

SAR TEST EXCLUSION

This device, FCC ID: YENNOP0611, is excluded from SAR testing by the following justification. The maximum power that the transmitter IC is capable of is 10 mW, see attached data sheet. By using the following formula from section 4.3.1 of KDB 447498:

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] * [\sqrt{f(\text{GHz})}] \leq 3.0 \text{ for 1-g SAR and } \leq 7.5 \text{ for 10-g extremity SAR}$$

and using the minimum test separation distance of 5 mm, the resulting calculated SAR value is:

$$(10 \text{ mW}) / 5 \text{ mm} * (\sqrt{4.3394 \text{ GHz}}) = 1.3$$

This value is below the exclusion threshold for both the 1-g SAR and 10-g extremity SAR requirements.

General Description

The MICRF113 is a high performance, easy to use, single chip ASK Transmitter IC for remote wireless applications in the 300 to 450MHz frequency band. This transmitter IC is a true "data-in, antenna-out" monolithic device. MICRF113 has three strong attributes: power delivery, operating voltage and operating temperature. In terms of power, the MICRF113 is capable of delivering +10 dBm into a 50Ω load. This power level enables a small form factor transmitter (lossy antenna) such as a key fob transmitter to operate near the maximum limit of transmission regulations. In terms of operating voltage, the MICRF113 operates from 1.8V to 3.6V. Many transmitter ICs in the same frequency band stop operating below 2.0V. The MICRF113 will work with most batteries to the end of their useful limits. In terms of operating temperature, the MICRF113 operates from -40°C to +85°C.

The MICRF113 is easy to use. It requires a reference frequency (RF carrier frequency divided by 32 times) generated from a crystal with a few additional external parts to create a complete versatile transmitter.

The MICRF113 operates with ASK/OOK (Amplitude Shift Keying/On-Off Keyed) UHF receiver types from wide-band super-regenerative radios to narrow-band, high performance super-heterodyne receivers. The MICRF113's maximum ASK data rate is 10kbps (Manchester Encoding).

Typical Application

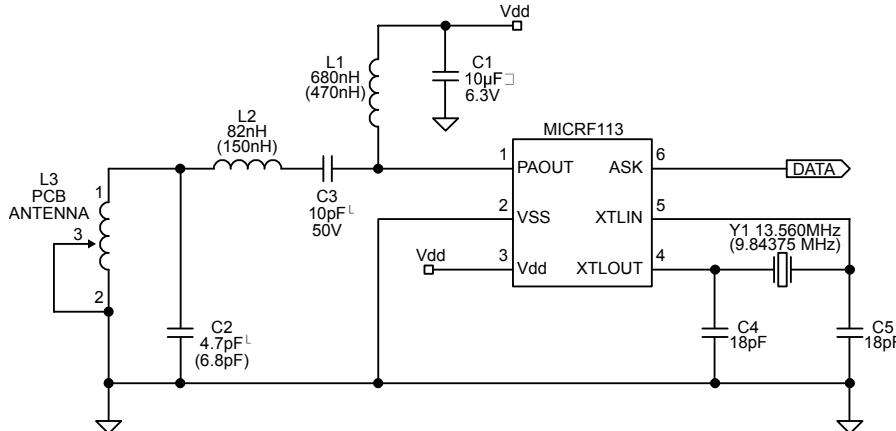


Figure 1. MICRF113 ASK Key Fob Design for 315 MHz and 433.92 MHz

The MICRF113 transmitter solution is ideal for industrial and consumer applications where simplicity and form factor are important.

Features

- Complete UHF transmitter
- Frequency range 300MHz to 450MHz
- Data rates up to 10kbps ASK
- Output Power to 10dBm
- Low external part count
- Low voltage operation (down to 1.8V)
- Operate with crystals or ceramic resonators

Applications

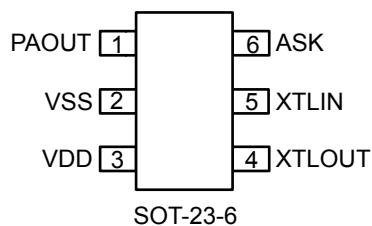
- Fan Controllers
- Remote Power Switches
- Multi-Media Remote Control
- Remote Sensor Data Links
- Infrared Transmitter Replacement

Ordering Information

Part Number	Temp. Range	Package
MICRF113YM6	-40°C to +85°C	SOT23-6

Note: Values indicated in parentheses are for 315MHz

Pin Configuration



Pin Description

Pin Number MSOP-6	Pin Name	Pin Function
1	PA_OUT	PA output
2	VSS	Ground
3	VDD	Voltage Drain Drain (Input): Positive Power Supply
4	XTLOUT	Crystal Out (Output): Reference oscillator output connection.
5	XTLIN	Crystal In (Input): Reference oscillator input connection.
6	ASK	ASK DATA Input

Absolute Maximum Ratings ⁽¹⁾

Supply Voltage VDD	+5.0V
Voltage on PAOUT.....	+7.2V
Voltage on I/O Pins	VSS-0.3 to VDD+0.3
Storage Temperature Range	-65°C to + 150°C
Lead Temperature (soldering, 10 seconds)	+ 300°C
ESD Rating.....	2KV ⁽³⁾

Operating Ratings ⁽²⁾

Supply Voltage VDD	1.8V to 3.6V
Ambient Operating Temperature (TA)	-40°C to +85°C
Programmable Transmitter Frequency Range	300MHz to 450MHz

Electrical Characteristics⁽⁴⁾

Specifications apply for VDD = 3.0V, TA = 25°C, Freq_{REFOSC} = 13.560MHz, EN = VDD.

