DATA SHEET

NE592
Video amplifier

Product specification

April 15, 1992

PHILIPS

Video amplifier NE592

DESCRIPTION

The NE592 is a monolithic, two-stage, differential output, wideband video amplifier. It offers fixed gains of 100 and 400 without external components and adjustable gains from 400 to 0 with one external resistor. The input stage has been designed so that with the addition of a few external reactive elements between the gain select terminals, the circuit can function as a high-pass, low-pass, or band-pass filter. This feature makes the circuit ideal for use as a video or pulse amplifier in communications, magnetic memories, display, video recorder systems, and floppy disk head amplifiers. Now available in an 8-pin version with fixed gain of 400 without external components and adjustable gain from 400 to 0 with one external resistor.

FEATURES

- 120MHz unity gain bandwidth
- Adjustable gains from 0 to 400
- Adjustable pass band
- No frequency compensation required
- Wave shaping with minimal external components
- MIL-STD processing available

PIN CONFIGURATIONS

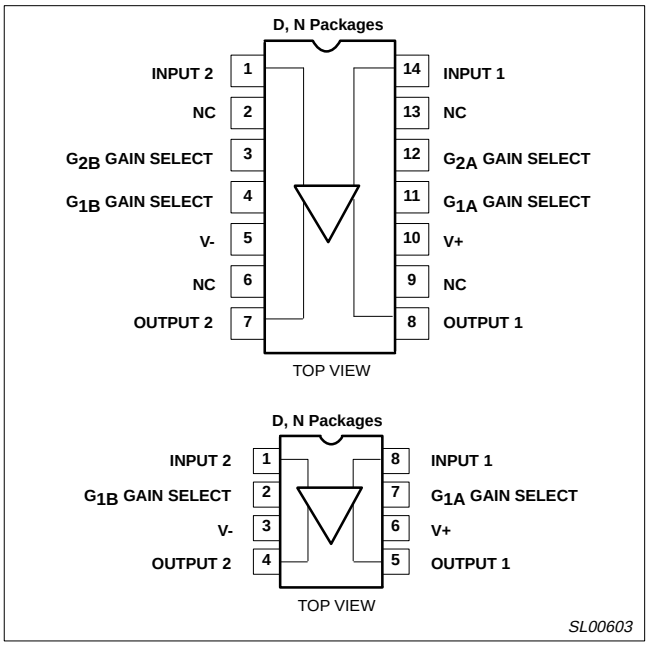


Figure 1. Pin Configuration

APPLICATIONS

- Floppy disk head amplifier
- Video amplifier
- Pulse amplifier in communications
- Magnetic memory
- Video recorder systems

BLOCK DIAGRAM

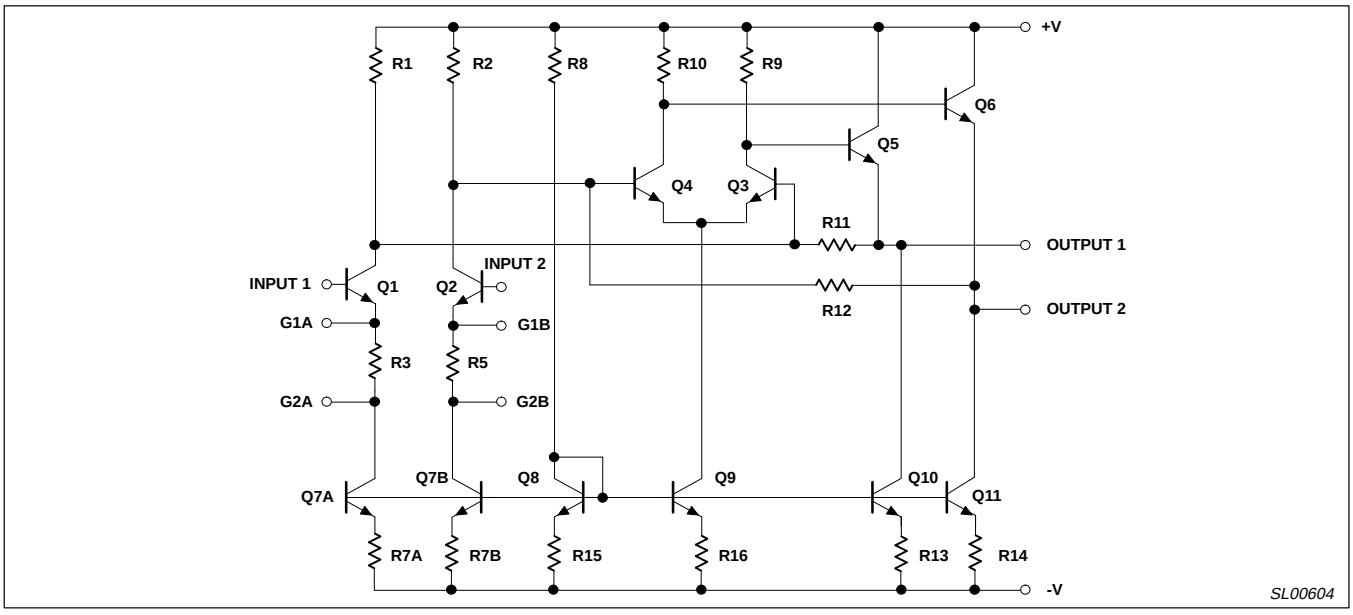


Figure 2. Block Diagram

ORDERING INFORMATION

DESCRIPTION	TEMPERATURE RANGE	ORDER CODE	DWG #
14-Pin Plastic Dual In-Line Package (DIP)	0 to +70°C	NE592N14	SOT27-1
14-Pin Small Outline (SO) package	0 to +70°C	NE592D14	SOT108-1
8-Pin Plastic Dual In-Line Package (DIP)	0 to +70°C	NE592N8	SOT97-1
8-Pin Small Outline (SO) package	0 to +70°C	NE592D8	SOT96-1

NOTES:
N8, N14, D8 and D14 package parts also available in “High” gain version by adding “H” before package designation, i.e., NE592HDB

ABSOLUTE MAXIMUM RATINGS

T_A**=+25**°C, unless otherwise specified.

