SP8690 200MHz÷10/11
SP8691 200MHz÷8/9

The SP8690 and SP8691 are low power ECL variable modulus dividers, with both ECL10K and TTL/CMOS compatible outputs. They divide by the lower division ratio when either of the ECL control inputs, PE1 or PE2, is in the high state and by the higher ratio when both are low (or open circuit).

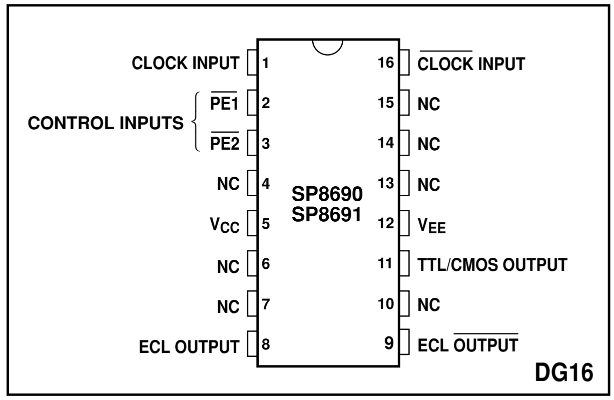


Fig. 1 Pin connections - top view

FEATURES

- ECL and TTL/CMOS Compatible Outputs
- AC-Coupled Input
- Control Inputs ECL Compatible

QUICK REFERENCE DATA

- Supply Voltage: −5·2V±0·25V (ECL), 5V±0·25V (TTL)
- Power Consumption: 70mW (Typ.)
- Temperature Range:

  −55°C to +125°C (A Grade)
  −30°C to +70°C (B Grade)

ABSOLUTE MAXIMUM RATINGS

Supply voltage, $\|V_{CC}-V_{EE}\|$	8V
ECL output current	10mA
Storage temperature range	−65°C to +150°C
Max. junction temperature	+175°C
TTL output voltage	+12V
Input voltage	2·5V p-p
Max. open collector current	15mA

ORDERING INFORMATION

SP8690 A DG
SP8690 B DG
SP8691 A DG
5962-87678 (SMD) (SP8690)

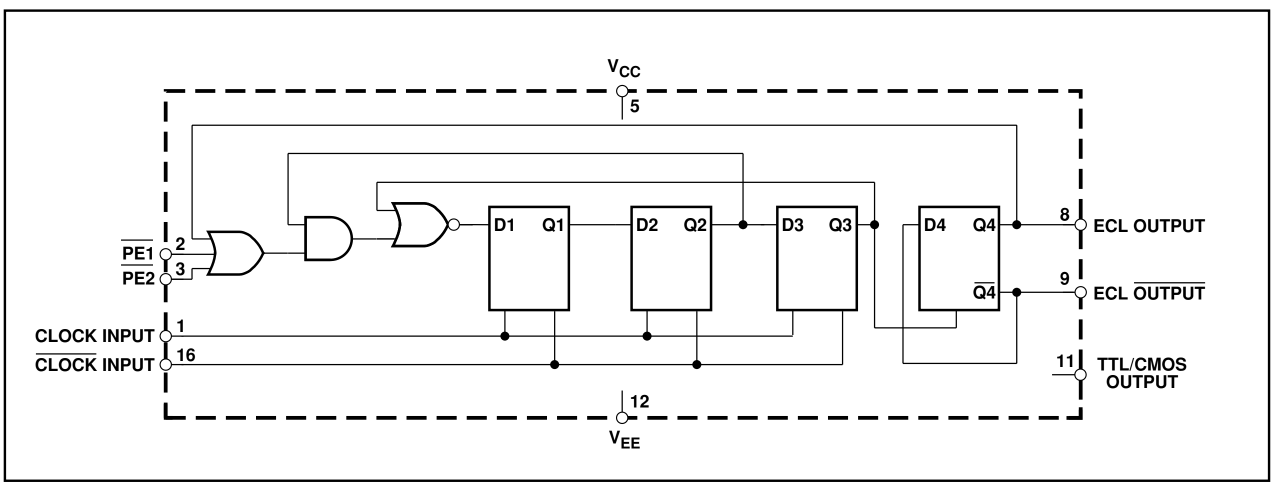


Fig. 2 Functional diagram (SP8690)

