



## EM-wise Communications Company

*A Leader at Innovative Microwave Components*

*"We Tame EM Waves Wisely!"*

- Innovative Low-cost UWB Components
- Low Phase Noise Signal Sources
- Microwave/mm-wave Transceivers



## Message from CEO

Our company, EM-wise Communications, designs and produces pioneering microwave/mm-wave components, subsystems, and systems for mobile/wireless industries, satellite communications, and defence industries.

The company foundation is based on many years of experiences of company founders at industries and universities in microwave and EM fields.

Our company possesses advanced proprietary technologies to design and produce microwave/mm-wave transceivers, oscillators, frequency synthesizers, antennas, filters, mixers, frequency multipliers, phase shifters as well as the microwave/mm-wave systems which integrate the above components, for commercial wireless communications and military applications.

As a recent research result, we patented on an ultra-wideband balun and its application modules, and began to produce ultra-wideband (UWB) products which utilize the balun.

Among them are ultra-wideband double-balanced mixers, frequency doublers, signal inverters, detectors, and antennas.



**Dr. Kang Wook Kim**  
President  
( Professor at KNU\* )



**Prof. Young-Ki Cho**  
Chief Consultant  
( Professor at KNU\*  
President of KIEE\*\* )

Also, since the structure of the ultra-wideband balun is uniplanar, the implementation cost of the UWB components with 10s of GHz bandwidth is very low as compared with the conventional ones, and enables to produce new surface-mountable UWB components for mass production.

Our company will keep collaborating internationally with other universities, research institutes, and other companies. Our company has a slogan, "We Tame EM Waves Wisely!," and will continuously endeavor to become a world-leader in pioneering technologies of microwave/mm-wave components and systems.

The following are our company's goals:

1. A company that ultimately focuses on pioneering EM technologies.
2. A company that sets priority in customer satisfactions, and keeps promises.
3. A company that appreciates talents of people, and helps them to be the experts.

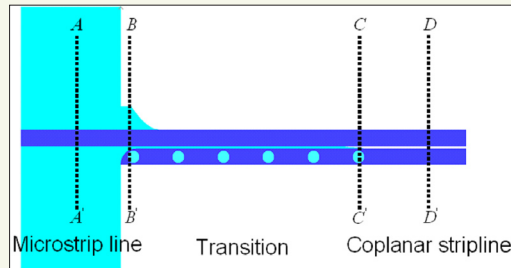
\*KNU  
Kyungpook  
National University

\*\*KIEE  
The Korean Institute of Electromagnetic  
Engineering and Science

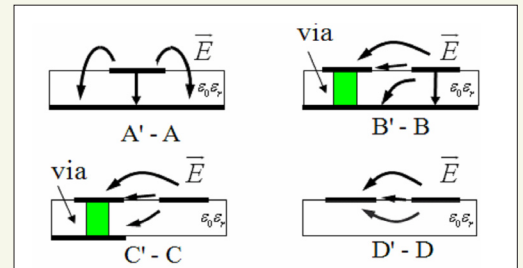
# 1 Ultra-wideband (UWB) Components

Products

Description



[ Ultra-wideband balun ]



[ Cross-sections and field ]

Ultra-wideband components are constructed using a novel uniplanar ultra-wideband balun, which has been developed and patented by our company in 2007. This balun is a structure which converts signals from a microstrip line (unbalanced line) to a coplanar strip line (CPS; balanced line). The balun has proved its ultra-wideband operating frequency range from DC to over 40 GHz. Utilizing this balun, our company is currently developing a variety of ultra-wideband components with 10s of GHz bandwidth, including double-balanced mixers, frequency doublers, detectors, antennas, and other modules which integrates the UWB components.

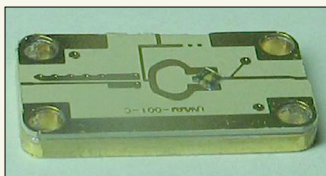
Thanks to excellent properties of this new balun, our ultra-wideband components show equal or better performance as compared with the conventional ultra-wideband balun products, but the component implementation cost can be much lower.

