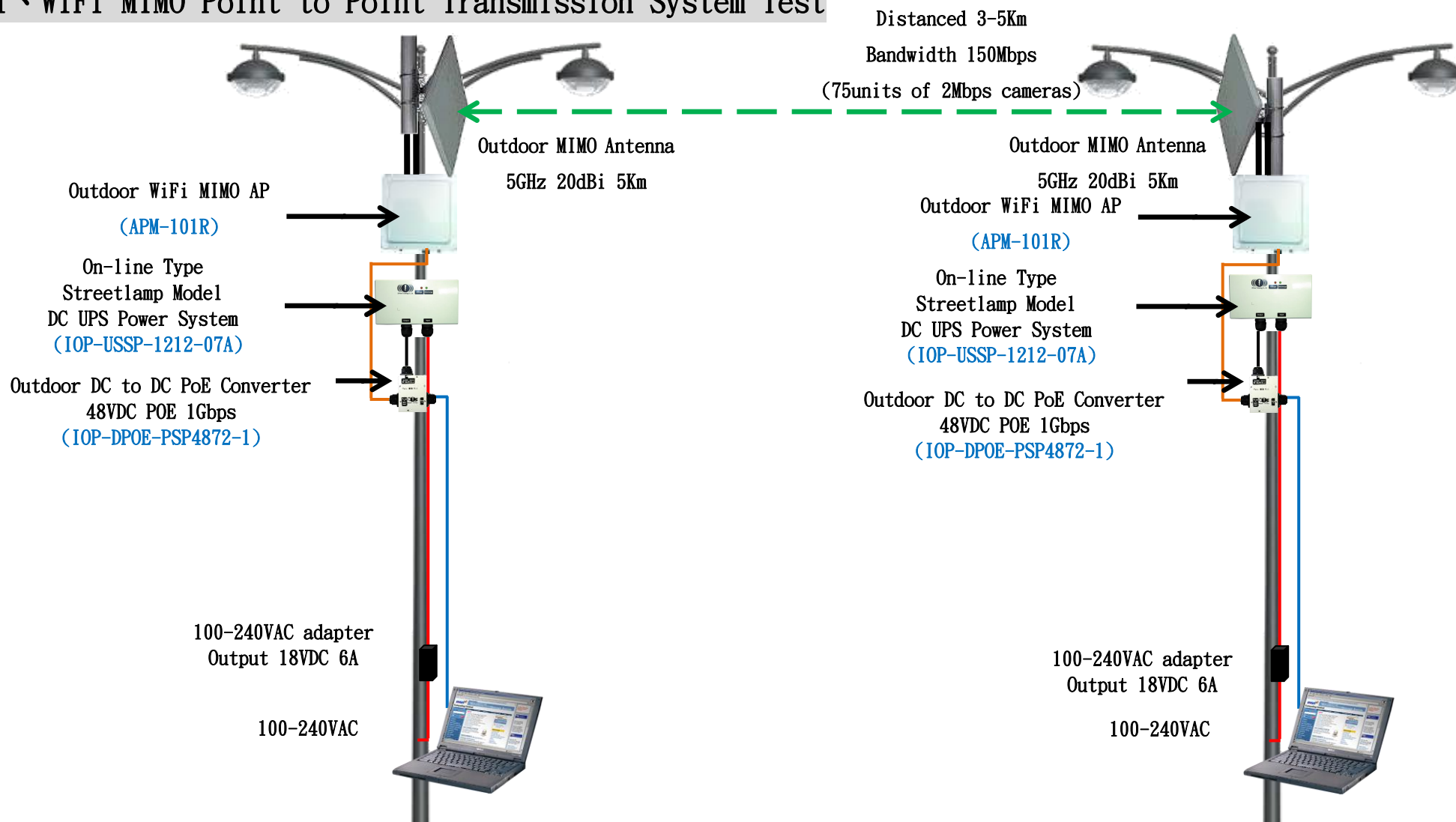




Outdoor WiFi MIMO Point to Point Transmission System with 『Outdoor Streetlamp Model DC UPS Power System』

1、WiFi MIMO Point to Point Transmission System Test





2、Outdoor WiFi MIMO Point to Point Transmission System with 『Outdoor Streetlamp Model DC UPS Power System』

Outdoor WiFi MIMO Point to Point Transmission System with 『Outdoor Streetlamp Model DC UPS Power System』 System Design

1. Device power consumption:

- 1-1. Outdoor WiFi MIMO AP: APM-101R- 7W/H
- 1-2. 12VDC to 48VDC PoE: 1W/H (for AP)

2. 4 hours of backup time when the electricity is out of service:

- 2-1. Outdoor WiFi MIMO AP and PoE converter
 $7+1=8\text{W/H}$, $8\text{W/H} \times 16\text{H}=128\text{W}$

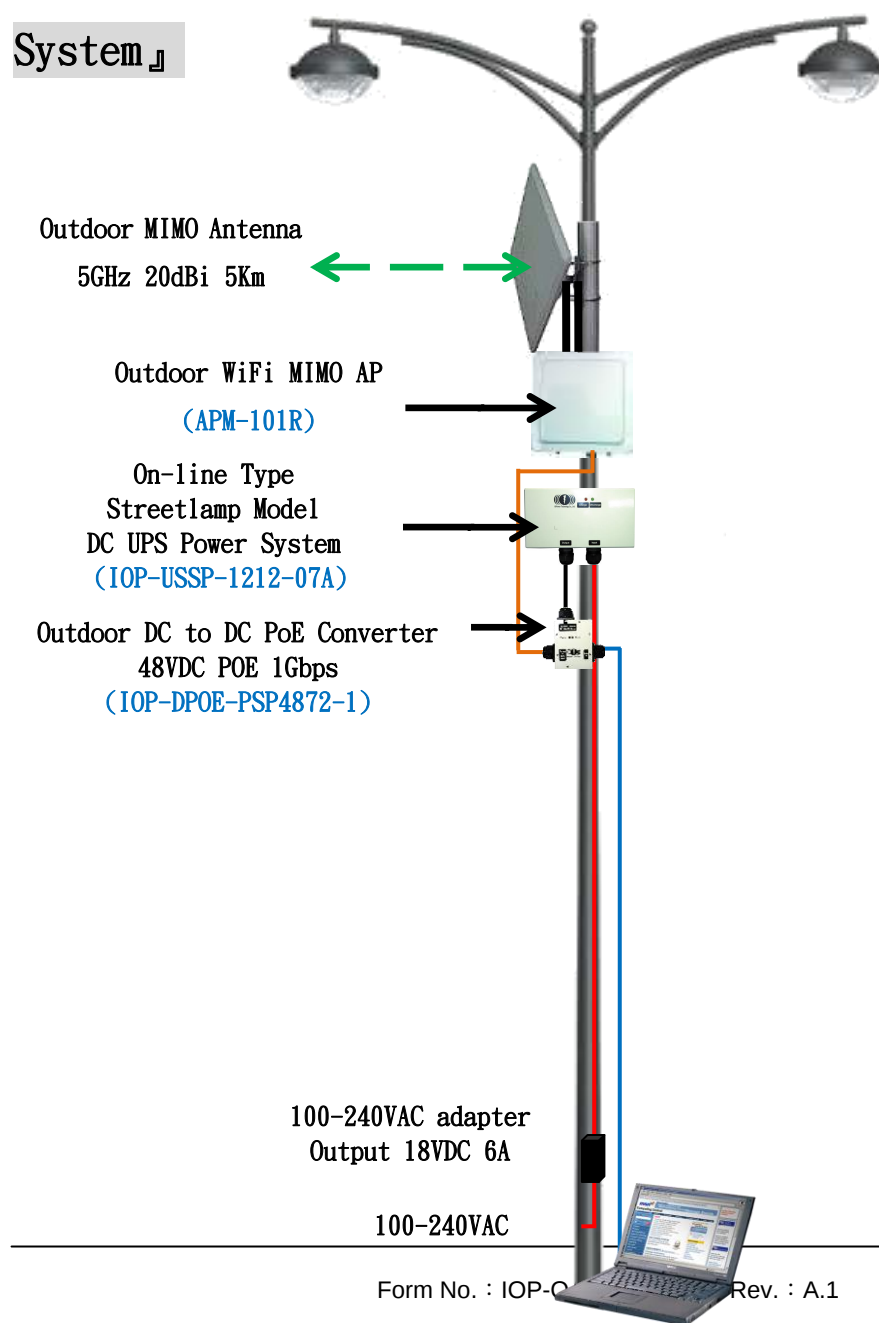
Suggestion: DC UPS: IOP-USSP-1212-07A 148WH (11.6Ah @ 12.8V)

