

### 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/HMC232](http://www.analog.com/HMC232)

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

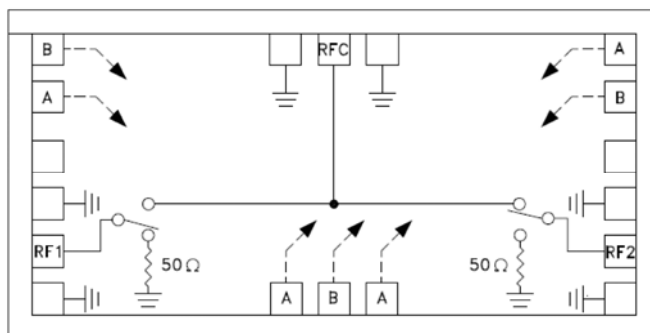
Part Number	Description
HMC8800	DC-15GHz High Isolation SPDT Switch Die

### 3.0 Die Information

#### 3.1 Die Dimensions

Die Size	Die Thickness	Bond Pad and Backside Metalization
41 mil x 81 mil	4 mil $\pm$ 0.5 mil	Au

#### 3.2 Die Picture



Control Input		Signal Path State	
A	B	RFC to RF1	RFC to RF2
High	Low	ON	OFF
Low	High	OFF	ON

Caution: Do not "Hot Switch" power levels greater than +26 dBm (VCTL = 0/-5 VDC)

- RF1\*
- A\*\*
- B\*\*
- RFC\*
- A\*\*
- B\*\*
- RF2\*
- A\*\*
- B\*\*
- A\*\*

- Die bottom must be connected to RF ground
- No connection required for unlabeled pads
- \* (DC coupled, matched to 50 ohms, blocking cap required if RF line potential not equal to 0V)
- \*\* Using any one of the A and any one of the B Pads connection is acceptable

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Rev. D

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## 3.3 Absolute Maximum Ratings 1/

RF Input Power ( $V_{ctl} = -5V$ ) (0.5 – 15GHz) .....	+30dBm (@ +50°C)
Control Voltage Range (A & B) .....	+1 V to -7.5 Vdc
Channel Temperature .....	150°C
Thermal resistance .....	92°C/W
Storage Temperature .....	-65°C to +150°C
Operating Temperature .....	-55°C to +85°C
ESD Sensitivity (HBM) .....	Class 1A

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/, 4/ 50 $\Omega$ System	Limit Min	Limit Max	Units
Insertion Loss	IL	DC – 6 GHz DC – 10 GHz DC – 15 GHz		1.6 2.2 2.9	dB
Isolation	Iso	DC – 6 GHz DC – 10 GHz DC – 15 GHz	50 45 40		dB
Return Loss “On State”	S11(on)	DC – 6 GHz DC – 15 GHz	17 9		dB
Return Loss RF1, RF2 “Off State”	S11(off)	DC – 6 GHz DC – 15 GHz	12 9		dB
Input Power for 1dB Compression	IP1dB	0.5 – 15 GHz	21		dBm

Table I Notes:

1/ Limits apply at +25°C only.

2/ Tested with VCTLA/B Low = -0.2V, High = -5V

3/ S-par data to be tabulated at 50MHz and every 1GHz, 1GHz to 15GHz. Pin = -25dBm

4/ P1dB shall be measured at 5GHz, 10GHz, 15GHz, Go-No-Go

**Table II - Electrical Characteristics for Qualification Samples**

Parameter	Symbol	Conditions <u>1/</u> , <u>2/</u> , <u>3/</u> , <u>4/</u> , <u>5/</u> , <u>6/</u> -40°C ≤ T <sub>A</sub> ≤ 85°C, 50 ohm system unless otherwise specified	Sub-groups	Min Limit	Max Limit	Units
Insertion Loss	IL	DC – 6.0 GHz	4		1.6	dB
			5,6		1.7	
		DC – 10.0 GHz	4		2.2	
			5,6		2.3	
		DC – 15.0 GHz	4		2.9	
			5,6		3.0	
Isolation	ISO	DC – 6.0 GHz	4,5,6	55		dB
		DC – 10.0 GHz	4,5,6	50		
		DC – 15.0 GHz	4,5,6	45		
Return Loss “On State”	RL(on)	DC – 6.0 GHz	4	18		dB
			5,6	17		
		DC – 15.0 GHz	4,5,6	12		
Return Loss RF1, RF2, “Off State”	RL(off)	DC – 6.0 GHz	4,5,6	14		dB
		DC – 15.0 GHz	4,5,6	12		
Input Power for 1dB Compression	IP1dB	0.5 – 15.0 GHz	4,5,6	21		dBm
Input Third Order Intercept (Two-Tone P <sub>IN</sub> = 7 dBm each tone, 1MHz Separation)	IIP3	0.5 – 15.0 GHz	4,5,6	42		dBm

