

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 ($< \pm 1$ 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 DFN (2 mm $\times$ 2 mm), flip chip (05-08-1957)
- ▶ -40°C to $+125^{\circ}\text{C}$ rated with guaranteed log slope and log intercept

COMMERCIAL SPACE FEATURES

- ▶ Radiation test and performance
 - ▶ Radiation hardness assurance (RHA) up to TID of 100 krad
 - ▶ No SEL occurs at effective LET: ≤ 80 MeV-cm²/mg
 - ▶ Radiation reports are available at [RH5596S](#) product page
- ▶ 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
- ▶ 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 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 ± 1 dB flatness within the frequency range of 200 MHz to 30 GHz. The detector is particularly suited for measurement of waveforms with crest factor as high as 12 dB, and waveforms that exhibit a significant variation of the crest factor 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.

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REVISION HISTORY

5/2026—Rev. A to Rev. B

Changed 8-Lead Plastic LFCSP to 8-Lead Plastic DFN Throughout.....	1
Changes to Commercial Space Features Section.....	1
Changes to Specifications Section and Table 1.....	3
Added Explanation of Test Levels Section and Table 6; Renumbered Sequentially.....	9
Changes to Table 8.....	9
Updated Outline Dimensions.....	12

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

$V_{CC} = 3.3\text{ V}$ and $EN = 3.3\text{ V}$, unless otherwise noted. Continuous wave, $50\ \Omega$ source at RF_{IN} and RF frequency (f_{RF}) = 2140 MHz , unless otherwise noted. Minimum and maximum specifications represent performance at $-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$, unless otherwise noted. Typical specifications represent performance at $T_A = 25^\circ\text{C}$.

Table 1. Electrical Characteristics

Parameter	Test Conditions	Test Level ¹	Temperature (T_A)	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	$f_{RF} = 50\text{ MHz}$	III	25°C		-33.2 to +6.3		dBm
$\pm 1\text{ dB Log Linearity Error}^{2,3}$	$f_{RF} = 100\text{ MHz}$	III	25°C		-37.1 to +5.8		dBm
	$f_{RF} = 500\text{ MHz}$	III	25°C		-40.8 to +3.3		dBm
	$f_{RF} = 2.14\text{ GHz}$	III	25°C		-39.1 to +4.2		dBm
	$f_{RF} = 5.8\text{ GHz}$	III	25°C		-39.7 to +3.7		dBm
	$f_{RF} = 7.6\text{ GHz}$	III	25°C		-38.9 to +4.3		dBm
	$f_{RF} = 10\text{ GHz}$	III	25°C		-39.0 to +4.2		dBm
	$f_{RF} = 12\text{ GHz}$	III	25°C		-38.5 to +4.5		dBm
	$f_{RF} = 15\text{ GHz}$	III	25°C		-37.5 to +5.5		dBm
	$f_{RF} = 18\text{ GHz}$	III	25°C		-38.4 to +4.6		dBm
	$f_{RF} = 24\text{ GHz}$	III	25°C		-39.3 to +0.2		dBm
	$f_{RF} = 26\text{ GHz}$	III	25°C		-37.8 to +5.0		dBm
	$f_{RF} = 28\text{ GHz}$	III	25°C		-40.1 to -0.6		dBm
	$f_{RF} = 30\text{ GHz}$	III	25°C		-39.8 to +3.1		dBm
	$f_{RF} = 35\text{ GHz}$	III	25°C		-37.3 to +3.1		dBm
	$f_{RF} = 38\text{ GHz}$	III	25°C		-34.2 to +3.6		dBm
	$f_{RF} = 40\text{ GHz}$	III	25°C		-32.6 to +2.9		dBm
	$f_{RF} = 43.5\text{ GHz}$	III	25°C		-28.2 to +4.6		dBm
	$f_{RF} = 50\text{ MHz}$	III	Full		-28.4 to +3.0		dBm
	$f_{RF} = 100\text{ MHz}$	III	Full		-37.1 to +3.0		dBm
	$f_{RF} = 500\text{ MHz}$	III	Full		-35.9 to -1.2		dBm
$\pm 1\text{ dB Log Linearity Error}^{2,3}$	$f_{RF} = 2.14\text{ GHz}$	III	Full		-35.2 to -0.2		dBm
	$f_{RF} = 5.8\text{ GHz}$	III	Full		-35.3 to -0.7		dBm
	$f_{RF} = 7.6\text{ GHz}$	III	Full		-34.7 to -0.2		dBm
	$f_{RF} = 10\text{ GHz}$	III	Full		-34.5 to -0.5		dBm
	$f_{RF} = 12\text{ GHz}$	III	Full		-34.1 to +0.3		dBm
	$f_{RF} = 15\text{ GHz}$	III	Full		-33.5 to +1.4		dBm
	$f_{RF} = 18\text{ GHz}$	III	Full		-35.2 to -0.1		dBm
	$f_{RF} = 24\text{ GHz}$	III	Full		-36.0 to -1.2		dBm
	$f_{RF} = 26\text{ GHz}$	III	Full		-34.8 to -0.1		dBm
	$f_{RF} = 28\text{ GHz}$	III	Full		-36.4 to -2.5		dBm
	$f_{RF} = 30\text{ GHz}$	III	Full		-35.3 to -2.1		dBm
	$f_{RF} = 35\text{ GHz}$	III	Full		-32.3 to -1.5		dBm
	$f_{RF} = 38\text{ GHz}$	III	Full		-29.2 to -0.2		dBm
	$f_{RF} = 40\text{ GHz}$	III	Full		-27.1 to -0.9		dBm
	$f_{RF} = 43.5\text{ GHz}$	III	Full		-22.1 to +0.3		dBm
$\pm 1.5\text{ dB Log Linearity Error}$	$f_{RF} = 50\text{ MHz}$	III	25°C		39.5		dB
	$f_{RF} = 100\text{ MHz}$	III	25°C		42.9		dB
	$f_{RF} = 500\text{ MHz}$	III	25°C		44.1		dB
	$f_{RF} = 2.14\text{ GHz}$	III	25°C		43.3		dB
	$f_{RF} = 5.8\text{ GHz}$	III	25°C		43.3		dB
	$f_{RF} = 7.6\text{ GHz}$	III	25°C		43.2		dB
Linear Dynamic Range ³							
	$f_{RF} = 50\text{ MHz}$	III	25°C		39.5		dB
	$f_{RF} = 100\text{ MHz}$	III	25°C		42.9		dB
	$f_{RF} = 500\text{ MHz}$	III	25°C		44.1		dB
	$f_{RF} = 2.14\text{ GHz}$	III	25°C		43.3		dB
	$f_{RF} = 5.8\text{ GHz}$	III	25°C		43.3		dB
	$f_{RF} = 7.6\text{ GHz}$	III	25°C		43.2		dB

