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DS3643-1·2

SP8647

250MHz÷10/11

The SP8647 is an ECL variable modulus divider, with ECL10K and TTL/CMOS compatible outputs. It divides by 10 when either of the ECL control inputs, PE1 or PE2, is in the high state and by 11 when both are low (or open circuit).

The two clock inputs are interchangeable and either will act as a clock inhibit when connected to an ECL high level. Normally, one input is left open circuit and the other is AC-coupled, with externally applied bias.

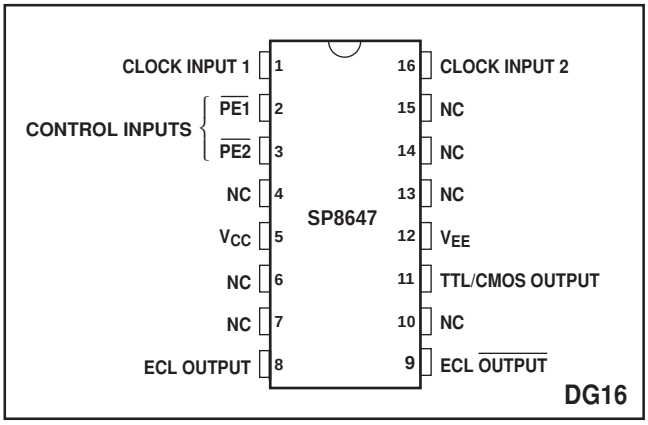


Fig. 1 Pin connections - top view

FEATURES

- ECL Compatible Inputs/Outputs
- Open Collector TTL/CMOS Output
- AC-Coupled Input (External Bias)

QUICK REFERENCE DATA

- Supply Voltage: −5·2V±0·25V (ECL), 5·0V±0·25V (TTL)
- Power Consumption: 260mW
- Temperature Range: −30°C to +70°C

ABSOLUTE MAXIMUM RATINGS

Supply voltage, $\|V_{CC}-V_{EE}\|$	8V
Output current	20mA
Storage temperature range	−65°C to +150°C
Max. junction temperature	+175°C
Open collector voltage (pin 11)	+12V
Max. clock input voltage	2·5V p-p
Max. open collector current	15mA

ORDERING INFORMATION

SP8647 B DG
5962-90618 (SMD)

