6-38 GHz Digital Radio System

NLite N

SAFETY INFORMATION

This safety instruction is prepared to protect accident resulting personal injury or death and also physical damage of the equipment during maintenance or installation. To avoid hazardous conditions, read this Instruction Manual thoroughly before equipment operation. The signal words (Danger, Warning and Caution) are used in the Instruction manual as follows:

GENERAL SAFETY

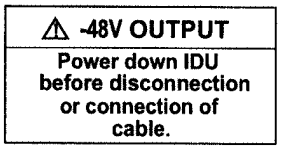
DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	Indicates an imminently hazardous situation which, if not avoided, could result in serious injury or physical damage.
CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or physical damage. It is also said to alert against inappropriate practice.

This system is to be installed, switched on and maintained only by service person, who is a person having appropriate technical training and experience necessary to be aware of hazards to which that person may be exposed in performing a task and of measures to minimize the risks to that person or other persons.

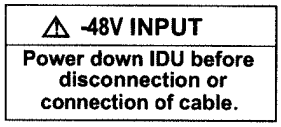
LABELS

Caution and Warning labels attached to the IDU and ODU as follows

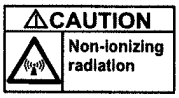
Do not disconnect I/F cable between the IDU and the ODU in operation condition, to avoid damaging the IDU and the ODU.



The –48 V DC power is superimposed on the center conductor of the I/F cable between the IDU and the ODU. Connecting a test equipment directly to this terminal may damage it and touching the coaxial cable core may cause electrical shock.



Be careful that top surface of the IDU and ODU are hot in operation.



Caution that the Non-ionizing radiation from the equipment may effect on health.

In a system using the OPT INTFC module, do not stare at the laser beam or look at it directly with optical instruments. Otherwise, it may hurt your eyes.

The mark on the electrical and electronic products only applies to the current European Union Member States.

WARNING

WARNING

The –48 V DC power is superimposed on the center conductor of the coaxial cable between the IDU and the ODU. Connecting a test set equipment directly to this terminal may damage it and touching the coaxial cable core may cause electrical shock.

The ODU is designed for use of –48 V DC at outdoor environment, pay attention for the risk of electric shock, because the contact resistance of the body is reduced when subjected to wet conditions.

WARNING

Do not touch the I/F cable jack core before turning off the power switch. If touching the coaxial cable core may cause electrical shock.

WARNING

In a system using the OPT INTFC module, do not stare nor use optical instruments to look at the laser beam directly as this may cause eye damage. (Class 1 Laser Product).

WARNING

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

WARNING

Do not enter in front of antenna when the transmitter is activating, because the power density of the microwave or milimeter-wave becomes high level along antenna beam. For the details, refer to the Safety Guidance for Microwave Radiation Hazard in NOTICE (Placing).

CAUTION

CAUTION

While the power supply is ON, do not connect/disconnect the power supply connector. Otherwise, the DC-DC CONV may break down.

CAUTION

Locate the ODU within the area protected by lightning rod. To avoid surge currents caused by lightning circulating in the equipment earth system, connect the equipment earth system (frame ground) to ground of the lightning rod at ground level.

CAUTION

Interrupt operation and turn off the power switch on the IDU, if in the event of an emergency situation with appearance such as smoking, burning smell, and strange sound. Continuation of operation may cause burning or resulting in electric shock. As there is risk, do not attempt to repair.

CAUTION

Introduction of spilling liquid, piece of metal, smoke, corrosive gas or dust into the equipment, or approach of birds or animals may cause burning or break-down.

CAUTION

Do not perform overhaul, modification or repairing of the equipment. As it may cause burning or resulting in electric shock.

NOTICE (PLACING)

1. *When the ODU is installed in the indoor, as the ODU generates Non-ionizing radiation and it may cause health effect, then, it is required to take adequate measures.*

2. *Do not block the vents of the equipment. It may cause break down due to heating up of inner equipment in stuffy condition. Ensure to follow the set up and usage rules as follows.*

   Do not set up the equipment on the carpet, heating floor or bare concrete.

   Do not cover or wrap the equipment with table cloth, lace, rubber or plastic material.

   Do not set up the equipment in the bookshelves or rocker or in a stuffy place.

   Do not put anything like books or paper on and against the equipment.

3. *The equipment must be installed in correct place. Do not install turning sideways or slanting. If not properly installed, it may cause break down due to rise of inner temperature.*

4. *Do not install the equipment in the following locations. If installed, it may cause harmful influence for the equipment.*

   The equipment must be installed and maintained in a clean, and dry place where temperature and humidity remain stable, non-condensing into dew and within the ranges specified by the manufacturer.

5. *Because of the equipment is an indoor type, do not install the equipment in the location where it could be caused harm influence by salt-air, sand-dust, sulphuric acid gas etc.*

   If the equipment will be installed necessarily in such location, the following must be heeded.

   (a) Construction of the Equipment Room

   Install the equipment in the airtight room or shelter where it could not be suffered by external influence mentioned above.

(b) Environmental Temperature Impact for the Equipment

In the airtight room, it may be caused rising in temperature with the heat generation of the equipment.

Furnish an air-conditioner for industrial use in accordance with the situation.

Do not apply air directly from the air-conditioner to the equipment. When the equipment is located in face of the air from the air-conditioner, it could be condensed into dew by temperature variation.

(c) In the case of using at marine and coastal areas (within 3 km from the seaside), it is necessary to make measures against the damage from salt water. For measures against the damage from salt water to an ODU, request them to NEC.

6. The place of installation is restricted to Telecommunication Center and similar environment.

(a) Twisted pair cable should be used for the power supply cable to suppress inductive interference signals.

(b) Shielded cable should be used for all of the data transmission cable.

(c) Temporary transmission quality degradation may occur due to by electromagnetic disturbances such as lightning or ESD.

7. The ODU shall be installed at a restricted access location[Note#1] by a service person.

Note#1: RESTRICTED ACCESS LOCATION is defined as a location for equipment where both of the following paragraphs apply:

access can only be gained by SERVICE PERSONS or by USERS who have been instructed about the reasons for the restrictions applied to the location and about any precautions that shall be taken; and

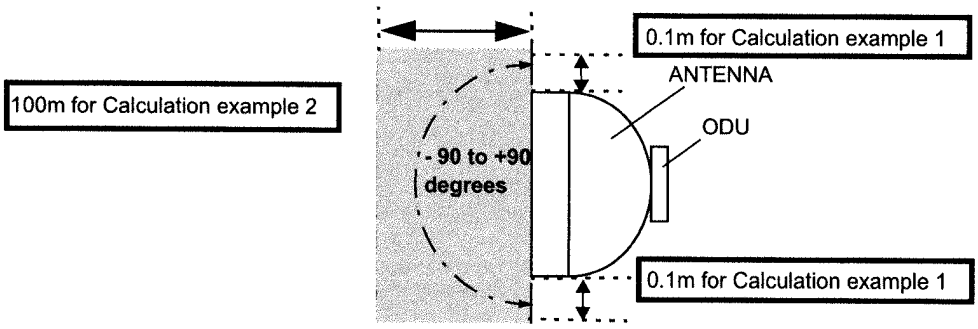
access is through the use of a TOOL or lock and key, or other means of security, and is controlled by the authority responsible for the location.

The Frame Grounding (FG) should be connected to the station earth point. For details, refer to INSTALLATION, 2.10 Frame Grounding.

Safety Guideline for Microwave Radiation Hazard

The Microwave and Millimetre-wave that NLite E series are treating is very small radiation level and never been reported to effect human health. But advanced countries about health hazard have started to regulate the radiation levels. In case of EU country, it is specified by EN50385. In order to keep the regulation, the operator shouldn't work at near parabolic antenna during transmitter activating. Especially the area in side to front of antenna shows higher radiation level. (please see below figure and calculation sample 1).

On the other hand, in case of front side of antenna, the power density becomes high level along antenna beam. Therefore the user of this system should pay attention not to radiate the beam against humans any time. (Please refer below calculation sample 2)



Hazard Area of Radiation

In addition, the Power density and Field strength level is calculated by equation below.

$$\text{Power density S (mW/cm}^2\text{)} = \frac{10^{\left(\frac{P+G-30}{10}\right)} \times K}{40 \times \pi \times R^2}$$

Where:

P = Output power of ODU (dBm),
G = Antenna Gain (dBi),
(in consideration of the angle from antenna)
K = Reflection factor =2.56 (given),
R = Distance between Human and Antenna (m)

Calculation example 1, (90 degree side of antenna)

NLite E = 18 GHz/+23 dBm,
Antenna diameter = 0.6 m,
0 degree antenna gain = 39 dBi,
90 degrees side antenna gain = –24 dBi, (90 degrees attenuation = –63 dB),
Distance = 0.1 m

Power density S (mW/cm^2) = 0.0016 ≤ 0.01 (European safety guideline)

Calculation example 2, (0 degree, front side of antenna)

NLite E = 7 GHz/+27 dBm,
Antenna diameter = 1.8 m,
0 degree antenna gain = 40 dBi,
Distance = 100 m

Power density S (mW/cm^2) = 0.01 => Equal to European safety guideline

ABBREVIATIONS

The following abbreviations are used in the manual for the NLite E equipment.

ABBREVIATION	DESCRIPTION
A	
AIS	Alarm Indication Signal
ALM	Alarm
ALS	Automatic Laser Shutdown
ANT	Antenna
APC	Automatic Phase Control
APS	Automatic Protection System
ASYNC	Asynchronization
ATPC	Automatic Transmitting Power Control
ATT	Attenuator
AUX	Auxiliary
B	
BBE	Background Block Error
BER	Bit Error Rate
BNC	Bayonet Navy Connector
BPF	Band Pass Filter
C	
CAS	Channel Associated Signaling
CBL	Cable
CD	Compact Disk
CH	Channel
CKT	Circuit
CLK	Clock
CMI	Coded Mark Inversion
COM	Common
COMB	Combiner
CONN	Connection
CONT	Control

ABBREVIATION	DESCRIPTION
CONV	Converter
CPU	Central Processing Unit
CTRL	Control
CW	Carrier Wave
D	
DADE	Differential Absolute Delay Equalizer
DC	Direct Current
DCCr	Data Communication Channel in RSOH
DCK	Drop Clock
DDT	Drop Data
DEM	Demodulator
DFP	Drop Frame Pulse
DMR	Digital Microwave Radio
DSC	Digital Service Channel
E	
E	Electrical
E/O	Electrical/Optical
E-BER	Excessive-Bit Error Rate
EMC	Electro Magnetic Compatibility
EOW	Engineering Orderwire
EP	Earthing Point
EQL	Equalizer
ERR	Error
ES	Errored Seconds
EXT	External

ABBREVIATION	DESCRIPTION
F	
FAS	Frame Alignment Signal
FEC	Forward Error Correction
FG	Frame Ground
FIL	Filter
FPGA	Field Programable Gate Array
FREQ	Frequency
F/W	Firmware
G	
G	Ground
GND	Ground
H	
HD	Hard Disk
HK	House Keeping
I	
ICK	Insert Clock
ID	Identification
IDT	Insert Data
IDU	Indoor Unit
IE	Internet Explorer
IEEE	Institute of Electrical and Electronic Engineers
IF	Intermediate Frequency
I/F	Inter Facility
IFL	Inter Facility Link
IN	Input
INTFC	Interface
I/O	Input/Output
IP	Internet Protocol
ITU	International Telecommunication Union

ABBREVIATION	DESCRIPTION
L	
LAN	Local Area Network
LB	Loop Back
LCD	Liquid Crystal Display
LCT	Local Craft Terminal
LED	Light Emitting Diode
LLF	Link Loss Forwarding
LEV	Level
LO	Local
LOF	Loss of Frame
LO REF	Local Reference Frequency
LOS	Loss of Signal
M	
MAC	Media Access Control
MAINT	Maintenance
MD	Modulator Demodulator
MDI	Media Dependent Interface
MDIX	Media Dependent Interface with Crossover
MFAS	Multi Frame Alignment Signal
MIX	Mixer
MII	Media Independent Interface
Mib	Management Information Base
MLC	Multi-Level Coding
MMC	Memory Card
MOD	Modulator
MODEM	Modulator-Demodulator
MON	Monitor
MPX	Multiplexer
MS-AIS	Multiplexer Section Alarm Indication Signal
MTPC	Manual Transmitter Power Control
MUX	Multiplexing Equipment

ABBREVIATION	DESCRIPTION
N	
NC	Normal Closed
NE	Network Element
NMS	Network Management System
NO	Normal Open
NORM	Normal
NRZ	Nonreturn to Zero
O	
O	Optical
O/E	Optical/Electrical
ODU	Outdoor Unit
OFS	Out of Frame Second
OH	Overhead
OMT	Orthogonal Mode Transducer
OPT	Optical
OS	Operating System
OUT	Output
OW	Orderwire
P	
P	Protection
PC	Personal Computer
PDH	Plesiochronous Digital Hierarchy
PH	Phase
PKG	Package
PMON	Performance Monitor
PROT	Protection
PS	Power Supply
PWR	Power
Q	
QAM	Quadrature Amplitude Modulation
QPSK	Quadrature Phase Shift Keying

ABBREVIATION	DESCRIPTION
R	
RAM	Random Access Memory
REC	Rectifier
RF	Radio Frequency
RFCOH	Radio Frame Complementary Overhead
RL	Relay
RMON	Remote Network Monitoring
ROM	Read Only Memory
RS	Reed Solomon
RSOH	Regenerator Section Overhead
RST	Regenerator Section Termination
RSL	Received Signal Level
RX	Receive
S	
SC	Service Channel
SD	Signal Degrade
SDH	Synchronous Digital Hierarchy
SELV	Safety Extra Low Voltage
SES	Severely Errored Seconds
SEP	Separation
SEP	Severely Errored Period
SOH	Section Overhead
SONET	Synchronous Optical Network
STM	Synchronous Transport Module
SV	Supervisory
SW	Switch
SYNC	Synchronizer
SYNTH	Synthesizer
SYS	System

ABBREVIATION	DESCRIPTION
T	
TCN	Threshold Crossing Notification
TRP	Transmitter-Receiver Equipment
TX	Transmit
U	
UAE	Unavailable Event
UAS	Unavailable Second
URL	Uniform Resource Locator
USB	Universal Serial Bus
V	
VF	Voice Frequency
V/H	Vertical/Horizontal
VOL	Volume
Vo-p	Volt zero (0) to Peak
W	
W	Working
Web	World Wide Web
WG	Waveguide
WS	Wayside
X	
XC	Cross Connect
XIF	IFof Cross Polarization
XPIC	Cross Polarization Interference Canceller
XPD	Cross Polarization Discrimination

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NLite N
6-38 GHz DIGITAL RADIO SYSTEM

Section I DESCRIPTION

CONTENTS

Special User Information for Part 15 Devices:

The user is cautioned that any changes / modifications not approved by the responsible party could void the user's authority to operate the equipment.

Statement for all intentional and unintentional radiators.

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

NOTE: 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.

NOTE: The antennas used for this transmitter must be installed to provide a separation distance of at least 147 cm from all persons and must not be located or operating in conjunction with any other antenna or transmitter.

1. GENERAL DESCRIPTION

This section provides descriptive information on the NLite N radios which are used for the wide/narrow band point-to-point fixed digital microwave radio links.

MDP (Modulator/Demodulator) provides LAN (2P × 10/100BASE-T(X), and 16 × Digital Signal Level-1 (DS-1), signal transmission by the change of the data signal interface card. It can select the modulation method QPSK/16QAM/32QAM/128QAM, by software selection depending on the transmission capacity that is configured in the modulator/demodulator unit.

TRP (Transmitter/Receiver) can be applied for a wide range of RF frequency bands from 6/11/18/23/24/38 GHz.

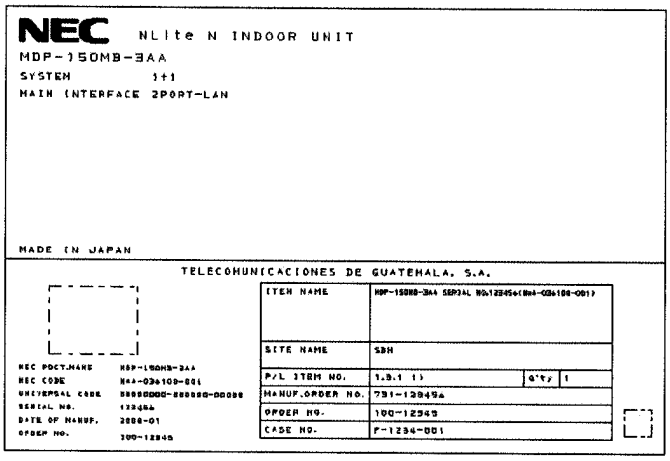
Applications using the following redundancy configurations, Unprotected (1+0), Protected (1+1) are available for NLite N radio systems.

ALL INDOOR TRP (Transmitter/Receiver)

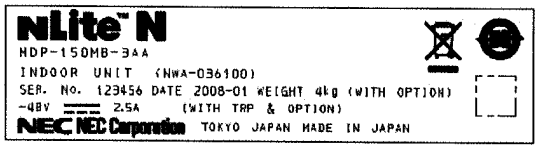
- RF band: L6/U6/11GHz
- Redundancy: (1+0), (1+1)

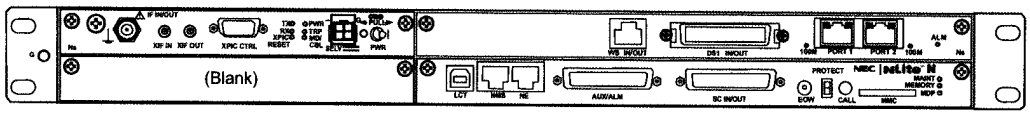
NLite N (MDP)

MDP Package Label (Example)

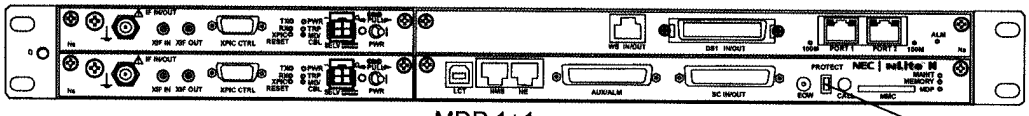


MDP Name Plate





MDP 1+0



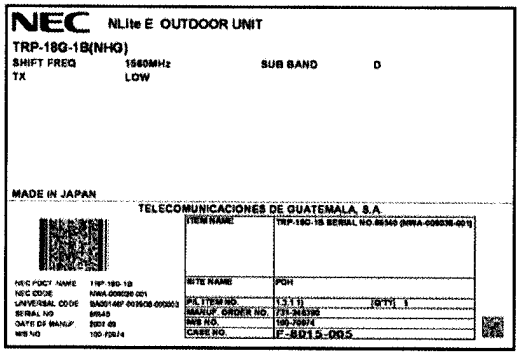
MDP 1+1

*1

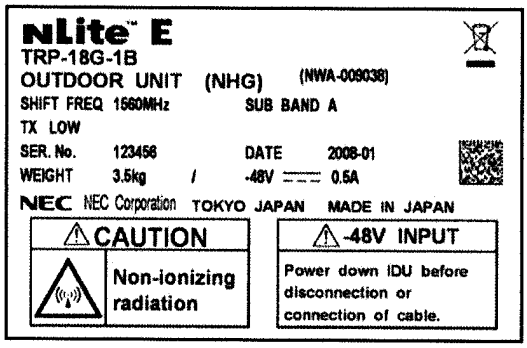
*Caution*1*
PROTECT SW is only used for CTRL panel replacement. Set PROTECT SW to OFF position (bottom side) in normal operation. Equipment may not work properly if the PROTECT SW is set to ON position (Upper side) by mistake. Refer to MAINTENANCE manual for the CTRL panel replacement.

