



AWD617T, AWD616R

2.4GHz Digital Audio RF Module

2011 AUG 28

Preliminary Rev0.9

FEATURES

- Worldwide 2.4GHz ISM band operation
- Highly robust forward error correction (FEC)
- Up to 2Mbps on air data rate
- 34 hopping frequencies
- 4 hopping sequences (RF channels)
- GFSK modulation
- ID codes to provide TX / RX pairing
- Auto channel scanning mechanism provided
- No RF induced audio noise
- Typical delay time 55ms (optional 20ms)
- Ready to go reference system
- Low power consumption
- Auto shutdown on low power

APPLICATIONS

- Low Cost/High Performance Wireless Audio
 - Wireless Surround Rear Speakers
 - High Performance Digital Audio Link
 - Wireless Headphone/Earphone
 - Wireless USB Transmitter
 - Wireless Skype phone
- FCC CFR47 Part 15, ETSI EN 300 328, EN 300 440 and ARIB STD-T-66 Compliant Radio.

1. General Description

The RF module transmitter employed GFSK modulation to deliver high-speed data rate up to 2Mbps.

The RF module receiver with -85dBm or better sensitivity allows system to achieve at least 300 feet transmission for line-of-sight application in open site.

2. Absolute Maximum Ratings

Symbol	Parameter	Min.	Max.	Unit
VDD	Supply voltage	2.8	3.6	V
T _{stg}	Storage temperature	-40	+125	°C
T _A	Operating temperature	-10	+55	°C
AUD_SEL	Audio source selection (For Transmitter)		3.6	V
PWR_CTL_IN	Power control in (For Receiver)		3.6	V
RX _{max}	Receiver maximum received signal at 0.1% BER		-15	dBm

3. Operating conditions

Symbol	Parameter (condition)	Note	Min.	Typ.	Max.	Unit
VDD	Supply voltage		2.8	3.0	3.6	V
AGND	Analog Ground			0		V
DGND	Digital Ground			0		V
VDT_IN	Voltage Detector input (For RX , VDT_IN > +1.3Vdc)		1.3		3.6	V
T _A	Operating Temperature		-10	+27	+55	°C

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4. Electrical specifications

Conditions: **VDD** = +3V, **AGND** = 0V, **DGND** = 0V, T_A = - 10°C to + 55°C

4.1. Power consumption

Symbol	Parameter (condition)	Note	Min.	Typ.	Max.	Unit
Transmitter						
I_{VDD_TX}	Supply current		67	68	72	mA
Receiver						
I_{VDD_RX}	Supply current		35	37	40	mA

4.2. General RF conditions

Symbol	Parameter (condition)	Note	Min.	Typ.	Max.	Unit
F_{OP}	Operating frequency		2400		2525	MHz
PLL_{step}	PLL Programming step			2		MHz
F_{sy}	System frequency			16		MHz
Δf	Frequency deviation			±320		KHz
R_{GFSK}	Air Data rate			2000		kbps
F_{ch}	Channel spacing			2		MHz

4.3. Transmitter operation

Symbol	Parameter (condition)	Note	Min.	Typ.	Max.	Unit
P_{RF}	Maximum output power	a	14	14.5	15	dBm
Modulation	GFSK, FHSS					

a. Conductive measurement

4.4. Receiver operation

Symbol	Parameter (condition)	Note	Min.	Typ.	Max.	Unit
RX_{max}	Maximum received signal at 0.1% BER			-15		dBm
RX_{sens}	Sensitivity(0.1% BER) @ 1.152 Mbps			-85		dBm
Image rejection	Relative to main carrier signal power		47			dBc

