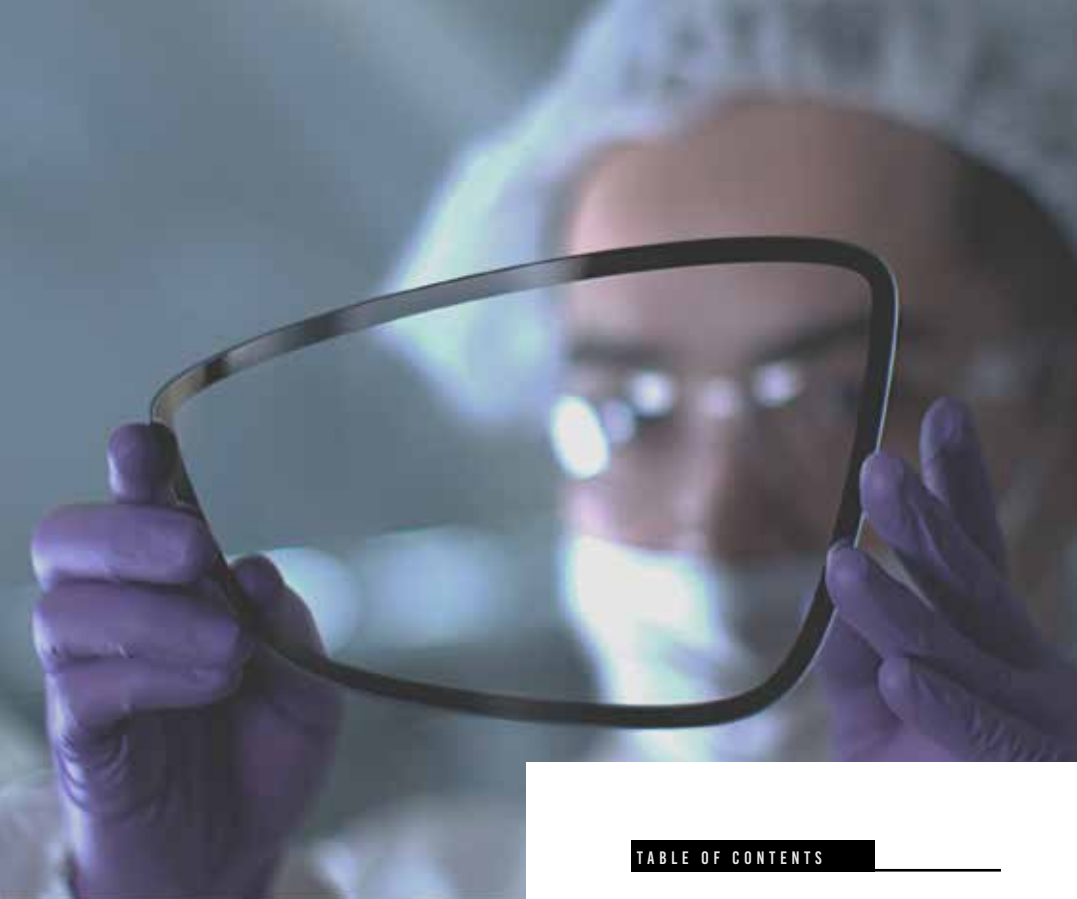




TODAY'S FEATURES TOMORROW'S TECHNOLOGY

- DIGITAL VISION
- CONNECTED CAR
- DIMMABLE GLASS SYSTEMS



OVERVIEW

Gentex is a long-time supplier of electro-optical products for the global automotive industry. We supply nearly every major automaker with advanced electronic features that optimize driver vision and enhance driving safety. We also manufacture alarms and signaling devices for the commercial fire protection industry and electrochemically dimmable windows for the aerospace industry. We have focused competency in digital vision, automotive connectivity, and dimmable glass systems.

