QUAD BAND OTA (Verizon) User's Manual

Notice

Trademark

R-tron is a registered trademark of R-tron Inc.

Other products and company names mentioned here in this manual might be trademarks or trade names of their respective owners.

Copyright

Copyright © R-tron Inc. 2000-2010

All Rights Reserved

Any reproduction, distribution, or revisions of any or all portions of this manual is prohibited without written permission from R-tron Inc.

Notice

This document describes the specifications, installation, and operation of the OTA repeater. Hardware and software mentioned in this document are subject to continuous development and improvement. Consequently, there may be minor discrepancies between the information in the document, performance, and design of the product.

Specifications, dimensions, and other statements mentioned in this document are subject to change without notice.

Questions or Comments

Address: R-tron America Inc. 6402 College Boulevard, Overland Park, KS 66211 Phone: +1-913-344-9977, 1-888-31R-TRON Fax: +1-913-344-9988 E-mail: info@r-tronamerica.com Website: www.rtronamerica.com

FCC Part 15.19

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

FCC Part 15.21

Any changes or modifications (including the antennas) made to this device that are not expressly approved by the manufacturer may void the user's authority to operate the equipment.

RF Exposure Statement

FCC RF Radiation Exposure Statement: This equipment complies with FCC RF Radiation exposure limits set forth for an uncontrolled environment. This device and its antenna must not be co-located or operating in conjunction with any other antenna or transmitter.

Safety Precautions

Warning /

Opening the OTA equipment could result in electric shock and may cause severe injury.

Warning /

Connect the equipment frame ground to the building ground.

Warning /

Operating the OTA with antennas in very close proximity facing each other could lead to severe damage to the repeater.

Caution /

RF EXPOSURE INFORMATION

A minimum separation distance of 27 cm must be maintained between the user and the external antenna of the repeater to satisfy FCC RF exposure requirements. For more information about RF exposure, please visit the FCC website at www.fcc.gov

Caution /

This equipment is for indoor use only and enables the communication wiring to communicate inside the building only.

Contents

Glossary				2
1. Introduction				3
2. Description				6
2.1.		Main		Unit
Overview				
7				
2.2.				Internal
Configuration				
8				
2.2.1.				Block
diagram				
9				
2.2.2.				AC-DC
Adaptor				
10				
2.2.3.				RFU(RF
Unit)				
11				
2.2.4.		MCU(Main		Control
Unit)				12
2.2.5.				
Duplexers				
13				
3. Hardware Installation				11
3.1.	Check		List	of
Items				
14				
3.2.				
Mounting				
15				
3.3.				
Grounding				
17				

3.4.	Cable
Connection	
18	
3.5.	Power
On	
18	
4. Operation	
4.1.	System
Requirements	- -
21	
4.2.	Network
Setup	
21	
4.2.1.	Windows
ХР	
21	
4.2.2.	Windows
2000	
23	
4.2.3.	Windows
Vista	
24	
4.3.	System Log
in	
27	
4.4.	System
Setup	
27	
5. Troubleshooting	
6. Specifications	
7 Appendix	50
/. /\phendix	J

Glossary

The following is a list of abbreviations and terms used in this manual.

Abbreviation	Definition
AC	Alternating Current
ANT	Antenna
ATT	Attenuator / Attenuation
CDMA	Code Division Multiple Access
DC	Direct Current
DL	Downlink
GND	Grounding
GUI	Graphic User Interface
LED	Light Emitting Diode
PLL	Phase-locked loop
PSU	Power Supply Unit
RF	Radio Frequency
RSSI	Received Signal Strength Indication
TEMP	Temperature
UL	Uplink
VSWR	Voltage Standing Wave Ratio

ALC (Automatic Level Control)

ALC feature prevents the repeater from exceeding its maximum output power by reducing the gain automatically. ALC is used to adjust the gain to an appropriate level for a range of input signal levels.

ASD (Automatic Shutdown)

Automatic shut down protects the repeater from the oscillation or excessive input signal and eliminates any degradation to the network.

There are three parameters: ASD Level, ASD Time, and ASD Iteration.

If the output power reaches higher than the "**ASD LEVEL**", the repeater will shut down for "**ASD TIME**" seconds and then it will turn the amp back on to measure the output power again. If this repeats at "Iteration" times, the repeater will shut down permanently.

1. Introduction

QUAD BAND OTA is used to fill out areas in QUAD BAND systems, such as base station fringe areas, business and industrial building, etc.

QUAD BAND OTA receives signals from a base station, amplifies and retransmits the signals

to the mobile stations. It also receives, amplifies and retransmits signals in the opposite direction. Both directions are served simultaneously with the following features:



QUAD BAND OTA Key Features

- Composition(4 BDA by service band and combining Unit)
- 700MHz Band BDA for LTE Service

- Cellular Band BDA for EVDO/CDMA2000 Service (LTE Service is possible even the Firmware update only)

- PCS Band BDA for EVDO/CDMA2000 Service

- AWS Band BDA for EVDO/CDMA2000 Service (LTE Service is possible even the Firmware update only)

- Combining Unit (MUX) is for input and output signal of each BDA to a single antenna.
- Design(Each BDA is possible to service selected channels by the user within a band.)
- Possible to select any channel combination within a band caused by the Digital Filter.
- Using the Digital Filter: High quality, out of band rejection, high performance
- Possible to combine the BDA according to Band.
- Each BDA can be used as a stand alone unit(Use Privacy Ant Port)
- Possible to combine the BDA(Dual, Tri, Quad-band)
- ♦ User friendly design.
- Local monitoring and control through the Web GUI interface
- Remote monitoring and control through the Remote Access and Control

- Reports the status of connection as a function of SNMP regularly and reports an alarm if the event occurred.

- Protection function
- Isolation and Oscillation Check
- Isolation cancellation Function
- Auto Gain Control
- Auto Shutdown
- Service Coverage

- Possible to service by 25k square feet
- Use in office buildings, warehouses, underground parking lots, etc.

2. Description

2.1 Main Unit Overview



AC Power & AC Power Switch



2.2 Internal Configuration

* BDA Unit



* MUX Unit



2.2.1 Block Diagram

The following diagram explains how the QUAD BAND OTA services signals.



2.2.2 PSU

The AC-DC adaptor supplies a steady DC power to the CDMA MINI equipment by drawing power from the general in-wall AC outlets.



Specification

It	em	Specification
	Operating Temp	-10°C~50°C (14°F~122°F)
Environmental	Humidity	20%~90%RH
	Cooling method	Convection.
Vo	ltage	AC 85-264V
Cı	ırrent	+ 24V/27A (600W)
Free	luency	50/60(47-63)

2.2.3 RFU (RF Unit)

The RFU (RF Unit) is a bi-directional amplifier that sharply filters out unwanted noise.



2.2.4 HPA (High Power Amplitude)



2.2.5 MCU (Main Control Unit)

The MCU (Main Control Unit) is the control unit of a QUAD BAND OTA. It controls and monitors operational parameters. It is also responsible for generating alarms, keeping event logs and performing many other functions of the QUAD BAND OTA.



2.2.6 Duplexer

A duplexer is a device that combines two or more signals onto a common channel or medium to increase its transmission efficiency.



