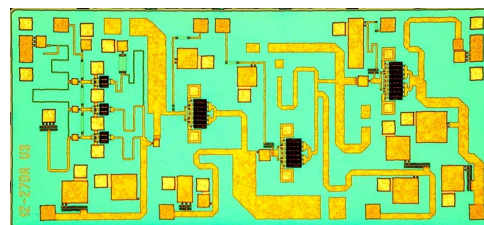


EMM5834X**Ku / K-Band Power Amplifier MMIC****FEATURES**

- Output Power; P1dB = 26 dBm (Typ.)
- High Gain; G1dB = 23 dB(Typ.)
- Wide Frequency Band ; 12.7 - 27.0 GHz
- Impedance Matched Zin/Zout = 50Ω

**DESCRIPTION**

The EMM5834X is a wide band power amplifier MMIC that contains a four stage amplifier, internally matched, for standard communications band in 12.7 to 27.0GHz 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 | V _{DD} | 10 | V |
| Gate-Source Voltage | V _{GG} | -3 | V |
| Input Power | P _{in} | 16 | dBm |
| Storage Temperature | T _{stg} | -55 to +125 | °C |

RECOMMENDED OPERATING CONDITIONS

| Item | Symbol | Conditions | Unit |
|--------------------------------|-----------------|------------|------|
| Drain-Source Voltage | V _{DD} | <=6 | V |
| Input Power | P _{in} | <=6 | dBm |
| 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 | V _{DD} =6V | 12.7 | - | 27 | GHz |
| Output Power at 1dB G.C.P. | P _{1dB} | I _{DD} =300mA typ. | 23 | 26 | - | dBm |
| Power Gain at 1dB G.C.P. | G _{1dB} | | 19 | 23 | - | dB |
| Power-added Efficiency at 1dB G.C.P. | η _{add} | | - | 18 | - | % |
| Third Order Intermodulation* | IM ₃ | * :Δf=10MHz , | -26 | -35 | - | dBc |
| Drain Current at 1dB G.C.P. | I _{DD} | 2-Tone Test, | - | 370 | 600 | mA |
| Input Return Loss (at Pin=-20dBm) | RL _{in} | P _{out} =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

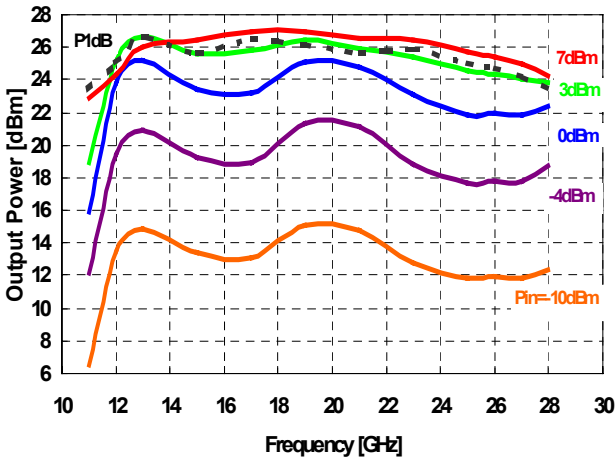
| | | |
|------------|----------------|---------------|
| ESD | Class 0 | ~ 199V |
|------------|----------------|---------------|

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

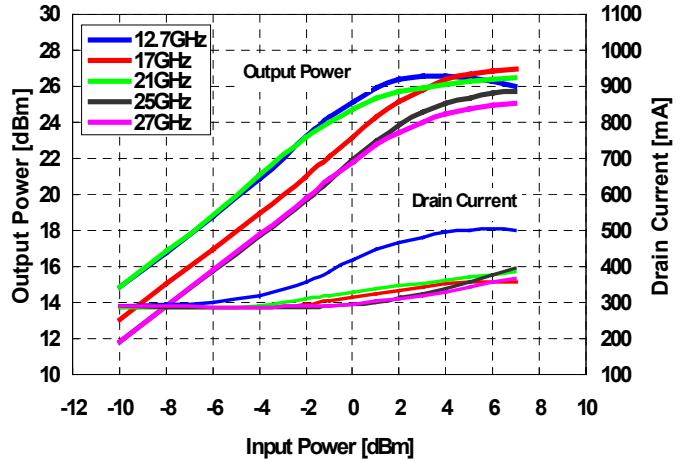
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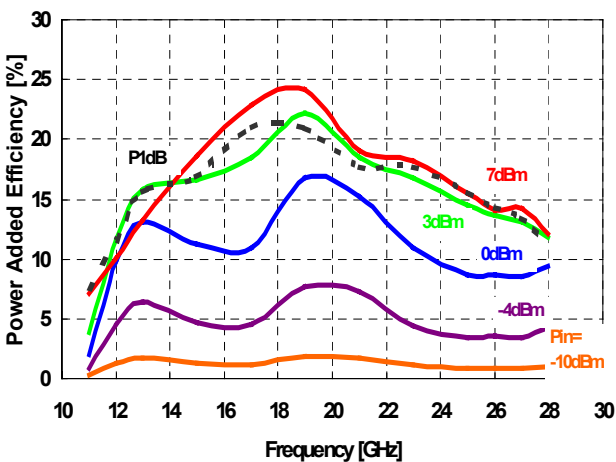
Output Power vs. Frequency
@ VDD=6V, IDD(DC)=300mA



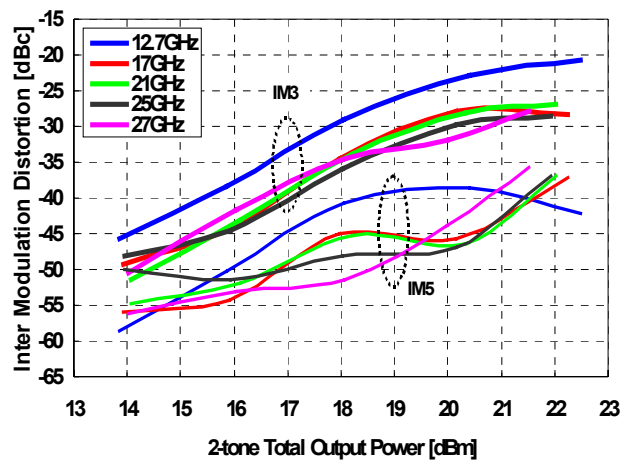
Output Power, Drain Current vs. Input Power
@ VDD=6V, IDD(DC)=300mA



