AWRL6844 Real-Time Demo:
CPD/LPD and SBR Test Results

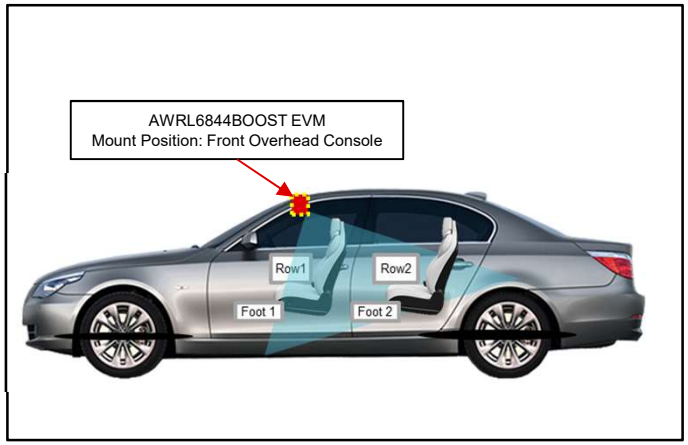
Low Power Radar - Body and Chassis

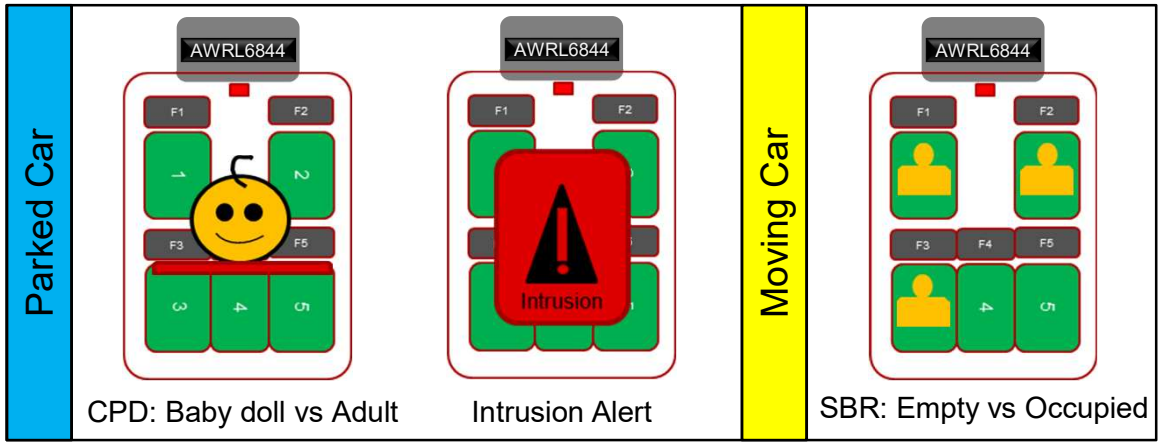
October, 2025

TI Radar | Trends & Offering in In-Cabin market

Market Trend	 **LPD and CPD** E-NCAP, Detection, Classification **OEM SOP 2021+**	 **LPD + Intrusion** Detection, Security OEM SOP **2024+**	 **CPD + Intrusion + SBR** Det, Security, Occupant Localization OEM SOP **2026+**	 **CPD + Intrusion + Monitoring** Det, Class, Security, Occupant Monitor OEM SOP **2029+**
Function	Detection, recognition of children left behind in car-seat or in vehicle footwells	+ Low power motion detection inside/around vehicle	*NCAP 2026* + Localization of occupants within vehicle	*NCAP 2029* + Recognition of occupant size/age and behavior
Key Features	Seat and Footwell Coverage Child vs Adult Classification	Motion Sensitivity / False Detection Low Power	Higher resolution and processing for Localization, Classification	Multi-modality for airbag suppression
TI Products	Gen1 60GHz Platform 4x3 Single Chip 4x3 Transceiver AoP	Gen2 60GHz Platform 3x2 Single Chip (AWRL6432)	Gen2+ 60GHz Platform 4x4 Single Chip **(AWRL6844)** 8x8 Single Chip (AWRL6888)	Gen2+ 60GHz Platform + AM6x / TDA4x Radar + Camera
TI Technology	45nm Gen1 Baseline TI Process UMC Manufacturing	Gen2 Low Power Architecture TI Process TI & UMC Manufacturing	Gen2+ Low Power Architecture TI Process TI & UMC Manufacturing	Gen2+ Low Power Architecture TI Process TI & UMC Manufacturing

