

**OVERVIEW**

SM5132 series are CMOS LSIs that incorporate two PLLs for signal transmission and reception in cordless telephones.

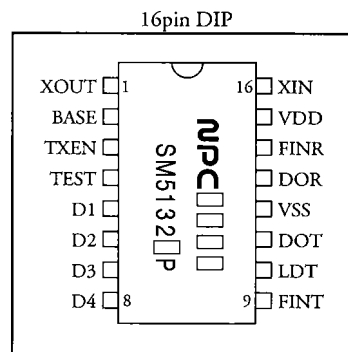
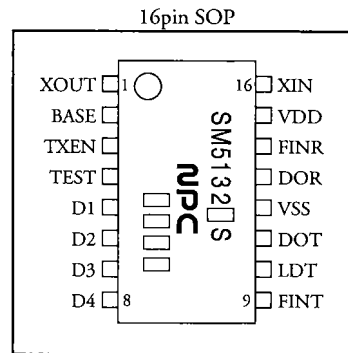
The SM5132C features 15 communication channels and the SM5132D features 10 communication channels. SM5132 series devices feature parallel input for communication channel selection.

SM5132 series devices operate from a 2.7 to 5.5 V supply and are available in 16-pin plastic DIPs and SOPs.

**FEATURES**

- Transmit and receive PLLs
- Basetest unit and handset unit selection
- 15 communication channels (SM5132C)  
10 communication channels (SM5132D)
- Parallel channel selection
- Built-in digital lock detector
- Standby function suspends transmit function to save power
- 60 MHz maximum operating frequency
- Direct frequency division and locking in transmit PLL at 46 to 49 MHz operating frequency
- 300 mV<sub>P-P</sub> (min) input sensitivity
- 5 kHz reference frequency
- Molybdenum-gate CMOS process
- 2.7 to 5.5 V supply
- 16-pin plastic DIP and SOP package

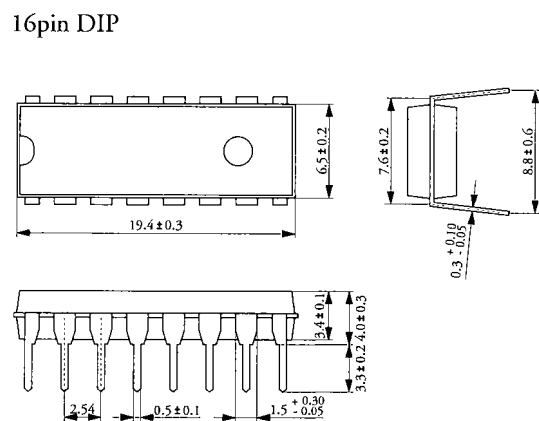
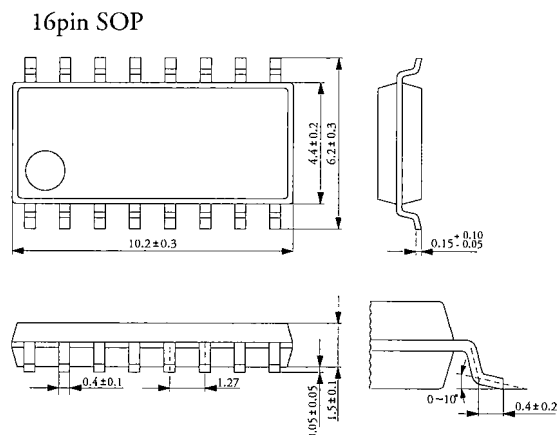
**PINOUTS (Top View)**



**LINE-UP**

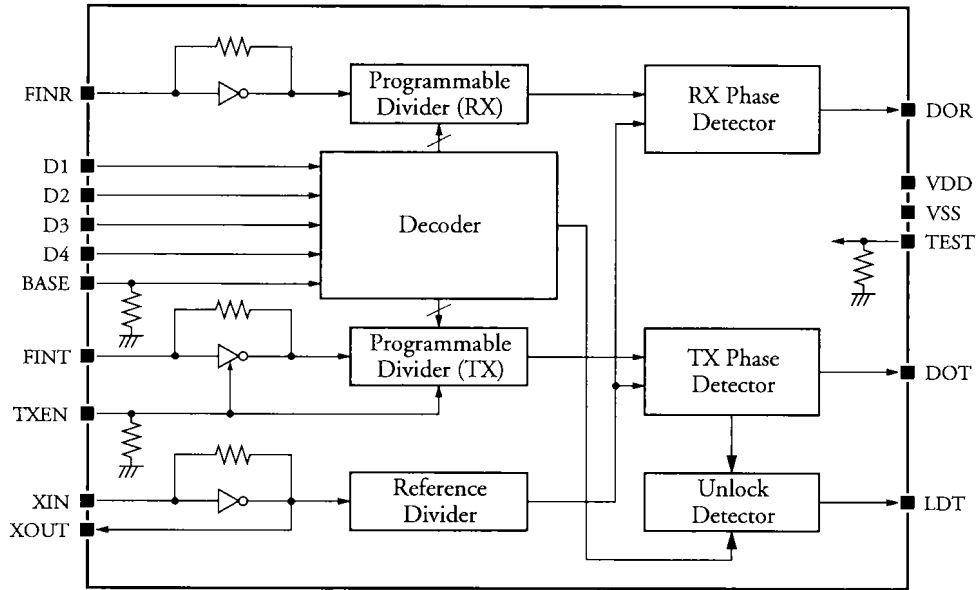
Device	Number of channel	Channel type select	Package
SM5132CS	15	Parallel using pins D1 to D4	16pin SOP
SM5132CP	15		16pin DIP
SM5132DS	10		16pin SOP
SM5132DP	10		16pin DIP