Bold values indicate -40°C to 85°C unless otherwise noted. 1kbps data rate 50% duty cycle. RL 50ohm load (matched)

Parameter	Condition	Min	Typ	Max	Units
Power Supply					
Mark Supply Current I _{ON}	@ 315MHz, P _{OUT} = +10dBm		12.3		mA
	@ 433.92MHz, P _{OUT} = +10dBm		12.5		mA
SPACE supply current, I _{OFF}	@ 315MHz		2		mA
	@ 433.92 MHz		2		mA
RF Output Section and Modulation Limits:					
Output power level, P _{OUT} ASK "mark"	@315MHz ⁽⁴⁾		10		dBm
	@433.92MHz ⁽⁴⁾		10		dBm
Harmonics output for 315 MHz	@ 630MHz ⁽⁴⁾ 2nd harm.		-39		dBc
	@945MHz ⁽⁴⁾ 3rd harm.		-53		dBc
Harmonics output for 433.92 MHz	@ 867.84MHz ⁽⁴⁾ 2nd harm.		-55		dBc
	@1301.76MHz ⁽⁴⁾ 3rd harm.		-55		dBc
Extinction ratio for ASK			70		dBc
ASK Modulation					
Data Rate			10		kbps
Occupied Bandwidth	@315MHz ⁽⁶⁾		<700		kHz
	@433.92MHz ⁽⁶⁾		<1000		kHz
VCO Section					
315 MHz Single Side Band Phase Noise	@ 100kHz from Carrier		-76		dBc/Hz
	@ 1000kHz from Carrier		-79		dBc/Hz
433.92 MHz Single Side Band Phase Noise	@ 100kHz from Carrier		-72		dBc/Hz
	@ 1000kHz from Carrier		-81		dBc/Hz
Reference Oscillator Section					
XTLIN, XTLOUT	Pin capacitance		2		pF
External Capacitance	See Schematic C17 & C18		18		pF
Oscillator Startup Time ⁽⁵⁾	Crystal: HC49S		300		μs
Digital / Control Section					
Output Blanking	VDD transition from LOW to HIGH		500		μs

Electrical Characteristics (continued)

Parameter	Condition	Min	Typ	Max	Units
Digital Input ASK Pin	High (V_{IH})	$0.8 \times V_{DD}$			V
	Low (V_{IL})			$0.2 \times V_{DD}$	V
Digital Input Leakage Current ASK Pin	High (V_{IH})		0.05		μ A
	Low (V_{IL})		0.05		μ A
Under Voltage Lock Out (UVLO)			1.6		V

Notes:

1. Exceeding the absolute maximum rating may damage the device.
2. The device is not guaranteed to function outside its operating rating.
3. Devices are ESD sensitive. Handling precautions recommended. Human body model, 1.5k in series with 100pF.
4. Measured using Test Circuit in Figure 2.
5. Dependent on crystal
6. RBW = 100kHz, OBW measured at -20dBc.

Test Circuit

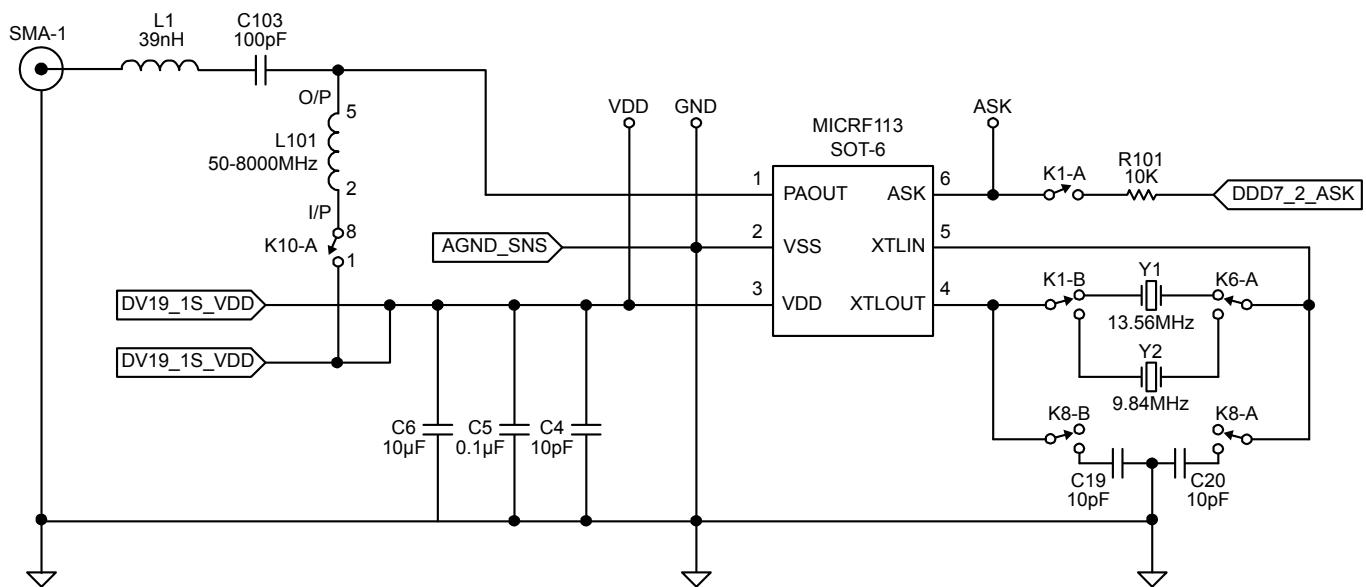


Figure 2. MICRF113 Test Circuit