SYMBOL	PARAMETER	RATING	UNIT
V_{CC}	Supply voltage	±8	V
V_{IN}	Differential input voltage	±5	V
V_{CM}	Common-mode input voltage	±6	V
I_{OUT}	Output current	10	mA
T_A	Operating ambient temperature range	0 to +70	°C
T_{STG}	Storage temperature range	-65 to +150	°C
$P_{D\ MAX}$	Maximum power dissipation,		
	T_A=25°C (still air)[1]		
	D-14 package	0.98	W
	D-8 package	0.79	W
	N-14 package	1.44	W
	N-8 package	1.17	W

NOTES:
1. Derate above 25°C at the following rates:
   D-14 package at 7.8mW/°C
   D-8 package at 6.3mW/°C
   N-14 package at 11.5mW/°C
   N-8 package at 9.3mW/°C

DC ELECTRICAL CHARACTERISTICS

T_A=+25°C V_{SS}=±6V, V_{CM}=0, unless otherwise specified. Recommended operating supply voltages V_S=±6.0V. All specifications apply to both standard and high gain parts unless noted differently.

SYMBOL	PARAMETER	TEST CONDITIONS	NE592			UNIT
			Min	Typ	Max	
A_{VOL}	Differential voltage gain, standard part					
	Gain 1[1]	R_L=2kΩ, V_{OUT}=3V_{P-P}	250	400	600	V/V
	Gain 2[2, 4]		80	100	120	V/V
R_{IN}	Input resistance					
	Gain 1[1]			4.0		kΩ
	Gain 2[2, 4]		10	30		kΩ
C_{IN}	Input capacitance[2]	Gain 2[4]		2.0		pF
I_{OS}	Input offset current			0.4	5.0	μA
I_{BIAS}	Input bias current			9.0	30	μA
V_{NOISE}	Input noise voltage	BW 1kHz to 10MHz		12		μV_{RMS}
V_{IN}	Input voltage range		±1.0			V
CMRR	Common-mode rejection ratio					
	Gain 2[4]	V_{CM}±1V, f<100kHz	60	86		dB
	Gain 2[4]	V_{CM}±1V, f=5MHz		60		dB
PSRR	Supply voltage rejection ratio					
	Gain 2[4]	ΔV_S=±0.5V	50	70		dB
V_{OS}	Output offset voltage					
	Gain 1	R_L=∞			1.5	V
	Gain 2[4]	R_L=∞			1.5	V
	Gain 3[3]	R_L=∞		0.35	0.75	V
V_{CM}	Output common-mode voltage	R_L=∞	2.4	2.9	3.4	V
V_{OUT}	Output voltage swing differential	R_L=2kΩ	3.0	4.0		V
R_{OUT}	Output resistance			20		Ω
I_{CC}	Power supply current	R_L=∞		18	24	mA

NOTES:
1. Gain select Pins G_{1A} and G_{1B} connected together.
2. Gain select Pins G_{2A} and G_{2B} connected together.
3. All gain select pins open.
4. Applies to 14-pin version only.

DC ELECTRICAL CHARACTERISTICS

DC Electrical CharacteristicsV_{SS}=±6V, V_{CM}=0, 0°C ≤T_A≤70°C, unless otherwise specified. Recommended operating supply voltages V_S=±6.0V. All specifications apply to both standard and high gain parts unless noted differently.

SYMBOL	PARAMETER	TEST CONDITIONS	NE592			UNIT
			Min	Typ	Max	
A_{VOL}	Differential voltage gain, standard part					
	Gain 1[1]	R_L=2kΩ, V_{OUT}=3V_{P-P}	250		600	V/V
	Gain 2[2, 4]		80		120	V/V
R_{IN}	Input resistance					
	Gain 2[2, 4]		8.0			kΩ
I_{OS}	Input offset current				6.0	µA
I_{BIAS}	Input bias current				40	µA
V_{IN}	Input voltage range		±1.0			V
CMRR	Common-mode rejection ratio					
	Gain 2[4]	V_{CM}±1V, f<100kHz	50			dB
PSRR	Supply voltage rejection ratio					
	Gain 2[4]	ΔV_S=±0.5V	50			dB
V_{OS}	Output offset voltage					
	Gain 1	R_L=∞			1.5	V
	Gain 2[4]				1.5	
	Gain 3[3]				1.0	
V_{OUT}	Output voltage swing differential	R_L=2kΩ	2.8			V
I_{CC}	Power supply current	R_L=∞			27	mA

NOTES:
1. Gain select Pins G_{1A} and G_{1B} connected together.
2. Gain select Pins G_{2A} and G_{2B} connected together.
3. All gain select pins open.
4. Applies to 14-pin versions only.

AC ELECTRICAL CHARACTERISTICS

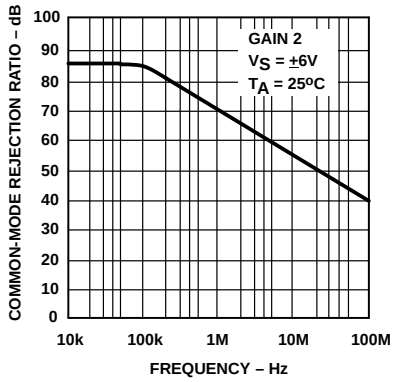
T_A=+25°C V_{SS}=±6V, V_{CM}=0, unless otherwise specified. Recommended operating supply voltages V_S=±6.0V. All specifications apply to both standard and high gain parts unless noted differently.

SYMBOL	PARAMETER	TEST CONDITIONS	NE/SA592			UNIT
			Min	Typ	Max	
BW	Bandwidth					
	Gain 1[1]			40		MHz
	Gain 2[2, 4]			90		MHz
t_R	Rise time					
	Gain 1[1]	V_{OUT}=1V_{P-P}		10.5	12	ns
	Gain 2[2, 4]			4.5		ns
t_{PD}	Propagation delay					
	Gain 1[1]	V_{OUT}=1V_{P-P}		7.5	10	ns
	Gain 2[2, 4]			6.0		ns

NOTES:
1. Gain select Pins G_{1A} and G_{1B} connected together.
2. Gain select Pins G_{2A} and G_{2B} connected together.
3. All gain select pins open.
4. Applies to 14-pin versions only.