2.2.7 Multiplexer



3. Hardware Installation

The installation procedure is as follows: • Check List of Items

- Mounting
- Grounding
- RF Cable Connection
- Power On

Index	Items	Quantity
1	RF Module	4
2	Shelf	1
3	MUX	1
4	AC Cable	1
5	RF Cable	8
6	LAN Cable	1
7	DATA Cable	4
8	Bolt	4
9	Quick Manual	1
10	User's Manual	1

Item Figure



3.2 Mounting

Step 1 : Find a location for the Repeater to be installed on a 19 inch rack.



Step 2: Insert the Repeater on the shelf.



Step 3 : Fix the Repeater shelf using the provided screws.



Step 4 : Insert the Combine Unit(MUX) and Fix it.



Step 5 : Insert each BDA for the Repeater and secure it.



3.3 Grounding

A rod on the left side is intended for a building ground. Connect the ground cable to the rod.



3.4 RF Cable Connection

Step 1 : Connect a cable from the donor antenna to the Donor Antenna Port. Step 2 : Connect a cable from a repeater's service antenna to the Server Antenna Port.



3.5 Power On

Step 1 : Connect the power cord.

Step 2 : Plug the power cord into a wall outlet.

Step 3 : Check if the green LED at the Top turns on.



4. Operation

4.1 System Requirements

QUAD BAND OTA operates on a customer provided PC based platform with the following system requirements:

- Windows® 2000, Windows® XP or Windows® Vista
- Internet Explorer 6.0(Recommended) or higher
- 128 MB RAM or higher
- Pentium III processor or higher
- RJ-45 jack required

4.2 Network Setup

4.2.1 Windows XP

Step 1 : Click the Start button and select My Network Places.



Step 2 : Click View network connections.



Step 3 : Right-click Local Area Connection to see a shortcut menu and click Properties.

S Hetwark Connections	
File EXE View Favorities Tools Howardset I	14g1
Oast · O · D Pasch Bri	lderv []] +
Salasia 🕲 Network Connections	
Network Tasks	h-Speed Internet Concrete, Fervaled Concrete, Ferva
advices advic	Create Shortcut Delates Reparts Proceeding

Step 4 : Select Internet Protocol (TCP/IP) and click Properties.



Step 5 : Check Obtain an IP address automatically and click OK.

perfies
Konelically if your network supports to adv your network, administrator for
calg
Arradicaly
addwiner:
1
Exercised
2073/99/991

Step 6 : Close all windows.

4.2.2 Windows 2000

Step 1 : Click the **Start** button, point to Settings, and then click **Network and Dial-up Connections**.



Step 2 : Right-click Local Area Connection to see the shortcut menu and click Properties.



Step 3 : Select Internet Protocol (TCP/IP) and click Properties.

			ب ليلم
General			
Cornect using:			
Realter ATLET	29(4) PCI Fast Ethe	enel Adapter	
1		Г	Current 1
Comparents shecked	are used by this on		congos
The second second	ac anoscy day to	CARACTER .	
区 图 Clarific Mics	coolt Networks		
E Bile and Prints	Sheing for Micros	aft Networks	
12 X Information	of HERRIEN		
1 - Y 10.000000000			
	CONTRACTOR OF THE OWNER OF		
InstalL.	Livinetal	CA	C refrequ
instal.	Uninetal		-2
Install.	Uninetal d'Enclocal/Internet	Protocol The	and state
InstalL. Description Transmission Eonio wide area network	Livinatal cl Photocol/Internet	Protocol The	e dela id
InstalL. Description Transmission Ecolo wide area network across diverse infer	Uninetal of Photocol/Internet protocol final provid connected network	Protocol The	e dela idi
InstalL. Description Transmission Conto wide and network duroos diverse inter	Livinetal diPhotocol/Internet protocol fired provide connected metwork	Protocol The	e dela il
InstalL. Description Transmission Control wide area network across diverse inter	Livinetal of Photoc of Anteen et protocol final provide connected metwork	Protocol The	e dela al
Install. Description Transmission Lonks wide ansanetwork across diversienter Show poninitabil	Livinatal of Photocol/Internet protocol find provide connected network bor when connected	Protocol The	e delesia shon
Install. Description Tigenamission Lonks wide ansametisation across divense inter Show isominitasid	Livinetal of Photoc of Anie met protocol final provide connected metwork bor when connected	Protocal The	e dela ut
InstalL. Description Trensmission Conta wide associational across diverve inter Show paninitaski	Livinetal of Photocol/Internet protocol find provid coverected network ber when connected	Protocol. The	e dela sita Shon

Step 4 : Check Obtain an IP address automatically and click OK.

nternet Protocal (1139/39) Pro	and an a	<u>?[x</u>
Genesal		
You can get IP cellings assigned the capability. Otherwise, you no the appropriate IP settings.	l automotically if your network and to ack your nativolic admin	esports estatox tor
C Obtain on IP address outor	valicoly	
T Una fea following IP adds	0.	
F'33378/		
Delay garage	-	-7
C Obtain DNS server addres	distination of	
- C Use the following DNS ser	veraddeses	
Frederict DNE server		
Hines Officers		3
	h	frenced.
	(IKN)	Cancel
	- 2	

Step 5 : Close all windows.

4.2.3 Windows Vista

Step 1 : Click the **Start** button and select **Control Panel**.



Step 2 : Click Network and Internet.



Step 3 : Click Network and Sharing Center.



Step 4 : Click View status of Local Area Connection.

Take Very 200 years and dealers Connect for 4 where Very 200 years working a dealers Connect for 4 where Very 200 years working a dealers Very 200 years Very 200 years	View full map
Crement to a variable Variage variable an object Variage variable an object Variage variable an object Variage variable and variable Variage variable and variable Variage variable and variable Variage v	Control (Contro
Notwork 2 (Hubic rationsk) Access Limited Connectivity Cennection Lacal Asia Connectivity Cennection Lacal Asia Connectivity Network Biocovery Network Biocovery @ DH File shearing @ OH Dials fortige shearing @ DH	-x- 🧼
Access Limited Connectivity Connection Laad Acas Canaditan III Sharleg and Discovery Network discovery @ Drt Fits sharing @ Drt Disk foffer sharing @ Drt	Customia
Convection Laak Area Cannadian III: Sharleg and Discovery Network discovery @ Dif Fit sharing @ Dif Disk foffer harms @ Dif	
III Sharleg and Discovery Network discovery = DH Fit sharing = DH Policie Entry = ■ DH	View statut
Network discovery © DH Titruburing © DH Data Enfire sharing © DH	h
Fit sheing 4 Off Datisfate sherea 4 Dff	9
Public folder sharing = Df	6
	8
Printer sharing 0 Off ins printers lests	aled 😿
Password protected sharing 🕫 On	8
Midastating # Of	

Step 5 : Click Properties and a caution pop-up window will appear. Click OK.

Connection			
IPv4 Connectiv	ity:	1	inited
IPv6 Connectly	ity1	5	inited
Media State;		0	rabled
Duration:		00	26:35
Speed:		10.0	Mbps
kcavity			
	Sent	- Ke	wied.
		1000	40.5500
Bytest:	42	1	182

Step 6 : Select Internet Protocol Version 4 (TCP/IPv4) and click Properties.

