IMISG508 REDUCED EMI CLOCK CHIP

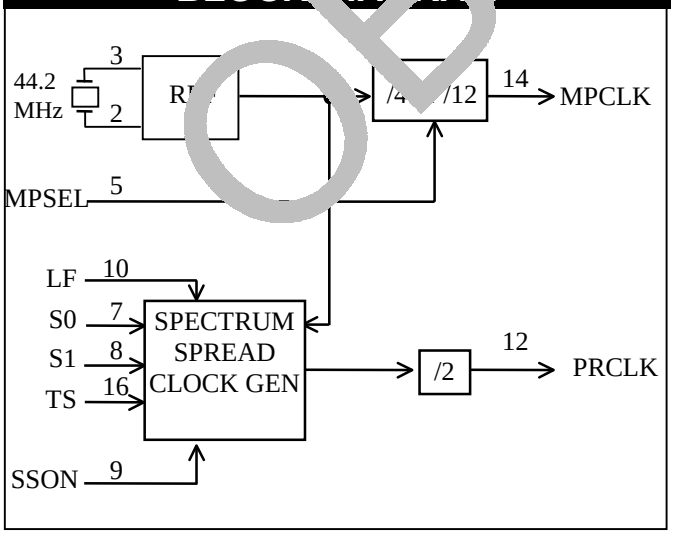
CMOS LSI

May 1996 ***SPECTRUM SPREAD CLOCK GENERATOR***

PRODUCT FEATURES

- Generates CPU Clock Signals for Microprocessor Systems
- Reduces Measured EMI by 10 dB nominal
- 4V to 6V Operating Supply Range
- Supports CPUs from all major manufacturers
- Wide Range of Selectable Output Frequencies including 40, 30, 25, and 16.7 MHz.
- Single, Low Cost Crystal used as Reference Frequency
- Glitch-Free Switching
- 50% Duty Cycle
- Power Down Mode for Low Power consumption
- TTL or CMOS Compatible Outputs with 6 mA Drive Capability
- Low, Short- and Long-Term Jitter
- 16 Pin PDIP and 16 Pin SOIC (300 mil body) Package Options

BLOCK DIAGRAM

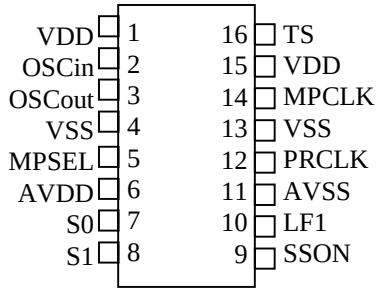


PRODUCT DESCRIPTION

The IMISG508 is a spectrum spread clock generator specially designed for personal computers, laser printers and other digital systems. IMISG508 uses a patented concept to generate popular clock frequencies that are intentionally wideboradbanded to reduce electromagnetic interference. IMISG508 attenuates the radiated emission amplitudes from products associated with either the clock harmonics or any signals derived from the clock signals nominally 10 dB and could significantly reduce the cost of complying with the regulatory requirements.

PRCLK is the broadbanded output and can be programmed by the PRCLK Frequency Selection Table on page 6. A single, low cost external crystal is required as reference frequency for the synthesizer. Output modulation function can be turned off with the SSON pin. Several power down modes add the flexibility to operate the device in a completely static mode to reduce standby currents and simplify system board [illegible].

CONNECTION DIAGRAM



APPLICATIONS

The IMISG508 eliminates the need for multiple oscillators and generates the CPU clock signals for personal computers, laser printers and other digital systems. Supports CPUs from all major manufacturers. IMISG508 can be used with laptop or notebook computers to save power by running the system slower than normal CPU speeds or completely disabling the clocks in standby mode.

INTERNATIONAL MICROCIRCUITS, INC. 525 LOS COCHES ST.
MILPITAS, CA 95035 TEL: 408-263-6300 FAX 408-263-6571

PIN DESCRIPTION

OSCin, OSCout - These pins form an on-chip reference oscillator when connected to terminals of an external 44.2 MHz third overtone parallel resonant crystal. OSCin may also serve as an input for an externally generated CMOS level or AC coupled reference signal.

S0, and S1 - Frequency select inputs. These inputs control the PRCLK frequency selection. S0-S1 inputs control the CPU clock frequencies. All these inputs have internal pull-downs.

PRCLK - Output from the spectrum spread clock generator. Frequency selection is shown in Table 1.

Table 1 shows the output frequency selection conditions.

TS - Controls power down and Tri-State Mode selection. When high, S1 input controls the mode selection as shown in Table 1 and Table 2. When low, the device operates in normal mode. This pin has an internal pull-down.

LF1 - This is the control output for the clock generator. It is a single-ended, tri-state output. Component connections are shown in Figure 1.