TYPICAL PERFORMANCE CHARACTERISTICS

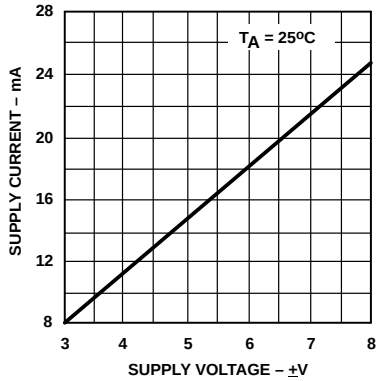
Common-Mode Rejection Ratio as a Function of Frequency



SL00605

Figure 3.

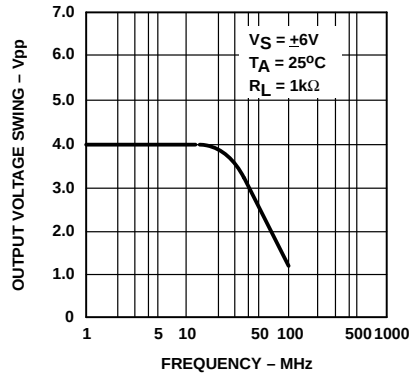
Supply Current as a Function of Temperature



SL00608

Figure 6.

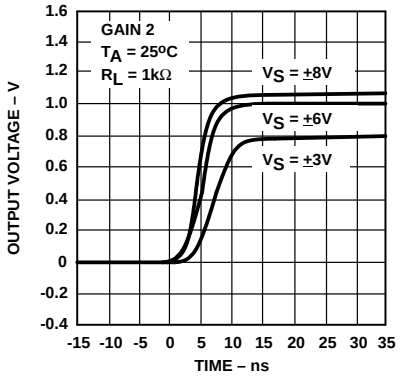
Output Voltage Swing as a Function of Frequency



SL00606

Figure 4.

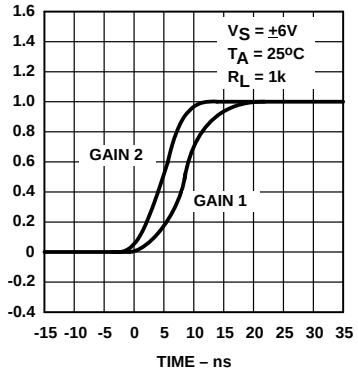
Pulse Response as a Function of Supply Voltage



SL00609

Figure 7.

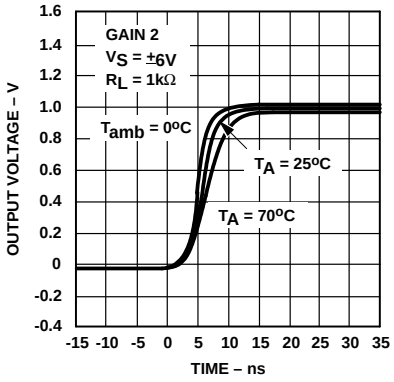
Pulse Response



SL00607

Figure 5.

Pulse Response as a Function of Temperature

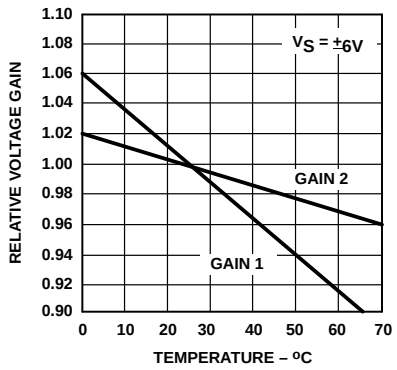


SL00610

Figure 8.

TYPICAL PERFORMANCE CHARACTERISTICS (continued)

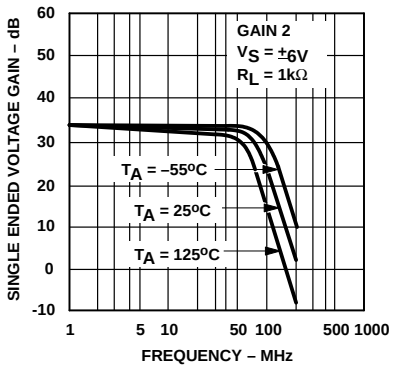
Voltage Gain as a Function of Temperature



SL00611

Figure 9.

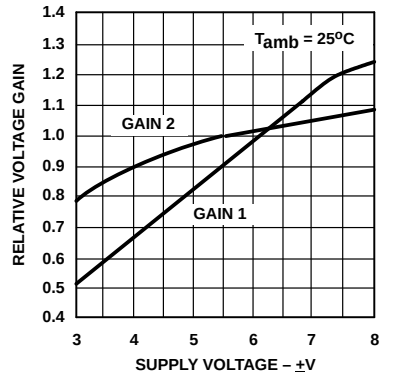
Gain vs. Frequency as a Function of Temperature



SL00612

Figure 10.

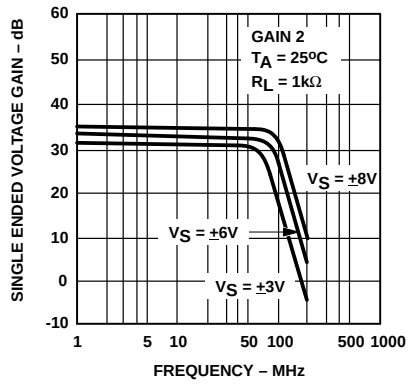
Voltage Gain as a Function of Supply Voltage



SL00613

Figure 11.

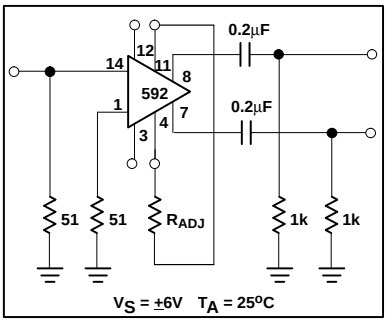
Gain vs. Frequency as a Function of Supply Voltage



SL00614

Figure 12.

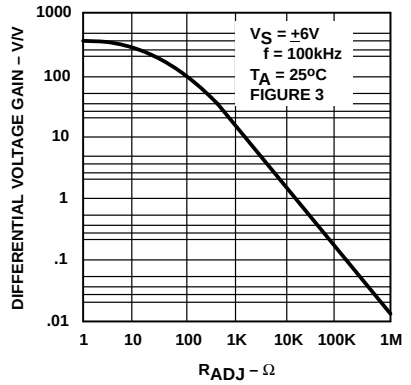
Voltage Gain Adjust Circuit



SL00615

Figure 13.