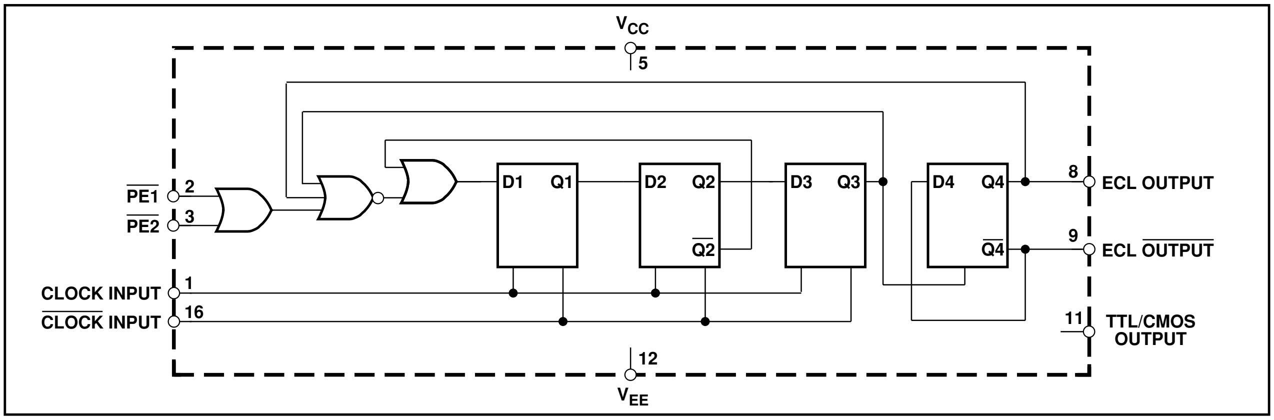


Fig. 3 Functional diagram (SP8691)

ELECTRICAL CHARACTERISTICS

Unless otherwise stated, the Electrical Characteristics are guaranteed over specified supply, frequency and temperature range

ECL OPERATION

Supply voltage, V_{CC} = 0V, V_{EE} = −5·2V ± 0·25V
Temperature, T_{AMB} = −55°C to +125°C (A Grade), −30°C to +70°C (B Grade)

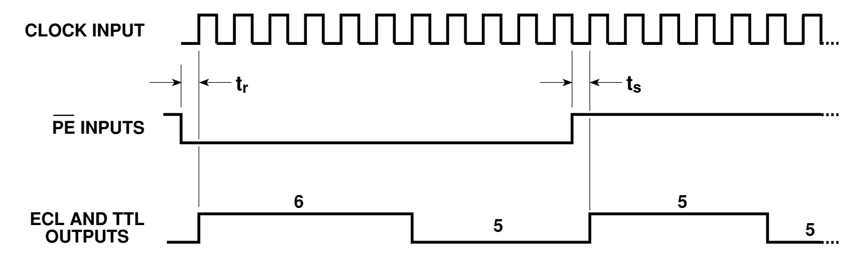
Characteristic	Symbol	Value		Units	Conditions	Notes
		Min.	Max.			
Maximum frequency (sinewave input)	f_{MAX}	200		MHz	Input = 400-800mV p-p	5
Minimum frequency (sinewave input)	f_{MIN}		40	MHz	Input = 400-800mV p-p	5
Power supply current	I_{EE}		21	mA	V_{EE} = −5·0V	5
ECL output high voltage	V_{OH}	−0·85	−0·7	V	V_{EE} = −5·2V (25°C)	
ECL output low voltage	V_{OL}	−1·8	−1·5	V	V_{EE} = −5·2V (25°C)	
PE input high voltage	V_{INH}	−0·93		V	V_{EE} = −5·2V (25°C)	
PE input low voltage	V_{INL}		−1·62	V	V_{EE} = −5·2V (25°C)	
Clock to ECL output delay	t_p		9	ns		6
Set-up time	t_s	3		ns		3, 6
Release time	t_r	8		ns		4, 6

TTL OPERATION

Supply voltage, V_{CC} = 5V ± 0·25V, V_{EE} = 0V
Temperature, T_{AMB} = −55°C to +125°C (A Grade), −30°C to +70°C (B Grade)

