



MT5193 Datasheet

Version: 0.3
Release date: 2011-02-14

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Document Revision History

Revision	Date	Author	Description
0.1	2010-11-29	HS Chou	Initial Draft
0.2	2011-01-07	HS Chou	Update thermal characteristic
0.3	2011-02-14	HS Chou	Update DC characteristic

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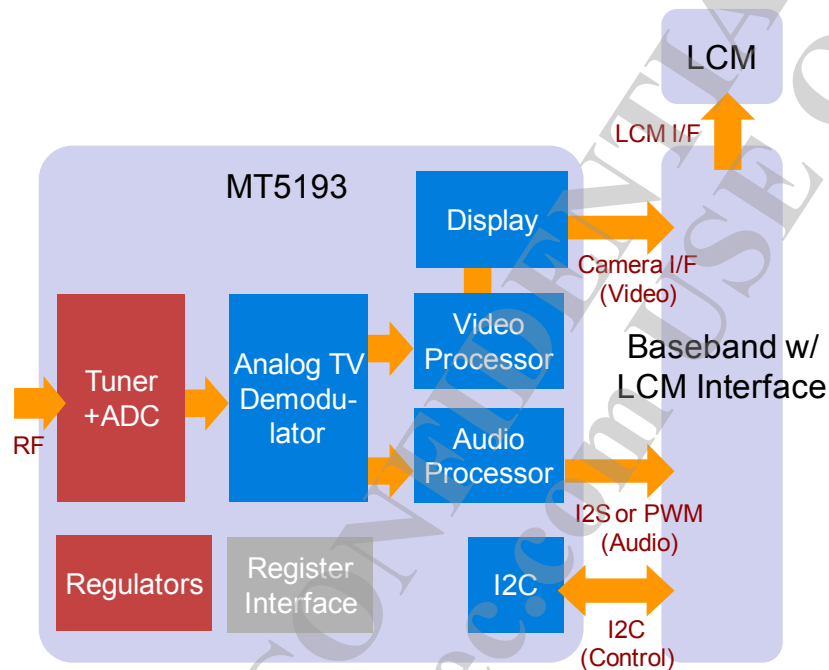
1 GENERAL DESCRIPTION

The MediaTek MT5193 is a single chip universal analog television/FM receiver that integrates VHF/UHF full-band RF tuner, alignment-free multistandard TV/FM demodulator, audio processor, video processor, scalar/rotation functions, and power regulators. It is low power and high sensitivity device optimized for mobile applications such as handset, PDA, notebook, PMP, and other portable devices.

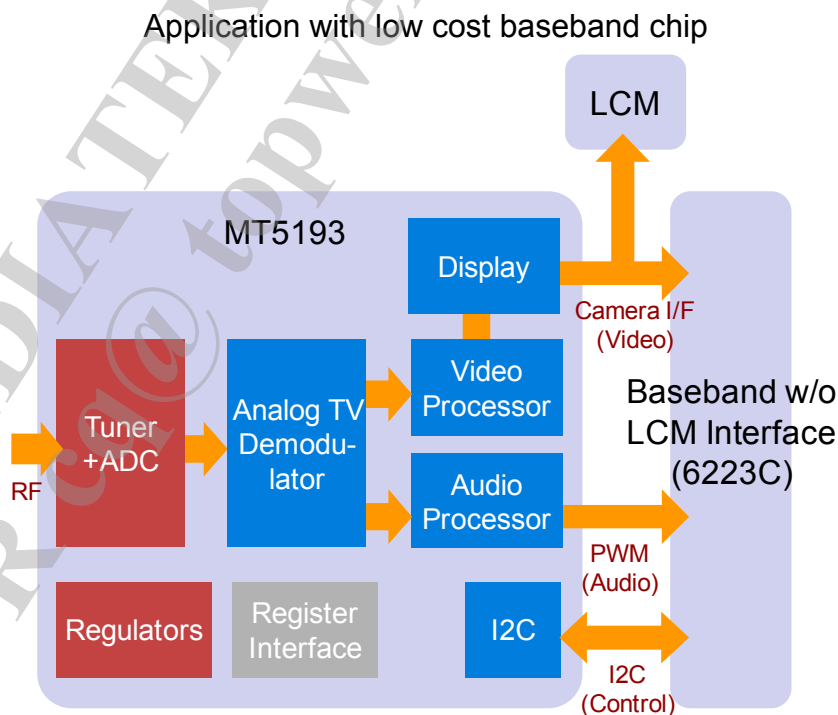
Key Features:

1. Zero-IF direct conversion tuner with VHF/UHF full band tuning range
2. Universal analog broadcasting standard compliant
3. Stereo FM radio reception support
4. Single-ended RF matching support
5. CCIR/601 compliant video interface
6. Dual audio interface (analog/I2S)
7. Dual I/O voltage support (1.8V and 2.8V)
8. Embedded power regulators
9. Excellent video/audio sensitivity
10. Small form factor and low BOM count; occupies small PCB area
11. Excellent stability under multipath and high-speed mobile conditions
12. Excellent adjacent channel interference (ACI) immunity
13. Wide carrier frequency acquisition range
14. Possess good non-standard signal reception capability
15. Fast/robust channel scan and channel switching

2 FUNCTIONAL BLOCK DIAGRAM



Application with conventional baseband chip



Application with low cost baseband chip

3 GENERAL FEATURE LIST

- IC Outline
 - QFN5x5 40-pin package
 - 2.8V for RF frontend
 - 1.2V for core logic
 - 1.8V or 2.8V for digital I/O
 - I2C control interface
 - Integrated power regulators (LDO) for optimizing system performance and RBOM cost
- RF Tuner
 - Zero-IF direct conversion receiver front-end with FM and VHF/UHF full band tuning range
 - Supports single-ended matching
 - Integrated VCOs, Synthesizers, LNAs, balanced I/Q down mixers, baseband filters and PGAs
 - Integrated automatic bandwidth tracking for LPF to compensate for temperature and process variations
 - Integrated wide band power detector for RF performance optimization
 - On-chip high-performance ADC for Zero IF I/Q interface
 - Excellent noise figure performance
 - Minimize external components counts
 - No manually tunable parts required
- Demodulator and Video/Audio Processors
 - Supports worldwide analog TV broadcasting standards: PAL (B/G,D/K,I,H,M/N,Nc), NTSC, NTSC-4.43, and SECAM (B/G, D/K,I,L/L')
 - Supports rich TV audio signal standards: BTSC, PAL FM (B/G,D/K,I), FM high deviation mode, NICAM (B/G,D/K,I) , A2 (KOREA,D/K,B/G), and SECAM AM
 - Supports stereo FM radio reception, stereo blend, soft mute, and high cut control
 - Supports flexible scalar options with multiple resolutions and frame rates
 - Camera interface for video output: supports CCIR/601 compliant 8-bit video output and CCIR/656 interface (YCbCr 4:2:2 format)
 - Audio output interface: supports both analog and digital (I2S) type
 - Full-digital frequency recovery with wide acquisition range
 - Robust to high-speed mobile condition and multipath interference
 - Robust to adjacent-channel interference (ACI) and co-channel interference (CCI)
 - Possess good non-standard signal reception capability
 - Fast/robust channel scan and channel switching

