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PRODUCT



SM8220/SM8221

Calling Number Identification Receiver IC

OVERVIEW

The SM8220/SM8221 Calling Number Identification Receiver IC is a CMOS integrated circuit, which provides an interface to various calling information delivery services such as Calling Number Delivery (CND) and Calling

Name Delivery (CNAM) compatible with the Bellcore GR-30-CORE. The device also contains a power down circuit, a ring detect circuit and a carrier detect circuit for easier system implementation.

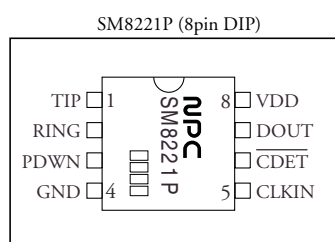
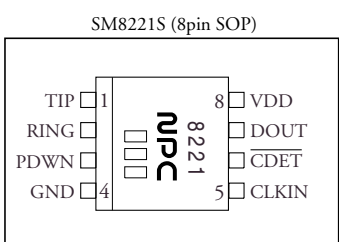
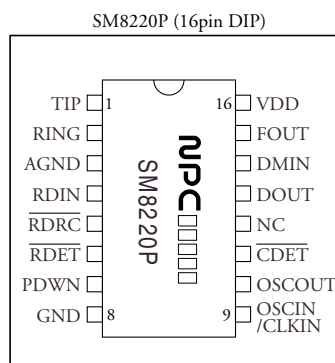
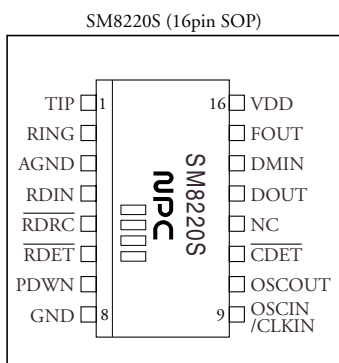
FEATURES

- Compatible with Bellcore GR-30-CORE
- Integrated band pass filter
- FSK demodulator
 - Bell 202 and ITU-T V.23
- High input sensitivity: -48 dBm typical
- Ring detect output
- Carrier Detect Output (SM8220)
- Power down mode: 1µA power down current
- Uses 3.579545 MHz crystal (SM8220) or external clock source
- Power supply voltage: 3V to 5.5V
- Low power consumption
- Molybdenum-gate CMOS process
- Package
 - SM8220: 16 pin SOP, 16 pin DIP
 - SM8221: 8 pin SOP, 8 pin DIP

APPLICATIONS

- Calling Number Delivery service
- Adjunct Boxes
- Telephone Answering Machines
- Feature Phones
- Fax Machines
- Computer Interface Products

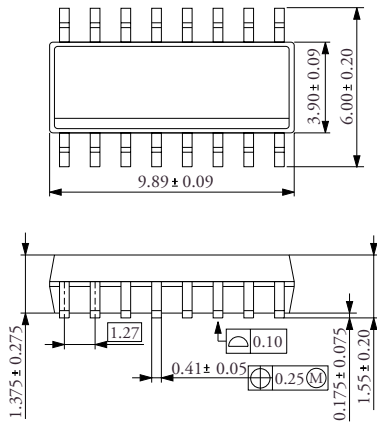
PINOUT (Top View)



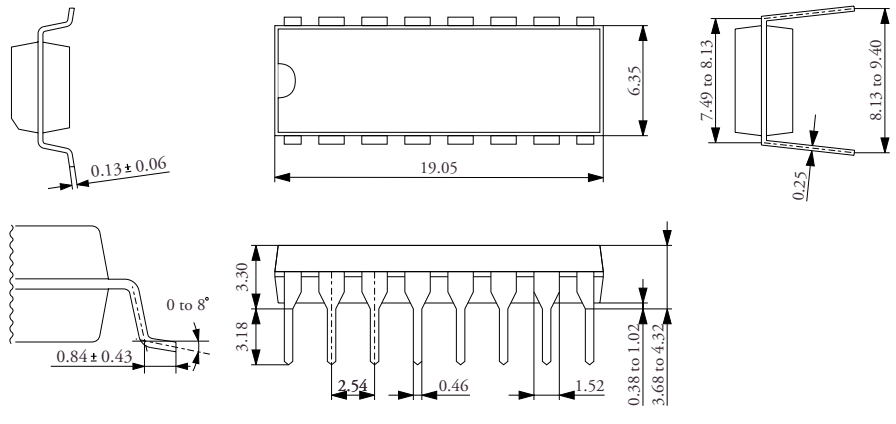
DISCONTINUED
SM8220/SM8221
PRODUCT

PACKAGE DIMENSIONS (Unit: mm)

