



## 5.8 GHz +30 dBm Transceiver Module

### FEATURES

- 5.8 GHz ISM Band Operation
- +30 dBm Transmit Power
- Mesh Network Topology
- O-QPSK, DSSS Modulation
- 32 Radio Channels
- 250 kbps Data Rate
- Range Up To 10,000 ft
- Sleep Current < 4  $\mu$ A
- Compact Size
- Network Security
- Multiple Antenna Connection, Mounting Options
- Supports Texas Instruments Z-Stack™, SimpleAPI™
- I/O Control and ADC Measurement
- Application Customization Available

### APPLICATIONS

- Robotics
- Defense Applications
- Telemetry
- Industrial Monitoring
- Home, Building Automation
- Security and Access

### DESCRIPTION

The ALT5802 is a compact, high power 5.8 GHz ISM band wireless transceiver module for OEMs who wish to quickly and easily add a robust long range 5.8 GHz wireless link to their product.

With the integration of the Texas Instruments Z-Stack™ full-featured networking protocol and accompanying SimpleAPI™ application programming interface, this module is optimized for low power applications requiring minimal sleep current. Point-to-point, point-to-multipoint and mesh network typologies are supported, with optional network security. Analog and digital I/O interfaces are provided for easy sensor integration.

The ALT5802 module can be mounted using a header-style connection or directly mounted to the surface of a printed circuit board. With power amplifier providing a maximum transmit power level of +30 dBm, this module can be used for long range applications. There are several antenna interface options available, including SMA connector, RP-SMA connector or surface mount connection.

Altan Technologies provides full customization services for the ALT5802, allowing OEMs to obtain a tailored module with features meeting their own specific requirements.

### ORDERING INFORMATION

Device	Antenna Connection	Mounting Option
ALT5802-1A1-1	SMA connector	Header
ALT5802-1A2-1	SMA connector	Surface
ALT5802-1B1-1	RP-SMA connector	Header
ALT5802-1B2-1	RP-SMA connector	Surface
ALT5802-1C2-1	Surface	Surface

### EXAMPLE

The ALT5802-1A1-1 is shown below, featuring SMA antenna connector and header style mounting.





## ABSOLUTE MAXIMUM RATINGS

Parameter	Min	Max	Unit	Condition
Supply voltage, VDD		3.6	V	All VDD supply pins must have the same voltage.
RF supply voltage, VTX		6.0	V	All VTX supply pins must have the same voltage.
Voltage on any input pin, except VTX	-0.3	VDD+0.3, Max 3.6	V	
Input RF level		+1	dBm	
Storage temperature range	-50	150	°C	
Soldering temperature		260	°C	

## OPERATING CONDITIONS

Parameter	Min	Max	Unit	Condition
Operating ambient temperature range	-10 <sup>1</sup>	60	°C	
Operating supply voltage, VDD	3.0	3.6	V	
Operating RF supply voltage, VTX	5.0	5.5	V	
Logic input low voltage, V <sub>IL</sub>		0.3* VDD	V	
Logic input high voltage, V <sub>IH</sub>	0.7* VDD		V	
Logic output low voltage, V <sub>OL</sub>		0.25	V	
Logic output high voltage, V <sub>OH</sub>	VDD-0.25		V	

## ELECTRICAL SPECIFICATIONS (TA = 25°C and VDD = 3.3 V, unless otherwise specified)

Parameter	Min	Typ	Max	Unit	Condition
<b>Current Consumption, VDD</b>					
Transmit Operation		130	160	mA	
Receive Operation		95		mA	
Idle Mode		4.3		mA	Transmitter and receiver disabled. Host communications interface operational.
Sleep Mode		3.0		μA	Transmitter and receiver disabled. Microcontroller sleep enabled. Low power clock operational. Contents of microcontroller RAM retained. Sleep timer enabled.
<b>Current Consumption, VTX</b>					
Transmit Operation		1400	1700	mA	
Receive Operation		1.0		μA	
Idle Mode		1.0		μA	Transmitter and receiver disabled. Host communications interface operational.
Sleep Mode		1.0		μA	Transmitter and receiver disabled. Microcontroller sleep enabled. Low power clock operational. Contents of microcontroller RAM retained. Sleep timer enabled.

