VISHAY INTERTECHNOLOGY, INC.

INTERACTIVE
data book

FREQUENCY CONTROL PRODUCTS
VISHAY DALE

VSE-DB0020-1012

Notes:
1. To navigate:
    a) Click on the Vishay logo on any datasheet to go to the Contents page for that section. Click on the Vishay logo on any Contents page to go to the main Table of Contents page.
    b) Click on the products within the Table of Contents to go directly to the datasheet.
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One of the World's Largest Manufacturers of
Discrete Semiconductors and Passive Components

VISHAY

VISHAY INTERTECHNOLOGY, INC.

DATA BOOK

FREQUENCY CONTROL PRODUCTS

Quartz Crystals

Thru-Hole Oscillators

Surface Mount Clock Oscillators

SEMICONDUCTORS

RECTIFIERS
Schottky (single, dual)
Standard, Fast and Ultra-Fast Recovery
(single, dual)
Bridge
Superectifier®
Sinterglass Avalanche Diodes

HIGH-POWER DIODES AND THYRISTORS
High-Power Fast-Recovery Diodes
Phase-Control Thyristors
Fast Thyristors

SMALL-SIGNAL DIODES
Schottky and Switching (single, dual)
Tuner/Capacitance (single, dual)
Bandswitching
PIN

ZENER AND SUPPRESSOR DIODES
Zener (single, dual)
TVS (TRANSZORB®, Automotive,
ESD, Arrays)

FETs
Low-Voltage TrenchFET® Power MOSFETs
High-Voltage TrenchFET® Power MOSFETs
High-Voltage Planar MOSFETs
JFETs

OPTOELECTRONICS
IR Emitters and Detectors, and IR Receiver
Modules
Optocouplers and Solid-State Relays
Optical Sensors
LEDs and 7-Segment Displays
Infrared Data Transceiver Modules
Custom Products

ICs
Power ICs
Analog Switches

MODULES
Power Modules (contain power diodes,
thyristors, MOSFETs, IGBTs)

PASSIVE COMPONENTS

RESISTIVE PRODUCTS
Film Resistors
Metal Film Resistors
Thin Film Resistors
Thick Film Resistors
Metal Oxide Film Resistors
Carbon Film Resistors
Wirewound Resistors
Power Metal Strip® Resistors
Chip Fuses
Variable Resistors
Cermet Variable Resistors
Wirewound Variable Resistors
Conductive Plastic Variable Resistors
Networks/Arrays
Non-Linear Resistors
NTC Thermistors
PTC Thermistors
Varistors

MAGNETICS
Inductors
Transformers

CAPACITORS
Tantalum Capacitors
Molded Chip Tantalum Capacitors
Coated Chip Tantalum Capacitors
Solid Through-Hole Tantalum Capacitors
Wet Tantalum Capacitors
Ceramic Capacitors
Multilayer Chip Capacitors
Disc Capacitors
Film Capacitors
Power Capacitors
Heavy-Current Capacitors
Aluminum Capacitors

Vishay Dale
Frequency Control Products

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Frequency Control Products

Frequency Control Products

Crystals

Contents

Crystals

QUARTZ

Quartz is formed from silicon and oxygen. It grows naturally or can be cultured in autoclaves under high pressure and heat. Most quartz used today by crystal manufacturers is cultured so that its purity and quality can be controlled. Quartz is used in Frequency Control Products because of its piezoelectric properties.

PIEZOELECTRIC EFFECT

When pressure is applied on a quartz crystal, a voltage is generated. The voltage produces a mechanical motion and vibration. The frequency of these vibrations is measured in hertz.

OPERATING MODES

A crystal can operate in a circuit in one of two modes, series or parallel.

- **SERIES RESONANCE:**
  When a crystal is operated at series resonance it appears resistive and no load capacitor is required.
- **PARALLEL MODE:**
  Crystals operated in this mode appear inductive in the circuit. A load capacitor must be specified for the crystal to operate at the proper frequency. Typical values of load capacitors at 18 pF, 20 pF, 30 pF or 32 pF.

FREQUENCY STABILITY

This is the allowable deviation from nominal frequency over a specified temperature range. It is expressed in ppm or % of nominal frequency.

FREQUENCY TOLERANCE

This is the maximum allowable deviation from the nominal frequency at 25 °C.

FUNDAMENTAL AND OVERTONE CRYSTALS

A crystal vibrates at many frequencies. The lowest frequency is called the fundamental mode and is usually supplied up to 30 MHz. Higher frequencies are achieved by operating the crystal at odd overtones (3rd, 5th, 7th, and 9th) and tuning the circuit so the crystal operates at the designed overtone frequency.
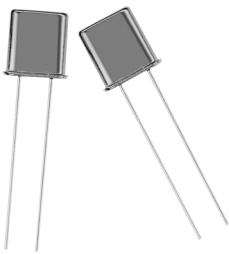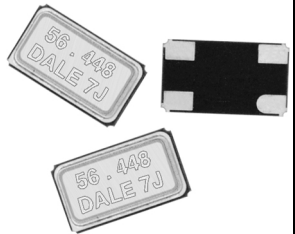
PULLABILITY

The change in frequency (measured in ppm) for a given change in the parallel load capacitance is the pullability of the crystal. This will be specified for special applications such as VCXOs.

EQUIVALENT SERIES RESISTANCE

This is the resistance of the crystal measured at the series resonance frequency. The resistance measured at the parallel load resonant frequency is called the effective resistance.

Crystals

PRODUCT	FREQUENCY RANGE	FREQUENCY TOLERANCE (TYPICAL)	TEMPERATURE STABILITY (TYPICAL)	TEMPERATURE RANGE	KEY FEATURES
XT49S	3.579545 MHz to 66.0 MHz	30 ppm	30 ppm	- 20 °C to + 70 °C	Industry standard 3.5 mm profile Low cost Hermetically sealed
XT49M	3.579545 MHz to 66.0 MHz	30 ppm	30 ppm	- 20 °C to + 70 °C	Industry standard 4.5 mm profile Low cost Hermetically sealed
XTUM1	10.0 MHz to 125.0 MHz	10 ppm	10 ppm	- 40 °C to + 85 °C	Miniature package Wide frequency range
XT36C	10.0 MHz to 70.0 MHz	50 ppm	50 ppm	- 10 °C to + 70 °C	Surface mountable 1.6 mm profile
XT46C	10.0 MHz to 30.0 MHz	30 ppm	30 ppm	- 10 °C to + 60 °C	Miniature package Low cost

SELECTOR GUIDE - CRYSTALS

Crystals
Global Part Numbering

GLOBAL PART NUMBERING

| X | T | 9 | S | | 2 | 0 | | A | | N | A | | 4 | 0 | M |

MODEL NUMBER	LOAD CAPACITANCE	PACKAGE CODE	OPTIONS	FREQUENCY
XT9S = XT49S XT9M = XT49M XTU1 = XTUM1	18 = 18 pF 20 = 20 pF NL = series to be specified by customer	**Tape and reel** G = RF5 (XT9S) H = RF7 (XT9M) **Bulk** A = B04 (all models)	NA = no additional options RR = extended temperature of - 40 °C to + 85 °C Contact factory for all other options	4M = 4 MHz 40M = 40 MHz 100M = 100 MHz 12M288 = 12.288 MHz M is used as decimal place holder in frequency

Example: XT49S-20 40M

| X | T | 3 | 6 | | 2 | 0 | | A | | 1 | 2 | M |

MODEL NUMBER	LOAD CAPACITANCE	PACKAGE CODE	FREQUENCY
XT46 = XT46C XT36 = XT36C	18 = 18 pF 20 = 20 pF NL = series to be specified by customer	**Tape and reel** H = RF7 **Bulk** A = B04 (all models)	4M = 4 MHz 40M = 40 MHz 100M = 100 MHz 12M288 = 12.288 MHz M is used as decimal place holder in frequency

Example: XT36C-20 12M

Low Profile Holder Type Crystal Units

FEATURES
- Low cost
- Industry standard
- Wide frequency range
- Excellent aging
- Compliant to RoHS Directive 2002/95/EC

RoHS
COMPLIANT

This part is a miniature AT cut strip crystal unit with a low profile package. It is with resistance weld.

STANDARD ELECTRICAL SPECIFICATIONS

PARAMETER	SYMBOL	CONDITION	UNIT	MIN.	TYP.	MAX.
Frequency range	F_O		MHz	3.579545	-	66.000
Frequency tolerance	$\Delta F/F_O$	at 25 °C	ppm	- 30	-	+ 30
Temperature stability	T_C	ref. to 25 °C	ppm	- 50	-	+ 50
Operating temperature range	T_{OPR}		°C	- 10	-	+ 70
Storage temperature range	T_{STG}		°C	- 55	-	+ 125
Shunt capacitance	C_0		pF	-	-	7
Load capacitance	C_L	customer specified	pF	10	-	series
Insulation resistance	I_R	100 V_{DC}	MΩ	500	-	-
Drive level	D_L		µW	-	100	500
Aging (first year)	Fa	at 25 °C, per year	ppm	- 5	-	+ 5

EQUIVALENT SERIES RESISTANCE (ESR) AND MODE OF VIBRATION (MODE)

FREQUENCY RANGE (MHz)	MAX. ESR (Ω)	MODE	FREQUENCY RANGE (MHz)	MAX. ESR (Ω)	MODE
3.579 to 3.999	200	fundamental/AT	10.000 to 13.999	80	fundamental/AT
4.000 to 4.999	150	fundamental/AT	14.000 to 39.999	50	fundamental/AT
5.000 to 5.999	120	fundamental/AT	40.000 to 66.000	80	3rd overtone
6.000 to 9.999	100	fundamental/AT			

DIMENSIONS in inches [millimeters]

0.403 [10.24] max.

0.150 [3.81] max.

0.138 [3.5] max.

0.435 [11.05] max.

0.183 [4.65] max.

0.500 [12.7] min.

0.192 ± 0.008 [4.88 ± 0.2]

Ø 0.017 ± 0.002 [0.43 ± 0.05]

XT49S

Vishay Dale

Low Profile Holder Type Crystal Units

VISHAY®

ORDERING INFORMATION

XT49S	R	-20	SP	12M	e2
MODEL	OTR	LOAD	OPTIONS	FREQUENCY/MHz	JEDEC LEAD (Pb)-FREE STANDARD
	blank = standard R = - 40 °C to + 85 °C	blank = series -16 = 16 pF -20 = 20 pF standard -30 = 30 pF -32 = 32 pF	blank = standard SP = spacer SL = sleeve		

GLOBAL PART NUMBER

X	T	9	S	2	0	A	N	A	1	2	M
MODEL				LOAD		PACKAGE CODE	OPTION		FREQUENCY		

GLOBAL PART NUMBERING

X	T	9	S	2	0	A	N	A	4	0	M

MODEL NUMBER	LOAD CAPACITANCE	PACKAGE CODE	OPTIONS	FREQUENCY
XT9S = XT49S XT9M = XT49M XTU1 = XTUM1	18 = 18 pF 20 = 20 pF NL = series to be specified by customer	**Tape and reel** G = RF5 (XT9S) H = RF7 (XT9M) **Bulk** A = B04 (all models)	NA = no additional options RR = extended temperature of - 40 °C to + 85 °C Contact factory for all other options	4M = 4 MHz 40M = 40 MHz 100M = 100 MHz 12M288 = 12.288 MHz M is used as decimal place holder in frequency

Example: XT49S-20 40M

X	T	3	6	2	0	A	1	2	M

MODEL NUMBER	LOAD CAPACITANCE	PACKAGE CODE	FREQUENCY
XT46 = XT46C XT36 = XT36C	18 = 18 pF 20 = 20 pF NL = series to be specified by customer	**Tape and reel** H = RF7 **Bulk** A = B04 (all models)	4M = 4 MHz 40M = 40 MHz 100M = 100 MHz 12M288 = 12.288 MHz M is used as decimal place holder in frequency

Example: XT36C-20 12M

Low Profile SMD Type Crystal Units

FEATURES

- Low cost
- Industry standard
- Wide frequency range
- Excellent aging
- Surface mount
- Compliant to RoHS Directive 2002/95/EC

RoHS
COMPLIANT

This part is a miniature AT cut strip crystal unit packaged for surface mounting.

STANDARD ELECTRICAL SPECIFICATIONS

PARAMETER	SYMBOL	CONDITION	UNIT	MIN.	TYP.	MAX.
Frequency range	F_O		MHz	3.579545	-	66.000
Frequency tolerance	$\Delta F/F_O$	at 25 °C	ppm	- 30	-	+ 30
Temperature stability	T_C	ref. to 25 °C	ppm	- 50	-	+ 50
Operating temperature range	T_{OPR}		°C	- 10	-	+ 70
Storage temperature range	T_{STG}		°C	- 55	-	+ 125
Shunt capacitance	C_0		pF	-	-	7
Load capacitance	C_L	customer specified	pF	10	-	series
Insulation resistance	I_R	100 V_{DC}	MΩ	500	-	-
Drive level	D_L		µW	-	100	500
Aging	Fa	at 25 °C, per year	ppm	- 5	-	+ 5

EQUIVALENT SERIES RESISTANCE (ESR) AND MODE OF VIBRATION (MODE)

FREQUENCY RANGE (MHz)	MAX. ESR (Ω)	MODE	FREQUENCY RANGE (MHz)	MAX. ESR (Ω)	MODE
3.579 to 3.999	200	fundamental/AT	10.000 to 13.999	80	fundamental/AT
4.000 to 4.999	150	fundamental/AT	14.000 to 39.999	50	fundamental/AT
5.000 to 5.999	120	fundamental/AT	40.000 to 66.999	80	3rd overtone
6.000 to 9.999	100	fundamental/AT			

DIMENSIONS in inches [millimeters]

0.403 [10.24] max.

0.150 [3.8] max.

Crystal Unit

0.150 [3.8] max.

0.008 [0.2] max.

0.177 [4.5] max.

0.012 [0.3] max.

0.484 ± 0.024 [12.3 ± 0.6]

0.437 + 0.020/- 0.031 [11.1 + 0.50/- 0.80]

Insulation Base

Crystal Lead

0.031 ± 0.012 [0.8 ± 0.3]

0.185 ± 0.012 [4.7 ± 0.3]

0.376 [9.55]

0.081 [2.05]

0.201 ± 0.020 [5.1 ± 0.5]

0.219 [5.55]

Solder Pattern

XT49M

Vishay Dale   Low Profile SMD Type Crystal Units

VISHAY®
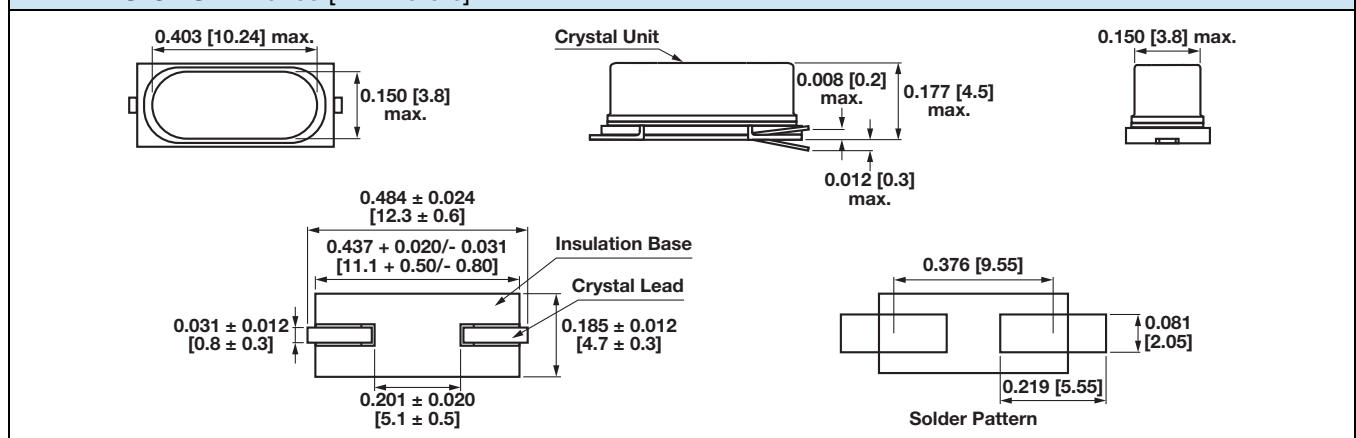
ORDERING INFORMATION

XT49M	R	-20	20M	e2
MODEL	OTR blank = standard R = - 40 °C to + 85 °C	LOAD blank = series -20 = 20 pF -30 = 30 pF -32 = 32 pF	FREQUENCY/MHz	JEDEC LEAD (Pb)-FREE STANDARD

GLOBAL PART NUMBER

X	T	9	M		2	0		A		N	A		2	0	M
MODEL					LOAD			PACKAGE CODE		OPTION			FREQUENCY		

GLOBAL PART NUMBERING

X	T	9	S		2	0		A		N	A		4	0	M

MODEL NUMBER	LOAD CAPACITANCE	PACKAGE CODE	OPTIONS	FREQUENCY
XT9S = XT49S XT9M = XT49M XTU1 = XTUM1	18 = 18 pF 20 = 20 pF NL = series to be specified by customer	**Tape and reel** G = RF5 (XT9S) H = RF7 (XT9M) **Bulk** A = B04 (all models)	NA = no additional options RR = extended temperature of - 40 °C to + 85 °C Contact factory for all other options	4M = 4 MHz 40M = 40 MHz 100M = 100 MHz 12M288 = 12.288 MHz M is used as decimal place holder in frequency

Example: XT49S-20 40M

X	T	3	6		2	0		A		1	2	M

MODEL NUMBER	LOAD CAPACITANCE	PACKAGE CODE	FREQUENCY
XT46 = XT46C XT36 = XT36C	18 = 18 pF 20 = 20 pF NL = series to be specified by customer	**Tape and reel** H = RF7 **Bulk** A = B04 (all models)	4M = 4 MHz 40M = 40 MHz 100M = 100 MHz 12M288 = 12.288 MHz M is used as decimal place holder in frequency

Example: XT36C-20 12M

For technical questions, contact: frequency@vishay.com

Resistance Welded Miniature Crystal Units

FEATURES

- Low cost
- Industry standard
- Small compact size
- Wide frequency range
- High stability
- "AT" cut crystal
- Compliant to RoHS Directive 2002/95/EC

RoHS
COMPLIANT

The XTUM1 crystal unit is a miniature resistance welded package that provides excellent hermetic seal and frequency aging. The frequency range till 125 MHz and miniature size is ideal for communication equipment.