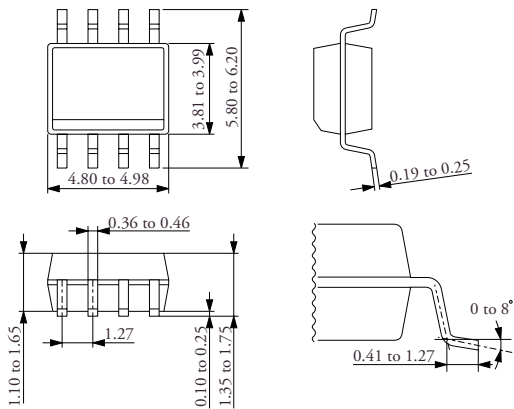
SM8220S (16 pin SOP)



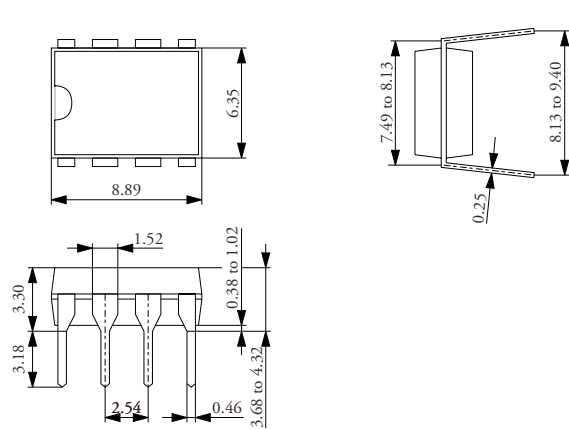
SM8220P (16 pin DIP)



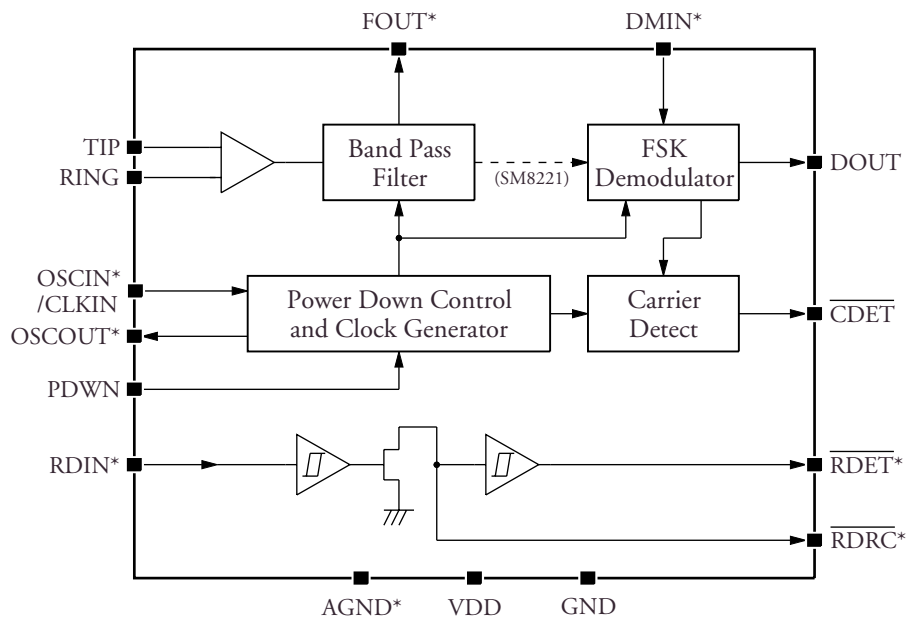
SM8221S (8 pin SOP)



SM8221P (8 pin DIP)



BLOCK DIAGRAM



*: Not available for SM8221.

