LM747 Bluetooth® Dual Mode Audio Module
Standalone (With Embedded Bluetooth® 5 Compliant Stack)

Product	LM747
Part No	See Last Page
Revised	14/AUG/2018
Datasheet Version	1.4

Bluetooth®

2.05 - 2.35mm

12.4mm

12.4mm
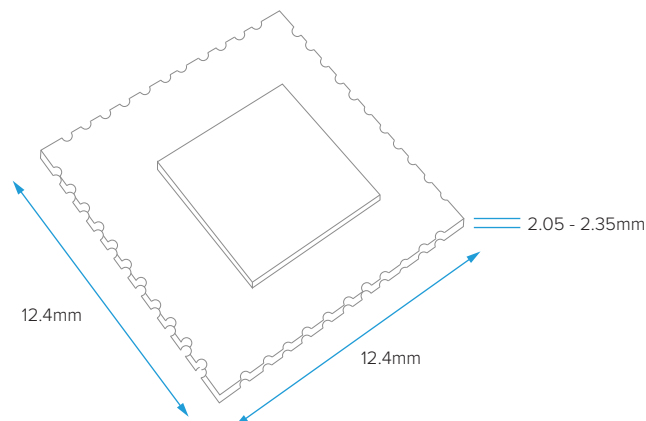
Features

- Bluetooth® 5 Compliant
- Low Power Consumption
- Application Firmware Support
- Integrated 16-bit Stereo Audio CODEC
- SBC, MP3 and AAC decoder
- aptX® codec (including support for SCMS-T) and Faststream codec
- CSR's cVc noise-cancellation technology
- UART and USB 2.0 Serial Interfaces
- Individual PWM blocks (2 on dedicated LED pads)
- Digital and Analogue I/O Interfaces
- Microphone input and Speaker output interfaces

- 12.4mm x 12.4mm x Height (Typical 2.05mm – Max 2.35mm)
- SMT Side and Bottom Pads for easy production
- See our website for this products certifications.
- RoHS, REACH and WEEE

Applications

- Wireless Headphones and Speakers
- Hand-free Headsets
- Automotive Infotainment systems
- Home Entertainment Devices
- Audio Adapters

Overview

The LM747 Bluetooth® 5 compliant audio module is a compact and cost effective solution. Enabling audio data to be wirelessly communicated between audio devices. Using a Bluetooth® v2.0, v2.1 and Bluetooth® v4.0, v4.1, (or 5 compliant) connection. It's sound enhancement features, makes it a perfect fit within your premium audio device. The sound enhancement features includes CSR's aptX® audio technology. Providing CD-like quality over a Bluetooth® connection. And CSR's cVc audio technology for noise cancellation. Perfectly suited to wireless headphones, speakers and hand-free headsets.

This standalone module allows the developer to connect a microphone, speakers and other I/O devices. Running the user application without using an external MCU. LM offer application support to the developer and can create new user applications for the module.

Your developed user application and settings can be preloaded to the LM747, simplifying the manufacturing and testing process. Its SMT side and bottom pads allows for easy integrations into your embedded system.

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General Specification

Wireless

Bluetooth® Standard	5 Compliant (Dual Mode)
Module Type	Standalone (Configurable with AT Commands)
Profiles	HSP, A2DP and AVRCP

Hardware

Chipset	Qualcomm
Antenna	RF Antenna Interface (Connect an ohm Antenna to Pin 7)
Micocontroller (MCU)	16-bit RISC 80 MHz MCU
Flash Memory	16 Mbit
RAM	56 KB
Program Interface	SPI
Interfaces	UART, PWM, USB 2.0, PIO and AIO
Power Supply	3V3 (VBAT) or 5V (VCHG)
Crystal Oscillators	26 MHz
Development Kit	LM559

RF Characteristics

Tx Output Power	2 dBm (Bluetooth® Classic)
Rx Sensitivity	-90 dBm (Bluetooth® Classic)
Data Rate	Up to 3Mbps
Frequency	2.4 GHz to 2.485 GHz

Physical Characteristics

|	
Operating Temperature	-20°C to +75°C
Storage Temperature	-40°C to +85°C
Dimensions (L x W x H)	12.4mm x 12.4mm x Height (Typical 2.05mm – Max 2.35mm)
Weight	0.48g +/- 0.25g tolerance
Certifications	See our website for this products certifications.
Compliance	RoHS, REACH and WEEE