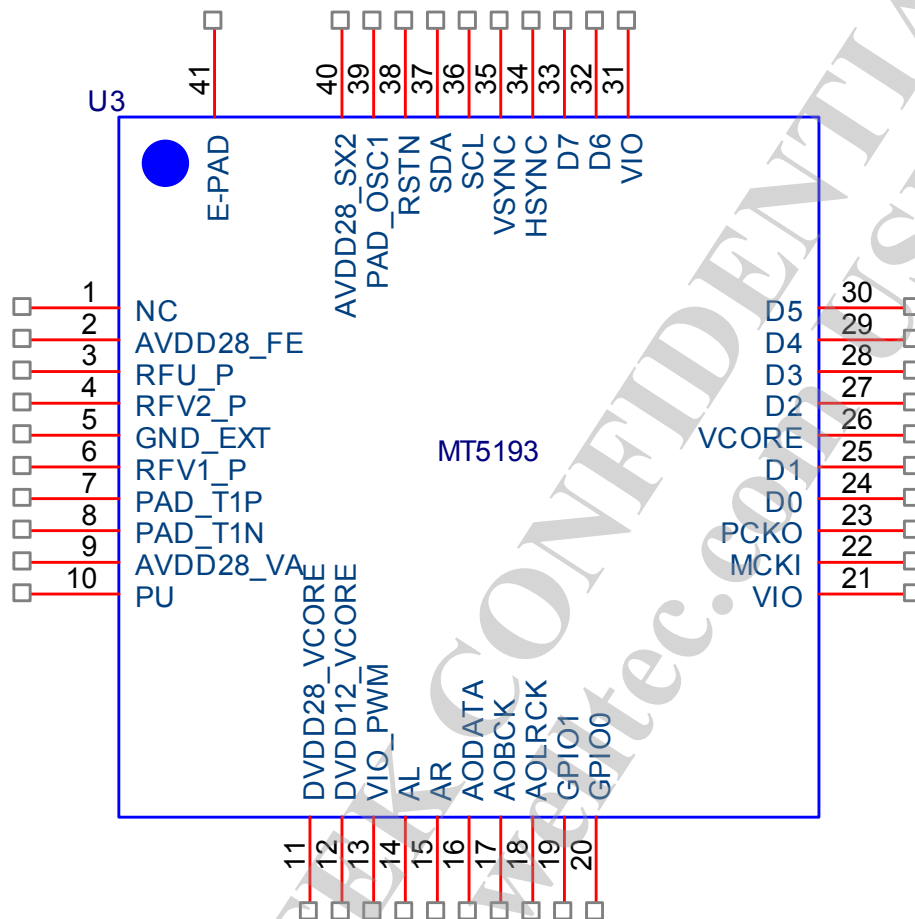
Video Resolution Support

Screen Rotation	H/V Resolution (pixel)	Noise Reduction	Progressive Mode	Video Output Format	Remark
Yes	320x240~4x4 *	Yes	Yes	CCIR/601**	320x240 is the default resolution
No	720x480	No	No	CCIR/656	Option for higher resolution panel

