Product/Process Change Notice - PCN 23_0062 Rev. -

Analog Devices, Inc. One Analog Way, Wilmington, MA 01887, USA

This notice is to inform you of a change that will be made to certain ADI products (see Appendix A) that you may have purchased in the last 2 years. **Any inquiries or requests with this PCN (additional data or samples) must be sent to ADI within 30 days of publication date.** ADI contact information is listed below.

PCN Title:	ADPA7005 Die and Data Sheet Revision
Publication Date:	09-Jun-2023
Effectivity Date:	11-Sep-2023 *(the earliest date that a customer could expect to receive changed material)*
Revision Description:	Initial Release.

Description Of Change:

1. Modify die to increase detector range.
2. Data Sheet Changes:
-->The HBM ESD rating will change from: 500V to 250V.
-->Add frequency band "Gain flatness" and "Gain variation" over temperature change slightly.
-->A new frequency band is established, 20 GHz to 22 GHz. The old frequency band was 20 GHz to 34 GHz.

Reason For Change:

1. Die changed to improve RF detector performance.
2. Data sheet is being revised to reflect actual product performance.

Impact of the change (positive or negative) on fit, form, function & reliability:

No change to fit, form, or function. Improved RF detector performance.

Summary of Supporting Information:

Qualification has been performed per Industry Standard Test Methods. See attached Qualification Report.

Data Sheet changes will be reflected in Product Data Sheet Revision A.

Supporting Documents

Attachment 1: Type: Datasheet Specification Comparison

ADI_PCN_23_0062_Rev_-_ADPA7005_Specification Changes.pdf...

Attachment 2: Type: Qualification Results Summary

ADI_PCN_23_0062_Rev_-_Qualification Report.pdf...

Note: If applicable, the device material declaration will be updated due to material change.

ADI Contact Information:

For questions on this PCN, please send an email to the regional contacts below or contact your local ADI sales representatives.

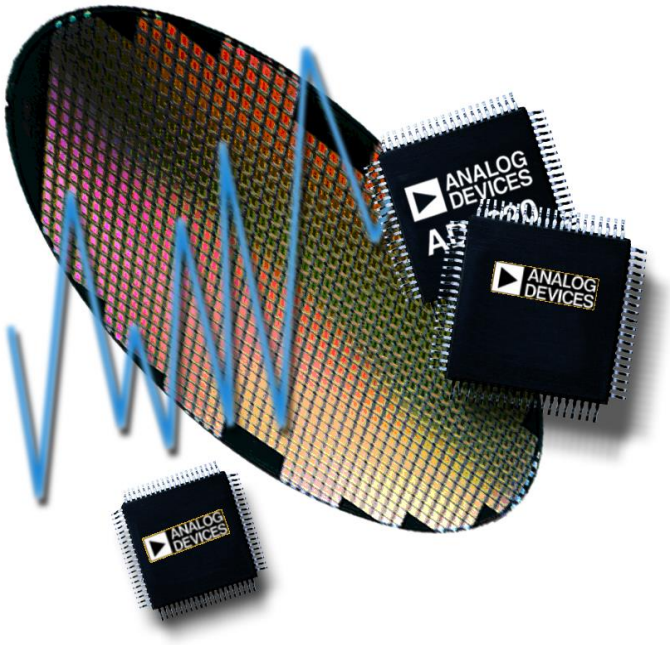
Americas:	Europe:	Japan:	Rest of Asia:
PCN_Americas@analog.com	PCN_Europe@analog.com	PCN_Japan@analog.com	PCN_ROA@analog.com

Appendix A - Affected ADI Models:

Added Parts On This Revision - Product Family / Model Number (1)

ADPA7005 / ADPA7005CHIP

Appendix B - Revision History:			
Rev	**Publish Date**	**Effectivity Date**	**Rev Description**
Rev. -	09-Jun-2023	11-Sep-2023	Initial Release.



