

Marine
Radar
Detection Performance
Comparison

July 12, 2011

Overview

This document was designed to provide a simple comparison of the detection performance for several commercially available radars operating with different antenna lengths.

Radar	Model	Type	Power (kw)
Furuno	2117	X	12
Furuno	2125	X	25
Furuno	2127	X	25
Furuno	2155	X	50
Furuno	2157	X	50
Furuno	2135	S	30
Furuno	2137	S	60
Furuno	2165	S	60
Furuno	2167	S	60
Terma	Scanter 2001	X	25
Terma	Scanter 2001	S	30
BME	X-Band Model	X	10
BME	X-Band Model	X	25
BME	S-Band Model	S	30
Pathfinder	MK2	X	25
Pathfinder	MK2	S	30

Assumptions

While numerous parameters can affect the detection performance of a radar, this analysis provides a comparison with no sea clutter or precipitation. The following parameters were common for all radars:

Antenna Height	50 m
Gain Efficiency	0.70
Target Size	1 m ² and 10 m ²
Target Height	2 m
Sea State	0
Rain	0 mm/hr

Radar Detection Comparison

Analysis Results

The analysis used the Computer-Aided Performance Evaluation Tool (CARPET) v 2.13. The associated CARPET parameters are included as appendices. The following tables summarize the maximum target detection range with a 50% probability of detection for each radar type.

X-Band Radars

Radar Type X-Band	Power (kw)	Antenna Length (ft)	Range (nm) [1m² Target]	Range (nm) [10m² Target]
BME	10	6	4.6	8.1
BME	10	8	5.2	9.2
Furuno 2117	12	6.5	5.1	9.0
Furuno 2117	12	8	5.8	10.3
Furuno 2125	25	6.5	6.2	11.0
Furuno 2125	25	8	6.8	12.0
Furuno 2127	25	6.5	6.1	10.8
Furuno 2127	25	8	6.9	12.3
Terma Scanter	25	12	7.5	13.2
Terma Scanter	25	18	11.9	14.5
Terma Scanter	25	21	14.0	15.2
Pathfinder	25	7	4.8	8.5
Pathfinder	25	9	5.4	9.6
Pathfinder	25	12	6.8	12.1
BME	25	6	5.7	10.2
BME	25	8	6.5	11.6
Furuno 2155	50	8	8.0	13.6
Furuno 2155	50	10	9.0	13.9
Furuno 2157	50	8	8.2	13.7
Furuno 2157	50	10	9.2	13.9

Radar Detection Comparison

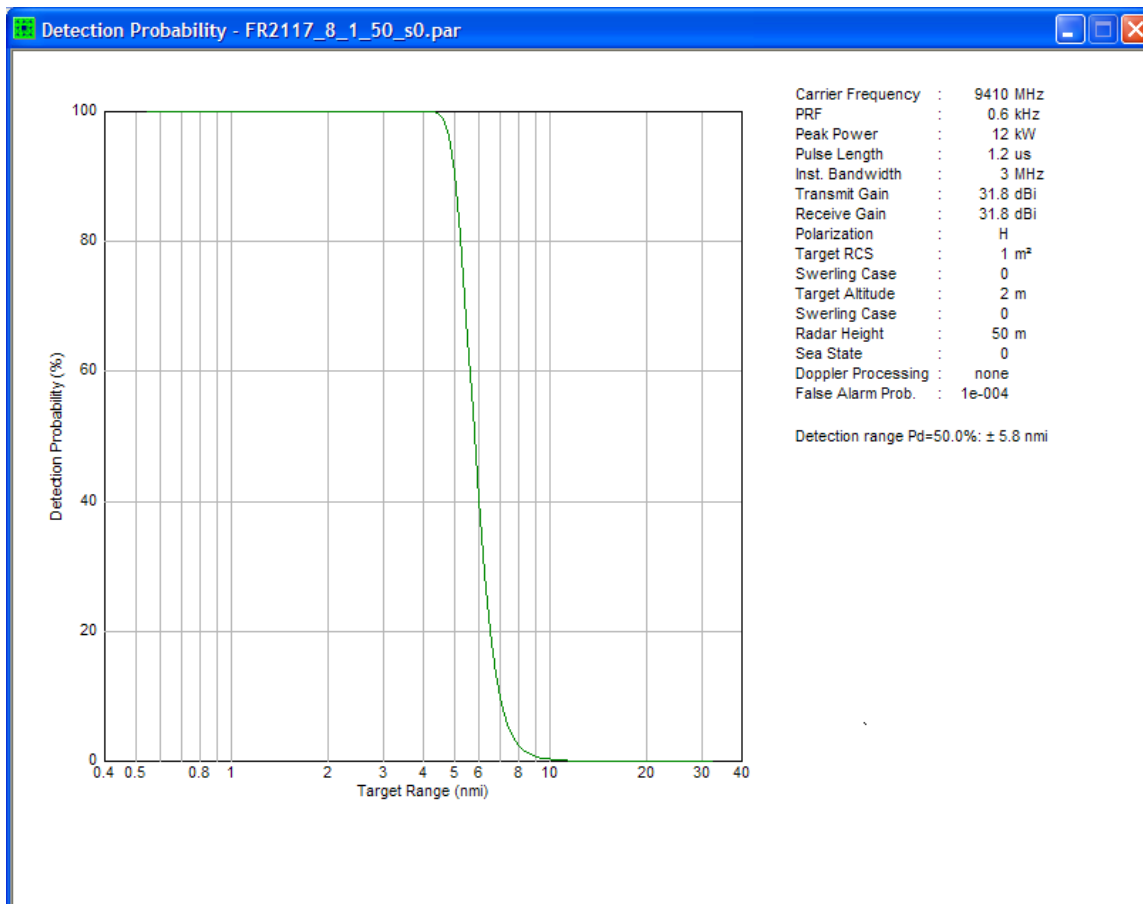
S-Band Radars

Radar Type S-Band	Power (kw)	Antenna Length (ft)	Range (nm) [1m² Target]	Range (nm) [10m² Target]
Furuno 2135	30	10	7.0	12.0
Furuno 2135	30	12	7.7	12.3
Terma Scanter	30	12	12.3	13.8
Terma Scanter	30	18	13.5	15.1
BME	30	9	6.4	11.4
BME	30	12	7.6	12.2
Pathfinder	30	12	8.0	12.4
Furuno 2137	60	10	8.7	12.6
Furuno 2137	60	12	9.8	12.9
Furuno 2165	60	10	8.3	12.5
Furuno 2165	60	12	9.1	12.7
Furuno 2167	60	10	8.8	12.9
Furuno 2167	60	12	9.8	12.9

Radar Detection Comparison

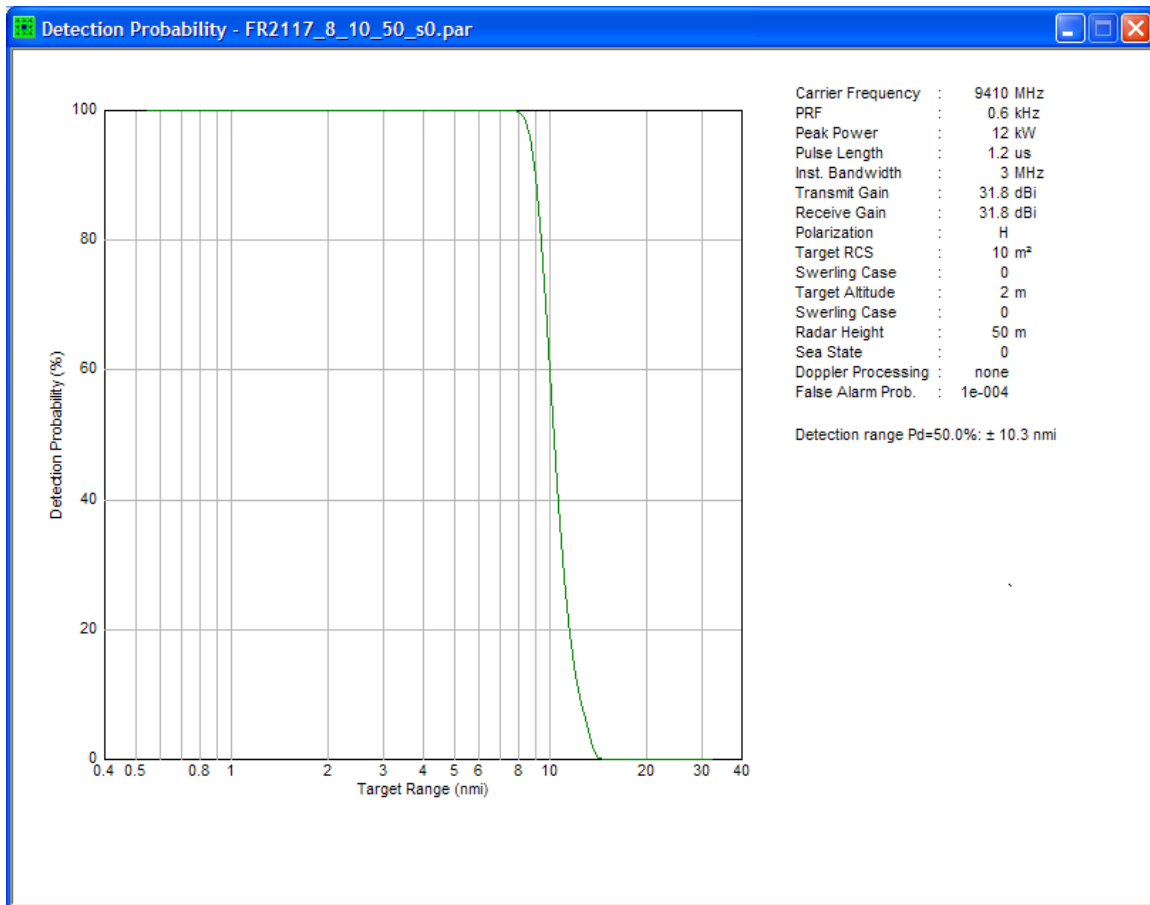
Detection Probability

Furuno 2117 – 12kw with 8ft Antenna (1m² target)



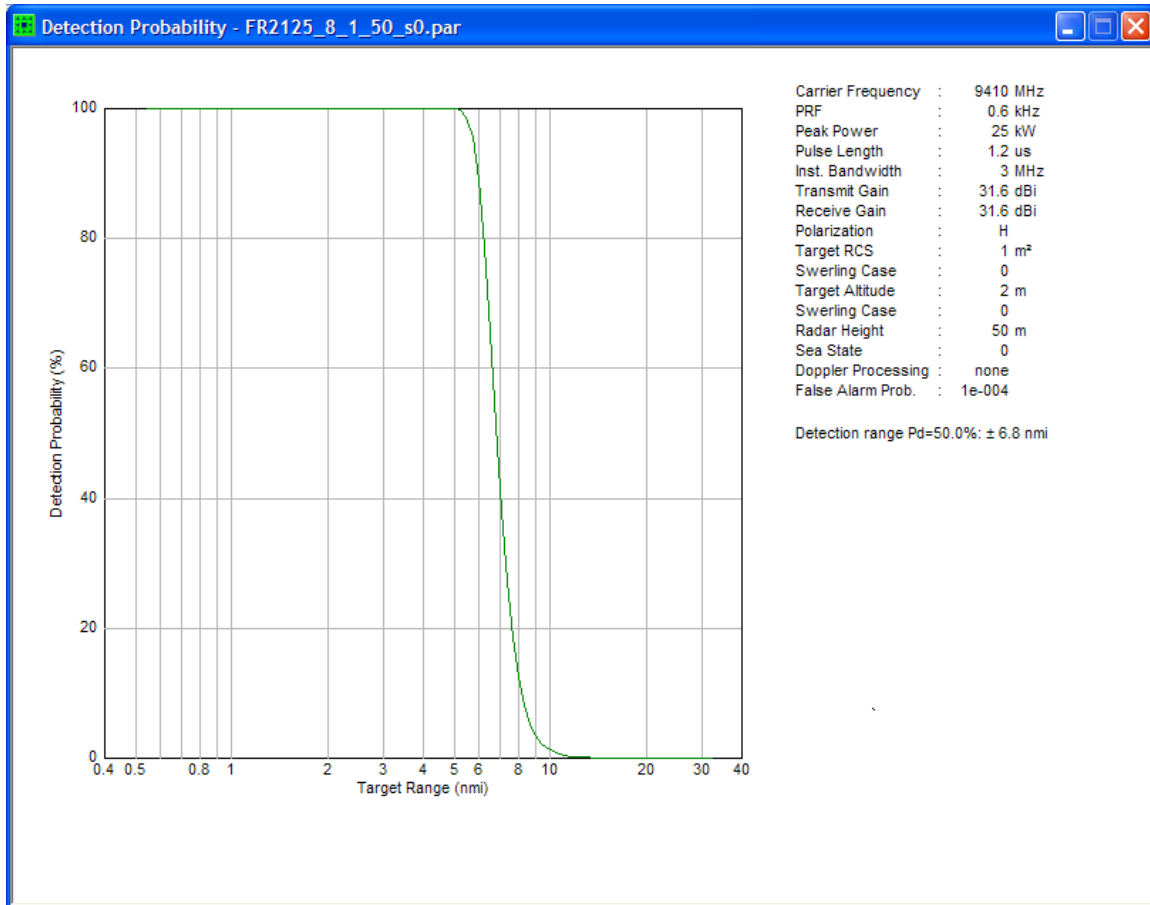
Radar Detection Comparison

Furuno 2117 – 12kw with 8ft Antenna (10m² target)



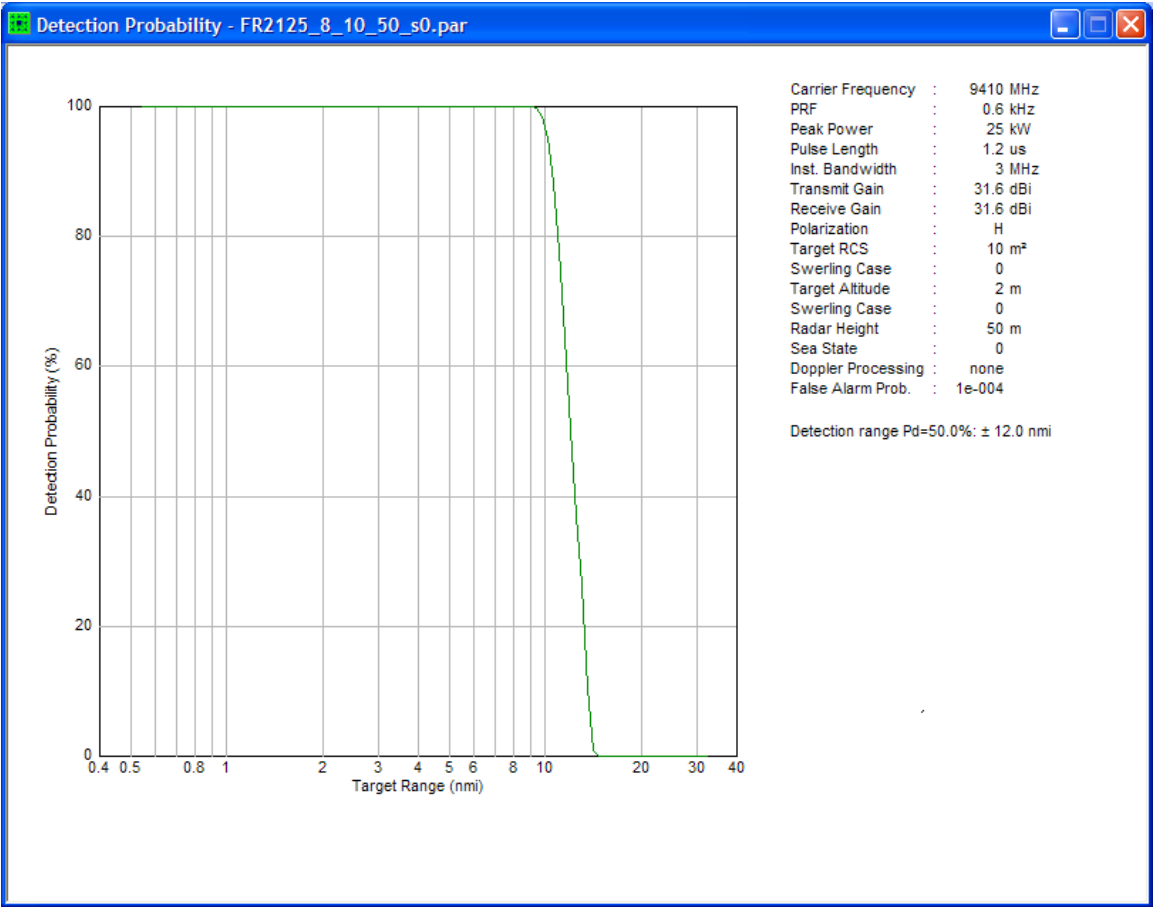
Radar Detection Comparison

Furuno 2125 – 25kw with 8ft Antenna (1m² target)



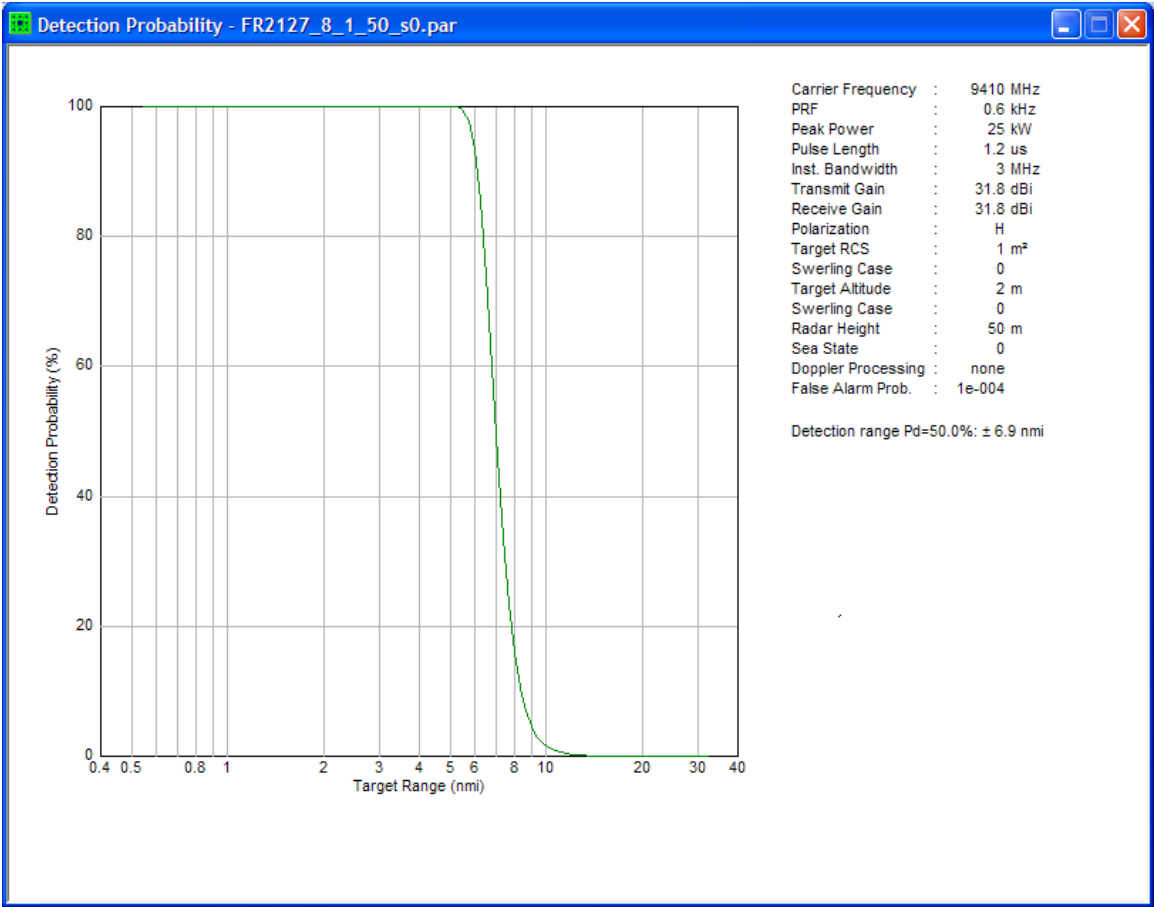
Radar Detection Comparison

Furuno 2125 – 25kw with 8ft Antenna (10m² target)



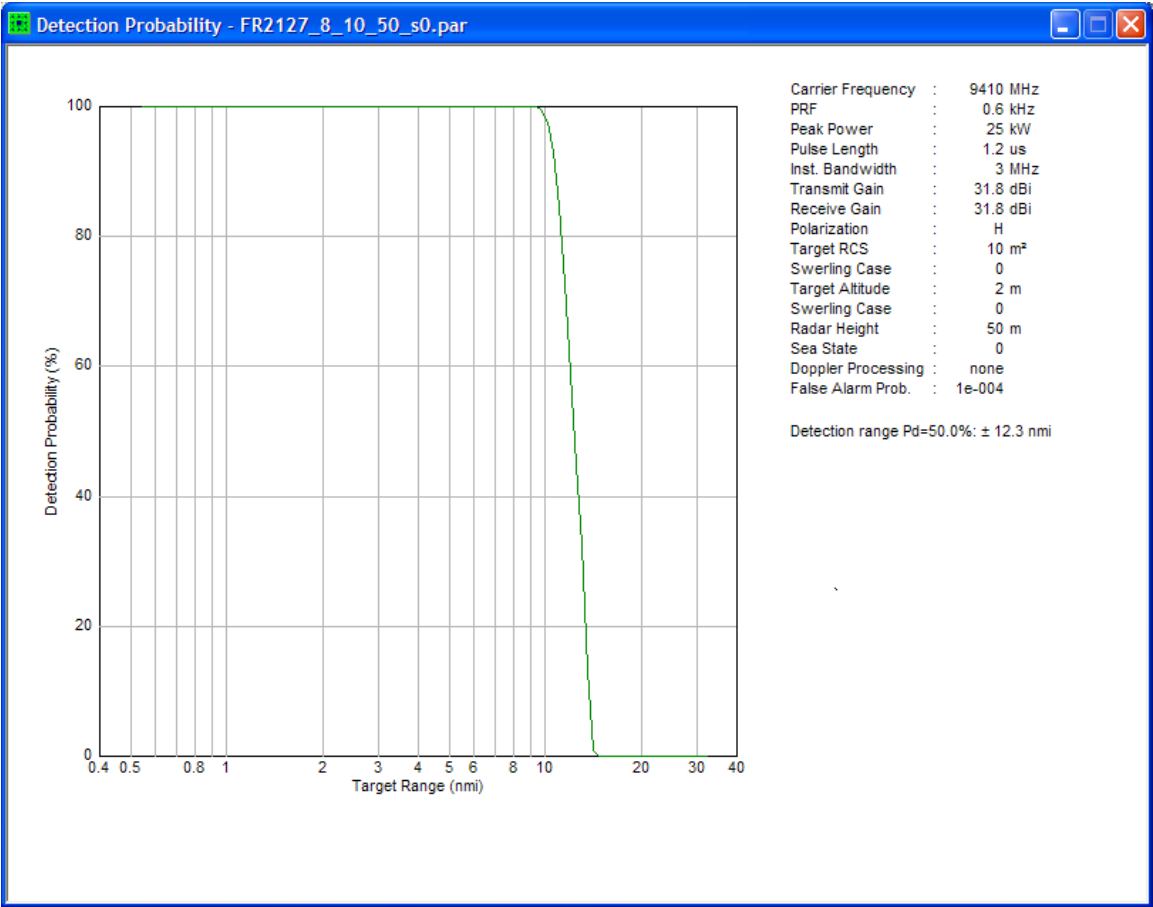
Radar Detection Comparison

Furuno 2127 – 25kw with 8ft Antenna (1m² target)



