FM IF IC FOR PAGER

■ GENERAL DESCRIPTION

NJM2294 is a super low current FM IF IC for pagers. It includes almost all functions of the paging IF system. In those functions, the RSSI function can be used for automatic gain control. When the electric field strength is high, the RSSI output signal can control the attenuation of an RF amplifier to improve the received condition.

■ PACKAGE OUTLINE

NJM2294V

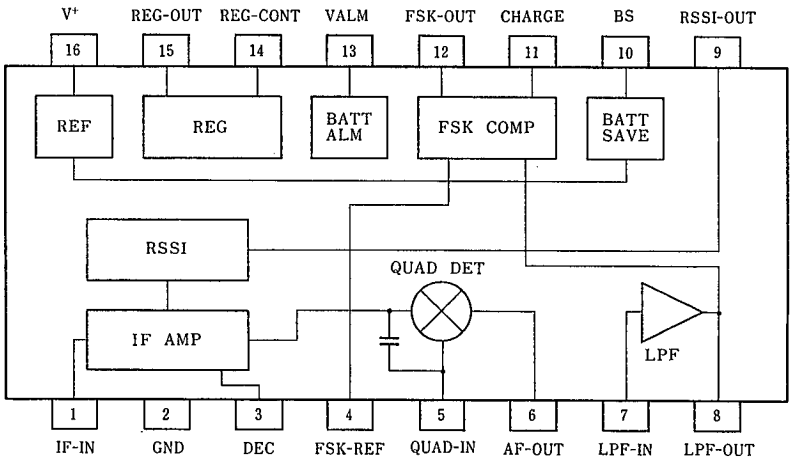
■ FEATURES

- Super low Operating Current (600 μA)
- Low Operating Voltage (1.1~4.0V)
- RSSI (Received Signal Strength Indicator)
- FSK wave shaper
- Battery check alarm function (Alarm Voltage=1.1V typ.)
- Battery saving function
- A high output current voltage regurator with an external transistor (1.1V typ.)
- A ceramic discriminator is available.
- Package Outline SSOP16
- Bipolar Technology

■ RECOMMENDED OPERATIONAL CONDITION

- Operating Voltage V^+ 1.1~4.0V

■ PIN CONFIGURATION



NJM2294V

■ MAXIMUM ABSOLUTE RATINGS

(Ta=25℃)

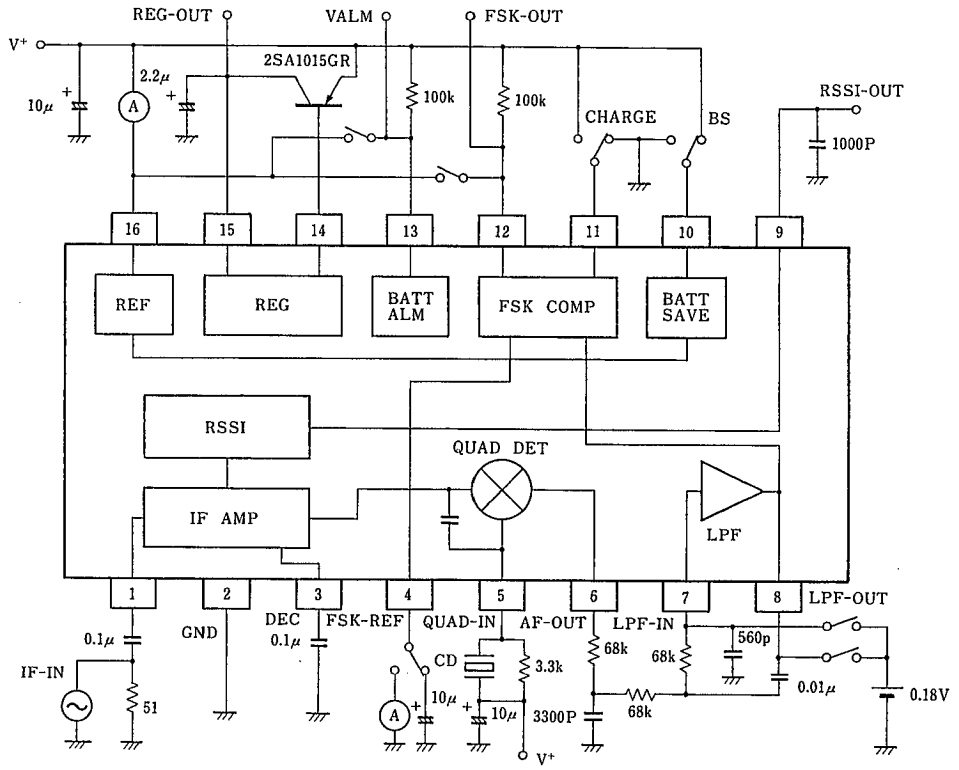
PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V^+	5	V
Power Dissipation	Pd	300	mW
Operating Temperature Range	T_{opr}	−20～+75	℃
Storage Temperature Range	T_{stg}	−40～+125	℃

