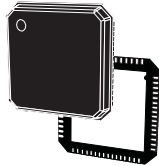


## AM/FM/HD-Radio™ submicron technology automotive receiver


**VFQFPN64 (9 x 9 x 1.0 mm)**

### Features

- AEC-Q100 qualified 
- AM/FM reception with digital IF processing
- Fully automotive grade CMOS design
- AM/FM Band
- Low-IF, DSP-based architecture
- Very high dynamic range built-in IF-ADC
- Minimum external component count
- Very small footprint package
- Multipath noise mitigation processing
- RDS demodulation with group and block synchronization
- Compatible with HD-Radio™ and DRM
- Digital Audio Output
- Fully RoHS-compliant

### Description

The **TDA7708** is a single chip fully-CMOS AM/FM tuner aimed at receivers for terrestrial radio broadcasting.

The TDA7708 is a complete integrated and optimized RF tuner for AM/FM reception. It allows the implementation of AM/FM solution (and also HD-Radio™ with external STMicroelectronics's STA680 co-processor) for automotive grade receivers and other applications.

The TDA7708 combines state-of-art performance with minimum external component count, making it therefore ideal for integration into car radios and other radio devices with challenging performance, quality, reliability and, last but not least, cost requirements.

Such a low external component count is made possible by cutting-edge circuit and implementation techniques that overcome the major challenges affecting both very-low and zero IF receivers.

The TDA7708 features multiple front-end low-noise amplifiers (LNAs) to cover AM LW/MW/SW bands, and the entire FM band, with advanced automatic gain control (AGC) amplifier and mixer stages.

After on-chip IF filtering, the TDA7708 digitizes the signal with a very high dynamic range ADC; it processes the complex phase-quadrature baseband signal allowing applications like multipath noise mitigation, and integrated RDS decoding.

The TDA7708 furthermore integrates the HD-Radio™ channel filtering.

Besides providing optimal AM/FM quality reception, the TDA7708 makes it the ideal solution to realize a complete HD-Radio™ receiver solution (in combination with the external STA680 HD-Radio™ decoder) or a DRM receiver (paired to the STA660DRM), with a low bill of material, high performance and real automotive grade quality and reliability.

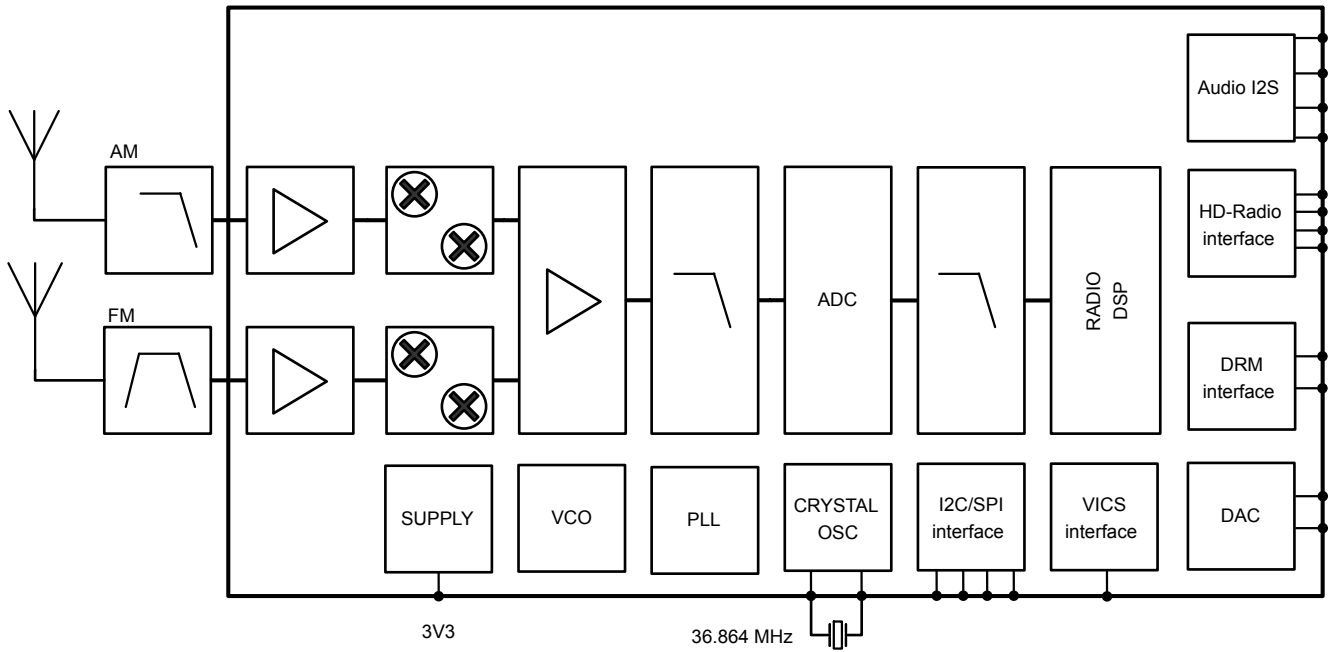
| Product status |  |
|----------------|--|
| TDA7708        |  |

| Device summary |                            |             |
|----------------|----------------------------|-------------|
| Order code     | Package                    | Packing     |
| TDA7708        | VFQFPN64<br>(9 x 9 x 1 mm) | Tray        |
| TDA7708CB      |                            | Tape & Reel |
| TDA7708TR      |                            |             |
| TDA7708CBTR    |                            |             |