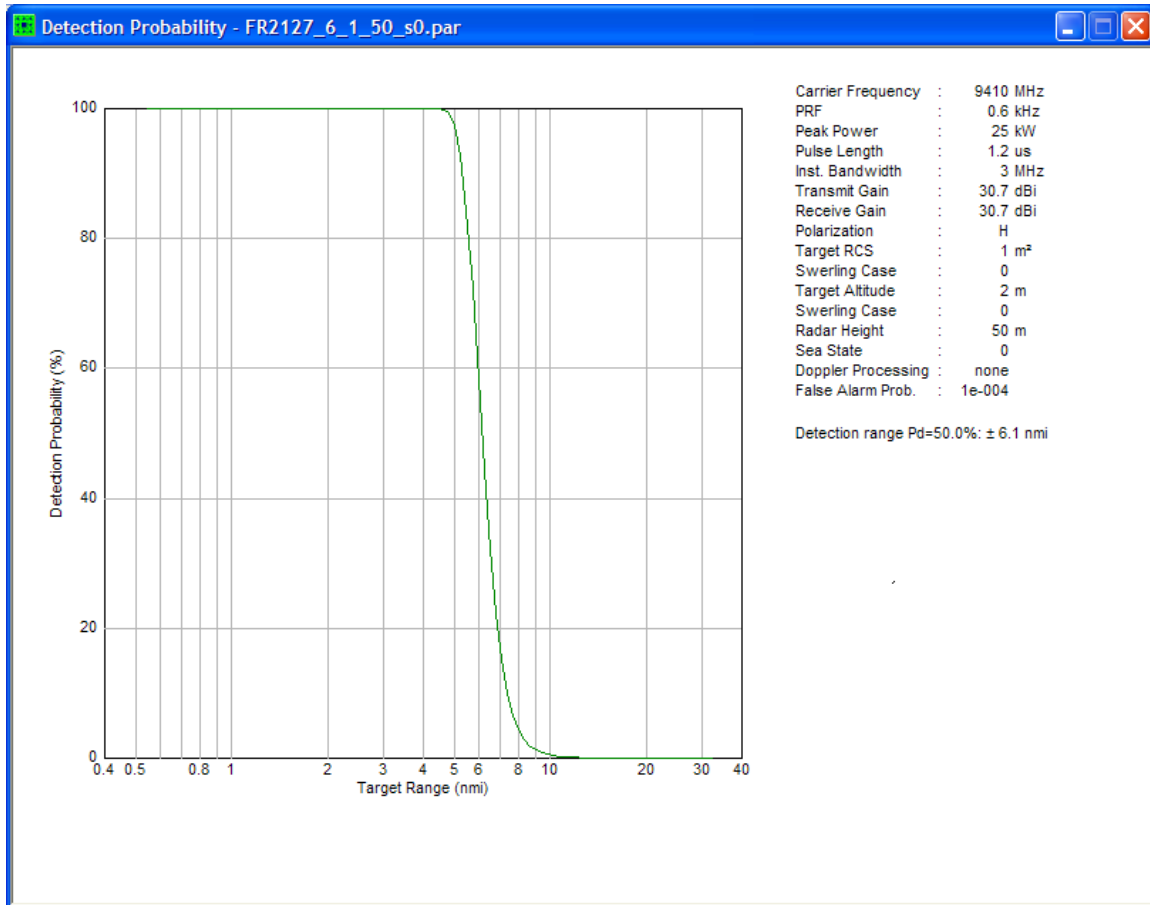
Radar Detection Comparison

Furuno 2127 – 25kw with 8ft Antenna (10m² target)



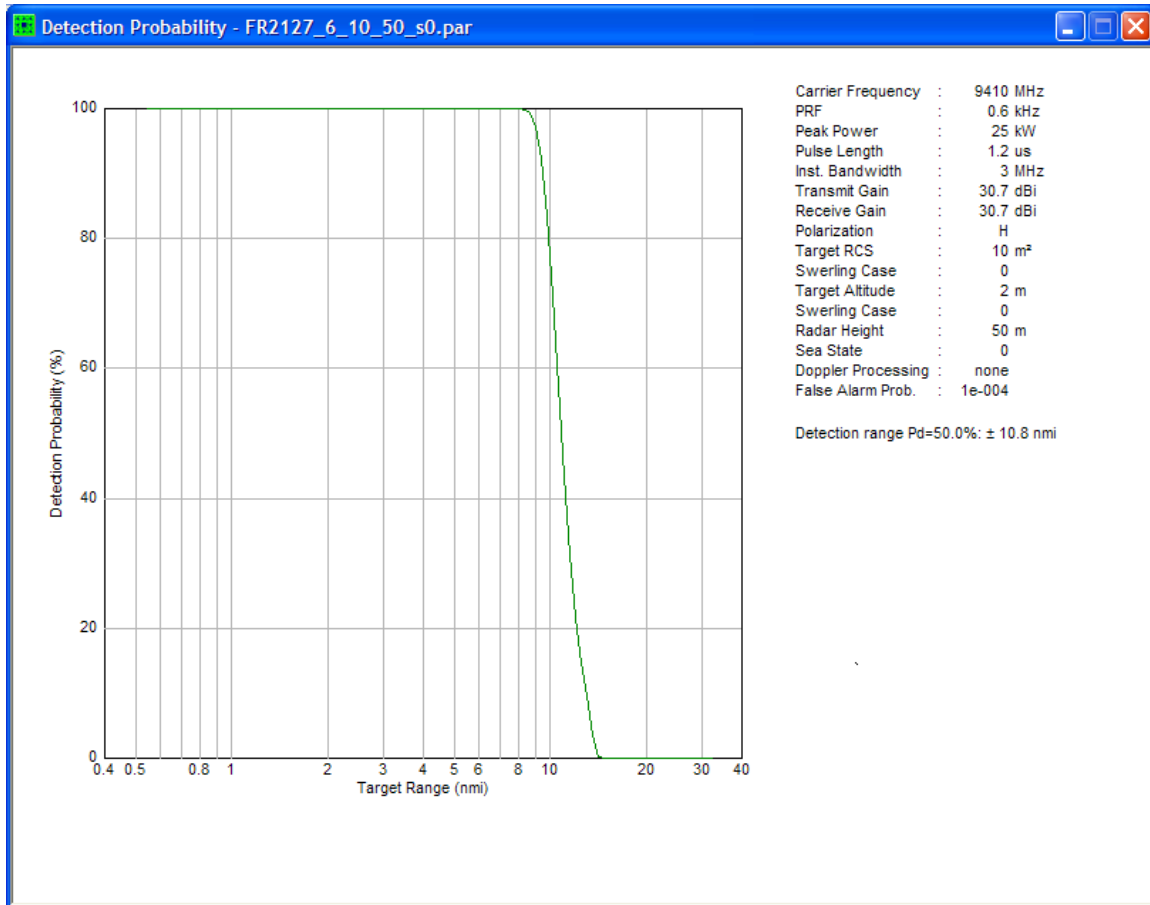
Radar Detection Comparison

Furuno 2127 – 25kw with 6.5ft Antenna (1m² target)



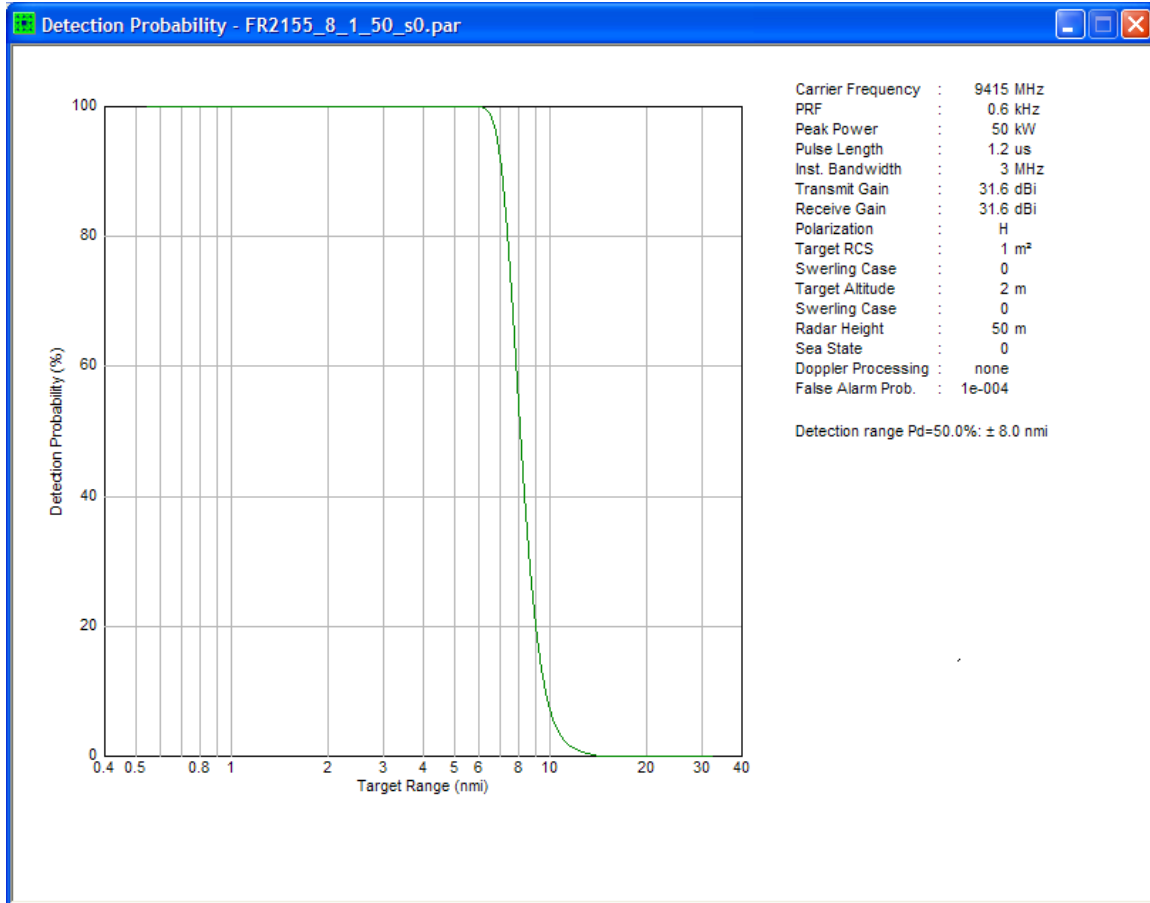
Radar Detection Comparison

Furuno 2127 – 25kw with 6.5ft Antenna (10m² target)



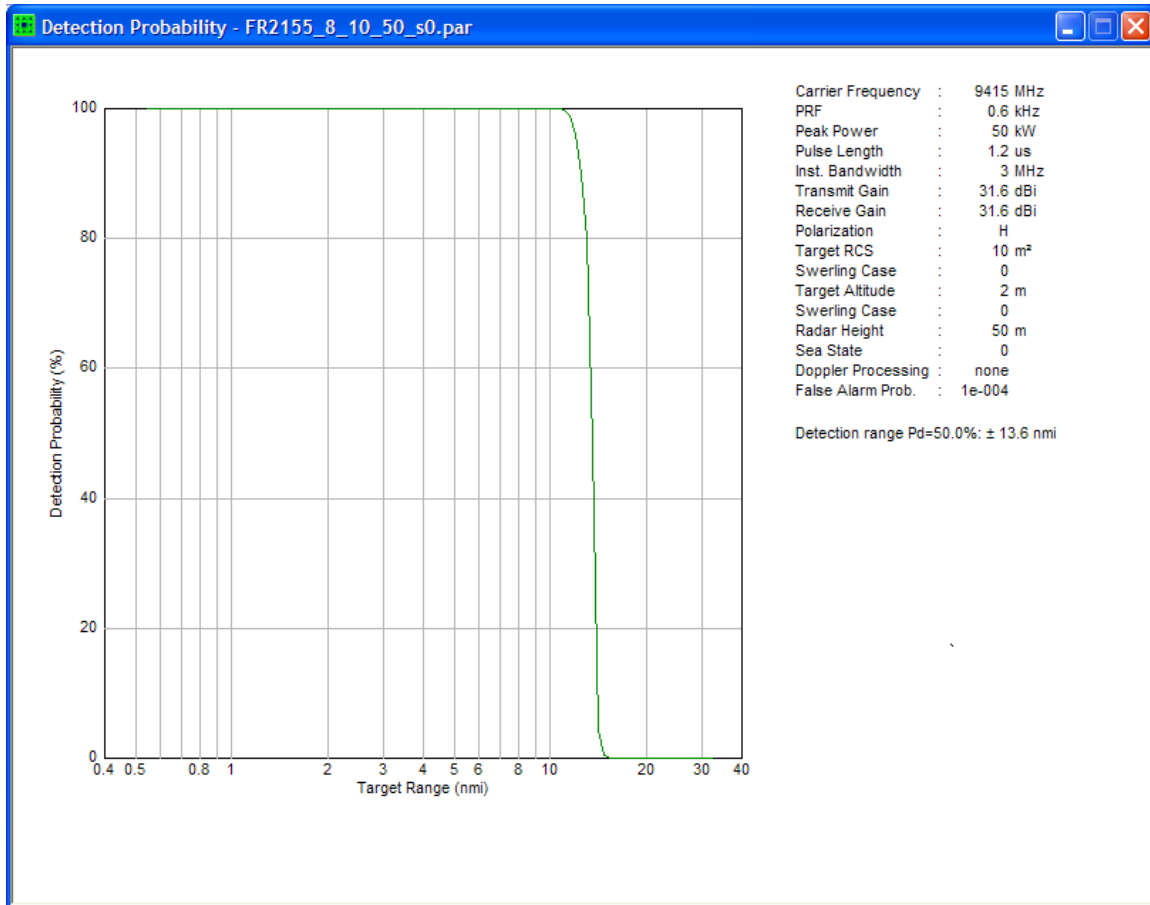
Radar Detection Comparison

Furuno 2155 – 50kw with 8ft Antenna (1m² target)



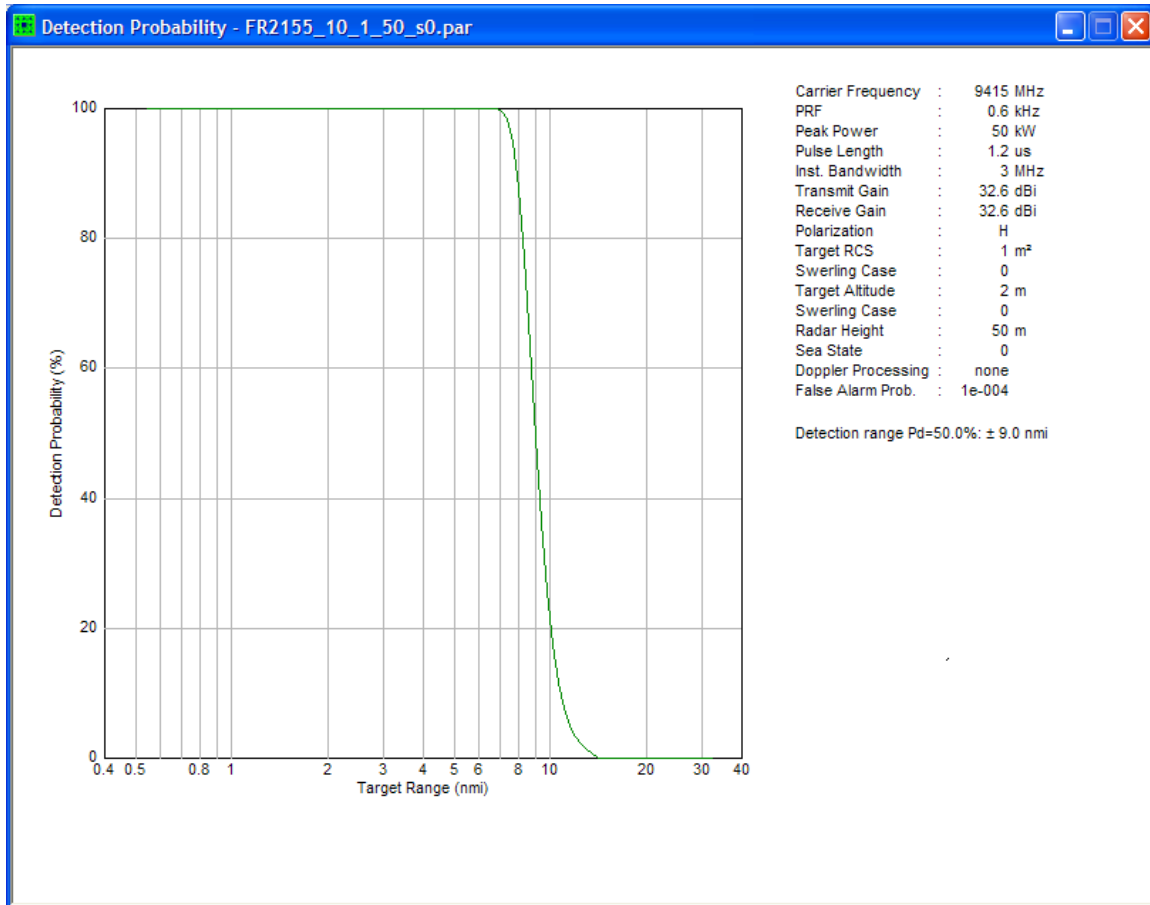
Radar Detection Comparison

Furuno 2155 – 50kw with 8ft Antenna (10m² target)



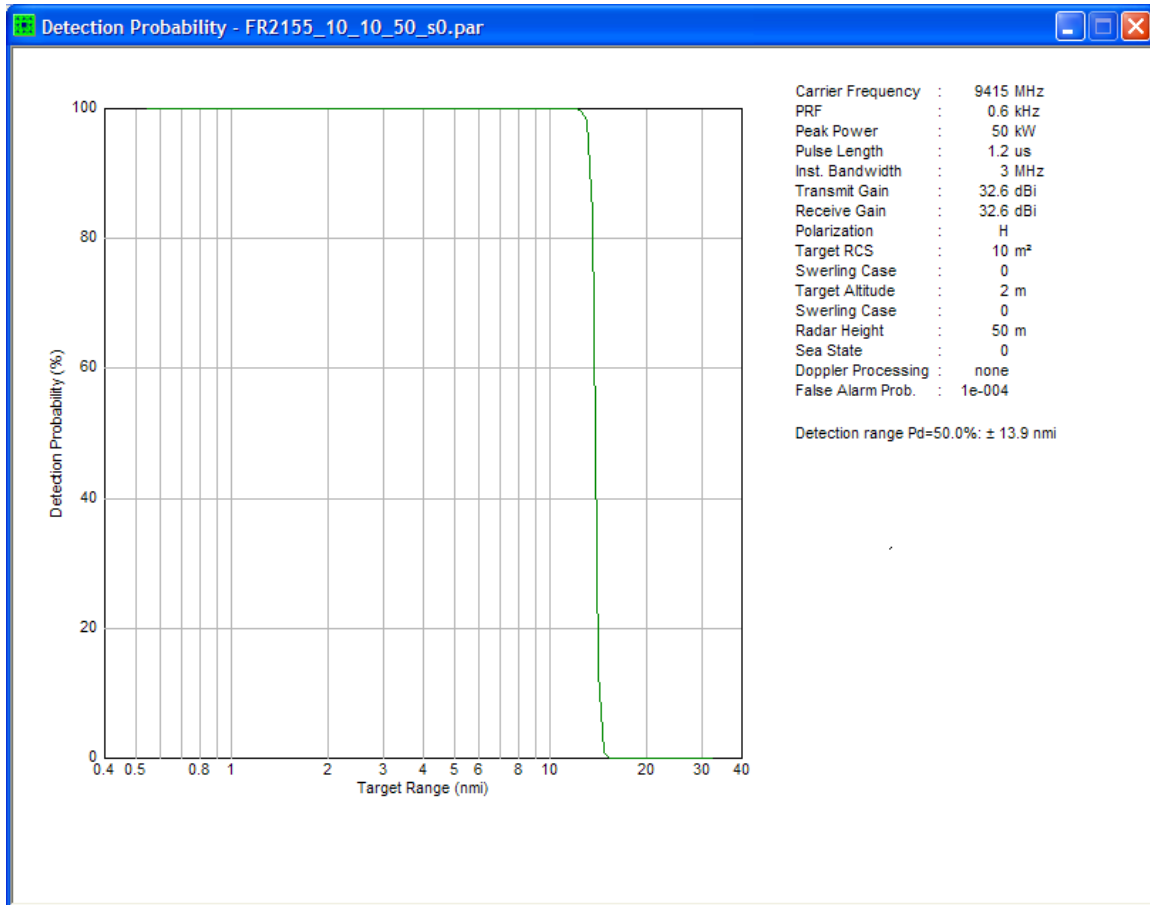
Radar Detection Comparison

Furuno 2155 – 50kw with 10ft Antenna (1m² target)



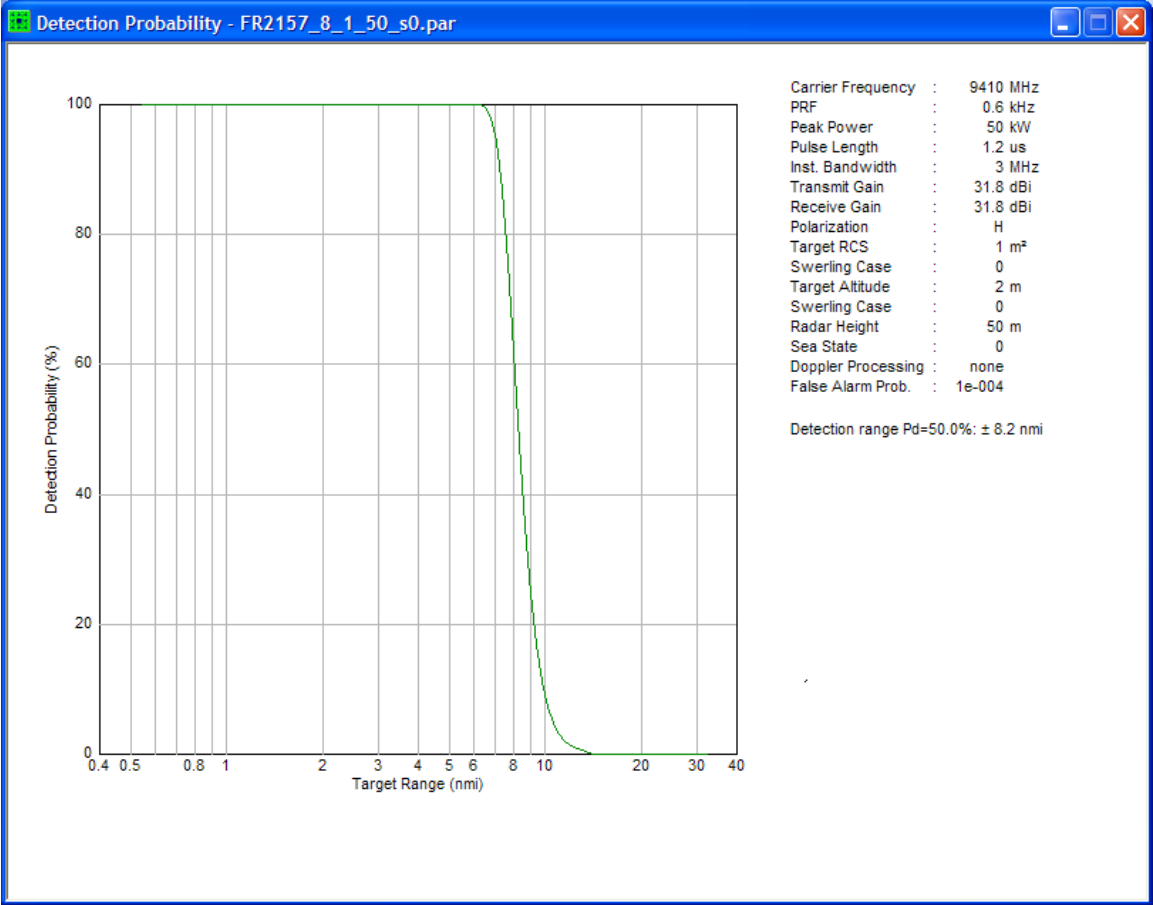
Radar Detection Comparison

Furuno 2155 – 50kw with 10ft Antenna (10m² target)



