Hi3751 V551 Brief Data Sheet

Key Specifications

Key Features

- High performance Cortex 64-bit CPU
- High-performance multi-standard demodulation
- Full HDR processing
- 4K x 2K 10-bit@60 Hz HEVC/VP9/AVS2 decoding
- HDMI 2.0
- Comprehensive integrated digital television solution
- Security processing feature

High-Performance CPU

- Multi-core Cortex A73
- Supporting intelligent applications smoothly
- Independent I-cache, D-cache, and L2 cache
- Integrated multimedia acceleration engine NEON
- Hardware half-precision, single-precision, and double-precision floating-point algorithms

TS Demultiplexing/PVR

- A maximum of 96 hardware PID channels
- Full-service PVR
- Recording of scrambled and non-scrambled streams

Video Decoding

- AVS2 main 10bits profile @level 8.2.60，4Kx2K@60 fps
- ITU-T H.265 Main 10 Profile@level 5.1 high-tier (and lower levels), 4K x 2K@60 fps
- FHD HFR for H.265
- VP9 Profile2 10-bit，4Kx2K@60fps
- H.264 BP/MP/HP@ level 5.0，4Kx2K@30fpsMVC, 1080p@60 fps
- MPEG1, 1080p@60 fps
- MPEG2 SP@ML, MP@HL, and 1080p@60 fps
- MPEG4 SP@level 0−3, ASP@level 0−5, GMC, 1080p@60 fps
- MPEG4 short header format (H.263 baseline), 1080p@60 fps
- AVS baseline@level 6.0, AVS+(AVS-P16), and 1080p@60 fps
- VC-1 SP@ML, MP@HL, and AP@level 0−3, 1080p@60 fps
- VP6/8, 1080p@60 fps
- Low-delay decoding

Image Decoding

- JPEG hardware decoding, a maximum of 64 megapixels
- Supported formats of 400, 420, 411, 422, 422T, and 444
- MJPEG baseline decoding
- PNG hardware decoding, maximum 64 megapixels
- 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 Encoding

- H.264 BP/MP@level 4.2 video encoding, 720p@30 fps
- 1/4 pixel motion estimation, CABAC encoding
- Low-delay encoding
- Encoding of multiple ROIs
- VBR and CBR modes

2D Graphics Acceleration

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

3D GPU

- Multi-core high-performance GPU
- FHD graphics rendering
- OpenGL ES 2.0/1.1/1.0 and OpenVG 1.1

Intermediate-Frequency Demodulation for Analog TV

- Digital IF demodulation for all analog TV standards worldwide (M/N, B/G/H, D/K, I, L and L-accent standard)
- Configurable low IF input
- No SAW filter needed
- Group delay equalization for all standards

Digital Demodulation

- Tuner low- and intermediate-frequency inputs and embedded 12-bit ADC
- One embedded DVB-C QAM demodulator
  - ITU-T J.83 Annex A/B/C
  - DVB-C 0.7−7 Mbaud symbol rate and correctable carrier frequency deviation range ±700 kHz
- One embedded DTMB demodulator
  - All 330 modes of the standard DTMB (GB20600-2006)
  - 6 MHz, 7 MHz, and 8 MHz input bandwidth
  - Low- and intermediate-frequency (4−11 MHz) and high- and intermediate-frequency (36−37 MHz) inputs
  - Compliance with access test specifications GB/T20683 and 20686-2011
  - Superior Gaussian, multipath, and mobile reception performance
  - Phase noise suppression
  - Anti-pulse-interference performance
  - Superior anti-interference (from the same frequency)

performance
  - Adaptive spectrum reverse recognition
  - Frequency error detecting range broader than ±1.5 MHz
  - Integrated 12-bit high-performance ADC for supporting highly precise sampling
- One embedded ATSC demodulator
  - Standard version A.53/2011
  - Low- and intermediate-frequency and high- and intermediate-frequency (36 MHz) inputs
  - Adaptive spectrum reverse recognition
  - Frequency error detecting range greater than ±600 kHz
  - Compliance with the A74:2010 test specifications
- External TS input
- External ATSC3.0

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 video standard detection
- Adaptive 3D comb filter
- 2xCVBS

Multi-Format Audio Demodulation

- SIF demodulation
- NICAM, A2, EIA-J, BTSC, FM, and AM demodulation
- BTSC, mono, stereo, and SAP modes in the EIA-J standard
- NICAM, mono, stereo, and dual modes in the A2 standard
- Automatic detection of the sound system and mode

Audio and Audio Effect Processing

- Conversion of the audio sampling rate
- Volume, equalization, mute control
- Virtual stereo/surround sound and bass enhancement
- Dialog enhancement and intelligent volume
- Sound processing[option] such as SRS
- Remote pick-up for the microphone array[option]

Audio Encoding/Decoding

- Audio decoding formats
  - Dolby Digital, Dolby Digital Plus, Dolby TrueHD
  - DTS, DTSHD
  - MPEG L1/L2
  - MP3
  - AAC_LC, HE_AAC, HE_AACV2
  - LPCM
  - APE
  - FLAC
  - OggVorbis
  - AMRNB
  - AMRWB
  - G.711 (u/a)
- AAC audio encoding format