PRCLK FREQUENCY TABLE

INPUTS			OUTPUT
TS	**S1**	**S0**	**PRCLK**
0	0	0	1[illegible]7 MHz
0	0	1	[illegible]40 MHz
0	1	0	25
0	1	1	30 MHz
1	0	0	0; Power Down
1	0	1	1; Power Down
1	1	0	TEST
1	1	1	Hi-Z

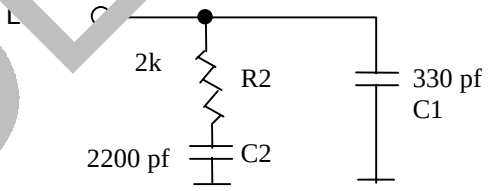
TABLE 1: When Power Down address is selected, the VCO is turned off and the device goes to standby mode. Phase detector is in tri-state mode. The Table is based on using 44.2 MHz crystal. Output can be scaled own using lower frequency crystals, see page 6.

SSON - This pin controls the spectrum spread function. When low, PRCLK is modulated. When high, spreading is turned off. This pin has an internal pull-up.

MPSEL - Controls MPCLK output frequency selections. Table 2 shows the selected frequencies for MPCLK. This input has an internal pull-up.

MPCLK - This is a non-modulated output. This output can be programmed to be 3.7 MHz or 11.06 MHz. The selection of the frequencies are controlled by the MPSEL pin shown in Table 1.

VSS - Circuit ground.
VDD - Positive power supply.
AVSS - Analog circuit ground.
AVDD - Analog positive power supply.



MPCLK FREQUENCY SELECTION

INPUTS				OUTPUT
TS	**MPSEL**	**S1**	**S0**	**MPCLK**
0	0	X	X	3.7 MHz
0	1	X	X	11.06 MHz
1	X	0	0	0; Power Down
1	X	0	1	1; Power Down
1	X	1	0	TEST
1	X	1	1	Hi-Z

TABLE 2: When Power down address is selected, the VCO is turned off and the device goes to standby mode. Phase detector is in tri-state mode.

MAXIMUM RATINGS

Voltage Relative to VSS:	-03V to 6V
Voltage Relative to VDD:	0.3V
Storage Temperature:	-65°C to 150°C
Ambient Temperature:	0°C to 70°C
Recommended Operating Range:	4.5 - 5.5V

This device contains circuitry to protect the inputs against damage due to high static voltages or electric field; however, precautions should be taken to avoid application of any voltage higher than the maximum rated voltages to this circuit. For proper operation, Vin and Vout should be constrained to the range:

$V_{SS} < (V_{in} \text{ or } V_{out}) < V_{DD}$

Unused inputs must always be tied to an appropriate logic voltage level (either VSS or VDD).

ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	Min	Typ	Max	Units
Input Low Voltage	V_{IL}	-	-	0.8	Vdc
Input High Voltage	V_{IH}	2.0	-	-	Vdc
Input Low Current with Pull-up/Pull-down	I_{IH}/I_{IL}		-	10/100	uA
Output Low Voltage IOL = 6mA	V_{OL}	-	-	0.4	Vdc
Output High Voltage IOH = 6mA		2.5	-	-	Vdc
Tri-State leakage Current	I_{OZ}	-	-	10	uA
Static Supply Current	I_{DD}	-	-	250	uA
Dynamic Supply Current	I_{CC}	-	25	30	mA
Short Circuit Current	I_{SC}	25	-	-	mA

VDD = 5V + 10%, TA = 0°C to 70°C

SWITCHING CHARACTERISTICS

Characteristic	Symbol	Min	Typ	Max	Units
Output Rise and Fall Time Measured at 10% - 90% of VDD	t_{TLH},t_{THL}	-	-	5	ns
Output Rise and Fall Time Measured at 0.8V - 2.0V	t_{TLH},t_{THL}	-		3	ns
Output Duty Cycles	T_{sym}F1	-		45/55	%
Jitter One Sigma	tj1s	-	-	2	% of Fout
					VDD = 5V ± 10%, TA = 0°C, CL = 15 pF

OSCILLATOR CHARACTERISTICS

Characteristic	Symbol	Min	Typ	Max	Units	Conditions
Transconductance	gm	20	80	180	millimhos	@44.2 MHz
Output Impedance	Zo	-	20	80	ohms	@ 44.2 MHz
Input Capacitance	Ci	8	13	18	pf	-
Output Capacitance	Co	3	6		pf	-
DC Bias Voltage	V_B	1.5	VDD/2	3.5	Volt	-
Start-up Time	ts	-	-	2	ms	@ VDD = 4.5V
Duty Cycle	TsymF		-	45/55	%	-
Input Rise Time OSCin	ICLKr	-	-	20	ns	-
Input Fall Time OSCout	ICLKf		-	20	ns	-

