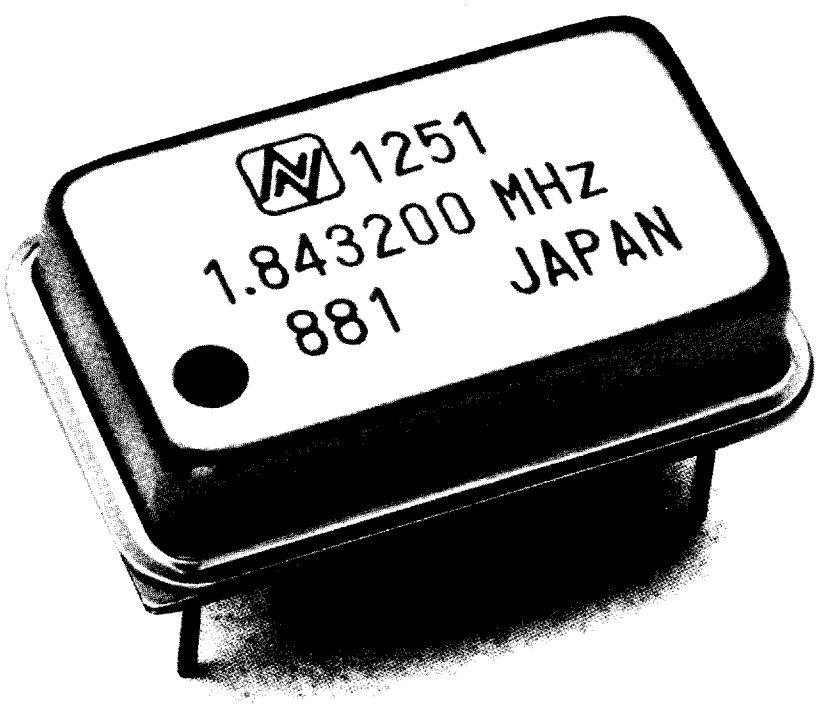
T-50-23

The broadest family of CMOS and TTL-compatible oscillators available, NDK 1200 Series Crystal Clock Oscillators offer the convenience of a standard 14-pin DIP socket and are available in a wide range of frequencies from 28kHz to 100 MHz. NDK Crystal Clock Oscillators deliver reliable performance and offer superior resistance to shock, vibration, EMI, and humidity.

1200 SERIES FEATURES

- Broadest range of available frequencies (28kHz to 100 MHz) speeds design and procurement process
- Fits standard 14-pin DIP socket for fast PC-board assembly
- CMOS technology for low power consumption/low heat
- Fast rise and fall times (5,7,10ns)
- Excellent fan out (2 or 5 TTL gates)
- Standby/Dual Output option available
- Sealed, grounded metal case resists EMI and humidity
- Shock and vibration resistant



NDK: THE INDUSTRY LEADER

Headquartered in Tokyo, Japan, NDK is the world's premier manufacturer of synthetic quartz crystal. NDK surpasses all other manufacturers in both quality and quantity of synthetic quartz production. NDK offers the widest range of microprocessor quartz crystals, crystal oscillators, and compact crystal oscillators available. All NDK products are fabricated under the strictest quality controls, and are guaranteed to be free from impurities and defects.

NDK standard products are available through a nationwide network of stocking distributors. NDK also offers custom crystal oscillator fabrication to meet individual needs. For more information on NDK custom services or distribution, write:

NDK America, Inc.
20300 Stevens Creek Blvd.
Suite 400
Cupertino, CA 95014-2210

NDK 1200 SERIES SPECIFICATIONS

Available Frequencies

Table 1. 1200 Series Quick-Reference Comparison

Frequency Range	Part Number	Output	Power Consumption	Rise and Fall Times	VOL Maximum VOH Minimum	Duty Cycle %	Fan Out	Standby/ Dual Output
28 kHz- 6.99 MHz	1221- 1228	CMOS/ TTL	5mA typical 10mA maximum	10ns	0.5V V_{DD} -0.5V	45/55	TTL 2 LS-TTL 10	Standby Only
7 kHz- 22 MHz	1229	CMOS/ TTL	5mA typical 10mA maximum	10ns	0.5V V_{DD} -0.5V	40/60	TTL 2 LS-TTL 10	Standby or Dual
22 MHz- 29.9 MHz	1230- 1232	CMOS Only	13mA typical 20mA maximum	5ns	0.5V V_{DD} -0.5V	40/60	TTL 5 LS-TTL 25	Standby Only
30 MHz- 50.9 MHz	1233- 1237	CMOS Only	17mA typical 30mA maximum	5ns	0.5V V_{DD} -0.5V	40/60	TTL 5 LS-TTL 25	Standby Only
51 MHz- 70 MHz	1238- 1239	CMOS Only	22mA typical 40mA maximum	5ns	0.5V V_{DD} -0.5V	40/60	TTL 5 LS-TTL 25	Standby Only
22 MHz- 29.9 MHz	1240- 1242	TTL Only	13mA typical 20mA maximum	5ns	0.4V 2.4V	40/60	TTL 5 LS-TTL 25	Standby Only
30 MHz- 50.9 MHz	1243- 1247	TTL Only	17mA typical 30mA maximum	5ns	0.4V 2.4V	40/60	TTL 5 LS-TTL 25	Standby Only
51 MHz- 70 MHz	1248- 1249	TTL Only	22mA typical 40mA maximum	5ns	0.5V 2.4V	40/60	TTL 5 LS-TTL 25	Standby Only
1.8432 and 3 MHz- 25 MHz	1251- 1259	CMOS/ TTL	11mA typical 20mA maximum	7ns	0.5V V_{DD} -0.5V	45/55 at ½V_{DD} 40/60 at 1.4V	TTL 5 LS-TTL 25	Standby Only
70 MHz- 84.9 MHz	1271	TTL Only	25mA typical 50mA maximum	5ns	0.5V 2.4V	40/60	TTL 5	Standby Only
85 MHz- 100 MHz	1272	TTL Only	35mA typical 50mA maximum	5ns	0.5V 2.4V	40/60	TTL 5	Standby Only

1271 and 1272 series are BT cut with overall tolerance and stability of ±200 ppm.

Table 2. Output Load and Power Consumption

V_{DD}=5V

Fan out	TTL		LS-TTL	
	Resistance (Ω)	Power Consumption (ma)	Resistance (Ω)	Power Consumption (mA)
1	4,000	1.25	20,000	0.25
2	2,000	2.50	10,000	0.50
5	800	6.25	4,000	1.25
10	400	12.50	2,000	2.50

TTL connected with the output side is equivalent to: 1 TTL=5 LS-TTL.

SPECIFICATIONS CONTINUED

Table 3. Standby Feature

A feature designed to facilitate board testing, the standby feature permits external digital signals to control oscillator output.

#5 pin output / #1 pin condition	1220 Series 1250 Series	1230 Series 1240 Series 1260 Series* 1271 and 1272
H level (+4V min.) or OPEN	Oscillation output	Oscillation output
L level (+1V max.)	Oscillation stops with the status at an L level.	Oscillation stops with the status at an H level.

*1260 Series is a standby option of the 1250 Series.

Dual-Output Option

Available only on Part Number 1229, the dual-output option permits simultaneous output of the original oscillation frequency and the output frequency multiplied by $\frac{1}{2}^n$ (where n is a positive integer from 1-8) from separate pins of the device.

When the dual-output option is selected, the optional standby feature is not available.

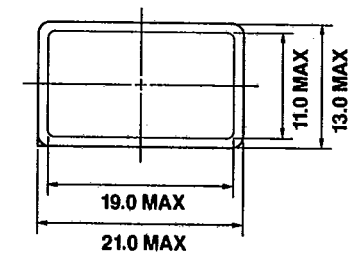
Table 4. Pinout

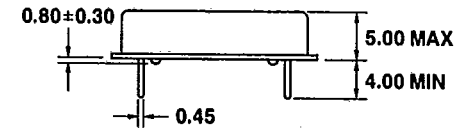
Pin	Function
1	NC or standby or output (Part 1229: Divided frequency for dual output)
7	GND (Ground to case)
8	Output (Original oscillation frequency)
14	+5V DC

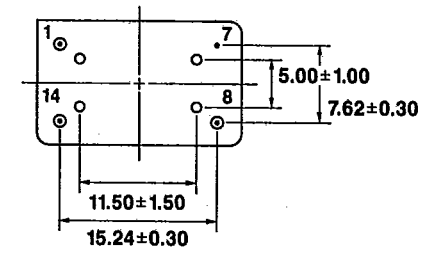
Packaging/Marking

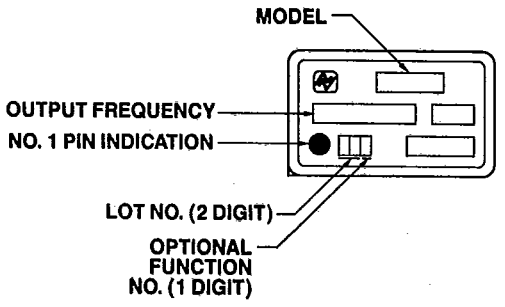
Only the original oscillation frequency is indicated on Part Number 1229 with the dual-output option.