■ ELECTRICAL CHARACTERISTICS

(V^+=14V, fi=455kHz, f_{mod}=600Hz, f_{dev}=±4kHz, Ta=25℃)

PARAMETER	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
No signal Operating Current	I_{CCq}	11	V_i =0, 10pin=V^+	—	600	900	μA
Battery saving Operating Current	Iccs	12	V_i =0, 10pin=GND	—	0	5	μA
IF amplifier input resistance	Rin	—		—	2	—	kΩ
S/N 1	S/N1	1	Vi=60dBμEMF	—	62	—	dB
S/N 2	S/N2	1	Vi=25dBμEMF	—	35	—	dB
−3dB limiting sensitivity	Vin(lim)	1		—	22	27	dBμEMF
Demodulated output level	Vod	1	Vi=60dBμEMF	30	46	65	mVrms
AM rejection ratio	AMR	1	Vi=60dBμEMF, AM=30%	—	50	—	dB
Duty ratio of wave shaped output	DR	2	Vi=60dBμEMF	40	50	60	%
RSSI output voltage	Vrssi	10	Vi=80dBμEMF	0.48	0.62	0.76	V
RSSI output resistance	Rrssi	—		—	62	—	kΩ
Quick charge/discharge current	Ich	13	4pin=GND, 8pin=0.18V	35	65	110	μA
Alarm voltage	Valm	3		1.05	1.10	1.15	V
Regulator output voltage	Vreg	8	RL=430Ω	0.95	1.00	1.05	V
Low level output voltage of VALM terminal	ValmL	4	IL=100μA	—	0.1	0.4	V
High level leak current of VALM terminal	IalmH	5		—	0	2	μA
Low level output voltage of FSK-OUT terminal	VfskL	6	IL=100μA	—	0.1	0.4	V
High level leak current of FSK-OUT terminal	IfskH	7		—	0	2	μA
Low level output voltage of REG-CONT terminal	VregL	9	IL=100μA	—	—	0.6	V

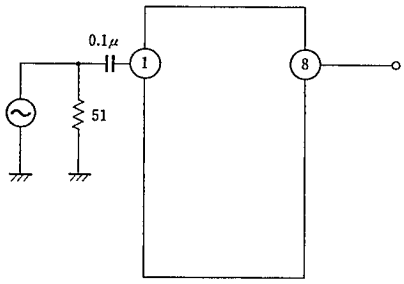
■ TEST CIRCUIT



CD:CDBC455CX (MURATA MFG.)

