

NJM2177

The NJM2177 is a higher level integration and high quality audio performance monolithic IC designed for use in Dolby Pro Logic Surround System. The NJM2177 provides all the necessary function for a complete Pro Logic processor except time delay; Automatic input balance, noise sequencer, adaptive matrix, center mode control, and modified B-type noise reduction all on chip.

In addition to Dolby Pro Logic function including Dolby 3-stereo, this device provides two channel bypass mode and two special outputs used for other surround conveniently.

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This device available only to licensees of Dolby Lab.

Licensing and application information may be obtained from Dolby Lab.

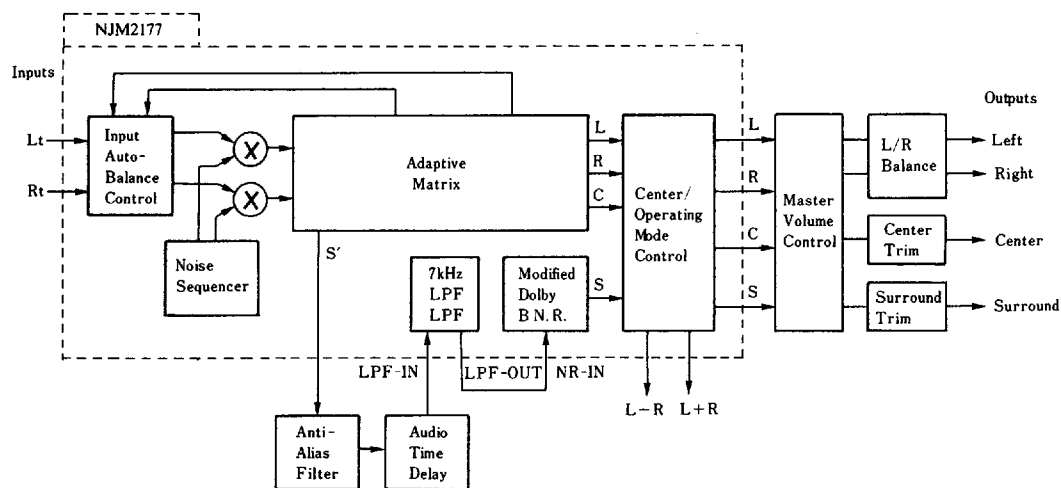
■ Functions

- Auto input balance and buffer
- Noise sequencer; a Noise generator, a sequencer controlled by external two bits
- Adaptive Matrix
- Center mode control; ON/OFF, Normal/Phantom/Wideband
- Modified Dolby B Type Noise Reduction and OP amp. for 7kHz low-pass filter
- Operating mode control; 4ch(L,C,R,S), 3ch(L,C,R), 2ch(no processing)
- L+R and L-R output

■ Features

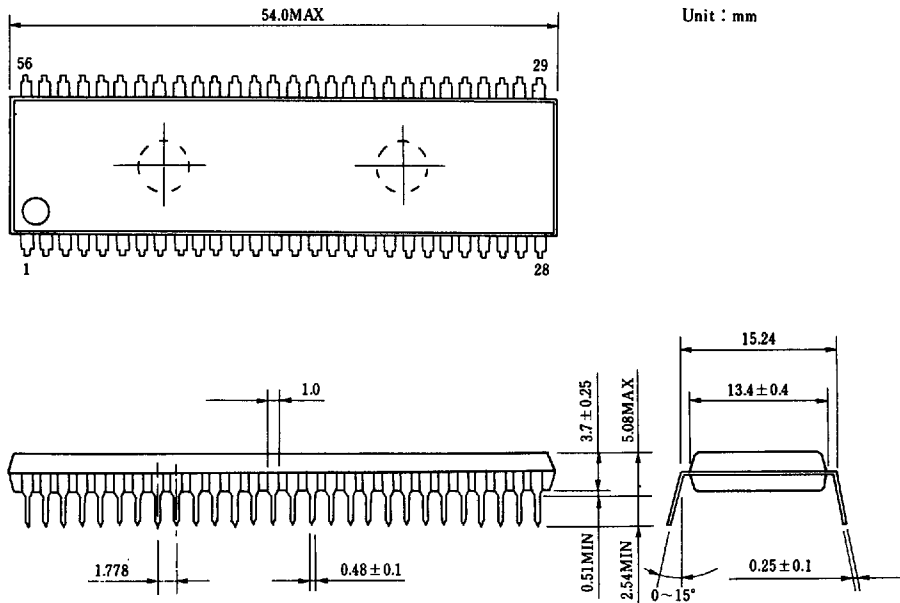
- Package: SDIP-56, QFP-56, QFP-64
- Dolby operating level: 300mVrms
- Operating supply voltage range: 9 to 13V
- Lower supply current: 34mA typ.
- Internal mode control switches

