

ITU-T e-Call AEDD & ADAS Combined Device

Daewon Kim / Director of VC Dept. / Thinkware
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Company Introduction

THINKWARE

Founded



26 Mar. 1997
(Listed on 19 May,
2006 / 084730. KQ)

Capital



US\$ 4.8million
(yr. 2020)

Employees



400
(2021, up to date)

Revenue



US\$182million
(yr. 2020)

- / No. 1 Brand Power Ranked in KOREA.
- / 55% Market Share in KOREA
- / 1,800 On & Offline Stores
- / 63 Original Technology for AR/ADAS
- / 1,500 Intellectual Property Rights
- / 680 Patents



[Head office in Pangyo, Korea]

Subsidiary Companies

OVERSEAS

Thinkware Automotive (China)

Business development, customer support, operations for automotive products.

Thinkware Systems USA Inc.

/ Mondo System Technology Canada Inc.

Business development, customer support and operations for dash cam

Thinkware Japan Inc.

DOMESTIC

Inavi Systems Co., Ltd.

Live Mapping, Big Data Processing, Navigation Platform

Thinkware Mobile Co., Ltd.

Mobile-based services and tablet PC business

Beagle Co., Ltd.

Development and service provision of outdoor sports apps

Own Factory

CHUNG JU, Korea

Person: 300

ISO9001, KC, K Mark

Product

: SAT NAV, DASH CAM, Tablet PC

Capacity

: 9.3K/D, 200K/M, 2M/Y

Area : 29,760m²



Global Dashcam Reference

DIO



Japan



- F800Pro, U1000
- High End
- Approved by Volvo JPN
- Dealer Installation Option
- Optimized Re-RnD
- In Delivery

ACC




USA



- F800Pro, F200
- High + Middle End
- Approved by GM & Ford USA
- Approved ACC
- Official Website Listed
- In Delivery

ACC



Singapore



- F800Pro, F770

ODM



DENSO

Japan

- Required Industrial level of Quality and parts
- Supply Logistics Fleet
- Harsh Environment
- Focus on NOT PRICE, QUALITY
- In Delivery
- Under other project too

DIO



Japan



- F800Pro, F100
- High End + Low End
- Approved by VW JPN
- Dealer Installation Option
- Optimized Re-RnD
- In Delivery

DIO



RENAULT

Morocco



- Q800Pro, F200, F70
- High ~ Low End
- Approved RN Morocco

ODM



KOREA



- LCD Dash Cam
- Approved by Mopar KOREA
- In Delivery + Being widened

ODM





GLOBAL



- Global Supply
- Co-work with Japan HQ directly
- In Delivery + Being widened
- Under other future project too

* OEM; Original Equipment Manufacturing
 * ODM; Under customer brand name
 * ACC; Approved Accessories
 * DIO; Approved as Dealer Installation Option

 **HYUNDAI**

 **KIA MOTORS**

OEM HQ

- Registered 1st Tier Supplier, JUNE 2020
- PASS Quality Approval Procedure
- Through IATF16949

No.1 Brand with Customer Satisfaction Service in Korea



The Largest
Nationwide
Network Service
120ea nationwide Service
Center & Call Center