3. System Construction:

- 3-1. Power is supplied by Streetlamp Model DC UPS Power system at daytime, and by streetlamp power(grid power) at night time and charge the battery at the same time.
- 3-2. when the grid power is out of service at nighttime, Streetlamp Model DC UPS Power System can still supply more than 4 hours.
- 3-3. Outdoor DC UPS series can stabilize the voltage, arrest the surges and lower the electricity interferences to the device.
- 3-4. According to real-outdoor environment test, after 1700 times of charge and discharge cycles, the power capacity remain more than 90%.

4. Installation Construction:

- 4-1. Find the 220-240VAC power line from the streetlamp.
- 4-2. Install a distribution box with sockets, and connect the power line.
- 4-3. Put 『Dc UPS Power System 』 into distribution box, and plug in the adapter.
- 4-4. plug in the adapter DC connector to 『DC UPS』 (Input).
- 4-5. plug one DC connector to DC UPS (output) and to 『12VDC to 48VDC PoE Converter』 and supply for Outdoor WiFi MIMO AP.





3、Streetlamp Model DC UPS Installation Instruction

3-1. Streetlamp Power



Output
93VAC/3A
220VAC/1.2A

B

A



220VAC
Power

Sodium Lamp Ballast
(SLB)

Power is supplied to
the lamp via the ballast

Sodium Lamp Ballast (SLB)
Input: 220VAC / 1.3A, 280W (Max)
Output: 3A (Max)

Power Company to streetlamp
(Streetlamp power supply controller)
Input 220~240VAC



Streetlamp Power Obtaining Instruction:

Obtaining from A (before SLB and after electric meter): Use 『No-Fuse Breaker』 or 『socket』 or 『cabling connecting』. The disadvantage is to receive the surges when power is on. And the advantage is no need to go through SLB and is able to protect SBL from surges.

Obtaining from B (after SLB): Need to consider if the power supply from 『SLB』 is enough. Use Use 『No-Fuse Breaker』 or 『socket』 or 『cabling connecting』. The disadvantage is unable to protect SLB and need to think about the power supply. The advantage is that the power via SLB is much more stable.

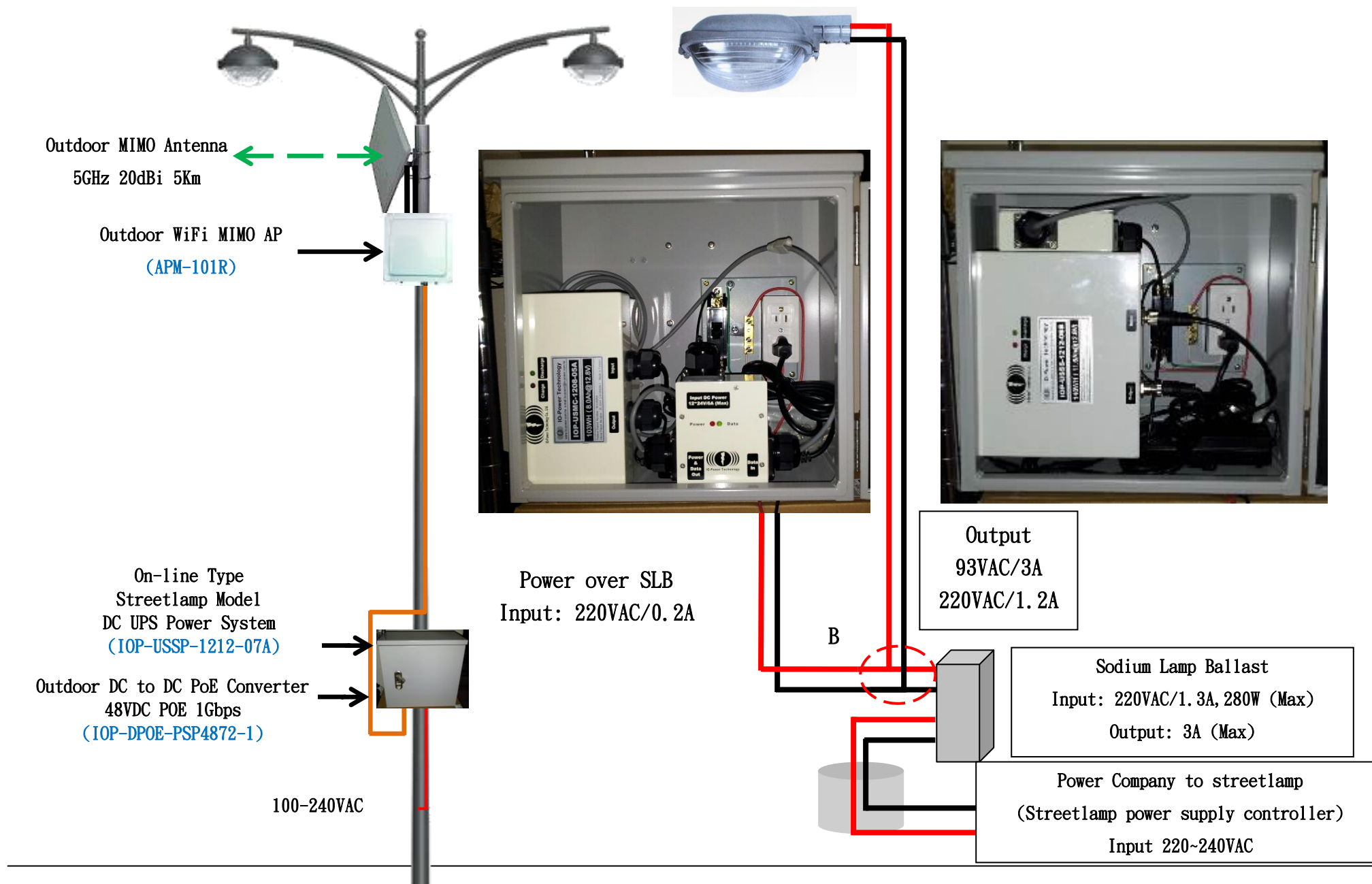


3-2. Distribution Box Installation





3-3. Streetlamp Model DC UPS Power System Installation





3-4. Analysis on Streetlamp Model DC UPS power consumption and streetlamp power supply

Obtaining from A (after electric meter):

Outdoor DC UPS power consumption (Max) when charging: $18\text{VDC} * 3\text{A} * 85\% = 45.9\text{W} \Rightarrow 45.9\text{W}/220\text{V} = 0.2\text{A}$

Conclusion: It does not influence the streetlamp power system much.

