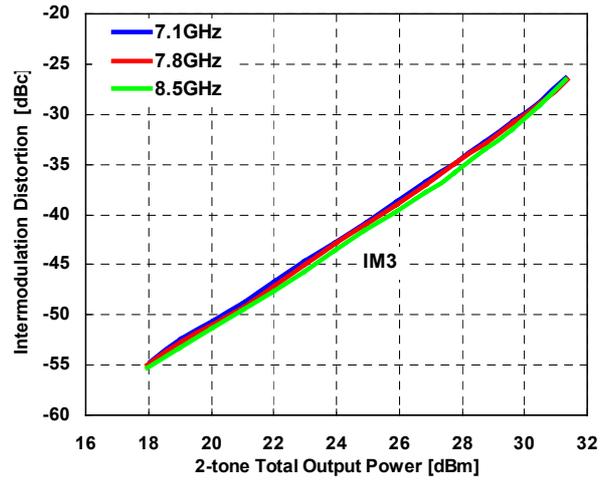
IMD vs. Frequency

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



IMD vs. Output Power

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

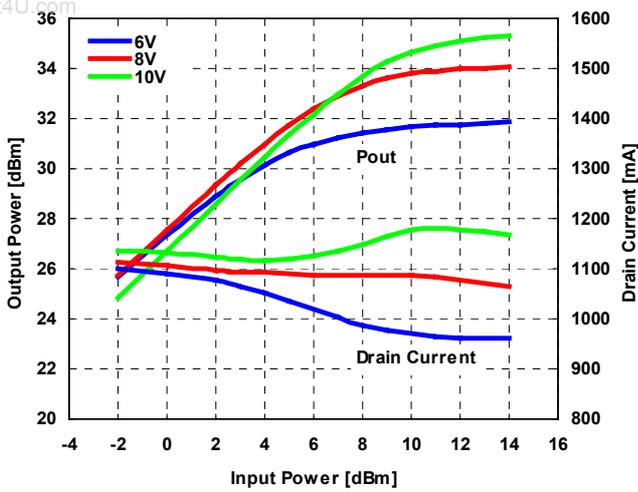


FMM5057X

C-Band Power Amplifier MMIC

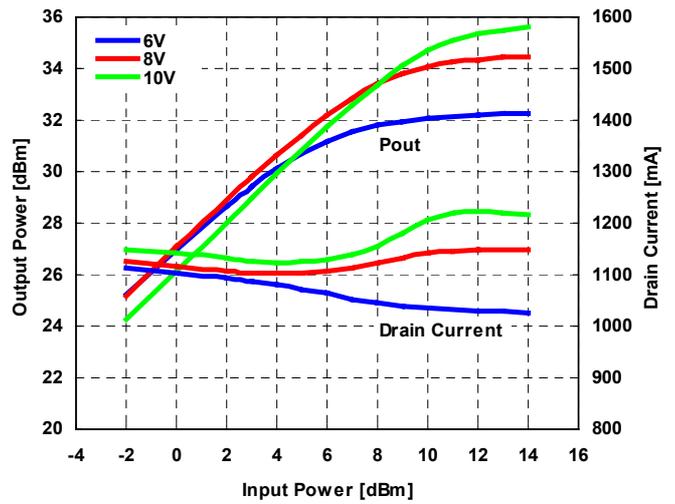
Output Power, Drain Current vs. Input Power by Drain Voltage

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



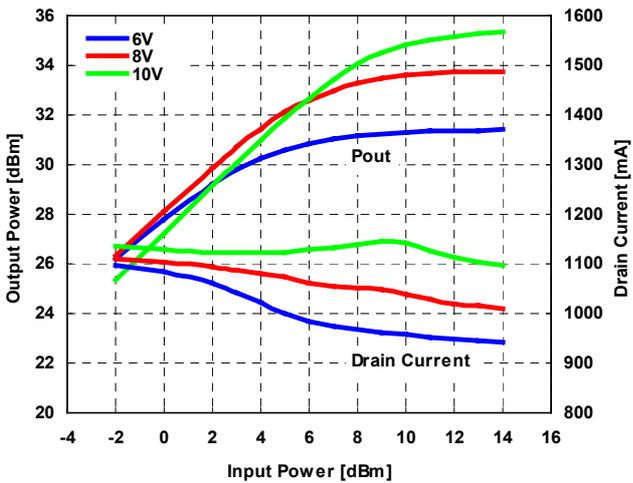
Output Power, Drain Current vs. Input Power by Drain Voltage

