

SEMCO Wireless Connectivity Module Solution

Samsung Electro-Mechanics

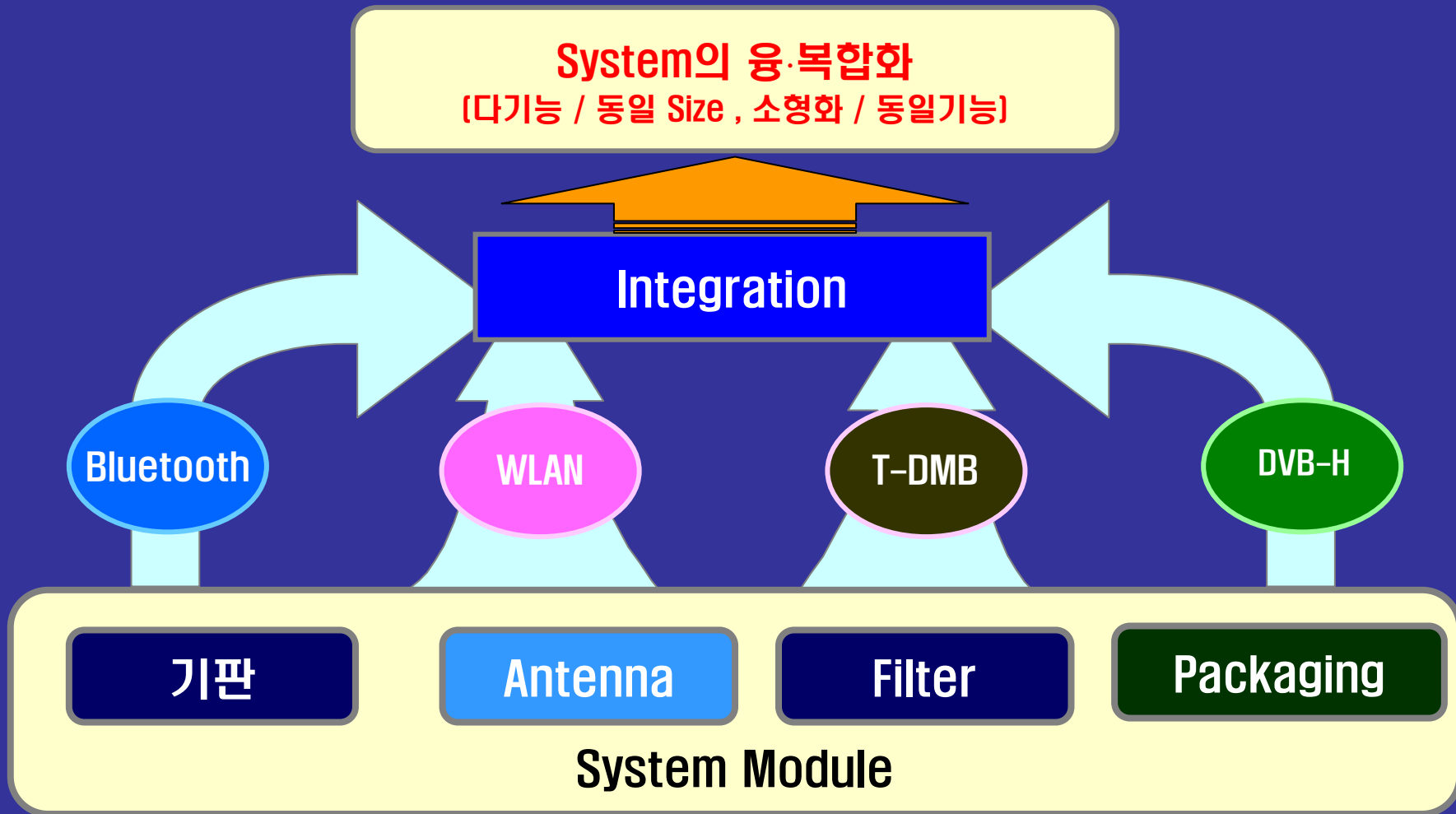
18th. Jul. '08

** The module size is subject to change without notice*

Network 시장흐름 & Module Trend

통신/방송 융·복합화 (N/W 시장의 흐름)

Multi-Functional System 의 융 복합화

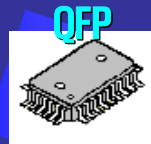


System Integration (Chip packaging Module)