Obtaining from B (after SLB):

Power over SLB (Sodium Lamp Ballast): $220\text{VAC} / 1.3\text{A}, 280\text{W (Max)}$

The power supply over SLB is 280W (Max)

Outdoor DC UPS power consumption (Max) when charging: $18\text{VDC} * 3\text{A} * 85\% = 45.9\text{W} \Rightarrow 45.9\text{W}/220\text{V} = 0.2\text{A}$

Surplus of power for streetlamp (sodium lamp): $280\text{W} - 45.9\text{W} = 234.1\text{W}$

There are many kinds of power consumption of 『sodium lamp』, including 400W, 300W, 250W, 200W, 125W, 100W, 60W...

Conclusion: If the 『sodium lamp』 is over 200W and use Outdoor DC UPS power system, the power may be not enough.

Therefore, you have to confirm the power supply of 『SLB』 and the power consumption of 『sodium lamp』, and then you may know if it is okay to obtain power from B.



4、Estimated Installation Device and Quantity

No.	Device Name	Device Model	Main SPEC	Quantity	Remark
1	Wireless WiFi MIMO AP -(Control Center) -(Surveillance Side)	APM-101R (1 module) (normal power) 	1. One MIMO 2*2 RF Module (802.11a/b/g/n) 2. System Operation Mode: Bridge 3. Output Power : 21dBm (Max) 4. Multiple Hops 5. Bandwidth Throughput : 320Mbps (@40MHz) 6. >= 4Hops Throughput 120Mbps	2	
2	Outdoor WiFi MIMO 5GHz 20dBi Dual Linear Panel Antenna	IOP-PANFO-5M2001010 	1. Frequency: 5150 - 5875 MHz 2. Gain: 20dBi 3. VSWR: 2:1 4. Polarization : Dual Linear +- 45° 5. N-Type Jack * 2	2	
3	Antenna RF Cable	IOP-RFCFD-400150NMR 	1. Connector: N-type Plug to N-type Plug 2. Cable Loss: <48dB/100m @5800MHz 3. Temp: - 40 ~ + 85°C 4. Length: 1.5 M	4	
4	Rainproof Self-bonding Tape	IOP-RMTOC-173830510B 	1. Thickness: 1.7mm ± 0.5mm 2. Elongation: 1000% 3. Adhesion: Detachment < 2cm 4. Breaking Strength: >2kg 5. Water Absorption: <0.2%	2	
5	Outdoor 12VDC to 48VDC PoE Converter	IOP-DPOE-PSP4872-1	1. Input voltage: 12~24VDC (28V Max) 2. Input current: 12VDC 6A Max / 24VDC 3A Max	2	



			3. Output PoE voltage/ current : 48VDC / 1.5A Max (max 72W) 4. 10/100/1000Mbps (1Gbps) 5. Cate 5e, 6e, 7e 6. compatible with IEEE802.3 / 802.3u / 802.3at / 802.3at PoE Passive 7. Ingress Protection: IP67		
6	Streetlamp Model DC UPS Power System	IOP-USSP-1212-07A 	1. outdoor large currents equipment Street lamp power system/IP67 industrial M12 connector/aluminum shell 2. Battery type: lithium iron phosphate batteries 3. Power Capacity : 148WH (11.6Ah @ 12.8V) 4. .Load voltage/current: DC 11.5~14.4V+-3% 6A Max 5. Battery charging voltage: 14.4V+-3%	2	Using Streetlamp Model DC UPS power system can supply more than 4 hours of backup working time after grid power is out of service.



5、Device Types and SPEC

IO-Power USSP-12V0712-II Series Indoor / Outdoor Street Lamps Model Online Type Uninterruptible Operation Power System

IOP-USSP-12V0712-II SPEC (*with patent)

Model	IOP-USSP-1207-04A	IOP-USSP-1208-05A	IOP-USSP-1210-06A	IOP-USSP-1212-07A
Outdoor Model M12 Connector Aluminium Radiating Airtight Housing IP 67				
Power Capacity	88 WH (6.9Ah@12.8V)	103 WH (8.05Ah@12.8V)	117 WH (9.2Ah@12.8V)	148 WH (11.6Ah@12.8V)
AC to DC Adapter Input AC Voltage Output DC Voltage	100-240V/1.5A 50/60Hz 18V/3A Max			
DC to DC for Device	DC 11.5V~14.4V +-3% 3A Max			
DC to DC for Battery	14.4V +-3% 1.5~2.4A Max			
Transform Efficiency	90%~			
Protection	On Line Working System Non Stop Standby Consume Protection* Standby Consume Protection* Balance Voltage Function*			



	Overload Protection Overcharge Protection Over discharge Protection Over current Protection Short circuit Protection			
Support Battery Type	C-LiFePO4 Lithium Batteries			
Battery Capacity	6.9Ah @ 12.8V (88WH)	8.05Ah @ 12.8V (103WH)	9.2Ah @ 12.8V (117WH)	11.6Ah @ 12.8V (148WH)
Battery Charge Mode	CCP/CVP MCU Control			
Battery Charge Voltage	14.4V +- 3%			
Battery Charge Float Voltage	13.6V +- 3%			
Battery Cut-off Discharge Voltage	11.5V +- 3%			
Battery recovery discharge voltage	12.4V +- 3%			
Standard Charge Current	1.8A			
Standard Discharge Current	1.5A			
Max. Discharge Current	3A			
Charging Time @95% Capacity	Non discharge 5hrs On line discharging 7hrs	Non discharge 6hrs On line discharging 8hrs	Non discharge 7hrs On line discharging 10hrs	Non discharge 8hrs On line discharging 12hrs
Battery Cycle Life (80% Capacity) 0.2C Charging 0.5C Discharge	@ 25 °C 2000 Times (@25°C , after 800 Times, power capacity over 93%. @25°C, after 1100 Times, power capacity over 90%) @45°C 1600 Times @50°C 1200 Times @60°C 550 Times @60°C 720 Times (70% power capacity left)			
Industrial Housing & Connector	Iron Airtight Housing			



