M51326P

Analog switch

REJ03F0079-0100Z
Rev.1.0
Sep.22.2003

Description

The M51326P is a semiconductor integrated circuit for use as an analog switch in image-handling equipment. The IC incorporates two audio switches, one with two and one with three inputs, and one video switch with two inputs. Each switch is independently controllable.

Features

- Built-in analog switches for use with video signals and stereo audio signals
- Wide video-switch bandwidth: DC to 10 MHz
- Good crosstalk characteristics (for video): 55 dB (typ.) @5 MHz

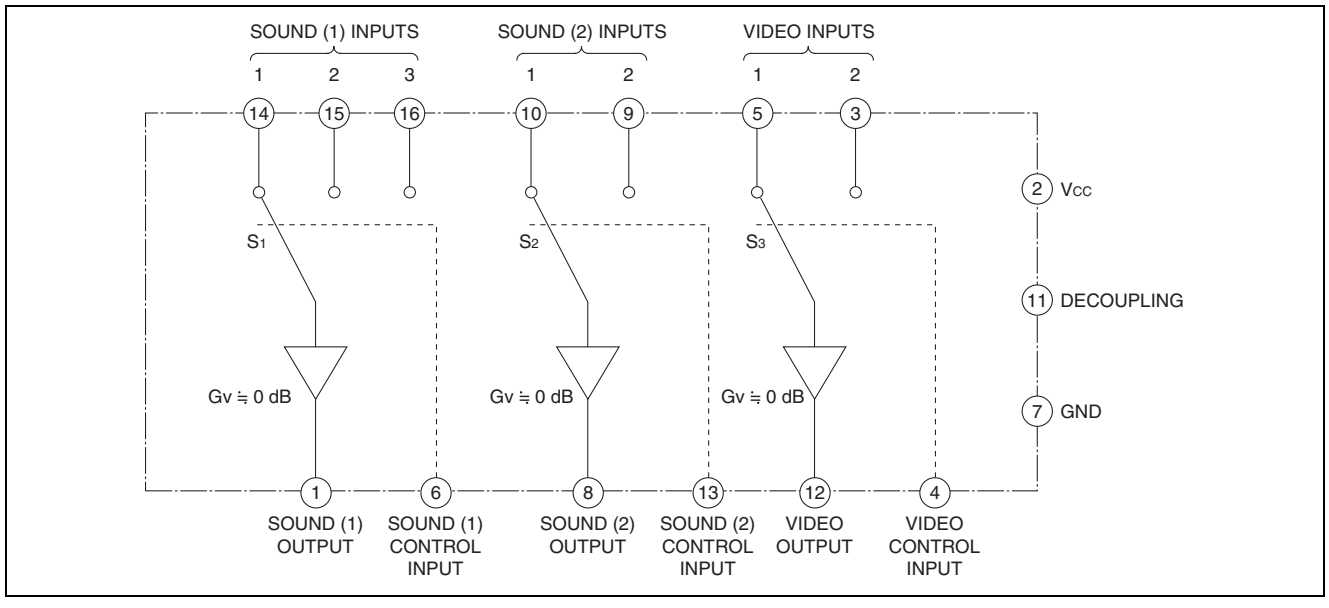
Applications

- Video equipment

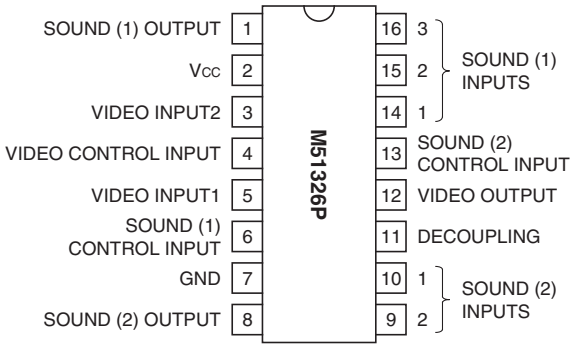
Recommended operating condition

- Power-supply-voltage range: 5 to 14 V
- Rated power-supply voltage: 9 V, 12 V

Block diagram



Pin Configuration



Package 16P4

Absolute maximum ratings

(unless otherwise noted, Ta = 25°C, Vcc = 12 V)

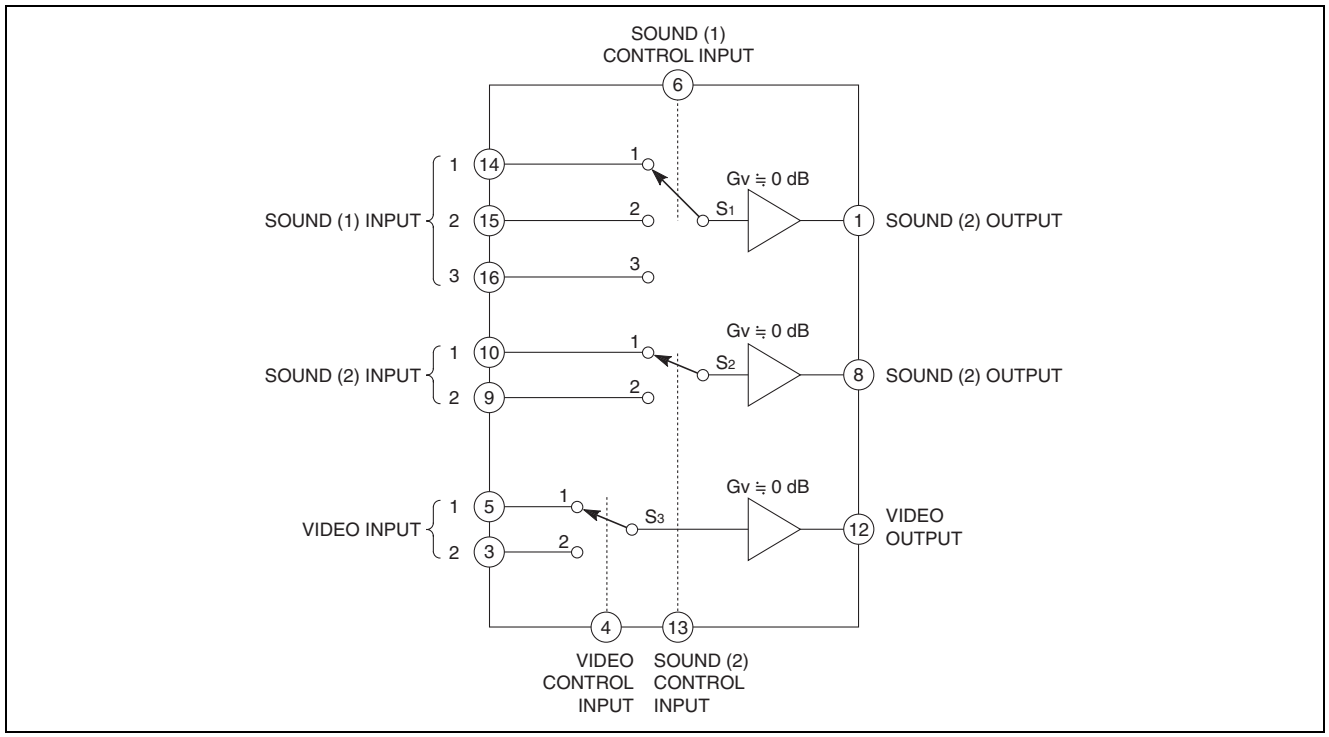
Symbol	Item	Ratings	Unit
Vcc	Power-supply voltage	14	V
V_{IS}	Input signal voltage	6	V
V_{IC}	Input control voltage	Vcc	V
Pd	Power dissipation	1.25	W
Kθ	Thermal derating	1.25	mW / °C
T_{opr}	Ambient operating temperature	–20 to +75	°C
Tstg	Storage temperature	–40 to +125	°C

