MT6188C/BR-L Data Sheet

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1 Introduction

1.1 Features

1 Fully integrated single-chip for FM radio
2 Cover EURO/US/Japan FM bands
3 Ultra Low power consumption 10.5mA
4 Power supply 2.6V~3.6V
5 I^2C/3-wire serial interface
6 Internal RF AGC control circuit
7 Power down mode
8 Fully integrated FM demodulator
9 Fully integrated channel filter and limiter
10 Signal dependent stereo blend
11 High cut control
12 Adjust-free stereo decoder
13 Stereo audio outputs
14 Fewer external components
15 No manually tunable parts required
16 10-bit IF counter
17 5-bit RSSI register
18 High SNR
19 High sensitivity
20 Low distortion
21 Integrated VCO circuit with only one external inductor
22 Operates with a standard 32.768kHz crystal or externally applied 32.768k/13/26MHz clock
23 Small 4x4 mm^2 28-pin LGA Package

1.2 Applications

Flash MP3, Cell Phone, Portable Radio.

1.3 General Descriptions

MT6188C/BR-L is a highly integrated FM radio IC for low power portable devices. The radio can tune the EURO/US/Japan FM bands. The MT6188C/BR-L includes LNA and mixer with AGC, integrated channel filter, limiter, 5-bit RSSI indicator, IF counter, FM demodulator, stereo decoder, and an integrated VCO with only one off-chip inductor. The MT6188C/BR-L includes control circuits to implement different operating modes. The device is housed in a small size 28-pin LGA SMD package.

A functional block diagram of the MT6188C/BR-L and its pin assignment is shown in Figure 1.