■ Active Surround Decoder Block Diagram



■ Package Outline and Pin Configuration

NJM2177L



— SDIP-56 —

PIN No. Pin Name
 1. C-RECT-OUT
 2. R-RECT-OUT
 3. L-RECT-OUT
 4. S-RECT-TC
 5. C-RECT-TC
 6. L-BPF-OUT
 7. L-BPF-IN
 8. L-RECT-TC
 9. R-BPF-OUT
 10. R-BPF-IN
 11. R-RECT-TC
 12. GND
 13. AB-GATE
 14. AB-HOLD-TC

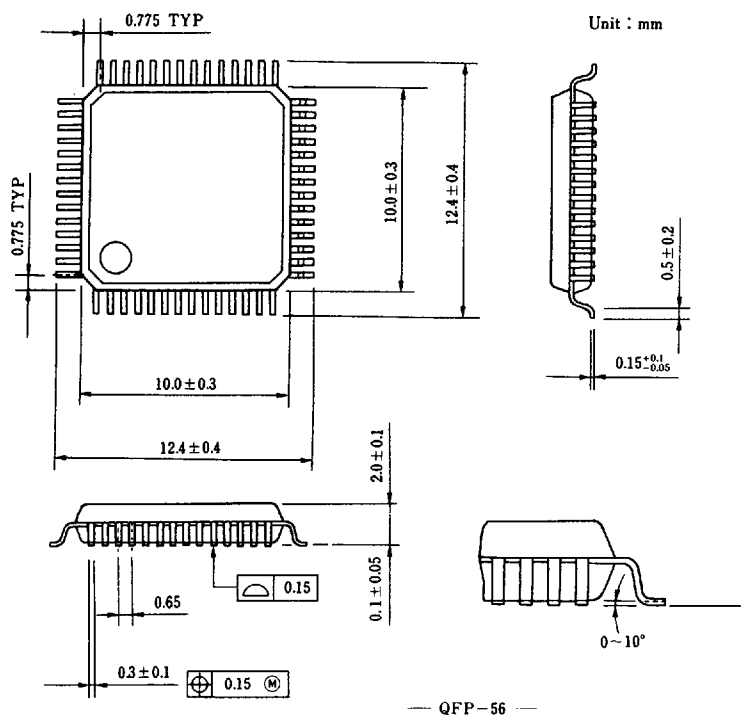
PIN No. Pin Name
 15. L-AB-IN
 16. L-AB-OUT
 17. L-IN
 18. L-INBUF-OUT
 19. R-INBUF-OUT
 20. R-IN
 21. R-AB-OUT
 22. R-AB-IN
 23. NOISE-CNT-E
 24. NOISE-CNT-A
 25. NOISE-CNT-B
 26. NOISE-REF
 27. NOISE-HPF
 28. NOISE-LPF

PIN No. Pin Name
 29. S-OUT
 30. CENTER-CNT
 31. MODE-CNT
 32. L-OUT
 33. R-OUT
 34. L+R-OUT
 35. L-R-OUT
 36. CENTER-MODE
 37. V+
 38. C-OUT
 39. S'-OUT
 40. IREF
 41. NR-VCF
 42. NR-IN

PIN No. Pin Name
 43. VREF
 44. VREF
 45. NR-WT
 46. LPF-OUT
 47. LPF-INV-IN
 48. LPF-NINV-IN
 49. NR-TC
 50. VLR-TC3
 51. VCS-TC3
 52. VCS-TC2
 53. VCS-TC1
 54. VLR-TC1
 55. VLR-TC2
 56. S-RECT-OUT

■ Package Outline and Pin Configuration

NJM2177FA1



PIN No. Pin Name

1. L-RECT-TC
2. R-BPF-OUT
3. R-BPF-IN
4. R-RECT-TC
5. GND
6. AB-GATE
7. AB-HOLD-TC
8. L-AB-IN
9. L-AB-OUT
10. L-IN
11. L-INBUF-OUT
12. R-INBUF-OUT
13. R-IN
14. R-AB-OUT

PIN No. Pin Name

15. R-AB-IN
16. NOISE-CNT-E
17. NOISE-CNT-A
18. NOISE-CNT-B
19. NOISE-REF
20. NOISE-HPF
21. NOISE-LPF
22. S-OUT
23. CENTER-CNT
24. MODE-CNT
25. L-OUT
26. R-OUT
27. L+R-OUT
28. L-R-OUT

