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# 1. Major Products for Military Applications

## 1-1. Radar Applications

## 1-2. UAV Applications

## 1-3. MilSat Applications

# 1-1. Synthesizer for Radar Warning Receiver



Parameter	LO out	RF out
Frequency Range	x.xx~xx.xxGHz	x~xxGHz
Frequency Step	10MHz	10MHz
Frequency Lock Time	<2.5usec	<2usec
output Level	+6dBm	+6dBm
Spurious	<-45dBc	<-30dBc
Harmonics	<-30dBc	<-25dBc
Phase Noise	-70dBc@1kHz -80dBc@10kHz -85dBc@100kHz -85dBc@1MHz	-70dBc@1kHz -80dBc@10kHz -85dBc@100kHz -85dBc@1MHz
Output Frequency Error	Fc+/- 10kHz	Fc+/- 10kHz

## ■ Features

- ▶ Electronic Warfare System

## ■ Applications

- ▶ Radar Warning Receiver

# 1-1. Waveform Generator for Transmitter of Target Searching Radar

84Ch Waveform Generator



# 1-1. Synthesizer for Guided Munition Radar



Frequency		60MHz	1080MHz	x.xx~x.xxGHz
Frequency Step				30MHz
Switching Speed				< 3 msec
Freq. Stability		+/-0.5ppm	+/-0.5ppm	+/-0.5ppm
Phase Noise		-120dBc@100Hz -140dBc@1KHz -150dBc@10KHz	-95dBc@100Hz -115dBc@1KHz -120dBc@10KHz	-70dBc@100Hz -80dBc@1KHz -95dBc@10KHz
Harmonics		< -40dBc	< -40dBc	< -40dBc
Spurious		< -80dBc	< -70dBc	< -60dBc
Output Power	+25°C	+20±1.5dBm	+15±1.5dBm	+15±2dBm
	-40~+70 °C	+20±2dBm	+15±2dBm	+15+4/-3dBm
RF Connectors		SMA-F	SMA-F	SMA-F
Supply Voltage	+15VDC ±5%			
Supply Current	1.5A Typical. 2A MAX.			
Op. Temp. Range	-40~+70 °C			
Storage Temp.	-51~+72 °C			
Altitude	10,000 Feet			
Humidity	95%RH, 10days			

## ■ Features

- ▶ Operating bands from 1 to 18GHz
- ▶ Ultra Low Phase Noise & Low Spurious
- ▶ Typical Phase Noise at 1GHz:  
-115dBc@1KHz offset
- ▶ Wide Bandwidths
- ▶ Extremely small step sizes available
- ▶ Various alarm and interfaces available
- ▶ Applicable for military standards (MIL-STD- 210)

## ■ Applications

- ▶ Ideal for Telecom / Radar / Instrumentation



# 1-2. Transmit-Receive Unit for UAV



ISOLATION	TX-RX: >100dB , RX-RX: >60dB
Insertion Loss	< 2.5dB
Switching Time	< 1usec
In/Output VSWR	< 1.5 : 1
Voltage	+28VDC@Typical (Ripple: 166mVp-p)
Power	< 40W

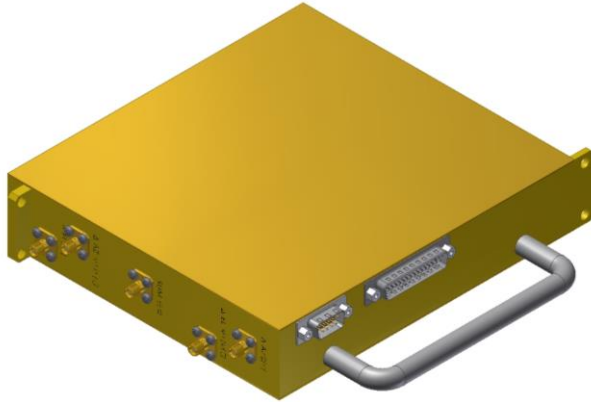
## TX

Input Frequency	xxMHz
Input	-15dBm $\pm$ 1dB, PAPR: 6dB, SC-FDMA (IBW: 4MHz, 2MHz, 1MHz, 500kHz )
Output Frequency	X20 ~ X70 MHz (OBW: 50MHz),
Output Level	30.5dBm, (P1dB: 36.5dBm), Output error : $\pm$ 1dB
Gain Flatness	<2dB @ Peak to Peak
Output Variable Range	30dB, 0.5dB Step,
IMD(ACLR)	> 40dBc @3 <sup>rd</sup> IMD, > 50dBc @5 <sup>th</sup> IMD
Harmonics / Spurious	< 60dBc @P1dB

## RX

Input Frequency	xx ~ xx MHz (OBW: xxMHz)
Input Level	-102dBm ~ -12dBm
Output Frequency	70MHz (IF)
IF Filter	4MHz, 2MHz, 1MHz, 500kHz
Output Level	-15dBm $\pm$ 3dB(CW)
Output Flatness	IF LEVEL $\pm$ 1dB
NF	< 5dB
Harmonics / Spurious	< 60dBc
Image Rejection	< 60dBc
AGC Range	90dB, AGC Time : <70 [ $\mu$ s]
RSSI	-102dBm ~ -12dBm, $\pm$ 1.0dB

# 1-2. Processor Unit for UAV Monopulse Radar



## ■ Features

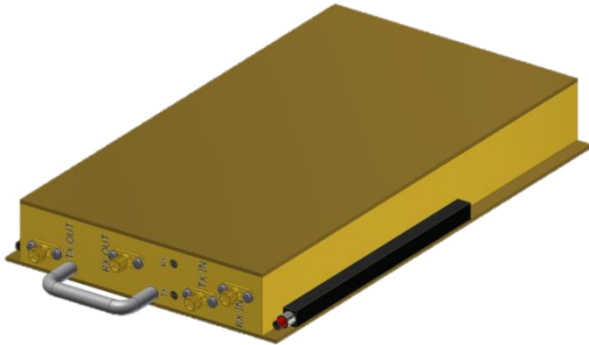
- ▶ Sum Channel 1ch
- ▶ Delta Channel 2ch
- ▶ Power Detection Phase Detection Method
- ▶ Small Size

## ■ Applications

- ▶ Military UAV Monopulse Radar

Parameter		SPEC.
Frequency		Ku-Band
Input Level Range		-100 ~ -20dBm
Input Level Accuracy	Delta	< -7dBm±1.5dB
	Sum	< -6dBm±1.5dB
Phase Noise		< -65dBc@100Hz
		< -75dBc@1KHz
		< -85dBc@10KHz
		< -95dBc@100KHz
Isolation		< -50dBc
Frequency Stability		< ±0.3PPM
Noise Figure		< 3.5dB
Image Rejection		< -50dBc
Elevation To Azimuth Isolation		< -60dBc
VSWR	Input	< 2:1
	Output	< 1.5:1
RF Attenuator Control		0~15dB±1.5dB(1dB Step)
IF Attenuator Control		±1.0dB@15dB
Consumption		< 25W

# 1-2. Ku-UDC for UAV Datalink



## ■ Features

- ▶ In/Out Return Loss : 1.5 :1
- ▶ LO Stability : 0.1 PPM
- ▶ Isolation : -90 dBc
- ▶ Phase noise : -75dBc @1KHz/ -85dBc @10kHz/  
-95dBc@100 kHz/ -110dBc@1MHz