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Pin Outs

TOP VIEW
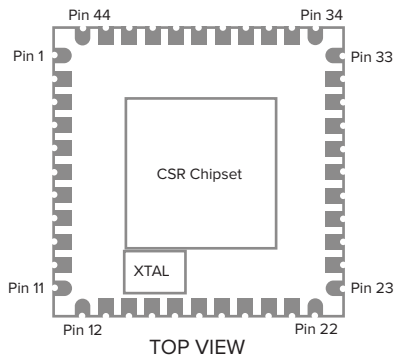
Pin Assignments

Pin	Name	Type	Supply Domain	Type
1	SPKR_R_P	Analogue	VDD_AUDIO_DRV (1V8_SMPS)	Speaker output positive, right
2	SPKR_R_N	Analogue	VDD_AUDIO_DRV (1V8_SMPS)	Speaker output negative, right
3	SPKR_LN	Analogue	VDD_AUDIO_DRV (1V8_SMPS)	Speaker output negative, left
4	SPKR_LP	Analogue	VDD_AUDIO_DRV (1V8_SMPS)	Speaker output positive, left
5	GND	Ground		Common Ground
6	GND	Ground		Common Ground
7	RF_IO	Analogue		Connect to ohm Antenna (RF Signal)
8	GND	Ground		Common Ground
9	AIO0	BI-directional	VDD_AUX (1.35V)	Analogue input/output line
10	LED1	Open drain output	PIO_POWER	LED Driver
11	LED0	Open drain output	PIO_POWER	LED Driver
12	SPI_CLK	Input with strong pull-down	PIO_POWER	SPI clock
13	SPI_MOSI	Input with weak pull-down	PIO_POWER	SPI data input
14	SPI_CS#	Input with weak pull-down	PIO_POWER	Chip select for SPI, active low
15	SPI_MISO	Output with strong pull-up	PIO_POWER	SPI data output
16	RST#	Input with strong pull-up	PIO_POWER	Reset if low. Pull low for minimum 5ms for reset.
17	UART_RX	Bi-directional weak pull-up	PIO_POWER	UART data input
18	UART_TX	Bi-directional weak pull-up	PIO_POWER	UART data output
19	PIO_POWER	VDD		Positive supply for PIO
20	PIO0	Bi-directional weak pull-down	PIO_POWER	Programmable input / output line
21	PIO1	Bi-directional weak pull-down	PIO_POWER	Programmable input / output line
22	GND	Ground		Common Ground
23	PIO2	Bi-directional weak pull-down	PIO_POWER	Programmable input / output line
24	PIO3	Bi-directional weak pull-down	PIO_POWER	Programmable input / output line
25	PIO4	Bi-directional weak pull-down	PIO_POWER	Programmable input / output line
26	PIO5	Bi-directional weak pull-down	PIO_POWER	Programmable input / output line
27	PIO6	Bi-directional weak pull-down	PIO_POWER	Programmable input / output line
28	PIO7	Bi-directional weak pull-down	PIO_POWER	Programmable input / output line

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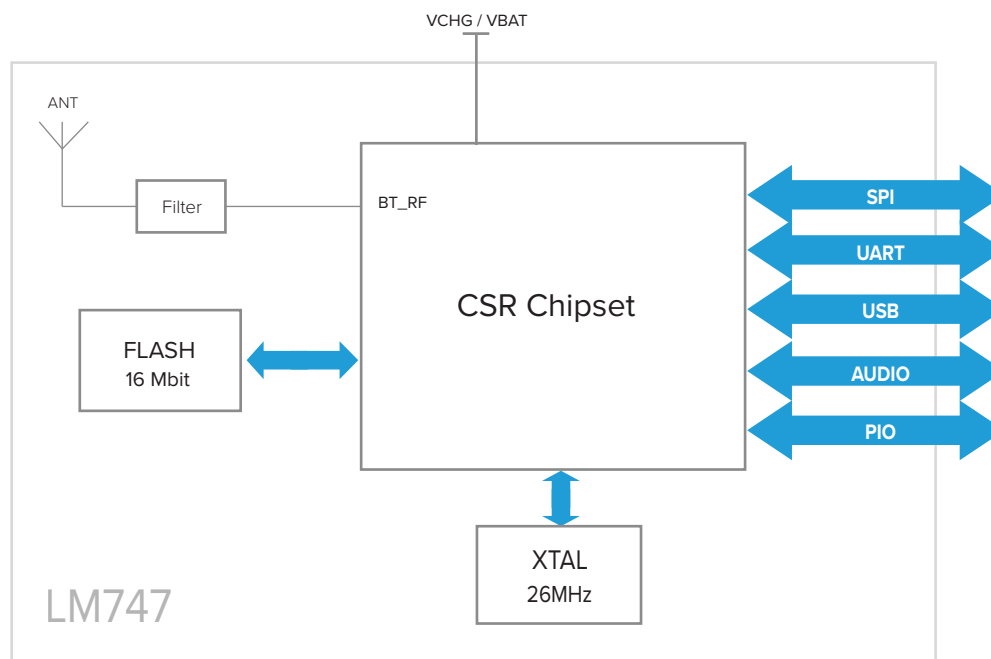Standalone (With Embedded Bluetooth® 5 Compliant Stack)

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Pin Assignments Continued

Pin	Name	Type	Supply Domain	Type
29	VCHG	Charger input		Lithium ion/polymer battery charger input
30	VBAT	Battery terminal +ve	3V3_USB	Lithium ion/polymer battery + term. Bat charge IO swmode reg
31	USB_DP	Bi-directional	3V3_USB	USB data positive
32	USB_DN	Bi-directional		USB data negative
33	GND	Ground		Common Ground
34	CHG_EXT			External charger control Otherwise leave unconnected
35	VBAT_SENSE			Battery charger output and input to switch mode regulator.
36	VREG_ENABLE	Analogue		Regulator enable input
37	1V8_SMPS	VDD		1V8 Output
38	MIC_RP	Analogue	VDD_AUDIO (1.35V)	Microphone input positive, right
39	MIC_RN	Analogue	VDD_AUDIO (1.35V)	Microphone input negative, right
40	MIC_BIAS_B	Analogue	VBAT/3V3_USB	Microphone bias B
41	MIC_LP	Analogue	VDD_AUDIO (1.35V)	Microphone input positive, left
42	MIC_LN	Analogue	VDD_AUDIO (1.35V)	Microphone input negative, left
43	MIC_BIAS_A	Analogue	VBAT/3V3_USB	Microphone bias A
44	GND	Ground		Common Ground

Module Block Diagram

LM747 Bluetooth® Dual Mode Audio Module
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Electrical Specification