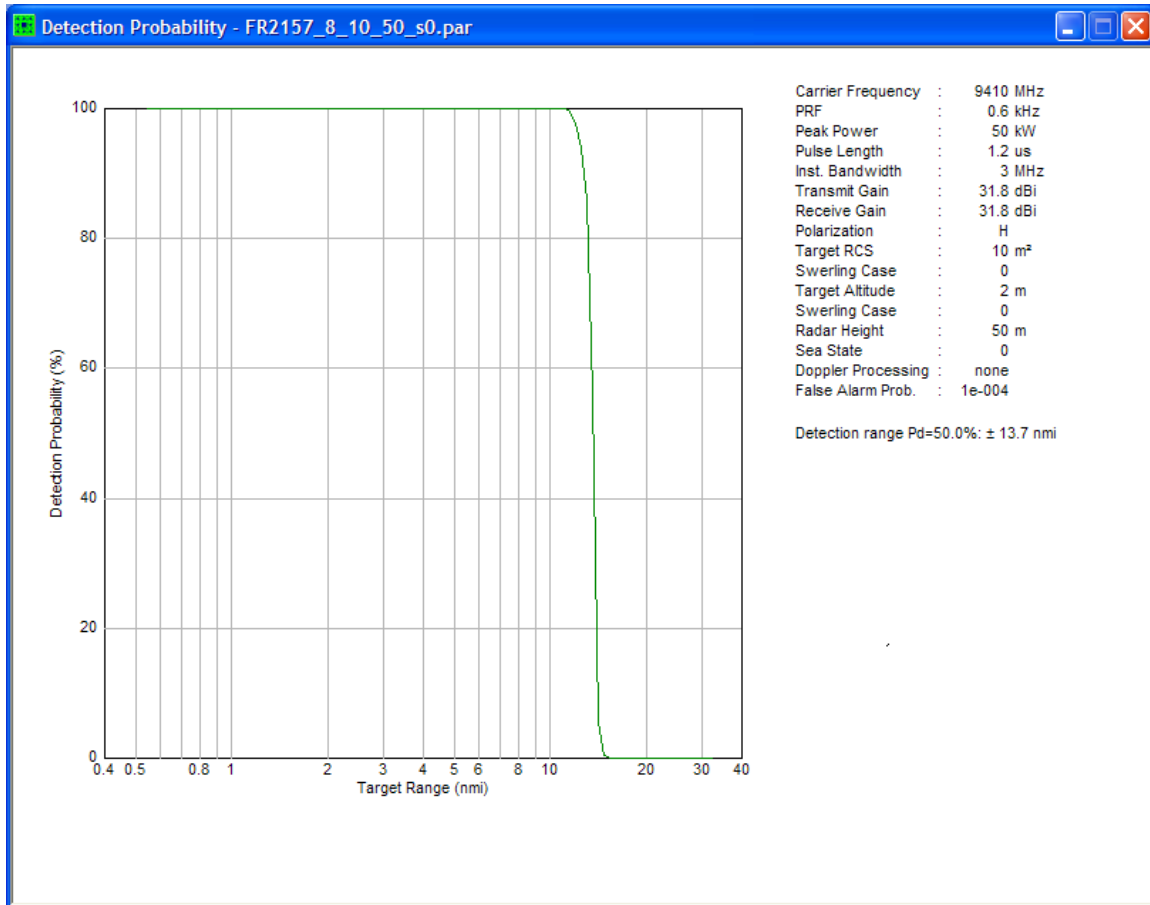
Radar Detection Comparison

Furuno 2157 – 50kw with 8ft Antenna (1m² target)



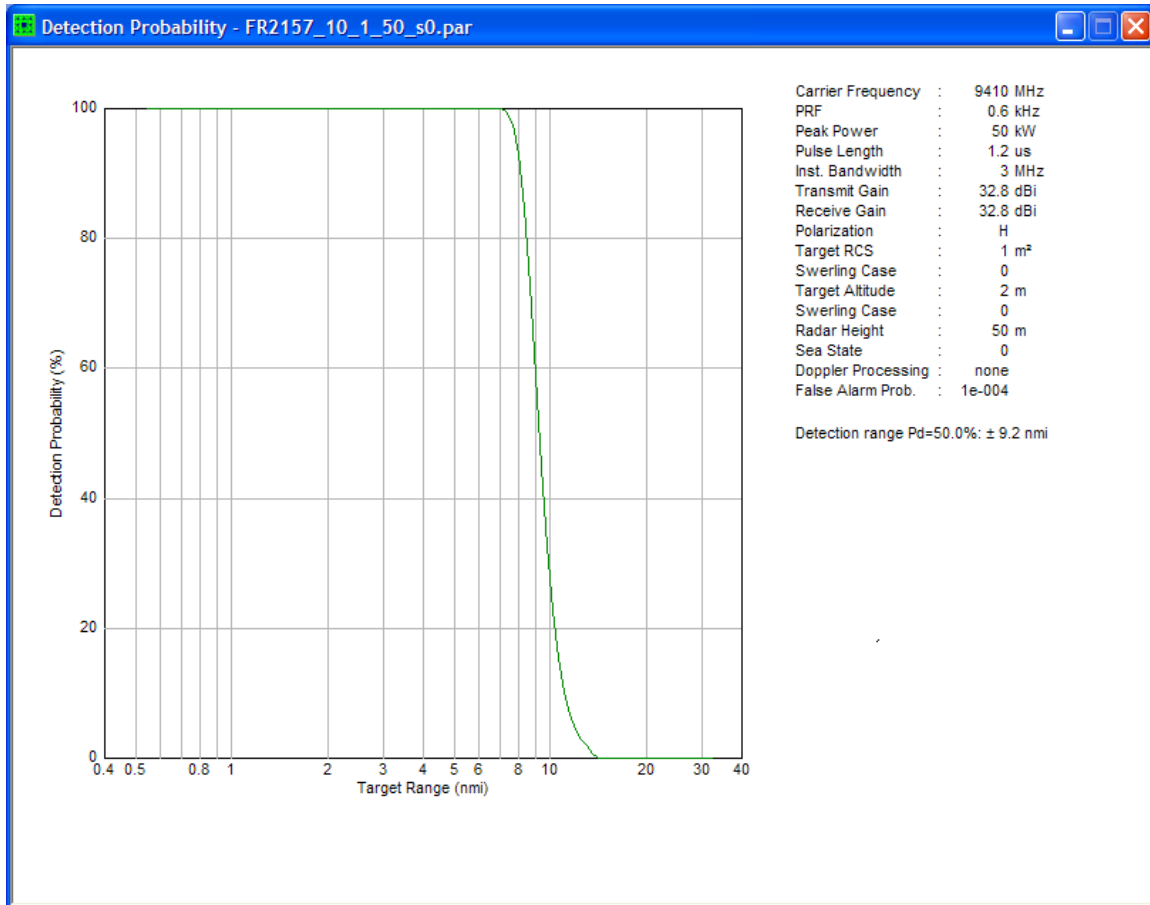
Radar Detection Comparison

Furuno 2157 – 50kw with 8ft Antenna (10m² target)



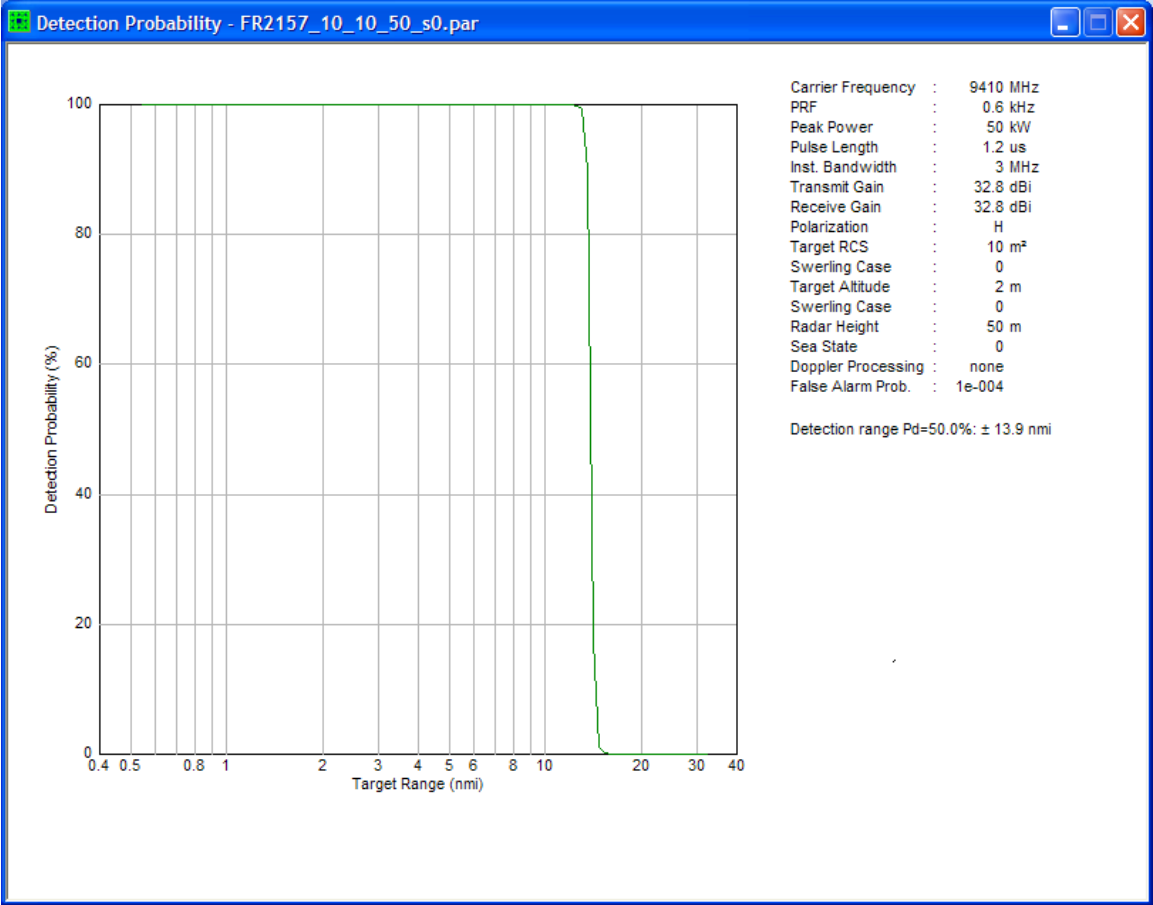
Radar Detection Comparison

Furuno 2157 – 50kw with 10ft Antenna (1m² target)



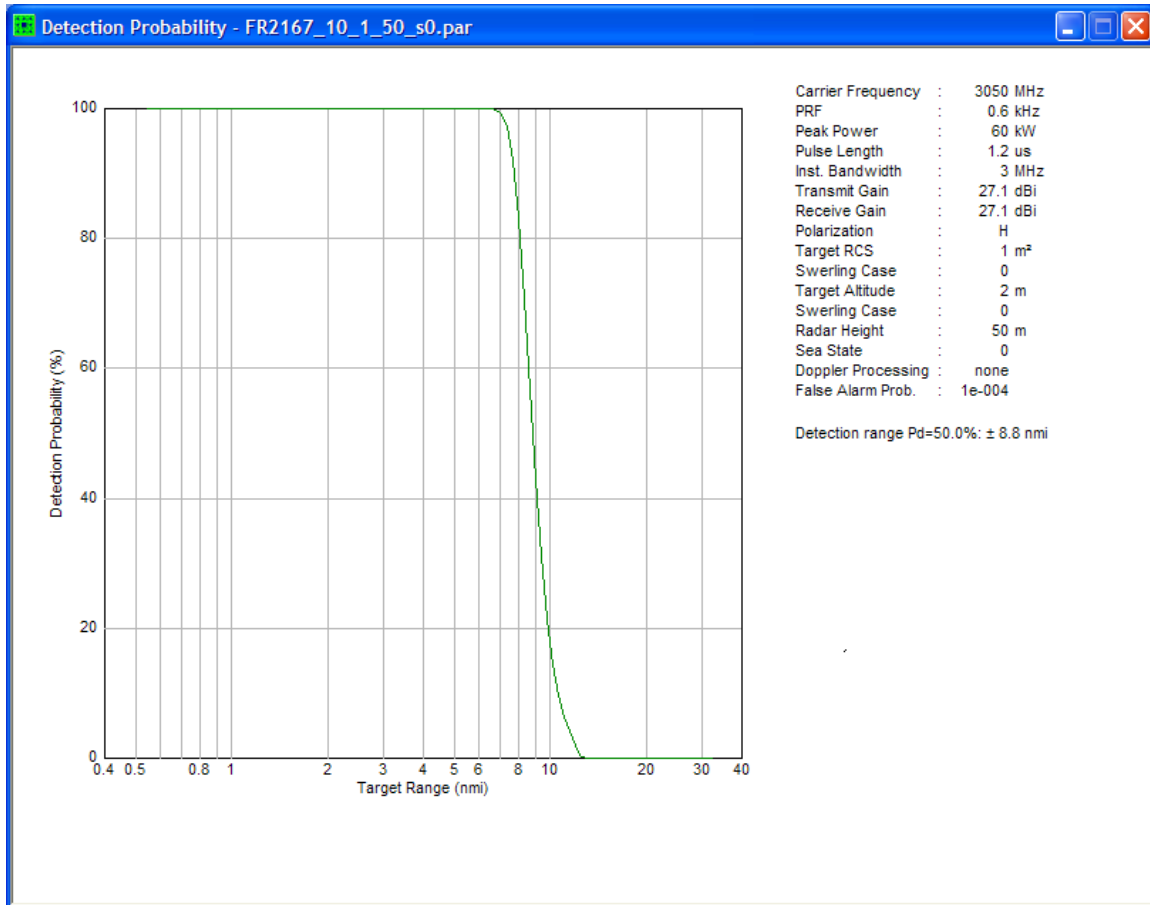
Radar Detection Comparison

Furuno 2157 – 50kw with 10ft Antenna (10m² target)



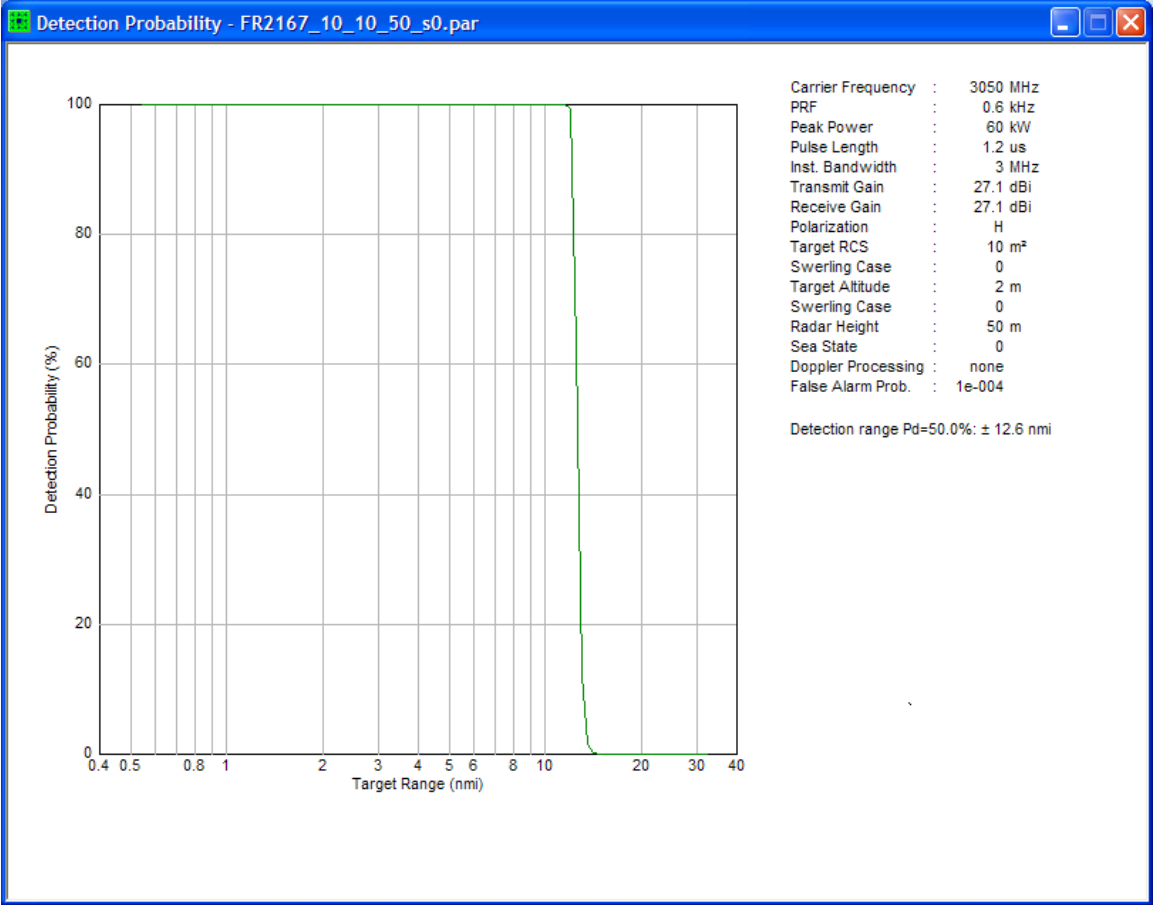
Radar Detection Comparison

Furuno 2167 – 60kw with 10ft Antenna (1m² target)



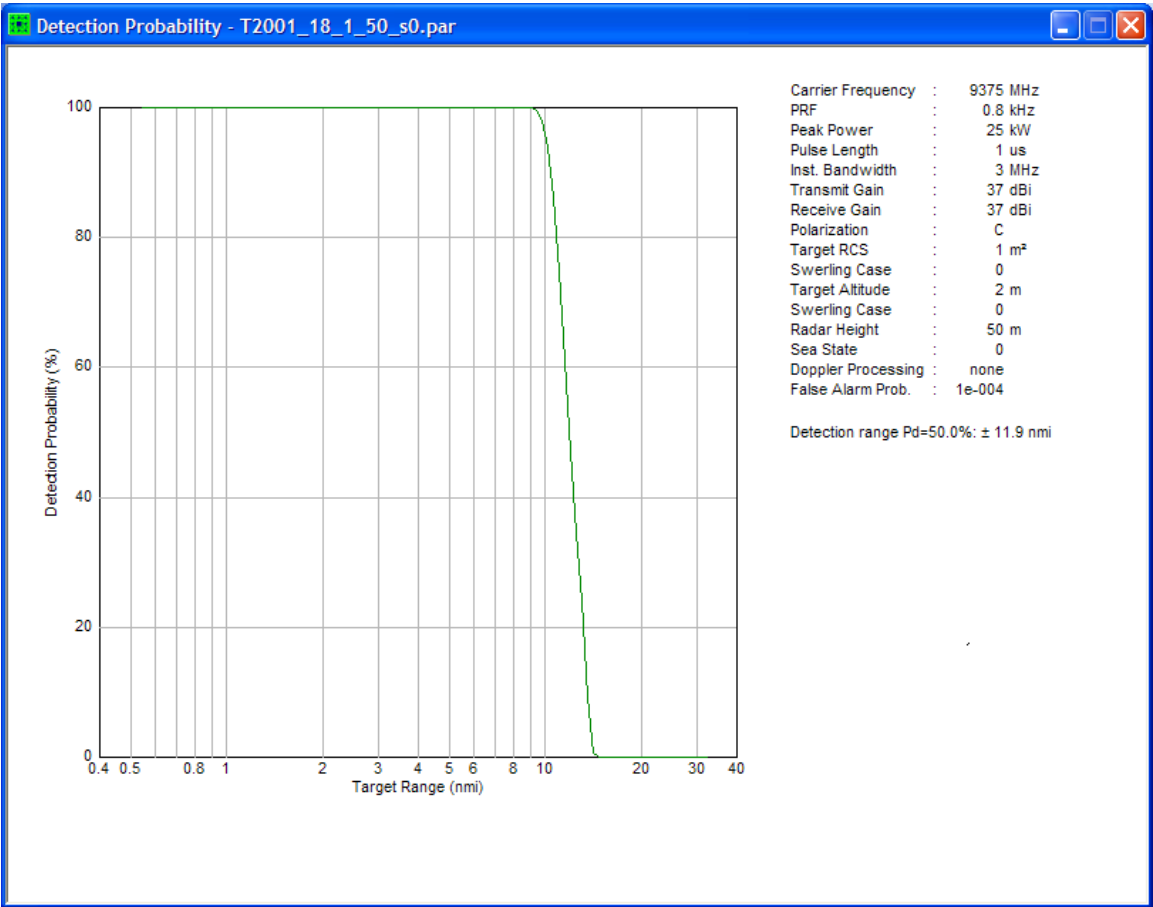
Radar Detection Comparison

Furuno 2167 – 60kw with 10ft Antenna (10m² target)



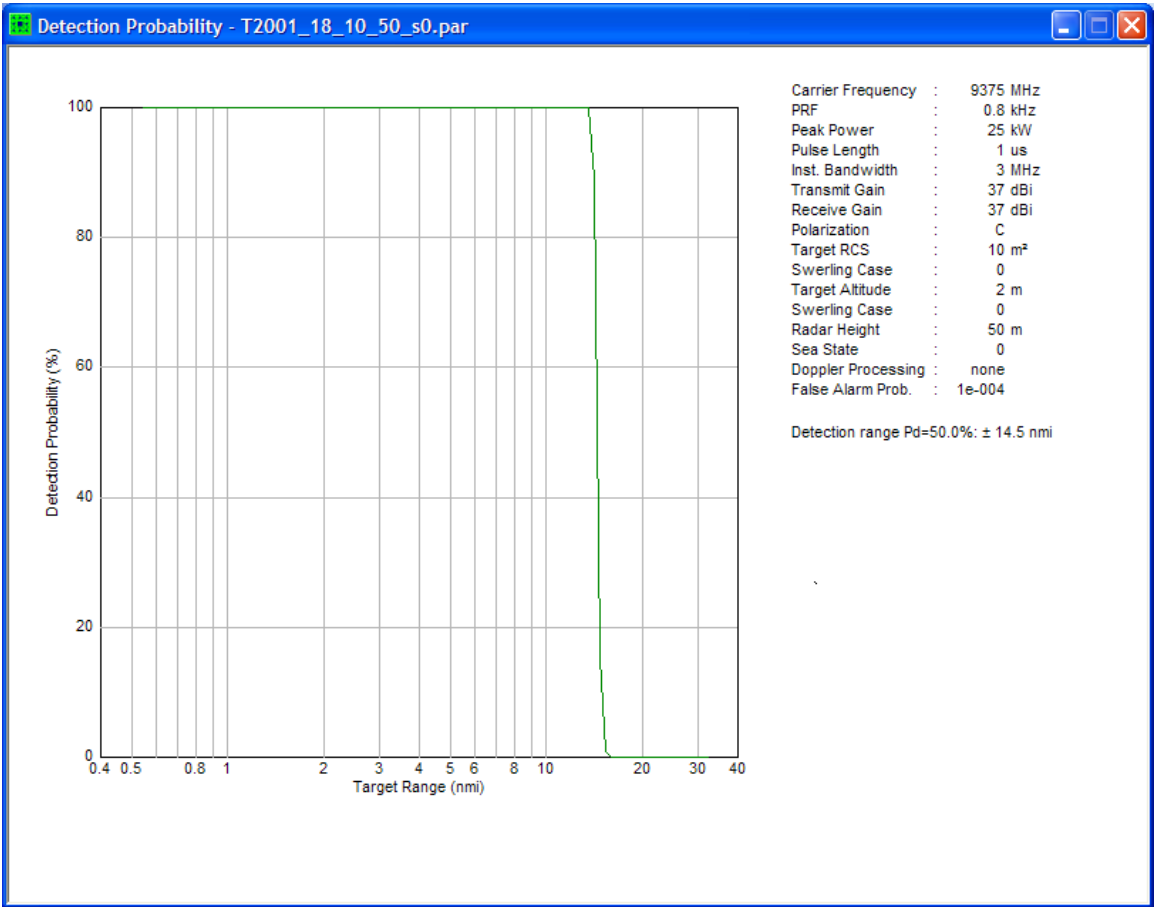
Radar Detection Comparison

Terma Scanter – 25kw with 18ft Antenna (1m² target)



