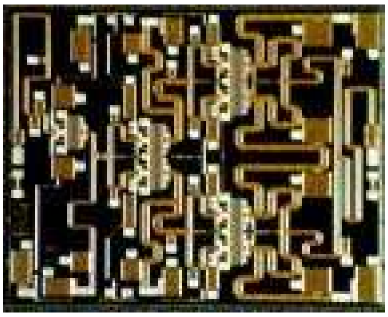
EMM5074X

C-Band Power Amplifier MMIC



FEATURES

- High Output Power: Pout = 32.5 dBm (Typ.)
- High Linear Gain: GL = 28 dB(Typ.)
- Broad Band: 5.8 - 8.5 GHz
- Impedance Matched Zin/Zout = 50Ω

DESCRIPTION

The EMM5074X is a wide band power amplifier MMIC that contains a three stage amplifier, internally matched, for standard communications band in 5.8 to 8.5GHz frequency range. Eudyna's stringent Quality Assurance Program assures the highest reliability and consistent performance.

ABSOLUTE MAXIMUM RATING

Item	Symbol	Rating	Unit
Drain-Source Voltage	V_{DD}	10	V
Gate-Source Voltage	V_{GG}	-3	V
Input Power	P_{in}	+26	dBm
Storage Temperature	T_{stg}	-55 to +125	°C

RECOMMENDED OPERATING CONDITIONS

Item	Symbol	Condition	Unit
Drain-Source Voltage	V_{DD}	<=6	V
Input Power	P_{in}	<=10	dBm
Operating Backside Temperature	Top	-40 to +85	℃

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	V_{DD}=6V	5.8	-	8.5	GHz
Output Power at 1dB G.C.P.	P_{1dB}	I_{DD}(DC)=1400mA typ. Zs=Zl=50ohm	30^{*1} 31^{*2}	32^{*1} 32.5^{*2}	- -	dBm
Power Gain at 1dB G.C.P.	G_{1dB}	*1:f=5.8~7.1GHz	23	27	-	dB
Power-added Efficiency at 1dB G.C.P.	ηadd	*2:f=7.1~8.5GHz	- -	18^{*1} 21^{*2}	- -	%
Third Order Intermodulation*	IM_3	*:Δf=10MHz ,	-37	-42	-	dBc
Drain Current at 1dB G.C.P.	IDD	2-Tone Test , Pout=20dBm S.C.L.	- -	1450^{*1} 1450^{*2}	1900^{*1} 1900^{*2}	mA
Input Return Loss (at Pin=-20dBm)	RL_{in}		-	10	-	dB
Output Return Loss (at Pin=-20dBm)	RL_{out}		-	10	-	dB

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

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

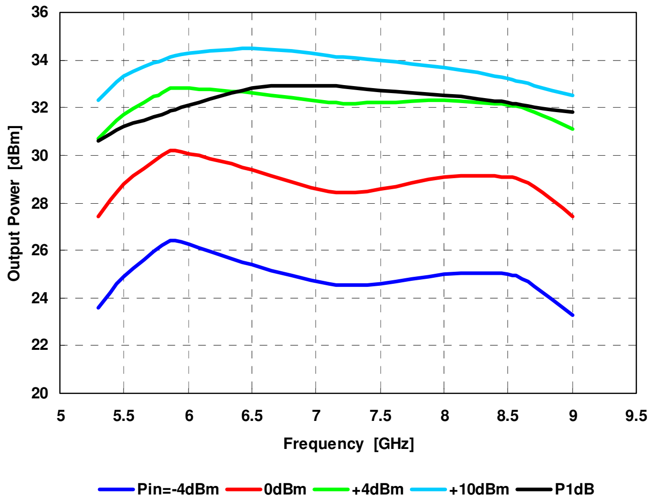
ESD	**Class 0**	**~ 249V**

Note : Based on JEDEC JESD22-A114C

RoHs Compliance	**Yes**

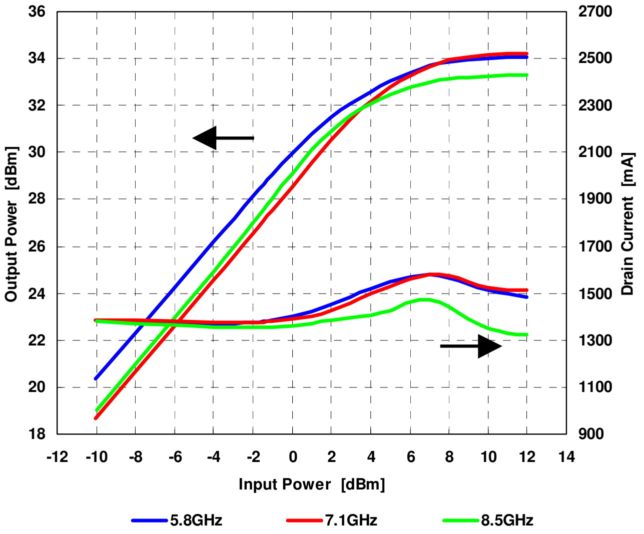
Output Power vs. Frequency

@VDD=6V, IDD(DC)=1400mA



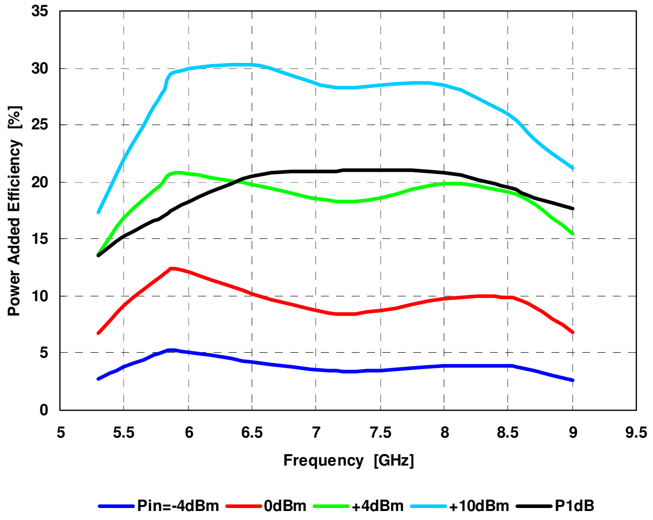
Output Power, Drain Current vs. Input Power

