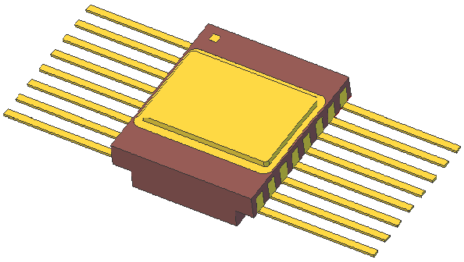
RHF200

Rad-hard, fully differential amplifier

Datasheet - preliminary data



Ceramic Flat-16

The upper metallic lid is electronically connected to pin 16 (GND)

Features

- High input impedance
- 420 MHz bandwidth
- Single-ended input compatible
- Differential slew rate: 550 V/µs
- 4 gains selectable by 2 digital inputs
- Gain setting (V/V): 1, 1.33, 2, 4
- Output common-mode control
- Optimized output stage for short and long line driving
- 4.5 V to 5.5 V operating power supply range
- Settling time at 0.1 %, 200 Ω and 4 Vpp: 13 ns
- 300 krad MIL-STD-883 1019.9
- SEL immune
- SET characterized

Applications

- Space imaging and space data acquisition systems
- Aerospace instrumentation
- Harsh radiation environments
- ADC drivers

Description

The RHF200 is a very high-speed (420 MHz), pure, differential amplifier that operates with a power supply from 4.5 V to 5.5 V. Four gains can be set by two digital inputs.

It can be used as a differential-to-differential or single-differential amplifier, and it is able to drive either an ADC input or a 100 Ω differential line.

With its non-inverting architecture, the RHF200 features a high input impedance that is particularly intended to drive video signals from CCD sensors to an ADC.

The RHF200 is mounted in a hermetic ceramic Flat-16 package.

Table 1: Device summary

Parameter	RHF200K1
SMD [1]	—
Quality level	Engineering model
Package	Flat-16
Mass	0.65 g
Temperature range	-55 °C to 125 °C

Notes:

[1] SMD = standard microcircuit drawing

This is preliminary information on a new product now in development or undergoing evaluation. Details are subject to change without notice.

Contents

1 Functional description

Figure 1: Block diagram

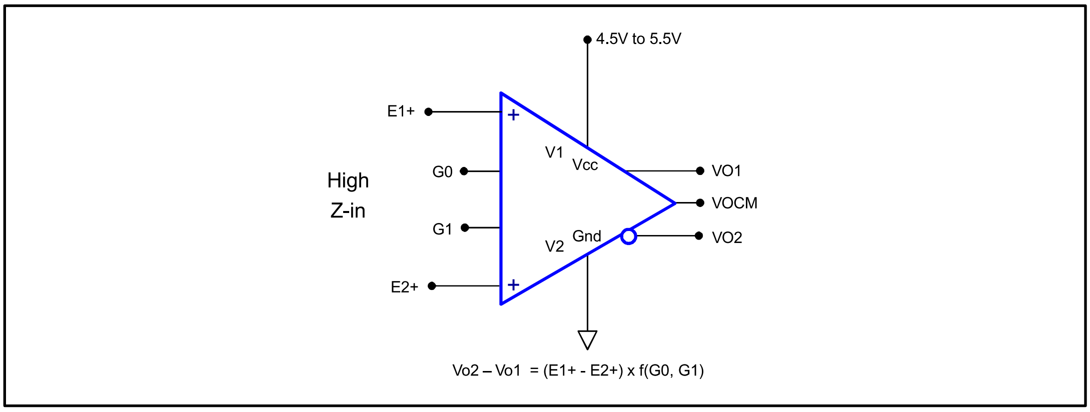
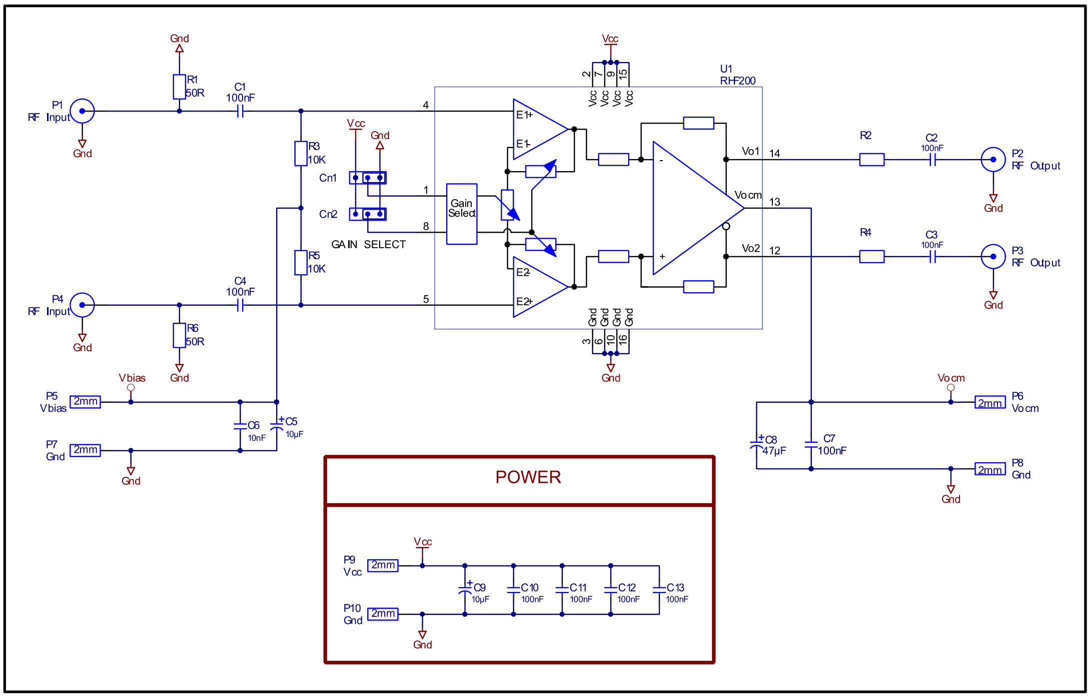
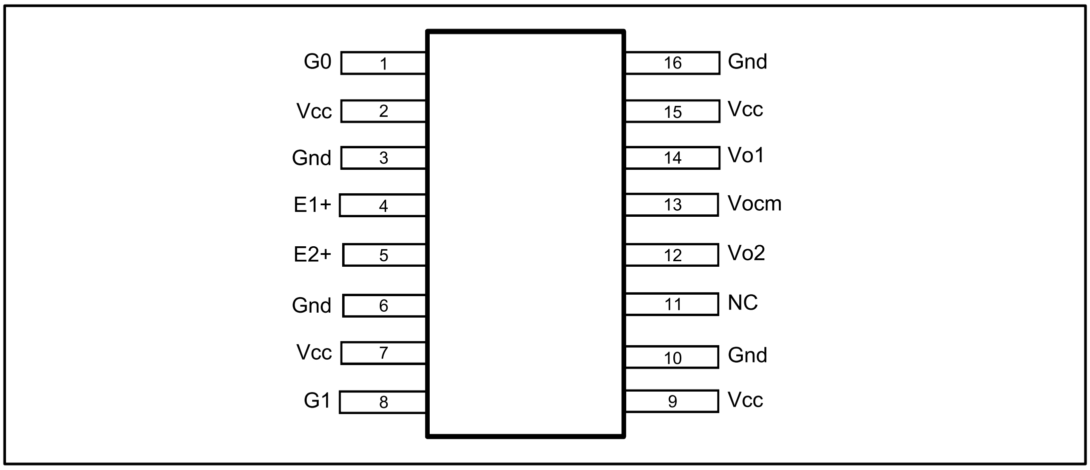


Figure 2: Typical application schematic



2 Pin description

Figure 3: Pin locations



1. Pins named Vcc **must be** externally connected together
2. Pins named Gnd **must be** externally connected together

Table 2: Pin description

Pin #	Name	Description
1	G0	Gain select
2	Vcc	Positive power supply
3	Gnd	Ground (reference level 0 V)
4	E1+	Positive input of amplifier 1
5	E2+	Positive input of amplifier 2
6	Gnd	Ground (reference level 0 V)
7	Vcc	Positive power supply
8	G1	Gain select
9	Vcc	Positive power supply
10	Gnd	Ground (reference level 0 V)
11	NC	Not connected
12	Vo2	Output 2 (in phase with E1+)
13	Vocm	Common-mode output voltage input pin
14	Vo1	Output 1 (in phase with E2+)
15	Vcc	Positive power supply
16	Gnd	Ground (reference level 0 V) - connected to upper metallic lid

Table 3: Truth table of RHF200

G1	G0	Gain (V/V)
0	0	1
0	1	1.33
1	0	2
1	1	4

3 Absolute maximum ratings and operating conditions

Table 4: Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{CC}	Supply voltage [1]	7	V
V_{in}	Input voltage range [2]	Gnd to Vcc	
V_{Gx}	Input voltage range on digital pin [3]	Gnd - 0.3 V to Vcc + 0.3 V	
T_{oper}	Operating free air temperature range	-55 to 125	°C
T_{stg}	Storage temperature	-65 to 150	
T_j	Maximum junction temperature [4]	150	
R_{thja}	thermal resistance junction to ambient	50	°C/W
R_{thjc}	thermal resistance junction to case	22	
ESD	HBM: human body model [5]	8	kV
	CDM: charged device model [6]	0.5	
IESD	ESD diode continuous current	10	mA
	Latch-up immunity	200	

Notes:

[1]All voltage values are measured with respect to the ground pin.