STANDARD ELECTRICAL SPECIFICATIONS

PARAMETER	SYMBOL	CONDITION	UNIT	MIN.	TYP.	MAX.
Frequency range	F_O		MHz	10.000	-	125.000
Frequency tolerance	$\Delta F/F_O$	at 25 °C	ppm	-	± 10	± 50
Temperature stability	T_C	see Frequency Stability vs. Temperature Range	ppm	-	± 10	± 50
Operating temperature range	T_{OPR}		°C	-	-	-
Storage temperature range	T_{STG}		°C	- 40	-	+ 85
Shunt capacitance	C_0		pF	-	-	7
Load capacitance	C_L	customer specified	pF	10	-	series
Insulation resistance	I_R	100 V_{DC}	MΩ	500	-	-
Drive level	D_L		µW	-	100	500
Aging	Fa	at 25 °C, per year	ppm	- 5	-	+ 5

EQUIVALENT SERIES RESISTANCE (ESR) AND MODE OF VIBRATION (MODE)

FREQUENCY RANGE (MHz)	MAX. ESR (Ω)	MODE	FREQUENCY RANGE (MHz)	MAX. ESR (Ω)	MODE
10.000 to 12.999	60	fundamental	40.000 to 59.999	50	fundamental
13.000 to 19.999	40	fundamental	60.000 to 79.999	50	3rd overtone
20.000 to 29.999	30	fundamental	80.000 to 125.000	100	5th overtone
30.000 to 39.999	60	fundamental			

FREQUENCY STABILITY VS. TEMPERATURE RANGE (25 °C ± 3 °C)

TEMPERATURE RANGE (°C)	FREQUENCY STABILITY (ppm)					
	± 5	± 10	± 15	± 20	± 30	± 50
0 to 50	x	x	x	x	x	x
- 10 to 60	x	x	x	x	x	x
- 20 to 70		x	x	x	x	x
- 40 to + 85				x	x	x

DIMENSIONS in inches [millimeters]

0.280 [7.10] max.
0.094 [2.40] max.
0.311 [7.90] max.
0.126 [3.20] max.
0.319 [8.10] max.
0.500 [12.7] min.
0.148 ± 0.008 [3.75 ± 0.2]
0.014 ± 0.002 [0.36 ± 0.05]

XTUM1

Resistance Welded Miniature Crystal Units

VISHAY

ORDERING INFORMATION

XTUM1	-18	20M	e2
MODEL	LOAD blank = series -32 = 32 pF -18 = 18 pF standard	FREQUENCY/MHz	JEDEC LEAD (Pb)-FREE STANDARD

GLOBAL PART NUMBER

X	T	U	1	1	8	A	N	A	2	0	M
MODEL				LOAD		PACKAGE CODE	OPTION		FREQUENCY		

GLOBAL PART NUMBERING

X	T	9	S	2	0	A	N	A	4	0	M

MODEL NUMBER	**LOAD CAPACITANCE**	**PACKAGE CODE**	**OPTIONS**	**FREQUENCY**
XT9S = XT49S XT9M = XT49M XTU1 = XTUM1	18 = 18 pF 20 = 20 pF NL = series to be specified by customer	**Tape and reel** G = RF5 (XT9S) H = RF7 (XT9M) **Bulk** A = B04 (all models)	NA = no additional options RR = extended temperature of - 40 °C to + 85 °C Contact factory for all other options	4M = 4 MHz 40M = 40 MHz 100M = 100 MHz 12M288 = 12.288 MHz M is used as decimal place holder in frequency

Example: XT49S-20 40M

X	T	3	6	2	0	A	1	2	M

MODEL NUMBER	**LOAD CAPACITANCE**	**PACKAGE CODE**	**FREQUENCY**
XT46 = XT46C XT36 = XT36C	18 = 18 pF 20 = 20 pF NL = series to be specified by customer	**Tape and reel** H = RF7 **Bulk** A = B04 (all models)	4M = 4 MHz 40M = 40 MHz 100M = 100 MHz 12M288 = 12.288 MHz M is used as decimal place holder in frequency

Example: XT36C-20 12M

For technical questions, contact: frequency@vishay.com

Surface Mount Crystal

FEATURES
- Miniature size: 8.0 x 4.5 x 1.8 (mm)
- Wide frequency range
- Glass sealing
- Emboss taping
- Compliant to RoHS Directive 2002/95/EC

RoHS
COMPLIANT

The XT36C part is a miniature SMD crystal with 8.0 x 4.5 (mm) ceramic package and a height of 1.8 mm maximum. It is widely applied in notebook computer, PCMCIA, and communication equipment.

STANDARD ELECTRICAL SPECIFICATIONS

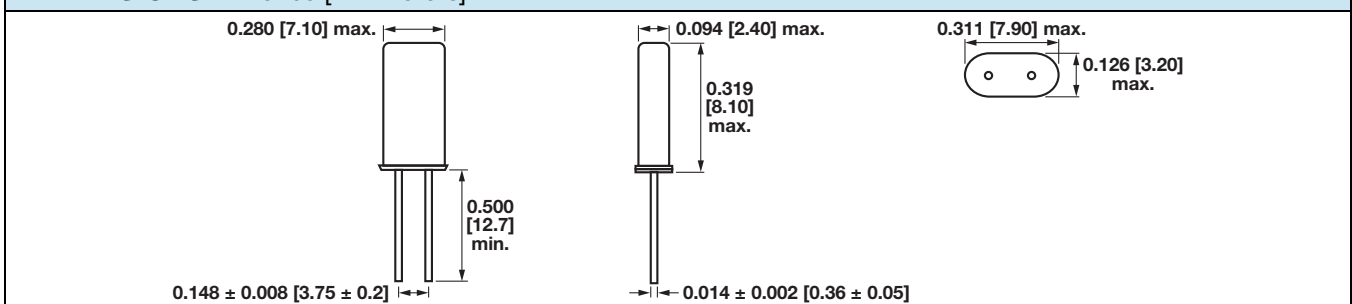| PARAMETER	SYMBOL	CONDITION	UNIT	MIN.	TYP.	MAX.
Frequency range	F_O		MHz	10.000	-	70.000
Frequency tolerance	$\Delta F/F_O$	at 25 °C	ppm	-	± 50	-
Temperature stability	T_C	ref. to 25 °C	ppm	-	± 50	-
Operating temperature range	T_{OPR}		°C	- 10	-	+ 60
Storage temperature range	T_{STG}		°C	- 55	-	+ 125
Shunt capacitance	C_0		pF	-	-	7
Load capacitance	C_L	customer specified	pF	10	-	series
Insulation resistance	I_R	100 V_{DC}	MΩ	500	-	-
Drive level	D_L		µW	-	10	500
Aging	Fa	at 25 °C, per year	ppm	- 5	-	+ 5

EQUIVALENT SERIES RESISTANCE (ESR) AND MODE OF VIBRATION (MODE)

FREQUENCY RANGE (MHz)	MAX. ESR (Ω)	MODE	FREQUENCY RANGE (MHz)	MAX. ESR (Ω)	MODE
10.000 to 10.999	110	fundamental	20.000 to 31.999	25	fundamental
11.000 to 14.099	50	fundamental	32.000 to 47.999	110	3rd overtone
14.100 to 17.999	45	fundamental	48.000 to 70.000	100	3rd overtone
18.000 to 19.999	30	fundamental			

DIMENSIONS in inches [millimeters]

0.315 ± 0.012
[8.00 ± 0.3]

MARKING AREA

0.177 ± 0.012
[4.5 ± 0.3]

0.079 ± 0.002
[2.0 ± 0.05]

0.059
[1.5]

0.071 [1.80] max.

Recommended Solder Pattern

0.094 [2.4]

0.110 [2.8]

0.260 [6.6]

XT36C

Vishay Dale

Surface Mount Crystal

VISHAY®
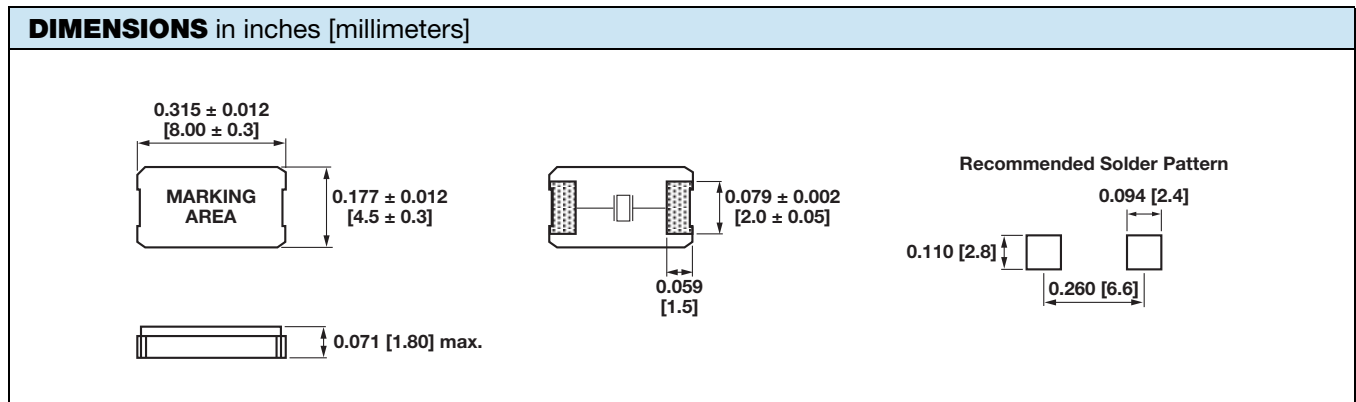
ORDERING INFORMATION

XT36C	-20	24M	e4
MODEL	LOAD blank = series -12 = 12 pF -16 = 16 pF -20 = 20 pF -32 = 32 pF	FREQUENCY/MHz	JEDEC LEAD (Pb)-FREE STANDARD

GLOBAL PART NUMBER

X	T	3	6		2	0		A		2	4	M
MODEL					LOAD			PACKAGE CODE		FREQUENCY		

GLOBAL PART NUMBERING

X	T	9	S		2	0		A		N	A		4	0	M

MODEL NUMBER	LOAD CAPACITANCE	PACKAGE CODE	OPTIONS	FREQUENCY
XT9S = XT49S XT9M = XT49M XTU1 = XTUM1	18 = 18 pF 20 = 20 pF NL = series to be specified by customer	**Tape and reel** G = RF5 (XT9S) H = RF7 (XT9M) **Bulk** A = B04 (all models)	NA = no additional options RR = extended temperature of - 40 °C to + 85 °C Contact factory for all other options	4M = 4 MHz 40M = 40 MHz 100M = 100 MHz 12M288 = 12.288 MHz M is used as decimal place holder in frequency

Example: XT49S-20 40M

X	T	3	6		2	0		A		1	2	M

MODEL NUMBER	LOAD CAPACITANCE	PACKAGE CODE	FREQUENCY
XT46 = XT46C XT36 = XT36C	18 = 18 pF 20 = 20 pF NL = series to be specified by customer	**Tape and reel** H = RF7 **Bulk** A = B04 (all models)	4M = 4 MHz 40M = 40 MHz 100M = 100 MHz 12M288 = 12.288 MHz M is used as decimal place holder in frequency

Example: XT36C-20 12M

Surface Mount Crystal
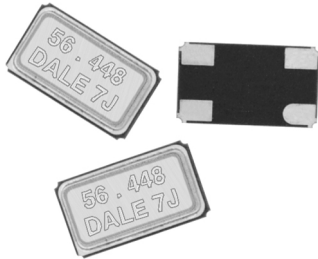
FEATURES
- Ultra-miniature size: 6.0 x 3.5 x 1.0 (mm)
- Seam sealing
- Ceramic package
- Emboss taping
- Reflow soldering
- Compliant to RoHS Directive 2002/95/EC

RoHS COMPLIANT

This part is an ultra miniature package with size of 6.0 mm x 3.5 mm x 1.0 mm. With its ceramic base and metal cover it provides the durability and reliability necessary for strenuous process like infrared and vapor phase reflow.

STANDARD ELECTRICAL SPECIFICATIONS

PARAMETER	SYMBOL	CONDITION	UNIT	MIN.	TYP.	MAX.
Frequency range	F_O		MHz	10.000	-	30.000
Frequency tolerance	$\Delta F/F_O$	at 25 °C	ppm	-	± 30	-
Temperature stability	T_C	ref. to 25 °C	ppm	-	± 30	-
Operating temperature range	T_{OPR}		°C	- 10	-	+ 60
Storage temperature range	T_{STG}		°C	- 40	-	+ 85
Shunt capacitance	C_0		pF	-	-	7
Load capacitance	C_L	customer specified	pF	10	-	series
Insulation resistance	I_R	100 V_{DC}	MΩ	500	-	-
Drive level	D_L		µW	-	10	100
Aging	Fa	at 25 °C, per year	ppm	- 5	-	+ 5

EQUIVALENT SERIES RESISTANCE (ESR) AND MODE OF VIBRATION (MODE)

FREQUENCY RANGE (MHz)	MAX. ESR (Ω)	MODE	FREQUENCY RANGE (MHz)	MAX. ESR (Ω)	MODE
10.000 to 11.999	60	fundamental	19.000 to 19.999	40	fundamental
12.000 to 12.099	50	fundamental	20.000 to 29.999	35	fundamental
13.000 to 18.999	45	fundamental	30.000	30	fundamental

DIMENSIONS in inches [millimeters]

Recommended Solder Pattern

Note
Pin #2 and pin #4 are connected through cover, in case connected to GND. Frequency might be drifted.

XT46C

Vishay Dale   Surface Mount Crystal

VISHAY
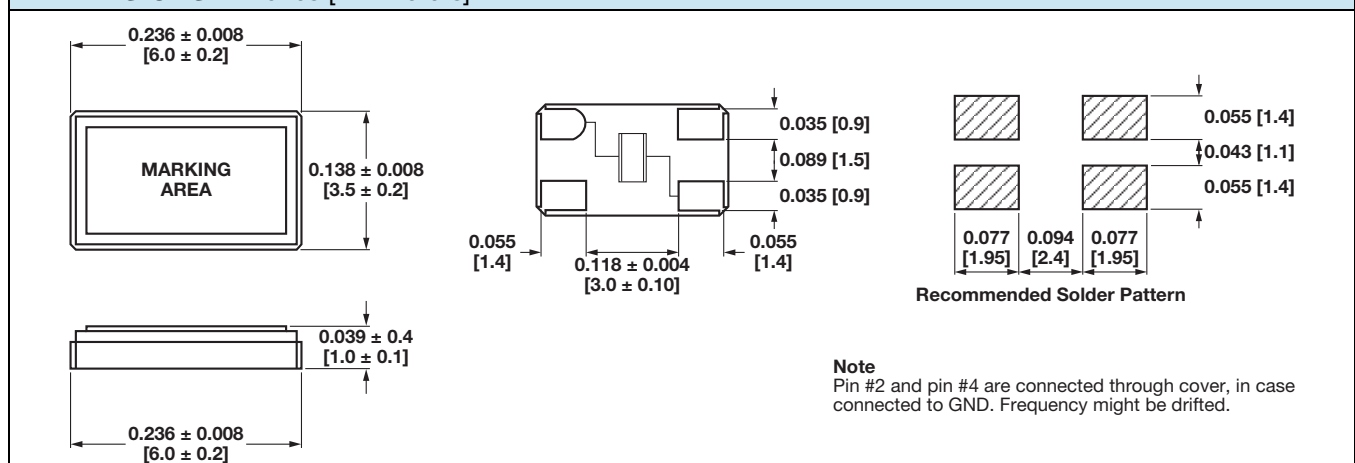
ORDERING INFORMATION

XT46C	-20	25M	e4
MODEL	LOAD blank = series -20 = 20 pF standard -32 = 32 pF	FREQUENCY/MHz	JEDEC LEAD (Pb)-FREE STANDARD

GLOBAL PART NUMBER

X	T	4	6		2	0		A		2	5	M
	MODEL				LOAD			PACKAGE CODE			FREQUENCY	

GLOBAL PART NUMBERING

X	T	9	S		2	0		A		N	A		4	0	M

MODEL NUMBER	**LOAD CAPACITANCE**	**PACKAGE CODE**	**OPTIONS**	**FREQUENCY**
XT9S = XT49S XT9M = XT49M XTU1 = XTUM1	18 = 18 pF 20 = 20 pF NL = series to be specified by customer	**Tape and reel** G = RF5 (XT9S) H = RF7 (XT9M) **Bulk** A = B04 (all models)	NA = no additional options RR = extended temperature of - 40 °C to + 85 °C Contact factory for all other options	4M = 4 MHz 40M = 40 MHz 100M = 100 MHz 12M288 = 12.288 MHz M is used as decimal place holder in frequency

Example: XT49S-20 40M

X	T	3	6		2	0		A		1	2	M

MODEL NUMBER	**LOAD CAPACITANCE**	**PACKAGE CODE**	**FREQUENCY**
XT46 = XT46C XT36 = XT36C	18 = 18 pF 20 = 20 pF NL = series to be specified by customer	**Tape and reel** H = RF7 **Bulk** A = B04 (all models)	4M = 4 MHz 40M = 40 MHz 100M = 100 MHz 12M288 = 12.288 MHz M is used as decimal place holder in frequency

Example: XT36C-20 12M

www.vishay.com
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For technical questions, contact: frequency@vishay.com
Document Number: 35021
Revision: 09-Mar-10

Oscillators

VISHAY.

