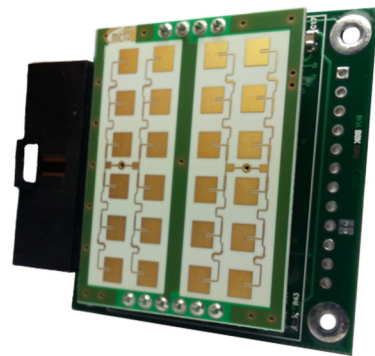# DC310

User Manual and Installation Guide

K-Band Doppler Speed Sensor
Built Type: DC310-DFT, DC310-OFD
Rev 0, 10th April 2013

DC310 in Weatherproof Enclosure
DC310-DFT

DC310 Open Frame Version
DC310-OFD

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. The device must be located 20 cm or more from persons. The device must not be co-located with other transmitters. These warnings must be included in the user manual of the final configuration where this device is utilized.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Any modification or use other than specified in this manual will strictly void the certification to operate the device.

This device carries FCC modular approval and as such is labeled with FCC ID TIADC310. If this label is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed DC310 module. This exterior label can use wording such as the following: "Contains Transmitter Module FCC ID: TIADC310" or "Contains FCC ID: TIADC310." Any similar wording that expresses the same meaning may be used.

ATTENTION
OBSERVE PRECAUTIONS
FOR HANDLING
ELECTROSTATIC
SENSITIVE DEVICES
MIL STD 129N/SYMBOL
LABEL MADE IN REDMOND, OREGON, U.S.A   THE DE LEONE CORPORATION   ASC 205

Warning: DC310-OFD radar is supplied in an open frame format with exposed antenna and electronics and thus is a static sensitive device. Please use static precautions when handling. Warrant*y* does not cover damage caused by inadequate ESD procedures and practices.

Note: Specifications may change without notice.

Note: Not liable for typographical errors or omissions.

Table Of Contents

INTRODUCTION

Congratulations on your purchase of the Houston Radar directional Tracking Doppler Radar DC310. This state of the art 24GHz K-band microwave Doppler radar is specifically designed for the license free battery operated traffic monitoring and data collection market.

Utilizing high performance, ultra-low power DSP (Digital Signal Processing) technology and microwave components based on a planar patch array antenna with integrated low power PHEMT oscillator, you will find that this high quality product meets your exacting standards for performance and reliability.

Some of the highlights of this product include:
- ✓ World's smallest and lowest power usage OEM target tracking, multi-lane and dual-direction traffic stats radar at 0.17 Watts[1]
- ✓ Collects individual time stamped vehicle counts and speeds per direction in up to 2+2 lanes simultaneously making it a perfect fit for real-time traffic monitoring and speed study applications
- ✓ Best-in-class 0.4% per vehicle basic speed accuracy
- ✓ Calculates average speed in real time for remote access[2] or generate detailed speed studies with 85th percentile speeds from historical data
- ✓ Vehicle classification in up to 3 size classes
- ✓ Data saved in on-board memory or available real-time via RS232
- ✓ FCC pre-approved with CE mark
- ✓ "Install and Go" hassle free no configuration required installation
- ✓ Wide input operating range and low power allows solar operation
- ✓ 1.9Wx2.1Hx0.9D in (4.5x4.8x2.4 cm) weatherproof enclosure option
- ✓ Firmware "boot loader" allows for field upgrading of firmware
- ✓ 100% self-test feature built-in including radar's own power usage
- ✓ IO expansion board w/ DB9 connector available for ease of testing
- ✓ Fully functional Windows Traffic Statistics Analysis program available to generate reports and graphs of vehicle counts, averages, & 85th percentile speeds.

INSTALLATION
Mounting
DC310-OFD is supplied in an "open frame" format. It requires a weatherproof enclosure before it may be used outdoors. Alternatively it may be mounted as a component in another product that already has a weatherproof enclosure.
The DC310-OFD should be mounted such that the <u>connector points left or right</u> as shown in the picture on the front page.

The DC310-DFT is supplied in a weatherproof encapsulated enclosure with a pigtail connection. This unit may be mounted outside without any further protection from the

environment. The DC310-DFT should be mounted such that the text "Houston Radar" on the face of the unit is horizontal.

Pick a location where the traffic is free flowing and the DC310 has at least 100 feet (30m) of unobstructed road in either direction. Avoid mounting within 100 feet (30m) of congestion points such as stop signs, sharp turns and traffic signals. Avoid mounting where trees, branches or other objects are obstructing the view of the traffic.

