SCOTTS INTERNATIONAL

Head-Up Display Market by Type (Conventional Head-Up Displays, AR-Based Head-Up Displays), Component (Video Generators, Projectors/ Projection Units, Display Units), Technology (CRT-based HUD, Digital HUD), Application & Region- Global Forecast to 2028

Market Report | 2023-11-17 | 212 pages | MarketsandMarkets

AVAILABLE LICENSES:

- Single User $4950.00
- Multi User $6650.00
- Corporate License $8150.00
- Enterprise Site License $10000.00

Report description:

The head-up display market is expected to reach USD 3.3 billion by 2028 from 1.5 billion in 2023, at a CAGR of 16.7% during the 2023- 2028 period.
Increasing awareness regarding passenger and vehicle safety holds paramount importance for potential vehicle buyers, with regulatory bodies worldwide concentrating their efforts on enhancing vehicle safety standards. According to the World Health Organization (WHO) data as of June 2022, over 1.35 million lives are lost annually due to road traffic incidents globally, making road traffic injuries the leading cause of death among individuals aged 5-29 years. Furthermore, projections suggest that road traffic injuries will become the fifth-leading cause of global mortality by 2030. A major contributor to these accidents is driver distraction, with reports from the National Center for Statistics and Analysis (NCSA) indicating that distracted drivers are responsible for crashes resulting in approximately nine fatalities and over a thousand injuries daily in the US. Consequently, the adoption of head-up displays is seen to reduce accidents resulting from driver distraction caused by in-vehicle display monitoring. Moreover, recent statistics from the National Security Council show a positive trend in safety, with the mileage-death rate per 100 million vehicle miles driven in the US improving from 1.50 in July 2022 to 1.44 in July 2023.
Road traffic crashes impose an economic burden of around 3% of the gross domestic product (GDP) in most countries globally. Remarkably, despite low and middle-income countries housing 60% of the world's total vehicles, approximately 93% of road fatalities occur within these nations (as per WHO data). In many instances, drivers divert their attention from the road to read conventional instrument clusters, necessitating a rapid shift from short distance to long-distance vision. This constant adjustment of focus not only leads to eye fatigue but also diminishes driver concentration. In contrast, head-up displays, which provide

essential information like vehicle speed and navigation within the driver's line of sight, mitigate distractions and have thus gained favor among automobile manufacturers. Consequently, the global awareness of safety considerations is anticipated to drive the demand for head-up displays in automobiles. While advanced AR-based head-up displays are anticipated for installation in luxury vehicles, conventional head-up displays are likely to be preferred for passenger cars.

"Windshield-based conventional head-up displays is expected to have the highest market share in the forecast period."

Head-up displays with windshield-based technologies are a cutting edge of technology. In certain premium automobile models, they are available as a standard feature; in other luxury and mid-segment automobiles, they are an optional feature. In order for head-up displays to be placed in all vehicle variations, Tier 1 suppliers such as Continental (Germany), Nippon Seiki (Japan), and Denso (Japan) are concentrating on bringing down the cost of windshield-based head-up displays. In addition, OEMs and tier 1 suppliers are focusing their R&D resources on creating full-windshield head-up displays for their upcoming car models. It is anticipated that these screens will take up a lot of room in automobile cockpits. Because of the advancement of autonomous vehicles, the automotive cockpit electronics market is changing to include a few electronics in automotive cockpits. This presents a problem for head-up display producers. For example, Nippon Seiki and Alps Alpine signed a business alliance agreement in January 2021 with the goal of developing integrated cockpit products that work with the integration of onboard electrical control units to give customers an experience that truly represents the future.

Projectors and a set of mirrors are used in windshield-based head-up displays to transmit information that appears either slightly above or below the driver's line of sight. The curvature of windshields has been taken into consideration in the development of these displays. The curvatures of the windshields on various automobile models vary, necessitating the alignment of head-up displays with windshields, which leads to a challenging calibration procedure. Thus, the cost of head-up displays that are based on windshields goes up. As a result, most automobiles only offer these screens as an optional feature. Commercial vehicles' windshields are not curved the same way as those of passenger automobiles. Commercial cars, on the other hand, have a roomy automotive cockpit that will eventually be able to hold full windshield displays. The incorporation of functions like pedestrian detection, night vision, loss damage waiver (LDW), and battery life indicators (for hybrid automobiles) in head-up displays is a result of tier 1 suppliers' increasing technological prowess. For instance, Visteon unveiled its microZone display technology in January 2020, which provides noticeably better graphics performance than conventional LCD panels. For use in automobile cockpit applications, the display technology provides a broad color gamut, excellent contrast, and brightness. In the upcoming years, there will likely be a major increase in demand for windshield head-up displays due to the expanding number of automobile models that come equipped with these safety features and consumers' increased willingness to pay for them. Also, in December 2022, Continental AG perpetuated a new trend by introducing an inaugural scenic view HUD in HUD cockpit. It presents vehicle and route information in the driver's line of sight on screens and ensures clear visibility.

Europe's market for windshield-based head-up displays is expanding as a result of rising demand from nations like the UK and Germany for cutting-edge in-car technology. In addition, the growing market for windshield-based head-up displays in Europe and North America is being propelled by the growing demand for high-end cars with cutting-edge in-car safety systems, as well as a notable installation rate of windshield head-up displays in mid-segment cars in North America due to the region's sizable light commercial vehicle (LCV) market.

"Europe to record the highest market share in the head-up display market during the forecast period."

In the period spanning from 2023 to 2028, Europe is anticipated to take the lead as the largest market in the field of head-up displays. This market analysis encompasses a comprehensive examination of key European nations, including Germany, the UK, France, and the rest of Europe. On a global scale, Europe boasts a distinguished reputation as a hub for the manufacturing of luxury and premium automobiles. Prominent high-end automotive original equipment manufacturers (OEMs) such as Audi AG, BMW AG, Mercedes-Benz, Bentley Motors Ltd., Maserati, Skoda Auto, Ferrari s.p.a, and Bugatti Automobiles S.A.S have established their headquarters in Europe. Notably, as head-up displays stand out as crucial safety features, a significant number of luxury and premium car manufacturers in Europe integrate these displays into their vehicle models. The growing consumer demand for luxury and premium cars, including SUVs furnished with head-up displays, is projected to be a driving force behind the expansion of the head-up display market in Europe.

Furthermore, Europe also distinguishes itself as a dominant player in the global aircraft manufacturing sector. Leading European airlines, such as Lufthansa AG, Air France, and Airbus, are prominent contributors to civil aviation aircraft production in the region.

Europe is home to key players in the aircraft and helicopter manufacturing industry, including Gulfstream, BAE Systems, Dassault, Eurocopter, and AgustaWestland. The notable presence of both automobile and aircraft manufacturers in Europe significantly contributes to the growth of the head-up display market within the continent.

Key players at the forefront of the European head-up display market are Continental AG, BAE Systems, Thales, Garmin, Robert Bosch GmbH, and Saab AB. The growth of this market in the region is propelled by several factors, including the escalating demand for advanced technologies, the increasing need for enhanced safety and security in driving experiences, and the evolution of connected cars. Additionally, the rising integration of head-up displays in vehicles, aimed at improving visibility and efficiency, further fosters the expansion of the head-up display market across Europe.

In January 2019, Nippon Seiki Co., Ltd. has established a new company in Lodz County, Republic of Poland, that will manufacture in-vehicle instruments and displays in order to increase production capacity for head-up displays.

"Civil Aviation is expected to have the highest CAGR in the forecast period"

Civil aviation encompasses both private and commercial aviation sectors, with the civil aviation segment of the head-up display (HUD) market further categorized into civil aircraft and civil helicopters. Traditional HUDs in civil aviation were primarily used for displaying data on Primary Flight Displays (PFDs). However, advanced HUDs now provide a comprehensive range of information, including flight path guidance, airspeed notifications, runway representation, landing guidance, runway details, and warning messages, significantly enhancing aircraft safety and aiding pilots in conducting safe flight operations. Modern HUDs utilize symbology to present the required information, departing from the previous analog format. This visual approach improves the comprehension and interpretation of information related to weather conditions, flight paths, takeoff performance, and landing guidelines, surpassing analog methods. Thales Group, based in France, is a prominent manufacturer of HUDs used in civil aircraft.

