# ICS MICROCLOCK

MK2150B
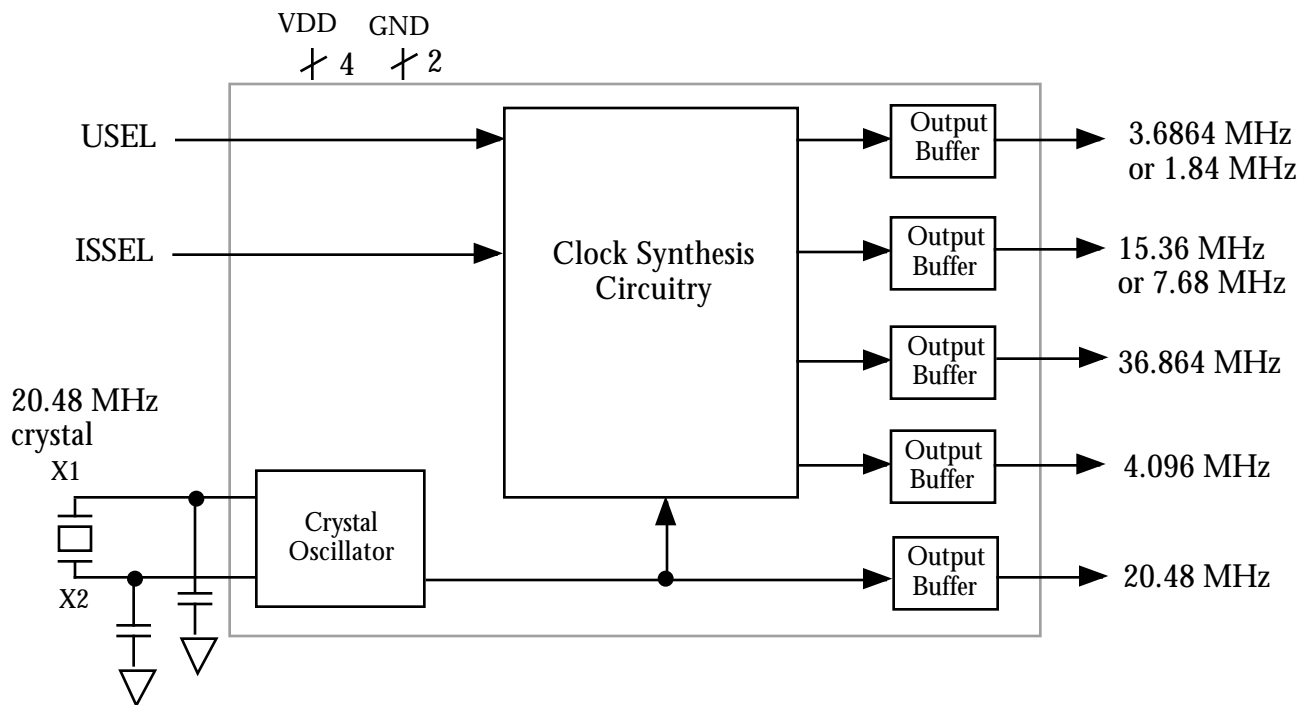# ISDN Card Clock Source

Description

The MK2150 provides clocks for Motorola ISDN adapter cards. It has five different clock outputs to replace commonly used crystals and oscillators. The UART clock can be selected for either a 3.6864MHz or 1.8432 MHz clock output. The clock outputs can be used to drive two or three loads, eliminating the need for an oscillator or multiple crystals. The device is easily surface mounted and is available in tape and reel packaging.

