

SPRF2738A

Low Power FM/FSK IF IC

APR. 30, 2003

Version 1.2

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LOW POWER FM/FSK IF IC

1. GENERAL DESCRIPTION

SPRF2738A is a highly integrated IF (Intermediate Frequency) IC which is popularly used in FM / FSK (Frequency Modulation / Frequency-Shift Keying) or OOK (On-Off Keying) communication systems.

It also contains a low noise amplifier, mixer, oscillator, IF limiting amplifier with RSSI (Received Signal Strength Indicator, metal optioned), quadrature demodulator, amplifier, and digital data slicer. The SPRF2738A is designed for single channel receiver at 10MHz - 50MHz band. It is also applicable for dual conversions communication system.

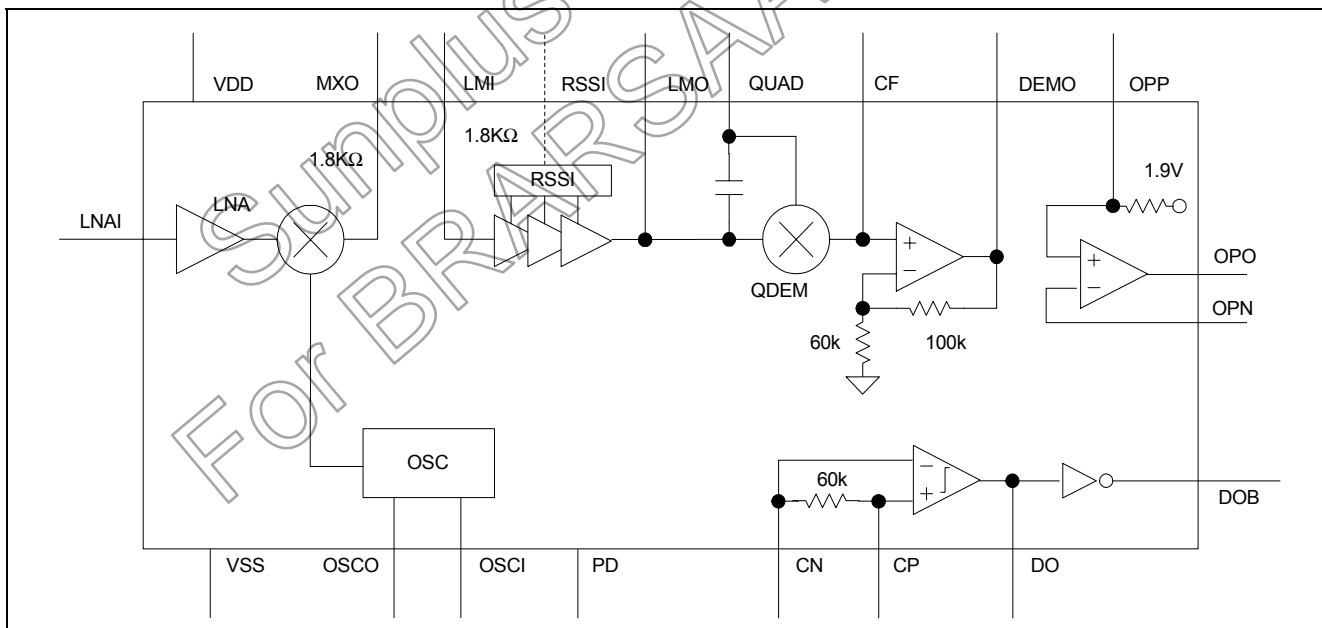
2. FEATURES

- Operation voltage: 2.4V - 5.5V
- Low current consumption: 2.5mA @ VDD = 3.0V.
- Operating frequency up to 50MHz
- Power down function
- Single chip FM/FSK or OOK receiver.
- RSSI function (metal option)
- -107dBm sensitivity (SNR = 12dB)
- Full ESD protection

3. APPLICATION FIELD

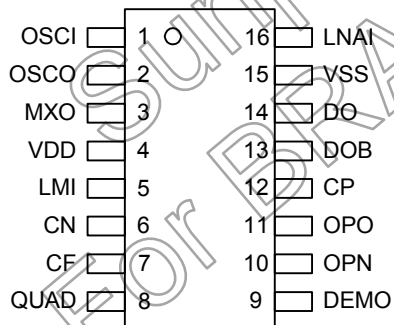
- Dual conversion IF
- Voice/data communication.
- Radio control toy
- Wireless keyboard, mouse receiver