Table II Notes:

- 1/ Pre burn-in and Post burn-in electrical require S-parameter testing only as defined. Final electrical tests shall incorporate power tests as defined.  
2/ Temperature testing required for Final Electrical testing only  
3/ Tested with VCTLA/B Low = -0.2 V, High = -5 V  
4/ S-par data to be tabulated at 50MHz and every 1 GHz, 1 GHz to 15 GHz. Pin = -25 dBm  
5/ P1dB shall be measured at 1 GHz to 15 GHz, 2 GHz steps  
6/ IP3 shall be measured at 1 GHz to 15GHz, 2 GHz steps

**Table III - Endpoint and Delta Limits (+25°C)****(Product is tested in accordance with Table II with the following exceptions)**

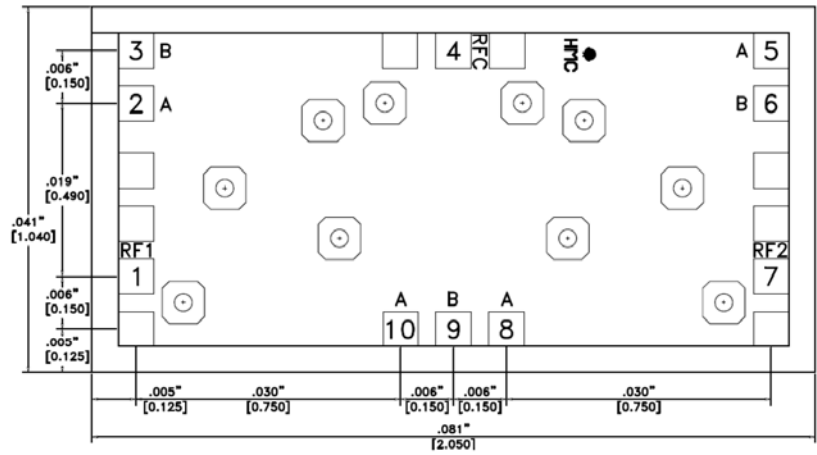
Parameter	Symbol	Sub-groups	End-point		Delta	Units
			Min	Max		
Insertion Loss	IL	4		2.9	±0.5	dB

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<sub>A</sub> = 25°C

# ADH232S

## 5.0 Die Outline



- NOTES:
- 1. ALL DIMENSIONS IN INCHES [MILLIMETERS]
  - 2. BOND PADS ARE 0.004" SQUARE
  - 3. TYPICAL BOND PAD SPACING CENTER TO CENTER IS .006"
  - 4. BACKSIDE METALIZATION: GOLD
  - 5. BOND PAD METALIZATION: GOLD
  - 6. BACKSIDE OF DIE IS GROUND
  - 7. DIE THICKNESS IS .004"
  - 8. NO CONNECTION REQUIRED FOR UNLABELED BOND PADS

- 1. RF1\*
  - 2. A\*\*
  - 3. B\*\*
  - 4. RFC\*
  - 5. A\*\*
  - 6. B\*\*
  - 7. RF2\*
  - 8. A\*\*
  - 9. B\*\*
  - 10. A\*\*
- Die bottom must be connected to RF ground
  - No connection required for unlabeled pads
  - \* (DC coupled, matched to 50 ohms, blocking cap required if RF line potential not equal to 0V)
  - \*\* Using any one of the A and any one of the B Pads connection is acceptable

Rev	Description of Change	Date
A	Initiate	27-October-2015
B	Changes to Section 3.2 (Absolute Maximum Ratings) and added clarification to sections 3.3 and 5.0	12-December-2015
C	Corrected minimum operating temperature from -40°C to -55°C, and corrected maximum operating temperature from 80°C to 85°C, corrected IP3 test conditions and notes in Table II, corrected numbering in Die Outline pin descriptions	26-February-2018
D	Add note to exceptions list clarifying test temperatures for interim and post burn-in electrical tests	4-June-2019

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