Power Added Efficiency vs. Frequency
@ VDD=6V, IDD(DC)=300mA



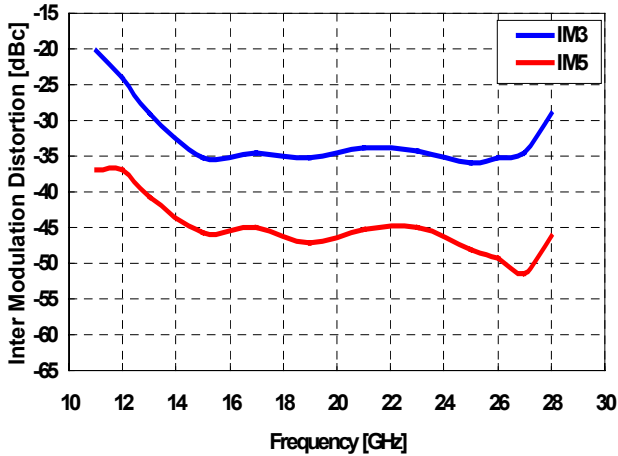
IMD vs. Output Power
@ VDD=6V, IDD(DC)=300mA



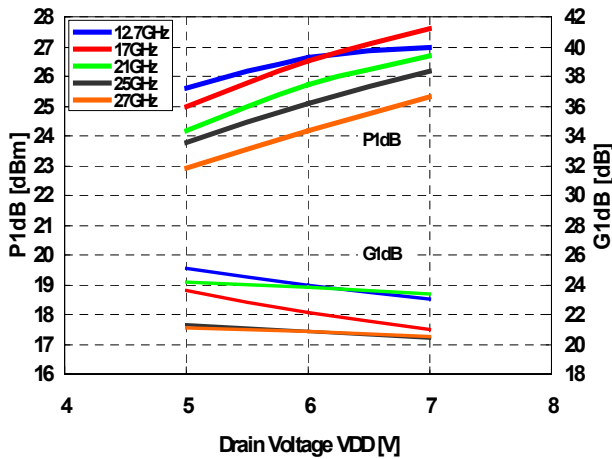
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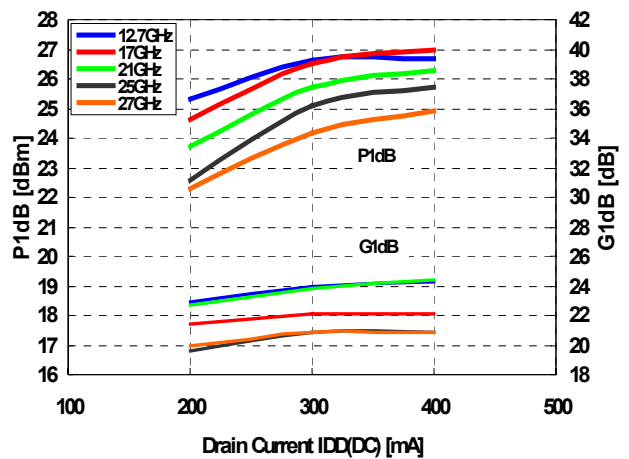
IMD vs. Frequency
 @ VDD=6V, IDD(DC)=300mA, Pou=15dBm S.C.L



Output Power, Gain vs. Drain Voltage
 @ IDD(DC)=300mA



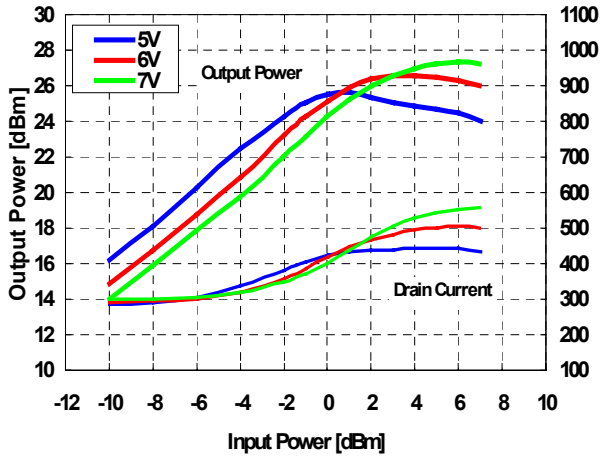
Output Power, Gain vs. Drain Current
 @ VDD=6V



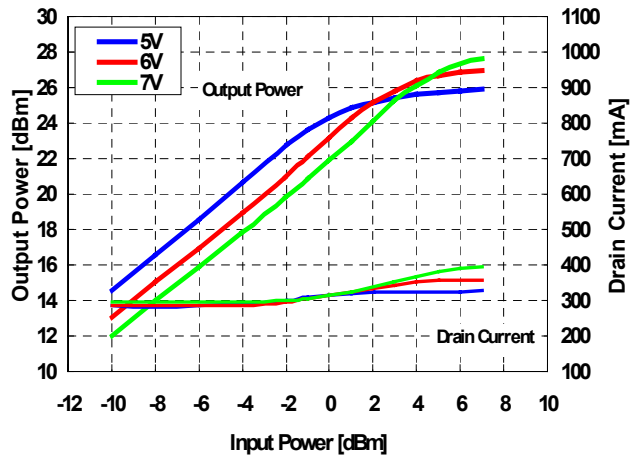
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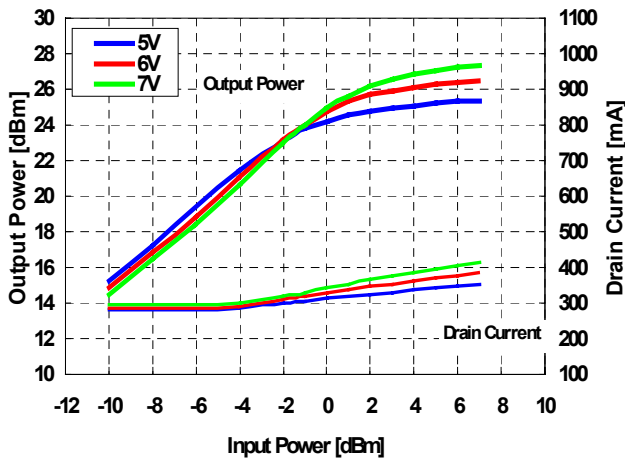
Output Power, Drain Current vs. Input Power by Drain Voltage
@f=12.7GHz, IDD(DC)=300mA