## 1 Ultra-wideband Double-balanced Mixers

- Features**
- Low cost
  - Low conversion loss
  - Standard package options :  
Housing (0.71"x0.7"x0.4") or carrier (0.6"x0.32"x0.04")
  - Custom designs (electrical specs. or package type) are possible.



[ housing type ]



[ carrier type ]

Model Number	RF/LO Freq.	IF Freq.	Conversion Loss
UWMM-R3T10G	3~10 GHz	DC ~ 3 GHz	Typ. 5.5 dB
UWMM-C3T12G	3~12 GHz	DC ~ 3 GHz	Typ. 6 dB
UWMM-C3T20G	3~20 GHz	DC ~ 3 GHz	Typ. 7 dB
UWMM-U3T29G	3~29 GHz	DC ~ 1 GHz	Typ. 7 dB
UWMM-U4T35G	4~35 GHz	DC ~ 1 GHz	Typ. 7 dB

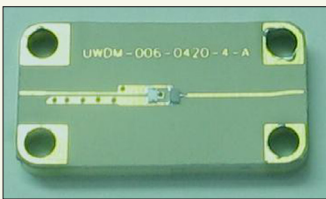
\* Customized ultra-wideband mixers can be ordered. Please fill out your mixer specifications in the [On-line Product Order](#) page. We will send you a fast quotation which contains the cost and delivery information of your customized product.

## 2 Ultra-wideband Frequency Doublers

- Features**
- Low cost
  - Low conversion loss
  - Standard package options :  
Housing (0.71"x0.7"x0.4") or carrier (0.6"x0.32"x0.04" or 0.32"x0.32"x0.04")
  - Custom designs (electrical specs. or package type) are possible.



[ housing type ]



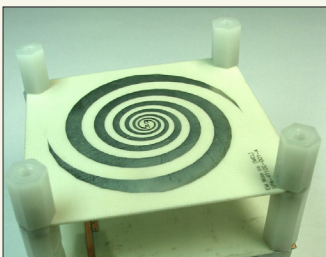
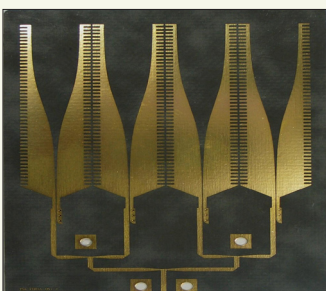
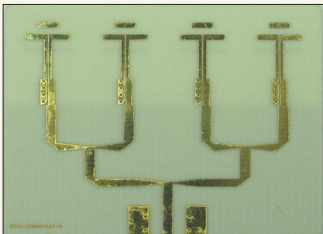
[ carrier type ]

Model Number	Input Freq.	Output Freq.	Conversion Loss
UWDM-D4T20G	2~10 GHz	4~20 GHz	Typ. 10 dB
UWDM-S8T36G	4~18 GHz	8~36 GHz	Typ. 10 dB
UWDM-S12T42G	6~21 GHz	12~42 GHz	Typ. 10 dB
UWDM-S10T41G	5~20.5 GHz	10~41 GHz	Typ. 10 dB
UWDM-D3T22G	1.5~11 GHz	3~22 GHz	Typ. 10 dB

\* Customized ultra-wideband frequency doublers can be ordered. Please fill out your doubler specifications in the [On-line Product Order](#) page. We will send you a fast quotation which contains the cost and delivery information of your customized product.

## 3 Ultra-wideband Antennas

- Features**
- Low cost
  - Custom designs (antenna configurations or electrical specs.) are possible.