Contents

Oscillators

OSCILLATOR

An oscillator is a circuit that generates an output signal though feedback and amplification.

CLOCK OSCILLATOR

A clock oscillator is a device that establishes a reference frequency for timing purposes such as sequencing events in a computer.

LOGIC

This is the terminology used for families of active devices used in the manufacturing of clock oscillator. The most popular are TTL, HCMOS, CMOS, and ECL.

LOAD/FAN-OUT

The maximum load, specified in number of gates or in maximum load capacity, that a family of oscillators can drive is defined as the output load of driving capability.

RISE TIME

The rise time is defined as the transition time of the output waveform from low state to high state.

FALL TIME

The fall time is defined as the transition time of the output waveform from high state to low state.

SYMMETRY

Symmetry is the time the waveform is above the threshold vs. below the threshold. 50/50 is perfect symmetry.

TRI-STATE

The tri-state option allows the oscillator to be isolated from the circuit upon application of a command signal. When this feature is activated, the output goes to a high impedance state.

SUPPLY VOLTAGE

The DC input voltage necessary for oscillator operation.
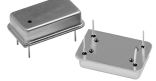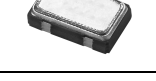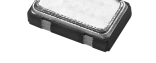
INPUT CURRENT

The amount of current consumed by an oscillator from the power supply.

FREQUENCY STABILITY (Variation of Frequency from Nominal)

This is inclusive of calibration tolerance at 25 °C, temperature change, input voltage change, load change, aging, shock, and vibration.

Oscillators

SELECTOR GUIDE - OSCILLATORS

PRODUCT		FREQUENCY RANGE	FREQUENCY STABILITY	TEMPERATURE RANGE	KEY FEATURES
XO-53		1 MHz to 100 MHz	(100/50/25) ppm	0 °C to + 70 ° C (- 40 °C to + 85 °C)	TTL compatible 14 pin dip
XO-54		1 MHz to 100 MHz	(100/50/25) ppm	0 °C to + 70 ° C (- 40 °C to + 85 °C)	14 pin dip HCMOS/TTL compatible Tri-state output available
XO-543		1 MHz to 100 MHz	(100/50/25) ppm	0 °C to + 70 ° C (- 40 °C to + 85 °C)	3.3 V operation HCMOS/TTL compatible Tri-state output available
XO-52		1 MHz to 100 MHz	(100/50/25) ppm	0 °C to + 70 ° C (- 40 °C to + 85 °C)	8 pin dip HCMOS/TTL compatible Tri-state output available
XO-523		1 MHz to 100 MHz	(100/50/25) ppm	0 °C to + 70 ° C (- 40 °C to + 85 °C)	3.3 V operation HCMOS/TTL compatible Tri-state output available
XOSM-52		1 MHz to 100 MHz	(100/50/25) ppm	0 °C to + 70 ° C (- 40 °C to + 85 °C)	Surface mount HCMOS/TTL compatible Tri-state output available
XOSM-57		1.5 MHz to 100 MHz	(100/50/25) ppm	0 °C to + 70 ° C (- 40 °C to + 85 °C)	Surface mount HCMOS/TTL compatible Tri-state output
XOSM-573		1.5 MHz to 100 MHz	(100/50/25) ppm	0 °C to + 70 ° C (- 40 °C to + 85 °C)	Surface mount 3.3 V operation HCMOS/TTL Tri-state output
XOSM-572		1 MHz to 100 MHz	(100/50/25) ppm	0 °C to + 70 ° C (- 40 °C to + 85 °C)	Surface mount 2.5 V operation HCMOS/TTL Tri-state output
XOSM-571		1 MHz to 70 MHz	(100/50/25) ppm	0 °C to + 70 ° C (- 40 °C to + 85 °C)	Surface mount 1.8 V operation HCMOS/TTL Tri-state output
XOSM-533		1.544 MHz to 100 MHz	(100/50/25) ppm	0 °C to + 70 ° C (- 40 °C to + 85 °C)	Surface mount 3.3 V operation HCMOS/TTL Tri-state output
XOSM-532		1.544 MHz to 100 MHz	(100/50/25) ppm	0 °C to + 70 ° C (- 40 °C to + 85 °C)	Surface mount 2.5 V operation HCMOS/TTL Tri-state output
XOSM-531		1.544 MHz to 100 MHz	(100/50/25) ppm	0 °C to + 70 ° C (- 40 °C to + 85 °C)	Surface mount 1.8 V operation HCMOS/TTL Tri-state output

Ordering Guide

Vishay Dale

Oscillators
Global Part Numbering

GLOBAL PART NUMBERING

| X | O | 5 | 2 | | C | | T | | E | | L | | N | A | | 4 | 0 | M |

MODEL NUMBER	FREQUENCY STABILITY	OPERATING TEMPERATURE (OTR)	ENABLE/ DISABLE	PACKAGE CODE	OPTION	FREQUENCY
XO53 = XO-53 XO54 = XO-54 XO34 = XO-543 XO52 = XO-52 XO32 = XO-523 XO5M = XOSM-52 XO63 = XOSM-533 XO62 = XOSM-532 XO61 = XOSM-531 XO57 = XOSM-57 XO37 = XOSM-573 XO27 = XOSM-572 XO17 = XOSM-571 XO55 = XOSM-55 XO35 = XOSM-553	C = 0.01 % (100 ppm) D = 0.005 % (50 ppm) E = 0.0025 % (25 ppm)	T = 0 °C to + 70 °C R = - 40 °C to + 85 °C	F = pin 1 open E = disable to tristate	**Tape and reel** H = RF7 **Bulk** A = B04 (XO63, XO62, XO61) C = D06 (XO57, XO37, XO27, XO17) D = D07 (XO53, XO54, XO34, XO55, XO35) L = D08 (XO52, XO32, XO5M)	NA = no additional options 60 = 45/55 symmetry Contact factory for all other options	4M = 4 MHz 40M = 40 MHz 100M = 100 MHz 12M288 = 12.288 MHz M is used as decimal place holder in frequency

Example: XO52CTELNA40M

For technical questions, contact: frequency@vishay.com

Full Size Clock Oscillators TTL Compatible

FEATURES
- 10 TTL output load
- Size: 14 pin full size
- Industry standard
- Wide frequency range
- Low cost
- Resistance weld package
- Compliant to RoHS Directive 2002/95/EC

RoHS
COMPLIANT

The XO-53 series oscillator is TTL compatible and features fast rise/fall times with high reliability at low cost. The metal package with pin 7 case ground acts as shielding to minimize EMI radiation.

STANDARD ELECTRICAL SPECIFICATIONS

PARAMETER	SYMBOL	CONDITION	VALUE
Frequency range	F_O	-	1.0 MHz to 100.000 MHz
Frequency stability [1]		all conditions	± 25 ppm, ± 50 ppm, ± 100 ppm
Operating temperature range	T_{OPR}	-	0 °C to 70 °C
			- 40 °C to + 85 °C (option)
Storage temperature range	T_{STG}	-	- 55 °C to + 125 °C
Power supply voltage	V_{DD}	-	5.0 V ± 10 %
Aging (first year)		25 °C ± 3 °C	± 5 ppm
Supply current	I_{DD}	1.0 MHz to 23.999 MHz	15 mA max.
		24.000 MHz to 69.999 MHz	30 mA max.
		70.000 MHz to 100.000 MHz	60 mA max.
Output symmetry	Sym	at 1.4 V	40 %/60 % (45 %/55 % option)
Rise time	t_r	0.4 V to 2.4 V	5 ns max.
Fall time	t_f	2.4 V to 0.4 V	5 ns max.
Output voltage	V_{OH}	-	2.4 V min.
	V_{OL}	-	0.4 V max.
Output load	TTL load	-	1 TTL to 10 TTL
Start-up time	t_s	-	10 ms max.

Note
[1] Include: 25 °C tolerance, operating temperature range, input voltage change, aging, load change, shock and vibration

DIMENSIONS in inches [millimeters]

MARKING AREA

0.508 [12.9] max.

#1 #7
#14 #8

0.300 ± 0.005 [7.62 ± 0.13]

0.600 ± 0.005 [15.24 ± 0.13]

0.803 [20.4] max.

0.200 [5.08] max.

0.031 ± 0.003 [0.8 ± 0.1]

0.018 ± 0.003 [0.45 ± 0.1]

0.268 [6.80] max.

PIN	CONNECTION
#1	N.C
#7	GND
#8	OUTPUT
#14	V_{DD}

TTL TEST CIRCUIT

+ 5.0 V   0.01 µF

TEST POINT   RL = 400 Ω

#14 #8
#1   #7

15 pF [2]

Note
[2] Includes Stray and Probe Capacitance

TTL OUTPUT WAVEFORM

V_{OH} T_r T_f 2.4 V

1.4 V

V_{OL} 0.4 V

GND

T1

$T0 = 1/F_o$

$SYMMETRY = \frac{T1}{T0} \times 100 \%$
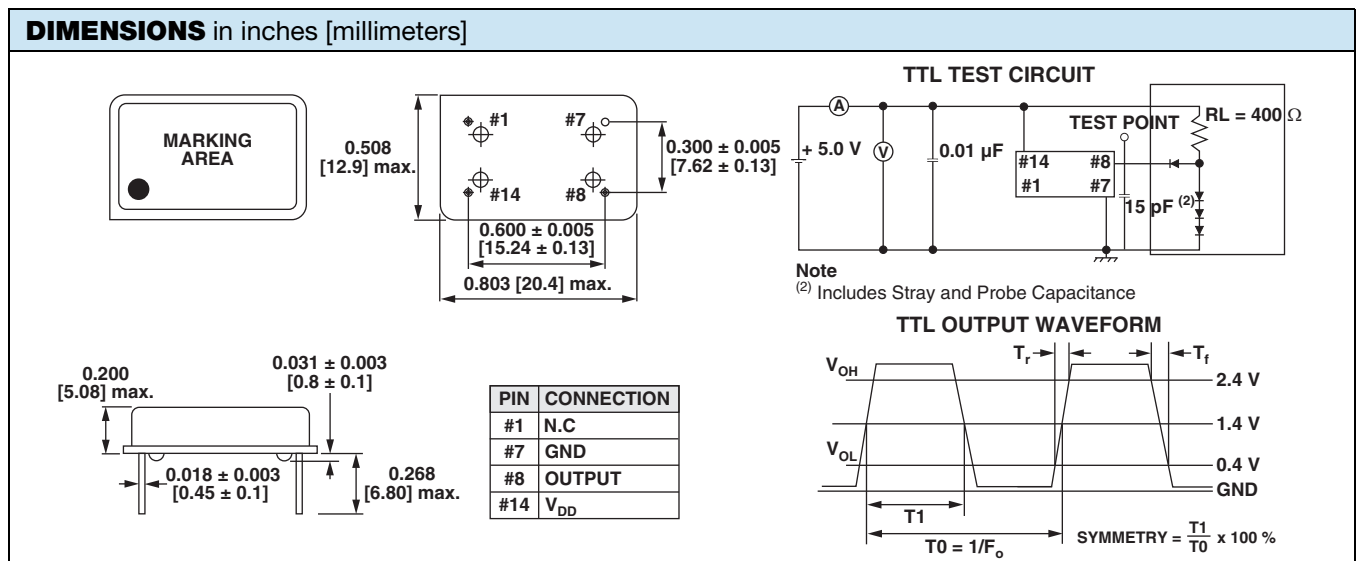
ORDERING INFORMATION

XO-53	B	R	40M	e2
MODEL	FREQUENCY STABILITY	OTR	FREQUENCY/MHz	JEDEC LEAD (Pb)-FREE
	AA = 0.0025 % (25 ppm)	blank = 0 °C to + 70 °C		standard
	A = 0.005 % (50 ppm)	R = - 40 °C to + 85 °C		
	B = 0.01 % (100 ppm)			
	standard			

GLOBAL PART NUMBER

X	O	5	3	C	T	D	N	A	4	0	M
MODEL				FREQUENCY STABILITY	OTR	PACKAGE CODE	OPTIONS		FREQUENCY		

GLOBAL PART NUMBERING

X	O	5	2	C	T	E	L	N	A	4	0	M

MODEL NUMBER	FREQUENCY STABILITY	OPERATING TEMPERATURE (OTR)	ENABLE/ DISABLE	PACKAGE CODE	OPTION	FREQUENCY
XO53 = XO-53 XO54 = XO-54 XO34 = XO-543 XO52 = XO-52 XO32 = XO-523 XO5M = XOSM-52 XO63 = XOSM-533 XO62 = XOSM-532 XO61 = XOSM-531 XO57 = XOSM-57 XO37 = XOSM-573 XO27 = XOSM-572 XO17 = XOSM-571 XO55 = XOSM-55 XO35 = XOSM-553	C = 0.01 % (100 ppm) D = 0.005 % (50 ppm) E = 0.0025 % (25 ppm)	T = 0 °C to + 70 °C R = - 40 °C to + 85 °C	F = pin 1 open E = disable to tristate	**Tape and reel** H = RF7 **Bulk** A = B04 (XO63, XO62, XO61) C = D06 (XO57, XO37, XO27, XO17) D = D07 (XO53, XO54, XO34, XO55, XO35) L = D08 (XO52, XO32, XO5M)	NA = no additional options 60 = 45/55 symmetry Contact factory for all other options	4M = 4 MHz 40M = 40 MHz 100M = 100 MHz 12M288 = 12.288 MHz M is used as decimal place holder in frequency

Example: XO52CTELNA40M

PART MARKING

Line 1:   M2803XXXXX (part number)

Line 2:   XX.XXXXM (frequency)

Line 3:   yywwvv (date/factory code)

Full Size Clock Oscillators TTL/HCMOS Compatible

FEATURES
- Size: 14 pin full size
- Industry standard
- Wide frequency range
- Low cost
- Tri-state enable/disable
- Resistance weld package
- 5 V
- Compliant to RoHS Directive 2002/95/EC

RoHS COMPLIANT

The XO-54 series oscillator is full size tri-state enable/disable control. The metal package with pin 7 case ground acts as shielding to minimize EMI radiation.

STANDARD ELECTRICAL SPECIFICATIONS

PARAMETER	SYMBOL	CONDITION	VALUE
Frequency range	F_O	-	1.000 MHz to 100.000 MHz
Frequency stability [1]		all conditions	± 25 ppm, ± 50 ppm, ± 100 ppm
Operating temperature range	T_{OPR}	-	0 °C to 70 °C
			- 40 °C to + 85 °C (option)
Storage temperature range	T_{STG}	-	- 55 °C to + 125 °C
Power supply voltage	V_{DD}	-	5.0 V ± 10 %
Aging (first year)		25 °C ± 3 °C	± 5 ppm
Supply current	I_{DD}	1.000 MHz to 23.999 MHz	20 mA max.
		24.000 MHz to 49.999 MHz	30 mA max.
		50.000 MHz to 69.999 MHz	40 mA max.
		70.000 MHz to 100.000 MHz	60 mA max.
Output symmetry	Sym	at ½ V_{DD}	40 %/60 % (45 %/55 % option)
Rise time	t_r	10 % V_{DD} to 90 % V_{DD}	10 ns max.
Fall time	t_f	90 % V_{DD} to 10 % V_{DD}	10 ns max.
Output voltage	V_{OH}	-	90 % V_{DD} min.
	V_{OL}	-	10 % V_{DD} max.
Output load	TTL load	-	1 TTL to 10 TTL
	HCMOS load	-	to 50M: 50 pF
		-	to 70M: 30 pF
		-	to 100M: 15 pF
Start-up time	t_s	-	10 ms max.
Pin 1, tri-state function		-	pin 1 = H or open (output active at pin 3)
			pin 1 = L (high impedance at pin 3)

Note
[1] Include: 25 °C tolerance, operating temperature range, input voltage change, aging, load change, shock and vibration

DIMENSIONS in inches [millimeters]

ENABLE/DISABLE FUNCTION	
INPUT (PIN 1)	OUTPUT (PIN 8)
OPEN	ENABLE
$V_{IH} \geq 2.2$ V_{DC}	ENABLE

PIN	CONNECTION
#1	TRI-STATE NC
#7	GND
#8	OUTPUT
#14	V_{DD}

HCMOS TEST CIRCUIT

HCMOS OUTPUT WAVEFORM

$SYMMETRY \frac{T1}{T0} \times 100\%$

XO-54

Vishay Dale

Full Size Clock Oscillators TTL/HCMOS Compatible

VISHAY®

ORDERING INFORMATION

XO-54	B	R	E	40M	e2
MODEL	FREQUENCY STABILITY	OTR	ENABLE/DISABLE	FREQUENCY/MHz	JEDEC LEAD (Pb)-FREE
	AA = 0.0025 % (25 ppm)	blank = 0 °C to + 70 °C	blank = pin 1 open		standard
	A = 0.005 % (50 ppm)	R = - 40 °C to + 85 °C	E = disable to tri-state		
	B = 0.01 % (100 ppm) standard				

