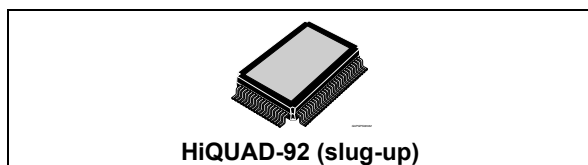


## 4 x 135 W / 2 x 270 W PWM digital input automotive power amplifier with I<sup>2</sup>C diagnostics, step-up driver and low voltage operation

Data brief



### Features



- AEC-Q100 qualified
- Integrated 108 dB D/A conversion
- I<sup>2</sup>S and TDM digital input (3.3/1.8 V)
- Input sampling frequency: 44.1 kHz, 48 kHz, 96 kHz, 192 kHz
- MOSFET power outputs
- Step-up driver included
- EMI control for FM/AM compatibility
- EMI compliance at the CEI EN 55025 (2009-10)
- Dithering possibility
- Very low component count
- Output low-pass filter included in the feedback
- Low radiation function (LRF)
- High output power capability
  - 4 x 85 W/4 Ω @ 25 V, 1 kHz, 10% THD
  - 2 x 150 W/2 Ω @ 25 V, 1 kHz, 10% THD
- Max. output power
  - 4 x 135 W/4 Ω @ 25 V, 1 kHz
  - 2 x 270 W/2 Ω @ 25 V, 1 kHz
- Full I<sup>2</sup>C bus driving (3.3/1.8 V):
  - Independent front/rear soft play/ mute
  - I<sup>2</sup>C diagnostics (DC and AC load detection, internal test signal generated)
- Very flexible fault detection though integrated diagnostic
- Offset detector (play or mute mode)
- Four independent short circuit protection
- Clipping detector
- C-MOS compatible enable pin (3.3/5 V)
- ESD protection

- 6 V operation ("start - stop")

### Description

The FDA4100LV is a new BCD- SOI (silicon on insulation) technology QUAD BRIDGE class D amplifier, specially intended for car radio applications.

Thanks to the technology used, it is possible to integrate a high performance D/A converter together with powerful MOSFET outputs in class D, to get an outstanding efficiency compared with the standard class AB.

The integrated D/A converter allows to reach outstanding performances (110 dB S/N ratio with 108 dB of dynamic range). The feedback loop includes the output L-C low-pass filter, allowing superior frequency response linearity and lower distortion independently of the inductor and capacitor quality.

FDA4100LV is fully configurable through I<sup>2</sup>C bus interface and integrates a full diagnostics array specially intended for automotive applications (with the status of each single speaker).

Thanks to the solutions implemented to solve the EMI problems, the device is conceived to be used in the standard single DIN car-radio box together with the tuner.

The possibility to parallelize the outputs allows to drive both 2 Ω and 1 Ω speakers.

A built-in step-up driver allows to provide high output power even using the standard 14 V supply voltage.

Moreover FDA4100LV is able to work down to 6 V supply, thus supporting the most recent low voltage ('start-stop') car-makers specification.

**Table 1. Device summary**

| Order code  | Package  | Packing     |
|-------------|----------|-------------|
| FDA4100LV   | HiQUAD92 | Tray        |
| FDA4100LV-T |          | Tape & Reel |