Model Number	Operating Freq. (GHz)	Antenna Gain (dBi)	HPBW (deg)	Sidelobe Level (dB)	Antenna Type
QYA-7T12G-01	7~12	4~6	75~85	-	Quasi-Yagi
QYA-7T12G-08	7~12	10~12	7~12	12~15	Quasi-Yagi
QYA-10T17G-01	10~17	5~6	75~85	-	Quasi-Yagi
QYA-10T17G-08	10~17	11~12	7~12	12~15	Quasi-Yagi
QYA-20T27G-01	20~27	5~6	75~85	-	Quasi-Yagi
QYA-20T27G-04	20~27	8~10	7~11	11~13	Quasi-Yagi
QYA-30T41G-01	30~41	5~5.6	75~82	-	Quasi-Yagi
QYA-30T41G-08	30~41	10~13	6~9	10~13	Quasi-Yagi
TSA-23T58G-01	23~58	12~14	28~38	14~17	Fermi Slot
TSA-23T48G-04	23~48	15~19	9~13	10~16	Fermi Slot
BTA-6T15G	6~15	3~5	-	-	Bow-tie
SPA-4T10G	4~10G	2~5	-	-	Log Spiral
SPA-1T10G	1~10G	2~5	-	-	Log Spiral

\* Customized ultra-wideband antennas can be ordered. Please fill out your antenna specifications (e.g., antenna type, center frequency, frequency bandwidth, antenna gain, etc.) in the [On-line Product Order](#) page. We will send you a fast quotation which contains the cost and delivery information of your customized product.

## 2 ■■■■ Low Phase Noise Oscillators/Frequency Synthesizers

### Products

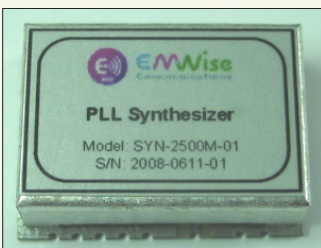
### Description

#### Features

- Low cost
- Low phase noise
- Custom designs (electrical specs. or package options) are possible.

Our company produces various frequency sources such as microwave frequency synthesizers, voltage-controlled DROs (Dielectric Resonator Oscillator), and PL-DROs (Phase-Locked DRO). By using a proprietary digital frequency acquisition circuit in the phase-locked loop, the PL-DROs are better stabilized in the presence of temperature changes and vibrations.

Our standard oscillators/frequency synthesizers covers up to 12 GHz, but customized frequency sources up to mm-wave frequencies are possible by integrating with frequency multipliers.



Model Number	Output Freq.	Output Power	Typical Phase Noise	
SYN-2050M-01	2.50 GHz (±50 MHz)	+10 dBm	-85 dBc/Hz	@1kHz
			-103 dBc/Hz	@10kHz
			-123 dBc/Hz	@100kHz
SYN-10G-01	10 GHz (fixed or ± 200MHz)	+10 dBm	-70 dBc/Hz	@1kHz
			-90 dBc/Hz	@10kHz
			-115 dBc/Hz	@100kHz
VCDRO-10G-01	10 GHz (±3.5 MHz)	+ 9 dBm	-70 dBc/Hz	@1kHz
			-97 dBc/Hz	@10kHz
			-117 dBc/Hz	@100kHz
PLDRO-10G-01	10 GHz	+10 dBm	-107 dBc/Hz	@1kHz
			-107 dBc/Hz	@10kHz
			-114 dBc/Hz	@100kHz

\* Customized oscillators (or frequency synthesizers) operating at different frequencies up to 60 GHz can be ordered. Please fill out your oscillator/synthesizer specifications (e.g., center frequency, frequency bandwidth, output power, phase noise, etc.) in the [On-line Product Order](#) page. We will send you a fast quotation which contains the cost and delivery information of your customized product.



# 3 Microwave/mm-wave Transceivers

Products

Description

## Features

- Low cost
- Custom designs (electrical specs. or package options) are possible.

Our company has developed transceivers up to 60 GHz. The transceivers include frequency up-converters, down-converters, and oscillators/frequency synthesizers. We have developed the low-cost, high-performance waveguide-to-microstrip transition. Also, we have competitive solutions in implementing low-cost commercial transceivers which integrate filters, mixers, amplifiers, attenuators, oscillators, etc.

