PDT
Pulse Directional Technologies

# QUAD ORBITAL GAMMA

## Azimuthal Gamma and Rotary Inclination

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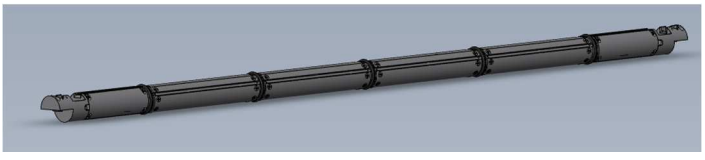
## DESCRIPTION

With azimuthal gamma, operators can see the dip and direction of the formation while rotating. By combining four gamma sensors into one probe, the Quad Orbital Gamma can capture Azimuthal gamma readings while sliding.

The Quad Orbital module will give a clearer crisper image than previous azimuthal gamma probe designs because of the increased amount of sensor inputs. It is designed to be incorporated with the MWD tool string and replace the existing MWD gamma module. Using PDT's surface decoder, an 8 bin azimuthal gamma can be compressed down hole and decompressed on surface for blazing fast decoding.

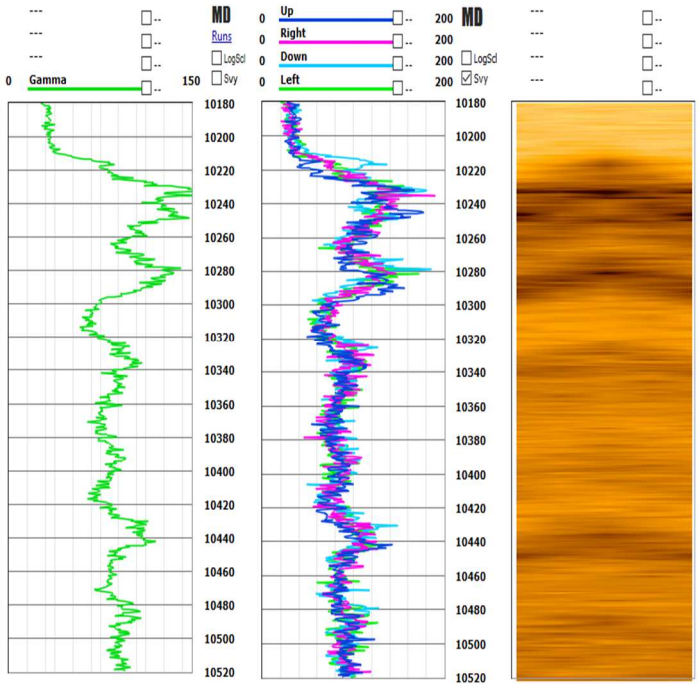
## APPLICATIONS

- Conventional Drilling.
- Vertical, directional and horizontal drilling.
- Unconventional Drilling.
- Coal Bed Methane/ coal seam gas.
- Mining/degasification and delineation of fields.
- Detecting Faulted Formations.
- Rotary inclination feature allows for continuous survey while drilling.



## FEATURES & BENEFITS

- Selectable between 2, 4 and 8 bin azimuthal gamma.
- Gamma can be sent to surface using conventional 1 bin at a time transmission or data compression methods.
- Ability to slide and still see up and down gamma.
- Off center detectors for higher contrast logs.
- More detectors for greater detection of small differences between each bin.
- Proprietary algorithms to reduce the shine thru from the shielded part of the detector.
- Memory recorded for post processing.
- Rotary inclination.
- Shock and vibration.
- Conventional gamma.
- Down hole RPM.
- Works with BHA magnetic interference.
- Real time transmission of tool status for ensuring proper tool operation.
- Field adjustable gamma sampling period and filtering.
- Stick Slip Detection.
- Fully retrievable.



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## Mechanical Specifications

| | |
|---|---|
| Diameter | 1.875'' |
| Length | 69.5'' (176cm) |
| End Connections | 10 Pin kintec connectors |
| Input Voltage Range | 17V-30V |
| Input Voltage Range | 1023V |
| Vibration(3 axis) 50-1000 Hz Random Spectrum | 20 G's |
| Shock(z-Axis) | 500 G.,0.5 mS |
| Shock(X or Y Axis) | 1000 G., 0.5mS |
| Sensitivity | 0.2 CPS |
| Max Operating Pressure | 20,000 PSI |
| Max Operating Temperature | 175°C (347° F) |

## Rotary Orientation Sensor Specification

| | |
|---|---|
| Two Bin Gamma Up and Down | 180° windows |
| Four Bin Gamma, Up, Down, Left, Right | 90° windows |
| Eight Bin Gamma | 45° windows |
| Rotary Inclination Accuracy | +/-0.25 ° |
| RPM Measurement | +/-1 RPM |
| Max RPM | 100 RPM |
| Shock Measurement Range | 100 G |
| Shock Measurement Accuracy | +/-1G |
| RMS Vibration Measurement Accuracy | +/-1G |
| Shock Count Threshold | Field Programmable |
| Temperature | 1° C Resolution |

## Available Measurements

| | |
|---|---|
| Inclination at bit | degree |
| Azimuth at bit | degree |
| Dip angle | degree |
| Gravity | G |
| Magnetic field | Gauss |
| Battery voltage | volts |
| Temperature | °C |
| Gap resistance | Ohms |
| Counts of Z-Accel over 20g | counts |
| Counts of XY-Accel over 20g | counts |
| Inclination at bit while drilling | degree |
| RPM at bit while drilling | RPM |
| Gravity X-Axis | G |
| Gravity Y-Axis | G |
| Gravity Z-Axis | G |
| Magnetic field X-Axis | Gauss |
| Magnetic field Y-Axis | Gauss |
| Magnetic field Z-Axis | Gauss |
| Flashlight Logging Flags | Flags |
| Flashlight Survey Flags | Flags |
| Gamma at bit | counts/second |
| Azm Gamma - Up/North 2 bin | counts/second |
| Azm Gamma - Down/South 2 bins | counts/second |
| Azm Gamma - Up/North 4 bins | counts/second |
| Azm Gamma - Right/East 4 bins | counts/second |
| Azm Gamma - Down/South 4 bins | counts/second |
| Azm Gamma - Left/West 4 bins | counts/second |
| Mid Res Azm Gamma - 2 bins 4 bits | packed |
| Mid Res Azm Gamma - 4 bins 4 bits | packed |
| Low Res Azm Gamma - 8 bins 2 bits | packed |
| Upper Mid Res Azm Gamma - top 4 bins 5 bits | packed |
| Upper Mid Res Azm Gamma - bottom 4 bins 5 bits | packed |