## ■ Applications

- ▶ Data Link

1.TX Specifications			
PARAMETER	SPEC.	Unit	
Input Frequency	xx	MHz	
Input Power Level	-10	dBm	
Output Frequency	15.4~15.8	GHz	
Output Power	1	W	
Gain	40	dB	
TX Power Range	30	dB	
Two-Tone IMD	-26	dBc	
2.RX Specifications			
PARAMETER	SPEC.	Unit	
Input Frequency	xx.x~xx.x	GHz	
Input Power Level	-82 ~ -7	dBm	
Output Frequency	70	MHz	
Output Power Level	-10	dBm	
Two-Tone IMD	-50	dBc	
AGC Range	75	dB	
Automatic gain control response time	20	ms	
Image Rejection	-60	dBc	
3. COMMON. Specifications			
PARAMETER	SPEC.	Unit	
Output micro-variable adjustment	±1.5	dB	
Temperature compensation for gain adjustment range	0 ~ +10/0.5 Step	dB	
Gain flatness	1	dB	
Spurious	-60	dBc	
Frequency Hopping Step size	1	MHz	
DC Power	Voltage	10	Vdc
	Power	4	W
Weight	1.0	Kg	
Dimensions	3U X 200 X 30	mm	



# 1-2. Beacon Transmitter for UAV Monopulse Radar



## ■ Features

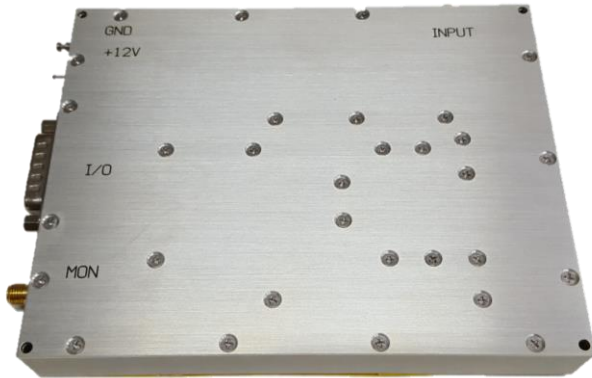
- ▶ Small Size
- ▶ RS-232 Control

## ■ Applications

- ▶ Military UAV Monopulse Radar

Parameter		SPEC.
Frequency		Ku-Band
Output Level		CH1~CH13 0~+3dBm
Phase Noise	100Hz	< -55dBc/Hz
	1KHz	< -70dBc/Hz
	10KHz	< -80dBc/Hz
Spurious		< -60dBc
Frequency Accuracy		< ±1ppm
VSWR		< 1.5:1

# 1-2. Down Converter for UAV Monopulse Radar



## ■ Features

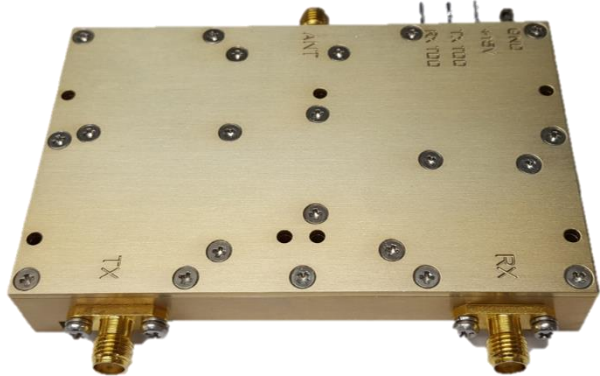
- ▶ Ku-Band Receiver
- ▶ Wide Dynamic Range Power Detection

## ■ Applications

- ▶ Military UAV MonoPulse Radar

Parameter		SPEC.
Frequency		Ku-Band
Input Level Range		-80~-0dBm
Phase Noise		< -65dBc@100Hz
		< -75dBc@1KHz
		< -85dBc@10KHz
		< -95dBc@100KHz
Channel to Channel Isolation	Fc + 6MHz	< -40dBc
	Fc - 6MHz	< -40dBc
	Fc + 12MHz	< -45dBc
	Fc - 12MHz	< -45dBc
VSWR	Input	2.0:1
	Output	1.5:1
Consumption		12V, <1A

# 1-2. Switching Module for UAV



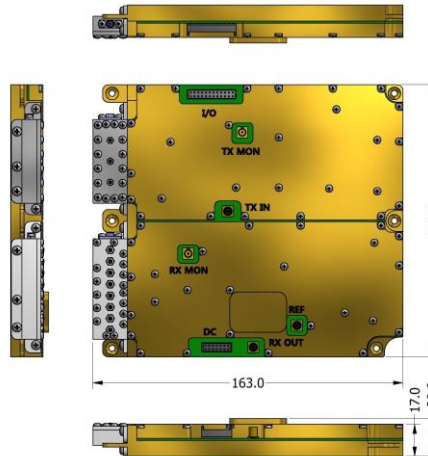
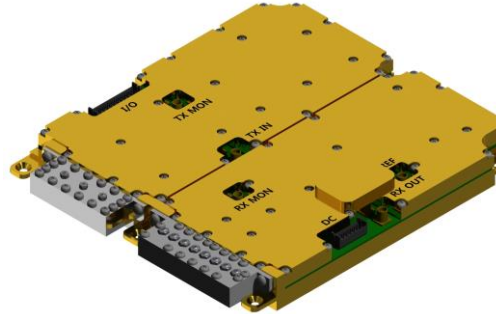
## ■ Features

- ▶ High power handling: 100W CW, 350W peak
- ▶ Low insertion loss: 0.75 dB typical
- ▶ Controlled with positive power supply

Parameter	Unit	Specification		
		Min	Typ.	Max
Frequency	MHz	xxx		xxx
Insertion Loss	dB		0.75	0.9
Isolation	dB	95	100	
TX to ANT CW input power	W		80	100
TX to ANT RF peak input power (RF burst width = 10 $\mu$ s, RF burst repetition rate = 25 kHz)	W		250	350
ANT to RX CW input power	W		50	60
ANT to RX RF peak input power (RF burst width = 10 $\mu$ s, RF burst repetition rate = 25 kHz)	W		150	200
Switching Time	usec		7	10
VSWR				1.5:1
Power Supply Voltage	V	12	15	17
Power Consumption	W		2.85	3.3
Control Interface		TTL compatible		

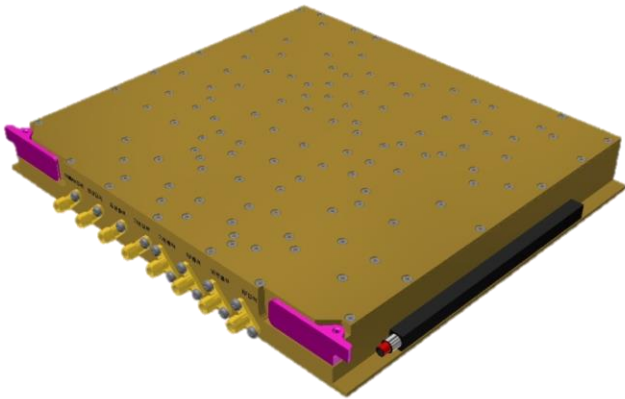
# 1-3. Transceiver Unit for Man-pack SatCom Terminal

TX	
Input Frequency	x.xMHz (BW: xMHz)
Output Frequency	X-Band
Output Level	31.5dBm
Output Flatness	< ± 1dB
Output Level Range	20 ± 1dB
Gain	60.5dB
Gain Stability	< ± 1dB @ 24hour
Output Harmonic	< -60dBc
Spurious	< -60dBc
IMD	-25dBc @ 6dB back-off
Phase Noise	< -65dBc/Hz @ 100Hz < -75dBc/Hz @ 1kHz < -85dBc/Hz @ 10KHz < -95dBc/Hz @ 100kHz < -95dBc/Hz @ 1MHz
Output Frequency Stability	< 1 x 10 <sup>-7</sup> @ 24hour
VSWR	Input : < 1.5 : 1 Output : < 1.5 : 1