<sup>1</sup> Contact Altan Technologies for extended temperature range qualified units, -40 °C to +85 °C.



## GENERAL CHARACTERISTICS (TA = 25°C and VDD = 3.3 V, unless otherwise specified)

Parameter	Min	Typ	Max	Unit	Condition
<b>Radio link</b>					
RF Frequency Range	5725		5875	MHz	
Bit rate		250		kbps	
Chip rate		2.0		MChip/s	
<b>Host interface</b>					
Serial data rate	1.2		115.2	kbps	UART interface.
		2		Mbps	SPI interface.
<b>Wake-up and timing</b>					
Radio enable		18		ms	

## RF RECEIVE PARAMETERS (TA = 25°C and VDD = 3.3 V, unless otherwise specified)

Parameter	Min	Typ	Max	Unit	Condition
Receiver sensitivity		-90		dBm	1% PER.
Saturation (maximum input level)		-15		dBm	1% PER.

## RF TRANSMIT PARAMETERS (TA = 25°C and VDD = 3.3 V, unless otherwise specified)

Parameter	Min	Typ	Max	Unit	Condition
Maximum transmit power		+30		dBm	



## PIN ASSIGNMENTS

Pin	Name	Type	Primary Functions	Alternative Functions <sup>2</sup>
1	GND	Ground	Power supply ground.	
2	GND	Ground	Power supply ground.	
3	GND	Ground	Power supply ground.	
4	NC	Reserved	Reserved. Do not connect.	
5	NC	Reserved	Reserved. Do not connect.	
6	NC	Reserved	Reserved. Do not connect.	
7	NC	Reserved	Reserved. Do not connect.	
8	GPIO3	Digital IO	Digital input, output.	Digital input, output. SPI master out slave in. UART transmit.
9	GPIO2	Digital IO	Digital input, output.	Digital input, output. Timer output. SPI master in slave out. UART receive.
10	SRDY	Digital IO	Slave ready. Mandatory for SPI, optional for UART.	Digital input, output. Timer output. SPI clock. UART request to send.
11	MRDY	Digital IO	Master ready. Optional for SPI and UART.	Digital input, output. Timer input, output. SPI slave select. UART clear to send.
12	GPIO1	Digital IO	Digital input, high current output.	Digital input, high current output. Timer input, output.
13	GPIO0	Digital IO	Digital input, high current output.	Digital input, high current output. Timer input, output.
14	GND	Ground	Power supply ground.	
15	VDD	Power	Power supply input.	
16	VDD	Power	Power supply input.	
17	RESET	Digital Input	Reset, active low.	
18	GPIO4	Digital IO	Digital input, output.	Digital input, output. Analog input.
19	CFG1	Digital Input	Configuration input 1.	Digital input, output. Analog input.
20	SO/RX	Digital IO	SPI slave output. UART receive.	Digital input, output. Analog input. Timer input, output. SPI master in slave out, slave select. UART receive, clear to send.
21	SI/TX	Digital IO	SPI slave input. UART transmit.	Digital input, output. Analog input. Timer input, output. SPI master out slave in, clock. UART transmit, request to send.
22	SS/CT	Digital IO	SPI slave select. UART clear to send.	Digital input, output. Analog input. Timer input, output. SPI master out slave in, slave select. UART transmit, clear to send.
23	C/RT	Digital IO	SPI clock. UART request to send.	Digital input, output. Analog input. SPI master in slave out, clock. UART receive, request to send.
24	A0	Analog Input	Analog input.	Digital input, output. Analog input.
25	A1	Analog Input	Analog input.	Digital input, output. Analog input.
26	GND	Ground	Power supply ground.	
27	GND	Ground	Power supply ground.	
28	GND	Ground	Power supply ground.	
29	VTX	Transmit Power	Transmit power supply input.	
30	VTX	Transmit Power	Transmit power supply input.	
31	RFGND1	RF Ground	RF ground connection. For surface mount option, only.	
32	RFGND2	RF Ground	RF ground connection. For surface mount option, only.	
33	RFSIG	RF Signal	RF input / output signal connection. For surface mount option, only.	
34	RFGND3	RF Ground	RF ground connection. For surface mount option, only.	

<sup>2</sup> Available with customization provided by Altan Technologies.



