Data Sheet

RH5596S-CSH

Commercial Space Product

100 MHz to 40 GHz Linear-in-dB RMS Power Detector with 35 dB Dynamic Range

FEATURES

- Ultra-wide matched input frequency range: 100 MHz to 40 GHz
- 35 dB linear dynamic range (< ±1 dB error)
- 29 mV/dB logarithmic slope
- ±1 dB flat response from 200 MHz to 30 GHz
- Accurate RMS power measurement of high crest factors (up to 12 dB) modulated waveforms
- Low-power shutdown mode
- Low-supply current: 30 mA at 3.3 V (typical)
- 8-lead plastic LFCSP (05-08-1957)
- –40°C to +125°C rated with guaranteed log slope and log intercept

COMMERCIAL SPACE FEATURES

- Supports aerospace applications
- Certificate of Conformance
- Wafer diffusion lot traceability
- Qualification based on flows per NASA PEM-INST-001 and SAE AS6294
- Burn-in, life test, and deltas analysis
- Radiation lot acceptance test (RLAT)
  - Total ionizing dose (TID)
- Radiation benchmark
  - No single event latch-up (SEL) occurs at effective linear energy transfer (LET): ≤ 80 MeV-cm^2/mg
- Outgassing characterization

APPLICATIONS

- Low and medium Earth orbit (LEO/MEO) space payloads
- Geosynchronous Earth orbit (GEO) satellites
- Avionics
- Point-to-point microwave links
- Instrumentation and measurement equipment
- Military radios
- Long-term evolution (LTE), Wi-Fi, WiMAX wireless networks
- RMS power measurement
- Receive and transmit gain control
- RF power amplifier (PA) transmit power control

GENERAL DESCRIPTION

The RH5596S-CSH is a high accuracy RMS power detector that provides a very wide RF input bandwidth, from 100 MHz up to 40 GHz. This makes the device suitable for a wide range of RF and microwave applications, such as point-to-point microwave links, instrumentation, and power control applications.

The DC output-voltage of the detector is an accurate representation of the average signal power applied to the RF input. The response is linear-in-dB with 29 mV/dB logarithmic slope over a 35 dB dynamic range with typically better than ±1 dB accuracy over the full operating temperature range and RF frequency range, from 200 MHz to 30 GHz. In addition, the device's response has ±1dB flatness within the frequency range of 200 MHz to 30 GHz. The detector is particularly suited for measurement of waveforms with crest factor (CF) as high as 12 dB, and waveforms that exhibit a significant variation of the CF during measurement.

To achieve higher accuracy and lower output ripple, the averaging bandwidth can be externally adjusted by a capacitor connected between the FLTR pin and OUT pin.

The enable interface switches the device between an active measurement mode and a low-power shutdown mode.

Additional application and technical information can be found in the Commercial Space Products Program brochure and the LTC5596 data sheet.

Rev. A

DOCUMENT FEEDBACK

TECHNICAL SUPPORT

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REVISION HISTORY

2/2024—Rev. 0 to Rev. A

Change to Features Section........ 1
Changes to Commercial Space Features Section........ 1
Changes to Applications Section........ 1
Change to Table 8 Title........ 9
Changes to Figure 1 and Table 9........ 10
Updated Outline Dimensions........ 12
Changes to Ordering Guide........ 12

2/2023—Revision 0: Initial Version

SPECIFICATIONS

T_A = 25°C, V_{CC} = 3.3 V, EN = 3.3 V, unless otherwise noted. Continuous wave, 50 Ω source at RF_{IN}, RF frequency (f_{RF}) = 2140 MHz, unless otherwise noted.