Since our inception, Gentex has managed the evolution of rear vision. We use the mirror (and surrounding windscreen) as a strategic electronic module – a delivery mechanism for advanced vision-related features, including cameras, displays, alerts, transaction modules, car-to-home automation systems, and security components.

As vehicle electrification and autonomous driving trends progress, our core technologies are converging to yield products that provide unprecedented advances in digital vision and stand to become integral components in connected cars and future mobility systems.

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WHY CENTEX



High-volume, high-quality electronics manufacturer.

Core competencies in microelectronics, vision systems, software design, chemical development, glass processing and coatings, microphones, automated assembly, and more.

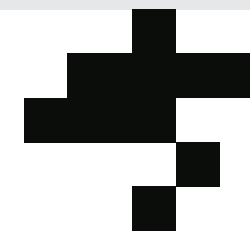
Expertise in automotive vision and rearward visibility products.

20+ years of experience in CMOS imager development and supply.

Custom camera solutions and integration options.

Trusted, long-time supplier of high-quality, innovative, priceable, and OEM-tailored electronic features.

Products for OEM integration, accessory programs, and the automotive aftermarket.





SECTION I.

Digital Vision

Gentex understands the challenge of optimizing automotive vision. That's why we develop and manufacture our vision systems based on multiple imager platforms, and why we implement scalable display solutions, helping the industry evolve from an analog to digital rear view. We don't provide "black box" solutions; instead, we develop custom lighting-assist, driver-assist, and rear-vision systems according to each OEM's unique specifications by using imager and display solutions designed for your unique applications, performance requirements, and price point.

Custom Cameras for Machine Vision and Video

SmartBeam®

SmartBeam was the world's first – and remains a best-selling – automatic high-beam assist system. Today, SmartBeam's enhanced feature set provides unprecedented lighting and driver-assist functionality in one compact, mirror-integrated module.



SmartBeam Functionality

- High-Beam Assist/Auto High Beam
- LED Matrix Beam
- Village Detection
- Motorway Detection
- Tunnel Detection
- Fog Detection
- Dynamic Forward Lighting/Constant-On High Beam



Custom Cameras for Automotive Video

Gentex understands the challenge of optimizing rear vision. That's why we develop and manufacture our own imager systems tailored to support integrated features, performance requirements, and OEM specifications. From basic imagers for standard rear vision systems to advanced megapixel cameras that support ADAS features and integrated graphics, we'll develop the imager system that's right for you.



SmartBeam Mirror

Displays and Alerts

The mirror is the original “heads up” display. It's the most logical, intuitive, and cost-effective location to display information critical to the driving task. Over the years, we've integrated a wide variety of displays in the mirror, including VFDs, LCDs, LEDs, and active matrix video. Whether it's compass, temperature, rear park assist, around view monitor, ADAS alerts, or rear camera display, Gentex can help you integrate it into the mirror.



The Gentex Full Display Mirror[®] (FDM[®])

The Gentex Full Display Mirror optimizes visibility by providing an unobstructed, panoramic rearward view. It also affords unique yet critical bimodal functionality. It can operate either as a standard automatic-dimming rearview mirror or a rear video display.



Full Display Mirror



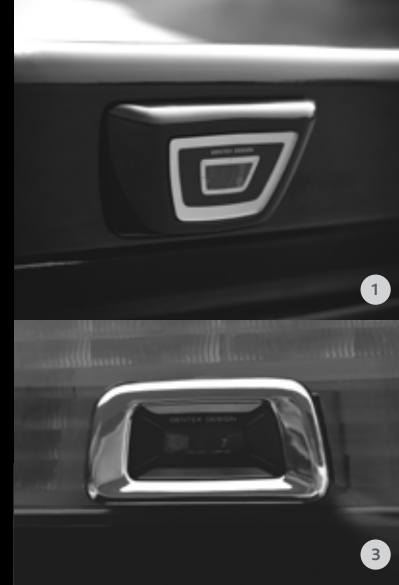
WHY THE DUAL MODE?