AWRL6844 Real Time Demo Overview





Real time demo shows single AWRL6844 60GHz radar performance for 2-row vehicle :

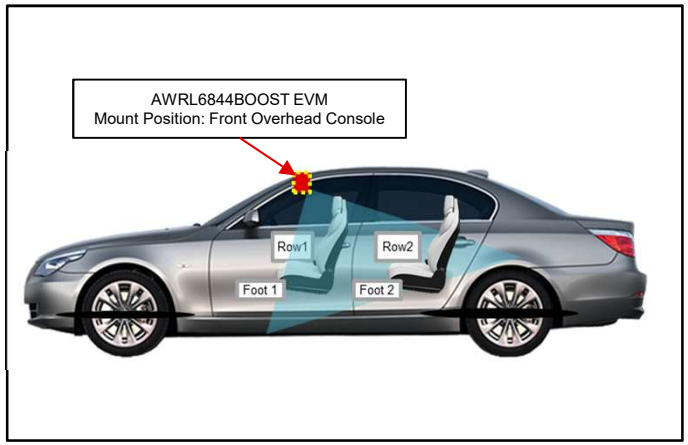
- Presence monitoring (LPD/CPD)
  - Classification of adult vs child
- Occupant detection /Seatbelt reminder
  - Human occupancy vs empty/non-human seats
- Low power intrusion detection

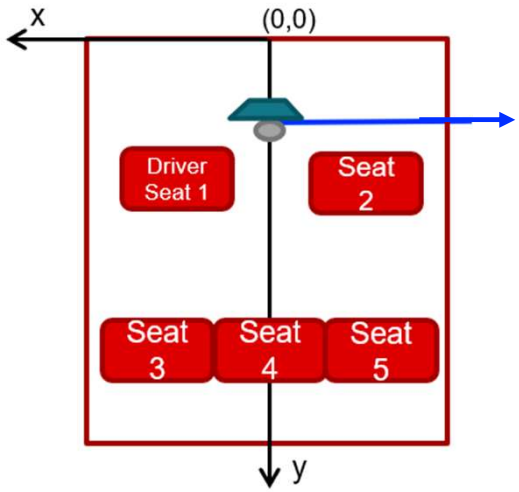
Following slides:

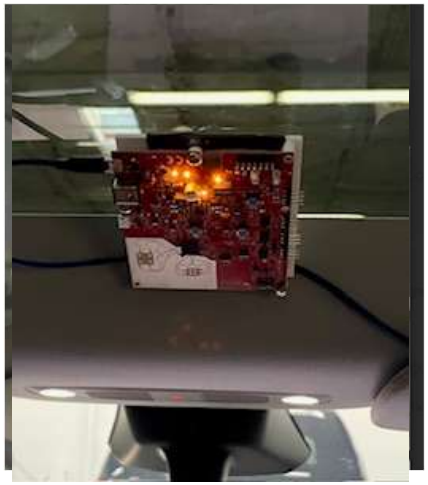
- Test setup details for CPD and SBR
- Test results and real time demo performance with overhead front sensor mounting

LPD/CPD/SBR Test Setup – Front Mounting

- Sensor is mounted near the front console with 180 degrees of rotation in the x-y plane and -120-degree rotation in the y-z plane from the upfront position.
- Seat naming convention is shown in the middle figure below
- Tests were done using a baby dummy from Ashton Drake for CPD/LPD
- SBR tests are done in a moving vehicle