RX	
Output Frequency	x.xxxMHz (BW: xMHz)
Input Frequency	X-Band
VSWR	< Input : 2 : 1 < Output : 1.5 : 1
Output Flatness	< ± 1.5dB
Noise Figure	< 1.7dB
Gain	92dB
Gain Stability	< ± 1dB @ 24hour
Output Harmonic	< -60dBc
Spurious	< -60dBc
Phase Noise	< -65dBc/Hz @ 100Hz < -75dBc/Hz @ 1kHz < -85dBc/Hz @ 10KHz < -95dBc/Hz @ 100kHz < -95dBc/Hz @ 1MHz
Output Frequency Stability	< 1 x 10 <sup>-7</sup>
Refi Frequency	< 10MHz, 7dBm ± 1dB
Phase Noise	< -95dBc/Hz @ 10Hz < -125dBc/Hz @ 100Hz < -135dBc/Hz @ 1kHz < -140dBc/Hz @ 10kHz
Output Frequency Stability	< 1 x 10 <sup>-7</sup>

# 1-3. Transceiver Unit for Portable SatCom Terminal



## ■ Features

- ▶ Dual link
- ▶ 312.5MHz, 2500~3500MHz Frequency Range
- ▶ Gain stability  $\pm 1.5\text{dB}@24\text{hr}$

## ■ Applications

- ▶ Military Satellite Transceiver

PARAMETER		SPEC.
Tx Input Freq./ Rx Output Freq.	link 1	xxx.xMHz $\pm$ xxMHz
	link 2	xxMHz $\pm$ xxx.xxkHz
Rx Input Freq./ Tx Output Freq.	link 1	xxxx~xxxxMHz
	link 2	xxxx~xxxxMHz
Tx In/Out Power Level	Input	-20dBm
	Output	-25~-5dBm +3dB
Rx In/Out Power Level	Input	-65~-15dBm
	Output	-4dBm ~ 0dBm
Tx/Rx Gain Flatness		3dBp <sub>p</sub> @1000MHz BW
		1.5dBp <sub>p</sub> @120MHz
		0.7dBp <sub>p</sub> @10MHz
Tx/Rx Harmonic		-60dBc
Tx/Rx Spurious		-60dBc
In/Out VSWR		1.5:1
Tx Variable attenuation Range		-20 $\pm$ 1dB
Rx Variable attenuation Range		-50 $\pm$ 1dB
Phase Noise		-65dBc@100Hz
		-75dBc@1kHz
		-85dBc@10kHz
		-95dBc@100kHz
		-95dBc@1MHz
Rx Gain		60dB
Tx/Rx Gain stability		$\pm 1.5\text{dB}@24\text{hr}$
Current	+5V	2100mA
	+3.3V	250mA
BICON Output		-80~70dBm
10MHz Frequency Output		4dBm
Rx to Tx isolation		40dB

# 1-3. Wideband UpConverter for SatCom Terminal



PARAMETER		SPEC.
TX Freq.	Input	xxx.xMHz / -20dBm
	Output	950 ~ 1950MHz / -5dBm±1dB
Gain Flatness		p-p.2dB @ 1GHz BW
Tx Spurious		-55dBc
Tx Variable attenuation Range		-45~-5dBm±1dB @Step 1dB
Phase Noise		-65dBc@100Hz
		-75dBc@1kHz
		-85dBc@10kHz
		-95dBc@100kHz
		-95dBc@1MHz
Tx mute isolation		-55dBc
TX Freq.	Input	950 ~ 1950MHz / -65 ~ -15dBm
	Output	312.5MHz / 0dBm±1dB
Tx Variable attenuation Range		-65~-15dBm± 1dB @Step 1dB
Tx Spurious		-55dBc
In/Out VSWR		1.5:1
Lock Time		5usec
DC Voltage		+3.3V, +5V, +15V
Power consumption		12W

## ■ Features

- ▶ Frequency Range 950 ~ 1950MHz
- ▶ Average output power -20dBm / -5dBm
- ▶ DC Voltage 15V / 5V / 3.5V

## ■ Applications

- ▶ Military Satellite Transceivers

# 1-3. DAMA Transceiver for SatCom Terminal



## ■ Features

- ▶ Frequency Band : 950MHz ~ 1450MHz
- ▶ Spurious: -55dBc
- ▶ ATT Range: 0~40dB, step 1dB
- ▶ Frequency Hopping Time(100MHz) - 15usec
- ▶ Phase noise : -65dBc @100Hz/ -75dBc @1kHz/  
-85dBc@10 kHz/ -95dBc@100kHz

## ■ Applications

- ▶ Army communications satellite system modem

1.TX Specifications				
No	Parameter	Specification	Unit	
1	Input Frequency	x.x	MHz	
2	Input Power	-7	dBm	
3	Output Frequency	950~1450	MHz	
4	Output Power	-5±2	dBm	
5	Output VSWR	≤1.5:1		
6	ATT Range	0~40	dB	
7	ATT Step size	±0.7	dB	
8	Spurious	≤ -55	dBc	
9	Output power flatness BW 500MHz	≤ ±2	dB	
10	Output power flatness BW 50MHz	≤ ±0.5	dB	
11	Frequency Hopping Step size	96	kHz	
12	Frequency Hopping Time(100MHz)	≤ 15	usec	
13	Phase noise	@100Hz	-65	dBc
		@1kHz	-75	dBc
		@10kHz	-85	dBc
		@100kHz	-95	dBc
2.RX Specifications				
No	Parameter	Specification	Unit	
1	Input Frequency	950~1450	MHz	
2	Input Power	-55~-15	dBm	
3	Input VSWR	≤1.5:1		
4	Output Frequency	7.2	MHz	
5	Output Power	-2±1	dBm	
6	IF 3dB BW	64	KHz	
7	Spurious	≤ -55	dBc	
3. ETC. Specifications				
No	Parameter	Specification	Unit	
1	Module Size	227.3×262.5×25		
2	DC Voltage	12 / 5 /3.3 /-5	V	
3	Operating TEMP.	-30~50	°C	

## 2. Major Products for Commercial Applications

2-1. HPA

2-2. LNA

2-3. Converter

2-4. SatCom Products - BUC, BDC, LNB, LNA, Repeater

2-5. AFC(Auto Frequency Control)





# 2-1. MCPA 6016(HPA)



## ■ Features

- ▶ 2150 ~ 2170MHz frequency range.
- ▶ Average output power 42dBm.
- ▶ ACLR@42dBm Pout : 53dB@Fc ±10MHz
- ▶ Operating Temperature -30 ~ 55°C

## ■ Applications

- ▶ WCDMA HPA

Parameter		Unit	SPEC.
Type			Module Type
Frequency Range		MHz	2150~2170
No. of Input Carriers		FA	4, max
Total Power Output		dBm	+42.0, Avg, min
RF Gain		dB	50.0 ±0.5
Gain variation Over Temp. Range		dB	± 1.0, max
Gain Flatness		dB	±0.5, max
Linearity		dB	±0.5, max
ACLR@42dBm Pout)		dB	48dB@Fc ±5MHz 53dB@Fc ±10MHz
Return Loss (VSWR)		dB	15.5 min (1.4 max)
DC	Nominal Volt.	Vdc	+28 ± 0.1V
	Current	A	6.5, max
Operating Temperature		°C	-30 ~ 55°C

# 2-1. CWPA2200-PCS(HPA)



## ■ Features

- ▶ 1860 ~ 1880MHz frequency range.
- ▶ Average output power 53dBm. 200W

## ■ Applications

- ▶ PCS Measuring instrument

Specification	CWPA 2200
Frequency Range	1860 ~1880 MHz
Average Output Power	53dBm (Avg. power)
Gain	53 ± 1 dB
Gain Flatness	± 1.0 dB
Gain Variation Over Temp. Range	± 1.0 dB
In/Out VSWR	1.4 :1 max to 50Ω
DC Input	27 ± 0.5 VDC
DC Current	Max 17A.
D-SUB 3Pin Description	A1 : +27V DC
	A2 : GND
	A3 : N.C
SIZE (W*D*Hmm)	205X170X30
In/Out Connector	SMA Female / N Female
Operation Temperature	-10°C ~ +60°C

