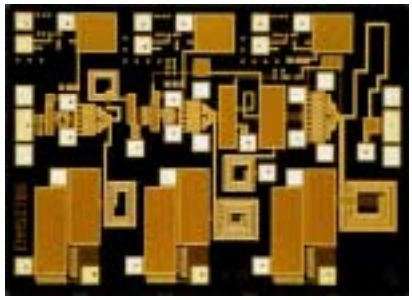
EMM5078X

C-Band Power Amplifier MMIC



FEATURES

- •High Output Power: Pout = 26 dBm (Typ.)
- •High Linear Gain: GL = 30 dB(Typ.)
- •Broad Band: 3.4 – 8.5 GHz
- •Impedance Matched Zin/Zout = 50Ω

DESCRIPTION

The EMM5078X is a wide band power amplifier MMIC that contains a three stage amplifier, internally matched, for standard communications band in 3.4 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}	22	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}	<=2	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	3.4	-	8.5	GHz
Output Power at 1dB G.C.P.	P_{1dB}	I_{DD}(DC)=300mA typ.	23.0	26.0	-	dBm
Power Gain at 1dB G.C.P.	G_{1dB}	Zs=Zl=50ohm	24	29	-	dB
Power-added Efficiency at 1dB G.C.P.	ηadd		-	18	-	%
Third Order Intermodulation*	IM_3	*:Δf=10MHz ,	-35	-40	-	dBc
Drain Current at 1dB G.C.P.	IDD	2-Tone Test,	-	350	450	mA
Input Return Loss (at Pin=-20dBm)	RL_{in}	Pout=15dBm S.C.L.	-	-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

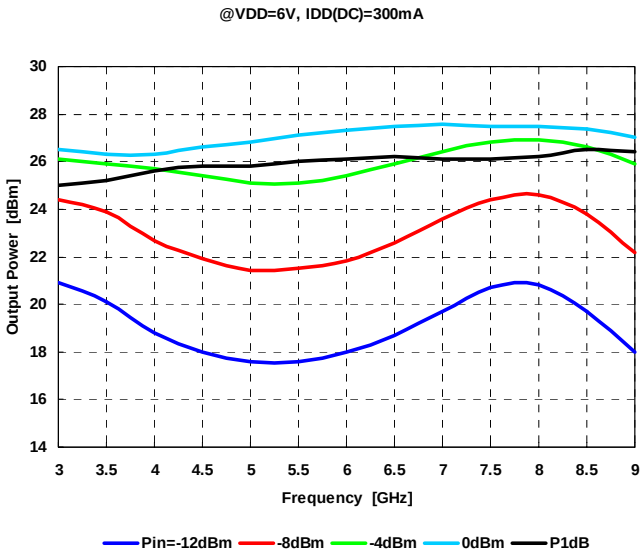
ESD	**Class 0**	**~ 249V**

Note : Based on JEDEC JESD22-A114C

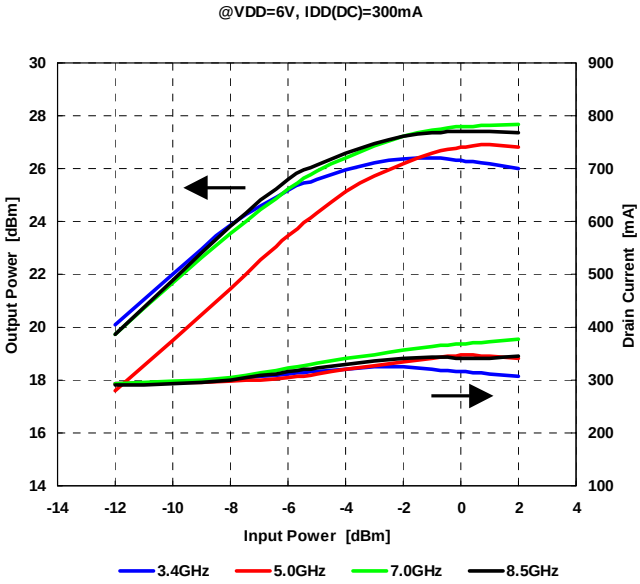
RoHs Compliance	**Yes**

This datasheet has been downloaded from http://www.digchip.com at this page

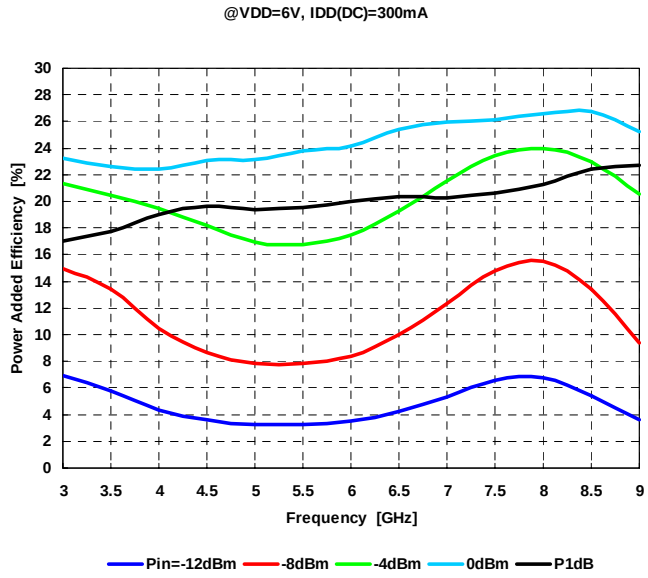
Output Power vs. Frequency



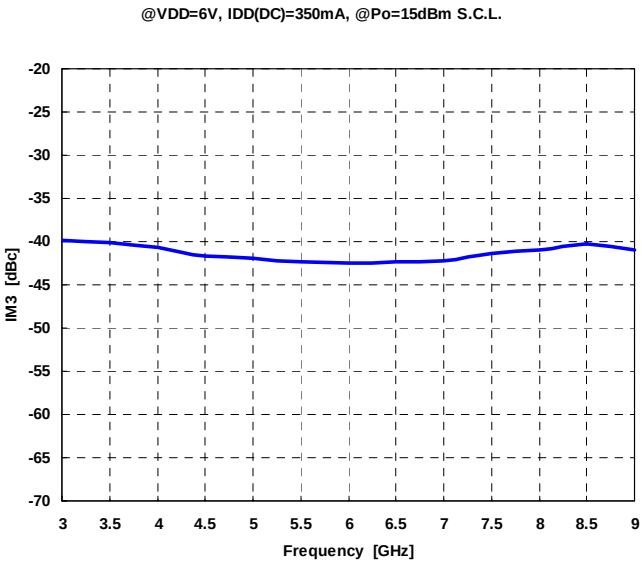
Output Power, Drain Current vs. Input Power