@VDD=6V, IDD(DC)=1400mA



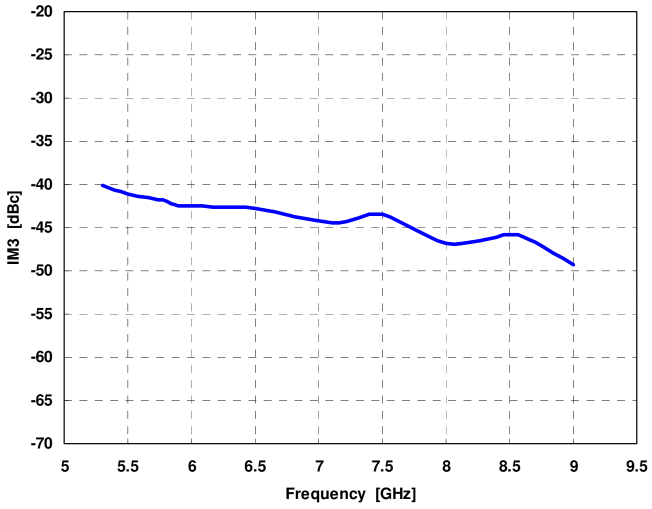
Power Added Efficiency vs. Frequency

@VDD=6V, IDD(DC)=1400mA



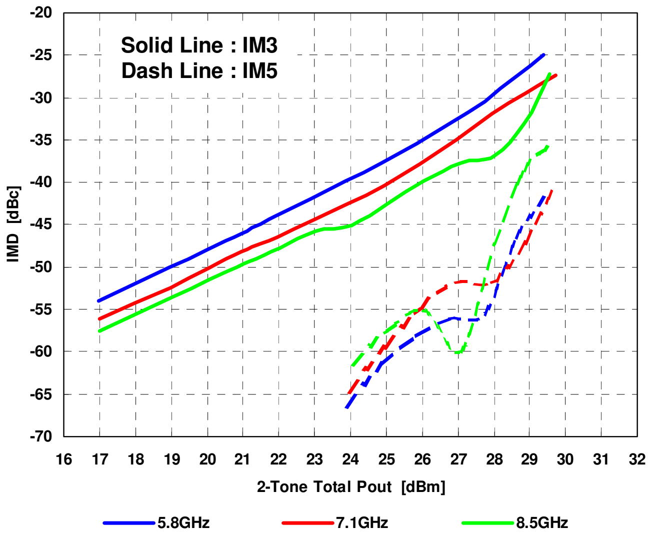
IM3 vs. Frequency

@VDD=6V, IDD(DC)=1400mA, @Po=20dBm S.C.L.



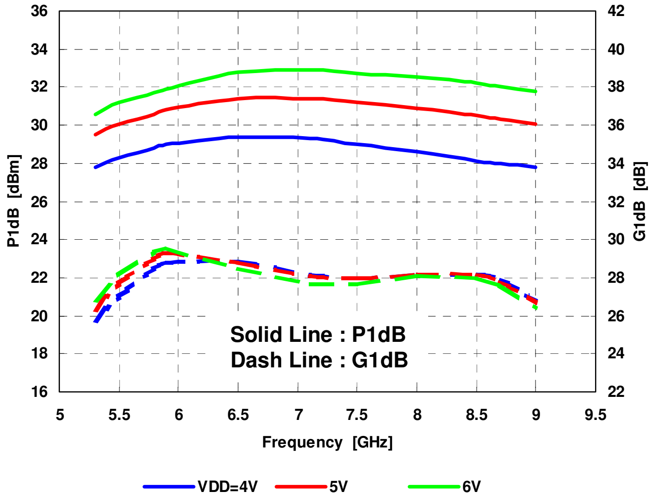
IMD vs. Output Power

@VDD=6V, IDD(DC)=1400mA



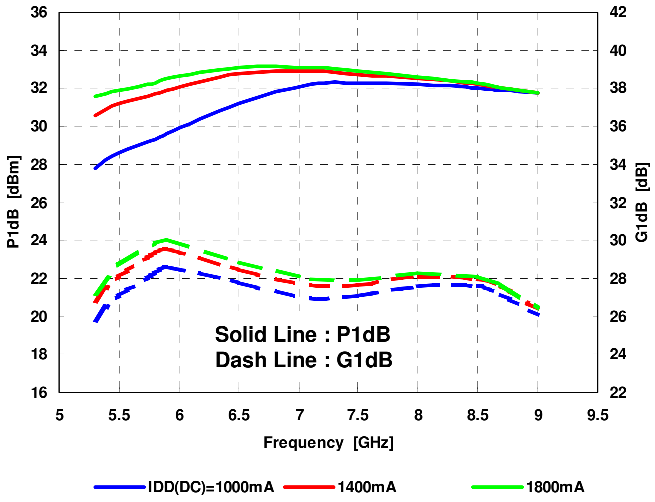
P1dB, G1dB vs. Frequency by Drain Voltage