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



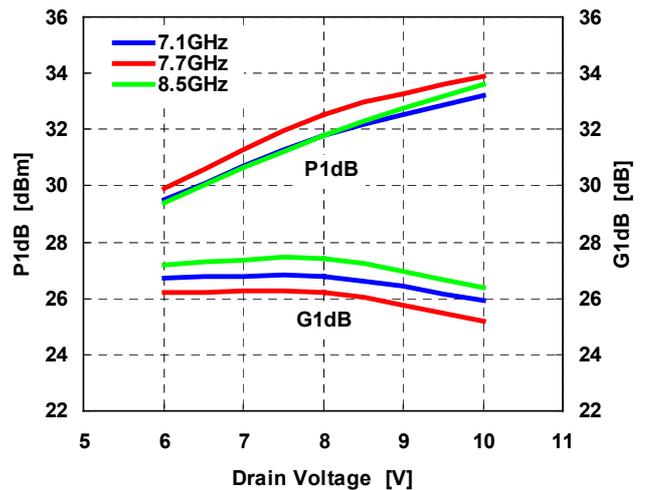
Output Power, Drain Current vs. Input Power by Drain Voltage

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



Output Power, Gain vs. Drain Voltage

IDD(DC)=1200mA

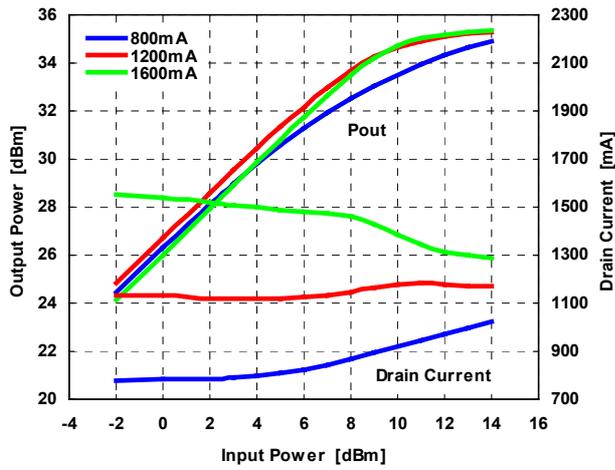


FMM5057X

C-Band Power Amplifier MMIC

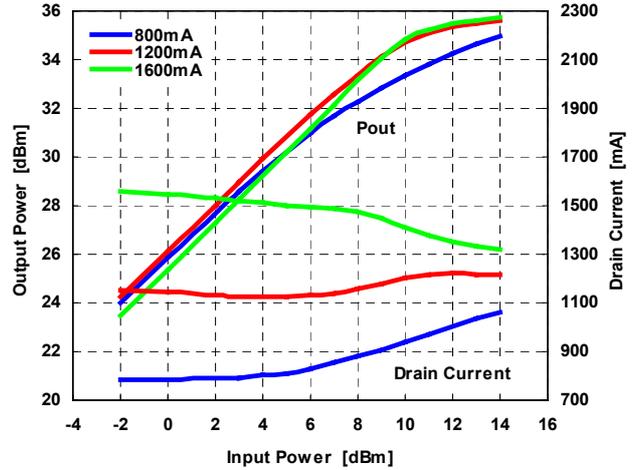
Output Power, Drain Current vs. Input Power by Drain Current

VDD=10V, f=7.1GHz



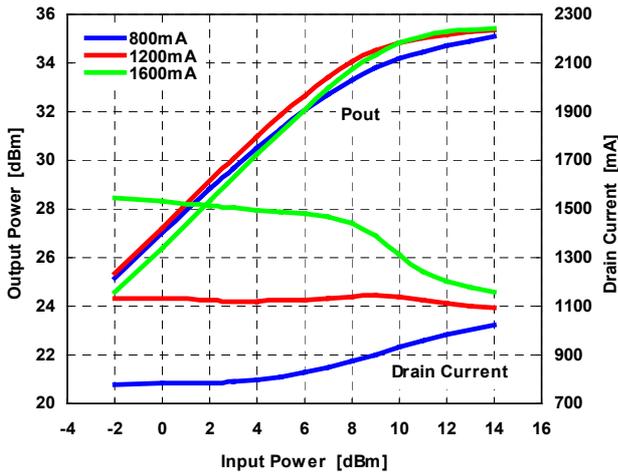
Output Power, Drain Current vs. Input Power by Drain Current

