ANALOG DEVICES

MMIC Mixer, 6-18GHz Die

ADH141S

1.0 SCOPE

This specification documents the detail requirements for space qualified die per MIL-PRF-38534 class K except as modified herein.

The manufacturing flow described in the SPACE DIE BROCHURE is to be considered a part of this specification.

This datasheet specifically details the space grade version of this product. A more detailed operational description and a complete datasheet for commercial product grades can be found at www.analog.com/HMC141

2.0 Part Number. The complete part number(s) of this specification follow:

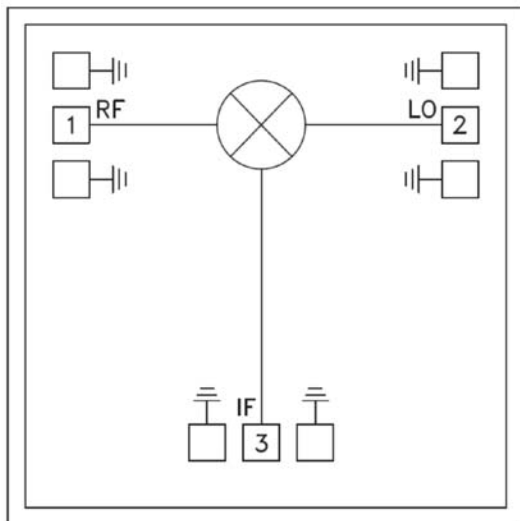
Part Number	Description
HMC8804	MMIC Mixer, 6-18GHz Die

3.0 Die Information

3.1 Die Dimensions

Die Size	Die Thickness	Bond Pad and Backside Metalization
60 mil x 60 mil	4 mil ± 0.5 mil	Au

3.2 Die Picture



1. RF (AC coupled, matched to 50 Ohms)
2. LO (AC coupled, matched to 50 Ohms)
3. IF (DC coupled)

- For applications not requiring operation to DC, port should be DC blocked externally using series capacitor with value chosen to pass necessary IF frequency range
- For operation to DC, pin must not source/sink more than 2mA else malfunction or possible failure will result

Backside (must be connected to RF/DC GND)

No connection required for unlabeled bond pads

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3.3 Absolute Maximum Ratings 1/

- RF/IF Input..........+20 dBm
- LO Drive..........+27 dBm
- Channel Temperature.......... 150°C
- IF DC Current..........±2 mA
- Thermal Resistance (Junction to Die Bottom)..........101.7°C/W
- Ambient Operating Temperature Range (T_A)..........-40°C to +85°C
- Storage Temperature..........-65°C to +150°C

Absolute Maximum Ratings Notes:

1/ Stresses above the absolute maximum rating may cause permanent damage to the device. Extended operation at the maximum levels may degrade performance and affect reliability.

4.0 Die Qualification

In accordance with class-K version of MIL-PRF-38534, Appendix C, Table C-II, except as modified herein.

(a) Pre-screen test post assembly required prior to die qualification, to remove all assembly related rejects.

(b) Mechanical Shock or Constant Acceleration not performed; die qualification is performed in an open carrier.

(c) Interim and post burn-in electrical tests will include static tests screened at +25°C only.

Table I - Dice Electrical Characteristics

Parameter	Symbol	Conditions 1/, 2/, 3/, 50 Ω System, IF = DC – 6GHz	Limit Min	Limit Max	Units
Conversion Loss	CL	RF&LO = 6-16 GHz, IF = 0.1 & 1.0 GHz RF&LO = 6-16 GHz, IF = 3.0 & 6.0 GHz RF&LO = 16-18 GHz, IF = 0.1 & 1.0 GHz RF&LO = 16-18 GHz, IF = 3.0 & 6.0 GHz		11 13 12 14	dB
LO to RF Isolation	Iso_{LO-RF}	RF&LO = 6-16 GHz RF&LO = 16-18 GHz	27 25		dB
LO to IF Isolation	Iso_{LO-IF}	RF&LO = 6-16 GHz RF&LO = 16-18 GHz	20 13		dB
RF to IF Isolation	Iso_{RF-IF}	RF&LO = 6-16 GHz RF&LO = 16-18 GHz	8 15		dB

Table I Notes:

1/ Limits apply at +25°C only.
2/ Tested as Down Converter only
3/ S-par data to be tabulated at 6, 12, 16, and 18GHz only
- a. RF: 6 – 20 GHz, 1 GHz steps, Pin = -10 dBm
- b. LO: 7-21 GHz, 1GHz steps, Pin = +20 dBm
- c. IF: 1 GHz