@IDD(DC)=1400mA

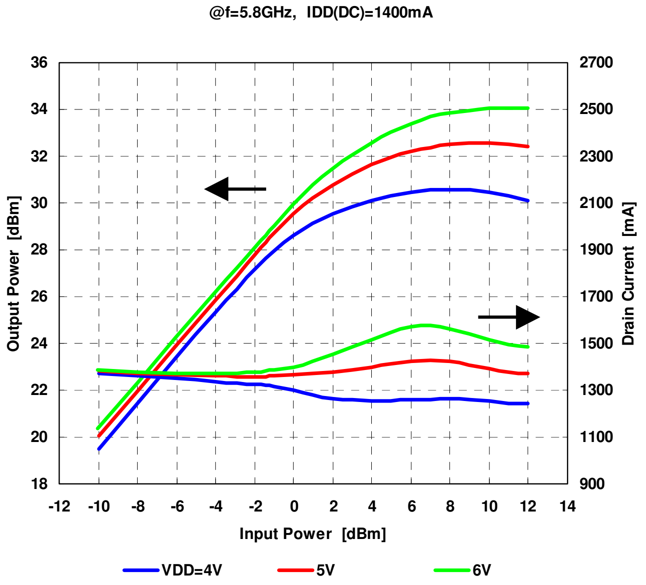


P1dB, G1dB vs. Frequency by Drain Current

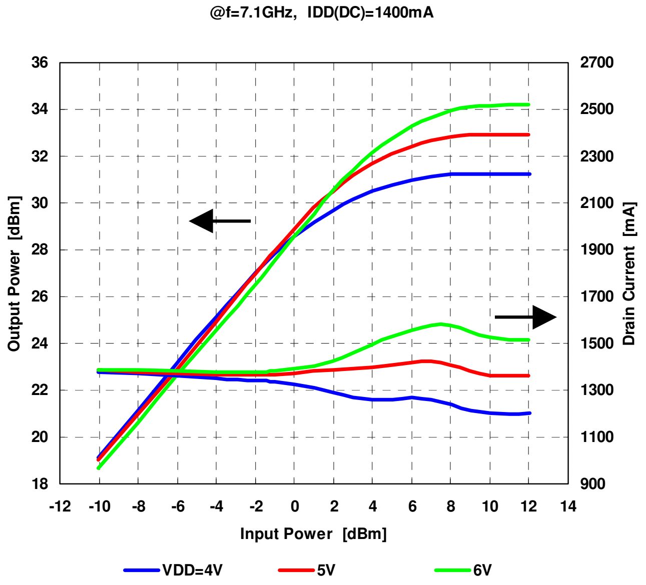
@VDD=6V



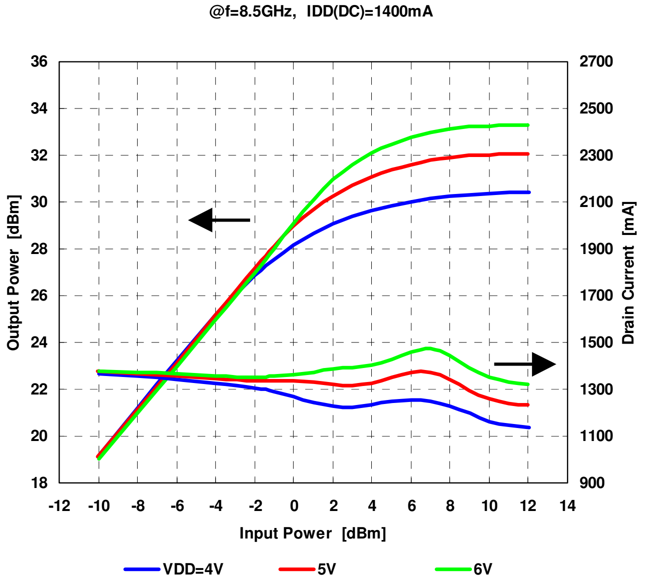
Output Power, Drain Current vs. Input Power by Drain Voltage



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

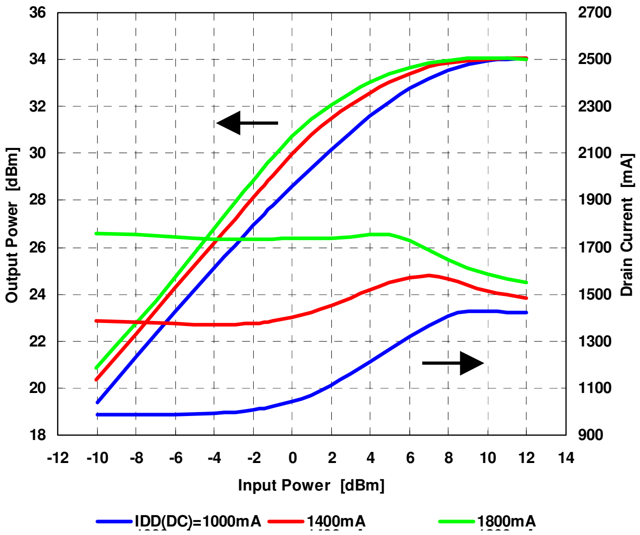


Output Power, Drain Current vs. Input Power by Drain Voltage



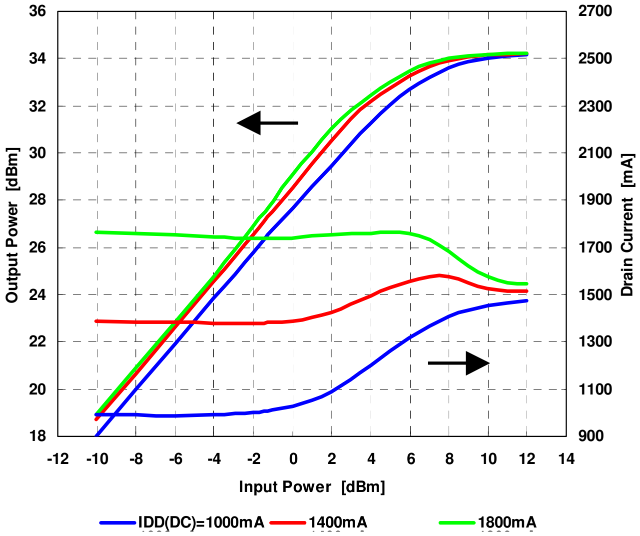
Output Power, Drain Current vs. Input Power by Drain Current