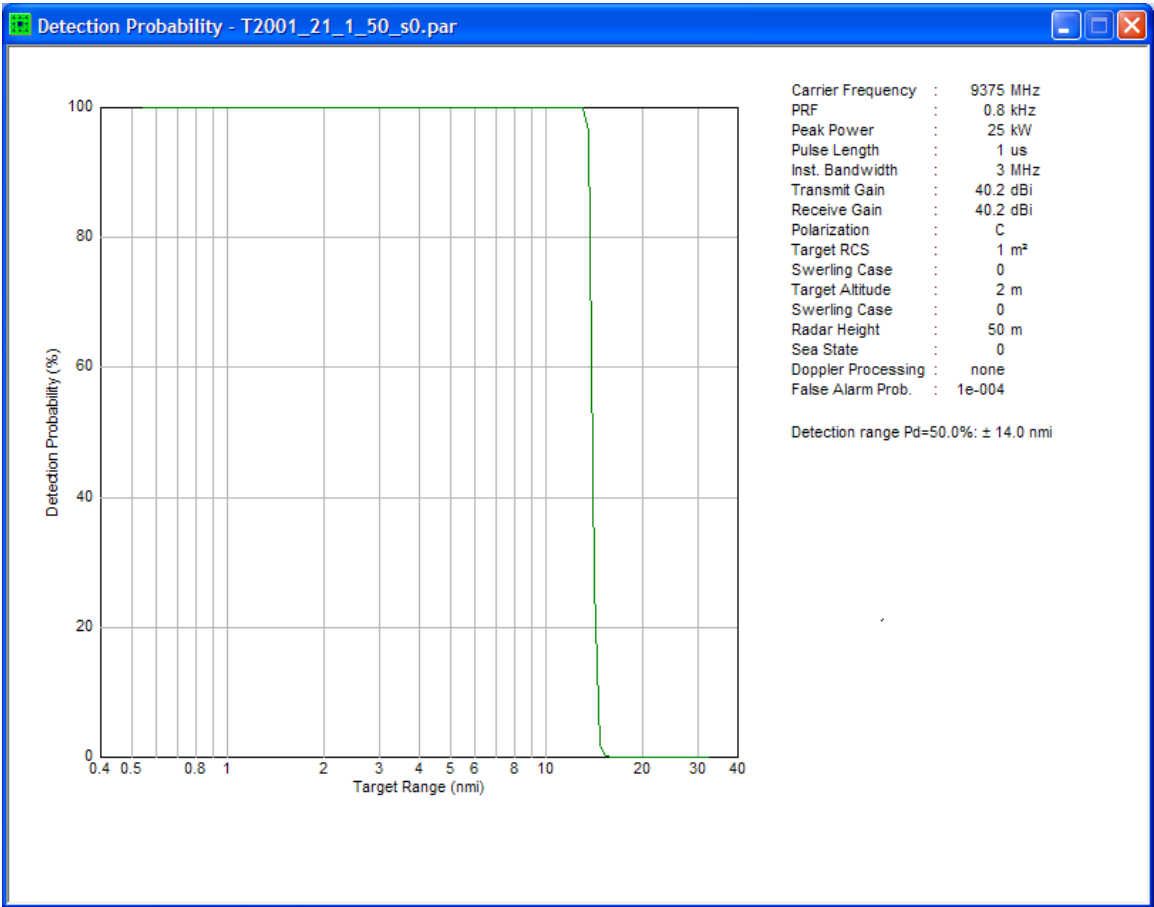
Radar Detection Comparison

Terma Scanter – 25kw with 18ft Antenna (10m² target)



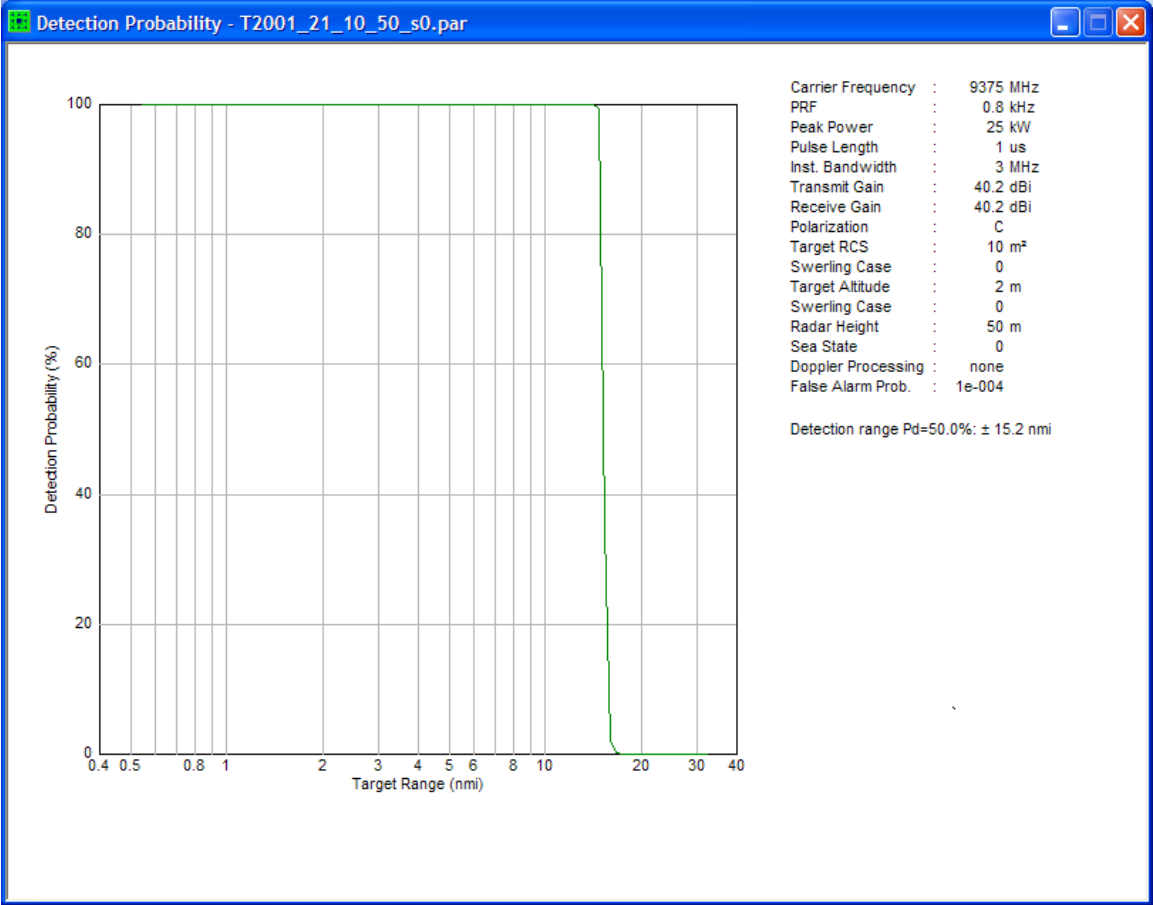
Radar Detection Comparison

Terma Scanter – 25kw with 21ft Antenna (1m² target)



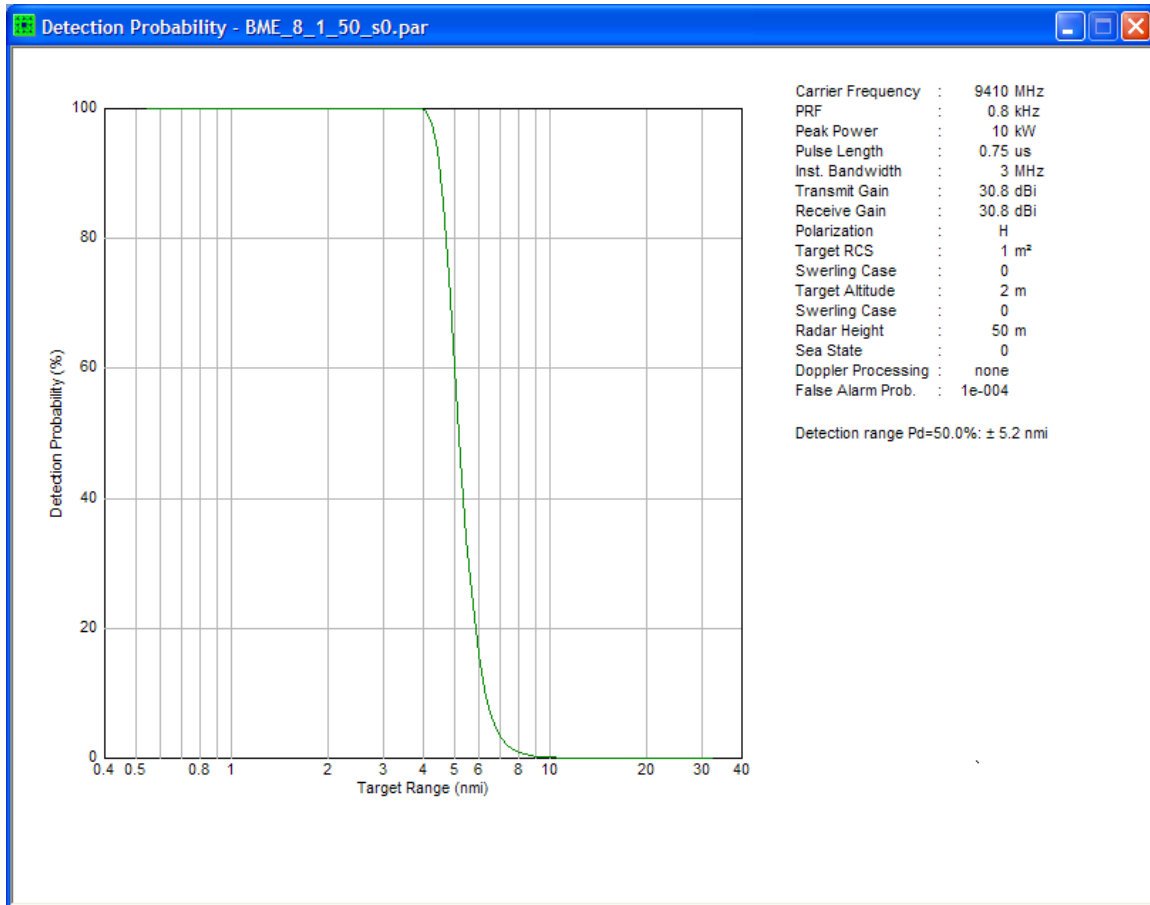
Radar Detection Comparison

Terma Scanner – 25kw with 21ft Antenna (10m² target)



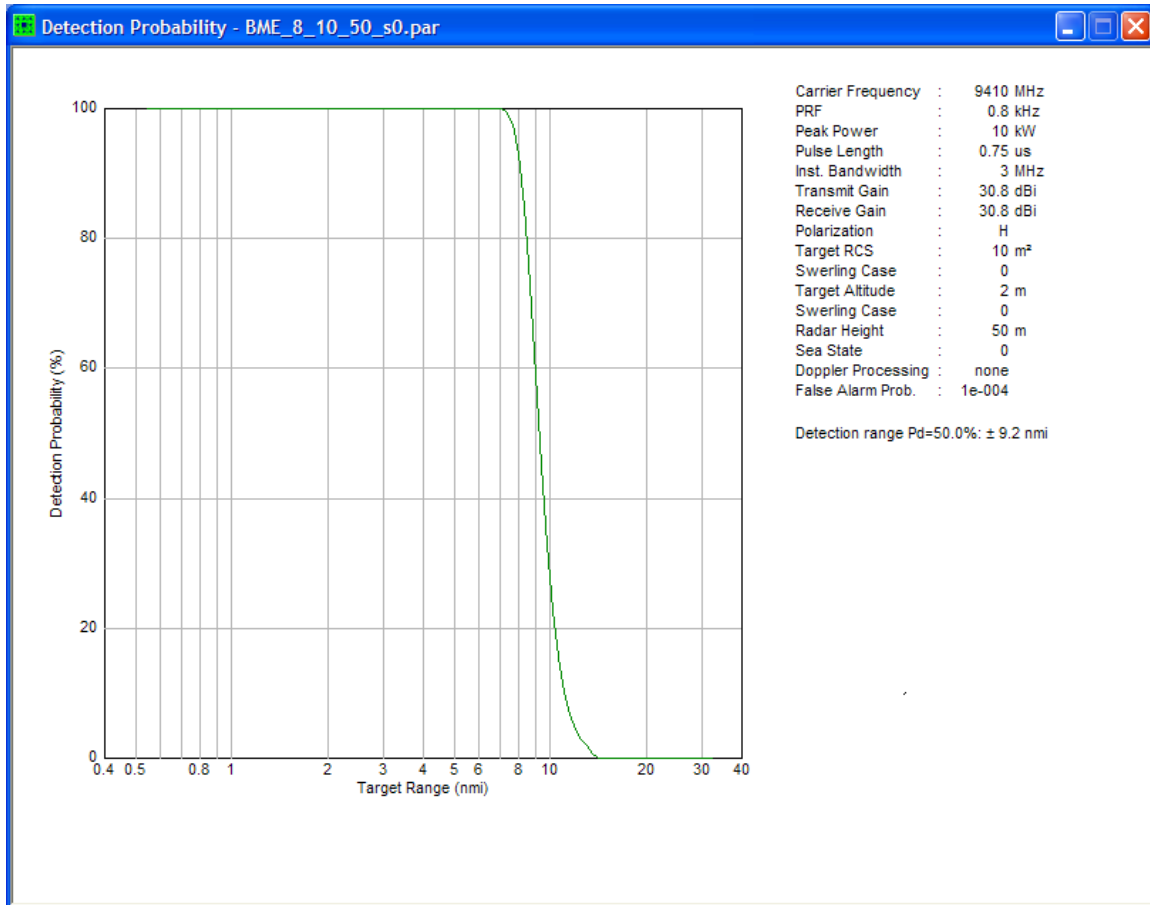
Radar Detection Comparison

BME X-Band – 10kw with 8ft Antenna (1m² target)



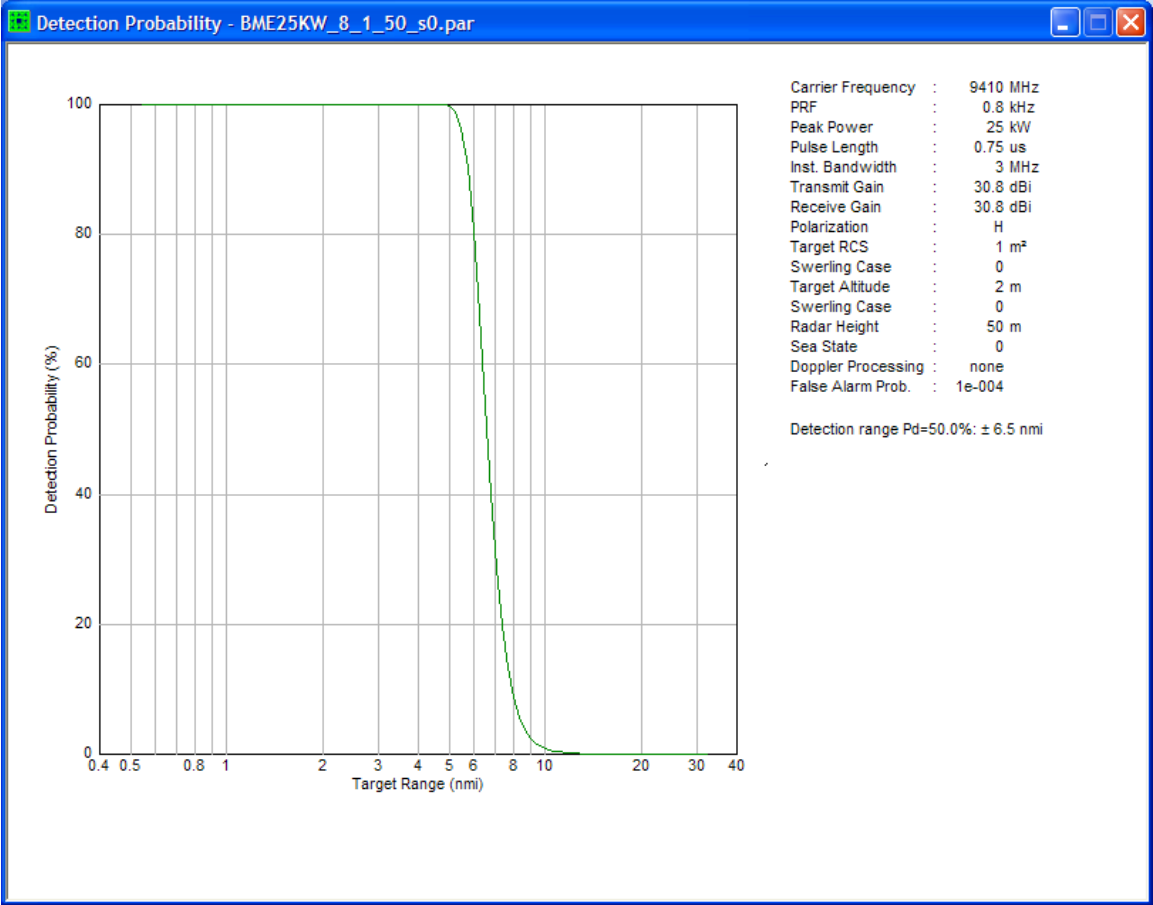
Radar Detection Comparison

BME X-Band – 10kw with 8ft Antenna (10m² target)



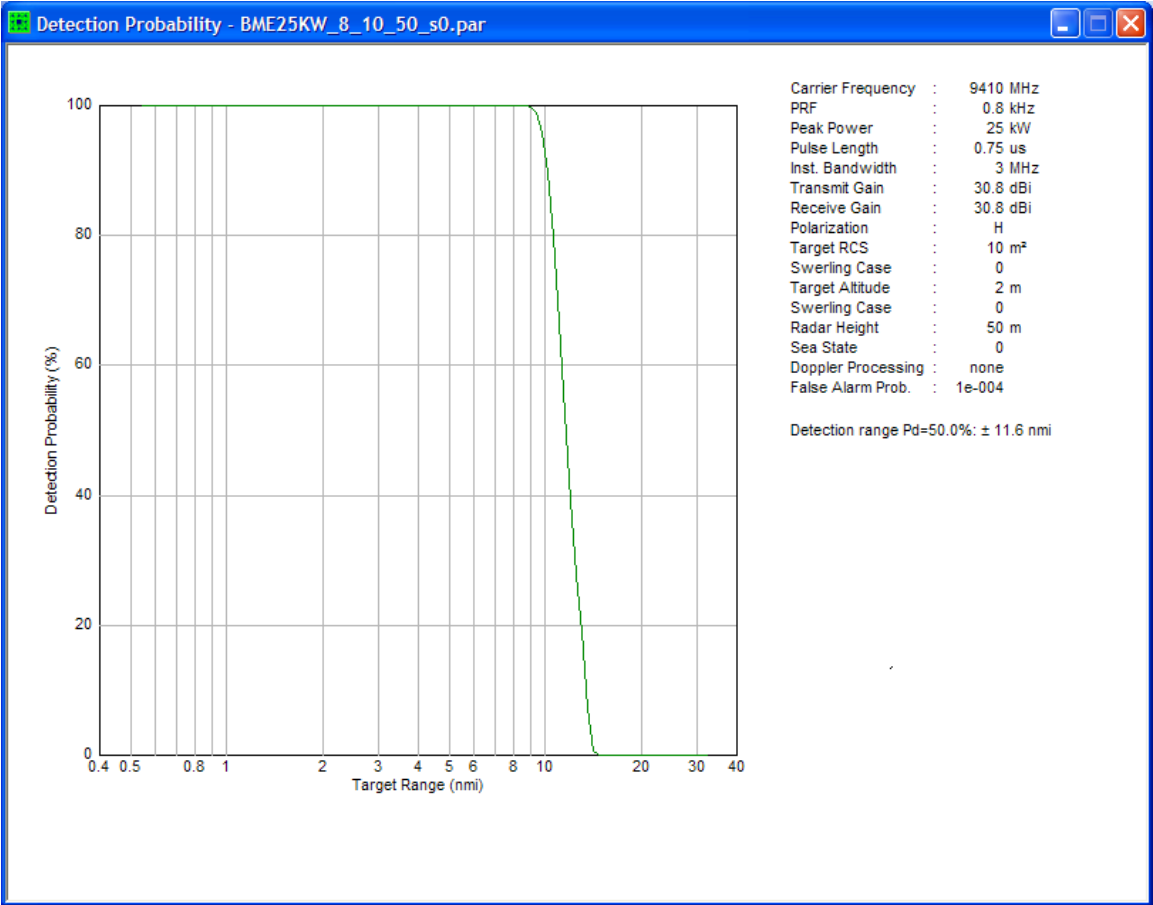
Radar Detection Comparison

BME X-Band – 25kw with 8ft Antenna (1m² target)



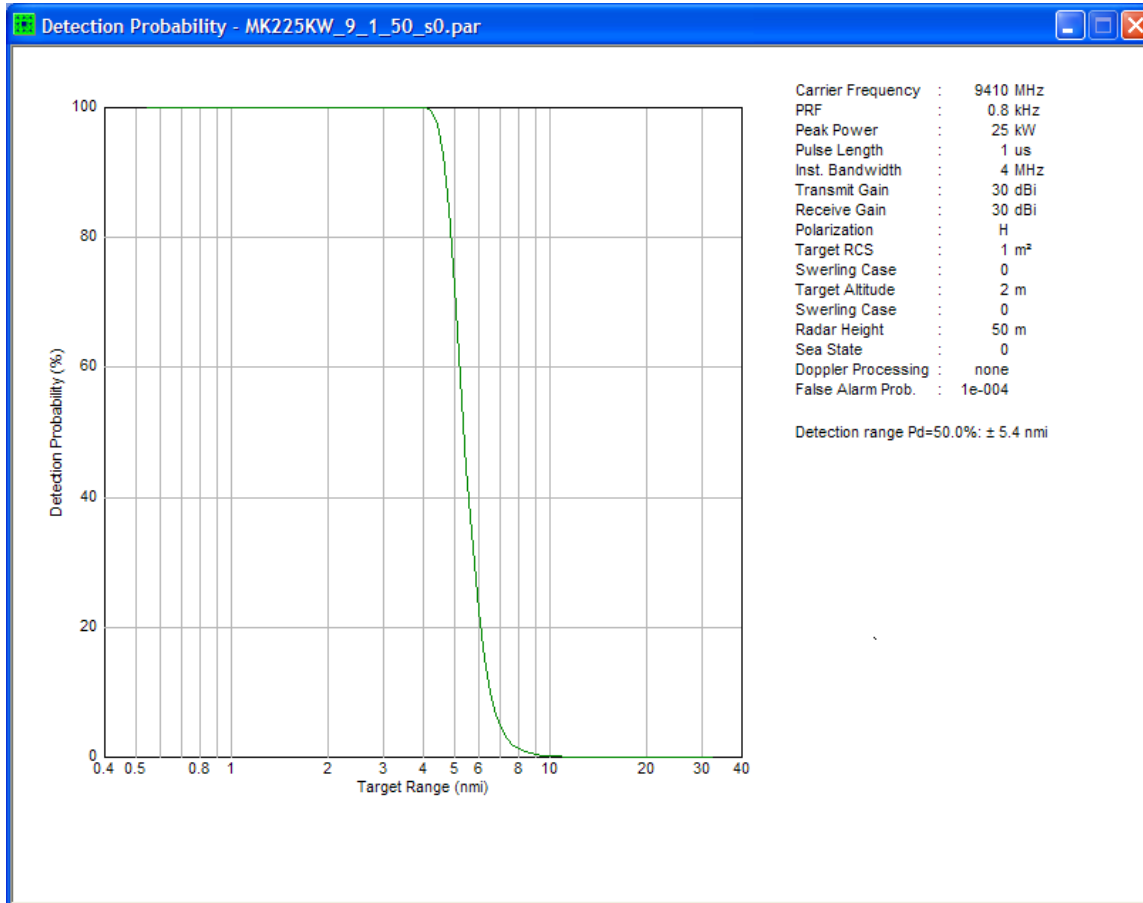
Radar Detection Comparison

BME X-Band – 25kw with 8ft Antenna (10m² target)



