

**APPLICATION NOTE**

**Outline Specification of  
High-End RDS/EON Car Radio  
System CCR526 V1.2**

**AN96014**

---

**Outline Specification of High-End  
RDS/EON Car Radio System CCR526 V1.2**

**Application Note  
AN96014**

---

**Abstract**

*CCR526 is a computer controlled high-end AM/FM car radio system with RDS/RBDS decoding and CD-changer control. It is based on a single 8051 family microcontroller (P83CE528) and various I<sup>2</sup>C-bus controlled peripherals.*

*The system contains functions such as PLL tuning, IF control, stereo decoding, RDS/RBDS+EON decoding, IAC, sound switching, sound fader control, LCD display, cassette interface, CD changer control, and a detachable front.*

"The purchase of Philips' complete set of Integrated Circuits as specified in this Outline Specification for manufacture of a radio system conforming the relevant specification as herein given, secures immunity from suit on unauthorized use of those Philips' patent rights, which specifically relate to automatic broadcast station storage (AST) and/or radio data system (RDS) features.



Purchase of Philips I<sup>2</sup>C components conveys a license under the I<sup>2</sup>C patent to use the components in the I<sup>2</sup>C system, provided the system conforms to the I<sup>2</sup>C specifications defined by Philips.

© Philips Electronics N.V. 1997

All rights are reserved. Reproduction in whole or in part is prohibited without the prior written consent of the copy-right owner.

The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice. No liability will be accepted by the publisher for any consequence of its use. Publication thereof does not convey nor imply any license under patent- or other industrial or intellectual property rights.

**Outline Specification of  
High-End RDS/EON Car Radio  
System CCR526 V1.2**

**AN96014**

**Author(s):**

**A. Demmers**

**M. Verheijden**

**Product Concept & Application Laboratory Eindhoven,  
The Netherlands**

**Keywords**

Car Radio

Radio Data System

Radio Broadcast Data System

CD-changer

EON

CCR526

P83CE528

**Number of pages: 27**

**Date: 96-03-08**

---

**Outline Specification of High-End  
RDS/EON Car Radio System CCR526 V1.2**

**Application Note  
AN96014**

---

**Summary**

CCR526 is a computer controlled high-end AM/FM car radio system with RDS/RBDS decoding. It is based on a single 8051 family microcontroller (P83CE528) and various I<sup>2</sup>C-bus controlled peripherals.

The system contains functions such as PLL tuning, IF control, stereo decoding, RDS/RBDS+EON decoding, IAC, sound switching, sound fader control, LCD display, cassette interface, CD changer control, and a detachable front.

Radio control and RDS/RBDS+EON processing are combined in a single microcontroller.

---

**Outline Specification of High-End  
RDS/EON Car Radio System CCR526 V1.2**

---

**Application Note  
AN96014**

**CONTENTS**

<b>1. INTRODUCTION .....</b>	<b>9</b>
<b>2. BASIC HARDWARE CONFIGURATION .....</b>	<b>10</b>
<b>3. SHORT SPECIFICATION .....</b>	<b>13</b>
<b>4. TARGET CHARACTERISTICS OF THE RADIO .....</b>	<b>19</b>
<b>5. MICROCONTROLLER AND PIN ASSIGNMENTS .....</b>	<b>21</b>
<b>6. KEYBOARD .....</b>	<b>24</b>
<b>7. OPTION DIODES .....</b>	<b>26</b>
<b>8. LCD DISPLAY .....</b>	<b>27</b>

---

**Outline Specification of High-End  
RDS/EON Car Radio System CCR526 V1.2**

**Application Note  
AN96014**

---

---

**Outline Specification of High-End  
RDS/EON Car Radio System CCR526 V1.2**

**Application Note  
AN96014**

---

**Document History**

**This Outline Specification is valid for CCR526S software release V1.2**

Modifications with respect to the application note "Outline specification of High-End RDS/EON Car Radio System with CD-changer control CCR526S V0.5", report number AN95099:

1. The sleep timer function has been changed from a 30 minute time-out to 1 hour.

Modifications with respect to the Application Note "Outline Specification of High-End RDS/EON Car Radio System with CD-changer control CCR526S V0.3", Report Number AN95077:

1. Umlaut display option added.

Modifications with respect to the Application Note "Outline Specification of High-End RDS/EON Car Radio System with CD-changer control CCR526S", Report Number AN95038:

1. Preset 6 key also controls the intro/disc scan function.
2. NVM initialization added.

**Outline Specification of High-End  
RDS/EON Car Radio System CCR526 V1.2**

**Application Note  
AN96014**

---



---

**Outline Specification of High-End  
RDS/EON Car Radio System CCR526 V1.2****Application Note  
AN96014**

---

**1. INTRODUCTION**

CCR526S is a computer control system based on a P83CE528 microcontroller. It controls a high-end AM/FM car radio with Radio Data System (RDS), Radio Broadcast Data System (RBDS), EON (Enhanced Other Networks information) and various I<sup>2</sup>C-bus controlled peripherals. The main features are:

- Radio control, CD-changer control, cassette control and RDS/RBDS decoding in a single microcontroller
- Bands: FM, MW, LW
- Tuning: manual, automatic (search and scan), Automatic Store Tuning (AST), selectable tuning grid and band limits for different parts of the world (Europe/USA option).
- Presets: 18 FM, 12 MW, 6 LW
- Controls mechanical cassette deck
- CD-changer control, supporting the SCC-600 (6 discs)
- Controls power stabilizer IC
- PLL frequency synthesizer
- Digital sound chip (optional) controlling: volume, bass, treble, balance, fader, loudness
- RDS/RBDS functions:
  - PS Programme Service name display and storage in Non Volatile Memory;
  - PTY Programme TYpe display and searching;
  - TP/TA Traffic Announcements break-in;
  - AF/PI Alternative Frequency follow and storage in Non Volatile Memory;
  - EON Enhanced Other Networks traffic announcements and update of preset AF lists into the NVM.
- Security code
- Non Volatile Memory for:
  - programme presets;
  - RDS/RBDS information;
  - System status.
- 120 or 144 segment LCD display
- Keyboard (optionally detachable) with up to 27 key functions

**NOTE:** RBDS is an extension of the European RDS system. Every reference in this document to RDS is also valid for the RBDS system, unless specified otherwise.