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4.5. Audio Specifications

Symbol	Parameter (condition)	Note	Min.	Typ.	Max.	Unit
THD+N	Input = 1kHz, ref=-1dB FS, BW=20Hz-20kHz, Un-weighted, R _{load} =100kΩ			-70		dB
SNR	Input = 1kHz @ 1Vp-p with 20kHz LPF, 100Hz HPF			80		dB
Frequency Response	3dB Bandwidth		20		20k	Hz
Sampling rate	Software defined			48		kHz
Audio Latency	Time Delay @ analog output w.r.t analog input			55 (20)		ms
Crosstalk	Output @ 1kHz			-96		dB
	Transmitter					
Audio Input Impedance	Audio sampling rate = 48kHz		13	20		kΩ
	Receiver					
Load resistance	AC load		16			Ω
Load capacitance					300	pF

4.6. TX/RX Pairing

Symbol	Parameter (condition)	Note	Min.	Typ.	Max.	Unit
TX/RX pairing	ID Code			16		bit
Pairing setting	Tact switch					

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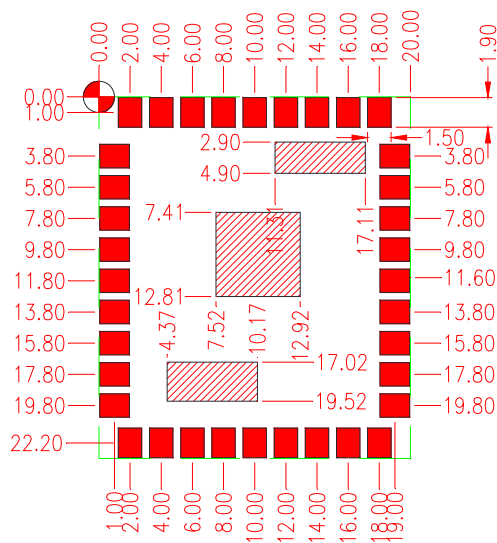
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5. Pin Information

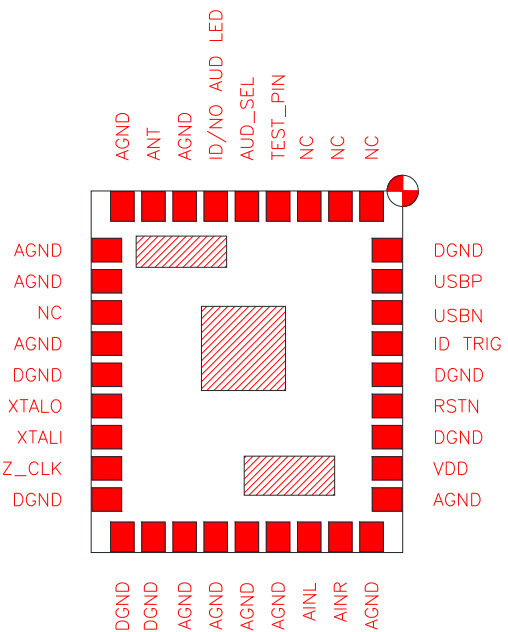
5.1. Transmitter (AWD617T) pin assignment

Diagonally slashed areas are for ground contacts and must be soldered on baseband PCB ground.

Top View



Bottom View



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5.2. Transmitter (AWD617T) pin functions

Pin	Name	Pin function	Description
1	DGND	Power	Digital Ground (0V)
2	USBP	Digital Input	USB transceiver pair, positive polarity D+
3	USBN	Digital Input	USB transceiver pair, negative polarity D+
4	ID TRIG	ID Pairing	Input "Low" about 3seconds for pairing. Default "High"
5	DGND	Power	Digital Ground (0V)
6	RSTN	Digital Input	System reset, low level reset
7	DGND	Power	Digital Ground (0V)
8	VDD	Power	Power Supply (Typ. +3Vdc)
9	AGND	Power	Analog Ground (0V)
10	AGND	Power	Analog Ground (0V)
11	AINR	Analog Input	Right channel Analog Input
12	AINL	Analog Input	Left channel Analog Input
13	AGND	Power	Analog Ground (0V)
14	AGND	Power	Analog Ground (0V)
15	AGND	Power	Analog Ground (0V)
16	AGND	Power	Analog Ground (0V)
17	AGND	Power	Analog Ground (0V)
18	AGND	Power	Analog Ground (0V)
19	DGND	Power	Digital Ground (0V)
20	16MHZ_CLK	Input/Output	Internal 16MHz Output
21	XTALI	Input	External crystal input
22	XTALO	Output	External crystal output
23	DGND	Power	Digital Ground (0V)
24	AGND	Power	Analog Ground (0V)
25	NC	NC	No Connection
26	AGND	Power	Analog Ground (0V)
27	AGND	Power	Analog Ground (0V)
28	AGND	Power	Analog Ground (0V)
29	ANT	RF	Antenna Interface
30	AGND	Power	Analog Ground (0V)
31	ID/NO AUD LED	Input/Output	SYNC indicator
32	AUD_SEL	Input/Output	High = USB input, Low = Analog input Default "Low"
33	TEST_PIN	Input/Output	High = Normal, Low = FT_EMI_Selection
34	NC	NC	No Connection
35	NC	NC	No Connection
36	NC	NC	No Connection