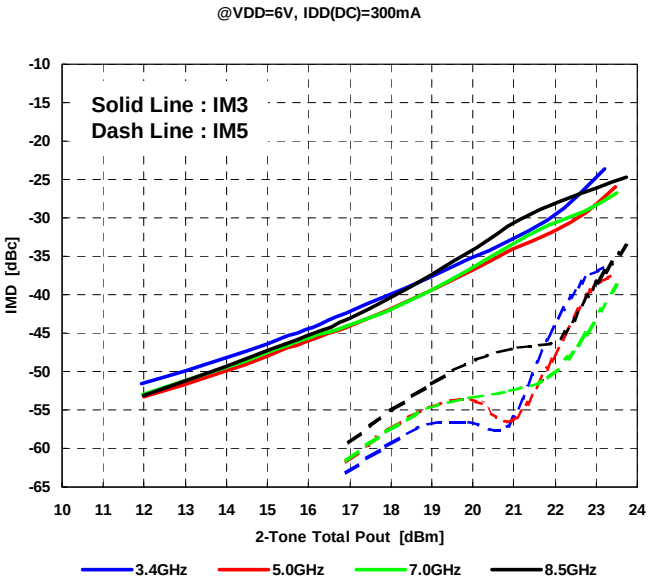
Power Added Efficiency vs. Frequency



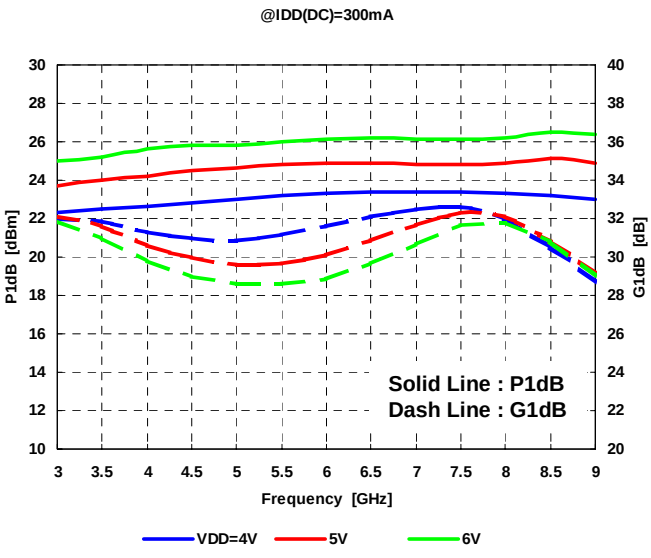
IM3 vs. Frequency



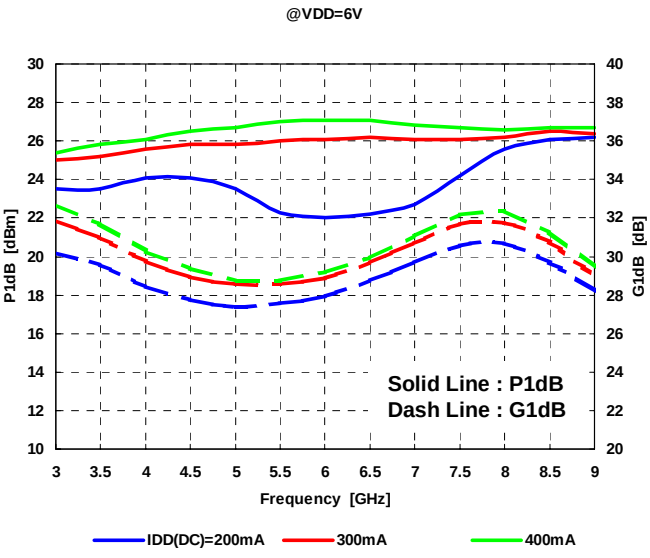
IMD vs. Output Power



P1dB, G1dB vs. Frequency by Drain Voltage

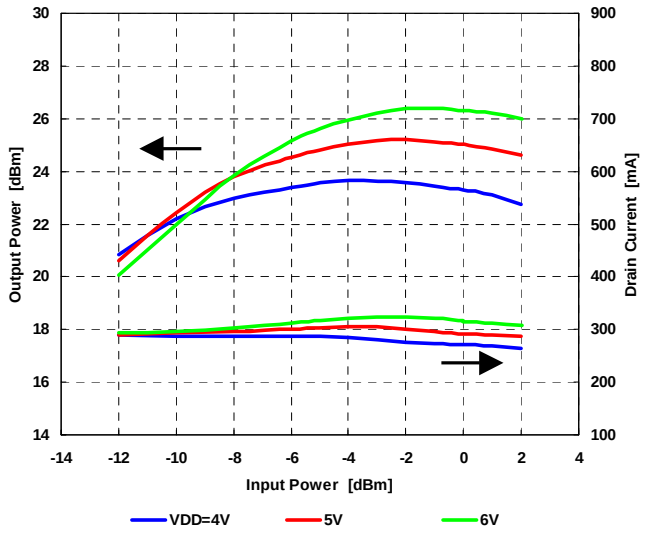


P1dB, G1dB vs. Frequency by Drain Current



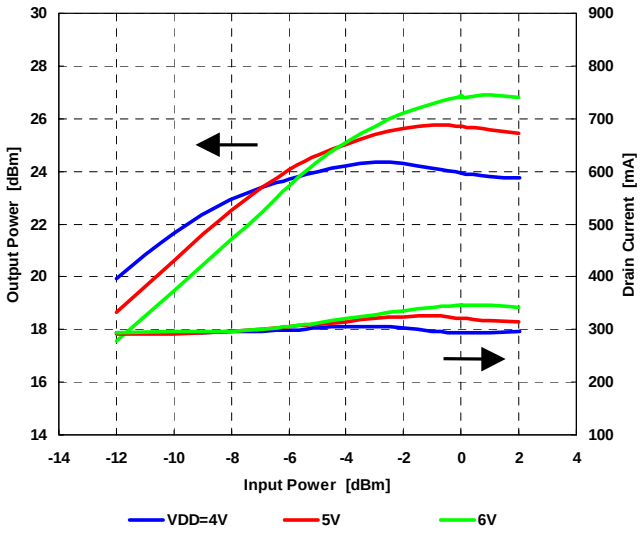
Output Power, Drain Current vs. Input Power by Drain Voltage