The TDA7708CB requires a very small FW code to be downloaded for booting the IC, thus making it especially suited to systems whose microcontroller has limited code storage capability.

# 1 Block diagram

Figure 1. Block diagram



## 2 Electrical specification

### 2.1 Absolute maximum ratings

**Table 1. Absolute maximum ratings**

| Symbol           | Parameter                                               | Test condition                    | Min                     | Typ | Max | Units |
|------------------|---------------------------------------------------------|-----------------------------------|-------------------------|-----|-----|-------|
| V <sub>CC</sub>  | Abs. supply voltage                                     | -                                 | -0.5                    | -   | 3.6 | V     |
| T <sub>stg</sub> | Storage temperature                                     | -                                 | -55                     | -   | 150 | °C    |
| V <sub>ESD</sub> | ESD absolute minimum withstand voltage                  | Human Body model                  | > ±2000  <sup>(1)</sup> |     |     | V     |
|                  |                                                         | Charged device model              | > ±500  <sup>(2)</sup>  |     |     |       |
|                  |                                                         | Charged device model, corner pins | > ±750                  |     |     |       |
| -                | Max. input current at any pin (latch-up characteristic) | I <sub>INMAX</sub>                | ±100                    |     |     | mA    |

1. |±1000| on AM\_IN pin

2. |±400| on AM\_IN pin

### 2.2 Thermal data

**Table 2. Thermal data**

| Symbol                | Parameter                              | Test condition                        | Value | Units |
|-----------------------|----------------------------------------|---------------------------------------|-------|-------|
| R <sub>th j-amb</sub> | Thermal resistance junction-to-ambient | Multilayer 2s2p as per JEDEC JESD51-7 | 27    | °C/W  |

### 2.3 General key parameters

**Table 3. General key parameters**

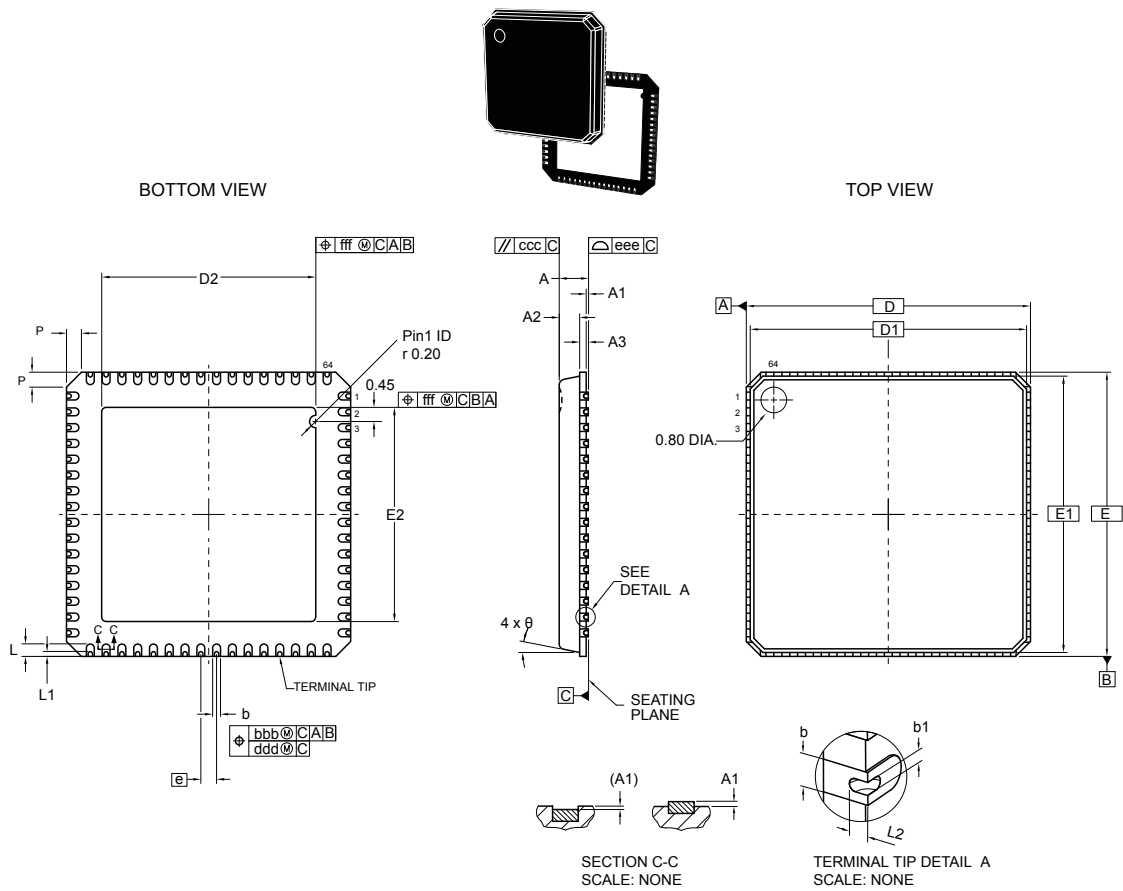
| Symbol              | Parameter                 | Test condition                              | Min  | Typ | Max  | Units |
|---------------------|---------------------------|---------------------------------------------|------|-----|------|-------|
| V <sub>CC</sub>     | 3.3 V supply voltage      | -                                           | 3.15 | 3.3 | 3.45 | V     |
| I <sub>CC</sub>     | Supply current            | FM @108 MHz, active interfaces (10 pF load) | -    | -   | 350  | mA    |
| T <sub>amb</sub>    | Ambient temperature range | -                                           | -40  | -   | 85   | °C    |
| T <sub>j_oper</sub> | Operative junction temp   | -                                           | -    | -   | 125  | °C    |
| P <sub>diss</sub>   | Dissipated power          | R <sub>ext</sub> = 12 Ohm                   | -    | -   | 1    | W     |

