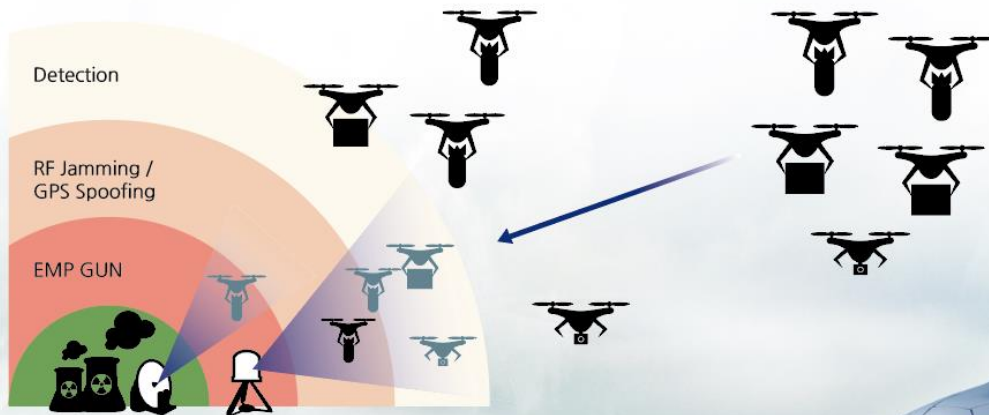
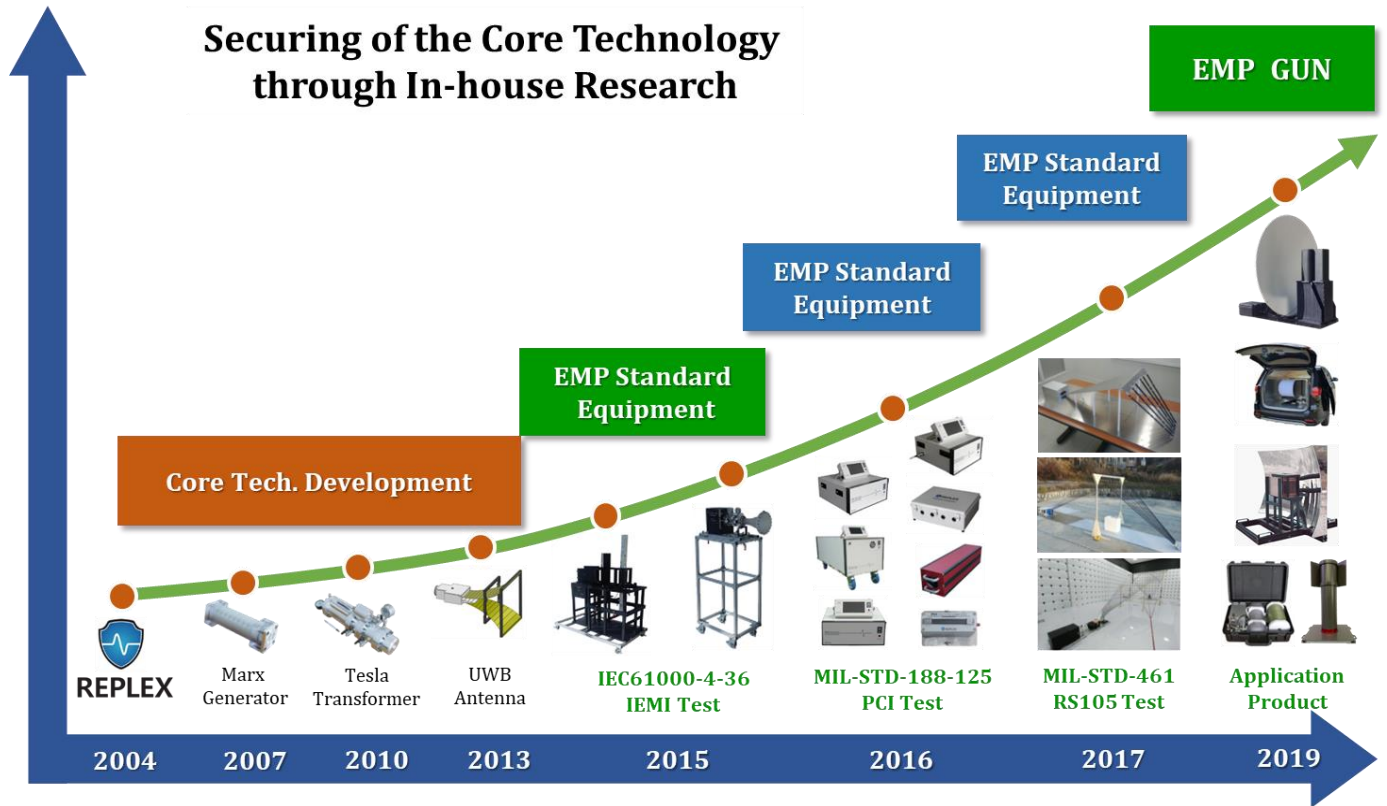


Multi-DOME Anti-Drone System



Since its establishment in 2004, Replex Co., Ltd. has been devoted to research on EMP(electromagnetic pulse) generation technology, and based on this, it has developed EMP GUNS, an application product.

Also, we have the technology to generate a GPS signal same as the actual GPS satellite transmission signal. Using this technology, we developed a GPS spoofer that can broadcast a fake GPS signals.



Patents





EMP GUN generates a significantly powerful electromagnetic pulse(EMP) for either damaging or stopping electronic devices, used for malicious purposes.

