Market Research Report **published on July, 2010**

The 3D new wave and the future image

～ Trend of 3D autostereoscopic display and Its future image ～

Fujiwara-Rothchild, Ltd.

Y's Bldg. 3F, 3-6-15 Kanda-Jimbocho, Chiyoda-ku, Tokyo 101-0051 JAPAN

Phone : 03-3239-3008
F A X : 03-3239-8081
E-mail: info@fujiroth.com

Y's Bldg. 3F, 3-6-15 Kanda-Jimbocho, Chiyoda-ku, Tokyo 101-0051 JAPAN
Phone：81-3-3239-3008 Fax：81-3-3239-8081 Email：info@fujiroth.com

INDEX

1. Preface 7
2. Exective Summary 9
3. 3D back groung 12
3.1. 3D History 12
3.2. Trend of Film industry 13
3.2.1. Movie business 13
3.2.2. Active demand of recent Hollywood 3D movie 15
3.2.3. 3D Movie bussiness 16
3.2.4. Increase of 3D screens and 3D titles 16
3.2.5. Expansion of Consumer 3DTV 20
4. 3D Application and the 3D display aptitude 26
4.1. 3D autostereoscopic method and its picture quality 29
4.2. 3D Consumer application and the display aptitude 32
4.2.1. 3DTV in living room 32
4.2.2. 3D Display for PC 38
4.3. 3D Mobile application and the display aptitude 47
4.4. 3D Professional application and the display aptitude 50
5. Autostereoscopic technologies 53
5.1. Theory of autostereoscopic display 54
5.1.1. Parallax barrier (Visumotion, Newsight, 4D-Vision, TRIDELITY, SANYO)55
5.1.2. Lenticular (Philips, Zero Creative, Alisoscopy, Magnetic 3D) 58
5.2. Active Parallax barrier （SHARP, HITACHI Displays） 61
5.3. Scan back-light（MITSUBISHI、3M） 62
5.4. DFD(Depth-Fused 3D Display) method 65
5.4.1. HITACH Displays, NTT Cyber Space Laboratories 65
5.4.2. Puredepth 67
5.5. Integral 68
5.5.1. Integral Videography（HITACHI） 68
5.5.2. Integral Imaging （TOSHIBA、TMD） 70
5.5.3. Integral photography （NHK） 71
5.6. Time division + space division 73
5.6.1. 1D-II Display (TMD) 73
5.6.2. Time Sequential Autostereoscopic 3DOCBDisplay （TMD) 74
5.7. Resolution improvement technologies 75
5.7.1. EPSON／Sony Mobile Display 75
5.7.2. HDDP (NEC LCD Technologies) 77
5.8. Special 3D autostereoscopic display 78
5.8.1. PIONEER Floating Vision 78
5.8.2. 3D-HOLO （ProVision) 79

Y's Bldg. 3F, 3-6-15 Kanda-Jimbocho, Chiyoda-ku, Tokyo 101-0051 JAPAN
Phone：81-3-3239-3008 Fax：81-3-3239-8081 Email：info@fujiroth.com

5.9. Holography 81
5.9.1. SeeReal 81
5.9.2. HoloVizio (HOLOGRAFIKA) 83
5.10. 360° 表示方式 84
5.10.1. 日立製作所 360 度立体ディスプレイ 84
5.10.2. SONY 360 degree3-dimensional display 85
5.10.3. g Cubik（NICT） 86
6. Problems to be solved and the improvement 89
6.1. Overall of the problems 89
6.2. View area (Optimum viewing area) 92
6.3. View jump/inverse view 94
6.4. 2D Compatibility 96
6.5. Motion parallax 97
7. 3D Consumer application and its Market forecast 98
7.1. Expansion to consumer 3DTV 100
7.2. 3D Photo frame 101
7.3. Mobile application 104
7.3.1. 3DDigital Still Camera 105
7.3.2. Mobile phone 111
7.3.3. 3D Digital Video Camera 114
7.3.4. 3D Game 115
7.4. Digital Signage 117
7.4.1. The market of digital signage 117
7.4.2. Problems as 3Ddigital signage display 118
7.4.3. Examplaes of 3Ddigital signage 119
7.4.4. 3Ddigital signage trend and the future 119
7.5. Others 120
7.6. Professional market 123
8. Postface 124

