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**Block Diagram for ADAS Camera**

### Block Diagram

**Camera Module**
- AD Converter
- C-MOS/CCD Image Sensor
- Oscillator

**Main Control Module**
- AD Converter
- ISP
- Image Processor

**Analog Signal**
- Case 1
  - AD Converter
  - DA Converter
- Case 2
  - One chip
  - AD Converter
  - Camera ISP
  - Interface IC
- Case 3
  - Ethernet
  - AD Converter
  - Camera ISP
  - Interface IC

**LVDS**
- PLC
- FPD-Link
- GMSL
- Camera-Link

**Appearance**
- Type
  - Ceramic Resonator
    - CSTNR-G-C series (4MHz to 7.99MHz)
    - CSTNE-G-C series (8MHz to 13.99MHz)
    - CSTNE-V-C series (14MHz to 20MHz)
  - Crystal Unit
    - XRCGB24M000F3A00R0
    - XRCGB27M000F3A00R0
    - XRCGB25M000F3A00R0
    - XRCGB30M000F5A00R0

**Series P/N**
- Image Processor
- Image sensor
- Camera ISP
- Interface IC
- Image processor

**SPEC**
- Frequency Tolerance:
  - Ceramic Resonator: +/-2700ppm
  - Crystal Unit: +/-85ppm, +/-135ppm
Timing device

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Type</th>
<th>Series P/N</th>
<th>SPEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crystal Unit</td>
<td></td>
<td><strong>Representative P/N</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>XRCGB30M000F5A00R0 (for MCU)</td>
<td>Frequency Tolerance : +/-135ppm</td>
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<tr>
<td></td>
<td></td>
<td>XRCGB40M000F5A00R0 (for MCU)</td>
<td></td>
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</table>
### Block Diagram for TPMS

**Block Diagram**

**TPMS Tx (Tires)**
- Battery
- Sensor
- MCU
- RF

**TPMS Rx (in Vehicle Body)**
- RF
- SAW Filter
- Ceramic Filter
- LF

### Timing device

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Type</th>
<th>Series P/N</th>
<th>SPEC</th>
</tr>
</thead>
</table>
| ![Appearance](image) | Ceramic Resonator | CSTNR-G-C series (4MHz to 7.99MHz)  
CSTNE-G-C series (8MHz to 13.99MHz)  
CSTNE-V-C series (14MHz to 20MHz) | Frequency Tolerance : +/-2700ppm   |
| ![Appearance](image) | Crystal Unit | **Representative P/N**  
XRCGB26M000F3A00R0 (for TPMS_Tx/Rx) | Frequency Tolerance : +/-85ppm    |
**Block Diagram for Remote Keyless Entry Tx**

### Timing Device

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Type</th>
<th>Series P/N</th>
<th>SPEC</th>
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<tr>
<td>40H</td>
<td>Ceramic Resonator</td>
<td><strong>CSTNR-G-C</strong> series (4MHz to 7.99MHz)</td>
<td>Frequency Tolerance : +/-2700ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>CSTNE-G-C</strong> series (8MHz to 13.99MHz)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>CSTNE-V-C</strong> series (14MHz to 20MHz)</td>
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<td>40H</td>
<td>Crystal Unit</td>
<td><strong>Representative P/N</strong></td>
<td>Frequency Tolerance : +/-60ppm</td>
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<tr>
<td></td>
<td></td>
<td>XRCGB27M600F2C00R0 (for RF control)</td>
<td>(-30 to 85 °C)</td>
</tr>
</tbody>
</table>

### RKE Tx Block Diagram

- **RKE Tx**
- **RF IC**
- **LF IC**
- **MCU**
**Block Diagram for Ethernet®**

**Timing device**

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Type</th>
<th>Series P/N</th>
<th>SPEC</th>
</tr>
</thead>
</table>
| ![Crystal Unit](401.png) | Crystal Unit | **XRCGB25M000F3A00R0** (for Ethernet® PHY)  
**XRCGB-F-A series** (24MHz to 48MHz, for CPU) | Frequency Tolerance : +/-85ppm |
### Appearance

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Type</th>
<th>Series P/N</th>
<th>SPEC</th>
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<tr>
<td>Ceramic Resonator</td>
<td>CSTNE8M00G55A000R0</td>
<td>Frequency Tolerance : +/-8000ppm</td>
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<tr>
<td>Crystal Unit</td>
<td>XRCGB27M120F3A00R0 (for NFC Transceiver)</td>
<td>Frequency Tolerance : +/-85ppm</td>
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</tr>
</tbody>
</table>
### Block Diagram for NFC pairing

**Keyless entry**
- Door module

**Bluetooth® Pairing**
- Infotainment Equipment

---

**Timing device**

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Type</th>
<th>Series P/N</th>
<th>SPEC</th>
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</thead>
<tbody>
<tr>
<td><img src="image" alt="Crystal Unit" /></td>
<td>Crystal Unit</td>
<td>XRCGB27M120F3A00R0</td>
<td>Frequency Tolerance : +/-85ppm</td>
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</tbody>
</table>
### General Instrument Cluster

#### Block Diagram

- **Head Up Display**
- **General Instrument**
- **Display Controller**
- **Mechanical meter control MCU**
- **LED driver**
- **Vehicle connect**
- **CAN/LIN**
- **Encode IC**

#### Timing device

- **Ceramic Resonator**
  - Series P/N: CSTNR-G-C series (4MHz to 7.99MHz)
  - CSTNE-G-C series (8MHz to 13.99MHz)
  - CSTNE-V-C series (14MHz to 20MHz)
  - Frequency Tolerance: +/-2700ppm

- **Crystal Unit**
  - Series P/N: XRCGB-F-A series (24MHz to 48MHz)
  - Frequency Tolerance: +/-85ppm, +/-135ppm

- **Piezoelectric Sounders**
  - PKLCS1212E24A0-R1
  - PKLCS1212E40A1-R1
  - SPL 80dB(Typ.) @10cm, ±1.5Vo-p square wave

- **Piezoelectric Sounders**
  - PKMCS1818E20A0-R1
  - SPL 100dB(Typ.) @10cm, +12Vo-p square wave

---

**General Instrument Cluster**

**Appearance**

- **Type**
- **Series P/N**

**SPEC**

- Frequency Tolerance: +/-2700ppm
- Frequency Tolerance: +/-85ppm, +/-135ppm

---

**Crystal Unit**

- **Type**
- **Series P/N**

**SPEC**

- SPL 80dB(Typ.) @10cm, ±1.5Vo-p square wave
- SPL 84dB(Typ.) @10cm, ±1.5Vo-p square wave

---

**Piezoelectric Sounders**

- **Type**
- **Series P/N**

**SPEC**

- SPL 100dB(Typ.) @10cm, +12Vo-p square wave
**Block Diagram for Digital Instrument Cluster**

**Digital Instrument Cluster**

**Timing device**

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Type</th>
<th>Series P/N</th>
<th>SPEC</th>
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<tbody>
<tr>
<td>![Resonator]</td>
<td>Ceramic Resonator</td>
<td>CSTNR-G-C series (4MHz to 7.99MHz)</td>
<td>Frequency Tolerance : +/-2700ppm</td>
</tr>
<tr>
<td>![Resonator]</td>
<td>Ceramic Resonator</td>
<td>CSTNE-G-C series (8MHz to 13.99MHz)</td>
<td>Frequency Tolerance : +/-2700ppm</td>
</tr>
<tr>
<td>![Resonator]</td>
<td>Ceramic Resonator</td>
<td>CSTNE-V-C series (14MHz to 20MHz)</td>
<td>Frequency Tolerance : +/-2700ppm</td>
</tr>
<tr>
<td>![Resonator]</td>
<td>Crystal Unit</td>
<td>XRCGB-F-A series (24MHz to 48MHz)</td>
<td>Frequency Tolerance : +/-85ppm, +/-135ppm</td>
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<tr>
<td>![Sounder]</td>
<td>Piezoelectric Sounders</td>
<td>PKLCS1212E24A0-R1</td>
<td>SPL 80dB(Typ.) @10cm, ±1.5Vo-p square wave</td>
</tr>
<tr>
<td>![Sounder]</td>
<td>Piezoelectric Sounders</td>
<td>PKLCS1212E40A1-R1</td>
<td>SPL 84dB(Typ.) @10cm, ±1.5Vo-p square wave</td>
</tr>
<tr>
<td>![Sounder]</td>
<td>Piezoelectric Sounders</td>
<td>PKMCS1818E20A0-R1</td>
<td>SPL 100dB(Typ.) @10cm, +12Vo-p square wave</td>
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</tbody>
</table>
### Block Diagram for Parking Assist System

#### Block Diagram

**Main MCU**

IC

**Network1**

Sensor MCU

**Network2**

Sensor MCU

**Other Sets**

Ultra Sonic Sensor

Ultra Sonic Sensor

**Timing device**

Cluster, Navi, etc.

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Type</th>
<th>Series P/N</th>
<th>SPEC</th>
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<tbody>
<tr>
<td></td>
<td>Ceramic Resonator</td>
<td>CSTCR-G-B series (4MHz to 7.99MHz)</td>
<td>Frequency Tolerance : +/-8000ppm</td>
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<tr>
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<td>(Standard Tol.)</td>
<td>CSTNE-G-A series (8MHz to 13.99MHz)</td>
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<tr>
<td></td>
<td></td>
<td>CSTNE-V-C series (14MHz to 20MHz)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ceramic Resonator</td>
<td>CSTNR-G-C series (4MHz to 7.99MHz)</td>
<td>Frequency Tolerance : +/-2700ppm</td>
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<td>(Tight Tol.)</td>
<td>CSTNE-G-C series (8MHz to 13.99MHz)</td>
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<tr>
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<td></td>
<td>CSTNE-V-C series (14MHz to 20MHz)</td>
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</tbody>
</table>
### Timing device

#### Block Diagram for Surround View Camera System

**Block Diagram**

**Camera Module**

- C-MOS/CCD Image Sensor
- AD Converter
- Oscillator
- DA Converter

**Main Control Module**

- AD Converter
- ISP
- Image Processor
- Image Processor

**Case 1**

- PLC
- FPD-Link
- Camera Link

**Case 2**

- LVDS

**Case 3**

- Ethernet®

### Table

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Type</th>
<th>Series P/N</th>
<th>SPEC</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Ceramic Resonator</td>
<td>CSTNR-G-C series (4MHz to 7.99MHz)</td>
<td>Frequency Tolerance : +/-2700ppm</td>
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<tr>
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<td>CSTNE-G-C series (8MHz to 13.99MHz)</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>CSTNE-V-C series (14MHz to 20MHz)</td>
<td></td>
</tr>
</tbody>
</table>
|            | Crystal Unit | Representative P/N
XRCGB25M000F3A00R0 (for Ethernet®) | Frequency Tolerance : +/-85ppm |
|            |             | XRCGB27M000F3A00R0 (for Camera ISP)        |                       |
### Block Diagram for Drive Recorder

#### Timing device

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Type</th>
<th>Series P/N</th>
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<tr>
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<td>CSTNR-G-C series (4MHz to 7.99MHz)</td>
<td>Frequency Tolerance : +/-2700ppm</td>
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<td>CSTNE-G-C series (8MHz to 13.99MHz)</td>
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<tr>
<td></td>
<td></td>
<td>CSTNE-V-C series (14MHz to 20MHz)</td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Crystal Unit" /></td>
<td>Crystal Unit</td>
<td>Representative P/N</td>
<td>Frequency Tolerance : +/-85ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>XRCGB24M000F3A00R0 (for Image Sensor/Processor)</td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Piezoelectric Sounders" /></td>
<td>Piezoelectric Sounders (SMD Type)</td>
<td>PKLCS1212E24A0-R1 (Sound Freq.: 2.4kHz)</td>
<td>Sound Pressure Level: 75dBmin (@+/-1.5Vo-p, Square wave, 10cm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PKLCS1212E40A1-R1 (Sound Freq.: 4kHz)</td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Piezoelectric Sounders" /></td>
<td>Piezoelectric Sounders (Pin Type)</td>
<td>Representative P/N</td>
<td>Sound Pressure Level: 70dBmin (@+/-1.5Vo-p, Square wave, 10cm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PKM13EPYH4000-A0 (Sound Freq.: 4kHz)</td>
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</tbody>
</table>
Block Diagram for EV/HEV

Timing Device

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Type</th>
<th>Series P/N</th>
<th>SPEC</th>
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<tr>
<td>Ceramic Resonator</td>
<td>Ceramic</td>
<td>CSTNR-G-C series (4MHz to 7.99MHz)</td>
<td>Frequency Tolerance : +/-2700ppm</td>
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<td>Resonator</td>
<td>CSTNE-G-C series (8MHz to 13.99MHz)</td>
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<td></td>
<td>CSTNE-V-C series (14MHz to 20MHz)</td>
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