NLite E
(TRP NHG/NHP TYPE)

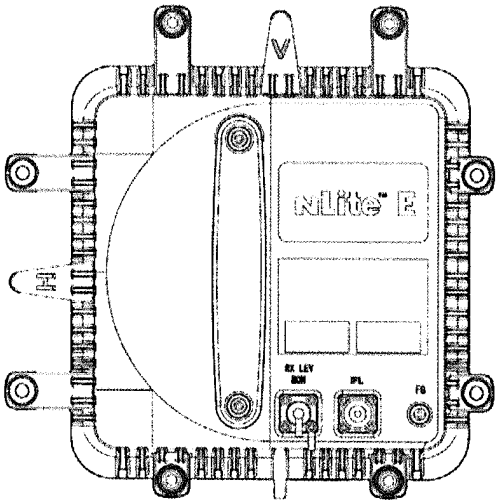
TRP Package Label
(Example)



TRP Name Plate

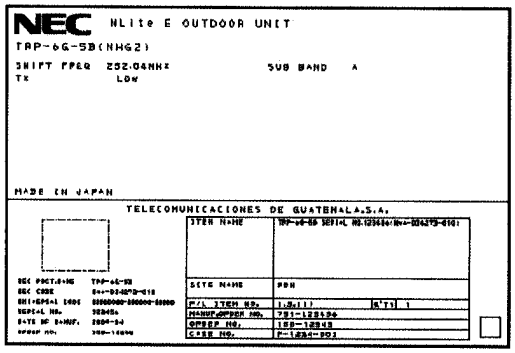


TRP NHG/NHP Type (For 6-38 GHz Band)

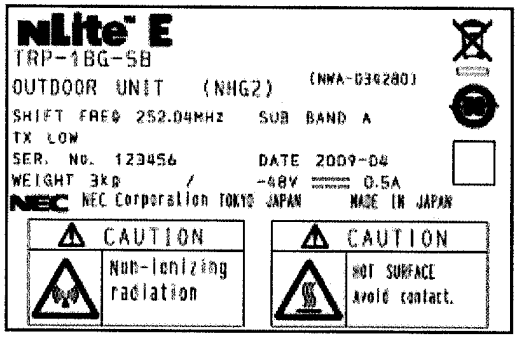


NLite E
(TRP NHG2 TYPE)

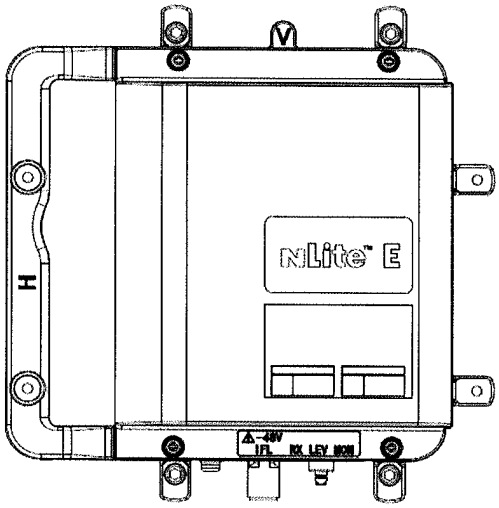
TRP Package Label
(Example)



TRP Name Plate

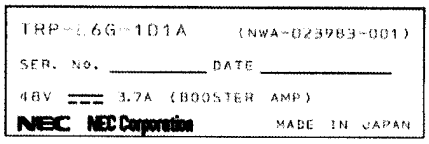


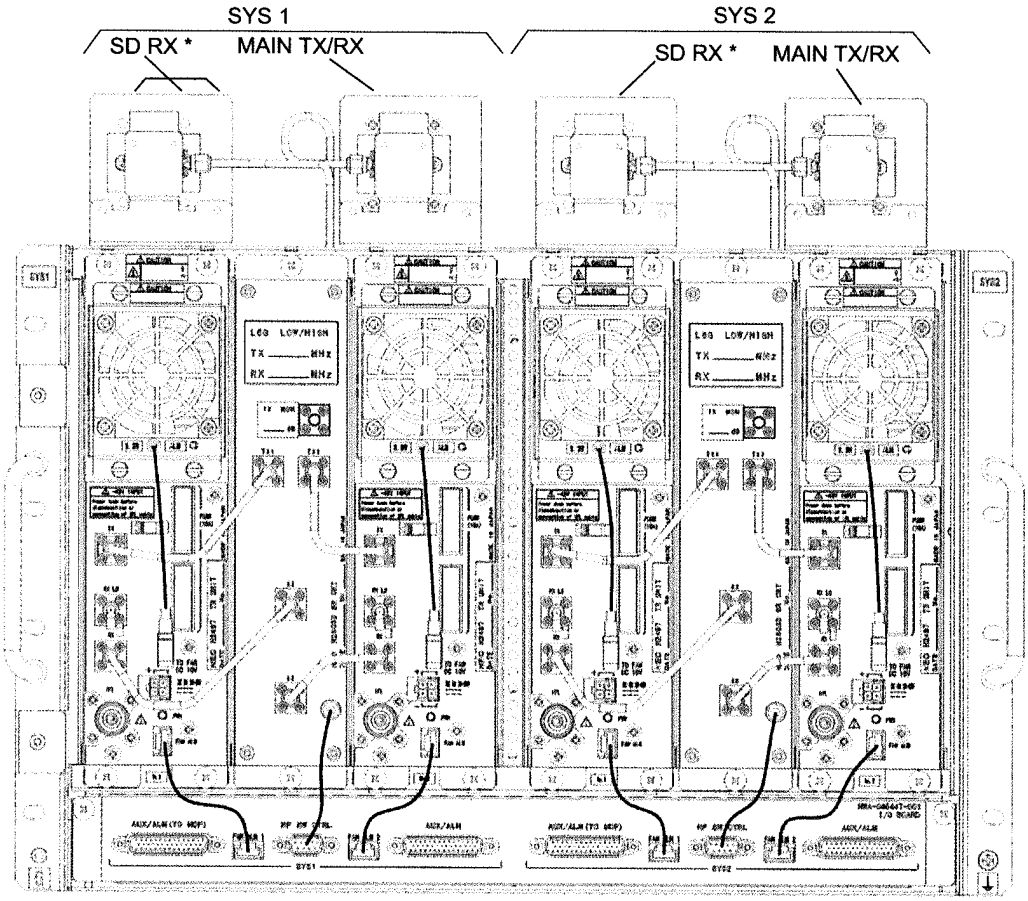
TRP NHG2 Type (For 18-38 GHz Band)



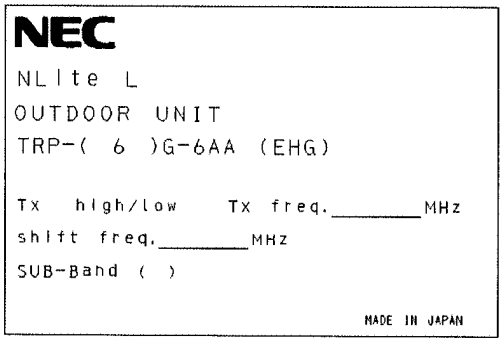
ALL INDOOR TRP (For L6/U6/11 GHz Band)

Name Plate

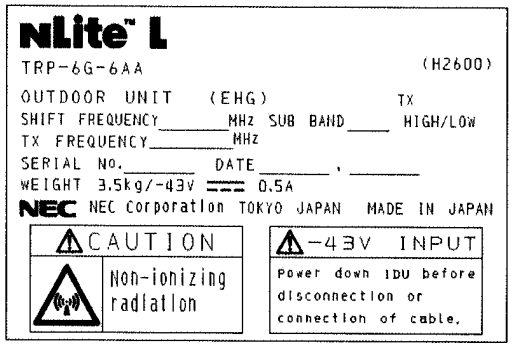


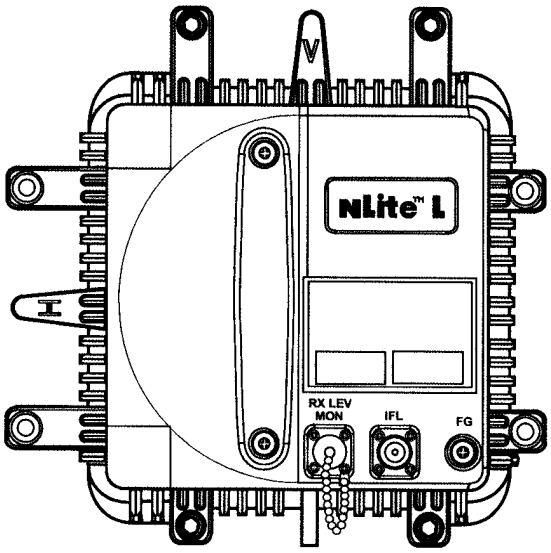


TRP Package Label
(Example)



TRP Name Plate





TRP EHG/NHG Type (For 5.8G/U6G/24G)

2. SYSTEM CONFIGURATION AND CHARACTERISTICS

This section provides outline of the system configuration, system performance, RF channel plan, external alarm items and House keeping input/output, and power supply.

2.1 System Configuration

The system consists of the MDP-150MB-3AA Modulator-Demodulator (MDP) and TRP-(*1)G-1B/5B/7B/6AA/2B Transmitter-Receiver (TRP) or TRP- (L6G/U6G/11G) -101A Transmitter-Receiver (ALL INDOOR TRP). Hybrid Combiner/Divider*2 or Orthogonal Mode Transducer (OMT)*3 and the antenna.

The TRP- ( )G-1B (NHG Type) is available with frequency bands of L6/ 11/18/23 GHz.

TRP-( )G-5B (NHG2 Type) is available with frequency bands of L6/11/18/ 23/38 GHz.

TRP-( )G-7B (NHP Type) is available with frequency band of 11 GHz.

TRP-6G-6AA (EHG Type) is available with frequency bands of 5.8/U6 GHz.

TRP-24G-2B (NHG Type) is available with frequency band of 24 GHz.

*Notes:*1: TRP Type depends on the frequency band used, such as TRP-(18)G-1B (NHG Type) is applied for 18 GHz band.*

**2: The Combiner/Divider is used in (1+1) single antenna configuration for antenna direct mount type TRPs.*

**3: The OMT is used in XPIC systems with antenna direct mounting TRPs.*

Refer to
Fig. 2-1 Protected/Unprotected System Configuration (1/3) to (3/3)
Fig. 2-2 Signal Interface/Capacity (1/2) to (2/2)
Fig. 2-3 MDP e/w Standard and Optional Interface (1/2) to (2/2)
Fig. 2-4 Configuration of the TRP (1/2) to (2/2)
Fig. 2-5 Configuration of the ALL INDOOR TRP
Fig. 2-6 System Block Diagram (1/4) to (4/4)
Fig. 2-7 Hybrid
Fig. 2-8 10 dB Coupler
Fig. 2-9 OMT
Fig. 2-10 Power Supply System Block Diagram (1/3) to (3/3)

Table 2-1 System Performance Characteristics (1/2) to (2/2)

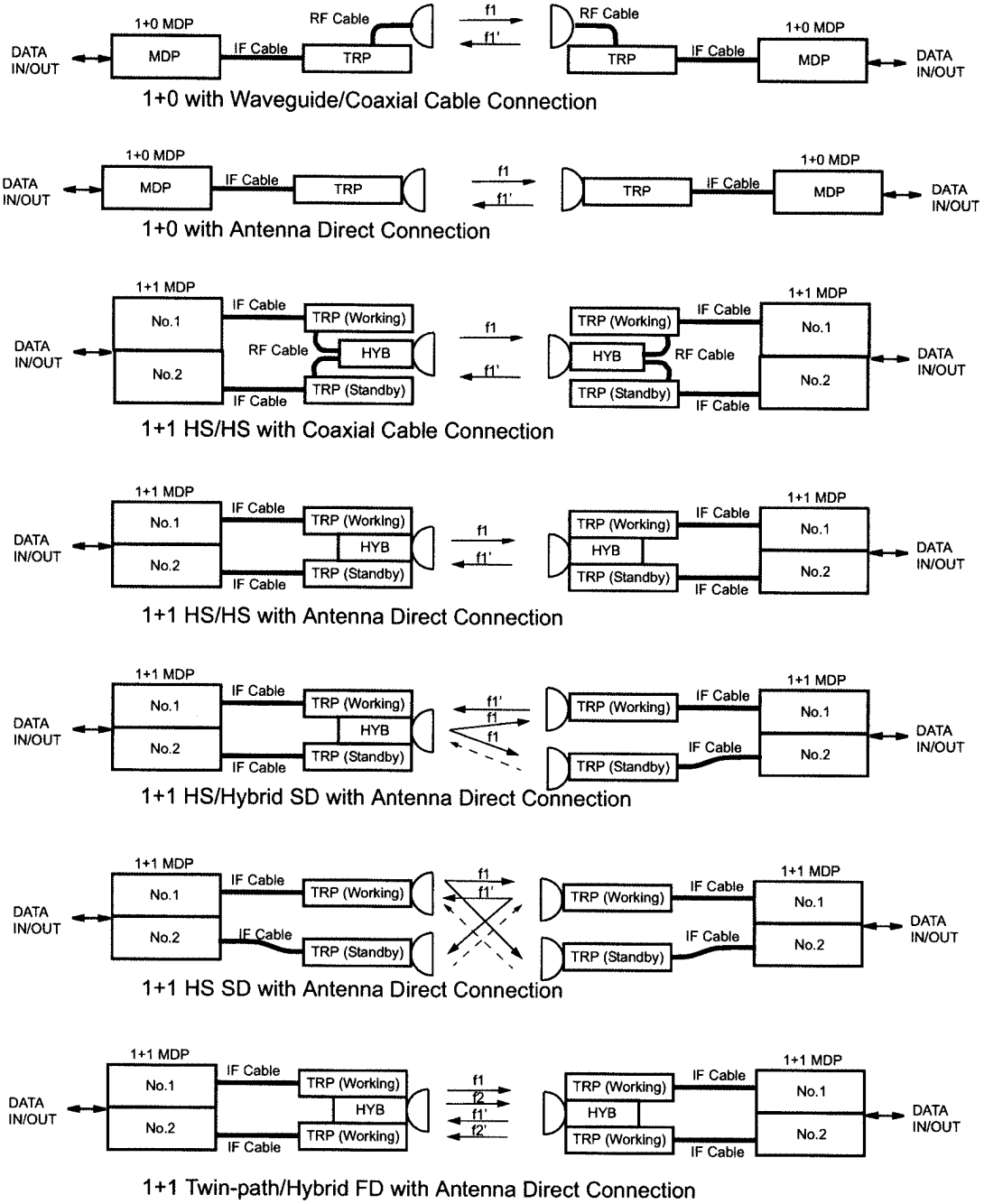
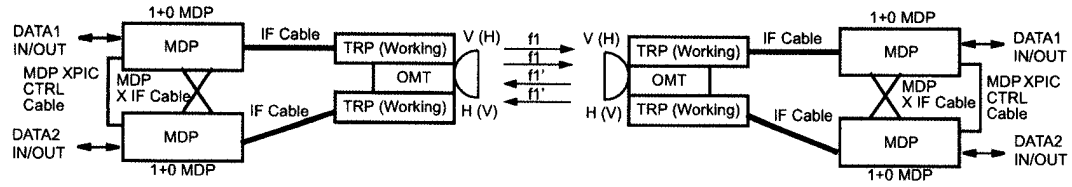
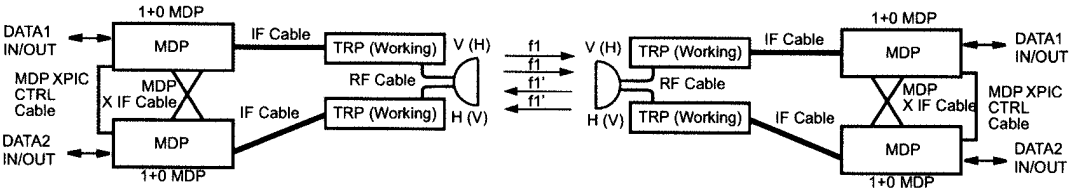


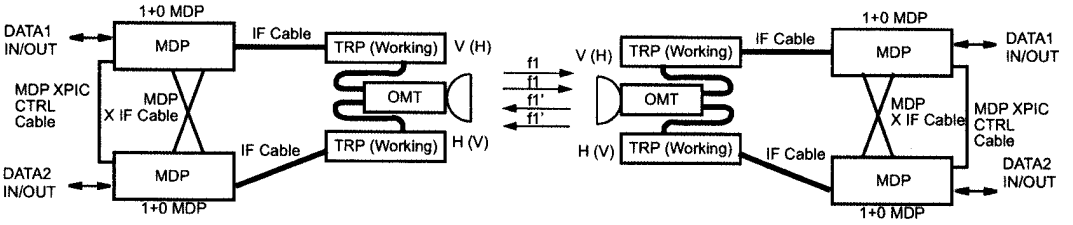
Fig. 2-1 Protected/Unprotected System Configuration (1/3)



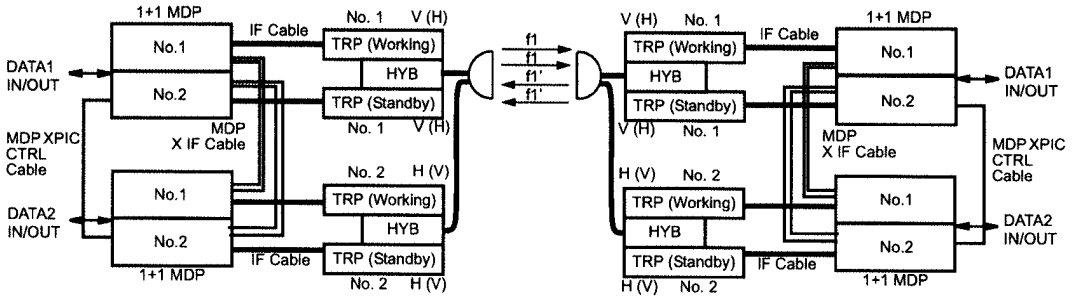
2(1+0) XPIC/OMT with Antenna Direct Connection



2(1+0) XPIC with Waveguide/Coaxial Cable Connection

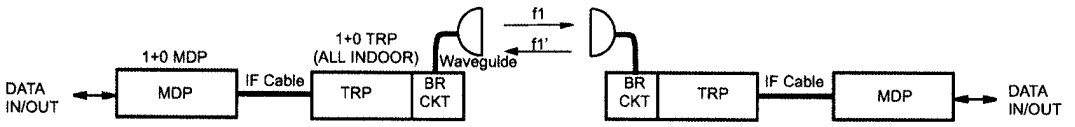


2(1+0) XPIC/OMT with Waveguide/Coaxial Cable Connection

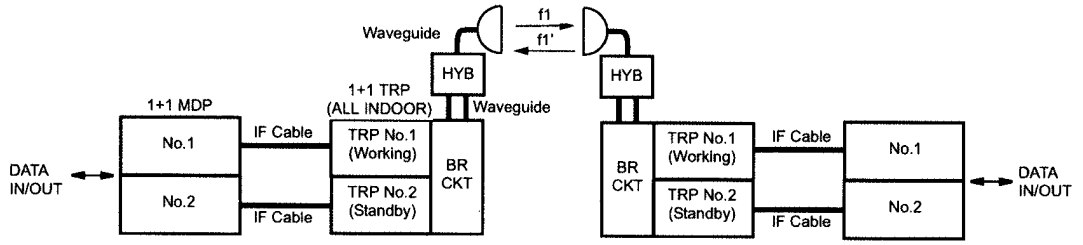


2(1+1) XPIC/Hybrid with Waveguide/Coaxial Cable Connection

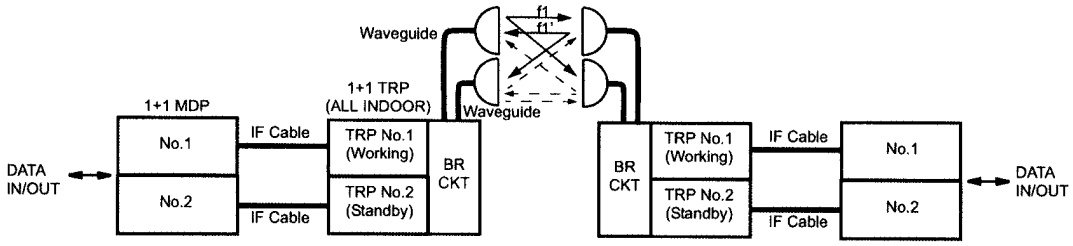
Fig. 2-1 Protected/Unprotected System Configuration (2/3)