Characteristic	Symbol	Value		Units	Conditions	Notes
		Min.	Max.			
Maximum frequency (sinewave input)	f_{MAX}	200		MHz	Input = 400-800mV p-p	5
Minimum frequency (sinewave input)	f_{MIN}		40	MHz	Input = 400-800mV p-p	5
Power supply current	I_{EE}		21	mA	V_{CC} = 5·0V	5
TTL output low voltage	V_{OL}		0·5	V	V_{CC} = 5V, R_L = 560Ω	5, 7
TTL output high voltage	V_{OH}	3·75		V	R_L = 560Ω	5, 7
Clock to TTL output high delay, +ve going	t_{PLH}		32	ns	R_L = 560Ω	6
Clock to TTL output low delay, −ve going	t_{PHL}		18	ns	R_L = 560Ω	6
Set-up time	t_s	3		ns		3, 6
Release time	t_r	8		ns		4, 6

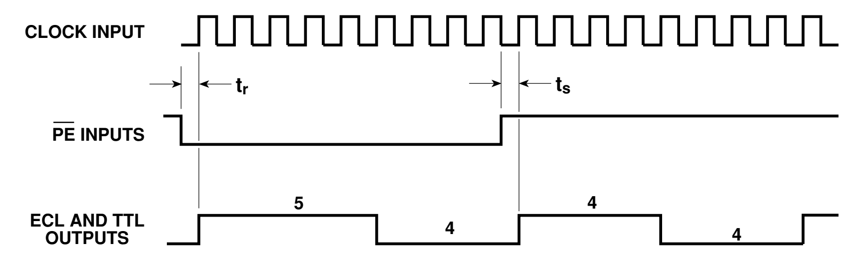
NOTES
1. The temperature coefficients of V_{OH} = +1·63mV/°C, V_{OL} = +0·94mV/°C and of V_{IN} = +1·22mV/°C.
2. The test configuration for dynamic testing is shown in Fig.8
3. The set-up time t_S is defined as the minimum time that can elapse between L→H transition of control input and the next L→H clock pulse transition to ensure that division by the lower modulus is obtained.
4. The release time t_r is defined as the minimum time that can elapse between H→L transition of control input and the next L→H clock pulse transition to ensure that division by the higher modulus is obtained.
5. SP8690/1B tested at 25°C only.
6. Guaranteed but not tested.
7. The open collector output is not recommended for use at output frequencies above 15MHz. C_{LOAD} ≤ 5pF.



