User manual for WIBT30A (for TV)

1. Introduction

WIBT30A is compliant with IEEE802.15.1. The core chipset is BCM2070X from Broadcom.

2. Hardware Architecture:

2.1 Main Chipset Information

Item	Vendor	Part Number
MAC/BBP/Radio Transceiver/PA	Broadcom	BCM2070X

2.2 Circuit Block Diagram

The major internal components and external interfaces of WIBT30A are illustrated in Figure 1-1.

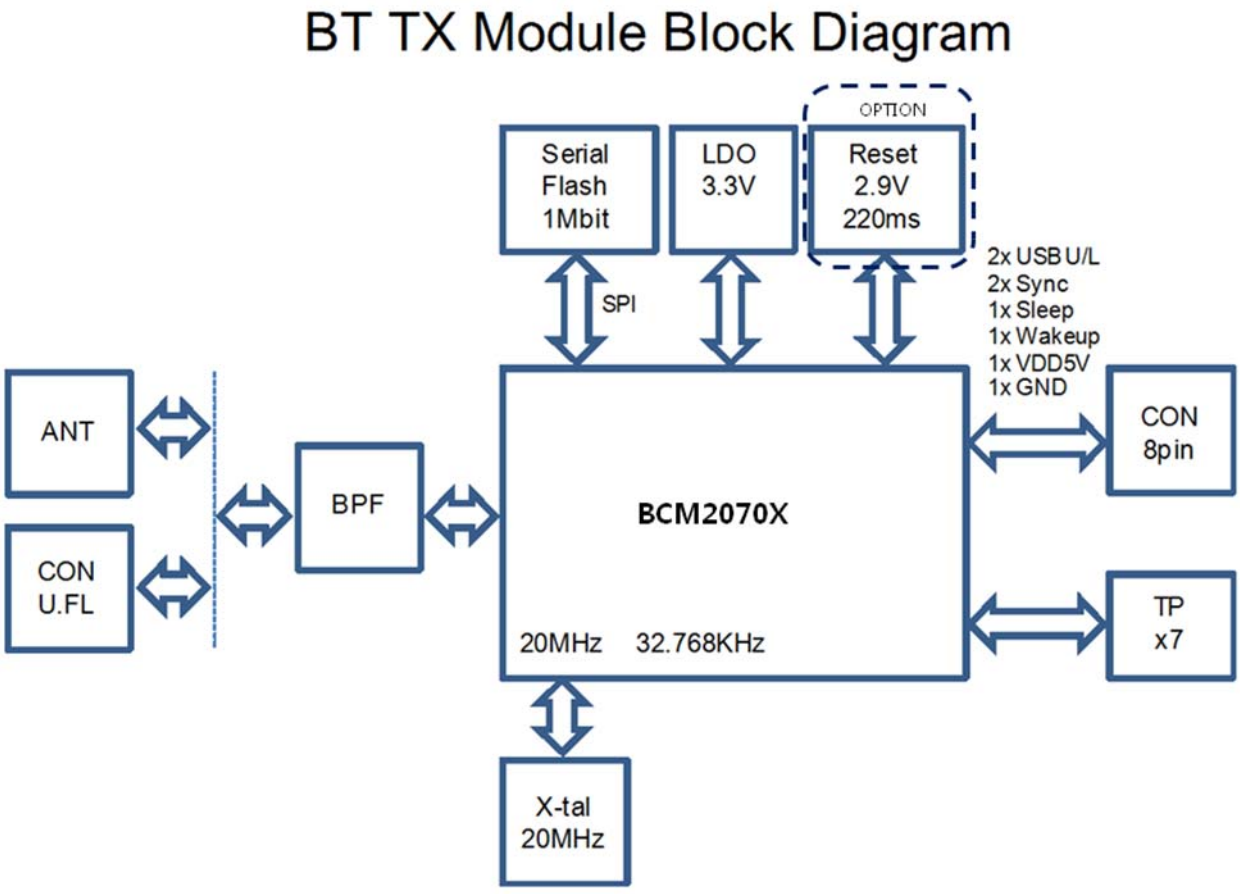


Figure 1-1 WIBT30A Major Components and System Interface

3. Feature

WIBT30A is the 802.15.1 RF Device, that acts as a wireless terminal equipment, which can communicate with a host device.

