Artificial Intelligence

Edge Computer

TRAVIS User's Manual

APPLICATION

1. Surveillance
2. Law enforcement
3. Hospitality
4. Logistics
5. Retail
6. Agriculture
7. Transportation
8. Smart city
9. Financial / Banking
10. Healthcare

Title	WiBASE TRAVIS User Manual
Document Version	Ver. 0.60
OS Version	Linux Ubuntu 16.04
BSP Version	0.8.5V & Above
Jetpack Version	3.2.1
L4T Version	R28.2.1
TRAVIS HW	A4 @ CRB

WiBASE
Industrial Solutions Inc.

Table of Contents

1 Preface

2 Revision History

Revision	Date	Changes
0.1	2018/5/25	Initial Release for DVT sample
0.2	2018/7/10	Release for L4T 28.2.1 Update with DVT sample
0.3	2018/9/04	Update HW version to A3
0.41	2018/11/14	Grace Reviewed -Remove wording of DVT samples - Add Mechanical Dimensions section -Remove precocious for DVT samples -Highlight items needed to be reviewed by TM & SWPM -Contents of Packing List and Model list to be updated afterwards
0.42		Glavin & Howard modified SW & HW related content
0.43	2018/11/22	Removed chapter of Remove Power
0.44	2018/12/05	Add TRAVIS S photo & TRAVIS V photo needed to be updated
0.45	2018/12/10	Modify the spec for adaptor
0.46	2018/12/11	Update TRAVIS V Photos Remove packing list.
0.50	2019/01/21	Add ordering code Modify Camera lens spec Add display OP spec and spec note Add ordering code info. Modify the wording & layouts. Add accessory list.
0.51	2019/01/30	Minor Modification in formatting @ spec portion—aligned with spec v1.02
0.52	2019/01/31	Remove the option of 256G SSD for better stock management.
0.60	2019/03/14	Revise Travis-S operating temperature spec to -20C to 50C Aligned with spec v1.1

3 Introduction

We create an energy-efficient AI supercomputer, Jetson TX2, for such intelligent IoT devices in different vertical industries, such as smart cities, law enforcement, mass transit, health care and even smart factories. Industries drives large-scale industrial and societal change. As computing evolves, new companies form, new products are built, our lives change. Looking back at the past couple of waves of computing, each was underpinned by a revolutionary computing model, a new architecture that expanded both the capabilities and reach of computing. By leveraging Jetson TX2 powerful platform, operating at less than 15 W of power outperforms the CPU operating at nearly 200W. Wibase offer an end-to-end AI computing platform — from GPU to deep learning software and algorithms, from training systems to AI computers, from cloud to data center to edge device – "TRAVIS". Wibase & NVIDIA are striving to foster TRAVIS AI computing platform helpful everywhere.

TRAVIS integrated NVIDIA Jetson TX2 module which provide 256 CUDA cores, high performance and powerful user experience. System OS is based on Linux Ubuntu and integrated NVIDIA JetPack & Deep Stream SDK, so user can base on this platform to develop their own applications with TRAVIS, and create Intelligent Video Analytics (IVA) in variety of user scenarios, even if real time object recognition also can be implement with TRAVIS.

To create a better feasibility for users on TRAVIS, the User Manual contains all essential information for users to make full use of this system. This manual includes a description of the system functions and capabilities, contingencies and alternate modes of operation, and step-by-step procedures for system access and use. Please kindly notice this manual is only for generic user scenarios, for special used case, please kindly contact us for further consult.

3.1 Points of Contact

This substitute report is issued by Grace Lee, Project Manager. Email address: Grace_Lee@wistron.com

The main contact persons are Angel Lu, Account Manager. Email address: angel_lu@wibase.com