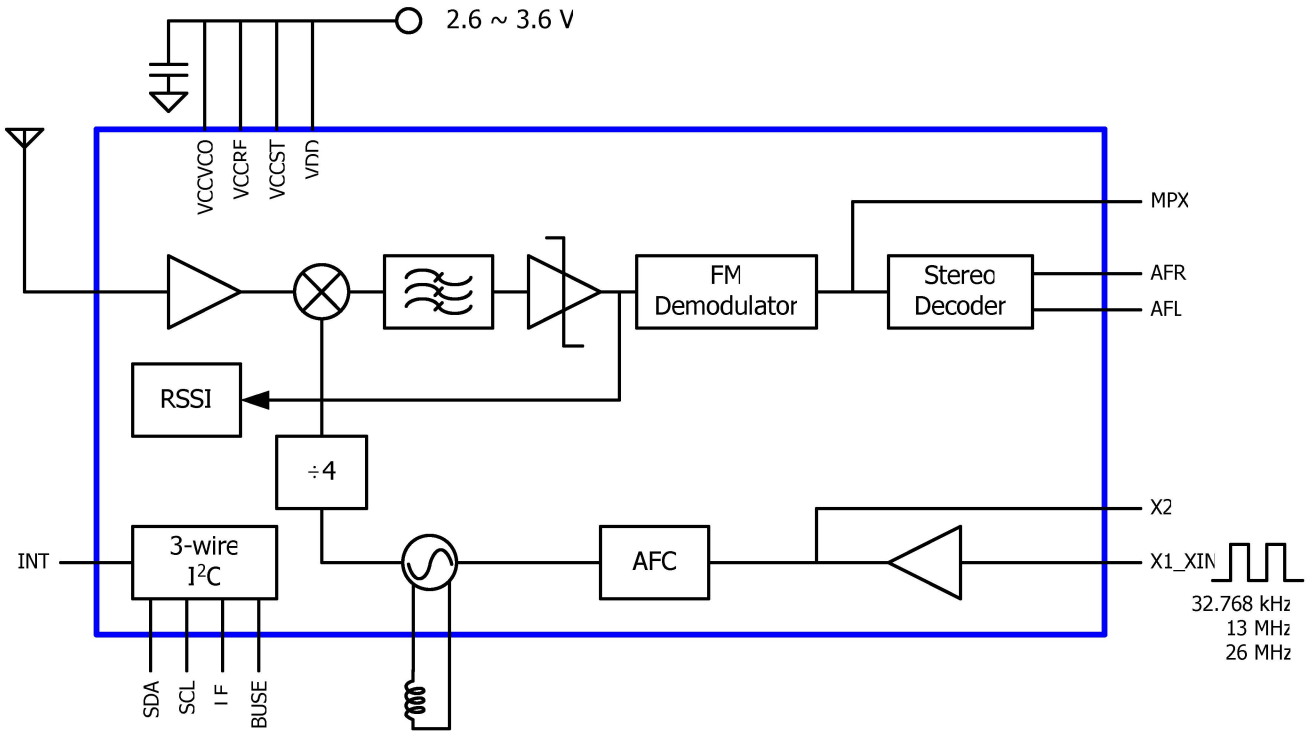

Figure 1 MT6188C/BR-L Function Block Diagram

1.4 Pin Assignments and Descriptions

Pin No.	Pin Name	I/O	Description
1	GND	ground	ground
2	AFR	O	Right audio output
3	AFL	O	Left audio output
4	VCCRF	power	RF block power supply input
5	GNDRF	ground	ground
6	RFINN	I	RF signal input
7	NC		
8	NC		
9	VCCVCO	power	VCO power supply input
10	GNDVCO	ground	ground
11	INDP	I/O	VCO inductor positive
12	INDN	I/O	VCO inductor negative
13	NC		
14	X1_XIN	I	Crystal oscillator pin 1 or external clock input
15	X2	I/O	Crystal oscillator pin 2
16	NC		
17	NC		
18	NC		
19	NC		
20	VCCST	power	Stereo block power supply input
21	GND	ground	ground
22	MPX	O	FM demodulated output
23	INT	O	Hardware interrupt
24	LE	I	3wire Latch
25	SDA_DATA	I/O	I^2C/3wire serial data
26	SCL_CLK	I	I^2C/3wire serial clock input
27	BUS_S	I	Selection of I^2C or 3wire mode
28	VDD	power	Digital power supply input

Table 1 MT6188C/BR-L Pin Descriptions

2 Electrical Characteristics

2.1 Absolute Maximum Ratings

Prolonged exposure to absolute maximum ratings may reduce device reliability. Functional operation at these maximum ratings is not implied.

Item	Symbol	Min.	Max.	Unit
ESD human body mode	HBM		3500	V
ESD machine mode	MM		200	V

Table 2 Absolute Maximum Ratings

2.2 Recommended Operating Range

Item	Symbol	Min.	Typ.	Max	Unit
Power supply voltage	VCCRF, VCCVCO, VCCST, VDD	2.6	2.8	3.6	V
Operating ambient temperature	T_{opr}	-20	25	85	°C

Table 3 Recommended Operating Range

2.3 DC Characteristics

VCCRF=VCCVCO=VCCST=VDD= 2.8 V, Ta = 25 °C unless otherwise specified.

Item	Min.	Typ.	Max.	Unit	Test condition
Power supply current		10.5		mA	VCCRF=VCCVCO=VCCST=VDD =3V
Power down mode supply current		1.0		uA	
Serial data VH (SCL, SDA, LE, BUSE)	2.5			V	VDD = 2.8 V
Serial data VL (SCL, SDA, LE, BUSE)			0.3	V	VDD = 2.8 V

Table 4 DC Characteristics

2.4 AC Characteristics

VCCRF=VCCVCO=VCCST=VDD= 2.8 V, Ta = 25 °C unless otherwise specified.

Item	Min.	Typ.	Max.	Unit	Test condition
Tuned frequency range	88.1		107.9	MHz	United States band

	87.5		108	MHz	European band
	76		90	MHz	Japanese band
RFAGC starts level		70		dBuVemf	RF gain compress 1dB
Sensitivity		8		dBuVemf	Δf =22.5kHz, mono, (S+N)/N=26dB
IIP3		92		dBuVemf	
Maximum input level			120	dBuVemf	
IF filter center frequency		280		kHz	
RSSI detectable range	7		60	dBuVemf	
MPX output					
MPX output AC load		4.7K		ohm	
MPX output swing		140		mVrms	Δf=22.5kHz, mono
MPX output S+N/N		58		dB	Δf=22.5kHz, mono, de-emp=75us, BW=200Hz~15kHz
MPX output THD		0.4		%	RF=1mVrms, Δf =75kHz, de-emp=75us
Stereo Audio Outputs					
AFR/AFL outputs AC load		10K		ohm	
AFR/AFL outputs swing, VAF		640		mVrms	Δf =75kHz, mono
AFR/AFL outputs (S+N)/N		58		dB	Δf=22.5kHz, mono, de-emp=75us, BW=200Hz~15kHz
AFR/AFL outputs THD		0.4		%	RF=1mVrms, Δf =75kHz, de-emp=75us
Right/Left difference	-1		+1	dB	
Stereo separation		35		dB	
Pilot tone at AFR/AFL outputs		40		dBc	
Stereo blend start level		40		dBuVemf	Separation -3dB point
Crystal oscillator					
Frequency step		8.192		kHz	Xtal frequency is 32.768kHz
		8.464		kHz	Xtal frequency is 13MHz or 26MHz