"Display units component is expected to have the highest CAGR for head-up display in the forecast period"

Display units represent another integral component employed within head-up displays, serving the purpose of image processing and subsequent projection onto vehicle windshields or combiners. These display units encompass various technologies, including Digital Micromirror Device (DMD), Liquid Crystal Display (LCD), and Liquid Crystal on Silicon (LCOS). Within the LCOS realm, further segmentation is possible, distinguishing between Nematic LCOS (NLCOS) and Ferroelectric LCOS (FLCOS).

The digital micromirror device (DMD) technology is a collection of thousands of moving microscopic mirrors combined on a rectangular array. These are microelectromechanical systems that provide reliable information at a fast speed. Micromirrors are made of aluminum. Each mirror has a size of 16 µm. The digital micromirror device (DMD) technology was first introduced by Texas Instrument (US) in 1987. The displays based on this technology contain several micromirrors (up to 2 million) controlled by modulators known as spatial light modulators (SLM). For instance, the company offers DLP4710 digital micromirror device (DMD) which is a digitally controlled micro-opto-electromechanical system (MOEMS) spatial light modulator (SLM). When integrated with a suitable optical system, the DLP4710LC DMD delivers exceptionally sharp and top-quality images and videos. The compact dimensions of the DLP4710LC, in combination with the controller and the PMIC/LED driver, offer a comprehensive system solution that facilitates compact form factors, low power consumption, and high-resolution HD displays. Furthermore, in February 2021, Nippon Seiki started the delivery of the first augmented reality (AR) head-up display (HUD) that uses the Digital Micro Mirror Device (DMD) technology.

Liquid crystal displays (LCDs) are flat-panel displays or electronically modulated optical devices utilizing the light-modulating properties of liquid crystals in conjunction with polarizers. These displays offer several advantages, including operation at low voltage levels, reduced power consumption, the capability to deliver high-resolution imagery, and the ability to maintain high contrast even in bright lighting conditions. LCDs notably outshine displays founded on micromirror device (DMD) technology in terms of brightness. In LCD projectors, light is directed onto micromirrors in the three primary colors: red, green, and blue (RGB). These primary colors are channelled through three individual glass panels, known as 3LCDs, where each pixel passes through. The distinct red, green, and blue colors are projected through the glass panels and presented on head-up displays. LCDs excel in providing vibrant colors and sharp imagery. Presently, LCDs are being replaced by thin-film-transistor (TFT) technology capable of displaying full-color visuals. A noteworthy example of this transition occurred in May 2019 when Nippon Seiki introduced a full-color TFT liquid display in the Mercedes-Benz GLE-class, projecting imagery onto the vehicle's windshield.

Liquid crystal on silicon (LCoS) technology uses the principle of reflection to project images. It uses liquid crystals to reflect mirror subtracts. As light beams pass through mirrors, they get reflected and create an image, which is projected on display units. LCoS

technology typically uses three LCoS chips to modulate light in red, green, and blue channels. It produces a higher resolution than DMD and LCD projector technologies. LCoS projectors are usually compact and have low power consumption.
In April 2023, Huawei Technologies Co., Ltd., introduced its AR-HUD. The Huawei AR-HUD employs Huawei's AutOptiX intelligent on-board light technology, ushering vehicles into the age of optical displays. This system features rail-level LCoS (Liquid Crystal on Silicon) technology with micron-level pixel units and 2K-level resolution, complemented by a three-color LED light source boasting an eye-catching brightness of 12,000 nits and an NTSC color gamut exceeding 85%. It is equipped with a short-focus lens for clearer imaging with minimal distortion (less than 2%) and a polarization component that optimizes light energy utilization to an impressive 90%, resulting in a remarkable contrast ratio of 1200:1. In terms of specifications, the Huawei AR-HUD sets an industry benchmark with the largest mass-production frame, delivering an equivalent display size of 70 inches at 7.5 meters and an expansive 96 inches at 10 meters, along with the highest resolution among mass-produced HUDs at 1922x730.
The break-up of the profile of primary participants in the head-up display market-
□□By Company Type: Tier 1 □ 15%, Tier 2 □ 50%, Tier 3 □ 35%
□□By Designation Type: C Level □ 45%, Director Level □ 35%, Others □ 20%
□□By Region Type: North America □ 45%, Europe □35 %, Asia Pacific □ 12%, RoW □ 8%,

The major players in the head-up display market with a significant global presence includes Nippon Seiki Co., Ltd. (Japan), Continental AG (Germany), DENSO CORPORATION (Japan), Robert Bosch GmbH (Germany), Visteon Corporation (US), BAE Systems (UK), YAZAKI Corporation (Japan), Pioneer Corporation (Japan), Panasonic Holdings Corporation (Japan), Garmin Ltd. (US), Thales (France), E-LEAD ELECTRONIC CO. LTD (Taiwan), Honeywell International Inc. (US), MicroVision (US), Collins Aerospace (US), Renesas Electronics Corporation (Japan), STMicroelectronics (Switzerland), ALPS ALPINE CO., LTD. (Japan), Elbit Systems Ltd. (Israel), Saab AB (Sweden), Vuzix (US), Foryou Corporation (US), HARMAN International (US), HUDWAY, LLC (US), WayRay AG (Switzerland), Envisics (UK), Texas Instruments Incorporated (US).

Research Coverage
The report segments the head-up display market and forecasts its size based and region. The report also provides a comprehensive review of drivers, restraints, opportunities, and challenges influencing market growth. The report also covers qualitative aspects in addition to the quantitative aspects of the market.
Reasons to buy the report:
The report will help the market leaders/new entrants in this market with information on the closest approximate revenues for the overall head-up display market and related segments. This report will help stakeholders understand the competitive landscape and gain more insights to strengthen their position in the market and plan suitable go-to-market strategies. The report also helps stakeholders understand the pulse of the market and provides them with information on key market drivers, restraints, opportunities, and challenges.
The report provides insights on the following pointers:
□□Analysis of key drivers (Improved ease and comfort provided by the fusion of satellite navigation technology and head-up displays), restraints (Space constraints in vehicle cockpits), opportunities (Increasing demand for semi-autonomous and electric vehicles), and challenges (Limited field of view (FOV) influencing the growth of the head-up display market.
□□Product Development/Innovation: Detailed insights on upcoming technologies, research & development activities, and new product launches in the head-up display market
□□Market Development: Comprehensive information about lucrative markets □ the report analyses the head-up display market across varied regions.
□□Market Diversification: Exhaustive information about new products, untapped geographies, recent developments, and investments in the head-up display market
□□Competitive Assessment: In-depth assessment of market shares, growth strategies, and product offerings of leading players like Continental AG (Germany), DENSO CORPORATION (Japan), Robert Bosch GmbH (Germany), Visteon Corporation (US), BAE Systems (UK) and many more.