[2]The magnitude of input and output voltages must never exceed Gnd - 0.3 V and V_{CC} + 0.3 V.

[3]The magnitude of input and output voltages must never exceed Gnd - 0.3 V and V_{CC} + 0.3 V.

[4]Short-circuits can cause excessive heating. Destructive dissipation can result from short-circuits on all amplifiers.

[5]Human body model: a 100 pF capacitor is charged to the specified voltage, then discharged through a 1.5 kΩ resistor between two pins of the device. This is done for all couples of connected pin combinations while the other pins are floating.

[6]Charged device model: all pins and package are charged together to the specified voltage and then discharged directly to the ground through only one pin.

Table 5: Operating conditions

Symbol	Parameter	Value	Unit
V_{CC}	Supply voltage	4.5 to 5.5	V
V_{bias}	Input DC biasing range	1.6 to V_{CC} - 1.5	
V_{ocm}	Output common-mode range	0.8 to V_{CC} - 1.8	
V_{InAC}	Usable input signal range [1]	1.3 to V_{CC} - 1.3	
R_L	Minimum load impedance	190	Ω
C_L	Maximum load capacitance directly connected on outputs	3	pF

Notes:

[1]At any time, one of the inputs (E1+ or E2+) must be in the V_{bias} range.

4 Electrical characteristics

Table 6: Electrical characteristics beginning of life, Vcc = 4.5 V to 5.5 V, Gnd = 0 V (unless otherwise specified)

Symbol	Parameter	Test conditions	Temp.	Min.	Typ.	Max.	Unit
DC performance							
V_o	Output offset voltage	V_{ocm} = 0.8 V to Vcc - 1.8 V, V_{bias} = 1.6 V to Vcc -1.5 V	-55 °C	-10		10	mV
			25 °C	-10		10	
			125 °C	-10		10	
ΔV_o	Output offset voltage drift $\Delta Vo = \frac{Vo(125°C) - Vo(-55°C)}{180°C} \times 10^6$	V_{ocm} = 0.8 V to Vcc - 1.8 V, V_{bias} = 1.6 V to Vcc - 1.5 V	-55 °C to 125 °C		±10		µV/°C
I_{CC}	Quiescent current	No load, V_{bias} = V_{ocm} = Vcc/2 (1)	-55 °C		20.5	26	mA
			25 °C		21	27	
			125 °C		21.5	28	
I_b	Input bias current	V_{ocm} = Vcc/2, V_{bias} = 1.6 V to Vcc - 1.5 V	-55 °C		0.02	1	µA
			25 °C		0.04	1	
			125 °C		0.15	1	
I_{ocm}	Input current on output common-mode range	V_{ocm} = 0.8 V to Vcc - 1.8 V	-55 °C to 125 °C	-25	-10		
C_{in}	Input capacitance		25 °C		2		pF
V_{bias}	Input DC biasing range	V_{ocm} = 0.8 V to Vcc - 1.8 V	-55 °C to 125 °C	1.6		Vcc - 1.5 V	V
V_{ocm}	Output common-mode range	V_{bias} = 1.6 V to Vcc - 1.5 V	-55 °C to 125 °C	0.8		Vcc - 1.8 V	
V_{InAC} (2)	Usable input signal range	V_{bias} = 1.6 V to Vcc - 1.5 V	-55 °C to 125 °C	1.3		Vcc - 1.3 V	
CMFBg	Common-mode feedback gain $CMFBg = \frac{\frac{Vo1 + Vo2}{2}}{Vocm}$	V_{ocm} = 0.8 V to Vcc - 1.8 V, V_{bias} = 1.6 V to Vcc - 1.5 V	-55 °C	0.985	1	1.015	V/V
			25 °C	0.985	1	1.015	
			125 °C	0.985	1	1.015	
V_{OH}	High output voltage	R_L = 200 Ω	-55 °C	Vcc - 0.45	Vcc - 0.39		V
			25 °C	Vcc - 0.58	Vcc - 0.49		
			125 °C	Vcc - 0.72	Vcc - 0.6		

Symbol	Parameter	Test conditions	Temp.	Min.	Typ.	Max.	Unit
V_{OH}	High output voltage	R_L = 1 kΩ	-55 °C	Vcc - 0.2	Vcc - 0.17		V
			25 °C	Vcc - 0.26	Vcc - 0.22		
			125 °C	Vcc - 0.33	Vcc - 0.28		
V_{OL}	Low output voltage	R_L = 200 Ω	-55 °C		120	145	mV
			25 °C		160	195	
			125 °C		300	360	
		R_L = 1 kΩ	-55 °C		110	132	
			25 °C		160	195	
			125 °C		200	240	
I_{out}	Output short circuit (even if the amplifier has an output current limiter, this test is performed during a short period of time)	Output to GND, V_{ocm} = Vcc/2	-55 °C		100		mA
			25 °C		100		
			125 °C		100		
Dynamic performance							
Bw	Small signal -3 dB bandwidth	V_{ocm} = V_{icm} = Vcc/2, gain = 1, V_{outdm} = 100 mV_{pp}, R_L = 200 Ω	-55 °C	360	460		MHz
			25 °C	330	420		
			125 °C	280	350		
		V_{ocm} = V_{icm} = Vcc/2, gain = 1.33, V_{outdm} = 100 mV_{pp}, R_L = 200 Ω	-55 °C	270	340		
			25 °C	250	310		
			125 °C	210	270		
		V_{ocm} = V_{icm} = Vcc/2, gain = 2, V_{outdm} = 100 mV_{pp}, R_L = 200 Ω	-55 °C		225		
			25 °C		220		
			125 °C		215		
		V_{ocm} = V_{icm} = Vcc/2, gain = 4, V_{outdm} = 100 mV_{pp}, R_L = 200 Ω	-55 °C		60		
			25 °C		50		
			125 °C		45		
SR	Differential slew rate	V_{ocm} = V_{icm} = Vcc/2, gain = 1, V_{outdm} = 2 V_{pp}, 20 % to 80 %, R_L = 200 Ω	-55 °C		520		V/µs
			25 °C		500		
			125 °C		450		
		V_{ocm} = V_{icm} = Vcc/2, gain = 1.33, V_{outdm} = 2 V_{pp}, 20 % to 80 %, R_L = 200 Ω	-55 °C		540		
			25 °C		520		
			125 °C		470		
		V_{ocm} = V_{icm} = Vcc/2, gain = 2, V_{outdm} = 4 V_{pp}, 20 % to 80 %, R_L = 200 Ω	-55 °C	460	580		
			25 °C	440	550		
			125 °C	400	500		
		V_{ocm} = V_{icm} = Vcc/2, gain = 4, V_{outdm} = 4 V_{pp}, 20 % to 80 %, R_L = 200 Ω	-55 °C	450	570		
			25 °C	420	530		
			125 °C	380	480		