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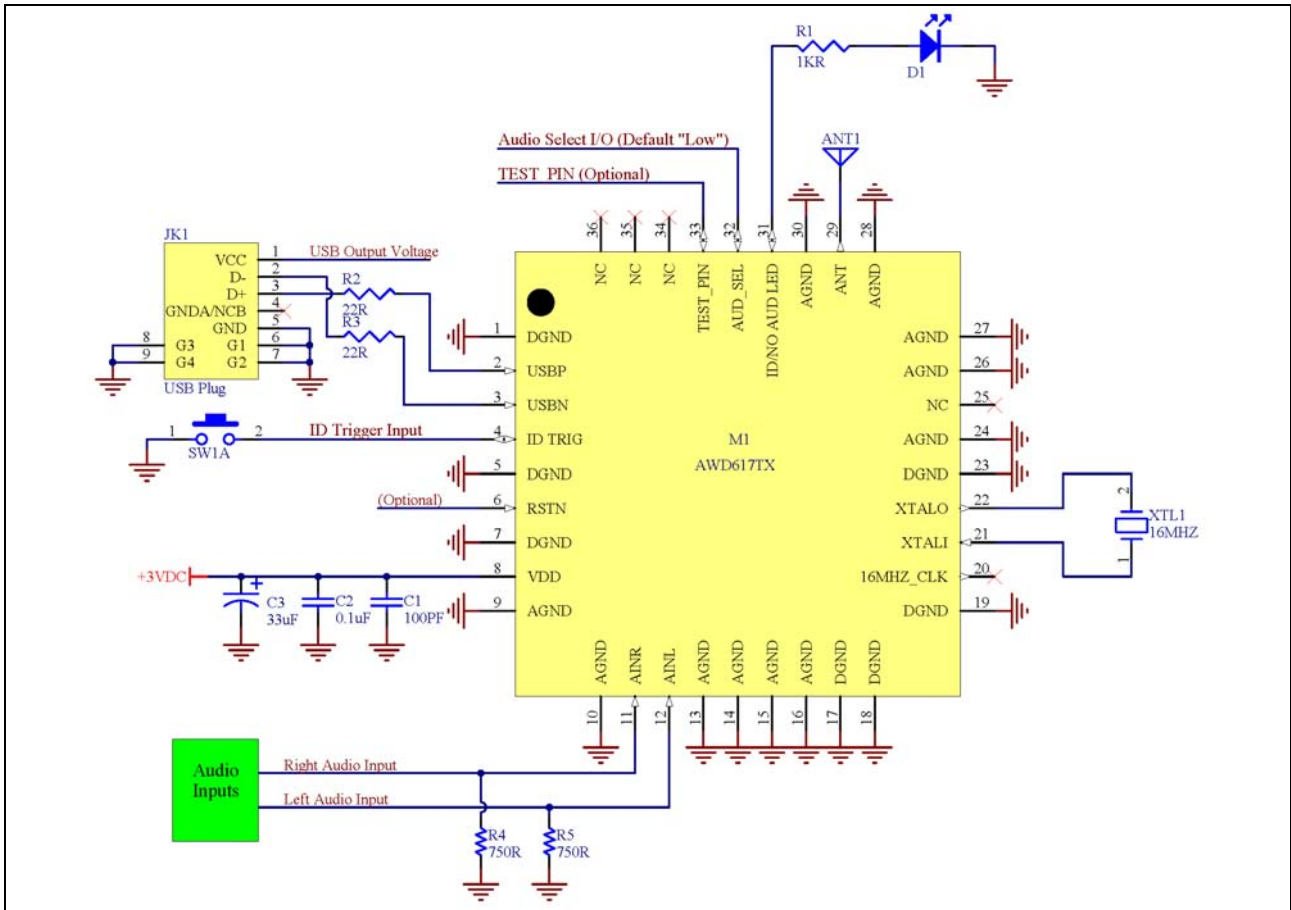
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5.3. AWD617T Module Application Circuit