Voltage Gain as a Function of RADJ (Figure 3)



SL00616

Figure 14.

TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

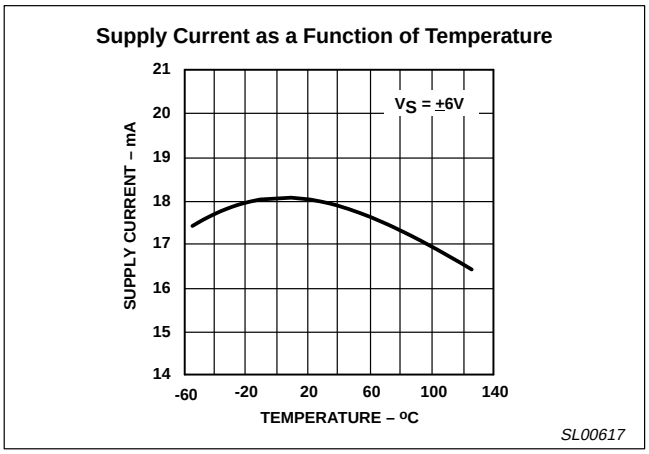


Figure 15.

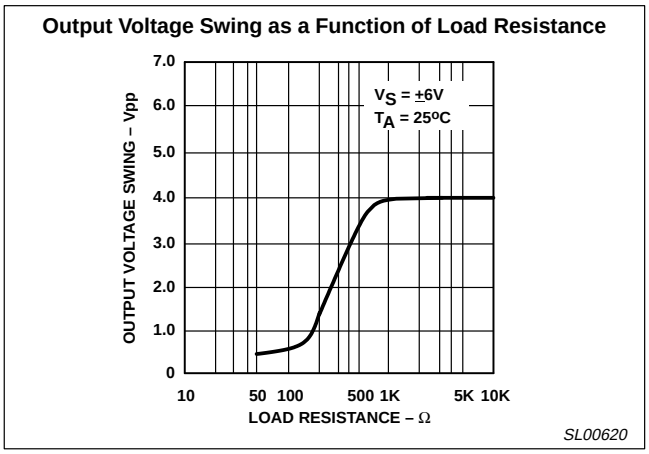


Figure 18.

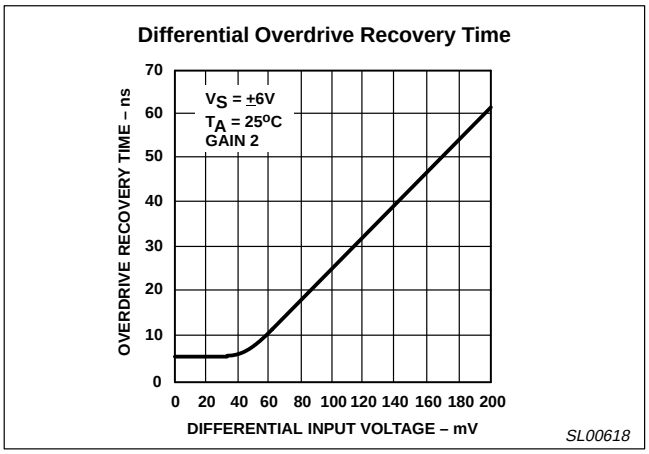


Figure 16.

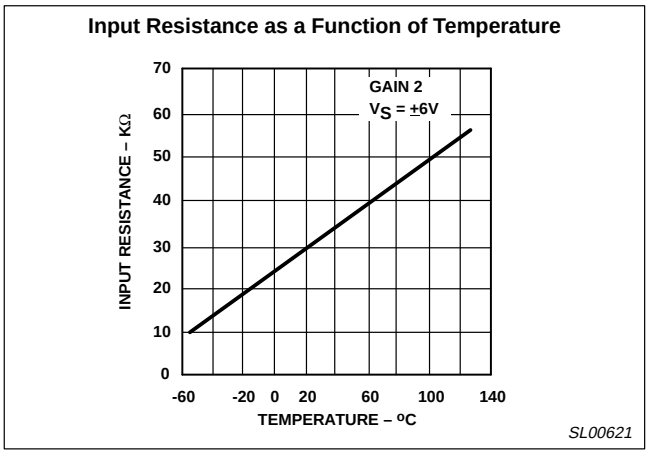


Figure 19.

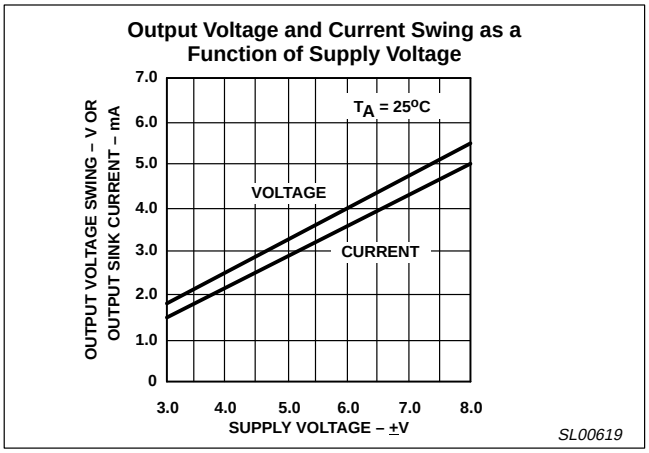


Figure 17.

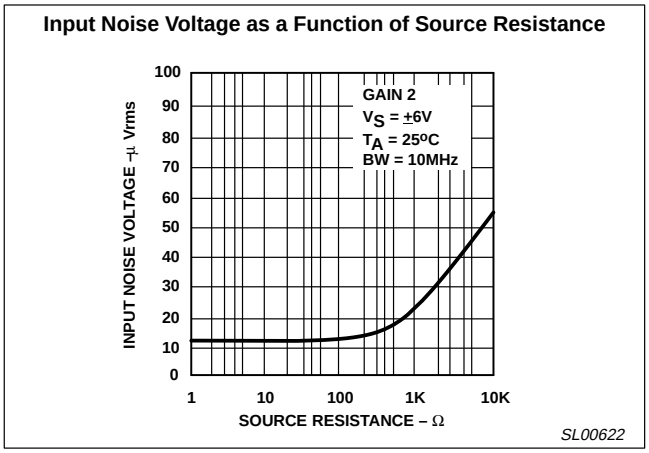


Figure 20.

TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

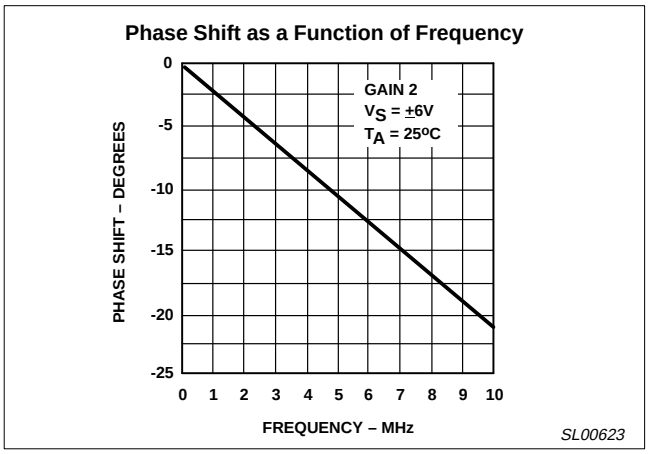


Figure 21.

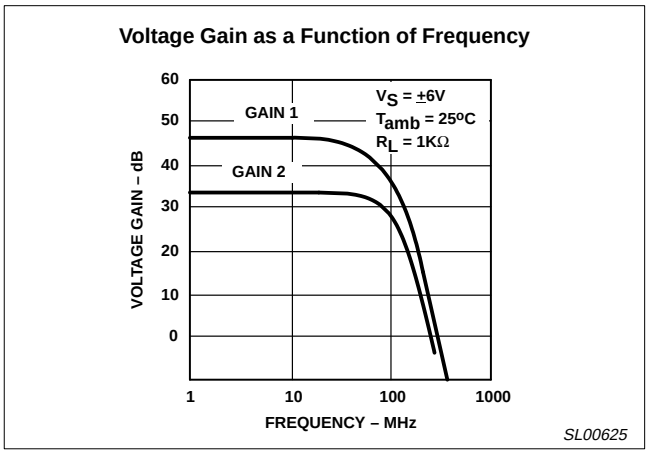


Figure 23.

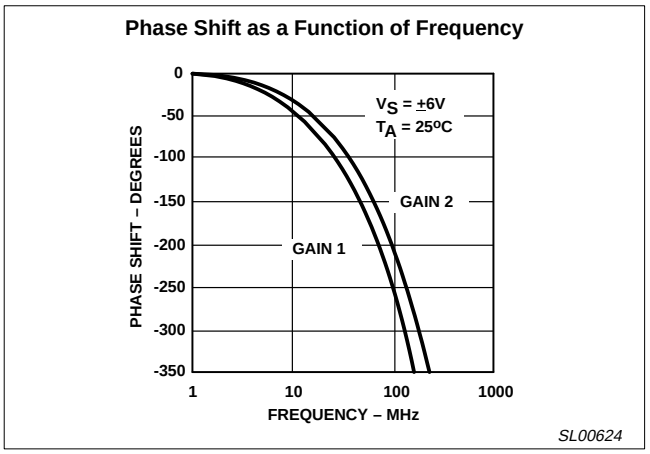


Figure 22.

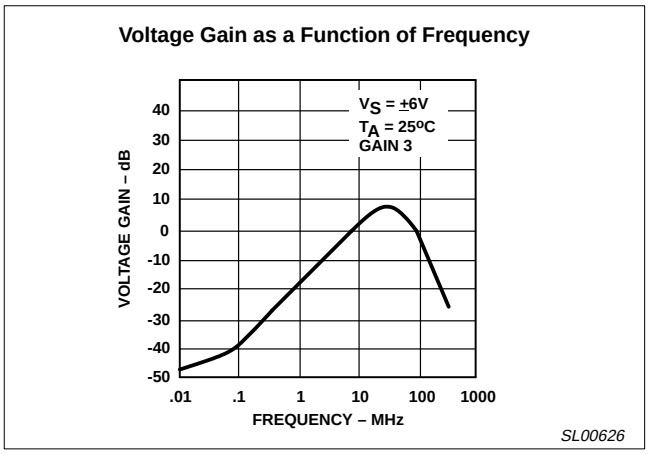


Figure 24.

TEST CIRCUITS T_A = 25°C, unless otherwise specified.