VCO CHARACTERISTICS

Characteristic	Symbol	Min	Typ	Max	Units	Conditions
VCO Gain	K_0	35	55	65	MHz/volt	ΔF/ΔV Measured with VCO Control at 2V - 3V
Phase Detector Gain	K_d	100	145	200	uA	-

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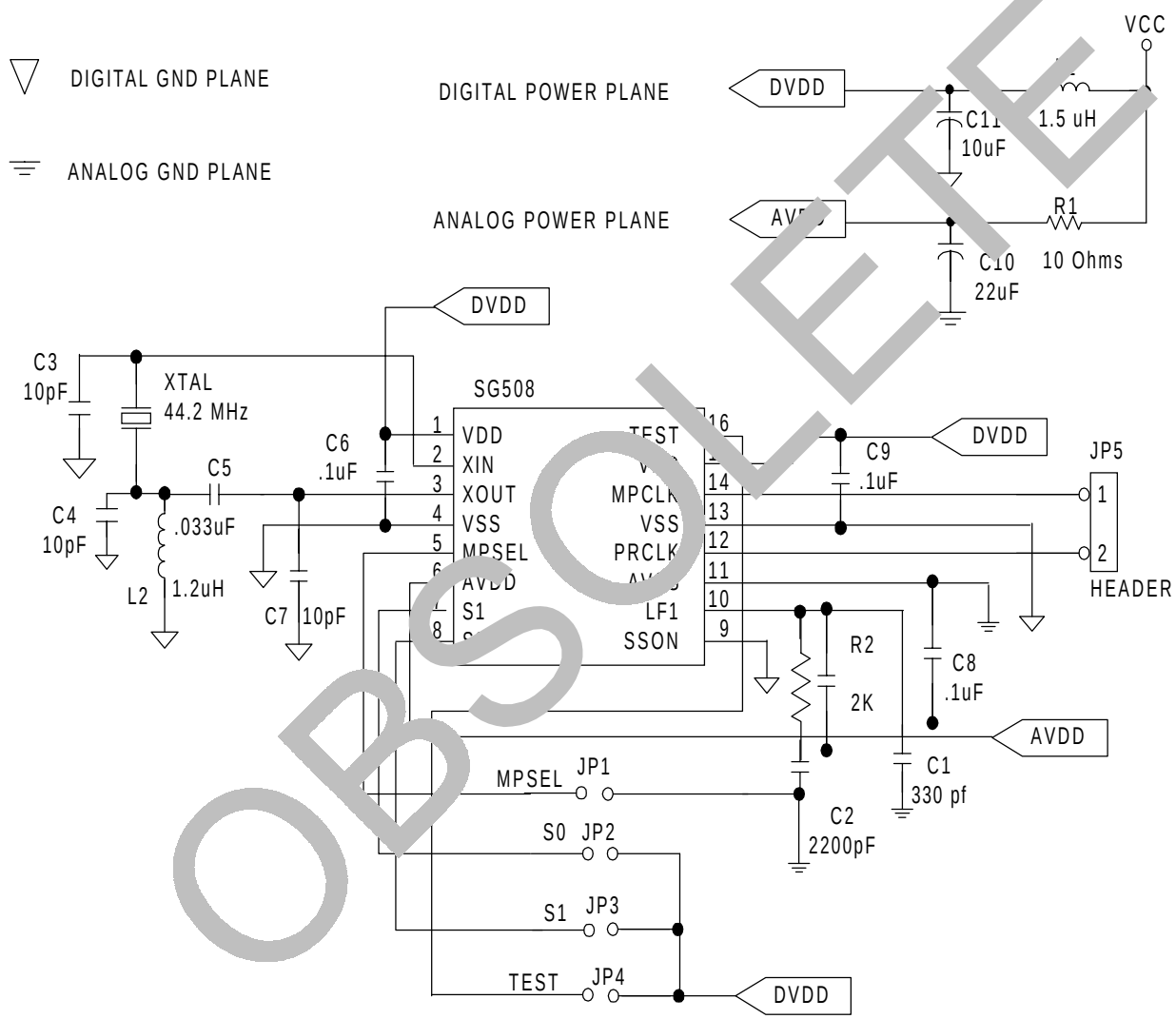
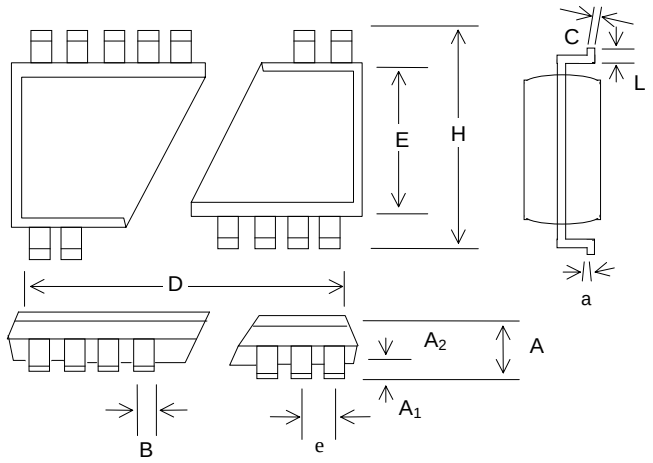
EXTERNAL CONNECTIONS