Electrical characteristics

(unless otherwise noted, Ta = 25°C, Vcc = 12 V)

Symbol	Item	Measured condition	Limits			Unit
			Min.	Typ.	Max.	
Icc	Circuit current		–	28	36	mA
V_{IDC}	Input bias voltage		3.8	4.2	4.6	V
V_{ODC}	Output bias voltage		3.0	3.6	4.2	V
ΔV_{ODC}	Output DC offset voltage		–	15	100	mV
V_{ICH}	Control-pin threshold voltage	For audio (1) (pin 6 tri - state input)	7.0	8.0	9.0	V
V_{ICL}		For audio (1) (pin 6 tri - state input)	3.0	4.0	5.0	V
V_{IC}		For audio (2) and images (pins 4, 13)	1.7	2.1	2.5	V
Gv	Voltage gain	f = 1 kHz,	–0.5	–0.1	–	dB
THD	Total harmonic distortion	For audio, f = 1 kHz, Vo = 1 Vrms	–	0.02	0.2	%
V_N	Output noise voltage	For audio, Rg = 600 Ω, bandwidth = 15 kHz	–	3	50	µVrms
		For video, Rg = 75 Ω, bandwidth = 10 MHz	–	0.5	1.0	mVrms
CT	Crosstalk	f = 1 kHz (for audio)	65	80	–	dB
		f = 5 MHz (for video)	45	50	–	

Switching mode



Selection of switch settings

Control input*	Switch number		
	S_1	S_2	S_3
H	1	1	1
M	2	(Note)	(Note)
L	3	2	2

Note: connect to Vcc or GND

Control input voltage (pin 6)

Control input	Vcc	
	9 V	12 V
H	7.2 to 9 V	9.2 to 12 V
M	4.2 to 4.8 V	5.2 to 6.8 V
L	0 to 1.8 V	0 to 2.8 V

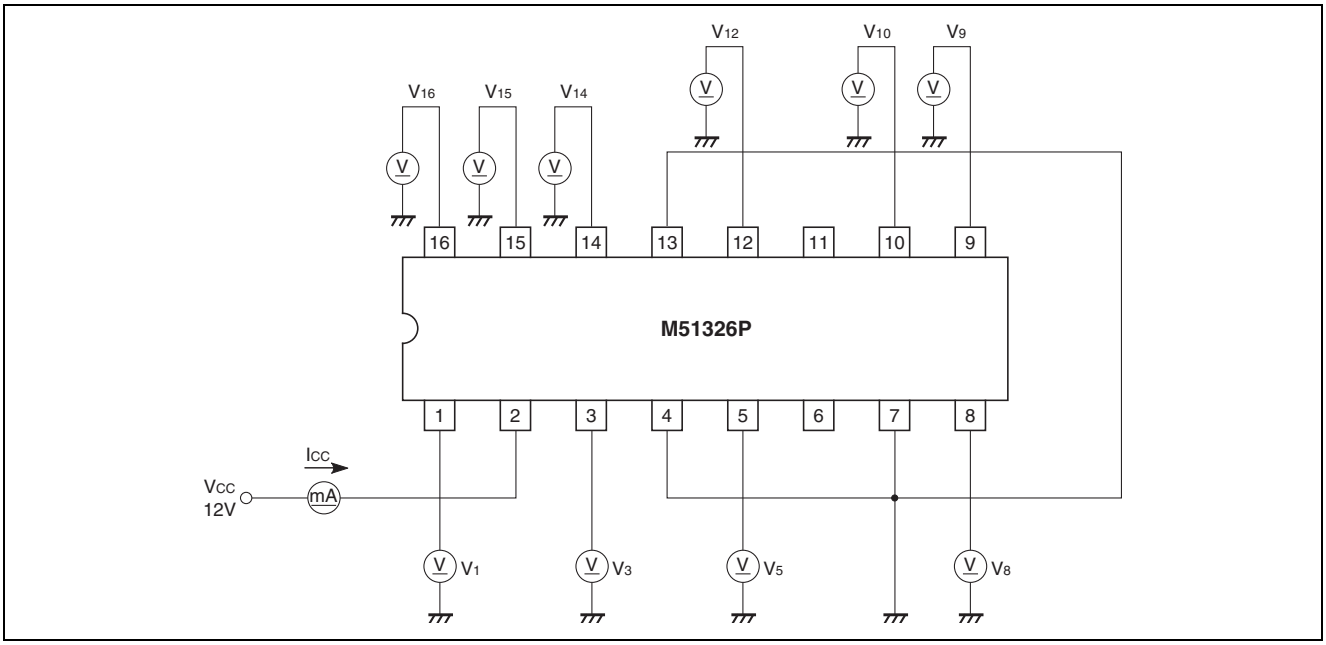
Control input voltage (pins 4, 13)