* the horizontal/vertical resolution setting can be changed in the multiple of 4

** CCIR/601 compliant 8-bit parallel video output

4 PIN ASSIGNMENT of MT5193

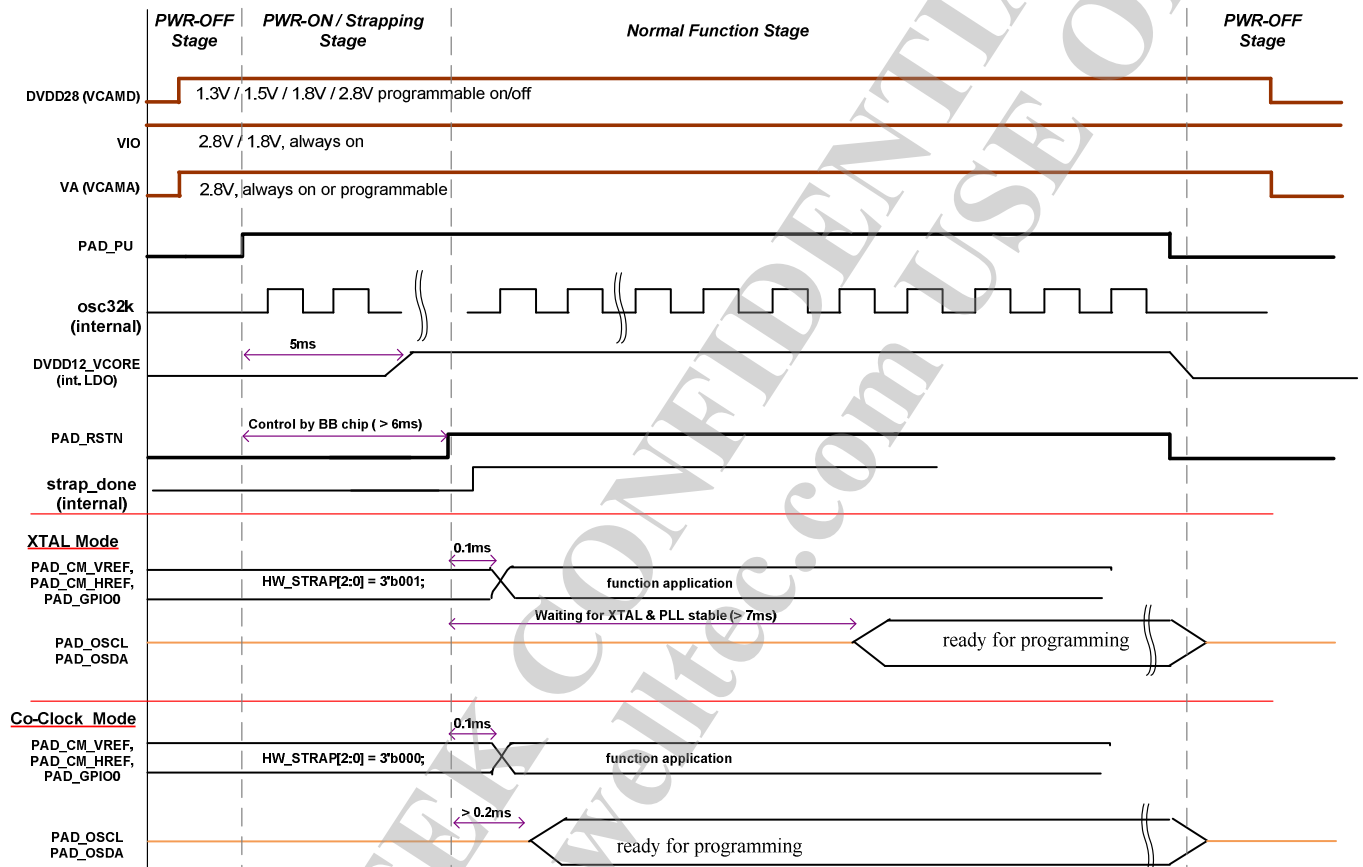


5 PIN DESCRIPTION of MT5193

Pin	Symbol	Type	Description
1	NC	NC	No Connect
2	AVDD28_FE	VCC_RF	RF 2.8volt supply
3	RFU_P	I	RF UHF input
4	RFV2_P	I	RF VHF2 input
5	GND_EXT	AVSS	Ground
6	RFV1_P	I	RF VHF1 input
7	PAD_T1P	IO	Test 1 positive pin
8	PAD_T1N	IO	Test 1 negative pin
9	AVDD28_VA	AVDD28	ADC 2.8V power supply
10	PU	I	PMU enable pin (High enable, 2.8V only)
11	DVDD28_VCORE	VDD_VCORE	DVDD12 LDO Input 2.8V/1.8/1.5V supply
12	DVDD12_VCORE	VDD12	DVDD12 LDO output
13	VIO_PWM	AVDD28	PWM pad power 2.8V supply
14	AL	O	Audio PWM left CH output
15	AR	O	Audio PWM right CH output
16	AODATA	O	I2S data output
17	AOBCK	IO	I2S bit CLK
18	AOLRCK	IO	I2S word CLK
19	GPIO1	IO	GPIO1 (Default) or AOMCK (I2S MCLK)
20	GPIO0	IO	GPIO0 or CLK mode strap for pin39. For strap, NC: Xtal mode; "Pull-low": external 26MHz CLK input.
21	VIO	DVDD28	Digital 2.8volt supply
22	MCKI	I	Camera external CLK input
23	PCKO	O	Camera pixel CLK
24	D0	O	Camera/CCIR data bit 0
25	D1	O	Camera/CCIR data bit 1
26	VCORE	DVDD12	Digital 1.2volt supply
27	D2	O	Camera/CCIR data bit 2
28	D3	O	Camera/CCIR data bit 3
29	D4	O	Camera/CCIR data bit 4
30	D5	O	Camera/CCIR data bit 5
31	VIO	DVDD28	Digital 2.8volt supply
32	D6	O	Camera/CCIR data bit 6
33	D7	O	Camera/CCIR data bit 7
34	HSYNC	O	Camera HSYNC signal

