

Product Operation Introduction

LPA1900-160-SC01

V1.0

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Bravo Tech Inc.

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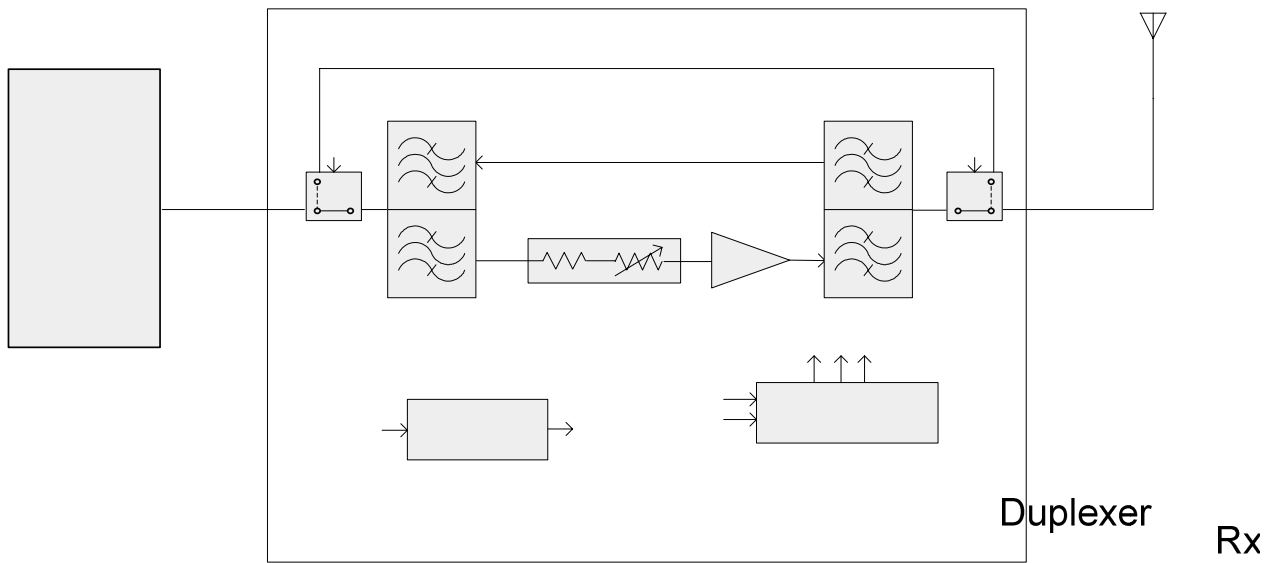
Part A, Summary

Bravo Tech Inc's newly introduced High Power Multi-Carrier Power Amplifier platform provides higher downlink EIRP to extend the coverage of existing networks. This multi-carrier based product platform can also work with customized BTS to extend capacity of original BTS with a low system total cost. This product platform features:

- Available for UMTS band
- Support multi-carrier WCDMA signals, with mixed mode operation
- Output maximum power 160W, support carriers number up to 4.
- Very High System Efficiency
- Extensive product monitoring and control (local and remote)
- Centralized system control/display/alarms
- Great system reliability supported by architecture built-in redundancy
- Powered by 30VDC available
- Extensive protection for lightning, voltage surge, and any high failure rate assemblies
- Compact system size and light weight

Part B, Connector and definition

Block Diagram of MCPA in system



BTS0
Tx/Rx

1、RF Part

Port Name	Type	Warning
Input	SMA Female (50 Ω)	Normal :-6.2dBm Maximum input power +1dBm.
Output	N Female (50 Ω)	Normal :52dBm Maximum output power 52.5dBm.

2、DC power

Port Name	Type	NO	Warning
DC IN	D-Sub type DSCD175PS1M (Male)	A1、 A2	VDC type +30V, AC 220V
		A3、 A4	GND to VDC

3、Communication

Connector type: USB

Note: Manufacture use to debug.