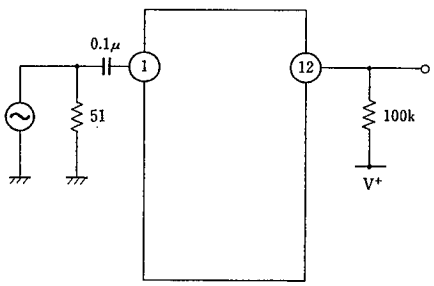
Test Circuit 1

SN1, SN2, Vi (LIM), Vod, AMR



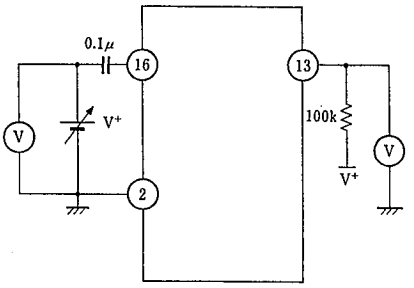
Test Circuit 2

DR



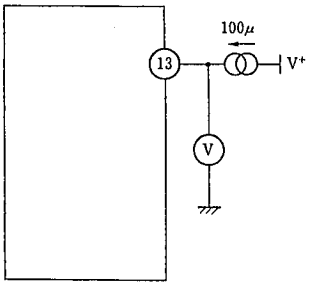
Test Circuit 3

Valm



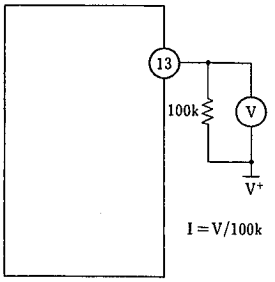
Test Circuit 4

ValmL



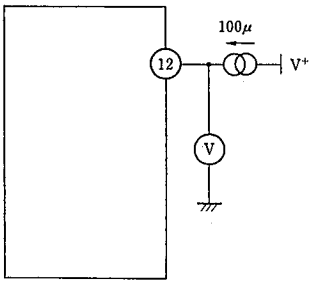
Test Circuit 5

IalmH



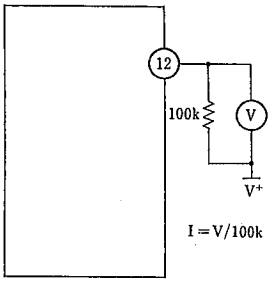
Test Circuit 6

VfskL



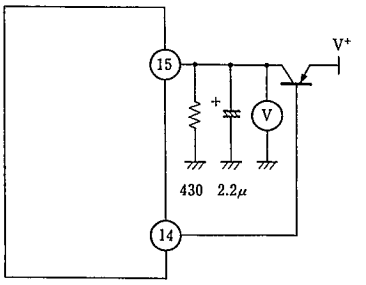
Test Circuit 7

IfskH



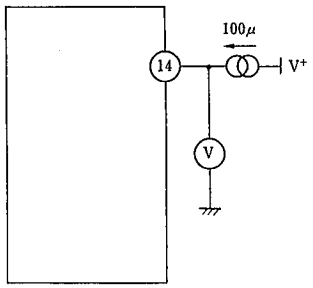
Test Circuit 8

Vreg



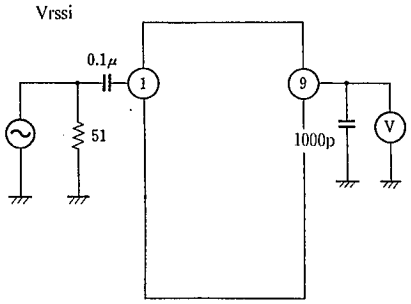
Test Circuit 9

VregL



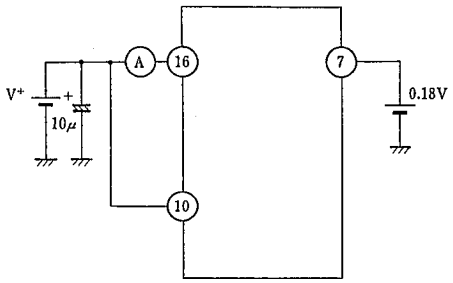
Test Circuit 10

Vrssi



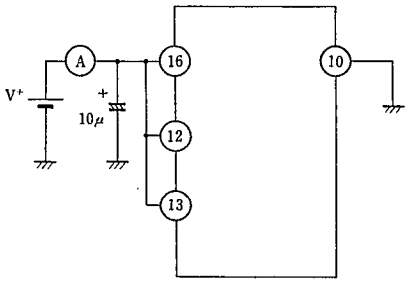
Test Circuit 11

Iccq



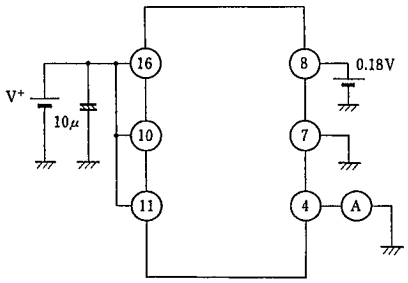
Test Circuit 12

Iccs

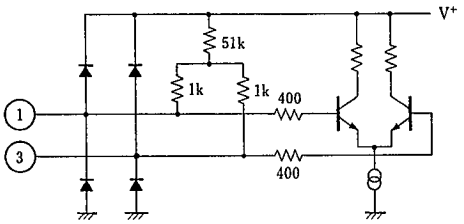
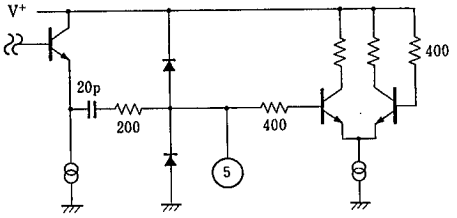
