



TEGRA LINUX DRIVER PACKAGE R19.3 RELEASE

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SW Feature List



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SOFTWARE FEATURES

This section describes the software features expected to be supported with this release of NVIDIA® Tegra® Linux Driver Package, which provides users with a complete package to bring up Linux on certain Tegra devices.

This release supports NVIDIA® Tegra® K1 32 Bit series code-name Jetson TK1 device.

Note: Always check the *Release Notes* for constraints related to these features.

BOOT LOADERS

Boot Loader	Feature	Notes
Fastboot	Boot Device	eMMC
	Root Device	USB, SD, eMMC, SATA
	Display device	UART
U-Boot	Boot Device	eMMC
	Root Device	USB, SD, eMMC
	Display device	UART

KERNEL

Feature	Notes
Linux kernel version	3.10
Core support	4 + 1
SMP	Yes

I/O

I/O Type	Feature	Notes
RTC	PMIC RTC	Support for RTC Alarm and system Wakeup PMIC: AMS3722
	Display device	UART
UART	Debug	Console (UART4)
	High-Speed	UART2
I2C	Master	100 Kbps, 400 Kbps
	Peripherals	AMS3722, Realtek Audio Codec, Board ID EEPROMS
USB 2.0	Recovery mode	USB1
	Host mode	MSD (Pen drives, HDD), CDC (USB Ethernet), UVC (web cams), Audio Class
	Device mode	Can be enabled via system interface. (Disabled by default)
	Peripherals	keyboard, mouse, webcam (INTEX), Pen drives, USB-ethernet dongle
USB 3.0	Host mode	MSD
	Peripherals	Pen drives, USB-HDD
Display	Framebuffer console device	HDMI
	Dual-display support	HDMI + eDP
	Primary display type/resolution	HDMI 1920 x 1080
	Secondary display type/resolution	eDP
PCIe	Device enumeration	-
	Lane configuration	x1 (mPCIe)
	Speed	Gen1
	Power state	L0
	Device	Realtek 8111E 1000BASE-T
SATA	Device enumeration	-
	Speed	Gen2
	Power state	None
	Device	Hyinx Half Slim SATA SSD
GPIO	non-PWM	7

	PWM	0
	Extended GPIO	Y
SPI	SPI Flash ROM tested: Winbond serial flash	-
SD	HS200 mode	-
eMMC	eMMC 4.5 Device: Hynix 2GB_H5TC4G63AFR	-
JTAG	ARM standard 20-pin header	-

CUDA

Feature	Notes
CUDA	Version 6.0.23

POWER MANAGEMENT

Feature	Notes
DVFS	-
EMC frequency scaling	Auto
GPU frequency scaling	Auto
Low-power states	Clock-gating, Rail-gating
CPU auto-hotplug	-
CPU clusters	4 + 1
EDP limiting	-
Thermal management	-

GRAPHICS AND MULTIMEDIA

Audio	Notes
Multi-instance audio decode	-
Multichannel playback	-
USB audio record	-
Video	Notes
Multi-Stream Video Encode	-

Video-only mode	-
4K playback	-
Media APIs	Notes
Gstreamer-0.10	-
Gstreamer-1.0	-

DISPLAYS

Feature	Resolution	Notes
Supported resolutions	640 X 480	-
Framebuffer console device	HDMI	-
Dual-display support	HDMI + eDP	-
Primary display type/default resolution	HDMI	Default resolution 1920 x 1080
Secondary display type/resolution	eDP	-
Supported resolutions	640 X 480	-
	720 X 576	-
	1024 X 768	-
	1280 X 720	-
	1280 X 1024	-
	1920 X 1080	-
	3840 X 2160	-
	4096 X 2160	-

EGL AND OPENGL ES SUPPORT

EGL is an interface between Khronos rendering APIs such as OpenGL ES and the underlying native platform window system. It handles graphics context management, surface/buffer binding, and rendering synchronization and enables high-performance, accelerated, mixed-mode 2D and 3D rendering using other Khronos APIs.

L4T supports the EGL 1.4 specification, Khronos Native Platform Graphics Interface (EGL 1.4 Specification).

The OpenGL ES driver in this release supports the following OpenGL ES specifications:

- OpenGL ES Common Profile Specification 23.0
- OpenGL 4.4

For more information on OpenGL ES, see the Khronos OpenGL ES API Registry.