Features

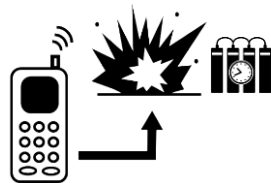
- Compact, Light-Weight, Battery Powered
- Effects random electronic devices by wideband frequency band characteristics
- Harmless to the human body by very Low average power
- Variety of Products (suitcase type, pole type, vehicle-mounted type, reflector type)
- Custom-made according to the needs of user

M30, M50(suitcase type)

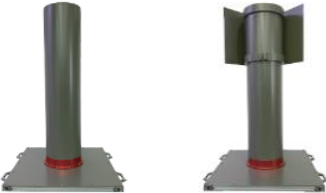
Picture	Parameter	Specifications	Comments
	Power Source	Battery	-
	Pulse Repetition Rate	1 to 10Hz	EMP shot per second
	Peak Electric-Field	150kV/m	Far Voltage : 150kV
	Direction Type	Omni-Directional	All way direction
	Size/Weight	0.5×0.4×0.2m/17kg	Insulation Gas :Nitrogen(N2)

Picture	Parameter	Specifications	Comments
	Power Source	Battery	-
	Pulse Repetition Rate	1 to 10Hz	EMP shot per second
	Peak Electric-Field	250kV/m	Far Voltage : 250kV
	Direction Type	Omni-Directional	All way direction
	Size/Weight	0.8×0.52×0.4m/40kg	Insulation Gas :Nitrogen(N2)

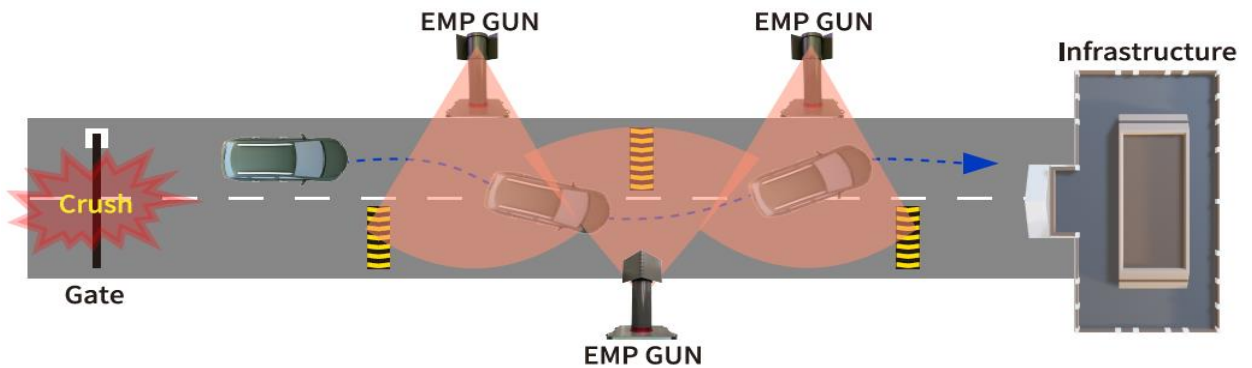
VIP security , Blocking of IED, Spy camera and Wiretapping




M60(pole type)

Picture	Parameter	Specifications	Comments
	Power Source	Battery	-
	Pulse Repetition Rate	1 to 10Hz	EMP shot per second
	Peak Electric-Field	300kV/m	Far Voltage : 300kV
	Direction Type	Directional	One way direction
	Size/Weight	1.2×0.6m/42kg	Insulation Gas : Nitrogen(N2)

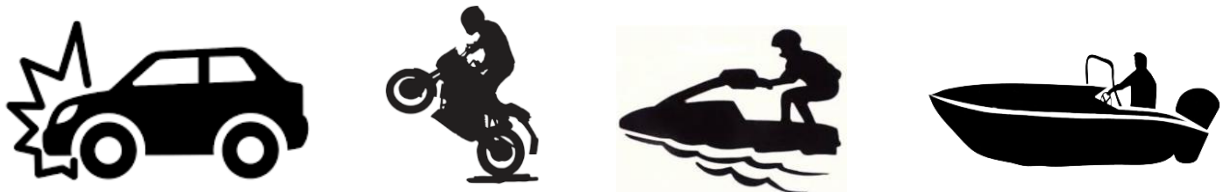
Unauthorized Entry Vehicle Blocking by the Engine Stopping




M200(vehicle-mounted type)

Picture	Parameter	Specifications	Comments
	Power Source	Battery	-
	Pulse Repetition Rate	1 to 10Hz	EMP shot per second
	Peak Electric-Field	850kV/m	Far Voltage : 850kV
	Direction Type	Directional	One way direction
	Size/Weight	1.2×1.2×1m/80kg	Insulation Gas : Nitrogen(N2)

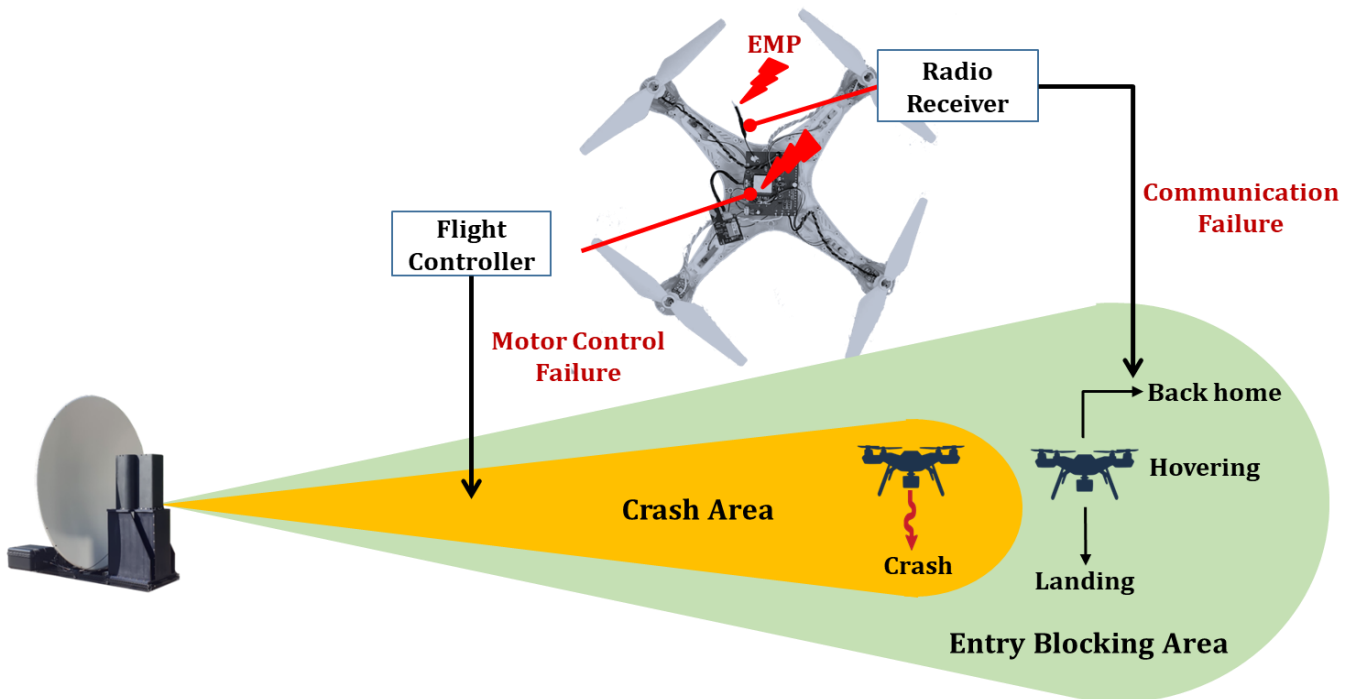
Engine stopping of moving Vehicle, Motor Cycle and Motor Boat