## 1 Up-Converters

Model Number	Operating Freq.	IF Freq.	P1 dB	Conv. Gain
TX-11G-01	11 GHz	1 GHz	+25 dBm	35 dB
TX-18G-01	18 GHz	2 GHz	+25 dBm	35 dB
TX-23G-01	23 GHz	2 GHz	+25 dBm	35 dB
TX-38G-01	38 GHz	2 GHz	+25 dBm	35 dB
TX-60G-01	60 GHz	2 GHz	+10 dBm	20 dB

## 2 Down-Converters

Model Number	Operating Freq.	IF Freq.	P1 dB	Conv. Gain
TX-11G-01	11 GHz	1 GHz	3 dBm	30 dB
TX-18G-01	18 GHz	2 GHz	4 dBm	30 dB
TX-23G-01	23 GHz	2 GHz	4 dBm	20 dB
TX-38G-01	38 GHz	2 GHz	5 dBm	20 dB
TX-60G-01	60 GHz	2 GHz	7 dBm	20 dB

## 3 Microwave/mm-wave Transceiver (Customized)

Model Number	Operating Freq.	IF Freq.	P1 dB	Conv. Gain
CTRS-XXG-01	XX GHz (±XX GHz)	XX GHz	+XX dBm	XX dB

\* Customized microwave/mm-wave up/down-converters and transceivers can be ordered. The transceiver integrates an up-converter, a down-converter, and an oscillator in the same housing.

However, each of transceiver modules (an up-converter, a down-converter, and an oscillator) can be packaged in a separate housing. Please fill out your up/down-converters or transceiver specifications (e.g., operating frequency, IF frequency (TX/RX), LO frequency (TX/RX), Output P1 dB (TX), Conversion gain (TX/RX), noise figure (RX), etc.) in the [On-line Product Order](#) page. We will send you a fast quotation which contains the cost and delivery information of your customized product.

# 4 <sup>◆◆◆◆</sup> Microwave/mm-wave Amplifiers

Products

Description

- Features**
- Low cost
  - Custom designs (electrical specs. or package options) are possible.
  - Standard package : Housing ( 1.2" X 1" X 0.4" )

**W**e offer microwave/mm-wave amplifiers up to 60 GHz, categorized by the operating frequency, frequency bandwidth, and output power.

## 1 Low Noise Amplifiers

Model Number	Operating Freq. (GHz)	Gain (dB)	Psat (dBm)	OIP3 (dBm)	NF (dB)
LNA-07T17G-01	7~17 GHz	20	13	20	2.5
LNA-17T24G-01	17~24 GHz	20	10	18	3
LNA-24T38G-01	24~38 GHz	18	9	15	2.2
LNA-35T45G-01	35~45 GHz	15	6	-	2.5
LNA-58T64G-01	58~64 GHz	20	10	-	3.8

## 2 Driving Amplifiers

Model Number	Operating Freq. (GHz)	Gain (dB)	Psat (dBm)	OIP3 (dBm)	NF (dB)
DRA-06T22G-01	6~22 GHz	18	18	28	5
DRA-20T40G-01	20~40 GHz	20	20	29	8
DRA-33T45G-01	33~47 GHz	18	25	37	-
DRA-55T65G-01	55~65 GHz	14	16	25	-

## 3 Power Amplifiers

Model Number	Operating Freq. (GHz)	Gain (dB)	Psat (dBm)	OIP3 (dBm)	NF (dB)
PWA-07T16G-01	7~16 GHz	20	30	37	-
PWA-17T24G-01	17~24 GHz	18	33	42	-
PWA-27T31G-01	27~31 GHz	20	33	36	-
PWA-30T40G-01	30~40 GHz	18	33	-	-
PWA-40T45G-01	40~45 GHz	9	29	-	-

\* **Customized amplifiers for your specifications can be ordered.** Please fill out your amplifier specifications (e.g., operating frequency range, P1dB, IP3, noise figure, etc.) in the [On-line Product Order](#) page. We will send you a fast quotation which contains the cost and delivery information of your customized product.

## Contact Us

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