SPECIFICATIONS

Table 1. Electrical Characteristics (Continued)

Parameter	Test Conditions	Test Level ¹	Temperature (T _A)	Min	Typ	Max	Unit
Linear Dynamic Range Over Operating Temperature Range ³	f _{RF} = 10 GHz	III	25°C		43.1		dB
	f _{RF} = 12 GHz	III	25°C		43.1		dB
	f _{RF} = 15 GHz	III	25°C		43.0		dB
	f _{RF} = 18 GHz	III	25°C		43.0		dB
	f _{RF} = 24 GHz	III	25°C		39.5		dB
	f _{RF} = 26 GHz	III	25°C		42.8		dB
	f _{RF} = 28 GHz	III	25°C		39.5		dB
	f _{RF} = 30 GHz	III	25°C		43.0		dB
	f _{RF} = 35 GHz	III	25°C		40.4		dB
	f _{RF} = 38 GHz	III	25°C		37.7		dB
	f _{RF} = 40 GHz	III	25°C		35.6		dB
	f _{RF} = 43.5 GHz	III	25°C		32.8		dB
	f _{RF} = 50 MHz	III	Full		31.4		dB
	f _{RF} = 100 MHz	III	Full		40.1		dB
	f _{RF} = 500 MHz	III	Full		34.7		dB
	f _{RF} = 2.14 GHz	III	Full		35.1		dB
	f _{RF} = 5.8 GHz	III	Full		34.6		dB
	f _{RF} = 7.6 GHz	III	Full		34.5		dB
	f _{RF} = 10 GHz	III	Full		34.0		dB
	f _{RF} = 12 GHz	III	Full		34.4		dB
±1.5 dB Log Linearity Error	f _{RF} = 15 GHz	III	Full		35.0		dB
	f _{RF} = 18 GHz	III	Full		35.1		dB
	f _{RF} = 24 GHz	III	Full		34.8		dB
	f _{RF} = 26 GHz	III	Full		34.8		dB
	f _{RF} = 28 GHz	III	Full		33.9		dB
	f _{RF} = 30 GHz	III	Full		33.2		dB
	f _{RF} = 35 GHz	III	Full		30.7		dB
	f _{RF} = 38 GHz	III	Full		29.0		dB
	f _{RF} = 40 GHz	III	Full		26.2		dB
	f _{RF} = 43.5 GHz	III	Full		22.4		dB
Logarithmic Slope ⁴	f _{RF} = 50 MHz	III	25°C		27.2		mV/dB
	f _{RF} = 100 MHz	I	25°C	25.7		31.6	mV/dB
	f _{RF} = 500 MHz	III	25°C		28.2		mV/dB
	f _{RF} = 2.14 GHz	I	25°C	25.5		33.5	mV/dB
	f _{RF} = 5.8 GHz	III	25°C		28.7		mV/dB
	f _{RF} = 7.6 GHz	III	25°C		28.8		mV/dB
	f _{RF} = 8 GHz	I	25°C	24.9		31.9	mV/dB
	f _{RF} = 10 GHz	III	25°C		28.8		mV/dB
	f _{RF} = 12 GHz	III	25°C		28.9		mV/dB
	f _{RF} = 15 GHz	III	25°C		29.0		mV/dB
	f _{RF} = 18 GHz	I	25°C	26.3		31.1	mV/dB
	f _{RF} = 20 GHz	I	25°C	26.3		31.3	mV/dB
	f _{RF} = 24 GHz	III	25°C		28.9		mV/dB
	f _{RF} = 26 GHz	III	25°C		29.1		mV/dB
	f _{RF} = 28 GHz	III	25°C		29.1		mV/dB
	f _{RF} = 30 GHz	III	25°C		28.9		mV/dB
	f _{RF} = 35 GHz	III	25°C		29.0		mV/dB
	f _{RF} = 38 GHz	III	25°C		29.2		mV/dB
	f _{RF} = 40 GHz	III	25°C		29.5		mV/dB

SPECIFICATIONS

Table 1. Electrical Characteristics (Continued)

Parameter	Test Conditions	Test Level ¹	Temperature (T _A)	Min	Typ	Max	Unit