4 Product Overview

4.1 Product Outlook

4.1.1 TRAVIS V

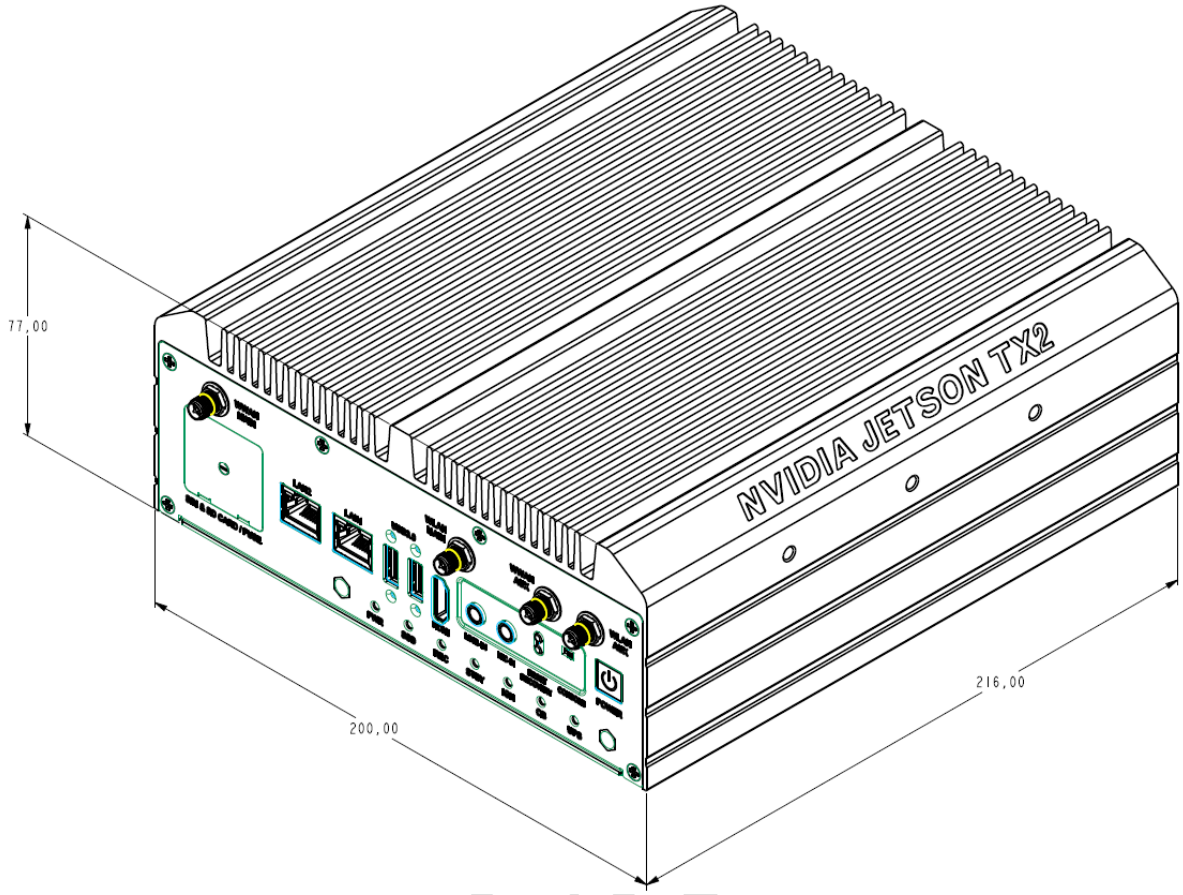
4.1.2 TRAVIS S


WWAN MAIN
WLAN MAIN
WWAN AUX
WLAN AUX
LAN2
LAN1
USB3.0
SIM & SD CARD / FUSE
HDMI
LINE-IN
MIC-IN
RESET RECOVERY
CONSOLE
POWER
PWR
SSD
REC
STBY


GPS
RS232-2
RS232-1
USB
Reserved
USB
CAN1
CAN2
DIO
RS485-2
RS485-1
POWER
GND

4.2 Mechenical Overview

4.2.1 Mechenical Dimentions



4.3 Product I/O Definition

4.3.1 Front side

FPDLINK Display-out for WiBase Display.