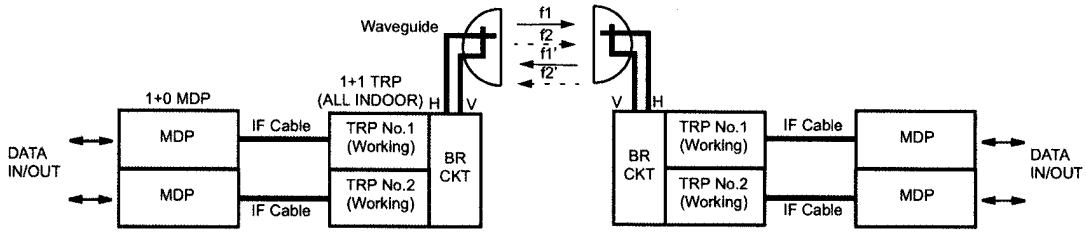
1+0 with Waveguide Connection



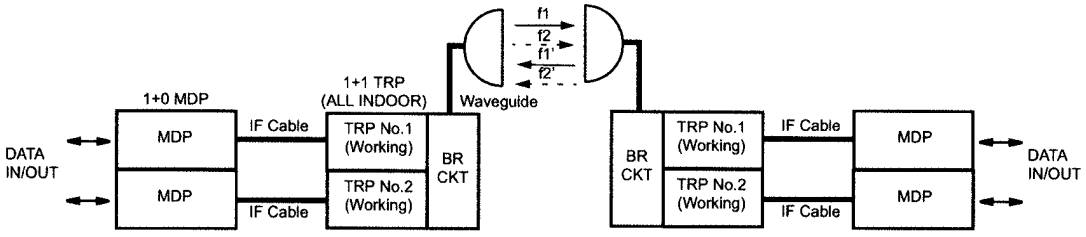
1+1 HS/HS Hybrid with Waveguide Connection



1+1 HS/HS with Waveguide Connection



2x(1+0) with Waveguide Connection and Dual Polar Antenna



2x(1+0) with Waveguide Connection (Co-Polar)

Fig. 2-1 Protected/Unprotected System Configuration (ALL INDOOR System Configuration) (3/3)

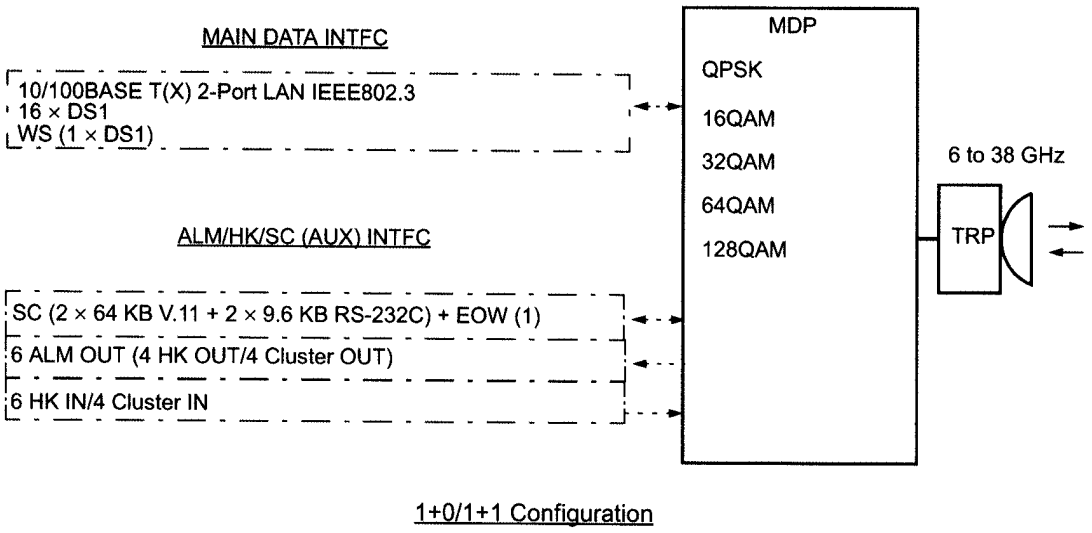


Fig. 2-2 Signal Interface/Capacity (1/2)

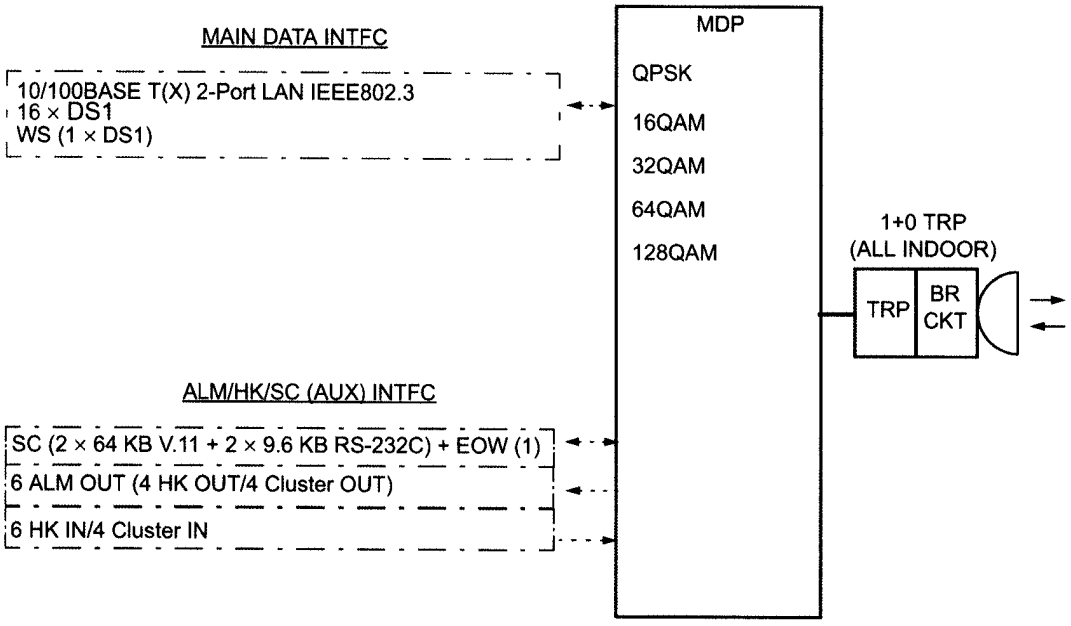
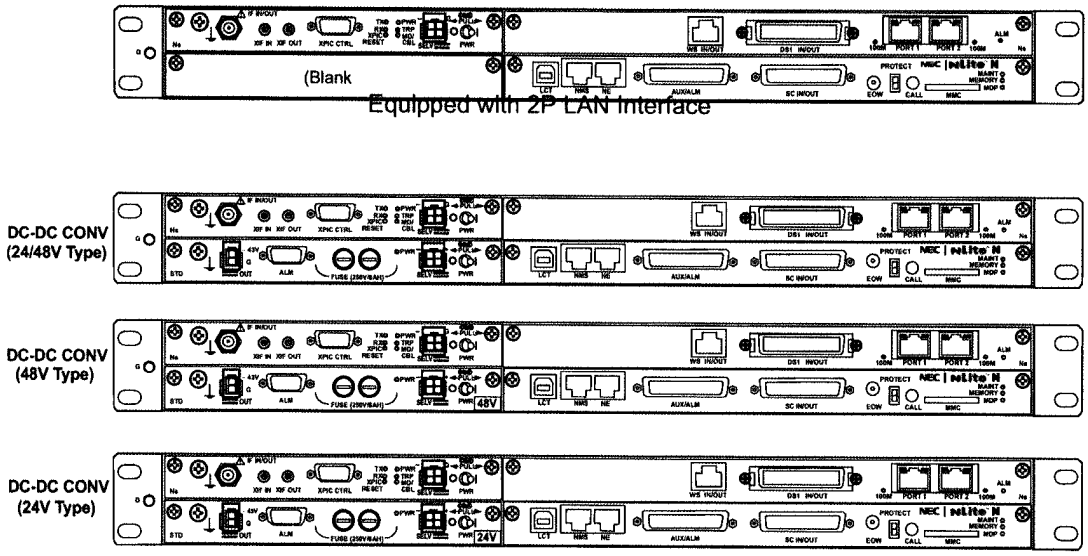


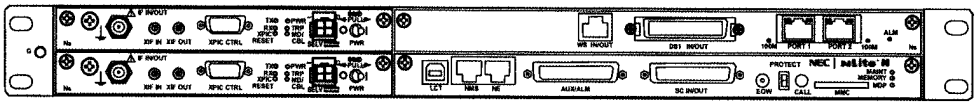
Fig. 2-2 Signal Interface/Capacity (2/2)



Equipped with DC-DC CONV

Unprotected System (MDP)

Fig. 2-3 MDP e/w Standard and Optional Interface (1/2)



Equipped with 2P LAN Interface

Protected System (MDP)

Fig. 2-3 MDP e/w Standard and Optional Interface (2/2)

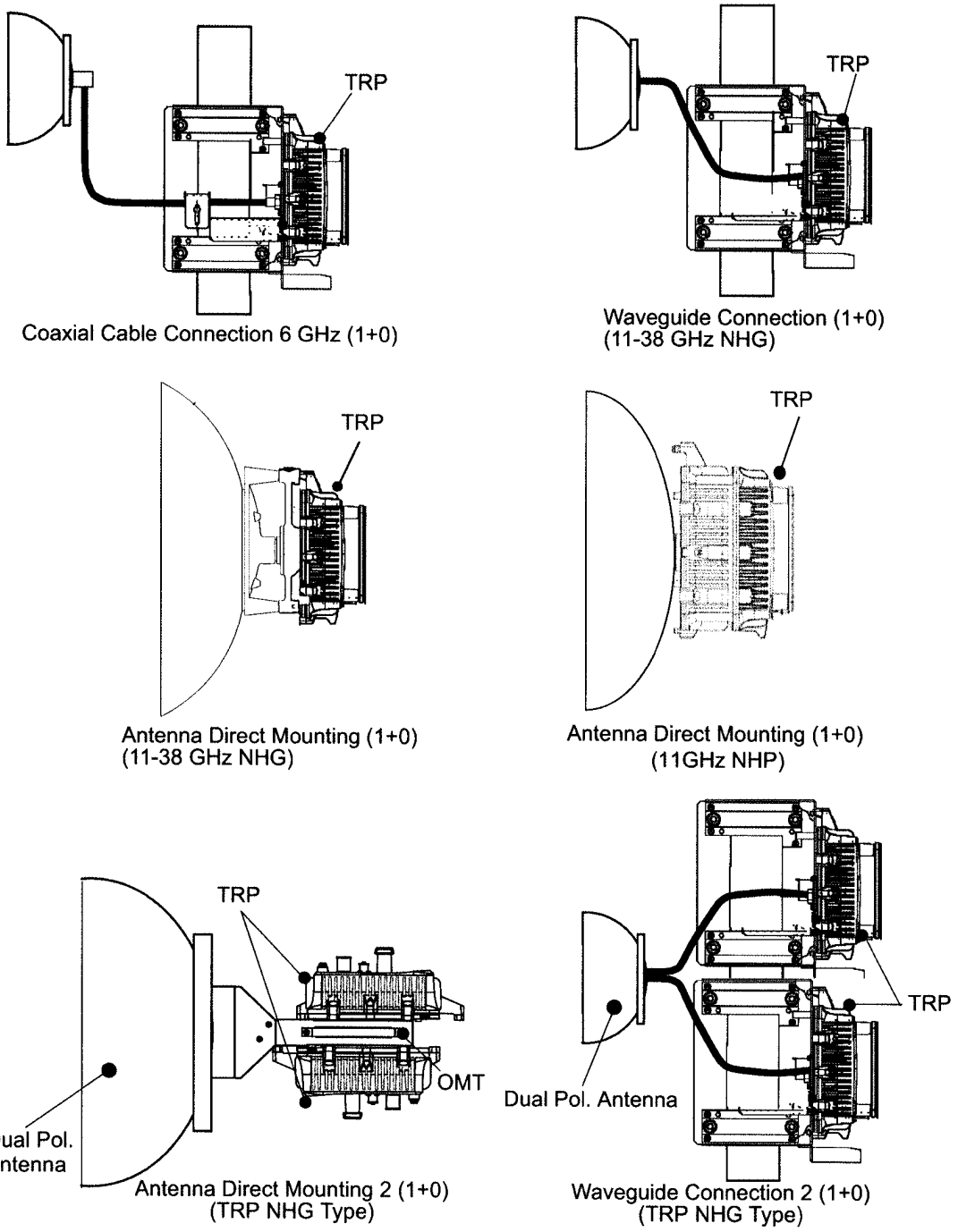
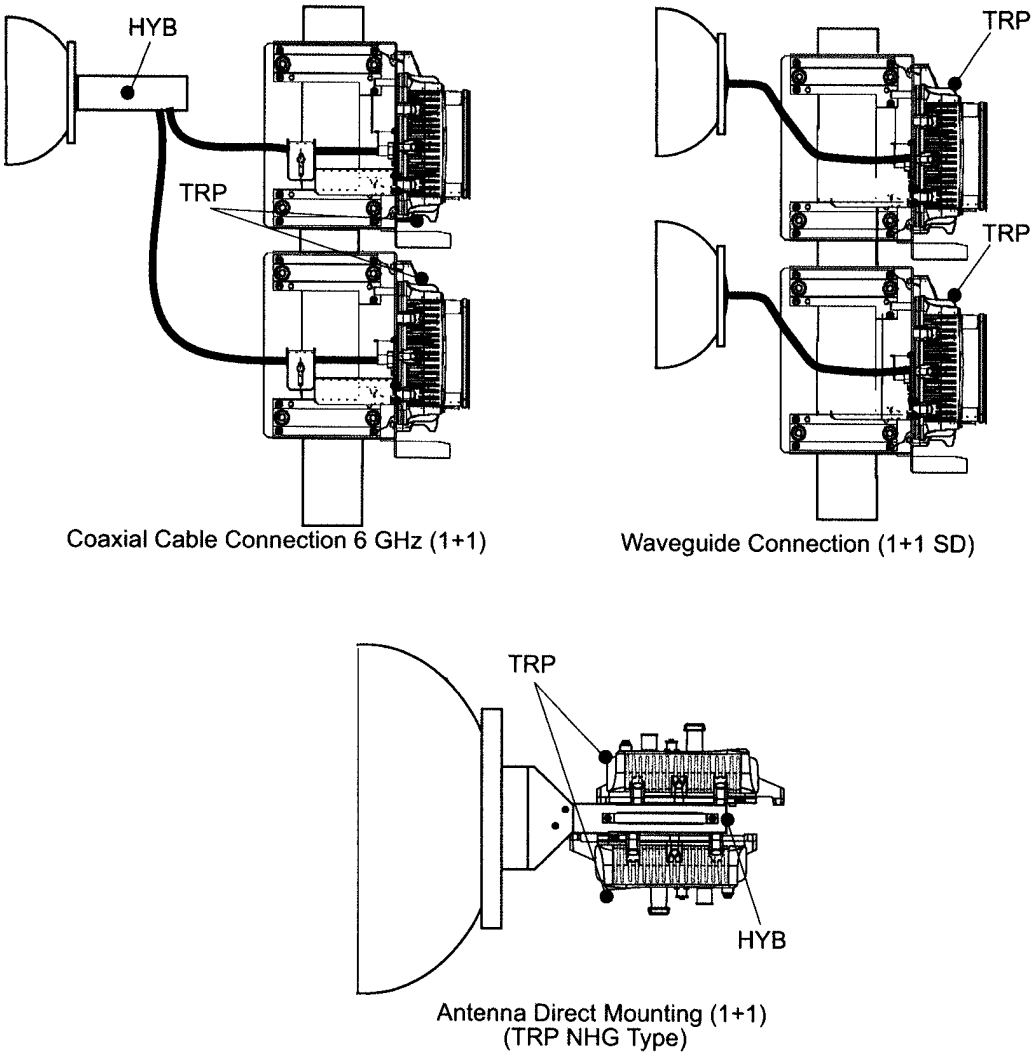


Fig. 2-4 Configuration of the TRP (1/2)



Coaxial Cable Connection 6 GHz (1+1)

Waveguide Connection (1+1 SD)

Antenna Direct Mounting (1+1)
(TRP NHG Type)

Fig. 2-4 Configuration of the TRP (2/2)

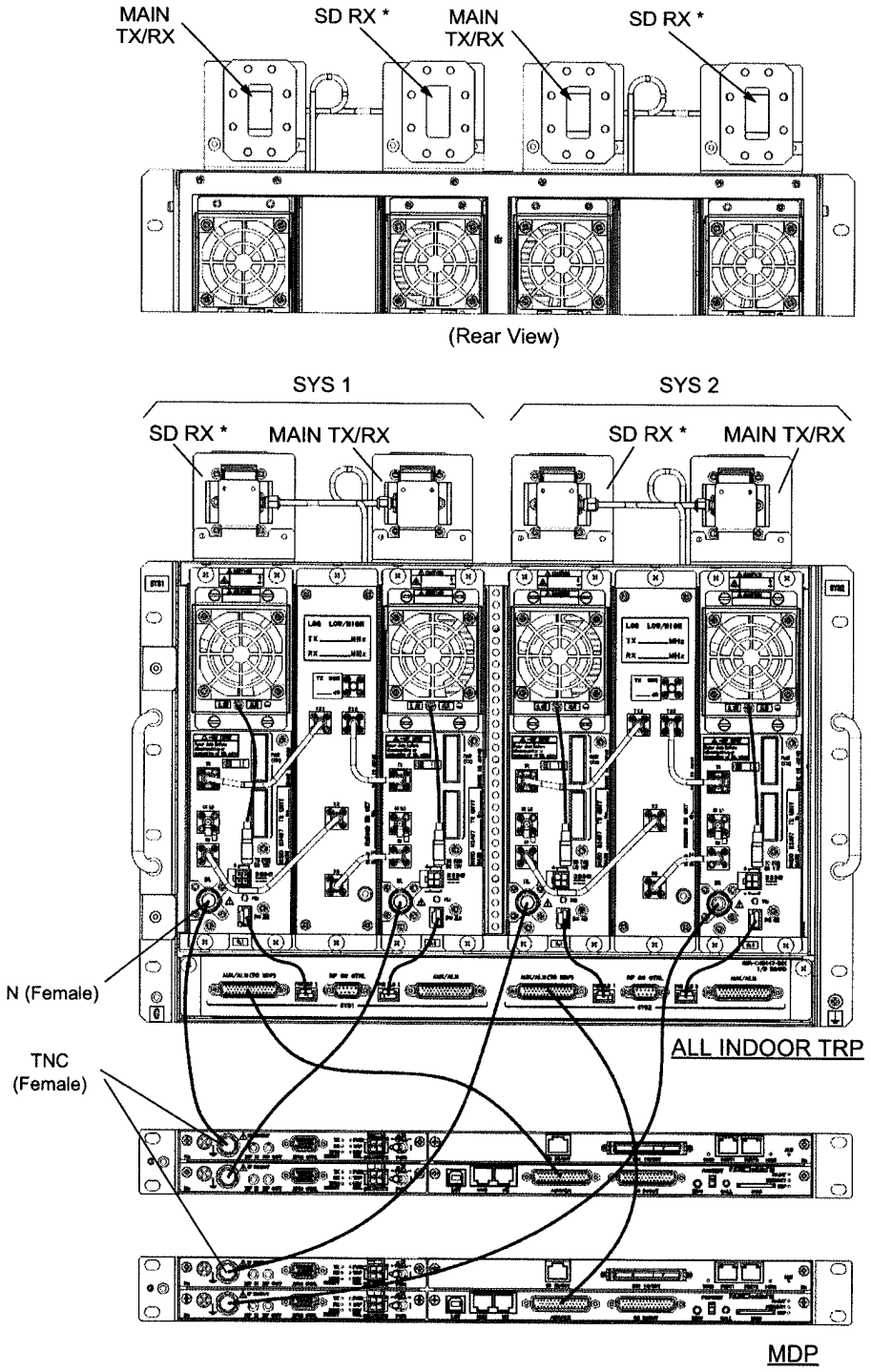
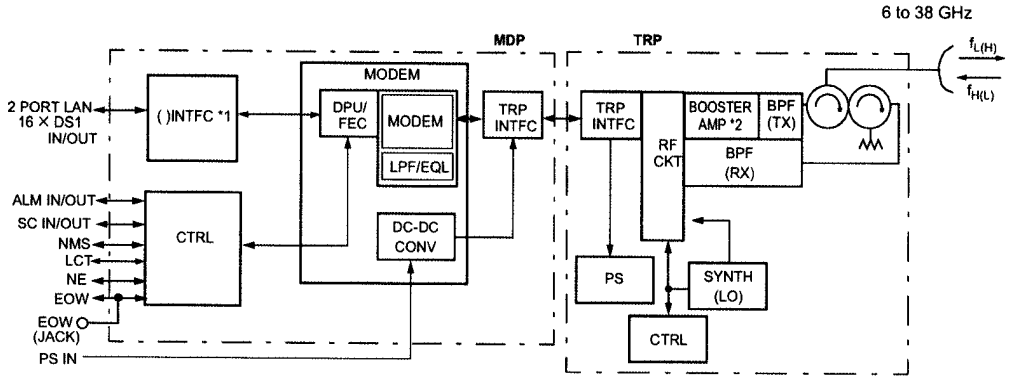
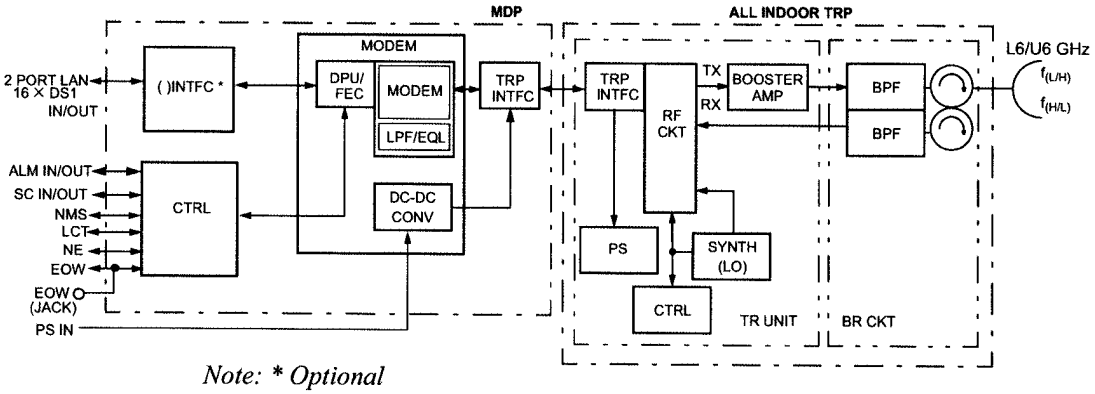