4. BLOCK DIAGRAM

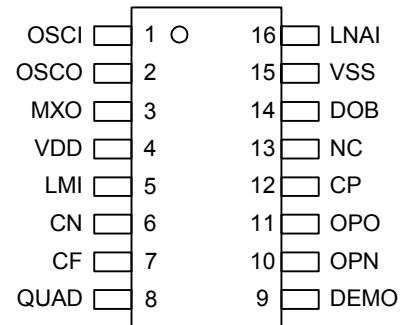


5. SIGNAL DESCRIPTIONS
5.1. Die form PIN Out

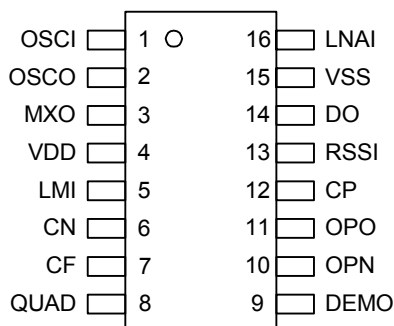
Mnemonic	PIN No.	Type	Description
OSCI	1	I	Oscillator input
OSCO	2	O	Oscillator output
MXO	3	O	Mixer output, Ro = 1.8K
PD	4	I	Power down, internally pulled high. PD = "H": power down; PD = "L": chip enable.
VDD	5	I	Positive power supply
LMI	6	I	Limit amplifier input, Ri = 1.8K
CN	7	I	Inverting input of comparator
CF	8	O	Discriminator output filtering capacitor
QUAD	9	I	Discriminator input for quadrature demodulator
LMO	10	O	Limiting amplifier output
DEMO	11	O	FM demodulation output
OPP	12	I	Non-inverting input of operational amplifier. Internally biased at 1.9V
OPN	13	I	Inverting input of operational amplifier
OPO	14	O	Output of operational amplifier
VSS	15	I	Ground
CP	16	I	Non-inverting input of comparator
DOB	17	O	Inverted data output
DO	18	O	Comparator output, data output
LNAI	19	I	Input of low noise amplifier, RF input

5.2. PIN Configuration


SPRF2738A -PS031



SPRF2738A -PS032


 SPRF2738A
-002C-PS031

5.3. Ordering Information

Product Number	Package Type
SPRF2738A - C	Chip form
SPRF2738A - PS031	Package form - SOP16
SPRF2738A - PS032	Package form - SOP16
SPRF2738A - 002C - C	Chip form
SPRF2738A - 002C - PS031	Package form - SOP16

Note: The differences between the above two parts are listed as below.

Product Number	Sensitivity @3.0V (dBm)	Input IP3 (dBm)	DOB pad option	RSSI pad option
SPRF2738A - C				
SPRF2738A - PS031	-110	-51	Yes	No
SPRF2738A - PS032				
SPRF2738A - 002C - C	-106	-38	No	Yes
SPRF2738A - 002C - PS031				

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6. ELECTRICAL SPECIFICATIONS
6.1. Absolute Maximum Ratings

Characteristics	Symbol	Ratings
DC Supply Voltage	V_+	< 6.0V
Input Voltage Range	V_{IN}	-0.5V to $V_+ + 0.5V$
Operating Temperature	T_A	0°C to +60°C
Storage Temperature	T_{STO}	-50°C to +150°C

Note: Stresses beyond those given in the Absolute Maximum Rating table may cause operational errors or damage to the device. For normal operational conditions, see DC/AC Electrical Characteristics.