PIN No. Pin Name

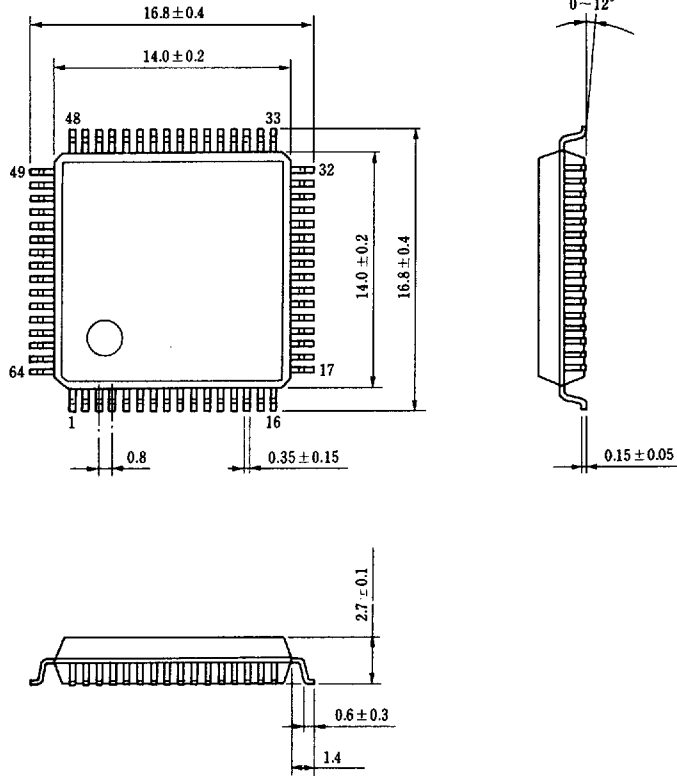
29. CENTER-MODE
30. V+
31. C-OUT
32. S'-OUT
33. IREF
34. NR-VCF
35. NR-IN
36. VREF
37. VREF
38. NR-WT
39. LPF-OUT
40. LPF-INV-IN
41. LPF-NINV-IN
42. NR-TC

PIN No. Pin Name

43. VLR-TC3
44. VCS-TC3
45. VCS-TC2
46. VCS-TC1
47. VLR-TC1
48. VLR-TC2
49. S-RECT-OUT
50. C-RECT-OUT
51. R-RECT-OUT
52. L-RECT-OUT
53. S-RECT-TC
54. C-RECT-TC
55. L-BPF-OUT
56. L-BPF-IN

■ Package Outline and Pin Configuration

NJM2177FB4



— QFP-64 —

PIN No. Pin Name

- 1. NC
- 2. L-RECT-TC
- 3. R-BPF-OUT
- 4. R-BPF-IN
- 5. R-RECT-TC
- 6. GND
- 7. AB-GATE
- 8. AB-HOLD-TC
- 9. L-AB-IN
- 10. L-AB-OUT
- 11. L-IN
- 12. L-INBUF-OUT
- 13. R-INBUF-OUT
- 14. R-IN
- 15. R-AB-OUT
- 16. NC

PIN No. Pin Name

- 17. NC
- 18. R-AB-IN
- 19. NOISE-CNT-E
- 20. NOISE-CNT-A
- 21. NOISE-CNT-B
- 22. VREF
- 23. NOISE-HPF
- 24. NOISE-LPF
- 25. S-OUT
- 26. CENTER-CNT
- 27. MODE-CNT
- 28. L-OUT
- 29. R-OUT
- 30. L+R-OUT
- 31. L-R-OUT
- 32. NC

PIN No. Pin Name

- 33. NC
- 34. CENTER-MODE
- 35. V+
- 36. C-OUT
- 37. S'-OUT
- 38. IREF
- 39. NR-VCF
- 40. NR-IN
- 41. VREF
- 42. VREF
- 43. NR-WT
- 44. LPF-OUT
- 45. LPF-INV-IN
- 46. LPF-NINV-IN
- 47. NR-TC
- 48. NC

PIN No. Pin Name

- 49. NC
- 50. VLR-TC3
- 51. VCS-TC3
- 52. VCS-TC1
- 53. VCS-TC1
- 54. VLR-TC2
- 55. VLR-TC2
- 56. S-RECT-OUT
- 57. C-RECT-OUT
- 58. R-RECT-OUT
- 59. L-RECT-OUT
- 60. S-RECT-TC
- 61. C-BPF-OUT
- 62. L-RECT-TC
- 63. L-BPF-IN
- 64. NC