Symbol	Parameter	Test conditions	Temp.	Min.	Typ.	Max.	Unit
St	Settling time 0.1 %	V_{outdm} = 4 Vpp-step, R_L = 200 Ω, gain = 2	-55 °C		12		ns
			25 °C		13		
			125 °C		16		
tdio	Propagation delay input to output	All gains	-55 °C		0.9		
			25 °C		1		
			125 °C		1.3		
CMRR	Common-mode rejection ratio, 20 log ($\Delta V_{icm}/\Delta V_{outdm}$)	V_{bias} = Vcc/2 + ΔV_{icm}, all gains, F = 1 MHz, ΔV_{icm} = ± 0.5 V	-55 °C	45	55		dB
			25 °C	45	55		
			125 °C	45	55		
CMRRo	Vocm CMRR, 20 log ($\Delta V_{ocm}/\Delta V_{outdm}$)	ΔV_{ocm} = 0.8 V to Vcc - 1.8 V, all gains	-55 °C	40	50		
			25 °C	40	50		
			125 °C	40	50		
Cu	Channel unbalanced, 20 log ($\Delta V_{outdm}/\Delta V_{outcm}$)	ΔV_{outdm} = 1 Vpp, F = 1 MHz, RL ≥ 200 Ω	- 55 °C to 125 °C	50	70		
PSRR	Power supply rejection ratio, 20 log ($\Delta V_{CC}/\Delta V_{outdm}$)	Vcc = 5 V ± 100 mV, F = 1 MHz, all gains	-55 °C to 125 °C		70		
Noise and distortion							
e_n	Differential output noise	F = 100 kHz, gain = 1	-55 °C		8.8		nV/ √Hz
			25 °C		10		
			125 °C		12.5		
		F = 100 kHz, gain = 1.33	-55 °C		10		
			25 °C		12		
			125 °C		14.5		
		F = 100 kHz, gain = 2	-55 °C		13		
			25 °C		15		
			125 °C		18.5		
		F = 100 kHz, gain = 4	-55 °C		22.5		
			25 °C		28		
			125 °C		33.5		
H2/H3, SFDR	Distortion	V_{outdm} = 4 V_{pp}, V_{bias} = V_{ocm} = Vcc/2, gain = 2, R_L = 200 Ω, F = 1 MHz	25 °C		80		dBc
		V_{outdm} = 4 V_{pp}, V_{bias} = V_{ocm} = Vcc/2, gain = 2, R_L = 200 Ω, F = 10 MHz			54		
		V_{outdm} = 4 V_{pp}, V_{bias} = V_{ocm} = Vcc/2, gain = 2, R_L = 1 kΩ, F = 1 MHz			80		
		V_{outdm} = 4 V_{pp}, V_{bias} = V_{ocm} = Vcc/2, gain = 2, R_L = 1 kΩ, F = 10 MHz			68		

Symbol	Parameter	Test conditions	Temp.	Min.	Typ.	Max.	Unit
Gain select							
Thr max.	Max. threshold on pin G0, G1 for low level	Versus GND	-55 °C			0.4	V
			25 °C			0.4	
			125 °C			0.4	
Thr min.	Min. threshold on pin G0, G1 for high level		-55 °C	1.4			
			25 °C	1.4			
			125 °C	1.4			
IGL	Input current on gain pin	Gx = 0 V	-55 °C to 125 °C	-25	-10		µA
IGH	Input current on gain pin	Gx = Vcc	-55 °C to 125 °C		10	25	
Gain	Gain setting, no load, Fin = 1 MHz, V_{bias} = V_{ocm} = Vcc/2, V_{outdm} = 100 mVpp	G1, G0 = 0, 0	25 °C	0.99	1	1.01	V/V
		G1, G0 = 0, 1		1.316	1.33	1.343	
		G1, G0 = 1, 0		1.98	2	2.02	
		G1, G0 = 1, 1		3.96	4	4.04	
		G1, G0 = 0, 0		-0.87	0	0.86	dB
		G1, G0 = 0, 1		2.38	2.48	2.56	
		G1, G0 = 1, 0		5.94	6	6.1	
		G1, G0 = 1, 1		11.95	12	12.12	
Gain drift	Average gain drift, no load, Fin = 1 MHz, V_{bias} = V_{ocm} = Vcc/2, V_{outdm} = 100 mVpp	Av = 1	-55 °C to 125 °C		5.9		(µV/V)/°C
		Av = 1.33			7.2		
		Av = 2			8.8		
		Av = 4			20		
	Standard deviation gain drift, no load, Fin = 1 MHz, V_{bias} = V_{ocm} = Vcc/2, V_{outdm} = 100 mVpp	Av = 1			3.5		
		Av = 1.33			4.7		
		Av = 2			7.5		
		Av = 4			22		
tdgo	Propagation delay gain control to output	All gains	-55 °C to 125 °C		8		ns

Notes:

(1)When $V_{bias} \neq V_{ocm}$, an extra current consumption is added which depends on V_{bias} and V_{ocm} values.

(2)In AC mode, one of the two inputs, E1+ and E2+, must always be in V_{bias} range.

Table 7: Electrical characteristics after 300 krad high-dose rate (HDR), Vcc = 4.5 V to 5.5 V, Gnd = 0 V (unless otherwise specified)

<table>
<tr><th>Symbol</th><th>Parameter</th><th>Test conditions</th><th>Temp.</th><th>Min.</th><th>Typ.</th><th>Max.</th><th>Unit</th></tr>
<tr><td colspan="8">DC performance</td></tr>
<tr><td>V_o</td><td>Output offset voltage</td><td>V_{ocm} = 0.8 V to Vcc - 1.8 V, V_{bias} = 1.6 V to Vcc -1.5 V</td><td>25 °C</td><td>-10</td><td></td><td>30</td><td>mV</td></tr>
<tr><td>I_{CC}</td><td>Quiescent current</td><td>No load, V_{bias} = V_{ocm} = Vcc/2 (1)</td><td>25 °C</td><td></td><td>21</td><td>27</td><td>mA</td></tr>
<tr><td>I_b</td><td>Input bias current</td><td>V_{ocm} = Vcc/2, V_{bias} = 1.6 V to Vcc - 1.5 V</td><td>25 °C</td><td></td><td>0.04</td><td>1</td><td rowspan="2">µA</td></tr>
<tr><td>I_{ocm}</td><td>Input current on output common-mode range</td><td>V_{ocm} = 0.8 V to Vcc - 1.8 V</td><td>25 °C</td><td>-25</td><td>-10</td><td></td></tr>
<tr><td>C_{in}</td><td>Input capacitance</td><td></td><td>25 °C</td><td></td><td>2</td><td></td><td>pF</td></tr>
<tr><td>V_{bias}</td><td>Input DC biasing range</td><td>V_{ocm} = 0.8 V to Vcc - 1.8 V</td><td>25 °C</td><td>1.6</td><td></td><td>Vcc - 1.5 V</td><td rowspan="3">V</td></tr>
<tr><td>V_{ocm}</td><td>Output common-mode range</td><td>V_{bias} = 1.6 V to Vcc - 1.5 V</td><td>25 °C</td><td>0.8</td><td></td><td>Vcc - 1.8 V</td></tr>
<tr><td>V_{InAC} (2)</td><td>Usable input signal range</td><td>V_{bias} = 1.6 V to Vcc - 1.5 V</td><td>25 °C</td><td>1.3</td><td></td><td>Vcc - 1.3 V</td></tr>
<tr><td>CMFBg</td><td>Common-mode feedback gain
$CMFBg = \frac{\frac{Vo1 + Vo2}{2}}{Vocm}$</td><td>$V_{ocm}$ = 0.8 V to Vcc - 1.8 V, V_{bias} = 1.6 V to Vcc - 1.5 V</td><td>25 °C</td><td>0.985</td><td>1</td><td>1.015</td><td>V/V</td></tr>
<tr><td rowspan="2">V_{OH}</td><td rowspan="2">High output voltage</td><td>R_L = 200 Ω</td><td rowspan="2">25 °C</td><td>Vcc - 0.58</td><td>Vcc - 0.49</td><td></td><td rowspan="2">V</td></tr>
<tr><td>R_L = 1 kΩ</td><td>Vcc - 0.26</td><td>Vcc - 0.22</td><td></td></tr>
<tr><td rowspan="2">V_{OL}</td><td rowspan="2">Low output voltage</td><td>R_L = 200 Ω</td><td rowspan="2">25 °C</td><td></td><td>160</td><td>195</td><td rowspan="2">mV</td></tr>
<tr><td>R_L = 1 kΩ</td><td></td><td>160</td><td>195</td></tr>
<tr><td>I_{out}</td><td>Output short circuit (even if the amplifier has an output current limiter, this test is performed during a short period of time)</td><td>Output to GND, V_{ocm} = Vcc/2</td><td>25 °C</td><td></td><td>100</td><td></td><td>mA</td></tr>
<tr><td colspan="8">Dynamic performance</td></tr>
<tr><td rowspan="4">Bw</td><td rowspan="4">Small signal -3 dB bandwidth</td><td>V_{ocm} = V_{icm} = Vcc/2, gain = 1, V_{outdm} = 100 mV_{pp}, R_L = 200 Ω</td><td rowspan="4">25 °C</td><td>330</td><td>420</td><td></td><td rowspan="4">MHz</td></tr>
<tr><td>V_{ocm} = V_{icm} = Vcc/2, gain = 1.33, V_{outdm} = 100 mV_{pp}, R_L = 200 Ω</td><td>250</td><td>310</td><td></td></tr>
<tr><td>V_{ocm} = V_{icm} = Vcc/2, gain = 2, V_{outdm} = 100 mV_{pp}, R_L = 200 Ω</td><td></td><td>220</td><td></td></tr>
<tr><td>V_{ocm} = V_{icm} = Vcc/2, gain = 4, V_{outdm} = 100 mV_{pp}, R_L = 200 Ω</td><td></td><td>50</td><td></td></tr>
</table>