LCD1 – 4.3” Display

Connect to

GMSL Camera

OTG port for SW update only

Antenna Port

CAN bus x2

* Proprietary pinout

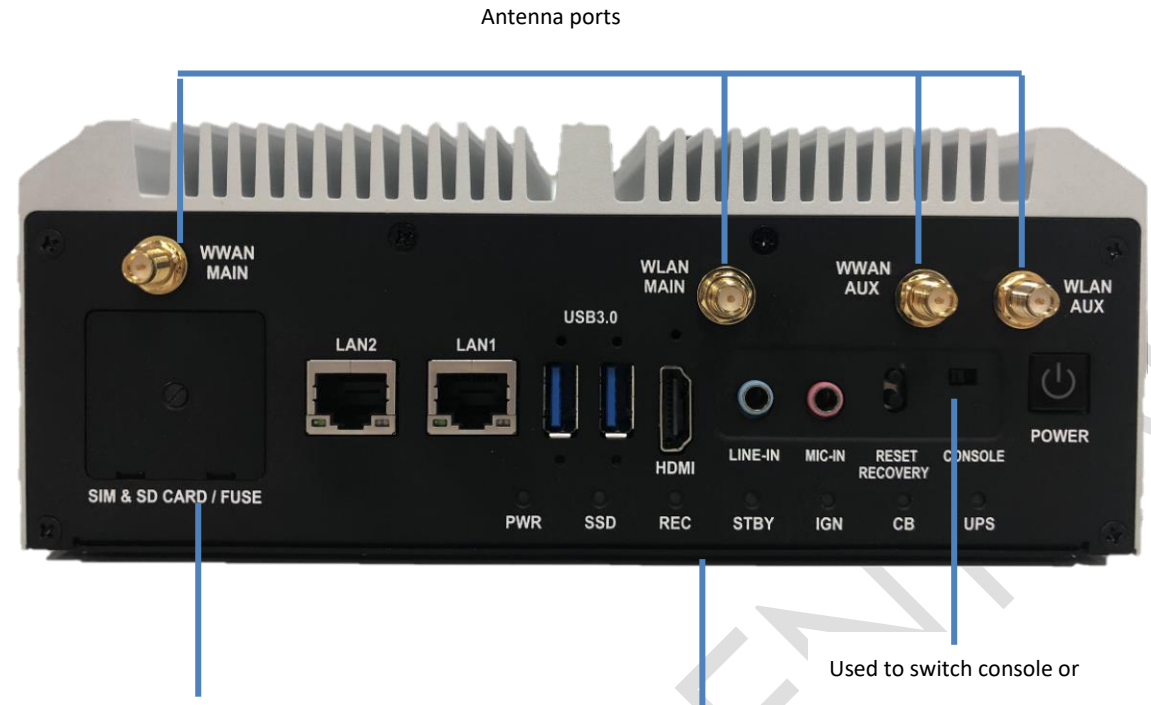
DI x4 and DO x4

* Proprietary pinout

UPS Input

Car battery / Power adaptor Input

4.3.2 Rear Side



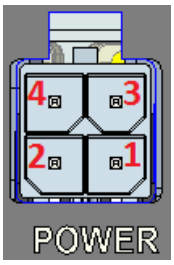
4.3.3 LED Behavior Description

LED	Color	Description
PWR	Orange	The unit is powered on
SSD	Green	Flashes when SSD is being accessed
REC	Red	The unit is recording video
STBY	Green	When a valid power supply is present
IGN	Blue	When ignition (ACC) signal is on
CB	Green	When Car battery / Power adaptor is supplying system power
UPS	Red	When optional UPS battery pack is supplying system power

■ Rows in green color are only available in TRAVIS-V

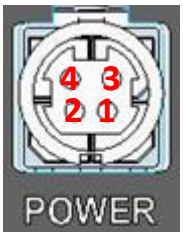
4.3.4 I/O Pinout Definition

- Mega-fit Pinout (for TRAVIS-V)



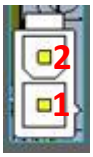
Pin No.	Pin Definition
1	GROUND
2	GROUND
3	CAR BATTERY INPUT
4	ACC/IGNITION INPUT

- Power Jack Pinout (for TRAVIS-S)



Pin No.	Pin Definition
1	GROUND
2	GROUND
3	POWER ADAPTOR INPUT
4	POWER ADAPTOR INPUT

- UPS Input Pinout



Pin No.	Pin Definition
1	GROUND
2	UPS POWER INPUT

- RS422/RS485 Pinout

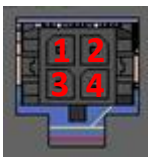
- RS422

Pin No.	Pin Definition
1	TX-
2	TX+
3	RX+
4	RX-
5	GROUND
6	NC
7	NC
8	NC
9	NC

- RS485

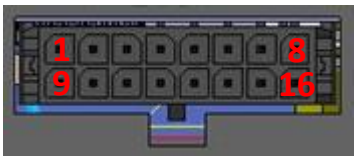
Pin No.	Pin Definition
1	D-
2	D+
3	NC
4	NC
5	GROUND
6	NC
7	NC
8	NC
9	NC

- CAN Bus Pinout



Pin No.	Pin Definition
1	CAN HIGH
2	CAN LOW
3	GROUND
4	12V POWER SUPPLY

- DIO Pinout



Pin No.	Pin Definition
1	DI_1+
2	DI_2+
3	DI_3+
4	DI_4+
5	DO_1+
6	DO_3+
7	DO_2+
8	DO_4+
9	DI_1-
10	DI_2-
11	DI_3-
12	DI_4-
13	DO_1-
14	DO_3-
15	DO_2-
16	DO_4-