Chip Module Protection

System Integration

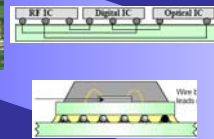
Packaging



ICP



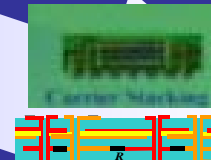
MCM



Flip Chip



IC Embedding



BGA

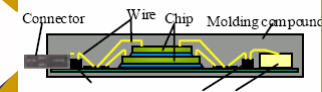


CSP, WLCSP



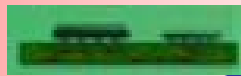
3D Packaging

System Module



Passive-Active Integrated Substrate

Passive Embedding



IC Packaging Substrate

Build Up Substrate

Mono Layer PCB

PCB

1995

2000

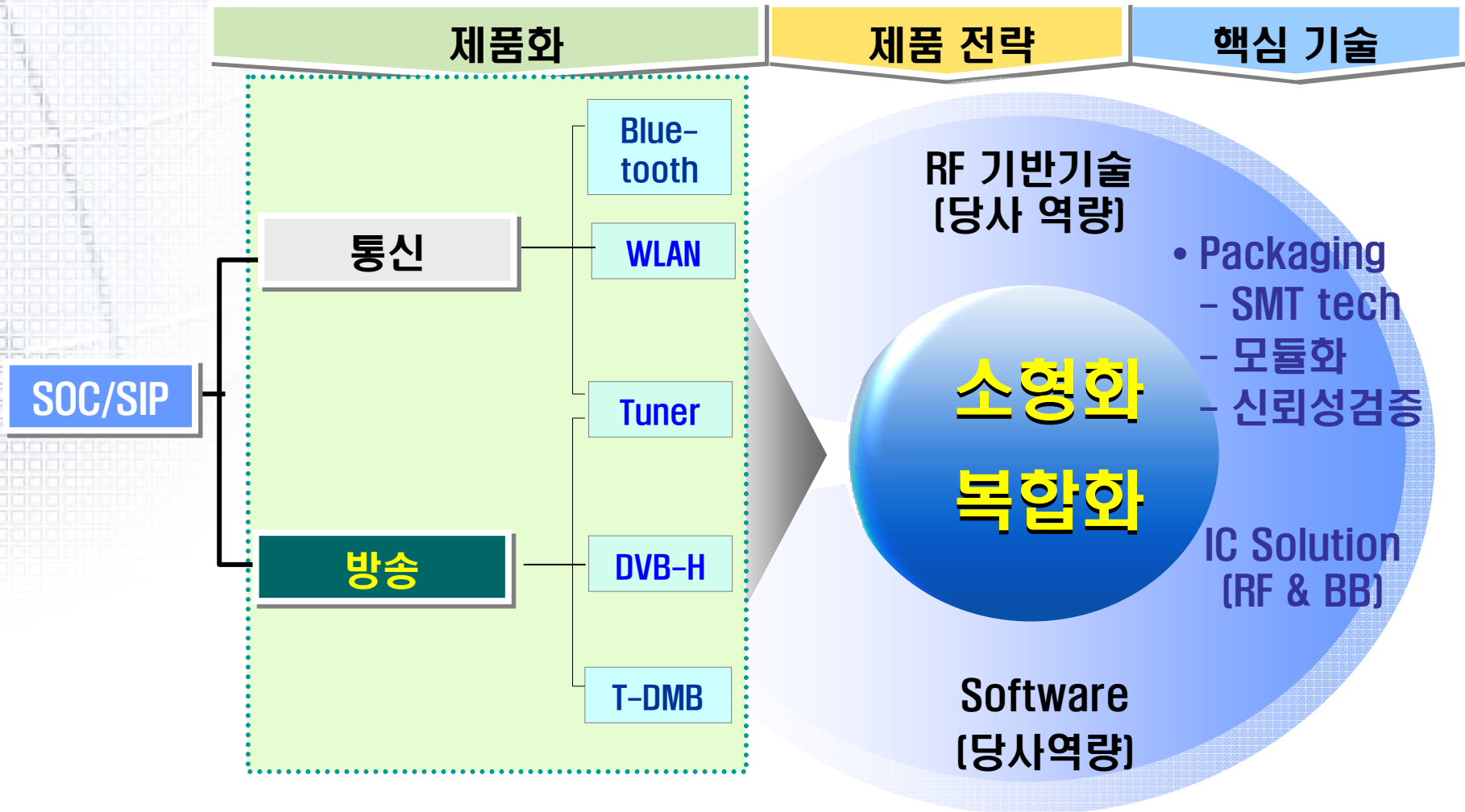
2005

2010



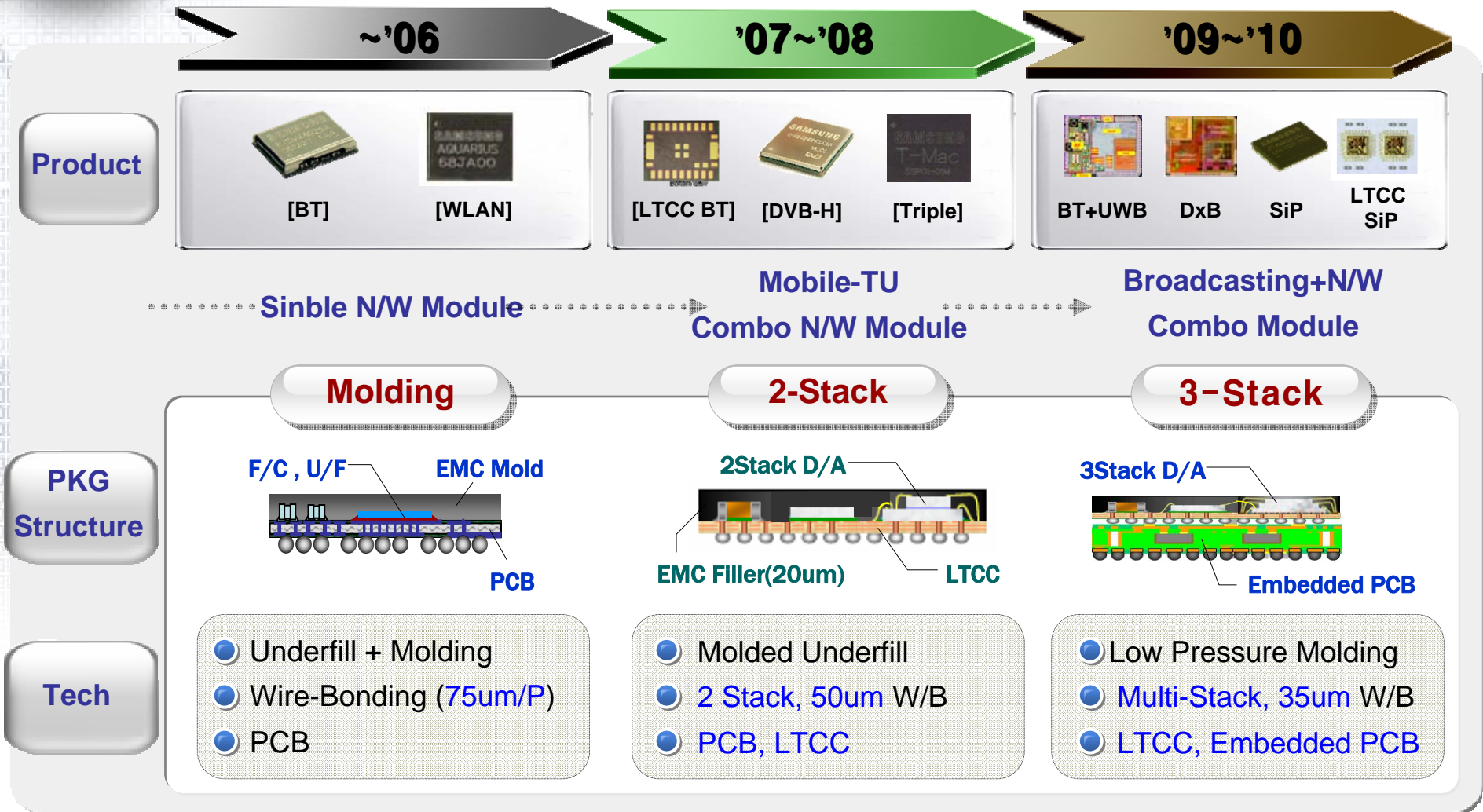
삼성전기 지향 목표

소형/ 복합화 패키징 모듈



SiP Module Trend

Package Core Competence with Low Profile

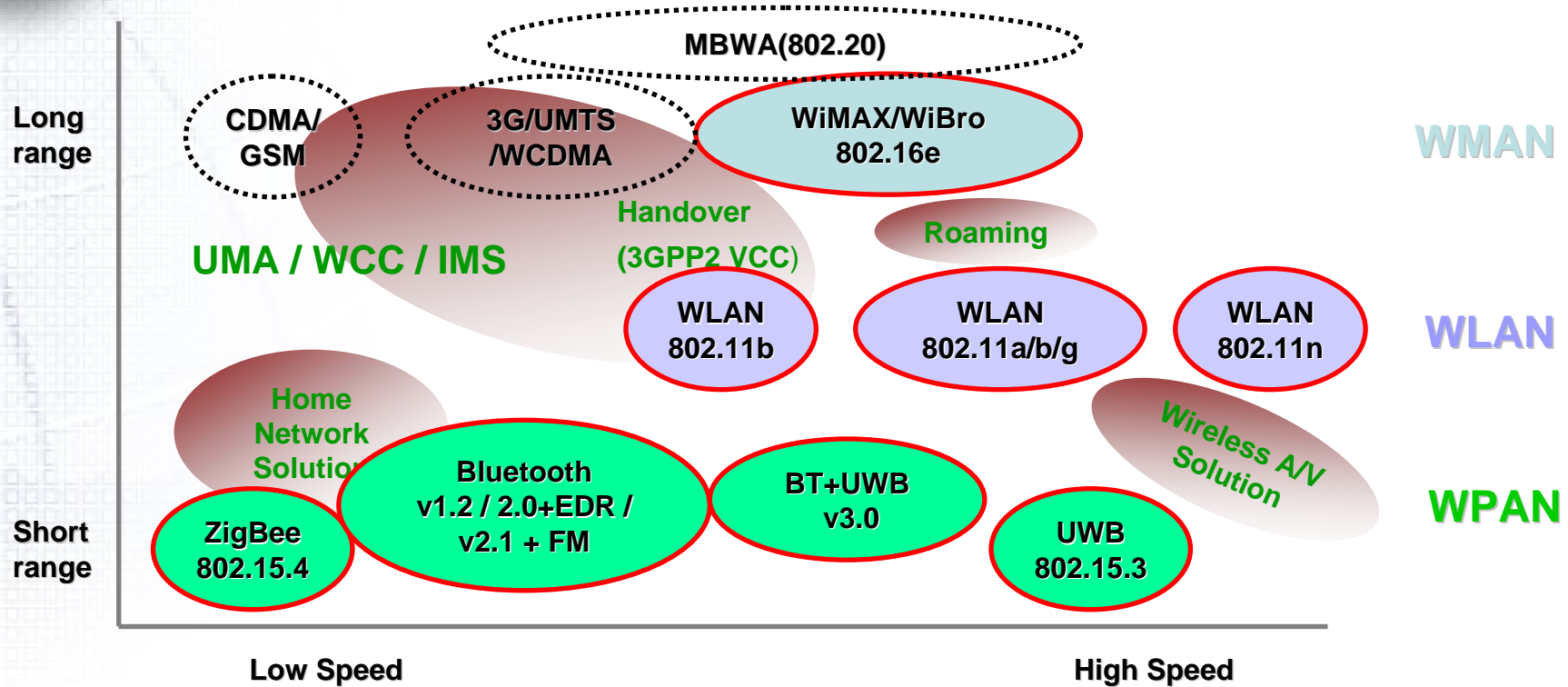



SEMCO


Wireless Connectivity Solution



SEMCO Wireless Connectivity Biz. Map



 SEMCO Available Products

 Related Technology

Wireless Connectivity Solution

- BT + WLAN Combo -



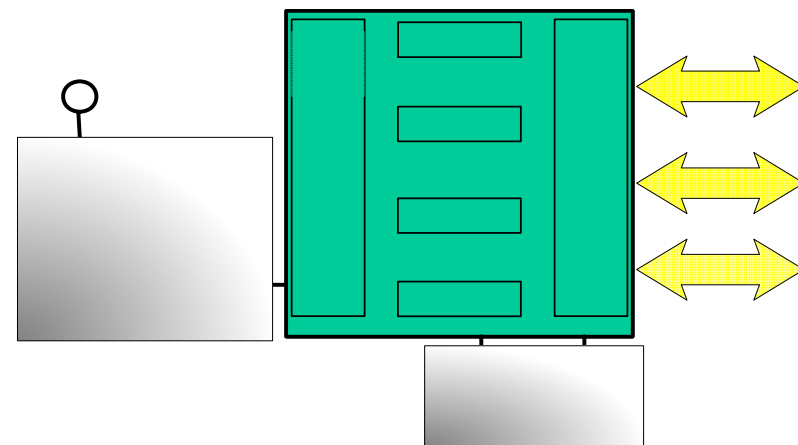
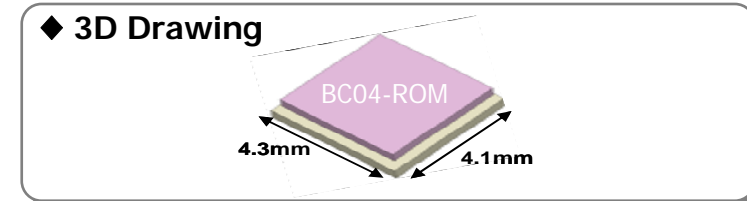
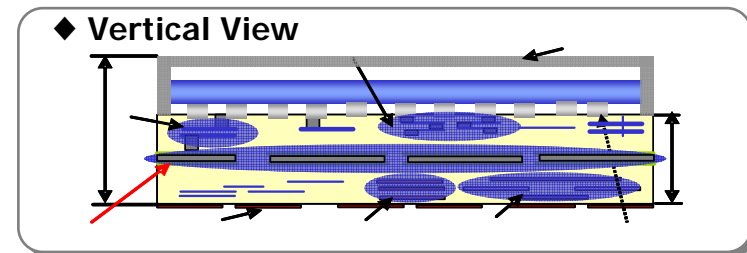
SEMCO Bluetooth Module for HHP Set

CSR BC04-ROM W/O X-TAL_LTCC

Features

Module	BTTM19C2SA
Interface	UART, PCM, PIO
Bluetooth Freq.	2.4GHz
Chip Size	3.8 × 3.4 × 0.7
Module Size	4.3 × 4.1 × 1.2
Substrate/Type	LTCC / Film Shielding
Etc..	BT Ver 2.0+EDR, Class-2
Schedule	WS : Q2.'07 MP : Q4,'07

Block-Diagram



* The module size is subject to change without notice

SEMCO BT Module Line-up

