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colour inside

Digital video interface – Gigabit video interface for multimedia systems

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CONTENTS

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DIGITAL VIDEO INTERFACE – GIGABIT VIDEO INTERFACE FOR MULTIMEDIA SYSTEMS

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IEC 62889 has been prepared by Technical Area 4: Digital system interfaces and protocols, of IEC Technical Committee 100: Audio, video and multimedia systems and equipment. It is an International Standard.

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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- withdrawn, or
- revised.

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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 ~~data~~ 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:

- 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 ~~a~~ 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.

~~IEC 62315-1:2003, *DTV profiles for uncompressed digital video interfaces – Part 1: General*~~

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**~~
~~**YU(Cb)V(Cr)**~~
~~display Y, U (Cb), V (Cr) pixel 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 ~~or YU (Cb) V (Cr)~~ 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 ~~outputs to convert~~ converts it into ~~the~~ 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 ~~signal~~, asserted when the differential input signal at the receiver cannot ~~receive~~ 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 ~~as well as REFRQP~~

3.1.23
SFTCLK
~~**pixel clock**~~
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
~~user data~~
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
~~transmitter end point for~~ 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

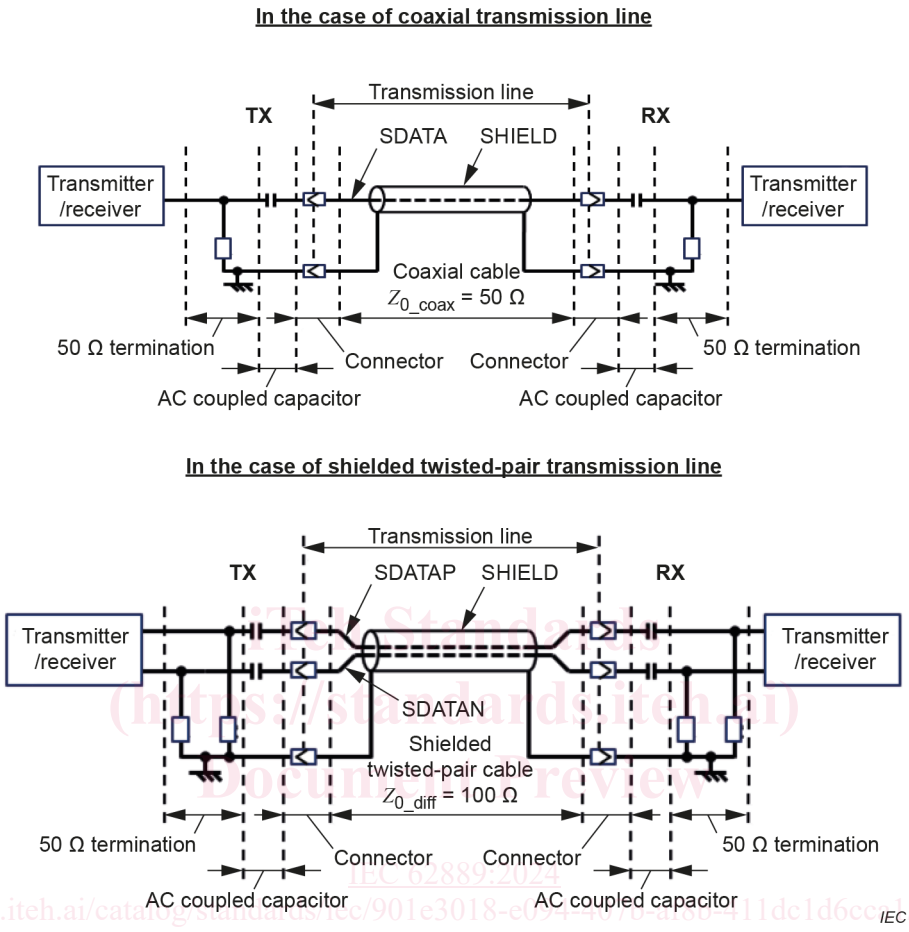
AC	alternating current
DC	direct current
EMI	electro-magnetic interference
GVIF	Gigabit Video InterFace
HDCP	high-bandwidth digital content protection
LSB	least significant bit
LVDS	low voltage differential signalling
MSB	most significant bit
PRBS	pseudo random binary sequence

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 Z0_diff or a coaxial cable with the characteristic impedance Z0_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.



Reproduced, with modifications, from JEITA CP-6101B, Figure 3-4, with permission from JEITA.

Figure 1 – Architecture of the GVIF2

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.