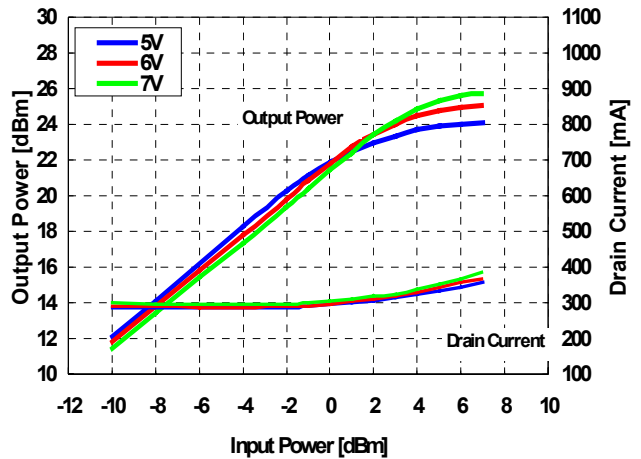
Output Power, Drain Current vs. Input Power by Drain Voltage
@f=17GHz, IDD(DC)=300mA



Output Power, Drain Current vs. Input Power by Drain Voltage
@f=21GHz, IDD(DC)=300mA



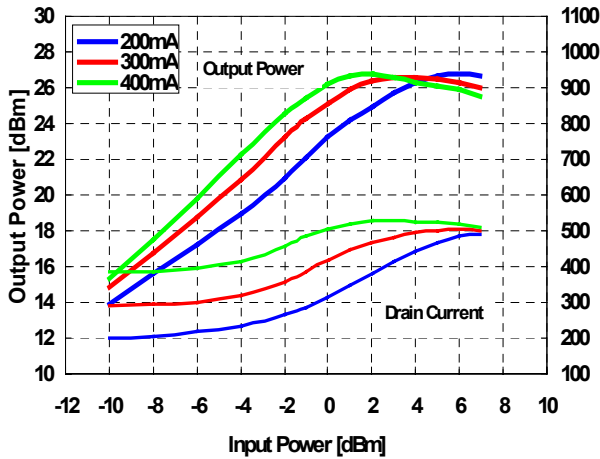
Output Power, Drain Current vs. Input Power by Drain Voltage
@f=27GHz, IDD(DC)=300mA



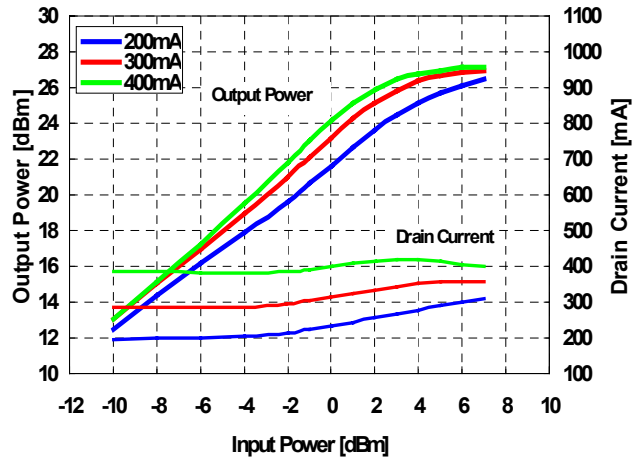
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Ku / K-Band Power Amplifier MMIC

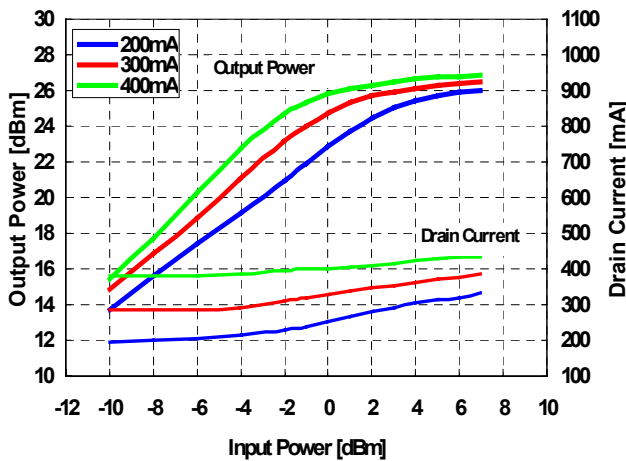
Output Power, Drain Current vs. Input Power by Drain Current
@f=12.7GHz, VDD=6V



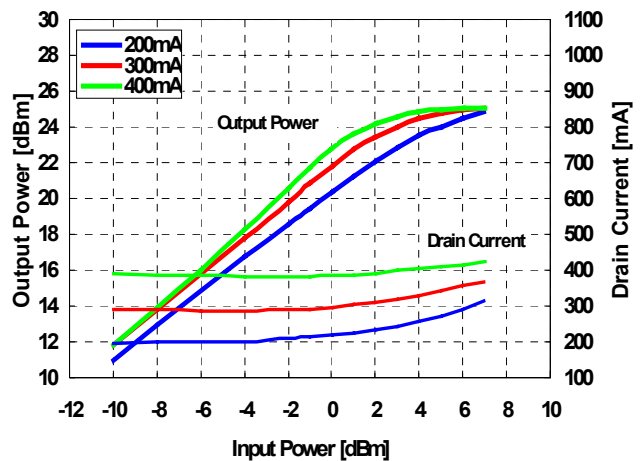
Output Power, Drain Current vs. Input Power by Drain Current
@f=17GHz, VDD=6V