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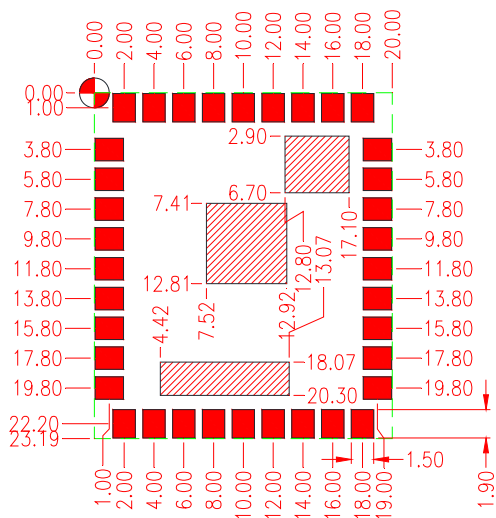
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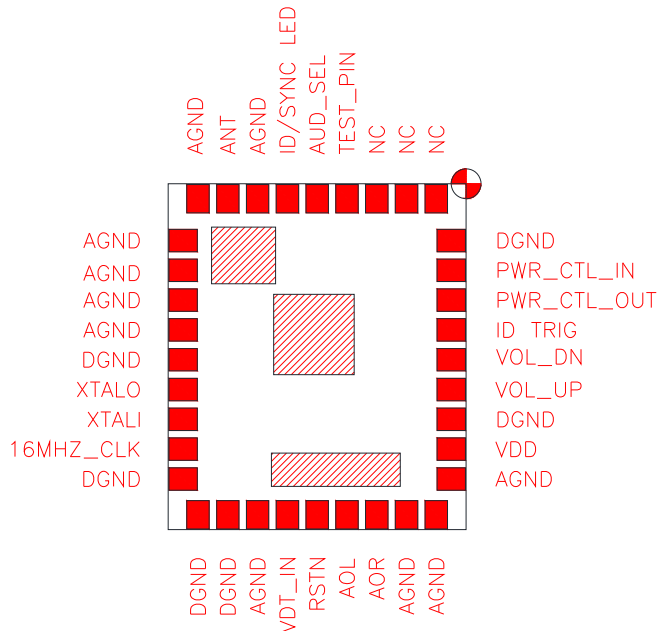
5.4. Receiver (AWD616R) pin assignment

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Top View



Bottom View



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5.5. Receiver (AWD616R) pin functions

