

T-DMB/DAB Test & Measurement

T-DMB/DAB Signal Generator – TMG2000/TMG3000

T-DMB/DAB Auto-Test system – TAT200

T-DMB/DAB Signal Analyzer – TMA2000

T-DMB/DAB Hand-Held Signal Analyzer – TMA2000H





DTVinteractive T-DMB/DAB Development & Test Solutions

DTVinteractive's T-DMB/DAB Solutions offers excellent and cost-effective way of solutions to all DAB/DMB receiver manufacturers. You can verify MPEG signal from DMB receiver directly compared with other DMB solutions, which not unable to do

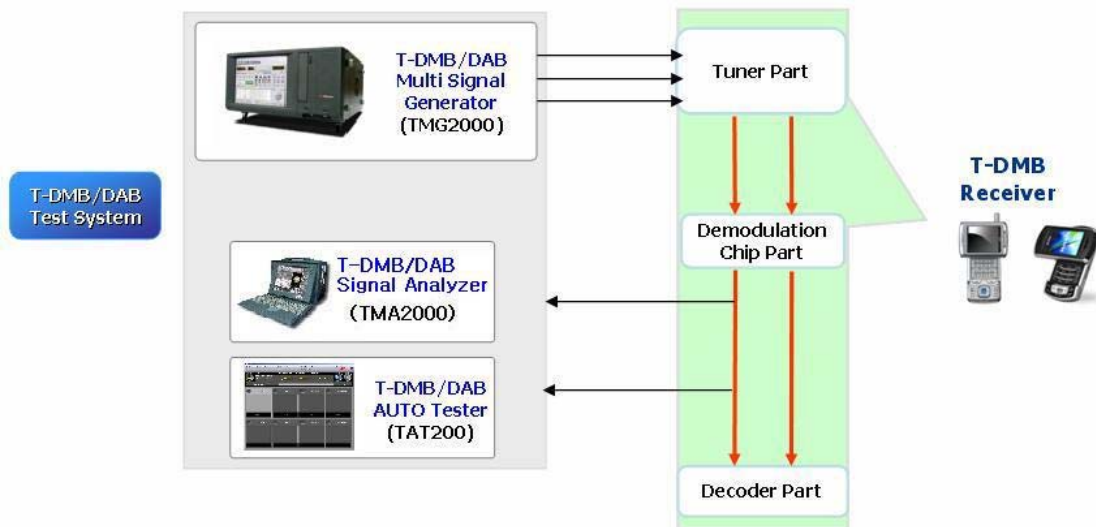
Also, DTVinteractive's T-DMB/DAB solutions enable you to test and develop each DAB/DMB receiver module such as chipset, module, tuner and DMB media processor.

DTVinteractive's T-DMB/DAB solutions use ETR290 technology, the universal standard for MPEG test and measurement, for DMB video test. And, we've awarded NEP (New Excellent Product) certification with ETR290 Analysis technology from the Korean Agency for Technology and Standards of the Ministry of Commerce, Industry and Energy.

ETR290 Error Testing is the essential measurement item for DMB receiver test and development.

DTVinteractive provides T-DMB/DAB Ensemble Generator supporting Error Generation and real-time T-DMB/DAB Analyzer for ETR290 error Analysis. Especially, we're providing Real-BER test solution, not Pseudo BER, for T-DMB/DAB receiver test and DMB monitoring process.

Test-Bed system Configuration for T-DMB/DAB



T-DMB/DAB Multi Signal Generator – TMG2000



● Overview

TMG2000 is the Signal Generator RF integrated. It's the only one which can completely support Korean T-DMB broadcasting in Korea. TMG2000 includes T-DMB Video/Audio Service(H.264+BSAC), DAB Service (Audio+DATA), Ensemble Multiplexer, OFDM Modulator and RF Up-converter. A user can use it to develop a DAB/DMB receiver and use for QC and Mass Production in easy and convenient.

Especially, TMG2000 has big difference from other simple DAB simulator because it generates same T-DMB broadcasting signal and information as present 6 DMB broadcasting stations in Korea. It means TMG2000 can make almost same broadcasting environment as real broadcasting station (Available to generate service type, number and information of each broadcasting station). As the result, a manufacture of a DAB/DMB receiver can reduce diverse risk happened during the development.