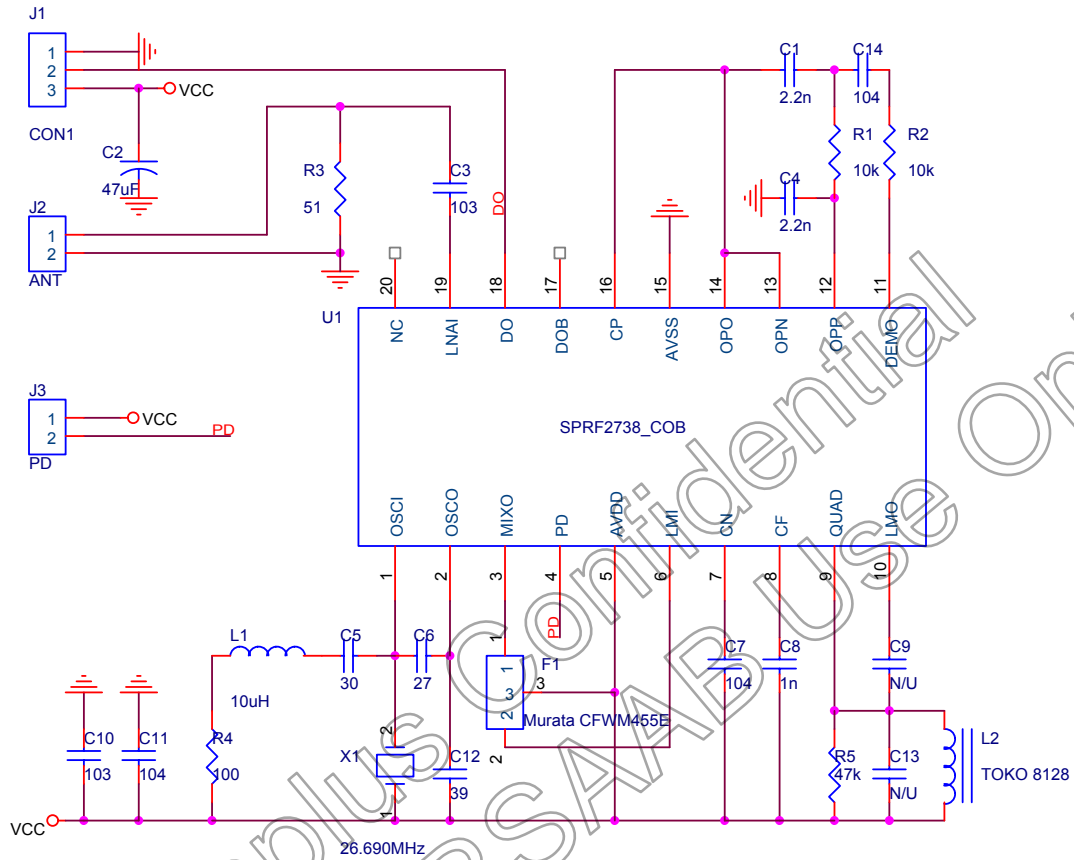
6.2. DC/AC Characteristics

(VDD = 3.0V, VSS = 0V, PD = 0V, $f_{IN} = 27.045MHz$, $X'TAL = 26.690MHz$, $f_{DEV} = 3.0KHz$, $f_{MOD} = 1.0KHz$, $T_A = 25^\circ C$)