VDD=10V, f=7.7GHz



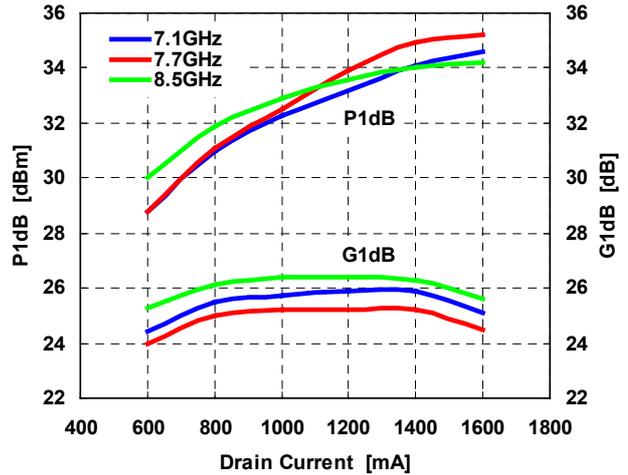
Output Power, Drain Current vs. Input Power by Drain Current

VDD=10V, f=8.5GHz



Output Power, Gain vs. Drain Current

VDD=10V

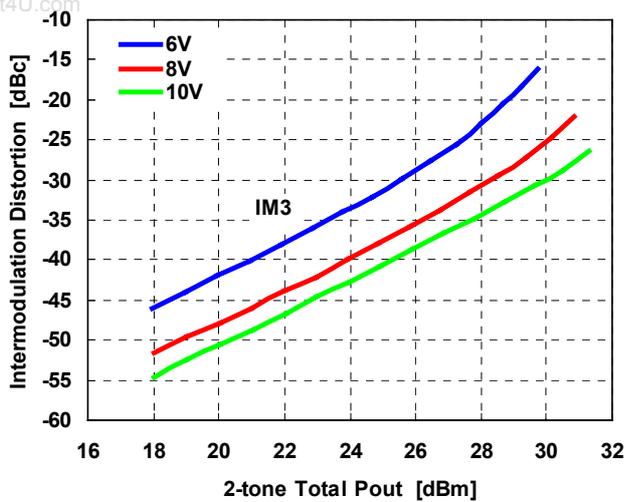


FMM5057X

C-Band Power Amplifier MMIC

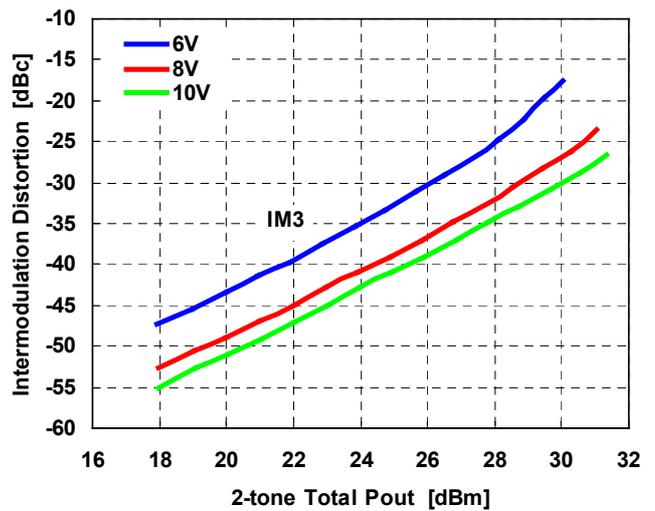
IMD vs. Output Power
by Drain Voltage

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



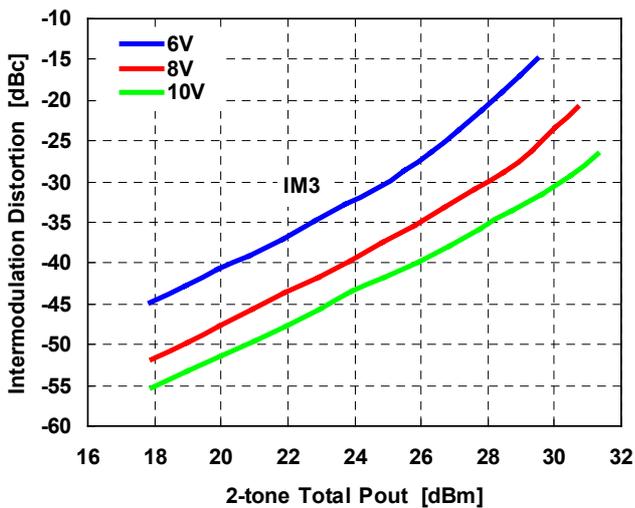
IMD vs. Output Power
by Drain Voltage