Fig. 2-5 Configuration of the ALL INDOOR TRP



*Notes: *1: Optional*
**2: Only for NHP type*

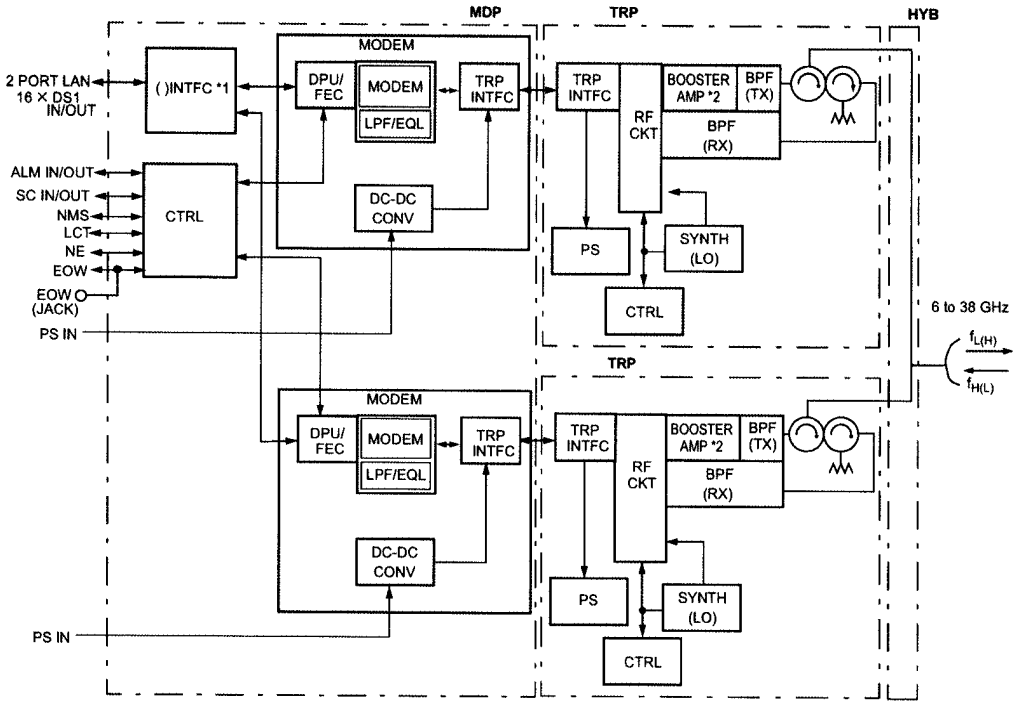
1+0 CONFIGURATION FOR 2P LAN INTFC



*Note: * Optional*

1+0 CONFIGURATION FOR 2P LAN INTFC (ALL INDOOR TRP)

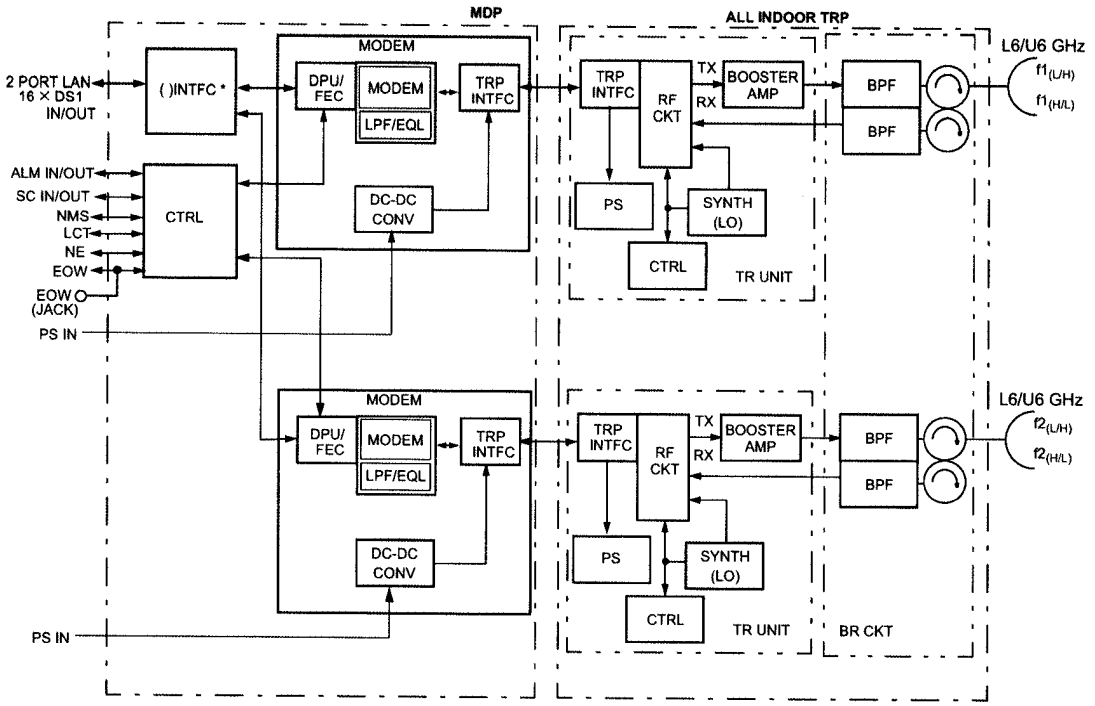
Fig. 2-6 System Block Diagram (1/4)



Notes: **1:Optional*
**2: Only for NHP type*

1+1 CONFIGURATION FOR 2P LAN INTFC

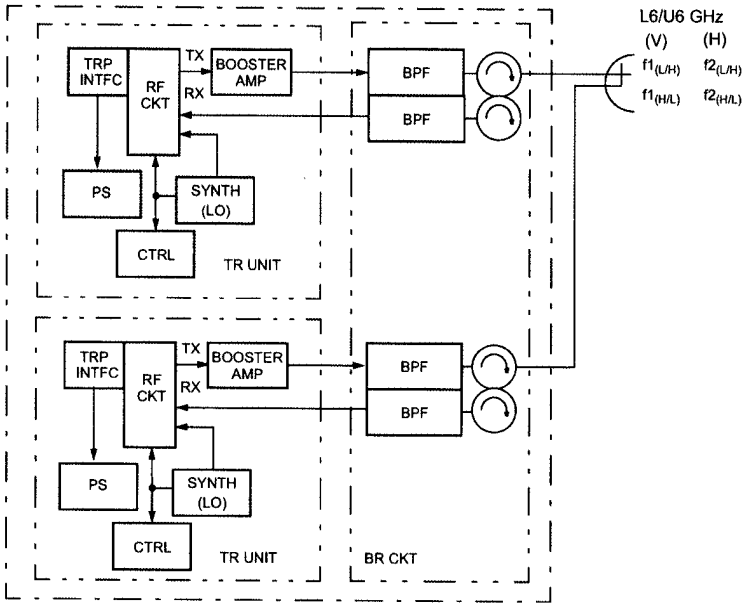
Fig. 2-6 System Block Diagram (2/4)



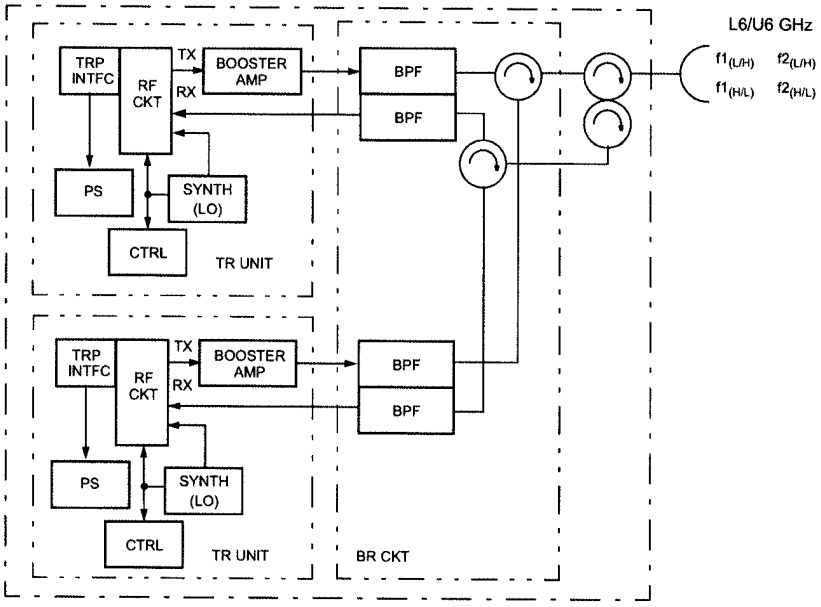
Note: *:*Optional*

1+1 HS/SD CONFIGURATION (ALL INDOOR TRP)

Fig. 2-6 System Block Diagram (3/4)



2 x (1+0) DUAL POLAR ANTENNA CONFIGURATION FOR ALL INDOOR TRP



2 x (1+0) CO-POLAR CONFIGURATION FOR ALL INDOOR TRP

Fig. 2-6 System Block Diagram (4/4)

2.2 Performance Characteristics

2.2.1 General System

Table 2-1 System Performance Characteristics (1/2)

Item		Specification
Capacity		Up to 150 Mbps
Interface		RJ-45 (2 Ports): 10/100BASE-T(X)
Interconnecting Connector, Cable impedance and Cable length (MDP-TRP)		MDP side: N type female, 50 ohms (Coaxial) TRP side: TNC type female, 50 ohms (Coaxial) 300m (in case 8D-FB cable or equivalent cable)
Channel Spacing	16/QAM/ 32QAM/ 64QAM/ 128QAM	
Environmental Requirement	Guaranteed Operation	TRP: –33 to +50°C MDP/ALL INDOOR TRP: –5 to +50°C
	Workable Operation	TRP: –40 to +55°C MDP/ALL INDOOR TRP: –10 to +55°C
	Transportation/ Storage	TRP, MDP: –40 to +70°C
	Relative humidity	TRP: 100% applicable MDP: Less than 90% at +50°C (Non-condensing)
EMC		FCC part.15
Safety		UL60950-1
IP code for IEC60529 (TRP)		Protection against ingress of water IP66
Power Requirement (MDP)		–48 V DC (–40.5 to –57 V DC), Conforms to EN300 132-2
Power Requirement (ALL INDOOR TRP)		–48 V DC (–36 to –60 V DC)/–24 V DC (–20 to –36 V DC), Conforms to EN300 132-2
Power Consumption (Typical)		
TRP	NHG type	30 W (6 to 11GHz), 23 W (13 to 38 GHz)
	NHP type	45W (11GHz)
ALL INDOOR TRP (1+0)		
BOOSTER AMP	L6/U6 GHz	Standard Power: 120 W/ High Power: 180 W
	11 GHz	120 W
RF CKT	L6/U6 GHz	35 W
	11 GHz	30 W

Table 2-1 System Performance Characteristics (2/2)

Item		Specification
Capacity		Up to 150 Mbps
MODEM		10 W
2P LAN INTFC		8 W
CTRL		8 W
Weight/Card		MODEM: 0.5 kg, 2 P LAN INTFC: 0.5 kg, CTRL: 0.5 kg
Mechanical Dimension	TRP	(NHG 6-38 GHz) 237 (W) × 237 (H) × 101 (D): Approx. 3.5 kg/Unit (NHP 11 GHz) 237 (W) × 237 (H) × 181 (D): Approx. 8 kg/Unit
	ALL INDOOR TRP	435 mm (W) × 310 mm (H) × 300 mm (D): Approx. 22 kg (for 1+1 system with RACK)
	MDP	482 (W) × 44 (H) × 240 (D): Approx. 4 kg

2.2.2 LAN Interface (10/100BASE-T(X))

- Type : 10BASE-T/100BASE-TX (Auto-sensing or fixed)
- Port Number and Interface
  : 2 (Each port is separated) × RJ-45
- Transmission Rate: Selectable and DS1 Channels
- Flow control : Full duplex or Half duplex (Backpressure)
- Forwarding Mode : Store-and-Forwarding
  (This interface card work as a "LAN Bridge" and compliant with IEEE802.3)

Note: In case of employing main traffic LAN interface, LAN ports and DS1 ports can be used at the same time. However, the numbers of DS1 port are limited depending on the selected LAN transmission rate as shown in the following tables.

(1) 2 Port LAN with WS INTFC

Table 2-2 2 Port LAN 150 Mbps (1xOC-3/16QAM, 1xOC-3/64QAM, 1xOC-3/128QAM)

System Configuration	LAN Setting		LAN Capacity [bps]	DS1 Capacity [Channels]
	Port 1	Port 2		
Best Effort	P1 & P2 = 150 M Best Effort (separated)		150 M	0
P1:P2 = 1:1	P1 = 75 M separated	P2 = 75 M separated	150 M	0
	P1 = 63 M separated	P2 = 63 M separated	126 M	16
P1 = Fixed/P2	P1 = 100 M separated	P2 = 50 M separated	150 M	0
	P1 = 100 M separated	P2 = 26 M separated	126 M	16
	P1 = 100 M separated	P2 = 1.5 M separated	101.5 M	15
P1-2 Separated (Main + WS)	P1 = 100 M separated	P2 = 1.5 M (WS) separated	100 M + 1.5 M (WS)	16
P1:P2 = 1:0	P1 = 100 M separated	Disabled	100 M	16
Not Used	Disabled	Disabled	0 M	16

Table 2-3 2 Port LAN 48 Mbps (32xDS1/QPSK)

System Configuration	LAN Setting		LAN Capacity [bps]	DS1 Capacity [Channels]
	Port 1	Port 2		
P1-2 Shared/ 1 Port Only (Main)	P1 & P2 = 48 M Shared (*1)		48 M	0
	P1 & P2 = Shared from 48 M to 24 M		(1.5 Mbps step)	(1 CH step)
	P1 & P2 = 24 M Shared		24 M	16
P1-2 Separated (Main)	P1 = 24 M separated	P2 = 24 M separated	48 M	0
	P1 = 12 M separated	P2 = 12 M separated	24 M	16
P1-2 Separated (Main+WS)	P1 = 48 M separated	P2 = 1.5 M (WS) separated	48 M + 1.5 M (WS)	0
	P1 = 24 M separated	P2 = 1.5 M (WS) separated	24 M + 1.5 M (WS)	16
P1-2 Separated (Main+SC)	P1 = 48 M separated	P2 = 256 k (SC) separated	48 M + 256 k (SC)	0
	P1 = 48 M separated	P2 = 128 k (SC) separated	48 M + 128 k (SC)	0
	P1 = 48 M separated	P2 = 64 k (SC) separated	48 M + 64 k (SC)	0
	P1 = 24 M separated	P2 = 256 k (SC) separated	24 M + 256 k (SC)	16
	P1 = 24 M separated	P2 = 128 k (SC) separated	24 M + 128 k (SC)	16
	P1 = 24 M separated	P2 = 64 k (SC) separated	24 M + 64 k (SC)	16
P1 Only (Main)	P1 = 48 M separated	Disabled	48 M	0
	P1 = 24 M separated	Disabled	24 M	16
Not Used	Disabled	Disabled	0 M	16

*Note: (*1) LAN capacity can be set in 1.5Mbps step. (P1 & P2 Shared mode)*

Table 2-4 2 Port LAN 42 Mbps (28xDS1/16QAM)

System Configuration	LAN Setting		LAN Capacity [bps]	DS1 Capacity [Channels]
	Port 1	Port 2		
P1-2 Shared/ 1 Port Only (Main)	P1 & P2 = 42 M Shared (*1)		42 M	0
	P1 & P2 = Shared from 42 M to 18 M		(1.5 Mbps step)	(1 CH step)
	P1 & P2 = 18 M Shared		18 M	16
P1-2 Separated (Main)	P1 = 21 M separated	P2 = 21 M separated	42 M	0
	P1 = 9 M separated	P2 = 9 M separated	18 M	16
P1-2 Separated (Main + WS)	P1 = 42 M separated	P2 = 1.5 M (WS) separated	42 M + 1.5 M (WS)	0
	P1 = 18 M separated	P2 = 1.5 M (WS) separated	18 M + 1.5 M (WS)	16
P1-2 Separated (Main + SC)	P1 = 42 M separated	P2 = 256 k (SC) separated	42 M + 256 k (SC)	0
	P1 = 42 M separated	P2 = 128 k (SC) separated	42 M + 128 k (SC)	0
	P1 = 42 M separated	P2 = 64 k (SC) separated	42 M + 64 k (SC)	0

*Note: (*1) LAN capacity can be set in 1.5Mbps step. (P1 & P2 Shared mode)*

2.2.3 Service Channel (SC)

- SC1 to SC4 : RS-232C, 9.6 kbps async.,
  : V.11, 64 kbps (Contra/Co-directional: Selectable)
- SC5 : EOW 1 channel
- Connector : High Density D-sub 44 ways
- LAN Interface : SC LAN Interface
  (throughput: 64/128/256 kbps)

2.2.4 LCT (PNMT) Interface

- Serial Interface : Connector type USB-B

2.2.5 PNMS Interface

- 10 Base T : Connector RJ-45

2.2.6 RF I/O Port

(1) TRP

- Interface Port Type:

  Antenna direct mount interface:
  exclusive NEC flange (11-38 GHz)
  is attached to the RF IN/OUT port at standard

  Coaxial cable interface : 6 GHz: N Type (Female)

  Waveguide feeder interface* (Remote mount):
  6 GHz: PDR70
  11 GHz: PDR100
  18/23 GHz: PBR220
  24 GHz: PBR260
  38 GHz: PBR320

  Polarization : Field changeable (Vertical or Horizontal)

Note: For the TRP of waveguide connection type, waveguide flange adapter is attached to the RF IN/OUT port of remote mount TRP at standard.

(2) ALL INDOOR TRP

- Interface Port Type:

  Waveguide feeder interface: L6/U6 GHz: CPR-137F
  11 GHz: CPR-90

2.2.7 Parallel Alarm Interface

- Output port : Relay Contact (Form-C); 6 outputs max. (assignable 4 outputs for multiple items)
- Input port : Photo coupler; 6 items max.
- Cluster ALM

  IN/OUT : 4 items (max.)
  (Up to four cluster alarms are provided. For each cluster alarm IN corresponding cluster alarm OUT should be assigned in the opposite station.
- Connector : High Density D-sub 44 ways

2.2.8 Wayside

In case of 155 Mbps capacity, one (1) wayside channel can be used as DS1 or LAN interface.