Table II - Electrical Characteristics for Qual Samples						
Parameter	**Symbol**	**Conditions 1/ 2/ 3/ 4/ -40°C ≤ T_A ≤ 85°C unless otherwise specified, 50 Ohm System, IF = DC – 6GHz**	**Sub-groups**	**Min Limit**	**Max Limit**	**Units**
Conversion Loss	CL	RF&LO = 6-16 GHz	4		11	dB
			5,6		12	
		RF&LO = 16-18 GHz	4		12	
			5,6		12.5	
LO to RF Isolation	Iso_{LO-RF}	RF&LO = 6-16 GHz	4,5,6	27		dB
		RF&LO = 16-18 GHz	4	25		
			5,6	23		
LO to IF Isolation	Iso_{LO-IF}	RF&LO = 6-16 GHz	4,5,6	20		dB
		RF&LO = 16-18 GHz	4,5,6	13		
RF to IF Isolation	Iso_{RF-IF}	RF&LO = 6-16 GHz	4,5,6	8		dB
		RF&LO = 16-18 GHz	4,5,6	15		
Input Third Order Intercept Point	IIP3	RF&LO = 6-16 GHz	4,5,6	15		dBm
		RF&LO = 16-18 GHz	4,5,6	20		
Input 1dB Compression	IP1dB	RF&LO = 6-16 GHz	4	11		dBm
			5,6	10		
		RF&LO = 16-18 GHz	4	13		
			5,6	12		

Table II Notes:

1/ Pre burn-in and Post burn-in electrical require S-parameter testing only as defined. Final electrical tests shall incorporate additional tests as defined.
2/ Temperature testing required for Final Electrical testing only
3/ S-par data to be tabulated at 6, 12, 16, and 18 GHz only
- RF: 6 – 20 GHz, 1 GHz steps, Pin = -10 dBm
- LO: 7 – 21 GHz, 1 GHz steps, Pin = +20 dBm
- IF: 1 GHz

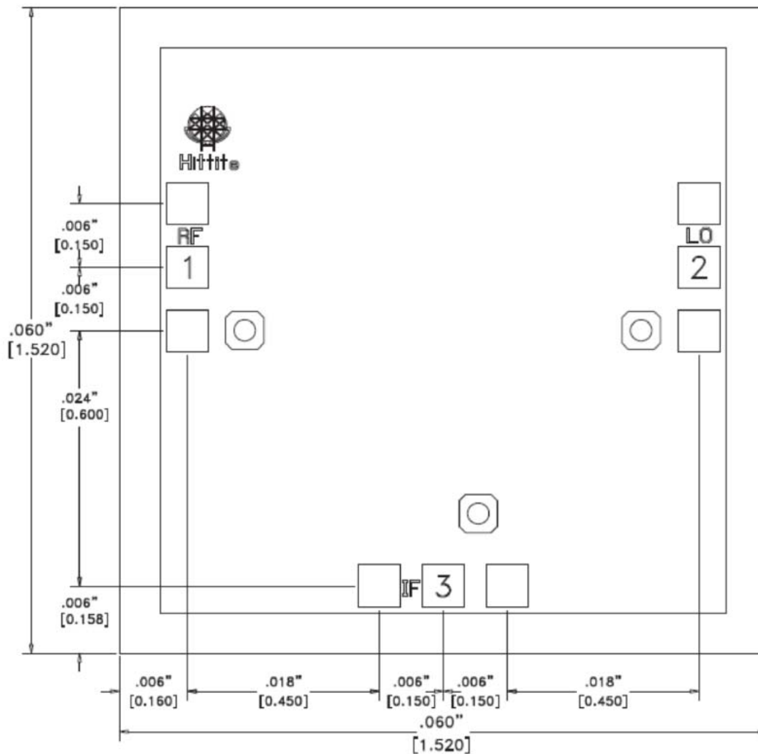
4/ IP3, P1dB to be tabulated at 6, 12, 16, and 18 GHz only
- RF: 6 – 20 GHz, 2 GHz steps, Pin = -10 dBm
- LO: 7 – 21 GHz, 2 GHz steps, Pin = +20 dBm
- IF: 1 GHz

Table III - Endpoint and Delta Limits (+25°C) (Product is tested in accordance with Table II with the following exceptions)						
Parameter	**Symbol**	**Sub-groups**	**End-point**		**Delta**	**Units**
			Min	**Max**		
Conversion Loss	CL	4		11	±0.5	dB

Table III Notes:

1/ Table II limits will not be exceeded
2/ 240 hour burn in and Group C end point electrical parameters. Deltas are performed at T_A = 25°C

5.0 **Die Outline**



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Backside (must be connected to RF/DC GND)
No connection required for unlabeled bond pads

NOTES:
1. ALL DIMENSIONS ARE IN INCHES [MM].
2. DIE THICKNESS IS .004".
3. TYPICAL BOND PAD IS .004" SQUARE.
4. BACKSIDE METALLIZATION: GOLD.
5. BOND PAD METALLIZATION: GOLD.
6. BACKSIDE METAL IS GROUND.
7. CONNECTION NOT REQUIRED FOR UNLABELED BOND PADS.

Rev	Description of Change	Date
A	Initiate	27-October-2015
B	Add note to exceptions list to clarify test temperatures for interim and post burn-in electrical tests	4-June-2019

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