Control input	Vcc	
	9 V	12 V
H	2.7 to 9 V	2.7 to 12 V
L	0 to 1.5 V	0 to 1.5 V

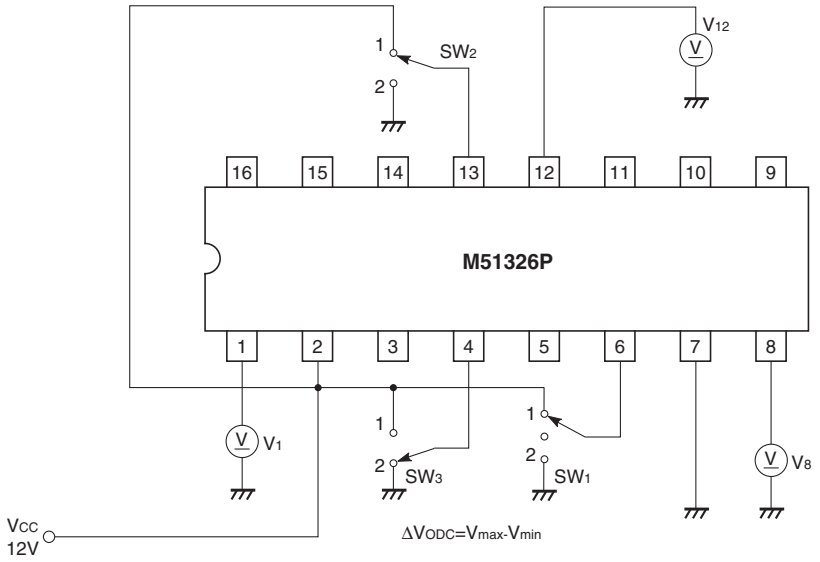
Measurement circuit

(unless otherwise noted, Ta = 25°C, Vcc = 12 V)

Measurement circuit for circuit current ICC, input bias voltage V_{IDC}, output bias voltage V_{ODC}



Measurement circuit output DC - offset voltage

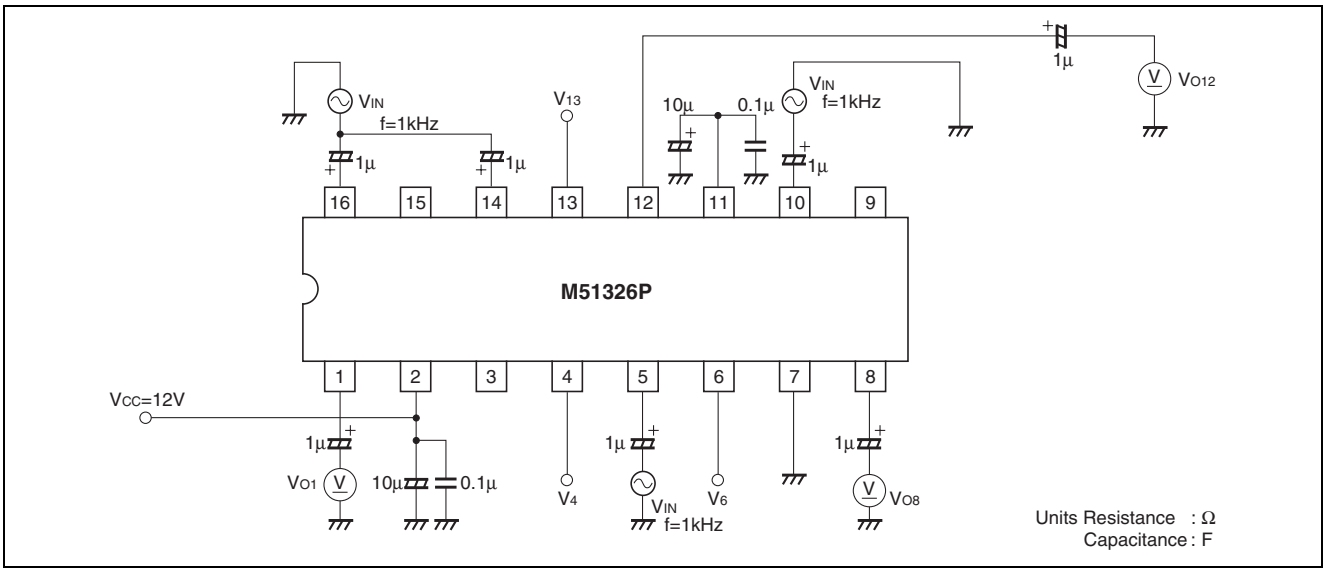


Video : DC voltages on V12 are measured while switch 1 is at setting 2 and switch 2 is at setting 2, before and after switch 3 is turned to setting 1 or 2.

Sound (1): DC voltages on V1 are measured while switch 2 is at setting 2 and switch 3 is at setting 2, and switch 3 is turned to setting 1, 2, or 3.

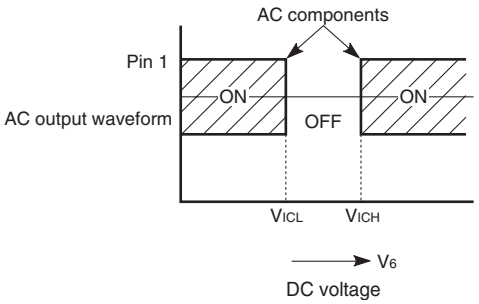
Sound (2): DC voltages on V8 are measured while switch 1 is at setting 2 and switch 3 is at setting 2, before and after switch 2 is turned from to setting 1or 2.