Symbol	Parameter	Test conditions	Temp.	Min.	Typ.	Max.	Unit
SR	Differential slew rate	$V_{ocm} = V_{icm} = Vcc/2$, gain = 1, $V_{outdm} = 2\ V_{pp}$, 20 % to 80 %, $R_L = 200\ \Omega$	25 °C		500		V/µs
		$V_{ocm} = V_{icm} = Vcc/2$, gain = 1.33, $V_{outdm} = 2\ V_{pp}$, 20 % to 80 %, $R_L = 200\ \Omega$			520		
		$V_{ocm} = V_{icm} = Vcc/2$, gain = 2, $V_{outdm} = 4\ V_{pp}$, 20 % to 80 %, $R_L = 200\ \Omega$		440	550		
		$V_{ocm} = V_{icm} = Vcc/2$, gain = 4, $V_{outdm} = 4\ V_{pp}$, 20 % to 80 %, $R_L = 200\ \Omega$		420	530		
CMRR	Common-mode rejection ratio, 20 log ($\Delta V_{icm}/\Delta V_{outdm}$)	V_{bias}= Vcc/2 ±0.5 V, all gains, F = 1 MHz	25 °C	45	55		dB
CMRRo	Vocm CMRR, 20 log ($\Delta V_{ocm}/\Delta V_{outdm}$)	ΔV_{ocm} = 0.8 V to Vcc - 1.8 V, all gains	25 °C	40	50		
Cu	Channel unbalanced, 20 log ($\Delta V_{outdm}/\Delta V_{outcm}$)	ΔV_{outdm} = 1 Vpp, F = 1 MHz, RL ≥ 200 Ω	25 °C	50	70		
Gain select							
Thr max.	Max. threshold on pin G0, G1 for low level	Versus GND	25 °C			0.4	V
Thr min.	Min. threshold on pin G0, G1 for high level		25 °C	1.4			
IGL	Input current on gain pin	Gx = 0 V	25 °C	-25	-10		µA
IGH	Input current on gain pin	Gx = Vcc	25 °C		10	25	
Gain	Gain setting, no load, Fin = 1 MHz, $V_{bias} = V_{ocm} = Vcc/2$, V_{outdm} = 100 mVpp	G1, G0 = 0, 0	25 °C	0.99	1	1.01	V/V
		G1, G0 = 0, 1		1.316	1.33	1.343	
		G1, G0 = 1, 0		1.9	2	2.02	
		G1, G0 = 1, 1		3.8	4	4.04	
		G1, G0 = 0, 0		-0.87	0	0.86	dB
		G1, G0 = 0, 1		2.38	2.48	2.56	
		G1, G0 = 1, 0		5.57	6	6.1	
		G1, G0 = 1, 1		11.6	12	12.12	

Notes:

(1)When $V_{bias} \neq V_{ocm}$, an extra current consumption is added which depends on V_{bias} and V_{ocm} values.

(2)In AC mode, one of the two inputs, E1+ and E2+, must always be in V_{bias} range.