@f=3.4GHz, IDD(DC)=300mA



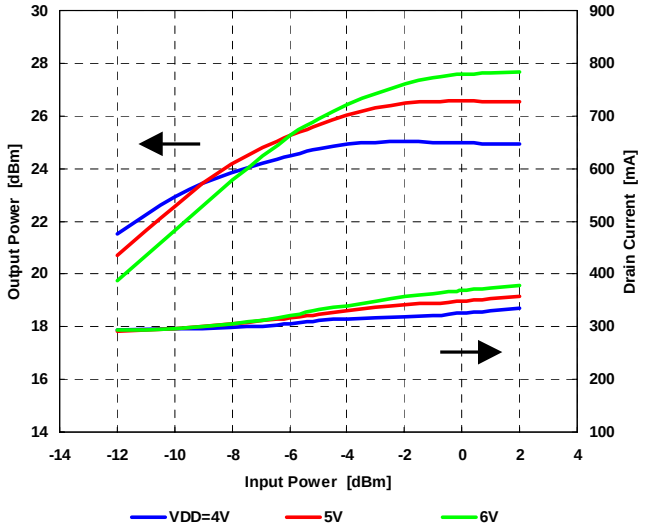
Output Power, Drain Current vs. Input Power by Drain Voltage

@f=5.0GHz, IDD(DC)=300mA



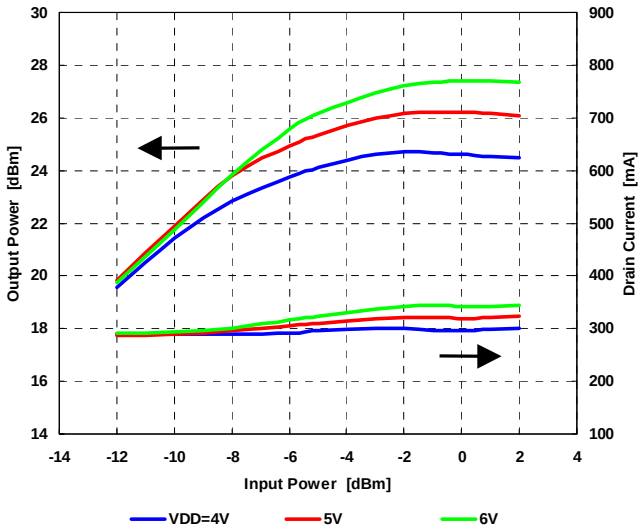
Output Power, Drain Current vs. Input Power by Drain Voltage

@f=7.0GHz, IDD(DC)=300mA



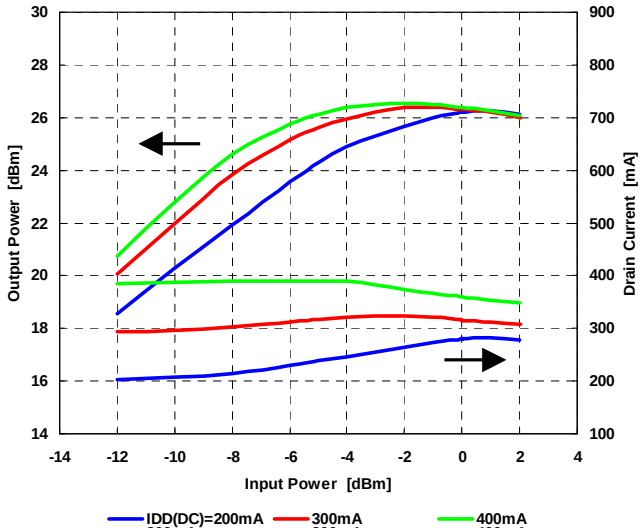
Output Power, Drain Current vs. Input Power by Drain Voltage

@f=8.5GHz, IDD(DC)=300mA



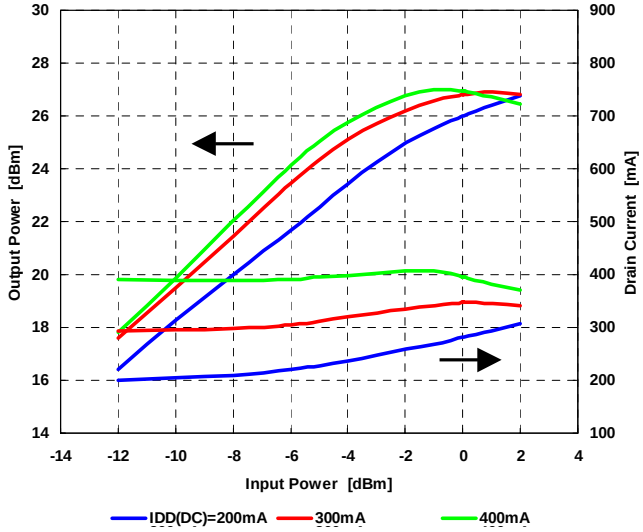
Output Power, Drain Current vs. Input Power by Drain Current

@f=3.4GHz, VDD=6V



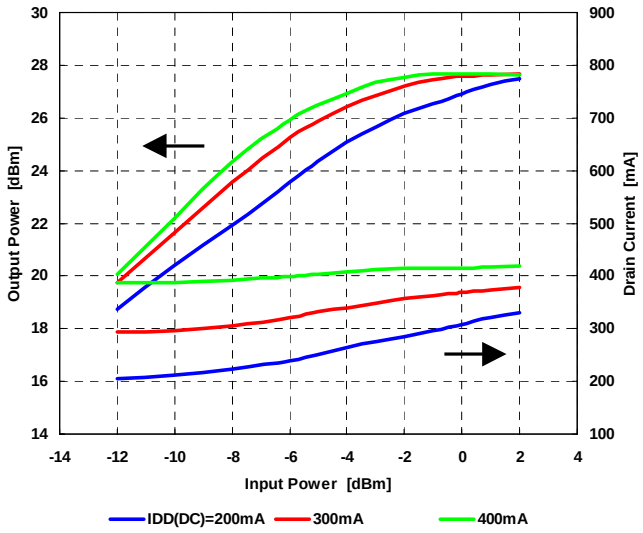
Output Power, Drain Current vs. Input Power by Drain Current