Absolute Maximum Ratings	Min	Max	Recommended Operating Condition	Min	Max
Storage Temperature	-40° C	+85° C	Operating Temperature Range	-20° C	+75° C
Supply Voltage (VCHG)	-0.4V	5.75V	Supply Voltage (VCHG)	4.75V / 3.10V	5.75V
Supply Voltage (VBAT)	-0.4V	4.4V	Supply Voltage (VBAT)	2.5V	4.25V
Supply Voltage (VBAT_SENSE)	-0.4V	5.75V	Supply Voltage (VBAT_SENSE)	0V	4.25V
Supply Voltage (VREG_ENABLE)	-0.4V	4.4V	Supply Voltage (VREG_ENABLE)	0V	4.25V
Supply Voltage (LED [2:0])	-0.4V	4.4V	Supply Voltage (LED [2:0])	1.10V	4.25V
Supply Voltage (PIO_POWER)	-0.4V	3.6V	Supply Voltage (PIO_POWER)	1.7V	3.6V

1.8V Switch-mode Regulator

1.8V Switch-mode Regulator	Min	Typ	Max	Unit
Input Voltage (VBAT)	2.80	3.70	4.25	V
Output Voltage (1V8_SMPS)	1.70	1.80	1.90	V
Normal Operation				
Transient setting time	-	30	-	µs
Load current	-	-	185	mA
Current available for external use, stereo audio with 16Ω load (a)	-	-	25	mA
Peak conversion efficiency	-	90	-	%
Switching frequency	3.63	4.00	4.00	MHz
Low Power Mode, automatically entered in Deep Sleep				
Transient setting time	-	200	-	µs
Load current	0.005	-	5	mA
Current available for external use	-	-	5	mA
Peak conversion efficiency	-	85	-	%
Switching frequency	100	-	200	kHz

Regulator Enable

VREG_ENABLE, Switching Threshhold	Min	Typ	Max	Unit
Rising Threshold	1.0	-	-	V

(a) = More current available for audio loads above 16Ω

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Battery Charger

Battery Charger	Min	Typ	Max	Unit
Input Voltage, VCHG (a)	4.75 / 3.10	5.00	5.75	V

(a) = Reduced specification from 3.1 to 4.75. Full specification > 4.75V

Trickle Charge Mode	Min	Typ	Max	Unit
Charge current $I_{trickle}$ as percentage of fast charge current	8	10	12	%
Vfast rising threshold	-	2.9	-	V
Vfast rising threshold trim step size	-	0.1	-	V
Vfast falling threshold	-	2.8	-	V

Fast Charge Mode		Min	Typ	Max	Unit
Charge current during constant	Max headroom > 0.55V	194	200	206	mA
Current mode, I_{fast}	Min headroom > 0.55V		10		mA
Reduced headroom charge current,					
as a percentage of I_{fast}	Mid headroom = 0.15V	50	-	100	%
I-CTRL charge current step size		-	10	-	mA
Vfloat threshold, calibrated		4.16	4.20	4.24	V

Standby Mode	Min	Typ	Max	Unit
Voltage hysteresis on VBAT, V_{hyst}	100	-	150	mV

Error Charge Mode	Min	Typ	Max	Unit
Headroom (a) error rising threshold	30	-	50	mV
Headroom (a) error threshold hysteresis	20	-	30	mV

(a) = Headroom = VCHG-VBAT

External Charge Mode	Min	Typ	Max	Unit
Fast charge current I_{fast}	200	-	500	mA
Control current into CHG_EXT	0	-	20	mA
Voltage on CHG_EXT	0		5.75	V
External pass device hfe	-	50	-	-
Sense voltage, between VBAT_SENSE and VBAT at max current	195	200	205	mV

(a) = In the external mode, the battery charger meets all the previous charger electrical characteristics and the additional or superceeded elecectrical characteristics are listed in this table

Stereo Codec: Analogue to Digital Converter

Parameter	Conditions		Min	Typ	Max	Unit
Resolution	-		-	-	16	Bits
Input Sample Rate Fsample	-		8	-	48	kHz
SNR	fin = 1kHz	Fsample				
	B/W = 20Hz--Fsample/2	8kHz	-	93	-	dB
	(20kHz max)	16kHz	-	92	-	dB
	A-Weighted	32kHz	-	92	-	dB
	THD+N < 1%	44.1kHz	-	92	-	dB
	1.6Vpk-pk input	48kHz	-	92	-	dB

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Stereo Codec: Analogue to Digital Converter Continued...

Parameter	Conditions			Min	Typ	Max	Unit
THD+N	fin = 1kHz	Fsample					
	B/W = 20Hz--Fsample/2						
	(20kHz max)	8kHz		-	0.004	-	%
	1.6Vpk-pk input	48kHz		-	0.008	-	%
Digital gain	Digital gain resolution = 1 / 32			-24	-	21.5	dB
Analogue gain	Pre-amplifier setting			-3	-	42	dB
	= 0dB, 9dB, 21dB or 30dB						
	Analogue setting						
	= -3dB to 12dB in 3dB steps						
Stereo seperation (crosstalk)				-	-89	-	dB

Stereo Codec: Digital to Analogue Converter

Parameter	Conditions			Min	Typ	Max	Unit
Resolution	-			-	-	16	Bits
Output Sample Rate Fsample	-			8	-	96	kHz
SNR	fin = 1kHz	Fsample	Load				
	B/W = 20Hz--20kHz						
	A-Weighted	48kHz	100Ω	-	96	-	dB
	THD+N < 0.1%	48kHz	32Ω	-	96	-	dB
	0dBFS input	48kHz	16Ω	-	96	-	dB