SEMCO BT Module Line-up (BROADCOM /TI)

	BROADCOM			TI	
Model	BTEM39B2SB	BTEM48B2SB	BTEM42B2SA	BTEM37T2SA	BTEMxxT2SA
IC Solution	BCM2046	BCM2048	BCM2046	BCM6300	BCM6350
Main Feature	BT2.1+EDR	BT2.0+EDR + FM	BT2.1+EDR W/O XTAL	BT2.0+EDR	BT2.1+FM T/Rx
IC Size (mm)	3.50x3.50x0.35	3.92x4.15x0.40	5.00x5.00x0.80	3.20x3.20x0.60	3.80x3.80x0.60
Module Size (mm)	4.82x6.15x1.32	5.42x6.88x1.30	6.30x5.90x1.20	5.20x5.80x1.30	4.25x5.35x1.30
Host Interface	UART/PCM	UART / PCM / I ² S	UART / PCM	UART / PCM	UART / PCM
Substrate	FR-4 PCB	FR-4 PCB	FR-4 PCB	FR-4 PCB	FR-4 PCB
ES Schedule	Available	Available	Available	Available	'08.07
MP Schedule	Available	Available	'08.Q2	'08.Q2	'08.Q3

SEMCO BT Module Line-up

SEMCO BT Module Line-up (CSR)

	CSR				
Model	BTTM45C2SA	BTTM36C2SA	BTTM47C2SA	BTTM35C2SA	T.B.D
IC Solution	BC04	BC04	BC04	BC06	BC06
Main Feature	BT2.0+EDR W/O XTAL	BT2.0+EDR	BT2.0+EDR	BT2.1+EDR	BT2.1+EDR
IC Size (mm)	3.80x3.40x0.70	3.80x3.40x0.70	3.80x3.40x0.70	3.10x3.49x0.60	3.10x3.49x0.60
Module Size (mm)	5.60x5.80x1.45	5.05x5.90x1.35	5.30x6.40x1.45	5.0x5.5x1.35	4.50x4.50x1.35
Host Interface	UART,USB	UART/PCM	UART/USB/PCM	UART/PCM	UART/PCM
Substrate	FR-4 PCB	LTCC	FR-4 PCB	FR-4 PCB	LTCC
ES Schedule	Available	Available	Available	Available	'08.07
MP Schedule	Available	Available	Available	'08.Q2	'08.Q3



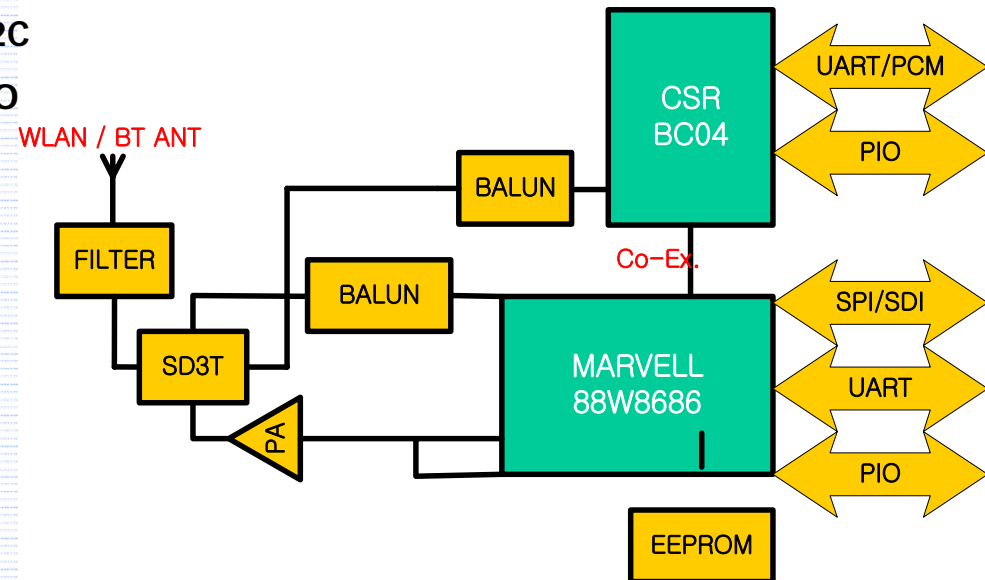
SEMCO WLAN + BT Combo Module for HHP Set