Part C, LED Indication

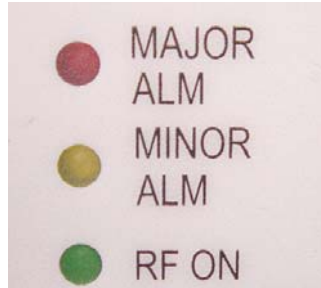


Figure 1 Power Amplifier Indicators

Table 1 Specification of Power Amplifier Indicator Lights

Item	Label	Color	State	Specification
1	MAJOR ALM	Red	On	Power amplifier alarms and shuts down
	MINOR ALM	Yellow	Off	
	RF ON	Green	Off	
2	MAJOR ALM	Red	Off	Power amplifier alarms but still works
	MINOR ALM	Yellow	On	
	RF ON	Green	Off	
3	MAJOR ALM	Red	Off	Power amplifier works normally
	MINOR ALM	Yellow	Off	
	RF ON	Green	On	

Part D, Specifications

1、Electrical Specifications

PARAMETER	SPECIFICATION	
Frequency	1930 ~ 1990 MHz (Band: any 15MHz@customer require, maximal band Δ 60MHz)	
Output Power	160Watts average max. (3FA, PAR: 8.0dB), Any location in the BW.	
Spurious Emission (3G 4Carriers)	<-48dBc @ \pm 5MHz	@+29~ +31 Vdc
	<-50dBc @ \pm 10MHz	@-20 $^{\circ}$ C~+50 $^{\circ}$ C, Po=52dBm(max)
	<-48dBc @ \pm 5MHz	@+29 ~ +31 Vdc

	<-53dBc @±10MHz	@+25 °C, Po=52dBm(max)
RF Gain	57.0 ± 1.0dB @ frequency range, +30Vdc, room temp.	
Normal Operating Voltage	+30Vdc±1.0Vdc	
Operating Voltage	+29Vdc ~ +31Vdc	
RF Gain Variation over Voltage & Temperature	±1.5dB @ +29≤Vsup≤+31V, -20 °C to +50 °C	
Gain Flatness	Peak to Peak 0.2dB over any 5MHz	
Input/Output Return Loss	<-18dB	
Output Protection	Mismatch protected with isolator	
Efficiency	≥15%@+30Volts, Po=+52dBm	
Operating Temperature	-30 °C to +55 °C (Air Temperature inside System),	
Input Power ALC	Operating point	Output power:52dBm ± 0.5dB
	Operating range	6dB min
	Over Power	Output Pwr:52.5dBm ± 0.5dB

2. Alarm and Functions Specifications

TTL output for the alarm pins. Normal is High, Alarm is Low.

2.1. Over temperature alarm

Alarm and shutdown at 95 °C base temperature, auto-recover at 90 °C base temperature.

2.2. Over power alarm

Alarm and shutdown when output power is over 52.5dBm, no auto-recover.

2.3. ALC

2.3.1. ALC level: 52±0.5dBm

2.3.2. ALC range: ≥6dB

2.4. VSWR alarm

Alarm and shutdown when reject is over 5, auto-recover at 3.

Part E, Declare

The device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Part F, Information to the User

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Changes or modifications not expressly approved by the party responsible for compliance could void to the user's authority to operate the equipment.

This device must be installed by a professional installer.

The antenna(s) used for this transmitter must be fixed-mounted on outdoor permanent structures. RF exposure compliance is addressed at the time of licensing, as required by the responsible FCC Bureau(s) including antenna co-location requirements acc to §1.1307(b)(3).