Parameter	Conditions			Min	Typ	Max	Unit
THD+N	fin = 1kHz	Fsample	Load				
	B/W = 20Hz--20kHz						
	0dBFS input	8kHz	100kΩ	-	0.002	-	%
		8kHz	32Ω	-	0.002	-	%
		8kHz	16Ω	-	0.003	-	%
		48kHz	100kΩ	-	0.003	-	%
		48kHz	32Ω	-	0.003	-	%
		48kHz	16Ω	-	0.004	-	%
Digital Gain	Digital Gain Resolution = 1 /32			-24	-	21.5	dB
Analogue Gain	Analogue Gain Resolution = 3dB			-21	-	0	dB
Stereo seperation (crosstalk)				-	-88	-	dB

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Digital

Digital Terminals	Min	Typ	Max	Unit
Input Voltage				
VIL input logic level low	-0.4	-	0.4	V
VIH input logic level high	0.7xPIO_POWER	-	PIO_POWER+0.4	V
Tr/Tf	-	-	25	ns
Output Voltage				
VOL output logic level low, IOL = 4.0mA	-	-	0.4	V
VIH output logic level high, IOH = -0.4mA	.75xPIO_POWER	-	-	V
Tr/Tf	-	-	5	ns
Input and Tristate Currents				
Strong pull-up	-150	-40	-10	uA
Strong pull-down	10	40	150	uA
Weak pull-up	-5	-1.0	-0.33	uA
Weak pull-down	0.33	1.0	5.0	uA
CI input Capacitance	1.0		5.0	pF

LED Driver Pads

LED Driver Pads		Min	Typ	Max	Unit
Current, IPAD	High impedance state	-	-	5	µA
	Current sink state	-	-	10	mA
LED pad voltage, VPAD	IPAD = 10mA	-	-	0.55	V
LED pad resistance	VPAD < 0.5V	-	-	40	Ω
VOL output logic level low(a)		-	0	-	V
VOH output logic level high(a)		-	0.8	-	V
VIL input logic level low		-	0	-	V
VIH input logic level high		-	0.8	-	V

(a) LED output port is open-drain and requires a pull-up

Auxiliary ADC

Auxiliary ADC		Min	Typ	Max	Unit
Resolution		-	-	10	Bits
Input voltage range(a)		0	-	1.35	V
Accuracy	INL	-1	-	1	LSB
(Guaranteed monotonic)	DNL	0	-	1	LSB
Offset		-1	-	1	LSB
Gain error		-0.8	-	0.8	%
Input bandwidth		-	100	-	kHz
Conversion time		1.38	1.69	2.75	µs
Sample rate(b)		-	-	700	Samples/s

(a) LSB size = VDD_AUX/1023

(b) The auxiliary ADC is accessed through a VM function. The sample rate given is achieved as part of this function.

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Auxiliary DAC

Auxiliary DAC	Min	Typ	Max	Unit
Resolution	-	-	10	Bits
Supply voltage, VDD_DAC	1.30	1.35	1.40	V
Output voltage range	0	-	1.35	V
Full-scale output voltage	1.30	1.35	1.40	V
LSB size	0	1.32	2.64	mV
Offset	-1.32	0	1.32	mV
Integral non-linearity	-1	0	1	LSB
Settling time(a)	-	-	250	ns

(a) The settling time does not include any capacitive load

RF Specification: Temperature = +20° C

Transmitter	Min	Typ	Max	Bluetooth® Specification	Unit
Maximum RF transmit power	-6	2	-	-6 to +4	dBm
RF power variation over temperature range with compensation enabled	-	±0.5	-	-	dB
RF power variation over temperature range with compensation disabled	-	±1.5	-	-	dB
20dB bandwidth for modulated carrier	-	925	1000	≤1000	kHz
Adjacent channel transmit power F = F0 ± 2MHz	-	-23	-20	≤-20	dBm
Adjacent channel transmit power F = F0 ± 3MHz	-	-32	-28	≤-40	dBm
Adjacent channel transmit power F = F0 ± > 3MHz	-	-65	-40	≤-40	dBm
Δf1avg Maximum Modulation	140	165	175	140<f1avg<175	kHz
Δf2max Minimum Modulation	115	137	-	≥115	kHz
Δf2avg/Δf1avg	0.8	0.9	-	≥0.80	-
Initial carrier frequency tolerance	-75	15	75	±75	kHz
Drift Rate	-	5	20	≤20	kHz/50µ
Drift (single slot packet)	-	15	25	≤25	kHz
Drift (five slot packet)	-	15	40	≤40	kHz
2nd Harmonic Content	-	-40	-	≤-30	dBm
3rd Harmonic Content	-	-55	-	≤-30	dBm

RF Specification: Temperature = +20° C

Receiver		Min	Typ	Max	Bluetooth® Specification	Unit
Sensitivity at 0.1% BER for all packet types	2.402	-	-87	-83	≤-70	dBm
	2.441	-	-90	-86		
	2.480	-	-90	-86		
Maximum received signal at 0.1% BER		-20	>-10	-	≥-20	dBm
C/I co-channel		-	5	11	≤11	dB
Adjacent channel selectivity C/I F = F0 + 1MHz		-	-5	0	≤0	dB
Adjacent channel selectivity C/I F = F0 - 1MHz		-	-3	0	≤0	dB
Adjacent channel selectivity C/I		-	-35	-30	≤-30	dB

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RF Specification: Temperature = +20° C Continued...

Receiver	Min	Typ	Max	Bluetooth® Specification	Unit
F = F0 + 2MHz					
Adjacent channel selectivity C/I F = F0 - 2MHz	-	-25	-20	≤-20	dB
Adjacent channel selectivity C/I F = F0 + 3MHz	-	-45	-40	≤-40	dB
Adjacent channel selectivity C/I F = F0 - 5MHz	--	-45	-40	≤-40	dB
Adjacent channel selectivity C/I F = FImage	-	-20	-9	≤-9	dB
Maximum level of intermodulation interferers	-39	-23	-	≥-39	dBm
Spurious output level	-	-155	-		dBm/Hz

1. Serial Interface

1.1 USB Interface

LM747 has a full-speed (12Mbps) USB interface for communicating with other compatible digital devices.

