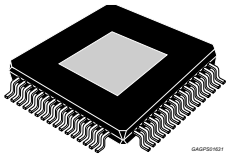
# FDA801

## 4 x 50 W class-D digital input power amplifier with I$^2$C diagnostics and low voltage operation

**Data brief**



**LQFP64 (exposed pad up)**

## Features

- Integrated 110 dB D/A conversion
- I$^2$S and TDM digital input (3.3/1.8 V)
- Input sampling frequency: 44.1 kHz, 48 kHz, 96 kHz, 192 kHz
- Class-D channels with 93% efficiency
- EMI control for AM compatibility
- EMI compliance evaluated following normative IEC61967-4 and IEC62132-4
- Low radiation function (LRF)
- Idle tones free DAC
- Output lowpass filter included in the feedback allowing lower cost filter components
- Max. output power
  - 4 x 50 W/4 Ω @ 15.2 V, 1 kHz
- High output power capability
  - 28 W/4 Ω 10 % THD, Vd = 14.4 V
- Full I$^2$C bus driving (3.3/1.8 V):
  - Channels independent tristate
  - Channel independent soft play/mute
  - I$^2$C bus diagnostics, including DC and AC load detection
- Integrated fault protection
- Input and output offset detector
- Clipping detector
- ESD protection
- 6 V operation (“Start - Stop” engines compatibility)
- 2 and 1 Ω load driving capability

## Description

FDA801 is a new BCD technology quad BRIDGE class D amplifier, specially intended for automotive 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 from the inductor and capacitor quality.

FDA801 is fully configurable through I$^2$C bus interface and integrates a full diagnostics array specially intended for automotive applications. Thanks to the solutions implemented to contain EMI emissions, the device is intended to be used in the standard single DIN car-radio box together with the tuner.

Moreover FDA801 is able to work with power supply as low as 6 V, thus supporting the most recent low voltage ('start-stop') car-makers specification.

**Table 1. Device summary**

| Order code | Package | Packing |
|---|---|---|
| FDA801-VYY | LQFP64 (exp. pad up) | Tray |
| FDA801-VYT | LQFP64 (exp. pad up) | Tape & Reel |

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# 1 Block diagram and pins description