Accessory, Sample of Test Procedure

1、 Test equipment set up

1). Signal generator:

Agilent IFR3413

2). Spectrum analyzer:

ROHDE&SCHWARZ FSEA

3). Power meter:

Agilent E4418B/E8481A

4). Network analyzer

Agilent 8753E or R3765CH

2、 test condition description

1). Power supply cables and connectors:

Port Name	Type	NO	DESCRIPTION
DC IN	D-Sub type DSCD175PS1M (Male)	1、 2	VDC
		3、 4	GND to VDC

2).Alarm ports (D-SUB DSCD175PS1M male connector)

- Pin#1: N.C
- Pin#2: BTI (do not contact anywhere)
- Pin#3: Over power alarm /over driver alarm /transistor fail alarm
- Pin#4: Over temperature alarm
- Pin#5: GND
- Pin#6: RF output power indication
- Pin#7: BTI (do not contact to anywhere)
- Pin#8: VSWR alarm
- Pin#9: Enable/Disable

3、 Checking item before testing

No seam on the surface of PA, the position and content of barcodes and labels are right.

Check the silk-screen of PA is correct and normal.

The connectors of power supply work normally and the poplars of positive and negative are right.

RF connectors work normally.

Power switch is in the position of turnoff.

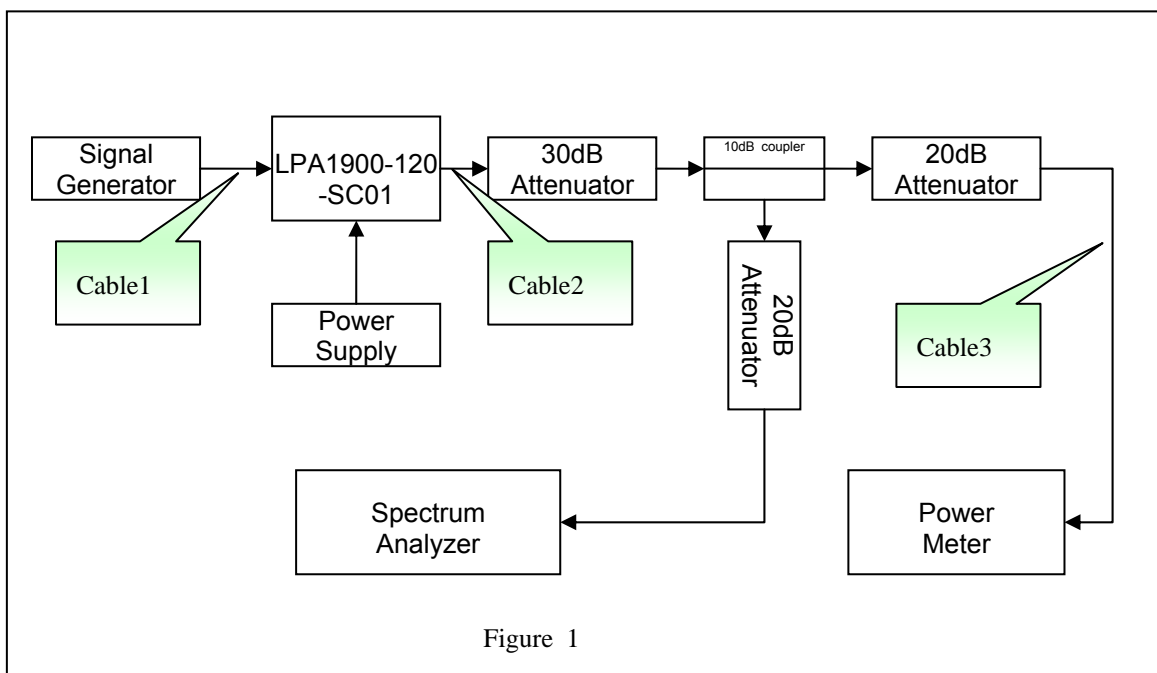
Turn on power supply and check the static current whose normal value should be 10A~12A.

When the PA works with full power, the current should be 33A~35A.

4、RF performance test procedure:

1) Spectrum emission

Test flow chart:



Purpose:

Check the quality of amplified signal.

Test setup list

Signal generator: Agilent IFR3413 or the same level instrumentation.

Power meter: Agilent E4418B or the same level instrumentation.

Spectrum analyzer: R&S FSEA or the same level instrumentation.