- OPTIMUM REAR VIEW**
Display mode provides a radically improved rear view in order to enhance driving safety. Camera view is not hindered by headrests, luggage, C/D pillars, small rear window, etc.
- FAILS SAFE**
Mirror mode provides a permanent backup solution should camera or display become non-operational.
- WEATHER CONDITIONS**
Mirror mode may be necessary should camera become blocked due to dirt or ice.
- VIEWING THE VEHICLE INTERIOR**
Mirror mode allows the driver to view vehicle interior, rear seats, passengers, etc.
- DRIVER PREFERENCE**
- GLARE ELIMINATION**
Full auto-dimming function with mirror mode; interior mirror controls exterior dimming mirrors in either display or mirror mode.



Rear Vision System Leader

No one has more rear vision experience than Gentex, which is why over the years we've been the leading supplier of intelligent rear vision systems for OEM racing programs, including Audi, Nissan Motorsports, Toyota Gazoo Racing, Cadillac, Porsche Motorsports LMP1, and others.



Custom Integration of Entire System

Gentex is your complete rear vision solution supplier. Imager – processor and software – display – camera lens and vehicle integration... Gentex supplies it all as a complete integrated system.

- 1 Vehicle Body Integration
- 2 Shark Fin and/or GPS Antenna Integration
- 3 CHMSL Designs
- 4 Rear Window/Behind-the-Glass Solutions



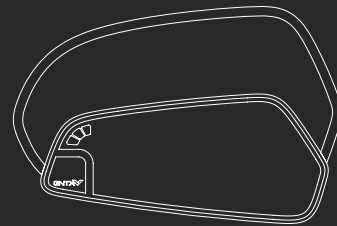
GNTX:R



Camera Monitoring Systems (CMS)

To blend the benefits of both mirrors and displays, Gentex offers a hybrid rear vision system that uses three cameras to provide a comprehensive view of the sides and rear of the vehicle.

The side-view cameras are discretely housed in downsized exterior mirrors, and their video feeds are combined with that of a roof-mounted camera and stitched together into multiple composite views that are streamed to the driver via Gentex's Full Display Mirror. The driver can choose between various viewing modes that present the three camera feeds independently or stitched together to form a single, wide-angle view.



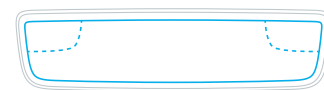
Camera-integrated, downsized exterior mirrors

SYSTEM BENEFITS

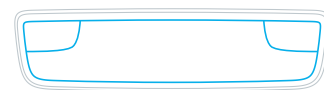
- **ENHANCED VISION** – Provides unobstructed view of sides and rear of vehicle.
- **FAILS SAFE** – Mirror views available if digital view is disrupted.
- **FUEL EFFICIENCY** – Smaller exterior mirrors offer weight savings, improved aerodynamics, and enhanced fuel efficiency.
- **READY TO IMPLEMENT** – Comprehensive system designed to meet automaker, driver, safety, and regulatory requirements.
- **COST EFFECTIVE** – No need to retool vehicle interiors to accommodate additional displays.
- **ADAS** – System can be integrated with side blind zone alerts and other ADAS functions.



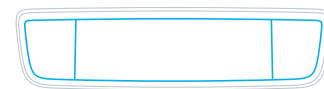
VIEWING MODES



Dynamic Spotter



Spotter



Segmented



Stitched

3X

REARWARD FIELD OF VIEW

Three-camera rear vision system triples driver's rearward field of view





SECTION II.

Connected Car

Gentex offers multiple, scalable connected-car technologies that allow the vehicle to talk to the home, surrounding infrastructure, and more. Our car-to-home automation technology allows you to operate all your home automation devices with a simple vehicle-integrated button push. Our V2i platform lets your car pay for your toll road usage. And, it can all be secured with our biometrics system – a vehicle-integrated iris-scanning feature that enhances cyber security and allows for unprecedented levels of vehicle personalization.

