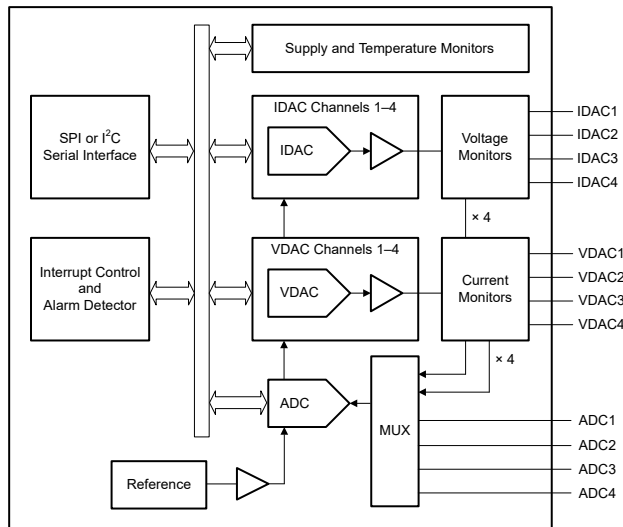# AMC6V704 4-Channel Optical Monitor and Controller With Current and Voltage Output DACs and Multichannel ADC

1 Features

- Four 12-bit current output DACs (IDACs)
  - 200mA full-scale output range
  - Low supply headroom: 300mV at 200mA
- Four 12-bit voltage output DACs (VDACs)
  - Selectable full-scale output ranges: –5V, –2.5V, +2.5V and +5V
  - High-current drive capability: ±50mA
- Multichannel, 12-bit, 1MSPS SAR ADC
  - Four external inputs: 2.5V and 5V ranges
  - Four IDAC voltage monitor channels
  - Four VDAC current monitor channels
  - Programmable sequencer
  - Programmable out-of-range alarms
- Internal 2.5V reference
- Supply and temperature fault alarms
- SPI and I^{2}C interfaces: 1.7V to 3.6V operation
  - SPI: 4-wire interface
  - I^{2}C: Four target addresses
- Specified temperature range: –40°C to +125°C

2 Applications

- Optical module
- Intra-DC interconnect (metro)

Simplified Schematic

3 Description

The AMC6V704 is a highly integrated, low-power analog monitor and controller for optical-transceiver applications.

The AMC6V704 includes four, 12-bit current-output digital-to-analog converters (IDACs) and four, 12-bit voltage-output DACs (VDACs) with programmable output ranges. The device also includes a 12-bit, 1MSPS analog-to-digital converter (ADC) used for external and internal signal monitoring, supply and temperature alarm monitors, and a high-precision internal reference.

The AMC6V704 VDACs support both positive and negative output-range operation and are capable or sourcing and sinking up to 50mA, making them an excellent choice for biasing optical modulators. Additionally, the AMC6V704 IDACs support a full-scale output range of 200mA with very-low power dissipation. The IDACs eliminate the need for external components to bias laser diodes. In combination, the AMC6V704 four VDACs and four IDACs enable accurate biasing of electro-absorption modulated lasers.

The AMC6V704 also includes four input pins that are multiplexed to the ADC and incorporate a low-latency window comparator. These features make this device an excellent choice for received signal strength indicator (RSSI) and loss-of-signal (LOS) detection. The ADC is also capable of measuring the voltage at the IDAC pins, as well as the current sourced or sunk by the VDACs, thus enabling these outputs to be monitored.

The AMC6V704 low-power, high-integration, very small size, and wide operating temperature range make this device an excellent choice as an all-in-one control circuit for optical modules.

Package Information

PART NUMBER	PACKAGE[1]	PACKAGE SIZE[2]
AMC6V704	YBH (DSBGA, 36)	2.555mm × 2.555mm

(1) For more information, see Section 6.
(2) The package size (length × width) is a nominal value and includes pins, where applicable.

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4 Device and Documentation Support

4.1 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on ti.com. Click on *Notifications* to register and receive a weekly digest of any product information that has changed. For change details, review the revision history included in any revised document.