**DISCONTINUED
SM8220/SM8221
PRODUCT**

PIN DESCRIPTIONS

Number		Name	i/o	Function
SM8220	SM8221			
1	1	TIP	i	Tip Input: This pin is connected to the tip side of the twisted pair telephone wires. This pin must be DC isolated from the phone line.
2	2	RING	i	Ring Input: This pin is connected to the ring side of the twisted pair telephone wires. This pin must be DC isolated from the phone line.
3	-	AGND	o	Analog Ground: 1/2 V _{DD} voltage output. This pin must be grounded through 0.1 μF capacitor.
4	-	RDIN	si	Ring Detect Input: The attenuated ring signal is connected to this pin for the ring detection.
5	-	$\overline{\text{RDRC}}$	od	Ring Detect RC Terminal: An RC network will be connected to this pin to set time delays for the ring signal detection.
6	-	$\overline{\text{RDET}}$	o	Ring Detect Output: This pin is an output of a schmitt trigger buffer which input is connected to RDRC pin. The low level at this pin indicates that the ring signal is detected.
7	3	PDWN	si	Power Down Control: This pin must be kept at low level for the normal operation. When it is high, the device will be in the power down. Under the power down mode, OSCOUT, $\overline{\text{CDET}}$ and DOUT pins are set to high level and AGND, FOUT pins are set to high impedance.
8	4	GND	-	Device Ground: This pin is connected to the system ground.
9	5	OSCIN /CLKIN	i	Crystal Oscillator Input: A crystal will be connected between this pin and OSCOUT pin. This pin may be driven from an external clock source.
10	-	OSCOUT	o	Crystal Oscillator Output: A crystal will be connected between this pin and OSCIN pin. This pin must be kept open when OSCIN pin is driven from an external clock source.
11	6	$\overline{\text{CDET}}$	o	Carrier Detect Output: When low, this output indicates that a valid carrier present on the line.
12	-	NC	-	No connection pin.
13	7	DOUT	o	Data Out: This pin presents the output of the demodulator while $\overline{\text{CDET}}$ pin is low. When $\overline{\text{CDET}}$ pin goes high, this pin is held high.
14	-	DMIN	i	Demodulator Input: This pin is connected from FOUT pin through a 0.1μF capacitor. No other components should be connected to this pin.
15	-	FOUT	o	Band Pass Filter Output: This pin is connected to DMIN pin through a 0.1μF capacitor. No other components should be connected to this pin.
16	8	VDD	-	Power Supply: Positive power supply pin.

(Note) si: Schmitt Triger Input, od: Open Drain Output.

DISCONTINUED
SM8220/SM8221
PRODUCT

ABSOLUTE MAXIMUM RATINGS

(GND= 0V unless otherwise noted)

Parameter	Symbol	Condition	Rating	Unit
Supply Voltage	V _{DD}		-0.5 to 7.0	V
Input Voltage	V _{IN}		-0.3 to V _{DD} +0.3	V
Input Current	I _{IN}		±10	mA
Power Dissipation	P _D		120	mW
Operating Temperature Range	T _a		-20 to 85	°C
Storage Temperature Range	T _{STG}		-40 to 125	°C
Soldering Temperature	T _{SLD}		255	°C
Soldering Time	t _{SLD}		10	sec

ELECTRICAL CHARACTERISTICS

DC CHARACTERISTICS

(V_{DD}= 5±0.5 V, GND = 0 V, f_{CLK} = 3.579545 MHz, T_a = -20 to 85 °C unless otherwise noted)

Parameter	Symbol	Condition	Rating			Unit
			MIN	TYP	MAX	
DC Supply Voltage	V _{DD}		3	5	5.5	V
Supply Current	I _{DD}	*1		1.7	3	mA
Power Down Current	I _{DPD}	*2			1	μA
Input Low Voltage1	V _{IL1}	OSCIN/CLKIN pin V _{OSCOUT} = 0.8V _{DD}			0.3V _{DD}	V
Input High Voltage1	V _{IH1}	OSCIN/CLKIN pin V _{OSCOUT} = 0.2V _{DD}	0.7V _{DD}			V
Input Low Voltage2	V _{IL2}	PDWN, RDIN, $\overline{\text{RDRC}}$ pin		2	0.3V _{DD}	V
Input High Voltage2	V _{IH2}	PDWN, RDIN, $\overline{\text{RDRC}}$ pin	0.75V _{DD}	3		V
Output Low Voltage	V _{OL}	DOUT, $\overline{\text{RDET}}$, $\overline{\text{CDET}}$, $\overline{\text{RDRC}}$ pin, V _{DD} = 4.5V, I _{OL} = 1.6mA			0.4	V
Output High Voltage	V _{OH}	DOUT, $\overline{\text{RDET}}$, $\overline{\text{CDET}}$ pin V _{DD} = 4.5V, I _{OH} = -1.6mA	3.7			V
Input Leakage Current	I _{IN}	OSCIN/CLKIN, PDWN, RDIN pin, V _{DD} = 5.5V, V _{IN} = 0 or 5V	-1		1	μA
Output Leakage Current	I _{OFF}	$\overline{\text{RDRC}}$ pin, RDIN= 0V V _{DD} = 5.5V, V _{OH} = 5.5V			1	μA
Input DC Resistance	R _{IN}	TIP, RING pin, V _{DD} = 5V Impedance measured from 1/2V _{DD}	175	250	325	kΩ