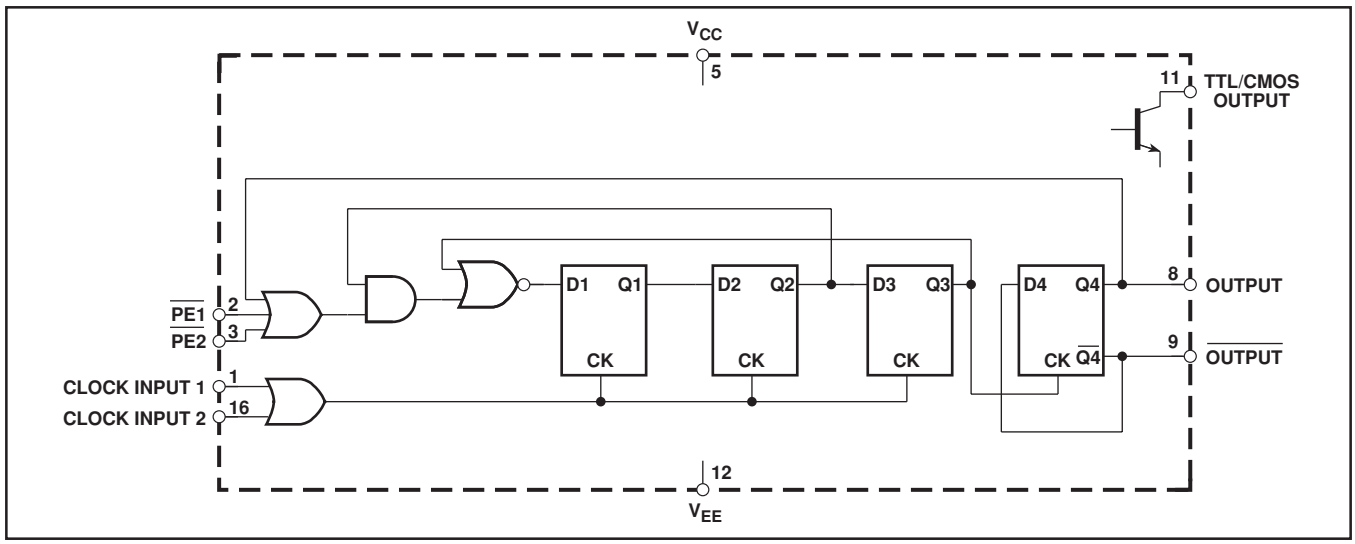


Fig. 2 Functional diagram

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} = −30°C to +70°C

Characteristic	Symbol	Value		Units	Conditions	Notes
		Min.	Max.			
Maximum frequency (sinewave input)	f_{MAX}	250		MHz	Input = 400-800mV p-p	5
Minimum frequency (sinewave input)	f_{MIN}		50	MHz	Input = 400-800mV p-p	5
Power supply current	I_{EE}		65	mA	V_{EE} = −5·2V	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)	
Clock and PE input high voltage	V_{INH}	−0·93		V	V_{EE} = −5·2V (25°C)	
Clock and PE input low voltage	V_{INL}		−1·62	V	V_{EE} = −5·2V (25°C)	
Clock to ECL output delay	t_p		6	ns		6
Set-up time	t_s	2·5		ns		3, 6
Release time	t_r	3		ns		4, 6

TTL OPERATION

Supply voltage, V_{CC} = 5V ± 0·25V, V_{EE} = 0V
Temperature, T_{AMB} = −30°C to +70°C

Characteristic	Symbol	Value		Units	Conditions	Notes
		Min.	Max.			
Maximum frequency (sinewave input)	f_{MAX}	250		MHz	Input = 400-800mV p-p	5
Minimum frequency (sinewave input)	f_{MIN}		50	MHz	Input = 400-800mV p-p	5
Power supply current	I_{EE}		65	mA		5
TTL output low voltage	V_{OL}		0·5	V	V_{CC} = 5·25V, sink current = 8mA	5, 7
TTL output high voltage	V_{OH}	3·5		V	V_{CC} = 5·0V	5, 7
Clock to TTL output high delay, +ve going	t_{PLH}		15	ns		6
Clock to TTL output low delay, −ve going	t_{PHL}		15	ns		6
Set-up time	t_s	2·5		ns		3, 6
Release time	t_r	3		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.6.
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 the ÷10 mode 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 the ÷11 mode is obtained.
5. 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. $C_{LOAD} \leqslant 5pF$.

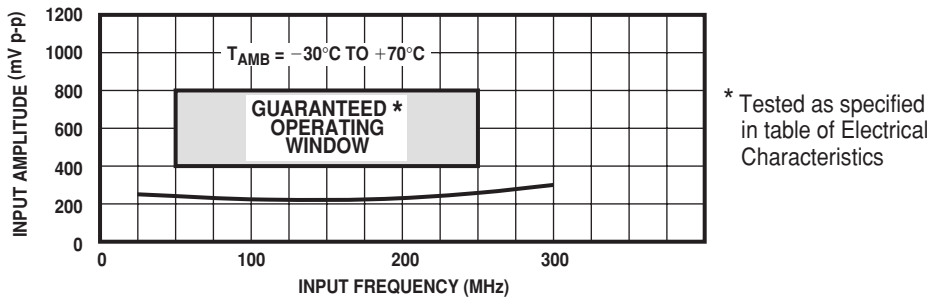
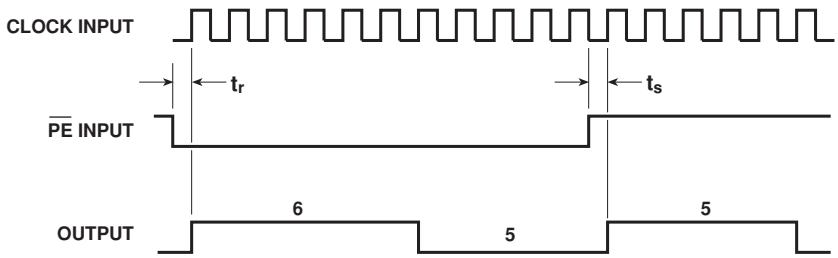


