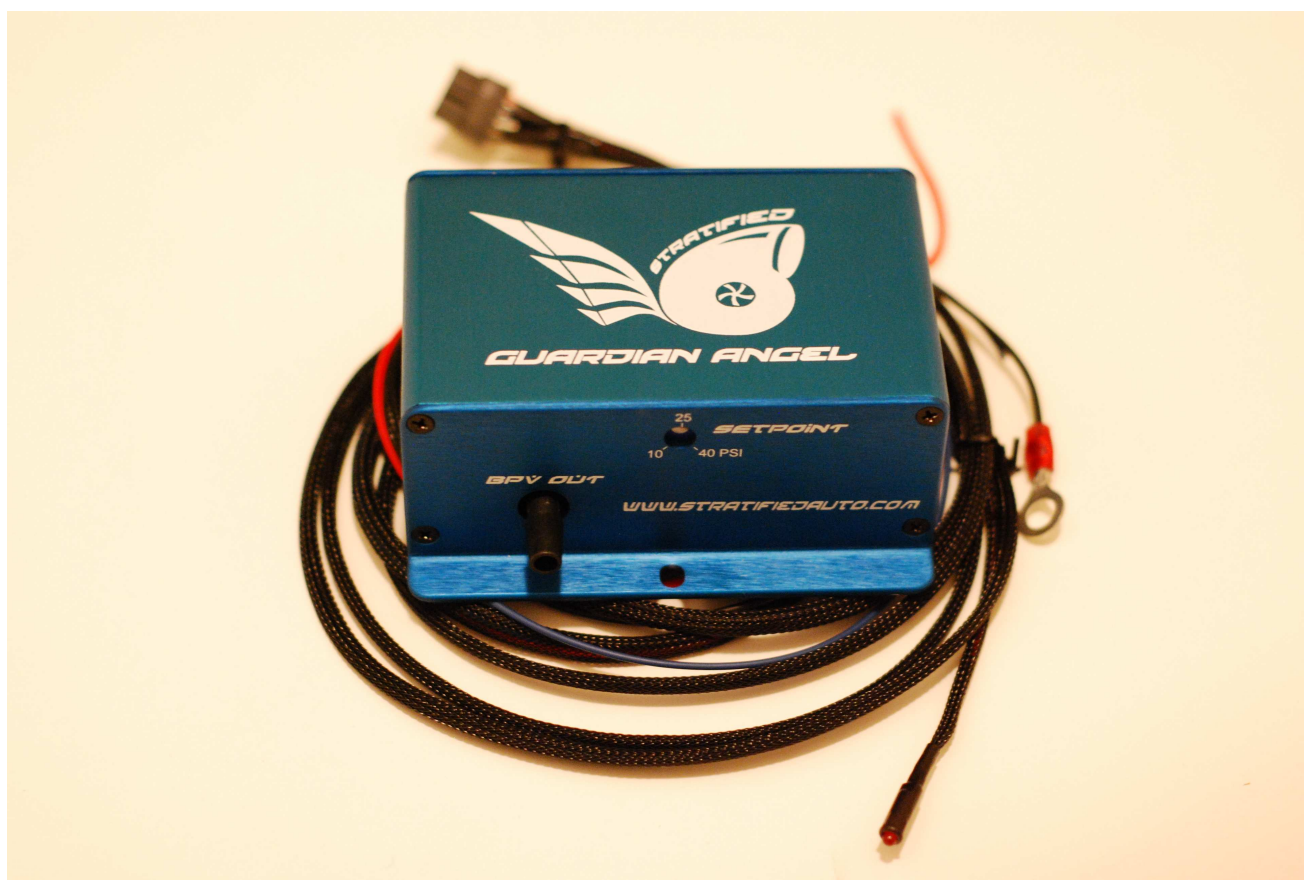


# ***STRATIFIED GUARDIAN ANGEL***

**Electronic Overboost Failsafe WITH  
Vent to Atmosphere Valve Control**

## **Installation and User Guide**

**Thank you and congratulations on the purchase of your new Stratified Guardian Angel over-boost protection device. This document should be followed to ensure safe and proper installation and operation of your new device.**



## **WARNINGS AND WARRANTY – PLEASE READ CAREFULLY**

ALL parts are sold for OFF ROAD RACE-ONLY ground vehicle use only.

