Hi3751 V811 Brief Data Sheet

Key Specifications

Key Features

- High-performance multi-core Cortex 64-bit CPU
- High-performance multi-core GPU
- High-performance multi-standard demodulation
- Dynamic multi-standard HDR processing
- 4K x 2K 10-bit@60 Hz decoding
- Security processing feature
- TCON connection to the screen
- 4K screen capturing
- Video rotation
- PiP processing
- 8K decoding and connection to the 8K screen
- 4K@120 Hz MEMC and connection to the 4K@120 Hz screen
- HDMI 2.0 output
- 1 x UHD + 1 x FHD decoding
- CI Plus 1.4

High-Performance CPU

- Big.LITTLE architecture of the multi-core Cortex-A73
- Smooth intelligent applications
- Independent I-cache, D-cache, and L2 cache
- Integrated multimedia acceleration engine NEON
- Integrated hardware floating-point coprocessor

TS Demultiplexing/PVR

- A maximum of 64 hardware PID channels
- Full-service PVR
- Recording of scrambled and non-scrambled streams

Video Decoding

- AVS2 Baseline 10-bit Profile@Level 8.2.60, 4Kx2K@60fps capability
- ITU-T H.265 Main 10 Profile@Level 5.1 high-tier (and lower levels), 4K x 2K@60 fps capability
- VP9 Profile 2 10-bit 4K x 2K@60 fps capability
- SHVC, complying with the ATSC 3.0 specifications (for H.265)
- FHD HFR (for H.265)
- H.264 Baseline Profile/Main Profile/High Profile@Level 5.0, 4K x 2K@30 fps capability
- MVC, 1080p@60 fps capability
- MPEG1, 1080p@60 fps capability
- MPEG2 Simple Profile@Main Level, Main Profile@High Level, 1080p@60 fps capability
- MPEG4 Simple Profile@Levels 0–3, ASP@Levels 0–5, GMC, 1080p@60 fps capability
- MPEG4 short header format (H.263 Baseline), 1080p@60 fps capability
- AVS Baseline Profile@Level 6.0, AVS+(AVS-P16), 1080p@60 fps capability
- VC-1 Simple Profile@Main Level, Main Profile@High Level, and Advanced Profile@Levels 0–3, 1080p@60 fps capability
- VP6/8, 1080p@60 fps capability
- Low-latency decoding
- Maximum 1 x UHD + 1 x FHD decoding performance
- 8K decoding (for H.264/H.265/VP9/AVS2)

Image Decoding

- JPEG hardware decoding, supporting maximum 64 megapixels
- Supported formats: 400, 420, 411, 422, 422T, and 444
- MJPEG Baseline decoding
- PNG hardware decoding, supporting maximum 64 megapixels
- Supported formats: gray-scale image, true-color image, indexed-color image, gray-scale image with alpha channel data, and true-color image with alpha channel data

Video and Image Encoding

- H.264 Baseline Profile/Main Profile@Level 4.2 video encoding, 1-channel 1080p@30 fps encoding
- 1/4 pixel motion estimation, CABAC
- Low-latency encoding
- Multi-ROI encoding
- VBR and CBR modes

2D Graphics Acceleration

- Hardware acceleration engine, supporting efficient 2D processing
- ARGB, CLUT, and AYCbCr data formats
- Copying, filling, pattern filling, resizing, clipping, alpha blending, color keying, and clip masking
- ROP
- Anti-flicker, gamma correction, and luminance/contrast adjustment
- Programmable scanning mode
- Linked-list operation mode

3D GPU

- Integrated multi-core high-performance GPU
- UHD graphics rendering
- OpenGL ES 3.2/2.0/1.1/1.0
- OpenCL 2.0
- Vulkan 1.0

IF Demodulation of the Analog TV

- All analog TV standards, including M/N, B/G/H, D/K, I, L, and L'
- Low IF tuner inputs and configurable IF
- External SAW not required
- Group delay compensation and equalization filtering