● Features

System

- All-in-One system
- (DMB Service + DAB Service + Ensemble MUX + OFDM Modulator + RF Up-converter)
- Extend a channel up to 5 per an unit
- Support GPIB Remote Control / RS232
- Support user friendly UI based on Windows
- Size of storage of video, audio and data (Basic160GB~1TB)

RF

- Support RF,IQ Output
- Support Band II : 87.5Mhz ~ 108Mhz
- Support Band III : 174Mhz ~ 250Mhz
- Support L Band : 1452Mhz ~ 1492Mhz
- Support Transmission Mode I, II, III, IV

Ensemble Multiplexing

- Support Enhanced Packet Mode (EN 300 401 v.1.4.1)
- Support Enhanced label Support (FIG 2) (EN 300 401 v.1.4.1)
- No limit of No. of Service and Service Component
- RS/CI Encoder integrated (Support RS/CI 204byte Video, 188byte Video)
- Support big size of Ensemble on real-time (Default : 1.152Mbps ,FEC = 1/2, Changeable by Protection Level)
- Available to extend specification such as BIFs or JAVA
- Support National FIG Information (Korea, China, Germany, France, Italy, Netherlands, United Kingdom, Russian Federation)
- Support Programme Schedule Simulation
- Support Primary/Secondary Service, Primary/Secondary Label
- Offer ETI recording for saving ETI signal as a file type

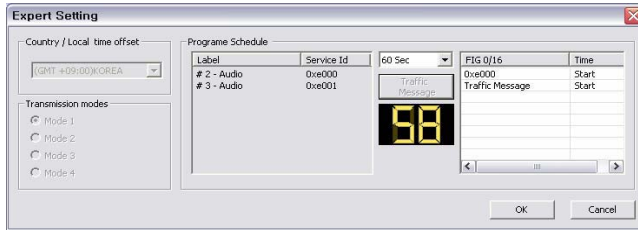
Service

- Support Data Broadcasting (MOT, BWS, SLS, PAD)
- Support Audio 32/48/56/64/80/96/111/128/160/192/224/256/320/384 kbps
- Support Audio Protection Level
- Support Video 8~1824(kbps) (Available to change it per 8kbp)
- Support Video Protection Level (1-A, 2-A, 3-A, 4-A, 1-B, 2-B, 3-B, 4-B)
- Support Audio/Video Decoding (Optional)

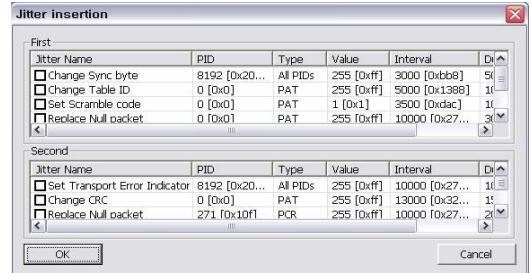
etc

- Support BER pattern for Actual Measurement BER (All 0, All 1, All 01, All 10)
- Support CAS (Optional)
- Support Auto Test (Optional)
- Support C/N Generation
 - C/N Range : -10~+30dB (Resolution : 0.5dB)
 - Noise BW : ① 0~10MHz according from Signal CH BW (Spec.)
 - ② User Select : ~ Max. 45MHz
- Support Fading Simulation (Future Support)
 - 6 CHs (Optional : Max. 12CHs)
 - Speed Range : 0~120km/h
 - Path Delay : 100ns~10µs (Resolution : 100ns)
 - Path Loss : 0~25dB (Resolution : 0.5dB)
- Real-time Live Mux. (Ethernet)
- P/S Service Component





Transmission Mode Change



Jitter Insertion into Video



Ensemble Muxing



Ensemble Monitoring

● **H/W Specification**

1. Frequency
 - Range: Band II, III, L
 - Resolution: 1KHz
 - Stability: 1ppm
2. RF Output Level
 - Range: 0~ -110dBm
 - Resolution: 0.5dB
 - Accuracy: ±1dB
 - Impedance: 50ohm
3. VSWR (Voltage Standing Wave Ratio) : Better than 1:1.5
4. Modulation
 - High performance OFDM modulation (Good SNR, Low Phase Noise architecture)
 - D-QPSK (Different Quadrature Phase Shift Keying)
5. Transmission Mode: Mode 1,2,3,4
6. IF Output: 36MHz~44MHz