Pin	Name	Pin function	Description
1	DGND	Power	Digital Ground (0V)
2	PWR_CTL_IN	Input/Output	Power Control In
3	PWR_CTL_OUT	Input/Output	Power Control Out
4	ID TRIG	ID Pairing	Input "Low" about 3seconds for pairing.
5	VOL_DN	Input/Output	Input "Low" for volume down
6	VOL_UP	Input/Output	Input "Low" for volume up
7	DGND	Power	Digital Ground (0V)
8	VDD	Power	Power Supply (Typ. +3Vdc)
9	AGND	Power	Analog Ground (0V)
10	AGND	Power	Analog Ground (0V)
11	AGND	Power	Analog Ground (0V)
12	AOR	Analog Output	Right channel Analog Output
13	AOL	Analog Output	Left channel Analog Output
14	RSTN	Digital Input	System reset, low level reset
15	VDT_IN	Analog Input	Voltage Detector input (Approx. +1.3Vdc→Low Voltage) Normal operation, VDT_IN > +1.3Vdc
16	AGND	Power	Analog Ground (0V)
17	DGND	Power	Digital Ground (0V)
18	DGND	Power	Digital Ground (0V)
19	DGND	Power	Digital Ground (0V)
20	16MHZ_CLK	Input/Output	Internal 16MHz Output
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31	ID/SYNC LED	Input/Output	SYNC indicator
32	AUD_SEL	Input/Output	High = I2S, Low = PWM, Default "High"
33	TEST_PIN	Input/Output	High = Normal, Low = FT_EMI_Selection
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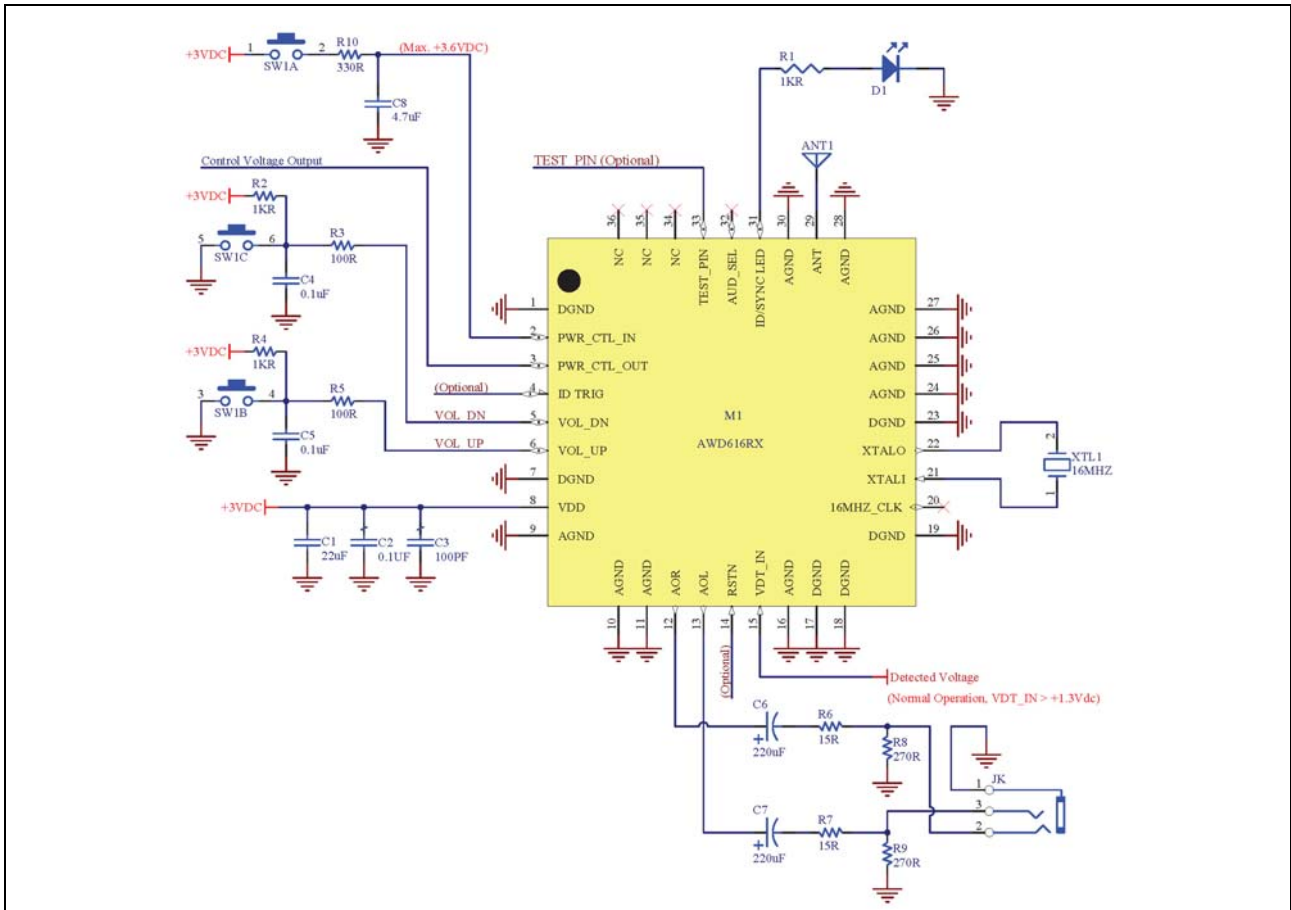
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5.6. AWD616R Module Application Circuit