5 Electrical characteristics curves

Figure 4: Gain vs. frequency, Av = 1

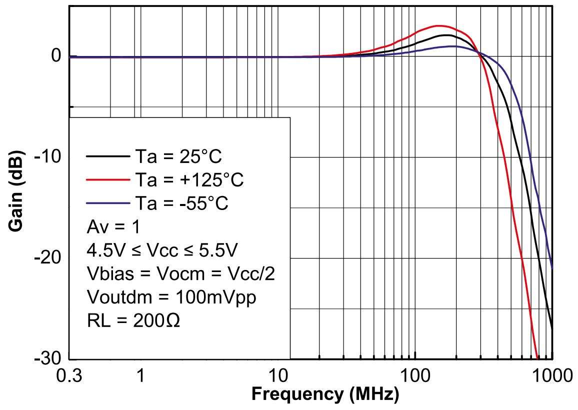


Figure 5: Gain vs. frequency, Av = 1, Vocm = 0.8 V

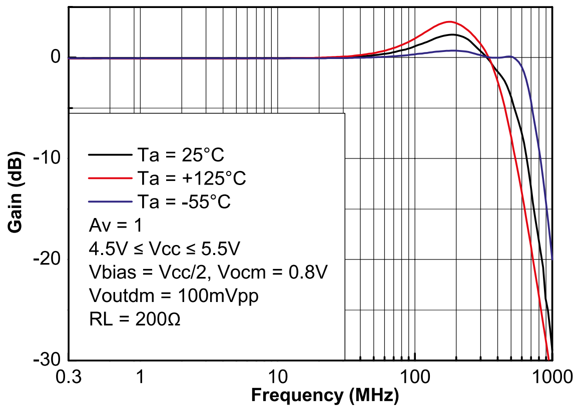


Figure 6: Gain vs. frequency, Av = 1.33

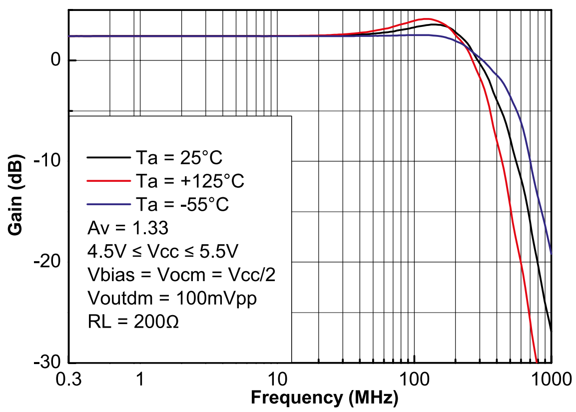


Figure 7: Gain vs. frequency, Av = 1.33, Vocm = 0.8 V

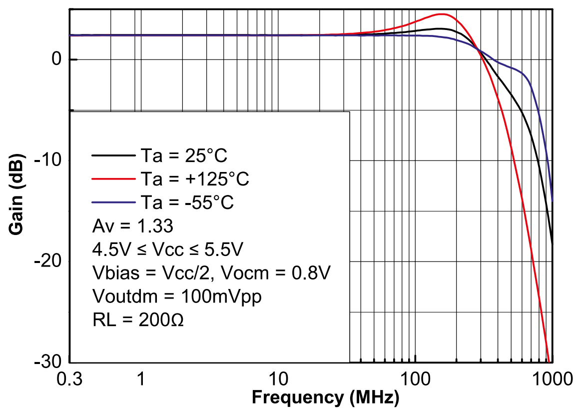


Figure 8: Gain vs. frequency, Av = 2

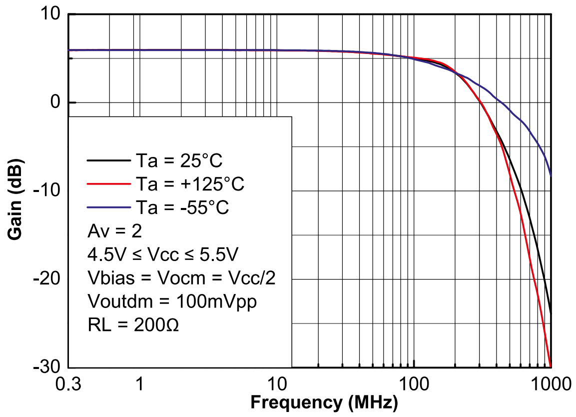


Figure 9: Gain vs. frequency, Av = 2, Vocm = 0.8 V

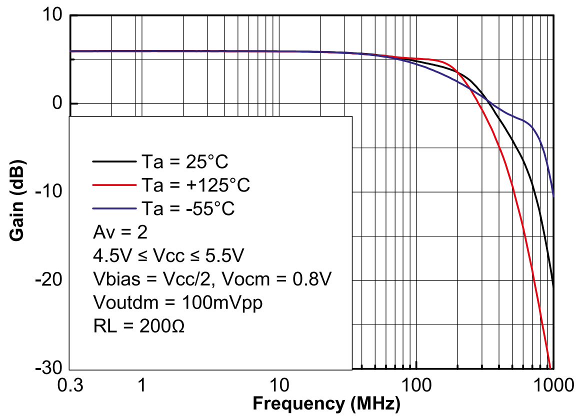


Figure 10: Gain vs. frequency, Av = 4

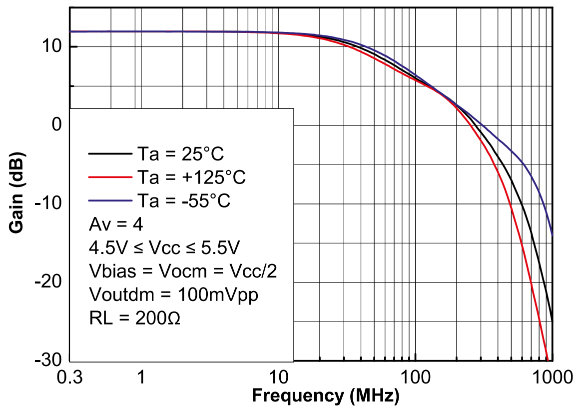


Figure 11: Gain vs. frequency, Av = 4, Vocm = 0.8 V

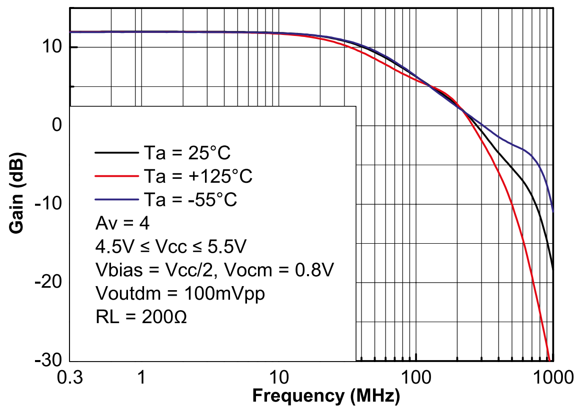


Figure 12: Gain vs. temperature, Av = 1

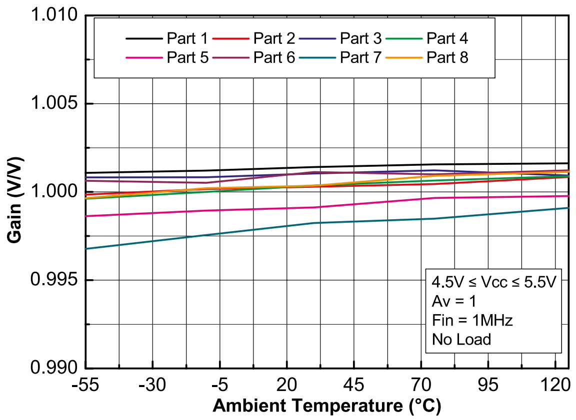


Figure 13: Gain drift, Av = 1

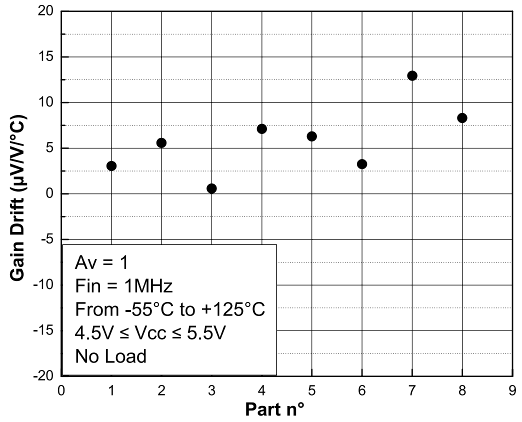


Figure 14: Gain vs. temperature, Av = 1.33

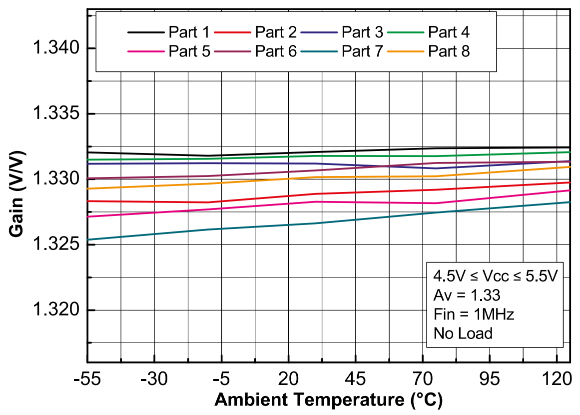


Figure 15: Gain drift, Av = 1.33

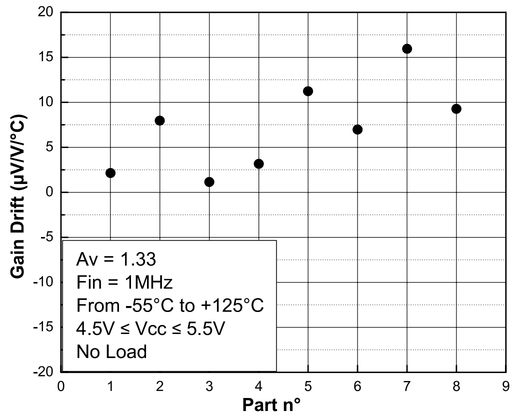


Figure 16: Gain vs. temperature, Av = 2

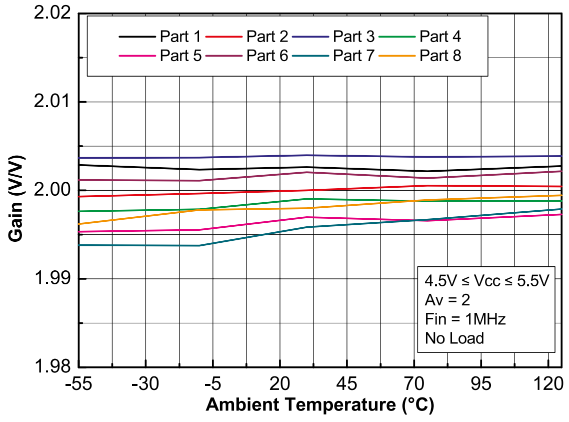