	IP 67 Gland Connector			
Connector Type	1.Input: 100~240V Adapter AC Plug & DC Jack 2.Output:12V/DC Jack Female			
Operating Temperature (Discharge)	-20 °C ~ 60 °C 20~40 °C Battery Capacity:100% -10 °C Battery Capacity : 60% -20 °C Battery Capacity : 48%			
Charging Temperature	-30 °C ~ 60 °C			
Storage Temperature	-20 °C ~ 40 °C			
Rel. Humidity	10~95%RH			
Storage Time	6 months (Please every three months charge one time) (Before the Use, please First Charge)			
Dimension	209(L)x109(W)x150mm(H)	209(L)x109(W)x150mm(H)	209(L)x109(W)x150mm(H)	209(L)x109(W)x150mm(H)
Weight	2.3Kg (Box 3.1Kg) (3Pcs/Carton)	2.5Kg (Box 3.3Kg) (3Pcs/Carton)	2.7Kg (Box 3.5Kg) (3Pcs/Carton)	2.9Kg (Box 3.7Kg) (3Pcs/Carton)
LED Indicator	1. Input AC power LED-red full light (Battery capacity more than 95%) 2. Input AC power LED-red flash light (Battery is charging) 3. Battery is charging, Insert the 12V device load, LED-green flash light 4. Battery non charging, Insert the 12V device load, LED-green full light			
Housing	IP66			
Approvals	CE FCC			
Installation	1.Street lamp pole mount 2.Upright pole mount 3.Wall mount installation 4.DIN Rail (Optional)			
Warranty	12 months			
Carton Size	490*340*155mm	490*340*155mm	490*340*155mm	490*340*155mm

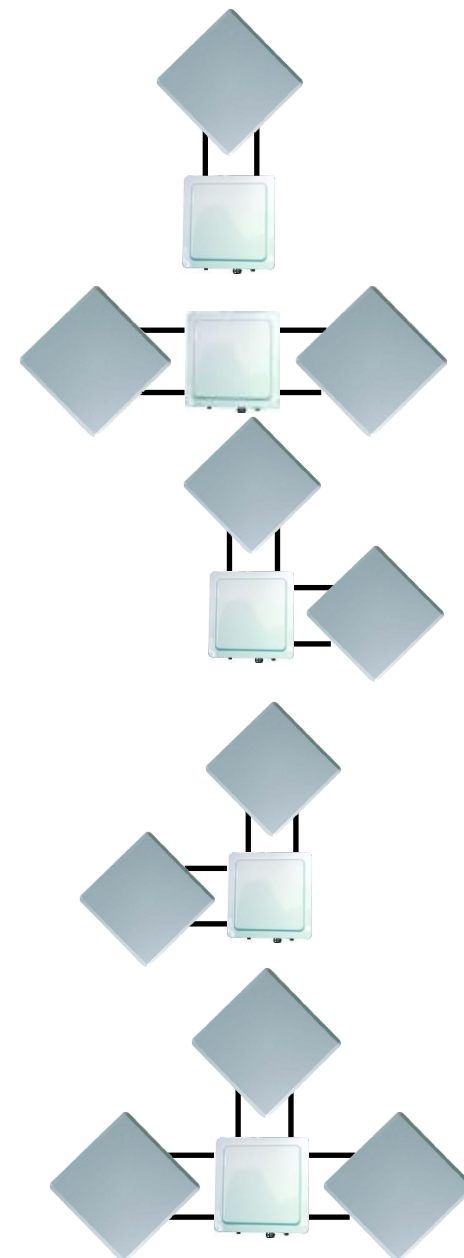
Ps 1: Battery Capacity +-5%

Ps 2: Product specifications change, without notice, consultation with agent or dealer before buying the latest specifications



Outdoor WiFi MIMO AP R(H) Series

Product Image	Model	APM-101R (H)	APM-102R (H)	APM-103R (H)
	Rear Side			
	Top of Antenna Connector			
	Below of Antenna Connector			
	Front Side			





Product Specifications

Hardware Specification

Key Components	
Main Processor	Atheros AR7161(680Mhz)
Wireless Chipset	Atheros AR9220 based miniPCI module, Up to three modules
Switch Controller	Atheros AR8035 / Atheros AR8021
Flash Memory	16MBytes
SDRAM	64MBytes(Up to 128MBytes)
Console	UART x 1(PCBA onboard)

Interfaces	
Wireless	Up to three 2x2 MIMO radios, mini-PCI version 1.0 type 3A Frequency ranges : a. USA : 2.400 ~ 2.483 GHz, 5.15 ~ 5.35 GHz, 5.5 ~ 5.7 GHz, 5.725 ~ 5.825 GHz b. Europe: 2.400 ~ 2.483 GHz, 5.15 ~ 5.35 GHz, 5.47 ~ 5.725 GHz



c. Japan: 2.400 ~ 2.497 GHz, 5.15 ~ 5.35 GHz, 5.47 ~ 5.725 GHz

d. China: 2.400 ~ 2.483 GHz, 5.725 ~ 5.85 GHz

RF output power of DNMA-92 :

a. IEEE802.11a

1. 21dBm@6M(all) 17dBm@54M(5180MHz) 16dBm@54M(5825MHz)

b. IEEE802.11b

1. 20dBm@1M(2412MHz) 19dBm@1M(2484MHz) 21dBm@11M(all)

c. IEEE802.11g

1. 23dBm@6M(all) 19dBm@54M(all)

d. IEEE802.11a/n HT20

1. 21dBm@MCS0/8(5180MHz) 19dBm@MCS0/8(5825MHz)

2. 16dBm@MCS7/15(5180MHz) 14dBm@MCS7/15(5825MHz)

e. IEEE802.11a/n HT40

1. 19dBm@MCS0/8(5190MHz) 18dBm@MCS0/8(5795MHz) 13dBm@MCS7/15(all)

f. IEEE802.11g/n HT20

1. 21dBm@MCS0/8(all) 17dBm@MCS7/15(all)

g. IEEE802.11g/n HT40

1. 21dBm@MCS0/8(2422MHz) 20dBm@MCS0/8(2462MHz)



	2. 16dBm@MCS7/15(all) Receive Sensitivity of DNMA-92 : a. IEEE802.11a 1.-82dBm@6M, 1Rx -95/-91dBm@6M, 2Rx 2. -65dBm@54M, 1Rx -79/-75dBm@54M, 2Rx b. IEEE802.11b 1.-82dBm@1M, 1Rx -95/-91dBm@1M, 2Rx 2. -76dBm@11M, 1Rx -91/-87dBm@11M, 2Rx c. IEEE802.11g 1.-82dBm@6M, 1Rx -95/-91dBm@6M, 2Rx 2. -65dBm@54M, 1Rx -80/-76dBm@54M, 2Rx d. IEEE802.11a/n HT20 1.-82dBm@MCS0, 1Rx -95/-91dBm@MCS0, 2Rx 2. -64dBm@MCS7, 1Rx -77/-73dBm@MCS7, 2Rx e. IEEE802.11a/n HT40 1.-79dBm@MCS0, 1Rx -91/-87dBm@MCS0, 2Rx 2. -61dBm@MCS7, 1Rx -74/-70dBm@MCS7, 2Rx f. IEEE802.11g/n HT20 1.-82dBm@MCS0, 1Rx -95/-91dBm@MCS0, 2Rx 2. -64dBm@MCS7, 1Rx -77/-73dBm@MCS7, 2Rx g. IEEE802.11g/n HT40 1.-79dBm@MCS0, 1Rx -90/-86dBm@MCS0, 2Rx 2. -61dBm@MCS7, 1Rx -74/-71dBm@MCS7, 2Rx
Ethernet	10/100/1000 Base-TX MDI/MDIX RJ-45 x 1 Compliant with :



	a. IEEE802.3 / 802.3u / 802.3at Hardware based 10/100/1000, full/half, flow control auto negotiation
Connector	101R 2 x N-type(1 radio) 102R 4 x N-type(2 radios) 103R 6 x N-type(3 radios)
Power Requirement	48V 1A PoE Support Gigabit Ethernet Link
Watch Dog	Hardware Watch Dog