Table 1. Electrical Characteristics

Parameter	Test Conditions	Temperature[1]	Min	Typ	Max	Unit
RF INPUT						
Input Frequency Range				0.1 to 40		GHz
Input Impedance				52||50		Ω||fF
DETECTOR RESPONSE (RF_{IN} TO OUT)						
RF Input Power Range, T_A = 25°C	f_{RF} = 50 MHz			−33.2 to +6.3		dBm
±1 dB Log Linearity Error[2, 3]	f_{RF} = 100 MHz			−37.1 to +5.8		dBm
	f_{RF} = 500 MHz			−40.8 to +3.3		dBm
	f_{RF} = 2.14 GHz			−39.1 to +4.2		dBm
	f_{RF} = 5.8 GHz			−39.7 to +3.7		dBm
	f_{RF} = 7.6 GHz			−38.9 to +4.3		dBm
	f_{RF} = 10 GHz			−39.0 to +4.2		dBm
	f_{RF} = 12 GHz			−38.5 to +4.5		dBm
	f_{RF} = 15 GHz			−37.5 to +5.5		dBm
	f_{RF} = 18 GHz			−38.4 to +4.6		dBm
	f_{RF} = 24 GHz			−39.3 to +0.2		dBm
	f_{RF} = 26 GHz			−37.8 to +5.0		dBm
	f_{RF} = 28 GHz			−40.1 to −0.6		dBm
	f_{RF} = 30 GHz			−39.8 to +3.1		dBm
	f_{RF} = 35 GHz			−37.3 to +3.1		dBm
	f_{RF} = 38 GHz			−34.2 to +3.6		dBm
	f_{RF} = 40 GHz			−32.6 to +2.9		dBm
	f_{RF} = 43.5 GHz			−28.2 to +4.6		dBm
RF Input Power Range Over	f_{RF} = 50 MHz	Full		−28.4 to +3.0		dBm
Operating Temperature Range	f_{RF} = 100 MHz	Full		−37.1 to +3.0		dBm
±1 dB Log Linearity Error[2, 3]	f_{RF} = 500 MHz	Full		−35.9 to −1.2		dBm
	f_{RF} = 2.14 GHz	Full		−35.2 to −0.2		dBm
	f_{RF} = 5.8 GHz	Full		−35.3 to −0.7		dBm
	f_{RF} = 7.6 GHz	Full		−34.7 to −0.2		dBm
	f_{RF} = 10 GHz	Full		−34.5 to −0.5		dBm
	f_{RF} = 12 GHz	Full		−34.1 to +0.3		dBm
	f_{RF} = 15 GHz	Full		−33.5 to +1.4		dBm
	f_{RF} = 18 GHz	Full		−35.2 to −0.1		dBm
	f_{RF} = 24 GHz	Full		−36.0 to −1.2		dBm
	f_{RF} = 26 GHz	Full		−34.8 to −0.1		dBm
	f_{RF} = 28 GHz	Full		−36.4 to −2.5		dBm
	f_{RF} = 30 GHz	Full		−35.3 to −2.1		dBm
±1.5 dB Log Linearity Error	f_{RF} = 35 GHz	Full		−32.3 to −1.5		dBm
	f_{RF} = 38 GHz	Full		−29.2 to −0.2		dBm
	f_{RF} = 40 GHz	Full		−27.1 to −0.9		dBm
	f_{RF} = 43.5 GHz	Full		−22.1 to +0.3		dBm
Linear Dynamic Range, T_A = 25°C[3]	f_{RF} = 50 MHz			39.5		dB
	f_{RF} = 100 MHz			42.9		dB
	f_{RF} = 500 MHz			44.1		dB
	f_{RF} = 2.14 GHz			43.3		dB
	f_{RF} = 5.8 GHz			43.3		dB
	f_{RF} = 7.6 GHz			43.2		dB

SPECIFICATIONS

Table 1. Electrical Characteristics (Continued)