Mount on the side of a two lane undivided road to measure both directions. Mount within 12 feet (3.6m) off to the side of the road. We recommend making the incoming direction the closer lane.
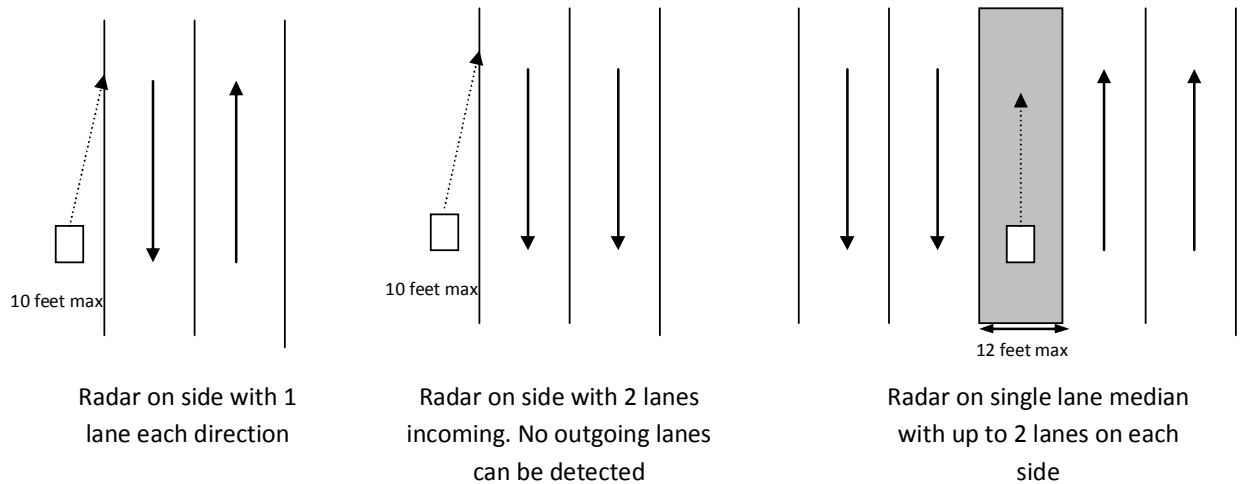
Mount in the median of a four lane divided road to measure both directions. Pick a location where the median is no more than 12 (3.6m) feet wide.

Mounting on the side of a 4 lane divided road will allow the DC310 to capture only the closest two incoming lanes accurately.

Radar may be mounted typically with 0 to 10 feet offset to the side of the road or in middle of median that is no more than 12 feet wide.

Mount DC310 at least 6 feet (1.8m) high but no more than 10 feet (3m) high. Adjust the tilt to point down to look at a spot about 75 to 100 feet (20 to 30m) in front of the radar. You may mount as low as 4 feet (1.2m) if the location has low traffic density and you are on an undivided two lane road.

When installing on the side of the road point DC310 slightly inwards towards the road. When installing in the median between opposite flowing traffic, do not angle the DC310 towards either side. You should still tilt the DC310 down to point about 100 (30m) feet in front of the mounting location.

10 feet max

10 feet max

12 feet max

Radar on side with 1
lane each direction

Radar on side with 2 lanes
incoming. No outgoing lanes
can be detected

Radar on single lane median
with up to 2 lanes on each
side

Recommended Enclosure for the DC310-OFD:

The DC310-OFD radar needs to be enclosed in a weatherproof enclosure for outside use.
The following needs to be observed for optimal performance:

1. The front face of the radar (with the golden pads) is the antenna and is the face
   that must point into traffic.
2. <u>Any cover or window in front of the unit MUST be at least ¼" away from the
   face.</u>
3. Do NOT spray any conformal (or other) coating, paint or other substance on the
   antenna.
4. The optimum material to use as a front window is Lexan (Polycarbonate) plastic.
5. The optimum thickness of the polycarbonate window is half wavelength at
   24.125Ghz or about <u>3.5 to 3.7mm (0.137" to 0.146") thick.</u>
   a. Alternatively a thin window of any plastic material may be used. The
      maximum thickness in this case should be no more than 1 mm (40 mils).
   b. Standard 0.25" thick Lexan should be avoided as it has particularly high
      reflection coefficient due to this specific thickness.
6. Other plastic materials may be used as a front window, but the optimum thickness
   will wary with the material's dielectric constant. Please contact us for details.

Alternatively, you may consider weatherproof version DC310-DFT that is available from
Houston Radar.

Hookup:

Power Input:

The DC310 radar features wide operating input voltage range of 5.5V-18V. In a typical application it may be powered from a nominal 12V DC source and will feature best in class operational power consumption of 14 mA (average). There is no other radar in the world that even comes close to this ultra-low power usage. Competing products may consume up to 20 times more power.

This ultra-low operational power translates directly into a longer battery life or gives you an option to power the unit from smaller batteries and smaller solar panels.

Note: The radar employs aggressive power saving measures that include turning off parts of the circuit that are not being used at any instant. To get a true measure of the power usage of the circuit use a multi-meter that has an <u>averaging function and does not suffer from autoranging during measurements</u>. Otherwise you will get current readings that fluctuate from 7 mA to 23 mA.

Note: when the under-voltage lockout (UVL) feature is activated, the operating voltage range is reduced to 6.2V-18V and dropping the input voltage to 4.5V-6.2V will put the radar into a sleep mode where it will only update the internal clock.

Your power supply to the radar must be capable of supplying up to 40mA of current for up to 5 seconds at a time (startup current is higher as the radar is initializing its internal systems).

Serial Connection:

The DC310 features an RS232 interface that is used to output average speed, access statistics data and configure the unit as explained later in this document.
The RS232 interface is factory set to default to "cable detect" mode and will power the interface chip down to save power if the radar RX line is not connected. Cable detect mode may be disabled and the interface may be forced ON via a bit in the "MD" variable.

Average Speed Output:

The DC310 can send out the average measured speed via the ASCII interface as a 3 digit speed with an optional direction indicator. This option is not turned on in the default configuration, and must be enabled. The format is:
`[?,+,-]nnn[.ddd][\r,\n]`
The format of the speed output can be adjusted to any combination of:
"?": Optional prefix sent when 000 is selected to be sent when no vehicles are detected
 "+": Optional prefix sent when nnn speed is sent for incoming vehicles
 "-": Optional prefix sent when nnn speed is sent for outgoing vehicles
"nnn": Three digit ASCII speed in the units selected via the UN variable

".ddd": Programmable number of digits (0-3) after decimal point
"\r": Carriage Return character, optional line ending
"\n": Line Feed character, optional line ending
At least one or both of the line endings must be selected with ASCII format. No line
ending is not an option. Please see serial port configuration section for details on how to
select the above format.