4.4 Preparation 

- Read and follow all instructions in the documentation before you operate your system.
- Do not place this product on an unstable cart, stand, or table. The product may drop, or cause severe damage.
- This system should be operated from the type of power indicated on the marking label. Please double check the power supply voltage within product spec before connect TRAVIS.
- **GMSL cameras DO NOT support hotswap. Please connect the GMSL cameras to TRAVIS units before the power-on.**
- **Under Linux Ubundtu's system limitation, please reserve at least 1GB to make sure TRAVIS could power on successfully.**
- **Micro USB OTG connector is used for software updating only. Please DO NOT plug in OTG cable or connect to any USB host during normal operation. This will cause other USB function being disabled.**

4.5 Operation Instructions 

- Connect the power to TRAVIS. Please follow pin define for power connect instruction.
- Connect the USB mouse/keyboard to TRAVIS
- Connect the GMSL camera to TRAVIS (TRAVIS-V only)
- Once the indicator STBY is ON, you could press the POWER key to power on TRAVIS.
- After that, you shall be able to have Ubuntu running on TRAVIS.

4.6 Product Mainance and Disposal 

- Unplug appliances when not in use to save energy and minimize the risk of shock and fire
- Storage and Disposal in dry locations. Dispose of as ordinary dry waste per local, state, and federal regulations. However, may not be recyclable in certain areas due to availability of community recycling programs.

4.7 Safety Information

TRAVIS is designed and tested to meet the latest standards of safety for information technology equipment. However, to ensure your safety, it is important that you read the following safety instructions.

4.7.1 Avoid creation of dust.

- Fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.
- Avoid heat, flames, sparks, and other sources of ignition.
- Converting operations may form combustible dust concentrations in air.
- Minimize any dust accumulation from converting operations.
- Use good industrial hygiene and housekeeping practices to minimize any dust accumulation.

4.7.2 DO NOT Dissembly

- Please DO NOT dissemble the sample. WiBase provide options of LTE, BT/WiFi and SSD cards, however, these functions have to be assembled in WiBase factory.

4.8 Product Specification

	TRAVIS – V	TRAVIS - S
Module	NVIDIA Jetson TX2	NVIDIA Jetson TX2
CPU on Module	ARM Cortex-A57 (quad-core) @ 2GHz + NVIDIA Denver2 (dual-core) @ 2GHz	ARM Cortex-A57 (quad-core) @ 2GHz + NVIDIA Denver2 (dual-core) @ 2GHz
GPU on Module	256-CUDA core Pascal @ 1300MHz	256-CUDA core Pascal @ 1300MHz
DRAM on Module	8GB 128-bit LPDDR4	8GB 128-bit LPDDR4
Storage on Module	32GB eMMC	32GB eMMC
Expansion Storage (Optional)	Support by M.2 SSD	Support by M.2 SSD
SD Socket	1 x SD Socket	1 x SD Socket
GMSL Camera Input	Support 6 x GMSL(1080P) camera with audio in.	N/A
Display	1 x HDMI-out 1 x FPDLINK Display[1]-out (Optional)	1 x HDMI-out
Audio	1 x Line-in & 1 x MIC-in (3.5mm phone jack)	1 x Line-in & 1 x MIC-in (3.5mm phone jack)
USB	2 x USB3.0 2 x USB2.0 1 x Micro USB 2.0 (Reserve for SW updating only)	2 x USB3.0 2 x USB2.0 1 x Micro USB 2.0 (Reserve for SW updating only)
Ethernet	2 x GIGA LAN	2 x GIGA LAN
COM	2 x RS232 2 x RS422/RS485	2 x RS232 2 x RS422/RS485
DIO	DI x 4, DO x 4 With isolation circuits	DI x 4, DO x 4 With isolation circuits
WWAN (Optional)	**For North America:** -LTE category 4, Max 150Mbps (DL) / 50Mbps (UL) -LTE FDD: B2/B4/B12 -WCDMA: B2/B4/B5 **For Europe:** -LTE category 4, Max 150Mbps (DL) / 50Mbps (UL) -LTE FDD: B1/B3/B5/B7/B8/B20 -WCDMA: B1/B5/B8 -GSM: B3/B8	**For North America:** -LTE category 4, Max 150Mbps (DL) / 50Mbps (UL) -LTE FDD: B2/B4/B12 -WCDMA: B2/B4/B5 **For Europe:** -LTE category 4, Max 150Mbps (DL) / 50Mbps (UL) -LTE FDD: B1/B3/B5/B7/B8/B20 -WCDMA: B1/B5/B8 -GSM: B3/B8
WLAN & BT (Default)	- 2x2 MIMO 802.11ac compliant (backwards compatible with legacy 802.11a/b/g/n) - Bluetooth 4.1 ready	- 2x2 MIMO 802.11ac compliant (backwards compatible with legacy 802.11a/b/g/n) - Bluetooth 4.1 ready
WLAN & BT (Optional)	- 2x2 MIMO 802.11ac compliant (backwards compatible with legacy 802.11a/b/g/n) - Bluetooth 4.2	- 2x2 MIMO 802.11ac compliant (backwards compatible with legacy 802.11a/b/g/n) - Bluetooth 4.2