Table of Contents:

1 INTRODUCTION 31
1.1 STUDY OBJECTIVES 31
1.2 MARKET DEFINITION 31
1.2.1 INCLUSIONS AND EXCLUSIONS 32
1.3 STUDY SCOPE 32
1.3.1 MARKETS COVERED 32
FIGURE 1 HEAD-UP DISPLAY: MARKET SEGMENTATION 32
1.3.2 REGIONAL SCOPE 33
FIGURE 2 HEAD-UP DISPLAY MARKET: REGIONAL SCOPE 33
1.3.3 YEARS CONSIDERED 33
1.4 CURRENCY CONSIDERED 33
1.5 UNITS CONSIDERED 33
1.6 LIMITATIONS 34
1.7 STAKEHOLDERS 34
1.8 SUMMARY OF CHANGES 34
1.8.1 RECESSION IMPACT 34
2 RESEARCH METHODOLOGY 35
2.1 RESEARCH DATA 35
FIGURE 3 HEAD-UP DISPLAY MARKET: RESEARCH DESIGN 35
2.1.1 SECONDARY DATA 36
2.1.1.1 Key data from secondary sources 36
2.1.1.2 Key secondary sources 36
2.1.2 PRIMARY DATA 37
2.1.2.1 Key data from primary sources 37
2.1.2.2 Key participants in primary processes across head-up display value chain 38
2.1.2.3 Breakdown of primary interviews 38
2.1.2.4 Key industry insights 38
2.1.3 SECONDARY AND PRIMARY RESEARCH 39
2.2 MARKET SIZE ESTIMATION 39
FIGURE 4 MARKET SIZE ESTIMATION METHODOLOGY - APPROACH 1 (SUPPLY SIDE): REVENUE GENERATED BY KEY EQUIPMENT MANUFACTURERS IN HEAD-UP DISPLAY MARKET 40
FIGURE 5 MARKET SIZE ESTIMATION METHODOLOGY - APPROACH 2 (SUPPLY SIDE): ILLUSTRATION OF REVENUE ESTIMATION OF KEY MANUFACTURERS IN HEAD-UP DISPLAY MARKET 41
FIGURE 6 MARKET SIZE ESTIMATION METHODOLOGY: APPROACH 3 (DEMAND SIDE) -BOTTOM-UP ESTIMATION OF HEAD-UP DISPLAY MARKET BASED ON REGION 42
2.2.1 BOTTOM-UP APPROACH 42
2.2.1.1 Approach to derive market size using bottom-up analysis 42
FIGURE 7 MARKET SIZE ESTIMATION METHODOLOGY: BOTTOM-UP APPROACH 43
2.2.2 TOP-DOWN APPROACH 43
2.2.2.1 Approach to derive market size using top-down analysis 43
FIGURE 8 MARKET SIZE ESTIMATION METHODOLOGY: TOP-DOWN APPROACH 44
2.3 MARKET SHARE ESTIMATION 44
2.4 DATA TRIANGULATION 44
FIGURE 9 DATA TRIANGULATION 45
2.5 RISK ASSESSMENT 45
TABLE 1 RISK FACTOR ANALYSIS 45
2.6 RECESSION IMPACT 46

2.7 RESEARCH ASSUMPTIONS AND LIMITATIONS 47
2.7.1 ASSUMPTIONS 47
2.7.2 LIMITATIONS 47
3 EXECUTIVE SUMMARY 48
3.1 RECESSION IMPACT 48
FIGURE 10 HEAD-UP DISPLAY MARKET: IMPACT OF RECESSION 49
FIGURE 11 CONVENTIONAL HEAD-UP DISPLAY SEGMENT TO HOLD LARGER MARKET SHARE IN 2028 49
FIGURE 12 COMBINER-BASED CONVENTIONAL HEAD-UP DISPLAY SEGMENT TO REGISTER HIGHER CAGR DURING FORECAST PERIOD 50
FIGURE 13 PROJECTORS/PROJECTION UNITS COMPONENT TO ACCOUNT FOR LARGEST MARKET SHARE IN 2028 50
FIGURE 14 EUROPE TO HOLD LARGEST SHARE OF HEAD-UP DISPLAY MARKET DURING FORECAST PERIOD 51
4 PREMIUM INSIGHTS 52
4.1 ATTRACTIVE OPPORTUNITIES FOR PLAYERS IN HEAD-UP DISPLAY MARKET 52
FIGURE 15 RISE IN GLOBAL DEMAND FOR SEMI-AUTONOMOUS AND ELECTRIC VEHICLES TO DRIVE GROWTH OF HEAD-UP DISPLAY MARKET 52
4.2 HEAD-UP DISPLAY MARKET, BY APPLICATION 52
FIGURE 16 AUTOMOTIVE SEGMENT TO HOLD LARGER MARKET SHARE IN 2023 52
4.3 HEAD-UP DISPLAY MARKET FOR AVIATION, BY SUB-APPLICATION 53
FIGURE 17 CIVIL AVIATION SEGMENT TO REGISTER HIGHER CAGR DURING FORECAST PERIOD 53
4.4 HEAD-UP DISPLAY MARKET FOR AUTOMOTIVE, BY SUB-APPLICATION 53
FIGURE 18 COMMERCIAL VEHICLES SEGMENT TO REGISTER HIGHER CAGR DURING FORECAST PERIOD 53
4.5 HEAD-UP DISPLAY MARKET, BY COUNTRY 54
FIGURE 19 CANADA TO EXHIBIT HIGHEST CAGR IN HEAD-UP DISPLAY MARKET DURING FORECAST PERIOD 54
5 MARKET OVERVIEW 55
5.1 INTRODUCTION 55
5.2 MARKET DYNAMICS 55
FIGURE 20 INCREASING AWARENESS ABOUT PASSENGER AND VEHICLE SAFETY TO SPUR DEMAND FOR HEAD-UP DISPLAYS 55
5.2.1 DRIVERS 56
FIGURE 21 DRIVERS - HEAD-UP DISPLAY MARKET 56
5.2.1.1 Rising awareness regarding safety of passengers and vehicles 56
FIGURE 22 ROAD ACCIDENT DEATHS PER MILLION HABITANTS, BY COUNTRY, 2001-2021 57
5.2.1.2 Increasing demand for advanced driver assistance systems (ADAS) 57
5.2.1.3 Improved ease and comfort provided by fusion of satellite navigation technology and head-up displays 58
5.2.1.4 Rising desire for enhancing in-vehicle experience 58
FIGURE 23 BENEFITS OF HUD FOR END USERS 58
FIGURE 24 CATEGORIES OF HUD DESIGNS 59
TABLE 2 APPLICATIONS THAT BENEFIT FROM HUD 59
5.2.1.5 Rising demand for connected vehicles worldwide 59
5.2.1.6 Growing interest in technologically advanced head-up displays 60
5.2.1.7 Increasing adoption of AR-based head-up displays 60
5.2.2 RESTRAINTS 61
FIGURE 25 RESTRAINTS - HEAD-UP DISPLAY MARKET 61
5.2.2.1 Spatial limitations in vehicle cockpits 61
5.2.2.2 Demand for high luminance, power, and brightness in head-up displays 62
5.2.2.3 Misinterpretation of symbols displayed in head-up displays 62
5.2.2.4 Complex installation and maintenance 62
5.2.3 OPPORTUNITIES 63