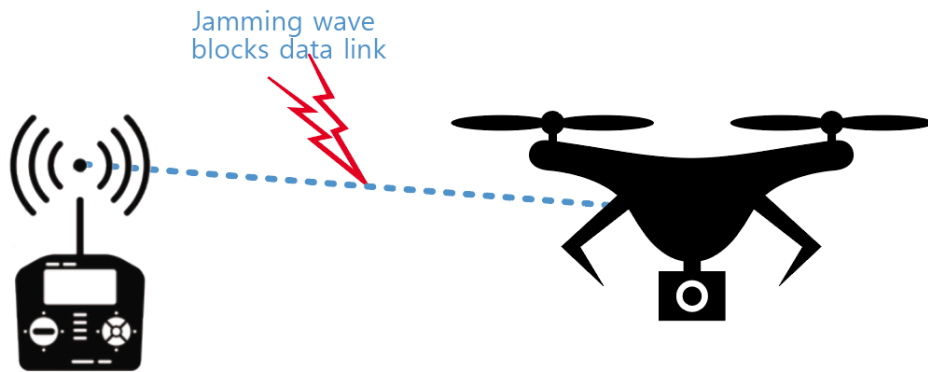
M500(applied to the anti-drone system)

Picture	Parameter	Specifications	Comments
	Power Source	Battery	-
	Pulse Repetition Rate	1 to 10Hz	EMP shot per second
	Peak Electric-Field	2.5MV/m	Far Voltage : 2.5MV
	Direction Type	Directional	One way direction
	Radiation angle(-3dB)	Vertical : 11~15° , Horizontal : 11~15°	-
	Size/Weight	1.6×2.5×2.5m/180kg	Insulation Gas : Nitrogen

- M500 was developed to neutralize swarm drones that could threaten public events, critical infrastructure and military missions.
- M500 has a directional radiation characteristic with a radiation angle of 11°~15°, which allows it to neutralize multiple drones simultaneously without precise aiming.
- The EMP radiated by the M500 directly affects the semiconductors inside of the drone. This will lead to drone crash or entry blocking such as back home, hovering and landing. This EMP effects depends on the drone model and attack distance.

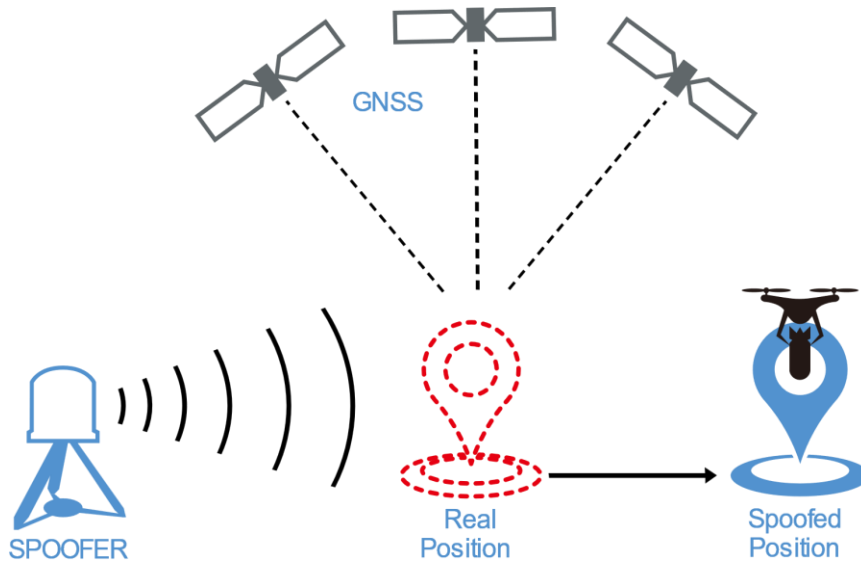


RF jammers use jamming radio waves to disturb the drone's control frequency (400MHz, 900MHz, 2.4GHz, 5.8GHz, etc.) signals, thus interfering with the drone's control.



Picture	Parameter	Specifications	Comments
	RF Frequency	1,575.42MHz(GPS L1) 1,602MHz(GLONASS L1) 2.4GHz / 5.8 GHz	400MHz/900MHz (option)
	Transmission Power	2.4 GHz-100W , 5.8 GHz-50W GNSS-10W	-
	Antenna	GNSS Rx Antenna Integrated Antenna(7dBi)	Antenna integration
	Antenna Type	Omni direction(360°)	Directional antenna (option)
	Range of disruption	About 1km(2.4 GHz)-3km(GNSS)	-
	Key Functions	GPS & GLONASS L1 spoofing /jamming Block control signal & video transmission	-

GPS spoofers can prevent drones from flying normally because they broadcast fake GPS satellite signals in real time to create deceptive location signals.



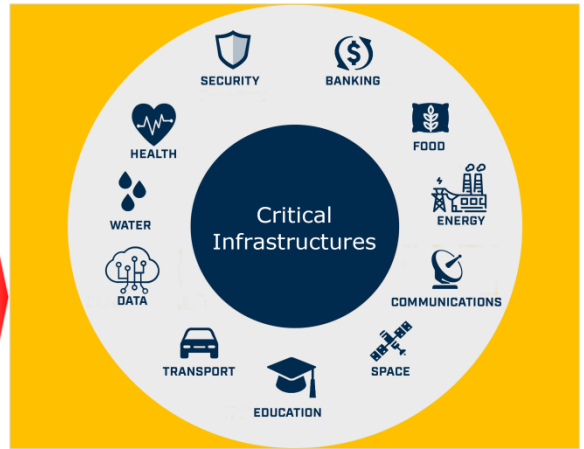
Picture	Parameter	Specifications	Comments
	Operating System	Linux	Ethernet support
	RF Frequency	1,575.42MHz 1,602MHz	GPS L1/GLONASS L1
	RF Power	10W	-
	Antenna Type	Omni direction	-
	Radiation angle	360°	-
	Size/Weight	50×50×60cm/50kg	Antenna integration

Unpredictable terrorism, for example, a swarm drone & car bomb has emerged as a new social threat in the worldwide. In addition, as the drone market grows rapidly, malicious use of drones such as precision bombing and illegal filming has become a social issue.