Measurement circuit for control - pin threshold - voltage values



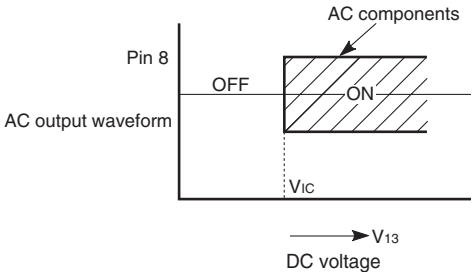
Sound (1) measuring the control-pin threshold-voltage value:

Firstly, DC voltage V6 is increased from 3 V to 5 V. Here, we take V_{ICL} as the V6 value at which the AC component in the output waveform from pin 1 is turned off. Then, DC voltage V6 is increased from 7 V to 9 V. Here, we take V_{ICH} as the V6 value at which the AC component in the output waveform from pin 1 is turned on .



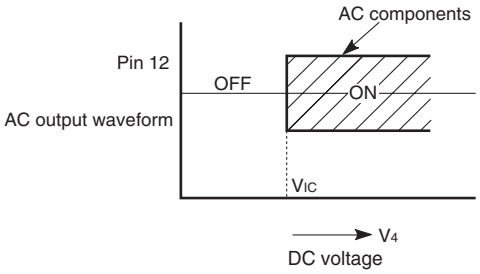
Sound (2) measuring the control-pin threshold-value voltage:

DC voltage V13 is increased from 1 V to 3 V. Here, we take the V13 value at which the AC component in the output waveform from pin 8 is turned on as V_{IC}.

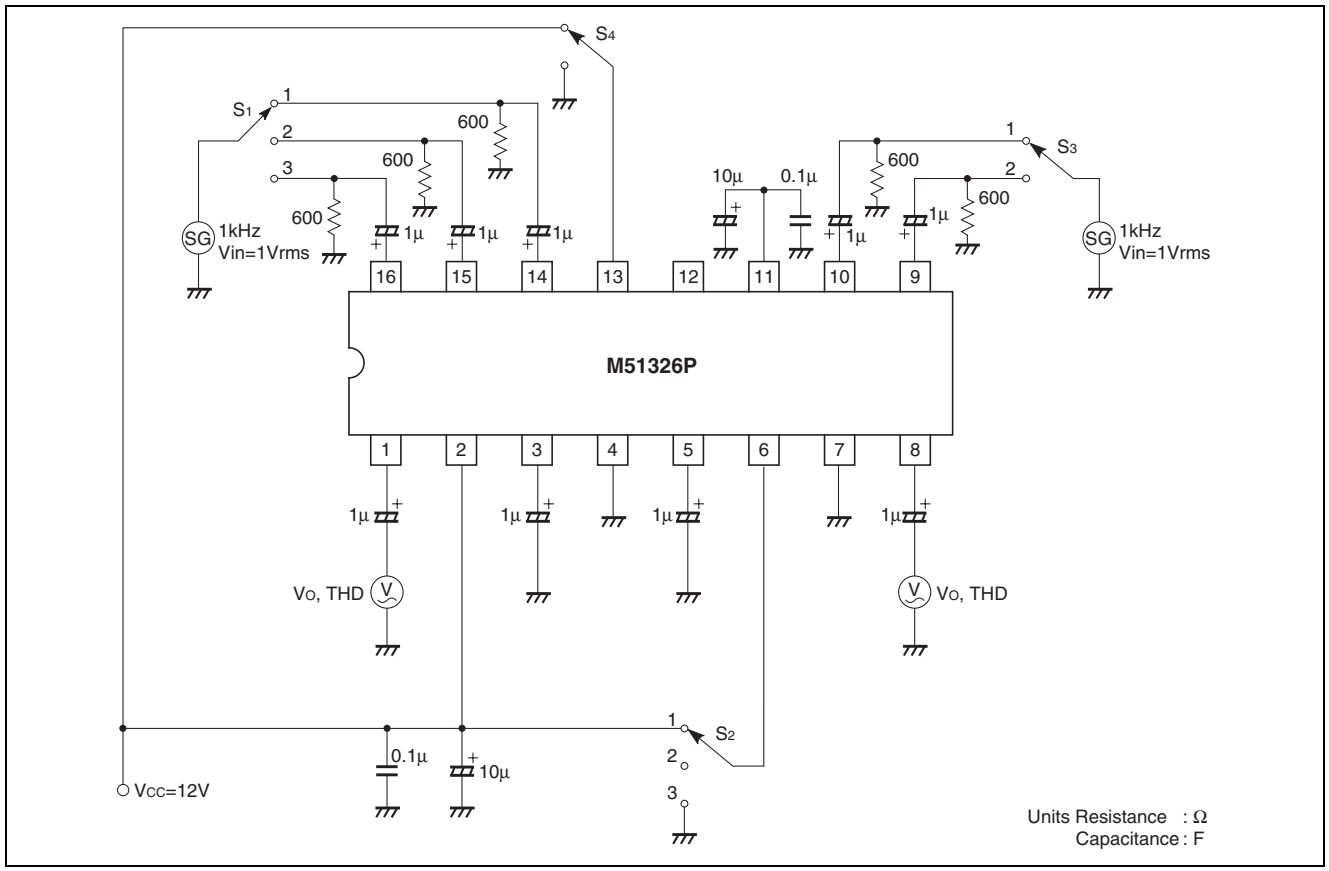


Measuring the image control pin threshold value voltage:

DC voltage V4 is increased from 1 V to 3 V. This time, we take the V14 value at which the AC component in the output waveform from pin 12 is turned on as V_{IC}.