**PACKAGE DIMENSIONS (Unit: mm)**



## SM5132 Series

### BLOCK DIAGRAM



### PIN DESCRIPTION

Number	Name	Description
1	XOUT	Crystal oscillator and capacitor connection Also connected to 2nd mixer.
2	BASE	Basetset/handset unit select input Handset mode when LOW or open, basetset mode when HIGH. Internal pull-down resistor.
3	TXEN	Transmit enable select input Receive only enabled when LOW, receive and transmit enabled when HIGH. Internal pull-down resistor.
4	TEST	Test pin Should be left open or grounded for normal operation. Internal pull-down resistor.
5	D1	Communication channel select parallel data input Selected 15 communication channels (SM5132C) Selected 10 communication channels (SM5132D)
6	D2	
7	D3	
8	D4	
9	FINT	Transmit programmable divider input Internal feedback resistance. Allows AC coupling.
10	LDT	Digital lock detector output (transmit only) HIGH when unlocked.
11	DOT	Transmit passive lowpass filter connection (Three state output.)
12	VSS	Ground
13	DOR	Receive passive lowpass filter connection (Three state output.)
14	FINR	Receive programmable divider input. Internal feedback resistance. Allows AC coupling.
15	VDD	2.7 to 5.5 V supply voltage
16	XIN	Crystal oscillator and capacitor connection. Internal feedback resistance.

# SM5132 Series

## SPECIFICATIONS

### Absolute Maximum Ratings

Parameter	Symbol	Condition	Rating	Unit
Supply voltage range	V <sub>DD</sub>		-0.3 to 7.0	V
Input voltage range	V <sub>IN</sub>		V <sub>SS</sub> to V <sub>DD</sub>	V
Operating temperature range	T <sub>OPR</sub>		-30 to +80	°C
Storage temperature range	T <sub>STG</sub>		-40 to +125	°C
Soldering temperature	T <sub>SLD</sub>		255	°C
Soldering time	t <sub>SLD</sub>		10	sec

(V<sub>SS</sub>= 0V)

### Electrical Characteristics

(Unless noted T<sub>a</sub>= -30 to 80°C, V<sub>SS</sub>= 0V, V<sub>DD</sub>= 2.7 to 5.5V)

Parameter	Symbol	Pin	Condition	Rating			Unit
				MIN	TYP	MAX	
Operating Voltage	V <sub>DD</sub>			2.7		5.5	V
Operating current 1	I <sub>DD11</sub>		V <sub>DD</sub> = 3.0V, TXEN= H (note1)		4.0	6.0	mA
	I <sub>DD12</sub>		V <sub>DD</sub> = 5.0V, TXEN= H (note1)		12.0		mA
Operating current 2	I <sub>DD21</sub>		V <sub>DD</sub> = 3.0V, TXEN= L (note2)		2.0	3.0	mA
	I <sub>DD22</sub>		V <sub>DD</sub> = 5.0V, TXEN= L (note2)		5.5		mA
Maximum operating frequency	f <sub>TX</sub>	FINT	V <sub>INT</sub> = V <sub>INR</sub> = 300mV <sub>P-P</sub>	60			MHz
	f <sub>RX</sub>	FINR	Sine wave	50			MHz
Input amplitude	V <sub>INT</sub>	FINT	f <sub>TX</sub> = 50MHz, f <sub>RX</sub> = 40MHz	0.3		V <sub>DD</sub> -0.5	V <sub>P-P</sub>
	V <sub>INR</sub>	FINR	f <sub>XIN</sub> = 10.24MHz	0.3		V <sub>DD</sub> -0.5	V <sub>P-P</sub>
	V <sub>INX</sub>	XIN	Sine wave	0.8		V <sub>DD</sub> -0.5	V <sub>P-P</sub>
Input current	I <sub>IH</sub>	*1				300	μA
Output current	I <sub>OH</sub>	LD	V <sub>OH</sub> = V <sub>DD</sub> -0.4V	0.4			mA
	I <sub>OL</sub>	LD	V <sub>OL</sub> = 0.4V	0.4			mA
Input voltage	V <sub>IH</sub>	*2		V <sub>DD</sub> -0.4		V <sub>DD</sub>	V
	V <sub>IL</sub>	*2		0		0.4	V