Swarm Drones Attacks on Critical Infrastructure

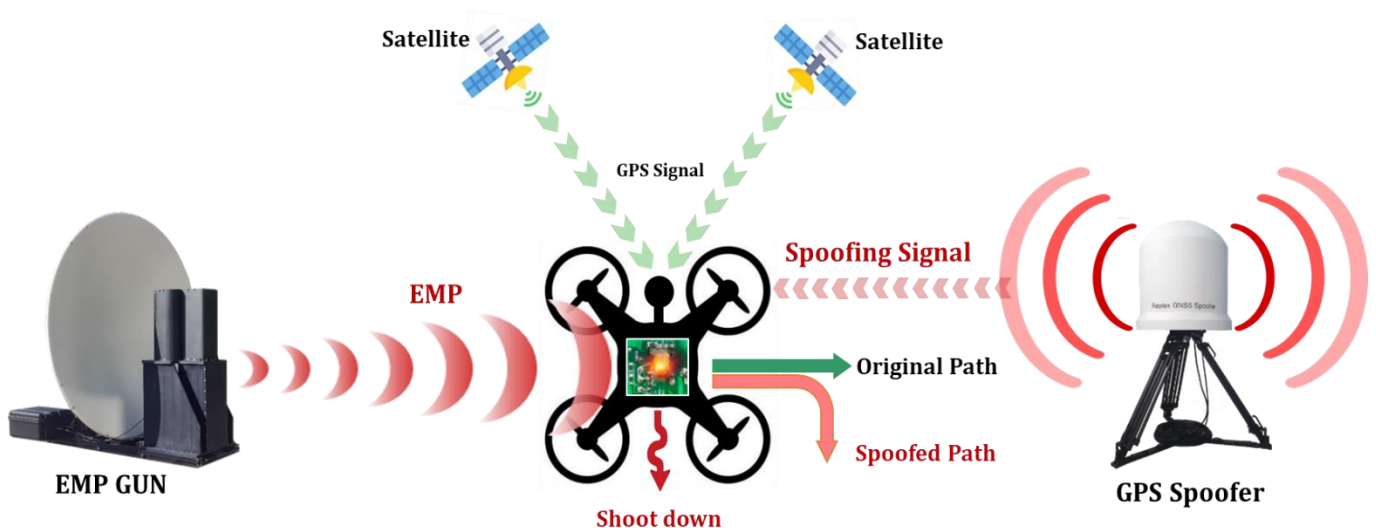


Low-cost dozens to hundreds of swarm drones, simultaneously and multiple attack on key national infrastructure



Temporary paralysis of the country's major social infrastructure systems → Chaos/paralysis occurs

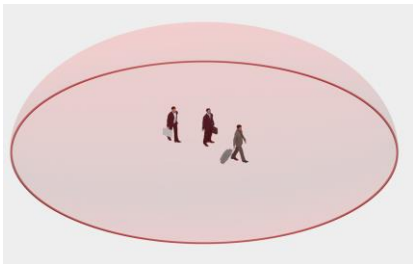
Replex's Swarm Drones Defense Technology



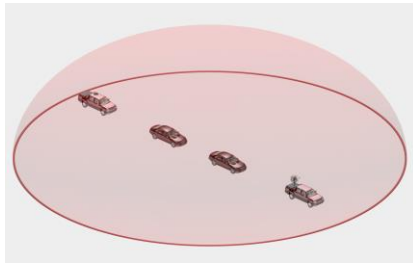
Most of the previous neutralization technologies used to defend drones were RF jamming, net capture, and high-power lasers. However, it may work for one drone, but it is limited for cluster drones. In particular, ultra-small swarm drones are not easily detected, so many sacrifices can already follow when recognizing threats.

We proposed multiple-electronic anti-drone scheme can have an optimal defense effect by forming multi-domes in response to simultaneous multi-attacking swarm drones using RF jamming, GPS spoofing, and EMP GUN. Applying this to your personal, mobile, and infrastructure can help protect the safety and property of your valued customers. This system is compatible with the existing drone detection system and can have the optimum effect through the operation system.

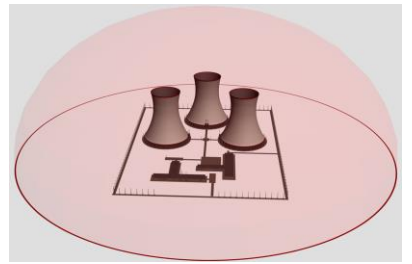
**Multiple Electronic Defense Systems(MEDS)
: Spoofing + Jamming + EMP**