FIGURE 26	OPPORTUNITIES - HEAD-UP DISPLAY MARKET	63
5.2.3.1	Increasing demand for semi-autonomous and electric vehicles	63
5.2.3.2	Utilizing head-up displays (HUDs) in sports for enhanced performance	64
5.2.3.3	Development of displays that operate without conventional screens	64
5.2.3.4	Improved driving experiences facilitated by AR-based head-up displays	64
5.2.3.5	Rollout of cost-effective portable HUDs within automotive market's affordable low and middle segments	65
5.2.4	CHALLENGES	65
FIGURE 27	CHALLENGES - HEAD-UP DISPLAY MARKET	65
5.2.4.1	Regulatory challenges	65
5.2.4.2	Limited field of view (FOV)	66
5.2.4.3	High expenses linked to advanced head-up displays	66
5.2.4.4	Presence of laser-based volumetric displays as substitutes for head-up displays	66
5.3	VALUE CHAIN ANALYSIS	66
FIGURE 28	ASSEMBLY, MANUFACTURING, AND SOFTWARE DEVELOPMENT STAGES TO ADD MAJOR VALUE TO HEAD-UP DISPLAYS	67
5.4	REVENUE SHIFT AND NEW REVENUE POCKETS IN HEAD-UP DISPLAY MARKET	68
5.5	DISPLAY ECOSYSTEM	68
FIGURE 29	DISPLAY MARKET: ECOSYSTEM ANALYSIS	69
FIGURE 30	HEAD-UP DISPLAY ECOSYSTEM FOR COCKPITS	70
TABLE 3	HEAD-UP DISPLAY MARKET ECOSYSTEM	70
FIGURE 31	KEY PLAYERS IN HEAD-UP DISPLAY ECOSYSTEM	72
5.6	FEATURES OF HEAD-UP DISPLAYS	72
5.6.1	FIELD OF VIEW	72
5.6.2	RESOLUTION	73
5.6.3	BRIGHTNESS	73
5.6.4	ACCURACY	73
5.6.5	COMBINER TRANSMITTANCE	73
5.7	TECHNOLOGY ANALYSIS	74
FIGURE 32	TECHNOLOGIES USED IN HEAD-UP DISPLAYS	74
5.7.1	CATHODE RAY TUBES	74
5.7.2	LIGHT-EMITTING DIODES	74
5.7.3	OPTICAL WAVEGUIDES	75
5.7.4	MICROELECTROMECHANICAL SYSTEMS	75
5.8	PRICING ANALYSIS	75
FIGURE 33	AVERAGE SELLING TREND OF KEY PLAYERS, BY TYPE	76
TABLE 4	AVERAGE SELLING PRICES OF TOP 3 KEY PLAYERS (USD)	76
FIGURE 34	AVERAGE SELLING PRICE TREND, BY COMPONENT, 2019-2028	76
5.9	HEAD-UP DISPLAY MARKET: CASE STUDIES	77
TABLE 5	BOYD CORPORATION HELPED NAVDY TO DEVELOP THERMAL SOLUTION FOR ITS HEAD-UP DISPLAYS	77
TABLE 6	GX GROUP HELPED VISTEON TO DESIGN COMPACT HEAD-UP DISPLAY UNIT	77
TABLE 7	EVALUATION OF USABILITY OF HEAD-UP DISPLAYS BY MITSUBISHI ELECTRIC RESEARCH LABORATORIES	77
5.9.1	PANASONIC'S LARGE-SCREEN WS HUD INCORPORATED IN NISSAN ARIYA	78
5.9.2	GARMIN COLLABORATED WITH FORD MOTORS TO INTEGRATE ITS NAVIGATION TECHNOLOGY	78
5.9.3	PIONEER PARTNERED WITH CONTINENTAL TO DEVELOP COCKPIT SOLUTIONS	78
5.10	TRADE ANALYSIS	78
TABLE 8	IMPORT DATA FOR MONITORS AND PROJECTORS NOT INCORPORATING TELEVISION RECEPTION APPARATUSES, BY COUNTRY, 2018-2022 (USD MILLION)	78
FIGURE 35	COUNTRY-WISE IMPORT DATA FOR PRODUCTS CLASSIFIED UNDER HS CODE: 8528, 2018-2022	79

Scotts International. EU Vat number: PL 6772247784
tel. 0048 603 394 346 e-mail: support@scotts-international.com
www.scotts-international.com

TABLE 9	EXPORT DATA FOR MONITORS AND PROJECTORS NOT INCORPORATING TELEVISION RECEPTION APPARATUSES, BY COUNTRY, 2018-2022 (USD MILLION)	79
FIGURE 36	COUNTRY-WISE EXPORT DATA FOR PRODUCTS CLASSIFIED UNDER HS CODE: 8528, 2018-2022	80
5.11	PATENT ANALYSIS	80
FIGURE 37	ANNUAL NUMBER OF PATENTS GRANTED OVER LAST 10 YEARS	80
TABLE 10	TOP 20 PATENT OWNERS IN US IN LAST 10 YEARS	81
FIGURE 38	TOP 10 COMPANIES WITH HIGHEST NO. OF PATENT APPLICATIONS IN LAST 10 YEARS	82
TABLE 11	IMPORTANT PATENT REGISTRATIONS, 2018-2022	82
5.12	PORTER'S FIVE FORCES ANALYSIS	84
5.12.1	BARGAINING POWER OF SUPPLIERS	84
5.12.2	BARGAINING POWER OF BUYERS	85
5.12.3	THREAT OF NEW ENTRANTS	85
5.12.4	THREAT OF SUBSTITUTES	85
5.12.5	INTENSITY OF COMPETITIVE RIVALRY	85
TABLE 12	IMPACT OF EACH FORCE ON HEAD-UP DISPLAY MARKET	85
FIGURE 39	PORTER'S FIVE FORCES ANALYSIS	86
5.13	TARIFF AND REGULATORY LANDSCAPE	86
5.13.1	TARIFF	86
5.13.2	REGIONAL REGULATORY BODIES, GOVERNMENT AGENCIES, AND OTHER ORGANIZATIONS	87
5.13.2.1	North America	87
5.13.2.2	Europe	87
5.13.2.3	Asia Pacific	87
5.13.2.4	Rest of the World	87
5.13.3	STANDARDS	87
5.13.3.1	Standards in ITS/C-ITS	88
TABLE 13	BASE STANDARDS OF C-ITS	88
TABLE 14	STANDARDS: EUROPEAN TELECOMMUNICATIONS STANDARDS INSTITUTE	88
TABLE 15	SECURITY AND PRIVACY STANDARDS DEVELOPED BY ETSI	89
TABLE 16	HEAD-UP DISPLAY MARKET: DETAILED LIST OF CONFERENCES & EVENTS (2023-2024)	90
5.14	KEY STAKEHOLDERS & BUYING CRITERIA	91
5.14.1	KEY STAKEHOLDERS IN BUYING PROCESS	91
FIGURE 40	INFLUENCE OF STAKEHOLDERS ON BUYING PROCESS FOR APPLICATIONS	91
TABLE 17	INFLUENCE OF STAKEHOLDERS ON BUYING PROCESS FOR APPLICATIONS (%)	92
5.14.2	BUYING CRITERIA	92
FIGURE 41	KEY BUYING CRITERIA FOR APPLICATIONS	92
TABLE 18	KEY BUYING CRITERIA FOR APPLICATIONS	92
6	HEAD-UP DISPLAY MARKET, BY TYPE	93
6.1	INTRODUCTION	94
FIGURE 42	HEAD-UP DISPLAY MARKET, BY TYPE	94
FIGURE 43	CONVENTIONAL HUD SEGMENT TO ACQUIRE LARGER SHARE DURING FORECAST PERIOD	94
TABLE 19	HEAD-UP DISPLAY MARKET, BY TYPE, 2019-2022 (USD MILLION)	94
TABLE 20	HEAD-UP DISPLAY MARKET, BY TYPE, 2023-2028 (USD MILLION)	95
6.2	CONVENTIONAL HEAD-UP DISPLAYS	96
6.2.1	WINDSHIELD-BASED HEAD-UP DISPLAYS	96
6.2.1.1	Windshield HUDs use projector and series of mirrors to relay information directly to driver's line of sight	96
6.2.2	COMBINER-BASED HEAD-UP DISPLAYS	97
6.2.2.1	Compact-shaped combiner-based head-up displays take less space in automotive cockpits	97