Networking Sharing		
Connect using:		
👻 NVIEXA nForce Networking Eo	ntruller	
	Configure.	-
This contraction uses the following be	THE:	
 ✓ Internet Protocol Version 6 (✓ → Internet Protocol Version 6 (✓ → Link-Layer Topology Discov 	TCP/IPvQ TCP/IPvQ INSTITUTE any Mappier I/O Driver	
	Torosoft Networks TCP/IPvG any Mapper I/O Driver ary Responder	S
	Increase Networks ICP/IPvG) ICP/IPvG ICP/IC	27
Internet Protocol Version § (Image: Strategy Proposed Version § (<tr< th=""><td>Increase Networks ID2/IP-60 Increase I/O Driver any Responder Increases International The default avides communication whe</td><td>23</td></tr<>	Increase Networks ID2/IP-60 Increase I/O Driver any Responder Increases International The default avides communication whe	23

Step 7 : Check Obtain an IP address automatically and click OK.

enoral Alternate Configural	ban				
You can get IP settings assigned this capability. Otherwise, yo for the appropriate IP setting	ned automati u need to asi s.	ally if your n	our n etwo	ertuvork rk. admir	supporta istrator
(a) Obtain an IP address au	toriatically				
O Use the following IP add	tess:				
IP address:					
publiet meski	1			11	111
Deltault gabes wy					
(i) Obtain DNS server addr	ess automatic	shr			
O Use the following DNS is	erver address	es			
Realizerad CINE sarvier;					
Alternate IAS server		11			
				Adv	anced
			_		
		0	OK	S	Cancel

Step 8 : Close all windows.

4.3 System Login

Open your Web browser and type "192.168.0.1" into the URL address box. Then press the Enter key.



4.4 System Setup

4.4.1 Clock

The clock will automatically be set to your PC time when you click the APPLY

	System Con Date :	figuration: Set Date/Time 5-11-2010	
	Time : New S	19:11:43 ystem Date and Time	
	Date : Time :	5 / 11 / 2010 19 : 10 : 41 Set Date/Time	
Message Board			

4.4.2 Network

When you click on the Network, the Web GUI screen is automatically updated every 5 seconds.

RtestOTA			Rtes	tota]		APPLY
2. Location Information - [example : N37.123456 , W98.123456]								
N2.345556	Ν		2.34	5556]		
W4.123333	w		4.12	3333]		APPLY
	Ν	2	- 2	- 0	44	1		
	w	4	- 7	7 -	24]		APPLY
3. Heartbeat Interval [1 ~ 60 minutes : Default=20]								
20	18 - 61		2	:0				APPLY
n						<u></u>		
Rtest001			Rtes	t001]		APPLY
						,		
Auto		Auto	Static					
218.239.217.38		218	239	217	38			APPLY
255 . 255 . 255 . 0		255	255	255	0]		APPLY
218.239.217.1		218	239	217	1			APPLY
0.0.0	J	0	0	0	0]		APPLY
Message Board								
	RtestOTA n - [example : N37.123456 , W9 N2.345556 W4.123333 [1 ~ 60 minutes : Default=20] 20 Rtest001 Auto 218.239.217.38 255.255.255.0 218.239.217.1 0.0.0.0	RtestOTA n - [example : N37.123456 , W98.1 N2.345556 N W4.123333 W W4.123333 W I ~ 60 minutes : Default=20] V 20 20 Rtest001 1 Auto 218.239.217.38 255.255.255.0 218.239.217.1 0.0.0.0 1	RtestOTA n - [example : N37.123456 , W98.123456] N2.345556 N W4.123333 W W4.123333 W Q N 2 W 4 2 20 0 Rtest001 0 Auto 218 218 239 217 0 0 0	RtestOTA Rtest n - [example : N37.123456 , W98.123456] N 2.34 N2.345556 N 2.34 W4.123333 W 4.12 N 2 - 2 W4.123333 W 4.12 N 2 - 2 W4 - - - 1 ~ 60 minutes : Default=20] 20 2 20 2 - - Rtest001 Rtest - - Auto 218 239 - - 218 239 255 255 255 255 218 239 0 0 0 0	RtestOTA RtestOTA n - [example : N37.123456 , W98.123456] N N2.345556 N 2.345556 W4.123333 W 4.123333 N 2 - 20 - W 4 - 7 - (1 ~ 60 minutes : Default=20) 20 - 20 Rtest001 Rtest001 - - Auto 218 239 217 255 255 255 255 255 218 239 217 0 0 0	RtestOTA RtestOTA n - [example : N37.123456 , W98.123456] N N2.345556 N 2.345556 W4.123333 N 2 - 20 - 44 W 4 - 7 - 24 [1 ~ 60 minutes : Default=20] 20 20 20 - 44 W 4 - 7 - 24 1 ~ 60 minutes : Default=20] 20 20 - - 20 20 20 - - - - - - - 24 - - - 24 -	RtestOTA RtestOTA n - [example : N37.123456 , W98.123456] N2.345556 N 2.345556 N 4.123333 N 2 20 4.123333 N 2 20 4.123333 N 2 20 44 $\sqrt{4}$ $\sqrt{4}$ 7 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 $218.239.217.38$ $255.255.255.0$ $218.239.217.1$ 218 239 217 $0.0.0.0$ 0 0 0 0	RtestOTA RtestOTA n - [example : N37.123456 , W98.123456] N2.345556 N W4.123333 W 4.123333 W N 2 - 2 - 20 - 20 20 $\frac{44}{\sqrt{4}}$ X - 7 - 20 20 $\frac{20}{\sqrt{2}}$ $\frac{1}{\sqrt{2}}$ Rtest001 Rtest001 Auto Auto 218.239.217.38 218 239 217 38 255 255 255 0 218 239 217 1 0.00.00 0 0 0 0 0 0 0

4.4.3 Control

Quad OTA Repeater does not need to be logged-In. The user can control the repeater directly with the WEB GUI.

Case1. 700M BAND

Network Information	System Information				
Cascade Code[Mandatory] RT VzW OTA	Mode	Number	WW-700-3	0-DC	
Latitiude/Longitude 12.345678/ 34.123456	56 Maximum Output Power/Gain 30dBm				
Serial Number Test001	Software	e Version	1	1.5.5	
Path Control	Factory Set & Recommend	Max Gain		222	
DL Path ON OFF	Factory Default	te.			
UL Path ON OV	Recommend Max Gain 104	.0 ds			
Power Status	Band Setup				
Downlink Uplink	C C				
Input Power -56.9 dBm -100.5 dBm [C1 C2	and Select			
Output Power 30.1 dBm -13.5 dBm					
Power Control	Alarms and Current Status				
ALC [Automatic Level Control]	Tamper detected	Communicat	ion failure		
DL ALC Level 30 dBm 30 🚔 [0~ 30] APR.Y	Field replaceable fail	Synthesizer I	Failure		
UL Gain Offset 0 dB 0 - 5~ 51 APPLY	Hardware Failure	Software Failure			
ALC Status ON OFF	UL Oscillation Detected	DL interferer power			
	UL Out-of-band emissions	DL Spurious	emission		
Manual Gain Control	Reset alarm	•	iormal Ran	ge	
DL Gain 87 dB 87 🚔 [67~ 87] 🤐	UL power at coverage high		< -30	dBm	
UL Gain 87 dB 87 - [67~ 87]	DL donor power Normai		-90~-30	dBm	
	DL VSWR				
ASD [Automatic Shut Down]	Power supply out of range	24	20~28		
	Over temperature	81.5	< 176		
	DL Low isolation	119		dB	
Status ON ON ON ON	Manual Shutdown	No	rmal		
Sleep Mode	Message Board				
Status ON OFF					

Solution 1. Manual Gain Setting

Step 1A Select the repeater.