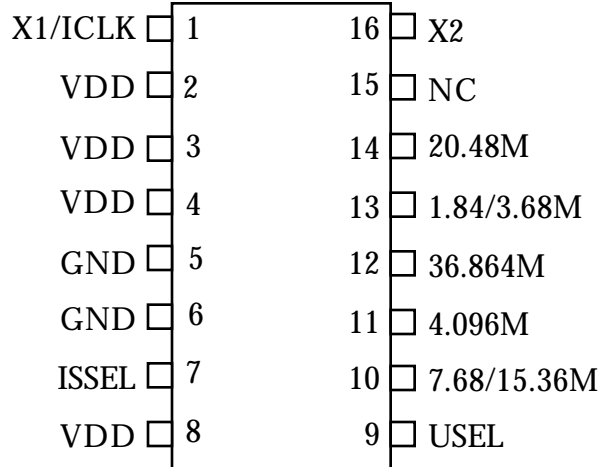MicroClock can customize this device for any different frequencies for a small NRE.

Features

• Packaged in 16 pin narrow (150 mil) SOIC

• Ideal for Motorola ISDN adapter cards

• Selectable UART clock of 1.8432 or 3.6864MHz

• Selectable ISDN clock of 7.68 or 15.36 MHz

• Fixed clocks of 4.096, 20.48, and 36.864 MHz

• Patented zero ppm synthesis error

• All clocks are frequency-locked to each other

• 3.0V to 5.5V operation

• Low power CMOS process

Block Diagram

Pin Assignment

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X1/ICLK □  1        16 □ X2
  VDD  □  2        15 □ NC
  VDD  □  3        14 □ 20.48M
  VDD  □  4        13 □ 1.84/3.68M
  GND  □  5        12 □ 36.864M
  GND  □  6        11 □ 4.096M
 ISSEL □  7        10 □ 7.68/15.36M
  VDD  □  8         9 □ USEL
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16 pin narrow (150 mil) SOIC

UART Clock Table

USEL (pin 9)	Pin 13
0	1.8432 MHz
1	3.6864 MHz

ISDN Clock Table

ISSEL (pin 7)	Pin 10
0	15.36 MHz
1	7.68 MHz

Pin Descriptions

Number	Name	Type	Description
1	X1/ICLK	I	Crystal connection. Connect to 20.48 MHz crystal, or clock input
2	VDD	P	Connect to +3.3V or +5V. Must be same as other VDDs.
3	VDD	P	Connect to +3.3V or +5V. Must be same as other VDDs.
4	VDD	P	Connect to +3.3V or +5V. Must be same as other VDDs.
5	GND	P	Connect to ground.
6	GND	P	Connect to ground.
7	ISSEL	I	ISDN Clock select. Selects 7.68 MHz on pin 10 when high, 15.36 MHz when low.
8	VDD	P	Connect to +3.3V or +5V. Must be same as other VDDs.
9	USEL	I	UART Clock select. Selects 3.6864 MHz on pin 13 when high, 1.843MHz when low.
10	7.68/15.36M	O	15.36 MHz or 7.68 MHz clock output, depending on status of ISSEL.
11	4.096M	O	4.096 MHz clock output.
12	36.864M	O	36.864 MHz clock output.
13	1.84/3.68M	O	3.6864 MHz or 1.8432 MHz clock output, depending on status of USEL.
14	20.48M	O	20.48 MHz buffered reference clock output.
15	NC	-	No Connect.
16	X2	O	Crystal connection. Leave unconnected for clock input, or connect to 20.48 MHz crystal.

Type: I = Input, O = output, P = power supply connection

External Components/Crystal Selection

The MK2150 requires a minimum number of external components for proper operation. For a crystal input, a parallel resonant 20.48 MHz crystal is recommended. The frequency tolerance of the crystal should be 50ppm or better. Crystal capacitors should be connected from each of X1 and X2 to ground. The value (in pF) of these crystal caps should be = $(C_L-4)*2$, where C_L is the crystal load capacitance in pF. For a clock input, connect to X1 and leave X2 unconnected. VDD and GND pins should be connected together, and a decoupling capacitor of 0.1µF must be connected between them very close to the chip. 33 terminating resistors can be used on clock outputs with traces longer than 1 inch.