# 2-1. CWPA6100-WCDMA(HPA)



## ■ Features

- ▶ 2110 ~ 2170MHz frequency range
- ▶ Average output power 50dBm 100W
- ▶ BW 60MHz

## ■ Applications

- ▶ WCDMA Measuring instrument

Specification	CWPA 6100
Frequency Range	2110~2170MHz(WCDMA)
Average Output Power	50dBm (Avg. power)
Gain	50 ± 0.5dB
Gain Flatness	± 1.0 dB
Gain Variation Over Temp. Range	± 1.0 dB
In/Out VSWR	1.3 :1 max to 50Ω
DC Input	27 ± 0.5 VDC
DC Current	Max 11A
D-SUB 3Pin Description	A1 : +27V DC
	A2 : GND
	A3 : N.C
SIZE (W*D*Hmm)	185 X 170 X 25
In/Out Connector	SMA Female / N Female
Operation Temperature	-10°C ~ +60°C

# 2-1. CWPA 2100(HPA)



## ■ Features

- ▶ 1805 ~ 1880MHz frequency range
- ▶ Average output power 50dBm 100W
- ▶ BW 75MHz

## ■ Applications

- ▶ PCS Measuring instrument

Specification	CWPA 2100
Frequency Range	1805~1880MHz(PCS)
Average Output Power	50dBm (Avg. power)
Gain	50 ± 0.5dB
Gain Flatness	± 1.0 dB
Gain Variation Over Temp. Range	± 1.0 dB
In/Out VSWR	1.3 :1 max to 50Ω
DC Input	27 ± 0.5 VDC
DC Current	Max 11A
D-SUB 3Pin Description	A1 : +27V DC
	A2 : GND
	A3 : N.C
SIZE (W*D*Hmm)	185 X 170 X 25
In/Out Connector	SMA Female / N Female
Operation Temperature	-10°C ~ +60°C

# 2-1. CWPA 1100-CDMA(HPA)



## ■ Features

- ▶ 869 ~ 896 MHz frequency range
- ▶ Average output power 50dBm 100W
- ▶ BW 30MHz

## ■ Applications

- ▶ CDMA Measuring instrument

Specification	CWPA 1100
Frequency Range	869~896 MHz
Average Output Power	50dBm (Avg. power 100W)
Gain	50 ± 0.5dB
Gain Flatness	± 1.0 dB
Gain Variation Over Temp. Range	± 1.0 dB
In/Out VSWR	1.4 :1 max to 50Ω
DC Input	27 ± 0.5 VDC
DC Current	Max 11A
D-SUB 3Pin Description	A1 : +27V DC
	A2 : GND
	A3 : N.C
SIZE (W*D*Hmm)	190 X 150 X 25
In/Out Connector	SMA Female / N Female
Operation Temperature	-10°C ~ +60°C

# 2-1. MCPA6016 APD(HPA)



PARAMETER	SPEC.	
Frequency Range	2150 ~ 2170 MHz	
Operation bandwidth	20MHz	
Output Power	16Watt-4FA	Pout=42dBm
Gain	50dB ±1dB	Po=22~42dBm
Gain flatness	1dB at any 20MHz band	
Gain variation with temperature	± 1dB	
Input VSWR	1.5 : 1	
Output VSWR	1.5 : 1	
Supply current	3.5A(Max) /3.3A (Typ)	@42dBm, +29.4V
ACLR (64DPCH WCDMA) @16W/4FA	Fc±5MHz	-45dBc(Min)
	Fc±10MHz	-50dBc(Min)
Supply voltage	29.4V NORMAL	
Operating temperature range	-20°C ~ +70°C (@Ambient temperature)	

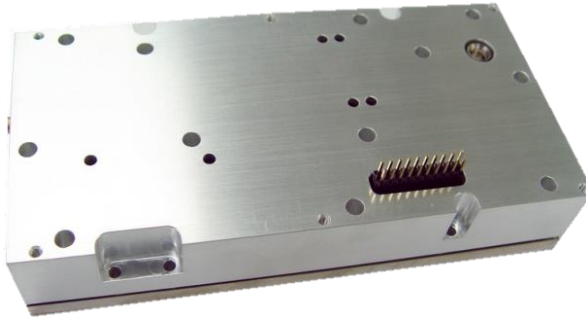
## ■ Features

- ▶ 2150 ~ 2170MHz frequency range
- ▶ Average output power 42dBm
- ▶ BW 20MHz
- ▶ Analog Predistortion

## ■ Applications

- ▶ WCDMA Measuring instrument

# 2-1. AMCPA6016K(HPA)



PARAMETER		SPEC.	
Frequency range		1840 ~ 1860 MHz	LTE
Occupied Bandwidth	HSPA+	5MHz/FA	99% channel power
	LTE	20MHz/FA	99% channel power
Frequency Stability		±0.03 ppm이하	
Input power Level		-6dBm/Total	
Output power Level		+42dBm/Total +42dBm/1FA	CFR(PAR 6.5dB), APD
Dynamic Range		Min. 30dB	
Flatness		Max. 0.7dB	Peak to Peak
Error Vector Magnitude (EVM)		1%	Source contrast
Peak Code Domain Error (PCDE)		-35dB 이하	
VSWR		1.3: 1 이하	
ACLR	+/-10MHz	Min. 48dBc@RBW 100KHz	LTE
2 <sup>nd</sup> Harmonic Rejection		Min. 45dBc	
Current		+29V/2.0A	Po = 42dBm, +25°C
		+5.6V/TBD	
Operating Temperature		-30°C to +75 °C	
Storage Temperature		-40°C to +85 °C	
Relative Humidity		0 to 95 % RH	Non-condensing
Gain Variation Over Dynamic Range		Max. ±0.5dB	- 25°C - reference output power =+42dBm
RF Gain Variation		Max. ±1.5dB	-30°C~+75°C
by Temp.& Voltage			

## ■ Features

- ▶ 1840 ~ 1860MHz frequency range
- ▶ Average output power 42dBm
- ▶ BW 20MHz
- ▶ Analog Predistortion

## ■ Applications

- ▶ LTE repeater System

## 2-2. Low Noise Amplifier(LNA)



### ■ Features

- ▶ 15 ~ 1300 MHz frequency range
- ▶ Gain : 15±1dB, 25±1dB (Alternative Function)
- ▶ Noise figure max. 3dB
- ▶ operating temperature -20°C~60°C
- ▶ Low cost, High efficiency, Compact size
- ▶ Various alarm interfaces available

### ■ Applications

- ▶ Radio scan system

ITEM	SPECIFICATION	ETC
FREQ. RANGE	15MHz ~ 1300MHz	
NOISE FIGURE	3dB 이내	
GAIN	15±1dB, 25±1dB	선택 가능
GAIN FLATNESS	±1 dB 이내	
P1dB	20dBm이상	
IP3	32.5dBm 이상	@5dBm/t, 2 tone
INPUT VSWR	2.0:1 이하	
OUTPUT VSWR	2.0:1 이하	
DC POWER	300 mA이내@24V	
OPERATING TEMPERATURE	-20°C~60°C	
STORAGE TEMPERATURE	-20°C~70°C	
IN/OUT IMPEDANCE	50Ω	
IN/OUT CONNECTOR	N FEMALE	
SIZE	70 X 50 X 22 (mm)	높이 TBD



## 2-2. Low Noise Amplifier(LNA)



### ■ Features

- ▶ 1000 ~ 3000 MHz frequency range
- ▶ Gain :  $16 \pm 1.25$ dB,
- ▶ Noise figure max. 3.5dB
- ▶ operating temperature  $-20^{\circ}\text{C} \sim 60^{\circ}\text{C}$
- ▶ Low cost, High efficiency, Compact size
- ▶ Various alarm interfaces available

