6 V to 28 V, Differential Broadband HPLC Line Driver with Common-mode

1 Description

The CN6212A is a differential line driver amplifier designed for power line communication (PLC) applications. It integrates two current-feedback amplifiers, delivering exceptionally low distortion to ensure transmitted signals strictly comply with power spectral mask requirements across PLC frequency bands. The device features a high 1A output current capability, enabling robust performance against significant variations in PLC channel impedance and maintaining signal transmission quality even under heavy loads. Its operating current is externally adjustable via a resistor and can be digitally scaled to 1/2 or 3/4 of the set value through a control pin, allowing software-based optimization of drive performance based on real-time channel conditions. The CN6212A operates over a wide voltage range of up to 28V.

The device incorporates on-chip protection circuits, including over-current protection and temperature compensation, ensuring stable and reliable operation under diverse conditions for superior performance in PLC systems.

The CN6212A is available in a QFN 4x4-16L package.

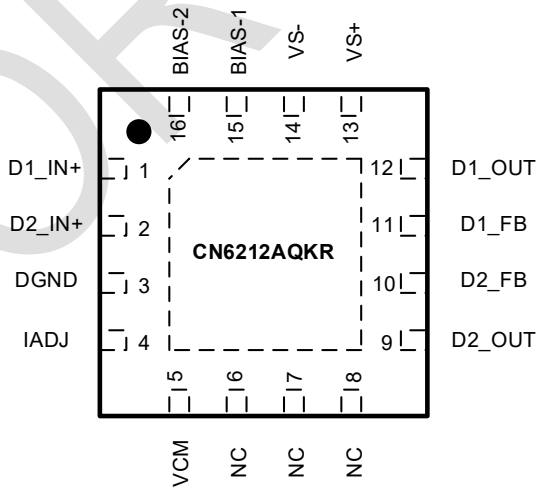
2 Features

- Operating voltage：6V to 28V
- Large signal bandwidth：> 20MHz
- 3rd harmonic suppression：
  > 40dBc @ 10M / 10Vpp / 50Ωload
  > 50dBc @ 5M / 10Vpp / 50Ωload
  > 60dBc @ 2M / 10Vpp / 50Ωload
  > 76dBc @ 500K / 10Vpp / 50Ωload
- 2nd harmonic suppression：
  > 55dBc @ 10M / 10Vpp / 50Ωload
  > 60dBc @ 5M / 10Vpp / 50Ωload
  > 70dBc @ 2M / 10Vpp / 50Ωload
  > 80dBc @ 500K / 10 Vpp /50Ωload
- Operating current externally set, digitally controllable
- Slew rate：500 V/μs
- Maximum differential output：2x operating voltage -6V@50Ωload
- TTL / CMOS compatible
- Temperature range -40°C to +85°C

3 Applications

- Power carrier communications

4 Pinout



5 Ordering information

Product Number	Package	Quantity/Tape
CN6212AQKR	QFN4X4-16L	3000/Tube

6 Marking

Product Numbe	Marking
CN6212AQKR	CN6212A YYWW

Note: YY=Year WW=Week.

Green (RoHS & HF): CHIPNORTH defines "Green" to mean Pb-Free (RoHS compatible) and free of halogen substances. If you have additional comments or questions, please contact your CHIPNORTH representative directly.