Physical	
Dimensions	220 x 220 x 77 mm
Weight	101R/101RH—1.8Kg 102R/102RH—1.9Kg 103R/103RH—2.0Kg 2.0kg (3.7kg mount kit included)

Environmental	
Temperature Range	-20°C~70°C



Humidity	0% ~ 95% Non-condensing
Storage	-40~ 85°C
Dusty & Waterproof	Outdoor IP67 rated

Regulatory	
Certification	FCC, CE Processing (will announce in 2012/1)
Safety	Processing

Software Specification

System Operation	
Bridge Mode	Layer 2 Switching Learning Technology
	Store-and-Forward
	Spanning Tree Protocol - IEEE 802.1d STP / IEEE 802.1w RSTP / IEEE 802.1s MSTP
	Static IP / Dynamic IP
	DHCP server / client



	Multicast / Broadcast Storm Limitation
	IEEE 802.1q Tag VLAN
	IEEE 802.1p VLAN Priority Based QoS

Network Interface	
Wireless	IEEE 802.11 a/b/g/n 2.4GHz / 5GHz Dual Band Radio
	2 x 2 MIMO Technology
	Single Radio / Dual Radios / Triple Radios
	AP mode / Client mode / WDS mode
	IEEE 802.11h DFS
	WMM QoS
	Channel / Tx Power / Data Rate / Max Distance Adjustable
	Advanced Wireless Parameters Adjustable



	Multi-SSIDs / VLAN tags mapping(Up to 16 x ESSIDs for each radio)
	Wireless Site Survey
	Node Information
	Concurrent Connected Node Limitation
	Client User Isolation
Wire	48V 1A PoE Support Gigabit Ethernet Speed
	Ethernet Link Speed Configurable
	10/100/1000 Base-TX MDI/MDIX RJ-45

Performance		
Wireless	TCP	Up to 180Mbps for one radio to Ethernet
To		Up to 320Mbps for two radios to Ethernet
Wire		Up to 320Mbps for three radios to Ethernet



	UDP	Up to 240Mbps for one radio to Ethernet
		Up to 350Mbps for two radios to Ethernet
		Up to 350Mbps for three radios to Ethernet
	PPS	>= 20,000@short packet for one radio to Ethernet
		>= 28,000@short packet for two radios to Ethernet
		>= 28,000@short packet for three radios to Ethernet
	Latency	< 5ms
Multiple Hops	2 hops	Up to 160Mbps
	3 hops	Up to 150Mbps
	>= 4hops	Up to 140Mbps
	PPS	>= 20,000@short packet at multiple hops
	Latency	< 10ms



Security

Hide SSID(turn off ESSID broadcasting)

MAC Address ACL

WEP 64/128/152 bits

IEEE 802.1x EAP-MD5 / EAP-TLS / EAP-TTLS

WPA / WPA2 PSK / EAP with TKIP / CCMP AES based Encryption

Management

HTTP(s) WEB GUI

Telnet

SSH

Console(optional interface)

CLI commands

SNMP v2c/v3, standard / private MIBs



Syslog
Management VLAN Tag
NTP Client
Firmware upgrade / downgrade
Dual Images
Dual Configuration files / Factory Default
Multiple Level Management

Advanced Technology	
Multiple Hopping	Up to 10 hops with more than 120Mbps throughput
	Configurable Max. Hop Counts(default 20 hops)



IOP-PANFO-5M2001010

5GHz 20dBi Dual Polarization MIMO Panel Antenna

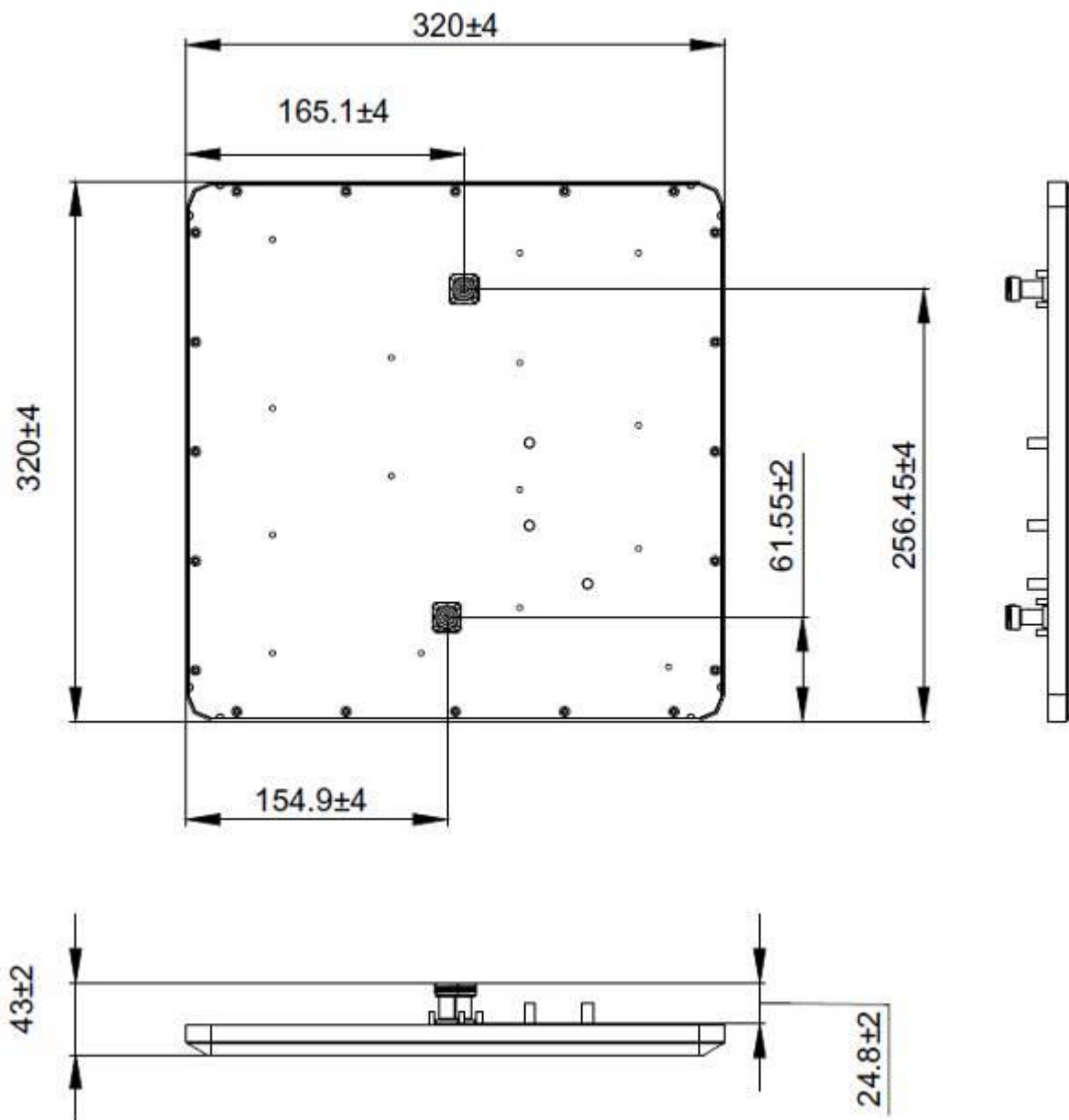
Electrical Specification	
Frequency range	5150 - 5875 MHz
Gain	20 dBi
VSWR	2 : 1 Max.
Polarization	Dual Linear, +- 45°
HPBW / Horizontal	10°
HPBW / Vertical	10°
Standard compliance	N / A
Front to back ratio	-30dB (Max)
Isolation	24dB (Min)
Power handing	6W (cw)
Impedance	50 Ohms
Connector	N Jack × 2





