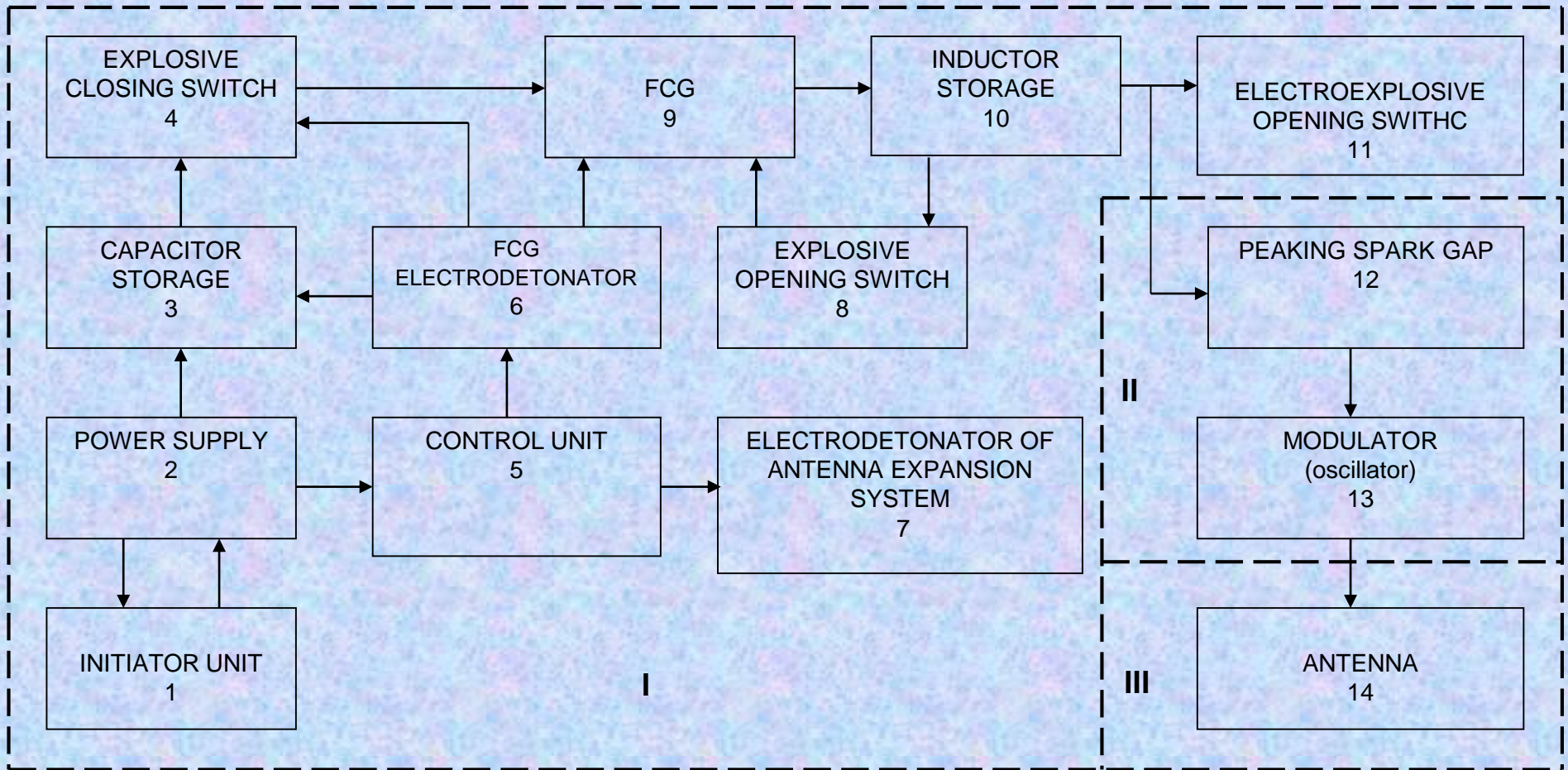

Self-Contained Electromagnetic Defeat Device (Microwave Munition)