Parameter	Test Conditions	Temperature[1]	Min	Typ	Max	Unit
	f_{RF} = 10 GHz			43.1		dB
	f_{RF} = 12 GHz			43.1		dB
	f_{RF} = 15 GHz			43.0		dB
	f_{RF} = 18 GHz			43.0		dB
	f_{RF} = 24 GHz			39.5		dB
	f_{RF} = 26 GHz			42.8		dB
	f_{RF} = 28 GHz			39.5		dB
	f_{RF} = 30 GHz			43.0		dB
	f_{RF} = 35 GHz			40.4		dB
	f_{RF} = 38 GHz			37.7		dB
	f_{RF} = 40 GHz			35.6		dB
	f_{RF} = 43.5 GHz			32.8		dB
Linear Dynamic Range Over	f_{RF} = 50 MHz	Full		31.4		dB
Operating Temperature Range[3]	f_{RF} = 100 MHz	Full		40.1		dB
	f_{RF} = 500 MHz	Full		34.7		dB
	f_{RF} = 2.14 GHz	Full		35.1		dB
	f_{RF} = 5.8 GHz	Full		34.6		dB
	f_{RF} = 7.6 GHz	Full		34.5		dB
	f_{RF} = 10 GHz	Full		34.0		dB
	f_{RF} = 12 GHz	Full		34.4		dB
	f_{RF} = 15 GHz	Full		35.0		dB
	f_{RF} = 18 GHz	Full		35.1		dB
	f_{RF} = 24 GHz	Full		34.8		dB
	f_{RF} = 26 GHz	Full		34.8		dB
	f_{RF} = 28 GHz	Full		33.9		dB
	f_{RF} = 30 GHz	Full		33.2		dB
±1.5 dB Log Linearity Error	f_{RF} = 35 GHz	Full		30.7		dB
	f_{RF} = 38 GHz	Full		29.0		dB
	f_{RF} = 40 GHz	Full		26.2		dB
	f_{RF} = 43.5 GHz	Full		22.4		dB
Logarithmic Slope, T_A = 25°C[4]	f_{RF} = 50 MHz			27.2		mV/dB
	f_{RF} = 100 MHz			28.9		mV/dB
	f_{RF} = 500 MHz			28.2		mV/dB
	f_{RF} = 2.14 GHz		25.5	29.3	33.5	mV/dB
	f_{RF} = 5.8 GHz			28.7		mV/dB
	f_{RF} = 7.6 GHz			28.8		mV/dB
	f_{RF} = 8 GHz			28.6		mV/dB
	f_{RF} = 10 GHz			28.8		mV/dB
	f_{RF} = 12 GHz			28.9		mV/dB
	f_{RF} = 15 GHz			29.0		mV/dB
	f_{RF} = 18 GHz			28.9		mV/dB
	f_{RF} = 20 GHz			28.8		mV/dB
	f_{RF} = 24 GHz			28.9		mV/dB
	f_{RF} = 26 GHz			29.1		mV/dB
	f_{RF} = 28 GHz			29.1		mV/dB
	f_{RF} = 30 GHz			28.9		mV/dB
	f_{RF} = 35 GHz			29.0		mV/dB
	f_{RF} = 38 GHz			29.2		mV/dB
	f_{RF} = 40 GHz			29.5		mV/dB

SPECIFICATIONS

Table 1. Electrical Characteristics (Continued)