The USB interface on LM747 acts as a USB peripheral, responding to requests from a master host controller. LM747 contains internal USB termination resistors and requires no external resistor matching. LM747 supports the Universal Serial Bus Specification, Revision v2.0 (USB v2.0 Specification), supports USB standard charger detection and fully supports the USB Battery Charging Specification , available from http://www.usb.org.

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1. Serial Interface

1.2 Programming and Debug Interface

LM747 provides a debug SPI interface for programming, configuring (PS Keys) and debugging the LM747. Access to this interface is required in production. Ensure the 4 SPI signals and the SPI line are brought out to either test points or a header. To use the SPI interface, the SPI line requires the option of being pulled high externally.

2. Interfaces

2.1 Analogue I/O Ports, AIO

LM747 has 1 general-purpose analogue interface pin, AIO[0]. Typically, this connects to a thermistor for battery pack temperature measurements during charge control.

2.2 LED Drivers

LM747 includes a 3-pad synchronised PWM LED driver for driving RGB LEDs for producing a wide range of colours. All LEDs are controlled by firmware. The terminals are open-drain outputs, so the LED must be connected from a positive supply rail to the pad in series with a current-limiting resistor.
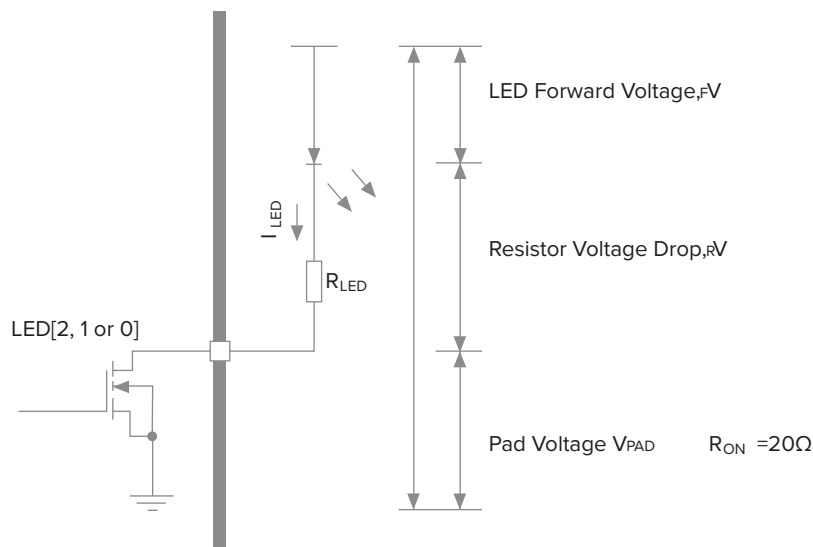
Figure 2.1: LED Equivalent Circuit

From Figure 2.1 it is possible to derive Equation 2.1 to calculate ILED. If a known value of current is required through the LED to give a specific luminous intensity, then the value of RLED is calculated.

$$I_{LED} = \frac{VDD - V_F}{R_{LED} + R_{ON}}$$

Equation 2.1: LED Current

For the LED pads to act as resistance, the external series resistor, RLED, needs to be such that the voltage drop across it, VR, keeps VPAD below 0.5V. Equation 2.2 also applies.

VDD = VF + VR + VPAD

Equation 2.2: LED PAD Voltage

Note: The LED current adds to the overall current. Conservative LED selection extends battery life.

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3. Power Control and Regulation

3.1 Voltage Regulator Enable

When using the integrated regulators the voltage regulator enable pin, VREG_ENABLE, enables the LM747 and the following regulators:

1.8V switch-mode regulator

1.35V switch-mode regulator

Low-voltage VDD_DIG linear regulator

Low-voltage VDD_AUX linear regulator

The VREG_ENABLE pin is active high.

LM747 boots-up when the voltage regulator enable pin is pulled high, enabling the regulators. The firmware then latches the regulators on, it is then permitted to release the voltage regulator enable pin.

The status of the VREGENABLE pin is available to firmware through an internal connection. VREGENABLE also works as an input line.

3.2 Reset, RST#

LM747 is reset from several sources:

RST# pin

Power-on reset

USB charger attach reset

Software configured watchdog timer

The RST# pin is an active low reset and is internally filtered using the internal low frequency clock oscillator. LM Developers recommend applying RST# for a period >5ms. At reset the digital I/O pins are set to inputs for bidirectional pins and outputs are set to tristate.

4. Battery Charger

4.1 Battery Charger hardware Operating Modes

The battery charger hardware is controlled by the VM. The battery charger has 5 modes:

Disabled

Trickle charge

Fast charge

Standby: fully charged or float charge

Error: charging input voltage, VCHG, is too low

The battery charger operating mode is determined by the battery voltage and current.

The internal charger circuit can provide up to 200mA of charge current, for currents higher than this the LM747 can control an external pass transistor

4.2 External Mode

The external mode is for charging higher capacity batteries using an external pass device. The current is controlled by sinking a varying current into the CHG_EXT pin, and the current is determined by measuring the voltage drop across a resistor, Rsense, connected in series with the external pass device, see Figure 4.2.1. The voltage drop is determined by looking at the difference between the VBAT_SENSE and VBAT pins. The voltage drop across Rsense is typically 200mV. The value of the external series resistor determines the charger current. This current can be trimmed with a PS Key. In Figure 4.2.1, R1 (220mΩ) and C1 (4.7µF) form a RC snubber that is required to maintain stability across all battery ESRs. The battery ESR must be <1.0Ω

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4. Battery Charger Continued...