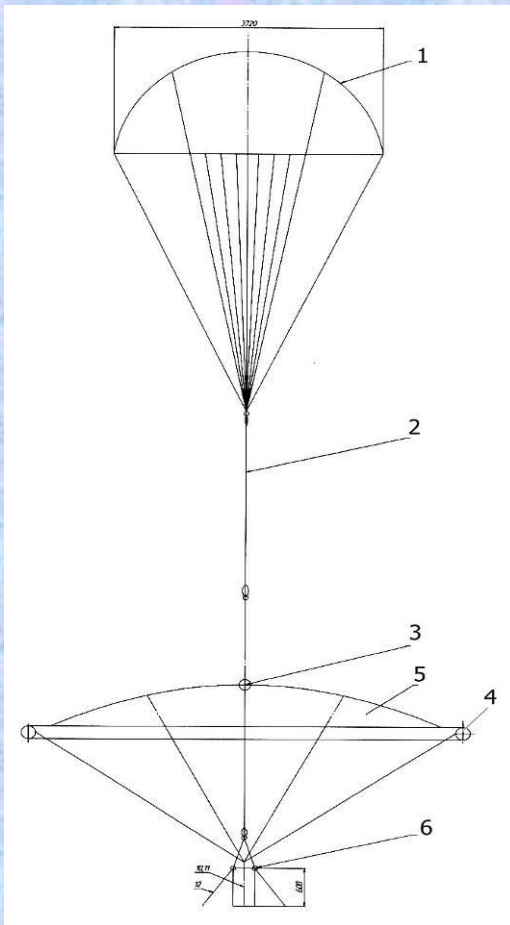
-
- Self-contained electromagnetic defeat device relates to the new type of directed energy weapons – electromagnetic weapons;
 - The defeat factor is electromagnetic radiation, whose effects cause operational upset, full or partial loss of adversarial battlefield electronic equipment functionality;
 - Microwave munition can also have additional defeating factors, found in the conventional munitions: fragments and blast wave;

-
- Microwave munition is also capable to cause a denial/nonavailability condition for IT and communication systems;
 - Microwave munition will cause active denial of communication channels and data storage/data chaining networks.
 - Two electromagnetic munition modifications will be considered in the presentation:
 - Parachute dropped microwave munition (electromagnetic bomb)
 - Microwave munition designed for the installation at surface-air, air-air, air-surface missiles.
-

Block chart of parachute-dropped munition:

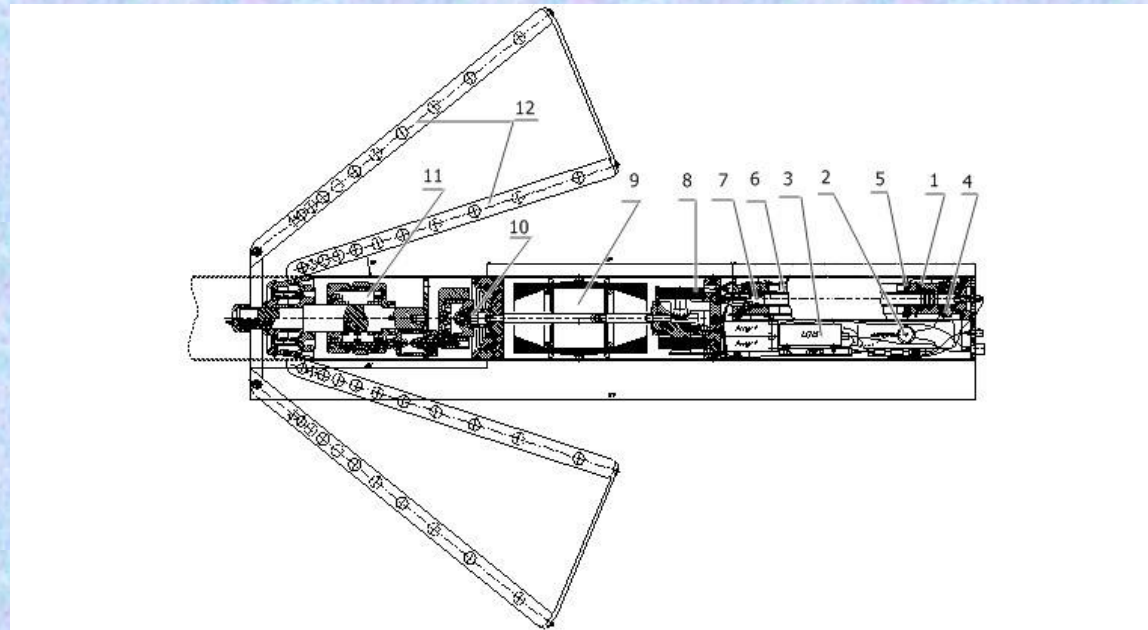


Schematic diagram, illustrating concept of parachute-dropped munition.