**Figure 1. Block diagram**

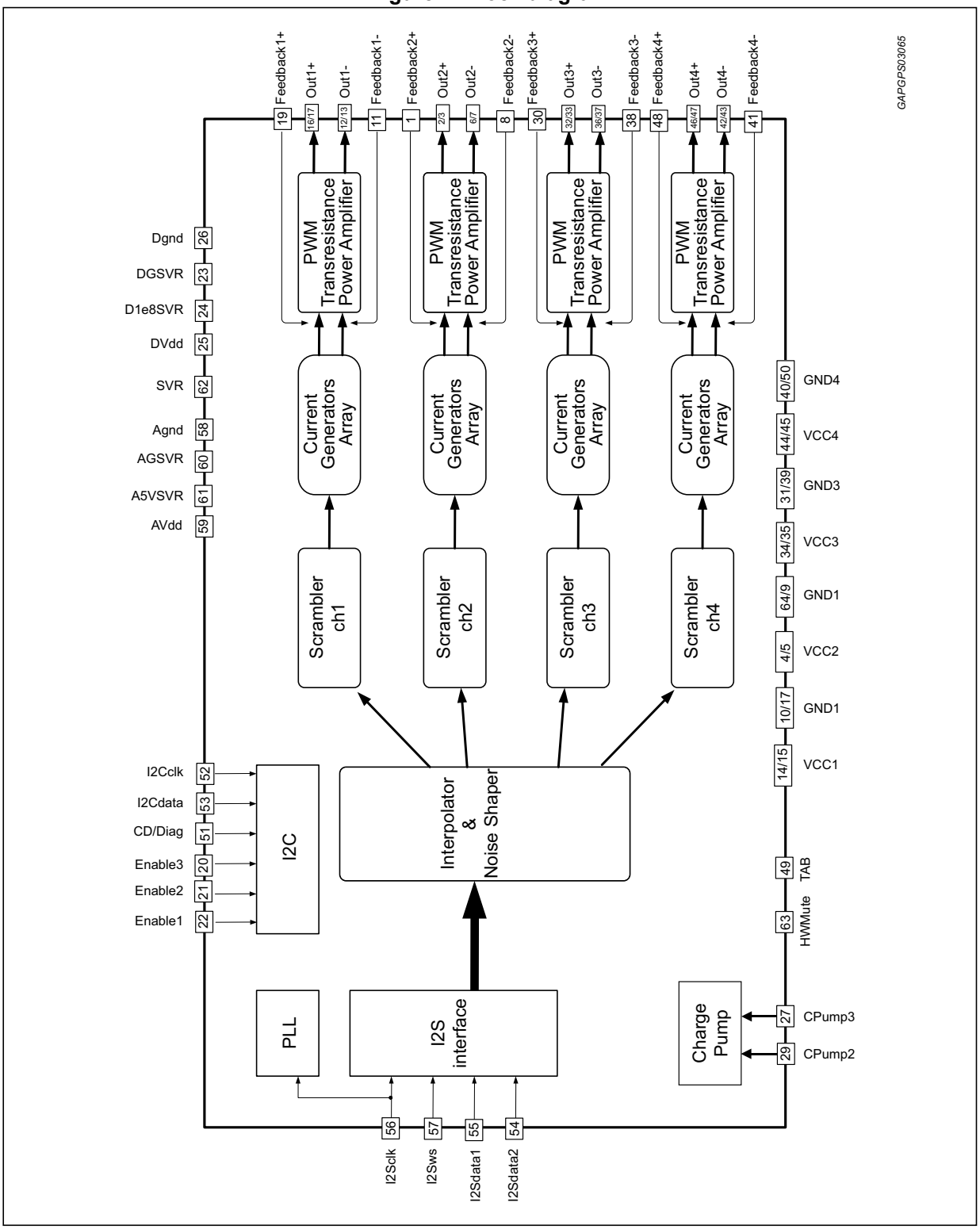


**Figure 2. Tentative pins connection diagram (top view)**

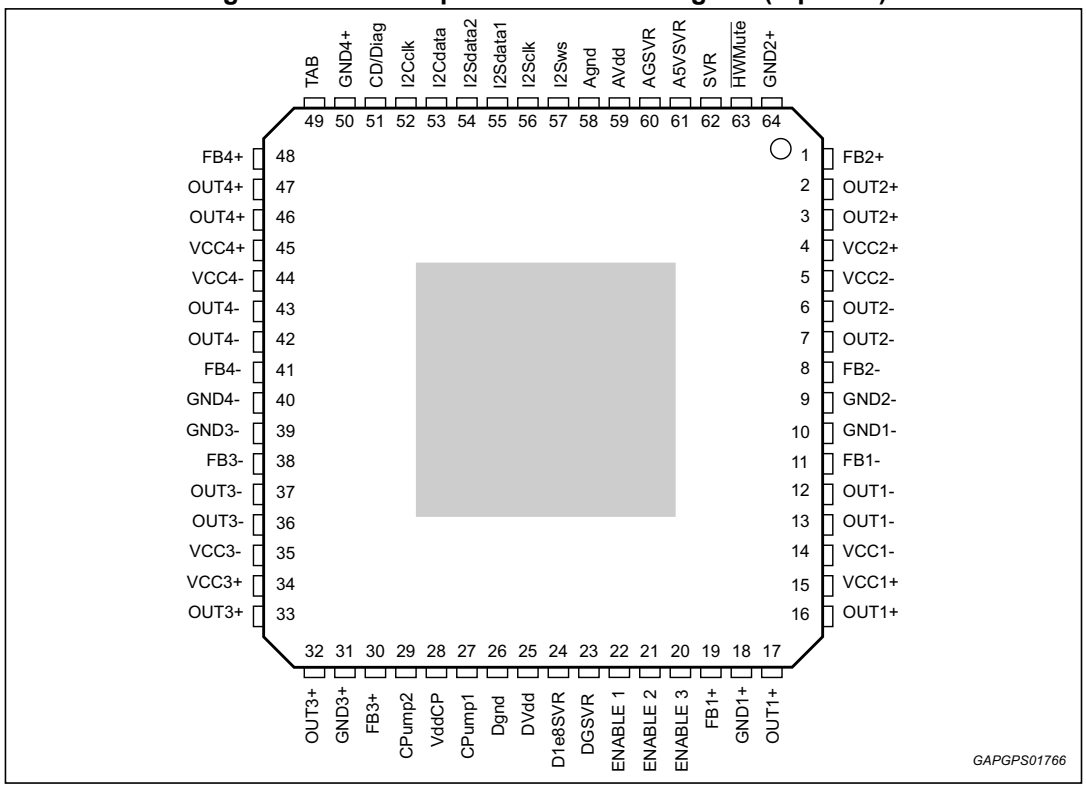



**Table 2. Pins list description**

| N# | Pin | Function |
|---|---|---|
| 1 | FB2+ | Channel 2, half bridge plus, Feedback |
| 2 | OUT2+ | Channel 2, half bridge plus, Output |
| 3 | OUT2+ | Channel 2, half bridge plus, Output |
| 4 | VCC2+ | Channel 2, half bridge plus, Power Supply |
| 5 | VCC2- | Channel 2, half bridge minus, Power Supply |
| 6 | OUT2- | Channel 2, half bridge minus, Output |
| 7 | OUT2- | Channel 2, half bridge minus, Output |
| 8 | FB2- | Channel 2, half bridge minus, Feedback |
| 9 | GND2- | Channel 2, half bridge minus, Power Ground |
| 10 | GND1- | Channel 1, half bridge minus, Power Ground |
| 11 | FB1- | Channel 1, half bridge minus, Feedback |
| 12 | OUT1- | Channel 1, half bridge minus, Output |
| 13 | OUT1- | Channel 1, half bridge minus, Output |
| 14 | VCC1- | Channel 1, half bridge minus, Power Supply |
| 15 | VCC1+ | Channel 1, half bridge plus, Power Supply |
| 16 | OUT1+ | Channel 1, half bridge plus, Output |

**Table 2. Pins list description (continued)**

| N# | Pin | Function |
|---|---|---|
| 17 | OUT1+ | Channel 1, half bridge plus, Output |
| 18 | GND1+ | Channel 1, half bridge plus, Power Ground |
| 19 | FB1+ | Channel 1, half bridge plus, Feedback |
| 20 | ENABLE 3 | Enable 3 |
| 21 | ENABLE 2 | Enable 2 |
| 22 | ENABLE 1 | Enable 1 |