Operating specification

Voltage : AC 100 ~ 240V, 50/60Hz
 Operating temperature : 10 to 40 degree
 Operating humidity : 45 ~ 85% RH
 Guaranteed temperature: 15 to 35 degree
 Guaranteed humidity : 45 ~ 85% RH
 Dimensions : 519.7(W) x 435(D) x 231.8(H)mm
 Weight : About 17kg



Base Model	Description
TMG2000	T-DMB/DAB Signal Generator * RF Level : 0dBm ~ -110dBm * RF Resolution : 0.5dBm * Frequency Range: Band II , III , L Band * Frequency Resolution: 1KHz

Options	Description	Notes
Option T	T-201 T-DMB/DAB Modulator & Up-converter Module * Selectivity Test & Multi Modulator & Multi RF	* User cannot select T-201 and T-202 options simultaneously. * User can select Max. 2 units of T-201 options (3 Modulator 3 RF) * User can select Max. 3 units of T-202 option. (1 Modulator 6 RF)
	T-202 T-DMB/DAB Up-converter Module * Selectivity Test & 2 RF	
	T-203 T-DMB/DAB Auto test Module * Sensitivity, Max Power, Selectivity, Black Out, BER Test	
	T-204 ETI Interface Module * Live ETI Recording & Player	
Option ST	ST-201 DVB-H Module	* If user select T-201 or T-202 options, it's not possible to select Options ST * In case of ST-203, multi RF signal will not be supported.
	ST-202 DVB-H IP En-capsulator Module	
	ST-203 ISDB-T Module	
	ST-204 S-DMB Module	
Option H	H-302 IQ Interface Module	* Can be selected only after choosing ST-201 or ST-202 option
Option B	B-101 ASI Out Module	* B-101 and B-102 can't be selected with Base Model without any other options. * B-100 options after purchasing, it'll cost additional charges and delivery terms will be within 4 weeks.
	B-102 SPI Out Module	
	B-201 AWGN Module (-10~+30dB)	
	B-202 Fading Module (Future support)	
	B-203 GPIB Module	
	B-100 Option Upgrade Service	



T-DMB/DAB Signal Generator Solutions

T-DMB/DAB Multi Signal Generator – TMG3000



Features

System

- All-in-One T-DMB Generator
 - DMB Service + DAB Service + Ensemble Mux. + OFDM Modulator + Up-converter
- User Friendly UI based on Windows
- Size of Storage for Video, Audio and Data (Basic 160GB~1TB)
- Extend a channel up to 3 per unit
- Auto Test (Optional)
- GPIO Remote Control/RS232 (Optional)

RF

- Output : Band III, L-band, IF, IQ
 - Band III : 174Mhz~250Mhz
 - L-band : 1452Mhz ~ 1492Mhz
- Support Transmission Mode I, II, III, IV
- Output Level : 0~ -110dBm
- Resolution : 0.5dBm
- Support C/N Generation
 - C/N Range : -10~+30dB (Resolution : 0.5dB)
 - Noise BW : ① 0~10MHz according from Signal CH BW (Spec.)
 - ② User Select : ~ Max. 45MHz
- Support Fading Simulation (Future Support)
 - 6 CHs (Optional : Max. 12CHs)
 - Speed Range : 0~120km/h
 - Path Delay : 100ns~10µs (Resolution : 100ns)
 - Path Loss : 0~-25dB (Resolution : 0.5dB)

Multiplexing

- Enhanced Packet Mode
 - Data Service FEC
 - EN 300 401 V.1.4.1 (2006-01)
- RS/CI Encoder integrated
 - Support RS/CI 204 byte Video TS
 - Support 188 byte Video TS
- ETI File Generation
- User Multiplexing
 - No limit for Number of Service and Service Component
- Support National FIG Information (Korea, China, Germany)
- Pattern Multiplexing
 - No limit for Number of Service and Service Component
 - One Touch Fast & Easy Mux. Interface

