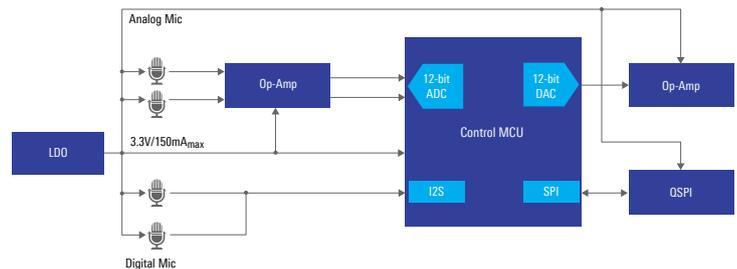# VOICE USER INTERFACE SOLUTION

## Easy-to-use Reference Design with RA Family

The easy-to-use Renesas hardware platform for Voice User Interface (VUI) solutions is based on the high-performance RA family of 32-bit MCUs and is used for all VUI partner-enabled solutions within the Renesas Ready Partner Network. Each kit demonstrates how easy it is to control your system with a simple voice command interface without extensive coding experience or in-house expertise.



The reference kits enable local voice recognition without a network connection to allow designers to quickly start building an enhanced VUI in minutes that recognizes custom voice commands to trigger corresponding operations.

## Hardware Features

- RA Arm® Cortex®-M23, M33, and M85 MCU
- Up to two digital and analog microphones, 6 additional MEMS DMIC board on VK-RA8M1 Mic-board
- External QSPI flash to store voice samples and library data
- Communication interfaces:
  - Pmod type 2A / 3A / 6A
  - USB type-C and micro-B
  - On board J-link Seggar debugger /programmer
- Stereo audio headphone jack
- Aux port

## Software Features

- Cyberon DSpotter
  - Provides DNN based pre-trained voice model
  - User creates command by text input
  - Support for Online & Offline test options
  - Analyze recognition score
  - Tune performance real-time
  - Real-time tool to observe input voice waveform
- Cyberon DSpotterNLU to deploy Natural Language Understanding model with VK-RA8M1
- Aizip Voice Speaker ID support
- Audio Front End
- Voice Anti-Spoofing application example

## Target Applications

- Edge application enabling endpoint voice user interface without network or cloud connections:
  - Home Automation
  - Consumer Electronics
  - Building Automation
  - City Infrastructure
  - Industrial Automation
  - Agriculture Transportation
  - Logistics
  - Healthcare

## Reference Kit



RA8M1 Voice User Reference Kit

RA6E1 Voice User Reference Kit

RA4E1 Voice User Reference Kit

RA2L1 Voice User Reference Kit

# VOICE USER INTERFACE SOLUTION

## Benefits

- Local voice trigger and command recognition
  - Endpoint capable, no need of network connection
- Robust noise reduction, high-accuracy performance, very small footprint
- Enables command customization, performance tuning, testing
  - Quick command customization / optimization by model adaptation with only a small amount of speech data
- Voice Activity Detection (VAD) and audio playback
  - Reduces power consumption, provides snooze mode, enables voice response function

- Voice Anti-Spoofing enables safety by distinguishing between real human and recorded voice
- Audio Front End enhances audio / noise resistance capabilities with noise cancellation, beamforming and direction of arrival
- Speaker ID enables safety and personalization with user identification
- Partner-enabled application examples and cloud GUI tool
  - Phoneme-based modeling for quick command customization without collecting speech data in advance and model adaption with small amount of speech data
  - Separation of recognition engine and command model, switching commands dynamically
  - NLU cloud GUI tool available for VK-RA8M1

## 44+ Languages Supported

**European Region**
UK English        Polish

German        Czech
French        Danish
Italian        Turkish
Spanish        Finnish
Portuguese        Norwegian
Russian        Swedish
Dutch        Greek
Slovak        Hungarian
Ukrain

**Asian Region**
Traditional Chinese
Simplified Chinese
(Chinese Accent English)
Cantonese
Korean        Hindi
Japanese        Vietnam
Thai        Bahasa

**American Region**
Northern American English
Brazilian Portuguese
Southern American Spanish

**Australian Region**
Australian English

## Ordering Information

| Part Number | Description |
|---|---|
| RTK0EG0005D00001BE | RA8M1 Voice reference kit with Natural Language Understanding and anti-spoofing |
| TW001-VUIA6E1POCZ | RA6E1 Voice reference kit with multi-language support and anti-spoofing |
| TW001-VUIA4E1POCZ | RA4E1 Voice reference kit with command recognition |
| TW001-VUIA2L1POCZ | RA2L1 Voice reference kit with low MHz consumption |

## Get more details and request a kit at: renesas.com/voice-recognition

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**renesas.com**