| 23 | DGSVR | Negative digital supply V(SVR)-0.9V (Internally generated) |
| 24 | D1e8SVR | Positive digital supply V(SVR)+0.9V (Internally generated) |
| 25 | DVdd | Digital supply |
| 26 | Dgnd | Digital ground |
| 27 | CPump1 | Charge Pump pin1 |
| 28 | VddCP | Charge Pump output voltage |
| 29 | CPump2 | Charge Pump pin2 |
| 30 | FB3+ | Channel 3, half bridge plus, Feedback |
| 31 | GND3+ | Channel 3, half bridge plus, Power Ground |
| 32 | OUT3+ | Channel 3, half bridge plus, Output |
| 33 | OUT3+ | Channel 3, half bridge plus, Output |
| 34 | VCC3+ | Channel 3, half bridge plus, Power Supply |
| 35 | VCC3- | Channel 3, half bridge minus, Power Supply |
| 36 | OUT3- | Channel 3, half bridge minus, Output |
| 37 | OUT3- | Channel 3, half bridge minus, Output |
| 38 | FB3- | Channel 3, half bridge minus, Feedback |
| 39 | GND3- | Channel 3, half bridge minus, Power Ground |
| 40 | GND4- | Channel 4, half bridge minus, Power Ground |
| 41 | FB4- | Channel 4, half bridge minus, Feedback |
| 42 | OUT4- | Channel 4, half bridge minus, Output |
| 43 | OUT4- | Channel 4, half bridge minus, Output |
| 44 | VCC4- | Channel 4, half bridge minus, Power Supply |
| 45 | VCC4+ | Channel 4, half bridge plus, Power Supply |
| 46 | OUT4+ | Channel 4, half bridge plus, Output |
| 47 | OUT4+ | Channel 4, half bridge plus, Output |
| 48 | FB4+ | Channel 4, half bridge plus, Feedback |
| 49 | TAB | Device slug connection |
| 50 | GND4+ | Channel 4, half bridge plus, Power Ground |