Service

- Video Service
 - Korea : H.264 + BSAC or H.264 + BSAC + BIFS
 - China : H.264/BSAC or H.264/AAC+
 - Other : H.264/BSAC or H.264/AAC+
- Video Bit rate : 8-1824(kbps)
- Audio Service : Musicam
- Audio Bit rate
 - 32/48/56/64/80/96/112/128/160/192/224/256/320 (kbps)
- UEP/EEP Full Support
 - UEP : Audio Protection Level 1, 2, 3, 4, 5
 - EEP : Video / Data Protection Level
 - 1-A, 2-A, 3-A, 4-A, 1-B, 2-B, 3-B, 4-B
- Data Service : BWS/SLS/DLS
- CAS (Optional)



Monitoring View



System View



System Setting View

H/W Specification

- Frequency
 - Range: Band II, III, L
 - Resolution: 1KHz
 - Stability: 1ppm
- RF Output Level
 - Range: 0~110dBm
 - Resolution: 0.5dB
 - Accuracy: ±1dB
 - Impedance: 50ohm
- VSWR (Voltage Standing Wave Ratio) : Better than 1:1.5
- Modulation
 - High performance OFDM modulation (Good SNR, Low Phase Noise architecture)
 - D-QPSK (Different Quadrature Phase Shift Keying)
- Transmission Mode: Mode 1,2,3,4
- IF Output: 36MHz~44MHz



Operating specification

Voltage :	AC 100 ~ 240V, 50/60Hz
Operating temperature :	10 to 40 degree
Operating humidity :	45 ~ 85% RH
Guaranteed temperature:	15 to 35 degree
Guaranteed humidity :	45 ~ 85% RH
Dimensions :	377(W) x 360(D) x 162(H)mm
Weight :	About 9kg

Ordering Information

Base Model	Description
TMG3000	T-DMB/DAB Signal Generator * RF Level : 0dBm ~ -110dBm * RF Resolution : 0.5dBm * Frequency Range: Band II , III , L Band * Frequency Resolution: 1KHz

Options	Description	Notes
Option T	T-201 T-DMB/DAB Modulator & Up-converter Module * Selectivity Test & Multi Modulator & Multi RF	* User can select Max. 2 units of T-201 options (3 Modulator 3 RF)
	T-203 T-DMB/DAB Auto test Module * Sensitivity, Max Power, Selectivity, Black Out, BER Test	
Option ST	ST-201 DVB-H Module	* If user select T-201, this option can't be supported
Option B	B-101 ASI Out Module	* User can select B-101 and B-102 after selecting Option ST. * B-100 options after purchasing, it'll cost additional charges and delivery terms will be within 4 weeks.
	B-102 SPI Out Module	
	B-201 AWGN Module (-10~+30dB)	
	B-202 Fading Module (Future Support)	
	B-203 GPIB Module	
	B-100 Option Upgrade Service	



Base Model	Description
TMG3000M	T-DMB/DAB Signal Generator * RF Level : 0dBm ~ -110dBm * RF Resolution : 0.5dBm * Frequency Range: Band II, III, L Band * Frequency Resolution: 1KHz * Double RF output from 1 Modulator

Options	Description	Notes
Option T	T-202 T-DMB/DAB Modulator & Up-converter Module * Selectivity Test & Multi Modulator & Multi RF	* User can select Max. 2 units of T-202 option. (1 Modulator 6 RF)
	T-203 T-DMB/DAB Auto test Module * Sensitivity, Max Power, Selectivity, Black Out, BER Test	
Option B	B-203 GPIB Module	* B-100 options after purchasing, it'll cost additional charges and delivery terms will be within 4 weeks.
	B-100 Option Upgrade Service	



T-DMB Signal Generator Solutions

T-DMB Auto-Test system – TAT200



T-DMB Auto-Test system, TAT200 is the most useful solution for multi T-DMB receiver test in mass production line.

TAT200 supports various kinds of essential performance test of T-DMB receiver simultaneously.

With TAT200, manufacturing engineers have only to set specific parameters and check the results in a short time.

Integrated with TMG2000/3000, TAT200 is the most cost-effective test solution for BER, RF Stability, Selectivity, Sensitivity test in T-DMB receiver mass production line.