Measurement circuit for crosstalk and total harmonic distortion rate (switches for audio)



Relation between the switch states and the monitor output

Switch state

S_1	S_2	Pin 1 output
1	1	Vos, THD
	2,3	Voc
2	2	Vos,THD
	1,3	Voc
3	3	Vos,THD
	1,2	Voc

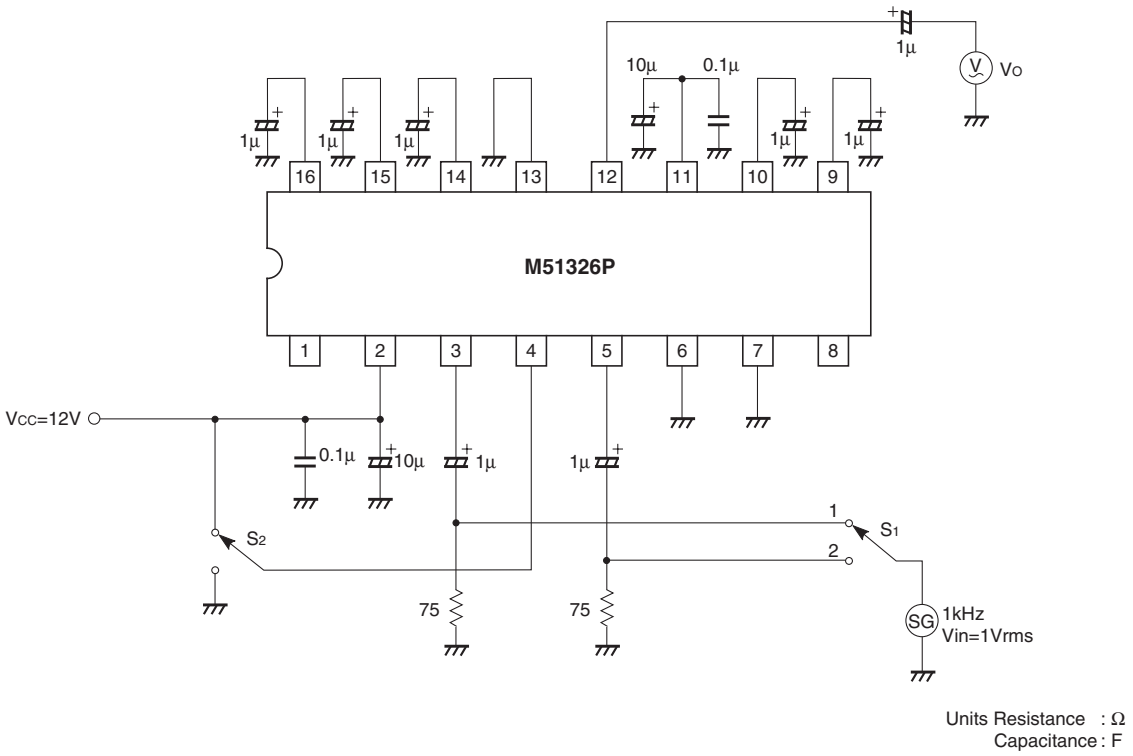
Switch state

S_3	S_4	Pin 8 output
1	1	V_{OC}
	2	V_{OC}
2	1	V_{OC}
	2	V_{OC}, THD

Crosstalk: CT = 20log (Vos/Voc) (dB)

Voltage gain: GV = 20log (Vos/Vin) (dB)

Measurement circuit for crosstalk and voltage gain (video switch)

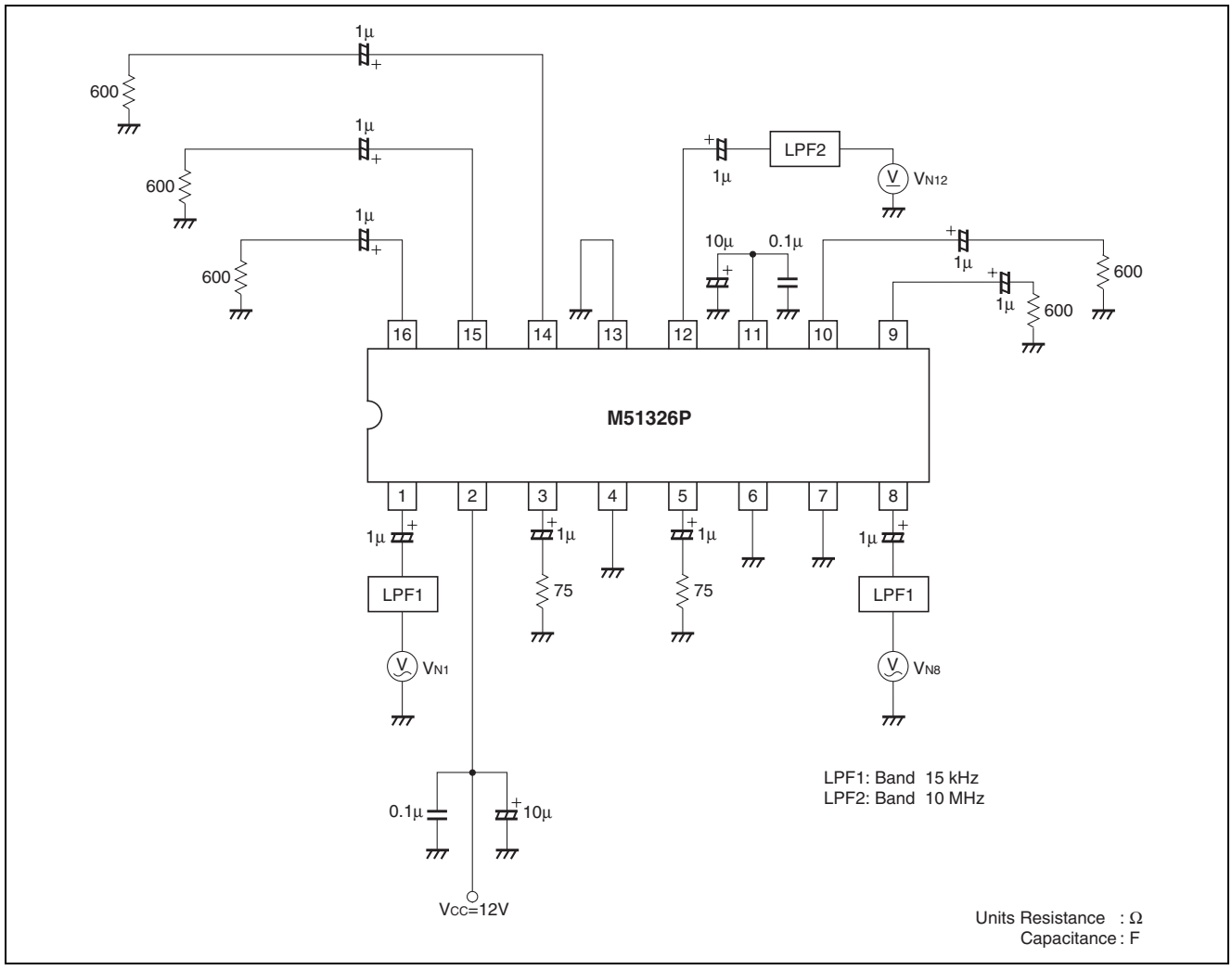


Switch state		Pin 12 output
S1	**S2**	
1	1	Vos
	2	Voc
2	1	Voc
	2	Vos

Crosstalk: CT = 20log (Vos/Voc) (dB)