Personal-DOME



Mobile-DOME

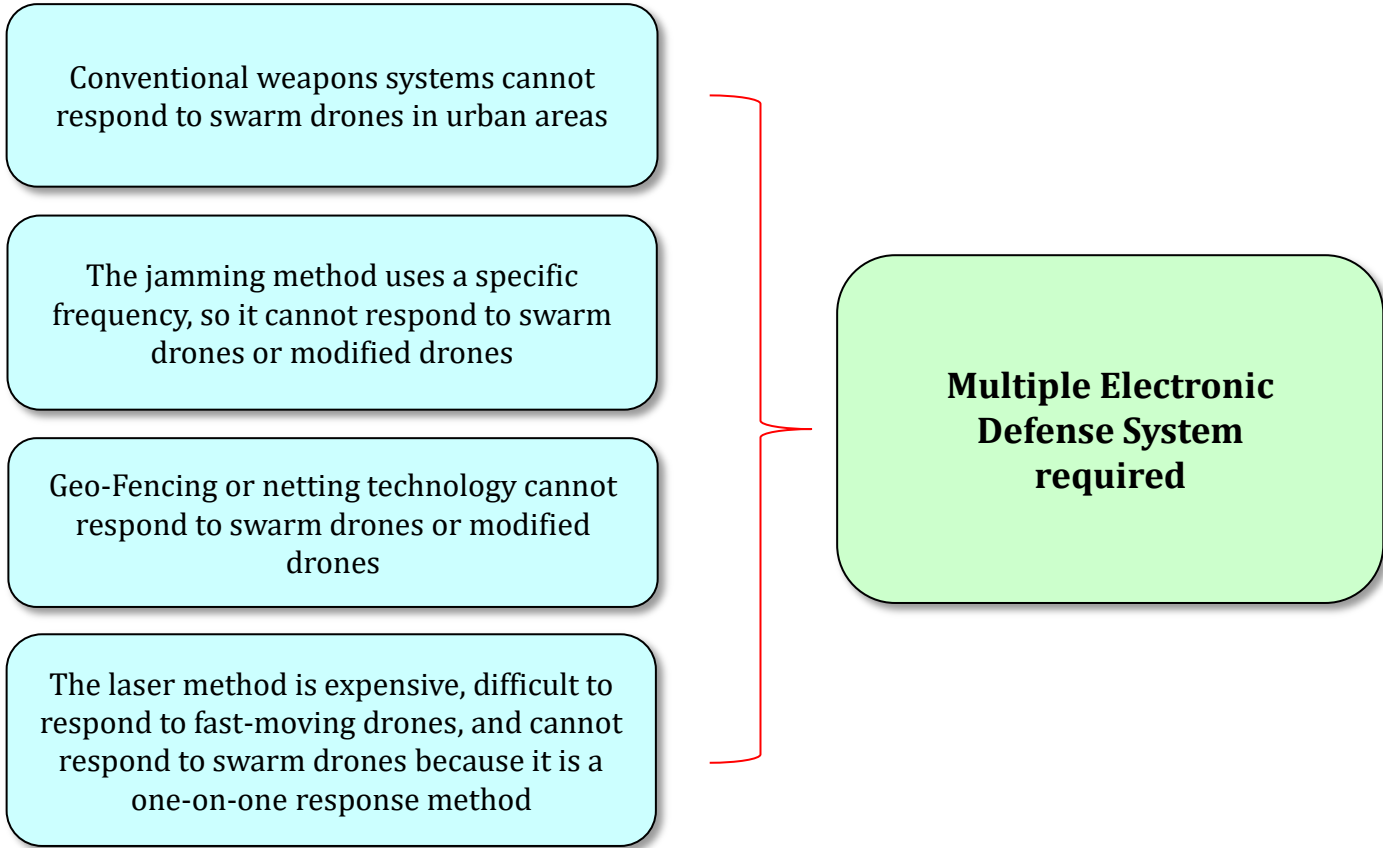


Infra-DOME

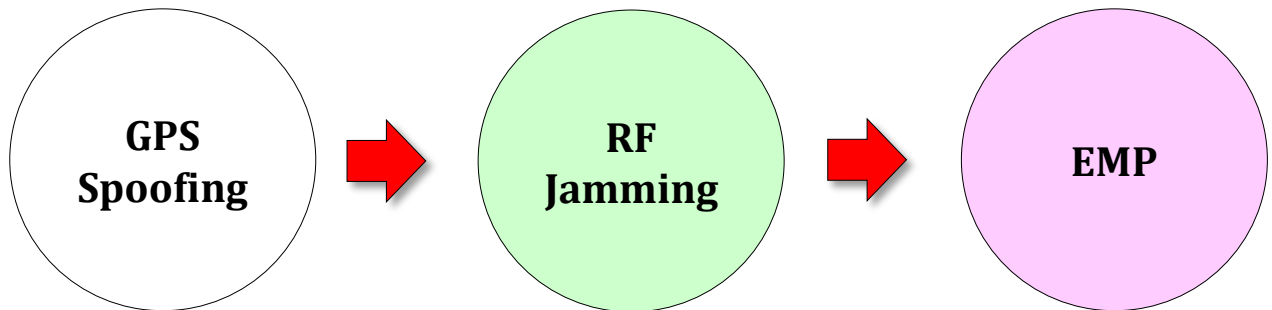
Multi-DOME





Item		Personal-DOME	Mobile-DOME	Infra-DOME
Effective Range (Diameter)	EMP	~20m	~100m	~1km
	Jammer	~100m	~1km	~2km
	Spoofers	~300m	~3km	~6km
Spec. (Size/Weight)	EMP	0.5×0.4×0.2m /17kg	1.2×1.5×1.5m /120kg	7m x 7m x 3m /1,600kg
	Jammer/ Spoofers	40X25X20 / 12kg 10W/ch. (Battery)	50X30X30 / 30kg 50W/ch. (Battery)	50X60X60 / 50kg 100W/ch. (Commercial Power)