Features

System

- Integrated T-DMB Auto-Test package system
- TAT200 + T-DMB Signal Generator + Combiner + Divider
- User Friendly UI based on Windows
- Extend Test Suit up to 8 devices at a time
- GPIO Remote Control/RS232C (Optional)

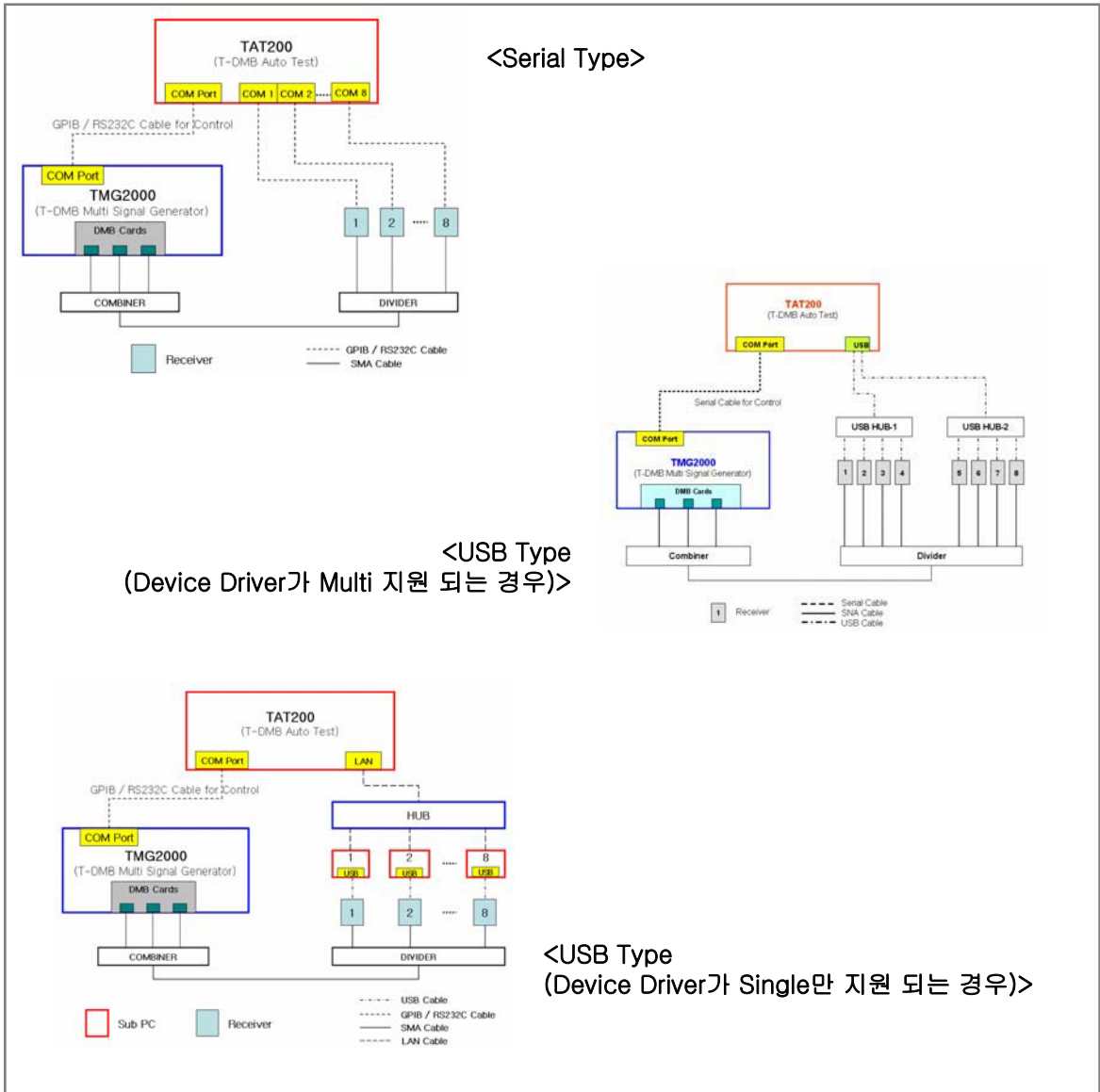
Test Parameter

- RF Stability Test (Frequency/Power (dBm)/BER)
- Sensitivity Test
- MAX. Power Level Test
- Adjacent Selectivity Test
- Far-Off Selectivity Test
- Black-Out Test on Transmission

System Expansion

DVB-H/S-DMB/ISDB-T/STMi

System Structure of TAT 200



T-DMB/DAB Signal Analyzer – TMA2000



● Overview

T-DMB Analyzer is the solution that can analyze Real-time T-DMB RF Signal with the standard receiver.

