

The background features a decorative graphic consisting of three blue circles of varying sizes, each with a lighter blue ring around its center. These circles are arranged along a diagonal line that runs from the top-left towards the bottom-right. The circles are positioned in the upper right, middle, and lower right areas of the page.

WiFi DISPLAY

WMTC-159N

WiFi Display Production Description

Content

1 Introduction 3

 1.1 Wireless Display 3

 1.2 Outlook..... 4

2 Feature Overview 6

 2.1 Features 6

3 System Overview 8

 3.1 Streaming Mode..... 8

 3.2 WiFi Management..... 9

4 Detailed Functional Spec 10

 4.1 Performance 10

 4.2 Push Button Functions..... 10

 4.3 Configurability..... 10

 4.4 WFD..... 11

 4.5 Hardware Interfaces 12

 4.6 Power..... 13

 4.7 Supported Audio Standards..... 14

 4.8 Supported Video Standards 15

 4.9 Supported Image Standards 16

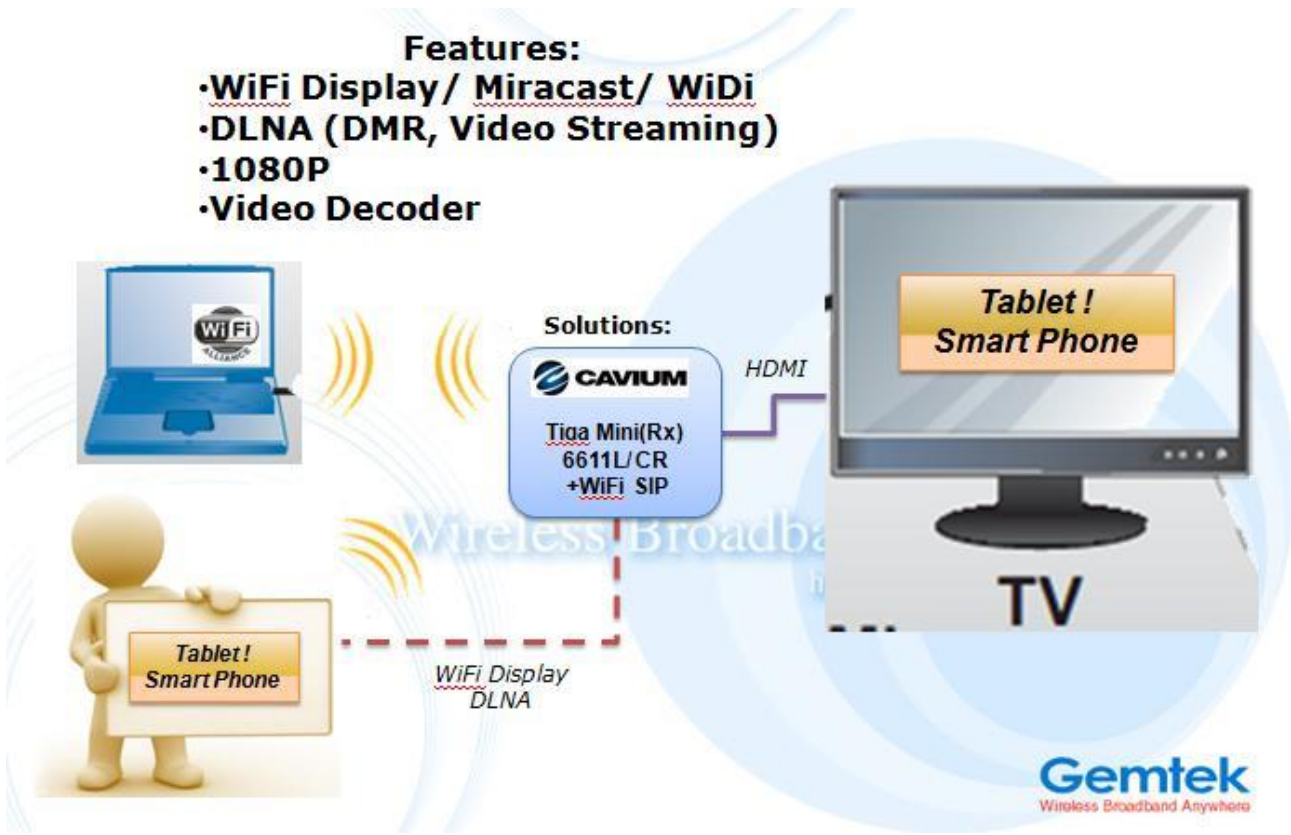
 4.10 Supported Video Resolution 17

 4.11 Supported Containers..... 18

1 Introduction

1.1 Wireless Display

Browsing, gaming, and video streaming from a smartphone, tablet, or notebook, wirelessly to a TV or video display



