

WHITE PAPERS

ONGUARD™ COLLISION SAFETY SYSTEM Q&A

Q: WHAT ARE COLLISION SAFETY SYSTEMS?

A: Collision safety systems are designed to reduce the human and property costs associated with accidents. Current systems are designed to address rear end accidents, they detect objects in a vehicle's path, manage the distance between them, and automatically intervene with braking and throttle controls until the driver can respond.

Q: WHAT'S THE DIFFERENCE BETWEEN PASSIVE AND ACTIVE SYSTEMS?

A: A passive system alerts the driver to a potentially dangerous situation. An active system not only warns the driver, it can slow the vehicle automatically in response to an impending collision.

Q: HOW PREVALENT ARE REAR-END COLLISIONS?

A: Rear-end collisions account for approximately 20 percent of all heavy truck crashes and the truck is the striking vehicle in 60 percent of those accidents. Inattention or poor decisions (e.g. driving too fast for the conditions or following too closely) are the primary factor in 66 percent of the collisions where fault is assigned to the truck driver. It's estimated that 90 percent of all rear-end collisions can be eliminated if the driver has one additional second of reaction time.

Q: WHAT IS ONGUARD?

A: The OnGuard system integrates three collision avoidance functionalities: collision warning, adaptive cruise with active braking and collision mitigation. Collision warning

detects impending rear end collisions and supplies visual and audible warnings to the driver via a dash-mounted display. Adaptive cruise with active braking supplements the vehicle's cruise control system and attempts to maintain a safe following distance. If a lead vehicle is detected traveling at a speed below set speed, the system automatically decelerates the host vehicle by throttle control, applying the engine brake, and if necessary, applying the foundation brakes until a safe following distance is re-achieved. Once the lane ahead is clear, the system automatically accelerates the vehicle back to set speed. Finally, collision mitigation detects when a rear-end accident is about to occur and supplies the driver a strong audible, visual and haptic warning. If the driver takes evasive action by braking or steering around the vehicle of concern, the system will automatically disengage. However, if the driver does not take the appropriate corrective action, the system will automatically de-throttle the vehicle, apply the engine brake and aggressively apply the foundation brakes. If the collision is unavoidable, the intervention of collision mitigation can minimize the severity of impact.

Q: HOW DOES IT WORK?

A: Using radar and advanced algorithms to minimize false alarms, OnGuard can detect objects in a vehicle's path and automatically engage the throttle, engine retarder and service brakes when it senses a likely collision without immediate action from the driver. If necessary, OnGuard can produce a deceleration rate up to 0.25 G. Once automatic braking has started, it will continue as long as the forward object remains in view of the radar and is perceived as a collision threat. It will

disengage when the driver takes over and manually applies the brakes.

Q: HOW DOES ONGUARD WARN THE DRIVER?

A: OnGuard provides a combination of audible, visual and haptic warnings. The driver will feel the application of the service brakes. OnGuard will produce audible and visual alarms in the cab only if it calculates that more braking input is needed from the driver.

Q: DOES THE SYSTEM WORK AT LOW SPEEDS?

A: OnGuard is active when the vehicle is traveling above 19 mph. It is inactive at lower speeds to eliminate nuisance alarms in non-threatening driving situations—creeping up to a traffic light, for example.

Q: WHAT HAPPENS TO THE BRAKES IF THE RADAR SENSOR IS BROKEN OR DISABLED?

A: OnGuard will indicate a warning through the dash display to warn the driver. There is no effect on the braking system; the ABS will continue to function normally.

Q: CAN ONGUARD STOP THE VEHICLE COMPLETELY?

A: The driver is responsible for stopping the vehicle. OnGuard is designed to monitor conditions ahead and, when necessary, automatically slow the vehicle using the engine throttle, retarder, and service brakes. This allows the driver time to apply additional braking force as needed. It is not intended to stop the vehicle without driver intervention.

Q: WHAT ADDITIONAL HARDWARE DOES ONGUARD REQUIRE?

A: OnGuard uses very little unique hardware: just the radar sensor and indash display. It is an extension of the Meritor WABCO anti-lock braking system (ABS) electronic control unit (ECU) and uses software to coordinate object detection, braking, and throttle adjustment.

Q: CAN I RETROFIT ONGUARD?

A: Because OnGuard is tightly integrated with engine and braking controls, it is not a practicable retrofit.

Q: WHERE DOES THE RADAR SENSOR MOUNT?

A: On most vehicle models, the sensor mounts in the grille opening below the front bumper.

Q: WHY IS THE DECELERATION LIMIT 0.25 G?

A: The 0.25 G deceleration limit is equivalent to approximately one-third of a full brake application. This is effective enough to slow the vehicle but not cause an unbelted driver to come out of his seat, hindering his ability to apply the additional braking force needed to stop the vehicle.

Q: WHAT DOES THE RADAR “SEE”?

A: OnGuard’s forward-looking monopulse radar sensor can detect multiple moving and fixed objects at distances up to 500 feet away. However, the algorithms are most effective at “locking in” on relevant objects at distances of 275 to 325 feet— a three-second following distance at highway speed. The radar sensor is not affected by weather, low light, or the dirt and road grime associated with highway use.

Q: WHAT HAVE YOU DONE TO REDUCE FALSE ALARMS?

A: Reliability and performance are especially important for collision safety systems because they are capable of applying the brakes. False alarms are more than a mere nuisance. OnGuard calculates the threat of a collision using a complex time-to-collision algorithm, unlike the simple two second headway alarms used by passive systems. Because it is an advanced system, OnGuard can reliably filter out radar clutter from highway dividers, cars in adjacent lanes, or the path of the road — a curve, dip, or hill. However, it is sensitive enough to detect motorcycles, fiberglass trailers, and pedestrians in the lane of travel. Field tests covering 10 million fleet miles over

a two-year period showed significantly better performance, reliability, and driver confidence compared to collision warning systems available in North America.

Q: WHEN IS ONGUARD AVAILABLE?

A: OnGuard is targeted to be available beginning third quarter 2008 as a factory-installed option at several OEM brands.

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