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



IMD vs. Output Power
by Drain Voltage

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

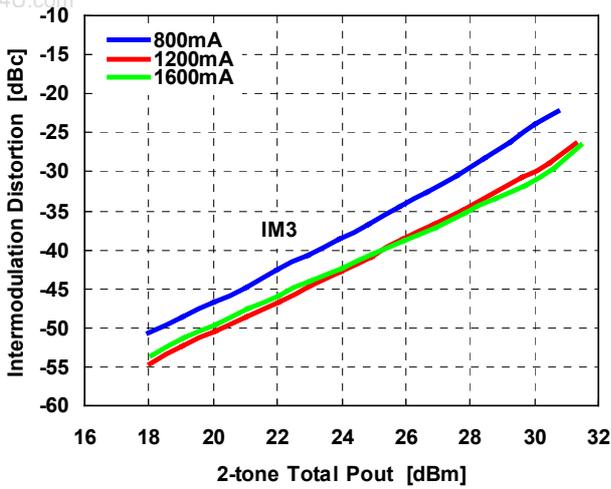


FMM5057X

C-Band Power Amplifier MMIC

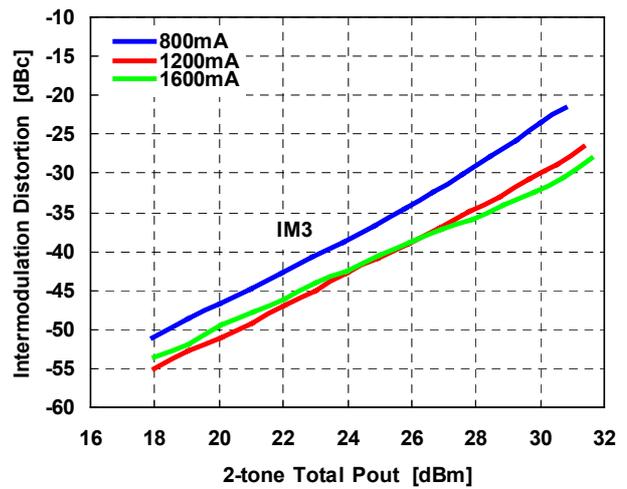
IMD vs. Output Power
by Drain Current

VDD=10V, f=7.1GHz



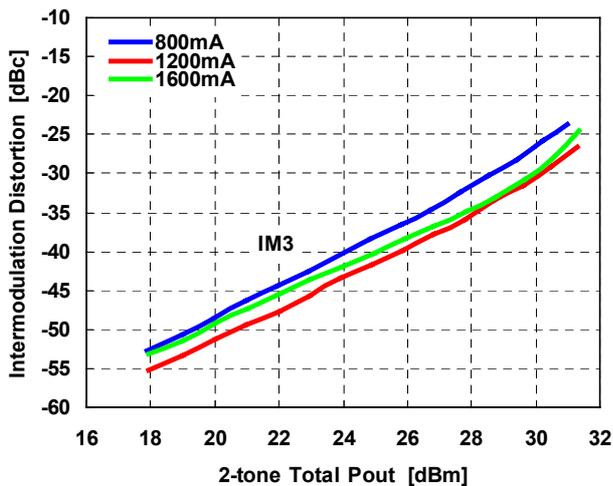
IMD vs. Output Power
by Drain Current

VDD=10V, f=7.7GHz



IMD vs. Output Power
by Drain Current

VDD=10V, f=8.5GHz