MARVELL 88W8686 + CSR BC06

□ Features

Module	TBD
Interface	BT : UART, USB, PCM, I2S, I2C WLAN : SPI, SDIO, UART, PIO
Frequency	2.4GHz
Spec	BT : Ver2.0+EDR4 Class-2 WLAN : 802.11b/g
Module Size	9.0 x 13.0 x 1.4T Single Sided
Schedule	WS : '07.12 MP : '08.07
Etc..	BT / WLAN Co-existence

□ Block-Diagram



** The module size is subject to change without notice*



SEMCO WLAN Module Line-up

	ATHEROS	ATHEROS	MARVELL	NanoRadio	TI
Model	SWL-2700	SWL-A20	SWL-2480	SWL-N10	SWL-T10
					
IC Solution	AR6001	AR6002	88w8686	NRX701	NETW1251
X-tal	W/X-TAL	W/O X-TAL	W/X-TAL	W/O X-TAL	W/O X-TAL
IC Size (mm)	6.64x6.72x0.30	4.70x4.90x0.33	4.05x4.55x0.75	4.20x3.90x0.30	4.78x4.78x0.60
Module Size (mm)	10.00x12.00x1.20	9.50x9.50x1.60	8.90x8.90x1.40	7.10x7.70x1.30	8.00x10.00x1.40
Rx Sensitivity (dBm) 11Mbps / 54Mbps	-87 / -73	-87 / -73	-85 / -71	-87 / -72	-88 / -74
Tx Power (dBm) 11Mbps / 54Mbps	17 / 13	17 / 13	16 / 14	18 / 14	18 / 13
Power consumption Con.Tx_MAX @ 18dBm	800mW	600mW	720mW	725mW	800mW
Power consumption RX	450mW	130mW	330mW	165mW	650mW
Schedule (ES)	Available	'08.Q3	Available	Available	Available
Schedule (MP)	Available	'08.12	Available	'08. Q3	Available

SEMCO Combo Module Line-up

	Two Chip Solution			
Model Name	SWB-T18	SWB-T20	SWB-C10S	SWB-M20
				
WLAN IC Solution	WL1251	WL1251	UF1050	88W8686
BT IC Solution	BRF6300	BRF6350	BC06	BC06
WLAN Connectivity	802.11b/g	802.11b/g	802.11b/g	802.11b/g
BT Connectivity	BT2.0+EDR	BT2.1+EDR+FM	BT2.1 + EDR	BT2.1 + EDR
WLAN IC Size	4.78x4.78x0.60	4.78x4.78x0.60	5.80x6.40x0.70	4.05x4.55x0.75
BT IC Size	3.20x3.20x0.60	3.80x3.80x0.60	3.20x3.40x0.60	3.20x3.40x0.60
Module Size	9.90x10.60x1.40	9.90x10.60x1.40	11.50x11.60x1.40	9.60x10.40x1.40
Rx Sensitivity [dBm] 11Mbps / 54Mbps	-88 / -74	-88 / -74	-85/-71	-88 / -74
Tx Power [dBm] 11Mbps / 54Mbps	18 / 13	18 / 13	17/13	17/13
Schedule(ES)	Available	Available	Available	Available
Schedule(MP)	'08.Q3	'08.Q3	'08.Q3	'08.Q3

SEMCO Combo Module Line-up

	One Chip Solution		Two Chip Solution	
Model Name	SWB-B10	SWB-T30	SWB-A21	SWB-A22
				
WLAN IC Solution	BCM4325	TI1271	AR6002	AR6002
BT IC Solution			BC06	BTS4020
WLAN Connectivity	802.11b/g	802.11/b/g/n	802.11b/g	802.11b/g
BT Connectivity	BT2.1+EDR +FM	BT2.1+EDR +FM T/Rx	BT2.1+EDR	BT2.1+EDR
WLAN IC Size	6.40x5.70x0.40	4.56x5.03x0.43	4.70x4.90x0.33	4.90x4.70x0.33
BT IC Size			3.20x3.40x0.60	3.20x3.20x0.30
Module Size	8.10x9.50x1.30	7.00x8.90x1.4	9.90x9.90x1.30	10.00x10.00x1.30
Rx Sensitivity [dBm] 11Mbps / 54Mbps	-88 / -73	TBD	-87 / -73	-87 / -73
Tx Power [dBm] 11Mbps / 54Mbps	17 / 14	TBD	17 / 13	17 / 13
Schedule(ES)	'08.08	'08.11	Available	Available
Schedule(MP)	'08.09	'09.Q1	'08.Q3	'08.Q3

Wireless Connectivity Solution

- Headset -



Contents

- **Main Production**
- **Basic Block Diagram**
- **Products overview**
- **Development scope**
- **Tuning scope**
- **Business Proposal**
- **BT application products**