GLOBAL PART NUMBER

X	O	5	4	C	T	E	D	N	A	4	0	M
MODEL				FREQUENCY STABILITY	OTR	ENABLE/ DISABLE	PACKAGE CODE	OPTIONS		FREQUENCY		

GLOBAL PART NUMBERING

X	O	5	2	C	T	E	L	N	A	4	0	M

MODEL NUMBER	FREQUENCY STABILITY	OPERATING TEMPERATURE (OTR)	ENABLE/ DISABLE	PACKAGE CODE	OPTION	FREQUENCY
XO53 = XO-53 XO54 = XO-54 XO34 = XO-543 XO52 = XO-52 XO32 = XO-523 XO5M = XOSM-52 XO63 = XOSM-533 XO62 = XOSM-532 XO61 = XOSM-531 XO57 = XOSM-57 XO37 = XOSM-573 XO27 = XOSM-572 XO17 = XOSM-571 XO55 = XOSM-55 XO35 = XOSM-553	C = 0.01 % (100 ppm) D = 0.005 % (50 ppm) E = 0.0025 % (25 ppm)	T = 0 °C to + 70 °C R = - 40 °C to + 85 °C	F = pin 1 open E = disable to tristate	**Tape and reel** H = RF7 **Bulk** A = B04 (XO63, XO62, XO61) C = D06 (XO57, XO37, XO27, XO17) D = D07 (XO53, XO54, XO34, XO55, XO35) L = D08 (XO52, XO32, XO5M)	NA = no additional options 60 = 45/55 symmetry Contact factory for all other options	4M = 4 MHz 40M = 40 MHz 100M = 100 MHz 12M288 = 12.288 MHz M is used as decimal place holder in frequency

Example: XO52CTELNA40M

PART MARKING

Line 1:   M2803XXXXX (part number)

Line 2:   XX.XXXXM (frequency)

Line 3:   yywwvv (date/factory code)

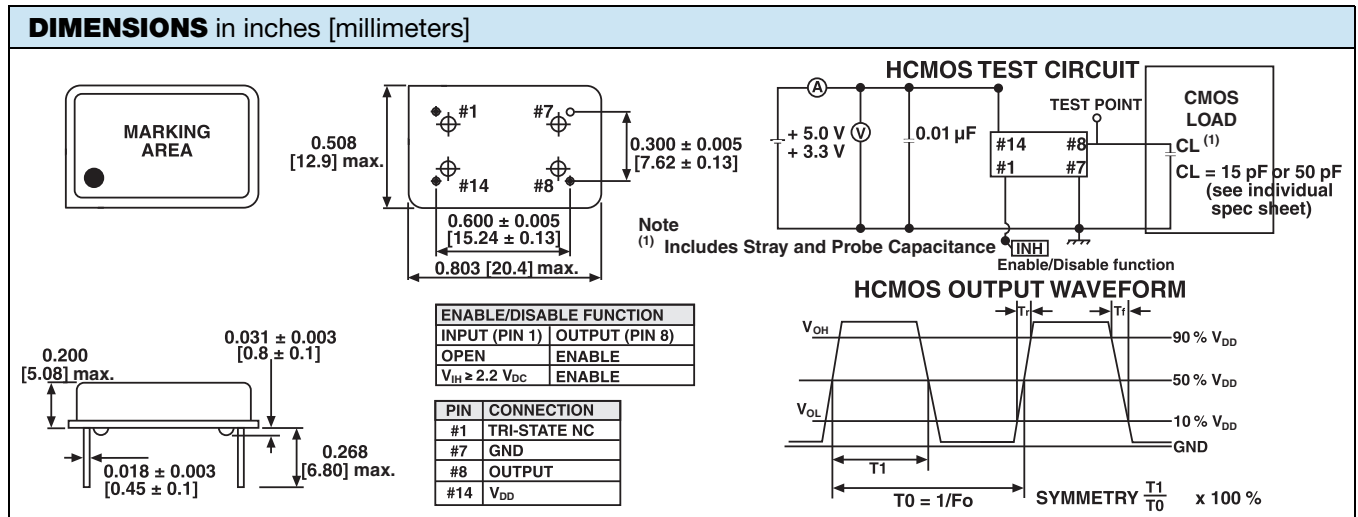# Full Size Clock Oscillators TTL/HCMOS Compatible

FEATURES
- Size: 14 pin full size
- Industry standard
- Wide frequency range
- Low cost
- Tri-state enable/disable
- Resistance weld package
- 3.3 V
- Compliant to RoHS Directive 2002/95/EC

RoHS COMPLIANT

The XO-543 series is with 3.3 V power supply. The metal package with pin 7 case ground acts as shielding to minimize EMI radiation.

STANDARD ELECTRICAL SPECIFICATIONS

PARAMETER	SYMBOL	CONDITION	VALUE
Frequency range	F_O	-	1.000 MHz to 100.000 MHz
Frequency stability [1]		all conditions	± 25 ppm, ± 50 ppm, ± 100 ppm
Operating temperature range	T_{OPR}	-	0 ºC to 70 ºC
			- 40 ºC to + 85 ºC (option)
Storage temperature range	T_{STG}	-	- 55 ºC to + 125 ºC
Power supply voltage	V_{DD}	-	3.3 V ± 10 %
Aging (first year)		25 °C ± 3 °C	± 5 ppm
Supply current	I_{DD}	1.000 MHz to 23.999 MHz	15 mA max.
		24.000 MHz to 49.999 MHz	20 mA max.
		50.000 MHz to 69.999 MHz	30 mA max.
		70.000 MHz to 100.000 MHz	45 mA max.
Output symmetry	Sym	at ½ V_{DD}	40 %/60 % (45 %/55 % option)
Rise time	t_r	10 % V_{DD} to 90 % V_{DD}	8 ns max.
Fall time	t_f	90 % V_{DD} to 10 % V_{DD}	8 ns max.
Output voltage	V_{OH}	-	90 % V_{DD} min.
	V_{OL}	-	10 % V_{DD} max.
Output load	TTL load	-	1 TTL to 5 TTL
	HCMOS load	-	to 50M: 30 pF
		-	to 125M: 15 pF
Start-up time	t_s	-	10 ms max.
Pin 1, tri-state function		-	pin 1 = H or open (output active at pin 3)
			pin 1 = L (high impedance at pin 3)

Note
[1] Include: 25 ºC tolerance, operating temperature range, input voltage change, aging, load change, shock and vibration

DIMENSIONS in inches [millimeters]

ENABLE/DISABLE FUNCTION	
INPUT (PIN 1)	OUTPUT (PIN 8)
OPEN	ENABLE
$V_{IH} \geq 2.2\ V_{DC}$	ENABLE

PIN	CONNECTION
#1	TRI-STATE NC
#7	GND
#8	OUTPUT
#14	V_{DD}

HCMOS TEST CIRCUIT

Note
(1) Includes Stray and Probe Capacitance

HCMOS OUTPUT WAVEFORM

$$SYMMETRY\ \frac{T1}{T0}\ \times 100\ \%$$

$$T0 = 1/Fo$$

XO-543

Vishay Dale

Full Size Clock Oscillators TTL/HCMOS Compatible

VISHAY®

ORDERING INFORMATION

XO-543	B	R	E	40M	e2
MODEL	FREQUENCY STABILITY	OTR	ENABLE/DISABLE	FREQUENCY/MHz	JEDEC LEAD (Pb)-FREE standard
	AA = 0.0025 % (25 ppm) A = 0.005 % (50 ppm) B = 0.01 % (100 ppm)	blank = 0 °C to + 70 °C R = - 40 °C to + 85 °C	blank = pin 1 open E = disable to tri-state		

GLOBAL PART NUMBER

X	O	3	4	C	T	E	D	N	A	4	0	M
MODEL				FREQUENCY STABILITY	OTR	ENABLE/ DISABLE	PACKAGE CODE	OPTIONS		FREQUENCY		

GLOBAL PART NUMBERING

X	O	5	2	C	T	E	L	N	A	4	0	M

MODEL NUMBER	FREQUENCY STABILITY	OPERATING TEMPERATURE (OTR)	ENABLE/ DISABLE	PACKAGE CODE	OPTION	FREQUENCY
XO53 = XO-53 XO54 = XO-54 XO34 = XO-543 XO52 = XO-52 XO32 = XO-523 XO5M = XOSM-52 XO63 = XOSM-533 XO62 = XOSM-532 XO61 = XOSM-531 XO57 = XOSM-57 XO37 = XOSM-573 XO27 = XOSM-572 XO17 = XOSM-571 XO55 = XOSM-55 XO35 = XOSM-553	C = 0.01 % (100 ppm) D = 0.005 % (50 ppm) E = 0.0025 % (25 ppm)	T = 0 °C to + 70 °C R = - 40 °C to + 85 °C	F = pin 1 open E = disable to tristate	**Tape and reel** H = RF7 **Bulk** A = B04 (XO63, XO62, XO61) C = D06 (XO57, XO37, XO27, XO17) D = D07 (XO53, XO54, XO34, XO55, XO35) L = D08 (XO52, XO32, XO5M)	NA = no additional options 60 = 45/55 symmetry Contact factory for all other options	4M = 4 MHz 40M = 40 MHz 100M = 100 MHz 12M288 = 12.288 MHz M is used as decimal place holder in frequency

Example: XO52CTELNA40M

PART MARKING

Line 1:   M28__XXXXX (part number)

Line 2:   XX.XXXXM (frequency)

Line 3:   yywwvv (date/factory code)

Half Size Clock Oscillator Enable/Disable

FEATURES
- Size: 8 pin half size
- Industry standard
- Tri-state enable/disable
- Wide frequency range
- Low cost
- Resistance weld package
- 5 V
- Compliant to RoHS Directive 2002/95/EC

RoHS
COMPLIANT

The XO-52 series oscillator is half size, has tri-state enable/disable controlled function. The metal package with pin 4 case ground acts as shielding to minimize EMI radiation.

STANDARD ELECTRICAL SPECIFICATIONS

PARAMETER	SYMBOL	CONDITION	VALUE
Frequency range	F_O	-	1.000 MHz to 100.000 MHz
Frequency stability [1]		all conditions	± 25 ppm, ± 50 ppm, ± 100 ppm
Operating temperature range	T_{OPR}	-	0 ºC to 70 ºC
			- 40 ºC to + 85 ºC (option)
Storage temperature range	T_{STG}	-	- 55 ºC to + 125 ºC
Power supply voltage	V_{DD}	-	5.0 V ± 10 %
Aging (first year)		25 ºC ± 3 ºC	± 5 ppm
Supply current	I_{DD}	1.000 MHz to 23.999 MHz	20 mA max.
		24.000 MHz to 49.999 MHz	30 mA max.
		50.000 MHz to 69.999 MHz	40 mA max.
		70.000 MHz to 100.000 MHz	60 mA max.
Output symmetry	Sym	at $1/2$ V_{DD}	40 %/60 % (45 %/55 % option)
Rise time	t_r	20 % V_{DD} to 80 % V_{DD}	10 ns max.
Fall time	t_f	80 % V_{DD} to 20 % V_{DD}	10 ns max.
Output voltage	V_{OH}	-	90 % V_{DD} min.
	V_{OL}	-	10 % V_{DD} max.
Output load	TTL load	-	1 TTL to 10 TTL
	HCMOS load	-	to 50M: 50 pF
		-	to 70M: 30 pF
		-	to 100M: 15 pF
Start-up time	t_s	-	10 ms max.
Pin 1, tri-state function		-	pin 1 = H or open (output active at pin 5)
			pin 1 = L (high impedance at pin 5)

Note
[1] Include: 25 °C tolerance, operating temperature range, input voltage change, aging, load change, shock vibration

DIMENSIONS in inches [millimeters]

MARKING AREA

0.508 [12.9] max.

0.300 ± 0.005 [7.62 ± 0.13]

0.300 ± 0.005 [7.62 ± 0.13]

0.580 [12.9] max.

0.031 ± 0.003 [0.8 ± 0.1]

0.220 [5.6] max.

0.268 [6.80] max.

0.018 ± 0.003 [0.45 ± 0.1]

ENABLE/DISABLE FUNCTION	
INPUT (PIN 1)	OUTPUT (PIN 5)
OPEN	ENABLE
$V_{IH} \geq 2.2$ V_{DC}	ENABLE

PIN	CONNECTION
#1	N.C.
#4	GND
#5	OUTPUT
#8	V_{DD}

HCMOS TEST CIRCUIT

Test Point

CMOS Load

+ 5.0 V
+ 3.3 V

0.01 µF

#8 #5
#1 #4

$CL^{(1)}$
CL = 15 pF or 50 pF (see individual spec. sheet)

Note
(1) Includes Stray and Probe Capacitance

INH Enable/Disable function

HCMOS OUTPUT WAVEFORM

V_{OH}

V_{OL}

90 % V_{DD}
50 % V_{DD}
10 % V_{DD}
GND

T1

T0 = 1/Fo

SYMMETRY = $\frac{T1}{T0}$ x 100 %

ORDERING INFORMATION

XO-52	B	R	E	40M	e2
MODEL	FREQUENCY STABILITY	OTR	ENABLE/DISABLE	FREQUENCY/MHz	JEDEC LEAD (Pb)-FREE standard
	AA = 0.0025 % (25 ppm)	blank = 0 °C to + 70 °C	blank = pin 1 open		
	A = 0.005 % (50 ppm)	R = - 40 °C to + 85 °C	E = disable to tri-state		
	B = 0.01 % (100 ppm)				

GLOBAL PART NUMBER

X	O	5	2	C	T	E	L	N	A	4	0	M
MODEL				FREQUENCY STABILITY	OTR	ENABLE/ DISABLE	PACKAGE CODE	OPTIONS		FREQUENCY		

GLOBAL PART NUMBERING

X	O	5	2	C	T	E	L	N	A	4	0	M

MODEL NUMBER	FREQUENCY STABILITY	OPERATING TEMPERATURE (OTR)	ENABLE/ DISABLE	PACKAGE CODE	OPTION	FREQUENCY
XO53 = XO-53 XO54 = XO-54 XO34 = XO-543 XO52 = XO-52 XO32 = XO-523 XO5M = XOSM-52 XO63 = XOSM-533 XO62 = XOSM-532 XO61 = XOSM-531 XO57 = XOSM-57 XO37 = XOSM-573 XO27 = XOSM-572 XO17 = XOSM-571 XO55 = XOSM-55 XO35 = XOSM-553	C = 0.01 % (100 ppm) D = 0.005 % (50 ppm) E = 0.0025 % (25 ppm)	T = 0 °C to + 70 °C R = - 40 °C to + 85 °C	F = pin 1 open E = disable to tristate	**Tape and reel** H = RF7 **Bulk** A = B04 (XO63, XO62, XO61) C = D06 (XO57, XO37, XO27, XO17) D = D07 (XO53, XO54, XO34, XO55, XO35) L = D08 (XO52, XO32, XO5M)	NA = no additional options 60 = 45/55 symmetry Contact factory for all other options	4M = 4 MHz 40M = 40 MHz 100M = 100 MHz 12M288 = 12.288 MHz M is used as decimal place holder in frequency

Example: XO52CTELNA40M

PART MARKING

Line 1:   M2802XXXXX (part number)

Line 2:   XX.XXXXM (frequency)

Line 3:   yywwvv (date/factory code)

Half Size Clock Oscillator Enable/Disable

The XO-523 series oscillator is half size, has tri-state enable/disable controlled function, and is with a 3.3 V power supply voltage. The metal package with pin 4 case ground acts as shielding to minimize EMI radiation.
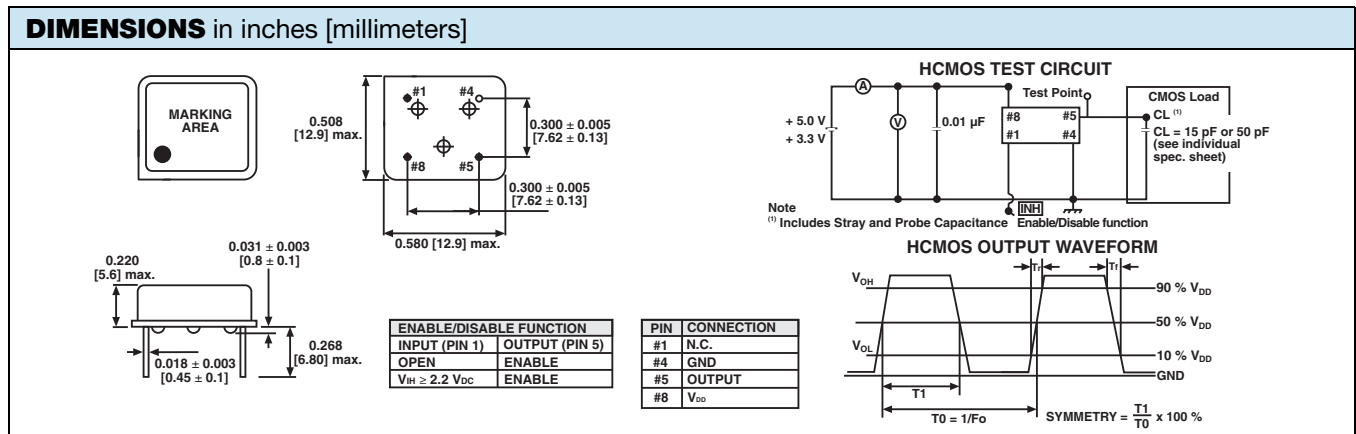
FEATURES
- Size: 8 pin half size
- Industry standard
- Tri-state enable/disable
- Wide frequency range
- Low cost
- Resistance weld package
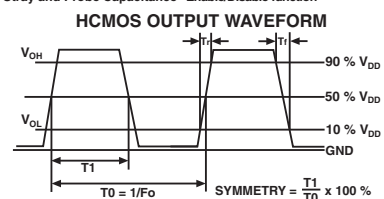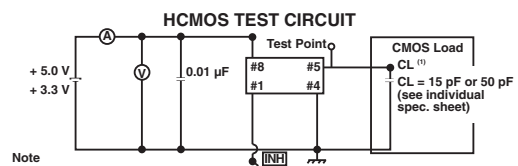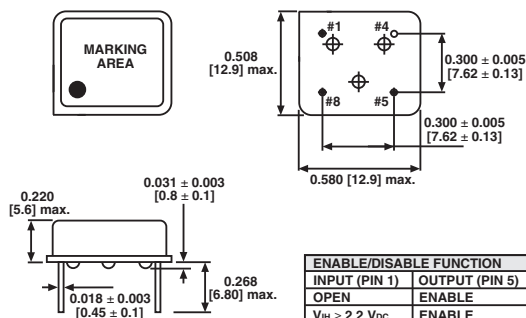- 3.3 V
- Compliant to RoHS Directive 2002/95/EC