Fig. 3 Typical input characteristic



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

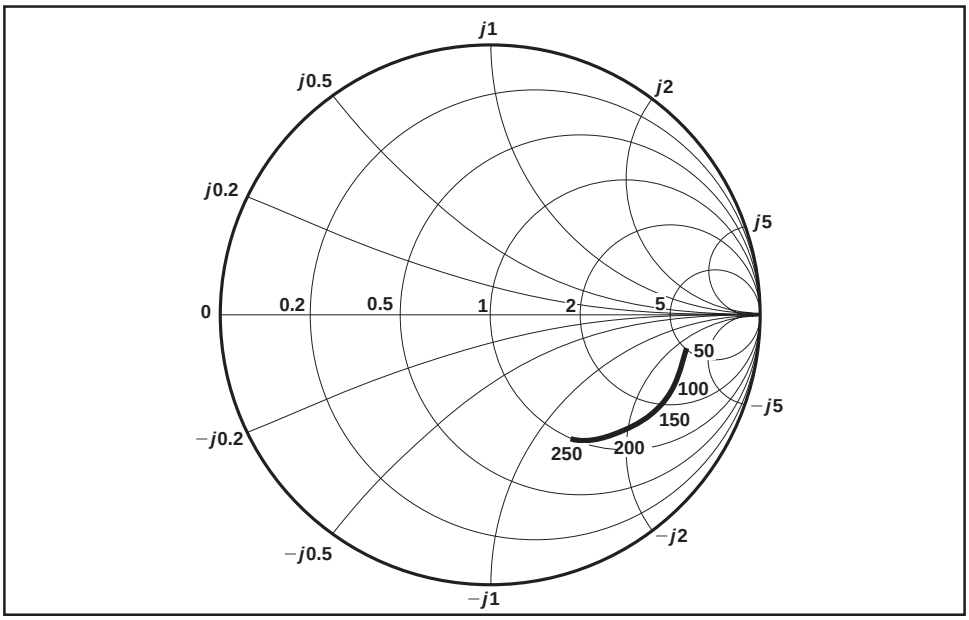


Fig. 5 Typical input impedance. Test conditions: Supply Voltage = 5V, Ambient Temperature = 25°C. Frequencies in MHz, impedances normalised to 50Ω.

OPERATING NOTES

1. The clock and control inputs are ECLIII compatible. There is an internal pulldown resistor to V_{EE} of 4·3kΩ on each input and therefore any unused input can be left open circuit. If it is desirable to capacitively couple the signal source to the clock then an external bias is required as shown in Fig. 6. The external bias voltage should be −1·3V at 25°C.
2. The outputs are compatible with ECLII but can be interfaced to ECL10K as shown in Fig.8.
3. The circuit will operate down to DC but slew rate must be better than 100V/μs.
4. Input impedance is a function of frequency. See Fig. 5.
5. The TTL/CMOS output is a free collector, with an output rise/fall time which is a function of load resistance and load capacitance. The load capacitance should therefore be kept to a minimum and the load resistance should not be too small otherwise V_{OL} will be too great. For example, TTL output current = 8mA, V_{OL} = 0·5V. For CMOS outputs, the value of load resistor should be the maximum consistent with satisfactory rise times.
6. All components should be suitable for the frequency in use.