Output Power, Drain Current vs. Input Power by Drain Current
@f=21GHz, VDD=6V



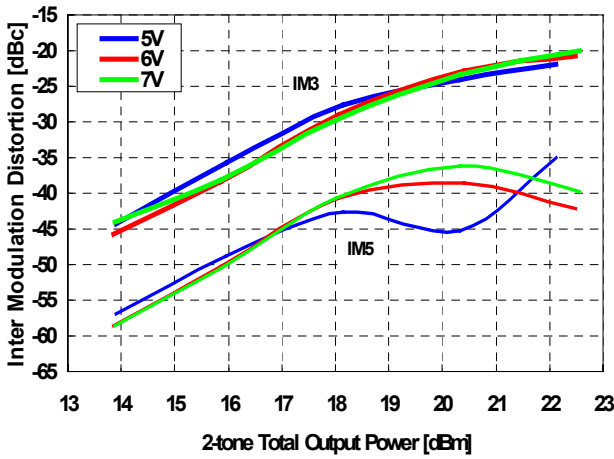
Output Power, Drain Current vs. Input Power by Drain Current
@f=27GHz, VDD=6V



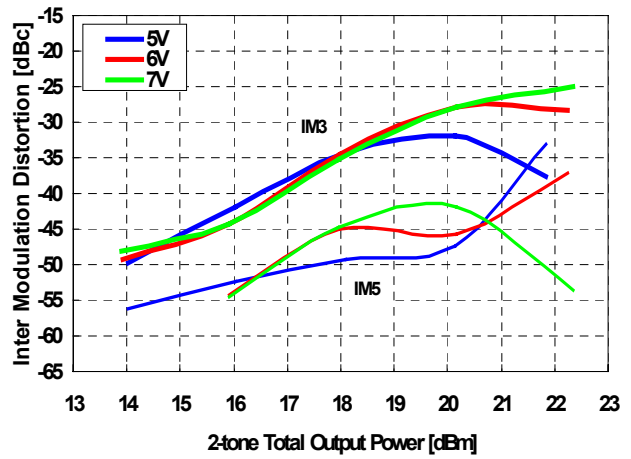
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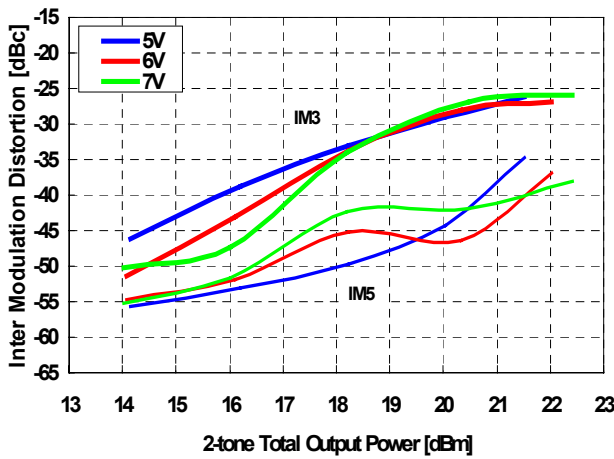
IMD vs. Output Power by Drain Voltage
@f=12.7GHz, IDD(DC)=300mA



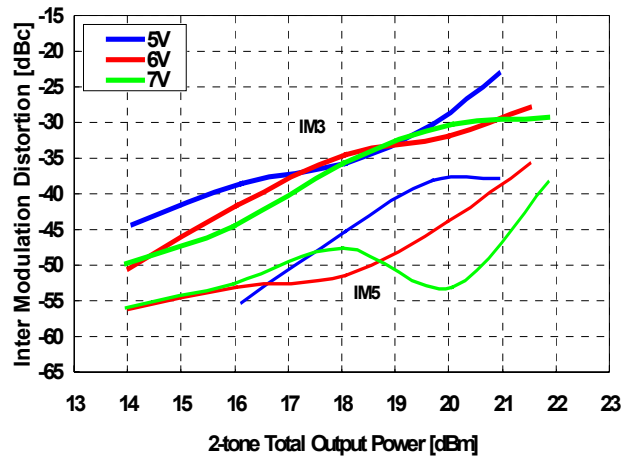
IMD vs. Output Power by Drain Voltage
@f=17GHz, IDD(DC)=300mA



IMD vs. Output Power by Drain Voltage
@f=21GHz, IDD(DC)=300mA



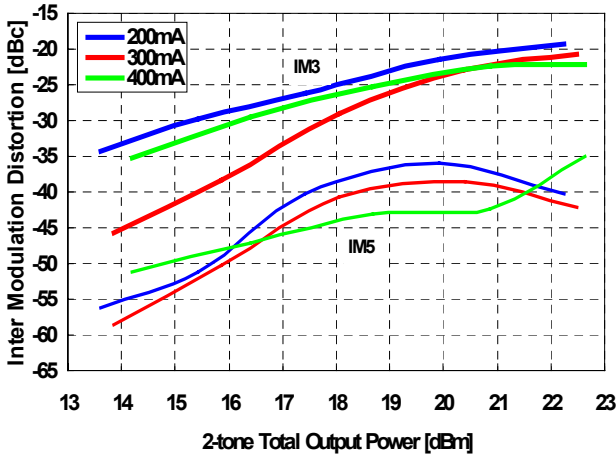
IMD vs. Output Power by Drain Voltage
@f=27GHz, IDD(DC)=300mA



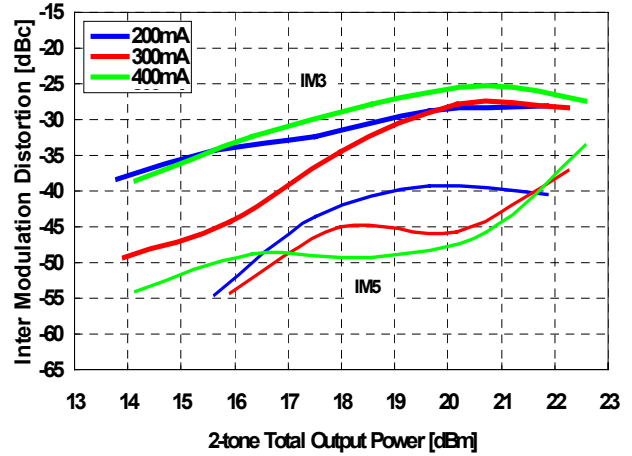
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Ku / K-Band Power Amplifier MMIC