@f=5.0GHz, VDD=6V



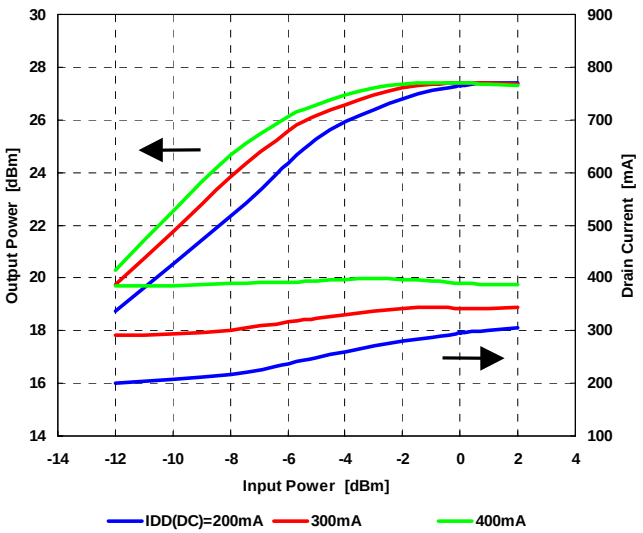
Output Power, Drain Current vs. Input Power by Drain Current

@f=7.0GHz, VDD=6V



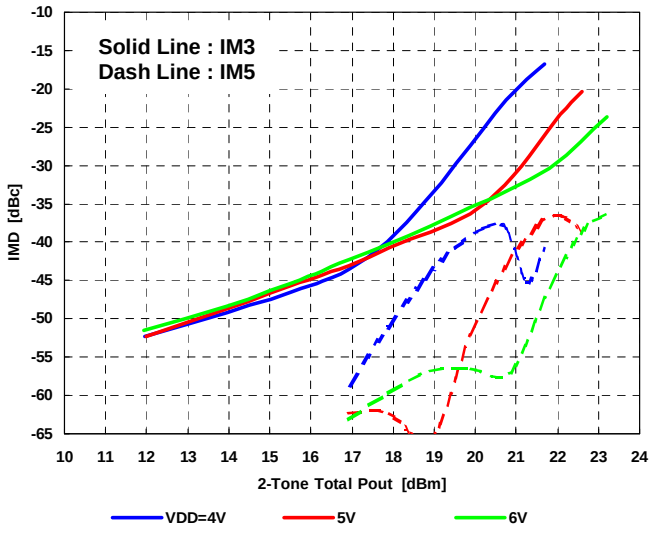
Output Power, Drain Current vs. Input Power by Drain Current