Logarithmic Slope	f _{RF} = 43.5 GHz	III	25°C		29.7		mV/dB
	f _{RF} = 50 MHz	III	Full		27.6 to 28.6		mV/dB
Operating Temperature Range ⁴	f _{RF} = 100 MHz	I	Full	25.7		31.6	mV/dB
	f _{RF} = 500 MHz	III	Full		27.4 to 28.9		mV/dB
	f _{RF} = 2.14 GHz	I	Full	25.5		33.5	mV/dB
	f _{RF} = 5.8 GHz	III	Full		28.0 to 29.4		mV/dB
	f _{RF} = 7.6 GHz	III	Full		28.1 to 29.5		mV/dB
	f _{RF} = 8 GHz	I	Full	24.9	28.5 to 28.6	31.9	mV/dB
	f _{RF} = 10 GHz	III	Full		28.1 to 29.5		mV/dB
	f _{RF} = 12 GHz	III	Full		28.2 to 29.5		mV/dB
	f _{RF} = 15 GHz	III	Full		28.3 to 29.4		mV/dB
	f _{RF} = 18 GHz	I	Full	26.3		31.1	mV/dB
	f _{RF} = 20 GHz	I	Full	26.3		31.3	mV/dB
	f _{RF} = 24 GHz	III	Full		28.3 to 29.5		mV/dB
	f _{RF} = 26 GHz	III	Full		28.4 to 29.6		mV/dB
	f _{RF} = 28 GHz	III	Full		28.3 to 29.5		mV/dB
	f _{RF} = 30 GHz	III	Full		28.3 to 29.5		mV/dB
	f _{RF} = 35 GHz	III	Full		28.4 to 29.3		mV/dB
	f _{RF} = 38 GHz	III	Full		28.6 to 29.4		mV/dB
	f _{RF} = 40 GHz	III	Full		28.8 to 29.7		mV/dB
	f _{RF} = 43.5 GHz	III	Full		29.1 to 29.7		mV/dB
Logarithmic Intercept ⁵	f _{RF} = 50 MHz	III	25°C		–33.1		dBm
	f _{RF} = 100 MHz	I	25°C	–40.5		–34.1	dBm
	f _{RF} = 500 MHz	III	25°C		–39.9		dBm
	f _{RF} = 2.14 GHz	I	25°C	–41.5		–34	dBm
	f _{RF} = 5.8 GHz	III	25°C		–38.7		dBm
	f _{RF} = 7.6 GHz	III	25°C		–37.9		dBm
	f _{RF} = 8 GHz	I	25°C	–44.1		–33.4	dBm
	f _{RF} = 10 GHz	III	25°C		–38.0		dBm
	f _{RF} = 12 GHz	III	25°C		–37.6		dBm
	f _{RF} = 15 GHz	III	25°C		–36.5		dBm
	f _{RF} = 18 GHz	I	25°C	–41.6		–32	dBm
	f _{RF} = 20 GHz	I	25°C	–41		–28	dBm
	f _{RF} = 24 GHz	III	25°C		–38.4		dBm
	f _{RF} = 26 GHz	III	25°C		–36.8		dBm
	f _{RF} = 28 GHz	III	25°C		–37.1		dBm
	f _{RF} = 30 GHz	III	25°C		–38.9		dBm
	f _{RF} = 35 GHz	III	25°C		–36.3		dBm
	f _{RF} = 38 GHz	III	25°C		–33.2		dBm
	f _{RF} = 40 GHz	III	25°C		–31.7		dBm
	f _{RF} = 43.5 GHz	III	25°C		–27.2		dBm
Logarithmic Intercept Over Operating Temperature Range ⁵	f _{RF} = 50 MHz	III	Full		–32.6 to –31.3		dBm
	f _{RF} = 100 MHz	I	Full	–41		–33	dBm
	f _{RF} = 500 MHz	III	Full		–40.4 to –38.6		dBm
	f _{RF} = 2.14 GHz	I	Full	–42		–33	dBm
	f _{RF} = 5.8 GHz	III	Full		–39.2 to –37.4		dBm
	f _{RF} = 7.6 GHz	III	Full		–38.5 to –36.7		dBm
	f _{RF} = 8 GHz	I	Full	–44.1		–33.4	dBm
	f _{RF} = 10 GHz	III	Full		–38.6 to –36.7		dBm