(cherry (herrich (<u>Gantes</u>	4 1		1
Select		Lock	
	700M Band		
	Celluar Band		
	PCS Band		
	AWS Band		

 $Step\ 2A$ Select the channel band of the area in use.



Step 3A Turn off the DL and UL Amplifier

Path Control		501	
DL Path	ON	ON	OFF
UL Path	ON	OV.	OFF

Step 4A ALC must be turned off

(700M, PCS, AWS: 30dBm / CELLUAR: 25dBm)

Power Control ALC [Automat	ic Lev	el Conti	rol]			
DL ALC Level	30	dBm	30	80	[0~ 30]	APPLY
UL Gain Offset	0	dß	0		[- 5~ 5]	APPLY
ALC Status	ON				GN	Ohk

Step 5A The Setup is the Available Maximum Gain which defines as the maximum gain. Change the DL and UL Gain. Turn on the DL and UL Amplifier



Result 1 DL and UL gain are fixed and the output power depends on the input power Result 2 Constant Maximum DL Output Power 30dBm If the DL Input Power >= -57dBm

Path Control				
DL Path	ON		ON	OFF
UL Path	ON		01	OFF
Power Status				
ſ	Downlink	Uplink		= 17 a
Input Power	-56.9 dB	m - 100.7 dBr	n E	16 3
Output Power	30.1 dB	m -13.7 dBr	n	
Power Control				
ALC [Automa	itic Level Co	ontrol]		
DL ALC Level	30 dBr	n 30 🥌	[0~ 30]	APRIL
UL Gain Offset	0 dB	0	[- 5~ 5]	APPLY
ALC Status	OFF		ON	OFF.
Manual Gain C	ontrol			
DL Gain	87 dE	87	[67~ 87]	APPLY
UL Gain	87 d8	87	[67~ 87]	APPLY
ASD [Automati	ic Shut Dow	n]	8	
ASD Level	33 de	33	[0~ 33]	APPLY
Status	ON		04	OFF
Sleep Mode Status	ON		ON .	OFF

Solution2 . ALC Gain Setting.

Step 1A \sim Step 3A

Step 4B ALC must be turned on. (700M, PCS, AWS : 30dBm / CELLUAR : 25dBm)

Power Control ALC [Automat	ic Lev	el Cont	rol]		
DL ALC Level	30	dBm	30	😑 [0~ 30]	APPLY
UL Gain Offset	0	dB	0	- 5~ 5]	APRLY
ALC Status	OFF			ON	OPP.

Step 5B Setup is the Available Maximum Gain which is defined as the maximum gain. Change the DL and UL Gain. Turn on the DL and UL Amplifier

Path Control				-44	
DL Path	ON			ON)	OFF
UL Path	ON			0%	OFF
Power Status					
	Downlink	Jplink	c.		
Input Power	-56.9	Bm -100.	5 dBm	L	
Output Power	30.1	Bm -13.5	dBm		
Power Control					
ALC [Automa	tic Level	Control]			
DL ALC Level	30 d	Brn 30	-01]	30]	APPLY
UL Gain Offset	0 d	в 0	- 5	~ 5]	APPLY
ALC Status	ON		C	oN .	OFF
Manual Gain C	ontrol				
DL Gain	87 d	8 87	[67	~ 87]	APPLY
				-	
UL Gain	87 d	87		~ 87]	ARTST
ASD [Automati	c Shut Do	wn]	Nome:		
ASD Level	33	IB 33	- 🚆 [0^	33]	APPLY
Status	ON			04	OFF
Sleep Mode					
Status	ON			qN II	OFF

Case2. CELLULAR BAND



Solution 1. Manual Gain Setting Gain

Step 1A Select the repeater.

(disses (disses			
[Santra	<u>1</u>		
Select		Lock	
	700M Band		
	Celluar Band		
	PCS Band		
►a	AWS Band		

Step 2A Select the channel band of the area in use.



Step 3A Turn off the DL and UL Amplifier

Path Control			22
DL Path	ON	ON	OFF
UL Path	ON	ON	OFF

Step 4A ALC must be turned off

(700M, PCS, AWS: 30dBm / CELLUAR: 25dBm)



Step 5A Setup is the Available Maximum Gain which is defined as the maximum gain. Change the DL and UL Gain. Turn on the DL and UL Amplifier



Result 1 DL and UL gain are fixed and the output power depends on the input power **Result 2** Constant Maximum DL Output Power 25dBm

If the DL Input Power >= -63dBm

Path Control				
DL Path	ON		ON	OFF
UL Path	ON		Oh.	OFF
Power Status				
Ĩ	Downlink	Uplink.		
Input Power	-62.6 dBm	-108.4 dBm	1	24 3
Output Power	27.4 dBm	-18.4 dBm		
Power Control				
ALC [Automa	tic Level Con	trol]		
DL ALC Level	27 dBm	27	[0~ 27]	APRY
UL Gain Offset	0 dB	0	[- 5~ 5]	APRLY
ALC Status	OFF		ON	OFF
Manual Gain C	ontrol	24-4 WOM		
DL Gain	90 dE	90 🚔	[60~ 90]	APPLY
UL Gain	90 dE	90 🐱	[60~ 90]	APPLY
ASD [Automati	c Shut Down]		
ASD Level	30 dB	30	[0~ 30]	APPLY
Status	ON		ON	OFF
Sleep Mode Status	ON		- QN	OFF

Solution2 . ALC Gain Setting.

Step 1A \sim Step 3A

Step 4B ALC must be turned on.

(700M, PCS, AWS : 30dBm / CELLUAR : 25dBm)



Step 5B The Setup is the Available Maximum Gain which is defined as the maximum gain. Change the DL and UL Gain. Turn on the DL and UL Amplifier

Path Control				
DL Path	ON		ON	OFF
UL Path	ON		01	OFF
Power Status				
(Downlink	Jplink		
Input Power	-62.6 dB	m -108.2 dB	m [26 1
Output Power	27.4 dB	m -18.2 dB	m	
Power Control				
ALC [Automa	atic Level C	ontrol]		
DL ALC Level	27 dB	m 27	[0~ 27]	APPLY
UL Gain Offset	0 dB	0	[- 5~ 5]	APPLY
ALC Status	ON		ON.	OFF
Manual Gain (Control			
DL Gain	90 dE	90	[60~ 90	APPLY
UL Gain	90 de	90	[60~ 90	
ASD [Automat	ic Shut Dov	m]		
ASD Level	30 di	30	[0~ 30]	APPLY
Status	ON		ON	OFF
Sleep Mode	-			
Status	ON		04	OFF

Case3. PCS BAND



Solution 1. Manual Gain Setting Gain

 $Step \ 1A \ {\rm Select} \ the \ repeater.$

[Contro			
Select		Lock	
	700M Band		
	Celluar Band		
	PCS Band		
	AWS Band	1	

 $Step \ 2A$ Select the channel band of the area is use.