RoHS
COMPLIANT

STANDARD ELECTRICAL SPECIFICATIONS

PARAMETER	SYMBOL	CONDITION	VALUE
Frequency range	F_O	-	1.000 MHz to 100.000 MHz
Frequency stability [1]		all conditions	± 25 ppm, ± 50 ppm, ± 100 ppm
Operating temperature range	T_{OPR}	-	0 °C to 70 °C
			- 40 °C to + 85 °C (option)
Storage temperature range	T_{STG}	-	- 55 °C to + 125 °C
Power supply voltage	V_{DD}	-	3.3 V ± 10 %
Aging (first year)		25 °C ± 3 °C	± 5 ppm
Supply current	I_{DD}	1.000 MHz to 23.999 MHz	15 mA max.
		24.000 MHz to 49.999 MHz	20 mA max.
		50.000 MHz to 69.999 MHz	30 mA max.
		70.000 MHz to 100.000 MHz	45 mA max.
Output symmetry	Sym	at $^1/_2$ V_{DD}	40 %/60 % (45 %/55 % option)
Rise time	t_r	20 % V_{DD} to 80 % V_{DD}	8 ns max.
Fall time	t_f	80 % V_{DD} to 20 % V_{DD}	8 ns max.
Output voltage	V_{OH}	-	90 % V_{DD} min.
	V_{OL}	-	10 % V_{DD} max.
Output load	TTL load	-	1 TTL to 5 TTL
	HCMOS load	-	to 50M: 30 pF
		-	to 125M: 15 pF
Start-up time	t_s	-	10 ms max.
Pin 1, tri-state function		-	pin 1 = H or open (output active at pin 5)
			pin 1 = L (high impedance at pin 5)

Note
[1] Include: 25 °C tolerance, operating temperature range, input voltage change, aging, load change, shock vibration

DIMENSIONS in inches [millimeters]

MARKING AREA

0.508 [12.9] max.

0.300 ± 0.005 [7.62 ± 0.13]

0.300 ± 0.005 [7.62 ± 0.13]

0.580 [12.9] max.

0.031 ± 0.003 [0.8 ± 0.1]

0.220 [5.6] max.

0.268 [6.80] max.

0.018 ± 0.003 [0.45 ± 0.1]

ENABLE/DISABLE FUNCTION	
INPUT (PIN 1)	OUTPUT (PIN 5)
OPEN	ENABLE
$V_{IH} \geq 2.2\ V_{DC}$	ENABLE

PIN	CONNECTION
#1	N.C.
#4	GND
#5	OUTPUT
#8	V_{DD}

HCMOS TEST CIRCUIT

Test Point

CMOS Load

CL [1]

+ 5.0 V
+ 3.3 V

0.01 µF

#8 #5
#1 #4

CL = 15 pF or 50 pF (see individual spec. sheet)

Note
[1] Includes Stray and Probe Capacitance   Enable/Disable function

HCMOS OUTPUT WAVEFORM

V_{OH}

V_{OL}

90 % V_{DD}
50 % V_{DD}
10 % V_{DD}
GND

T1

T0 = 1/Fo

$SYMMETRY = \frac{T1}{T0} \times 100 \%$

XO-523

Vishay Dale — Half Size Clock Oscillator Enable/Disable

VISHAY.

ORDERING INFORMATION

XO-523	B	R	E	40M	e2
MODEL	FREQUENCY STABILITY	OTR	ENABLE/DISABLE	FREQUENCY/MHz	JEDEC LEAD (Pb)-FREE standard
	AA = 0.0025 % (25 ppm) A = 0.005 % (50 ppm)	blank = 0 °C to + 70 °C R = - 40 °C to + 85 °C	blank = pin 1 open E = disable to tri-state		

GLOBAL PART NUMBER

X	O	3	2	C	T	E	L	N	A	4	0	M
MODEL				FREQUENCY STABILITY	OTR	ENABLE/ DISABLE	PACKAGE CODE	OPTIONS		FREQUENCY		

GLOBAL PART NUMBERING

X	O	5	2	C	T	E	L	N	A	4	0	M

MODEL NUMBER	FREQUENCY STABILITY	OPERATING TEMPERATURE (OTR)	ENABLE/ DISABLE	PACKAGE CODE	OPTION	FREQUENCY
XO53 = XO-53 XO54 = XO-54 XO34 = XO-543 XO52 = XO-52 XO32 = XO-523 XO5M = XOSM-52 XO63 = XOSM-533 XO62 = XOSM-532 XO61 = XOSM-531 XO57 = XOSM-57 XO37 = XOSM-573 XO27 = XOSM-572 XO17 = XOSM-571 XO55 = XOSM-55 XO35 = XOSM-553	C = 0.01 % (100 ppm) D = 0.005 % (50 ppm) E = 0.0025 % (25 ppm)	T = 0 °C to + 70 °C R = - 40 °C to + 85 °C	F = pin 1 open E = disable to tristate	**Tape and reel** H = RF7 **Bulk** A = B04 (XO63, XO62, XO61) C = D06 (XO57, XO37, XO27, XO17) D = D07 (XO53, XO54, XO34, XO55, XO35) L = D08 (XO52, XO32, XO5M)	NA = no additional options 60 = 45/55 symmetry Contact factory for all other options	4M = 4 MHz 40M = 40 MHz 100M = 100 MHz 12M288 = 12.288 MHz M is used as decimal place holder in frequency

Example: XO52CTELNA40M

PART MARKING

Line 1:   M2801XXXXX (part number)

Line 2:   XX.XXXXM (frequency)

Line 3:   yywwvv (date/factory code)

Half Size Clock Oscillator Enable/Disable

The XOSM-52 series oscillator is half size, has tri-state enable/disable controlled function. The metal package with pin 4 case ground acts as shielding to minimize EMI radiation.
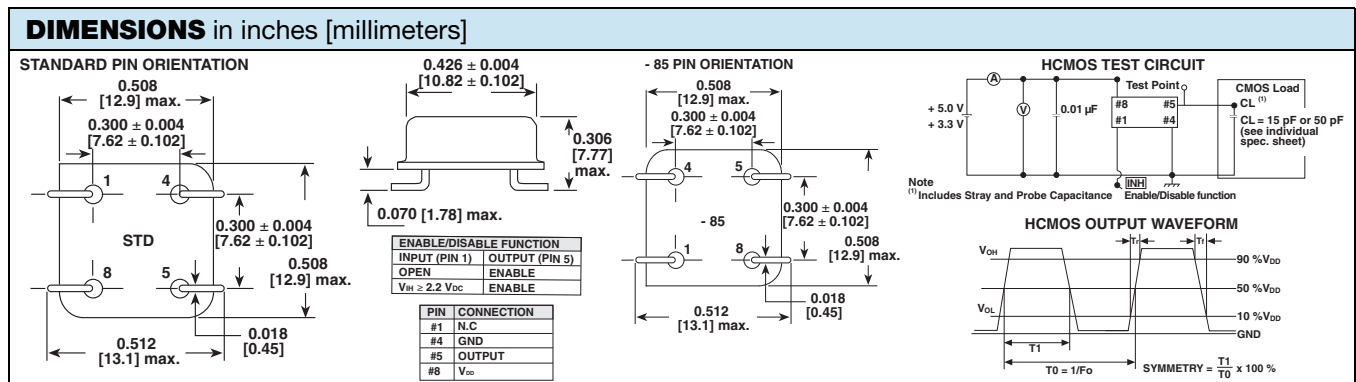
FEATURES
- Size: 8 pin half size
- Industry standard
- Tri-state enable/disable
- Wide frequency range
- Low cost
- Resistance weld package
- 5 V
- Compliant to RoHS Directive 2002/95/EC

RoHS COMPLIANT

STANDARD ELECTRICAL SPECIFICATIONS

PARAMETER	SYMBOL	CONDITION	VALUE
Frequency range	F_O	-	1.000 MHz to 100.000 MHz
Frequency stability [1]		all conditions	± 25 ppm, ± 50 ppm, ± 100 ppm
Operating temperature range	T_{OPR}	-	0 °C to 70 °C
			- 40 °C to + 85 °C (option)
Storage temperature range	T_{STG}	-	- 55 °C to + 125 °C
Power supply voltage	V_{DD}	-	5.0 V ± 10 %
Aging (first year)		25 °C ± 3 °C	± 5 ppm
Supply current	I_{DD}	1.000 MHz to 23.999 MHz	20 mA max.
		24.000 MHz to 49.999 MHz	30 mA max.
		50.000 MHz to 69.999 MHz	40 mA max.
		70.000 MHz to 100.000 MHz	60 mA max.
Output symmetry	Sym	at $^1/_2$ V_{DD}	40 %/60 % (45 %/55 % option)
Rise time	t_r	20 % V_{DD} to 80 % V_{DD}	10 ns max.
Fall time	t_f	80 % V_{DD} to 20 % V_{DD}	10 ns max.
Output voltage	V_{OH}	-	90 % V_{DD} min.
	V_{OL}	-	10 % V_{DD} max.
Output load	TTL load	-	1 TTL to 10 TTL
	HCMOS load	-	to 50M: 50 pF
		-	to 70M: 30 pF
		-	to 100M: 15 pF
Start-up time	t_s	-	10 ms max.
Pin 1, tri-state function		-	pin 1 = H or open (output active at pin 5)

Note

[1] Include: 25 °C tolerance, operating temperature range, input voltage change, aging, load change, shock vibration

DIMENSIONS in inches [millimeters]

STANDARD PIN ORIENTATION

ENABLE/DISABLE FUNCTION

INPUT (PIN 1)	OUTPUT (PIN 5)
OPEN	ENABLE
V_{IH} ≥ 2.2 V_{DC}	ENABLE

PIN	CONNECTION
#1	N.C
#4	GND
#5	OUTPUT
#8	V_{DD}

- 85 PIN ORIENTATION

HCMOS TEST CIRCUIT

HCMOS OUTPUT WAVEFORM

$$SYMMETRY = \frac{T1}{T0} \times 100 \%$$

$$T0 = 1/Fo$$

ORDERING INFORMATION

XOSM-52	B	R	E	40M	e2
MODEL	FREQUENCY STABILITY	OTR	ENABLE/DISABLE	FREQUENCY/MHz	JEDEC LEAD (Pb)-FREE
	AA = 0.0025 % (25 ppm)	blank = Standard	blank = pin 1 open		standard
	A = 0.005 % (50 ppm)	R = - 40 °C to + 85 °C	E = disable to tri-state		
	B = 0.01 % (100 ppm)				
	standard				

GLOBAL PART NUMBER

X	O	5	M	C	T	E	L	N	A	4	0	M
MODEL				FREQUENCY STABILITY	OTR	ENABLE/ DISABLE	PACKAGE CODE	OPTIONS		FREQUENCY		

GLOBAL PART NUMBERING

X	O	5	2	C	T	E	L	N	A	4	0	M

MODEL NUMBER	FREQUENCY STABILITY	OPERATING TEMPERATURE (OTR)	ENABLE/ DISABLE	PACKAGE CODE	OPTION	FREQUENCY
XO53 = XO-53 XO54 = XO-54 XO34 = XO-543 XO52 = XO-52 XO32 = XO-523 XO5M = XOSM-52 XO63 = XOSM-533 XO62 = XOSM-532 XO61 = XOSM-531 XO57 = XOSM-57 XO37 = XOSM-573 XO27 = XOSM-572 XO17 = XOSM-571 XO55 = XOSM-55 XO35 = XOSM-553	C = 0.01 % (100 ppm) D = 0.005 % (50 ppm) E = 0.0025 % (25 ppm)	T = 0 °C to + 70 °C R = - 40 °C to + 85 °C	F = pin 1 open E = disable to tristate	**Tape and reel** H = RF7 **Bulk** A = B04 (XO63, XO62, XO61) C = D06 (XO57, XO37, XO27, XO17) D = D07 (XO53, XO54, XO34, XO55, XO35) L = D08 (XO52, XO32, XO5M)	NA = no additional options 60 = 45/55 symmetry Contact factory for all other options	4M = 4 MHz 40M = 40 MHz 100M = 100 MHz 12M288 = 12.288 MHz M is used as decimal place holder in frequency

Example: XO52CTELNA40M

PART MARKING

Line 1:   M2802XXXXX (part number)

Line 2:   XX.XXXXM (frequency)

Line 3:   yywwvv (date/factory code)

Surface Mount Oscillator

FEATURES
- Size: 7.0 x 5.0 x 1.9 (mm)
- Miniature package
- Tri-state enable/disable
- TTL/HCMOS compatible
- Tape and reel
- I_R re-flow
- 5 V input voltage
- Compliant to RoHS Directive 2002/95/EC

Pb-free

RoHS COMPLIANT

The XOSM-57 series is an ultra miniature package clock oscillator with dimensions 7.0 mm x 5.0 mm x 1.9 mm. It is mainly used in portable PC and telecommunication devices and equipment.

STANDARD ELECTRICAL SPECIFICATIONS

PARAMETER	SYMBOL	CONDITION	VALUE
Frequency range	F_O	-	1.500 MHz to 100.000 MHz
Frequency stability [1]		all conditions	± 25 ppm, ± 50 ppm, ± 100 ppm
Operating temperature range	T_{OPR}	-	0 °C to 70 °C
			- 40 °C to + 85 °C (option)
Storage temperature range	T_{STG}	-	- 55 °C to + 125 °C
Power supply voltage	V_{DD}	-	5.0 V ± 10 %
Aging (first year)		25 °C ± 3 °C	± 5 ppm
Supply current	I_{DD}	1.500 MHz to 20.000 MHz	20 mA max.
		20.001 MHz to 50.000 MHz	35 mA max.
		30.001 MHz to 100.000 MHz	45 mA max.
Output symmetry	Sym	at $^1/_2 V_{DD}$	40 %/60 % (45 %/55 % option)
Rise/fall time	t_r/t_f	1.500 MHz to 67.000 MHz	10 ns
		67.001 MHz to 100.000 MHz	3 ns
Output voltage	V_{OH}	-	90 % V_{DD} min.
	V_{OL}	-	10 % V_{DD} max.
Output load		1.500 MHz to 67.000 MHz	10 TTL or 50 pF max.
		67.001 MHz to 100.000 MHz	15 pF max.
Start-up time	t_s	-	10 ms max.
Pin 1, tri-state function		-	pin 1 = H or open (output active at pin 3)
			pin 1 = L (high impedance at pin 3)

Note

[1] Include: 25 °C tolerance, operating temperature range, input voltage change, aging, load change, shock vibration

DIMENSIONS in inches [millimeters]

0.055 [1.40] typ.

0.276 ± 0.008 [7.0 ± 0.2]

0.197 ± 0.008 [5.0 ± 0.2]

0.075 [1.90] max.

0.2 [5.08] typ.

0.102 [2.60] typ.

0.047 [1.20] typ.