Also, TMA2000 can analyze output of T-DMB Encoder in real-time because it is possible real-time signal and ETI file which was saved as File type can be analyzed with ETI input device. (Optional)

T-DMB Analyzer analyzes full ETI Signal (ETI frame, FIC, and MSC information). TMA2000 offers analyzing function of DMB A/V data, Musicam Audio Frame and almost analyzing functions for development DMB receiver (BWS, SLS, DLS and TPEG etc of MOT data with PAD/NPAD mode).

TMA2000 records current T-DMB broadcasting signal and re-transmit with TMG2000/3000, T-DMB Generator of DTVinteractive. Because it has recording function of each Sub-Channel and broadcasting contents, a user can use it after reconstructing in type of Ensemble. So T-DMB receiver makers can create the various T-DMB receiver test environment by making ETI signal you want with TMA2000 without purchasing the other expensive products.

● Features

- ETI capture
- Band III, L-Band supported
- RF measure (SNR, BER, Power)
- ETI Frame Analysis
- Ensemble Information Analysis
- FIC Analysis
- MCI & SI Analysis
- FIG Analysis
- Sub-Channel Analysis
- MSC Analysis
- Audio Frame Analysis
- DMB Audio Data (PAD, X-PAD) Analysis
- DMB Stream Data Analysis
 - Packet, Service, PSI section, PCR, TS Error (ETR 290)
- H.264/BSAC A/V Decoding
- H.264/AAC A/V Decoding
- DMB Packet Data Analysis
- MOT protocol Analysis (& storing)
- BWS Analysis
- SLS Analysis
- DLS Analysis
- EPG Analysis (Optional)
- TPEG Analysis (Optional)



Ordering Information

Base Model	Description
TMA2000	T-DMB/DAB Signal Analyzer * Portable Frame * Professional T-DMB Receiver

Options		Description	Notes
Option TA	TA-201	ETI Input Module	
	TA-202	TPEG Analyzer Module	
Option B	B-100	Option Upgrade Service	* B-100 options after purchasing, it'll cost additional charges and delivery terms will be within 4 weeks.



T-DMB/DAB Hand-held Signal Analyzer – TMA2000H



● Overview

TMA2000H Analyzer is the solution that can analyze Real-time T-DMB RF Signal through the standard receiver.

TMA2000H analyzes FIC and MSC information. TMA2000H offers analyzing function of DMB picture data, Musicam Audio Frame and almost analyzing functions for development DMB receiver (BWS, SLS and DLS etc of MOT data with PAD/NPAD mode).

TMA2000H records current T-DMB broadcasting signal and re-transmit with TMG2000/3000, T-DMB Generator of DTVinteractive. Because it has recording function of each Sub-Channel and broadcasting contents, a user can use it after reconstructing in type of Ensemble.

Especially, TMA2000H supports GPS field test function. T-DMB receiver makers can test their receiver in various field environment with TMA2000H.

● Features

- Band III, L-Band supported
- RF measure (SNR, BER, Power)
- Ensemble Information Analysis
- FIC Analysis
- MCI & SI Analysis
- FIG Analysis
- Sub-Channel Analysis
- MSC Analysis
- Audio Frame Analysis
- GPS Field Test
- DMB Audio Data (PAD, X-PAD) Analysis
- DMB Stream Data Analysis
 - Packet, Service, PSI section, PCR, TS Error (ETR 290)
- H.264/BSAC A/V Decoding
- DMB Packet Data Analysis
- MOT protocol Analysis (& storing)
- BWS Analysis
- SLS Analysis
- DLS Analysis
- EPG Analysis (Optional)



Ordering Information

Base Model	Description
TMA2000H	T-DMB/DAB Hand-Held Signal Analyzer * Hand-Held Portable Frame * Professional T-DMB Receiver * Carrying Bag

Options		Description	Notes
Option TA	TA-202	TPEG Analyzer Module	
	TA-203	GPS Field Test Module	
Option B	B-100	Option Upgrade Service	* B-100 options after purchasing, it'll cost additional charges and delivery terms will be within 4 weeks.