@f=5.8GHz, VDD=6V



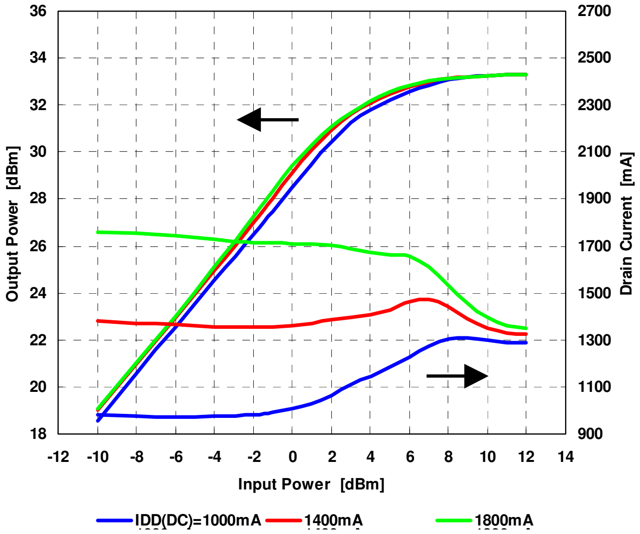
Output Power, Drain Current vs. Input Power by Drain Current

@f=7.1GHz, VDD=6V



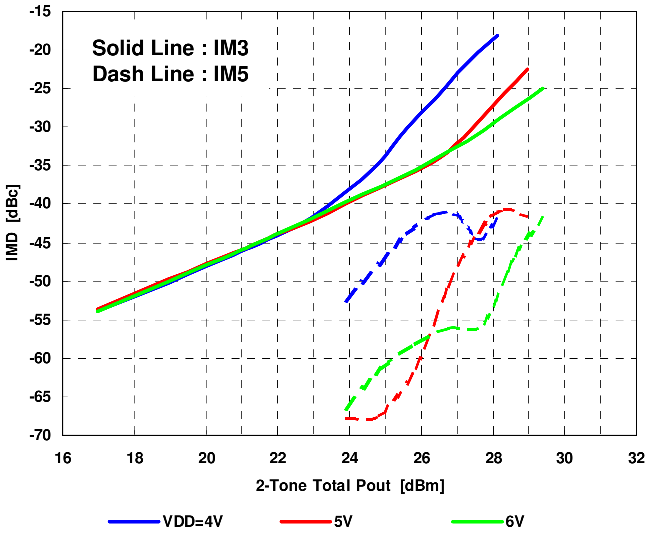
Output Power, Drain Current vs. Input Power by Drain Current

@f=8.5GHz, VDD=6V



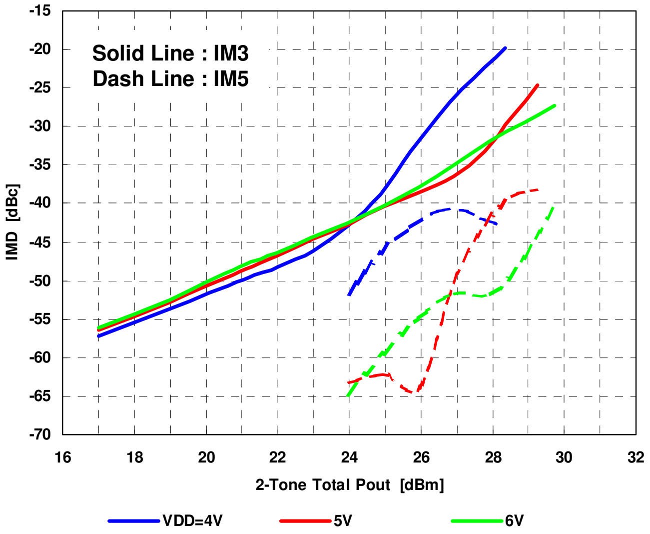
IMD vs. Output Power by Drain Voltage

@f=5.8GHz, IDD(DC)=1400mA



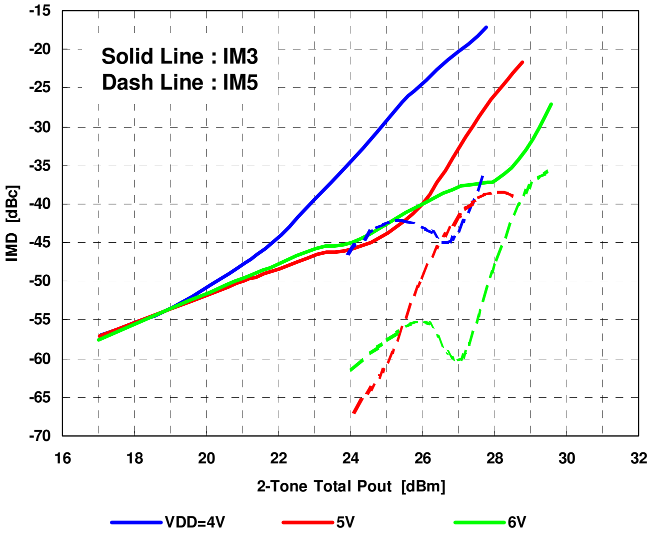
IMD vs. Output Power by Drain Voltage

@f=7.1GHz, IDD(DC)=1400mA

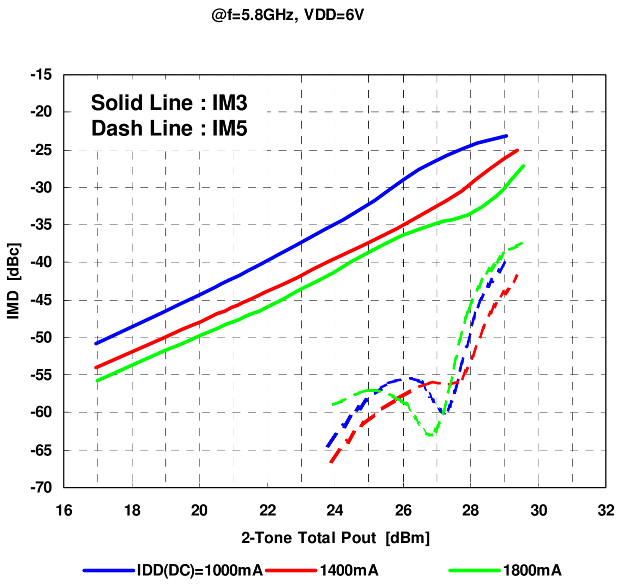


IMD vs. Output Power by Drain Voltage

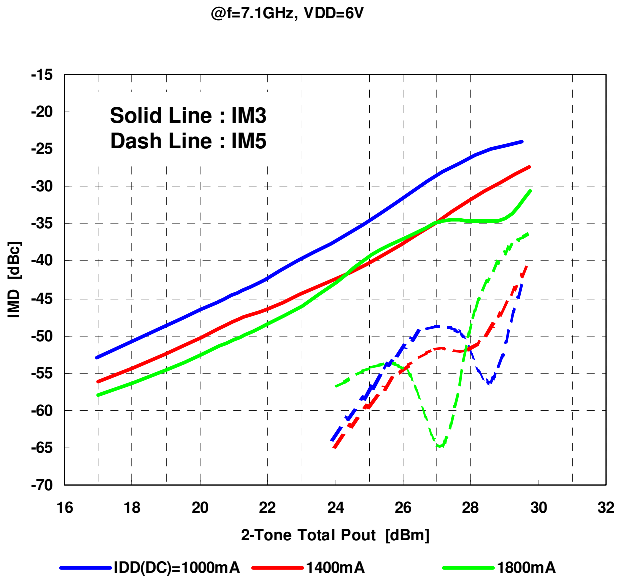
@f=8.5GHz, IDD(DC)=1400mA



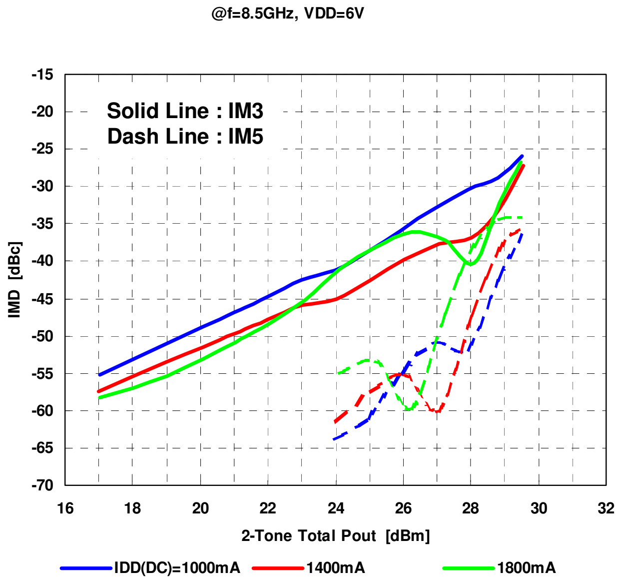
IMD vs. Output Power by Drain Current



IMD vs. Output Power by Drain Current

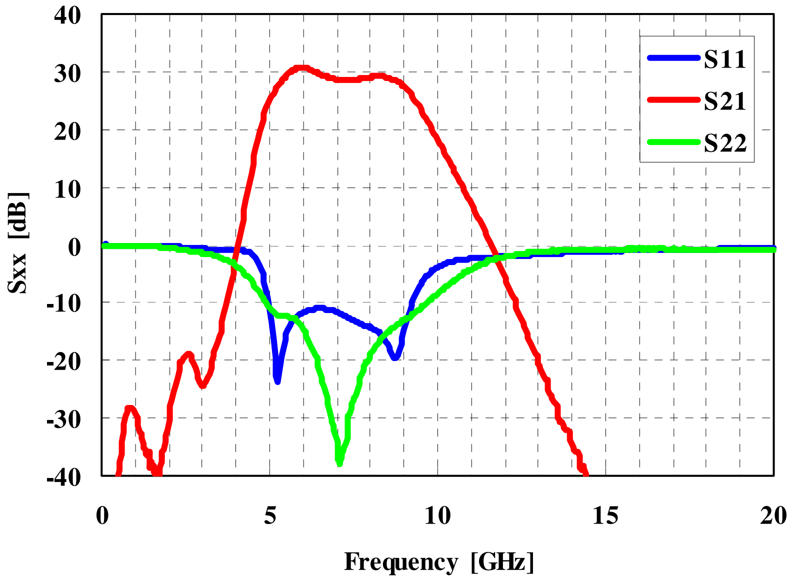


IMD vs. Output Power by Drain Current

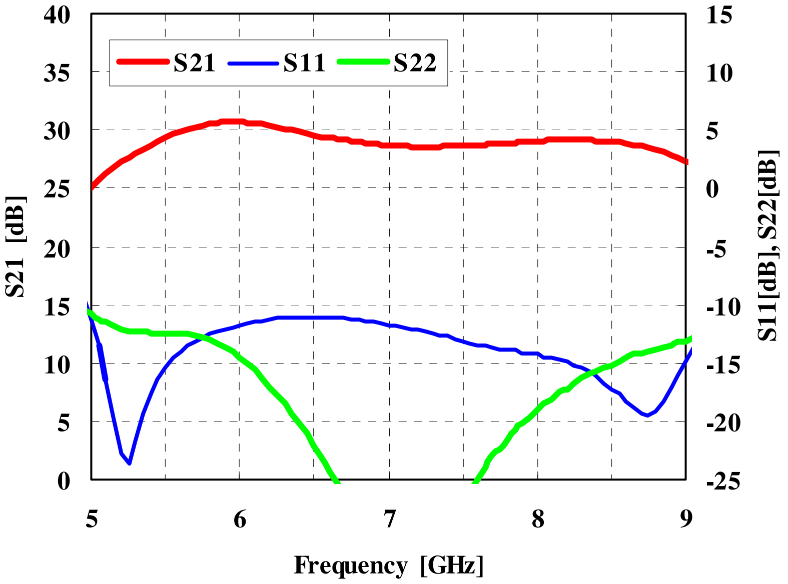


■ S-Parameter

VDD/IDD(DC)=6V/1400mA



VDD/IDD(DC)=6V/1400mA

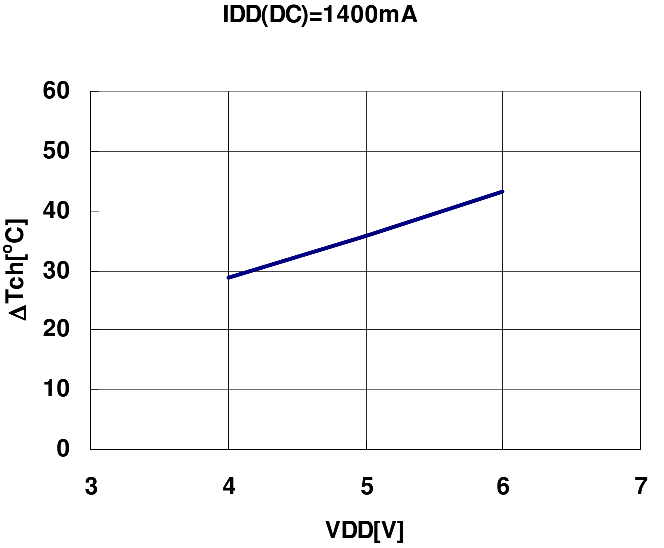


■ S-Parameter

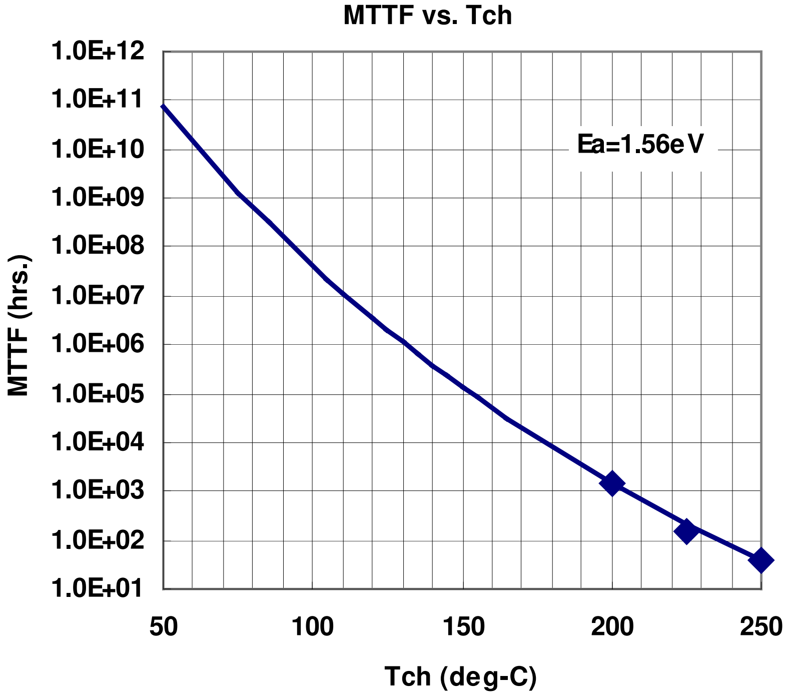
VDD=6V, IDD(DC)=1400mA

Frequency	S11		S21		S12		S22	
[GHz]	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
1.0	0.985	−34.4	0.035	−49.4	0.001	20.0	0.973	−60.9
2.0	0.977	−69.7	0.031	−71.2	0.001	58.0	0.944	−120.1
3.0	0.927	−107.3	0.059	173.4	0.001	−41.0	0.848	−178.4
4.0	0.903	−153.7	0.805	−178.7	0.000	−11.9	0.654	106.3
5.0	0.274	107.2	18.066	−1.9	0.001	4.7	0.288	−21.5
5.5	0.170	−156.5	29.370	−117.9	0.000	146.8	0.238	−123.6