Pin	Symbol	Type	Description
35	VSYNC	O	Camera VSYNC signal
36	SCL	I	SIF CLK
37	SDA	IO	SIF DATA
38	RSTN	I	RTSTN
39	PAD_OSC1	I	Reference xtal or Ext. CLK input
40	AVDD28_SX2	VCC_RF	RF 2.8volt supply

6 POWER-ON SEQUENCE



7 CRYSTAL SPECIFICATION

26MHz Crystal		
Parameters	Value	Unit
Nominal Frequency	26	MHz
Oscillation Mode	Fundamental	
Load Capacitance	8~11	pF
Frequency Tolerance (25°C)	±10	ppm
Effective Series Resistance	30	ohm
Operation Temperature Range	-20~ +75	°C
Stability Over Operation Temperature Range	±10	ppm

8 ELECTRICAL CHARACTERISTICS

8.1 Absolute Maximum Rating

Symbol	Parameters	Value	Unit
DVDD28	IO 2.8V supply voltage	-0.3 to 3.08	V
DVDD12	Core 1.2V supply voltage	-0.3 to 1.32	V
AVDD28	2.8V Analog supply voltage	-0.3 to 3.08	V
AVDD28_PWM	2.8V PWM pad supply voltage	-0.3 to 3.08	V
VCC_RF	RF supply voltage	-0.3 to 3.08	V