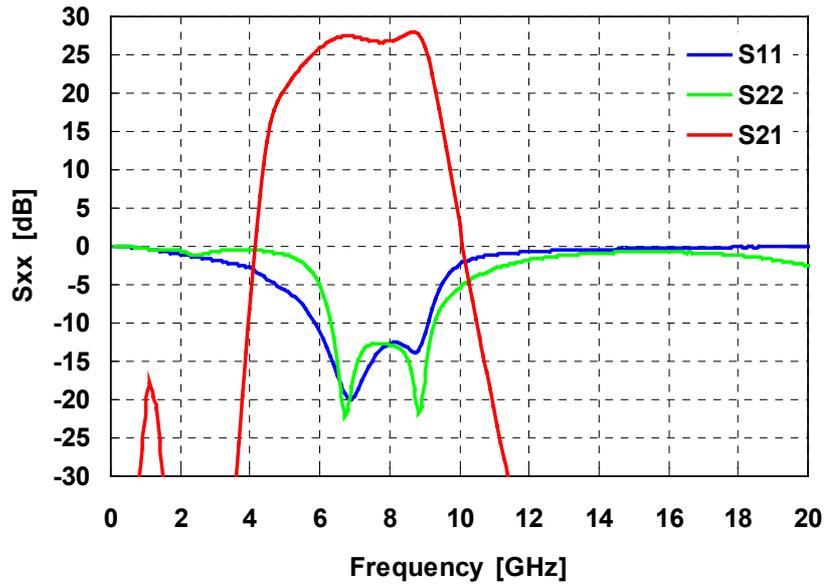


FMM5057X

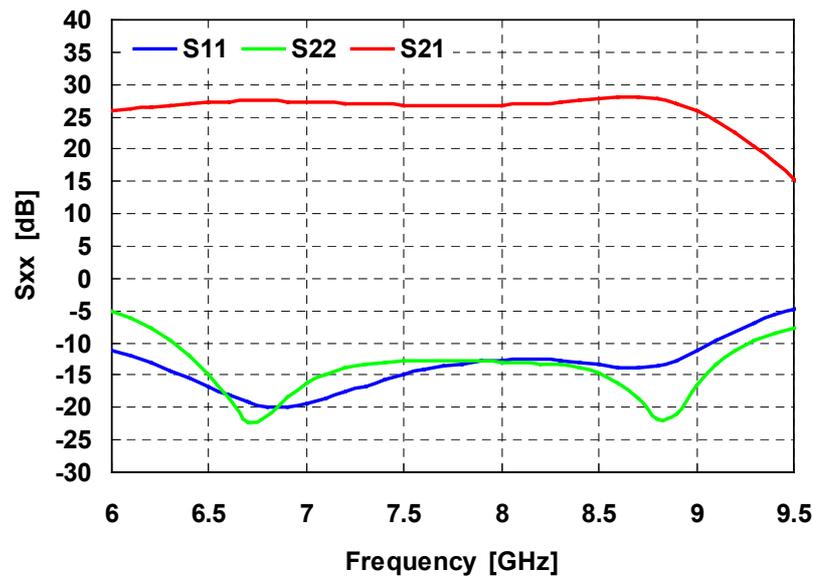
C-Band Power Amplifier MMIC

■ S-PARAMETER

@VDD=10V, IDD=1200mA



@VDD=10V, IDD=1200mA



FMM5057X

C-Band Power Amplifier MMIC

■ S-PARAMETER

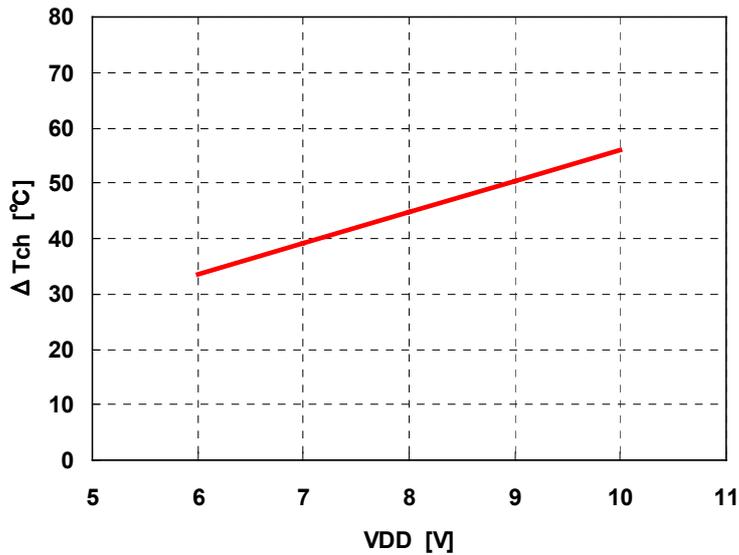
@VDD=10V, IDD=1200mA

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

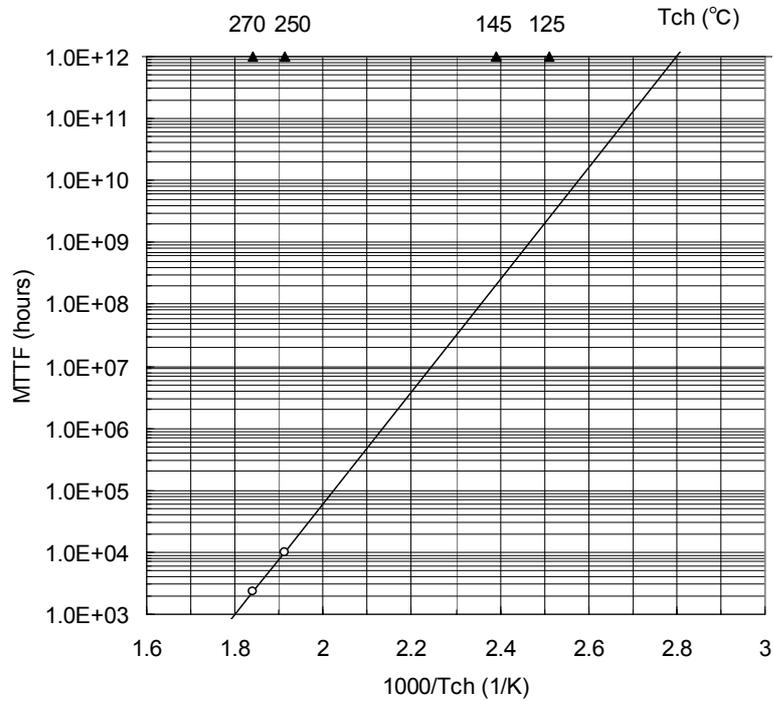
FMM5057X

C-Band Power Amplifier MMIC

ΔT_{ch} vs. Drain Voltage
(Reference)



