

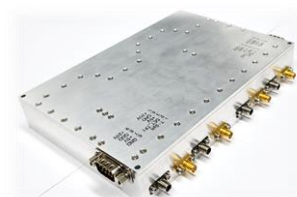
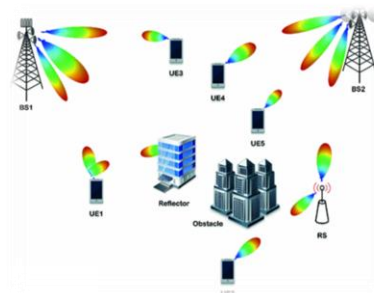
WAVETRACK Technology

TRM & UDC Overview

Products Introduce & Core Technologies

Mobile Networks

- Transceiver for 5G Communication
 - 3.5GHz, 28GHz Transceiver modules (2T x2R, 1T x1R) and phased array antenna.



Defense/Military

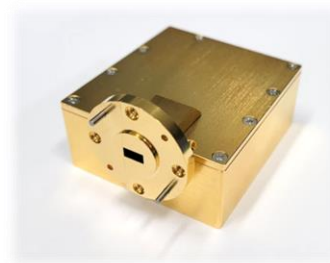
- Radar for Marine and helicopter

- X-band Up-Down Converter , High power pulsed SSPA and FPGA



- Commercial Satellite Communication

- Ka-band 10W BUC, LNB, Q-band SSPA with waveguide combining



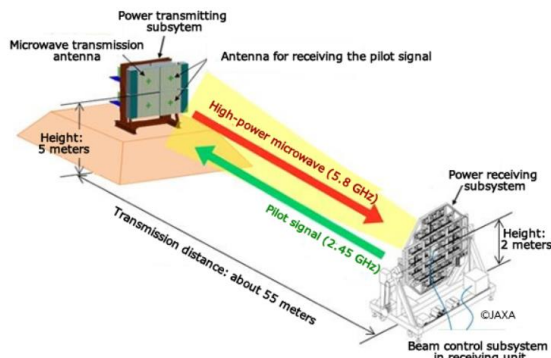
WVETRACK

(주) 웨이브트랙

Defense/Military

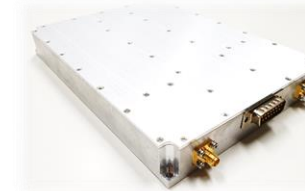
- wireless power transmission system

- 5750~5850MHz 96Channel, 64Channel system for wireless power transmission with beamforming