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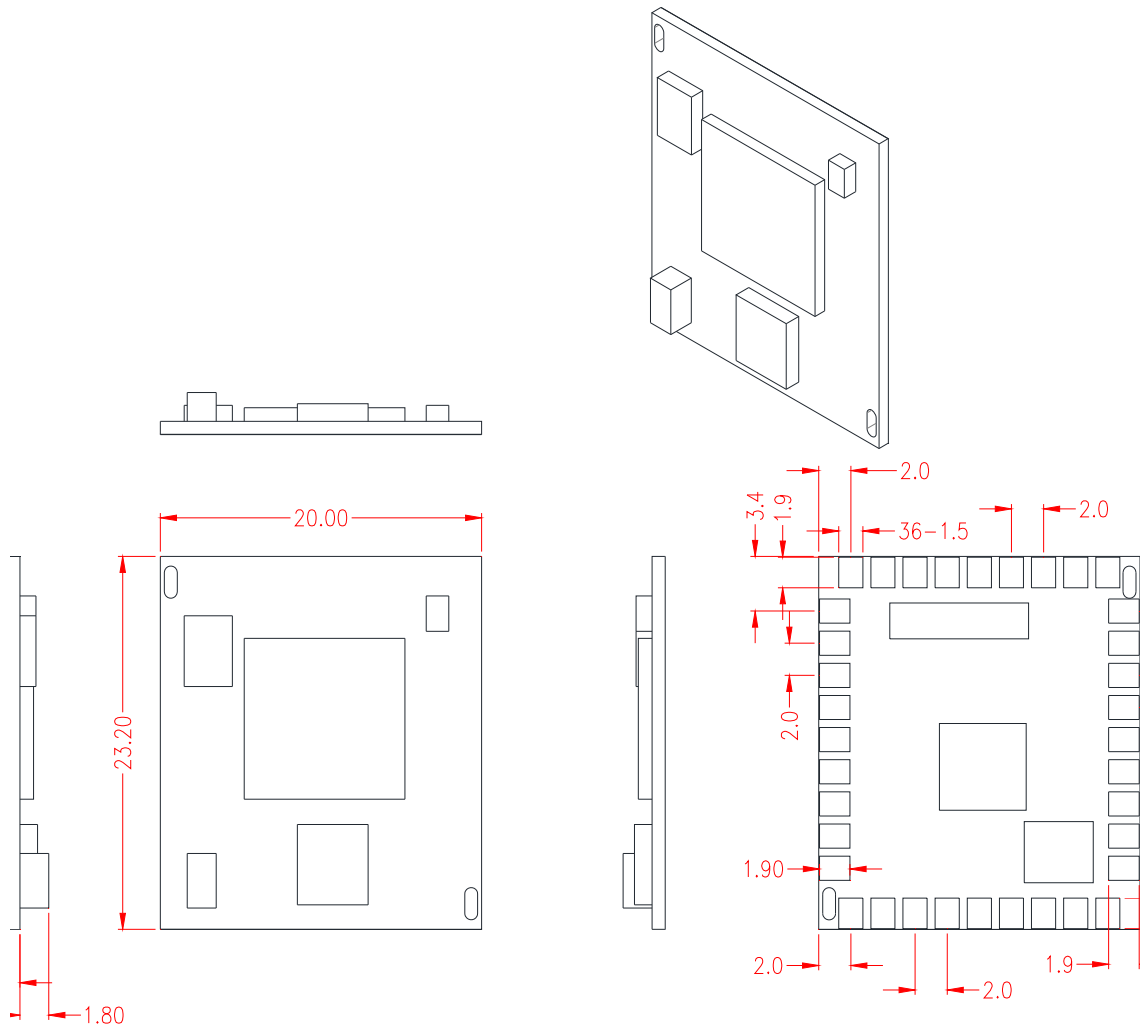
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6.2. Receiver (AWD616R) dimensions