\*1: BASE, TXEN pins

\*2: BASE, TXEN, D1, D2, D3, D4 pins

note1: V<sub>INT</sub>= V<sub>INR</sub>= 300mV<sub>P-P</sub>, Sine wave, f<sub>TX</sub>= 46.930MHz, f<sub>RX</sub>= 39.295MHz,

See TYPICAL APPLICATIONS for external component values.

note2: V<sub>INR</sub>= 300mV<sub>P-P</sub>, Sine wave, f<sub>RX</sub>= 39.295MHz,

See TYPICAL APPLICATIONS for external component values.

### DESIGN NOTES

LDT is HIGH when the PLL is unlocked. LDT goes HIGH when the communication channel is switched or when DOT has been HIGH for 3.2μs.

LDT return to LOW after 6.4 ± 0.4 ms when the both of the conditions are canceled. See figure 1.

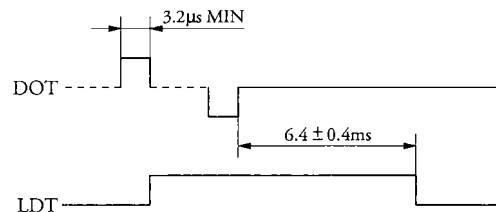


Figure 1. Lock detector timing

## SM5132 Series

### Communication Channel Selection

SM5132 series devices have parallel inputs for communication channel selection. The states of D1 to D4 and BASE are used to select one of the available channels.

#### SM5132C

Base	D4	D3	D2	D1	Ch.	TX(f <sub>REF</sub> = 5.0kHz)		RX(f <sub>REF</sub> = 5.0kHz)		
						f <sub>rx</sub> f <sub>vco</sub> (kHz)	N	f <sub>rx</sub> (kHz)	f <sub>vco</sub> (kHz)	N
0	0	0	0	1	1	49695	9939	46510	35815	7163
	0	0	1	0	2	49710	9942	46530	35835	7167
	0	0	1	1	3	49725	9945	46550	35855	7171
	0	1	0	0	4	49740	9948	46570	35875	7175
	0	1	0	1	5	49755	9951	46590	35895	7179
	0	1	1	0	6	49670	9934	46610	35915	7183
	0	1	1	1	7	49845	9969	46630	35935	7187
	1	0	0	0	8	49860	9972	46670	35975	7195
	1	0	0	1	9	49770	9954	46710	36015	7203
	1	0	1	0	10	49875	9975	46730	36035	7207
	1	0	1	1	11	49830	9966	46770	36075	7215
	1	1	0	0	12	49890	9978	46830	36135	7227
	1	1	0	1	13	49930	9986	46870	36175	7235
	1	1	1	0	14	49990	9998	46930	36235	7247
	1	1	1	1	15	49970	9994	46970	36275	7255
1	0	0	0	0	15	49970	9994	46970	36275	7255
	0	0	0	1	1	46510	9302	49695	39000	7800
	0	0	1	0	2	46530	9306	49710	39015	7803
	0	0	1	1	3	46550	9310	49725	39030	7806
	0	1	0	0	4	46570	9314	49740	39045	7809
	0	1	0	1	5	46590	9318	49755	39060	7812
	0	1	1	0	6	46610	9322	49670	39975	7795
	0	1	1	1	7	46630	9326	49845	39150	7830
	1	0	0	0	8	46670	9334	49860	39165	7833
	1	0	0	1	9	46710	9342	49770	39075	7815
	1	0	1	0	10	46730	9346	49875	39180	7836
	1	0	1	1	11	46770	9354	49830	39135	7827
	1	1	0	0	12	46830	9366	49890	39195	7839
	1	1	0	1	13	46870	9374	49930	39235	7847
	1	1	1	0	14	46930	9386	49990	39295	7859
1	1	1	1	15	46970	9394	49970	39275	7855	
0	0	0	0	15	46970	9394	49970	39275	7855	

(Note)

A "0" in the columns for BASE and input data implies LOW-level input voltage, and a "1" implies HIGH-level input voltage.