### ■ Applications

- ▶ Radio scan system

ITEM	SPECIFICATION	ETC
FREQ. RANGE	1000MHz ~ 3000MHz	
NOISE FIGURE	3.5dB 이내	
GAIN	16dB 이상	
GAIN FLATNESS	$\pm 1.25$ dB 이내	
P1dB	20dBm이상	
IP3	33dBm 이상	@5dBm/t, 2 tone
INPUT VSWR	2.2:1 이하	
OUTPUT VSWR	1.8:1 이하	
DC POWER	270mA이내@12V	
OPERATING TEMPERATURE	$-20^{\circ}\text{C} \sim 60^{\circ}\text{C}$	
STORAGE TEMPERATURE	$-20^{\circ}\text{C} \sim 70^{\circ}\text{C}$	
IN/OUT IMPEDANCE	50 $\Omega$	
IN/OUT CONNECTOR	SMA FEMALE	
SIZE	70 X 50 X 22 (mm)	

## 2-2. S-BAND(LNA)



PARAMETER	UNIT	SPECIFICATION
Noise Figure at 23°C	dB	2.0dB typ. 2.2dB max.
Noise Figure increasing with temperature(>23°C)	dB	0.01dB/°C max
Gain	dB	26dB min
Gain Flatness	dB	+/-1.0dB max
Gain Variation vs Temperature	dB	+/-1.0dB max
VSWR In/Out		1.5:1 max / 1.4:1 max
Input P1dB	dBm	-13dBm min
OIP3	dBm	22dBm min
Recovery Time	ns	250sec typ. To within 1dB of linear gain 500nsec max.
Peak Power(Overload)	kW	1kW max. The unit shall survive with no damage to 5 microsec for 1% duty cycle.
Stability		Unconditionally stable
Monotonicity		Guaranteed
Attenuation Accuracy		+/-1.0dB or +/-5% of nominal value
Digital Attenuation Control		Inputs : RS-422 programming : 6bit
Attenuation Range	dB	0 to 31.5dB
Programmable Step	dB	0.5dB approx
Clock		Inputs : RS-422 Input Rate : 4MHz max
Attenuation Stabilization Time	Sec	500ns max. for Change Difference 0.5 to 16dB 1microsec max. for Change Difference > 16dB
Unit Gain out of band	dB	<= -24dB at DC-2500MHz <= 6dB at 2600MHz <= 6dB at 3000MHz <= -24dB at 3100-6000MHz
Switch gate		Inputs : RS-422 400ns max. from receiving mode to high isolation 3microsec max. from high isolation to receiving mode

### ■ Features

- ▶ Input Frequency range 2.8GHz
- ▶ Output Frequency range 2.8GHz

### ■ Applications

- ▶ SSR (Radar)

## 2-3. WLAN-BDA236(Converter)



### ■ Features

- ▶ 10dB cable loss compensation
- ▶ TDD bidirectional amplifier
- ▶ Down link signal triggered TDD switching
- ▶ 1uS rising/falling time
- ▶ Low receive noise figure
- ▶ Output mismatch protection Isolator
- ▶ GaAsFET design

### ■ Applications

- ▶ TDD wireless radio
- ▶ WLAN range extender

Specification		WLAN_BDA236
Frequency Range		2,400 ~ 2,480 MHz
TDD Switching Time		1us
Cable loss compensation AGC		0~10 dB
UP Link	N/F	3.5 dB
	Gain @ 0dB AGC	22 ± 1 dB
	Gain @ 10dB AGC	12 ± 1 dB
	Gain flatness	±1.5 dB
DOWN Link	Pout (peak power)	36 dBm
	Gain @ 0dB AGC	26 ± 1 dB
	Gain @ 10dB AGC	16 ± 1 dB
	Gain flatness	±1.5 dB
	input power (AGC)range	+10 ~ +20 dBm
	Sync level	0 dBm <min>
Connector		N-female (water proof)
Case		weatherproof
Lighting protection		Direct DC ground at Antenna port
Operating temperature		-20 ~ +60 deg C
DC	voltage	+12 V
	surge protection	600W TVS @+15 V
	Current	4.7A (TDD ON)
LED	Red	DOWN Link ON

## 2-3. WLAN-BDA530(Converter)



### ■ Features

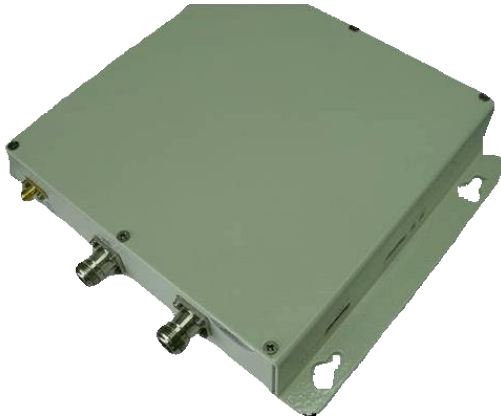
- ▶ 10dB cable loss compensation
- ▶ TDD bidirectional amplifier
- ▶ Down link signal triggered TDD switching
- ▶ 1uS rising/falling time
- ▶ Low receive noise figure
- ▶ Output mismatch protection Isolator
- ▶ GaAsFET design

### ■ Applications

- ▶ TDD wireless radio
- ▶ WLAN range extender

Specification		WLAN_BDA530
Frequency Range		5,725~5,875 MHz
TDD Switching Time		1us
Cable loss compensation AGC		0~10 dB
UP Link	N/F	4.5 dB
	Gain @ 0dB AGC	22 ± 1 dB
	Gain @ 10dB AGC	12 ± 1 dB
	Gain flatness	±1.5 dB
DOWN Link	Pout (peak power)	30 dBm
	Gain @ 0dB AGC	20 ± 1 dB
	Gain @ 10dB AGC	10 ± 1 dB
	Gain flatness	±1.5 dB
	input power (AGC)range	+10 ~ +20 dBm
	Sync level	0 dBm <min>
Connector		N-female (water proof)
Case		weatherproof
Lighting protection		Direct DC ground at Antenna port
Operating temperature		-20 ~ +60 deg C
DC	voltage	+12 V
	surge protection	600W TVS @+15 V
	Current	2A (TDD ON)
LED	Red	DOWN Link ON

## 2-4. Satellite Phone Repeater



### ■ Features

- ▶ Frequency Range : Down Link (1525~1559MHz)  
Up Link(1625.5~1660.5MHz)  
GPS(1575.42MHz)
- ▶ Noise figure max. 7dB
- ▶ Output Power: Down Link (-50dBm)  
Up Link(+30dBm,1W)  
GPS(-80dBm)
- ▶ operating temperature -20°C~60°C
- ▶ Low cost, High efficiency
- ▶ Various alarm and interfaces available

### ■ Applications

- ▶ Satellite mobile phone repeater

Parameters		Specifications
Frequency Range	Down Link	1525 ~ 1559MHz
	Up Link	1626.5 ~ 1660.5MHz
	GPS	1575.42MHz (UP Link Rejection Typical 54dBc)
Gain	Down Link/Up Link	80±1dB
	GPS	45±1.5dB
Gain Flatness	Down Link	3dB peak to peak(MAX)
	Up Link	3dB peak to peak(MAX)
Input Power	Down Link	-125dBm
	Up Link	-45~0dBm
	GPS	-115dBm
Output Power	Down Link	-50dBm
	Up Link	29dBm
	GPS	-80dBm
OIP3	Up Link	38dBm(2TONE,25dBm/TONE)
Attenuations	Down Link	System/ ATT. 30dB(1dB STEP)
ALC Range	Up Link	45dB
Noise Figure	Down Link, Up Link	7dB (MAX)
Propagation Delay	Down Link, Up Link	1μs (MAX)
VSWR		1.5:1 (MAX)
Temp Gain Variation	Down Link, Up Link	4dB peak to peak (MAX)
Power Supply		110 ~ 220 V AC / (20W)
Operating Temp. range		-20 ~ +60°C
Dimension		213 * 180 * 39