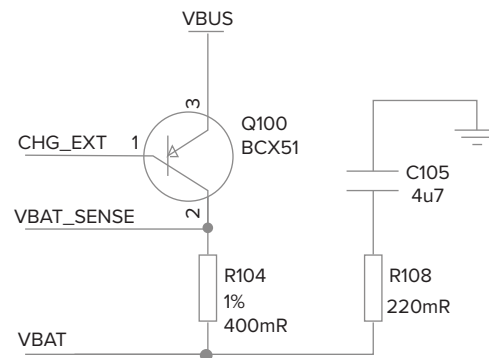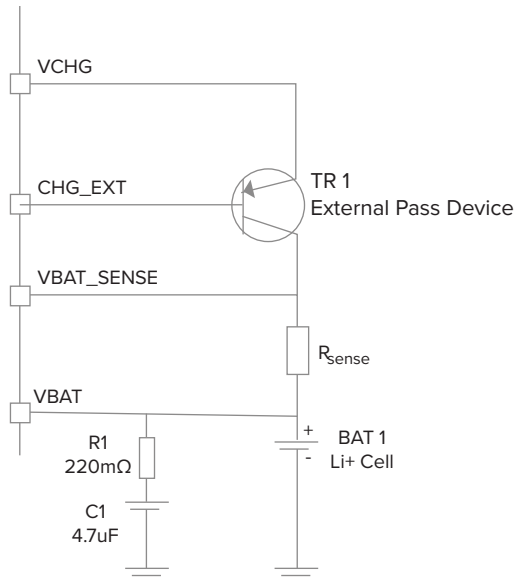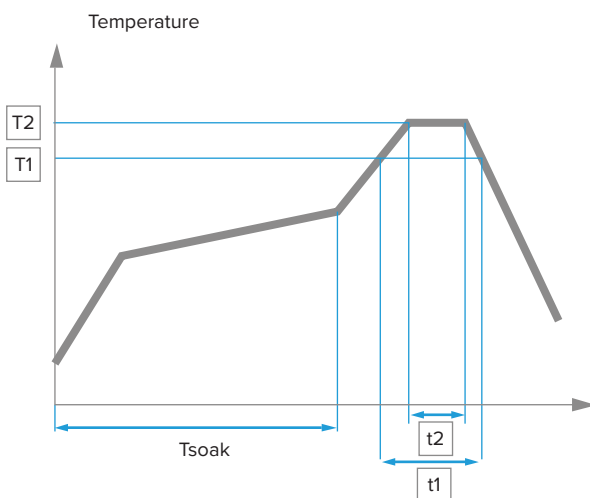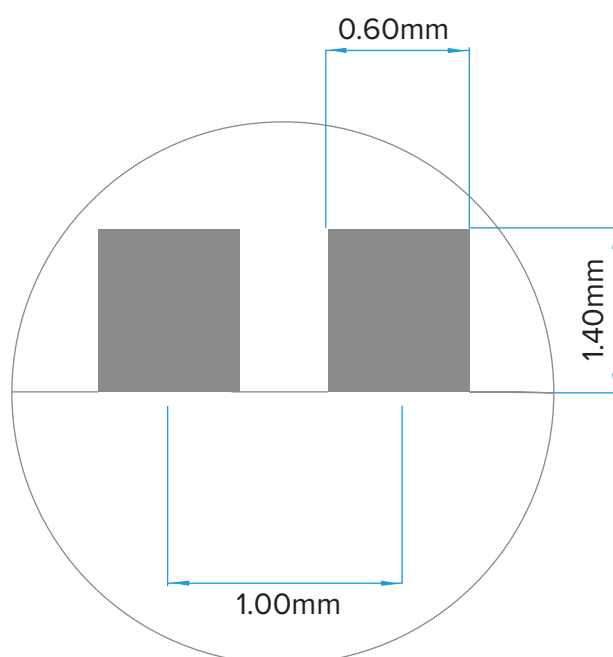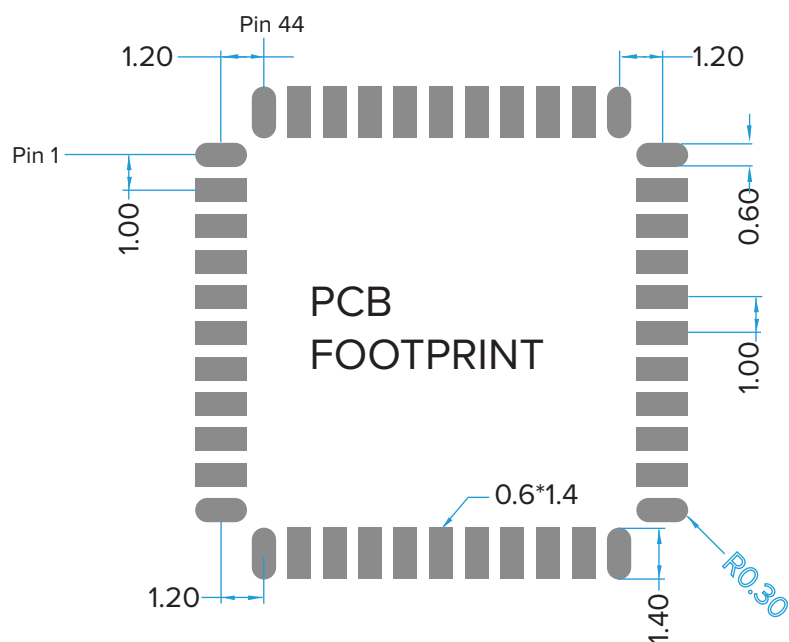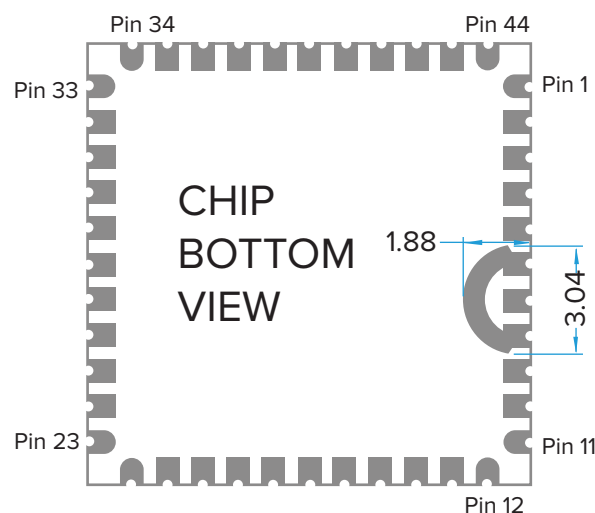Figure 4.2.1: Battery Charger External Mode Typical Configuration