4.2 Support Resources

TI E2E™ support forums are an engineer's go-to source for fast, verified answers and design help — straight from the experts. Search existing answers or ask your own question to get the quick design help you need.

Linked content is provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's Terms of Use.

4.3 Trademarks

TI E2E™ is a trademark of Texas Instruments.
All trademarks are the property of their respective owners.

4.4 Electrostatic Discharge Caution

This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

4.5 Glossary

TI Glossary   This glossary lists and explains terms, acronyms, and definitions.

5 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

DATE	REVISION	NOTES
August 2024	*	Initial Release

6 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

Product Folder Links: *AMC6V704*

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
AMC6V704YBHR	ACTIVE	DSBGA	YBH	36	3000	RoHS & Green	SNAGCU	Level-1-260C-UNLIM	-40 to 125	AMC6V704	Samples

(1) The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.
OBSOLETE: TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".
RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.
Green: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead finish/Ball material - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

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In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

TAPE AND REEL INFORMATION

REEL DIMENSIONS

TAPE DIMENSIONS

A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE

*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
AMC6V704YBHR	DSBGA	YBH	36	3000	180.0	8.4	2.71	2.71	0.6	4.0	8.0	Q1

TAPE AND REEL BOX DIMENSIONS

*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
AMC6V704YBHR	DSBGA	YBH	36	3000	182.0	182.0	20.0

B E A

BALL A1
CORNER

D

0.4 MAX

C

SEATING PLANE

BALL TYP

0.16
0.10

⌒ 0.05 C

2 TYP

SYMM
℄

SYMM
℄

2
TYP

D: Max = 2.585 mm, Min =2.524 mm

E: Max = 2.585 mm, Min =2.524 mm

0.4 TYP

F E D C B A

1 2 3 4 5 6

36X ⌀ 0.225
0.185

⊕ 0.015 Ⓜ C A B

0.4 TYP

4225648/A   01/2020
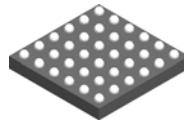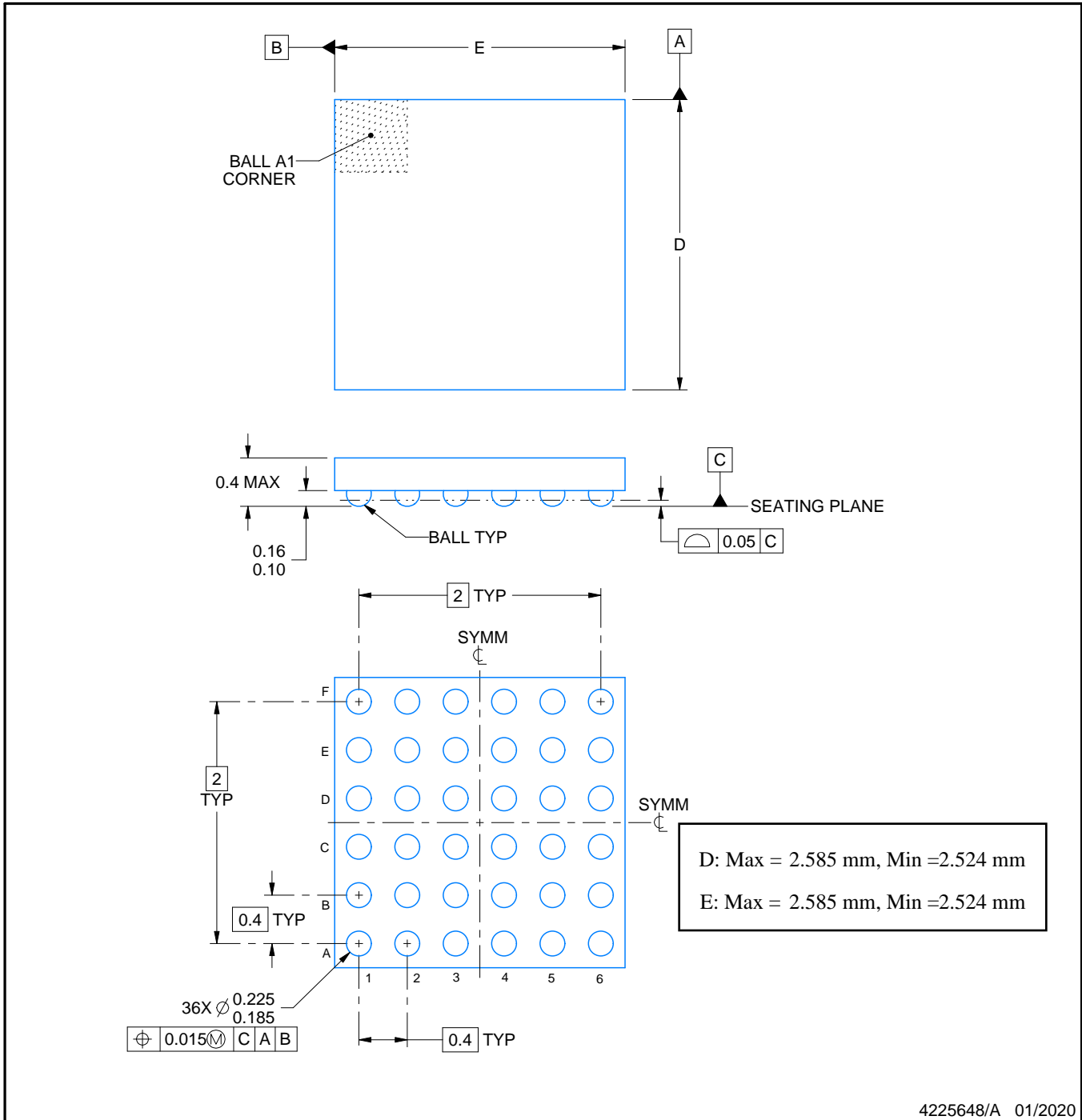
NOTES:

1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing
   per ASME Y14.5M.
2. This drawing is subject to change without notice.

(0.4) TYP

36X (∅ 0.2)

(0.4) TYP

1 2 3 4 5 6

A
B
C
D
E
F

SYMM
℄

SYMM
℄
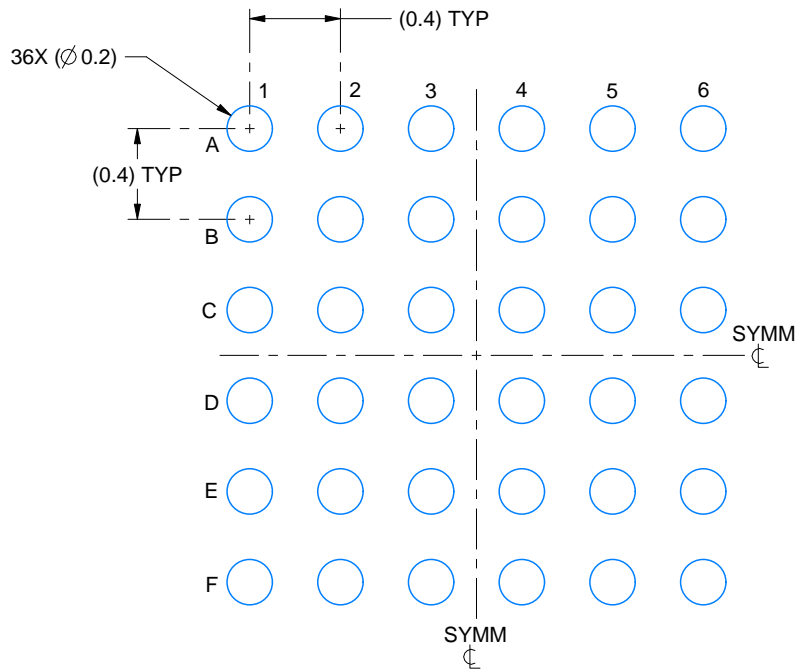
LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 30X