■ Absolute Maximum Ratings at Ta=25°C

Operating Supply Voltage	V ⁺	13V
DC Supply Voltage	V ⁺	15V
Power dissipation	P _D	700mW
Operating Temperature	T _{opr}	-20~+75°C
Storage Temperature	T _{stg}	-40~+125°C

■ Electrical Characteristics (Ta=25°C, V⁺=12V, 0dB Reference is 300mV/1kHz at C-OUT. Unless otherwise specified.)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
☆ Overall						
Supply Voltage Range	V _{OP}		9.0	—	13.0	V
Supply Current	I _{CC}	No signal	—	34.0	40.0	mA
Reference Voltage	V _{ref}	No signal	—	4.0	—	V
Control SW input voltage						
2ch Mode	V _{C-2ch}	MODE-CNT PIN	0.0	—	0.8	V
3ch	V _{C-3ch}	MODE-CNT PIN	—	Open	—	
4ch	V _{C-4ch}	MODE-CNT PIN	3.8	—	7.0	V
Center on	V _{C-con}	CENTER-CNT PIN	2.4	—	7.0	V
Center off	V _{C-coff}	CENTER-CNT PIN	0.0	—	0.8	V
Noise Seq. on	V _{C-nson}	NOISE-CNT-E PIN	0.0	—	0.8	V
Noise Seq. off	V _{C-nsoff}	NOISE-CNT-E PIN	3.2	—	7.0	V
Noise Seq. channel select H	V _{C-nssH}	NOISE-CNT-A and NOISE-CNT-B PIN	3.2	—	7.0	V
Noise Seq. channel select L	V _{C-nssL}	NOISE-CNT-A and NOISE-CNT-B PIN	0.0	—	0.8	V
☆ Modified B Noise Reduction (0dBd Reference is input level at NR-IN when adjust to 300mV/100Hz at S-OUT)						
Voltage gain	GV-BNR	V _{in} =0dBd, f=100Hz	—	9.0	—	dB
Decode Response 1	D _{ec1}	V _{in} =0dBd, f=1.0kHz	-1.6	-0.1	1.4	dB
2	D _{ec2}	V _{in} =-15dBd, f=1.4kHz	-3.0	-1.5	0.0	dB
3	D _{ec3}	V _{in} =-20dB, f=1.4kHz	-4.9	-3.4	-1.9	dB
4	D _{ec4}	V _{in} =40dBd, f=5.0kHz	-6.8	-5.3	-3.8	dB
T.H.D	THD-NR	V _{in} =0dBd, f=1.0kHz	—	0.07	—	%
Headroom	HR-NR	V ⁺ =9V AT T.H.D.=1%	15.0	17.0	—	dB
SN Ratio	SN-NR	R _g =0, weighted CCIR/ARM	76	82	—	dB
☆ Noise sequencer						
OUTPUT Noise level	V _{no}		-15	-12.5	-10	dB
Output Noise Level Accuracy relative to Cch Lch Rch S'ch	ΔV _{no}		-0.5	0.0	0.5	dB
☆ Adaptive Matrix						
Output Level Accuracy relative to Cch L,R,S'ch out	ΔVol		-0.5	0.0	0.5	dB
Matrix Rejection relative L,R,C,S'ch out	Mr		25.0	40.0	—	dB
T.H.D L,R,C,S'ch out	THD-AM		—	0.02	—	%
Headroom L,R,C,S'ch out	HR-AM	V ⁺ =9V at T.H.D.=1%	15.0	15.7	—	dB
Signal to Noise Ratio L,R,C,S' ch out	SN-AM	R _g =0, weighted CCIR/ARM	78	83	—	dB
☆ Auto Balance						
Capture Range	CPR		—	±5	—	dB
Error collection	CER		—	±4	—	dB
T.H.D Lt, Rt OUT	THD-AB		—	0.03	—	%
S/N Lt, Rt OUT	SN-AB	R _g =0, weighted CCIR/ARM	78	83	—	dB
Headroom Lt,Rt OUT	HR-AB	V ⁺ =9V at T.H.D.=1%	15.0	17.0	—	dB
☆ L+R & L-R OUTPUT						
Output Level Accuracy relative to Cch L+R, R-L ch	ΔVol-OP		—	0.0	—	dB
T.H.D	THD-OP		—	0.02	—	%
S/N	SN-OP	R _g =0, weighted CCIR/ARM	—	92	—	dB
Headroom	HR-OP	V _{CC} =9V at T.H.D.=1%	—	17.0	—	dB