SPECIFICATIONS

Table 1. Electrical Characteristics (Continued)

Parameter	Test Conditions	Test Level ¹	Temperature (T _A)	Min	Typ	Max	Unit
Linear Dynamic Range for Various Modulation Formats ⁶	f _{RF} = 12 GHz	III	Full		–38.1 to –36.3		dBm
	f _{RF} = 15 GHz	III	Full		–37.0 to –35.5		dBm
	f _{RF} = 18 GHz	I	Full	–41.6		–32	dBm
	f _{RF} = 20 GHz	I	Full	–33		–28	dBm
	f _{RF} = 24 GHz	III	Full		–38.8 to –37.3		dBm
	f _{RF} = 26 GHz	III	Full		–37.5 to –35.9		dBm
	f _{RF} = 28 GHz	III	Full		–37.7 to –35.9		dBm
	f _{RF} = 30 GHz	III	Full		–39.7 to –38.0		dBm
	f _{RF} = 35 GHz	III	Full		–37.1 to –34.9		dBm
	f _{RF} = 38 GHz	III	Full		–34.1 to –31.7		dBm
	f _{RF} = 40 GHz	III	Full		–32.8 to –30.3		dBm
	f _{RF} = 43.5 GHz	III	Full		–28.3 to –25.9		dBm
	Code division multiple access (CDMA), 9 channels, forward	III	25°C		–39.7 to +1.7		dB
	CDMA, 32 channels, forward	III	25°C		–39.6 to +1.7		dB
	CDMA, 64 channels, forward	III	25°C		–39.5 to +1.7		dB
	CDMA, 3 carriers	III	25°C		–40.4 to +3.0		dB
	CDMA, 4 carriers	III	25°C		–40.3 to +2.7		dB
	Wideband code division multiple access (W-CDMA), 1 channel, up	III	25°C		–39.9 to +1.8		dB
	W-CDMA, 1 channel, down	III	25°C		–39.9 to +1.7		dB
	W-CDMA, 2 carriers	III	25°C		–40.0 to +1.9		dB
	W-CDMA, 3 carriers	III	25°C		–40.4 to +2.0		dB
	W-CDMA, 4 carriers	III	25°C		–40.3 to +1.7		dB
	additive white Gaussian noise (AWGN), 5 MHz bandwidth	III	25°C		–40.2 to +2.6		dB
	AWGN, 10 MHz bandwidth	III	25°C		–40.2 to +3.1		dB
	AWGN, 15 MHz bandwidth	III	25°C		–40.1 to +3.1		dB
Propagation Delay ⁷	P _{IN} from –55 dBm to 0 dBm	II	25°C		1.2		µs
OUT INTERFACE							
Output DC Voltage	No RF signal present, EN = 1.1 V	I	Full		1.0	5.0	mV
Output-Voltage Droop	P _{IN} = 10 dBm, EN = 1.1 V	I	Full	1.150	1.2	1.250	V
	25 mA sourcing	I	Full	–35	+6	+20	mV
Integrated Output Noise	25 mA sinking	II			30		mV
	1 kHz to 6.5 kHz, P _{IN} = 0 dBm	II	25°C		22		µV RMS
Rise Time ⁸	50 Ω load at OUT	II	25°C		2.9		µs
Fall Time ⁹	50 Ω load at OUT	II	25°C		8.1		µs
ENABLE (EN) LOW = OFF, HIGH = ON							
EN Input High Voltage (On)		I	Full	1.1			V
EN Input Low Voltage (Off)		I	Full			0.6	V
EN Pin Input Current		I	Full		50	500	nA
Turn-On Time ¹⁰	50 Ω load at OUT	II	25°C		8		µs
Turn-Off Time ¹¹	50 Ω load at OUT	II	25°C		45		ns
	1 MΩ 11 pF load at OUT	II	25°C		100		µs