@f=8.5GHz, VDD=6V



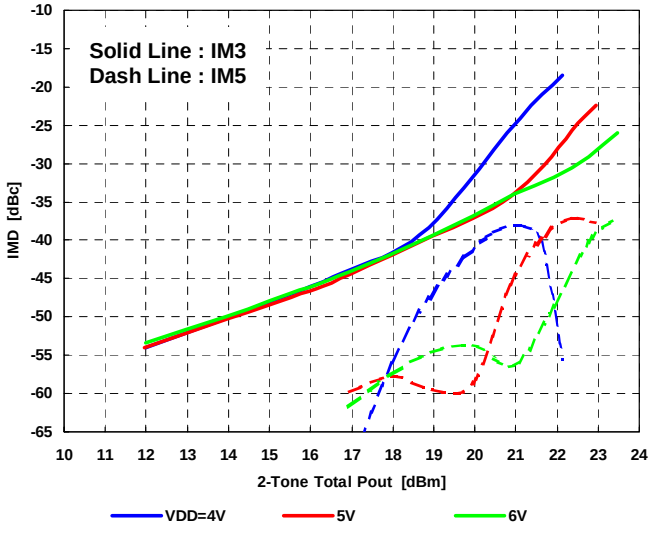
IMD vs. Output Power by Drain Voltage

@f=3.4GHz, IDD(DC)=300mA



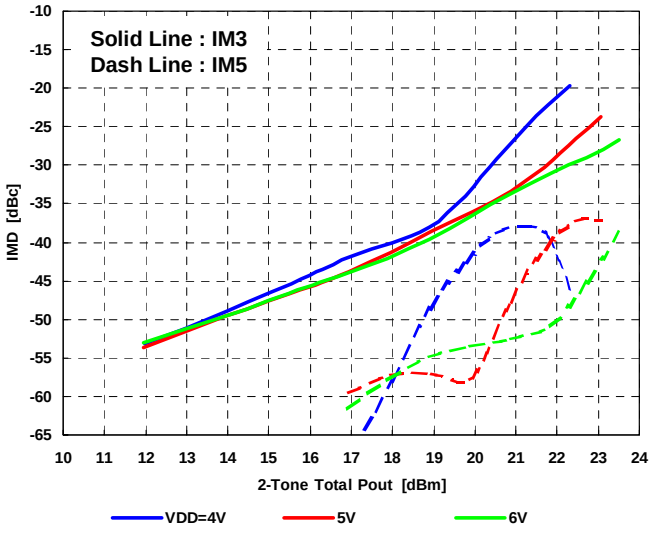
IMD vs. Output Power by Drain Voltage

@f=5.0GHz, IDD(DC)=300mA



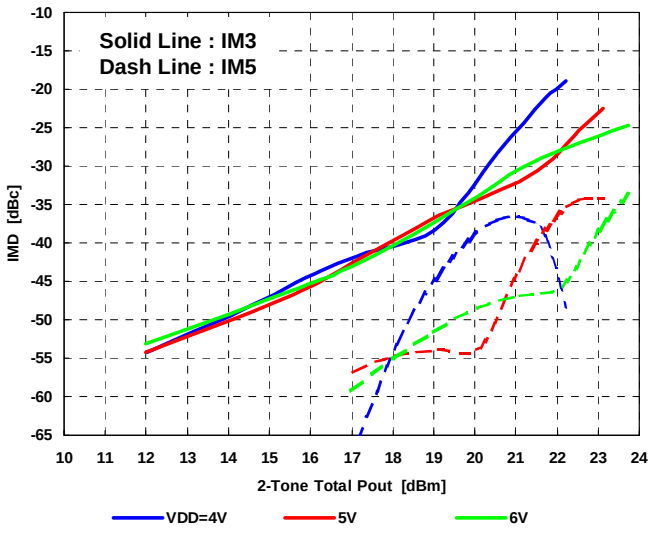
IMD vs. Output Power by Drain Voltage

@f=7.0GHz, IDD(DC)=300mA



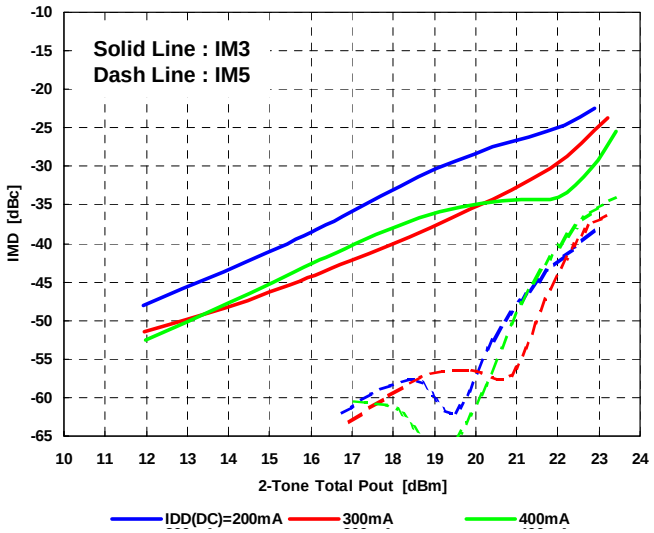
IMD vs. Output Power by Drain Voltage

@f=8.5GHz, IDD(DC)=300mA



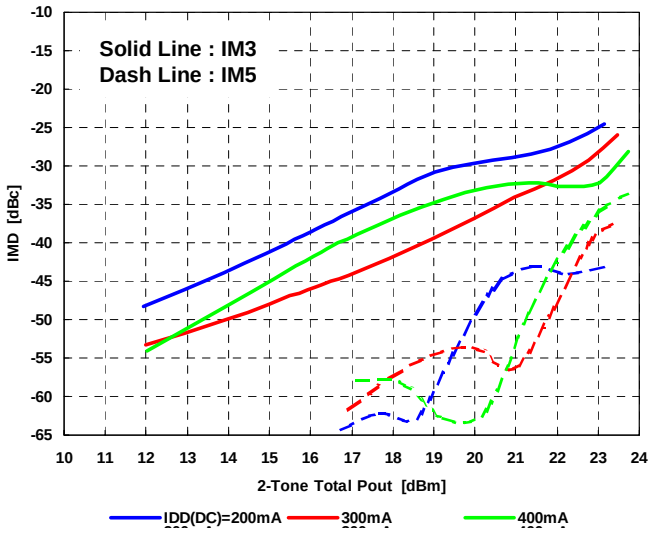
IMD vs. Output Power by Drain Current

@f=3.4GHz, VDD=6V



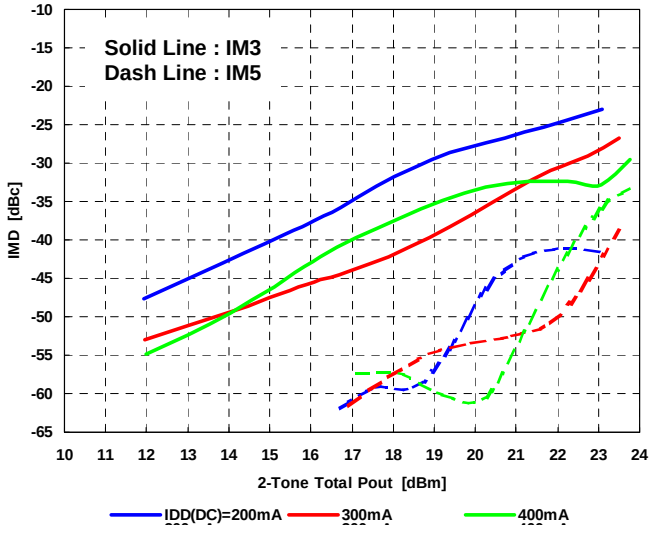
IMD vs. Output Power by Drain Current

@f=5.0GHz, VDD=6V



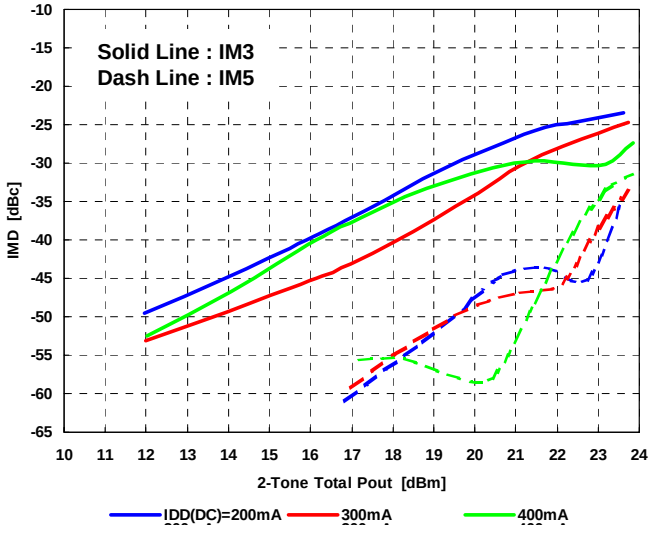
IMD vs. Output Power by Drain Current

@f=7.0GHz, VDD=6V



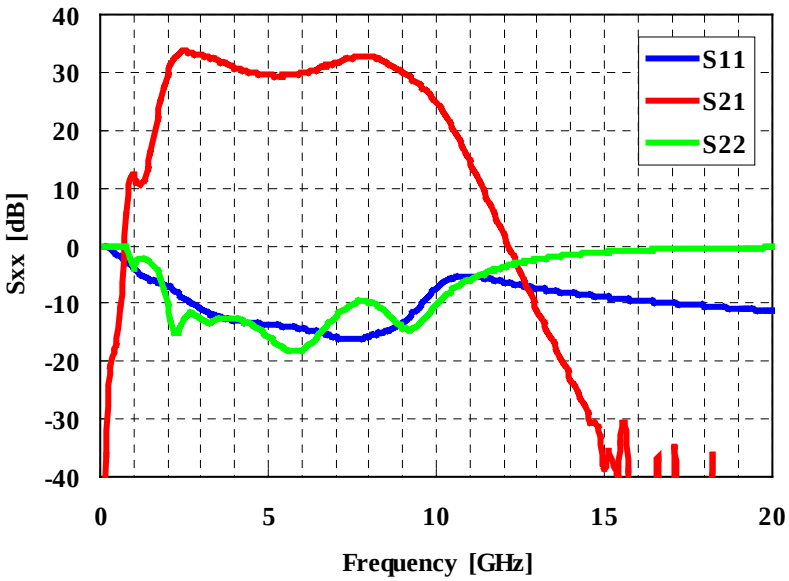
IMD vs. Output Power by Drain Current

@f=8.5GHz, VDD=6V

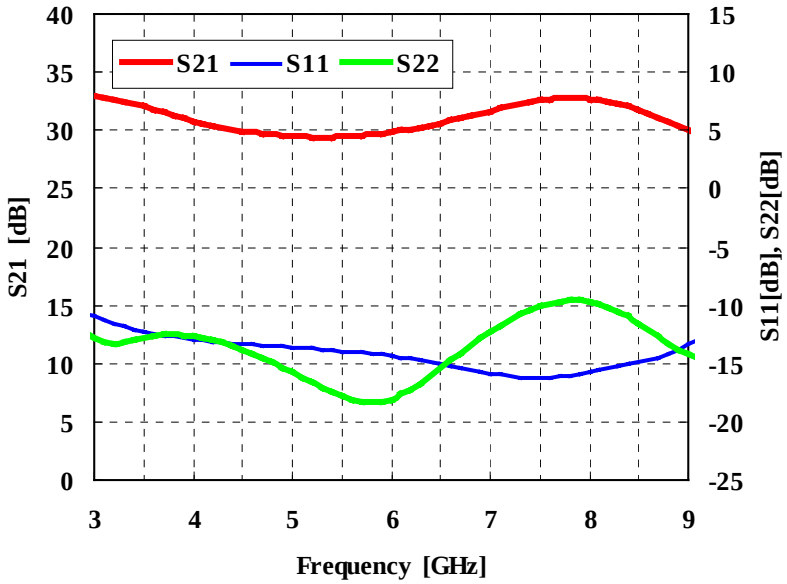


■ S-Parameter

VDD/IDD(DC)=6V/300mA



VDD/IDD(DC)=6V/300mA

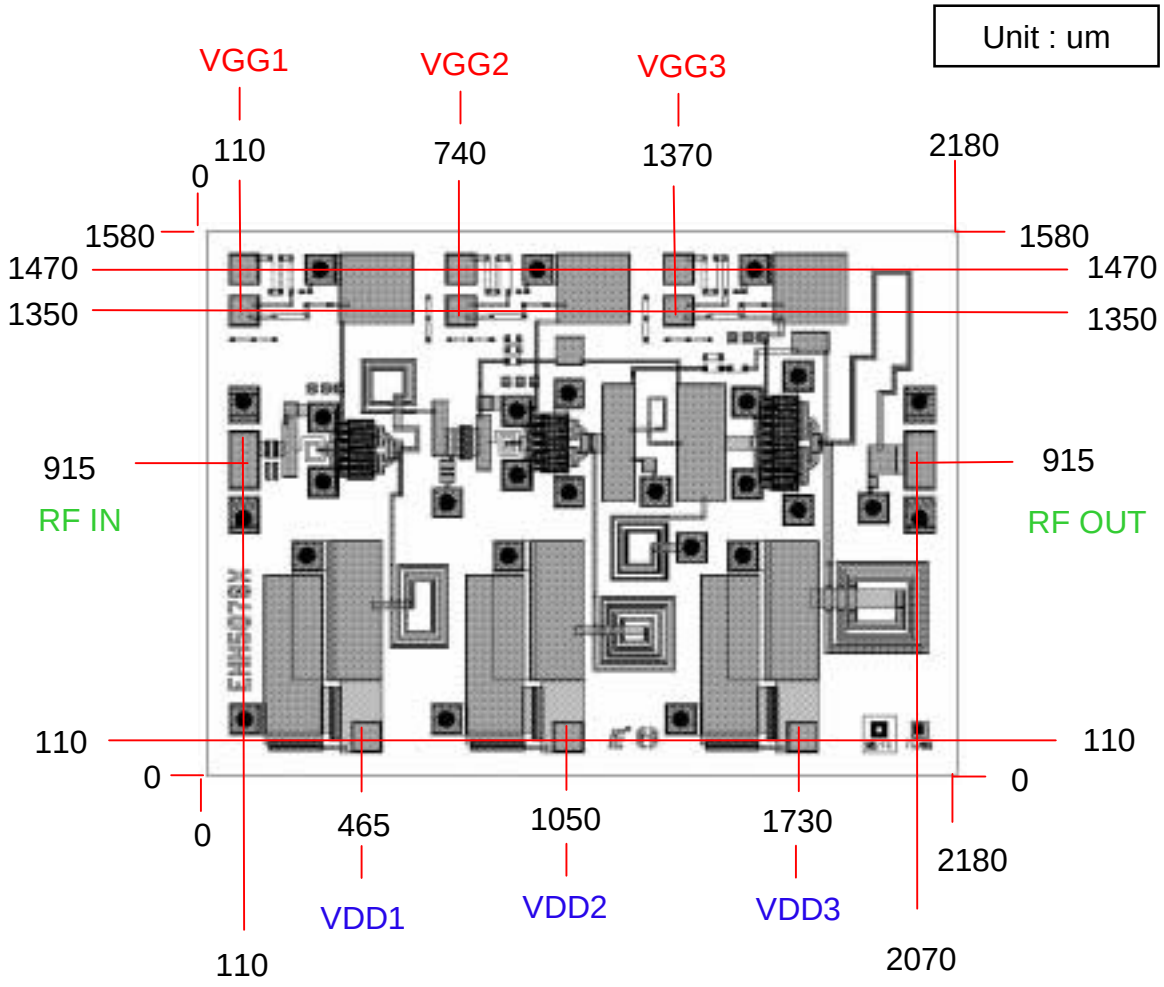


■ S-Parameter

VDD=6V, IDD(DC)=300mA

Frequency	S11		S21		S12		S22	
[GHz]	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
1.0	0.635	-54.5	4.197	32.3	0.001	-65.8	0.640	-81.5
2.0	0.450	-77.8	30.316	-85.9	0.000	55.2	0.310	-166.2
3.0	0.282	-95.5	44.371	96.0	0.000	164.7	0.229	-138.8
3.1	0.272	-96.3	43.902	83.6	0.000	166.9	0.220	-137.8
3.2	0.264	-97.1	43.096	71.4	0.000	145.8	0.217	-136.3
3.3	0.256	-97.6	42.303	59.6	0.000	130.3	0.219	-135.1
3.4	0.250	-98.1	41.078	48.3	0.000	122.8	0.224	-134.8
3.5	0.244	-98.6	40.021	37.5	0.000	95.6	0.229	-135.5
3.6	0.239	-99.2	38.846	27.3	0.000	108.9	0.233	-136.8
3.7	0.235	-99.8	37.689	17.4	0.000	63.1	0.236	-138.6
3.8	0.231	-100.4	36.677	8.0	0.000	60.8	0.236	-140.6