Contents

1      **Block diagram** ..... 3

2      **Pins description** ..... 4

3      **Package information** ..... 7

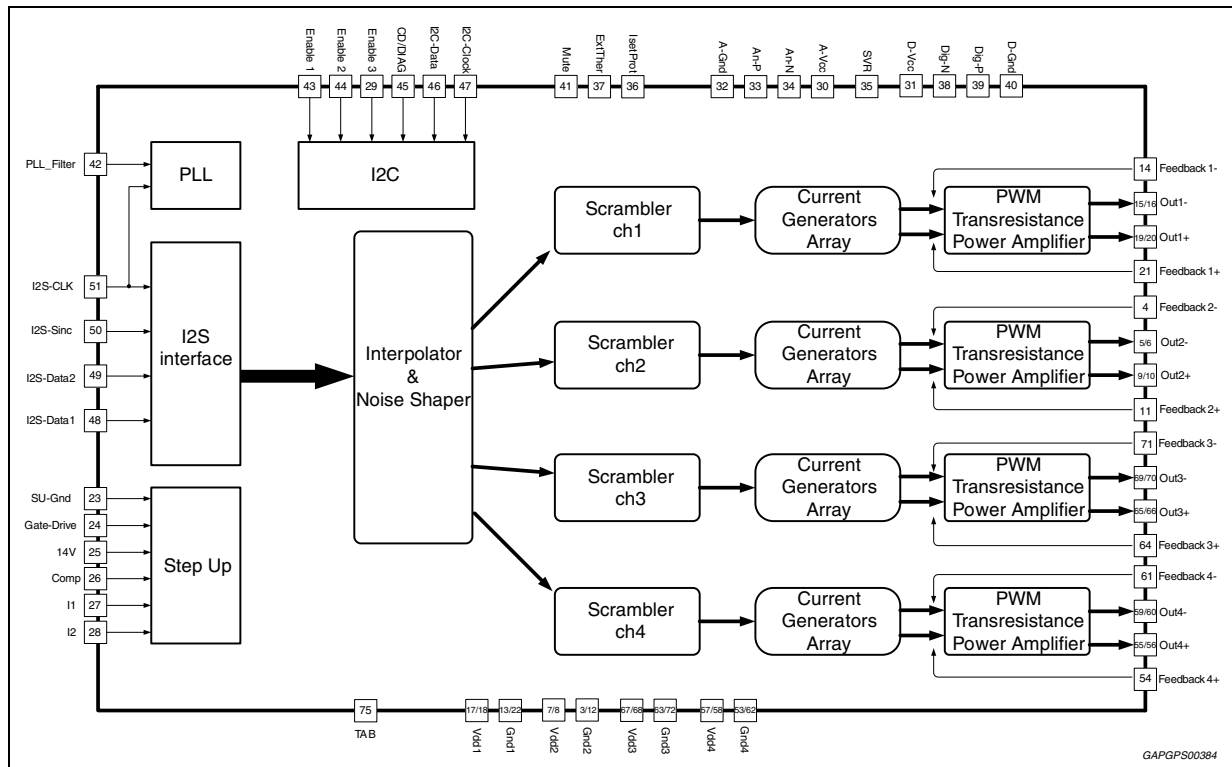
      3.1      HiQUAD-92 slug-up (14 x 20 mm) package information ..... 7

4      **Revision history** ..... 9



## 1 Block diagram

**Figure 1. Block diagram**



## 2 Pins description

Figure 2. Pins connection diagram (top view)