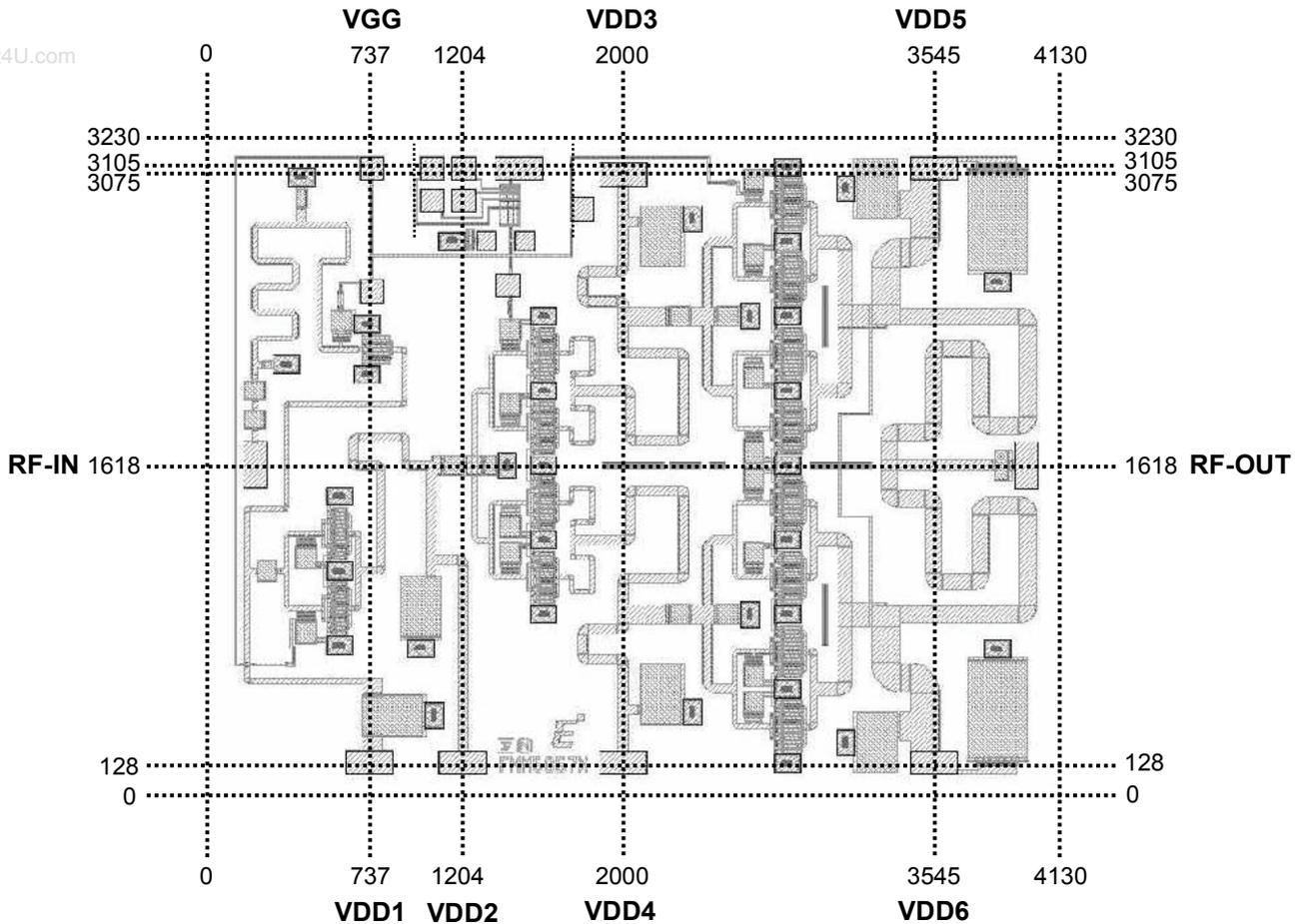
MTTF vs. T_{ch}



FMM5057X

C-Band Power Amplifier MMIC

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



Chip Size : $4130 \pm 30 \mu\text{m} \times 3230 \pm 30 \mu\text{m}$