## 2-4. Low Noise Block Down Convertors(LNB)



Parameter	Specification	
Input return loss	≥ 9.5 dB	
Output return loss	≥ 14 dB	
C-band(7~8GHz) filtering	55 dB	
LO drift over temp.	Internal Ref. : ±10 KHz max.	
Maximum phase noise(SSB) Internal Ref. / External Ref.	-62 dBc/Hz @ 100 Hz	
	-72 dBc/Hz @ 1 KHz	
	-82 dBc/Hz @ 10 KHz	
	-92 dBc/Hz @ 100 KHz	
	-102 dBc/Hz @ 1.0 MHz	
OP1dB	+10 Bm	
2 tone IMD	40 dBc @ tone 0 dBm	
OIP3	-20 dBm	
Maximum Tx Band(7.9~8.4GHz) signal level(-30dBm) that will not saturation the LNB and cause any N/F degradation.		
Gain	60 dB typ (55 dB ~ 65 dB)	
Gain flatness	≤ 1dB p-p over 36 MHz	
	≤ 3dB p-p over 120 MHz	
	≤ 4dB p-p over 500 MHz	
Gain variation over temp.	≤ 4dB p-p	
Spurious	Receive band	-65 dBm max. (950~1450MHz)
	Out of band	-50 dBm max. (200~2200MHz)
	Others	-25 dBm max. (0.2~20GHz, except nLO)
LO leakage	IF output	-30 dBm max.
	RF input	-45 dBm max.
Image rejection	45 dB min., 60 dB typ.	
Noise Figure (N/F)	0.6 dB max @ 23°C (With SMA to WR-112 waveguideadapter)	
Input / Output stability	ok	
DC current	300 mA max.	

### ■ Features

- ▶ Input Frequency Range 7.25~7.75GHz
- ▶ Output Frequency Range 950~1450MHz
- ▶ DC +12 ~ 24V

### ■ Applications

- ▶ Satellite Receivers

## 2-4. Ka-Band BDC(BDC)



### ■ Features

- ▶ Input Frequency Range 19.7~20.2GHz
- ▶ Output Frequency Range 950~1450MHz
- ▶ Small Size & Light Weight

### ■ Applications

- ▶ Satellite Receivers

Parameter		Specification
Frequency	Input	19.7 ~20.2 GHz
	Output	950 ~ 1450MHz
	LO	18.75 GHz
LO Phase Noise		-65 dBc @ 1KHz
		-75 dBc @ 10KHz
		-90 dBc @ 100KHz
Noise Figure @23° C		18 dB
Gain		25 ± 2dB
Gain Flatness		≤ 1dB p-p over 27 MHz ≤ 4dB p-p over full IF range
Gain variation over Temp.		≤ 5dB p-p
VSWR	Input	2.2 : 1
	Output	2 : 1
OP1dB		6 dBm
OIP3		15dBm
Spurious in band		-65dBm Max(non harmonic)
Spurious out band		-30dBm Max
Image Rejection		40 dB Min
LO leakage at input		-45dBm Max
External ref.		10MHz, 5±5dBm
Input ,Output stability		Any load unconditionally stable
Operating Temperature		-40 ~ +60 °C
DC Power	Voltage	15 ~ 24 V
	Current	500 mA
Connector	Input	WR-42
	Output	N-female

## 2-4. X-Band BDC(BDC)



### ■ Features

- ▶ Input Frequency Range 7.25 ~ 7.75GHz
- ▶ Output Frequency Range 950~1450MHz
- ▶ Small Size & Light Weight

### ■ Applications

- ▶ Satellite Receivers

Parameter		Specification
Frequency	Input	7.25 ~ 7.75 GHz
	Output	950 ~ 1450MHz
	LO	6.3 GHz
LO Stability		±2ppm (±12.6KHz)
LO Phase Noise		-75 dBc @ 1KHz
		-85 dBc @ 10KHz
		-95 dBc @ 100KHz
NoiseFigure@23°		12 dB
Gain		25 ± 2dB
Gain Flatness		≤ 1dB p-p over 27 MHz ≤ 4dB p-p over full IF range
Gain variation over Temp.		≤ 4dB p-p
IN, OUT VSWR		2 : 1
OP1dB		10 dBm
Spurious in band		-65dBm Max
Spurious out band		-25dBm Max
Image Rejection		40 dB Min
LO leakage at input		-45dBm Max
Operating Temperature		-40 ~ +60 °C
DC Power	Voltage	15 ~ 24 V
	Current	280 mA
Connector	Input	SMA-female
	Output	N-female



## 2-4. X-Band LNA(LNA)



### ■ Features

- ▶ Input Frequency range 9410MHz
- ▶ Output Frequency range 60MHz
- ▶ Small Size & Light Weight

### ■ Applications

- ▶ Satellite receivers

PARAMETER		SPEC.
Frequency	Input	9410 MHz
	Output	60 MHz
	LO	9380 MHz
Noise Figure @23° C		< 2 dB
Gain		40 ± 1dB
VSWR	Input	2.0 : 1
	Output	1.5 : 1
Spurious		-55 dBc
DC Power	Voltage	8 V
	Current	800 mA
SIZE		98 X 60 X 37.4 mm

## 2-4. C-Band 2W BUC(BUC)



### ■ Features

- ▶ Input Frequency Range 950 ~ 1.750MHz
- ▶ Output Frequency Range 5.85~6.65MHz
- ▶ LED Indicator

### ■ Applications

- ▶ Satellite Receivers

Parameter	Specifications
Input Freq.	950 ~ 1,750MHz
Output Freq.	5.85 ~ 6.65GHz
LO Freq.	4.9GHz
TX rated power (P1dB)	2W(33dBm)
TX input power @rated power	-20dBm <typ>
LO Phase noise	-60dBc @100Hz -70dBc @1KHz -80dBc @10KHz -90dBc @100KHz
required Ext 10MHz ref	0dBm ±5dB -135dBc @100Hz -140dBc @1KHz -143dBc @10KHz
Input VSWR	2 : 1
Output VSWR	2 : 1
Gain	53dB <typ>
Gain Variation Over Temp.	4dB p-p over operating temperature
Gain Flatness	4dB p-p over full band
TX shut down	@ PLL unlock, Over temp 85°C
Spurious	-50dBc<min> In Band
DC power (2W model)	15~24V / 32W<Max>
Input connector	N-female, F-female
Output interface	CPR-137G
LED Indicator	GREEN : LO locked RED : LO unlocked, Over temp 85°C
Operating Temp.	-40°C ~ +55°C
Dimension(L x W x H)	184mm x 160mm x 59mm
Weight	1.94kg

## 2-4. C-Band 5W BUC(BUC)



### ■ Features

- ▶ Input Frequency Range 5.85 ~ 6.425MHz
- ▶ Output Frequency Range 950~1.525MHz
- ▶ LED Indicator

### ■ Applications

- ▶ Satellite Receivers

Parameter	Specifications
Input Freq.	5.85 ~ 6,425GHz
Output Freq.	950 ~ 1.525MHz
LO Freq.	4.9GHz
TX rated power (P1dB)	5W(37dBm)
Receive Band Noise Density	-87dBm/4kHz max
LO Phase noise	-60dBc @100Hz -70dBc @1KHz -80dBc @10KHz -90dBc @100KHz
required Ext 10MHz ref	0dBm ±5dB -120dBc @100Hz -130dBc @1KHz -140dBc @10KHz -150dBc @10KHz
Input VSWR	2 : 1
Output VSWR	2 : 1
Gain	61dB <typ>
Gain Variation Over Temp.	4dB p-p over operating temperature
Gain Flatness	4dB p-p over full band
TX shut down	@ PLL unlock, Over temp 85°C
Spurious	-50dBc<min> In Band
DC power (2W model)	15~24V / 48W<Max>
Input connector	N-female, F-female
Output interface	CPR-137G
LED Indicator	GREEN : LO locked RED : LO unlocked, Over temp 85°C
Operating Temp.	-40°C ~ +55°C
Dimension(L x W x H)	184mm x 160mm x 59mm
Weight	1.94kg