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Table 1. Electrical Characteristics (Continued)

Parameter	Test Conditions	Test Level ¹	Temperature (T _A)	Min	Typ	Max	Unit
POWER SUPPLY							
Supply Voltage		I	Full	2.7	3.3	3.6	V
Active Supply Current	EN = 3.3 V	I	Full	25	30	35	mA
Shutdown Supply Current	EN = 0 V	I	Full		50	500	nA

¹ Refer to Table 6 for an explanation of the test levels.

² Log linearity error is the input-referred power measurement error relative to the best fit straight line (V_{OUT} vs. pin in dBm) obtained by linear regression at T_A = 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.

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RADIATION TEST AND LIMIT SPECIFICATIONS

$T_A = 25^\circ\text{C}$, $V_{CC} = 3.3\text{ V}$, and $EN = 3.3\text{ V}$. Continuous wave, $50\ \Omega$ source at RF_{IN} , $f_{RF} = 2140\text{ MHz}$, unless otherwise noted. Total ionizing dose (TID) testing is characterized to 100 krad.

Table 3. Radiation Test and Limit Specifications

Parameter	Test Conditions/Comments	Min	Typ	Max	Unit
LOGARITHMIC SLOPE, $T_A = 25^\circ\text{C}$ ¹	$f_{RF} = 100\text{ MHz}$	24	28.9	34	mV/dB
	$f_{RF} = 2.14\text{ GHz}$	24	29.3	35	mV/dB
	$f_{RF} = 8\text{ GHz}$	23	28.6	34	mV/dB
	$f_{RF} = 18\text{ GHz}$	24	28.9	34	mV/dB
	$f_{RF} = 20\text{ GHz}$	24	28.8	34	mV/dB
LOGARITHMIC INTERCEPT, $T_A = 25^\circ\text{C}$ ²	$f_{RF} = 100\text{ MHz}$	-43	-36.2	-30	dBm
	$f_{RF} = 2.14\text{ GHz}$	-46	-39	-32	dBm
	$f_{RF} = 8\text{ GHz}$	-46	-39	-32	dBm
	$f_{RF} = 18\text{ GHz}$	-44	-37.4	-31	dBm
	$f_{RF} = 20\text{ GHz}$	-44	-37.1	-30	dBm
OUT INTERFACE					
Output DC Voltage	No RF signal present, $EN = 1.1\text{ V}$		1.0	5.0	mV
	Input power (P_{IN}) = 10 dBm, $EN = 1.1\text{ V}$	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	$EN = 3.3\text{ V}$	25	30	35	mA
Shutdown Supply Current	$EN = 0\text{ V}$		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. Absolute Maximum Ratings

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

EXPLANATION OF TEST LEVELS

Table 6. Explanation of Test Levels

Test Level	Description
I	100% production tested at minimum, room, and maximum operating temperatures.
II	Parameter is guaranteed by design and not production tested.
III	Parameter is guaranteed by bench characterization and not production tested.