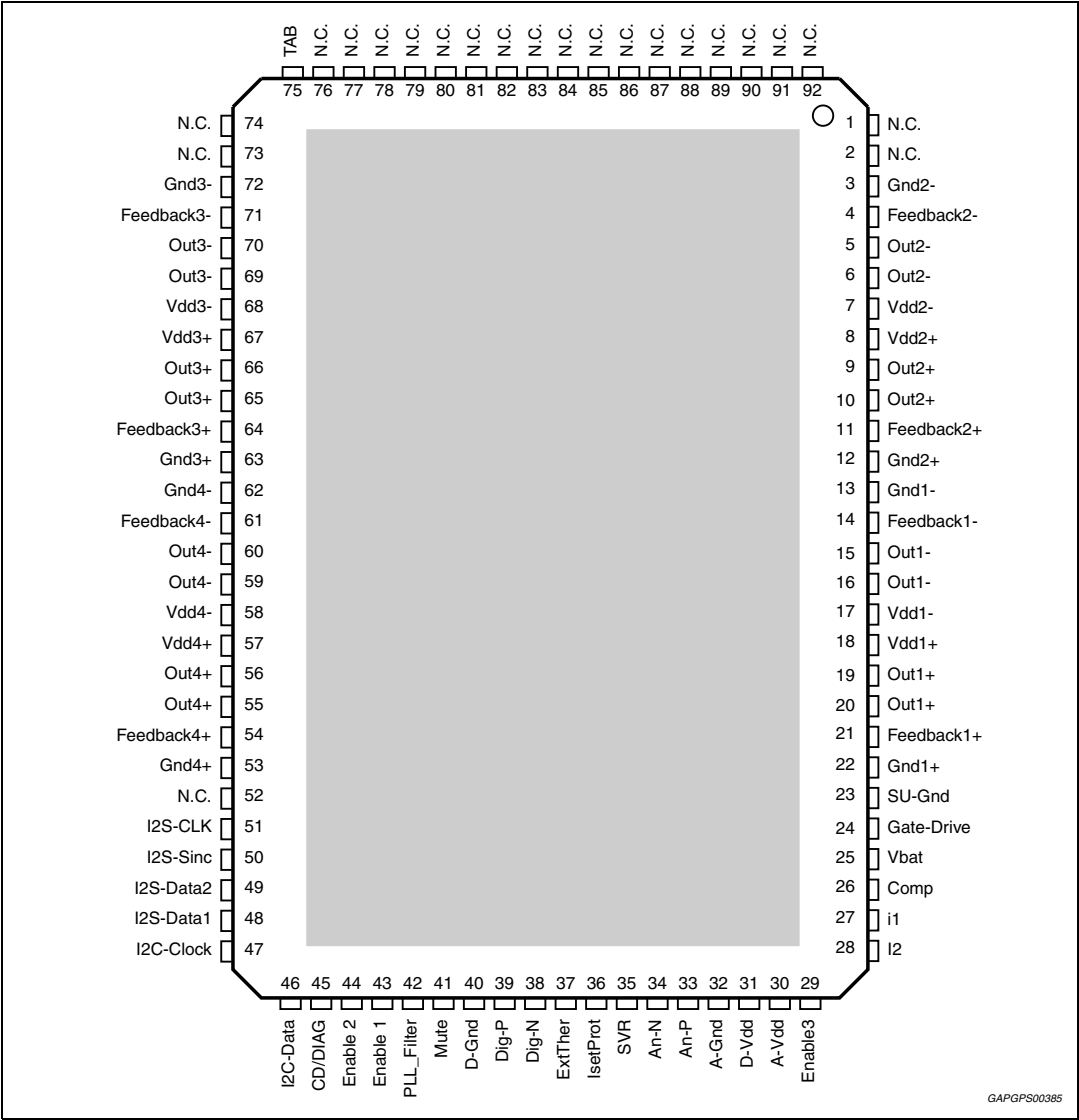


Table 2. Pins list description

| Pin #<br>(HiQUAD-92) | Pin name   | Function                              |
|----------------------|------------|---------------------------------------|
| 1                    | N.C.       | Not connected                         |
| 2                    | N.C.       | Not connected                         |
| 3                    | Gnd2-      | Channel 2, half bridge power ground - |
| 4                    | Feedback2- | Channel 2 half bridge feedback -      |
| 5                    | Out2-      | Channel 2 half bridge output -        |
| 6                    | Out2-      | Channel 2 half bridge output -        |

Table 2. Pins list description (continued)