Professional HiSilicon Graphics Engines (Hi-Imprex VI Engines)

- Hi-HDR III processing engine
  - HDR 10
  - SLF[option]
  - HLG[option]
  - Techinicolor[option]
- Hi-Imprex VI scaling engine
  - High-order multi-phase filter with programmable coefficients
  - Various scaling modes including the non-linear scaling mode
  - -Pre-emphasis for graphics scaling and de-ring
- Hi-Imprex VI video processing engine
  - MC interlaced or progressive conversion processing
  - Automatic detection and restoration in 3:2, 2:2, or M: N film mode
  - MC noise reduction
  - MPEG noise reduction: de-blocking, and mosquito noise reduction
  - Global motion detection and scene change detection
- Hi-Imprex VI image enhancement engine
  - 3D adaptive sharpening for the videos including 4K x 2K videos, and enhancement and shoot control for different directions and frequencies
  - LTI and CTI
  - 3D adaptive color management such as specified color management and automatic color copy
  - Wide color gamut processing
  - Dynamic contrast enhancement such as adaptive contrast adjustment and color compensation based on luminance variance
  - Blue level expansion
- Hi-SuperClear VI processing, edge smoothing, and edge enhancement
- Programmable 12-bit gamma look-up table
- Automatic 3D format detection
- 2D-to-3D processing
- Local dimming

Security Processing[Option]

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

Audio/Video Interfaces

- Audio interfaces
  - One I^2S input, one I^2S outputs, and one SPDIF output
  - One HDMI ARC channel
  - There stereo inputs or Two stereo inputs and two MIC inputs
  - Two stereo outputs or One stereo output and one headphone output
  - Two analog channels Automatic format and mode detection
  - Position and phase adjustment for the RGB channel
- YPbPr/RGB interface

  - Two analog channels, at most 1080p
  - SoG
  - Automatic format and mode detection
  - Position and phase adjustment for the RGB channe
- Cable online detection for analog video channels
- HDMI interfaces
  - Three HDMI2.0 input interfaces (one supports MHL 2.0, and the other one supports ARC)
  - 4K x 2K@60 Hz inputs
  - CEC
  - HDCP 2.2/1.4/1.3/1.1
- 8-lane VbyOne outputs
- TCON interface: P2P and mini-LVDS
  - OD processing
  - RGBW processing
  - de-mura processing
- One CVBS output

Memory Control Interfaces

- DDR3/DDR4 interface
  - Maximum 2 GB capacity
  - Maximum 32-bit interface
  - Over 1.866 Gbit/s frequency
- SPI-nand flash interface
  - 1-, 2-, or 4-bit flash memory
  - Maximum capacity of 32 MB
- eMMC 5.0 interface
- SLC-nand flash

Peripheral Interfaces

- Two USB 2.0 host ports
- One USB 3.0 host port
- One SDIO 3.0 interface, supporting 3.3 V component
- One 10 Mbit/s or 100 Mbit/s adaptive Ethernet port
- One CI/CI+^{option}
- One IR receiver
- Four keypad interfaces
- Multiple I^2C interfaces
- Two UART interfaces
- Multiple GPIO interfaces
- Multiple PWM interfaces
- Integrated POR module

Others

- 2-layer PCB
- Package：PBGA27*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 design using the technologies such as AVS and DVFS

Acronyms and Abbreviations

3DES	triple data encryption standard
ADC	analog-to-digital converter
AES	advanced encryption standard
ARC	audio return channel
AVS	adaptive voltage scaling
BER	bit error rate
CABAC	context-based adaptive binary arithmetic coding
CBR	constant bit rate
CEC	consumer electronics control
CI	common interface
CTI	chroma transient improvement
CVBS	composite video broadcast signal
DES	data encryption standard
DRM	digital rights management
DTMB	digital terrestrial multimedia broadcasting
DVFS	dynamic voltage frequency scaling
ECC	error correcting code
eMMC	embedded multimedia card
GPIO	general-purpose input/output
GPU	graphics processing unit
HDCP	high-bandwidth digital content protection
HDMI	high-definition multimedia interface
HDR	high dynamic range

HEVC	high efficiency video coding
HFR	High Frame Rate
HLG	Hybitid Log-Gamma
I^2C	inter-integrated circuit
IR	infrared
I^2S	inter-IC sound
LTI	luma transient improvement
LVDS	low-voltage differential signaling
MC	motion compensation
MHL	mobile high-definition link
OD	Over Drive
OSD	on-screen display
PCB	printed circuit board
POR	power-on reset
PVR	personal video recorder
PWM	pulse-width modulation
P2P	Peer to Peer
QAM	quadrature amplitude modulation
RGBW	Red Green Blue White
RISC	reduced instruction set computing
ROI	region of interest
ROP	raster of operation
SDIO	secure digital input/output
SIF	sound intermediate frequency
SLC	single-level cell
SLF	Scene Luminance fidelity
SoG	sync on green
SPDIF	Sony/Philips digital interface
SPI	serial peripheral interface
SVP	secure video path
TCON	Timing Controler
TEE	Trusted Execution Environment
TCON	Timing Controler
TS	transport stream
UART	universal asynchronous receiver transmitter
VBR	variable bit rate