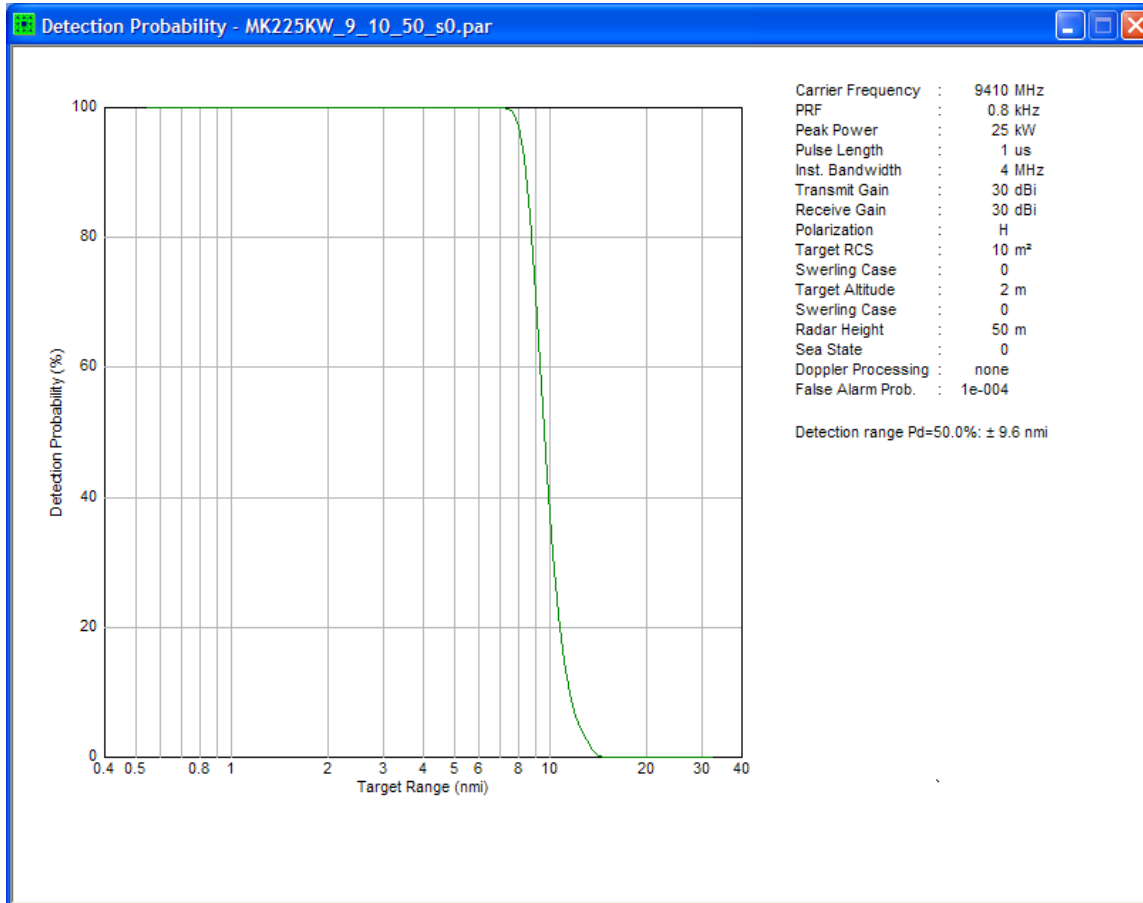
Radar Detection Comparison

Pathfinder MK2 X-Band – 25kw with 9ft Antenna (1m² target)



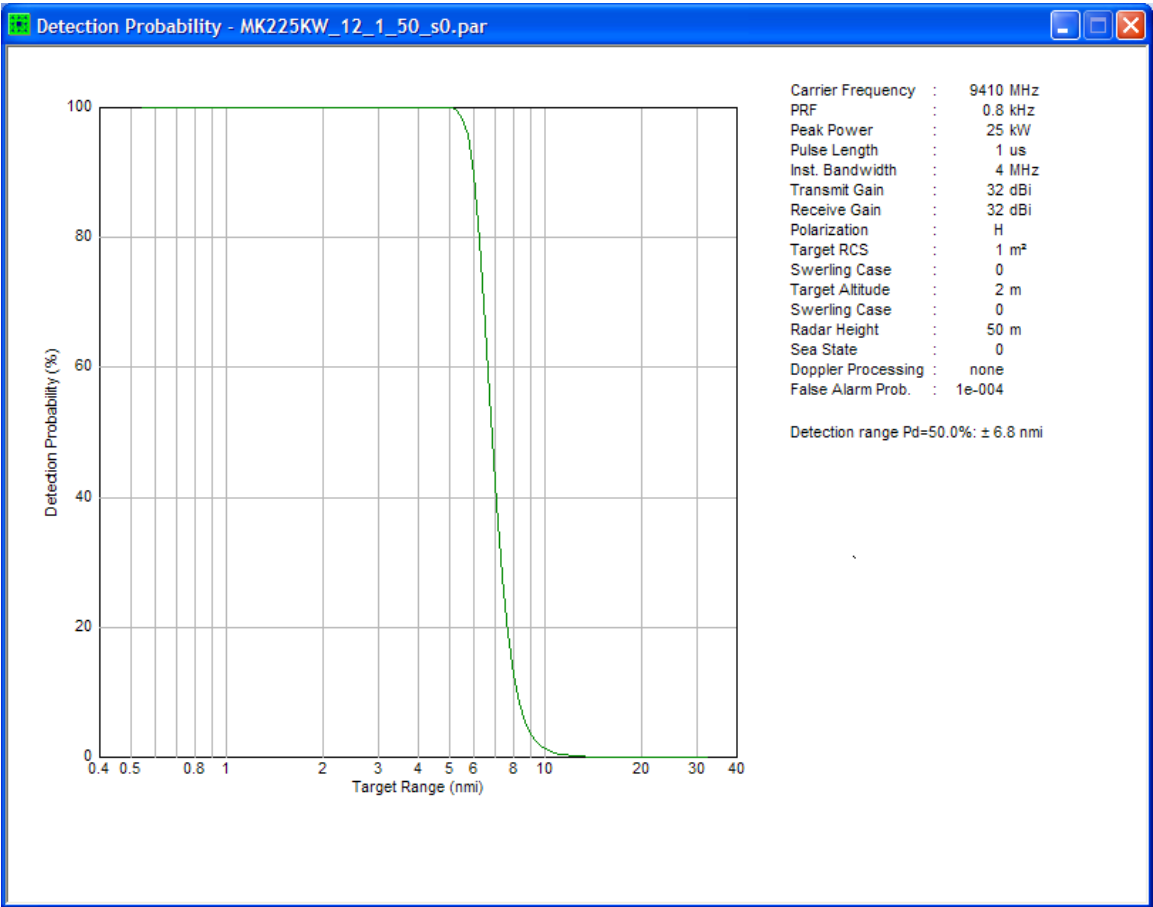
Radar Detection Comparison

Pathfinder MK2 X-Band – 25kw with 9ft Antenna (10m² target)



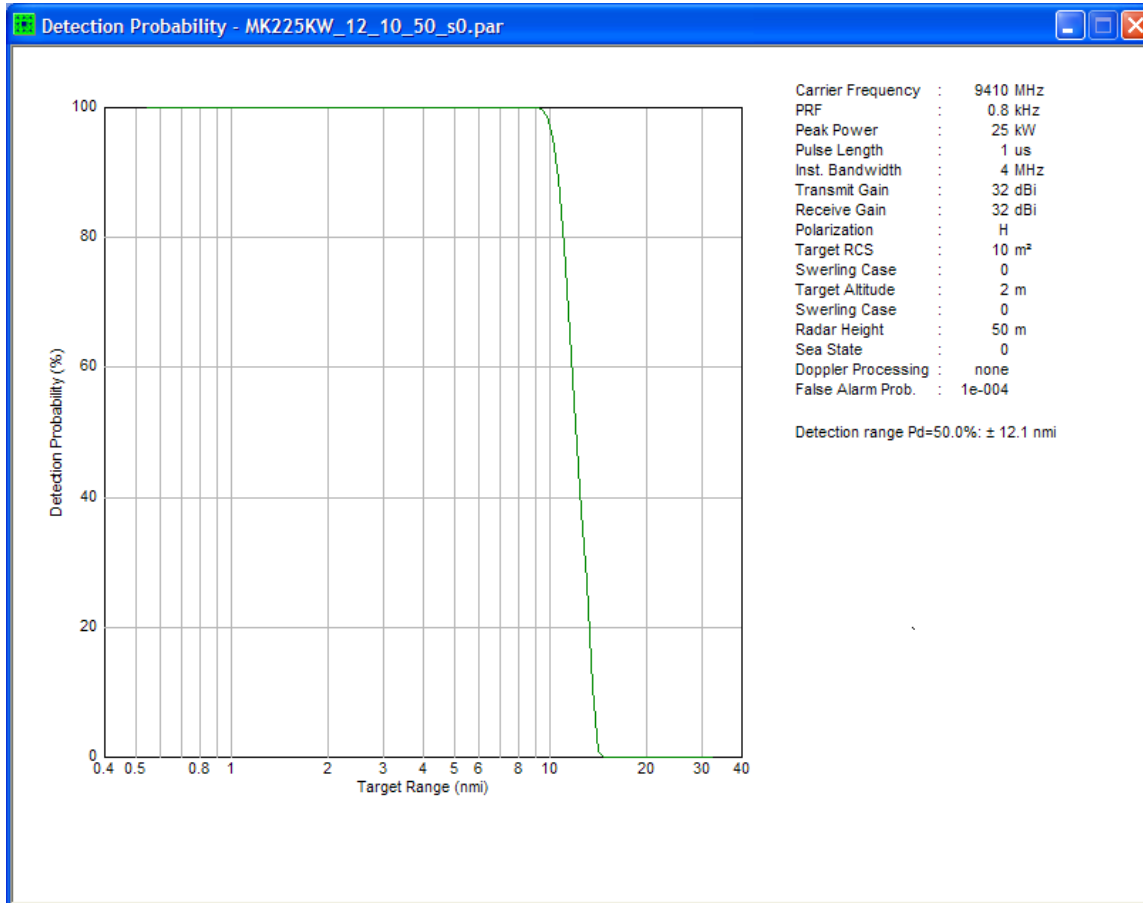
Radar Detection Comparison

Pathfinder MK2 X-Band – 25kw with 12ft Antenna (1m² target)



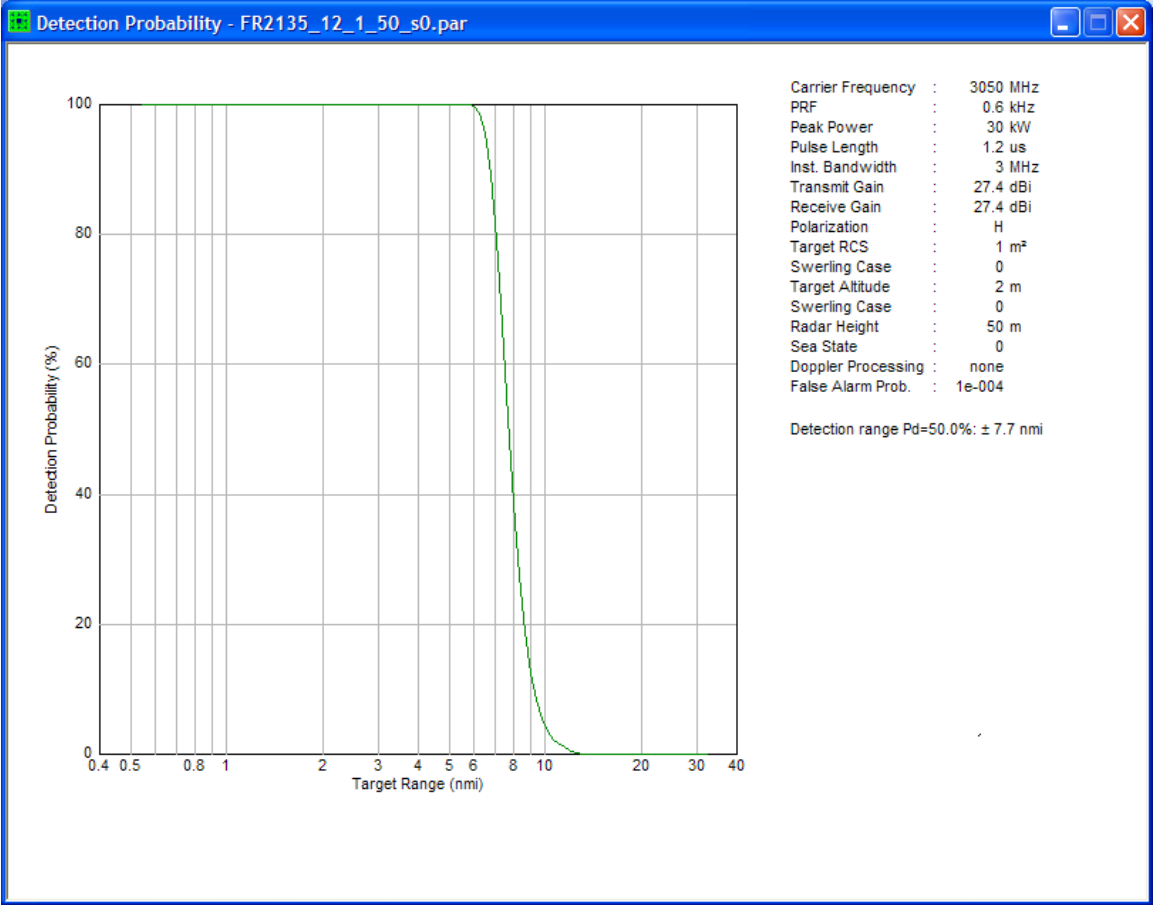
Radar Detection Comparison

Pathfinder MK2 X-Band – 25kw with 12ft Antenna (10m² target)



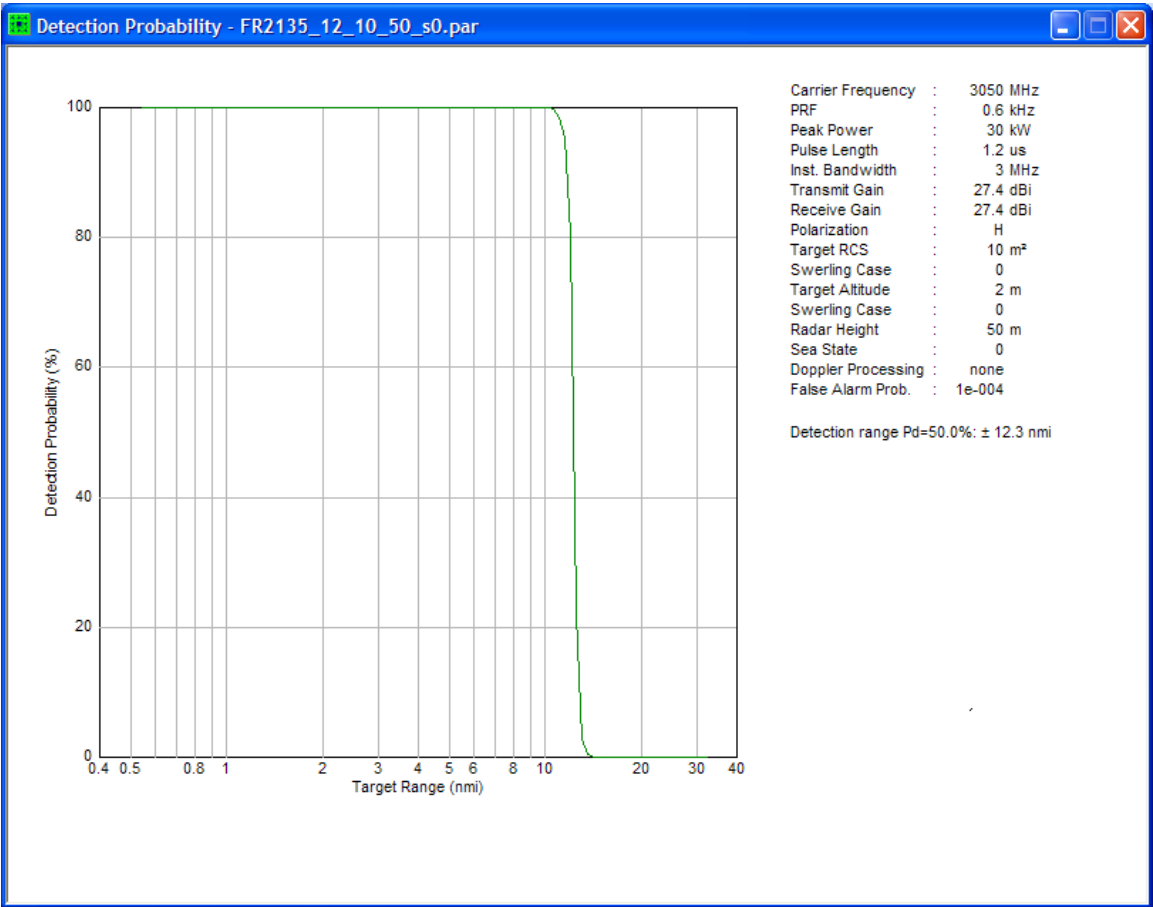
Radar Detection Comparison

Furuno 2135 S-Band – 30kw with 12ft Antenna (1m² target)



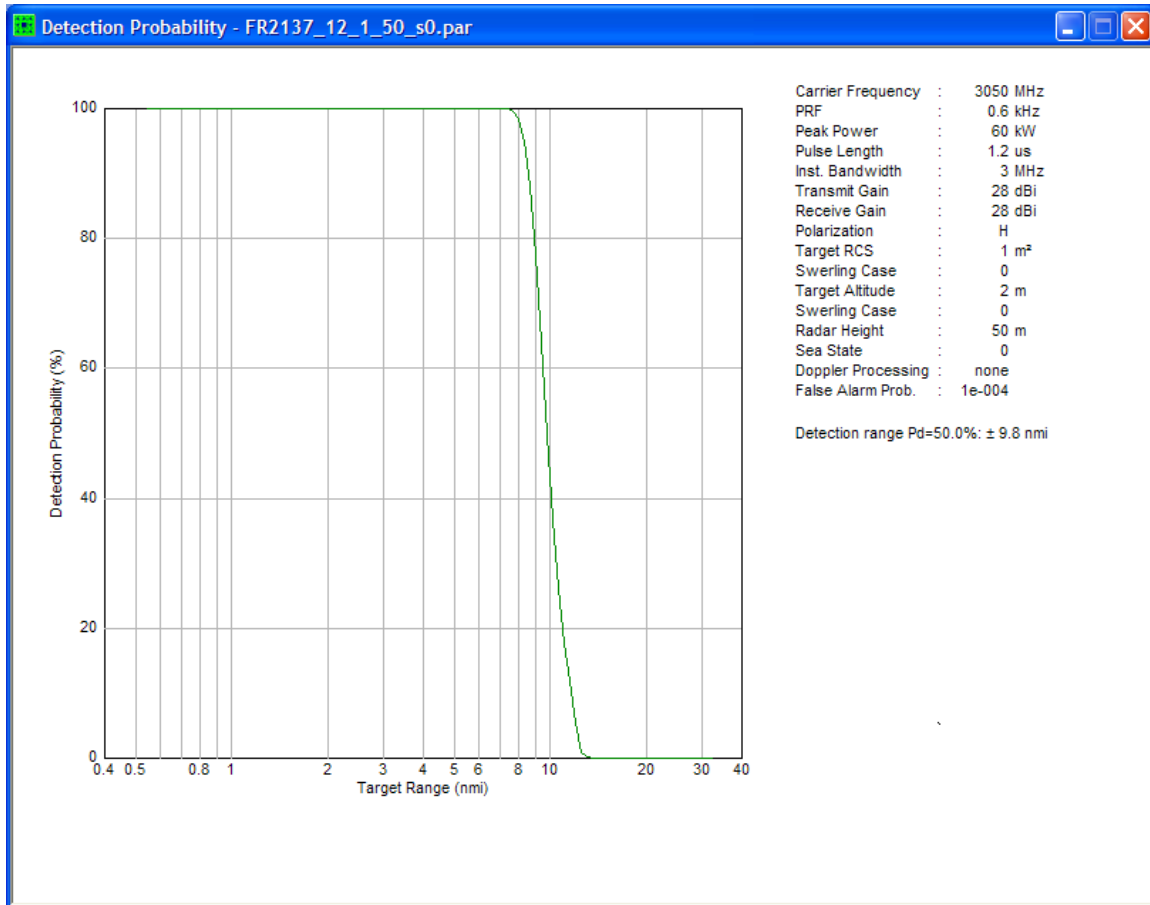
Radar Detection Comparison

Furuno 2135 S-Band – 30kw with 12ft Antenna (10m² target)



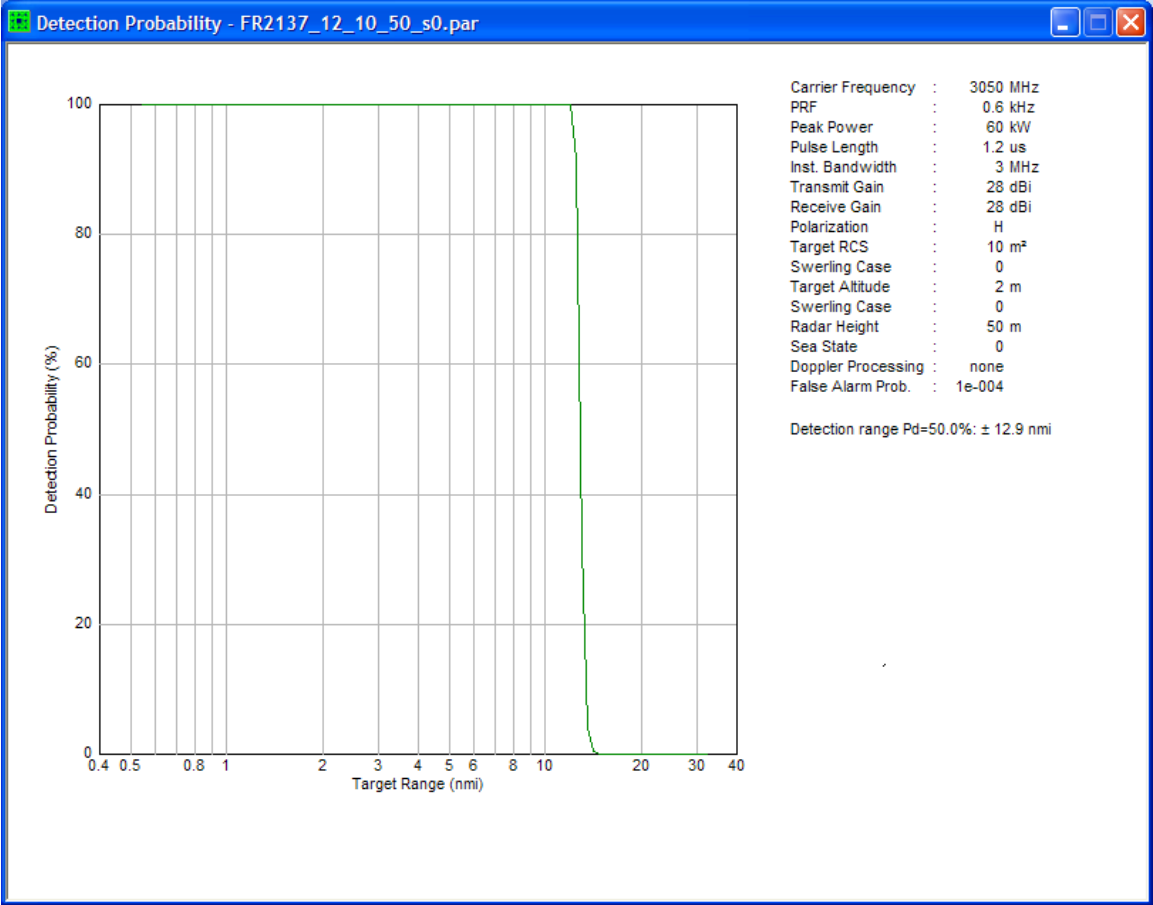
Radar Detection Comparison

Furuno 2137 S-Band – 60kw with 12ft Antenna (1m² target)