NOTE1: KEEP C3, C4, C5, C6 CLOSE TO THEIR PINS (4, 11, 13, 10, 9 RESPECTIVELY).

IMISG508

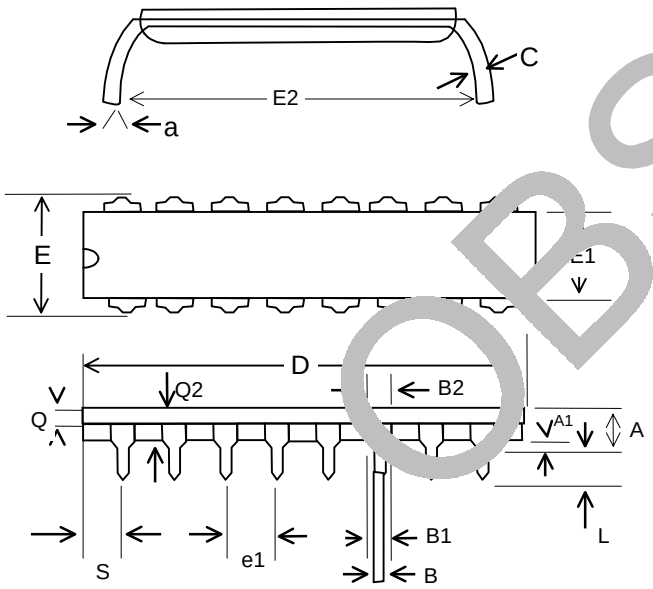
PACKAGE DRAWING AND DIMENSIONS



SOIC PACKAGE (300 mil)

16 PIN SOIC OUTLINE DIMENSIONS

SYMBOL	INCHES			MILLIMETERS		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.097	0.101	0.104	2.46	2.56	2.64
A_1	0.0020	0.009	0.0015	0.060	0.22	0.38
A2	0.090	0.092	0.1	2.29	2.34	2.39
B	0.014	0.016	0.01	55	0.41	0.48
C	0.0091	0.01	0.0125	23	.25	0.32
D	.399	.407	.412	10.1	10.34	10.46
E	0.285	0.296	0.3	7.24	7.52	7.59
e	0.050 BSC			1.27 BSC		
H	.400	0.406	0.410	10.16	10.31	10.41
a	0	5°	10°	0°	5°	10°
L	0.024	.032	0.040	0.61	0.81	1.02



16 PIN PLASTIC DIP DIMENSIONS

SYMBOL	INCHES			MILLIMETERS		
	MIN	NOM	MAX	MIN	NOM	MAX
	0.150	0.160	0.170	3.81	4.06	4.318
A_1	0.015	-	-	0.381	-	-
B	0.016	0.018	0.020	0.40	0.45	0.50
B_1	0.056	0.059	0.062	1.47	1.52	1.57
B_2	0.046	0.049	0.052	1.17	1.24	1.32
C	0.008	0.010	0.012	0.20	0.25	0.30
D	0.748	0.750	0.752	19.00	19.05	19.10
E	0.300	0.312	0.325	7.62	7.924	8.255
E_1	0.240	0.252	0.260	6.096	6.49	6.604
E_2	0.335	0.345	0.355	8.51	8.76	9.01
e_1	0.100 BSC			2.54 BSC		
L	0.25	0.230	0.135	3.175	3.30	3.429
a	0°	7°	15°	0°	7°	15°
Q_1	0.059	0.060	0.061	1.50	1.53	1.55
Q_2	0.128	0.130	0.132	3.25	3.30	3.35
S	0.073	0.075	0.077	1.85	1.90	1.95

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ORDERING INFORMATION

Part Number	Package Type	Production Flow
IMISG508APB	16 Pin Plastic Dip	Commercial, 0°C to + 70°C
IMISG508AXB	16 Pin SOIC	Commercial, 0°C to +70°C

Note: The ordering part number is formed by a combination of device number, device revision, package style, and screening as shown below.

Marking: Example: IMI
SG508APB
Date Code, Lot #

IMISG508APB

Flow

B = Commercial, 0°C to + 70°C

Package

P = Plastic Dip
X = Small Outline

Revision

IMI Device Number

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