0.05 MAX

(∅ 0.2)
METAL

SOLDER MASK
OPENING

EXPOSED
METAL

NON-SOLDER MASK
DEFINED
(PREFERRED)

0.05 MIN

METAL UNDER
SOLDER MASK

(∅ 0.2)
SOLDER MASK
OPENING

EXPOSED
METAL

SOLDER MASK
DEFINED
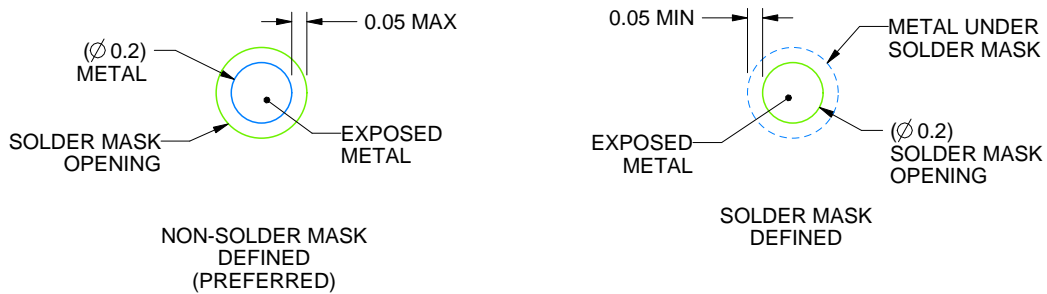
SOLDER MASK DETAILS
NOT TO SCALE

4225648/A   01/2020

NOTES: (continued)

3. Final dimensions may vary due to manufacturing tolerance considerations and also routing constraints.
   See Texas Instruments Literature No. SNVA009 (www.ti.com/lit/snva009).

YBH0036

36X (□ 0.21)

(0.4) TYP

(R0.05) TYP

(0.4) TYP

METAL TYP

SYMM ℄

SYMM ℄
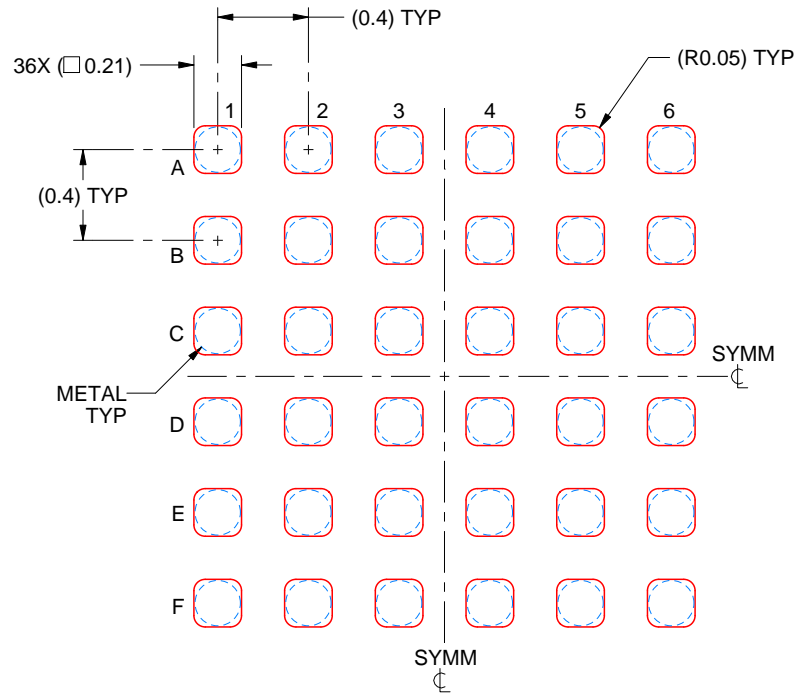
SOLDER PASTE EXAMPLE
BASED ON 0.075 mm THICK STENCIL
SCALE: 30X

4225648/A   01/2020

NOTES: (continued)

4. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release.

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