5.6	0.200	−159.3	31.168	−140.1	0.000	68.8	0.238	−142.2
5.7	0.222	−162.6	32.705	−162.1	0.001	−38.4	0.233	−161.6
5.8	0.237	−165.1	33.710	176.0	0.001	−168.9	0.223	−178.4
5.9	0.248	−168.3	34.202	154.4	0.000	36.8	0.206	164.9
6.0	0.258	−171.5	34.182	133.5	0.000	161.7	0.187	150.2
6.1	0.267	−175.2	33.668	113.1	0.001	32.5	0.166	136.3
6.2	0.274	−177.7	32.891	93.7	0.001	166.4	0.140	124.8
6.3	0.277	178.7	31.970	75.2	0.000	38.5	0.119	114.2
6.4	0.281	175.4	30.974	57.3	0.001	−133.8	0.098	106.3
6.5	0.281	171.4	30.116	40.2	0.000	173.7	0.079	96.5
6.6	0.281	168.0	29.261	23.6	0.000	−54.1	0.061	89.3
6.7	0.276	164.5	28.534	7.4	0.001	−17.9	0.048	82.1
6.8	0.272	160.5	27.961	−8.4	0.000	161.2	0.036	71.2
6.9	0.269	156.9	27.493	−23.8	0.001	−37.8	0.027	63.1
7.0	0.260	153.5	27.148	−39.3	0.001	145.0	0.018	40.2
7.1	0.253	150.6	26.950	−54.6	0.001	98.2	0.013	7.1
7.2	0.246	147.4	26.852	−69.8	0.001	161.0	0.017	−36.5
7.3	0.238	144.6	26.825	−85.1	0.001	133.7	0.024	−67.4
7.4	0.232	141.2	26.895	−100.5	0.001	134.1	0.034	−82.2
7.5	0.221	138.7	27.048	−115.9	0.001	−48.5	0.046	−88.3
7.6	0.213	135.9	27.216	−131.7	0.001	−3.4	0.056	−99.2
7.7	0.207	133.0	27.492	−147.6	0.001	1.9	0.071	−109.0
7.8	0.202	129.9	27.758	−163.7	0.000	−113.2	0.083	−116.7