Setting variables from an ASCII Terminal program via ASCII commands:

All the radar variables can be set and queried via a simple ASCII command set over the
serial port. ASCII commands may be issued via an ASCII terminal program like
Hyperterminal or Teraterm Pro. Alternatively, you may issue these commands from an
attached microcontroller.

All settings are written to FLASH memory and are non-volatile. Do not update
settings on a periodic basis, e.g. every second or every minute. Only change settings
when the user needs it. The FLASH memory has a limited number of write cycles
and will wear out with excessive (>10,000) number of writes. On the other hand,
setting the variable to the same value repeatedly is OK because the radar recognizes
that the variable has not changed and does not update it in FLASH.

The ASCII commands are:

get (get a config variable)

set (set a config variable to a supplied value)

reset (resets the radar. Required after changing variables MO, MD and RS).

info (print out some info about the radar. Info is in the format of <tag>=<value>). New
tags may be added in the future. Order of tags may be moved around.
e.g.
To set a variable (variables are documented in the user manual):
set: <case sensitive var name>   <value>[Enter]
e.g.
set:LO 5
alt format:
set:LO=5
sets the low speed cutoff to 5 etc.

Variables are case sensitive. Commands are not.
Success is indicated by an "OK".
Failure is indicated by either:
"ERROR" - Command was recognized but some other error occurred (variable not
present, format not correct, etc.)
<nothing returned> - Command was not recognized. Entire line was silently discarded.
This ensures that spurious things like enters or other ASCII chars do not generate

"ERROR" when you are not expecting them.

To get a variable:
get:<case sensitive var name>[ENTER]
e.g.
get:LO
returns
LO=5 (if value is presently set to 5).

If sending the ASCII command via an attached microcontroller, the "[ENTER]" key press should be replaced by the carriage return and/or line feed ASCII character.

Wire Signal Descriptions:

Connector Pin #	Signal Name	Direction (wrt Radar)	Description
1	GND	PWR	Radar GND (battery "–" terminal)
2	N/C	N/C	Do not connect
3	I/O0	I/O	Reserved for future use
4	I/O1	I/O	Reserved for future use
5	I/O2	I/O	Reserved for future use
6	I/O3	I/O	Reserved for future use
7	Trig O/P 1	Output	"Open Drain Output 1". See Note 1.
8	Trig O/P 2	Output	"Open Drain Output 2". See Note 1.
9	RS232 TX	Output	RS232 Transmit Signal from radar
10	RS232 RX	Input	RS232 Receive Signal into radar
11	VCC	PWR	+5.5 to +18VDC Power Supply
12	GND	PWR	Radar GND (battery "-" terminal)

Note 1: *See Appendix A for detailed description on how to hookup an external device to be triggered when radar detects incoming objects. Incorrect hookup may result in the output devices being destroyed and will not be covered under warranty.*

The DC310 features two low impedance outputs that can trigger/turn on an external display/device to bring it out of power saving mode when a vehicle is detected. Both of these outputs can be configured to trigger for incoming vehicles, outgoing vehicles, or all vehicles. If you need different functionality, however, please contact us.

When a vehicle is detected, the corresponding pins are pulled down to GND and held low for the time duration specified in milliseconds by the "TA" variable. This logic may be inverted via a bit in the "IO" variable. See later section.

These are "open drain" (AKA open collector) outputs capable of sinking 130 mA each. You must limit the current externally to ensure that no more than 130 mA goes into each pin when they turn on. They may be connected in parallel to double the sink capacity to 260 mA.
    The device providing this functionality on the radar board is the ON-Semi "NUD3124" relay driver. Please refer to the datasheet for this device on detailed operating characteristics for these trigger outputs.

USE

Turn on the power to the DC310 to make it operational. No other action is required. The radar will activate the appropriate OUT 1 and OUT 2 open drain outputs, if enabled, whenever it detects a vehicle that is above the programmed lower speed limit (the "LO" value) and below the programmed high limit (the "HI" value). The default limits are set at 3 and 99 at the factory. The units (e.g. kph, mph, fps, mps) are determined by UN variable.

Connect radar to PC RS232 serial port and use provided Windows configuration software to program the high speed limit ("HI" variable). The radar de-asserts the trigger outputs above this limit. If you do not wish an upper detection limit, set this value to 159. This will ensure that the upper limit is never reached regardless if the units are set to MPH or KPH.

Set the "LO" variable to set the lower detection speed limit. The outputs will be de-asserted for vehicles below this speed limit. The lowest value this may be set is 3 MPH (5KPH).
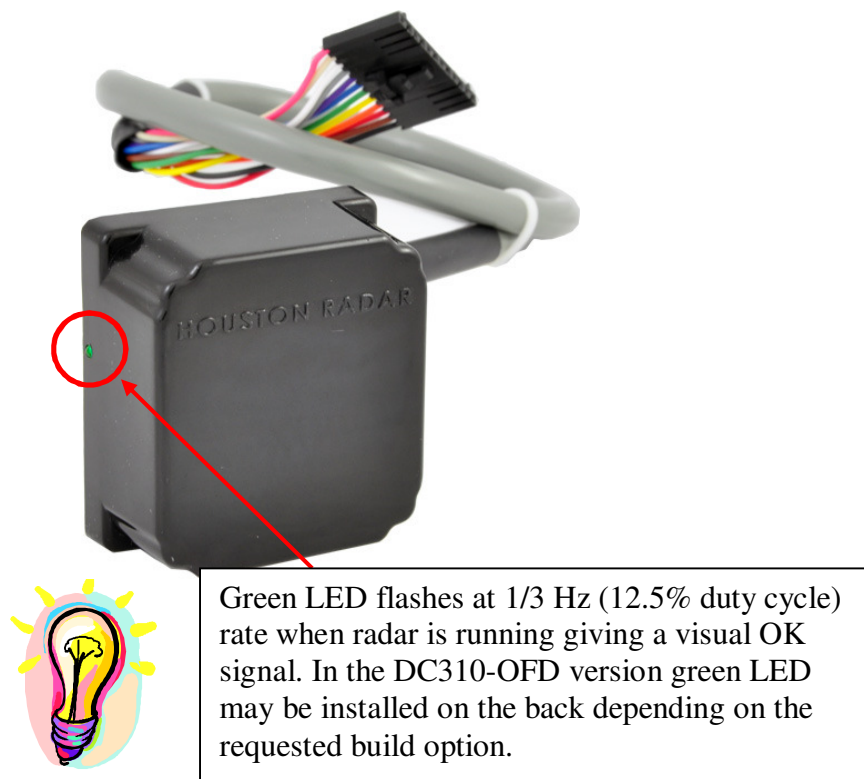
Green LED flashes at 1/3 Hz (12.5% duty cycle) rate when radar is running giving a visual OK signal. In the DC310-OFD version green LED may be installed on the back depending on the requested build option.