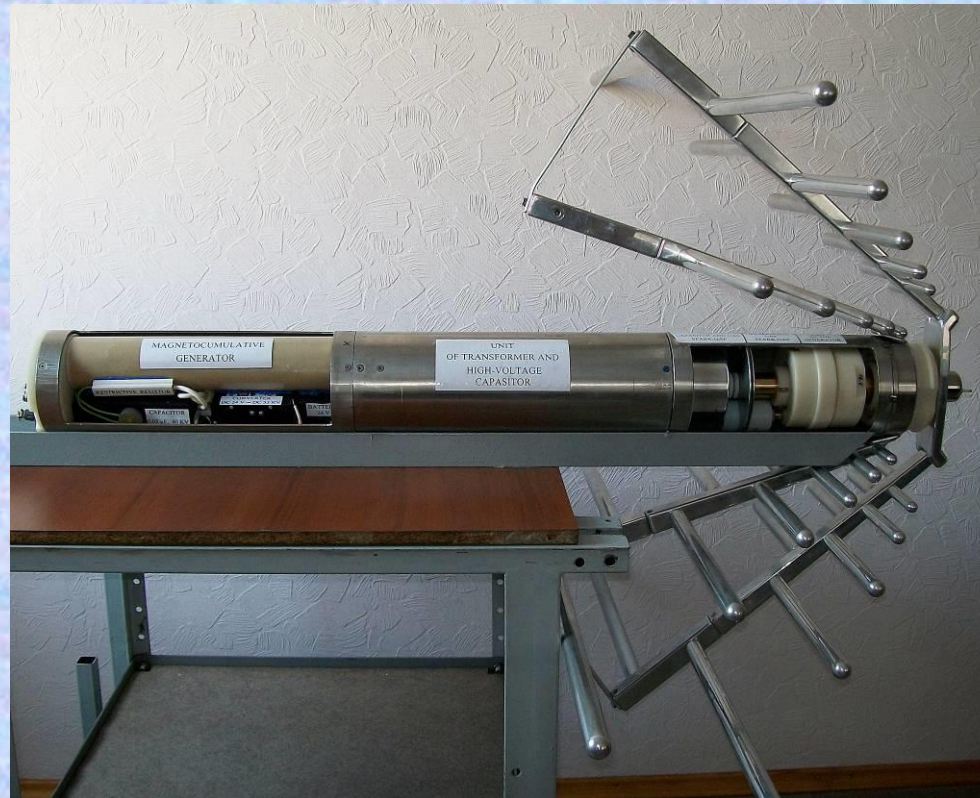
1. Cargo parachute
2. Nylon cargo rope
3. Parachute antenna reflector
4. Stabilizing inflating fabric ring
5. Parachute mirror ropes
6. Oscillator irradiating the reflector of parallel antenna

-
- Oscillator subsystem design of a electromagnetic defeat munition modification:

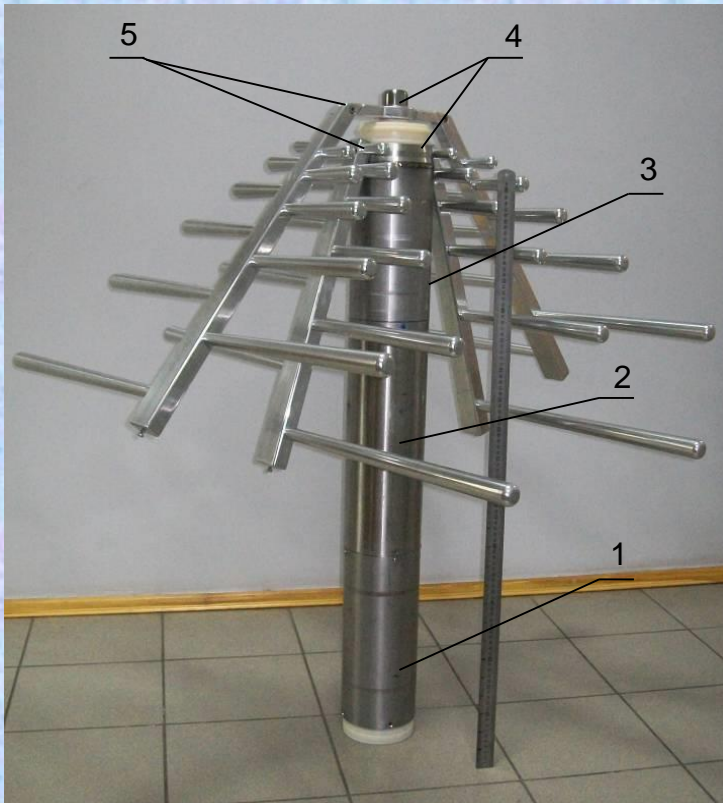


1. is explosive closing switch; 2. is capacitor storage; 3. is DC-DC converter; 4. is closing switch to capacitor storage contact; 5. is MCG crowbar; 6. is HE-loaded liner; 7. is explosive switch; 8. is high voltage pulse transformer; 9. is high voltage pulse capacitor 10. is peaking spark gap; 11. is modulator; 12. is antenna

A general view photograph of the munition with logperiodic antenna with a partially open case

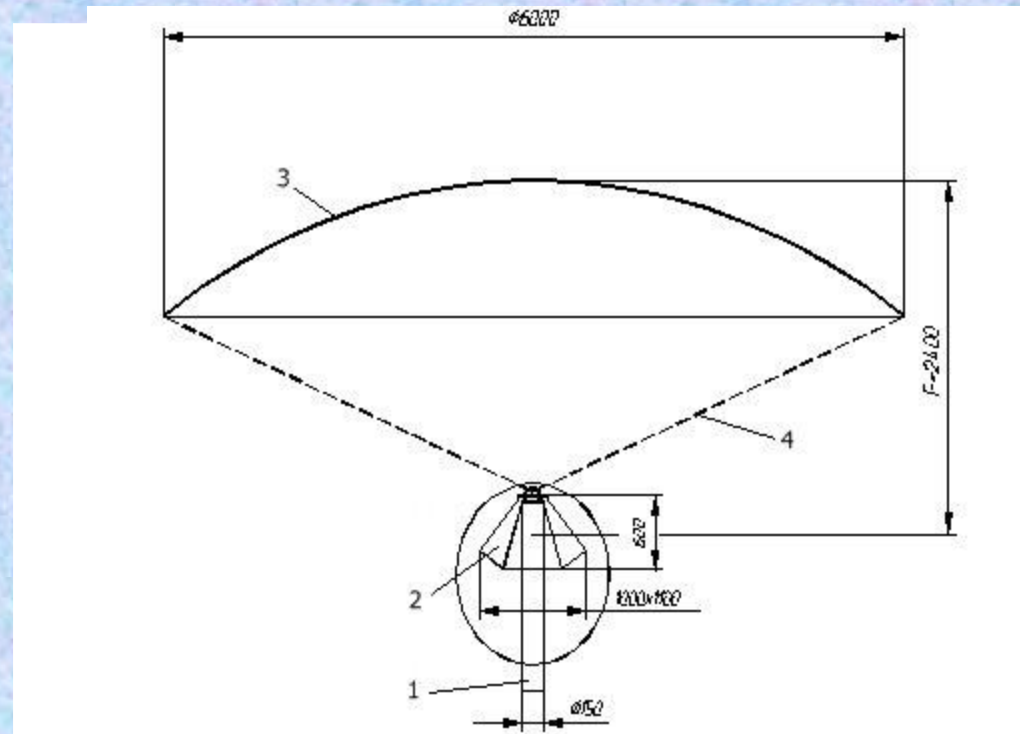


- General view of a parachute-dropped munition prototype (electromagnetic bomb) with a logperiodic antenna:



1. is self-contained power supply with FCG and seed source;
2. is high-voltage unit with low-inductive capacitor and high-voltage pulse transformer;
3. is transducer unit (oscillator);
4. is oscillator coupling unit;
5. is logperiodic antenna array.