35	RFGND4	RF Ground	RF ground connection. For surface mount option, only.	
36	GND	Ground	Power supply ground.	
37	GND	Ground	Power supply ground.	

## OVERVIEW

The ALT5802 wireless transceiver module allows OEMs to add a long range 5.8 GHz ISM band wireless link to their product quickly and easily. Utilizing the license-free 5.8 GHz ISM band enhances wireless link reliability by avoiding crowding and unique sources of interference present in 915 MHz and 2.45 GHz ISM bands. Microwave oven emissions are an example of a problematic interference source present in the 2.45 GHz ISM band that can be avoided by using the ALT5802 module. In addition, by utilizing channels above the U-NII upper band limit of 5.825 GHz, interference from IEEE 802.11a and IEEE 802.11n Wi-Fi devices can be avoided, further improving link reliability.

The ALT5802 module emulates the functionality of the Texas Instruments CC2480 Z-Accel™ processor. See [Texas Instruments CC2480 Interface Specification](#), SWRA175A, and [CC2480 Developer's Guide](#), SWRA176, for interface and applications programming information.

The network protocol stack utilized in the ALT5802 is the Texas Instruments Z-Stack™, supporting point-to-point, point-to-multipoint and mesh network typologies. For further information, see the [Texas Instruments Z-Stack Developer's Guide](#), F8W-2006-0022. The application programming interface utilized, SimpleAPI™, is documented in [Texas Instruments Simple API for Z-Stack](#), F8W-2007-0021. Z-Stack™ supports optional network security.

An application processor communicates with the ALT5802 via SPI or UART serial interface using the SimpleAPI™ interface, which allows the application processor to initialize and configure the ALT5802 radio, send and receive wireless messages, and obtain wireless network information. The ALT5802's application programming interface also provides the ability to configure several ALT5802 pins for digital input and output control, as well as analog signal measurement.

Optimized for low power applications, the ALT5802 features a low power sleep mode, with supply current reduced to less than 4 μA. This permits the use of the ALT5802 module in battery powered applications. In addition, the module's compact form factor permits its use in applications where small size is important.

There are several order options available, including mounting method and antenna connection. The module can be mounted to the main printed circuit board via header strips or via a solder-pad surface mount configuration. There are several antenna connection options available. An SMA or RP-SMA connector can be provided for direct antenna or antenna cable connection. For surface mount module applications, the antenna connection can be routed through the main printed circuit board.

In situations where OEMs require additional features to meet their specific product needs, Altan Technologies provides full customization services for the ALT5802. For example, module firmware can be customized to include application-specific firmware, eliminating the need for a dedicated applications processor, reducing overall system cost. In addition, customization permits use of additional digital input and output signals, as well as analog input signals, available on the module through customization.

## API EXTENSIONS

The ALT5802 implements the Texas Instruments Simple API for Z-Stack and Texas Instruments CC2480 Interface Specification, with the following extension.

### SYS\_GPIO

The SYS\_GPIO command has been modified as follows to include access to GPIO4. See section 6.1.11 of [Texas Instruments CC2480 Interface Specification](#), SWRA175A, for detailed information about SYS\_GPIO.

#### SREQ:

<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>
Length = 3	Cmd0 = 0x21	Cmd1 = 0x0E	Operation	Value1	Value0

