FEATURES
• High Output Power: Pout=32.0dBm (typ.)
• High Linear Gain: GL=22.0dB (typ.)
• Broad Band: 17.7 to 19.7GHz
• Impedance Matched Zin/Zout=50ohm
• Small Hermetic Metal-Ceramic SMT Package(VU)

DESCRIPTION
• The FMM5822VU is a MMIC amplifier that contains a three-stage amplifier, internally matched, for standard communications band in the 17.7 to 19.7GHz frequency range.
• Smitomo Electric Industries's stringent Quality Assurance Program assures the highest reliability and consistent performance.

ABSOLUTE MAXIMUM RATING

<table>
<thead>
<tr>
<th>Item</th>
<th>Symbol</th>
<th>Rating</th>
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</thead>
<tbody>
<tr>
<td>Drain-Source Voltage</td>
<td>VDD</td>
<td>10</td>
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<tr>
<td>Gate-Source Voltage</td>
<td>VGG</td>
<td>-3</td>
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<tr>
<td>Input Power</td>
<td>Pin</td>
<td>+25</td>
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<tr>
<td>Storage Temperature</td>
<td>Tstag</td>
<td>-55 to +125</td>
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RECOMMENDED OPERATING CONDITIONS

<table>
<thead>
<tr>
<th>Item</th>
<th>Symbol</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drain-Source Voltage</td>
<td>VDD</td>
<td>&lt;= 7</td>
</tr>
<tr>
<td>Input Power</td>
<td>Pin</td>
<td>&lt;= 15</td>
</tr>
<tr>
<td>Operating Case Temp</td>
<td>Tc</td>
<td>-40 to +85</td>
</tr>
</tbody>
</table>

ELECTRICAL CHARACTERISTICS (Case Temperature Tc=25°C)

- RF Frequency Range
- Output Power at 1dB G.C.P.
- Power Gain at 1dB G.C.P.
- Power-added Efficiency at 1dB G.C.P.
- Drain Current at 1dB G.C.P.
- Third Order Intermodulation Distortion
- Input Return Loss (at Pin=-20dBm)
- Output Return Loss (at Pin=-20dBm)

ESD
Class 0 <= 250V

CASE STYLE
VU

RoHS COMPLIANCE
Yes

ORDERING INFORMATION

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Order Unit</th>
<th>Packing</th>
</tr>
</thead>
<tbody>
<tr>
<td>FMM5822VU</td>
<td>No Limitation</td>
<td>48 pcs./Tray x 4+Tray = 192 pcs./Packing</td>
</tr>
<tr>
<td>FMM5822VUT</td>
<td>500 pcs.</td>
<td>500 pcs./Reel x 1Reel = 500 pcs./Packing</td>
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</table>
OUTPUT POWER vs. FREQUENCY
@VDD=6V, IDD(DC)=850mA

OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER
@VDD=6V, IDD(DC)=850mA

POWER-ADDED EFFICIENCY vs. FREQUENCY
@VDD=6V, IDD(DC)=850mA
K-Band Power Amplifier MMIC

FMM5822VU

IMD vs. FREQUENCY

@VDD=6V, IDD(DC)=850mA, Po=20dBm S.C.L.