Figure 17: Gain drift, Av = 2

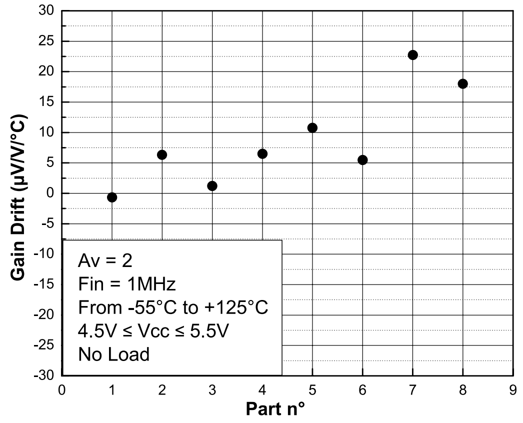


Figure 18: Gain vs. temperature, Av = 4

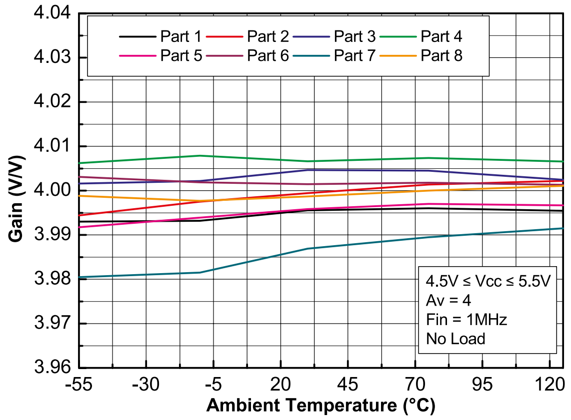


Figure 19: Gain drift, Av = 4

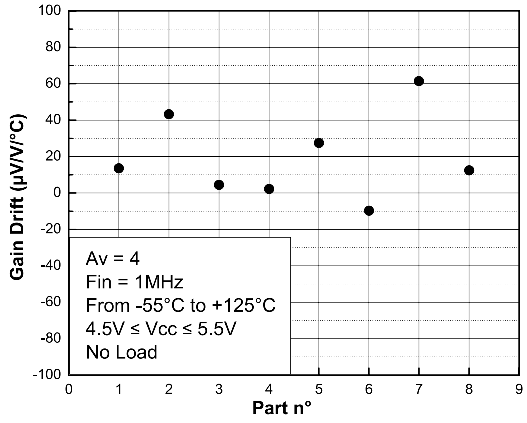


Figure 20: CMRR vs. frequency, Av = 1

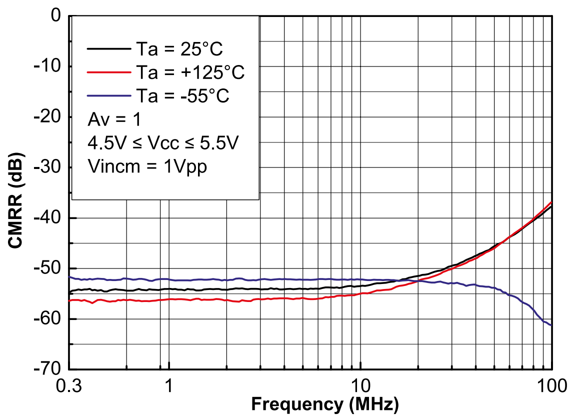


Figure 21: CMRR vs. frequency, Av = 1.33

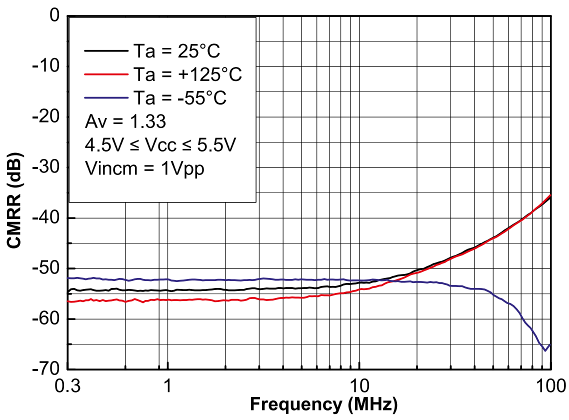


Figure 22: CMRR vs. frequency, Av = 2

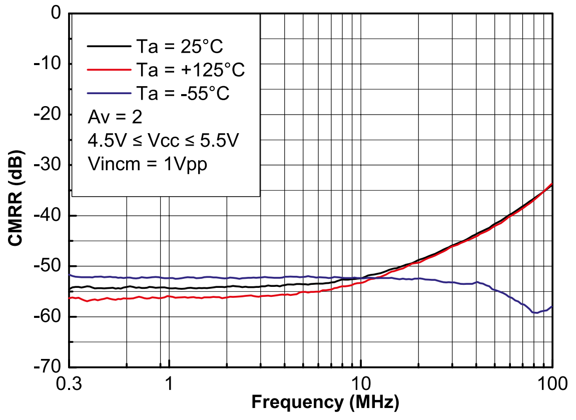


Figure 23: CMRR vs. frequency, Av = 4

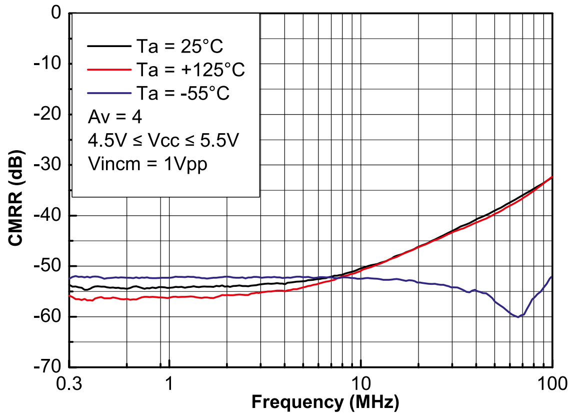


Figure 24: CMRRout vs. frequency

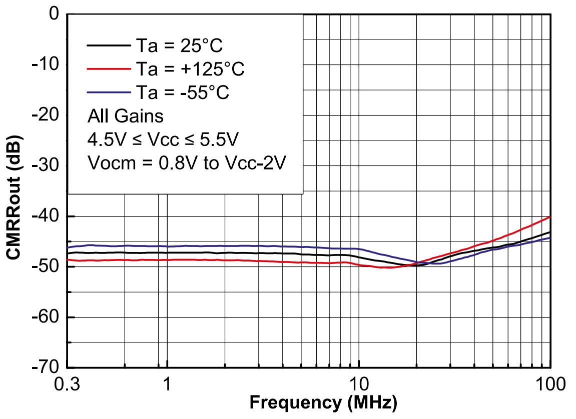


Figure 25: Channel unbalance vs. frequency

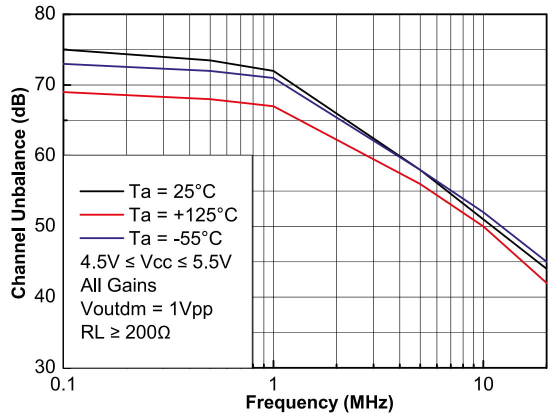


Figure 26: PSRR vs. frequency, Av = 1

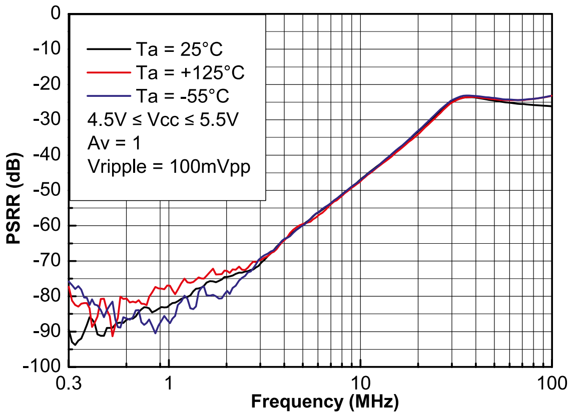


Figure 27: PSRR vs. frequency, Av = 1.33

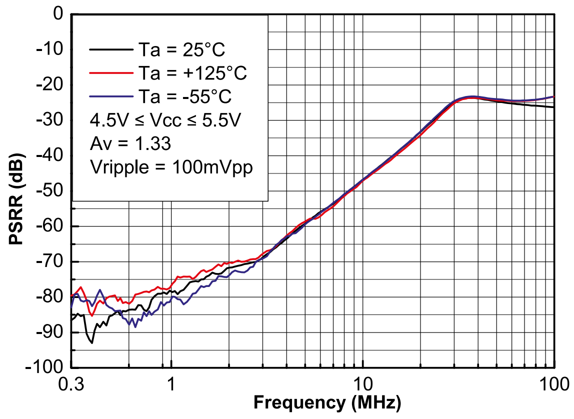


Figure 28: PSRR vs. frequency, Av = 2

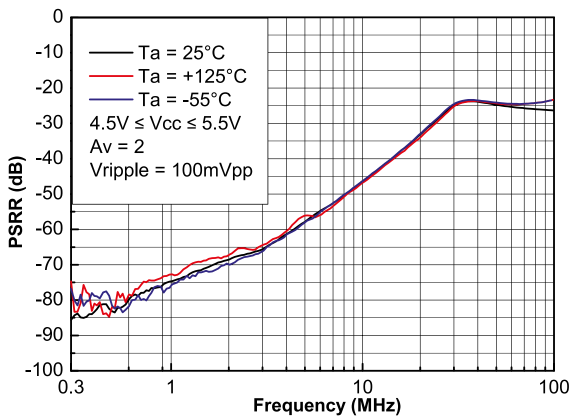


Figure 29: PSRR vs. frequency, Av = 4

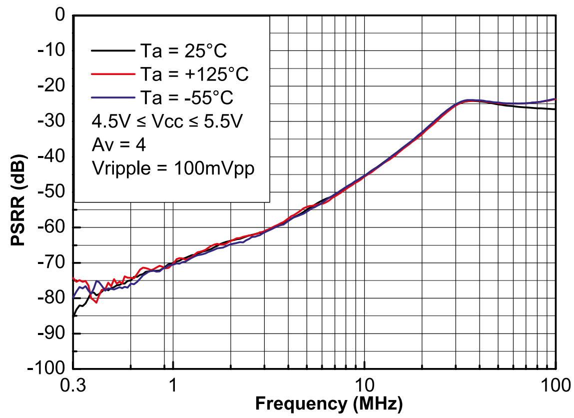
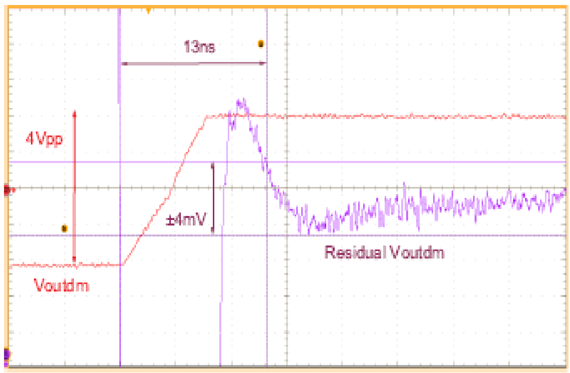
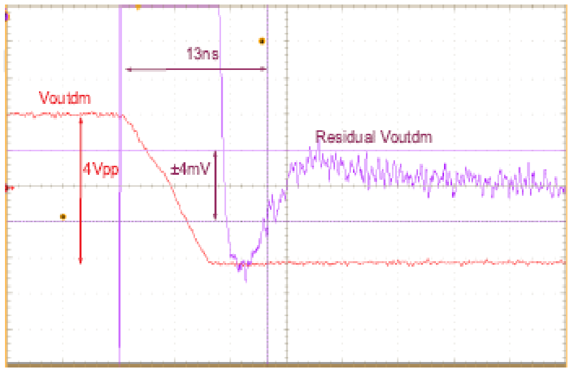