Various Typed Service

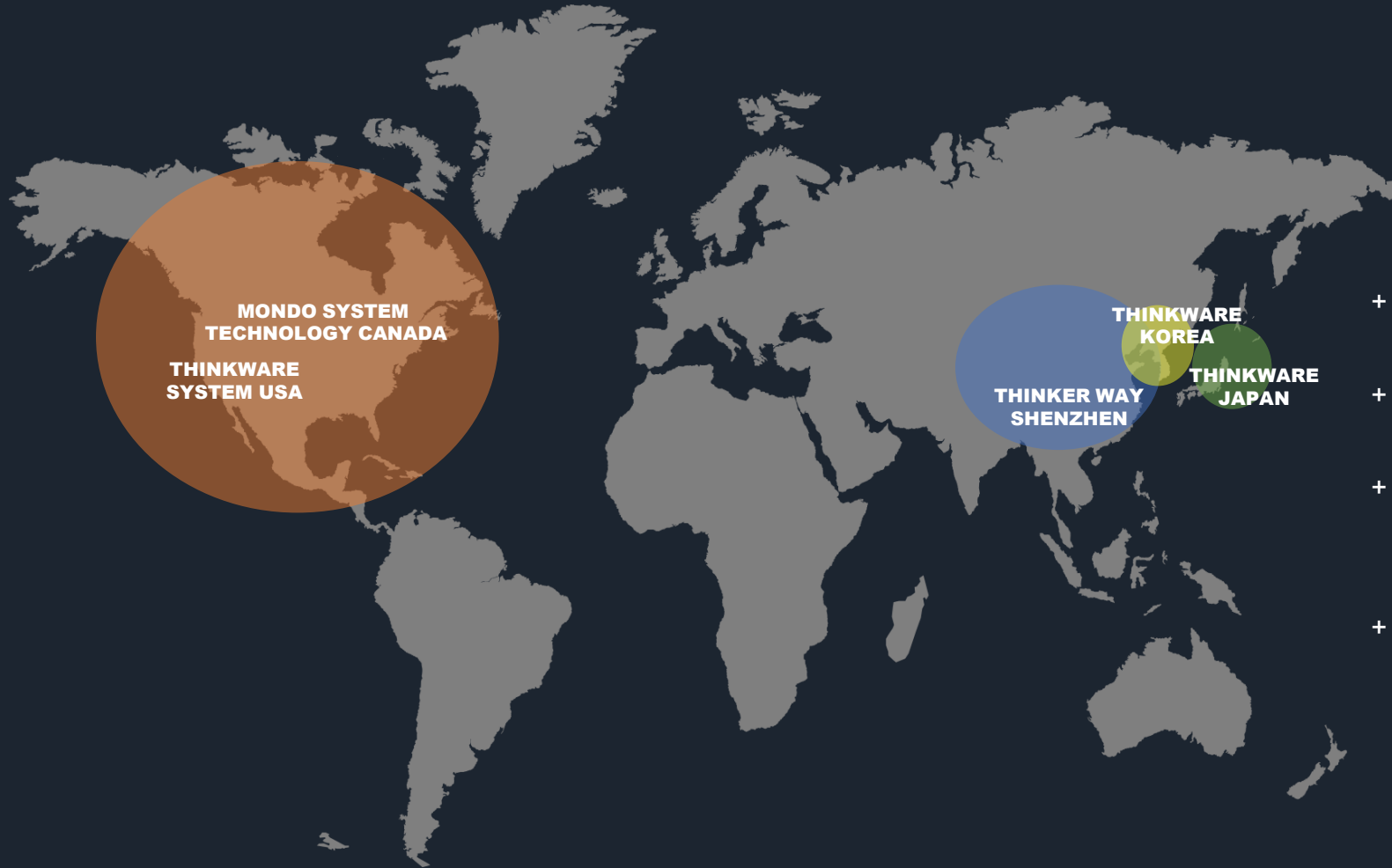
Direct Service Center, Parcel Service Center, Upgrade Agencies, Service Agencies



Thinkware Premium Stores(10)

Product Experience, Counseling, Purchase, Installation & A/S, 『One Stop Service』

THINKWARE Global Branch



MONDO SYSTEM
TECHNOLOGY CANADA
THINKWARE
SYSTEM USA

THINKER WAY
SHENZHEN

THINKWARE
KOREA

THINKWARE
JAPAN

- + Thinkware Systems Corporation (Headquarter)
- + Shenzhen Thinker Way Science Technology Co., Ltd.
- + Thinkware Systems USA Inc.
/ Mondo System Technology Canada Inc.
- + Thinkware Japan Co., Ltd.

Global Sales Channels (B2B and B2C)



as of 2020
Global Business

We have a presence in 17 main countries across the world, including North America and Europe, and established around 2,700 overseas online and offline network channels. Our professional & huge network provides the best follow-up service worldwide.

ZDNet



“All in all, the U1000 [dash cam] is a superb dashcam for people who use their cars a lot”

Forbes

RECOMMENDED

“I’d recommend the Thinkware M1 system for recording your adventures - or shenanigans.”

c|net



“...[the F800PRO] does everything I would ever need from a dash cam and more. I loved this camera.”

T3

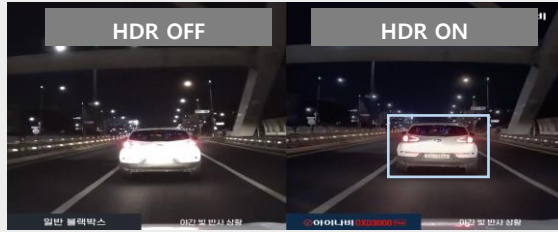


“REASONS TO BUY
+2K video recording
+Great build quality
+Packed full of features”



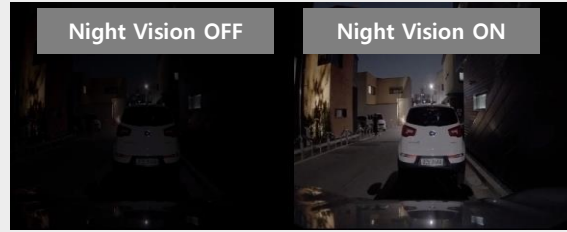
reddot award 2019 winner

Dash Cam Technology



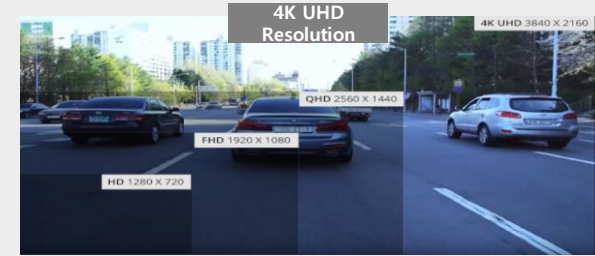
True HDR

2F-DOL HDR technology to improve video quality in worst case light condition



Super Night Vision

Technology to maximize night time visibility and to enable license plate recognition in dark parking environments