| Pin #<br>(HiQUAD-92) | Pin name   | Function                                                   |
|----------------------|------------|------------------------------------------------------------|
| 7                    | Vdd2-      | Channel 2 half bridge power supply -                       |
| 8                    | Vdd2+      | Channel 2 half bridge power supply +                       |
| 9                    | Out2+      | Channel 2 half bridge output +                             |
| 10                   | Out2+      | Channel 2 half bridge output +                             |
| 11                   | Feedback2+ | Channel 2 half bridge feedback +                           |
| 12                   | Gnd2+      | Channel 2, half bridge power ground +                      |
| 13                   | Gnd1-      | Channel 1, half bridge power ground -                      |
| 14                   | Feedback1- | Channel 1 half bridge feedback -                           |
| 15                   | Out1-      | Channel 1 half bridge output -                             |
| 16                   | Out1-      | Channel 1 half bridge output -                             |
| 17                   | Vdd1-      | Channel 1 half bridge power supply -                       |
| 18                   | Vdd1+      | Channel 1 half bridge power supply +                       |
| 19                   | Out1+      | Channel 1 half bridge output +                             |
| 20                   | Out1+      | Channel 1 half bridge output +                             |
| 21                   | Feedback1+ | Channel 1 half bridge feedback +                           |
| 22                   | Gnd1+      | Channel 1, half bridge power ground +                      |
| 23                   | SU-Gnd     | Step-up power ground                                       |
| 24                   | Gate-Drive | External PowerMOS gate drive output                        |
| 25                   | Vbat       | Power supply (battery)                                     |
| 26                   | Comp       | Step-up compensation input                                 |
| 27                   | I1         | Step-up current limiting input                             |
| 28                   | I2         | Step-up current limiting reference                         |
| 29                   | Enable3    | Chip enable 3                                              |
| 30                   | A-Vdd      | Analog power supply                                        |
| 31                   | D-Vdd      | Digital power supply                                       |
| 32                   | A-Gnd      | Analog ground                                              |
| 33                   | An-P       | Positive analog supply V(svr)+1.65 (internally generated)  |
| 34                   | An-N       | Negative analog supply V(svr)-1.65 (internally generated)  |
| 35                   | SVR        | Supply voltage ripple rejection capacitor                  |
| 36                   | IsetProt   | Current protection resistor setting                        |
| 37                   | ExtTher    | External thermal protection input                          |
| 38                   | Dig-N      | Negative digital supply V(svr)-1.65 (internally generated) |
| 39                   | Dig-P      | Positive digital supply V(svr)+1.65 (internally generated) |
| 40                   | D-Gnd      | Digital ground                                             |
| 41                   | Mute       | Mute input (10 $\mu$ A source current)                     |

Table 2. Pins list description (continued)

| Pin #<br>(HiQUAD-92) | Pin name   | Function                                                                                       |
|----------------------|------------|------------------------------------------------------------------------------------------------|
| 42                   | PLL_Filter | PLL filter network                                                                             |
| 43                   | Enable 1   | Chip enable 1                                                                                  |
| 44                   | Enable 2   | Chip enable 2                                                                                  |
| 45                   | CD/DIAG    | Clip detector and diagnostic output: overcurrent protection, thermal warning, offset detection |
| 46                   | I2C-Data   | I2C data input                                                                                 |
| 47                   | I2C-Clock  | I2C data Clock                                                                                 |
| 48                   | I2S-Data1  | I2S/TDM data 1 Input                                                                           |
| 49                   | I2S-Data2  | I2S/TDM data 2 Input                                                                           |
| 50                   | I2S-Sinc   | I2S/TDM sinc Input DRAFT                                                                       |
| 51                   | I2S-CLK    | I2S/TDM clock Input                                                                            |
| 52                   | N.C.       | Not connected                                                                                  |
| 53                   | Gnd4+      | Channel 4, half bridge Power Ground +                                                          |
| 54                   | Feedback4+ | Channel 4 half bridge Feedback +                                                               |
| 55                   | Out4+      | Channel 4 half bridge Output +                                                                 |
| 56                   | Out4+      | Channel 4 half bridge Output +                                                                 |
| 57                   | Vdd4+      | Channel 4 half bridge Power Supply +                                                           |
| 58                   | Vdd4-      | Channel 4 half bridge Power Supply -                                                           |
| 59                   | Out4-      | Channel 4 half bridge Output -                                                                 |
| 60                   | Out4-      | Channel 4 half bridge Output -                                                                 |
| 61                   | Feedback4- | Channel 4 half bridge Feedback -                                                               |
| 62                   | Gnd4-      | Channel 4, half bridge Power Ground -                                                          |
| 63                   | Gnd3+      | Channel 3, half bridge Power Ground +                                                          |
| 64                   | Feedback3+ | Channel 3 half bridge Feedback +                                                               |
| 65                   | Out3+      | Channel 3 half bridge Output +                                                                 |
| 66                   | Out3+      | Channel 3 half bridge Output +                                                                 |
| 67                   | Vdd3+      | Channel 3 half bridge Power Supply +                                                           |
| 68                   | Vdd3-      | Channel 3 half bridge Power Supply -                                                           |
| 69                   | Out3-      | Channel 3 half bridge Output -                                                                 |
| 70                   | Out3-      | Channel 3 half bridge Output -                                                                 |
| 71                   | Feedback3- | Channel 3 half bridge Feedback -                                                               |
| 72                   | Gnd3-      | Channel 3, half bridge Power Ground -                                                          |
| 73, 74               | N.C.       | Not connected                                                                                  |
| 75                   | TAB        | -                                                                                              |
| 76-92                | N.C.       | Not connected                                                                                  |