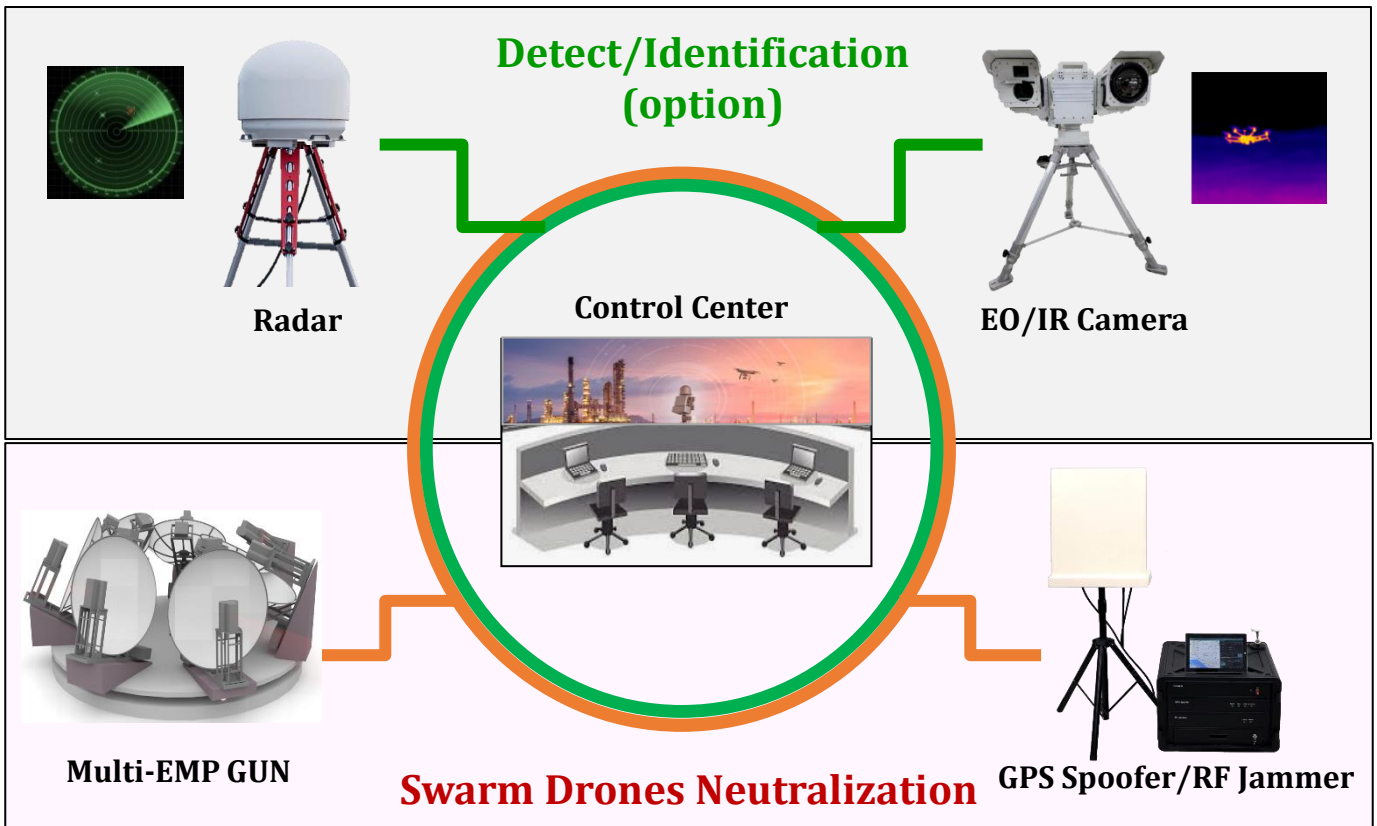
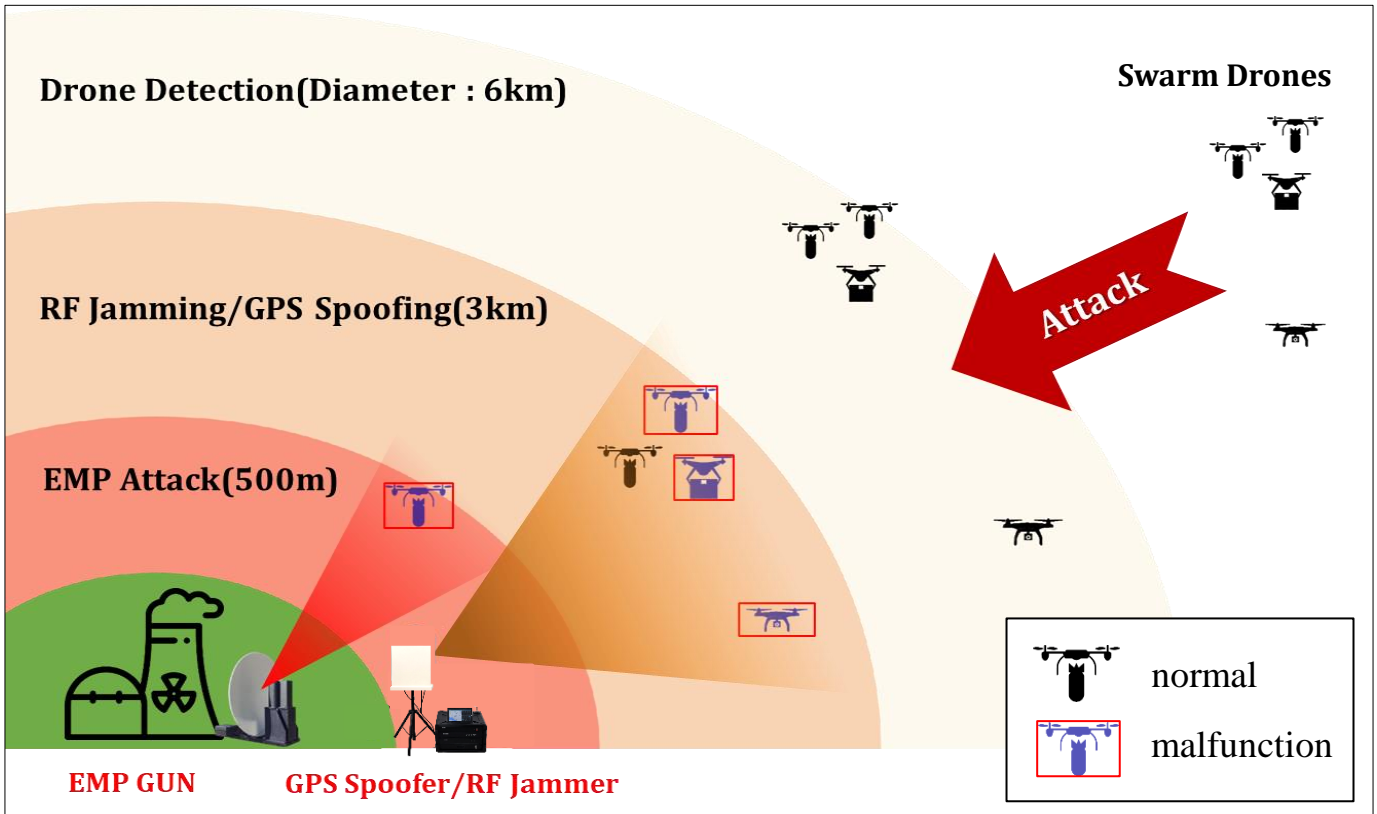
* Some specifications may change depending on system configuration.