Internal Clock:

       The radar has a built in clock/calendar function. This allows the radar to date/time stamp the historical archive records saved by the Advanced In-Radar traffic statistics collection feature.

> *The radar does not feature a clock backup battery. Power must remain connected to the radar for the clock to keep time. An external clock battery may be connected to keep time while radar goes into low power sleep mode. See Appendix C for more details.*

Configuring the Unit:

The radar's internal parameters may be configured via the radar's RS232 port after connecting to a PC's RS232 serial COM port and using the Houston Radar configuration program's Graphical User Interface (GUI). While this is the most convenient way to configure the radar, customers may also wish to set the configuration variables directly, for example when the radar is part of a system and connected to another microcontroller. The radar configuration variables and their functionality are described below.

| Configuration Variable Name	Description
RS	Sets the RS232 serial port's baud rate and output format. Do not change this value unless you understand the implications.
UN	**Lower Byte**: Sets the internal speed units of the radar. All LO, SP, and HI speeds are interpreted to be in these units. 0 = MPH 2=FPS (Feet per second) 1 = KPH 3=MPS (Meters per second) **Upper Byte**: Sets number of digits after decimal point.
LO	Low speed cutoff. Vehicles are not detected below this speed. Minimum value is 2. Should be set to be less than HI. Speeds above this limit can trigger the O/P1 and O/P2 outputs.
HI	High speed cutoff. Vehicles are not detected above this speed. Maximum value is 159. Should be set higher than LO speed.
SF	Select tracking filter. This should be pre-configured to monitor bi-directional traffic. Please contact us if you wish to modify this.

Radar Configuration Variables Continued:

Configuration Variable Name	Description
ST	Target detection sensitivity. Valid values are from 10 to 100 and are a percentage of max magnitude. This value should be left at 100, unless the radar is over counting due to mounting location.
MO	Radar mode bitmask. Bits are as follows: **Bit 0**: SI3 ASCII command compat flag. Contact us for more details. **Bit 1**: Enable ASCII console output on RS232 serial port **Bit 2 to 15**: Currently reserved in DC310 radar
MD	Radar mode bitmask number 2. Bits are as follows: **Bit 0**: Enable low voltage power down. See Appendix C for details. **Bit 1**: Enable True Average Speed output **Bit 2**: Force enable the RS232 interface when set. Sets to "cable detect" mode when bit is cleared. Power usage is increased by 0.012Watts if this interface is force enabled or if RS232 cable is connected. **Bit 3**: Reserved in DC310 radar **Bit 4**: Save traffic statistics (if enabled in radar) in 3mph/5kph speed bins rather than original default of 5mph/10kph speed bins **Bit 5**: Enable beeper (For armadillo) **Bit 6**: Enable cycle skipping mode to save power when no vehicles are detected
HT	Output Hold Time in milliseconds. Once the output is triggered, it is held for this amount of seconds from the last trigger source before going inactive.
IO	Radar IO configuration bitmask. Bits are as follows: Bit 0: Reserved in DC310 radar Bit 1: Active high open drain 1 output Bit 2 to 8: Reserved in DC310 radar Bit 9: Active high open drain 2 output Bit 10 to 15: Reserved in DC310 radar

Configuring the Radar via the provided Houston Radar Configuration Tool GUI:

1. Install the provided Houston Radar Advanced Stats Analyzer (or Houston Radar Configuration) Windows program on a Windows 2000, XP, Vista or Win 7 computer. Both 32 and 64 bit operating systems are supported.
2. Connect the radar RS232 port to the PC's RS232 serial port. If the PC does not have a serial port you may buy a USB serial converter dongle (from BestBuy, Radioshack, or any Internet store).
3. Power up the radar. Ensure the green LED flashes every 3 seconds. Power must be provided externally unless you have purchased and are using the Houston Radar powered USB dongle (part #USB-RS-P1) which provides a COM port to the PC and boosts the USB 5V to 12V for the radar all in a single device.
4. Start the Houston Radar Stats Configuration Tool program
5. Click on Start -> Connect to Radar…
6. Click on "Connect" button.
7. Ensure you see a "Radar found on COM" message. The COM # will depend on your computer
8. Click on OK. Now you are ready to configure the radar.