TABLE 21 CONVENTIONAL HEAD-UP DISPLAY MARKET, BY SUBTYPE, 2019-2022 (USD MILLION) 97
TABLE 22 CONVENTIONAL HEAD-UP DISPLAY MARKET, BY SUBTYPE, 2023-2028 (USD MILLION) 97
FIGURE 44 AUTOMOTIVE SEGMENT TO HAVE LARGER SHARE IN CONVENTIONAL HEAD-UP DISPLAY MARKET FROM 2023 TO 2028 97
TABLE 23 CONVENTIONAL HEAD-UP DISPLAY MARKET, BY APPLICATION, 2019-2022 (USD MILLION) 98
TABLE 24 CONVENTIONAL HEAD-UP DISPLAY MARKET, BY APPLICATION, 2023-2028 (USD MILLION) 98
TABLE 25 CONVENTIONAL HEAD-UP DISPLAY MARKET, BY COMPONENT, 2019-2022 (USD MILLION) 98
TABLE 26 CONVENTIONAL HEAD-UP DISPLAY MARKET, BY COMPONENT, 2023-2028 (USD MILLION) 99
6.3 AR-BASED HEAD-UP DISPLAYS 99
6.3.1 ADOPTION OF AR-BASED HEAD-UP DISPLAYS FOR USAGE IN LUXURY CARS TO BOOST THEIR GLOBAL DEMAND 99
TABLE 27 AR-BASED HEAD-UP DISPLAY MARKET, BY APPLICATION, 2019-2022 (USD MILLION) 100
TABLE 28 AR-BASED HEAD-UP DISPLAY MARKET, BY APPLICATION, 2023-2028 (USD MILLION) 100
TABLE 29 AR-BASED HEAD-UP DISPLAY MARKET, BY COMPONENT, 2019-2022 (USD MILLION) 100
TABLE 30 AR-BASED HEAD-UP DISPLAY MARKET, BY COMPONENT, 2023-2028 (USD MILLION) 100
7 HEAD-UP DISPLAY MARKET, BY APPLICATION 101
7.1 INTRODUCTION 102
FIGURE 45 HEAD-UP DISPLAY MARKET, BY APPLICATION 102
FIGURE 46 AUTOMOTIVE SEGMENT TO DOMINATE HEAD-UP DISPLAY MARKET FROM 2023 TO 2028 102
TABLE 31 HEAD-UP DISPLAY MARKET, BY APPLICATION, 2019-2022 (USD MILLION) 102
TABLE 32 HEAD-UP DISPLAY MARKET, BY APPLICATION, 2023-2028 (USD MILLION) 103
TABLE 33 HEAD-UP DISPLAY MARKET, BY APPLICATION, 2019-2022 (THOUSAND UNITS) 103
TABLE 34 HEAD-UP DISPLAY MARKET, BY APPLICATION, 2023-2028 (THOUSAND UNITS) 103
7.2 AVIATION 104
7.2.1 CIVIL AVIATION 104
7.2.1.1 Civil aircraft 104
7.2.1.1.1 Use of head-up displays in commercial and civil aircraft to provide required information to pilots witnessing increase 104
7.2.1.2 Civil helicopters 105
7.2.1.2.1 Deployment of head-up displays in civil helicopters to increase for providing information related to flight safety 105
7.2.2 MILITARY AVIATION 105
7.2.2.1 Aircraft 106
7.2.2.1.1 Military aircraft use head-up displays to provide cockpit information to pilots 106
7.2.2.2 Helicopters 106
7.2.2.2.1 Modern military helicopters use head-up displays during war missions 106
FIGURE 47 CIVIL AVIATION SEGMENT TO DOMINATE HEAD-UP DISPLAY MARKET FROM 2023 TO 2028 107
TABLE 35 HEAD-UP DISPLAY MARKET FOR AVIATION, BY SUB-APPLICATION, 2019-2022 (USD MILLION) 107
TABLE 36 HEAD-UP DISPLAY MARKET FOR AVIATION, BY SUB-APPLICATION, 2023-2028 (USD MILLION) 107
TABLE 37 HEAD-UP DISPLAY MARKET FOR AVIATION, BY TYPE, 2019-2022 (USD MILLION) 107
TABLE 38 HEAD-UP DISPLAY MARKET FOR AVIATION, BY TYPE, 2023-2028 (USD MILLION) 108
TABLE 39 HEAD-UP DISPLAY MARKET FOR AVIATION, BY REGION, 2019-2022 (USD MILLION) 108
TABLE 40 HEAD-UP DISPLAY MARKET FOR AVIATION, BY REGION, 2023-2028 (USD MILLION) 108
7.3 AUTOMOTIVE 108
7.3.1 PASSENGER CARS 109
7.3.1.1 Passenger cars projected to dominate head-up display market for automotive applications 109
7.3.2 COMMERCIAL VEHICLES 109
7.3.2.1 Formulation of mandates and regulations regarding vehicle safety to fuel adoption of advanced safety features in commercial vehicles 109
FIGURE 48 PASSENGER CARS SEGMENT TO DOMINATE HEAD-UP DISPLAY MARKET FOR AUTOMOTIVE APPLICATIONS 110
TABLE 41 HEAD-UP DISPLAY MARKET FOR AUTOMOTIVE, BY SUB-APPLICATION, 2019-2022 (USD MILLION) 110

TABLE 42 HEAD-UP DISPLAY MARKET FOR AUTOMOTIVE, BY SUB-APPLICATION, 2023-2028 (USD MILLION) 110
TABLE 43 HEAD-UP DISPLAY MARKET FOR AUTOMOTIVE, BY TYPE, 2019-2022 (USD MILLION) 111
TABLE 44 HEAD-UP DISPLAY MARKET FOR AUTOMOTIVE, BY TYPE, 2023-2028 (USD MILLION) 111
TABLE 45 HEAD-UP DISPLAY MARKET FOR AUTOMOTIVE, BY REGION, 2019-2022 (USD MILLION) 111
TABLE 46 HEAD-UP DISPLAY MARKET FOR AUTOMOTIVE, BY REGION, 2023-2028 (USD MILLION) 111
TABLE 47 CONVENTIONAL HEAD-UP DISPLAY MARKET FOR AUTOMOTIVE, BY REGION, 2019-2022 (USD MILLION) 112
TABLE 48 CONVENTIONAL HEAD-UP DISPLAY MARKET FOR AUTOMOTIVE, BY REGION, 2023-2028 (USD MILLION) 112
TABLE 49 AR-BASED HEAD-UP DISPLAY MARKET FOR AUTOMOTIVE, BY REGION, 2019-2022 (USD MILLION) 113
TABLE 50 AR-BASED HEAD-UP DISPLAY MARKET FOR AUTOMOTIVE, BY REGION, 2023-2028 (USD MILLION) 113
8 HEAD-UP DISPLAY MARKET, BY COMPONENT 114
8.1 INTRODUCTION 115
FIGURE 49 HEAD-UP DISPLAY MARKET, BY COMPONENT 115
FIGURE 50 PROJECTORS/PROJECTION UNITS SEGMENT TO HOLD LARGEST MARKET SIZE 115
TABLE 51 HEAD-UP DISPLAY MARKET, BY COMPONENT, 2019-2022 (USD MILLION) 116
TABLE 52 HEAD-UP DISPLAY MARKET, BY COMPONENT, 2023-2028 (USD MILLION) 116
8.2 VIDEO GENERATORS 116
8.2.1 VIDEO GENERATORS ACT AS INTERFACE BETWEEN PROJECTION UNITS AND DATA TO BE DISPLAYED 116
TABLE 53 HEAD-UP DISPLAY MARKET FOR VIDEO GENERATORS, BY TYPE, 2019-2022 (USD MILLION) 117
TABLE 54 HEAD-UP DISPLAY MARKET FOR VIDEO GENERATORS, BY TYPE, 2023-2028 (USD MILLION) 117
8.3 PROJECTORS/PROJECTION UNITS 117
8.3.1 GROWING USE OF HIGH-VERSION PICO PROJECTORS IN HEAD-UP DISPLAYS TO SUPPORT MARKET GROWTH 117
FIGURE 51 TYPES OF PROJECTOR TECHNOLOGIES 118
8.3.2 LIQUID CRYSTAL ON SILICON (LCOS) PROJECTORS 118
8.3.3 DIGITAL LIGHT PROCESSING (DLP) PROJECTORS 118
8.3.4 LASER BEAM STEERING (LBS) PROJECTORS 119
TABLE 55 HEAD-UP DISPLAY MARKET FOR PROJECTORS/PROJECTION UNITS, BY TYPE, 2019-2022 (USD MILLION) 119
TABLE 56 HEAD-UP DISPLAY MARKET FOR PROJECTORS/PROJECTION UNITS, BY TYPE, 2023-2028 (USD MILLION) 119
8.4 DISPLAY UNITS 119
8.4.1 DISPLAY UNITS RESPONSIBLE FOR IMAGE PROCESSING AND PRESENTATION ON VEHICLE WINDSHIELDS OR COMBINERS 119
FIGURE 52 TYPES OF DISPLAY TECHNOLOGIES 120
8.4.2 DIGITAL MICROMIRROR DEVICE (DMD) TECHNOLOGY 120
8.4.3 LIQUID CRYSTAL DISPLAY (LCD) TECHNOLOGY 120
8.4.4 LIQUID CRYSTAL ON SILICON TECHNOLOGY 120
8.4.4.1 Nematic LCoS displays 121
8.4.4.2 Ferroelectric LCoS displays 121
TABLE 57 HEAD-UP DISPLAY MARKET FOR DISPLAY UNITS, BY TYPE, 2019-2022 (USD MILLION) 121
TABLE 58 HEAD-UP DISPLAY MARKET FOR DISPLAY UNITS, BY TYPE, 2023-2028 (USD MILLION) 121
8.5 SOFTWARE 122
8.5.1 SOFTWARE APPLICATIONS TO BE INCORPORATED IN HEAD-UP DISPLAYS FOR NAVIGATIONAL PURPOSES 122
TABLE 59 HEAD-UP DISPLAY MARKET FOR SOFTWARE, BY TYPE, 2019-2022 (USD MILLION) 122
TABLE 60 HEAD-UP DISPLAY MARKET FOR SOFTWARE, BY TYPE, 2023-2028 (USD MILLION) 123
8.6 OTHER COMPONENTS 123
TABLE 61 HEAD-UP DISPLAY MARKET FOR OTHER COMPONENTS, BY TYPE, 2019-2022 (USD MILLION) 123
TABLE 62 HEAD-UP DISPLAY MARKET FOR OTHER COMPONENTS, BY TYPE, 2023-2028 (USD MILLION) 123
9 HEAD-UP DISPLAY MARKET, BY TECHNOLOGY 124
9.1 INTRODUCTION 124
9.2 CRT-BASED HEAD-UP DISPLAYS 124