Aftermarket systems interacting with engine function are not for use on pollution controller vehicles.

Alteration of emission related components constitutes tampering under most local emission regulation guidelines and can lead to fines and penalties.

### **Limited Warranty**

This Stratified product is warranted against defects in materials and workmanship for ninety (90) days from date of purchase. During the warranty period, Stratified will repair, or at its option replace at no charge, components that prove to be defective. The product must be returned, shipping prepaid, to a Stratified facility. This limited warranty does not apply if the product is damaged by accident or misuse. The foregoing warranty is in lieu of all other warranties expressed or implied including but not limited to any implied warranty of merchantability, fitness, or adequacy for any particular purpose or use. Stratified Automotive Controls LTD. is not responsible for any fines, injuries, or damages incurred as a result of the installation or use or misuse of our products. It is the complete responsibility of the purchaser of such products to ensure that they are used in a legal, safe, and appropriate manner.

DISCONNECT THE NEGATIVE BATTERY TERMINAL BEFORE PERFORMING ANY ELECTRICAL WORK ON YOUR VEHICLE. IF YOU DO NOT FEEL COMFORTABLE MAKING THESE MODIFICATIONS, HAVE THEM PERFORMED BY A PROFESSIONAL.



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## 1. Introduction and Precautions

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The Guardian Angel (GA) is an overboost failsafe device that releases the Bypass Valve (BPV) on turbocharged vehicles if the measured boost pressure exceeds a user-preset value OR the device is triggered via an external device (such as an engine controller, water-methanol injection system, etc).

The GA will immediately release excess boost in the event of an overboost or trigger event. This is a much gentler process than a fuel or ignition cut. It is easier on the drivetrain and allows the driver to continue driving even in the event that the device is triggered making it safer than an ECU fuel or ignition cut.

The GA protects against any type of overboost condition, whether it is caused by a poor tune, boost spike, or even a mechanical failure of the wastegate.

Another feature of the GA is that it allows the use of vent to atmosphere push-type valves to be run in MAF based vehicles. In MAF based vehicles, releasing a BPV or BOV to atmosphere causes very rich conditions at idle and during shifts. With this feature enabled (see how to enable it in the document below), the GA will stop the BPV from leaking at idle and during shifts allowing you to run the valve in VTA (Vent to Atmosphere) without a loss of driveability.

The GA works with **push type** BPVs. Most factory and aftermarket BPVs are push type valves. One way to test if your BPV works with our device is to pull the vacuum line from the valve and to see if the valve opens under boost. If it **DOES** our device works with it. The GA **DOES NOT** work with **pull type** or reversed valves. The HKS SSQV and all imitations are pull type valves and do not work with the GA.

The device works with both re-circulated and vented to atmosphere (VTA) valves. If your car is MAF/MAF based and the valve is VTA, when the device is triggered it will cause a rich condition since metered air is now lost to atmosphere instead of being burned along with the fuel. If the valve is re-circulated, the air fuel ratio commanded by the ECU will be maintained.