Power supply: 30V/50A

Attenuator: 30dB 500W 1PCS, 20dB 5W 2PCS,

Coupler: 60dB frequency range: 1930MHz~1990MHz

RF cable

Instruction

1. Set up the structure according to the figure 1.

2. Signal generator setup:

signal type: 1. 3G 3Carriers 3FA, PAR: 8.0dB

2. ats_3gpp_fdd_fwd_tm1_64ch_sc0_v5pt1

3. Spectrum analyzer setup:

RBW→30KHz, VBW→300KHz, Center frequency: 1960MHz, SPAN→40MHz, Sweep time: 1S Spectrum Analyzer's offset value according the attenuation from PA output to input port of spectrum analyzer.

4. Power meter must to be calibration and set the offset value according to attenuation from PA output to power sensor.

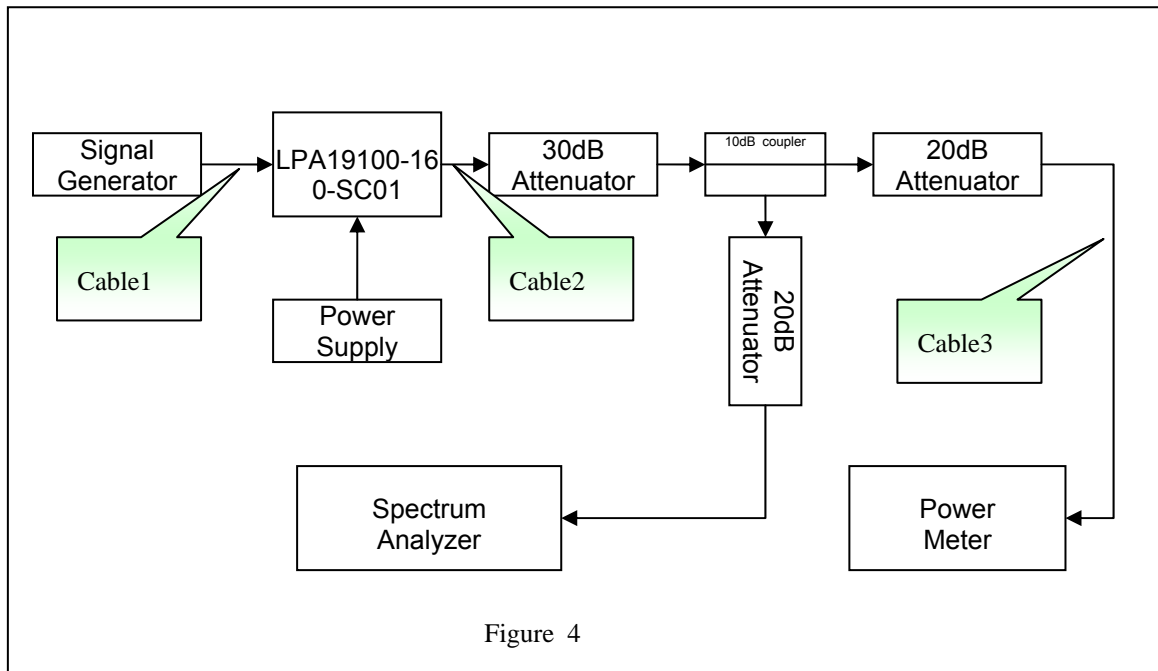
5. Input PA voltage setup +30V.

6. Turn on the signal generator.

7. Than confirm standard ACLR peculiarity.

2) Gain flatness

Test flow chart:



Purpose:

Check the gain at different frequency point.

Test setup list

Signal generator: IFR3413 or the same level instrumentation.

Power meter: Agilent E4418B or the same level instrumentation.

Spectrum analyzer: R&S FSEA or the same level instrumentation.