HomeLink®

Car-to-Home Automation

HomeLink by Gentex is the most widely used and trusted car-to-home automation system, with over 80 million HomeLink equipped vehicles on the road today.

HomeLink consists of vehicle-integrated programmable buttons that use radio frequency (RF) and/or cloud-based wireless control to operate garage doors, gates, home lighting, thermostats, smart outlets, security systems, and other home automation devices.



HomeLink Can Operate:

- Garage door openers
- Security gates
- Door locks
- Interior/exterior lighting
- Security systems
- Appliances
- Thermostats
- Smart Outlets

MULTIPLE INTEGRATION OPTIONS

- MIRROR INTEGRATION**
 Mirror integration for easy, cost-effective cross-car-line application.
- VISOR AND OVERHEAD CONSOLE SOLUTIONS**
 Vehicle integration for a sophisticated look.
- ACCESSORY MODULE**
 Small, sleek module available in a variety of colors to match vehicle interiors.
- TWO-BUTTON UTILITY MODULE**
 For application on motorcycles, lawn tractors, snowmobiles, ATVs, etc.
- CENTER CONSOLE SOLUTIONS**
 For touchscreens and multi-function displays.



RF Transmission

HomeLink uses RF transmissions to operate entry-critical devices such as garage doors and gates. It also can be programmed to activate security systems and home lighting. The latest version of HomeLink is our most sophisticated yet. We've improved package space, weight, programming ease, and frequency range/accuracy. It's also a global solution, with a common module working in multiple markets. And, it's capable of providing two-way communication to the vehicle, allowing it to acknowledge the last known garage door open/close status.

Cloud-Based Wireless Transmission: Introducing HomeLink Connect

Today, HomeLink is getting even smarter. Introducing HomeLink Connect, a home automation aggregator app that allows automakers to offer drivers access to an increasing array of cloud-based, home automation services.



HomeLink Connect app



Drivers of HomeLink Connect-compatible vehicles can download and configure the app to control a myriad of individual home automation devices, or set up entire home automation "scenes."

For instance, when heading home, one HomeLink button press could adjust your thermostat, turn on your lights, disarm the security system, unlock the door, and begin playing your favorite music.

Once configured, the app pairs with the vehicle, allowing users to activate vehicle-integrated HomeLink buttons without needing to fumble with their phone. Depending on how the OEM wants to integrate the feature, HomeLink Connect can be activated by hard buttons via a low-energy Bluetooth connection with the phone, or soft buttons created in the app that populate on the vehicle's center stack once the phone is paired.

Uses Both RF and Cloud-Based Wireless Control

By offering a combination of RF and cloud-based wireless control, HomeLink remains the industry standard for comprehensive, reliable vehicle-to-home automation.

HomeLink and the HomeLink Connect app bring convenience to drivers around the world, with ever expanding compatibility and use cases. They also help automakers simply and securely integrate a robust home automation platform that provides drivers with an incredible connected-car experience.



HOMELINK CONNECT FEATURES + BENEFITS

- Vehicle-integrated HomeLink buttons pair with mobile phone app to operate home automation devices.
- Completely reprogrammable to control individual devices or entire scenes within the "smart things" ecosystem.
- Allows you to interact with your smart home hub to control home lighting, door locks, alarm systems, thermostats, etc.
- Operate multiple devices with a single button push.
- One button can run an entire "scene" of commands (i.e. create a "coming home" scene that opens the garage door, turns on house lights, disarms security system, adjusts thermostat, begins playing music).
- No need to access phone.
- Can be integrated with OEM smart vehicle app and vehicle user interface.





Integrated Toll Module

The Gentex Integrated Toll Module (ITM) is a nationwide toll collection technology for factory integration into new vehicles. The system uses a mirror-integrated multi-protocol toll tag that provides motorists with access to any toll road throughout the U.S. The system allows automakers to offer yet another connected-car feature to their customers and benefit

from an ideal, high-performance transponder location. Motorists benefit by convenient, unfettered access to the country's toll roads while eliminating toll-tag windscreen clutter and the need to manage multiple toll accounts.