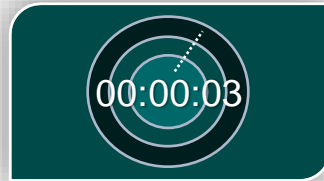
4K 2-Channel High Resolution

4K/QHD resolution camera to provide highest video quality



Low Power Parking

Lower power (within 7.8mA) consumption waked by impact in park mode



Quick Booting

Fast booting and recording within 3 seconds after engine start



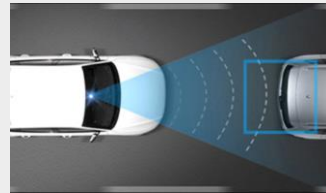
TFM 2.0

FAT32 based Format Free 2.0 to provide stable video file management



Radar Detect System

24Hz Radar monitoring system for low power parking mode



Extreme ADAS

LDWS, FCWS, FSVA, BCWS, TLDS



Video Image Dewarp

Image DSP technology to correct image distortion by wide angle fish eye lens



INAVI Connected

Notify accident event in parking mode
Transmit remote capture image
View driving path history



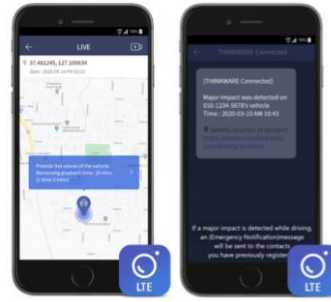
Dash Cam CONNECTED Services

Main Features

REMOTE LIVE VIEW

Remotely view your vehicle in both Continuous Recording Mode and Parking Mode. Click on Live View button on your smartphone app to view a real-time video of your vehicle.

- *Remote Live View can be requested up to 30 minutes a month on the standard data plan.
- **Remote Live View is unavailable in Energy Saving Mode when your vehicle is parked.



SEND EMERGENCY MESSAGE

In case of emergency situations, register the contact details of your family, friend or associate. A SOS message will be transmitted to your emergency contact in the event of a strong impact crash or when the driver presses the SOS button on the dash cam to urgently request for help.

Strong impact crash message includes a 20 seconds video (10 seconds before and after the incident) and location of the crash. SOS recording message includes a 10 seconds video (5 seconds before and after the incident) and location of the crash.

REAL-TIME PARKING IMPACT VIDEO

In Parking Mode, you can immediately detect an impact with the dash cam. Receive impact notification and play video of the impact on your smartphone.

Upon user consent, a 20 seconds Full-HD video (10 seconds before and after the incident) is uploaded on the server.

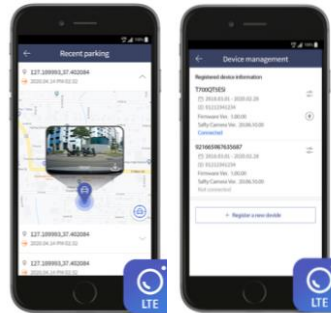


VEHICLE STATUS AND DRIVING HISTORY

Monitor your vehicle's status to check whether your vehicle is parked or operating on the road. Check your vehicle battery voltage and remotely turn off the dash cam when the battery voltage is low. View your driving history including data such as date, time, distance, route and driving behavior.