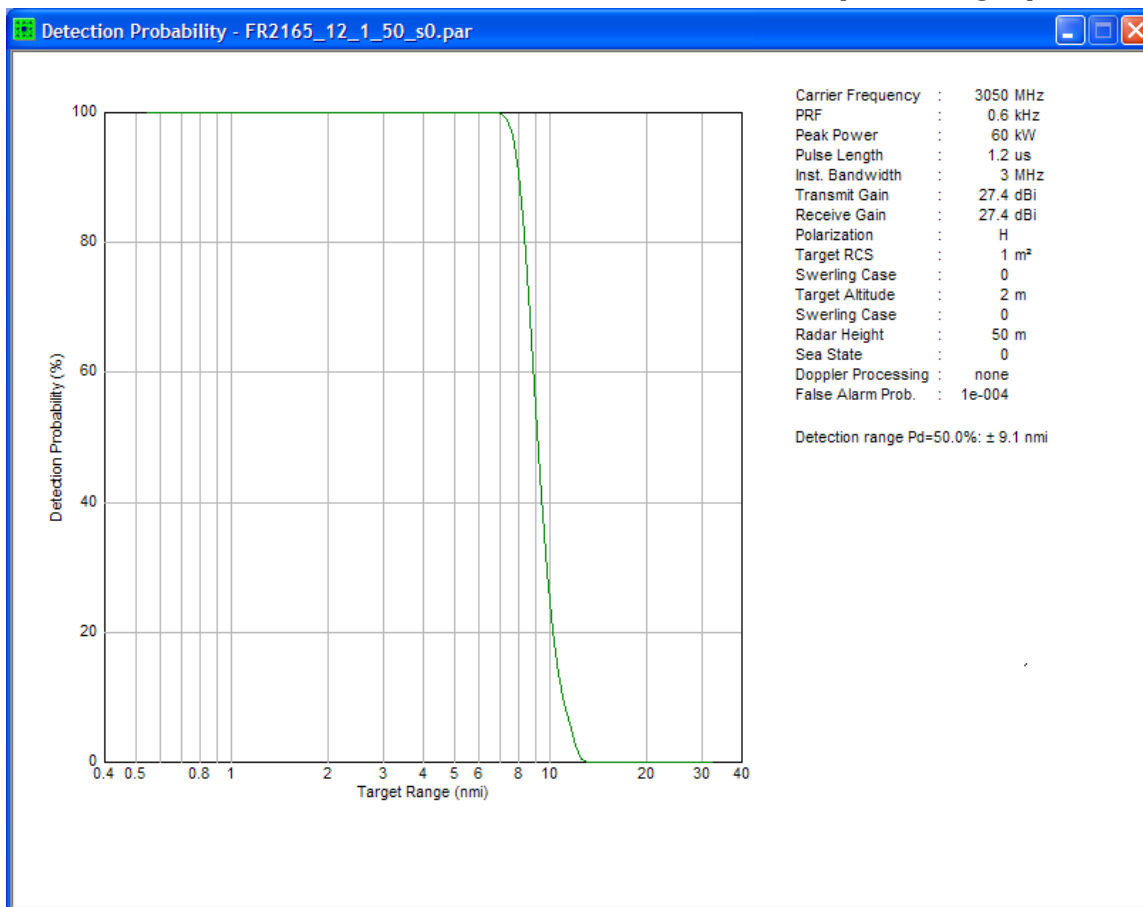
Radar Detection Comparison

Furuno 2137 S-Band – 60kw with 12ft Antenna (10m² target)



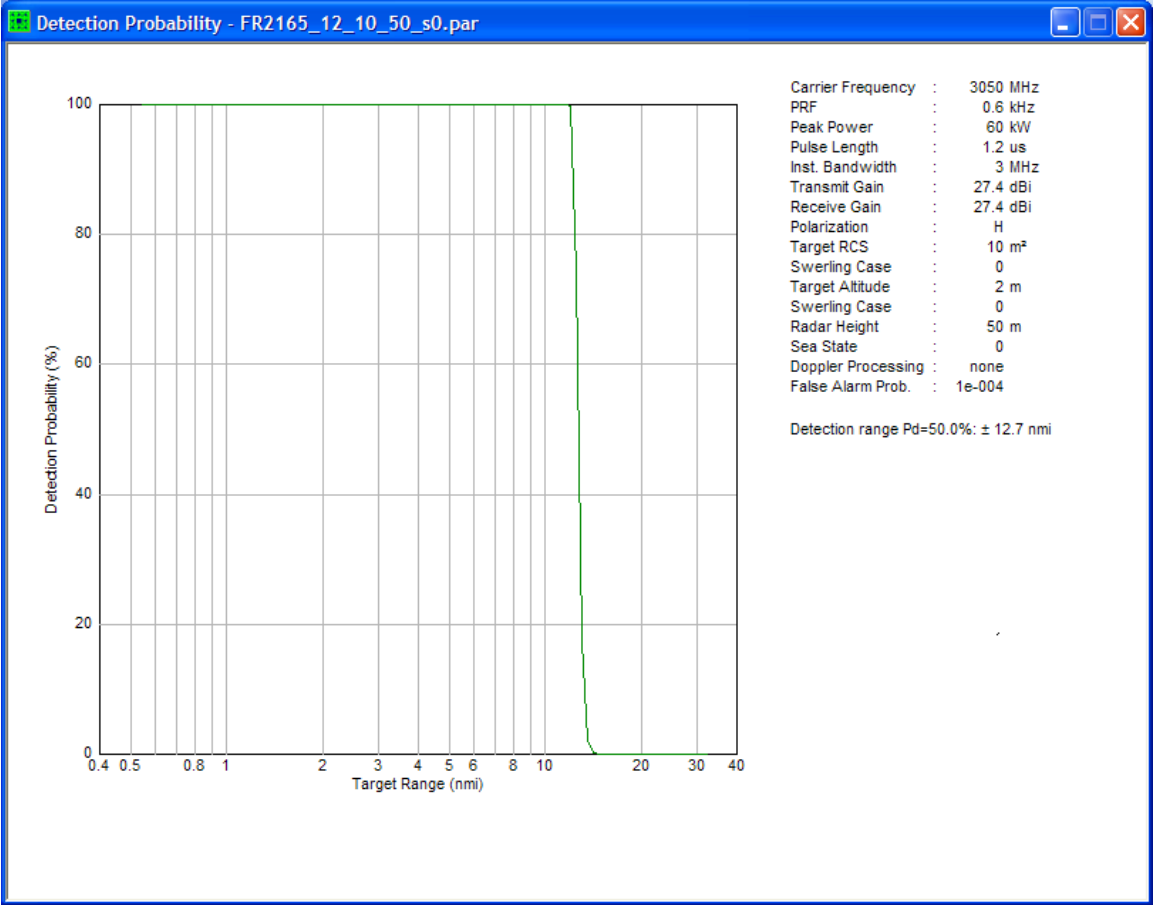
Radar Detection Comparison

Furuno 2165 S-Band – 60kw with 12ft Antenna (1m² target)



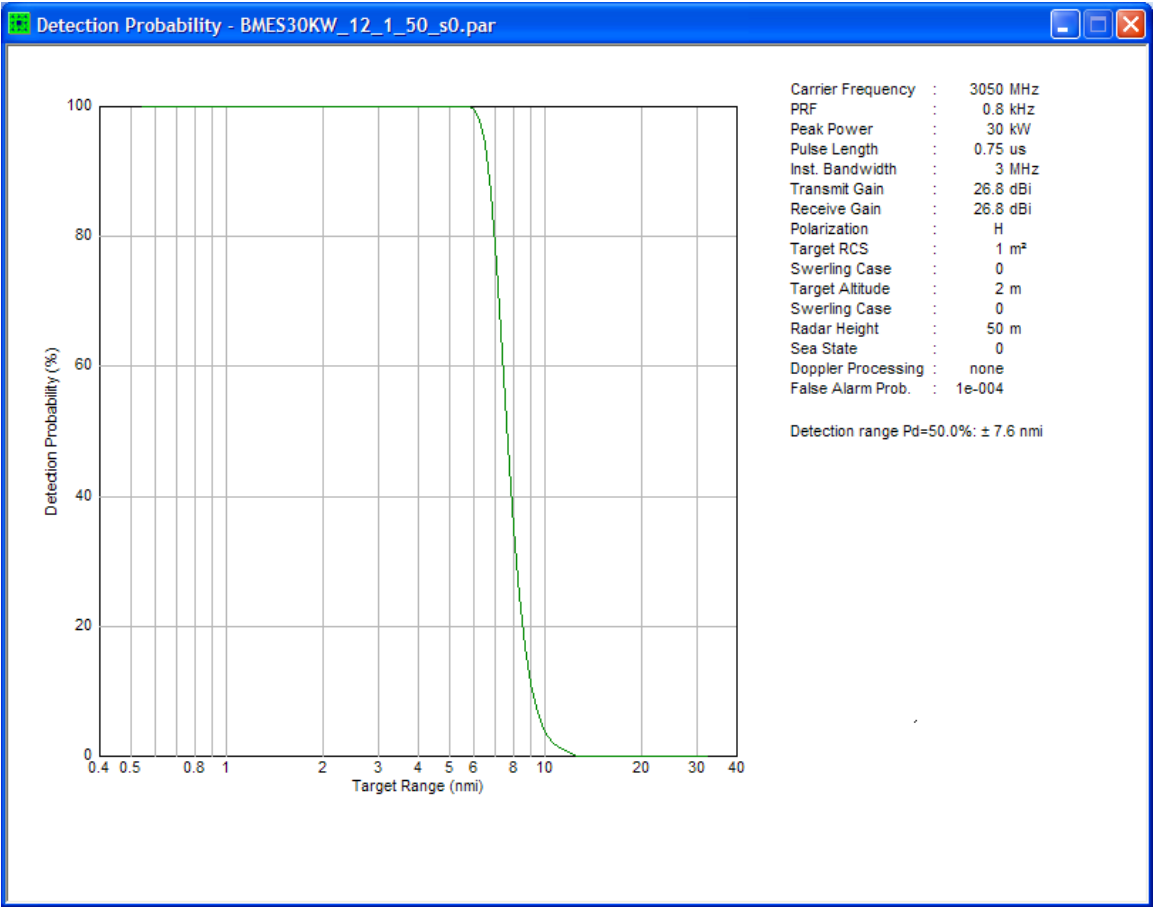
Radar Detection Comparison

Furuno 2165 S-Band – 60kw with 12ft Antenna (10m² target)



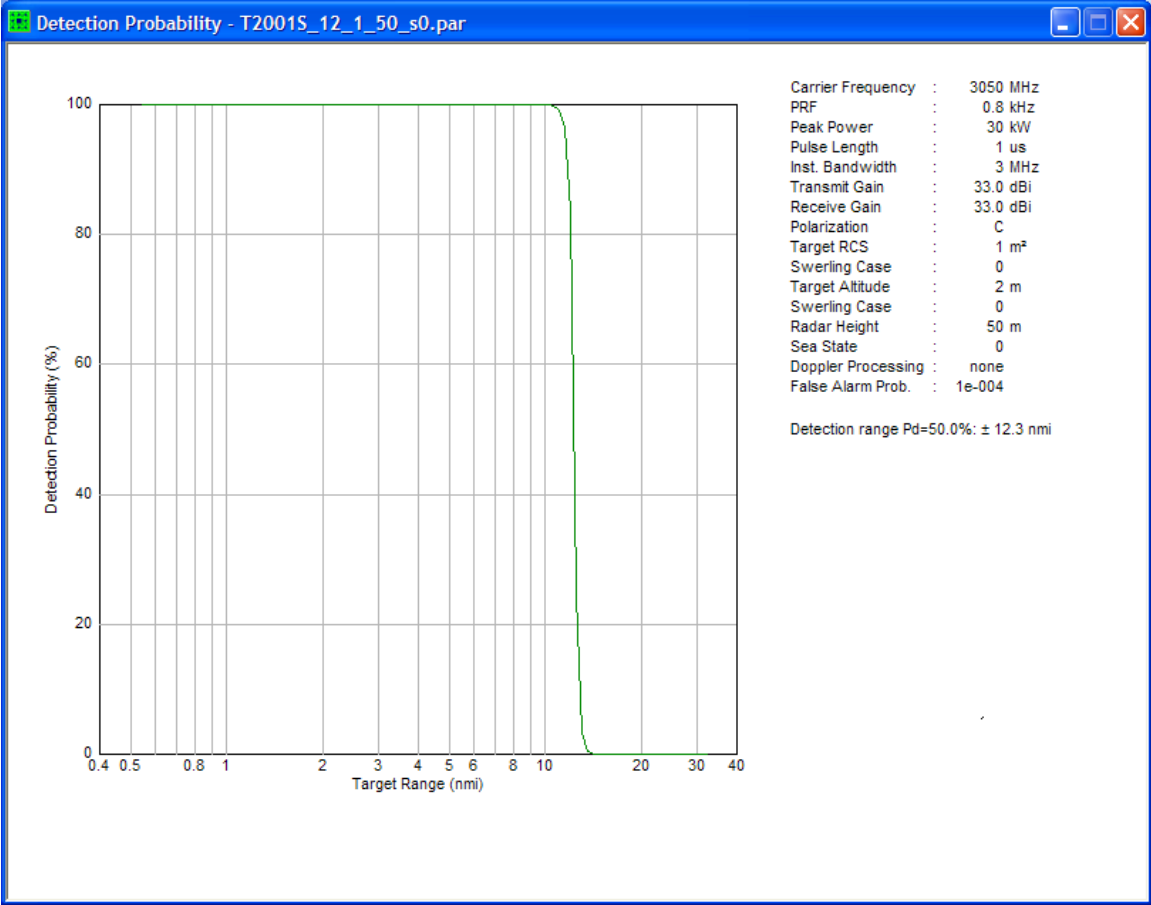
Radar Detection Comparison

BME S-Band – 30kw with 12ft Antenna (1m² target)



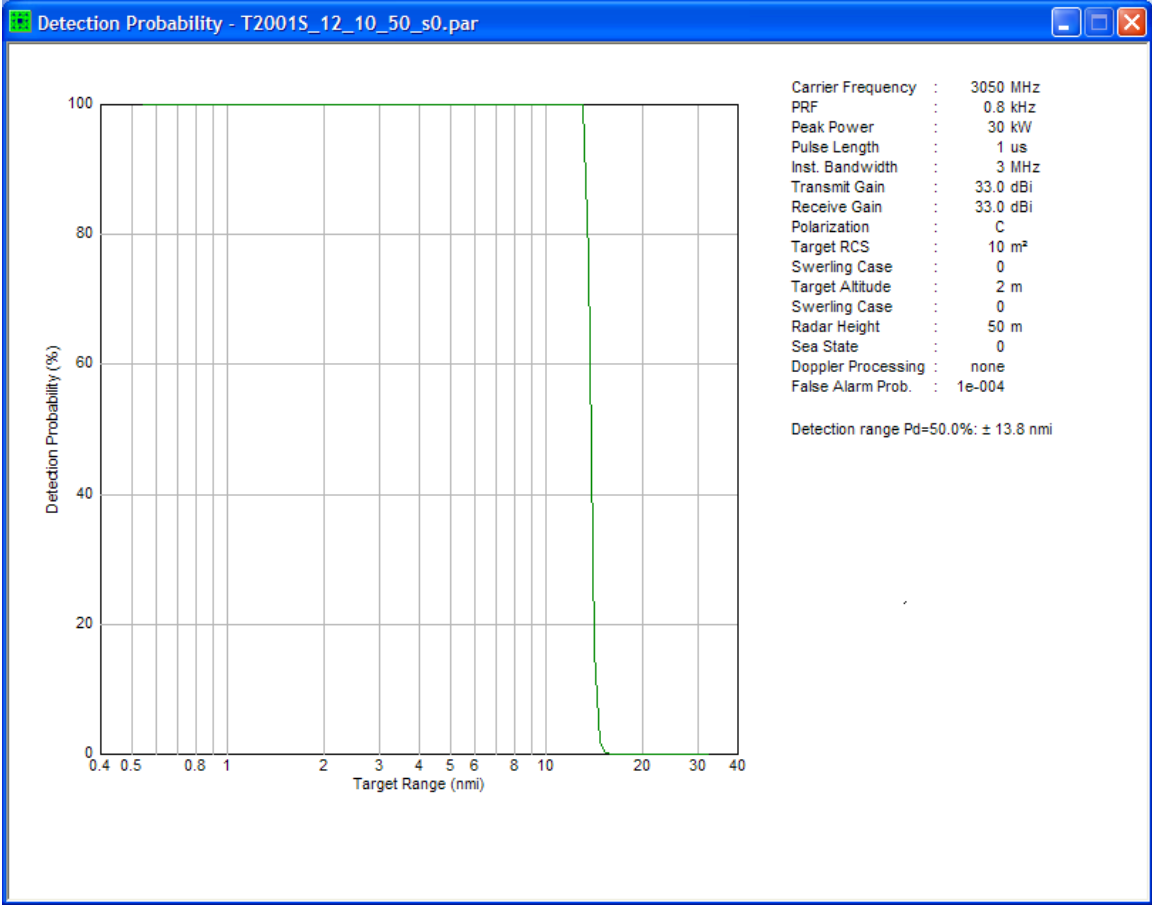
Radar Detection Comparison

Terma Scanner S-Band – 30kw with 12ft Antenna (1m² target)



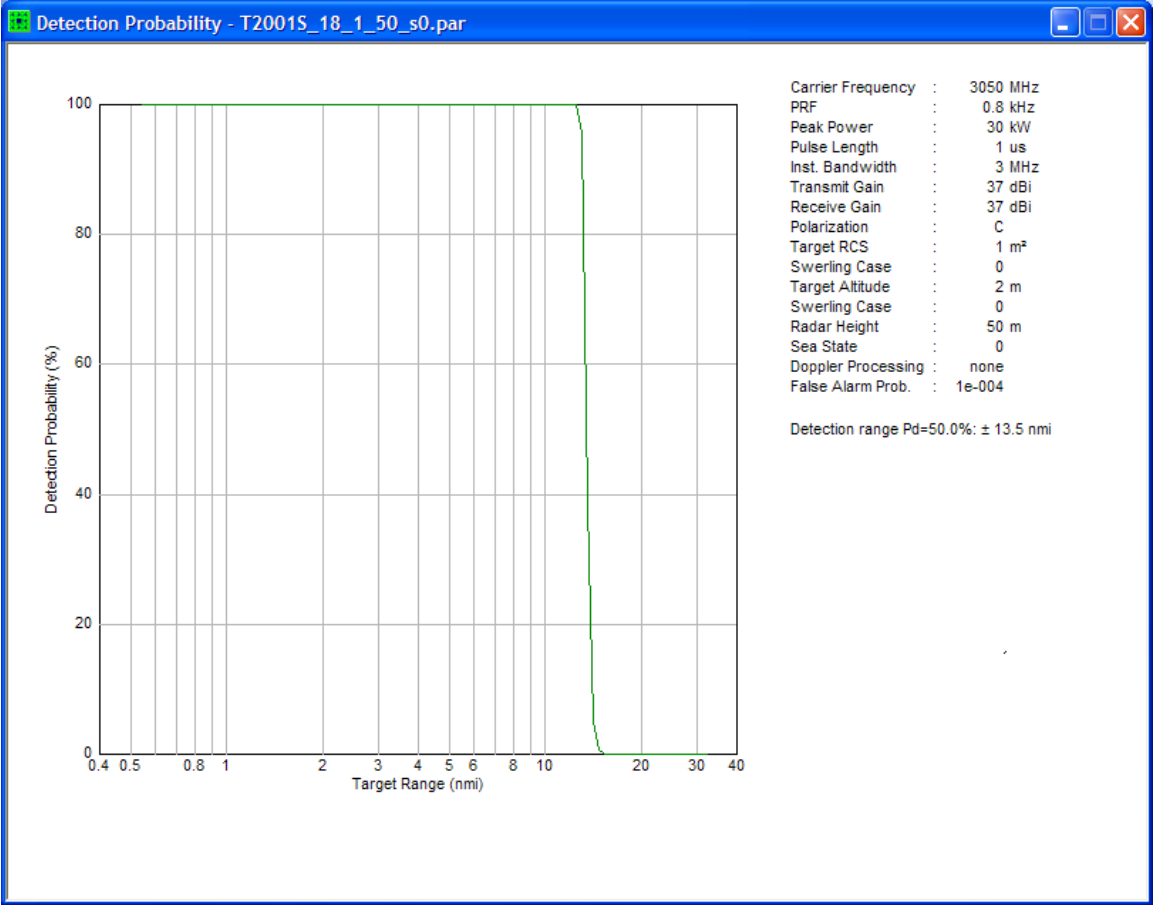
Radar Detection Comparison

Terma Scanner S-Band – 30kw with 12ft Antenna (10m² target)



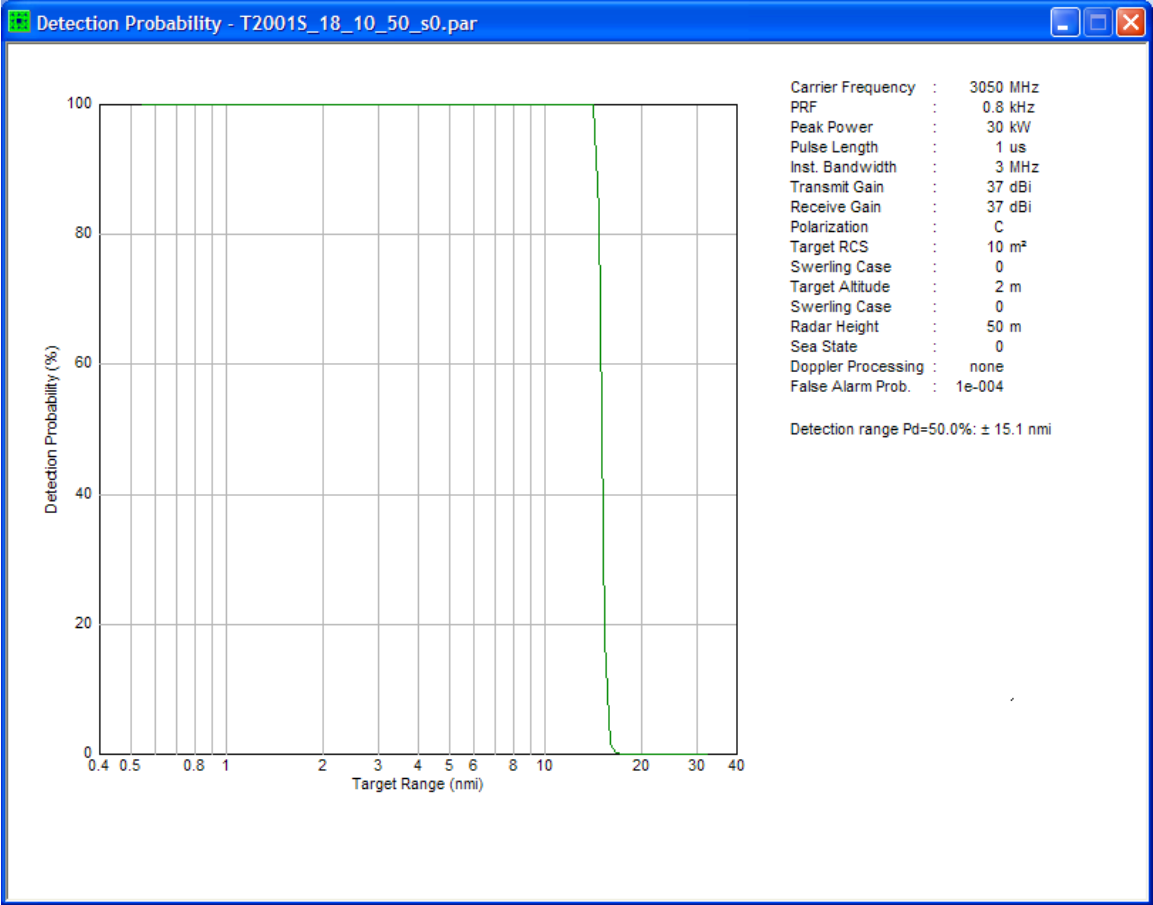
Radar Detection Comparison

Terma Scanner S-Band – 30kw with 18ft Antenna (1m² target)