TRUTH TABLE FOR CONTROL INPUTS

PE1	PE2	Division ratio
L	L	11
H	L	10
L	H	10
H	H	10

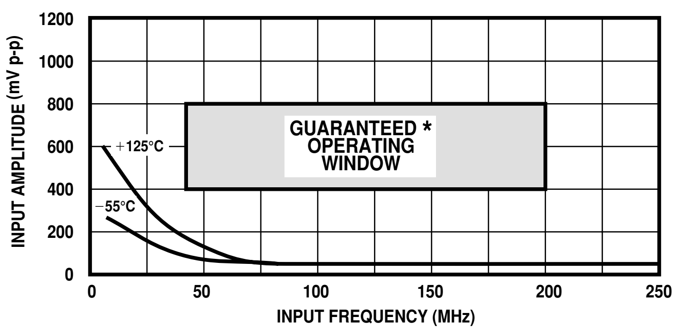
Fig. 4 Timing diagram, SP8690



TRUTH TABLE FOR CONTROL INPUTS

PE1	PE2	Division ratio
L	L	9
H	L	8
L	H	8
H	H	8

Fig. 5 Timing diagram, SP8691



* Tested as specified in table of Electrical Characteristics

Fig. 6 Typical input characteristics, SP8690/1

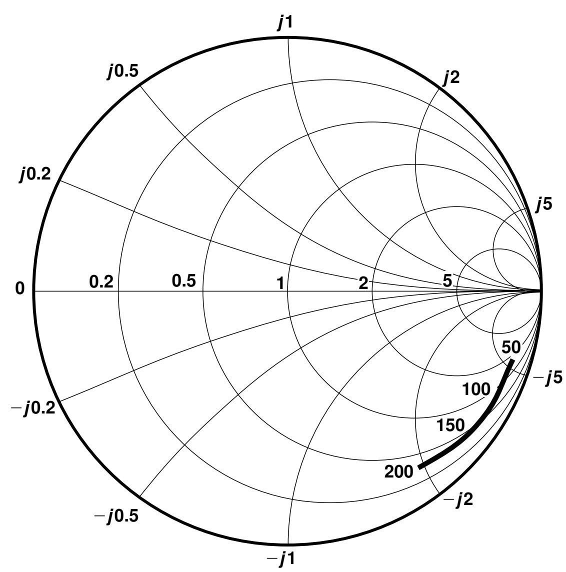


Fig. 7 Typical input impedance. Test conditions: Supply Voltage = 5.0V, Ambient Temperature = 25°C. Frequencies in MHz, impedances normalised to 50Ω.