Figure 4.2.2: Optional Ancilliary Circuits

In Figure 4.2.2, Optional fast charge,400mΩ = 500m.

Connect VBAT_SENSE to VBAT if not using this circuit.

Reflow profile requirements

Please refer below to the conditions for drying before the solder reflow processes. (Extracted from IPC/JEDEC J-STD-033B.1)

Solder Reflow Temperature Profile

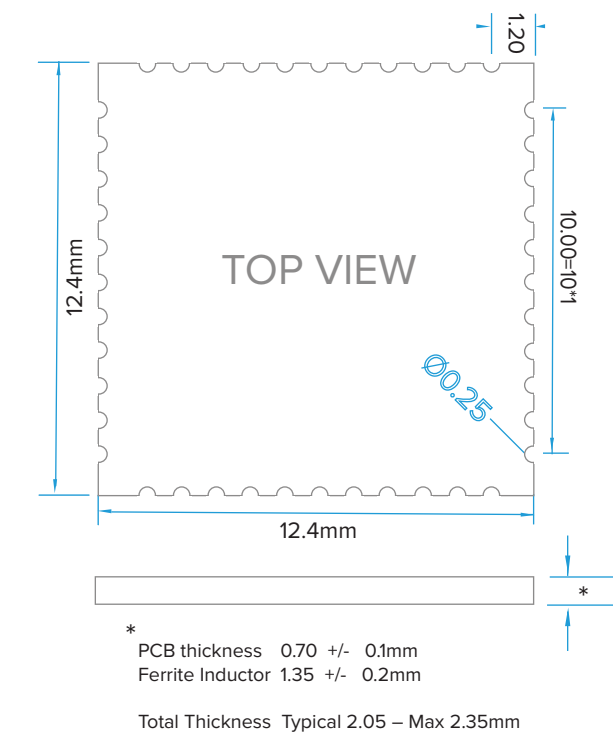| Parameter Specification	Ref	Specification
Average temperature gradient in preheating	-	1~2.5°C/s to 175°C equilibrium.
	-	
Soak time	Tsoakt	120~180 seconds
Time above 217°C (T1)	1	45~90 seconds
Peak temperature in reflow	T2	250°C (–0/+5°C)0
Time at peak temperature	t2	6 seconds0
Temperature gradient in cooling	-	6°C/second max.

LM747 Bluetooth® Dual Mode Audio Module
Standalone (With Embedded Bluetooth® 5 Compliant Stack)

Product   LM747

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Physical Dimensions

TOP VIEW

12.4mm

12.4mm

1.20

10.00=10*1

Ø0.25

*

PCB thickness   0.70   +/-   0.1mm
Ferrite Inductor   1.35   +/-   0.2mm

Total Thickness   Typical 2.05 – Max 2.35mm

CHIP BOTTOM VIEW

Pin 34   Pin 44

Pin 33   Pin 1

1.88

3.04

Pin 23   Pin 11

Pin 12

PCB FOOTPRINT

Pin 44

Pin 1

1.20   1.20

1.00   0.60

1.00

0.6*1.4

R0.30

1.20   1.40

0.60mm

1.40mm

1.00mm

LM747 Bluetooth® Dual Mode Audio Module
Standalone (With Embedded Bluetooth® 5 Compliant Stack)

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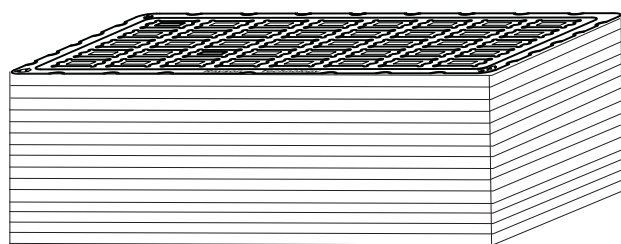## Tray Dimensions

314mm

144mm
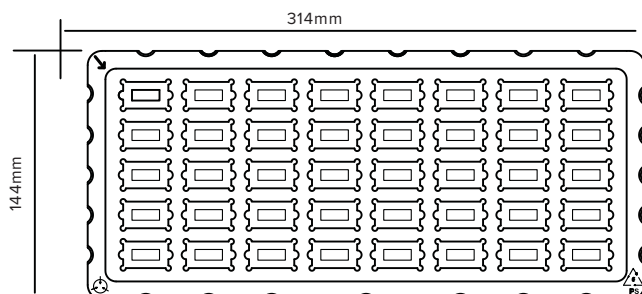
Quantitites

1 Tray = 50 modules
10 Trays = 500 modules
20 Trays = 1000 modules

The trays/reels are stacked and inserted into an anti-static vacuum bag with a Humidity Indicator Card.