Figures

Fig 1-1 Major elements for the 3D growth 8
Fig 2-1 Autostereoscopic requirements and allowable characteristics corresponding to each application 10
Fig 2-2 Forecast of small size autostereoscopic panel for Consumer products 11
Fig 3-1 3D History 13
Fig 3-2 Influence of 3D Movie spread 14
Fig 3-3 The highest-grossung 3D movies (1980~) 15
Fig 3-4 3D screen number forecast 17
Fig 3-5 3D movies released 2007-2009 18
Fig 3-6 3D movies released in 2010 & to be released in 2010 19
Fig 3-7 3D movies to be released 2011～ 19

Y's Bldg. 3F, 3-6-15 Kanda-Jimbocho, Chiyoda-ku, Tokyo 101-0051 JAPAN
Phone：81-3-3239-3008 Fax：81-3-3239-8081 Email：info@fujiroth.com

Fig 3-8 Present situation of consumer 3D market 20
Fig 3-9 Full-HD and Half-HD 21
Fig 3-10 TV resolution type 22
Fig 3-11 Multi-format 3DTV and 3D format 22
Fig 3-12 3D ready TV forecast 23
Fig 3-13 Trend of 3D-ready TV in detail 25
Fig 3-14 3D BD Player trend 25
Fig 4-1 3D application and Display type 26
Fig 4-2 3D Autostereoscopic application 27
Fig 4-3 Picture quality dependence on 3D technologies 29
Fig 4-4 Application/Problems/Business of Autostereoscopic 30
Fig 4-5 Major elements for the success of consumer 3D 33
Fig 4-6 Requirements for Consumer 3DTV (for Living room) 34
Fig 4-7 Integrated 3D TV system 36
Fig 4-8 3D PCs with glasses 39
Fig 4-9 Requirements for Consumer 3D PC Display 45
Fig 4-10 3D Consumer Mobile Applications 47
Fig 4-11 Requirements for Mobile small Display 48
Fig 4-12 China 3DInllife： 3D-Camera 49
Fig 4-13 3D Professional Use 50
Fig 4-14 Requirements for Digital Signage / Arcade Game machine 51
Fig 5-1 3D display classification 53
Fig 5-2 Japan proposal to ISO regarding autostereoscopic display 54
Fig 5-3 Parallax barrier method 56
Fig 5-4 Step barrier method 56
Fig 5-5 parallax barrier 3D display products 57
Fig 5-6 TRIDELITY Display Solutions GMBH 57
Fig 5-7 Lenticular method 58
Fig 5-8 Zero creative Xyz 3D display 59
Fig 5-9 Lenticular display (ALISOSCOPY, Magnetic 3D Displays) 59
Fig 5-10 Philips lenticular 3D Display 60
Fig 5-11 Active parallax barrier (SHARP) 61
Fig 5-12 HITACHI Displays (3D autostereoscopic display for mobile) 62
Fig 5-13 Scan back-light 63
Fig 5-14 3M 3D Film 64
Fig 5-15 DFD Display 66
Fig 5-16 Structure of compact DFD Display 66
Fig 5-17 PureDepth Multi-Layer Display technology 67
Fig 5-18 Integral Videography（Hitachi) 69
Fig 5-19 Integral Imaging (Toshiba) 70
Fig 5-20 Integral Photography (NHK) 72
Fig 5-21 TMD 1DII Time-multiplexed 3D display 73

Y's Bldg. 3F, 3-6-15 Kanda-Jimbocho, Chiyoda-ku, Tokyo 101-0051 JAPAN
Phone：81-3-3239-3008 Fax：81-3-3239-8081 Email：info@fujiroth.com

