

MPHTM Industries

DS4TM

Speed, Direction, & Range Sensing Radar

Specifications

And

User's Guide

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I. DS4 Description and Operation

The MPH Industries, Inc. DS4 Radar Sensor is designed for DOT agencies to measure the speed, direction, and range of motor vehicles and communicate via RS-232 to a PC, data logger or some other data storage or display device. The DS4 reports the target vehicle's velocity (speed and approaching or receding direction) and range of the strongest reflected signal. The DS4 utilizes the legally accepted microwave doppler shift principle and has performance characteristics compliant for use under Part 15 of the US FCC regulations and with the European RTTE harmonized standards for this class of equipment.

The DS4 is a self contained module consisting of a Gunn oscillator transmitter, a transmit and receive antenna, and an integral signal processing unit. It is housed in a NEMA type enclosure with one eight pin circular connector through which all of the power and communications pass. Cable termination configurations include "flying leads" and a DB9 type of connector. The module is not waterproof, but can be modified to use for outside locations in a fixed mounting configuration with the addition of a sealed radome over the antennas. The DS4 standard configuration outputs the strongest approaching target within a preset range of 600 feet. Special configurations with ranges up to 1000 feet can be made with variations in the software modules installed at the time of manufacture, but field change in configuration is not an option.

A. SYSTEM SPECIFICATIONS

Power Requirements & Voltage:	10.8 Vdc-16.5 Vdc (13.6 Vdc Nominal)
Low Voltage Brown-out:	Input voltage $7.0 < V_{input} < 10.8$ VDC: Transmitter disabled and Low Voltage status bit enabled Input voltage < 7.0 entire unit disabled.
Current:	0.25A nominal @ 13.6V input voltage
Target Detection Speed:	6 to 110 mph (10 to 193 km/h)
Speed Accuracy:	+/- 1 mph (+/- 2 km/h)
Target Range:	≤ 1000 feet (328 meters)
Range Accuracy:	+/- 30 feet (+/- 9 meters)
Operating Temperature Range:	-30°C (-22°F) to 60°C (+140°F)
Operating Humidity Stability:	Operates normally up to at least 90% relative humidity at 99°F (37°C).

B. PHYSICAL CHARACTERISTICS

Connector:	8 Pin Circular Weather tight
Physical Size:	Weight = 3.0 lb. (1.36 kg) Depth = 2.5" (6.4cm) Width = 6.0" (15.2 cm) Height = 8.75" (22.2 cm)

C. MICROWAVE CHARACTERISTICS

The DS4 unit has separate transmit and receive antennas. The transmit antenna has a broad beam width and illuminates targets in a wide field.

Operating Frequency:	K band: 24.15 GHz _
Modulation:	Square wave 48.25 KHz., +/- 100 KHz deviation peak
Microwave Source:	Varactor tuned Gunn cavity oscillator
Output Power:	Nominal 12-18 mW / Maximum 20 mW
Radiated Power Density:	< 100 mw EIRP
Transmit Antenna:	Linear Polarization, vertical E field
Beam Width:	40 deg. Horiz. , 70 deg. Vert.
Gain:	+ 6 dBi
Received Microwave Beam:	Linear Polarization, vertical E field
Beam Width:	20 deg. Horiz., 30 deg. Vert.
Gain:	+17 dBi
Detection Range:	1000 ft. typical for average size vehicle. Range varies by size of vehicle, terrain, traffic conditions, weather conditions, and other external conditions present in various locations.

This device complies with Part 15 of FCC rules. Modification of this device without the express consent of the manufacturer may invalidate the user's right to operate the device.

This device complies with Part 15 of the FCC Rules subject to the following two conditions:

- 1) This device must not cause harmful interference and,
- 2) This device must accept all interference, including interference that may cause undesired operation.

RF Exposure Warning: A minimum separation distance must be maintained between the user and the radiating antenna. Failure to maintain this minimum separation distance may cause the device to operate in excess of the rf exposure levels required by FCC Rules and should be avoided.

MPH DS4 Radar Interface Protocol Document

1. Speed Packet Protocol

The DS4 Radar message packet consists of 7 bytes @ 1200 baud, no parity, 8 data bits, 1 start bit. Messages are paced at 250mS intervals and are sent whether there is a target or not.

Char		Description
1	<STX>	Start of message
2	Status	Radar status, as defined below
3	Not used	
4	Approaching Target	Speed values below 4 are treated as zero.
5	Reserved	
6	Target Range/10	Values below 4 are treated as zero
7	<ETX>	End of message

1.1. Radar status byte

Bit	Description/function if set
0	Low voltage error
1	Not used
2	Not used
3	Not used
4	Not used
5	Always zero
6	Always zero
7	Always set

1.2. Example

Received sequence 02, 128(0x80), 01, 65, 01, 55, 03.

Strongest approaching target at 65 at a range of 550 feet.

2. Recommendations for remote displays (sign boards) or data loggers.

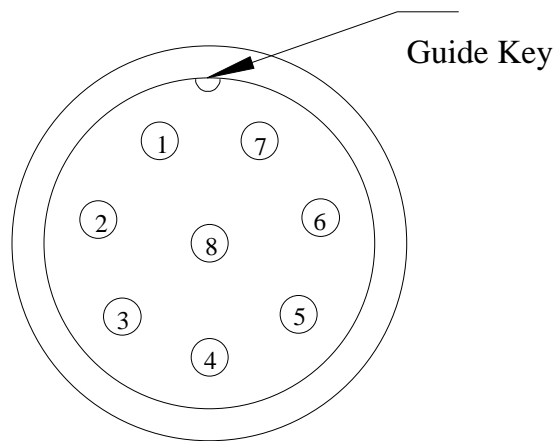
- Look at the Approaching Target byte. If it is 4 or above, display it.
- If messages are not arriving, blank screen after a few seconds. The radar is probably off, or not connected.
- Displaying the difference between the sign receiving a speed of zero and not receiving a message at all is recommended. This makes troubleshooting easier. We display a dot if communications are working properly.

3. Pin out Description

Following is the pin out for the DS4 circular output connector (male bulkhead connector on the module) with the mating cable wire colors:

<u>Pin</u>	<u>Description</u>	<u>Cable Wire Color</u>
1	+13.6 VDC Input	Red
2	OFF/ (Gnd to turn unit off)	White
3	RS232 Rec Line (not used)	Blue
4	RS232 Trans Line	Brown
5	Signal Gnd	Green
6	No Connection	Orange
7	No Connection	Yellow
8	Power Ground	Black

DS4 CONNECTOR PIN DEFINITION



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