Dimensions indicated in (mm).









Absolute Maximum Rating

- Source Voltage (V_{DD}) -0.5V to +7.0V DC
- Storage Temperature Range -55°C to +125°C

Operating Conditions

- Source Voltage (V_{DD}) +5.0V DC ±0.5V
- Operating Temperature Range Subject to specifications

T_r/T_f Measuring Conditions

- TTL-Compatible Value between VOL max. & VOH min. (Refer to Measuring Load Conditions, Figures 1 & 2)
- TTL-Compatible* Value between VOL max. & VOH min. (Refer to Measuring Load Conditions, Figures 3 & 4)
- CMOS-Compatible Difference between $0.1 \times V_{DD}$ and $0.9 \times V_{DD}$ (Refer to Measuring Load Conditions, Figures 5 & 6)

Table 5. Measuring Load Conditions

1 TTL=5 LSTTL

TTL	C_L	R_L
1	15pF	4 kΩ
2	15pF	2 kΩ
5	15pF	800 kΩ
10	15pF	400 kΩ

(Note) CL: includes the stray capacitance of measuring system.

Fig. 1

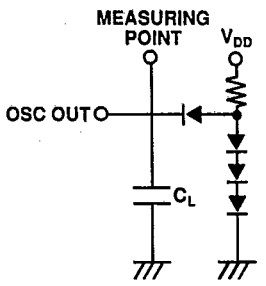


Fig. 2

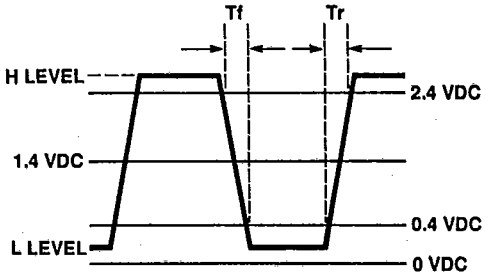


Fig. 3
*(1270 Series)

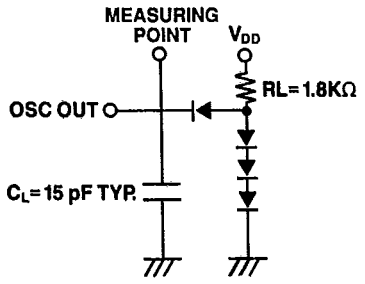


Fig. 6

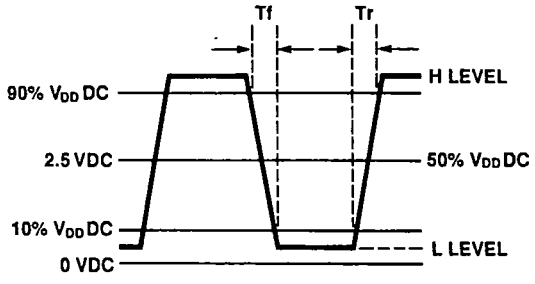


Fig. 5

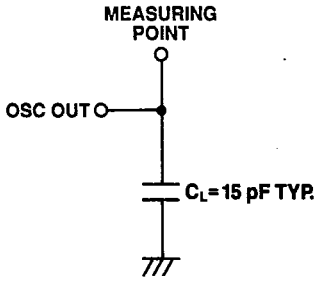
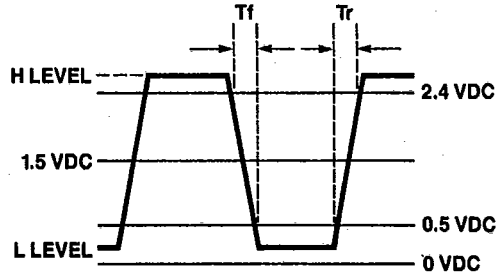


Fig. 4
*(1270 Series)



Environmental and Mechanical Characteristics

▶ Vibration	No abnormality after vibration under MIL-STD-202F, Method 204D, Condition B. Six hour total test time; three orthogonal directions for two hours each.
▶ Shock	No abnormality after shock test; MIL-STD-202F, Method 213B, 1000 G, 0.5ms, half sine for one time, each in three orthogonal directions.
▶ Humidity	No abnormality under MIL-STD-202F, Method 103B, Condition A.
▶ Soldering Heat	No abnormality under MIL-STD-202F, Method 210A, Condition B.
▶ Thermal Shock	No abnormality after execution of 100 cycles. Cycle range and duration: -40°C for 30 minutes, +85°C for 30 minutes.
▶ Terminal Strength	No damage or leakage under MIL-STD-202F, Method 211A, Condition A.