IMD vs. OUTPUT POWER

@VDDD=6V, IDD(DC)=850mA
K-Band Power Amplifier MMIC

FMM5822VU

OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER by Drain Voltage

@f=17.7GHz, IDD(DC)=850mA

OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER by Drain Voltage

@f=18.7GHz, IDD(DC)=850mA

OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER by Drain Voltage

@f=19.7GHz, IDD(DC)=850mA

OUTPUT POWER, GAIN vs. DRAIN VOLTAGE

@IDD(DC)=850mA

Edition 2.2
Apr. 2011
FMM5822VU
K-Band Power Amplifier MMIC

OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER by Drain Current

@f=17.7GHz, VDD=6V

OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER by Drain Current

@f=18.7GHz, VDD=6V

OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER by Drain Current

@f=19.7GHz, VDD=6V

OUTPUT POWER, GAIN vs. DRAIN CURRENT

@VDD=6V

Edition 2.2
Apr. 2011
IMD PERFORMANCE vs. OUTPUT POWER
by Drain Current

@f=17.7GHz, VDD=6V

IMD PERFORMANCE vs. OUTPUT POWER
by Drain Current

@f=18.7GHz, VDD=6V

IMD PERFORMANCE vs. OUTPUT POWER
by Drain Current

@f=19.7GHz, VDD=6V
## S-Parameter

**VDD=6V, IDD=850mA**

<table>
<thead>
<tr>
<th>Frequency [GHz]</th>
<th>S11 MAG</th>
<th>ANG</th>
<th>S12 MAG</th>
<th>ANG</th>
<th>S21 MAG</th>
<th>ANG</th>
<th>S22 MAG</th>
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<td>132.8</td>
<td>0.88</td>
<td>-443.1</td>
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</tr>
</tbody>
</table>
S-PARAMETER

VDD=6V, IDD(DC)=850mA

Frequency [GHz]

Sxx [dB]

S21
S11
S22

Frequency [GHz]
Block Diagram

PIN ASSIGNMENT
1 : VGG
2 : RF in
3 : VGG
4 : VDD
5 : RF out
6 : VDD

Recommended Bias Circuit

Note 1: The capacitors are recommended on the bias supply line, close to the package, in order to prevent video oscillations which could damage the module.

Note 2: Two pins named VGG are internally connected.

Note 3: Two pins named VDD are internally connected.
Package Outline and Pin Assignment

PIN Assignments
1: VCC
2: RF in
3: VCC
4: VDD
5: RF out
6: VDD
Unit: mm
PCB Pads and Solder-resist Pattern

Notes:
1. LAMINATE: Rogers Corporation RO4003, Thickness t=0.2mm, Cu Foil 18μm
   Finish to copper foil; Ni 0.1μm min./Au 0.1±0.08μm (Both side)
2. : Resist

Unit: mm
FMM5822VU
K-Band Power Amplifier MMIC

$\Delta T_{ch}$ vs. Drain Voltage (Reference)
IDD=850mA

Note: $\Delta T_{ch}$: Temperature Rise from Backside of the Package to Channel.

MTTF vs. Tch

$E_a=1.56eV$
Mounting Method of SMD (Surface Mount Devices) for Lead-free solder

Mounting Condition
(1) For soldering, Lead-free solder (Sn-3.0Ag-0.5Cu)*1 or equivalent shall be used.
   (*1: The figure displays with weight %. A predominantly tin-rich alloy with 3.0% silver and 0.5% copper.)
(2) A rosin type flux with a chlorine content of 0.2% or less shall be used. The rosin flux with low halogen content is recommended.
(3) When soldering, use one of the following time / temperature methods for acceptable solder joints. Make sure the devices have been properly prepared with flux prior soldering.
   * Reflow soldering method (Infrared reflow / Heat circulation reflow / Hot plate reflow):
   Limit solder to 3 reflow cycles because resin is used in the modules manufacturing process. Excessive reflow cycles will effect the resin resulting in a potential failure or latent defect. The recommended reflow temperature profile is shown below. The temperature of the reflow profile must be measured at the device body surface.

Reflow temperature profile and condition:

<table>
<thead>
<tr>
<th>Temperature (deg. C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>260</td>
</tr>
<tr>
<td>255</td>
</tr>
<tr>
<td>217</td>
</tr>
<tr>
<td>200</td>
</tr>
<tr>
<td>150</td>
</tr>
<tr>
<td>RT</td>
</tr>
</tbody>
</table>

(1) Preheating: 150 – 200 deg.C, 60 – 120 seconds
(2) Ramp-up Rate: 3 deg.C /seconds max
(3) Liquidous temperature and time: 217 deg.C, 60 – 150 seconds
(4) Peak Temperature: 260 deg.C
(5) Time Peak Temperature within 5 deg.C: < 30seconds
(6) Ramp-down Rate: 6 deg.C /seconds max
(7) Time RT to peak temperature: 8 minutes max

* Measurement point: Center of the package body surface

(4) The above-recommended conditions were confirmed using the manufacture’s equipment and materials. However, when soldering these products, the soldering condition should be verified by customer using their equipment and materials.
For further information please contact:


CAUTION

This product contains 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.