**Outline Specification of High-End RDS/EON Car Radio System CCR526 V1.2**

**Application Note AN96014**

**2. BASIC HARDWARE CONFIGURATION**

The block diagrams of CCR526 with fixed, and detachable front are given in Fig.1 and Fig.2 .

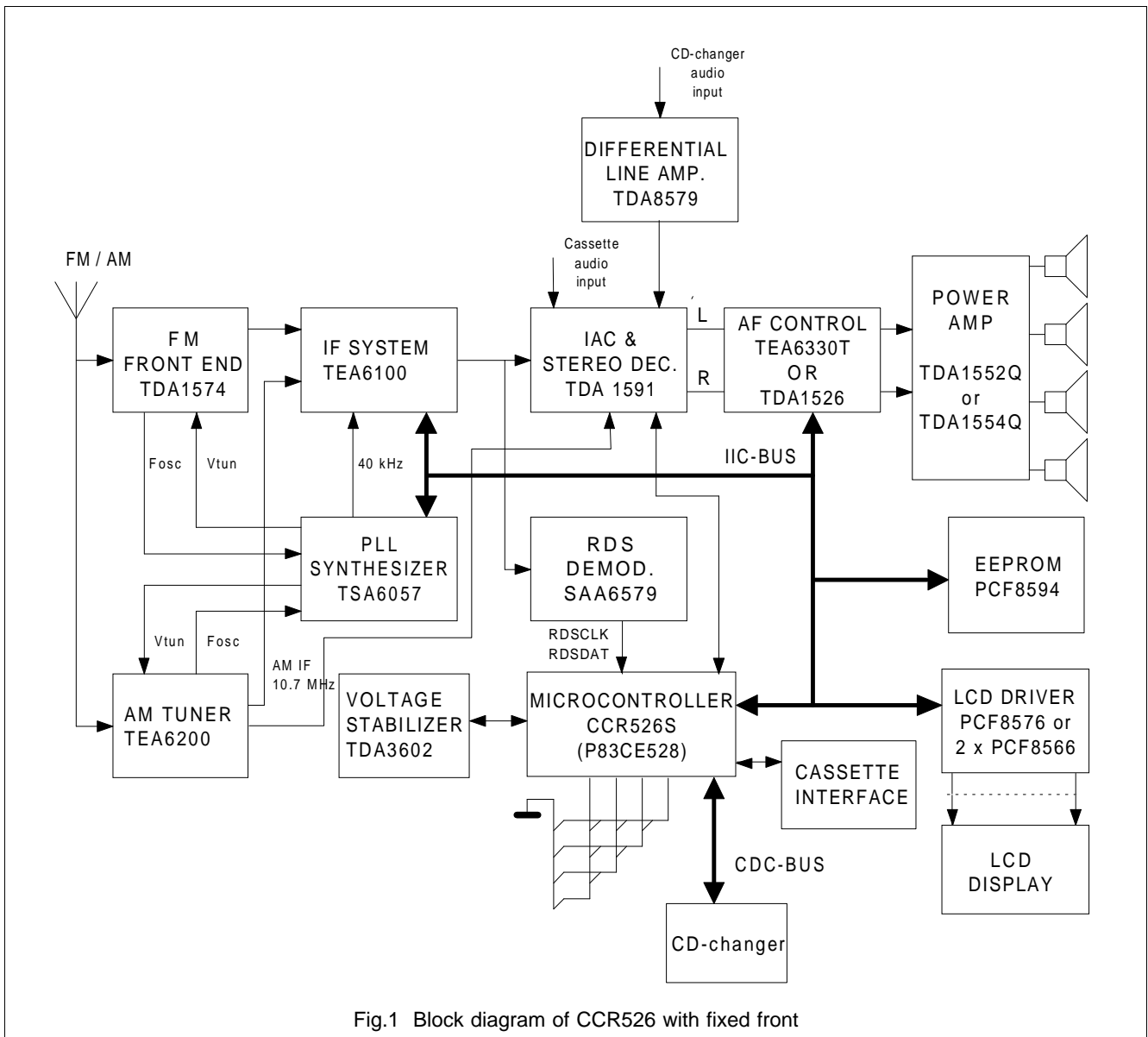


Fig.1 Block diagram of CCR526 with fixed front

**Outline Specification of High-End  
RDS/EON Car Radio System CCR526 V1.2**

**Application Note  
AN96014**

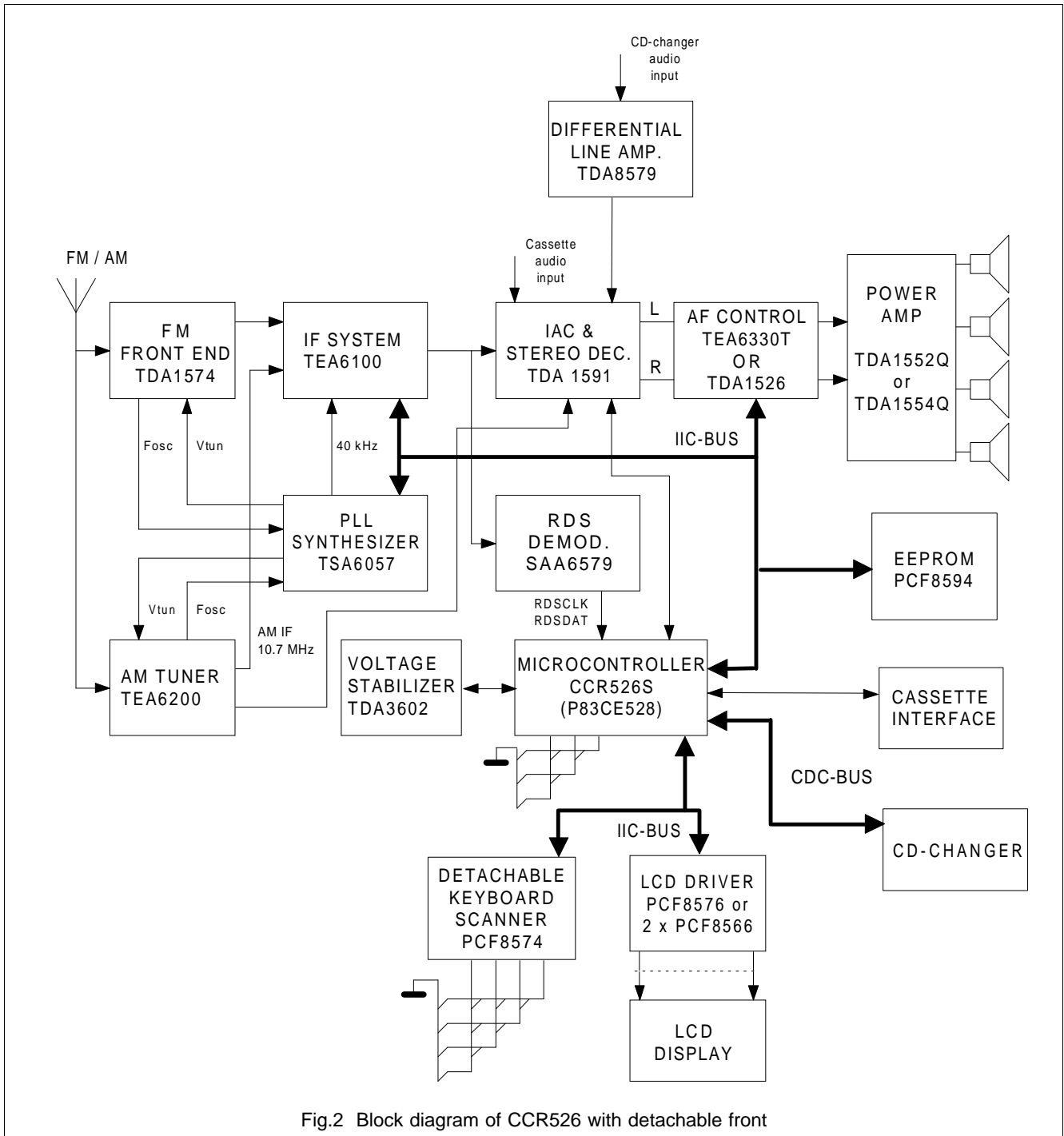


Fig.2 Block diagram of CCR526 with detachable front

---

**Outline Specification of High-End  
RDS/EON Car Radio System CCR526 V1.2****Application Note  
AN96014**

---

The CCR526 concept requires the following IC's to be present in the system:

- TDA1574(T) Performs all the FM front-end functions, except the R.F. pre-amplifier stage. Incorporates an FM/IF pre-amplifier.
- TEA6200 AM tuner, up-conversion system. Does not need a tuned aerial circuit. I.F. frequency 10.7 MHz. No alignments needed.
- TEA6100 Integrated FM/IF system including a digital AM/FM tuning interface for microcomputer controlled radios with an I<sup>2</sup>C-bus.
- TSA6057(T) PLL synthesizer with separate prescalers for AM and FM and loop filter outputs. I<sup>2</sup>C-bus controlled.
- TDA1591(T) System combination of adjustment free PLL stereo decoder with de-emphasis control and an Interference Absorption Circuit (IAC) with low component count. Specially designed for car radios.
- TEA6330T/  
TDA1526 I<sup>2</sup>C-bus (TEA6330) or potentiometer (TDA1526) controlled AF pre-amplifier in SO package for car and home receivers. Includes volume, balance, bass, treble, fader (TEA6330) control and mute (TEA6330).
- CCR526S The microcontroller, based on a P83CE528EFB. It is a 8051 derivative with an 8-bit CPU, 32 Kbytes ROM, 512 bytes RAM and four 8-bits I/O ports in a 44-pin QFP package.
- TDA3602 Supply voltage stabilizer in SIL package with three output voltages (2 x 5V and 8.5V). Two outputs are switchable by external controls.
- TDA1552Q/  
TDA1554Q Class-B audio power amplifiers in SIL plastic package with 4 identical amplifiers. The TDA1552Q can deliver 2 x 22 W in BTL configuration, the TDA1554Q can deliver either 4 x 11 W or 2 X 22 W.
- SAA6579(T) RDS demodulator with on-chip 57 kHz bandpass filter and a digital demodulator. Outputs a digital data signal and a clock signal for further processing.
- PCF8566T  