Fig 5-22 Time sequential 3D-OCB Display 74
Fig 5-23 Step barrier method 76
Fig 5-24 SEIKO EPSON 76
Fig 5-25 HDCP pixel layout（NEC press release） 78
Fig 5-26 PIONEER Floating Vision 79
Fig 5-27 Provision (3D-HOLO) 80
Fig 5-28 Holographic Display (SeeReal) 82
Fig 5-29 Holovizio（HOLOGRAFIKA) 84
Fig 5-30 Holography 85
Fig 5-31 SONY: 360 degree-viewable 3D Display 86
Fig 5-32 360deree 3-dimensional Display system 87
Fig 6-1 Picture quality dependence on 3D display technologies 90
Fig 6-2 Present application dependence on 3D properties 91
Fig 6-3 3 major problems of Autostereoscopic 91
Fig 6-4 Example of viewing are (distance, angle) 92
Fig 6-5 Improvement technologies of Optimum viewing area 93
Fig 6-6 Viewing position of an autostereoscopic display 94
Fig 6-7 Improving technologies of View jump/reverse view 95
Fig 6-8 Improving technologies of 2D Compatibility 96
Fig 7-1 Minimum Requirement for any application 98
Fig 7-2 Autostereoscopic aptitude correspond to each application 99
Fig 7-3 Autostereoscopic aptitude correspond to each application in future (2020~) 99
Fig 7-4 Necessity of motion parallax from contents side 101
Fig 7-5 3D Photo frame Forecast 103
Fig 7-6 3D Consumer application 104
Fig 7-7 3D Digital camera Business model 106
Fig 7-8 FUJIFILM FinePix Real 3D System 106
Fig 7-9 Trend of Digital Compact Still Camera Share 108
Fig 7-10 3D Digital still camera Market forecast 110
Fig 7-11 Samsung 3Dmobile phone 「SCH-B710」 112
Fig 7-12 3D Mobile Phone Forecast 113
Fig 7-13 Panasonic 3DVideo Camera 114
Fig 7-14 NINTENDO 3DS 115
Fig 7-15 NINTENDO DS, 3DS Forecast 116
Fig 7-16 3D Digital Signage Display Forecast 117
Fig 7-17 3D-TV example in Carrefour（resource: NewSight Japan） 119
Fig 7-18 Trend of Pachinko with LCD display 121
Fig 7-19 Autostereoscopic 3D LCD for Pachinko 122
Fig 7-20 Trend of LCD size for Pachinko 122
Fig 7-21 3D application and display type 123
Fig 8-1 Small size autostereoscopic panel demand for Consumer products 124

Y's Bldg. 3F, 3-6-15 Kanda-Jimbocho, Chiyoda-ku, Tokyo 101-0051 JAPAN
Phone：81-3-3239-3008 Fax：81-3-3239-8081 Email：info@fujiroth.com

Table 4-1 Aptitude for Consumer 3DTV of Autostereoscopic Display 37
Table 4-2 3D PC list 38
Table 4-3 NEC 40
Table 4-4 FUJITSU 41
Table 4-5 TOSHIBA 42
Table 4-6 ASUS 43
Table 4-7 ACER 44
Table 4-8 Aptitude for Consumer 3D PC of Autostereoscopic Display 46
Table 4-9 Aptitude for mobile of Autostereoscopic Display 49
Table 4-10 Aptitude for Consumer 3D PC of Autostereoscopic Display (Tentative) 51
Table 5-1 Autostereoscopic company list 88
Table 6-1 Necessary pixels of each display method 95
Table 7-1 3D photo frame products 102

Y's Bldg. 3F, 3-6-15 Kanda-Jimbocho, Chiyoda-ku, Tokyo 101-0051 JAPAN
Phone:81-3-3239-3008 Fax:81-3-3239-8081 Email:info@fujiroth.com