Theft Protection/ Vehicle Operation

Authorized users could start the vehicle, with its operation modified for each different driver. In the case of an unauthorized driver, the vehicle could text its owner, limit functionality, or not operate.



Cabin Personalization

The biometric system could personalize the vehicle cabin according to user-determined presets for items such as:

- Seat position
- HVAC controls
- Steering wheel position
- Music favorites
- Mirror adjustments
- GPS locations



Biometrics

As connected-car features grow, so does the need for security. Automotive biometrics systems analyze physical characteristics (face, voice, fingerprints) to identify the driver prior to granting vehicle and/or information access.

Gentex biometrics consists of an iris-scan camera, near-infrared emitters, and system intelligence integrated into a rearview mirror assembly.

It scans a driver's irides and maps their unique pattern to a storable, algorithmic-based template that authenticates the user with every subsequent glance to the mirror.

Secure Access to Cloud-Based Services

The biometric system could also sanction safe, secure access to a host of cloud-based, connected-vehicle services, such as:

- HomeLink car-to-home automation controls
- Integrated Toll Module and parking payments
- Gas, coffee, fast food payments
- Ride/vehicle sharing accounts
- Social media accounts
- On-line banking
- Work files and virtual meetings
- Health information





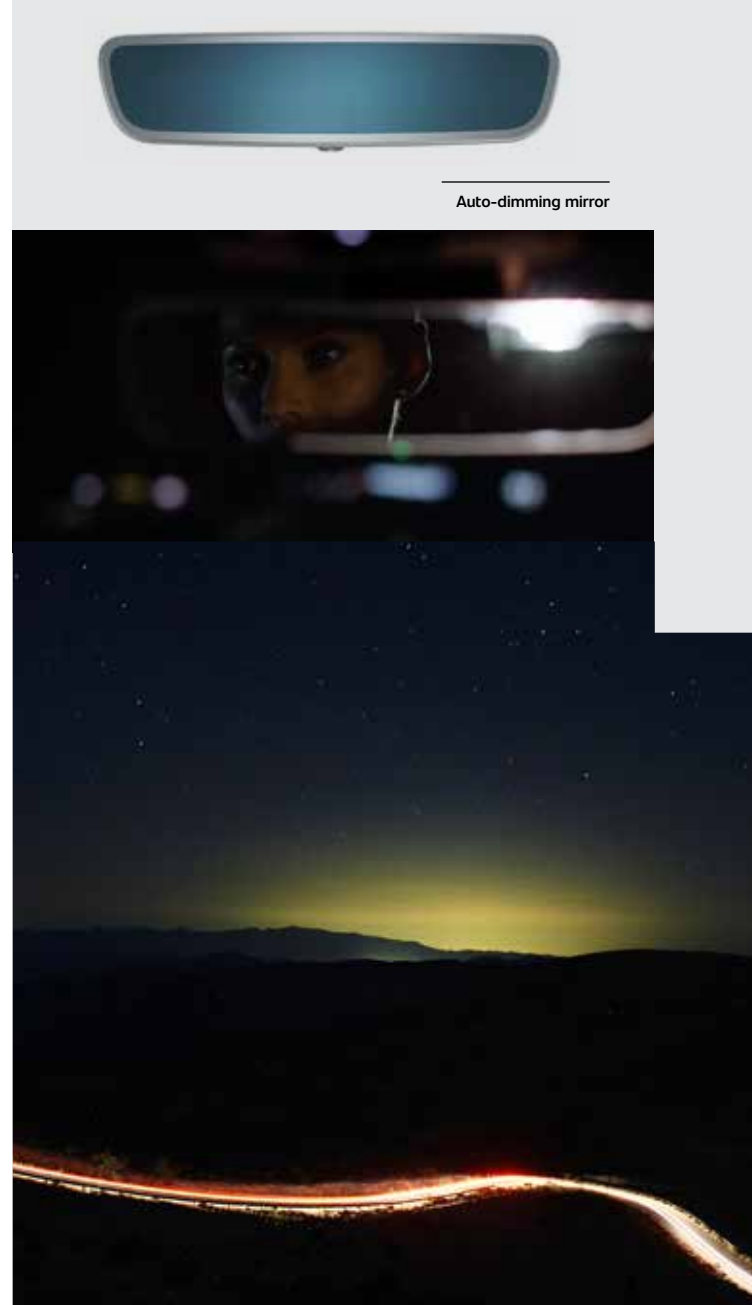
SECTION III.