Band Sel	tup				
A1	A2	A3	D	81	B2
83		F	C3	C4	C5

Step 3A Turn off the DL and UL Amplifier

Path Control			
DL Path	ON	ON	OFF
UL Path	ON	OV	OFF

Step 4A ALC must be turned off

(700M, PCS, AWS: 30dBm / CELLUAR: 25dBm)



Step 5A The Setup is the Available Maximum Gain which is defined as the maximum gain. Change the DL and UL Gain. Turn on the DL and UL Amplifier

Warning	The gain mus Available Ma	st be low ximum G	er than the Gain.	e current value ar	nd
Manual G	ain Control	8			
DL Gain	97	dB	97	🪔 [67~ 97]	APPLY
UL Gain	97	dB	97	🗻 [67~ 97]	APPLY

Result 1 DL and UL gain are fixed and the output power depends on the input power **Result 2** Constant Maximum DL Output Power 30dBm

If the DL Input Power >= -67dBm

Power Status						
Input Power	Downlin -67.3	k dBm	Uplink -103.4	dBm	I	116
Output Power	29.7	dBm	-6.4	dBm		
ALC [Automa	atic Leve	el Con	trol]			
DL ALC Level	30	dBm	30		[0~ 30]	APPLY
UL Gain Offset	0	dB	Ū		[- 5~ 5]	APPCY
ALC Status	OFF	D			ON	OFF
Manual Gain G	ontrol					
DL Gain	97	d£	97		67~ 97	APPLY
UL Gain	97	dE	97		67~ 97]	APPLY
				a sugar		

Solution2 . ALC Gain Setting.

Step 1A \sim Step 3A

Step 4B ALC must be turned on. (700M, PCS, AWS : 30dBm / CELLUAR : 25dBm) Power Control ALC [Automatic Level Control] DL ALC Level 30 dBm 20 [0~ 30] UL Gain Offset 0 dB 5 [- 5~ 5]

ALC Status

Step 5B The Setup is the Available Maximum Gain which is defined as the maximum gain. Change the DL and UL Gain. Turn on the DL and UL Amplifier

APPLY

ON

Path Control				
DL Path	ON		ON.	OFF
UL Path	ON		011	OFF
Power Status				
ſ	Downlink	Uplink		
Input Power	-67.3 dBm	-103.2 dBm	1	14. 7
Output Power	29.7 dBm	-6.2 dBm	Ś.	
Power Control		Same March		
ALC [Automa	atic Level Cor	itrol]		
DL ALC Level	30 dBm	30	[0~ 30]	APPLY
UL Gain Offset	0 dB	0	[- 5~ 5]	APPLY
ALC Status	ON		ON	OFF
Manual Gain G	Control			
DL Gain	97 dE	97	[67~ 97]	APPLY
UL Gain	97 di	97	[67~ 97]	APPLY
ASD [Automat	ic Shut Down	1		
ASD Level	33 dB	33	[0~ 33]	APPLY
Status	ON		ON	OFF
Sleep Mode Status	ON		ON	OFF

Case4. AWS BAND



Solution 1. Manual Gain Setting Gain

Step 1A Select the repeater.



Step 2A Select the channel band of the area in use.



Step 3A Turn off the DL and UL Amplifier

Path Control			1
DL Path	ON	ON	OFF
UL Path	ON	0%	OFF

$Step \; 4A \; ALC \; {\rm must} \; {\rm be} \; {\rm turned} \; {\rm off} \\$

(700M, PCS, AWS: 30dBm / CELLUAR: 25dBm)

Power Control ALC [Automat	ic Lev	el Conti	rol]		
DL ALC Level	30	dBm	30	[0~ 30]	APPLY
UL Gain Offset	0	dB	0	[- 5~ 5]	APPLY
ALC Status	ON			ON	OFF

Step 5A The Setup is the Available Maximum Gain which is defined as the maximum gain. Change the DL and UL Gain. Turn on the DL and UL Amplifier



Result 1 DL and UL gain are fixed and the output power depends on the input power Result 2 Constant Maximum DL Output Power 30dBm If the DL Input Power >= -67dBm

Path Control	35 76		-	
DL Path	ON		ON	OFF
UL Path	ON		ON	OFF
Power Status				
(Downlink	Uplink		-
Input Power	-66.9 dBr	n -101.3 dBn	n E	
Output Power	30.1 dBr	n -4.3 dBn	n	
Power Control				
ALC [Automi	atic Level Co	ntrol]		
DL ALC Level	30 dBr	n 30	[0~ 30]	APPLY
UL Gain Offset	0 dB	0	[- 5~ 5]	APPLY
ALC Status	OFF	7 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	ON	OFF
11				
Manual Gain G	Control			
DL Gain	97 df	97	[67~ 97]	APPLY
UL Gain	97 dt	97	[67~ 97]	APPLY
(100 million 100 million	-	
ASD [Automat	ic Shut Dow	n]	5	
ASD Level	33 dB	33	[0~ 33]	APPLY
Status	ON		0%	OFF.
Sleep Mode Status	ON		04	OFF

Solution2 . ALC Gain Setting.

Step 1A \sim Step 3A

Step 4B ALC must be turned on. (700M, PCS, AWS : 30dBm / CELLUAR : 25dBm)

Power Control ALC [Automat	ic Lev	el Conti	rol]		
DL ALC Level	30	dBm	30	😑 [0~ 30]	APPLY
UL Gain Offset	0	dB	ō	- 5~ 5]	APPLY
ALC Status	OFF			ON	OFF

Step 5B The Setup is the Available Maximum Gain which is defined as the maximum gain. Change the DL and UL Gain. Turn on the DL and UL Amplifier

Path Control			· · · ·	10
OL Path	ON		ON	OFF
UL Path	ON		ON .	OFF
Power Status				
ſ	Downlink	Uplink		
Input Power	-66.9 dBr	-101.3 dBm	1	14 1
Output Power	30.1 dBr	-4.3 dBm	i.	
Power Control		water the		
ALC [Automa	itic Level Co	ntrol]		
DL ALC Level	30 dBm	30 🚔	[0~ 30]	APPLY
UL Gain Offset	a da	0	[- 5~ 5]	APPLY
ALC Status	ON		ON	OFF
Manual Gain G	Control			
DL Gain	97 df	97	[67~ 97]	APPER
UL Gain	97 di	97	[67~ 97]	APRY.
ASD [Automat	ic Shut Down	ป		
ASD Level	33 dB	33	[0~ 33]	APPLY
Status	ON		01	OFF
Sleep Mode Status	ON		01	OFF

Solution3. Alarms

Alarms and Current Status			
Tamper detected	Communica	tion failure	
Field replaceable fail	Synthesizer	Failure	
Hardware Failure	Software Fai	lure	
UL Oscillation Detected	DL interferer power exceeded		
UL Out-of-band emissions	DL Spurious	emission	
Reset alarm	Normal Range		
UL power at coverage high		< -30	dBm
DL donor power Normal		-90~-30	dBm
DL VSWR		< 3	
Power supply out of range	24	20~28	v
Over temperature	81.5	< 176	F
DL Low isolation	119	> 103	dB
Manual Shutdown	No	ormal	

• Alarm : If an alarm occurs, the alarm LED on the repeater will turn on. Please refer to the troubleshooting section of this manual.

 \cdot It is recommended to NOT change any of the values in the alarm range.