Voltage gain: GV = 20log (Vos/Vin) (dB)

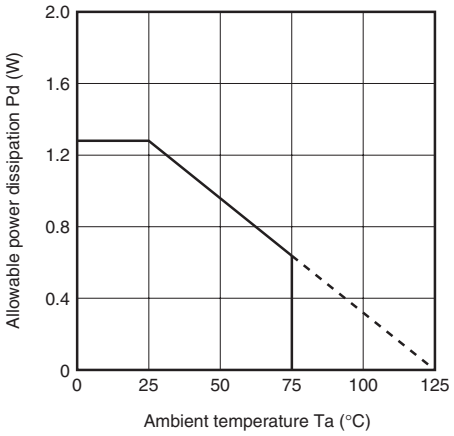
Measurement circuit for output noise voltage



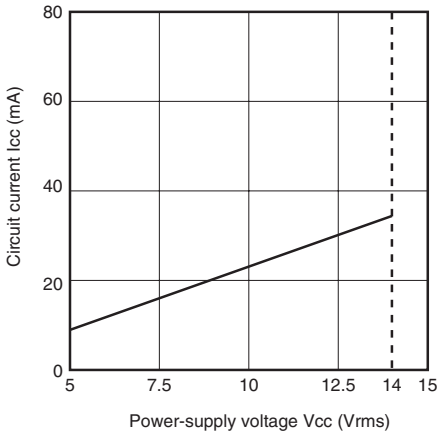
Characteristic curves

(unless otherwise noted, Ta = 25°C)

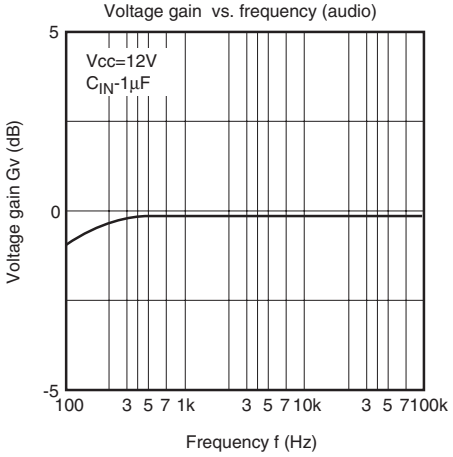
Thermal derating curve (maximum rating)



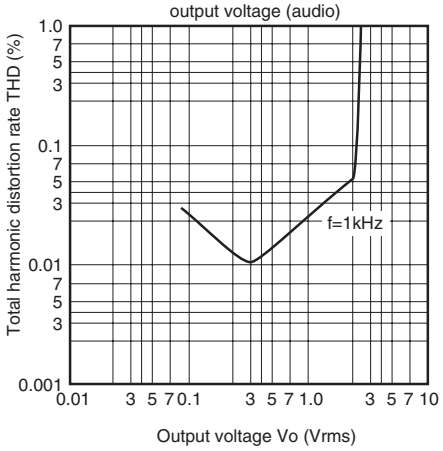
Circuit current vs. power-supply voltage



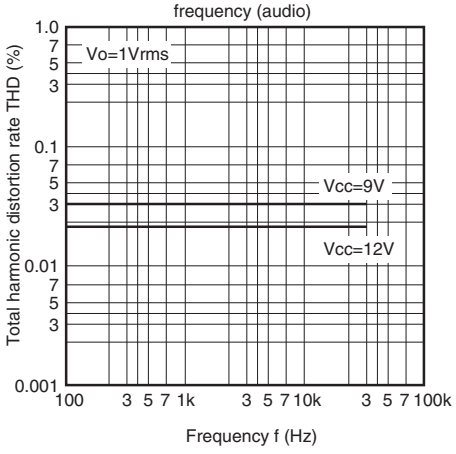
Voltage gain vs. frequency (audio)



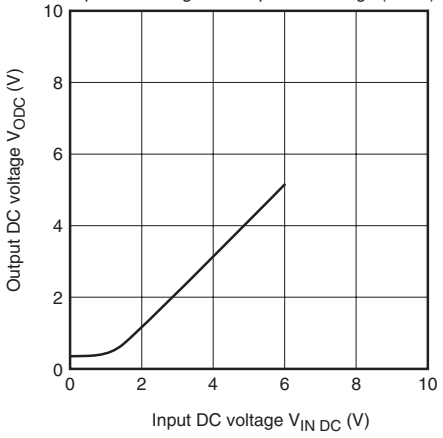
Total harmonic distortion rate vs. output voltage (audio)



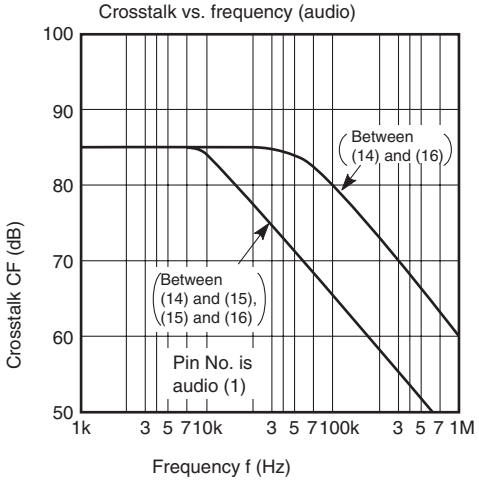
Total harmonic distortion rate vs. frequency (audio)