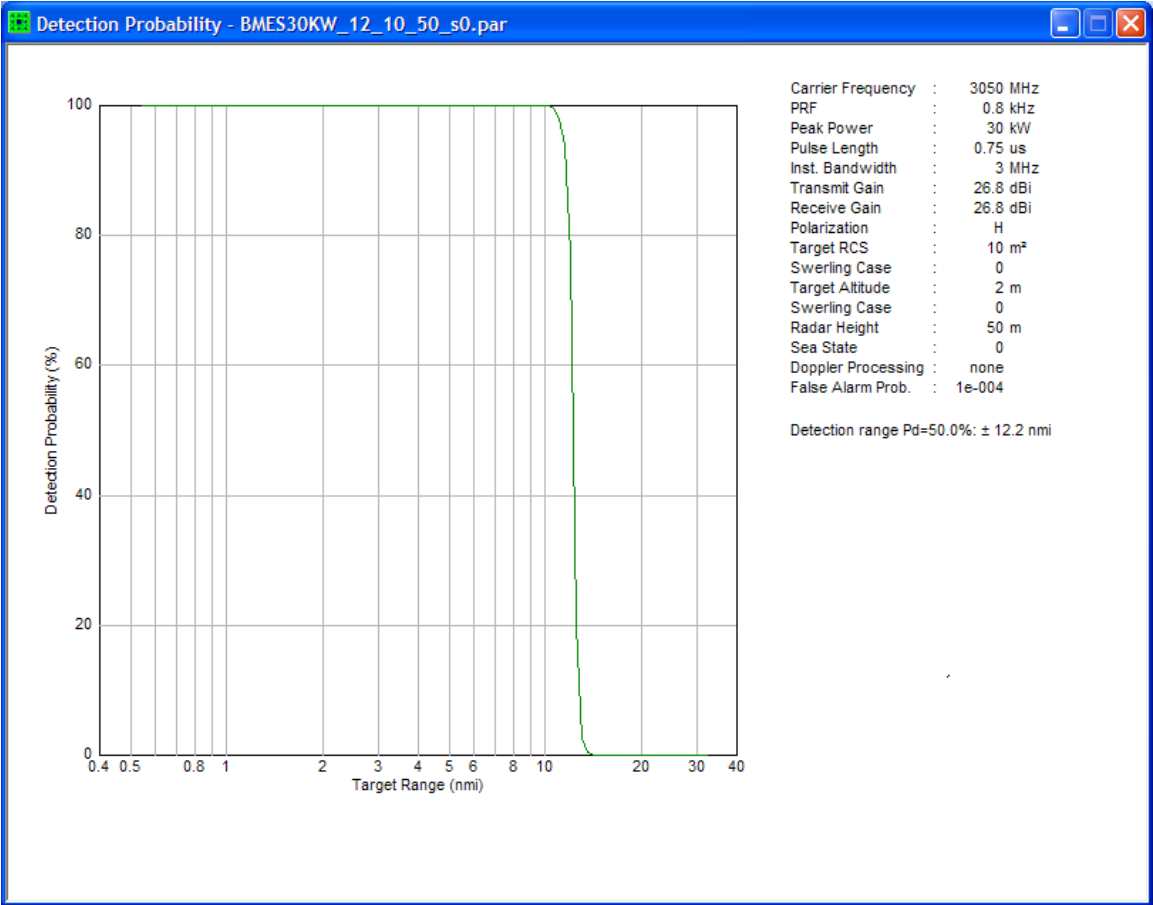
Radar Detection Comparison

Terma Scanner S-Band – 30kw with 18ft Antenna (10m² target)



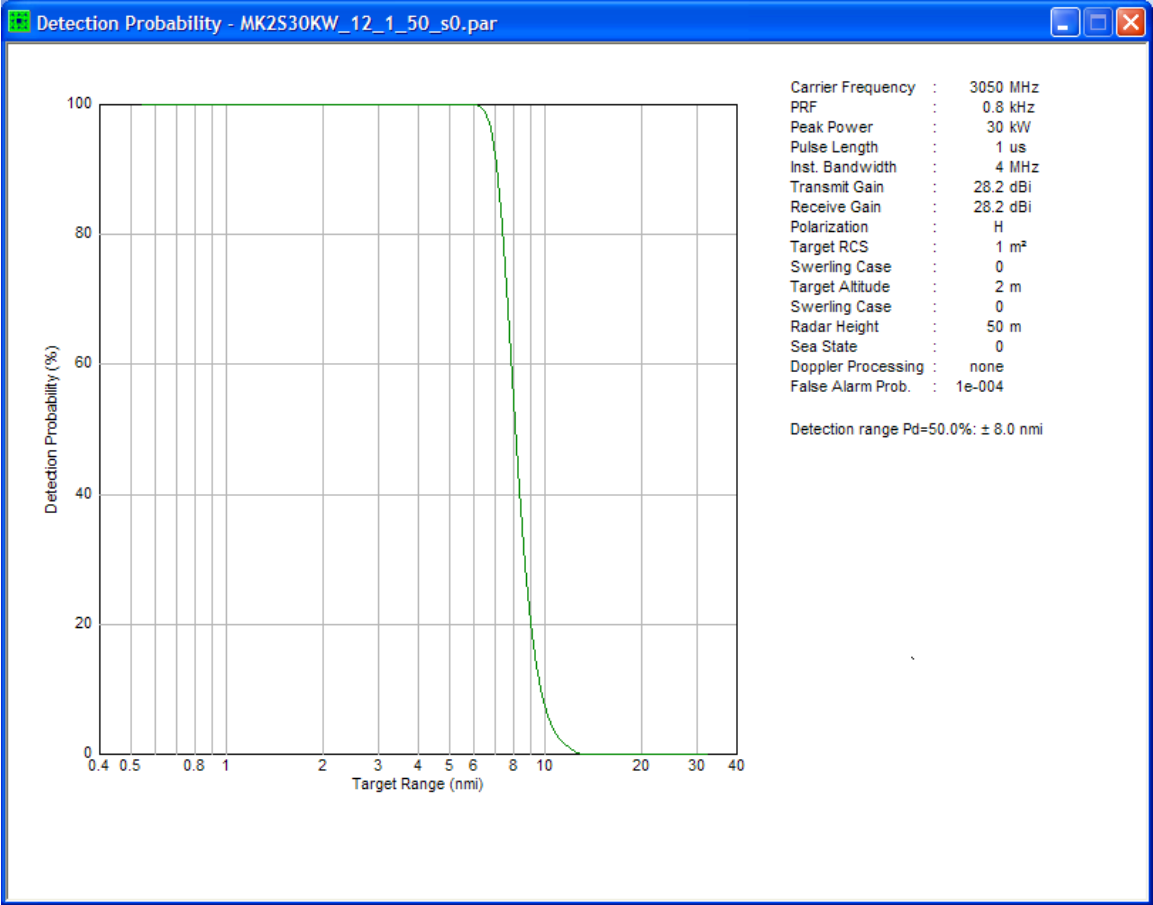
Radar Detection Comparison

BME S-Band – 30kw with 12ft Antenna (10m² target)



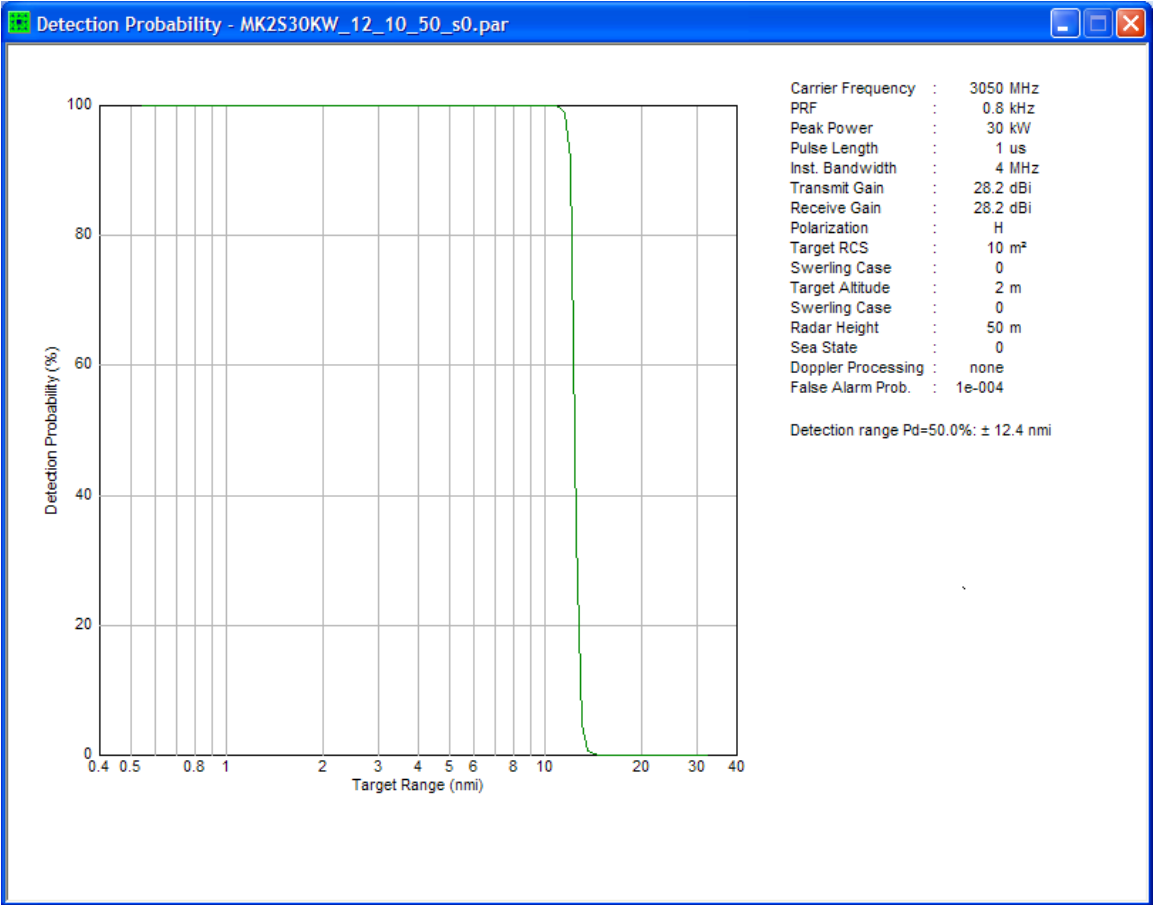
Radar Detection Comparison

Pathfinder MK2 S-Band – 30kw with 12ft Antenna (1m² target)



Radar Detection Comparison

Pathfinder MK2 S-Band – 30kw with 12ft Antenna (10m² target)



Appendices

CARPET Parameters (FR2117, 8ft)

```
Settings file      : S:\Apps\CARPET\basic_radar_perf_20110707\Furuno\X-Band\2117\FR2117_8_1_50_s0_par.txt

Troposcatter      : off
Attenuation       : off
Free space       : off
Surface based Duct : off
Evaporation Duct  : off
Cosmic Noise     : off
Sea Clutter      : on
Land Clutter     : off
Constant Gamma   : off
Rain             : off
Chaff            : off
Barrage Jamming  : off
Responsive Jamming : off
Phase Noise      : off
Doppler Processing : off
Timing Jitter    : off
Rotating         : on
Tracking         : none
Atmosph. Pressure : 1020 hPa
Humidity         : 70 %
Air Temperature  : 15 °C
Water Temperature : 10 °C
Wind Force       : 3 Bfirt
Wind Direction   : 0 deg
K-Factor        : 1.33
Refractivity     : 328 Nunit
Sea State       : 0
Salinity         : 35 prom
Evap. Duct Height : 10 m
Surf. Duct Height : 100 m
Soil             : average
Water Content Soil : 60 %
Std Surface Height : 0.1 m
Galactic Noise   : average
Land Reflectivity : -38 dB
Rainfall Rate    : 4.0 mm/hr
Chaff Density    : 30.0 g/km3
Min Range Rain   : 5 km
Max Range Rain   : 15 km
Max Altitude Rain : 3 km
Jammer Power     : 10 kW
Antenna Gain Jam. : 31.4 dBi
Bandw Barrage Mode : 600 MHz
Bandw Respons Mode : 10 MHz
Jammer Range     : 200 km
Jammer Height    : 3 m
Carrier Frequency : 9410 MHz
Peak Power       : 12 kW
Pulse Length     : 1.2 us
Inst. Bandwidth  : 3 MHz
PRF              : 0.6 kHz
Number of Bursts : 1
Pulses per Burst : 1
Transmitter Losses : 2.0 dB
White Noise Level : -120.0 dB/Hz
Colored Noise Level : -40.0 dBc
Cut-off Frequency : 1 Hz
Timing Jitter TX : 0.1 ns
Antenna Type     : rect.
Vertical Illum.  : uniform
Azimuth Beamwidth : 1.2 °
Elevation Beamw. : 20.0 °
Transmit Gain    : 31.8 dBi
Polarization     : H
Tracking         : none
Receive Gain     : 31.8 dBi
Beamshape Loss   : 1 dB
Antenna Tilt     : 0 °
Radar Height     : 50 m
Azimuth Sidelobes : -32 dB
Frame Time       : 2.5 s
MTI              : off
Doppler Bank     : off
Taper DFB        : Blackman
Noise Figure     : 6 dB
Receiver Losses  : 1 dB
False Alarm Prob. : 1e-004
Fill Pulses      : 0
Timing Jitter RX : 0.1 ns
Target RCS       : 1 m²
Target Velocity  : 0 m/s
Target Range     : 10 km
Target Altitude  : 2 m
Swerling Case    : 0
```

Radar Detection Comparison

Minimum Plot range : 1 km
Maximum Plot range : 60 km
Minimum Plot vty : 0 m/s
Maximum Plot vty : 300 m/s
Minimum Plot hght : 1 m
Maximum Plot hght : 500 m
Range Axis : logarithmic
Performance Prmtr : range

CARPET Parameters (FR2125, 8ft)

Settings file : S:\Apps\CARPET\basic_radar_perf_20110707\Furuno\X-Band\FR2125_8_1_50_s0_par.txt

Troposcatter : off
Attenuation : off
Free space : off
Surface based Duct : off
Evaporation Duct : off
Cosmic Noise : off
Sea Clutter : on
Land Clutter : off
Constant Gamma : off
Rain : off
Chaff : off
Barrage Jamming : off
Responsive Jamming : off
Phase Noise : off
Doppler Processing : off
Timing Jitter : off
Rotating : on
Tracking : none
Atmosph. Pressure : 1020 hPa
Humidity : 70 %
Air Temperature : 15 °C
Water Temperature : 10 °C
Wind Force : 3 Bfrt
Wind Direction : 0 deg
K-Factor : 1.33
Refractivity : 328 Nunit
Sea State : 0
Salinity : 35 prom
Evap. Duct Height : 10 m
Surf. Duct Height : 100 m
Soil : average
Water Content Soil : 60 %
Std Surface Height : 0.1 m
Galactic Noise : average
Land Reflectivity : -38 dB
Rainfall Rate : 4.0 mm/hr
Chaff Density : 30.0 g/km3
Min Range Rain : 5 km
Max Range Rain : 15 km
Max Altitude Rain : 3 km
Jammer Power : 10 kW
Antenna Gain Jam. : 31.4 dBi
Bandw Barrage Mode : 600 MHz
Bandw Respons Mode : 10 MHz
Jammer Range : 200 km
Jammer Height : 3 m
Carrier Frequency : 9410 MHz
Peak Power : 25 kW
Pulse Length : 1.2 us
Inst. Bandwidth : 3 MHz
PRF : 0.6 kHz
Number of Bursts : 1
Pulses per Burst : 1
Transmitter Losses : 2.0 dB
White Noise Level : -120.0 dB/Hz
Colored Noise Level : -40.0 dBc
Cut-off Frequency : 1 Hz
Timing Jitter TX : 0.1 ns
Antenna Type : rect.
Vertical Illum. : uniform
Azimuth Beamwidth : 1 °
Elevation Beamw. : 20.0 °
Transmit Gain : 31.6 dBi
Polarization : H
Tracking : none
Receive Gain : 31.6 dBi
Beamshape Loss : 1 dB
Antenna Tilt : 0 °
Radar Height : 50 m
Azimuth Sidelobes : -32 dB
Frame Time : 2.3 s
MTI : off
Doppler Bank : off
Taper DFB : Blackman
Noise Figure : 6 dB
Receiver Losses : 1 dB
False Alarm Prob. : 1e-004
Fill Pulses : 0
Timing Jitter RX : 0.1 ns
Target RCS : 1 m²
Target Velocity : 0 m/s
Target Range : 10 km
Target Altitude : 2 m
Swerling Case : 0
Minimum Plot range : 1 km
Maximum Plot range : 60 km

Radar Detection Comparison

Minimum Plot vty : 0 m/s
Maximum Plot vty : 300 m/s
Minimum Plot hght : 1 m
Maximum Plot hght : 500 m
Range Axis : logarithmic
Performance Prmtr : range

CARPET Parameters (FR2127, 8ft)

Settings file : S:\Apps\CARPET\basic_radar_perf_20110707\Furuno\X-Band\2127\FR2127_8_1_50_s0_par.txt

Troposcatter : off
Attenuation : off
Free space : off
Surface based Duct : off
Evaporation Duct : off
Cosmic Noise : off
Sea Clutter : on
Land Clutter : off
Constant Gamma : off
Rain : off
Chaff : off
Barrage Jamming : off
Responsive Jamming : off
Phase Noise : off
Doppler Processing : off
Timing Jitter : off
Rotating : on
Tracking : none
Atmosph. Pressure : 1020 hPa
Humidity : 70 %
Air Temperature : 15 °C
Water Temperature : 10 °C
Wind Force : 3 Bft
Wind Direction : 0 deg
K-Factor : 1.33
Refractivity : 328 Nunit
Sea State : 0
Salinity : 35 prom
Evap. Duct Height : 10 m
Surf. Duct Height : 100 m
Soil : average
Water Content Soil : 60 %
Std Surface Height : 0.1 m
Galactic Noise : average
Land Reflectivity : -38 dB
Rainfall Rate : 4.0 mm/hr
Chaff Density : 30.0 g/km3
Min Range Rain : 5 km
Max Range Rain : 15 km
Max Altitude Rain : 3 km
Jammer Power : 10 kW
Antenna Gain Jam. : 31.4 dBi
Bandw Barrage Mode : 600 MHz
Bandw Respons Mode : 10 MHz
Jammer Range : 200 km
Jammer Height : 3 m
Carrier Frequency : 9410 MHz
Peak Power : 25 kW
Pulse Length : 1.2 us
Inst. Bandwidth : 3 MHz
PRF : 0.6 kHz
Number of Bursts : 1
Pulses per Burst : 1
Transmitter Losses : 2.0 dB
White Noise Level : -120.0 dB/Hz
Colored Noise Level : -40.0 dBc
Cut-off Frequency : 1 Hz
Timing Jitter TX : 0.1 ns
Antenna Type : rect.
Vertical Illum. : uniform
Azimuth Beamwidth : 0.9 °
Elevation Beamw. : 20.0 °
Transmit Gain : 31.8 dBi
Polarization : H
Tracking : none
Receive Gain : 31.8 dBi
Beamshape Loss : 1 dB
Antenna Tilt : 0 °
Radar Height : 50 m
Azimuth Sidelobes : -32 dB
Frame Time : 2.5 s
MTI : off
Doppler Bank : off
Taper DFB : Blackman
Noise Figure : 6 dB
Receiver Losses : 1 dB
False Alarm Prob. : 1e-004
Fill Pulses : 0
Timing Jitter RX : 0.1 ns
Target RCS : 1 m²
Target Velocity : 0 m/s
Target Range : 10 km
Target Altitude : 2 m
Swerling Case : 0
Minimum Plot range : 1 km
Maximum Plot range : 60 km
Minimum Plot vty : 0 m/s
Maximum Plot vty : 300 m/s
Minimum Plot hght : 1 m

Radar Detection Comparison

Maximum Plot hght : 500 m
Range Axis : logarithmic
Performance Prmtr : range

CARPET Parameters (FR2155, 8ft)

Settings file : S:\Apps\CARPET\basic_radar_perf_20110707\Furuno\X-Band\2155\FR2125_8_1_50_s0_par.txt

Troposcatter : off
Attenuation : off
Free space : off
Surface based Duct : off
Evaporation Duct : off
Cosmic Noise : off
Sea Clutter : on
Land Clutter : off
Constant Gamma : off
Rain : off
Chaff : off
Barrage Jamming : off
Responsive Jamming : off
Phase Noise : off
Doppler Processing : off
Timing Jitter : off
Rotating : on
Tracking : none
Atmosph. Pressure : 1020 hPa
Humidity : 70 %
Air Temperature : 15 °C
Water Temperature : 10 °C
Wind Force : 3 Bfirt
Wind Direction : 0 deg
K-Factor : 1.33
Refractivity : 328 Nunit
Sea State : 0
Salinity : 35 prom
Evap. Duct Height : 10 m
Surf. Duct Height : 100 m
Soil : average
Water Content Soil : 60 %
Std Surface Height : 0.1 m
Galactic Noise : average
Land Reflectivity : -38 dB
Rainfall Rate : 4.0 mm/hr
Chaff Density : 30.0 g/km3
Min Range Rain : 5 km
Max Range Rain : 15 km
Max Altitude Rain : 3 km
Jammer Power : 10 kW
Antenna Gain Jam. : 31.4 dBi
Bandw Barrage Mode : 600 MHz
Bandw Respons Mode : 10 MHz
Jammer Range : 200 km
Jammer Height : 3 m
Carrier Frequency : 9415 MHz
Peak Power : 50 kW
Pulse Length : 1.2 us
Inst. Bandwidth : 3 MHz
PRF : 0.6 kHz
Number of Bursts : 1
Pulses per Burst : 1
Transmitter Losses : 2.0 dB
White Noise Level : -120.0 dB/Hz
Colored Noise Level : -40.0 dBc
Cut-off Frequency : 1 Hz
Timing Jitter TX : 0.1 ns
Antenna Type : rect.
Vertical Illum. : uniform
Azimuth Beamwidth : 1.0 °
Elevation Beamw. : 20.0 °
Transmit Gain : 31.6 dBi
Polarization : H
Tracking : none
Receive Gain : 31.6 dBi
Beamshape Loss : 1 dB
Antenna Tilt : 0 °
Radar Height : 50 m
Azimuth Sidelobes : -32 dB
Frame Time : 2.3 s
MTI : off
Doppler Bank : off
Taper DFB : Blackman
Noise Figure : 6 dB
Receiver Losses : 1 dB
False Alarm Prob. : 1e-004
Fill Pulses : 0
Timing Jitter RX : 0.1 ns
Target RCS : 1 m²
Target Velocity : 0 m/s
Target Range : 10 km
Target Altitude : 2 m
Swirling Case : 0
Minimum Plot range : 1 km
Maximum Plot range : 60 km
Minimum Plot vty : 0 m/s
Maximum Plot vty : 300 m/s
Minimum Plot hght : 1 m
Maximum Plot hght : 500 m
Range Axis : logarithmic
Performance Prmtr : range