Digital Demodulation

- Low IF tuner inputs

- Built-in 12-bit ADC, ensuring the sampling precision
- One embedded DVB-C QAM demodulator
  - ITU-T J.83 Annex A/B/C
  - Symbol rate: 1–7 Mbaud/s
  - Carrier frequency offset range: ±700 kHz
  - Superior anti-pulse-interference performance
  - Superior Gaussian reception performance
- One embedded DTMB demodulator
  - All the 330 standard DTMB (GB20600-2006) modes
  - 6 MHz, 7 MHz, and 8 MHz input signal bandwidths
  - Low IF (4–11 MHz) and high IF (36–37 MHz)
  - Compliance with the access test standards GB/T 26683-2011 and GB/T 26686-2011
  - Superior Gaussian, multi-path, and mobile reception performance
  - Superior anti-phase-noise performance
  - Superior anti-pulse-interference performance
  - Superior anti-interference (at the same frequency) performance
  - Adaptive spectrum inversion recognition
  - Frequency error capturing range broader than ±1.5 MHz
- One embedded ATSC demodulator
  - Standard-version A.53/2011
  - Low IF and high IF (36 MHz)
  - Adaptive spectrum inversion recognition
  - Frequency error detection range broader than ±600 kHz
  - Compliance with the A74:2010 test specifications
- One embedded ISDB-T demodulator
  - Compliance with the ARIB STD-B31v2_2-E1 test standard
  - Low IF and high IF (36 MHz)
  - 6 MHz, 7 MHz, and 8 MHz input signal bandwidths
  - Compliance with the ARIB STD-B21v5_4-E1 test standard
  - ISDB-T 13-SEG mode
  - Superior Gaussian, multi-path, and mobile reception capability
  - Superior anti-pulse-interference and anti-interference (at the same frequency) capabilities
  - Adaptive spectrum inversion recognition
  - Frequency error detection range broader than ±500 kHz
- One embedded DVB-T demodulator
  - Compliance with the ETSI EN300744-V1.6.1 standard
  - Low IF and high IF (36 MHz)
  - 6 MHz, 7 MHz, and 8 MHz input signal bandwidths
  - Compliance with the NorDig Unified Test Specification V2.4 and DTG 8.0 test standard
  - 2K, 8K FFT mode, 1/32 to 1/4 guard interval
  - Superior Gaussian, multi-path, and mobile reception capability
  - Superior anti-pulse-interference and anti-interference (at the same frequency) capabilities
  - Adaptive spectrum inversion recognition
  - Frequency error detection range broader than ±500 kHz
- One embedded DVB-T2 demodulator
  - T2-Base and T2-Lite modes in the ETSI EN302755-V1.3.1 standard
  - Low IF and high IF (36 MHz) signal inputs
  - 1.7 MHz, 5 MHz, 6 MHz, 7 MHz, and 8 MHz input signal bandwidths
  - Single PLP and multi-PLP services as well as SISO and MISO transfer
  - Compliance with the NorDig Unified Test Specification V2.4 and DTG 8.0 test standard
  - Superior Gaussian, multi-path, and mobile reception capability
  - Superior anti-pulse-interference and anti-interference (at the same frequency) capabilities
  - Superior guard interval exceeding performance
  - Adaptive spectrum inversion recognition
  - Frequency error detection range broader than ±500 kHz
- One embedded DVB-S2X/S2/S modulator
  - Standard ETSI EN 302307-1/2 broadcast mode, supported by DVB-S2X/S2
  - Standard ETSI EN300421, supported by DVB-S
  - ZIF I/Q input
  - All the QPSK/8PSK/16APSK/32APSK bit rates, supported by DVB-S2X/S2
  - QPSK: 1–60 Mbaud/s symbol rate
  - 8PSK: 1–60 Mbaud/s symbol rate
  - 16APSK: 1–45 Mbaud/s symbol rate
  - 32APSK: 1–45 Mbaud/s symbol rate
  - All the QPSK bit rates supported by DVB-S: 1–60 Mbaud/s symbol rate
  - DiSEqC 2.x protocol
  - Adaptive spectrum recognition
  - Fast signal locking
  - Superior anti-interference capability
- External TS inputs

NTSC/PAL/SECAM Video Demodulation

- NTSC (NTSC-M, NTSC-J, NTSC-4.43), PAL (B, D, G, H, M, N, I, Nc), and SECAM standards
- Automatic standard detection
- Motion-adaptive 3D comb filter
- Cross-luma and cross-color suppression
- Two CVBS inputs

Multi-Format Audio Demodulation

- SIF demodulation
- NICAM, A2, EIA-J, BTSC, FM, and AM demodulation
- BTSC, mono, stereo, and SAP modes in the EIAJ standard
- Mono, stereo, and dual modes in the NICAM and A2 standards
- Sound standard and automatic mode detection

Audio and Sound Effect Processing

- Conversion of the audio sampling rate
- Volume, equalization, and mute control
- Virtual stereo/surround and bass enhancement
- Dialog enhancement and intelligent volume
- DTS and DBX-TV total technology audio

enchancement[option]
- HiSilicon's unique SWS 3D advanced audio post-processing technology[option]