CAPTURED IMAGE OF MOST RECENT PARKING

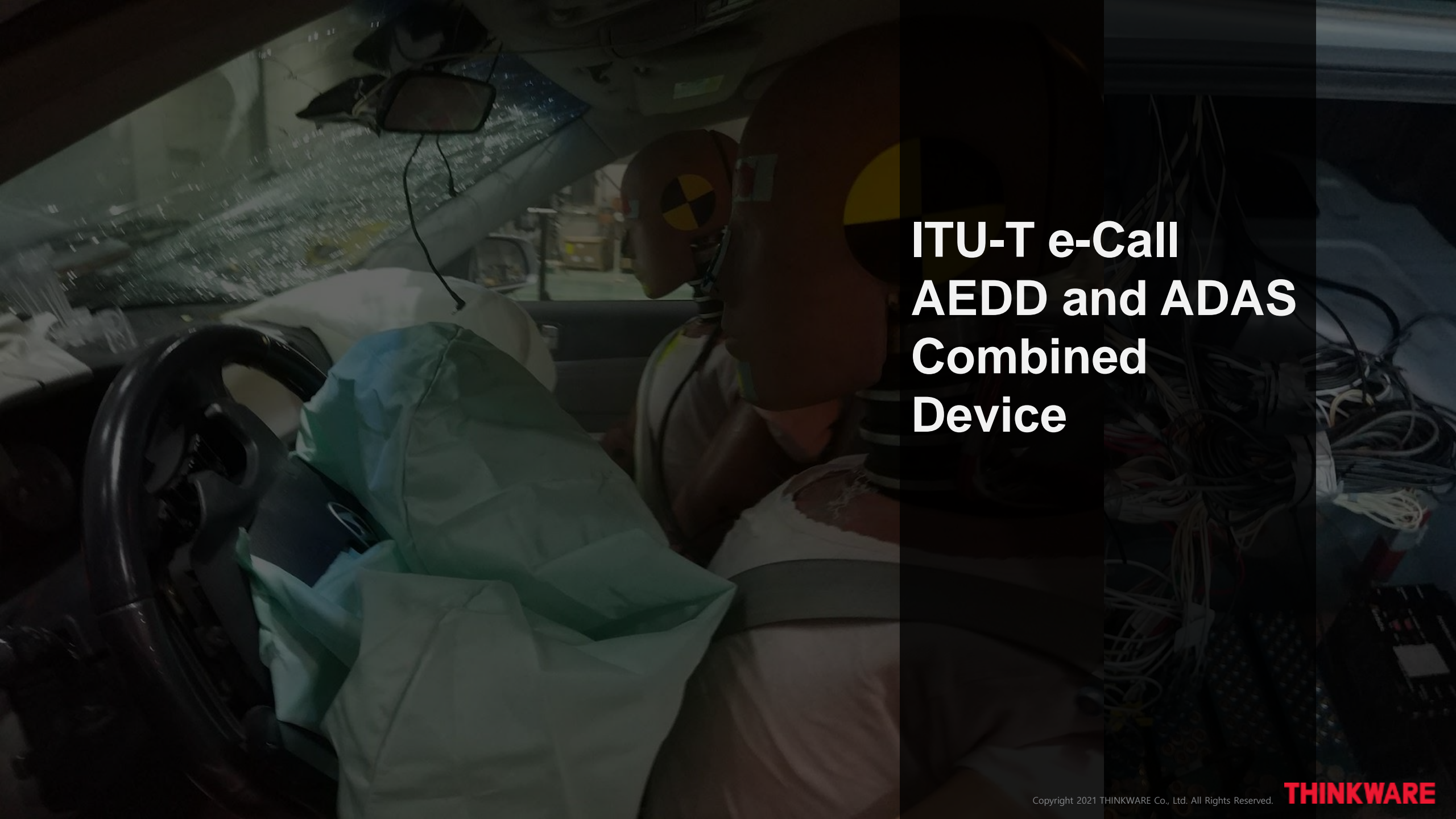
In Parking Mode, check the location of your vehicle and its surroundings. View a Full-HD image of your front camera including the location of your parked vehicle.



REMOTE FIRMWARE DATA UPDATE

Update your dash cam remotely to enhance your dash cam's features, maintain optimal operation and increase stability. Conveniently upgrade your firmware and speed cam data to the latest version on your smartphone. Firmware download can take up to several minutes and you will receive a push notification once the download is complete. Check the firmware download and reboot the dash cam to start firmware update.

Possible Proprietary e-Call Limitations :
High operation cost
Low market penetration rate
Delayed rescue agency deploy



ITU-T e-Call AEDD and ADAS Combined Device

Product Specification

CPU	Samsung Exynoss 5 Octa (5422), 1.9GHz
DDR Memory	LPDDR3 2GB
IMU	Bosch Automotive 9-Axis IMU
Image Sensor	Sony Starvis HD
LCD	2.7inch TN TFT (320 x 240) Touch panel
Speaker	1.5W 8Ω
Interface (customizable)	Car Signals(CAN and Analog Signals), GPS Antenna, USB, UART, 5v DC out, etc.
Power	From 12V or 24V Vehicle Battery
Operating temp.	- 20 ~ + 70 °C
Storage Temp.	- 30 ~ + 85 °C

Main Feature

Detail

LDW	Lane Departure Warning
FCW	Forward Collision Warning
PCW	Pedestrian Collision Warning
HMW	Headway Monitoring and Warning
FVDW	Forward Vehicle Departure Warning
Night Vision	Ultra Low-Light Sensitivity
e-Call	ITU-T e-Call AEDD
Dash Cam	HD Recording While Driving



Indicator



Main Controller



Vision Sensor



Ultra Low-Light Sensitivity

<https://photos.app.goo.gl/9QJtxwHcbbdZNJ3L7>

Korean NCAP FCW Test Passed



TEST REPORT

303, Pungse-ro, Pungse-myeon, Dongnam-gu,
Cheonan-si, Chungcheongnam-do, Korea
Tel : +82-41-559-3342 <http://www.katech.re.kr/>