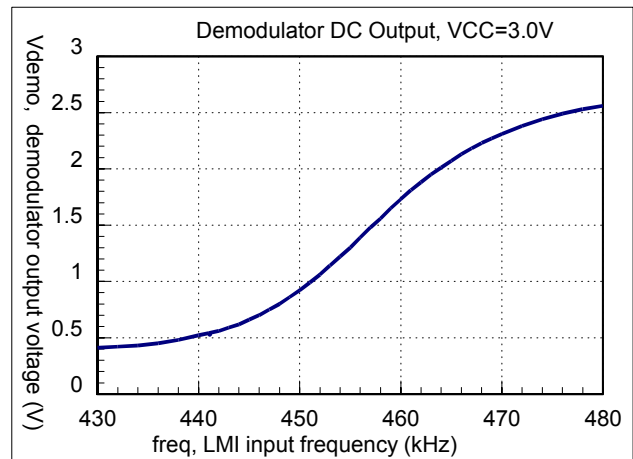
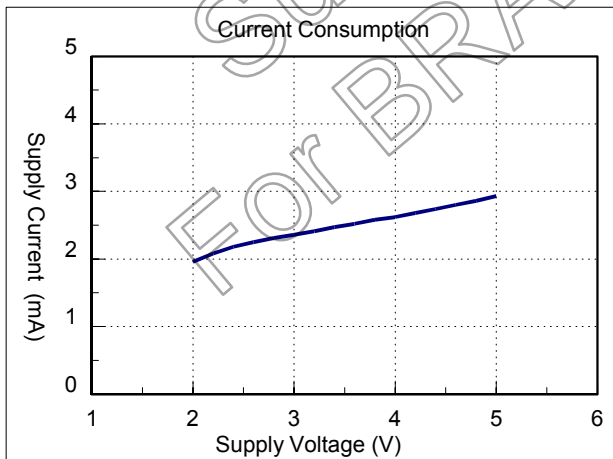
Characteristics	Symbol	Conditions	Limit			Unit
			Min.	Typ.	Max.	
DC Supply Voltage	VDD		2.4	3.0	5.5	V
Operating Current (RX)	I_{CC2}	PD = 0	-	2.5	-	mA
Power Down Current	I_{SB}	PD = 1 or floating	-	1.0	-	μA
LNA Input Impedance	Z _I		-	2.0	-	K Ω
System Noise Figure	NF		-	11	-	dB
System Sensitivity	S_{RX}	DEMO out SNR = 12dB	-	-107	-100	dBm
LNA AC Gain	A_{LNA}		-	17	-	dB
LNA -3dB Bandwidth	BW		-	50	-	MHz
Mixer Conversion Gain	CG		-	24	-	dB
Mixer Output Impedance	R_{MXO}		-	1.8	-	K Ω
Limiting Input Impedance	R_{LMI}		-	1.8	-	K Ω
Limiting AC Gain	A_{LMT}		-	84	-	dB
Demodulator Output Level	V_{DEMO}		-	450	-	mVp-p
Demo Output DC Voltage	V_{DC_DEMO}		-	1.6	-	V
Auto Threshold Control Resistor	R_{RC}		-	60	-	K Ω
RSSI Sensitivity	I_{RSSI}	Metal option	-	1.0	-	$\mu A/dB$
DO Driving Current	I_{OL}, I_{OH}		-	0.2	-	mA