## 2-5. Automatic Frequency Control(AFC)



### ■ Features

- ▶ Auto/ Manual Switch ;  
AFC Auto operation/ AFC Manual operation
- ▶ Pulse Power Detect ;  
RF Pulse Repetition Rate 1~300Hz,  
Pulse Width 4~13usec

### ■ Applications

- ▶ Klystron Exciter AFC, Linear Accelerators

PARAMETER	SPEC.
Operating Frequency	2856MHz $\pm$ 5MHz
Forward Input Power Range	0~20dBm
Reflected Input Power Range	0~20dBm
Forward Input, Reflected Input Connector	SMA-Female 50 Ohm
VSWR	< 1.4:1
AFC Analog Output	-10~10V
Trigger input	0V/5V TTL
Trigger input Connector	BNC-Female
Input Signal Form	Pulse Width 4us ~ 13us
RF Pulse Repetition Rate	1 ~ 300Hz
Rise / Fall time	<100ns
Rise / Fall time	<100ns

## 2-5. Pulse Power Detector(AFC)



PARAMETER	SPEC.	
FREQUENCY	2851 ~ 2861 MHz	
INPUT POWER	7 ~ 22 dBm	
PULSE REPETITION RATE	1 ~ 60 Hz	
PULSE WIDTH	1 ~ 6us	
DETECTOR 출력	DC 0.25 ~4V 4V@22dBm	PULSE REPITITION RATE, PULSE WIDTH 와 상관없이 출력 동일
동작온도	-30°C to +75 °C	
저장온도	-40°C to +85 °C	
상대습도	0 to 95 % RH	Non-condensing

### ■ Features

- ▶ Pulse Power Detect ;  
RF Pulse Repetition Rate 1~100Hz,  
Pulse Width 1~10usec

### ■ Applications

- ▶ TDD System, Radar, Linear Accelerators

## 2-6. Synthesizer for Instrument



### ■ Features

- ▶ 4~8GHz frequency sweep generator
- ▶ 1Hz resolution
- ▶ Low phase noise
- ▶ Fast switching time
- ▶ Internal & external 10MHz reference
- ▶ Multi loop PLL/DDS hybrid design
- ▶ YIG based main oscillator
- ▶ 3wire serial data interface
- ▶ 2wire trigger handshake

### ■ Applications

- ▶ Spectrum analyzers
- ▶ Signal/sweep generators

Parameter	SPEC.
Frequency	x~xGHz
Frequency Step	1Hz
Switching Speed	130usec
Frequency Stability	+/-1ppm
Phase Noise	-80dBc@1kHz -95dBc@10kHz -102dBc@100KHz
Harmonics	<-30dBc
Spurious	<-60dBc
Output Power	+13dBm
RF Connectors	SMA-F
Supply Voltage	+24Vdc, +12Vdc,+5Vdc, +3.3Vdc, -5Vdc
Operating Temperature	0~+60 degree C
Storage Temperature	-40 ~ +80 degree C
Dimension(W × L × H)	120 x 120 x 30mm

## 2-6. Virtual Singal Generator



Channel NO.	Setting Freq.	EIRP/Channel	Amp Output Level
1	x~xMHz	EIRP : -42.26dBW	26dBm
2	x~xxxMHz	EIRP : -3.2dBW	22dBm
3	x.xxx~xGHz	EIRP : -6.39dBW	20dBm
4	x~xx.xGHz	EIRP : -17.84dBW	21dBm
5	xx.x~xx.xGHz	EIRP : -31.42dBW	11dBm
6	xx.x~xx.xxGHz	EIRP : -27.94dBW	10dBm
7	xx.xx~xxGHz	EIRP : -18.27dBW	18dBm

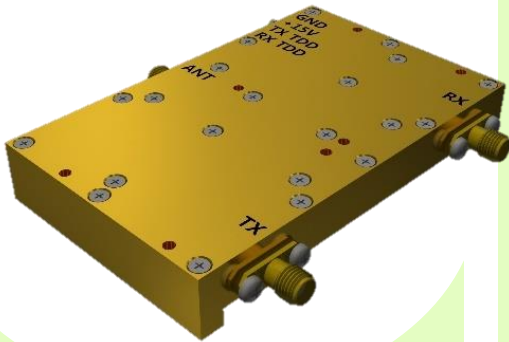
### ■ Features

- ▶ Remote setting single frequency among 2MHz ~ 40GHz
- ▶ EIRP setting from Amplifier output
- ▶ Setting frequency is automaticalcy matching with pre-defined channel antenna.

### ■ Applications

- ▶ Channel Sounder, Wideband Radio Receiver and Measurement Equipment, Wideband Signal Generator

## High Power Silicon PIN Diode SPDT Switch Module



### Features

- High power handling: 100W CW, 350W peak
- Low insertion loss: 0.75 dB typical
- Controlled with positive power supply

### Electrical Specifications @ Vin = +15V; T = 25°C; ZS = ZL = 50Ω

Parameter	Unit	Specification		
		Min	Typ.	Max
Frequency	MHz	400		500
Insertion Loss	dB		0.75	0.9
Isolation	dB	95	100	
TX to ANT CW input power	W		80	100
TX to ANT RF peak input power (RF burst width = 10 μs, RF burst repetition rate = 25 kHz)	W		250	350
ANT to RX CW input power	W		50	60
ANT to RX RF peak input power (RF burst width = 10 μs, RF burst repetition rate = 25 kHz)	W		150	200
Switching Time	usec		7	10
VSWR				1.5:1
Power Supply Voltage	V	12	15	17
Power Consumption	W		2.85	3.3
Control Interface		TTL compatible		

### Mechanical Specifications

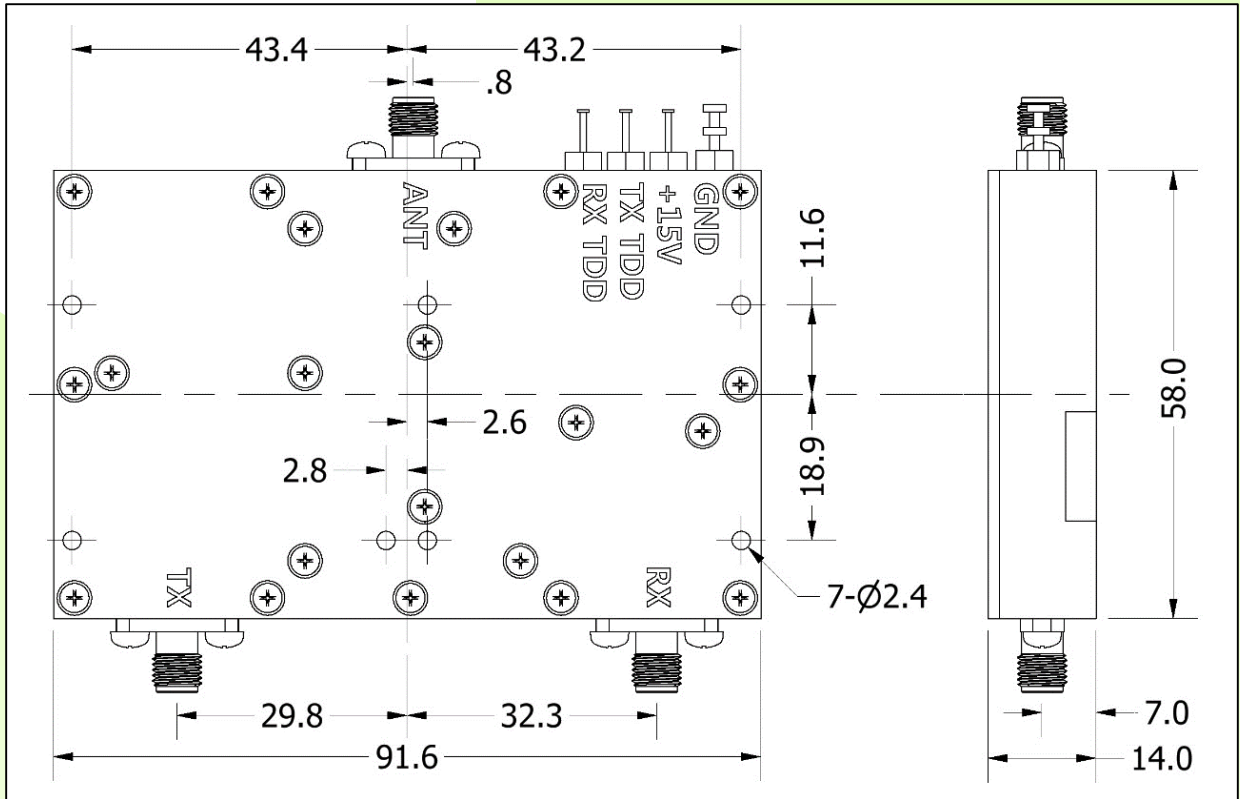
Parameter	Unit	Specification
RF Connector		SMA(F)
Power/control Connector		Feed-thru Capacitors
Body Size	mm	91.6 x 58 x 14
Weight	g	120