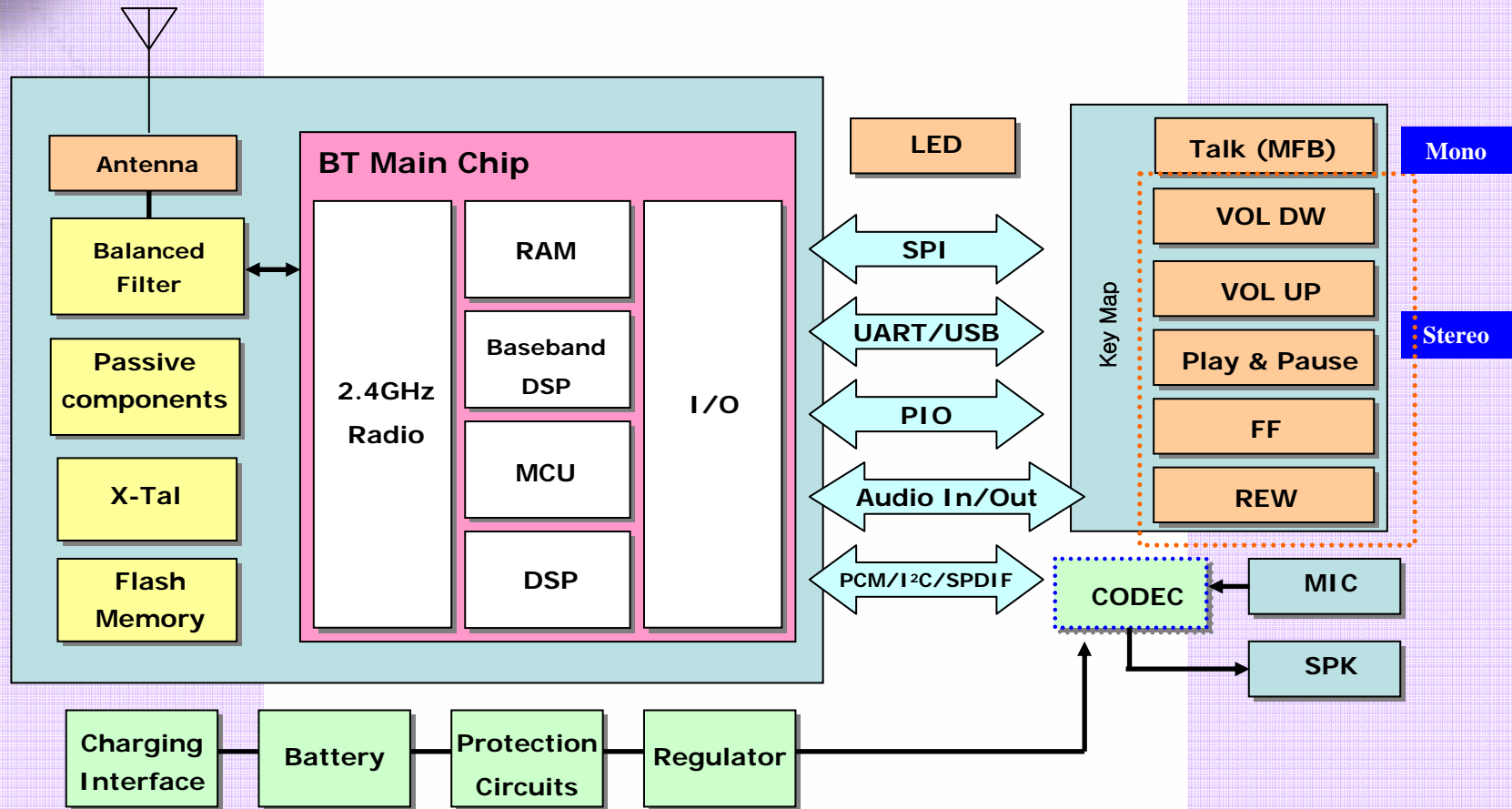


Main Production

Model	Mono-1	Mono-2	Mono-3	Mono	Stereo	BT + FM
Products						
Module						
Size	17 × 12 × 2.2T	22 × 11 × 5.2T	27 × 22 × 2.0T	22 × 21 × 6.2T	45 × 22 × 2.85T	27 × 22 × 2.0T
Feature	<ul style="list-style-type: none"> ▪ Mono Headset ▪ BT V1.2 ▪ Million seller 	<ul style="list-style-type: none"> ▪ Mono Headset ▪ BT V2.0 ▪ In ear type ▪ Slim & Tiny size 	<ul style="list-style-type: none"> ▪ Mono Headset ▪ BT V2.0 + EDR ▪ Noise Cancellation ▪ Auto Volume ctrl ▪ Dual MIC 	<ul style="list-style-type: none"> ▪ Mono Headset ▪ BT V2.1 + EDR ▪ Noise Cancellation ▪ Ear hook ▪ Dual MIC 	<ul style="list-style-type: none"> ▪ Stereo Headset ▪ BT V2.0 ▪ Neck band type ▪ Good audio qual. 	<ul style="list-style-type: none"> ▪ Stereo Headset ▪ BT V2.1 + EDR ▪ Clip & Necklace ▪ OLED [display] ▪ FM Receiver
Main IC	CSR BC03AF	CSR BC03AF	CSR BC05MM 8Mb Flash memory	CSR BC05MM 8Mb Flash memory	CSR BC03MM SST Flash Memory	CSR BC05MM Ci-Lab u-COM FM Receiver IC
Time	Talk : 4 hours	Talk : 4 hours	Talk : 4 hours	Talk : 6 hours	Talk : 7 hours Music: 6 hours	Talk : 7 hours Music : 6 hours



Basic Block Diagram



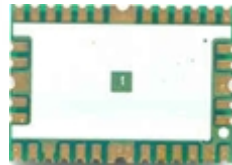
Mono-1 overview



Million Seller Model



Top view



Bottom view

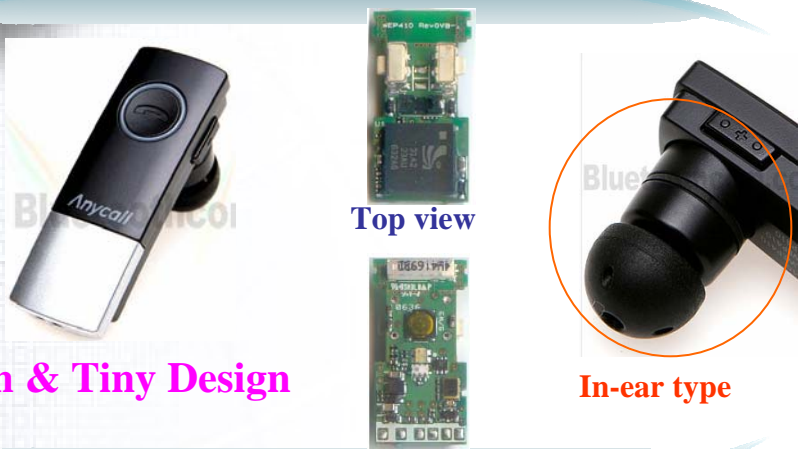
General Spec

- **Chipset** BC03 Audio Flash
- **Size** **17mm × 12mm × 2.2T**
- **Bluetooth version** V1.2 Compliant
- **Battery Supply voltage** 2.8V ~ 4.2V
- **Output Power class** Class2, 1dBm Typ. (Max. +4dBm)
- **Interface** Audio, UART, PIOs
- **Built-in Memory** 6Mbit Flash
- **Package type** Castellation package (36 terminations)
- **Operation Temperature** -30 to 70°C (storage -40 to 85°C)

RF Characteristics

No.	Items	Specification			unit	Conditions
		Min.	Typ.	Max.		
1	TX Output Power	-6	1.0	4	dBm	-Conducted
2	TX Frequency Accuracy	-75	Within +/- 15	75	KHz	- Tested with '01010101' Test Scenario
3	TX Frequency Drift	-25	Within +/- 15	25	KHz	-Test with '01010101' Test Scenario - DH1 packet
4	TX Frequency Deviation (Test Channel : 39only)	140	165	175	KHz	- '00001111' Test Scenario
		120	160	-	KHz	- '01010101' Test Scenario
5	BER	-	-82	-70	dBm	- 'ACL Lookback whitened' Scenario - Freq. Hopping & BER=0.1%

Mono-2 overview



Slim & Tiny Design

Top view

In-ear type

General Spec

- **Chipset** BC03 Audio Flash
- **Size** **22mm × 11mm × 5.2T**
- **Bluetooth version** V2.0 Compliant
- **Battery Supply voltage** 2.8V ~ 4.2V
- **Output Power class** Class2, 1.5dBm Typ. (Max. +4dBm)
- **Interface** Audio, UART, PIOs
- **Built-in Memory** 6Mbit Flash
- **Inner Reference Clock** 26MHz
- **Operation Temperature** -30 to 70 °C (storage -40 to 85 °C)

RF Characteristics

No.	Items	Specification			unit	Conditions
		Min.	Typ.	Max.		
1	TX Output Power	-6	1.5	4	dBm	-Conducted
2	TX Frequency Accuracy	-75	Within +/- 30	75	KHz	- Tested with '01010101' Test Scenario
3	TX Frequency Drift	-25	Within +/- 15	25	KHz	-Test with '01010101' Test Scenario - DH1 packet
3	Maximum Drift Rate	-20	Within +/- 15	20	KHz	"
4	TX Frequency Deviation (Test Channel : 39only)	140	165	175	KHz	- '00001111' Test Scenario
		120	160	-	KHz	- '01010101' Test Scenario
5	BER	-	-84	-70	dBm	-'ACL Lookback whitened' Scenario - Freq. Hopping & BER=0.1%

Mono-3 overview



Ultra Slim coin type



Top view



Bottom view

- **DSP Noise Reduction**
- **Echo Cancellation**
- **2-MIC system**
- **Auto Volume Control**

General Spec

- **Chipset** BC05 Multi-Media Chip
- **Size** **27mm × 22mm × 2.0T**
- **Bluetooth version** V2.0 + EDR Compliant
- **Battery Supply voltage** 2.8V ~ 4.2V
- **Output Power class** Class2, 1.5dBm Typ. (Max. +4dBm)
- **Interface** Audio, UART, PIOs
- **Memory Interface** 8Mbit Flash
- **Inner Reference Clock** 26MHz
- **Operation Temperature** -30 to 70°C (storage -40 to 85°C)