Reliability Report

Report Title: ADPA7005 New Product Qualification

Report Number: 18482

Revision: A

Date: 21 April 2023

Summary

This report documents the successful completion of the reliability qualification requirements for the release of the ADPA7005 product in an 18-LCC_HS package. The ADPA7005 is a gallium arsenide (GaAs), pseudomorphic high electron mobility transistor (pHEMT), monolithic microwave integrated circuit (MMIC), 32 dBm saturated output power (PSAT), >1 W, power amplifier, with an integrated temperature compensated, on chip power detector that operates between 18 GHz and 44 GHz.

Die/Fab Product Characteristics

Table 1: Die/Fab Product Characteristics

Product Characteristics	Product
Generic	ADPA7005
Die Id	N2301
Die Size (mm)	3.50 x 3.50
Wafer Fabrication Process	GaAs pHEMT
Die Substrate	GaAs
Passivation	SiN

Die/Fab Test Results

Table 2: Die/Fab Test Results - GaAs pHEMT

Test Name	Spec	Conditions	Generic	Lot #	Fail/SS
High Temperature Operating Life (HTOL)	JESD22-A108	125°C<Tj<135°C, Biased, 1,000 Hours	HMC907APM5E	Q12971.1	0/45
				Q12971.3	0/45
			HMC994APM5E	Q12726.10	0/45
		135°C<Tj<150°C, 1,000 Hours		Q12726.25	0/45
		150°C<Tj<175°C, Biased, 1,000 Hours	HMC797APM5E	Q12907.11	0/45
				Q12907.12	0/45
			HMC906A	Q12910.3	0/45
			HMC5622ALSH7	Q11814.11	0/77
				Q11814.12	0/77
				Q11814.13	0/77
High Temperature Storage Life (HTSL)	JESD22-A103	150°C, 1,000 Hours	ADPA7002	Q13958.HS1	0/77
			ADPA7005	Q16365.HS1	0/77
			ADPA7006	Q16366.HS1	0/77
			ADPA7007	Q13969.HS1	0/77

Package/Assembly Product Characteristics

Table 3: Package/Assembly Product Characteristics - 18-LCC_HS

Product Characteristics	Product
Generic	ADPA7005
Package	18-LCC_HS
Body Size (mm)	7.00 x 7.00 x 1.32
MSL/Peak Reflow Temperature(°C)	3 / 260°C
Mold Compound	N/A
Die Attach	Namics XH9890-6A
Leadframe Material	Alumina Ceramic
Lead Finish	NiAu
Wire Bond Material/Diameter (mils)	4N Gold / 1.00

Package/Assembly Test Results

Table 4: Package/Assembly Test Results - LCC_HS

Test Name	Spec	Conditions	Generic/Root Part #	Lot #	Fail/SS
High Temperature Storage Life (HTSL)	JESD22-A103	150°C, 1,000 Hours	ADPA7002	Q13958.HS1	0/77
			ADPA7005	Q16365.HS1	0/77
			ADPA7006	Q16366.HS1	0/77
			ADPA7007	Q13969.HS1	0/77
Solder Heat Resistance (SHR)	J-STD-020	MSL-3	ADPA7005	Q18482.1.SH1	0/30
Temperature Cycling (TC)[1]	JESD22-A104	-65°C/+150°C, 500 Cycles	ADPA7002	Q13958.6	0/77
				Q13958.TC1	0/77
			ADPA7005	Q13992.7	0/77
				Q16365.TC1	0/77
			ADPA7006	Q13993.TC1	0/77
				Q16366.TC1	0/77
			ADPA7007	Q13969.TC1	0/77
			HMC7229LS6	Q11686.4	0/77
				Q11686.5	0/77

[1] These samples were subjected to preconditioning at MSL 3 with 3x reflow peak temp of 260°C prior to the start of the stress test.