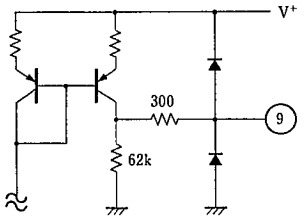
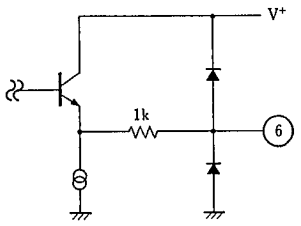


Test Circuit 13

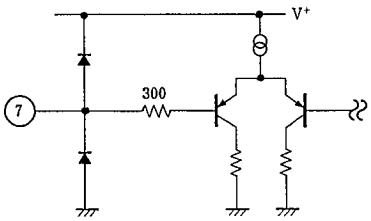
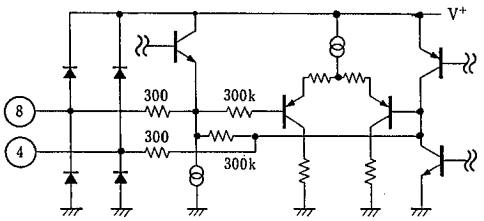
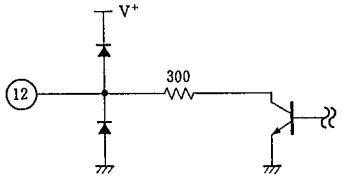
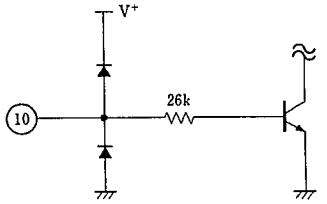
Ich



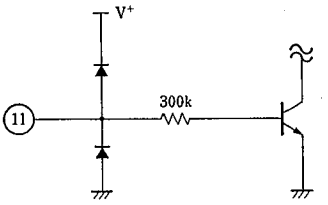
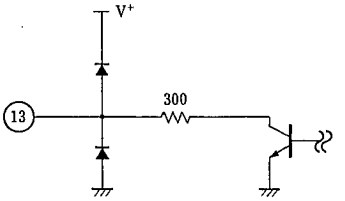
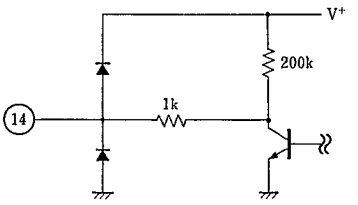
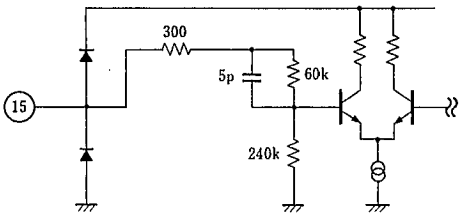
■ TERMINAL FUNCTION

PIN NO.	SYMBOL	FUNCTION	EQUIVARENT CIRCUIT
1	IF-IN	An IF amplifier input. Typical input impedance is 2kΩ.	
3	DEC	A Decoupling terminal which is connected with a decoupling capacitor.	
2	GND	Ground	
5	QUAD-IN	An input terminal of a quadrature detection circuit. This terminal will be connect with a ceramic discriminator.	
9	RSSI OUT	An RSSI Output. This voltage level is in logarithmic proportion to the input signal level.	
6	AF-OUT	An FM demodulated signal output.	