- Full support for Bluetooth 2.1 + EDR additional features

- Secure simple pairing(SSP)
- encryption pause resume(EPR)

- enhance inquiry response(EIR)
- Link supervision time out(LSTO)

- Sniff subrating(SSR)
- Erroneous Data(ED)
- Packet Boundary flag (PBF)

- Integrated RF section

- Single-ended, 50 ohm RF interface
- Buit-in TX/RX switch functionality
- TX class 1 output power capability
- -88 dBm RX sensitivity basic rate

Parameter	*Conditions*	*Minimum*	*Typical* [c]	*Maximum*	*Unit*
General					
Frequency range	–	2402	–	2480	MHz
RX sensitivity [d]	GFSK, 0.1% BER, 1 Mbps, UFBGA and WFBGA packages	–	–89	–85	dBm
	GFSK, 0.1% BER, 1 Mbps, WLBGA package	–	–88	–84	dBm
	π/4-DQPSK, 0.01% BER, 2 Mbps	–	–91	–85	dBm
	8-DPSK, 0.01% BER, 3 Mbps UFBGA and WFBGA packages	–	–86	–81	dBm
	8-DPSK, 0.01% BER, 3 Mbps, WLBGA package	–	–85	–80	dBm
Maximum input	GFSK, 1 Mbps	–	–	–20	dBm
Maximum input	π/4-DQPSK, 8-DPSK, 2/3 Mbps	–	–	–20	dBm
Interference Performance					
C/I cochannel	GFSK, 0.1% BER	–	–	11	dB
C/I 1 MHz adjacent channel	GFSK, 0.1% BER	–	–	0	dB
C/I 2 MHz adjacent channel	GFSK, 0.1% BER	–	–	–30.0	dB
C/I ≥ 3 MHz adjacent channel	GFSK, 0.1% BER	–	–	–40.0	dB
C/I image channel	GFSK, 0.1% BER	–	–	–9.0	dB
C/I 1 MHz adjacent to image channel	GFSK, 0.1% BER	–	–	–20.0	dB
C/I cochannel	π/4-DQPSK, 0.1% BER	–	–	13	dB
C/I 1 MHz adjacent channel	π/4-DQPSK, 0.1% BER	–	–	0	dB
C/I 2 MHz adjacent channel	π/4-DQPSK, 0.1% BER	–	–	–30.0	dB
C/I ≥ 3 MHz adjacent channel	8-DPSK, 0.1% BER	–	–	–40.0	dB
C/I image channel	π/4-DQPSK, 0.1% BER	–	–	–7.0	dB
C/I 1 MHz adjacent to image channel	π/4-DQPSK, 0.1% BER	–	–	–20.0	dB

Parameter	Conditions	Minimum	Typical [c]	Maximum	Unit
C/I cochannel	8-DPSK, 0.1% BER	–	–	21	dB
C/I 1 MHz adjacent channel	8-DPSK, 0.1% BER	–	–	5	dB
C/I 2 MHz adjacent channel	8-DPSK, 0.1% BER	–	–	–25.0	dB
C/I ≥ 3 MHz adjacent channel	8-DPSK, 0.1% BER	–	–	–33.0	dB
C/I Image channel	8-DPSK, 0.1% BER	–	–	0	dB
C/I 1 MHz adjacent to image channel	8-DPSK, 0.1% BER	–	–	–13.0	dB
Out-of-Band Blocking Performance (CW) [e]					
30 MHz–2000 MHz	0.1% BER	–	–10.0	–	dBm
2000–2399 MHz	0.1% BER	–	–27	–	dBm
2498–3000 MHz	0.1% BER	–	–27	–	dBm
3000 MHz–12.75 GHz	0.1% BER	–	–10.0	–	dBm
Out-of-Band Blocking Performance, Modulated Interferer					
776–764 MHz	CDMA	–	–15	–	dBm
824–849 MHz	CDMA	–	–15	–	dBm
1850–1910 MHz	CDMA	–	–20	–	dBm
824–849 MHz	EDGE/GSM	–	–10	–	dBm
880–915 MHz	EDGE/GSM	–	–10	–	dBm
1710–1785 MHz	EDGE/GSM	–	–15	–	dBm
1850–1910 MHz	EDGE/GSM	–	–15	–	dBm
1850–1910 MHz	WCDMA	–	–25	–	dBm
1920–1980 MHz	WCDMA	–	–25	–	dBm
Intermodulation Performance [f]					
BT, Df = 5 MHz	–	–39.0	–	–	dBm