**Value1**

GPIO	Bit position
0	0
1	1
2	4
3	5

**Value0**

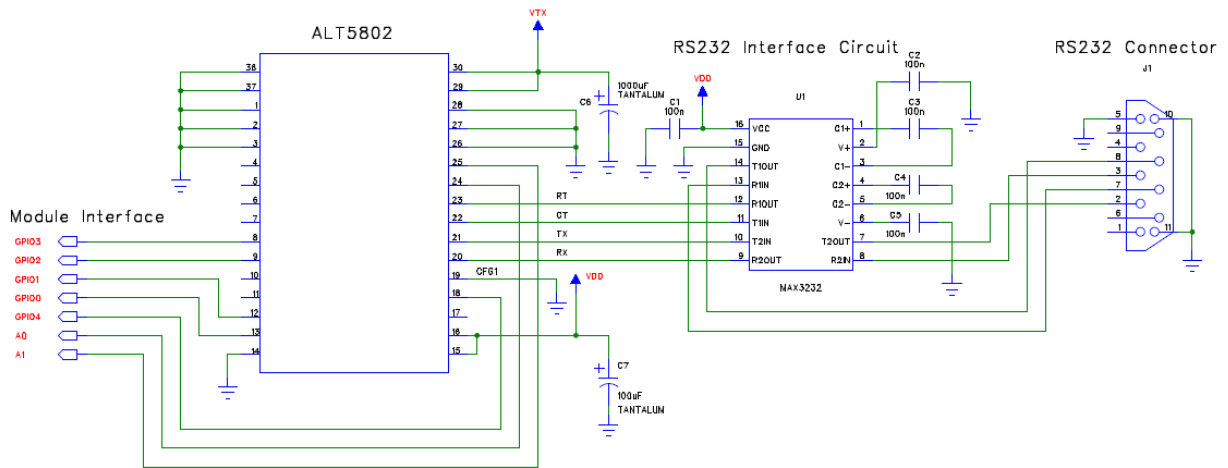
GPIO	Bit position
4	0

**SRSP:**

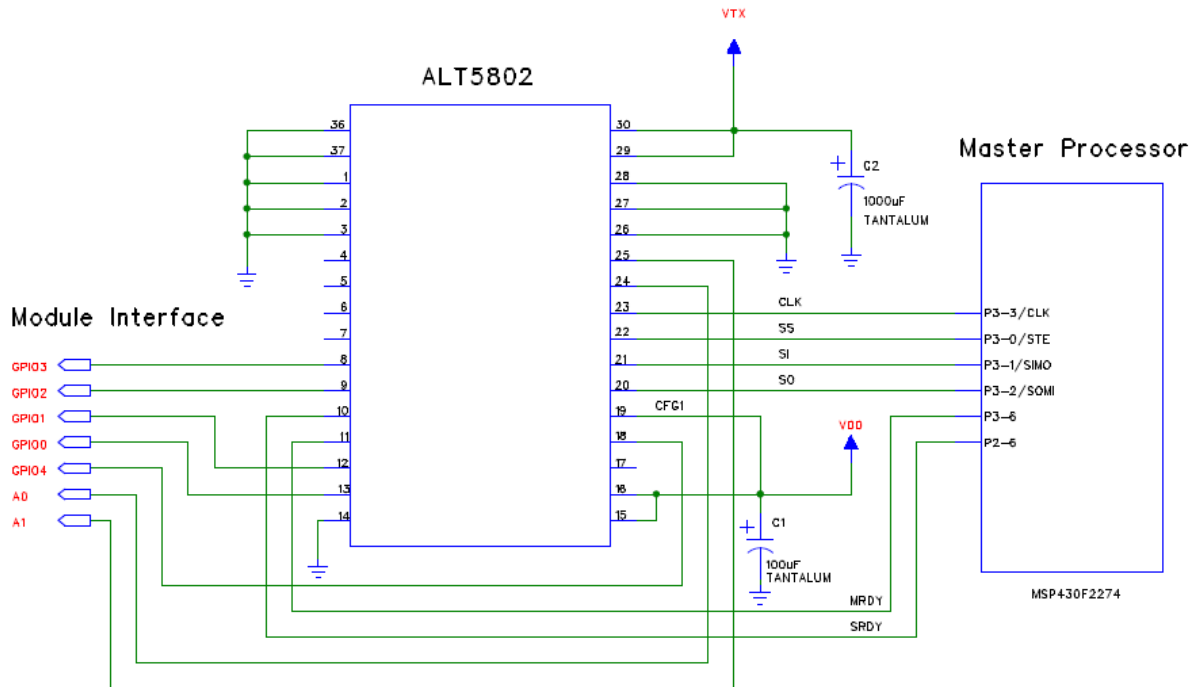
1	1	1	1	1
Length = 2	Cmd0 = 0x61	Cmd1 = 0x0E	Value1	Value0