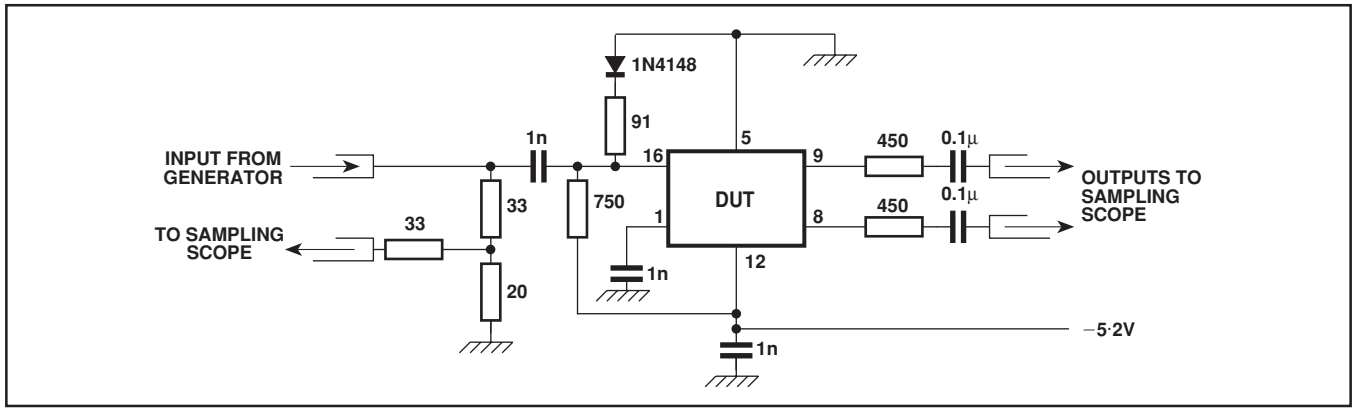


Fig. 6 Test circuit

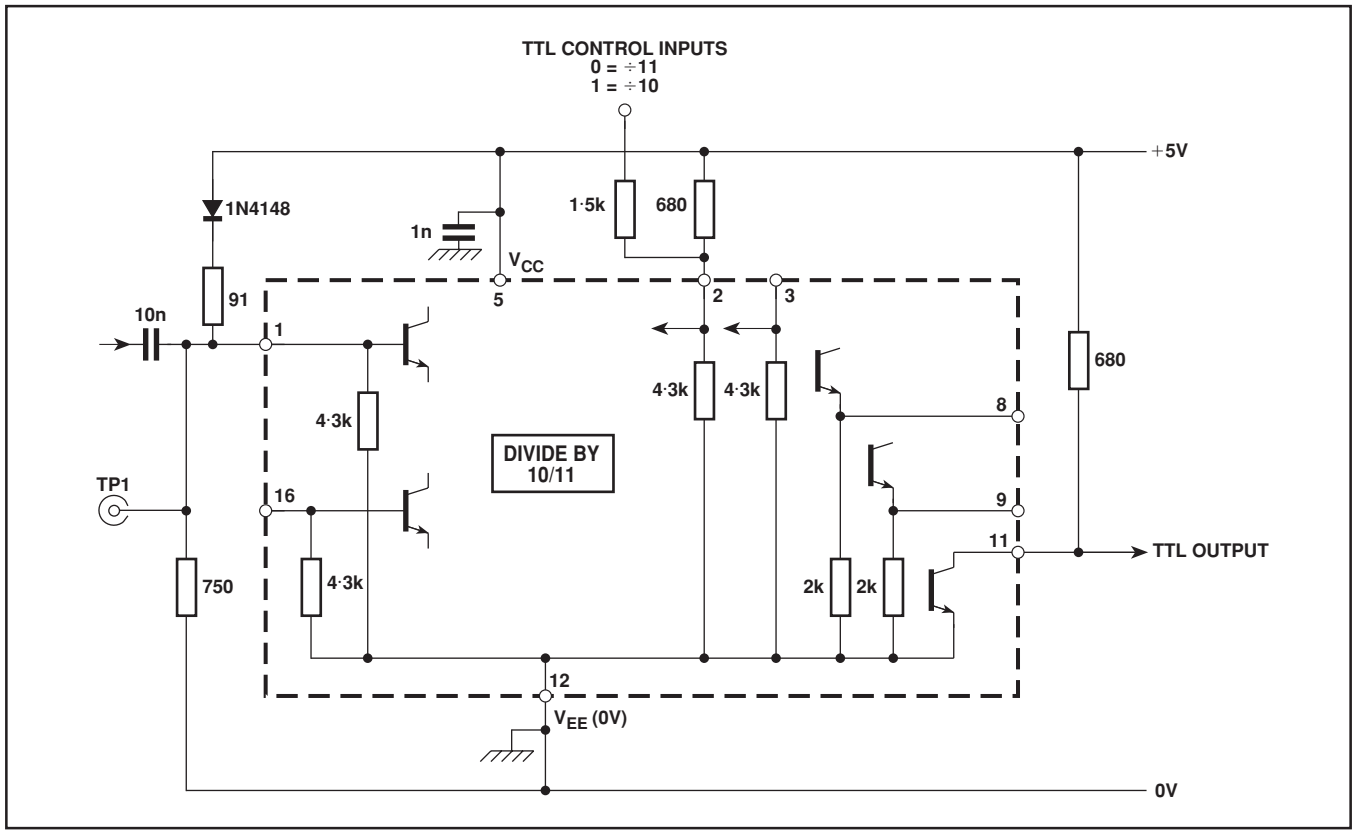


Fig. 7 Typical application showing TTL interfacing. NB: Voltage at TP1 should be +3·75V at 25°C.