Moisture sensitivity level(MSL):3

7 Typical Application

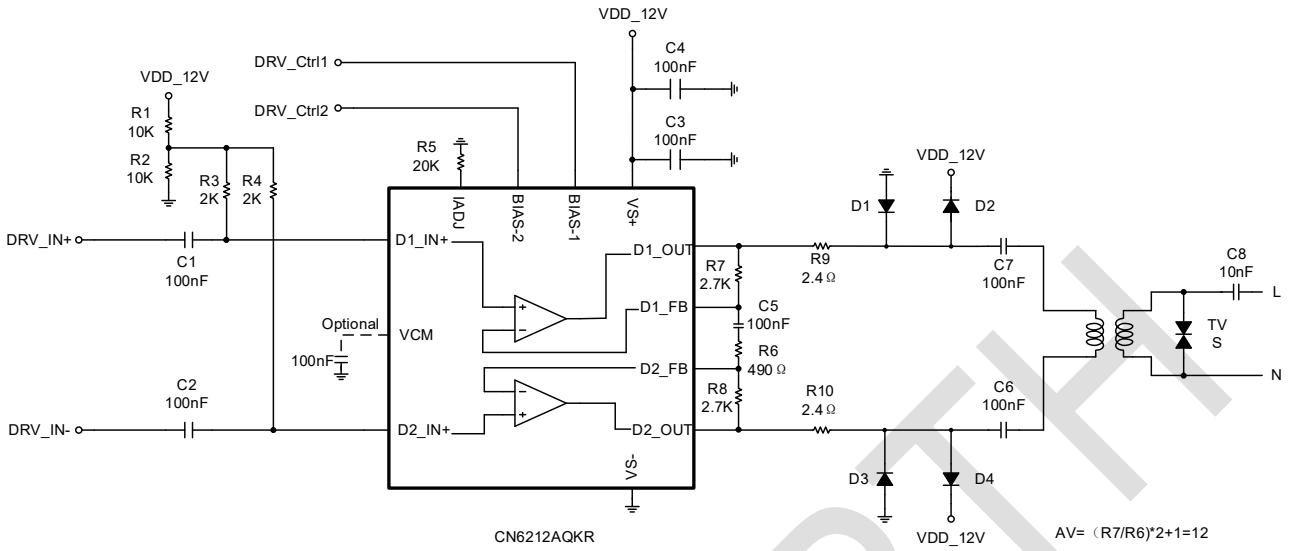


Figure 2 Typical Application

8 Pin Description

Pin No.	Pin Name	Descriptions
1	D1_IN+	OP1 Non-inverting Input
2	D2_IN+	OP2 Non-inverting Input
3	DGND	Ground reference for bias control pins
4	IADJ	Operating Current Set Point (External Resistor Connection)
5	VCM	Common-Mode Reference Voltage Output
6~8	NC	No Connect
9	D2_OUT	Amplifier D2 output
10	D2_FB	Amplifier D2 inverting input
11	D1_FB	Amplifier D1 inverting input
12	D1_OUT	Amplifier D1 output
13	VS+	Positive power-supply connection
14	VS-	Negative power-supply connection
15	BIAS-1	Power mode parallel control, LSB
16	BIAS-2	Power mode parallel control, MSB
17	EP（1）	Connect to VS– on the printed circuit board (PCB) for best performance.

Note (1): EP must be connected to the exposed copper heat sink during PCB design and connected to the GND of the chip.

9 Specifications

9.1 Absolute Maximum Ratings

Symbol	Parameter	Value	Units
VS+	Maximum VDD terminal voltage	28	V
V_{BIAS}	Logic pin BIAS1/BIAS2 input range	-0.3~10	V
T_J	Maximum Junction Temperature	150	°C
T_{STG}	Storage temperature	-55~150	°C

Note (1): If applied to extreme parameter conditions, the chip may be damaged.

9.2 ESD Ratings

Symbol	Standardize	Value	Units
HBM	ESDA/JEDEC JS-001-2017	±4000	V

9.3 Thermal Information

Symbol	Description	Value	Units
θJA	Junction-to-ambient thermal resistance	48	°C /W
θJC(top)	Junction-to-case (top) thermal resistance	55	°C /W
θJB	Junction-to-board thermal resistance	22	°C /W

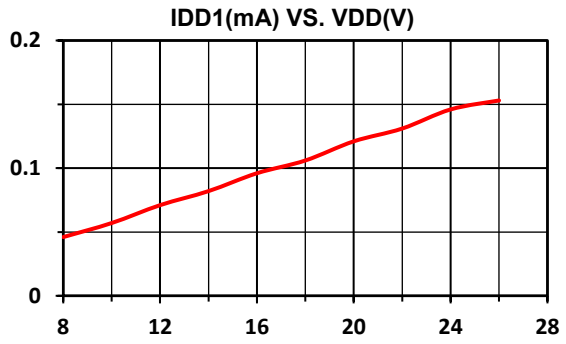
10 Electrical Characteristics

(VS+ = 12V, R_{IADJ} = 10K, T_A = +25°C, A_V = 10, Differential load resistor RL is added directly to the output via a 0.1μF capacitor, unless otherwise noted.)