Parameter	Conditions	Minimum	Typical [c]	Maximum	Unit
Spurious Emissions [g]					
30 MHz to 1 GHz	–	–	–	–57	dBm
1 GHz to 12.75 GHz	–	–	–	–47	dBm
65 MHz to 108 MHz	FM Rx	–	–145	–	dBm/Hz
746 MHz to 764 MHz	CDMA	–	–145	–	dBm/Hz
851–894 MHz	CDMA	–	–145	–	dBm/Hz
925–960 MHz	EDGE/GSM	–	–145	–	dBm/Hz
1805–1880 MHz	EDGE/GSM	–	–145	–	dBm/Hz
1930–1990 MHz	PCS	–	–145	–	dBm/Hz
2110–2170 MHz	WCDMA	–	–145	–	dBm/Hz

Figure 3-1 Receiver RF Specifications (bcm2070X)

RECEIVER							
RCV/CA/07/C (EDR Sensitivity)	3-DH5;Hopping Off;Payload = Tx;Dirty TX = On;Tx power [dBm] = -70.00;						
	Min	Max	***2402***	***2441***	***2480***		
EDR BER @ Ref Sens (1.6e6/-70)*	-	0.00007	0.00E+00	0.00E+00	0.00E+00	[BER]	PASS
EDR BER @ Ref Sens (16e6/-70 if 1st fail)**	-	0.0001	-	-	-	[BER]	PASS
RCV Sensitivity Level Search	3-DH5;Hopping Off;Payload = Tx;Dirty TX = On;						
	Min	Max	***2402***	***2441***	***2480***		
EDR Receiver 0.01% BER Sensivity Level	-	-70	-84.02	-84.38	-83.38	[dBm]	PASS
EDR Receiver PER @0.01% BER	-	-					
RCV/CA/08/C (EDR BER Floor Performance)	3-DH5;Hopping Off;Payload = Tx;Dirty TX = Off;Tx power [dBm] = -60.00;						
	Min	Max	***2402***	***2441***	***2480***		
EDR BER Floor Performance (8e6/-60)*	-	0.000007	0.00E+00	0.00E+00	0.00E+00	[BER]	PASS
EDR BER Floor Performance (160e6/-60 if 1st fail)**	-	0.00001	-	-	-	[BER]	PASS
TP/RCV/CA/09/C (EDR C/I Performnace)	3-DH5;Hopping Off;Payload = Tx;Dirty TX = Off;						
	Min	Max	***2405***	***2441***	***2477***		
Number of Fails	0	0	0	0	0		PASS
Number of Exceptions	0	5	1	0	0		PASS
RCV/CA/10/C (EDR Maximum Input Level)	3-DH5;Hopping Off;Payload = Tx;Tx power [dBm] = -20.00 dBm TxLevel;						
	Min	Max	***2402***	***2441***	***2480***		
EDR Maximum Input Level (-20/1.6e6)	-	0.001	0.00E+00	0.00E+00	0.00E+00	[BER]	PASS

Figure 3-2 Receiver RF Specifications (WIBT30A)