0.079 [2.0]

0.200 [5.08]

0.071 [1.8]

0.165 [4.20]

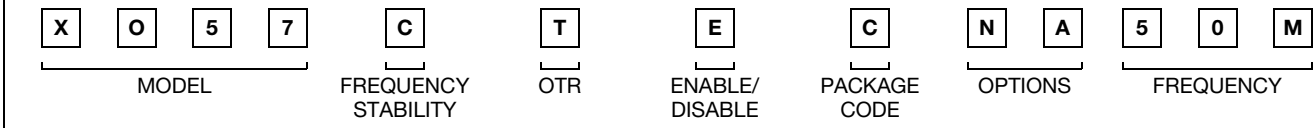| PIN	CONNECTION
#1	TRI-STATE/NC
#2	GND
#3	OUTPUT
#4	V_{DD}

Note

- A 0.01 µF bypass capacitor should be placed between V_{DD} (pin 4) and GND (pin 2) to minimize power supply line noise

XOSM-57

Vishay Dale

Surface Mount Oscillator

ORDERING INFORMATION

XOSM-57	B	R	E	50M	e4
MODEL	FREQUENCY STABILITY	OTR	ENABLE/DISABLE	FREQUENCY/MHz	JEDEC LEAD (Pb)-FREE
	AA = 0.0025 % (25 ppm)	blank = standard	E = disable to tri-state		standard
	A = 0.005 % (50 ppm)	R = - 40 °C to + 85 °C			
	B = 0.01 % (100 ppm) standard				

GLOBAL PART NUMBER

X	O	5	7	C	T	E	C	N	A	5	0	M
MODEL				FREQUENCY STABILITY	OTR	ENABLE/ DISABLE	PACKAGE CODE	OPTIONS		FREQUENCY		

GLOBAL PART NUMBERING

X	O	5	2	C	T	E	L	N	A	4	0	M

MODEL NUMBER	FREQUENCY STABILITY	OPERATING TEMPERATURE (OTR)	ENABLE/ DISABLE	PACKAGE CODE	OPTION	FREQUENCY
XO53 = XO-53 XO54 = XO-54 XO34 = XO-543 XO52 = XO-52 XO32 = XO-523 XO5M = XOSM-52 XO63 = XOSM-533 XO62 = XOSM-532 XO61 = XOSM-531 XO57 = XOSM-57 XO37 = XOSM-573 XO27 = XOSM-572 XO17 = XOSM-571 XO55 = XOSM-55 XO35 = XOSM-553	C = 0.01 % (100 ppm) D = 0.005 % (50 ppm) E = 0.0025 % (25 ppm)	T = 0 °C to + 70 °C R = - 40 °C to + 85 °C	F = pin 1 open E = disable to tristate	**Tape and reel** H = RF7 **Bulk** A = B04 (XO63, XO62, XO61) C = D06 (XO57, XO37, XO27, XO17) D = D07 (XO53, XO54, XO34, XO55, XO35) L = D08 (XO52, XO32, XO5M)	NA = no additional options 60 = 45/55 symmetry Contact factory for all other options	4M = 4 MHz 40M = 40 MHz 100M = 100 MHz 12M288 = 12.288 MHz M is used as decimal place holder in frequency

Example: XO52CTELNA40M

PART MARKING

Line 1:   M2804XXXXX (part number)

Line 2:   XX.XXXXM (frequency)

Line 3:   yywwvv (date/factory code)

Surface Mount Oscillator

FEATURES

- Size: 7.0 x 5.0 x 1.9 (mm)
- Miniature package
- Tri-state enable/disable
- TTL/HCMOS compatible
- Tape and reel
- I_R re-flow
- 3.3 V input voltage
- Compliant to RoHS Directive 2002/95/EC

Pb-free

RoHS COMPLIANT
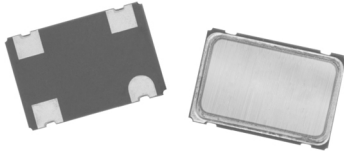
The XOSM-573 series is an ultra miniature package clock oscillator with dimensions 7.0 mm x 5.0 mm x 1.9 mm. It is mainly used in portable PC and telecommunication devices and equipment

STANDARD ELECTRICAL SPECIFICATIONS

PARAMETER	SYMBOL	CONDITION	VALUE
Frequency range	F_O	-	1.500 MHz to 100.000 MHz
Frequency stability [1]		all conditions	± 25 ppm, ± 50 ppm, ± 100 ppm
Operating temperature range	T_{OPR}	-	0 °C to 70 °C
			- 40 °C to + 85 °C (option)
Storage temperature range	T_{STG}	-	- 55 °C to + 125 °C
Power supply voltage	V_{DD}	-	3.3 V ± 10 %
Aging (first year)		25 °C ± 3 °C	± 5 ppm
Supply current	I_{DD}	1.500 MHz to 20.000 MHz	10 mA max.
		20.001 MHz to 50.000 MHz	20 mA max.
		50.001 MHz to 67.000 MHz	30 mA max.
		67.001 MHz to 100.000 MHz	55 mA max.
Output symmetry	Sym	at ½ V_{DD}	40 %/60 % (45 %/55 % option)
Rise/fall time	t_r/t_f	1.500 MHz to 50.000 MHz	6 ns
		50.001 MHz to 80.000 MHz	4 ns
		80.001 MHz to 100.000 MHz	2 ns
Output voltage	V_{OH}	-	90 % V_{DD} min.
	V_{OL}	-	10 % V_{DD} max.
Output load		-	2 TTL or 15 pF
Start-up time	t_s	-	10 ms max.
Pin 1, tri-state function		-	pin 1 = H or open (output active at pin 3)
			pin 1 = L (high impedance at pin 3)

Note

[1] Include: 25 °C tolerance, operating temperature range, input voltage change, aging, load change, shock and vibration

DIMENSIONS in inches [millimeters]

PIN	CONNECTION
#1	TRI-STATE/NC
#2	GND
#3	OUTPUT
#4	V_{DD}

0.276 ± 0.008 [7.0 ± 0.2]
0.197 ± 0.008 [5.0 ± 0.2]
0.075 [1.90] max.
0.055 [1.40] typ.
0.2 [5.08] typ.
0.102 [2.60] typ.
0.047 [1.20] typ.
0.200 [5.08]
0.079 [2.0]
0.071 [1.8]
0.165 [4.20]

Note
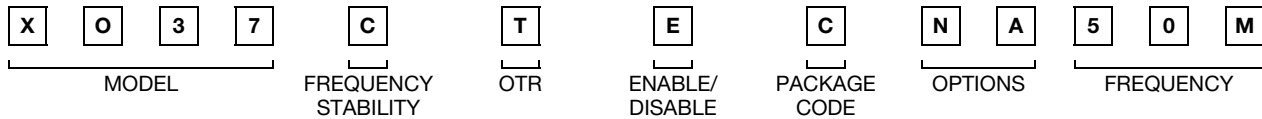
- A 0.01 µF bypass capacitor should be placed between V_{DD} (pin 4) and GND (pin 2) to minimize power supply line noise

XOSM-573

Vishay Dale

Surface Mount Oscillator

VISHAY®

ORDERING INFORMATION

XOSM-573	B	R	E	50M	e4
MODEL	FREQUENCY STABILITY	OTR	ENABLE/DISABLE	FREQUENCY/MHz	JEDEC LEAD (Pb)-FREE
	AA = 0.0025 % (25 ppm) A = 0.005 % (50 ppm) B = 0.01 % (100 ppm) standard	blank = standard R = - 40 °C to + 85 °C	E = disable to tri-state		standard

---

GLOBAL PART NUMBER

X	O	3	7	C	T	E	C	N	A	5	0	M
MODEL				FREQUENCY STABILITY	OTR	ENABLE/ DISABLE	PACKAGE CODE	OPTIONS		FREQUENCY		

GLOBAL PART NUMBERING

X	O	5	2	C	T	E	L	N	A	4	0	M

MODEL NUMBER	FREQUENCY STABILITY	OPERATING TEMPERATURE (OTR)	ENABLE/ DISABLE	PACKAGE CODE	OPTION	FREQUENCY
XO53 = XO-53 XO54 = XO-54 XO34 = XO-543 XO52 = XO-52 XO32 = XO-523 XO5M = XOSM-52 XO63 = XOSM-533 XO62 = XOSM-532 XO61 = XOSM-531 XO57 = XOSM-57 XO37 = XOSM-573 XO27 = XOSM-572 XO17 = XOSM-571 XO55 = XOSM-55 XO35 = XOSM-553	C = 0.01 % (100 ppm) D = 0.005 % (50 ppm) E = 0.0025 % (25 ppm)	T = 0 °C to + 70 °C R = - 40 °C to + 85 °C	F = pin 1 open E = disable to tristate	**Tape and reel** H = RF7 **Bulk** A = B04 (XO63, XO62, XO61) C = D06 (XO57, XO37, XO27, XO17) D = D07 (XO53, XO54, XO34, XO55, XO35) L = D08 (XO52, XO32, XO5M)	NA = no additional options 60 = 45/55 symmetry Contact factory for all other options	4M = 4 MHz 40M = 40 MHz 100M = 100 MHz 12M288 = 12.288 MHz M is used as decimal place holder in frequency

Example: XO52CTELNA40M

PART MARKING

Line 1:   M2809XXXXX (part number)

Line 2:   XX.XXXXM (frequency)

Line 3:   yywwvv (date/factory code)

For technical questions, contact: frequency@vishay.com

Surface Mount Oscillator
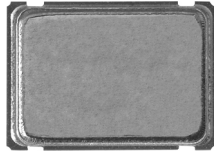
The XOSM-572 series is an ultra miniature package clock oscillator with dimensions 7.0 mm x 5.0 mm x 1.9 mm. It is mainly used in portable PC and telecommunication devices and equipment.

FEATURES
- Size: 7.0 x 5.0 x 1.9 (mm)
- Miniature package
- Tri-state enable/disable
- HCMOS compatible
- Tape and reel
- I_R re-flow
- 2.5 V input voltage
- Compliant to RoHS Directive 2002/95/EC

RoHS COMPLIANT

STANDARD ELECTRICAL SPECIFICATIONS

PARAMETER	SYMBOL	CONDITION	VALUE
Frequency range	F_O	-	1.000 MHz to 100.000 MHz
Frequency stability [1]		all conditions	± 25 ppm, ± 50 ppm, ± 100 ppm
Operating temperature range	T_{OPR}	-	0 ºC to 70 ºC
			- 40 ºC to + 85 ºC (option)
Storage temperature range	T_{STG}	-	- 55 ºC to + 125 ºC
Power supply voltage	V_{DD}	-	2.5 V ± 10 %
Aging (first year)		25 ºC ± 3 ºC	± 5 ppm
Supply current	I_{DD}	1.000 MHz to 100.000 MHz	30 mA max.
Output symmetry	Sym	at $^1/_2$ V_{DD}	40 %/60 % (45 %/55 % option)
Rise/fall time	t_r/t_f	1.000 MHz to 100.000 MHz	6 ns max.
Output voltage	V_{OH}	-	90 % V_{DD} min.
	V_{OL}	-	10 % V_{DD} max.
Output load		-	10 TTL or 15 pF
Start-up time	t_s	-	10 ms max.
Pin 1, tri-state function		-	pin 1 = H or open (output active at pin 3)
			pin 1 = L (high impedance at pin 3)

Note

[1] Include: 25 °C tolerance, operating temperature range, input voltage change, aging, load change, shock vibration

DIMENSIONS in inches [millimeters]

PIN	CONNECTION
#1	TRI-STATE/NC
#2	GND
#3	OUTPUT
#4	V_{DD}

Note
- A 0.01 µF bypass capacitor should be placed between V_{DD} (pin 4) and GND (pin 2) to minimize power supply line noise

XOSM-572

Vishay Dale

Surface Mount Oscillator

ORDERING INFORMATION

XOSM-572	B	R	E	50M	e4
MODEL	FREQUENCY STABILITY	OTR	ENABLE/DISABLE	FREQUENCY/MHz	JEDEC LEAD (Pb)-FREE
	AA = 0.0025 % (25 ppm) A = 0.005 % (50 ppm) B = 0.01 % (100 ppm) standard	blank = Standard R = - 40 °C to + 85 °C	E = disable to tri-state		standard

GLOBAL PART NUMBER

X	O	2	7	C	T	E	C	N	A	5	0	M
MODEL				FREQUENCY STABILITY	OTR	ENABLE/ DISABLE	PACKAGE CODE	OPTIONS		FREQUENCY		

GLOBAL PART NUMBERING

X	O	5	2	C	T	E	L	N	A	4	0	M

MODEL NUMBER	FREQUENCY STABILITY	OPERATING TEMPERATURE (OTR)	ENABLE/ DISABLE	PACKAGE CODE	OPTION	FREQUENCY
XO53 = XO-53 XO54 = XO-54 XO34 = XO-543 XO52 = XO-52 XO32 = XO-523 XO5M = XOSM-52 XO63 = XOSM-533 XO62 = XOSM-532 XO61 = XOSM-531 XO57 = XOSM-57 XO37 = XOSM-573 XO27 = XOSM-572 XO17 = XOSM-571 XO55 = XOSM-55 XO35 = XOSM-553	C = 0.01 % (100 ppm) D = 0.005 % (50 ppm) E = 0.0025 % (25 ppm)	T = 0 °C to + 70 °C R = - 40 °C to + 85 °C	F = pin 1 open E = disable to tristate	**Tape and reel** H = RF7 **Bulk** A = B04 (XO63, XO62, XO61) C = D06 (XO57, XO37, XO27, XO17) D = D07 (XO53, XO54, XO34, XO55, XO35) L = D08 (XO52, XO32, XO5M)	NA = no additional options 60 = 45/55 symmetry Contact factory for all other options	4M = 4 MHz 40M = 40 MHz 100M = 100 MHz 12M288 = 12.288 MHz M is used as decimal place holder in frequency

Example: XO52CTELNA40M

PART MARKING

Line 1:   M2805XXXXX (part number)

Line 2:   XX.XXXXM (frequency)

Line 3:   yywwvv (date/factory code)

Surface Mount Oscillator

FEATURES

- Size: 7.0 x 5.0 x 1.9 (mm)
- Miniature package
- Tri-state enable/disable
- HCMOS compatible
- Tape and reel
- I_R re-flow
- 1.8 V input voltage
- Compliant to RoHS Directive 2002/95/EC

RoHS
COMPLIANT
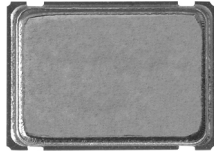
The XOSM-571 series is an ultra miniature package clock oscillator with dimensions 7.0 mm x 5.0 mm x 1.9 mm. It is mainly used in portable PC and telecommunication devices and equipment.

STANDARD ELECTRICAL SPECIFICATIONS

PARAMETER	SYMBOL	CONDITION	VALUE
Frequency range	F_O	-	1.000 MHz to 70.000 MHz
Frequency stability [1]		all conditions	± 25 ppm, ± 50 ppm, ± 100 ppm
Operating temperature range	T_{OPR}	-	0 °C to 70 °C
			- 40 °C to + 85 °C (option)
Storage temperature range	T_{STG}	-	- 55 °C to + 125 °C
Power supply voltage	V_{DD}	-	1.8 V ± 10 %
Aging (first year)		25 °C ± 3 °C	± 5 ppm
Supply current	I_{DD}	1.000 MHz to 70.000 MHz	20 mA max.
Output symmetry	Sym	at $^1/_2$ V_{DD}	40 %/60 % (45 %/55 % option)
Rise/fall time	t_r/t_f	1.000 MHz to 35.328 MHz	10 ns
		35.329 MHz to 70.000 MHz	4 ns
Output voltage	V_{OH}	-	90 % V_{DD} min.
	V_{OL}	-	10 % V_{DD} max.
Output load		-	10 TTL or 30 pF
Start-up time	t_s	-	10 ms max.
Pin 1, tri-state function		-	pin 1 = H or open (output active at pin 3)
			pin 1 = L (high impedance at pin 3)

Note

[1] Include: 25 °C tolerance, operating temperature range, input voltage change, aging, load change, shock vibration

DIMENSIONS in inches [millimeters]

PIN	CONNECTION
#1	TRI-STATE/NC
#2	GND
#3	OUTPUT
#4	V_{DD}

Note

- A 0.01 µF bypass capacitor should be placed between V_{DD} (pin 4) and GND (pin 2) to minimize power supply line noise

Surface Mount Oscillator

![VISHAY logo]

ORDERING INFORMATION

XOSM-571	B	R	E	50M	e4
MODEL	FREQUENCY STABILITY	OTR	ENABLE/DISABLE	FREQUENCY/MHz	JEDEC LEAD (Pb)-FREE
	AA = 0.0025 % (25 ppm)	blank = standard	E = disable to tri-state		standard
	A = 0.005 % (50 ppm)	R = - 40 °C to + 85 °C			
	B = 0.01 % (100 ppm)				
	standard				

GLOBAL PART NUMBER

X	O	1	7	C	T	E	C	N	A	5	0	M
MODEL				FREQUENCY STABILITY	OTR	ENABLE/ DISABLE	PACKAGE CODE	OPTIONS		FREQUENCY		

GLOBAL PART NUMBERING

X	O	5	2	C	T	E	L	N	A	4	0	M

MODEL NUMBER	FREQUENCY STABILITY	OPERATING TEMPERATURE (OTR)	ENABLE/ DISABLE	PACKAGE CODE	OPTION	FREQUENCY
XO53 = XO-53	C = 0.01 % (100 ppm)	T = 0 °C to + 70 °C	F = pin 1 open	**Tape and reel** H = RF7	NA = no additional options	4M = 4 MHz
XO54 = XO-54	D = 0.005 % (50 ppm)	R = - 40 °C to + 85 °C	E = disable to tristate	**Bulk** A = B04 (XO63, XO62, XO61)	60 = 45/55 symmetry	40M = 40 MHz
XO34 = XO-543	E = 0.0025 % (25 ppm)					100M = 100 MHz
XO52 = XO-52				C = D06 (XO57, XO37, XO27, XO17)	Contact factory for all other options	12M288 = 12.288 MHz
XO32 = XO-523				D = D07 (XO53, XO54, XO34, XO55, XO35)		M is used as decimal place holder in frequency
XO5M = XOSM-52				L = D08 (XO52, XO32, XO5M)		
XO63 = XOSM-533						
XO62 = XOSM-532						
XO61 = XOSM-531						
XO57 = XOSM-57						
XO37 = XOSM-573						
XO27 = XOSM-572						
XO17 = XOSM-571						
XO55 = XOSM-55						
XO35 = XOSM-553						

Example: XO52CTELNA40M

PART MARKING

Line 1: M28__XXXXX (part number)

Line 2: XX.XXXXM (frequency)

Line 3: yywwvv (date/factory code)

Surface Mount Oscillator

The XOSM-533 series is an ultra miniature package clock oscillator with dimensions 5.0 mm x 3.2 mm x 1.3 mm. It is mainly used in portable PC and telecommunication devices and equipment.