Power supply: 30V/50A

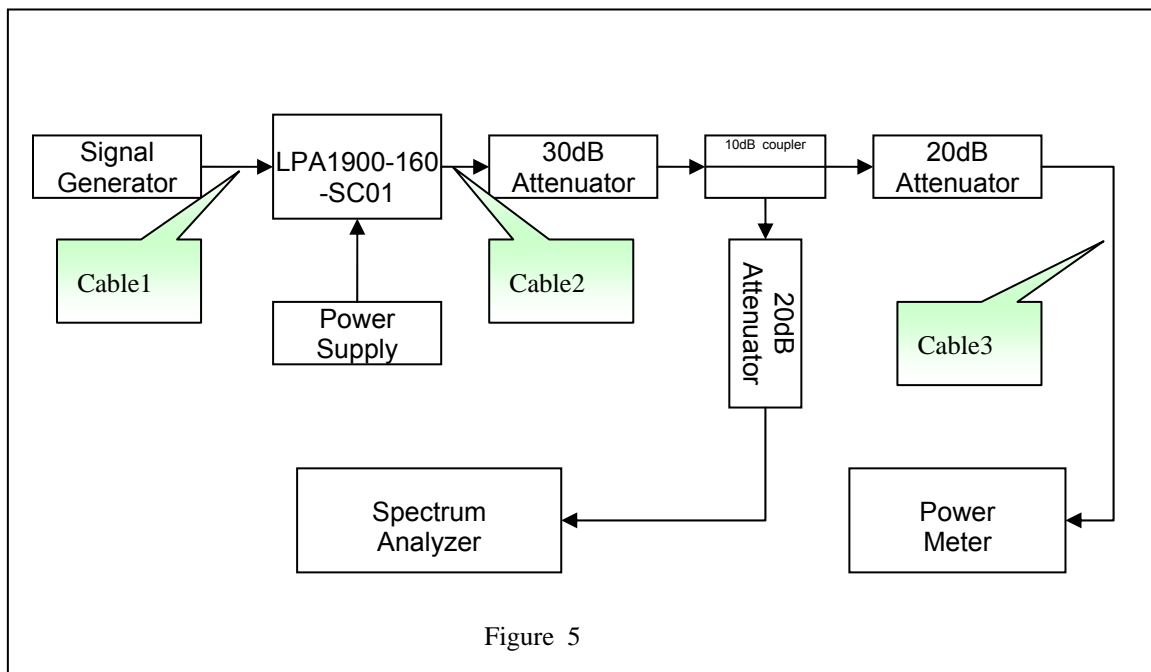
Attenuator: 30dB 500W 1PCS, 20dB 5W 2PCS,

Coupler: 60dB frequency range: 1930MHz~1990MHz

RF cable

3) Gain Variation & Detect Accuracy & Current consumption

Test flow chart:



Purpose:

Check the variation of gain over voltage.

Measure the difference between forward power and detect power.

Measure the efficiency of PA.

Test setup list

Signal generator: IFR3413 or the same level instrumentation.

Power meter: Agilent E4418B or the same level instrumentation.

Spectrum analyzer: R&S FSEA or the same level instrumentation.

Power supply: 30V/50A

Attenuator: 30dB 500W 1PCS, 20dB 5W 2PCS,

Coupler: 60dB frequency range: 1930MHz~1990MHz

RF cable

Instruction

1. Set up the structure according to the figure 5.

2. Signal generator setup:

3. Spectrum analyzer setup:

RBW→30KHz, VBW→300KHz, Center frequency is 1960MHz, SPAN→40MHz, and Spectrum Analyzer's offset value according the attenuation from PA output to input port of spectrum analyzer.

4. Power meter must to be calibration and set the offset value according to attenuation from PA output to power sensor.

5. Input PA voltage setup +30V.

6. Turn on the signal generator; adjust the output power from -6.2dBm to -23dBm with -1dB step.

7. Read out the output power from the power meter and do subtractions of each gain and get the gain Variation.

9. Compare the value on the power meter with the value shown on GUI, and then get the accuracy for different frequency range and different carriers.