### 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 VFQFPN-64 (9x9x1.0mm) package information

Figure 2. VFQFPN-64 (9x9x1.0 mm) package outline



8511068\_B\_A02G

GAPGPS03460

Table 4. VFQFPN-64 (9x9x1.0 mm) package mechanical data

| Ref.             | Dimensions in mm |      |      |
|------------------|------------------|------|------|
|                  | Min.             | Typ. | Max. |
| $\Theta$         | -                | -    | 14   |
| A                | -                | -    | 1.0  |
| A1               | 0.00             | -    | 0.05 |
| A2               | 0.55             | -    | 0.80 |
| A3               | 0.20 REF         |      |      |
| b <sup>(1)</sup> | 0.18             | 0.25 | 0.30 |

| Ref.                                  | Dimensions in mm |      |      |
|---------------------------------------|------------------|------|------|
|                                       | Min.             | Typ. | Max. |
| b1                                    | -                | 0.15 | -    |
| D                                     | 9.00 BSC         |      |      |
| D1 <sup>(2)</sup>                     | 8.75 BSC         |      |      |
| D2                                    | -                | 6.70 | -    |
| e                                     | 0.50 BSC         |      |      |
| E                                     | 9.00 BSC         |      |      |
| E1 <sup>(2)</sup>                     | 8.75 BSC         |      |      |
| E2                                    | -                | 6.70 | -    |
| L                                     | 0.30             | -    | 0.50 |
| L1                                    | 0.15 REF         |      |      |
| L2                                    | -                | 0.10 | -    |
| P                                     | -                | -    | 0.60 |
| <b>Tolerance of form and position</b> |                  |      |      |
| aaa                                   | 0.15             |      |      |
| bbb                                   | 0.10             |      |      |
| ccc                                   | 0.10             |      |      |
| ddd                                   | 0.05             |      |      |
| eee                                   | 0.08             |      |      |
| fff                                   | 0.10             |      |      |

1. Maximum allowable burr is 0.076 mm in all directions.

2. D1 and E1 are Maximum plastic body size dimensions including mold mismatch. Dimensions D1 and E1 do not include mold flash or protrusions. Allowable mold flash or protrusions is "0.25 mm (0.0098 inch)" per side.

**Note:** The package is compliant to IPC/JEDEC J-STD-020D June 2007 standard Moisture/Reflow Sensitivity Classification for Nonhermetic Solid State Surface Mount Devices, MSL Level 3.

## Revision history

**Table 5. Document revision history**

| Date        | Revision | Changes                                                                             |
|-------------|----------|-------------------------------------------------------------------------------------|
| 16-Dec-2014 | 1        | Initial release.                                                                    |
| 29-Nov-2016 | 2        | Fully revised.                                                                      |
| 15-May-2017 | 3        | Added 'RDS demodulation' on <a href="#">Section Features</a> .                      |
| 25-Jan-2018 | 4        | Updated <a href="#">Section Description</a> and Device summary table on cover page. |
| 25-Nov-2019 | 5        | Updated <a href="#">Figure 1. Block diagram</a> .                                   |

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