2.2.9 System Performance

2.2.9.1 TRP and System Performance

Note: Following characteristics may be affected due to electromagnetic disturbance (ESD, Surge, etc.)

Table 2-5 System Performance for QPSK/TRP

Frequency Band (GHz)		5.8G (EHG)	L6G	U6G (EHG)	10.5G	11G	18G	23G	38G	Guaranteed
Range (GHz)		5.731875-5.766125	5.93532-6.705625	5935.32-6705.625	10.5525-10.63125	10.705-11.198125	17.705-18.8175	21.205-22.3975	38.600-39.300	-
Interface type	Direct Mount	PDR70			NEC Original					-
	Remote mount *1	N type or PDR70			PDR 100	PDR 100	PBR 220	PBR 220	PBR 320	-
Output Power, nominal (dBm) (Measured at TRP output Port)		+21	+29	+21	+25	+25	+24	+24	+18	5.8-23G: +1.5 dB 38G +1.5/-2.5dB
Power Control (1 dB step, variable)		0 to 30 dB *2							0 to 25 dB*2	±1.0 dB
ATPC (1 dB step)		0 to 30 dB *2							0 to 25 dB*2	-
Frequency Stability		±6 ppm								±10 ppm
Threshold Level		(dBm), (Measured at TRP input Port) at BER=10^{-6}								+3.0 dB
Channel Separation (CS) = 40 MHz		-85.5	-84	-85.5	-83	-83	-82.5	-82	-81	
30 MHz		-86.5	-85	-86.5	-84	-84	-83.5	-82	-82	
20 MHz		-88	-86.5	-88	-85.5	-85.5	-85	-84.5	-83.5	
10 MHz		-91	-89.5	-91	-88.5	-88.5	-88	-87.5	-86.5	
5 MHz		-94	-92.5	-94	-91.5	-91.5	-91	-90.5	-89.5	
BER = 10^{-3}		Above value -1.5 dB								
System Gain		(dBm), (Measured at TRP input port) at BER=10^{-6}								5.8-23G:-3.0 dB 38G:-4.0 dB
Channel Separation (CS) = 40 MHz		106.5	113	106.5	108	108	106.5	106	99	
30 MHz		107.5	114	107.5	109	109	107.5	107	100	
20 MHz		109	115.5	109	110.5	110.5	109	108.5	101.5	
10 MHz		112	118.5	112	113.5	113.5	112	111.5	104.5	
5 MHz		115	121.5	115	116.5	116.5	115	114.5	107.5	
BER = 10^{-3}		Above value +1.5 dB								
Maximum Input Level		-15 dBm (No Error)								-
Residual BER		Less than 10^{-12} at RSL = -30 dBm								-

*Notes: *1: For the TRP of waveguide connection type, flange adapter is attached to the RF IN/OUT port of remote mount TRP in standard.*

**2: Additional attenuation is unavailable.*

Table 2-6 System Peformance for 16 QAM / TRP

Frequency Band (GHz)		5.8G (EHG)	L6G	U6G (EHG)	10.5G	11G	18G	23G	38G	Guaranteed
Range (GHz)		5.731875-5.766125	5.93532-6.705625	5935.32-6705.625	10.5525-10.63125	10.705-11.198125	17.705-18.8175	21.205-22.3975	38.600-39.300	-
Interface type	Direct Mount	PDR70			NEC Original					-
	Remote mount *1	N type or PDR70			PDR 100	PDR 100	PBR 220	PBR 220	PBR 320	-
Output Power, nominal (dBm) (Measured at TRP output Port)		+21	+27	+21	+21.5	+21.5	+22	+22	+14.5	5.8-23G: +1.5 dB 38G: +1.5/-2.5dB
Power Control (1 dB step, variable)		0 to 24 dB *2								±1.0 dB
ATPC (1 dB step)		0 to 24 dB *2								-
Frequency Stability		±6 ppm								±10 ppm
Threshold Level		(dBm), (Measured at TRP input Port) at BER=10^{-6}								+3.0 dB
Channel Separation (CS) = 50 MHz		-77.5	-76	-77.5	-75	-75	-74.5	-74	-73	
30 MHz		-80	-78.5	-80	-77.5	-77.5	-77	-76.5	-75.5	
20 MHz		-81.5	-80	-81.5	-79	-79	-78.5	-78	-77	
10 MHz		-84.5	-83	-84.5	-82	-82	-81.5	-81	-80	
5 MHz		-87.5	-86	-87.5	-85	-85	-84.5	-84	-83	
BER = 10^{-3}		Above value -1.5 dB								
System Gain		(dBm), (Measured at TRP input port) at BER=10^{-6}								5.8-23G:-3.0 dB 38G:-4.0 dB
Channel Separation (CS) = 50MHz		98.5	103	98.5	96.5	96.5	96.5	96	87.5	
30 MHz		101	105.5	101	99	99	99	98.5	90	
20 MHz		102.5	107	102.5	100.5	100.5	100.5	100	91.5	
10 MHz		105.5	110	105.5	103.5	103.5	103.5	103	94.5	
5 MHz		108.5	113	108.5	106.5	106.5	106.5	106	97.5	
BER = 10^{-3}		Above value +1.5 dB								
Maximum Input Level		-20 dBm for the BER less than 10^{-3}								-
Residual BER		Less than 10^{-12} at RSL = -30 dBm								-

*Notes:*1: For the TRP of waveguide connection type, flange adapter is attached to the RF IN/OUT port of remote mount TRP in standard..*

**2: Additional attenuation is unavailable.*

Table 2-7 System Peformance for 32 QAM / TRP

Frequency Band (GHz)		5.8G (EHG)	L6G	U6G (EHG)	10.5G	11G	18G	23G	38G	Guaranteed
Range (GHz)		5.731875-5.766125	5.93532-6.705625	5935.32-6705.625	10.5525-10.63125	10.705-11.198125	17.705-18.8175	21.205-22.3975	38.600-39.300	-
Interface type	Direct Mount	PDR70			NEC Original					-
	Remote mount *1	N type or PDR70			PDR 100	PDR 100	PBR 220	PBR 220	PBR 320	-
Output Power, nominal (dBm) (Measured at TRP output Port)		+21	+25	+21	+21	+21	+19	+19	+14.5	5.8-23G: +1.5 dB 38G: +1.5/-2.5 dB
Power Control (1 dB step, variable)		0 to 23 dB *2							0 to 23 dB*3	±1.0 dB
ATPC (1 dB step)		0 to 23 dB *3								-
Frequency Stability		±6 ppm								±10 ppm
Threshold Level		(dBm), (Measured at TRP input Port) at BER=10-6								+3.0 dB
Channel Separation (CS) = 30 MHz		-77.5	-76	-77.5	-75	-75	-74.5	-74	-73	
3.75 MHz		-86.5	-85	-86.5	-84	-84	-83.5	-83	-82	
BER=10-3		Above value -1.5 dB								
System Gain		(dBm), (Measured at TRP input port) at BER=10-6								5.8-23G: -3.0 dB 38G: -4.0 dB
Channel Separation (CS) = 30 MHz		98.5	101	98.5	96	96	93.5	93	87.5	
3.75 MHz		107.5	110	107.5	105	105	102.5	102	96.5	
BER = 10-3		Above value +1.5 dB								
Maximum Input Level		-20 dBm for the BER less than 10-3								-
Residual BER		Less than 10-12 at RSL = -30 dBm								-

*Notes:*1: For the TRP of waveguide connection type, flange adapter is attached to the RF IN/OUT port of remote mount TRP in standard..*

**2: Additional attenuation (5 dB maximum) is available.*

**3: Additional attenuation is unavailable.*

Table 2-8 System Peformance for 64 QAM / TRP

Frequency Band (GHz)		5.8G (EHG)	L6G	U6G (EHG)	10.5G	11G	18G	23G	38G	Guaranteed
Range (GHz)		5.731875-5.766125	5.93532-6.705625	5935.32-6705.625	10.5525-10.63125	10.705-11.198125	17.705-18.8175	21.205-22.3975	38.600-39.300	-
Interface type	Direct Mount	PDR70			NEC Original					-
	Remote mount *1	N type or PDR70			PDR 100	PDR 100	PBR 220	PBR 220	PBR 320	-
Output Power, nominal (dBm) (Measured at TRP output Port)		+21	+25	+21	+21	+21	+19	+19	+14.5	5.8-23G: +1.5 dB 38G: +1.5/-2.5dB
Power Control (1 dB step, variable)		0 to 20 dB *2							0 to 20 dB*3	±1.0 dB
ATPC (1 dB step)		0 to 20 dB *3								-
Frequency Stability		±6 ppm								±10 ppm
Threshold Level		(dBm), (Measured at TRP input Port) at BER=10-6								+3.0 dB
Channel Separation (CS) = 40MHz		-74	-72.5	-74	-71	-71	-71	-70	-69.5	
10 MHz		-79	-77.5	-79	-76.5	-76.5	-76	-75.5	-74.5	
BER = 10-3		Above value -1.5 dB								
System Gain		(dBm), (Measured at TRP input port) at BER=10-6								5.8-23G:-3.0 dB 38G:-4.0 dB
Channel Separation (CS) = 40 MHz		95	97.5	95	92	92	900	89	84	
10 MHz		100	102.5	100	97.5	97.5	95	94.5	89	
BER = 10-3		Above value +1.5 dB								
Maximum Input Level		-20 dBm for the BER less than 10-3								-
Residual BER		Less than 10-12 at RSL = -30 dBm								-

Notes: *1: *For the TRP of waveguide connection type, flange adapter is attached to the RF IN/OUT port of remote mount TRP in standard..*

*2: *Additional attenuation (5 dB maximum) is available.*

*3: *Additional attenuation is unavailable.*

Table 2-9 System Peformance for 128 QAM / TRP

Frequency Band (GHz)		5.8G (EHG)	L6G	U6G (EHG)	10.5G	11G	18G	23G	38G	Guaranteed
Range (GHz)		5.731875-5.766125	5.93532-6.705625	5935.32-6705.625	10.5525-10.63125	10.705-11.198125	17.705-18.8175	21.205-22.3975	38.600-39.300	-
Interface type	Direct Mount	PDR70			NEC Original					-
	Remote mount *1	N type or PDR70			PDR 100	PDR 100	PBR 220	PBR 220	PBR 320	-
Output Power, nominal (dBm) (Measured at TRP output Port)		+21	+25	+21	+21	+21	+19	+19	+14.5	5.8-23G: +1.5 dB 38G: +1.5/-2.5dB
Power Control (1 dB step, variable)		0 to 20 dB *2							0 to 20 dB*3	±1.0 dB
ATPC(1 dB step)		0 to 20 dB *3								-
Frequency Stability		±6 ppm								±10 ppm
Threshold Level		(dBm), (Measured at TRP input Port) at BER=10-6								+3.0 dB
Channel Separation (CS) = 30 MHz		-71.5	-70	-71.5	-69	-69	-68.5	-68	-67	
5MHz		-79	-77.5	-79	-76.5	-76.5	-76	-75.5	-74.5	
BER = 10-3		Above value -1.5 dB								
System Gain		(dBm), (Measured at TRP input port) at BER=10-6								5.8 - 23G:-3.0 dB 38G:-4.0 dB
Channel Separation(CS) = 30 MHz		92.5	95	92.5	90	90	87.5	87	81.5	
5 MHz		100	102.5	100	97.5	97.5	95	94.5	89	
BER = 10-3		Above value +1.5 dB								
Maximum Input Level		-20 dBm for the BER less than 10-3								-
Residual BER		Less than 10-12 at RSL = -30 dBm								-

*Notes:*1: For the TRP of waveguide connection type, flange adapter is attached to the RF IN/OUT port of remote mount TRP in standard.*

**2: Additional attenuation (5 dB maximum) is available.*

**3: Additional attenuation is unavailable.*

2.2.9.2 ALL INDOOR TRP System Performance

Note: Following characteristics may be affected due to electromagnetic disturbance (ESD, Surge, etc.)

Table 2-10 System Peformance for 32 QAM 100 Mbps / ALL INDOOR TRP

Frequency Band (GHz)	L6G	U6G	11G	Guaranteed
Range [MHz]	5925-6425	6525-6875	10700-11700	-
Output Power, nominal (dBm) at Antenna Port (1+0 system)	Typical Value (w/o TX MON)			e/w EXP Port
Standard Power (dBm)	+29.5	+29.5	-	+2.5 / -3.5 dB
High Power (dBm)	+32.5	+32.5	+30	+2.5 / -3.5 dB
Power Control (1 dB step)	0 to 20 dB *1			
ATPC (1 dB step)	0 to 20 dB *1			
Frequency Stability	± 6 ppm			±10 ppm
Threshold Level at TR UNIT Input Port	Typical Value			
BER=10-6 (dBm)	-76	-76	-75	+3.0 dB
BER=10-3 (dBm)	Above value +1.5 dB			+3.0 dB
System Gain at Antenna Port (1+0 system) BER=10-6 (dBm)	Typical Value			
Standard Power (dBm)	105.5	105.5	-	-
High Power (dBm)	108.5	108.5	105	-
BER=10-3 (dBm)	Above value +1.5 dB			
Maximum Input Level	-17 dBm for the BER less than 10-3			
Residual BER	Less than 10-12 at RSL=-30 dBm			

*Note: *1: Additional attenuation (5 dB maximum) is available.*

Table 2-11 System Peformance for 64 QAM 50 Mbps / ALL INDOOR TRP

Frequency Band (GHz)	L6G	U6G	11G	Guaranteed
Range [MHz]	5925-6425	6525-6875	10700-11700	-
Output Power, nominal (dBm) at Antenna Port (1+0 system)	Typical Value (w/o TX MON)			e/w EXP Port
Standard Power (dBm)	+29.5	+29.5	-	+2.5 / -3.5 dB
High Power (dBm)	+32.5	+32.5	+30	+2.5 / -3.5 dB
Power Control (1 dB step)	0 to 20 dB *1			
ATPC (1 dB step)	0 to 20 dB *1			
Frequency Stability	± 6 ppm			±10 ppm
Threshold Level at TR UNIT Input Port	Typical Value			
BER = 10-6 (dBm)	-77.5	-77.5	-76.5	+3.0 dB
BER = 10-3 (dBm)	Above value +1.5 dB			+3.0 dB
System Gain at Antenna Port (1+0 system) BER=10-6 (dBm)	Typical Value			
Standard Power (dBm)	107	107	-	-
High Power (dBm)	110	110	106.5	-
BER=10-3 (dBm)	Above value +1.5 dB			
Maximum Input Level	-17 dBm for the BER less than 10-3			
Residual BER	Less than 10-12 at RSL=-30 dBm			

*Note: *1: Additional attenuation (5 dB maximum) is available.*

Table 2-12 System Peformance for 128 QAM 155 Mbps / ALL INDOOR TRP

Frequency Band (GHz)	L6G	U6G	11G	Guaranteed
Range [MHz]	5925-6425	6525-6875	10700-11700	-
Output Power, nominal (dBm) at Antenna Port (1+0 system)	Typical Value (w/o TX MON)			e/w EXP Port
Standard Power (dBm)	+29.5	+29.5	-	+2.5 / -3.5 dB
High Power (dBm)	+32.5	+32.5	+30	+2.5 / -3.5 dB
Power Control (1 dB step)	0 to 20 dB *1			
ATPC (1 dB step)	0 to 20 dB *1			
Frequency Stability	± 6 ppm			±10 ppm
Threshold Level at TR UNIT Input Port	Typical Value			
BER = 10-6 (dBm)	-70	-70	-69	+3.0 dB
BER = 10-3 (dBm)	Above value +1.5 dB			+3.0 dB
System Gain at Antenna Port (1+0 system) BER=10-6 (dBm)	Typical Value			
Standard Power (dBm)	99.5	99.5	-	-
High Power (dBm)	102.5	102.5	99	-
BER=10-3 (dBm)	Above value +1.5 dB			
Maximum Input Level	-17 dBm for the BER less than 10-3			
Residual BER	Less than 10-12 at RSL=-30 dBm			

*Note: *1: Additional attenuation (5 dB maximum) is available.*

2.2.10 MDP and System performance

Table 2-13 System Performance for MDP

No.	Item	Specification	
		DS1	LAN
1	MDP Type	1+0 Expandable/1+1	
2	Modulation Type	QPSK/16/64/128 QAM	
3	Baseband Interface	DS1: 1.544 Mbps (Input:±130 ppm, Output:±32 ppm)	10/100BASE-T (X)
		100 ohm	
		B8ZS / AMI	
		Cable EQL (0 - 655 ft)	
		MDR68	RJ-45 (10/100BASE-T (X))
	Channel Number	16	1/ 2
	Total Capacity	24 Mbos	1.5 - 100 + 50, 75 + 75 Mbps etc.
4	Service Channels	V.11 (contra/Co-directional) x 2 channels, RS-232C x 2 channnels / WS (DS1) x 1 channnel	
5	EOW	MDP - MDP	
6	External Alarm & House Keeping	See table below	
7	Security Level by LCT	2 levels	
8	Control & Setting by LCT/PNMT	Serial Interface (USB connector)	
	Loop Back	a) Far End Baseband Loop Back b) Near End Baseband Loop Back	
		c) IF Loop Back	
		d) CSU In-band Far End Loop Back e) CSU In-band Near End Loop Back	
	BER Alarm	Adjustable 10^{-3} / 10^{-4} / 10^{-5} (High BER) 10^{-6} / 10^{-7} / 10^{-8} / 10^{-9} (Low BER)	
	Frequency Setting	Direct entry or Table Download entry: Available when using PNMx (optional)	
	TX Output Control	Manual control, Automatic control, Mute control	
9	Performance monitoring (PMON) /Metering	PMON Items; a) OFS, b) BBE, c)ES, d) SES, e) SEP, f) UAS	
		Metering Items; a) Output power level (TX PWR), b) Received signal level (AGC V), c) Bit error rate (BER MON)	
		LAN Monitoring Items; a) RX Unicast, b) RX Broadcast, c) RX Multicast, d) RX Pause, e) RX CRC error	
		CSU PMON Items; a) Incomming CVL, b) Incomming CV-P, c) Outgoing CV-P	
10	LED Display	CTRL	MDP Alarm (Red) Maintenance (Amber) Memory Access (Amber)
		NSMODEM	Operating PWR (Green) TRP Alarm (Red) MD/CBL Alarm (Red) TX Status (Green) RX status (Green) XPIC Reset (Amber)*
		2P LAN INTFC	Modulr Alarm (Red)

Notes: * *This value is available with 2 MDPs per 1 RF CH with XPIC system.*

Table 2-14 Alarm & House Keeping Output Items (1/3)

#	Alarm Item displayed on LCT/PNMT	Condition	ALM LED Indication (MDP's front)	Summarized Alarm Output (Form-C) <Note 3, 4, 5, 10>					
				RL1	RL2	RL3	RL4	RL5	RL6
1	MAINT	System under maintenance	MAINT	●	—	MASK	MASK	MASK	MASK
2	MDP CPU ALM	MDP CPU failure	-	—	●	—	—	—	—
3	PS ALM (No.1)	PS1 failure (only1+1)	PWR	—	●	—	—	—	—
4	PS ALM (No.2)	PS2 failure (only1+1)	-	—	●	—	—	—	—
5	TRP ALM (No.1)	TRP1 total alarm	TRP	—	—	○	√	○	○
6	TRP ALM (No.2)	TRP2 total alarm		—	—	○	√	○	○
7	TRP CPU ALM (No.1)	TRP1 CPU failure or IF cable is open	TRP Blinking	—	—	√	○	○	○
8	TRP CPU ALM (No.2)	TRP2 CPU failure or IF cable is open		—	—	√	○	○	○
9	TX PWR ALM (No.1)	TRP1 output power decrease	TRP	—	—	○	○	○	○
10	TX PWR ALM (No.2)	TRP2 output power decrease		—	—	○	○	○	○
11	TX Input ALM (No.1)	TRP1 TX IF input level decrease	TRP	—	—	○	○	○	○
12	TX Input ALM (No.2)	TRP2 TX IF input level decrease		—	—	○	○	○	○
13	APC ALM (No.1)	TRP1 LO OSC APC loop out of lock	TRP	—	—	○	○	○	○
14	APC ALM (No.2)	TRP2 LO OSC APC loop out of lock		—	—	○	○	○	○
15	RX Level ALM (No.1)	TRP1 Receiving level decrease	TRP	—	—	○	○	○	○
16	RX Level ALM (No.2)	TRP2 Receiving level decrease		—	—	○	○	○	○
17	TRP Fan ALM (No.1)	All Indoor TRP1 Fan alarm (Reserved)	TRP	—	—	○	○	○	○
18	TRP Fan ALM (No.2)	All Indoor TRP2 Fan alarm (Reserved)		—	—	○	○	○	○
19	MDP ALM	MDP total alarm	MDP	—	—	○	○	√	○
20	IF Cable Short ALM (No.1)	IF Cable connected to TRP1 short	MDP MD/CBL Blinking	—	—	○	○	○	○
21	IF Cable Short ALM (No.2)	IF Cable connected to TRP2 short		—	—	○	○	○	○
22	MOD ALM (No.1)	MOD PLL APC loop out of lock, MOD output level down or TX DPU CLK loss in MODEM1	MDP MD/CBL	—	—	○	○	○	○
23	MOD ALM (No.2)	MOD PLL APC loop out of lock, MOD output level down or TX DPU CLK loss in MODEM2		—	—	○	○	○	○