Parameter	Test Conditions	Temperature[1]	Min	Typ	Max	Unit
	f_{RF} = 43.5 GHz			29.7		mV/dB
Logarithmic Slope Operating Temperature Range[4]	f_{RF} = 50 MHz	Full		27.6 to 28.6		mV/dB
	f_{RF} = 100 MHz	Full		28.2 to 29.4		mV/dB
	f_{RF} = 500 MHz	Full		27.4 to 28.9		mV/dB
	f_{RF} = 2.14 GHz	Full	25	28.0 to 29.5	33.5	mV/dB
	f_{RF} = 5.8 GHz	Full		28.0 to 29.4		mV/dB
	f_{RF} = 7.6 GHz	Full		28.1 to 29.5		mV/dB
	f_{RF} = 8 GHz	Full		28.5 to 28.6		mV/dB
	f_{RF} = 10 GHz	Full		28.1 to 29.5		mV/dB
	f_{RF} = 12 GHz	Full		28.2 to 29.5		mV/dB
	f_{RF} = 15 GHz	Full		28.3 to 29.4		mV/dB
	f_{RF} = 18 GHz	Full		28.2 to 29.6		mV/dB
	f_{RF} = 20 GHz	Full		28.6 to 28.8		mV/dB
	f_{RF} = 24 GHz	Full		28.3 to 29.5		mV/dB
	f_{RF} = 26 GHz	Full		28.4 to 29.6		mV/dB
	f_{RF} = 28 GHz	Full		28.3 to 29.5		mV/dB
	f_{RF} = 30 GHz	Full		28.3 to 29.5		mV/dB
	f_{RF} = 35 GHz	Full		28.4 to 29.3		mV/dB
	f_{RF} = 38 GHz	Full		28.6 to 29.4		mV/dB
	f_{RF} = 40 GHz	Full		28.8 to 29.7		mV/dB
	f_{RF} = 43.5 GHz	Full		29.1 to 29.7		mV/dB
Logarithmic Intercept, T_A = 25°C[5]	f_{RF} = 50 MHz			–33.1		dBm
	f_{RF} = 100 MHz			–36.2		dBm
	f_{RF} = 500 MHz			–39.9		dBm
	f_{RF} = 2.14 GHz		–41.5	–39.0	–34	dBm
	f_{RF} = 5.8 GHz			–38.7		dBm
	f_{RF} = 7.6 GHz			–37.9		dBm
	f_{RF} = 8 GHz			–39.0		dBm
	f_{RF} = 10 GHz			–38.0		dBm
	f_{RF} = 12 GHz			–37.6		dBm
	f_{RF} = 15 GHz			–36.5		dBm
	f_{RF} = 18 GHz			–37.4		dBm
	f_{RF} = 20 GHz			–37.1		dBm
	f_{RF} = 24 GHz			–38.4		dBm
	f_{RF} = 26 GHz			–36.8		dBm
	f_{RF} = 28 GHz			–37.1		dBm
	f_{RF} = 30 GHz			–38.9		dBm
	f_{RF} = 35 GHz			–36.3		dBm
	f_{RF} = 38 GHz			–33.2		dBm
	f_{RF} = 40 GHz			–31.7		dBm
	f_{RF} = 43.5 GHz			–27.2		dBm
Logarithmic Intercept Over Operating Temperature Range[5]	f_{RF} = 50 MHz	Full		–32.6 to –31.3		dBm
	f_{RF} = 100 MHz	Full		–38.1 to –37.9		dBm
	f_{RF} = 500 MHz	Full		–40.4 to –38.6		dBm
	f_{RF} = 2.14 GHz	Full	–42	–39.7 to –37.0	–33	dBm
	f_{RF} = 5.8 GHz	Full		–39.2 to –37.4		dBm
	f_{RF} = 7.6 GHz	Full		–38.5 to –36.7		dBm
	f_{RF} = 8 GHz	Full		–39.1 to –38.8		dBm
	f_{RF} = 10 GHz	Full		–38.6 to –36.7		dBm

SPECIFICATIONS

Table 1. Electrical Characteristics (Continued)

Parameter	Test Conditions	Temperature[1]	Min	Typ	Max	Unit
	f_{RF} = 12 GHz	Full		−38.1 to −36.3		dBm
	f_{RF} = 15 GHz	Full		−37.0 to −35.5		dBm
	f_{RF} = 18 GHz	Full		−38.1 to −36.4		dBm
	f_{RF} = 20 GHz	Full		−37.3 to −36.8		dBm
	f_{RF} = 24 GHz	Full		−38.8 to −37.3		dBm
	f_{RF} = 26 GHz	Full		−37.5 to −35.9		dBm
	f_{RF} = 28 GHz	Full		−37.7 to −35.9		dBm
	f_{RF} = 30 GHz	Full		−39.7 to −38.0		dBm
	f_{RF} = 35 GHz	Full		−37.1 to −34.9		dBm
	f_{RF} = 38 GHz	Full		−34.1 to −31.7		dBm
	f_{RF} = 40 GHz	Full		−32.8 to −30.3		dBm
	f_{RF} = 43.5 GHz	Full		−28.3 to −25.9		dBm
Linear Dynamic Range for Various Modulation Formats[6]	Code division multiple access (CDMA), 9 channels, forward			−39.7 to +1.7		dB
	CDMA, 32 channels, forward			−39.6 to +1.7		dB
	CDMA, 64 channels, forward			−39.5 to +1.7		dB
	CDMA, 3 carriers			−40.4 to +3.0		dB
	CDMA, 4 carriers			−40.3 to +2.7		dB
	Wideband code division multiple access (W-CDMA), 1 channel, up			−39.9 to +1.8		dB
	W-CDMA, 1 channel, down			−39.9 to +1.7		dB
	W-CDMA, 2 carriers			−40.0 to +1.9		dB
	W-CDMA, 3 carriers			−40.4 to +2.0		dB
	W-CDMA, 4 carriers			−40.3 to +1.7		dB
	additive white Gaussian noise (AWGN), 5 MHz bandwidth			−40.2 to +2.6		dB
	AWGN, 10 MHz bandwidth			−40.2 to +3.1		dB
	AWGN, 15 MHz bandwidth			−40.1 to +3.1		dB
Propagation Delay[7]	P_{IN} from −55 dBm to 0 dBm			1.2		μs
OUT INTERFACE						
Output DC Voltage	No RF signal present, EN = 1.1 V			1.0	5.0	mV
	P_{IN} = 10 dBm, EN = 1.1 V		1.150	1.2	1.250	V
Output-Voltage Droop	25 mA sourcing		−35	+6	+20	mV
	25 mA sinking			30		mV
Integrated Output Noise	1 kHz to 6.5 kHz, P_{IN} = 0 dBm			22		μV RMS
Rise Time[8]	50 Ω load at OUT			2.9		μs
Fall Time[9]	50 Ω load at OUT			8.1		μs
ENABLE (EN) LOW = OFF, HIGH = ON						
EN Input High Voltage (On)		Full	1.1			V