- Anti-Drone Jammer

- 15MHz to 6GHz 400W to 20W HPA, Power Cut-back for Optimum Power Consumption



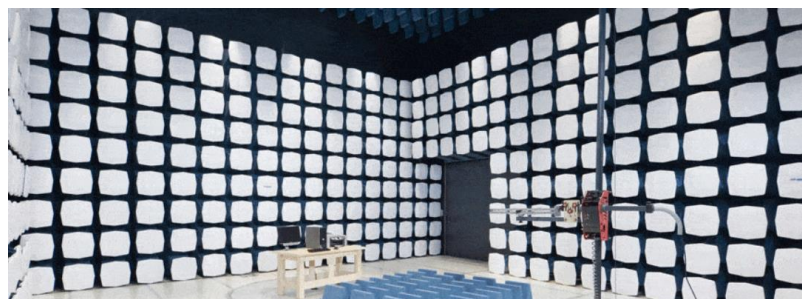
WVETRACK

(주) 웨이브트랙

Defense/Military

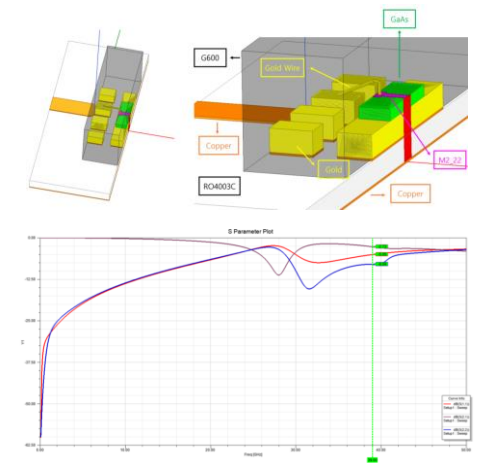
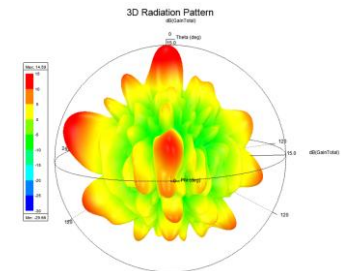
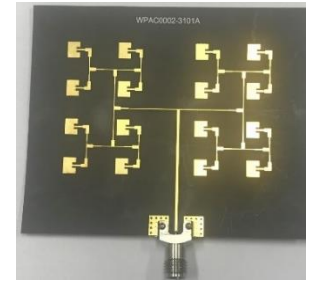
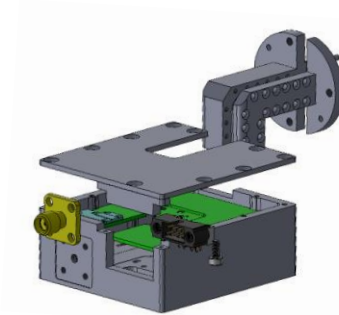
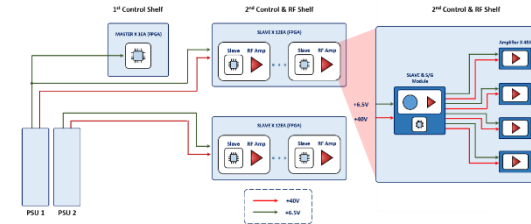
- EMC/EMI, Test & Measurement

- S-band (5KW), C-band (400W), Ka-band (10W) HPA module and Rack for radiation & conduction EMC/EMI testing



Core Technologies

- System Design
- Antenna Technology
- 3D Analysis and Mechanical Design
- Thermal Analysis
- Power Combining Technologies
- High educated Engineer : Over 50% Ph.D and Master Degree
- Total microwave experience 170 year Over
- ISO9001 Certified.

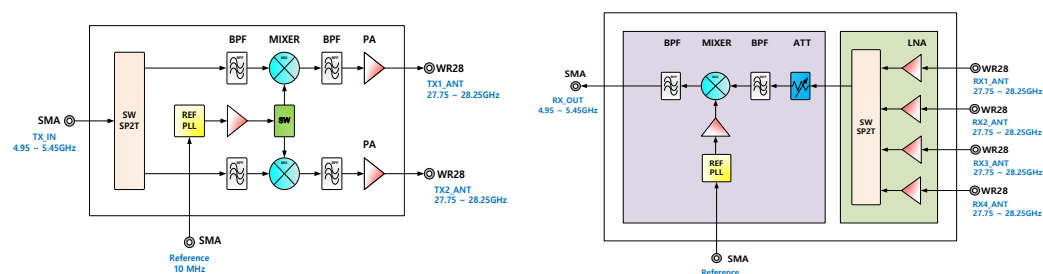


Core customers & Partners



Transceiver Products for 5G communication

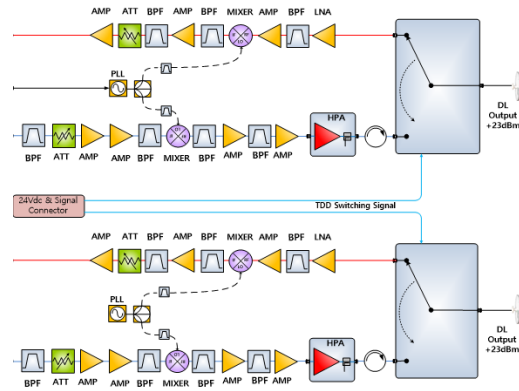
Ka-band 2T*4R channel sounder



- **Application : mmWave Channel Sounder for 5G communication**
- DC fail alarm. Local PLL Lock (2-tone LED)
- Power supply : +27V
- GaN FET Base HPA