Report No. : KTS181709-2

Page 1 of 31 Pages

Client

Company : Thinkware	Date of Receipt : Jun. 14. 2018
Name : Lee Heung-Bok	Start Date of Test : Jun. 18. 2018
Address : 9nd FL., Samhwan Hipex A dong, 679, Sampyeong-dong, Bundang-gu, Seongnam-si, Gyeonggi-do	End Date of Test : Jun. 21. 2018
Test Sample : INAVI ADAS DS-1	Date of Issue : Jul. 02. 2018
Test Method Used : FCWS Performance Specification	Use of Report : SUBMISSION
Test Environment : KATECH PG (26.5±2) °C	

Test Results

Items	Result	Remark
FCWS Performance Specification	Refer to Contents	FCWS Performance Spec.


Remark : 1. The test results on this test report are only limited to the sample(s) and sample name(s) provided by the customer and Our research institute does not guarantee the quality of all products of the customer.
2. This test report shall not be used for a public relations, an advertisement and a lawsuit without a prior consent of our research institute. And it is prohibited from using any other purposes outside the scope of its defined usage.
3. You can confirm the authenticity of the test report online(<http://kts.katech.re.kr/>) or QR Code.

Affirmation	Tested by	Technical Manager
	Name : CHO HA NA Tel : 041-559-3256 e-mail : hncho@katech.re.kr	Name : Jeon Kwang Ki Tel : 041-559-3113 e-mail : kkjeon@katech.re.kr

Subject Vehicle(SV) Speed	Target Vehicle(TV) Speed		Alarm or Not	TTC Criteria	Test Times (max)	Note
	Stopped State	Stopped				
72km/h	Stopped State	Stopped	Y	(2.3~4.0) s	7 times	
	Deceleration State	Decelerate at 0.3 g	Y	(2.6~4.0) s	7 times	
	Slower State	32 km/h	Y	(2.2~4.0) s	7 times	
	False Positive Test (Two Stopped TV on the right and left lane)		N	-	7 times	
40km/h	Stopped State	Stopped	Y	(1.6~3.0) s	7 times	



Korean NCAP LDW Test Passed



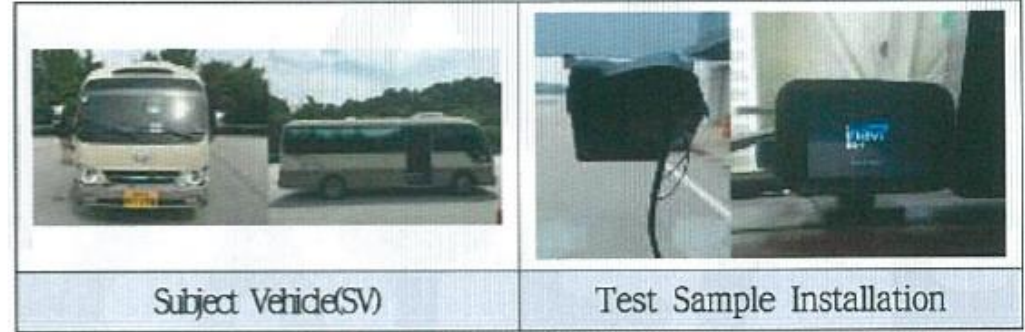
TEST REPORT

303, Pungse-ro, Pungse-myeon, Dongnam-gu,
Cheonan-si, Chungcheongnam-do, Korea
Tel : +82-41-559-3342 <http://www.katech.re.kr/>

Report No. : KTS181708-2 Page 1 of 14 Pages

Client



Company : Thinkware	Date of Receipt : Jun. 14. 2018
Name : Lee Heung-Bok	Start Date of Test : Jun. 22. 2018
Address : 9nd FL., Samhwan Hipex A dong, 679, Sampyeong-dong, Bundang-gu, Seongnam-si, Gyeonggi-do	End Date of Test : Jun. 25. 2018
Test Sample : INAVI ADAS DS-1	Date of Issue : Jul. 19. 2018
Test Method Used : Specified in the body	Use of Report : CONFIRM.
Test Environment : Specified in the body	



<Test Equipment Lay-out>

Test Results		
Items	Result	Remark
1) Lane Departure Warning Test in Curve	5 page	Refer to 4 page
2) Warning Signal Visualization	6 page	Refer to 4 page
3) Lane Departure Warning Test in Straight Road	7 page	Refer to 4 page
4) Minimum Operation Velocity	8 page	Refer to 4 page
5) Malfunction Detection Test	9 page	Refer to 4 page

Remark : 1. The test results on this test report are only limited to the sample(s) and sample name(s) provided by the customer and Our research institute does not guarantee the quality of all products of the customer.
 2. This test report shall not be used for a public relations, an advertisement and a lawsuit without a prior consent of our research institute. And it is prohibited from using any other purposes outside the scope of its defined usage.
 3. You can confirm the authenticity of the test report online(<http://kts.katech.re.kr/>) or QR Code.