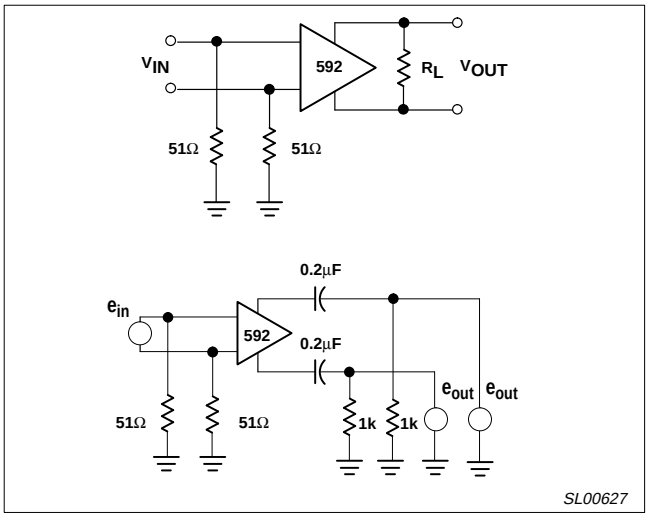


Figure 25. Test Circuits

TYPICAL APPLICATIONS

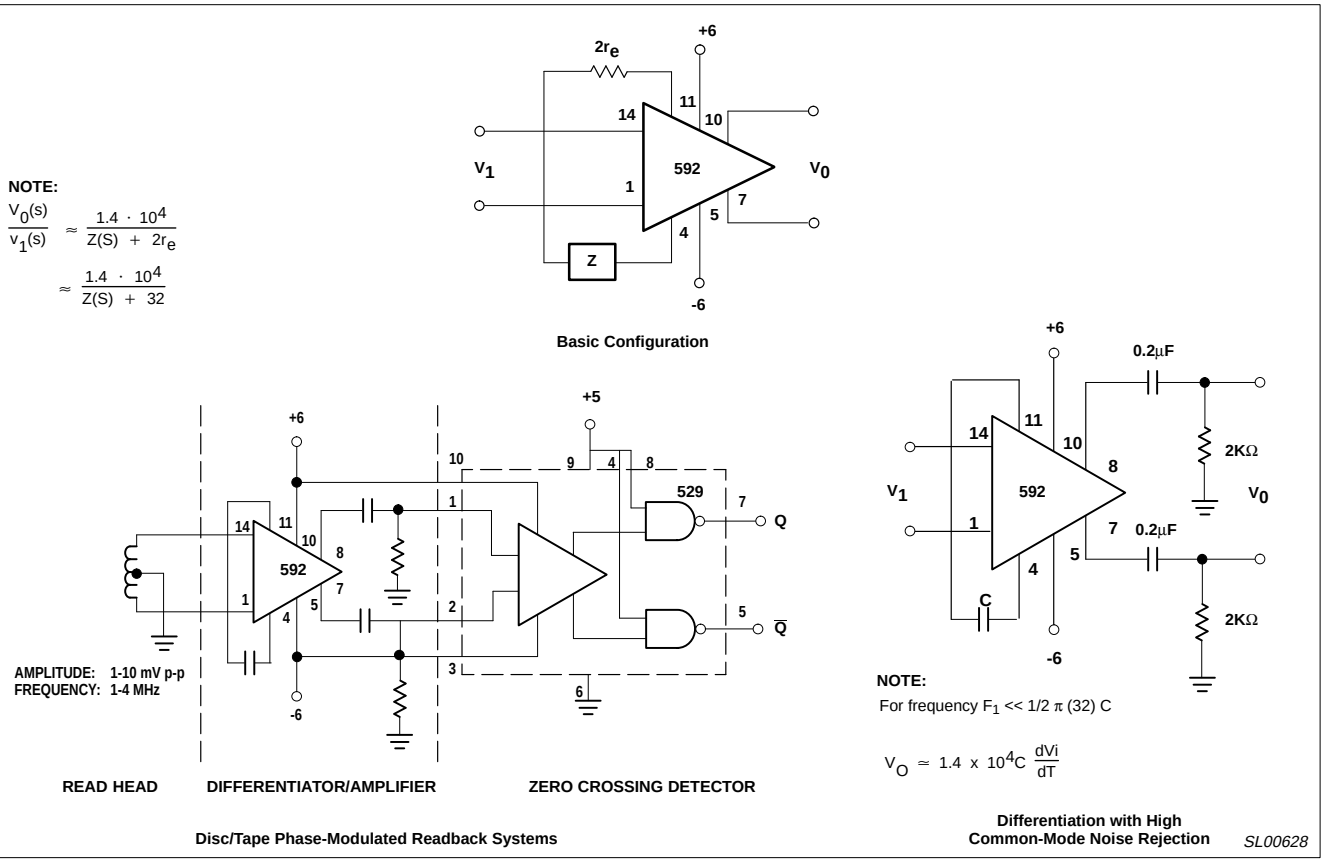
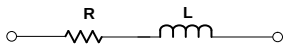
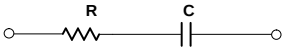
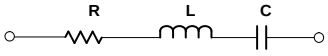
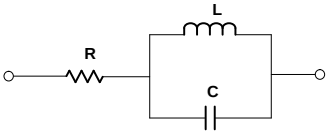


Figure 26. Typical Applications

FILTER NETWORKS

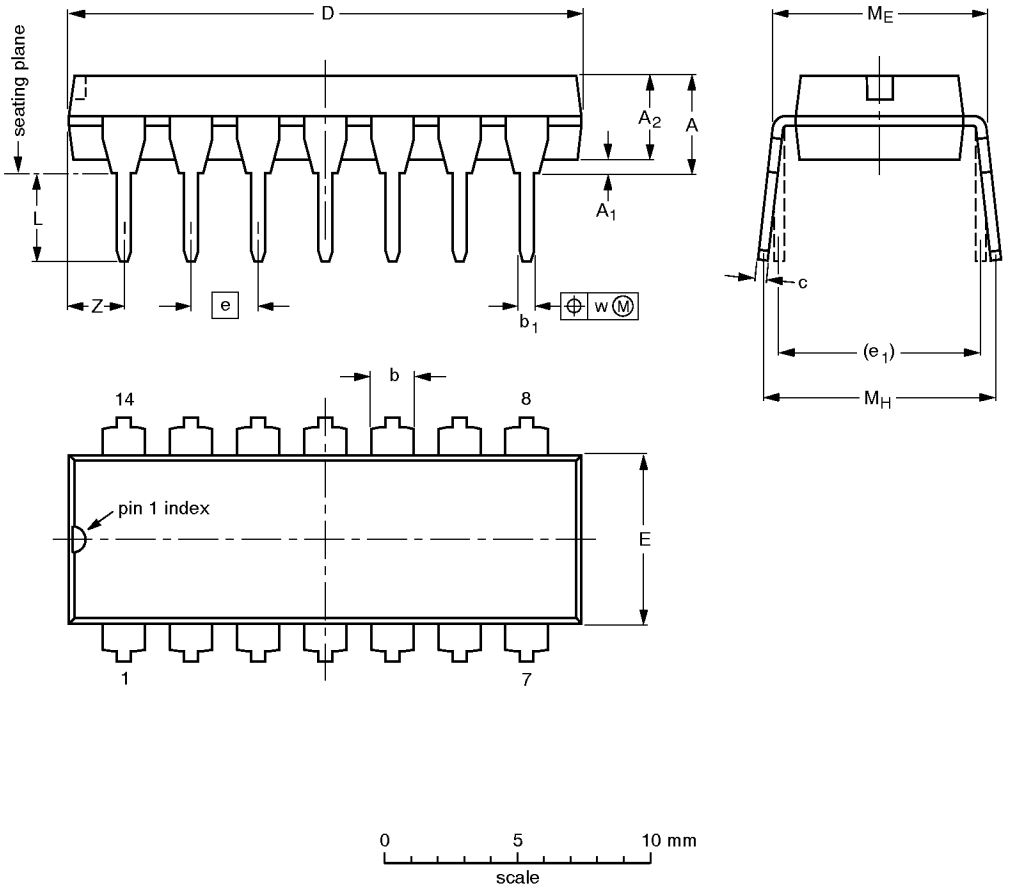
Z NETWORK	FILTER TYPE	V_0 (s) TRANSFER V_1 (s) FUNCTION
	LOW PASS	$\frac{1.4 \times 10^4}{L} \left[\frac{1}{s + R/L}\right]$
	HIGH PASS	$\frac{1.4 \times 10^4}{R} \left[\frac{s}{s + 1/RC}\right]$
	BAND PASS	$\frac{1.4 \times 10^4}{L} \left[\frac{s}{s^2 + R/Ls + 1/LC}\right]$
	BAND REJECT	$\frac{1.4 \times 10^4}{R} \left[\frac{s^2 + 1/LC}{s^2 + 1/LC + s/RC}\right]$