Table 2-14 Alarm & House Keeping Output Items (2/3)

#	Alarm Item displayed on LCT/PNMT	Condition	ALM LED Indication (MDP's front)	Summarized Alarm Output (Form-C) <Note 3, 4, 5, 10>					
				RL1	RL2	RL3	RL4	RL5	RL6
24	DEM ALM (No.1)	Carrier Asynchronous, Frame Asynchronous at DPU in MODEM1	MDP MD/CBL	—	—	○	○	○	○
25	DEM ALM (No.2)	Carrier Asynchronous, Frame Asynchronous at DPU in MODEM2		—	—	○	○	○	○
26	High BER ALM (No.1)	BER > 10E-3 to -5 (selectable) in MODEM1	MDP MD/CBL	—	—	○	○	○	√
27	High BER ALM (No.2)	BER > 10E-3 to -5 (selectable) in MODEM2		—	—	○	○	○	√
28	Low BER ALM (No.1)	BER > 10E-6 to -9 (selectable) in MODEM1	MDP MD/CBL	—	—	○	○	○	○
29	Low BER ALM (No.2)	BER > 10E-6 to -9 (selectable) in MODEM2		—	—	○	○	○	○
30	LOF (No.1)	Loss of Radio frame syncronization in MODEM1	MDP MD/CBL	—	—	○	○	○	○
31	LOF (No.2)	Loss of Radio frame syncronization in MODEM2		—	—	○	○	○	○
32	Input LOS 01-28	Loss of input data stream from DTE <Note 1>	MDP INTFC <Note 7>	—	—	○	○	○	○
33	AIS Received 01-28	AIS (all "1") is received from DTE <Note 1>	MDP INTFC <Note 7>	—	—	○	○	○	○
34	AIS Generated 01-28	AIS (all "1") is sent to DTE <Note 1>	MDP INTFC <Note 7>	—	—	○	○	○	○
35	CH Usage Error 01-28	Use of a channel set as not used (DS1 channel) <Note 2>	MDP INTFC <Note 7>	—	—	○	○	○	○
36	LAN Link ALM	Loss of LAN Link <Note 3>	MDP INTFC <Note 7>	—	—	○	○	○	○
37	OC-3 LOS (MUX) 1-2	Loss of input data stream from MUX <Note 3>	MDP INTFC <Note 8>	—	—	○	○	○	○
38	OC-3 LOS (DMR) 1-2	Loss of input data stream from DMR <Note 3>	MDP INTFC <Note 8>	—	—	○	○	○	○
39	OC-3 TF ALM 1-2	Loss of OC-3 data output to MUX <Note 3>	MDP INTFC <Note 8>	—	—	○	○	○	○
40	WS Input ALM	Loss of Wayside signal input	MDP INTFC	—	—	○	○	○	○
41	SC LAN Link ALM	Loss of SC LAN Link	MDP INTFC	—	—	○	○	○	○
42	XCTRL ALM	Control failure or REF Signal failure	MDP INTFC <Note 9>	—	—	○	○	○	○
43	XREF ALM (No.1)	Control failure or REF Signal failure	MDP INTFC <Note 9>	—	—	○	○	○	○
44	XREF ALM (No.2)	Control failure or REF Signal failure	MDP INTFC <Note 9>	—	—	○	○	○	○

Table 2-14 Alarm & House Keeping Output Items (3/3)

#	Alarm Item displayed on LCT/PNMT	Condition	ALM LED Indication (MDP's front)	Summarized Alarm Output (Form-C) <Note 3, 4, 5, 10>					
				RL1	RL2	RL3	RL4	RL5	RL6
45	HK Out1	House keeping Control out1	Only show PNMT	—	—	—	—	—	○
46	HK Out2	House keeping Control out2	Only show PNMT	—	—	—	—	○	—
47	HK Out3	House keeping Control out3	Only show PNMT	—	—	—	○	—	—
48	HK Out4	House keeping Control out4	Only show PNMT	—	—	○	—	—	—
49	Cluster ALM Out1	This item received from opposite site. Item1	Only show PNMT	—	—	—	—	—	○
50	Cluster ALM Out2	This item received from opposite site. Item2	Only show PNMT	—	—	—	—	○	—
51	Cluster ALM Out3	This item received from opposite site. Item3	Only show PNMT	—	—	—	○	—	—
52	Cluster ALM Out4	This item received from opposite site. Item4	Only show PNMT	—	—	○	—	—	—

Note 1: Apply to each channel of DS1/DS3.

Note 2: Unused channel/interface is masked according to the bit rate.

Note 3: It is possible to change capacity between DS1 and Ethernet under working condition.

Note 4: In MAINT status, excepting HK-OUT and Cluster ALM, alarm outputs are masked to normal condition.

Note 5: The summarization of alarm outputs is fully user programmable; The sign ● in above table shows fixed item and can not be changed. The sign √ only shows the factory settings. The sign ○ output can be assigned for plural items. The sign — input/output can not be assigned. Either HK output or Cluster ALM output in each channel can be assigned.

Note 6: Above Table shows Alarm output matrix for 1+1 configuration.

Note 7: Without OC-3 INTFC.

Note 8: With OC-3 INTFC.

Note 9: Only apply to XPIC system.

Note 10: Assign to relays 3 to 6 only one category, either NLite Alarm, House Keeping Control out or Cluster Alarm out.

Output Port condition

Interface circuit: Relay Form C
Maximum Current: 0.2 A
Maximum Voltage: 100 V (AC+DC)

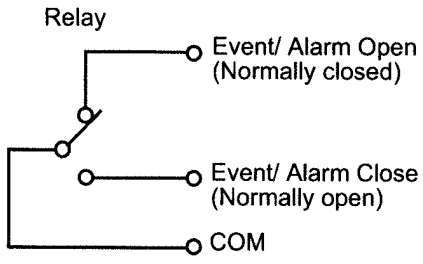


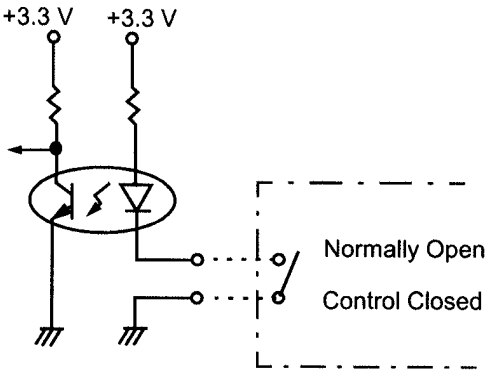
Table 2-15 Alarm & House Keeping lutput Items

#	House keeping Item displayed on LCT/PNMT	Condition	Event Indication	Summarized Alarm Input (Photo coupler)					
				IN1	IN2	IN3	IN4	IN5	IN6
1	HK-IN1	House keeping Event inport1	Only show PNMT	●	—	—	—	—	—
2	HK-IN2	House keeping Event inport2	Only show PNMT	—	●	—	—	—	—
3	HK-IN3	House keeping Event inport3	Only show PNMT	—	—	●	—	—	—
4	HK-IN4	House keeping Event inport4	Only show PNMT	—	—	—	●	—	—
5	HK-IN5	House keeping Event inport5	Only show PNMT	—	—	—	—	●	—
6	HK-IN6	House keeping Event inport6	Only show PNMT	—	—	—	—	—	●
7	Cluster ALM input1	This item transmits to opposite site. Item 1	Only show PNMT	—	—	—	—	—	○
8	Cluster ALM input2	This item transmits to opposite site. Item 2	Only show PNMT	—	—	—	—	○	—
9	Cluster ALM input3	This item transmits to opposite site. Item 3	Only show PNMT	—	—	—	○	—	—
10	Cluster ALM input4	This item transmits to opposite site. Item 4	Only show PNMT	—	—	○	—	—	—

Note 1: Unused channel/interface is masked according to the bit rate.

Input Port condition

Normal OPEN (> 200 k ohms)
Control CLOSE (< 50 ohms)
Interface circuit: photo coupler with bias circuit



2.3 Interconnection between TRP and MDP

Table 2-16 IF Cable

No.	Item	Specification
1	Interconnection	Single coaxial cable /50 ohms
2	Standard Type of Cable	5D-FB, 8D-FB (standard), 10D-FB
3	Signals	IF signal, alarms, control, monitoring and power source
4	Maximum Cable Length	150 m (5D-FB) 300 m (8D-FB) 350 m (10D-FB)
5	Cable Equalization	Automatic level equalization
6	Guaranteed temperature range	–33°C to +50°C (workable: –40°C to +55°C)

Note 1 : In case of employing hitless protection, set each length of two IF cables same or the difference of their cable length shall be less than 100 meters.

Note 2 : Salt damage (custom order)
In case of operating in the sea or around the coast area (within 3 km from coastline), measure must be taken for the TRP against salt damage. Please contact NEC for the countermeasure.

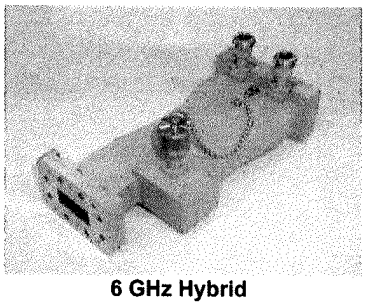
Note 3 : Water Proof N type connector
The waterproof N type connectors must be used for IF cable of TRP side, because DC voltage power is supplied in it.

Note 4 : MDP IF connector = TNC (Female),
TRP IF connector = N (Female)

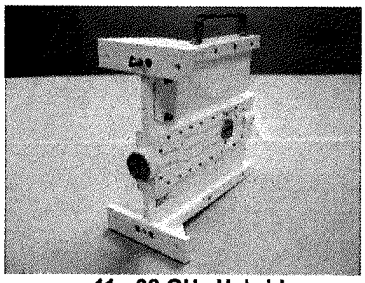
Note 5 : TNC (Male) L-angle connector for the 8D-FB IF cable is used to connect it to the MDP. When the N (Male) straight connector is attached to the 5D-FB or 10D-FB IF cable, the TNC (Male) - N (Female) L-angle adapter is used.

2.4 Hybrid Combiner/Divider

There are two types of hybrid combiner/divider used in 1+1 protected systems, one is coaxial cable connection type for 6 GHz Bands and the other is TRP Direct Mount type for 11 - 38 GHz Bands. The following NEC Hybrid Combiner/Divider is suited for Andrew or RFS Antenna, and all NEC TRPs.



6 GHz Hybrid



11 - 38 GHz Hybrid

Fig. 2-7 Hybrid

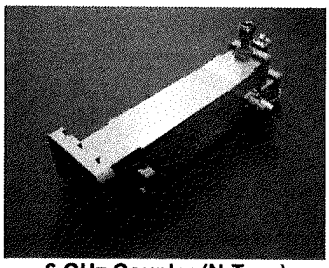
Table 2-17 Hybrid Combiner/Divider Characteristics

Frequency Band [GHz]	Frequency Range [GHz]	1-2 PORT Variation Max.(dB)	Loss Max. (dB)	Isolation Min.(dB)	VSWR Max.	Interface	
						(ANT Side)	(TRP Side)
L6	5.925 - 6.425	0.5	3.7	20	1.3	UDR70	N Connector
U6	6.425 - 7.125	0.5	3.7	20	1.3	UDR70	N Connector
11	10.15 - 11.7	0.5	3.5	20	1.2	NEC Original	NEC Original
18	17.7 - 19.7	0.5	3.5	20	1.2		
23	21.2 - 23.6	0.5	3.5	20	1.2		
24(26)	24.25 - 26.5	0.5	3.8	20	1.2		
38	37 - 39.5	0.5	3.8	20	1.2		

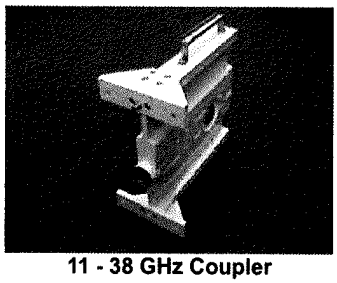
Note 1: TRP for 6 GHz: Separate Type
Note 2: TRP for 11 - 38 GHz: Direct Mount Type

2.4.1 10 dB Coupler

There are two types of NEC 10 dB Coupler; one is coaxial cable connection type for 6 GHz bands and the other is TRP Direct Mount type for 11 - 38 GHz Bands. The following 10 dB Coupler is suited for Andrew or RFS Antenna, and all NEC TRPs.



6 GHz Coupler (N-Type)



11 - 38 GHz Coupler

Fig. 2-8 10 dB Coupler

Table 2-18 10 dB Coupler Characteristics

Frequency Band [GHz]	Frequency Range [GHz]	Coupling (dB)	Loss Max. (dB)	Isolation Min.(dB)	VSWR Max.	Interface	
						(ANT Side)	(TRP Side)
L6/U6	5.925 - 7.125	0.5	1.2	20	1.3	UDR70	N Connector
11	10.15 - 11.7	0.5	1.2	20	1.2	NEC Original	NEC Original
18	17.7 - 19.7	0.5	1.2	20	1.2		
23	21.2 - 23.6	0.5	1.2	20	1.2		
24(26)	24.25 - 26.5	0.5	1.2	20	1.2		
38	37 - 39.5	0.5	1.2	20	1.2		

Note 1: TRP for 6 GHz: Separate Type
Note 2: TRP for 11 - 38 GHz: Direct Mount Type

2.4.2 OMT (Ortho-Mode Transducer)

The OMT enables dual polarization feature to double the transmission capacity for the NLite system using the same frequency. The following NEC OMT has TRP Direct Mount type for 11-38 GHz Bands, which is suited for RFS Antenna and all NEC TRPs.

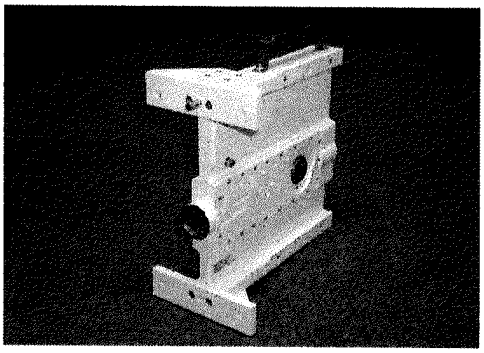


Fig. 2-9 OMT

Table 2-19 OMT (Ortho-Mode Transducer) Characteristics

Frequency Band [GHz]	Frequency Range [GHz]	XPD Min. [dB]	LOSS Max. [dB]	P-P ISOLATION Min.[dB]	VSWR Max.	INTERFACE WG INNER DIA. (mm) (ANT Side)	INTERFACE (TRP Side)
11	10.4 - 11.7	35	0.6	38	1.3	18.0	NEC Original
18	17.7 - 19.7	35	0.6	38	1.3	10.5	
23	21.2 - 23.6	35	0.6	38	1.3	9.0	
24(26)	24.25 - 26.5	35	0.8	38	1.3	8.0	
38	37 - 39.5	35	1.0	38	1.3	5.5	

2.5 RF Channel Plan

Radio frequencies in 6 to 23 GHz applicable to NLite N are shown in the following Table: For details of frequency range in each Sub Band RF frequency band listed below, refer to the Appendix attached in this Section 1.

Table 2-20 RF Frequencies

RF BAND [GHz]	Tx-Rx Shift Frequency [MHz]
5.8 GHz : 5.725 - 5.850	77
L6 GHz : 5.925 - 6.425	252.04
U6 GHz : 6.43 - 7.11	160
11 GHz : 10.7 - 11.7	490
18 GHz : 17.7 - 19.7	1560
23 GHz : 21.2 - 23.6	1200
24 GHz : 24.25 - 25.25	800

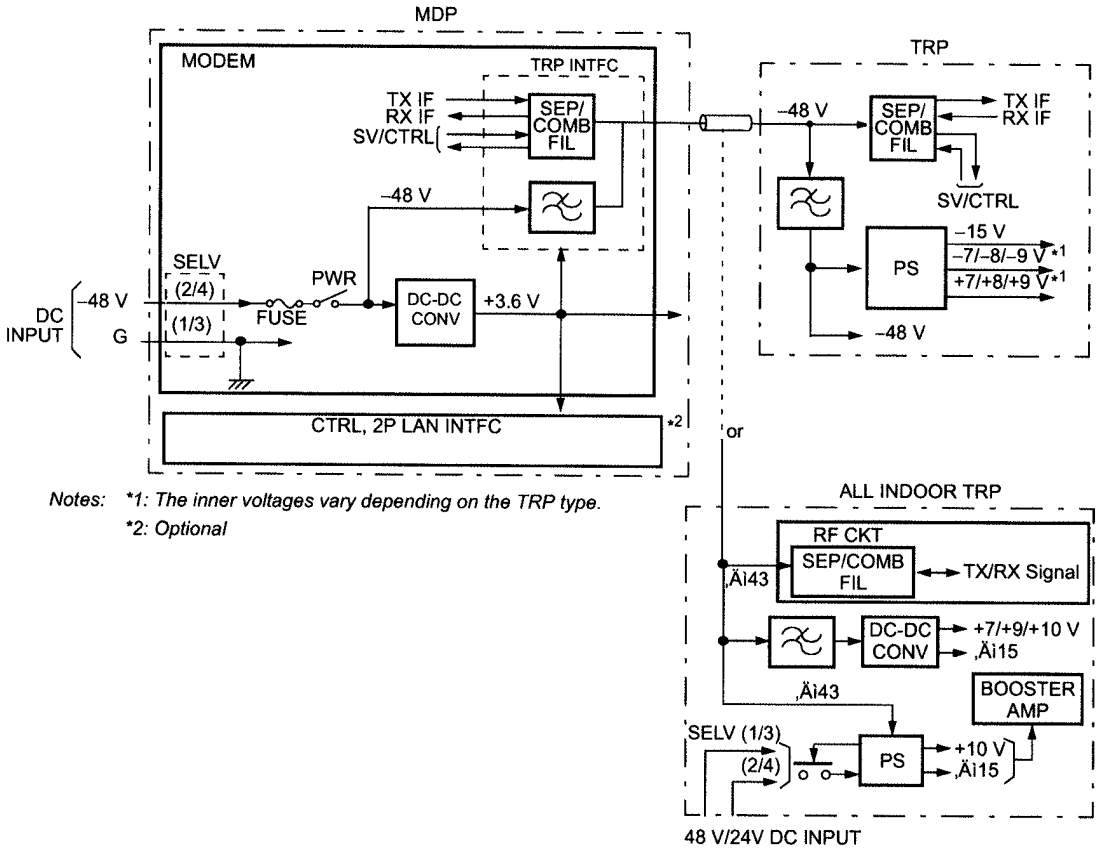
2.6 Power Supply

The power supply systems are shown in Fig. 2-10 (1/3) to (3/3). The DC-DC CONV module in the MODEM module produces regulated +3.6 V DC from –48 V *1 DC input for the component modules on the MDP. Also, this module supplies a –48 V DC to the TRP.

Caution: * 1 That uses 20 to 60 V DC and floating polarities with NLite-L system.