### 3 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](http://www.st.com).

ECOPACK® is an ST trademark.

#### 3.1 HiQUAD-92 slug-up (14 x 20 mm) package information

Figure 3. HiQUAD-92 slug-up (14 x 20 mm) package outline

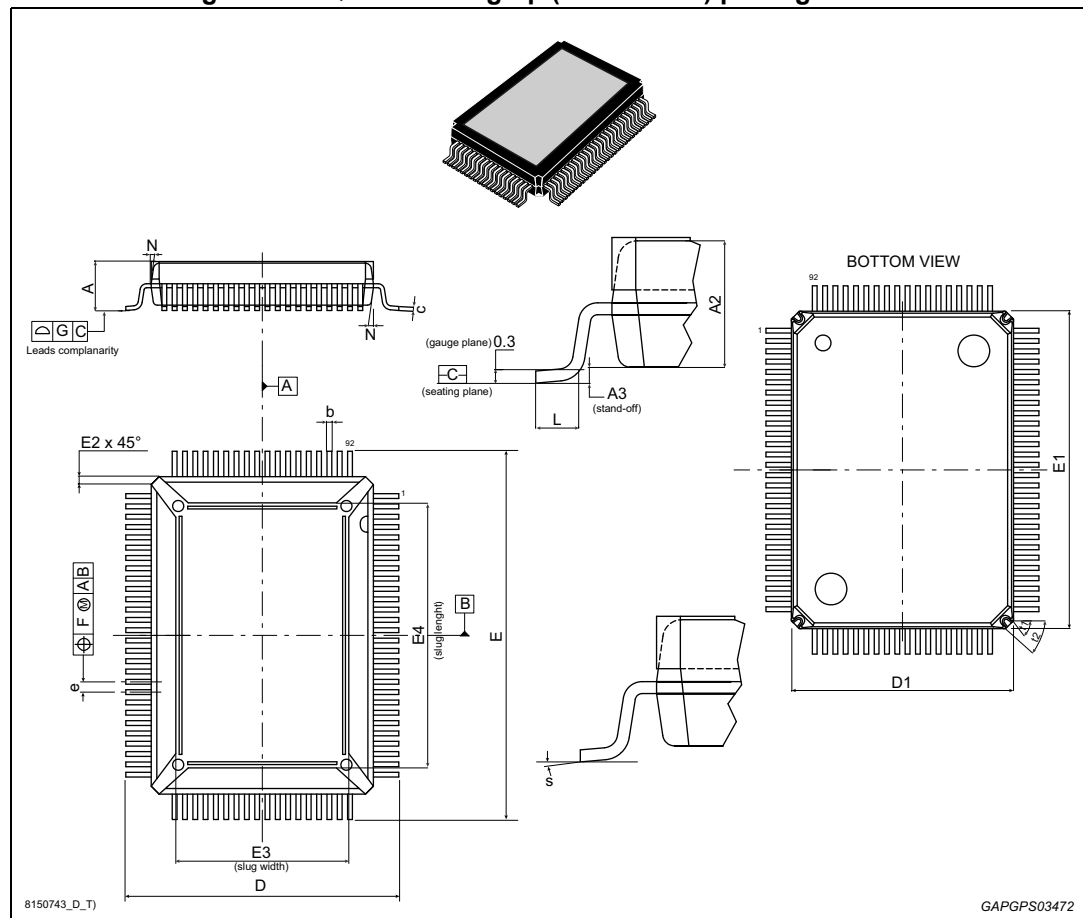


Table 3. HiQUAD-92 slug-up (14 x 20 mm) package mechanical data

| Ref               | Dimensions  |       |       |                       |        |        |
|-------------------|-------------|-------|-------|-----------------------|--------|--------|
|                   | Millimeters |       |       | Inches <sup>(1)</sup> |        |        |
|                   | Min.        | Typ.  | Max.  | Min.                  | Typ.   | Max.   |
| A                 | -           | -     | 3.05  | -                     | -      | 0.1201 |
| A2                | 2.50        | -     | 2.90  | 0.0984                | -      | 0.1142 |
| A3                | -0.05       | -     | 0.05  | -0.0019               | -      | 0.0019 |
| b                 | 0.22        | -     | 0.38  | 0.0087                | -      | 0.0150 |
| c                 | 0.23        | -     | 0.32  | 0.0091                | -      | 0.0126 |
| D                 | 17.00       | -     | 17.40 | 0.6693                | -      | 0.6850 |
| D1 <sup>(2)</sup> | 13.90       | 14.00 | 14.10 | 0.5472                | 0.5512 | 0.5551 |
| E                 | 23.00       | -     | 23.40 | 0.9055                | -      | 0.9213 |
| E1 <sup>(2)</sup> | 19.90       | 20.00 | 20.10 | 0.7835                | 0.7874 | 0.7913 |
| E2                | -           | 0.500 | -     | -                     | 0.0197 | =      |
| E3                | 10.70       | -     | 11.10 | 0.4213                | -      | 0.4370 |
| E4                | 16.50       | -     | 16.90 | 0.6496                | -      | 0.6654 |
| e                 | -           | 0.65  | -     | -                     | 0.0256 | -      |
| F                 | -           | 0.12  | -     | -                     | 0.0047 | -      |
| G                 | -           | 0.10  | -     | -                     | 0.0039 | -      |