Specification (DL)			Comments	Specification (UL)			Comments
1	Input frequency	4.95~5.45GHz		1	Input frequency	27.75~28.25GHz	
2	Output Frequency	27.75~28.25GHz		2	Output Frequency	4.95~5.45GHz	
3	Gain	30dB	Min.	3	Gain	15dB	
4	Input Power	-20~0dBm		4	Input Power	-71~-11dBm	
5	Output Power	10~30dBm	@500MHz	5	Output Power	-56~-16dBm	@500MHz
6	Gain flatness	3.0dB	@500MHz	6	Gain flatness	3.0dB	Peak to Peak
7	ACLR	35dBc	@ Pout =30dBm	7	Nosie Figure	6dB max	Max Gain
8	Spurious	-10dBm	@ Pout =30dBm	8	IIP3	-10dBm	Min
9	Phase noise	-65dBc/Hz@100Hz -83dBc/Hz@1KHz -90dBc/Hz@10KHz -95dBc/Hz@100KHz -110dBc/Hz@1MHz	Ext.10MHz	9	Phase noise	-65dBc/Hz@100Hz -83dBc/Hz@1KHz -90dBc/Hz@10KHz -95dBc/Hz@100KHz -110dBc/Hz@1MHz	Ext.10MHz
10	In/Output VSWR	1.5:1		10	In/Output VSWR	1.5:1	

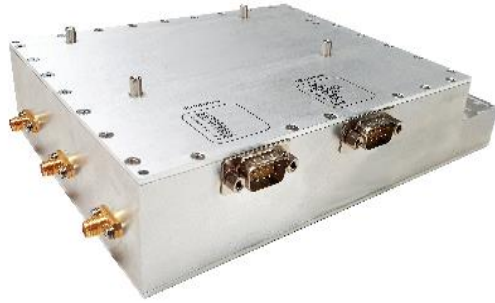
Ka-band 2T*2R Transceiver



- **Application : mmWave 2T*2R Transceiver for 5G communication**
- A control board can be set command using SPI that allows setting the amplifier, PLL or debugging for different output power levels and frequency.
- Over Temperature, Over Power Protection, PLL unlock Alarm
- Power supply : +24V
- GaN FET Base HPA

Specification (DL)				Comments	Specification (UL)				Comments
1	Input frequency	1.8432GHz			1	Input frequency	27.5~28.35GHz		
2	Output Frequency	27.5~28.35GHz			2	Output Frequency	1.8432GHz		
3	Gain	43dB			3	Gain	38dB		
4	Input Power	-20dBm			4	Input Power	-58dBm		
5	Output Power	+23dBm			5	Output Power	-20dBm		
6	Gain flatness	2.0dB	Peak to Peak		6	Gain flatness	2.0dB	Peak to Peak	
7	Harmonic 2 nd	45dBc	Min		7	Nosie Figure	6dB	Max Gain	
8	EVM	2%	Max		8	Switching Time	200nS		
9	In/Output VSWR	1.5:1			9	In/Output VSWR	1.5:1		
10	DL <-> UL Isolation	60dBc	Min		10	Input Power Limited Level	-33dBm		

Ka-band 2T*2R Transceiver



- **Application : mmWave 2T*2R Transceiver for 5G communication**
- A control board can be set command using UART that allows setting the amplifier, PLL or debugging for different output power levels and frequency.
- Over Temperature, Over Power Protection, PLL unlock Alarm
- Power supply : +20V, +5.6V
- GaN FET Base HPA

Specification (DL)				Comments	Specification (UL)				Comments
1	Input frequency	1.8GHz	1.4~2.2GHz		1	Input frequency	26.5~27.3GHz		
2	Output Frequency	26.5~27.3GHz			2	Output Frequency	1.8GHz		
3	Gain	50dB			3	Gain	48dB		
4	Input Power	-25dBm			4	Input Power	-58dBm		
5	Output Power	+25dBm	1Channel 20MHz		5	Output Power	-10dBm		
6	Gain flatness	2.0dB	Peak to Peak		6	Gain flatness	2.0dB	Peak to Peak	
7	ACLR	35dBc	1Channel 20MHz		7	Nosie Figure	3.5dB max	Max Gain	
8	Output Detection Range	+2~+28dBm	CW fixing		8	Output Detection Range	-40~-5dBm	CW fixing	
9	EVM	5%	1Channel 20MHz		9	In/Output VSWR	1.5:1		
10	In/Output VSWR	1.5:1			10	RX switching Time	0.5us		
11	TX switching Time	2us	Rising & Falling						