FEATURES
- Size: 5.0 x 3.2 x 1.3 (mm)
- Miniature package
- Tri-state enable/disable
- HCMOS compatible
- Tape and reel
- I_R re-flow
- 3.3 V input voltage
- Compliant to RoHS Directive 2002/95/EC

RoHS COMPLIANT

STANDARD ELECTRICAL SPECIFICATIONS

PARAMETER	SYMBOL	CONDITION	VALUE
Frequency range	F_O	-	1.544 MHz to 100.000 MHz
Frequency stability [1]		all conditions	± 25 ppm, ± 50 ppm, ± 100 ppm
Operating temperature range	T_{OPR}	-	0 °C to 70 °C
			- 40 °C to + 85 °C (option)
Storage temperature range	T_{STG}	-	- 55 °C to + 125 °C
Power supply voltage	V_{DD}	-	3.3 V ± 10 %
Aging (first year)		25 °C ± 3 °C	± 5 ppm
Supply current	I_{DD}	1.544 MHz to 9.999 MHz	8 mA max.
		10.000 MHz to 34.999 MHz	10 mA max.
		35.000 MHz to 49.999 MHz	25 mA max.
		50.000 MHz to 100.000 MHz	35 mA max.
Output symmetry	Sym	at $^1/_2$ V_{DD}	40 %/60 % (45 %/55 % option)
Rise time	t_r	10 % V_{DD} to 90 % V_{DD}	7 ns max.
Fall time	t_f	90 % V_{DD} to 10 % V_{DD}	7 ns max.
Output voltage	V_{OH}	-	90 % V_{DD} min.
	V_{OL}	-	10 % V_{DD} max.
Output load	HCMOS load	-	30 pF max. (15 pF typ.)
Start-up time	t_s	-	10 ms max.
Pin 1, tri-state function		-	pin 1 = H or open (output active at pin 3)
			pin 1 = L (high impedance at pin 3)

Note

[1] Include: 25 °C tolerance, operating temperature range, input voltage change, aging, load change, shock vibration

DIMENSIONS in inches [millimeters]

PIN	CONNECTION
#1	TRI-STATE/NC
#2	GND
#3	OUTPUT
#4	V_{DD}

Note

- A 0.01 µF bypass capacitor should be placed between V_{DD} (pin 4) and GND (pin 2) to minimize power supply line noise

XOSM-533

Vishay Dale

Surface Mount Oscillator

VISHAY.

ORDERING INFORMATION

XOSM-533	B	R	E	50M	e2
MODEL	FREQUENCY STABILITY	OTR	ENABLE/DISABLE	FREQUENCY/MHz	JEDEC LEAD (Pb)-FREE
	AA = 0.0025 % (25 ppm) A = 0.005 % (50 ppm) B = 0.01 % (100 ppm) standard	blank = standard R = - 40 °C to + 85 °C	E = disable to tri-state		standard

GLOBAL PART NUMBER

X	O	6	3	C	T	E	A	N	A	5	0	M
MODEL				FREQUENCY STABILITY	OTR	ENABLE/ DISABLE	PACKAGE CODE	OPTIONS		FREQUENCY		

GLOBAL PART NUMBERING

X	O	5	2	C	T	E	L	N	A	4	0	M

MODEL NUMBER	FREQUENCY STABILITY	OPERATING TEMPERATURE (OTR)	ENABLE/ DISABLE	PACKAGE CODE	OPTION	FREQUENCY
XO53 = XO-53 XO54 = XO-54 XO34 = XO-543 XO52 = XO-52 XO32 = XO-523 XO5M = XOSM-52 XO63 = XOSM-533 XO62 = XOSM-532 XO61 = XOSM-531 XO57 = XOSM-57 XO37 = XOSM-573 XO27 = XOSM-572 XO17 = XOSM-571 XO55 = XOSM-55 XO35 = XOSM-553	C = 0.01 % (100 ppm) D = 0.005 % (50 ppm) E = 0.0025 % (25 ppm)	T = 0 °C to + 70 °C R = - 40 °C to + 85 °C	F = pin 1 open E = disable to tristate	**Tape and reel** H = RF7 **Bulk** A = B04 (XO63, XO62, XO61) C = D06 (XO57, XO37, XO27, XO17) D = D07 (XO53, XO54, XO34, XO55, XO35) L = D08 (XO52, XO32, XO5M)	NA = no additional options 60 = 45/55 symmetry Contact factory for all other options	4M = 4 MHz 40M = 40 MHz 100M = 100 MHz 12M288 = 12.288 MHz M is used as decimal place holder in frequency

Example: XO52CTELNA40M

PART MARKING

Line 1:   M2807XXXXX (part number)

Line 2:   XX.XXXXM (frequency)

Line 3:   yywwvv (date/factory code)

Surface Mount Oscillator

The XOSM-532 series is an ultra miniature package clock oscillator with dimensions 5.0 mm x 3.2 mm x 1.3 mm. It is mainly used in portable PC and telecommunication devices and equipment.

FEATURES

- Size: 5.0 x 3.2 x 1.3 (mm)
- Miniature package
- Tri-state enable/disable
- HCMOS compatible
- Tape and reel
- I_R re-flow
- 2.5 V input voltage
- Compliant to RoHS Directive 2002/95/EC

RoHS
COMPLIANT

STANDARD ELECTRICAL SPECIFICATIONS

PARAMETER	SYMBOL	CONDITION	VALUE
Frequency range	F_O	-	1.544 MHz to 100.000 MHz
Frequency stability [1]		all conditions	± 25 ppm, ± 50 ppm, ± 100 ppm
Operating temperature range	T_{OPR}	-	0 °C to 70 °C
			- 40 °C to + 85 °C (option)
Storage temperature range	T_{STG}	-	- 55 °C to + 125 °C
Power supply voltage	V_{DD}	-	2.5 V ± 10 %
Aging (first year)		25 °C ± 3 °C	± 5 ppm
Supply current	I_{DD}	1.544 MHz to 9.999 MHz	7 mA max.
		10.000 MHz to 34.999 MHz	8 mA max.
		35.000 MHz to 49.999 MHz	20 mA max.
		50.000 MHz to 100.000 MHz	30 mA max.
Output symmetry	Sym	at $^1/_2$ V_{DD}	40 %/60 % (45 %/55 % option)
Rise time	t_r	10 % V_{DD} to 90 % V_{DD}	6 ns max.
Fall time	t_f	90 % V_{DD} to 10 % V_{DD}	6 ns max.
Output voltage	V_{OH}	-	90 % V_{DD} min.
	V_{OL}	-	10 % V_{DD} max.
Output load	HCMOS load	-	30 pF max. (15 pF typ.)
Start-up time	t_s	-	10 ms max.
Pin 1, tri-state function		-	pin 1 = H or open (output active at pin 3)
			pin 1 = L (high impedance at pin 3)

Note

[1] Include: 25 °C tolerance, operating temperature range, input voltage change, aging, load change, shock vibration

DIMENSIONS in inches [millimeters]

PIN	CONNECTION
#1	TRI-STATE/NC
#2	GND
#3	OUTPUT
#4	V_{DD}

Note

- A 0.01 µF bypass capacitor should be placed between V_{DD} (pin 4) and GND (pin 2) to minimize power supply line noise

Surface Mount Oscillator

ORDERING INFORMATION

XOSM-532	B	R	E	50M	e4
MODEL	FREQUENCY STABILITY AA = 0.0025 % (25 ppm) A = 0.005 % (50 ppm) B = 0.01 % (100 ppm) standard	OTR blank = standard R = - 40 °C to + 85 °C	ENABLE/DISABLE E = disable to tri-state	FREQUENCY/MHz	JEDEC LEAD (Pb)-FREE standard

GLOBAL PART NUMBER

X	O	6	2	C	T	E	A	N	A	5	0	M
MODEL				FREQUENCY STABILITY	OTR	ENABLE/ DISABLE	PACKAGE CODE	OPTIONS		FREQUENCY		

GLOBAL PART NUMBERING

X	O	5	2	C	T	E	L	N	A	4	0	M

MODEL NUMBER	FREQUENCY STABILITY	OPERATING TEMPERATURE (OTR)	ENABLE/ DISABLE	PACKAGE CODE	OPTION	FREQUENCY
XO53 = XO-53 XO54 = XO-54 XO34 = XO-543 XO52 = XO-52 XO32 = XO-523 XO5M = XOSM-52 XO63 = XOSM-533 XO62 = XOSM-532 XO61 = XOSM-531 XO57 = XOSM-57 XO37 = XOSM-573 XO27 = XOSM-572 XO17 = XOSM-571 XO55 = XOSM-55 XO35 = XOSM-553	C = 0.01 % (100 ppm) D = 0.005 % (50 ppm) E = 0.0025 % (25 ppm)	T = 0 °C to + 70 °C R = - 40 °C to + 85 °C	F = pin 1 open E = disable to tristate	**Tape and reel** H = RF7 **Bulk** A = B04 (XO63, XO62, XO61) C = D06 (XO57, XO37, XO27, XO17) D = D07 (XO53, XO54, XO34, XO55, XO35) L = D08 (XO52, XO32, XO5M)	NA = no additional options 60 = 45/55 symmetry Contact factory for all other options	4M = 4 MHz 40M = 40 MHz 100M = 100 MHz 12M288 = 12.288 MHz M is used as decimal place holder in frequency

Example: XO52CTELNA40M

PART MARKING

Line 1:   M2808XXXXX (part number)

Line 2:   XX.XXXXM (frequency)

Line 3:   yywwvv (date/factory code)

For technical questions, contact: frequency@vishay.com

Surface Mount Oscillator

FEATURES
- Size: 5.0 x 3.2 x 1.3 (mm)
- Miniature package
- Tri-state enable/disable
- HCMOS compatible
- Tape and reel
- I_R re-flow
- 1.8 V input voltage
- Compliant to RoHS Directive 2002/95/EC

RoHS COMPLIANT

The XOSM-531 series is an ultra miniature package clock oscillator with dimensions 5.0 mm x 3.2 mm x 1.3 mm. It is mainly used in portable PC and telecommunication devices and equipment.

STANDARD ELECTRICAL SPECIFICATIONS

PARAMETER	SYMBOL	CONDITION	VALUE
Frequency range	F_O	-	1.544 MHz to 100.000 MHz
Frequency stability [1]		all conditions	± 25 ppm, ± 50 ppm, ± 100 ppm
Operating temperature range	T_{OPR}	-	0 ºC to 70 ºC
			- 40 ºC to + 85 ºC (option)
Storage temperature range	T_{STG}	-	- 55 ºC to + 125 ºC
Power supply voltage	V_{DD}	-	1.8 V ± 10 %
Aging (first year)		25 ºC ± 3 ºC	± 5 ppm
Supply current	I_{DD}	1.544 MHz to 9.999 MHz	6 mA max.
		10.000 MHz to 34.999 MHz	7 mA max.
		35.000 MHz to 49.999 MHz	15 mA max.
		50.000 MHz to 100.000 MHz	25 mA max.
Output symmetry	Sym	at $^1/_2$ V_{DD}	40 %/60 % (45 %/55 % option)
Rise time	t_r	10 % V_{DD} to 90 % V_{DD}	5 ns max.
Fall time	t_f	90 % V_{DD} to 10 % V_{DD}	5 ns max.
Output voltage	V_{OH}	-	90 % V_{DD} min.
	V_{OL}	-	10 % V_{DD} max.
Output load	HCMOS load	-	30 pF max. (15 pF typ.)
Start-up time	t_s	-	10 ms max.
Pin 1, tri-state function		-	pin 1 = H or open (output active at pin 3)
			pin 1 = L (high impedance at pin 3)

Note

[1] Include: 25 °C tolerance, operating temperature range, input voltage change, aging, load change, shock vibration

DIMENSIONS in inches [millimeters]

PIN	CONNECTION
#1	TRI-STATE/NC
#2	GND
#3	OUTPUT
#4	V_{DD}

Note

- A 0.01 μF bypass capacitor should be placed between V_{DD} (pin 4) and GND (pin 2) to minimize power supply line noise

VISHAY®

ORDERING INFORMATION

XOSM-531	B	R	E	50M	e4
MODEL	FREQUENCY STABILITY	OTR	ENABLE/DISABLE	FREQUENCY/MHz	JEDEC LEAD (Pb)-FREE standard
	AA = 0.0025 % (25 ppm) A = 0.005 % (50 ppm) B = 0.01 % (100 ppm)	blank = standard R = - 40 °C to + 85 °C	E = disable to tri-state		

GLOBAL PART NUMBER

X	O	6	1	C	T	E	A	N	A	5	0	M
MODEL				FREQUENCY STABILITY	OTR	ENABLE/ DISABLE	PACKAGE CODE	OPTIONS		FREQUENCY		

GLOBAL PART NUMBERING

X	O	5	2	C	T	E	L	N	A	4	0	M

MODEL NUMBER	FREQUENCY STABILITY	OPERATING TEMPERATURE (OTR)	ENABLE/ DISABLE	PACKAGE CODE	OPTION	FREQUENCY
XO53 = XO-53 XO54 = XO-54 XO34 = XO-543 XO52 = XO-52 XO32 = XO-523 XO5M = XOSM-52 XO63 = XOSM-533 XO62 = XOSM-532 XO61 = XOSM-531 XO57 = XOSM-57 XO37 = XOSM-573 XO27 = XOSM-572 XO17 = XOSM-571 XO55 = XOSM-55 XO35 = XOSM-553	C = 0.01 % (100 ppm) D = 0.005 % (50 ppm) E = 0.0025 % (25 ppm)	T = 0 °C to + 70 °C R = - 40 °C to + 85 °C	F = pin 1 open E = disable to tristate	**Tape and reel** H = RF7 **Bulk** A = B04 (XO63, XO62, XO61) C = D06 (XO57, XO37, XO27, XO17) D = D07 (XO53, XO54, XO34, XO55, XO35) L = D08 (XO52, XO32, XO5M)	NA = no additional options 60 = 45/55 symmetry Contact factory for all other options	4M = 4 MHz 40M = 40 MHz 100M = 100 MHz 12M288 = 12.288 MHz M is used as decimal place holder in frequency

Example: XO52CTELNA40M

PART MARKING

Line 1:   M28__XXXXX (part number)

Line 2:   XX.XXXXM (frequency)

Line 3:   yywwvv (date/factory code)
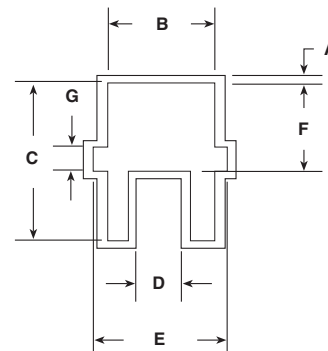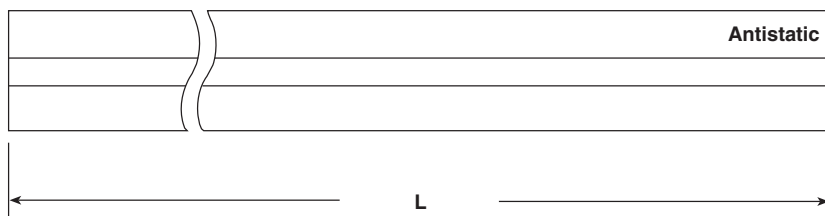
Reference Information

Contents

Tubes

PACKAGING SPECIFICATIONS in inches (millimeters)

Style A

Antistatic

Style B

Antistatic
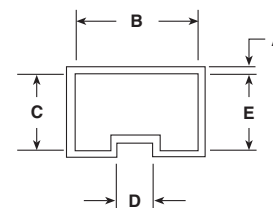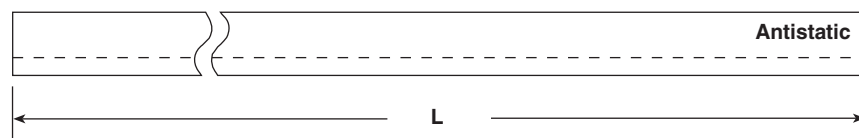
MODEL	STYLE	A	B	C	D	E	F	G	L	QUANTITY/ TUBE
XO-53	A	0.031 [0.8]	0.433 [11.0]	0.622 [15.8]	0.177 [4.5]	0.531 [13.5]	0.339 [8.6]	0.087 [2.2]	20.08 [510.0]	25
XO-54	A	0.031 [0.8]	0.433 [11.0]	0.622 [15.8]	0.177 [4.5]	0.531 [13.5]	0.339 [8.6]	0.087 [2.2]	20.08 [510.0]	25
XO-543	A	0.031 [0.8]	0.433 [11.0]	0.622 [15.8]	0.177 [4.5]	0.531 [13.5]	0.339 [8.6]	0.087 [2.2]	20.08 [510.0]	25
XO-52	A	0.031 [0.8]	0.433 [11.0]	0.622 [15.8]	0.177 [4.5]	0.531 [13.5]	0.339 [8.6]	0.087 [2.2]	20.08 [510.0]	40
XO-523	A	0.031 [0.8]	0.433 [11.0]	0.622 [15.8]	0.177 [4.5]	0.531 [13.5]	0.339 [8.6]	0.087 [2.2]	20.08 [510.0]	40
XOSM-52	A	0.031 [0.8]	0.433 [11.0]	0.622 [15.8]	0.177 [4.5]	0.531 [13.5]	0.339 [8.6]	0.087 [2.2]	20.08 [510.0]	40
XOSM-57	B	0.024 [0.6]	0.26 [6.6]	0.094 [2.4]	0.098 [2.5]	0.079 [2.0]	–	–	15.16 [385.0]	50
XOSM-573	B	0.024 [0.6]	0.26 [6.6]	0.094 [2.4]	0.098 [2.5]	0.079 [2.0]	–	–	15.16 [385.0]	50