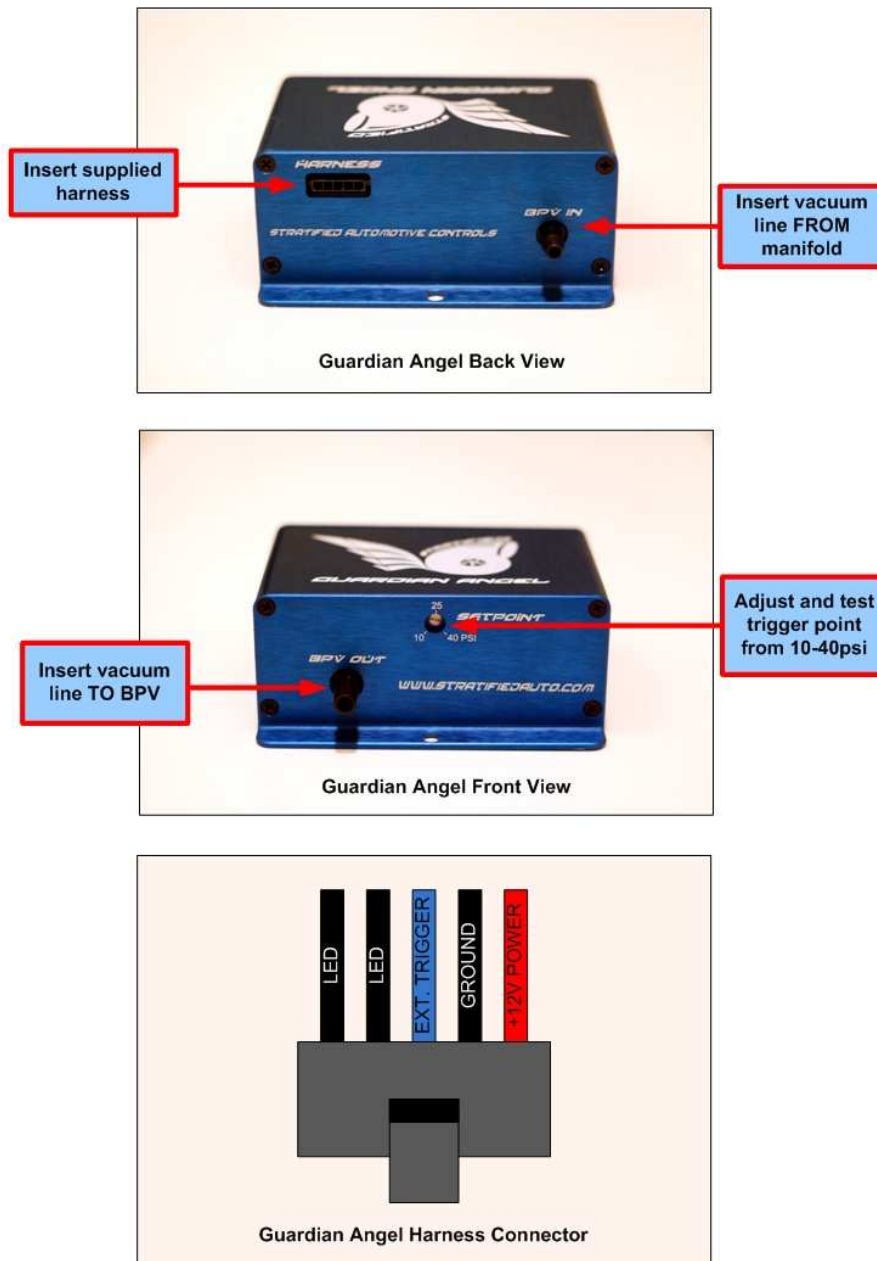
When the GA is triggered, the amount of boost pressure released depends on the flow capacity of your BPV and turbocharger. In normal circumstances this will bring the boost pressure low enough to avoid damage. However you may see a small boost spike above the trigger point of the GA. This is normal and just relative to how quickly your BPV is able to vent the extra boost.

The Guardian Angel is a safety device and not meant to be used as a boost controller. Having the Guardian Angel triggered all the time makes the turbocharger work unnecessarily hard and may increase wear.



The Guardian Angel is **water repellent but NOT water resistant** and should not be mounted directly on the engine itself. Do not power wash the unit and mount it off the engine - preferably close to other vehicle electronics such as the fuse box.

## 2. Quick Install Guide



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### 3. Installation Instructions