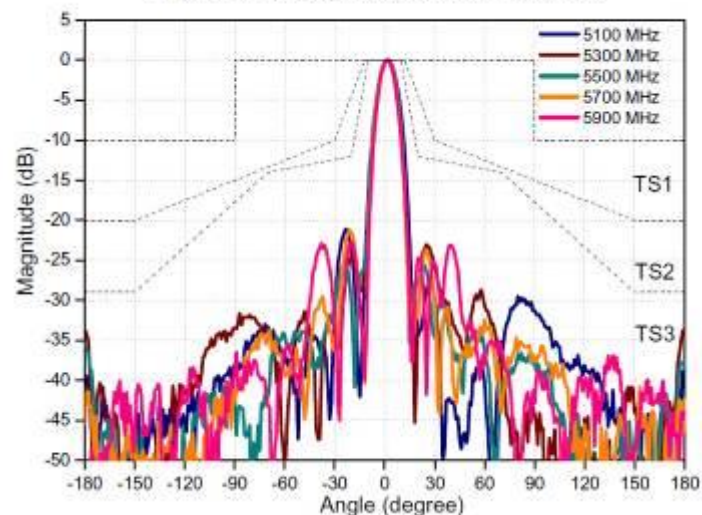
Environmental & Mechanical Characteristics	
Survival wind speed	216Km/hr
Temperature	-40°C to +80°C
Humidity	95% @ 55°C
Lightning protection	DC ground
Radome color	Gray
Radome material	PC, UV resistant
Weight	1245g
Dimensions	320 × 320 × 20 mm
Waterproof	IP-67
Mounting kit	Pole mount & Wall mount