- Microwave reflector mirror component of the electromagnetic munition drop system



1. is illuminating oscillator; 2. expanding logperiodic/TEM horn antenna, 3. is parachute antenna reflective mirror ; 4. are ropes holding the oscillator



1 – parachute system reflector mirror;
2 – reflector mirror tensioner system



1 – pilot parachute;
2 – cargo parachute.

-
- Microwave munition design for the installation at a missile system.

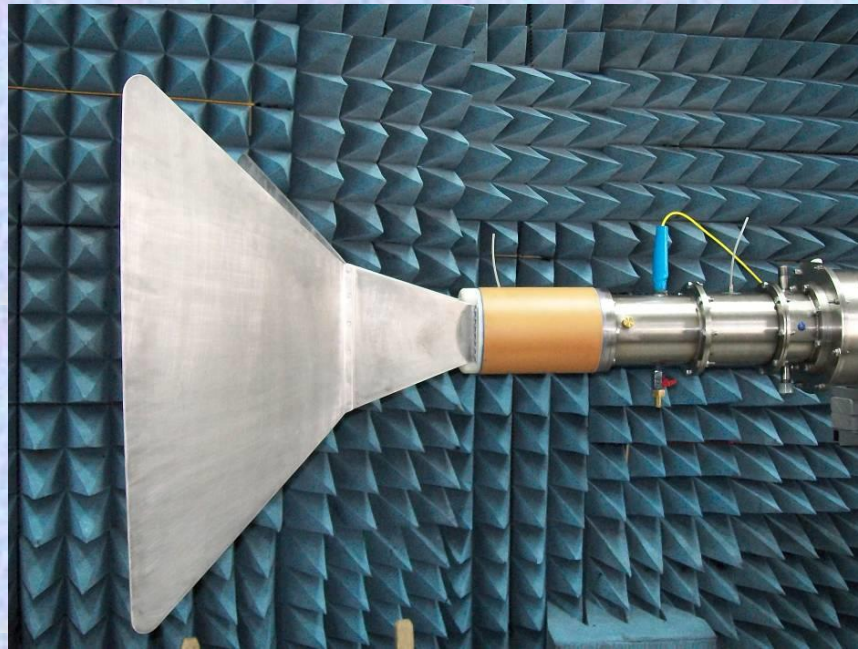
This design provides for operation with/without parachute system.

The design of missile-mounted munition is identical to the design of parachute dropped munition with exception of a few key differences as follows:

- Munition is equipped with higher gain antenna;
- Microwave oscillator power should reach 2 GW;
- Munition prototype can use parachute system with no reflective mirror designed to provide required descent velocity.

Munition design can use both capacitor storage and FCG as an energy source

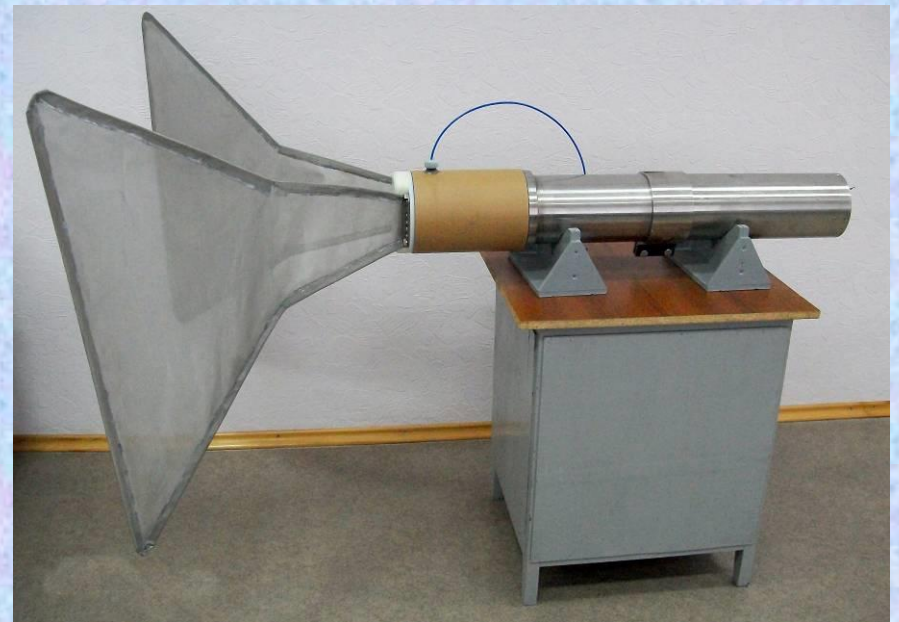
Photograph of missile-mounted munition with the TEM-horn antenna at the test stand:



Photograph of the rocket munition prototype with extended TEM horn antenna assembled:



TEM-antenna made of sheet metal



TEM-antenna made of metal mesh

- Experimental test results of the parachute dropped munition (electromagnetic bomb) :

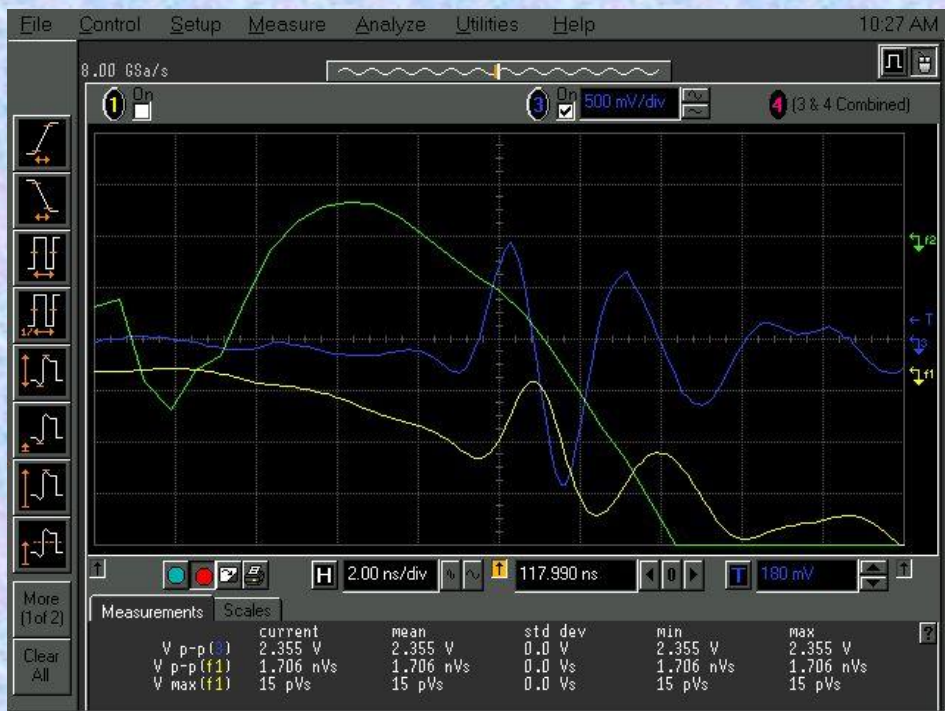


Yellow curve – radiated waveform;

Blue curve – integrated radiated waveform;

Green curve – radiated spectrum.

- Experimental test results of the missile-mounted munition :



Yellow curve – radiated waveform;

Blue curve – integrated radiated waveform;

Green curve – radiated spectrum.

Developed parachute-dropped microwave munition with the following characteristics :

- E-field strength at 50 m distance w/o parachute - 11.6 kV/m;
- Parachute mirror antenna gain - 22,1 dB
- Radiated pulse length - 10÷12 ns;
- Radiated frequency spectrum - 200÷550 MHz;
- Peak power at the frequency of - 300 ± 50 MHz;
- Operation regime - single-shot.

Using parachute system with reflective mirror will allow to produce E-field strength of up to 45-50 kV/m at 50m.

Further improvement of the munition will produce burst of radiation pulses (15-40 pulses) with the above pulse characteristics.

Developed missile-mounted microwave munition w/o the following characteristics :

- E-field strength at 50 m distance - 12.2 kV/m;
- Radiated pulse length - 4÷6 ns;
- Radiated frequency spectrum - 200÷550 MHz;
- Peak power at the frequency - 320±50 MHz;
- Operation regime - single-shot;
- Capable of generating bursts - 15-40 pulses.