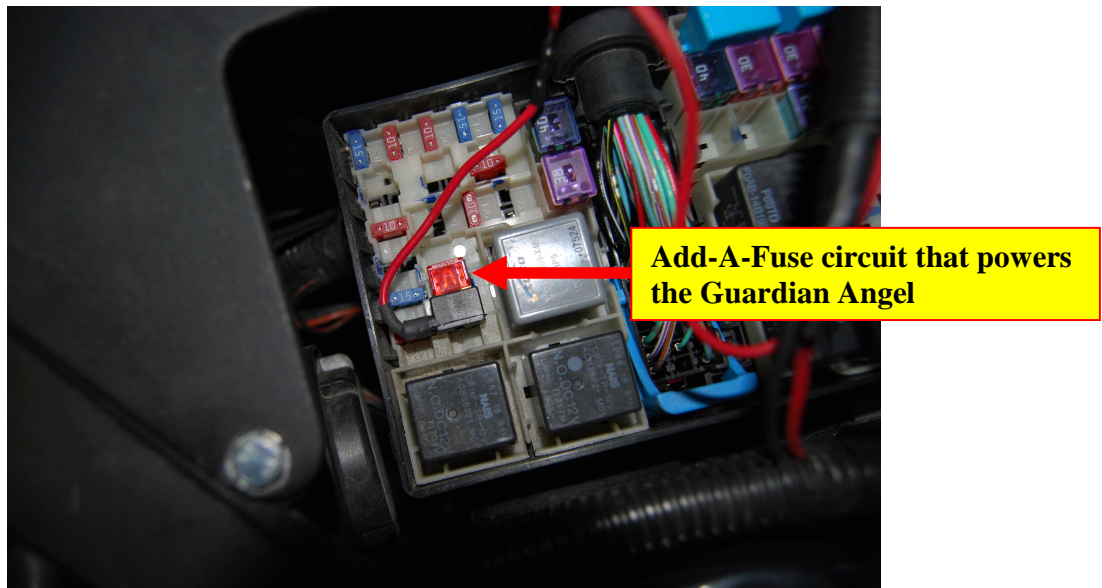
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1. Park the vehicle safely and remove the negative battery cable.
2. Find a suitable location where the Guardian Angel (GA) will be mounted. The unit is rated for under-hood temperatures (up to 125 degrees Celsius), however it should be placed away from direct heat sources such as the exhaust manifold or turbocharger. It should also be placed away from water and water drains. A suitable location is on top of the vehicle's fuse box as shown below:



3. Secure the GA into place using either double sided automotive tape or fasteners through the flanges of the enclosure.
4. The GA has 3 electrical connections: +12V Power - **RED** wire, Ground - **BLACK** wire, and an external trigger - **BLUE** wire.
5. Connect the power of the GA (+12V) to a power source using an Add-A-Fuse (not included) or similar setup. Make sure this power source is always on while the ignition is in the ON position. Test this circuit to ensure this is the case using a voltmeter. The GA uses less than 1 Amp of current, so choosing a fuse in the **2 Amp-5 Amp** range is appropriate. A sample Add-A-Fuse in a Mazdaspeed3 is shown below:





6. Connect the ground ring terminal to a solid chassis ground as shown below:

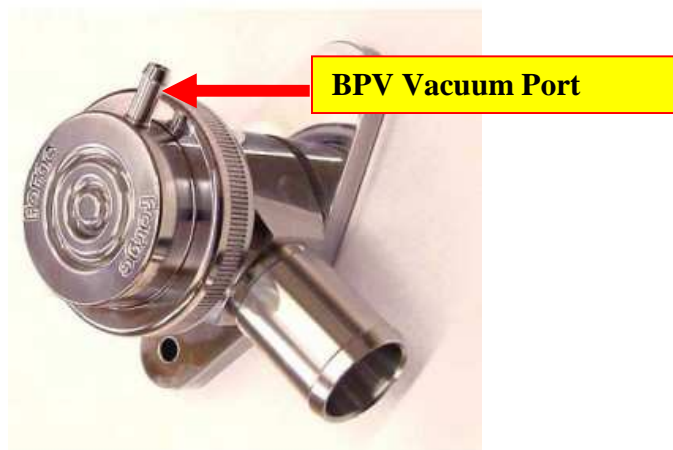


7. The indicator LED should be brought inside the cabin and placed somewhere where the driver will see it at all times.
8. The **BLUE** trigger wire can optionally be wired to a controller or device that can trigger the GA independently of boost pressure. Such a device can be a water-methanol controller or standalone ECU. The signal the controller needs to send is a



positive 5Volt or higher. If an external trigger is not used, tape and secure this wire with the others.

9. Once all electrical connections are secured, plug the electrical harness into the GA.
10. The next step involves connecting your Bypass Valve (BPV) vacuum line to the GA. One end of this hose is connected to your vehicle's intake manifold and the other end is connected to the BPV.
11. Locate your BPV and ensure that it works with the GA (This is explained in the Introduction and Precautions section). Locate and disconnect the vacuum source from the BPV. This is the smaller vacuum hose located at the top of the valve and is shown below on a Forge brand BPV.