NOTES:
In the networks above, the R value used is assumed to include $2r_e$, or approximately 32Ω.
$S = j\omega$
$\omega = 2\pi f$

SL00629

Figure 27. Filter Networks

DIP14: plastic dual in-line package; 14 leads (300 mil) **SOT27-1**



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

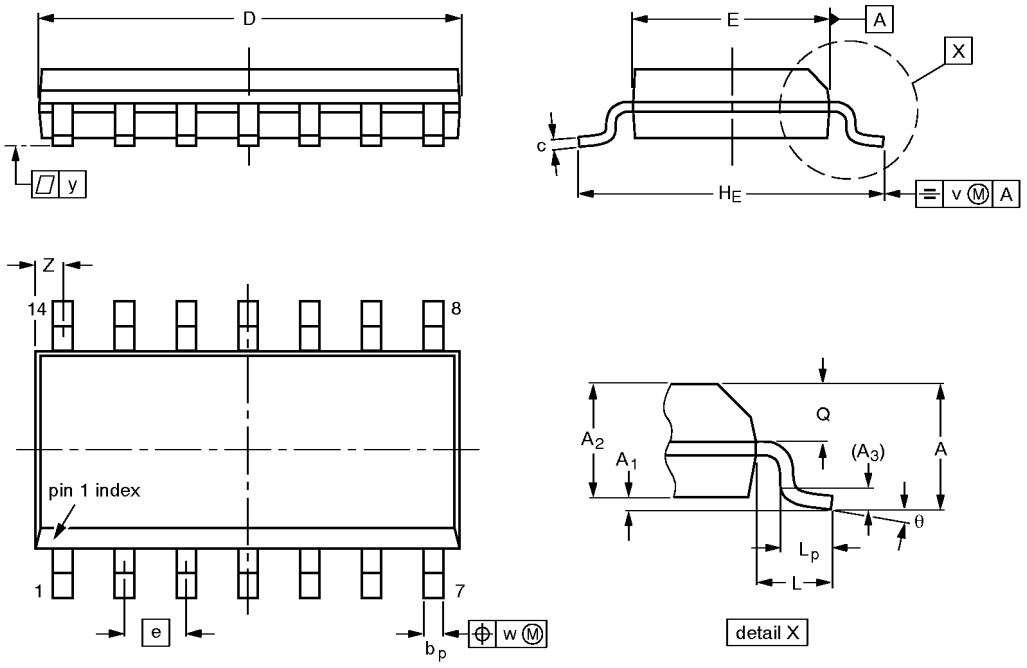
UNIT	A max.	A_1 min.	A_2 max.	b	b_1	c	D (1)	E (1)	e	e_1	L	M_E	M_H	w	Z (1) max.
mm	4.2	0.51	3.2	1.73 1.13	0.53 0.38	0.36 0.23	19.50 18.55	6.48 6.20	2.54	7.62	3.60 3.05	8.25 7.80	10.0 8.3	0.254	2.2
inches	0.17	0.020	0.13	0.068 0.044	0.021 0.015	0.014 0.009	0.77 0.73	0.26 0.24	0.10	0.30	0.14 0.12	0.32 0.31	0.39 0.33	0.01	0.087

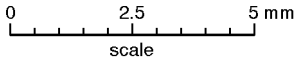
Note

1. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT27-1	050G04	MO-001AA				~~92-11-17~~ 95-03-11

SO14: plastic small outline package; 14 leads; body width 3.9 mm SOT108-1





DIMENSIONS (inch dimensions are derived from the original mm dimensions)

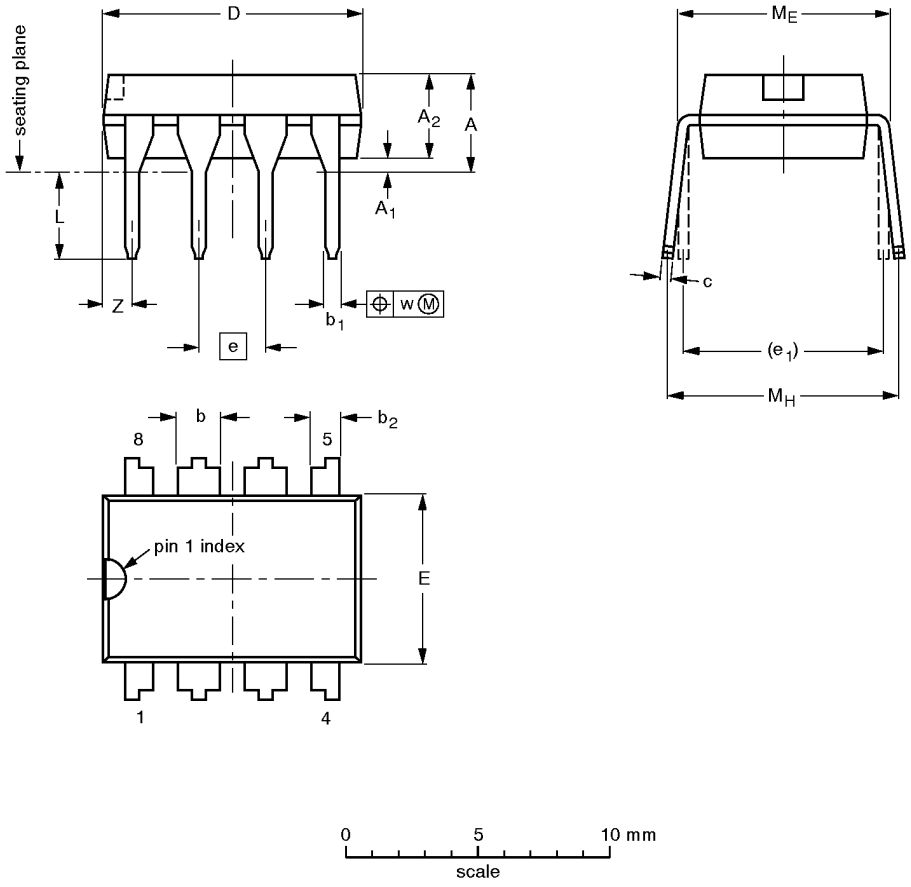
UNIT	A max.	A_1	A_2	A_3	b_p	c	$D^{(1)}$	$E^{(1)}$	e	H_E	L	L_p	Q	v	w	y	$Z^{(1)}$	θ
mm	1.75	0.25 0.10	1.45 1.25	0.25	0.49 0.36	0.25 0.19	8.75 8.55	4.0 3.8	1.27	6.2 5.8	1.05	1.0 0.4	0.7 0.6	0.25	0.25	0.1	0.7 0.3	8° 0°
inches	0.069	0.0098 0.0039	0.057 0.049	0.01	0.019 0.014	0.0098 0.0075	0.35 0.34	0.16 0.15	0.050	0.24 0.23	0.041	0.039 0.016	0.028 0.024	0.01	0.01	0.004	0.028 0.012	