*1: OSCIN/CLKIN= 0V, PDWN= 0V, RDIN= 0V, $\overline{\text{RDRC}}$ = 0V, Other Input Pins= open

*2: OSCIN/CLKIN= 0V, PDWN= V_{DD}, RDIN= 0V, $\overline{\text{RDRC}}$ = 0V, Other Input Pins= open

DISCONTINUED
SM8220/SM8221
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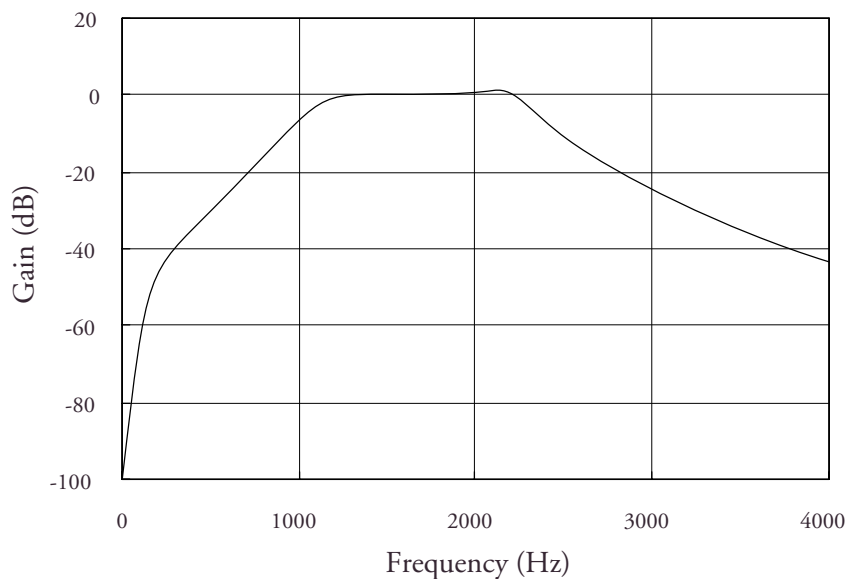
AC CHARACTERISTICS

($V_{DD}= 5.0V$, $GND= 0V$, $f_{CLK}= 3.579545MHz$, $T_a= -20$ to $85\text{ }^\circ C$, $0dBm= 0.7746V_{rms}$ @ 600Ω unless otherwise noted)

Parameter	Symbol	Condition	Rating			Unit
			MIN	TYP	MAX	
Input Sensitivity		TIP, RING pin		-48		dBm
TIP, RING pin Input Level		$V_{DD}= 5V$			-15	dBm
		$V_{DD}= 3V$			-18	
Band Pass Filter Frequency Response (relative to 1700 Hz @ -34 dBm input level)		60Hz		-80		dB
		1200 Hz		-1		
		2200Hz		0		
		4000Hz		-43		
		$\geq 10000Hz$		-54		
Carrier Detect ON Sensitivity	CDON	\overline{CDET} pin		-48	-44	dBm
Carrier Detect OFF Sensitivity	CDOFF	\overline{CDET} pin	-55	-51		dBm
Oscillator Frequency	f_{CLK}		-0.1%	3.579545	+0.1%	MHz

TYPICAL BAND-PASS FILTER FREQUENCY RESPONSE

(Relative to 1700 Hz @ -34 dBm input level)



SWITCHING CHARACTERISTICS

($V_{DD}= 5.0V$, $GND= 0V$, $f_{CLK}= 3.579545MHz$, $T_a= 25\text{ }^\circ C$, $C_L= 50pF$ unless otherwise noted)

Parameter	Symbol	Condition	Rating			Unit
			MIN	TYP	MAX	
Power Down Low to Oscillator Start Up	t_{DOSC}			5		ms
Power Down Low to FSK Data Detect	t_{SUPD}			10		ms
Carrier Detect Acquisition Time	t_{DAQ}			10		ms
End of Data to Carrier Detect High	t_{DCH}			10		ms