### Environment specifications

Parameter	Unit	Specification		
		Min	Typ.	Max
Operating Temperature	°C	-40		80
Storage Temperature	°C	-60		120



## High Power Silicon PIN Diode SPDT Switch Module



### Pin Description

PIN Name	Function
TX	TX RF signal input
RX	RX RF signal output
ANT	TX RF signal output / RX RF signal input
TX TDD	TTL Control Input
RX TDD	TTL Control Input
+15V	Power supply Voltage Input
GND	Ground

### Truth Table

Control Input		Control Current	
TX TDD	RX TDD	TX to ANT	ANT to RX
Low	Low	Off	ON
High	High	ON	Off

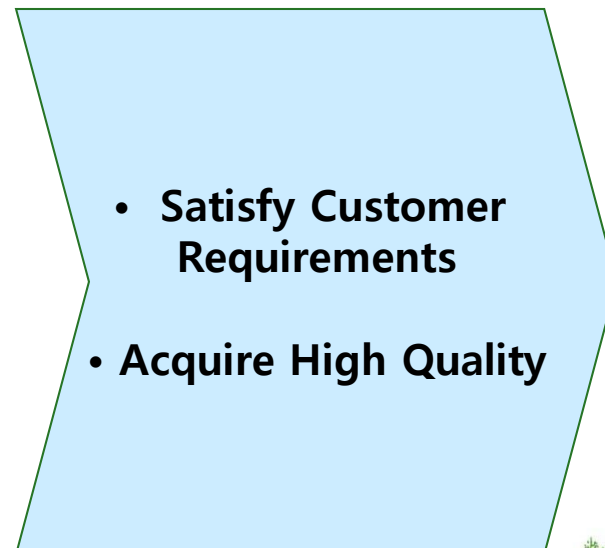
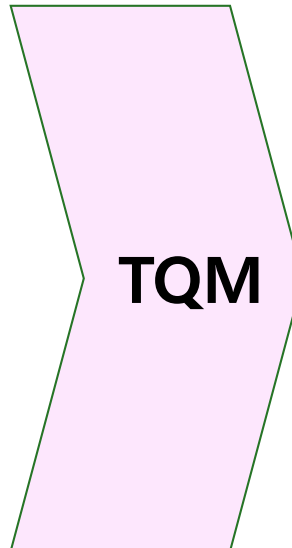
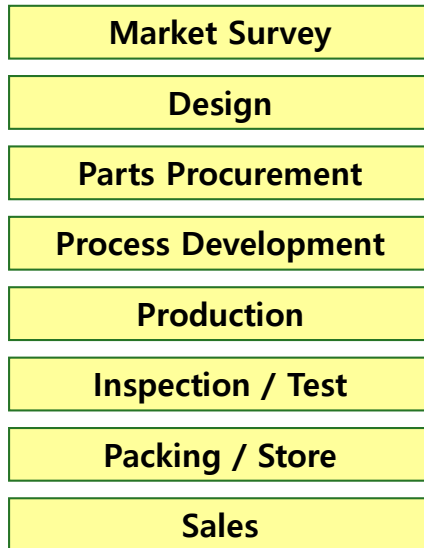
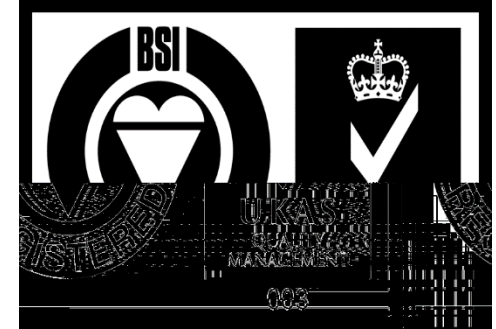
### Control Voltage

State	Unit	Min	Typ.	Max
Low	V	-0.2	0	0.3
High	V	4	5	5.5


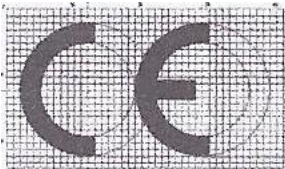

# 3. Quality Assurance

- Pursuing the perfect quality
- **ISO 9001 Certified** (British Standards Institution)
- **Total Quality Management (TQM)**

from design conception through sales



## 4. Certification

ISO	CE	FCC
 <p>ISO 9001 CERTIFIED</p>		
<ul style="list-style-type: none"><li>• FM523801 The design and manufacture of RF modules and devices</li></ul>	<ul style="list-style-type: none"><li>• X-LNB P7275Duo TK-CC100114</li><li>• C-band 2W Block Up Converter TK-CC</li><li>• C-band 5W Block Up Converter TK-CC100115</li></ul>	<ul style="list-style-type: none"><li>• BUCC2W KES-E1-110712</li></ul>

Thank you !



# 증폭기 PSSPA09G10-50



## ■ Features

- ▶ 9.7~10GHz frequency range
- ▶ 50W pulsed output power
- ▶ 25KHz(40uS period)/1.2% duty cycle pulsed operation
- ▶ 200nS pulse delay
- ▶ 20nS rising/falling time
- ▶ -167dBm/Hz output noise @ pulse off state
- ▶ 90° hybrid combined GaAsFET design

## ■ Applications

- ▶ X-band radar transmitters

Parameters	Specifications
RF Output Frequency Range	9.7~10GHz
RF Output Pulse Peak Power	+46.7dBm Min. +48.5dBm Max.
RF Pulse Peak power Flatness VS. Time	±0.15dB Max. The minimum level of pulse peak output power of time axis should meet +46.7dBm
RF Pulse Small Signal Gain	45 ± 5.0 dB Max.
RF Pulse Small Signal Gain Flatness VS. Frequency	±2.0 dB Max.
RF Output Pulse Width	Input pulse width ±15nsec at 3dB point
Pulse Rise & Fall Time	20.0nsec Max.
Pulse Jitters	5.0nsec Max.
RF Output Pulse Repetition Frequency	22.222KHz ~ 25.0KHz
Output Noise Level	-167dBm/Hz
Noise Figure	12.0dB Max.
Delay before SSPA operational after Enable	200nsec Max.
Non Harmonic Spurious	-60 dBc Max.
IN/OUT VSWR	1.5 : 1 Max.
Power Consumption	12.0W Max. at 20~32VDC
Required Input Current	0.6Amps peak Max. 0.4Amps Avg. at 28VDC
Isolator	For Output mismatch protection, the isolator should be equipped .
RF In(J1)/Output(J2) Connector	SMA female
Enable Signal(J3)	SMA female
DAMM3W3P Pin Connection	A1 : DC Power(+28VDC), A2 : - ,A3 : GND