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Digital video interface – Gigabit video interface for multimedia systems

Interface vidéo numérique – Interface vidéo gigabit pour les systèmes multimédias

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GIGABIT VIDEO INTERFACE FOR MULTIMEDIA SYSTEMS****FOREWORD**

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JEITA CP-6101B served as a basis for the elaboration of this document.

This second edition cancels and replaces the first edition published in 2015. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) Addition of a new technology interface, GVIF2.

The text of this International Standard is based on the following documents:

Draft	Report on voting
100/3912/CDV	100/4040/RVC

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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INTRODUCTION

This International Standard is based on JEITA CP-6101B: *Digital monitor interface GVIF*, which was originally specified by the Japan Electronics and Information Technology Industries Association (JEITA).

The Gigabit Video InterFace (GVIF) is a serial point-to-point interface supporting uncompressed digital video links that was designed to address the needs of automotive navigation and entertainment systems, etc., to transport baseband digital video information. GVIF applies low-voltage differential signalling (LVDS) technology and makes use of a thin cable consisting of a single shielded twisted pair of conductors that exhibits high noise immunity and low EMI, and is optimized for small size and low weight. GVIF supports display resolutions ranging from WQVGA through WUXGA with a maximum of 24 bits per pixel colour video data, and can transmit a baseband video signal over cable lengths over 10 m. Optionally, GVIF supports audio data transmission and user data transmission.

Gigabit Video InterFace 2 (GVIF2) is a baseband transmission method for digital video information that applies serial data transmission technology. In the downstream transmission from GVIF2 TX to GVIF2 RX, the high-bandwidth data for video information (GHDS) and the device control signal (GLDS) are transmitted by using the time-division multiplexing method. In the upstream transmission from GVIF2 RX to GVIF2 TX, the control signal GLUS is transmitted. The upstream transmission and downstream transmission occur in full duplex. Optionally, GVIF2 also supports audio data transmission and user data transmission.

Also optionally, when paired with high-bandwidth digital content protection (HDCP), the GVIF's standard functions and features address all of the requirements for delivering content-protected video from a source to a video display monitor.

This document describes the GVIF family that consists of GVIF2 in the main body and Annex A, and GVIF in Annex B and Annex C.

GVIF2 has the following features: [IEC 62889:2024](https://standards.iteh.ai/catalog/standards/iec/901e3018-e094-407b-af8b-411dc1d6cca1/iec-62889-2024)

- transmission by a differential shielded twisted-pair cable or coaxial cable,
- to enable multiple video and audio content transmission using time-division multiplexing,
- possibility to use audio transmission, bi-direction user communication, and HDCP (high-bandwidth digital content protection) technology (optional),
- availability for daisy chain transmission (optional).

The Association of Radio Industries and Businesses (ARIB) refers to GVIF and GVIF2 in its standard ARIB STD-B21 as being authorized digital video output interfaces.

DIGITAL VIDEO INTERFACE – GIGABIT VIDEO INTERFACE FOR MULTIMEDIA SYSTEMS

1 Scope

This document describes two serial digital interfaces, Gigabit Video InterFace (GVIF) and Gigabit Video InterFace2 (GVIF2), for the interconnection of digital video equipment. GVIF and GVIF2 are primarily intended to carry high-speed digital video data for general usage and are well suited for multimedia entertainment systems in a vehicle.

This document specifies the physical layer of the interface, including transmission line characteristics and electrical characteristics of transmitters and receivers. Mechanical and physical specifications of connectors are not included.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ITU-R BT.601-5, *Studio encoding parameters of digital television for standard 4:3 and wide-screen 16:9 aspect ratios*

ITU-R BT.656-5, *Interface for digital component video signals in 525-line and 625-line television systems operating at the 4:2:2 level of Recommendation ITU-R BT.601*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1.1

DE

display enable signal given in IEC 62315-1

3.1.2

HSYNC

display horizontal synchronous signal given in IEC 62315-1

3.1.3

VSYNC

display vertical synchronous signal given in IEC 62315-1

3.1.4**RGB**

display red, green, blue colour data input (TX) or output (RX) given in ITU-R BT.601-5 and ITU-R BT.656-5

3.1.5**CNTL/AUX**

downstream user-defined signal or audio enable signal

3.1.6**P[23:0]**

digital signal data such as 24-bit colour video data, for example RGB data input (TX) or output (RX)

3.1.7**GHDS**

GVIF2 High bandwidth DownStream

high-bandwidth downstream content data of the GVIF2 format

3.1.8**GLDS**

GVIF2 Low bandwidth DownStream

low-bandwidth downstream control signal data of the GVIF2 format

3.1.9**GLUS**

GVIF2 Low bandwidth UpStream

low-bandwidth upstream control signal data of the GVIF2 format

3.1.10**GVIF RX**

circuit that receives the serial signal from a shielded-pair transmission line, decodes it and converts it into a parallel video signal

3.1.11**GVIF TX**

circuit that receives the parallel video signal and the control signals, and encodes them into serial data to send a signal by driving a shielded-pair transmission line

3.1.12**GVIF2 RX**

circuit that receives the serial signal from a shielded twisted-pair cable or coaxial cable, decodes it and converts it into video and audio/control signals

3.1.13**GVIF2 TX**

circuit that receives the video and audio/control signals, encodes them into serial data and sends a signal by driving a shielded twisted-pair cable or coaxial cable