To Radar RS232 + 12VDC Power

To Windows PC USB port
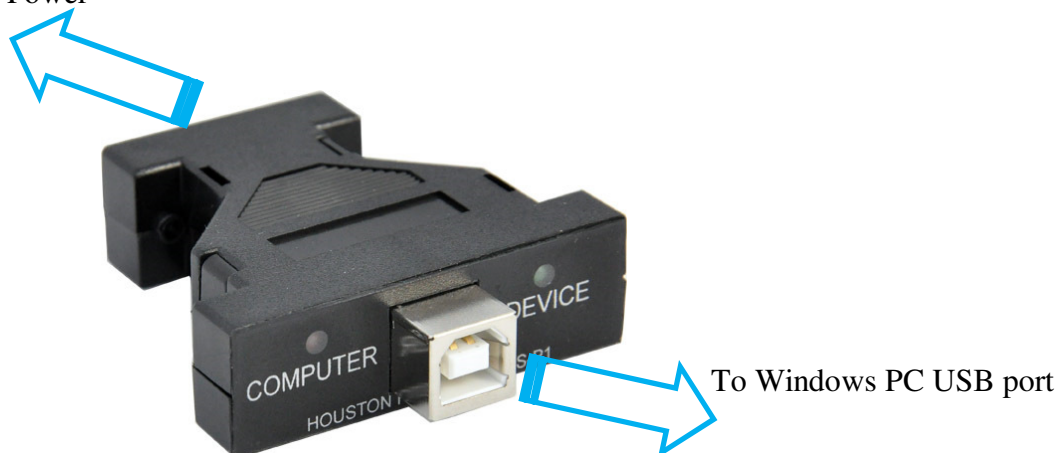
Houston Radar USB-RS-P1 USB powered RS232 interface to the radar.

For a quick and easy connection from a Windows computer to the radar, we suggest purchasing our USB-RS-P1 powered USB dongle (shown above). This device connects to a USB port on a Windows computer and provides a RS232 connection and 12VDC power to all Houston Radar devices. You can be up and taking to the radar within a few minutes of receiving your device.

STEP 1: Connect to Radar

Select your COM port (or "AutoDetect Port" option) and then click on "Connect To Radar".

Click "OK" on the next two boxes. The one on the left shows you information about the radar that you have connected to which you may ignore at this time.

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STEP 2: Click on Radar Setup to bring up the configuration GUI

Click on "Radar Setup" to bring up the GUI.

You must click on "Write To Radar" button for your changes to be saved to the radar.

STEP 3: Select the radar units

Radar units apply to the speed output over the RS232 serial port as well the low limit cutoff and high limit cutoff settings.

Additionally, if traffic statistics gathering is enabled, statistics are saved in integer mph boundary speed bins for mph and ft/sec units and in km/h integer boundary speed bins for km/h or m/s units in the radar.

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STEP 4: Set the radar cutoff speeds (low and high speed cutoff)
Cutoff speeds affect the measurement range for sending speed out over the serial port and activation of the hardware trigger outputs.
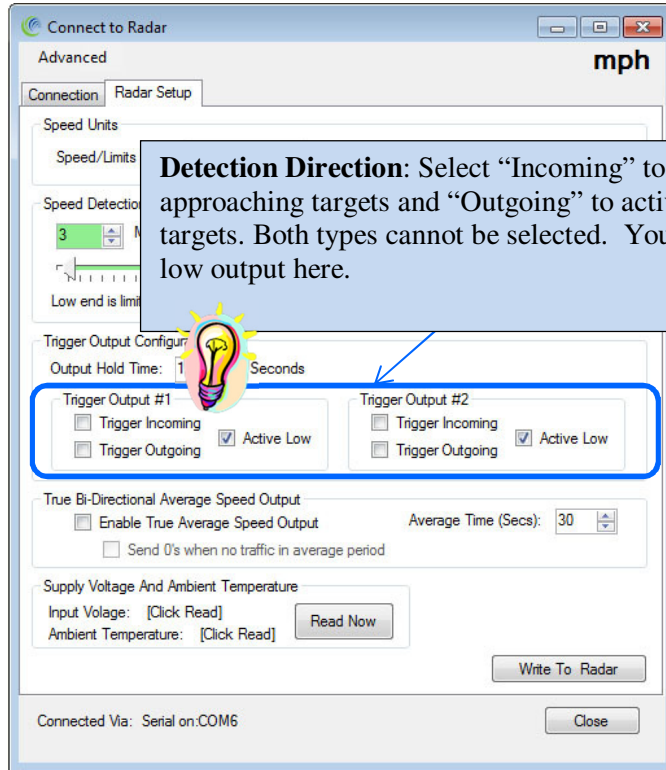
Cutoff speeds will affect collection of traffic statistics for the DC310. Traffic statistics will not collected outside of the detection limits.

Set the minimum speed you wish the radar to pick up and display. This is also the minimum speed that will activate the trigger outputs.
You may enter a number, click the up/dn arrows or move the slider.

Set the maximum speed you wish the radar to pick up and display. This is also the maximum speed that will activate the trigger outputs.

Speed Detection Limits

3 ⇅ Minimum Detectable Speed

Maximum Detectable Speed 99 ⇅

Low end is limited by radar specification

Limits DO apply to statistics collection and Trigger

Trigger Output Configuration

Output Hold Time: 1.0 ⇅ Seconds

Trigger Output #1
☐ Trigger Incoming
☐ Trigger Outgoing
☑ Active Low

Trigger Output #2
☐ Trigger Incoming
☐ Trigger Outgoing
☑ Active Low

True Bi-Directional Average Speed Output
☐ Enable True Average Speed Output   Average Time (Secs): 30 ⇅
☐ Send 0's when no traffic in average period

Supply Voltage And Ambient Temperature
Input Volage: [Click Read]
Ambient Temperature: [Click Read]   Read Now

Write To Radar

Connected Via: Serial on:COM6   Close

STEP 5: Configure the trigger outputs

Detection Direction: Select "Incoming" to activate trigger for approaching targets and "Outgoing" to activate for receding targets. Both types cannot be selected. You may also enable active low output here.