| L                 | 0.80        | -     | 1.10  | 0.0315                | -      | 0.0433 |
| N                 | -           | -     | 10°   | -                     | -      | 10°    |
| s                 | 0°          | -     | 8°    | 0°                    | -      | 8°     |
| t1                | 53°         |       |       | 53°                   |        |        |
| t2                | 42°         |       |       | 42°                   |        |        |

1. Values in inches are converted from mm and rounded to 4 decimal digits.

2. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.15 mm (.006 inches).

## 4 Revision history

**Table 4. Document revision history**

| Date        | Revision | Changes                                                                                                                                                                                                                                                                   |
|-------------|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 19-Jul-2013 | 1        | Initial release.                                                                                                                                                                                                                                                          |
| 18-Sep-2013 | 2        | Updated Disclaimer.                                                                                                                                                                                                                                                       |
| 28-Nov-2016 | 3        | Added "automotive" in the title in cover page.<br>Added in cover page the feature "AEC-Q100 qualified and car logo."<br>Added new order code in <a href="#">Table 1: Device summary on page 1</a> .<br>Updated <a href="#">Section 3: Package information on page 7</a> . |

**IMPORTANT NOTICE – PLEASE READ CAREFULLY**

STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST's terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers' products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2016 STMicroelectronics – All rights reserved