DECODERS

Audio Decoders

Audio Decode	Profile	Sampling	Bitrate	Notes
AAC+	Mono and stereo for SBR; plus limited support (described in Notes) for multichannel AAC+ (AAC+SBR)	Up to 48 kHz	Up to 128 kilobits per second (kbps)	For multi-channel AAC+ (AAC+SBR) streams, only the AAC multi-channel is decoded. The 5.1 channels are down-mixed to stereo.
AAC-LC	Mono and stereo; plus 5.1 channels down-mixed to stereo	Up to 48 kHz	Up to 320 Kbps	-
AAC-LC multichannel	6 channel [5.1]	Up to 48 kHz	Up to 320 Kbps	Output over HDMI
eAAC+	Stereo only	Up to 48 kHz	Up to 320 Kbps	-
AMR-NB	1 channel	Up to 8 kHz	Up to 12.2 Kbps	-
AMR-WB	1 channel	Up to 16 kHz	Up to 23.85 Kbps	-
MP3	2 channel	Up to 48 kHz	Up to 320 Kbps	-
MPEG-2 (MPEG-1 Layer 2)	2 channel	Up to 48 kHz	Up to 384 Kbps	-
Vorbis	Ogg Audio	Up to 48 kHz	Up to 256 Kbps	-
WAV linear PCM	16-bit, 2 channels	8kHz to 48 kHz	-	-
WAV multichannel support	Multichannel support	-	-	-
WMA-9 *	Standard 2-channel	Up to 48 kHz	Up to 384 Kbps	-
WMA Lossless	Lossless: Up to N1 Profile; WMA 10: 2 channel	Up to 48 kHz	Up to 384 Kbps	-

WMA Pro LBR 10	M2 Profile; 2 channel	Up to 48 kHz	Up to 384 Kbps	-
WMA Pro LBR 10 multichannel	6 channel [5.1]	Up to 48 kHz	Up to 768 Kbps	-
Notes				
* Use of this decoder requires a BSP add-on component available only to customers with Windows Media Component licensing. For more information see http://wmlicense.smdisp.net/wmcomponents/ .				

Image Decoders

Image Decode	Notes
Lib-JPEG HW decoder	-

Video Decoders

Video Decode	Profile and Level	Sampling Frequency and Bit rate/Frame rate	Notes
AVCHD	MPEG-4 AVC/H.264/V C1 1080/60i Highdef	Up to 1080p 60 fps Up to 10 Mbps	No support for AVH-DC stereoscope (3D)
DivX 4/5/6 compatible	1080p Highdef	Up to 1080p 30 fps Up to 10 Mbps	No QPEL; No interlace; No GMC
DivX 4/5/6 compatible	PlusHD	Up to 1080p 30 fps Up to 20 Mbps	-
H.263	Baseline (Profile 0)	Standard H.263 picture formats up to 4CIF 30 fps Up to 8 Mbps	Standard H.263 picture formats = SQCIF, QCIF, CIF, 4CIF
H.264 AVC	Baseline Profile Main Profile High Profile @ L4.1	Up to 720p 60 fps Up to 40 Mbps	-
H.264 AVC	Baseline Profile Main Profile High Profile @ L4.1	Up to 1080p 60 fps Up to 62.5 Mbps	-

H.264 AVC	Baseline Profile Main Profile High Profile @ L4.1	Up to 1080i 60 fps Up to 40 Mbps	-
MJPEG	YUV 420/ YUV 422	Up to 1080p 30 fps	-
MPEG-2 Video	Main Profile @ High Level	Up to 1080p 30 fps /1080i 60 fps Up to 80 Mbps	-
MPEG-2 Video	Main Profile @ High Level	Up to 720p 60 fps Up to 80 Mbps	-
MPEG-4	Advanced Simple Profile @ L5	Up to 1080p 30 fps Up to 10 Mbps	No QPEL; No interlace; No GMC
MVC	Multiview High Profile, Stereo High Profile	Up to 1080p 24 fps Up to 32 Mbps	Local playback and playback over HDMI
VC-1/WMV *	Simple Profile	Up to 1080p 30 fps Up to 45 Mbps	-
VC-1/WMV *	Main Profile	Up to 1080p 30 fps Up to 45 Mbps	-
VC-1/WMV *	Advanced Profile	Up to 1080p 30 fps Up to 45 Mbps	-
Xvid	Xvid Highdef	Up to 1080p 30 fps Up to 10 Mbps	No QPEL; No interlace; No GMC
VP8	Version 0	Up to 1080p 60 fps Up to 40 Mbps	-

Notes

* Use of this decoder requires a BSP add-on component available only to customers with Windows Media Component licensing. For more information see <http://wmlicense.smdisp.net/wmcomponents/>.