*exclusive of mounting kit

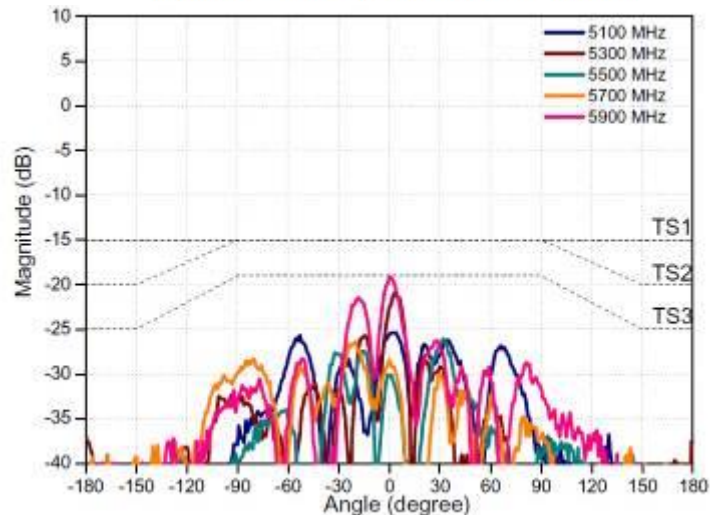




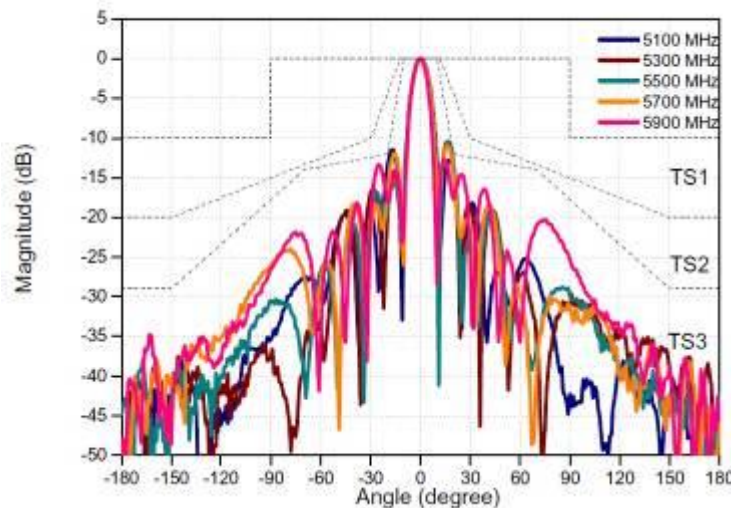
V-plane Co-polarization Pattern



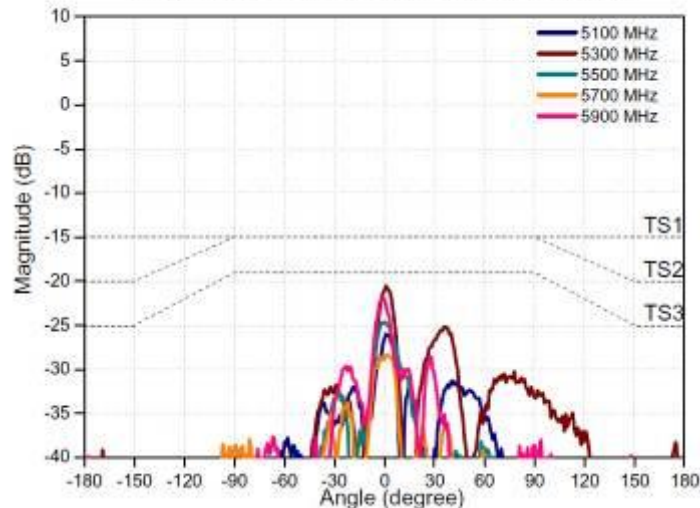
V-plane Cross-polarization Pattern



H-plane Co-polarization Pattern



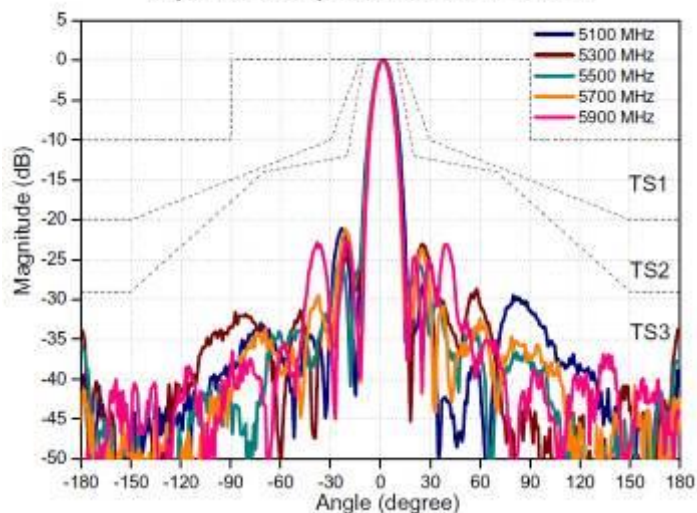
H-plane Cross-polarization Pattern



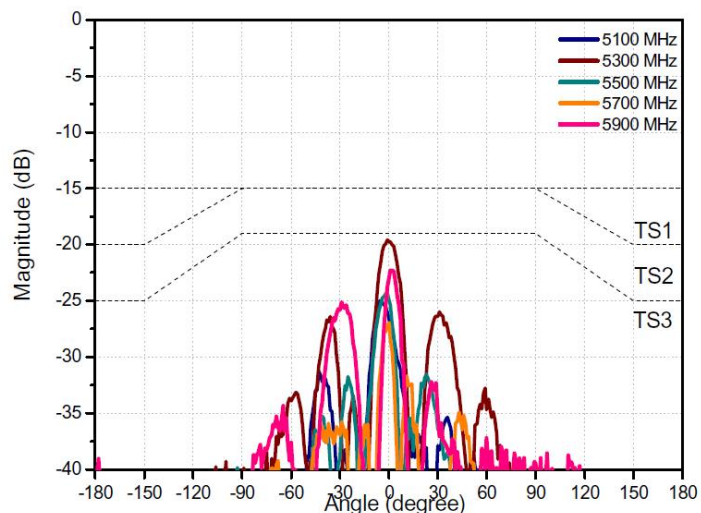


Port 2

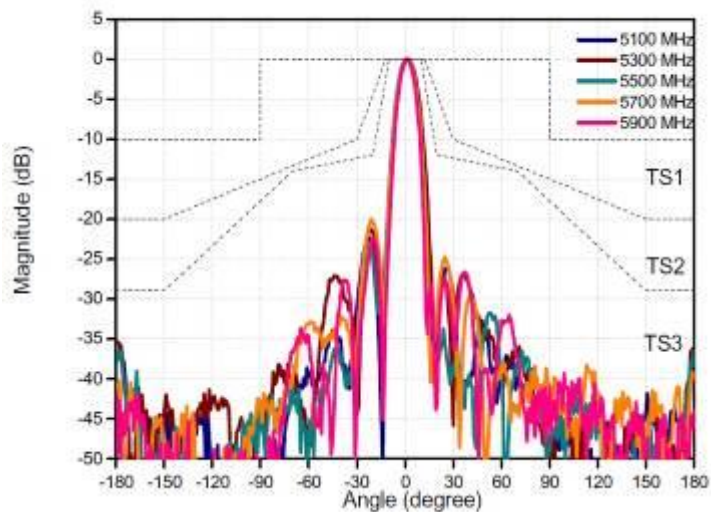
V-plane Co-polarization Pattern



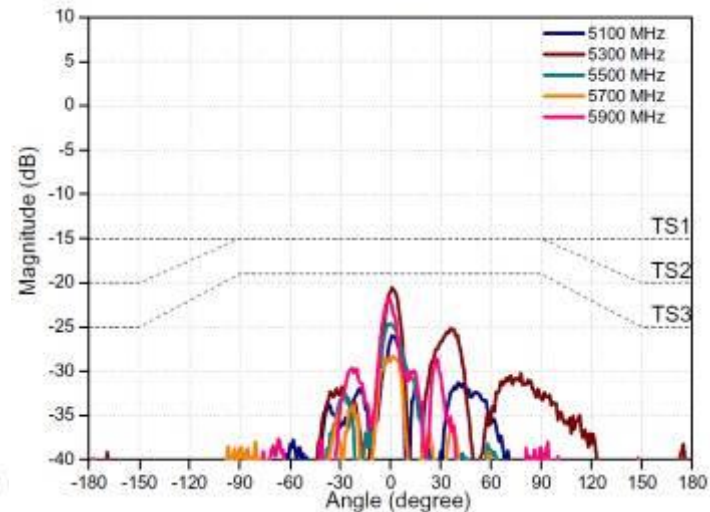
V-plane Cross-polarization Pattern



H-plane Co-polarization Pattern



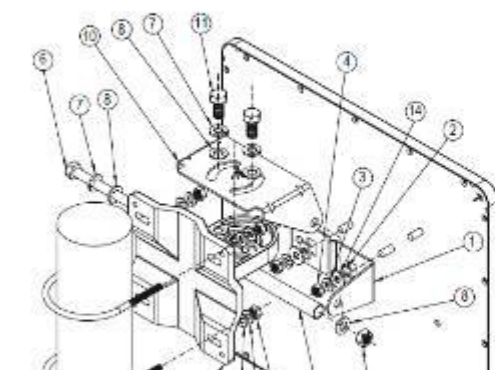
H-plane Cross-polarization Pattern





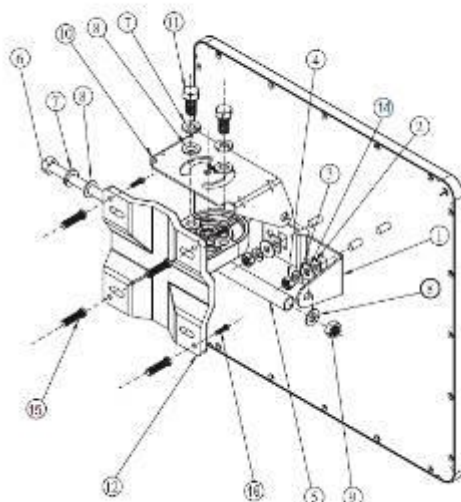
Pole Mount

Slant+45 Degree Polarization

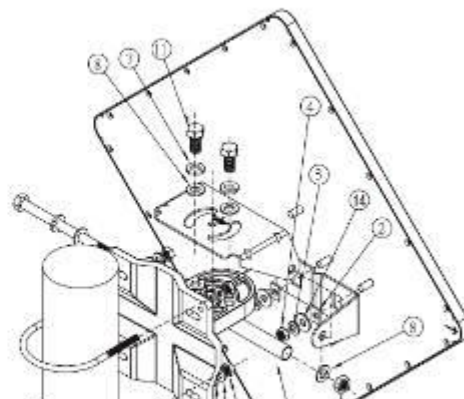


Wall Mount

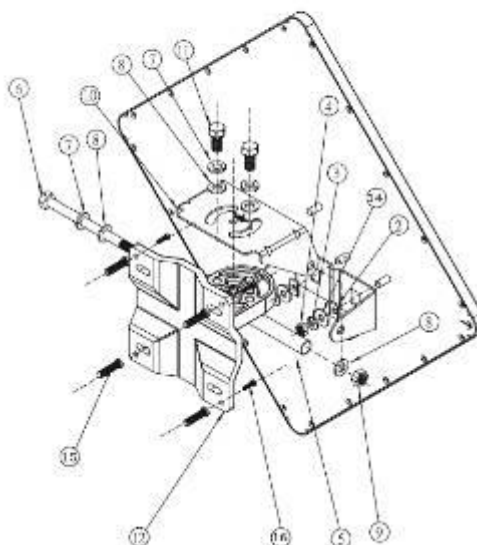
Slant+45 Degree Polarization



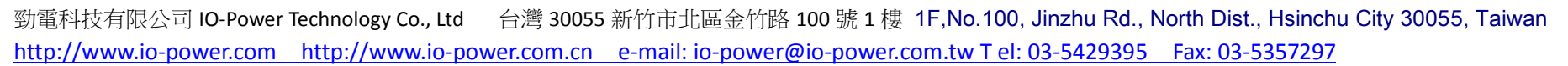
Hor. & Ver. Polarization



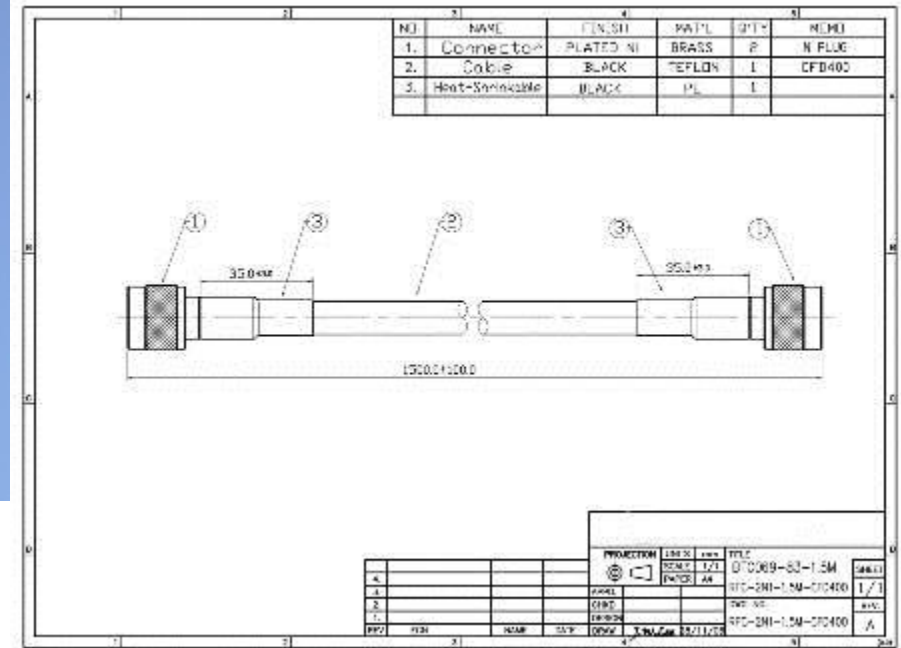
Hor. & Ver. Polarization



- | | |
|------------------------|------|
| 1. M-Type breaket (L) | 1Pcs |
| 2. Space Keeper | 2Pcs |
| 3. Spaing washer | 6Pcs |
| 4. M6-1.0 Nut | 6Pcs |
| 10. Rotating bracket | 1Pcs |
| 11. XHM8-1.25*20 | 2Pcs |
| 12. Mounting main fram | 1Pcs |
| 13. U-Type Screw | 2Pcs |
| 14. M6 washer | 6Pcs |
| 15. Wall Tiger | 4Pcs |
| 16. TH 5/32-16*1" | 4Pcs |



CFD-400 N-Type 1.5M Antenna RF Cable





CFD-400 RF Cable SPEC

Standard: CFD400 (CFD400-E) CABLE 1/2.74MM X 1C

CONSTRUCTION:

ITEM	UNIT	2.74MM
No. of Wire	P + C	1C
1) Conductor	Material	Copper Clad Aluminium
	Size	No./mm 1/2.74
2) Insulation	Material	PEF
	Thickness	mm (NOM.) 2.2
	O.D	mm (NOM.) 7.24
3) Binder		Sealed Aluminum Mylar Tape