FUNCTIONAL DESCRIPTION

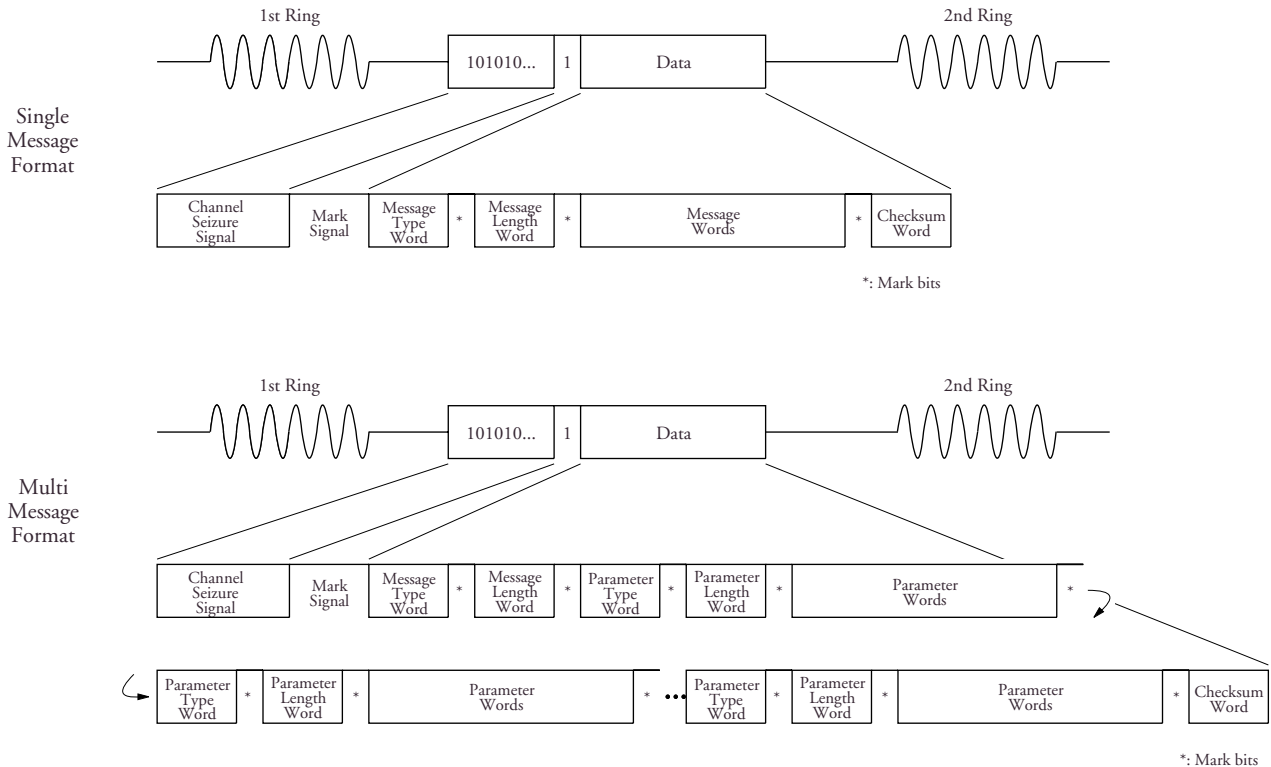
The SM8220/SM8221 Calling Number Identification Receiver IC is a device compatible with the Bellcore GR-30-CORE for transmitting asynchronous voice-band data to Customer Premises Equipment (CPE) from a serving Stored Program Controlled Switching System (SPCS) or a Central Office (CO). This data transmission technique is

applicable in a variety of services such as Calling Number Delivery (CND), Calling Name Delivery (CNAM). With these services, a subscriber will have the ability to display a message containing the phone number of the calling party, the name of a calling party, the date and the time.

The data signaling interface should conform to Bell 202 and ITU-T V.23 specification, which is:

	Bell 202	ITU-T V.23
Modulation Type	Continuous - phase binary frequency shift keying (FSK)	
Logical 1 (Mark)	1200 ± 12Hz	1300 ± 22Hz
Logical 0 (Space)	2200 ± 22Hz	2100 ± 22Hz
Carrier Frequency	1700Hz	1700Hz
Transmission rate	1200BPS	1200BPS
Data format	serial, asynchronous	serial, asynchronous

Bellcore GR-30-CORE Data Format



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