## SM5132 Series

### SM5132D

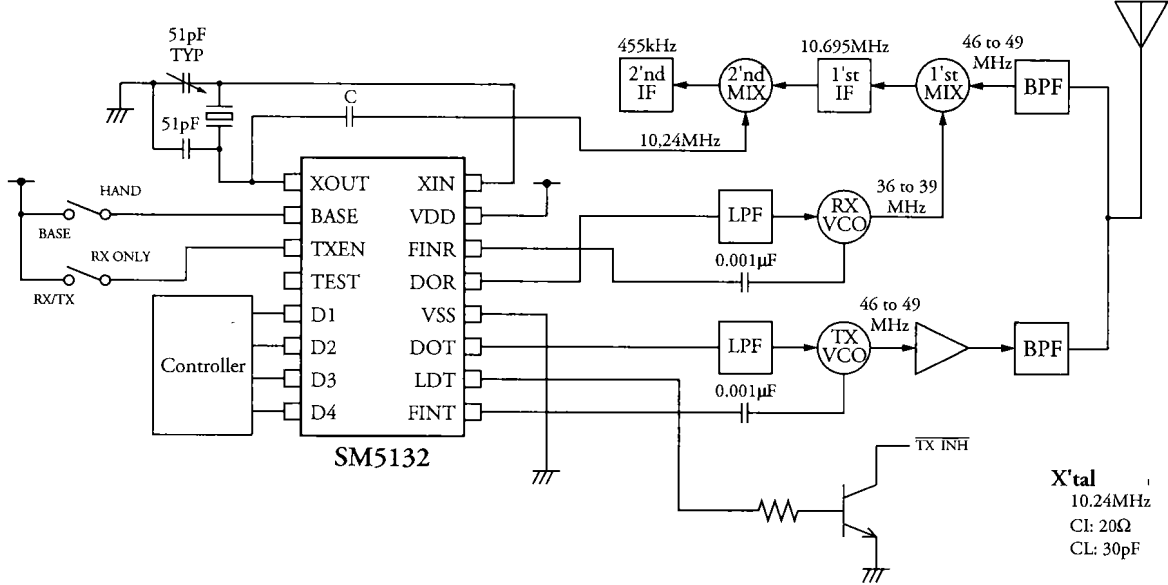
Base	D4	D3	D2	D1	Ch.	TX( $f_{REF}=5.0kHz$ )		RX( $f_{REF}=5.0kHz$ )		
						frx	N	frx	fvco	N
						fvco (kHz)		(kHz)	(kHz)	
0	0	0	0	1	1	49670	9934	46610	35915	7183
	0	0	1	0	2	49845	9969	46630	35935	7187
	0	0	1	1	3	49860	9972	46670	35975	7195
	0	1	0	0	4	49770	9954	46710	36015	7203
	0	1	0	1	5	49875	9975	46730	36035	7207
	0	1	1	0	6	49830	9966	46770	36075	7215
	0	1	1	1	7	49890	9978	46830	36135	7227
	1	0	0	0	8	49930	9986	46870	36175	7235
	1	0	0	1	9	49990	9998	46930	36235	7247
	1	0	1	0	10	49970	9994	46970	36275	7255
	1	0	1	1	10	49970	9994	46970	36275	7255
	1	1	0	0	10	49970	9994	46970	36275	7255
	1	1	0	1	10	49970	9994	46970	36275	7255
	1	1	1	0	10	49970	9994	46970	36275	7255
	1	1	1	1	10	49970	9994	46970	36275	7255
	0	0	0	0	10	49970	9994	46970	36275	7255
1	0	0	0	1	1	46610	9322	49670	38975	7795
	0	0	1	0	2	46630	9326	49845	39150	7830
	0	0	1	1	3	46670	9334	49860	39165	7833
	0	1	0	0	4	46710	9342	49770	39075	7815
	0	1	0	1	5	46730	9346	49875	39180	7836
	0	1	1	0	6	46770	9354	49830	39135	7827
	0	1	1	1	7	46830	9366	49890	39195	7839
	1	0	0	0	8	46870	9374	49930	39235	7847
	1	0	0	1	9	46930	9386	49990	39295	7859
	1	0	1	0	10	46970	9394	49970	39275	7855
	1	0	1	1	10	46970	9394	49970	39275	7855
	1	1	0	0	10	46970	9394	49970	39275	7855
	1	1	0	1	10	46970	9394	49970	39275	7855
	1	1	1	0	10	46970	9394	49970	39275	7855
	1	1	1	1	10	46970	9394	49970	39275	7855
	0	0	0	0	10	46970	9394	49970	39275	7855

(Note)

A "0" in the columns for BASE and input data implies LOW-level input voltage, and a "1" implies HIGH-level input voltage.


# SM5132 Series

## TYPICAL APPLICATIONS



Low pass filter(LPF) is the passive type.  
 As for VCO, use a type whose frequency goes high in  
 proportion to the rise of input voltage.

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NIPPON PRECISION CIRCUITS INC.

**NIPPON PRECISION CIRCUITS INC.**

3-9, TAIHEI 4 CHOME, SUMIDA-KU  
 TOKYO, 130 JAPAN  
 Telephone: +81-3-5608-5577  
 Facsimile: +81-3-5608-5566