Table 5 AC Characteristics

Reference Application Circuit

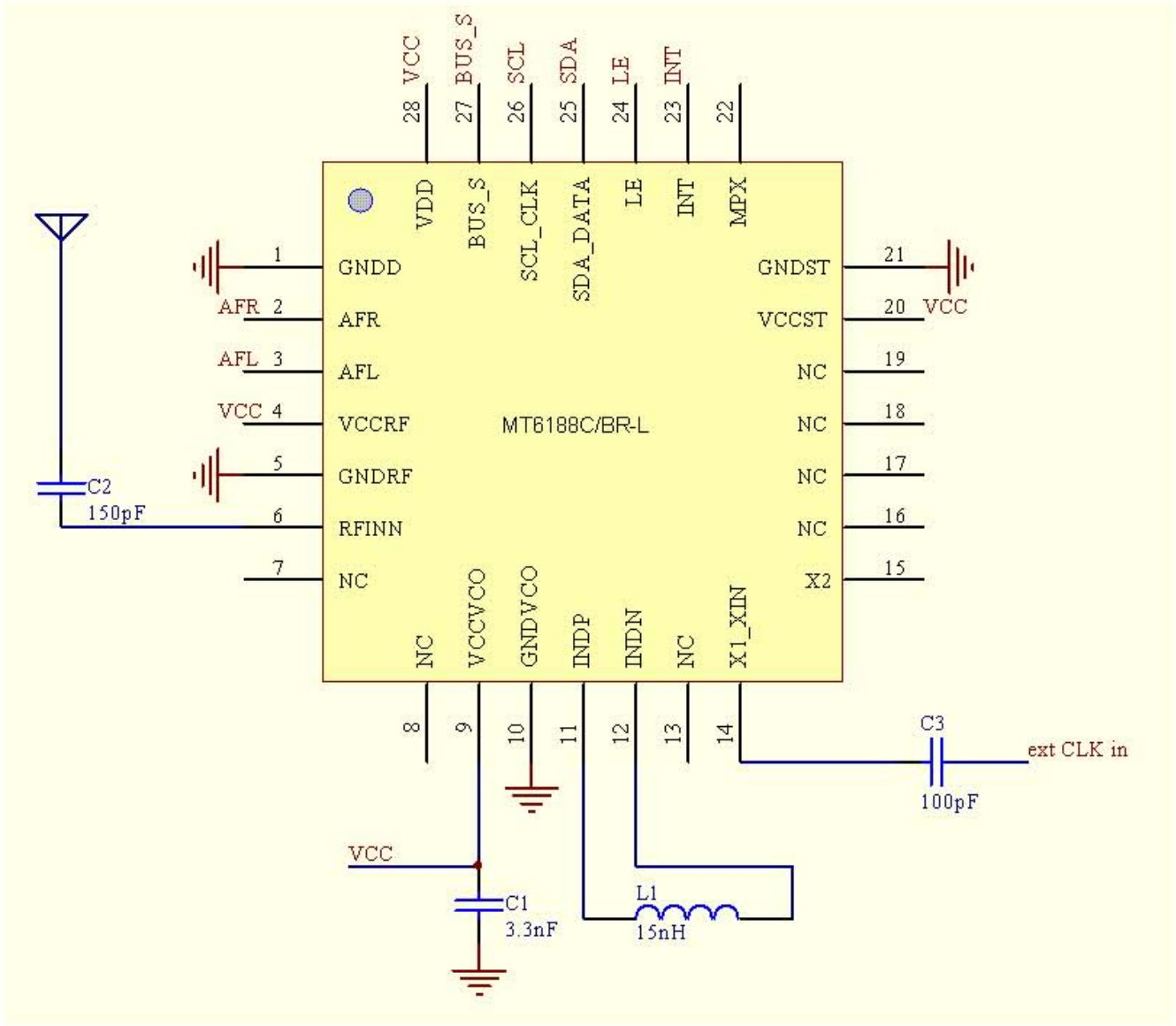

Figure 3 MT6188C/BR-L with external clock

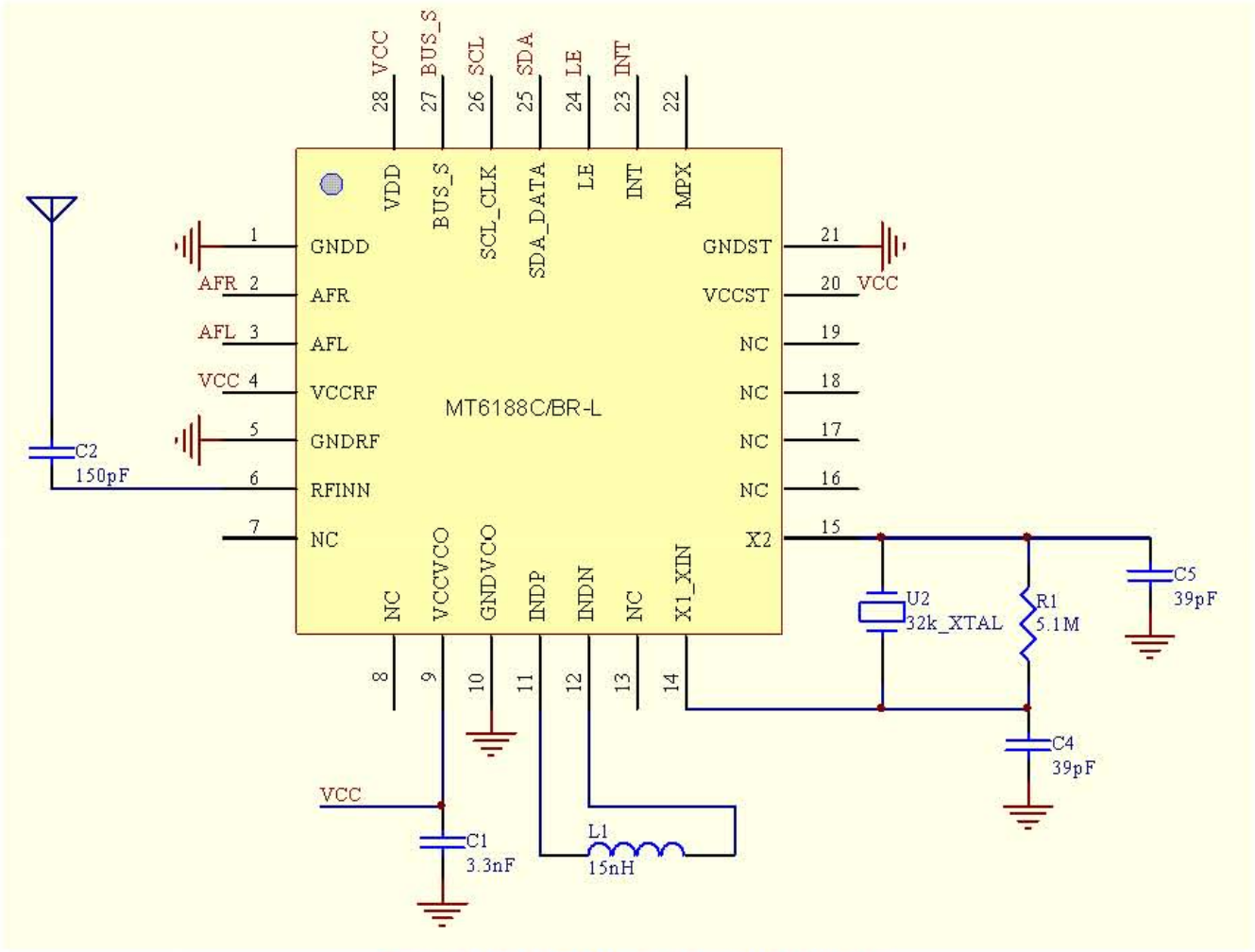

Figure 4 MT6188C/BR-L with crystal oscillator

Bill of Materials

Component	Value	Description	Comments
U1		MT6188C/BR-L FM Tuner	
C1	3.3nF	0402; Bypass capacitor	
C2	150pF	0402; DC blocking	
L1	15nH	0402; VCO tank inductor	

Memo