Figure 30: Settling time response, Av = 2, Ta = 25 °C, high side



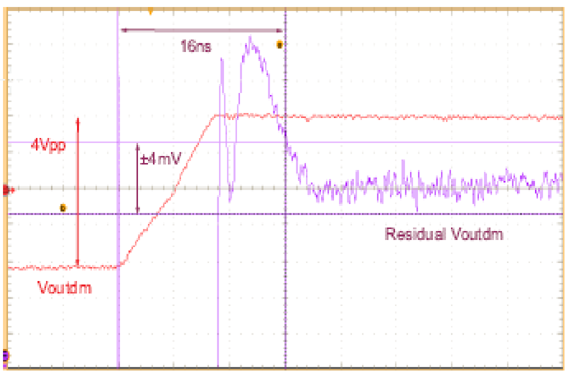
4.5V ≤ Vcc ≤ 5.5V, AV = 2, RL = 200Ω, 5ns/div, Ta = +25°C

Figure 31: Settling time response, Av = 2, Ta = 25 °C, low side



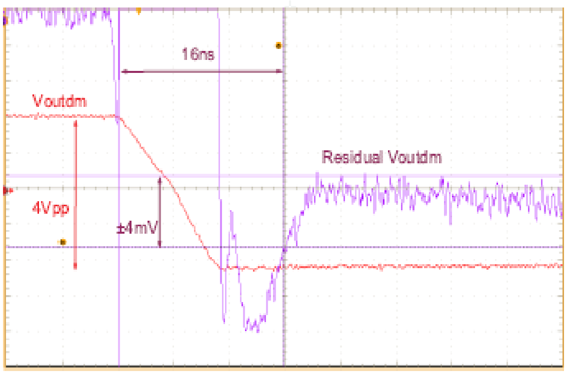
4.5V ≤ Vcc ≤ 5.5V, AV = 2, RL = 200Ω, 5ns/div, Ta = +25°C