RF Characteristics

No.	Items	Specification			unit	Conditions
		Min.	Typ.	Max.		
1	TX Output Power	-6	1.0	4	dBm	-Conducted
2	TX Frequency Accuracy	-75	Within +/- 15	75	KHz	- Tested with '01010101' Test Scenario
3	TX Frequency Drift	-25	Within +/- 15	25	KHz	-Test with '01010101' Test Scenario - DH1 packet
4	TX Frequency Deviation (Test Channel : 39only)	140	165	175	KHz	- '00001111' Test Scenario
		120	160	-	KHz	- '01010101' Test Scenario
5	BER	-	-86	-70	dBm	-'ACL Lookback whitened' Scenario - Freq. Hopping & BER=0.1%

Stereo overview



High Quality Audio



Right PBA



Left PBA

- Neck Band Type
- Multi Paring
- High Quality CODEC

General Spec

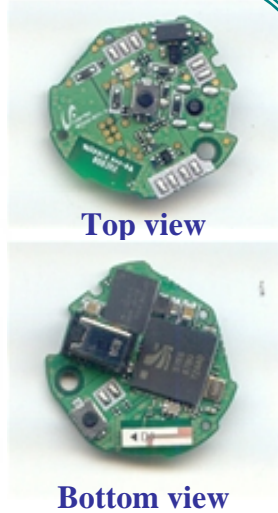
- *Chipset* BC03 Multi-Media Chip
- *Size* **45mm × 22mm × 2.85T**
- *Bluetooth version* V2.0 Compliant
- *Battery Supply voltage* 3.3V ~ 4.2V
- *Output Power class* Class2, 1.0dBm Typ. (Max. +4dBm)
- *Interface* Audio, UART, PIOs
- *Built-in Memory* 8Mbit Flash
- *Inner Reference Clock* 12MHz
- *Operation Temperature* -20 to 60°C (storage -30 to 75°C)

RF Characteristics

No.	Items	Specification			unit	Conditions
		Min.	Typ.	Max.		
1	TX Output Power	-6	1.0	4	dBm	-Conducted
2	TX Frequency Accuracy	-75	Within +/- 15	75	KHz	- Tested with '01010101' Test Scenario
3	TX Frequency Drift	-25	Within +/- 15	25	KHz	-Test with '01010101' Test Scenario - DH1 packet
4	TX Frequency Deviation (Test Channel : 39only)	140	165	175	KHz	- '00001111' Test Scenario
		120	160	-	KHz	- '01010101' Test Scenario
5	BER	-	-80	-70	dBm	-'ACL Lookback whitened' Scenario - Freq. Hopping & BER=0.1%

New Products overview

New



General Spec

- <i>Chipset</i>	BC05 Multi-Media Chip
- <i>Size</i>	23mm × 20mm × 5.9T
- <i>Bluetooth version</i>	V2.1 + EDR Compliant
- <i>Battery Supply voltage</i>	3.3V ~ 4.2V
- <i>Memory Interface</i>	8Mbit Flash
- <i>Inner Reference Clock</i>	26MHz
- <i>Operation Temperature</i>	-30 to 70°C (storage -40 to 85°C)

Noise Reduction Performance

Stationary noise reduction	Up to 22dB
Non-stationary noise reduction	Up to 22dB
Speech attenuation at receiving side	0dB
Speech attenuation at sending side	≤3dB
Start-up behavior stationary noise reduction	≥22dB after 4sec
Change in behavior non-stationary noise reduction	≥22dB immediately after change
Quality of speech during double talk (MOS score)	Good → based on listening tests
Intelligibility of speech during double talk (MOS score)	Good → based on listening tests

- **DSP Noise Reduction**
- **Echo Cancellation**
- **2-MIC system**
- **Auto Volume Control**
- **Talk time 7 hours**
- **Ear Hook type**

New Products overview

BT V2.1 + FM Radio + OLED

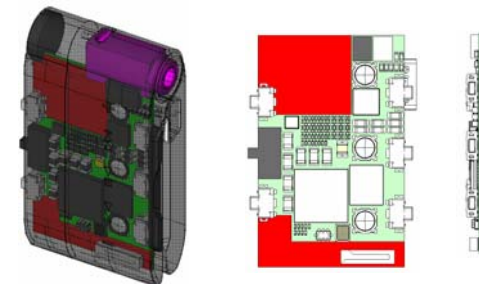
New



- **OLED Display**
- **Clip & Necklace type**
- **Include FM Receiver & u-COM**
- **Include Headset amplifier**
- **Simple pairing & Multi-connection**
- **Good audio quality**
- **Micro USB charging**

General Spec

- **Chipset** BC05 Multi-Media Chip
- **Size** **26mm × 45mm × 4.0T**
- **Bluetooth version** V2.1 + EDR Compliant
- **Battery Supply voltage** 3.3V ~ 4.2V
- **Memory Interface** 8Mbit Flash
- **Inner Reference Clock** 26MHz
- **Operation Temperature** -30 to 70°C (storage -40 to 85°C)

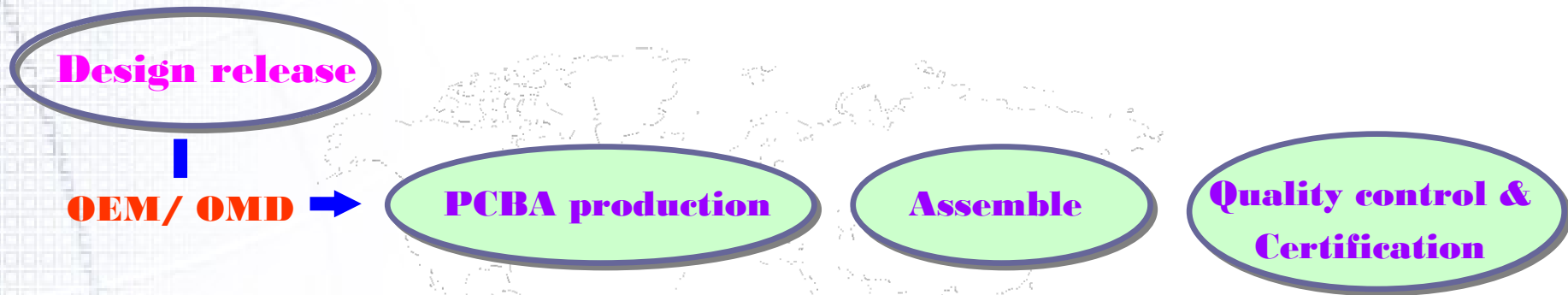




Business Proposal

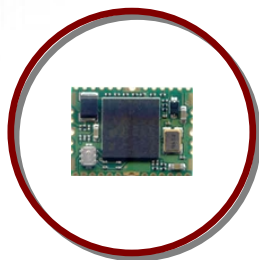
Possible to New Design & Production

If your design release, we will make it from development to production.