CPD Test Results

SW version: 3.30.0

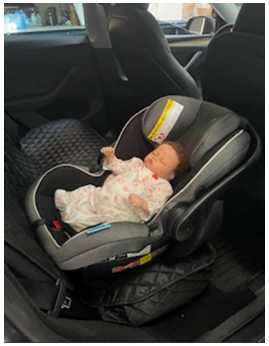
Release date:

Test Objectives

Achieve 2-row car coverage for LPD and CPD using single AWRL6844 sensor

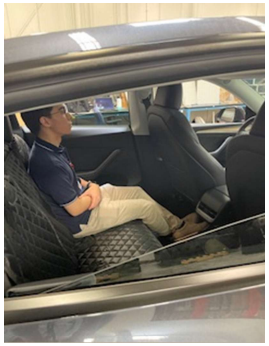
- LPD Test cases
  - LPD tests are currently targeted to identify living vs nonliving objects.
  - Tested for E-NCAP TEST AND ASSESSMENT PROTOCOL – CHILD PRESENCE DETECTION requirement in multiple seats and the footwell areas
  - Assessment of life occupancy is based on whole car detection
- CPD Test Cases
  - Determine if the child is alone or if there is an adult caregiver in the car
  - Localization and occupant classification into child vs adult

Pictures of Test Objects



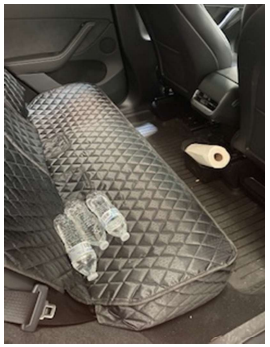
Baby-doll in rear facing

Baby-doll in footwell

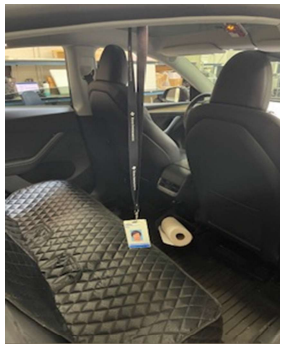


Adult

Fan powered on



3 Water bottles in a shaking car



Swing ID

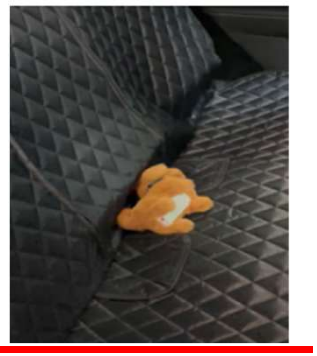
Test object with purchase link

- Fan
- Cat toy
- Barking Dog
- Swing toy
- Baby-doll

CatToy

Swing toy

Barking Dog



CPD/LPD Test Results

Trial	LPD Accuracy	Child vs Adult Accuracy	Number of Frames
Baby-doll rear-facing – seat 2	100%	100%	153
Baby-doll rear-facing – seat 3	100%	100%	153
Baby-doll rear-facing – seat 4	100%	100%	153
Baby-doll rear-facing – seat 5	100%	100%	153
Baby-doll in footwell – seat 1	100%	100%	153
Baby-doll in footwell – seat 2	100%	100%	153
Baby-doll in footwell – seat 3	100%	100%	153
Baby-doll in footwell – seat 4	100%	100%	153
Baby-doll in footwell – seat 5	100%	100%	153
Baby-doll lay on the seat –seat 2	100%	100%	153
Baby-doll lay on the seat –seat 3	100%	100%	153
Baby-doll lay on the seat –seat 4	100%	100%	153
Baby-doll lay on the seat –seat 5	100%	100%	153
Baby-doll forward-facing – seat 3	100%	100%	153
Baby-doll forward-facing – seat 4	100%	100%	153
Baby-doll forward-facing – seat 5	100%	100%	153

CPD/LPD Test Results (continue)