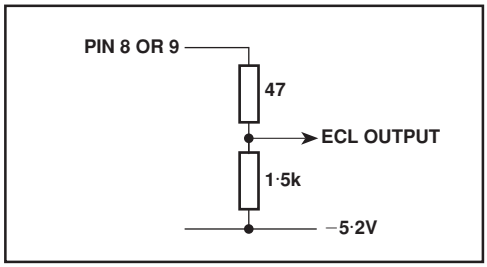
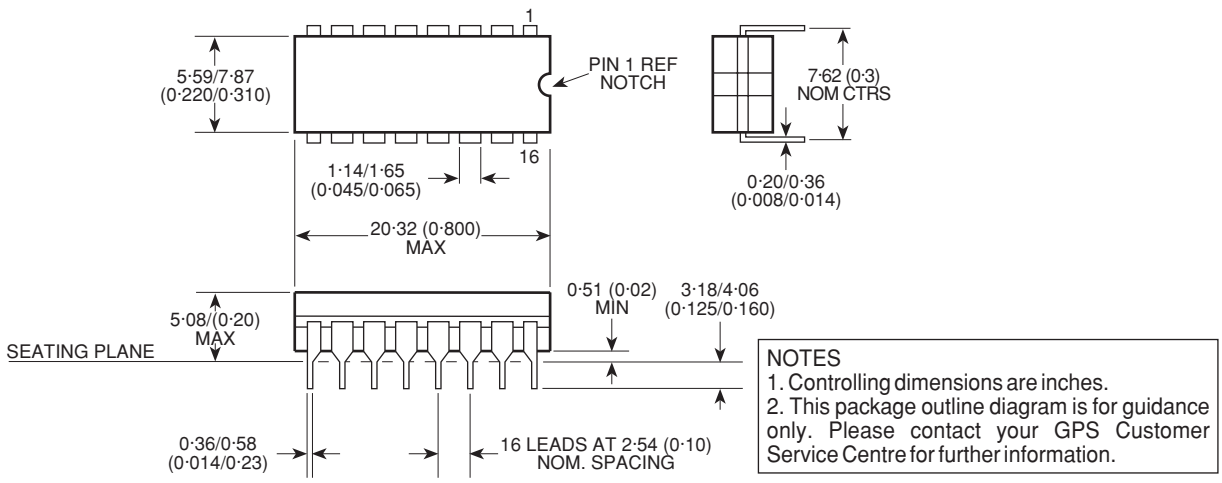


Fig. 8 Interfacing to ECL10K

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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