Surface Mount Tape and Reel

TAPE AND REEL SPECIFICATIONS in inches (millimeters)
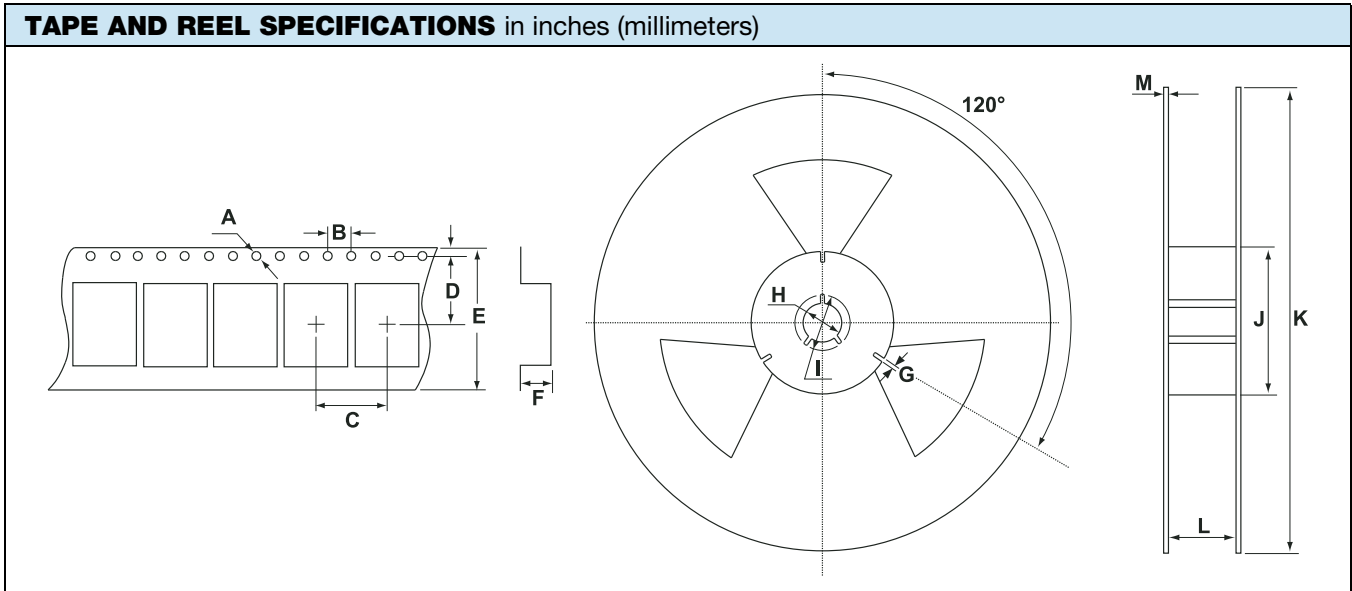
TAPE SPECIFICATIONS

MODEL	A	B	C	D	E	F	QUANTITY/ REEL
XT49M	Ø 0.059 (1.50)	0.157 (4.0)	0.472 (12.0)	0.453 (11.5)	0.945 (24.0)	0.171 (4.35)	1000
XT46C	Ø 0.059 (1.50)	0.157 (4.0)	0.315 (8.0)	0.295 (7.5)	0.630 (16.0)	0.059 (1.5)	1000
XT36C	Ø 0.059 (1.50)	0.157 (4.0)	0.315 (8.0)	0.295 (7.5)	0.630 (16.0)	0.079 (2.0)	1000
XOSM-57, XOSM-573, XOSM-572, XOSM-571	Ø 0.059 (1.50)	0.157 (4.0)	0.315 (8.0)	0.295 (7.5)	0.630 (16.0)	0.079 (2.0)	1000
XOSM-533, XOSM-532, XOSM-531	Ø 0.059 (1.50)	0.157 (4.0)	0.315 (8.0)	0.217 (5.5)	0.472 (12.0)	0.059 (1.5)	1000

REEL SPECIFICATIONS

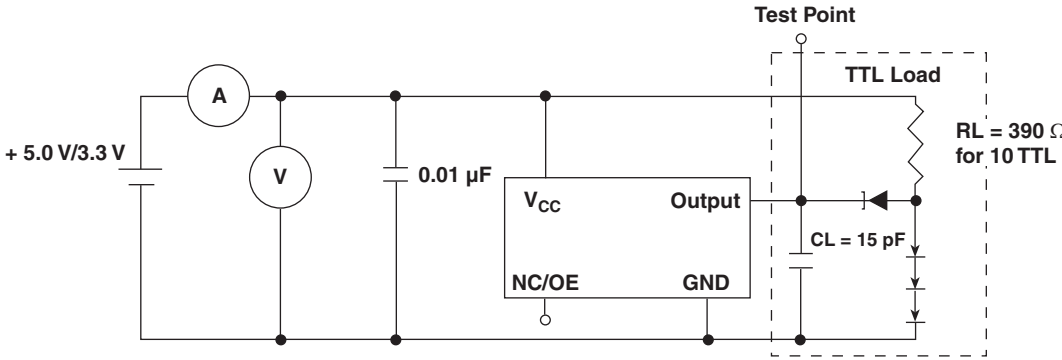| MODEL	G	H	I	J	K	L	M
XT49M	0.098 (2.5)	Ø 0.531 (13.5)	0.850 (21.6)	3.917 (99.5)	12.99 (330)	0.945 (24.0)	0.091 (2.3)
XT46C	0.091 (2.3)	Ø 0.531 (13.5)	0.850 (21.6)	2.362 (60.0)	7.008 (178)	0.630 (16.0)	0.056 (1.4)
XT36C	0.098 (2.5)	Ø 0.531 (13.5)	0.850 (21.6)	2.362 (60.0)	7.008 (178)	0.689 (17.5)	0.056 (1.4)
XOSM-57, XOSM-573, XOSM-572, XOSM-571	0.098 (2.5)	Ø 0.531 (13.5)	0.850 (21.6)	2.362 (60.0)	7.008 (178)	0.689 (17.5)	0.056 (1.4)
XOSM-533, XOSM-532, XOSM-531	0.098 (2.5)	Ø 0.531 (13.5)	0.850 (21.6)	2.362 (60.0)	7.008 (178)	0.531 (13.5)	0.056 (1.4)

Crystals and Oscillators Packaging Methods

TAPE AND REEL in inches [millimeters]											
MODEL	PACKAGE CODE	SAP CODE	REEL SIZE	CARRIER TAPE WIDTH	COMPONENT PITCH	MINIMUM ORDER QUANTITY	ORDER MULTIPLE	PACKAGE CODE	SAP CODE	MINIMUM ORDER QUANTITY	ORDER MULTIPLE
XT49S	-	-	-	-	-	-	-	B04	A	3000	100
XT49M	RF7	H	13	0.087 [2.2]	0.531 [13.5]	3000	1000	B04	A	3000	100
XT36C	RF7	H	7	0.630 [16.0]	0.315 [8.0]	1000	1000	B04	A	400	100
XT46C	RF7	H	7	0.087 [2.2]	0.531 [13.5]	1000	1000	B04	A	300	100
XO-53	-	-	-	-	-	-	-	D07	D	500	25
XO-54	-	-	-	-	-	-	-	D07	D	500	25
XO-543	-	-	-	-	-	-	-	D07	D	500	25
XO-52	-	-	-	-	-	-	-	D08	L	520	40
XO-523	-	-	-	-	-	-	-	D08	L	520	40
XOSM-52	-	-	-	-	-	-	-	D08	L	520	40
XOSM-57	RF7	H	7	0.630 [16.0]	0.315 [8.0]	1000	1000	D06	C	500	50
XOSM-573	RF7	H	7	0.630 [16.0]	0.315 [8.0]	1000	1000	D06	C	500	50
XOSM-572	RF7	H	7	0.630 [16.0]	0.315 [8.0]	1000	1000	D06	C	500	50
XOSM-571	RF7	H	7	0.630 [16.0]	0.315 [8.0]	1000	1000	D06	C	500	50
XOSM-533	RF7	H	7	0.472 [12.0]	0.315 [8.0]	1000	1000	B04	A	1000	100
XOSM-532	RF7	H	7	0.472 [12.0]	0.315 [8.0]	1000	1000	B04	A	1000	100
XOSM-531	RF7	H	7	0.472 [12.0]	0.315 [8.0]	1000	1000	B04	A	1000	100

For technical questions, contact: frequency@vishay.com

Environmental and Mechanical Specifications

ENVIRONMENTAL AND MECHANICAL SPECIFICATIONS

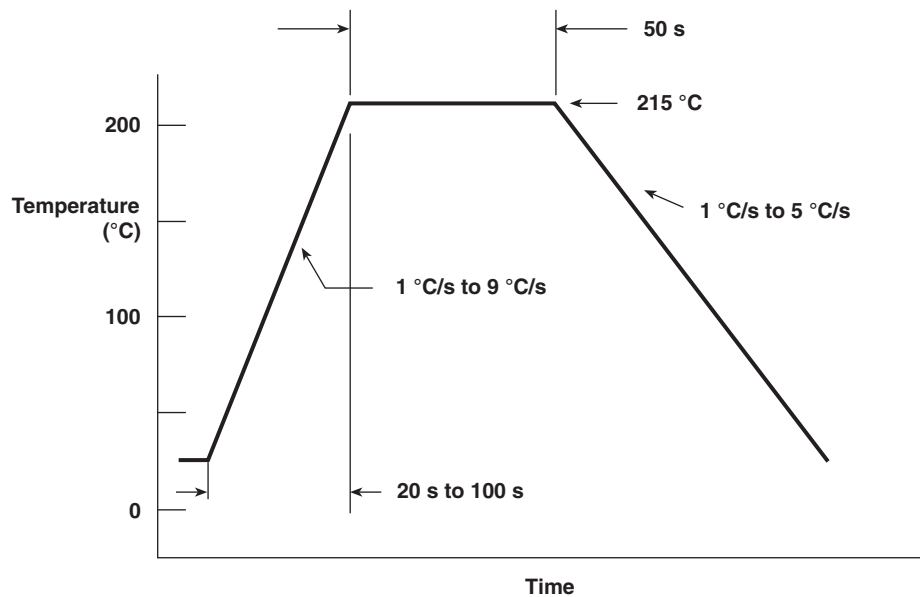| DESCRIPTION	LIMITS/CONDITIONS	TEST PROCEDURES
Thermal Cycle	- 55 °C, + 85 °C, 5 cycles	MIL-STD-202, Method 107, Condition A
Gross Leak test	All units 100 % leak tested	MIL-STD-202, Method 112, Condition D
Fine Leak	Mass spectrometer leak rate less than 2 x 10^{-8} Atm. cc/s of helium	MIL-STD-202, Method, Condition C
Moisture Resistance	95 % RH, + 25° to + 65 °C, 10 cycles	MIL-STD-202, Method 106
Shock	1000 g, 0.35 ms	MIL-STD-202, Method 213, Condition I
Vibration	10 Hz to 55 Hz, 0.06" D.A., 55 - 2000 Hz, 20 g	MIL-STD-202, Method 204, Condition D
Solderability	Minimum 95 % coverage	MIL-STD-202, Method 208
Resistance to Solvents	Isopropyl alcohol, terpene and monethanolamine solutions	MIL-STD-202, Method 215

TEST CIRCUITS

TTL

HCMOS

Soldering Profiles

RECOMMENDED PROFILES FOR SOLDER REFLOW

Infrared Reflow
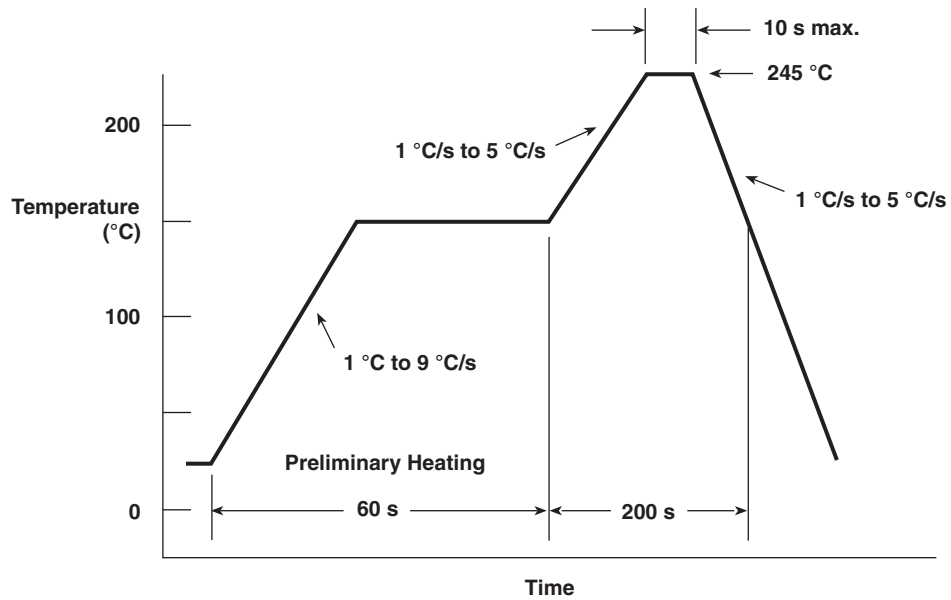
Vapor Phase Reflow

CROSS REFERENCE - CRYSTALS AND OSCILLATORS

VISHAY P/N	ABRACON	AVX KYOCERA	CTS	ECS	ECLIPTEK	EPSON	FOX	M-TRON	PLETRONICS	RALTRON	RXD	SARONIX	VALPEY
XT49S	ABL	–	ATS	–	EC2	–	HC49S	ATS-49	LP49	AS	MP35	49S	VM6S
XTUM1	ABU	–	–	–	ECUM	–	UM1	UM-1	UM1	–	–	UM1	UM1
XT46C	ECCM5	KSX-36	–	ECX-64	–	FA368	FM	PP	SM12H	–	–	NKS6	–
XT49M	ABLS	–	ATS-SM	–	EC2SM	–	HC49SD	ATSM-49	SM42	AS-SMD	MP35L	49SMLB	VM6SSM-2
XT36C	ABM5	–	–	–		–	–	PX	–	H180A	–	–	–
XO-52B	ACH	KHO-HC1CS	MXO45HS	ECS-2100	EC1100HS	–	–	MH13FAD	SQ2200	CO12100	HHSC2 or HTHSC2	NCH 039/069/089 C	VF70
XO-52BE	ACHA	KHO-HC1CSE	MXO45HST	ECS-2200	EC100HSTS	SG531 [1]	H5C-2 or F3020	MH13EAD	SQ3300	CO19100	NNSCR2 or HRC2	NTH 039/069/089 C	VF70T
XO-523B	–	–	–	–	EC1300HS	–	–	–	SQ2200V	–	–	–	–
XO-523BE	–	–	–	–	EC1300HSTS	–	–	–	SQ3300V	–	–	–	–
XO-53B	–	KXO-01-1	MXO45	ECS 100A	–	–	F1100E	MTO13FAD	–	CO1100	T2	NCT 040/050/070 C	VF150
XO-53BE	–	–	MXO45T	–	–	SG51 [1]	F100HT	MTO13EAD	–	–	–	NTT 040/050/070 C	VF150T
XO-54B	ACO	KXO-HC 1CS	–	ECS 400A	EC1100	–	F5C	MHO+13FAD	P1100-HC	CO6100	HSC2 or THSC2	NCH 030/060/080 C	VF140
XO-54BE	ACOA	KHO-HC 1CSE	–	ECS 1000E	EC1100TS	–	F5C-2 or F3000	MHO+13EAD	P1100-3SV	CO15100	HSCR2 or RC2	NTH 030/060/080 C	VF140T
XO-543B	–	–	–	–	EC1300	–			P1100-HCV	–	–	–	–
XO-543BE	–	–	–	–	EC1300TS	–			P1100-3SV	–	–	–	–
XOSM-57BE	ASLA	K50-HC 1 CSE	CB3-2C	ECS-3951C	EC2500TS	–	F3345 or F3355	M113TAN	SM7700H	CO4910	–	S1700C or 1750C	VF1 / VF5
XOSM-573BE	ASVA	K50-3C1E	CB3LV-2C	ECS-3953C	EC2600TS	–	F4100	M213TAN	–	CO4310	–	S1703C	VF3
XOSM-572	–	K53-2C	CB2V5	ECS-5725	EC2700TS	–	F4400	M2250	–	–	–	S1614	–
XOSM-571	–	K53-1C	CB1V8	ECS-5718	EC2900TS	–	F4500	M2180	–	CO418	–	S1612	–
XOSM-533	ASFLP	FXO-61F2	636L	ECS-3963	EC3600TS	–	F530L	M2034	–	COM23	–	S1633	G3
XOSM-532	ASFL2	–	636N	ECS-3525	EC3700TS	–	F540L	–	–	–	–	S1634	–
XOSM-531	ASFL3	–	636M	ECS-3518	EC3900TS	–	F510L	–	–	–	–	–	–

Notes
- The above cross reference is the suggested substitute for key competitors part numbers. Vishay does not accept any responsibility for any errors that result from this cross reference. Please contact factory for other crosses.
- [1] The Vishay product is pin compatible in a metal can. The SG-51 and SG531 are in a molded package.

Notes

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