Solution4. ALC

Path Control						
OL Path	ON				ON	OFF
UL Path	ON			j	09	OFF
Power Status						
ſ	Downlink		Jplink.			
Input Power	-56.9	dBm	-100.5	1Bm	E	
Output Power	30.1	dBm	-13.5	Bm		
Power Control	and Series	X and a				
ALC [Automa	itic Leve	I Con	trol]	1000		
DL ALC Level	30	dBm	30		0~ 30]	APPLY
UL Gain Offset	0	dB	0	-	- 5~ 5]	APPLY
ALC Status	ON		11-12.00		ON	OFF
and a second)		8		
Manual Gain C	ontrol					
DL Gain	87	dB	87	- I	67~ 87	APPLY
						-
UL Gain	87	aB	87	• ¹	5/~ 8/	Rees.T.
ASD [Automati	ic Shut E	own	È.	_		
ASD Level	33	dB	33	· 1	0~ 331	APPLY
			10000000	and a		0.55
Status	ON			1	014	QF7
Sleep Mode	2 3					
Status	ON				ON	OFF

Automatic Level Control: Type under 30 and then click APPLY and ON. [Example at the 700M BAND]
For a repeater with 30dBm maximum output power, 87dB maximum gain/ 30dB gain Control range, → If the signal -57dBm and the ALC is set as 23dBm, the gain will be 80dB to adjust to the output power.
If the input signal is -50dBm, the output power will be 30dBm by the Limitation of the maximum gain even though the ALC is set as 30dBm

Solution5. ASD

ASD [Automa	tic Shut	Down]	12 more	enter		
ASD Level	33	dB	33		[0~ 33]	APPLY
Statu≤	ON				ON .	OFF

(700, PCS, AWS)

ASD [Automa	tic Shut	Down]		in perso		
ASD Level	30	dB	30]ê	[0~ 30]	APPLY
Status	ON				ON	OFF

(CELLULAR)

• Automatic Shutdown: Type the desired value for the ASD Level and then Click APPLY and ON.

[Example at the PCS BAND]

For a repeater with 30dBm Maximum Output Power, 97dB Maximum Gain/ 30dB gain control range, assuming **ASD Level: 33dBm, ASD Time, ASD Count** are already fixed at 3seconds, 10times.

If the composite output power is 33dBm(ASD Level) and higher, the repeater will shutdown for 3seconds(ASD Time). If the shutdown occurs 10times(ASD Count), the 11th shutdown will be permanent.

And repeater runs Easy setup automatically. After that, it is activated with the

re-calculated antenna isolation value.

5. Troubleshooting

Before contacting your service dealer, please make sure you refer to the following guide. If the QUAD BAND OTA does not work normally after completing the following troubleshooting tips, please contact your local dealer or service center.

Problem	Check Point	Solution
Critical	POR LED is red	Power supply out of range
		- Confirm AC 85 - 264V common use power and
		power cable.
	TD LED is red	Tamper detected
		 Check the status of the BDA equipment.
	BTF LED is red	Built-in test failure
		- Check which alarm occurred through the WEB
		GUI Alarm status.
		- UL Out-of-band emissions, DL Spurious
		emissions, DL Interferer power exceeded, DL
		Low isolation, Over temperature
		- Case 2) Problem solving by Alarm indicator.
	RMF LED is red	Replaceable module failure
		- select BDA's alarm LED is red
		- reset BDA's power
		- BDA's alarm LED is still red, Contact
		Technical Support
	OSC LED is red	Oscillation detected
		- Check Donor/Server ant. Isolation and if the
		value of Gain is less than +5dB, adjust the
		location of antenna to secure isolation.
	SD LED is red	Shutdown
		 Check the S/D reason using WEB GUI.
		- If the Manual HPA is Off, turn it back On.
		- If Overpower S/D occurred and Manual Gain is
		setting up, control the Gain setting.
		- If Overpower S/D occurred and the ALC is On,
		set up the ALC Level 1 to 3dB low. Fix the
		ALC Level if it is normal after monitoring for so
		long. (It can be possible to occur if input
N 41		Power change is extreme.)
Minor	DCF LED is orange	Donor Circuitry failure
		- DL Donor Power too nign
		- After checking the DL input Power, adjust the
		location of the antenna or install the external
		antenna to the permitted range in it is over the
		Deper power too low
	DFL LED is oralige	Di Donor Power teo low
		If the DL input Power is too low, adjust the
		location of the antenna to be at a high input
		value
	CCE LED is orange	Coverage Circuitry failure
		- UI Power at coverage high DI VSWR
		- If the DPL LED is normal but the CCF LED is
		not normal reduce the UI Gain (If AI C is On it
		can reduce the UL Gain by controlling the Gain
		Offset.)

Case 1) LED indicator is not normal

RE LED is orange	Reset engaged - Reset alarm - Do not control the Repeater during reset.
AGC LED is orange	AGC active - AGC On - It means that ALC is On and operating well not the Alarm.

Case 2) When Alarm indicator

Problem	Check Point	Solution
General	Tamper detected	Install the BDA at the System and set up the
		Lock using the WEB GUI.
		Alarm occurred when the BDA unequipped
	Deven even the event of second	without cancellation of Lock for setting.
	Power supply out of range	- Check If the input power is AC85-264V and if it
	Communication failure	Check the status of the Data Cable connection
	Communication failure	If communication failure occurred at every
		connected BDA. Reset the MCU
		If communication failure occurred at a particular
		BDA, Reset BDA for the occurred failure.
	Field replaceable module	If the same alarm occurs after resetting the
	failure	BDA, request technical support.
	Reset alarm	Do not control anything during the reset.
	Manual shutdown alarm	If it has no problem regarding the installation,
		the HPA is On.
	Heartbeat	Check the connection of the Remote NMS
		Cable.
		Check the interval of Heartbeat on the WEB
	Operillation datastad	GUI. Chaole Depart/Convertence legistics value. If
Орилк	Oscillation detected	the gain value is lower than +5dR, adjust the
		antenna location to secure Isolation
	Power at coverage port too	If the UL Input Power is too high check the
	high	Coverage antenna of the initial installation again.
	Synthesizer failure	If the same alarm occurs after resetting the
		BDA, request technical support.
	Hardware failure	If the same alarm occurs after resetting the
		BDA, request technical support.
	Software failure	If the same alarm is occurs after resetting the
		BDA, request technical support.
	Out-of-band emissions out of	It may occur when VSWR is too high and need
	spec	to adjust the antenna location.
Downlink	Donor Power too high/low	Check the DL Input Power, need to adjust the
		antenna location.
	Low isolation	Check Donor/Server antenna Isolation value. If
		the Gain value is lower than +5dB, adjust the
	Syntheoizer feilure	If the same elerm essure effer reporting the
	Synthesizer failure	BDA request technical support
	Hardware failure	If the same alarm occurs after resetting the
		BDA, request technical support.
	Software failure	If the same alarm occurs after resetting the
		BDA, request technical support.
	Spurious emissions out of	It may occur when VSWR is too high and need
	spec	to adjust the antenna location.
	Interferer power exceeded	It may occur when VSWR is too high and need
		to adjust the antenna location.

Case 3) Cannot communicate with the repeater.