■ TERMINAL FUNCTION

PIN NO.	SYMBOL	FUNCTION	EQUIVARENT CIRCUIT
7	LPF-IN	An input terminal of a low pass filter. This terminal is biased from the AF-OUT terminal (6pin) through an external RC filter.	
8	LPF-OUT	An output terminal of a low pass filter.	
4	FSK-REF	A Reference input terminal of a wave shaping comparator. This terminal is connected with an external capacitor.	
12	FSK-OUT	An output terminal of a wave shaping circuit. The Wave shaped signal inverted for the LPF output comes out.	
10	BS	A Control terminal of a battery saving circuit. H:This circuit is OFF. L:This circuit is ON.	

■ TERMINAL FUNCTION

PIN NO.	SYMBOL	FUNCTION	EQUIVARENT CIRCUIT
11	CHARGE	A Control terminal of a quick charge/discharge circuit. H:This circuit is ON. L:This circuit is OFF.	
13	VALM	An output terminal of the alarm signal. When V+ drops down to 1.1V, this output becomes high.	
14	REG CONT	A Control terminal of an external PNP transistor used for the regulator.	
15	REG-OUT	A Monitering terminal of the regulator.	
16	V+	Supply voltage.	

■ FSK WAVE SHAPING FUNCTION

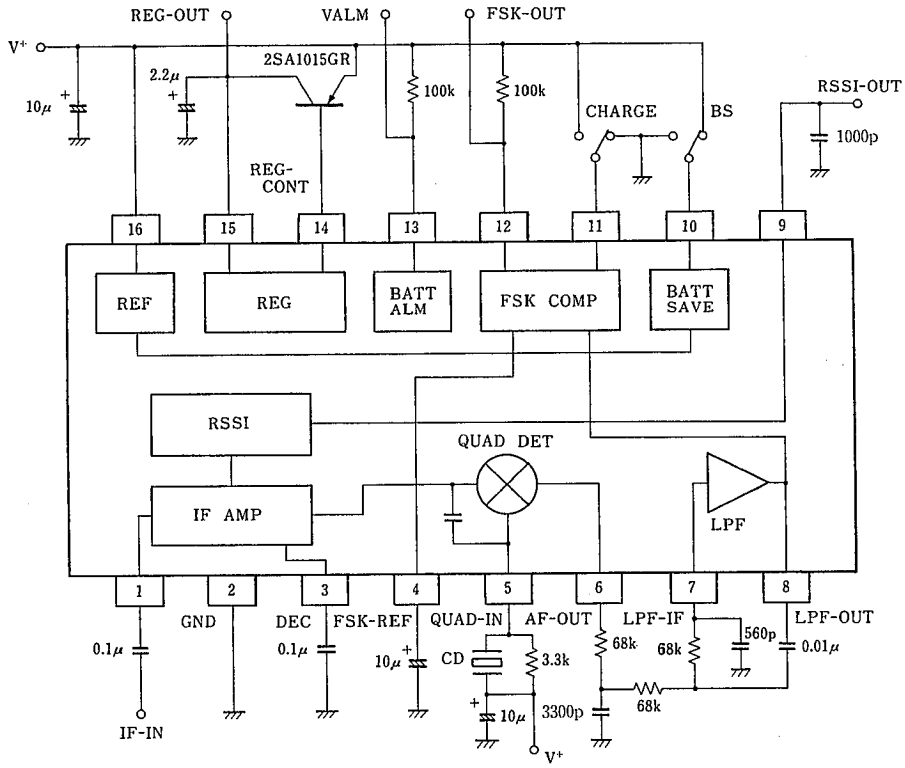
When the demodulated FSK signal is weak or noisy, the micro computer may fail to read data.
The wave shaping circuit (comparator) will change those signals to the correct logical signal to prevent the readerror.

■ QUICK CHARGE/DISCHARGE FUNCTION

The DC voltage of the FSK-REF terminal is equal to that of the demodulated FSK signal. When the battery saving state turns into the ordinary state, the FSK-REF terminal voltage will be late to come up to the reference voltage by the time constant of an external capacitor and an internal resistor, and the wave shaped data may be failed. This circuit will charge/discharge the external capacitor quickly to prevent the error.

When the DC level of the FM demudulated output changes in the operation mode of this function, the FSK-REF terminal voltage follows to the FSK demodulated output DC voltage, and the FSK output duty ratio can be constant.

■ APPLICATION CIRCUIT



CD: CDBC455CX (MURATA MFG.)

MEMO