



**EVAS :**  
Electric Vehicle Alert System



On & Off Highway



Emergency



# EVAS Introduction

- Known as EVAS and AVAS in different markets
  - EVAS = Electric Vehicle Alert System
  - AVAS = Acoustic Vehicle Alert System
- An audio noise generator to warn pedestrians and cyclists when a nearby quiet electric vehicle is moving
- Designed to comply with UN Regulation 138 “Approval of Quiet Road Transport Vehicles with regard to their reduced audibility”
- Creates a sound when vehicle speed is typically between 0-20km/h
- Pitch and volume rise as speed increases
- Pitch and volume drop as speed decreases
- Connects to vehicle CAN bus for vehicle speed info



- UN regulation 138
- <https://treaties.un.org/doc/Publication/MTDSG/Volume%20I/Chapter%20XI/XI-B-16-138.en.pdf>
- applies to electrified vehicles of categories M and N1
- requires vehicle type approval i.e. the unit needs to be approved on each vehicle design
- must produce required sound pressure levels in two chosen bands (one band must be below 1.6kHz)
- at least one tone must vary by 0.8% per 1km/h
- must operate in forward and reverse modes
- designed with proximity in mind; max 75dB(A) at 2m and max 66dB(A) at 7.5m
- ESG device meets all requirements of Reg 138
- Already approved for production vehicles (Karma and Bluebird)



UNITED NATIONS

**Addendum 137: UN Regulation No. 138**

**Revision 1**

01 series of amendments– Date of entry into force: 10 October 2017

**Uniform provisions concerning the approval of Quiet Road Transport Vehicles with regard to their reduced audibility**

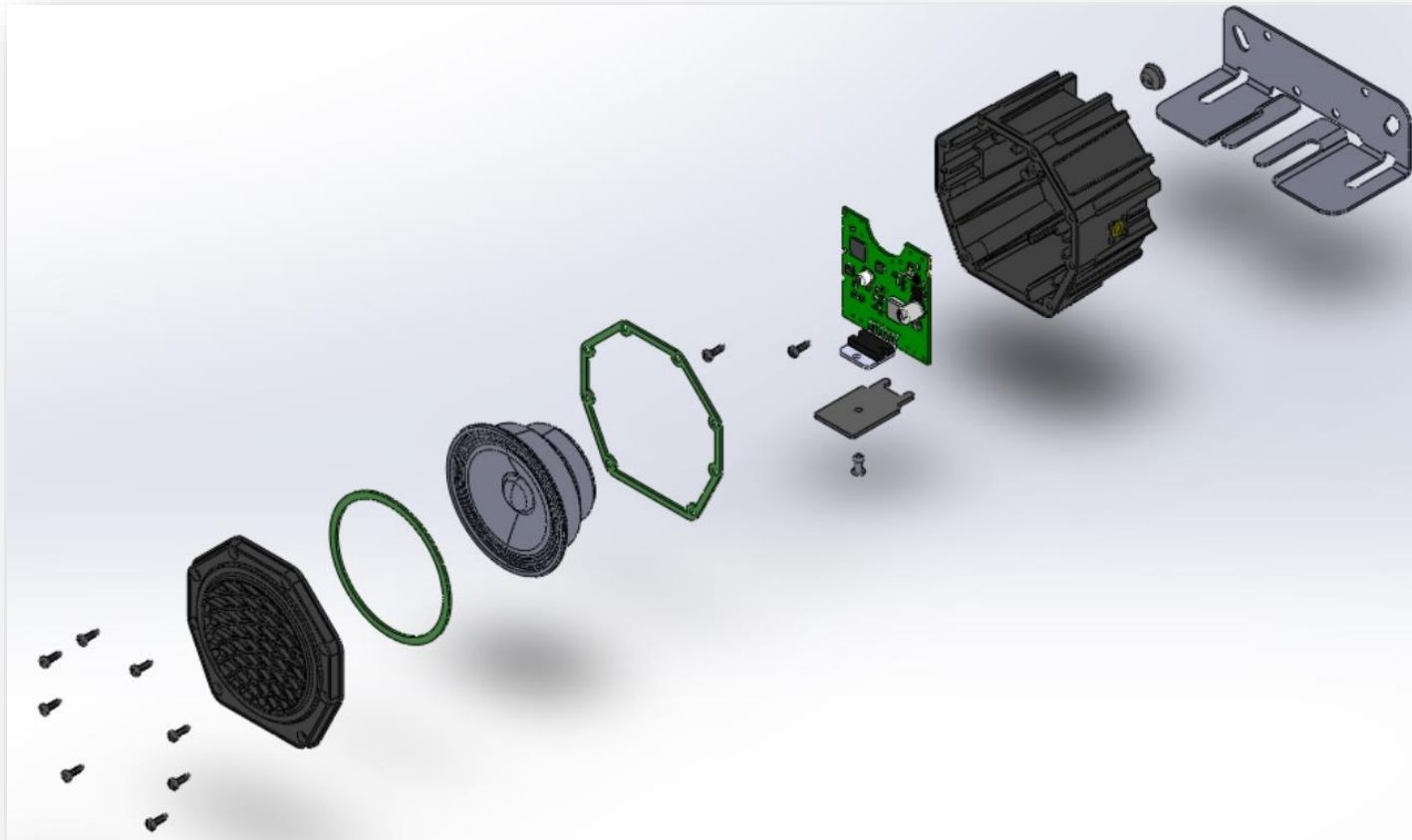
This document is meant purely as a documentation tool. The authentic and legal binding texts are: ECE/TRANS/WP.29/2016/26, ECE/TRANS/WP.29/2017/6, ECE/TRANS/WP.29/2017/7, as amended by paragraph 67. of the report (ECE/TRANS/WP.29/1129)