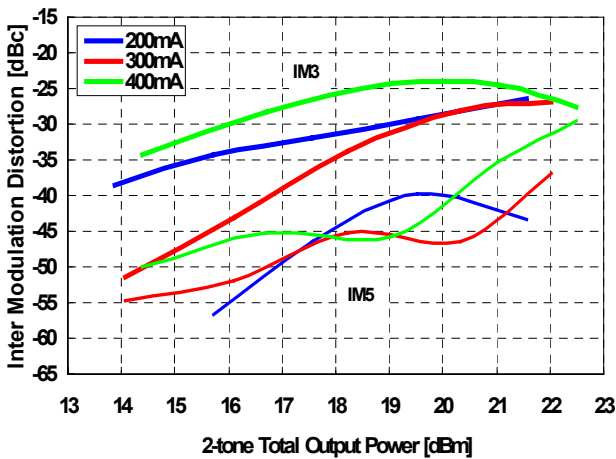
IMD vs. Output Power by Drain Current
@f=12.7GHz, VDD=6V



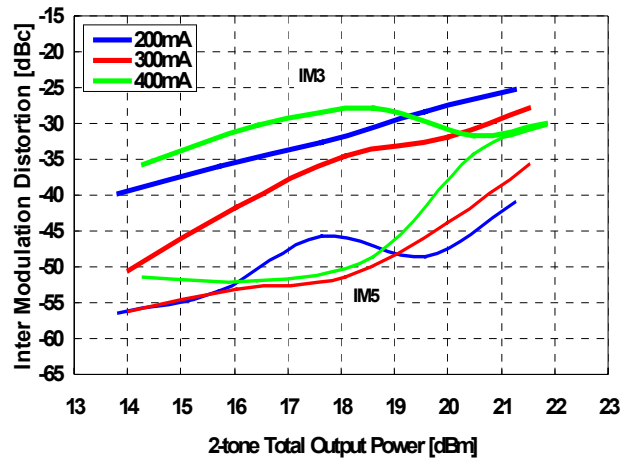
IMD vs. Output Power by Drain Current
@f=17GHz, VDD=6V



IMD vs. Output Power by Drain Current
@f=21GHz, VDD=6V



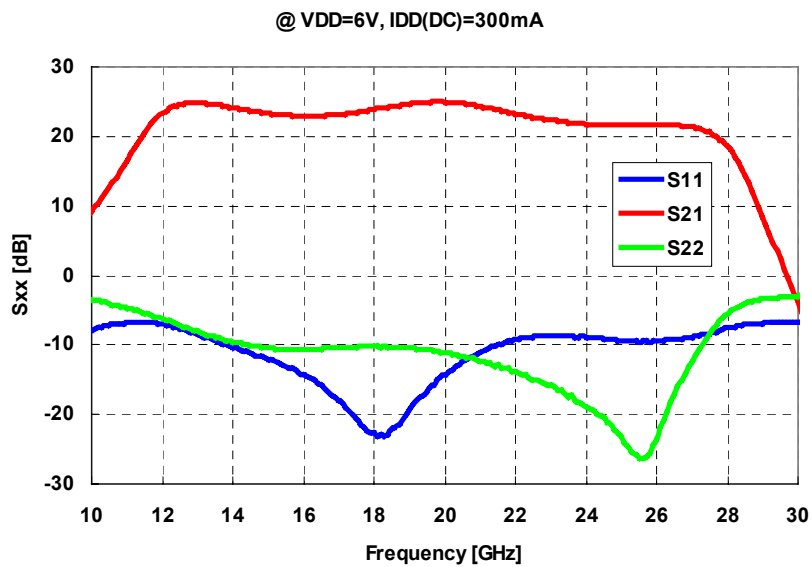
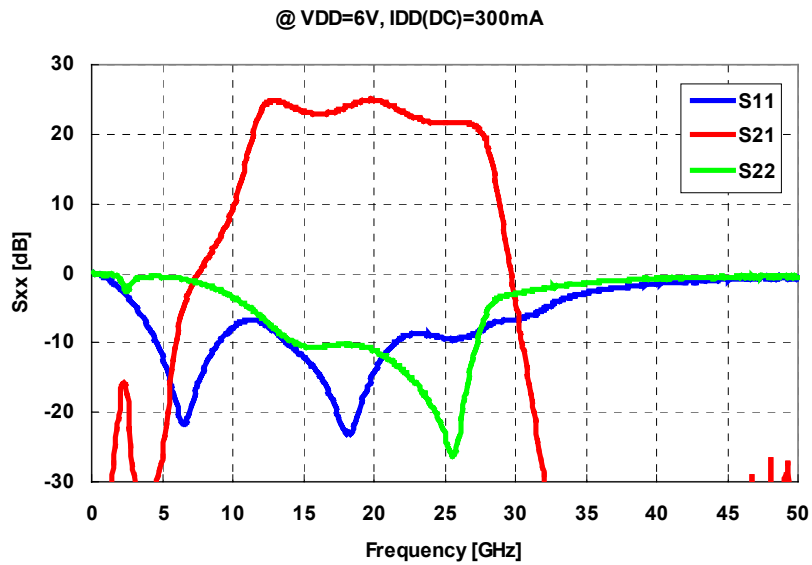
IMD vs. Output Power by Drain Current
@f=27GHz, VDD=6V