3.9	0.229	-101.2	35.635	-1.1	0.000	79.5	0.236	-142.7
4.0	0.225	-101.9	34.722	-9.8	0.000	58.7	0.233	-144.7
4.1	0.223	-102.7	33.947	-18.4	0.000	61.9	0.229	-146.7
4.2	0.220	-103.7	33.140	-26.8	0.000	77.0	0.224	-148.5
4.3	0.218	-104.9	32.546	-34.8	0.000	70.6	0.218	-150.3
4.4	0.217	-106.1	31.888	-42.7	0.000	54.2	0.211	-151.8
4.5	0.215	-107.3	31.375	-50.5	0.000	69.5	0.204	-153.0
4.6	0.214	-108.8	30.904	-58.3	0.000	52.2	0.197	-154.2
4.7	0.212	-110.2	30.602	-65.8	0.000	44.6	0.188	-155.0
4.8	0.211	-111.7	30.260	-73.2	0.000	57.5	0.180	-155.5
4.9	0.210	-113.4	30.028	-80.6	0.000	60.2	0.172	-155.7
5.0	0.208	-115.3	29.828	-87.9	0.000	40.9	0.163	-155.4
5.1	0.207	-117.2	29.767	-95.2	0.000	35.2	0.155	-154.7
5.2	0.206	-119.2	29.596	-102.5	0.000	55.3	0.147	-153.5
5.3	0.204	-121.4	29.628	-109.7	0.000	27.5	0.140	-151.7
5.4	0.203	-123.6	29.629	-116.9	0.000	31.7	0.134	-149.5
5.5	0.201	-126.4	29.747	-124.1	0.000	-10.4	0.128	-146.4
5.6	0.200	-129.1	29.937	-131.3	0.000	-9.2	0.124	-142.9
5.7	0.198	-131.9	30.100	-138.5	0.000	21.7	0.121	-138.7
5.8	0.196	-135.0	30.437	-145.8	0.000	-11.5	0.121	-134.5
5.9	0.194	-138.1	30.749	-153.2	0.000	4.4	0.122	-130.1
6.0	0.191	-141.6	31.130	-160.7	0.000	-1.7	0.125	-125.8
6.1	0.189	-145.4	31.603	-168.1	0.000	-10.0	0.131	-122.1
6.2	0.186	-149.3	32.060	-175.7	0.000	5.0	0.138	-118.8
6.3	0.183	-153.9	32.625	176.6	0.000	-22.9	0.147	-116.1
6.4	0.181	-158.5	33.322	168.8	0.000	-25.1	0.157	-114.1
6.5	0.178	-163.5	34.010	160.8	0.000	-26.6	0.169	-112.9
6.6	0.174	-169.0	34.772	152.7	0.000	-42.4	0.183	-112.6
6.7	0.171	-174.9	35.483	144.4	0.000	-43.9	0.196	-112.8
6.8	0.168	178.7	36.428	135.9	0.000	-56.9	0.211	-113.9
6.9	0.165	171.8	37.308	127.1	0.000	-62.5	0.227	-115.4