4) Braid	Material	Tinned Copper Wire
Shield	Coverage	% 85% ±
5) Jacket	Material	PVC or PE
	O.D	mm 10.34-0.25

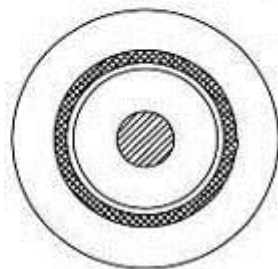
MECHANICAL PROPERTIES:

ITEM	UNIT	
Minimum Bend Radius	mm	25.4
Weight	kg/m	0.1
Tensile strength	kg	72.6
Operating temperature	°C	-40/85

ELECTRICAL PROPERTIES (20°C):

ITEM	UNIT	
Conductor Resistance	Ω/Km	1.67
Impedance	Ω	(NOM.) 50
Capacitance	PF/FT	(NOM.) 23.9
Velocity of propagation	%	(NOM.) 85
DC resistance, inner cond.	Ω/Km	4.56
DC resistance, outer cond.	Ω/Km	5.41
Shielding effectiveness	dB	≥90

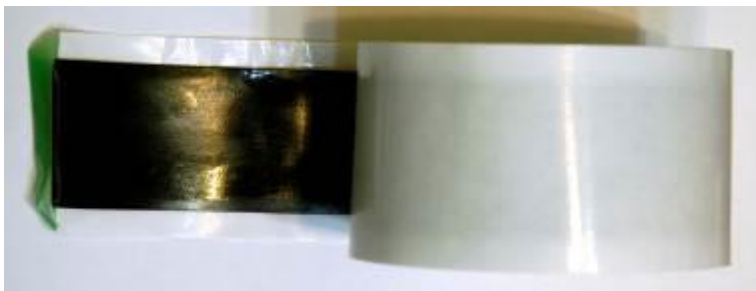
Attenuation (nom.)	
MHz	dB/100ft
30	0.7
50	0.9
150	1.5
450	2.7
900	3.9
1500	5.1
2000	6.0
2500	6.8
5800	10.8





IOP-RMTOC-173830510B

Self-Bonding Rainproof Insulating Tape SPEC





Specifications and instructions for use

1. The scope of:

- 600V Low-voltage connector used for sealing and insulation
- High and low voltage bus of anti-corrosion protection, maintenance of high pressure joints of waterproofing treatment

2. Conditions of use:

- Environment temperature is below 40 °C
- Continuous operating temperature: 90 °C below 130 °C under low pressure overload and emergency operation linkage PE joints of copper or aluminum cables.

3. Characteristics:

- Voltage level : 600V
- AC voltage : Above 25KV
- Insulation resistance : $1 \times 10^6 \text{M}\Omega$
- Black, thickness : $1.7\text{mm} \pm 0.5\text{mm}$
- Adhesion/split : Below 2cm
- Extension rate : Above 1000%
- Tensile breaking force : Above 2Kg
- Water absorption : Below 0.2%
- Stability : $130^\circ\text{C}/100\text{hrs}$ No gum

4. Instructions for use: With low-voltage cable straight connector as an example