1.2 Outlook



I/O Ports of HDMI and Power via USB



Connect to TV/Monitor Device via HDMI



2 Feature Overview

2.1 Features

The following is a list of the Gemtek WiFi Display evaluation board features:

Communication protocols supported

- DLNA DMR (1.5 Certified)
- WFD Primary Sink

Video decoding

- H.264 CBP (WFD specific)
- MPEG4, MPEG1, MPEG2, H.264, AVS, VC-1, H.263, RV8/9/10, DIVX 3/4/5/6, XVID (DLNA specific)
- Resolution: up to 1080p 30fps

Audio

- Pass-through (pass-through modes are WFD, WiVu, WiDi and DLNA specific)
- MPEG1 layer1/2, MP1/MP2/MP3, AC3, AAC, AAC-LC, HE-AAC, Dolby Digital plus, DTS, FLAC, OGG Vorbis, WAV (PCM, ADPCM, A-law PCM), DVD PCM, WMA, WMA-PRO

Security

- HDCP 1.3 (wireless display specific)
- DTCP-IP (DLNA specific)

QoS

- Back-channel messages to 'known' Tx to reduce PER
- Error resilient (robust error detection and concealment)

Performance

- Throughput: 15Mbps (encoded video) at 30 feet

- Receiver latency (WiFi PHY to dongle output) < 40ms (30 fps), or <23 ms (60fps) with HW crypto with HDCP 2

User support

- GUI: splash screen and connection status display
- Upgrade over WiFi with fail-safe mechanism

Interfaces

- HDMI Tx 1.3 with CEC
- Tri-color LED (Blue, Red, Green)
- Multi-function reset button
- USB power input
- WiFi: dual band Selectable (2.4GHz/ 5GHz) 802.11n 1x1
- USB Host (Option)

Power Consumption

- Active state: <2.5W
- Power saving standby: <1W

Operating Temperature

- 0°C ~ 40°C

Mechanicals

- Dimensions: 81 x 81x 16 mm

3 System Overview

3.1 Streaming Mode

This mode uses DLNA (Digital Living Network Alliance) protocol: the Smart Phone (or any other device on the network) provides DMC, and optionally DMS functionality while the dongle acts as DMR. The smart phone typically does not transcode the content as long as it conforms to DLNA codec specification. Note that DLNA discovery and connection works over any IP network. DTCP/IP can be used for premium content.

Following network topologies can be supported by this mode.

Topology	Description
Access Point	Both Mobile device and the Dongle are connected to same Access Point
Direct Connection using Hotspot on the handset	Mobile device hosts an Access Point and the dongle is the client
Direct Connection using Wi-Fi Direct	Mobile device and the dongle form a WI-Fi Direct network

3.2 WiFi Management

Discoverability

- DLNA is discoverable over any IP (Layer-3) network
- WFD is discoverable by using Wi-Fi Display Discovery method at Layer 2 only

Wi-Fi pairing modes for WFD and DLNA

Protocol	Encoder Wi-Fi Mode	Decoder Wi-Fi Mode
WFD	P2P, GO or GC	P2P, GO or GC
DLNA	Station	Soft AP or Station

Wi-Fi Management

Feature	Detailed Functional Spec
Wi-Fi Discovery	L2 Discovery is supported via Scanning (as a STA) and Wi-Fi Direct/Display Discovery protocol support
WPS pairing	PBC and PIN
Dongle connects to mobile device via AP without WPS	This is supported by having a user configure the AP credentials through an 'admin' page hosted by dongle's HTTP server

4 Detailed Functional Spec

4.1 Performance

Feature	Detailed Functional Spec
Time from cold boot to splash screen	3 seconds (to HDMI output)
Time from splash screen to idle screen (ready for connection)	30 seconds
HDMI Video Output	Up to 1080p 30 fps
HDMI Audio	Pass through and Raw
Video display Latency through the dongle	< 33ms (30 fps)

4.2 Push Button Functions

Feature	Detailed Functional Spec
WPS Pairing support	The dongle is in Active state and if push-button is pressed for > 2 sec and < 10 sec, the dongle goes through WPS pairing process
Factory reset support	The dongle is in Active or Standby state and if push-button is pressed for >10 sec, the dongle goes through factory reset procedure. This will reset only user-configurable data as described in Persistent Components
Wake-up support	The dongle is in Standby state and push-button is pressed for <=10 sec, the dongle goes to Active state.