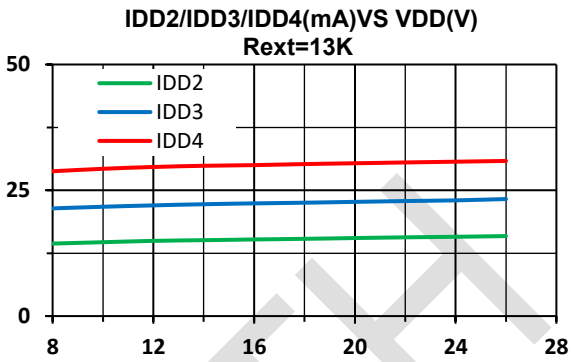
Parameter	Symbol	Conditions	Min	Typ	Max	Units
Supply Voltage	V_{DD}		6	12	28	V
Shutdown current	I_{DD1}	BIAS-1 = BIAS-2 = 5V		60		μA
Quiescent current	I_{DD2}	BIAS-1 = BIAS-2 = 0V，R_{IADJ} = 13K		40		mA
	I_{DD3}	BIAS-1 = 5V, BIAS-2 = 0V, R_{IADJ} = 13K		22		mA
	I_{DD4}	BIAS-1 = 0V, BIAS-2 = 5V, R_{IADJ} = 13K		15		mA
Input Voltage Range	V_{IN}			1	3	Vpp
Output Offset Voltage	V_{OS}			1		mV
Input current at in-phase end	I_{INP}			0		μA
Input current at the inverting end	I_{INN}			20		μA
Input noise	en	2~12 MHz		11		nV/sqr tHz
Input High Level	V_{IH}		1.9			V
Input Low Level	V_{IL}				0.7	V
Logic built-in pull-up resistor	R_P	Built-in pull-up resistors on BIAS1 and BIAS2 ports		80		KΩ
Internal pull-up power supply	V_{DI}	BIAS1 = 0, BIAS2 dangling or BIAS2 = 0, BIAS1 dangling, measure dangling port voltage		5	7.5	V
Output Voltage Range	V_{OUT}	unladen			18	V
Maximum Output Current	I_{OUT}	V_{OUT} = 1 V_{PP}，R_L = 1Ω		1		A
Output Leakage Current	I_{LEAK}	BIAS1 = BIAS2 = 0，D1_OUT = D2_OUT = 6V		5		μA
Common mode level	V_{CM}			6		V
Bias voltage (electronics)	V_{IADJ}			1.6		V
Power Bandwidth	BW	R_L = 100Ω, A_V = 10，R_F = 2k		30		MHz
2nd harmonic distortion	2HD	Fc = 500KHz, V_{OUT} = 10Vpp-diff, R_L = 50Ω		80		dBc
		Fc = 2MHz, V_{OUT} = 10Vpp-diff, R_L = 50Ω		71		dBc
		Fc = 5MHz, V_{OUT} = 10Vpp-diff, R_L = 50Ω		63		dBc
		Fc = 10MHz, V_{OUT} = 10Vpp-diff, R_L = 50Ω		57		dBc
3rd harmonic distortion	3HD	Fc = 500KHz, V_{OUT} = 10Vpp-diff, R_L = 50Ω		80		dBc
		Fc = 2MHz, V_{OUT} = 10Vpp-diff, R_L = 50Ω		61		dBc
		Fc = 5MHz, V_{OUT} = 10Vpp-diff, R_L = 50Ω		50		dBc
		Fc = 10MHz, V_{OUT} = 10Vpp-diff, R_L = 50Ω		41		dBc
Slew rate	SR	V_{OUT} = 16V_{PP}		500		V/μs