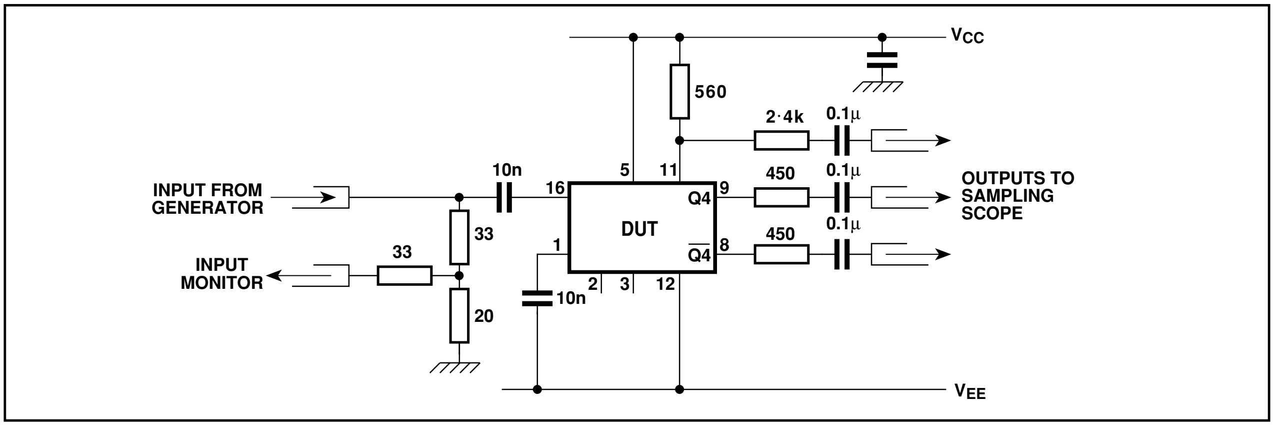


Fig. 8 Test circuit for dynamic measurements

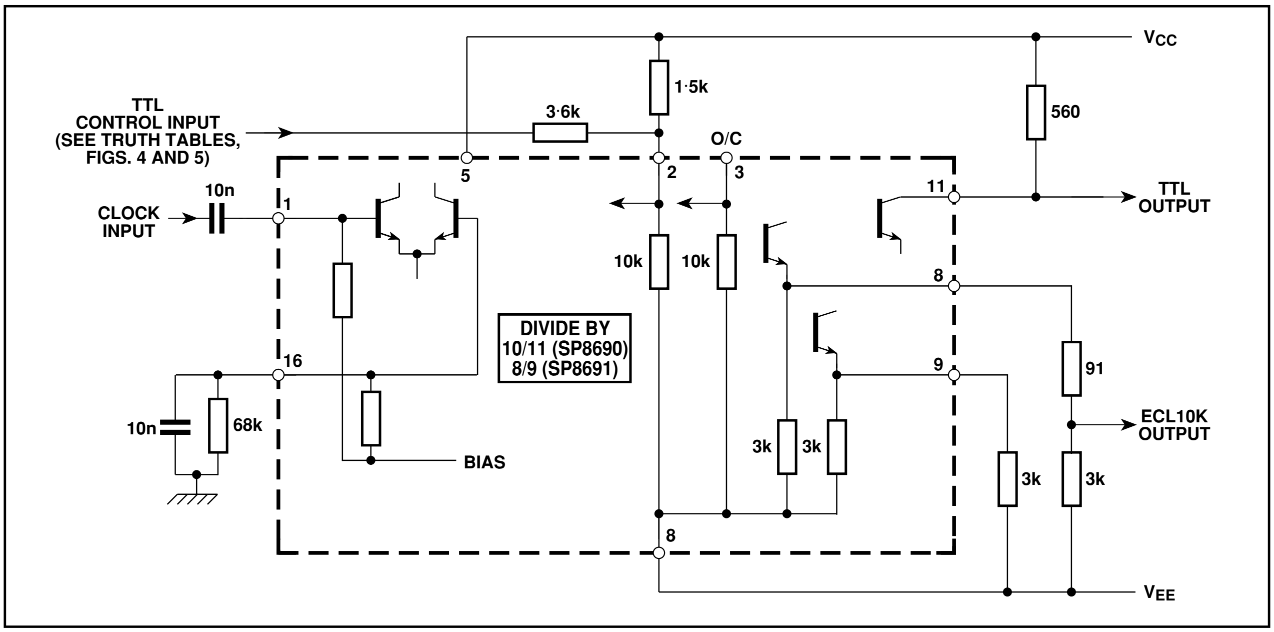


Fig. 9 Typical application showing interfacing.

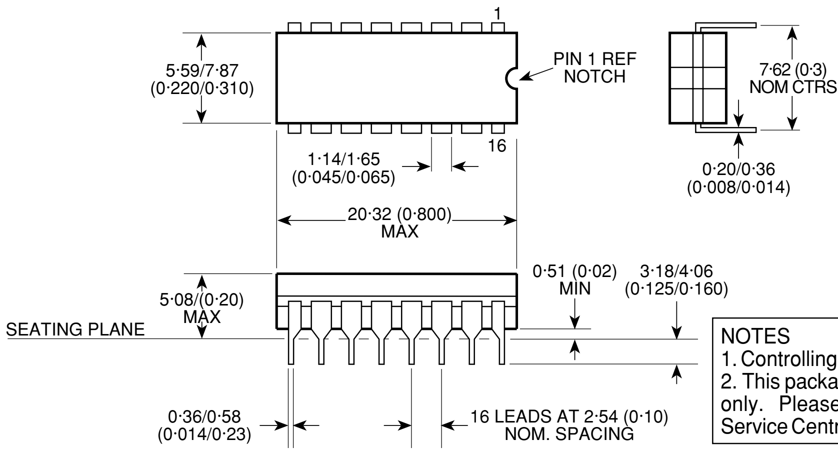
OPERATING NOTES

1. The clock inputs can be single or differentially driven. The clock input is biased internally and is coupled to the signal source with a suitable capacitor. The input signal path is completed by an input reference decoupling capacitor which is connected to ground.
2. In the absence of a signal the device will self-oscillate. If this is undesirable, it may be prevented by connecting a 68kΩ resistor from the input to V_{EE} i.e., from pin 1 or pin 16 to pin 12. This reduces the input sensitiviy by approximately 100mV.
3. The circuit will operate down to DC but slew rate must be better than 100V/µs.
4. The Q_4 and $\underline{Q}_4$ outputs are compatible with ECLII but can be interfaced to ECL10K as shown in Fig. 9.
5. The PE inputs are ECLIII/10K compatible and include internal 10kΩpulldown resistors. Unused inputs can therefore be left open circuit.
6. The input impedance of the SP8690/1 varies as a function of frequency. See Fig. 7.
7. The TTL/CMOS output is a free collector and the high state output voltage will depend on the supply that the collector load is taken to. This should not exceed 12V.
8. The rise/fall time of the open collector output waveform is directly proportional to load capacitance and load resistor value. Therefore, load capacitance should be minimised and the load resistor kept to a minimum consistent with system power requirements. In the test configuration of Fig. 8 the output rise time is approximately 10ns and the fall time

NOTES

PACKAGE DETAILS

Dimensions are shown thus: mm (in).



NOTES
1. Controlling dimensions are inches.
2. This package outline diagram is for guidance only. Please contact your GPS Customer Service Centre for further information.

16-LEAD CERAMIC DIL – DG16

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