4.3 Configurability

Firmware Upgrading over Wi-Fi : Reference dongle software supports on-field firmware upgradability

- Uses HTTP server on the dongle to receive new firmware file. The file can be

uploaded from any connected device that has web-browser.

- Fail-safe upgrade procedure with ability to recover using factory-installed firmware
- Maximum time to perform upgrade over 20Mbps LAN connection: < 180 seconds
- Retains persistent connection settings across the upgrade

Support for HTTP server for:

- Firmware upgrade
- Ability to configure connectivity to a router that does not support WPS
- Ability to configure any other parameters such as resolution, friendly name, etc. as deemed necessary.

4.4 WFD

Basic Features

- Compatible with WFD specification version 1.38

Optional Features

- HDCP 2.1 (4.7)
- Explicit A/V Format Change (4.10.3.2)
- WFD Video Recovery (4.10.5)
- HIDC UIBC (4.11)
- Persistent WFD group (4.13)
- EDID (6.1.6)
- Connector Type (6.1.19)

Optional Resolutions

- All CEA progressive resolutions up to 1080p30, VESA/HH resolutions
- Optional Audio – 2ch AAC, AC3

4.5 Hardware Interfaces

IO interface

Standard Interfaces (exposed on the system enclosure)

- **HDMI 1.3** with Type A HDMI receptacle
- **USB power input** using Micro-USB type B receptacle that carries 5V DC input power to the board
- **Push button** switch allows the user to access functions such as pairing with another Wi-Fi device (an Access Point (AP) or a mobile device in P2P mode), wake from standby, system reset, and restoring factory defaults.
- **Tri LED** indicates up to seven states, represented by three colors, each constant or blinking, and off.
- **USB 2.0 host** port is an internal 4-pin header available (Option)

Wi-Fi: 1x1 Dual-band radio

Antenna

- PIFA Antenna

Flash memory

- Serial NOR Flash: Both 64 Mbit (8 Mbyte) NOR flash and 512 K-bit serial are supported by the Gemtek WiFi Display firmware. The NOR flash connects to the CPU via SPI. The CPU can be configured via strapping resistors to read a boot-loader from SPI NOR flash, then will continue execution by uncompressing an image from NAND flash.
- NAND Flash: A 1Gbit (128 Mbyte) parallel SLC NAND flash stores the Linux kernel and application code. Also stores the bootloader, and encrypted DTCP-IP and HDCP 2.1 keys.

DDR3 memory

- The 16-bit wide DDR3 interface can run up to 648 MHz for speeds approaching DDR3-1333. Gemtek WiFi Display features a 2Gb (256 Mbyte) DDR3 DRAM.

4.6 Power

Gemtek WiFi Display is powered by a 5V input on the micro USB type B receptacle. Power can be provided to the receptacle either by a USB host device (i.e. TV) or an external AC power adapter. Maximum current draw is 500mA, for a total power of 2.5W.

Power states, as described below.

State	Power	Description
No power	0W	No power is applied to the device
Active	2.3 W	Active use. Active streaming of video and display
Idle	1.0 W	Idle mode. No activity in source and display

4.7 Supported Audio Standards

Audio Decoder (For MM Video)	Max-Bitrate	Channel	Sample Frequency
wav: PCM /ADPCM / A-law PCM	1536kbps	2	48k
MPEG1 Layer1/2	448k(L1)/384k(L2)bps	2	48k
MP3 (MPEG1 Layer3)	320kbps	2	48k
MPEG2 AAC(AAC-LC)	all bit rate	5.1	96k
MPEG4 AAC-LC	all bit rate	5.1	96k
MPEG4 HE-AAC	all bit rate	2	96k
AC3	640kbps	5.1	48k
WMA v7/8/9	all bit rate	5.1	48k
Window	all bit rate	5.1	48k
Media Audio v8			
MP3 (MPEG1 Layer3)	320kbps	2	48k
Window Media audio Pro	all bit rate	5.1	48k

Window Media Audio v9	all bit rate	5.1	48k
DVD LPCM	all bit rate	7.1	192k
FLAC(stereo)	all bit rate	2	96k
OGG Vorbis	all bit rate	2	64k
cook: COOK (RealAudio6)	96kbps	2	48k
raac: MPEG4 AAC-LC (RealAudio9)	all bit rate	5.1	96k
racp: MPEG4 HE-AAC(RealAudio10)	all bit rate	2	96k

4.8 Supported Video Standards

Standard	Resolution
Divx 3.11	1920x1080
Divx 4.x	1920x1080
Divx 5.1	1920x1080
Divx 6.x	1920x1080
XviD	1920x1080
MPEG1	768x576
MPEG2 MP@HL	1920x1080
H.264 BP LV 4.0	1920x1080