12. Connect and secure this hose to the port called BPV in on the GA. 5/32" or 3/16" ID hose sizes work best. Work the hose on gently and secure it in place. Don't force the hose onto the GA's barbs, if it does not fit easily lubricate with some soap or procure a larger size hose.



**Connect hose from manifold to BPV IN port**

13. Obtain another vacuum hose of similar size (5/32", 3/16" or similar) and connect this hose from the BPV OUT port of the GA to the vacuum source port of your BPV.



**Connect hose from BPV OUT port to BPV vacuum source**

14. Now that all the hardware is connected, it is time to test and setup the unit. These are very important steps described below.

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## 4. Test and Configuration For OVEBOOST Protection

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You will notice a turn dial called SETPOINT on the front of the unit labelled 10-40psi. This sets the boost pressure at which the GA will trigger. The markings on the case are there as a guideline, so you will have to do a bit of trial and error testing to set the GA at an appropriate level. DO NOT just rely on the markings on the case.



1. First of all, turn the ignition to the ON position. The LED should light up and stay on for 2 seconds. This is a self test that happens every time the GA is turned on. It shows you it is powered. If the LED does not come on when you turn the ignition on, something is wrong either with the wiring or unit itself.
2. The SETPOINT dial has a very small arrow on it. Locate this and set the SETPOINT dial to the lowest position (10psi).
3. Take the car for a drive and try to go over 10psi of boost. The GA should trigger, you should feel a gentle reduction in boost and the LED should come on to tell you it has triggered. Monitor that your boost is indeed dropping once it triggers.
4. Take your foot off the accelerator and you will see the LED turn off. The GA will reset once the engine is out of boost.
5. If you are using an external trigger, this is the time to test this as well. Set this trigger to actuate the GA under boost and watch that the LED comes on and boost drops. Once again, when the engine is out of boost, the GA will reset. The external trigger works independently of the boost SETPOINT.

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6. Now it is time to set the GA to a reasonable boost trigger level. Generally you want the GA set 1-3psi above what boost you normally run and 2-3psi BELOW the ECU fuel cut.
  7. To do this, move the SETPOINT dial up to close to where you expect your boost to be. Go for a test drive and see if you can trigger the GA at the top of your boost range. If you triggered it at the top of that range, move the SETPOINT higher by turning the dial approximately 15 degrees in the clockwise direction. The adjustment resolution is: for every 10 degrees the dial is turned, the GA trigger is adjusted by approximately 1 psi.
  8. Since the GA is not a device that is used all the time but should always be ready, we advise that you test your GA periodically. Every couple of months, trigger the GA and make sure it is lowering your boost as expected.

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## 5. Test and Configuration For Vent to Atmosphere

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When running a VTA (Vent-To-Atmosphere) BOV or BPV in a vehicle that has a MAF or VAF sensor, the valve will vent air that has already been "counted" by the sensor. This causes a very rich condition and bogging and afterfire during shifting.