EMM5834X

Ku / K-band Power Amplifier MMIC

■ S-Parameter



EMM5834X**Ku / K-Band Power Amplifier MMIC****■ S-Parameter**

| Freq. GHz | S11 | | S21 | | S12 | | S22 | |
|--------------|--------|---------|---------|---------|--------|---------|--------|---------|
| | Mag. | Ang. | Mag. | Ang. | Mag. | Ang. | Mag. | Ang. |
| 1.0 | 0.9364 | -42.16 | 0.0173 | 91.32 | 0.0001 | 90.00 | 0.9705 | -48.09 |
| 2.0 | 0.7812 | -81.39 | 0.0866 | -95.26 | 0.0001 | -171.87 | 0.9164 | -91.14 |
| 3.0 | 0.6008 | -117.15 | 0.0361 | 63.31 | 0.0001 | -131.99 | 0.8766 | -108.46 |
| 4.0 | 0.4254 | -151.08 | 0.0114 | 92.76 | 0.0001 | 95.71 | 0.9449 | -135.96 |
| 5.0 | 0.2654 | 172.75 | 0.0496 | 148.46 | 0.0001 | 26.57 | 0.9470 | -158.24 |
| 6.0 | 0.1382 | 120.00 | 0.4097 | 102.31 | 0.0000 | 90.00 | 0.9345 | -178.20 |
| 7.0 | 0.1247 | 29.61 | 0.8893 | 16.24 | 0.0001 | -63.43 | 0.8907 | 162.82 |
| 8.0 | 0.2184 | -24.49 | 1.2973 | -44.79 | 0.0001 | 22.62 | 0.8341 | 144.85 |
| 9.0 | 0.3199 | -56.88 | 1.8931 | -92.65 | 0.0003 | 43.73 | 0.7652 | 126.73 |
| 10.0 | 0.4069 | -84.14 | 3.2336 | -132.46 | 0.0001 | 118.30 | 0.6859 | 107.56 |
| 11.0 | 0.4609 | -110.53 | 7.8616 | 176.68 | 0.0002 | -114.44 | 0.6031 | 87.01 |
| 12.0 | 0.4482 | -137.09 | 16.5903 | 90.45 | 0.0003 | 85.43 | 0.5160 | 63.83 |
| 12.5 | 0.4190 | -148.66 | 18.7073 | 43.74 | 0.0002 | 122.91 | 0.4739 | 51.49 |
| 13.0 | 0.3791 | -158.44 | 18.8635 | 1.56 | 0.0002 | 171.47 | 0.4301 | 38.34 |
| 13.5 | 0.3415 | -166.35 | 18.2229 | -36.28 | 0.0001 | -51.34 | 0.3942 | 25.44 |
| 14.0 | 0.3117 | -173.16 | 17.3261 | -70.47 | 0.0004 | 99.46 | 0.3656 | 11.48 |
| 14.5 | 0.2884 | 179.83 | 16.5197 | -101.96 | 0.0002 | -148.39 | 0.3443 | -2.57 |
| 15.0 | 0.2649 | 172.43 | 15.9096 | -131.47 | 0.0002 | 105.95 | 0.3294 | -16.42 |
| 15.5 | 0.2456 | 163.53 | 15.5321 | -159.70 | 0.0006 | -141.04 | 0.3160 | -30.62 |
| 16.0 | 0.2197 | 152.38 | 15.3884 | 172.80 | 0.0002 | 177.27 | 0.3108 | -44.25 |
| 16.5 | 0.1924 | 138.65 | 15.4297 | 145.60 | 0.0001 | 116.57 | 0.3091 | -56.59 |
| 17.0 | 0.1604 | 123.63 | 15.7534 | 118.68 | 0.0000 | -180.00 | 0.3081 | -69.08 |
| 17.5 | 0.1372 | 102.04 | 16.2360 | 91.14 | 0.0003 | -66.50 | 0.3067 | -80.34 |
| 18.0 | 0.1166 | 77.07 | 16.9396 | 63.15 | 0.0021 | 29.03 | 0.3047 | -91.07 |
| 18.5 | 0.1107 | 40.95 | 17.7663 | 33.76 | 0.0005 | 105.95 | 0.3009 | -100.77 |
| 19.0 | 0.1270 | 10.27 | 18.5339 | 3.08 | 0.0005 | -86.27 | 0.2931 | -110.10 |
| 19.5 | 0.1570 | -18.52 | 18.9621 | -28.82 | 0.0005 | 87.84 | 0.2837 | -119.04 |
| 20.0 | 0.1943 | -38.14 | 18.9627 | -61.17 | 0.0007 | 15.83 | 0.2716 | -126.66 |
| 20.5 | 0.2368 | -56.50 | 18.3970 | -93.92 | 0.0004 | -173.37 | 0.2530 | -134.34 |
| 21.0 | 0.2787 | -74.08 | 17.3632 | -125.68 | 0.0006 | -155.30 | 0.2298 | -141.02 |
| 21.5 | 0.3149 | -90.70 | 16.3173 | -156.67 | 0.0004 | -152.85 | 0.2089 | -146.80 |
| 22.0 | 0.3427 | -107.39 | 15.1908 | 173.17 | 0.0004 | 157.48 | 0.1868 | -151.92 |
| 22.5 | 0.3682 | -124.45 | 14.2478 | 143.68 | 0.0004 | 138.01 | 0.1610 | -156.86 |
| 23.0 | 0.3781 | -141.04 | 13.4796 | 114.33 | 0.0004 | 126.87 | 0.1424 | -160.66 |
| 23.5 | 0.3842 | -158.57 | 12.8187 | 84.98 | 0.0005 | 128.66 | 0.1159 | -166.49 |
| 24.0 | 0.3812 | -176.04 | 12.3604 | 55.18 | 0.0005 | 93.30 | 0.0939 | -171.74 |
| 24.5 | 0.3794 | 165.28 | 12.0174 | 24.95 | 0.0006 | 75.47 | 0.0726 | -179.61 |
| 25.0 | 0.3757 | 145.99 | 11.8535 | -6.54 | 0.0006 | 96.01 | 0.0509 | 162.79 |
| 25.5 | 0.3775 | 125.86 | 11.8023 | -39.56 | 0.0005 | 62.95 | 0.0419 | 122.93 |
| 26.0 | 0.3830 | 105.17 | 11.8585 | -74.57 | 0.0003 | 43.60 | 0.0632 | 74.85 |
| 26.5 | 0.3962 | 84.89 | 12.0356 | -112.74 | 0.0004 | -30.96 | 0.1152 | 51.97 |
| 27.0 | 0.4087 | 65.61 | 12.1294 | -154.82 | 0.0005 | -67.22 | 0.1983 | 37.78 |
| 27.5 | 0.4269 | 48.48 | 11.9840 | 157.33 | 0.0002 | 57.09 | 0.3150 | 23.65 |
| 28.0 | 0.4490 | 33.54 | 10.9988 | 101.22 | 0.0001 | -82.87 | 0.4673 | 7.13 |
| 29.0 | 0.5021 | 6.64 | 4.4476 | -20.99 | 0.0002 | -106.39 | 0.6835 | -33.61 |
| 30.0 | 0.5071 | -13.97 | 1.0263 | -105.33 | 0.0000 | 26.57 | 0.7080 | -55.94 |
| 31.0 | 0.5147 | -25.92 | 0.2519 | -167.14 | 0.0003 | -178.03 | 0.7314 | -69.40 |
| 32.0 | 0.5508 | -31.91 | 0.0601 | 134.22 | 0.0007 | -105.26 | 0.7604 | -80.08 |
| 33.0 | 0.6245 | -39.98 | 0.0042 | 87.96 | 0.0004 | 113.96 | 0.7954 | -88.22 |
| 34.0 | 0.6836 | -50.00 | 0.0020 | -49.58 | 0.0004 | 64.09 | 0.8141 | -95.73 |
| 35.0 | 0.7313 | -57.97 | 0.0038 | 157.75 | 0.0001 | 55.01 | 0.8355 | -102.17 |
| 36.0 | 0.7485 | -65.77 | 0.0053 | 165.16 | 0.0003 | -28.18 | 0.8564 | -107.84 |
| 37.0 | 0.7731 | -72.50 | 0.0026 | -119.47 | 0.0005 | -28.52 | 0.8650 | -113.51 |
| 38.0 | 0.8007 | -78.20 | 0.0034 | 71.83 | 0.0003 | 47.86 | 0.8752 | -117.97 |
| 39.0 | 0.8122 | -83.09 | 0.0078 | -50.87 | 0.0008 | -177.95 | 0.9058 | -121.72 |
| 40.0 | 0.8263 | -88.26 | 0.0063 | -108.00 | 0.0009 | 66.63 | 0.9189 | -127.13 |