Table 2. Pins list description (continued)

| N# | Pin | Function |
|---|---|---|
| 51 | CD/Diag | Clipping detector and diagnostic output pin:<br>– Overcurrent protection intervention<br>– Thermal warning<br>– Offset detection |
| 52 | I2Cclk | I2C Clock |
| 53 | I2Cdata | I2C Data |
| 54 | I2Sdata2 | I2S/TDM Data input 2 |
| 55 | I2Sdata1 | I2S/TDM Data input 1 |
| 56 | I2Sclk | I2S/TDM Clock input |
| 57 | I2Sws | I2S/TDM Sinc input |
| 58 | Agnd | Analog ground |
| 59 | AVdd | Analog supply |
| 60 | AGSVR | Negative Analog Supply V(SVR)-2.5V (Internally generated) |
| 61 | A5VSVR | Positive Analog Supply V(SVR)+2.5V (Internally generated) |
| 62 | SVR | Supply Voltage Ripple Rejection Capacitor |
| 63 | $\overline{\text{HWMute}}$ | Hardware mute pin |
| 64 | GND2+ | Channel 2, half bridge plus, Power Ground |

# 2 General introduction

FDA801 is a fully digital single chip class D amplifier with high immunity to the demodulation filter effects. The high integration level and the on-board signal processing allow excellent audio performance to be achieved.

Thanks to the digital input and to the feedback strategy in the power stage that make the amplifier immune from the output filter components non-linearity, the number and size of the external components are minimized.

A number of features are included to reduce EMI and the fully digital approach provides a strong GSM immunity.

FDA801 includes: digital $I^2C$ and $I^2S$ interfaces, internal 24 bits DAC conversion, digital signal processing for interpolation and noise shaping, innovative self-diagnostic functions and automatic detection of wrong load connections or variation of the load, internal PLL for a clock generation.

# 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*.

ECOPACK® is an ST trademark.