## APPLICATION

**FIGURE 1: RS232 INTERFACE**

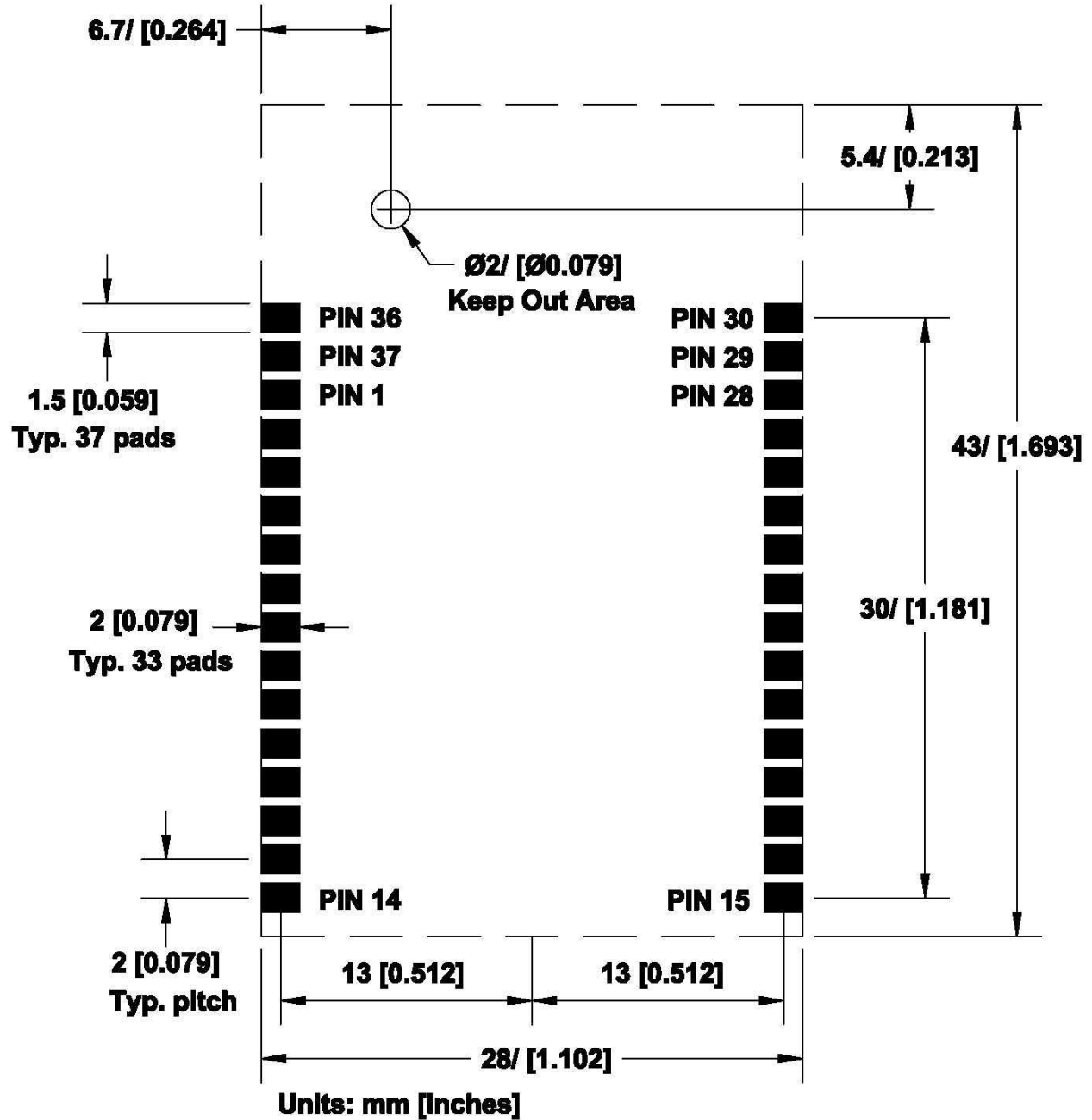


**FIGURE 2: SPI INTERFACE**