Figure 32: Settling time response, Av = 2, Ta = 125 °C, high side



4.5V ≤ Vcc ≤ 5.5V, AV = 2, RL = 200Ω, 5ns/div, Ta = +125°C

Figure 33: Settling time response, Av = 2, Ta = 125 °C, low side



4.5V ≤ Vcc ≤ 5.5V, AV = 2, RL = 200Ω, 5ns/div, Ta = +125°C

Figure 34: Settling time response, Av = 2, Ta = -55 °C, high side

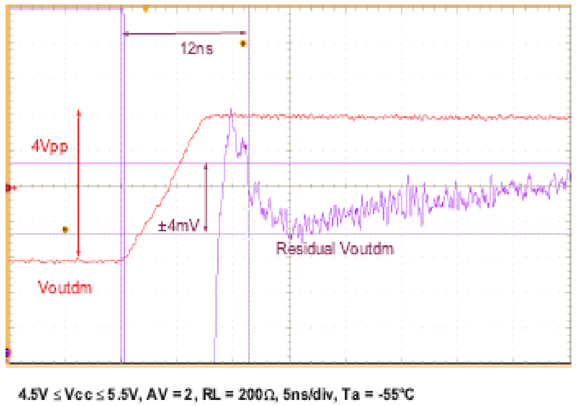


Figure 35: Settling time response, Av = 2, Ta = -55 °C, low side

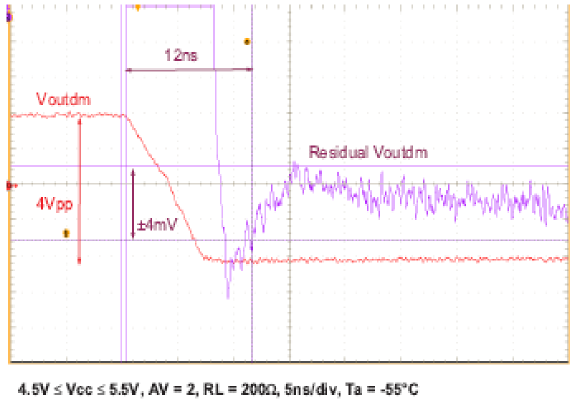


Figure 36: Harmonic level vs. frequency, RL = 200 Ω, Ta = 25 °C

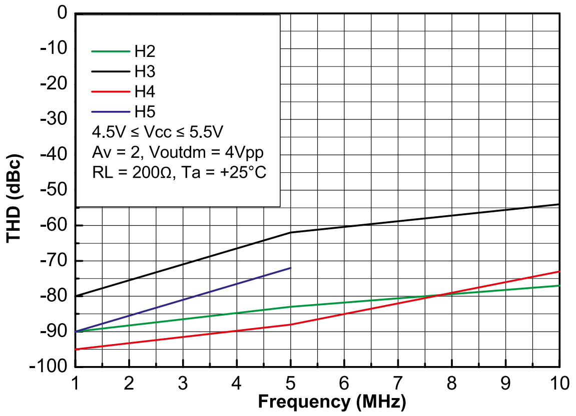


Figure 37: Harmonic level vs. frequency, RL = 1 kΩ, Ta = 25 °C

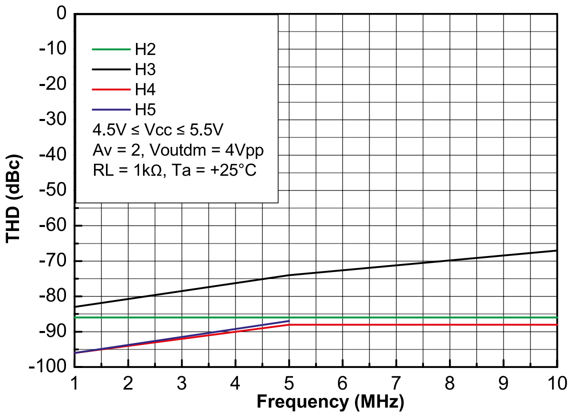


Figure 38: Harmonic level vs. frequency, RL = 200 Ω, Ta = 125 °C

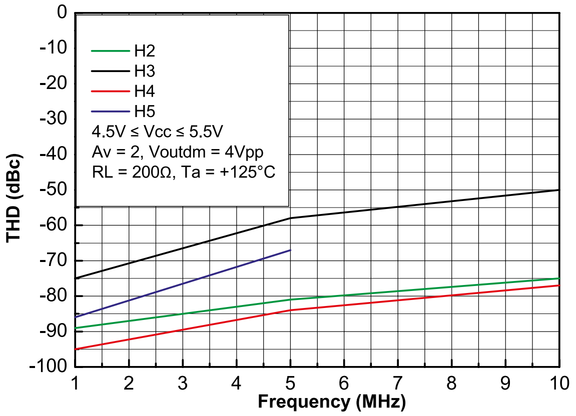


Figure 39: Harmonic level vs. frequency, RL = 1 kΩ, Ta = 125 °C

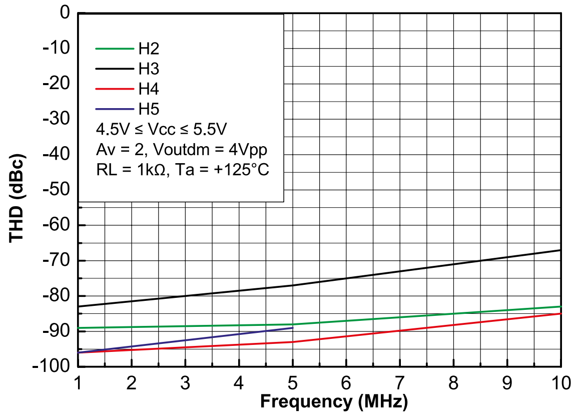


Figure 40: Harmonic level vs. frequency, RL = 200 Ω, Ta = -55 °C

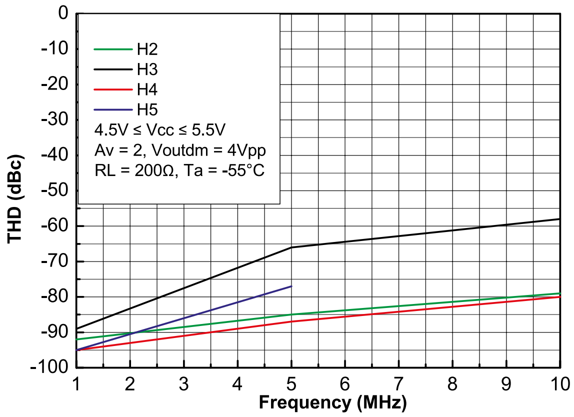


Figure 41: Harmonic level vs. frequency, RL = 1 kΩ, Ta = -55 °C

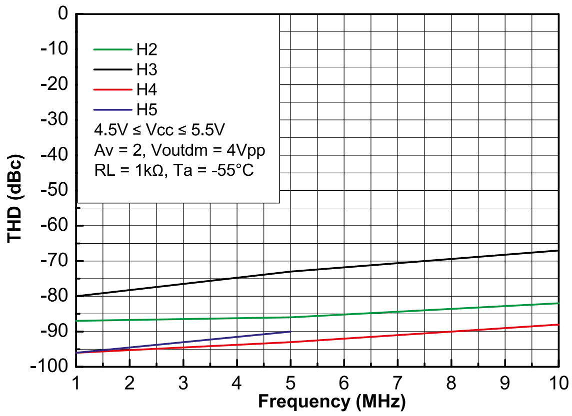
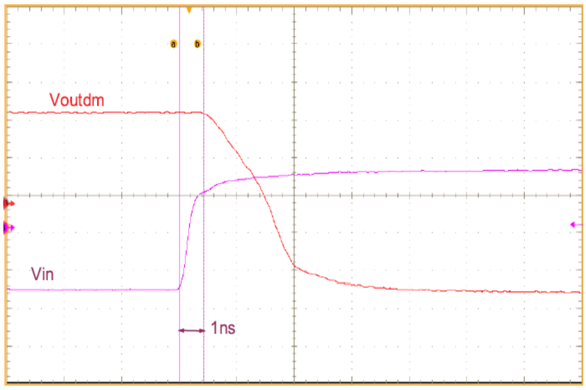
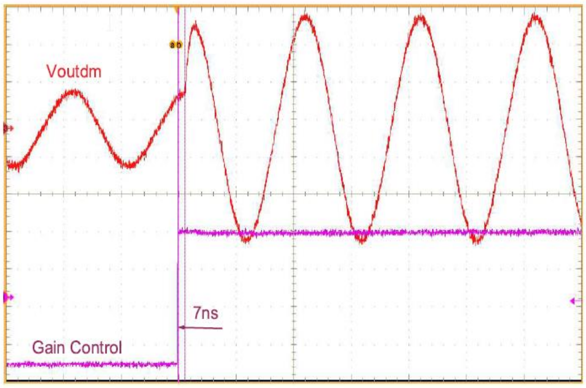


Figure 42: Propagation delay input to output



4.5V ≤ Vcc ≤ 5.5V, 2.5ns/div, Ta = +25°C

Figure 43: Propagation delay gain control to output



4.5V ≤ Vcc ≤ 5.5V, 50ns/div, Ta = +25°C

6 Application note

Figure 44: Short track driving

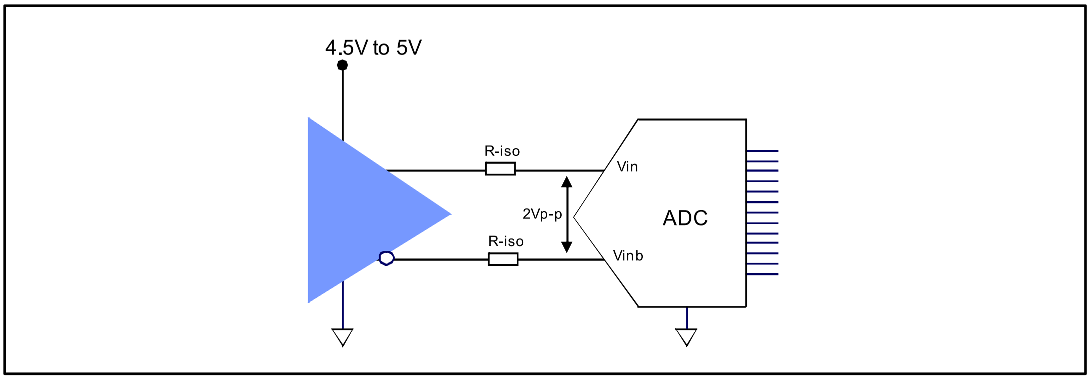
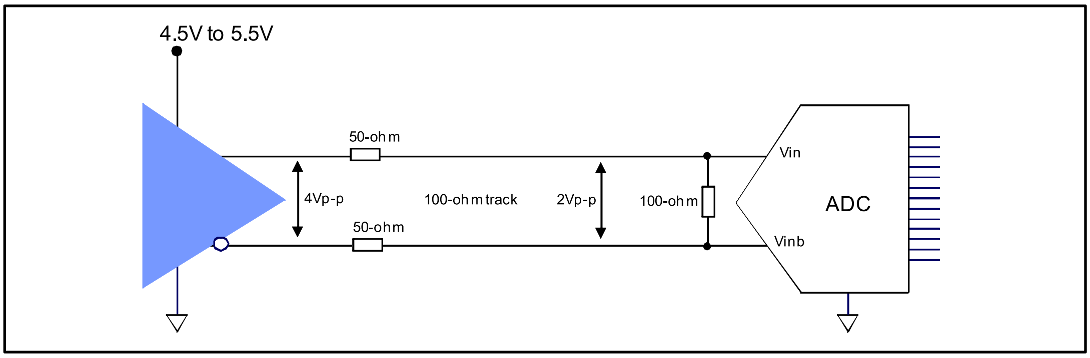


Figure 45: Long track driving with impedance matching

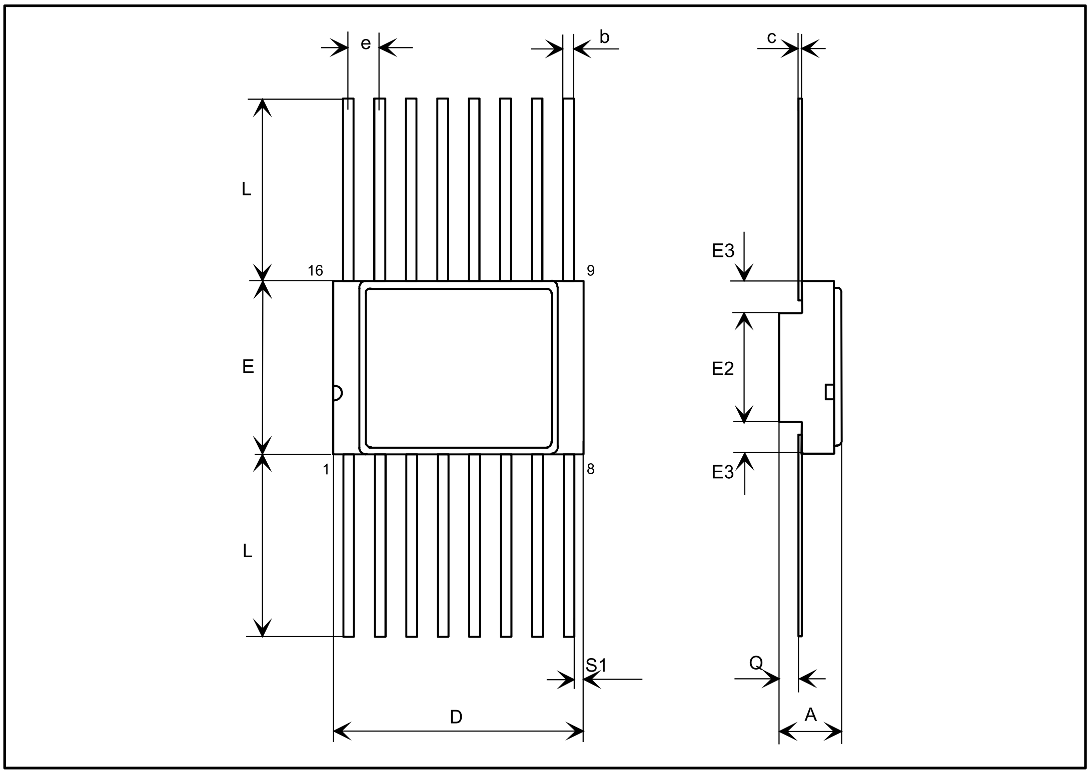


7 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: ***www.st.com***. ECOPACK® is an ST trademark.

7.1 Ceramic Flat-16 package information

Figure 46: Ceramic Flat-16 package outline



1. The upper metallic lid is electrically connected to pin16.

Table 8: Ceramic Flat-16 mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.31		2.72	0.091		0.107
b	0.38		0.48	0.015		0.019
c	0.10		0.18	0.004		0.007
D	9.75		10.13	0.384		0.399
E	6.75		7.06	0.266		0.278
E2		4.32			0.170	
E3	0.76			0.030		
e		1.27			0.050	
L	6.35		7.36	0.250		0.290
Q	0.66		1.14	0.026		0.045
S1	0.13			0.005		

8 Ordering information

Table 9: Order codes

Order code	Description	Temp. range	Package	Marking	Packing
RHF200K1	Engineering model	-55 °C to 125 °C	Flat-16	RHF200K1	Conductive strip pack

Contact your ST sales office for information regarding the specific conditions for products in die form and QML-Q versions.

9 Revision history

Table 10: Document revision history

Date	Revision	Changes
09-Jan-2017	1	Initial release