SPECIFICATIONS

Table 1. Electrical Characteristics (Continued)

Parameter	Test Conditions	Temperature[1]	Min	Typ	Max	Unit
EN Input Low Voltage (Off)		Full			0.6	V
EN Pin Input Current				50	500	nA
Turn-On Time[10]	50 Ω load at OUT			8		µs
Turn-Off Time[11]	50 Ω load at OUT			45		ns
	1 MΩ‖11 pF load at OUT			100		µs
POWER SUPPLY						
Supply Voltage		Full	2.7	3.3	3.6	V
Active Supply Current	EN = 3.3 V		25	30	35	mA
Shutdown Supply Current	EN = 0 V			50	500	nA

1 The RH5596S-CSH is guaranteed functional over the case temperature range –40°C to +125°C. All limits at –40°C and +125°C are guaranteed by 100% production testing.

2 Log linearity error is the input-referred power measurement error relative to the best fit straight line (VOUT vs. pin in dBm) obtained by linear regression at TA = 25°C. The input power range used for the linear regression is from –32 dBm to +5 dBm for 50 MHz, from –37 dBm to –5 dBm for 100 MHz through 35 GHz, from –34 dBm to –5 dBm for 38 GHz, from–32 dBm to –5 dBm for 40 GHz, and from –28 dBm to –5 dBm for 43.5 GHz. An offset of 0.5 dB is added to the log intercept for frequencies from 50 MHz to 38 GHz, and 0.25 dB is added for 40 GHz and 43.5 GHz to center the errors over the full temperature range. See also the LTC5596 data sheet for an explanation of measurement error metrics.

3 Range for which the log linearity error is within ±1 dB.

4 Slope of the best fit straight line obtained by linear regression.

5 Extrapolated input power level (straight line obtained by linear regression) where the voltage at OUT equals 0 V.

6 Power range for which log linearity error is within ±1 dB, relative to best fit straight line for continuous wave data (see footnote 2).

7 Delay from 50% change in RF_{IN} to 50% change in output voltage.

8 Time required to change voltage at OUT pin from 10% to 90% of final value. Input power stepped from –55 dBm to 0 dBm.

9 Time required to change voltage at OUT pin from 90% to 10% of initial value. Input power stepped from 0 dBm to –55 dBm.

10 Time required to change voltage at OUT pin to 90% of final value. Input power 0 dBm.

11 Time required to change voltage at OUT pin to 10% of initial value. Input power 0 dBm. For higher load impedance, the turn-off time is larger because the OUT interface is high-impedance in shutdown mode.

BURN-IN DELTA LIMIT SPECIFICATIONS

Electrical characteristics at V_{CC} = 3.3 V and EN = 3.3 V. Continuous wave, 50 Ω source at RF_{IN}, and f_{RF} = 2140 MHz. Delta limits apply at room temperature (T_A = 25°C) for post 240 hour burn-in test. Delta calculation is based on absolute maximum changes.

Table 2. Burn-In Delta Limit Specifications

Parameter[1, 2]	Test Conditions/Comments	Delta	Unit
ACTIVE SUPPLY CURRENT		±3.5	mA
OUTPUT DC VOLTAGE			
f_{RF} = 100 MHz, 2.14 GHz, 8 GHz, 18 GHz, 20 GHz	P_{IN} = 5 dBm	±0.2	V

1 Delta = Max (Absolute (Maximum Post 240 Hour Burn-in Data − Minimum Pre 240 Hour Burn-in Data), Absolute (Minimum Post 240 Hour Burn-in Data − Maximum Pre 240 Hour Burn-in Data)).