## MECHANICAL INFORMATION

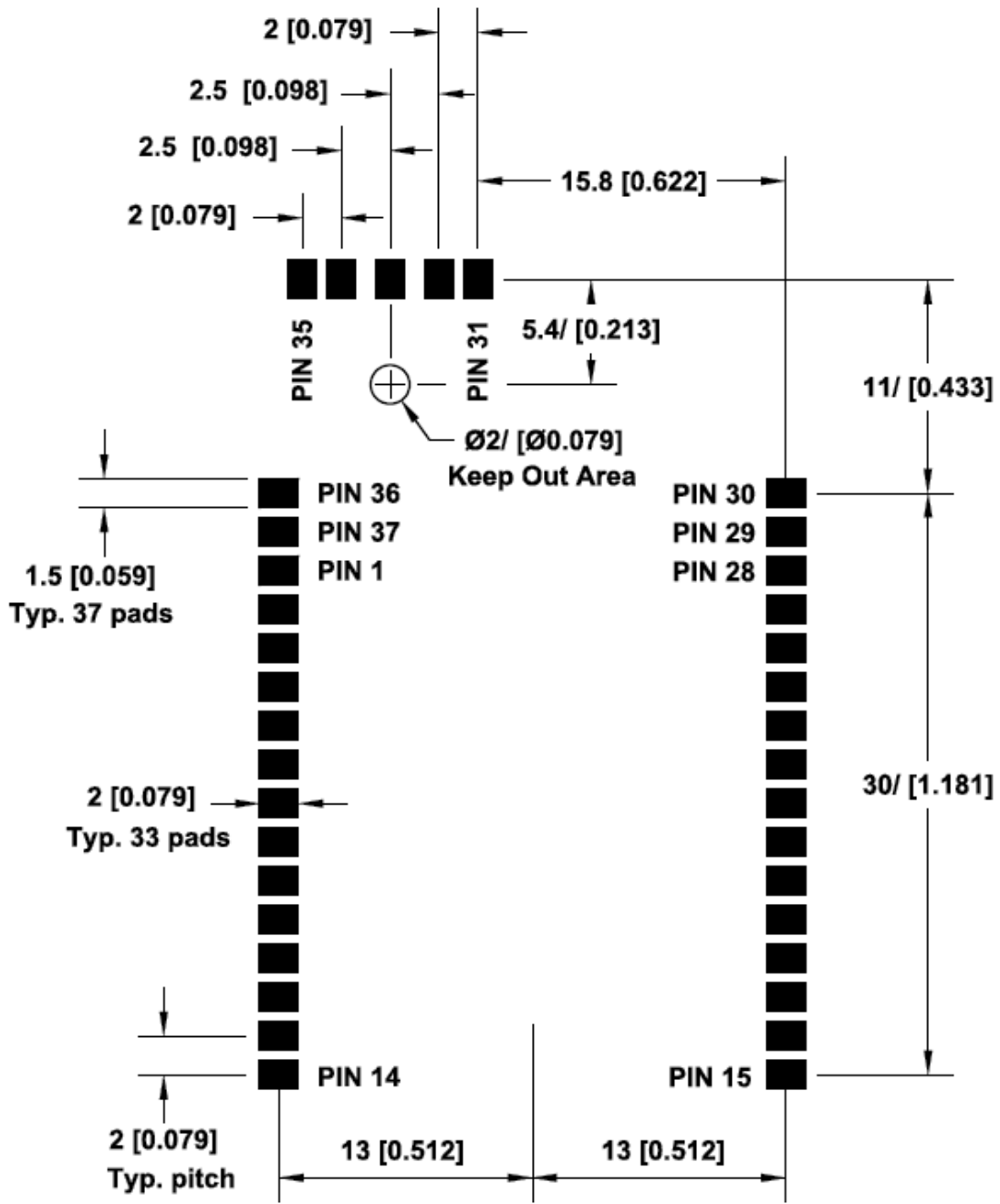
FIGURE 3: PIN LOCATIONS – HEADER MOUNT<sup>3</sup>