H.264 MPLV 4.0	1920x1080
H.264 HP LV 4.0	1920x1080
MPEG-4 SP@L 3.0	1920x1080
MPEG-4 ASP@HL 4.0	1920x1080
Window Media Video v9	1920x1080
VC-1	1920x1080

4.9 Supported Image Standards

Standard	Resolution	Other
JPEG	N/A	Baseline and Progressive up to 8M pixel
BMP	1920x1080	
PNG	1920x1080	

4.10 Supported Video Resolution

Wi-Fi Display Res	FPS	I/P	Supported
640x480	60.00	P	Y
720x480	60.00	P	Y(59.94)
720x576	50.00	P	Y
1280x720	30.00	P	Y
1280x720	60.00	P	Y
1280x720	24.00	P	Y
1280x720	25.00	P	Y
1280x720	50.00	P	Y
1920x1080	25.00	P	Y
1920x1080	30.00	P	Y
1920x1080	24.00	P	Y
800x600	30.00	P	Y(29.84)
800x600	60.00	P	Y
1152x864	30.00	P	Y(30.19)
1152x864	60.00	P	Y(60.38)
1360x768	30.00	P	Y
1360x768	60.00	P	Y
1368x768	30.00	P	Y
1368x768	60.00	P	Y
1280x1024	30.00	P	Y
1280x1024	60.00	P	Y
1400x1050	30.00	P	Y
1400x1050	60.00	P	Y
1600x900	30.00	P	Y(29.98)
1600x900	60.00	P	Y(59.96)
1600x1200	30.00	P	Y(30.06)
1600x1200	60.00	P	Y(60.12)
1680x1050	30.00	P	Y(29.95)
1680x1050	60.00	P	Y(59.90)

4.11 Supported Containers

The following

- AVI, ASF, MP4, MKV, PS, TS, FLV, RM

5 Statement

5.1 Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

Operations in the 5.15-5.25GHz band are restricted to indoor usage only.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

IMPORTANT NOTE:

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

The availability of some specific channels and/or operational frequency bands are country dependent and are firmware programmed at the factory to match the intended destination. The firmware setting is not accessible by the end user.



-

- - -

-

-

5.3 Europe – EU Declaration of Conformity

This device complies with the essential requirements of the R&TTE Directive 1999/5/EC. The following test methods have been applied in order to prove presumption of conformity with the essential requirements of the R&TTE Directive 1999/5/EC:

- **EN60950-1: 2006/A1:2010 => 請確認 LVD repot 並放上正確版本**
Safety of Information Technology Equipment
- **EN50385 : (2002-08)**
- Product standard to demonstrate the compliance of radio base stations and fixed terminal stations for wireless telecommunication systems with the basic restrictions or the reference levels related to human exposure to radio frequency electromagnetic fields (110MHz - 40 GHz) - General public
- **EN 301 893 V1.5.1: (2008-12)**
- Broadband Radio Access Networks (BRAN); 5 GHz high performance RLAN; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive
- **EN 301 489-1 V1.8.1: (2008-04)**
- Electromagnetic compatibility and Radio Spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements
- **EN 301 489-17 V2.1.1 (2009-05)**
- Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment; Part 17: Specific conditions for Broadband Data Transmission Systems

In Italy the end-user should apply for a license at the national spectrum authorities in order to obtain authorization to use the device for setting up outdoor radio links and/or for supplying public access to telecommunications and/or network services.

