Micram DAC7201 and DAC7202

72 GS/s Digital to Analog Converter Systems

Data Sheet

- 72 GS/s Sample rate per channel
- 22+ GHz Analogue Bandwidth
- Very fast (<10 ps) rise/fall time
- Low (<100 fs) typical intrinsic RMS jitter
- 1.8 V maximum differential output voltage
- Pristine signal integrity
- Supports Matlab or Python Application Programming Interface
DAC7201 and DAC7202 System Performance

- Single and Dual differential channels
- 22+ GHz Analogue Bandwidth (-3 dB point)
- Rise/Fall time (20%-80%) < 10 ps
- Ultra low intrinsic jitter (RJ< 100 fs)
- Sample Rate up < 72 GS/s on each channel
- Fully automatic channel to channel synchronization
- Output voltage up to 1.8 Vdiff pk-pk
- LAN controlled with simple Matlab or Python API
- Flexible, powerful and expandable

For visionary developers working to create the next generation of high speed communications technology, the Micram DAC7201 and DAC7202 systems deliver truly ultrafast signal generator performance.

Powered by the world record-setting Micram DAC3 UltraFastSiGe™ digital to analog converter, the DAC7202 enables researchers and engineers to generate high order complex modulation, such as 32-QAM, 64-QAM, OFDM and advanced 4D formats, at performance levels never previously achieved.

Example DAC7201 system output: 28 GBd PAM4 signal (56 Gb/s)

Example DAC7201 system output at 28 Gb/s, PRBS11 showing fast rise and fall times and extremely low jitter. Signal generated with 28 GS/s Sample Rate (1 sample/bit)

DAC7201: Single Channel 72 GS/s DAC System
Applications:

Coherent Optical Applications
Multi level signal generation up to 64 Gbps
High Speed SERDES Characterization
Advanced Electronic Research

USPA Board Architecture

Many channels often means many screens, confusing controls and a lot of time wasted. We’ve put everything you need for the DAC7201 and DAC7202 on one system; it’s easy to see all operational aspects in one glance, and changes can be made to channels individually, or all together. User custom setups can be easily saved and reload for future use.

Applications:

Coherent Optical Applications
Multi level signal generation up to 64 Gbps
High Speed SERDES Characterization
Advanced Electronic Research

USPA Board System Block Diagram

The DAC7202 provides fully automatic synchronization of two data output channels, industry-leading sampling performance of up to 72 GS/s with 22+ GHz analogue bandwidth and a powerful, fully integrated, easy to use MATLAB or Python programming interface.

Example: DAC7201 output of a 66 Gb/s PAM-4 signal showing fast rise and fall times and extremely low jitter.

DAC7202: Dual Channel 72 GS/s DAC System

USPA board with DAC3 module on board
DAC7201 and DAC7202 Specifications

Clocking requirement

Reference Clock Input
- Frequency: Half Rate, 7 GHz to 36 GHz
- Minimum Clock Power: 0 dBm
- Impedance: 50 Ω nominal, DC-coupled
- Connector: 2.92mm (K Connector), differential, module

Optional Reference Clock Output with CD3 Module
- Clock rate: /2, /4, /8, /16, /32
- Output type: 2.92 mm, differential, CD3 module
- Impedance: 50 Ω nominal, DC-coupled
- Amplitude: 400 mV typical

Data Output
- Analogue Bandwith: 22+ GHz at -3dB
- Number of Channels: 1 (DAC7201) and 2 (DAC7202)
- Data Ouput Connectors: 1.85 mm
- Sample Rate: 14 GS/s to 72 GS/s
- DAC Resolution: 6 bits, non-interleaved
- Data output: Differential, DC coupled, CML Logic
- ENOB: 4.5 bits @ 22 GHz
- Number of DAC channels per board: 1
- Output Patterns: arbitrary
- PRBS patterns (NRZ): PRBS 2^n-1, n=7, 9, 10, 11, 15, 23, 31
- Multi level: PAM-4 & PAM-8
- User Definable: 9 Mpts/channel
- Channel to Channel Skew: < 300 fs/channel
- Output skew control: fully automatic
- Output Voltage: 400 mV to 1800 mV pk-pk differential, DC Coupled
- Resolution: 12.7 mV @ 0.8 Vpk-pk (single ended)
- Intrinsic Jitter: < 100 fs typical
- Rise/fall times (20%-80%): < 12 ps typical
- Output Impedance: 50 Ohm, 100 Ohm differential

Micram CD3 module: 36 GHz clock distribution module and programmable divider. This component is necessary for the automatic channel to channel alignment function.
DAC7201 and DAC7202 Specifications, continued

**General**

- **Control software**: Requires PC running Windows® OS Version 7 or later and Matlab version R2013 (or later version) or WinPython-32bit-3.5.1.3
- **Interfaces**: 10/100M Ethernet
- **Included power supply**: 100 V to 240 V AC, 48 Volt DC, 50-60 Hz,
- **Operating temperature**: 10°C to 30°C
- **Dimensions (W x H x D)**: Bench top 133.35 mm H x 449 mm W x 435 mm D (5.25” H x 17.67” W x 17.13” D)
- **Weight**: 22 lbs (10 kg)
- **Warranty**: 1 year standard

**Included Accessories**

- User guide with programming reference, Matlab and Python API with board sample scripts on CD Rom
- DAC specific calibration files on CD Rom
- Metal Base Plate with cooling fan

**DAC3 Analogue Bandwith as derived from a single ended full-scale 800 mV step response; positive and negative edges**

![Graph](image1)

**ENoB = (SINAD - 1.76)/6.02 as derived from a single-ended full-scale Sinewave Synthesis. ENoB measured at full Nyquist Bandwidth (36 GHz) without correction for inherent sinc roll-off.**

![Graph](image2)
**Ordering Information**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAC7201</td>
<td>1 channel 72 GS/s DAC board system. 1 year warranty included</td>
</tr>
<tr>
<td>DAC7202</td>
<td>2 channel 72 GS/s DAC Board system. 1 year warranty included</td>
</tr>
<tr>
<td>DAC7201-3W</td>
<td>3 years total warranty for DAC7201 system</td>
</tr>
<tr>
<td>DAC7202-3W</td>
<td>3 years total warranty for DAC7202 system</td>
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</tbody>
</table>

**Other Micram products**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>DAC10001</td>
<td>Single channel 100 GS/s DAC4 System</td>
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<tr>
<td>DAC10002</td>
<td>Dual channel 100 GS/s DAC4 System</td>
</tr>
<tr>
<td>ADC3402</td>
<td>Dual channel 34 GS/s ADC acquisition system</td>
</tr>
<tr>
<td>DAC3401</td>
<td>Single channel 34 GS/s DAC2 System</td>
</tr>
<tr>
<td>DAC3402</td>
<td>Dual channel 34 GS/s DAC2 System</td>
</tr>
<tr>
<td>MX2180</td>
<td>80 Gbps 2:1 Multiplexer</td>
</tr>
<tr>
<td>CDR8086</td>
<td>80 Gbps 1:2 De-Mux and clock to data recovery</td>
</tr>
<tr>
<td>DFF60/DFF30</td>
<td>Flip flop 30/60 GHz</td>
</tr>
<tr>
<td>FD60</td>
<td>Frequency Divider</td>
</tr>
<tr>
<td>CD3</td>
<td>Clock Distributor/Divider</td>
</tr>
</tbody>
</table>

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**About us**

Micram Microelectronic GmbH is an independent fabless whole-service provider for high performance ASIC solutions. It is a privately owned company, located in the Technology Quarter, in close vicinity to the Ruhr-University Bochum.

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