7.0	0.162	164.3	38.210	118.2	0.000	-56.2	0.243	-117.4
7.1	0.159	156.4	39.127	108.9	0.000	-73.4	0.258	-120.1
7.2	0.157	147.7	40.012	99.5	0.000	-78.0	0.273	-123.3
7.3	0.155	138.4	40.906	89.7	0.000	-88.2	0.287	-127.0
7.4	0.155	128.6	41.781	79.7	0.000	-95.4	0.301	-131.1
7.5	0.155	118.7	42.344	69.4	0.000	-107.5	0.312	-135.8
7.6	0.155	108.5	43.101	58.6	0.001	-113.9	0.321	-141.0
7.7	0.157	98.4	43.317	47.8	0.001	-121.6	0.328	-146.5
7.8	0.159	88.2	43.499	36.8	0.001	-132.1	0.331	-152.5
7.9	0.161	78.6	43.524	25.6	0.001	-140.7	0.331	-159.0
8.0	0.165	69.5	43.111	14.3	0.001	-144.6	0.327	-165.6
8.1	0.167	61.0	42.735	2.8	0.001	-159.2	0.319	-172.7
8.2	0.171	53.4	41.744	-8.7	0.001	-168.2	0.309	179.9
8.3	0.173	46.3	40.924	-20.0	0.001	-175.7	0.295	172.3
8.4	0.176	40.2	39.901	-31.3	0.001	174.8	0.282	164.1
8.5	0.181	34.9	38.708	-42.7	0.001	171.1	0.265	155.3
8.6	0.185	30.6	37.334	-53.8	0.001	156.3	0.249	146.4
8.7	0.189	26.9	35.809	-65.0	0.001	151.3	0.231	136.4
8.8	0.195	23.8	34.352	-76.1	0.001	143.8	0.215	125.7
8.9	0.203	21.3	32.993	-87.1	0.001	127.6	0.203	114.5
9.0	0.214	19.0	31.483	-98.1	0.000	125.7	0.194	102.1
10.0	0.427	-13.0	17.319	148.7	0.000	17.6	0.309	-2.5
11.0	0.542	-60.8	5.437	38.7	0.000	-70.9	0.507	-46.0
12.0	0.482	-90.6	1.224	-41.5	0.000	-106.5	0.654	-70.4
13.0	0.425	-107.7	0.275	-99.8	0.000	-107.5	0.758	-87.8
14.0	0.387	-119.5	0.069	-136.6	0.000	-130.3	0.832	-101.4
15.0	0.359	-128.9	0.012	170.8	0.000	-153.3	0.882	-112.5
16.0	0.337	-136.7	0.006	164.6	0.000	-167.0	0.913	-121.7
17.0	0.317	-143.5	0.001	-144.4	0.000	-144.5	0.934	-129.6
18.0	0.301	-149.6	0.002	-47.6	0.001	-159.0	0.947	-136.4
19.0	0.286	-155.0	0.004	142.7	0.001	-178.6	0.956	-142.3

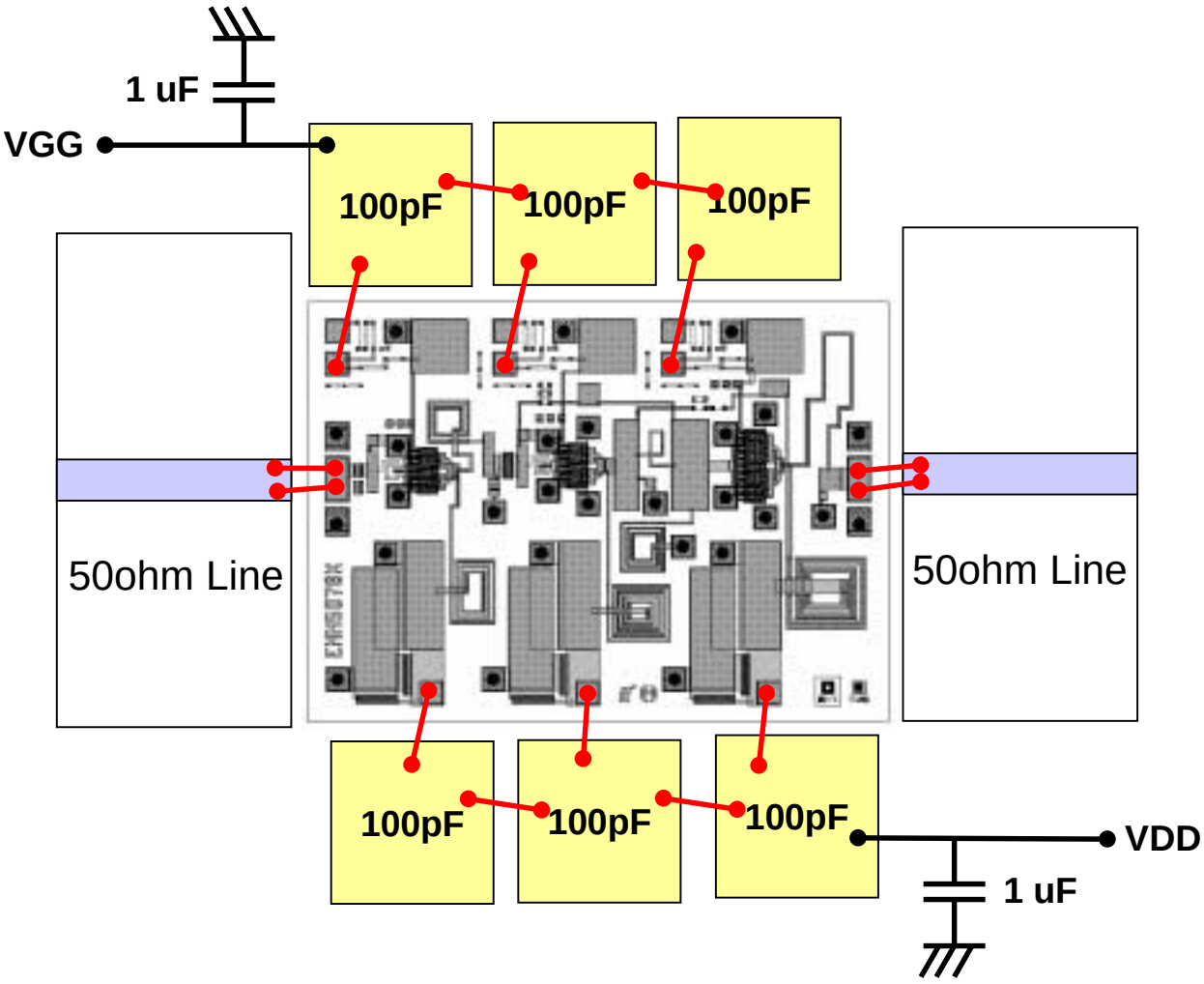
■ **Chip Outline and Bonding Pad Locations (Dimension in Micro-Meters)**



Chip Size : 2180±30um x 1580±30um
Chip Thickness : 85±20um
Bonding Pad Size : 90um x 90um(VDD, VGG), 90um x 170um (RF)

■ **Assembly Diagrams**

Recommended assembly

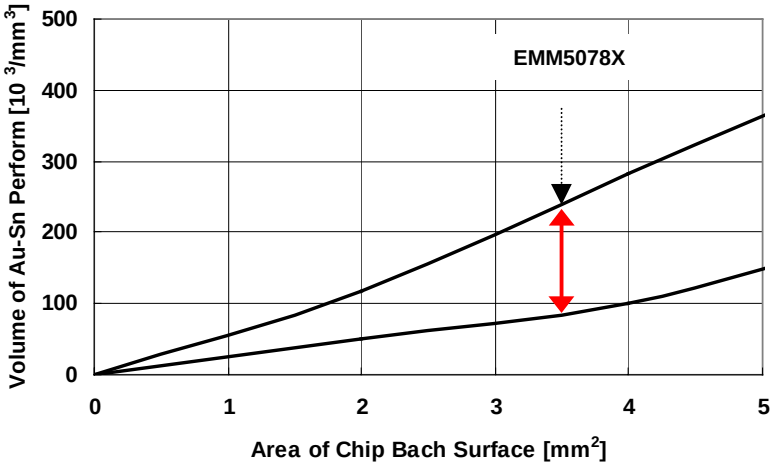


“Copper” is the recommended material for the package or carrier.

■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

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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.

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