2 Devices are not serialized during testing.

SPECIFICATIONS

RADIATION TEST AND LIMIT SPECIFICATIONS

T_A = 25°C, V_{CC} = 3.3 V, and EN = 3.3 V. Continuous wave, 50 Ω source at RF_{IN}, f_{RF} = 2140 MHz, unless otherwise noted. Total ionizing dose (TID) testing is characterized to 100 krads.

Table 3. Radiation Test and Limit Specifications

Parameter	Test Conditions/Comments	Min	Typ	Max	Unit
LOGARITHMIC SLOPE, T_A = 25°C[1]	f_{RF} = 100 MHz	24	28.9	34	mV/dB
	f_{RF} = 2.14 GHz	24	29.3	35	mV/dB
	f_{RF} = 8 GHz	23	28.6	34	mV/dB
	f_{RF} = 18 GHz	24	28.9	34	mV/dB
	f_{RF} = 20 GHz	24	28.8	34	mV/dB
LOGARITHMIC INTERCEPT, T_A = 25°C[2]	f_{RF} = 100 MHz	−43	−36.2	−30	dBm
	f_{RF} = 2.14 GHz	−46	−39	−32	dBm
	f_{RF} = 8 GHz	−46	−39	−32	dBm
	f_{RF} = 18 GHz	−44	−37.4	−31	dBm
	f_{RF} = 20 GHz	−44	−37.1	−30	dBm
OUT INTERFACE					
Output DC Voltage	No RF signal present, EN = 1.1 V		1.0	5.0	mV
	Input power (P_{IN}) = 10 dBm, EN = 1.1 V	1.150	1.2	1.250	V
ENABLE (EN) LOW = OFF, HIGH = ON					
EN Pin Input Current			50	500	nA
POWER SUPPLY					
Active Supply Current	EN = 3.3 V	25	30	35	mA
Shutdown Supply Current	EN = 0 V		50	500	nA

1 Slope of the best fit straight line obtained by linear regression.

2 Extrapolated input power level (straight line obtained by linear regression) where the voltage at OUT equals 0 V.

ABSOLUTE MAXIMUM RATINGS

Table 4.

Parameter[1]	Rating
Supply Voltage (V_{CC})	3.8 V
Input Signal Power (RF_{IN}), Average	15 dBm
Input Signal Power (RF_{IN}), Peak[2]	20 dBm
DC Voltage at RF_{IN}	−0.3 V to +1 V
DC Voltage at FLTR	−0.3 V to +0.4 V
DC Voltage at EN	−0.3 V to +3.8 V
T_{JMAX}	150°C
Operating Temperature Range	−40°C to 125°C
Storage Temperature Range	−65°C to 150°C

1 The voltage on all pins must not exceed 3.8 V, V_{CC} + 0.3 V, or be less than −0.3 V, otherwise damage to the ESD diodes may occur.

2 Not production tested. Guaranteed by design and correlation to production tested parameters.

Stresses at or above those listed under Absolute Maximum Ratings may cause permanent damage to the product. This is a stress rating only; functional operation of the product at these or any other conditions above those indicated in the operational section of this specification is not implied. Operation beyond the maximum operating conditions for extended periods may affect product reliability.

THERMAL RESISTANCE

Thermal performance is directly linked to the printed circuit board (PCB) design and operating environment. Careful attention to the PCB thermal design is required.

θ_{JC} is the junction-to-case thermal resistance.

Table 5. Thermal Resistance

Package Option	θ_{JC}	Unit
05-08-1957	25	°C/W

OUTGAS TESTING

The criteria used for the acceptance and rejection of materials must be determined by the user and based upon specific component and system requirements. Historically, a total mass loss (TML) of 1.00% and collected volatile condensable material (CVCM) of 0.10% have been used as screening levels for rejection of spacecraft materials.