Trial	LPD Accuracy	Child vs Adult Accuracy	Number of Frames
Adult seating – seat 1	100%	100%	306
Adult seating – seat 2	100%	100%	306
Adult seating – seat 3	100%	100%	306
Adult seating – seat 4	100%	100%	306
Adult seating – seat 5	100%	100%	306
Adult lie down in the 2nd row, occupied seat 3/4/5*	100%	80%	306
3 Water Bottle in shaking car – seat 1	100%	N/A	153
3 Water Bottle in shaking car – seat 2	100%	N/A	153
3 Water Bottle in shaking car – seat 3	100%	N/A	153
3 Water Bottle in shaking car – seat 4	100%	N/A	153
3 Water Bottle in shaking car – seat 5	100%	N/A	153
3 Water Bottle in shaking car – different footwell	100%	N/A	768
Swing ID above seat 3	100%	N/A	153
Swing ID above seat 5	100%	N/A	153
Cat-Toy in different seat	99%	N/A	765
Fan in different seat	100%	N/A	765

*ML model not trained for this scenario making the results slightly worse

CPD/LPD Test Results (continue)

Trial	LPD Accuracy	Child vs Adult Accuracy	Number of Frames
Move and barking dog toy on different seat	32%	N/A	765
Move and barking dog toy on different footwell	63%	N/A	459
Bigger Swing Toy hang above seat 3	83%	N/A	153
Bigger Swing Toy hang above seat 5	70%	N/A	153
Car window rolling up	0%	N/A	153

- The above objects are not included in the model training.
- Performance improvement may be seen with additional data capture and classifier model re-training

Improvement since RTB 3.00.0 release

- In the previous version of this demo, the classifier was based on point cloud position only
- In this version
  - CFAR parameter is re-tuned
  - SNR is included in the features calculation.
  - The macro-Doppler feature is calculated to identify the moving pattern.
  - CPD ML model is retrained
- Performance improvement
  - LPD performance is improved significantly (The shaking water bottles case was failing in version **3.10.0** of this demo)
  - The CPD performance is more robust.
  - Performance tuning is easier.

Seat Belt Reminder Test Results

SW version: 3.30.0.0

Release date:

Test Objectives

Achieve 2-row car coverage for occupancy detection/SBR using single AWRL6844 sensor

- Accurately detect human occupancy vs empty seats
- Localize the occupants
- Minimize false detection due to noise factors like water bottles and other non-living objects.

SBR Localization Test Results – WITH 180 DEGREE ROTATION

Test Condition:

- Driver seats are always occupied
- All tests were done while the car was moving
- Adult occupants only

The Acura RDX was used for testing

Ground Truth Occupancy					Accuracy (%)					
Seat 1	Seat 2	Seat 3	Seat 4	Seat 5	Seat 1	Seat2	Seat 3	Seat 4	Seat 5	Num Frames
✓	computer	Empty	24 waterPack	Empty	100	100	100	100	100	899
✓	✓	Empty	Empty	✓	100	100	99.4	98.5	100	1893
✓	✓	Empty	✓	Empty	100	100	98.2	95	94.5	923
✓	✓	Empty	✓	✓	100	100	100	100	100	873
✓	✓	✓	✓	✓	100	100	83.2	100	100	3754
✓	✓	✓	Empty	Empty	100	100	100	100	96.7	888
✓	✓	✓	Empty	✓	100	100	91.3	93.5	99.8	812
✓	✓	✓	✓	Empty	100	100	95.2	97.9	100	872
✓	✓	✓	✓	24 waterPack	100	100	100	96.3	93.4	843
✓	✓	✓	24 waterPack	✓	100	100	98.7	100	100	903
✓	✓	24 waterPack	Empty	✓	100	100	100	93.1	100	865
✓	✓	24 waterPack	✓	✓	100	100	100	100	99.8	885

Observed less performance in seat 3 due to the Asymmetric Antenna performance

Summary

- AWRL6844 SBR demo can meet the SBR requirement for 2-row coverage
- SBR is robust across different cars and driving scenarios with minor exceptions
- A better performance is expected from a more balanced antenna design.