[1] FPDLINK Display are currently available with 4.3”, please contact sales for further information

	TRAVIS – V	TRAVIS - S
	- Adjustable country code / power table for optimal performance	- Adjustable country code / power table for optimal performance
SIM Socket	1 x SIM Socket (used by WWAN module)	1 x SIM Socket (used by WWAN module)
GPS (Optional)	- GNSS supported: BeiDou, Galileo, GLONASS, GPS / QZSS - Untethered Dead Reckoning (UDR) technology included	- GNSS supported: BeiDou, Galileo, GLONASS, GPS / QZSS - Untethered Dead Reckoning (UDR) technology included
CAN Bus	2 x CAN 2.0	2 x CAN 2.0
Fuse	1	N/A
Power Input	9V ~ 36V DC Power Input @25C	12V DC Power Input (ship with 60W Adaptor)
Input protection tolerance (OVP, OCP, UVP)	Within +/- 5%	Within +/- 5%
UPS	Support external battery	N/A
Operating Temperature	-20C to 60C (Fanless) -20C to 70C (with Fan Module)	-20C to 50C
Dimension	77(H) x 200(W) x 216mm(D) (Fanless)	77(H) x 200(W) x 216mm(D) (Fanless)

5 NVIDIA Jetson TX2 Software

- TRAVIS comes preloaded with an L4T (Linux for Tegra) environment, which includes support for many common APIs, and is supported by NVIDIA's complete development tool chain, L4T R28.2.1.
  NVIDIA JetPack 3.2.1 Release Notes:
  https://developer.nvidia.com/embedded/jetpack-3_2_1

  Please refer to NVIDIA's official L4T R28.2.1 webpage link for full details:
  https://developer.nvidia.com/embedded/linux-tegra-r2821

  You could refer to the following link to search "L4T Multimedia API Reference" to understand the multimedia related functions:
  https://developer.nvidia.com/embedded/downloads

6 Quick Start with TRAVIS Software

- How to check the SW Version?
  nvidia@tegra-ubuntu:~$ ./wibase.sh
- How to do the SW update?
  Once the new SW is released, we will upload to our FTP with the SOP to do the manual SW update.
- How to do the SW development on TRAVIS?
  Please refer to our "TRAVIS Software Porting Guide" to understand the necessary information for your coding.

7 Accessories

7.1 Accessory List

7.1.1 Travis V Accessory List

Item	Description
Camera	1) 2.8mm: 120° ±5% (Horizontal) 2) 6mm: 54° ±5% (Horizontal)
Camera Rosenberger HSD Cable	1) 10M 2) 15M
FPDLINK Display	1) 4.3“ sample available
Display Cable	1) 10M

7.1.2 Travis S Accessory List

Item	Description
Adaptor	60W
Power Cord	Type B plug

7.2 GMSL Camera

Lens		
Resolution		2Megapixel
Aperture		F/2.0
F.O.V.		1) 2.8mm: 120° ±5% (Horizontal) OR 2) 6mm: 54° ±5% (Horizontal)
Image Format		IMX290 is 1/2.8"
Image Sensor		
Chipset		1/2.8" Progressive CMOS For Automotive
Minimum Illumination	Color	0.1Lux
	B/W	0.05Lux
Dynamic Range		Up to 72 dB
ISP		
Chipset		ISP LSI For CMOS Image Sensor For Automotive
White Balance		Auto/ Manual (1800K - 10500K)
WDR		DOL+ATR
S/N Ratio		50dB (AGC OFF)
Serializes		
Transmission Distance		15M
Transmission Audio		I2S / Up to 48kHz Sample Rate