Electrical Specifications

| Parameter	Conditions	Minimum	Typical	Maximum	Units
ABSOLUTE MAXIMUM RATINGS (Note 1)					
Supply Voltage, VDD	Referenced to GND			7	V
Inputs and Clock Outputs		-0.5		VDD+0.5	V
Ambient Operating Temperature		0		70	°C
Soldering Temperature	Max of 10 seconds			250	°C
Storage Temperature		-65		150	°C
DC CHARACTERISTICS (at 5.0V unless noted)					
Operating Voltage, VDD		3		5.5	V
Input High Voltage, VIH		2			V
Input Low Voltage, VIL				0.8	V
Output High Voltage	IOH=-4mA	VDD-0.4			V
Output High Voltage	IOH=-25mA	2.4			V
Output Low Voltage	IOL=25mA			0.4	V
Operating Supply Current, IDD	No Load, VDD=5.0V		20		mA
Operating Supply Current, IDD	No Load, VDD=3.0V		12		mA
Short Circuit Current	Each output		±80		mA
Input Capacitance, USEL and ISSEL			7		pF
Actual mean frequency error versus target	All outputs		0	0	ppm
AC CHARACTERISTICS					
Input Frequency			14.31818		MHz
Output Clock Rise Time	0.8 to 2.0V			1.5	ns
Output Clock Fall Time	2.0 to 0.8V			1.5	ns
Output Clock Duty Cycle, High Time	At 1.4V	40	49 to 51	60	%

Note:
1. Stresses beyond those listed under Absolute Maximum Ratings could cause permanent damage to the device. Prolonged exposure to levels above the operating limits but below the Absolute Maximums may affect device reliability.
2. Provided the crystal is properly tuned, or an accurate 20.48 MHz input clock is used.

Package Outline and Package Dimensions

16 pin SOIC narrow
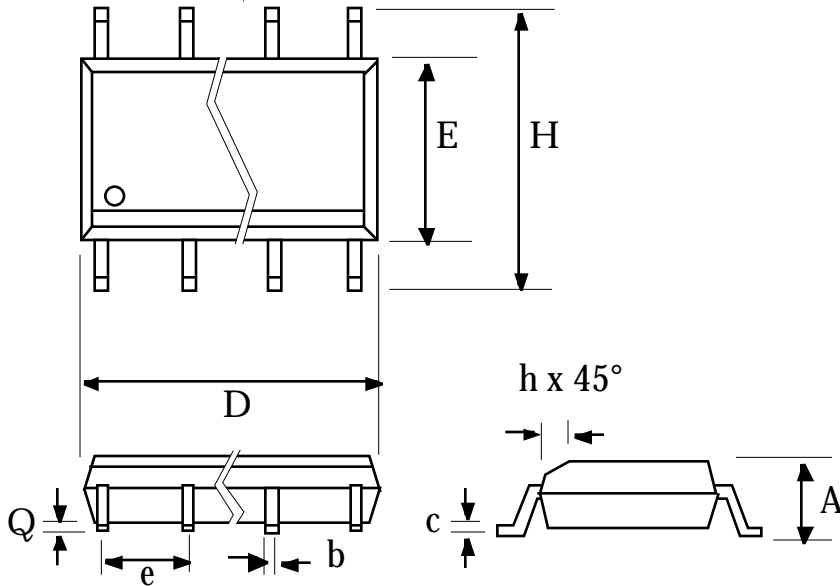
Symbol	Inches		Millimeters	
	Min	Max	Min	Max
A	0.055	0.070	1.397	1.778
b	0.013	0.019	0.330	0.483
c	0.007	0.010	0.190	0.254
D	0.385	0.400	9.779	10.160
E	0.150	0.160	3.810	4.064
H	0.225	0.245	5.715	6.223
e	.050 BSC		1.27 BSC	
h		0.016		0.406
Q	0.004	0.01	0.102	0.254

Ordering Information

Part/Order Number	Marking	Package	Temperature
MK2150-01S	MK2150-01S	16 pin narrow SOIC	0-70°C
MK2150-01STR	MK2150-01S	Add Tape & Reel	0-70°C

CHANGE HISTORY

Version	Date first published	Comments
A	8/8/96	Original
B	1/13/98	Corrected ISDN Select Table