9.2.1	FUNCTIONING OF CRT-BASED HEAD-UP DISPLAYS	124
9.2.2	BENEFITS OF USING CATHODE-RAY TUBE-BASED HEAD-UP DISPLAYS IN AUTOMOBILES AND AIRCRAFT	124
9.3	DIGITAL HEAD-UP DISPLAYS	125
9.3.1	FUNCTIONING OF DIGITAL HEAD-UP DISPLAYS	125
9.3.2	BENEFITS OF INCORPORATING DIGITAL HEAD-UP DISPLAYS IN AUTOMOBILES AND AIRCRAFT	125
10	HEAD-UP DISPLAY MARKET, BY REGION	127
10.1	INTRODUCTION	128
FIGURE 53	HEAD-UP DISPLAY MARKET, BY REGION	128
FIGURE 54	NORTH AMERICA TO RECORD HIGHEST CAGR IN HEAD-UP DISPLAY MARKET DURING FORECAST PERIOD	128
TABLE 63	HEAD-UP DISPLAY MARKET, BY REGION, 2019-2022 (USD MILLION)	128
TABLE 64	HEAD-UP DISPLAY MARKET, BY REGION, 2023-2028 (USD MILLION)	129
10.2	NORTH AMERICA	129
FIGURE 55	SNAPSHOT: NORTH AMERICAN HEAD-UP DISPLAY MARKET	130
TABLE 65	NORTH AMERICA: HEAD-UP DISPLAY MARKET, BY COUNTRY, 2019-2022 (USD MILLION)	130
TABLE 66	NORTH AMERICA: HEAD-UP DISPLAY MARKET, BY COUNTRY, 2023-2028 (USD MILLION)	130
TABLE 67	NORTH AMERICA: HEAD-UP DISPLAY MARKET, BY APPLICATION, 2019-2022 (USD MILLION)	131
TABLE 68	NORTH AMERICA: HEAD-UP DISPLAY MARKET, BY APPLICATION, 2023-2028 (USD MILLION)	131
TABLE 69	NORTH AMERICA: HEAD-UP DISPLAY MARKET FOR AVIATION, BY COUNTRY, 2019-2022 (USD MILLION)	131
TABLE 70	NORTH AMERICA: HEAD-UP DISPLAY MARKET FOR AVIATION, BY COUNTRY, 2023-2028 (USD MILLION)	132
TABLE 71	NORTH AMERICA: HEAD-UP DISPLAY MARKET FOR AUTOMOTIVE, BY COUNTRY, 2019-2022 (USD MILLION)	132
TABLE 72	NORTH AMERICA: HEAD-UP DISPLAY MARKET FOR AUTOMOTIVE, BY COUNTRY, 2023-2028 (USD MILLION)	132
10.2.1	US	132
10.2.1.1	Rising demand for advanced features in vehicles to boost market growth in US	132
TABLE 73	US: HEAD-UP DISPLAY MARKET, BY APPLICATION, 2019-2022 (USD MILLION)	133
TABLE 74	US: HEAD-UP DISPLAY MARKET, BY APPLICATION, 2023-2028 (USD MILLION)	133
10.2.2	CANADA	133
10.2.2.1	Increased awareness for passenger and vehicle safety to drive market expansion in Canada	133
TABLE 75	CANADA: HEAD-UP DISPLAY MARKET, BY APPLICATION, 2019-2022 (USD MILLION)	134
TABLE 76	CANADA: HEAD-UP DISPLAY MARKET, BY APPLICATION, 2023-2028 (USD MILLION)	134
10.2.3	MEXICO	134
10.2.3.1	Dynamic evolution of automotive industry to fuel market growth in Mexico	134
TABLE 77	MEXICO: HEAD-UP DISPLAY MARKET, BY APPLICATION, 2019-2022 (USD MILLION)	135
TABLE 78	MEXICO: HEAD-UP DISPLAY MARKET, BY APPLICATION, 2023-2028 (USD MILLION)	135
10.2.4	RECESSION IMPACT ON HEAD-UP DISPLAY MARKET IN NORTH AMERICA	135
10.3	EUROPE	135
FIGURE 56	SNAPSHOT: EUROPEAN HEAD-UP DISPLAY MARKET	136
TABLE 79	EUROPE: HEAD-UP DISPLAY MARKET, BY COUNTRY, 2019-2022 (USD MILLION)	136
TABLE 80	EUROPE: HEAD-UP DISPLAY MARKET, BY COUNTRY, 2023-2028 (USD MILLION)	137
TABLE 81	EUROPE: HEAD-UP DISPLAY MARKET, BY APPLICATION, 2019-2022 (USD MILLION)	137
TABLE 82	EUROPE: HEAD-UP DISPLAY MARKET, BY APPLICATION, 2023-2028 (USD MILLION)	137
TABLE 83	EUROPE: HEAD-UP DISPLAY MARKET FOR AVIATION, BY COUNTRY, 2019-2022 (USD MILLION)	138
TABLE 84	EUROPE: HEAD-UP DISPLAY MARKET FOR AVIATION, BY COUNTRY, 2023-2028 (USD MILLION)	138
TABLE 85	EUROPE: HEAD-UP DISPLAY MARKET FOR AUTOMOTIVE, BY COUNTRY, 2019-2022 (USD MILLION)	138
TABLE 86	EUROPE: HEAD-UP DISPLAY MARKET FOR AUTOMOTIVE, BY COUNTRY, 2023-2028 (USD MILLION)	139
10.3.1	GERMANY	139
10.3.1.1	Installation of head-up displays in vehicles by automotive manufacturers to drive market growth	139
TABLE 87	GERMANY: HEAD-UP DISPLAY MARKET, BY APPLICATION, 2019-2022 (USD MILLION)	139