UNITED NATIONS

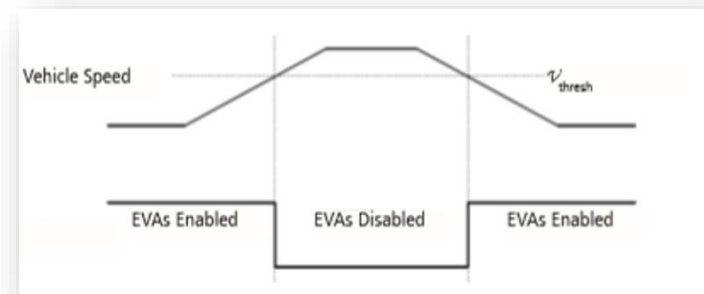
# Construction of ECCO device

- Manufactured to IATF/TS 16949 international automotive quality management standards
- IP69K+ environmental sealing (can be jet washed)
- Automotive grade EMI/EMC for total reliability in noisy electrical environments
- 12-24v DC and 12-48v DC versions to suit traditional and electric vehicle supplies
- Industry standard J1939 CAN bus interface



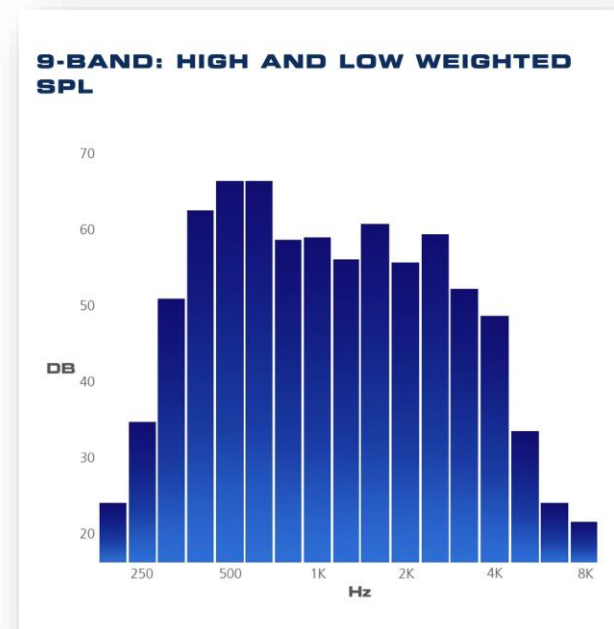
# Key functions

- Custom sound profiles
  - Currently available for burn-in during production
  - Uploadable via USB/CAN in 2020
- Smooth fade-in and fade-out at upper and lower thresholds of speed range
  - Avoids abrupt audio changes and stuttering on marginal speeds
- Master/slave configurations
  - Allows use as forward and reverse audio alerts
  - Easily expanded over vehicle CAN
- J1939 compatible interface
  - Common in bus & coach, car, and truck industry
  - Other protocols available on request



# Tuning for Reg 138 approval

- Reg138 approval by vehicle/EVAS combination
- Already certified on production vehicles i.e. Karma sports car, Bluebird bus
- Vehicle body panels, chassis material, and design cause resonance and attenuation:
  - Each EVAS needs “tuning” to meet the specific design of each vehicle type
  - Tuning is an iterative process, typically requiring 1-4 tuning sessions to achieve required result for certification
  - Tuning aims to equalise the spectral response of EVAS using external measurement microphones and signal-processing software
  - When acceptable tuning is achieved the parameters are “burnt” into the EVAS and given a unique part number for that vehicle design
  - Future orders for that part will be delivered pre-tuned



- Contact ESG EMEA representative for discussion of application:
  - Vehicle type
  - Stage of design
  - Forecast production dates and volumes
  - Sound requirements
  - CAN protocol
- Demonstration and loan units available
- Assistance with tuning and certification available