PCF8576CT LCD display drivers that interface to almost any liquid crystal display (LCD) having low multiplex rates. They generate the drive signals for any static or multiplexed LCD with up to four backplanes and up to 24 (PCF8566) or 40 (PCF8576) segment lines and can easily be cascaded for larger LCD applications. I<sup>2</sup>C-bus controlled.
- PCF8594C-2P/T 512 byte 5V electrically erasable programmable read only memory (EEPROM) that can be 100,000 times re-written.
- PCF8574(T) Detachable keyboard scanner. I<sup>2</sup>C-bus controlled.
- TDA8579(T) Differential line amplifier for external input.

## Outline Specification of High-End RDS/EON Car Radio System CCR526 V1.2

Application Note  
AN96014

### 3. SHORT SPECIFICATION

#### Tuning

- Frequency bands

The following frequency bands are used depending on the factory option USA / Europe:

FM:	87.50 -	108.00	MHz	(50 / 100 kHz steps)	}	For application
MW:	531 -	1629	kHz	(1 / 9 kHz steps)	}	in Europe
LW:	144 -	288	kHz	(1 kHz steps)	}	
FM:	87.90 -	107.90	MHz	(50 / 100 kHz steps)	}	For application
MW:	530 -	1710	kHz	(1 / 10 kHz steps)	}	in USA

- PLL tuning principle
- Manual tuning up / down.  
Initially slow / fine grid. After 2.5 sec. fast / coarse grid.
- Local/DX switching  
The Local/DX feature controls the search sensitivity. If the tuner has an input attenuator, the Local/DX switch controls the attenuator during search. If not, it controls the signal level threshold during search. By default, after switching on, the radio is in DX mode.
- Search tuning up / down  
Sensitivity is controlled by Local/DX. If after one complete band sweep in local mode no station is found, the radio switches automatically to DX. Automatic muting and display of running frequency.
- Frequency Scan  
Continuous automatic search tuning, pausing for 6 seconds on every station.
- AST (Automatic Store Tuning) for FM and MW band  
AST switches to FM-AST or MW-AST band, searches for the 6 strongest transmitters and stores them in the AST programme preset memory. In FM, duplication of PI codes will be avoided.
- Programme preset memory  
For each band (FM1, FM2, MW, LW, FM-AST and MW-AST) 6 programme presets and a "manual" frequency are stored. In FM, additional RDS information is stored: PI code (Programme Identification), AF list (Alternative Frequencies), PS name (Programme Service) and AF follow mode on/off.  
After band switching, the radio reverts to the latest frequency used in the new band (Either preset or a manually tuned frequency).
- Programme preset up / down control  
Programme presets can be recalled/stored by two key control (up and down) or by 6 separate preset keys.

---

**Outline Specification of High-End  
RDS/EON Car Radio System CCR526 V1.2****Application Note  
AN96014**

---

- **AF follow mode**  
If AF follow mode is on, the set will regularly measure the signal strength on alternative frequencies and compare it with the current station. If an alternative frequency offers better quality, the radio will automatically switch over to that frequency. The alternative frequency list will be updated. The measuring scheme is designed to cause minimum noticeable disturbance for the listener. The interval time between two measurements depends on the signal quality.
- **Intelligent preset programme recall**  
If an FM programme preset with a known PI code is recalled, the primary frequency and all alternative frequencies stored in the programme preset memory are examined. The frequency with the highest signal strength that broadcasts the correct PI code will be selected. Only when the programme is not found on one of the AFs, a search is started after 6 seconds for a station with the proper PI code.
- **TA mode**  
In TA mode the radio only searches for transmitters that transmit the RDS traffic programme on the same station or linked via EON.  
The radio will automatically start a search when switching TA mode on and the current station is not a traffic station.
- **PTY search mode**  
In PTY search mode the radio only searches for transmitters that transmit the user-selected PTY code. Dependent on the factory option USA/Europe the RBDS PTY-table or the RDS PTY-table is used.
- **Last status memory:** band, frequency, PI code, PS name, AF follow mode on/off status and TA mode on/off status are stored in memory. This status is recalled during switch on.

**RDS**


- Bit, block and group synchronisation (inclusive RBDS E-block detection)
- Data decoding and collection of:
  - PI, Programme Identification code;
  - AF, Alternative Frequencies;
  - TP, Traffic Programme;
  - TA, Traffic Announcement;
  - PS, Programme Service name;
  - PTY, Programme TYpe (two different tables for RDS and RBDS);
  - EON, Enhanced Other Networks information.
- AF follow mode using PI and AF (see also Tuning)
- Display of the programme service name in 8 alpha-numeric characters (PS name)
- Display of TP status
- Display of PTY status

## Outline Specification of High-End RDS/EON Car Radio System CCR526 V1.2

## Application Note AN96014

- EON
  - Switches temporarily to an other station if EON information indicates a traffic announcement on that other network.
  - Updates lists of alternative frequencies of other stations stored in preset memory with information received via the EON data.
- Break-in of traffic announcements and PTY alarm messages when the radio is muted or in cassette / CD changer mode

### Detachable front

- Optionally, the keyboard and the LCD display unit can be placed on a detachable front controlled by a 2nd I<sup>2</sup>C bus. Only 5 contacts are required to connect the detachable front (6 if it hosts also the power key). No extra hardware is required to detect its presence.
- Control
  - Up to 27 local control keys on either a fixed, a detachable keyboard or a combination. Triangular matrix using 7 lines.
- Display
  - 120 Segment LCD or 144 Segment LCD with Umlaut (ü) and Accent (á) characters, 1:3 multiplexed.
  - 8 Alphanumeric characters + decimal point are used for display of:
    - Band and frequency (Example: "FM 103.50")
    - Indication "BALANCE", "FADER", "TREBLE", "BASS" and their position.
    - Security code being entered
    - RDS programme service name (PS) in 8 alphanumeric characters.
    - RDS programme type (PTY):
    - "MUTE", in case the user mutes the radio, cassette or CD changer
    - Cassette mode function such as "PLAY ->", "CAS WIND", etc.
    - CD changer function such as disc number and track number display during play mode.
  - 7 Segment display for the current programme preset number.
  - 8 Icons for display of:
    - STEREO On when stereo pilot signal is detected, off when forced mono is selected or no pilot signal is detected.
    - AST On when AST band selected.
    - AF On when AF follow mode is enabled (see also Tuning). Flashes if no RDS data received.
    - TA On in TA mode and flashing during a traffic announcement in progress.
    - TP On when a traffic station is received, flashing when the station is not a traffic station and TA mode is on.
    - PTY On when PTY code is received, flashing when RDS reception is poor or during a PTY search.
    - DOLBY  On in cassette mode when dolby selected.
    - MTL On in cassette mode when Metal selected.

---

## Outline Specification of High-End RDS/EON Car Radio System CCR526 V1.2

---

## Application Note AN96014

### Non Volatile Memory

- 512 bytes EEPROM. The following information is stored in NVM:
  - Checksum to verify whether an EEPROM has been initialized or not. If a not initialized EEPROM has been detected default values will be stored to insure reasonable settings for e.g. the audio control values.
  - System status e.g.: band, audio source (radio / cassette / CD changer).
  - For each band (FM1, FM2, FM-AST, MW, MW-AST, LW): six preset frequencies and one non-preset frequency, last used preset.
  - For each stored FM frequency:
    - PI code
    - PS Name
    - AF List (9 AF's)
    - AF follow mode on/off
  - Audio controls: volume, balance, fader, treble, bass and loudness.
  - Four digit security code (0000 - 9999).
    - Security code can be programmed with the keyboard by means of a service mode or a preprogrammed EEPROM has to be used.
    - Security code can not be changed by the user. The security code can be enabled or disabled by the user; enable/disable status is stored in EEPROM.
    - Must be entered each time the main supply line has been interrupted or the radio has been removed from the retrack.

### Sound

- Volume, balance, fader, treble and bass control with vol-up/down keys. Sound control select key to cycle through balance, fader, treble and bass.
- Mute key
- Automatic muting during tuning and AST search (silent tuning).
- Break-in of traffic announcements (in TA mode) and PTY-alarm messages when the radio is muted or in cassette / CD changer mode.
- Loudness switching
- Sound settings are stored at switch-off and recalled at switch-on (limited to -10 dB).
- "Bleep" tone to confirm user actions such as storing a programme preset, entering AST mode, etc.
- Mono / Stereo key
- Output pins for mute, loudness and traffic announcement, for use with conventional audio control circuitry.



---

## Outline Specification of High-End RDS/EON Car Radio System CCR526 V1.2

---

## Application Note AN96014

### Power-amplifier

- Conventional power-amplifiers can be used such as two TDA1552Q (4 x 22 Watt), one TDA1554Q (4 x 11 Watt (2  $\Omega$  load) or 6 Watt (4  $\Omega$  load)) or one TDA1552Q (2 x 22 Watt (4  $\Omega$  load)) in a BTL stereo configuration.

### Options

- Diode programmable
  - Detachable front
  - No LW band
  - FM only
  - No security code
  - Static on/off switch
  - Method of source switching
  - Application area of the radio (USA / Europe)
  - Fader control enabled/disabled

#### User programmable

- 2 / 4 Loudspeakers
- Loudness on/off
- TA / PTY Alarm volume level
- Security code enable/disable

#### Automatically detected

- Digital sound control chip or conventional controls
- 120 / 144 segment LCD display
- Loudness
- Local/DX FM Tuner Attenuator
- AMS )
- Dolby ) Cassette deck functions
- MTL )
- CD changer presence

### Power connections

- Continuous power supply input. Normally connected directly to the car battery. All supply power is drawn from this input.
- Ignition key input. Normally connected to the accessory contact of the ignition switch. Used only for switching the radio on/off.  
This input is also used when the static on/off switch option is chosen instead of the momentary on/off key.

### **Switching-on/off**

- Recall of last system status (e.g.: frequency, band, sound control settings, RDS status and last selected audio source).
- Switch on by:
  - Power key, can be static or momentary.
  - Ignition contact (only if the set was switched off by turning the ignition off).
- Switch off by:
  - Power key, can be static or momentary.
  - Ignition contact.
  - Removal of detachable keyboard.
  - Opening of the security contact.
  - 30 to 40 seconds after a wrong security code is entered.
- When switched on while the ignition contact is (and remains) off, the set will automatically switch off after 1 hour.
- The radio will switch on again when switched off due to a power voltage dip during engine start.

### **Cassette**

- Automatically switches to cassette mode after insertion of a tape
- Interfaces with a mechanically controlled cassette deck
- Play/wind mode detection
- Play direction detection for auto-reverse cassette decks
- Radio reception during wind mode
- Cassette/Radio/CD changer mode key
- Metal versus Ferro/Chromium tape select key
- DOLBY noise reduction system on/off key
- AMS (Auto Music Search) on/off key
- Optional source switching to CD changer mode (CD changer plug is in) or always to radio mode (option diode D6 is in) when the tape is ejected.

### **CD changer**

- Cassette/Radio/CD changer mode key.
- Disc up/down keys for selecting the next/previous disc.
- Track up/down keys for selecting the next/previous track.
- Fast forward/reverse keys for jumping some grooves forward/backward.
- Shuffle on/off key, for playing the tracks in random order. (The user can make a selection between playing the tracks of current disc or all discs in shuffle mode.)
- Repeat on/off key, for repetitive play of the current track or the current disc.
- Intro-scan key. When Intro-scan mode is on, each track of the current disc or the first track of every disc (user selectable) are played for 10 seconds in successive order.

**Outline Specification of High-End RDS/EON Car Radio System CCR526 V1.2**

**Application Note AN96014**

**4. TARGET CHARACTERISTICS OF THE RADIO**

**General**

Supply voltage range		10.2 to 16	V
Quiescent current,	power off	2	mA (typ.)
	power on	520	mA (typ.)
Operating ambient temperature		-30 to 75	°C
FM frequency range	Europe	87.5 to 108	MHz
	USA	87.9 to 107.9	MHz
AM frequency range	Europe	144 to 288	kHz (LW)
		531 to 1629	kHz (MW)
	USA	530 to 1710	kHz (MW)
IF-frequency (AM and FM)		10.7	MHz

**FM characteristics**

$V_{supply} = 14.4\text{ V}$ ,  
 $T_{amb} = 25\text{ °C}$ ,  
 $f_o = 98\text{ MHz}$ ,  
 $f_{dev} = 22.5\text{ kHz}$ ,  
 $f_{mod} = 1\text{ kHz}$  unless otherwise specified.  
 Dummy aerial as shown in Fig.3 .

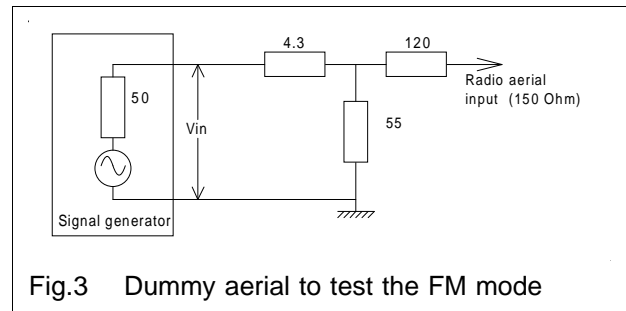


Fig.3 Dummy aerial to test the FM mode

Aerial input voltage ( $V_{in}$ ), for -3 dB limiting (adjust)		10	$\mu\text{V}$
for (S+N)/N = 26 dB		3	$\mu\text{V}$
for 10 dB crosstalk (stereo)		150	$\mu\text{V}$
Signal-to-noise ratio over most of the signal range		60	dB
RF signal handling capability for THD < 2% at 75kHz dev.		> 2	V
AF output over most of the signal range measured at pin 11 of IF module TEA6100.		150	mV
AM suppression over most of the signal range		> 50	dB
Total Harmonic Distortion over most of the signal range. 75 kHz dev.		0.5	% (typ.)
Adjacent signal selectivity (two signal method)	$S_{200}$	> 44	dB
IF bandwidth 3dB bandwidth		160	kHz
IF suppression		> 85	dB
Search sensitivity		$V_{in} > 20$	$\mu\text{V}$
RDS sensitivity: Traffic Announcement		$V_{in} > 14$	$\mu\text{V}$
Programme Identification		$V_{in} > 16$	$\mu\text{V}$
Frequency counter resolution		6.4	kHz
Frequency grid Search Tuning		100	kHz
Manual Tuning		50	kHz

**Outline Specification of High-End RDS/EON Car Radio System CCR526 V1.2**

**Application Note AN96014**

**AM characteristics**

$V_{supply} = 14.4 V,$   
 $T_{amb} = 25 \text{ }^\circ\text{C},$   
 $f_o = 999 \text{ kHz}, m = 0.3,$   
 $f_{mod} = 1 \text{ kHz unless otherwise specified.}$   
 Dummy aerial as shown in Fig.4 .

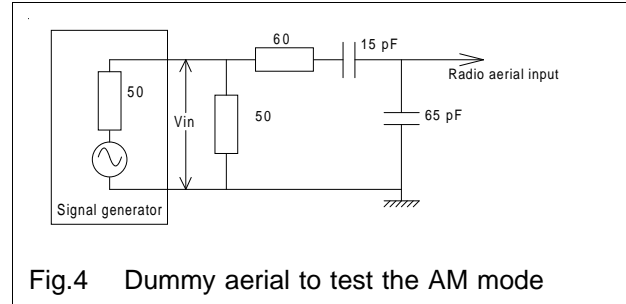


Fig.4 Dummy aerial to test the AM mode

Aerial input voltage ( $V_{in}$ ), for $(S+N)/N = 26 \text{ dB}$	MW	45	$\mu\text{V}$
	LW	70	$\mu\text{V}$
Signal-to-noise ratio for $V_{in} = 1 \text{ mV}$		> 45	dB
AGC range $V_{in}/500 \text{ mW}$ for 10 dB variation of AF output		90	dB
RF signal handling capability for THD < 10 % at $m = 0.8$		1.4	V
Total Harmonic Distortion over most of the AGC range, $m = 0.8, f_{mod} = 400 \text{ Hz}$		< 2	%
Total bandwidth B 3dB		5	kHz
Fidelity ( -3 dB )		30Hz to 2	kHz
IF suppression tuned frequency 1400 kHz, $V_{in} = 20 \mu\text{V}$		62	dB
Image rejection tuned frequency 1400 kHz, $V_{in} = 20 \mu\text{V}$		76	dB
IF selectivity	$S_9$	36	dB
	$S_{20}$	66	dB
Frequency counter resolution		500	Hz
Frequency grid	Europe		
	LW (search and manual tuning)	1	kHz
	MW (search tuning)	9	kHz
	MW (manual tuning)	1	kHz
	USA		
	MW (search tuning)	10	kHz
	MW (manual tuning)	1	kHz
Search sensitivity $V_{in}$		> 40	$\mu\text{V}$

# Outline Specification of High-End RDS/EON Car Radio System CCR526 V1.2

# Application Note AN96014

## 5. MICROCONTROLLER AND PIN ASSIGNMENTS

CCR526S is based on a P83CE528 microcontroller. It is single-chip microcontroller, manufactured in an advanced CMOS process and is a derivative of the 80C51 microcontroller family. The pin assignments and keyboard configurations are given in the figures below

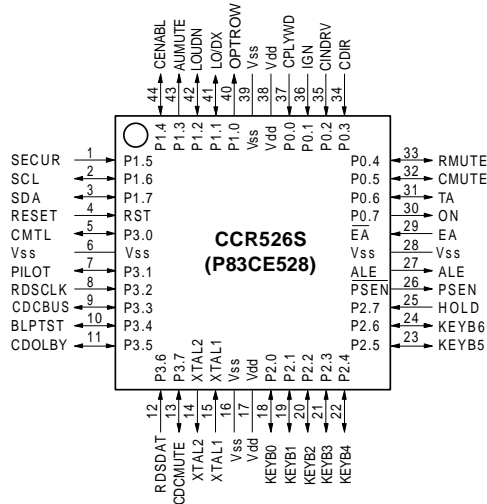


Fig.5 Pinning of CCR526S for fixed front

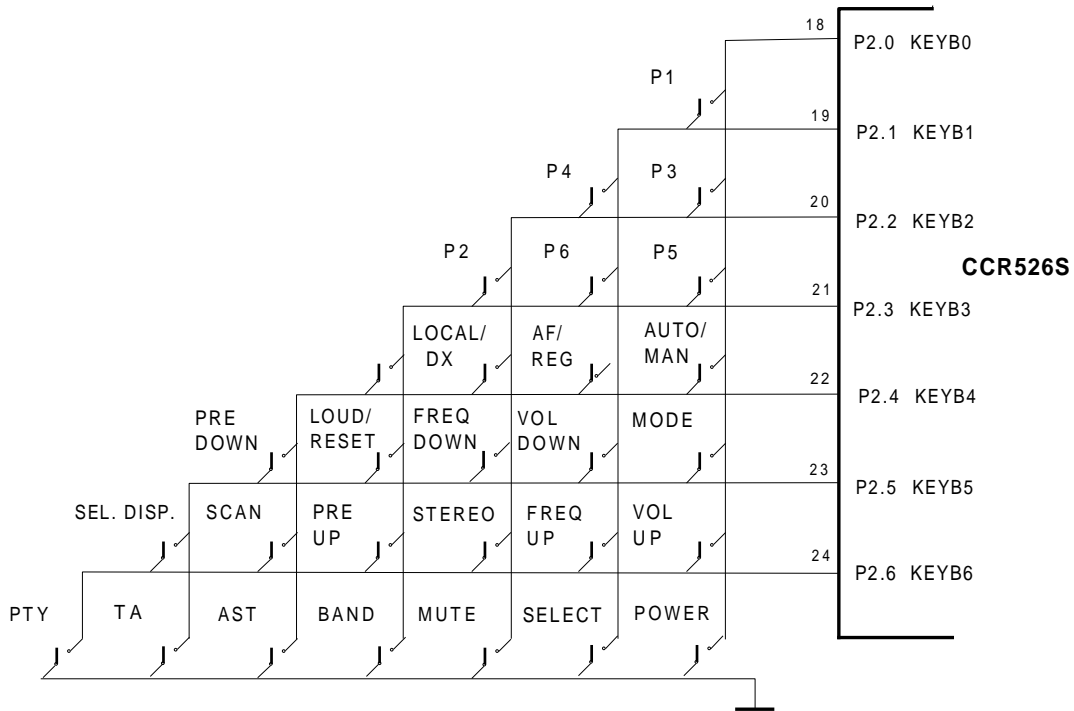


Fig.6 Keyboard configuration for fixed front



## Outline Specification of High-End RDS/EON Car Radio System CCR526 V1.2

## Application Note AN96014

The following table gives a short description of all pins.

PIN	NAME	I/O	DESCRIPTION
1	SECUR	I	Security contact
2	SCL	I/O	I <sup>2</sup> C Bus Clock line
3	SDA	I/O	I <sup>2</sup> C Bus Data line
4	RESET	I	Device reset
5	CMTL	I/O	Cassette Metal versus Ferro/Chromium select
6+16+28+39	Vss		GROUND
7	PILOT	I/O	Stereo indication / mono/stereo control
8	RDSCLK	I	RDS Clock from RDS demodulator
9	CDCBUS	I/O	CD-changer bus line
10	BLPTST	I/O	Bleep output / Test input (service mode)
11	CDOLBY	I/O	Cassette dolby select
12	RDSDAT	I	RDS Data from RDS demodulator
13	CDCMUTE	O	CD-changer mute
14	XTAL2	O	Oscillator output
15	XTAL1	I	Oscillator input
17+38	Vdd		+ 5 V supply voltage
18	KEYB0	I/O	Keyboard matrix line 0
19	KEYB1	I/O	Keyboard matrix line 1
20	KEYB2	I/O	Keyboard matrix line 2
21	KEYB3	I/O	Keyboard matrix line 3 / AMS select
22	KEYB4	I/O	Keyboard matrix line 4
23	KEYB5	I/O	Keyboard matrix line 5 / detach. I <sup>2</sup> C Data
24	KEYB6	I/O	Keyboard matrix line 6 / detach. I <sup>2</sup> C Clock
25	HOLD	I	Power supply OK in
26	/PSEN	O	Program Store Enable (n.c.)
27	ALE	O	Address Latch Enable (n.c.) (disabled)
29	/EA	I	External Access (connect pull-up)
30	ON	O	Power supply on control
31	TA	O	Traffic announcement in progress
32	CMUTE	O	Cassette mute
33	RMUTE	O	Radio mute
34	CDIR	I	Cassette direction (forward/reverse)
35	CINDRV	I	Cassette In drive
36	IGN	I	Ignition contact status or static on/off switch
37	CPLYWD	I	Cassette play/wind mode
40	OPTROW	O	Option row output
41	LO/DX	I/O	Local / DX control
42	LOUDN	I/O	Loudness
43	AUMUTE	O	General audio mute
44	CENABL	O	Cassette enable

## Outline Specification of High-End RDS/EON Car Radio System CCR526 V1.2

## Application Note AN96014

### 6. KEYBOARD

The keyboard consists of a 7-line triangular matrix connected to the microcontroller or the I/O expander PCF8574. The following table lists the available keys.

NAME	DESCRIPTION
P1	Radio mode: Preset-1
P2 DISC-DOWN	Radio mode: Preset-2 CD-changer mode: Disc-down
P3 DISC-UP	Radio mode: Preset-3 CD-changer mode: Disc-up
P4 SHUFFLE	Radio mode: Preset-4 CD-changer mode: Shuffle (Current disc when pressed short and all discs when pressed long)
AMS	Cassette mode: Auto Music Search on/off
P5 REPEAT	Radio mode: Preset-5 CD-changer mode: Repeat (Current track when pressed short and current disc when pressed long)
MTL	Cassette mode: MTL on/off
P6 INTRO-SCAN	Radio mode: Preset-6 CD-changer mode: Intro-scan for all tracks of the current disc when pressed short and Intro-scan for all discs when pressed long.
DOLBY	Cassette mode: Dolby on/off
POWER	Power on/off (momentary on/off key)
VOL-UP	Analog sound setting up
VOL-DOWN	Analog sound setting down
SELECT	Select analog function for update
MUTE	Mute on/off
FREQ-UP TRACK-UP FFORWARD	Radio mode: Manual / search tuning upward CD-changer mode: Track-up when pressed short and Fast Forward when pressed long.
FREQ-DOWN TRACK-DOWN FREVERSE	Radio mode: Manual / search tuning downward CD-changer mode: Track-down when pressed short and Fast Reverse when pressed long.
AUTO/MANUAL	Radio mode: Switch between manual / search tuning
BAND	Cycle through bands
AST	Automatic search tuning band select and programming
AF REGIONAL	RDS AF follow mode on/off when pressed short. Regional mode on/off when pressed long.
TA	RDS traffic information mode on/off