Variable business form

Module, COB full PCBa or including to full ass'y and other BT application



Module Biz



PCBa Biz



Full Ass'y Biz



BT Application Biz

BT Application Products



BT Headset

Mono, Stereo. Main Products



BT Speaker

Note PC, Game.. Portable Products

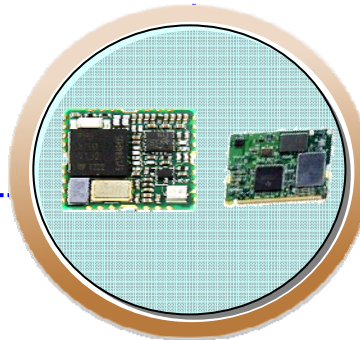
Conference set

Moving office



BT Hands Free

For car inner



Wireless Connectivity Solution

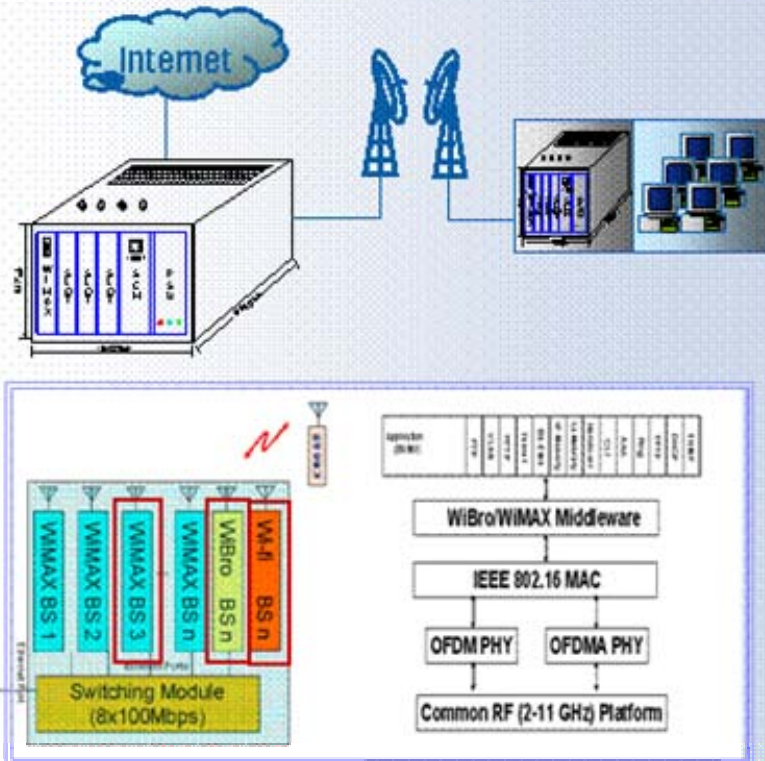
- WiMAX -

WiMAX 제품 개요

WiMAX (Worldwide Interoperability for Microwave Access)란?

- 휴대 인터넷 서비스를 제공하기 위한 Mobile BWA(Broadband Wireless Access)로 기존 고정 BWA 기술의 이동성, 전송률의 한계 극복을 위해 발전
- Fixed WiMAX → mWiMAX로 발전

WiMax System

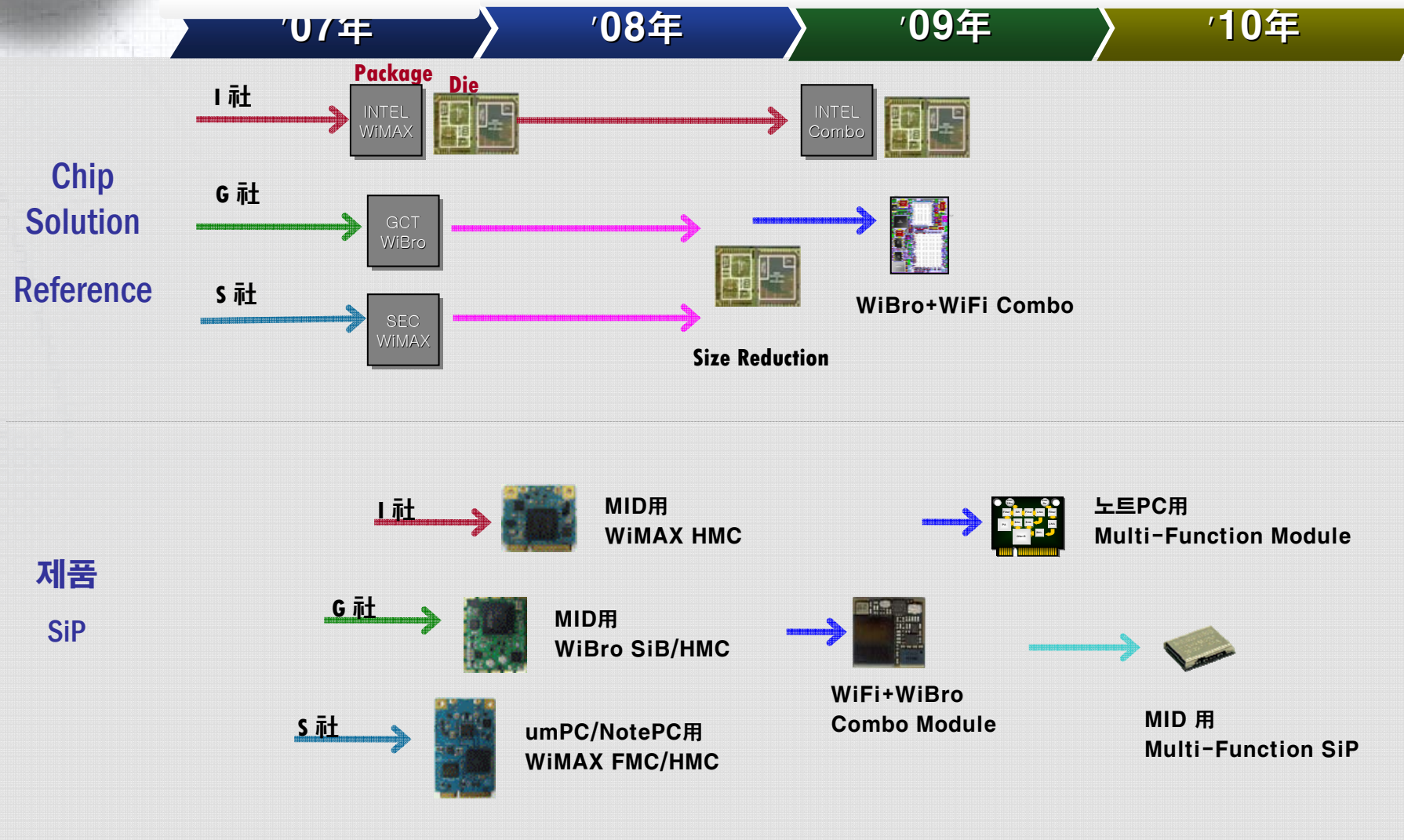


APPLICATION





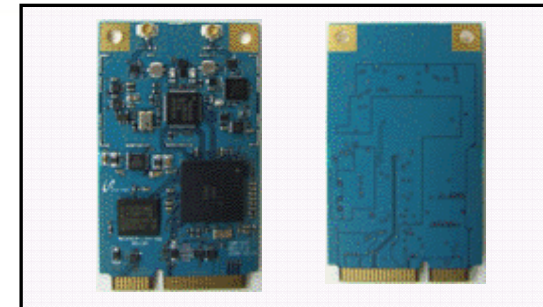
Road MAP of mobile WiMAX / WiBro





SWM-S10 WiMAX Full-Mini Card

Product Description	[SWM-S10] Full Functional Mobile WiMAX FMC* IEEE 802.16e Wave2 Compliant 2.5~2.6GHz Single Band Supported ANTs:2 U.FL Connector/1TX,2RX Host Interface : USB2.0 * Full-Mini Card : 30 x 50.95 x 3.0 mm
Usage Model	Mobile WiMAX Module inside UMPC/MID
Differentiation	SEC is the Leader of WiBro & mWiMAX Qualified, reliable Solution
Geography Availability	2.5~2.7GHz Single Band enabled region
SW Status	Supported OS: Vista, XP, Linux Connect Manager for XP is possible.
Contact Information	JG Park / Sales Manager / bluestra@samsung.com / +82-31-218-2445 Jung Kim / US Business Development Manager / jung-uk.kim@samsung.com / 949-797-8027
URL	http://www.sem.samsung.com



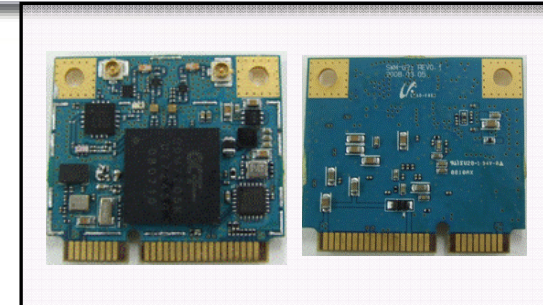
Product Specification	
Protocol	IEEE802.16e
Size	30X50.95(mm)
Thickness	3.0 (mm)
Freq.	2.5~2.7 (GHz)
I/F	USB2.0
Ant.	2 U.FL