Handling/Assembly Considerations

The mechanical and electronic properties of crystal products require that they be handled differently than other components.

▶ Bending of Leads	Repeated bending or rough handling of leads may break the hermetic seal of the device, leading to performance degradation.
▶ Dropping	NDK Crystal Clock Oscillators have been designed to resist natural physical shocks. However, drops onto hard surfaces may decalibrate these devices. If a device is dropped, remeasure it to confirm accurate calibration before use.
▶ Static	These components, like all CMOS devices, should be kept away from static electricity.
▶ High Temperature	Specifications are not guaranteed if component storage temperature exceeds +125°C for 24 hours.
▶ Storage and Solderability	The solder-dipped leads of these devices will oxidize over time, negatively impacting solderability. Therefore, we recommend storage of these components be limited to 6 months or less.

ORDERING INFORMATION

When ordering, refer to the tables to select the components and options which meet your frequency and specifications.

Please supply the quantity of parts needed, the original oscillating frequency, and the divided frequency (if selecting Part 1229, 7 to 22 MHz, with the dual output option).

To Specify a Product

List part number, frequency stability code, option code and desired frequency. An example is shown below:

1251	**B**	**1**	**1.8432MHz**
(Part Number)	(Frequency Stability)	(Output Option)	(Desired Frequency)

To Determine Part Number

Use Table 1 to determine the correct series designation and frequency range. The part listed in the example is a 50 series part. Then refer to Table 9 to determine the correct frequency designation. In the example above, a 50 series 1.8432MHz part is designated by 1251. (12 designates the model, 5 designates the series and 1 designates the frequency range.)

To Determine Desired Frequency Stability

Use Table 7. In the example above, the letter B indicates NDK standard is ± 100 ppm over 0°C to 70°C.

To Determine the Desired Output Option

Use Table 8. In the example above, the number 1 indicates NDK standard which has the standby (enable/disable) feature.

Table 7. Operating Temperature/Frequency Stability Code Chart

Operating Temperature	Frequency Stability ±50ppm	±100ppm	±200ppm
0°C~+70°C	A	B	—
-10°C~+70°C	—	G	—
-20°C~+70°C	—	M	1271 1272

Table 8. Standby/Dual Output Option Code Chart

Option	Applicable Code	Parts
Not Connected on Pin 1	0	All
Standby Active	1	All
Dual-Output Active	2	1229

NDK 1200 SERIES

Table 9.

Part Number	Output	Frequency (MHz)
1221	CMOS/TTL	0.028 ≈ 0.053
1222		0.054 ≈ 0.108
1223		0.109 ≈ 0.217
1224		0.218 ≈ 0.436
1225		0.437 ≈ 0.874
1226		0.875 ≈ 1.740
1227		1.750 ≈ 3.490
1228		3.500 ≈ 6.990
1229		7.000 ≈ 22.000
1230	CMOS/TTL	22.000 ≈ 22.900
1231		23.000 ≈ 25.900
1232		26.000 ≈ 29.900
1233		30.000 ≈ 33.900
1234		34.000 ≈ 35.900
1235		36.000 ≈ 39.900
1236		40.000 ≈ 43.900
1237		44.000 ≈ 50.900
1238		51.000 ≈ 59.900
1239		60.000 ≈ 70.000
1240	TTL only	22.000 ≈ 22.900
1241		23.000 ≈ 25.900
1242		26.000 ≈ 29.900
1243		30.000 ≈ 33.900
1244		34.000 ≈ 35.900
1245		36.000 ≈ 39.900
1246		40.000 ≈ 43.900
1247		44.000 ≈ 50.900
1248		51.000 ≈ 59.900
1249		60.000 ≈ 70.000
1251	CMOS/TTL	1.8432
1251		3.000 ≈ 10.900
1252		11.000 ≈ 11.400
1253		11.500 ≈ 12.900
1254		13.000 ≈ 14.900
1255		15.000 ≈ 16.900
1256		17.000 ≈ 17.900
1257		18.000 ≈ 19.900
1258		20.000 ≈ 21.900
1259		22.000 ≈ 25.000
1271	TTL only	70.000 ≈ 84.900
1272		85.000 ≈ 100.000