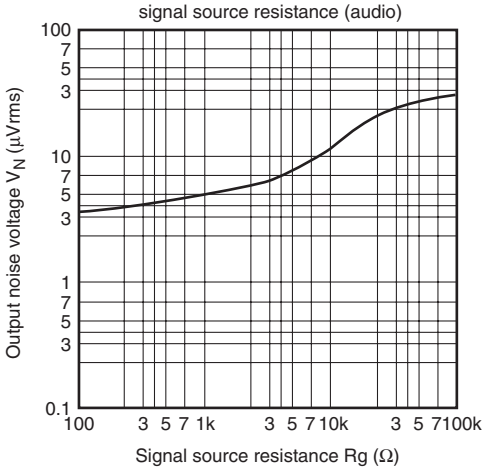
Input DC voltage vs. output DC voltage (audio)



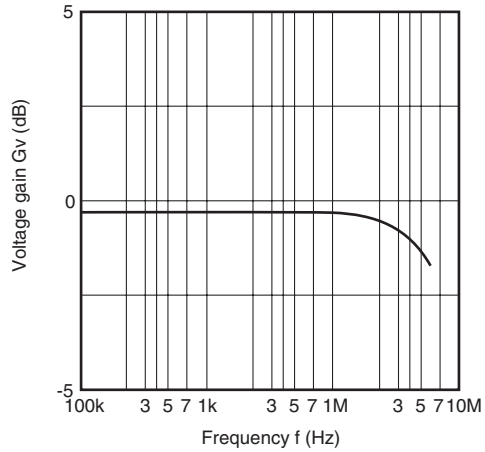
Crosstalk vs. frequency (audio)



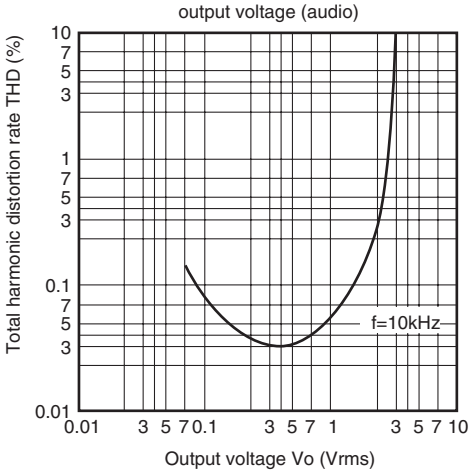
Output noise voltage vs. signal source resistance (audio)



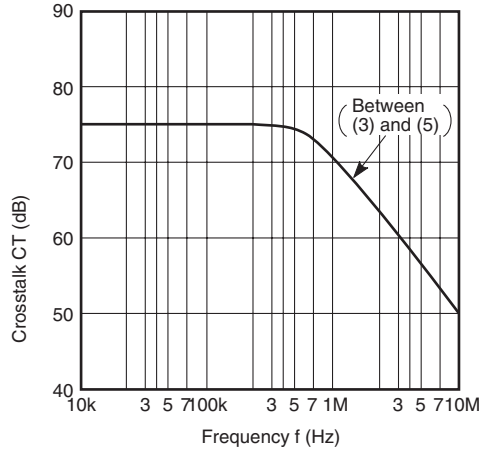
Voltage gain vs. frequency (video)



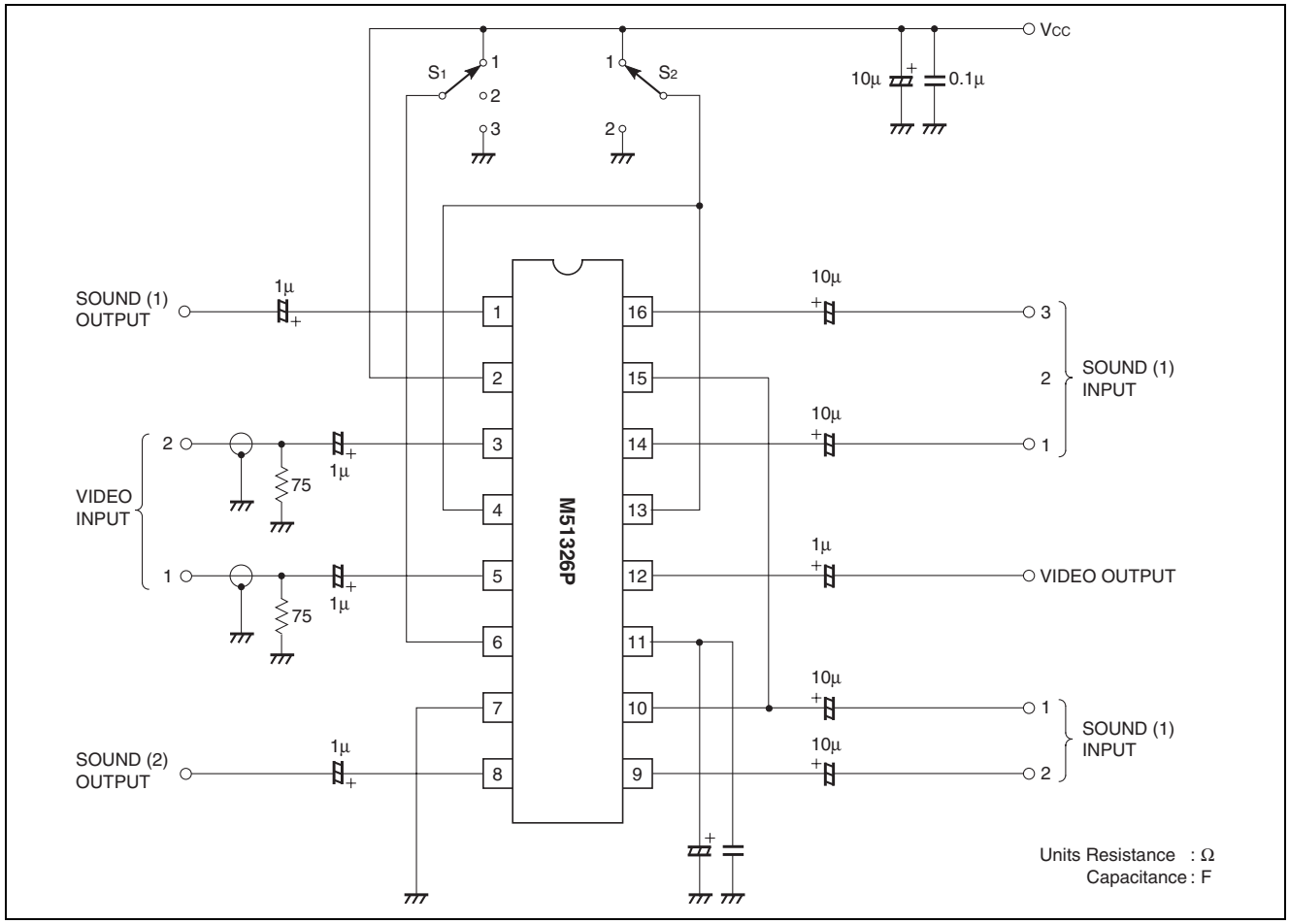
Total harmonic distortion vs. output voltage (audio)