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 7. Outgas Testing

Specification (Tested per ASTM E595-15)	Value	Unit
Total Mass Lost	0.06	%
Collected Volatile Condensable Material	0.01	%
Water Vapor Recovered	0.02	%

RADIATION FEATURES

Table 8. 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)	≤80	MeV-cm ² /mg

¹ Guaranteed by device and process characterization. See more details on the [RH5596S](#) product page.

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 9. RH5596S-CSH, 8-Lead, Plastic DFN (2 mm × 2 mm), Flip Chip

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

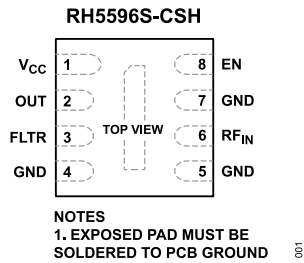


Figure 1. Pin Configuration

Table 10. 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

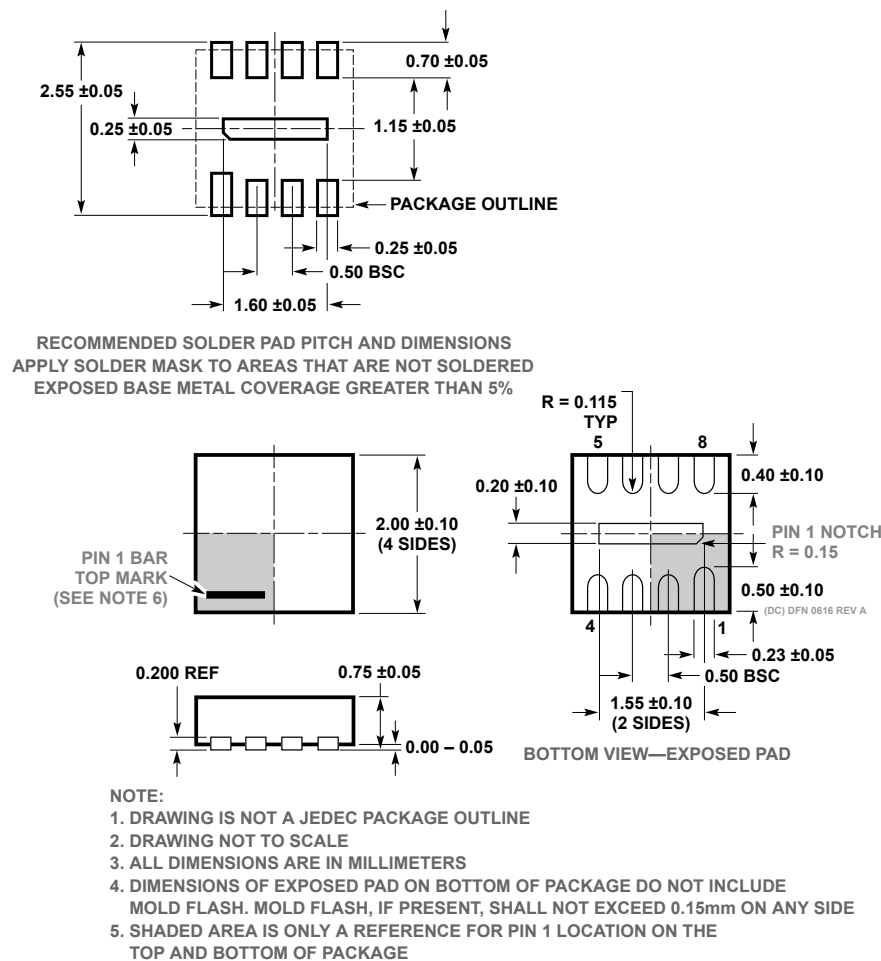


Figure 2. 8-Lead Plastic DFN (2 mm × 2 mm), Flip Chip
(Reference LTC DWG # 05-08-1957 Rev A

Updated: May 15, 2026

ORDERING GUIDE

Model ¹	Temperature Range	Package Description	Packing Quantity	Package Option
RH5596HDC#PBF-CSH	-40°C to +125°C	8-Lead, Plastic DFN (2 mm × 2 mm), Flip Chip	Reel, 500	05-08-1957

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

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