Note

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT108-1	076E06S	MS-012AB				~~91-08-13~~ 95-01-23

DIP8: plastic dual in-line package; 8 leads (300 mil) SOT97-1



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

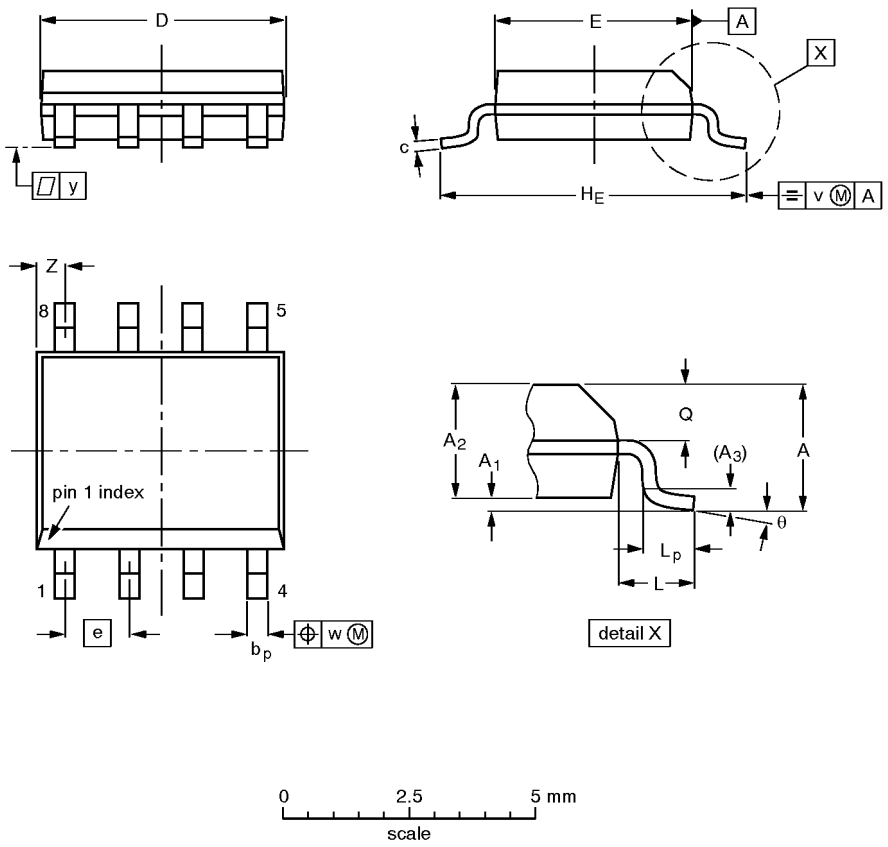
UNIT	A max.	A_1 min.	A_2 max.	b	b_1	b_2	c	D (1)	E (1)	e	e_1	L	M_E	M_H	w	Z (1) max.
mm	4.2	0.51	3.2	1.73 1.14	0.53 0.38	1.07 0.89	0.36 0.23	9.8 9.2	6.48 6.20	2.54	7.62	3.60 3.05	8.25 7.80	10.0 8.3	0.254	1.15
inches	0.17	0.020	0.13	0.068 0.045	0.021 0.015	0.042 0.035	0.014 0.009	0.39 0.36	0.26 0.24	0.10	0.30	0.14 0.12	0.32 0.31	0.39 0.33	0.01	0.045

Note

1. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT97-1	050G01	MO-001AN				~~92-11-17~~ 95-02-04

SO8: plastic small outline package; 8 leads; body width 3.9mm **SOT96-1**



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

UNIT	A max.	A_1	A_2	A_3	b_p	c	$D^{(1)}$	$E^{(2)}$	e	H_E	L	L_p	Q	v	w	y	$Z^{(1)}$	θ
mm	1.75	0.25 0.10	1.45 1.25	0.25	0.49 0.36	0.25 0.19	5.0 4.8	4.0 3.8	1.27	6.2 5.8	1.05	1.0 0.4	0.7 0.6	0.25	0.25	0.1	0.7 0.3	8° 0°
inches	0.069	0.0098 0.0039	0.057 0.049	0.01	0.019 0.014	0.0098 0.0075	0.20 0.19	0.16 0.15	0.050	0.24 0.23	0.041	0.039 0.016	0.028 0.024	0.01	0.01	0.004	0.028 0.012	

Notes

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.
2. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT96-1	076E03S	MS-012AA				~~92-11-17~~ 95-02-04

DEFINITIONS

Data Sheet Identification	Product Status	Definition
Objective Specification	Formative or in Design	This data sheet contains the design target or goal specifications for product development. Specifications may change in any manner without notice.
Preliminary Specification	Preproduction Product	This data sheet contains preliminary data, and supplementary data will be published at a later date. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.
Product Specification	Full Production	This data sheet contains Final Specifications. Philips Semiconductors reserves the right to make changes at any time without notice, in order to improve design and supply the best possible product.

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