<sup>3</sup> Models ALT5802-\*\*1-\*



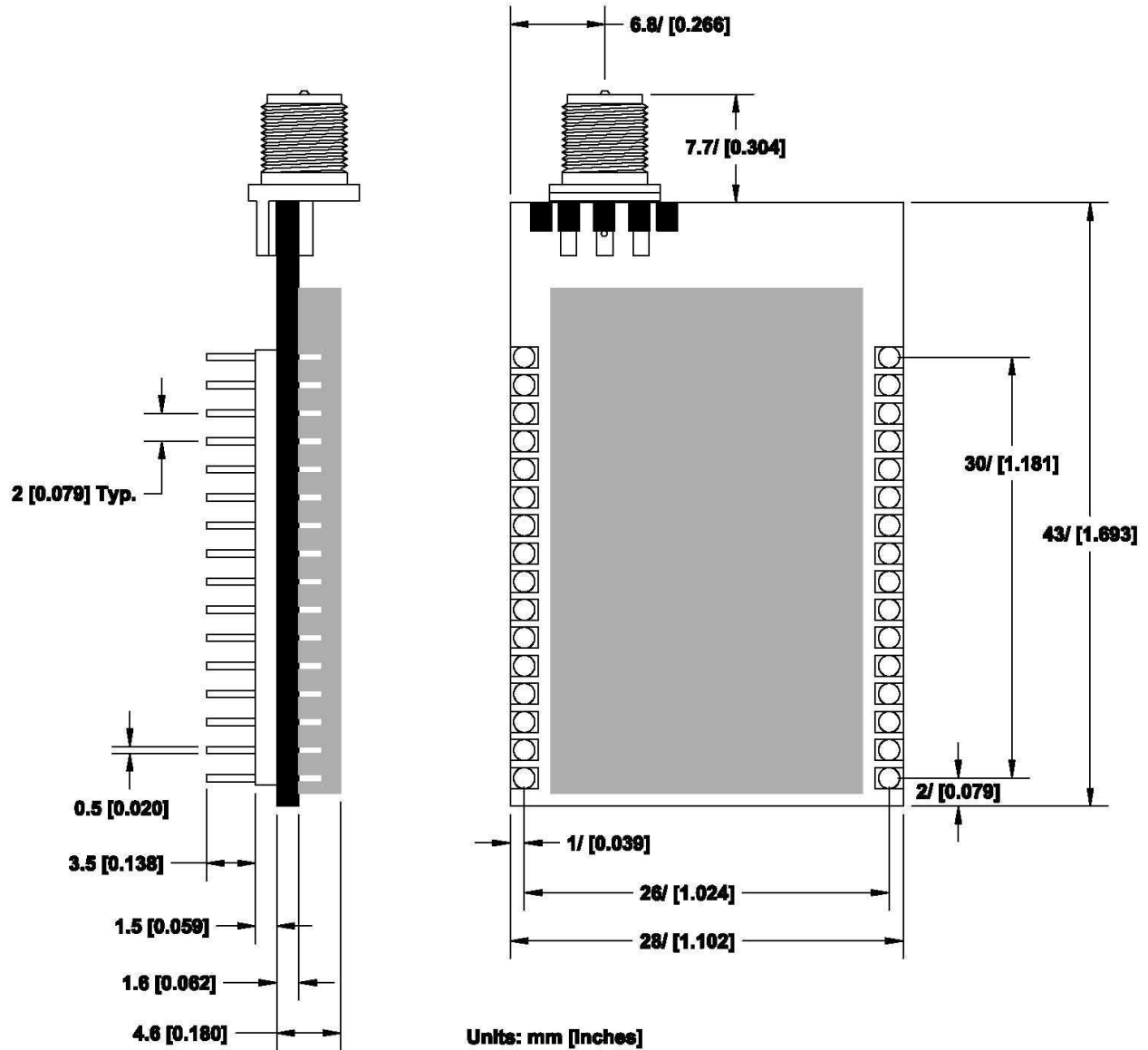
FIGURE 4: PAD LOCATIONS – SURFACE MOUNT<sup>4</sup>



Units: mm [inches]

<sup>4</sup> Models ALT5802-\*\*2-\*

FIGURE 5: DIMENSIONS - HEADER MOUNT<sup>5</sup>



<sup>5</sup> Models ALT5802-\*\*-1-\*

## THERMAL MANAGEMENT

For broad temperature range operation, the ALT5802 requires a thermally conductive path between the underside surface of the ALT5802 printed circuit board and the top surface of the mating printed circuit board assembly. A flexible thermal filler material which provides electrical isolation can be used for this purpose.

For a header mount version of the ALT5802, it is recommended that a layer of thermally conductive material such as Laird Thermal Products Tflex™ 300 series be installed between the two printed circuit board surfaces. Laird part number TFLEX 3100TG A15973-10 can be used in a situation where the ALT5802 is soldered directly to the mating circuit board assembly.

Dimensions and mounting location of this layer of thermally conductive material relative to the ALT5802 footprint are provided below.