Problem	Check Point	Solution
Cannot		1. Click My Network Places →
communicate		View network connections. Right-click on the
with the repeater.		Wireless Network Connection and then
-		click Disable .
		wither
		R-tron
		Internet My Documents
		Paint
		My Pictures
		My Music
		My Computer
		My Network Places
		Control Panel
		Set Program Access and
		Printers and Faxes
		Help and Support
		Search
		All Programs
		Dog Off 🔘 Turn Off Computer
		2 My Network Places
		File Edit View Favorites Tools Help
		Address My Network Places
		Network Tasks
		2 Add a network place
		View network connections
		office network
		Set up a wireless network for a home or small office
		View workgroup computers
		UPnP devices
		Network Connections File Edit View Favorites Tools Advanced Help
		③ tack - ③ - 方 ♀ Search ⊘ Folders ::::-
		Retwork Tasks
		Constant a new Connection Connecon Connection Connection Connection Connection
		Change Windows Frewall ettings ¹⁰ ¹⁰ ¹⁰ ¹⁰ ¹⁰ ¹⁰ ¹⁰ ¹⁰
		text available Wireless text for records text of tex of text of text of text of text of t
		Repart this connection Bridge Connectons
		View status of this connection Detete
		Connection of this connection Properties



 4. Open the Internet Browser and then select Tools → Internet Options. Click Delete Files button in the Temporary Internet files section. No page to display - Microsoft Internet Explorer File Edit View Favorites Tools Help Mail and News Pop-up Blocker Manage Add-ons Synchronize Windows Update Motion cance Internet Explorer was una
Please try the following:
General Security Privacy Content Connections Programs Advanced Home page You can change which page to use for your home page.
Address: http://www.naver.com/ Use Current Use Default Use Blank
Pages you view on the Internet are stored in a special folder for quick viewing later. Delete Cookies Delete Files
History The History folder contains links to pages you've visited, for quick access to recently viewed pages. Days to keep pages in history: 20 🐑 Clear History
Colors Fonts Languages Accessibility
OK Cancel Apply
Internet Options
Uetete rites Image: Advanced Image: Delete all files in the Temporary Internet Files Page. You can also delete all your offline content stored locally. Page. Image: Delete all offline content Page.
Pages you view on the Internet are stored in a special folder for quick viewing later. Delete Cookies Delete Files Settings
The History folder contains links to pages you've visited, for quick access to recently viewed pages. Days to keep pages in history: 20 🐑 Clear History
Colors Fonts Languages Accessibility
OK Cancel Apply

5. Click Start and select Run.
Type ping 192.168.0.1-t and click UK .
NAME D trop
Internet My Documents
Paint
My Pictures
My Music
My Lomputer
Wy Network Places
Control Panel
Set Program Access and Defaults
Printers and Faves
(2) Help and Support
O Search
Jeach
All Programs 📄 🖉 Run
Log Off Of Turn Off Computer
Run ?X
Type the name of a program, folder, document, or
Internet resource, and windows will open it for you.
Open: ping 192.168.0.1 -t
OK Cancel Browse
CA C:\WINUUWS\system32\ping.exe
Pinging 192.168.0.1 with 32 bytes of data:
Reply from 192.168.0.1: bytes=32 time <ins ttl="128<br">Reply from 192.168.0.1: bytes=32 time<ins ttl="128</th"></ins></ins>
Reply from 192.168.0.1: bytes=32 time<1ns TTL=128 Reply from 192.168.0.1: bytes=32 time<1ns TTL=128 Dualy from 192.168.0.1: bytes=32 time<1ns TTL=128
Reply From 192.168.0.1: pytes=32 time(Inc 11L=128 Reply from 192.168.0.1: bytes=32 time(Inc TTL=128 Reply from 192.168.0.1: bytes=32 time(Inc TTL=128
Reply from 192.168.0.1: bytes=32 time <ins itl-128<br="">Reply from 192.168.0.1: bytes=32 time<ins itl-128<="" th=""></ins></ins>
Reply from 192.168.0.1: bytes=32 time <ins ttl="128</th"></ins>

6. Specifications

6.1 RF Characteristics

6.1.1 700MHz Band

Parameter		700MH	z Band	
Parame		TX(Down-Link)	RX(Up-Link)	
Frequency Range		746 - 756 MHz (C block)	777 - 787 MHz (C block)	
Band Se	lect	C bl	ock	
Channel S	Select	Max assumes 1x10 MH	z or 2x5 MHz channels	
Servic	e	LTE S	ervice	
Max. Composite	Input Power	-27dBm	-27dBm	
Composite Output	Power Range	30 dBm	30 dBm	
Gain Ra	nge	57 - 87 dB	57 - 87 dB	
Gain Offset			recommend -2dB	
ALC	Range	30 dB		
Gain Rip	ople	± 2 dB peak to peak		
Noice Figure	BDA Only	$\leq 5 \text{ dB}$	$\leq 5 \text{ dB}$	
Noise Figure	System	\leq 7 dB	\leq 7 dB	
EVM		8%-12.5%	12.5%-17.5%	
Operation at Minimum	15dB Coupling	8%	12.50%	
Stability Point	10dB Coupling	12.50%	14.50%	
(EVM)	5dB Coupling	17.50%	17.50%	
Cancellation	Window	1 µsec		
Cancellatior	n Depth	Isolation+5dB		
Roll-off		50 dBc at ± 1 MHz		
Spurious Emission		FCC role		
Return Loss		> 15dB		
Propagation	n Delay	< 6	μs	
Impedar	nce	50Ω		

6.1.2 Cellular Band

Dement	4	Cellular Band					
Parame	ter	TX(Down-Link)	RX(Up-Link)				
Frequency	Range	869 - 894 MHz (A1,B1,A2,B2)	824 - 849 MHz (A1,B1,A2,B2)				
Band Se	lect	(B1 and B2) or (A1 and A2) or (all of A and all of B)					
Channel S	Select	Max assumes 15 contiguous(non-contiguous) carriers in all of A and all of B					
Servic	e	CDMA2000 or	EV-DO Service				
Max. Composite	Input Power	-33dBm	-33dBm				
Composite Output	Power Range	25dBm	25dBm				
Gain Ra	nge	60 - 90 dB	60 - 90 dB				
Gain Of	fset		±3dB				
ALC	Range	25	dB				
Gain Rip	ople	± 2 dB pea	ak to peak				
Gain Flat	ness	5 dB peak to peak					
Noise Figure	BDA Only	$\leq 5 dB$	$\leq 5 dB$				
Noise Figure	System	\leq 7 dB	\leq 7 dB				
EVM		12.5% - 14.75% (EV-DO) 14.75% - 17.5% (CDMA2k)	14.75%-17.5% (EV-DO) 14.75% - 17.5% (CDMA 2k)				
Operation at Minimum	15dB Coupling	12.5% (EV-DO) 17% (CDMA2k)	15% (EV-DO) 17% (CDMA2k)				
Stability Point	10dB Coupling	14.75% (EV-DO) 19.25% (CDMA2k)	17% (EV-DO) 19.25% (CDMA2k)				
	5dB Coupling	17.5% (EV-DO) 19.25% (CDMA2k)	19.25% (EV-DO) 19.25% (CDMA2k)				
Cancellation	Window	1 µ	sec				
Cancellatior	Depth	Isolation+5dB					
Poll off	sub-band edge	45dBc at ± 1.5 MHz from each cellular sub-band edge					
	band edge	B1 and B2 30dBc at ±	750kHz from band edge				
Spurious Er	nission	Section 22, 24 and section 15 of FCC					
Return L	oss	> 15dB					
Propagatior	n Delay	< 6 µs					
Impeda	nce	50	Ω				