TABLE 88	GERMANY: HEAD-UP DISPLAY MARKET, BY APPLICATION, 2023-2028 (USD MILLION)	140
10.3.2	UK	140
10.3.2.1	Increasing luxury car demand to fuel market expansion in UK	140
TABLE 89	UK: HEAD-UP DISPLAY MARKET, BY APPLICATION, 2019-2022 (USD MILLION)	140
TABLE 90	UK: HEAD-UP DISPLAY MARKET, BY APPLICATION, 2023-2028 (USD MILLION)	140
10.3.3	FRANCE	140
10.3.3.1	Production of luxury vehicles in France to lead to market expansion	140
TABLE 91	FRANCE: HEAD-UP DISPLAY MARKET, BY APPLICATION, 2019-2022 (USD MILLION)	141
TABLE 92	FRANCE: HEAD-UP DISPLAY MARKET, BY APPLICATION, 2023-2028 (USD MILLION)	141
10.3.4	REST OF EUROPE	141
TABLE 93	REST OF EUROPE: HEAD-UP DISPLAY MARKET, BY APPLICATION, 2019-2022 (USD MILLION)	141
TABLE 94	REST OF EUROPE: HEAD-UP DISPLAY MARKET, BY APPLICATION, 2023-2028 (USD MILLION)	142
10.3.5	RECESSION IMPACT ON HEAD-UP DISPLAY MARKET IN EUROPE	142
10.4	ASIA PACIFIC	142
FIGURE 57	SNAPSHOT: ASIA PACIFIC HEAD-UP DISPLAY MARKET	143
TABLE 95	ASIA PACIFIC: HEAD-UP DISPLAY MARKET, BY COUNTRY, 2019-2022 (USD MILLION)	144
TABLE 96	ASIA PACIFIC: HEAD-UP DISPLAY MARKET, BY COUNTRY, 2023-2028 (USD MILLION)	144
TABLE 97	ASIA PACIFIC: HEAD-UP DISPLAY MARKET, BY APPLICATION, 2019-2022 (USD MILLION)	144
TABLE 98	ASIA PACIFIC: HEAD-UP DISPLAY MARKET, BY APPLICATION, 2023-2028 (USD MILLION)	145
TABLE 99	ASIA PACIFIC: HEAD-UP DISPLAY MARKET FOR AVIATION, BY COUNTRY, 2019-2022 (USD MILLION)	145
TABLE 100	ASIA PACIFIC: HEAD-UP DISPLAY MARKET FOR AVIATION, BY COUNTRY, 2023-2028 (USD MILLION)	145
TABLE 101	ASIA PACIFIC: HEAD-UP DISPLAY MARKET FOR AUTOMOTIVE, BY COUNTRY, 2019-2022 (USD MILLION)	146
TABLE 102	ASIA PACIFIC: HEAD-UP DISPLAY MARKET FOR AUTOMOTIVE, BY COUNTRY, 2023-2028 (USD MILLION)	146
10.4.1	CHINA	146
10.4.1.1	Market growth to be driven by rising vehicle production in China	146
TABLE 103	CHINA: HEAD-UP DISPLAY MARKET, BY APPLICATION, 2019-2022 (USD MILLION)	146
TABLE 104	CHINA: HEAD-UP DISPLAY MARKET, BY APPLICATION, 2023-2028 (USD MILLION)	147
10.4.2	JAPAN	147
10.4.2.1	Continuous mass production of automotive components in Japan to drive down the prices of head-up displays	147
TABLE 105	JAPAN: HEAD-UP DISPLAY MARKET, BY APPLICATION, 2019-2022 (USD MILLION)	147
TABLE 106	JAPAN: HEAD-UP DISPLAY MARKET, BY APPLICATION, 2023-2028 (USD MILLION)	148
10.4.3	SOUTH KOREA	148
10.4.3.1	Rising demand for semi-autonomous and autonomous vehicle technologies in South Korea to drive market expansion	148
TABLE 107	SOUTH KOREA: HEAD-UP DISPLAY MARKET, BY APPLICATION, 2019-2022 (USD MILLION)	148
TABLE 108	SOUTH KOREA: HEAD-UP DISPLAY MARKET, BY APPLICATION, 2023-2028 (USD MILLION)	148
10.4.4	AUSTRALIA	149
10.4.4.1	Rinsing awareness of head-up displays to lead to market growth in Australia	149
TABLE 109	AUSTRALIA: HEAD-UP DISPLAY MARKET, BY APPLICATION, 2019-2022 (USD MILLION)	149
TABLE 110	AUSTRALIA: HEAD-UP DISPLAY MARKET, BY APPLICATION, 2023-2028 (USD MILLION)	149
10.4.5	REST OF ASIA PACIFIC	149
TABLE 111	REST OF ASIA PACIFIC: HEAD-UP DISPLAY MARKET, BY APPLICATION, 2019-2022 (USD MILLION)	150
TABLE 112	REST OF ASIA PACIFIC: HEAD-UP DISPLAY MARKET, BY APPLICATION, 2023-2028 (USD MILLION)	150
10.4.6	RECESSION IMPACT ON HEAD-UP DISPLAY MARKET IN ASIA PACIFIC	150
10.5	REST OF THE WORLD (ROW)	151
FIGURE 58	REST OF THE WORLD: HEAD-UP DISPLAY MARKET, BY REGION	151
TABLE 113	ROW: HEAD-UP DISPLAY MARKET, BY REGION, 2019-2022 (USD MILLION)	151
TABLE 114	ROW: HEAD-UP DISPLAY MARKET, BY REGION, 2023-2028 (USD MILLION)	151

TABLE 115 ROW: HEAD-UP DISPLAY MARKET, BY APPLICATION, 2019-2022 (USD MILLION) 151
TABLE 116 ROW: HEAD-UP DISPLAY MARKET, BY APPLICATION, 2023-2028 (USD MILLION) 152
TABLE 117 ROW: HEAD-UP DISPLAY MARKET FOR AVIATION, BY REGION, 2019-2022 (USD MILLION) 152
TABLE 118 ROW: HEAD-UP DISPLAY MARKET FOR AVIATION, BY REGION, 2023-2028 (USD MILLION) 152
TABLE 119 ROW: HEAD-UP DISPLAY MARKET FOR AUTOMOTIVE, BY REGION, 2019-2022 (USD MILLION) 152
TABLE 120 ROW: HEAD-UP DISPLAY MARKET FOR AUTOMOTIVE, BY REGION, 2023-2028 (USD MILLION) 152
10.5.1 MIDDLE EAST & AFRICA 153
10.5.1.1 Rising demand for helicopters equipped with head-up displays and growing income levels among populace to drive market expansion in Middle East & Africa 153
10.5.2 SOUTH AMERICA 153
10.5.2.1 Increasing presence of automotive assembly facilities to fuel market growth in South America 153
10.5.3 RECESSION IMPACT ON HEAD-UP DISPLAY MARKET IN ROW 153
11 COMPETITIVE LANDSCAPE 154
11.1 OVERVIEW 154
FIGURE 59 KEY STRATEGIES UNDERTAKEN BY LEADING PLAYERS IN HEAD-UP DISPLAY MARKET FROM 2021 TO 2023 154
11.2 MARKET SHARE AND RANKING ANALYSIS 155
TABLE 121 HEAD-UP DISPLAY MARKET: INTENSITY OF COMPETITIVE RIVALRY 155
FIGURE 60 MARKET SHARE OF TOP FIVE PLAYERS OFFERING HEAD-UP DISPLAYS 155
11.3 FIVE-YEAR COMPANY REVENUE ANALYSIS 157
FIGURE 61 FIVE-YEAR REVENUE ANALYSIS OF KEY COMPANIES 158
11.4 COMPANY EVALUATION MATRIX, 2022 158
FIGURE 62 HEAD-UP DISPLAY MARKET (GLOBAL): COMPANY EVALUATION MATRIX, 2022 158
11.4.1 STARS 159
11.4.2 EMERGING LEADERS 159
11.4.3 PERVASIVE PLAYERS 159
11.4.4 PARTICIPANTS 159
11.5 COMPETITIVE BENCHMARKING 159
TABLE 122 COMPANY FOOTPRINT 159
TABLE 123 APPLICATION FOOTPRINT 160
TABLE 124 REGIONAL FOOTPRINT 161
11.6 STARTUP/SME EVALUATION MATRIX, 2022 161
FIGURE 63 HEAD-UP DISPLAY MARKET: STARTUP/SME EVALUATION MATRIX, 2022 162
11.6.1 PROGRESSIVE COMPANIES 162
11.6.2 RESPONSIVE COMPANIES 162
11.6.3 DYNAMIC COMPANIES 162
11.6.4 STARTING BLOCKS 163
TABLE 125 HEAD-UP DISPLAY MARKET: DETAILED LIST OF KEY STARTUPS/SMES 163
TABLE 126 HEAD-UP DISPLAY MARKET: COMPETITIVE BENCHMARKING OF KEY STARTUP/SMES APPLICATION 163
11.7 COMPETITIVE SCENARIO 164
TABLE 127 PRODUCT LAUNCHES 164
11.7.1 DEALS 165
TABLE 128 DEALS, 2022-2023 165
12 COMPANY PROFILES 166
12.1 INTRODUCTION 166
12.2 KEY PLAYERS 166
(Business overview, Products/Solutions/Services offered, Recent developments, Deals, MnM view, Key strengths, Strategic choices, and Weaknesses and Competitive threats)*