Table 6. Outgas Testing

Specification (Tested per ASTM E595-15)	Value	Unit
Total Mass Lost	0.06	%
Collected Volatile Condensable Material	0.01	%

Table 6. Outgas Testing (Continued)

Specification (Tested per ASTM E595-15)	Value	Unit
Water Vapor Recovered	0.02	%

RADIATION FEATURES

Table 7. Radiation Features

Specifications	Value	Unit
Maximum Total Dose Available (Dose Rate = 50 rad(Si)/s to 300 rad(Si)/s)[1]	100	krad(Si)
No Single Event Latch-Up (SEL) Occurs at Effective Linear Energy Transfer (LET)[2]	≤80	MeV-cm^2/mg

1 Guaranteed by device and process characterization. Contact Analog Devices, Inc., for data available up to 100 krads.

2 Limits are characterized at initial qualification and after any design or process changes that may affect the SEL characteristics but are not production lot tested, unless specified by the customer through the purchase order or contract. For more information on single event effect (SEE) test results, contact Analog Devices for further data beyond published report on the Analog Devices website.

ELECTROSTATIC DISCHARGE (ESD) RATINGS

The following ESD information is provided for handling of ESD-sensitive devices in and ESD-protected area only.

Human body model (HBM) per ANSI/ESDA/JEDEC JS-001.

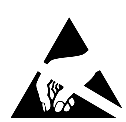
Charged device model (CDM) per ANSI/ESDA/JEDEC JS-002.

ESD Rating for the RH5596S-CSH

Table 8. RH5596S-CSH, 8-Lead Plastic LFCSP

ESD Model	Withstand Threshold (V)	Class
HBM	3500	2
CDM	2000	C3

ESD CAUTION



ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

PIN CONFIGURATION AND FUNCTION DESCRIPTIONS

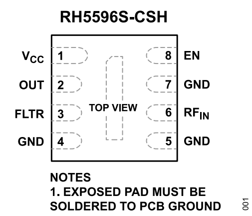


Figure 1. Pin Configuration

Table 9. Pin Function Descriptions

Pin No.	Mnemonic	Description
1	V_{CC}	Power-Supply Pin. Typical current consumption is 30 mA at room temperature. The V_{CC} pin must be externally bypassed with a 100 nF capacitor.
2	OUT	Detector Output. The DC voltage at the OUT pin varies linearly with the RF input power level in dBm. The detector output is able to drive a 50 Ω load. To avoid permanent damage, do not short to V_{CC} or GND. In shutdown mode (EN = low), the detector output pin becomes high impedance, to avoid discharge of capacitors in an external ripple filter.
3	FLTR	Filter. An optional capacitor connected between the FLTR pin and the OUT pin (Pin 2) reduces the detector ripple averaging bandwidth, and increases the rise and fall times of the detector. To avoid permanent damage to the circuit, the DC voltage at the FLTR pin must not exceed 0.4 V.
4, 5, 7	GND	Circuit Ground. All ground pins are internally connected. Pin 5 and Pin 7 must be used as RF return ground and connected to the transmission line interfacing to the RF_{IN} pin (Pin 6).
6	RF_{IN}	RF Input. The RF_{IN} pin is internally DC-coupled to the GND through a 50 Ω termination resistor. To avoid damage to the internal circuit, the DC voltage applied to the RF_{IN} pin must not exceed 1 V. The ground-signal-ground arrangement of Pin 5 through Pin 7 support termination of Pin 6 by a high-frequency transmission line, such as a grounded co-planar waveguide (GCPW). No external decoupling capacitor is necessary as long as the DC voltage on Pin 6 is kept below 1 V.
8	EN	Chip-Enable. A voltage above 1.1 V applied to the EN pin brings the device into normal operating mode. A voltage below 0.6 V brings the device into a low-power shutdown mode. Do not float the EN pin.
	EPAD	Exposed Pad. The exposed pad must be soldered to PCB ground .

TYPICAL PERFORMANCE CHARACTERISTICS

See the LTC5596 data sheet for the full set of typical performance characteristics plots.

OUTLINE DIMENSIONS

Package Drawing (Option)	Package Type	Package Description
05-08-1957	LFCSP	8-Lead, Lead Frame Chip Scale Package

For the latest package outline information and land patterns (footprints), go to Package Index.

ORDERING GUIDE

Model[1]	Temperature Range	Package Description	Packing Quantity	Package Option
RH5596HDC#PBF-CSH	−40°C to +125°C	8-Lead Lead Frame Chip Scale Package (LFCSP)	Reel, 500	05-08-1957

1 RH5596HDC#PBF-CSH is a RoHS compliant part.