Ka-band 2T*2R Transceiver

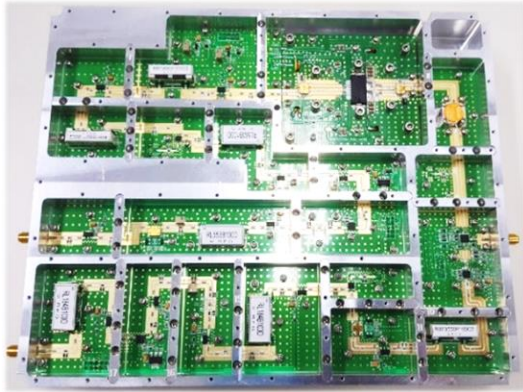


- **Application : mmWave 2T*2R Transceiver for 5G communication**
- A control board can be set command using UART that allows setting the amplifier, PLL or debugging for different output power levels and frequency.
- Over Temperature, Over Power Protection, PLL unlock Alarm
- GaN FET Base HPA

Specification (DL)				Comments
1	Input frequency	1.5GHz	1.1~1.9GHz	
2	Output Frequency	27.7GHz	27.3~28.1GHz	
3	Gain	36dB		
4	Input Power	-16dBm		
5	Output Power	+20dBm		
6	Gain flatness	2.0dB	Peak to Peak	
7	ACLR	32dBc		
8	Output Detection Range	-12~-30dBm	CW fixing	
9	In/Output VSWR	1.5:1		
10	DL <-> UL Isolation	60dBc		

Specification (UL)				Comments
1	Input frequency	27.3~28.1GHz	27.7GHz	
2	Output Frequency	1.5GHz	1.1~1.9GHz	
3	Gain	30dB		
4	Input Power	-57dBm		
5	Output Power	-26dBm		
6	Gain flatness	2.0dB	Peak to Peak	
7	Nosie Figure	4dB max	Max Gain	
8	In/Output VSWR	1.5:1	In/Output VSWR	
9	DL <-> UL Isolation	60dBc	DL <-> UL Isolation	

S-band 1T*1R Transceiver



- **Application : 3.5GHz 1T*1R Transceiver for 5G communication**
- A control board can be set command using UART that allows setting the amplifier, PLL or debugging for different output power levels and frequency.
- Over Temperature, Over Power Protection, PLL unlock Alarm
- Power supply : +28V, +5.6V
- LDMOS Base HPA

Specification (DL)			Comments
1	Input frequency	552.96MHz	
2	Output Frequency	3.5GHz~3.6GHz	LTE 100MHZ
3	Gain	58dB	
4	Input Power	-25dBm	
5	Output Power	+33dBm	
6	Gain flatness	1.5dB	Peak to Peak
7	ACLR	37dBc	1Channel 20MHz
8	EVM	3%	
9	In/Output VSWR	1.5:1	
10	TX switching Time	2us	

Specification (UL)			Comments
1	Input frequency	3.5GHz~3.6GHz	
2	Output Frequency	184.32MHz	
3	Gain	50dB	
4	Input Power	-58dBm	
5	Output Power	-8dBm	
6	Gain flatness	1.5dB	Peak to Peak
7	Nosie Figure	3dB max	Max Gain
8	In/Output VSWR	1.5:1	In/Output VSWR
9	DL <-> UL Isolation	60dBc	DL <-> UL Isolation
10	RX switching Time	0.5us	

3-band Up-down Converter

- Application : Measurement and test simulator
- S-band, C-band, X-band up-down converter
- Power supply : +7.5V



Specification (Up convertor)			
1	Input Frequency	70MHz	
		125MHz	
2	Output Frequency	2.2~2.4GHz	
		5.0~5.2GHz	
		9.0~9.2GH	
3	Input power	-10dBm	
4	Output Power	S-band	10dBm
		C-band	10dBm
		X-band	10dBm
5	Flatness	2dB	
6	Gain control	30dB	
7	VSWR	1.5 : 1	

Specification (Down convertor)			
1	Input Frequency	2.2~2.4GHz	
		5.0~5.2GHz	
		9.0~9.2GH	
2	Output Frequency	70MHz	
		125MHz	
3	Input power	-40dBm	
4	Output Power	S-band	-10dBm
		C-band	-10dBm
		X-band	10dBm
5	Flatness	2dB	
6	NF	6dB	
7	STC	40dB	



Thank you

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