Dimmable Glass

Gentex dimmable glass systems utilize electrochromics, which is the science of darkening a material using electricity. They contain a chemical formulation known for their time-tested chemistry and durable device construction. Gentex's electrochromic technology has the greatest opacity range from light to dark, the highest optical clarity, and allows for the most durable electrochromic devices in the market.

Interior and Exterior Auto-Dimming Mirrors

During nighttime driving, Gentex mirrors use sophisticated light sensors, proprietary gels, and microprocessor-based algorithms to detect mirror glare and automatically darken to the precise level necessary to preserve driver vision. They are must-have automotive active-safety features.



Over the years, Gentex has helped automakers deliver dozens of additional features through its mirrors, including:

- Displays, alerts and signals
- Lighting
- Microphones
- Forward-facing cameras
- ADAS components
- Telematics components
- Car-to-home automation



Dimmable Automotive Components

When it comes to smart, self-darkening glass, one thing is clear: future mobility systems will accelerate the need for and use of smart dimmable devices, prompting an ever-expanding number of features and use cases.

Self-Dimming Sunroofs and Moonroofs

Self-dimming sunroofs and moonroofs help keep the vehicle cool and increase the life of interiors. They can even help lower CO2 emissions by decreasing air conditioning use, thus improving fuel efficiency. They can darken on demand or automatically when combined with system intelligence.

Dimmable Combiner HUDs

Dimmable combiner HUDs prevent sunlight, glare, and stray reflections from interfering with the display. Sunload sensors and related control algorithms constantly monitor ambient and glare light conditions, continually adjusting the HUD glass transparency in order to optimize visibility.

Sensor Shrouds

Dimmable sensor shrouds consist of reinforced glass panels that darken on demand or automatically according to sensor function. They work to conceal and optimize the operation of forward-facing cameras, optical systems, and the ADAS sensor farm.



Top: Self-dimming moonroofs

Center: Dimmable combiner HUD

Bottom: Sensor shroud and sun visor



Airplane Windows



Gentex is the leading supplier of electrochemically dimmable windows for the aerospace industry.

These windows darken on demand to cut sunlight and glare while still providing an exterior view. They make the flying experience better and more comfortable, improve aircraft design flexibility, and enable airlines to give their customers and crew more control over the view out of their windows.



Above: Window control switches in production
Right: Airplane window dimming stages



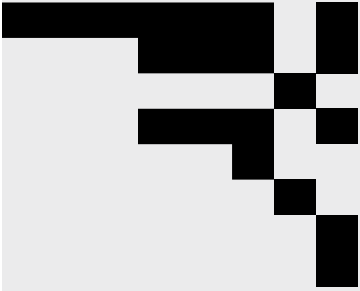
SECTION IV.

Fire Protection Devices

Gentex was originally founded as a manufacturer of high-quality fire-protection products. The market had long-recognized the need for better smoke detection, and in 1974, Gentex introduced the world's first dual-cell photoelectric smoke alarm. It quickly became the commercial industry benchmark because it is less prone to false alarms and designed to quickly detect slow, smoldering fires. This technology became the foundation for our current products, and today, millions of Gentex smoke detectors and signaling devices can be found in schools, dormitories, hotels, and hospital buildings throughout North America and the world.



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