ESD and Latch-Up Test Results

Table 5: ESD Test Result

ESD Model	Generic/Root Part #	Package	ESD Test Spec	RC Network	Highest Pass Level	Class
FICDM	ADPA7005	18-LCC_HS	JS-002	1Ω, Cpkg	±500V	C2a
HBM	ADPA7005	18-LCC_HS	ESDA/JEDEC JS-001	1.5kΩ, 100pF	±250V	1A

Approvals

Reliability Engineer: Carl Bunis

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ADPA7005 Specification Changes

▶ OLD SPECIFICATIONS

SPECIFICATIONS

20 GHz TO 34 GHz FREQUENCY RANGE

T_A = 25°C, V_{DD} = 5 V, and quiescent supply current (I_{DQ}) = 1200 mA for nominal operation, unless otherwise noted.

Table 1.

Parameter	Symbol	Min	Typ	Max	Unit	Test Conditions/Comments
FREQUENCY RANGE		20		34	GHz	
GAIN		15	17		dB	
Gain Flatness			±0.5		dB	
Gain Variation Over Temperature			0.012		dB/°C	
NOISE FIGURE			7		dB	
RETURN LOSS						
Input			18		dB	
Output			20		dB	
OUTPUT						
Output Power for 1 dB Compression	P1dB	28	31		dBm	
Saturated Output Power	P_{SAT}		32		dBm	
Output Third-Order Intercept	IP3		41		dBm	Measurement taken at output power (P_{OUT}) per tone = 14 dBm
SUPPLY						
Current	I_{DQ}		1200		mA	Adjust the gate bias voltage (V_{GG1}) between −1.5 V up to 0 V to achieve the desired I_{DQ}
Voltage	V_{DD}	4	5		V	

▶ New Specifications

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20 GHZ TO 22 GHZ FREQUENCY RANGE

T_A = 25°C, V_{DD} = 5 V, and quiescent supply current (I_{DQ}) = 1200 mA for nominal operation, unless otherwise noted.

Table 1.

Parameter	Symbol	Min	Typ	Max	Unit	Test Conditions/Comments
FREQUENCY RANGE		20		22	GHz	
GAIN			16.5		dB	
Gain Flatness			±0.7		dB	
Gain Variation Over Temperature			0.012		dB/°C	
NOISE FIGURE			9		dB	
RETURN LOSS						
Input			21		dB	
Output			24		dB	
OUTPUT						
Output Power for 1 dB Compression	P1dB		28.5		dBm	
Saturated Output Power	P_{SAT}		30		dBm	
Output Third-Order Intercept	IP3		38.5		dBm	Measurement taken at output power (P_{OUT}) per tone = 14 dBm
SUPPLY						
Current	I_{DQ}		1200		mA	Adjust the gate bias voltage (V_{GG1}) between −1.5 V up to 0 V to achieve the desired I_{DQ}
Voltage	V_{DD}	4	5		V	

22 GHZ TO 34 GHZ FREQUENCY RANGE

T_A = 25°C, V_{DD} = 5 V, and quiescent supply current (I_{DQ}) = 1200 mA for nominal operation, unless otherwise noted.

Table 2.

Parameter	Symbol	Min	Typ	Max	Unit	Test Conditions/Comments
FREQUENCY RANGE		22		34	GHz	
GAIN		15	17		dB	
Gain Flatness			±0.6		dB	
Gain Variation Over Temperature			0.023		dB/°C	
NOISE FIGURE			7		dB	
RETURN LOSS						
Input			18		dB	
Output			20		dB	
OUTPUT						
Output Power for 1 dB Compression	P1dB	28	30.5		dBm	
Saturated Output Power	P_{SAT}		32		dBm	
Output Third-Order Intercept	IP3		41		dBm	Measurement taken at output power (P_{OUT}) per tone = 14 dBm
SUPPLY						
Current	I_{DQ}		1200		mA	Adjust the gate bias voltage (V_{GG1}) between −1.5 V up to 0 V to achieve the desired I_{DQ}
Voltage	V_{DD}	4	5		V	