## 3.1 LQFP64 (10x10x1.4 mm exp. pad up) package information

**Figure 3. LQFP64 (10x10x1.4 mm exp. pad up) package outline**

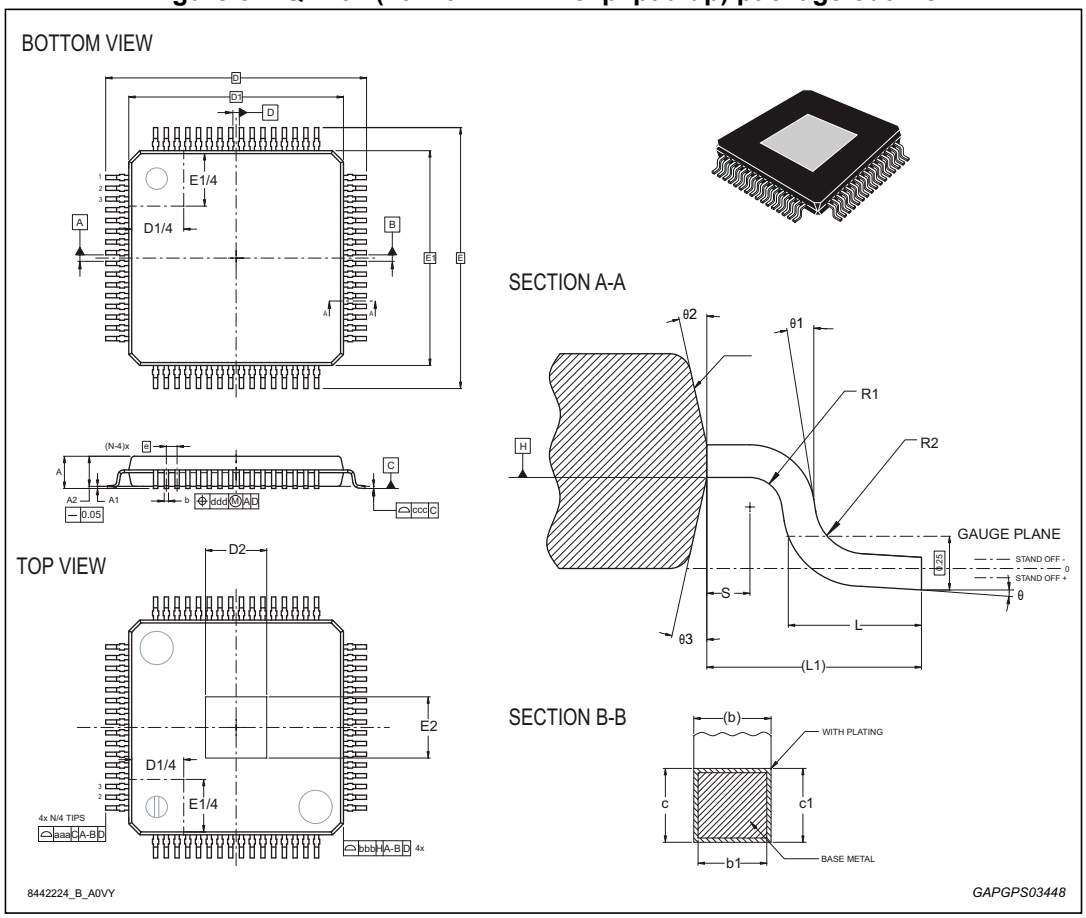


**Table 3. LQFP64 (10x10x1.4 mm exp. pad up) package mechanical data**

| Ref | Dimensions | | | | | |
|---|---|---|---|---|---|---|
| | Millimeters | | | Inches[1] | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| Θ | 0° | 3.5° | 6° | 0° | 3.5° | 6° |
| Θ1 | 0° | 9° | 12° | 0° | 9° | 12° |
| Θ2 | 11° | 12° | 13° | 11° | 12° | 13° |
| Θ3 | 11° | 12° | 13° | 11° | 12° | 13° |
| A | - | - | 1.49 | - | - | 0.0587 |
| A1 | -0.04 | - | 0.04 | -0.0016 | - | 0.0016 |
| A2 | 1.35 | 1.4 | 1.45 | 0.0531 | 0.0551 | 0.0571 |
| b | - | - | 0.255 | - | - | 0.0100 |
| b1 | 0.17 | 0.20 | 0.23 | 0.0067 | 0.0079 | 0.0091 |
| c | 0.09 | - | 0.20 | 0.0035 | - | 0.0079 |
| c1 | 0.09 | - | 0.16 | 0.0035 | - | 0.0063 |
| D | - | 12.00 | - | - | 0.4724 | - |
| D1[2] | - | 10.00 | - | - | 0.3937 | - |
| D2[3] | - | 6.00 | - | - | 02362 | - |
| e | - | 0.50 | - | - | 0.0197 | - |
| E | - | 12.00 | - | - | 0.4724 | - |
| E1[2] | - | 10.00 | - | - | 0.3937 | - |
| E2[3] | - | 6.00 | - | - | 0.2362 | - |
| L | 0.45 | 0.60 | 0.75 | 0.0177 | 0.0236 | 0.0295 |
| L1 | - | 1.00 | - | - | 0.0394 | - |
| N | - | 64.00 | - | - | 2.5197 | - |
| R1 | 0.08 | - | - | 0.0031 | - | - |
| R2 | 0.08 | - | 0.20 | 0.0031 | - | 0.0079 |
| S | 0.20 | - | - | 0.0079 | - | - |
| aaa | - | 0.20 | - | - | 0.0079 | - |
| bbb | - | 0.20 | - | - | 0.0079 | - |
| ccc | - | 0.08 | - | - | 0.0031 | - |
| ddd | - | 0.08 | - | - | 0.0031 | - |

1. Values in inches are converted from mm and rounded to 4 decimal digits.
2. Dimensions D1 and E1 do not include mold flash or protrusions.
   Allowable mold flash or protrusion is “0.25 mm” per side.
3. The optional exposed pad is generally coincident with the top or bottom side of the package and not allowed to protrude beyond that surface.

# 4 Revision history

Table 4. Document revision history

| Date | Revision | Changes |
|---|---|---|
| 13-Nov-2015 | 1 | Initial release. |

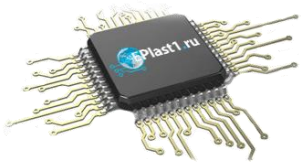
Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits,General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.

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