The DC V to the TRP is supplied through the coaxial cable which is also used for the IF and other signals. The PS circuit on the TRP produces +7/+8/+9/–7/–8/–9 * and –15 V DC for the component modules from the –48 V DC supplied from the MDP.

*Note: *: Necessary voltages in the TRP vary depending on the TRP type.*



Notes: *1: The inner voltages vary depending on the TRP type.
*2: Optional

For 1+0 Configuration

Fig. 2-10 Power Supply System Block Diagram (1/3)

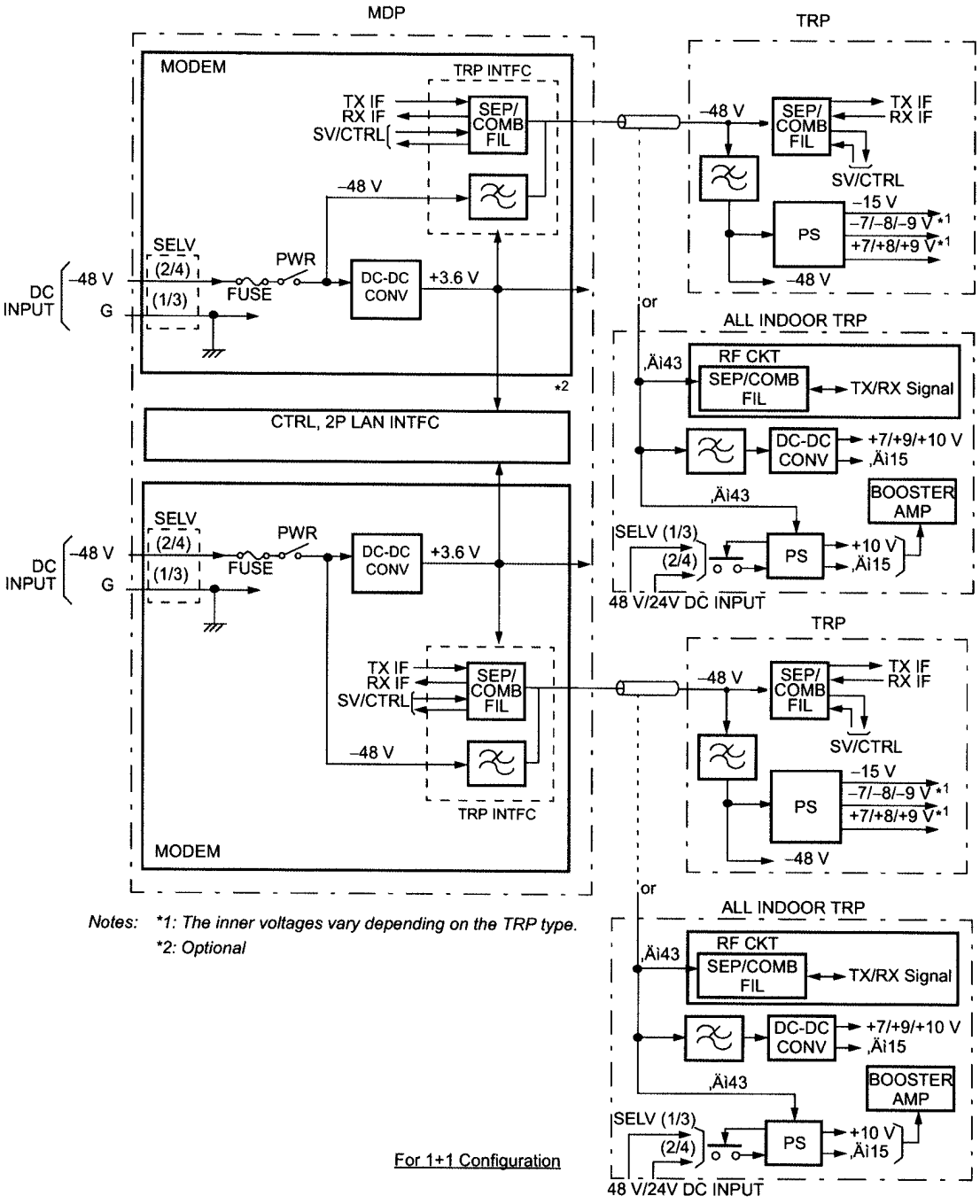
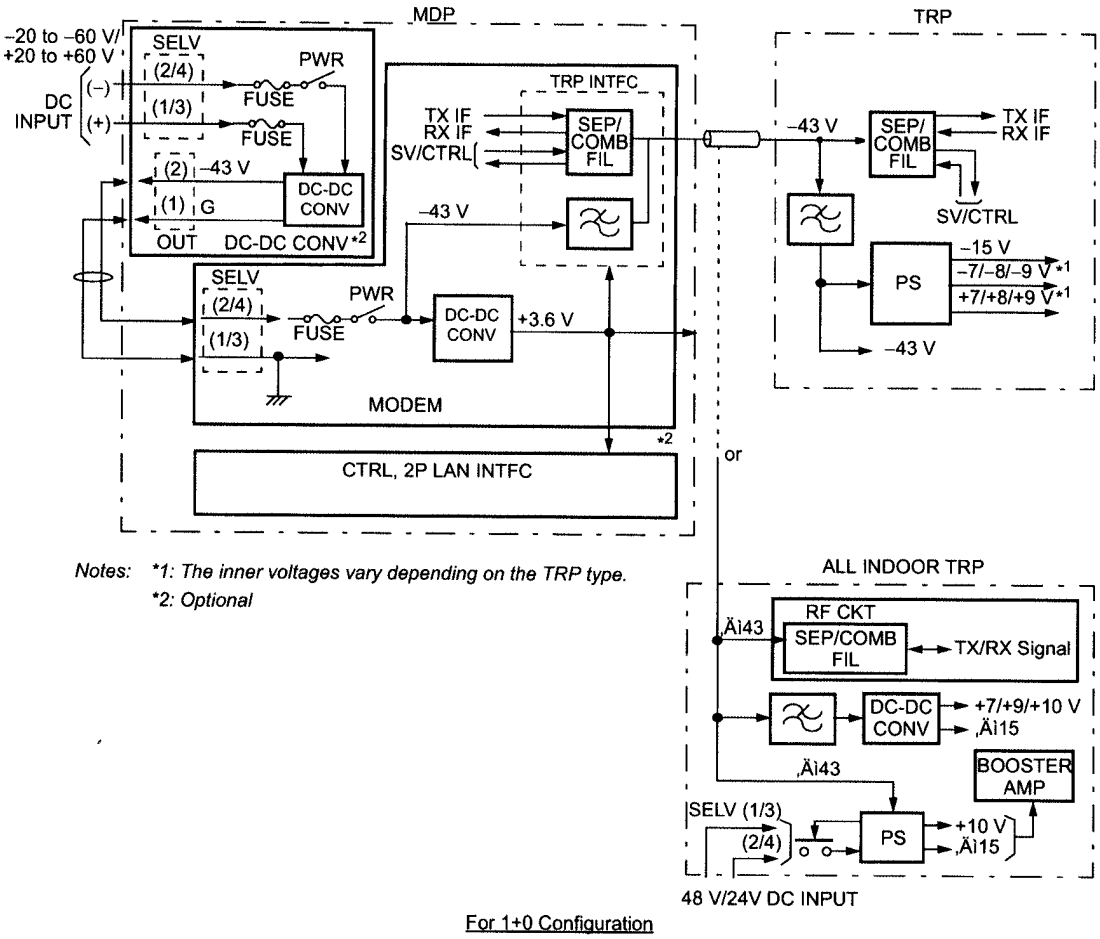


Fig. 2-10 Power Supply System Block Diagram (2/3)



Notes: *1: The inner voltages vary depending on the TRP type.
*2: Optional

For 1+0 Configuration

Connecting Other Type NLite N TRP

Fig. 2-10 Power Supply System Block Diagram (3/3)

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NLite N

6-38 GHz DIGITAL RADIO SYSTEM

APPENDIX

RADIO FREQUENCY PLAN FOR NLite N

CONTENTS

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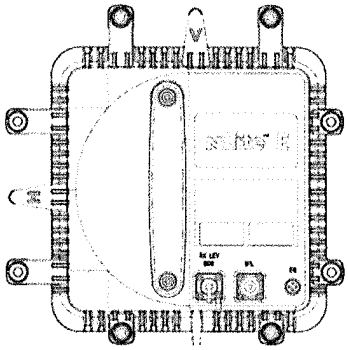
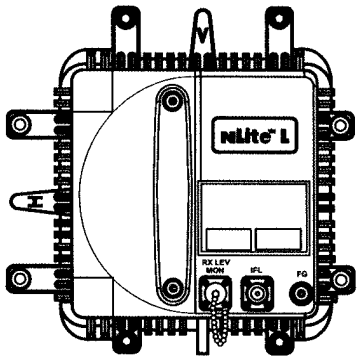
APPENDIX
RADIO FREQUENCY PLAN FOR NLite N

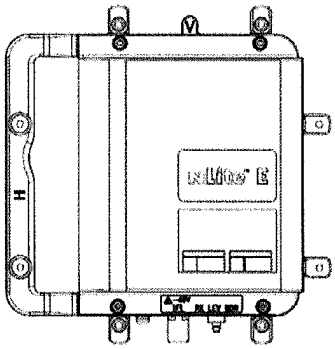
This provides frequency range used in each RF frequency band (6 to 38 GHz). Refer to Note 1, Note 2 and Note 3 for corresponding frequency band of the system. From Table A-1 to Table A-5 and Table A-17 are applied for the TRP NHG/NHP Type; from Table A-6 to Table A-14 are applied for TRP NHG2 Type; from Table A-15 to Table A-16 are applied for TRP EHG Type; from Table A-18 to Table A-22 are applied for ALL INDOOR TRP Type.



TRP
L6/11/18/23/38 GHz (NHG Type)
11 GHz (NHP Type)
L6/11 GHz (NHG2 Type)



TRP
24 GHz (NHG Type)
5.8/U6 GHz (EHG Type)



TRP
18/23/38 GHz (NHG2 Type)

Notes 1: When 18 to 38GHz band of the TRP NHG or 6 to 38GHz TRP NHG2 is applied, each data transmission system has to take following channel separation or more.

Usually, RF channel frequency must be assigned that is shifted a half of channel separation from Start and Stop frequency values within frequency range of Sub Band.

Refer to below example for the system of transmission capacity of 100/155 MB.

Transmission Capacity: 100 MB/155 MB
Modulation Scheme: 32QAM/128QAM
CH Separation: 28 MHz
TX frequency Ft: f1 + 14 MHz < Ft < fn - 14 MHz
where; f1=Start frequency, fn=Stop frequency

*Note 2: When 6 GHz Band is applied for the TRP NHG Type, the TX/RX BPFs are adjusted to the point frequency which is indicated in the TRP name plate. Therefore, to change the point frequency over the variable range in the TX/RX BPFs replacement and LCT resetup are required *.*

**: RF channel frequency is assignable depending on the transmission capacity within frequency range of Sub Band as above Note 1 for 18 to 38 GHz band. Refer to start and stop frequency in the frequency table corresponded channel separation.*

Note 3: When 11 GHz Band for the TRP NHG Type is applied, refer to start and stop frequency in the frequency table corresponded channel separation.

The change of the BPF varies depending on the Frequency Band and Sub Band to be used, so contact NEC before changing the TRP Sub Band whether the change of the BPF is necessary or not.

Caution: TRPs that have been used outside should NOT be opened. Silica Gel Packs should be replaced with new ones every time the customer opens the TRP and also the air leakage test operation should be performed by using the air leakage tester (NEC made, sold separately).

1. L6 GHz Band (NHG Type)

Table A-1 L6 GHz, Sub-band E versus Frequency Range (TX-RX frequency spacing: 252.04 MHz): STANDARD

TRP Type	Sub-Band	TX Radio Point Frequency Range		RX Radio Point Frequency Range		TX HIGH/LOW	
		5930.375 to 6152.750 MHz		6182.415 to 6404.790 MHz		Lower Band	
		6182.415 to 6404.790 MHz		5930.375 to 6152.750 MHz		Higher Band	
		TX Low			TX High		
		RF CH	TX Point Freq.	RX Point Freq.	RF CH	TX Point Freq.	RX Point Freq.
NWA-009024( )	E	1	5930.375	6182.415	1'	6182.415	5930.375
		2	5945.200	6197.240	2'	6197.240	5945.200
		3	5960.025	6212.065	3'	6212.065	5960.025
		4	5974.850	6226.890	4'	6226.890	5974.850
		5	5989.675	6241.715	5'	6241.715	5989.675
		6	6004.500	6256.540	6'	6256.540	6004.500
		7	6019.325	6271.365	7'	6271.365	6019.325
		8	6034.150	6286.190	8'	6286.190	6034.150
		9	6048.975	6301.015	9'	6301.015	6048.975
		10	6063.800	6315.840	10'	6315.840	6063.800
		11	6078.625	6330.665	11'	6330.665	6078.625
		12	6093.450	6345.490	12'	6345.490	6093.450
		13	6108.275	6360.315	13'	6360.315	6108.275
		14	6123.100	6375.140	14'	6375.140	6123.100
		15	6137.925	6389.965	15'	6389.965	6137.925
		16	6152.750	6404.790	16'	6404.790	6152.750

Note: It is required to define point frequency which is to be used. The BPF for 6 GHz is set to each frequency though it is within the same Sub Band. To change the point frequency, not only LCT setup, but also the change of BPF is needed.

2. 11 GHz Band (NHG/NHP Type)

Table A-2 11 GHz, Sub-band E/F/G versus Frequency (TX-RX frequency spacing: 490 (500) MHz): STANDARD

TRP Type	Sub-Band	TX Radio Point Frequency Range	RX Radio Point Frequency Range	TX HIGH/LOW
NWA-009032 ITU-R F.387-7 ANNEX 2/USA FCC 101.147	E	10705 to 10865 MHz	11205 to 11355 MHz	Lower Band
	F	10875 to 11035 MHz	11365 to 11525 MHz	
	G	11045 to 11195 MHz	11535 to 11695 MHz	
	E'	11205 to 11355 MHz	10705 to 10865 MHz	Higher Band
	F'	11365 to 11525 MHz	10875 to 11035 MHz	
	G'	11535 to 11695 MHz	11045 to 11195 MHz	

3. 18 GHz Band (NHG Type)

Table A-3 18 GHz, Sub-band A versus Frequency Range (TX-RX frequency spacing: 1560 MHz)

TRP Type	Sub-Band	TX Radio Point Frequency Range	RX Radio Point Frequency Range	TX HIGH/LOW
NWA-009038( )	A	17700 to 18140 MHz	19260 to 19700 MHz	Lower Band
	A	19260 to 19700 MHz	17700 to 18140 MHz	Higher Band

4. 23 GHz Band (NHG Type)

Table A-4 23 GHz, Sub-band A/B/C versus Frequency Range (TX-RX frequency spacing: 1200 MHz)

TRP Type	Sub-Band	TX Radio Point Frequency Range	RX Radio Point Frequency Range	TX HIGH/LOW
NWA-009040( )	A	21200.00 to 21802.00 MHz	22400.00 to 23002.00 MHz	Lower Band
	B	21498.00 to 22100.00 MHz	22698.00 to 23300.00 MHz	
	C	21798.00 to 22400.00 MHz	22998.00 to 23600.00 MHz	
	A	22400.00 to 23002.00 MHz	21200.00 to 21802.00 MHz	Higher Band
	B	22698.00 to 23300.00 MHz	21498.00 to 22100.00 MHz	
	C	22998.00 to 23600.00 MHz	21798.00 to 22400.00 MHz	

Sub-Band A and C cover full band.

5. 38 GHz Band (NHG Type)

Table A-5 38 GHz, Sub-band A/B/C versus Frequency Range (TX-RX Frequency Spacing: 1260 MHz): STANDARD

TRP Type	Sub-band	TX Radio Point Frequency Range	RX Radio Point Frequency Range	TX High/Low
NWA-009048( )	A	37016.00 to 37620.00 MHz	38276.00 to 38880.00 MHz	Lower Band
	B	37316.00 to 37920.00 MHz	38576.00 to 39180.00 MHz	
	C	37616.00 to 38220.00 MHz	38876.00 to 39480.00 MHz	
	A	38276.00 to 38880.00 MHz	37016.00 to 37620.00 MHz	Higher Band
	B	38576.00 to 39180.00 MHz	37316.00 to 37920.00 MHz	
	C	38876.00 to 39480.00 MHz	37616.00 to 38220.00 MHz	

Full range can be arranged in concerted with sub-band A and C.

6. L6 GHz Band (NHG2 Type)

Table A-6 L6 GHz, Sub-band A/B/C/D/E/F/G/H versus Frequency Range (TX-RX Frequency Spacing: 252.04 MHz): STANDARD

TRP Type	Sub-band	TX Radio Point Frequency Range	RX Radio Point Frequency Range	TX High/Low
NWA-034273( )	A	5930.375 to 5974.850 MHz	6182.415 to 6226.890 MHz	Lower Band
	B	5989.675 to 6034.150 MHz	6241.715 to 6286.190 MHz	
	C	6048.975 to 6093.450 MHz	6301.015 to 6345.490 MHz	
	D	6108.275 to 6152.750 MHz	6360.315 to 6404.790 MHz	
	E	5935.317 to 5984.733 MHz	6187.357 to 6236.773 MHz	
	F	5994.616 to 6044.033 MHz	6246.656 to 6296.073 MHz	
	G	6053.916 to 6103.333 MHz	6305.956 to 6355.373 MHz	
	H	6113.216 to 6162.633 MHz	6365.256 to 6414.673 MHz	
	A	6182.415 to 6226.890 MHz	5930.375 to 5974.850 MHz	Higher Band
	B	6241.715 to 6286.190 MHz	5989.675 to 6034.150 MHz	
	C	6301.015 to 6345.490 MHz	6048.975 to 6093.450 MHz	
	D	6360.315 to 6404.790 MHz	6108.275 to 6152.750 MHz	
	E	6187.357 to 6236.773 MHz	5935.317 to 5984.733 MHz	
	F	6246.656 to 6296.073 MHz	5994.616 to 6044.033 MHz	
	G	6305.956 to 6355.373 MHz	6053.916 to 6103.333 MHz	
	H	6365.256 to 6414.673 MHz	6113.216 to 6162.633 MHz	

7. 11 GHz Band (NHG2 Type)

Table A-7 11 GHz, Sub-band A/B/C/D versus Frequency Range (TX-RX Frequency Spacing: 490 MHz): STANDARD

ODU Type	Sub-band	TX Radio Point Frequency Range	RX Radio Point Frequency Range	TX High/Low
NWA-034277-01( )	A	10715.000 to 10825.000 MHz	11205.000 to 11315.000 MHz	Lower Band
	B	10835.000 to 10945.000 MHz	11325.000 to 11435.000 MHz	
	C	10955.000 to 11065.000 MHz	11445.000 to 11555.000 MHz	
	D	11075.000 to 11195.000 MHz	11565.000 to 11685.000 MHz	
	A	11205.000 to 11315.000 MHz	10715.000 to 10825.000 MHz	Higher Band
	B	11325.000 to 11435.000 MHz	10835.000 to 10945.000 MHz	
	C	11445.000 to 11555.000 MHz	10955.000 to 11065.000 MHz	
	D	11565.000 to 11685.000 MHz	11075.000 to 11195.000 MHz	

Table A-8 11 GHz, Sub-band E/F/G versus Frequency Range (TX-RX Frequency Spacing: 490 MHz): N Lite

ODU Type	Sub-band	TX Radio Point Frequency Range	RX Radio Point Frequency Range	TX High/Low
NWA-034277-05( )	E	10705.000 to 10865.000 MHz	11195.000 to 11355.000 MHz	Lower Band
	F	10875.000 to 11035.000 MHz	11365.000 to 11525.000 MHz	
	G	11045.000 to 11195.000 MHz	11535.000 to 11685.000 MHz	
	E	11195.000 to 11355.000 MHz	10705.000 to 10865.000 MHz	Higher Band
	F	11365.000 to 11525.000 MHz	10875.000 to 11035.000 MHz	
	G	11535.000 to 11685.000 MHz	11045.000 to 11195.000 MHz	

8. 18 GHz Band (NHG2 Type)

Table A-9 18 GHz, Sub-band A/B versus Frequency Range (TX-RX Frequency Spacing: 1560 MHz): USA/BRAZIL

TRP Type	Sub-band	TX Radio Point Frequency Range				RX Radio Point Frequency Range				TX High/Low
NWA-034280( )	A	17712.00	to	17922.00	MHz	19272.00	to	19482.00	MHz	Lower Band
	B	17918.00	to	18128.00	MHz	19478.00	to	19688.00	MHz	
	A	19272.00	to	19482.00	MHz	17712.00	to	17922.00	MHz	Higher Band
	B	19478.00	to	19688.00	MHz	17918.00	to	18128.00	MHz	

Table A-10 18 GHz, Sub-band C versus Frequency Range (TX-RX Frequency Spacing: 1560 MHz): USA/BRAZIL (Wide Band)

TRP Type	Sub-band	TX Radio Point Frequency Range				RX Radio Point Frequency Range				TX High/Low
NWA-034280( )	C	17700.00	to	18140.00	MHz	19260.00	to	19700.00	MHz	Lower Band
	C	19260.00	to	19700.00	MHz	17700.00	to	18140.00	MHz	Higher Band

9. 23 GHz Band (NHG2 Type)

Table A-11 23 GHz, Sub-band A/B/C/D versus Frequency Range (TX-RX Frequency Spacing: 1200 MHz): USA

TRP Type	Sub-band	TX Radio Point Frequency Range				RX Radio Point Frequency Range				TX High/Low
NWA-034281( )	A	21266.0	to	21544.0	MHz	22466.0	to	22744.0	MHz	Lower Band
	B	21543.5	to	21821.5	MHz	22743.5	to	23021.5	MHz	
	C	21821.0	to	22099.0	MHz	23021.0	to	23299.0	MHz	
	D	22098.5	to	22376.5	MHz	23298.5	to	23576.5	MHz	
	A	22466.0	to	22744.0	MHz	21266.0	to	21544.0	MHz	Higher Band
	B	22743.5	to	23021.5	MHz	21543.5	to	21821.5	MHz	
	C	23021.0	to	23299.0	MHz	21821.0	to	22099.0	MHz	
	D	23298.5	to	23576.5	MHz	22098.5	to	22376.5	MHz	

Table A-12 23 GHz, Sub-band E/F/G versus Frequency Range (TX-RX Frequency Spacing: 1200 MHz): USA (Wide Band)

TRP Type	Sub-band	TX Radio Point Frequency Range				RX Radio Point Frequency Range				TX High/Low
NWA-034281( )	E	21200.00	to	21802.00	MHz	22400.00	to	23002.00	MHz	Lower Band
	F	21498.00	to	22100.00	MHz	22698.00	to	23300.00	MHz	
	G	21798.00	to	22400.00	MHz	22998.00	to	23600.00	MHz	
	E	22400.00	to	23002.00	MHz	21200.00	to	21802.00	MHz	Higher Band
	F	22698.00	to	23300.00	MHz	21498.00	to	22100.00	MHz	
	G	22998.00	to	23600.00	MHz	21798.00	to	22400.00	MHz	

Full range can be arranged in concerted with sub-band E and G.