3.1.14**LOS**

loss of signal detection, asserted when the differential input signal at the receiver cannot be received

3.1.15**RX front-end**

front-end block of receiver side

3.1.16

SDA

serial data down-stream signal

3.1.17

SDATA

GVIF2 serial data signal on coaxial cable transmission

3.1.18

SDATAP

down-stream positive-phase side signal of the differential serial data

3.1.19

SDATAN

down-stream negative-phase side signal of the differential serial data

3.1.20

REF

reference signal

3.1.21

REFRQP

current source positive signal for reference clock request from RX side

3.1.22

REFRQN

current source negative signal for reference clock request from RX side

3.1.23

SFTCLK

pixel clock for capture of the parallel video data per pixel

3.1.24

TDA

transmit data down-stream user-defined signal

3.1.25

TX front-end

front-end block of transmitter side

3.1.26

UDA

up-stream user defined ancillary data signal

3.1.27

IRQ

up-stream common-mode reference request current for REFRQP/N

3.1.28

VOS

common-mode voltage amplitude of reference request

3.1.29

VOD

differential voltage amplitude for SDATAP/N

3.1.30**VDD**

power supply on the transmitter side

3.1.31**V_SDATAP**

single-ended voltage of SDATAP

3.1.32**V_SDATAN**

single-ended voltage of SDATAN

3.1.33**TP1**

test point of a downstream eye mask specification

3.1.34**TP2**

test point of an upstream eye mask specification

3.1.35**normalized differential voltage**

voltage of transmitter output point

3.1.36**UI**

normalized time unit interval of transmitter output point

3.1.37**WSYNC**

word synchronized signal

3.2 Abbreviated terms

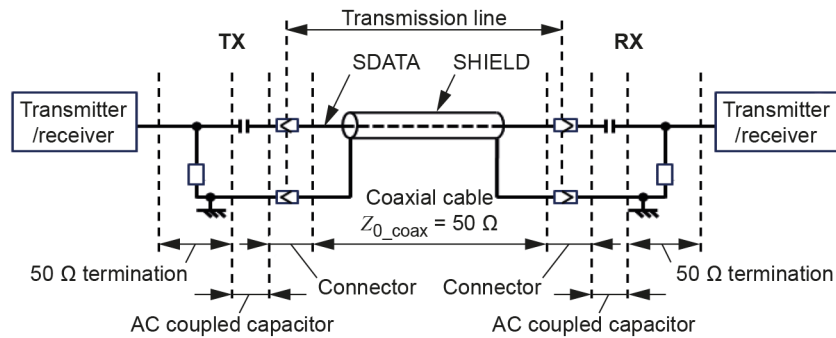
AC	alternating current
DC	direct current
EMI	electro-magnetic interference
GVIF	Gigabit Video InterFace
HDCP	high-bandwidth digital content protection
LSB	least significant bit
LVDS	low voltage differential signalling
MSB	most significant bit
PRBS	pseudo random binary sequence

4 Architecture

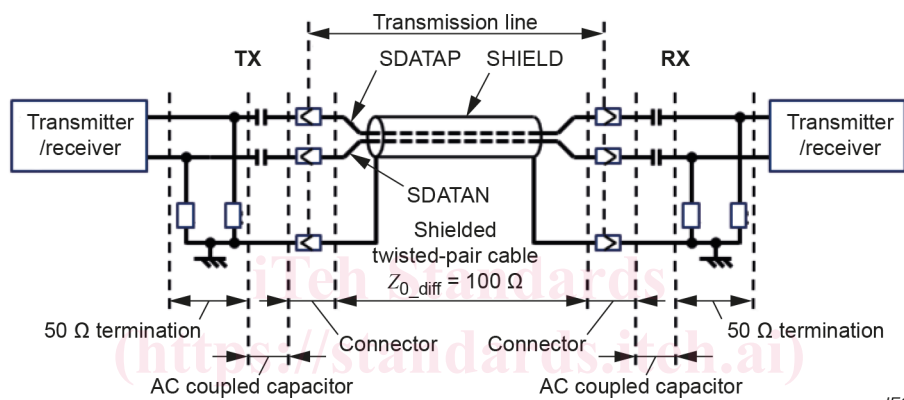
The GVIF2 has a higher capability multimedia interface and is considered as the next generation of GVIF, which is described in Annex B and Annex C.

The GVIF2 transmission line is a shielded twisted-pair cable with the differential characteristic impedance Z_{0_diff} or a coaxial cable with the characteristic impedance Z_{0_coax} , and is connected to GVIF2 RX and GVIF2 TX, with an AC coupling capacitor, and high-frequency terminated resistor (see Figure 1). The signal path of the transmission line of GVIF2 is DC isolated from both GVIF2 TX and GVIF2 RX. The shield of the transmission line of GVIF2 is connected to the GND of the TX circuit and of the RX circuit.

In the case of coaxial transmission line



In the case of shielded twisted-pair transmission line



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Figure 1 – Architecture of the GVIF2

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5 Electrical characteristics

5.1 General

AC specifications described in below shall be satisfied. GVIF2 does not specify DC specifications because the transmission architecture of GVIF2 is a complete AC coupling.

5.2 AC electrical specifications

The AC electrical specifications of the transmitter and receiver side are given in Table 1. The definition of voltage levels are shown in Figure 2, and Figure 3 and Figure 4 show a downstream eye mask specification at TP1 and an upstream eye mask specification at TP2 for GVIF2.