**HMC-C004**

**WIDEBAND DRIVER AMPLIFIER MODULE, 10 MHz - 20 GHz**

### Features
- Gain: 15 dB
- Saturated Output Power: +24 dBm
- 50 Ohm Matched Input/Output
- Regulated Supply and Bias Sequencing
- Hermetically Sealed Module
- Field Replaceable SMA connectors
- -55 to +85˚C Operating Temperature

### General Description
The HMC-C004 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 self-biased amplifier provides 15 dB of gain, 3 to 4 dB noise figure and +24 dBm of saturated output power while requiring a single +12V supply. Gain flatness is excellent at ±0.5 dB as well as ± 2 deg deviation from linear phase from 0.01 to 10 GHz making the HMC-C004 ideal for OC192 fiber optic LN/MZ modulator driver applications. The wideband amplifier I/Os are internally matched to 50 Ohms and are internally DC blocked.

### Typical Applications
The HMC-C004 Wideband Driver is ideal for:
- OC192 LN/MZ Modulator Driver
- Telecom Infrastructure
- Microwave Radio & VSAT
- Military & Space
- Test Instrumentation

### Functional Diagram

![Functional Diagram](image)

### Electrical Specifications, \( T_A = +25^\circ C, \ Vs = +11.6V \text{ to } +12.4V \)

<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>
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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></td>
<td></td>
<td></td>
<td>dB</td>
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<tr>
<td>Gain Flatness</td>
<td>±0.5</td>
<td>±0.5</td>
<td>±0.5</td>
<td>±1.0</td>
<td>±1.0</td>
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<td>dB</td>
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<td>Gain Variation Over Temperature</td>
<td>0.012</td>
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<td>dB/°C</td>
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<td>3</td>
<td>4</td>
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<td>dB</td>
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<td>Input Return Loss</td>
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<td>17</td>
<td>10</td>
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<td></td>
<td></td>
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<td>dB</td>
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<tr>
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<td>10</td>
<td>10</td>
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<td>dB</td>
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<td>Output Power for 1 dB Compression (P1dB)</td>
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<td>23</td>
<td>19</td>
<td>22</td>
<td>17</td>
<td>20</td>
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<td></td>
<td></td>
<td>dBm</td>
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<tr>
<td>Saturated Output Power (Psat)</td>
<td>25</td>
<td>24</td>
<td>24</td>
<td>22</td>
<td>22</td>
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<td></td>
<td></td>
<td></td>
<td>dBm</td>
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<tr>
<td>Output Third Order Intercept (IP3)</td>
<td>33</td>
<td>30</td>
<td>30</td>
<td>26</td>
<td>26</td>
<td>26</td>
<td></td>
<td></td>
<td></td>
<td>dBm</td>
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<tr>
<td>Saturated Output Voltage</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
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<td>Vpk-pk</td>
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<tr>
<td>Group Delay</td>
<td>±3</td>
<td>±3</td>
<td>±3</td>
<td>±3</td>
<td>±3</td>
<td>±3</td>
<td></td>
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<td></td>
<td>ps</td>
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<tr>
<td>Spurious Response</td>
<td>-50</td>
<td>-60</td>
<td>-60</td>
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<td>dBc</td>
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Phone: 781-329-4700 • Order online at www.analog.com
Application Support: Phone: 1-800-ANALOG-D
**HMC-C004**

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### Gain & Return Loss

![Graph showing Gain & Return Loss](image)

### Gain vs. Temperature

![Graph showing Gain vs. Temperature](image)

### Input Return Loss vs. Temperature

![Graph showing Input Return Loss vs. Temperature](image)

### Output Return Loss vs. Temperature

![Graph showing Output Return Loss vs. Temperature](image)

### Reverse Isolation vs. Temperature

![Graph showing Reverse Isolation vs. Temperature](image)

### Noise Figure vs. Temperature

![Graph showing Noise Figure vs. Temperature](image)
For price, delivery, and to place orders, please contact Hittite Microwave Corporation:
20 Alpha Road Chelmsford, MA 01824 Phone: 978-250-3343 Fax: 978-250-3373
Order Online at www.hittite.com

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**P1dB vs. Temperature**

- **Psat vs. Temperature**
  - +25 C
  - +85 C
  - -55 C

**Output IP3 vs. Temperature**

- **Group Delay**
  - -200
  - -150
  - -100
  - -50
  - 0

**Deviation from Linear Phase**

- **Low Frequency Gain and Return Loss**
  - S21
  - S11
  - S22
**HMC-C004**

**WIDEBAND DRIVER AMPLIFIER
MODULE, 10 MHz - 20 GHz**

### 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>RFIN</td>
</tr>
<tr>
<td>2</td>
<td>Vs</td>
<td>Power supply voltage for the amplifier.</td>
<td>Vs</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>RFOUT</td>
</tr>
<tr>
<td>4</td>
<td>GND</td>
<td>Power supply ground.</td>
<td>GND</td>
</tr>
</tbody>
</table>

**Absolute Maximum Ratings**

<table>
<thead>
<tr>
<th>Bias Supply Voltage (Vs)</th>
<th>+11 Vdc to +13 Vdc</th>
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</thead>
<tbody>
<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>

**Input OC-192 Eye Diagram**

*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 = 2³⁴-1
Vertical Scale = 200 mV/Div.
Vertical Scale = 1 V/Div.

**Output OC-192 Eye Diagram**

**Electrostatic Sensitive Device
OBSERVE HANDLING PRECAUTIONS**

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Outline Drawing

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 ±.005 [0.13] UNLESS OTHERWISE SPECIFIED.
6. FIELD REPLACEABLE SMA CONNECTORS.
   TENSOLITE 5602 - 5CCSF OR EQUIVALENT.

Package Information

<table>
<thead>
<tr>
<th>Package Type</th>
<th>C-3</th>
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<tbody>
<tr>
<td>Spacer Weight</td>
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</tr>
</tbody>
</table>

[1] Includes the connectors
[2] ±1 gms Tolerance

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Notes: