**High-definition Locator**

**Outline**

High-precision positioning unit to estimate the vehicle position in the driving lane using quasi-zenith satellites (QZS) positioning augmentation signal under the 4 satellites operation from April 2018.

**Features**

Mitsubishi Electric started the production of world first GPS based car navigation in 1990, and using the advantage of QZS development, we provide high-precision positioning unit which integrates the low-cost composite receiver of positioning augmentation signal and GNSS.

1. **Positioning function**
   - CLAS enhanced RTK-PPP/SBAS enhancement 2 frequency PPP
   - 3D autonomous navigation with 6 axis IMU, composite positioning with GNSS
   - Driving lane identification with on-board camera and High-definition map, white line relative positioning
   - Position update frequency 10 Hz, Position estimation error output

2. **ADAS function**
   - Create driving route as lane level
   - Create recommendation lane as lane level
   - Output High-definition map data contents

3. **High-definition map**
   - Car navigation road data as road level
   - Lane level data (Only highway across the country)
   - Map update function

4. **Main application**
   - Active safety, Semi-autonomous driving (level 3), Car navigation

**<H/W outline>**

- 2 frequency GNSS receiver for automotive use
- CLAS augmentation signal composite chip
- 6 axis IMU (3 axis Gyro & 3 axis acceleration sensor)
- SD memory for High-definition map
- Input/output I/F : Ethernet/CAN/CAN-FD/USB

- CLAS : Centimeter Level Augmentation Service
- SBAS : Satellite-Based Augmentation Systems
- RTK : Real Time Kinematic
- PPP : Precise Point Positioning
- IMU : Inertial Measurement Unit
Positioning functions

Developing positioning unit to realize high-precision at any time and any place.

**Utilize augmentation signal of quasi-zenith**
Receive PPP positioning and augmentation signal obtained at the reference observation point, and calculate own position at centimeter class.

**Autonomous navigation technology**
Using 6-axis IMU, measure attitude angle and three-dimensional position. Calculate high-precision position even when the GNSS radio wave is interrupted.

**Complex positioning**
With complex positioning using GNSS positioning, autonomous navigation, and High-definition map, calculate high-precision own position with a high probability (50% to more than 95%).

**GNSS positioning & reliability evaluation technology**
Using GNSS Raw data, evaluate GNSS positioning error and perform high-precision position calculation.

**Measurement technology /High-definition map maintenance**
With Mobile Mapping System (MMS), make a database of road shape at each lane less than several tens centimeter error of accuracy.

**PPP : Precise Point Positioning**
**CLAS : Centimeter Level Augmentation Service**

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ADAS function

With High-definition map and positioning information, realize accuracy improvement for semi-autonomous driving and drive assistance function.

- **High-precision own position calculation**
  Positioning technology calculates high-precision own position

- **Road data creation as lane level**
  With High-definition map data, describe lane center line position as triaxial spatial coordinate dot sequence of X, Y & Z and describe road more accurately.

- **High-definition map contents**
  Not only high-precision road shape data, speed limit, stop line, train crossing stop line, signal and road sign position are stored.

- **ADAS-ECU (Semi-autonomous driving)**
  Using high-precision own position and road shape data, realize lane-keeping driving. Lane change is possible using the recommended lane position created form navigation route.

- **ADAS-ECU (Traffic sign Indication)**
  Using coordination position of High-definition map and sign position (3D), only required speed limit sign can be obtained by camera. (prevent false detection by camera)