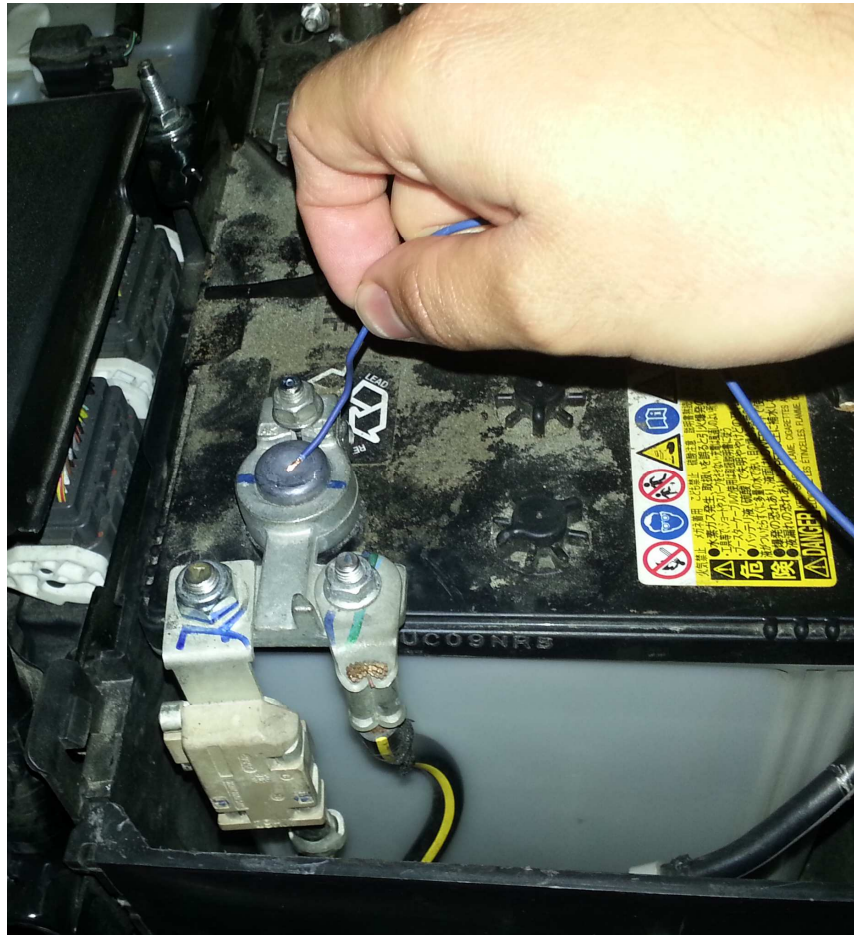
Furthermore, push type BPV and BOV valves tend to leak at idle or part throttle and therefore once again create very rich conditions when run in VTA mode. Tightening down the valve spring to stop them from leaking usually causes turbocharger compressor surge and it is not desirable.

The GA offers a feature that can be toggled on or off that closes the BPV/BOV at idle and low throttle preventing leaks. It also makes the valve much more responsive after it releases to atmosphere so the car will not bog during shifts.

You can toggle this feature ON or OFF by doing the following:

1. Power the GA off by either unplugging the main harness or turning off the supply of power from the vehicle (turning the ignition key off).
2. Take the **BLUE** external trigger wire; make sure the copper is exposed on the end; and hold the copper of the exposed wire against a +12V power source such as the positive post of your battery as shown below.





3. While holding the **BLUE** external trigger wire against the +12V source, power on the GA by plugging it back in or turning on the key and continue holding the **BLUE** wire against +12V for 2 seconds.
4. Now the VTA feature was toggled ON if it was off or OFF if it was on.
5. The VTA feature will remain in this state (either on or off) until steps 1-4 are repeated. Please note that while the VTA feature is on, you will see the indicator LED flash twice every time the unit is powered on. You will also notice that the indicator LED will now turn on while at idle and low load conditions. This is **NORMAL** with the VTA feature turned on. This is the GA controlling your BPV/BOV so it can be run in VTA mode.
6. With the VTA featured turned on, the GA is still protecting you from overboost - this is the main function of the GA and overboost protection can't be turned off.



7. When in boost, the indicator LED will be off if everything is normal and it will turn ON if an overboost condition occurs.
8. If you find that you hear fluttering or surging while running in VTA mode, use a softer spring in your BPV/BOV or reduce the tension on the spring. With the GA controlling your valve in VTA you no longer need a very stiff spring to hold the valve closed at idle.

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## 6. Specifications

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The Guardian Angel is designed to be installed in the engine bay; away from direct sources of heat and water. Damage caused by exceeding the operating conditions listed below or exposing the Guardian Angel to water will void the included warranty.

Power Supply Max Operating Voltage:	+16.5 Volt
Power Supply Min Operating Voltage:	+11.5 Volt
Maximum Operating Temperature:	125 degrees C (257 degrees F)
Absolute Boost Pressure Trigger Adjustability Range:	10-40psi +/- 2psi (70-275Kpa +/- 14Kpa)
External Trigger Minimum Voltage:	+4.5 Volt
Current Draw in Operation	< 0.75 Amp