Audio Encoding and Decoding

- Multi-format audio decoding
  - Dolby Digital[option], Dolby Digital Plus[option], and Dolby TrueHD[option]
  - DTS[option], DTS-HD[option], and DTS-M6[option]
  - MS12 D[option]
  - MPEG L1/L2
  - MP3
  - AAC-LC, HE-AAC, and HE_AAC v2
  - LPCM
  - APE
  - FLAC
  - Ogg Vorbis
  - AMR-NB
  - AMR-WB
  - -G.711(u/a)
- Audio encoding in a unified format of AAC

Professional HiSilicon Graphics Engines (Hi-Imprex VII Engines)

- Hi-HDR IV processing engine
  - HDR10 processing
  - SLF[option] processing
  - HLG[option] processing
  - Technicolor PS[option] processing
  - Dolby Vision[option] processing
  - ST.2094 processing
- Hi-Imprex VII scaling engine
  - High-order multi-phase filtering with programmable coefficients
  - Various scaling modes, including the non-linear scaling mode
  - De-ringing
  - De-jagging
- Hi-Imprex VII video processing engine
  - Full-MC IPC
  - Automatic detection and restoration in 3:2, 2:2, or M: N film mode
  - Full-MC NR for various video contents, including network videos
  - MPEG NR, de-blocking, and mosquito NR
  - -Global motion detection and scene change detection
- Hi-Imprex VII image enhancement engine
  - Adaptive sharpening for the 4K x 2K content
  - Enhancement and shoot control for different directions and frequencies
  - LTI and CTI
  - 3D adaptive color management, supporting enhancement of specific colors and automatic color copying
  - Wide color gamut processing
  - Blue level extension
- Hi-SuperClear VII processing
  - Thin edge, improving the edge effect
  - Edge smoothing and enhancement
- 12-bit programmable gamma LUT
- Automatic 3D format detection
- 2D-to-3D processing
- 0D/1D/2D local dimming processing
- Ambilight processing[option]
- Video rotation
- 4K screen capturing

Professional HiSilicon MEMC Engine (Hi-Motion IV Engine)

- 4K@120 Hz processing
- Enhanced halo free processing
- Enhanced deblur & dejudder processing
- Enhanced small object processing
  - Football tracking technology
  - Small object protection
- Enhanced OSD
  - Scrolling caption tracking technology
  - OSD region protection

Security Processing[Option]

- Advanced CA feature
- TEE and SVP
- DRM
- AES, DES, and 3DES data encryption and decryption
- Hardware hash/RSA algorithm
- Content protection for USB devices
- Downloadable CA[option]

Audio and Video Interfaces

- Audio interface
  - Two I^2S inputs or outputs and one S/PDIF output
  - One HDMI ARC
  - Three stereo inputs or two stereo inputs and two MIC inputs
  - Three or two stereo outputs and one headphone output
- YPbPr/RGB interface
  - Two analog channels, supporting maximum 1080p resolution
  - SoG
  - Automatic format and mode detection
  - Position and phase adjustment of the RGB channel
  - Online cable detection for analog video channels
- HDMI
  - Four HDMI 2.0 input interfaces (One interface supports MHL 2.0 and one supports ARC.)
  - 4K x 2K@60 Hz inputs
  - CEC
  - HDCP 2.2/1.4/1.3/1.1
  - One HDMI 2.0 output interface
- 16-lane VBO outputs
  - 4K@60 Hz screen
  - 4K@120 Hz screen
  - Screen that contains the 8K@30 Hz timing
- P2P interface output required by each screen factory

  - 4K@60 Hz screen
  - OD processing
  - RGBW processing
  - Demura processing
- One CVBS output

Memory Control Interfaces

- DDR3/DDR4 interface
  - Maximum 4 GB capacity
  - Maximum 64-bit interface
  - Up to 2.4 Gbit/s frequency
- eMMC V5.1 flash interface
- UFS V2.1 flash interface

Peripheral Interfaces

- Three USB 2.0 host ports
- One USB 3.0 host port
- One PCIe interface
- One SDIO interface, supporting 3.3 V components
- One 10 Mbit/s or 100 Mbit/s adaptive network port
- Two CI/CI+ interfaces[option]
- One IR receiver
- Four keypad interfaces
- Multiple I^2C interfaces
- Two UART interfaces
- Multiple groups of GPIO interfaces
- Multiple PWM interfaces
- Integrated POR module

Others

- 4-layer PCB design
- PBGA 27 x 27
- Various boot modes
- Boot program download and execution over a serial port or USB port
- Integrated and dedicated standby processor, supporting various low-power modes
- Low-power technologies such as AVS and DVFS, supporting ultra-low-power design