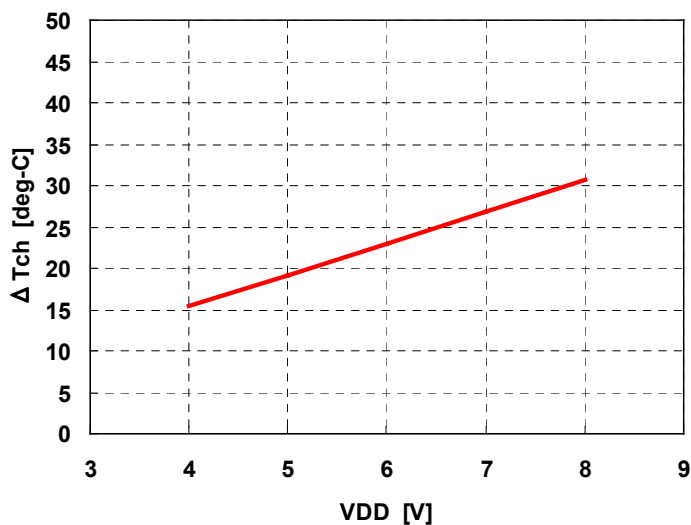
Eudyna

EMM5834X

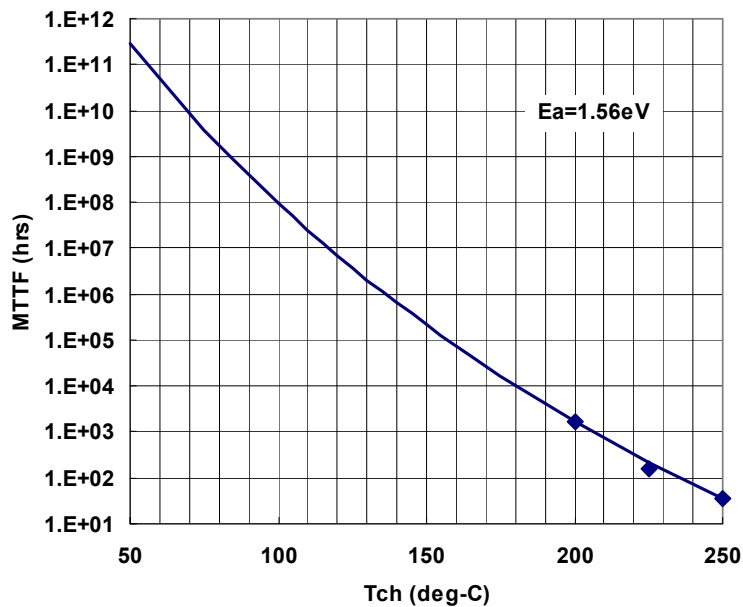
Ku / K-band Power Amplifier MMIC

■ Channel Temperature rise and MTTF

**ΔTch vs. Drain Voltage
(Reference)
IDD=300mA**



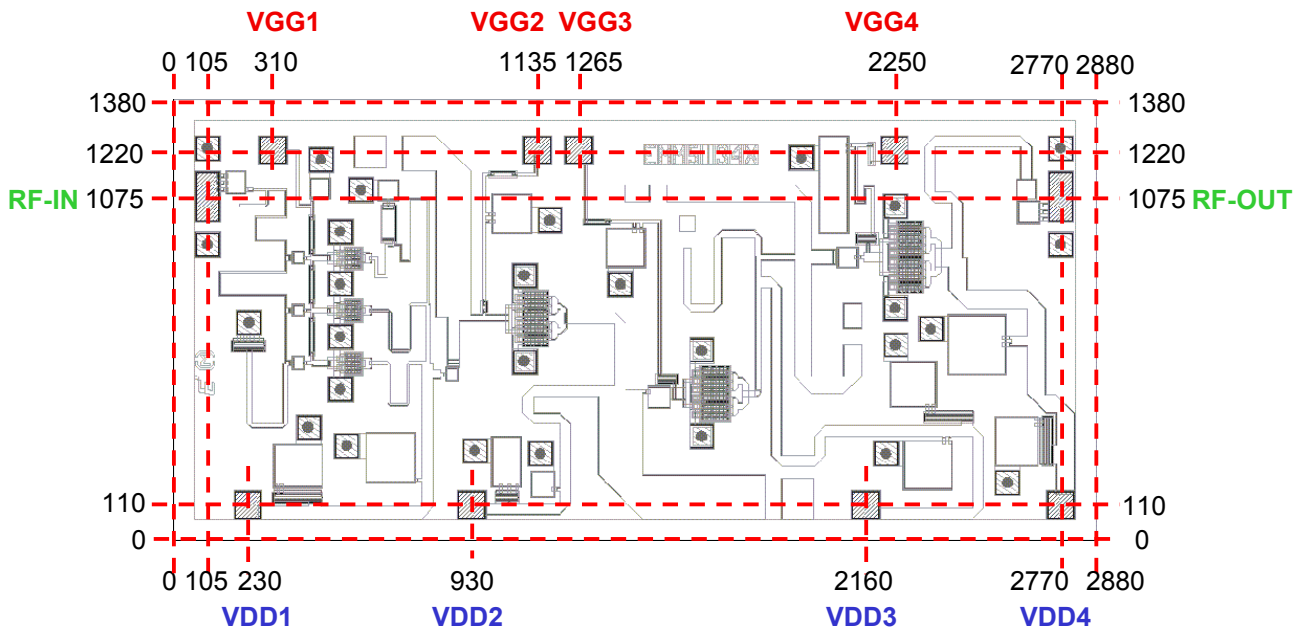
MTTF vs. Tch



EMM5834X

Ku / K-Band Power Amplifier MMIC

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



Chip Size : 2880±30µm x 1380±30µm

Chip Thickness : 60±20µm

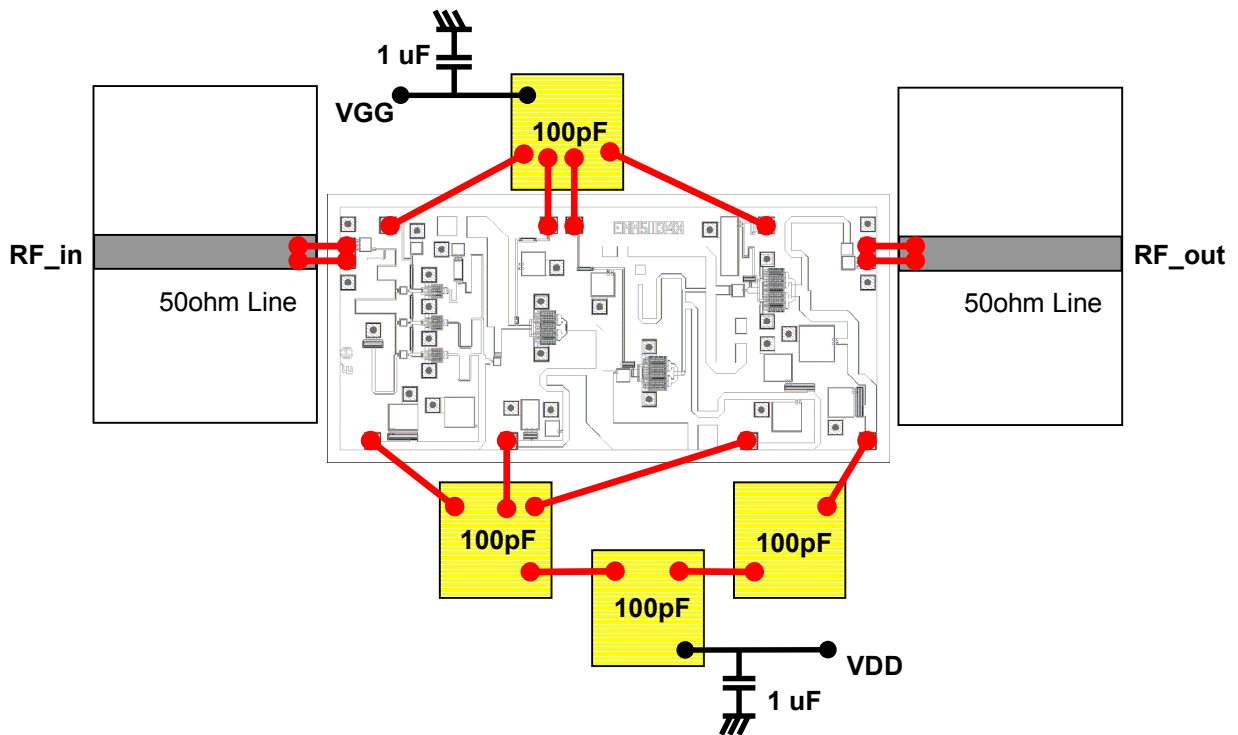
Bonding Pad Size : 80µm x 80µm(VDD, VGG), 160µm x 80µm (RF)