Chip Thickness : $70 \pm 20 \mu\text{m}$

Bonding Pad Size :

RF-Pad : $120 \mu\text{m} \times 240 \mu\text{m}$

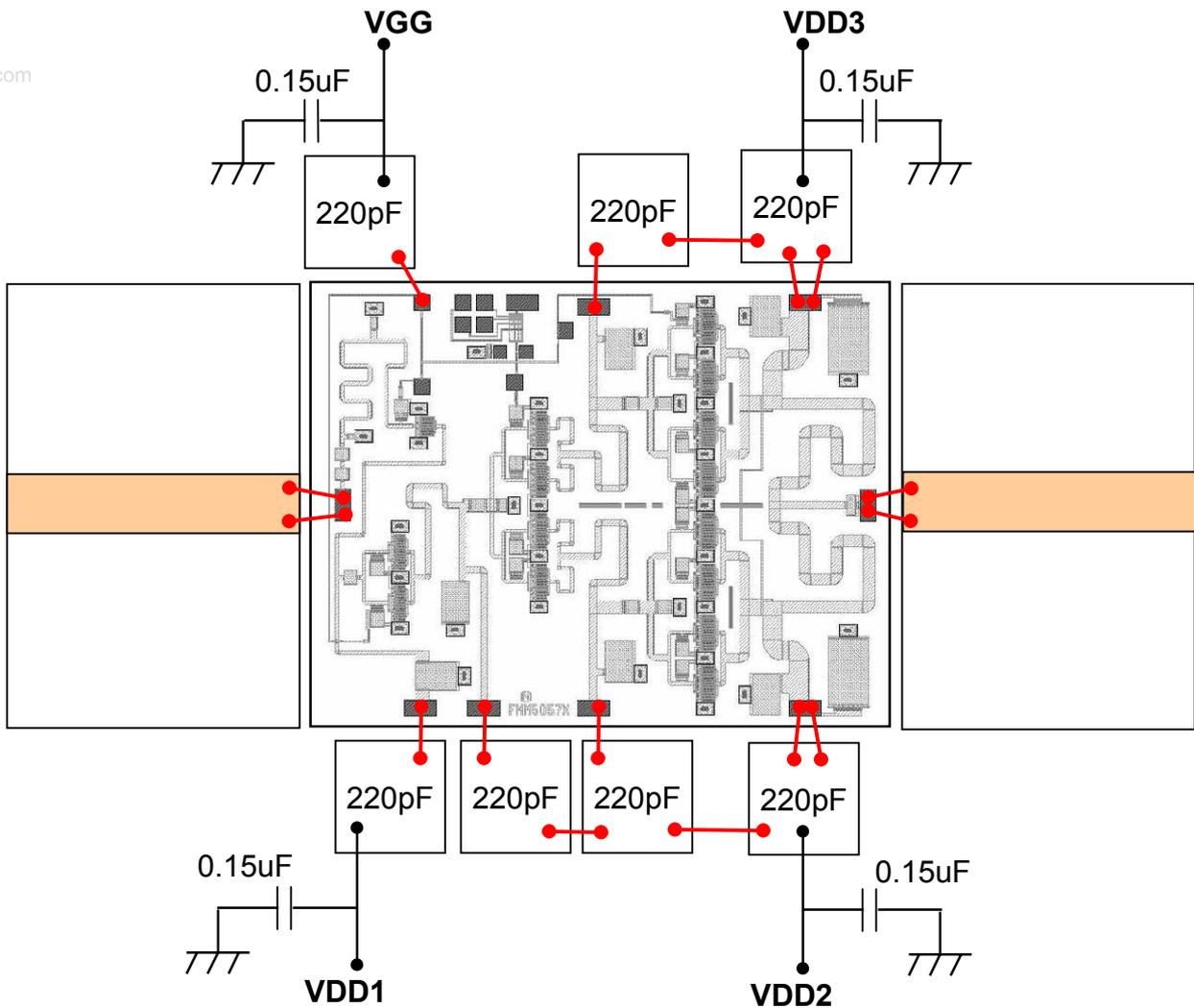
VDD Pad : $240 \mu\text{m} \times 120 \mu\text{m}$