Parameter	Conditions	Minimum	Typical	Maximum	Unit
General					
Frequency range	–	2402	–	2480	MHz
Class1: GFSK Tx power [c]	–	6.5	10	–	dBm
Class1: EDR Tx power [d]	–	4.5	8	–	dBm
Class 2: GFSK Tx power	–	–0.5	3	–	dBm
Power control step	–	2	4	6	dB
Modulation Accuracy					
π/4-DQPSK Frequency Stability	–	–10	–	10	kHz
π/4-DQPSK RMS DEVM	–	–	–	20	%
π/4-QPSK Peak DEVM	–	–	–	35	%
π/4-DQPSK 99% DEVM	–	–	–	30	%
8-DPSK frequency stability	–	–10	–	10	kHz
8-DPSK RMS DEVM	–	–	–	13	%
8-DPSK Peak DEVM	–	–	–	25	%
8-DPSK 99% DEVM	–	–	–	20	%
In-Band Spurious Emissions					
+500 kHz	–	–	–	–20	dBc
1.0 MHz < |M – N| < 1.5 MHz	–	–	–	–26	dBc
1.5 MHz < |M – N| < 2.5 MHz	–	–	–	–20	dBm
|M – N| ≥ 2.5 MHz	–	–	–	–40	dBm
Out-of-Band Spurious Emissions					
30 MHz to 1 GHz	–	–	–	–36.0 [e]	dBm
1 GHz to 12.75 GHz	–	–	–	–30.0 [e, f]	dBm
1.8 GHz to 1.9 GHz	–	–	–	–47.0	dBm
5.15 GHz to 5.3 GHz	–	–	–	–47.0	dBm
GPS Band Noise Emission (without a front-end band pass filter)					
1572.92 MHz to 1577.92 MHz	–	–	–150	–127	dBm/ Hz

Parameter	Conditions	Minimum	Typical	Maximum	Unit
Out-of-Band Noise Emissions (without a front-end band pass filter)					
65 MHz to 108 MHz	FM Rx	–	–145	–	dBm/ Hz
746 MHz to 764 MHz	CDMA	–	–145	–	dBm/ Hz
869 MHz to 960 MHz	CDMA	–	–145	–	dBm/ Hz
925 MHz to 960 MHz	EDGE/GSM	–	–145	–	dBm/ Hz
1805 MHz to 1880 MHz	EDGE/GSM	–	–145	–	dBm/ Hz
1930 MHz to 1990 MHz	PCS	–	–145	–	dBm/ Hz
2110 MHz to 2170 MHz	WCDMA	–	–145	–	dBm/ Hz

Figure 3-3 Transmitter RF Specifications(bcm2070X)

TRANSMITTER							
TRM/CA/10/C (EDR Relative Transmit Power)	3-DH5;Hopping Off;Loopback;EUT Max & Min;# of blocks/packets = 10;						
	Rel. Min	Rel. Max	***Min***	***Avg***	***Max***		
			EDR Absolute Power				
2402	-	-	6.26	6.29	6.29	dBm	
2441	-	-	7.13	7.15	7.15	dBm	
2480	-	-	7.31	7.32	7.32	dBm	
			EUT TX Power MAX				
2402	-4	1	-1.56	-1.57	-1.59	[dB]	PASS
2441	-4	1	-1.56	-1.57	-1.58	[dB]	PASS
2480	-4	1	-1.55	-1.56	-1.56	[dB]	PASS
			EUT TX Power MIN				
2402	-4	1	-1.66	-1.67	-1.68	[dB]	PASS
2441	-4	1	-1.66	-1.67	-1.68	[dB]	PASS
2480	-4	1	-1.66	-1.67	-1.68	[dB]	PASS
TRM/CA/11/C (EDR Carrier Frequency Stability and Modulation Accuracy)	3-DH5;Hopping Off;Loopback;# of blocks/packets = 200;						
	Min	Max	***Min***	***-***	***Max***		
99% DEVM<=0.20	99	-	100	-	100	[%]	PASS
Peak DEVM	-	0.25	0.139	-	0.147		PASS
RMS DEVM	-	0.13	0.059	-	0.059		PASS
Init Freq Error (kHz)	-75	75	3.2	-	3.8	[kHz]	PASS
Freq Error(kHz)	-10	10	-2.5	-	-1.8	[kHz]	PASS
Block Freq Error(kHz)	-75	75	2.4	-	3.6	[kHz]	PASS
TRM/CA/12/C (EDR Differential Phase Encoding)	3-DH1;Hopping Off;# of blocks/packets = 100;						
	Min	Max	***2402***	***2441***	***2480***		
% Good Packets	99	-	100	100	100	[%]	PASS
TRM/CA/13/C (EDR In-band Spurious Emission)	3-DH5;Hopping Off;Loopback;EUT Max;						
	Min	Max	***2405***	***2441***	***2477***		
Number of Fails	0	0	0	0	0		PASS
Number of Exceptions	0	3	0	0	0		PASS