CE 0560

cs Česky [Czech]	<i>[Jméno výrobce]</i> tímto prohlašuje, že tento <i>[typ zařízení]</i> je ve shodě se základními požadavky a dalšími příslušnými ustanoveními směrnice 1999/5/ES.
da Dansk [Danish]	Undertegnede <i>[fabrikantens navn]</i> erklærer herved, at følgende udstyr <i>[udstyrets typebetegnelse]</i> overholder de væsentlige krav og øvrige relevante krav i direktiv 1999/5/EF.
de Deutsch [German]	Hiermit erkläre <i>[Name des Herstellers]</i> , dass sich das Gerät <i>[Gerätetyp]</i> in Übereinstimmung mit den grundlegenden Anforderungen und den übrigen einschlägigen Bestimmungen der Richtlinie 1999/5/EG befindet.
et Eesti [Estonian]	Käesolevaga kinnitab <i>[tootja nimi = name of manufacturer]</i> seadme <i>[seadme tüüp = type of equipment]</i> vastavust direktiivi 1999/5/EÜ põhinõuetele ja nimetatud direktiivist tulenevatele teistele asjakohastele sätetele.
en English	Hereby, <i>[name of manufacturer]</i> , declares that this <i>[type of equipment]</i> is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.
es Español [Spanish]	Por medio de la presente <i>[nombre del fabricante]</i> declara que el <i>[clase de equipo]</i> cumple con los requisitos esenciales y cualesquiera otras disposiciones aplicables o exigibles de la Directiva 1999/5/CE.
el Ελληνική [Greek]	ΜΕ ΤΗΝ ΠΑΡΟΥΣΑ <i>[name of manufacturer]</i> ΔΗΛΩΝΕΙ ΟΤΙ <i>[type of equipment]</i> ΣΥΜΜΟΡΦΩΝΕΤΑΙ ΠΡΟΣ ΤΙΣ ΟΥΣΙΩΔΕΙΣ ΑΠΑΙΤΗΣΕΙΣ ΚΑΙ ΤΙΣ ΛΟΙΠΕΣ ΣΧΕΤΙΚΕΣ ΔΙΑΤΑΞΕΙΣ ΤΗΣ ΟΔΗΓΙΑΣ 1999/5/ΕΚ.
fr Français [French]	Par la présente <i>[nom du fabricant]</i> déclare que l'appareil <i>[type d'appareil]</i> est conforme aux exigences essentielles et aux autres dispositions pertinentes de la directive 1999/5/CE.
it Italiano [Italian]	Con la presente <i>[nome del costruttore]</i> dichiara che questo <i>[tipo di apparecchio]</i> è conforme ai requisiti essenziali ed alle altre disposizioni pertinenti stabilite dalla direttiva 1999/5/CE.
Latviski [Latvian]	Ar šo <i>[name of manufacturer / izgatavotāja nosaukums]</i> deklarē, ka <i>[type of equipment / iekārtas tips]</i> atbilst Direktīvas 1999/5/EK būtiskajām prasībām un citiem ar to saistītajiem noteikumiem.
Lietuvių [Lithuanian]	Šiuo <i>[manufacturer name]</i> deklaruoja, kad šis <i>[equipment type]</i> atitinka esminius reikalavimus ir kitas 1999/5/EB Direktyvos nuostatas.
nl Nederlands [Dutch]	Hierbij verklaart <i>[naam van de fabrikant]</i> dat het toestel <i>[type van toestel]</i> in overeenstemming is met de essentiële eisen en de andere relevante bepalingen van richtlijn 1999/5/EG.
mt Malti [Maltese]	Hawnhekk, <i>[isem tal-manifattur]</i> , jiddikjara li dan <i>[il-mudel tal-prodott]</i> jikkonforma mal-ftigijiet essenzjali u ma provvedimenti oħrajn rilevanti li hemm fid-Dirrettiva 1999/5/EC.
hu Magyar [Hungarian]	Alulírott, <i>[gyártó neve]</i> nyilatkozom, hogy a <i>[... típus]</i> megfelel a vonatkozó alapvető követelményeknek és az 1999/5/EC irányelv egyéb előírásainak.
pl Polski [Polish]	Niniejszym <i>[nazwa producenta]</i> oświadczam, że <i>[nazwa wyrobu]</i> jest zgodny z zasadniczymi wymogami oraz pozostałymi stosownymi postanowieniami Dyrektywy 1999/5/EC.
pt Português [Portuguese]	<i>[Nome do fabricante]</i> declara que este <i>[tipo de equipamento]</i> está conforme com os requisitos essenciais e outras disposições da Directiva 1999/5/CE.
sl Slovensko [Slovenian]	<i>[Ime proizvajalca]</i> izjavlja, da je ta <i>[tip opreme]</i> v skladu z bistvenimi zahtevami in ostalimi relevantnimi določili direktive 1999/5/ES.
Slovensky [Slovak]	<i>[Meno výrobcu]</i> týmto vyhlasuje, že <i>[typ zariadenia]</i> spĺňa základné požiadavky a všetky príslušné ustanovenia Smernice 1999/5/ES.
fi Suomi [Finnish]	<i>[Valmistaja = manufacturer]</i> vakuuttaa täten että <i>[type of equipment = laitteen tyyppimerkintä]</i> tyyppinen laite on direktiivin 1999/5/EY oleellisten vaatimusten ja sitä koskevien direktiivin muiden ehtojen mukainen.
sv Svenska [Swedish]	Härmed intygar <i>[företag]</i> att denna <i>[utrustningstyp]</i> står i överensstämmelse med de väsentliga egenskapskrav och övriga relevanta bestämmelser som framgår av direktiv 1999/5/EG.