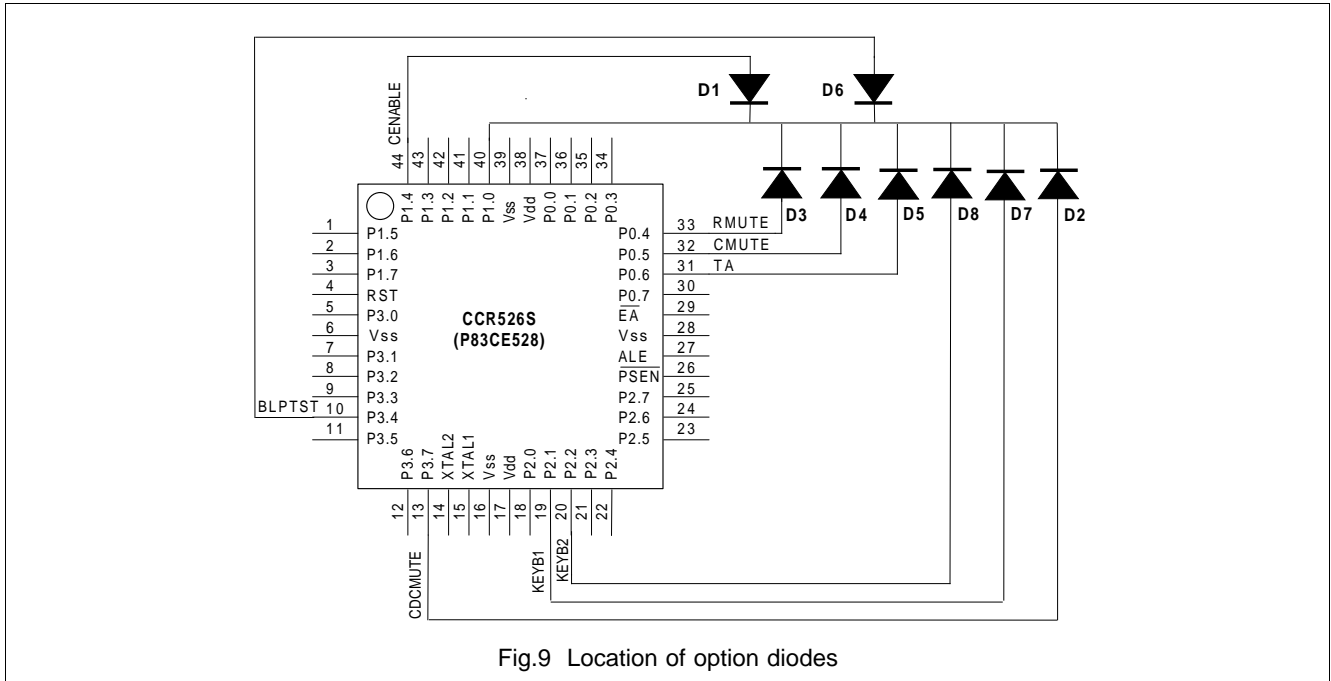


## Outline Specification of High-End RDS/EON Car Radio System CCR526 V1.2

Application Note  
AN96014

NAME	DESCRIPTION
PTY	Display current PTY and enter PTY search mode
LOUD RESET	Loudness on/off when pressed short. Analogue reset function when pressed long.
MODE	Radio / Cassette / CD-changer selection
LOCAL/DX	Local / DX selection
STEREO	Suppress/enable stereo mode
PRE-UP DISC-UP MTL	Radio mode: Preset up CD-changer mode: Disc-up Cassette mode: MTL on/off
PRE-DOWN DISC-DOWN DOLBY	Radio mode: Preset down CD-changer mode: Disc-down Cassette mode: Dolby on/off
SCAN INTRO-SCAN	Radio mode: Automatic frequency scan CD-changer mode: Intro-scan for all tracks of the current disc when pressed short and Intro-scan for all discs when pressed long.
DISPLAY	Radio mode: Select display (PTY / frequency / PS name) CD-changer mode: Select display (track / elapsed time) Cassette mode: Select display (Cassette-mode / frequency)

**7. OPTION DIODES**



DIODE	DESCRIPTION
D1	Detachable front
D2	FM Only
D3	No LW band
D4	No security
D5	Static on/off switch
D6	Method of source switching
D7	Application area of the radio (USA / Europe)
D8	2 / 4 speakers (Fader disable)

**Outline Specification of High-End  
RDS/EON Car Radio System CCR526 V1.2**

**Application Note  
AN96014**

**8. LCD DISPLAY**

The Liquid Crystal Display (LCD) is driven by either one PCF8576 or two PCF8566's. Fig.10 shows all the segments of the display. To support the RDS programme service name (PS) feature, the display is equipped with 8 alpha numeric characters. With 13 segments per character, display is possible of all required RDS characters (capitals only); with 16 segments per character, umlauts and the accent can be displayed as well. Both displays operate in 1:3 multiplex mode.

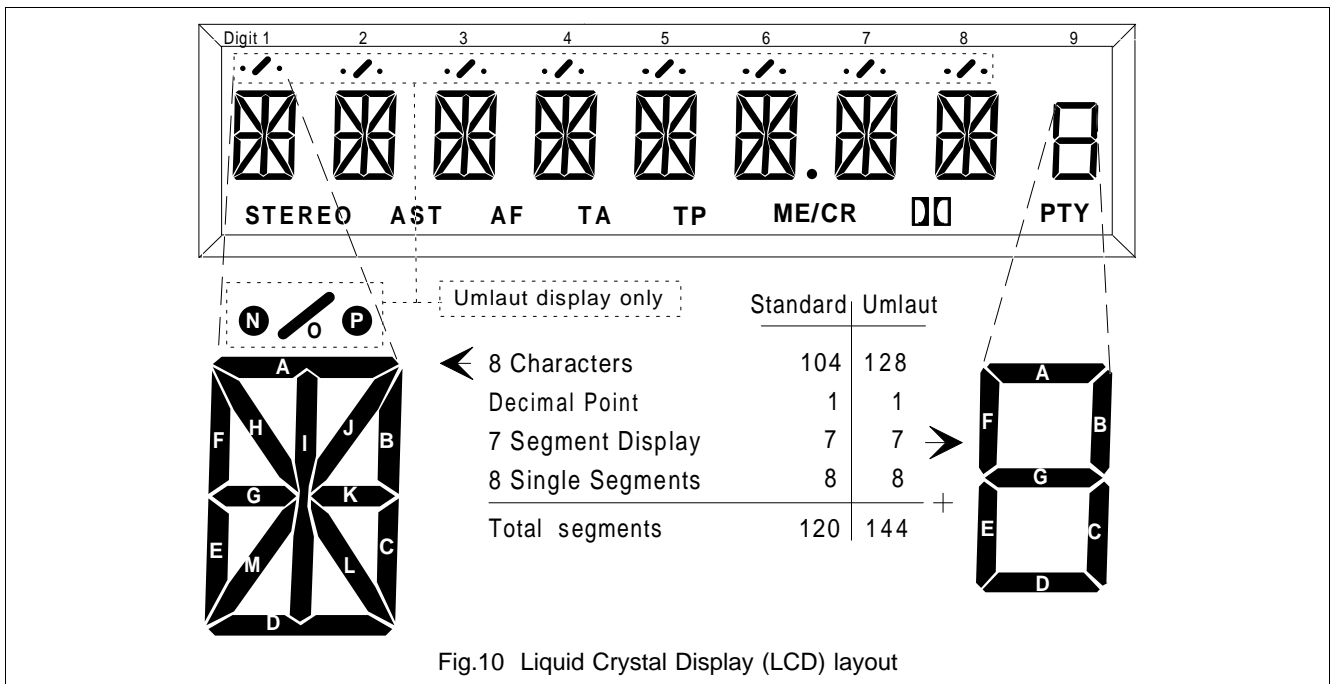


Fig.10 Liquid Crystal Display (LCD) layout