Affirmation	<p>Tested by</p> <p>Name : LEE SEUNG MIN </p> <p>Tel : 041-559-5913</p> <p>e-mail : smlee@katech.re.kr</p>	<p>Technical Manager</p> <p>Name : Hwang yon hyoung </p> <p>Tel : 041-559-3101</p> <p>e-mail : yhhwang@katech.re.kr</p>
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Environmental and Electrical Specifications Test Passed

1. ESD
2. Voltage Fluctuation Test
3. High Voltage Test
4. Power Line Withstand Voltage Test
5. Reverse Battery
6. EMI
7. EMS-BCI
8. Vibration Test
9. High Temp./ Low Temp. Operation Limit Test
10. Drop Test
11. Light Fastness Test

서명 No.135135541841

시험 성적서

(주)케이씨티엘 경기도 평택시 신승면 평안로 600-18516 Tel : 031-296-0801 Fax : 031-296-1154 www.kctel.co.kr	영적서번호: KR19-HAP0065
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1. 신청자
 - 기 관 명 : 임프웨어 유
 - 주 소 : 경기도 성남시 분당구 관교역로 240 (신광동, 삼원하이텍5A509동)
 - 계약일자 : 2018년 04월 02일
2. 시험성적서의 용도 : 제품검
3. 제품명 / 모델명 : ADAS 전용단말기 / 하이네어 ADAS DS-1
4. 제조사 / 제조국 : 임프웨어 유 / 한국
5. 시험기간 : 2018년 04월 15일 ~ 2018년 04월 15일
6. 시험장비 : 고저서 테스트기
<자문이탈은교양자 규약 > 준수금 한우체고 지원
7. 시험결과 : 합격 불합격
8. Test Plan 승인번호 : -
9. 계약단계 : -

시 출 원 임 권 : 권 태 권	기 술 적 일 자 성 명 : 변 수 일
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2018년 05월 01일

(주)케이씨티엘 대표이사 (인)

본 성적서의 유효기간은 상기 신청자로부터 제품명, 시험종류명, 계약번호, (주)케이씨티엘로 한정되며, 다른 사항에 대한 내용은 본 성적서의 관부 통부를 참조하십시오.

KCTEL (135) 60021 KP18-01167

서명 No.10-086909093

시험 성적서

(주)케이씨티엘 경기도 평택시 신승면 평안로 600-18516 Tel : 031-296-0801 Fax : 031-296-1154 www.kctel.co.kr	영적서번호: KR18-XP0222
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1. 신청자
 - 기 관 명 : 임프웨어 유
 - 주 소 : 경기도 성남시 분당구 관교역로 240 (신광동, 삼원하이텍5A509동)
 - 계약일자 : 2018년 04월 02일
2. 시험성적서의 용도 : 품질평가용
3. 제품명 / 모델명 : ADAS 전용단말기 / 하이네어 ADAS DS-1
4. 제조사 / 제조국 : 임프웨어 유 / 한국
5. 시험기간 : 2018년 04월 19일 ~ 2018년 04월 24일
6. 시험방법 : 신청자 제시규격
7. 시험결과 : 불합 시험성적서 참조

시 출 원 성 명 : 김 민 중	기 술 적 일 자 성 명 : 최 동 형
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2018년 05월 11일

(주)케이씨티엘 대표이사 (인)

본 성적서의 유효기간은 상기 신청자로부터 제품명, 시험종류명, 계약번호, (주)케이씨티엘로 한정되며, 다른 사항에 대한 내용은 본 성적서의 관부 통부를 참조하십시오.

KCTEL (135) 60021 KP18-01167

서명 No.10-086909093

시험 성적서

(주)케이씨티엘 경기도 평택시 신승면 평안로 600-18516 Tel : 031-296-0801 Fax : 031-296-1154 www.kctel.co.kr	영적서번호: KR18-047694_M1
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1. 신청서 번호 : KR18-047694_M1
2. 용 목 지
 - 용 목 명 : 임프웨어(주)
 - 주 소 : 경기도 성남시 분당구 관교역로 240(신광동, 삼원하이텍5A509동)
3. 시험기간 : 2018년 04월 18일 ~ 2018년 05월 11일
4. 시험성적서의 용도 : 제품검
5. 시 료 명 : ADAS 전용단말기 / 하이네어 ADAS DS-1
6. 시험방법 : -
7. 시험결과 : (1) KS R 0021:2014 에 준함