On the outside of the bag are labels for Anti-Static, Model Name and Moisture Sensitivity Levels.

A total of 15 trays stacked up with an empty tray on the top.

drying agent

Humidity Indicator Card

Anti-static aluminium vacuum bag.
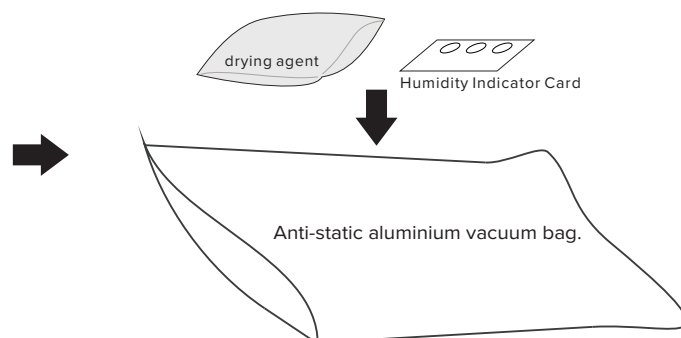
The vacuum bag is placed inside the box and a Model Name Label stuck on the front-side of each box.

Anti-static aluminium vacuum bag.

Model name label

box

box

carton

carton label
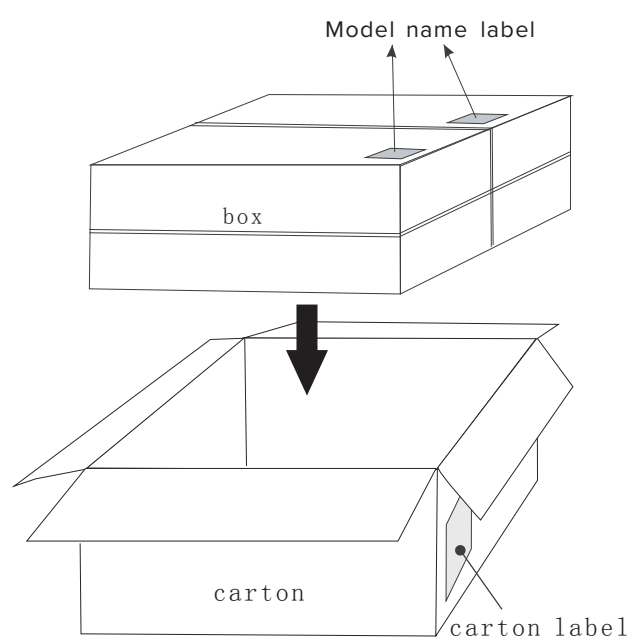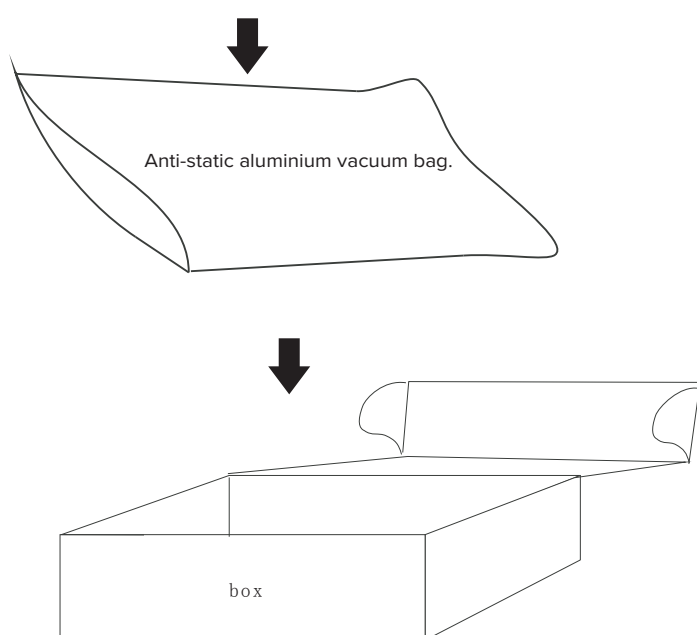
Each carton contains 4 boxes.

LM747 Bluetooth® Dual Mode Audio Module
Standalone (With Embedded Bluetooth® 5 Compliant Stack)

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Datasheet Version Notes

v1.0	11 JAN 2018	Added version notes to datasheet.
v1.1	9 MAR 2018	Typo changed on packing page 17.
v1.2	4 MAY 2018	Bluetooth 5 Compliant
v1.3	4 JUL 2018	Packing information addition.
v1.4	14 AUG 2018	

LM747 Bluetooth® Dual Mode Audio Module
Standalone (With Embedded Bluetooth® 5 Compliant Stack)

Product   LM747

Part No   See Below

LM747 Packaging Options

	747-0423	**LM747 Module** MOD SMT PROG BT4.1 D/Mode Fw.ATSNK_0202_Headset No-ANT SP
	747-0426	**LM747 Module** MOD SMT PROG BT4.1 D/Mode FwATCom_0102 No-ANT SP
	747-0427	**LM747 Module** MOD SMT PROG BT4.1 D/Mode FwATCom_0102 No-ANT TRAY
	747-0428	**LM747 Module** MOD SMT PROG BT4.1 D/Mode FwATCom_0102 No-ANT T&R

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