Multiple Electronic Defense System(MEDS)

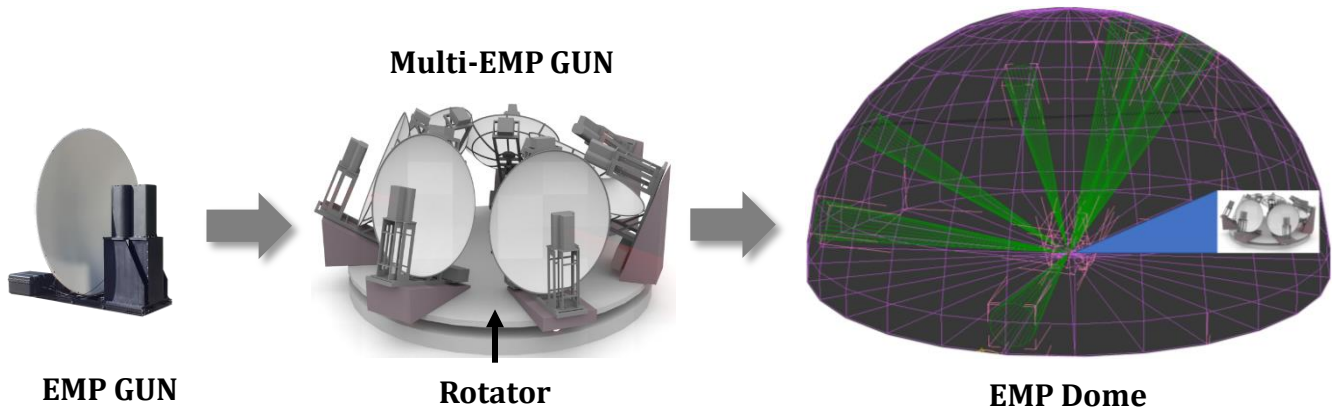


<p>Multi-EMP GUN</p>		<p>Multi-EMP GUN is composed of EMP GUN(M500) array, which has a directional radiation characteristic with radiation angle of a 11°~15° and an effective range of up to 500m. Each EMP GUN is fixed in a different orientation so that their radiation angles do not overlap.</p> <p>The Multi-EMP Gun is mounted on an electric rotator to radiate EMP in all directions, which forms an EMP dome.</p> <p>The EMP domes can neutralize drones approaching from all directions and times, including swarm drone attacks.</p>
<p>GPS Spoofer & RF Jammer</p>		<p>Radio interference can overpower weak GNSS signals, causing satellite signal loss and potentially loss of positioning. GPS Spoofing, is an intelligent form of interference which makes the receiver believe it is at a false location. During a GPS spoofing attack a radio transmitter located nearby sends fake GPS signals into the target receiver.</p> <p>RF Jammers work by blasting electromagnetic noise at the radio frequencies that drones use to operate and emit information. Effectively, they drown out the conversation between a drone and its operator. This is usually either 2.4GHz or 5.8GHz, which are non-assigned, public frequencies.</p>
<p>Radar (option)</p>		<p>3D radar provides for radar ranging and direction in three dimensions. In addition to range, the more common two-dimensional radar provides only azimuth for direction, whereas the 3D radar also provides elevation. Applications include weather monitoring, air defense, and surveillance.</p>
<p>EO/IR Camera (option)</p>		<p>EO/IR (Electro-Optical/Infra-Red) systems are imaging systems used for military or law enforcement applications which include both visible and infrared sensors. Because they span both visible and infrared wavelengths, EO/IR systems provide total situational awareness both day and night and in low light conditions. In general, multiple cameras can be operated simultaneously, and can be used even in poor external environments.</p>



3. Multi-DOME Anti-Drone System Configuration(2) 14

Type	Component	Specification	Q'ty
Essential	Multi-EMP GUN	<ul style="list-style-type: none"> - EMP GUN : 7ea - Rotator : 1ea - Peak Electric-Field : 2.5MV/m(Far Voltage : 2.5MV) - Freq. Band : 380MHz ~ 930MHz(-10dB BW) - Effective range : < 500m 	1set
	RF Jammer	<ul style="list-style-type: none"> - 2.4GHz : 100Watt - 5.8GHz : 50W - 400MHz, 900MHz : 100Watt(option) - Effective range : < 1km 	1set
	GPS Spoofer	<ul style="list-style-type: none"> - GPS, GLONASS : Jamming/Spoofing - Output Power : 10Watt - Effective range : < 3km 	1set
	DOME	<ul style="list-style-type: none"> - Multi-EMP GUN : 12m x 12m x 5m(W x D x H) - RF Jammer, GPS Spoofer : 1m x 2m x 2m(W x D x H) 	1set
	Operating Software	<ul style="list-style-type: none"> - Integrated control of the equipment(GUI) - Optimized for user's needs 	1set
Option	Radar	<ul style="list-style-type: none"> - Freq. Band : Ku-Band(16~17GHz) - Scan time & area : 60RPM, 360⁰ - Det. Range : 3km(RCS=0.01m²) - Manufacture : ART(Spain) 	1set
	EO/IR Camera	<ul style="list-style-type: none"> - Pan-Tilt - IR resolution : 1280 x 1024 - EO resolution : 1920 x 1080 - Manufacture : Feelanet(Korea) 	1set
	Control Center	Control room(50m ² , min.)	1set
	Spare parts (A/S)	<ul style="list-style-type: none"> - EMP GUN - Power Amp.(for RF Jammer) 	1ea 2ea



- Multi-EMP GUN is composed of EMP GUN(M500) array, which has a directional radiation characteristic with radiation angle of a 11° ~15° and an effective range of up to several hundred meters for drone.
- Each EMP GUN is fixed in a different orientation so that their radiation angles do not overlap.
- The Multi-EMP GUN is mounted on an electric rotator to radiate EMP in all directions, which forms an EMP dome.
- The EMP dome can neutralize drones approaching from all directions and times, including swarm drones attacks.

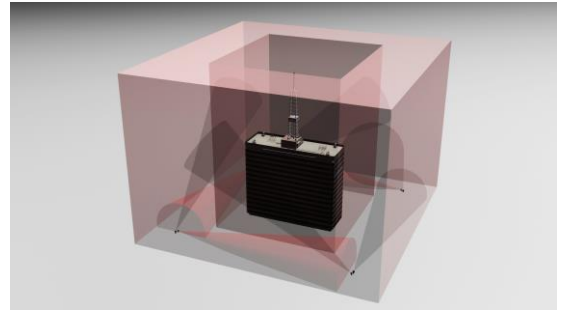
Specification

Peak Electric-Field	2.5MV/m(Far Voltage : 2.5MV)	Direction Type	Directional
Pulse Repetition Rate	1 to 10Hz (PRF)	Insulation Gas	Nitrogen(N2)
Operation Time	Continuously(1Hz@PRF)	Operating Temperature	0 ~ +50 °C
Frequency Band	380MHz ~ 930MHz(-10dB BW)	Input Power	220VAC
Effective Range	~500m(Max.)	Dimension(L x W x H)	7m x 7m x 3m (excluding size of rotator)
Radiation Angle(-3dB)	<ul style="list-style-type: none"> • Vertical degree: 11° ~15° • Horizontal degree: 11° ~ 15° 	Weight	1,600kg (excluding weight of rotator)