Radar Detection Comparison

CARPET Parameters (FR2157, 8ft)

```
Settings file      : S:\Apps\CARPET\basic_radar_perf_20110707\Furuno\X-Band\2157\FR2157_8_1_50_s0_par.txt

Troposcatter      : off
Attenuation        : off
Free space         : off
Surface based Duct : off
Evaporation Duct   : off
Cosmic Noise       : off
Sea Clutter        : on
Land Clutter       : off
Constant Gamma     : off
Rain               : off
Chaff              : off
Barrage Jamming    : off
Responsive Jamming : off
Phase Noise        : off
Doppler Processing : off
Timing Jitter      : off
Rotating           : on
Tracking           : none
Atmosph. Pressure  : 1020 hPa
Humidity           : 70 %
Air Temperature    : 15 °C
Water Temperature  : 10 °C
Wind Force         : 3 Bft
Wind Direction     : 0 deg
K-Factor           : 1.33
Refractivity       : 328 Nunit
Sea State          : 0
Salinity           : 35 prom
Evap. Duct Height  : 10 m
Surf. Duct Height  : 100 m
Soil               : average
Water Content Soil : 60 %
Std Surface Height : 0.1 m
Galactic Noise     : average
Land Reflectivity  : ~38 dB
Rainfall Rate      : 4.0 mm/hr
Chaff Density       : 30.0 g/km3
Min Range Rain     : 5 km
Max Range Rain     : 15 km
Max Altitude Rain  : 3 km
Jammer Power       : 10 kW
Antenna Gain Jam.  : 31.4 dBi
Bandw Barrage Mode : 600 MHz
Bandw Respons Mode : 10 MHz
Jammer Range       : 200 km
Jammer Height      : 3 m
Carrier Frequency  : 9410 MHz
Peak Power         : 50 kW
Pulse Length       : 1.2 us
Inst. Bandwidth    : 3 MHz
PRF                : 0.6 kHz
Number of Bursts   : 1
Pulses per Burst   : 1
Transmitter Losses : 2.0 dB
White Noise Level  : -120.0 dB/Hz
Colored Noise Level : -40.0 dBc
Cut-off Frequency  : 1 Hz
Timing Jitter TX   : 0.1 ns
Antenna Type       : rect.
Vertical Illum.    : uniform
Azimuth Beamwidth  : 1.0 °
Elevation Beamw.   : 20.0 °
Transmit Gain      : 31.8 dBi
Polarization       : H
Tracking           : none
Receive Gain       : 31.8 dBi
Beamshape Loss     : 1 dB
Antenna Tilt       : 0 °
Radar Height       : 50 m
Azimuth Sidelobes  : ~32 dB
Frame Time         : 2.7 s
MTI                : off
Doppler Bank       : off
Taper DFB          : Blackman
Noise Figure       : 6 dB
Receiver Losses    : 1 dB
False Alarm Prob.  : 1e-004
Fill Pulses        : 0
Timing Jitter RX   : 0.1 ns
Target RCS         : 1 m²
Target Velocity    : 0 m/s
Target Range       : 10 km
Target Altitude    : 2 m
Swerling Case      : 0
Minimum Plot range : 1 km
Maximum Plot range : 60 km
Minimum Plot vty   : 0 m/s
Maximum Plot vty   : 300 m/s
Minimum Plot hght  : 1 m
Maximum Plot hght  : 500 m
Range Axis         : logarithmic
Performance Prmtr  : range
```

CARPET Parameters (FR2167, 10ft)

Settings file : S:\Apps\CARPET\basic_radar_perf_20110707\Furuno\S-Band\2167\FR2167_10_1_50_s0_par.txt

Troposcatter : off
Attenuation : off
Free space : off
Surface based Duct : off
Evaporation Duct : off
Cosmic Noise : off
Sea Clutter : on
Land Clutter : off
Constant Gamma : off
Rain : off
Chaff : off
Barrage Jamming : off
Responsive Jamming : off
Phase Noise : off
Doppler Processing : off
Timing Jitter : off
Rotating : on
Tracking : none
Atmosph. Pressure : 1020 hPa
Humidity : 70 %
Air Temperature : 15 °C
Water Temperature : 10 °C
Wind Force : 3 Bft
Wind Direction : 0 deg
K-Factor : 1.33
Refractivity : 328 Nunit
Sea State : 0
Salinity : 35 prom
Evap. Duct Height : 10 m
Surf. Duct Height : 100 m
Soil : average
Water Content Soil : 60 %
Std Surface Height : 0.1 m
Galactic Noise : average
Land Reflectivity : -38 dB
Rainfall Rate : 4.0 mm/hr
Chaff Density : 30.0 g/km3
Min Range Rain : 5 km
Max Range Rain : 15 km
Max Altitude Rain : 3 km
Jammer Power : 10 kW
Antenna Gain Jam. : 31.4 dBi

Radar Detection Comparison

Bandw Barrage Mode : 600 MHz
Bandw Respons Mode : 10 MHz
Jammer Range : 200 km
Jammer Height : 3 m
Carrier Frequency : 3050 MHz
Peak Power : 60 kW
Pulse Length : 1.2 us
Inst. Bandwidth : 3 MHz
PRF : 0.6 kHz
Number of Bursts : 1
Pulses per Burst : 1
Transmitter Losses : 2.0 dB
White Noise Level : -120.0 dB/Hz
Colored Noise Level : -40.0 dBc
Cut-off Frequency : 1 Hz
Timing Jitter TX : 0.1 ns
Antenna Type : rect.
Vertical Illum. : uniform
Azimuth Beamwidth : 2.3 °
Elevation Beamw. : 25.0 °
Transmit Gain : 27.1 dBi
Polarization : H
Tracking : none
Receive Gain : 27.1 dBi
Beamshape Loss : 1 dB
Antenna Tilt : 0 °
Radar Height : 50 m
Azimuth Sidelobes : -32 dB
Frame Time : 2.3 s
MTI : off
Doppler Bank : off
Taper DFB : Blackman
Noise Figure : 6 dB
Receiver Losses : 1 dB
False Alarm Prob. : 1e-004
Fill Pulses : 0
Timing Jitter RX : 0.1 ns
Target RCS : 1 m²
Target Velocity : 0 m/s
Target Range : 10 km
Target Altitude : 2 m
Swerling Case : 0
Minimum Plot range : 1 km
Maximum Plot range : 60 km
Minimum Plot vty : 0 m/s
Maximum Plot vty : 300 m/s

Radar Detection Comparison

Minimum Plot hght : 1 m
Maximum Plot hght : 500 m
Range Axis : logarithmic
Performance Prmtr : range

CARPET Parameters (Terma Scanner X-Band, 12ft)

Settings file : S:\Apps\CARPET\basic_radar_perf_20110707\Terma\X-Band\T2001_12_1_50_s0_par.txt

Troposcatter : off
Attenuation : off
Free space : off
Surface based Duct : off
Evaporation Duct : off
Cosmic Noise : off
Sea Clutter : on
Land Clutter : off
Constant Gamma : off
Rain : off
Chaff : off
Barrage Jamming : off
Responsive Jamming : off
Phase Noise : off
Doppler Processing : off
Timing Jitter : off
Rotating : on
Tracking : none
Atmosph. Pressure : 1020 hPa
Humidity : 70 %
Air Temperature : 15 °C
Water Temperature : 10 °C
Wind Force : 3 Bft
Wind Direction : 0 deg
K-Factor : 1.33
Refractivity : 328 Nunit
Sea State : 0
Salinity : 35 prom
Evap. Duct Height : 10 m
Surf. Duct Height : 100 m
Soil : average
Water Content Soil : 60 %
Std Surface Height : 0.1 m
Galactic Noise : average
Land Reflectivity : -38 dB
Rainfall Rate : 4.0 mm/hr

Radar Detection Comparison

Chaff Density : 30.0 g/km³
Min Range Rain : 5 km
Max Range Rain : 15 km
Max Altitude Rain : 3 km
Jammer Power : 10 kW
Antenna Gain Jam. : 31.4 dBi
Bandw Barrage Mode : 600 MHz
Bandw Respons Mode : 10 MHz
Jammer Range : 200 km
Jammer Height : 3 m
Carrier Frequency : 9375 MHz
Peak Power : 25 kW
Pulse Length : 1 us
Inst. Bandwidth : 3 MHz
PRF : 0.8 kHz
Number of Bursts : 1
Pulses per Burst : 1
Transmitter Losses : 2.0 dB
White Noise Level : -120.0 dB/Hz
Colored Noise Level : -40.0 dBc
Cut-off Frequency : 1 Hz
Timing Jitter TX : 0.1 ns
Antenna Type : rect.
Vertical Illum. : uniform
Azimuth Beamwidth : 0.6 °
Elevation Beamw. : 11 °
Transmit Gain : 33 dBi
Polarization : C
Tracking : none
Receive Gain : 33 dBi
Beamshape Loss : 1 dB
Antenna Tilt : 0 °
Radar Height : 50 m
Azimuth Sidelobes : -32 dB
Frame Time : 1.3 s
MTI : off
Doppler Bank : off
Taper DFB : Blackman
Noise Figure : 2 dB
Receiver Losses : 1 dB
False Alarm Prob. : 1e-004
Fill Pulses : 0
Timing Jitter RX : 0.1 ns
Target RCS : 1 m²
Target Velocity : 0 m/s
Target Range : 10 km

Radar Detection Comparison

Target Altitude : 2 m
Swerling Case : 0
Minimum Plot range : 1 km
Maximum Plot range : 60 km
Minimum Plot vty : 0 m/s
Maximum Plot vty : 300 m/s
Minimum Plot hght : 1 m
Maximum Plot hght : 500 m
Range Axis : logarithmic
Performance Prmtr : range

CARPET Parameters (Terma Scanner S-Band, 12ft)

Settings file : S:\Apps\CARPET\basic_radar_perf_20110707\Terma\S-Band\T2001S_12_1_50_s0_par.txt

Troposcatter : off
Attenuation : off
Free space : off
Surface based Duct : off
Evaporation Duct : off
Cosmic Noise : off
Sea Clutter : on
Land Clutter : off
Constant Gamma : off
Rain : off
Chaff : off
Barrage Jamming : off
Responsive Jamming : off
Phase Noise : off
Doppler Processing : off
Timing Jitter : off
Rotating : on
Tracking : none
Atmosph. Pressure : 1020 hPa
Humidity : 70 %
Air Temperature : 15 °C
Water Temperature : 10 °C
Wind Force : 3 Bft
Wind Direction : 0 deg
K-Factor : 1.33
Refractivity : 328 Nunit
Sea State : 0
Salinity : 35 prom
Evap. Duct Height : 10 m
Surf. Duct Height : 100 m
Soil : average

Radar Detection Comparison

Water Content Soil : 60 %
Std Surface Height : 0.1 m
Galactic Noise : average
Land Reflectivity : -38 dB
Rainfall Rate : 4.0 mm/hr
Chaff Density : 30.0 g/km³
Min Range Rain : 5 km
Max Range Rain : 15 km
Max Altitude Rain : 3 km
Jammer Power : 10 kW
Antenna Gain Jam. : 31.4 dBi
Bandw Barrage Mode : 600 MHz
Bandw Respons Mode : 10 MHz
Jammer Range : 200 km
Jammer Height : 3 m
Carrier Frequency : 3050 MHz
Peak Power : 30 kW
Pulse Length : 1 us
Inst. Bandwidth : 3 MHz
PRF : 0.8 kHz
Number of Bursts : 1
Pulses per Burst : 1
Transmitter Losses : 2.0 dB
White Noise Level : -120.0 dB/Hz
Colored Noise Level : -40.0 dBc
Cut-off Frequency : 1 Hz
Timing Jitter TX : 0.1 ns
Antenna Type : rect.
Vertical Illum. : uniform
Azimuth Beamwidth : 0.6 °
Elevation Beamw. : 11.0 °
Transmit Gain : 33.0 dBi
Polarization : C
Tracking : none
Receive Gain : 33.0 dBi
Beamshape Loss : 1 dB
Antenna Tilt : 0 °
Radar Height : 50 m
Azimuth Sidelobes : -32 dB
Frame Time : 1.3 s
MTI : off
Doppler Bank : off
Taper DFB : Blackman
Noise Figure : 2.0 dB
Receiver Losses : 1 dB
False Alarm Prob. : 1e-004

Radar Detection Comparison

Fill Pulses : 0
Timing Jitter RX : 0.1 ns
Target RCS : 1 m²
Target Velocity : 0 m/s
Target Range : 10 km
Target Altitude : 2 m
Swerling Case : 0
Minimum Plot range : 1 km
Maximum Plot range : 60 km
Minimum Plot vty : 0 m/s
Maximum Plot vty : 300 m/s
Minimum Plot hght : 1 m
Maximum Plot hght : 500 m
Range Axis : logarithmic
Performance Prmtr : range

CARPET Parameters (BME X-Band, 8ft)

Settings file : S:\Apps\CARPET\basic_radar_perf_20110707\BME\X-Band\25KW\BME25KW_8_1_50_s0_par.txt

Troposcatter : off
Attenuation : off
Free space : off
Surface based Duct : off
Evaporation Duct : off
Cosmic Noise : off
Sea Clutter : on
Land Clutter : off
Constant Gamma : off
Rain : off
Chaff : off
Barrage Jamming : off
Responsive Jamming : off
Phase Noise : off
Doppler Processing : off
Timing Jitter : off
Rotating : on
Tracking : none
Atmosph. Pressure : 1020 hPa
Humidity : 70 %
Air Temperature : 15 °C
Water Temperature : 10 °C
Wind Force : 3 Bft
Wind Direction : 0 deg
K-Factor : 1.33

Radar Detection Comparison

Refractivity : 328 Nunit
Sea State : 0
Salinity : 35 prom
Evap. Duct Height : 10 m
Surf. Duct Height : 100 m
Soil : average
Water Content Soil : 60 %
Std Surface Height : 0.1 m
Galactic Noise : average
Land Reflectivity : -38 dB
Rainfall Rate : 4.0 mm/hr
Chaff Density : 30.0 g/km³
Min Range Rain : 5 km
Max Range Rain : 15 km
Max Altitude Rain : 3 km
Jammer Power : 10 kW
Antenna Gain Jam. : 31.4 dBi
Bandw Barrage Mode : 600 MHz
Bandw Respons Mode : 10 MHz
Jammer Range : 200 km
Jammer Height : 3 m
Carrier Frequency : 9410 MHz
Peak Power : 25 kW
Pulse Length : 0.75 us
Inst. Bandwidth : 3 MHz
PRF : 0.8 kHz
Number of Bursts : 1
Pulses per Burst : 1
Transmitter Losses : 2.0 dB
White Noise Level : -120.0 dB/Hz
Colored Noise Level : -40.0 dBc
Cut-off Frequency : 1 Hz
Timing Jitter TX : 0.1 ns
Antenna Type : rect.
Vertical Illum. : uniform
Azimuth Beamwidth : 1.0 °
Elevation Beamw. : 24.0 °
Transmit Gain : 30.8 dBi
Polarization : H
Tracking : none
Receive Gain : 30.8 dBi
Beamshape Loss : 1 dB
Antenna Tilt : 0 °
Radar Height : 50 m
Azimuth Sidelobes : -32 dB
Frame Time : 2.1 s

Radar Detection Comparison

MTI : off
Doppler Bank : off
Taper DFB : Blackman
Noise Figure : 5 dB
Receiver Losses : 1 dB
False Alarm Prob. : 1e-004
Fill Pulses : 0
Timing Jitter RX : 0.1 ns
Target RCS : 1 m²
Target Velocity : 0 m/s
Target Range : 10 km
Target Altitude : 2 m
Swerling Case : 0
Minimum Plot range : 1 km
Maximum Plot range : 60 km
Minimum Plot vty : 0 m/s
Maximum Plot vty : 300 m/s
Minimum Plot hght : 1 m
Maximum Plot hght : 500 m
Range Axis : logarithmic
Performance Prmtr : range

CARPET Parameters (BME S-Band, 12ft)

Settings file : S:\Apps\CARPET\basic_radar_perf_20110707\BME\S-Band\BMES30KW_12_1_50_s0_par.txt

Troposcatter : off
Attenuation : off
Free space : off
Surface based Duct : off
Evaporation Duct : off
Cosmic Noise : off
Sea Clutter : on
Land Clutter : off
Constant Gamma : off
Rain : off
Chaff : off
Barrage Jamming : off
Responsive Jamming : off
Phase Noise : off
Doppler Processing : off
Timing Jitter : off
Rotating : on
Tracking : none
Atmosph. Pressure : 1020 hPa
Humidity : 70 %

Radar Detection Comparison

Air Temperature : 15 °C
Water Temperature : 10 °C
Wind Force : 3 Bft
Wind Direction : 0 deg
K-Factor : 1.33
Refractivity : 328 Nunit
Sea State : 0
Salinity : 35 prom
Evap. Duct Height : 10 m
Surf. Duct Height : 100 m
Soil : average
Water Content Soil : 60 %
Std Surface Height : 0.1 m
Galactic Noise : average
Land Reflectivity : -38 dB
Rainfall Rate : 4.0 mm/hr
Chaff Density : 30.0 g/km³
Min Range Rain : 5 km
Max Range Rain : 15 km
Max Altitude Rain : 3 km
Jammer Power : 10 kW
Antenna Gain Jam. : 31.4 dBi
Bandw Barrage Mode : 600 MHz
Bandw Respons Mode : 10 MHz
Jammer Range : 200 km
Jammer Height : 3 m
Carrier Frequency : 3050 MHz
Peak Power : 30 kW
Pulse Length : 0.75 us
Inst. Bandwidth : 3 MHz
PRF : 0.8 kHz
Number of Bursts : 1
Pulses per Burst : 1
Transmitter Losses : 2.0 dB
White Noise Level : -120.0 dB/Hz
Colored Noise Level : -40.0 dBc
Cut-off Frequency : 1 Hz
Timing Jitter TX : 0.1 ns
Antenna Type : rect.
Vertical Illum. : uniform
Azimuth Beamwidth : 2 °
Elevation Beamw. : 30 °
Transmit Gain : 26.8 dBi
Polarization : H
Tracking : none
Receive Gain : 26.8 dBi

Radar Detection Comparison

Beamshape Loss : 1 dB
Antenna Tilt : 0 °
Radar Height : 50 m
Azimuth Sidelobes : -32 dB
Frame Time : 2.4 s
MTI : off
Doppler Bank : off
Taper DFB : Blackman
Noise Figure : 5 dB
Receiver Losses : 1 dB
False Alarm Prob. : 1e-004
Fill Pulses : 0
Timing Jitter RX : 0.1 ns
Target RCS : 1 m²
Target Velocity : 0 m/s
Target Range : 10 km
Target Altitude : 2 m
Swerling Case : 0
Minimum Plot range : 1 km
Maximum Plot range : 60 km
Minimum Plot vty : 0 m/s
Maximum Plot vty : 300 m/s
Minimum Plot hght : 1 m
Maximum Plot hght : 500 m
Range Axis : logarithmic
Performance Prmtr : range

CARPET Parameters (Pathfinder X-Band, 12ft)

Settings file : S:\Apps\CARPET\basic_radar_perf_20110707\Pathfinder\X-Band\MK225KW_12_1_50_s0_par.txt

Troposcatter : off
Attenuation : off
Free space : off
Surface based Duct : off
Evaporation Duct : off
Cosmic Noise : off
Sea Clutter : on
Land Clutter : off
Constant Gamma : off
Rain : off
Chaff : off
Barrage Jamming : off
Responsive Jamming : off
Phase Noise : off
Doppler Processing : off

Radar Detection Comparison

Timing Jitter : off
Rotating : on
Tracking : none
Atmosph. Pressure : 1020 hPa
Humidity : 70 %
Air Temperature : 15 °C
Water Temperature : 10 °C
Wind Force : 3 Bft
Wind Direction : 0 deg
K-Factor : 1.33
Refractivity : 328 Nunit
Sea State : 0
Salinity : 35 prom
Evap. Duct Height : 10 m
Surf. Duct Height : 100 m
Soil : average
Water Content Soil : 60 %
Std Surface Height : 0.1 m
Galactic Noise : average
Land Reflectivity : -38 dB
Rainfall Rate : 4.0 mm/hr
Chaff Density : 30.0 g/km³
Min Range Rain : 5 km
Max Range Rain : 15 km
Max Altitude Rain : 3 km
Jammer Power : 10 kW
Antenna Gain Jam. : 31.4 dBi
Bandw Barrage Mode : 600 MHz
Bandw Respons Mode : 10 MHz
Jammer Range : 200 km
Jammer Height : 3 m
Carrier Frequency : 9410 MHz
Peak Power : 25 kW
Pulse Length : 1 us
Inst. Bandwidth : 4 MHz
PRF : 0.8 kHz
Number of Bursts : 1
Pulses per Burst : 1
Transmitter Losses : 2.0 dB
White Noise Level : -120.0 dB/Hz
Colored Noise Level : -40.0 dBc
Cut-off Frequency : 1 Hz
Timing Jitter TX : 0.1 ns
Antenna Type : rect.
Vertical Illum. : uniform
Azimuth Beamwidth : 0.7 °

Radar Detection Comparison

Elevation Beamw. : 23 °
Transmit Gain : 32 dBi
Polarization : H
Tracking : none
Receive Gain : 32 dBi
Beamshape Loss : 1 dB
Antenna Tilt : 0 °
Radar Height : 50 m
Azimuth Sidelobes : -32 dB
Frame Time : 2.5 s
MTI : off
Doppler Bank : off
Taper DFB : Blackman
Noise Figure : 5.5 dB
Receiver Losses : 1 dB
False Alarm Prob. : 1e-004
Fill Pulses : 0
Timing Jitter RX : 0.1 ns
Target RCS : 1 m²
Target Velocity : 0 m/s
Target Range : 10 km
Target Altitude : 2 m
Swerling Case : 0
Minimum Plot range : 1 km
Maximum Plot range : 60 km
Minimum Plot vty : 0 m/s
Maximum Plot vty : 300 m/s
Minimum Plot hght : 1 m
Maximum Plot hght : 500 m
Range Axis : logarithmic
Performance Prmtr : range

CARPET Parameters (Pathfinder S-Band, 12ft)

```
Settings file      : S:\Apps\CARPET\basic_radar_perf_20110707\Pathfinder\S-Band\MK2S30KW_12_10_50_s0_par.txt

Troposcatter      : off
Attenuation       : off
Free space        : off
Surface based Duct : off
Evaporation Duct  : off
Cosmic Noise      : off
Sea Clutter       : on
Land Clutter      : off
Constant Gamma    : off
Rain              : off
Chaff             : off
Barrage Jamming   : off
Responsive Jamming : off
Phase Noise       : off
Doppler Processing : off
Timing Jitter     : off
Rotating          : on
Tracking          : none
Atmosph. Pressure : 1020 hPa
Humidity          : 70 %
Air Temperature   : 15 °C
Water Temperature : 10 °C
Wind Force        : 3 Bfrrt
Wind Direction    : 0 deg
K-Factor          : 1.33
Refractivity      : 328 Nunit
```

Radar Detection Comparison

Sea State : 0
Salinity : 35 prom
Evap. Duct Height : 10 m
Surf. Duct Height : 100 m
Soil : average
Water Content Soil : 60 %
Std Surface Height : 0.1 m
Galactic Noise : average
Land Reflectivity : -38 dB
Rainfall Rate : 4.0 mm/hr
Chaff Density : 30.0 g/km3
Min Range Rain : 5 km
Max Range Rain : 15 km
Max Altitude Rain : 3 km
Jammer Power : 10 kW
Antenna Gain Jam. : 31.4 dBi
Bandw Barrage Mode : 600 MHz
Bandw Respons Mode : 10 MHz
Jammer Range : 200 km
Jammer Height : 3 m
Carrier Frequency : 3050 MHz
Peak Power : 30 kW
Pulse Length : 1 us
Inst. Bandwidth : 4 MHz
PRF : 0.8 kHz
Number of Bursts : 1
Pulses per Burst : 1
Transmitter Losses : 2.0 dB
White Noise Level : -120.0 dB/Hz
Colored Noise Level : -40.0 dBc
Cut-off Frequency : 1 Hz
Timing Jitter TX : 0.1 ns
Antenna Type : rect.
Vertical Illum. : uniform
Azimuth Beamwidth : 1.9 °
Elevation Beamw. : 23.0 °
Transmit Gain : 28.2 dBi
Polarization : H
Tracking : none
Receive Gain : 28.2 dBi
Beamshape Loss : 1 dB
Antenna Tilt : 0 °
Radar Height : 50 m
Azimuth Sidelobes : -32 dB
Frame Time : 2.5 s
MTI : off
Doppler Bank : off
Taper DFB : Blackman
Noise Figure : 5.5 dB
Receiver Losses : 1 dB
False Alarm Prob. : 1e-004
Fill Pulses : 0
Timing Jitter RX : 0.1 ns
Target RCS : 10 m²
Target Velocity : 0 m/s
Target Range : 10 km
Target Altitude : 2 m
Swerling Case : 0
Minimum Plot range : 1 km
Maximum Plot range : 60 km
Minimum Plot vty : 0 m/s
Maximum Plot vty : 300 m/s
Minimum Plot hght : 1 m
Maximum Plot hght : 500 m
Range Axis : logarithmic
Performance Prmtr : range