12.2.1 NIPPON SEIKI CO., LTD. 166
TABLE 129 NIPPON SEIKI CO., LTD.: COMPANY OVERVIEW 166
FIGURE 64 NIPPON SEIKI CO., LTD.: COMPANY SNAPSHOT 167
TABLE 130 NIPPON SEIKI CO., LTD.: PRODUCTS/SOLUTIONS/SERVICES OFFERED 167
TABLE 131 NIPPON SEIKI CO., LTD.: PRODUCT LAUNCHES/DEVELOPMENTS 168
TABLE 132 NIPPON SEIKI CO., LTD.: DEALS 168
TABLE 133 NIPPON SEIKI CO., LTD.: OTHERS 169
12.2.2 CONTINENTAL AG 170
TABLE 134 CONTINENTAL AG: COMPANY OVERVIEW 170
FIGURE 65 CONTINENTAL AG: COMPANY SNAPSHOT 171
TABLE 135 CONTINENTAL AG: PRODUCTS/SOLUTIONS/SERVICES OFFERED 171
TABLE 136 CONTINENTAL AG: PRODUCT LAUNCHES/DEVELOPMENTS 172
TABLE 137 CONTINENTAL AG: DEALS 172
12.2.3 DENSO CORPORATION 174
TABLE 138 DENSO CORPORATION: COMPANY OVERVIEW 174
FIGURE 66 DENSO CORPORATION: COMPANY SNAPSHOT 174
TABLE 139 DENSO CORPORATION: PRODUCTS/SOLUTIONS/SERVICES OFFERED 175
TABLE 140 DENSO CORPORATION: PRODUCT LAUNCHES/DEVELOPMENTS 175
TABLE 141 DENSO CORPORATION: DEALS 175
12.2.4 ROBERT BOSCH GMBH 177
TABLE 142 ROBERT BOSCH GMBH: COMPANY OVERVIEW 177
FIGURE 67 ROBERT BOSCH GMBH: COMPANY SNAPSHOT 178
TABLE 143 ROBERT BOSCH GMBH: PRODUCTS/SOLUTIONS/SERVICES OFFERED 178
TABLE 144 ROBERT BOSCH GMBH: PRODUCT LAUNCHES/DEVELOPMENTS 179
TABLE 145 ROBERT BOSCH GMBH: DEALS 179
12.2.5 VISTEON CORPORATION 181
TABLE 146 VISTEON CORPORATION: COMPANY OVERVIEW 181
FIGURE 68 VISTEON CORPORATION: COMPANY SNAPSHOT 182
TABLE 147 VISTEON CORPORATION: PRODUCTS/SOLUTIONS/SERVICES OFFERED 182
TABLE 148 VISTEON CORPORATION: PRODUCT LAUNCHES/DEVELOPMENTS 182
TABLE 149 VISTEON CORPORATION: DEALS 183
12.2.6 BAE SYSTEMS 185
TABLE 150 BAE SYSTEMS: COMPANY OVERVIEW 185
FIGURE 69 BAE SYSTEMS: COMPANY SNAPSHOT 186
TABLE 151 BAE SYSTEMS: PRODUCTS/SOLUTIONS/SERVICES OFFERED 186
TABLE 152 BAE SYSTEMS: PRODUCT LAUNCHES/DEVELOPMENTS 187
12.2.7 YAZAKI CORPORATION 188
TABLE 153 YAZAKI CORPORATION: COMPANY OVERVIEW 188
FIGURE 70 YAZAKI CORPORATION: COMPANY SNAPSHOT 188
TABLE 154 YAZAKI CORPORATION: PRODUCTS/SOLUTIONS/SERVICES OFFERED 189
12.2.8 PIONEER CORPORATION 190
TABLE 155 PIONEER CORPORATION: COMPANY OVERVIEW 190
TABLE 156 PIONEER CORPORATION: PRODUCTS/SOLUTIONS/SERVICES OFFERED 190
TABLE 157 PIONEER CORPORATION: DEALS 191
12.2.9 PANASONIC HOLDINGS CORPORATION 192
TABLE 158 PANASONIC HOLDINGS CORPORATION: COMPANY OVERVIEW 192
FIGURE 71 PANASONIC HOLDINGS CORPORATION: COMPANY SNAPSHOT 193

TABLE 159 PANASONIC HOLDINGS CORPORATION: PRODUCTS/SOLUTIONS/SERVICES OFFERED 193
TABLE 160 PANASONIC HOLDINGS CORPORATION: PRODUCT LAUNCHES/DEVELOPMENTS 194
TABLE 161 PANASONIC HOLDINGS CORPORATION: DEALS 195
12.2.10 GARMIN LTD. 196
TABLE 162 GARMIN LTD.: COMPANY OVERVIEW 196
FIGURE 72 GARMIN LTD.: COMPANY SNAPSHOT 197
TABLE 163 GARMIN LTD.: PRODUCTS/SOLUTIONS/SERVICES OFFERED 197
12.3 OTHER KEY PLAYERS 198
12.3.1 THALES 198
12.3.2 E-LEAD ELECTRONIC CO. LTD 199
12.3.3 HONEYWELL INTERNATIONAL INC. 200
12.3.4 MICROVISION 201
12.3.5 COLLINS AEROSPACE 202
12.3.6 RENESAS ELECTRONICS CORPORATION 202
12.3.7 STMICROELECTRONICS 203
12.3.8 ALPS ALPINE CO., LTD. 204
12.3.9 ELBIT SYSTEMS LTD. 205
12.3.10 SAAB AB 206
12.3.11 VUZIX 207
12.3.12 FORYOU CORPORATION 208
12.3.13 HARMAN INTERNATIONAL. 209
12.3.14 HUDWAY, LLC 210
12.3.15 WAYRAY AG 210
12.3.16 ENVISICS 211
12.3.17 TEXAS INSTRUMENTS INCORPORATED 212
*Details on Business overview, Products/Solutions/Services offered, Recent developments, Deals, MnM view, Key strengths, Strategic choices, and Weaknesses and Competitive threats might not be captured in case of unlisted companies.
13 APPENDIX 213
13.1 INSIGHTS FROM INDUSTRY EXPERTS 213
13.2 DISCUSSION GUIDE 213
13.3 KNOWLEDGESTORE: MARKETSANDMARKETS' SUBSCRIPTION PORTAL 216
13.4 CUSTOMIZATION OPTIONS 218
13.5 RELATED REPORTS 218
13.6 AUTHOR DETAILS 219

SCOTTS INTERNATIONAL

Head-Up Display Market by Type (Conventional Head-Up Displays, AR-Based Head-Up Displays), Component (Video Generators, Projectors/ Projection Units, Display Units), Technology (CRT-based HUD, Digital HUD), Application & Region- Global Forecast to 2028

Market Report | 2023-11-17 | 212 pages | MarketsandMarkets

To place an Order with Scotts International:
- - Print this form
- - Complete the relevant blank fields and sign
- - Send as a scanned email to support@scotts-international.com

ORDER FORM:

Select license	License	Price
	Single User	$4950.00
	Multi User	$6650.00
	Corporate License	$8150.00
	Enterprise Site License	$10000.00
	VAT	
	Total	

*Please circle the relevant license option. For any questions please contact support@scotts-international.com or 0048 603 394 346.

** VAT will be added at 23% for Polish based companies, individuals and EU based companies who are unable to provide a valid EU Vat Numbers.

Email*		Phone*	
First Name*		Last Name*	
Job title*			
Company Name*		EU Vat / Tax ID / NIP number*	
Address*		City*	

Zip Code*		Country*	
		Date	2025-05-20
		Signature	