VGG Pad : $120 \mu\text{m} \times 120 \mu\text{m}$

FMM5057X

C-Band Power Amplifier MMIC

Recommended Assembly Diagrams



Note :

* High isolation between VDD1 and VDD2 is needed.

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

FMM5057X

C-Band Power Amplifier MMIC

■ DIE ATTACH

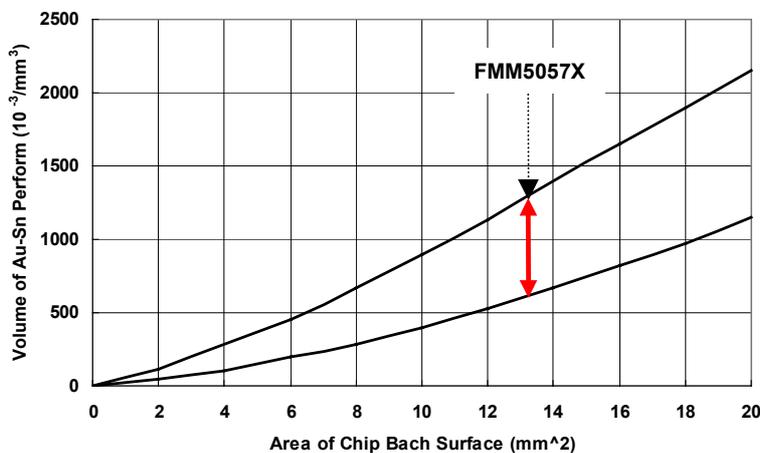
- 1) The die-attach station must have accurate temperature control and an inert forming gas should be used.
- 2) Chips should be kept at room temperature except during die-attach.
- 3) Place package or carrier on the heated stage.
- 4) Lightly grasp the chip edges by the longer side using tweezers.

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 : $0.196 \text{ N} \pm 0.0196 \text{ N}$

Stage Temperature : $215 \text{ deg.C} \pm 5 \text{ deg.C}$

Tool Heater : None

Ultrasonic Power Transmitter : West Bond Model 1400

Duration : 150 mS/Bond

FMM5057X

C-Band Power Amplifier MMIC

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.

Eudyna Devices Inc. reserves the right to change products and specifications without notice. The information does not convey any license under rights of Eudyna Devices Inc. or others.

© 2006 Eudyna Devices Inc.

Eudyna