※ Effective range may vary depending on the drone model



EMP GUN



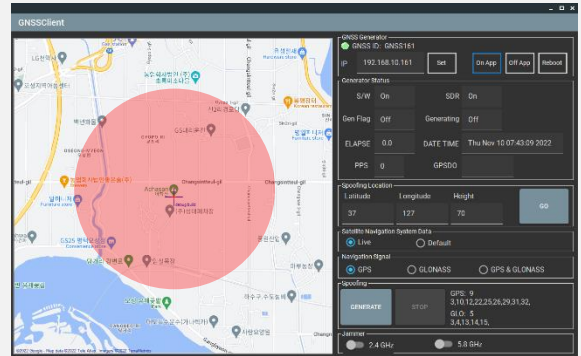
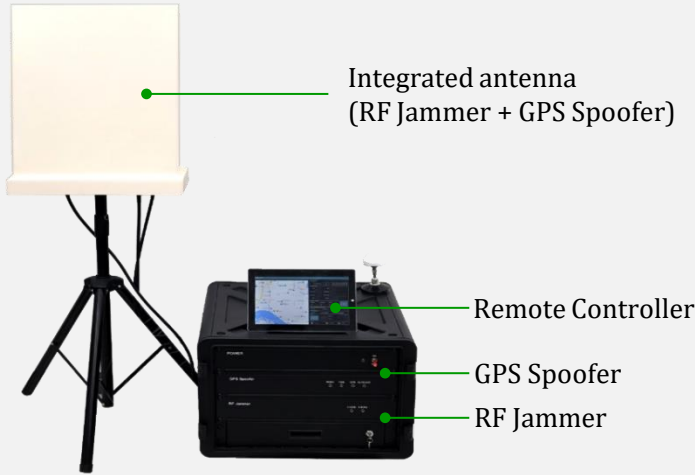
EMP Wall

- The EMP Wall is composed of EMP GUN(M500) array, which has a directional radiation characteristic with radiation angle of a 15° ~20° and an effective range of up to several hundred meters for drone.
- Each EMP GUN is fixed in a different orientation so that their radiation angles do not overlap.
- The EMP Wall is mounted on an electric rotator to radiate EMP, which forms an EMP Wall.
- The EMP Wall can neutralize drones approaching from all directions, including swarm drones attacks.

Specification

Peak Electric-Field	~2MV/m(Far Voltage : ~2MV)	Direction Type	Directional
Pulse Repetition Rate	1 to 10Hz (PRF)	Insulation Gas	Nitrogen(N2)
Operation Time	Continuously(1Hz@PRF)	Operating Temperature	0 ~ +50 °C
Frequency Band	380MHz ~ 930MHz(-10dB BW)	Input Power	220VAC
Effective Range	~250m(Max.)	Dimension(L x W x H)	2m x 3m x 3m (excluding size of rotator)
Radiation Angle(-3dB)	<ul style="list-style-type: none"> • Vertical degree: 15°~20° • Horizontal degree: 15°~20° 	Weight	1,600kg (excluding weight of rotator)

※ Effective range may vary depending on the drone model




- High power RF Jamming system
 - Drone control and video transmit frequency disrupt(2.4GHz / 5.8GHz)
 - Output power variable and other frequencies can be blocked(option : 400MHz/900MHz)
- The visual synchronization System
 - Synchronize with actual GPS within 100ns with built- in high- precision GPSDO
 - Enable to change drone's location information in real time within 1 second
 - Enable to deceive the GPS signals which the detected drone received in real time
- Provide world- wide public map to select locations in real time and enable automation programs.
- Control the transmission power precisely according to the defense range (300m~ 3km)
- Since operator can choose and apply directional or non-directional antennas selectively, various types of defense areas can be configured.


Specification

Operating Frequency Band	-1,575.42 MHz(GPS L1) -1,602 MHz(GLONASS L1) -2.4 GHz / 5.8 GHz -400MHz / 900MHz(Option)	Key Functions	-GPS&GLONASS L1 deception -GPS&GLONASS L1 disturbance -Remote control system -Block video transmission
Transmission Power	-2.4 GHz-100W -5.8 GHz-50W -GNSS-10W	IP rating	IP65
Antenna	-GNSS Rx Antenna -Integrated Antenna(7dBi)	Input Power	220VAC
Operating time	24 hours continuously	Operating Temperature	-20 ~ +65 °C
Range of disruption	< 1km(2.4 GHz), <3km(GNSS)	Dimension	-Main : 19inch Rack(8U) -Antenna : 20 x 60 x 60(cm)
		Weight	40kg (Main 35kg, Antenna 5kg)

3D Radar(option)

Picture	Item	Specification
	Freq. Type	Doppler CWLFM / LPI
	Freq. Type	Ku-band(16~17 GHz)
	Bandwidth	1 GHz
	Output Power	15 W
	Transmitter type	Solid State
	RF Tx. Masking	Settable RF Transmission azimuth sector
	Scan time	60 RPM
	Scan area	360°
	Detection range	10, 7, 5 km
	Det. Range vs target	Micro UAS: 3km(RCS = 0.01m2) / Small UAS: 8km
	Distance resolution	1m ~ 0.2m (changeable)
	Distance accuracy	0.25m ~ 0.05m
	Input Power	24 VDC
	Power Consumption	200W(outside : 600Watt, Max.)
	Operation temp.	-25 ~ 50°C
	Size	90cm x 110cm
Weight	75 kg	
Manufacture	ART(Made in Spain)	

EO/IR Camera(option)

Picture	Item	Specification	
	Pan-Tilt	Accuracy	0.001
		Rotation range(Pan)	360° continuous
		Rotation range(Tilt)	±70 °
		Rotation speed(Pan)	0.001~60°/s
		Rotation speed(Tilt)	0.001 ~30°/s
		Operation Temp.	-32° ~ 65°
	IR Camera	Resolution	1280 x 1024
		Lens	0mm ~ 300mm
		Pixel Pitch	12um
		Function	30 ~ 300mm 4x zoom lens
	EO Camera	Resolution	1920 x 1080
		Lens	6mm ~ 540mm
		Function	6 ~ 540mm 90x optical zoom
Manufacture	Feelanet(Made in Korea)		



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