7.9	0.197	126.4	28.024	179.7	0.001	8.1	0.097	−127.3
8.0	0.196	121.9	28.307	163.0	0.001	64.0	0.113	−135.7
8.1	0.186	116.2	28.510	145.9	0.001	18.4	0.123	−146.5
8.2	0.179	109.1	28.622	128.3	0.000	15.3	0.138	−157.6
8.3	0.170	100.1	28.709	110.4	0.001	−86.4	0.153	−168.9
8.4	0.156	88.9	28.501	92.3	0.001	−56.6	0.163	179.9
8.5	0.138	73.5	28.234	73.5	0.001	−39.2	0.175	166.7
8.6	0.121	52.2	27.745	54.7	0.000	175.0	0.186	154.9
8.7	0.107	23.7	26.911	35.6	0.001	−116.4	0.194	141.0
8.8	0.111	−11.9	25.993	16.2	0.001	−139.4	0.203	127.4
8.9	0.138	−44.9	24.774	−3.3	0.000	−138.8	0.213	114.3
9.0	0.182	−71.4	23.345	−22.8	0.000	40.3	0.222	100.1
10.0	0.643	161.9	8.145	156.8	0.000	−65.9	0.381	−3.8
11.0	0.758	91.3	2.269	4.4	0.000	56.9	0.613	−63.8
12.0	0.795	37.2	0.520	−140.8	0.001	−162.3	0.791	−107.0
13.0	0.827	−8.7	0.093	95.0	0.001	41.9	0.871	−138.9
14.0	0.859	−47.8	0.019	−17.5	0.001	23.2	0.898	−163.8
15.0	0.883	−80.7	0.004	−134.6	0.001	−174.7	0.915	175.6
16.0	0.898	−107.9	0.001	157.8	0.002	143.3	0.928	157.3
17.0	0.914	−131.6	0.002	167.0	0.001	138.7	0.924	140.6
18.0	0.922	−152.0	0.003	85.1	0.001	115.0	0.914	124.0
19.0	0.926	−169.5	0.001	146.9	0.001	110.2	0.906	106.4
20.0	0.928	174.7	0.004	123.8	0.002	35.3	0.888	85.8

ΔTch vs. DRAIN VOLTAGE
(Reference Data)