6.1.3 PCS Band

Domento	4	PCS Band					
Parame	ter	TX(Down-Link)	RX(Up-Link)				
Frequency	Range	1930 - 1990 MHz (A,D,B,E,F,C)	1850 - 1910 MHz (A,D,B,E,F,C)				
Band Se	lect	Up to 20 MHz of spectrun contiguous PCS sub-ba	m in no more than 3 non- ands of 5, 10 or 15 MHz				
Channel S	elect	Max assumes 15 contiguous(non-contiguous) carriers in 20MHz					
Servic	e	CDMA2000 or	EV-DO Service				
Max. Composite	Input Power	-37dBm	-37dBm				
Composite Output	Power Range	30 dBm	30 dBm				
Gain Rai	nge	67 - 97 dB	67 - 97 dB				
Gain Off	set		±3dB				
ALC	Range	30	dB				
Gain Rip	ple	± 2 dB pea	ak to peak				
Gain Flati	Gain Flatness		5 dB peak to peak				
Noiso Figuro	BDA Only	$\leq 5 dB$	$\leq 5 dB$				
Noise Figure	System	\leq 7 dB	\leq 7 dB				
EVM		12.5% - 14.75% (EV-DO) 14.75% - 17.5% (CDMA2k)	14.75%-17.5% (EV-DO) 14.75% - 17.5% (CDMA 2k)				
	15dB Coupling	12.5% (EV-DO) 17% (CDMA2k)	15% (EV-DO) 17% (CDMA2k)				
Operation at Minimum Stability Point	10dB Coupling	14.75% (EV-DO) 19.25% (CDMA2k)	17% (EV-DO) 19 25% (CDMA2k)				
(EVM)	5dB Coupling	17.5% (EV-DO) 19.25% (CDMA2k)	19.25% (EV-DO) 19.25% (CDMA2k)				
Cancellation	Window	1 µsec					
Cancellation	Depth	Isolation+5dB					
Roll-of	ff	45dBc at \pm 2 MHz from each PCS sub-band edge					
Spurious En	nission	Section 22, 24 and section 15 of FCC					
Return L	oss	> 15dB					
Propagation	Delay	< 6 µs					
Impedar	nce	50Ω					

6.1.4 AWS Band

Damage		AWS Band					
Parame	ter	TX(Down-Link)	RX(Up-Link)				
Frequency	Range	2115 - 2155 MHz (A,B,C,D,E,F)	1715 - 1775 MHz (A,B,C,D,E,F)				
Band Se	lect	Up to 20 MHz of spectrum in no more than 3 non- contiguous AWS sub-bands of 5, 10 or 15 MHz					
Channel S	Select	Max assumes 15 contiguous(non-contiguous) carriers in 20MHz					
Servic	е	CDMA2000 o	r LTE Service				
Max. Composite	Input Power	-37dBm	-37dBm				
Composite Output	Power Range	30 dBm	30 dBm				
Gain Ra	nge	67 - 97 dB	67 - 97 dB				
Gain Off	set		±3dB				
ALC	Range	30 dB m	inimum.				
Gain Rip	ple	± 2 dB peak to peak					
Gain Flatness		5 dB peak to peak					
Noise Figure	BDA Only	$\leq 5 dB$	$\leq 5 dB$				
Noise Figure	System	\leq 7 dB	\leq 7 dB				
EVM		12.5% - 14.75% (EV-DO) 14.75% - 17.5% (CDMA2k)	14.75%-17.5% (EV-DO) 14.75% - 17.5% (CDMA 2k)				
	15dB Coupling	12.5% (EV-DO)	15% (EV-DO)				
Operation at Minimum Stability Point	10dB Coupling	14.75% (EV-DO)	17% (EV-DO)				
(EVM)	5dB Coupling	19.25% (CDMA2k) 17.5% (EV-DO)	19.25% (CDMA2k) 19.25% (EV-DO)				
Concellation		19.25% (CDMA2k)	19.25% (CDMA2k)				
Cancellation	vvindow						
Roll-O	niccion	450BC at ± 2 MHZ from each AWS sub-band edge					
Boturn		Section 22, 24 and section 15 of FCC					
		> 1508					
	Delay	< ö µs					
Impedar	nce	50	ΩΩ				

6.2 Mechanical Specification

Parameter	Specifications	Remark
RF connectors	N-female x 2	
Dimensions (WxHxD)	19 * 10.47 * 17.72 Inch 482.6 * 265.9 * 450 mm	W * D * H
Weight	132.45 lb 60 Kg max	

6.3 Environmental Specification

Parameter	Specifications	Remark
Cooling	Convection	
Working Temperature	-10 - +50 °C	
Splash, Dust	IP -40	Indoor enclosure

7. Appendix Quad Band Channel

700MHz Band



PCS Band

	18501	ИНz		1865	5 187	0		18	385	1890) 189(5	1902.5	1910)	MHz
PCS UL			۵		р		в			F	F	C1		C2	
			Ŷ		Ū		Ū			-		СЗ	C4	C5	
												190	190	15	
	19301	ИНz		194	5 195	0		19	965	1970	J 197	5	1982.5	19901	MHz
PCS DL			^		р		Р			F	E	C1		C2	
			A		U		b			-	ſ	сз	C4	C5	
												198	0 198	15	_
AWS	Band														
		1710N	/Hz	17	20	1	730	1735	5 1	1740	174	5	1755	MHz	
AWS	UL			Α		В		с	D		Е		F		

	2110N	10MHz 2120) 2130) 2135 2140		0 214	5 2155N	2155MHz	
AWS DL		А		В		с	D	E	F		

Warranty

LIMITED WARRANTY

This product, as supplied and distributed by R-tron, in the original carton, is warranted by R-tron against manufacturing defects in materials and workmanship for a limited warranty period of:

Five (5) Year Parts and Labor

This limited warranty begins on the original date of purchase, and is valid only on products purchased and used in the United States. R-tron will repair or replace this product, at our option and at no charge as stipulated herein, with new or reconditioned parts or products if found to be defective during the limited warranty period specified above. All replaced parts and products become the property of R-tron and must be returned to R-tron. Replacement parts and products assume the remaining original warranty.

This limited warranty covers manufacturing defects in materials and workmanship encountered in normal, and except to the extent otherwise expressly provided for in this statement, use of this product, and shall not apply to the following, including, but not limited to: damage which occurs in installation; applications and uses for which this product was not intended; altered product or serial numbers; cosmetic damage or exterior finish; accidents, abuse, neglect, fire, water, lightning or other acts of nature; use of products, equipment, systems, utilities, services, parts, supplies, accessories, applications, installations, repairs, external wiring or connectors not supplied or authorized by R-tron which damage this product or result in service problems; or incorrect electrical line voltage, fluctuations and surges; customer adjustments and failure to follow operating instruction. R-tron does not warrant uninterrupted or error-free operation of the product.

THERE ARE NO EXPRESS WARRANTIES OTHER THAN THOSE LISTED AND DESCRIBED ABOVE, AND NO WARRANTIES WHETHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, SHALL APPLY AFTER THE EXPRESS WARRANTY PERIODS STATED ABOVE, AND NO OTHER EXPRESS WARRANTY OR GUARANTY GIVEN BY ANY PERSON, FIRM OR CORPORATION WITH RESPECT TO THIS PRODUCT SHALL BE BINDING ON R-tron.

Return Material Authorization(RMA) Procedure

The return and exchange of products are not allowed without prior approval from R-tron America, Inc.

Please follow the exchange procedure below.

- 1. Call Tech Support for troubleshooting.
- 2. If the device has a hardware problem, R-tron will replace it if it is within warranty. A RMA number will be issued for the return.
- 3. R-tron will ship the replacement and a return label will be provided.
- 4. The customer must return the product using the original packaging, including accessories.

