HMC-C024

WIDEBAND DRIVER AMPLIFIER
MODULE, 10 MHz - 20 GHz

Features
- Gain: 15 dB
- Saturated Output Power: +24 dBm
- Spurious-Free Operation
- Regulated Supply and Bias Sequencing
- Hermetically Sealed Module
- Field Replaceable SMA connectors
- -55 to +85°C Operating Temperature

Typical Applications
The HMC-C024 Wideband Driver is ideal for:
- OC192 LN/MZ Modulator Driver
- Telecom Infrastructure
- Microwave Radio & VSAT
- Military & Space
- Test Instrumentation

General Description
The HMC-C024 is a GaAs MMIC PHEMT Distributed Driver Amplifier in a miniature, hermetic module with replaceable SMA connectors which operates between 10 MHz and 20 GHz. The amplifier provides 15 dB of gain, 3 to 4 dB noise figure and +24 dBm of saturated output power. Deviation from linear phase of only ±2 degrees from 0.01 to 10 GHz make the HMC-C024 ideal for OC192 fiber optic LN/MZ modulator driver applications. The wideband amplifier I/Os are in-ternally matched to 50 Ohms and are internally DC blocked. Integrated voltage regulators allow for flexible biasing of both the negative and positive supply pins, while internal bias sequencing circuitry assures robust operation.

Electrical Specifications, $T_A = +25^\circ C$, $+\text{Vdc} = +11V \text{ to } +16V$, $-\text{Vdc} = -3V \text{ to } -12V$

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Frequency Range</td>
<td>0.010 - 6.0</td>
<td>6.0 - 12.0</td>
<td>12.0 - 20.0</td>
<td>GHz</td>
<td></td>
<td></td>
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<tr>
<td>Gain</td>
<td>14</td>
<td>16</td>
<td>13</td>
<td>15</td>
<td>10</td>
<td>13</td>
<td>10</td>
<td>13</td>
<td>13</td>
<td>dB</td>
</tr>
<tr>
<td>Gain Flatness</td>
<td>±0.75</td>
<td>±0.75</td>
<td>±1.0</td>
<td>dB</td>
<td></td>
<td></td>
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<tr>
<td>Gain Variation Over Temperature</td>
<td>0.018</td>
<td>0.025</td>
<td>0.018</td>
<td>0.025</td>
<td>0.018</td>
<td>0.025</td>
<td>dB/°C</td>
<td></td>
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<tr>
<td>Noise Figure</td>
<td>3.5</td>
<td>3</td>
<td>3</td>
<td>dB</td>
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<td></td>
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<tr>
<td>Input Return Loss</td>
<td>19</td>
<td>17</td>
<td>17</td>
<td>dB</td>
<td></td>
<td></td>
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<tr>
<td>Output Return Loss</td>
<td>14</td>
<td>14</td>
<td>14</td>
<td>dB</td>
<td></td>
<td></td>
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<tr>
<td>Output Power for 1 dB Compression (P1dB)</td>
<td>20</td>
<td>24</td>
<td>19</td>
<td>23</td>
<td>17</td>
<td>20</td>
<td>dBm</td>
<td></td>
<td></td>
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<tr>
<td>Saturated Output Power (Psat)</td>
<td>26</td>
<td>25</td>
<td>25</td>
<td>dBm</td>
<td></td>
<td></td>
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<tr>
<td>Output Third Order Intercept (IP3)</td>
<td>33</td>
<td>30</td>
<td>25</td>
<td>dBm</td>
<td></td>
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<tr>
<td>Saturated Output Voltage</td>
<td>10</td>
<td>10</td>
<td>8</td>
<td>Vpk-pk</td>
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<tr>
<td>Group Delay</td>
<td>±3</td>
<td>±3</td>
<td>±3</td>
<td>ps</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Positive Supply Current (+IDC)</td>
<td>225</td>
<td>225</td>
<td>225</td>
<td>mA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative Supply Current (-IDC)</td>
<td>1.6</td>
<td>1.6</td>
<td>1.6</td>
<td>mA</td>
<td></td>
<td></td>
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</tbody>
</table>
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Gain & Return Loss

Gain vs. Temperature

Input Return Loss vs. Temperature

Output Return Loss vs. Temperature

Reverse Isolation vs. Temperature

Noise Figure vs. Temperature

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**Input OC-192 Eye Diagram** \[1\]/\[2\]

![Input OC-192 Eye Diagram](image1)

**Output OC-192 Eye Diagram** \[1\]/\[3\]

![Output OC-192 Eye Diagram](image2)

**Absolute Maximum Ratings**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Bias Supply Voltage (+Vdc)</td>
<td>+17V Max</td>
</tr>
<tr>
<td>Negative Bias Supply (-Vdc)</td>
<td>-16V Min.</td>
</tr>
<tr>
<td>RF Input Power (RFIN)</td>
<td>+23 dBm</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-65 to +150 °C</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-55 to +85 °C</td>
</tr>
</tbody>
</table>

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**Electrostatic Sensitive Device**

**Observe Handling Precautions**

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1. Test Conditions:
   - Pattern generated with an Agilent N4901B Serial BERT
   - Eye diagram data presented on an infiniium DCA 86100A.
   - Rate = 10.709 GB/s
   - Pseudo Random Code = 223-1
2. Vertical Scale = 200 mV/Div.

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# Pin Descriptions

<table>
<thead>
<tr>
<th>Pin Number</th>
<th>Function</th>
<th>Description</th>
<th>Interface Schematic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RFIN &amp; RF Ground</td>
<td>RF input connector, SMA female, field replaceable. This pin is AC coupled and matched to 50 Ohms.</td>
<td><img src="rfin.png" alt="Schematic" /></td>
</tr>
<tr>
<td>2</td>
<td>+Vdc</td>
<td>Positive power supply voltage for the amplifier.</td>
<td><img src="voltage_regulator.png" alt="Schematic" /></td>
</tr>
<tr>
<td>3</td>
<td>RFOUT &amp; RF Ground</td>
<td>RF output connector, SMA female. This pin is AC coupled and matched to 50 Ohms.</td>
<td><img src="rfout.png" alt="Schematic" /></td>
</tr>
<tr>
<td>4</td>
<td>-Vdc</td>
<td>Negative power supply voltage for the amplifier</td>
<td><img src="voltage_regulator.png" alt="Schematic" /></td>
</tr>
<tr>
<td>5</td>
<td>GND</td>
<td>Power supply ground.</td>
<td><img src="ground.png" alt="Schematic" /></td>
</tr>
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</table>
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Outline Drawing

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**Package Information**

<table>
<thead>
<tr>
<th>Package Type</th>
<th>C-3B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Package Weight $^{[1]}$</td>
<td>12 gms $^{[2]}$</td>
</tr>
<tr>
<td>Spacer Weight</td>
<td>N/A</td>
</tr>
</tbody>
</table>

$^{[1]}$ Includes the connectors
$^{[2]}$ ±1 gms Tolerance

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NOTES:

1. PACKAGE, LEADS, COVER MATERIAL: KOVAR™
2. SPACER MATERIAL: ALUMINUM
3. PLATING: ELECTROLYTIC GOLD 50 MICROINCHES MIN., OVER ELECTROLYTIC NICKEL 75 MICROINCHES MIN.
4. ALL DIMENSIONS ARE IN INCHES [MILLIMETERS].
5. TOLERANCES ±0.005 [0.13] UNLESS OTHERWISE SPECIFIED.
6. FIELD REPLACEABLE SMA CONNECTORS.
   TENSOLITE 5602 - 5CCSF OR EQUIVALENT.

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