6.3. Test Circuit

COB (Chip on Board) Testing Circuit



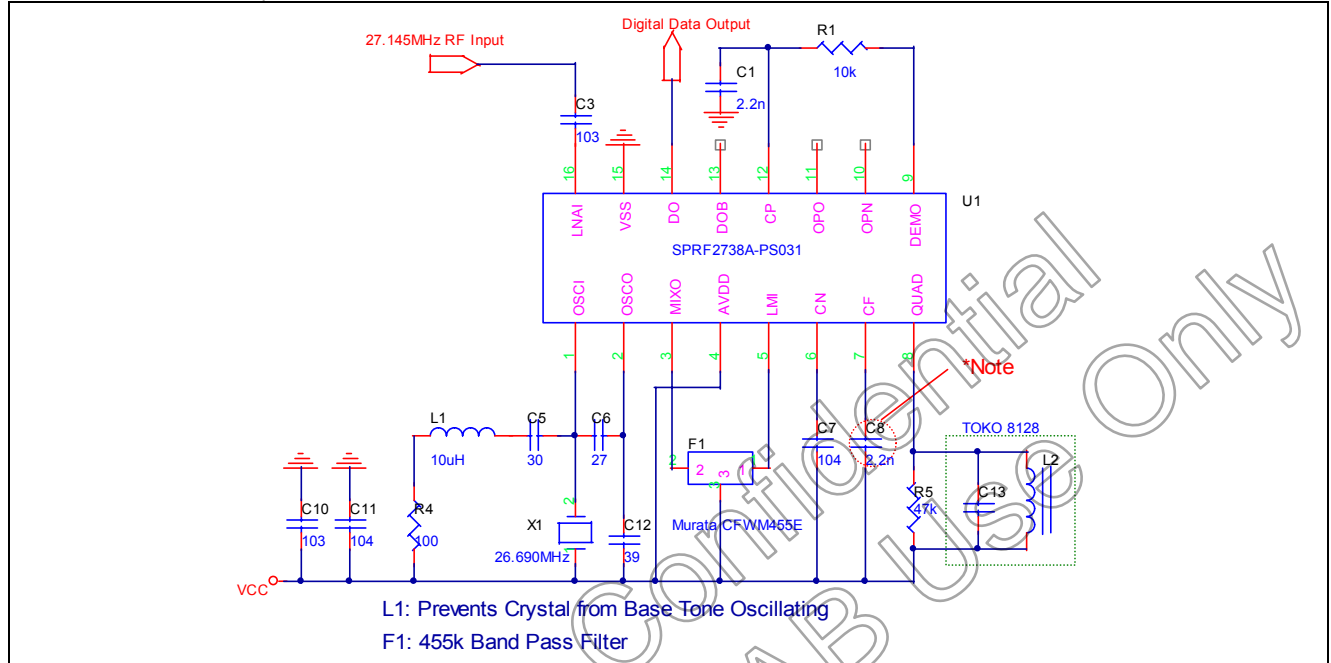
6.4. Typical Characteristics



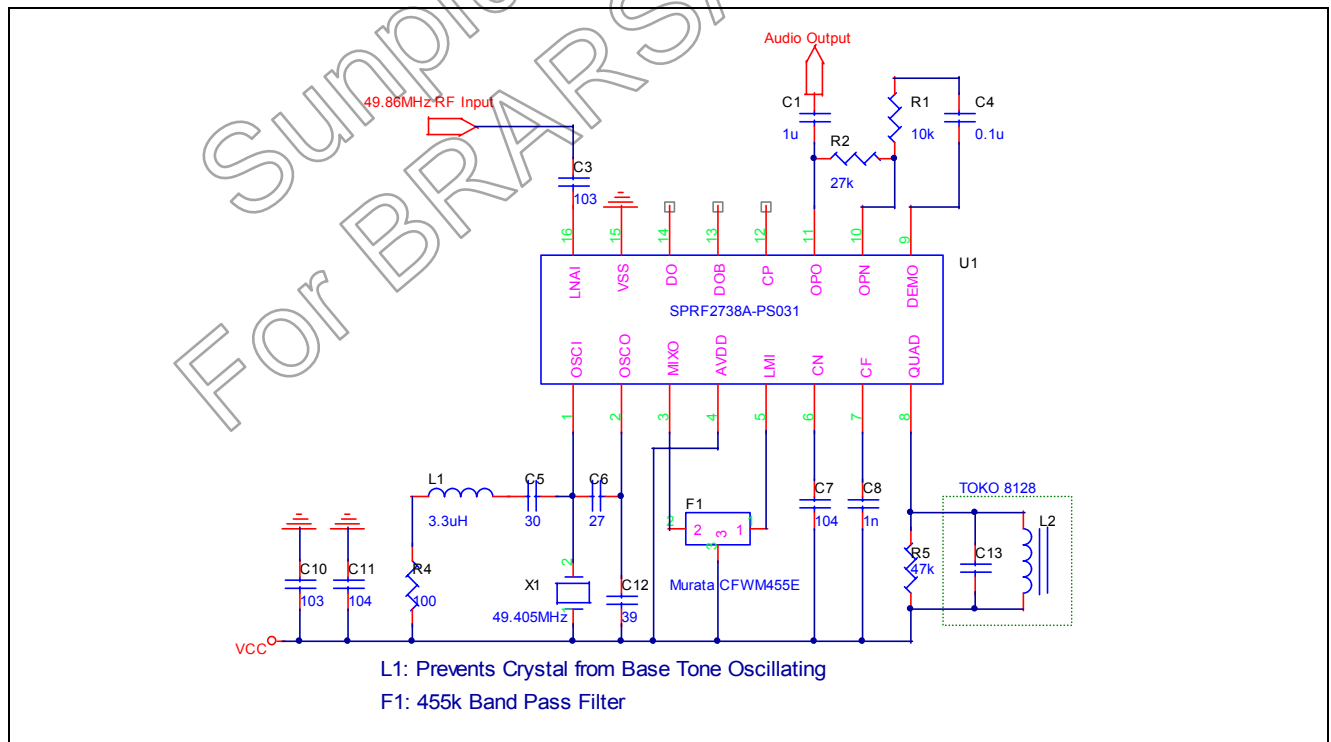
7. APPLICATION CIRCUITS

7.1. 27MHz Wireless Mouse or Keyboard Receiver RF Module

SPRF2738A is almost compatible with MC3361



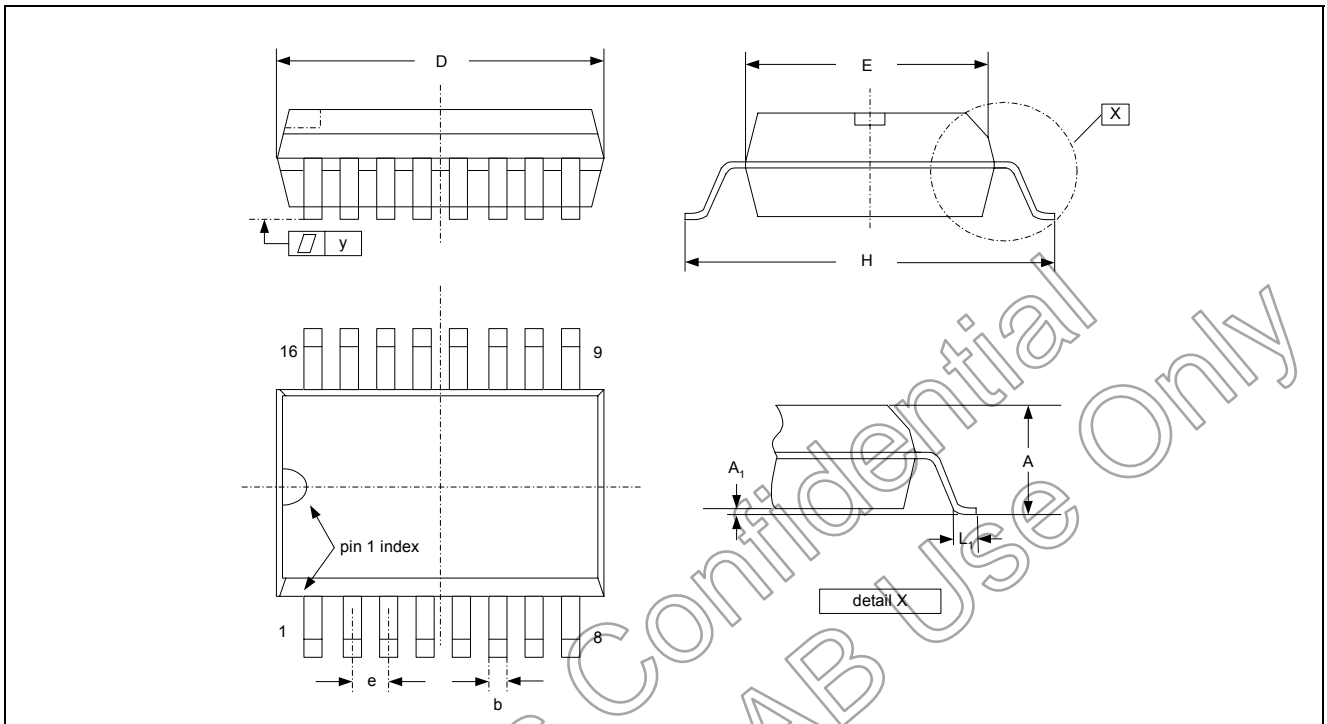
7.2. 49MHz FM Baby Monitor Receiver



8. PACKAGE/PAD LOCATIONS**8.1. PAD Assignment and Locations**

Please contact Sunplus sales representatives for more information.

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8.2. Package Information
8.2.1. SOP16 (150mil)


Symbol	Dimension in inch		
	Min.	Typ.	Max.
A	0.053	-	0.069
A1	0.004	-	0.010
b	-	0.016	-
D	0.386	-	0.394
E	0.150	-	0.157
e	-	0.050	-
H	0.228	-	0.244
L	0.016	-	0.050
y	-	-	0.004

9. DISCLAIMER

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10. REVISION HISTORY

Date	Revision #	Description	Page
APR. 30, 2003	1.2	1. Change operating range from 2.4V - 4.5V to 2.4V - 5.5V	6
		2. Add C14 to the COB application circuit.	7
		3. Change ordering information.	5
SEP. 10, 2002	1.1	1. Add description of "Die form pin out".	4
		2. Spec modification and typing correction.	5, 7
		3. Add description of "COB (Chip on Board) Testing Circuit".	6
		4. Add bonding options for SPRF2738A-PS031, SPRF2738A-PS032.	8
AUG. 14, 2002	1.0	Original	12

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