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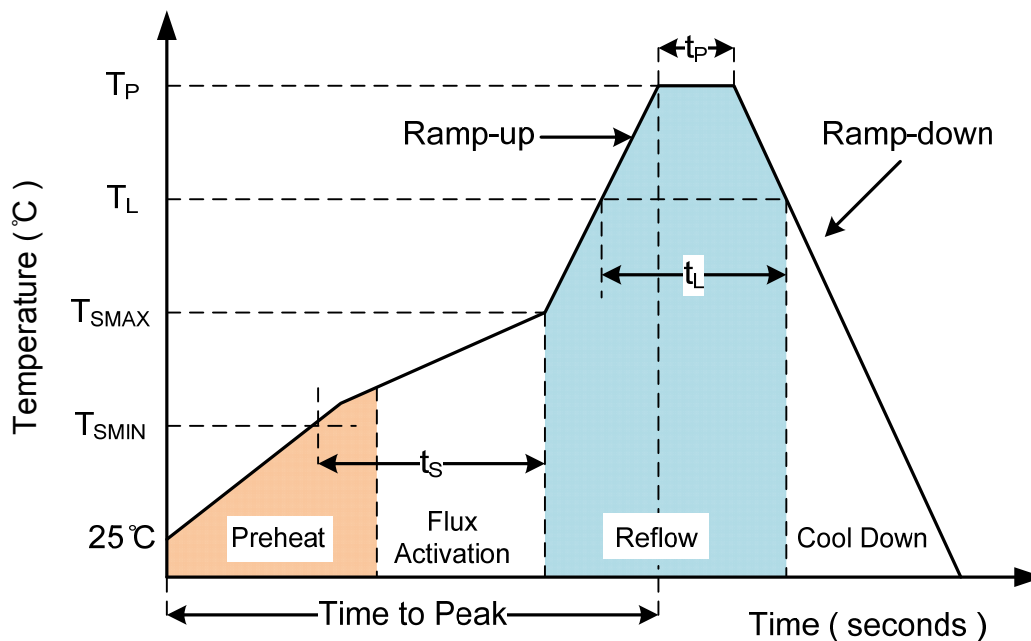
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7. Recommended Reflow Temperature Profile

7.1. Temperature Profile for Convection Reflow



7.2. Reflow Profile

Parameter	Description	Pb-Free Assembly
Ramp-Up	Average Ramp-Up Rate (T _S MAX to T _P)	3°C /second max.
T _S MIN	Preheat Peak Min. Temperature	150°C
T _S MAX	Preheat Peak Max. Temperature	200°C
T _P	Max. Reflow Temperature	250 (+0/-5) °C
t _s	Time between T _S MIN and T _S MAX	60-120 seconds
T _L	Solder Melting Point	217°C
t _L	Time Maintained above T _L	60-150 seconds
t _P	Time within 5°C of Peak Temperature	20-40 seconds
Ramp-Down	Ramp-down Rate	6°C /second max.
Time to Peak	Time from 25°C to Peak Temperature	8 minutes max.

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