2018년 05월 11일

한국건설생활환경시험연구원

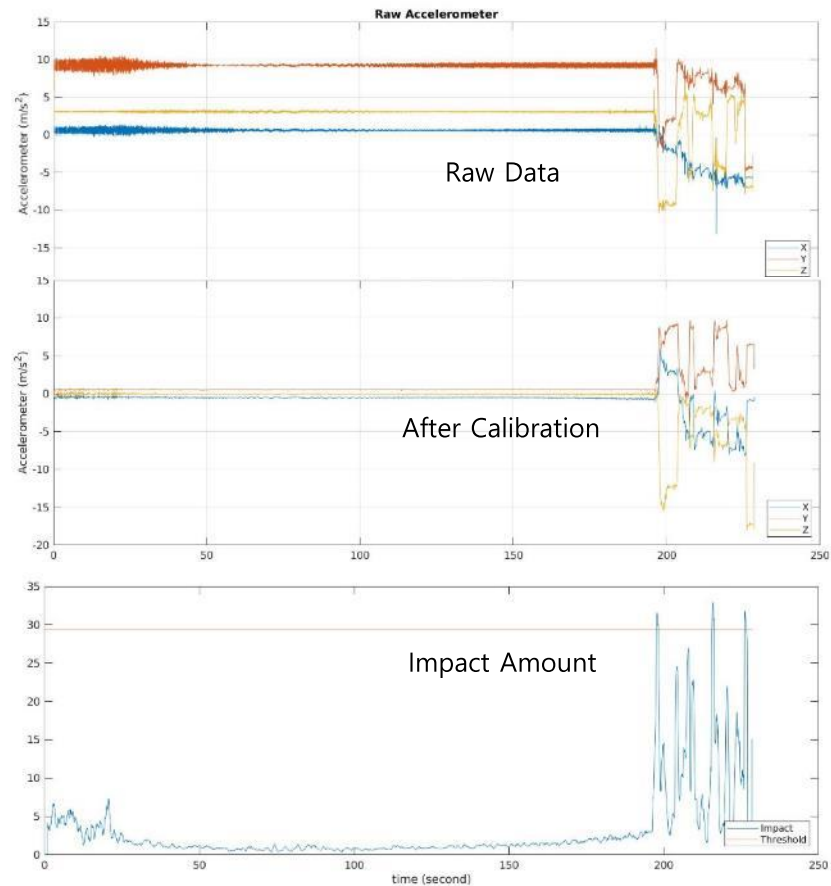
건설시험연구원 : 09503 서울특별시 관악구 가산디지털로 100 (가산동) 02-218-2500
 본공무원 : 고분자시험3차원시험 (02)218-2599

Accident Detection and Analysis

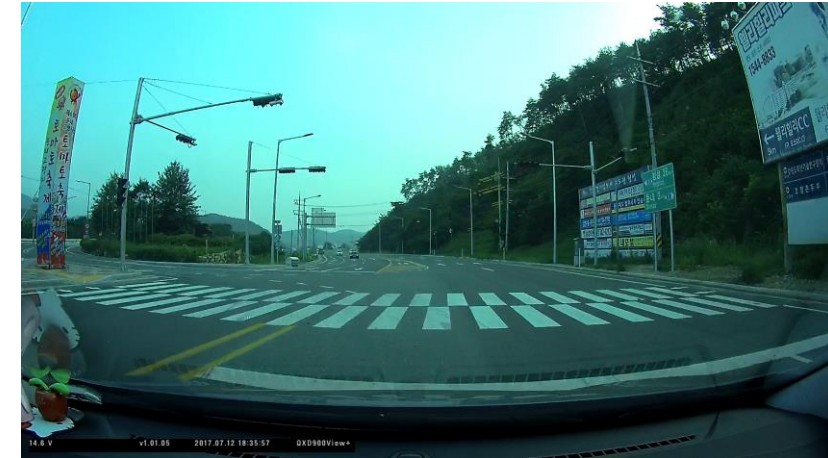
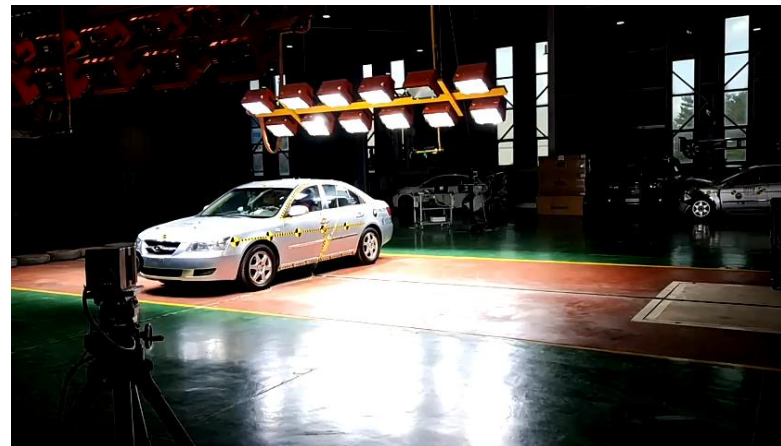
- Analyzed over 2,200 real car accident data and several e-Call crash test data.
- Advanced IMU algorithm can estimate impact amount and identify crash type