STEP 6: Enable Average Speed Output

STEP 7: Input Voltage and Ambient Temperature

In this section, you can view the radar's input voltage, and ambient temperature. Click "Read Now" to update these values.

DC310 SPECIFICATIONS

General

Operating Band	K-Band
Frequency	24.125 GHz ±50Mhz (US), 24.200Ghz on request
RF Power Output	5mW
Antenna Beam Pattern	20deg x 60deg
Polarization	Linear
Supply Voltage	5.5V DC to 18V DC
Reverse Battery	Protected
Nominal Current Draw	14 mA avg. (7mA-23mA depending on traffic) @+12V DC
Operating Temp.	-22°F to +185°F
	(-30°C to +85°C). Electronics designed and tested to –40C.
Weatherproof	Yes (DC310-DFT build option). Open frame also available.
IR Remote Programmable	No

Approvals

Approvals	FCC Part 15, modular approval (US Version), CE Mark.

Data Interfaces

Serial Communication	RS232
Data Rate	Baud Rates from 1200 to 115200 baud
Data & Pwr Connector	DC310-OFD:Molex "C Grid SL" male shrouded 12 pin RA part #70553-0011
	DC310-DFT:Molex "C Grid SL" female 12 pin (mate to above #)

Mechanical

Weight	approx 33 grams (1.16 oz)
Dimensions	2.1"x1.75"x0.6" (LxWxD) 52 x 46 x 16mm
Cable Exit	DC310-OFD: Side via right angle connector
	DC310-DFT: Encapsulated cable from back
Mounting	Four #2-56 standoff's embedded on module

Specifications continued on next page …

Performance

Speed Measurement Range   1.3mph to 100 mph (2.1km/h to 161 kph).

Resolution   ±0.006 mph

Accuracy   ±0.5% of reading + 0.1mph

Detection Range   Typically 75+ m (250+ feet) for compact vehicles on open and level road with radar mounted 1.5 m (5 feet) high and pointed straight into traffic. 150+ m (500+ feet) for larger trucks, lorries and vehicles with inherently large radar cross-section. May vary with installation and road conditions. Detection range specified is typical for speeds between 20kph and 88kph (12 to 55 mph). It tapers off below and above this speed range.

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Appendix A: Hooking up to the trigger outputs on the radar

The DC310 radar features two "open drain" outputs. The device used for this purpose is the On Semiconductor relay driver NUD3124. The output configuration of this device is shown below (from the On Semi datasheet).

The two outputs O/P1 and O/P2 are brought out on the radar connector pins (see IO connector pin out in manual for connector pin numbers).

This device can sink 130mA of DC current at up to 28VDC.

However, these are low impedance outputs, which means that you must externally limit the maximum current that will flow into these outputs to 150mA at the worst-case head voltage. They may be parallel together to increase this value to 300mA.

There are two ways to ensure this:
1. Connect an output device that is rated to draw no more than 150mA at your supply voltage (+Vhead). This device can be powered up to 28VDC. For example, this can be a 12 or 24VDC relay coil rated at more than 150 mA coil current or

2. Connect an external resistor in series with the output load and the O/P1 or O/P2 pins. The value of this external resistor should be calculated as follows (ohms law):
   R (in K Ohms)= (Vhead –Vload drop)/150
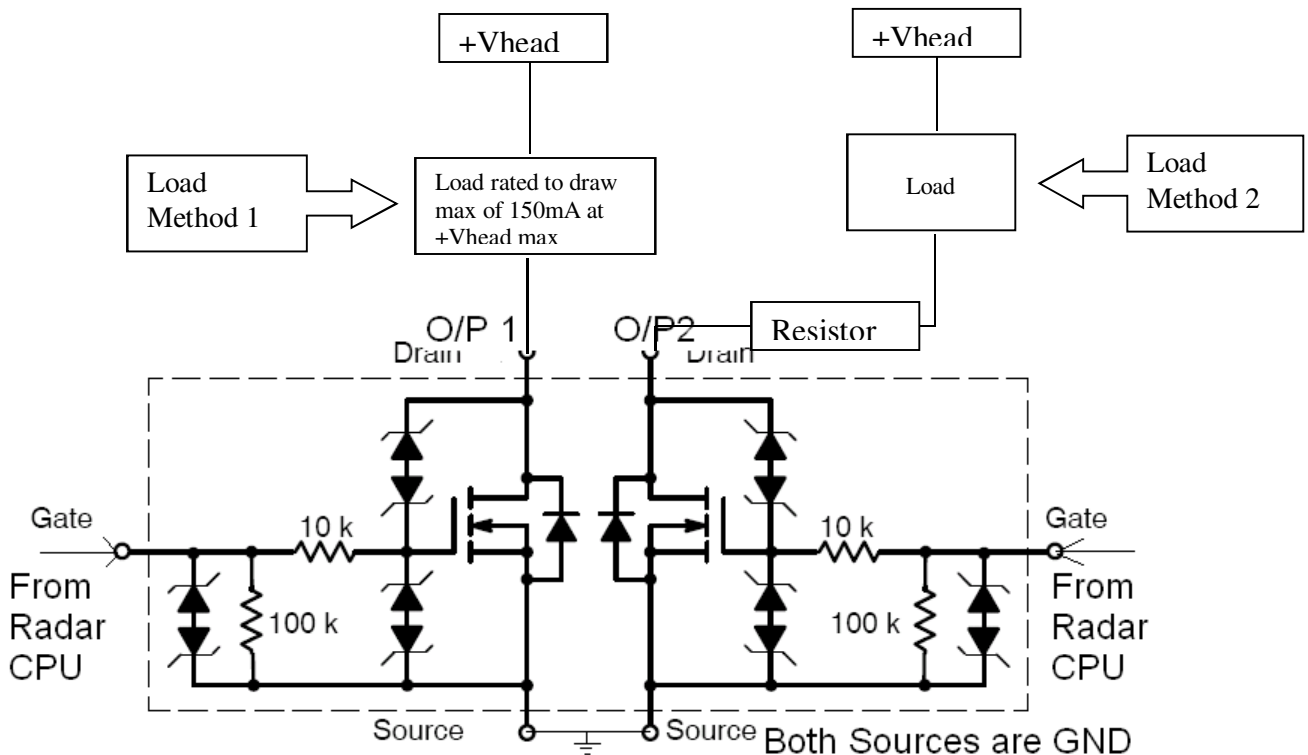
Appendix B: Optional Breakout IO Board Connections:
(Non-Isolated Mosfet version with PWM Brightness Control)