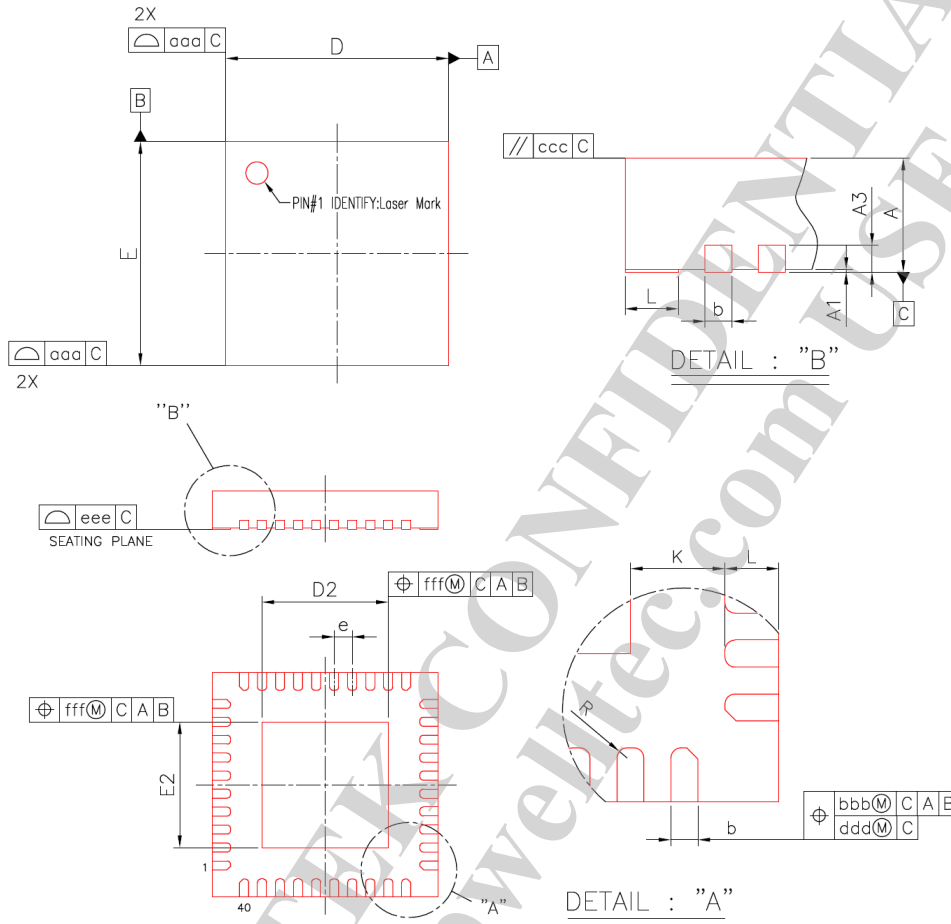
8.2 DC Characteristics

Symbol	Parameters	Min	Typical	Max	Unit	Note
DVDD28	2.8V supply voltage	2.52	2.8	3.08	V	
DVDD12	1.2V supply voltage	1.08	1.2	1.32	V	
AVDD28	Analog 2.8V supply voltage	2.52	2.8	3.08	V	
AVDD28_PWM	PWM 2.8V supply voltage	2.52	2.8	3.08	V	
VCC_RF	RF supply voltage		2.8		V	
IVIO	2.8V supply current		3.5		mA	
I DVDD12	1.2V supply current		44		mA	
I AVDD28	Analog 2.8V supply current		18		mA	
I AVDD28_PWM	PWM 2.8V supply current		1		mA	
I VCC_RF	RF supply current		38		mA	
VIH(2.8V)	2.8V input voltage high	2.0	-	-	V	
VIL(2.8V)	2.8V input voltage low	-	-	0.8	V	
VOH(2.8V)	2.8V output voltage high	2.4	-	-	V	
VOL(2.8V)	2.8V output voltage low	-	-	0.4	V	
VIH(5V)	5V tolerance input voltage high	2.0	-	-	V	
VIL(5V)	5V tolerance input voltage low	-	-	0.8	V	
VOH(5V)	5V tolerance output voltage high	2.4	-	-	V	
VOL(5V)	5V tolerance output voltage low	-	-	0.4	V	

8.3 Thermal Characteristics

Symbol	Parameters	Value	Unit
Ts	Storage Temperature	-40 to 150	°C
Ta	Ambient Temperature	-20 to 85	°C
Tjmax	Maximum Junction operation temperature	125	°C
Θja-4LPCB	Typical value of QFN package junction to ambient thermal resistance on 4 layer PCB	37.6	°C/W
PD(estimate)	Power dissipation	TBD	W
Pdown	Power down mode	0.076	mW

9 OUTLINE DIMENSION



Symbol	Dimension in mm			Dimension in inch		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.80	0.85	0.90	0.031	0.033	0.035
A1	0.00	0.02	0.05	0.000	0.001	0.002
A3	0.20 REF			0.008 REF		
b	0.15	0.20	0.25	0.006	0.008	0.010
D/E	4.90	5.00	5.10	0.193	0.197	0.201
e	0.40 BSC			0.016 BSC		
L	0.30	0.40	0.50	0.012	0.016	0.020
K	0.20	---	---	0.008	---	---
R	0.075	---	---	0.003	---	---
aaa	0.10			0.004		
bbb	0.07			0.003		
ccc	0.10			0.004		
ddd	0.05			0.002		
eee	0.08			0.003		
fff	0.10			0.004		

Exposed Pad Size							Internal Pad Size					
L/F	Dimension in mm			Dimension in inch			Dimension in mm			Dimension in inch		
	MIN	NOM	MAX	MIN	NOM	MAX	MIN	NOM	MAX	MIN	NOM	MAX
D2/E2	2.65	2.80	2.95	0.104	0.110	0.116	2.85	3.00	3.15	0.112	0.118	0.124

10 TOP MARKING

- MT5193N: Part Number
- YYWW: Date Code
- ALLLLL: Lot Number