Acronyms and Abbreviations

3DES	Triple Data Encryption Standard
AAC	Advanced Audio Coding
AAC-LC	Advanced Audio Coding Low Complexity
ADC	analog-to-digital converter
AES	Advanced Encryption Standard
AM	amplitude modulation
AMR-NB	adaptive multi-rate narrowband
AMR-WB	adaptive multi-rate wideband
APE	Monkey's Audio
APSK	absolute phase shift keying
ARC	audio return channel
ARIB	Association of Radio Industries and Businesses
ASP	audio signal processing
ATSC	Advanced Television Systems Committee
AVS	Audio Video Standard
AVS	adaptive voltage scaling
BTSC	Broadcast Television Systems Committee
CA	conditional access
CABAC	context-adaptive binary arithmetic coding
CBR	constant bit rate
CEC	consumer electronics control
CI	common interface
CLUT	color look-up table
CPU	central processing unit
CTI	chroma transient improvement
CVBS	Composite Video Broadcast Signal
DCI	dynamic contrast improvement
DDR	double data rate
DES	Data Encryption Standard
DiSEqC	Digital Satellite Equipment Control
DRM	digital rights management
DTG	Digital TV Group

DTMB	Digital Terrestrial Multimedia Broadcast
DTS	Digital Theater Systems
DVB-C	Digital Video Broadcasting-Cable
DVB-S	Digital Video Broadcasting-Satellite
DVB-S2	Digital Video Broadcasting-Satellite-Second Generation
DVB-S2X	Digital Video Broadcasting-Satellite-Second Generation Extension
DVB-T	Digital Video Broadcasting-Terrestrial
DVB-T2	Digital Video Broadcasting-Terrestrial-Second Generation
DVFS	dynamic voltage and frequency scaling
EIAJ	Electronic Industries Association of Japan
eMMC	embedded multimedia card
ETSI	European Telecommunications Standards Institute
FFT	fast Fourier transformation
FHD	full high definition
FLAC	Free Lossless Audio Codec
FM	frequency modulation
GMC	global motion compensation
GPIO	general-purpose input/output
GPU	graphics processing unit
HDCP	High-bandwidth Digital Content Protection
HDMI	high definition multimedia interface
HDR	high dynamic range
HE-AAC	High-Efficiency Advanced Audio Coding
HE-AAC v2	High-Efficiency Advanced Audio Coding version 2
HFR	high frame rate
HLG	Hybrid Log-Gamma
IF	intermediate frequency
I^2C	inter-integrated circuit
IR	infrared
I^2S	inter-IC sound
IPC	interlaced-to-progressive conversion
ISDB-T	Integrated Service Digital Broadcasting-Terrestrial
ITU-T	International Telecommunication Union Telecommunication Standardization Sector
LPCM	linear pulse-code modulation
LTI	luma transient improvement
LUT	lookup table
MC	motion compensation
MEMC	Motion Estimation/Motion Compensation
MHL	Mobile High-Definition Link
MIC	microphone
MISO	multiple-input single-output
MVC	multiview video coding
NICAM	Near Instantaneous Companded Audio Multiplex
NR	noise reduction
NTSC	National Television System Committee
OD	on demand
OSD	on-screen display
PAL	Phase Alternating Line
PBGA	plastic ball grid array
PCB	printed circuit board
PCIe	Peripheral Component Interconnect Express
PID	packet identifier
PiP	picture-in-picture
PLP	physical layer pipe
PNG	Portable Network Graphics

POR	power-on reset
PS	Prime Single
PSK	phase shift keying
P2P	point-to-point
PVR	personal video recording
PWM	pulse-width modulation
QAM	quadrature amplitude modulation
QPSK	quadrature phase shift keying
ROI	region of interest
ROP	raster operation
RSA	Rivest-Shamir-Adleman
SAP	secondary audio programming
SAW	surface acoustic wave
SDIO	Secure Digital Input Output
SECAM	sequential color with memory
SEG	Similar Exposure Group
SHVC	Scalability extension of HEVC
SIF	sound intermediate frequency
SISO	single-input single-output
SLF	scene luminance fidelity
SoG	sync on green
S/PDIF	Sony/Philips Digital Interface Format
SRS	Sound Retrieval System
SVP	secure video path
SWS	super wide sound
TCON	timing controller
TEE	Trusted Execution Environment
TS	transport stream
UART	universal asynchronous receiver transmitter
UFS	Universal Flash Storage
UHD	ultra high definition
VBO	V-by-One
VBR	variable bit rate
ZIF	zero intermediate frequency