11 Typical Parameter

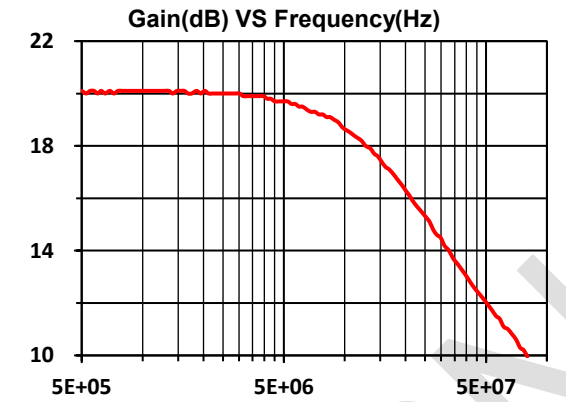
(VS+ = 12V, R_{IADJ} = 10K, T_A = +25°C, A_V = 10, differential load resistor RL is added directly to the output via a 0.1μF capacitor, and the test circuit operating conditions are based on typical application conditions, unless otherwise noted)



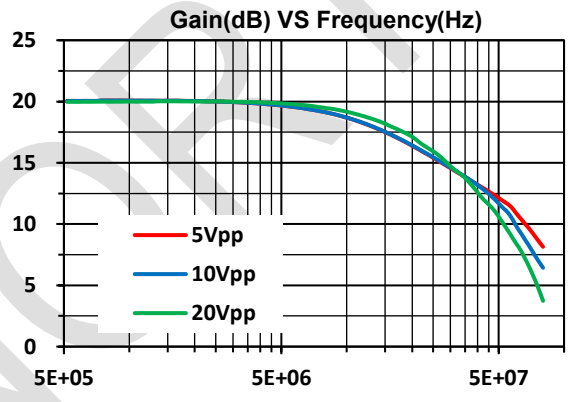
Shutdown Current vs Supply Voltage



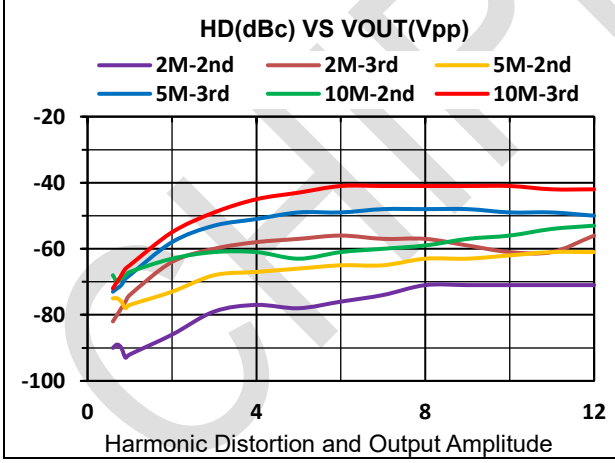
Quiescent Current vs Supply Voltage



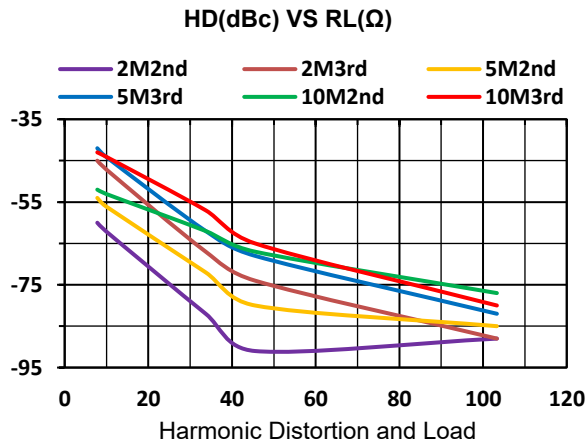
Small Signal Frequency Response



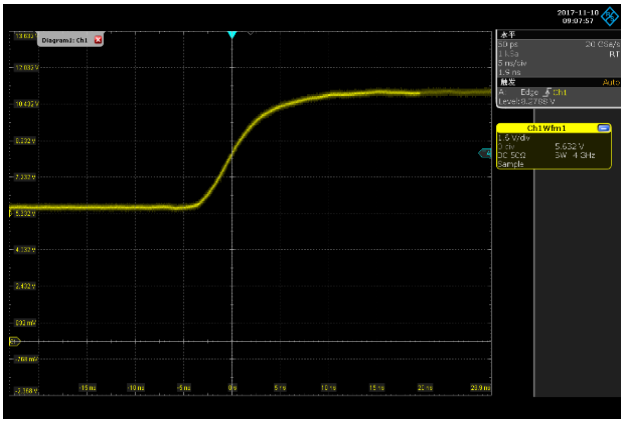
Large Signal Frequency Response