10. 38 GHz Band (NHG2 Type)

Table A-13 38 GHz, Sub-band A/B/C/D versus Frequency Range (TX-RX Frequency Spacing: 1260 MHz): STANDARD

TRP Type	Sub-band	TX Radio Point Frequency Range	RX Radio Point Frequency Range	TX High/Low
NWA-034285( )	A	37058.00 to 37341.50 MHz	38318.00 to 38601.50 MHz	Lower Band
	B	37338.00 to 37621.50 MHz	38598.00 to 38881.50 MHz	
	C	37618.00 to 37901.50 MHz	38878.00 to 39161.50 MHz	
	D	37898.00 to 38181.50 MHz	39158.00 to 39441.50 MHz	
	A	38318.00 to 38601.50 MHz	37058.00 to 37341.50 MHz	Higher Band
	B	38598.00 to 38881.50 MHz	37338.00 to 37621.50 MHz	
	C	38878.00 to 39161.50 MHz	37618.00 to 37901.50 MHz	
	D	39158.00 to 39441.50 MHz	37898.00 to 38181.50 MHz	

Table A-14 38 GHz, Sub-band E/F/G versus Frequency Range (TX-RX Frequency Spacing: 1260 MHz): STANDARD (Wide Band)

TRP Type	Sub-band	TX Radio Point Frequency Range	RX Radio Point Frequency Range	TX High/Low
NWA-034285( )	E	37016.00 to 37620.00 MHz	38276.00 to 38880.00 MHz	Lower Band
	F	37316.00 to 37920.00 MHz	38576.00 to 39180.00 MHz	
	G	37616.00 to 38220.00 MHz	38876.00 to 39480.00 MHz	
	E	38276.00 to 38880.00 MHz	37016.00 to 37620.00 MHz	Higher Band
	F	38576.00 to 39180.00 MHz	37316.00 to 37920.00 MHz	
	G	38876.00 to 39480.00 MHz	37616.00 to 38220.00 MHz	

Full range can be arranged in concerted with sub-band E and G.

The NLite N applies for the Radio frequencies as follows:

- FCC 5.8 GHz Band: 5725 to 5850 MHz
- FCC U6 GHz Band: 6525 to 6875 MHz
  SRSP U6 GHz Band: 6425 to 7125 MHz
- FCC 24 GHz Band: 24250 to 25250 MHz

The TX frequency must be assigned within the TX radio frequency sub-band of the RF CKT in the TR UNIT. The TX frequency is entered using the local craft terminal (LCT). Normally, the corresponding RX frequency is automatically set after the TX frequency is entered but for the 5.8/6/24 GHz band TR UNIT of split and L6/U6/10.5/11 GHz band Indoor type e/w FAN, the RX frequency is setable to other values.

The frequency spacing between adjacent channels should be taken more than the following values of bandwidth:

- 1 × DS3/28 × DS1 (45M) 64QAM: 10MHz
- 56 × DS1 (80M) 16QAM: 30MHz
- 70 × DS1 (100M) 32QAM: 30MHz
- OC-3 (155M) 128QAM: 30MHz
- OC-3 (155M) 64QAM: 40MHz
- OC-3 (155M) 16QAM: 50MHz

11. 5.8 GHz Band (EHG Type)

Table A-15 FCC 5.8 GHz Band: 5725 to 5850 MHz (TX-RX Frequency Spacing: 77 MHz)

Low Band		High Band		Sub-band
TX	RX	TX	RX	
5730.000 to 5743.000	5807.000 to 5820.000	5807.000 to 5820.000	5730.000 to 5743.000	A
5743.000 to 5755.000	5820.000 to 5832.000	5820.000 to 5832.000	5743.000 to 5755.000	B
5755.000 to 5768.000	5832.000 to 5845.000	5832.000 to 5845.000	5755.000 to 5768.000	C

Note: Assignable frequency for the 8DS1 system: between from the [lowest frequency + 1.875 MHz] to the [top frequency – 1.875 MHz] within corresponding band.

Assignable frequency for the 16DS1 system: between from the [lowest frequency + 2.5 MHz] to the [top frequency – 2.5 MHz] within corresponding band.

Assignable frequency for the 1DS3 system: between from the [lowest frequency + 5 MHz] to the [top frequency – 5 MHz] within corresponding band.

12. U6 GHz Band (EHG Type)

Table A-16 FCC U6 GHz Band: 6525 to 6875MHz, SRSP U6 GHz Band: 6425 to 7125MHz (Bandwidth: 10 MHz, TX-RX frequency spacing: 160 MHz)

Low Band			High Band		
CH	TX	RX	CH	TX	RX
1	6545	6715	1'	6705	6865
2	6555	6725	2'	6695	6855
3	6565	3735	3'	6685	6845
4	6585	6745	4'	6675	6835
5	6595	6755	5'	6665	6825
6	6605	6765	6'	6655	6815
7	6615	6775	7'	6645	6805
8	6625	6785	8'	6635	6795
9	6635	6795	9'	6625	6785
10	6645	6805	10'	6615	6775
11	6655	6815	11'	6605	6765
12	6665	6825	12'	6595	6755
13	6675	6835	13'	6585	6745
14	6685	6845	14'	6565	3735
15	6695	6855	15'	6555	6725
16	6705	6865	16'	6545	6715

13. 24 GHz Band (NHG Type)

Table A-17 FCC 24 GHz Band: 24250 to 25250 MHz (Bandwidth: 10 MHz, TX-RX frequency spacing: 800 MHz)

Low Band		High Band		Sub-band
TX	RX	TX	RX	
24250 to 25250	25250 to 24250	25250 to 24250	24250 to 25250	A

The NLite N ALL INDOOR applies for the Radio frequencies as follows:

- FCC L6 GHz Band: 5925 to 6425 MHz
- FCC U6 GHz Band: 6515 to 6875 MHz
  SRSP U6 GHz Band: 6425 to 7125 MHz
- FCC 11 GHz Band: 10700 MHz to 11700 MHz

14. L6 GHz Band (ALL INDOOR TRP)

Table A-18 FCC L6 GHz Band: 5925 to 6425 MHz (Bandwidth: 10 MHz, TX-RX frequency spacing: 252.04 MHz)

Bandwidth: 10 MHz
Shift Freq: 252.04 MHz

Low Band			High Band		
CH	TX	RX	CH	TX	RX
1	5935.32	6187.36	1'	6162.63	6414.67
2	5945.20	6197.24	2'	6152.75	6404.79
3	5955.08	6207.12	3'	6142.87	6394.91
4	5964.97	6217.01	4'	6132.98	6385.02
5	5974.85	6226.89	5'	6123.10	6375.14
6	5984.73	6236.77	6'	6113.22	6365.26
7	5994.62	6246.66	7'	6103.33	6355.37
8	6004.50	6256.54	8'	6093.45	6345.49
9	6014.38	6266.42	9'	6083.57	6335.61
10	6024.27	6276.31	10'	6073.68	6325.72
11	6034.15	6286.19	11'	6063.80	6315.84
12	6044.03	6296.07	12'	6053.92	6305.96
13	6053.92	6305.96	13'	6044.03	6296.07
14	6063.80	6315.84	14'	6034.15	6286.19
15	6073.68	6325.72	15'	6024.27	6276.31
16	6083.57	6335.61	16'	6014.38	6266.42
17	6093.45	6345.49	17'	6004.50	6256.54
18	6103.33	6355.37	18'	5994.62	6246.66
19	6113.22	6365.26	19'	5984.73	6236.77
20	6123.10	6375.14	20'	5974.85	6226.89
21	6132.98	6385.02	21'	5964.97	6217.01
22	6142.87	6394.91	22'	5955.08	6207.12
23	6152.75	6404.79	23'	5945.20	6197.24
24	6162.63	6414.67	24'	5935.32	6187.36

Table A-19 FCC L6 GHz Band: 5925 to 6425 MHz
(Bandwidth: 30 MHz, TX-RX frequency spacing: 252.04 MHz)

Bandwidth 30 MHz
Shift Freq. 252.04 MHz

Low Band			High Band		
CH	**TX**	**RX**	**CH**	**TX**	**RX**
1	5945.20	6197.24	1'	6197.24	5945.20
2	5974.85	6226.89	2'	6226.89	5974.85
3	6004.50	6256.54	3'	6256.54	6004.50
4	6034.15	6286.19	4'	6286.19	6034.15
5	6063.80	6315.84	5'	6315.84	6063.80
6	6093.45	6345.49	6'	6345.49	6093.45
7	6123.10	6375.14	7'	6375.14	6123.10
8	6152.75	6404.79	8'	6404.79	6152.75

Note: *(*) The RX frequency can be assigned to any frequency values independently of the TX frequency in case of the SHIFT FREQUENCY ≥ 250 MHz.*

15. U6 GHz Band (ALL INDOOR TRP)

Table A-20 FCC U6 GHz Band: 6525 to 6875 MHz
SRSP U6 GHz Band: 6425 to 7125 MHz
(Bandwidth: 10 MHz, TX-RX frequency spacing: 160 MHz)

Bandwidth 10 MHz
Shift Freq. 160 MHz

Low Band			High Band		
CH	TX	RX	CH	TX	RX
1	6545	6715	1'	6535	6575
2	6555	6725	2'	6705	6865
3	6565	6735	3'	6695	6855
4	6585	6745	4'	6685	6845
5	6595	6755	4'	6675	6835
6	6605	6765	1'	6665	6825
7	6615	6775	2'	6655	6815
8	6625	6785	3'	6645	6805
9	6635	6795	4'	6635	6795
10	6645	6805	5'	6625	6785
11	6655	6815	6'	6615	6775
12	6665	6825	7'	6605	6765
13	6675	6835	8'	6595	6755
14	6685	6845	9'	6585	6745
15	6695	6855	10'	6565	6735
16	6705	6865	11'	6555	6725
17	6535	6575	12'	6545	6715

16. 11 GHz Band (ALL INDOOR TRP)

Table A-21 FCC 11 GHz Band: 10700 MHz to 11700 MHz
(Bandwidth: 10 MHz, TX-RX frequency spacing: 490 (500) MHz)

Bandwidth 10 MHz
Shift Freq. 490/500 MHz

Low Band			High Band		
CH	TX	RX	CH	TX	RX
1	10705	11205	1'	11195	11695
2	10715	11215	2'	11185	11685
3	70725	11675	3'	11175	11665
4	10735	11225	4'	11165	11655
5	10745	11235	5'	11155	11645
6	10755	11245	6'	11145	11635
7	10765	11255	7'	11135	11625
8	10775	11265	8'	11125	11615
9	10785	11275	9'	11115	11605
10	10795	11285	10'	11105	11595
11	10805	11295	11'	11095	11585
12	10815	11305	12'	11085	11575
13	10825	11315	13'	11075	11565
14	10835	11325	14'	11065	11555
15	10845	11335	15'	11055	11545
16	10855	11345	16'	11045	11535
17	10865	11355	17'	11035	11525
18	10875	11365	18'	11025	11515
19	10885	11375	19'	11015	11505
20	10895	11385	20'	11005	11495
21	10905	11395	21'	10995	11485
22	10915	11405	22'	10985	11475
23	10925	11415	23'	10975	11465
24	10935	11425	24'	10965	11455
25	10945	11435	25'	10955	11445
26	10955	11445	26'	10945	11435
27	10965	11455	27'	10935	11425
28	10975	11465	28'	10925	11415
29	10985	11475	29'	10915	11405
30	10995	11485	30'	10905	11395
31	11005	11495	31'	10895	11385
32	11015	11505	32'	10885	11375
33	11025	11515	33'	10875	11365
34	11035	11525	34'	10865	11355
35	11045	11535	35'	10855	11345

Table A-21 FCC 11 GHz Band: 10700 MHz to 11700 MHz
(Bandwidth: 10 MHz, TX-RX frequency spacing: 490 (500) MHz)

Bandwidth 10 MHz
Shift Freq. 490/500 MHz

Low Band			High Band		
CH	TX	RX	CH	TX	RX
36	11055	11545	36'	10845	11335
37	11065	11555	37'	10835	11325
38	11075	11565	38'	10825	11315
39	11085	11575	39'	10815	11305
40	11095	11585	40'	10805	11295
41	11105	11595	41'	10795	11285
42	11115	11605	42'	10785	11275
43	11125	11615	43'	10775	11265
44	11135	11625	44'	10765	11255
45	11145	11635	45'	10755	11245
46	11155	11645	46'	10745	11235
47	11165	11655	47'	10735	11225
48	11175	11665	48'	70725	11675
49	11185	11685	49'	10715	11215
50	11195	11695	50'	10705	11205

Table A-22 FCC 11 GHz Band: 10700 MHz to 11700 MHz
(Bandwidth: 30 MHz, TX-RX frequency spacing: 490 (500) MHz)

Bandwidth 30 MHz
Shift Freq. 490/500 MHz

Low Band			High Band		
CH	TX	RX	CH	TX	RX
1	10715	11215	1'	11215	10715
2	10755	11245	2'	11245	10755
3	10795	11285	3'	11285	10795
4	10835	11325	4'	11325	10835
5	10875	11365	5'	11365	10875
6	10915	11405	6'	11405	10915
7	10955	11445	7'	11445	10955
8	10995	11485	8'	11485	10995
9	11035	11525	9'	11525	11035
10	11075	11565	10'	11565	11075
11	11115	11605	11'	11605	11115
12	11155	11645	12'	11645	11155
13	11185	11685	13'	11685	11185

Note: *(*) The RX frequency can be assigned to any frequency values independently of the TX frequency in case of the SHIFT FREQUENCY ≥ 490 MHz.*

ANNEX-1
FD SYSTEM CHANNEL ALLOCATION

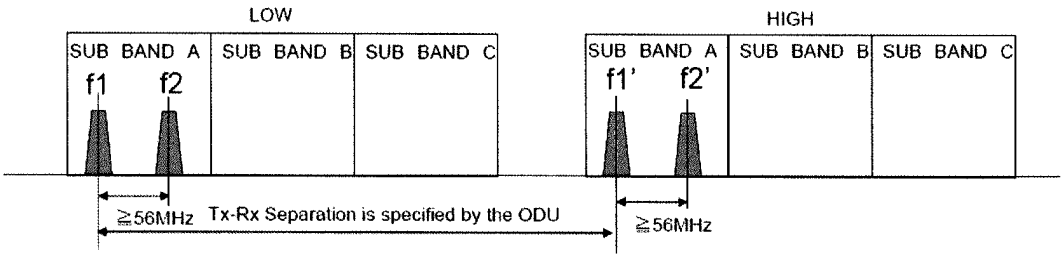
For FD (frequency diversity) system, following frequency allocation rules should be applied.

A. 6-38GHz* band Adjacent Channel Co-Polarization

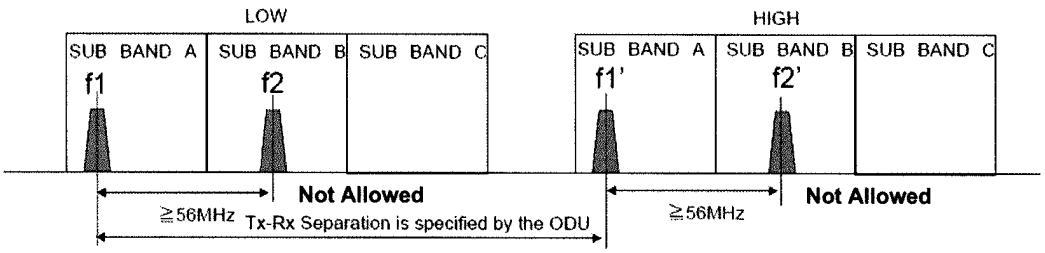
[SUB BAND of TRP]

For Co-polarization, Min. TX-Rx Separation frequency should be 56 MHz or more.

Need to allocate two frequencies within same sub-band as shown below.



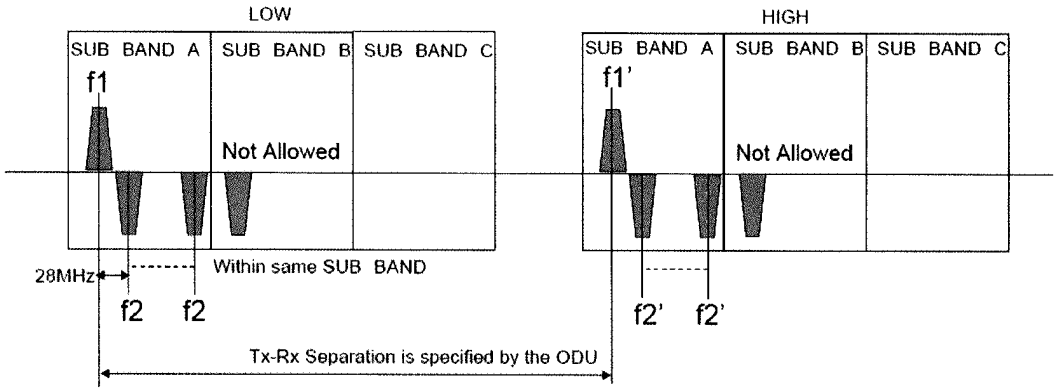
Assigning each frequency to different sub-band, is NOT allowed, example of how not to assign is shown below.



B. 6-38GHz* band Adjacent Channel Alternative Polarization.

[SUB BAND of TRP]

For Alternative Polarization, Min. TX-Rx Separation frequency should be 28 MHz or more.
Need to allocate two frequencies within same sub-band as shown below and not assign to different sub-band.



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