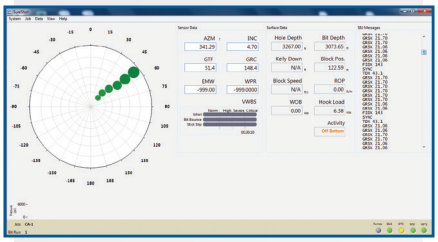
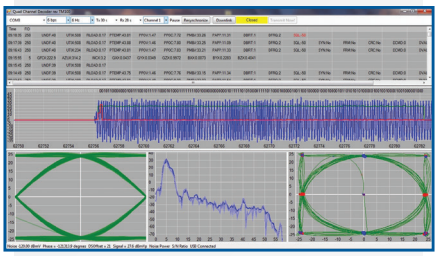
SureShot™ EM Telemetry System

SureShot-EM

Features

- > Data rates up to 12 bps
- > High-power 50 W transmitter
- > Downhole selectable data sequences – choose the optimum combination of directional, LWD and pressure measurements for the drilling operation
- > EM Downlinking – Quickly adjust power, bit rate, carrier frequency and telemetry sequences for the conditions
- > Plug-and-Play compatibility with APS SureShot downhole and surface equipment
- > Quad channel digital surface receiver to rapidly select the best signal from among 4 antenna pairs as the well progresses
- > Turbine alternator option for extended bit runs and high current draw applications
- > Unique rugged, reliable dual gap sub
- > WPR resistivity compatible



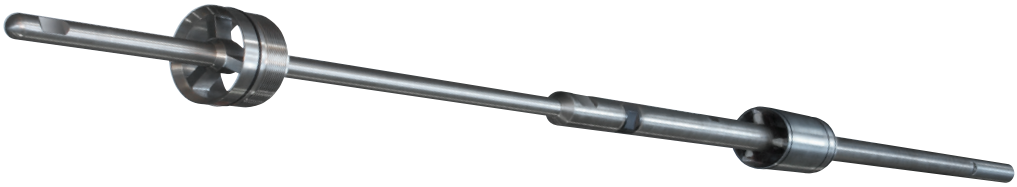


EM Telemetry

The APS EM system communicates by transmitting electromagnetic waves through the formation instead of pressure pulses through a fluid column. Benefits include time saved by transmitting surveys during a connection, high data rates and the ability to operate in conditions where mud pulse telemetry cannot.

Applications

- > High ROP drilling with frequent surveys
- > High data density LWD and drilling optimization applications
- > Underbalanced drilling
- > Foam and air drilling
- > Extreme lost circulation conditions



SureShot EM

SureShot EM is a state-of-the art system. The downhole tool features two-way EM communication. The sequence and frequency of transmitted measurements is EM downlink selectable. Whether it's a higher density log to pick a casing point, more pressure measurements for drilling optimization or emphasis on directional measurements while sliding, SureShot EM enables the operator to quickly choose the optimum data sequence for the drilling operation.

Power, data rate and carrier wave are user adjustable while drilling – helpful for transmitting through changing formations and when automatic adjustments are ineffective due to overburden or changing surface conditions. The innovative quad surface receiver is actually four receivers in one. The receiver can decode using one antenna while simultaneously monitoring up to four antennas. As the wellbore changes direction the operator can select antennas at the optimum time for best reception. Utilizing the strongest signal conserves batteries and allows for higher data rates. The gap sub is a dual gap design for added reliability. Features include ceramic sleeves to prevent loss of power due to arcing; no coating to wear and arc; dual insulator rings for more reliability; and higher power to the formation due to gap distance.

Fixed-mount and retrievable configurations are available. The fixed-mount tool features a sliding electrode contact ring – no need for spacers to accommodate various length subs. The fixed-mount tool is field configurable to work with different size drilling tubulars.

The EM tool operates with batteries or turbine alternator. The turbine alternator enables longer downhole time, high transmitting power for longer periods and power for high draw applications with multiple sensors. The turbine alternator configuration includes backup batteries for operation during periods of no flow.

Depth tracking options include the SureShot Depth Tracker, the SureShot mud pulse SIU and WITS.

Compatibility

SureShot EM works with all APS downhole sensors. The EM transmitter uses the same flow subs and is a drop-in alternative for the mud pulse transmitter, having many parts in common with the SureShot mud pulse system. Operators benefit from reduced inventory cost and increased flexibility when providing a mix of EM and mud pulse MWD services.

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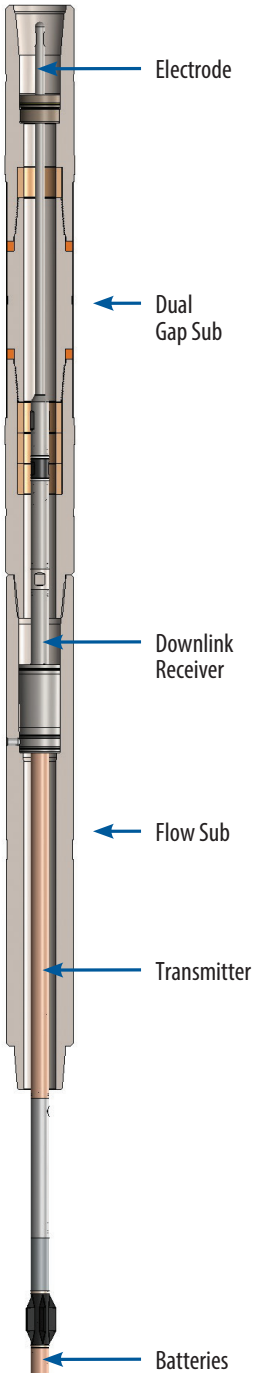

Product Specifications

Downhole Transceiver		
Data Rate	1 to 12 bps uncompressed; selectable	
Power Output	2 to 50 W, selectable	
Power Source	2 - 4x 10 DD lithium battery or APS Turbine Alternator + 1x 10 DD lithium battery	
Downlink Methods	EM and flow	
Downlink-adjustable Parameters	Data Rate Power Output Operating Frequency Data/Survey Sequences Survey-on-command	
Operating Frequency	2 to 12 Hz; selectable	
Collar OD	8.0 in. 6.75 / 6.50 in. 4.75 in.	204 mm 172 / 165 mm 121 mm
Flow Rate Limits	8.0 in. – 300 to 1100 gpm 6.75 / 6.50 in. – 150 to 750 gpm 4.75 in. – 125 to 350 gpm	203 mm – 19 to 69 L/sec 171 / 165 mm – 9 to 47 L/sec 121 mm – 7.9 to 22 L/sec
Sand Content	< 1% by volume recommended	
Operating Temperature	-13˚ to 302˚F	-25˚ to 150˚C
Maximum Pressure	20,000 psi	138 MPa
Surface System		
Operating Temperature	32˚ to 158˚F	0˚ to 70˚C
Storage Temperature	14˚ to 185˚F	-10˚ to 85˚C
Surface Sensors	Depth encoder, hookload, standpipe pressure	
SureShot MWD with EM		
Downhole Configurations		
Available Platforms	Fixed-mount or retrievable	
Fixed-mount System	Battery Battery and PWD Turbine, battery and PWD	
Retrievable System	Battery Battery and PWD	
Available Sensors	Directional, gamma, vibration, WPR, annular and bore pressure	
Length	Equal to mud pulse transmitter; 30 - 31 ft for DGMWD collar	
Surface System		
Surface System	Surface receiver, downlink transmitter, laptop, rig floor display	
Depth Options	WITS, SureShot Depth Tracker, SIU 1 or SIU 2	

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