Crosstalk vs. frequency (video)



Application Example



Precautions on usage

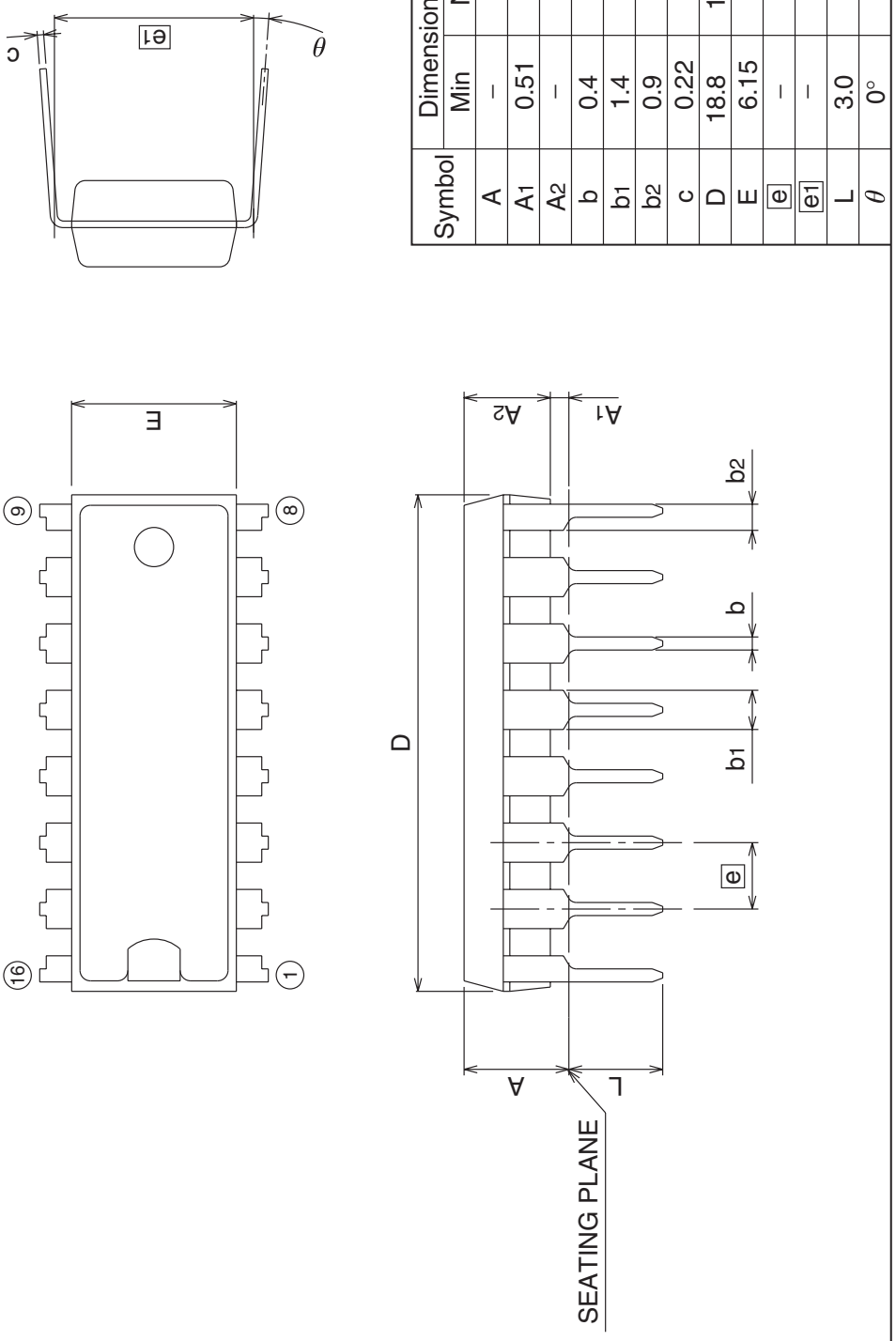
Both the video and audio outputs are emitter follower. Accordingly, when the external wiring is long or a capacitive load is added, add a resistor with a value of the tens of ohms order in series near the position of the output pin.

Package Dimension

16P4 (MMP) **Plastic 16pin 300mil DIP**

EIAJ Package Code	JEDEC Code	Weight(g)	Lead Material
DIP16-P-300-2.54	–	1.0	Alloy 42/Cu Alloy

Symbol	Dimension in Millimeters		
	Min	Nom	Max
A	–	–	4.5
A_1	0.51	–	–
A_2	–	3.3	–
b	0.4	0.5	0.59
b_1	1.4	1.5	1.8
b_2	0.9	1.0	1.3
c	0.22	0.27	0.34
D	18.8	19.0	19.2
E	6.15	6.3	6.45
e	–	2.5	–
e1	–	7.62	–
L	3.0	–	–
θ	0°	–	15°



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Colophon 1.0