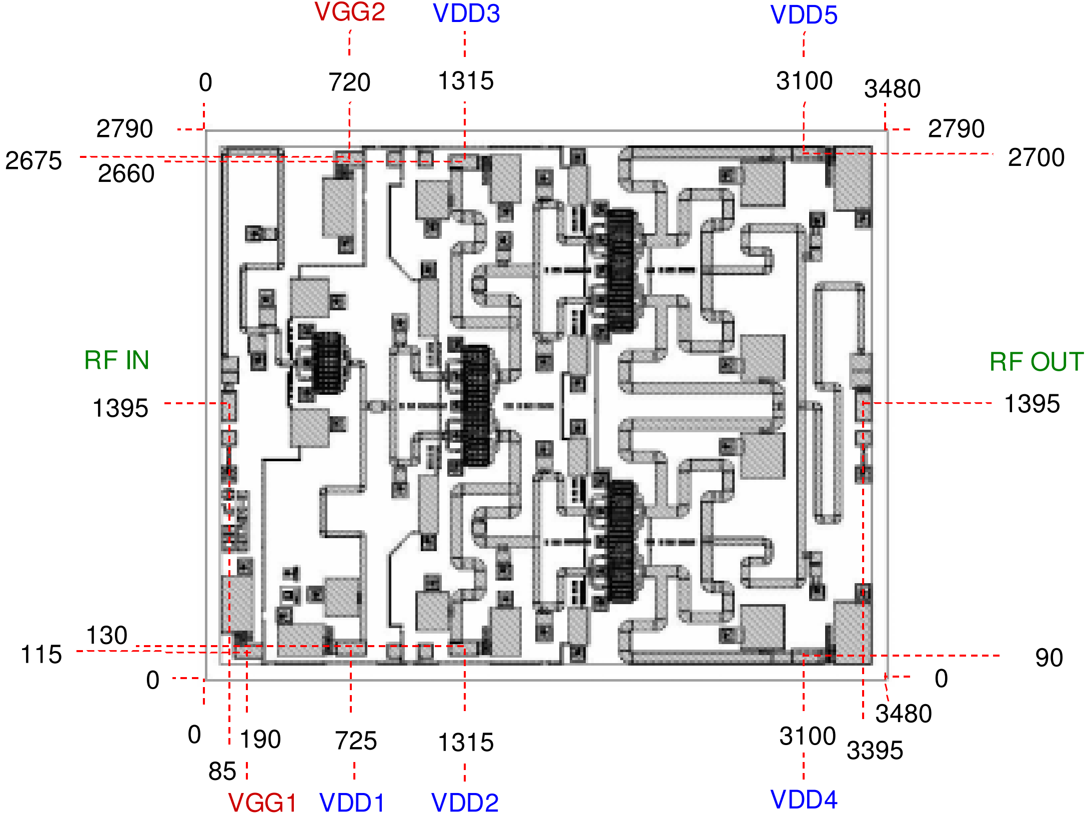


Note : ΔTch : Temperature Rise from Backside of MMIC to Channel



■ CHIP OUTLINE

Unit : µm



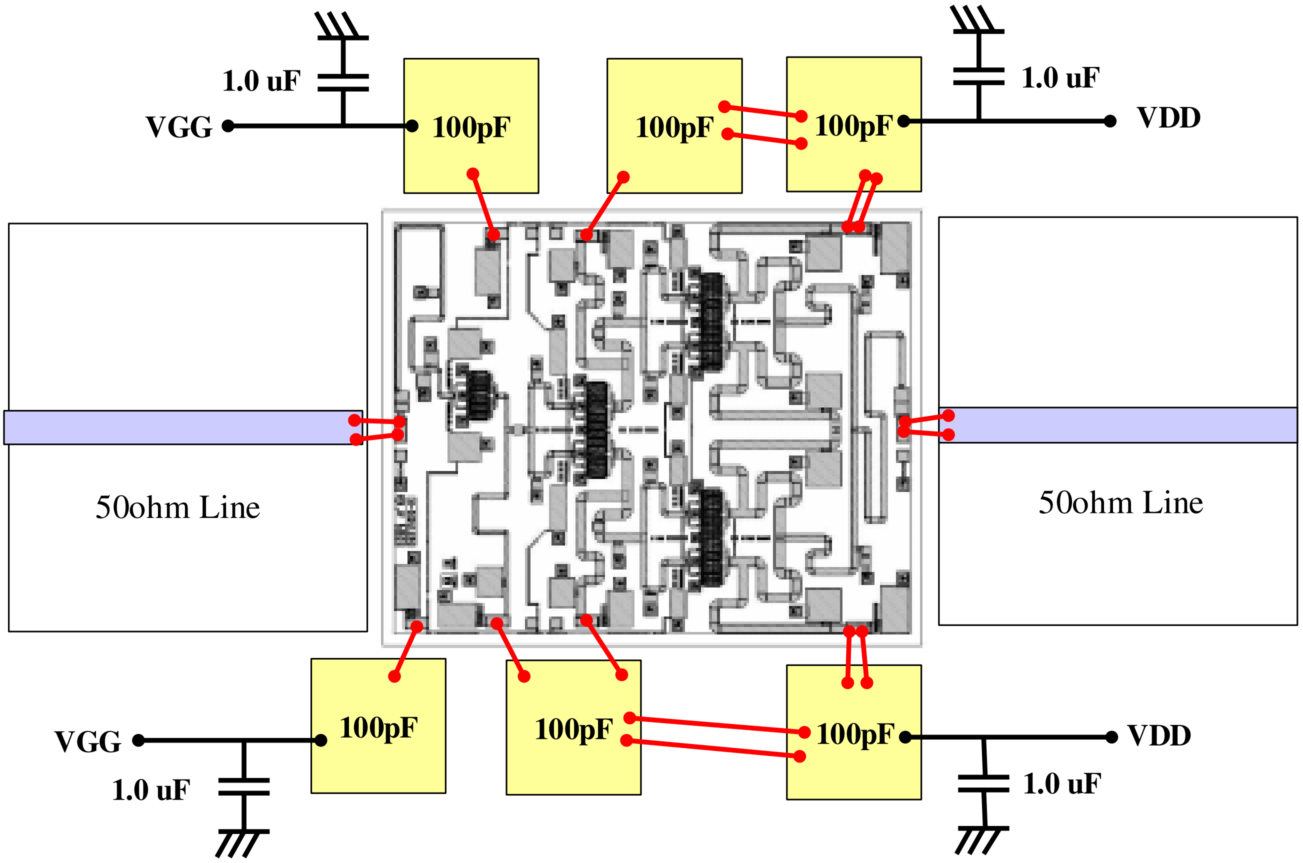
Chip Size : 3480±30µm x 2790±30µm

Chip Thickness : 60±20µm

Bonding Pad Size : 80µm x 160µm

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

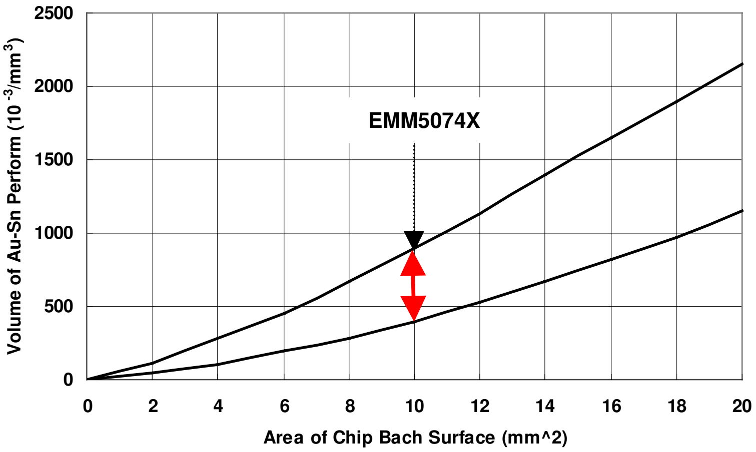
■ BONDUNG DIAGRAM & RECOMMENDED EXTERNAL CIRCUIT



"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.