TO PC COM (RS232) PORT

SPEED SWITCH (1)

FULL/AUTO BRIGHTNESS SWITCH (2)

TO SS300 RADAR

AMBIENT LIGHT SENSOR (LDR) Available as option. (2)

VCC: +9.5 TO 16VDC (FOR RADAR & LOAD)

HIGH POWER LOAD (5A DC @VCC MAX)

FUSE FOR HIGH POWER LOAD

TRIGGER OUTPUT #2 (135mA DC @ VCC MAX)

TRIGGER OUTPUT #1 (135mA DC @VCC max)
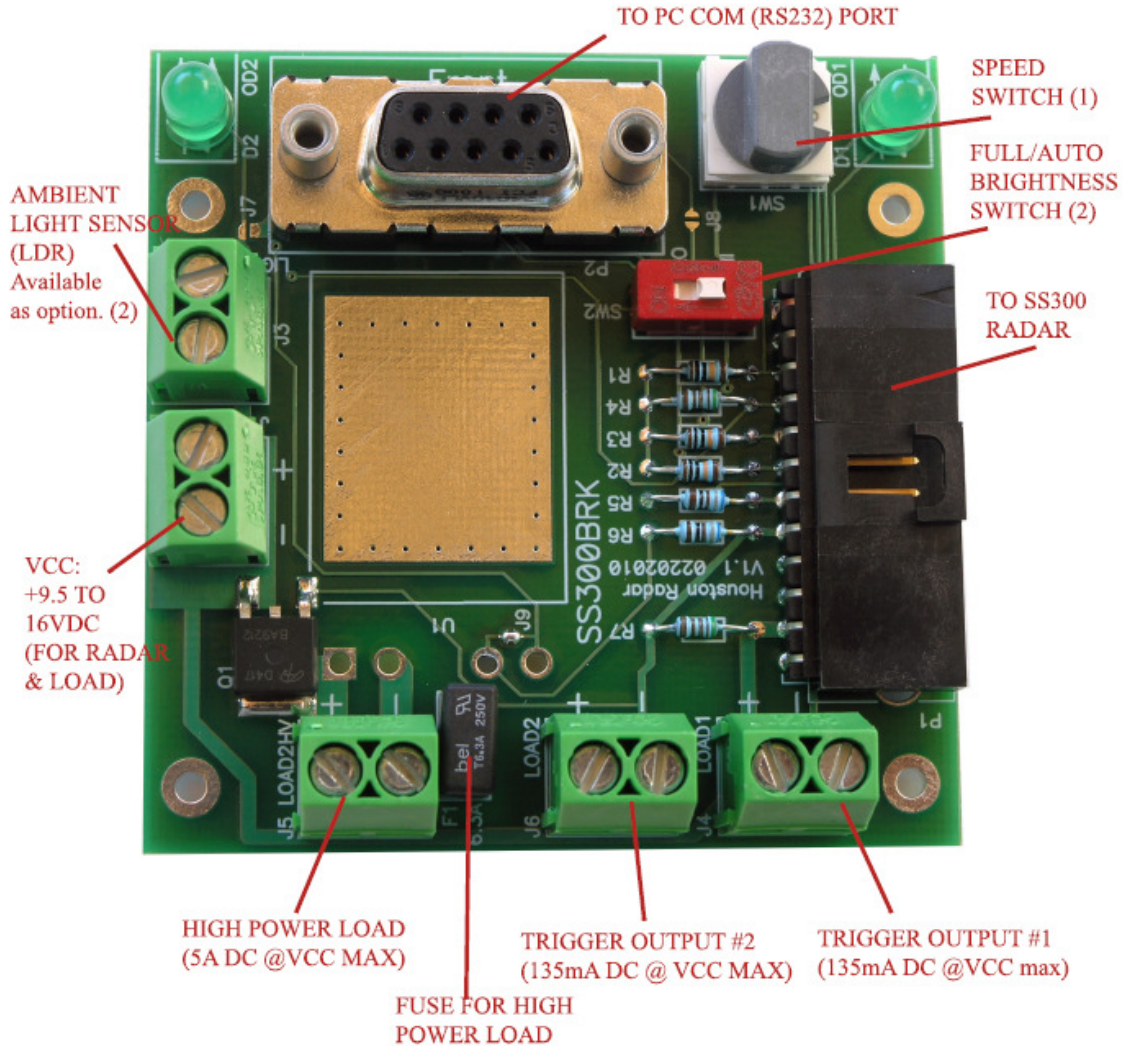
NOTES:
(1) Switch can be enabled in software to change the effective low speed cutoff below which radar will not pickup targets. See MO & SI variables in user manual for more information.
(2) Automatic brightness adjustment of LED loads can be enabled via PWM of the load outputs. See user manual for more information.