EMM5834X

Ku / K-band Power Amplifier MMIC

■ Assembly Diagrams

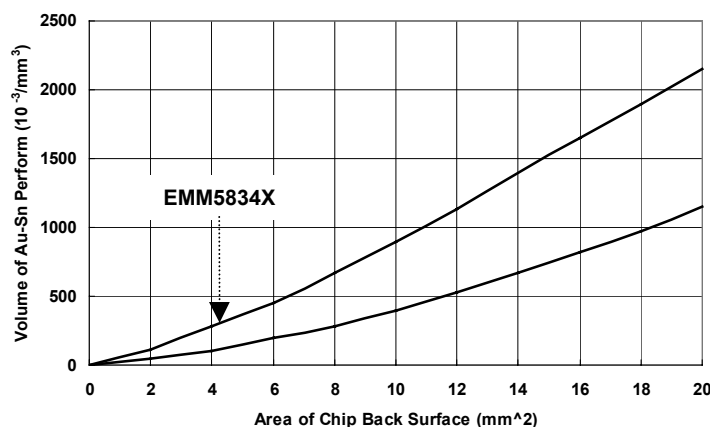
Recommended assembly



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

EMM5834X**Ku / K-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 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****Eudyna**

EMM5834X

Ku / K-band Power Amplifier MMIC

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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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