* IMU sensor calibration & impact amount estimation example

e-Call Crash Test Data



e-Call Crash Test Video

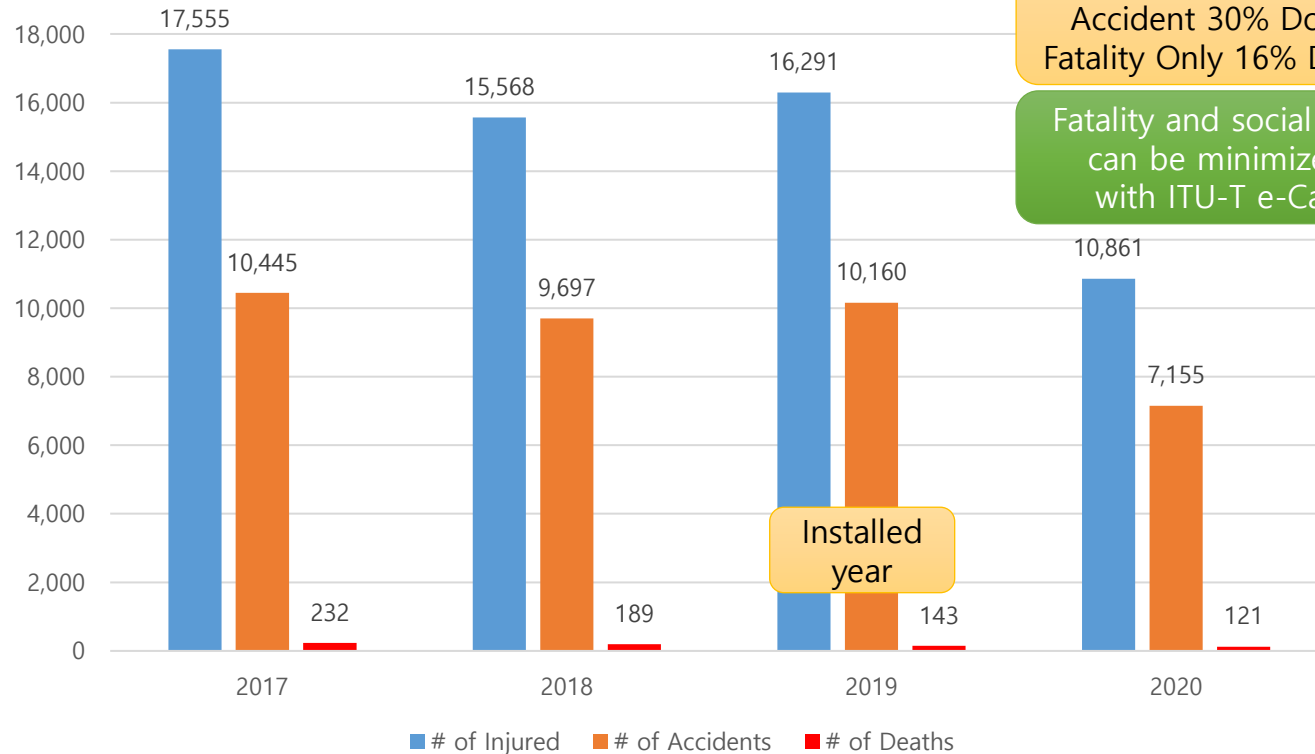


Real Accident Video

Market-Proven Product & Effectiveness

- Installed about 20,000 units in 2019 Korea (without e-Call)
- ADAS was made mandatory in all buses longer than 9m and heavy trucks over 20 tons

Bus Traffic Accident in Korea



1) Traffic accident analysis system, Korea The Road Traffic Authority,
http://taas.koroad.or.kr/sta/acs/exs/typical.do?menuId=WEB_KMP_OVT_UAS_TAT

THINKWARE

아이나비

사고를 미리 예방하는
첨단 운전자 지원 시스템

아이나비 ADAS OS-1

국토교통부
인증통과

정부보조금
지원제품

[차로이탈경고] [전방추돌경고] [안전거리경고] [보행자충돌경고] [앞차출발알림]

12년 연속 브랜드 파워 1위 | 아이나비의 믿을 수 있는 A/S

Thinkware is looking forward to wide adoption ITU-T e-Call in global market.

- ✓ **Turn-Key solution provider**
- ✓ **e-Call & ADAS combined pilot project partner**
- ✓ **Provider of e-Call HW(PBA) and SW**
- ✓ **Extend & Customize e-Call & ADAS product**

**If you need any further info,
please contact me by email.**

Business Opportunities

Thank you