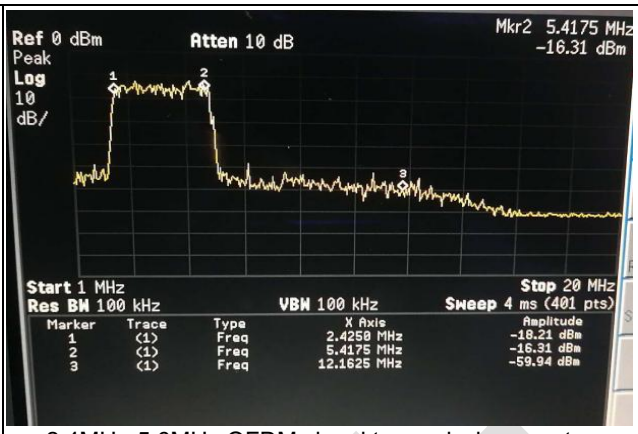
Harmonic Distortion and Output Amplitude



Harmonic Distortion and Load



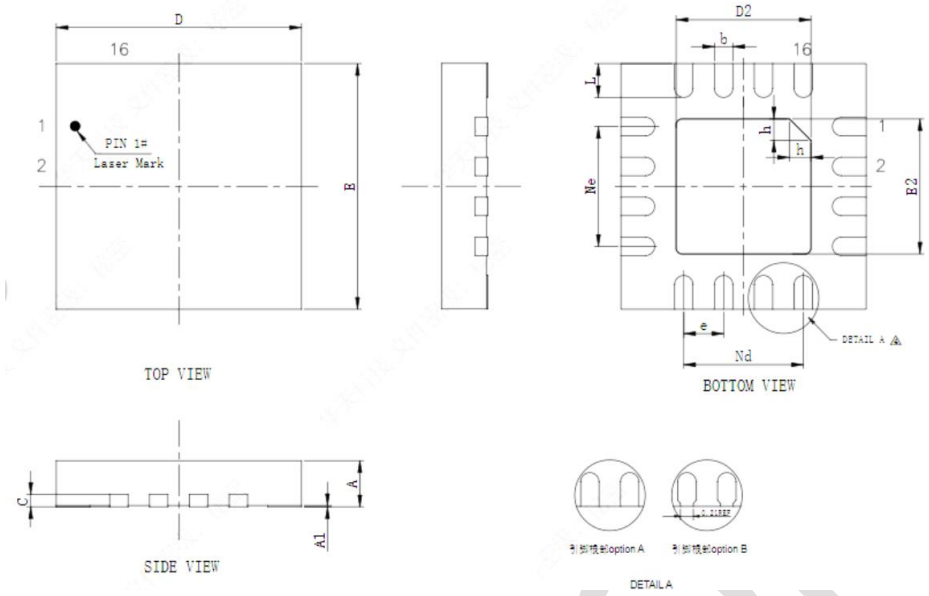
Step Response Waveform



2.4MHz-5.6MHz OFDM signal transmission spectrum

12 Package Outside Dimensions

QFN 4X4 - 16L



SYMBOL	MILLIMETER			
	MIN	NOM	MAX	
A	0.70	0.75	0.80	
	0.80	0.85	0.90	3
A1	—	0.02	0.05	
b	0.25	0.30	0.35	
c	0.18	0.20	0.25	
D	3.90	4.00	4.10	
D2	2.10	2.20	2.30	
e	0.650BSC			
Ne	1.96BSC			
Nd	1.96BSC			
E	3.90	4.00	4.10	
E2	2.10	2.20	2.30	
L	0.45	0.55	0.65	
h	0.30	0.35	0.40	

13 Important Statement

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