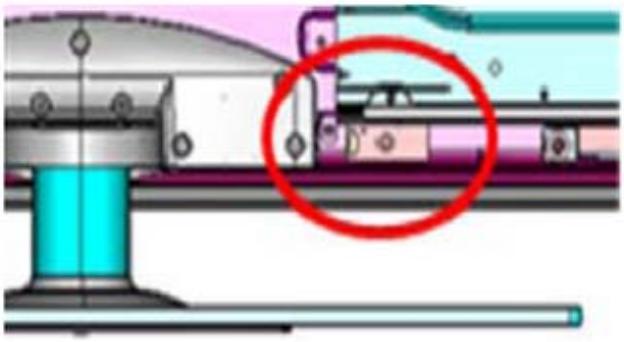
Figure 3-4 Transmitter RF Specifications(WIBT30A)

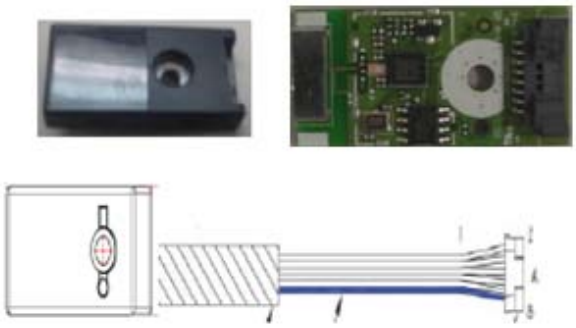
4. PIN description

NO	Pin name	I/O
1	Power Det	I
2	TV Wake Up	O
3	A5V	I
4	USB D- (BT)	I/O
5	USB D+ (BT)	I/O
6	GND	-
7	3D V Sync	I
8	Frame Sync	O

5. Installation

This radio module must be installed in a device and not allow the user to replace nor modify it.
And the location of installation is as follows Figure 5-1.





6. Notice

I.

This device complies with Part 15 of FCC Rules. Operation is Subject to following two conditions:

(1) This device may not cause harmful interference, and

(2) This device must accept any interference received including interference that cause undesired operation.

This equipment has been tested and found to comply within 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 or more 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 different circuit from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help.

The transmitter must not be co-located or operated in conjunction wit any other antenna or transmitter.

The available scientific evidence does not show that any health problems are associated with using low power wireless devices. There is no proof, however, that these low power wireless devices are absolutely safe. Low power wireless devices emit low levels of radio frequency energy (RF) in the microwave range while being used. Whereas high levels of RF can produce health effects (by heating tissue), exposure to low-level RF that does not produce heating effects causes no known adverse health effects. Many studies of low-level RF exposures have not found any biological effects. Some studies have suggested that some biological effects might occur, but such findings have not been confirmed by additional research.

To satisfy RF exposure requirements, this device and its antenna(s) must operate with a separation distance of at least 20 centimeters from all persons and must not be co-located or operated in conjunction with any other antenna or transmitter. End-users must be provided with specific operating instructions for satisfying

RF exposure.

FCC WARNING:

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

LABEL OF THE END PRODUCT:

The final end product must be labeled in a visible area with the following " Contains FCC ID: A3LWIBT30A ".

If the size of the end product is larger than 8x10cm, then the following FCC part 15.19 statement has to also be available on the label: This device complies with Part 15 of 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.

IC Statement

This Class B digital apparatus complies with Canadian ICES-003.

Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil num?rique de la classe B est conforme ? la norme NMB-003 du Canada.

This device and its antenna(s) must not be co-located or operation in conjunction with any other antenna or transmitter.

LABEL OF THE END PRODUCT:

The final end product must be labeled in a visible area with the following "Contains IC : 649E-WIBT30A".