HOUSTON RADAR LLC SS300 IO CONNECTOR BOARD QUICK START
(DC Mosfet, vertical connectors/led/switch version. right angle DB9, switch & LED's option is also available. Isolated high power AC electronic relay option is available.)
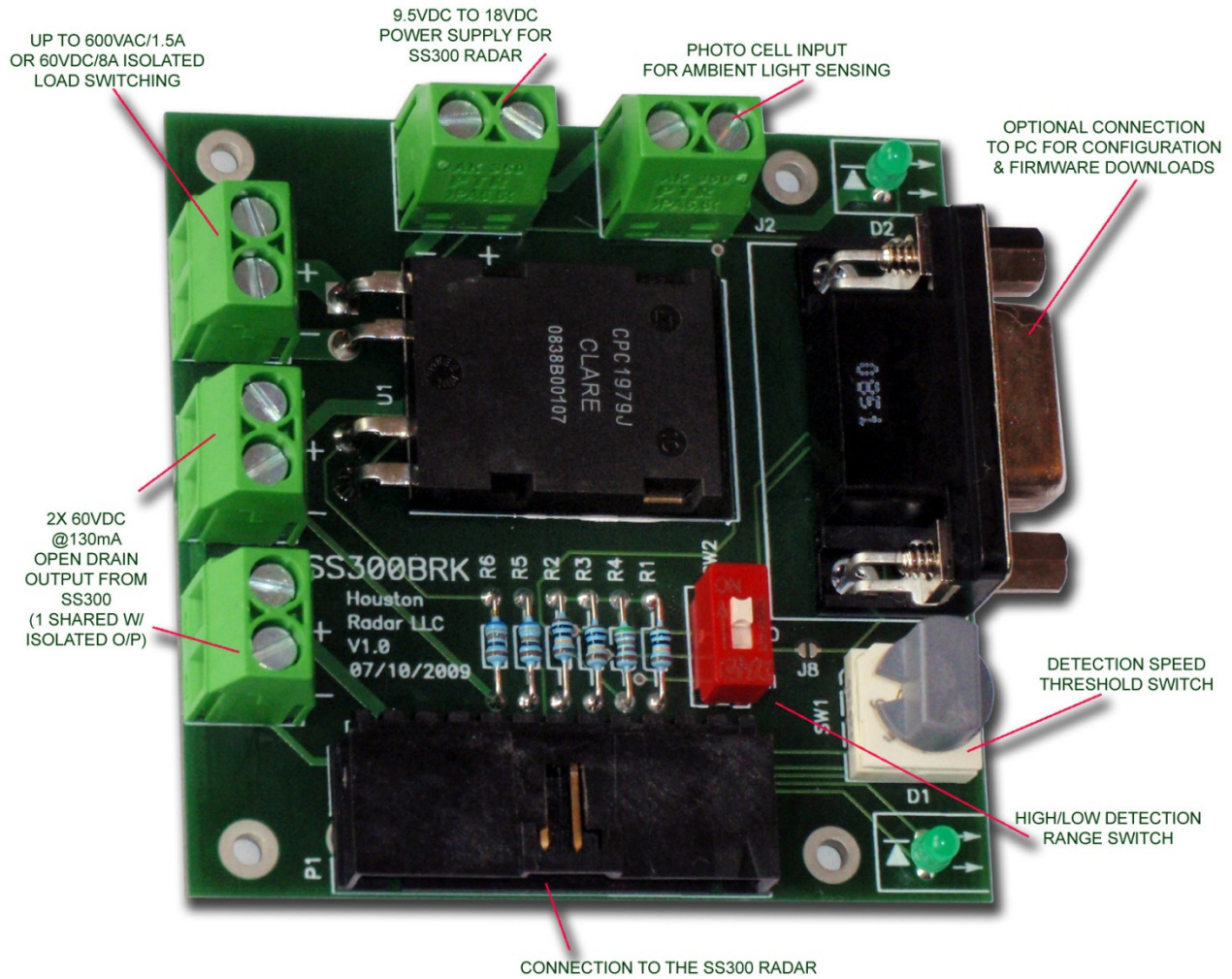
Connecting the load to the High power and trigger outputs:
You may directly connect your high power DC load + & - to J5. The load is activated via fuse F1 when the output is triggered.
You may directly connect a <150mA relay coil or other low power load to the J4 & J6 connectors. The + load terminals are always wired to VCC. The (-) terminals are connected to GND when a vehicle is detected and the output triggered. J5 is always triggered at the same time as J6.

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Optional Breakout IO Board Connections:

(Isolated Solid-State Relay version, AC or DC capable)

UP TO 600VAC/1.5A
OR 60VDC/8A ISOLATED
LOAD SWITCHING

9.5VDC TO 18VDC
POWER SUPPLY FOR
SS300 RADAR

PHOTO CELL INPUT
FOR AMBIENT LIGHT SENSING

OPTIONAL CONNECTION
TO PC FOR CONFIGURATION
& FIRMWARE DOWNLOADS

2X 60VDC
@130mA
OPEN DRAIN
OUTPUT FROM
SS300
(1 SHARED W/
ISOLATED O/P)

DETECTION SPEED
THRESHOLD SWITCH

HIGH/LOW DETECTION
RANGE SWITCH

CONNECTION TO THE SS300 RADAR

SS300 DOPPLER RADAR BREAK OUT AND SWITCH PANEL BOARD

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