Apr. 08	May.08	July.08
Working Sample	Engineer Sample	Mass Product



SWM-G21 WiMAX Half-Mini Card

Product Description	[SWM-G21] Full Functional Mobile WiMAX HMC* IEEE 802.16e Wave2 Compliant 2.5~2.7GHz Band Supported ANTs:2 U.FL Connector/1TX,2RX Host Interface : USB2.0 * Half-Mini Card : 26.8 x 30 x 3.5 mm
Usage Model	Mobile WiMAX Module inside UMPC/MID
Differentiation	Cost effective, Good Performance
Geography Availability	2.5~2.7GHz Single Band enabled region
Driver Status	Supported OS: Linux, Vista, XP Win CE : possible
Contact Information	JG Park / Sales Manager / bluestra@samsung.com / +82-31-218-2445 Jung Kim / US Business Development Manager / jung-uk.kim@samsung.com / 949-797-8027
URL	http://www.sem.samsung.com



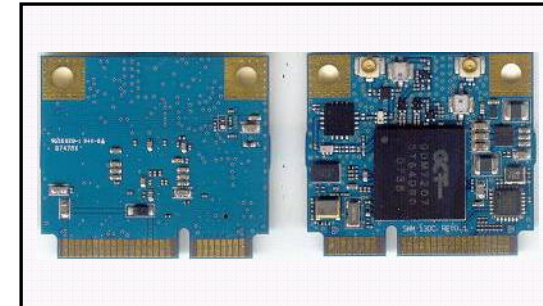
Product Specification	
Protocol	IEEE802.16e
Size	26.8X30(mm)
Thickness	3.5 (mm)
Freq.	2.5~2.7 (GHz)
I/F	USB2.0
Ant.	2 U.FL

Apr.08	May.08	Aug.08
Working Sample	Engineer Sample	Mass Product



SWM-G11 WiBro Half-Mini Card

Product Description	[SWM-G11] Full Functional WiBro HMC* Korea WiBro/Wave2 Compliant 2.3GHz Single Band Supported ANTs:2 U.FL Connector/1TX,2RX * Half-Mini Card : 26.8 x 30 x 3.5 mm
Usage Model	Mobile WiMAX Module inside UMPC/MID
Differentiation	Cost effective, Good Performance
Geography Availability	2.3 GHz Single Band enabled region
Driver Status	Supported OS: Linux, Vista, XP Win CE : possible For Other Mobile OS : possible
Contact Information	JG Park / Sales Manager / bluestra@samsung.com / +82-31-218-2445 Jung Kim / US Business Development Manager / jung-uk.kim@samsung.com / 949-797-8027
URL	http://www.sem.samsung.com



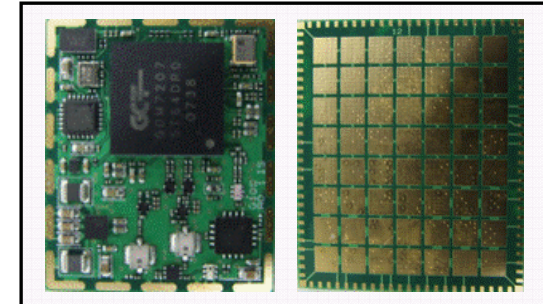
Product Specification	
Protocol	IEEE802.16e
Size	26.8X30(mm)
Thickness	3.5 (mm)
Freq.	2.3 (GHz)
I/F	USB2.0
Ant.	2 U.FL

Apr.08	May.08	Aug.08
Working Sample	Engineer Sample	Mass Product



SWM-G12 WiBro SiB Module

Product Description	[SWM-G12] Full Functional WiBro SiB Module Korea WiBro/Wave2 Compliant 2.3GHz Single Band Supported ANTs:2 U.FL Connector/1TX,2RX Host Interface : USB2.0 & SDIO * SiB Module : 25 x 30 x 2.5 mm, 102pin LGA
Usage Model	WiBro Module inside UMPC/MID
Differentiation	Best Fit to Korean WiBro Service
Geography Availability	2.3GHz Single Band enabled region – Especially for Korean Market
Driver Status	Supported OS: Linux, Vista, XP Win CE : possible For Other Mobile OS : possible
Contact Information	JG Park / Sales Manager / bluestra@samsung.com / +82-31-218-2445 Jung Kim / US Business Development Manager / jung-uk.kim@samsung.com / 949-797-8027
URL	http://www.sem.samsung.com



Product Specification	
Protocol	IEEE802.16e
Size	25X30(mm)
Thickness	Typ. 2.3 (mm)
Freq.	2.3 (GHz)
I/F	USB, SDIO
Ant.	2 Port on Pin

Apr.08	May.08	July.08
Working Sample	Engineer Sample	Mass Product

Wireless Connectivity Solution

ZigBee SoC



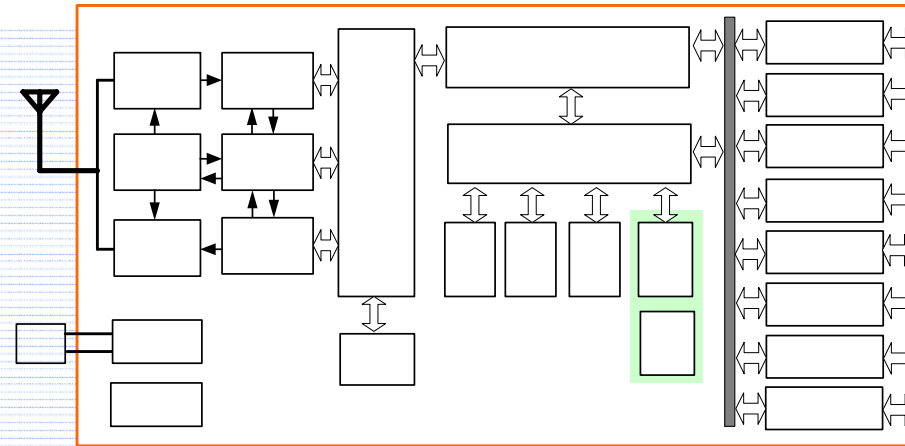
SEMCO ZigBee SoC

SEMCO ICPZB240

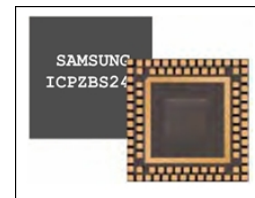
Features

Module	TBD
Interface	UART, PCM, SPI, I2C, ..
Frequency	2.4GHz
Spec	IEEE 802.15.4
Chip PKG Size	7.0 x 7.0 x 0.9T
Schedule	WS : Available MP : Q1. '08
Etc..	Memory: 128Kbyte Flash, 8Kbyte RAM

Block-Diagram

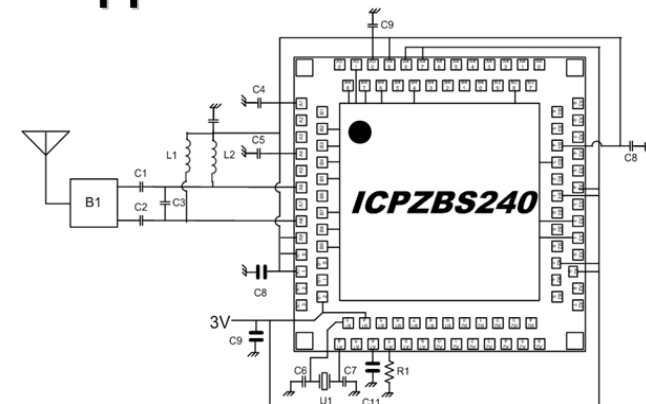


Package



TAPP 100Pin

Application Circuits



** The module size is subject to change without notice*

Thank you

문웅한 수석

uhmoon@samsung.com