General		
Video Output		MIPI CSI-2 2 LANE YUV422 8 bit
Connector		Rosenberger HSD[4+2]
Audio Input Support		Built-in Mono Microphone x 1
Audio Effective Range		3 meters (Max.)
Power Input		DC 12V ±10% With HSD[4+2]
Power Consumption		4.2W (Max.)
Environment Temperature	Operation	-20~60 ° C
	Storage	-30~70 ° C
Dimensions		61mm(W) x 61mm(H) x 40mm(D)
Cable		
Cable Length		10M / 15M
Connector		Rosenberger HSD Mechanical Life Cycle: 20 times

7.3 FPDLINK Display

LCM & Touch	
LCD Type	4.3" TFT
Resolution	480 (RGB) x 272 dots
Display Mode	TN / Transmission
View Angle (CR>10)	Horizontal: 80° Vertical: 80°
Luminous Intensity	400 cd/m2 (min.)
Uniformity	80% (typ.)
Contrast Ratio (Center)	400 (min.)
Backlight Color	White
Touch Type	4-Wire Resistive
Touch Response Time	<= 10ms
General	
SerDes Solution	TI FPD-Link III
Transmission Distance	10 meter
Built-in Speaker	Mono, 2 Watt (max.)
Function keys	Power On&Off/Volume Up/Volume Down/ Brightness Up/Brightness Down/Key Backlight On&Off
I/O Connector	Rosenberger HSD 4+2
Power Input	DC 12V ±10% (supplied by system)
Operating Temperature	-20C to 60C
Dimensions (Draft ID)	122.5(W)*105.2(H)*29.2 mm(D)
Weight	TBD

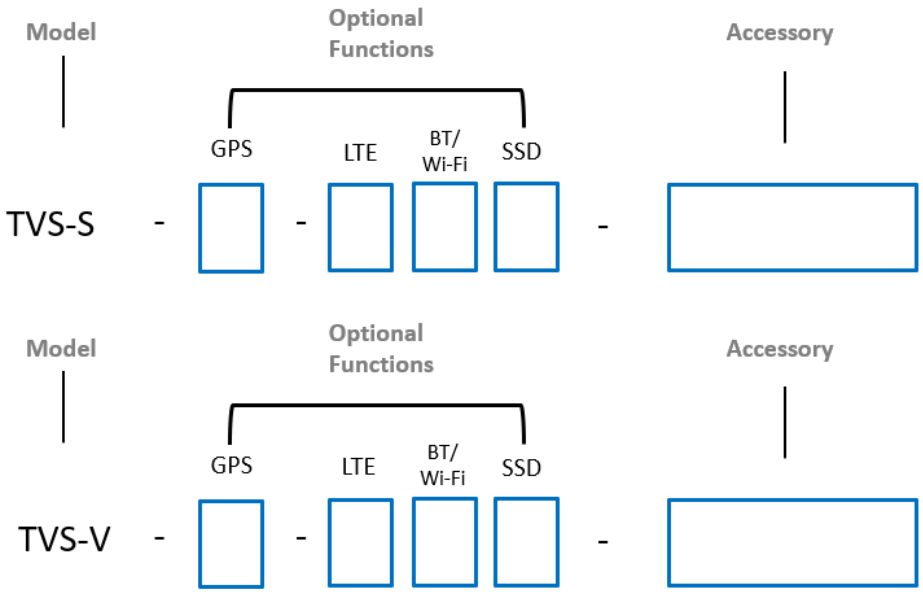
**This spec will be finalized and confirmed after validation.

7.4 Camera/Display Cable

General	
Camera Cable	10m & 15m available
4.3” Display Cable	10m available
Rosenberger Cable	
Features	- Rosenberger HSD connector used - Shielded and impedance controlled - Suitable for high speed data application (frequency: DC to 2.0GHz) - Additional pins for camera power delivery

8 Model List & Accessory Packages

8.1 Model Optionals define



8.1.1 GPS

Code	GPS
0	w/o
1	w/

8.1.2 LTE

Code	LTE
0	w/o
A	USA
E	Europe

8.1.3 BT / Wi-Fi

Code	BT / Wi-Fi
0	w/o
1	TX2
2	External M.2 Module

8.1.4 SSD

Code	SSD
0	w/o
1	128G

8.1.5 Accesory

Model	Accessory
TVS-V	Camera of different focus lenth & camera cable with 10M&15M to be choosen in the package by customers‘ preference
TVS-S	Ship with 60W adaptor