ENCODERS

Audio Encoders

Audio Encode	Profile	Resolution	Bit Rates
AAC-LC	-	-	Up to 320 Kbps

Image Encoders

Image Encode	Profile	Resolution	Bit Rates
Lib-JPEG HW encoder	-	-	-

Video Encoders

Video Encode	Profile and Level	Sampling Frequency and Bit rate/Frame rate	Notes
H.264	Baseline Profile Main Profile High Profile	Up to 1080p 30 fps Up to 50 Mbps	-
H.263	Baseline Profile	640 X 480	-
MPEG-4	Simple Profile	640 X 480	-
VP8	Ver0	HD 1080p30 @ 50Mbps (High Quality)	-

READER CONTAINER FORMATS

Codecs are provided by GStreamer. You can download GStreamer codecs from the gstreamer opensource project at:

<http://gstreamer.freedesktop.org>

Or you can use `apt-get` in the provided Ubuntu-derived sample file system.

ASF (WMV) (Gstreamer)	Description	Notes
Video	VC-1	-

Audio	WMA 10, WMA Pro, WMA Lossless	-
AVI (Gstreamer)	Description	Notes
Video	MPEG-4, H.264, DivX/Xvid	-
Audio	AAC, AAC+, eAAC+, MP3, MPEG-2, AC3	-
MPEG-4 (MP4)/3G2/3GP/MOV (Gstreamer)	Description	Notes
Video	MPEG-4, H.264, H.263	-
Audio	AAC, AAC+, eAAC+, AMR-NB, AMR-WB	-
Matroska (MKV) (Gstreamer)	Description	Notes
Video	MPEG-4, DivX/Xvid, H.264	-
Audio	AAC, AAC+, eAAC+, MP3, AC3	-
WebM (Gstreamer)	Description	Notes
Video	VP8	-
Audio	Vorbis	-
OGG (Gstreamer)	Description	Notes
Audio	Vorbis	-
MP3 (Gstreamer)	Description	Notes
Audio	MP3	-
M2TS/MPEG-TS (Gstreamer)	Description	Notes
Video	H.264, VC-1, MPEG-2	-
Audio	AAC, AAC+, eAAC+	-

WRITER CONTAINER FORMATS

The following table presents container information. See container specifications for audio/video pairing within the container.

MPEG-4 (MP4)/3GP (Gstreamer)	Description	Notes
Video	MPEG-4, H.264, H.263	-
Audio	Audio: AAC AMR-NB, AMR-WB	-
Streaming (Gstreamer)	Description	Notes

HTTP1.0	MP3, MP4, 3GP,WMA, WMV, AVI, ASF	-
HTTP 1.1	MP3, MP4, 3GP,WMA, WMV, AVI, ASF	-
RTSP (Gstreamer)	Description	Notes
RFC 2326	Real Time Streaming Protocol (RTSP)	-
RFC 2429	H.263	-
RFC 3016	AAC-LC, AAC+,eAAC+, MPEG-4	-
RFC 3267	AMR-NB	-
RFC 3550	RTP: A Transport Protocol for Real-Time Applications	-
RFC 3640	AAC-LC, AAC+,eAC+, MPEG-4	-
RFC 3984	MPEG-4 AVC/H.264	-

STREAMING PROTOCOLS

Streaming protocols are provided by GStreamer. You can download GStreamer codecs from the gstreamer opensource project at:

<http://gstreamer.freedesktop.org>

Or you can use `apt-get` in the provided Ubuntu-derived sample file system.

Hardware codecs are not included in the base release but can be provided separately under a software license agreement.

HTTP Protocols*	Formats
HTTP 1.0	3GP
	AAC
	ASF
	AVI
	MKV
	MOV
	MP3
	MP4
	TS
	WMA
	WMV
HTTP 1.1	3GP

	AAC
	ASF
	AVI
	MKV
	MOV
	MP3
	MP4
	TS
	WMA
	WMV
HTTP Chunked Mode Support	Notes
Chunked Mode Support	Chunked Mode Data Transfer with HTTP 1.1 only
HTTP Streaming	Notes
Live Streaming	-
RTSP Protocols*	Notes
RFC 2326	Real Time Streaming Protocol (RTSP)
RFC 2429	H.263
RFC 3016	AAC-LC, AAC+, eAAC+, MPEG-4
RFC 3267	AMR-NB
RFC 3550	RTP: A Transport Protocol for Real-Time Applications
RFC 3640	AAC-LC, AAC+, eAAC+, MPEG-4
RFC 3984	MPEG-4 AVC/H.264
Buffer control with watermarking for RTSP streaming	-
SDP Session Set Up	Notes
RFC 4566	Session Description Protocol
Additional Notes	
* For better user experience, NVIDIA recommends limiting HTTP, RTSP, and RTP streaming tests to 1080p 30 fps 10 Mbps content over a sustained network with a bandwidth of greater than 16 Mbps.	